INTELLISPEC™ Software Guide for Administrators

SOFTWARE VERSION: 6.0

MANUAL PART NUMBER: 82118 REV. 01

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Chapter 1 Pressco Introduction

Welcome!

Congratulations on your purchase of an Intellispec system! The Intellispec is a high-speed machine vision system designed specifically for product and online process monitoring. It is a powerful tool that provides inspection much more reliably than the human eye or sampling methods. The latest PC technology, powerful inspection algorithms, online adjustment capability, and inspection data storage allow the Intellispec to automatically inspect parts with extreme accuracy on high-speed lines.

The Intellispec will help you provide the highest quality of products shipped to your customers.

About This Manual

IMPORTANT: Keep this manual for future reference

This book is considered an integral part of the system and should be kept handy for future reference as long as the system is being used in your plant.

The purpose of this manual is to describe all of the features in the software. It is intended for Administrators and trained users.

This manual:

- Is considered to be valid for Intellispec version 6.0.034. Contents of this manual are subject to change without notice.
- Is your responsibility to keep in good condition, in a dry place, and ready for consultation by the authorized users of the system.
- Contains the technology implemented at the time of selling and supplying the system and shall not be considered inadequate in case of technological enhancements in the machine or in the manual's illustrations.

Related books include:

- Intellispec Operator's Guide which has Operator-level user instructions, and is a good place to start if you are new to Intellispec
- Intellispec Hardware Guide (multiple options)
- Intellispec Hardware Module Addendums (if applicable)

The following types of alerts may appear in this guide:

DANGER! - Danger messages alert you to specific conditions that can cause serious or fatal personal injury. Danger messages give you important information which must be observed to prevent injury.

WARNING: - Warning messages indicate information which must be observed to prevent injury, data loss, or equipment damage.

CAUTION - Caution messages indicate important information which must be observed to prevent: loss of data, poor system performance, or equipment damage.

> *Note: Notes contain special information that warrants being set off from the body text as shown here.*
>
> *IMPORTANT - Indicates prerequisites or information that must be observed to complete or understand a concept or task.*
>
> *TIP: Provides helpful hints for completing a task.*

Safety Considerations

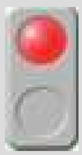
Observe the following safety warnings when operating the system or working near it:

> *WARNING - Potential for projectiles to strike persons and cause injury. Keep clear of reject devices.*
>
> *WARNING - Sensitive electronics and High Voltages may be exposed. Keep Processor Cabinet/ Electrical Control Box door closed.*

Chapter 2 Operating the Intellispec System

This section contains basic operating instructions.

Online - Offline



The stoplight is the online/offline indicator for each lane.

- Red = offline
- Green = online
- Amber = smart offline (processing parts in the queue when the system goes offline).

To switch from the online to offline mode, or vice versa, click the stoplight.

Lanes can be put online or offline independently. If multiple lanes are configured, then one lane can be offline while another is online.

> *Note: you may need user permissions to put the lane online or offline*

Part Changeover

When changing parts to inspect, you only need to change the part program (if you have a part program already set up for the newly inspected part type).

This will load the proper inspections, lighting, and guide rail settings, if applicable (as long as these were previously set).

> *Note: Some menu items are available to advanced users only*

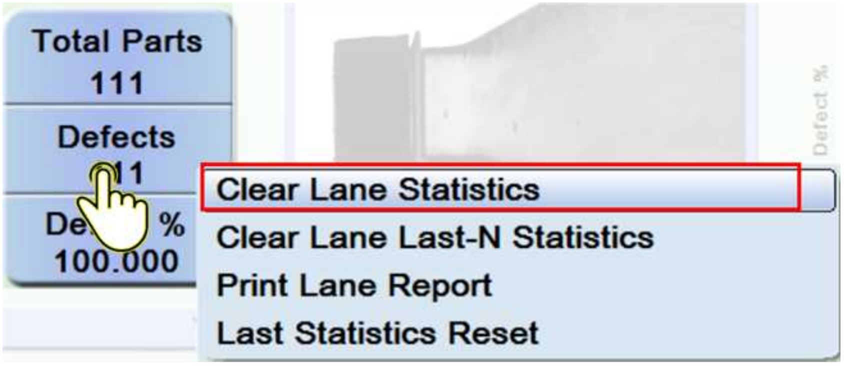
What you need:

User permission to Switch Part Program

To change parts:

1. Log in.
2. Click the part drop-down menu.

3. Click the name of the new part to inspect. The new part program is loaded on the Intellispec.
4. Click the statistics panel and select Clear Lane Statistics, to begin counting statistics for the new production run.



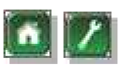
5. Put the lane online to begin inspecting new parts.

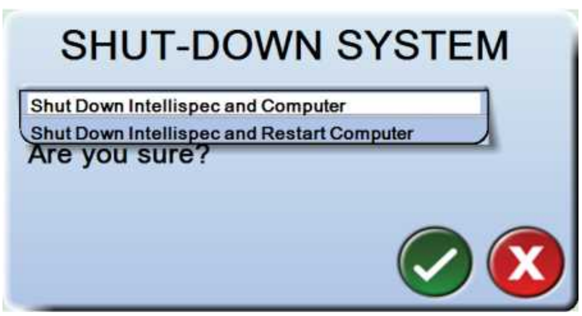
Lane-specific information is contained in each Part Program. Everything you set up have previously set up is stored: camera information, lighting information, calibration information, and inspections.

Exiting the Intellispec Software

You must have proper user permissions to exit the software. This prevents unauthorized system shutdowns. Contact your system administrator if you need user permissions.

To exit Intellispec software:

1. Log in.
2.  Select Home | Tools | Exit System.
3. Select an option.



4.  Select the OK button. The Intellispec software and/or computer shuts down (and restarts if applicable).

Chapter 3 Software Overview

This section describes the regions of the user interface and how to navigate through the software. It also describes how to select items and how to use the user interface buttons.

Log in and log out

To log in, use either method:

A. 

Select the Log In button. Select your user name, and enter your password.

B. With the optional biometric sensor: Press your finger to the sensor. The system logs you in. If the system fails to recognize your identity after three attempts, then log in through the log in dialog box.

To log out:

A. 

Select the button with your name, then select the Log Out button.

B. With the optional biometric sensor: Press your finger to the sensor. The system logs you out.

> *Note: When another user logs in, the system automatically logs you out.*

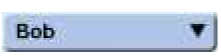
Log In menu

To ensure that only authorized users perform certain changes to the system, users are required to log in.* Some of these menu items are available to advanced users only.

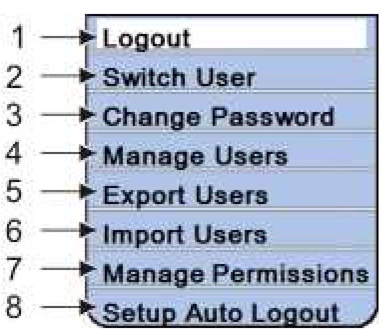
*Some tasks can be configured so that users do not need to log in. This is done through the "Manage Permissions" on page 462 menu.

To view the Log In menu:

Select the Log In button and enter your password. The text on the button changes to indicate who is logged in.



Select the Log In button again. The popup menu appears.



1 - Logout

2 - Switch user

3 - **Change Password** - change only your password

4 - **Manage Users** – add, remove, or edit users

5 - **Export Users** - export user profiles from one Intellispec to another

6 - **Import Users** - import user profiles from one Intellispec to another

7 - **Manage Permissions** – assign specific areas of the system that a user can access

8 - **Set Up Auto Logout** – the system logs you out if there is no activity for the specified time

> *Note: There is a Pressco Technician account for use only by Pressco Service Engineers. This gives access to unsupported features (menu items are a different color). If you log into this account and use those features, do so at your own risk.*

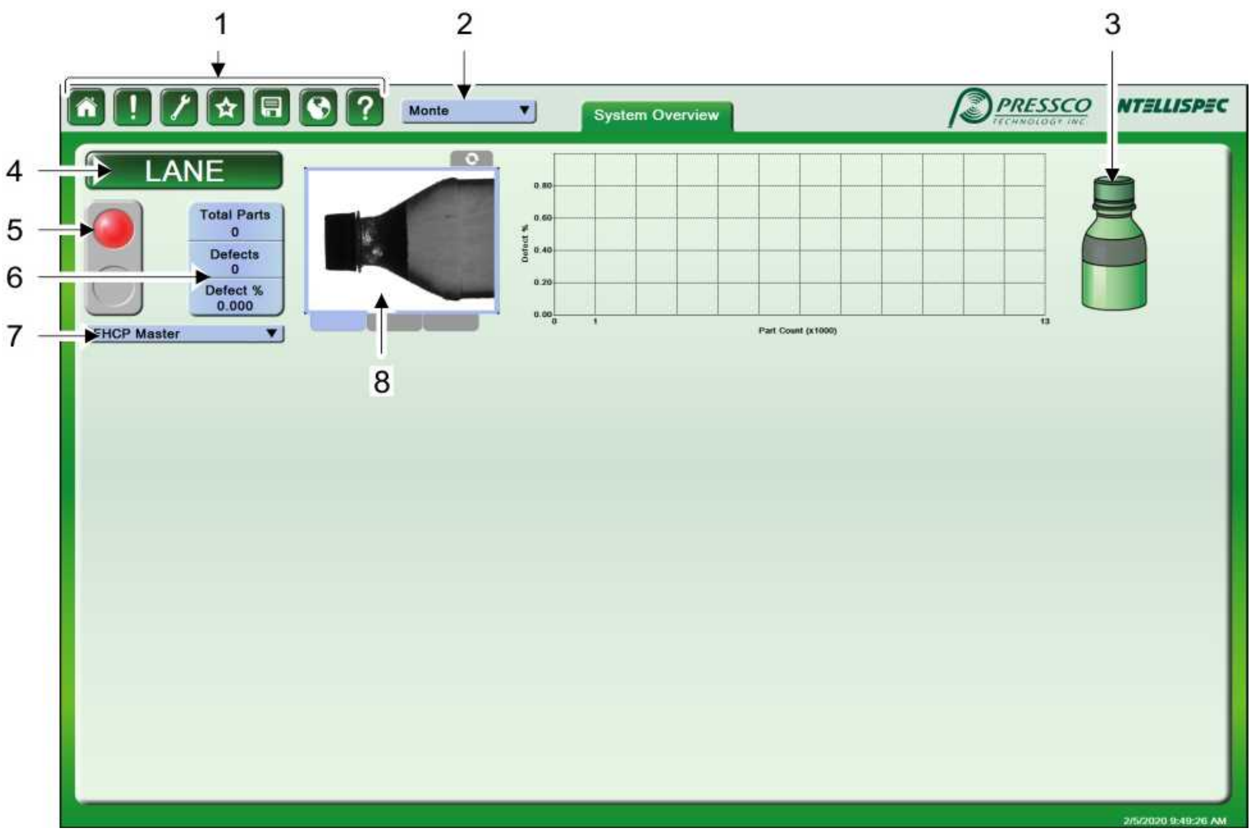
4 Software Screens

This section describes the four main types of screens in the Intellispec software.

System Overview screen


Access the System Overview screen by selecting the Home icon.

> *Note: your system may have multiple lanes. This example shows one lane.*



1 - "Menu Toolbar" on page 12

2 - Log in/ Log out.

3 - Walk-by graphic

4 - Go to Lane Overview

5 - Online/ Offline

6 - Lane Statistics

7 - Part Program

8 - Heartbeat Image

Lane Overview Screen

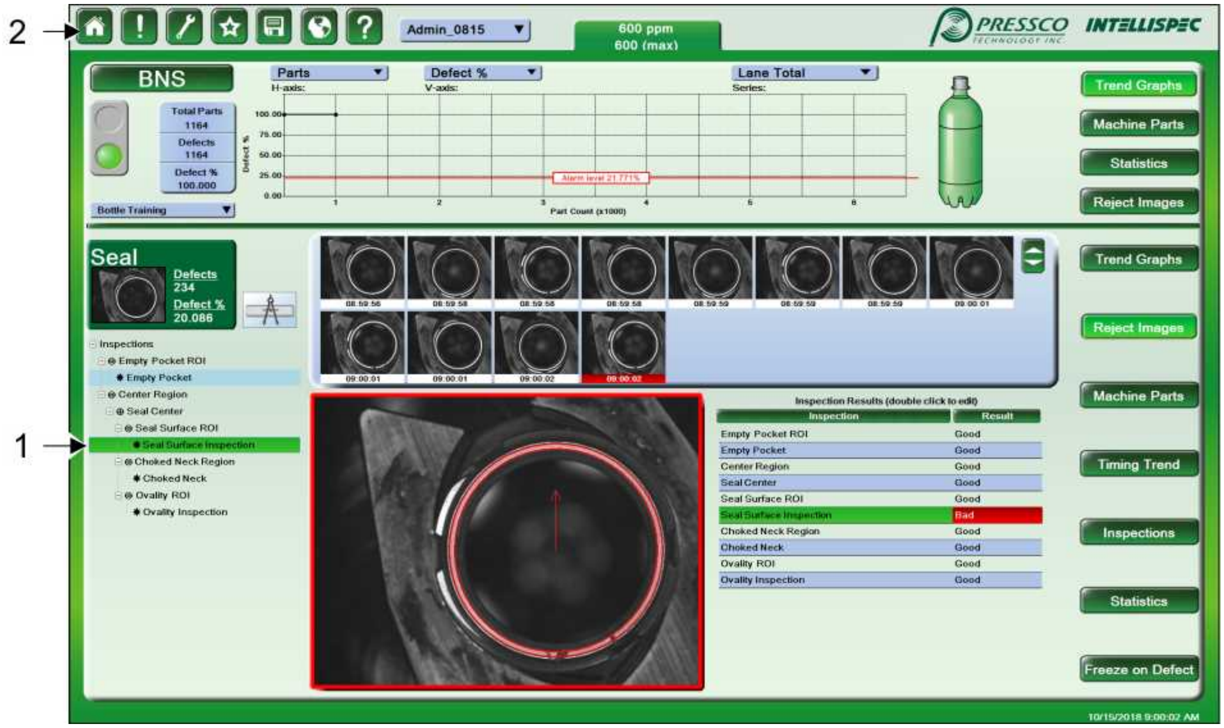
Select a "Lane" button to access the Lane Overview screen.

1 - Select the sensor button to toggle to detailed Sensor View and back

2 - Switch to System Overview

Sensor Overview Screen

Select a sensor or camera button to access the Sensor Overview screen.



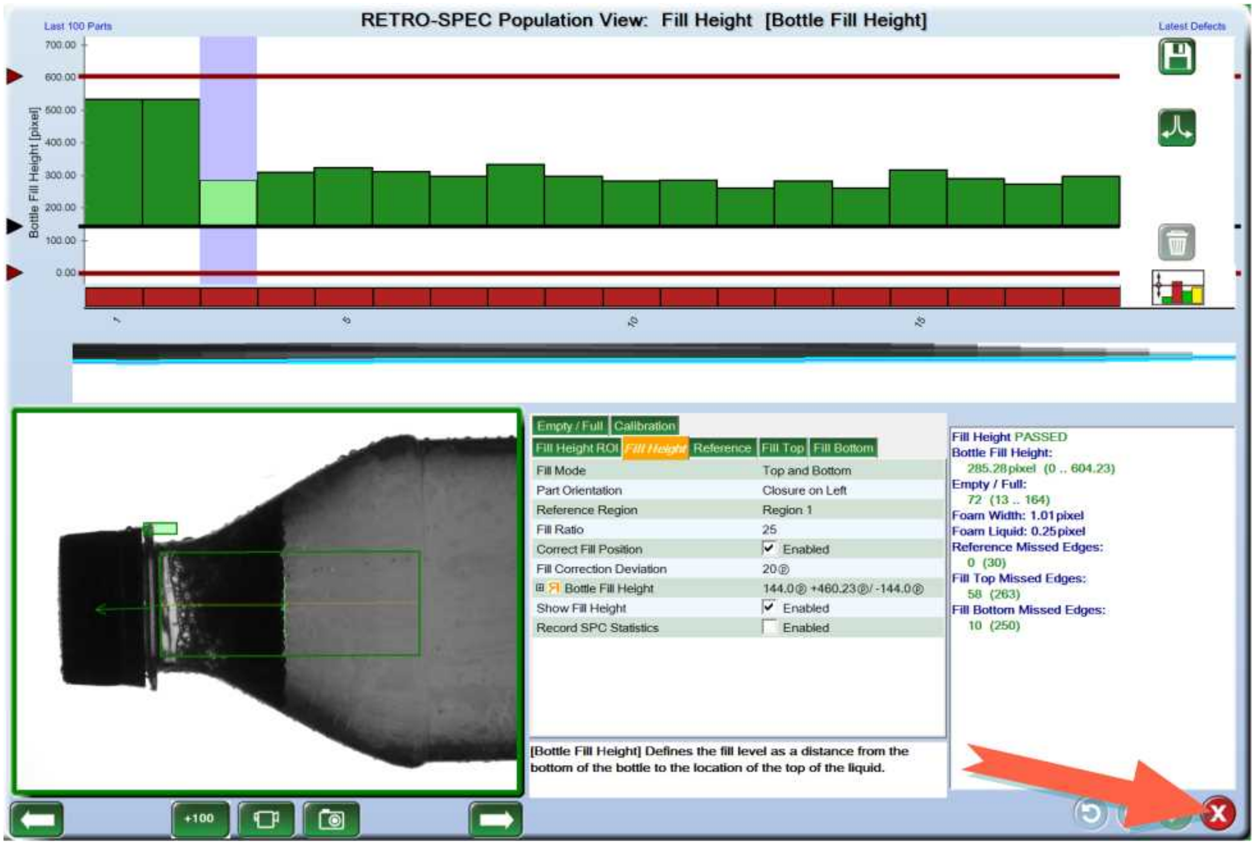
1 - Double-click to open Inspection View

2 - Switch to System Overview

Inspection Overview Screen

Double-click an inspection name in the inspection tree to access the Inspection Overview screen. This is the screen where you may adjust inspection parameters (if you have user permission).

Two different views are available in this screen: ""Retro-Spec Population View Graph" on page 198" and ""Retro-Spec Part View Graph" on page 202."



Close the Inspection View to switch to System Overview or Sensor Overview

Statistics Menu

Use the Statistics menu in the Lane Overview screen to view, reset, or print statistics.

> *Note: Some menu items are available to advanced users only*

To view the Statistics menu: Select a Lane button | Click over a statistics box.

1 - **Clear Lane Statistics** Clear the statistics for the lane only.

2 - **Clear Lane Statistics and Clear Images** Clear the statistics for the lane and empty the defective image buffer.

3 - **Clear Last-N Statistics Only** Clear the statistics for the Last N and Last N% parts in the corresponding graphs. It also clears the counts for population-based alarms, and clears such alarms that are currently triggered. (includes: Percent Defects, Good Parts, Percent Rejects, Excessive Rejects, Excessive Warnings, and Consecutive Defects)

4 - **Clear SPC Statistics Only** (Only available if you have Retro-Spec inspections enabled to keep SPC data) Clear the statistics from statistical process control.

5 - **Clear Machine Part Statistics Only** (Only available if machine part correlation is enabled on your system) Clear the statistics for the machine parts.

6 - **Print Lane Report** Send the lane statistics report to the default configured printer.

7 - **Statistics Last Reset** Display the date and time when the lane statistics were last reset.

See also:

"Machine Part Correlation" on page 471

"Schedule Reports" on page 37

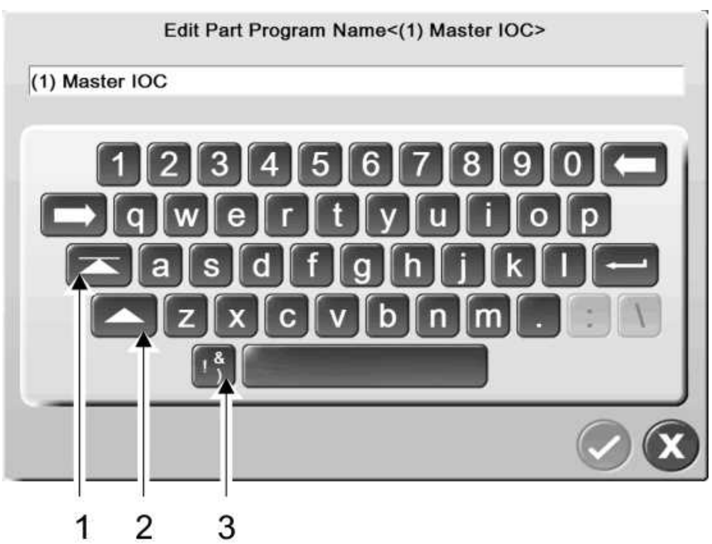
"Statistics Grid Options" on page 33

"SPC Graphs" on page 45

On Screen Keyboard (OSK)

Keyboards will be displayed depending on what kind of input is needed. Other keys are available, depending on your language. Keys may be grayed out if not applicable to the current operation.

Alphanumeric keyboard



1 - Shift lock button - capitalizes all letters until you press this button again.

2 - Shift button - capitalizes one letter, then returns to uncapitalized letters automatically.

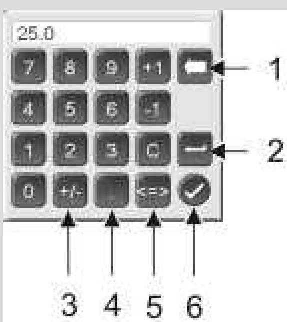
3 - Symbols button - provides additional keys:

	Latin key: This key, available in some languages, allows you to enter Latin characters. This is required for entering some system-level items, including file extensions.

Numeric keyboard

The numeric keyboard is displayed when the input field requires a numeric entry. Most of the buttons are self-explanatory. Additional buttons are described below.

> *Note: some buttons are not displayed if they are not appropriate for that field.*



1 - Backspace - removes a digit

2 - Enter - populates the field in the Intellispec screen without closing the keyboard. This is useful if you want to test a value and see the results of the change immediately.

3 - [+/-] makes the number positive or negative

4 - [.] available only if a decimal number is valid in the input field

5 - [<=>] cycles to the next limit of the parameter. If the parameter has more than two limits, then asterisks will surround the selected value in the menu.

6 - the OK button accepts your changes and closes the numeric keypad

Menu Toolbar

> *Note: some menu items change, depending whether you are in System Overview mode or Lane/Sensor Overview mode*

1) **Home** Go to the System Overview Screen

2) **Alarms** Clear, view, and set alarms

3) **Tools menu** Configure system settings, reports, hardware, part tracking, rejectors, part setup, and more

4) **Star menu** Take screen shots and manage background tasks, and launch the OPC Client (if installed)

5) **Back Up and Restore Menu** Create a support package, restore the system from a support package, and launch Windows Explorer

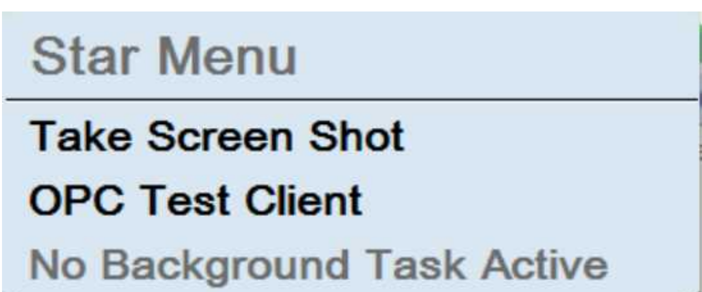
6) **Language** Select the language to display the Intellispec software, from the available options

7) **Help** Access the help documents, remote support, and determine software version

Star Menu

Select the Star button from the toolbar to see this menu.

> *Note: Some menu items are only available to advanced level users.*



This menu allows you to access the following utilities:

"Take Screen Shot" on the next page

"The Intellispec OPC Test Client" on page 576 - only with the optional OPC package installed. Use this menu to open the OPC client when the system is online.

Manage "Background Tasks" on the next page

Take Screen Shot

Capture an Intellispec screen image. This is different from saving individual part images through the Save Image function. A screen shot is useful to illustrate a problem to technical support, capture error messages, or to capture settings for future setup.

To capture the current full Intellispec screen:

1.  Select the Star button | Take Screen Shot. An onscreen keyboard is displayed with a default image name.
2. Re-name the screen shot if desired.
3. Select OK to save the image. The image is saved as a Portable Network Graphic (.png) file to C:\Pressco\DataExport\ScreenShots.

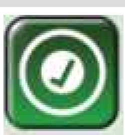
Background Tasks

Control the Intellispec system's background tasks. If you are saving or copying several images, especially to a USB device, this process is slow, so it is considered a background task. The system will continue to inspect and perform regular tasks in the foreground. You may stop or remove certain background tasks if desired.

Permissions needed:

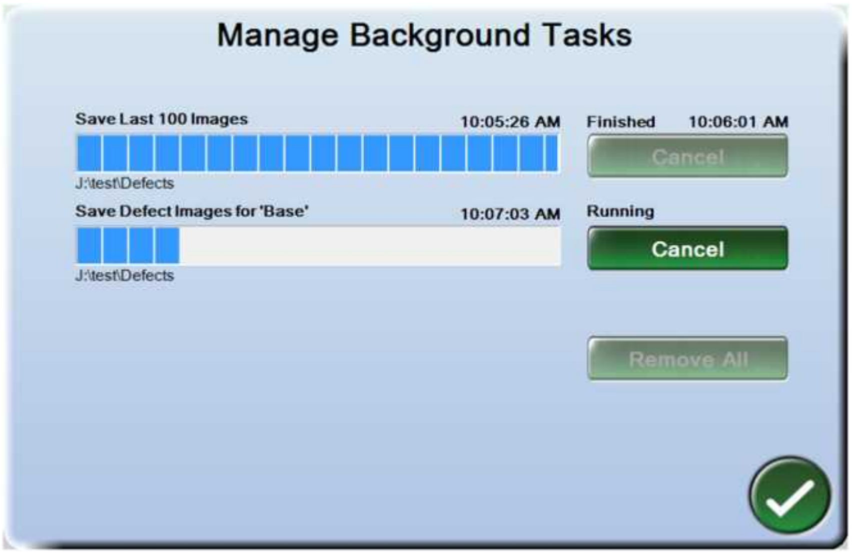
- You must have the "Cancel Background Task" permission to use these features.
- These icons are also used during Auto-Learn. Note that you need the permissions "Start Auto-Learn" and "Stop Auto-Learn" instead of "Cancel Background Task" to use these icons during Auto-Learn.
- See your Intellispec Administrator or see "Manage Permissions" on page 462 for more information.

 Background task management is found under the Star icon (except in System Overview mode). You may see different icons depending on whether the system is performing background tasks.

	1 - Normal. No background tasks in use.
	2 - One or more background task is running. None is complete.
	3 - One or more background task is running. At least one is complete.
	4 - All background tasks are complete. This icon will appear on screen until you "Remove All" tasks from the system using the Manage Background Tasks menu.

When at least one background task is active, the Manage Background Tasks menu item becomes active in the Star menu. Select either icon [item 2 or 3 above] to access the menu.

Select the Manage Background Tasks option from the Star menu to cancel or remove one or more tasks. Removing a task gets rid of all information about the task.

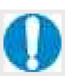


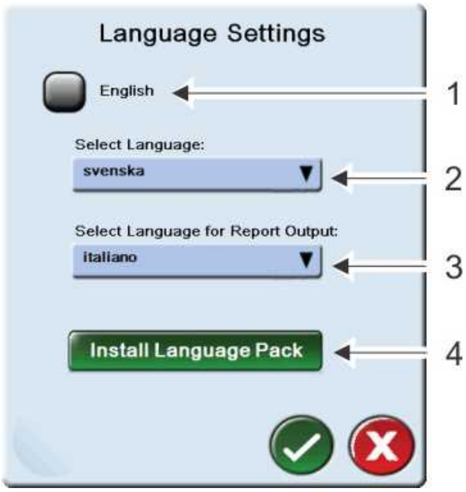
Notes:

- Each lane maintains its own list of background tasks. If you start a task on Lane 1, you must manage the task from Lane 1.
- You will not be able to close the dialog box until the task is complete or canceled. This prevents errors from occurring in the system.

Language

 Select a language.

 *Caution: The Language settings dialog (shown below) is the only place to change language, including number and date/time formatting. These settings must NOT be made in the Windows configuration, where the computer's locale must remain at US English. Otherwise, you may encounter errors and lose critical information.*



1 - **English** If this box is checked, the names of the available languages are displayed in US English (example: Swedish instead of svenska).

2 - **Select Language** Select the language to display on the user interface.

3 - **Select Language for Report Output** Select the language for the reports, such as the Lane Report from the Statistics menu.

4 - **Install Language Pack** When a new language is available, use this option to install the proper files. You will receive instructions from Pressco to install the language pack.

Part Rate

The part rate is displayed in Lane Overview and Sensor Overview modes. You can reset the part rate by right-clicking over the part rate tab and selecting Reset Part Rate.

The part rate displays:

- ppm (parts per minute) - The average rate over the last five seconds. It is updated once per second.
- max - The maximum rate found for all individual parts in the last five seconds determined in (parts per minute). The displayed value is the largest value found in the last five seconds.

Chapter 4 Graphs

Several graphs are available on the user interface to help you view inspection trends. This section discusses the buttons on the right side of the screen in the Lane Overview and Sensor Overview modes.

Walk-by Graphic Overview

The Walk-by Graphic is a graphic representation of a part so that you can quickly identify which area of the part is failing. It is called Walk By because you can quickly walk by the Intellispec and look at the graphic to determine the status of inspection:

- Green = passing parts
- Yellow = warning. The spoilage rate is approaching, but has not yet reached a critical level. You can make changes to the manufacturing process before the failure rate gets too high.
- Red = failing parts

Set up warning or failure limits in "Walk-by Graphic Setup" on the next page.

There are two Walk By Graphics:

- A small Walk By Graphic is displayed in System Overview, Lane Overview, and Sensor Overview modes
- A large Walk By Graphic can be displayed in Lane Overview mode

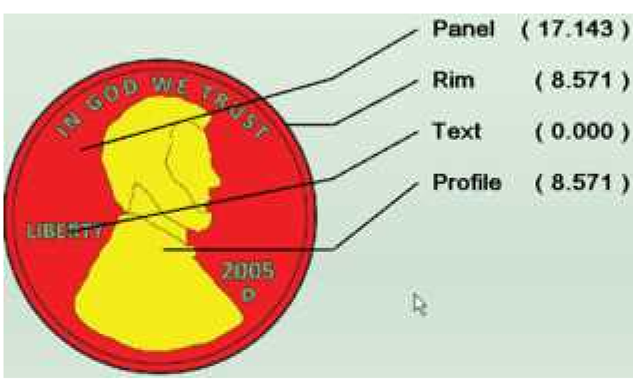
To see the large Walk By Graphic:

1. 

Select a Lane button.
2. 

Select the Walk By button on the right side of the screen.

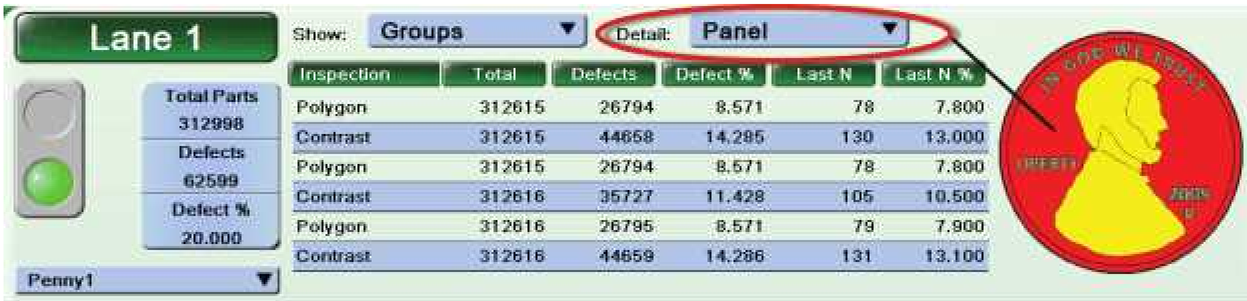
The large Walk By Graphic displays the group names, pointing to the appropriate areas on the part. It also displays the defect percentage for each of those groups, from inspection results.



Using the Walk-by Graphic

View inspection information by selecting on the areas of the graphic. The example below shows:

- The Panel group was selected - all the inspections for Panel are displayed in the table
- The Panel area in the Walk By Graphic is red - The average defect % for the group of inspections exceeds the failure limit from the Walk By setup



Double-click an inspection from the table to open and edit that inspection. Note: Some menu items are only available to advanced level users.

Walk-by Graphic Setup

Set up the Walk By Image. Each Lane can be set up differently if needed.

In this example, a group (the text) is a non-contiguous area displayed in red.

Each area of the part graphic display is:

- Assigned a group name.
- Assigned the correct inspections for that group.
- Configured to turn the area yellow or red when defined defect statistics are achieved.

> *Note: you must have correct user permissions to set up the Walk By Graphic. You must also have a part program loaded.*

 To change the graphic on screen to match your part, from Lane Overview mode, select Tools | Part Setup | Change Part Type. Select the desired part type.

 To get to the Walk By Setup screen: From the Lane or Sensor Overview screen, select Tools | Lane setup | Walk By Setup.

To set up the Walk By graphic:

1. Follow the instructions on screen, and navigate using the buttons at the bottom of the screen. Some parameters are explained below.

2. After the last screen, the system takes you back to the first screen so that you can set up another group. If you are finished, select the OK button at the bottom of the screen to accept your changes and exit the screen.

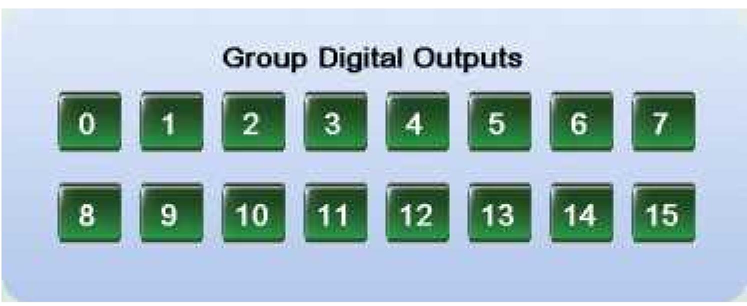
Group Each area on the part is already assigned to a group (built into the software). Assign as many inspections as you wish to a group. Inspections can be from any sensor within the same part program on the lane. A group can be a contiguous area, or a group of related areas on a part.

Warning Percent Set the value at which the group on the Walk By Graphic turns yellow. Yellow warning areas mean that the spoilage rate is approaching, but has not yet reached a critical level. You can make changes to the manufacturing process before the failure rate gets too high. Note: this warning percentage is not connected to inspection warning limits. Those limits are set separately. Additionally, this warning percentage does not affect the Excessive Warnings alarm.

Failure Percent Set the failure limit for the part graphic. The part graphic area turns Red when the spoilage rate has exceeded this number. Note: this failure percentage is not connected to inspection limits. Those limits are set separately. Additionally, this failure percentage does not affect the rejects alarms.

Group Digital Outputs (for Extended I/O option) Select the group number (Group 0 through 15) to trigger an output signal through the Extended I/O board.

Group Digital Outputs details



The outputs pulse when any inspection within the group fails. You can use these outputs to monitor the process within your plant and make adjustments as necessary.

The output does not stay on if the part graphic turns red. The output only pulses when an inspection fails and then it turns off. This allows you to use the output to count failures, such as through your plant's PLC.

You can assign multiple groups to one output. The groups can contain inspections from any sensor within their corresponding lane part program. Each lane may have its own Extended I/O board, so you cannot combine inspections from different lanes.

Group Priority Level

Assign a priority to each group within the Walk By graphic. You can designate which defects are more important and prioritize them.

With Group Priority Level, only one defect per part is counted for each of the groups. This differs from normal group reporting where there can be counts in multiple groups depending on which inspections fail. If no defects are found in the first priority level group, then the priority falls to the second priority group, and so forth for all groups configured. See example below.

Notes about Group Priority Level:

- You must have user permission to "Select Features"
- Group Priority Level must be enabled before use.
- You can assign only one priority level per group.
- You do not need to use every group in the Walk By graphic.

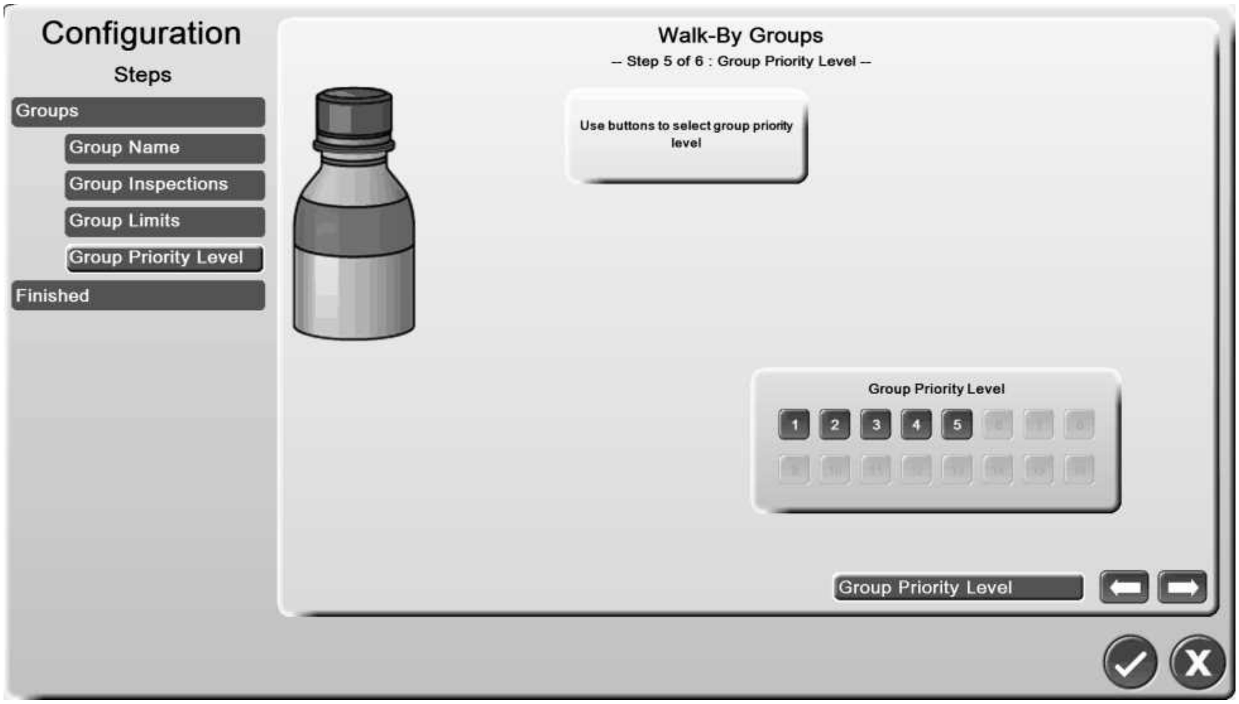
To enable Group Priority Level:

1.  From Lane or Sensor Overview mode, select Tools | Lane Setup |Select Features | and select Group Priority Level Reporting. = enabled.
2. When you enable the feature, a dialog prompts you to go to the Walk By Setup wizard to set up Group Priority Level. Select OK.

Next, set up Group Priority Level in the Walk By Setup. If you need information about setting up other areas of the Walk By Graphic, see "Walk-by Graphic Setup" on page 17.

To set up Group Priority Level:

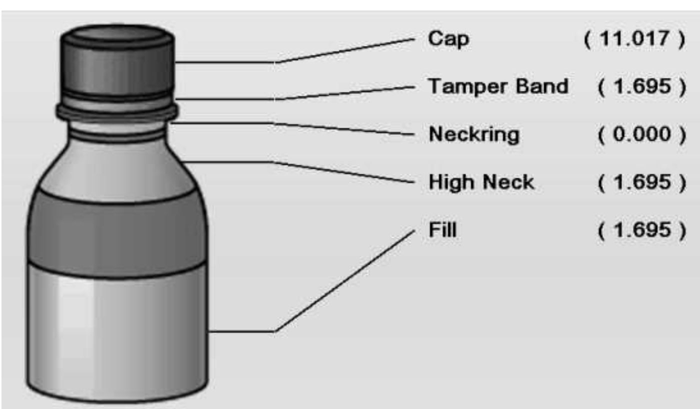
1.  From Lane or Sensor Overview mode, select Tools | Lane Setup |Walk By Setup. You will see an additional step (six instead of five) in the wizard.
2. Follow the instructions on screen for steps one through four. This is where you assign inspections to a group.
3. In step five, choose a priority for the group you have just set up. Level 1 is the highest priority. In this example, we have five group priority levels because that is the total number of groups available on this type of part. The priority number you assign is highlighted. If you try to use a priority level that has already been assigned, the system will prompt you to either delete the previously assigned group, or select another priority.



4. After Step 5, the wizard returns to Step 1 so that you can set up another group and assign a priority. Repeat Steps 1 through 5 of the wizard for each group you want to assign.
5. Select OK to finish and exit.

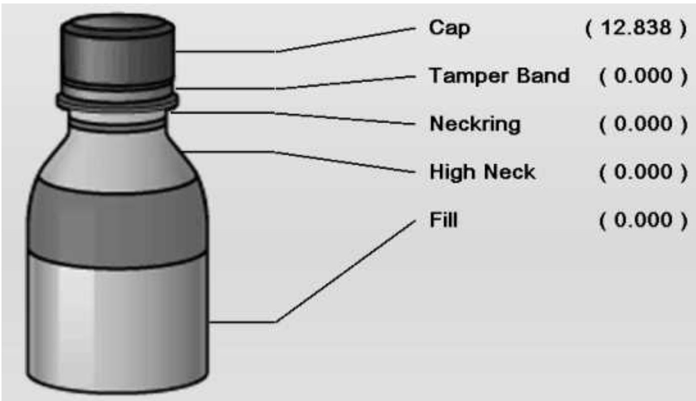
Example

Example 1 below = Group Priority Level disabled. Notice that almost all of the groups show a defect percentage.



Example 2 below = Group Priority enabled, and the inspections were run similar to the above example. Only one group shows a defect percentage. The "Cap" group has the highest priority. This means that only one defect per part was counted, and each failed inspection was part of the "Cap" group. Other defects for each part are recorded by the system, but not reported in the Walk By Graphic or output through the Group Digital Outputs.

If the "Fill" group was set at Priority 2, and a part had a defect for one of the inspections in the Fill group but NOT the Cap group, then you would see a defect percentage for that group.

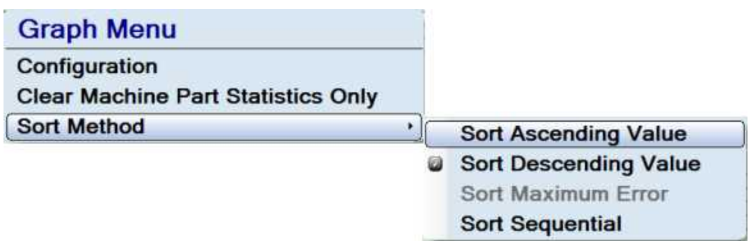


Sort Data in Graphs

Change the order of the displayed data in the Trend Graphs or Machine Part Graphs (if configured).

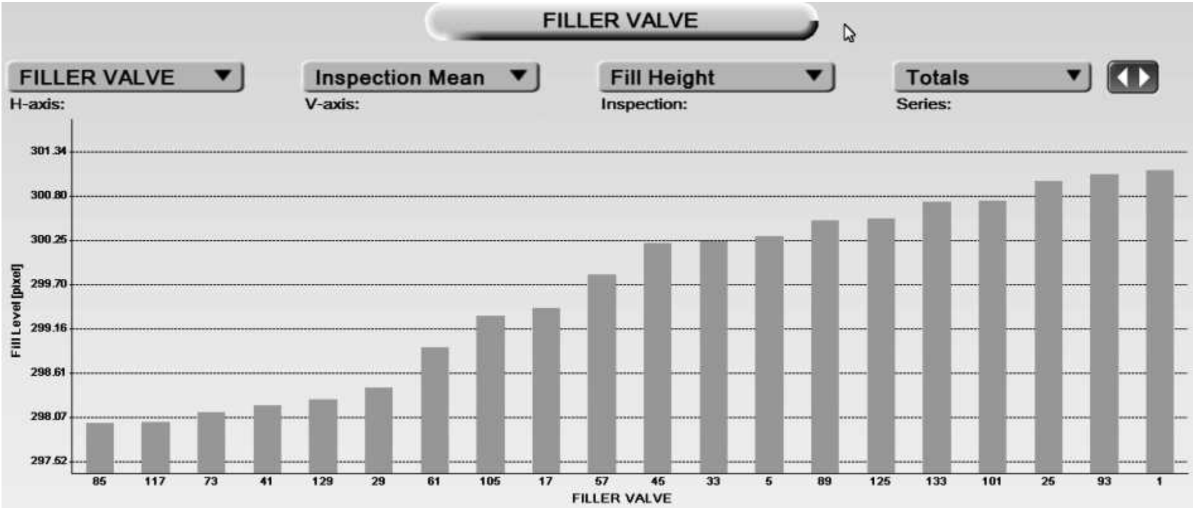
> *Note: when you change sorting order, it affects the Trend Graphs or Machine Part Graphs in the upper and lower screens. Other graphs are not affected.*

To sort the graph data: Right-click over a graph | select Sort Method | select an option.



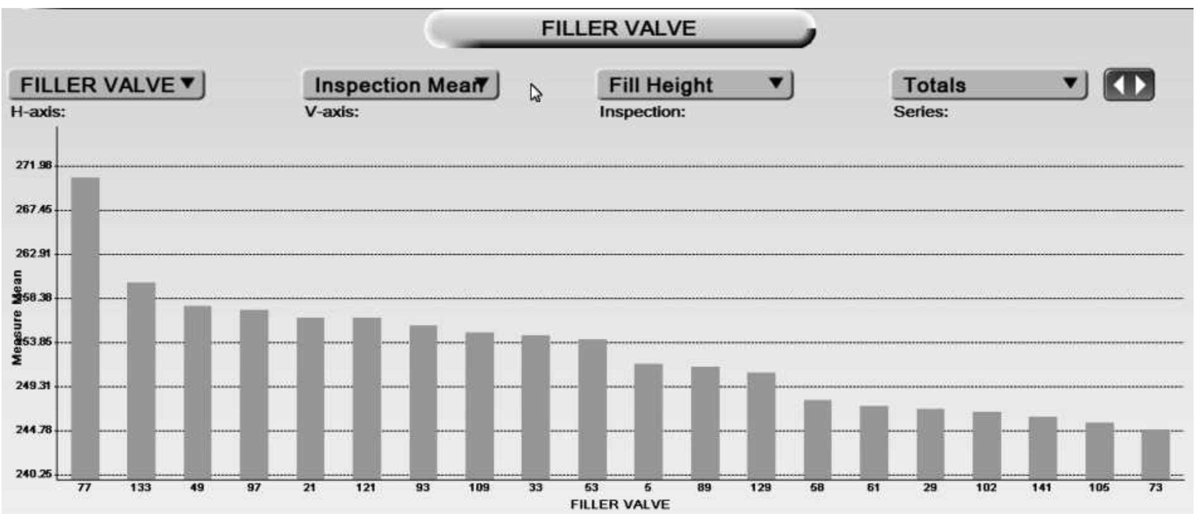
Sort Ascending Value

Sort from low to high result. In the example below, the machine part with the highest number of defects is shown on the right side of the graph.



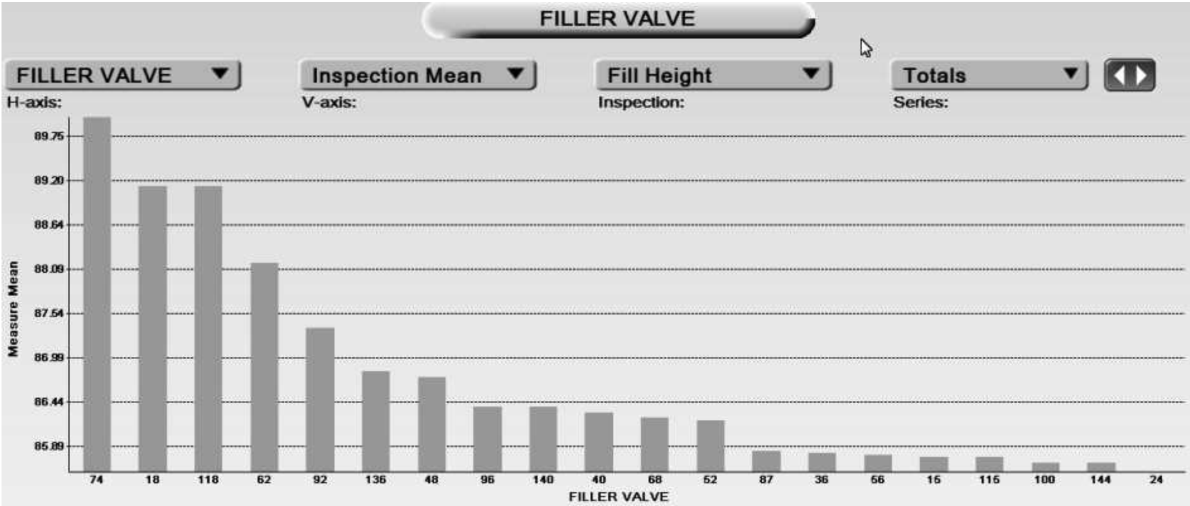
Sort Descending Value

Sort from high to low result. In the example below, the machine part with the highest number of defects is shown on the left side of the graph.



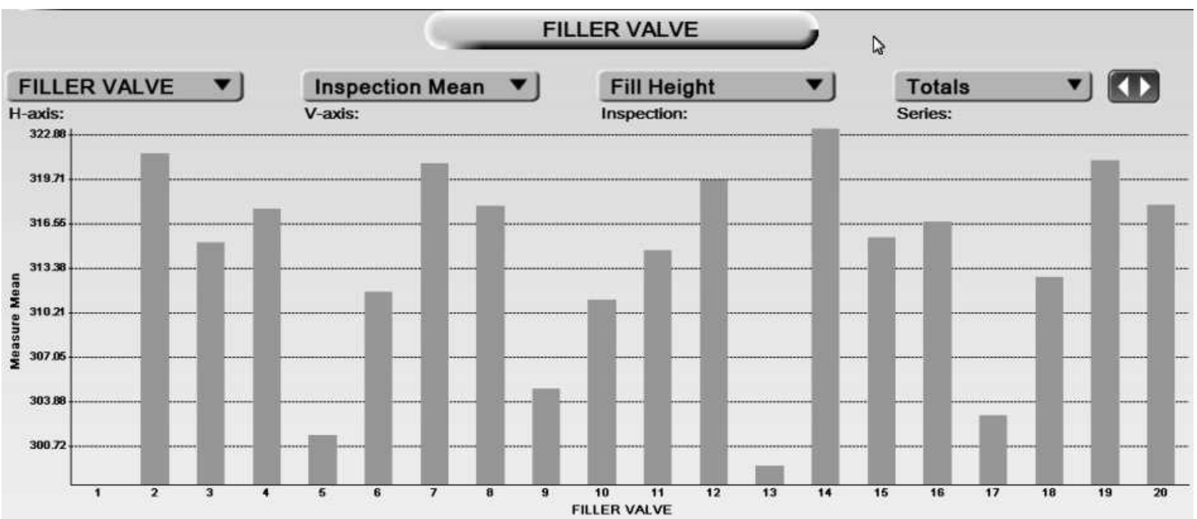
Sort Maximum Error

[Available when "Record SPC Statistics" is enabled for an inspection, Totals is selected for the graph Series, and Inspection Mean is selected for V-Axis] Sort the data by machine part where the highest peak shows the furthest value from nominal, as an absolute value.



Sort Sequential

Display an ordered list of machine parts.



Clear Machine Part Statistics

Clear the statistics for the machine parts only, if desired [only if correlation is enabled].

To clear Machine Part statistics:

1. Right-click over a trend graph or machine part graph.

2. Select Clear Machine Part Statistics Only.

Scroll in Graphs

 When the data falls outside of the current viewing range (example, time) a scroll button becomes available.

The data goes back to when the system was powered up, or 2880 data points, whichever is more recent. The trend data is reset when the system is restarted.

- In a time-based graph, if the graph time per update is set to one minute, then the data goes back 48 hours
- In a part-based graph, if parts per update is set at 1000 parts, then the data goes back 2,880,000 parts

Trend Graphs

To view the Lane trend graphs:

1. 

Select a lane.
2. 

Select a Trend Graphs button on the right side of the screen. The trend graph is displayed.

> *Note: There are two Trend Graphs buttons available. One is for the lane; the other is for the sensor. If you are viewing Lane Overview mode, then the trend graph in the upper screen is where you select the viewing options. The trend graphs in the lower screen follow the settings from the upper screen. In Sensor Overview mode, you can select viewing options separately within the upper and lower screens.*

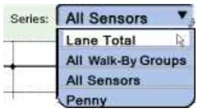
Trend graphs show statistics based on specified criteria. These graphs are available for each lane and each sensor within that lane.

If you have an inspection enabled that collects Retro-Spec Statistics, then an additional column of Inspection* data is available.

H-axis	V-axis	Inspection*	Series
Time	Defect % Defect Count Defect Cost Parts & Defect % Inspection Mean* Inspection STD* Inspection CPK*	Inspection name (the names of the inspections that have Retro-Spec statistics enabled)	Lane Total All Walk-By Groups All Sensors Individual Sensors (list)
Parts	Defect % Defect Count Defect Cost Inspection Mean* Inspection STD*	Inspection name (the names of the inspections that have Retro-Spec statistics enabled)	Lane Total All Walk-By Groups All Sensors Individual Sensors (list)

H-axis	V-axis	Inspection*	Series
	Inspection CPK*		

For Trend Graphs, you can select which data to display. Select from the Series drop-down menu.



Lane Total Statistics are averaged for all sensors within the lane.

All Walk-By Groups Statistics for inspection groups. These groups are defined in the Walk By Graphic setup, and pertain to a specific area of a part.

All Sensors Statistics for each sensor.

Individual Sensors [names vary] Statistics for only the selected sensor.

> *Note: A key (to explain color-coding and data point shape) is displayed to the right of the graph for All Walk-By Groups and All Sensors.*

To change the graph criteria:

1. Select any button (next to H-axis, V-axis, Inspection, or Series) to view the drop-down menu options.
2. Select the desired criteria. The graph is updated to display based on your chosen criteria.

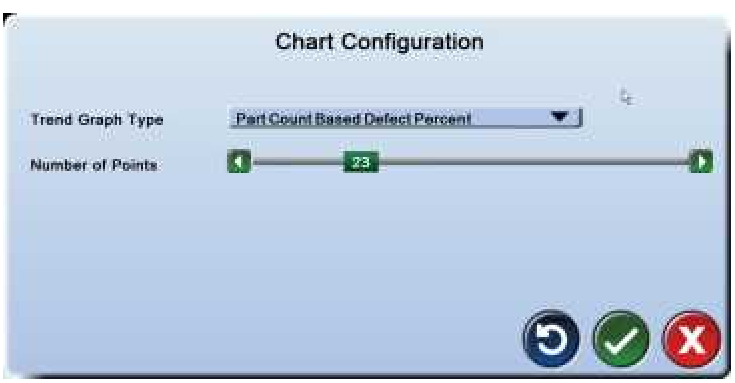
Trend Graph Configuration - System Overview

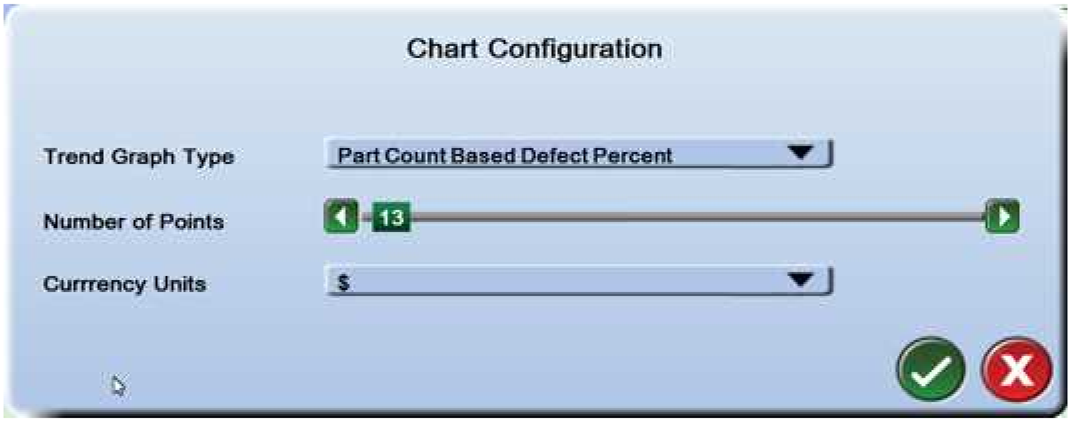
 This is the setting for the trend graph displayed on System Overview screen.

> *Note: the vertical axis is automatically scaled to best represent the data on the graph.*

To change the graph configuration:

1.  Select the Home button.
2. Right-click over the trend graph. The Chart Configuration menu is displayed.





3. Choose from the available trend graph types, and select the number of points to display on the graph.

   Also choose a currency unit to display, if desired.

4.  Select the OK button to save changes and exit.The selected graph is displayed in the System Overview screen.

> *Note: these changes affect all trend graphs in the System Overview screen*

Trend Graph Configuration - Lane Overview

These settings affect the display of all the trend graphs in the Lane Overview or Sensor Overview screens.

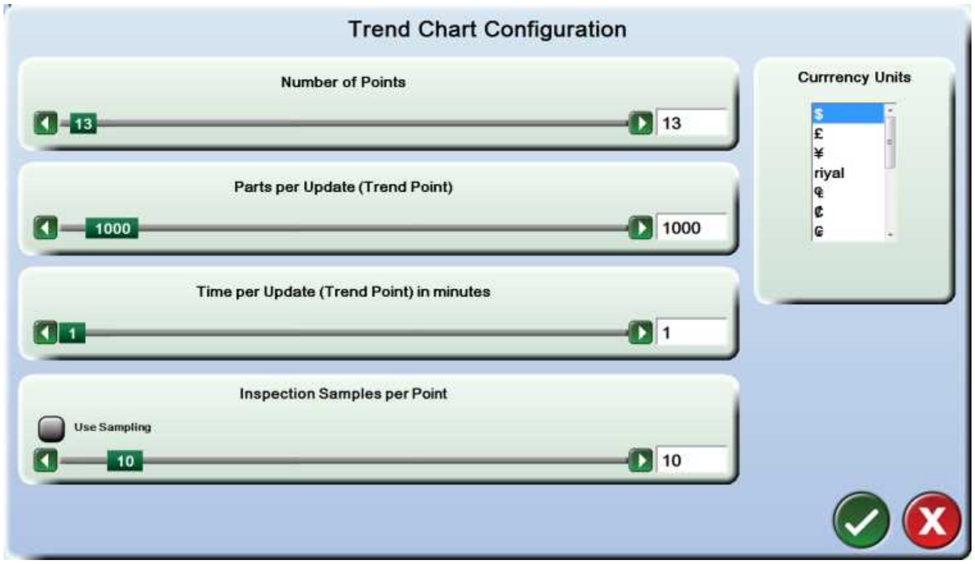
> *Note: the statistics for the lane are reset when you change a configuration setting.*

To change the trend graph display:

1. 

From Lane or Sensor Overview mode, select a Trend Graph button on the right side of the screen.
2. Right-click over one of the trend graphs.

3. Select Configuration from the Graph menu. The Trend Chart Configuration menu is displayed.

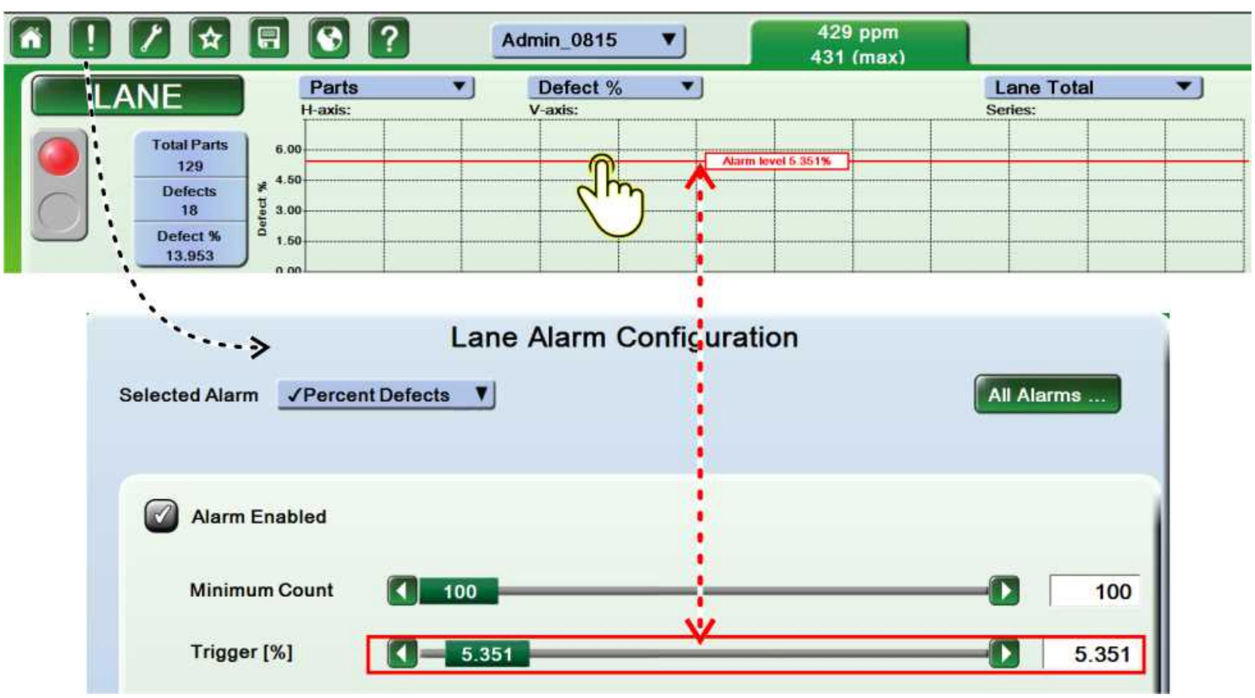


4. Select the desired settings from all the available parameters.
5. Select the OK button to save changes and exit. All the trend graphs for the selected lane are updated to reflect your changes.

Alarm Percentages in Trend Graphs

The alarm level can be adjusted in the graphs. Select and drag on the red Alarm Level line to adjust it. This also changes the alarm percentage in the Lane Alarm Configuration menu.

If you adjust the percentage in the Lane Alarm Configuration menu, you may need to go to System Overview, then back to Lane Overview mode to see the change on the graph.



> *Note: Changing this alarm percentage does not affect the alarm percentage level in the Walk By Graphic.*

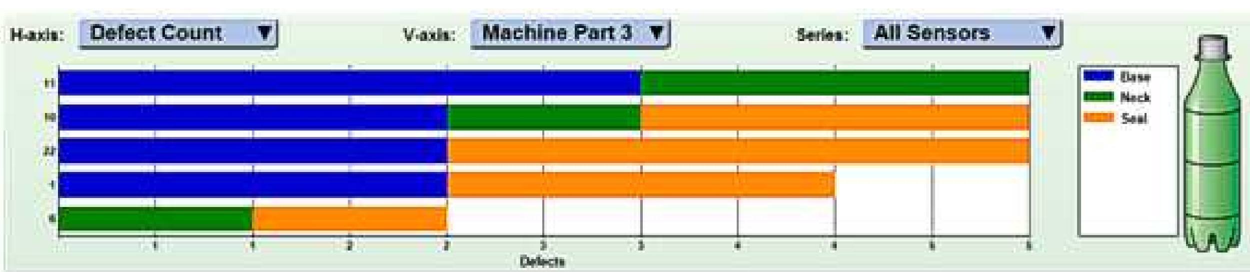
Machine Part Graphs

Machine Part Graphs are available when you have the Correlation option installed. They display defect information for each machine part. The name on the button(s) matches your system configuration.

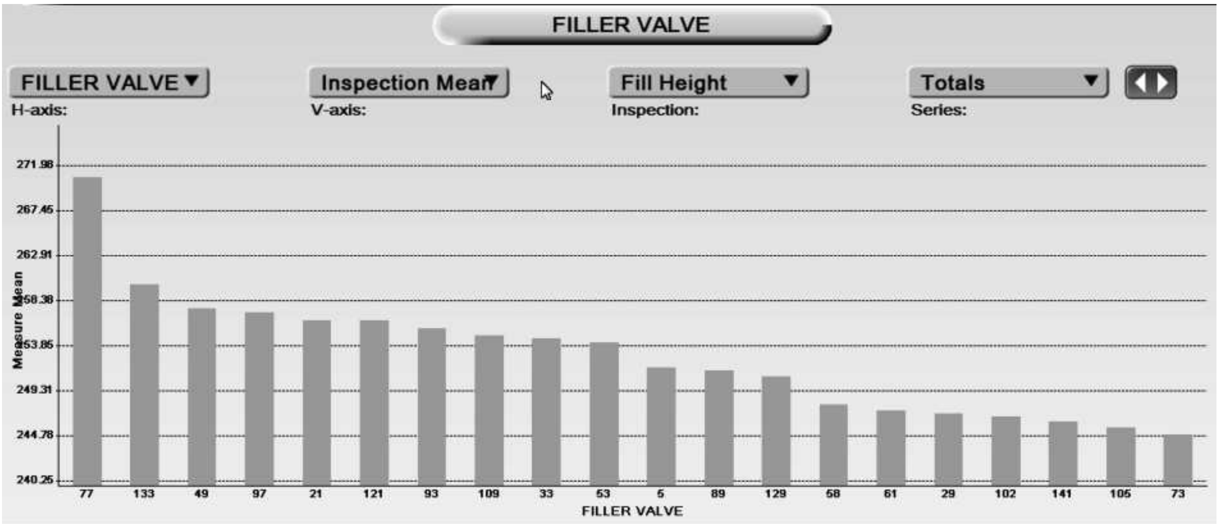
If you have an inspection enabled that collects Retro-Spec Statistics, then an additional column of Inspection data is available.

H-axis	V-axis	Inspection*	Series
Machine Part (depending on correlation configuration)	Defect % Defect Count Inspection Mean* Inspection STD* Inspection CPK*	Inspection name (the names of the inspections that have Retro-Spec statistics enabled)	In the upper screen: Lane Total All Sensors In the lower screen: Latest Defects Totals

An example graph is displayed below. It shows defects for a machine part type, and the number of defects correlated to each sensor.

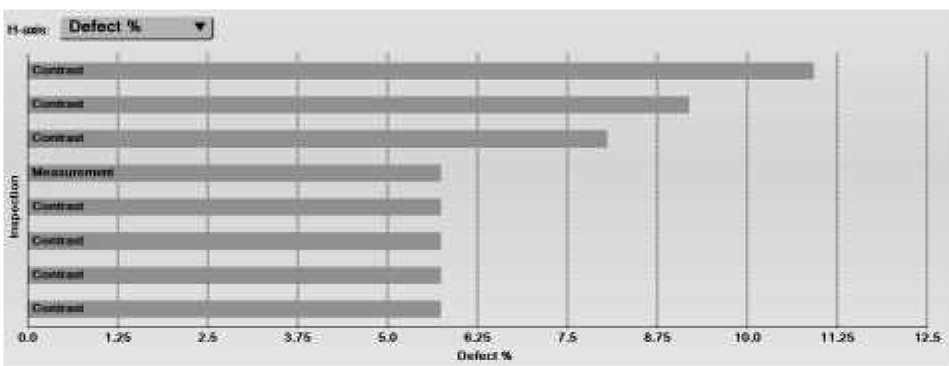


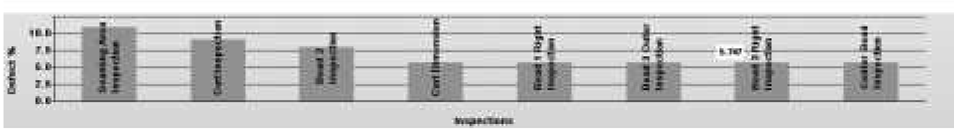
The example below shows machine part data for the fill height for each machine part, for one camera. To change the sorting order, right-click on the graph. For more information, see "Sort Data in Graphs" on page 21.



Inspections Graph

Select the Inspections button to display the Defect Count or Defect % for the selected sensor. It displays the failed inspections in descending order of failure. The example below shows the graphs in both Lane Overview and Sensor Overview modes.





When you right-click over the graph, you can choose to view or hide Empty Pocket or Statistics-Excluded inspections.

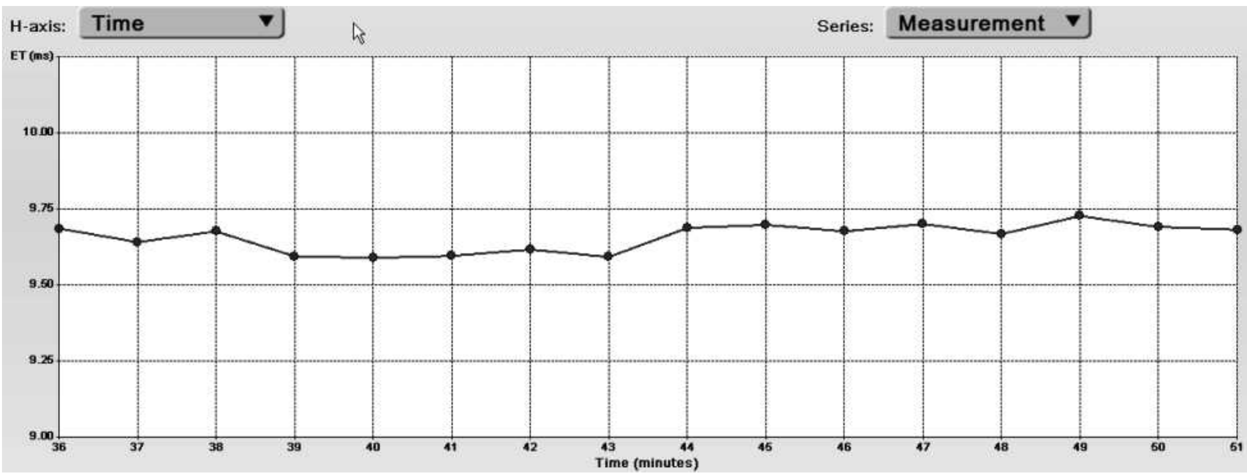
Timing Trend

Note: this graph is mostly used by Pressco service engineers during installation, or it can be used when additional inspections or hardware have been added to the system.

View the Timing Trend graph in the Sensor Overview screen.

This graph displays the time required to run inspections. It is important to view the inspection timing, especially if you have multiple sensors or multiple lanes, to make sure that the system is inspecting all parts before they reach the reject station.

The choices for the Series in the Timing Trend graph allow you to choose Sensor Total, which is all inspections for that sensor, or any individual inspection for that sensor.



Chapter 5 Statistics and Reports

See also: "Graphs" on page 16

Statistics Grid

The Statistics Grid displays information about each Sensor. There are two types of Statistics Grids: Lane and Sensor.

Lane Statistics Grid

The Lane Statistics Grid (in Lane Overview mode) displays general information about each Sensor. It shows the Total number of parts run, Sensor, Defects, Defect %, Last N, and Last N %.

Sensor	Total	Defects	Defect %	Last N	Last N %
Rivet	56748	56748	100.000	953	95.300
Panel	56748	56748	100.000	953	95.300

Sensor Statistics Grid

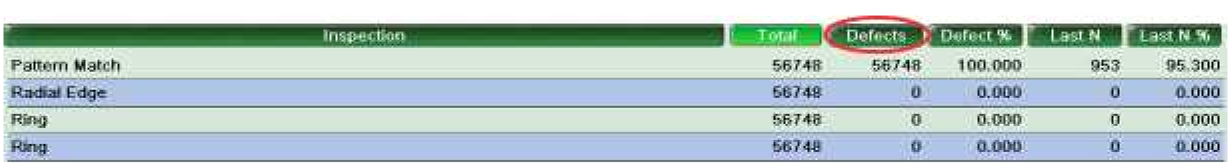
This grid is available when you display Sensor information. It shows specific information for each sensor, including Inspection, Total number of parts run, Defects, Defect %, Last N, and Last N %.

Inspection	Total	Defects	Defect %	Last N	Last N %
Pattern Match	56748	56748	100.000	953	95.300
Radial Edge	56748	0	0.000	0	0.000
Ring	56748	0	0.000	0	0.000
Ring	56748	0	0.000	0	0.000

> *Note: you can configure the statistics display. Your system may not display all of the above-mentioned items.*

Sorting order

To sort any column in ascending or descending order, select the button at the top of the column. Select it again to toggle to the opposite order. Right-click to clear sorting in the statistics grid.

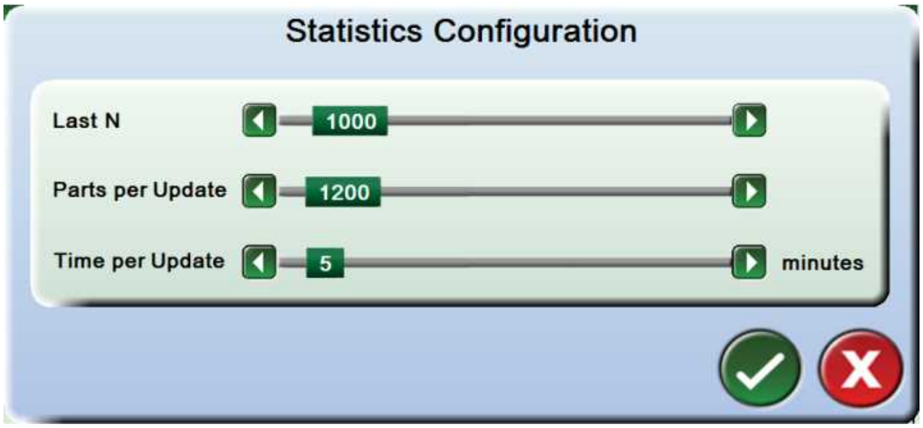


Inspection	Total	Defects	Defect %	Last N	Last N %
Pattern Match	56748	56748	100.000	953	95.300
Radial Edge	56748	0	0.000	0	0.000
Ring	56748	0	0.000	0	0.000
Ring	56748	0	0.000	0	0.000

Statistics Configuration - Lane

All the statistics grids in the current lane will use these settings.

 To get to this screen: From Lane or Sensor Overview mode, select Tools | Lane Setup | Statistics Configuration.



Last N Specify how many parts to include in recent statistics. This feature allows you to continue to collect inspection data (Total inspected, total defects, and defect %) without clearing the statistics to see how the most recent batch of parts has done.

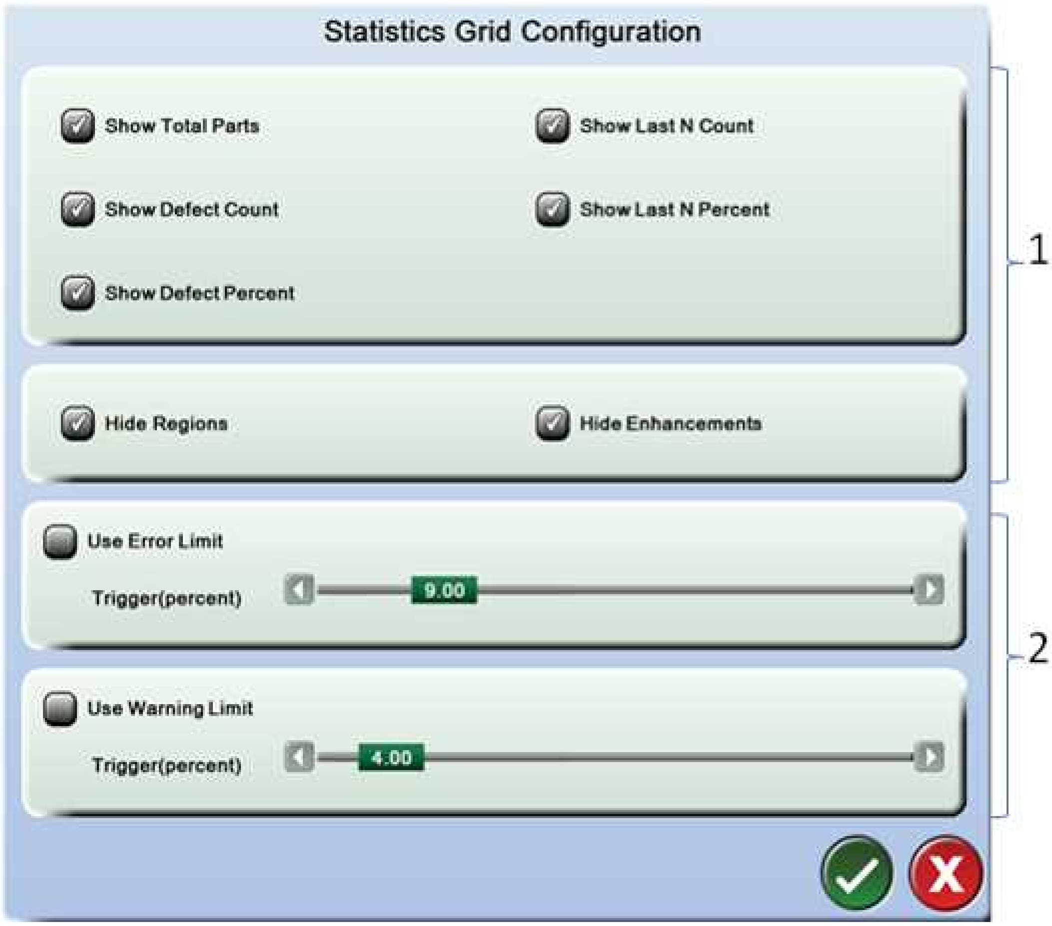
Parts per Update The points on the horizontal axis for the Trend Graph and Timing Trend if "Parts" is selected.

Time per Update The points on the horizontal axis on the Trend Graph and Timing Trend if "Time" is selected.

Statistics Grid Configuration - Lane

Choose how the statistics grids are displayed.

 To get to this screen: From Lane or Sensor Overview mode, select Tools | Lane Setup | Statistics Grid Configuration.

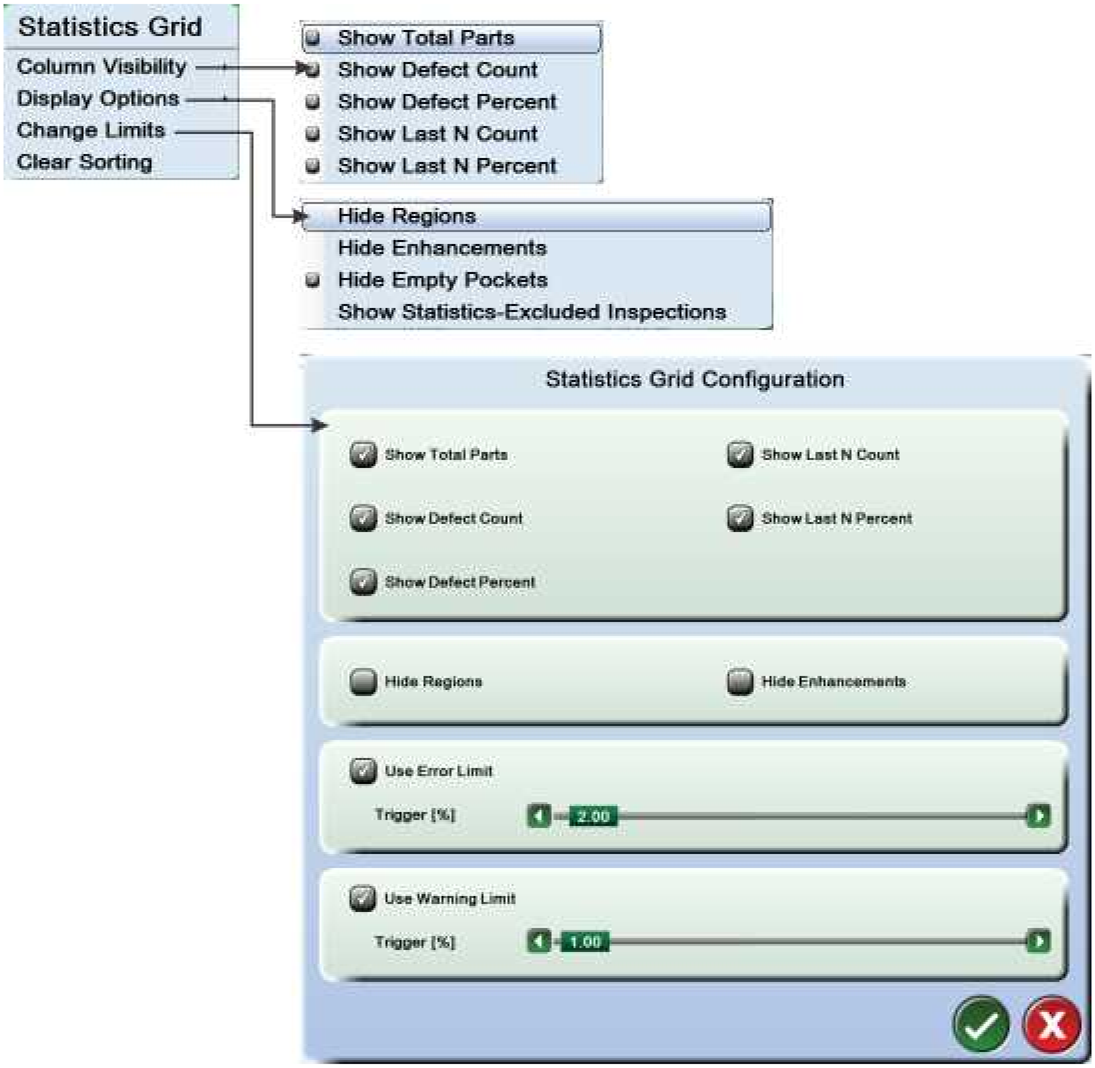


1 - Choose what is displayed on the Statistics Grid screen.

2 - Enable/ disable and determine the setting for warning and error limits in the Statistics Grid.

Statistics Grid Options

These settings are applied to all statistics grids, whether in the Lane Overview or Sensor Overview mode. Right-click over any statistics grid to see the options. These are explained below.



Column Visibility The number of columns in the grid.

Display Options The number of rows in the grid. This only affects the statistics grids in the Sensor Overview level.

Hide Regions Hide regions such as Ring, Adaptive, or Rectangle from the grid.

Hide Enhancement Hide enhancements such as Clipping, Stretch Grayshades, or Power Filter.

Hide Empty Pockets and Show Statistics-Excluded inspections Show or hide Empty Pocket or Statistics-Excluded inspections.

Change Limits Change the number of columns and rows of the grids in the first two sections of the menu. These are the same as Column Visibility and Display Options.

Use Error Limit Causes the Defect % and Last N % columns to display in red if the trigger percentage is exceeded. This allows you to see these statistics from a distance.

Use Warning Limit Causes the Defect % and Last N % columns to display in yellow if the trigger percentage is exceeded. This allows you to see these statistics from a distance.

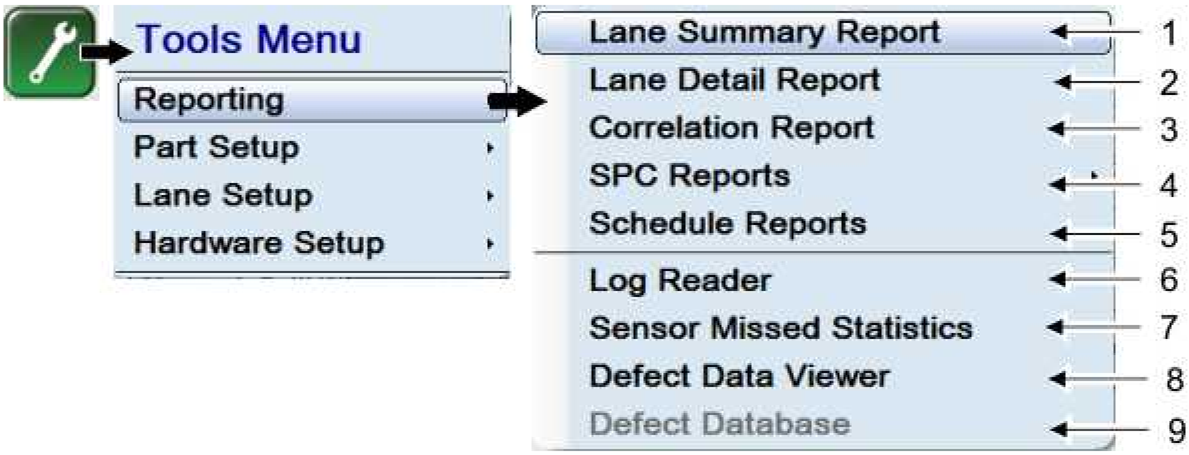
Clear Sorting Puts the sorting order back to the default setting.

Reporting

The Intellispec generates many different reports to provide inspection detail. Many of these reports can be transferred outside of the Intellispec.

> *Note: Some menu items are only available to advanced level users.*

To view reports: Select a Lane button | Tools | Reporting.



1 - "Lane Summary Report" below

2 - "Lane Detail Report" on the next page

3 - "Correlation Report" on page 37

4 - "SPC Reports" on page 47

5 - "Schedule Reports" on page 37

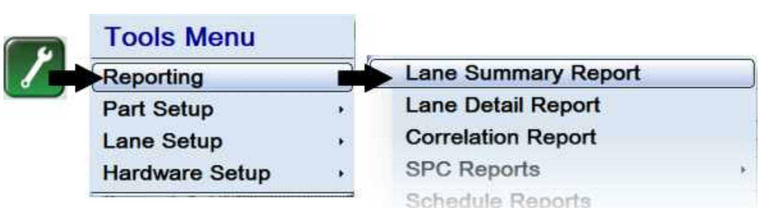
6 - "Log Reader" on page 41

7 - **Sensor Missed Statistics** Displays the number of missed parts and missed part tracking for the sensor.

8 - **Defect Data Viewer** [if enabled] view the images in the defect database

9 - **Defect Database** [if enabled] view the inspection data from the defect database

Lane Summary Report



This report lists the statistics for the lane, including:

- Number of parts inspected
- Number of defects

- Defect percentage

The above numbers are reported per sensor, and as an overall number for the lane. An example from a one lane system is shown below.

Lane Summary Report.txt - Notepad

File Edit Format View Help

```
Machine Name:   INTELLISPEC1234
Part Program:   Bottles
Current Time:   2/6/2017 8:27:28 AM
Last Reset:     1/27/2017 11:18:47 AM

Inspection      Parts    Defects   Defect %      Last N   Last N %

BNS             3456     1614     46.701           0      0.000
Base            3456      692     20.023           0      0.000
Sensor          3456      231      6.684           0      0.000
Seal            3456      691     19.994           0      0.000
```

Lane Detail Report

This report contains all the information in the Lane Summary Report, plus inspection detail for each sensor.

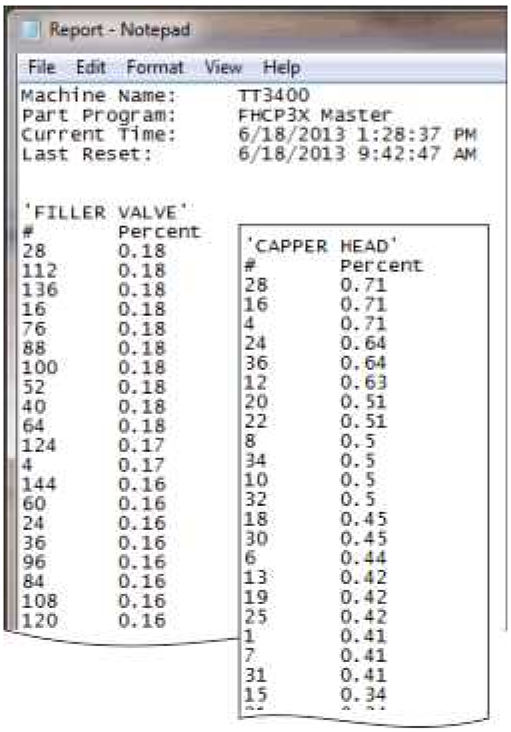
Lane Detail Report.txt - Notepad

File Edit Format View Help

```
Machine Name:     INTELLISPEC1234
Part Program:     Bottles
Current Time:     2/6/2017 8:34:40 AM
Last Reset:       1/27/2017 11:18:47 AM

Inspection                        Parts   Defects   Defect %     Last N   Last N %

BNS                                3456      1614     46.701          0      0.000

Base                               3456       692     20.023          0      0.000
  Empty Pocket ROI                 3456         0      0.000          0      0.000
  Empty Pocket                     3456         0      0.000          0      0.000
  True Center ROI                  3456         0      0.000          0      0.000
  True Center                      3456         0      0.000          0      0.000
  Outer Base ROI                   3456         0      0.000          0      0.000
  Outer Base Inspection            3456       231      6.684          0      0.000
  Spoke Defects ROI                3456         0      0.000          0      0.000
  Black and White                  3456         0      0.000          0      0.000
  Clipping                         3456         0      0.000          0      0.000
  Orientation ROI                  3456         0      0.000          0      0.000
  Orientation                      3456         0      0.000          0      0.000
  Foot ROI                         3456         0      0.000          0      0.000
  Foot Inspection                  3456       462     13.368          0      0.000
  Between Foot ROI                 3456         0      0.000          0      0.000
  Between Foot Inspection          3456         0      0.000          0      0.000
  Pearling ROI                     3456         0      0.000          0      0.000
  Pearling Inspection              3456         0      0.000          0      0.000
  Gate Registration ROI            3456         0      0.000          0      0.000
  Gate Registration                3456         0      0.000          0      0.000
  Gate ROI                         3456         0      0.000          0      0.000
  Gate Inspection                  3456         0      0.000          0      0.000
  Around Gate ROI                  3456         0      0.000          0      0.000
  Around Gate Inspection           3456       231      6.684          0      0.000
  Base Fold Inspection             3456         0      0.000          0      0.000
  Off-Center Gate Inspection       3456       230      6.655          0      0.000
```

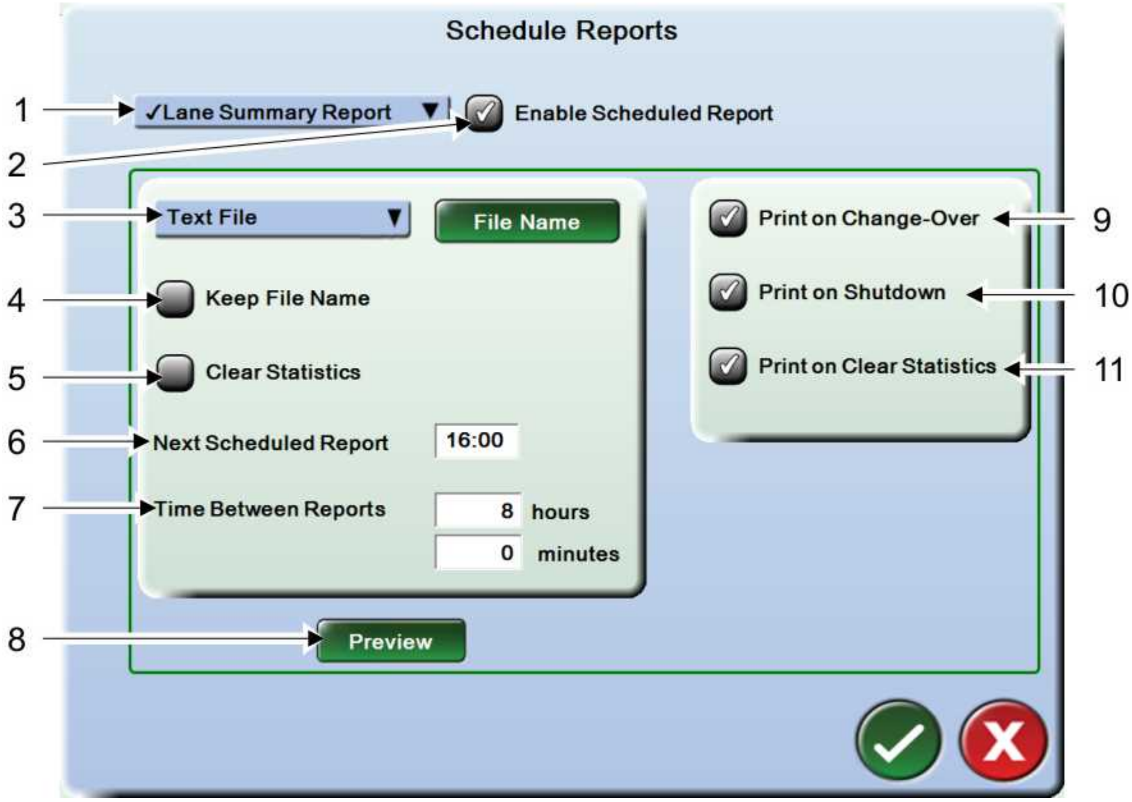
Correlation Report

This report contains the percentage of defects by machine part, sorted from highest to lowest percentage of failure.



Schedule Reports

Set up a schedule where the Intellispec generates reports automatically. This is a Lane-level setting. To schedule reports for more than one lane, you must repeat the process for each lane. To access: select from Lane Overview: Tools | Reporting | Schedule Reports.



1 - **Report drop-down menu** Select a report to schedule. Each report must be set up separately. See also "Lane Summary Report" on page 35, "Lane Detail Report" on page 36, and "Correlation Report" on the previous page.

2 - **Enable Scheduled Report** When this box is checked, the settings below are active.

3 - **Destination drop-down menu** Send the report to the default printer or a file. When "Text File" is selected, you can enter a file name and destination by selecting the File Name button. If you do not choose the name or location of the file, then the file is named "Report.txt" and is saved at the hard disk location "c:\Pressco\Reports." Subsequently saved reports include a time stamp in the file name, unless you enable Keep File Name.

4 - **Keep File Name** The system overwrites the file each time, rather than creating unique names for files. Select the File Name button, browse to the location where you want to save it, and create a name for your report. Example: a plant where the Intellispec is networked. Say the office computer is programmed to poll the Intellispec at regular intervals to get the latest statistics report. With the same file name, the office computer just needs to request the same file name each time, regardless of the date and time the report was saved.

5 - Clear Statistics

The statistics are cleared after each scheduled report. This applies to the current report selected in the dialog.

In this example, the Lane Detail report will not clear any statistics when it runs. The Lane Summary report will clear the statistics when it runs.

6 - **Next Scheduled Report** Using a 24 hour clock, set the time to save or print the next report. No reports will print until the specified time. This time of day is always used in subsequent report days, so that you can schedule your network computer to collect reports after this time. Note that this number is updated by the system continuously - it will always show the next scheduled report time. Example: if the current time is 17:00, and Next Scheduled Report is 15:00, then the next report will not print till the next day at 15:00.

7 - **Time Between Reports** Set the time interval to save or print the following reports. This interval is used after the Next Scheduled Report. The reports on following days are scheduled to always include the Next Scheduled Report time as originally set up.

Example: Time Between Reports

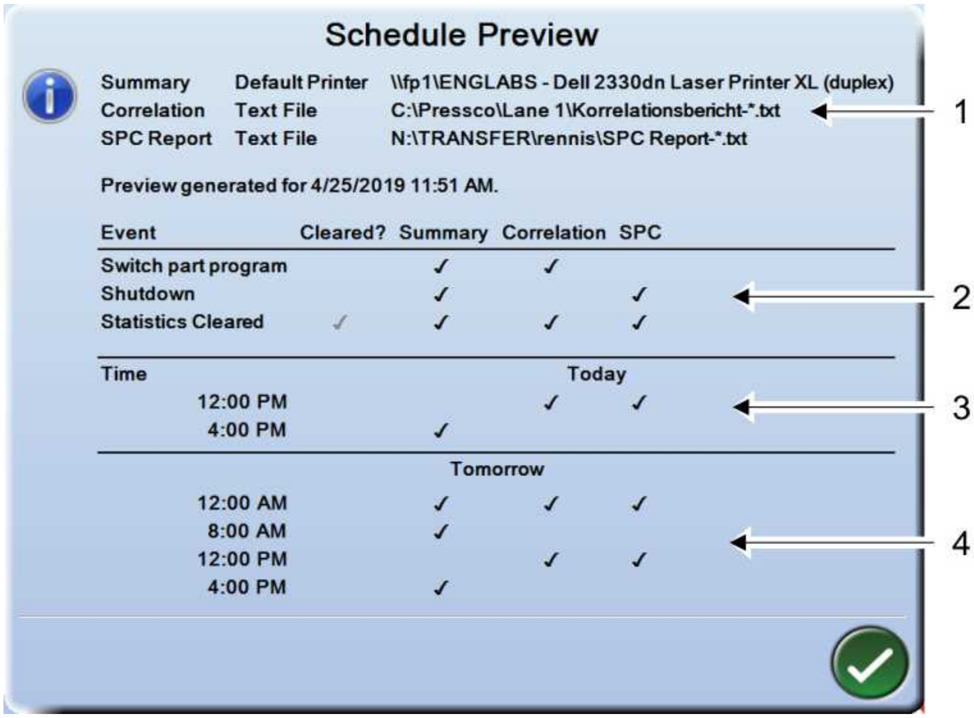
Next Scheduled Report = 15:00 and Time Between Reports = 5 hours. The reports will print the next day at 15:00, then at 20:00. The following day, the scheduled reports occur at 00:00, 05:00, 10:00, 15:00, and 20:00. This repeats each following day.

If the system is shut down when a report is scheduled and later started up again, then no report is created for the time when the system is shut down. This is true with the following exceptions:

- If a report was already created today, or the report schedule was edited today
- If the shut down was today
- If either of the above conditions happens, and a report was scheduled during the down time, then a report is created immediately after the system starts up again.

8 - **Preview** Select the preview button to see when scheduled reports will print.

Preview Details



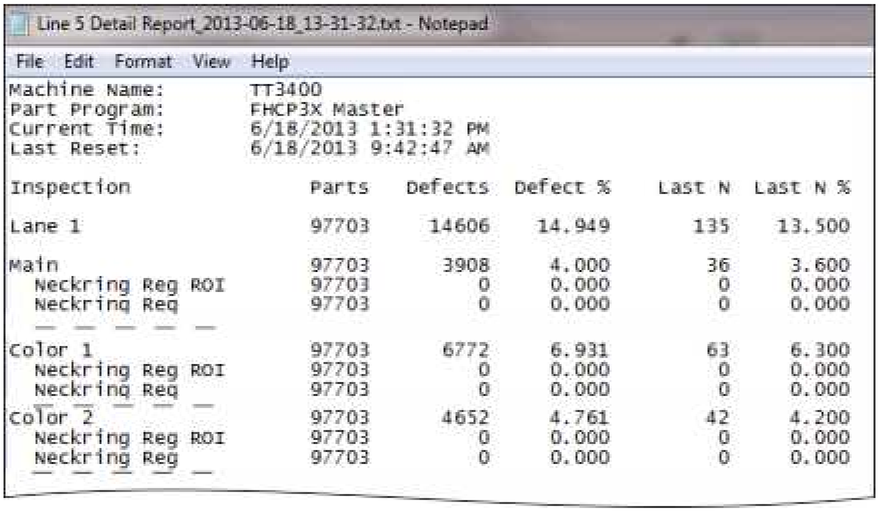
1 - Enabled reports | 2 - If checked, that report will print at the time the event happens (example, when you switch a part program) | 3 - If checked, that report will print today at the time shown | 4 - If checked, that report will print tomorrow and each day after at the time shown

Cleared = Clear Statistics is enabled for that report.

9 - **Print on Changeover** Schedule the system to generate a report if someone changes a part program. This contains defect statistics from the time of the last statistics reset until the time that the part change-over occurred.

Changeover Report Example

This report contains defect information for the most recent parts. It has the time of the last statistics reset, and displays information through the time that the part change-over occurred.



Line 5 Detail Report_2013-06-18_13-31-32.txt - Notepad

File Edit Format View Help

```
Machine Name:          TT3400
Part Program:          FHCP3X Master
Current Time:          6/18/2013 1:31:32 PM
Last Reset:            6/18/2013 9:42:47 AM

Inspection                  Parts    Defects   Defect %     Last N   Last N %

Lane 1                      97703      14606     14.949        135     13.500

Main                        97703       3908      4.000         36      3.600
  Neckring Reg ROI          97703          0      0.000          0      0.000
  Neckring Reg              97703          0      0.000          0      0.000
  _ _ _ _ _
Color 1                     97703       6772      6.931         63      6.300
  Neckring Reg ROI          97703          0      0.000          0      0.000
  Neckring Reg              97703          0      0.000          0      0.000
Color 2                     97703       4652      4.761         42      4.200
  Neckring Reg ROI          97703          0      0.000          0      0.000
  Neckring Reg              97703          0      0.000          0      0.000
  _ _ _ _ _
```

10 - **Print on Shutdown** The report is generated when the system shuts down.

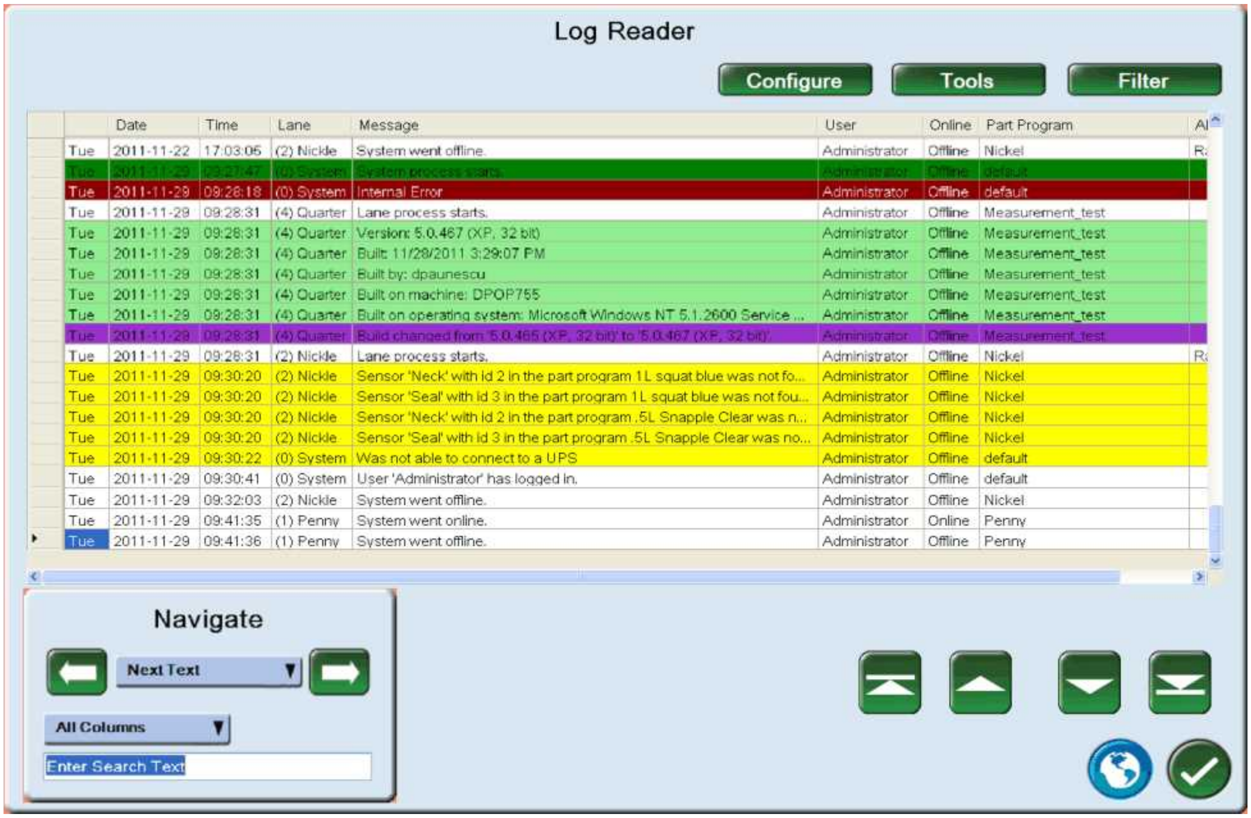
11 - **Print on Clear Statistics** The report is generated when you manually clear statistics.

Log Reader

To get to this menu: select Home | Tools | Log Reader.

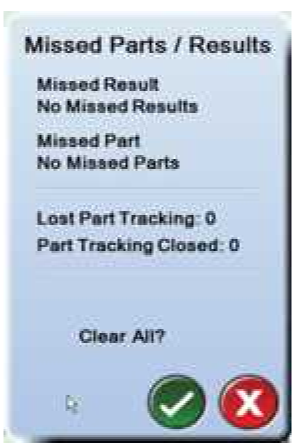
The log reader displays the Intellispec event history including:

- User log in and log out information
- Notification when the part program was changed. Note: detailed changes to parameters and program changes are found in the "Part Program Change Log" on page 102
- Alarms, when triggered and cleared
- System errors
- System starting information
- Lane online/ offline history
- Lighting changes
- Reports generated
- Text files of the logs are stored at: C:\Pressco\Logs.



Sensor Missed Statistics

Displays the number of missed parts and missed part tracking for the sensor. From Lane or Sensor Overview mode, select Tools | Reporting | Sensor Missed Statistics. This information is recorded in the Log Reader.



Missed Results This can occur if you set the Reject Delay Calibration incorrectly. Another cause could be kinks or intermittent connections to cables, or the inspection time for the lane is too long.

Lost Part Tracking This occurs if the system loses connection to the Part Tracker. You may be able to change the Missed Packets Exception threshold to prevent loss of connection.

Error Messages

Part Tracker Exception

If you see an error "Part Tracker Exception" on the Intellispec screen, this means that power was lost to the Cluster Box or Part Tracker.

To reset the part tracker board:

Push the Reset button on the part tracker board. This is found inside the inspection module or Cluster Box.

Lost Part Tracking

If you see a "Lost Part Tracking" message, possibly the power was lost to the Cluster Box or Part Tracker inside an inspection module. Reset the Part Tracker board as described above.

SPC Statistics and Reports

SPC = Statistical Process Control. The Intellispec system can record this data, and you can view it on graphs or save to file.

SPC Statistics

Inspections that collect measurement data can be displayed in Machine Parts or SPC graphs. These inspections have a check box called Record SPC Statistics, which must be enabled in order for the system to keep this data.

The inspections that have SPC statistics:

- Ambient
- Measurement
- Fill Height
- Fill Height - Segmented
- Label Skew Extract
- Distance
- Angle
- Closure Angle

The statistics that are recorded:

- Defect % (percentage)
- Defect Count
- Inspection Mean
- Inspection STD (Standard Deviation)
- Inspection CPK (statistical value, showing how well-centered the data population is within the reject specification)

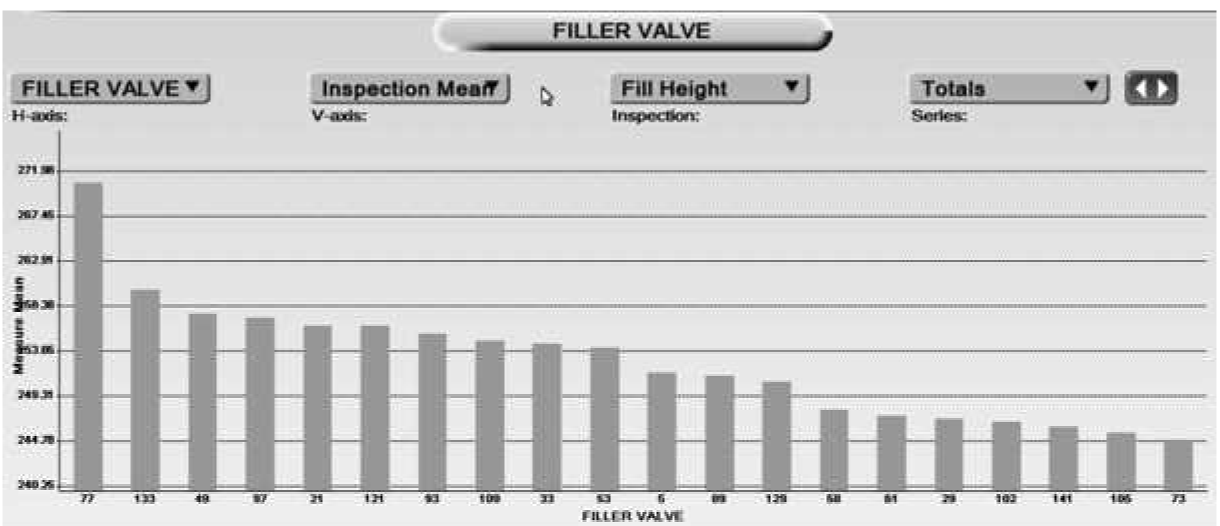
To view the statistics:

In either the Lane Overview Screen or Sensor Overview Screen, select the Machine Parts button on the right side of the screen. A machine parts correlation graph is displayed. The Machine Parts button in the upper screen allows you to view machine part data for the lane.

The Machine Parts button in the lower screen allows you to view machine part data for one sensor. The button may be named for your machine part. Example: Filler Valve

Example: fill height SPC graph

The example below shows the mean fill height for each valve, for one camera. The valve numbers are displayed at the bottom of the graph.



> *Note: to choose an inspection to view (in this example: "Fill Height"), you must select Inspection Mean, Inspection STD, or Inspection CPK in the V-axis drop-down menu. In addition, you must select "Lane Total" in the upper screen or "Totals" in the lower screen from the Series drop-down menu.*

You can plot the fill level in the SPC graphs to show the data for the inspection in several different ways.

Another way to view fill height data is through the Trend Graphs in the upper screen.

SPC Graphs

This option is available if you have a sensor that measures specific data, or you have an inspection with "Record SPC Statistics" enabled.

There are four sections to the SPC graph, each of which can be setup to display a unique view of the data. Select from the following options for each view:

- Source
- Type
- Show / Series

Source

The inspection from which the data is derived.

- For mass sensors, the only choice under Source is the mass inspection.
- For camera sensors, the choices for Source depend what inspections are included and enabled in the part program. Only the inspections that keep Retro-Spec Statistics have SPC graph data.
- For other sensors (such as X-Ray), the choice for Source depends on the available inspection(s).

Type

Select the type of graph. The choices are:

- X-Bar - the history of the average values from this sensor
- Range - the history of the range of values from this sensor
- Sigma - the history of the standard deviation of the values from this sensor
- Trend - similar to X-Bar, with the addition of a trend line that shows the historical trend of the data from this sensor
- Distribution - the histogram of the data values
- Correlation - the display of the average sensor values by individual cavity

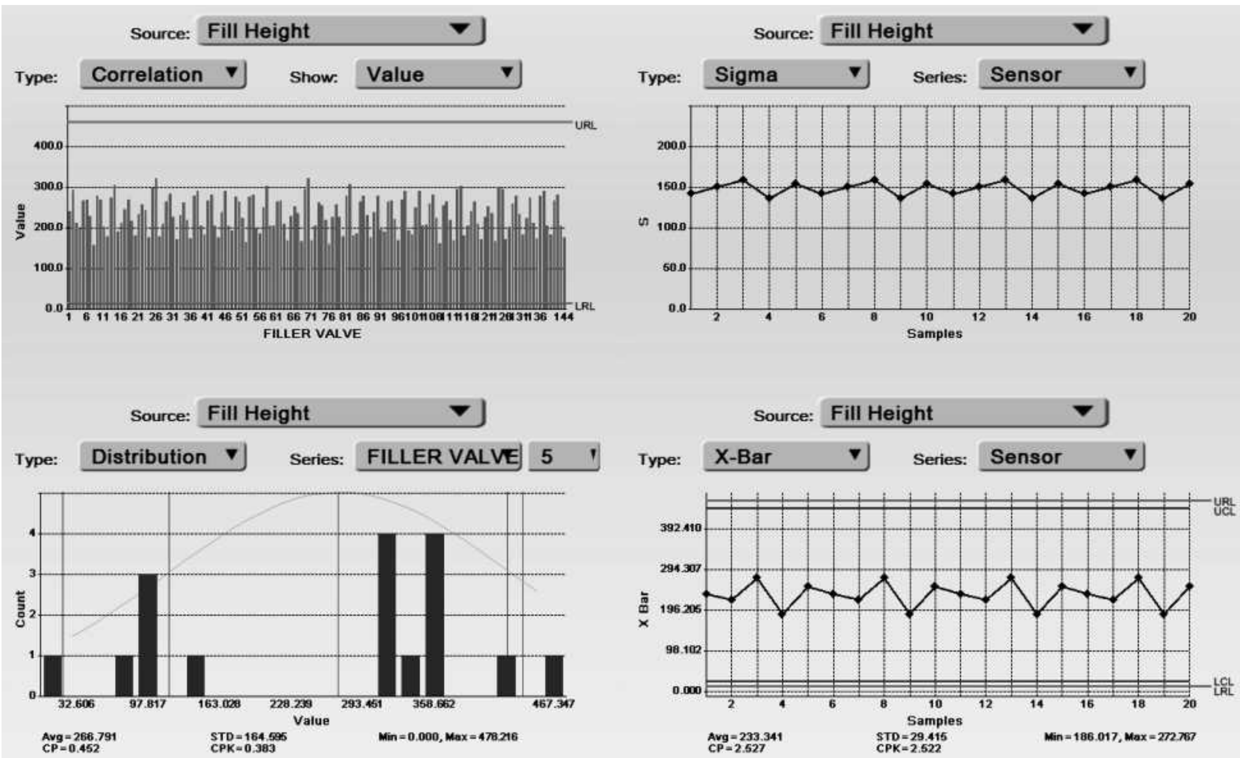
Series/ Show

On the first five graph types listed above, the Series category selects the source of the data. The available settings are ‘Sensor,' which is the average value for the sensor, or the name of a machine part.

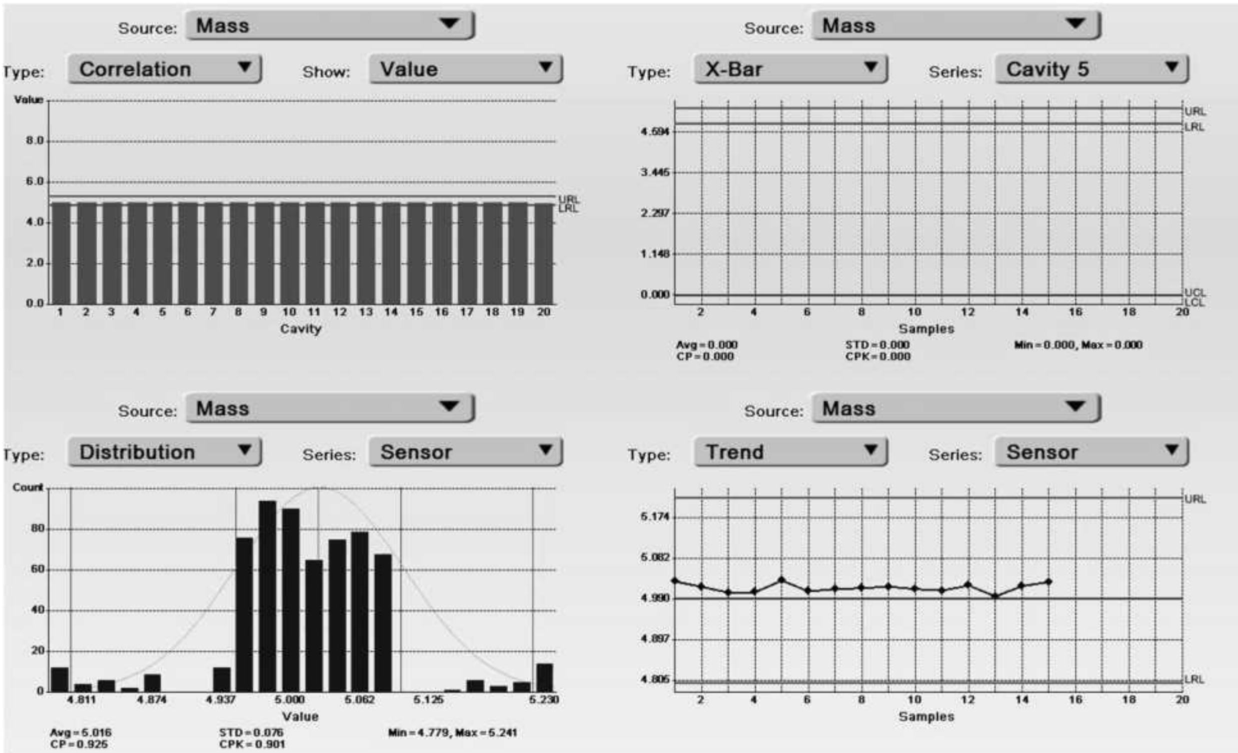
When the Correlation graph is selected, the Show category allows the selection of:

- Value - the average data value
- Sigma - the standard deviation
- Defects - a defect count from when the data was last reset

Example graphs from camera sensors:



Example graphs from mass sensors:



SPC Reports

SPC Reporting allows selected RetroSpec parameter statistics to be printed or saved to file. Generate a report if "Record SPC Statistics" is enabled in an inspection. (to see how to enable this feature, see "SPC Statistics" on page 43

Scalar sensors (Mass, SIM, Fill Height / X-Ray, etc.) are implicitly enabled for SPC measurements. The "Compare" inspection for these sensors is automatically enabled.

> *NOTE: The statistics in SPC Reporting are independent of any other statistics, including those used to create data for the SPC Graphs. "Clear SPC Statistics Only" on the graphs will only clear the statistics used on the graphs, and "Clear SPC Report Statistics" will only clear the statistics used for reporting.*

Statistics used for SPC Reporting are accumulated as soon as the part program containing inspections that collect SPC data for SPC Graphs is loaded. There are two types of SPC Reporting statistics: Continuous and Last N. Continuous statistics accumulates until reset, while Last N statistics accumulates only over the most recent N parts.

SPC Reports can be created interactively, using the Create SPC Report menu item or scheduled like any other type of report. Available output formats are Text File (separator given in SPC Report Configuration), Excel Spreadsheet, Printer. XML output is NOT supported.

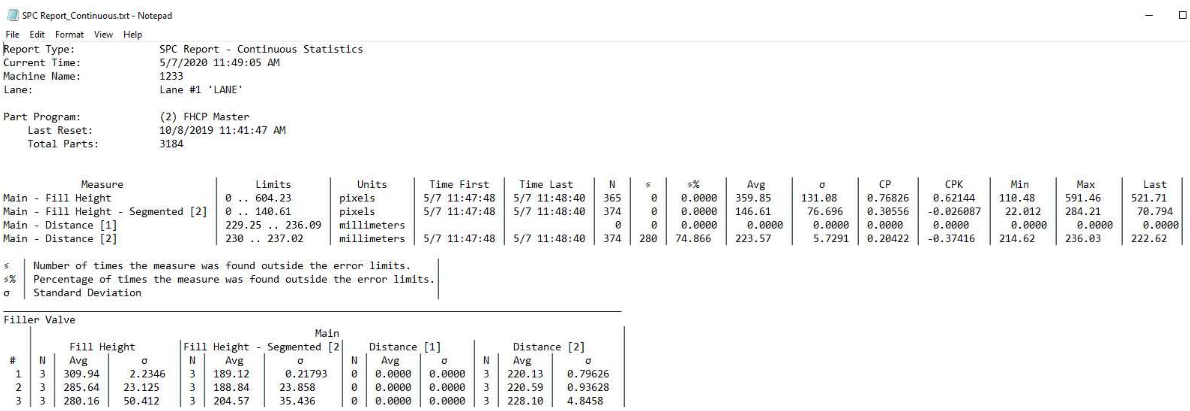
 **Language** To ensure the reports are generated in the correct language, select the language icon, and "Select Language for Report Output."

Schedule reports The Schedule Reports dialog allows reporting at given times of the day or when switching part programs, optionally clearing the statistics upon writing a report. See .

To create SPC reports, from Lane Overview mode, go to Tools | Reporting| SPC Reports | SPC Report Configuration. Select the options from each tab (described below).

To generate the report, select Create SPC Report. This will generate a report based on your configuration, and you can select a type of output (print, text file, or Excel spreadsheet).

Example SPC Report



SPC Report_Continuous.txt - Notepad

File Edit Format View Help

```
Report Type:            SPC Report - Continuous Statistics
Current Time:           5/7/2020 11:49:05 AM
Machine Name:           1233
Lane:                   Lane #1 'LANE'

Part Program:           (2) FHCP Master
    Last Reset:         10/8/2019 11:41:47 AM
    Total Parts:        3184
```

Measure	Limits	Units	Time First	Time Last	N	≶	≶%	Avg	σ	CP	CPK	Min	Max	Last
Main - Fill Height	0 .. 604.23	pixels	5/7 11:47:48	5/7 11:48:40	365	0	0.0000	359.85	131.08	0.76826	0.62144	110.48	591.46	521.71
Main - Fill Height - Segmented [2]	0 .. 140.61	pixels	5/7 11:47:48	5/7 11:48:40	374	0	0.0000	146.61	76.696	0.30556	-0.026087	22.012	284.21	70.794
Main - Distance [1]	229.25 .. 236.09	millimeters			0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Main - Distance [2]	230 .. 237.02	millimeters	5/7 11:47:48	5/7 11:48:40	374	280	74.866	223.57	5.7291	0.20422	-0.37416	214.62	236.03	222.62

≶	Number of times the measure was found outside the error limits.
≶%	Percentage of times the measure was found outside the error limits.
σ	Standard Deviation

Filler Valve

	Main											
	Fill Height			Fill Height - Segmented [2			Distance [1]			Distance [2]		
#	N	Avg	σ	N	Avg	σ	N	Avg	σ	N	Avg	σ
1	3	309.94	2.2346	3	189.12	0.21793	0	0.0000	0.0000	3	220.13	0.79626
2	3	285.64	23.125	3	188.84	23.858	0	0.0000	0.0000	3	220.59	0.93628
3	3	280.16	50.412	3	204.57	35.436	0	0.0000	0.0000	3	228.10	4.8458

> *Note: to make sure the report lays out correctly, use a fixed-width font that supports Unicode, such as Consolas*

SPC Report Configuration The configuration determines what will be reported and how it will be presented. Presentation aspects are shared by all lanes; data collection aspects are lane specific:

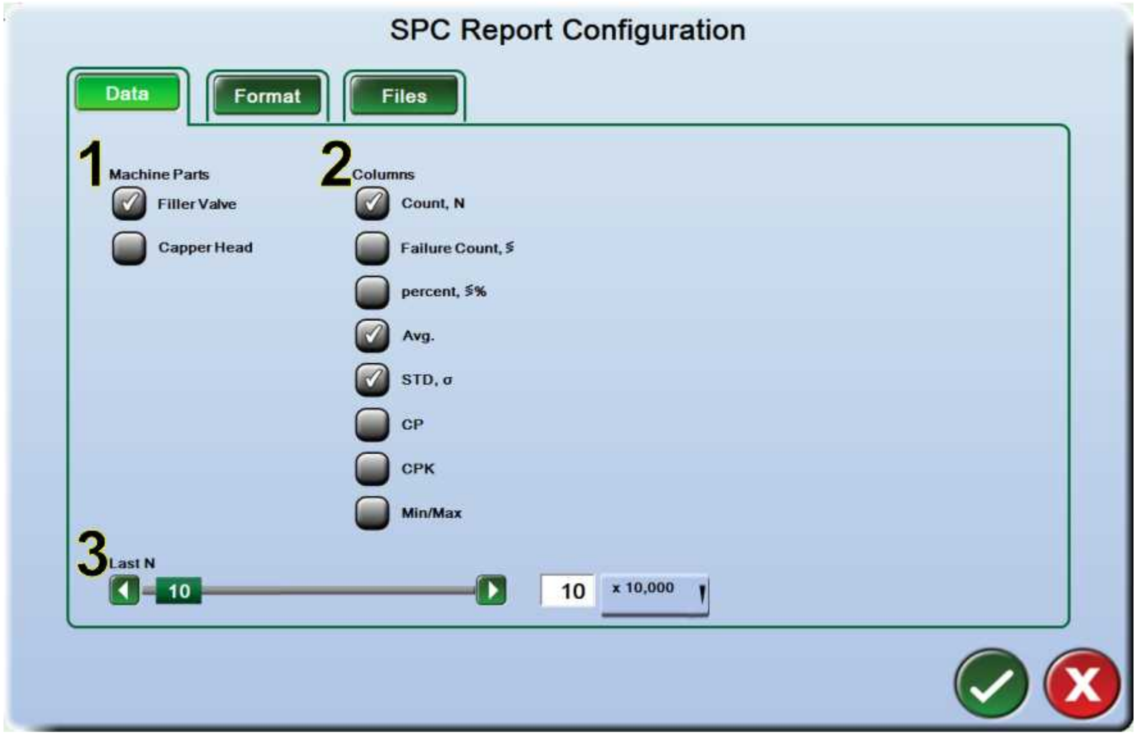
The following information is shared by Lanes:

- Data Tab: "Columns"
- Format Tab: Print "Font Size", Text File: "Maximum Width", Column Separator
- Files Tab: "Saved Data"

Lane Specific information in each tab:

- Data Tab: "Last N"

Data Tab



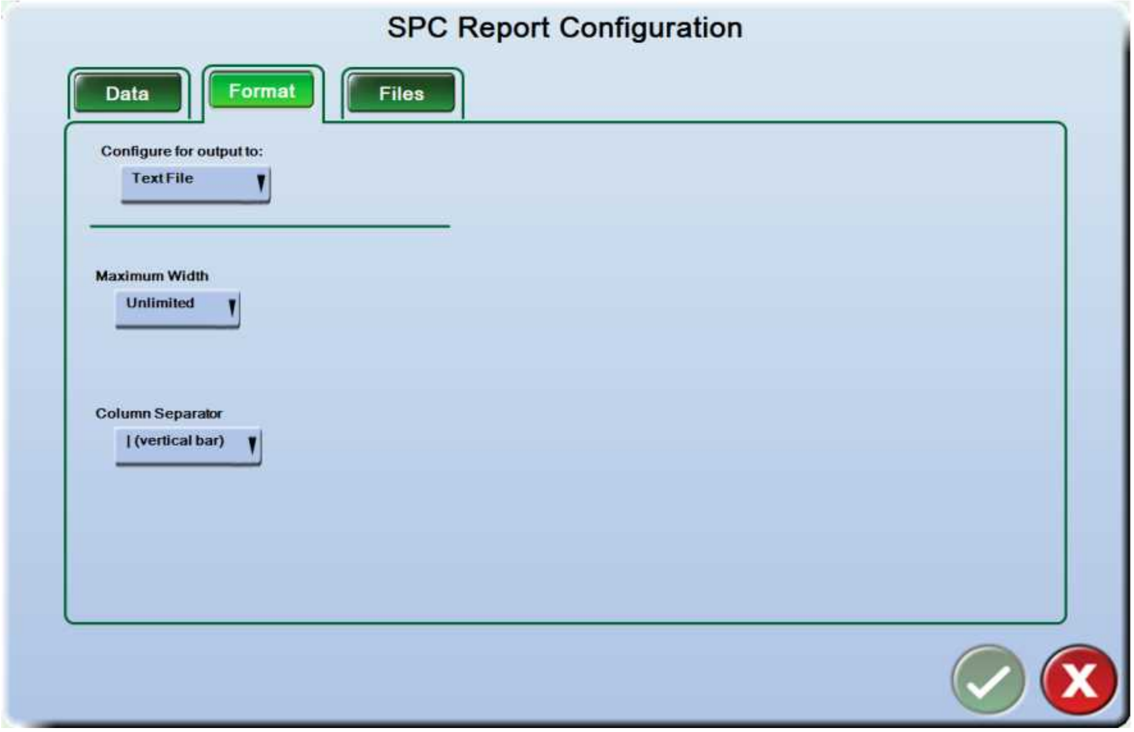
1 - **Machine Parts** [Only in systems with correlation installed] Select which machine parts to report correlation specific data for. For example, you may be interested only in Cavity data, so only check this.

2 - **Columns** Select which correlation-specific statistics will be written to file or printer. (All these columns are assumed to be checked for the overall statistics for each SPC enabled RetroSpec parameter.)

3 - **Last N** Specify the Last N size to use for Last N statistics.

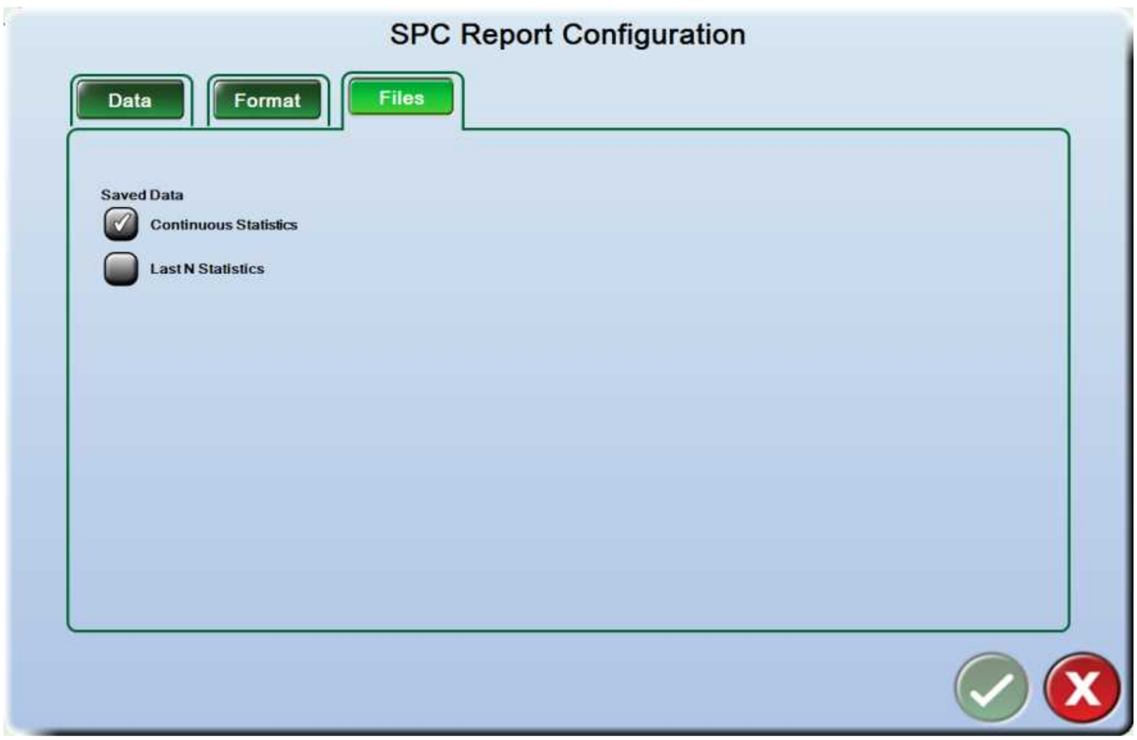
Format tab

Specify the size / width of the output and the output separator. Output can be configured separately for Text File and Printer. Excel file output does not need to be configured. XML output is not supported (can't be selected).



Files tab

Saved Data Select which data will be reported. When more than one item is selected, multiple files will be created.

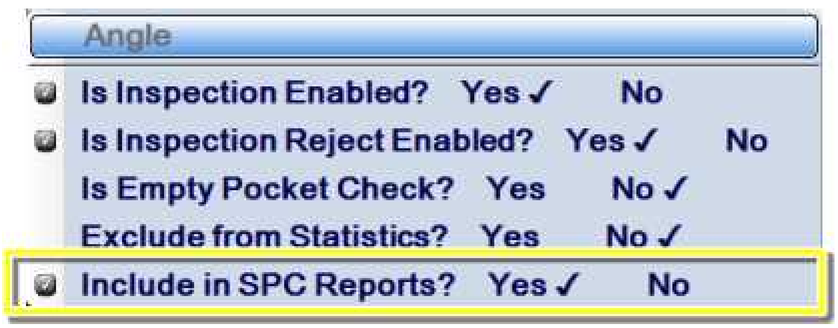


Report Output

Report Statistics When accumulating data for SPC statistics, only those values are included that have no failures other than exceeding the control limits . For example, an SPC value may not be created if a registration failed that leads to the inspection containing the measured RetroSpec parameter.

- Values for CP and CPK are calculated from the limits at the time of the report
- ≶≶% : To save space, parameters "Failure Count" ("Number of times the parameter was outside of the error limits"), "Failure Count Percent", are displayed as symbols.

By default, any RetroSpec parameter which has an enabled “Record SPC Statistics” option (implied for inspections on scalar sensors such as Mass), will result in reported statistics. If you want to graph certain parameters but not include them in the reports, the inspections have a special property “Include in SPC Reports.” Right click on the inspection and select “settings:” a sub-menu will drop down showing the option.



> *Note: this option will only be displayed if the inspection has an enabled “Record SPC Statistics” option, or is situated on a scalar sensor. Note that data will be accumulated even if “Include in SPC Reports” is disabled.*

Chapter 6 Alarms

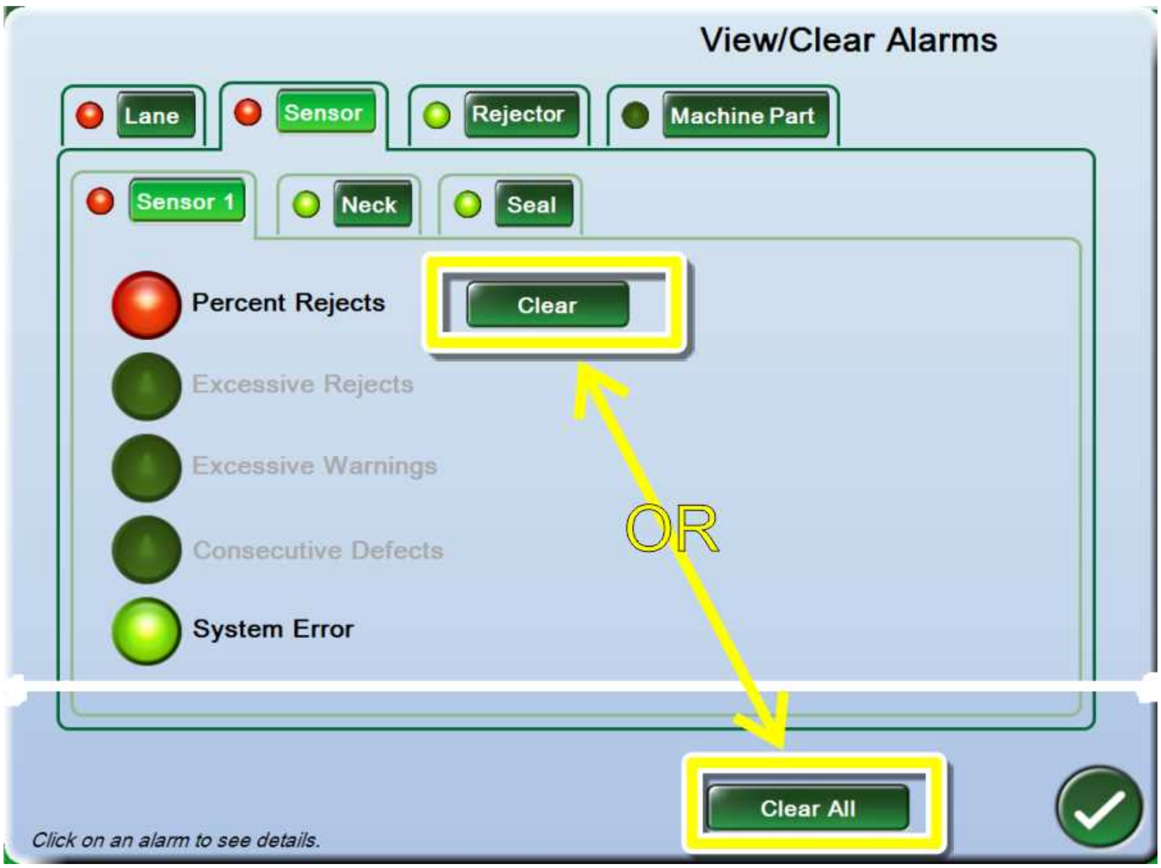
There are five types of alarms: System, Lane, Sensor, Rejector, and Machine Part alarms. Most of these are configurable (except the System Alarms - UPS and over temperature).

> *Note: Alarms are recorded in the system log reader, even when the alarms are automatically cleared.*

View and Clear Alarms


To View or Clear Alarms, select an Alarm button. If no alarm is active, click the Alarms icon | View/Clear Alarms.

Select the Clear button to clear a single alarm, or the Clear All button to clear all alarms, including alarms in other tabs.



The indicators in this screen show whether an alarm is enabled, and whether it is triggered.

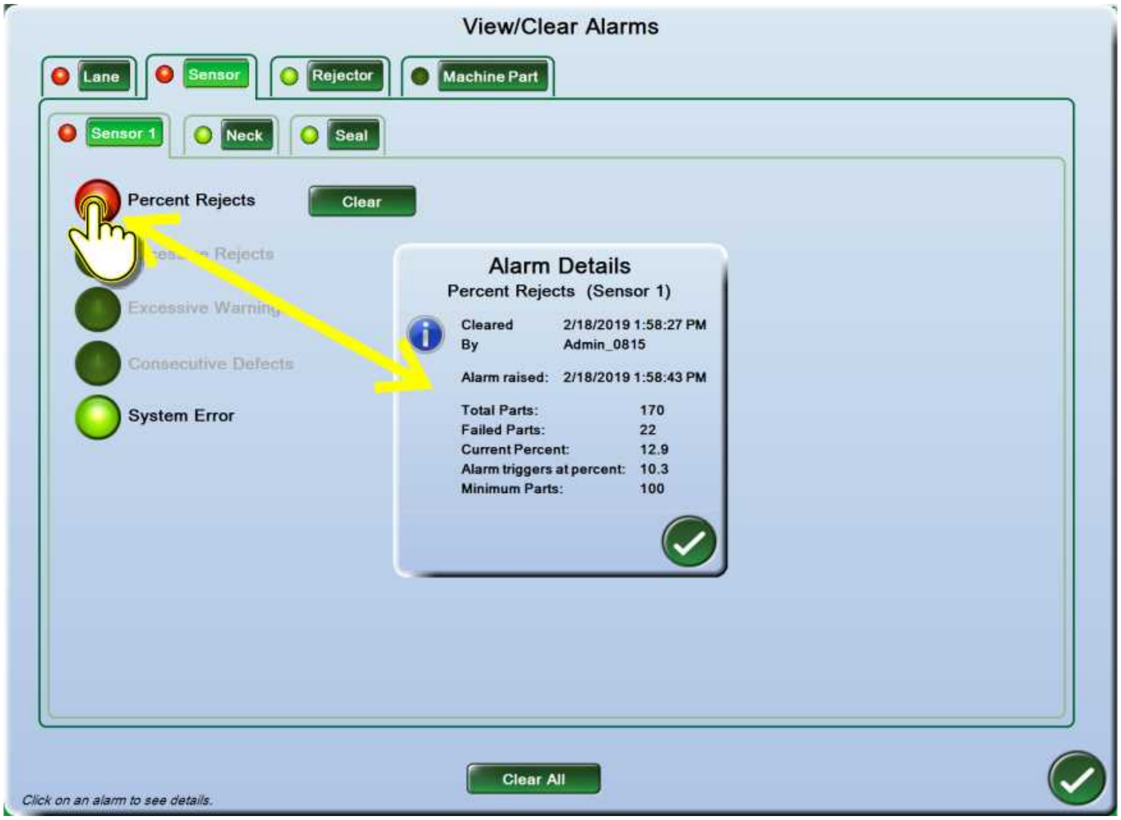
 Red On - the alarm is both enabled and triggered

 Green On - the alarm is enabled, but has not been triggered

 Green Off - the alarm is not enabled nor triggered

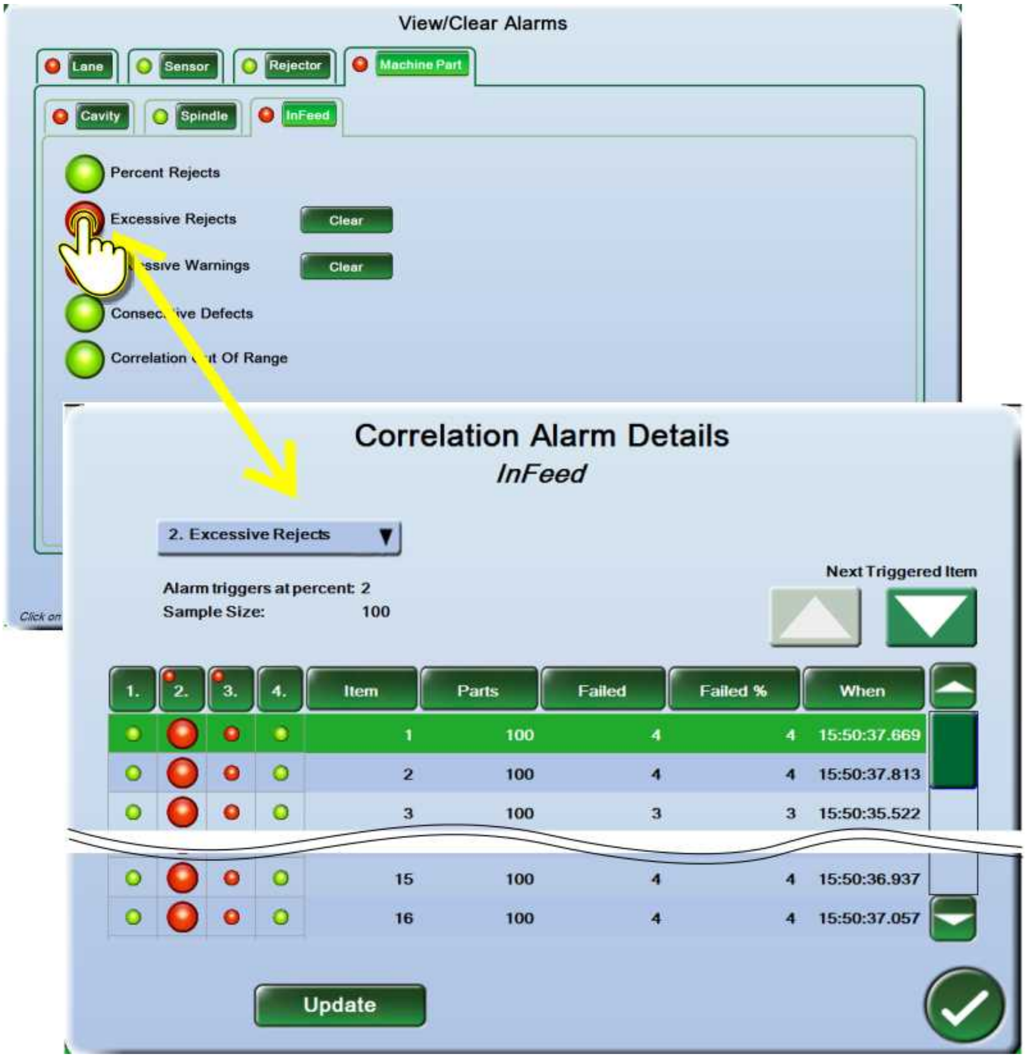
Select different tabs to see more alarms. The tabs (except Lane) have sub-tabs. If any alarm is raised in a sub-tab (Sensor 1 in our example), then the container tab (Sensor) also shows an alarm.

Select any indicator to see alarm details. You can also do this if an alarm is not active.



View and Clear Machine Part Alarms

 From the alarms button | View/ Clear Alarms | Machine Part:



Clicking on any machine part alarm shows a details table breaking the alarm details down per correlation value (aka machine part item).

The table lets you select any of the (enabled) alarms either by using the drop down or by clicking one of the columns 1., 2., 3., etc.

A "Next Triggered Item" navigator helps to quickly find the item in alarm when all machine parts cannot be displayed simultaneously.

The Update button updates current inspection information (how many parts have currently been processed and how many failed; this is automatically done if an alarm is raised while in this view).

Review Alarm Configurations

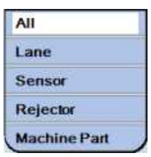
 You can view all the alarm setups from one screen. Access this screen from the alarms button | Review Alarm Configurations, in Lane or Sensor Overview.

Review Configurations for All Alarms

Lane #1 (LANE) Source Type All Activation Hide Disabled

Lane	Source		Alarm	Activation	Visual (Light Tree)	Audible (Light Tree)	Digital Out (Extended I/O)
#1 (LANE)	Lane		Percent Defects	Warning	3600s	3600s	0x2 (Bit 1)
#1 (LANE)	Lane		System Error	Warning	10s	2s	–
#1 (LANE)	Sensor 1	Main	Percent Rejects	Warning	3600s	3600s	0x2 (Bit 1)
#1 (LANE)	Sensor 1	Main	Consecutive Defects	Warning	3600s	3600s	0x2 (Bit 1)
#1 (LANE)	Sensor 1	Main	System Error	Warning	10s	2s	–
#1 (LANE)	Sensor 2	Color 1	Percent Rejects	Warning	3600s	3600s	0x2 (Bit 1)
#1 (LANE)	Sensor 2	Color 1	Consecutive Defects	Warning	3600s	3600s	0x2 (Bit 1)
#1 (LANE)	Sensor 2	Color 1	System Error	Warning	10s	2s	–
#1 (LANE)	Sensor 3	Color 2	Percent Rejects	Warning	3600s	3600s	–
#1 (LANE)	Sensor 3	Color 2	System Error	Warning	10s	2s	–
#1 (LANE)	Rejector 1		Jam at Reject Confirm	Warning	3600s	3600s	–
#1 (LANE)	Rejector 1		Missed Reject	Warning	10s	2s	–
#1 (LANE)	Rejector 1		Missed Result	Warning	10s	2s	–
#1 (LANE)	MP1	Filler Valve	Percent Rejects	Warning	3600s	3600s	–
#1 (LANE)	MP2	Capper Head	Percent Rejects	Warning	3600s	3600s	–
#1 (LANE)	MP2	Capper Head	Excessive Rejects	Warning	3600s	3600s	–

Use the drop-down menus at the top of the screen to filter what you want to see. For example, view the alarm setups for only the Sensors, through the Source drop-down.



Sort data by column, by selecting a button at the top of the table. For example, sort the alarms alphabetically by sensor/ machine part name, by clicking the blank button.

System Alarms - Description and Configuration

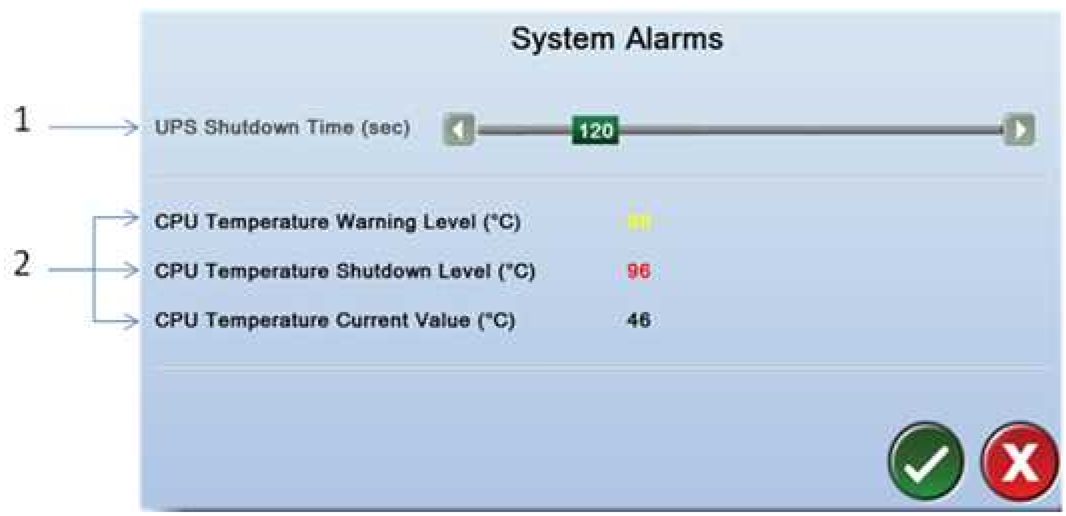
The system alarms are the UPS (uninterruptible power supply) and CPU temperature alarms. You can configure the UPS shut down time.

These are only shown in the System Overview and will not show up as flashing lane buttons, or on any light tree, and will not sound a horn.

Alarm	Description	Action
UPS	Battery is dead. Or: Plant power is lost and the UPS shutdown time is exceeded. The Intellispec shuts down.	Replace battery Automatically resets If plant power is restored before the Intellispec shuts down, then the alarm is automatically cleared. Otherwise, restart the system.
Over temperature	CPU temperature exceeds highest recommended operating temperature. The Intellispec system shuts down. You must wait till the processor cools before resuming operation.	

System Alarm Setup

To get to this menu: select Home | Alarms.



1 -**UPS Shutdown Time** The number of seconds that the UPS will maintain power to the system if AC power has been lost. The Intellispec system shuts down after this time period. This allows for a normal Windows shutdown.

2 - **CPU Temperature** If a multiple core computer is used, the highest temperature is displayed. If the shutdown CPU temperature is reached, the Intellispec system shuts down.

Lane Alarms - Brief Description

The Lane Alarms affect the hardware associated with one lane. A lane usually refers to one production line, and can contain multiple sensors.

Alarm	Description	Action	4-Light Tree[2]	5-Light Tree[2]
Percent Defects[1]	Percentage of defects exceeds the set limit.	Check the production line to see what might be creating too many bad parts Reset alarm on screen	Red	Red
Offline[1]	Lane goes offline	Automatically resets	Green = system is online Red = system is offline	Green = system is online Red = system is offline
Chute Full[1]	Reject chute is full	Clear chute Reset alarm on screen	Red	Red
Power Status[1]	Lane AC Power is lost	Automatically resets Troubleshoot: Check that the inspection module power switch is on. Check +24V supply.	Red = AC power is lost Blue = power is OK	Red = AC power is lost White = power is OK
Good Parts[1]	Used as a part counter. When specified number of parts is reached, then alarm is triggered.	Replace the box with counted parts with an empty box, then clear alarm. Reset alarm on screen	Red	Red
System Error[1]	Part tracker or other internal system errors	Depends on specific alarm (see details for System Error Alarm) Reset alarm on screen	Red Red Flashing for Part Tracker Lost Communication	Red Red Flashing for Part Tracker Lost Communication

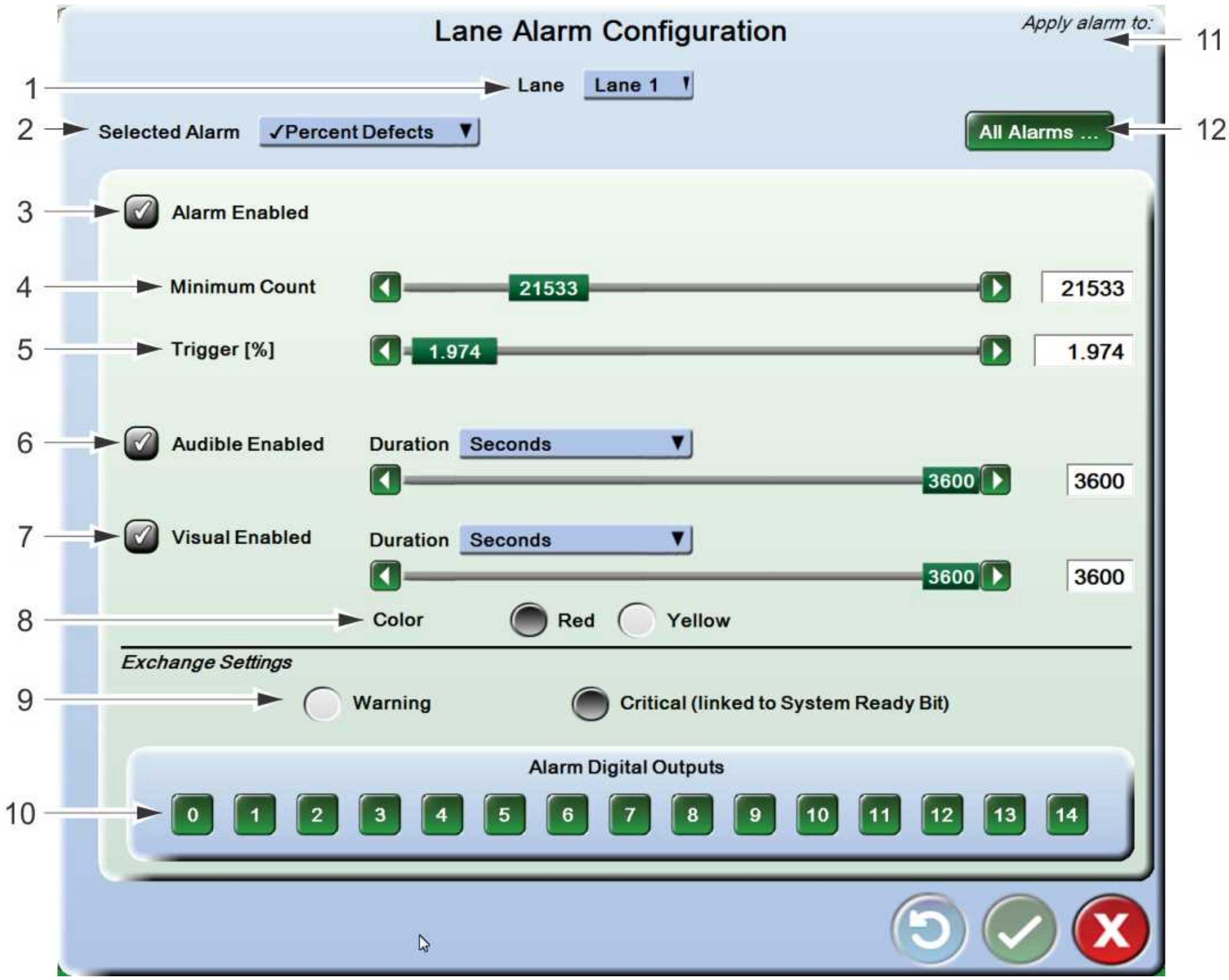
[1] If you want to connect an external monitoring device such as a PLC, an optional Extended I/O board is required for each lane.

[2] The light tree displays this color for the Duration if Visual Enabled.

Lane Alarm Configuration

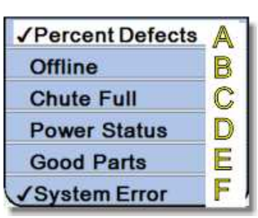
Set up alarms for a lane. To get to this menu: From Lane Overview mode, select Alarms | Lane Alarm Configuration. Select an alarm from the drop-down menu to configure that alarm. Enabled = checked.

Note: Some menu items are only available to advanced level users.



1) **Lane** Select the lane to configure. This is only available if your system has multiple lanes.

2) Selected alarm:



Note: if certain features are enabled, then you will see more alarms. See "Consecutive Bottles Added Alarm" on page 62 and "Rejector Air Pressure Fault Signal" on page 63

A) **Percent Defect** The percentage of defective parts in a Lane exceeds the Trigger %. It remains triggered until you clear the alarm.

B) **Offline alarm** This alarm is triggered when the system goes offline.

C) **Chute Full alarm** This alarm is mainly used in systems that have inspection modules installed within a blow molder, and use the blow molder’s internal reject chute. (it may not apply to your system) It is triggered when the blow molder’s internal reject chute is full. NOTE: This alarm is disabled when the Intellispec is offline.
If this alarm is triggered, the blow molder’s internal rejector will be disabled, thus not allowing any more defective parts to be rejected. The rejector will remain disabled until you clear the chute and then clear the alarm from the alarms tab. If you clear the alarm without clearing the chute, the alarm will be triggered again.

D) **Power Status** This alarm is triggered when Lane AC power is lost. It remains triggered until AC power is restored. If AC power remains off for an extended period of time, the system will shut down.

E) **Good Parts alarm** This alarm is triggered when a number of good inspected parts [Trigger (thousands)] has been reached. It will remain triggered until you clear the alarm. Note that clearing this alarm also clears the Good Parts count.

Good Parts alarm example

The Good Parts alarm can be used as a part counter. For example, say you are inspecting preforms, and have a box at the end of the conveyor (after inspection) that holds 5000 preforms. This alarm counts the number of good inspected parts, and notifies you when 5000 good parts have reached that box. The Alarm Output through the optional Extended I/O can be used to stop the conveyor from moving parts into the inspection system. You can then install a new box at the end of the conveyor, reset this alarm, and start counting the next 5000 parts. See also information about the optional Extended I/O board.

F) **System Error Alarm** The System Error Alarm cannot be disabled. However, there is a Details button that shows whether it is being used as an alarm. System alarms may be added or subtracted (by Pressco) from the software without notice. These errors are recorded in the Log Reader.

System Error alarm details

- Part Tracker Lost Communication – a transient problem with sending result packets to the part tracker. Often this is related to a Missed Packets threshold that is too low (Missed Packets Exception under Lane – Tools – Hardware Setup). Otherwise, network connections may need to be checked. The light tree will flash red.
- Part Tracker Closed Connection – The communication to the part tracker was closed. This always requires resetting the part tracker and restarting the system. The system will also show a message box instructing to do this, and going on-line will not be permitted. In this condition, since no communication between Intellispec and Part Tracker exists, the light tree may not show an alarm or sound the horn.
- Internal Error - an internal error was logged. This usually requires Pressco technical assistance.
- Use as Alarm - This is the normal setting.
- Count Only - The selected alarm(s) will count triggers only.
  - In the View/Clear Alarms screen, the indicator will be yellow if the alarm is triggered (instead of red).
  - The Count Only alarms will NOT light the light tree, sound the horn, nor cause the flashing ALARM button over the Lane button.
  - A small warning indicator displays over the Alarms button and View/Clear Alarms menu item when one or more count-only alarms have been triggered - in Lane Overview mode only. The warning indicator is not displayed when a regular alarm is already active.
- 

> *We do not recommend using Count Only for any of the System alarms, unless the system has a problem where a specific alarm is frequently triggered and thus overshadows other alarms.*

---

3) **Alarm Enabled** Enables the alarm.

4) **Minimum Count** The minimum number of parts that must be inspected before the alarm can be triggered. This prevents the alarm from being triggered too soon, when only a small number of parts may make the statistics trigger the alarm.

5) **Trigger [%]** The percentage of parts inspected that must fail, to trigger the Percent Defects alarm. This number is selectable between zero and 100. The default value is five percent.

(not shown) **Trigger [parts]** [Good Parts alarm] The number of parts (in thousands) that must pass inspection to trigger the alarm.

6) **Audible Enabled** The horn will sound when the alarm is triggered.

6) **Audible Duration** The number of seconds the horn will sound. After this time it will remain on off until the alarm is cleared.

7) **Visual Enabled** The appropriate light tree segment will light when the alarm is triggered.

7) **Visual Duration** The number of seconds the light tree will remain on when the alarm is triggered. After this time it will remain on off until the alarm is cleared.

8) **Color**The appropriate light tree segment will light when the alarm is triggered.

9) Exchange Settings:

Exchange Settings

> *Note: These settings are only used in specific customer sites.*

Less critical alarms are set to Warning. The ready bit is not affected (it remains active) when Warning is selected.

Critical (Linked to System Ready Bit): This signal is tied to a specific output bit on the Embedded I/O. The system is considered to be OK (and this bit is active) when no critical alarms are raised, the system is online, and there is no lost communication.

If any alarms are triggered, or a lane is offline, then the Ready Bit is not active.

---

10) **Alarm Digital Outputs** Select an output (Inspection Alarm 0-14) to be toggled on the optional Extended I/O kit when the alarm is triggered.

Alarm Digital Outputs details

- There are 15 available Inspection Alarm outputs that correspond to the extended I/O signals. Select one of the output numbers to assign the current alarm to an output.
- These outputs go active when the alarm is triggered, and go inactive when the alarm is cleared, provided no other alarm is still active that uses the same output.
- The outputs can be monitored by your plant equipment, such as a PLC, to notify you when certain alarms are triggered.
- See the Intellispec Hardware Guide for information about Extended I/O.

---

11) **Apply Alarm to** Click on additional lanes (if applicable to your system) to simultaneously configure all lanes currently checked in the side list. Any changes to the currently visible settings are reflected in all checked lanes. When you uncheck a lane, the settings remain applied but the unchecked lane will not follow the visible changes anymore. Each alarm has a separate list of simultaneous lanes.

Apply Alarm to - details

"✔ " means the settings are applied to those selections

" * " (asterisk) means the setting for the source differs from the current configuration

---

"≠ " means the settings for the source and alarm differ from the currently visible settings

12) **All Alarms** Select the All Alarms button from an alarm configuration window (Lane, Sensor, Rejector, or Machine Part). See also "All Alarms" on page 77

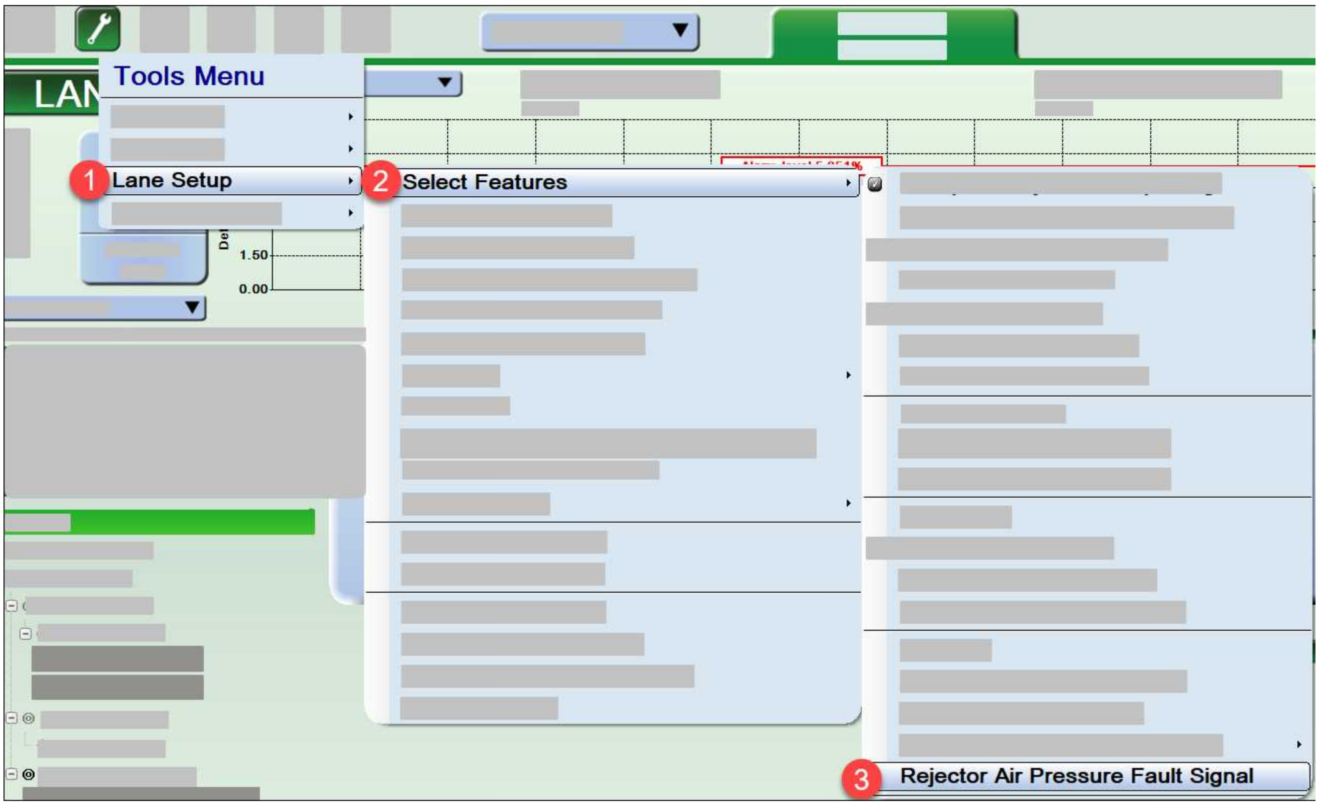
Consecutive Bottles Added Alarm

If Multi-Zone Part Tracking is enabled (through Select Features), then Consecutive Bottles Added is an additional alarm in the Lane Alarm Configuration. If more than 'n' bottles are added to the production line, the alarm is triggered. 'n' = Consecutive Triggers. This helps keeps track of the number of bottles between the part sensors, and triggers the alarm if the number of parts is inconsistent.

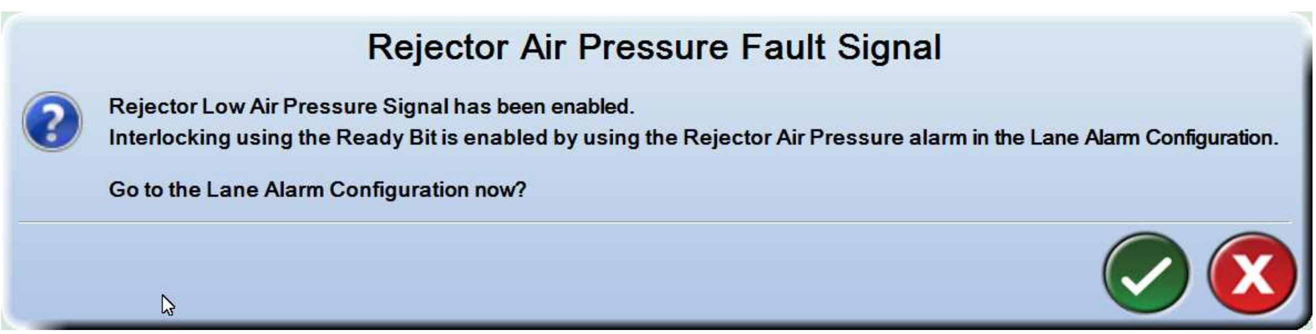
Rejector Air Pressure Fault Signal

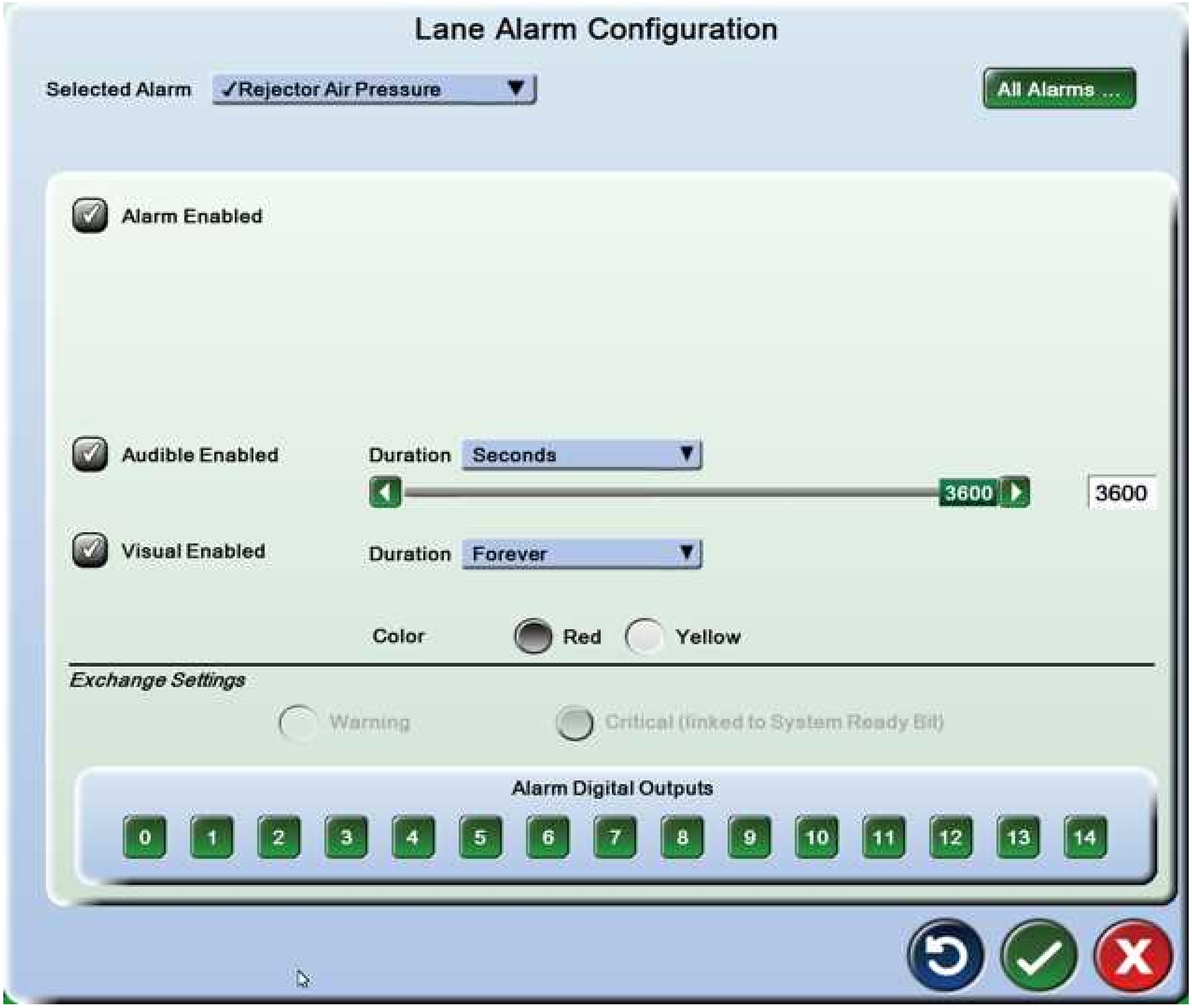
This alarm is used with Filter-Regulator 79854, which is used with some inspection modules. This filter regulator is wired to input IN7 on the extended I/O board. When the air pressure is too low, the switch will trigger the input and set the air pressure alarm. The alarm is automatically cleared when the air pressure returns to normal. The input IN7 is ON when the air pressure is normal. It will turn off when the pressure is too low.

This alarm must be enabled through Select Features. When you enable it, the system prompts you to go to Lane Alarm Configuration.



Checked = enabled





Sensor Alarms - Brief Description

Sensor alarms are configured for each sensor (camera or other sensor).

Alarm	Description	Action	Light Tree[2]
Percent Rejects[1]	**Percent Rejects** This alarm is triggered when the Trigger [%] is exceeded. It will remain triggered until you clear the alarm.	Check the production line to see what might be creating too many bad parts Reset alarm on screen	Red
Excessive Rejects[1]	**Excessive Rejects** This alarm is triggered when Trigger [%] of the last Sample Size parts have been found defective. It will remain triggered until you clear the alarm.	Check the production line to see what might be creating too many bad parts Reset alarm on screen	Red
Excessive Warnings[1]	**Excessive Warnings** This alarm is triggered when Trigger	Check the production line to see what might be cre-	Amber

Alarm	Description	Action	Light Tree[2]
	[%] of the last Sample Size parts have been found with a warning status. It will remain triggered until you clear the alarm. Warnings are enabled in the RetroSpec Options when you are editing an inspection. They can also be enabled in Lane Setup | Select Features.	ating too many bad parts Reset alarm on screen	
Consecutive Defects[1]	**Consecutive Defects** This alarm is triggered when Consecutive Triggers has been exceeded [the sensor had too many consecutive defects]. It will remain triggered until you clear the alarm.	Check the production line to see what might be creating too many bad parts Reset alarm on screen	Red
Mass Lighting	Mass Lighting - This alarm is triggered when the lighting threshold falls below a minimum level.	Clean the mass sensors and emitters Reset alarm on screen	none
System Error[1]	Missed part, missed acquisition, missed result, or other internal error	Reset alarm on screen	Red

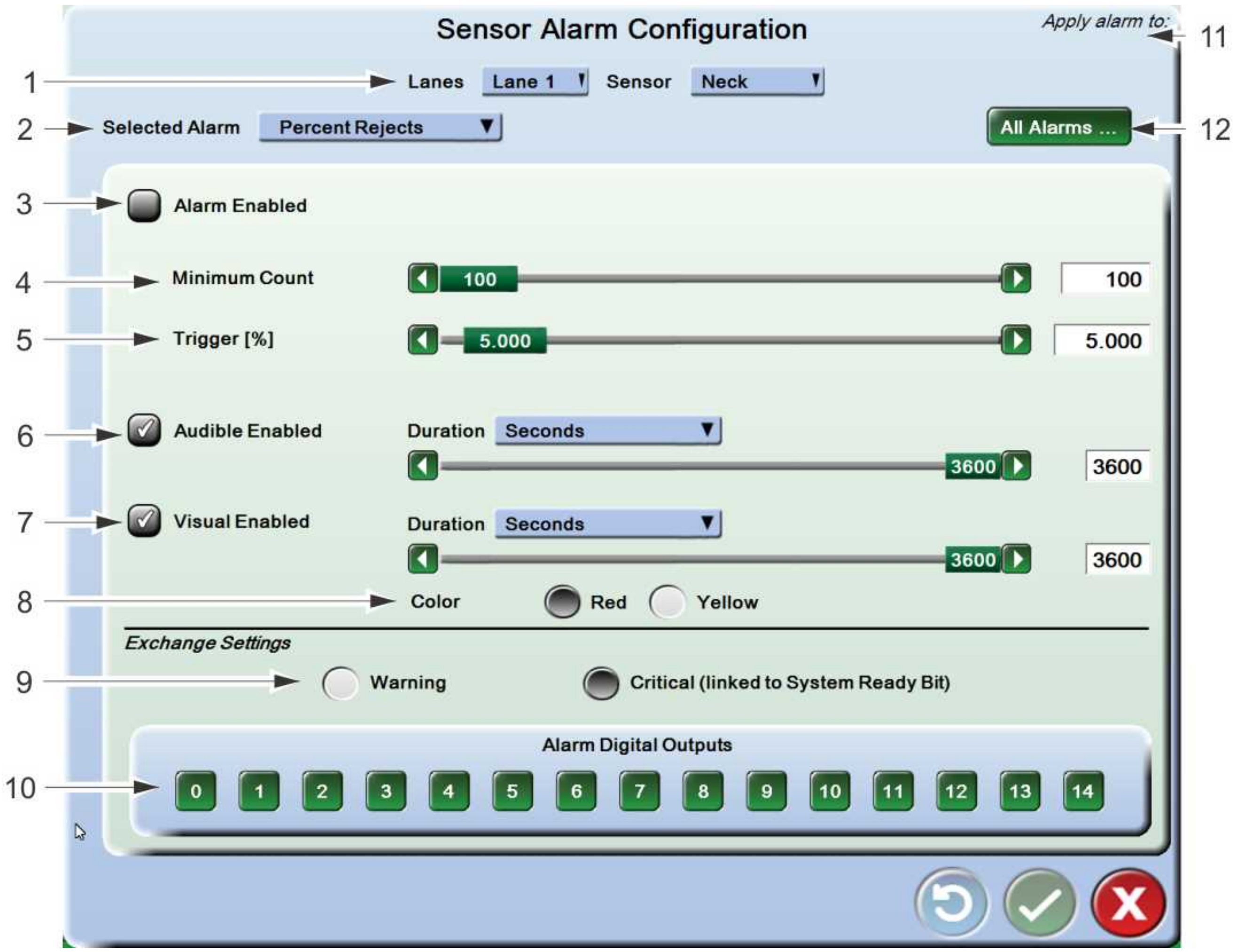
[1] If you want to connect an external monitoring device such as a PLC, an optional Extended I/O board is required for each lane.

[2] The light tree displays this color for the Duration if Visual Enabled.

Sensor Alarm Configuration

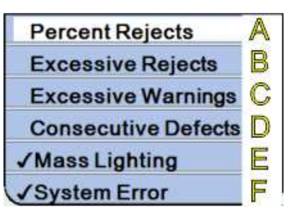
Set up alarms for a Sensor. To get to this menu: From Lane or Sensor Overview mode, select Alarms | Sensor Alarm Configuration. Choose a sensor to configure. You must configure each sensor separately. Select an alarm from the drop-down menu to configure that alarm. Enabled = checked.

> *Some menu items are only available to advanced level users.*



1) Select a lane and sensor to configure.

2) Select an alarm to configure:



A) **Percent Rejects** This alarm is triggered when the Trigger [%] is exceeded. It will remain triggered until you clear the alarm.

B) **Excessive Rejects** This alarm is triggered when Trigger [%] of the last Sample Size parts have been found defective. It will remain triggered until you clear the alarm.

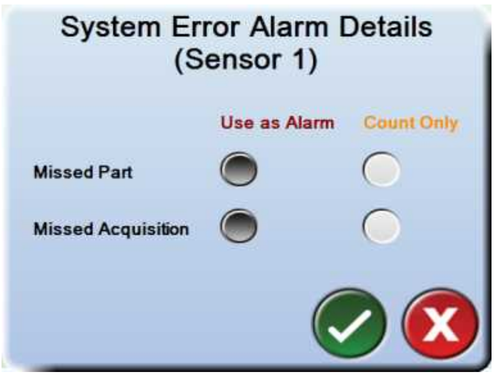
C) **Excessive Warnings** This alarm is triggered when Trigger [%] of the last Sample Size parts have been found with a warning status. It will remain triggered until you clear the alarm. Warnings are enabled in the Retro-Spec Options when you are editing an inspection. They can also be enabled in Lane Setup | Select Features.

D) **Consecutive Defects** This alarm is triggered when Consecutive Triggers has been exceeded [the sensor had too many consecutive defects]. It will remain triggered until you clear the alarm.

E) (only on systems with Mass sensors) **Mass Lighting** This alarm is triggered when, for the given sensor, the backlight measured for the part is below the Alarm Level given in the Mass Lighting dialog.

F) **System Error Alarm** The System Error Alarm cannot be disabled. However, there is a Details button that shows whether it is being used as an alarm. System alarms may be added or subtracted (by Pressco) from the software without notice.

System Error alarm details



These errors are recorded in the Log Reader.

- Missed Part - the inspection was still being processed when the part made it to the reject station
- Missed Acquisition - the system was unable to acquire an image in time. There may be a problem with the camera or with the connection of the camera to the computer.
- Use as Alarm - This is the normal setting.
- Count Only - The selected alarm(s) will count triggers only.
  - The selected alarm(s) will be used as a warning. In the View/Clear Alarms screen, the indicator will be yellow if the alarm is triggered (instead of red).
  - The Count Only alarms will NOT light the light tree, sound the horn, nor cause the flashing ALARM button over the Lane button.
  - A small warning indicator displays over the Alarms button and View/Clear Alarms menu item when one or more count-only alarms have been triggered - in Lane Overview mode only. The warning indicator is not displayed when a regular alarm is already active.

> *We do not recommend using Count Only for any of the System alarms, unless the system has a problem where a specific alarm is frequently triggered and thus overshadows other alarms.*

3) **Alarm Enabled** Enables the alarm.

4) **Minimum Count** The minimum number of parts that must be inspected before the alarm can be triggered. This prevents the alarm from being triggered too soon, when only a small number of parts may make the statistics trigger the alarm.

(not shown) **Sample Size** [Excessive Rejects and Excessive Warnings alarms] The number of parts that must be inspected, to determine the excessive warning percentage. This number is selectable between one and 100,000. The default value is 100. This is a sliding window: for example, assume Sample Size = 1,000 and Percent Trigger = 3. If three percent of the last 1000 parts have had a warning status, the alarm is triggered.

5) **Trigger [%]** The percentage of parts inspected that must fail, to trigger the Percent Defects alarm. This number is selectable between zero and 100. The default value is five percent.

(not shown) **Consecutive Triggers** [Consecutive Defects alarm] The number of defects in a row that must occur to trigger the alarm. This number is selectable between two and 100. The default value is 25.

6) **Audible Enabled** The horn will sound when the alarm is triggered.

6) **Audible Duration** The number of seconds the horn will sound. After this time it will remain on off until the alarm is cleared.

7) **Visual Enabled** The appropriate light tree segment will light when the alarm is triggered.

7) **Visual Duration** The number of seconds the light tree will remain on when the alarm is triggered. After this time it will remain on off until the alarm is cleared.

8) **Color**The appropriate light tree segment will light when the alarm is triggered.

9) Exchange Settings:

Exchange Settings

> *Note: These settings are only used in specific customer sites.*

Less critical alarms are set to Warning. The ready bit is not affected (it remains active) when Warning is selected.

Critical (Linked to System Ready Bit): This signal is tied to a specific output bit on the Embedded I/O. The system is considered to be OK (and this bit is active) when no critical alarms are raised, the system is online, and there is no lost communication.

If any alarms are triggered, or a lane is offline, then the Ready Bit is not active.

10) Alarm Digital Outputs

Alarm Digital Outputs details

- There are 15 available Inspection Alarm outputs that correspond to the extended I/O signals. Select one of the output numbers to assign the current alarm to an output.
- These outputs go active when the alarm is triggered, and go inactive when the alarm is cleared, provided no other alarm is still active that uses the same output.
- The outputs can be monitored by your plant equipment, such as a PLC, to notify you when certain alarms are triggered.
- See the Intellispec Hardware Guide for information about Extended I/O.

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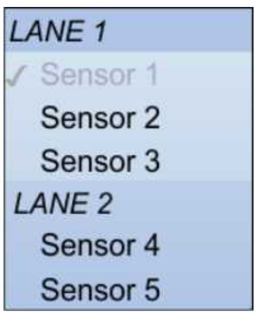
11) **Apply Alarm to** Click on additional sensors to simultaneously configure all sensors currently checked in the side list. Any changes to the currently visible settings are reflected in all checked sensors. When you uncheck a sensor, the settings remain applied but the unchecked sensor will not follow the visible changes anymore. Each alarm has a separate list of simultaneous sensors.

Apply Alarm to - details



- "✔ " means the settings are applied to those selections
- " * " (asterisk) means the setting for the source differs from the current configuration
- "≠ " means the settings for the source and alarm differ from the currently visible settings

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12) **All Alarms** Select the All Alarms button from an alarm configuration window (Lane, Sensor, Rejector, or Machine Part). See also "All Alarms" on page 77

Rejector Alarms - Brief Description

Rejector Alarms are triggered when a part did not get rejected as expected.

Alarm	Description	Action	Light Tree[2]
Jam at Reject Confirm[1]	The reject confirm path has been blocked too long. Works with "Reject Confirm Calibration (Optional)" on page 130	Remove jammed parts at the rejecter, then clear alarm. Reset alarm on screen	Red
Missed Reject[1]	System missed rejecting a part. Works with	Reset alarm on screen	Red

Alarm	Description	Action	Light Tree[2]
	"Reject Confirm Calibration (Optional)" on page 130		
Missed Result[1]	The part reached the rejector before the part was fully inspected and the result was sent to the part tracker. That is, the inspections took too long to run.	If this occurs often, look at the inspection settings. It may be possible to use other settings to reduce inspection time. Reset alarm on screen	Red

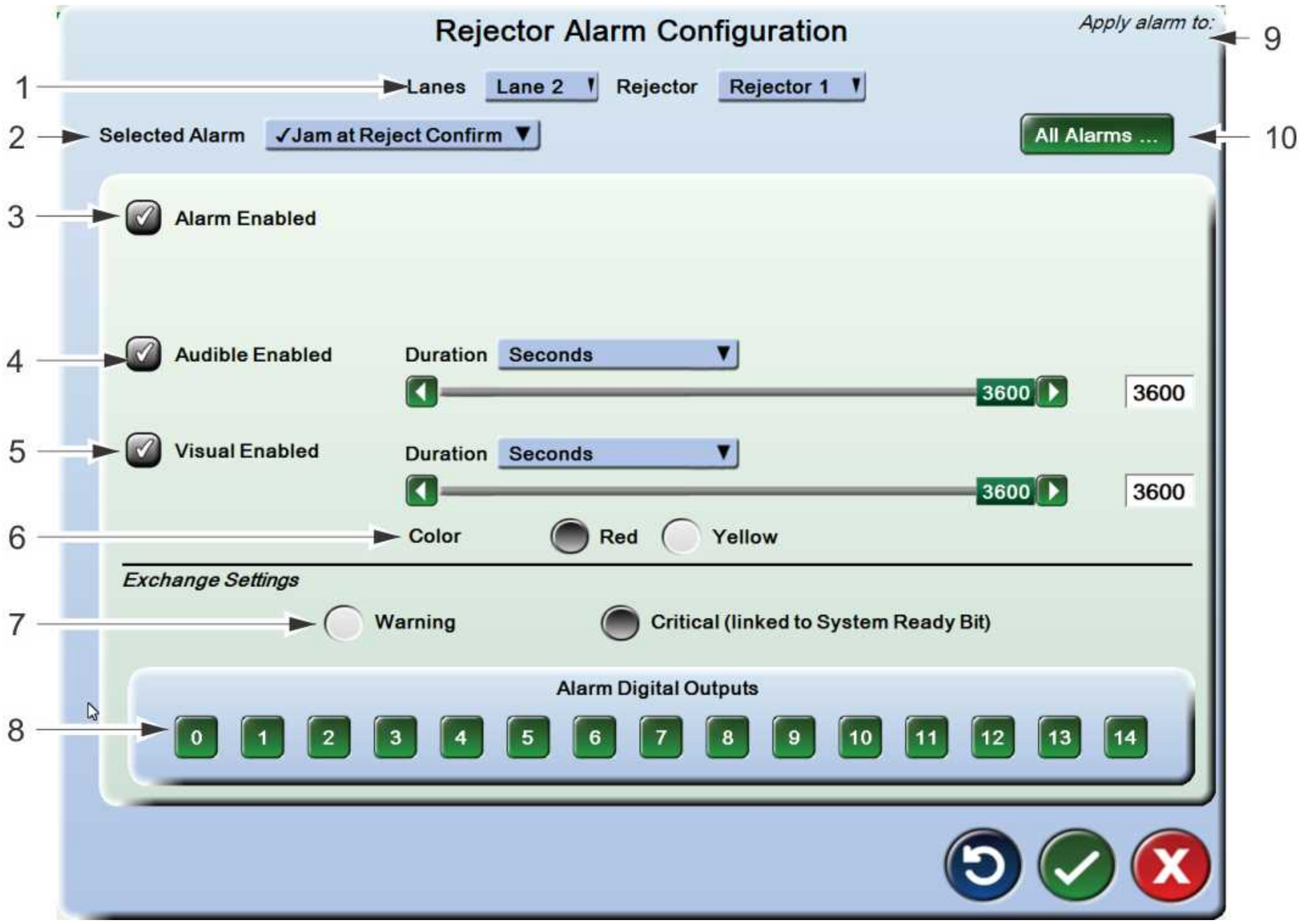
[1] If you want to connect an external monitoring device such as a PLC, an optional Extended I/O board is required for each lane.

[2] The light tree displays this color for the Duration if Visual Enabled.

Rejector Alarms Configuration

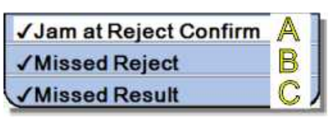
Set up alarms for rejecting. To get to this menu: From Lane Overview mode, select Alarms | Rejector Alarm Configuration. Select an alarm from the drop-down menu to configure that alarm. Enabled = checked.

> *Note: Some menu items are only available to advanced level users.*



1) Select a lane and rejector to apply the current alarm to

2) Selected alarm:



A) **Jam at Reject Confirm** This alarm is used with "Reject Confirm Calibration (Optional)" on page 130. The alarm is triggered when the reject path has been blocked too long.

B) **Missed Reject** This alarm works in conjunction with "Reject Confirm Calibration (Optional)" on page 130. It is triggered when a missed reject occurs. There will be two Missed Reject alarms available if two rejectors are enabled and two Reject Confirm rejectors are enabled.

C) **Missed Result** This signal is triggered if a part reaches the rejector without the part tracker having received the reject/not-reject command, determined by the inspection results. That is, the inspections took too long to run.

3) **Alarm Enabled** Enables the alarm.

4) **Audible Enabled** The horn will sound when the alarm is triggered.

4) **Audible Duration** The number of seconds the horn will sound. After this time it will remain on off until the alarm is cleared.

5) **Visual Enabled** The appropriate light tree segment will light when the alarm is triggered.

5) **Visual Duration** The number of seconds the light tree will remain on when the alarm is triggered. After this time it will remain on off until the alarm is cleared.

6) **Color**The appropriate light tree segment will light when the alarm is triggered.

7) Exchange Settings:

Exchange Settings

> *Note: These settings are only used in specific customer sites.*

Less critical alarms are set to Warning. The ready bit is not affected (it remains active) when Warning is selected.

Critical (Linked to System Ready Bit): This signal is tied to a specific output bit on the Embedded I/O. The system is considered to be OK (and this bit is active) when no critical alarms are raised, the system is online, and there is no lost communication.

If any alarms are triggered, or a lane is offline, then the Ready Bit is not active.

---

8) **Alarm Digital Outputs** Select an output (Inspection Alarm 0-14) to be toggled on the optional Extended I/O kit when the alarm is triggered.

Alarm Digital Outputs details

- There are 15 available Inspection Alarm outputs that correspond to the extended I/O signals. Select one of the output numbers to assign the current alarm to an output.
- These outputs go active when the alarm is triggered, and go inactive when the alarm is cleared, provided no other alarm is still active that uses the same output.
- The outputs can be monitored by your plant equipment, such as a PLC, to notify you when certain alarms are triggered.
- See the Intellispec Hardware Guide for information about Extended I/O.

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9) Apply Alarm to: details

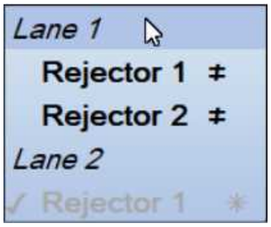
Click on additional rejectors (if applicable to your system) to simultaneously configure all rejectors currently checked in the side list. Any changes to the currently visible settings are reflected in all checked items. When you uncheck a rejector, the settings remain applied but the unchecked rejector will not follow the visible changes anymore. Each alarm has a separate list of simultaneous rejectors.

"✔ " means the settings are applied to those selections

" * " (asterisk) means the setting for the source differs from the current configuration

"≠ " means the settings for the source and alarm differ from the currently visible settings

The options available are based on your system configuration, and may be different than shown here.



10) "All Alarms" on page 77

Machine Part Alarms - Brief Description

Machine Part alarms are the correlation-based alarms. They are visible only if your system has correlation sensors installed.

> *Note: for Machine Part Alarms, except Correlation Out of Range, statistics apply to each correlation value separately. That is, if one of 100 machine parts fails at 100 percent, the detected percentage is 100 percent while overall it would be 1 percent.*

Alarm	Description	Action	Light Tree[2]
Percent Rejects[1]	**Percent Rejects** This alarm is triggered when the Trigger [%] is exceeded. It will remain triggered until you clear the alarm.	Check the production line to see what might be creating too many bad parts Reset alarm on screen	Red
Excessive Rejects[1]	**Excessive Rejects** This alarm is triggered when Trigger [%] of the last Sample Size parts have been found defective. It will remain triggered until you clear the alarm.	Check the production line to see what might be creating too many bad parts Reset alarm on screen	Red
Excessive Warnings[1]	**Excessive War-ings** This alarm is triggered when Trigger [%] of the last Sample Size parts have been found with a warning status. It will remain triggered until you clear the alarm. Warnings are enabled in the Retro-Spec Options when you are editing an inspection. They can also be enabled in Lane Setup | Select Features.	Check the production line to see what might be creating too many bad parts Reset alarm on screen	Amber

Alarm	Description	Action	Light Tree[2]
Consecutive Defects[1]	**Consecutive Defects** This alarm is triggered when Consecutive Triggers has been exceeded [the sensor had too many consecutive defects]. It will remain triggered until you clear the alarm.	Check the production line to see what might be creating too many bad parts Reset alarm on screen	Red
Correlation Out of Range	Correlation Out of Range - This alarm is triggered if the part tracker counts a machine part that was not configured.	Reset alarm on screen	Red

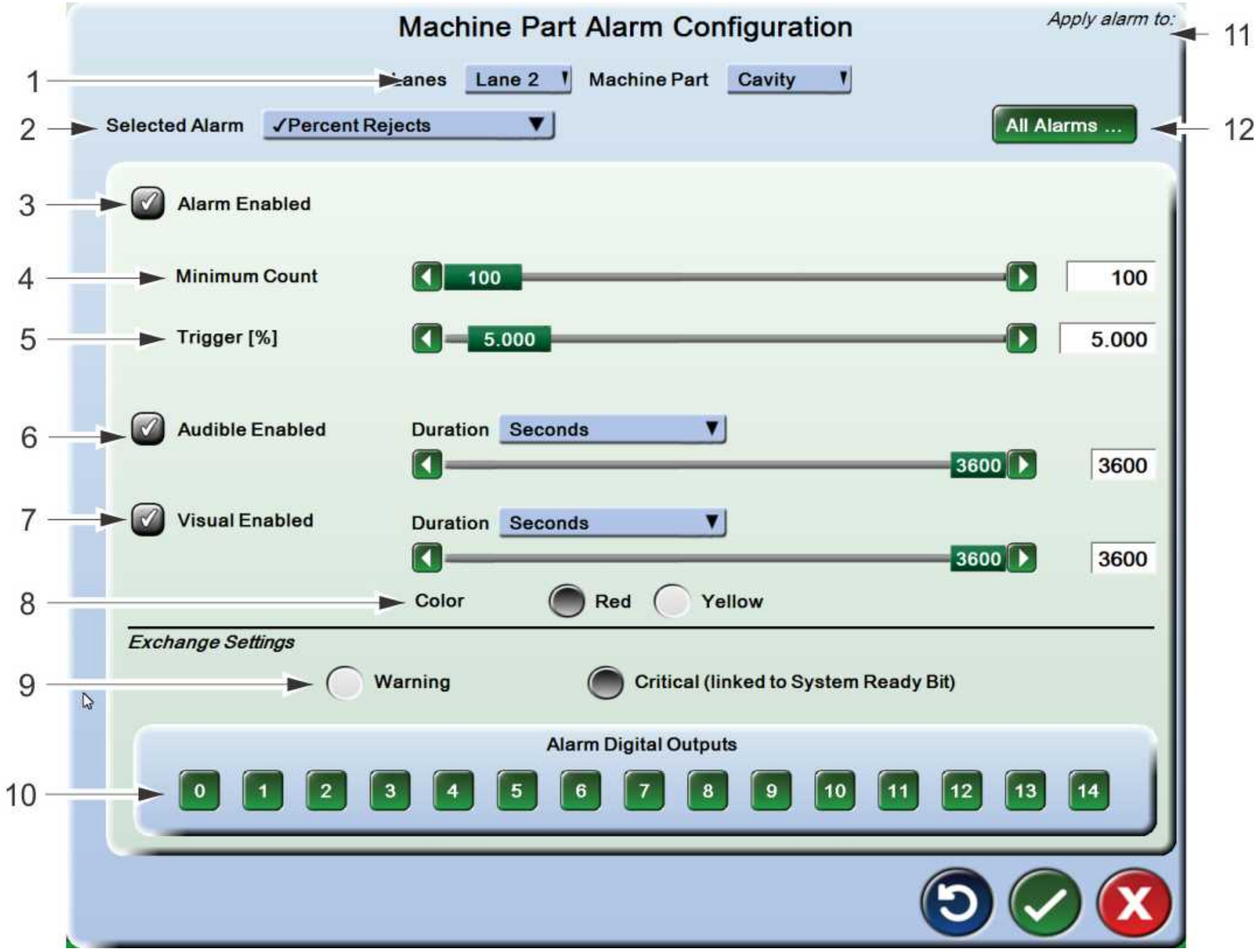
[1] If you want to connect an external monitoring device such as a PLC, an optional Extended I/O board is required for each lane.

[2] The light tree displays this color for the Duration if Visual Enabled.

Machine Part Alarms Configuration

 Set up alarms for machine parts. To get to this menu: From Lane Overview mode, select Alarms | Machine Part Alarm Configuration. Select an alarm from the drop-down menu to configure that alarm. Enabled = checked.

> *Note: Some menu items are only available to advanced level users.*



1) **Lane and Machine Part** Select the lane and machine part to apply an alarm to

2) Selected Alarm:

A) **Percent Rejects** This alarm is triggered when the Trigger [%] is exceeded. It will remain triggered until you clear the alarm.

B) **Excessive Rejects** This alarm is triggered when Trigger [%] of the last Sample Size parts have been found defective for a correlation value. It will remain triggered until you clear the alarm.

C) **Excessive Warnings** This alarm is triggered when Trigger [%] of the last Sample Size parts for a correlation value have been found with a warning status. It will remain triggered until you clear the alarm. Warnings are enabled in the Retro-Spec Options when you are editing an inspection. They can also be enabled in Lane Setup | Select Features.

D) **Consecutive Defects** This alarm is triggered when Consecutive Triggers has been exceeded [the correlation value had too many consecutive defects]. It will remain triggered until you clear the alarm.

E) **Correlation Out of Range** This alarm is triggered if the part tracker counts a machine part that was not configured. For example, if you configure 24 cavities, normally the part tracker counts 22, 23, 24, 1, 2, etc. If the part tracker sees 24, 25, 1, 2 then 25 is out of range. In "Machine Part Correlation" on page 471, you set a number of machine part items (Number) for each machine part. The part tracker continuously increases a counter for each machine part until it sees an index pulse, which resets the counter. When the counter runs longer than the “Number” configured, the correlation is out of range – the part tracker reports a machine part that does not exist (assuming the original configuration matches the physical number of machine parts).

3) **Alarm Enabled** Enables the alarm.

4) **Minimum Count** The minimum number of parts that must be inspected before the alarm can be triggered. This prevents the alarm from being triggered too soon, when only a small number of parts may make the statistics trigger the alarm.

5) **Trigger [%]** For a correlation value, the percentage of parts inspected that must fail, to trigger the Percent Defects alarm. This number is selectable between zero and 100. The default value is five percent.

6) **Audible Enabled** The horn will sound when the alarm is triggered.

6) **Audible Duration** The number of seconds the horn will sound. After this time it will remain on off until the alarm is cleared.

7) **Visual Enabled** The appropriate light tree segment will light when the alarm is triggered.

7) **Visual Duration** The number of seconds the light tree will remain on when the alarm is triggered. After this time it will remain on off until the alarm is cleared.

8) **Color**The appropriate light tree segment will light when the alarm is triggered.

9) Exchange Settings:

Exchange Settings

> *Note: These settings are only used in specific customer sites.*

Less critical alarms are set to Warning. The ready bit is not affected (it remains active) when Warning is selected.

Critical (Linked to System Ready Bit): This signal is tied to a specific output bit on the Embedded I/O. The system is considered to be OK (and this bit is active) when no critical alarms are raised, the system is online, and there is no lost communication.

If any alarms are triggered, or a lane is offline, then the Ready Bit is not active.

---

10) **Alarm Digital Outputs** Select an output (Inspection Alarm 0-14) to be toggled on the optional Extended I/O kit when the alarm is triggered.

Alarm Digital Outputs details

- There are 15 available Inspection Alarm outputs that correspond to the extended I/O signals. Select one of the output numbers to assign the current alarm to an output.

- These outputs go active when the alarm is triggered, and go inactive when the alarm is cleared, provided no other alarm is still active that uses the same output.
- The outputs can be monitored by your plant equipment, such as a PLC, to notify you when certain alarms are triggered.
- See the Intellispec Hardware Guide for information about Extended I/O.

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11) **Apply Alarm to** Click on additional machine parts (if applicable to your system) to simultaneously configure all machine parts currently checked in the side list. Any changes to the currently visible settings are reflected in all checked items. When you uncheck a machine part, the settings remain applied but the unchecked machine part will not follow the visible changes anymore. Each alarm has a separate list of simultaneous machine parts.

11) Apply Alarm to - details

"✔ " means the settings are applied to those selections

" * " (asterisk) means the setting for the source differs from the current configuration

"≠ " means the settings for the source and alarm differ from the currently visible settings

The options available are based on your system configuration, and may be different than shown here.

---

12) "All Alarms" below

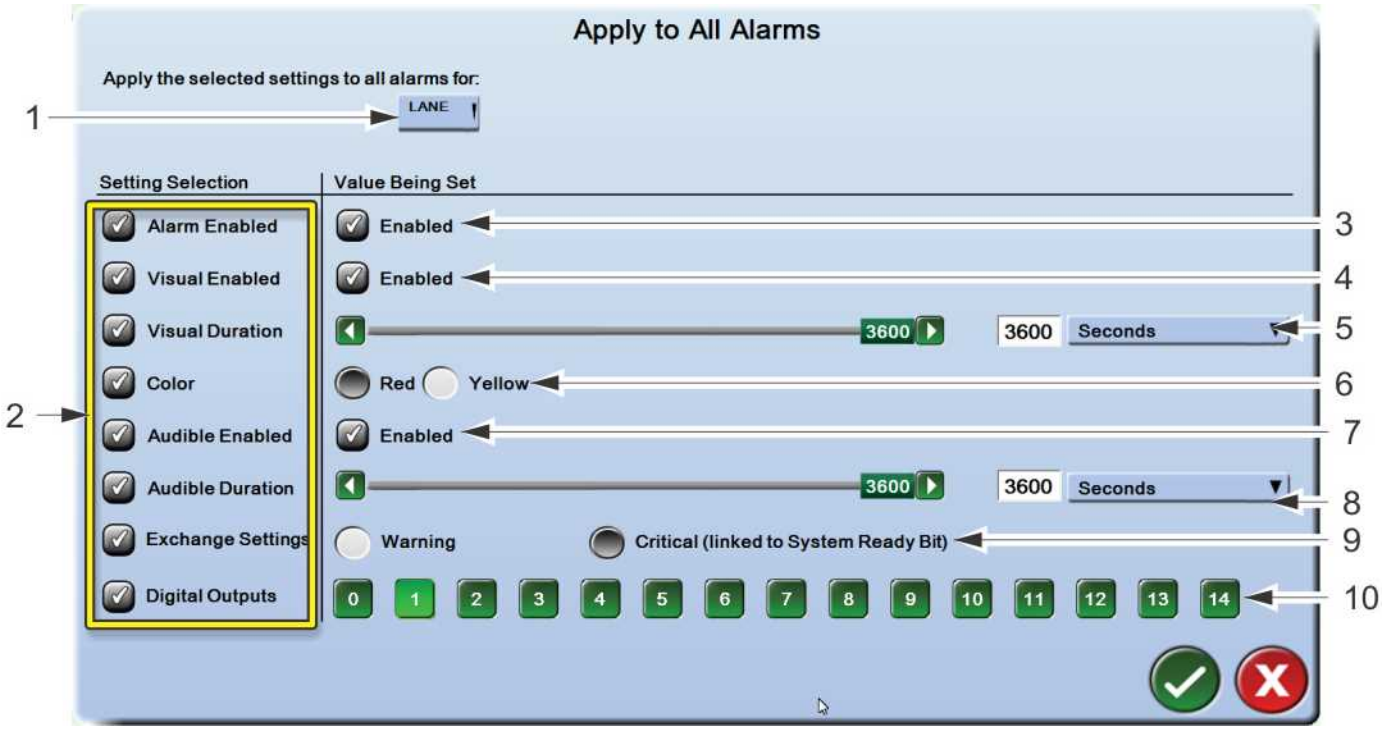
All Alarms

All Alarms button from an alarm configuration window

Apply the same settings to all alarms on one or all lanes and one or all sources (Sensors, Rejectors, or Machine Parts). For example, you may always want to use the same Visual Duration for all Sensor alarms. This screen applies that setting. (You still have to do it separately for each source type: Lane, Sensor, Rejector, Machine Part.)

Example 1

In the example below, everything is enabled. When we apply the changes, all of the lane alarms will be enabled, and all the values shown in the right column will be applied.



1) Select the item(s) for which the alarms settings will be applied (Lane, Sensor, Rejector, or Machine Part). More than one drop-down menu may be shown, depending on your configuration.

Checked = enabled

2) **Setting Selection** select which settings you want to apply to all alarms for the alarm sources selected in 1). If a box is unchecked, the setting is NOT applied to any alarm and remains unchanged when you select OK.

Value Being Set column contains the value of the setting to apply.

3) **Alarm Enabled** Value “Enabled” = enables all selected alarms.

4) **Visual Enabled** Value “Enabled” = The appropriate light tree segment will light for any alarm for the selected alarm sources when triggered.

5) **Visual Duration** Value = The number of seconds the light tree will remain on when the alarm is triggered. After this time it will remain on off until the alarm is cleared.

6) **Color**The appropriate light tree segment will light when the alarm is triggered.

7) **Audible Enabled** Value “Enabled” checked (unchecked) = The horn will sound (not sound) for any alarm for the selected alarm sources when triggered.

8) **Audible Duration** Value = The number of seconds the horn will sound. After this time it will remain on off until the alarm is cleared.

9) Exchange Settings:

Exchange Settings

> *Note: These settings are only used in specific customer sites.*

Less critical alarms are set to Warning. The ready bit is not affected (it remains active) when Warning is selected.

Critical (Linked to System Ready Bit): This signal is tied to a specific output bit on the Embedded I/O. The system is considered to be OK (and this bit is active) when no critical alarms are raised, the system is online, and there is no lost communication.

If any alarms are triggered, or a lane is offline, then the Ready Bit is not active.

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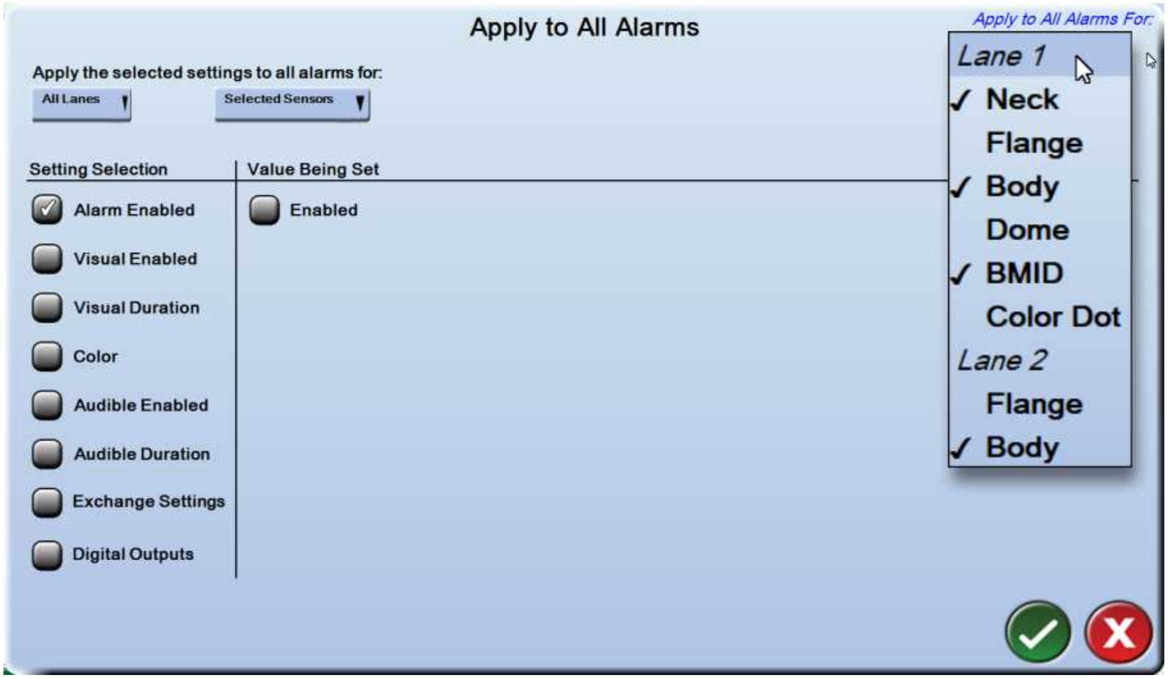
10) Alarm Digital Outputs

Alarm Digital Outputs details

- There are 15 available Inspection Alarm outputs that correspond to the extended I/O signals. Select one of the output numbers to assign the current alarm to an output.
- These outputs go active when the alarm is triggered, and go inactive when the alarm is cleared, provided no other alarm is still active that uses the same output.
- The outputs can be monitored by your plant equipment, such as a PLC, to notify you when certain alarms are triggered.
- See the Intellispec Hardware Guide for information about Extended I/O.

Example 2

If we only check Alarm Enabled in the Apply Setting column, then only the state of the Enabled checkbox in the Value column would be applied. In this example, after clicking the OK button, all alarms would be disabled for the Neck, Body, BMID, and Lane 2 Body sensors. No other alarm settings would change.



Exclamation Sign or Warning Displayed on Alarms Button

If you see a small exclamation sign over the Alarms button, this means that a count-only alarm was triggered. See:

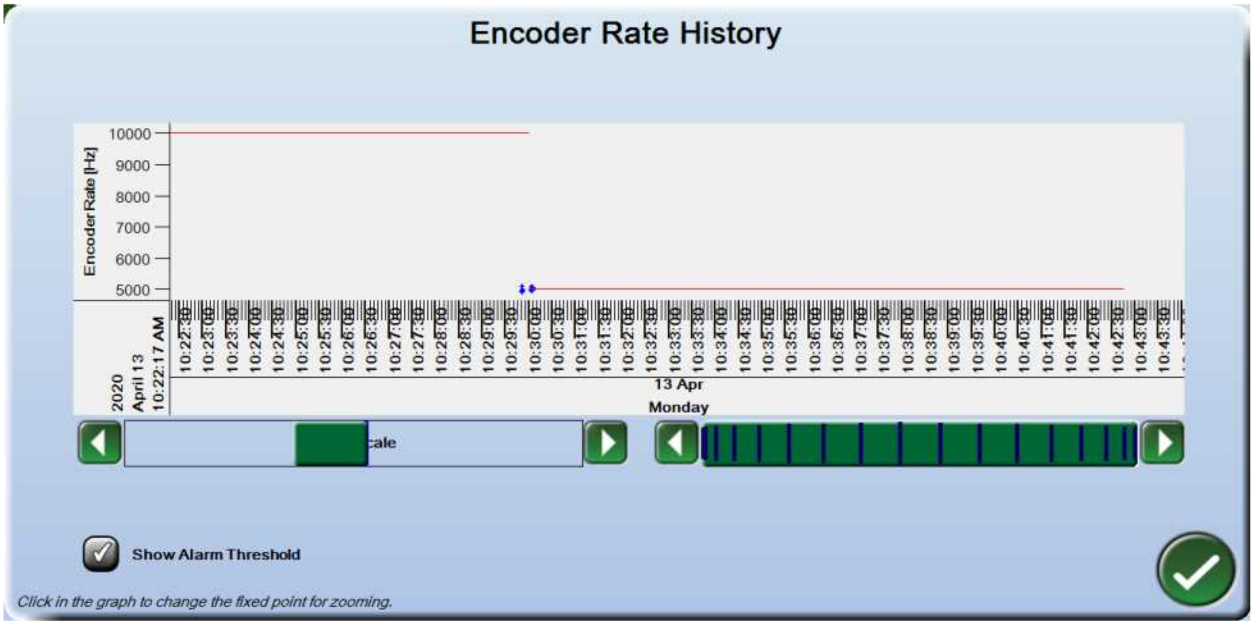
- Lane Alarm Configuration - Lane Alarm Configuration
- System Error alarm details - Sensor Alarm Configuration
- Missed Reject / Missed Result in Rejector Alarms - Configuration (Details button next to Alarm Enabled, which cannot be modified for these alarms).

Encoder Rate Alarm

This alarm is raised when the encoder rate exceeds a threshold. You can also “see” the encoder rates from this alarm. This feature is available in Intellispec software versions 5.6.017, 5.7.025, 6.0.029 and later.

The Encoder Alarm is a System Error alarm. You can click on the LED of the alarm to get more details.

If the alarm is active you can Show Encoder Rates.



Here you can view the recent encoder rates and alarm thresholds. The blue marks in the graph are the encoder rates, the red lines are the alarm thresholds.

You can change the time scale by using the slider to the left to see older data. When changing the time scale, the Fixed Point remains at the same place in the graph. You can change this point by clicking inside the graph. The wheel allows moving the data left and right without changing the scale.

Background information

If the encoder rate is too high, it may cause the part tracker to crash, resulting in the following message:

The part tracker and system both need to be shut down and reset, which causes downtime.

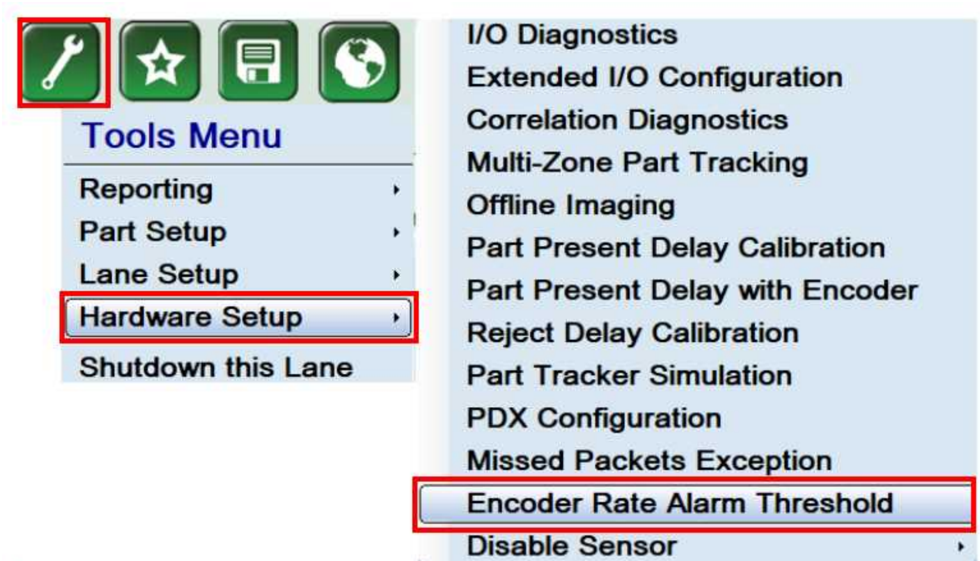
This can happen if:

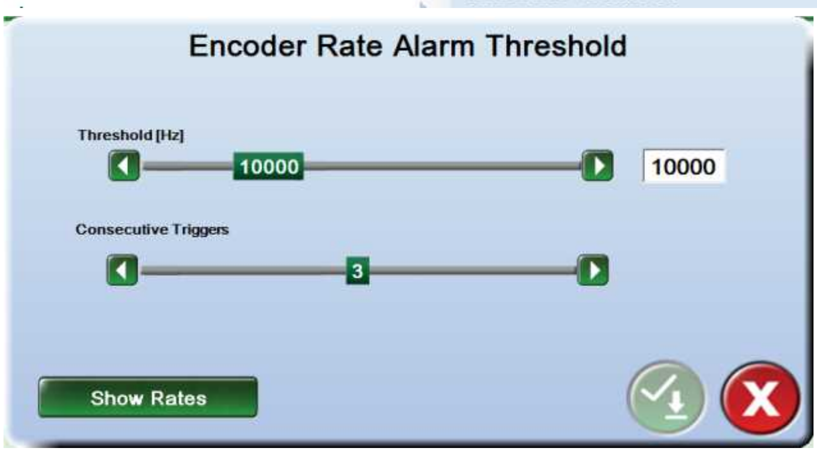
- the encoder has too high a resolution for the normal part rate, or
- the part rate (for the current encoder resolution) exceeds a threshold rate that the part tracker cannot handle.

To allow intervention before this happens, the system has a System Error Alarm of type “Encoder Rate Too High.”

Setting the threshold

 To set the threshold, go to Lane Overview | Tools | Hardware Setup | Encoder Rate Alarm Threshold. Any user can view the settings. To change settings, you need "Alarm Configuration" user permission. See "Edit Permissions" on page 466





The default threshold is 10,000 Hz. If you increase the alarm threshold, you may exceed the part tracker's capacity without getting an alarm. This requires a system restart.

You should only adjust the rate when advised by Pressco technical support, or when experience has demonstrated that your system can handle a somewhat higher rate, and you don’t want the alarm to be raised at this higher rate.

> *Note: the actual rate the part tracker can handle depends on the number of sensors; so if cameras are added later to the system, the required threshold may change.*

Chapter 7 Tools Menu

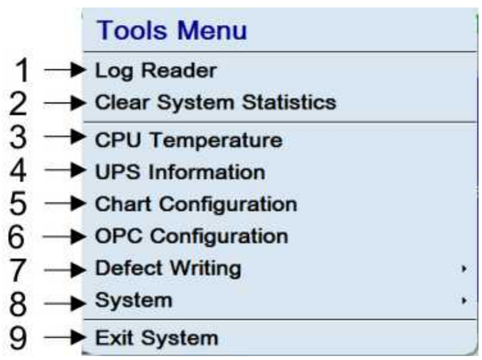
This section covers the tools menus that are available through System Overview or Lane/Sensor Overview modes.

> *Note: Items may be grayed out if your user account does not have permissions.*

Tools menu - System Overview Screen

To get to this menu: Select the Home button | Tools.

> *Note: Some menu items are only available to advanced level users.*



1 - **Log Reader** Open the Intellispec log (see also "Log Reader" on page 41)

2 - **Clear System Statistics** Clear the entire system statistics (all Lanes)

3 - **CPU Temperature** If a multiple core computer is used, the highest temperature is displayed. If the shutdown CPU temperature is reached, the Intellispec system shuts down.

4 - **UPS Information** Display Uninterruptible Power Supply (UPS) information and settings

5 - **Chart Configuration** Choose the Trend Graph type and the number of points for the chart in the System Overview Screen

6 - **OPC Configuration**[Only if OPC option is installed and enabled] The OPC Configuration screen provides access and settings to the OPC server. "OPC Configuration" on page 574

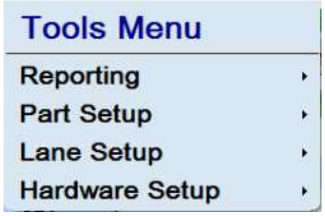
7- **Defect Writing** [Only if Defect Database option is installed and enabled] Enable or disable defect recording for multiple lanes.

6 - **System** Set system date and time or set up a printer

7 - **Exit System** Shut down Intellispec software

Tools Menu - Lane Overview and System Overview Screens

From Lane or Sensor Overview mode, select Tools.



"Reporting" on page 35

"Part Setup" on page 86

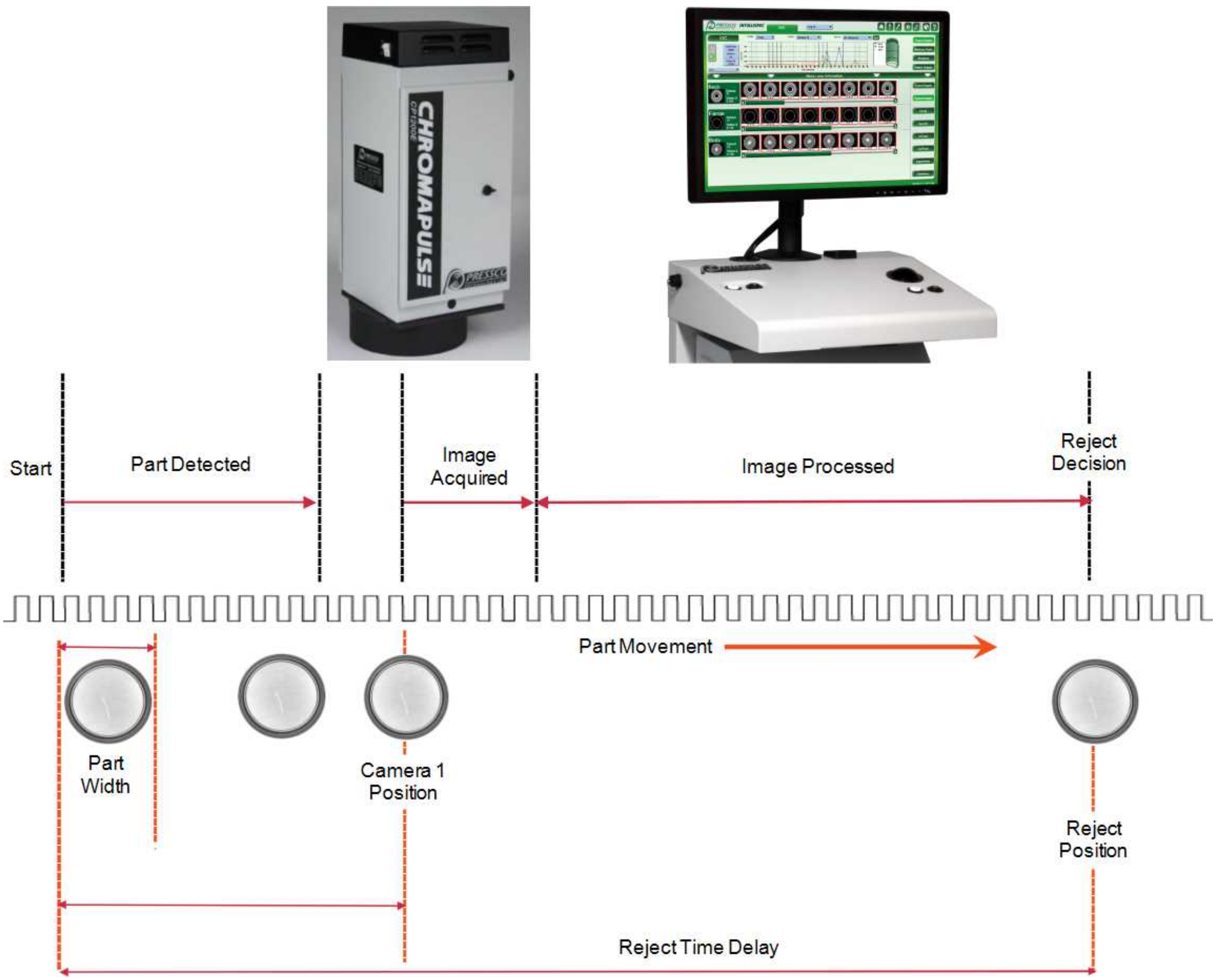
"Lane Setup" on page 470

"Hardware Setup" on page 475

Chapter 8 Part Setup and Tracking

Sequence of Events During Inspection

This illustration shows a typical inspection sequence of events. Note that your system configuration may involve more components, and may be different than pictured here.

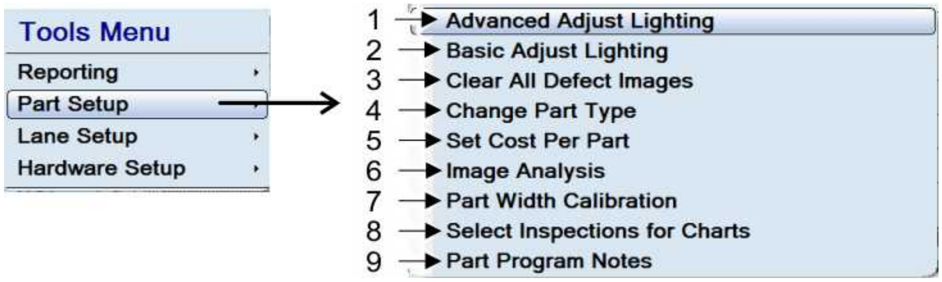


Part Setup

The Part Setup menu provides access to lighting, part display options in charts, and part width calibration.

> *Note: Some menu items are available to advanced users only*

To get to this menu: From Lane Overview mode, select Tools | Part Setup.



1 - "Advanced Adjust Lighting" on page 145

2 - "Basic Adjust Lighting" on page 143

3 - **Clear All Defect Images** Clear images from the Reject Images buffer.

4 - **Change Part Type** Select the type of part to be displayed on the Walk By Graphic for the current lane.

5 - **Set Cost Per Part** Set the cost of each product, to be used with the "Defect Cost" trend chart.

6 - **Image Analysis** Determine the gray shade value for any pixel or group of pixels in your image. "Image Analysis" on page 150

7 - **Part Width Calibration** Set the number of encoder ticks that the part detect sensor "sees" the part. "Part Width Calibration" below

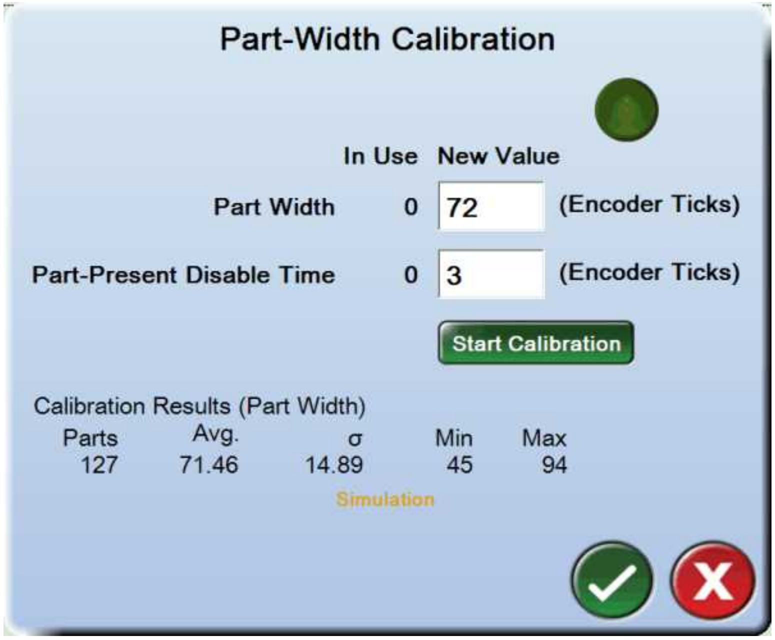
8 - **Select Inspections For Charts** Select which inspections (up to 8) to display on the Trend Chart and Timing Trend.

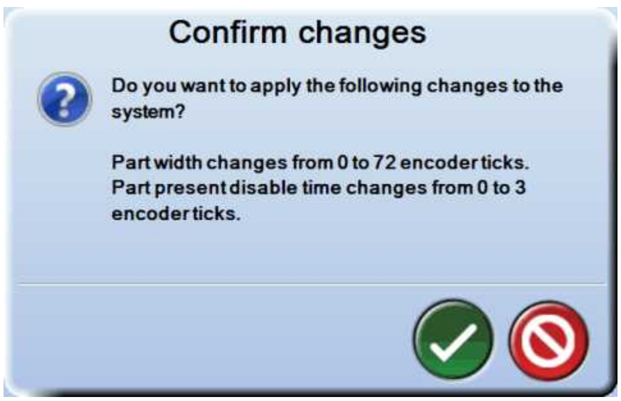
9 - **Part Program Notes** Add setup and program information about the part. This is helpful if you need to modify the part program later.

Part Width Calibration

Part Width is the number of encoder ticks that the part detect sensor "sees" the part. To perform the calibration you must be running parts past the part detect sensor.

> *Note: For systems using a PDX, the Part Width Calibration is not used, but values of 0 and 1 should be used respectively for Part Width and Part Present Disable Time.*





To calibrate the Part Width:

1. From Sensor Overview mode, right-click a sensor button | Part Tracking | Part Width Calibration.
2. With parts running under the camera or sensor, select Start Calibration. As each part goes by its width is displayed in Part Width field.
3. After a sufficient number of parts have gone by (we recommend about 10 parts), select "Stop Calibration" (same button as Start Calibration). This will display the calibration results in the lower part of the screen.
4. Examine the results; look for the minimum and maximum values to be within approximately 10 encoder ticks of each other. If the results are acceptable select OK to save the data. If the results are skewed, recalibrate the part width. To exit without saving the changes, select the exit button.
5. The system will prompt you to confirm your changes. If the results are acceptable select OK to save the data. If the results are skewed, select the cancel button and recalibrate.

Part Present Delay Calibration

Part Present Delay The distance (in encoder ticks) from the part detect sensor to the camera centerline. If a PDX is used, this is the number of encoder ticks from the part detect pulse out of the PDX to the camera centerline. Two signals are generated: 1) light strobe and 2) camera snap.

> *Note: if your system is using a PDX, set up PDX Configuration before Part Present Delay.*

Part Present Delay ensures that your part is in the center of the camera's image. Depending on the orientation of your camera, your part could be moving from left to right, right to left, top to bottom or bottom to top.

For an illustration of Part Present Delay within the inspection process, refer to the "Sequence of Events During Inspection" on page 86.

> *Note: you may be able to get images by using a part present delay that does not correspond to the part at the part detect – for example you may see the part right before or after the correct part by shifting the delay by the separation between parts.*

For sensors that are far from the part detect it may appear convenient to use a shorter delay, taking images of parts tens or hundreds of parts ahead of the correct one. If you do so, certain functionality of the system will not work anymore, such as the ability to detect empty pockets. This may result in incorrect statistics being reported.

Even if you are unsure what the Part Present Delay value should be, you can view the strobing of the lights. If Part Present Delay is too short, the lights will strobe before the part reaches the camera. If Part Present Delay is too long, the lights will strobe after the part has passed the camera.

When the part is close enough to be in the image, you can use the image itself to center the part. A Part Present Delay calibration needs to be done for each camera in the system.

When you calibrate the Part Present Delay, it is ideal to only use one part at a time. Otherwise, it will not be easy to determine if the part detected is actually the same part in the image or the part rejected (for Reject Delay) since all the parts look alike. If it is not possible to use only one part, an alternative is to use a different color part. You will most likely use a few parts to test the calibration, or run the same part through several times.

> *Note: you must be logged in with proper user access to calibrate the Part Present Delay.*

To calibrate the Part Present Delay:

1. From Sensor Overview mode, right-click a sensor button | Part Tracking | Part Present Delay Calibration.
2. Select the Start Calibration button.
3. Place a part onto the conveyor or into the part stream. The part will trigger the part detect sensor, then the system will count the number of encoder ticks and take a picture.
4. Manually adjust the part present delay (encoder ticks) value until the image is centered every time a part is run through the system.
5. When completed, select the Stop Calibration button. The Part Present Delay calibration value is saved and stored in a Lane configuration file.
6. Select the OK button to save changes and exit.

Advanced Settings

> *Note: Advanced settings are normally set at the Pressco factory. You should not need to adjust them. Normal settings are listed below.*

These settings apply only to Base and Neck camera types.

Camera	Strobe Delay	Trigger Delay	Part Present Delay
Base	5	0	same as Neck
Neck	5	30	same as Base

Also check "Advanced Lighting Software - Set Delays" on page 148 - set delay to make sure that the Neck lighting delays are set correctly.

Part Present Delay with Encoder

This tool provides a rough calibration of the part present delay by using encoder counts. You can fine tune the calibration using the "Part Present Delay Calibration" on page 89 tool. Up to eight buttons (sensors) may be displayed on this screen, depending on your system configuration. Each part present delay is set separately, unless the sensors use the same sensor trigger (as in Base/Neck modules).

To set the Part Present Delay with Encoder:

1. Run the conveyor or machine slowly or by hand, and place a part before the part present sensor.
2. When the part reaches the part present sensor, and you see the Part Present LED flash on the inspection module or cluster box I/O box, select the Reset button to set the encoder count to zero.
3. Select the Start button to begin counting encoder ticks.

4. Run the conveyor slowly so that the part passes in front of or underneath the sensor.
5. When the part reaches the sensor, select the Stop button to stop counting encoder ticks.
6. Select a sensor button [example: Neck or Dome] to apply the encoder counter to the sensor's Part Present Delay value.
7. Repeat this process for the remaining sensors.
8.  Select the OK button to save changes and exit.

Encoder Counts The encoder count from the part tracker board. The board continually counts, and restarts at zero when you press the Reset button.

Start button Begin displaying encoder ticks.

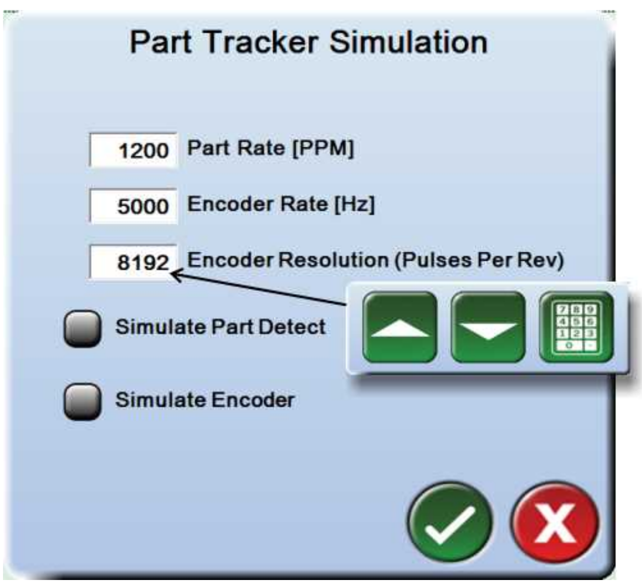
Stop button Stop updating the encoder tick display. The part tracker will remain counting, but the display will stop updating.

Reset button Reset the part tracker board encoder count.

Part Tracker Simulation

Used for troubleshooting. A simulated part rate allows inspection to continue.

 To get to this screen: From Lane or Sensor Overview mode, select Tools | Hardware Setup | Part Tracker Simulation. Select the desired check box(es) and then enter the desired values.



Part Rate Enter a simulated part rate in parts per minute (PPM).

Encoder Rate and Resolution Enter the simulated encoder properties.

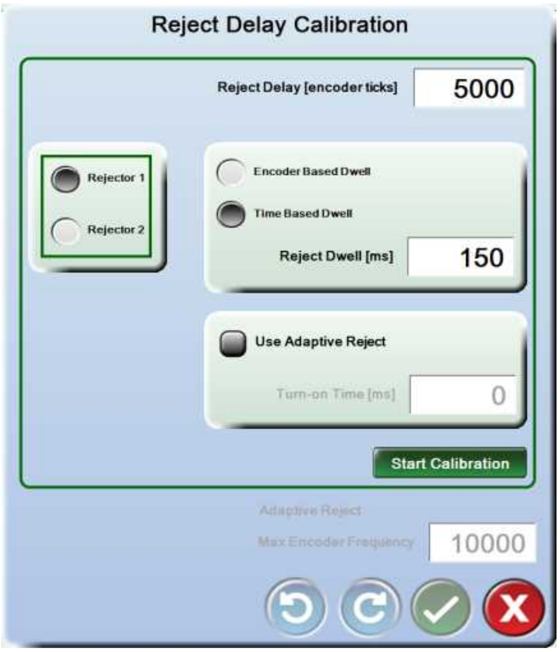
> *Note: the system cannot run in both PDX mode and Part Tracker Simulation mode at the same time. If one mode is already running and you enable the other mode, the system displays a warning that the latest setting will override the previous mode.*

Reject Delay Calibration

Calibrate the distance (in encoder ticks) from the part detect sensor to the rejector. This ensures that the correct part is rejected.

During Reject Delay calibration, the reject device will activate for each part. After calibration, ensure that adjacent parts are not being rejected (example, from too long a reject dwell time), nor being knocked off by the rejected part.

For an illustration of the Reject Time Delay within the inspection process, refer to the "Sequence of Events During Inspection" on page 86.



Note: you must be logged in with proper user access to calibrate Reject Delay.

To calibrate the Reject Delay:

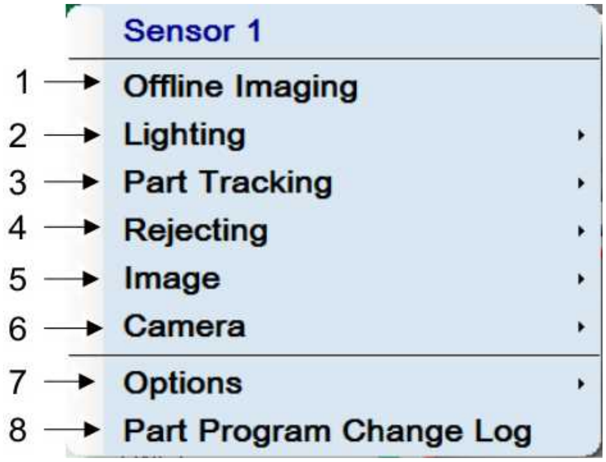
1. From Sensor Overview mode, right-click a sensor button | Rejecting | Reject Delay Calibration.
2. Select the Start Calibration button.
3. Place a part on the running conveyor or into the part stream. After the number of encoder ticks shown in the Reject Delay box, the rejector will be activated.
4. Make sure the correct part was rejected.
5. Continue to insert parts into the part stream.
6. Manually adjust the reject delay (encoder ticks) until the correct part is rejected every time.
7. Adjust Reject Dwell so that it is long enough to completely reject the part, and short enough that only one part is rejected for each reject pulse.
8. When completed, select the Stop Calibration button. The Reject values are saved and stored in a Lane configuration file.
9.  Select the OK button to save changes and exit.

Reject Dwell The duration of the reject signal. Dwell can be set by encoder ticks or by milliseconds. Select the correct button for your application. This signal must be long enough to ensure the part is effectively rejected, and short enough to ensure that only one part is rejected for each reject pulse.

Adaptive Reject This feature is necessary when you have a significant change in product speed, since the rejector has a constant turn-on time. This logic allows the system to monitor the product speed and compensate the pulse being sent to the rejector.

Chapter 9 Sensor Menu

Right-click over a sensor button. The sensor menu appears:



1 - "Offline Imaging" on page 143- Acquire images when the lane is offline.

2 - Lighting - Opens lighting options: "Basic Adjust Lighting" on page 143 and "Advanced Adjust Lighting" on page 145.

3 - Part Tracking - Opens part tracking options:

- "Part Width Calibration" on page 87
- "Part Present Delay Calibration" on page 89
- "Part Present Delay with Encoder" on page 91

4 - Rejecting - opens rejecting options:

- Sensor Reject Enabled - "Disable or Enable the Rejector for One Sensor" on page 107
- "Reject Delay Calibration" on page 93
- "Reject Confirm Calibration (Optional)" on page 130
- "Inspection-Based Rejecting" on page 113

5 - Image - opens image options:

- Image Analysis - Measure the gray shade value, or distance between, pixels in your image. This is available offline only.
- "Save Images Through the Sensor Menu" on page 154
- "SmartCAL" on page 175- Run a set of images on the current part program, and make sure the part program is passing or rejecting parts as you expect.
- "Image Source" on page 182 - Choose where to display images from (camera or simulated).

6 - Camera - opens camera options:

- "Camera Focus and Aperture" on page 97 - Calibrate the focus and aperture of some cameras. This item is grayed out if not applicable to your system.

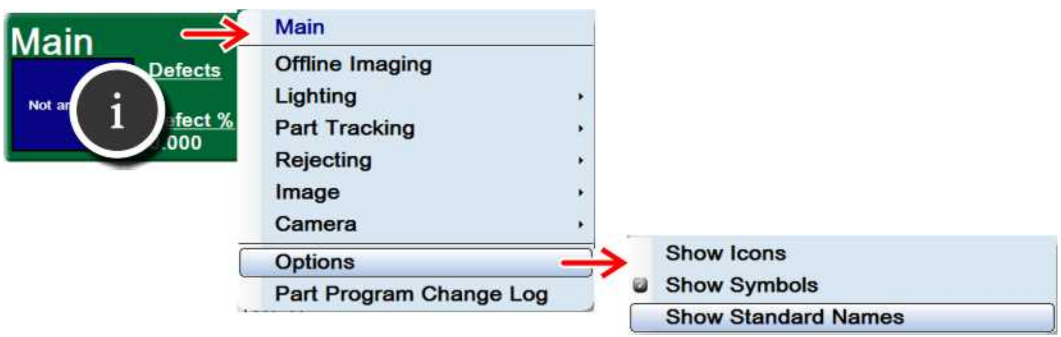
- **Camera Gain and Offset** Note: This menu normally should not be adjusted. It is set by the Pressco installer. Improper adjustment can cause image distortion. Camera gain is the amplification of the video signal. Offset adjusts the grayscale reference values.
- Review Camera Calibration - "Select Measurement Unit (Review Camera Calibration)" on page 152 This shows how the current camera is calibrated. Calibration is used in measurement inspections.
- Sensor Type - Pressco Technician only. Select different types of camera and sensors.

7 - "Icon or Symbol Options (Sensor Menu)" below- Provides different inspection tree views.

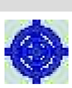
8 - "Part Program Change Log" on page 102 - Display the Part Program Change Log. This lists the inspections and the edit history for each.

Icon or Symbol Options (Sensor Menu)

Icons or symbols indicate the General Type of inspection for each item. Checked = enabled



Show Icons **Show Symbols**

Icon	Symbol	General Inspection Type
		Region - location of inspection
		Registration - to find part center or point of reference

Icon	Symbol	General Inspection Type
	✸	Analysis - inspection
	✱	Correlation - inspection to correlate a part to the machine part where it was made
	↻	Orientation - to place an inspection on the same location on each part, regardless of part rotation
	☆	Enhancement - to add image processing to make defects or part features stand out better
	≡	Intellispec Mass inspection

Show Standard Names

Displays the default Intellispec inspection names. You may use other inspection names that make sense for your part (example: upper wall).

Showing Standard Names is useful to Pressco engineers or to someone troubleshooting your machine, so that they quickly know the exact inspection type.

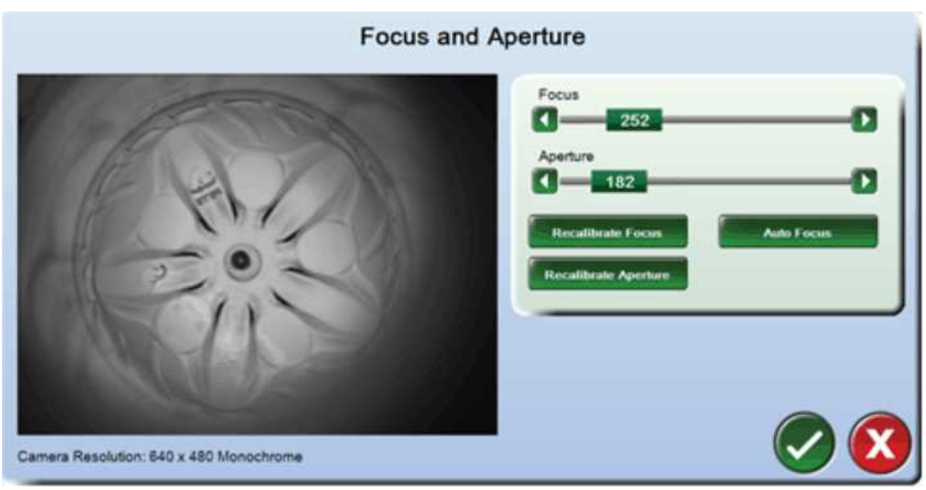
The Standard Names are used in the inspection descriptions in this guide.

Camera Focus and Aperture

Adjust the focus and aperture. It is only available when the lane is offline.

> *Note: only some cameras support this feature. They contain built-in motors to make these adjustments. This menu item will be grayed out in the Sensor menu if your system does not support this feature.*

From the Lane or Sensor Overview screen, right-click the sensor button | Camera Focus and Aperture.



Focus slider Set the focus position of the lens.

Aperture slider Set the aperture position of the lens.

Recalibrate/ Calibrate Focus Set the usable range of focus positions for the lens.

Recalibrate/ Calibrate Aperture Sets the usable range of aperture positions for the lens.

Auto Focus Automatically set the best focus position for the image.

Chapter 10 Part Programs

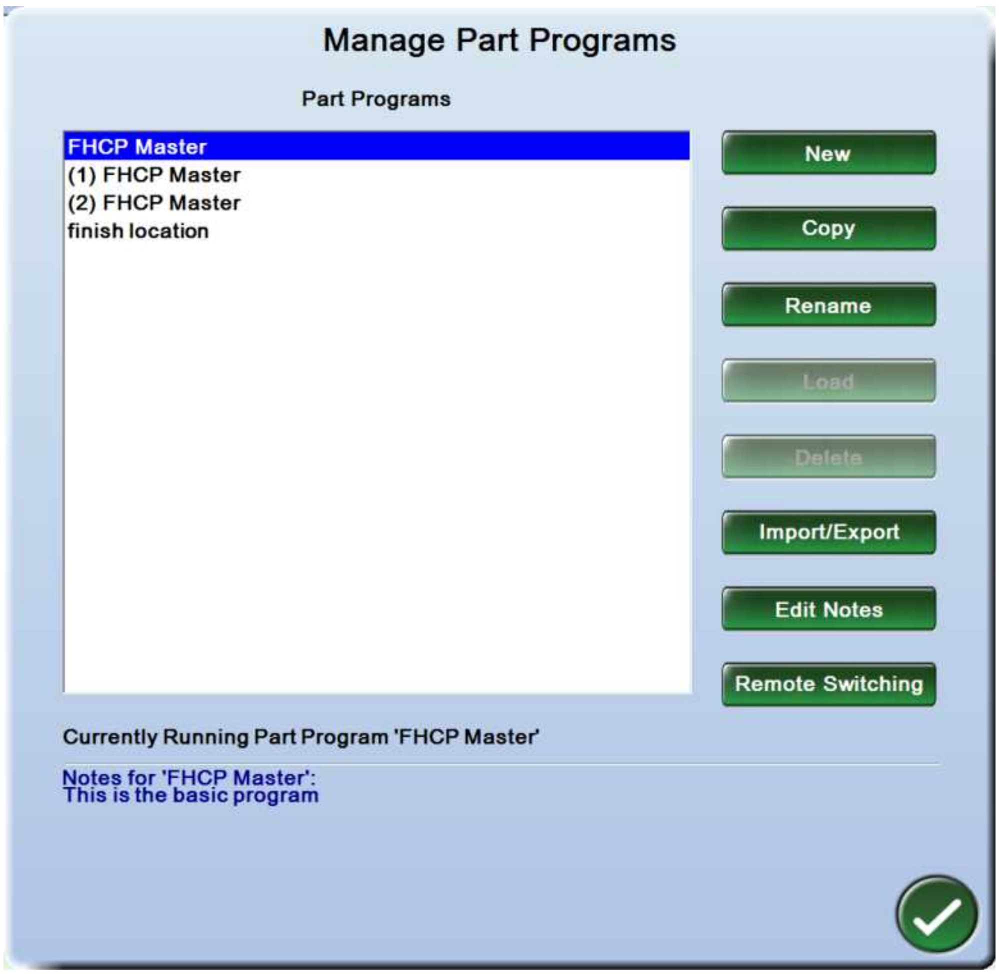
Manage Part Programs

Create new part programs or delete, edit, rename, import or export existing part programs for all the different products inspected with the system.

To load a part program, see "Part Changeover" on page 3

To get to this screen:

-  From Lane or Sensor Overview mode, select Tools | Lane Setup | Manage Part Programs. Or:
- Right-click the Part Program drop-down.



Edit Notes Add setup and program information about the part. This is helpful if you need to modify the part program later. These notes are displayed at the bottom of the Manage Part Programs screen when you select or change a part program.

"Remote Part Program Switching" on page 515

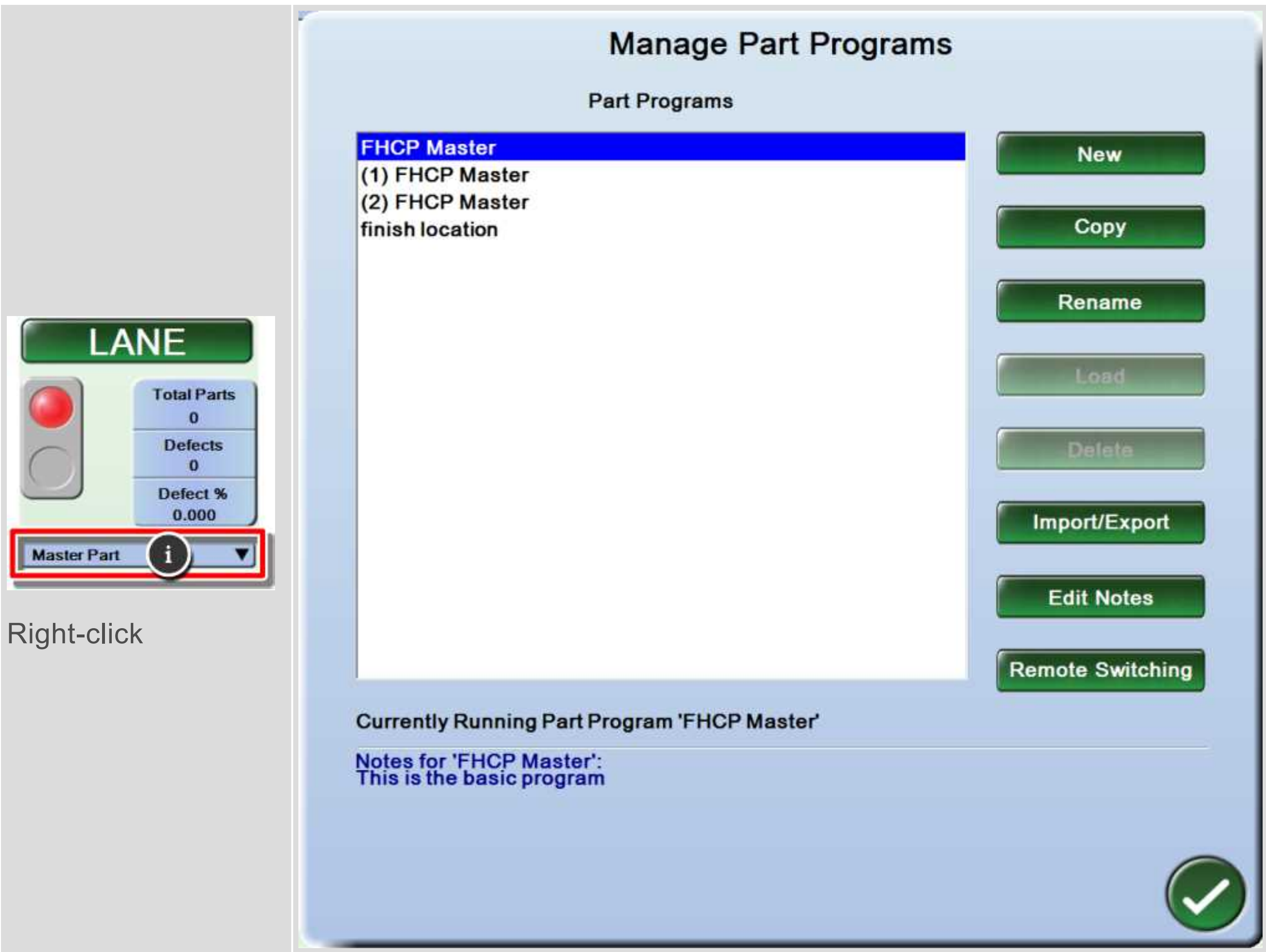
Create or Copy a Part Program

You will need:

System permissions to create part programs

To create a Part Program:

1. Go to a Lane Overview or Sensor Overview screen.
2. Right-click over the part program drop-down menu. Choose from the available options.



Delete a Part Program

You can delete a part program to prevent other users from running it.

To delete a part program:

1. Go to Lane Overview or Sensor Overview mode.
2. Load a known good part program, one that you will not delete. You cannot delete the currently running part program.

3. Right-click over the part program drop-down menu | highlight the program name (to be deleted) | select the Delete button.

Right-click

4. Select the OK button to delete the program. The program is deleted from memory.

Import or Export a Part Program

You can import or export a part program to use it on another sensor, lane, or Intellispec.

To import or export a part program:

1. Go to a Lane Overview or Sensor Overview screen.
2. Right-click over the part program drop-down menu. The Manage Part Programs menu is displayed.
3. Select the Import/Export button. The Import or Export Part Programs menu is displayed.

4.  Select the disk icon to browse to the folder or USB destination to import or export the part program.
5. Highlight the part program that you want to import or export.
6. Select the left arrow button to import, or the right arrow button to export the part program.
7. Select the OK button to exit the Import or Export Part Programs menu. The part program is exported.
8. Select the OK button to exit the Manage Part Programs menu.

Part Program Change Log

The part program change log lists the inspections and the edit history for each. You can view all inspections from one sensor, other sensors, or other part programs. This is helpful if you want to see the previous settings for an inspection.

To view the part change log:

1.  Go to Sensor Overview mode.
2. Right-click over an inspection name and select Part Program Change Log from the Inspection menu. If the current inspection has never been changed since it was set up, no data is displayed.
3. Select any of the available check boxes to view other inspections, inspections from other part programs, or inspections from other sensors. Some boxes are dependent on others; for example, you must select a dark gray check box before a light gray check box becomes active.

   To view a full column width, select and drag the column title to re-size that column.

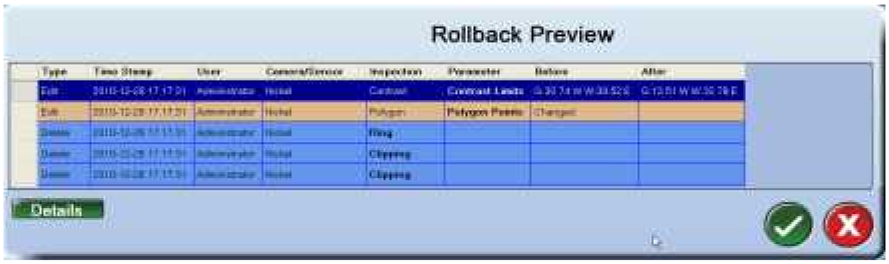
Rollback This feature allows you to restore the part program to a previous state, allowing you to undo several changes at once.

Using the Rollback feature

To use the Rollback feature:

1. Check the box next to the Rollback button at the top of the Part Program Change Log screen.

2. Scroll down towards the bottom of the inspection list. The latest changes are at the bottom of the list.
3. Select a line where you want to delete the latest changes, including the selected line.
4. Select the Rollback button near the top of the screen. A Rollback Preview is displayed so that you can see what will be deleted.

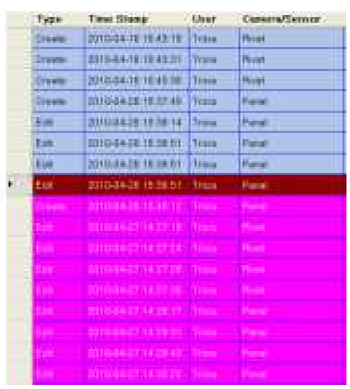


5. If desired, select the Details button to see the inspection change details of each line.
6. If you are ready to delete the displayed lines, select the OK button. The lines are deleted, and the part program is changed back to a previous state.

Inspection Differences

To see inspection differences:

1. Select the Difference button to see a list of differences in inspections. A Mark Start/ Mark Stop menu is displayed, and the inspections in the list are highlighted in magenta (depending where your cursor is).



2. Select the Mark Start button.
3. Select the first item in the list where you want to begin viewing inspection differences. (this is similar to holding the Shift key and selecting multiple items in a list)
4. Select the Mark Stop button.
5. Select the last item in the list where you want to view inspection differences. Your selected items are highlighted in magenta.
6. Select the OK button in the Mark Start/ Mark Stop menu. A Differences table is displayed. This allows you to view a shorter list of items, only those of which have been changed. Only edited (not created) inspections are included.

Details button

Select the Details button to see more information about the highlighted item. A pop-up window displays more information, including the number of times the inspection was modified.

Filter button

Select the Filter button to choose the items to display in the log. As soon as you select any option, the Change Log is updated. Some options are dependent on others; for example, if you want to see the Historic Names for the Sensor, you must choose Historic Names for Inspection first.


Filters
Historic Name
Selected
Show All
Historic Mode
Inspection
Pattern Match
Pattern Match
Historic Names
PartProgram
Demo Converted End
Demo Converted End
Current Names
Pattern Match
Panel
Current Names
User
Tricia
Show Deleted Items

Chapter 11 Rejecting

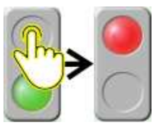
Quick-reference:

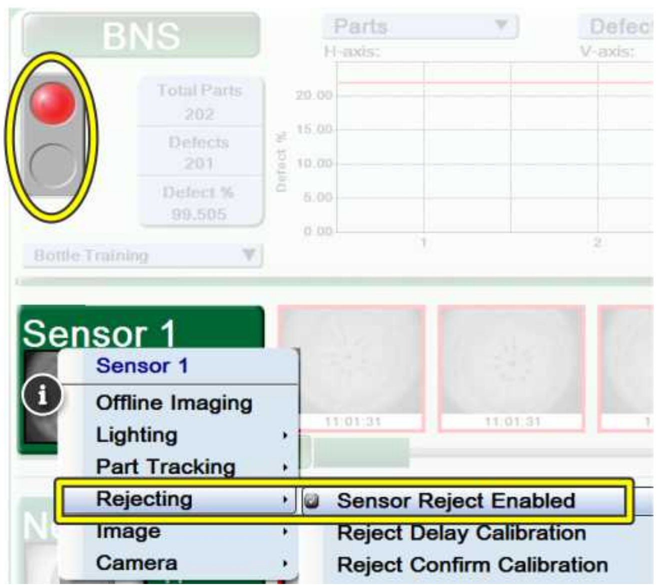
- "Disable or Enable the Rejector for One Sensor" below
- "Disable or Enable the Rejector for Multiple Sensors" on the next page

Disable or Enable the Rejector for One Sensor

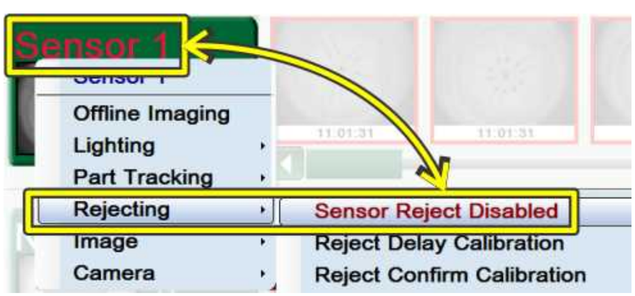
Mechanic level user and higher

If the system is rejecting excessive parts, you can quickly disable the rejector for that camera.

1.  Take the lane offline.
2. Right-click a sensor button. Select Rejecting | Sensor Reject Enabled.



This toggles to Sensor Reject Disabled. Red text = disabled.

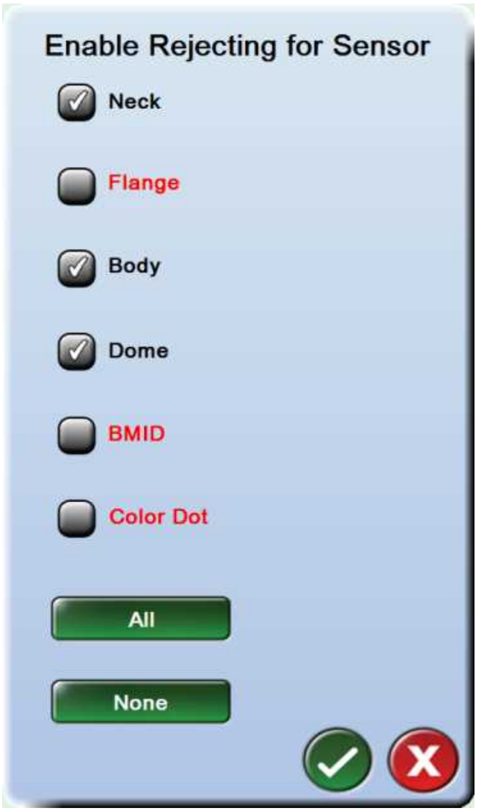


After you have resolved the problem, be sure to Enable the rejector, using the same steps as above. Checked = enabled

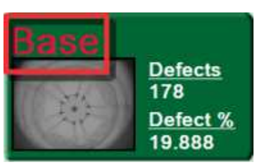
Disable or Enable the Rejector for Multiple Sensors

To enable or disable the rejector for one or more sensors within a lane:

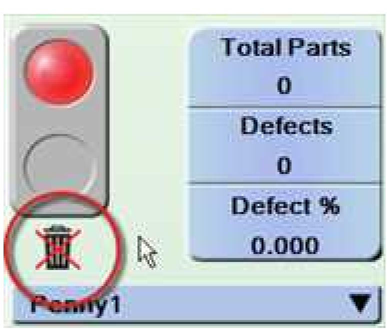
 From Lane Overview or Sensor Overview mode, select Tools | Lane Setup | Rejecting | Sensor Reject Enable/Disable. Checked = enabled



If a rejector is disabled, the sensor name is displayed in red instead of white.



If the rejector for all sensors within the lane is disabled, you will see the trash can icon.



Disable or Enable the Rejector for an Inspection

> *Note: you can enable/ disable rejector for any inspection, regardless of whether Inspection-Based Rejecting is enabled.*

Right-click an inspection in the inspection tree. Select Settings | "Is Inspection Reject Enabled?" Make your selection.

Enabling or disabling an inspection reject from the Inspection tree has the same effect as "Inspection-Based Rejecting" on page 113.

Sensor-Based Rejecting vs. Inspection-Based Rejecting

The system can reject parts in several ways. Sensor-Based Rejecting is the default method.

You will see different menu items depending on whether Inspection-Based Rejecting is enabled.

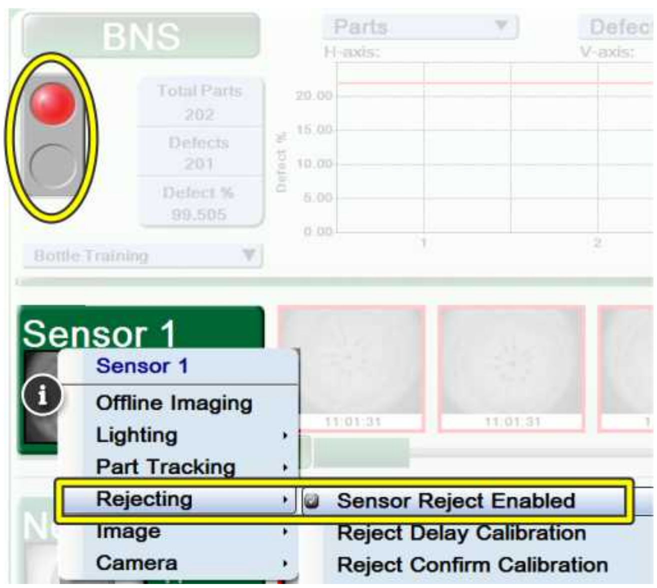
The difference between the two methods:

- In Sensor-Based Rejecting, you assign rejectors by sensor.
- In Inspection-Based Rejecting, you assign rejectors by inspection.

In either method, the system will reject a part when it fails any inspection if:

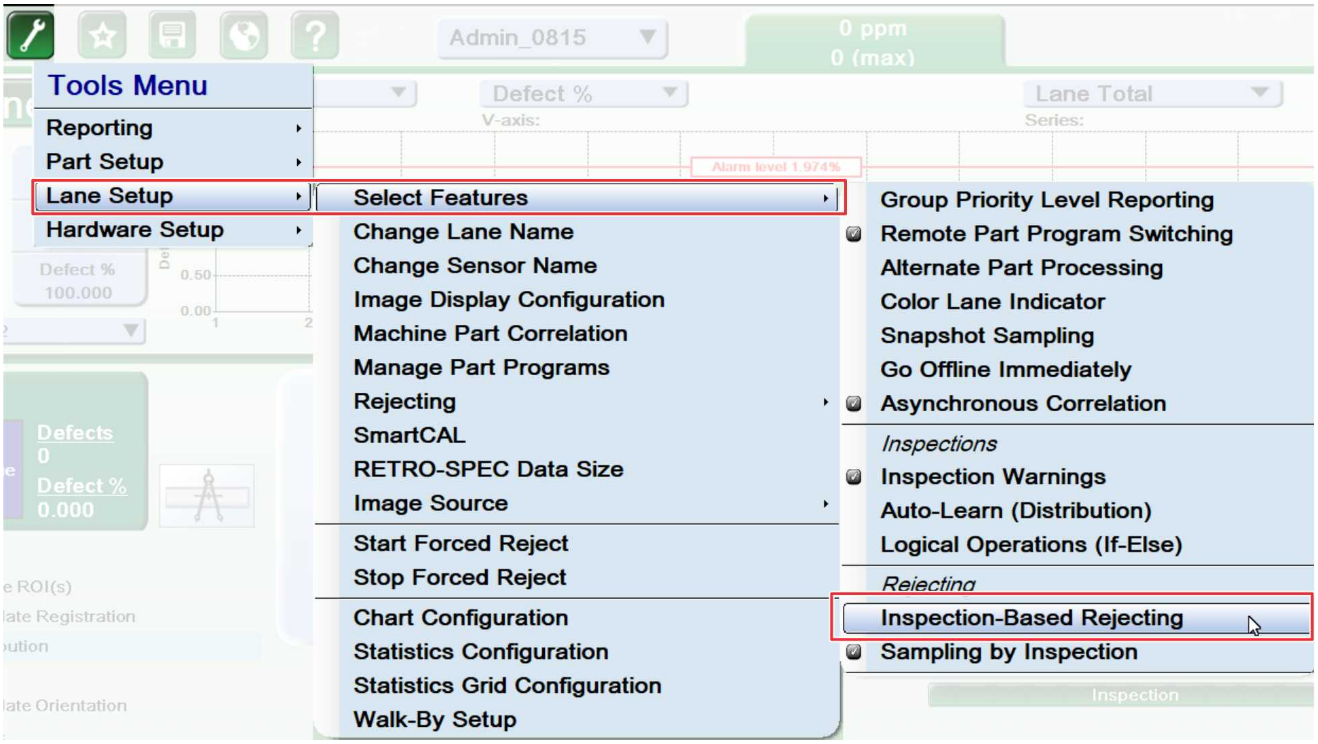
- The rejector is enabled for the inspection, and

- The rejector is enabled for the sensor containing the inspection

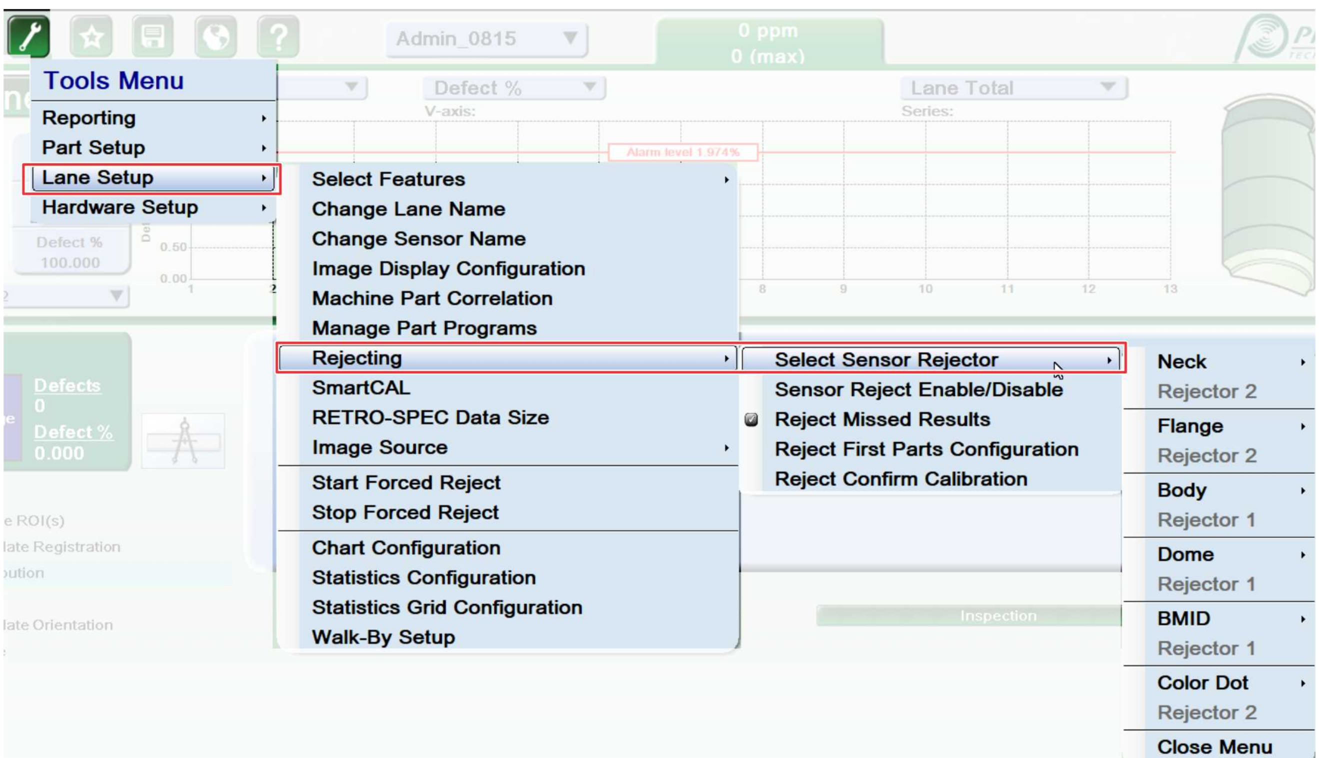


Sensor-Based Rejecting

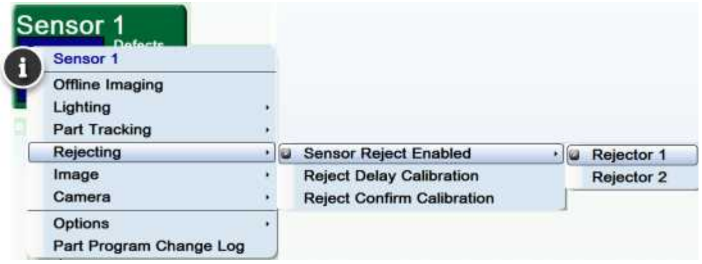
This is the default method. Sensor-based rejecting is active if Inspection-Based rejecting is not enabled, as shown below. An administrator may enable the feature.



You will see these menus ("Select Sensor Rejector" is available if you have more than one rejector):



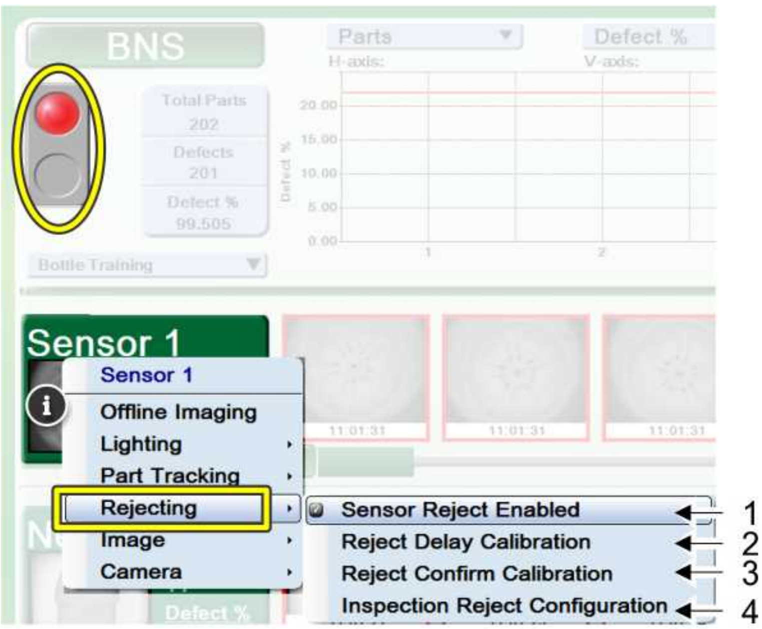
When you right-click a sensor button, you can select a rejector (same as in the above menu).



Sensor Rejecting Setup

Mechanic level user and higher

Set up rejecting options from the sensor level. The lane must be offline. Right-click to see the menu.



1 - "Disable or Enable the Rejector for One Sensor" on page 107

2 - "Reject Delay Calibration" on page 93

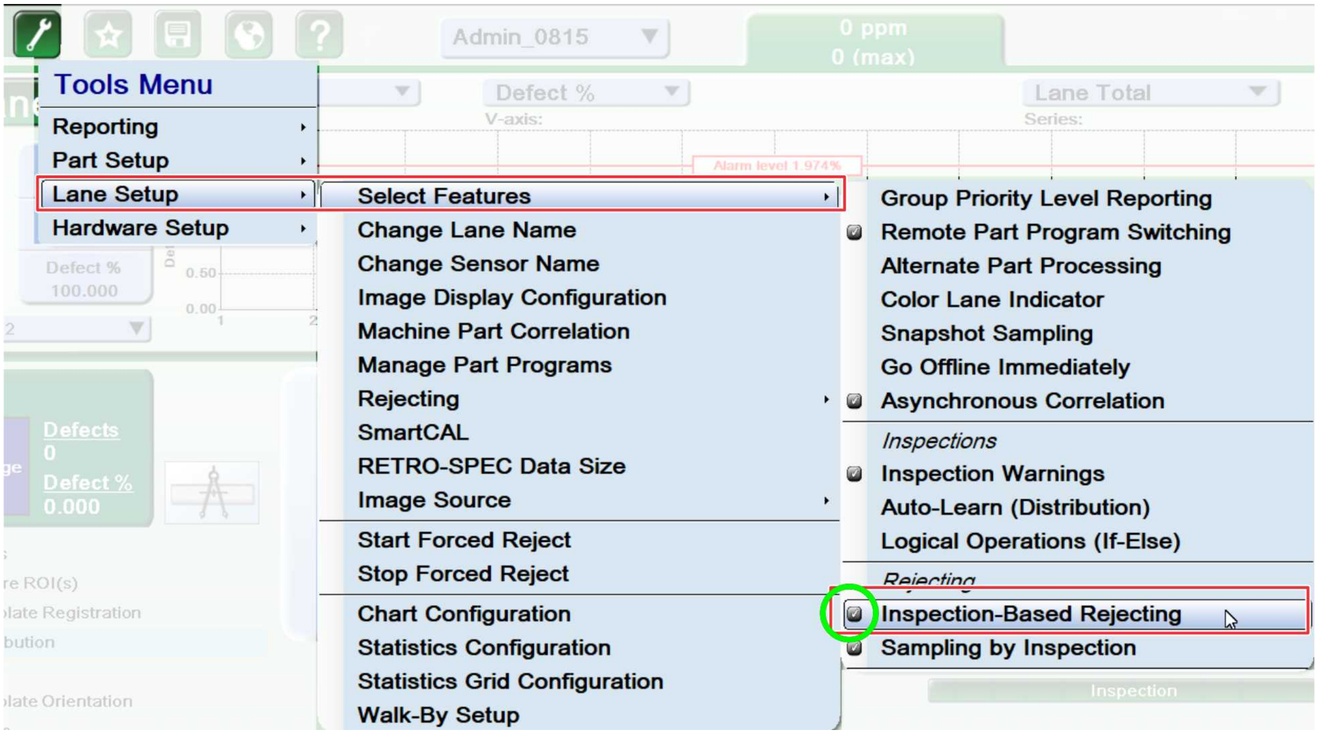
3 - "Reject Confirm Calibration (Optional)" on page 130

4 - "Inspection-Based Rejecting" on the next page (if enabled)

Inspection-Based Rejecting

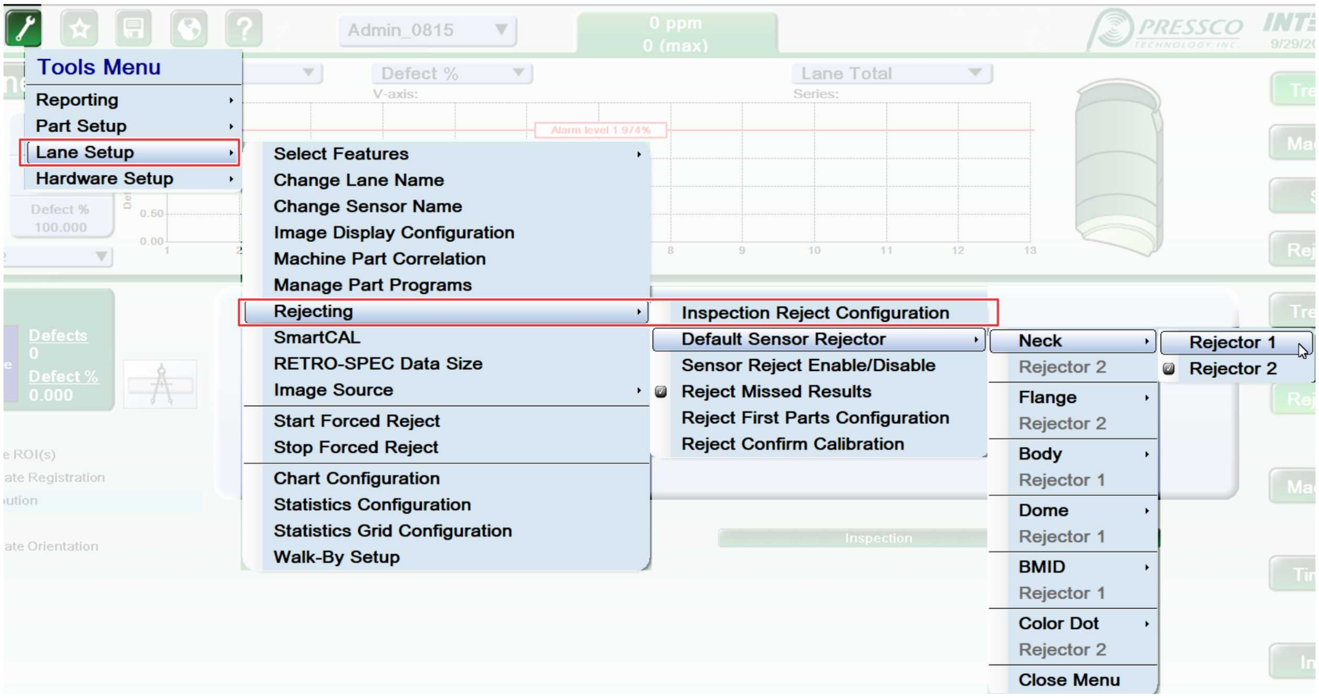
This feature allows you to reject parts based on the inspections that fail. Administrators must enable this feature through Select Features. Any user can see whether the feature is enabled.

Enable Inspection-Based Rejecting



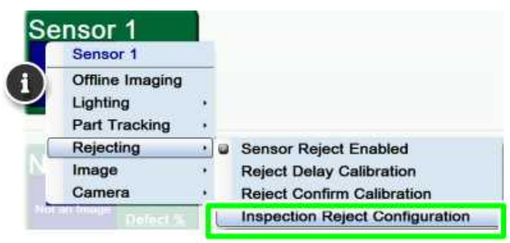
When you first enable this feature, the configuration interface is displayed.

You will see these menus (Inspection Reject Configuration, and Default Sensor Rejector if you have more than one rejector):



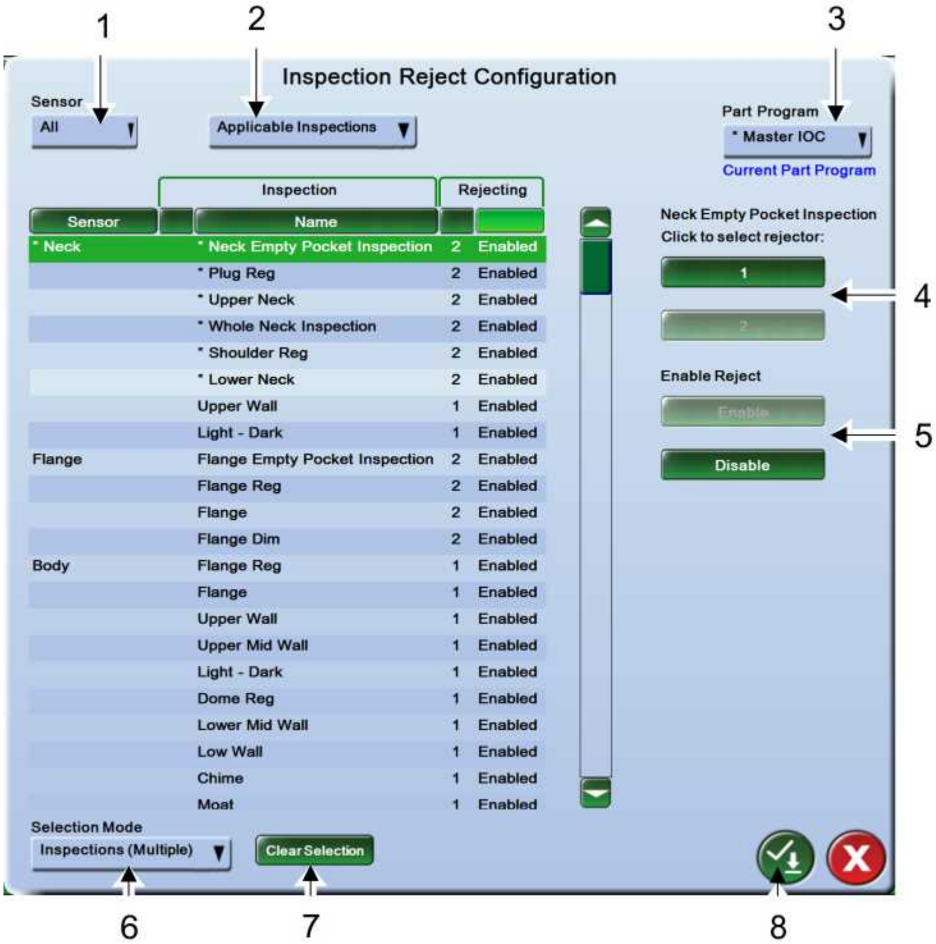
Configure Inspection-Based Rejecting

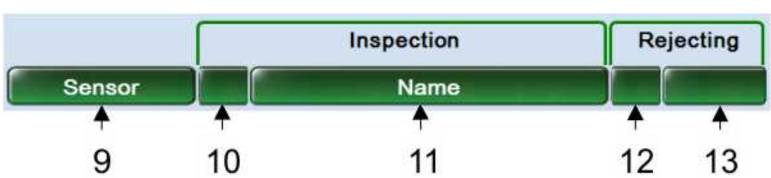
To set up Inspection Rejecting: Right-click a sensor button | Rejecting | Inspection Reject Configuration.



Note: Mechanic level users and higher can configure Inspection Rejecting. Only Administrators may enable the feature. If it is not enabled, then you will not see this menu in the sensor rejecting options.

To configure inspection rejection from the menu shown below: (descriptions of items are shown after the picture)





1. Select a sensor or sensors to configure rejection [1]. To select inspections from multiple sensors in step 3, select "All."
2. Select a different part program if desired [3].
3. Choose a selection mode [6].
4. Select the inspection(s) in the left column, rejectors [4], and enable or disable the rejectors [5].
5. Make other selections as desired.
6. Save changes [8] and exit the menu.

An asterisk in the menu (*) indicates that you made changes since entering the menu. Select [8] to save changes.

The following are callouts from the above picture:

1 - **Sensor** Configure rejecting for one or all sensors

2 - **Inspections** Show all inspections or only applicable inspections. Not-applicable inspections, such as regions of interest, cannot reject a part.

3 - **Part Program** Select a part program to configure rejection. You do not have to change the currently running program to change rejection.

4 - **Select Rejector** Select from the available rejector(s). Clicking a button applies the rejector to all currently selected inspections. (You may need to select inspections from the left side of the menu before these buttons are available. Selecting inspections is dependent on [6] Selection Mode.)

5 - **Enable Reject** Enable or disable the rejector for the selected inspections.

6 - **Selection Mode** Sensor (single) = select all inspections for one sensor. Sensor (multiple) = select all inspections for multiple sensors. Inspections (single) = select only one inspection. Inspections (multiple) = select inspections from any sensor. With Sensor (Multiple) and Inspections (Multiple), you can click several sensors or inspections in sequence, and the system will add to the selection - selecting or de-selecting based on previous state. With Sensor (Single) and Inspections (Single), the system will de-select a previous selection if you try to select more than one item.

7 - Clear Selection

8 - **Save Selection** Save changes without exiting the menu. The asterisk (*) is removed.

9 - **Sort by sensor** (if All is selected under [1]) Reverse the list of sensors (by camera number, not by name).

10 - **Sort by inspection - per sensor** reverse the order of the inspections in each sensor group

11 - **Sort by inspection name** List all inspections alphabetically. Select [11] again to reverse the order. Select [10] to group inspections by sensor again.

12 - **Sort by rejector** List all inspections numerically by rejector number. Select [12] again to reverse the order.

13 - **Sort by enabled rejector** Sort inspections based on enabled or disabled rejectors.

Automatic Rejector Assignments

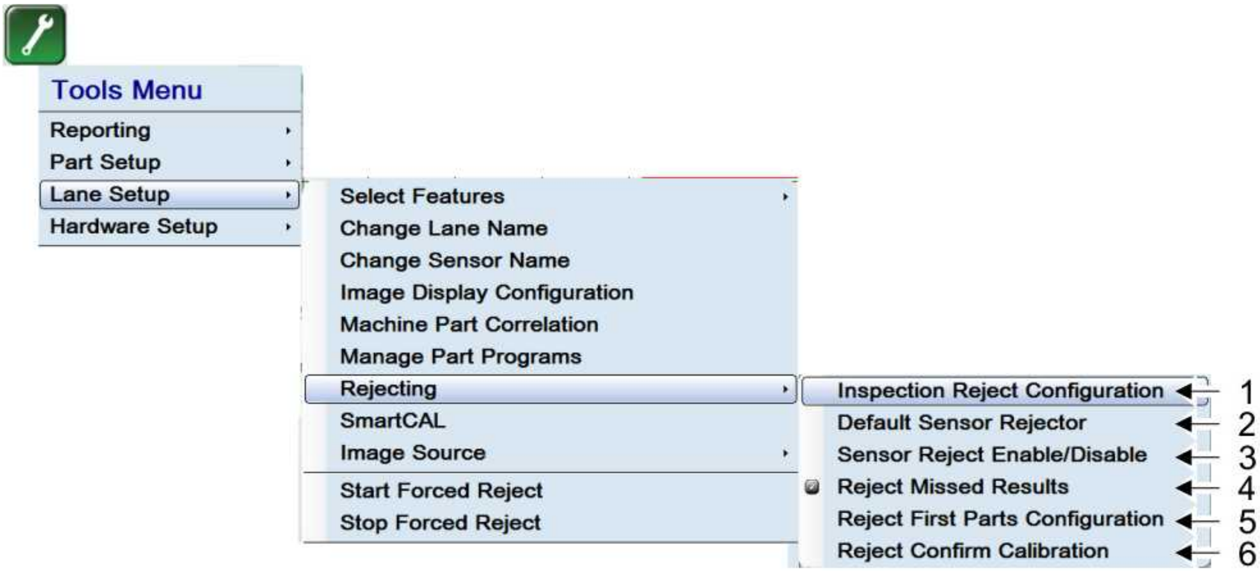
- When you enable Inspection Based Rejection, the system automatically assigns rejectors per the Default Sensor Rejector setup.
- When you create a new inspection, or import an inspection that has no rejector assigned yet, the Default Sensor Rejector is assigned.
- When you import a program that was using Inspection Based Rejecting, the reject settings in the imported program are used (except if you do not have such a rejector in the new lane setup - then the Default Sensor Rejector is used).
- The system remembers Inspection-Based Rejecting assignments, if you switch to Sensor-based rejection and back to Inspection-Based Rejecting.

Lane Rejecting Setup

These tools set up rejecting for all the sensors within a lane. If you have multiple lanes, then you will need to complete these settings for each lane.

Mechanic level user and higher

To set up rejecting: from Lane or Sensor Overview mode, select Tools | Lane Setup | Rejecting.



1 - "Inspection-Based Rejecting" on page 113 (if enabled)

2 - "Select Sensor Rejector or Default Sensor Rejector" below

3 - "Disable or Enable the Rejector for Multiple Sensors" on page 108

4 - "Reject Missed Results" on the next page

5 - "Reject the First Parts After a Part Changeover" on the next page

6 - "Reject Confirm Calibration (Optional)" on page 130

> *Note: to set up multiple rejectors, use Discovery. This is normally done by Pressco engineers.*

Select Sensor Rejector or Default Sensor Rejector

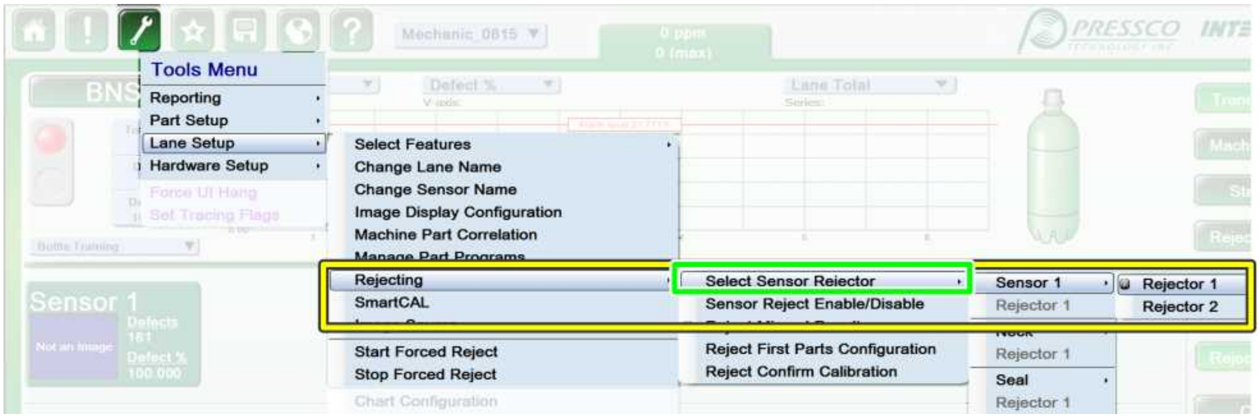
Mechanic level user and higher

> *Note: This topic applies only if you have more than one rejector.*

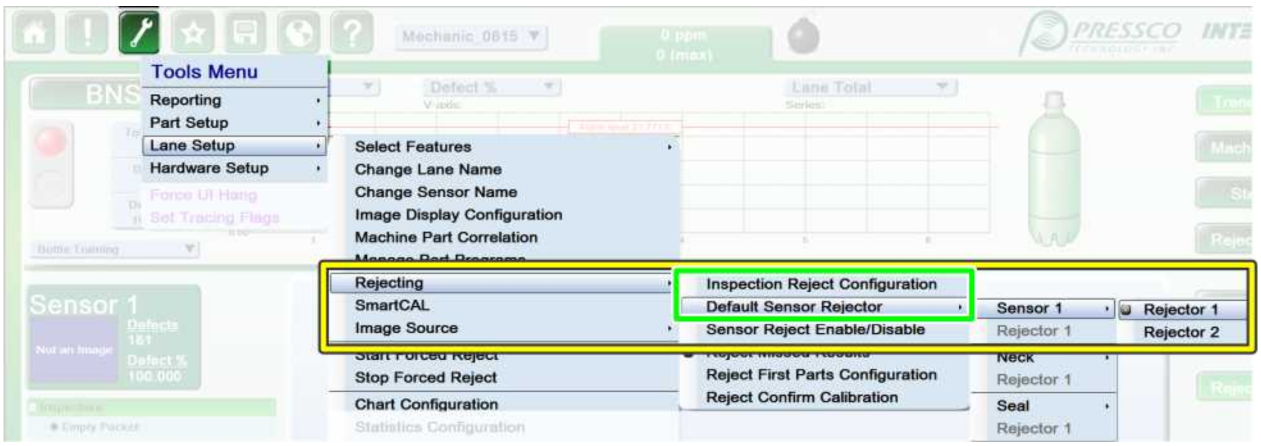
Select a rejector for each sensor. Your sensor names will vary based on system setup.

To get to this screen: from Lane or Sensor Overview mode, select Tools | Lane Setup | Rejecting.

If Sensor-Based Rejecting is active: Select Sensor Rejector, then select a sensor and a rejector.



If Inspection-Based Rejecting is active: Select Default Sensor Rejector, then select a sensor and a rejector.



Reject Missed Results

A missed result occurs if the system misses the inspection results of a part. This can happen if the inspection time is too long or if the system is too busy to process all the data before the part reaches the reject station.

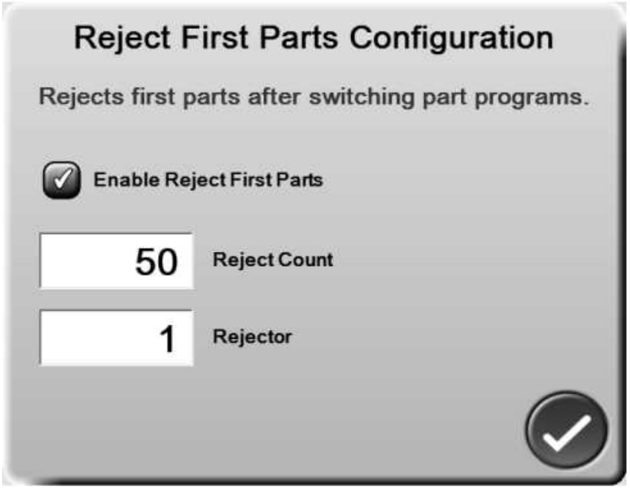
If you want the system to reject parts from any missed results in the current Lane, then enable this feature: from Lane or Sensor Overview mode, select Tools | Lane Setup | Rejecting. Select Reject Missed Results. Checked = enabled

Reject the First Parts After a Part Changeover

Reject the first N parts after a part program change. This is to ensure there are no old parts in the queue when you run a new part program.

> *Note: Another system option, Alternate Part Processing, allows you to do the same thing as above, but with more options. You will need an Extended I/O board. See "Alternate Part Processing - Setup" on page 518*

 To get to this menu: from Lane or Sensor Overview mode, select Tools | Lane Setup | Rejecting. Select Reject First Parts Configuration. Checked = enabled.



Reject Count Set the number of parts to reject (up to 100) when the part program is changed. The parts are rejected when the lane goes online.

Rejector Select the rejector to reject the parts. Choices are dependent on your configuration.

> *Note: If your system uses a PDX and Empty Pocket inspections, the Reject Count = PDX part detect counts, regardless of whether a part is actually present. Empty Pockets may be included in the first (50) parts rejected after a part changeover.*

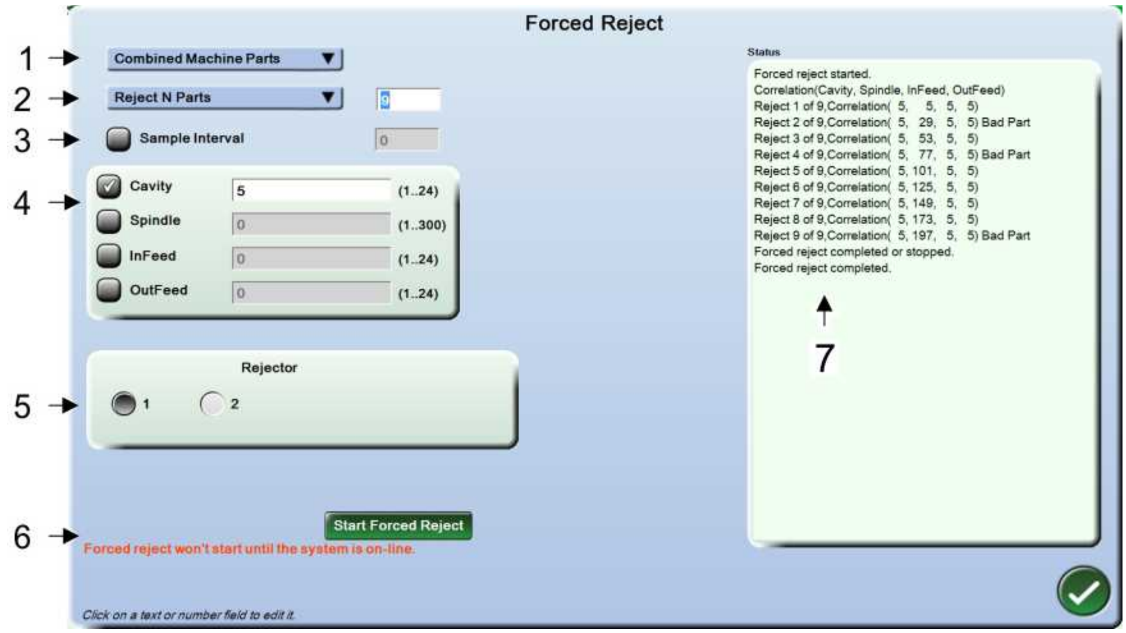
Forced Reject

Force any part to be rejected. The system will reject all parts associated with the selected components, regardless of the pass/fail condition. This can be used to handle an emergency situation until repairs on a blow-molder or other machine can be made, among other uses.

> *Note: the correlation check boxes and machine parts are only displayed if your machine is using correlation.*

 To get to this screen: From Lane or Sensor Overview mode, select Tools | Lane Setup | Start Forced Reject.

> *Note: the lane must be Online to force rejects*



1 - Any Part/ Single Machine Part/ Combined Machine Parts/ By Sampling Inspection (drop-down menu)

Any Part - Reject any part, regardless of correlation to a machine part.

Single Machine Part - Reject a part or parts correlated to one machine part (example: cavity, or fill valve). You can enter multiple values, such as Cavity 5-7, 11. Use the onscreen keypad.

Combined Machine Parts - All correlated machine parts are displayed (as in the example above). Check the boxes next to the desired machine parts. Only one correlation value per machine part is allowed (example, Cavity 2 and Spindle 7). Use the keypad.

> *Note: Combined Machine Parts is an AND function. The part must be correlated to each machine part and number entered. If there are no such parts, then none will be rejected.*

"Sampling by Inspection" on page 125

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2 - Reject One Part/ Reject N Parts/ Continuous Reject (drop-down menu)

Reject one part, ‘N’ parts, or continuously reject from a specific machine part. Select the Start Forced Reject button to begin rejecting. If you select Single or Combined Machine Parts in the above drop-down menu, the part(s) must meet that criterion.

Reject One Part - Reject the next part that reaches the reject station, regardless of inspection status.

Reject N Parts - Enter a number of parts you want to reject, regardless of inspection status.

Continuous Reject - Reject all parts regardless of inspection status, until you select the Stop Forced Reject button.

3 - Sample Interval

Only reject parts every n number of intervals. If you enter 3 Revolutions, then the system will reject parts on every third revolution. If you select Single or Combined Machine Parts in the first drop-down menu, the part(s) must meet that criterion.

4 - Select Machine Part

The names of your machine part components [only shown if you select Single or Combined Machine Parts in the first drop-down menu].

5 - Rejector

Specify which rejector to force rejection of the part.

6 - Start Forced Reject/ Stop Forced Reject

When you select Start Forced Reject, the criteria specified are applied and the parts are rejected. Select the Stop Forced Reject button to stop the reject process.

Note that if you only reject one part, or specify a number of parts, the button toggles back to "Start Forced Reject" automatically.

7- Status Box

Displays information about the rejection process.

Forced Reject using Correlation Inspections

Reject parts identified by the Body-Maker ID, Color Dot, Feature Correlation, or Alphanumeric Correlation inspections without affecting statistics. Use the Forced Reject menu to select which machine part (example: Body Maker or Spray Gun) the rejected part is correlated to.

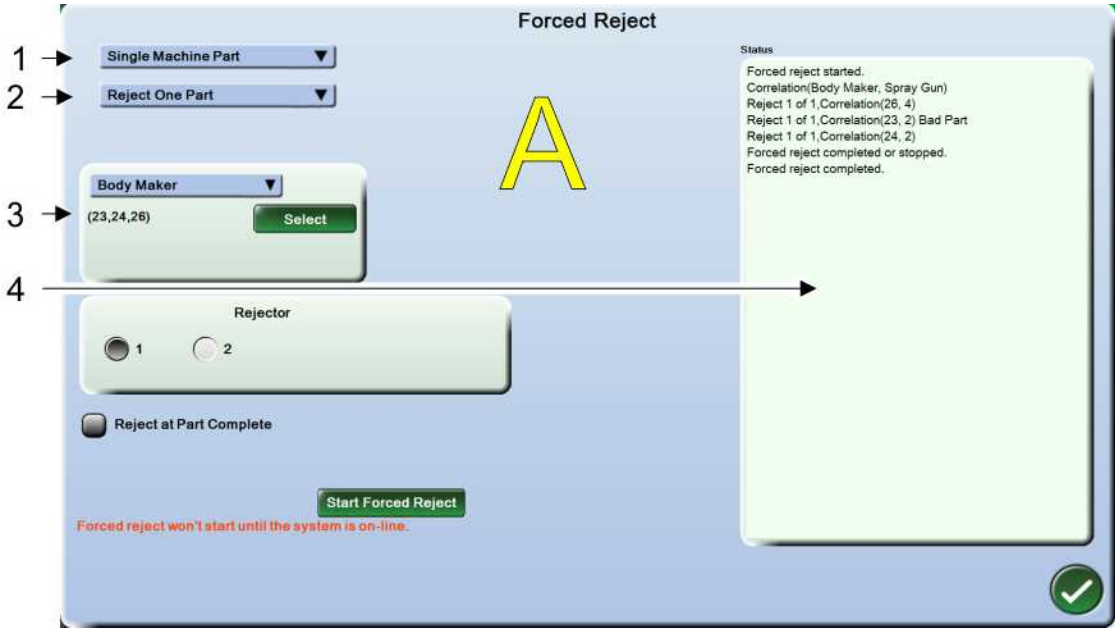
To get to this screen: From Lane or Sensor Overview mode, select Tools | Lane Setup | Start Forced Reject. For more information see "Forced Reject" on page 119

Select the options to reject the desired parts. Reject statistics are not affected. A few examples:

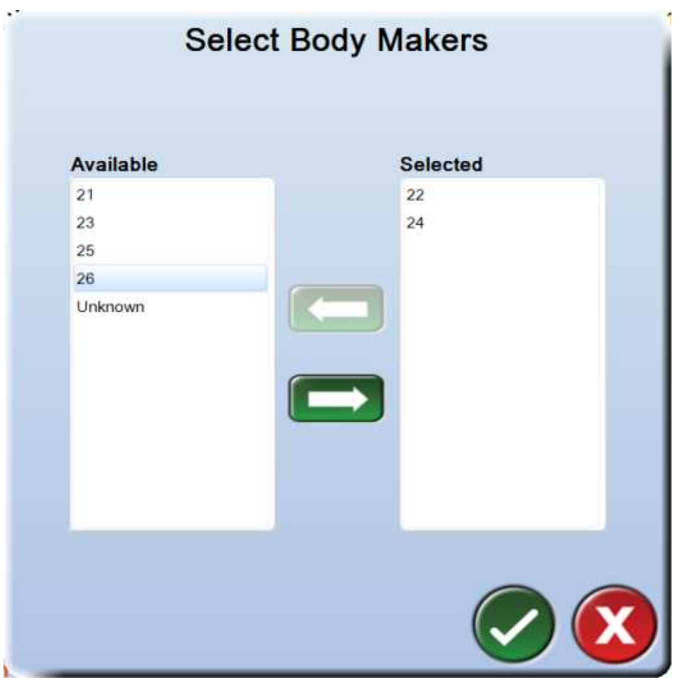
> *Note: Sample Interval cannot be enabled if you select Single Machine Part or Combined Machine Parts.*

Example A:

- Single Machine Part [item 1] - select one machine part [item 3]
- Reject One Part [item 2] - one part correlated to the selected machine part [item 3] is rejected
- Selected machine parts [item 3] - we selected three Body Makers: 23, 24, and 26. One can correlated to each of these Body Makers is rejected, for a total of three cans [shown in item 4].

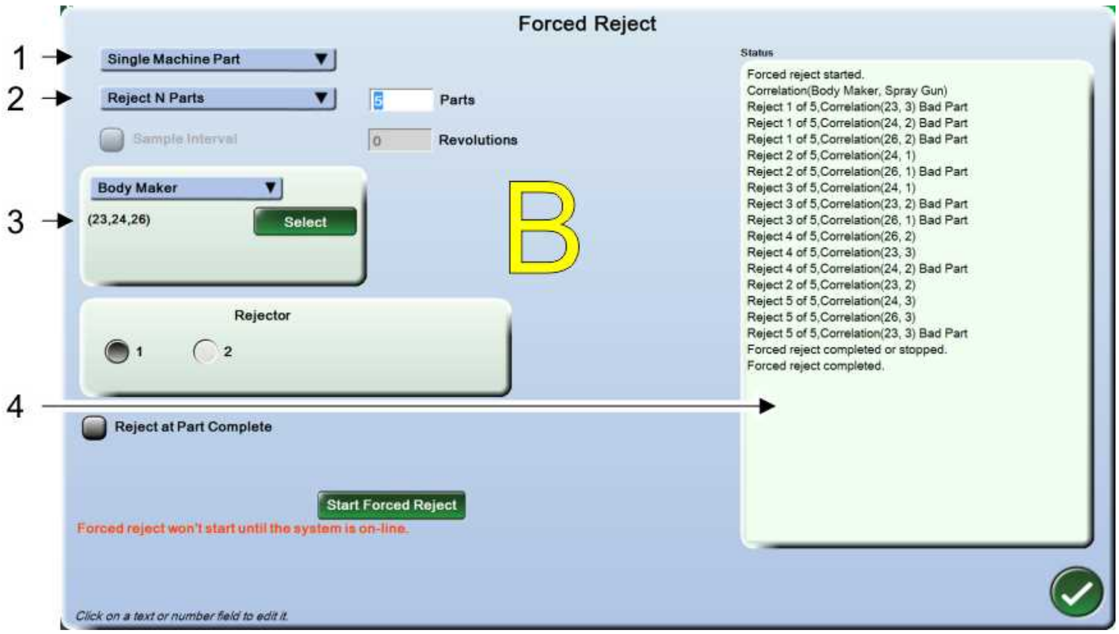


You can select multiple items when you select Single Machine Part [1]:



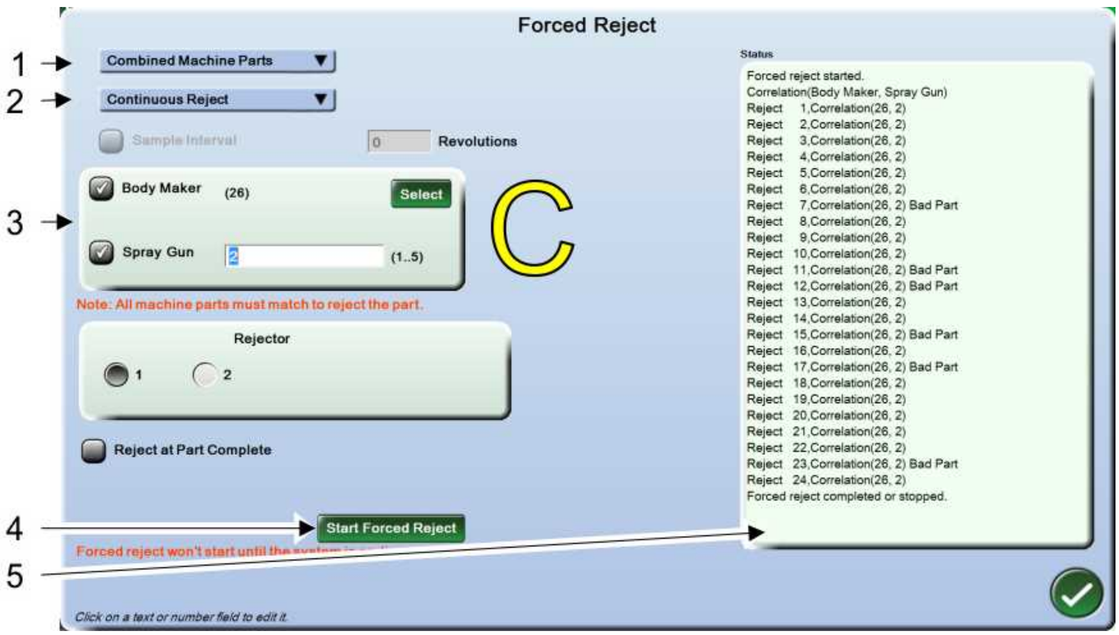
Example B:

- Single Machine Part [item 1] - select a machine part [item 3]
- Reject N Parts [item 2] - the number of parts correlated to each selected machine part [item 3] are rejected
- Selected machine parts [item 3] - we selected three Body Makers: 23, 24, and 26. Five cans correlated to each of these Body Makers is rejected, for a total of 15 cans [shown in item 4].



Example C:

- Combined Machine Parts [item 1] - select the machine parts [item 3]
- Continuous Reject [item 2] - parts matching the criteria will be rejected until you select the Stop Forced Reject button [item 4]
- Selected machine parts [item 3] - select which machine parts to correlate. Select ONLY ONE machine part ID for each (example: Body Maker 26 and Spray Gun 2). In this example, rejected cans must be correlated to Body Maker 26 AND Spray Gun 2 to be rejected. The cans are rejected until you select the Stop Forced Reject button [item 4].



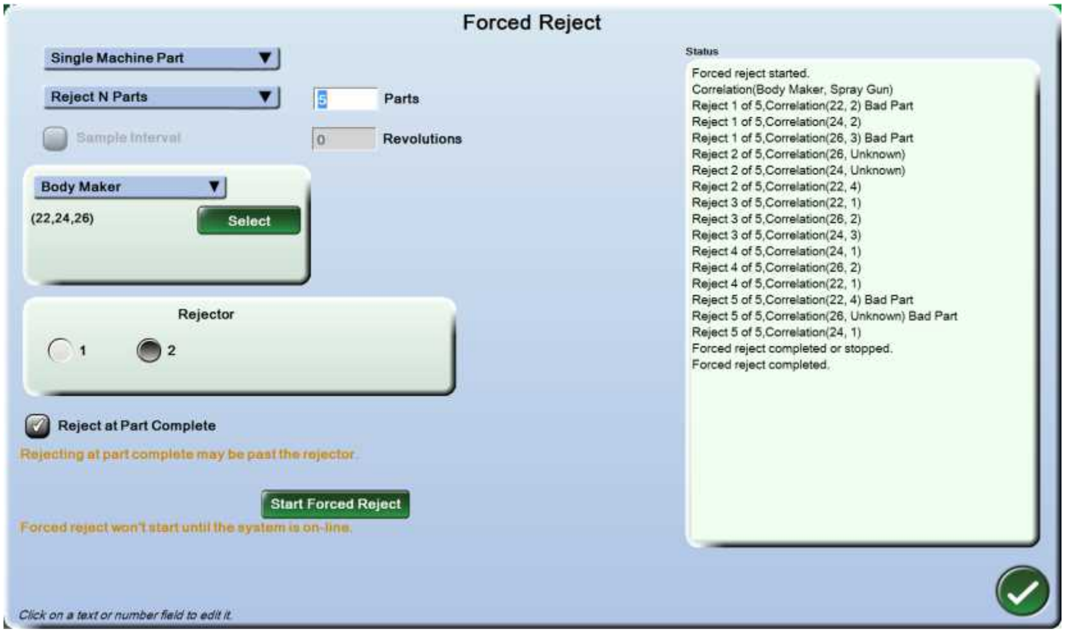
Reject at Part Complete using Correlation Inspections

Using Forced Reject, you can specify that the system reject after all sensors have run inspections (part complete). This is important because the correlation value of the part is not known until the correlation inspection(s) have run.

This option is only available when ALL of the following three conditions are met:

- More than one rejector is used in the system. Rejectors are set up using Discovery. This is normally performed by Pressco engineers.
- You are using a correlation inspection: Body-Maker ID, Color Dot, Feature Correlation, or Alphanumeric Correlation
- In the Forced Reject menu, the selection in the drop-down menu at the top of the screen must be Single Machine Part or Combined Machine Parts.

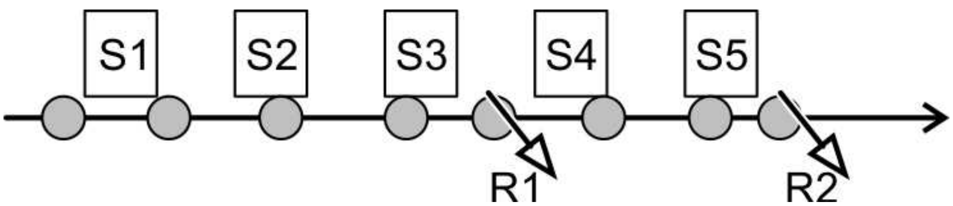
If you have two or more rejectors and Reject at Part Complete is NOT checked, then correlation will be checked at each sensor. This can cause the wrong part to be rejected if the correlation inspection has not yet run. This is because one of the rejectors might be placed before the sensor with the correlation inspection.



Example with five sensors and two rejectors

There are five sensors (S1 - S5) and two rejectors (R1 and R2).

> *Note: your system may have a different configuration. Consult Pressco to determine proper setup.*



- CORRECT setup: Reject at Part Complete is checked AND Rejector 2 is selected. If the correlation inspection takes place at any sensor S1-S5, then the correct part will always be rejected. This is because all correlation inspections are completed before R2.
- WRONG setup: Reject at Part Complete is unchecked. If the correlation inspection takes place at sensor S4 or S4 and the part gets rejected at R1, then the wrong part might be rejected.
- WRONG setup: Reject at Part Complete is checked and Rejector 1 is selected. Nothing will be rejected, because part complete does not finish until after rejector R1.

Sampling by Inspection

This feature allows you to reject parts without affecting defect statistics. This is used for quality control purposes. For example, you may wish to reject a number of parts to determine how well a manufacturing process is working.

Example for use:

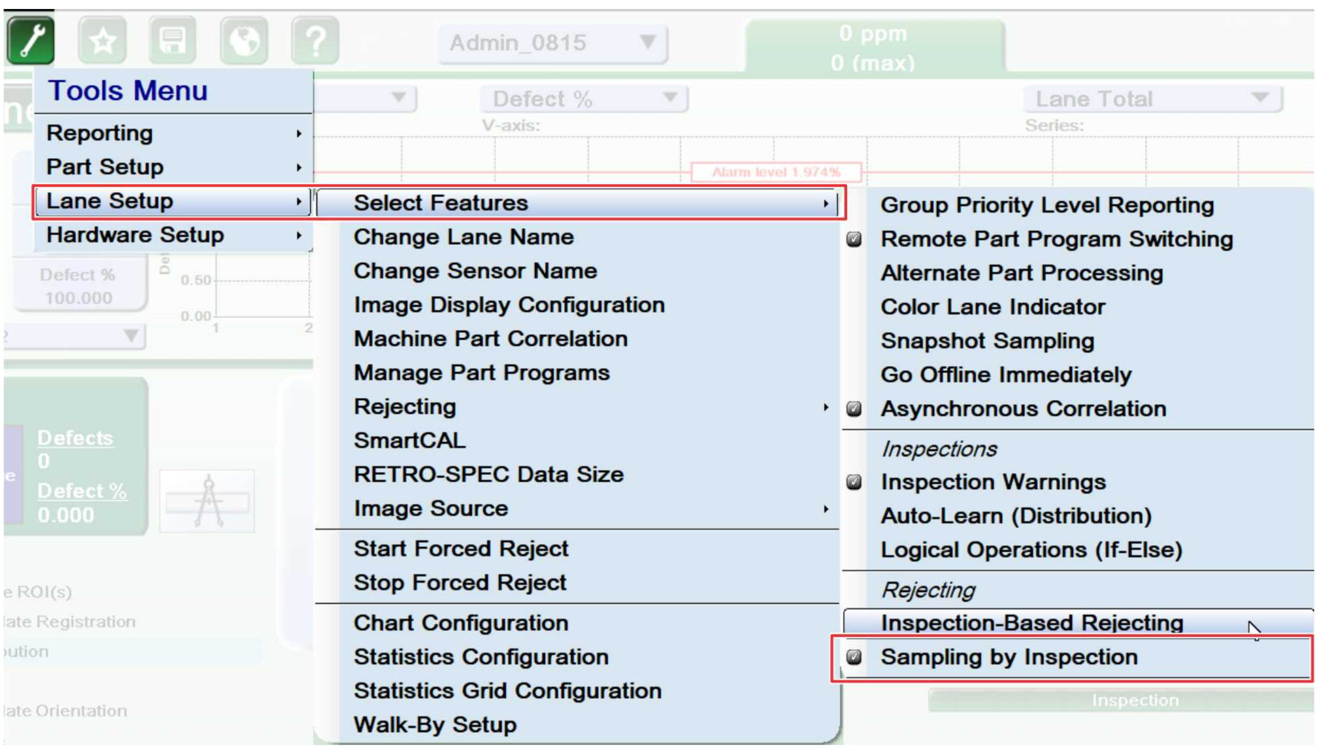
You are producing converted ends, and you want to sample n parts to see the difference in orientation of the grain between the well and the panel of the part. You would use Sampling by Inspection to reject some parts where the orientation of well-to-grain falls within a certain range.

Notes about sampling:

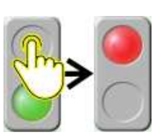
- We recommend using an additional rejector for sampling products
- If you are using Inspection-Based Rejecting, you will see an additional rejector selection
- Sampled parts do not count towards defect totals in the statistics
- Some inspections need to add "Invert Limits" to get the desired results

To enable sampling:

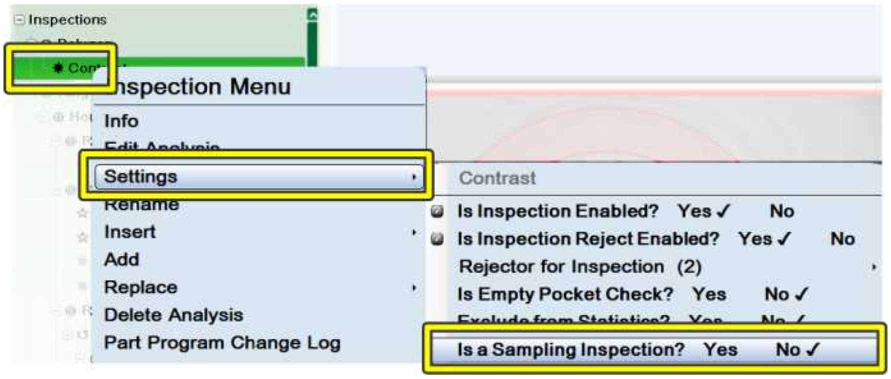
 From Lane or Sensor View mode: Select | Lane Setup | Select Features | Sampling by Inspection. Checked = enabled



To use sampling:

1.  Take the lane offline.
2. Right-click on an inspection name in the inspection tree | select Settings | select Yes for "Is a Sampling Inspection?." The name of the inspection will be displayed in red to indicate that "rejecting" is disabled.

> *Note: This feature is not available for regions, enhancements, and some other inspections.*



Then use the "Forced Reject" on page 119 feature to sample parts.

Adaptive Reject (Optional)

Adaptive Reject compensates for the reject device’s turn-on time delay with varying speeds of machine operation. An example where this is used is on a Belvac machine. The turn-on time of the reject device might be over one-half of a can width at high machine speeds. The Adaptive Reject will delay the activation of the reject device as a function of encoder speed. As the belt (or production line) slows down, more delay is added.

Adaptive Reject allows for different speeds without having to recalibrate between part types.

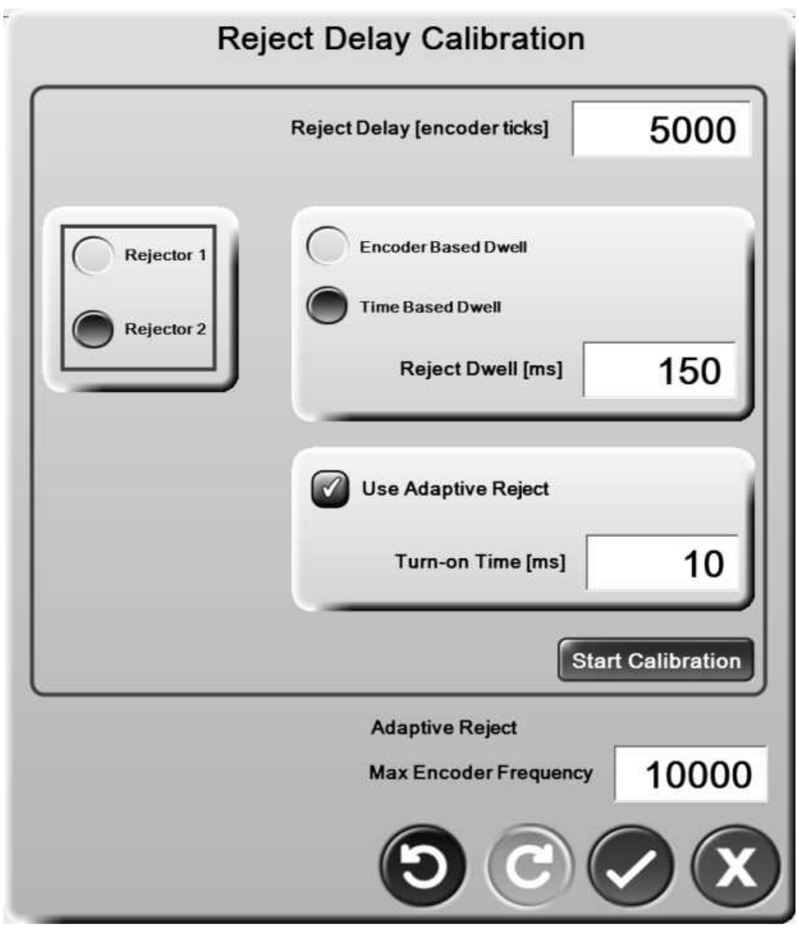
For best results when using Adaptive Reject:

- Calibrate the Reject Delay and Reject Dwell at the fastest possible conveyor or production line speed prior to enabling the Adaptive Reject function
- Calibrate the Reject Delay when the conveyor or production line is running at a constant speed -- not during a startup or stopping

> *Note: Adaptive Reject will not function properly if the reject device delay is greater than the spacing between parts.*

To calibrate Adaptive Reject:

1. Run the conveyor at maximum speed for about 35-40 seconds. This programs the adaptive reject logic for maximum product speed.
2. Go to the I/O Diagnostics screen and record the encoder rate while the line is running at max speed.
3. Go to the Reject Delay Calibration menu: Right-click over a sensor button | Part Tracking | Reject Delay Calibration.
4. Select the check box: Use Adaptive Reject.
5. Set the Max Encoder Frequency to the value you recorded in step 1.
6. Set the reject device Turn On Time (usually about 10 ms for air rejectors and about 15 ms for the pusher rejector).
7.  Select the OK button to save changes and exit.



Turn on Time

Latency of the rejector mechanism in milliseconds.

Max Encoder Frequency

Maximum encoder frequency of the starwheel or conveyor. Notes:

- Reject Delay should be calibrated with the system running at the maximum encoder frequency.
- A positional error will occur if the encoder frequency exceeds the maximum encoder frequency.
- Max Encoder Frequency is shared by all rejectors

Reference table

The table below shows the computed value of the delay based on encoder speed and how the resultant delay (in encoder ticks) is the same regardless of speed.

Max Encoder Frequency (Hz)	Encoder Frequency (Hz.)	Computed Delay (encoder ticks) (A)	Reject device turn-on delay (encoder ticks) (B)	Total movement (encoder ticks) (A + B)
10000	500	95	5	100
10000	1000	90	10	100
10000	2000	80	20	100
10000	3000	70	30	100
10000	4000	60	40	100
10000	5000	50	50	100
10000	6000	40	60	100
10000	7000	30	70	100
10000	8000	20	80	100
10000	9000	10	90	100
10000	10000	0	100	100

- Computed Delay (Encoder Ticks) (A) = [Max Enc Freq (Hz) – Enc Freq (Hz)] * Reject Turn-on Delay (msec) / 1000
- Rejecter Latency (Encoder Ticks) (B) = Enc Freq (Hz) * Reject Turn-on Delay (msec) / 1000
- Total Movement = A+B

Reject Confirm Calibration (Optional)

Reject Confirm can detect missed rejects. It is used with the Missed Reject Alarm. There are two types of Reject Confirm sensors (Encoder-based and Time-based), and calibration is different for each. The type used in your process depends on your plant's needs.

> *Note: Reject Confirm is an optional feature, and an additional sensor must be installed at your site.*
> *Note: If your system is using a PDX, then each sensor must have one Empty Pocket inspection in the part program. See "PDX Configuration" on page 528 and "Empty Pocket" on page 204.*

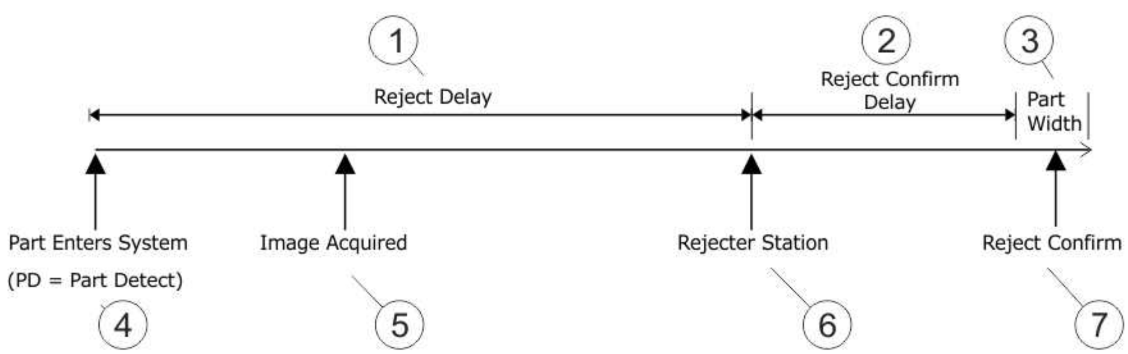
A. Encoder-based sensor

Reject Confirm uses a part detect sensor positioned past the normal reject mechanism to determine whether the defective part was rejected. Reject Confirm Delay must be a value of 1024 or less. This calibration method uses encoder ticks because the measurement is made along the same path as the parts.

Details - Encoder-based sensor

After the rejector fires (meaning the reject delay for a part has passed), the Reject Confirm Delay starts. Once the Reject Confirm Delay has passed, the system examines the reject confirm sensor for a period of time equal to the Part Width. If the reject confirm sensor “sees” a part within that time, it means that the reject was missed. If the reject confirm sensor does not see a part, it means the part was rejected successfully.

If the reject was missed, the Missed Reject Alarm will be triggered (if enabled). Below is a timing diagram of the Reject Confirm process.



1 - Reject Delay

2 - Reject Confirm Delay, set by Reject Confirm Calibration

3 - Part Width

4 - Part Detect (PD) - where the part is first detected by the sensor

5 - Image Acquired - image is taken, inspection is performed

6 - Rejector Station - standard rejection point

7 - Reject Confirm - second part sensor to determine whether a defective part was rejected

B. Time-based sensor

With this method of Reject Confirm, the part detect sensor is mounted in the path of the rejected products. This calibration method measures the reject confirm delay in milliseconds, because the product is flying through the air and not related to encoder ticks. If the Reject Confirm sensor does NOT see a part, then it triggers the Missed Reject alarm.

C. Setting up Reject Confirm

To set up Reject Confirm Calibration:

1 - Enable the Missed Reject alarm

Go to Rejector Alarms Configuration to enable the Missed Reject alarm. If you are using time-based reject confirm, you may also want to enable the Jam at Reject Confirm alarm, which is triggered when the reject path has been blocked too long. That is, the reject bin may be blocked or full.

2 - Calibrate Standard Reject Delay

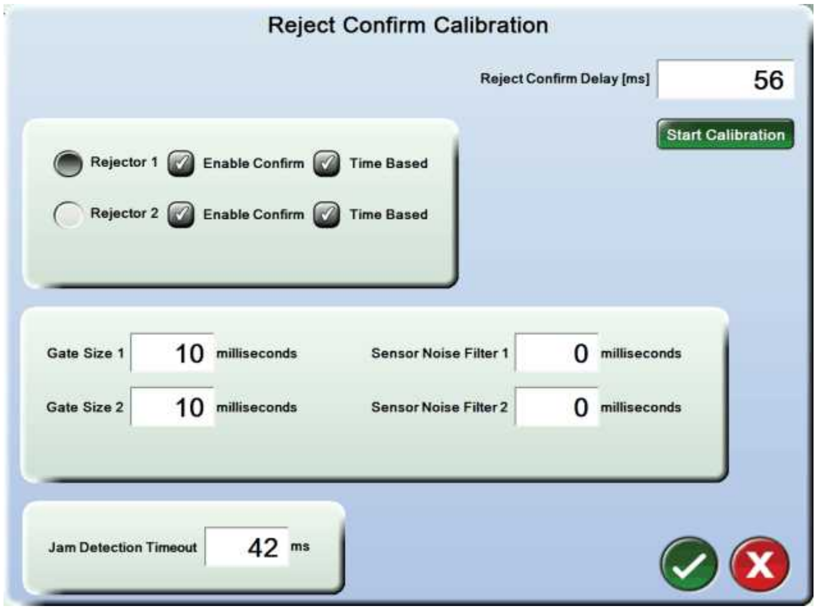
Calibrate the standard reject delay using normal procedures. "Reject Delay Calibration" on page 93

3 - Set up Reject Confirm

Using encoder-based Reject Confirm: Mount the Reject Confirm sensor at “X” distance beyond the rejector where “X” is distance in encoder ticks. For example, if there are 70 encoder ticks per inch, and the sensor is mounted five inches beyond the rejector, the Reject Confirm Delay would be set to 350. When the Reject Confirm sensor sees a part that is not supposed to be there, it triggers the Missed Reject alarm.

> *Note: The maximum setting for Reject Confirm Delay is 1024. Mount the Reject Confirm sensor within that range of encoder ticks.*

Using time-based Reject Confirm: Mount the Reject Confirm sensor so that it can see parts after they are rejected (for example, in the reject chute). If the sensor is closer to the rejector, less gate and dwell time is needed. If the Reject Confirm sensor does NOT see a part, then it triggers the Missed Reject alarm.



To calibrate Reject Confirm:

1. From Sensor Overview mode, right-click a sensor button | Rejecting | Reject Confirm Calibration.
2. Check Enable Confirm.
3. If using time-based Reject Confirm, then also check the Time-Based box, and set Gate Size, Sensor Filter and Jam Detection Timeout.
4. Select the Start Calibration button.
5. Run a part through the system. Tip: for best results, run about 10 parts through the system.
6. When completed, select the Stop Calibration button. The system will compute Reject Confirm Delay. [Reject Confirm Delay = (number of pulses from Part Detect to Reject Confirm Sensor) minus Reject Delay]
7.  Select the OK button to save changes and exit.

The following parameters are used only with Time-Based Reject Confirm:

Gate Size The time interval (in milliseconds) that the system looks for the product to pass by the reject confirm sensor. The valid range is 1 to 63 milliseconds.

Sensor Noise Filter The shortest pulse width (in milliseconds) that the reject confirm sensor will pass. This is used to filter out glitches or noise. This is usually set much smaller than part width, but larger than glitches or noise. The valid range is 0 to 4 milliseconds.

Jam Detection Timeout Specifies how long the sensor is blocked before the Jam at Reject Confirm alarm is triggered. This alarm must be enabled through Lane Alarm Configuration. The valid range is 1 to 32000 milliseconds.

Alternate Part Processing - Using

Process the first N parts different than normal when your machine starts back up (after you stop it).

When your system starts back up, the Extended I/O board sends a trigger to the Intellispec system to reject the next N parts (Quantity of Parts to Process).

You may see a message on the screen indicating that Alternate Part Processing is in progress:

See also "Alternate Part Processing - Setup" on page 518

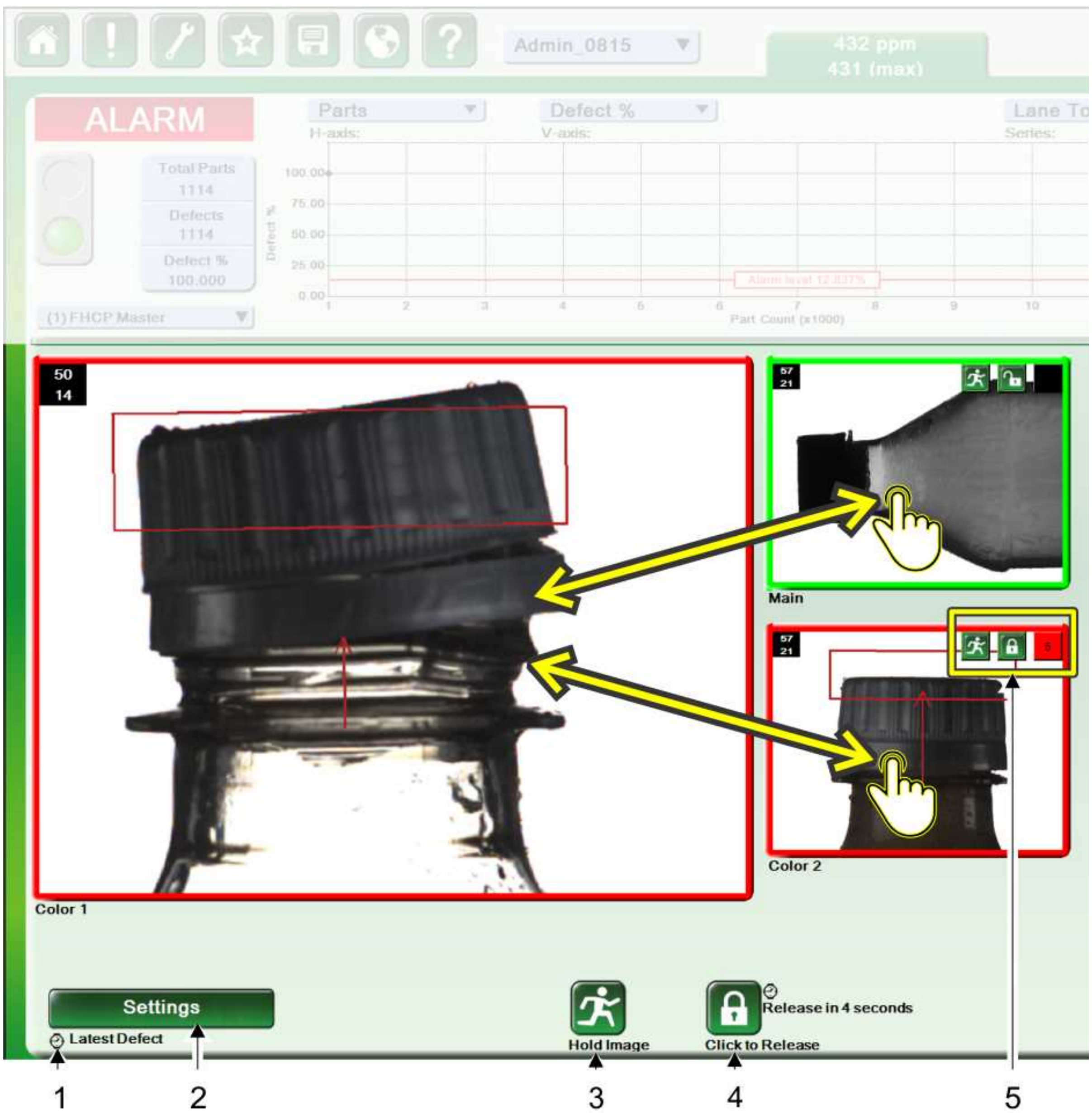
Chapter 12 Lighting and Imaging

Freeze on Defect

Automatically freeze an image when a lane is online. Freeze on Defect has two views: Multi Sensor View and Single Sensor View.

Multi Sensor View

This is accessed from Lane Overview Screen.

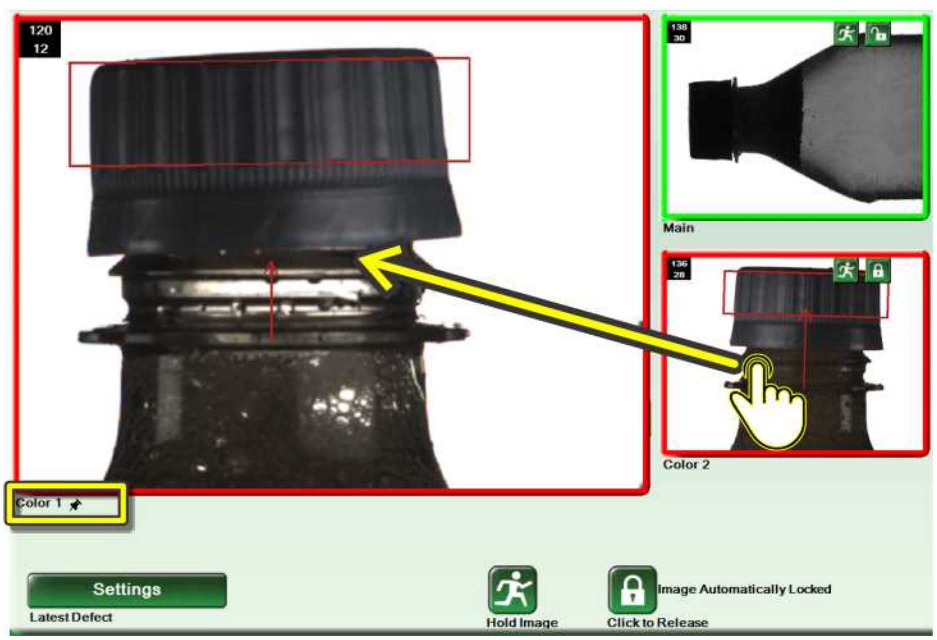


1		Optional Timed Release feature
2		Go to "Freeze on Defect Setup Menu" on page 137
3		Hold an image
3		Held image
4		Locked image. Select this button to release an image.
4		Unlocked image.
5		These symbols appear only on the smaller images, when Side-by-Side Locked Images = Latest Sensor Image in the Settings menu (Freeze on Defect Setup menu). The number in the upper right corner of the small image is the countdown timer (when Timed Release is used). The large image does not show these buttons; holding the image is controlled by the buttons at the bottom of the screen.

Right-click over any image to use the "Freeze on Defect Options Menu" on page 138

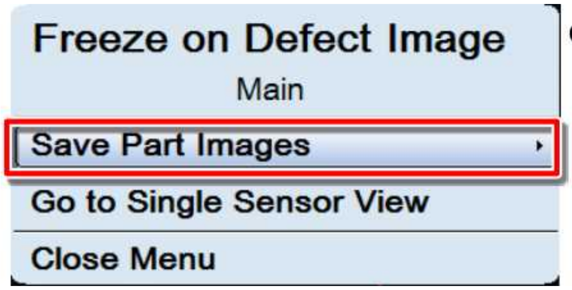
Pinned Image

In Multiple Sensor View, a view can be pinned to the large image when" Automatically switch to the latest locked image" is enabled. This allows you to work with the image for 10 seconds before it gets replaced by another image. When you select one of the smaller images, that image gets moved to the large image, and is pinned there temporarily. A push pin icon is displayed below the large image.

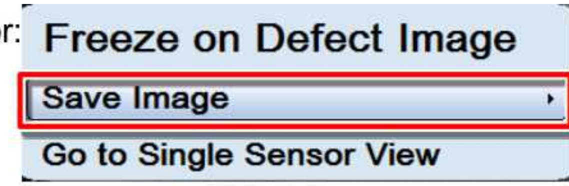


To save an image:

1.  Select the Hold Image button.
2. Right-click over the image.



or:

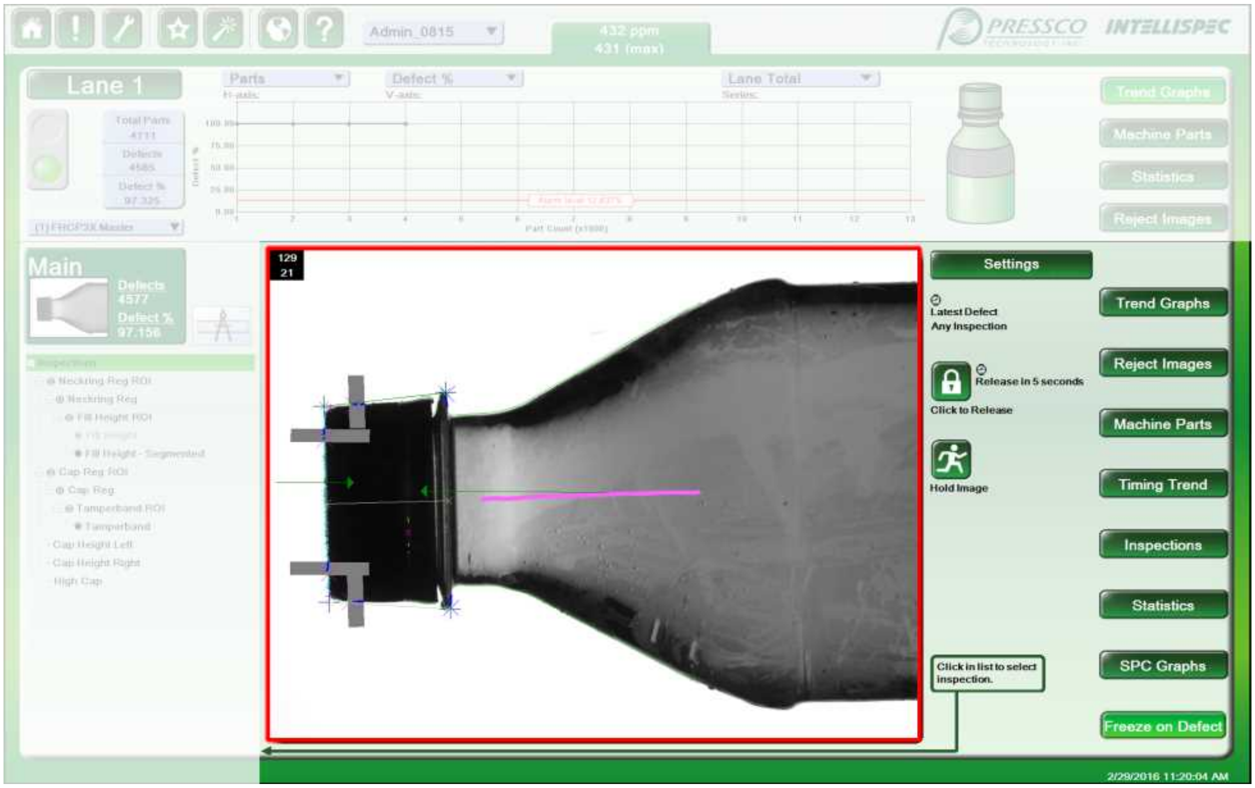


3. Select Save Part Images or Save Images (depending what is shown on screen).
4. Select Image Only or Image with Graphics.

5. Select Save Now... and follow the instructions on screen.

Single Sensor View

Enter this view from the Sensor Overview Screen. Select the inspection to freeze from the inspection tree.

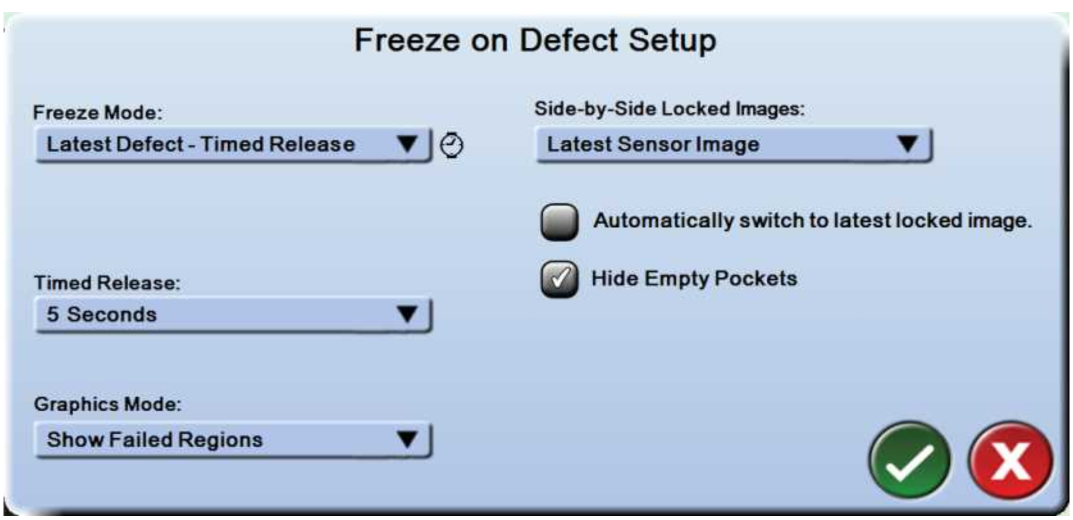


To exit Freeze on Defect:

Select another button on the right side of the screen (example: Trend Graphs).

Freeze on Defect Setup Menu

Select the Settings button from Freeze on Defect mode. Menu options change based on where you entered from.



Freeze Mode

Manual Lock Only Do not automatically hold an image. Images will be updated continuously, except if you select the Hold button.

Latest Defect Freeze the last rejected part. Each subsequent failing part will freeze until another part fails.

Latest Defect - Timed Release Hold the last defective image for a number of seconds (set by Timed Release). If another defect occurs during the countdown, that image is frozen and the Timed Release countdown resets.

First Defect Freeze the image of the first defective part after going online. The image freezes until you release it or change Freeze Mode.

First Good Freeze the image of the first good part after going online. The image freezes until you release it or change Freeze Mode.

Machine Part Freeze the next part image correlated to the selected machine part. It freezes until the next correlated image becomes available and is replaced by the new image. Use the Select Machine Part button to select the machine part.

Machine Part - Timed Release Freeze the next part image correlated to the selected machine part. It remains on screen for the specified time, or until the next correlated image becomes available, whichever comes first. Use the Timed Release settings to set the display time.

Timed Release Set the display time. When the time expires, a new image is displayed.

Graphics Mode Select which inspection graphics to display.

Hide Empty Pockets If enabled: If an inspection detected an Empty Pocket, then that blank image will not be displayed.

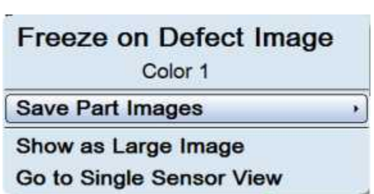
The following only apply if you are in Multi Sensor View.

Side-by-Side Locked Images Same Part - The images displayed are all the same part. Latest Sensor Image - Displays the last inspected images. If your cameras are located far apart, the images may be different parts. This mode is usually used when your cameras are close together, such as in a BNS application. If your system uses Machine Part Correlation, you can "Show Correlation Values in Images," so that you can see which image is associated with each machine part.

Automatically switch to latest locked image This switches the image that most recently met the freeze frame conditions to the large image.

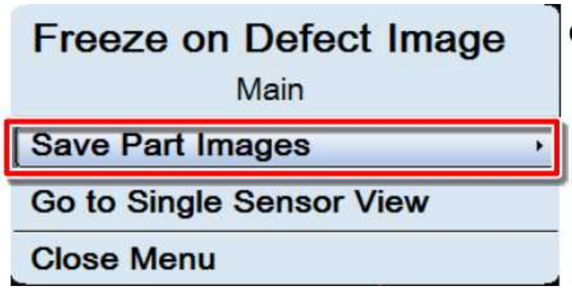
Freeze on Defect Options Menu

Select or right-click over one of the images from Freeze on Defect mode to see the menu.

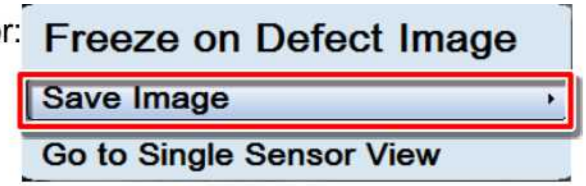


To save an image:

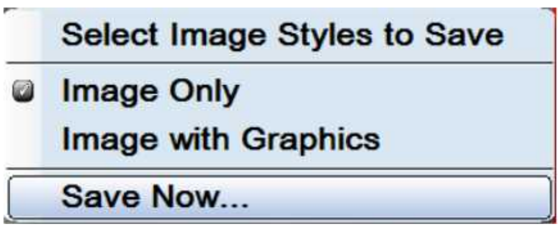
1.  Select the Hold Image button.
2. Right-click over the image.



or:



3. Select Save Part Images or Save Images (depending what is shown on screen).
4. Select Image Only or Image with Graphics.



5. Select Save Now... and follow the instructions on screen.

Show as Large Image[Available from Multi Sensor View, when you right-click over a smaller image] Display the current image as the large image.

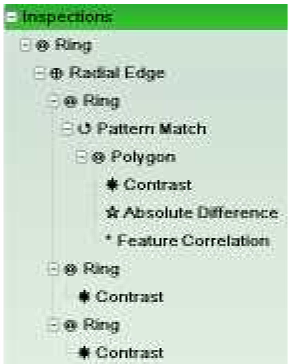
Go to Single Sensor View Go back to Sensor Overview mode and display the Reject Images screen for the selected sensor.

Freeze on Defect Image - Use in Retro-Spec

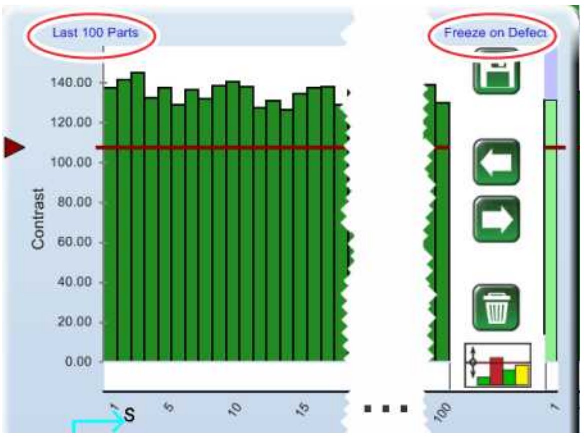
Adjust an inspection (not a region) in Retro-Spec using an image (good or bad) captured in "Freeze on Defect" on page 134.

To get to Retro-Spec from Freeze on Defect:

1. Right-click over a LARGE frozen image.
2. Choose "Go to Single Sensor View."
3. Double-click an inspection name (in the inspection tree). This will open the Retro-Spec interface for that inspection. The Freeze on Defect operation is paused, so that you can keep working on the same frozen image.



4. The frozen image will appear on the right side of the graph.



5. Select the bar on the right side of the graph. The frozen image will be displayed. Adjust the inspection as desired.

Freeze on Defect Image - Use in Reject Images

If you have one image locked in Freeze on Defect, it is displayed in the Reject Images. If you release that image, then it is replaced by the standard reject images.

To remove that image, select Freeze on Defect | Settings | select a different mode. Then select the Reject Images button.

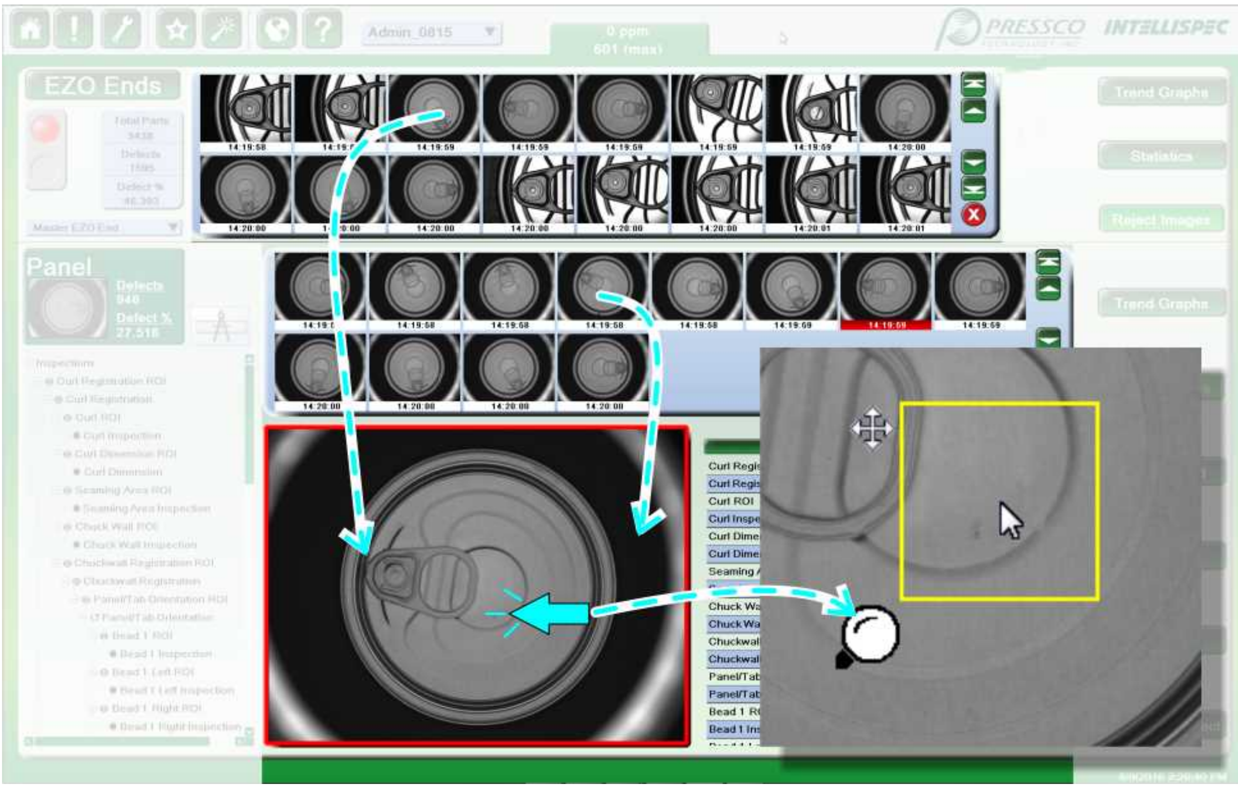
Standard reject images:

Reject Images

Reject Images are images from the last 100 defects from a sensor (or all sensors for Lane Overview mode). Select a Reject Images button. Note: there are buttons for Lane and Sensor levels.

Lane Reject Images show failed images from different sensors.

Sensor Reject Images show failed images from that sensor only.



Reject Images - Access Inspections From

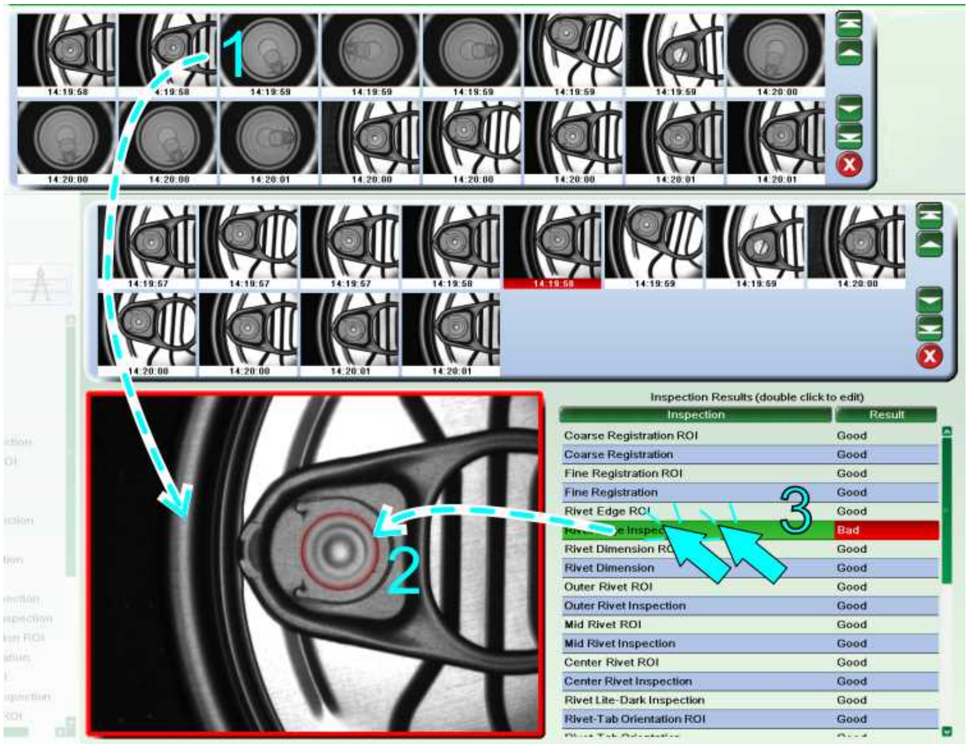
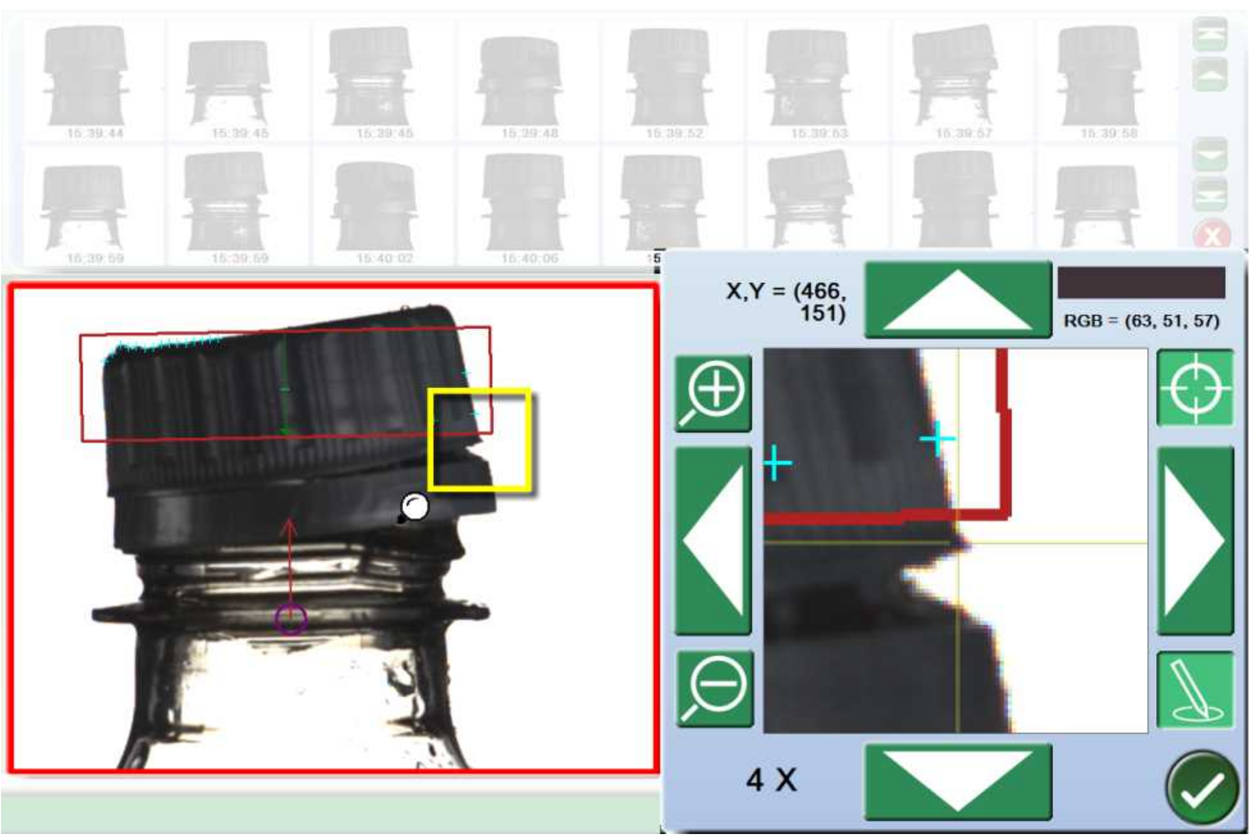
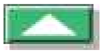


Image Magnifier



To use the magnifier:

When you first open the tool, the yellow box area over the image is magnified. This moves when you move the cursor on screen. To move the magnified area independent of the cursor, right-click over the image.

 The arrow buttons become available.

Select the target button to display or remove crosshairs on the magnified image. The pixel at the center of the crosshairs is where the RGB values are measured.

Offline Imaging

Acquire images when the lane is offline. To see this menu, right-click over a sensor button, then select Offline Imaging.

Triggered Mode

Single Image a picture is taken every time the button is clicked. (it uses the part detector)

Run pictures are taken continuously as each part triggers the part detect sensor.

Immediate Mode

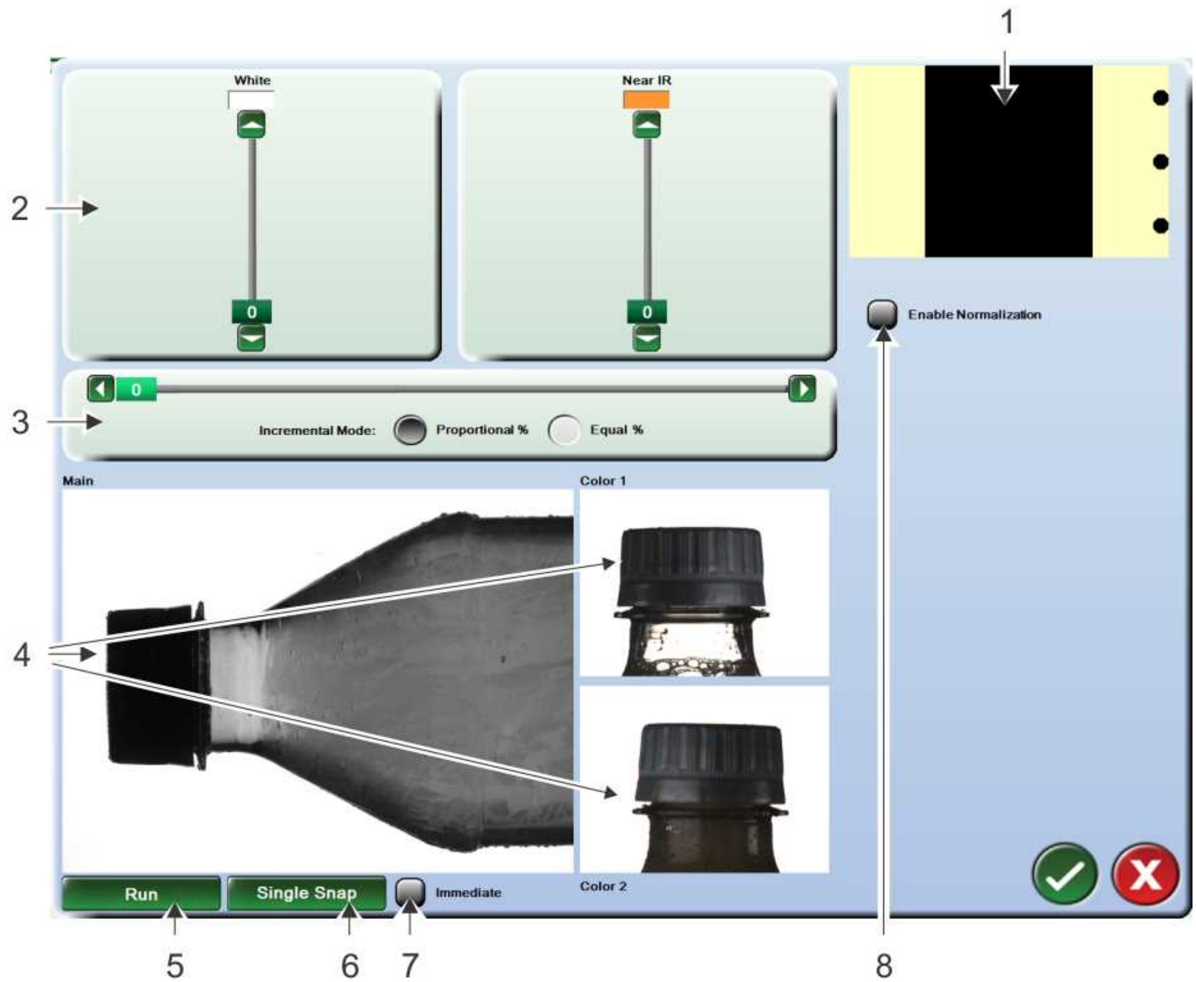
Single Image a picture is taken every time the button is clicked. (it does not use the part detector)

Run the camera takes continuous pictures, using the "Image Update Interval." You see whatever is under the camera.

Basic Adjust Lighting

Basic lighting provides most of the lighting adjustments you will use. Lighting must be adjusted while the lane is offline.

To get to this screen: Right-click over a sensor button | Lighting | Basic Adjust Lighting.



1- Select a zone to adjust it. You can select a single zone or multiple zones. As lighting is changed, the zone and the button next to it change color.

2 - Separate slider bars for each color (red, green, blue, and infrared) allow individual adjustment.

3 - Proportional % - Moving the slider bar adjusts all colors but maintains the current percentage of each color. Equal % lighting - Each color is adjusted by the same amount.

4 - Select any image (if applicable to your system) to select the camera to adjust lighting.

> *Note: the buttons below are similar to* *"Offline Imaging" on the previous page*

5 - Run

- Immediate mode [7] checked: the camera takes continuous pictures. You see whatever is under the camera.
- Immediate mode not checked: pictures are taken continuously as each part triggers the part detect sensor.

---

6 - Single Snap

- Immediate mode [7] checked: a picture is taken every time the button is clicked. (it does not use the part detector)
- Immediate mode not checked: a picture is taken every time the button is clicked. (it uses the part detector)

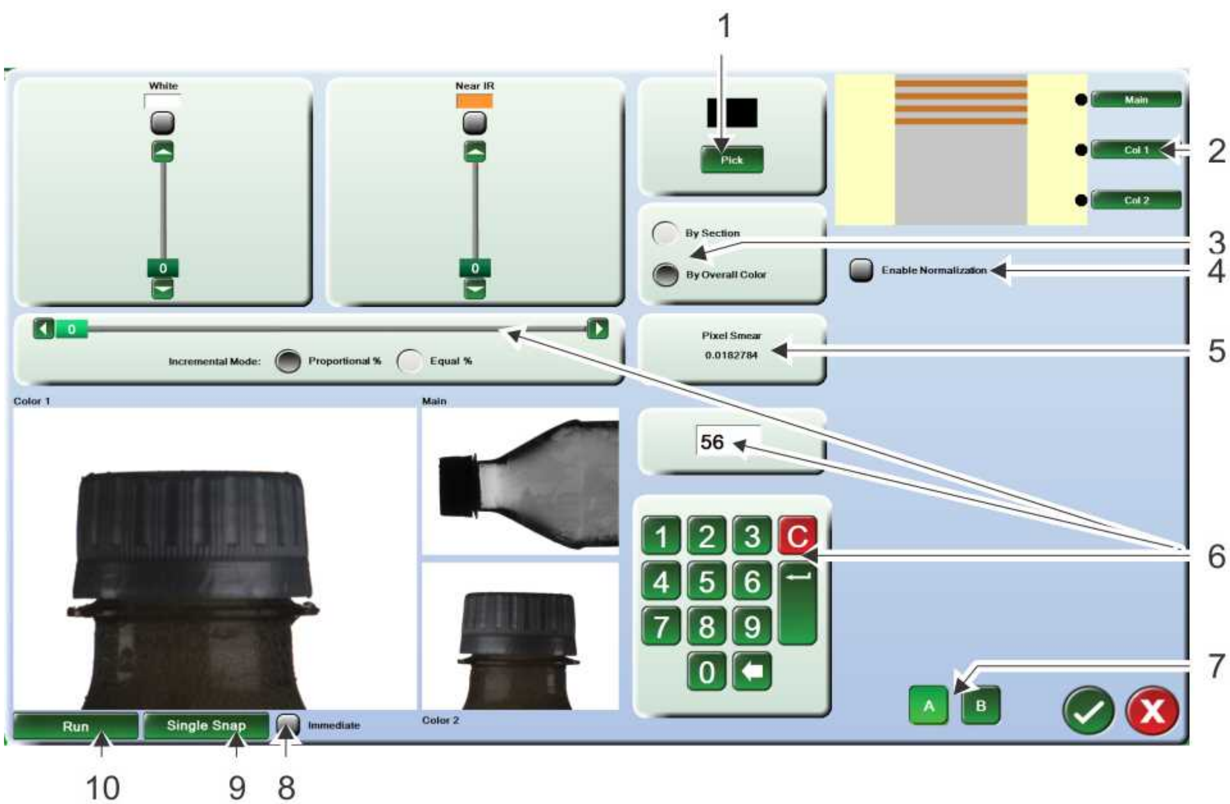
---

8 - Enable Normalization - (or Disable Normalization). For most applications leave normalization disabled. If you are modifying an old part program that has normalization enabled, then leave it enabled.

Advanced Adjust Lighting

This screen provides additional lighting setup. This is mostly used by Pressco engineers, or for making infrequently performed specialized settings. Lighting must be adjusted while the lane is off-line.

To get to this screen: Right-click over a sensor button | Lighting | Advanced Adjust Lighting.



1 - Opens a color palette and allows you to choose preselected colors.

2 - If your inspection module has different lighting arrays, click one of the array buttons to adjust lighting by zone. "Advanced Adjust Lighting - Zones" on the next page

3 - By Section - Change lighting by each section. By Color - Change lighting for multiple sections at once.

4 - Enable Normalization - (or Disable Normalization). For most applications leave normalization disabled. If you are modifying an old part program that has normalization enabled, then leave it enabled.

5 - Pixel Smear - The Intellispec computes the amount of pixel smear from lighting, image size, and part rate. It should be kept below one.

6 - On-screen keypad - enter the percentage of color. This also moves the percentage slider.

7 - A/B buttons - Set up two different lighting settings for the same part so you can compare.

8 - Immediate Mode - see Run and Single Snap mode

9 - Single Snap

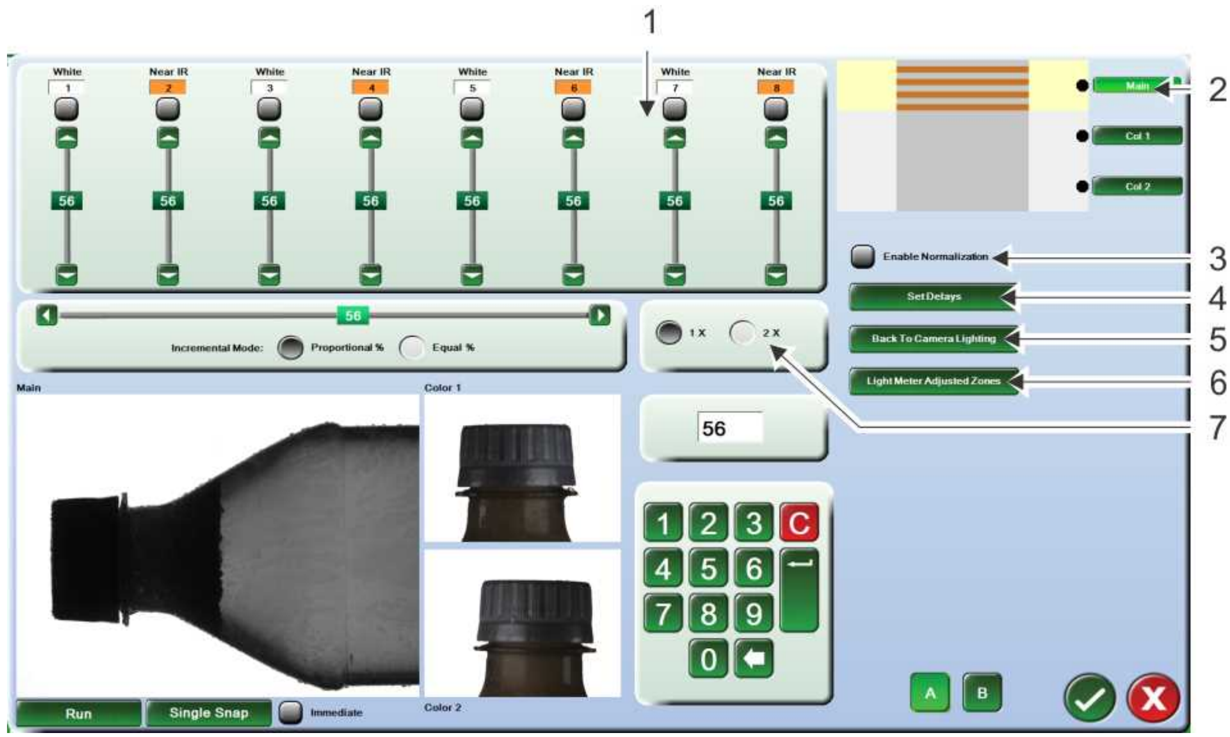
- Immediate mode [8] checked: a picture is taken every time the button is clicked. (it does not use the part detector)
- Immediate mode not checked: a picture is taken every time the button is clicked. (it uses the part detector)

10 - Run

- Immediate mode [8] checked: the camera takes continuous pictures. You see whatever is under the camera.
- Immediate mode not checked: pictures are taken continuously as each part triggers the part detect sensor.

Advanced Adjust Lighting - Zones

When you select one of the array buttons [2] from the "Advanced Adjust Lighting" on the previous page screen, you can adjust each zone independently.



1 - Adjust any zone within the light array. Options:

- Adjust any zone with the slider or arrows
- Select several zones (check their gray boxes) to adjust those zones as a group (intensity will be the same for the whole group)

2 - Select a button to adjust lighting zones for that array

3 - **Enable Normalization** (or Disable Normalization). For most applications leave normalization disabled. If you are modifying an old part program that has normalization enabled, then leave it enabled.

4 - Set Delays provides a delay for certain cameras so that the lighting does not occur for all cameras at once. "Advanced Lighting Software - Set Delays" on the next page

5 - Select Back to Camera Lighting to go back to the Advanced Adjust lighting screen

6 - Light Meter Adjusted Zones

This is used when you have a "Light Meter" on page 337 inspection.

Checked = enabled. If a box is un-checked, then the Light Meter inspection does not adjust that zone. This depends on your application.

An example is inspecting the body of a can: The Light Meter might adjust lighting to be brighter if it finds that the can material is getting darker over time. However, we do not want the Flange lighting zones to be brighter because it is usually very bright initially. If the Flange zones were adjusted brighter, then the image would be overdriven in the Flange area. Therefore we would un-check the Flange zones.

7 - Intensity. 1X is the normal setting. 2X doubles the intensity without having to adjust through the sliders. Maximum intensity is 100%. If a slider is already at 100%, then the intensity will not be doubled.

For descriptions of the other buttons, see "Advanced Adjust Lighting" on page 145

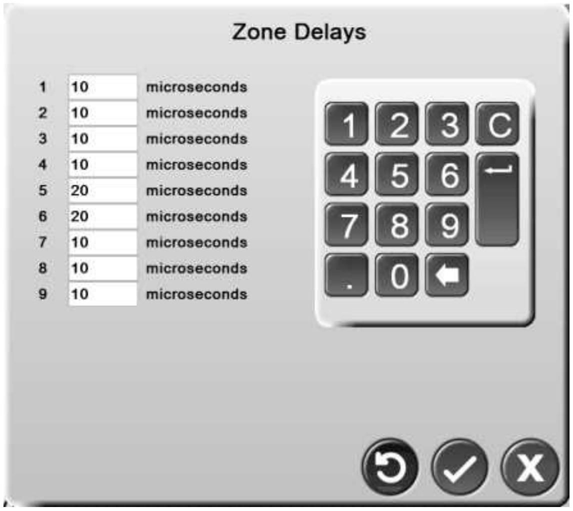
Advanced Lighting Software - Set Delays

This provides a strobe delay for a camera, so that the lighting for all cameras does not all occur at once. For example, in a Base and Neck inspection system, the Base and Neck part present signal occurs at the same time. A lighting delay is required so that the Base is lit separately from the Neck.

> *Note: this setting is normally done in the Pressco factory. You should not need to adjust it.*

To get to this screen:

1. Right-click over a Sensor button to see the sensor menu | Lighting | Advanced Adjust Lighting.
2. In the upper right corner of the lighting screen, click one of the array buttons to go to the zone adjustment screen.
3. Click the Set Delays button. The Zone Delays menu is displayed.



To adjust zone delay:

1. Enter the number of microseconds for each zone with the keyboard. The normal setting for the Neck camera is 350 microseconds on each zone.
2. Click the OK button to save changes and exit the menu.

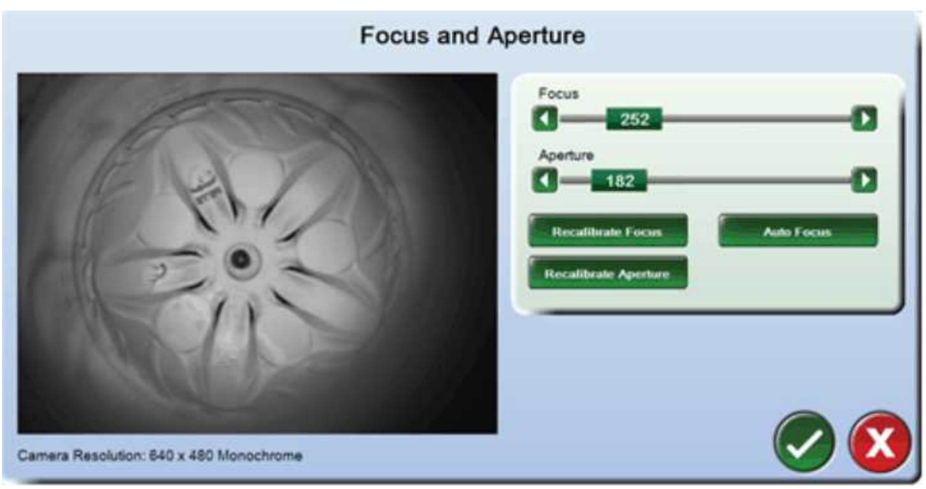
> *Note: this delay is separate from the Strobe Delay set in Part Present Delay Calibration.*

Motorized Camera Adjustments

Make the appropriate adjustment(s) through the software. This feature is only available when the lane is offline.

> *Note: only some cameras support this feature. They contain built-in motors to make these adjustments. Cameras may support only one feature (example: motorized focus, not aperture). Menu items will be grayed if your system does not support specific features.*

From the Lane or Sensor Overview screen, right-click over a sensor button | Camera | Camera Focus and Aperture.



Focus slider Set the focus position of the lens.

Aperture slider Set the aperture position of the lens.

Z axis slider Adjust the depth of the image.

Detect/ Redect Focus Range Set the usable range of focus positions for the lens.

Auto Focus Automatically set the best focus position for the image.

Detect/ Redetect Aperture Range Set the usable range of aperture positions for the lens.

Detect/ Redect Z axis Range Set the usable range of depth positions for the lens.

Image Analysis

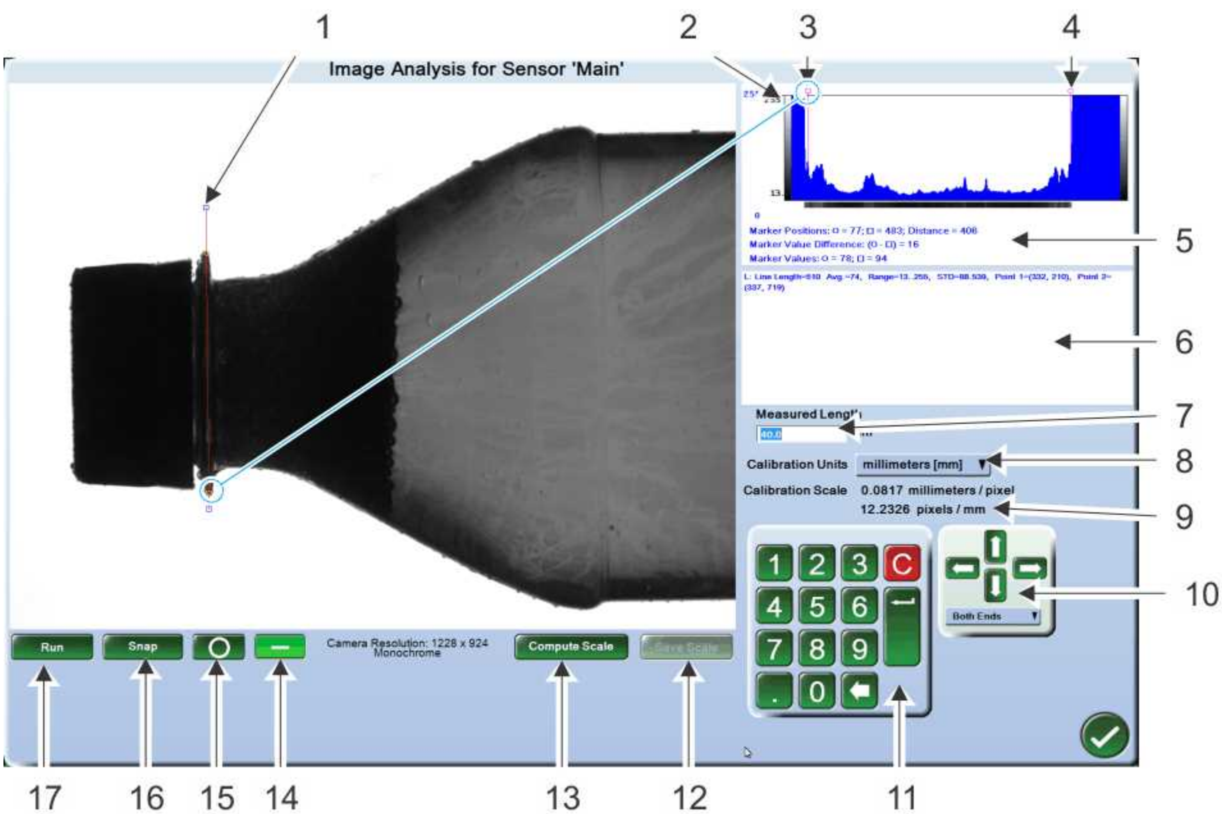
Measure the gray shade value, or distance between, pixels in your image. This is available offline only.

> *Note: to quickly measure a gray shade in an image, use the Image Magnifier instead (click or right-click an image).*

To get to Image Analysis: Make sure the lane is offline. Right-click a sensor button | Image | Image Analysis.

To center the line or circle, right-click over the image: Options | Center Drawing Tool.

The Image Analysis screen shown below is from a high resolution camera. The regular 640 x 480 camera screen has the same controls, but has a different layout.



1 - Select and drag a square to change the length or location of the line. If you are using a circle, use the middle square to re-position the circle.

2 - The highest and lowest gray shade values along the line or circle

3 - Square marker - move to any point on the line or circle (in the image or in the graph)

4 - Circle marker - move to any point on the line or circle (in the image or in the graph)

> *Note: use the square and circle markers [items 3 and 4] to make measurements. You can make your circle or line [items 15 and 14] any size you want, but the markers will give you a more accurate measurement. Use the histogram graph to place the markers, using gray level transitions as marker locations.*

5 - Marker Positions - The distance in pixels that the markers are from the beginning of the reference (red) line. If you are using a circle, then the markers measure the length in pixels from the yellow square. Marker Value Difference - The difference in gray shade between the two markers. Marker Values - Gray shades of markers.

6 - The difference between images

7 - Measure your actual part with a ruler or calipers and enter the measured value in this box. Place a line or circle on the image, covering the same area you measured.

- If using a line: place the markers [3 and 4] on the same area on the image that you used to measure the part. This will measure length.
- If using a circle: place the circle on the image over the same location you used to measure your part. This will measure diameter.

8 - Choose the calibration units that you used to measure your part

9 - Displayed when you select the Compute Scale button. It computes the units of measure per pixel, and shows the number of pixels measured by the line or circle.

10 - Re-position the line or circle with buttons. The drop-down menu allows you to choose the point or feature to move.

11 - Use the keyboard enter the measured value of your part.

12 - Save Scale - (available after you Compute the scale) Save the number of pixels per unit of measure to the sensor file. This calibration unit can be used in Measurement or Distance inspections.

13 - Compute Scale - Select this button after you enter your measured valued [item 4] and set up your line or circle. The system computes the units of measure per pixel.

14 - View gray shades along a line

15 - View gray shades along a circle

16 - Select Snap to acquire one new image

17 - Select Run to continually snap new images. Different images are only displayed if your production line is running.

Calibrating the Image Pixel Scale

Using Image Analysis

Image Analysis can be used to enter your actual measured values of your part and compute the units of measure per pixel. This is called Pixel Scale. This calibration can be used for any inspection on that sensor.

To compute the pixel scale:

1. Using a known good part, measure the length or diameter of an area on your part.
2. Enter that value into the Measured Length or Diameter box.
3. Place a line or circle on the part image in Image Analysis over the same location used to measure your part. Place the markers of the line, or a circle at the edges where you want the system to measure your part.
4. Click the Compute Scale button. The system computes the pixel scale and displays the values.
5. To save the scale to the Sensor file, click the Save Scale button. The pixel scale is saved with the sensor and can be used for any inspection on that sensor.

Using an inspection

Pixel scale can be calibrated for an individual inspection or sensor. When Save Calibration is used in these inspections, you can use the calibrated information in other inspections for that sensor. The inspections that perform pixel scale calibration are:

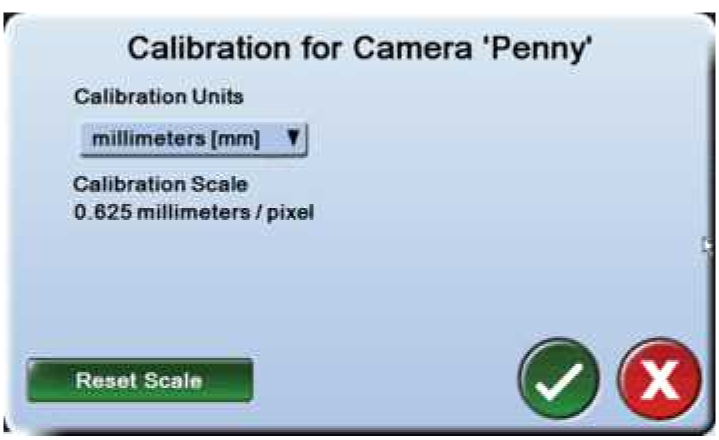
- Measurement
- Fill Height
- Fill Height - Segmented
- Neckring Registration
- Distance

Select Measurement Unit (Review Camera Calibration)

Select a measurement unit. If you switch between inches and millimeters, the pixel scale is automatically converted. Calibration to pixel scale is performed in Image Analysis or some inspections such as Measurement or Fill Height. Calibration is used to compute measurements on a part.

The unit you select in this menu is displayed in the Inspection menus: "p" in a circle for pixels, mm for millimeters, " for inches, or [ ] blank for custom units.

To get to this menu, right-click over a Sensor button | Camera | Review Camera Calibration.



Notes:

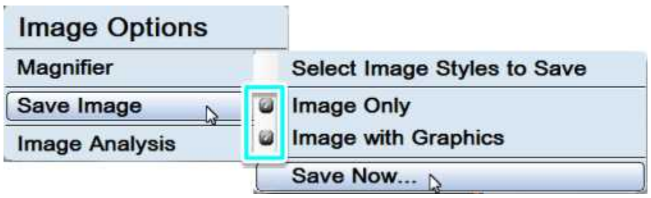
- If you switch from mm to inches or the opposite, the scale is converted for you. However, if you switch to custom or pixels between mm and inches, then the scale is not adjusted for you.
- If you switch to pixels, the scale is set to 1.0. The scale will revert back to your calibrated value if you switch from pixels to another unit.
- The Reset Scale button sets the scale to 1.0 for any unit you have selected.

Save Images

There are several ways to save an image within the Intellispec system.

Save any image:

In most parts of the system, right-click over any image. Follow the instructions on screen. This is useful to save images to include with a Support Package.



Checked = enabled. Then click Save Now...

Image Only - bitmap (.bmp) image with no graphics. Note: only bitmap images can be loaded back into the Intellispec.

Image with Graphics - portable network graphic (.png) image with inspection graphics

The image is saved to the default location shown, unless you specify a different location. A default file name is provided for you. Select the keyboard icon to rename the image.

Find information about other methods of saving images through the links below:

"Save Images Through the Sensor Menu" on the next page

"Auto-Save Images" on the next page

"Save Images through the Retro-Spec interface" on page 155

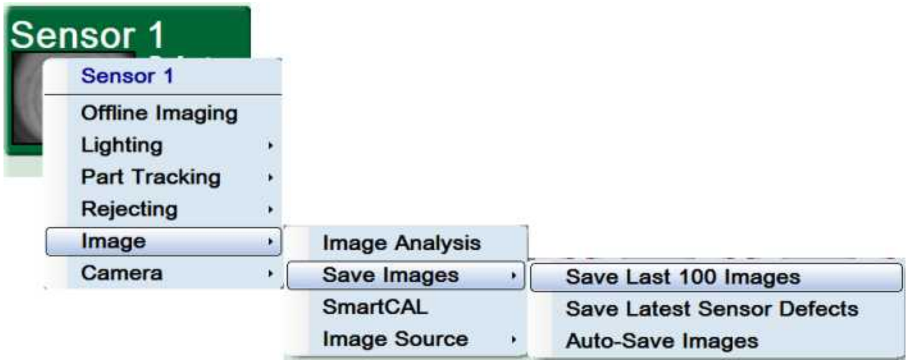
"Save Individual Images While Editing an Inspection" on page 159

"Save Reject Images" on page 159

"Save a Region of Interest (Unwrapped) Image" on page 164

Save Images Through the Sensor Menu

Save a set of images from one sensor (up to 100 images). You can save images whether the lane is online or offline. Right-click to see the menus.



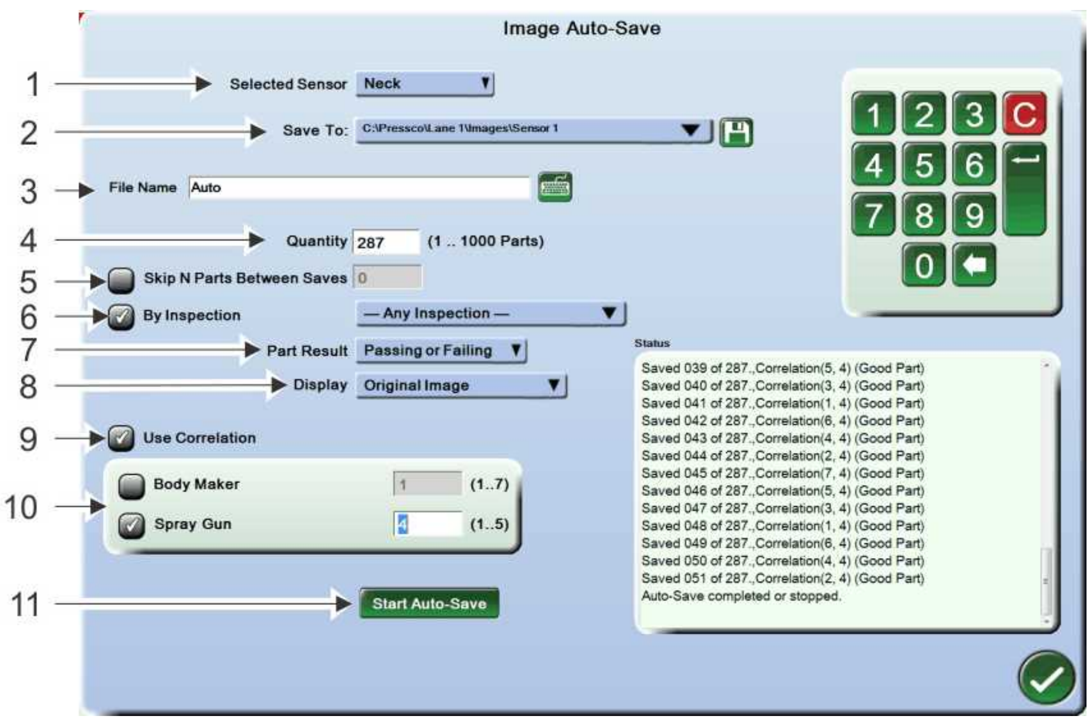
Save Last 100 Images Save the last 100 images captured by the current sensor.

Save Latest Sensor Defects Save the latest defect images shown in the Reject Images thumbnails, up to 100 images.

See also "Auto-Save Images" below

Auto-Save Images

Save up to 1000 images from one sensor when the lane is online. To get to this menu: Right-click a sensor button | Image | Save Images | Auto-Save Images.



1 - **Selected Sensor** Select one or all sensors.

2 - **Save To** Select the location. To change the location, select the disk icon and browse to the desired location.

3 - **File Name** Create a file name, descriptive of the part you are inspecting. The system automatically adds numbers and letters to the name. Example: "Auto0001_S1_P.bmp." [0001] = image 1. [S1] = Sensor 1. [P] = part passed. [F] = part failed.

4 - **Quantity** Quantity of images to auto-save, up to 1000.

5 - **Skip N Parts Between Saves** Check the box if you do not want to save consecutive images. Enter the number [N] of parts to skip between saved images.

6 - **By Inspection** Only available when you have one sensor selected [in item 1]. Save images related to an inspection. Use the drop-down menu to select the inspection from the current part program.

7 - **Part Result** Save images that pass or fail inspection, or both. When images are saved, the file name contains [P] for passing or [F] for failing.

8 - **Display** Save the original image from the camera, or the image after centering, or the image after centering and orientation.

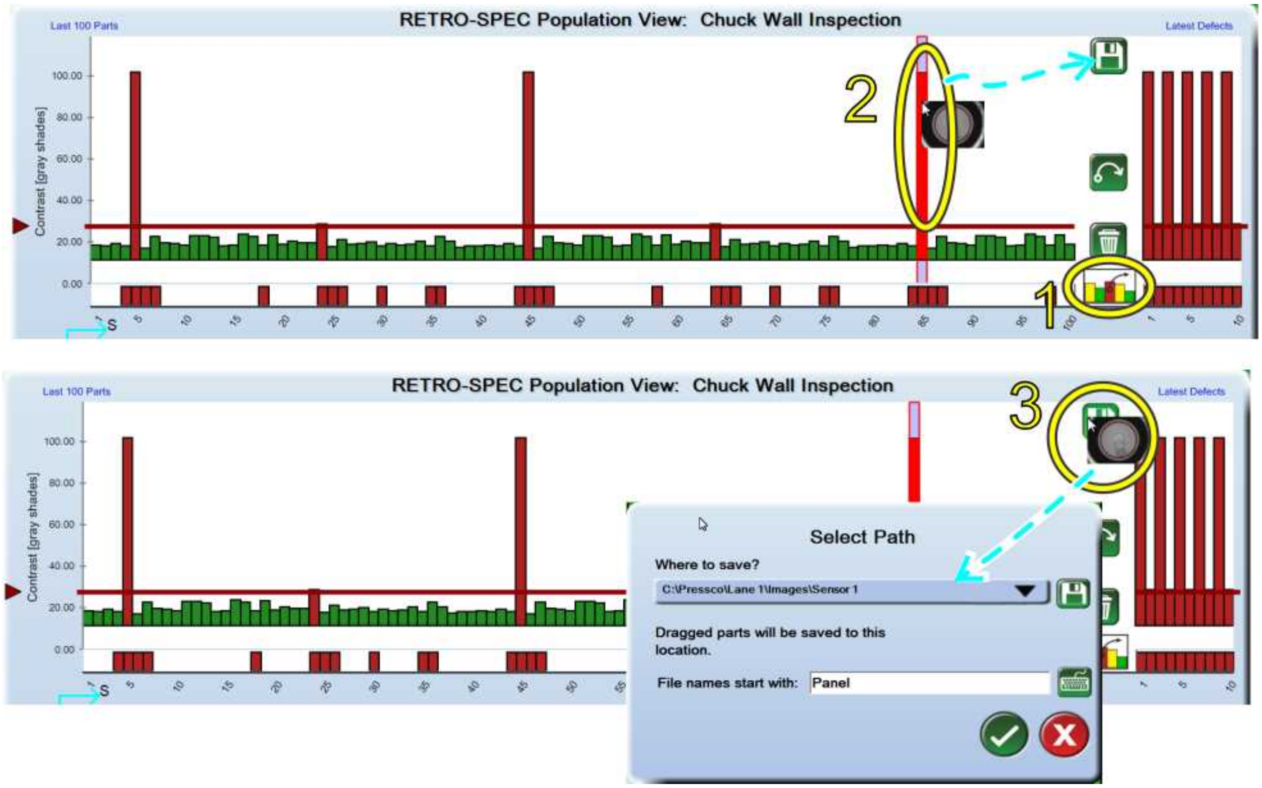
9 - **Use Correlation** [available if correlation is installed] Save images correlated to specific machine parts.

10 - **Machine parts** [available if correlation is installed] Select the machine part(s) to save images from. Also enter a machine part number in the box provided.

11 - **Start Auto-Save** Select Start Auto-Save to start saving images. Select Stop Auto-Save to stop the process. The lane must be online to collect images.

Save Images through the Retro-Spec interface

[1] Unlock, [2] drag image to disk [3]. Choose where to save the image.



Later, you can load the saved images for setting up a part program or testing.

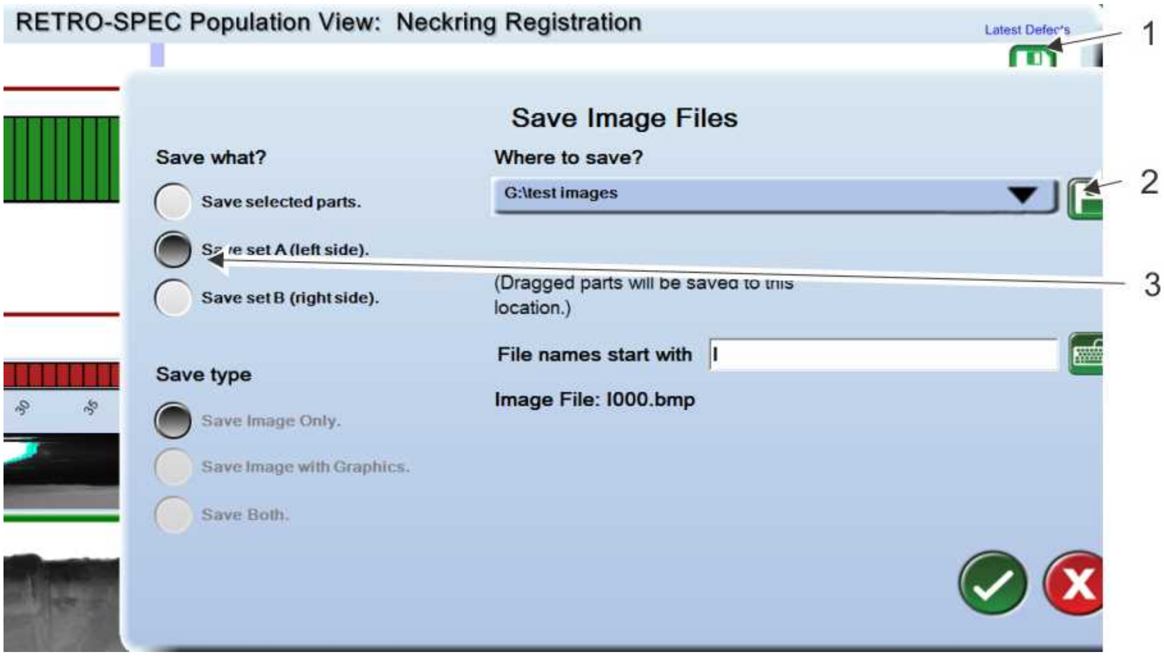
See "Recommendations for Image File Management" on the next page

Saving images to USB using the Retro-Spec interface

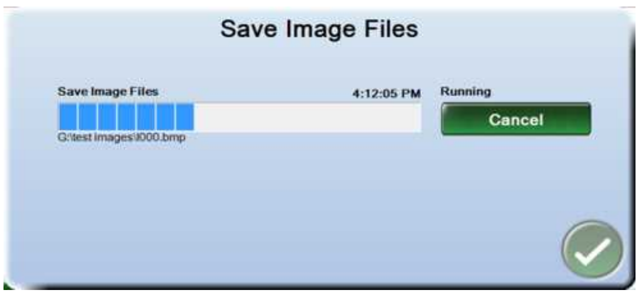
When you are editing an inspection, you might save image sets to a USB device. This is not a background task, and you will not be able to perform other tasks while saving the images. However, you can cancel the task if necessary (see menu shown below). You will not be able to close the dialog box until the task is complete. This prevents errors from occurring in the system.

The sequence to save the images is (see illustration below):

1. Select the Save button.
2. Choose the USB device.
3. Save a data set (A or B).



You may cancel the task if necessary.



Recommendations for Image File Management

This topic relates to "Save Images through the Retro-Spec interface" on page 155

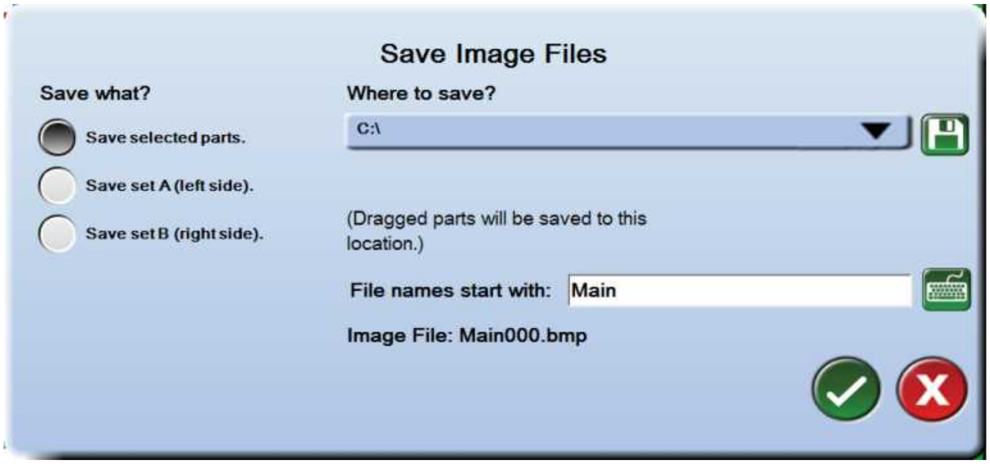
When you save the images for data sets to a folder, each image is given a unique name. Those original images are overwritten if you save images again. We recommend that you create new folders when you save images. Our recommendations are:

- Make new folders and give them meaningful names
- Add the word Defects (or Good) to the folder name to indicate that you are storing defects (or good images) for that inspection

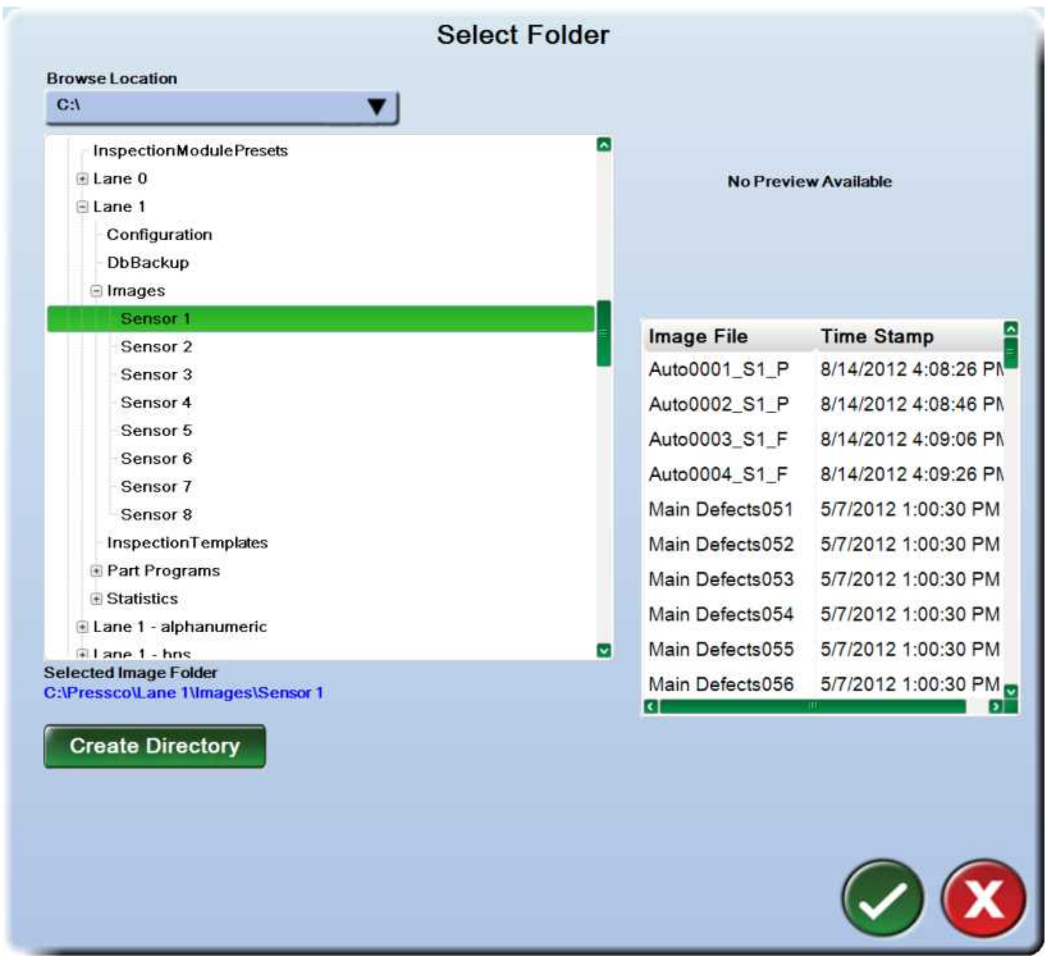
When you are saving images, you can create new folders (directories).

To create a new folder while saving images:

1.  Select the disk icon on the Retro-Spec graph.



2. Select the disk icon to browse folders. The Select Folder menu is displayed.

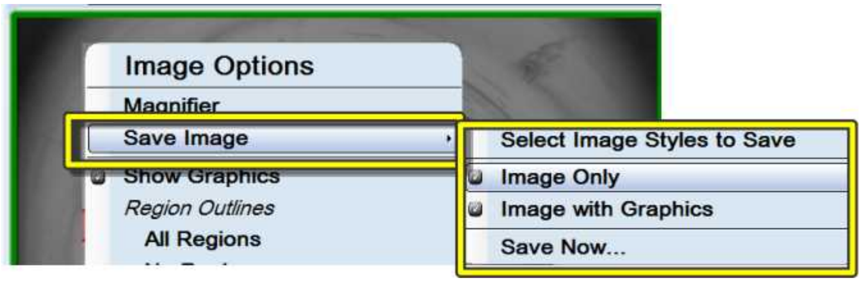


3. Select the button at the top of the menu to browse to the location for the sensor (example, "C:\Pressco\Lane 1\Images\Sensor 1\"). Note that you can also save images to a USB device.

4. Select the Create Directory button to create a new folder. Rename the folder something meaningful (example, sidewall). If you are saving images of defects, use Defects in the folder name.
5.  Select the OK button to complete browsing and return to the Save Image Files menu.
6.  Select the OK button to save the images. Depending where the images are being stored, it may take up to a minute to complete, especially if a USB device is used.

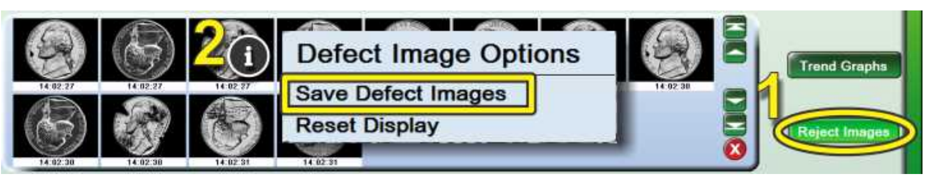
Save Individual Images While Editing an Inspection

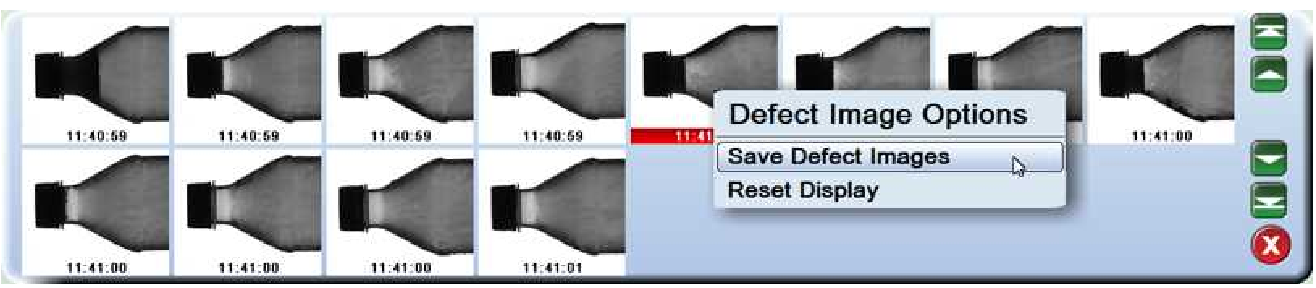
Right-click over the image | Save Image | choose the desired option. The image can be saved whether the lane is online or offline.



Save Reject Images

Right-click to save up to 100 (*.bmp) images from defective parts. The lane can be online or offline. The Reject Images button must be selected.

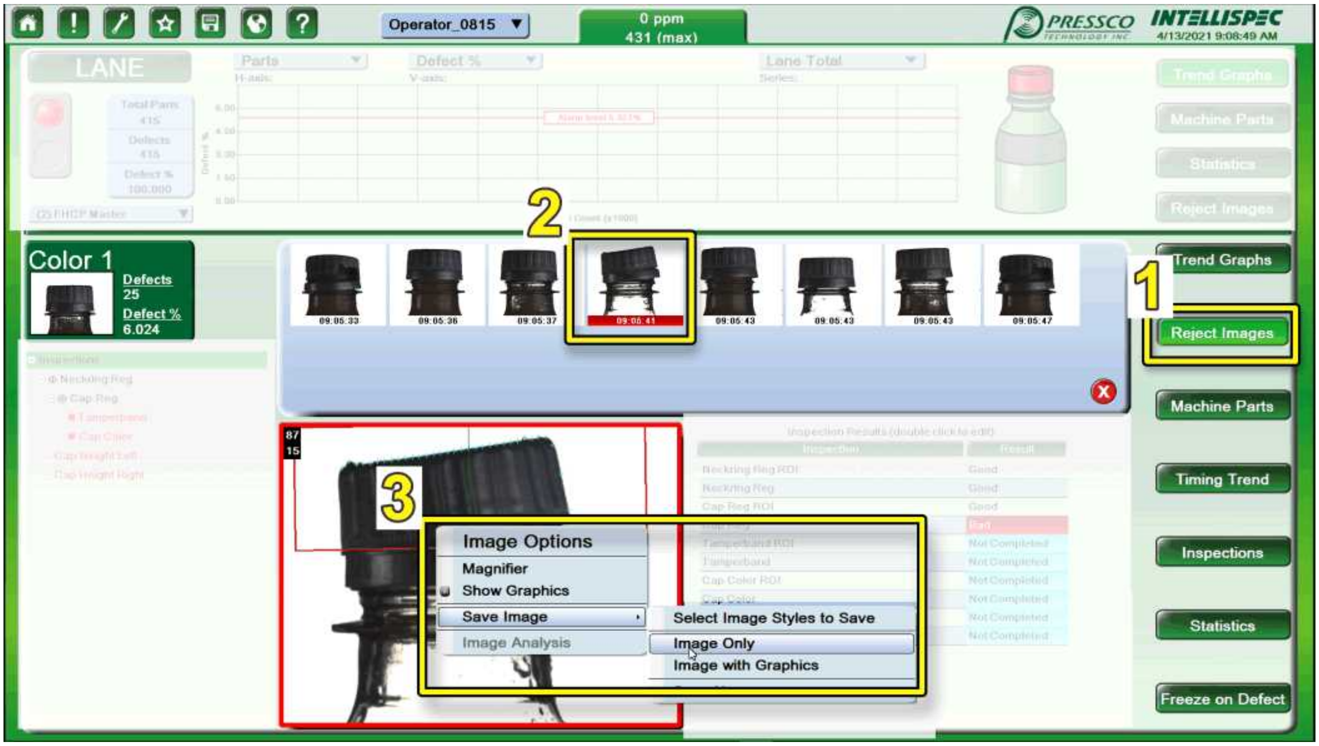




Reset Display Resets the reject image display to show all failed parts, instead of images from only one part or one inspection.

Save Individual Reject Images

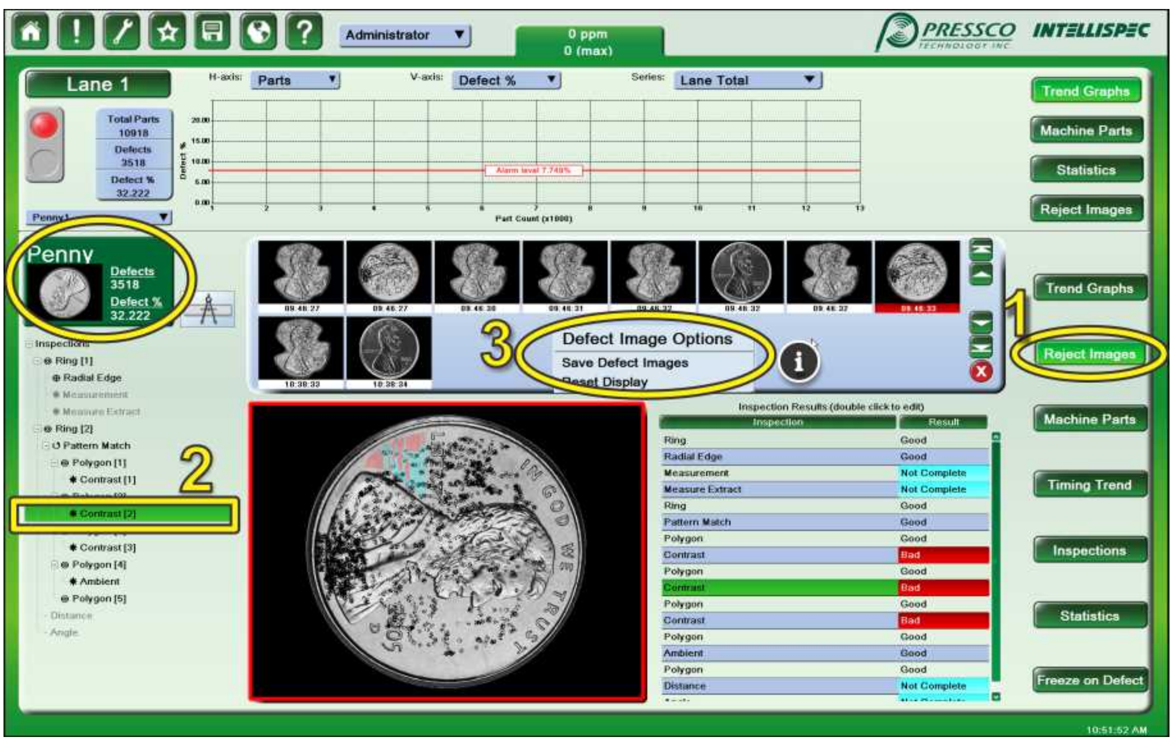
Select any thumbnail image in Sensor Overview mode and right-click to save it.



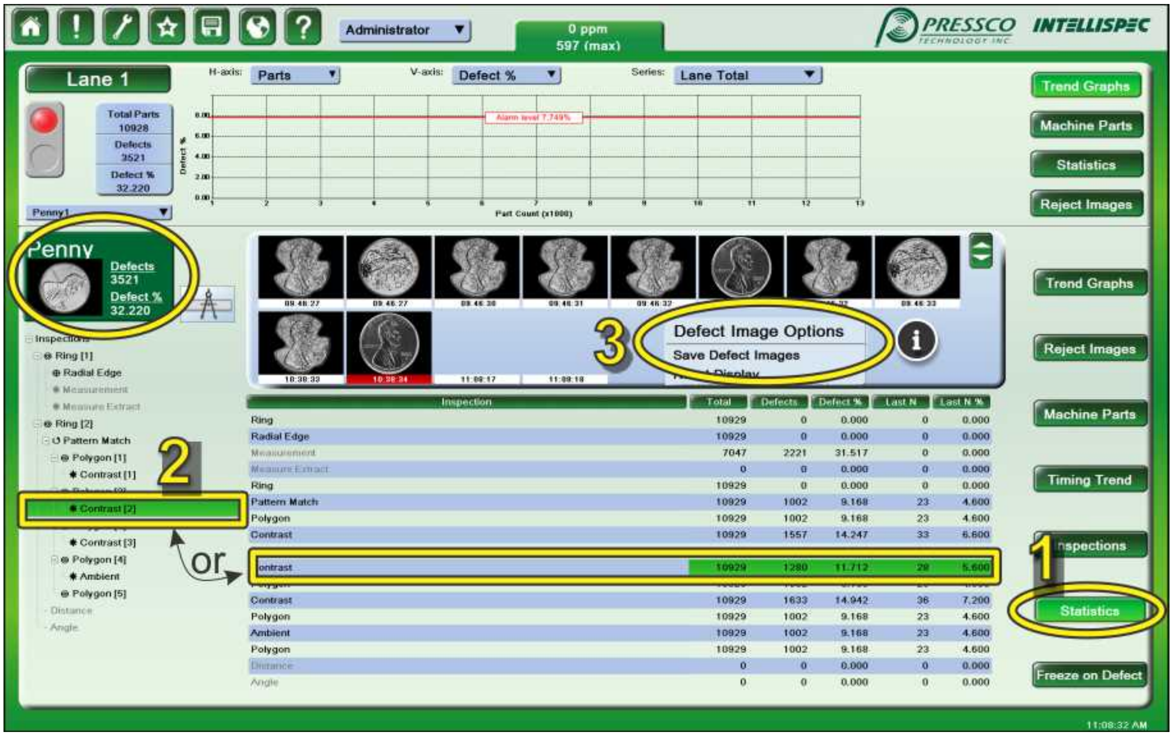
Save Reject Images by Inspection

Save images that failed a specific inspection in Sensor Overview mode. Right-click [3].

> *Note: If you select an inspection that did not fail any parts, up to 100 reject images from that sensor (regardless of inspection) are saved.*

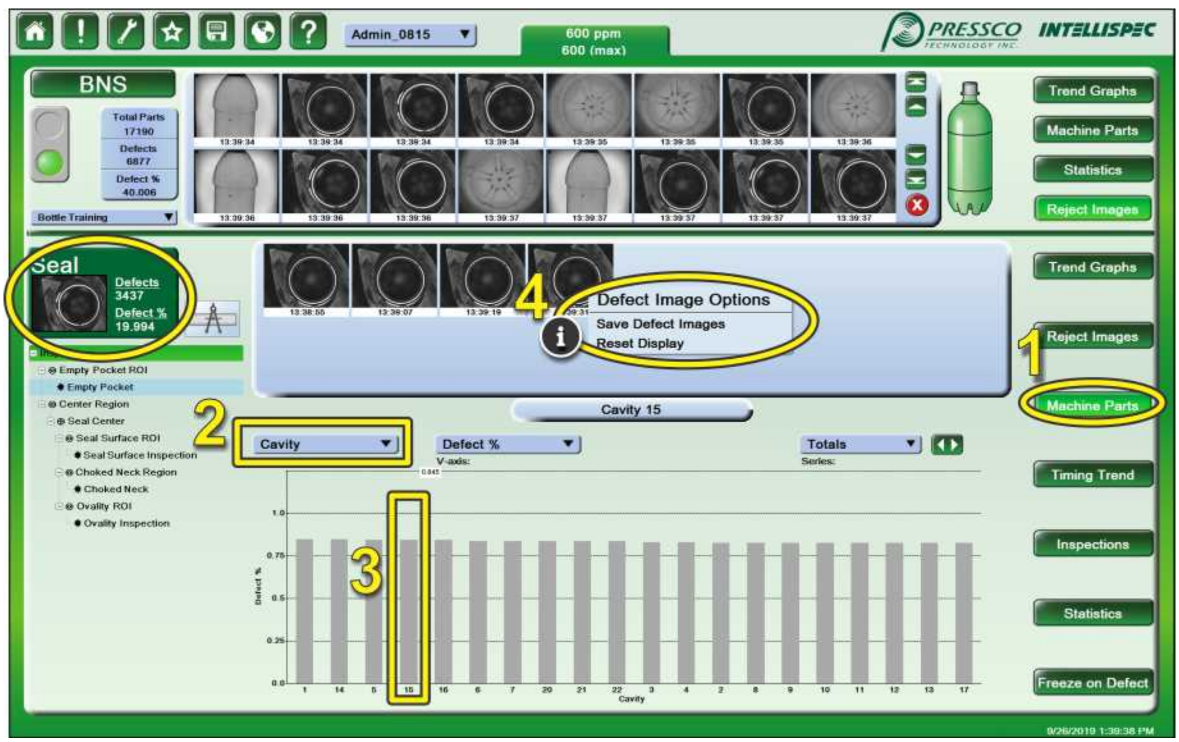


Or:



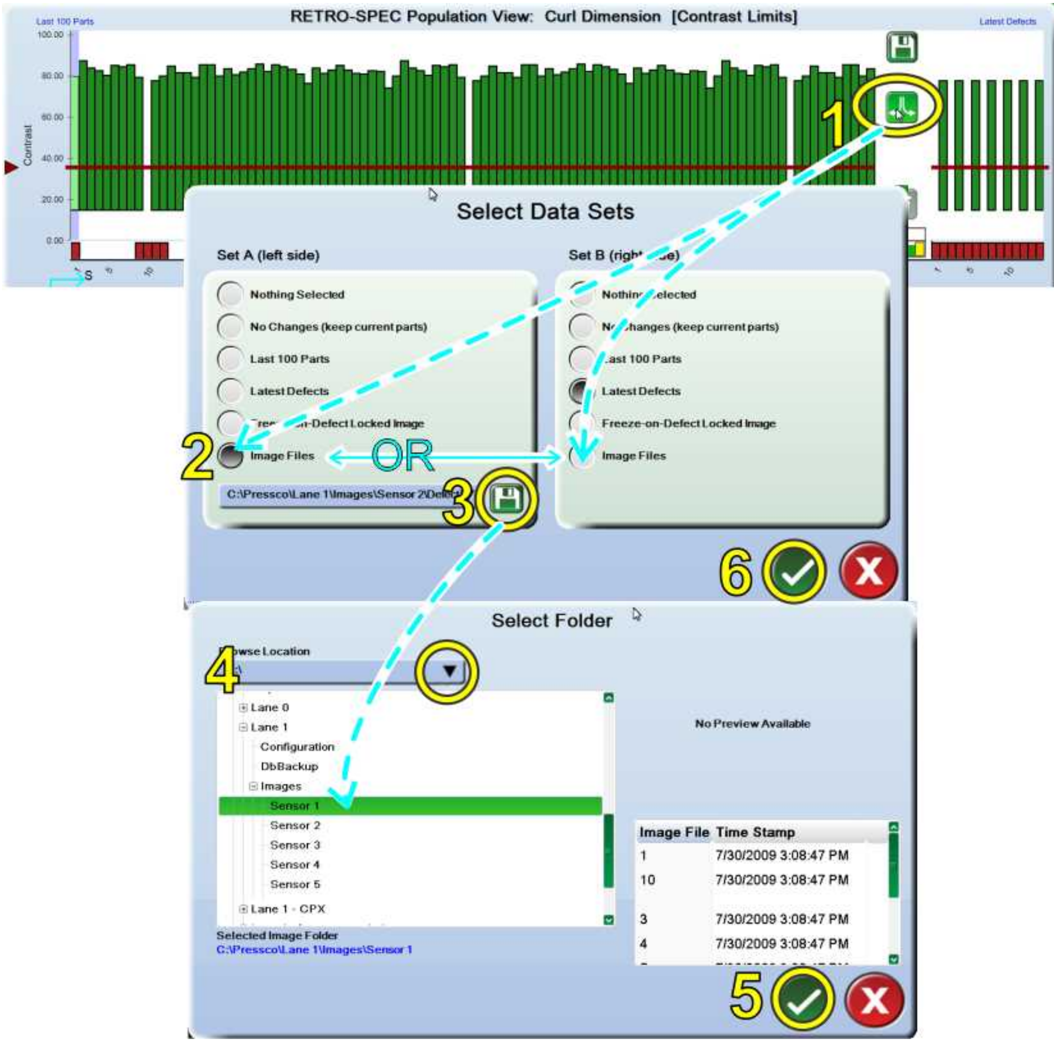
Save Reject Images by Machine Part

Save images that failed inspection and are associated with specific machine parts. Right-click [4].



Loading Saved Images

You can load saved images through the Retro-Spec interface. These images can be used to test part programs, or to set up a part program without the production line running.

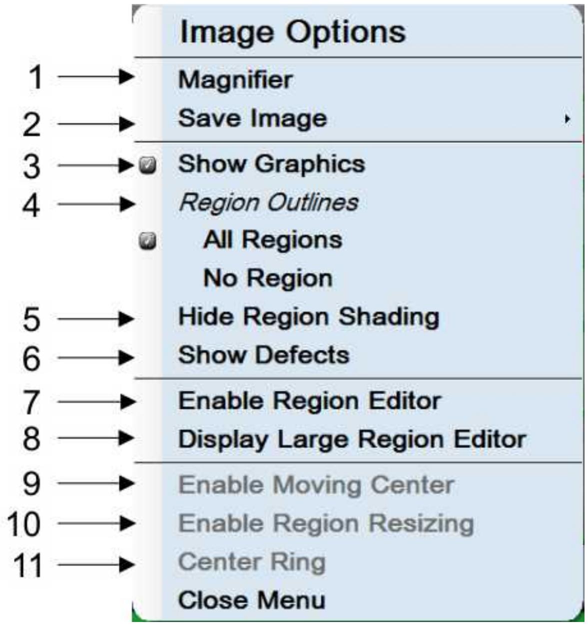


See also how to choose an "Image Source" on page 182. This allows you to run the system with simulated (saved) images.

Image Options

While editing an inspection, right-click in the part image to see the Image Options menu. Checked = enabled Options are grayed out if they do not apply to the current inspection.

> *Note: some menu items are not shown when you are viewing a registration or orientation. You see a slightly different menu in Measure ROI inspection.*



1 - **Magnifier** Open the Image Magnifier.

2 - **Save Image** Save an individual image. Refer to Save Individual Images While Editing an Inspection.

3 - **Show Graphics** Display the region and graphics for the current inspection.

4 - **Selections** Select whether to show the region outlines (All Regions or No Region)

5 - **Hide Region Shading** Remove the shaded graphics from the screen so that you can see more of the part image.

6 - **Show Defects** Displays the graphics highlighting the defects.

7 - **Enable Region Editor** Change the shape and placement of the region directly on the image. You must enable one of the options in Edit Mode (or at the bottom of the menu).

8 - **Display Large Region Editor** Display a large part image on which you can change the placement of the region. Check Enable Region Editor to make the changes to the region. Un-check Display Large Region Editor to return the image to normal size.

9 - **Enable Moving Center (or Region)** The wording changes depending on whether you are editing a region or an inspection. Change the center of the region on the image.

10 - **Enable Region Resizing** Resize the region directly on the image.

(not shown) **Enable Set Region Direction** [Available in inspections such as Measure ROI] Select the region in the image. The region box will be displayed in yellow with diamonds around the box. Select one of the diamonds to make the inspection towards the direction of the selected diamond. The selected diamond is filled in solid yellow.

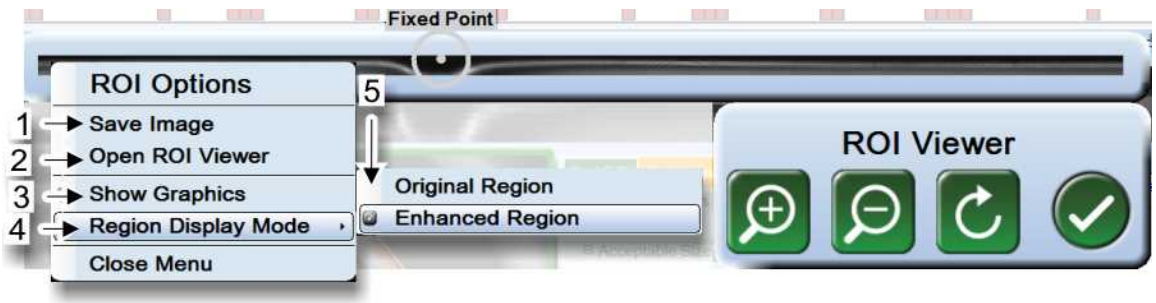
11 - **Center Ring** [Available when you are using Region Editor on the image and Enable Moving Center is checked.] Select Center Ring to re-center the region on the image using the current parameters. This is a command; there will be no check mark next to this option.

Save a Region of Interest (Unwrapped) Image

Save the unwrapped region display while you are editing an inspection. The image can be saved whether the lane is online or offline. The image is saved as a .png file.

Unwrapped Region of Interest Options

Right-click in the Unwrapped Region of Interest to display this menu. Checked = enabled



1 - Save Region of Interest Image

2 - **Open ROI Viewer** Display the unwrapped region at full resolution.Select a rotate button to change the orientation of the unwrapped ROI image.

3 - Show Graphics - no effect

4 - **Region Display Mode** Show the original region, or the enhanced region if you use an enhancement in the part program.

[not shown] **Region Selected** (Only available if the inspection has more than one region; example: Fill Height) Select which region to display.

Dual Snap

What is Dual Snap?

In 5.7 software and later, the Intellispec system has the ability to take two images of the same part while it is in front of the camera. This is used in applications where two unique images of the same part are helpful in inspections. These include applications such as food cans, preforms, lined shells, converted ends, and more.

Dual snap is configured as two cameras within one lane. This means that if you have an 8-channel cluster box, then one spot is skipped (like a Base/Neck configuration). Two of the eight channels are taken by one dual snap camera.

> *Note: A dual snap camera is normally added during manufacturing. Installing a dual snap camera on a system that was already configured requires a clean system configuration. That is, if the Intellispec was already set up with lanes, part programs, cameras, and other settings, then all of those settings will be erased. We recommend that you back up the system before configuring it.*

You can adjust the lighting and the overall gain between the two snaps, but not the offset or color gains.

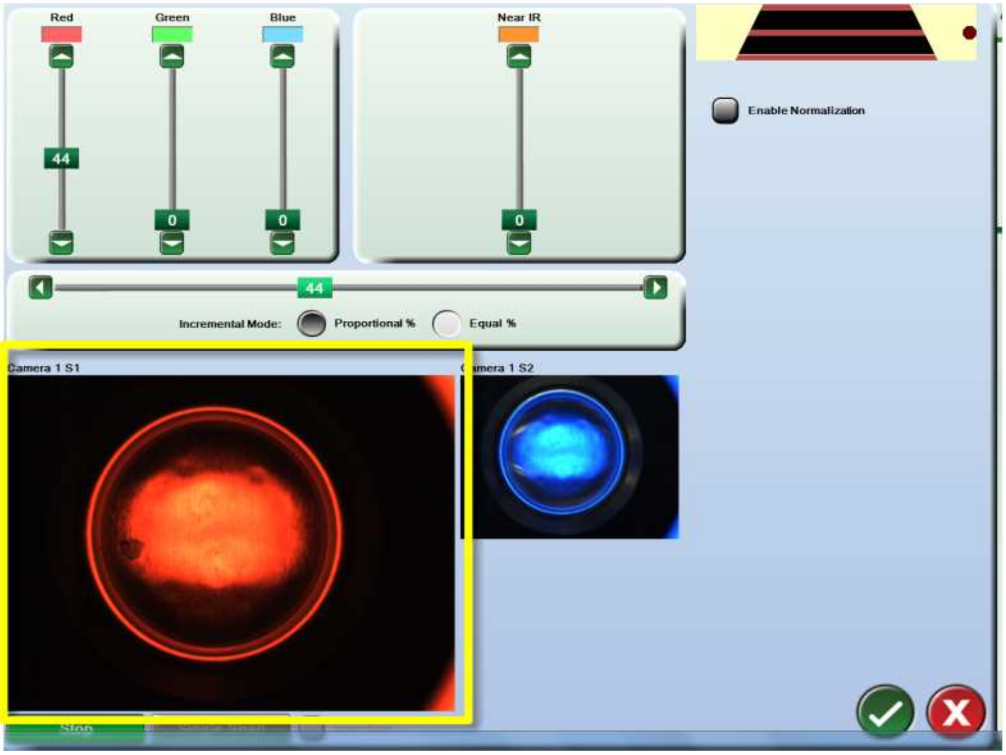
> *Inspection Tip: if you use a color camera, we recommend that you use Snap 1 for color checking, and Snap 2 for defect detection.*

If you have dual snap cameras on your system, then you should see two camera buttons for the same camera in Lane Overview. S1 and S2 in the example below represent Snap 1 and Snap 2.

Dual Snap Lighting

Each snap has its own lighting setup. When you open the lighting dialog, you will see two images that represent the two snaps. The larger image is the one you will be adjusting lighting for. In the example below, that image is Camera 1 S1.

To adjust the lighting on the other snap, click the smaller image.



See how to adjust lighting: "Basic Adjust Lighting" on page 143

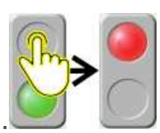
Dual Snap Camera Adjustments

> *Note: This menu normally should not be adjusted. It is set by the Pressco installer. Improper adjustment can cause image distortion. "Camera gain" is the amplification of the video signal. "Offset" adjusts the grayscale reference values.*

Camera gain can be adjusted separately for each snap.

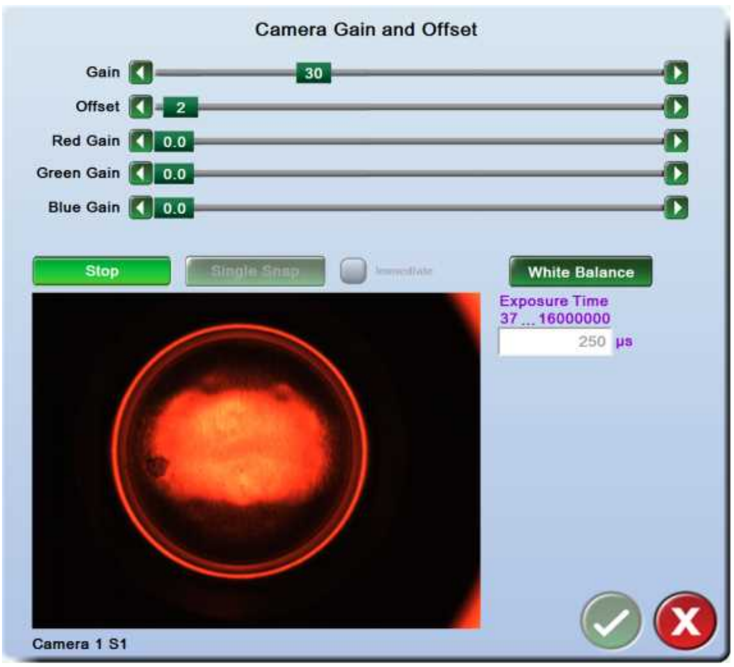
Color gain and offset settings are applied to both snaps, but can only be adjusted on Snap 1.

To adjust Camera Gain:

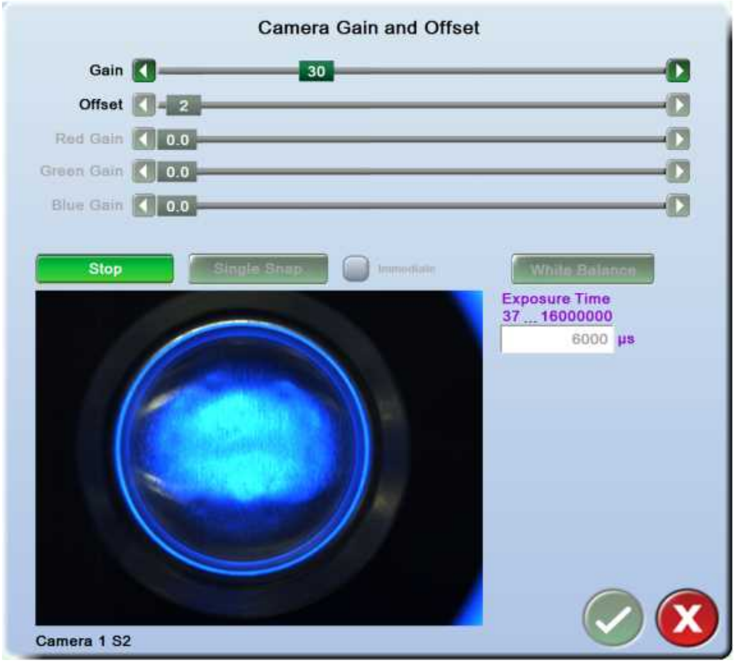
1. . Take the lane offline.
2. From Lane or Sensor view, right-click over a sensor button. Select Camera | Camera Gain and Offset.

3. Make adjustments as necessary.

Snap 1 Color Gain and Offset adjustments:



Snap 2 Gain adjustment:



Camera Gain and Offset
Gain
30
Offset
2
Red Gain
0.0
Green Gain
0.0
Blue Gain
0.0
Stop
Single Snap
White Balance
Exposure Time
37 ... 16000000
6000
µs
Camera 1 S2

Chapter 13 Testing the System Performance

The tools in this section allow you to test the Intellispec performance.

Snapshot Sampling

Snapshot sampling allows you to generate statistics for a limited number of future parts (up to 1,000,000). You can sample defect images (up to 1,000 per camera) and good images (up to 1,000 per camera). The sampled data generates statistics for: lane defects / defect %, sensor defect / defect %, and walk-by-group defect / defect %.

> *Note: This feature is available in software versions 5.6.015, 5.7.014, 6.0.022, and later. One purpose of this feature is to validate the current performance of the system setup.*

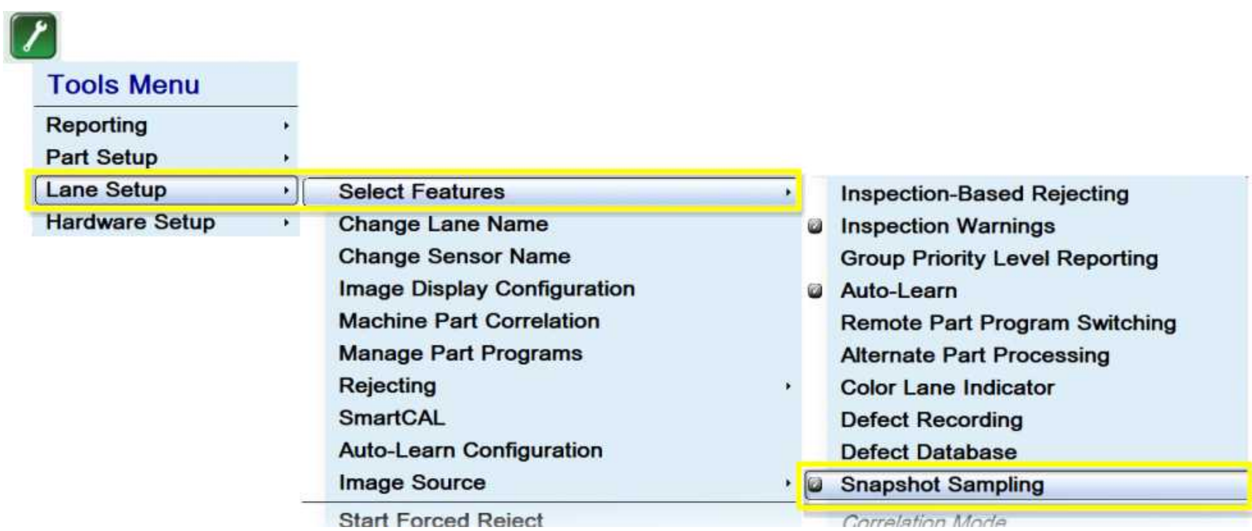
Required and Optional Permissions:

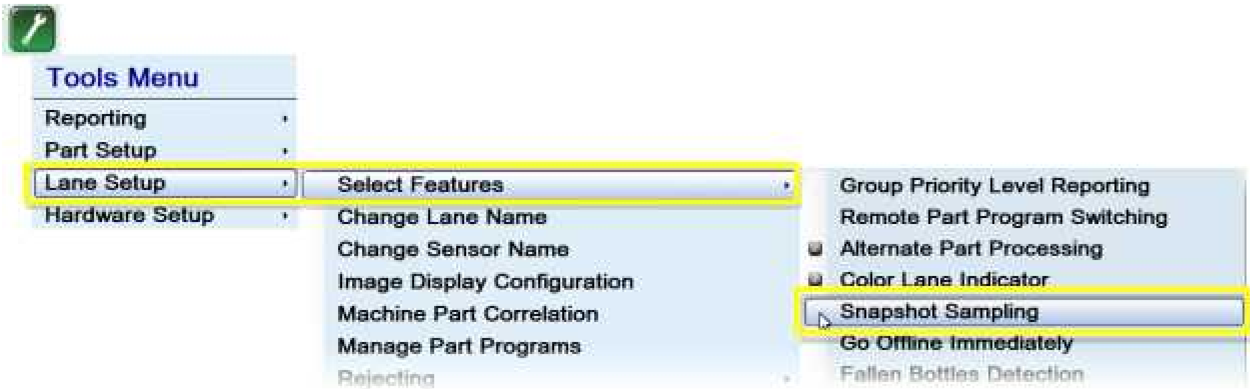
- Select Features - [required] to enable the Snapshot Sampling feature
- Access System Configuration -[required] to configure Snapshot Sampling
- Setup Report Schedule - to start a snapshot sample
- Cancel Background Task - to cancel a running snapshot if not started by the current user
- Delete Generated Data - to delete snapshots in the Manage Snapshots dialog
- Download Data - to download snapshots in the Manage Snapshots dialog
- Launch Windows Explorer - to open a downloaded snapshot in Windows Explorer

To configure permissions, see "Manage Permissions" on page 462

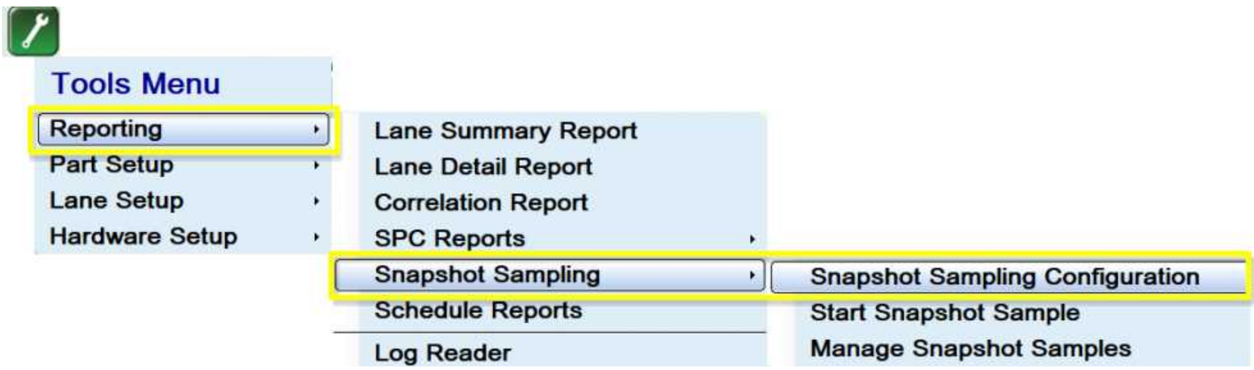
Enable / Disable the Feature:

"Select Features" permission required.



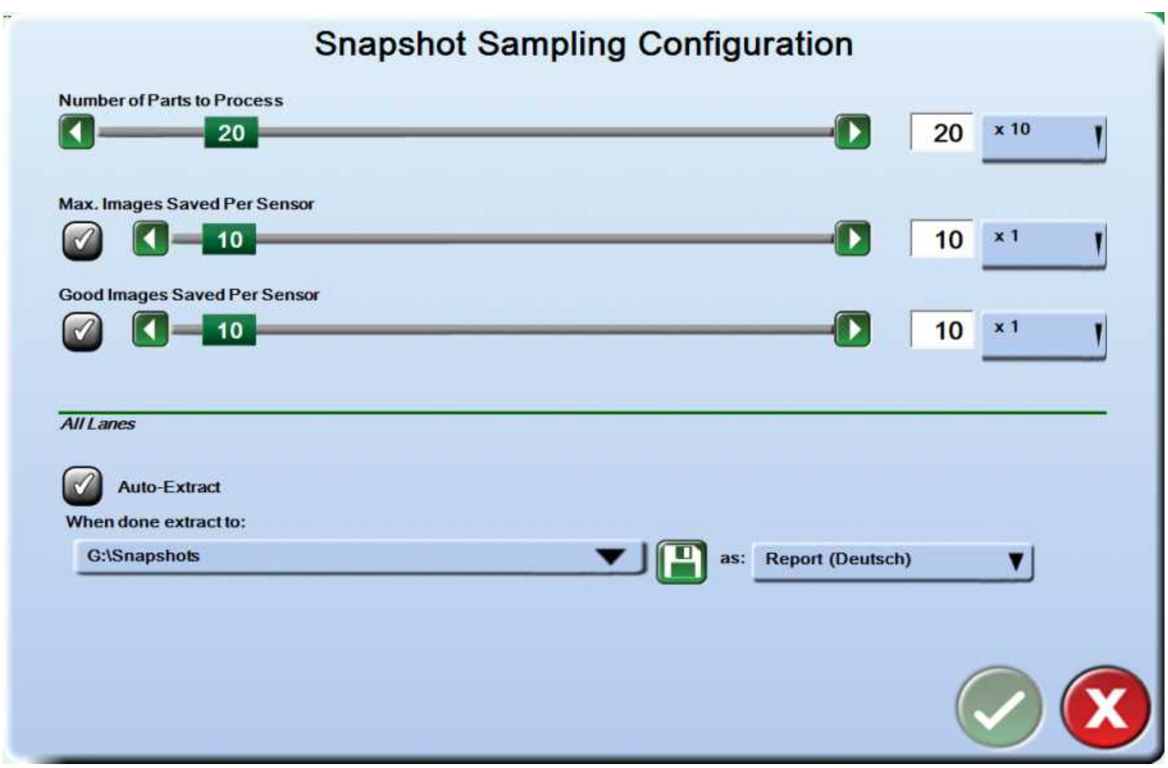


Configure Snapshot Sampling:



Configure Snapshots:

"Access System Configuration" permission required.



Number of Parts to Process This is the total number of parts in the snap shot. If any changes are made during the snapshot, such as editing an inspection, editing a walk-by-group or switching part programs, the change is recorded and the snapshot continues. For example, if after 567 of 10,000 parts you switch to a different part program then the remaining 9433 parts are recorded for the new part program.

Max. Images Saved Per Sensor During the snapshot, an image will be saved for each defective part until this number is reached for each sensor.

Good Images Saved Per Sensor During the snapshot, this number of good images will be saved for each sensor. An image is considered "good" if no inspection failed for the sensor. Good images are saved, distributed evenly over all parts of the snapshot. For example, a snapshot of 1,000 images with 10 good images saved would save the 1st image and save the first good image after the 100th, 200th, … , and 900th part.

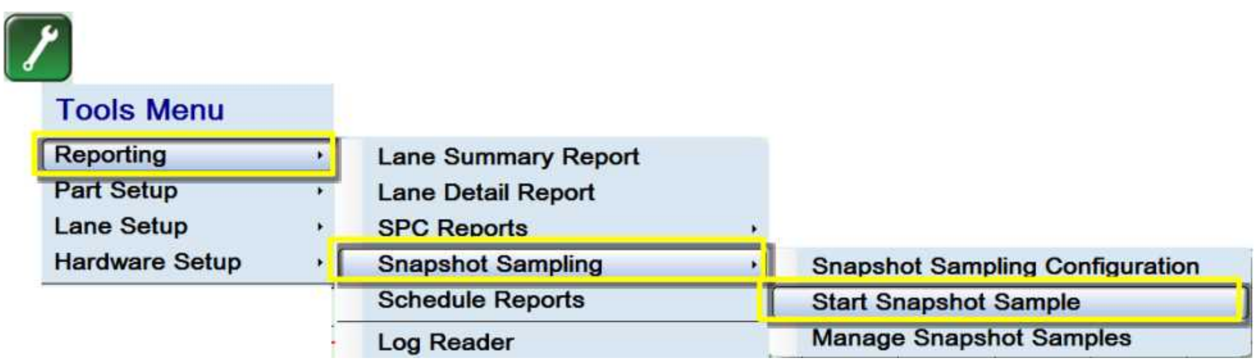
Auto-Extract Option Specify where to download the snapshot results. For example, this can be a USB device. If the device is not present when the snapshot completes, the data will not be written immediately but can still be downloaded using the Manage Snapshots dialog.

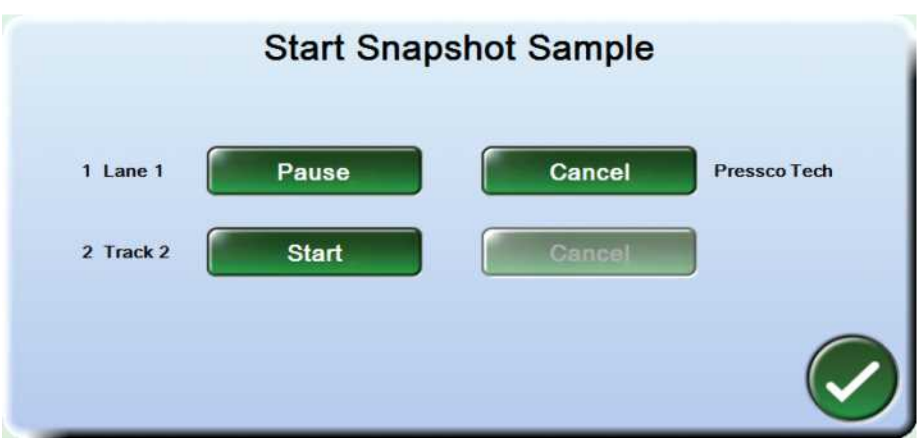
When done extract to: When the auto-extract option is enabled, this lets you specify where to auto-extract to.

as: Selects the language for which the report is generated. This can be: English, Display (the display language selected at the time of snapshot completion), or Report (the report language selected at the time of snapshot completion)

Start Snapshot Sample:

"Setup Report Schedule" permission required.





This dialog allows you to start a new snapshot, or if one is already running, to pause, resume, or cancel it. Snapshots can be started for any or all lanes regardless of where the dialog was opened from.

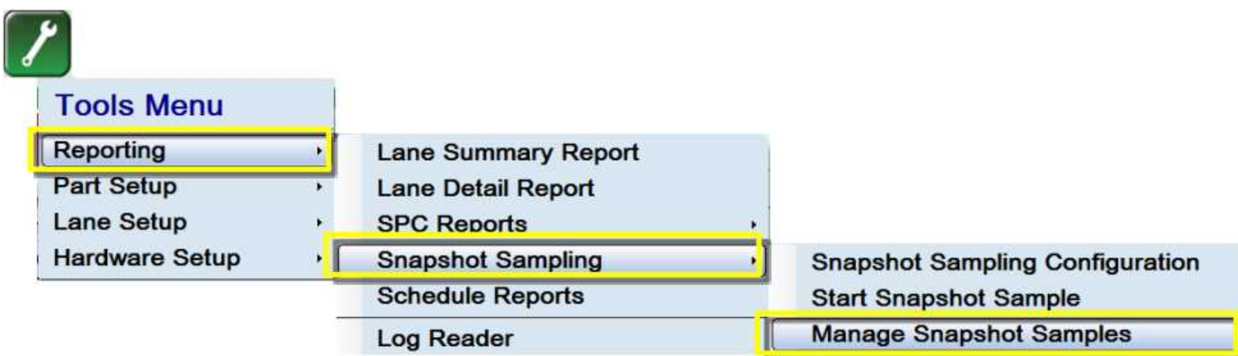
Click the Start button for any lane(s) to start sampling. Snapshot Sampling will record statistics and save images for parts according to the snapshot sampling configuration until the snapshot ends. Statistics and images are recorded for inspected parts only (that is, while running on-line; it also excludes empty pockets).

If a snapshot is currently running but was not started by the current user, the user who started it is shown to the right in the row corresponding to the lane it's running on. Pausing, resuming or canceling a snapshot not started by the current user requires Stop Background Task permission.

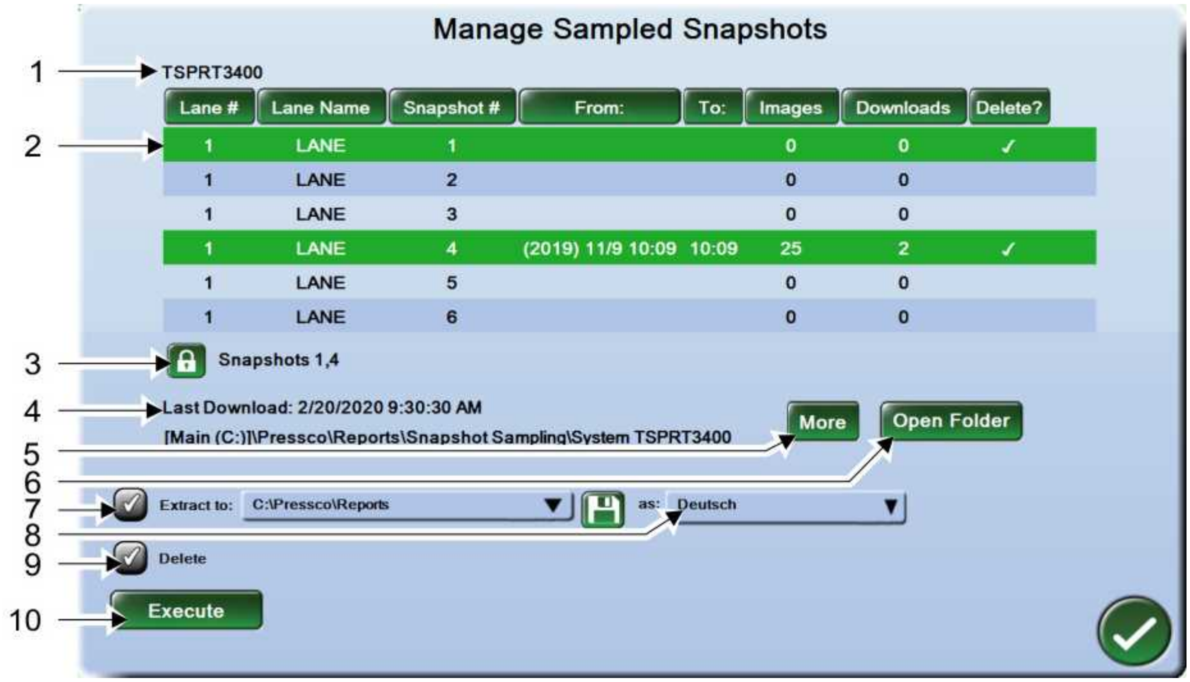
 A running snapshot will be represented as a Background Task. The current progress of a snapshot can be viewed in the Manage Background Tasks dialog, and can also be canceled here (if you have the permission).

 The completed task icon appears when the snapshot is finished.

Manage Snapshot Samples



No permissions are required to access this dialog. However, some options require additional permissions: "Extract to" requires Download Data permission, "Open Folder" requires Launch Windows Explorer permission, "Delete" requires Delete Generated Data permission.



The dialog shows the following:

1 - The system identifier, such as ISPEC 1236

2 - A table of generated snapshots, which can be downloaded or deleted

3 - Multiple row selection: Clicking on any row toggles whether it is selected. When multiple rows are selected, a lock icon appears; clicking the lock clears the selection.

Details of the current selection in the table:

4 - The most recently downloaded location.

5 - [More] shows the list of all locations where the selection was downloaded to. This is only shown when the snapshot was downloaded to more than one location.

6 - [Open Folder] opens Windows Explorer for the location where the snapshot was saved (if it still exists). You can open the text file and browse the image folders from that location.

7 - When the Extract to: box is checked, you can select the location where to download the report.

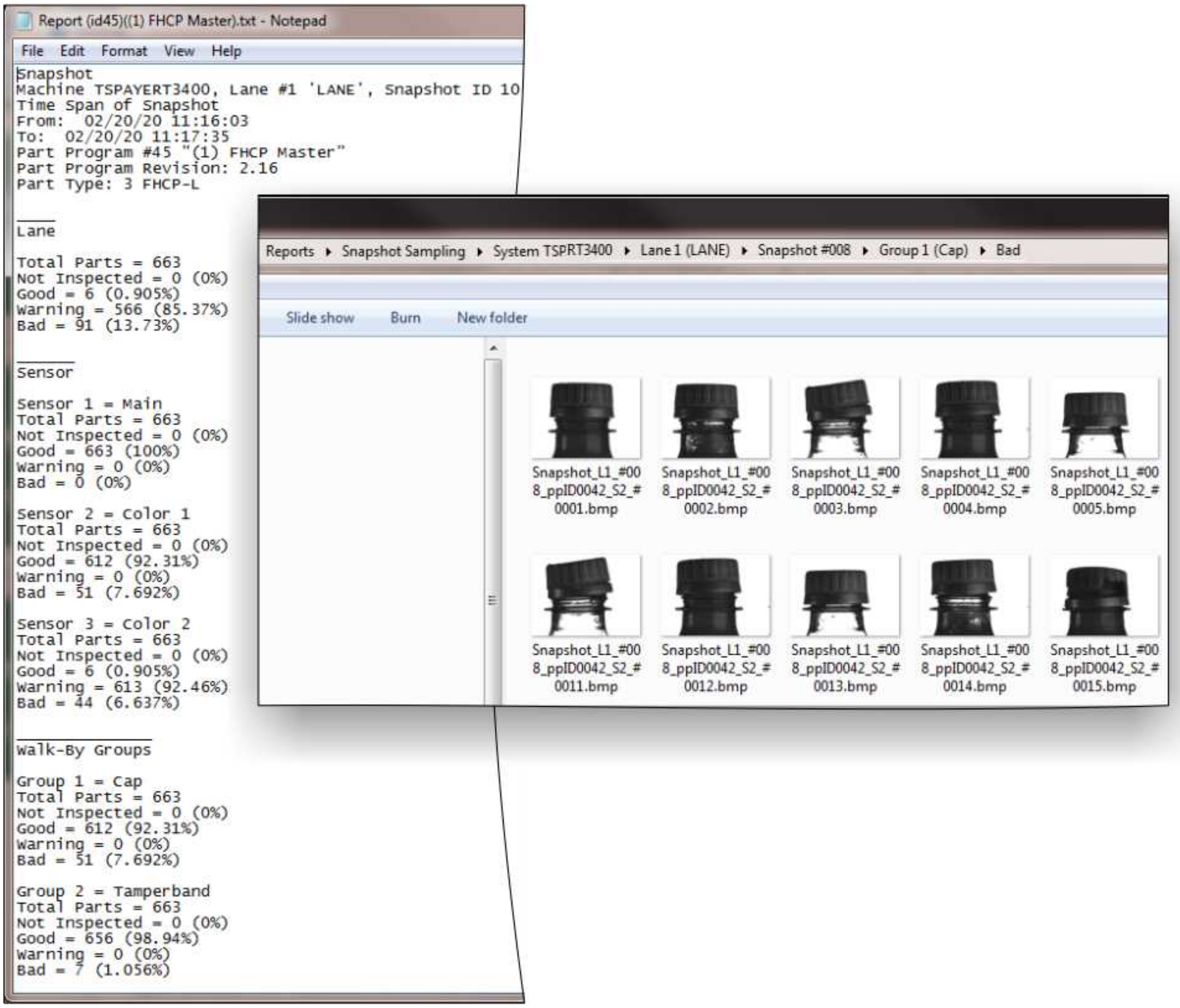
8 - Select the language to download in. Available selections are English, Display (currently selected display language), or Report (currently selected report language).

9 - If the Delete box is checked, the snapshot data and images will be deleted from memory, after you Execute the sequence to save all the data and images to the desired folders. The rows in the table are displayed in red after the information is deleted from memory. The content in the output folders is not deleted.

10 - Select the Execute button to begin saving the text files and images to the selected locations.

Example snapshot text file and images:

This example shows the snapshot of one lane, three sensors, and walk-by groups. The images are found in the sub-folders where you saved the snapshot information.

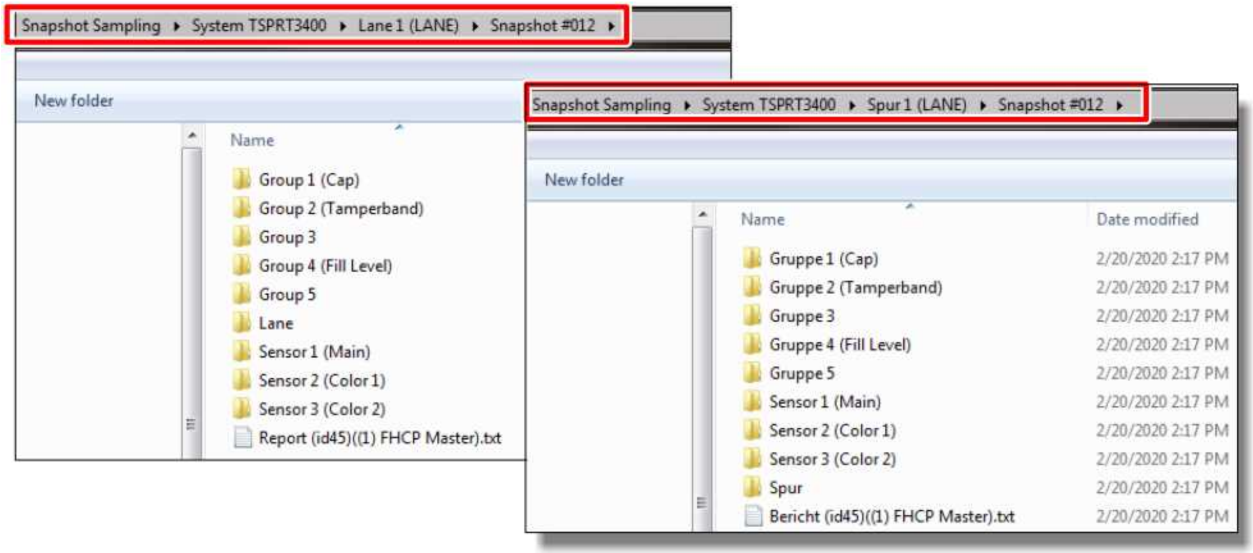


Downloaded folder structure:

The "Extract to:" location specifies the root under which many snapshots from many sources would be saved. The structure is the following:

[Root]\System ID\Lane Number (Lane Name)\Snapshot #\

Each subfolder is represented in the selected language. The example below shows information saved in both English and German.



SmartCAL

What is SmartCAL?

Run a set of images on the current part program, and make sure the part program is passing or rejecting parts as you expect.

What is the difference between SmartCAL and PDL?

SmartCAL loads images and runs the current part program to determine whether the part program is passing or rejecting parts as you expect. PDL is a file in which you save and load images to be used in the SmartCAL process.

Save Images for SmartCAL

SmartCAL helps determine if the part program is working correctly. To use SmartCAL you must save good and defective images to the hard drive. Carefully name the images. Suggestions:

- Save two sets of images for each sensor, one good set and one bad set. Use a tool such as Auto-Save.
- Save good images as "Good0001.bmp, Good0002.bmp" etc.
- Save bad part images as "Bad0001.bmp, Bad0002.bmp" etc.
- Create a directory that matches your PDL file name. For example, we want a PDL called "1 Ltr Green Grip." We create a subdirectory for every sensor called "1 Ltr Green Grip" as shown below. Do the same for every lane, if applicable to your system.

```
Sensor 1
 └1 Ltr Green Grip
     ├Good0001.bmp
     └ Bad0001.bmp
Sensor 2
   └1 Ltr Green Grip
       ├Good0001.bmp
       └ Bad0001.bmp
```

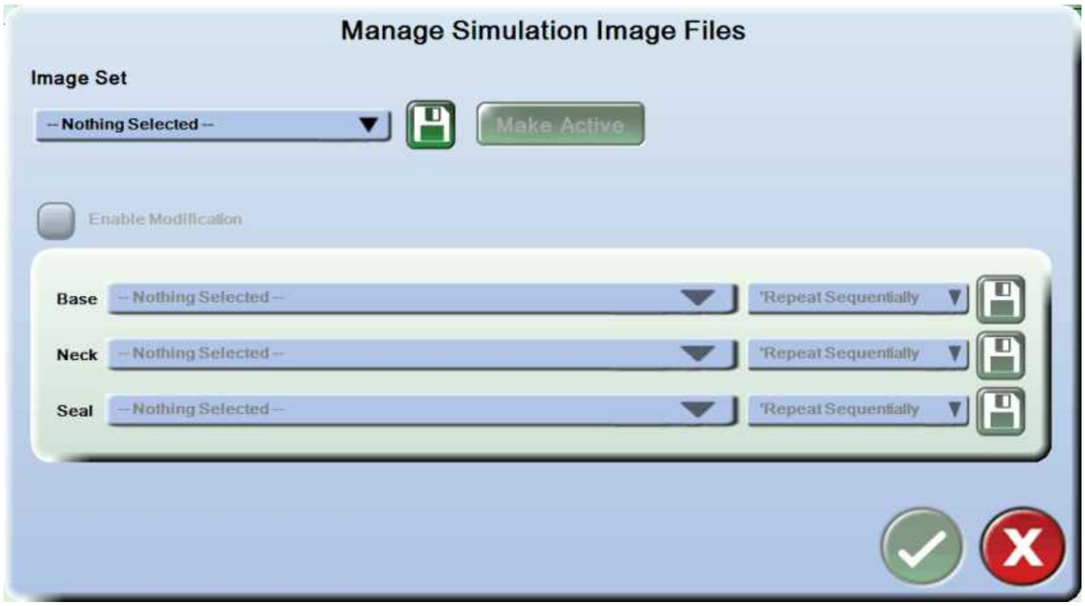
Create a PDL (Manage Simulation Image Files)

Create a Pressco Data List file [.PDL] that lists images for each camera. This way, you can load the same images any time.

> *Note: when you run simulated images, the system disables the rejector for safety reasons*

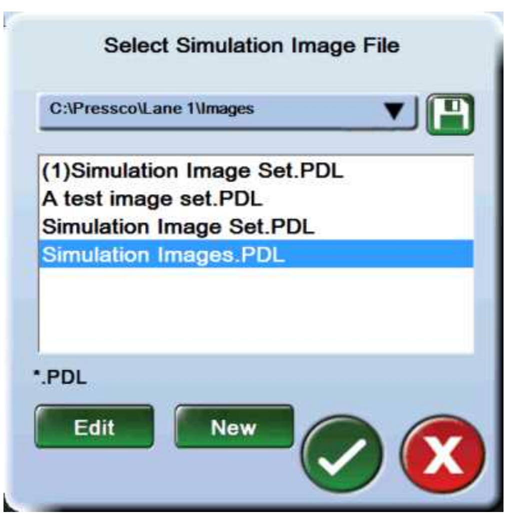
Before creating a PDL file: "Save Images for SmartCAL" on the previous page

Right-click a sensor button | Image | Image Source | Manage Simulation Image Files.



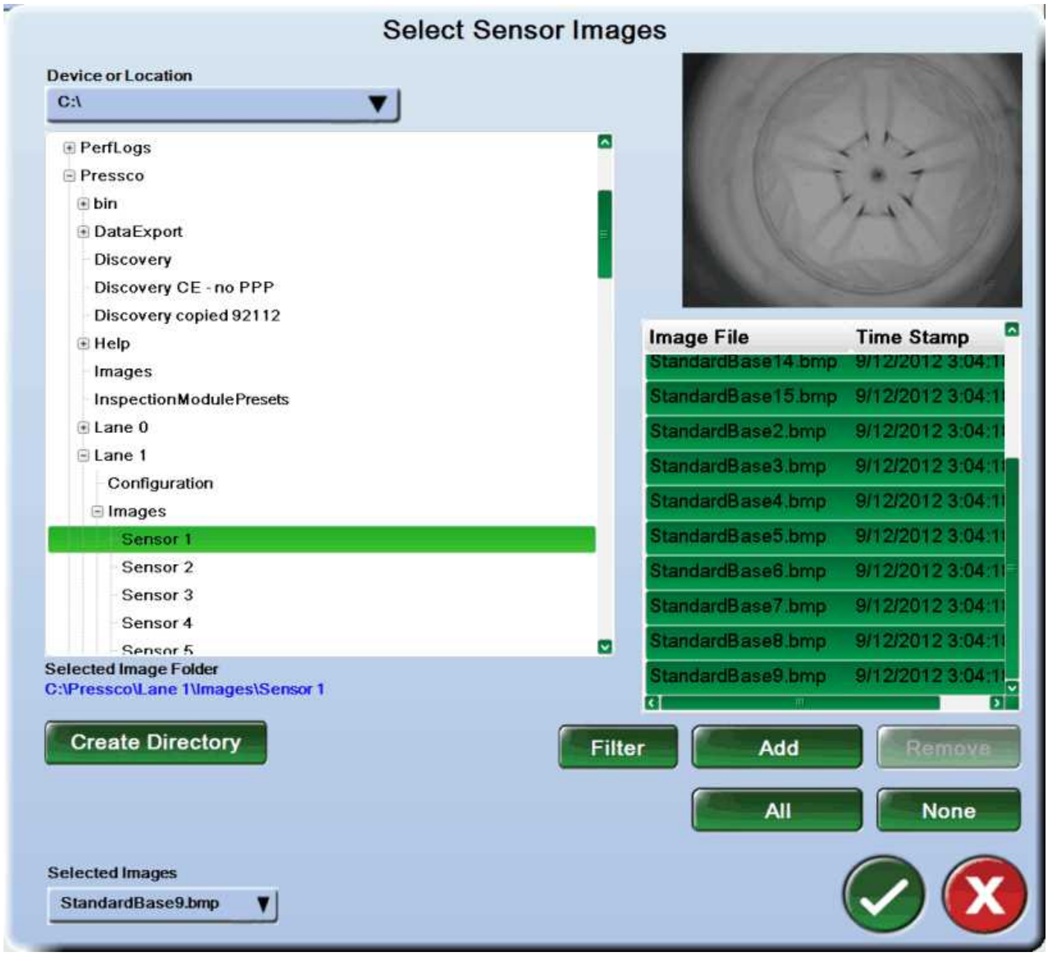
To create a new PDL file:

1.  Select the disk icon under Simulation Image File.
2. In the Select Simulation Image File screen, select the "New" button.



3. Type an image file name and select OK. A file is created and saved in the default directory for the sensor (example: C:\Pressco\Lane 1\Images).
4. To add images to the set, highlight the file name in the Select Simulation Image File screen.

5. Select the Edit button. The selected file name is displayed in the Manage Simulation Image Files screen.
6. Check the Enable Modification box, then select the disk icon next to the 'Repeat Sequentially' drop-down menu. The Select Simulated Images screen is displayed.



7. Select images for the PDL for each camera. For more information about this screen see Select Simulated Images for 'Camera'.
8. Select OK to save changes and exit.
9. Choose how to display the images using the drop-down menu on the right of the Manage Simulation Image Files screen.

   Repeat Sequentially - display the images in order by file name, starting from the first image file, repeating as long as the lane is online.

   Repeat Randomly - display the images in a random order, repeating as long as the lane is online.

   Run Once - not currently supported
10. Select the Make Active button. A check mark is displayed next to the PDL file name, and the file is activated.
11. Select OK to exit from the Manage Simulation Image Files screen.

Next, display the list of images.

To display the simulation images:

1. Right-click over a sensor button | Image| Image Source | Simulated. Checked = display images from disk, not the camera.
2. To clear the previous images from the lane, right-click over the Statistics menu, and select Clear Lane Statistics and Clear Images.
3. The next time you put the lane online, the selected PDL images will be displayed.

Using SmartCAL

Before using SmartCAL:

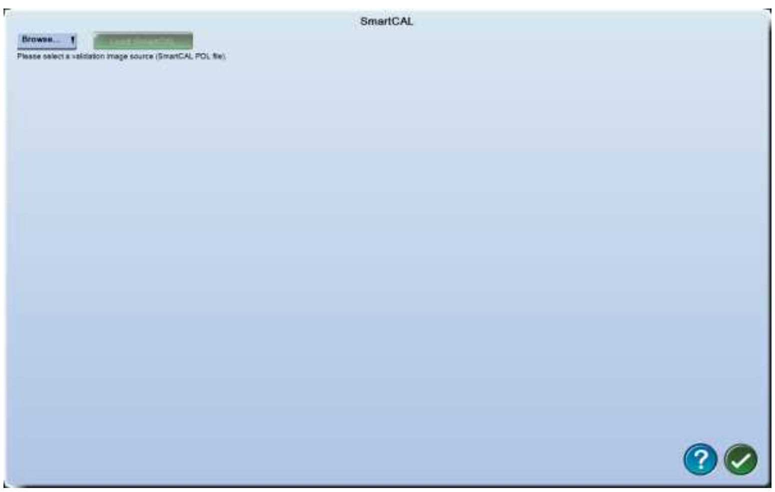
"Save Images for SmartCAL" on page 175

"Create a PDL (Manage Simulation Image Files)" on page 176

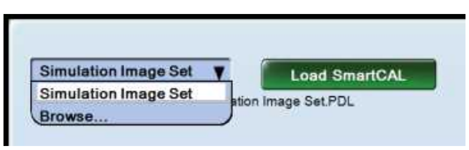
> *Note: SmartCAL is limited to 100 images per sensor, so it will load the first 100 images in your PDL file*

To use SmartCAL:

1. Take the system offline.
2. Select the part program on which you want to test SmartCAL.
3. Right-click any sensor button and select Image | SmartCAL.

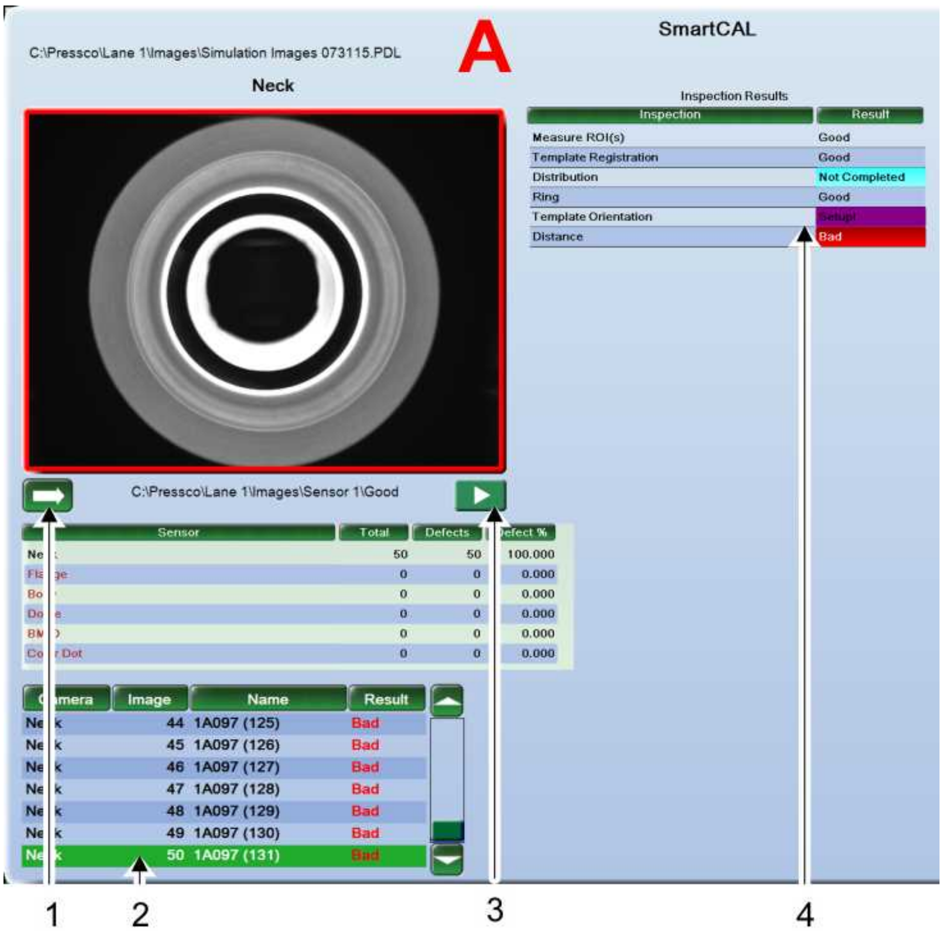


4. Select an image list (PDL) from the drop-down menu, or select Browse | select the desired PDL file | select OK to continue.



5. Select the Load SmartCAL button. The number of images (in the PDL file) is displayed.

6. Select the Run SmartCAL button. One image is displayed with the results of the part program run on that image.
7. View the results for each image. Make sure the inspection is passing or failing the correct inspections for each image. If not, then you may need to adjust the inspections.



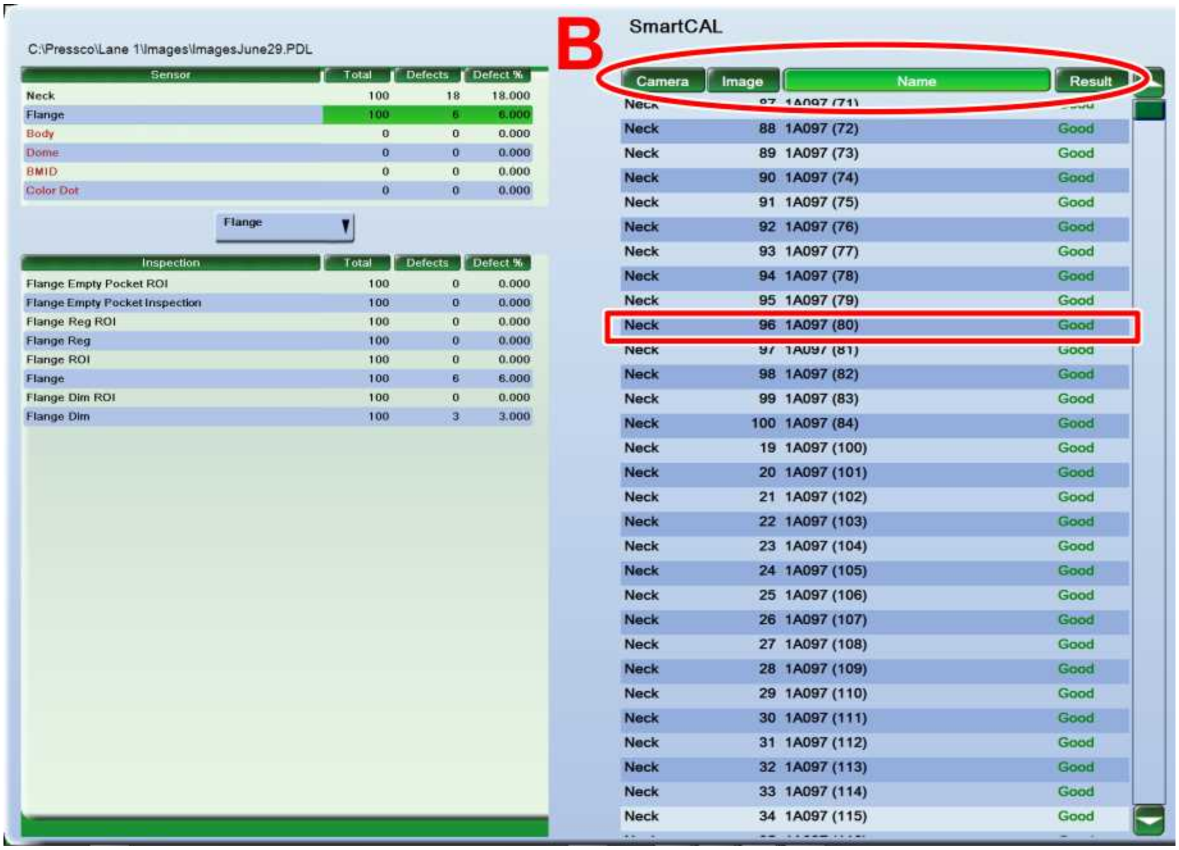
1 - Single step through the images, running the part program for each image

2 - Select an image to see the results

3 - Automatically run the part program for all the images

4 - View the test results for each image

If you use item 3 to run the part program automatically, the results are displayed as shown below [item B]. Select any sort button (circled items) to sort by that criteria. Select any row (shown with rectangle) to return to the display with the image.

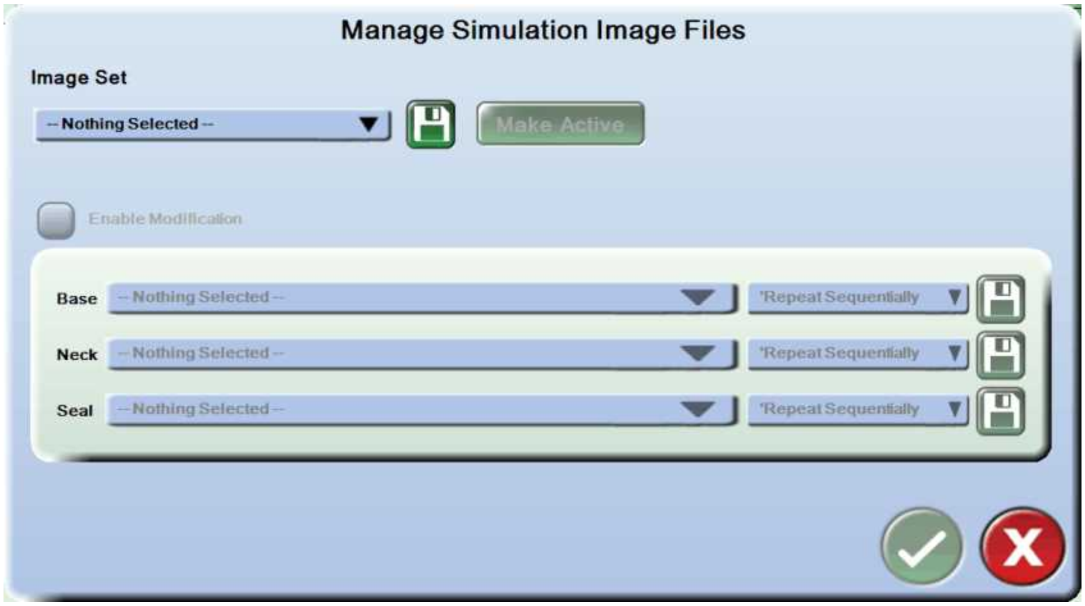


> *Important: When you finish using SmartCAL, change the image source back to "camera." From Sensor Overview mode | right-click over a Sensor button | Image | Image Source | Camera. Checked = enabled*

Add or Delete Images in a PDL File

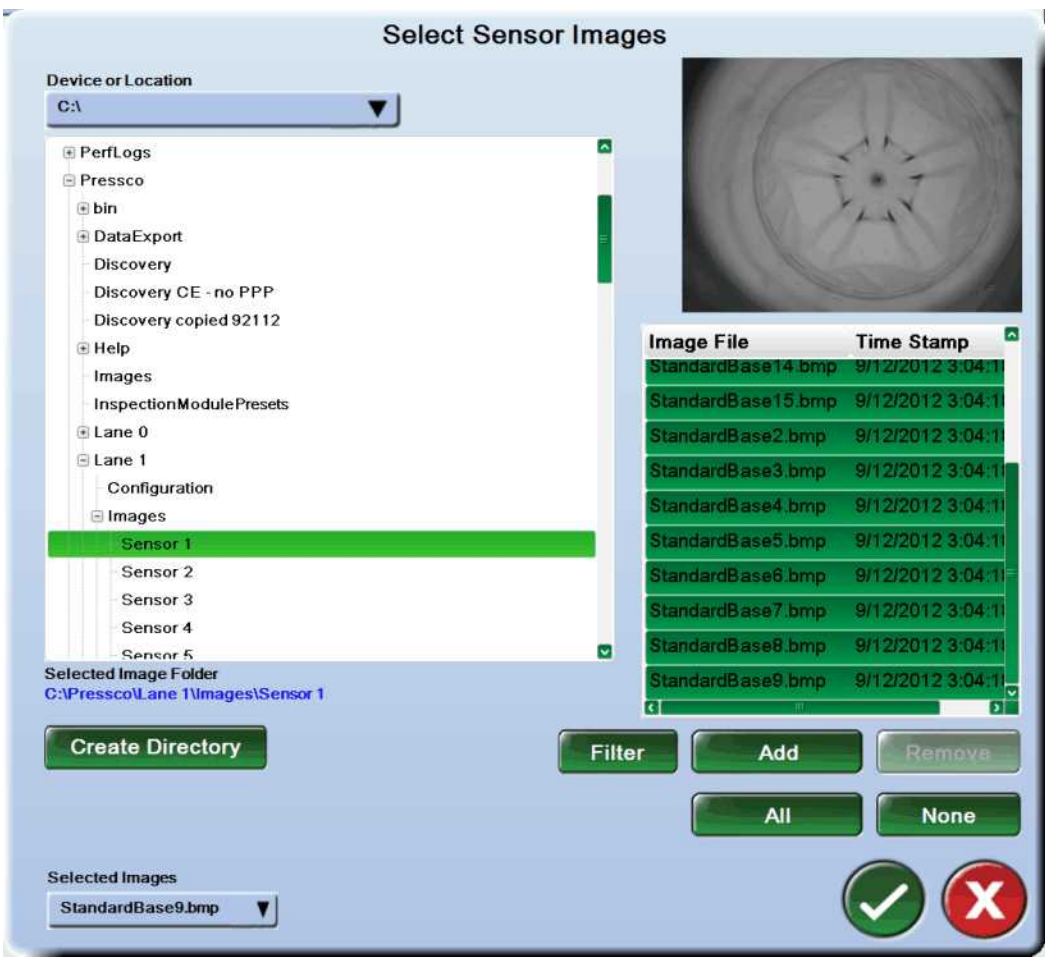
To edit an existing PDL file:

1. Right-click a sensor button | Image | Image Source | Manage Simulation Image Files.
2. In the Manage Simulation Image Files screen, select a PDL file to edit under Simulation Image File.
3. Check the Enable Modification box. The list of images in the PDL file is displayed in the drop down menu next to the sensor name.



To add images:

1. Select the disk icon next to 'Repeat Sequentially.' The Select Simulated Images screen is displayed.



2. Add images, using the Add button. For more information about this screen see Select Simulated Images for 'Camera'.
3. Exit from the Select Simulated Images screen.
4. Select the OK button to save the changes and exit.

To delete images:

1. From the Manage Simulation Images Files screen, select the sensor name to display the images in the PDL file, and select an image name to delete. Release the trackball buttons or select outside of the menu to collapse the drop-down menu.
2. Right-click over the drop-down menu next to the sensor name to see the Image List menu.

3. Delete the selected image or all the images in the PDL file. The images are only deleted from the PDL file, not from the hard drive.
4. If desired, delete images from other cameras.
5. Select the OK button to save the changes and exit.

Reference Information - Image Sources

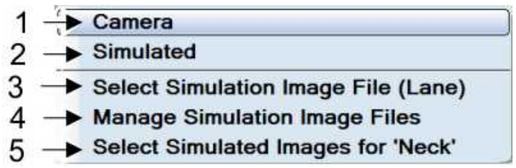
"Image Source" below

"Load a PDL File" on the next page

"Select Simulated Images for Camera" on page 184

Image Source

Display images for the lane or camera. Right-click a sensor button | Image | Image Source.



1 - Camera - Display the live images from the current camera.

2 - Simulated - Display images you have previously saved to disk. When you select Simulated images, the following happens:

- All rejectors for the current lane are disabled.
- The name of the camera(s) is displayed in red (in Lane or Sensor Overview mode) to indicate that the rejector is disabled.
- You must specify images through one of the option in the lower part of the menu, listed below.

3 - Select Simulation Image File (Lane) - "Load a PDL File" below

4 - Manage Simulation Image Files - "Create a PDL (Manage Simulation Image Files)" on page 176

5 - Select Simulated Images for 'Camera' - "Select Simulated Images for Camera" on the next page

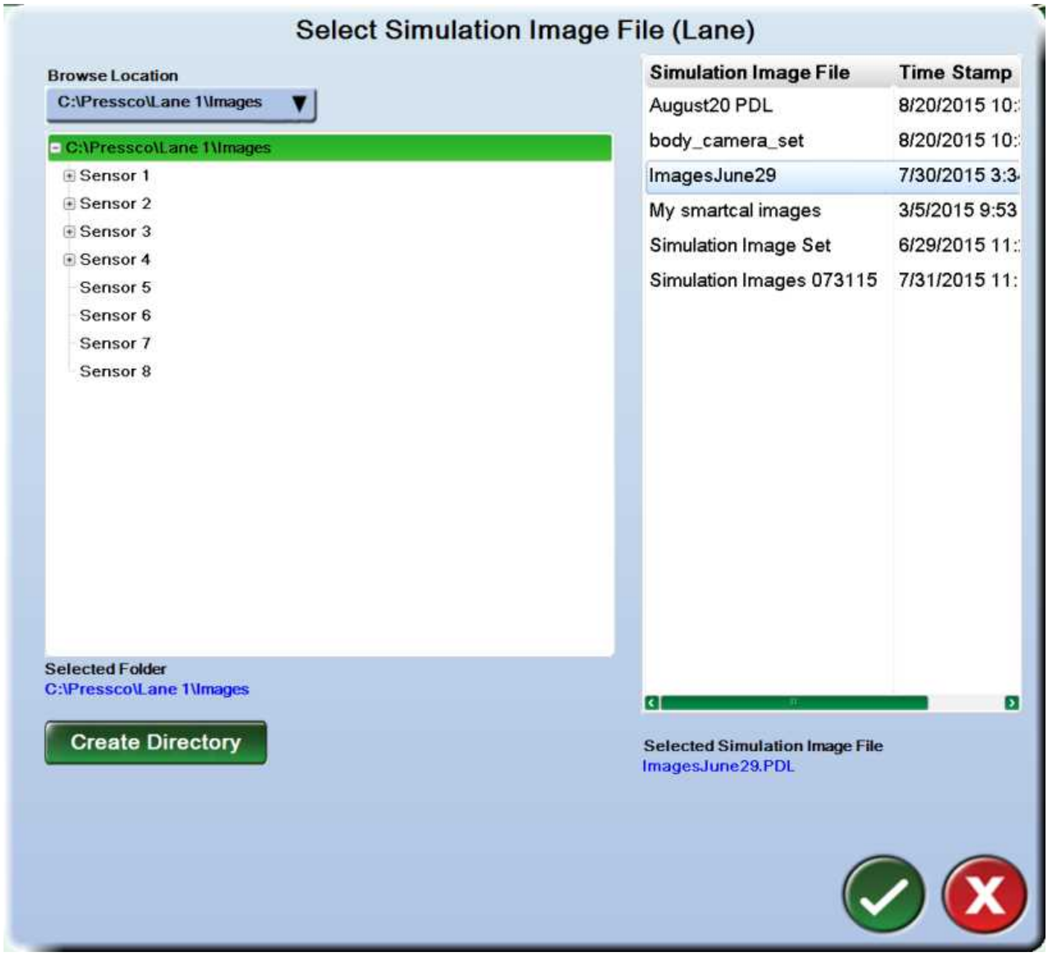
Load a PDL File

This topic assumes that your system already has PDL files on the hard disk. If not, create a new PDL file: "Create a PDL (Manage Simulation Image Files)" on page 176

> *Note: when you run simulated images, the system disables the rejector for safety reasons*

To load a PDL file:

1. Take the lane offline (if necessary).
2. Right-click a sensor button | Image | Image Source | Simulated. Checked = display images from disk, not the camera.
3. Right-click a sensor button | Image | Image Source | Select Simulation Image File (Lane).

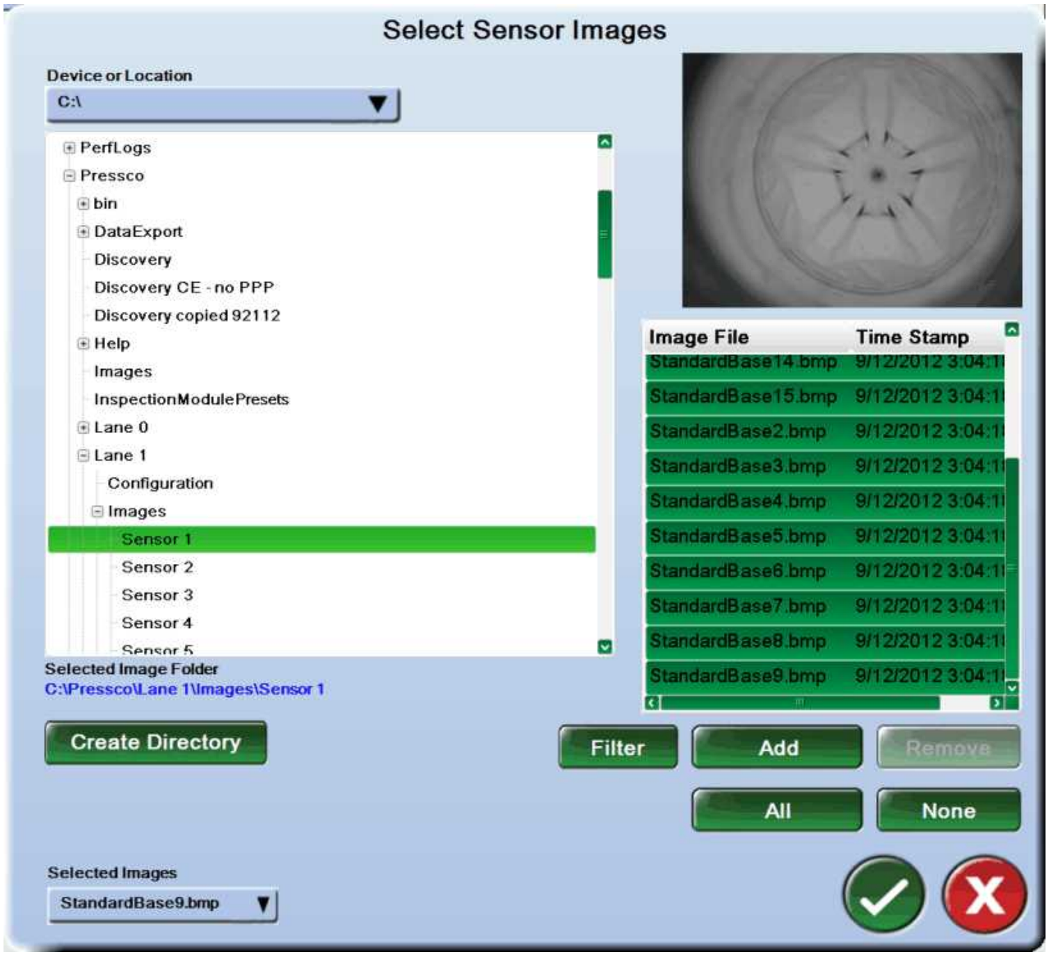


4. Select the PDL file to display. Select OK to save changes and exit.
5. To clear the previous images from the lane, right-click over the Statistics menu, and select Clear Lane Statistics and Clear Images.
6. The next time you put the lane online, the selected PDL images will be displayed.

Important: When you finish using simulated images, change the image source back to "camera." From Sensor Overview mode | right-click over a Sensor button | Image | Image Source | Camera. Checked = enabled

Select Simulated Images for Camera

Select individual images or a group of images to display. To see this menu, right-click on a Sensor button | Image | Image Source | Select Simulated Images for 'Camera name.'



If you have not yet saved images, see suggestions: Save Images for SmartCAL

To select images:

1. Browse through the directories using the drop-down menu at the top of the screen. The list of images in the selected directory is displayed on the right side of the screen.
2. Select an image name from the right side of the screen. Select the All button to select all images in the directory, or select "None" to de-select all the images.

   Filter allows you to specify a portion of the file name

   An asterisk [*] is required in the filter name

   Example: "*good*" as a filter. If you saved your images with "good" in the name, this allows you to choose all the "good" images

   Example: "*.bmp" as a filter. The Intellispec system can only load bitmap (.bmp) images

   The Selected Images menu (at the bottom of the screen) contains the selected set of images. If necessary, use the Remove button to remove an image.

   You can add images from more than one directory. Browse to another directory in the left panel and add more images. The Selected Images menu shows all the image files you have selected.

3. Select the OK button to save the set of images. The system displays the selected images when you put the system online.

> *Important: When you finish using simulated images, change the image source back to "camera." From Sensor Overview mode | right-click over a Sensor button | Image | Image Source | Camera. Checked = enabled*

Chapter 14 Inspection Overview

This section includes basic information about inspections. For detailed information, see "Inspections" on page 204.

Inspection Terminology

Analysis Analyzes the pixel shade information within a region and compares it to reference values. The inspection passes or fails based on these comparisons. There are also several analyses that make measurements. You may have many analyses for each inspection region.

Dimension The dimension inspection type connects the results of two other inspections to do the analysis. For example, a distance inspection can connect two registrations to measure the distance between centers of two features.

Enhancements Enhancements are used to alter images for better defect detection, or for making certain features stand out.

Inspection Module The housing, camera, cables, and associated electronics that are installed on or over the production line to acquire an image of your product. Sometimes referred to as a tunnel. The inspection module can have a different sensor than a camera to make measurements of your product (example: Intellimass sensor).

Lane A lane usually refers to one production line, and can contain multiple sensors.

Orientation An orientation compensates for part rotation by finding a grayscale pattern. An analysis which must rotate with the part must follow an orientation.

Part Program The list of regions, analyses, registrations, etc. programmed specifically for your part to detect defects or make measurements.

Part Tracking refers to the monitoring of parts from the part detect sensor to reject station. This ensures that the correct parts are rejected at the correct time, and that good parts remain in the part stream.

Region The Region indicates where on the part the analyses will take place. You may have as many inspections as you like in one region.

Registration A registration compensates for part movement by finding the reference point on the part. All analyses follow a registration.

Reject A part that failed one or more inspections from any sensor. The part can be physically rejected, or simply counted in the statistics.

Retro-Spec The graphical interface that allows you to make quick changes to a part program. It also allows you to experiment with different parameter settings to see how changes affect the most recent inspection population, without rejecting parts.

Sensor A camera, Intellimass, or other sensor that acquires images, measurements, or other data from your product.

Lane-Specific Information - part program

Cameras (or other sensor) All information for each camera or other sensor is contained in the Part Program.

Lighting Each camera has different lighting settings for each part. When you load your Part Program after a Part Changeover, the lighting will be specific for that part and save any changes you make.

Calibration Calibration setup for Part Present Delay and Reject Delay is saved for each part you will run. Part Present and Reject Delay will only need to be set up once.

Inspections All Inspections will be contained in your Part Program. Also, parameter changes are saved for each Part Program.

Part Tracking Terminology

Part Width The number of encoder ticks that the part sensor "sees" the part.

Part Present Delay The distance (in encoder ticks) from the part detect sensor to the camera centerline. If a PDX is used, this is the number of encoder ticks from the part detect pulse out of the PDX to the camera centerline.

Reject Time Delay The distance, in encoder ticks, from the part detect sensor (or from the PDX part detect pulse) to rejector. This signal ensures the correct part is rejected.

Reject Dwell or Reject Pulse Width The duration (in milliseconds) of the reject signal. This signal must be long enough to ensure the part is efficiently rejected, and short enough to ensure that only one part is rejected for each reject pulse.

Adaptive Reject This feature is necessary when you have a significant change in product speed, since the rejector has a constant turn-on time. This logic allows the system to monitor the product speed and compensate the pulse being sent to the rejector.

Reject Confirm Not commonly used. This is the distance in encoder pulses from the reject mechanism to the reject confirm sensor (if installed).

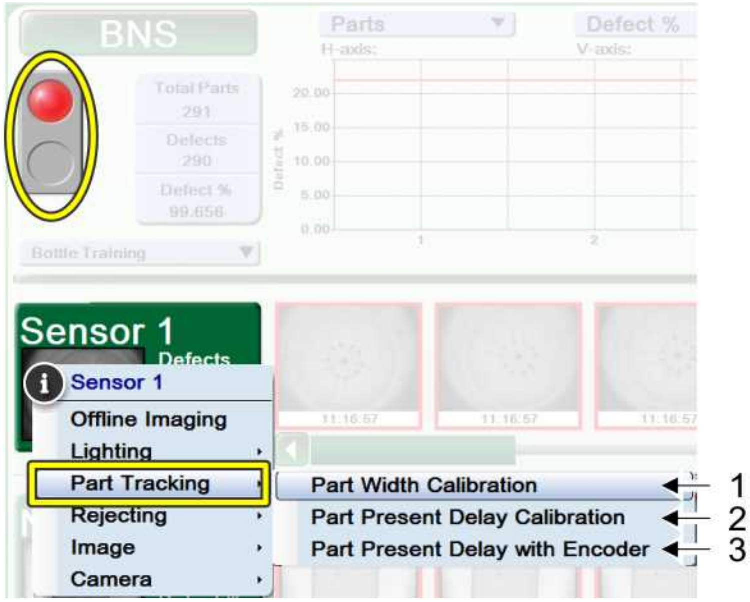
Part Tracking

Part Tracking refers to the monitoring of parts from the part detect sensor to reject station. This ensures that the correct parts are rejected at the correct time, and that good parts remain in the part stream.

Mechanic level user and higher

> *Note: the lane must be offline*

Part Tracking includes:



1 - "Part Width Calibration" on page 87

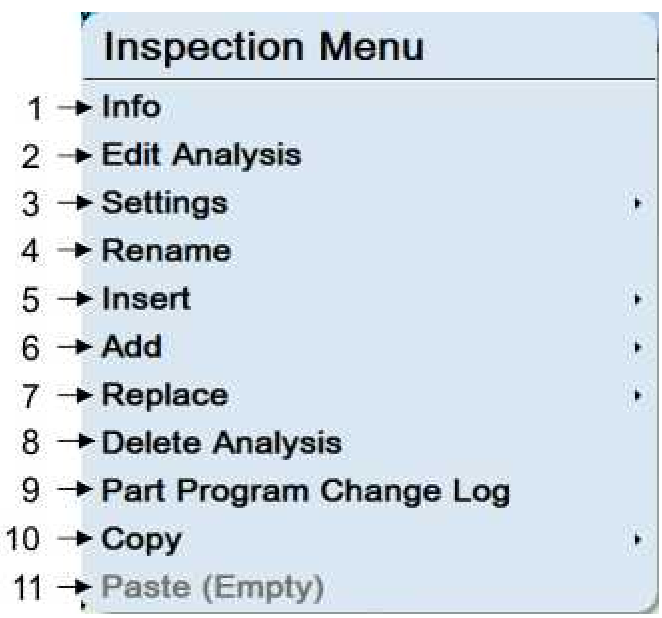
2 - "Part Present Delay Calibration" on page 89

3 - "Part Present Delay with Encoder" on page 91

Inspection menu

Create and edit part programs through the inspection menu. To see this menu, right-click over any inspection name.

> *We use the term 'inspection' as a generic term for analyses, regions, enhancements, registrations, dimensions, etc.*
> *some items are grayed out if you do not have user access to those items, or if they do not apply to the current selection.*



1 - Info

Display general information about the inspection. The "Specific Type" is the name used in the Inspections section in this guide

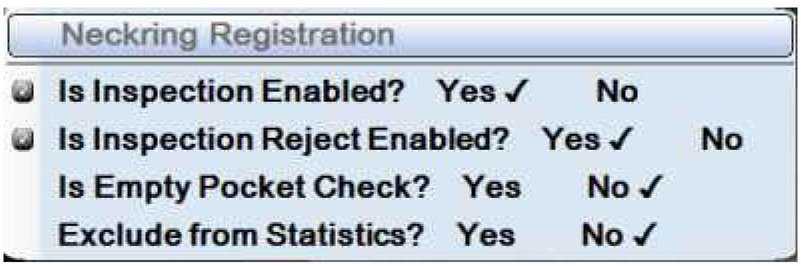
1 - Name - your name for the inspection | 2 - General type - Analysis, Region, Orientation, etc. | 3 - Specific type - sub-category (example, Ring, Polygon, or Measurement Region)

---

2 - **Edit** Open the Inspection Editor - performs the same action as double clicking.

3 -Settings

Inspection sub-menu. Checked = enabled



Is Inspection Enabled? All of its dependent inspections are also enabled/disabled. The inspection name is grayed out when it is disabled.

Is Inspection Reject Enabled? If "No" is checked, then you can temporarily pass all parts regardless of whether they pass or fail the current inspection. Some items, such as Regions, do not have pass/fail criteria. This option is grayed out if reject is not applicable.

Is Empty Pocket Check? If "Yes" is checked, then inspection is being used as an empty pocket check.

Exclude from Statistics? If "Yes" is checked, then do not count failures of this inspection in the statistics. If "Yes" is checked, then:

- The inspection is not displayed in graphs
- If the inspection fails on a sensor, and no other inspection fails on the same sensor, the defect count is not increased for that sensor.
- If the inspection fails for a walk-by group and no other inspection fails in the same group, the defect count is not increased for that group.

- If the inspection fails and is the only inspection failing within a lane, the defect count is not increased for that lane.
- The inspection is still displayed in the results grid when you select the Reject Images button.
- The inspection name is still available in the drop-down selections when you select the SPC Graphs button.
- You can still view this inspection in the Inspections graph and Statistics Grid if you select the appropriate Display option (right-click over graph).

Start or Stop Auto-Learn (not shown) [Present when Operator Trigger is enabled in Auto-Learn] Manually start or stop an Auto-Learn process. See Auto-Learn.

4 - Rename the inspection

5 - **Insert** Add one item above the currently selected item.

6 - Add an inspection

7 - **Replace** Replace the current item with a similar inspection.

8 -**Delete** Delete the current item. If the item has other items below it (at a lower hierarchy), those items are deleted as well. Delete All Inspections deletes all the items in the inspection tree.

9 - **Part Program Change Log** Display the "Part Program Change Log" on page 102. This lists the inspections and the edit history for each.

10 - Copy the selected inspection

11 - **Paste** Paste the contents of the clipboard into the inspection list. The contents are pasted below the currently selected item.

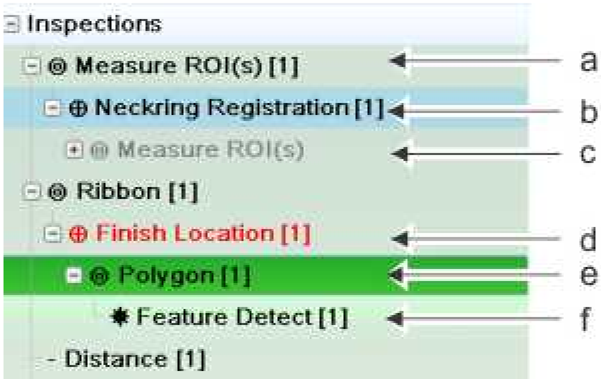
Inspection Tree Relationships

The inspection tree shows the relationship of each inspection. Indented objects are dependent on the object above it. Some items in the menu may be turned off. The ability to access some items depends on your user access.

See also "Icon or Symbol Options (Sensor Menu)" on page 96

Inspection Tree Colors

Sometimes the inspection names are highlighted with different colors. To set different states, use the Sensor Menu.



a) Normal state

b) [blue highlight] Empty pocket check

c) [gray] Disabled

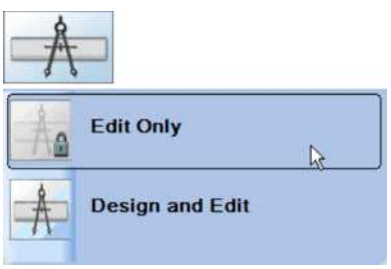
d) [red] Inspection reject is disabled

e) [highlight] Inspection is currently selected by the cursor

f) [light green highlight] Inspection is excluded from statistics

Design Mode Icon

The Design Mode icon provides additional part program restrictions. Select the icon to see the options.



- Edit Only - users are allowed to edit, but not add, the inspections. This also restricts access to regions.
- Design and Edit - users are allowed to edit and add inspections, as well as add and edit regions.

> *Note: some users (for example, Operators) cannot edit or add inspections regardless of this setting. To add and edit inspections in Design and Edit mode, users must also have proper permissions. See Manage Permissions*

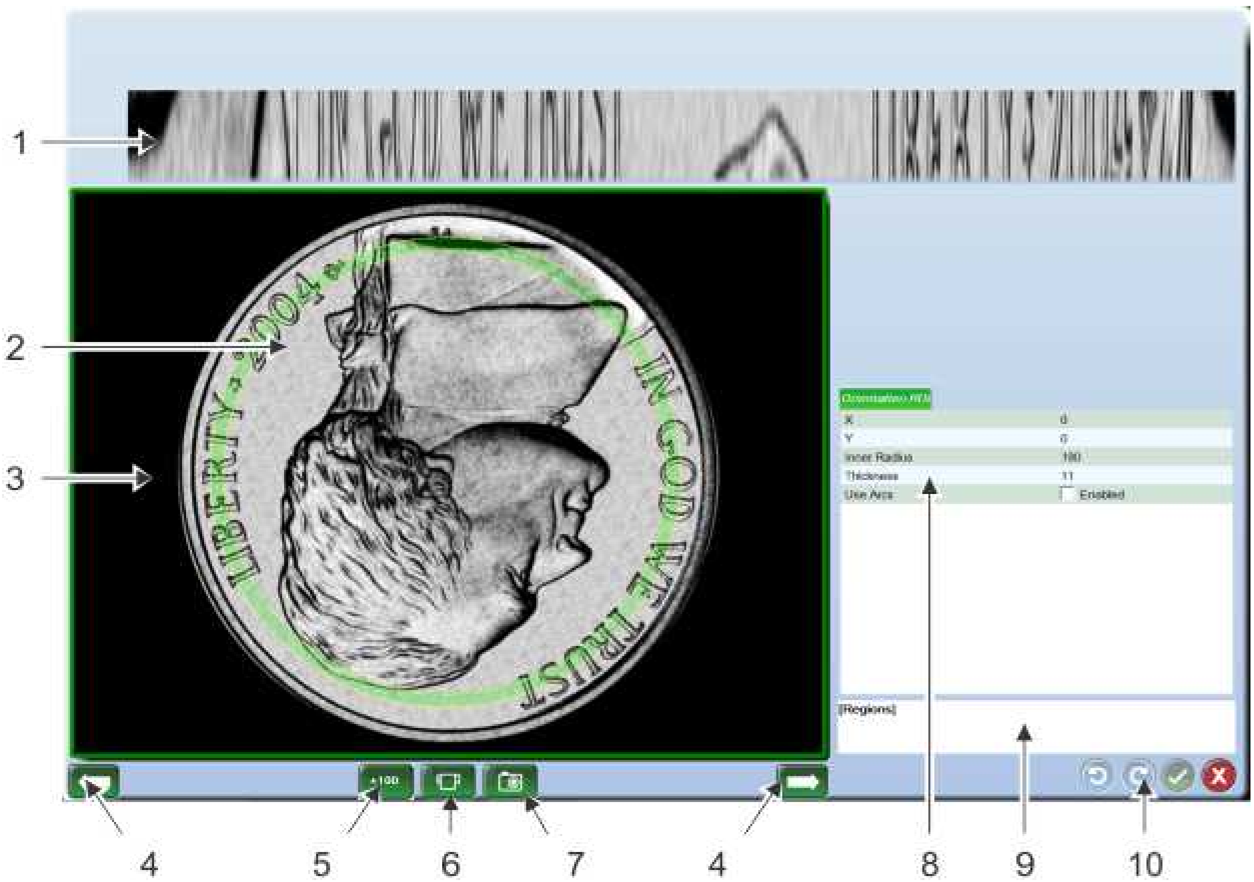
Add Regions and Inspections

To add an Analysis, Enhancement, etc., you must first add a "Region." The Region indicates where on the part the inspections are applied. Right-click over the inspection tree, select Add, then choose an item to add. You may add as many inspections underneath the region as you wish.

Edit Regions

This view is available when you are editing a region. Double-click a region name in the inspection tree to see the region editor. You must have user permissions to edit.

> *In Region editor, you will not see anything happen if you select numbers 5, 6, or 7. The data set is changed, but you will not see the data set until you view the Inspection Editor.*



1 - **Unwrapped region of interest (ROI)** A linear view of the region from the edited inspection. Some inspections show "S" for "Slow direction" and "F" for "Fast direction," to illustrate how those inspections work.

2 - Part image

3 - **Editable region** When the lines are yellow, they can be edited. To enable region editing, right-click on the region and check "Enable Region Editor."

4 - Previous and Next image

5 - Get 100 new images

6 - **Refresh data set** Take up to 100 images and replace Data Set A. The images continue to update until you click the button again.

7 - Snap one image

8 - Edit parameters

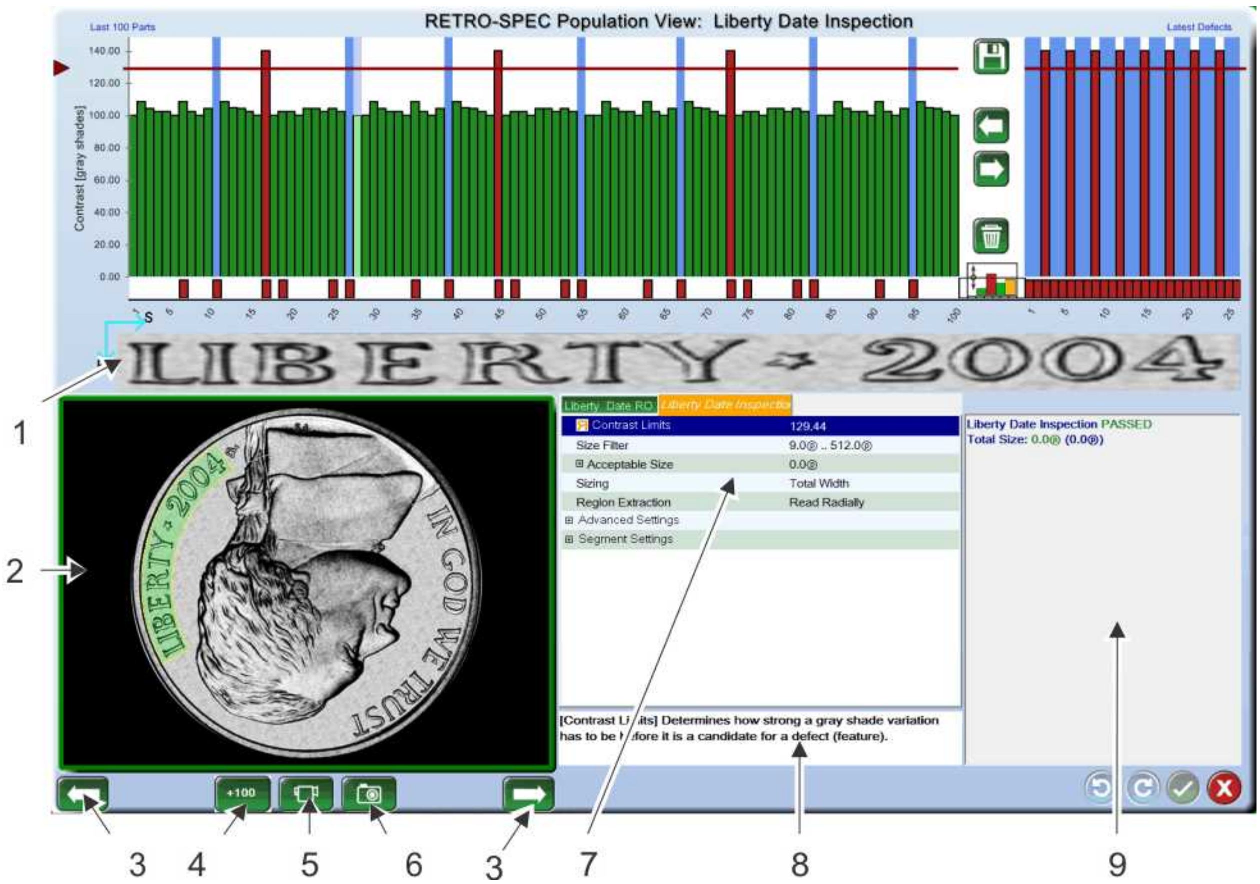
9 - Parameter description window

10 - Undo/ Redo/ Accept/ Cancel

Edit Inspections

Edit an inspection. You must have user permissions to edit.

The Retro-Spec graph at the top of the screen is described separately.



1 - **Unwrapped region of interest (ROI)** A linear view of the region from the edited inspection. Some inspections show "S" for "Slow direction" and "F" for "Fast direction," to illustrate how those inspections work.

2 - Part image

3 - Previous and next image

4 - Get 100 new images

5 - **Refresh data set** Take up to 100 images and replace Data Set A. The images continue to update until you click the button again.

6 - Snap one image

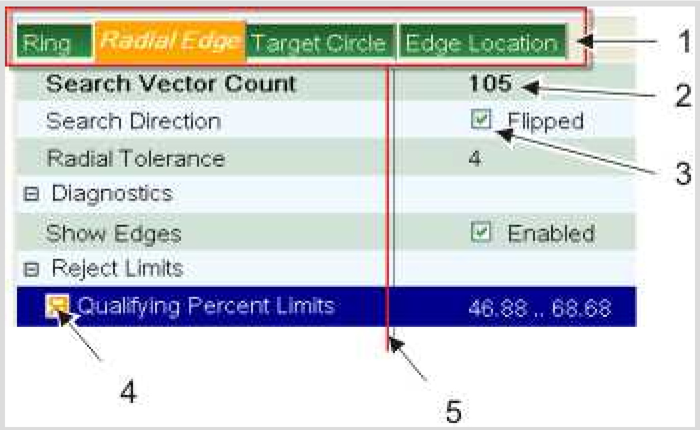
7 - Inspection parameters

8 - Parameter description window

9 - Results box

Edit Parameters

You can change options that will alter the outcome of an inspection. You must have user permissions to edit. Double-click the inspection name in the inspection tree to edit.



1 - Inspection tabs

2 - Adjust numeric values

3 - Check box to enable or disable the feature

4 - Backwards R

5 - Column division

1- **Inspection tabs** Select a tab to adjust parameters. The orange tab contains the parameters that can be adjusted with the bars on the Retro-Spec graph. The tabs depend on the inspection and its relationship within the inspection tree.

Adjust numeric values

Large Slider - Use a sliding bar. Changes are also applied to the red and yellow sensitivity bars in the Retro-Spec graph. If the parameter has an upper and lower limit, portions of the bar are displayed in different colors, as shown below:

Red = failure limit. A part value that falls in the red zone fails inspection.

Yellow = warning limit. A part value that falls in the yellow zone is tagged as a warning level part.

Green = passing. A part value that falls in the green zone passes (at least this parameter).

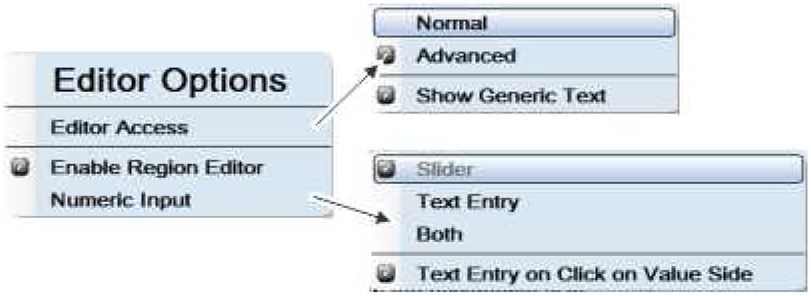
Numeric Text Entry - Type in a specific number. You can use the +1 and -1 feature to make minor adjustments.

4 - **Backwards R** The current parameter can be adjusted in the Retro-Spec graph (example: the red and yellow limits bars).

5 - **Column division** This line is not actually displayed. You can see Large Slider AND numeric entry pad if you select in the left column, or just the numeric entry pad if you select in the right column (this only applies if Numeric Input setting = both. See "Editor Options" below).

Editor Options

Right-click over the parameters menu to see the Editor Options. Checked = enabled



Editor Access

Normal - display the normal menus (for most users)

Advanced - display the advanced parameters (for power users)

> *you must have the appropriate permissions to see the advanced parameters: "Access advanced inspection parameters"*

Show Generic Text - default Intellispec names.

Enable Region Editor Available when the inspection has an associated region that can be modified.

Numeric Input

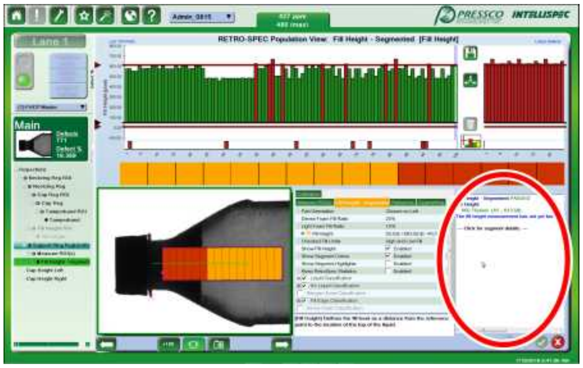
Slider = Large Slider as described in "Edit Parameters" on the previous page

Text Entry = Numeric Text Entry

Both = both Large Slider and Numeric Text entry. After you make changes, select the OK button to close them.

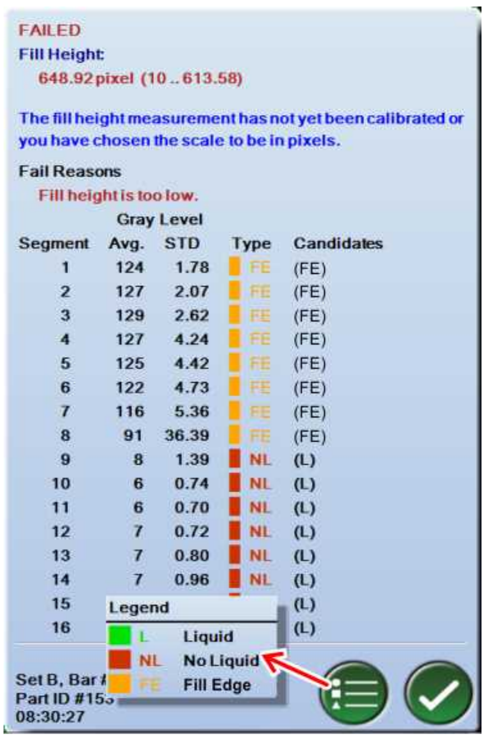
Text entry on click on value side = if you select an item the right column of the menu, you will see only the Numeric Text Entry box, even if you have Both checked

Results in the Inspection window



Click in the Results box in the inspection to see specific part information.

An example from Fill Height Segmented inspection is shown below.



Result Options

There is additional information for the Results Box. Right-click to see the menu. Checked = enabled

Show Other Inspections Shows whether a part passed or failed other inspections on the current sensor. Right-click the menu again to see the option to hide good inspections. Double-click any inspection to show the Retro-Spec graph and images for that inspection.

Display Timing Information Displays timing information for each inspection on the current sensor and the total time in milliseconds.

Inspection Results

When an inspection runs, the results are displayed in Sensor Overview mode.

Chuckwall Registration	Good
Panel/Tab Orientation ROI	Good
Template Orientation [1]	Setup!
Adaptive	Good
Shape Check	Bad
Turned Tab	Good

- Good = part passed inspection
- Bad = part failed inspection
- Warning = part passed inspection with a warning
- Setup! = part had an inspection setup problem.This is used for Template Orientation and Template Registration inspections when the template is not valid.
  - The system displays a warning when the inspection is not set up correctly
  - When you are editing the inspection, the results window shows the setup error

Template Orientation SETUP!
Previous Center = (0, 0)
Center = (-1, -1)
Orientation Angle = -1°
Storage Size = -1x-1
Downsize Level = Disabled
Orientation Strength: -1 (1.5)
Fail Reasons:
General Failure

Setup Error - Statistics Results and Rejecting

If you see a Setup error, it means that the inspection had a setup problem in a Template Orientation or Template Registration inspection. See "Inspection Results" above.

- In the system statistics, a Setup error counts as a defect, unless Excluded from Statistics is enabled for the inspection. For information about Excluded from Statistics, see "Inspection menu" on page 189.
- A Setup error causes a reject, unless the rejector is disabled for the inspection or sensor.
- A Setup error does NOT cause a reject if Reject Missed Results is disabled. See "Reject Missed Results" on page 118

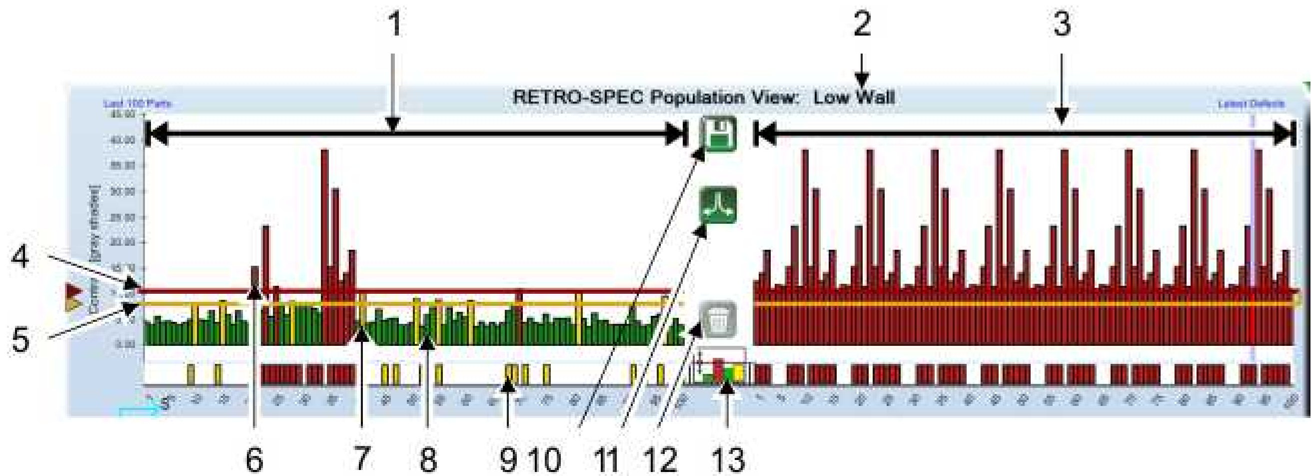
Retro-Spec Population View Graph

This graph is displayed when you edit an inspection.

Population View The parts can be the last 100 run, the latest 100 defects for the inspection, or a set of parts previously saved to the hard drive.

Graphs with One Reject Bar The Warning/Reject Bar [4 or 5] can be a minimum requirement where the inspection value must be higher than the reject bar in order to pass. The Warning/Reject Bar can also be a maximum requirement where the inspection value cannot exceed the reject bar.

Graphs with Two Reject Bars (not shown) The part's value must be between the two reject limits to be considered a good part.



1 - Data Set A

2 - The inspection name.

3 - Data Set B

4 - Reject Bar (red) - The inspection limits. Parts that fall outside the reject limits are defective.

5 - Warning Bar (yellow) - The inspection warning limits. Parts that fall outside the warning limits are not defective, but are approaching reject status.

6 - Defective Part - red.

7 - Warning Part - yellow.

8 - Passing Part - green.

9 - Indicates failed/ warning on a different inspection.

10 - Save a set of part images to use again later

11 - Select a set of parts to be displayed. Also, or when [13] is unlocked, to move a part to the other side.

In the Select Data Sets dialog box, use the Apply As Default button to remember your preferred data sets. If you select Apply as Default (for example: Set A = Last 100 parts; Set B = Latest Defects), then the system will automatically select those options the next time you open the dialog. The setting is saved with your user account.

12 - Delete a single part. This can only be used when [13] is unlocked. To delete a part: highlight the part, then select [12].

13 - Lock/ Move Parts. Toggles to: - When locked, parts cannot be moved or deleted. When the graph is unlocked, part sets can be modified. You can select a part (vertical bar) and drag it to buttons [10], [11], or [12]. Once a part has been deleted or moved, **Scratch Parts** is displayed at the top of the data set. To change the name back to the data set, select [10] to save Set A or Set B.

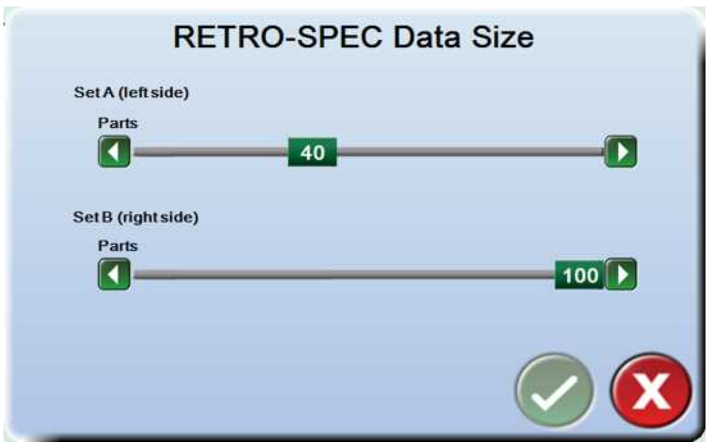
Move or delete multiple parts

On Intellitrainer only, select a part and hold the Shift key to select parts next to each other. Select a part and hold the Ctrl key to select parts not next to each other.

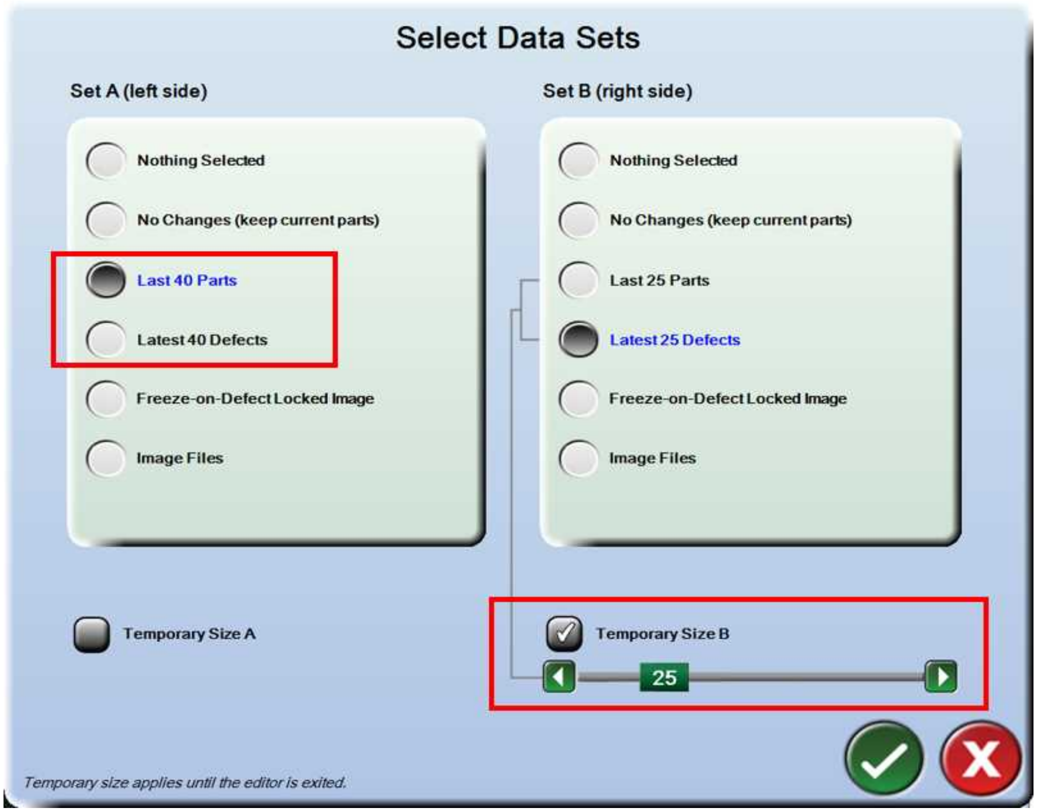
Retro-Spec Data Size

You can limit the number of items in the RetroSpec graph. There are two ways to adjust the limit: Lane Setup and in the Retro-Spec graph.

 In Lane Overview click on the Tools icon | Lane Setup | Retro-Spec Data Size. Whatever you set these to will be the new limit for all inspections on the Lane. Other lanes can have different values.



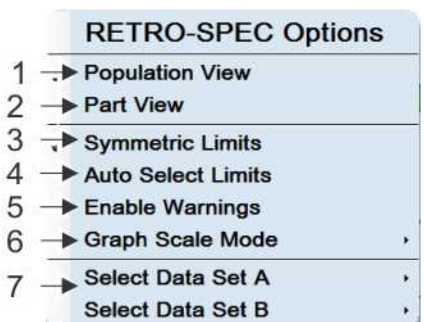
 In the Retro-Spec graph, click on the downward double arrow. You will see two check boxes at the bottom of the window. If you changed the number in Lane Setup you should see that Last 100 and Latest defects labels has changed. When you click on the Temporary Size Box you will see a slider. You can temporarily change the value for the edit session. When you close the Retro-Spec editor, the value will go back to whatever the Lane Setup slider is.



Retro-Spec Options

Right-click the Retro-Spec graph to see the Retro-Spec options menu.

> *some options are not displayed if they are not applicable to the current inspection.*



1 - **Population View** Display the Retro-Spec population view graph.

2 - **Part View** Display the Retro-Spec part view graph.

3 - **Symmetric Limits** When the Retro-Spec graph has upper and lower limits (two red bars and two yellow bars), this option keeps the upper and lower limits the same distance from nominal.

Lock Warnings to Errors [If warnings are enabled] Locks the yellow warning bar to the red reject bar in the Retro-Spec graph, keeping them the same distance apart.

4 - **Auto Select Limits** Automatically adjusts warning and reject levels to make all parts in the data set pass.

5 - **Enable Warnings** Provides a warning level (yellow) sensitivity bar. A warning does not reject parts, but indicates that the process is approaching the reject status. When you enable warnings, they are enabled for all inspections for the current sensor.

6 - **Graph Scale Mode** Change the height scale of the graph. Limits Only displays part parameter values up to and including the current inspection limits. This is useful when you want to zoom in on data without extra lines on the graph. Note that the limit lines may not be displayed on the graph. As soon as you change the parameter limits from the menu, the limit lines are displayed again on the graph. Limits and Data is the default mode that displays all the inspection data plus the limit lines.

7 - **Select Data Set A or B** For each Data Set, you can select what you want to display. You can choose files that have been previously saved to the computer. See information about Saving Images. See also Freeze on Defect Image in Retro-Spec.

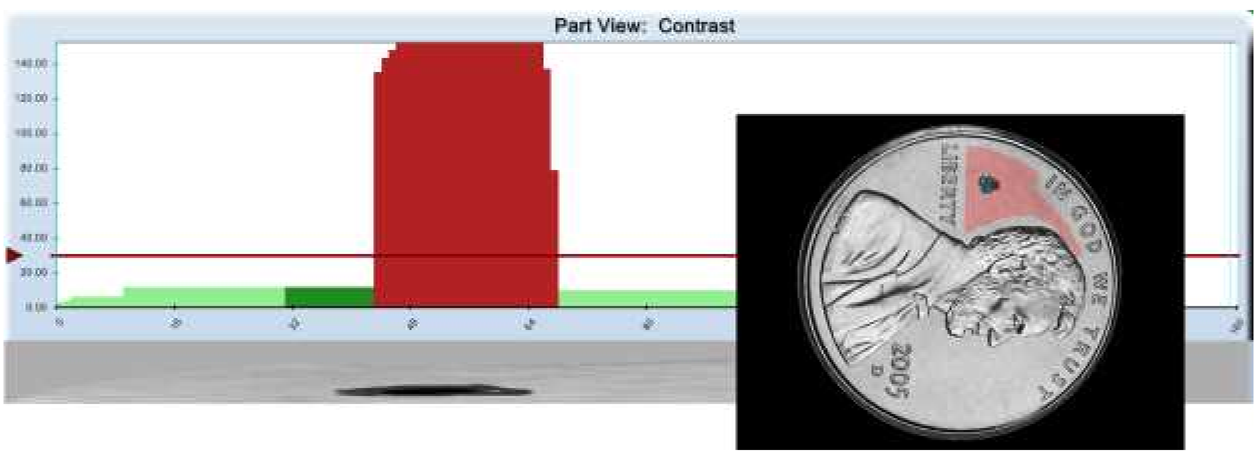
[not shown] **Select Parameter** Choose a graph to display. This is available for some inspections, such as Measurement and BMID inspections.

Retro-Spec Part View Graph

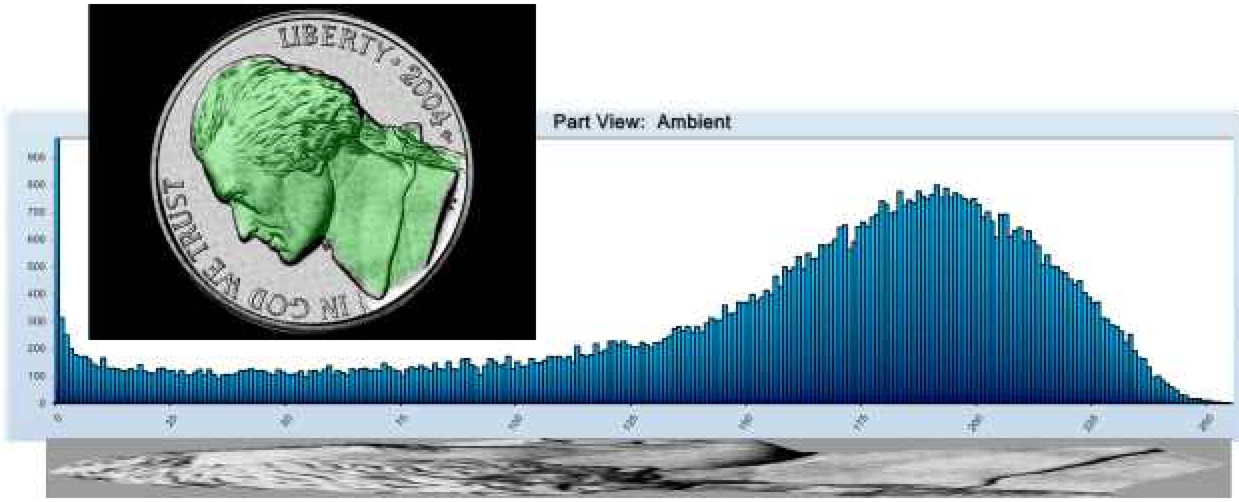
The Part View shows specific information for each part. To display the Part View, double-click a part from the Population View. Part Views vary by inspection.

> *Note: not all inspections have a Part View graph available.*

Shown below is the Part View of a Contrast inspection. It has a reject bar and an Unwrapped Region of Interest. Any type of damage to the surface of the part, which can be seen in the Unwrapped Region of Interest, will have a corresponding value on the graph. If any part of the graph exceeds the Reject Bar, the whole part will be considered a defective image. The Reject Bar can be dragged, changing the actual reject threshold.



Shown below is a Part View of an Ambient inspection. This Part View does not have a reject bar but does have an Unwrapped Region of Interest. The graph does not correspond to Gray Shades on the Unwrapped Region of Interest. The graph represents how many pixels of each Gray Shade are found on the part.


LIBERTY · 2004
IN GOD WE TRUST
Part View: Ambient

Chapter 15 Inspections

This section covers regions of interest, registrations, orientations, enhancements, analyses, dimensions, and correlations. We use the term inspections to include all of these items.

The information in this section is valid as of software version 6.0.034

The inspection categories include:

- "Regions of Interest (ROI)" on page 209
- "Enhancements" on page 228
- "Registrations" on page 249
- "Orientations" on page 310
- "Analyses" on page 319
- "Dimensions" on page 386
- "Correlations" on page 402
- Logical Operations - "If Else" on page 450

These categories each contain several inspections.

Empty Pocket

The Empty Pocket inspection tests to see if a part is present before proceeding with inspection. A common use for this test is in Starwheel applications where the encoder is used, based on pocket position, rather than a part present signal. If there is no part, then it is called an "empty pocket." For accurate production numbers, we need to locate empty pockets. No inspection takes place (for the current part) if the system finds an empty pocket.

Notes:

- You must already have a part program
- You may run the Empty Pocket check on any inspection. We recommend that you use it with an inspection that has pass or fail criteria. Ambient and Contrast inspections are most commonly used.
- If you use Empty Pocket, then you must have only ONE Empty Pocket inspection for EVERY sensor in the lane. If it is set up incorrectly, the system displays a warning when you put the lane online.
- You are not required to use Empty Pocket (that is, no Empty Pocket inspections on ANY sensor).
- Statistics - If all of the sensors within a lane detect an empty pocket, then the part is not counted toward any of the statistics.

To add an Empty Pocket check:

1. In the inspection tree, right-click over the name of the inspection to which you want to add the Empty Pocket check.
2. Select Settings | "Is Empty Pocket Check?." Click in the left column to apply a check mark.

An Empty Pocket inspection is highlighted in blue.

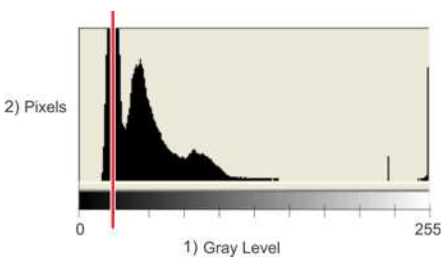
Parameter Illustrations

Several parameters are used in multiple inspections. They are illustrated here for your convenience.

Ambient Technique

This method determines the region's ambient. Choose the method through the drop-down menu.

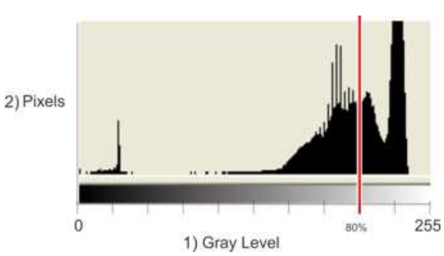
Max Amplitude looks for the maximum gray level amplitude — the gray level with the most pixel counts — within the histogram of the search area.



1) Gray level | 2) histogram of the image

Peak Percentile locates the gray level value that exceeds the threshold. In the example below, the system would use the gray level to the right of the line marking 80%.

Ambient Threshold defines what percentage of the search area to use.



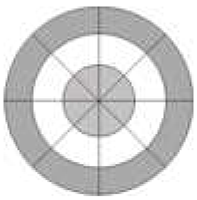
1) Gray level - choose a percentage | 2) histogram of the image

Density computes the average of all the pixel gray levels — total gray level divided by pixels.

Angular Samples

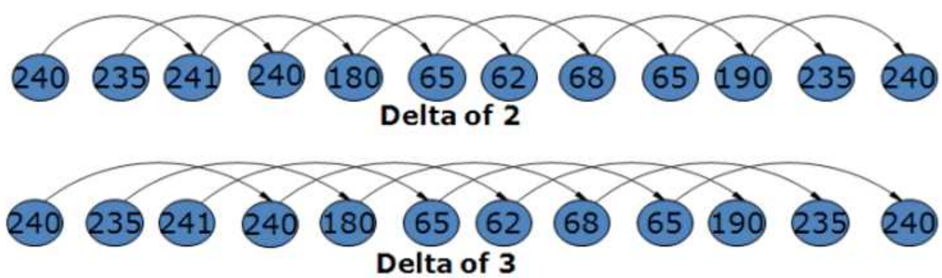
This number is automatically set by clicking the Standard Settings button (in the Settings menu). This number divides the region into a number of arcs. See example below.

Example: This example shows a region with three (3) radial samples [inside to out] and eight (8) angular samples [pieces of a pie]. (Note: these values are not available in the inspection. These examples and shading are for illustration purposes only.)



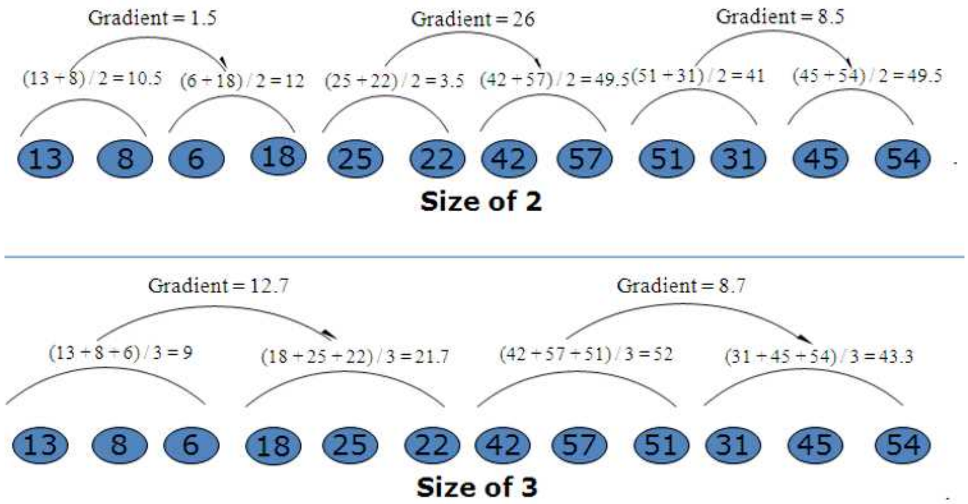
Edge Delta

Edge Delta - The distance between pixels being compared. Higher delta = greater sensitivity.



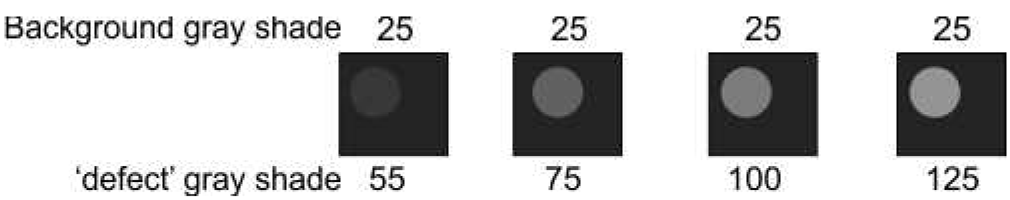
Edge Size

Edge Size - The number of pixels in a group being compared. Greater size = lower sensitivity.

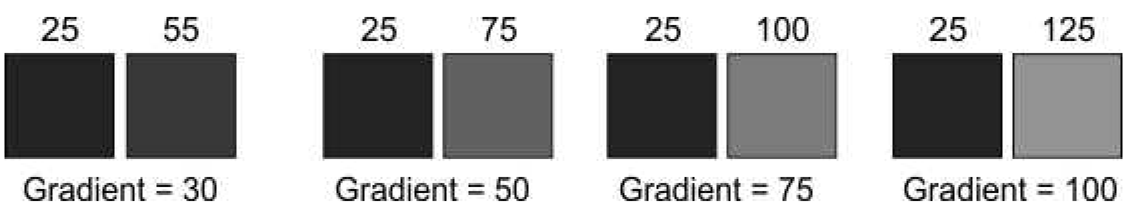


Edge Gradient

Edge Gradient - The difference in gray shades between pixels being compared. The illustration below shows what a defect might look like at different gray shades.



And the resulting gradient:

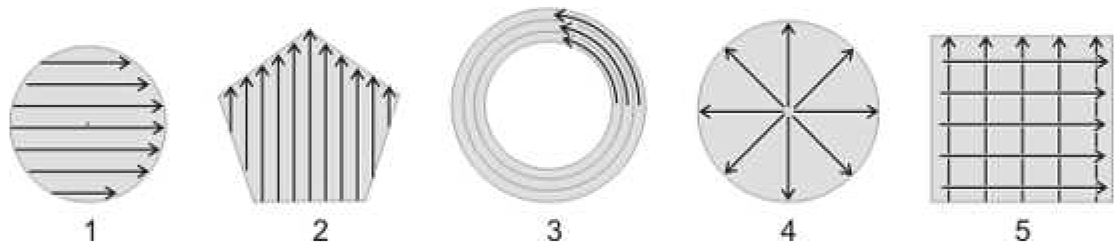


Region Extraction

Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

> *Note: some inspections do not use all of these options*

The illustration below shows how the information is read by each method. Note that these shapes are examples only - your region does not have to match the shape.



1) Read Horizontally - Extract the region horizontally - 90 degrees with respect to orientation.

2) Read Vertically - Extract the region vertically - parallel with respect to orientation.

3) Read Circularly - Extract in a circular fashion around the region.

4) Read Radially - Extract region in a radial direction.

5) Read Horizontally and Vertically - Extract the region both horizontally and vertically (with respect to orientation). This is used in special cases.

Regions of Interest (ROI)

Regions of Interest (ROI) are where the inspections take place. There is no analysis or pass/fail processing done in a Region of Interest. You will add inspections to a Region of Interest. There is no limit to the number of inspections that you can add to one Region of Interest. All regions can be edited directly on the image (after adding them to the inspection list).

> *Note: Your system (and this book) may show only those items that apply to your application.*

"Ring Region" below

"Polygon Region" on the next page

"Ribbon Region" on page 215

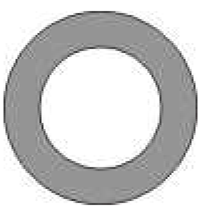
"Measure ROI" on page 217

"Cylindrical Region" on page 219

"Adaptive Region" on page 223

Ring Region

The Ring region is circular or donut-shaped. You can create arcs and adjust the donut size.



To add a Ring Region:

1. If you plan to use Arcs for the Ring Region, place an Orientation in the inspection tree. If you want the region to be circular or donut-shaped, skip the Orientation.
2. Highlight the Orientation name in the inspection tree (if applicable).
3. Right-click on the item you just added.
4. From the Inspection menu, select Add | Region | Ring. Re-name it to something more meaningful to you.
5. The Ring Menu is displayed and the ring is shown on the image. Adjust the placement of the ring and parameters as necessary.

Ring menu

Ring	
X	-31
Y	3
Inner Radius	153
Thickness	98
Use Arc Segments	☑ Enabled
Start Angle	0.0°
Stop Angle	0.0°
Arc Segment Count	2
Arc Alignment	Align to boundary
Perimeter Type	Normal

Set the parameters on the image or through a numeric keypad. More information: "Edit Parameters" on page 195

X and Y position Horizontal and vertical position of the center of the ring on the image.

Inner Radius Size of the inner ring.

Thickness The thickness of the ring; outer radius minus inner radius.

Use Arcs (or Arc Segments) Inspect an arc instead of the whole region. The system inspects the region between the Start and Stop angles. Make sure you have an Orientation in the job prior to using arcs. This will ensure that the inspection region is placed on the same location of the part regardless of the part's orientation.

The following parameters are available when "Use Arcs" is enabled.

Start Angle The start angle of the region.

Stop Angle The stop angle of the region

Arc Segment Count Set the number of segments you want to create in the region.

Arc Alignment Not currently used.

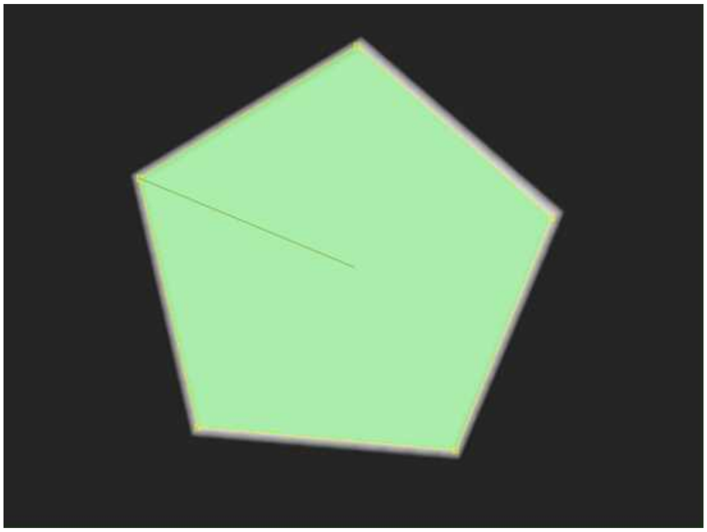
"Perimeter Type Virtual and Aggregate" on page 212

Polygon Region

Similar to the Ribbon Region, the Polygon Region is a customizable region that is used for:

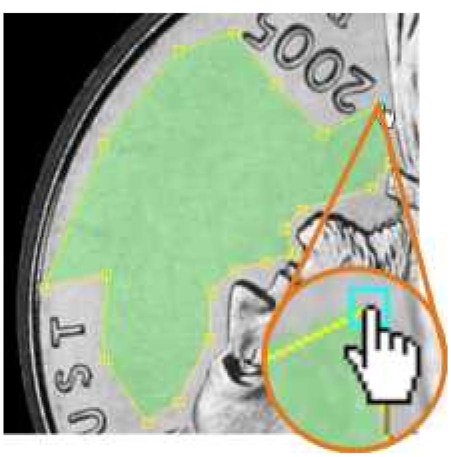
- free-form inspection areas on a part
- areas that do not fit a circle or other standard inspection region

> *Note: place a Registration and Orientation (if applicable) prior to adding a polygon region. This ensures that the polygon is placed correctly on the part, regardless of the part's placement or rotation.*



To add a Polygon Region:

1. Make sure that the part program has a registration and/or orientation in place to ensure proper placement of the polygon on all inspected parts.
2. Highlight the Registration or Orientation name in the inspection tree.
3. Right-click on the item you just added.
4. From the Inspection menu, select Add | Region | Polygon. Re-name it to something more meaningful to you.
5. A "NEW POLYGON: Click to add points" message is displayed in the large image area, and the Polygon Menu is displayed. (The menu is described below) Click anywhere in the image to start the polygon.
6. Continue clicking with the yellow boxes (polygon points) to create a polygon region. You may create as many points as you like.
7. When you want to close the region, click on the first box that you placed. The region closes and is filled in for you.



8. Make any necessary adjustments from the menu (described below). You can make adjustments to the region, duplicate it, or rotate it from the menu.

To edit the polygon region:

Right-click the image to view the Image Options menu. Use Edit Mode to Delete, Add, or Move any polygon point or the entire region.

Polygon menu

Polygon	
Repeat Polygons	☑ Enabled
Repeat Count	1
Rotate Polygon	0.0°
Expand or Contract	0

Repeat Polygons Create duplicate copies of the original polygon.

Repeat Count (Available when using multiple polygons) Choose 1 - 10 duplicate polygons to place on the image. A common use for this feature is for the feet of a PET bottle.

Rotate Polygon Rotate the polygon (and duplicated polygons) around the center.

Expand or Contract Resize the region. Note: be careful not to contract the region too much. This distorts the original shape.

"Perimeter Type Virtual and Aggregate" below

Perimeter Type Virtual and Aggregate

Right-click over the inspection parameters | Editor Options | Advanced = Checked. You must have the "Access advanced inspection parameters" permission.

These items apply to "Ring Region" on page 209 or "Polygon Region" on page 210

Perimeter Type

Choose the best perimeter type for your part.

Normal - standard region.

Virtual and Aggregate - allows you to subdivide a larger region (aggregate region) into smaller regions (virtual region) that can be independently inspected or ignored. This is mostly used for deco on Converted Ends or EZO ends. This is described below in the form of an example.

Rules for Virtual and Aggregate regions:

- A Ring region can be an Aggregate but not a Virtual region
- A Polygon/ Ribbon region can be either Aggregate or Virtual.
- Inspections are not added to virtual regions. Virtual regions use the inspection that was attached to the aggregate region and either add to or subtract from the aggregate region.
- Any inspection added to an aggregate region that has virtual regions attached to it must scan linearly (vertical, horizontal, or both). It cannot scan radially or circularly.
- If you insert a virtual region above an aggregate region, it always subtracts from the aggregate region.

- If you insert a virtual region above an existing virtual region, it does the opposite of what the first region did. For example, if you insert a virtual region above a virtual region that was subtracting from the aggregate region, the second virtual region will add its region back to the aggregate region.

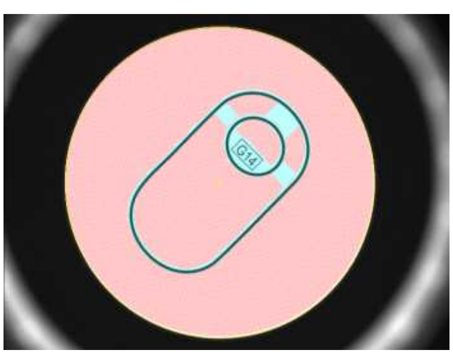
Example of Perimeter and Aggregate usage:

Suppose we have a converted end on which we want to inspect only the panel area and the finger well, but not the tab nor the embossed area inside the finger well. We can inspect this area using one Contrast inspection with Aggregate and Virtual regions. In our example, the rivet is not present to make the example simple.

To add the Aggregate region:

1. First add the normal regions, registrations, and orientations that you would normally use to inspect this type of part.
2. Add a Ring region after the orientation. Adjust the region so that it covers the entire panel area.
3. For Perimeter Type, select Aggregate.
4. Click OK to close the inspection.
5. Add a Contrast inspection after the Ring region.
6. In the Contrast menu, Region Extraction must be Read Horizontally, Read Vertically, or Read Horizontally and Vertically.
7. Click OK to close the inspection.

At this point the Contrast inspection would fail because it would see the tab and other grayscale changes.

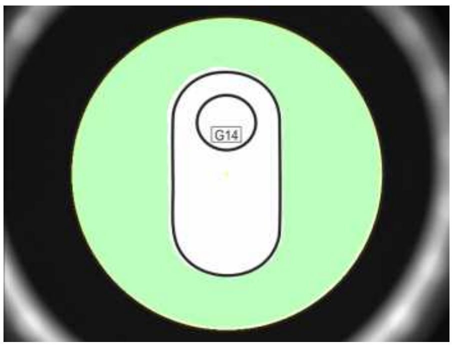


Next, insert a Virtual region to allow the inspection to ignore an area.

To add a Virtual region:

1. Right-click on the Ring region and INSERT a Polygon region.
2. Create the Polygon so that it covers the whole tab area.
3. In the Polygon menu, change Perimeter Type to Virtual. This makes the system ignore the tab area. It subtracts the Virtual region (Polygon) from the Aggregate region (Ring).
4. Click OK to close the inspection.

Now the Contrast inspection would pass. However, we still want to inspect the finger well area, but ignore the embossed letters.



Next, add more Virtual regions to ignore and include some areas.

To add more Virtual regions:

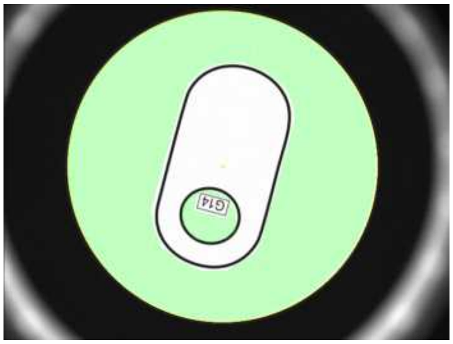
1. Right-click on the Polygon region and INSERT another Polygon region.
2. Create the Polygon so that it covers the whole finger well area.
3. In the Polygon menu, change Perimeter Type to Virtual. This makes the system add the whole finger well area back into the inspection. (When you insert a Virtual region above a Virtual region, it does the opposite of what the previous Virtual region did.)
4. Click OK to close the inspection. Now the Contrast inspection fails because it sees the embossed area.

5. Add another Virtual area to ignore the embossed area. Right-click on the Polygon [2] region (from step 1 under "To add more Virtual regions") and INSERT a Polygon region.
6. Create the Polygon so that it covers the embossed letter area.

7. In the Polygon menu, change Perimeter Type to Virtual. This makes the system ignore the embossed area. (When you insert a Virtual region above a Virtual region, it does the opposite of what the previous Virtual region did.)
8. Click OK to close the inspection.

Now the Contrast inspection should pass because it inspects only the areas we want it to inspect. This is our desired result. (You may need to adjust your Contrast inspection for best results) The inspection tree used to create these inspections is also shown below.



Ribbon Region

Similar to the "Polygon Region" on page 210, the Ribbon Region is a customizable region. This type of region is used for:

- free-form inspection areas on a part
- areas that do not fit a circle or other standard inspection region

> *Note: place a Registration and Orientation (if applicable) prior to adding a Ribbon region. This ensures that the ribbon is placed correctly on the part, regardless of the part's placement or rotation.*

To add a Ribbon Region:

1. Make sure that the part program has a registration and/or orientation in place to ensure proper placement of the region on all inspected parts.
2. Highlight the Registration or Orientation name in the inspection tree.
3. Right-click on the item you just added.
4. From the Inspection menu, select Add | Region | Ribbon. Re-name it to something more meaningful to you.
5. A "NEW RIBBON: Click to add points" message is displayed in the large image area, and the Ribbon Menu is displayed. (The menu is described below) If you want to change the ribbon type to Loop, use the Ribbon Style drop-down item in the menu.
6. Click anywhere in the image to start the ribbon.
7. Continue clicking with the yellow boxes (ribbon points) to create a ribbon region. You may create as many points as you like.

8. To close the region, right-click on the image to view the Image Options menu and select Complete New Ribbon. The region closes and is filled in for you.
9. Make any necessary adjustments from the menu (described below). You can make adjustments to the region, duplicate it, or rotate it from the menu.

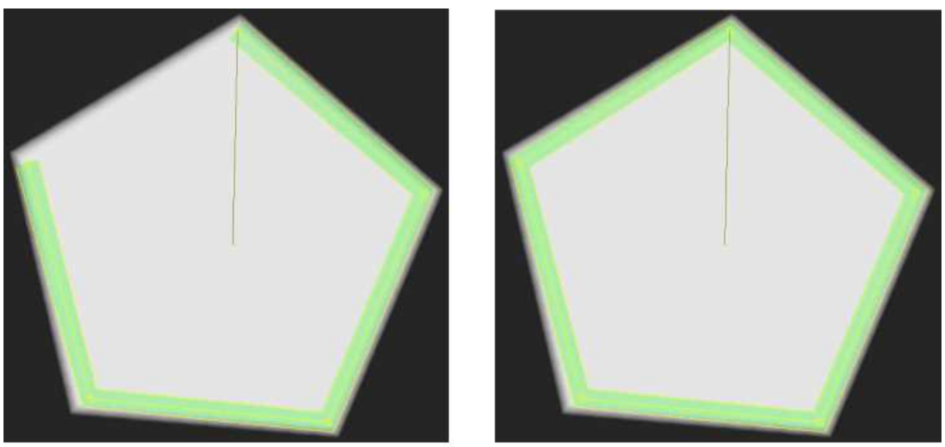
To edit the ribbon region:

Right-click the image to view the "Image Options" on page 162 menu. Use Edit Mode to Delete, Add, or Move any ribbon point or the entire region.

Ribbon menu

Ribbon	
Ribbon Style	**Loop**
Ribbon Width	20
Repeat Ribbons	☐ Enabled
Mirror Ribbon	☐ Enabled
Rotate Ribbon	0.0°
Expand or Contract	0

Ribbon Style



1 2

1) Ribbon - a customizable region that does not close, similar to a cut rubber band. Thickness remains the same throughout the region.

2) Loop - a closed region, similar to a rubber band. Thickness remains the same throughout the region.

Ribbon Width Set the region width.

Repeat Ribbons (Mirror Ribbon = disabled) Create duplicate copies of the ribbon.

Mirror Ribbon (Repeat Ribbons = disabled) Create a flipped duplicate of the region. This is typically used for the Centerline Registration where two sides are being searched for.

Mirror Angle (Only used with Mirror Ribbon) Flip the mirrored region horizontally (90 degrees), vertically (zero degrees), or any angle in between.

Mirror Offset (Only used with Mirror Ribbon) Move the mirrored region further or closer together.

Repeat Count (Available when using multiple ribbons) Choose 1 - 10 duplicate ribbons. A common use for this feature is for the feet of a PET bottle.

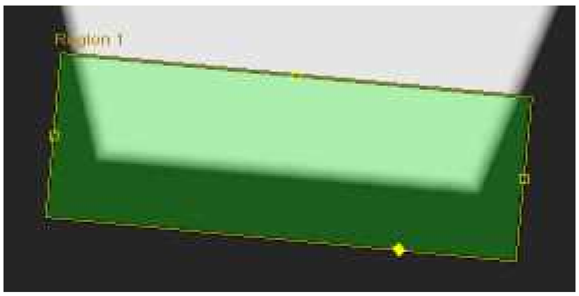
Rotate Ribbon Rotate the ribbon (and duplicate ribbons) around the center.

Expand or Contract Resize the region. Note: be careful not to contract the region too much. This distorts the original shape.

See also "Perimeter Type Virtual and Aggregate" on page 212

Measure ROI

Measure ROI is a region that is intended to be used in measurement type operations (such as Label Skew Extract, Measure Extract, Fill Height, and Support Ring Registration or Neckring Registration).

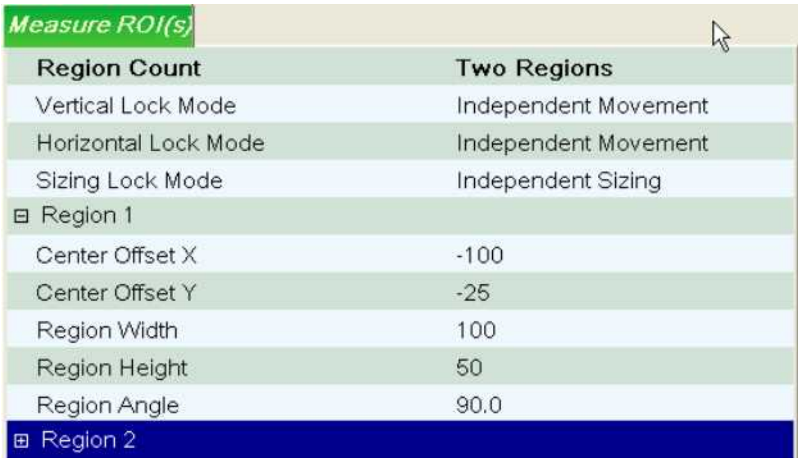


To add a Measure ROI Region:

> *Tip: We recommend that you first add a standard region of interest and registration to locate a reference point on the part. The Measure ROI region will then follow the correct location on the part.*

1. Highlight the Registration name (if one is available) in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add | Region | Measure ROI. The Measure ROI region is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Measure ROI menu is displayed and the region is shown on the image. (The menu is described below) Adjust the placement of the region and parameters as necessary. Right-click over the image to see more image options. See "Image Options" on page 162 - Measure ROI and Cylindrical Regions.

Measure ROI menu

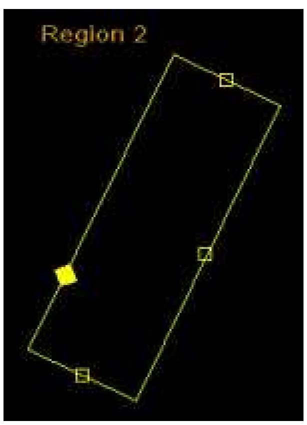


Region Count Leave this set at One Region unless you have a Fill Height application. Fill Height applications require two regions: 1) reference and 2) for fill level.

Region 1 or 2 Contains the settings for each region.

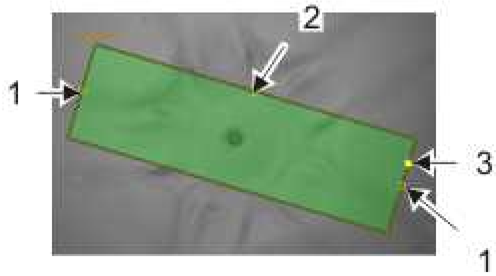
Center Offset X and Y Set the region offset value relative to the registered center. If your region is off the screen, you may need to change these values.

Region Width, Height, and Angle Click on the image to adjust the region (Enable Region Editor = ✔ in the Image Options menu). Set Region Angle to 0, 90, 180, or 270 degrees to make the region a rectangle.



The Measure ROI is a two point polygon ribbon region. Refer to the illustration below. The end points [1] adjust the length of the ribbon. The point on the side of the region [2] adjusts the width of the ribbon. The diamond [3] indicates the direction towards which the vectors are searching.

> *Note: for the image below, both Enable Region Editor and Enable Region Size are checked in the Image Options menu. You view the yellow boxes and points when you click on the image to adjust the region size and/or position.*



1) End points of the ribbon region

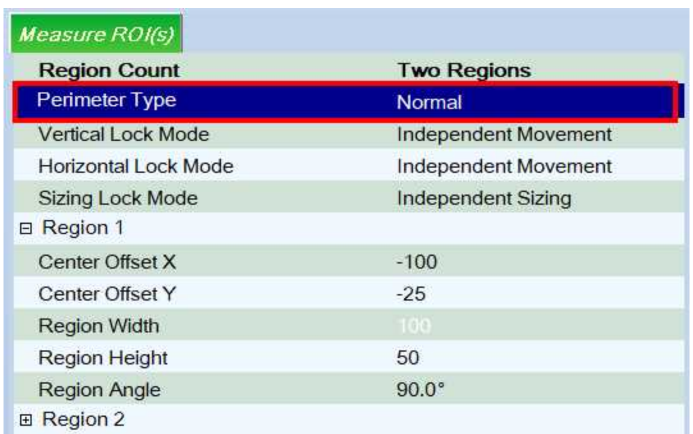
2) Point to adjust the width of the region

3) A yellow diamond indicates the direction towards which the vectors are searching

Additional menu items for Two Regions

Vertical Lock Mode, Horizontal Lock Mode, and Sizing Lock Mode Choose whether to move the two regions independently, or to lock the regions (move the regions together). When you choose to mirror the regions, the regions move in opposite directions.

Advanced Parameters for Measure ROI



Perimeter Type: Normal means that the region is added with nothing special added. See the link below for Element and Combined regions.

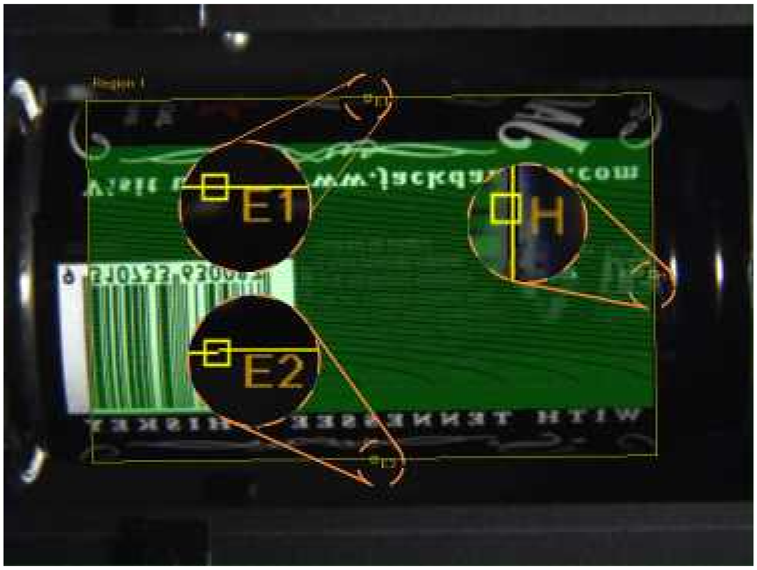
"Perimeter Type in Ribbon, Measure ROI, and Cylindrical Region" on page 222

Cylindrical Region

Cylindrical Region is used for outside of can inspection. Its main purpose is to allow you to add a Template Orientation after this region. (For reference, you cannot add a Template Orientation after a Ribbon nor Measure ROI region.) Cylindrical region takes a curved surface, such as the side of a can, and attempts to flatten the image within the region, so that the system can better inspect the part.

To add a Cylindrical Region:

1. Right-click over the Inspection menu | Add | Region | Cylindrical Region.
2. Adjust the region as necessary. Align the "E" boxes with the top and bottom edges of the can, and the "H" to one side, as seen below.



3. Right-click over the image to see more image options. See Image Options - Measure ROI and Cylindrical Regions.
4. Adjust the parameters as necessary.

Cylindrical menu

Cylindrical	
Sampling Window	90
Center Offset X	-100
Center Offset Y	-25
Region Width	100
Region Height	50
Region Angle	[illegible]

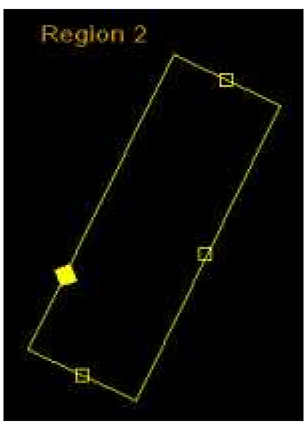
Sampling Window

Typical setting = 50. It eliminates distortion near the edges of the part, since the part is not flat. In the example below, Sampling Window = 100 [1], and Sampling Window = 50 [2].

Center Offset X and Y Set the region offset value relative to the registered center. If your region is off the screen, you may need to change these values.

Region Width, Height, and Angle

Click on the image to adjust the region (Enable Region Editor = in the Image Options menu). Set Region Angle to 0, 90, 180, or 270 degrees to make the region a rectangle.



Advanced Parameters for Cylindrical Region

Cylindrical	
Sampling Window	90
Center Offset X	-100
Center Offset Y	-25
Region Width	100
Region Height	50
Region Angle	90.0°
Camera Distance	18.1
Part Diameter	2.6
Height Sampling	1.0
Perimeter Type	Normal

Camera Distance Set the distance from the camera lens to the part.

Part Diameter Set the diameter of the part.

Height Sampling Set the inspection resolution. Normally you can leave this at 1.0. A setting of 0.5 samples every other pixel, and a setting of 1.0 samples every pixel.

> *Note: if you find that the Template Orientation that follows the Cylindrical Region takes too much inspection time, then try reducing Height Sampling, such as 0.9. If Region Height is 512 or greater, and Height Sampling is 1.0, then inspection time increases.*

"Perimeter Type in Ribbon, Measure ROI, and Cylindrical Region" below

Perimeter Type in Ribbon, Measure ROI, and Cylindrical Region

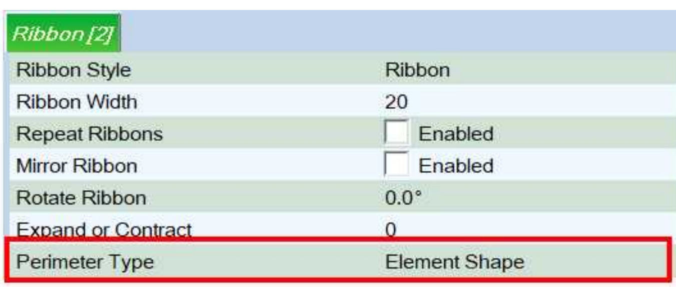
Right-click over the inspection parameters | Editor Options | Advanced = Checked. You must have the "Access advanced inspection parameters" permission.

These items apply to "Ribbon Region" on page 215, "Measure ROI" on page 217, and "Cylindrical Region" on page 219.

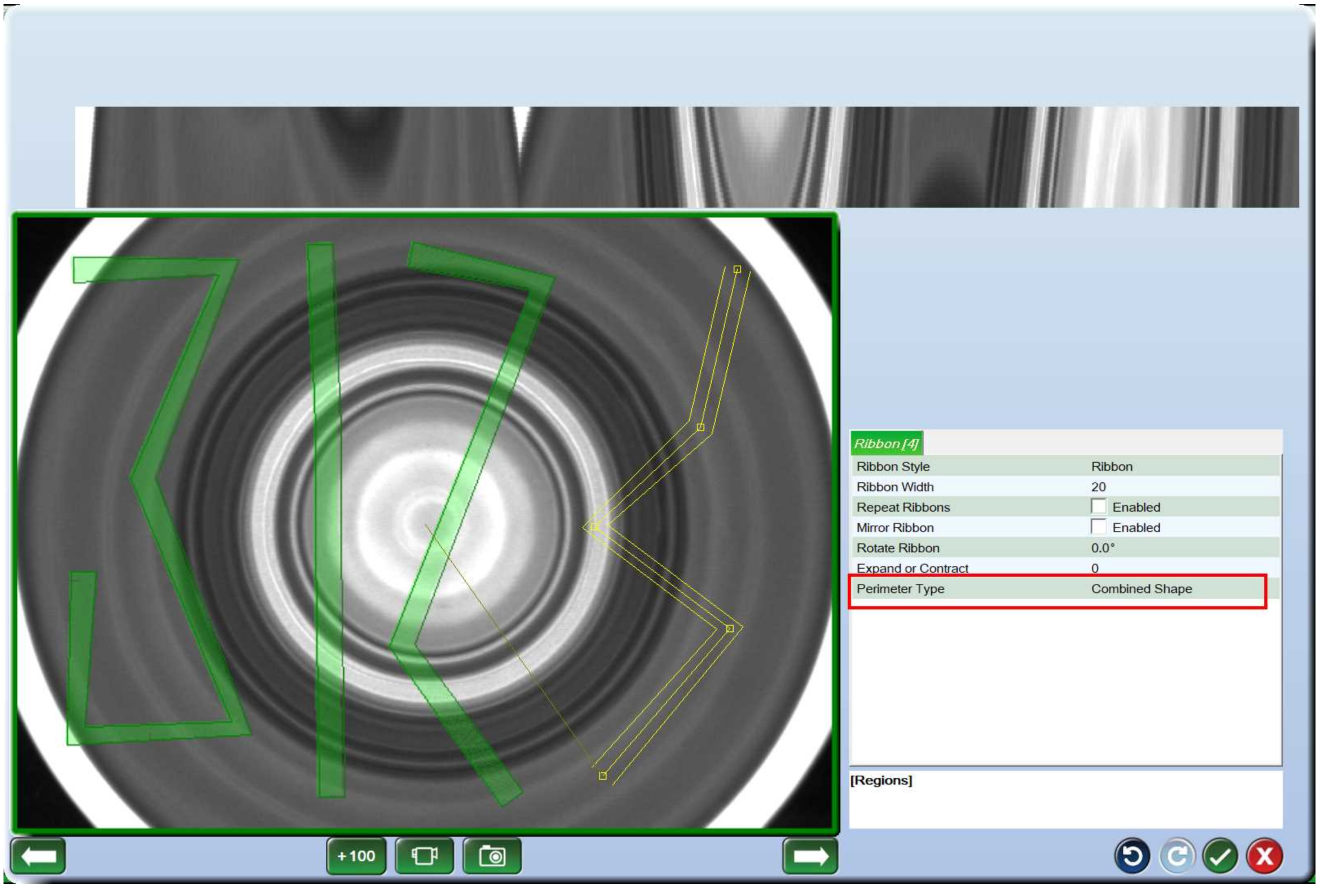
Element shape allows you mark a region to allow it to be combined into a Combined Shape region, allowing for creating of complex shapes. Element Shape regions affect the next Combined Shape region in the whole tree.

To create a Combined Shape:

1. Add a region (either a Ribbon, Measure ROI, or Cylindrical Region).
2. Place the region shape on the image.
3. For Perimeter Type, select "Element Shape."

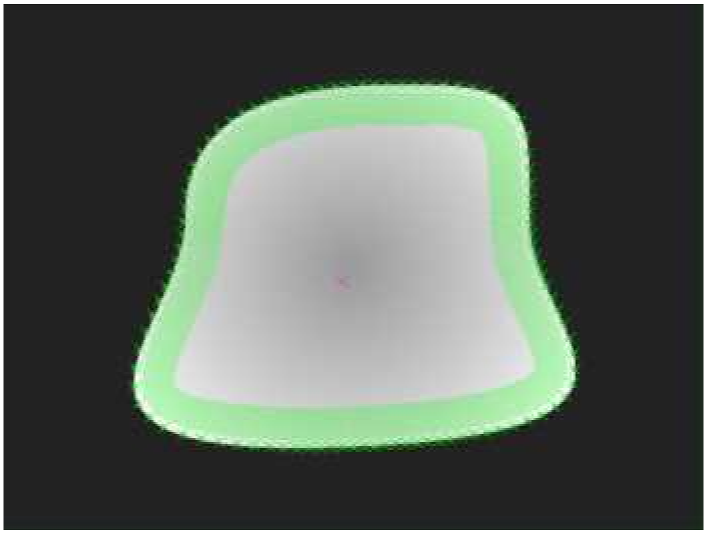


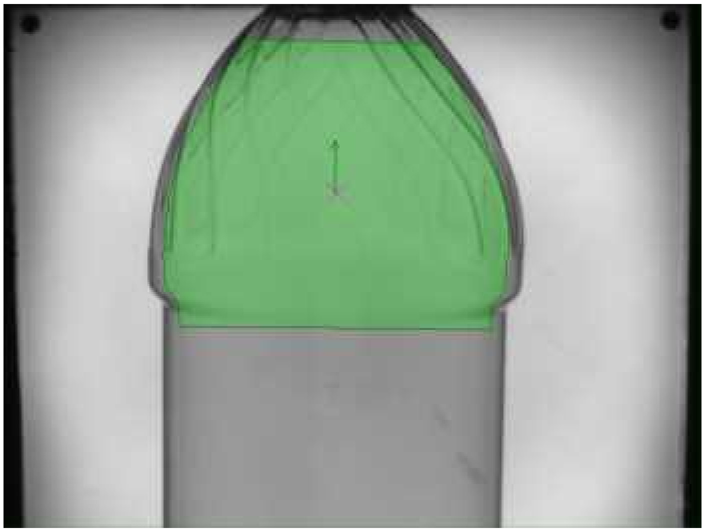
4. Repeat steps 1-3 for as many elements as you want to include in the final shape.
5. Add another region (Ribbon, Measure ROI, or Cylindrical Region). This will hold the final combined shape.
6. For Perimeter Type, select "Combined." You will see the combined shape on the image.



Adaptive Region

Adaptive Region is built from the edge points found in registrations (except from Template Registration). It can follow the shape of your part.



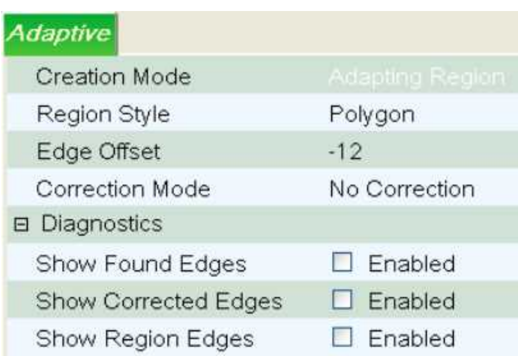


> *Note: Adaptive Region can be added only after one or more "Registrations" on page 249.*

To add an Adaptive Region:

1. Make sure at least one Registration has been added to the inspection tree.
2. Highlight the Registration name in the inspection tree.
3. Right-click on the item you just added.
4. From the Inspection menu, select Add | Region | Adaptive. The Adaptive region is added to the inspection tree. Re-name to something more meaningful to you.
5. The Adaptive Menu is displayed and the region is shown on the image. (The menu is described below) Adjust the placement of the region and parameters as necessary.

Adaptive menu



Adaptive	
Creation Mode	Adapting Region
Region Style	Polygon
Edge Offset	-12
Correction Mode	No Correction
⊟ Diagnostics	
Show Found Edges	☐ Enabled
Show Corrected Edges	☐ Enabled
Show Region Edges	☐ Enabled

Creation Mode Choose whether to have the region adapt to each part as it is inspected [Adapting Region], or to find a region once and use it for all parts [Fixed Region]. Different menu parameters are available. Fixed Region is described below.

Region Style

Choose the type of region you want to create from the registration results. Use the one best suited to the area you are inspecting. The options are described below.

Fit to Circle - A donut-shaped region is created.

> *Note: For descriptions of shapes, also refer to Polygon Region and Ribbon Region. The difference in the Adaptive Region is that the shape is created using found registration points, rather than manually placed points, as is done in the standard Polygon or Ribbon Regions.*

Polygon - a free-form shape is created and filled in.

Ribbon - a free-form ribbon shape is created. The ends are open. You specify the width of the region.

Loop - a free-form shape is created. The ends are connected. You specify the width of the region.

Custom 2 Sided Polygon - a free-form shape is created and filled in. This shape should only be used after a Centerline registration. You have the option of creating separate off-sets for each side. A common use for this is Preform sidewall inspections, where there is a dark area on either side of the preform in cameras one and three. With Custom 2 Sided Polygon, you could create the region to ignore that dark area.

Edge Offset Specify how many pixels away from the found registration points the Adaptive Region should be.

Region Offset Side 2 (Used with Custom 2 Sided Polygon) Create a different offset for one side of the part. This is normally used for Preform sidewall inspections.

Correction Mode

Correct the edge positions from one of the available techniques:

No Correction - uses the original registration positions.

Simple Smoothing - smooths the edges of the region.

Circular Smoothing - smooths the edges to form a circle.

Dual Edge Correction - (applies additional Correction Settings) this mode should only be used after a Centerline registration. It corrects missing and bad points in the two sets of edge locations (the two sides of the part).

Bad Point Removal - uses an additional Correction Sensitivity parameter. Removes bad points from the found edge positions. If an edge point does not fall within the specified sensitivity, it is removed from the Adaptive region.

Correction Sensitivity - (used with Bad Point Removal) Adjust the sensitivity of the edge positions between 10 and 500. A smaller number means greater sensitivity.

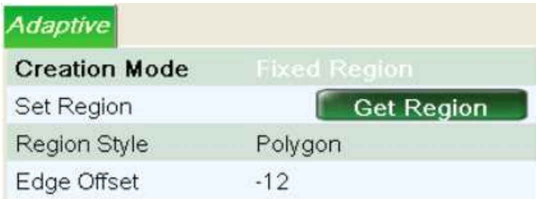
> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: Show Graphics = checked.*

Correction Settings (Used with Dual Edge Correction)

Maximum Deviation Specify how many pixels an edge can be away from the found edge before applying edge correction.

Learn Cross Section Click the Learn Distances button to determine normal edge locations for that part.

Fixed Region Adaptive menu



When you choose Fixed Region, the Intellispec will find the shape of the part once, then use that shape region for all remaining parts.

To set a Fixed Region:

1. Select a Region Style.
2. Set the remaining parameters below Region Style as appropriate for your part.
3. Click the Get Region button to set the region based on the current part.

Set Region Click the Get Region button (after setting the Region Style and other parameters) to set the region based on the current part. The Intellispec finds the region edges for the current part and creates a polygon or other region style. That region is then used for inspection of all subsequent parts.

Region Style

Choose the type of region you want to create from the registration results. Use the one best suited to the area you are inspecting. The options are described below.

Fit to Circle - A donut-shaped region is created.

> *Note: For descriptions of shapes, also refer to Polygon Region and Ribbon Region. The difference in the Adaptive Region is that the shape is created using found registration points, rather than manually placed points, as is done in the standard Polygon or Ribbon Regions.*

Polygon - a free-form shape is created and filled in.

Ribbon - a free-form ribbon shape is created. The ends are open. You specify the width of the region.

Loop - a free-form shape is created. The ends are connected. You specify the width of the region.

Custom 2 Sided Polygon - a free-form shape is created and filled in. This shape should only be used after a Centerline registration. You have the option of creating separate offsets for each side. A common use for this is Preform sidewall inspections, where there is a dark area on either side of the preform in cameras one and three. With Custom 2 Sided Polygon, you could create the region to ignore that dark area.

Region Width (Used with Fit to Circle, Ribbon, and Loop) Specify how many pixels wide the region should be.

Edge Offset Specify how many pixels away from the found registration points the Adaptive Region should be.

Region Offset Side 2 (Used with Custom 2 Sided Polygon) Create a different offset for one side of the part. This is normally used for Preform sidewall inspections.

Ribbon/Loop Offset Style (Used with Ribbon and Loop) Distance Offset works best with small offsets. Proportional Scaling works better with large offsets and keeps the shape nicely.

Enhancements

Enhancements Enhancements are used to alter images for better defect detection, or for making certain features stand out.

Notes:

- The unwrapped image (displayed while you are editing an inspection) shows the effect of the enhancement. You will not see any difference in the main image.
- Enhancements are added prior to inspections
- The order in which you place enhancements is important. The effect of most enhancements is cumulative, except for Color Distance and Color Extraction. Color Distance and Color Extraction work independently of other enhancements.
- To determine the best enhancement for your inspection, it may take some experimentation. Use the enhancement that brings out the defects or features best for your part.
- You can add inspections between enhancements and have the enhancements affect inspections differently. Example: suppose you have 1) Region 2) Clipping 3) Contrast 4) Stretch and 5) Ambient. The Contrast inspection works only with the Clipping results, but the Ambient inspection works with the combined effects of Clipping and Stretch enhancements.

How to add an enhancement

To add an enhancement:

1. Make sure at least one region is placed on the image.
2. Right-click on the item you just added.
3. Select Insert or Add | Enhancement.
4. Choose the desired enhancement from the menu.
5. Add an inspection after the enhancement.
6. Adjust the parameters in both the enhancement and inspection to see the effects of the enhancement.

The available enhancements are:

"Subtract Bias" on the next page

"Clipping" on the next page

"Stretch Grayshades" on page 230

"Black and White (Binary)" on page 232

"Gamma Correction" on page 232

"Grow Dark Areas" on page 233

"Grow Light Areas" on page 234

"Absolute Difference" on page 234

"Color Distance" on page 235

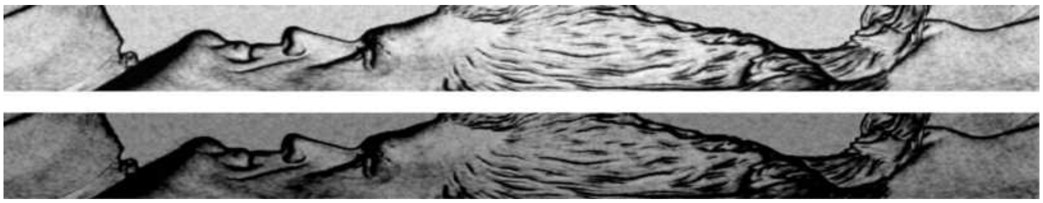
"Color Replacement" on page 237

"Color Extraction" on page 240

> *Note: Your system (and this book) may show only those items that apply to your application.*

Subtract Bias

Subtract the gray level value from all pixels in the region. The example below shows the result (bottom image) of subtracting a gray level of 80 from the top image.



Subtract Bias menu

Use Bias Enable the enhancement.

Black Level Set the gray level value to subtract from the original value of each pixel.

Clipping

Clipping is used to change gray shades to a specified value. It allows the system to ignore light reflections or normal grain in a part, to provide easier defect detection.

Clipping menu

Clipping mode

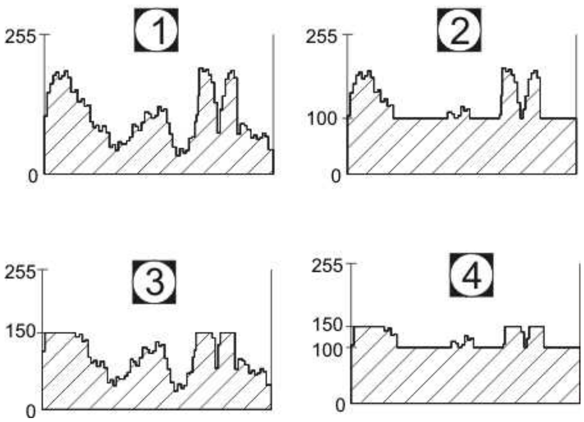
Disabled [item 1] – no clipping.

Clip Black Level [item 2] – set a dark gray shade value. A value of 100 makes all pixels with gray levels of 0-99 a gray level of 100.

Clip White Level [item 3] – set a light gray shade value. A value of 150 makes all pixels with gray levels of 151-255 a gray level of 150.

Clip Black and White Levels [item 4] – set both dark and light levels.

The illustrations below show the effects of clipping.



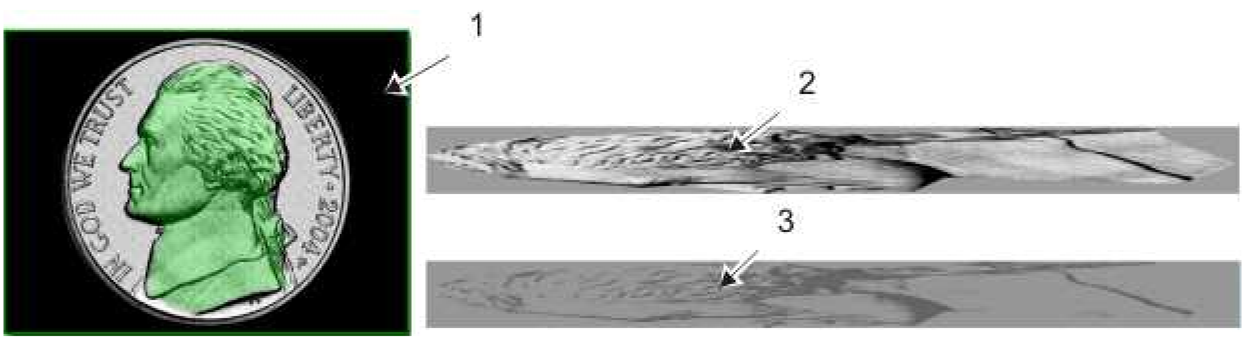
1) Clipping Disabled

2) Clip Black Level [100]

3) Clip White Level [150]

4) Clip Black Level [100] and White Level [150]

You will see the effects of clipping in the Unwrapped Region of Interest, as shown below.



1) Region

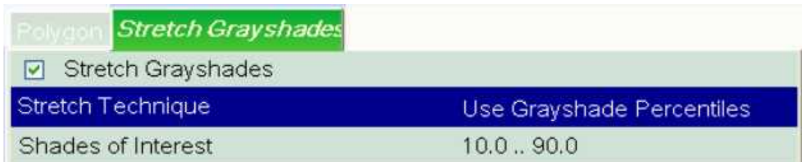
2) Clipping disabled

3) Clip Black and White Levels applied

Stretch Grayshades

Stretch Grayshades is used when you want to make one feature stand out from the rest of the part. It allows you to zoom in on a specific range of gray shades and stretch them to the full 0 - 255 range. You will see the effects of stretching gray shades in the Unwrapped Region of Interest.

Stretch Grayshades menu



Stretch Grayshades Enable the enhancement.

Stretch Technique

Zoom in on any range of gray shades.

Use Min/Max of Region - use the lowest gray shade found and the highest gray shade found, and stretch that range from 0 to 255.

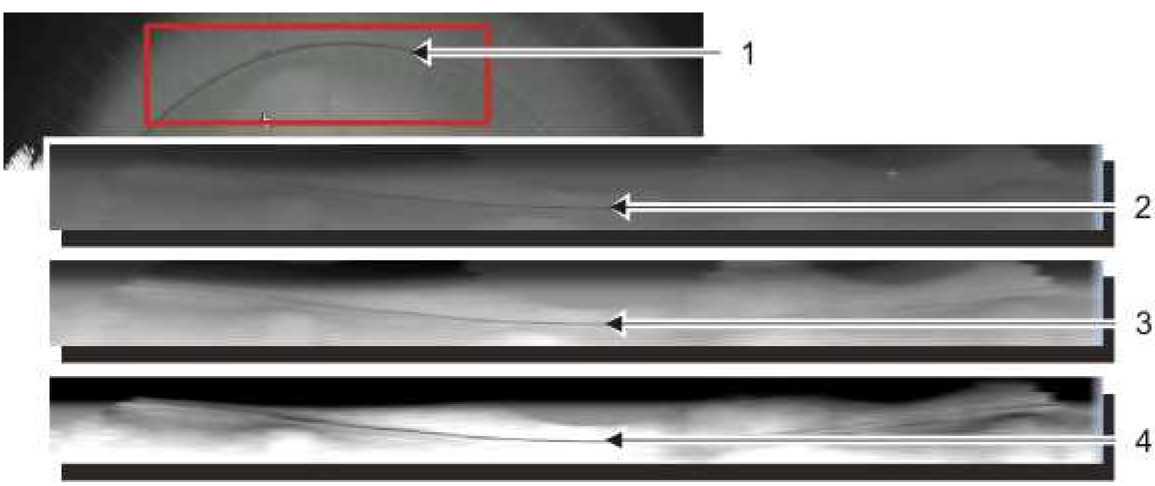
Use Grayshade Percentiles - Specify lower and upper values in the Shades of Interest box in terms of percentage of pixels. The system counts the number of pixels of each gray shade and puts them into bins. An example is when 29-65 is used for Shades of Interest. The system determines (a) the gray shade where 29% of the pixels fall, and (b) the gray shade where 65% of the pixels fall. The system then takes the pixels at gray shades (a) and (b) and sets them to 0 and 255. The gray shades in between (a) and (b) are stretched from 1-254.

Use Absolute Grayshades - Specify lower and upper values in the Shades of Interest box. The system sets all pixels at or below the lower specified value to black, pixels at or above the higher specified value to white, and the values in between are stretched from gray-shades 1 to 254.

Shades of Interest Define the gray shade range that you want to stretch. Adjust so that the desired feature stands out in the image.

Example of Stretch Grayshades

In the example below, we use the mold line as a reference point. We want that mold line to stand out, so we use Stretch Grayshades.



---

1) Original image

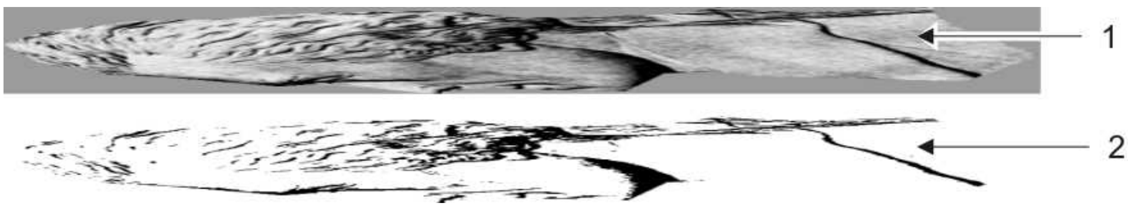
2) no enhancement

3) Use Min/Max of Region applied

4) Use Grayshade Percentiles and Shades of Interest applied

Black and White (Binary)

This enhancement makes all pixels at or above a threshold white, and makes all pixels at or below the threshold black. This can help certain features to stand out. An example of a Black and White enhancement is shown below.



1) no enhancement

2) Black and White Enhancement applied

Black and White enhancement menu

Use the technique and threshold that best suits your application.

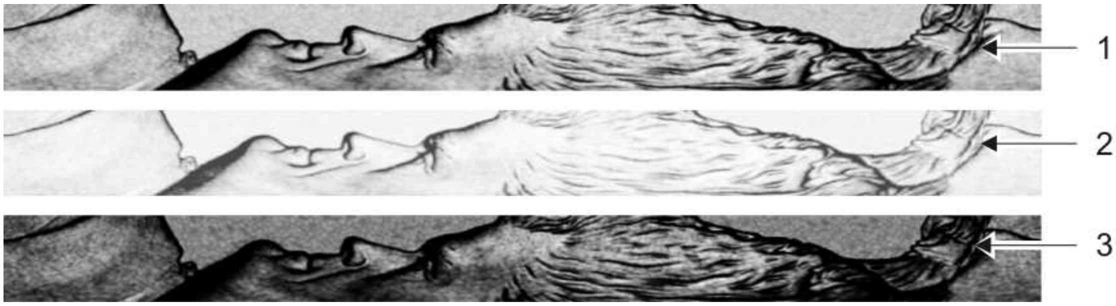
Threshold Rule Choose between Fixed Threshold and Black/ White Ratio.

Threshold Grayshade (Used with Fixed Threshold) Enter a threshold. All pixels at or below the threshold will be turned black. All pixels at or above the threshold will be turned white.

Black Fraction (Used with Black/White Ratio) Enter a percentage. The system finds the gray shade that is lighter than the Black Fraction percent of pixels. Then it sets all pixels to white that are above this gray shade, and all others to black.

Gamma Correction

Reveal detail in a low-contrast image without affecting the shadows or highlights. The example below shows the results of the Gamma Correction enhancement applied.



1) Original image

2) Decreased contrast - Gamma value less than one

3) Increased contrast - Gamma value greater than one

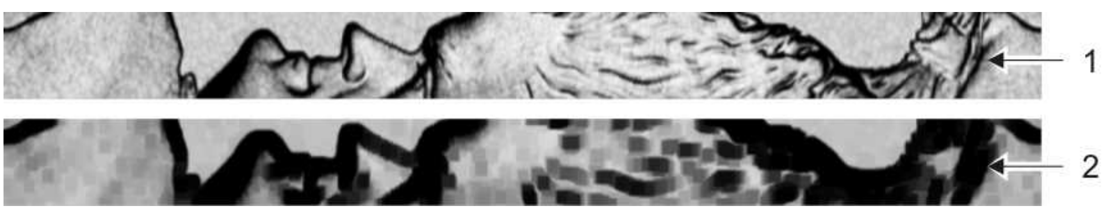
Gamma Correction menu

Gamma Correction Enable the enhancement.

Gamma Change the contrast of the image. Values less than one decrease contrast, and values greater than one increase contrast.

Grow Dark Areas

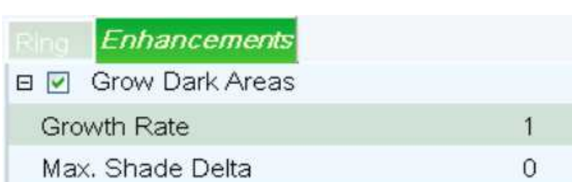
This enhancement will grow the dark areas of the region. This can be used to remove reflections, or shrink bright spots on the image.



1) original image

2) Grow Dark Areas applied

Enhancements menu



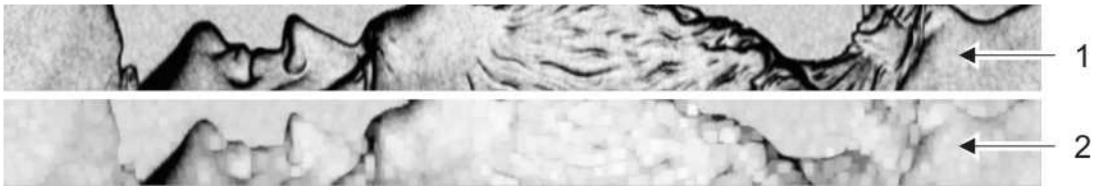
Grow Dark Areas Enable the enhancement.

Growth Rate Increase this value to grow the areas more.

Max. Shade Delta The largest gray shade difference that can be applied to a pixel during area growth. If this value is set to zero, then the resulting pixel can be set to any value.

Grow Light Areas

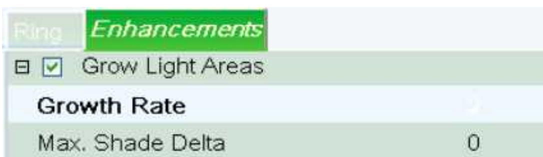
Grow Light Areas is the opposite of the Grow Dark Areas enhancement. Small dark defects can be blurred out and therefore ignored.



1) Normal image

2) Grow Light Areas enhancement applied

Enhancements menu



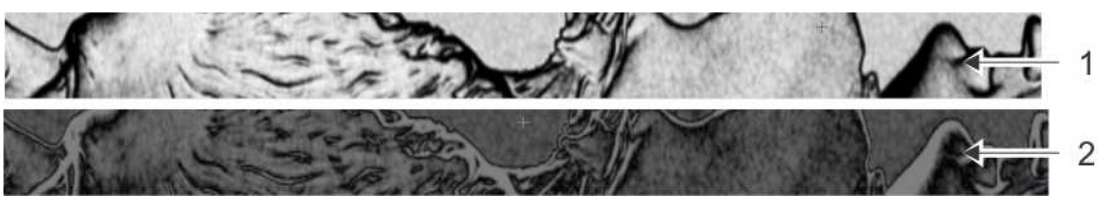
Grow Light Areas Enable the enhancement.

Growth Rate Increase this value to grow the areas more.

Max. Shade Delta The largest gray shade difference that can be applied to a pixel during area growth. If this value is set to zero, then the resulting pixel can be set to any value.

Absolute Difference

Absolute Difference subtracts a value from all of the gray shades in an image. The resulting gray shade value is an absolute value, so that value is always positive.



1) Normal image

2) Absolute Difference enhancement applied

Enhancements menu

Absolute Difference Enable the enhancement.

Gray Level The resulting gray shade is the absolute difference between this value and the original gray shade. For example, assume Absolute Difference is set at 100, and two original pixel values are 175 and 25. When the system subtracts 100 from each, the resulting values are both 75 [175 - 100 = 75, and 25 - 100 = 75] (using the absolute value)

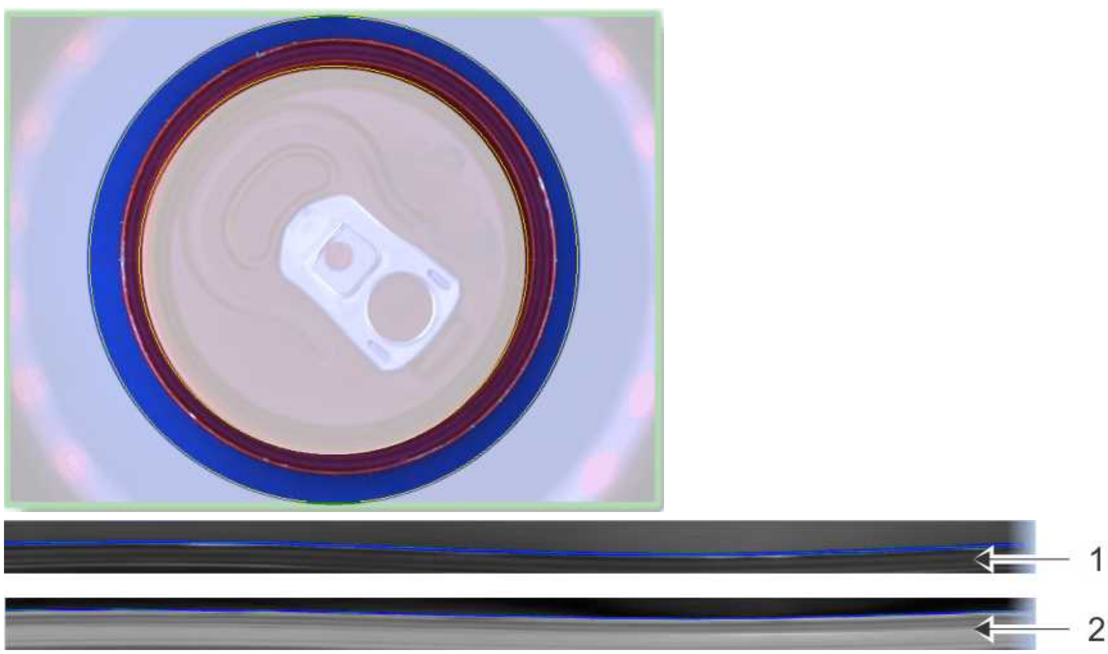
Color Distance

[Only applicable to color camera images] Color Distance provides greater contrast between similar colors to make certain defects or features stand out. It is similar to the Absolute Difference enhancement that is used for grayscale images.

> *Note: Color Distance works oppositely from Color Extraction. Experiment between the two enhancements to see which one works better for your application.*

Color Distance evaluates all pixels against the selected color and translates that value to a gray level. The closer a color is to the selected color, the darker the pixel. The further away a color is from the selected color, the lighter the pixel.

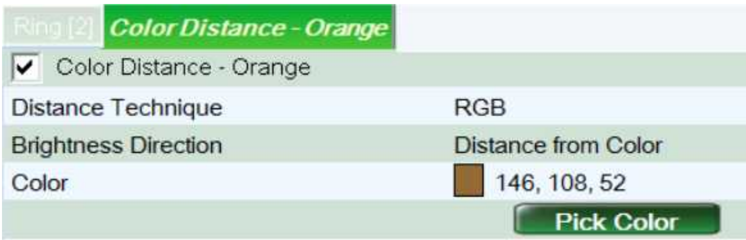
The example below shows a purple part against a blue belt. The region of interest is highlighted in the image for illustration purposes. Notice that, in the unwrapped region [item 1], the purple and blue colors are very similar in grayscale, making it difficult to detect the part edges. We apply a Color Distance enhancement to make purple and blue stand out from each other, as shown in [item 2].



1) Normal image

2) Color Distance enhancement applied

Color Distance menu



Color Distance Enable the enhancement.

Distance Technique

Select how to determine the distance between two colors.

RGB - Use the red, green, and blue components of a color.

Delta E - Use L*a*b* color space instead of RGB. This is only used if your plant uses L*a*b* as your color standard. It computes the distance between the selected color and current image's color.

> *Note: Using Delta E uses a significant amount of inspection time. Use only if necessary.*

Brightness Direction

Choose how the system determines what grayscale value will be applied to pixels with respect to their proximity to the selected color.

Distance from Color - the closer the pixel is to the selected color, the darker the pixel will appear after the enhancement. This is the default.

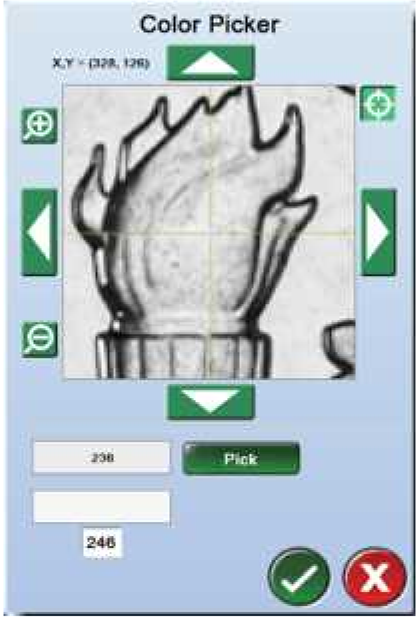
Proximity to Color - the closer the pixel is to the selected color, the lighter the resulting pixel will be after the enhancement.

Inclusion Distance This is only displayed if Proximity to Color is selected for Brightness Direction. Choose how large a range of pixel values can be considered close to the selected color. For example, if the setting is 6.0, then pixels within six grayscale values of the selected color have the enhancement applied. Those pixels that do not fall within the range of six grayscale values have a value of zero (black) applied.

Pick Color Choose the desired reference color.

Color Picker

This tool is available through several Enhancements.



To use the magnifier:

When you first open the tool, the yellow box area over the image is magnified. This moves when you move the cursor on screen. To move the magnified area independent of the cursor, right-click over the image.

 The arrow buttons become available.

Select the target button to display or remove crosshairs on the magnified image. The pixel at the center of the crosshairs is where the RGB values are measured.

To pick a color:

1. Move the cursor over the image, magnifying the image if necessary, until the desired RGB value is displayed in the box next to the Pick button. The value is from the center of the crosshairs in the magnified image. You may need to right-click over the image to unbind the yellow box from the mouse movements (use the buttons in the Color Picker menu independent of the cursor).
2. Select the Pick button to select the color. Wait until the lower box is filled in with the same color as the upper box.
3.  Select the OK button to save changes and exit.

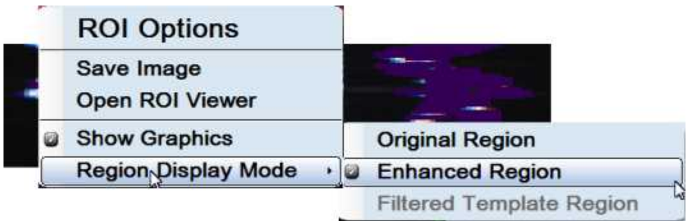
Color Replacement

[Only applicable to color camera images] Replace a color in an image with either a single color or a background color.

> *Note: the color replacement is only visible in the unwrapped image area. The part image does not change.*

To adjust the Color Replacement enhancement:

1. Select Decision Rule to determine how the system replaces color. RGB Distance is used most often.
2. Choose the color to replace by clicking the Pick Color button under Replaced Color.
3. Choose the Replacement Mode to determine whether to replace the color with a fixed color or with the background average color.
4. Choose the replacement color by clicking the Pick Color button under Replaced With.
5. Look at the unwrapped image area to see the results. (Right-click over the Unwrapped Region and make sure Enhanced Region is selected for Region Display Mode).



   - If the replaced color is not what you expected, then try another Decision Rule or another color.
   - To improve color replacement around the edges of color transitions, adjust Edge Softening.
   - To expand the range of colors to replace, adjust Inclusion Distance.
6. Adjust remaining parameters as necessary until you achieve the desired results.

Color Replacement menu

Color Replacement Checked = enabled

Decision Rule

Select how to replace the color.

RGB Distance - Use the red, green, and blue components of a color. This is the technique used most often.

Delta E - Use the color L*a*b definition of a color. See also Delta E in Retro-Spec Distribution inspection for more information.

Color Extraction - Use the same technique used in Color Extraction during the color replacement.

Inclusion Distance The largest distance form the target color for which pixels will be replaced with the replacement color; pixels outside of this distance will keep their old color.

Edge Softening Reduce the noise around the color transitions. In some areas on a part, the transition from one color to another is very sharp. A higher number gradually blends the transition from one color to another, improving the replacement of colors in these areas.

Replacement Mode

Select how to choose the replacement color.

Background - replaces the chosen color with the background color in the search region. This color is the average of all colors except the chosen color.

Fixed Color - replaces the chosen color that you select through the Pick Color button.

Template Registration using Color Replacement

The following parameters only apply to part programs with Template Registration. They require a Polygon or Ring Region prior to the Color Replacement.

Template Conditional This option requires a Template Registration to have already been performed in the inspection list. If enabled, this option uses the information from the Template Registration to restrict where the color replacement can be done. Other conditions may apply. The system will prompt you to add the appropriate inspections.

Inclusion Threshold [Used when Template Conditional is enabled] Set the threshold to determine whether the color will be replaced.

Edge Softening Reduce the noise around the color transitions. In some areas on a part, the transition from one color to another is very sharp. A higher number gradually blends the transition from one color to another, improving the replacement of colors in these areas.

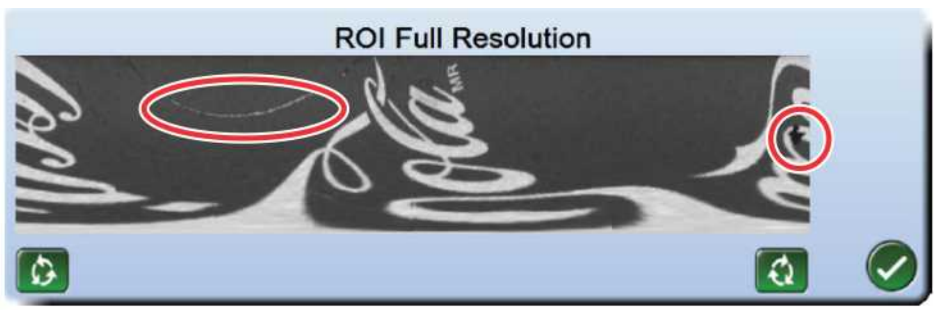
View Template Image Click the View Template button to see the template that the system created (if you already used Create Template). You must use Create Template in the Template Registration prior to the Color Replacement.

View Effect Choose what to display in the unwrapped region of interest.

Color Replacement Example

An example: The images below show a closure with a scratch and contamination that are difficult to detect because of the printing. Color Replacement was used to replace the white printing with the red background. In the lower image, the defects stand out.

> *Note: if the defect you are looking for is the same as the color you are replacing, then this technique would not work, as it would hide the defects. We suggest trying a Template enhancement instead.*



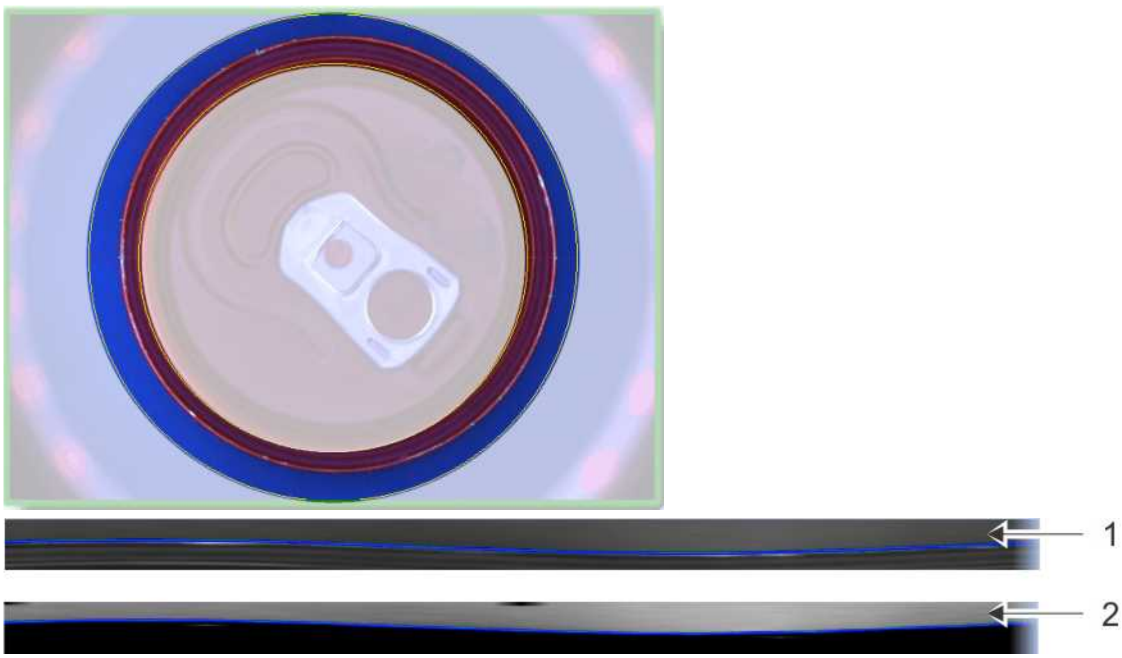
Color Extraction

[Only applicable to color camera images] Select a color and lighten all pixels with that color. This makes certain defects or features stand out.

> *Note: Color Distance works oppositely from Color Extraction. Experiment between the two enhancements to see which one works better for your application.*

When the Intellispec enhances the image, pixels containing the selected color will appear brighter. This difference in pixel appearance is only displayed in the unwrapped region - not the full part image. The color pixels are translated to grayscale values and then inspected. This is what you see in the unwrapped image.

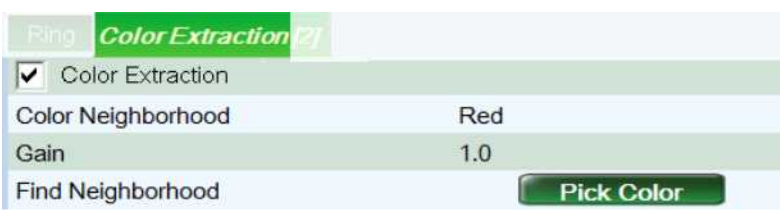
The example below shows a purple part against a blue belt. The region of interest is highlighted in the image for illustration purposes. Notice that, in the unwrapped region [item 1], the purple and blue colors are very similar when translated to grayscale, making it difficult to detect the part edges. We can apply a Color Extraction enhancement to this image to make purple and blue stand out from each other, as shown in the unwrapped image [item 2].



1) Normal image

2) Color Extraction applied

Color Extraction menu



Color Extraction Checked = enabled

Color Neighborhood Select the color closest to the color you want to enhance. The system converts all colors to grayscale that are included in that neighborhood. If you select a Raw color such as red, then the Intellispec enhances only the red pixels and ignores the green and blue elements of the image.

Gain The default is 1.0 and is typically used. If you increase gain, you increase the result values to make analysis and display easier to see. This is helpful on darker color extractions.

Find Neighborhood Click Pick Color to select a pixel of the color you want to convert to grayscale. The system sets colors outside of the neighborhood to black. See Color Picker.

Color Conversion

[Only applicable to color camera images] This is mainly used prior to a Template Enhancement. If you have a Template Enhancement, make sure the Color Conversion box is checked.

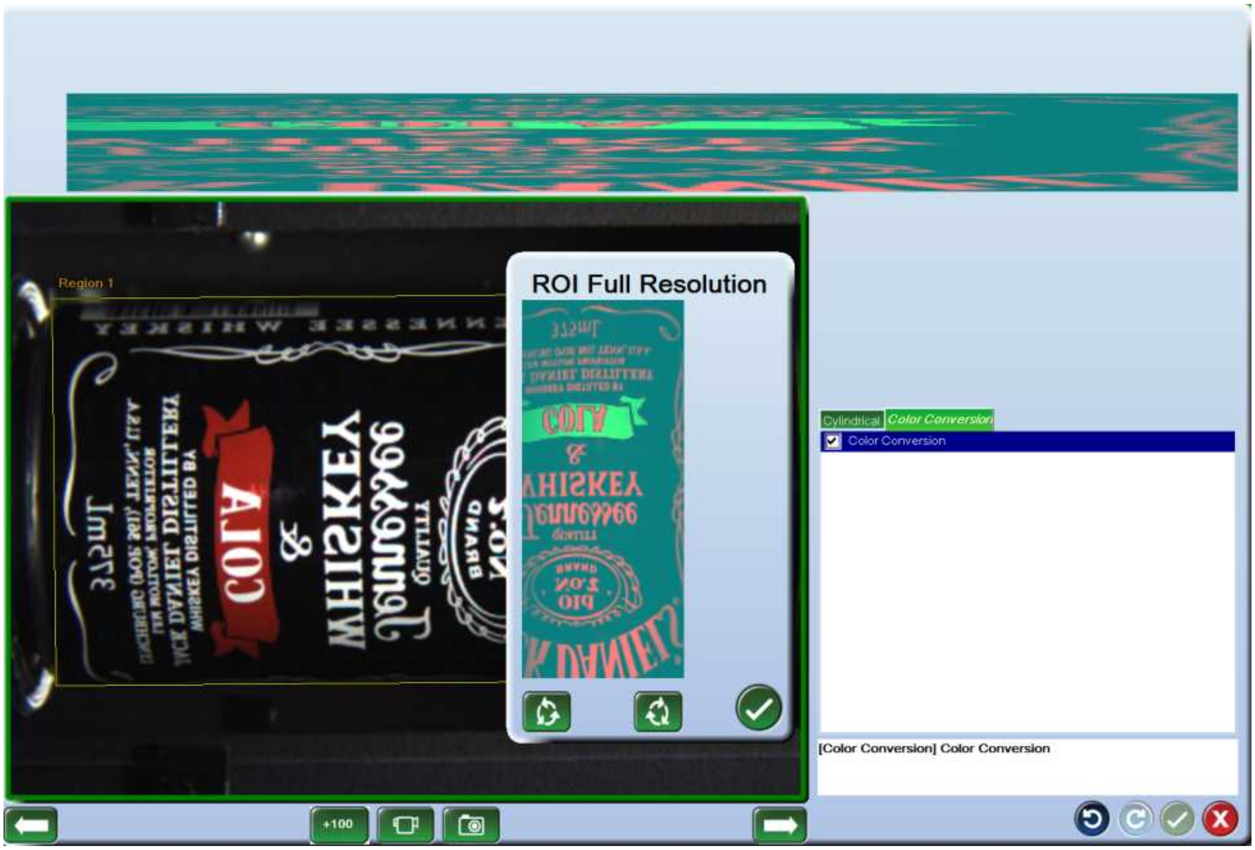
IRY converts RGB to Intensity-Red-Yellow color coordinates. An example of usage is to detect a colored smudge on an area that is normally a different color. The system transforms the colors to an opposing color system.

This inspection can also convert RGB into L*a*b* color if you use Advanced Parameters. This is used when your plant uses L*a*b* color as a standard, and you want the inspection to use the same color space and terminology. This technique takes a lot of processing time, and therefore should only be used when needed.

> *Note: The Conversion parameter is only shown if you have Advanced parameters shown. If it is not shown, then enabling Color Conversion converts the image into IRY color.*

Example:

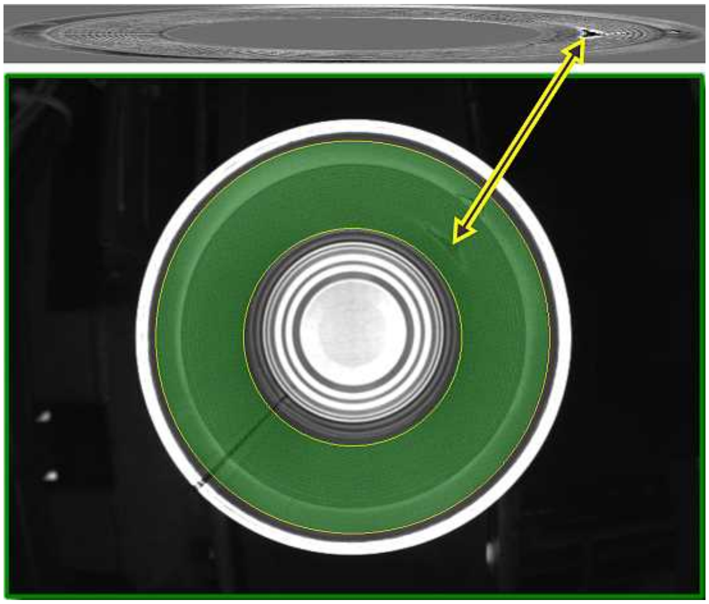
An example of a color conversion to IRY is shown below. To see the pop-up window, right-click over the unwrapped region of interest image, then select Open ROI Viewer.



Template Difference

Template Difference creates a difference image between the learned population and the current part. The result shows those pixels that appear different from the learned template.

The example below shows the unwrapped region of interest after the enhancement is applied. It makes the defects easier to see.



Template Difference menu

Polygon	Template Difference
☑ Template Difference	
Applies to Data	Color and Grayscale
Template Source	Use Internal Template
Difference Mode	Absolute Difference
Edge Softening	3
Difference Amplification	10.0
⊟ Correction Processing	
Correction Mode	Standard

Set the parameters as recommended by a Pressco engineer, or use what works best for your application. Look at the Unwrapped Region of Interest Display to see the results of the enhancement.

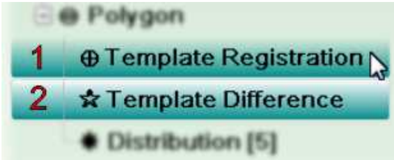
Template Difference Checked = enabled

Applies to Data [Only available on systems with color cameras] If you have a color image and you wish to use the color data in the Template Difference Enhancement then select Color and Grayscale. If you have a grayscale image, then select Grayscale Only. Note that this selection affects External Template Source. Follow the instructions on screen if the system provides a warning message.

Template Source

Choose the source of the template to which to compare the current image. Internal - the Template Difference Enhancement creates its own template.

External* - the Template Difference Enhancement uses a template from a previous Template Registration [1] or Template Orientation, which need to be immediately above the Template Difference Enhancement [2] in the inspection tree.



Show Template Source button - Show the External template source.

*If your part program changes, and the external source is no longer being referenced, the system displays a warning message.

Difference Mode

Choose the mode that works best for your application. The enhancement creates a difference image based on the selection.

Absolute Difference - shows white or gray pixels as the differences in the image. Defects will appear light in the resulting image, their intensity based on how different from the template that the defects are. If you are using a Feature Detect inspection, Absolute Difference may work better.

Signed Difference - [not used with a color image] creates a gray background with black, white, or gray pixels shown as the difference in the image. In this mode, light defects will appear light, and dark defects will appear dark. If you are using a Contrast inspection, Signed Difference may work better.

Gray Value at Zero [Only if Difference Mode = Signed Difference] This is the grayscale level used for a perfect match. If this is zero, then all dark defects are clipped to zero and will be ignored. If this is 255, then all light defects are clipped to 255 and are ignored.

Edge Softening Reduce the noise around the color transitions. In some areas on a part, the transition from one color to another is very sharp. A higher number gradually blends the transition from one color to another, improving the replacement of colors in these areas.

Difference Amplification This is a multiplier. The enhancement multiplies the original difference by this amount so that you can see defects better. The default value is 10.

Correction Processing [Advanced Parameters]

Correction Mode [Advanced Parameter]

Standard - default setting, used for most applications. The template is created by using information from the image as is.

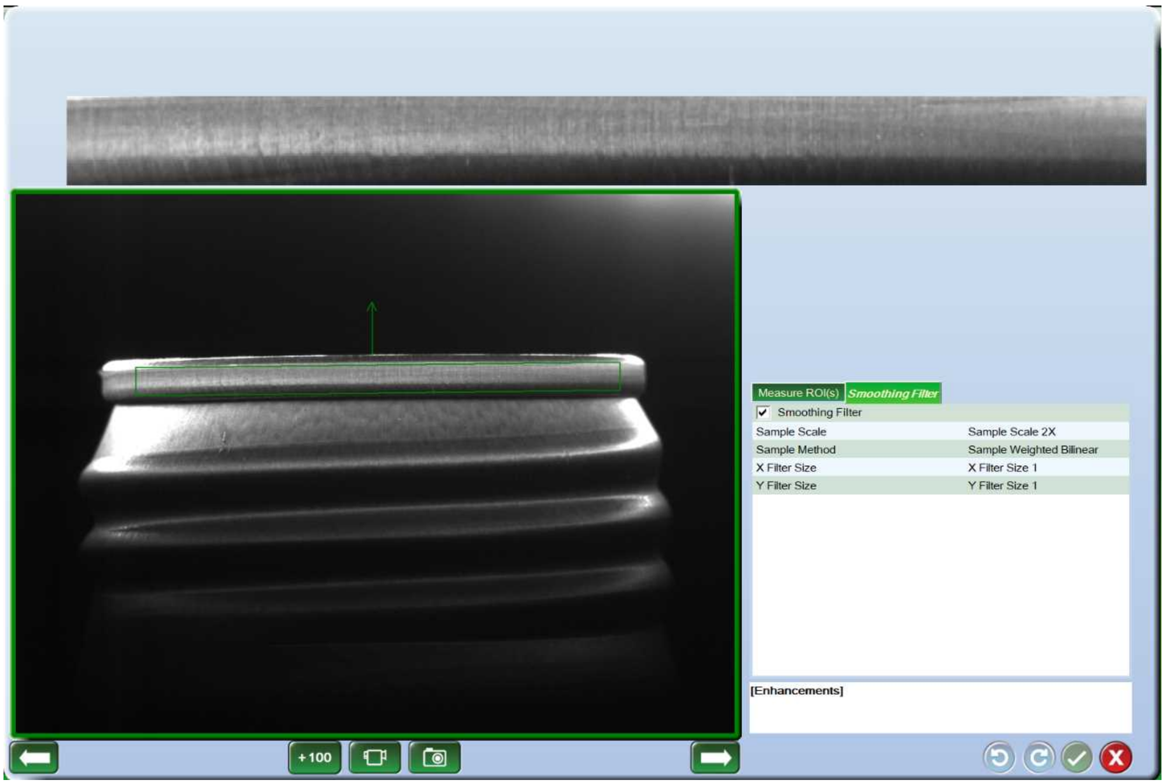
Flat Field Correction - this setting is used when lighting is not uniform, such as when viewing the outside of a can, where the edges are darker and the middle has bright spots.

Smoothing Filter

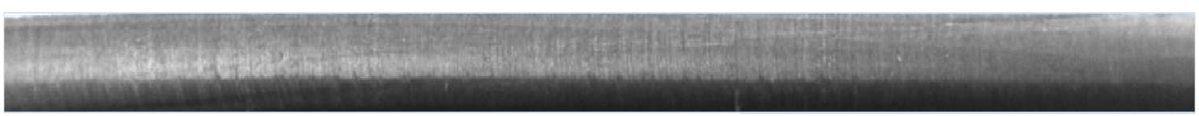
This filter is used mainly on images of metal parts that have grain. The grain may affect the inspection in some images, so this enhancement smooths out the grain without affecting the defects in the image. It can be used with any Region type. The filter is intended for grayscale images only.

> *Note: Any method of smoothing filter has a chance to reduce or eliminate defects in the image being inspected. Use these types of filters with caution and experiment with how much filter is acceptable and not too aggressive to reduce defect detection.*

Example image with product grain

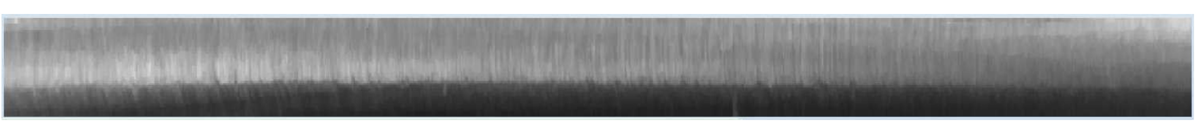


No filter applied:

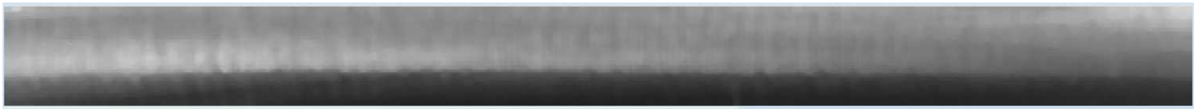


Smoothing filter in X direction only with X 7 Bicubic Sampling:

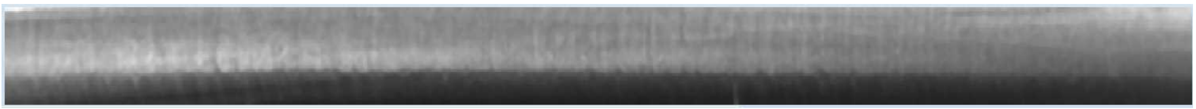
Smoothing filter in Y direction only with Y 7 Bicubic Sampling:



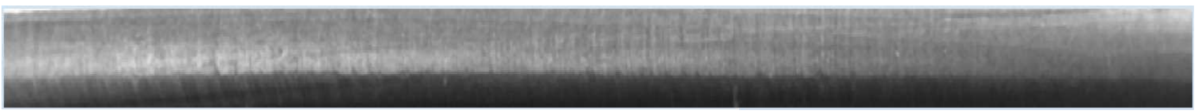
Smoothing filter in both X and Y directions with X7 and Y7 Bicubic Sampling:



Smoothing filter in both X and Y directions, 2X Sampling applied, X7 and Y7 Bicubic Sampling:

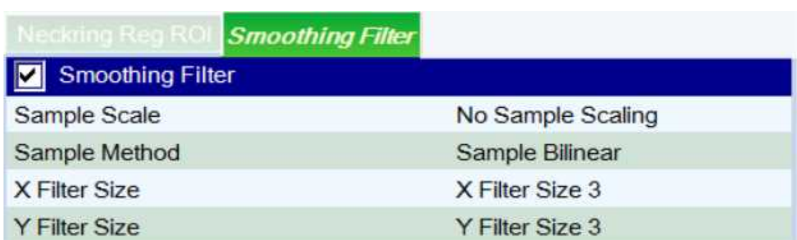


Smoothing filter both X and Y directions, 4X Sampling applied, X7 and Y7 Bicubic Sampling:



Smoothing filter with very aggressive X15 and Y15 Bicubic Sampling:

Smoothing Filter menu



Smoothing Filter Enable or disable the filter.

Sample Scale

The sample scale parameter allows the algorithm to oversample the region data to allow finer granularity of the filter size parameter behavior. So if you want a 3x3 filter but this is too aggressive, then you can increase the scale to reduce the impact of the 3x3 filter. So in general the more scaling the less impact the filter has on the data.

Sample Scale	Description
No Sample Scaling	Sample the data 1 to 1
Sample Scale 2X	Increase the sampling by a factor of 2
Sample Scale 4X	Increase the sampling by a factor of 4

Sample Method

The smoothing filter algorithm has several different methods that can be selected. It is intended for very advanced users. You may not see much difference in behavior after applying a method.

Sample Method	Description
Sample Nearest Neighbor	Low quality sampling using nearest gray values, but very fast
Sample Bilinear	Medium quality sampling using 4 nearest pixels, medium speed
Sample Bicubic	High quality sampling, slow speed
Sample Constant Bilinear	Medium quality sampling, medium speed
Sample Weighed Bilinear	High quality sampling, slow speed

X and Y Filter Size

The filter is broken into two control parameters. One is for the X (horizontal) direction and the other is for the Y (vertical) direction. Note: This filter size must be an odd number.

X or Y Filter Size	Description
Filter Size 1	Essentially disables filtering in the X or Y direction
Filter Size 3	Minor filtering in the X or Y direction
Filter Size 5	Medium filtering in the X or Y direction
Filter Size 7	Medium filtering in the X or Y direction
Filter Size 9	Major filtering in the X or Y direction
Filter Size 11	Major filtering in the X or Y direction
Filter Size 13	Extreme filtering in the X or Y direction
Filter Size 15	Extreme filtering in the X or Y direction

Registrations

Registration A registration compensates for part movement by finding the reference point on the part. All analyses follow a registration.

Note: you must first place a Region of Interest where you want the Registration to take place.

Available registrations include:

"Feature" below

"Center of Mass" on page 251

"Hough" on page 253

See also: "Hough registration vs. Radial Edge registration" on page 253

"Radial Edge" on page 255

"Centerline" on page 257

"Finish Location" on page 261

"Template Registration" on page 264 (note: there is also a Template Orientation)

"Neckring Registration" on page 272

"Measure Registration" on page 280

"Barcode Inspection and Registration" on page 368

"Pattern Registration" on page 282

"Pattern Difference" on page 293

Note: Your system (and this book) may show only those items that apply to your application.

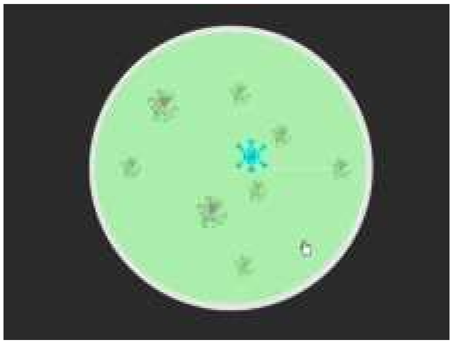
To add a registration:

1. Make sure a Region of Interest has been added to the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add | Registration | select the desired registration. The registration is added. Re-name it to something more meaningful to you.
4. Adjust the placement of the region and parameters as necessary.

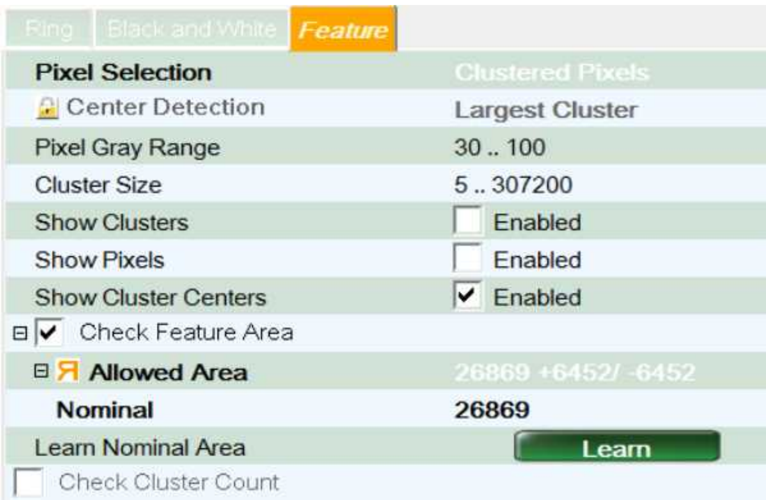
Feature

This registration searches for the center of a feature that may not fall into a standard inspection shape. It looks for all the pixels within a specified gray shade range, or a cluster of pixels. Alternately, you may restrict a feature size to determine the center; the found feature does not need to be the largest feature. It also allows you to count all the found features and reject the part if there are too many or too few.

The example below shows a Feature registration to find the largest feature. The center of the largest feature is used as the registration point.



Feature menu



You may see "Region Extraction" if you have a Ring and/or Adaptive Region in your part program.

Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Pixel Selection Specify which pixels are selected as candidates for the feature. Choose from a range of Gray Shades or Clustered Pixels.

Center Detection Specifies how the registration center is determined. This is automatically set based on the Pixel Selection setting.

Pixel Gray Range A pixel's gray shade must fall into this range to be considered part of a cluster.

Cluster Size [When Pixel Selection = Clustered Pixels] Set the size range of pixels you want to be considered clusters. Groups of connected pixels that fall outside this range are not considered to be clusters.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: check the Show Graphics box.*

Check Feature Area Check the area of the feature to see that it is within the specified tolerance.

Allowed Area [only available if Check Feature Area is enabled] The tolerance (in pixel area) of the feature you want to locate.

Nominal The expected area size. This number is populated when you press the Learn button.

Learn Nominal Area Click the Learn button to automatically learn the area.

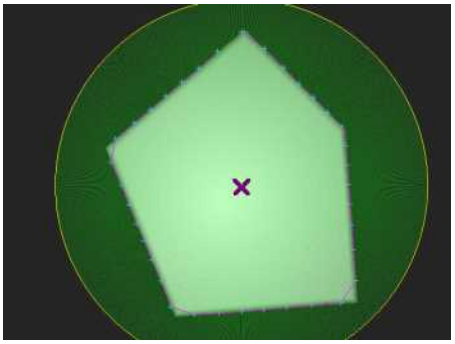
Check Cluster Count Check to see that the correct number of clusters is found.

Center of Mass

Center of Mass takes the average of all found edges and uses that as the center position.

> *Tip: Center of Mass can be used to find edges before an "Adaptive Region" on page 223 to assist in locating the adapted region.*

An example of a Center of Mass registration is shown below. This registration works with almost any shape. The center of the part is marked with a large magenta "X."

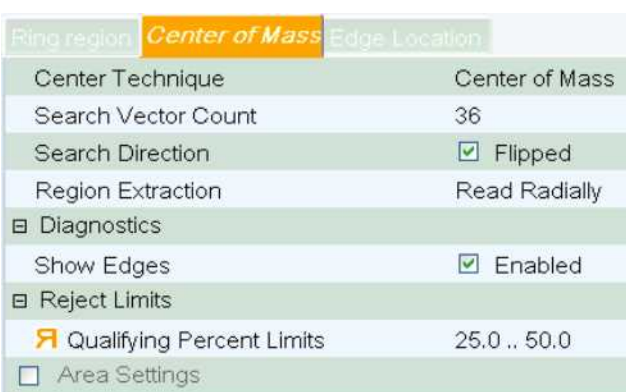


> *Note: the center is computed from all found edges. If bad edges are found from a defective part, those edges would be used in the center computation.*

To set up the Center of Mass registration:

1. Make sure the region surrounds the feature that you want to locate.
2. Go to the Edge Location menu and select an Edge Polarity. If you are searching for a light edge against a dark background, choose Dark to Light.
3. Go back to the Center of Mass menu and select a Center Technique.
4. If necessary, change the Search Direction (check the Flipped box) to make the search vectors go in the opposite direction.
5. Adjust other parameters as necessary. The menu is described below.

Center of Mass menu



Center Technique

Choose the best technique to find the center.

Center of Mass - Find the center of mass of the total area enclosed by all edges. In most cases, this is the more accurate technique, but it may fail if the part is shaped irregularly, or if you are trying to find edges on a linear feature.

Average of Edges - Use for linear features or if the Center of Mass technique does not work for your part. This technique finds the average location of all individual edges. Average of Edges works better for ribbon types of regions.

Search Vector Count Set the number of search vectors to locate the feature. More vectors provide a more accurate search, but also take more processing time.

Search Direction Change the search to the opposite direction.

Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Qualifying Percent Limits The percentage of edges that must be part of the target circle. If there are not enough found edges on the target circle, this registration will fail. This can be set lower if you expect large changes in sample size (less sensitive). It can be set higher if the size of your product should not vary (more sensitive).

Area Settings

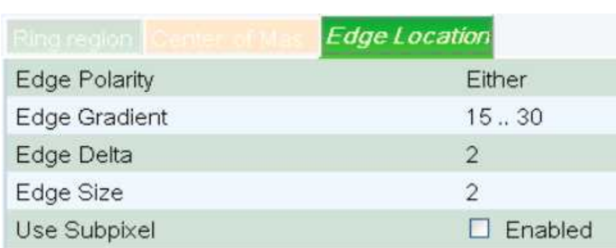
[When Area Settings = checked] Click the Learn button to determine the nominal area (in pixels) for your part.

Area Range Define the acceptable deviation (in pixels) from the normal area of the region. You may also adjust the values on the Retro-Spec graph.

Nominal The expected area size. This number is populated when you press the Learn button.

Learn Nominal Area Click the Learn button to automatically learn the area.

Edge Location menu



This menu determines what kind of edges the system should look for.

Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

Use Subpixel This provides greater centering accuracy.

Hough registration vs. Radial Edge registration

This topic is intended to help you decide whether to use a Hough or Radial Edge registration for your round parts. Use the registration that best fits your needs.

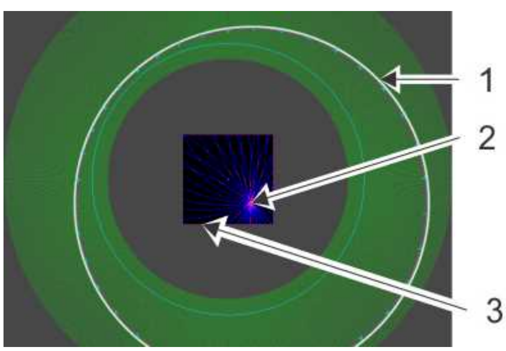
Hough	Radial Edge
Finds edges on non-round parts	Finds edges on round parts
Works on incomplete circular features	Works on complete circular features
Takes slightly more processing time	Faster

Hough

Hough registration locates a circular feature (or not quite circular) within an image and computes the center point of that feature. The feature you wish to find does not need to fit within the camera image. As long as a good portion of the feature can be found, the computed center point is accurate.

> *Note: Hough registration only works with a "Ring Region" on page 209.*

Hough registration locates edges on the desired feature and computes the best center position based on these edges.



1) Feature (white circle) that we are searching for. This feature is partially outside of the camera view.

2) Found center of the feature

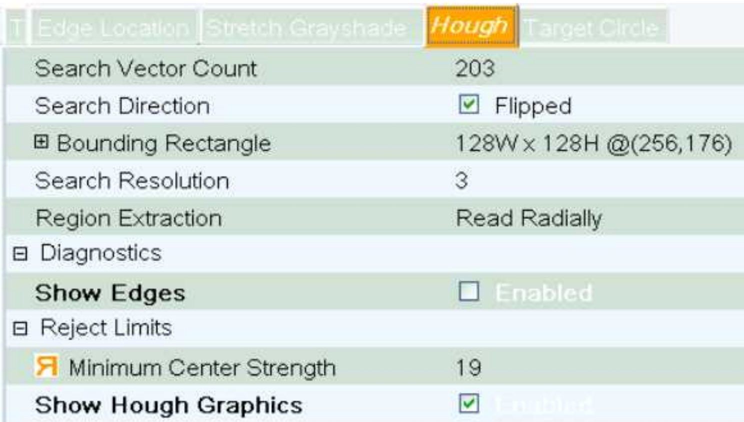
3) Bounding rectangle. The center must be found within the rectangle.

To set up the Hough registration:

1. Make sure the Ring region surrounds the feature that you want to locate. Adjust the ring with the parameters in the Ring menu (or the Region Editor on the image) if necessary.
2. In the Hough menu select a Search Direction. Flipped Checked = vectors search from an outer to inner direction. If Flipped is unchecked, then the vectors search from an inner to outer direction.
3. Go to the Edge Location menu and select an Edge Polarity. If searching for a light edge against a dark background, choose Dark to Light.

4. Go to the Target Circle menu and click Learn. If the Edge Location parameters are set correctly, the system automatically detects the target radius size. The system uses this radius to compute the center. You may need to adjust the parameters in the Hough, Target Circle, and Edge Location menus to find the desired feature accurately.

Hough menu



Search Vector Count Set the number of search vectors to locate the feature. More vectors provide a more accurate search, but also take more processing time.

Search Direction Change the search to the opposite direction.

> *Tip: if you flip the search direction, go back to the Target Circle menu and press Learn to re-learn the target radius size.*

Bounding Rectangle Adjust the size of the area where you would expect the center of the feature to be found, even with slight movement of parts in the camera's field of view. The system uses only this area to compute the center. If the computed center falls outside of this bounding area, the registration fails. Use Height and Width to adjust the number of pixels to create the size of the rectangle.

> *Note: larger sized Bounding Rectangles take more processing time.*

Search Resolution The area (in pixels) within the bounding rectangle where the center should be computed. A larger resolution allows a larger area. This allows the system to more accurately locate the center on parts that are not perfectly round.

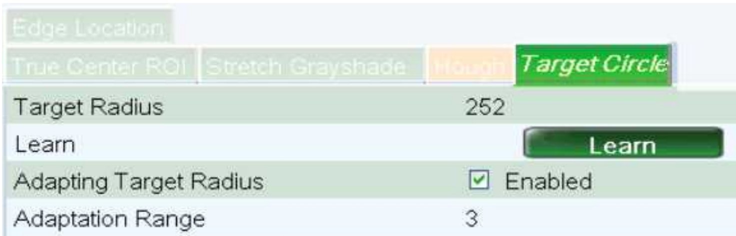
Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Show Edges Show the found edges on the image.

Minimum Center Strength The minimum strength, or quality, you require for the circle fit. When the quality of the fit is less than this value, the registration fails.

Show Hough Graphics Display the bounding rectangle and search graphics on the image.

Target Circle menu



> *Tip: to quickly set the Target Circle, click the Learn button. Adjust the other parameters as necessary.*

Target Radius The size of the feature you want to find. This is automatically computed by using the Learn process.

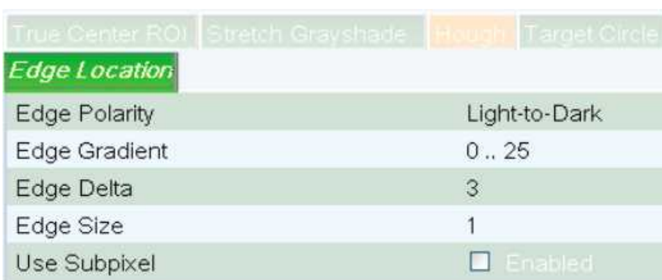
Learn button Using the Edge Location settings, the system automatically sets the Target Radius size.

Adapting Target Radius When this is enabled, the system automatically figures out the best fit for the target radius, within the inner and outer radius of the region.

> *Note: Increasing Adaptation Range increases accuracy, but it also increases inspection time.*

Adaptation Range When Adapting Target Radius is used, this range limits the number of pixels that the target radius can move in either direction.

Edge Location menu



Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

Use Subpixel This provides greater centering accuracy.

Radial Edge

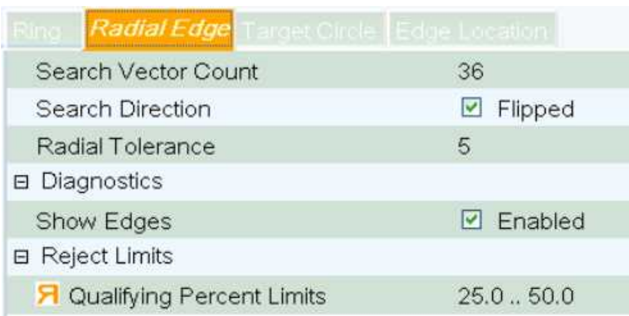
Radial Edge registration is good for circular parts that have a distinct edge either on the inside or outside of the part. Place the Ring region where you would expect the edges of the part to fall.

> *Note: Radial Edge only works with a* *"Ring Region" on page 209.*

To set up the Radial Edge registration:

1. Make sure the Ring region surrounds the feature that you want to locate. Adjust with the parameters in the Ring menu (or the Region Editor on the image) if necessary.
2. In the Radial Edge menu select a Search Direction. Flipped means that the vectors search from an outer to inner direction. If Flipped is unchecked, then the vectors search from an inner to outer direction.
3. Go to the Edge Location menu and select an Edge Polarity. If searching for a light edge against a dark background, choose Dark to Light.
4. Go to the Target Circle menu and click Learn. If the Edge parameters are set correctly, the system automatically detects the proper target radius size. The system uses this radius to compute the center. You may need to adjust the parameters in the Radial Edge, Target Circle, and Edge Location menus to find the desired feature accurately.

Radial Edge menu



Search Vector Count Set the number of search vectors to locate the feature. More vectors provide a more accurate search, but also take more processing time.

Search Direction Change the search to the opposite direction.

Radial Tolerance The number of pixels in either direction of the target circle that the system will consider an edge (that is, the size range allowed for the part). A radial tolerance of two allows a four pixel wide area in which the edge of the part may fall.

Qualifying Percent Limits The percentage of edges that must be part of the target circle. If there are not enough found edges on the target circle, this registration will fail. This can be set lower if you expect large changes in sample size (less sensitive). It can be set higher if the size of your product should not vary (more sensitive).

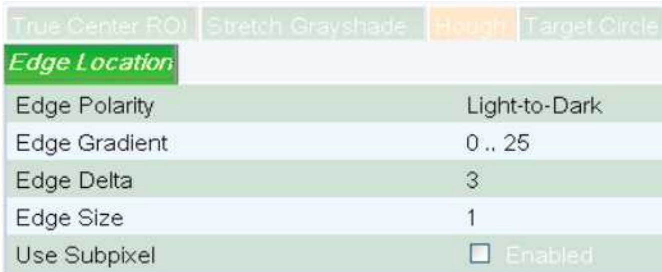
Target Circle menu

Target Radius The size of the feature you want to find. This is automatically computed by using the Learn process.

Learn button Using the Edge Location settings, the system automatically sets the Target Radius size.

Adapting Target Radius When this is enabled, the system automatically figures out the best fit for the target radius, within the inner and outer radius of the region.

Edge Location menu


True Center ROI | Stretch Grayshade | Hough | Target Circle
Edge Location

Edge Polarity	Light-to-Dark
Edge Gradient	0 .. 25
Edge Delta	3
Edge Size	1
Use Subpixel	☐ Enabled

Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

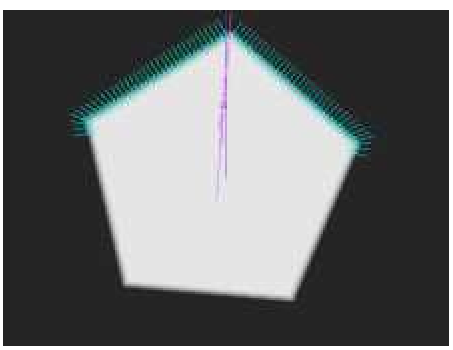
Use Subpixel This provides greater centering accuracy.

Centerline

Centerline Registration finds the sides of a container and determines the center line between them. It also computes an orientation of the container. With Centerline registration, you can determine the orientation of a feature and compare it to the orientation of the entire part. You can also check the slope of the sides of the container, or check the overall shape of the container.

> *Note: this registration requires a "Ribbon Region" on page 215 using settings: Ribbon Style = Ribbon, and Mirror Ribbon = Enabled.*
> *Tip: you can use Centerline to determine Registration plus Orientation, or just Orientation.*

Click in the Results box in the inspection to see specific part information.



Click in the Results box in the inspection to see specific part information.

Centerline menu

Applied Results This determines whether the found center and/or orientation are reported to inspections that follow this inspection. Use Center and Orientation to report both to following inspections. Use Orientation to report only the orientation, but use a previously found center.

Setup Mode Use the same parameters to find both sides of the container (Common Setup), or set up the parameters differently for each side of the container (Individual Setup).

Search Vector Count Set the number of search vectors to locate the feature. More vectors provide a more accurate search, but also take more processing time.

Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Centerline Correction Iterations [advanced parameter] This re-computes the centerline to produce a more accurate centerline angle. Note that this adds inspection time. A setting of zero means no correction.

Shape Check

Check the angle of the sides of the container.

Shape Limits Set the angle limits for the container.

Nominal The ideal value for the shape of the container.

Shape Sensitivity Set the sensitivity for the straightness of the center line. 100 indicates that points must fall on a perfectly straight line (most sensitive). A setting of one indicates that points can fall anywhere (least sensitive). A value of 90 is good sensitivity in most cases.

Area Check

Check the area of the points found. It is good for determining underblown and overblown bottles.

Area Range Define the acceptable deviation (in pixels) from the normal area of the region. You may also adjust the values on the Retro-Spec graph.

Nominal The expected area size. This number is populated when you press the Learn button.

Learn Nominal Area Click the Learn button to automatically learn the area.

Angle Check

Check the orientation of a feature against the previous orientation. If an orientation inspection was not added to the part program, zero degrees is used. For example, this could be used to detect turned tabs on a converted end.

Angle Limits Set the angle tolerance for the feature.

Nominal The ideal orientation of the feature.

Centerline Sensitivity Set the orientation sensitivity. 1 = least sensitive; 100 = most sensitive. The value of 90 is good in most cases.

Enhance Center

Use this feature to track the vertical position of the part; not just the side to side angle position. The inspection performs a pattern match, between matching points in the two regions. If it does not find similar features on both sides of the part, then the registration fails.

> *Tip: when placing the ribbon region, place it on an area of the part that is unique from other areas of the part. Place the ribbon where the system can see edges across from each other. See the example under Pattern Size below.*
> *This technique works best when the ribbon is set up parallel with the centerline of the part and NOT set up to follow the profile of the sidewall.*
> *Note: This feature will only work with a symmetrical part. If the part looks different from side to side as it rotates, then this feature may not work.*

Enhance Center Enable the search for the vertical position of the part.

Learn Contour Pattern

Click the Learn button to allow the system to learn the features of the part. You will need to re-learn the part if you:

- Change the number of search vectors,
- Move or resize the region,
- Adjust the edge search criteria, or
- Change anything that makes the edge positions change.

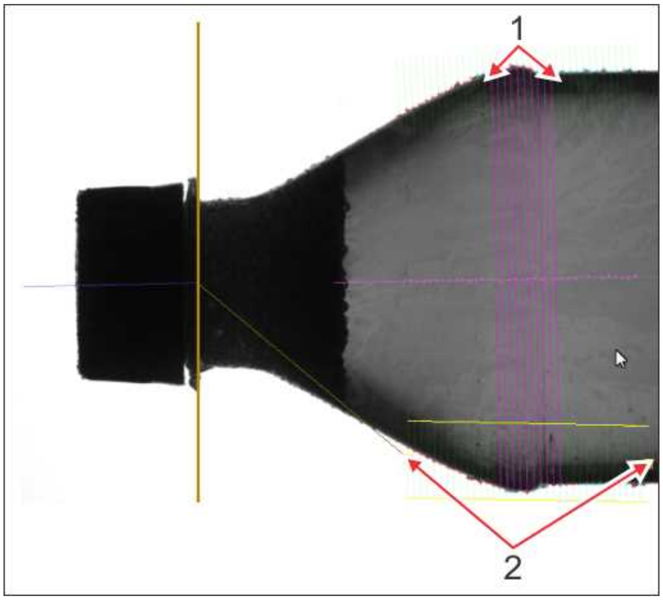
Pattern Start

Specify how many vectors down from the top of the ribbon that the pattern area should start. Check the Show Learned Section and Show Match Location boxes to view it. Note that if you move your pattern too far towards the bottom of the search region, then the pattern will be clipped. That is, it will have fewer vectors than you specify. If you move it outside of the range of the search region, then the pattern wraps back to the top of the region.

Pattern Size

Specify how large the pattern should be, in search vectors. The pattern should only take a portion of the search area, and should be large enough to accommodate the unique section of the part. In the example below, our pattern area covers just the shoulder area of the bottle.

> *Note: The pattern works best when it is set up to follow a unique pattern, such as the shoulder of this bottle. It will not work well on an area with no width variation. If you have a part with multiple features that are all similar, it is best to include all of the similar features in the pattern.*



1) Pattern Area

2) Ribbon search region

Search Settings menu

Ribbon | Centerline | **Search Settings**

Vector Direction	Inwards
Edge Polarity	Light-to-Dark
Edge Gradient	15 .. 96
Edge Delta	2
Edge Size	1
Use Subpixel	☐ Enabled

This menu specifies settings for the search vectors.

Vector Direction Specify which direction the vectors should search, with respect to the center.

Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

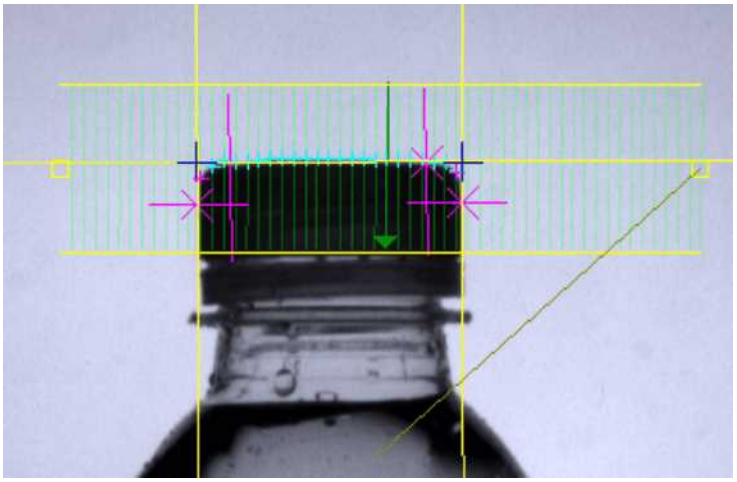
Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

Use Subpixel This provides greater centering accuracy.

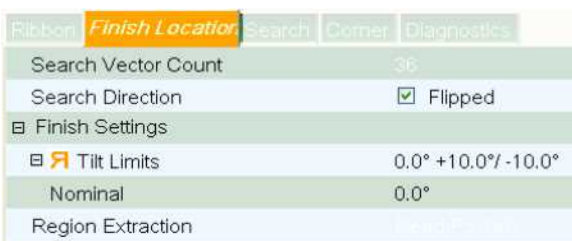
Finish Location

Finish Location is used to locate the top corners of a bottle. It uses a ribbon region. Finish Location also determines part orientation, and passes on the orientation to subsequent inspections.



Note: this inspection requires a *"Ribbon Region" on page 215*

Finish Location menu



Search Vector Count Set the number of search vectors to locate the feature. More vectors provide a more accurate search, but also take more processing time.

Search Direction Change the search to the opposite direction.

Tip: Make the arrow point towards the bottle.

Finish Settings

Tilt Limits Set the allowed range of tilt of the part within the image.

Nominal The expected degree of tilt.

Tip: On most parts the nominal would be 0, with the Tilt Limits + and – some amount.

Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Search menu

Ribbon | Finish Location | **Search** | Corner | Diagnostics

Edge Polarity	Either
Edge Gradient	15 .. 30
Edge Delta	2
Edge Size	2
Use Subpixel	☐ Enabled

Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

Use Subpixel This provides greater centering accuracy.

Corner menu

Ribbon | Finish Location | Search | **Corner** | Diagnostics

Corner Desensitization	20
Top Search: Inward Shift	40
Top Search: Search Vector Count	20
Top Search: Edges Used	25%
Side Search: Down Shift	40
Side Search: Inward Shift	0
Side Search: Search Vector Count	20
Side Search: Vector Length	100
Side Search: Edges Used	25%

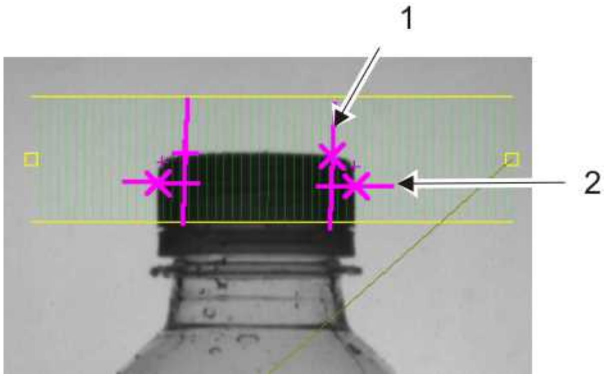
Adjust these settings to best find the corner on your part.

> *Note: Enable the Show Corners option in the Diagnostics menu to see the position of the vectors. Also make sure that Show Graphics is enabled when you right-click over the image.*

Corner Desensitization

Larger values detect more rounded corners. This is used to prevent detection of false corners.

The illustration below shows the top and side vectors that search for the part.



1) Top search, 2) Side search

> *Note: your image may be rotated. Regardless of orientation, the top vectors search for the top of your part, and the side vectors search for the sides of your part.*

Top Search: Inward Shift Move the top vectors closer or further away from the corner.

Top Search: Search Vector Count Set the number of vectors to search for the top of the cap. If your parts have water droplets, use a higher number of vectors to improve accuracy.

Top Search: Edges Used Set the percentage of vectors that will determine the top of the cap. For example, if 100 vectors are used, and this parameter is set at 15, then the 15 vectors that found the lowest edges would be used (and colored green). Vectors that find higher edges may be from water droplets. The other 85 vectors are colored blue and are ignored.

Side Search: Down Shift Move the side vectors closer or further away from the corner.

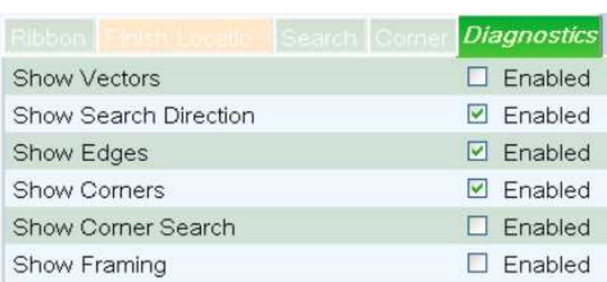
Side Search: Inward Shift Move the side vectors closer to or further away from the midpoint of the cap or part.

Side Search: Search Vector Count Set the number of vectors to search for the sides of the cap.

Side Search: Vector Length Set the length of the side search vectors.

Side Search: Edges Used Set the percentage of vectors that will determine the sides of the cap. This helps ignore water droplets.

Diagnostics menu



> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: Show Graphics = checked.*

Template Registration

Template Registration is used to locate the center of a feature that is either irregularly shaped, or is located in a region with a lot of gray scale variation. Examples include rivets from converted ends, EZO ends, and rectangular bottles.

> *Notes: this registration may not perform well if the visual features are not consistent from part to part.*
> *If an orientation is needed, use a separate Template Orientation instead of the orientation built into this inspection, to save processing time, EXCEPT if you are inspecting a part with decoration on it. See the Template Registration menu description for more information.*

Before adding the Template Registration:

Choose Option 1 or Option 2 from the choices below.

Option 1: If your part's feature appears in an unpredictable location in the image, then use the Measure ROI method:

Example: for this EZO closure, we are not sure where the rivet will appear in the image. We are using Measure ROI region.

1. Add a "Measure ROI" on page 217 region of interest to the part program. This can be placed at the highest level in the inspection tree.

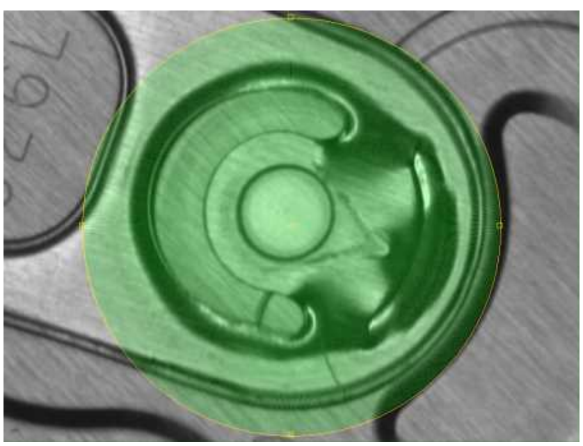
2. Leave Region Count = One Region.
3. In the Measure ROI menu, set the Center Offset X and Y = 0.

Measure ROI(s)	
Region Count	**Two Regions**
Vertical Lock Mode	Independent Movement
Horizontal Lock Mode	Independent Movement
Sizing Lock Mode	Independent Sizing
⊟ Region 1	
Center Offset X	-100
Center Offset Y	-25
Region Width	100
Region Height	50
Region Angle	90.0
⊞ Region 2	

4. Place the inspection region over almost the entire region:
   - If you have a 640 x 480 image, then set Region Width and Region Height to 630 and 470. This allows five pixels around the inspection window.
   - If you have a 1360 x 1024 image, then set Region Width and Region Height to 1350 x 1014. This allows five pixels around the inspection window.
5. Select the OK button to save changes and exit.
6. Go to the section: "To add a Template Registration"

Option 2: If you know approximately where your part's feature might appear in the image, then use a Ring or other region method:

Example: in this converted end rivet image, we know approximately where the rivet might appear. We are using a Ring region.



1. Add a Ring region (or other region) to the part program. Note: make this region as small as possible, but make sure that the desired feature is ALWAYS in the region of interest regardless of part movement. Using a smaller region saves inspection time.

2. Click the OK button .
3. Add a Template Registration.

To add a Template Registration:

1. Make sure a region has been added to the inspection tree, as described in Option 1 or Option 2 (above).
2. Put the lane online, long enough to acquire about 100 images. Take the lane offline.
3. Right-click on the item you just added.
4. From the Inspection menu, select Add | Registration | Template Registration. Re-name if desired.
5. If your part does not have deco, then un-check the Perform Orientation box in the Template Registration menu. Then go to the section: "To save a seed image:" below
6. If you are inspecting a part with deco, then Perform Orientation = checked.
7. Click the Select Angle button. With your cursor, select a place on the image that the system can use to determine orientation. Select a place that is consistent from part to part (example, a rivet). Click the Apply Angle button to complete the selection.
8. Click the Suggest button (expand Perform Orientation to see this). The Suggest button sets Radial Samples and Angular Samples for you.

Next, save a seed image. The system uses a "seed" image to create an average image for the template.

To save a seed image:

1.  From the Retro-Spec graph, find an image that represents an average part. Use the arrows to scroll through the images.
2. If necessary, adjust the region size to cover an area where there is a repeatable grayscale pattern.
3. Go to the Template menu (described below) and click the Save Seed button.
4. Name the seed image and click the OK button.

You can set the remaining parameters of the Template menu at a later time.

OPTIONAL: Select a Feature Region. The system will look at a smaller portion of the region to save inspection time (Example, find just the rivet in the image).

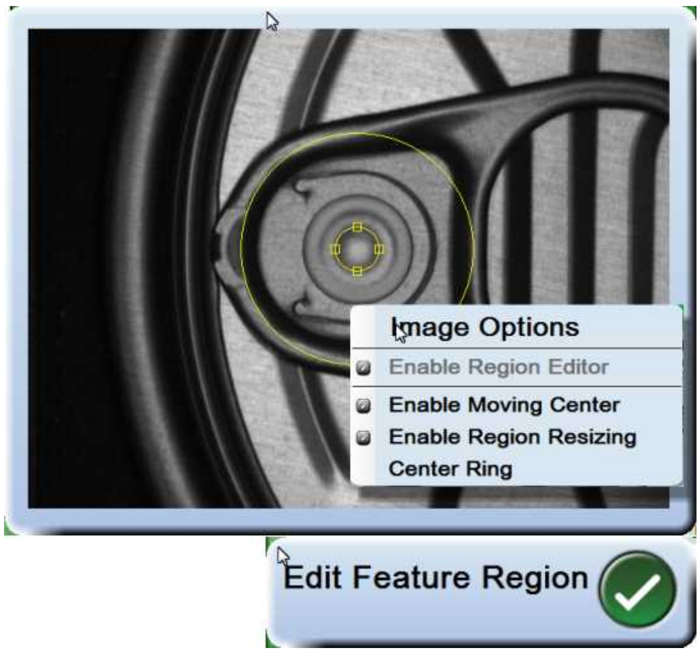
> *Note: in MOST CASES, you will use the entire inspection region rather than looking at only a portion of the region. Skip to the section "To adjust the registration."*

To select a Feature Region:

1. In the Template menu, select a Feature Region, depending on the feature you want to locate. In our example, we want to find a circle, so we choose Ring Subregion. (The region types are discussed in the "Template menu" section) Notes about using Ring or Polygon Subregion:
   - Template Registration does not perform an orientation when looking for this subregion. The feature used for the polygon or ring subregion must be located in the same place on each part.

- Subregions are only used with a seed image. [Create Template, which is not used with subregions, ignores ring and polygon subregions]

2. Click the Edit Region button. The seed image is displayed.
3. Use the yellow boxes (and circle) to adjust the subregion.
   - Right-click in the Edit Region viewer to use the Image Options menu.
   - The center point is also a ring (if using a Ring Subregion). It can be adjusted to create a donut shaped region.
   - If using a Polygon Subregion, the system will prompt you to click anywhere in the image to begin placing points. Keep clicking points in image to create the polygon. To close the polygon, click the first point again.

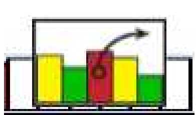


4. Click the OK button in the Edit Feature Region viewer to save changes and exit.

Next, test the registration and adjust settings so that it will work on almost all part images. The menus are described below. If you set up a Feature Subregion above, then you will NOT use the "To adjust the registration..." section below.

To adjust the registration - FOR MOST APPLICATIONS:

Delete bad images:

1. In the Retro-Spec graph, view all the images in Data Set A [left side of the screen]. Look for a range of part images that best represent your production (they do not have to all be perfect).
2. Delete any bad images:
   a. Click the Lock/ Move Parts button to unlock the data set.
   b. Click the bar on the graph for any part you want to delete, then click the trash can icon to delete the part from the set.

c. For information about how to use the graph, see Retro-Spec Population View Graph.
d. Click the Lock/ Move Parts button again to lock it.

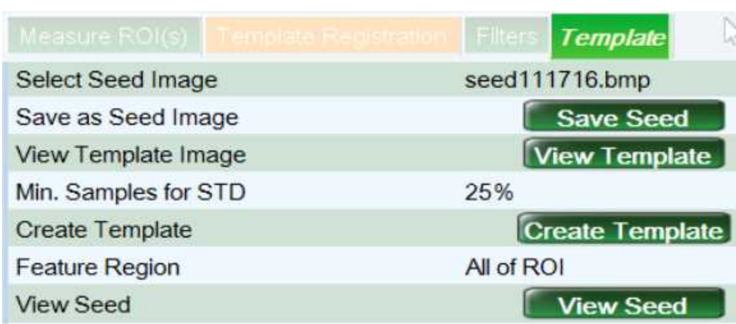
3. In the Template menu, click the Create Template button. This creates a template using all the data set images combined instead of using one image.
4. (Optional) In the Filters menu, set Downsize Level at Level 2 (16 to 1). This will speed inspection time.

> *Note: Downsizing creates a slight pixel error. The more Downsizing used, the more pixel error is produced. We use Downsizing when Template Registration is being used as a coarse registration to locate a feature. We then add an additional registration such as Radial Edge or Hough to accurately find the center of the feature.*

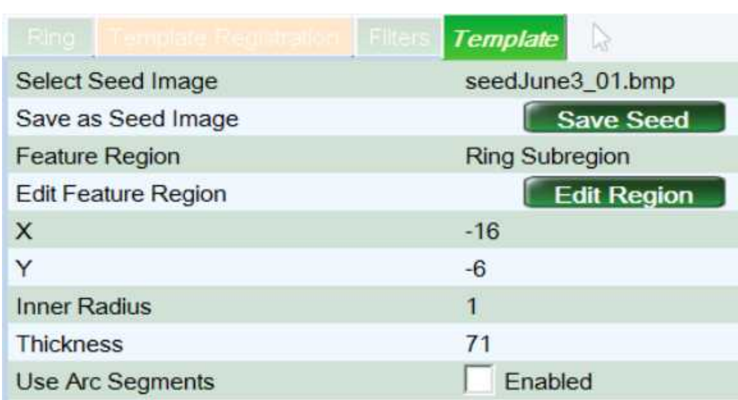
5. In the Template Registration menu, adjust Registration Strength. This can be adjusted by the horizontal bar in the Retro-Spec graph. This will set pass/ fail limits for the registration.
6. Test the registration: 

Put the lane online to acquire several images, then click the or buttons to update the Retro-Spec graph. Make sure that bad parts are failing, as indicated in the Retro-Spec graph (red bars). Take the lane offline. If you used the movie button to update the images, then click it again to stop updating the Retro-Spec graph.
7. Make adjustments to the registration as instructed by Pressco for your application. The menus are described below.
8. In applications such as our example, Template Registration is used as a coarse registration. Add another registration after the Template Registration, such as Radial Edge, to accurately locate the center of the feature.

Template menu



or



Select Seed Image: Select the image (from the drop-down menu) to use as the template. You must first "Save Seed" image(s) to create a list of images.

Save as Seed Image: Select the best image in the Retro-Spec graph, and click the Save Seed button. The image is saved to the lane and sensor. Example: C:\Pressco\Lane 1\InspectionTemplates\dime_10.bmp.

View Template Image Click the View Template button to see the template that the system created (if you already used Create Template).

Min. Samples for STD (Standard Deviation) [Advanced parameter] When you use this inspection for an input to Template Enhancement, set the percentage of pixels that must be present in the standard deviation. The default is 25%.

Create Template Use all the images in Data Set A to create an average image, starting with the seed image. For best results, delete all defective images, or images that you do not want as part of the template, from Data Set A.

View Seed or View Editor

This is the image you selected through "Select Seed Image."

Feature Region

> *Note: most applications use All of ROI. If you use Ring or Polygon subregion, then the system only uses a seed image as the template (not Data Set A, as is used when you click Create Template).*

All of ROI - Use the region of interest already set up prior to this inspection.

Ring Subregion - Create a region smaller than the search region, to speed up inspection time.

Polygon Subregion - [Not used in Template Orientation] Create a polygon region to use for the template instead of the search region, to speed up inspection time. When you choose this option, click the Edit Region button to create the polygon. In the viewer, create a polygon by clicking several points in the image. To complete the polygon, click the first point again.

> *Note: The following parameters are used only if Ring Subregion is selected.*

X and Y

The center of the **template** region.

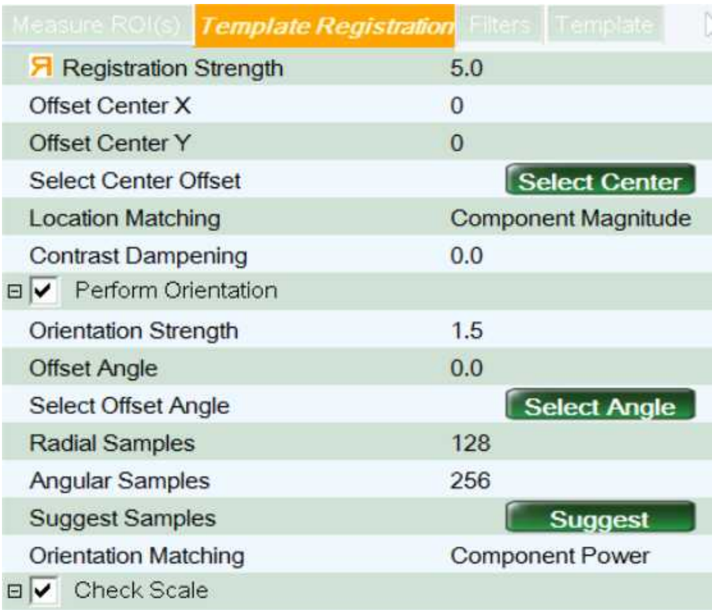
Inner Radius Size of the inner ring.

Thickness The thickness of the ring; outer radius minus inner radius.

Use Arc Segments This is normally NOT used in this inspection. If enabled, it divides the ring region into arc segments.

Exclusion Threshold This is mostly used when you use advanced region options such as aggregate and virtual regions and multiple orientations. Exclusion Threshold allows the system to ignore pixels and discard them from the template if they do not have a minimum number of sample data available.

Template Registration menu



Registration Strength Set the minimum registration quality between the inspected image and the template image. This sets the pass/ fail limits. Select this parameter to adjust it on the Retro-Spec graph.

Offset Center X and Y We recommend that you leave these values set at zero.

Select Center Offset Click the Select Center button to initiate the selection. Then click in the image where the center should be. Wait while the system computes the new center values and populates the Offset Center X and Y parameters. Then click the Select Center button to complete the selection. Offset Angle and Select Offset Angle are only used if Perform Orientation is enabled.

Location Matching This uses template data as a reference and compares it to current part data. Normally this does not need to be changed from Component Power. If you are getting inconsistent results, try another technique. We recommend trying the techniques in this order: 1) Component Power, 2) Component Magnitude, and 3) Global Power.

Contrast Dampening [Advanced parameter] We recommend that you leave this set at zero.

Perform Orientation Select whether an orientation is performed as part of the inspection. This is normally not used, except if you are inspecting parts with decoration on them. We recommend that if you need to perform an orientation (on parts without deco), use a separate Template Orientation to save inspection time. The following parameters are only used if Perform Orientation is enabled.

Orientation Strength Set the minimum orientation between the inspected image and the template image. You can set this through the bar on the graph. If the current part falls below this value, the part fails.

Offset Angle

Rotate the inspections on an image. Set the angle on a specific feature to match the current orientation of the part. You can use the Select Angle button to set this value. This feature saves you from modifying subsequent regions during slight changes that might affect region placement.

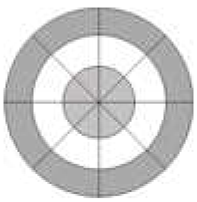
> *Note: this angle can only be set after you create a template.*

Radial Samples

This number divides the region into a number of rings. See example below.

Angular Samples - This number divides the region into a number of arcs. See example below.

Example: This example shows a region with three (3) radial samples [inside to out] and eight (8) angular samples [like pieces of a pie]. (Note: these values are not available in the inspection. These examples, and shading, are for illustration purposes only.)

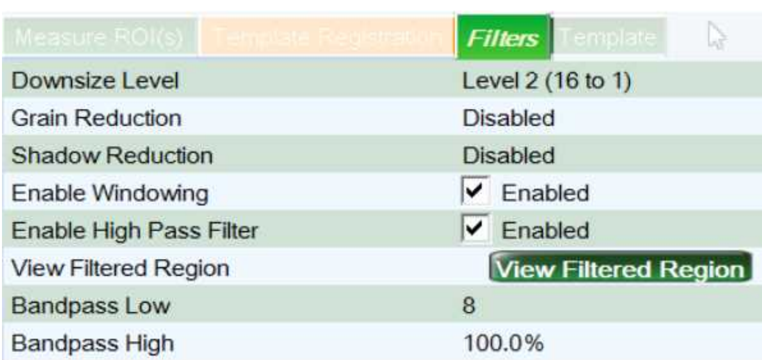


Suggest Samples Click the Suggest button to automatically set Radial Samples and Angular Samples based on the current region settings.

Orientation Matching This uses template data as a reference and compares it to current part data. Normally, use Component Magnitude. If you are getting inconsistent results, try the other techniques in this order: 1) Component Power, 2) Global Power.

Check Scale Leave this box un-checked. Scale refers to a magnification factor in the event of a change in optics or part movement. It can be used as a reject limit for part size.

Filters menu



Downsize Level	Level 2 (16 to 1)
Grain Reduction	Disabled
Shadow Reduction	Disabled
Enable Windowing	Enabled
Enable High Pass Filter	Enabled
View Filtered Region	View Filtered Region
Bandpass Low	8
Bandpass High	100.0%

Use the suggested rules, described below, for optimum inspection.

Downsize Level Using this option depends on the image. For example, if your part image has grain, then use a Downsize Level of 4 to 1 - this will blur the image enough to almost ignore the grain. The system groups pixels when you enable this option. Larger values reduce the image further, speeding up the inspection at the cost of resolution.

Grain Reduction [Technique] (Optional) Enable this feature only if your part has grain and is causing inspection problems. This filter will help block grain from the image. Use the technique that works best on your part.

Shadow Reduction (Optional) Enable this feature only if your part has features such as shadows that are causing inspection problems. Use the technique that works best on your part.

Enable Windowing Default = checked. The region fades to black around the edges, emphasizing the features towards the center of the region, while ignoring the features towards the edges of the region. Click the View Filtered Region button to see the effects of this filter.

Enable High Pass Filter Default = checked. The filter reduces shading and leaves sharp edges in the region. Some cases where this filter might be un-checked would be in some color images, or if edges are normally fuzzy. Click the View Filtered Region button to see the effects of this filter.

View Filtered Region [Only applicable if any of the filter techniques above are being used] This displays the image using the filters.

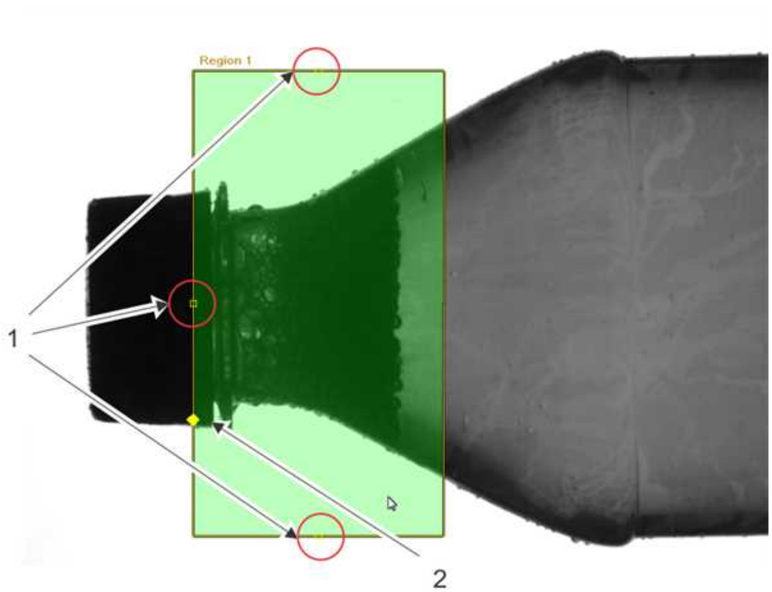
Bandpass Low and Bandpass High [Advanced parameters] These are only used if Orientation is enabled in the Template Registration menu. Since we recommend that you do not use Orientation in this inspection, leave these set at their default values (Low = 8; High = 100%).

Neckring Registration

Neckring Registration locates both sides of the neck ring on a bottle and then positions the inspections with respect to these points.

Before adding a Neckring registration:

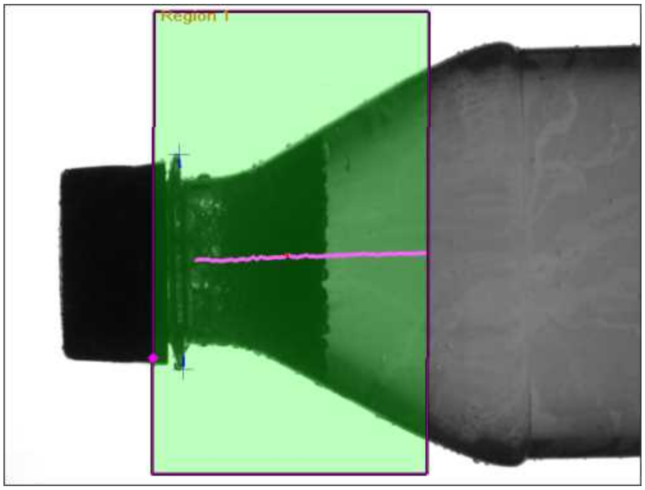
Add a "Measure ROI" on page 217 Region of Interest. It should be wide enough to accommodate some part movement and bottle tilt, but not so wide that adjacent bottles can be seen in the region.



1) Make sure these handles are oriented towards the cap and sides.

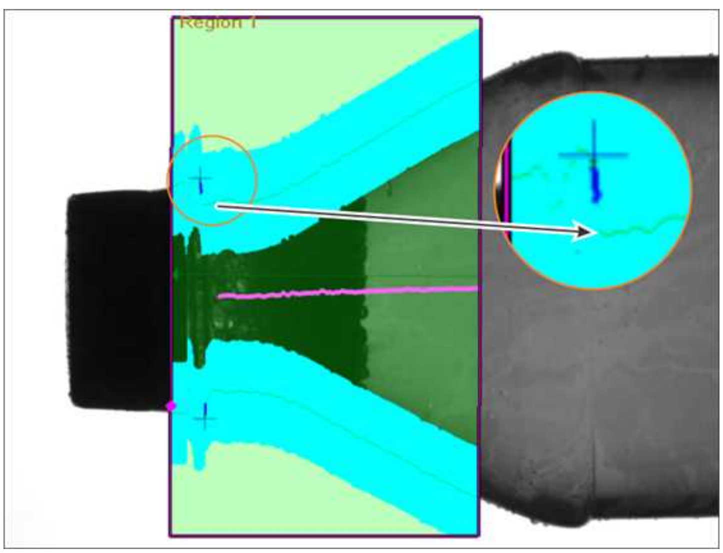
2) Make sure the diamond is set towards the cap.

Next add a Neckring registration.



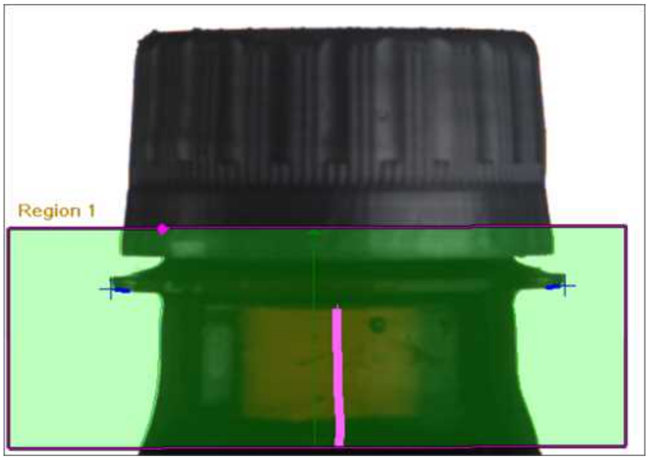
To set up the Neckring Registration:

1. In the Part Search menu, adjust the Edge Polarity, Gradient, Delta, and Size to find the edge points on the outside edges of the bottle, neckring, and cap. Leave Use Subpixel un-checked. Edge Thickness should be set so that thin pieces of flash in the region will be ignored (a value of 5-8 is usually good).
   - To see the effects of these settings, go to the Neckring Registration menu and enable Show Vectors, Show Search Direction, and Show Edges.
   - Look for green (good) edges at the edges of the bottle, as shown below. To zoom in, right-click over the image and use the magnifier from the Image Options menu.

2. In the Neckring Search menu, adjust the number and length of vectors so that they can locate the underside of the neckring.
3. If there are many water droplets or flash hanging down from the neckring, you may want to un-check Use Common Edge Settings in the Part Search menu. This will provide independent edge location settings for the vectors looking for the sides of the bottle and the vectors that search upwards towards the bottom of the neckring.
4. If desired, adjust Tilt Limits in the Neckring Registration menu. Normally, this is not used to reject bottles, so we use a wide range for Tilt Limits.

5. Scroll through the images to test the registration and make sure that the blue '+' marks are in the correct places on the bottle (that is, at the edges of the neckring). Adjust the parameters in the menus as needed. The parameters are described below. An example of a good neck-ring search is shown below.



Neckring Registration menu

Neckring Reg ROI | **Neckring Reg** | Contour Edges | Neckring Edges

Use Linear Hough	☐ Enabled
Centerline Sensitivity	90
⊞ Tilt Limits	268.64 +/-31.4
Show Vectors	☐ Enabled
Show Neckring Vectors	☐ Enabled
Show Search Direction	☐ Enabled
Show Edges	☑ Enabled
Show Candidates	☐ Enabled

Use the Neckring Registration menu to locate the neckring. Use the settings recommended by Pressco support engineers, and adjust as necessary for your part.

See also "Advanced Parameters for Neckring Registration" on page 276.

Use Linear Hough Do not use this feature, as of this publication.

Centerline Sensitivity Set the orientation sensitivity. 1 = least sensitive; 100 = most sensitive. The value of 90 is good in most cases.

Tilt Limits Set the allowed range of tilt of the part within the image.

Nominal The expected degree of tilt.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: Show Graphics = checked.*

Contour Edges menu

Neckring Edges | Measure ROI(s) | Neckring Registration | **Contour Edges**

Use Common Edge Settings	☑ Enabled
Edge Polarity	Light-to-Dark
Edge Gradient	6 .. 54
Edge Delta	5
Edge Size	5
Use Subpixel	☑ Enabled

The settings in this menu determine which edges are used to find the sides of the bottle and the neckring.

Use Common Edge Settings Normally, leave this box un-checked. This allows the system to use different settings to ignore flash and other possible flaws. If this box is un-checked, then you will set the search vectors both in this menu and in the Neckring Search menu. If this is enabled, then the registration uses common edge location settings for the search vectors looking for the sides of the bottle (part search), AND the search vectors looking for the neckring.

Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

Use Subpixel This provides greater centering accuracy.

Neckring Edges menu

Neckring Reg ROI | Neckring Reg | Contour Edges | **Neckring Edges**

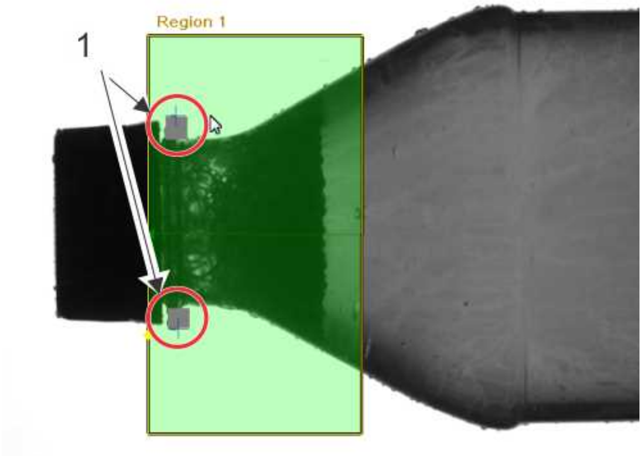
Neckring Vector Length	50
Neckring Vectors	15
Vector Offset from Axis	-1
Edge Polarity	Either
Edge Gradient	15 .. 30
Edge Delta	2
Edge Size	2
Use Subpixel	☐ Enabled
Edge Thickness	1

Use the Neckring Edges menu to find the edges along the underside of the neckring and then locate the outer edges.

> *Note: if "Use Common Edge Settings" is enabled on the Contour Edges menu, then only three parameters are shown in this menu.*

Neckring Vector Length

The length of the vectors that search for the neckring. You can see the neckring vectors when you enable "Show Neckring Vectors" in the Neckring Registration menu.



1) Neckring vectors

Neckring Vector Set the number of vectors to search for the neckring.

Vector Offset from Axis Set the number of pixels away from the neckring corner that the vectors will begin their search. If you enter a value, then the offset position is referenced to the centerline of the part. If the offset is [-1], then the inspection automatically determines the offset as the average of edges found on the neckring. The system provides a suggested value to use; look at the Results window to see that value.

Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

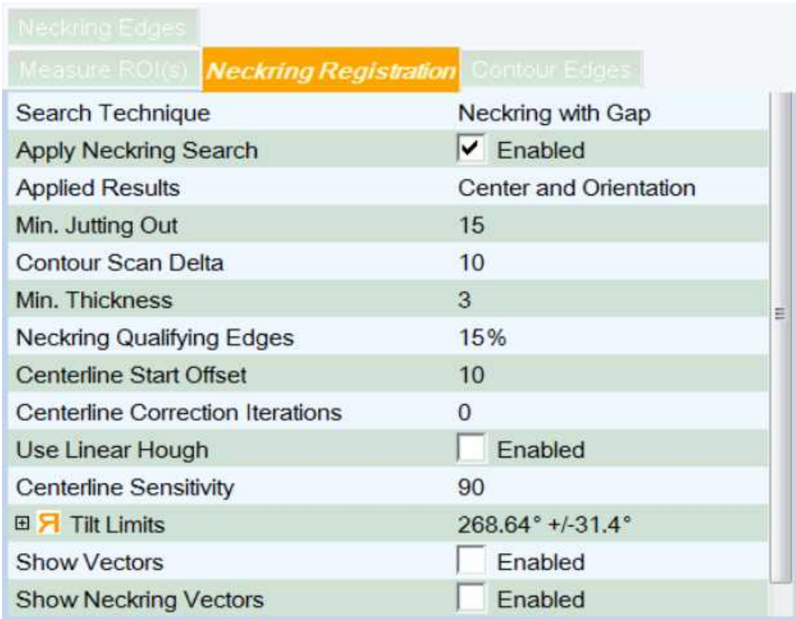
Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

Use Subpixel This provides greater centering accuracy.

Edge Thickness The number of consecutive times that the gradient must be met to indicate an edge.

Advanced Parameters for Neckring Registration

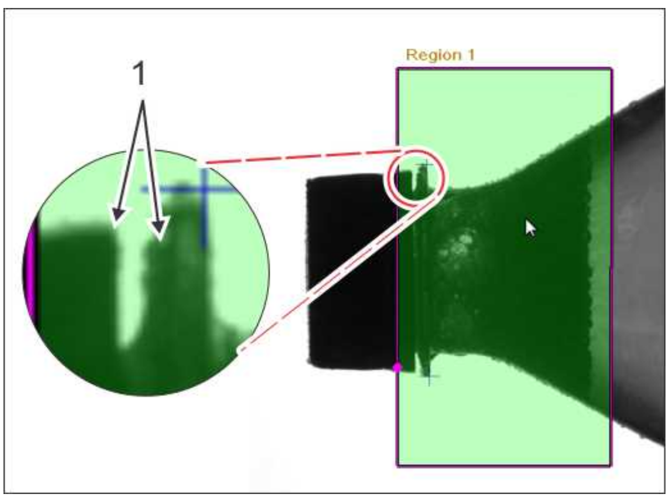
Right-click over the inspection parameters | Editor Options | Advanced = Checked. You must have the "Access advanced inspection parameters" permission.



Search Technique	Neckring with Gap
Apply Neckring Search	Enabled
Applied Results	Center and Orientation
Min. Jutting Out	15
Contour Scan Delta	10
Min. Thickness	3
Neckring Qualifying Edges	15%
Centerline Start Offset	10
Centerline Correction Iterations	0
Use Linear Hough	Enabled
Centerline Sensitivity	90
Tilt Limits	268.64° +/-31.4°
Show Vectors	Enabled
Show Neckring Vectors	Enabled

Search Technique

Neckring with Gap - This works well with parts that have a Neckring and a closure that does not sit right on top of the neckring.



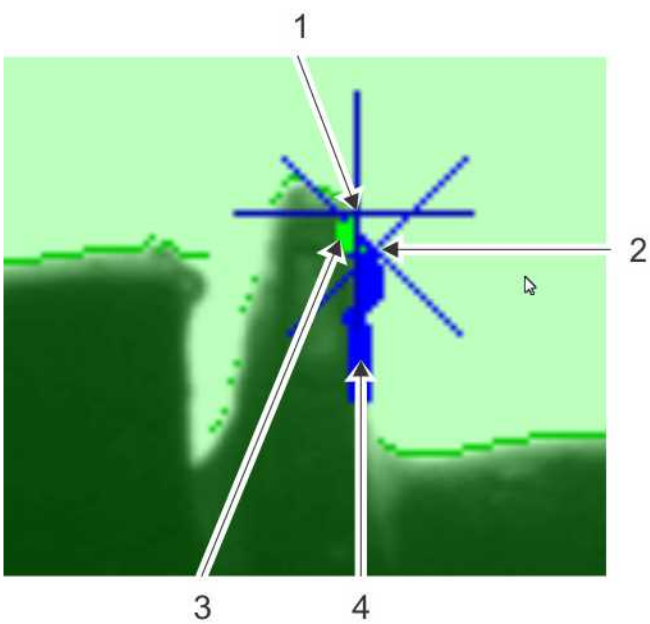
Neckring with No Gap - This works well when the closure sits right on top of the Neckring.

Furthest Out Feature - This works well with parts that do not have a visible neckring. The system looks for the feature that is furthest out, within the field of view. Make sure the search region is not too far down on the bottle. Neckring Threshold, Delta, and Thickness are not used.

Apply Neckring Search

This is a re-computed location to determine the position of the Neckring, after Neckring Percentage is used. Initially, the system finds a candidate for Neckring position [2] in the illustration below. Apply Neckring Search can find a more accurate position. This parameter is most often used with Neckring With Gap Search Technique.

If you are using other search techniques, then you may get better results with Apply Neckring Search turned off.



1) Large '+' is the re-computed location used when Apply Neckring Search is enabled.

2) Large 'X' is the initial Neckring position found. It is not used when Apply Neckring Search is enabled.

In some cases, multiple 'X' marks show where other candidate positions were found and discarded. The discarded candidates are drawn in red.

3) Green edges are used to determine the Neckring position. Percentage of edges is set by Neckring Qualifying Edges.

4) Blue edges are ignored. Percentage of edges is set by Neckring Qualifying Edges.

Applied Results

The Neckring Registration can produce a left and right position, centerline, as well as orientation of the bottle.

Center and Orientation - (most often used). Compute both the center of the bottle and the orientation of the bottle.

Orientation - Compute only the orientation of the bottle.

Center - Compute only the center of the bottle. Bottle tilt does not get computed when orientation is not used.

Min. Jutting Out The minimum distance you expect the Neckring to extend from the profile of the bottle. A minimum distance = 15. Setting this value too high may make the inspection less accurate if there is water under the Neckring.

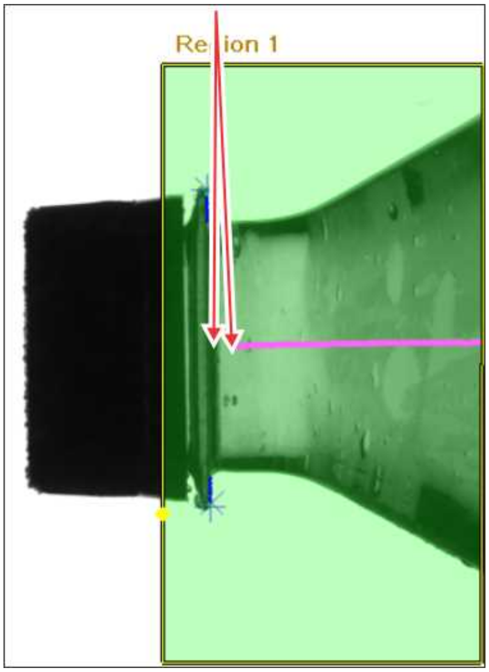
Contour Scan Delta The number of pixels between each edge comparison that the system looks for transitions that indicate the Neckring. The system looks at the edge profile of the bottle. A typical setting is 10.

Min. Thickness The minimum width (in pixels) that you expect the Neckring to be. You can usually set this to a small value, such as five.

Neckring Qualifying Edges The percentage of vectors that determine the bottom of the Neckring. This is used to ignore false edges and flash that might occur on the bottle. If this parameter is set at 15%, then the 15 vectors that find the highest edges (closer to the top of the bottle) would be used and colored green. The other 85 vectors would be colored blue and ignored. See illustration under Apply Neckring Search above.

Centerline Start Offset

The distance, in pixels, below the Neckring, where the registration begins to compute the tilt of the bottle. Make sure this number is large enough so that the system is using data from side bottle edges, not edges from the neck ring.



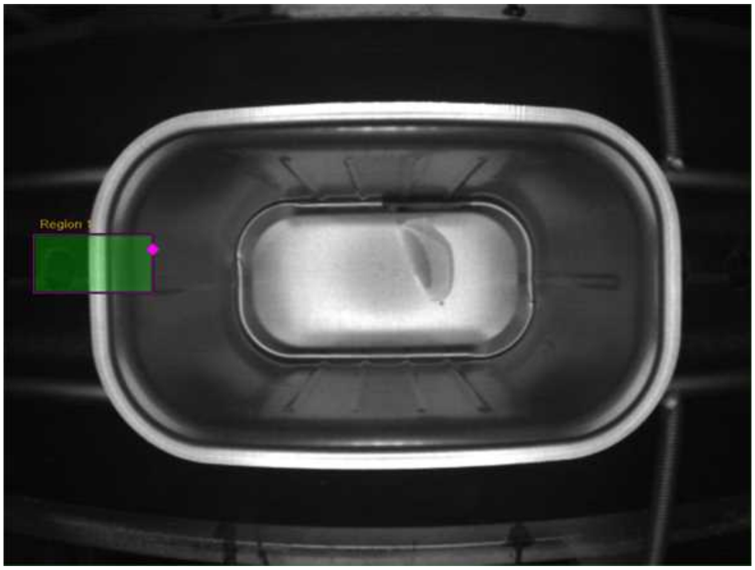
Centerline Correction Iterations Set the number of passes you want to use to correct the centerline angle. Zero = disabled.

Measure Registration

Measure Registration is used for rectangular or other non-round parts. This registration finds one edge of a part and places inspections relative to this edge.

> *Note: This registration uses a "Measure ROI" on page 217 region.*

Before adding Measure Registration, place the Measure ROI region where the system will consistently see an edge. If you want to search both horizontal and vertical directions, place one region that will search in the horizontal direction. You can set up another region for the vertical direction later. You can set up a diagonal region to locate a corner, if desired.



Measure Registration menu

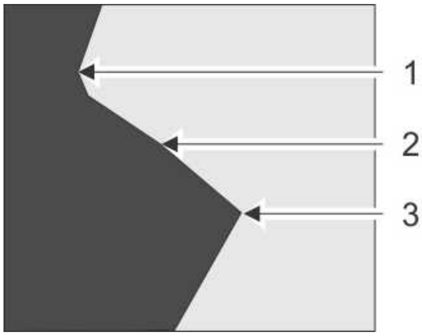
Measure ROI(s) **Measure Registration**

Applied Results	Average Position
Vector Spacing	1
Max Missed Edges	2
Edge Polarity	Either
Edge Gradient	30 .. 255
Edge Size	2
Edge Delta	2
Enhance Vectors	☑ Enabled
Show Edges	☑ Enabled
Show Vectors	☐ Enabled
Show Search Direction	☑ Enabled
Show Measurement Positions	☑ Enabled
Discard for Average	0%

Set the registration parameters to locate the edges.

Applied Results

[Advanced parameter] Choose which edges to use when computing the registration center. The illustration below shows a search region in which the system is searching from right to left, seeking a light to dark transition.



Minimum Position -- [3] The minimum distance of the search region.

Maximum Position -- [1] The maximum distance of the search region.

Average Position -- [2] The average distance of the search region.

Vector Spacing The distance between search vectors.

Max Missed Edges The number of search vectors that are allowed to fail without causing the inspection to fail.

Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

Enhance Vectors Computes an average pixel value from a neighborhood of 3x3 pixels around each pixel of the vector.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: check the Show Graphics box.*

Discard for Average Ignore the extreme edges found. If you set a percentage, the inspection will ignore that percentage of the minimum and maximum edges found. This helps determine an average edge position.

Barcode Registration

See "Barcode Inspection and Registration" on page 368

Pattern Registration

Pattern Registration learns a feature in a seed image and then locates that feature in the production images. The technique is similar to "Template Registration" on page 264.

> *Note: this inspection requires the purchase of an additional license and dongle. Contact your sales representative.*

The difference between Pattern Registration and Template Registration is that Pattern learns the edge profile of a feature, and Template learns an irregular feature to determine its center.

Pattern Registration can work with grayscale or color images.

Region types supported: Pattern works with the following region types (choose one that best fits your part): Ring, Polygon, Measure, Ribbon, or Cylindrical. Pattern Registration also has internal Ring and Polygon region types that you will select when setting up the inspection.

In Pattern Registration, you can choose where in the image you wish to create the pattern. You can identify a unique feature and then track the position and angle of that feature in the production images. The way the algorithm operates is different than in Template Registration. So in this algorithm an orange ball will look virtually the same as a blue circular outline. If there is sufficient contrast, then it is identified as a feature or pattern to be found.

This inspection is very good when detecting a single unique feature. The better the pattern the better the results. The technique will struggle if there are too few feature points learned or if there is a lot of noise or repetitive features in the learned pattern. One example of where this algorithm struggles is finding a shape within a series of vertical lines. When the vertical lines are part of the learned pattern, then the inspection finds too many possible candidates and takes much longer to inspect the part.

The algorithm has two major operation modes: Standard and Adaptive.

Standard Mode: In this mode the algorithm is designed to find the pattern anywhere in the region. The pattern remains constant in shape, but can rotate and even change size slightly.

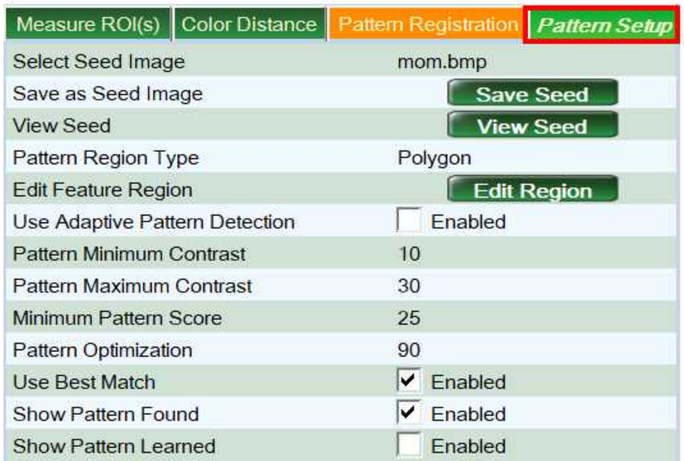
Adaptive Mode: In this mode the algorithm is designed to find the pattern anywhere in the region. The pattern can be warped in any direction as well as rotated or scaled. This is ideal for patterns that are on curved surfaces and will warp as the pattern moves closer or further from the camera viewpoint. This is a very powerful feature, but it comes at a speed cost. Use this ability only if you have warping patterns and your inspection time does not exceed the time required for your part rate.

Pattern Registration Setup

To set up the Pattern Registration:

1. Examine the part to determine if there is a unique feature or pattern that can be used to track the part position and orientation.
2. Find a representative sample of the unique feature and save that image as the 'seed.' The algorithm works best when the seed image has a clear view of the feature. Choose an image with no reflections, shadows or scratches. Anything abnormal will be learned into the pattern and cause the algorithm to not perform as efficiently as possible.
3. Figure out if you have a feature that is only going to change position and angle or if the feature is being imaged in a way that will warp the pattern from image to image. This will help determine which algorithm mode to use (Standard or Adaptive respectively).
4. Decide if the feature can be easily surrounded with a circular region or if the more flexible polygon region is required. Then draw / position your region around the pattern you wish to learn.
5. Enable the “Show Pattern Learned” diagnostic. View the ROI in a popup window. Then adjust parameters for sensitivity to get the best possible pattern. The pattern will be drawn in green on a black background.
6. Run sample product through the algorithm to see if it is properly tracking the pattern you have learned. You can further tweak the inspection parameters to qualify more or less patterns to get the best possible accuracy.

Pattern Setup Menu (Normal parameters)



Select Seed Image: Select the image (from the drop-down menu) to use as the template. You must first "Save Seed" image(s) to create a list of images.

The seed images are stored by part program (the specific folder is defined as Lane N\HPD\part program number so an example is “Lane 1\HPD\34”). This means that the seed images are stored by part program and only available to the part program they were stored with.

Save as Seed Image: This allows you to save the currently selected part as the seed image. Choose the seed carefully so that you have a very good example of the pattern you want to locate or learn.

View Seed Image:

This displays the currently selected seed image (see Select Seed Image) in a popup window.

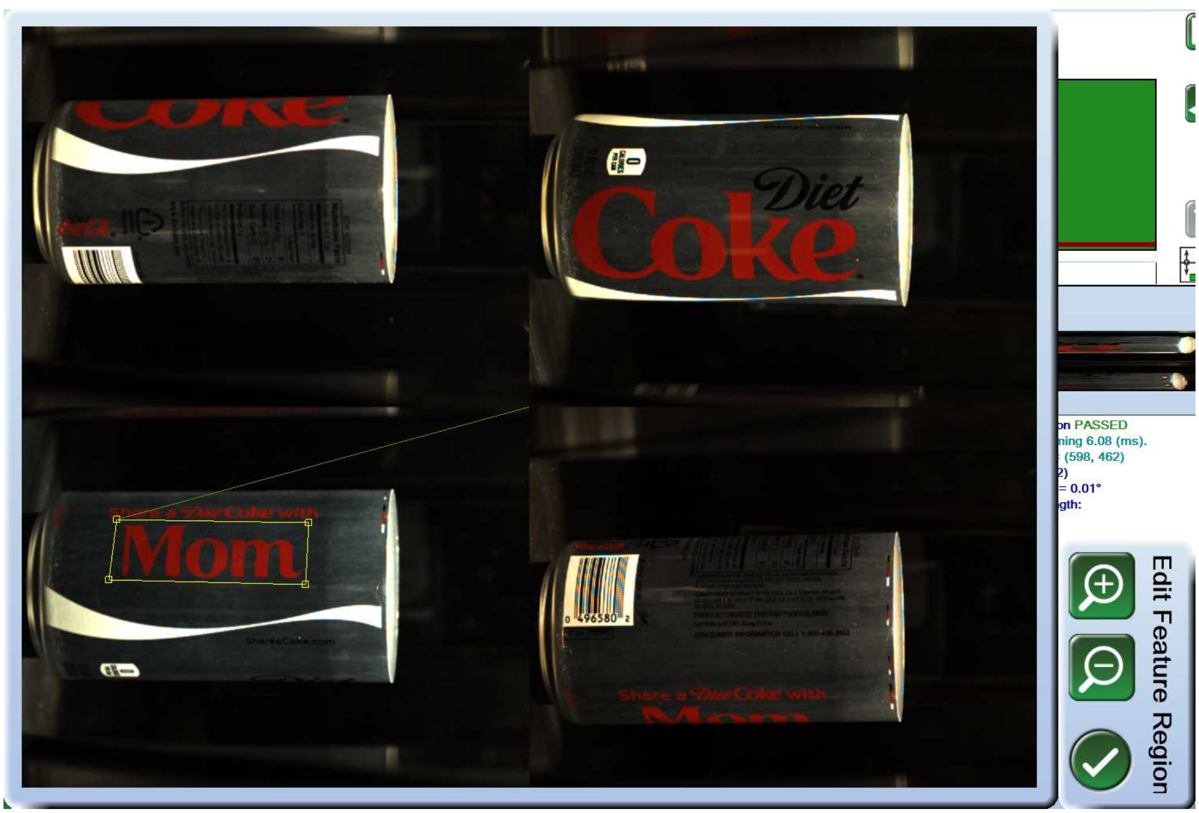
Pattern Region Type: (Ring, Polygon) Create either a Ring or Polygon region within the seed image to find the pattern. Choose the best type of region for the pattern you want to learn.

Edit Feature Region:

This displays a popup window with the seed image and the type of region you have chosen.

Pattern Region Editor – Ring Region:

Pattern Region Editor – Polygon Region:



To learn how to add a polygon region, see "Polygon Region" on page 210

Use Adaptive Pattern Detection:

(checked, unchecked) The algorithm has two different techniques for locating the pattern. When this parameter is not checked, then we use the standard pattern detection. It searches for the exact pattern in the current image inspected. If the parameter is checked, then we use an adaptive pattern detection. This is ideal for patterns that are on cylinders and will “warp” as the pattern moves towards the side of the cylinder. See the comparison below to understand the differences between the two techniques.

Pattern Diagnostic – Standard Pattern Detection:

Pattern Diagnostic – Adaptive Pattern Detection:

Pattern Minimum Contrast: (5 – 100) The pattern found is controlled by the minimum and maximum contrast parameters. Setting the minimum contrast lower will locate more feature details. The higher the contrast in the pattern, the better the algorithm will work. Use the Show Pattern Learned diagnostic to help tune the contrast limits.

Pattern Maximum Contrast: (10 – 100) The pattern found is controlled by the minimum and maximum contrast parameters. Setting the maximum contrast lower will locate more feature details. The higher contrast the pattern, the better the algorithm will work. Use the Show Pattern Learned diagnostic to help tune the contrast limits.

Minimum Pattern Score: (10 – 100) This reports how closely the current image matches the learned pattern. High scores = ignores patterns that do not match well. This takes less inspection time. Low scores = the system finds almost anything in the image even if the actual pattern is not in the image. This takes more inspection time. The Minimum Pattern Score is related to the Registration Strength reported, however it is not an exact match. We suggest to set this value lower than the values seen in the RetroSpec plot. So if the values are around 70%, set this parameter closer to 50% to not miss any valid pattern locations.

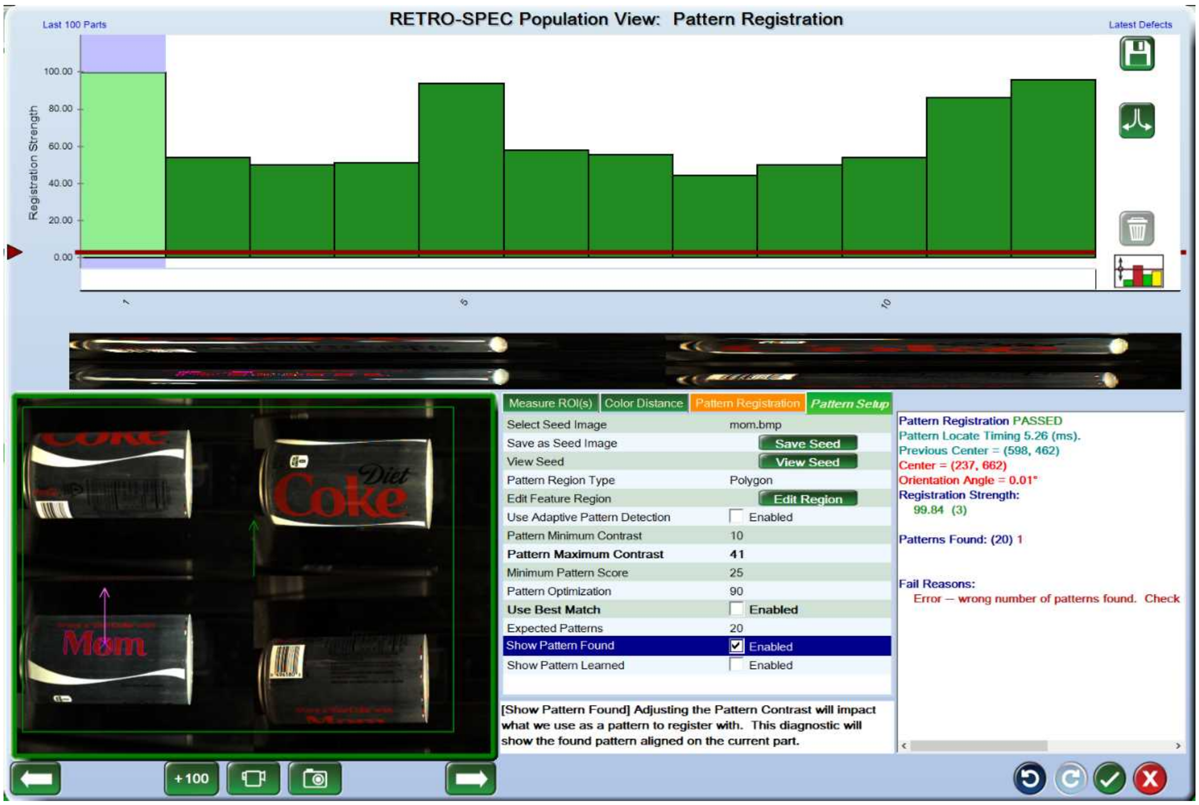
Pattern Optimization: (0 – 100) This determines how diligently the algorithm will attempt to match the pattern. We recommend that you leave this setting at its default value (90). Lower values may be more accurate but take slightly longer. Larger values may be less accurate but take less time.

Use Best Match: (checked, unchecked) This algorithm can find multiple copies of the learned pattern. If you want to use the best match found, then enable this parameter (checked). If you are expecting a specific number of copies, then disable this parameter (unchecked) and adjust the "Expected Patterns" number accordingly. The center and angle reported will always be the first match in the list which is the strongest pattern strength found.

Expected Patterns: (0 – 20) When the system is not looking for the best match ("Use Best Match" - unchecked), then you can set the number of patterns you expect to find.

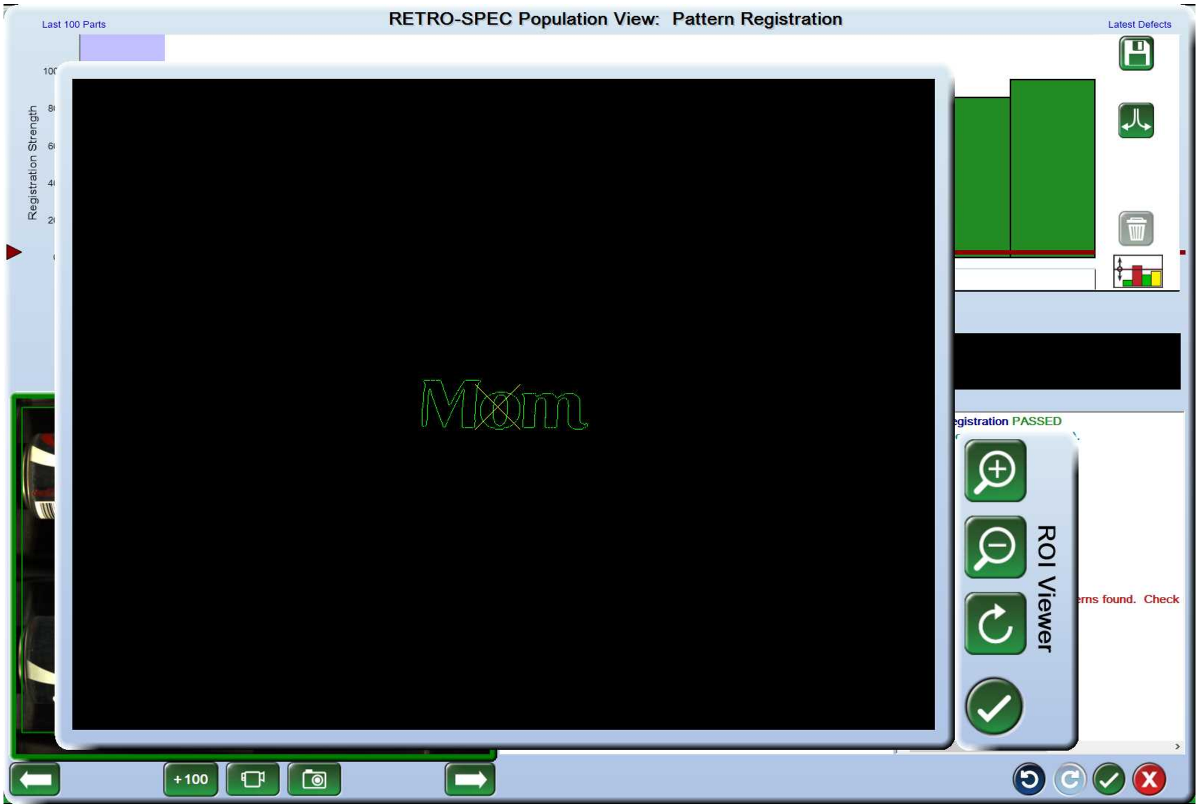
Show Pattern Found:

(checked, unchecked) This shows where in the image and region display that the pattern is found. The pattern is drawn in magenta. The center and orientation angle direction are also displayed.

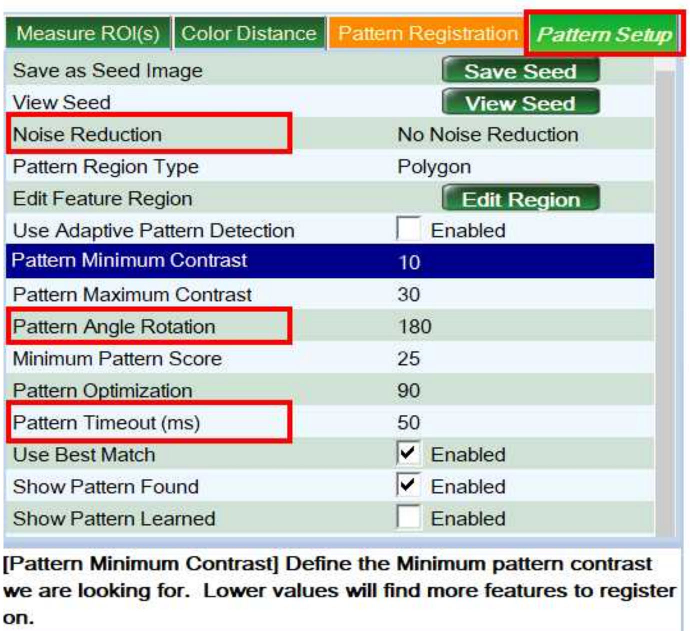


Show Pattern Learned:

This is a diagnostic to show the learned pattern. This is only drawn in the region display area. It overwrites the extracted image data and shows the pattern in green on a black background. This diagnostic will take top priority over the Show Pattern Found diagnostic.



Pattern Setup Menu (Advanced Parameters)



Noise Reduction: (No Noise Reduction, 3x3, 5x5, 7x7) In some images there is a lot of noise around the pattern we want to learn. Noise Reduction filters out background noise and should make it easier to create a good pattern. This filter is only applied to the seed image to generate the pattern. The filter is not applied to inspected part images. The smaller the filter value the less noise reduction. So the 3x3 filter will reduce some noise while the 7x7 will aggressively reduce noise.

Pattern Angle Rotation: (1 - 180) This parameter allows you to optimize the inspection speed by reducing the possible pattern angles. This is the expected rotation in either direction from the learned pattern position angle. This is why the limit only goes to 180 since that will be the same as going full circle (-180 to 180 degrees is the same as 0 to 360 degrees).

Pattern Timeout (ms): (10 - 500) This parameter allows you to force the inspection to fail to find a pattern if it takes longer than the value given here. This is only used in the standard pattern location technique at this time.

Pattern Registration Menu (Normal parameters)

Registration Strength: (0 - 100) This is the RetroSpec plotted value and can be used to fail the part if a pattern that we locate is not strong enough.

Extract In Color:

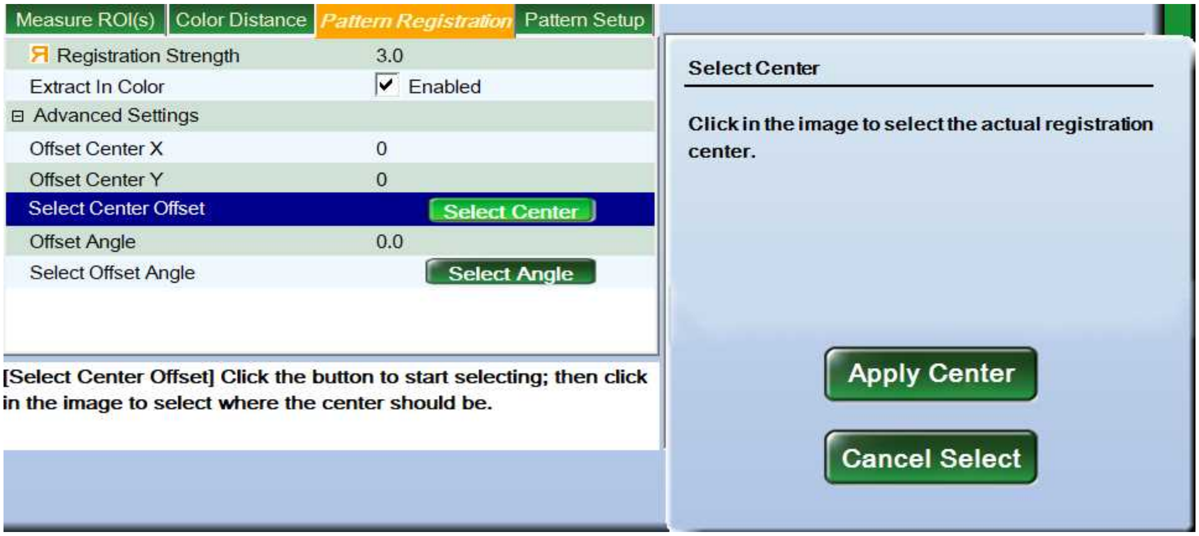
(checked, unchecked) This parameter is only visible if you have a color image. Checked = use color image. When unchecked the system uses the equivalent grayscale image data.

Offset Center X: (range +/- Image Width) This allows you to tweak the pattern position returned. This is the horizontal position offset. In our examples you may wish to set the center to the upper left of the pattern. This can be manually adjusted with this center X parameter or use Select Center Offset to adjust the center visually.

Offset Center Y: (range +/- Image Height) This allows you to tweak the pattern position returned. This is the vertical position offset. In our examples you may wish to set the center to the upper left of the pattern. This can be manually adjusted with this center Y parameter or use Select Center Offset to adjust the center visually.

Select Center Offset:

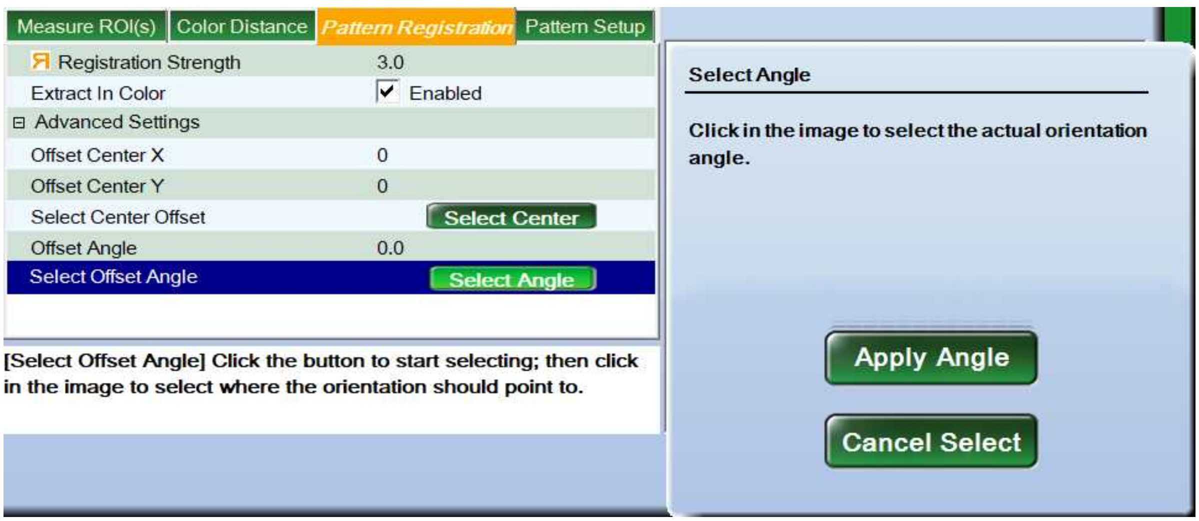
This is allows you to visually set the Offset Center X and Offset Center Y positions. The position is selected by clicking on a location in the current part image. Select the "Select Center" button, select a location in the part image, then select "Apply Center" or cancel your selection.



Offset Angle: (0 - 360) This allows you to tweak the pattern angle returned. This can be manually adjusted with this angle parameter or use Select Offset Angle to adjust the angle visually.

Select Offset Angle:

This is allows you to visually set the Offset Angle. The angle is selected by clicking on a location in the current part image. Select the "Select Angle" button, select an angle in the part image, then select "Apply Angle" or cancel your selection.



Pattern Registration Menu (Advanced Parameters)

Applied Results: This adds the "Registration" version of the inspection. "Applied Results" allows the system to report the position information in the following modes:

- Center and Orientation – Report the found center of the customer code and the orientation angle. Note: The angle may be off 180 degrees since we do not determine the direction of the code.
- Orientation – Report the found orientation angle of the customer code. Note: The angle may be off 180 degrees since we do not determine the direction of the code.
- Center – Report the found center of the customer code.

Pattern Difference

Pattern Difference learns what a “normal” part looks like and rejects the part if it looks different. This inspection only works on grayscale images.

> *Note: this inspection requires the purchase of an additional license and dongle. Contact your sales representative.*

This inspection has a built-in registration and pass/ fail criteria.

You must add Pattern Difference after a region, but this inspection ignores the region. Regions supported are Ring, Polygon, and Measure ROI. You can make the region small and out of the way, so that you do not use much inspection time. This inspection does not need an additional registration.

To set up Pattern Difference, follow the steps in the order presented below. The parameters are described in sections following the steps.

1. Pattern Location

Examine the part to determine if there is a unique feature or pattern that can be used to track the part position and orientation.

Find a representative sample of the unique feature and save that image as the 'seed.' The algorithm works best when the seed image has a clear view of the feature. Choose an image with no reflections, shadows or scratches. Anything abnormal will be learned into the pattern and cause the algorithm to not perform as efficiently as possible. Try to find a part that shows the pattern in the straightest possible orientation.

See "Locate Setup Menu" on the next page

2. Inspection Region

Decide if the pattern can be easily surrounded with a circular region or the custom rectangle region. Then draw / position your region around the product you wish to inspect.

3. Learn Normal Pattern

The learn process uses any images provided in Dataset A. Make sure that you have good images before attempting to learn the normal pattern. If you have any defects in this set, then you will be learning that defect into that pattern.

Enable the “Show Pattern” diagnostic to see if you have a decent pattern. The pattern is shown in magenta overlaid on the current image.

Use the "Show Mean Template" button to show how well the template was created. The algorithm uses the pattern location to position and orient each part. If this is working correctly, then the mean template image will be as crisp and sharp as any single image.

Use the "Show Deviation Template" button to show how clean the learned population is. The brighter an area is, this indicates more part to part variation that the system sees.

Use the Show Image Difference on a good sample and bad sample to see how well the pattern detection is operating.

4. Adjust Inspection

Adjust the Defect Sensitivity and Defect Size to achieve desired results. After you have learned a pattern, the images in Dataset A should most likely all pass. PRO TIP: To check for bad parts in the dataset: lower the Defect Sensitivity to the minimum (2.0 standard deviations), then review any failing parts to see if a defective part snuck into the set. Then manually remove these from the dataset and relearn.

Locate Setup Menu

Select Seed Image: Select the image (from the drop-down menu) to use as the template. You must first "Save Seed" image(s) to create a list of images.

The seed images are stored by part program (the specific folder is defined as Lane N\HPD\part program number so an example is “Lane 1\HPD\34”). This means that the seed images are stored by part program and only available to the part program they were stored with.

Save as Seed Image: This allows you to save the currently selected part as the seed image. Choose the seed carefully so that you have a very good example of the pattern you want to locate or learn.

View Seed Image: This displays the currently selected seed image in a popup window.

Region Type: (Circle or Ring; Rectangle) Create either a Circle/Ring or Rectangle region on the seed image, over the pattern you want to search for. Choose the best type of region for the pattern you want to learn.

Region Editor:

This displays a popup window with the seed image and the type of region you have chosen. Note: This is the same image view tool as described in View Seed Image.

The circle editor allows you to grab any of the yellow control markers to resize the circle. If you enable the “Region is a Ring” option, then you get a second inner circle with additional yellow grab controls. If you enable the “Allow Region Movement” option, then you get a yellow control marker in the center of the region that allows the entire region to be moved anywhere. You also have numeric entry fields for the Radius and Inner Radius (not shown).

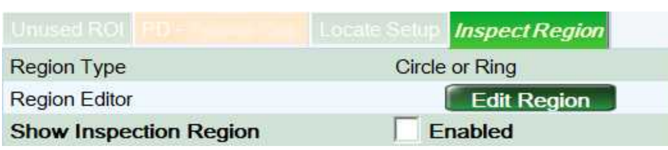
The rectangle editor provides yellow grab markers to change the size and position of the rectangle. If you enable the “Allow Region Movement” option, then you get a yellow control marker in the center of the region that allows the entire region to be moved anywhere.

> *Note: At this time the region cannot be rotated. Make sure the pattern you are searching for fits in the rectangle shape. Adjust the region size if necessary.*

Show Pattern:

(checked, unchecked) This is a diagnostic to show the found pattern. The pattern is drawn in magenta. We also display the center and orientation angle direction.

Inspect Region Menu



Region Type: (Circle or Ring; Rectangle) Create either a Circle/Ring or Rectangle region on the seed image, over the pattern you want to search for. Choose the best type of region for the pattern you want to learn.

Region Editor:

This displays a popup window with the seed image and the type of region you have chosen. Note: This is the same image view tool as described in View Seed Image.

The circle editor allows you to grab any of the yellow control markers to resize the circle. If you enable the “Region is a Ring” option, then you get a second inner circle with additional yellow grab controls. If you enable the “Allow Region Movement” option, then you get a yellow control marker in the center of the region that allows the entire region to be moved anywhere. You also have numeric entry fields for the Radius and Inner Radius (not shown).

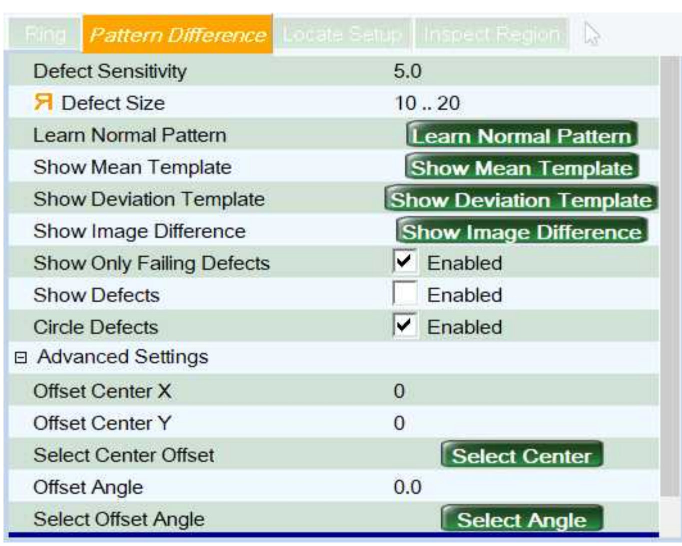
The rectangle editor provides yellow grab markers to change the size and position of the rectangle. If you enable the “Allow Region Movement” option, then you get a yellow control marker in the center of the region that allows the entire region to be moved anywhere.

> *Note: At this time the region cannot be rotated. Make sure the pattern you are searching for fits in the rectangle shape. Adjust the region size if necessary.*

Show Inspection Region:

(checked, unchecked) This is a diagnostic to show where the image is being inspected for pattern consistency. The inspection region is drawn in yellow. Note: as of this publication, the region may not show as expected. Regardless, look at the "Show Image Difference" to see exactly what the system is inspecting.

Pattern Difference Menu



Defect Sensitivity: (2 – 15) Control how much deviation from the learned mean template the pattern is before it is considered a defect. The sensitivity is in the unit of standard deviations from nominal. Typically 3.0 standard deviations (aka 3 sigma) encompasses about 99.73% of a normal distribution. The smaller the sensitivity value the more defect data the algorithm will detect. Pro tip: use values between 3.0 and 5.0 for good results.

> *PRO TIP: To check for bad parts in the dataset: lower the Defect Sensitivity to the minimum (2.0 standard deviations), then review any failing parts to see if a defective part snuck into the set. Then manually remove these from the dataset and relearn.*

Defect Size: (1 – 10000) Control how many pixels that deviate from the pattern, defined by the Defect Sensitivity setting, are acceptable before the current part is rejected. When you view the defects in the image, this is the parameter that shows the largest defect found on the part.

Learn Normal Pattern:

Once you have a good pattern and good parts collected in Dataset A, then press this button to build a Mean and Standard Deviation template (using the parts in Dataset A). You can use the Show Mean Template and Show Deviation Template buttons to verify how well the system learned the label or pattern you want to inspect. Note: you cannot undo a learn operation.

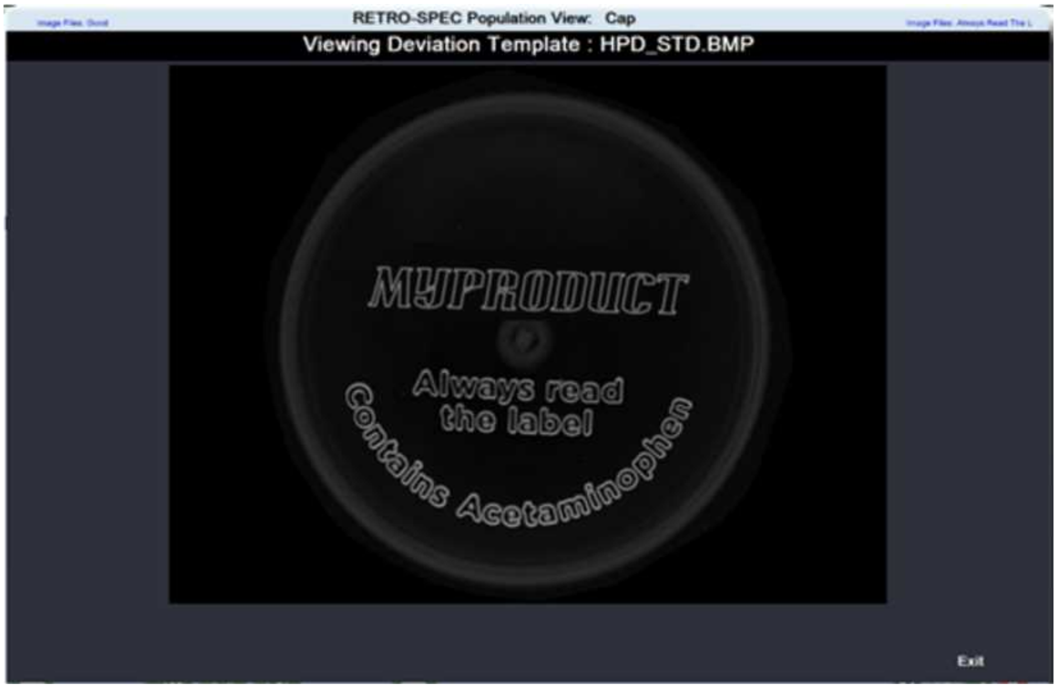
This learn process creates inspection-specific template and deviation files. The learn files are stored by part program and specific inspection (the specific folder is defined as Lane N\HPD\part programnumber\inspectionnumber so an example is “Lane 1\HPD\34\383”). This allows the part program to have multiple pattern difference inspections configured without having the files corrupting each instance of the inspection.

Show Mean Template:

This will display the Mean template that was learned using Learn Normal Pattern. If the pattern location worked well, then you should see a nice crisp image.

Show Deviation Template:

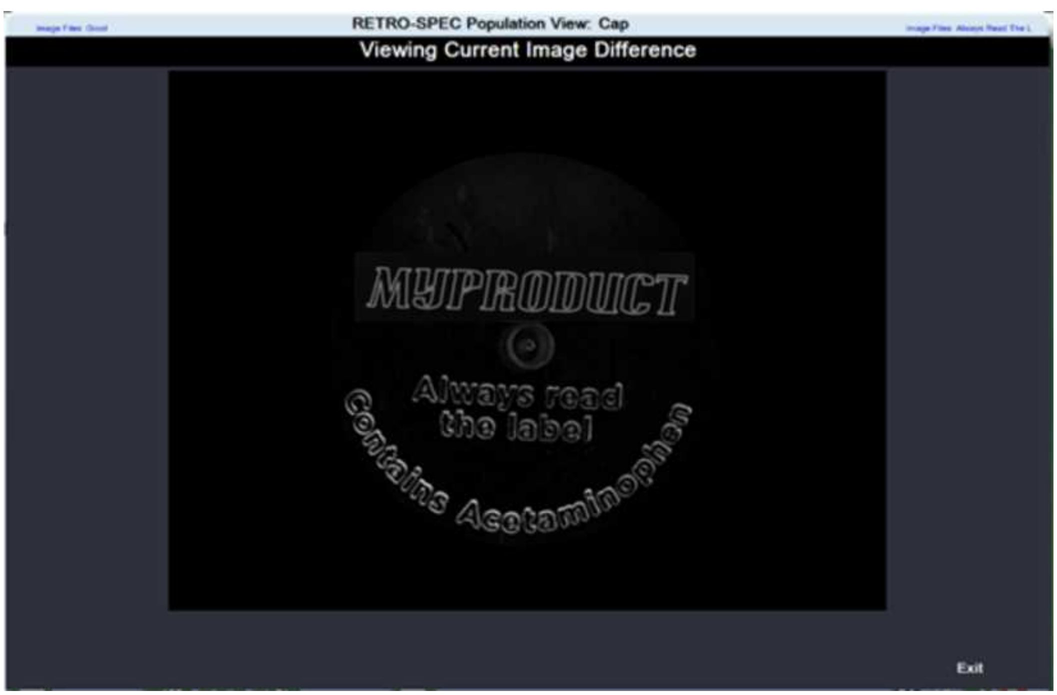
This will display the Standard Deviation template that was learned using Learn Normal Pattern. If the pattern location worked well, then you should see a mostly dark image with some gray to white in the high transition areas. Some variation is expected near transition areas, especially around things like text. The grayshade intensity is an indication of how much deviation there is in a given location. Black equates to a little deviation and white equates to a lot of deviation.



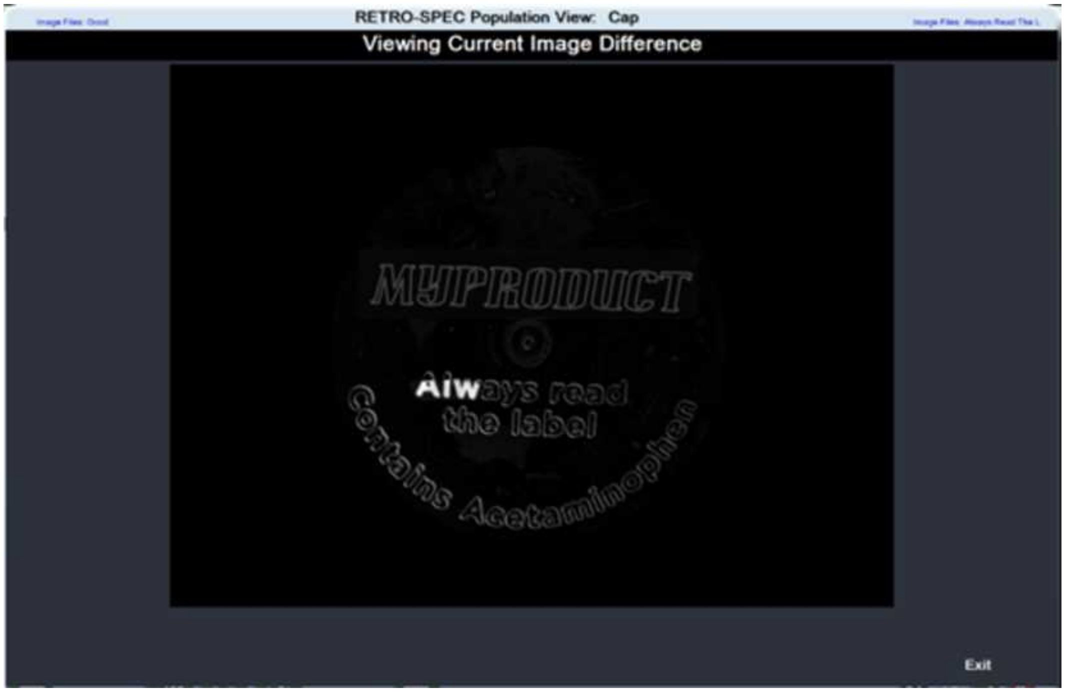
Show Image Difference:

This will display an image with the differences between the template and current part. The part is also positioned and oriented based on the location information to make it easier to see defects.

Show Image Differences – Example of a good part:



Show Image Differences – Example of a bad part with part of the “Alw” missing:



Show Only Failing Defects: (checked, unchecked) This parameter applies to the Show Defects and Circle Defects diagnostics. When checked, the system displays defects in red. When unchecked, the system displays the defects in red and areas that are smaller than Defect Size in green.

Show Defects:

(checked, unchecked) This is a diagnostic to show areas of deviation larger than Defect Sensitivity. Green pixels are those groups of pixels that are smaller than Defect Size (assuming Show Only Failing Defects is disabled). Red pixels are those groups of pixels found larger than Defect Size.

Show Defects – Defects in red with Show Only Failing Defects enabled:

Show Defects – Color coded defects with Show Only Failing Defects disabled (small groups of green pixels are shown):

Circle Defects:

(checked, unchecked) This is a diagnostic to show areas of deviation larger than Defect Sensitivity. It displays a green circle around defects that are smaller than Defect Size (assuming Show Only Failing Defects is disabled) and a red circle around defects that are larger than Defect Size.

Circle Defects – Defects in red with Show Only Failing Defects enabled:

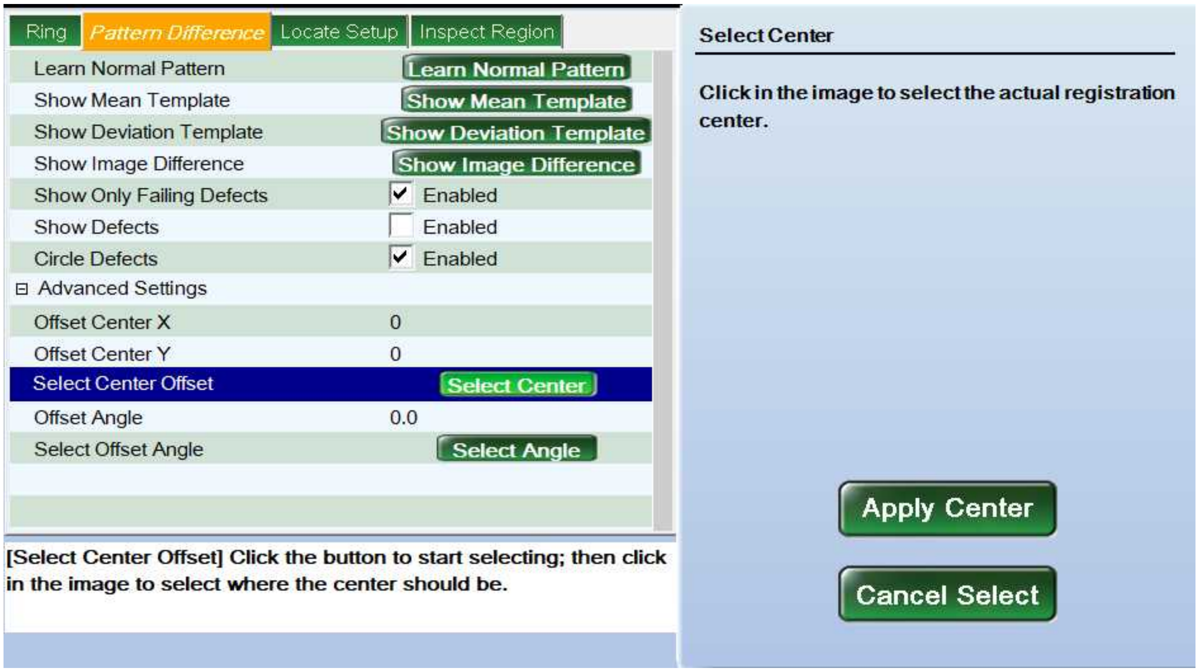
Circle Defects – Color coded defects with Show Only Failing Defects disabled:

Offset Center X: (range +/- Image Width) This allows you to tweak the pattern position returned. This is the horizontal position offset. In our examples you may wish to set the center to the upper left of the pattern. This can be manually adjusted with this center X parameter or use Select Center Offset to adjust the center visually.

Offset Center Y: (range +/- Image Height) This allows you to tweak the pattern position returned. This is the vertical position offset. In our examples you may wish to set the center to the upper left of the pattern. This can be manually adjusted with this center Y parameter or use Select Center Offset to adjust the center visually.

Select Center Offset:

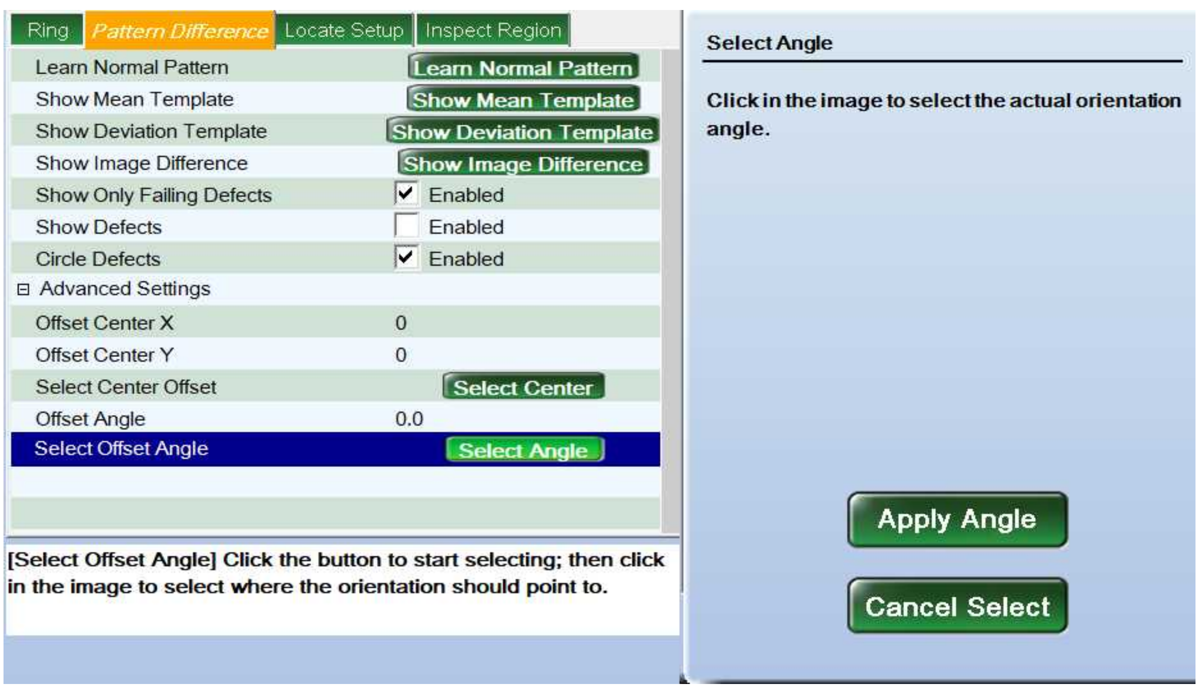
This is allows you to visually set the Offset Center X and Offset Center Y positions. The position is selected by clicking on a location in the current part image. Select the "Select Center" button, select a location in the part image, then select "Apply Center" or cancel your selection.



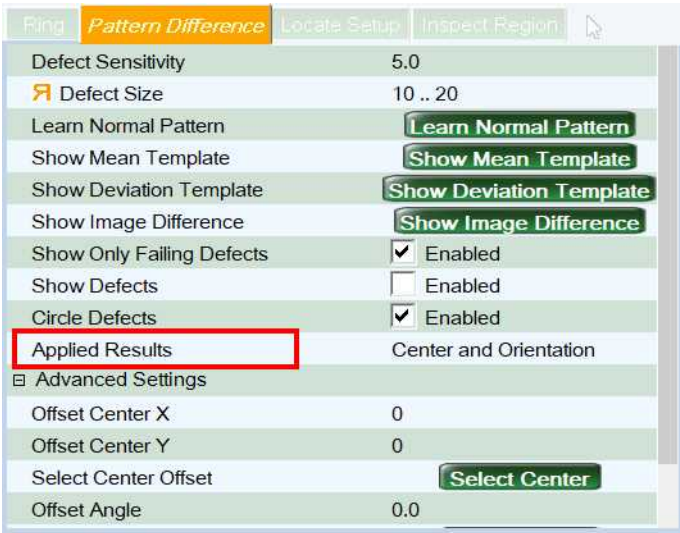
Offset Angle: (0 - 360) This allows you to tweak the pattern angle returned. This can be manually adjusted with this angle parameter or use Select Offset Angle to adjust the angle visually.

Select Offset Angle:

This is allows you to visually set the Offset Angle. The angle is selected by clicking on a location in the current part image. Select the "Select Angle" button, select an angle in the part image, then select "Apply Angle" or cancel your selection.



Pattern Difference Menu (Advanced parameters)



Applied Results: This adds the "Registration" version of the inspection. "Applied Results" allows the system to report the position information in the following modes:

- Center and Orientation – Report the found center of the customer code and the orientation angle. Note: The angle may be off 180 degrees since we do not determine the direction of the code.
- Orientation – Report the found orientation angle of the customer code. Note: The angle may be off 180 degrees since we do not determine the direction of the code.
- Center – Report the found center of the customer code.

Orientations

Orientation An orientation compensates for part rotation by finding a grayscale pattern. An analysis which must rotate with the part must follow an orientation.

> *Note: you must first place a Region of Interest where you want the Orientation to take place.*

Available orientations include:

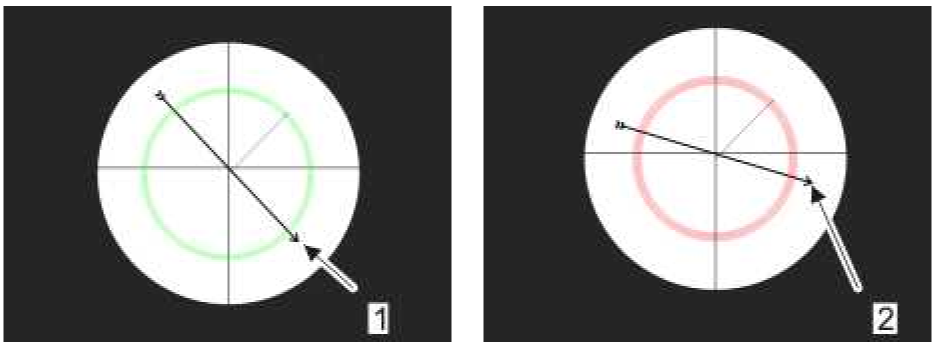
"Pattern Match" below

"Template Orientation" on page 312 (note: there is also a Template Registration)

> *Note: the Centerline and Template Registrations also contain an orientation angle that can be used to orient regions.*

Pattern Match

Pattern Match Orientation creates a pattern that inspected parts must meet. A reference must be set on one good part.



1) Normal orientation; 2) Incorrect orientation

> *Note: Pattern Match only works with a "Ring Region" on page 209.*

To add a Pattern Match Orientation:

1. Make sure a Ring Region of Interest has been added to the inspection tree. Normally the region is a narrow donut- shaped region placed over a repeatable pattern on the part, such as ridges or other geometry.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add | Orientation | Pattern Match.
4. Adjust the placement of the region and parameters as necessary.

Pattern Match menu

> *Important: Set Reference before adjusting other parameters.*

Symmetry Repeat [Advanced parameter] Divide the region into sections. The system only needs to match the pattern in one of these sections to determine proper orientation. An example for the use of symmetry is when you are inspecting the base of a bottle that has five feet - use a symmetry of five. Inspection time = 1/symmetry squared. If symmetry = 5, then orientation takes 1/25th inspection time.

Radial Spacing The number of pixels between search circles. It can be used to increase the speed of this inspection, especially if the region is large.

Select Offset Angle Set the Offset Angle (described below). Click the Select Angle button, then click in the image where you want the orientation to point to.

> *Note: you can only set Offset Angle if the inspection is passing. You may have to adjust other parameters, or disable other inspections while setting this to get the inspection to pass.*

Offset Angle [Advanced parameter] Allows you to rotate the inspections on an image. Set the angle on a specific feature to match the current orientation of the part. This feature saves you from modifying subsequent regions during slight changes that might affect region placement.

Set Reference 

Click the Set Reference button to set the reference pattern from the currently displayed image.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: Show Graphics = checked.*

Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Pattern Match Confidence Define how closely the pattern must match the original sample. To adjust this value, you can change the numerical value, or click and drag the red line in the Retro-Spec graph at the top of the screen. If you check Show Pattern Match, you can see the red failure limit line in the unwrapped image move when you change this value.

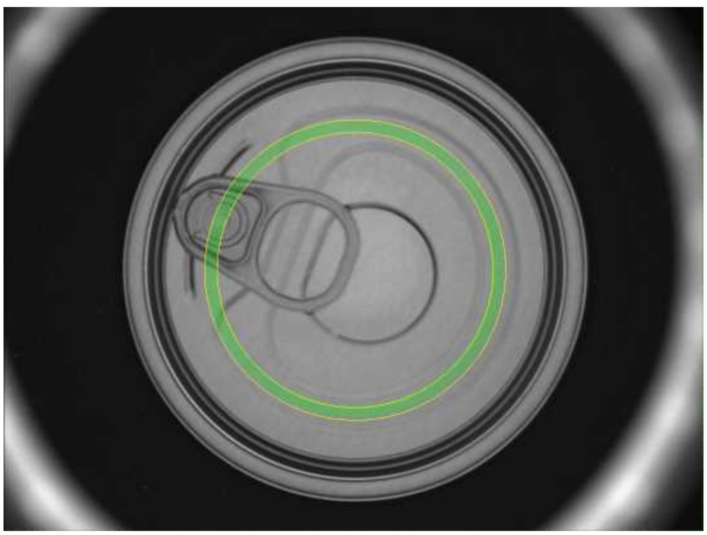
Template Orientation

Template Orientation can determine the orientation of a feature that is either irregularly shaped, or is located in a region with a lot of gray scale variation. It can be used on any type of part. It is fast and accurate.

> *Note: if you have a part that requires using symmetry, such as the base of a plastic bottle, or a lugged closure, use Pattern Match to find the orientation.*
> *Note: you must have a registration in the part program prior to the Template Orientation. The registration will locate the part and allow the Template Orientation to be properly placed.*

Before adding a Template Orientation:

1. Add a registration that will best locate your part.
2. Add a region of interest in the area where you want to place the Template Orientation. An example is shown below. We want to orient the part using the rivet and the surrounding part geometry.



To add a Template Orientation:

1. Make sure a region of interest has been added to the inspection tree. A sample Ring region placement is shown above.
2. Acquire about 100 images to get a good sample population of part images:
   - Put the lane online, long enough to acquire about 100 images. Take the lane offline.
   - OR: Use Offline Imaging. Right-click the Sensor button to see the Sensor menu | Offline Imaging | Immediate Mode Run button. Exit the Offline Imaging screen after acquiring about 100 images.
3. Right-click on the item you just added.
4. From the Inspection menu, select Add | Orientation | Template Orientation. The orientation is added to the inspection tree. Re-name it to something more meaningful to you.
5. The Template Orientation menus are displayed and the region is shown on the image. (The menus are described below) Adjust the placement of the region and parameters as necessary.

Next, save a seed image. The system uses a "seed" image to create an average image for the template.

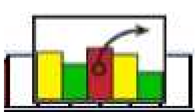
To save a seed image:

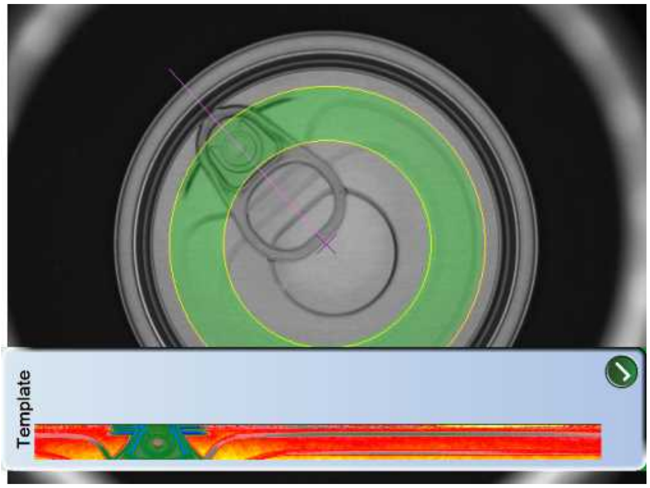
1. From the Retro-Spec graph, find an image that represents an average part. Use the arrows to scroll through the images.
2. If necessary, adjust the region size to cover an area where there is a repeatable grayscale pattern.
3. Go to the Template menu (described below) and click the Save Seed button.
4. Name the seed image and click the OK button.

5. To verify that you have saved a good image, click the View Seed or View Template button. The Template Image Viewer will display the seed image you saved. If you want to save a different image, select another image and click the Save Seed button.
6. In the Template menu, make sure Feature Region = All of ROI.

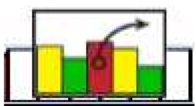
Next, create a template. The system will use the seed image as the first image when creating the template, then add information from Data Set A.

To create a template:

1. In the Retro-Spec graph, view all the images in Data Set A [left side of the screen]. Look for a range of part images that best represent your production (they do not have to all be perfect).
2. Delete any bad images:
   a.  Click the Lock/ Move Parts button to unlock the data set.
   b. Click the bar on the graph for any part you want to delete, then click the trash can icon to delete the part from the set.
   c. For information about how to use the graph, see Retro-Spec Population View Graph.
   d. Click the Lock/ Move Parts button again to lock it.
3. Click the Create Template button. The system will use all images in Data Set A, with the seed image, to create a template.
4. Click the View Template button to view the created template. The image should be sharp and clear. If it is sharp and clear, then go to "To set up the Template Orientation" section. If the template is not sharp and clear, then you may need to refine the template. A good example is shown below. (The colors are only used for software reference)



To refine the template:

1.  In the Retro-Spec graph, view all the images in Data Set A [left side of the screen]. Look for a range of part images that best represent your production (they do not have to all be perfect).
2. Delete any bad images:
   a.  Click the Lock/ Move Parts button to unlock the data set.
   b. Click the bar on the graph for any part you want to delete, then click the trash can icon to delete the part from the set.
   c. For information about how to use the graph, see Retro-Spec Population View Graph.
   d. Click the Lock/ Move Parts button again to lock it.
3. In the Template menu, set the number of Learn Passes. More Learn Passes will create a more accurate template, but may take more time.
4. Click the Refine Template button. The system will add data to the template already created when you clicked the Create Template button.
5. Click the View Template button to see the updated template. The image should be sharp and clear. If it is sharp and clear, then go to "To set up the Template Orientation" section. If the template is still not sharp and clear, then you may need to add more images and refine the template again, or change the settings on other parameters.

Next, set the parameters in the other menus. Use the steps below for quick setup of the orientation. Depending on your part and application, you may need to make other adjustments after these steps. The parameters for each of the menus are described at the end of this section.

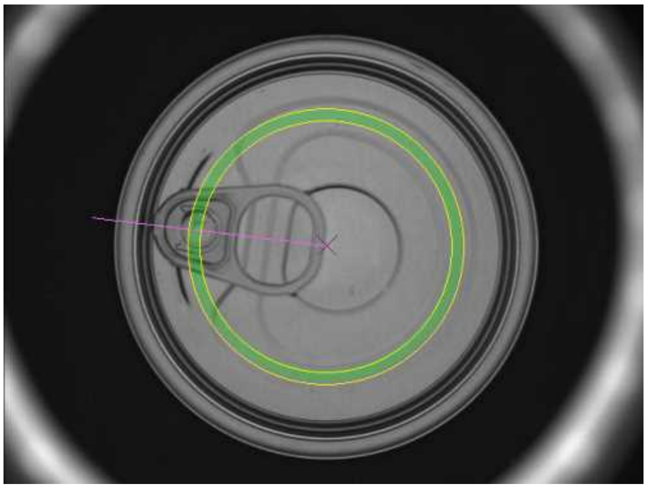
To set up the Template Orientation:

1. In the Template Orientation menu, click the Suggest button so that the system can adjust to the image.
2. Click the Select Angle button. Click in the image where the orientation should point to. Then click the Apply Angle button to complete the process.

3. Select and adjust Orientation Strength to pass or fail the part. This can be adjusted using the bars on the graph.
4. Test the orientation:   Put the lane online to acquire several images, then click the or buttons to update the Retro-Spec graph. Make sure that bad parts are failing, as indicated in the Retro-Spec graph (red bars). Take the lane offline. If you used the movie button to update the images, then click it again to stop updating the Retro-Spec graph.

5. Make other adjustments as necessary in the menus, making sure that the orientation is properly found on each part, and that improperly oriented components make the part fail.

Below is an example of how a Template Orientation looks on a part.



Template Orientation menu

Use the Standard Settings button and Select Angle button for easy setup in this menu.

If your inspection is not getting consistent results, set the Angular Samples, Downsize Level, and Offset Angle, using the guidelines described below.

Orientation Strength Set the minimum orientation between the inspected image and the template image. You can set this through the bar on the graph. If the current part falls below this value, the part fails.

Offset Angle

Rotate the inspections on an image. Set the angle on a specific feature to match the current orientation of the part. You can use the Select Angle button to set this value. This feature saves you from modifying subsequent regions during slight changes that might affect region placement.

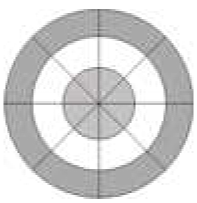
> *Note: this angle can only be set after you create a template.*

Select Offset Angle Click the Select Angle button to initiate the selection. Then click in the image where the orientation should point to. Wait while the system computes and then populates the Offset Angle parameter. Then click the Select Angle button to complete the selection.

Angular Samples

This number is automatically set by clicking the Standard Settings button (in the Settings menu). This number divides the region into a number of arcs. See example below.

Example: This example shows a region with three (3) radial samples [inside to out] and eight (8) angular samples [pieces of a pie]. (Note: these values are not available in the inspection. These examples and shading are for illustration purposes only.)



Suggest Samples Click the Suggest button to automatically set Radial Samples and Angular Samples based on the current region settings.

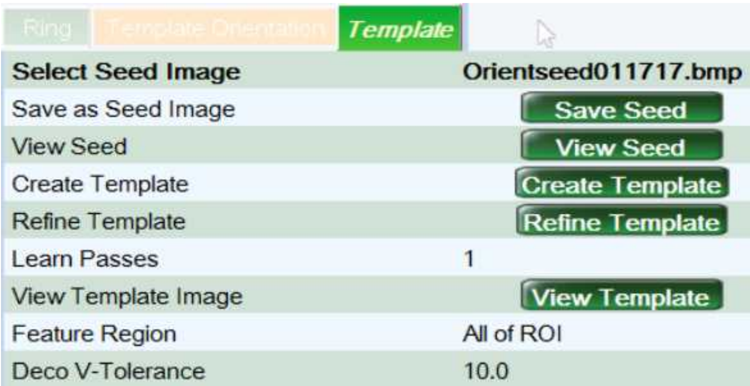
Downsize Level Using this option depends on the image. For example, if your part image has grain, then use a Downsize Level of 4 to 1 - this will blur the image enough to almost ignore the grain. The system groups pixels when you enable this option. Larger values reduce the image further, speeding up the inspection at the cost of resolution.

> *Note: For Template Orientation, Downsize Level can be left disabled for most applications.*

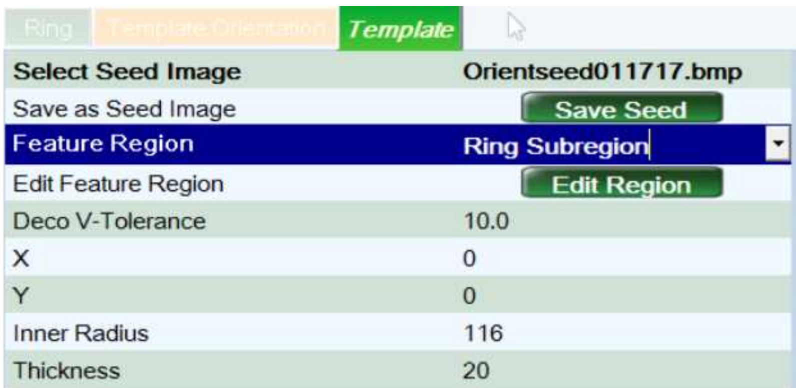
Orientation Matching This uses template data as a reference and compares it to current part data. Normally, use Component Magnitude. If you are getting inconsistent results, try the other techniques in this order: 1) Component Power, 2) Global Power.

Contrast Dampening [Advanced parameter] We recommend that you leave this set at zero.

Template menu



or



This menu allows you to save a template image, view the selected template image, and create a region that is different from the region of interest that the orientation uses.

Select Seed Image: Select the image (from the drop-down menu) to use as the template. You must first "Save Seed" image(s) to create a list of images.

Save as Seed Image: Select the best image in the Retro-Spec graph, and click the Save Seed button. The image is saved to the lane and sensor. Example: C:\Pressco\Lane 1\InspectionTemplates\dime_10.bmp.

View Seed or View Editor

This is the image you selected through "Select Seed Image."

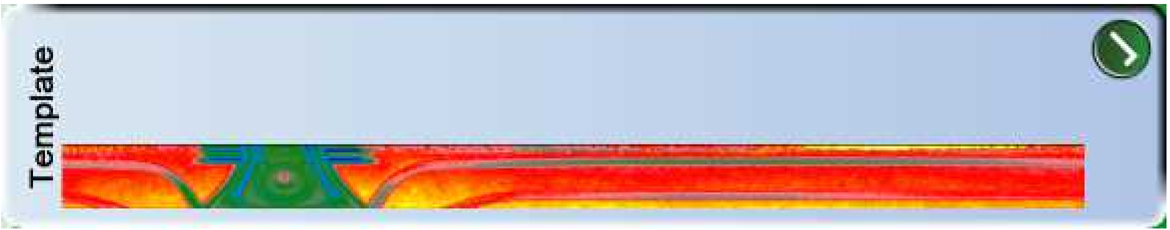
Create Template Use all the images in Data Set A to create an average image, starting with the seed image. For best results, delete all defective images, or images that you do not want as part of the template, from Data Set A.

Refine Template Add images to the average template, from the images in Data Set A. For best results, delete all defective images, or images that you do not want as part of the template, from Data Set A. This process is beneficial to run at a later time from when the inspection was created, because over time materials or processes may change slightly, and you can build in new parts to the template.

Learn Passes Define the number of learning passes to perform. This applies to the Refine Template process.

View Template Image

View the average image created through the **Create Template** and **Refine Template** buttons. This example is rotated 90 degrees.



Feature Region

> *Note: most applications use All of ROI. If you use Ring or Polygon subregion, then the system only uses a seed image as the template (not Data Set A, as is used when you click Create Template).*

All of ROI - Use the region of interest already set up prior to this inspection.

Ring Subregion - Create a region smaller than the search region, to speed up inspection time.

Polygon Subregion - [Not used in Template Orientation] Create a polygon region to use for the template instead of the search region, to speed up inspection time. When you choose this option, click the Edit Region button to create the polygon. In the viewer, create a polygon by clicking several points in the image. To complete the polygon, click the first point again.

> *Note: The following parameters are used only if Ring Subregion is selected.*

X and Y

The center of the **template** region.

Inner Radius Size of the inner ring.

Thickness The thickness of the ring; outer radius minus inner radius.

Use Arc Segments This is normally NOT used in this inspection. If enabled, it divides the ring region into arc segments.

Deco V-Tolerance [Advanced Parameter] After performing an orientation, this allows for a small shift of the decoration along the primary oriented direction. The vertical direction of the imaged feature is often used for the orientation.

Cross Tolerance and Seam Mode [Advanced Parameters] These are set specifically for each can, for learning deco patterns using a Cylindrical Region.

Analyses

These inspections analyze the part for defects, features, measurements, or gray shades.

> *Note: you must first place "Regions of Interest (ROI)" on page 209 where you want the analysis to take place. We also recommend a Registration and an Orientation (depending on the part type) prior to an analysis.*

The available types of analyses are:

> *Note: Your system (and this book) may show only those items that apply to your application.*

To add an analysis:

1. Make sure a Region of Interest has been added to the inspection tree. We also recommend a Registration.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add | Analysis | select the desired analysis. Re-name the analysis to something more meaningful to you.
4. Adjust the placement of the region and parameters as necessary.

Ambient

Ambient measures gray levels in a region and looks for abnormal gray levels.

1) Normal ambient | 2) Incorrect ambient

Ambient menu

Ring Region	Ambient
Ambient Technique	Density
Ambient Analysis Mode	Max Only
Region Extraction	Read Radially
⊟ Ambient Limits	
Nominal	39
Record SPC Statistics	☐ Enabled

Ambient Technique

Max Amplitude - looks for the gray level with the most pixel counts within the histogram of the search area.

Peak Percentile - locates the gray level value above a percentage of the highest gray level value.

Ambient Threshold - defines what percentage of the search area to use.

Density - computes the average of all the pixel gray levels.

For more information about these techniques, see Parameter Illustrations

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Ambient Analysis Mode

Specify the reject criteria.

Min & Max - The minimum and maximum acceptable ambient gray level values. Any computed ambient found lower than or greater than these values will cause the inspection to fail.

Min Only - The minimum acceptable ambient gray level value. Any computed ambient found lower than this value will cause the inspection to fail.

Max Only - The maximum acceptable ambient gray level value. Any computed ambient found greater than this value will cause the inspection to fail.

Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Ambient Limits The minimum and maximum acceptable ambient gray level values. Any computed ambient found lower than or greater than these values will cause the inspection to fail.

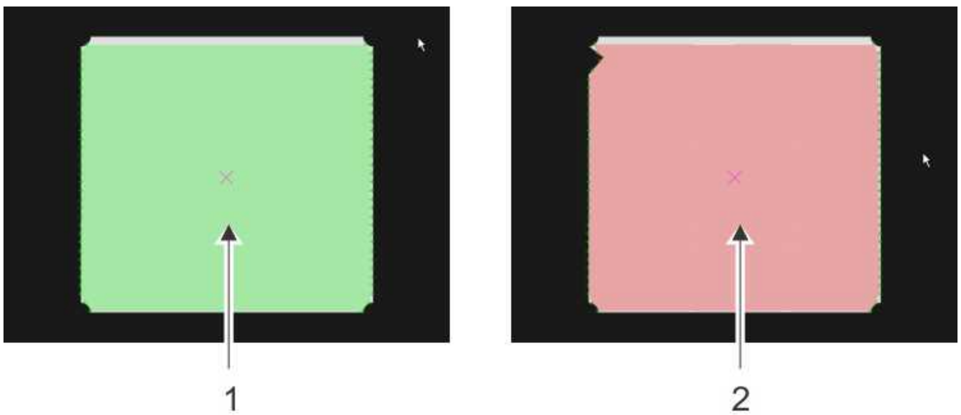
Nominal The expected gray level value of the region of interest.

Keep Retro-Spec Statistics Check this box to keep statistics such as Mean, Standard Deviation, and CPK, from this inspection. For more information see Retro-Spec Statistics.

Shape Check

Shape Check looks for a certain shape and rejects parts if they are out of tolerance. This feature helps ensure that the search region does not get fooled by an irregularly shaped container.

> *Note: This inspection is only available for "Adaptive Region" on page 223.*



1) Normal part | 2) Part failed Shape Check

Shape Check menu

Select between three methods to determine proper shape (Area Check, Cross Section Check, and Vertex Deviation Check).

Area Check Enable the Area Range portion of the inspection. This computes the area of the region in pixels to check for proper region size.

Area Range Define the acceptable deviation (in pixels) from the normal area of the region. You may also adjust the values on the Retro-Spec graph.

Nominal The expected area size. This number is populated when you press the Learn button.

Learn Nominal Area Click the Learn button to automatically learn the area.

Cross Section Check [Only when an Adaptive Region is added to a Centerline registration] Enable the Cross Section portion of the inspection. The system ensures that the learned distance between the two sets of points is within tolerance.

Maximum Cross Section Deviation First use the Learn Cross Section button to determine the normal values. The distance is in pixels. Then adjust these values per your specifications.

Learn Cross Section Click this button to determine the normal values for the Cross Section check.

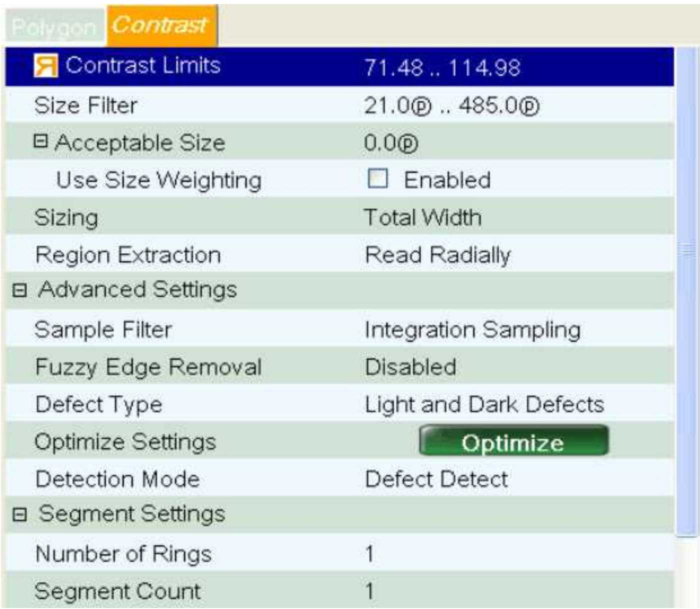
Vertex Deviation Check [Only when an Adaptive Region is added to a Centerline registration] Enable the Vertex Deviation Check portion of the inspection. This check looks at the deviation between consecutive edge points, and is performed on each side. An example where this feature is used is searching for choked necks on bottles. The vertex edge points are determined when you use Learn Cross Section.

Maximum Deviation Side 1 and 2 The system computes the distance (in pixels) between consecutive edge points. Adjust the sensitivity per your specifications.

Contrast

Contrast looks for light and dark defects within your region. You can look for light defects only, dark defects only, or both light and dark defects. In the example image below, a Contrast analysis found a scratch. For information about adding an analysis, see To Add an Analysis.

Contrast menu



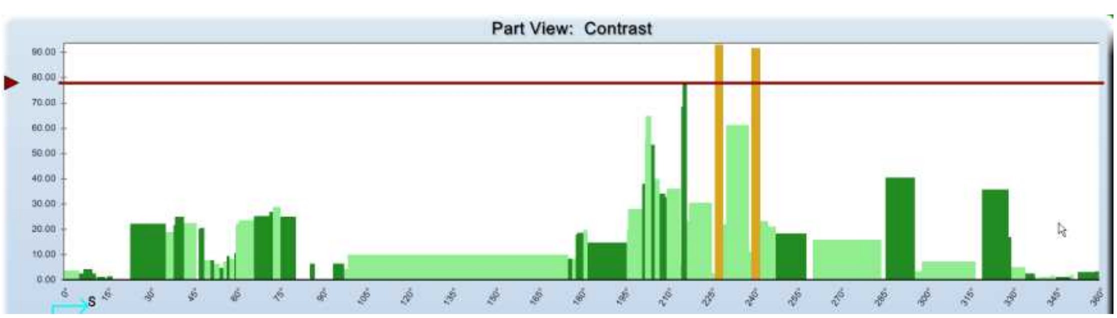
> *Note: The symbol [ⓟ] indicates that this value is in pixels. Your system may show [mm] for millimeters, ["] for inches, or [ ] blank for custom units. It indicates that this value can be calibrated using Review Camera Calibration or Image Analysis for the current sensor.*

Contrast Limits Set the sensitivity of the inspection. You can also move the red and yellow bars on the Retro-Spec graph by selecting the arrows to the left of the graph.

Size Filter Choose a feature size you want to measure. For example, you may want to ignore very small features but find larger ones. For example, if Size Filter is set to 3 -- 80, any feature smaller than three pixels or larger than 80 pixels would be ignored.

Acceptable Size

This looks at the width of only those peaks that go above the contrast bar. It sums up the total size of those peaks and puts a limit on how large the total size of the defects can be. In the Part View graph shown below, there are peaks that go above the contrast bar. However, Acceptable Size is set to a number greater than the sum of those peaks, and this part passes. Acceptable Size allows you to pass parts with some anomalies, but reject parts with too many anomalies.



Use Size Weighting

This feature helps find defects such as wrinkles on metal parts. It is not normally used on bottles.

- If an area of the part fails, it is weighted. If the area does not fail, it is not weighted.
- The Acceptable Size parameter changes (with a slider) to provide adjustment for weighting.
    - The left value is Acceptable Size; see the description for that parameter.
    - The right value adjusts the weighted size limit.

Sizing

Choose between Total Width and Total Area for the inspection. The Number of Rings also affects Sizing.

- Total Width, the default setting, adds the number of units (pixels, millimeters, etc.) of defective bars at or above the sensitivity level within an inspection region or segment.
- Total Area adds all the defect pixels. Suppose your part had two small defects along the same radial line. Normally, the width of the predominant defect would be counted. But with Area enabled, all defect pixels are counted. This results in a larger defect area counted.

Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Advanced Settings

Sample Filter Choose how to filter the samples. The default selection is Integration. Leave that selected for most applications. Concavity is used for detecting and ignoring draw marks in two-piece beverage cans.

Fuzzy Edge Removal This is for parts that have normal anomalies at the edges that are fuzzy, but the feature edges are sharp and clear on the image. The default is disabled. The higher the Filter Level, the stronger the fuzzy edge removal. Be aware that this filtering increases inspection time.

Defect Type Search for dark, light, or both types of defects.

"Optimize" on page 326 settings

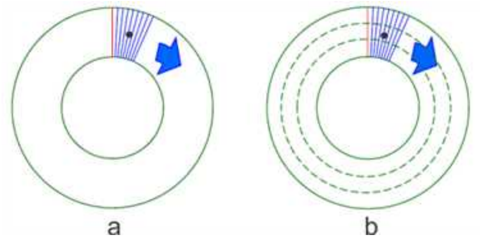
Detection Mode [Advanced parameter] Search for either a defect (default setting) or for a feature (for example, a feature that should be there and its absence represents a defect).

Detection Mode [Advanced parameter] Search for either a defect (default setting) or for a feature (for example, a feature that should be there and its absence represents a defect).

Segment Settings

Number of Rings

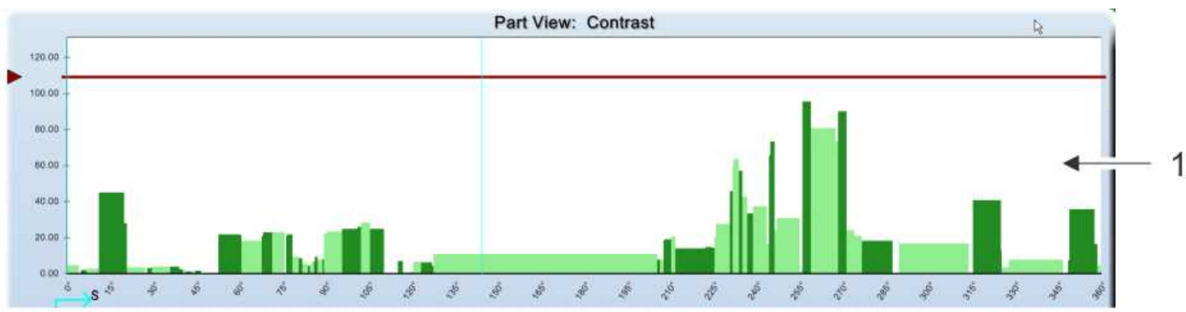
The number of concentric rings the region is divided into (for Read Circularly or Read Radially Region Extractions only). More rings generally means more sensitive.

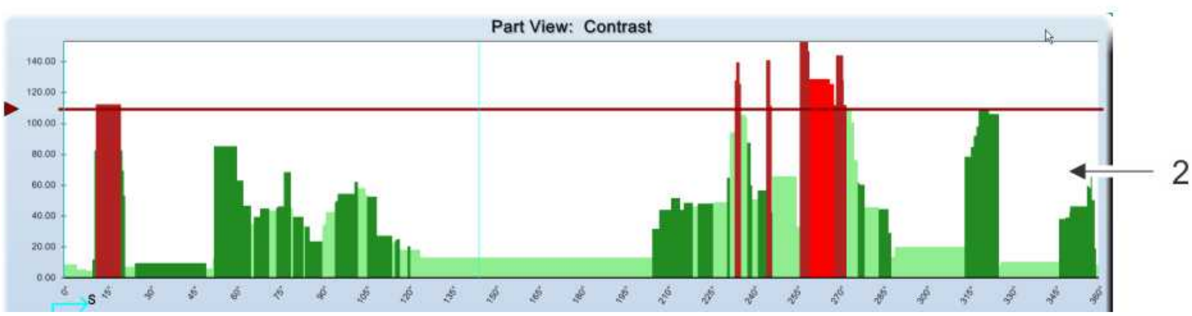


a) Region with one ring

b) Region with three rings

The example below shows a Part View graph of the same part's region with one ring [item 1], and that same region divided into several rings [item 2]. Notice that the width of the peaks do not change, but the amplitude of the peaks change, because the system is focusing on a smaller region.





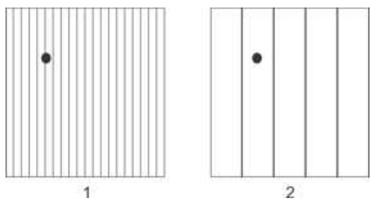
1) Part with region with one ring

2) Same part with region divided into several rings

Number of Segments The number of angular segments the region is divided into.

Ring Height

This number refers to a number of pixels wide or high, depending whether you are using Read Horizontally or Read Vertically for Region Extraction. Ring Height can improve sensitivity to defects that do not span the width of the inspection region. The default value for Ring Height is one, which is the most sensitive value. In the example below, Ring Height in [item 1] is one pixel, and Ring Height in [item 2] is five pixels. In this case, the part using Ring Height of one [item 1] would be more likely to fail than with a Ring Height of five [item 2].



1) Smaller Ring Height - more sensitive

2) Larger Ring Height - less sensitive

Optimize

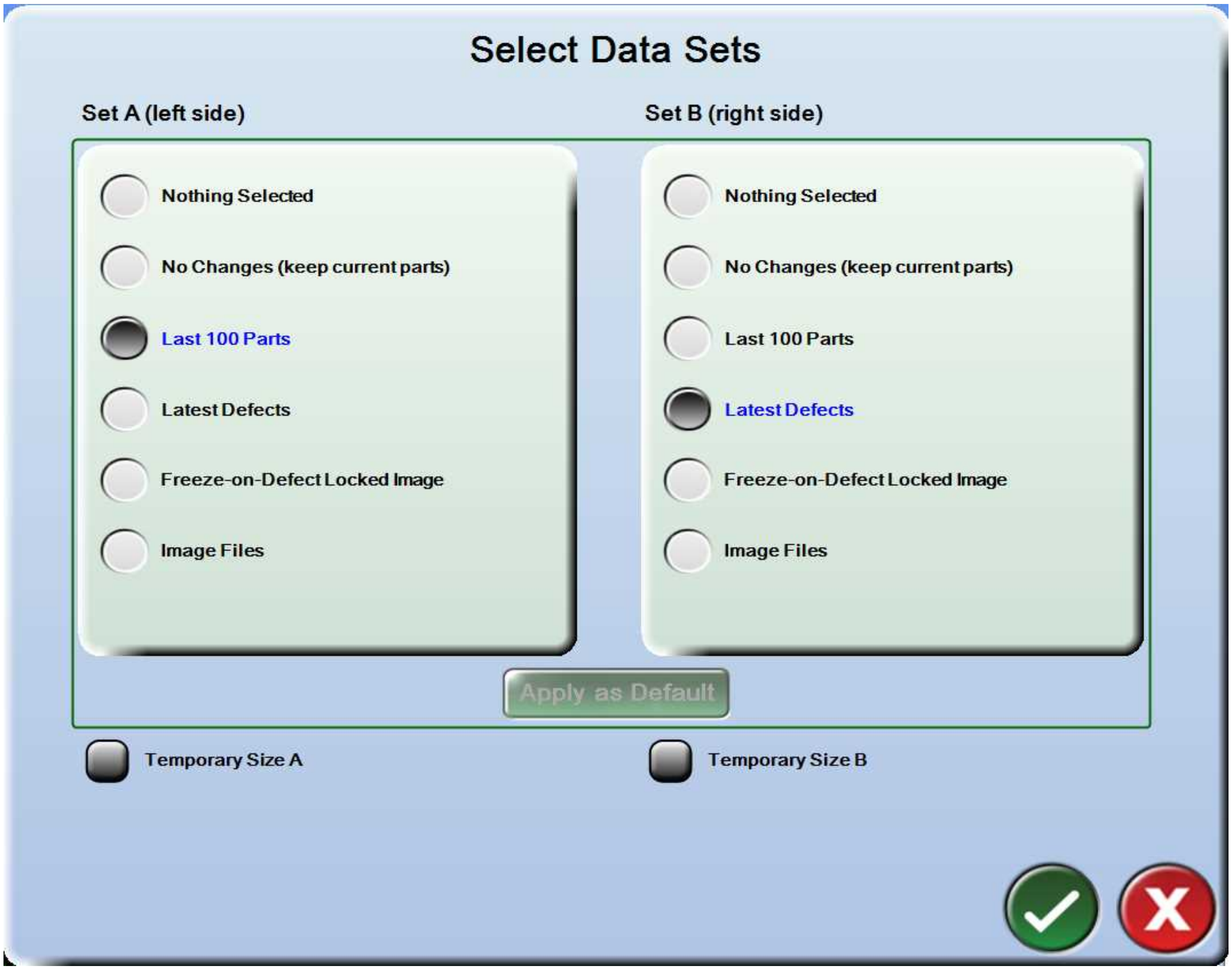
The Optimize feature in Contrast inspection automatically sets the optimum settings for many inspection parameters. It is processor-intensive and must be done off-line. For this to work correctly, ensure that you have moved all acceptable images to the left side of the Retro-Spec graph (Set A), and the defect images to the right side of the graph (Set B). Optimize is available under "Advanced Settings."

To use the Optimize feature:

1. Make sure the Retro-Spec graph is in Population view: right-click on the graph to select Population View.
2. Load a set of good images into Data Set A

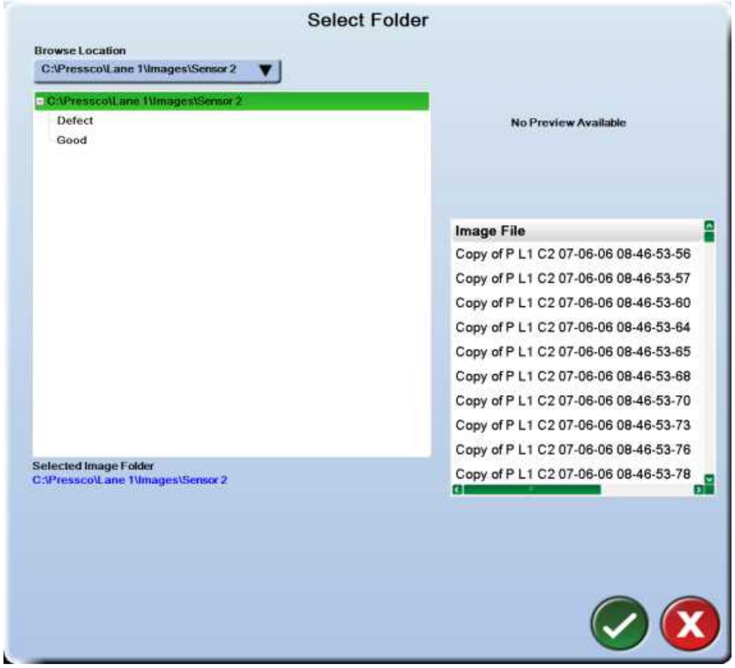
To load good images into Data Set A:

1. Look at the Retro-Spec Population View Graph.
2.  Click the data sets button on the Retro-Spec graph to view the Select Data Sets menu.



3. Click the Image Files button for Set A.

4.  Click the disk icon to browse to the folder where the images were saved. The Select Folder menu is displayed.



5. Browse to and select the folder that contains the images you want to load.
6. Click the OK button in the Browse Location and Select Data Sets menus to load all the bit-map images that were previously saved in the selected folder.

In the Select Data Sets dialog box, use the Apply As Default button to remember your preferred data sets. If you select Apply as Default (for example: Set A = Last 100 parts; Set B = Latest Defects), then the system will automatically select those options the next time you open the dialog. The setting is saved with your user account.

Next load a set of images of bad parts into Data Set B. These parts should have defects in the current inspection's region of interest.

To load images of bad parts:

1. Click the button to view the Select Data Sets menu.
2. From the Select Data Sets menu, select Latest Defects, or choose Image Files for Set B. For Image Files, browse to a folder that contains images of bad parts. Click the OK button.
3. Exit the Select Data Sets menu.

To finish setting up the Optimize feature:

1. In the Contrast menu, choose the Defect Type: light, dark, or both.
2. Adjust the Acceptable Size parameter to catch the size of defect you want to detect.
3. Click the Optimize button. The system will analyze the part sets and determine the best settings to pass the good parts while failing the bad parts. Wait till the optimization process is complete - this may take several seconds.
4. Scroll through the images from the Retro-Spec graph to determine whether the good parts are still passing and the bad parts are failing. You should see good parts on the left side of the graph, and bad parts on the right side of the graph.

5. Test the inspection by loading more images. You can make slight adjustments in the Contrast menu if necessary.

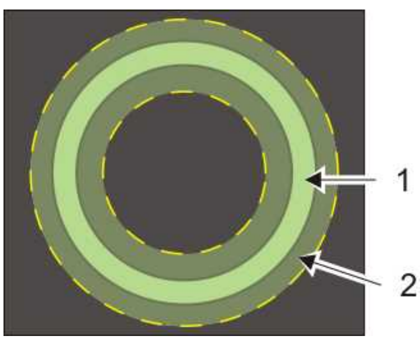
Measurement

Measurement analysis determines an inner/outer diameter and/or width of a feature. It can be used in other types of shapes, but is most often used to measure circular features. It can find non-round (oval) parts, as well as incorrect widths of circular features.

Before setting up the Measurement analysis:

1. Decide which feature you want to measure: inner diameter, outer diameter, width, or all three.
2. Make actual measurements on a good part. Measure at least one of the features you want to measure (inner diameter, outer diameter, and/ or width). Make a note of these measurements to input into the analysis during setup.
   - Note: if you choose Inspection Calibration [most common] during setup, then you only need one measurement. If you choose Feature Calibration, you will need the actual values of all the features you want to measure.
3. Place a Region of Interest over the area you want to measure, allowing space to find edges.

> *Tip: If you want to measure the width of a circular feature, make the region approximately as wide as the feature on both sides. For example, if the feature is 10 pixels wide, place the region 10 pixels outside of the feature, as well as 10 pixels inside of the feature as in the example shown below.*



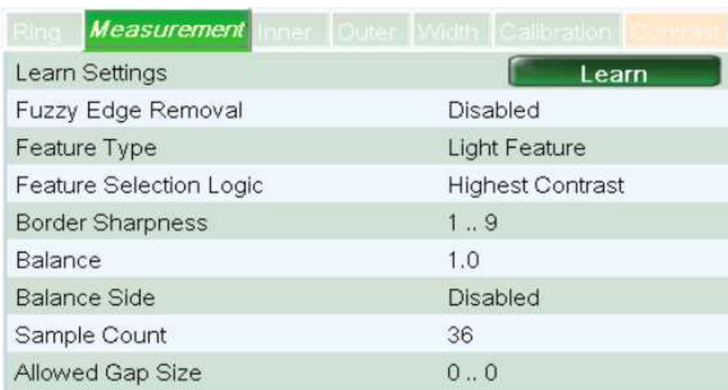
1) feature | 2) region

To set up a basic Measurement analysis:

1. In the Measurement menu, pick a Feature Type [see description below].
2. Choose whether to inspect for inner diameter, outer diameter, width, or all three. Under each of the corresponding menus, enable those measurements.
   - Note: for most applications, you can disable Range and Continuity. Leave these enabled only if required by your plant.
3. Go to the Contrast menu and adjust the Contrast Limits until you find an edge.
4. Go to the Measurement menu and set most of the parameters [described below].
5. Click the Learn button. This sets the inspection limits for the Inner, Outer, and Width measurements.

6. Find the actual measurements you made on the part prior to setting up the inspection. Go to the corresponding menus (example, inner diameter = Inner menu). Enter these values in the Measured Distance field for each measurement (depending on Calibration Provider setting in the Calibration menu).
    - If you use Inspection Calibration [most common] for Calibration Provider, then you only need to enter one value in one of the Inner/ Outer/ or Width menus.
    - If you use Feature Calibration for Calibration Provider, then you must enter values for all enabled measurements.
    - If you use Sensor Calibration for Calibration Provider and the system has already been calibrated, then skip this step.
7. Change the Units field to match your actual measurement (example, millimeters).
8. Go to the Calibration menu and use the Calibrate on Part [recommended setting] or Calibrate on Set features to set the scale factor for the analysis.
9. Set other parameters as required by your plant.

Measurement menu



This menu provides settings that will be used in all (Inner, Outer, or Width) measurements. It also has a Learn feature that automatically sets measurement reject criteria for you.

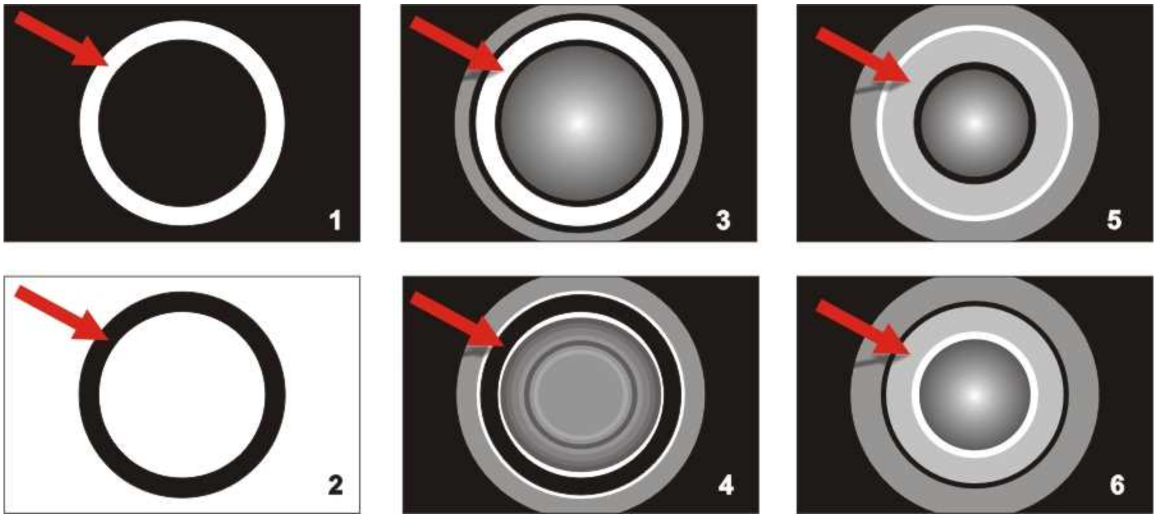
Learn Settings Click to learn the measurements of the part. This sets the diameter, min/max values, and average values for you and updates that information in the Inner/ Outer/ Width menus.

> *Note: if you make significant changes to the parameters in this menu or the other Measurement menus, click the Learn button again to update the information.*

Fuzzy Edge Removal This is for parts that have normal anomalies at the edges that are fuzzy, but the feature edges are sharp and clear on the image. The default is disabled. The higher the Filter Level, the stronger the fuzzy edge removal. Be aware that this filtering increases inspection time.

Feature Type

Use the type of feature that best finds the region on your part.



1) light feature 2) dark feature 3) borders - both dark 4) borders - both light 5) borders - dark inner, light outer 6) borders - light inner, dark outer

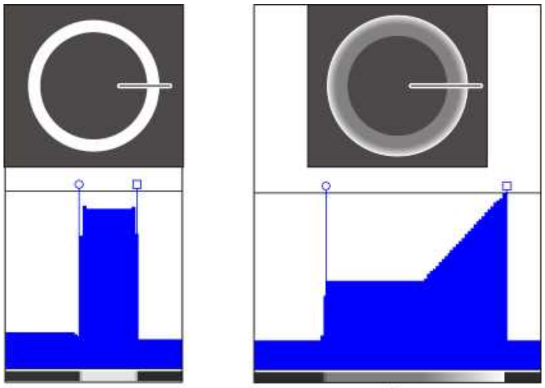
Feature Selection Logic Set this according to your part type and measurement type. Choose the type of edges you want to find for a type of feature.

> *Tip: for most applications, leave Border Sharpness, Balance, Balance Side, and Allowed Gap Size at their default settings.*

Border Sharpness For most cases, leave this set at 1 - 9. This allows you to choose whether to find sharp or gradual edges. At the default setting, the system finds both types of edges. If you only want to find sharp edges, set the values closer to one. If you only want to find gradual edges, set the values closer to nine.

Balance

For most cases, leave this disabled. This parameter applies mostly to Feature Type = Feature. If the feature in your image is not the same gray shade across the feature, you could adjust Balance to compensate for the change in gray shade. Normally, the histogram across the feature is flat, as in illustration [a]. In the example below, the histogram for the feature of part [b] shows that the gray scale of the inner diameter is about 50% of the gray scale of the outer diameter. In this example, we would use a Balance of 0.5, and we would choose Outer for Balance Side. This allows the system to treat part [b] as though it has similar gray shades on both sides.

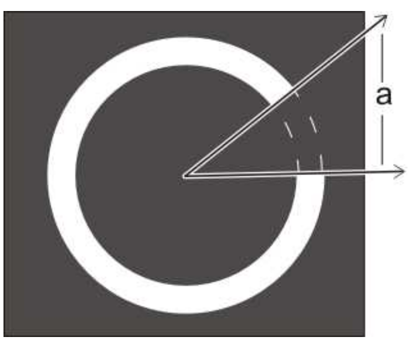


Balance Side When using Balance, choose which side's contrast needs to be reduced.

Sample Count Choose how to divide up the circle. For example, if Sample Count is 36, then the system places a search vector every 10° (360° divided by 36 equals 10°).

Allowed Gap Size

This is used in special cases where you want to ignore a number of segments. Set this to the number of search vectors you want to ignore. For example, if Sample Count is 36, and the gap is approximately 40°, then the Allowed Gap Size would be four.



a) - Allowed gap size

Inner/ Outer/ Width menus

There are three menus to provide three different measurements. The parameters in each of the menus are the same.

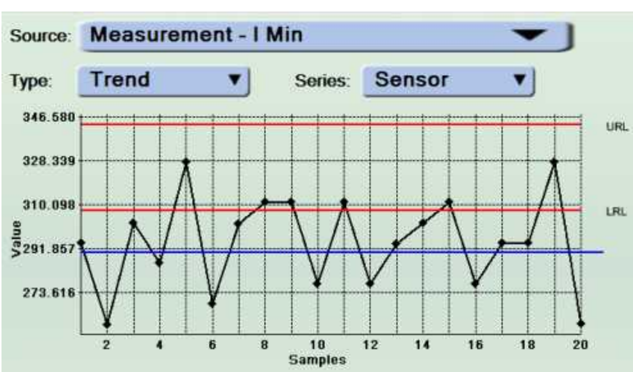
Inner diameter/ outer diameter/ width Check the box under the appropriate menu to perform this measurement.

> *Tip: When you click the Learn button in the Measurement menu, the values for Diameter/Width, Min/Max, and Average are set for you. Normally, you do not need to adjust these further.*

Min/Max Set the minimum and maximum allowable measurement.

Record SPC Statistics

Min, Max, or Min/Max. Each of these Plotting parameters enables a different graph in the Statistical Process Control (SPC) graphs. When you enable one of these Plotting parameters, you will see an SPC Graphs button on the right side of the screen, after you exit the inspection. An example graph is shown below.



The source for the graphs depend on which items you have enabled. If you enable all of the Inner measurements and all of the Plotting parameters, the Source drop-down menu will look like the following:

Enabling the Outer and Width measurements and enabling the Plotting parameters for those measurements will yield more graphs available in the Source drop-down menu.

See "SPC Graphs" on page 45 for more information.

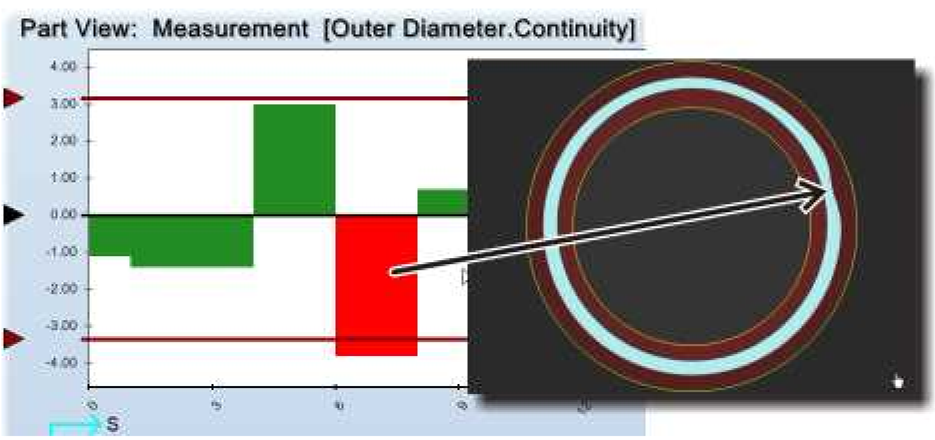
Average Set the average measurement for the part.

> *Tip: for most applications, Range and Continuity are disabled.*

Range Set the acceptable measurement range for the part. This can be used to check for ovality. The system subtracts the minimum value found from the maximum value found.

Continuity

This feature checks for local changes in edge position between vectors. This allows detection of defects where the part may be crushed or bent.

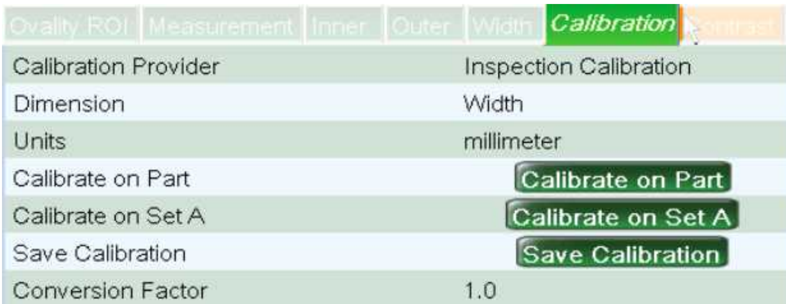


Continuity - Size Choose the size range of the defects you want to catch, specified in segments.

Units Choose your preference in the reporting of the measurements. Custom allows any calibration factor to be used.

Measured Distance Measure your part with calipers or another tool, then enter the value for Measured Distance.

Calibration menu



This menu uses your actual measurements (that you input into the Measured Distance parameter) to convert the number of pixels into your preferred unit of measurement. This ensures that the system is making accurate measurements.

Calibration Provider

Specify the source for the display of the calibrated values.

Sensor Calibration -- Calibration can be done through Image Analysis, or through an inspection. When Save Calibration is used within an inspection, that information can be used in any other inspection (that uses Calibration Provider) for that sensor.

Inspection Calibration -- [most common] use the value from one of your actual measurements to calibrate the Measurement analysis. Additional Dimension and Units parameters are available to choose one of your measurements and preferred unit of measurement. Additionally, Conversion Factor can be adjusted manually to get the best match between pixels and physical length.

Feature Calibration -- use separate calibration settings for each of the enabled measurements (inner diameter, outer diameter, or width). You must enter an actual measured value into each of the appropriate menus.

Dimension [Available when Calibration Provider = Inspection Calibration] Specify which dimension to use to calibrate the inspection.

Units Choose your preference in the reporting of the measurements. Custom allows any calibration factor to be used.

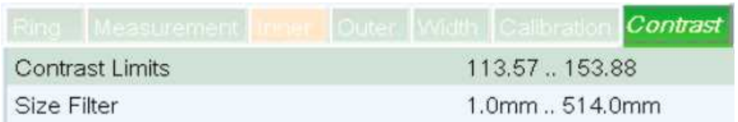
Calibrate on Part Use the current image to calibrate the Measurement analysis. Use a known good part.

Calibrate on Set A Use the current set of images in Set A to calibrate the Measurement analysis. The system takes the average value of the set and uses that number to calibrate the analysis.

Save Calibration Click the Save Calibration button to save the calibration scale and units to the sensor for use by other inspections.

Conversion Factor Convert one pixel into the units selected. The initial conversion will be controlled by the Learn Calibration results. You can adjust this manually if necessary.

Contrast menu



This menu allows you to adjust for sensitivity and defect size for the inspection.

Contrast Limits Set the sensitivity of the inspection. You can also move the red and yellow bars on the Retro-Spec graph by selecting the arrows to the left of the graph.

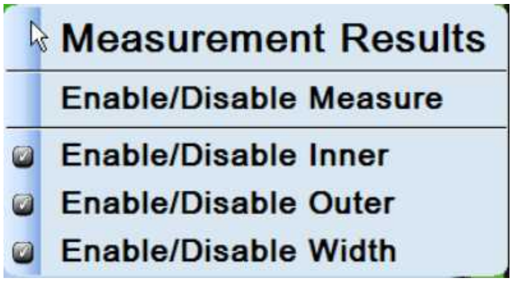
Size Filter Choose a feature size you want to measure. For example, you may want to ignore very small features but find larger ones. For example, if Size Filter is set to 3 -- 80, any feature smaller than three pixels or larger than 80 pixels would be ignored.

Results window

The results displayed for a measurement inspection are different than other inspections. Right-click to display timing information or information from other inspections.

By clicking a number in this menu, you can go directly to the parameters to adjust a particular measurement.

More options are available when you right-click over this window to see the Measurement Results menu. This menu allows you to enable or disable an entire measurement set such as Inner, Outer, or Width. If you click "Enable/ Disable Measure," then the parameter you right-clicked to see this menu becomes enabled or disabled.

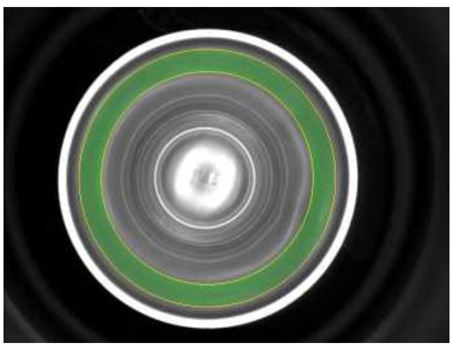


Light Meter

Light Meter adjusts the lighting automatically while the system is online. This prevents spoilage due to normal process variations. Automatic adjustment of the lighting allows the system to compensate for the following:

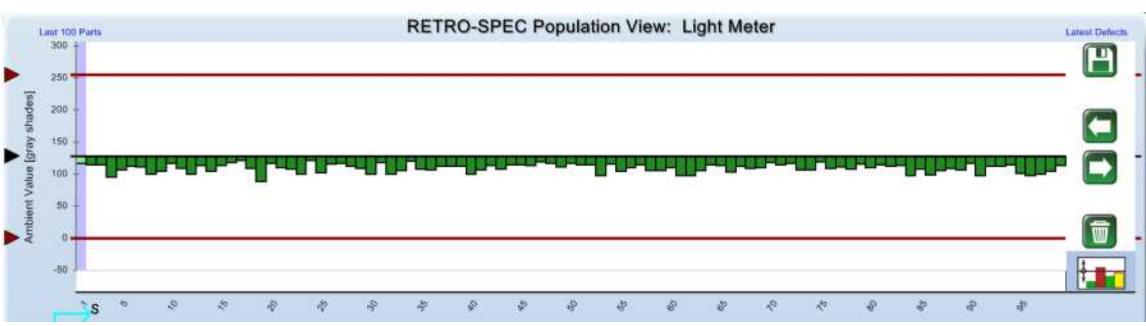
- Brightness variations of the stock (for gradual changes over a period of time, not sudden changes)
- Part variations due to washer and other process variables
- Change in lighting brightness due to the age of the lights
- Dust/ oil accumulation on the lighting and optics components such as lens and diffuser

Place the region of interest on an area that is consistent in gray levels from part to part.



Tips for setting up Light Meter:

1. Run several parts to get a good sample of parts. Use the Retro-Spec graph to make adjustments.



2. Grab the middle bar (black triangle) and drag it so that you have a similar number of peaks above and below the middle line, as shown below.

3. Grab the upper line and adjust it so that it is about 20 gray shades above the middle line. Repeat for the lower line, making it about 20 gray shades lower than the middle line, as shown below. You can make fine adjustments using the menu later.

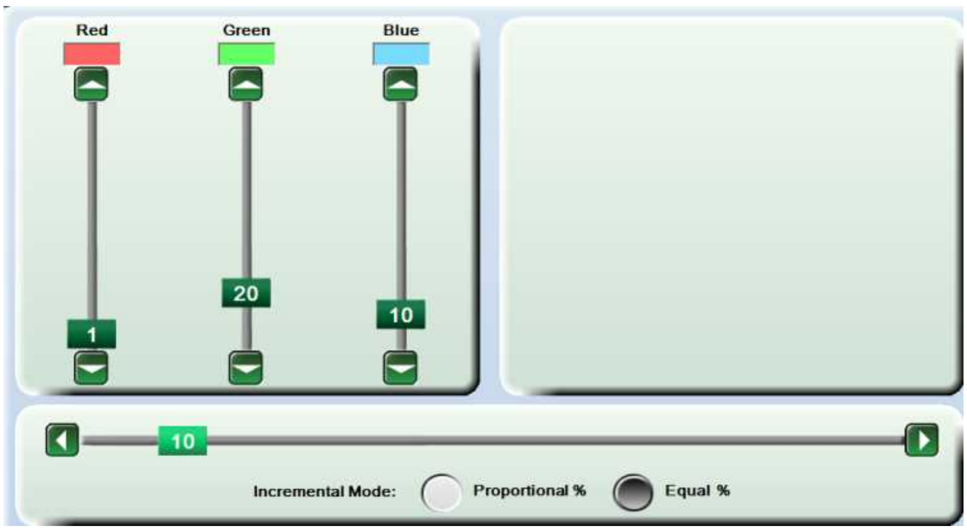
4. Set the number of Parts per Check in the menu, as recommended by your quality control supervisor, or a Pressco service engineer. See menu description below.

How it works

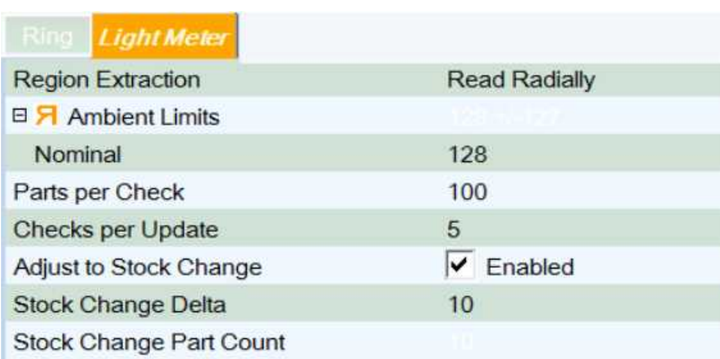
- The Light Meter inspection compares the average gray level of an inspection region to the Ambient Limit values. If the average gray scale does not fall within this range, the lighting will be automatically adjusted to compensate.
- The system checks N parts to create an average gray shade. N = Parts per Check

> *Note: the part must pass all of the inspections in the part program to be included in the Light Meter Parts per Check count*

- If the average gray shade is above the max limit (Nominal + Ambient Limit) or upper line, then the system decreases the lighting by a small amount. Only a small adjustment is used, so that lighting does not become too dark and then have to be adjusted again soon.
- If the average gray shade is below the minimum limit (Nominal - Ambient Limit) or lower line, then the system increases the lighting by a small amount.
- You may see a notice on the screen indicating that the light limit has been reached. Lighting can only be adjusted to its maximum or minimum values.
  - If the lighting is set up such that Equal % is selected, then the system adjusts lighting an equal amount for each light color. If the setup is similar to below, the system can only adjust the lighting 1% lower than its current state, because 1% (for red) can only go down 1%.
  - Look at your lighting settings and test adjustment so that you can see how the system will adjust lighting.



Light Meter menu



Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Ambient Limits The minimum and maximum acceptable ambient gray level values.

The system measures the gray level of each pixel of the region and averages those values. This average gray level must fall within the Ambient Limits, or the lighting will be adjusted so that it does. We recommend that, for very high speed inspection lines, you make the range as wide as you can tolerate.

Parts Per Check The number of parts that will be inspected between gray level checks. The faster your inspection line, the more parts should be used (at least 20-50).

Checks Per Update The number of gray level checks after the last adjustment before the next adjustment will be performed.

Adjust to Stock Change When this is enabled, the light intensities will be adjusted by larger amounts, allowing the system to quickly react to changes in the material. This may cause the adjustment to become unstable.

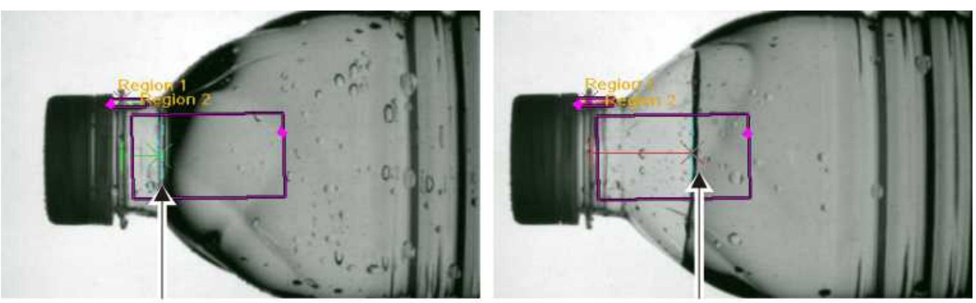
Stock Change Delta The value for which stock change is detected. When the measured ambient value differs from the nominal by at least this amount, then the adjustment to lighting will be more drastic.

Stock Change Part Count The number of consecutive times the ambient value must exceed the trigger value for a stock change to be detected.

Fill Height

Fill Height determines the fill level of containers, mostly to find containers with high fill or low fill. Fill Height compares the fill level of the liquid to a standard reference point, which is typically the neck-ring of a container.

> *Note: This inspection requires a "Measure ROI" on page 217 using two regions.*
> *Note: If your bottle's fill level or foam goes into the closure, or way below the fill region, then the fill height may not be detected. We recommend the Fill Height - Segmented inspection for these cases.*



1 2

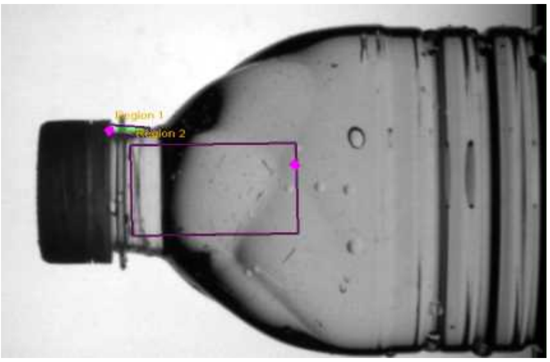
1) Normal fill height

2) Fill height too low

Before adding a Fill Height inspection:

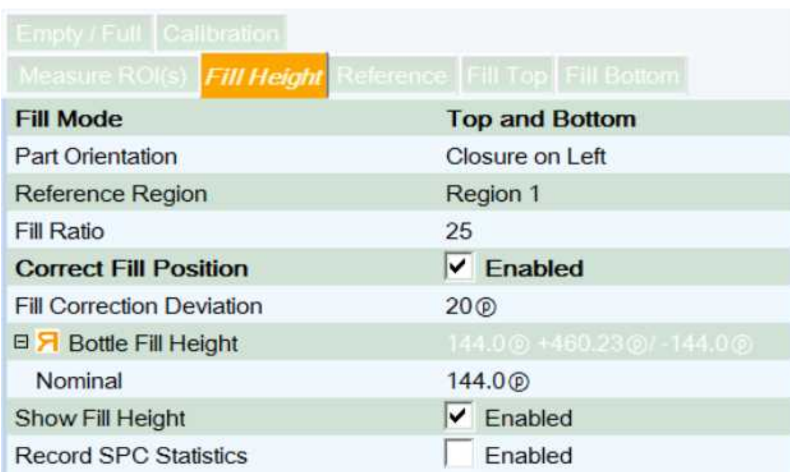
Make sure a "Measure ROI" on page 217 Region of Interest has been added to the inspection tree. Suggested settings are:

- In the Measure ROI menu, set Region Count = Two Regions.
- Place Region One over a distinct reference point, such as the neckring. Set the search direction (yellow diamond) to search towards the top of the cap.
- Place Region Two over a section of the bottle where you expect to see the liquid level. Set the search direction (yellow diamond) to search towards the bottom of the bottle.
- An example is shown below.
- Save and close the Measure ROI region menu.



Add the Fill Height inspection to your part program.

Fill Height menu



Fill Mode	**Top and Bottom**
Part Orientation	Closure on Left
Reference Region	Region 1
Fill Ratio	25
Correct Fill Position	☑ **Enabled**
Fill Correction Deviation	20℗
⊟ Bottle Fill Height	144.0℗ +460.23℗/ -144.0℗
Nominal	144.0℗
Show Fill Height	☑ Enabled
Record SPC Statistics	☐ Enabled

Use this menu to set the reject limits for the fill height of the bottle. Note that you may need to adjust the settings in the Reference or Fill Height menus before setting the Fill Height limits.

> *Note: The symbol [℗] indicates that this value is in pixels. Your system may show [mm] for millimeters, ["] for inches, or [ ] blank for custom units. It indicates that this value can be calibrated using Review Camera Calibration or Image Analysis for the current sensor.*

Fill Mode

Choose whether to measure fill level at the Top Only or at the Top and Bottom

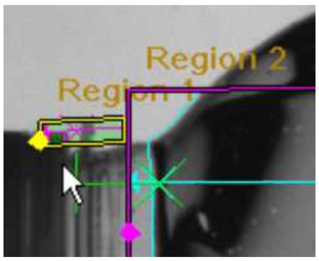
Top Only is generally used for water or other non-carbonated beverages.

Top and Bottom is used mainly for carbonated beverages, or beverages that foam when the liquid sloshes around in the container as it moves in front of the inspection module. The inspection can measure the distance from the reference point to the top of the foam, and also from the reference point to the bottom of the foam.

Part Orientation Choose the orientation of your part.

Reference Region

Choose a region from the Measure ROI region of interest to set as the reference point (in our setup example, we picked Region 1). A typical setup uses the neck ring of a bottle as the reference region. The direction of the search is determined in the region setup (search towards the diamond). You can change search direction by right-clicking over the image and using the choices from the Image Options menu.



Fill Ratio [Available when Fill Mode = Top and Bottom] Set the percentage of the distance from the bottom edge (top of the liquid) to the top edge (top of the foam). The percentage used depends on the type of liquid in the container. Usually, a value of 25% works well.

Correct Fill Position Enables edge correction, where the system uses a "moving average" technique to eliminate outlying edges (example: edges caused by water spots or bubbles in the liquid).

Fill Correction Deviation [Available when Correct Fill Position is enabled] This is used to correct stray points that fall too far away from the moving average edge position. The value is in pixels. Make sure you use a high enough value, or the inspection will not properly detect sloshing liquid. A common value to use is 25 or higher.

(Bottle) Fill Height Limits Define the valid fill height limits. This value is measured with respect to your reference point (example, neck ring). You can use the bars on the Retro-Spec graph to adjust the limits.

Nominal The ideal fill height value.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: Show Graphics = checked.*

Keep Retro-Spec Statistics Check this box to keep statistics such as Mean, Standard Deviation, and CPK, from this inspection. For more information see Retro-Spec Statistics.

Reference menu

Fill Height RO | Fill Height | Reference | Fill Top | Calibration

Vector Spacing	1
Max Missed Edges	6
Edge Polarity	Light-to-Dark
Edge Gradient	70 .. 255
Edge Size	2
Edge Thickness	1
Edge Delta	3
Show Edges	☑ Enabled
Show Vectors	☐ Enabled
Show Search Direction	☐ Enabled

Set the parameters to find the edges in the reference region.

Vector Spacing The distance between search vectors.

Max Missed Edges The number of search vectors that are allowed to fail without causing the inspection to fail.

Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

Edge Thickness The number of consecutive times that the gradient must be met to indicate an edge.

Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: check the Show Graphics box.*

Fill Top or Fill Bottom menu

Fill Height RO | Fill Height | Reference | Fill Top | Calibration

Vector Spacing	1
Search Direction	☐ Flipped
Max Missed Edges	95
Edge Polarity	Light-to-Dark
Edge Gradient	5 .. 45
Edge Size	2
Edge Thickness	1
Edge Delta	1
Show Edges	☑ Enabled
Show Vectors	☐ Enabled
Show Search Direction	☐ Enabled

Set the parameters to find the edges for the fill level top (Fill Top menu) or the fill level bottom (Fill Bottom menu).

Vector Spacing The distance between search vectors.

Vector spacing is normally kept at one in this inspection.

Search Direction Change the search to the opposite direction.

> *Note: If you are using both Fill Top and Fill Bottom menus, then one of the search directions is usually flipped from the direction indicated in the Measure ROI. You are not required to flip the search direction, since you can change the Edge Polarity to achieve the same effect.*

Max Missed Edges The number of search vectors that are allowed to fail without causing the inspection to fail.

Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

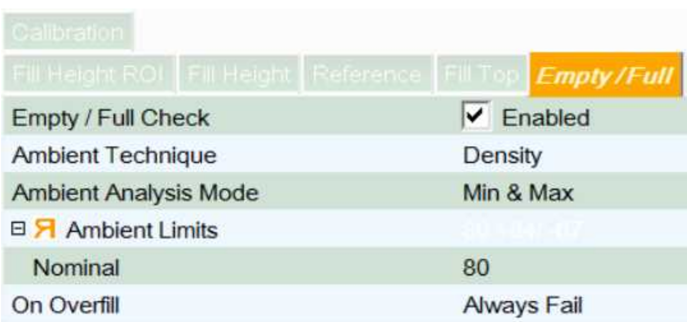
Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

Edge Thickness The number of consecutive times that the gradient must be met to indicate an edge.

Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: check the Show Graphics box.*

Empty/ Full menu



Use this check to determine whether the bottle is empty or full. The system performs an ambient check in the Fill Height region to determine whether the bottle is empty or full.

Ambient Technique

Max Amplitude - looks for the gray level with the most pixel counts within the histogram of the search area.

Peak Percentile - locates the gray level value above a percentage of the highest gray level value.

Ambient Threshold - defines what percentage of the search area to use.

Density - computes the average of all the pixel gray levels.

For more information about these techniques, see Parameter Illustrations

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Ambient Analysis Mode

Specify the reject criteria.

Min & Max - The minimum and maximum acceptable ambient gray level values. Any computed ambient found lower than or greater than these values will cause the inspection to fail.

Min Only - The minimum acceptable ambient gray level value. Any computed ambient found lower than this value will cause the inspection to fail.

Max Only - The maximum acceptable ambient gray level value. Any computed ambient found greater than this value will cause the inspection to fail.

Ambient Limits The minimum and maximum acceptable ambient gray level values. Any computed ambient found lower than or greater than these values will cause the inspection to fail.

Nominal The expected gray level value of the region of interest.

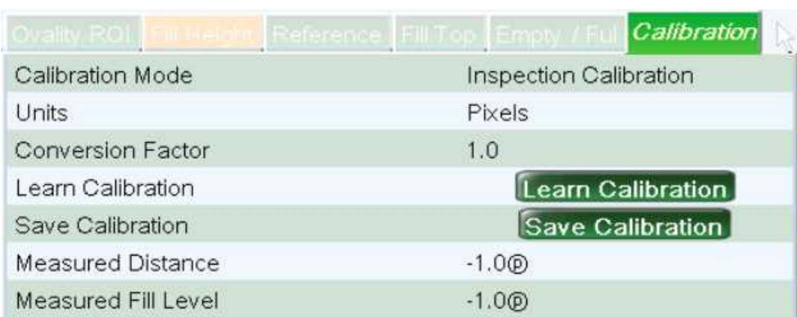
On Overfill

Determine what happens when the systems finds a bottle that is too full. If a bottle is too full, the fill height cannot be computed.

Always Fail - Always fail bottles that are too full [for this inspection].

Always Pass - Always pass bottles that are too full [for this inspection], regardless of any other results.

Calibration menu



Set the parameters to convert pixel measurement into your preferred measurement unit.

> *Note: The symbol [Ⓟ] indicates that this value is in pixels. Your system may show [mm] for millimeters, ["] for inches, or [ ] blank for custom units. It indicates that this value can be calibrated using Review Camera Calibration or Image Analysis for the current sensor.*

Calibration Mode

The system will convert the pixel dimensions into your preferred unit of measurement.

Sensor Calibration -- Use the calibration previously set up for the sensor through Image Analysis or through another inspection.

Inspection Calibration -- Use the calibration from this inspection only.

Units Choose your preference in the reporting of the measurements. Custom allows any calibration factor to be used.

Conversion Factor Convert one pixel into the units selected. The initial conversion will be controlled by the Learn Calibration results. You can adjust this manually if necessary.

Learn Calibration Click the Learn Calibration button to automatically determine the scale factor, which converts the value to the desired units.

Save Calibration Click the Save Calibration button to save the calibration scale and units to the sensor for use by other inspections.

Measured Distance Measure your part with calipers or another tool, then enter the value for Measured Distance.

The measurement should be the physical length from the neckring to the normal fill height, in your selected unit of measurement.

Measured Fill Level Measure your part's normal fill level (with respect to the bottom of the bottle) with calipers or another tool, then enter the actual value for Measured Fill Level. This is used to help calibrate the measurement.

Fill Height Segmented

Fill Height - Segmented determines the fill level of containers. It compares the fill level to a standard reference point, which is typically the neckring of a container.

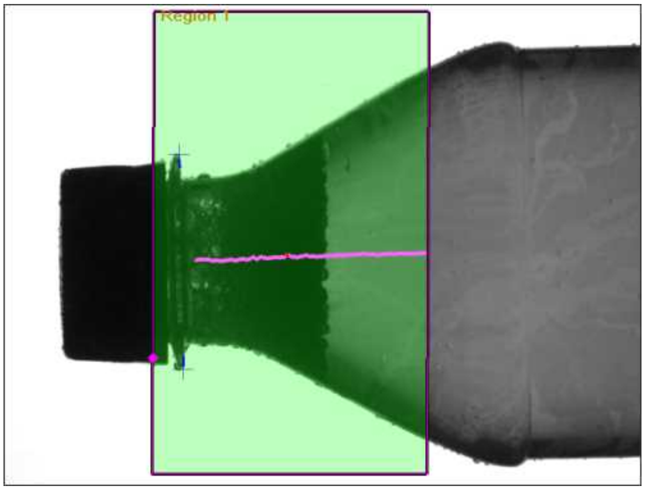
> *Note: This inspection requires "Neckring Registration" on page 272 Registration and "Measure ROI" on page 217Region*

The differences between Fill Height and Fill Height - Segmented inspections are:

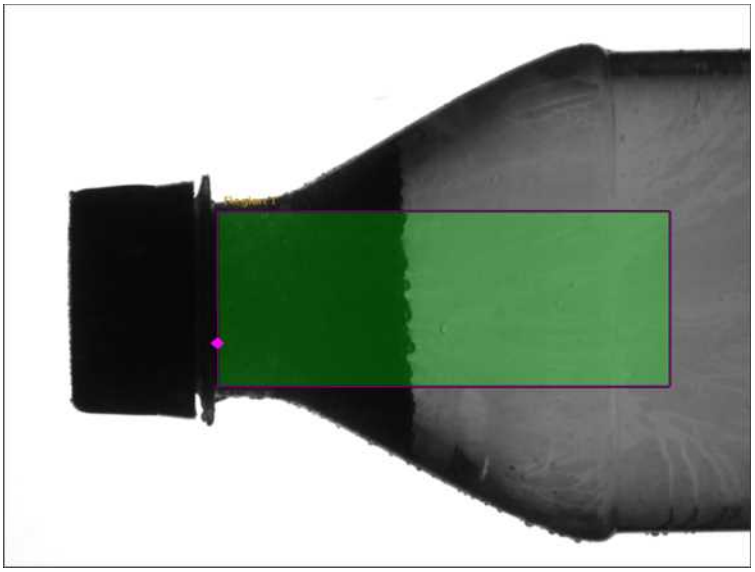
- Fill Height - Segmented inspection uses an external reference point, meaning that you can choose any point of reference on the bottle to measure fill height. Fill Height inspection uses an internal reference point - one Measure ROI for the reference point, and one Measure ROI for the measurement.
- Fill Height - Segmented inspection uses ambient analysis to find the fill line. Fill Height inspection uses edge point analysis to find the fill line.

A. Before setting up the Fill Height - Segmented inspection:

1. Set up a "Neckring Registration" on page 272 Registration that locates the neckring. The system places inspections with respect to the neckring.



2. Set up a "Measure ROI" on page 217 region of interest. Suggested settings:
   - In the Measure ROI menu, set Region Count to One Region.
   - Place the region on the bottle so that:
     - The region is high as possible, but does not overlap the neckring
     - The region is far down enough to accommodate the normal fill range of the bottle
     - The region is as wide as possible but does not fall outside of the bottle
     - The diamond (search direction) points towards the top of the bottle



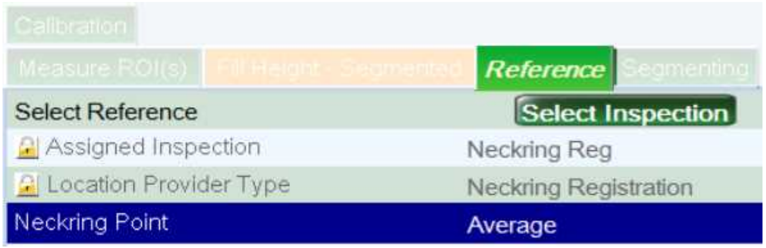
B. Add the Fill Height - Segmented inspection.

See "Analyses" on page 319 for information on adding the inspection.

Next, you will set the reference to the registration that you placed earlier.

C. Set up the Fill Height - Segmented inspection reference:

1. Go to the Reference menu and click the Select Inspection button.



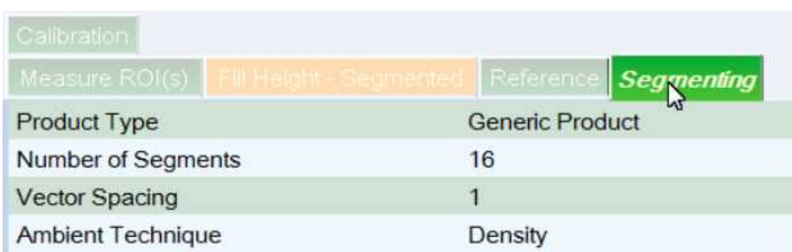
2. In the inspection menu, select the Neckring registration that you set up earlier. This tells the inspection to use data from the registration as a reference.

3. Click Apply Reference to complete the selection.
4. In the Reference menu, select Neckring Point = Average.

Next, set up the type of bottle you are inspecting.

D. Set up the product type:

1. Go to the Segmenting menu.



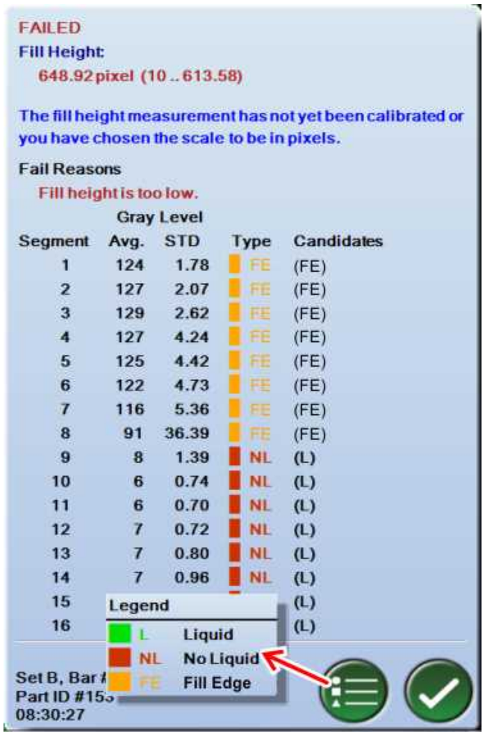
2. Select the Product Type you are inspecting.
3. Leave the default values for the remaining parameters. You can change them later, if necessary. These are described later in this section.

Next, set up the segments to determine fill height.

E. Set up the segments:

1. Go to the Fill Height - Segmented menu.

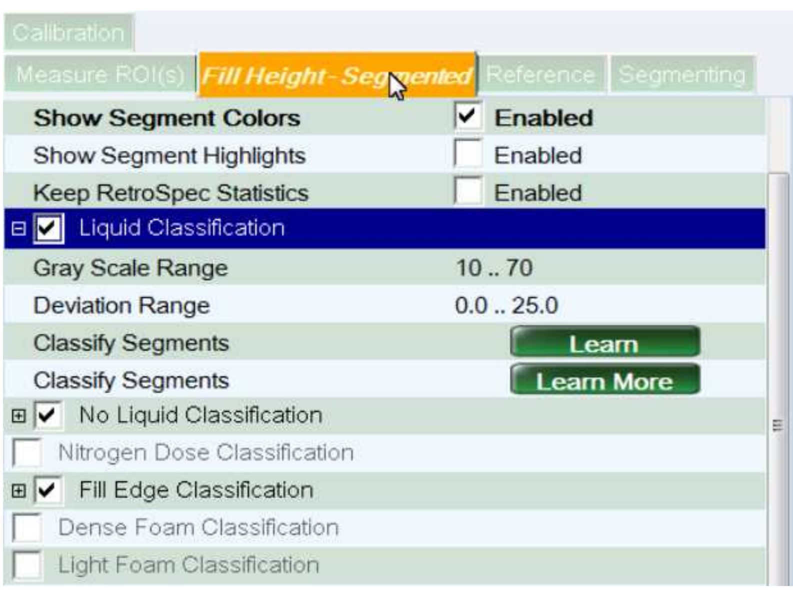
2.  To see part images, put the lane online (at least for a short time) and press the [+100] button.
3. For Part Orientation, select the appropriate orientation.
4. To see the segments as you set them up, check the Show Fill Height box. Also choose Show Segment Colors [displays solid colors] or the Show Segment Highlights [displays transparent colors] box. These allow you to see the setup on the screen. You can turn these off later, if desired.
5. Check all the classifications that pertain to your bottle. A classification key is shown below. The abbreviations and colors are described when you click in the Results window.



Next, set up the inspection to learn the ambient values of each classification.

F. Learn the classifications:

1. In the Fill Height - Segmented menu, expand the classification you want to learn [+]. Start with Liquid Classification. (See also Tips for Setting Classifications below)



2. Click Learn.
3. In the image, click all the segments that match the classification, using the cursor. For liquid classification, click all the segments that have only liquid showing in the current image. If you select an undesired segment, click it again to de-select it.

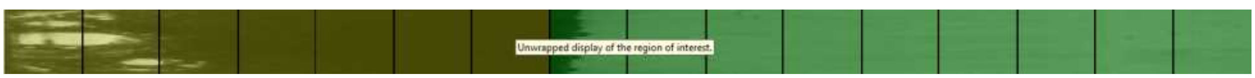
4. Click Apply Learned to complete the selection. The system asks you to save changes. Click the OK button.

   > *Note: this inspection uses only the displayed image to learn. You may need to use Learn More on additional images to get a good sample population.*

5.  Select an arrow button to display a new image. If the new image does not contain a good example of the classification (liquid, for example), select a new image.
6. Click the Learn More button. This adds data to the information already learned using the Learn button.
7. Use the crosshair cursor to select all the segments that match the current classification.
8. Click Apply Learned to complete the selection.
9. Click OK to confirm the changes.
10. Repeat steps 6-9 several more times to get a good sample population. Select different bottles in the Retro-Spec graph, and make sure that the segments are properly highlighted for the classification you are setting. Learn More as necessary.
11. Repeat steps 1-10 above for the remaining classifications. Tips are provided below.

Tips for setting classifications:

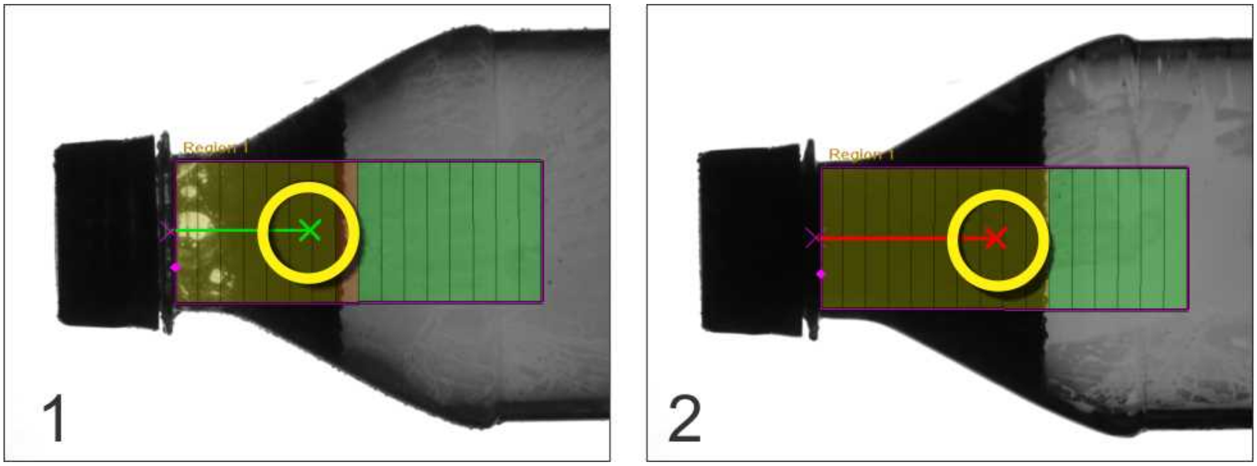
- Show Segment Highlights rather than Show Segment Colors. This allows you to see the fill line, and when the segments change classification.
- Use the unwrapped Region of Interest to view the segments better.



Finding the fill level edge:

For learning fill edge, try to use a segment that has the fill line in the middle of the segment. You may need to scroll through images. The system uses only one segment when learning.

- The system places a large X (green for passing, red for failing) where it determines the fill level. An example is shown below.
- If the product has foam, the system compensates for it by:
  - determining how much and what type of foam is detected, and
  - the value you assign to the Dense Foam Fill and Light Foam Fill ratios in the Fill Height - Segmented menu



1) Bottle passes - fill level was within specifications 2) Bottle fails - fill level was too low

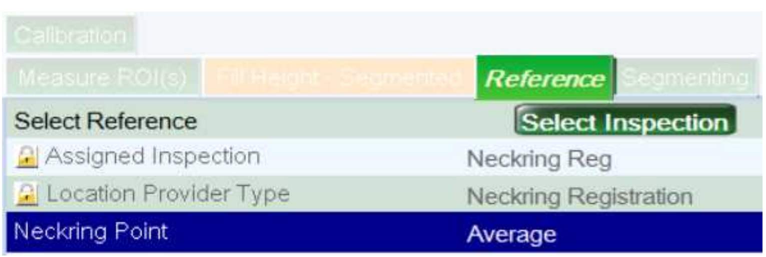
G. Test the Fill Height - Segmented inspection:

1. In the Retro-Spec graph, right-click to see the Retro-Spec Options menu. Select Auto Select Limits. This sets the pass/fail limits for the inspection based on current settings.
2. Test the inspection by looking at selecting more images on the Retro-Spec graph. Make sure each bottle passes or fails according to your specifications. You can adjust the bars on the Retro-Spec graph to make bottles pass or fail.
3. Test several more images to make sure bottles are passing and failing correctly. To acquire more images, put the lane online and click the [+100] button below the image.
4. If bottles are not passing and failing correctly, then go back to "F. To learn the classifications" and learn more bottles for the classifications. Or you may need to adjust other menu parameters. These are listed below for your reference.

Fill Height - Segmented menus

To set up this inspection, follow the procedures A - G above. The following descriptions are for reference.

Reference menu

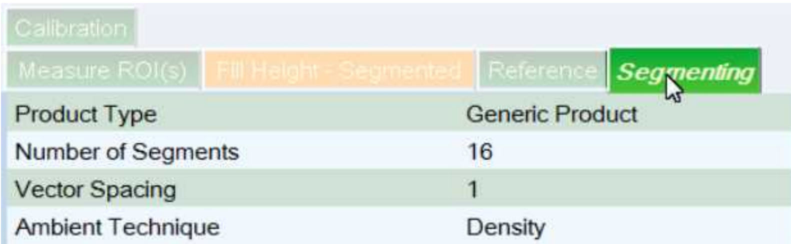


Select the inspection to which the fill level is referenced. Refer to "C. To set up the Fill Height - Segmented inspection reference" above to set this menu.

Select Reference Choose an inspection to use as a reference point. Click Select Inspectino, then choose an inspection from the inspection tree. Click Apply Reference to set the choice. The Assigned Inspection and Location Provider Type information is filled in for you.

Neckring Point If the inspection chosen for the Reference has multiple reference points, then choose which point to use. For Fill Height - Segmented inspection, you will usually use Average.

Segmenting menu



Set up the types of segments needed for your current product. See "D. To set up the product description."

Product Description Choose the type of product you are inspecting.

Number of Segments Divide the search region into a number of segments between one and 32.

Vector Spacing The distance between search vectors.

For this inspection, leave Vector Spacing at one.

For Fill Height - Segmented inspection, Ambient Technique is usually set to the default Density.

Ambient Technique

Max Amplitude - looks for the gray level with the most pixel counts within the histogram of the search area.

Peak Percentile - locates the gray level value above a percentage of the highest gray level value.

Ambient Threshold - defines what percentage of the search area to use.

Density - computes the average of all the pixel gray levels.

For more information about these techniques, see Parameter Illustrations

Fill Height - Segmented menu

Program the inspection to learn your product. See "E. To set up the segments."

Part Orientation Choose the orientation of your part.

Dense Foam and Light Foam Fill Ratio These are usually used for carbonated soft drink or beer applications. Set the amount of liquid volume contained in the dense foam and light foam. The default values are 20% (dense foam) and 10% (light foam).

Fill Height Limits Define the valid fill height limits. This value is measured with respect to your reference point (example, neck ring). You can use the bars on the Retro-Spec graph to adjust the limits.

Nominal The ideal fill height value.

Checked Fill Limits Check for high or low fill, or both.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: check the Show Graphics box.*

Keep Retro-Spec Statistics Check this box to keep statistics such as Mean, Standard Deviation, and CPK, from this inspection. For more information see Retro-Spec Statistics.

Classifications

Enable the proper classifications based on the product you are inspecting.

Gray Scale Range - This is automatically populated during the learn process.

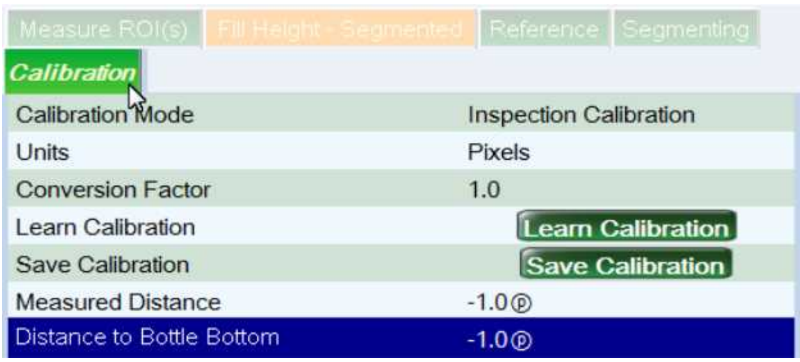
Deviation Range - This is automatically populated during the learn process.

Learn button - Use this button during the first learn process for a classification. Click the Learn button, then in the image, click all the segments that match that classification. Then click Apply Learned.

Learn More - Use this button to add data to the learned values. Select a different image than used for the Learn process, then click the Learn More button, then in the image, click all the segments that match that classification. Then click Apply Learned.

> *Note: the system uses only ONE image for the Learn and Learn More processes. We recommend that you select additional images and use the Learn More button to add data to the learned population.*

Calibration menu



Program the system to translate pixels into your desired units of measure (mm, for example).

> *Note: The symbol [℗] indicates that this value is in pixels. Your system may show [mm] for millimeters, ["] for inches, or [ ] blank for custom units. It indicates that this value can be calibrated using Review Camera Calibration or Image Analysis for the current sensor.*

Calibration Mode

The system will convert the pixel dimensions into your preferred unit of measurement.

Sensor Calibration -- Use the calibration previously set up for the sensor through Image Analysis or through another inspection.

Inspection Calibration -- Use the calibration from this inspection only.

Units Choose your preference in the reporting of the measurements. Custom allows any calibration factor to be used.

Conversion Factor Convert one pixel into the units selected. The initial conversion will be controlled by the Learn Calibration results. You can adjust this manually if necessary.

Learn Calibration Click the Learn Calibration button to automatically determine the scale factor, which converts the value to the desired units.

Save Calibration Click the Save Calibration button to save the calibration scale and units to the sensor for use by other inspections.

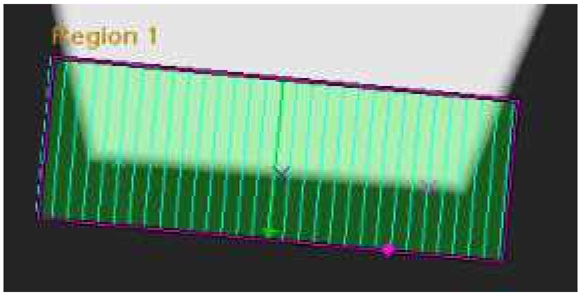
Measured Distance Measure your part with calipers or another tool, then enter the value for Measured Distance.

Measure the length from the reference point to the normal fill height, in your selected unit of measurement.

Distance to Bottle Bottom The distance from the reference point to the bottom of the bottle. Allows reporting of fill height with respect to the bottom of the bottle. [-1 = disabled]

Measure Extract

This analysis will use edge search criteria to find the minimum, maximum, and average edge location in a Measure ROI. You then add a Dimension - Distance inspection to do the measurement of the found feature position.



> *Note: Add a "Measure ROI" on page 217 region before adding Measure Extract*

Measure Extract menu

Measure ROI(s)	Measure Extract
Vector Spacing	1
Max Missed Edges	2
Edge Polarity	Either
Edge Gradient	30 .. 255
Edge Size	2
Edge Delta	2
Enhance Vectors	☑ Enabled
Show Edges	☑ Enabled
Show Vectors	☐ Enabled
Show Search Direction	☑ Enabled
Show Measurement Positions	All
Edges for Minimum	0%
Edges for Maximum	0%
Discard for Average	0%

Vector Spacing The distance between search vectors.

Max Missed Edges The number of search vectors that are allowed to fail without causing the inspection to fail.

Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

Enhance Vectors Computes an average pixel value from a neighborhood of 3x3 pixels around each pixel of the vector.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: check the Show Graphics box.*

Edges for Minimum or Maximum Set a percentage of the vectors in the region to compute the minimum or maximum position rather than just a single min. or max. position. Setting the percentage to 0% causes the system to use just one vector to find the position.

Discard for Average Ignore the extreme edges found. If you set a percentage, the inspection will ignore that percentage of the minimum and maximum edges found. This helps determine an average edge position.

Distribution

Distribution looks at color printing on parts, detecting 'tramp cans' or gross decoration errors on parts. See also Auto-Learn.

Distribution can also inspect for proper color of a product. For example, if you are inspecting blue preforms, it can detect when a preform is not the proper color blue, or if it is an incorrect color.

Distribution can inspect for gross decorator defects in gray scale images or color images. Use Gray Scale mode if your system does not have a color camera, or you want to focus on a specific range of gray shades. This can help detect scratches or other defects where the color is missing from an area on the part.

The inspection uses:

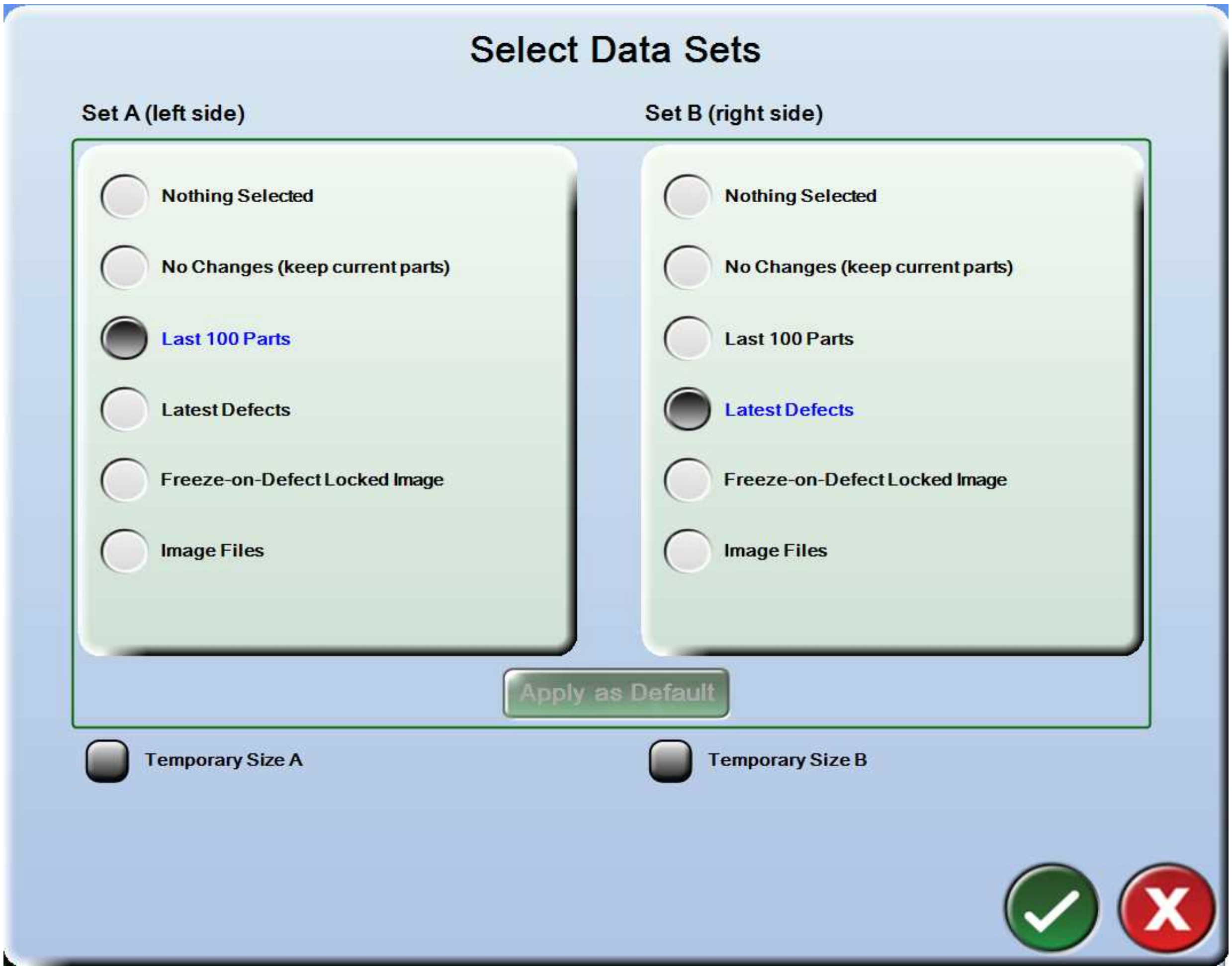
- A learned data set to compare to newly inspected parts
- Color histograms that consist of a number of color bins. Each color in the region of interest is analyzed. The total number of pixels containing a certain color (or gray scale) are counted and placed in each bin.

Load a set of good images into Data Set A

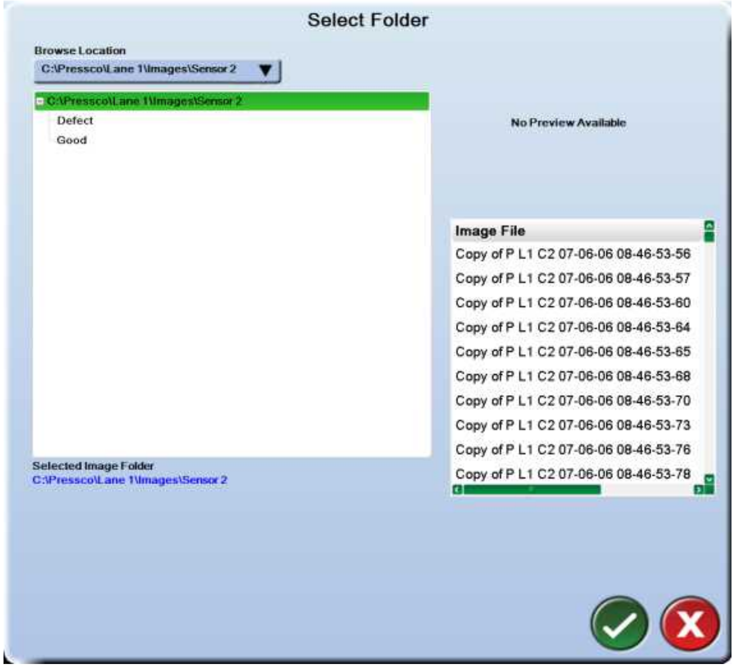
You can use images of the last parts run (up to 100 parts) and learn using this data. However, you must make sure that all the images in the data set are from good parts. You can look at the Population View graph and delete the images you do not want. Alternately, you can load a set of known good images that you have saved previously using the steps below.

To load Data Set A:

1. Look at the Retro-Spec Population View Graph.
2. Click the button on the Retro-Spec graph to view the Select Data Sets menu.



3. Click the Image Files button for Set A.
4. Click the disk icon to browse to the folder where the images were saved. The Select Folder menu is displayed.



5. Browse to and select the folder that contains the images you want to load.
6. Click the OK button in the Browse Location and Select Data Sets menus to load all the bit-map images that were previously saved in the selected folder.

In the Select Data Sets dialog box, use the Apply As Default button to remember your preferred data sets. If you select Apply as Default (for example: Set A = Last 100 parts; Set B = Latest Defects), then the system will automatically select those options the next time you open the dialog. The setting is saved with your user account.

> *Note: your system may be set up to display a different number of items in Data Set A or B. See "Retro-Spec Data Size" on page 200*

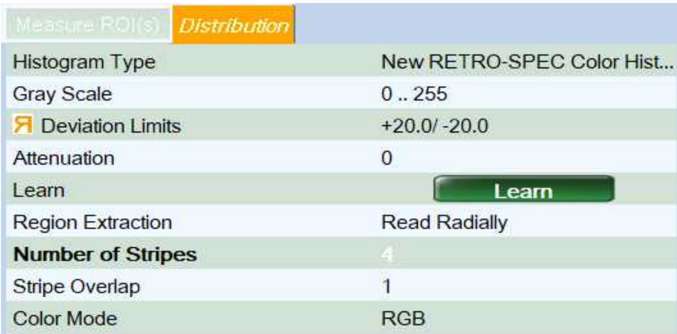
Set up the Distribution inspection

To set up a Distribution inspection:

1. Load a good set of images into Data Set A (see above).
2. Choose a different Histogram Type if appropriate for your part.
3. Use the Learn function.
4. Set the Attenuation if desired.
5. Use the Learn More function if desired.

> *Note: To use the Learn More function, you need a set of part images in Data Set A. The images can be the last 100 parts you have inspected, or images from a file.*

Distribution menu



Histogram Type Select one of the Distribution Histogram Types. This is not used if Color Mode = Gray Scale.

Gray Scale Specify the range of gray scales for the distribution inspection. This is not used if Color Mode = RGB.

Bin Count This is only used when Color Mode = Gray Scale. Set the number of bins (gray shades) the histogram is divided into. Note that some constraints may apply, and this number may not exactly match the number of bins.

Deviation Limits Set the tolerance level for the colors or gray scale values. Positive values represent too much of some color. Negative values represent too little of some color. The values correspond to the largest deviations of some color from its expected amount, which is determined when learning the data set. Values of zero represent no deviation of color.

Attenuation Set the minimum number of pixels of a color or gray shade that must be seen before they are counted. For example, if Attenuation is set at 100, there must be at least 100 pixels of that color or gray shade, or it will be ignored. Increasing attenuation reduces sensitivity to small changes. It ensures that only significant color changes cause the product to fail.

Learn

The inspection needs to learn the colors or gray shades of your product. To learn, the inspection looks at the samples in Data Set A. Ideally, you should store the images of about 100 good parts in Data Set A.

> *Note: if there are any defective parts in Data Set A, they are included in the learned data. You should move defective part images to Data Set B.*
> *Note: Learn overwrites existing data. It can be used if you are testing the inspection on a new part, or want to clear the data from a previous learn.*

Learn More [Only available after you use Learn] - After you have used the Learn function, you can add to the learned data. This builds a wider tolerance of colors for your parts. Learn More should always be used on NEW parts. Using Learn More on parts that have already been learned will skew the histogram.

Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Number of Stripes

If set to one, then striping is disabled. The region is normal.

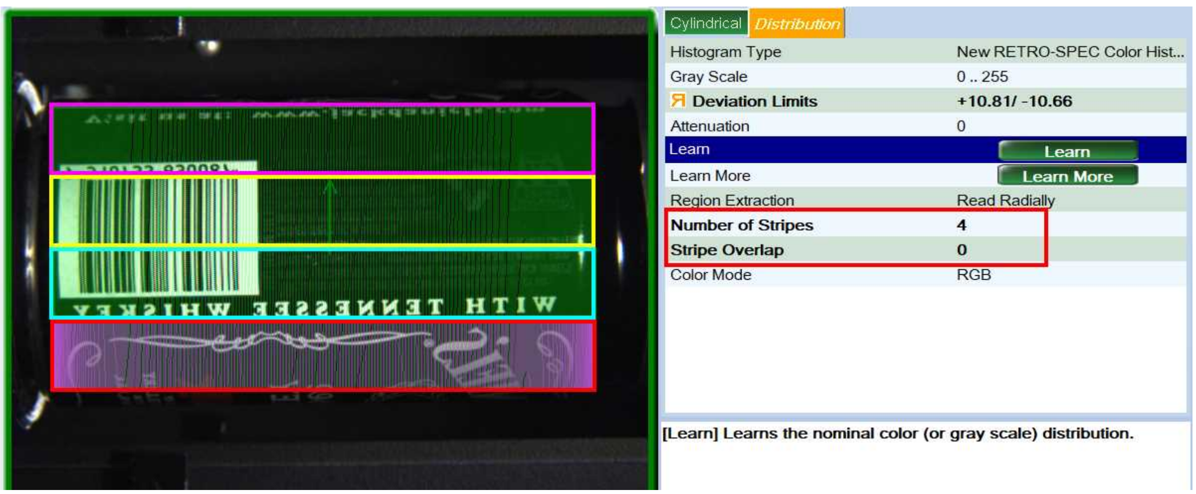
Striping allows the region to be subdivided into equally-sized regions, “stripes,” each of which maintains its own histogram. This allows separate regions of a part to be analyzed within the same Distribution inspection without requiring to setup a separate region and Distribution.

Striping is only available for certain regions:

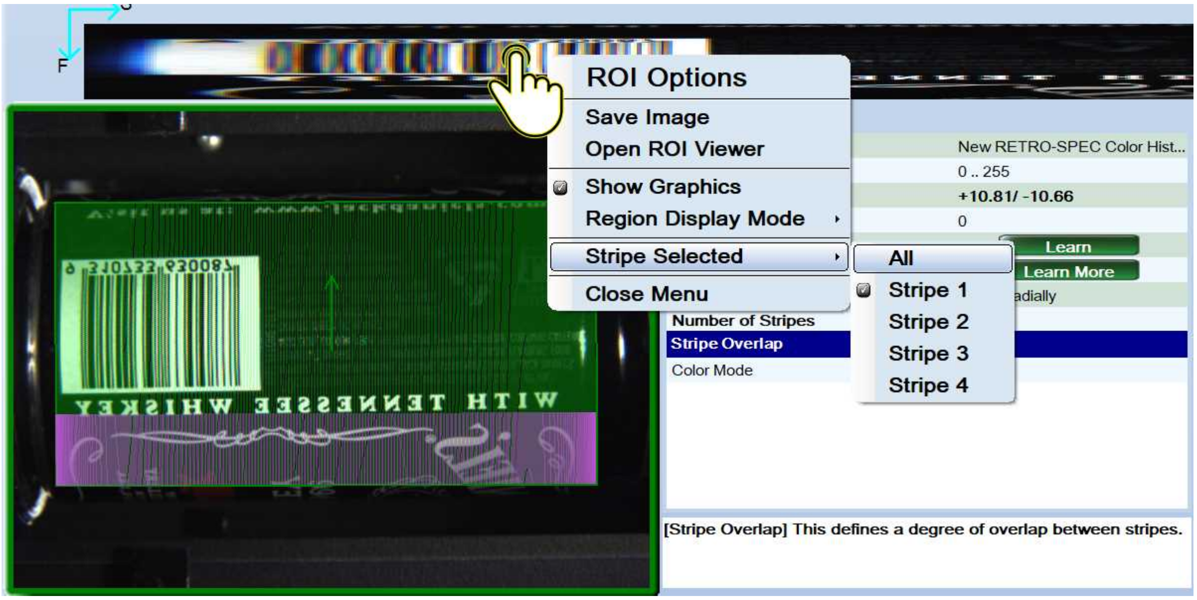
- Ribbon, Measure ROI(s) (first region only)
- Cylindrical
- Ring (only Radial and Circular extraction)

Stripes always follow a single direction. For example, for Ring regions each stripe follows the angular direction, separate stripes forming concentric rings. For Ribbons, stripes follow the ribbon, separate stripes being located on different parts along the width of the ribbon.

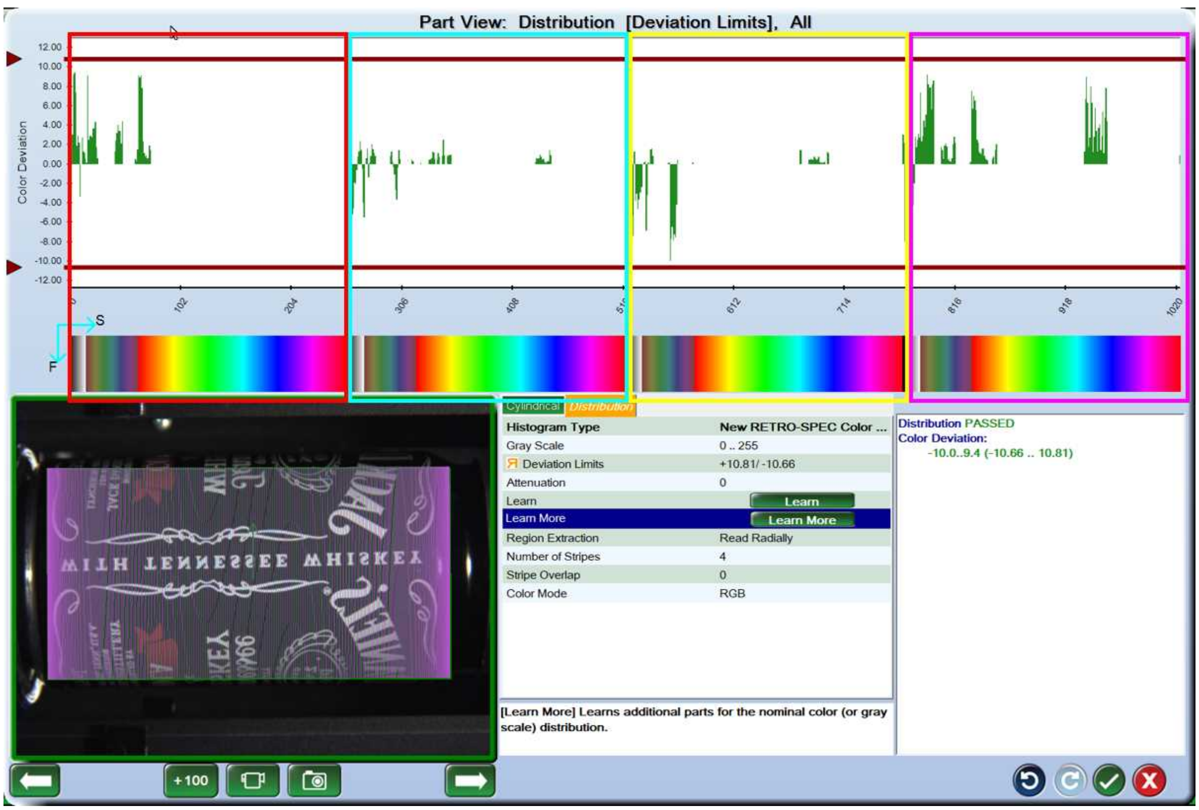
The following example highlights four stripes, with no overlap. The boxes in this picture are for illustration only.



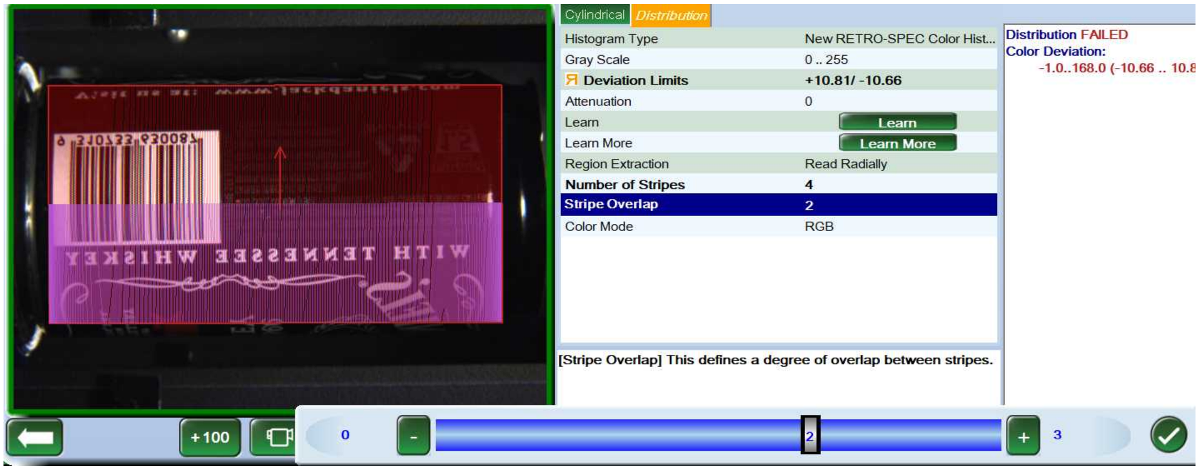
The inspection editor shows the stripes when region highlighting is active. Different stripes can be selected in the ROI Options menu, which is shown when clicking on the ROI window. In this example, Stripe 1 is active.



When selecting “All” Stripes, the part view will show the histograms for all stripes side-by-side.



If you enable overlap, you will need to select Learn again.



Color Mode Choose whether to extract the data in Gray Scale or RGB mode. Note that your system must have a color camera to use RGB mode.

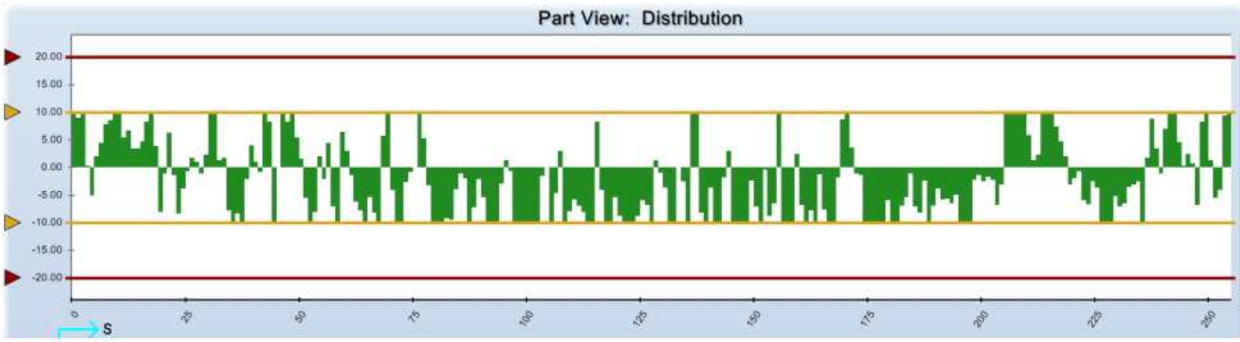
Information about Auto-Learn

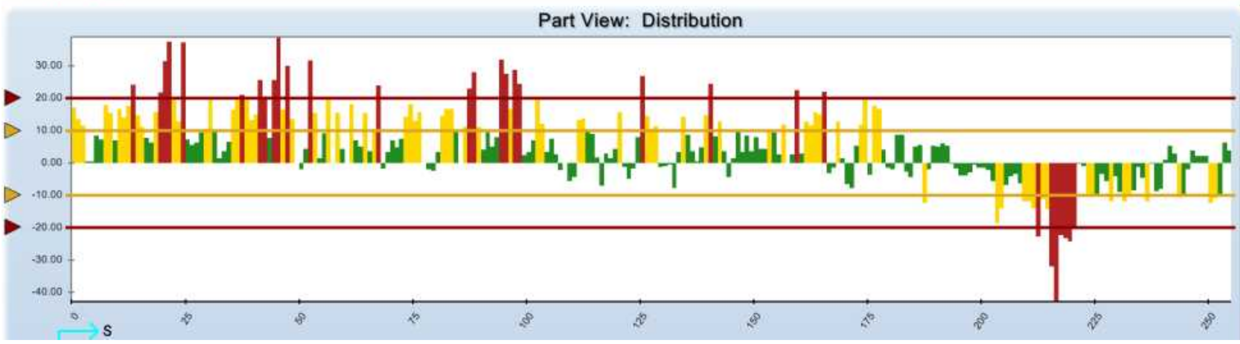
"Auto-Learn" on page 543

Information about the graphs in Distribution inspection

The Part View graph view shows the distribution of the color of pixels in the inspection's region of interest. Each bar on the graph represents a number of pixels in each color bin. The color bins are shown in the color band at the bottom of the graph. For information about the color bins, refer to Distribution Histogram Types.

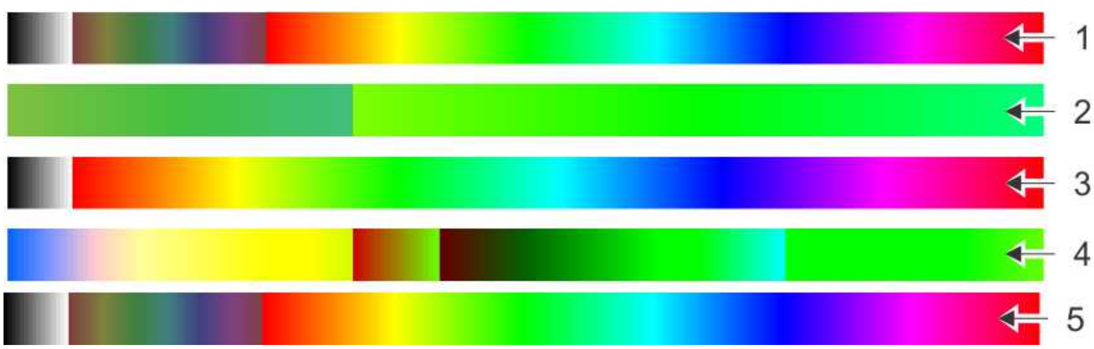
The example below shows a Part View graph with a good part (top) and a defective part (bottom). The defective part had too many pixels of several different colors in this example - possibly a 'tramp' part.





Distribution Histogram Types

In the Distribution inspection, there are several color histograms available. Most often, you will be using the New Retro-Spec Color Histogram. You will notice the difference between the histograms in the color bar directly below the Retro-Spec Part View Graph.



1) New Retro-Spec Color Histogram

2) Special Color Histogram (Chartreuse, Green, Spring Green shown)

3) Classic Extractor Histogram

4) White Level histogram

5) Delta E histogram

To see a different histogram:

1. Select a different type from the Histogram Type drop-down menu.
2. Switch to Part View by double-clicking any bar in the Retro-Spec graph. The new histogram is displayed below the graph.

New Retro-Spec Color Histogram In this histogram, there are 16 bins of gray scale, 48 bins of dark or pastel colors, and 192 bins of very bright colors. The 48 bins of dark or pastel colors have a wider tolerance, and therefore you may see most of the colors of your part in those bins. This histogram also has some overlapping of colors - that is, pixels may be mapped to more than one color bin. This ensures that slight variations of color do not cause the product to fail.

Special Color Histograms In special cases, you may use other color histograms. The color bars are viewable under the Part View graph. If you are trying to detect off-color parts, such as preforms, use one of the special color histograms. For example, if your preforms are supposed to be green, use the histogram that most closely matches the correct color. This provides a large range of green colors to be detected. When a different color part (blue, for example) goes through your product stream, that part will be easily detected because it will not fall into the learned green color range.

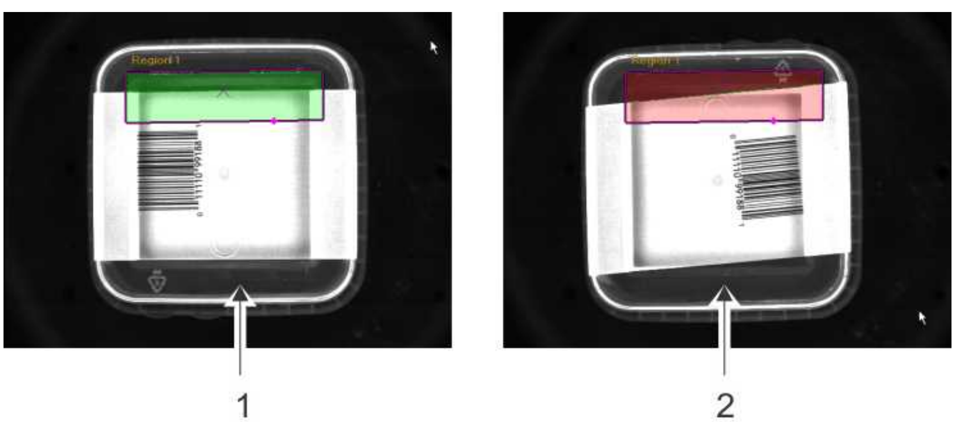
Classic Extractor Histogram This histogram is the same as the original Pressco Extractor product. It has 16 gray scale bins and 240 color bins. This is different from the New Retro-Spec Color Histogram in that it does not have the middle section of 48 bins of dark or pastel color. This histogram is only used when an approximate comparison between the original Extractor product and the Retro-Spec Distribution is required.

White Level Histogram This histogram is used for pastel colors, or if you want to differentiate between shades of the same color. For example, you might need to detect when a yellow color is too light compared to the normal yellow color.

Delta E Histogram This histogram has the same bins as the "New Retro-Spec Color Histogram," but is better for Delta E analysis. This is good for detecting slight differences in color. [The New Retro-Spec histogram is better for detecting larger deviations, like tramp cans]

Label Skew Extract

Label Skew Extract is similar to Measure Extract. Label Skew Extract is specialized to locate the edge of the label and can be set up for either one or two search regions. It finds the edges of a label and draws a "best fit" line using those edges. The inspection's main function is to export this data to a Dimension | Angle inspection. Label Skew Extract can reject a part if the label is not consistent enough, such as a flagged label.

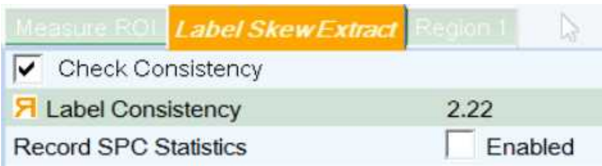


1) Normal label

2) Skewed label

> *Note: Label Skew requires a "Measure ROI" on page 217 to set up the region(s). After setting up the Label Skew Extract, add an Angle dimension.*

Label Skew Extract menu



Check Consistency Enable the consistency check (the label skew check).

Label Consistency Set up the limits for the position of the found edges. This number indicates the straightness of a line. A lower number means the points do not deviate much from a straight line and is therefore more consistent.

Keep Retro-Spec Statistics Check this box to keep statistics such as Mean, Standard Deviation, and CPK, from this inspection. For more information see Retro-Spec Statistics.

Region menu

Set the parameters so that desired label edges are found. Note that search direction and region position can be set by using the Image Options menu. Right-click over the image to see the Image Options menu.

Vector Spacing The distance between search vectors.

Max Missed Edges The number of search vectors that are allowed to fail without causing the inspection to fail.

Edge Polarity Choose the type of edge to search for – Light to Dark, Dark to Light, or Either.

Edge Gradient The difference in gray shades between pixels being compared.

Edge Size The number of pixels in a group being compared. Greater size = lower sensitivity.

Edge Delta The distance in pixels being compared. Higher delta = greater sensitivity.

Edge Thickness The number of consecutive times that the gradient must be met to indicate an edge.

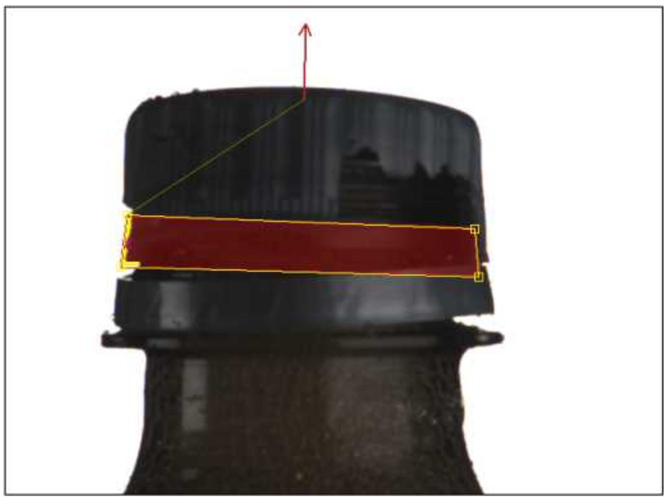
Use Subpixel This provides greater centering accuracy.

Enhance Vectors Computes an average pixel value from a neighborhood of 3x3 pixels around each pixel of the vector.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: check the Show Graphics box.*

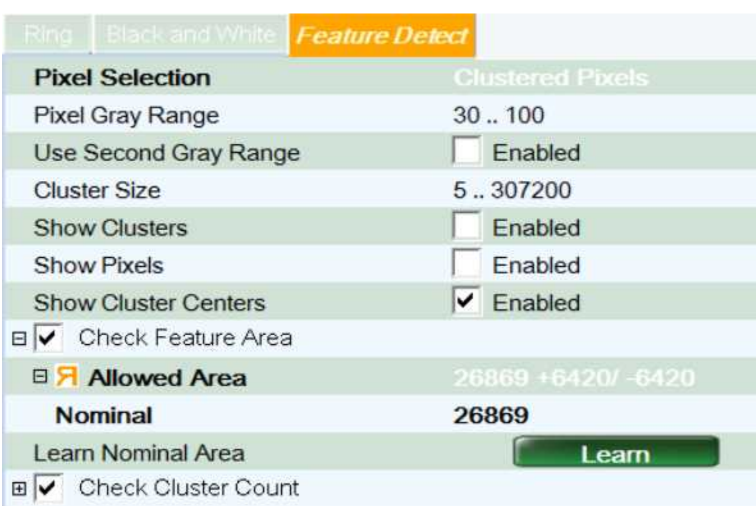
Feature Detect

Feature Detect can be used to detect a range of gray shades to determine defects. For example, in a fill height/ cap placement inspection, it can be used on the cap to determine whether a tamper band is broken.



> *Note: Feature Detect analysis requires either a* *"Ring Region" on page 209* *or* *"Polygon Region" on page 210* *of interest.*

Feature Detect menu



Use the Feature Detect menu to specify a range of gray shades to find.

You may see "Region Extraction" depending on your part program setup.

Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Pixel Selection Specify which pixels are selected as candidates for the feature. Choose from a range of Gray Shades or Clustered Pixels.

Pixel Gray Range A pixel's gray shade must fall into this range to be considered part of a cluster.

Use Second Gray Range Allows you to define a second range of gray shades to identify candidates for clusters. Pixels will be candidates if they fall into either gray shade range.

Cluster Size [When Pixel Selection = Clustered Pixels] Set the size range of pixels you want to be considered clusters. Groups of connected pixels that fall outside this range are not considered to be clusters.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: check the Show Graphics box.*

Check Feature Area Check the area of the feature to see that it is within the specified tolerance.

Allowed Area [only available if Check Feature Area is enabled] The tolerance (in pixel area) of the feature you want to locate.

Nominal The expected area size. This number is populated when you press the Learn button.

Learn Nominal Area Click the Learn button to automatically learn the area.

Check Cluster Count Check to see that the correct number of clusters is found.

Barcode Inspection and Registration

The inspection reads the customer code and compares it to what is expected. If the codes do not match, then the part fails. The inspection is capable of reading many varieties of barcode as well as other code types such as a QR code.

> *Note: this inspection requires the purchase of an additional license and dongle. Contact your sales representative.*

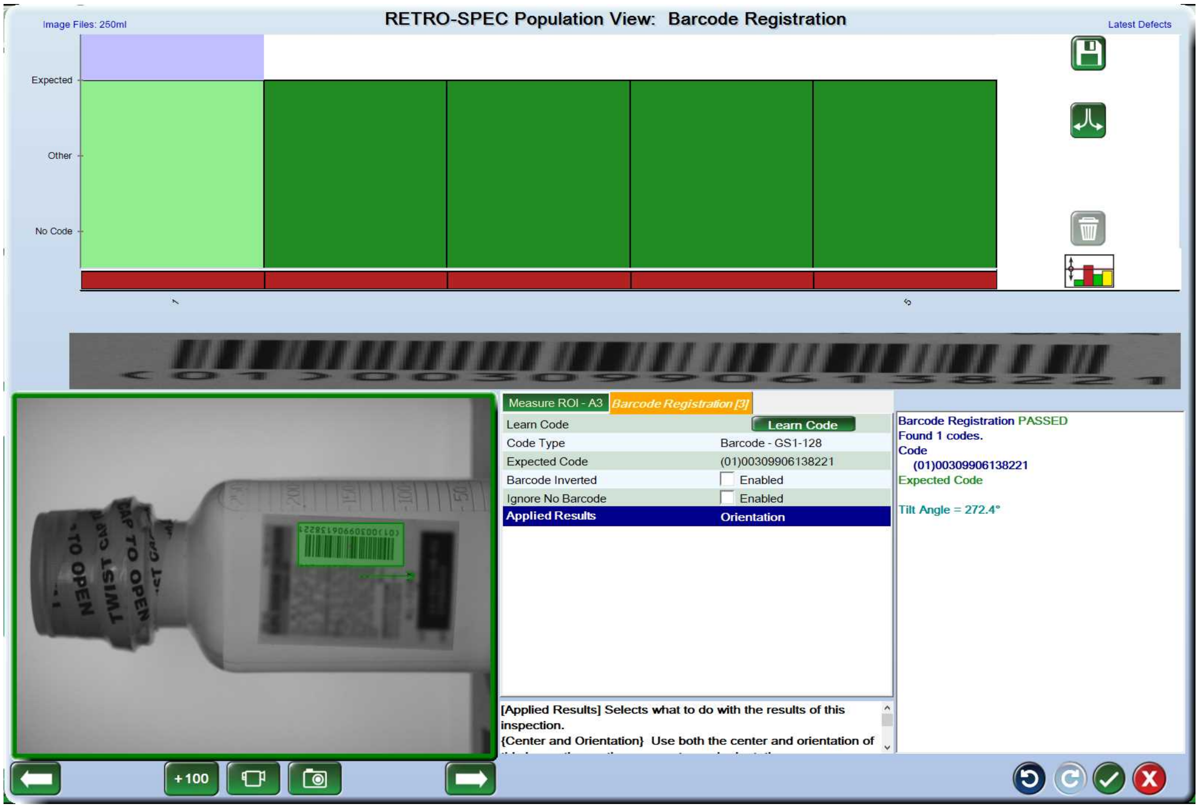
The registration is used to locate the position of the customer code, and place subsequent inspections with respect to the code position. It also detects for the proper customer code, like the inspection.

The inspection and registration only work on grayscale images.

Barcode requires a "Measure ROI" on page 217 region. The Measure ROI may have one or two regions; however, Barcode only uses the first region.

Example

The example below shows a registration that found the proper barcode.



Menus - Registration and Inspection

The Barcode registration and inspection have similar parameters.

Measure ROI - A1	Barcode Registration [1]	Registration
Learn Code		Learn Code
Code Type	Barcode - GS1-128	
Expected Code	(01)00309906138221	
Barcode Inverted	☐ Enabled	
Ignore No Barcode	☐ Enabled	
Applied Results	Center and Orientation	

Measure ROI - A1	Barcode	Inspection
Learn Code		Learn Code
Code Type	Barcode - GS1-128	
Expected Code	(01)00309906138221	
Barcode Inverted	☐ Enabled	
Ignore No Barcode	☐ Enabled	

Applied Results (Registration parameter only):

When you need to register on the position of the customer code you can add the registration version of the algorithm. This parameter allows you to use the position information in the following modes:

- Center and Orientation – Report the found center of the customer code and the orientation angle. Note: The angle may be off 180 degrees since we do not determine the direction of the code.
- Orientation – Report the found orientation angle of the customer code. Note: The angle may be off 180 degrees since we do not determine the direction of the code.
- Center – Report the found center of the customer code.

Learn Code: This allows the system to automatically read the current code and set the “Expected Code” field automatically. The type of customer code is also detected setting the “Code Type” field automatically. This works on the currently selected part, so be sure that the code is in the region and is readable.

Expected Code: This is the code that we are expecting to see on the product. Anything different than what we are expecting will cause the system to return “other” code as the result and the inspection will fail.

Barcode Inverted: This will invert the image data. We are expecting black data (bars if a barcode) on a white background. If our imaging produces white data on a black background, then we enable this field to be able to properly read the code.

Ignore No Barcode: When enabled the inspection will not fail if no customer code is located in the search region. This is helpful in a multi-camera configuration where the barcode might not be visible in all camera views.

Code Type:

This algorithm can support multiple customer code types. See the list below list for all possible customer codes supported. Notice that there are many different variations of barcode types.

Code Type	Description
Barcode – Auto	Look for any type of product barcode.
Barcode – 2/5 Industrial	Look for a 2/5 Industrial barcode.
Barcode – 2/5 Interleaved	Look for a 2/5 Interleaved barcode.
Barcode – Codabar	Look for a Codabar barcode.
Barcode – Code 128	Look for a Code 128 barcode.
Barcode – Code 39	Look for a Code 39 barcode.
Barcode – Code 93	Look for a Code 93 barcode.
Barcode – EAN-13 Add-On 2	Look for a EAN-13 Add-On 2 barcode.
Barcode – EAN-13 Add-On 5	Look for a EAN-13 Add-On 5 barcode.
Barcode – EAN-13	Look for a EAN-13 barcode.
Barcode – EAN-8 Add-On 2	Look for a EAN-8 Add-On 2 barcode.
Barcode – EAN-8 Add-On 5	Look for a EAN-8 Add-On 5 barcode.
Barcode – EAN-8	Look for a EAN-8 barcode.

Code Type	Description
Barcode – GS1 DataBar Expanded Stacked	Look for a GS1 DataBar Expanded Stacked barcode.
Barcode – GS1 DataBar Expanded	Look for a GS1 DataBar Expanded barcode.
Barcode – GS1 DataBar Limited	Look for a GS1 DataBar Limited barcode.
Barcode – GS1 DataBar OmniDir	Look for a GS1 DataBar OmniDir barcode.
Barcode – GS1 DataBar Stacked OmniDir	Look for a GS1 DataBar OmniDir Stacked barcode.
Barcode – GS1 DataBar Stacked	Look for a GS1 DataBar Stacked barcode.
Barcode – GS1 DataBar Truncated	Look for a GS1 DataBar Truncated barcode.
Barcode – GS1-128	Look for a GS1-128 barcode.
Barcode – MSI	Look for a MSI barcode.
Barcode – PharmaCode	Look for a PharmaCode barcode.
Barcode – UPC-A Add-On 2	Look for a UPC-A Add-On 2 barcode.
Barcode – UPC-A Add-On 5	Look for a UPC-A Add-On 5 barcode.
Barcode – UPC-A	Look for a UPC-A barcode.
Barcode – UPC-E Add-On 2	Look for a UPC-E Add-On 2 barcode.
Barcode – UPC-E Add-On 5	Look for a UPC-E Add-On 5 barcode.
Barcode – UPC-E	Look for a UPC-E barcode.
PDF417	Look for a product PDF417 code.
Data Matrix ECC 200	Look for a product Data Matrix ECC 200 code.
QR Code	Look for a product QR code.
Micro QR Code	Look for a product Micro QR code.
Aztec Code	Look for a product Aztec code.

Split Detection

This inspection looks for vertical splits on metal containers. It ignores defects that are diagonal or horizontal rather than vertical.

> *Note: this inspection requires the purchase of an additional license and dongle. Contact your sales representative.*

Split Detection will locate the largest light and dark defects based on the given sensitivity parameters. If the largest light or dark defect exceeds the defect size criteria, then the part has a defect. This inspection DOES NOT sum up all of the found defect areas. Only the largest light and largest dark defects are compared against the defect size thresholds.

This inspection only works on grayscale images.

Split Detection Menu

Ring	Split Detection 2.0
Dark Contrast Threshold	65
Light Contrast Threshold	55
Defect Area	+10.0/ -10.0
Show Defect Areas	☐ Enabled
Circle Defects	☑ Enabled

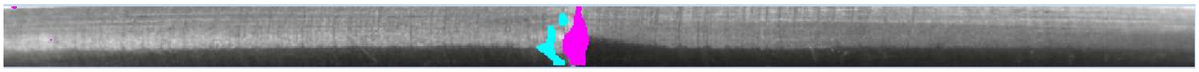
Dark Contrast Threshold: (0 – 255) Set the sensitivity for dark defects. Lower thresholds are less sensitive to dark defects. Higher thresholds are more sensitive to dark defects.

Light Contrast Threshold: (0 – 255) Set the sensitivity for light defects. Lower thresholds are less sensitive to light defects. Higher thresholds are more sensitive to light defects.

Defect Area: (-250 – 250) Set the acceptable defect area. The dark defects are represented as a negative defect area. The light defects are represented as a positive defect area. Some of the split defects will give a stronger light signature while others will give a stronger dark signature.

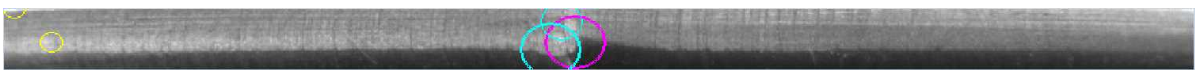
Show Defect Areas:

(checked, unchecked) Show the defect areas color coded for Light (Cyan) and Dark (Magenta) defects. The defect pixels are filled in with the appropriate color.

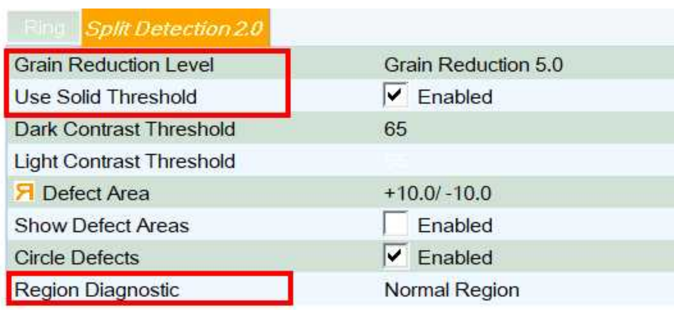


Circle Defects:

(checked, unchecked) When this is checked, the system draws a circle around defect areas color coded for Light (Cyan) and Dark (Magenta) defects. Any defect smaller than the limit is shown in a small circle (Yellow). The size of the circles also have a purpose: the smallest circles are for defects smaller than the threshold, medium sized circles are for defects above the threshold and not the largest, and large sized circles represent the largest light or dark defect found.



Split Detection (Advanced parameters)



Ring	Split Detection 2.0
Grain Reduction Level	Grain Reduction 5.0
Use Solid Threshold	☑ Enabled
Dark Contrast Threshold	65
Light Contrast Threshold	
Defect Area	+10.0/ -10.0
Show Defect Areas	☐ Enabled
Circle Defects	☑ Enabled
Region Diagnostic	Normal Region

Grain Reduction

The grain reduction level determines how much to smooth the region data and is also used to enhance the defects in the desired direction. The smoothing value applied is the value that follows “Grain Reduction."

- Grain Reduction (1 - 2.5): minimal smoothing
- Grain Reduction (3 - 4.5): moderate smoothing
- Grain Reduction (5 - 6.5): standard smoothing
- Grain Reduction 7: maximum smoothing

Use Solid Threshold: (checked, unchecked) This defines what type of Threshold Image will be applied to help detect defects. When checked we use the average of the region data to create a solid grayshade image. When unchecked, the system uses an adaptive threshold based on the Adaptive Median Radius parameter. Note: our experience shows that the inspection works better when this parameter is checked.

Adaptive Median Radius: (3 – 25) This parameter is only visible and used when Use Solid Threshold is unchecked. The size of this parameter is used to create local averages based on the surrounding pixel values. So a radius of 3 will look at pixels within 3 of the current location to create the localized average and a radius of 10 will look at pixels within 10 of the current location. If you set this value too high, a warning is displayed. Lower the value to remove the warning.

Region Diagnostic

This allows you to take a closer look at how the algorithm is working. Examples for the Region Diagnostic views:

Region Diagnostic – Normal Region

Region Diagnostic – Defect Enhancement

Region Diagnostic – Normalized Median Filter- Solid

Region Diagnostic – Normalized Median Filter- Adaptive

Region Diagnostic – Defect Difference

Country Code Validation

This inspection uses optical character recognition (OCR) to determine if a label has the correct country code label. It is typically used on beverage cans. This inspection is designed for grayscale cameras.

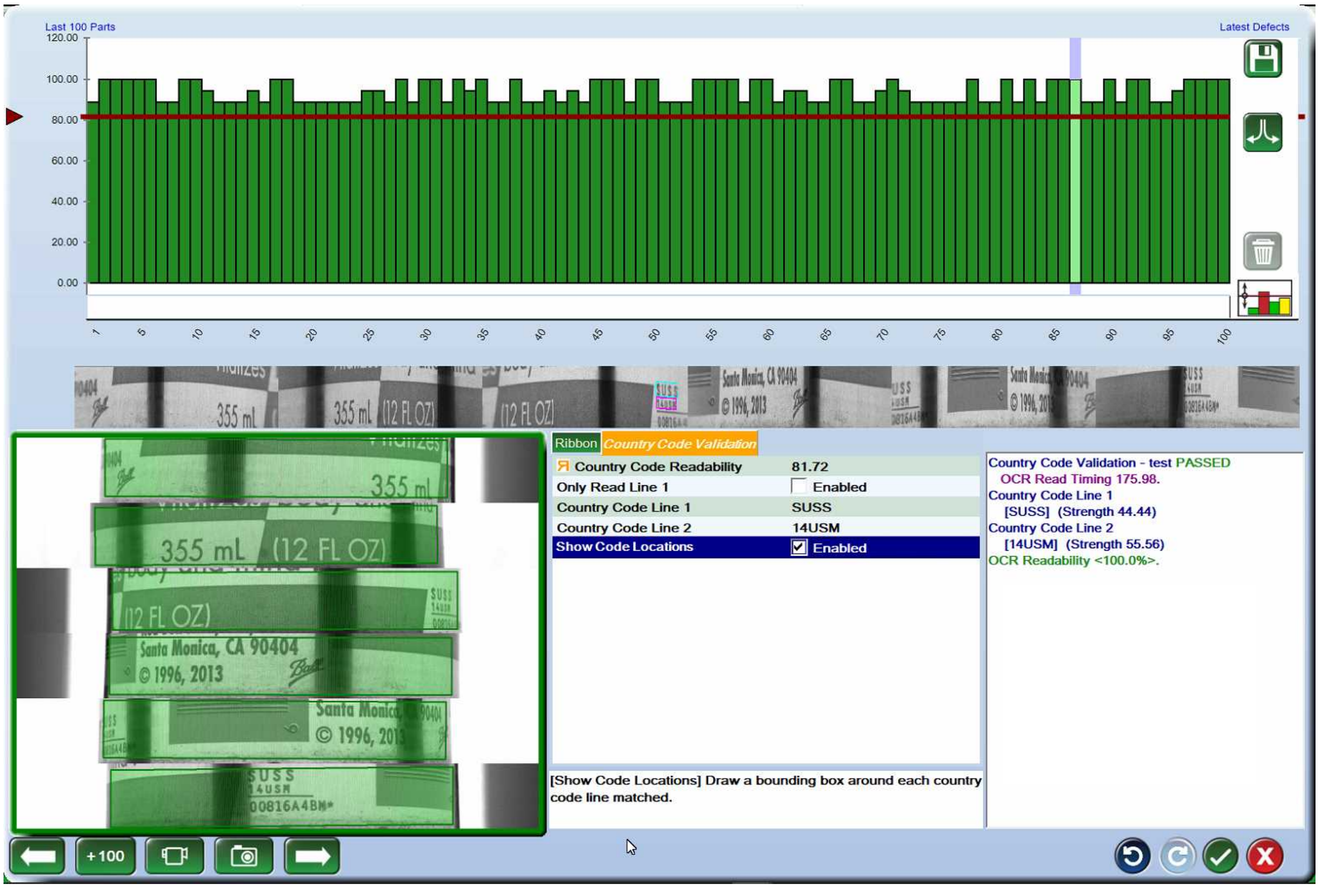
The manufacturers using this inspection produce product that have completely random orientation. The system uses six camera views to ensure that the country code is visible in at least one view.

Setup

See this example setup for the Country Code inspection module: "Inspections CDX6 Module" on page 378. Make sure you have set up the appropriate regions before adding the Country Code Validation inspection.

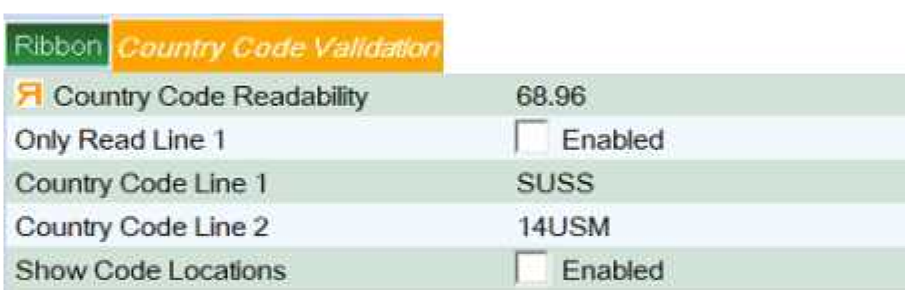
To set up the inspection:

1. Right-click on the inspection tree. Select Add | Analysis | Country Code Validation.
2. In the Country Code Validation menu, select whether to read 1 or 2 lines of country code.
3. Manually enter your country code (either 1 or 2 lines).
4. Adjust the Country Code Readability based on your preferences.
5. Put the system online to capture images and test the inspection (select the "+100" button to see more images in Retro-Spec). Make adjustments to Country Code Readability, and other advanced parameters, if necessary. A sample good inspection is shown below.



Menu Reference

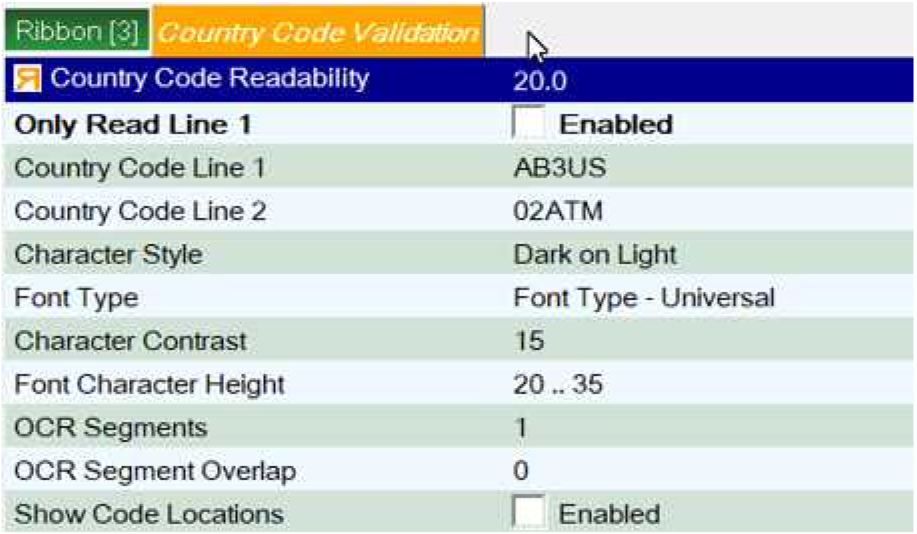
Country Code Validation menu (normal access view)



Ribbon	Country Code Validation
Country Code Readability	68.96
Only Read Line 1	Enabled
Country Code Line 1	SUSS
Country Code Line 2	14USM
Show Code Locations	Enabled

Country Code Validation menu (advanced access view)

Right-click over the inspection parameters | Editor Options | Advanced = Checked. You must have the "Access advanced inspection parameters" permission.



Country Code Readability: (0 - 100) This value gets plotted on the Retro-Spec graph. This is a measurement of how well the system reads the expected Country Code. The system will reject any part with a readability reading lower than the limit entered. Note: The inspection gives partial readability for characters that are similar, such as a "1" and "I." If you set the readability to 100, then you must have an exact match for every character in each inspected country code line. In most situations you will want to allow the inspection to pass a country code that is just slightly different than expected. The readability limit allows you to determine how different the country code can be from the expected value.

Only Read Line 1: (checked, unchecked) When this is checked, it allows the system to read only the first line. Sometimes the second line has smaller text and is more difficult to read, so reading only the first line helps the inspection work well. When this is unchecked, the system reads both lines 1 and 2.

Country Code Line 1: (country code text string) This is the expected first line of the country code. Manually enter the country code you expect to see on the label.

Country Code Line 2: (country code text string) This is the expected second line of the country code. Manually enter the country code you expect to see on the label. This parameter will only be visible if Only Read Line 1 is unchecked.

Character Style: (Light on Dark, Dark on Light) This helps the inspection work more efficiently. Select which type of text to look for.

Font Type: (Universal, Industrial, OCR-A, OCR-B) Select which type of font is used on your part. The industrial font tends to work slightly better for most country codes, but use the type that works best for your part.

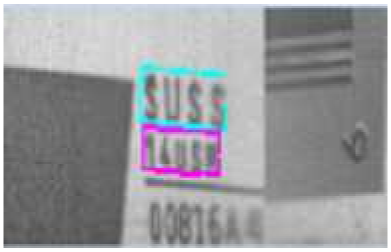
Character Contrast This ensures that the system reads the correct characters. Lower contrast images require a lower character contrast value.

Font Character Height Define the range of character heights to search for (in pixels). A tighter range results in faster inspection times. Setting the range to the lowest and highest limit results in any text height being located.

OCR Segments Set the number of segments to divide the region. The optical character recognition (OCR) works faster in small chunks of data, resulting in better performance.

OCR Segment Overlap The segment overlap allows smaller chunks of data to be processed while still ensuring the country code is within each segment. We suggest an offset of half the code width (as reported in the results). With perfect alignment, segments matching camera views, an offset of zero is suggested.

Show Code Locations In the Region of Interest view, this draws a bounding box around each country code line matched.



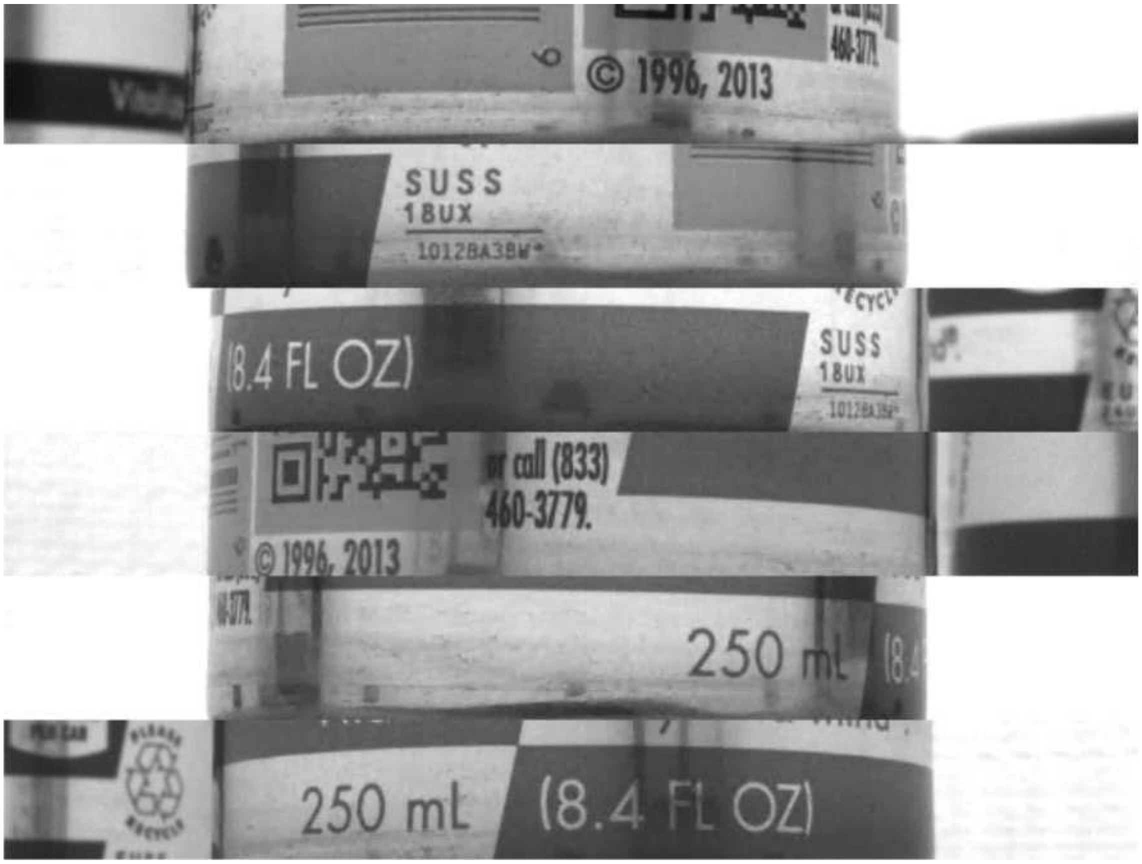
Inspections CDX6 Module

Your inspection system will be set up to display six camera image slices in one image. From this image, you can set up inspections to find codes printed on the can. There is an inspection called Country Code that identifies codes.

> *Note: the settings in this section were used for a specific can type and style. You will likely have different parameters depending on what is being inspected.*

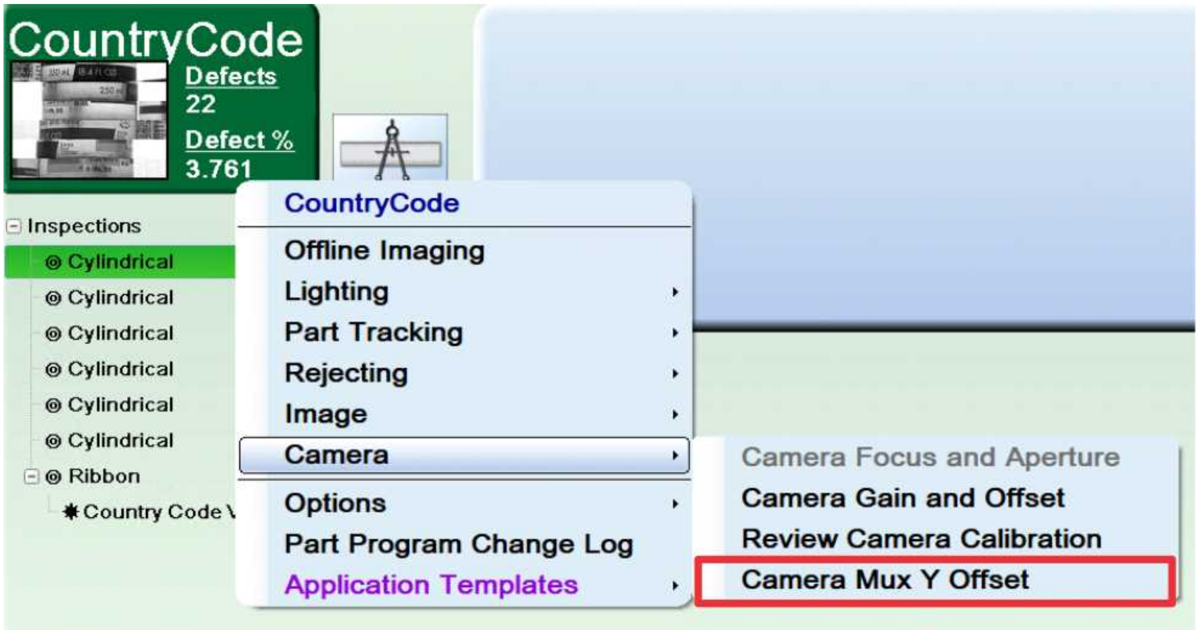
The image

The CDX6 module uses six PD7 cameras multiplexed (muxed) into one image. Each slice is 160 x 1280 pixels.



Mux Offset

The Mux Y Offset is typically set to 585 pixels. This can be adjusted as needed if images are out of alignment in the Y axis. The X axis is not used as of this publication. To adjust, right-click over the sensor button | Camera | Camera Mux Y Offset.



Inspection tree

The inspection tree is made up of six cylindrical regions using the Element Shape Perimeter. Inspection for country codes does not use any registrations. Next, a ribbon is added using the Combined Shape Perimeter. Lastly, using Country Code Validation; the country code algorithm uses OCR (optical character recognition) to search for the country code within the six regions.

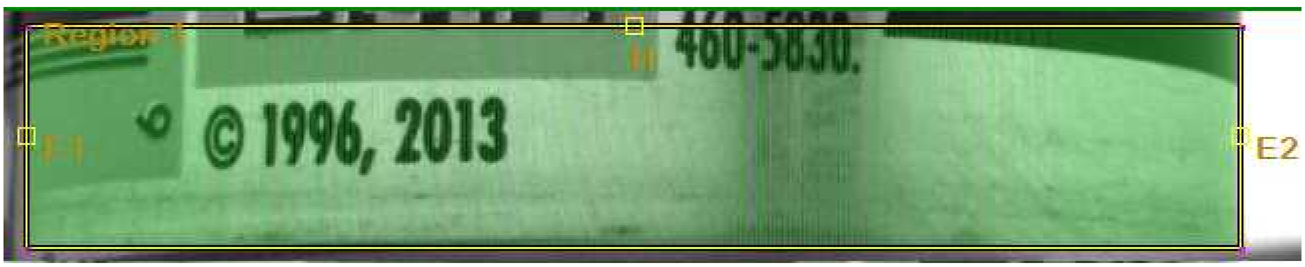
Inspection tree with Standard inspection names

Inspection tree with Customer-specific inspection names

Cylindrical region with perimeter type Element Shape

Cylindrical	
Sampling Window	85
Center Offset X	-17
Center Offset Y	-401
Region Width	777
Region Height	142
Region Angle	90.0°
Camera Distance	11.5
Part Diameter	2.26
Height Sampling	1.0
Perimeter Type	Element Shape

It's crucial that each cylindrical region be drawn correctly as pictured below:



Ribbon with perimeter type Combined Shape

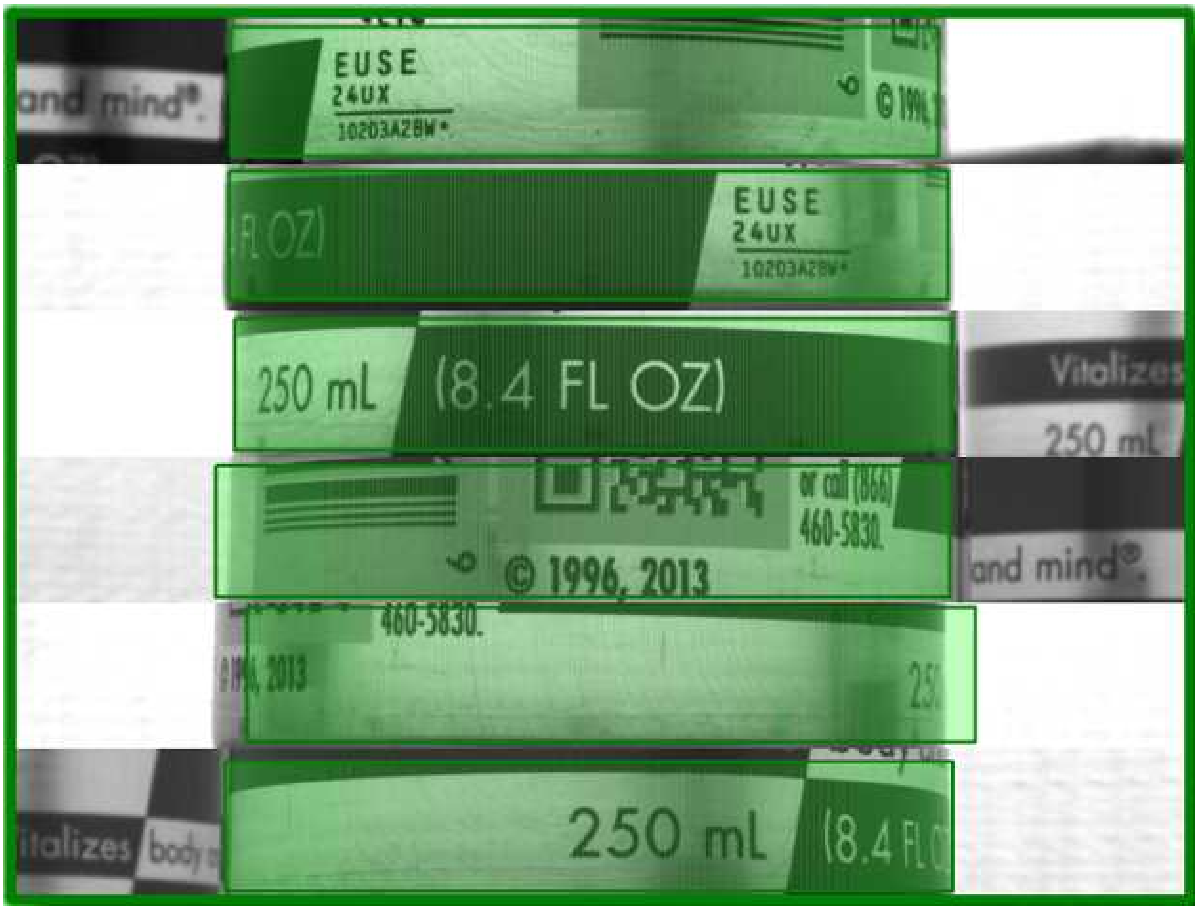
Combined Ribbon	
Ribbon Style	Ribbon
Ribbon Width	840
Repeat Ribbons	☐ Enabled
Mirror Ribbon	☐ Enabled
Rotate Ribbon	0.0°
Expand or Contract	0
Perimeter Type	Combined Shape

Country Code Validation

Ribbon	Country Code Validation
Country Code Readability	68.96
Only Read Line 1	Enabled
Country Code Line 1	SUSS
Country Code Line 2	14USM
Show Code Locations	Enabled

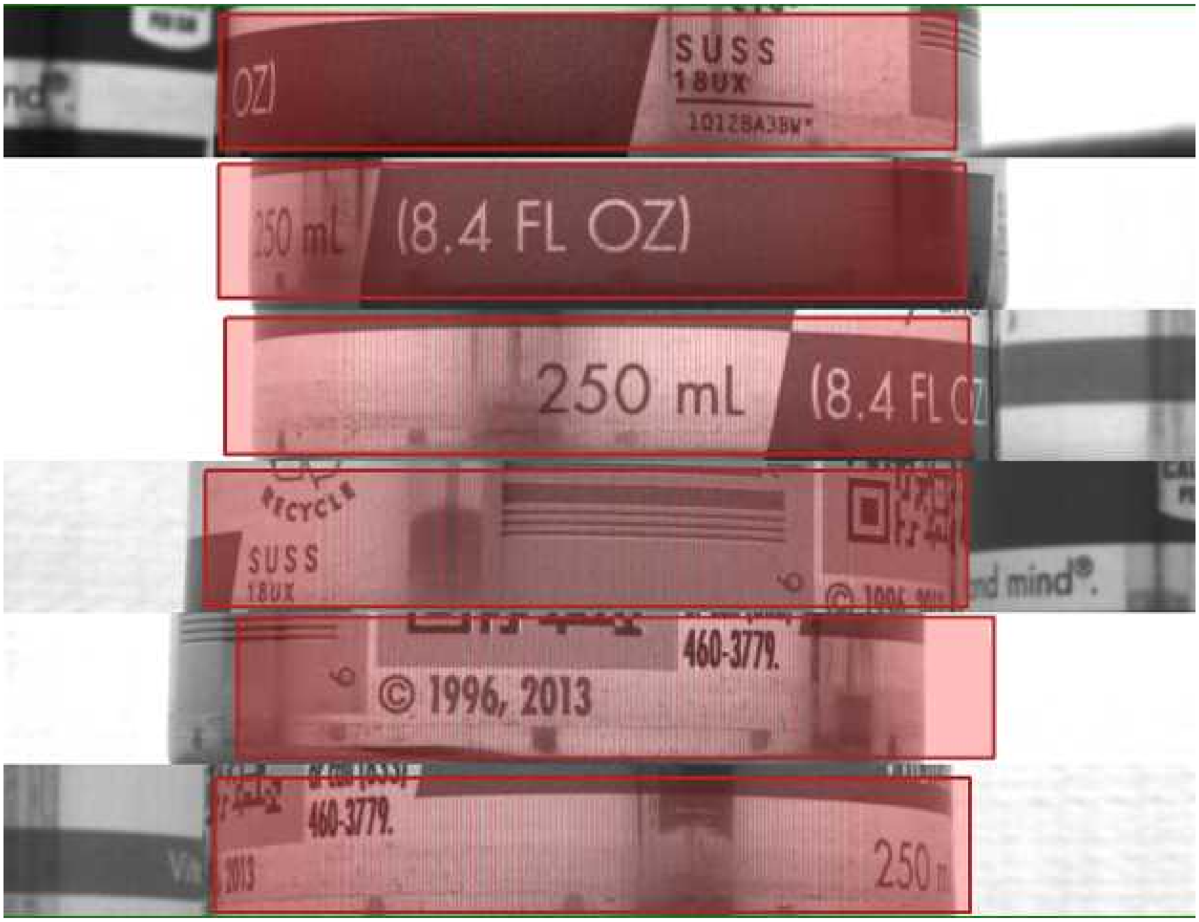
Below is a good image. The algorithm is looking for EUSE and 24UX. Once it has found both lines and readability passes, the inspection is complete.

The suggested font type is Universal with OCR segments set to 12 and overlap at 40. Validation can also be set to read only one line if that is all that is required.



Show code locations will highlight the match inside of a box within the viewing window. Line 1 and Line 2 can could be found independently in any of the six regions.

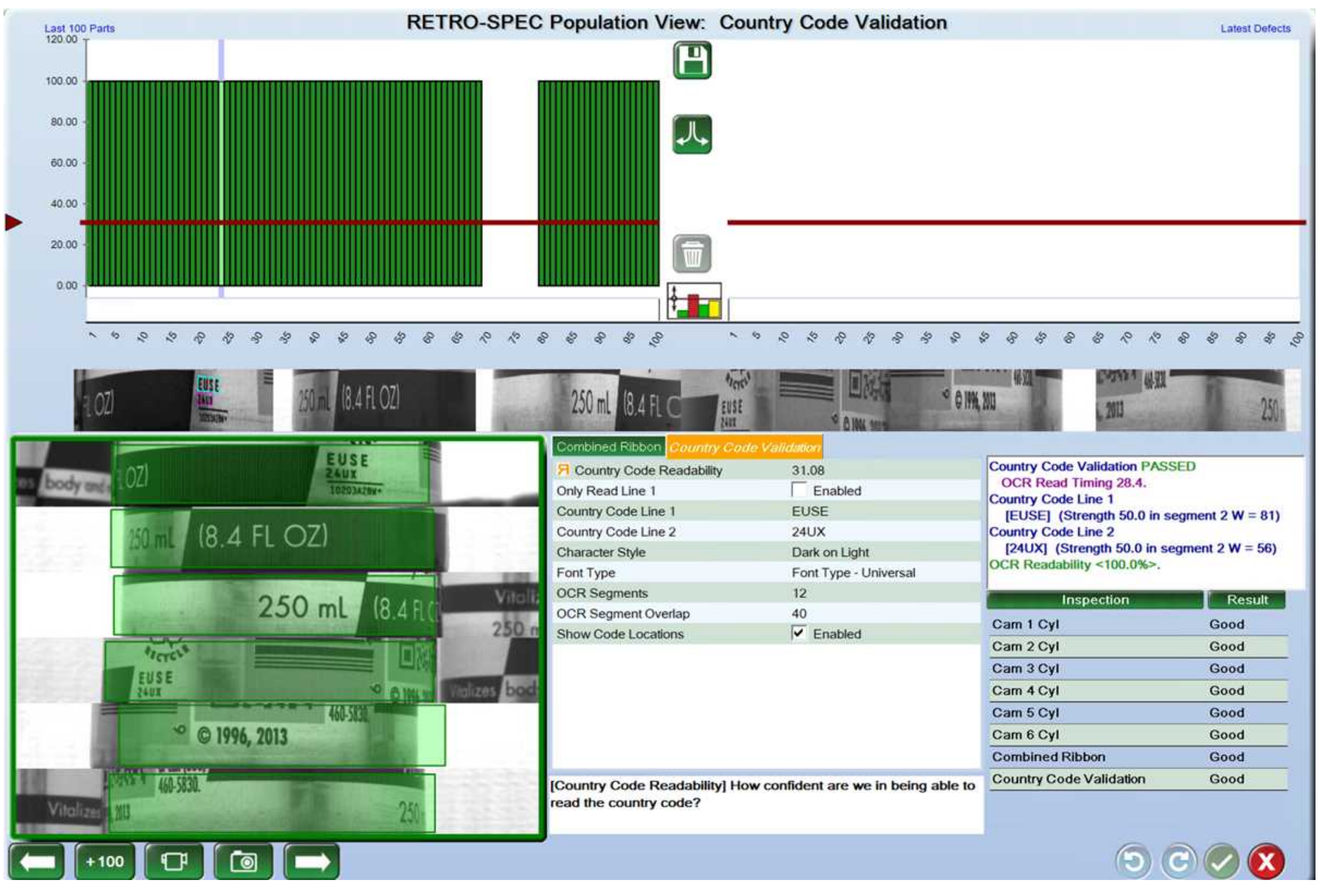
Below is an example of a failed image. Again, EUSE is entered for Line 1 and 24UX for Line 2. The code does not match and this part fails the validation inspection.



The results of the inspection can be read in the text box in the lower right corner below the viewing panel.

Country Code Validation PASSED
OCR Read Timing 28.56.
Country Code Line 1
[EUSE] (Strength 50.0 in segment 1 W = 75)
Country Code Line 2
[24UX] (Strength 50.0 in segment 1 W = 54)
OCR Readability <100.0%>.

Inspection	Result
Cam 1 Cyl	Good
Cam 2 Cyl	Good
Cam 3 Cyl	Good
Cam 4 Cyl	Good
Cam 5 Cyl	Good
Cam 6 Cyl	Good
Combined Ribbon	Good
Country Code Validation	Good



Dimensions

The dimension inspection type is special in that it connects the results of two other inspections to do the analysis. For example, a distance inspection can connect two registrations to measure the distance between centers of two features.

The Dimension inspections include:

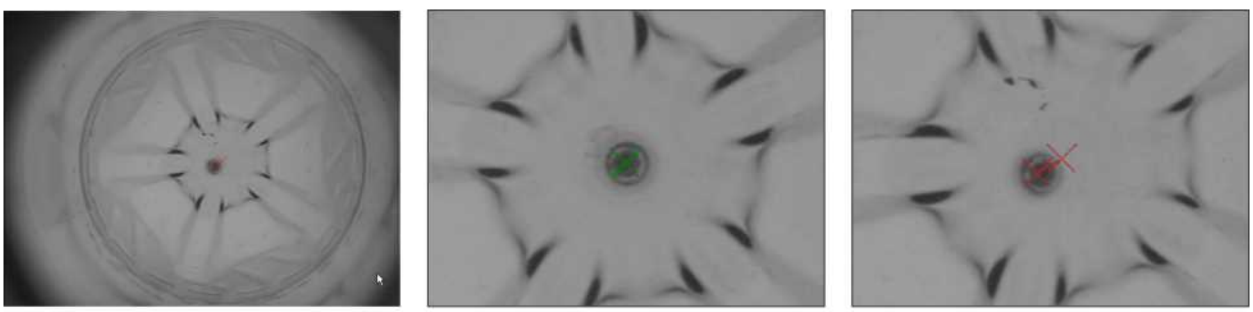
- Distance
- Angle
- Closure Torque

> *Note: Your system (and this book) may show only those items that apply to your application.*

Distance

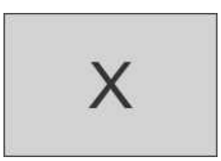
The Distance inspection computes the distance between two points. This is useful if you want to find features that are out of tolerance or out of place on a part. Distance inspection does NOT use a region. It obtains information produced in other inspections. The other inspections can include a Registration (it uses the found registration point), or a Measure Extract inspection.

Examples of where Distance inspection might be used is for detecting swung gates or high caps on bottles, turned tabs on converted or EZO ends, or computing finish dimensions. The example below shows a gate position computed with respect to the center of the base.



1 2 3

1) Full image with swung gate, 2) Enlarged image of good part, 3) Enlarged image of bad part showing incorrect position of gate



Distance can be computed with respect to the Image Center (instead of another inspection).

Click in the Results box in the inspection to see specific part information.

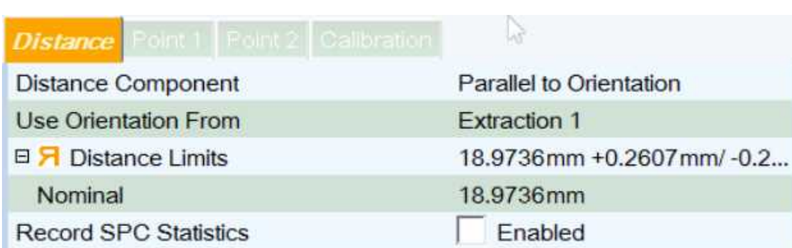
To add a Distance measurement:

1. Make sure at least one Registration or Measure Extract inspection is placed in the inspection tree. To find the distance between two points, place the registrations or Measure Extract inspections for each point.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add | Dimension | Distance. The dimension is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Distance menus are displayed and the region is shown on the image. (The menus are described below) Adjust the parameters as necessary.

To set up a basic Distance measurement using Inspection as a Source Type:

1. Choose a Distance Component from the Distance menu.
2. Go to the Point 1 menu and click the Select Inspection button.
3. Select the first reference point (in the inspection tree) you want to use for the Distance measurement. Click the Apply Reference button to complete the selection.
4. Go to the Point 2 menu and click the Select Inspection button.
5. Select the second reference point (in the inspection tree) you want to use for the Distance measurement. Click the Apply Reference button to complete the selection.
6. Go back to the Distance menu and set the Distance Limits.
7. Adjust other parameters as necessary.

Distance menu

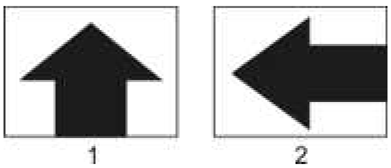


Note: The symbol [℗] indicates that this value is in pixels. Your system may show [mm] for millimeters, ["] for inches, or [ ] blank for custom units. It indicates that this value can be calibrated using Review Camera Calibration or Image Analysis for the current sensor.

Distance Component

Point to Point -- [most common] Find the distance between two reference points.

Perpendicular to Orientation and Parallel to Orientation -- Set this depending on your part's orientation.



1) Part oriented upright - use Perpendicular to Orientation

2) Part oriented sideways - use Parallel to Orientation

Note: If you use Finish Location or Centerline registrations for either of the Source Types, note that these registrations produce an orientation. The distance measured will reference the orientation produced by the Finish Location or Centerline registrations. If using other inspections, zero degrees or ninety degrees is used as a reference.

Use Orientation From Select which measurement from which to use orientation information.

Distance Limits Specify the minimum and maximum distance between the two reference points.

Nominal The ideal distance.

Keep Retro-Spec Statistics Check this box to keep statistics such as Mean, Standard Deviation, and CPK, from this inspection. For more information see Retro-Spec Statistics.

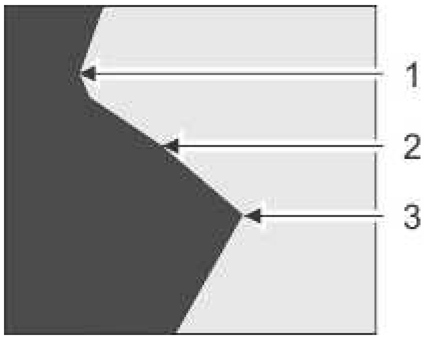
Point 1 and Point 2 menus

Note: when only one inspection is used for the Source Type, the second reference point used is the Image Center.

Source Type Select where to get the distance from. If you choose Inspection, then click the Select Inspection button, then choose an inspection from the inspection tree. Click the Apply Reference button to set the choice. The Assigned Inspection and Location Provider Type information is filled in -- you cannot manually change these.

Reference Point

(Available when you choose Measure Extract as a reference) Choose which edges to measure relative to. The illustration below shows the system searching from right to left, seeking a light to dark transition.



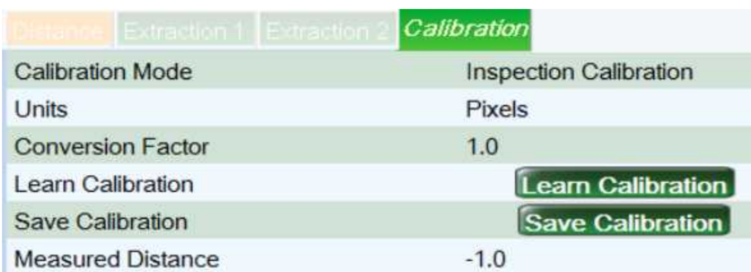
1) maximum position

2) average position

3) minimum position

Finish Corner (Available when you use Finish Location as a reference) Choose which corner to measure relative to.

Calibration menu



Calibration Mode	Inspection Calibration
Units	Pixels
Conversion Factor	1.0
Learn Calibration	Learn Calibration
Save Calibration	Save Calibration
Measured Distance	-1.0

Program the system to translate pixels into your desired units of measure (mm, for example).

Calibration Mode

The system will convert the pixel dimensions into your preferred unit of measurement.

Sensor Calibration -- Use the calibration previously set up for the sensor through Image Analysis or through another inspection.

Inspection Calibration -- Use the calibration from this inspection only.

Units Choose your preference in the reporting of the measurements. Custom allows any calibration factor to be used.

Conversion Factor Convert one pixel into the units selected. The initial conversion will be controlled by the Learn Calibration results. You can adjust this manually if necessary.

Learn Calibration Click the Learn Calibration button to automatically determine the scale factor, which converts the value to the desired units.

> *Note: you must first enter the Measured Distance before learning calibration.*

Save Calibration Click the Save Calibration button to save the calibration scale and units to the sensor for use by other inspections.

Measured Distance Measure your part with calipers or another tool, then enter the value for Measured Distance.

Angle

Angle computes the difference in angles between two orientations or registrations. Angle does NOT use a region itself. It uses information obtained in previous registrations or orientations. To measure an angle, use at least one registration or orientation - anything that produces an orientation. Examples where Angle could be used are to find skewed labels, or turned tabs on converted ends or EZO ends.

Inspections that produce an orientation, that can be used to compute an angle include:

"Centerline" on page 257

"Finish Location" on page 261

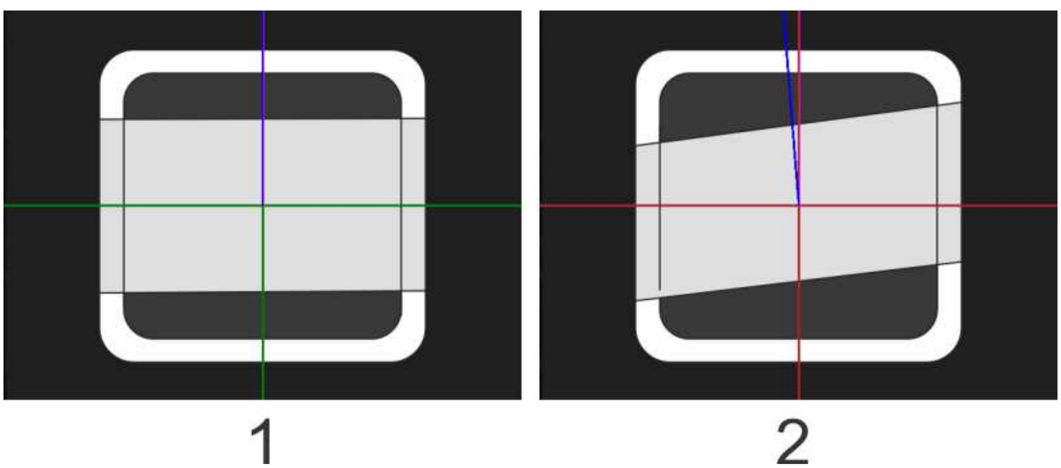
"Template Registration" on page 264

"Pattern Match" on page 310

"Template Orientation" on page 312

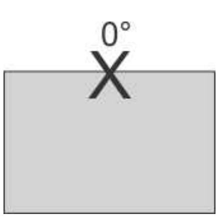
"Label Skew Extract" on page 365

In the example below, a label angle is computed with respect to the centerline of the part.



1) Good part | 2) Bad part - label angle is out of tolerance

You can measure the angle with respect to zero degrees on the image, if desired.



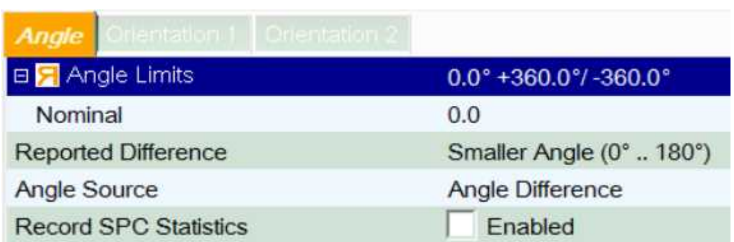
To add an Angle dimension:

1. Make sure at least one inspection that produces an orientation has been added to the inspection tree. [see list above]
2. Right-click on the item you just added.
3. From the Inspection menu, select Add | Dimension | Angle. The Angle dimension is added to the inspection tree. Re-name the inspection to something more meaningful to you.
4. Adjust the placement of the region and parameters as necessary.

To set up Angle dimension:

1. Select the Orientation 1 menu.
2. Click the Select Inspection button.
3. From the inspection tree on the left side of the screen, choose an inspection to reference one angle. The inspection you choose must be one that produces an orientation. Suitable inspections are highlighted in green in the inspection tree.
4. Click the Apply Reference button to complete the selection.
5. If you have another inspection to reference, use the Select Inspection button in the Orientation 2 menu. If you do not have another inspection to reference, the system uses zero degrees on the image as a reference.
6. Go to the Angle menu and set the Angle Limits to pass or fail parts based on your quality control criteria. For example, a part may be rejected if the angle of the label is too large compared to the centerline of a bottle.
7. Adjust other parameters as necessary to pass or fail parts per your criteria.

Angle menu



Angle Limits Set the valid range of measured angles per your specifications.

Nominal The ideal angle measured.

Reported Difference Use the Smaller or Larger Angle found. An example: the system could measure an angle at 2° or 358° depending which direction it is measuring.

Angle Source Choose how to determine the angle. Angle Difference = The difference between two angles. Line Tilt = The clockwise angle measured from a vertical line. These lines are shown on the image.

Detection Mode [Advanced parameter] Search for either a defect (default setting) or for a feature (for example, a feature that should be there and its absence represents a defect). See also "Detection Mode - Angle Inspection" on the next page

Keep Retro-Spec Statistics Check this box to keep statistics such as Mean, Standard Deviation, and CPK, from this inspection. For more information see Retro-Spec Statistics.

Orientation menu (1 or 2)

Pick the reference point(s) to measure the angle.

> *Note: when only one inspection is used for Extraction, the reference angle used is zero degrees, so the inspection would measure the angle with respect to zero degrees.*

Source Type (Only when Angle Source = Angle Difference) Select what type of source to get the angle from. Inspection uses an angle provided from an inspection. Fixed Angle allows you to enter a clockwise angle measured from a vertical line.

Select Extraction These menus allow you to choose an inspection to use as a reference point for the measurement. Click the Select Inspection button, then choose an inspection from the inspection tree. Click the Select Inspection button again to set the choice. The Assigned Inspection and Location Provider Type information is filled in -- you cannot manually change these.

Angle Selection This parameter is available when the inspection selected for the extraction contains more than one data point to reference. Examples include Finish Location or Centerline. Select the data point to which you want to reference the angle.

Flip Angle 180 Use this option if your angles are pointing in opposite directions and you want them aligned in the same direction. Sometimes this depends on how a ribbon was drawn, for example.

Detection Mode - Angle Inspection

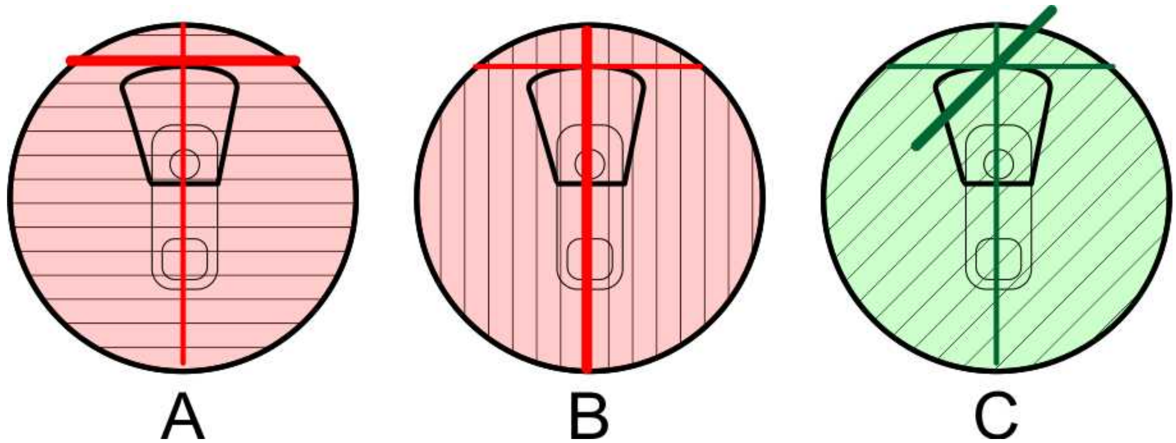
Detection Mode [Advanced parameter] Search for either a defect (default setting) or for a feature (for example, a feature that should be there and its absence represents a defect).

Right-click over the inspection parameters | Editor Options | Advanced = Checked. You must have the "Access advanced inspection parameters" permission.

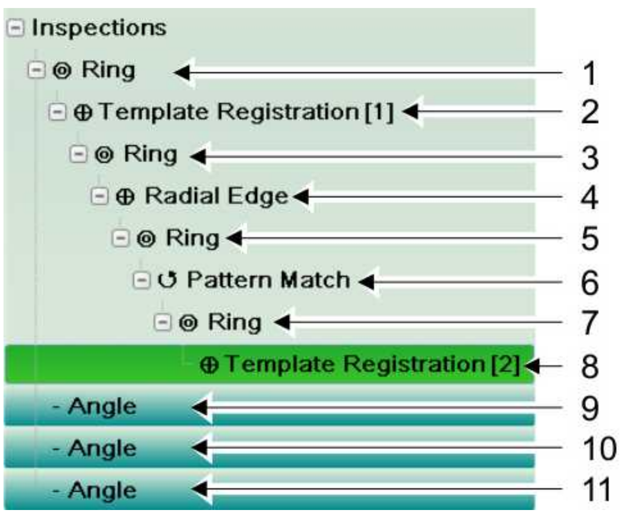
Outside Limits (Defect) - the inspection fails when the measured angle is outside of the Angle Limits. This might be used to detect flagged labels, or skewed labels, or a bottle that is too tilted, for example.

Inside Limits (Detection) - the inspection fails when the measured angle lies inside the limits.

An example where this parameter is used: we inspect a converted end and determine the angle of the grain with respect to the score (opening). The manufacturer of the converted end does not want the grain to parallel [A] with respect to the score, because that may make the seal too weak. They also do not want the grain to be perpendicular [B] with respect to the score, because that may make the seal too difficult to open. If the grain orientation is anywhere in between [C], then the grain/score alignment is acceptable.

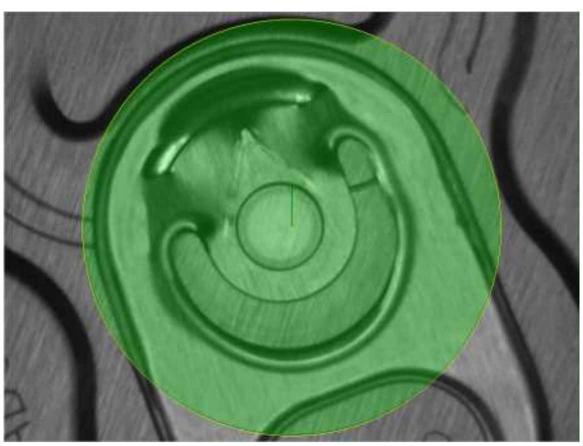


To determine the grain orientation, we set up inspections to find the rivet, then determine orientation of the grain. A sample part program is shown below.

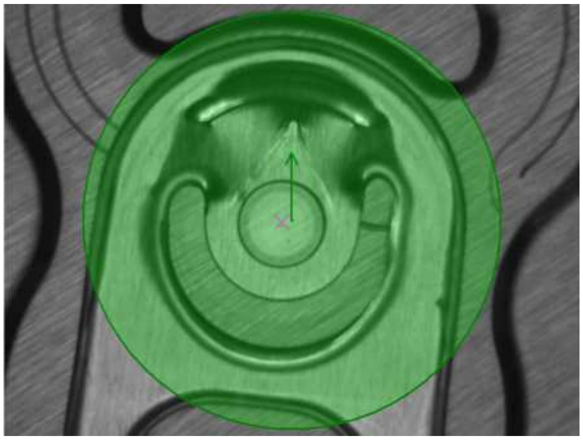


Example:

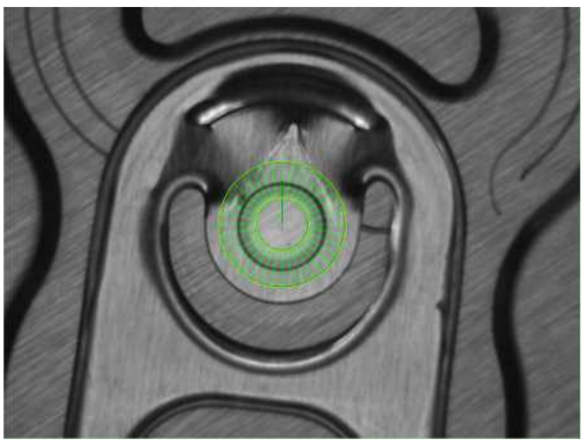
1. Use a Ring region to cover the center of the tab area. The region is used for a Template Registration.



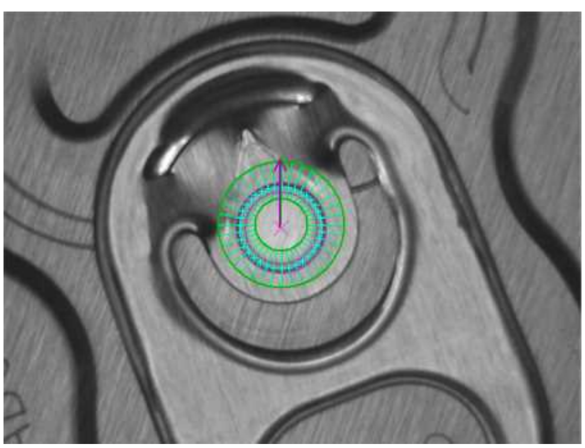
2. Use a Template Registration as a coarse registration. The green arrow in this example points to zero degrees in the image, which is used in subsequent inspections.



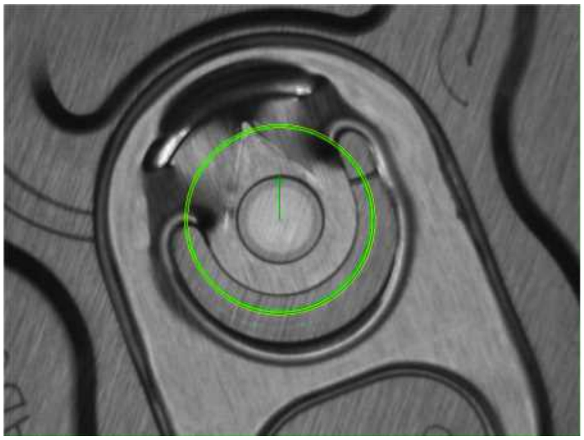
3. Place another Ring region to cover the area where the rivet edges will fall.



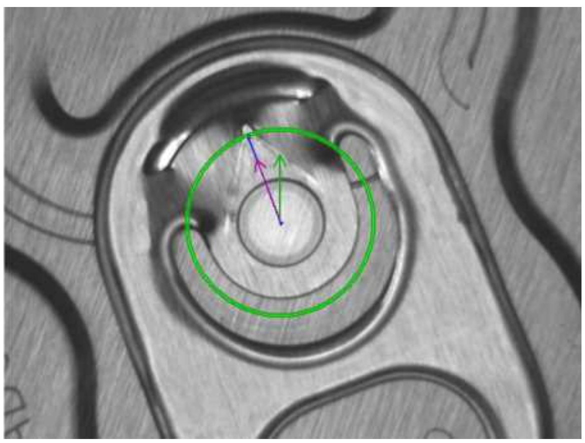
4. Use a Radial Edge Registration to find the edges of the rivet.



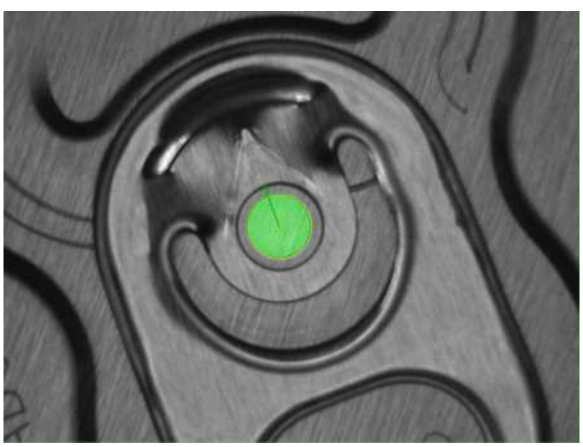
5. Place another Ring Region surrounding the rivet.



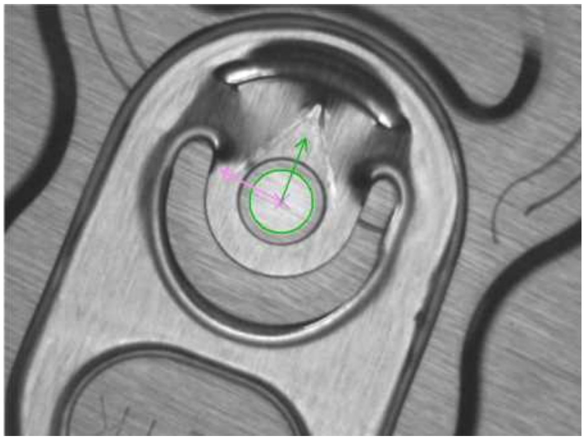
6. Use a Pattern Match Orientation to find the orientation of the part with respect to zero degrees.



7. Place another Ring Region on the rivet.



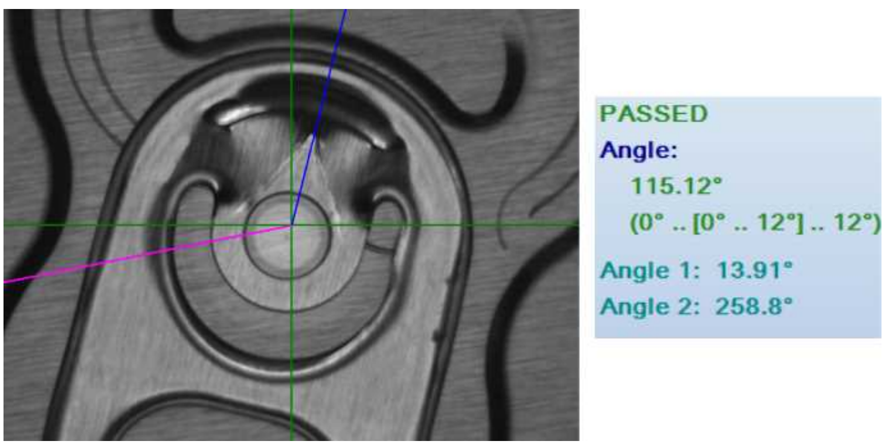
8. Use a Template Registration to determine the orientation of the grain on the rivet. Make sure Perform Orientation is checked in the Template Registration menu.



9. Set up an Angle inspection to determine if the rivet grain is zero degrees +/- 12 degrees. If it is, then the part fails because the seal may be too strong for the consumer to open.

Angle 0+	Orientation 1	Orientation 2
Angle Limits	0.0° +12.0°/- 0.0°	
Reported Difference	Smaller Angle (0° .. 180°)	
Angle Source	Angle Difference	
Detection Mode	Inside Limits (Detection)	
Record SPC Statistics	☐ Enabled	

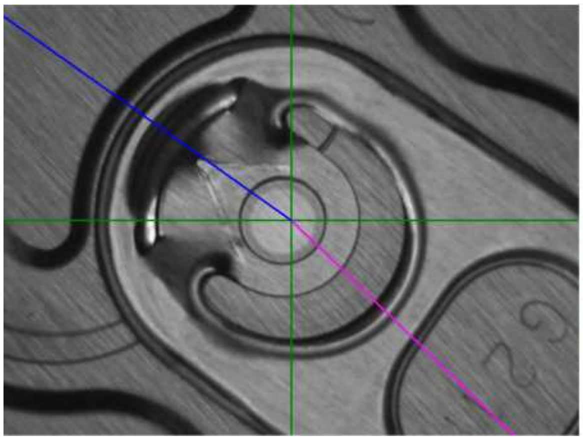
This part passed. The rivet grain is 115 degrees, which is outside the limits.



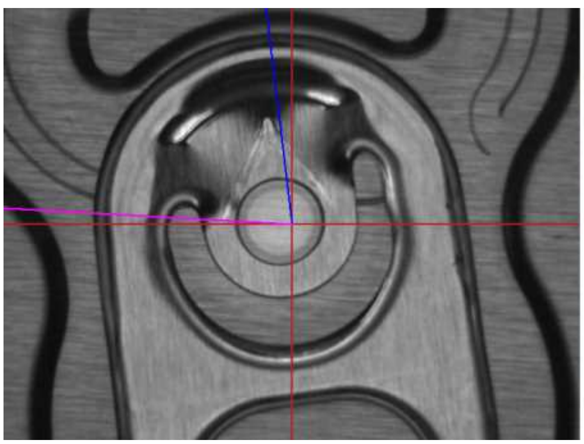
10. Set up another Angle inspection to determine if the rivet grain is 90 degrees +/- 12 degrees. If it is, then the part fails because the seal may be too weak.

Angle 90 | Orientation 1 | Orientation 2

⊞ Angle Limits	90.0° +12.0°/-12.0°
Reported Difference	Smaller Angle (0° .. 180°)
Angle Source	Angle Difference
Detection Mode	Inside Limits (Detection)
Record SPC Statistics	☐ Enabled



PASSED
Angle:
171.38°
(78° .. [78° .. 102°] .. 102°)
Angle 1: 305.39°
Angle 2: 134.01°

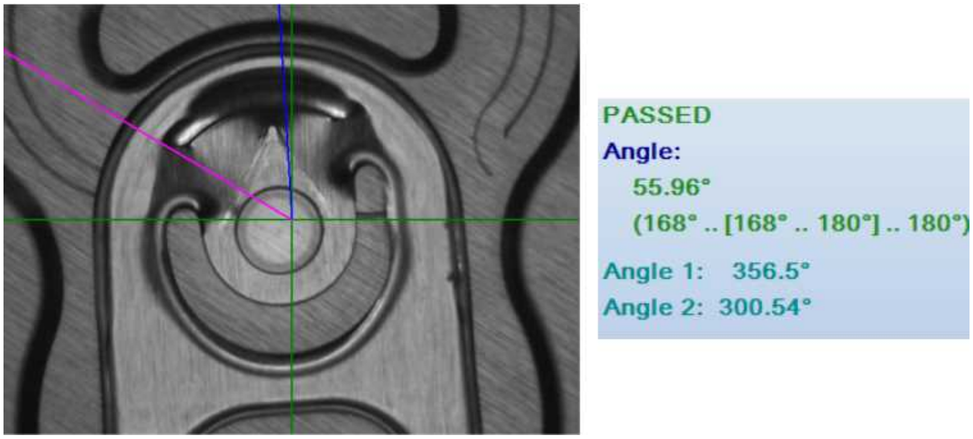


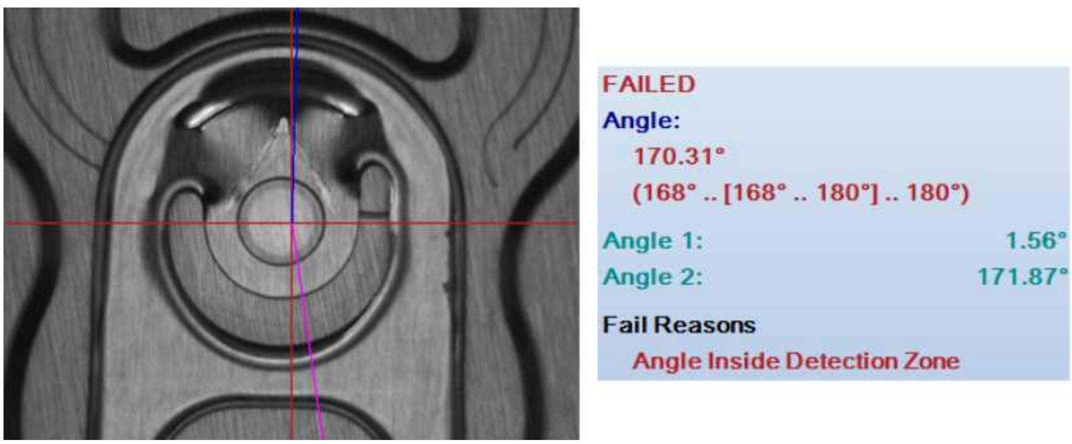
FAILED
Angle:
79.95°
(78° .. [78° .. 102°] .. 102°)
Angle 1: 353.13°
Angle 2: 273.19°
Fail Reasons
Angle Inside Detection Zone

11. Set up another Angle inspection to determine if the rivet grain is 180 degrees +/- 12 degrees. If it is, then the part fails because the seal may be too strong for the consumer to open. (This is a means of checking the opposite of zero degrees)

Angle 180 | Orientation 1 | Orientation 2

⊞ Angle Limits	180.0° +0.0°/-12.0°
Reported Difference	Smaller Angle (0° .. 180°)
Angle Source	Angle Difference
Detection Mode	Inside Limits (Detection)
Record SPC Statistics	☐ Enabled





Closure Torque Dimension

This inspection is similar to Angle Dimension, but has more features for over/ under-torqued closures on filled bottles. It measures the rotational angle of a closure with respect to a notch on the neck ring. The rotational angle is usually determined by a mark on the top of the closure. An example is shown below.

Closure Angle does NOT use a region - it uses information from previous inspections. To measure an angle, use at least one registration or orientation - anything that produces an orientation. Inspections that produce an orientation, that can be used to compute an angle include:

"Centerline" on page 257

"Finish Location" on page 261

"Template Registration" on page 264

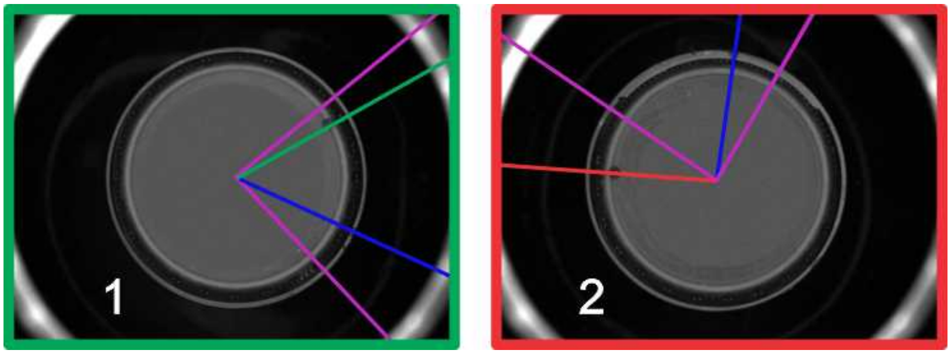
"Pattern Match" on page 310

"Template Orientation" on page 312

"Label Skew Extract" on page 365

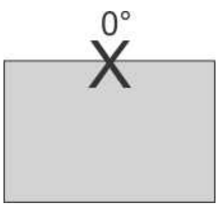
Example: In the illustration below:

- Blue line = reference point: notch on neck ring.
- Magenta lines = angle limits. The found mark on the cap must fall between these lines.
- Green line = good part: mark on the top of the cap falls within limits.
- Red line = bad part: mark on the top of the cap falls outside limits.



1) Good part | 2) Bad part

You can measure the angle with respect to zero degrees on the image, if desired.



To add a Closure Angle dimension:

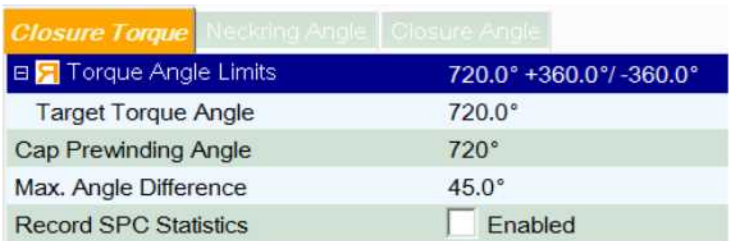
1. Make sure at least one inspection that produces an orientation has been added to the inspection tree. [see list above]
2. Right-click on the item you just added.
3. From the Inspection menu, select Add | Dimension | Closure Torque. The Closure Torque dimension is added to the inspection tree. Re-name the inspection to something more meaningful to you.
4. Adjust the placement of the region and parameters as necessary.

To set up Closure Torque dimension:

1. Select the Neckring Angle menu.
2. Click the Select Inspection button.
3. From the inspection tree on the left side of the screen, choose an inspection to reference one angle. The inspection must produce an orientation. Suitable inspections are highlighted for you.
4. Click the Apply Reference button to complete the selection.
5. Select the Closure Angle menu.
6. Click the Select Inspection button.
7. Choose an inspection to reference one angle. The inspection must produce an orientation. Suitable inspections are highlighted for you.
8. Click the Apply Reference button to complete the selection.

9. Select the Closure Torque menu.
10. For Cap Prewinding Angle, enter the angular rotation of the cap when it is perfectly placed. That is, the number of degrees that the cap is turned from the first thread when the cap is properly torqued.
11. For Max. Angle Difference, enter the number of degrees past the Cap Prewinding Angle that the cap can possibly be torqued.
12. Set the Torque Angle Limits to pass or fail parts based on your quality control criteria. This can be adjusted using the bars on the Retro-Spec graph. These limits will be displayed by magenta lines on the image.
13. Adjust other parameters as necessary to pass or fail parts per your criteria.

Closure Torque menu



Torque Angle Limits Set the allowed torque angle range per your specifications.

Target Torque Angle The ideal torque angle.

Cap Prewinding Angle Enter the angular rotation of the cap when it is perfectly placed. That is, the number of degrees that the cap is turned from the first thread when the cap is properly torqued.

Max. Angle Difference Enter the number of degrees past the Cap Prewinding Angle that the cap can possibly be torqued.

Keep Retro-Spec Statistics Check this box to keep statistics such as Mean, Standard Deviation, and CPK, from this inspection. For more information see Retro-Spec Statistics.

Neckring Angle or Closure Angle Menu

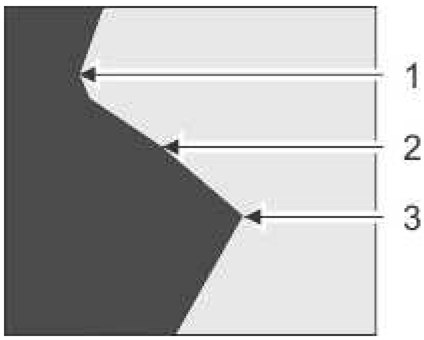
Select Extraction These menus allow you to choose an inspection to use as a reference point for the measurement. Click the Select Inspection button, then choose an inspection from the inspection tree. Click the Select Inspection button again to set the choice. The Assigned Inspection and Location Provider Type information is filled in -- you cannot manually change these.

Angle Selection This parameter is available when the inspection selected for the extraction contains more than one data point to reference. Examples include Finish Location or Centerline. Select the data point to which you want to reference the angle.

Finish Corner (Available when you use Finish Location as a reference) Choose which corner to measure relative to.

Reference Point

(Available when you choose Measure Extract as a reference) Choose which edges to measure relative to. The illustration below shows the system searching from right to left, seeking a light to dark transition.



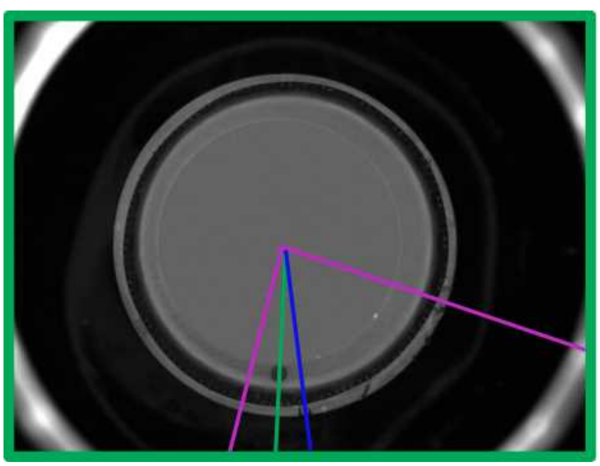
1) maximum position

2) average position

3) minimum position

Understanding the Inspection Results

The Results window displays information about the inspection. An example is shown below:



Closure Torque: PASSED
Torque Angle:
729.84° (360° .. 1080°)

Neckring Angle: 173.21°
Closure Angle: 183.04°
Target Torque Angle: 720°
Torque: Over torqued by 9.84°

Click in the Results box in the inspection to see specific part information.

Closure Torque Inspection passes (green) or fails (red).

Torque Angle Closure angle (green line) with respect to the value of the neckring notch (blue line). Or: in the case of a failed part, the angle of the red line with respect to the blue line.

Neckring Angle Notch ring position (blue line) with respect to 360 degrees in the image where 0 degrees is straight up.

Closure Angle Closure position (green line, or red line on a failed part) with respect to 360 degrees in the image where 0 degrees is straight up.

Target Torque Equals the value set for Cap Prewinding Angle.

Torque Torque = (Torque Angle) - (Target Torque Angle).

Correlations

The Correlation inspections identify which machine part was used during manufacturing of each product. For example, body makers and spray guns are identified, allowing you to monitor trends or trace potential manufacturing problems.

> *Prerequisites: you must first place a Region of Interest where you want the correlation inspection to take place. We also recommend a Registration and an Orientation (depending on the part type) prior to the inspection.*

The available types of correlation inspections are:

- "Body-Maker ID" below
- "Color Dot" on page 417
- "Feature Correlation" on page 433
- "Alphanumeric Correlation" on page 437
- OCR Correlation - this feature is not being used as of this publication

Note: Your system (and this book) may show only those items that apply to your application.

Body-Maker ID

This inspection identifies the markings from Body-Makers on cans, and correlates the can to the machine part where it was made. This information helps to identify trends in defects from a particular machine part, to help in troubleshooting and improved processes.

If a part fails this inspection, it is because the ID mark cannot be read or is unknown.

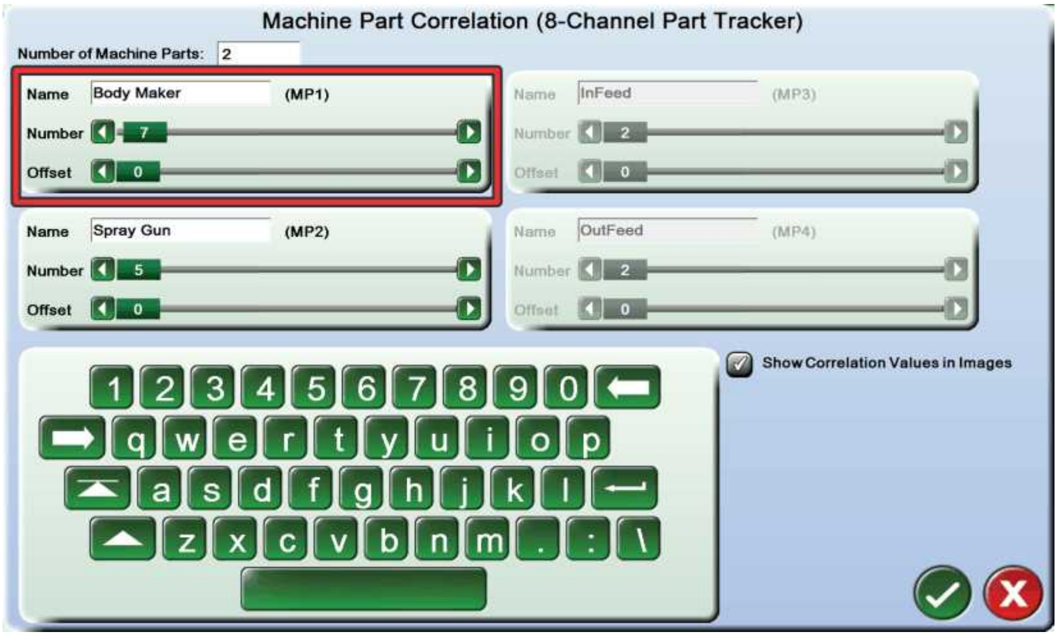
You will need cans with Body-Maker ID marks on them running through the inspection system. Make sure your camera and lighting setup provides the best image possible of the ID marks. You will run several hundred cans through the system, identify them yourself, sort them into the proper ID category, then program the inspection to do the same.

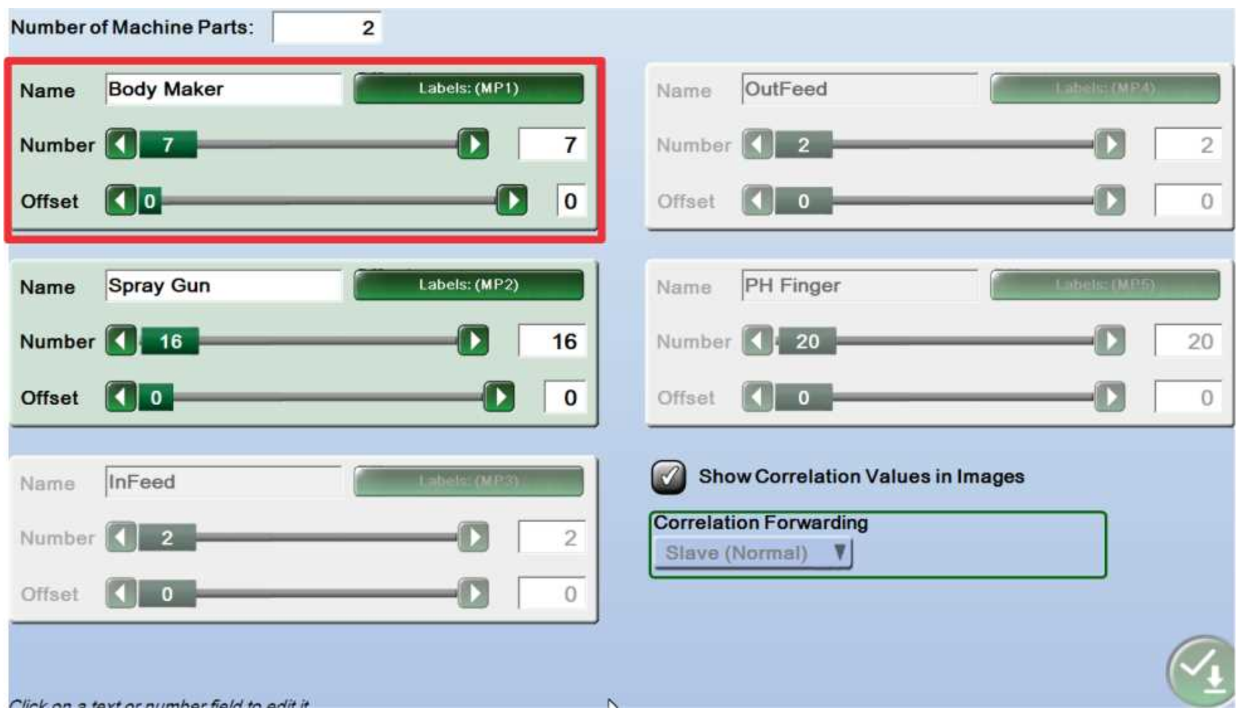
> *Note: Initial setup may take 30 minutes or longer, depending on the number of cans and Body-Makers you identify.*

Before adding a Body-Maker ID inspection:

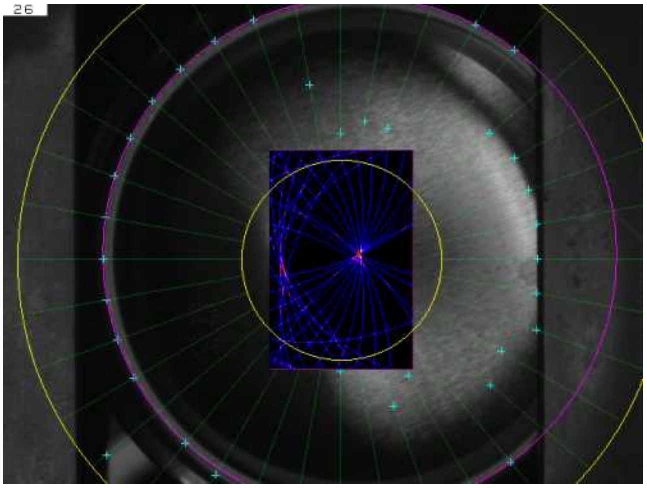
1. Make sure that your system has a Body-Maker configured in the "Machine Part Correlation" on page 471 menu. Set the number of machine parts to the number of body-makers plus one. For example, if your body-makers are numbered 21-26, you have six body makers: set the number of machine parts to seven. Always leave the offset at zero.

   > *Note: The extra body-maker ID is used to report machine parts that the Intellispec system cannot identify (for example, if a part is damaged). The system will record those parts as "Unknown."*

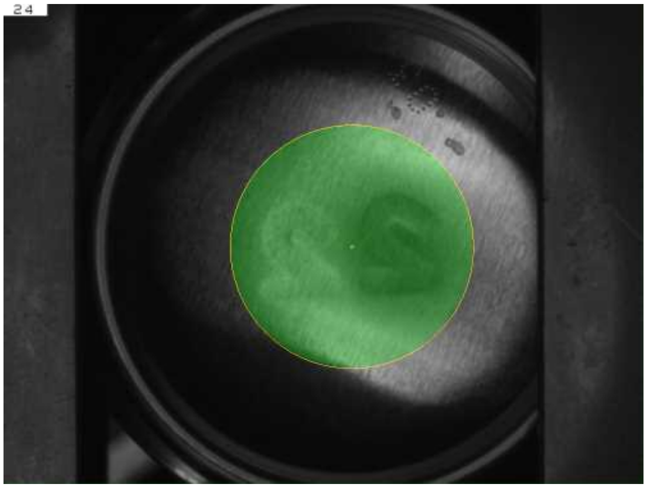




2. Set the labels as desired. More information: "Machine Correlation Labels" on page 474
3. Use a region and registration to find the center of the part. For example, place a Ring Region and Hough registration to determine the center of the part. An example is shown below.



4. Add another Ring Region to cover the area where the Body-Maker ID will be found. An inner radius of one, and a thickness of ~127 works well. Thickness depends on the size of the Body-Maker ID marks.



To add a Body-Maker ID inspection:

1. Make sure a Ring Region has been added to the inspection tree to surround the body-maker ID mark you want to find.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add | Correlation | Body Maker ID. Re-name it to something more meaningful to you. The inspection is added to the inspection tree.

The Body Maker ID menus are displayed and the region is shown on the image. The steps to setting the inspection should be followed in the order shown below. See also Body-Maker ID menus.

"BMID Step 1 - Set the Machine Part" on the next page

"BMID Step 2 - Collect Images" on the next page

"BMID Step 3 - Sort the Images" on page 406

"BMID Step 4 - Learn the Images" on page 410

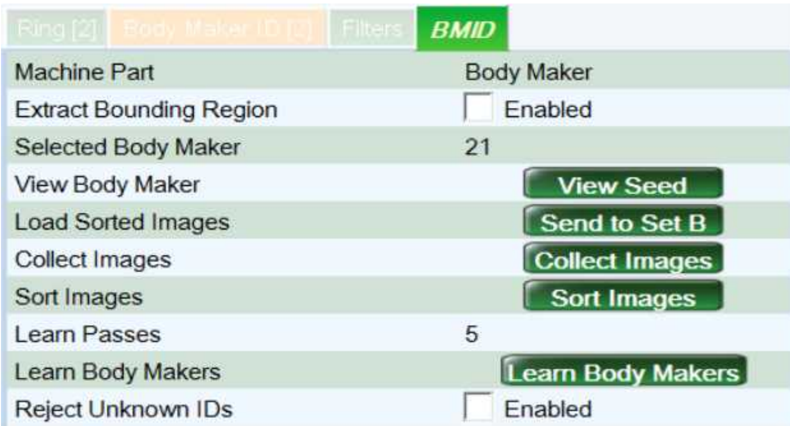
"BMID Step 5 - Adjust the Parameters" on page 411

"BMID Step 6 - Adjust More Parameters" on page 412

BMID Step 1 - Set the Machine Part

BMID = Body-Maker Identification.

To correlate the can to the proper Body Maker, go to the BMID menu and set Selected Machine Part to Body Maker. Note: your machine parts may be named differently, depending on system setup. Other parts of this menu are explained in the following procedures.

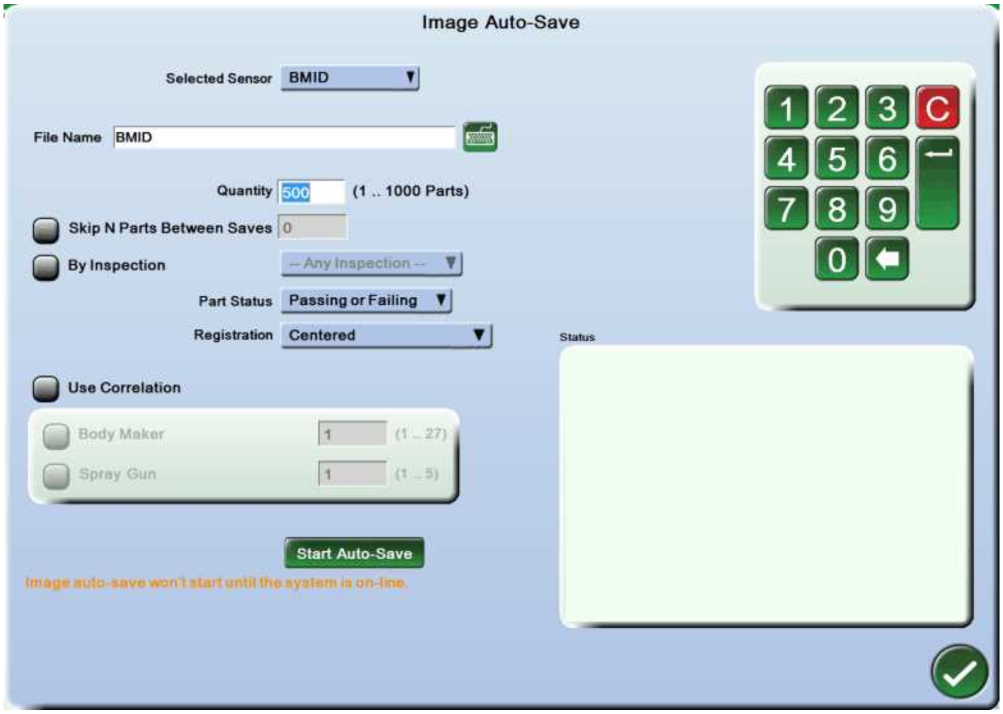


BMID Step 2 - Collect Images

You will collect images, sort them, then program the inspection to identify the proper ID marks.

To acquire the sample images:

1. From the BMID menu, select the Collect Images button. The Image Auto-Save menu is displayed. Set the parameters as follows, or as recommended by a Pressco Service Engineer. Most of the parameters are set by default to properly to collect body maker images. For additional information about this menu, see Saving Images Automatically.



2. For Selected Sensor, select the proper sensor from which you will collect body maker images.
3. For File Name, type the root name of the images that will be saved. BMID is the default name, so that when images are saved, they are named "BMID_0001.bmp" etc. If you have previously saved images with the same name, those images will be overwritten, so you may need to change the name to avoid overwriting the images.
4. Set Quantity to the desired number of images to capture. The more images you capture, the better the identification. You will need ideally 100 images per ID mark. The default quantity of images to capture is 500. Note: setting this number does not guarantee an equal number of images per Body-Maker, but it provides a good sample population.
5. Leave the other settings at their default values.
6. Put the lane online, and click the Start Auto-Save button to acquire the images. The status is displayed, and the auto-save process will stop when completed. The images are saved to [C:\Pressco\Lane_n\sensor_name\part_program\BMID_xxxx.bmp.]
7. Click the OK button to return to the BMID menu, and take the lane offline if desired.

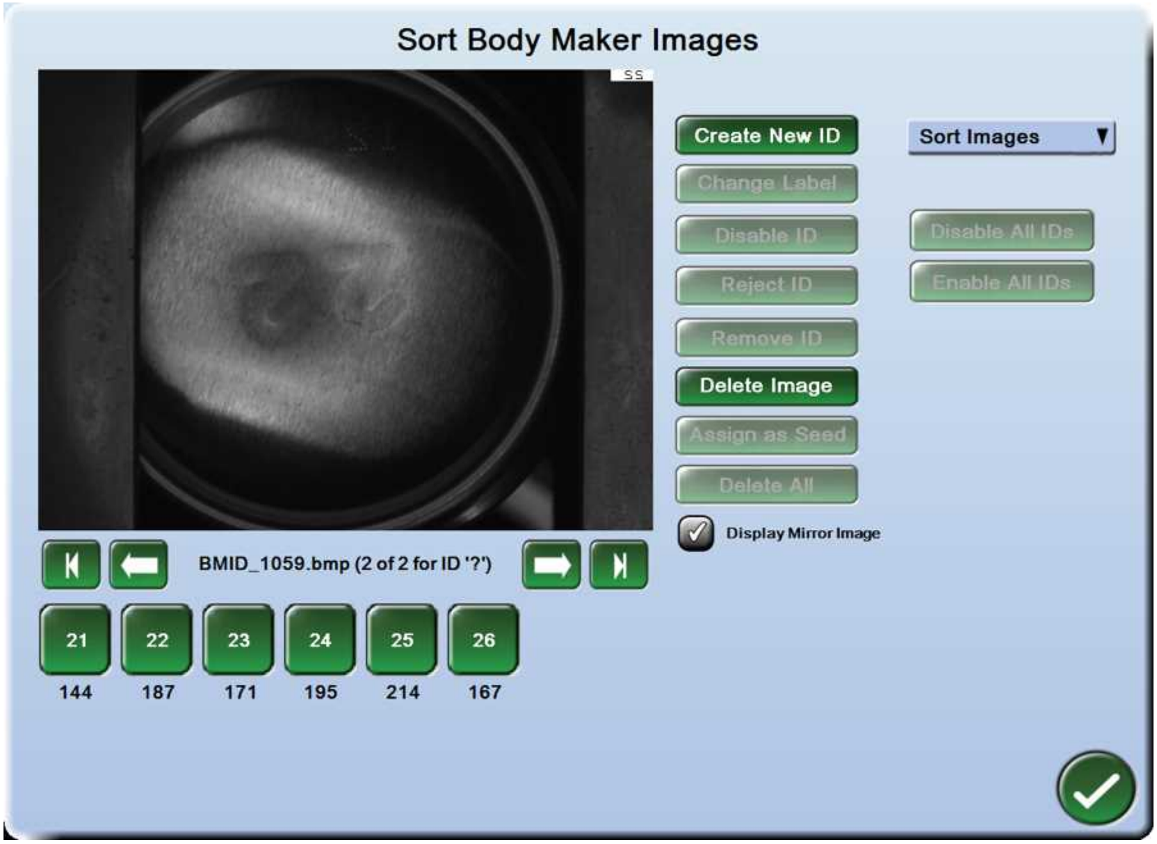
Next, you will visually sort the images by body maker ID marks.

BMID Step 3 - Sort the Images

This is a critical step in which you tell the Intellispec system which image came from which body maker. The system uses the images to create a template image for each body maker mark.

To sort the images:

1. Click the Sort Images button in the BMID menu. The image sorter is displayed.



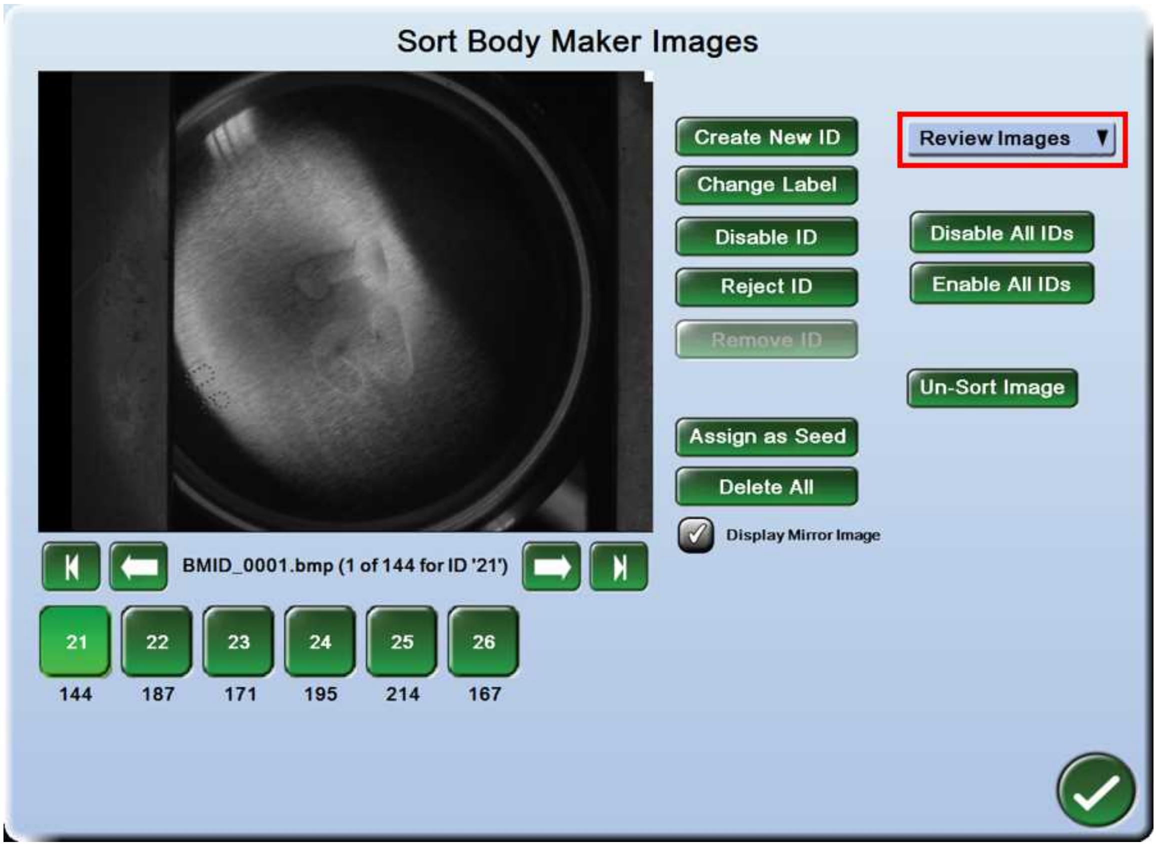
2. If your system is set up so that the ID marks appear backwards in the image, then check the Display Mirror Image box.
3. Look at the current image on the screen.
   - If you have a numbered bin below the image that matches the body maker number, then click that button. In our example, the image shows "25." We would click the "25" button below the image.
   - If you do not already have the numbered bins below the image, then click the Create New ID button. Type the new ID number or name on the keyboard provided. A button with the new ID is displayed below the image.
   - If an image is difficult to read, poorly marked, or defective, then click the Delete Image button to remove it from the sample set. If you cannot read the ID number, then the system cannot either.
4. Sort all the remaining images into the proper ID bins as in step 3. As you sort images, the system places the image files into separate folders on the Intellispec hard drive. The images are removed from the default unsorted list.
   - The image folders are located under [C:\Pressco\Lane_n\sensor_name\part_program\folder.] These images can be used in other jobs or testing.
   - The number of remaining images to sort is displayed below the image (example: "1 of 500" changes to "1 of 499" when you sort an image).
   - The number of images in each bin is displayed below each ID button (this number changes each time you place an image in the bin).

- If you select the wrong bin, just continue sorting images. You will be able to make changes later.

When all images have been sorted, the image screen will be blank. After you have sorted all the images, review each bin to verify proper images and assign seed images. These are described next.

To review images:

1. Select Review Images from the drop-down menu in the upper right of the menu. More buttons are enabled, and the images for the first bin are displayed on the screen.



2. To review the images for each ID, click one of the bins at the bottom of the menu, and scroll through all the images.
   - Find an image that represents a regular part - not the best image, not the worst image, but a typical part image. Click the Assign as Seed button.
   - If you find any un-readable images, or images that were assigned incorrectly, use the Un-Sort Image button and delete or re-sort them later.
3. Repeat Step 2 for all remaining bins.

Use the remaining functions as described below:

Create New ID Create a new body maker ID label. A button is created and placed below the image.

Change Label Select an ID button below the image, then click the Change Label button. A keyboard is presented to allow you to change the ID of the button.

Disable ID/ Enable ID Select an ID button below the image, then click the Disable ID button. That ID button is disabled. An 'X' is displayed below the button. You will not be able to save any images to that ID. To re-enable the button, click the Enable ID button (the button toggles between Disable and Enable).

Reject ID Select an ID button below the image, then click the Reject ID button. The system will reject any part that it identifies with this ID. See also "Sorting or Rejecting Parts Using Body-Maker ID" on page 415.

Remove ID Select an ID button below the image, then click the Remove ID button. That ID button is removed from the screen. You will not be able to save nor review any images assigned to that ID. You will not be able to remove the ID if you have any images assigned to it. You can use the Delete All button to remove all images assigned to the ID.

Un-Sort Image As you review images, you can use the Un-Sort Image button to remove an image assigned to an ID. This is helpful if the image was improperly assigned, or if the image is difficult to read. You can re-assign unsorted images, using the Sort Images drop-down menu at the top right of the screen.

Assign as Seed The system uses the "Seed" image as the first image when creating an average image for the ID. For best results, find an image that represents a regular part - not the best image, not the worst image, but a typical part image - and click the Assign as Seed button. Click the other ID buttons at the bottom of the screen and assign a seed image. If you find a different image to use as a seed, click Assign as Seed again to overwrite the old image.

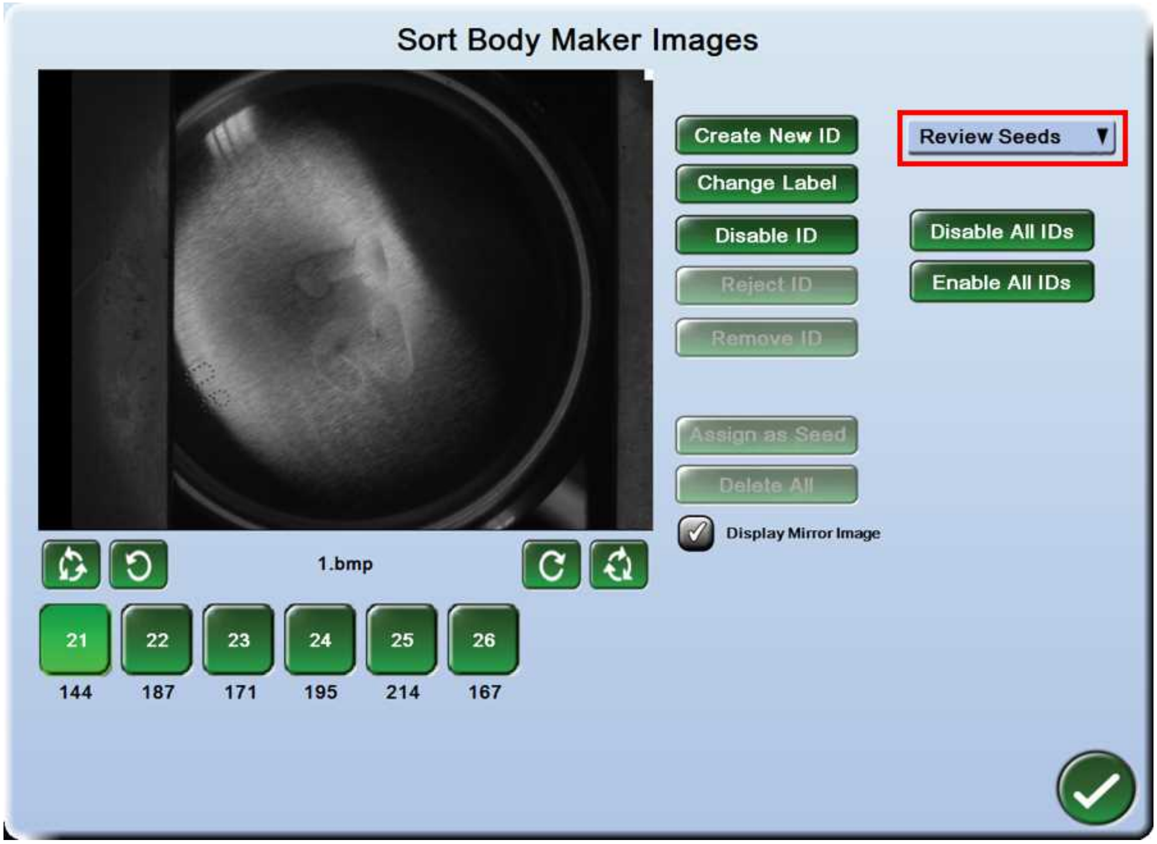
Delete All To remove all images from an ID bin, select that ID button and click the Delete All button. All those images are removed from the system.

Disable All IDs/ Enable All IDs These buttons allow you to enable or disable all the IDs at once.

After you have reviewed the images and assigned seed images, review the seed images.

To review seed images:

1. Select Review Seeds from the drop-down menu in the upper right of the menu. Some different buttons are displayed below the image. The buttons on the right of the screen are described above.



2. Select an ID button at the bottom of the screen to display the seed image.
   - If the image looks good, then no further action is necessary.
   - If desired, you can use the buttons directly below the image to rotate it so that it looks upright and straight. The outer buttons rotate the image 30 degrees at a time, and the inner buttons rotate the image one degree at a time. This does not affect inspection; it is available for you to read the image easier.
3. If you want to change the seed image, select the Review Images drop-down menu and scroll through the available images, then assign a different seed image.

> *Important: You should have 100-200 images per ID. A minimum of 100 images has been proven to work well.*

- If you do not have the minimum images for an ID, you can disable that ID by selecting it, then clicking the Disable ID button in the sort menu. OR:
- You can acquire more images by the procedures described above, and sorting enough images into the ID bin to have at least 100 images.
- If you have previously learned sets of images and disabled ID numbers or acquired more images, you will need to relearn the IDs, as described below.

Next, set the parameters. Click the OK button to save changes and exit the sort images menu.

BMID Step 4 - Learn the Images

The system learns the images by analyzing each image in each bin, determines the distinguishing characteristics, and creates an average (combined) image from all the samples in each bin.

To learn the images:

1. Make sure you have acquired images as described in Step 2 Collect Images and Step 3 Sort the Images.
2. In the BMID menu, click the Learn Body Makers button. The system displays a progress bar as it learns the images.

> *Note: this process may take several minutes, depending on the number of images and the number of Learn Passes.*

3. When the learn process is complete, the progress bar is removed from the screen.
4.  Test the inspection by scrolling through the images in the Retro-Spec interface and comparing the image to the results. (To get more images, put the lane online and select the camera or movie icon)

The image should match the ID. Remember that your images may be reversed in the image area because of hardware setup. The example below shows the correct ID for the selected image.

You may need to adjust some parameters for best results in identifying the correct ID mark every time.

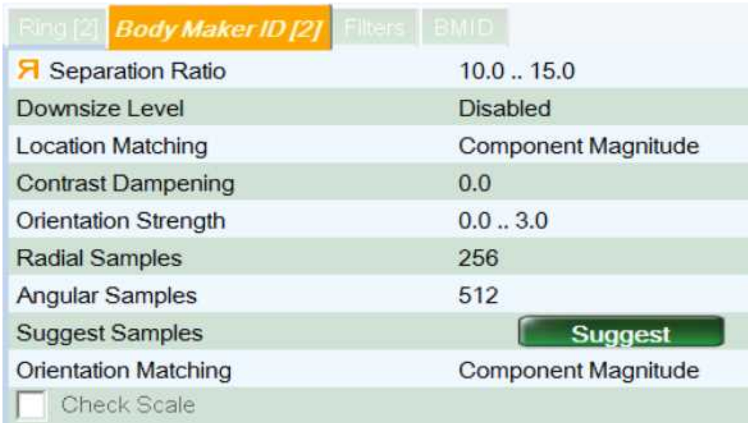
> *Note: After the system learns the images, it saves the average image (template) in a "results" folder for each body maker at [C:\Pressco\Lane_n\sensor_name\part_program\folder\results.]*

BMID Step 5 - Adjust the Parameters

You may set other parameters after using the learn process, but as a minimum, set the following.

To set the parameters:

1. In the Body Maker ID menu, click the Suggest button. This allows the system to set the best values for the angular and radial samples parameters based on your configured region.



2. In the BMID menu, set the number of Learn Passes. A setting of 20 usually works well. A higher setting may improve the results slightly, but takes more time.

BMID Step 6 - Adjust More Parameters

Adjust the following only if you are still not getting excellent results identifying ID numbers.

> *Note: If you change grain or shadow settings, you must Learn Body Makers again. A new template image will be created.*

To adjust the parameters:

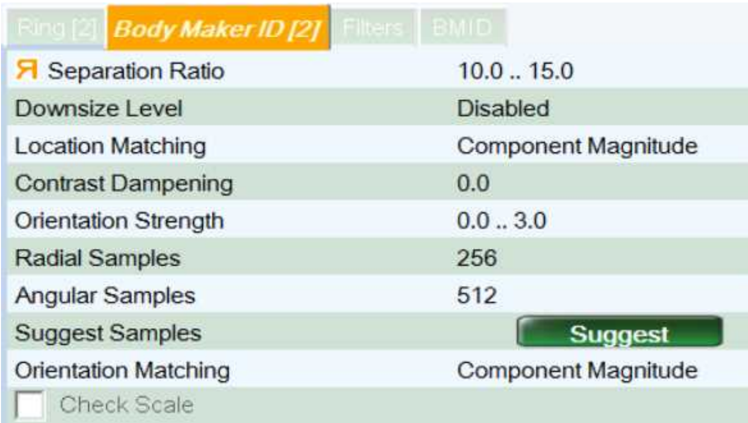
1. Adjust the following parameters for best results:
   - Filters Menu: Grain Reduction - the default setting is enabled. Try Moving Average first, with a reduction level 15.
   - Filters Menu: Shadow Reduction - the default setting is enabled. Try Moving Average first, with a setting of 20.
2. If you have made any changes, click the Learn Body Makers button [BMID menu]. A progress bar is displayed to show progress.

When the learn process is complete, the progress bar is removed from the screen. The inspection should be ready to use.

Body-Maker ID Menus

This topic explains the parameters for the Body-Maker ID inspection. To set up the inspection, see Body-Maker ID.

Body Maker ID menu



Separation Ratio Measure how good the body maker ID is, compared to the next strongest body maker template. The higher the number the better. A value of 2 = twice as strong.

Downsize Level Using this option depends on the image. For example, if your part image has grain, then use a Downsize Level of 4 to 1 - this will blur the image enough to almost ignore the grain. The system groups pixels when you enable this option. Larger values reduce the image further, speeding up the inspection at the cost of resolution.

For cans, Downsize level is normally disabled. To improve inspection time, try a setting of 4, but the inspection will probably not work well with a setting of 16 or 64.

Location Matching This uses template data as a reference and compares it to current part data. Normally this does not need to be changed from Component Power. If you are getting inconsistent results, try another technique. We recommend trying the techniques in this order: 1) Component Power, 2) Component Magnitude, and 3) Global Power.

Contrast Dampening [Advanced parameter] We recommend that you leave this set at zero.

Orientation Strength Set the minimum orientation between the inspected image and the template image. You can set this through the bar on the graph. If the current part falls below this value, the part fails.

> *Note: It is best to use the Suggest button to set Radial Samples and Angular Samples.*

Radial Samples Divide the region into rings. To set this manually, set this to the approximate outer radius of the template region, rounded up. For example, if you have a Ring region, go to the Ring menu, and add Inner Radius plus Thickness to get Outer Radius. In the Settings menu, use the next highest value from the radius.

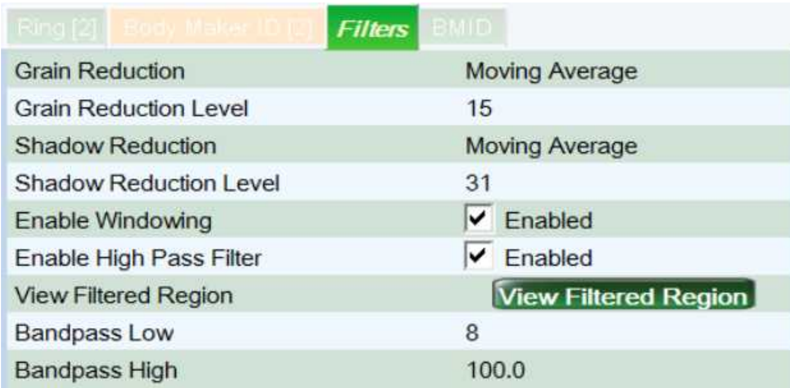
Angular Samples Divide the region into arcs. For more information, see "Parameter Illustrations" on page 205.

Suggest Samples Click the Suggest button to automatically set Radial Samples and Angular Samples based on the current region settings.

Orientation Matching This uses template data as a reference and compares it to current part data. Normally, use Component Magnitude. If you are getting inconsistent results, try the other techniques in this order: 1) Component Power, 2) Global Power.

Check Scale Leave this box un-checked. Scale refers to a magnification factor in the event of a change in optics or part movement. It can be used as a reject limit for part size.

Filters menu



> *Note: If you change grain or shadow settings, you must Learn Body Makers again. A new template image will be created.*

Grain Reduction [Technique] (Optional) Enable this feature only if your part has grain and is causing inspection problems. This filter will help block grain from the image. Use the technique that works best on your part.

For cans, the default for Grain Reduction is enabled, and the Grain Reduction Level is set at 15.

Grain Reduction Level The size of the grain reduction filter. A larger value results in more reduction of the grain.

Shadow Reduction (Optional) Enable this feature only if your part has features such as shadows that are causing inspection problems. Use the technique that works best on your part.

Shadow Reduction Level Increase to apply more Shadow Reduction. Use View Filtered Region to preview the effect.

Enable Windowing Default = checked. The region fades to black around the edges, emphasizing the features towards the center of the region, while ignoring the features towards the edges of the region. Click the View Filtered Region button to see the effects of this filter.

Enable High Pass Filter Default = checked. The filter reduces shading and leaves sharp edges in the region. Some cases where this filter might be un-checked would be in some color images, or if edges are normally fuzzy. Click the View Filtered Region button to see the effects of this filter.

View Filtered Region [Only applicable if any of the filter techniques above are being used] This displays the image using the filters.

Bandpass Low and High Filter out lighting effects (low), and scratches (high). The defaults are 8 for Low, and 100% for High, and do not need to be adjusted.

BMID menu

Machine Part Select the machine part to correlate the body maker ID. The items in the drop-down menu must be configured in Machine Part Correlation.

Extract Bounding Region Not used. Leave it un-checked.

Selected Body Maker Select which body maker you want to see in the body maker found graph, and also for viewing the body maker template.

View Body Maker Select a body maker (in Selected Body Maker), then click the View Seed button to see the seed image. If the image is not a good, sharp image, then you may need to select a different seed. Go to Sort Images to choose a different seed.

Load Sorted Images Load all the images you have sorted for the Selected Body Maker by clicking Send to Set B. The image bars are represented on the right side of the Retro-Spec graph. This feature allows you to see how well the inspection is working.

Collect Images Open the Image Auto-Save menu. Instructions: "BMID Step 2 - Collect Images" on page 405

Sort Images Open the image sort manager. Use this to sort and review images and place the images into ID bins. Instructions: "BMID Step 3 - Sort the Images" on page 406. ALSO: Use the image sort manager to reject parts correlated to specific Body Maker IDs. For information, see "Sorting or Rejecting Parts Using Body-Maker ID" below

Learn Passes Run through the data this number of times. NOTE: this takes a long time if you have hundreds of images. A value of 3 is a minimal setting, but we recommend a setting of 20 for best results.

Learn Body Makers Create the templates for all body makers using the sorted images. Instructions: "BMID Step 4 - Learn the Images" on page 410

Reject Unknown BMIDs Reject parts with BMIDs that cannot be identified.

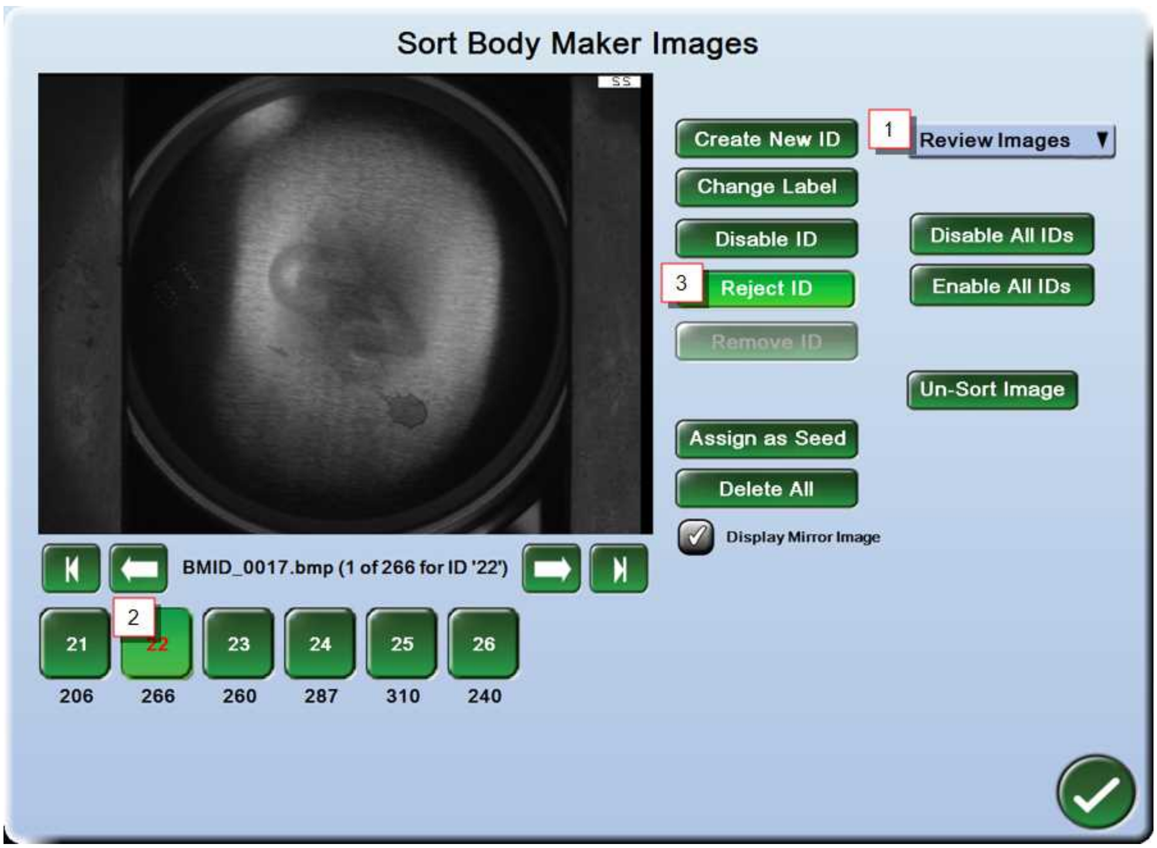
Sorting or Rejecting Parts Using Body-Maker ID

You can set up the system to reject parts correlated to specific Body Makers. First, set up the Body-Maker ID inspection.

Note: in this topic, we refer to sorting in two different ways. The "Sort menu" applies to sorting images in the software to place them in the proper bins. Sorting or Rejecting "parts" applies to your production line: you can reject or sort/ divert parts based on their body maker ID number.

To sort or reject parts:

1. In the BMID menu, select the Sort Images button. This displays the image sort manager.
2. Select Review Images from the drop-down menu [1].
3. Select an ID button at the bottom of the menu [2]. This is the ID that you want to reject. You may select more than one ID if desired. The ID number or name is displayed in red and the button remains highlighted to indicate that these parts will be rejected. [we selected 25 in our example]
4. Select the Reject ID button [3]. This button will remain highlighted to indicate that it is enabled. (To disable rejection, select the button again. It toggles to dark green to indicate that it is disabled.)



5. Select the OK button to save changes and exit.
6. If parts are shown in the Retro-Spec graph, you will see them displayed in red to indicate that they will be rejected.

7. Put the system online to inspect and reject parts.

The parts are counted in the statistics as bad parts. If you do not want the rejected ID parts to be counted as bad parts, then exclude them from statistics.

To exclude from statistics:

Right-click over the inspection tree | select Settings | select Exclude from Statistics. A check mark is present when this is enabled (that is, the system is excluding this inspection from statistics).

For more information, see "Inspection menu" on page 189.

Color Dot

This inspection identifies color dots sprayed on the bottom of cans during manufacturing. The inspection could pass or fail parts based on the size and number of color dots sprayed on the can.

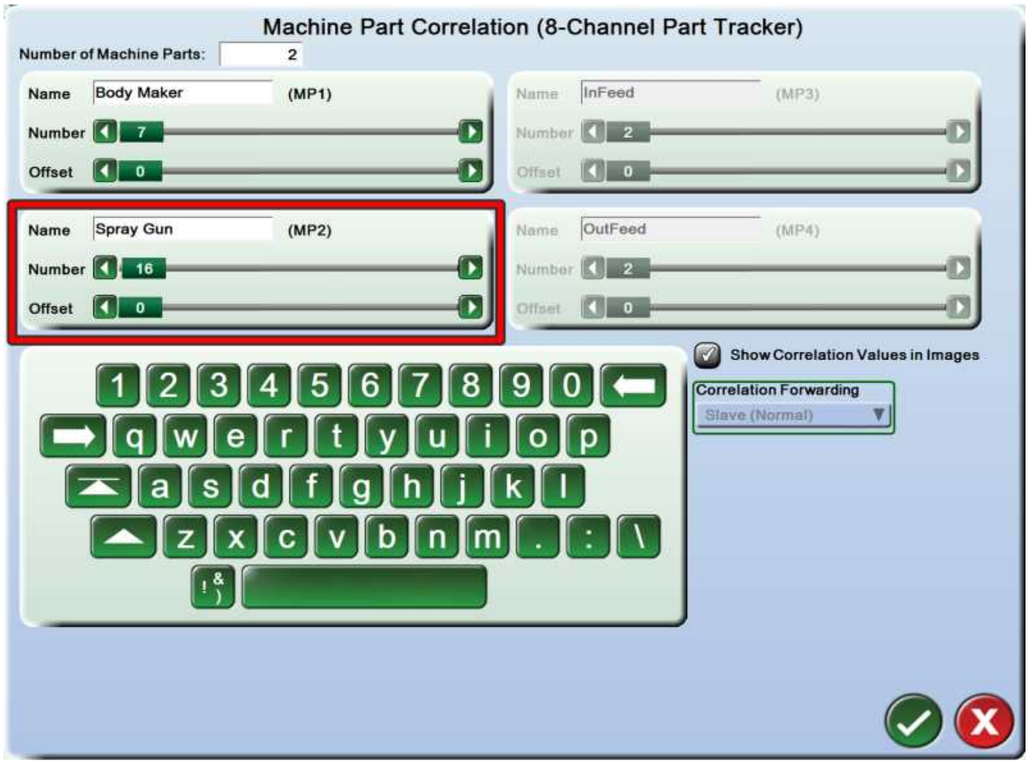
Color Dot Correlation uses a color image of the bottom of a can to detect the color of the spray dot that is made from the different spray guns. A color enhancement is used to classify that color as a certain grayscale range, and then the Color Dot inspection finds only the pixels that fall into that range. Currently, this inspection is only used for detecting spray dots on beverage cans.

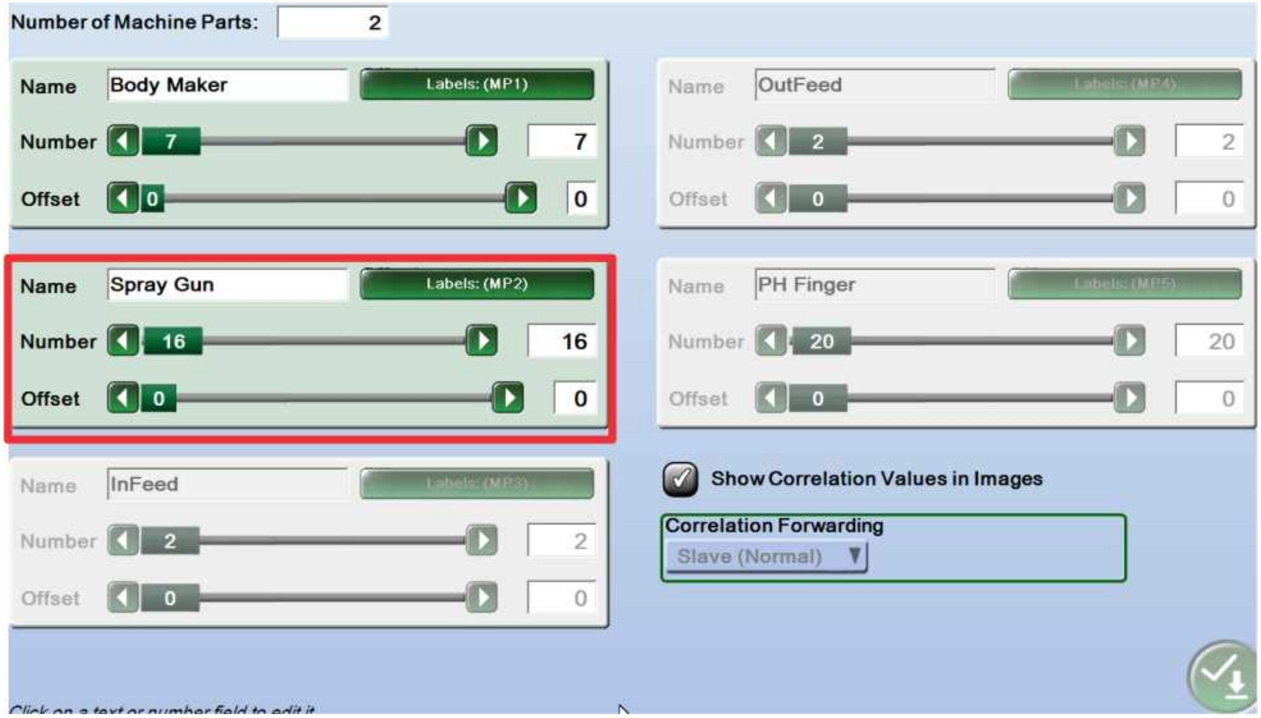
> *Note: setup is similar to Feature Registration and Feature Detect Analysis.*
> *Note: We recommend that one Color Dot inspection be set up for each different color dot or pattern of dots. Also add a separate Color Distance Enhancement prior to each Color Dot inspection.*

Before setting up Color Dot Correlation:

Make sure that your system has a Spray Gun (or Color Dot, or another name) configured in the "Machine Part Correlation" on page 471 menu. The usual setting is 16. You may not have this many different spray guns, but this allows for adding future spray guns without additional setup, and without resetting correlation statistics. When you put the system online, the system will notify you if you need a larger number.

> *Note: The last number ID (example: 16) is used to report machine parts that the Intellispec system cannot identify (for example, if a part is damaged). The system will record those parts as "Unknown." Using a value of 16 with an Ultra I/O output makes the "unknown" parts easy to identify. The binary value for 16 is 10000. If that highest bit is "1," then you will know that the part was not correlated to any known spray guns. Always leave the offset at zero.*

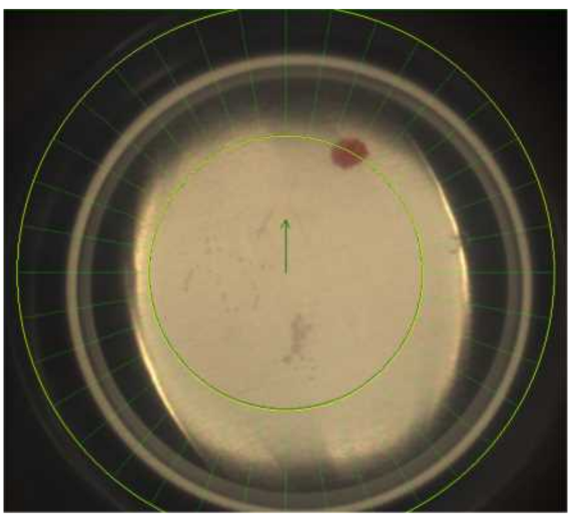




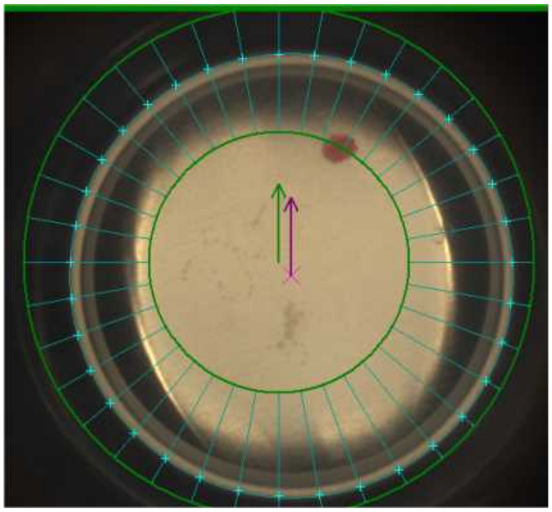
Set the labels as desired. More information: "Machine Correlation Labels" on page 474

Set up the inspection tree:

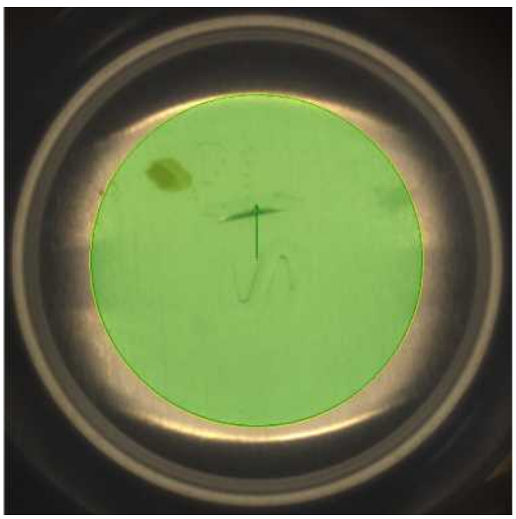
1. Add a region, such as a Ring Region, to surround the edges of the part.



2. Add an appropriate registration (usually a Hough or Radial Edge) to find the center of the bottom of the can. (Hough shown below)

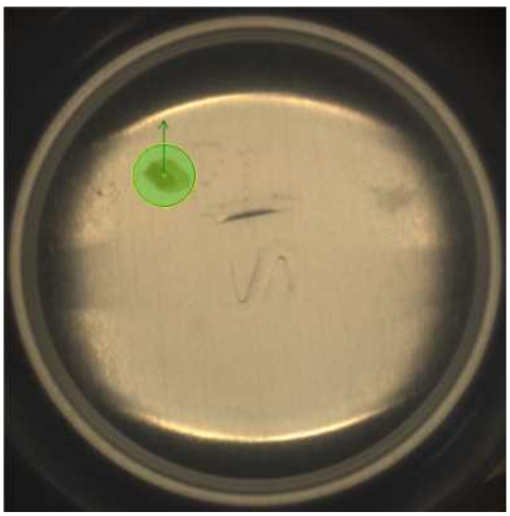


3. Add a second Ring Region to include the area where the dot will be found. Size the Ring Region so that it covers the circle formed by the bottom of the can, but do not include the dark shadow area near the edges.

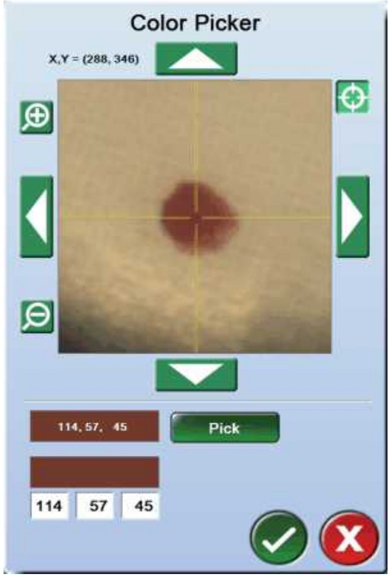


4. Add a Feature Registration. Adjust the settings to find the center of the color dot or dots. The X with the magenta arrow shows the center point of the feature. An example is shown below.

5. Add a third Ring Region to inspect only the area containing the dot or dots. This will make the inspection time faster (than inspection the whole area of the can bottom).



6. Add a Color Distance Enhancement to specify the range of colors acceptable for the color dot. This will allow the inspection to ignore all other colors.
    - In the Color Distance menu, click the Color Picker button, then use the Color Picker to select the color dot in the image area. Make sure you put the desired color in the center of the crosshairs and click the Pick button to save the color. Click the OK button to save the color and exit.

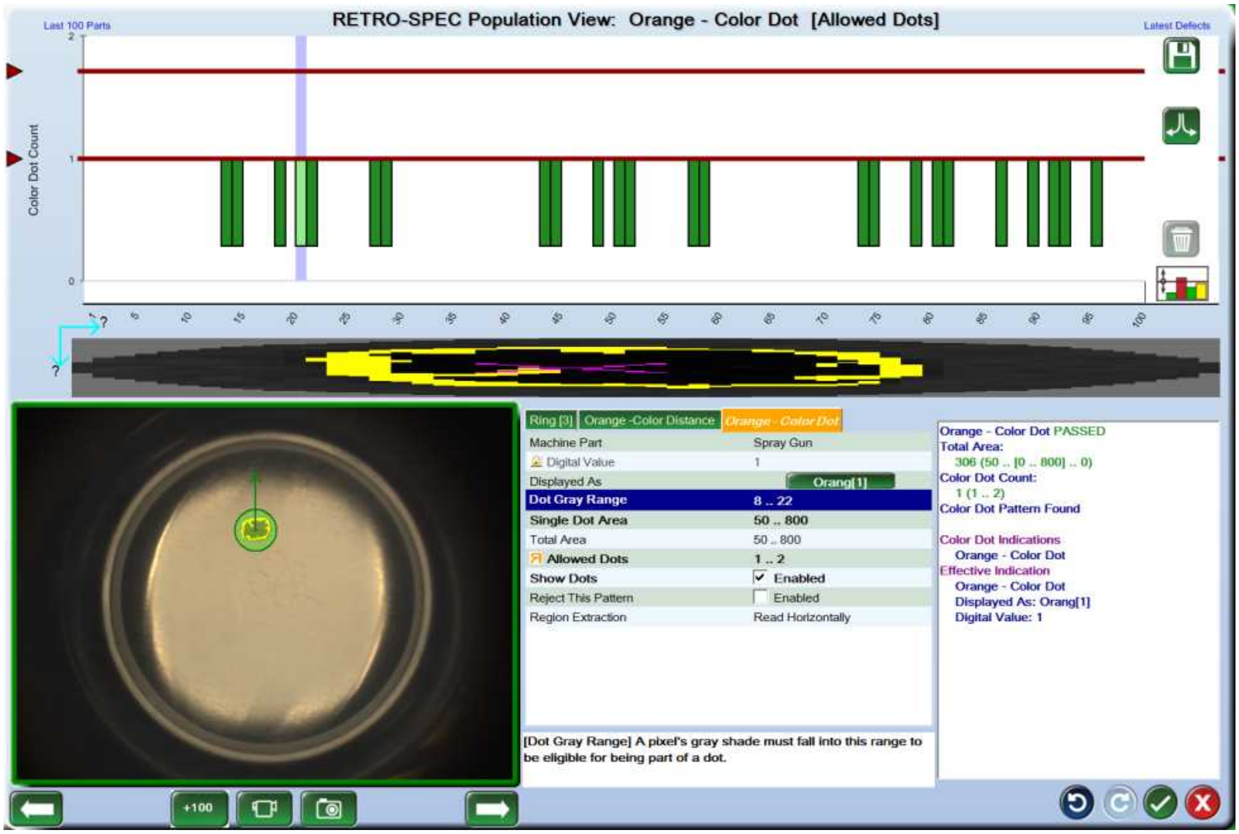


- This assigns the selected color to the enhancement. The enhancement will make all pixels of the selected color black, and all others a lighter gray shade value.
- Re-name the Color Distance enhancement to note the color of the dot.
- Add another Color Distance enhancement for each color dot in your process. You may need to turn off the graphics to see the color dots (right-click over the image, and un-check Show Graphics from the menu).
- An example of a menu with several Color Distance enhancements is shown below.

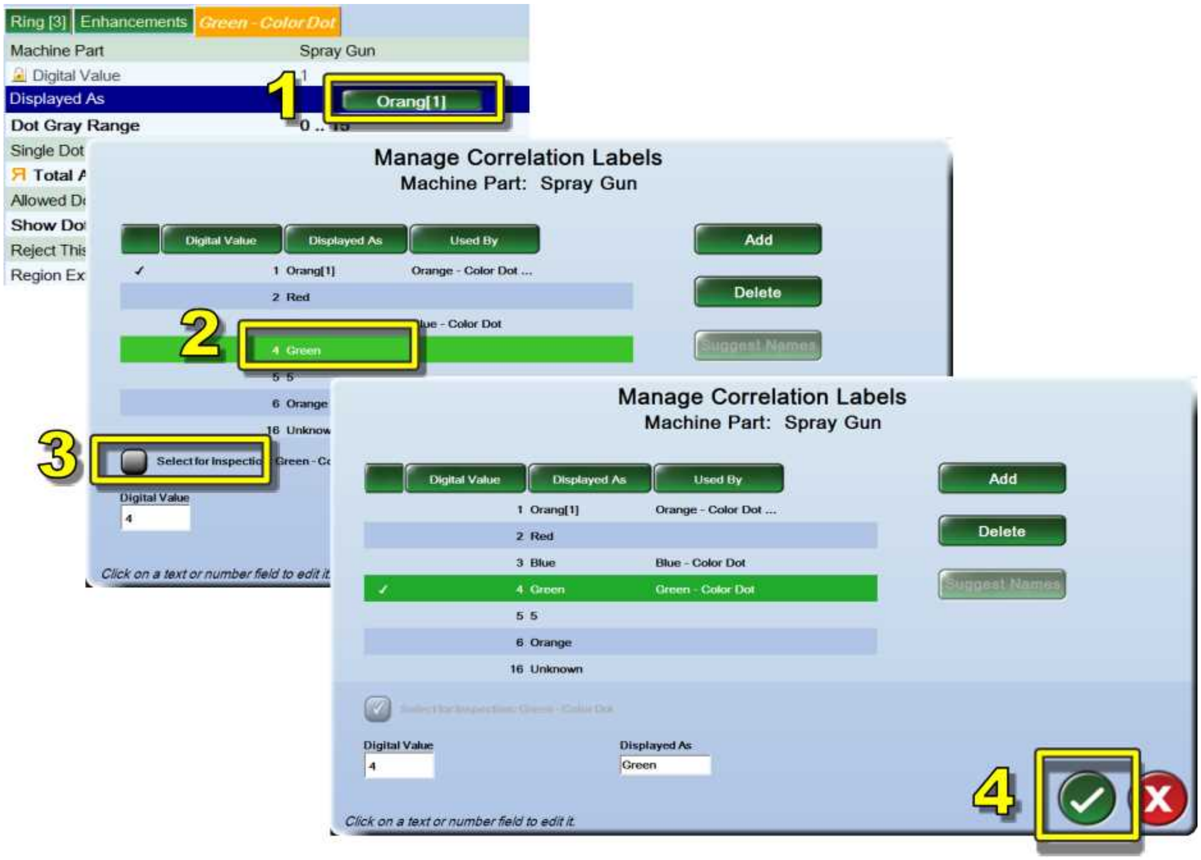
7. Add (or insert) a Color Dot Correlation after each Color Distance. You will set up these up in the following sections.
8. Your inspection tree may look similar to the tree shown below. Your settings will vary based on your part.

To set up the Color Dot Correlation:

1. Open the Retro-Spec interface for the Color Dot inspection by double-clicking the name in the inspection menu.
2. Use the Machine Part drop-down menu to select a machine part to correlate the color dot. This is usually named spray gun, spray dot, or color dot.
3.  Put the lane online to acquire several images, then click the "+100" or movie button to update the Retro-Spec graph. Take the lane offline. If you used the movie button to update the images, then click it again to stop updating the Retro-Spec graph.
4. For Dot Gray Range, select the range of gray shades you are searching for. If you have used a Color Distance enhancement, this range will be very low (example: 0 - 20). You will know you have selected the correct range when you see peaks on the Retro-Spec graph only for those images that have the color dot you are looking for. In the example below, when we click each of the green peaks on the graph, the corresponding image has an orange dot. There are no peaks for the wrong-colored dots.



5. Set the value/ color that the system displays. Below is the example of how we set the green dot. Click the Displayed As button [1]. From the menu, select the correct color/ name under the "Displayed As" column [2]. Check the box at the bottom of the dialog [3]. Click OK [4].



6. If the system is not consistently finding the correct color dots, you may need to adjust Single Dot Area, Total Area and/or Allowed Dots. These are described below.
7. Repeat steps 1-6 above for each of the other color dots in your process.

Color Dot menu

Machine Part Select the machine part to which you want to correlate the color dots. The items in the drop-down menu must be configured during system setup. See Machine Part Correlation.

Digital Value You can assign a digital value that will be reported (for this color dot pattern) to external devices such as Ultra I/O. It is not used otherwise. Click the Displayed As... button to change the value.

Displayed As Click the button to configure how the dot is represented in correlation. See Color Dot - Manage Correlation Labels

Dot Gray Range Define the grayscale range that could be considered the color dot. All other grayscale values are ignored. [Using a Color Distance Enhancement prior to the Color Dot inspection converts the color pixels to grayscale]

Single Dot Area The range of sizes for individual dots. Groups of connected pixels that are outside this range are not considered to be dots.

Total Area When the system finds color dots, this parameter puts a limit on the total number of pixels for the pattern. If you have more than one dot (region of connected pixels of the dot color as explained in Single Dot Area), all of them are summed up for this check.

Allowed Dots Set the number of acceptable dots. This is normally set at one. If you need to distinguish patterns of multiple dots, such as 1 green dot vs. 2 green dots, set this to the number required for the pattern (1 or 2). Otherwise set this to a larger number if you expect splatter that would result in more than one separate dots.

> *Note: for the "Show" parameters, Show Graphics must be enabled. Right-click over the image: Show Graphics = checked.*

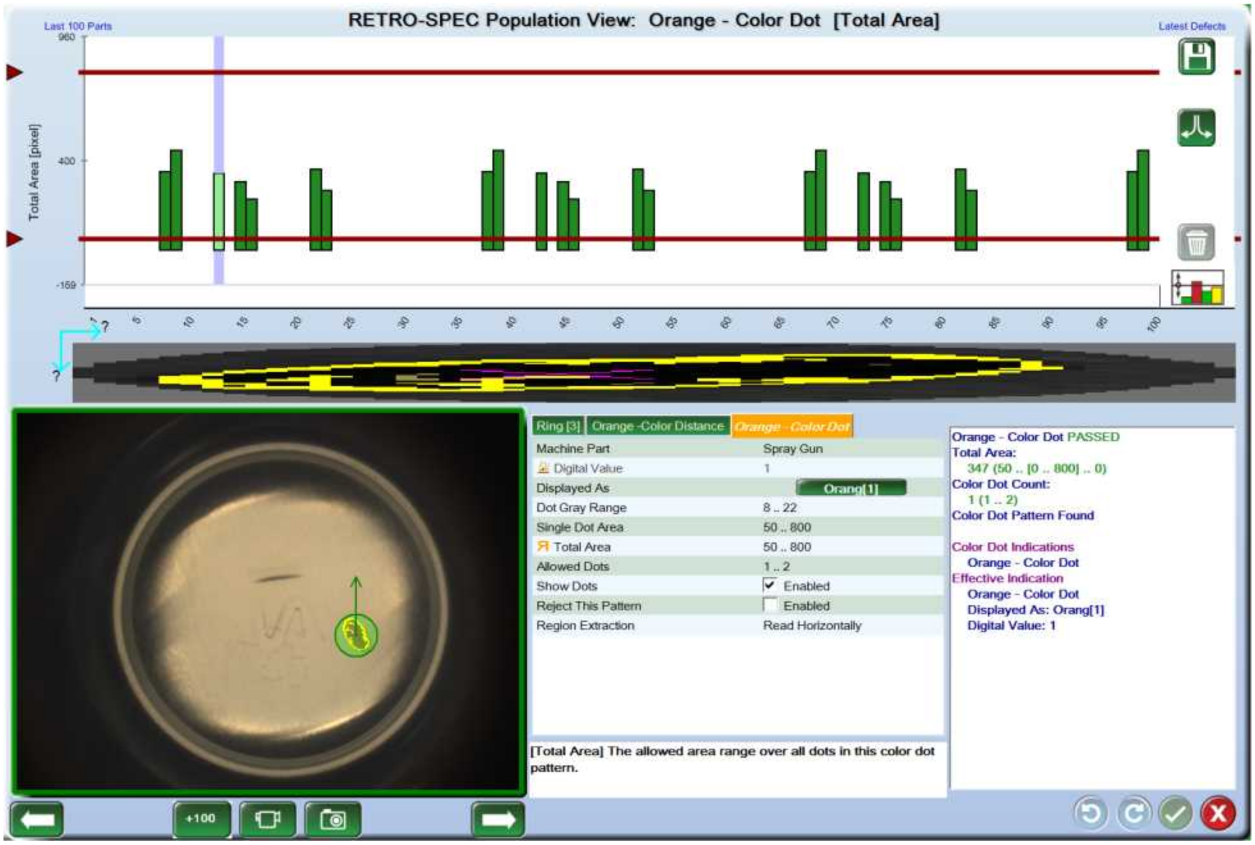
Reject This Pattern If the inspection identifies a part with the current color pattern, then the part is rejected. The system also reports this correlation value when it is identified.

Region Extraction Choose how the Intellispec should read the information from the region. This depends on the shape of your region. You may notice that the inspection runs faster with a particular setting.

Test the inspection

Open a Color Dot Correlation in Retro-Spec. Put the lane online to acquire several images, then click the "+100" or movie button to update the Retro-Spec graph. Take the lane offline. If you used the movie to update the images, then click it again to stop updating the Retro-Spec graph.

Select the forward and back arrows to see the results of the inspection. In this example, we opened the Orange Color Dot inspection. The bars in the graph at the top of the screen represent the parts with orange dots. Also see information about results: Color Dot - Results.

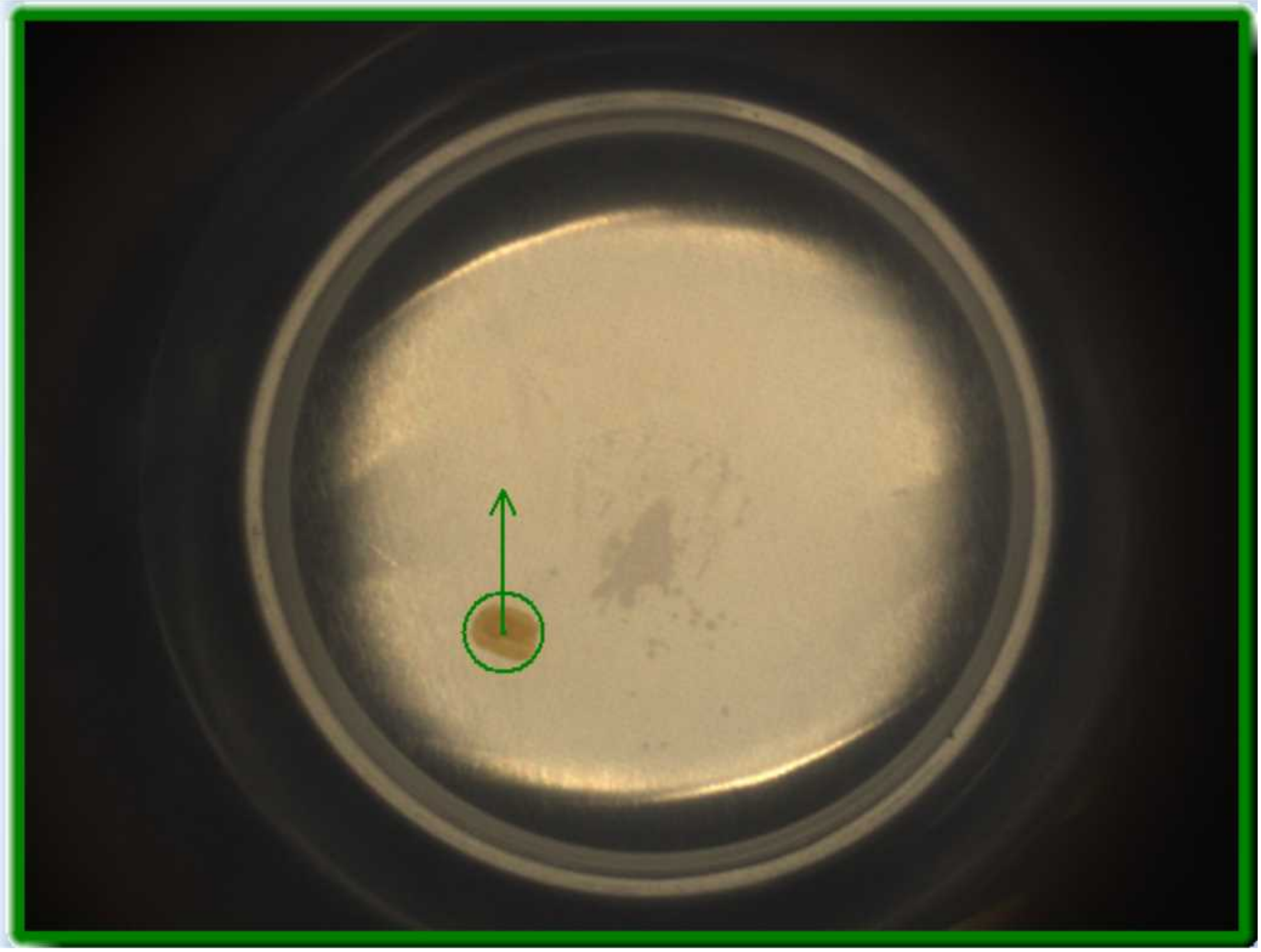


If the inspection is not finding color dots as expected, then adjust the parameters in the inspection menu.

Color Dot - Detecting Absence of Dots

Color Dot can detect the absence of a dot, if you use the Feature Registration to locate the color dot region.

Note: this feature is available only when Color Dot follows a Feature Registration in the inspection tree. We recommend that you create a small region after the Feature Registration to save inspection time. Example (this was set up on a part with the dot present):



Inspection tree for Feature Registration and Color Dot to find absence of dots:

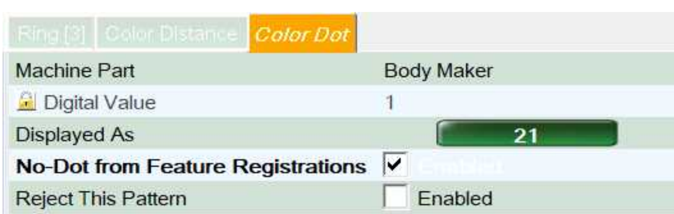
Before adding the Color Dot inspection:

1. Add a Feature Registration in the inspection tree.
2. For Pixel Selection, select "Clustered Pixels."
3. Enable "Check Cluster Count."
4. Set the lower limit for "Allowed Clustered Counts" to zero.

To see this option in Color Dot:

1. Select a range of Allowed Dots from zero to zero:

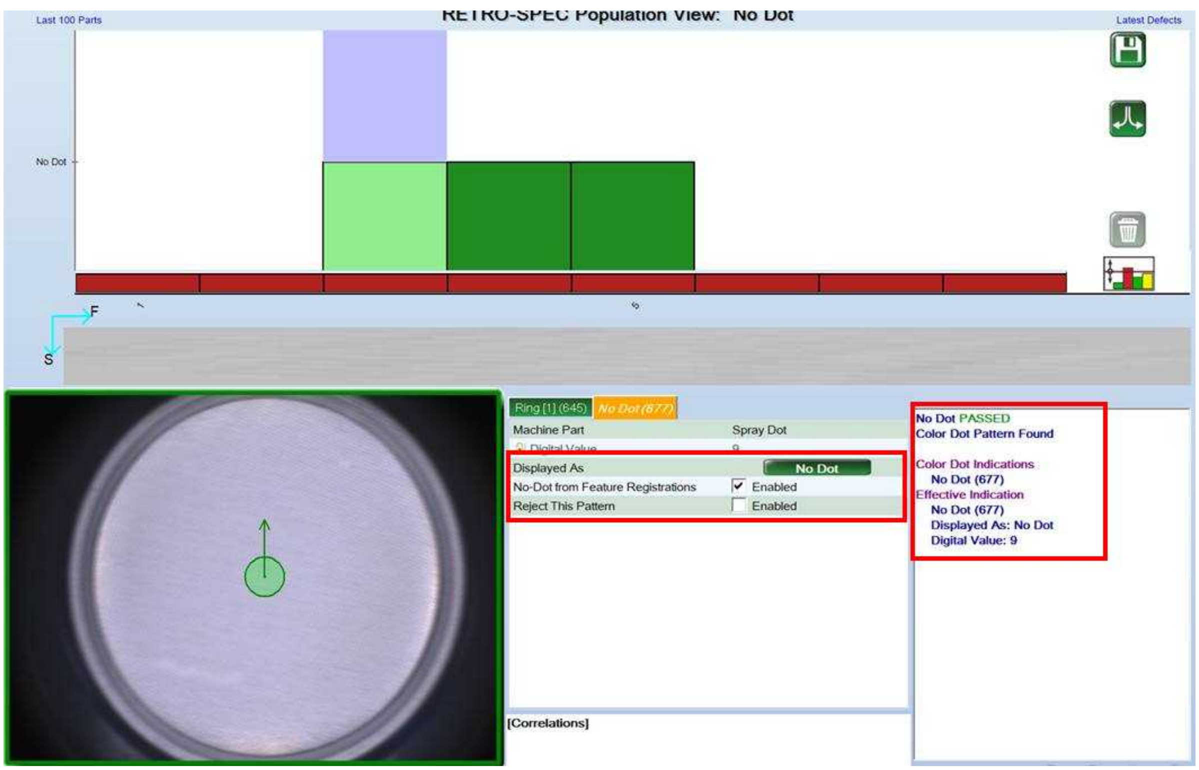
2. Check "No-Dot from Feature Registrations." This removes the color dot setup and diagnostic parameters.



Example of No Dot:

In our example, the Feature Registration is set up to find no dots. The Feature Registration must pass, in order for the Color Dot inspection to run.

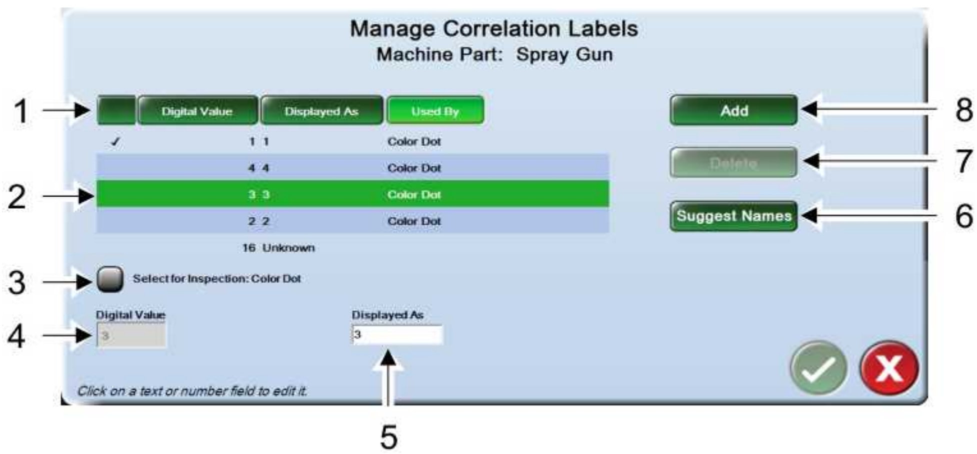
The Color Dot inspection finds no dot, and the output is displayed as "No Dot."



If you want to reject parts with no dots, check the "Reject This Pattern" box.

Color Dot - Manage Correlation Labels

Use of this menu is optional. It allows you to change the names of the correlation values reported for Color Dot inspection. You can use the inspection with default values. If you would like to customize the inspection, then make changes from this dialog. You can select how the correlated values are displayed on screen and through external devices such as Ultra I/O. To get to this menu, select the button next to "Display As..." in the Color Dot menu.



1 - Sort buttons - click one of the buttons to sort the data from low to high or high to low. Click the button again to sort the opposite way.

2 - Select any row to select a value

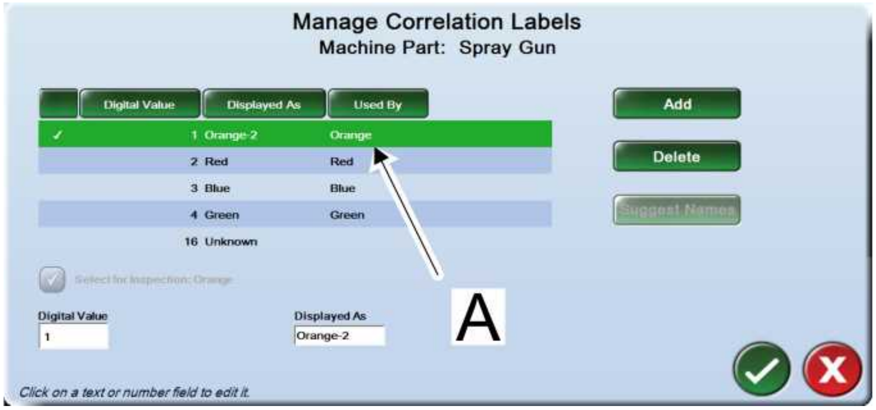
3 - Select for Inspection - when you click this button, the system assigns the selected row to the current inspection (the inspection you were editing when you entered this menu).

4 - Digital Value - you can edit this value when you select a row. This allows you to assign a digital value that will be reported (for this color dot pattern) to external devices such as Ultra I/O. It is not used otherwise. See Color Dot - Results > Effective Indication for an example of digital values.

> *Note: if you enter a Digital Value that conflicts with another color dot inspection, then the system will display an error.*

5 - Displayed As - this value is displayed on the button in the Color Dot menu. You can enter a name or value here, or allow the system to "Suggest Names" [6]

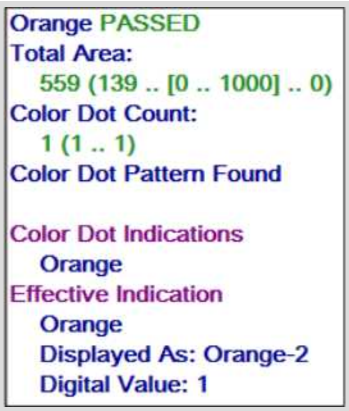
6 - Suggest Names - allow the system to rename the Displayed As... value. The system uses the user-defined inspection names. For example, if you named a color dot inspection "Orange," then the system changes the Displayed As value to "Orange."



A - Used By - this is the inspection name that uses the selected correlation value.

Color Dot - Results

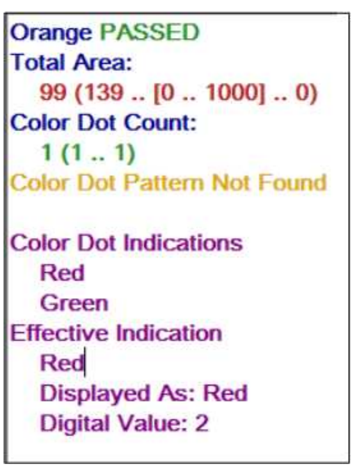
After you run the inspection, the Results window displays whether the expected color dot was found. In this example, we opened the Orange Color Dot inspection in Retro-Spec.



This part passed inspection

The system found an orange colored dot

Note: the Digital Value and "Displayed As" values can be changed in Color Dot - Manage Correlation Labels



This part passed inspection. Even though the system did not find an orange dot, the part still passes.

A part may fail the inspection if the system could not locate the part, or if the inspection region was out of the field of view. But in this case, the part was located.

The system found a red dot.

Effective Indication shows what the system found for all color dot inspections on the same sensor. For example, the system may detect a pattern on the part that could match both red and green dots. It reports the first digital value in the sequence.

The default digital value is determined by the inspection tree. In this example:

Orange = Digital Value: 1

Red = Digital Value: 2

Blue = Digital Value: 3

Green = Digital Value: 4

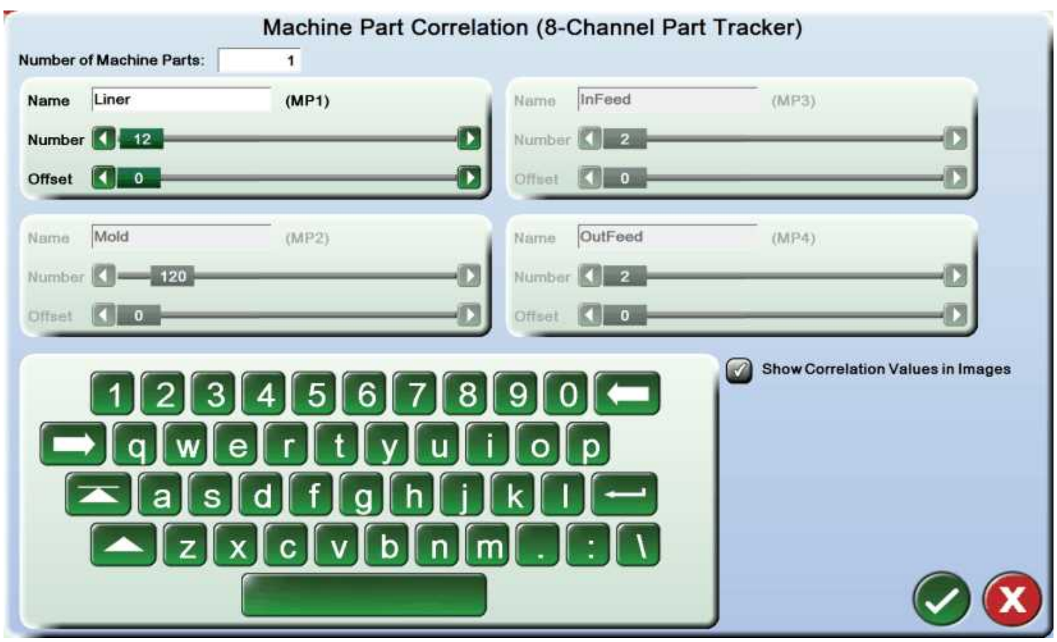
Feature Correlation

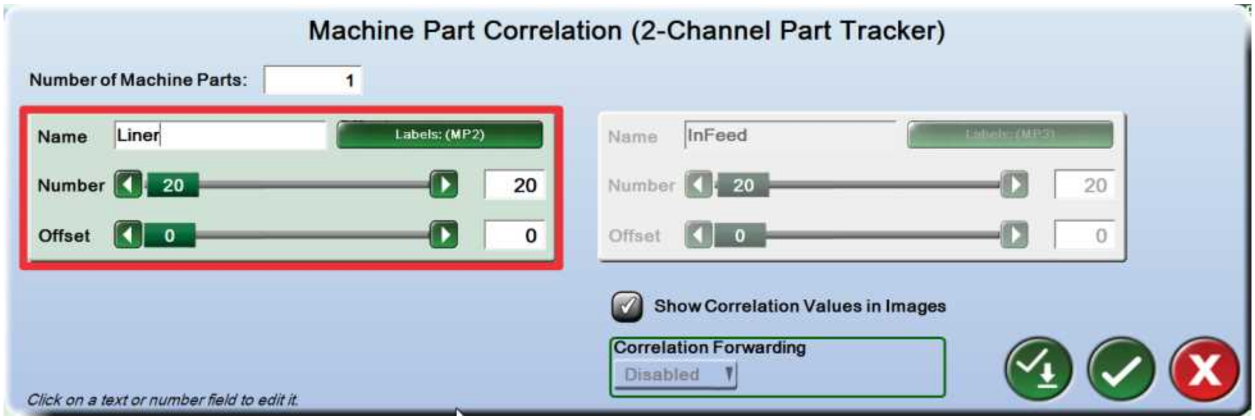
This inspection identifies the presence or absence of a feature on parts in order to identify the mold, punch, or other machine that created the part. This inspection is intended to be used on a system where there is only one machine part that creates the feature for which we are searching (example, a punch that creates a dimple on a lined shell).

The Feature Correlation inspection does not create a pass/fail condition for a part. Instead, it uses the results of an inspection that runs before it.

Before setting up Feature Correlation:

Make sure Machine Part Correlation is set up for your process. In our example, we are inspecting lined shells, assuming there is a 12-station liner upstream of the shells and liner number 1 is the one that places a dimple on the shell. Set the number of machine parts that match your process. Offset should be kept at zero.



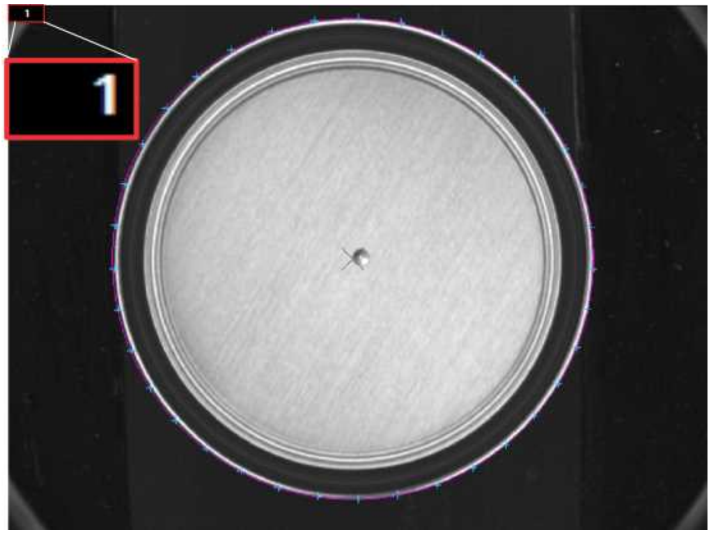


To add a Feature Correlation:

1. Set up an appropriate region and registration to locate the part and place subsequent inspections accurately.
2. Create a region and an inspection that will pass or fail if the feature you are looking for is present. For example, we are searching for a dimple on a lined shell. We could use a Contrast inspection in the area where the dimple is supposed to be. If the dimple is present, then the Contrast inspection fails. This result is used by the Feature Correlation inspection.

1) No feature. Contrast inspection passes | 2) Feature present. Contrast inspection fails

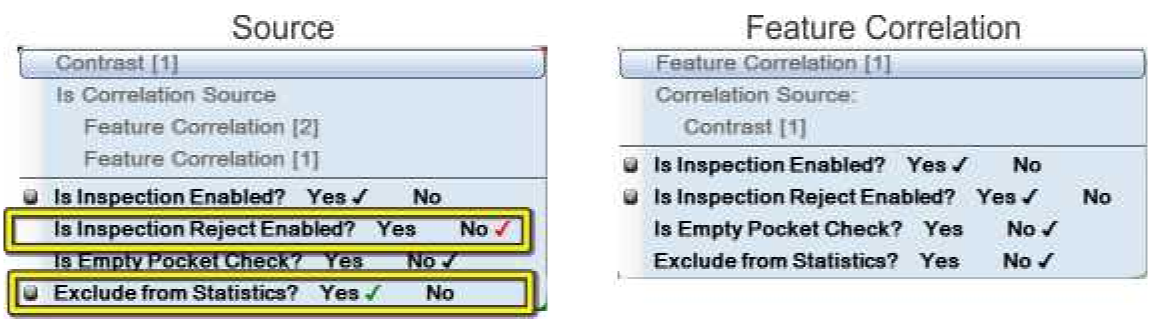
3. Next, add a Feature Correlation inspection: Right-click on the item you just added.
4. From the Inspection menu, select Add | Correlation | Feature Correlation.
5. The inspection is added to the inspection tree. Re-name the inspection to something more meaningful to you.
6. Adjust the Feature Correlation parameters as necessary.
7. Verify that the correlation is properly set up: verify that the Machine Part number in the image is the same one you assigned for Preset Value in the Feature Correlation menu.



Settings sub-menu for Feature Correlation

If you add a Feature Correlation, the source inspection automatically has the following applied (right-click in the Inspection menu | select Settings):

- Is Inspection Reject Enabled? = No
- Exclude from Statistics? = Yes



Feature Correlation menu

Ring	Feature Correlation
Machine Part	Cavity
Correlation Value	1
Source Inspection	Select Inspection
Assigned Inspection	UNDEFINED
Feature Indicator	Inspection Fails
Sync after mismatched rounds	1

Machine Part Select the machine part to which you want to correlate the feature. The items in the drop-down menu must be configured during system setup. See Machine Part Correlation.

Correlation Value Specify a machine part number to be assigned every time a feature is found. In our example, the dimple is placed by Liner 1, so we use a 1 for this parameter.

Source Inspection Select the inspection that is used to identify the feature. Click the Select Inspection button, then choose an inspection from the inspection tree - the inspection must be ABOVE the Feature Correlation in the menu tree. Click the Select Inspection button again to set the choice. The Assigned Inspection information is filled in - you cannot manually change this.

Feature Indicator Specify that a feature is identified when the source inspection passes or fails. In our example, we set up a Contrast inspection to fail when it detects a dimple.

Sync after mismatched rounds This is used to prevent false feature detects. Specify the number of times that the predefined numbering scheme can be consecutively interrupted before this inspection automatically resets the correlation back to a value of 1 when it sees the next feature.

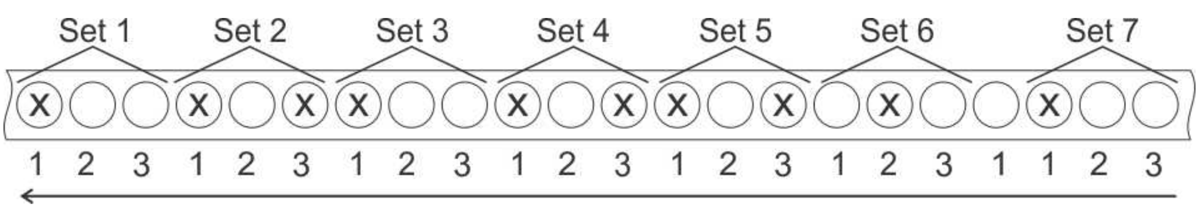
Example:

Assume the following:

- Lined shell manufacturing line
- 3 machine parts
- Machine part 1 puts a dimple on the shell. An 'X' indicates a dimple in the illustration below.
- Sync after mismatched rounds is set at 3

Feature Correlation operates as follows:

1. Set 1: The first 3 shells go by without any problems. They are identified with machine parts 1, 2, and 3.
2. Set 2: The third shell has a feature. Correlation sees the error (error #1), but does not change numbering scheme.
3. Set 3: These shells go by as usual. They are identified with machine parts 1, 2, and 3
4. Set 4: The third shell has a feature. Correlation sees the error (error #1), but does not change numbering scheme.
5. The operator puts 4 shells on the belt; 2 with dimples and 2 without.
6. Set 5: The first and third ends have a feature. Correlation sees the error (error #2), but does not change numbering scheme.
7. Set 6: The second shell has a feature. Correlation sees the error (error #3). This meets the Sync after mismatched rounds criteria. Correlation will begin at 1 again when the system detects a feature.
8. Set 7: The system detects a correct pattern and re-starts numbering with 1, starting with the first feature found.

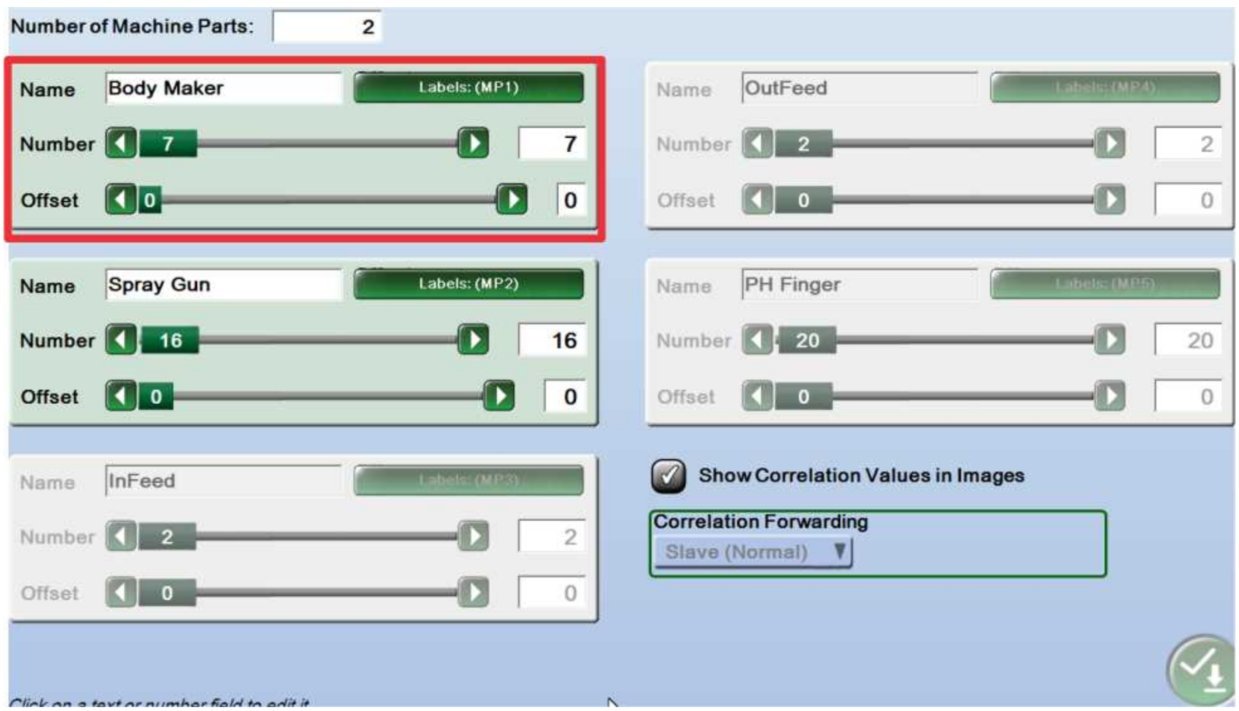


Alphanumeric Correlation

This inspection reads the stamped characters on a part, such as on the bottom of a beverage can, and identifies the machine part in which the part was manufactured.

1 - Before Adding the Alphanumeric Correlation

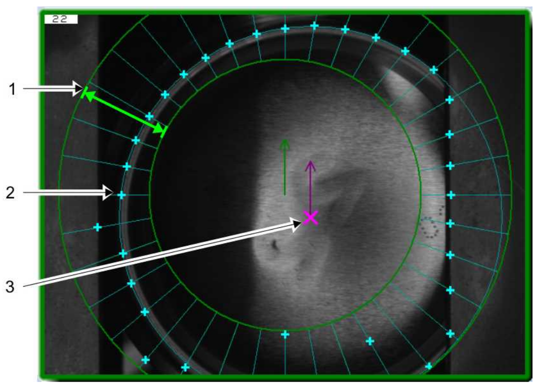
1.  Make sure the Machine Part Correlation is properly set for your system. From Lane or Sensor Overview mode, select Tools | Lane Setup | Machine Part Correlation. The 'Number' for the Machine Part being used with this inspection (e.g. the Machine Part named 'Body Maker') should be at least the maximum number of different IDs plus one. Example: if you have sixteen (16) different possible ID marks (Body Maker IDs), set 'Number' to seventeen (17). The extra one is reserved for parts where the ID is determined to be 'Unknown'. The 'Offset' should always be set to 0. Finally, make sure that the 'Show Correlation Values in Images' option is checked, so that the ID values will be displayed in the upper left corner on the inspected part images.



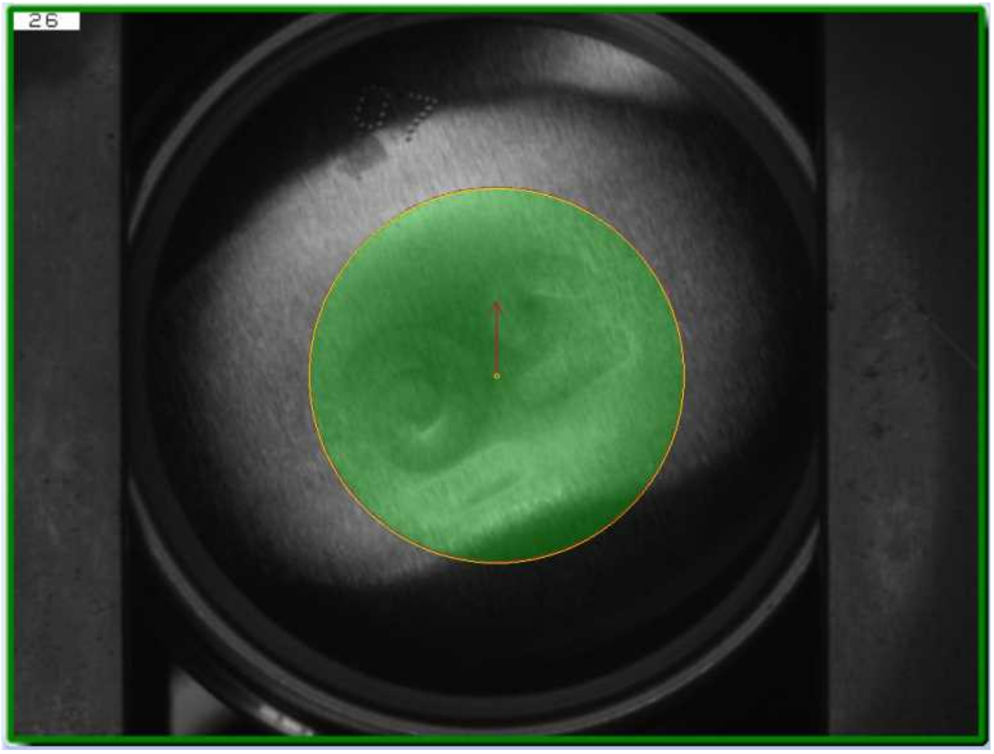
2. In the camera inspection tree, place a region [1] and registration [2], such as a Ring Region and Hough Registration, to locate the center of the part.

1) Region to find part center | 2) Registration to find part center | 3) Region to place AlphaNumeric Correlation | 4) AlphaNumeric Correlation

In the example below, the Ring Region [1] defines the boundary of where the part edges may fall. The Hough Registration [Part Center REG] finds most of the part edges. The part edges do not all have to show in the image. The Hough Registration still reliably computes the center of each part [3].

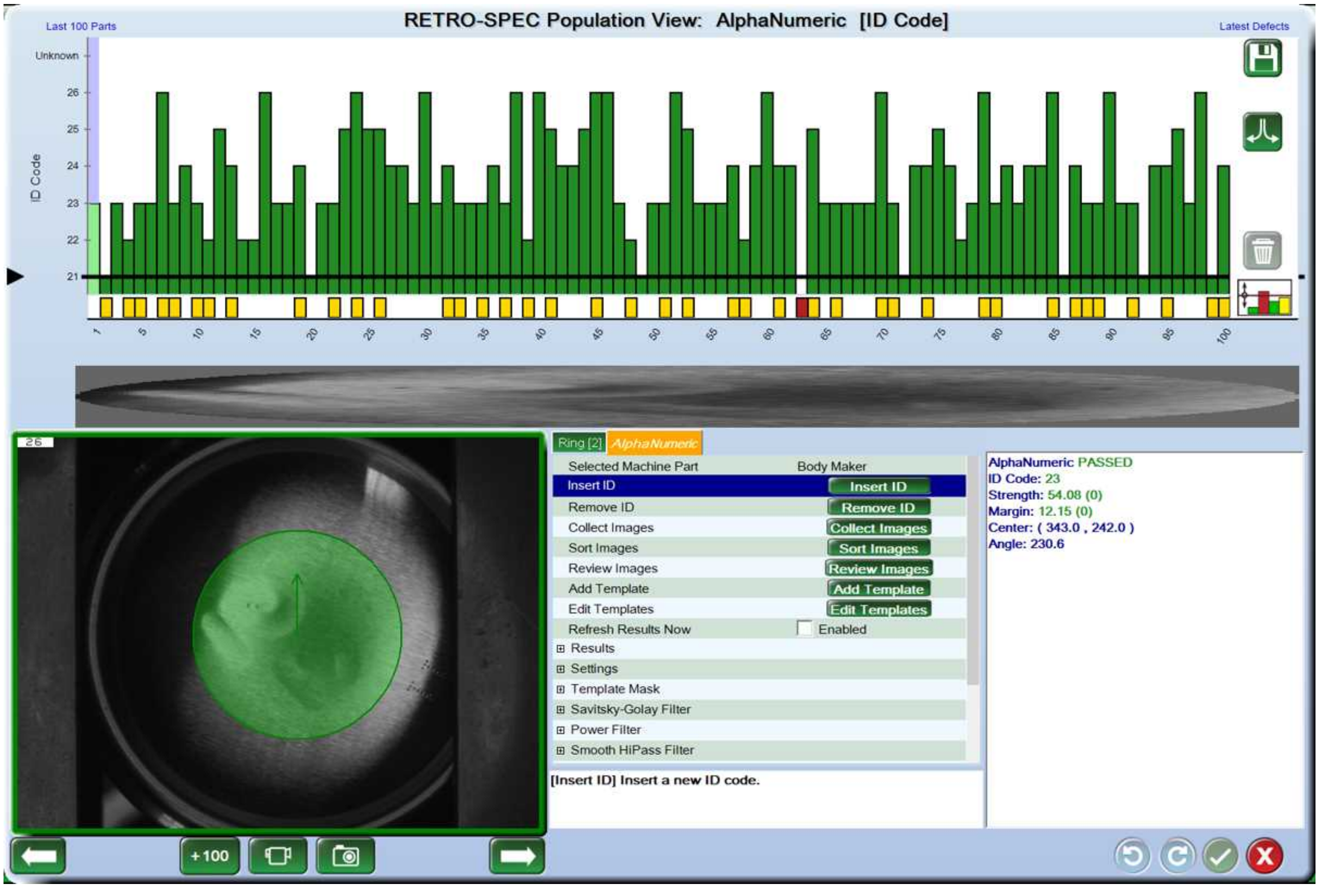


3. Place a Ring Region [AlphaNumeric ROI] to define the area of the image to be used by the Alphanumeric Correlation inspection. The ‘Inner Radius’ should typically always be 1, and the ‘Thickness’ should be large enough to cover the entire ID mark but not much more than that.



2 - Add the Alphanumeric Correlation inspection

1. In the inspection tree, right-click on the item you just added.
2. From the Inspection menu, select Add | Correlation | AlphaNumeric Correlation. The Retro-Spec screen will show the inspection and menu.



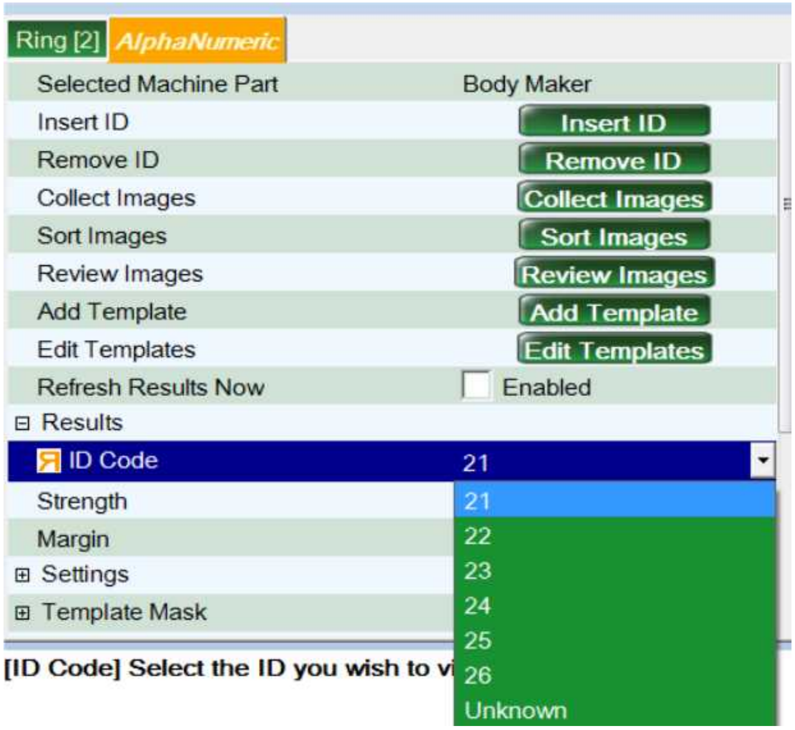
3 - Select the Machine Part

In the AlphaNumeric menu, select the machine part that you are correlating the ID marks to. For metal beverage can applications it will usually be named ‘Body Maker.’ For plastic closure applic-ations it will usually be named ‘Mold ID’.

4 - Insert or Remove IDs

If your system is not yet set up for the exact set of different ID character combinations that appear on your parts (“Body Makers IDs”), then you will first need to insert (or remove) those IDs to (or from) the system. The maximum number of IDs supported is limited by the ‘Number’ value set in ‘Machine Part Correlation’ for the selected machine part, as previously described.

Look under Results | ID Code. Select the drop-down menu. This displays a list of all the IDs that are set up in your system, plus the additional entry “Unknown” which is used to indicate when the value of the ID cannot be confidently determined.



Insert an ID Select the Insert ID button. Use the pop-up keyboard to enter the ID characters and select the OK button. You can confirm the addition by looking at the drop-down menu next to ID Code.

Remove an ID Select an ID Code from the drop-down menu. Then select the Remove ID button. Click the OK button to confirm removal. The ID will be removed.

If there are any templates still associated with the ID you want to remove, you must first remove them before the ID can be removed. Go to Edit Templates, scroll to the first template for the ID you want to remove, and select Delete. Repeat for all templates used by the ID to be removed. When all templates for that ID have been deleted, select [OK]. You can now remove the ID.

After you are finished inserting or removing IDs, you should click [OK] on the Retro-Spec editor to save the changes and close the form, then re-open the inspection. This will insure that the ID numbers on the left of the Retro-Spec 'ID Code' graph are properly updated for the new set of IDs.

Collect Images and Sort Images These are advanced functions and are only required when it is not possible to otherwise obtain the required accuracy in identification results. They should not be used unless being specifically instructed to do so by Pressco Technical Support.

5 - Add Templates

You will need to find good images for each ID code. Run the system long enough to get a good sample. Start with at least 100 parts. You may need to collect more.

1. 

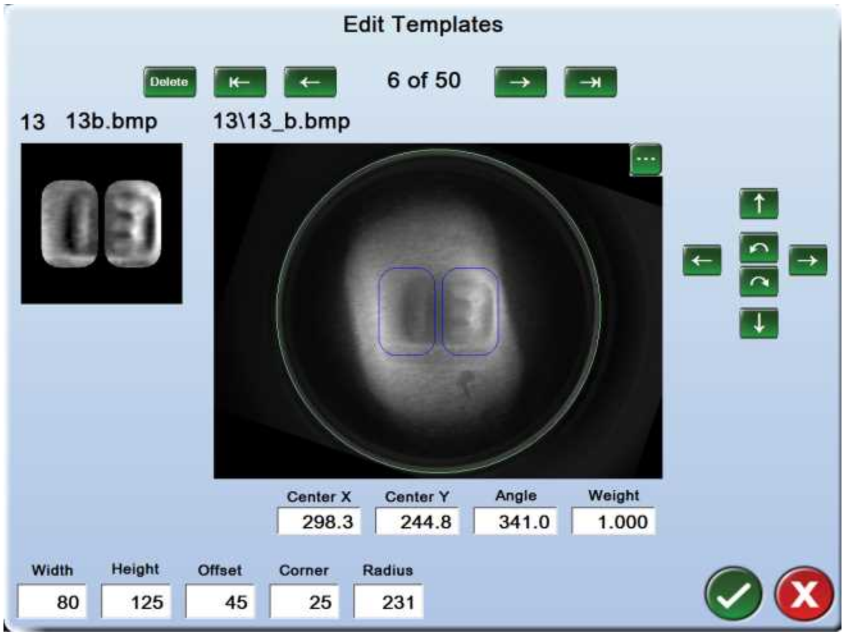
 Put the lane online and select the "+100" or movie button. If you used the movie button to start continuously updating the images, then click it again when ready to stop updating them.
2. Take the lane offline.
3. From the Retro-Spec screen, scroll through the new images (in Set A, the left side) to find a good one for each ID. Look for images that:

- do have good contrast on the ID characters, and
- do not have any image distortion in the ID region (in particular, avoid images where the spray dot is partially obscuring the ID characters).

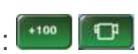
When selecting these images, you should hide the inspection region to make it easier to evaluate the quality of the ID on each image: right-click over the image, then un-check Show Graphics.

Add new templates:

1. Find an image in Set A (left side) of the Retro-Spec Population View that you want to use for adding a new template. Note that you CANNOT add templates from Set B (right side) of the Retro-Spec graph.
2. Select the correct ID code for the image you have selected. You may use either the ‘ID Code’ pull-down list in the ‘Results’ section of the parameters, or the slider on the left of the Retro-Spec ‘ID Code’ graph to select the ID code.
3. Select the Add Template button.
4. The ‘Edit Templates’ form will be displayed with the new template, using the selected image and ID code. Names for the template’s source image file as well at the processed region file will automatically be generated by using the ID code along with a sequential alphabetic letter (‘a’ – ‘z’) for each additional template assigned to that ID code.



5. Verify that the image and ID code (shown in the upper left area of the ‘Edit Templates’ form) are the ones you intended to add a template for. If you did NOT select the correct image or ID code for the template you want, click [Cancel] and go back to step 1 or 2 (no changes will be made yet).
6.  Use the rotate buttons and to rotate it so that the ID characters are centered inside the template mask boxes and the ID code is properly aligned (e.g. to an imaginary horizontal base line). Note that you can press and hold these buttons to get two different levels of continuous motion. If you have not already done so, see the section Set Up the Template Mask so the template mask regions enclose the ID characters as best as they can. The image should already be accurately pre-centered, but if not you may use the [Up], [Down], [Left], [Right] arrow buttons to make any necessary adjustments in the position.
7. Select [OK] to save the template.
8. Repeat steps 1-7 for additional images and ID codes.
9. Change the setting of ‘Refresh Results Now’ (toggle the state from unchecked to checked or vice-versa) to refresh the template information and update the inspection results.

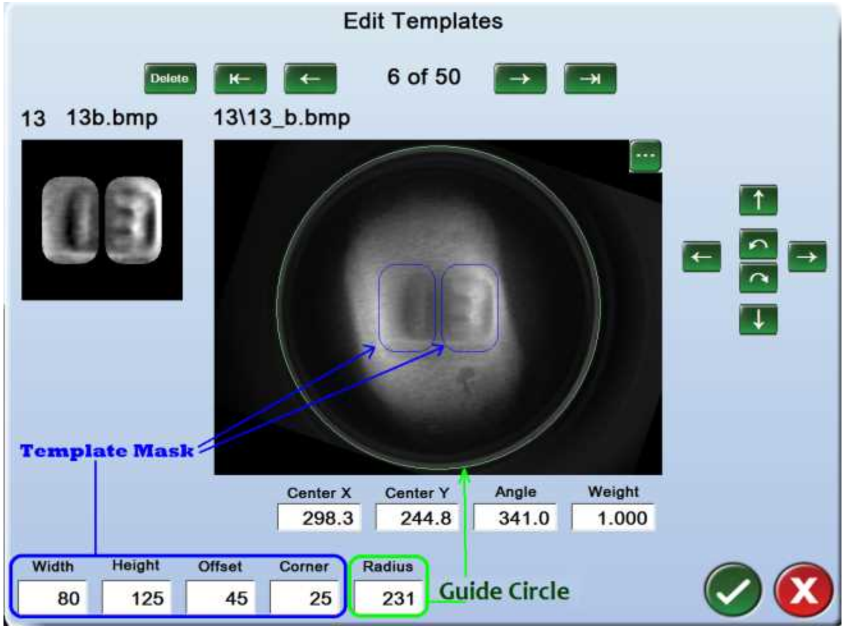
To get more images (to have at least one good template for each ID code): 

Put the lane online and select the "+100" or movie button. If you used the movie button to start continuously updating the images, then click it again when ready to stop updating them.

> *Note: there is a maximum of 99 different templates that may simultaneously be assigned overall, and a maximum of 26 different templates that may simultaneously be assigned to any single ID code.*

6 - Set Up the Template Mask

The ‘Edit Templates’ form is also used for setting up the Template Mask parameters, which is for defining the portion of the image that the ID characters lie within. The same template mask parameters are used for all the different templates, so they need to be set up to accommodate all the different ID codes. In other words, selecting a different template to edit will NOT change the template mask parameters – they are not specific to the individual templates. The template mask regions are shown as a blue outline on the template image.



The 'Width', 'Height', 'Offset', and 'Corner' controls at the bottom left of the form are used to adjust the size, shape and relative positions of the two semi-rectangular regions of the template mask:

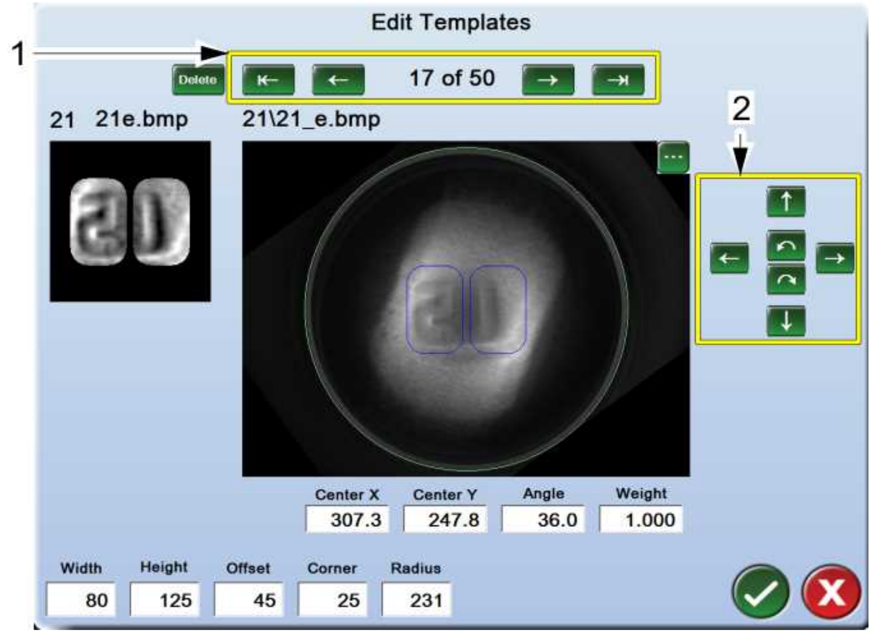
- Use the 'Width' and 'Height' controls to adjust the width and height of the two regions to always include the entire area for each of the various ID characters, but as little else of the image as possible.
- Use the 'Offset' control to adjust the spacing between the two regions so each one closely corresponds to the positions of the two ID characters.
- Use the 'Corner' control to round off the corners of each region, again so the area includes the entirety of all the ID characters but as little else as is possible.

The 'Radius' control is used to define the radius of a 'Guide Circle' that helps to insure the part for every template image is properly centered. The guide circle is shown as a green outline on the template image. This needs to be set properly before attempting to adjust the center position of the template images. You can find the correct radius value to enter here in the Results of the 'Part Center' registration described earlier (this value should be consistent from part to part). Note that the guide circle is only a visual aid in making sure that the template images are properly centered, and adjusting it is unrelated to definition of the Template Mask. If this value is left at 0 then no guide circle for centering will be displayed.

When you are finished adjusting the template mask, click the [OK] button to save the changes since opening the form, or click the [Cancel] button to discard them.

7 - Edit Templates

This dialog is used to view the current templates (including the processed region, shown to the left of the template source image) and make any adjustments in the orientation or position, as well as to delete any unwanted templates. It is also used to Set Up the Template Mask.



1) select template; 2) make adjustments

To edit a template:

1. Use the browse buttons [1] to select the template that is to be edited.
2. Use the rotation and position buttons [2] to adjust it as necessary. Note that you can press and hold these buttons to get two different levels of continuous motion. The ‘Center X’, ‘Center Y’, and ‘Angle’ values shown below the template image will be updated accordingly. Note that the template mask and guide circle radius need to be properly set up before making any adjustments. See the section: Set Up the Template Mask.

The ‘Weight’ value shown below the image is an experimental feature at this time and should always be left at 1.000.

To delete a template:

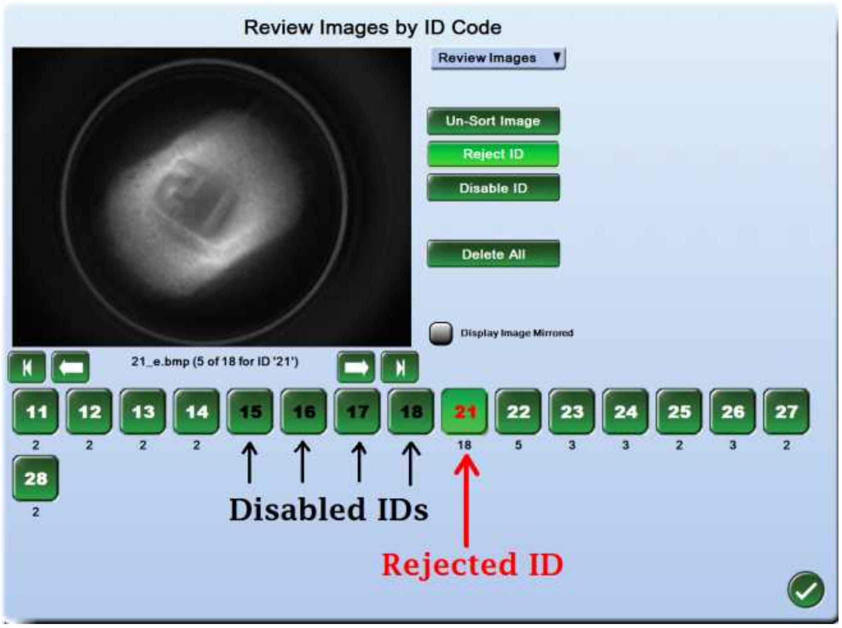
1. Use the browse buttons [1] to select the template that is to be deleted.
2. Click the ‘Delete’ button above the processed region image.

When finished editing and / or deleting templates, click the [OK] button to save the changes since opening the form, or click the [Cancel] button to discard them. Note that you are NOT prompted to confirm either saving or discarding your changes.

8 - Review Images

Review the images that have had templates assigned to them, with the images grouped according to the different ID codes that have been set up. There is one group available for every ID code that has been defined. To review the images for a specific ID code, click one of the ID selection buttons below the image window. You may then use the browse buttons directly beneath the image (First, Previous, Next, Last) to scroll through the different images for the currently selected ID code.

Each selection button is labeled with one of the ID codes, and the color of the label indicates if the ID is currently disabled (i.e. templates for that ID will not be used during inspection) as well as if parts found with that ID will be rejected.



When the ID code label on the selection button appears in white, templates for this ID will be used during inspection (i.e. the ID code is ‘Enabled’). This is the normal state when parts having this ID code are expected to be encountered during inspection. Press the ‘Disable ID’ button to disable templates for this ID (the ID label will turn black), or the ‘Reject ID’ button to cause all parts found with this ID code to be rejected (the ID label will turn red).

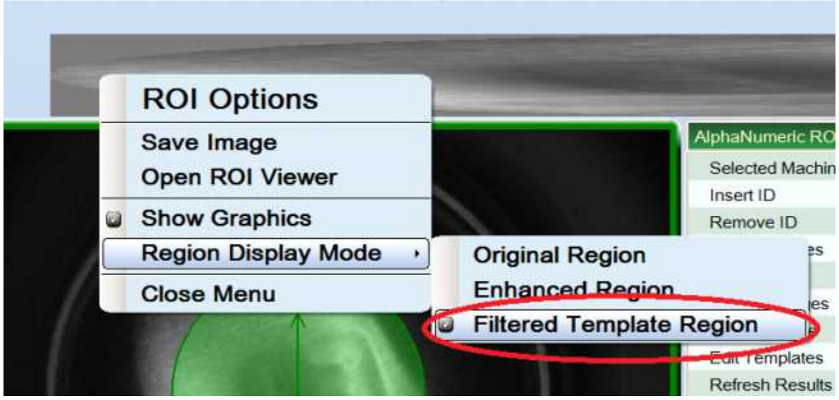
When the ID code label on the selection button appears in black, templates for this ID will be skipped during inspection (i.e. the ID code is ‘Disabled’). Use this feature to reduce the number of active templates during inspection when it is known that parts with this ID will not be in the part stream. This will help to improve the accuracy of identifying the other ID codes.

When the ID code on the selection button appears in red, templates for this ID will be used during inspection (i.e. the ID code is ‘Enabled’) and whenever a part with this ID code is found, it will be rejected. This function is used for sorting parts with a particular ID code out of the part stream. Note that the ‘Reject ID’ button will remain highlighted when an ID is in the “to-be-rejected” state. Click the ‘Reject ID’ button again to un-highlight it and turn off the reject function for this ID (the ID label will then change from red back to white).

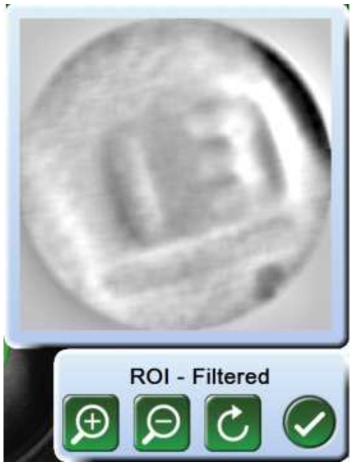
View the Processed Region of Interest

This is an advanced feature that allows you to see the effects that the various filters are having on the Region of Interest (ROI) for the currently selected part in the Retro-Spec graph. This corresponds to what you are seeing when looking at the processed template images in the ‘Edit Templates’ form, except that the template mask is only applied to the templates (and not to the current part ROIs).

To view the processed region of interest, first right-click over the ROI band directly below the Retro-Spec graph to display the ‘ROI Options’ menu, click on ‘Region Display Mode’, then make sure that the ‘Filtered Template Region’ option is selected.



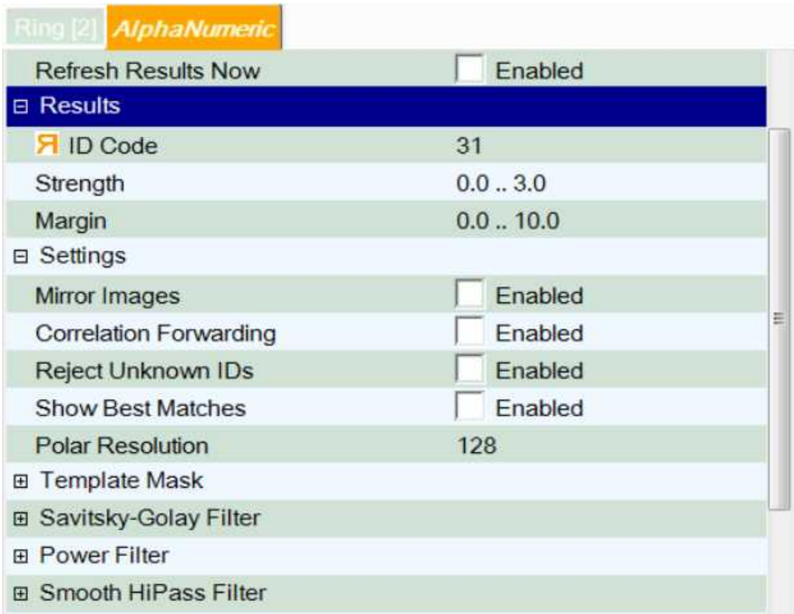
Right-click over the ROI band to display the ‘ROI Options’ menu and select ‘Open ROI Viewer’.



- To see a larger picture, click the [+] button.
- To see a smaller picture, click the [-] button.
- Click the arc arrow to rotate the image.
- This region of interest is NOT saved with Intellispec images, unless you save it from the ROI Options menu.

Reference - Alphanumeric Correlation Parameters

This part of the menu has system-level settings such as reject, as well as inspection-level settings. Typically, the default settings work well.



Results

ID Code Set the ID code that will be used for the ‘Add Template’ function. Note that changing this will also change the ID code selected in the Retro-Spec graph, and changing the ID code via the slider on the left-hand side of the graph will also change this.

Strength Set the minimum acceptable value for how well the most closely matching template corresponds to the image being inspected. Parts with a computed Strength below this value will have their ID considered to be ‘Unknown’.

Margin Set the minimum acceptable value for how uniquely (according to the computed Strengths) the most closely matching template corresponds to the image being inspected. A Margin value of 0 indicates that the two most closely matching templates both have the same Strength (and thus are both equally likely to be the correct match). Parts with a computed Margin below this value will have their ID considered to be ‘Unknown’.

Settings

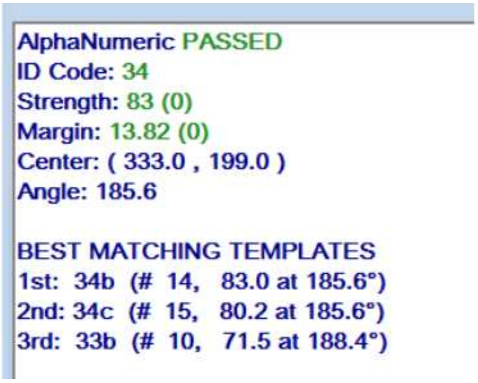
Mirror Images When this is enabled, images that appear "mirrored" (i.e. left and right are reversed) on the ‘Review Images’ form will be displayed correctly. This does NOT affect how the images are displayed within the Retro-Spec editor.

Correlation Forwarding When this is enabled, the correlation results for the machine part being used with the Alphanumeric Correlation inspection will be transferred ("forwarded") to another inspection lane. This is only used in specific applications where a system is configured as two lanes even though it is actually just a single stream of parts. See the ‘Correlation Forwarding’ section of the Software Guide for more information on this feature.

Reject Unknown IDs When this is enabled, the system will reject any parts that do not meet the minimum limits for either Strength or Margin (in which case the ID is considered ‘Unknown’ instead of one of the ID codes that has been set up).

Show Best Matches

When this is enabled, look in the Results window to see the three closest matches to the template.



Each of the three rows ‘1st:', ‘2nd:', and ‘3rd:’ directly beneath "Best Matching Templates" shows the template that was matched, the index number of that template (this is shown as "(Index) of (Total)" above the template image on the ‘Edit Templates’ form), and the strength and angle of the match.

You can click on any one of those three rows to open up the ‘Edit Templates’ form with the corresponding template for that row already selected, to immediately view details about that template. For example, clicking on ‘1st:’ as shown above would open the Edit Templates form with template number 14 (i.e. template ‘b’ for ID code 34) already selected. This feature is especially useful for finding and then deleting templates that are consistently matching with the wrong ID code.

Polar Resolution This sets the number of samples used in the conversion to polar co-ordinates, which is one of the first steps in the inspection algorithm. The medium setting is normally used. Note that a higher resolution does not always result in improved identification accuracy, although it will always cause the inspection time to be longer.

Other parameters

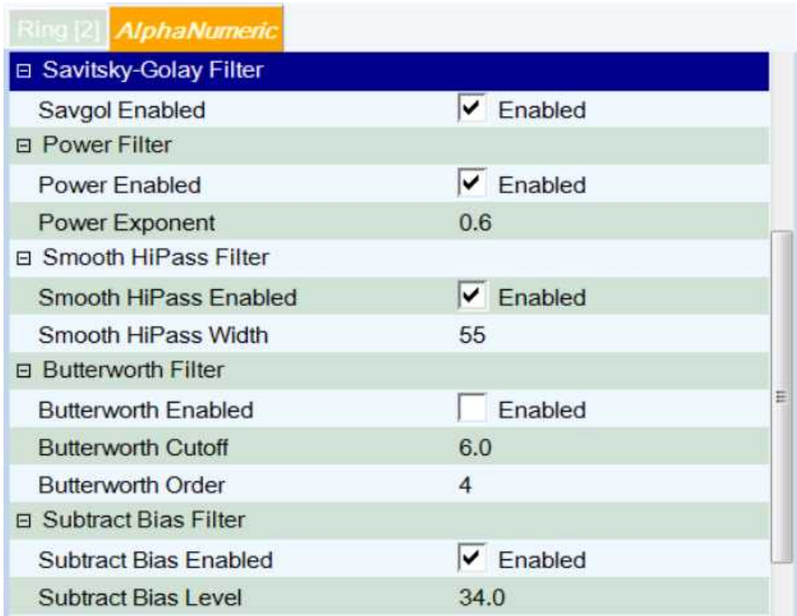
Template Mask Enabled This is used as part of the template creation process to mask out areas of the image except for the ID characters. This should always be checked.

Fix Saturation Reduce the effect of "blooming," or localized excessive brightness.

Clipping This limits the grayscale values to fall within the range of dark to light. It allows the system to ignore light reflections or normal grain on a part.

Reference - Alphanumeric Correlation Filters

The filters help adjust the images’ region of interest before they are compared with the processed (filtered) template images. Set the filters as recommended below unless instructed differently by Pressco Tech Support.



Savitzky-Golay filter This filters out undesired grain shine.

Power filter This adjusts the gray scale of the image.

Smooth HiPass filter This smooths the gray scale of the image.

Butterworth filter This filter should normally not be enabled.

Subtract Bias filter This filter reduces the gray scale values by a fixed amount.

If Else

The If-Else inspection runs only with certain conditions applied. We will use "IF" to refer to the inspection in this topic.

IF takes an input inspection and controls whether subsequent inspections run, depending on the result of that input.

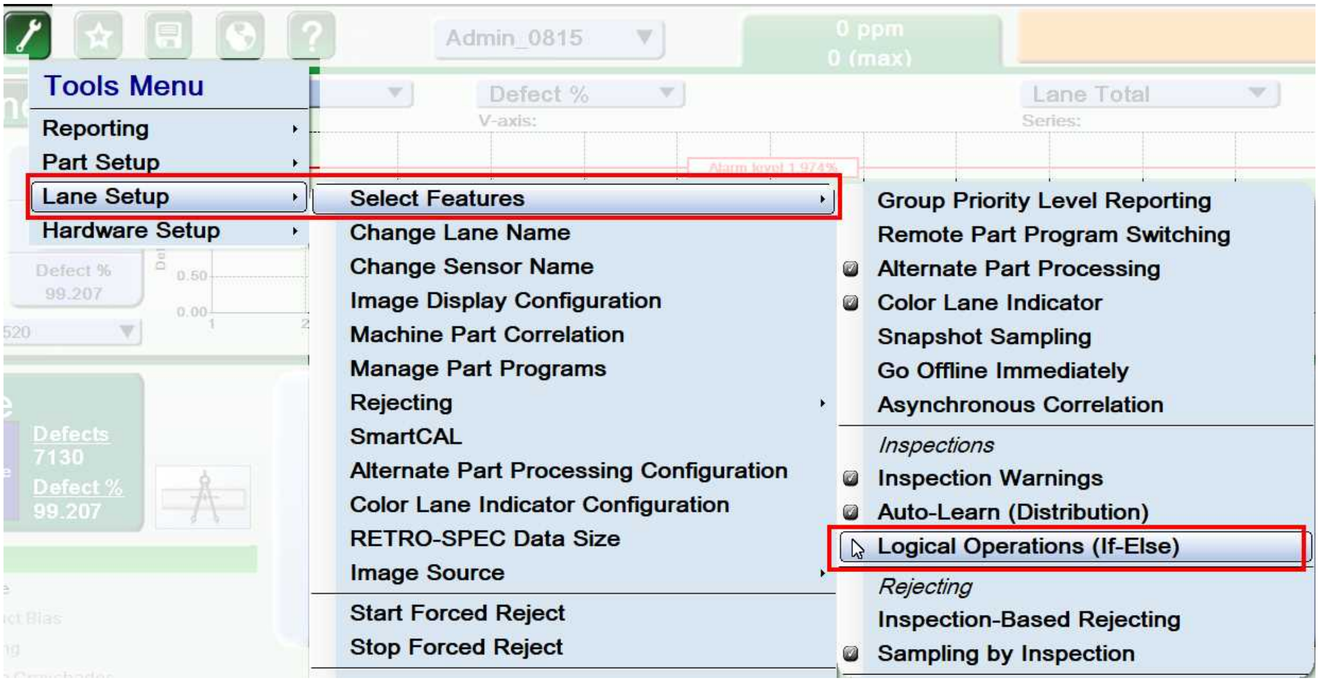
An IF inspection, and the inspections after it that you want to apply the conditions to, must all be in one Region. There is no limit on the number of IF inspection you can add, including those taking the same input. Running an IF inspection is essentially free (does not take much inspection time).

Child inspections of an IF inspection have the same conditions applied. That is, if the parent inspection does not run, then the children do not run.

Setup

Before any IF inspections can be added, the feature has to be enabled for the lane.

From lane overview, select Tools | Lane Setup | Select Features | Logical Operations. Checked = enabled

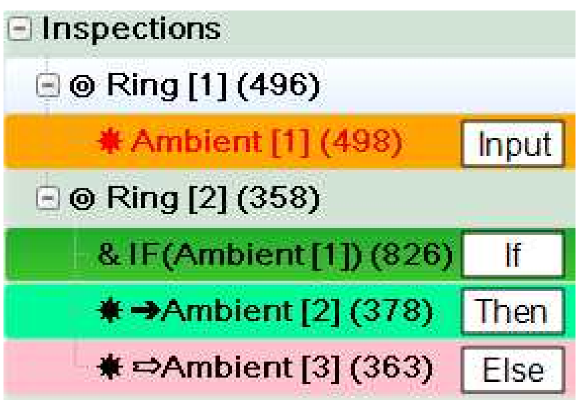


To set up an IF inspection:

The following steps are described more in detail in the following sections.

1. Identify and/or create an input inspection that will decide the conditions when to run the controlled inspection.
2. Add the If-Else Logical Operation inspection.
3. In the editor, select the input inspection.
4. In the inspection tree, select the inspections to be controlled by the IF inspection, indicating whether to run or not run depending on the result of the input inspection.

Terms and Symbols



Symbol or color	Term
orange background	Input inspection - the inspection that determines whether the following inspections will run

Symbol or color	Term
green background	IF inspection - must be placed before the conditionally controlled inspections
➔ cyan background	Then inspection - runs if the input inspection passes
⇨ pink background	Else inspection - runs if the input inspection is bad
	End IF - ends the logic block

1. Create an Input Inspection

Build up the inspection tree as usual. Select an inspection that can pass or fail (have a result of good or bad).

🚫 Do not select the following as input inspections:

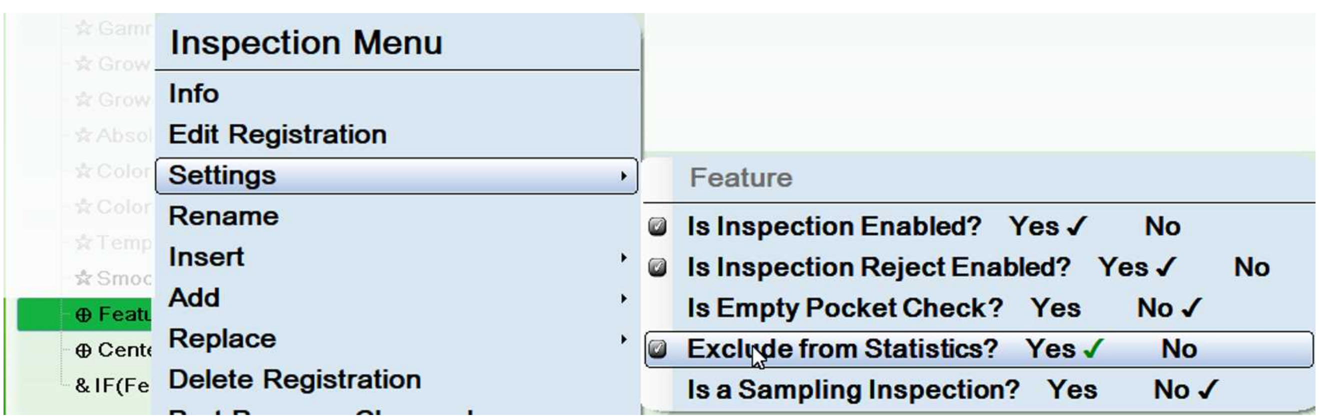
- Regions, Enhancements, or If/ Else - these inspections do not have a pass/ fail result
- Distance or Angle - these normally run after all other inspections

When the input inspection has a result of Good, the controlled inspections selected to run in the Then branch will run but the ones in the Else branch will not. When the input inspection has a result of Bad, the reverse happens: the inspections in the Else branch will run but the ones in the Then branch will not.

Input inspection result	Then Runs?	Else Runs?
Good	Yes	No
Bad	No	Yes

If you want to use the input inspection to control subsequent flow, but don't want the inspection's failed state to cause reject or count as a bad part, select the following settings in the tree (right-click on the inspection, select "Settings"):

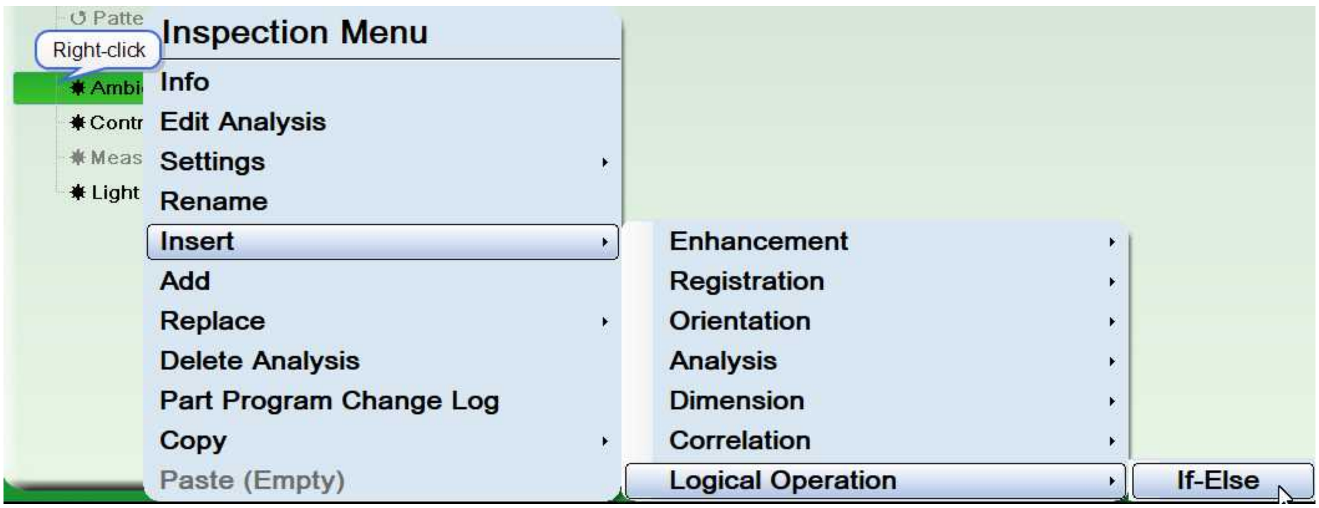
- Is Inspection Reject Enabled? – set this to No to turn off rejecting for this inspection
- Exclude from Statistics? – set this to Yes to prevent the failed state of this inspection in counting as a bad part



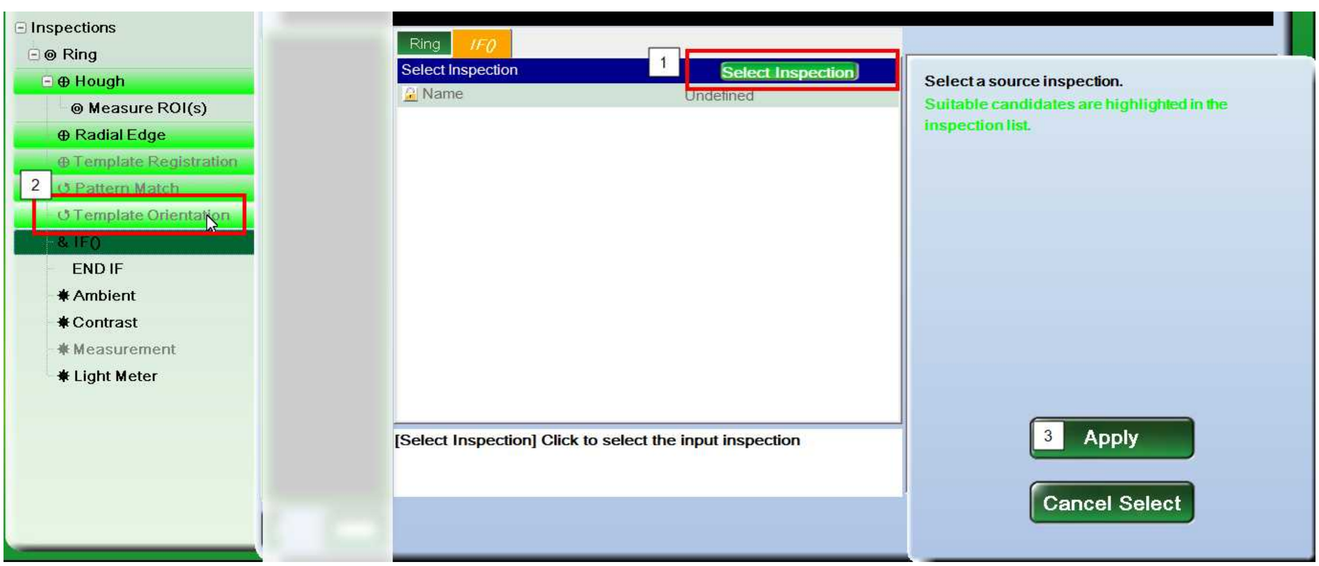
2. Add the If-Else Logical Operation Inspection

If-Else will control the inspections on a single region. You must set conditions on each region, and the If-Else inspection has to be added in front of the inspections to be controlled. Inspections you want to run unconditionally on the same region have to be added either before the If-Else inspection, or after the END IF marker.

On the Region containing the inspections to be controlled, right-click on the first inspection to be controlled and select Insert (or Add) | Logical Operation | If-Else. You can drag the If-Else inspection to move it to the correct location.



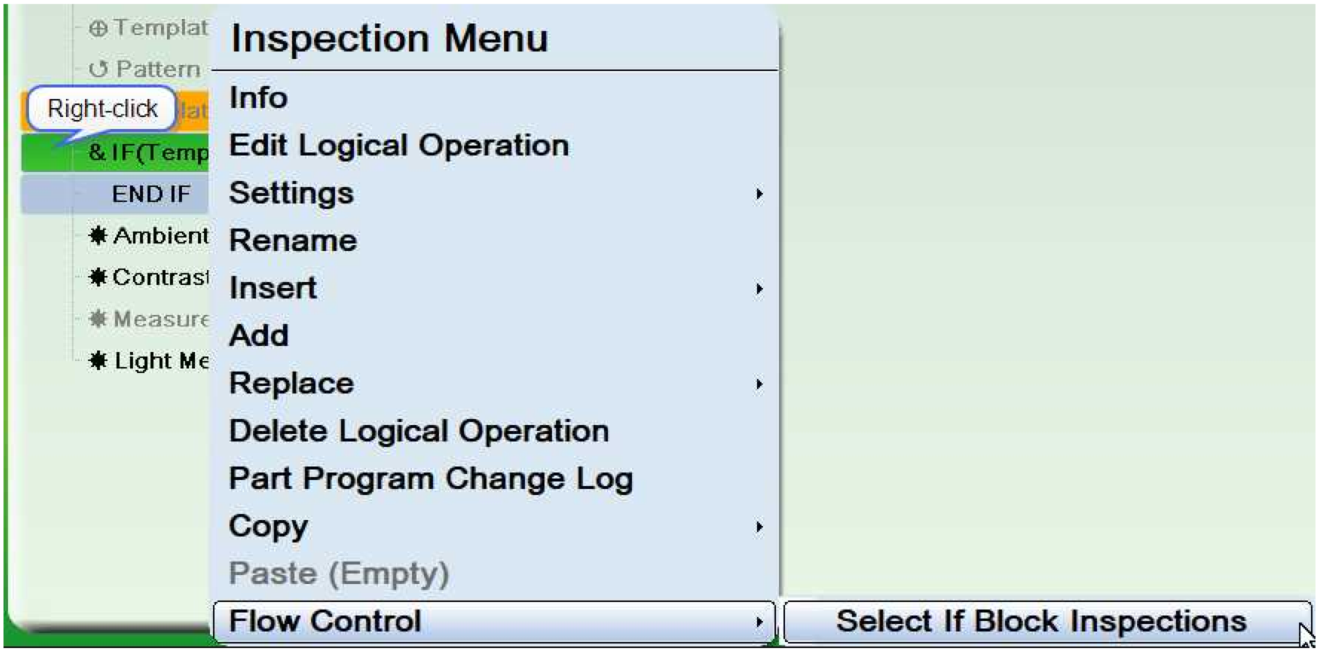
If not already opened when adding the If-Else inspection, open it in the editor now. Click the “Select Inspection” button, then click the input inspection you have previously defined in step 1, and click Apply in the selection window. The valid inspections are highlighted in green.



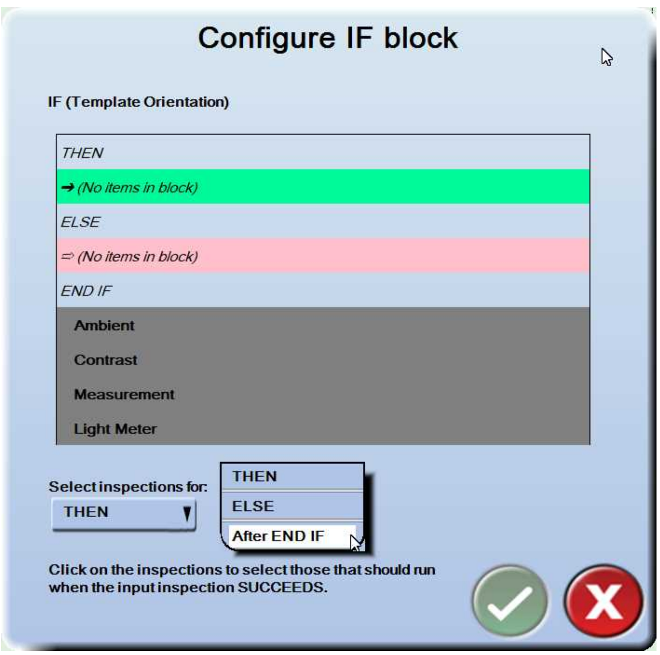
Select the OK button to save changes and exit.

3. Select the inspections to be controlled and when to run

Right-click the IF inspection | select Flow Control | Select If Block Inspections.

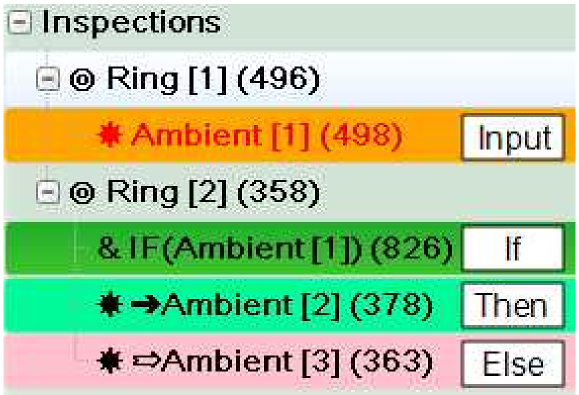


This opens a dialog to select which inspection to put in the Then block, which to put in the Else block, and which to put outside the IF block.



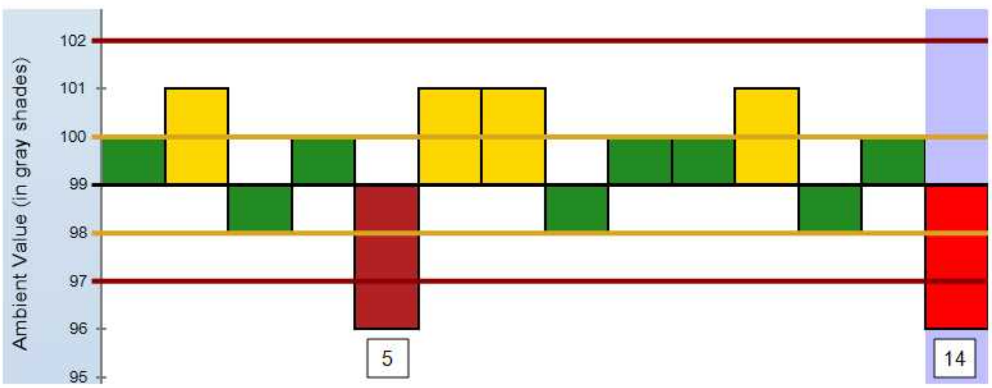
Select from the drop down which block you want to add inspections to. For the selected mode click on the inspections to put in the appropriate section. For example, select Then from the drop down, then click on all inspections that should run when the input inspection succeeds and not run if it fails. You can click either in the tree to the left, or in the list in the dialog. After exiting and applying the changes, the inspections in the tree will reflect the current selection.

The input inspection is shown on an orange background. Inspections in the Then block are shown in cyan with a solid arrow ➔ in front. The Else inspections are highlighted in pink with a hollow arrow ⇨ in front. (The specific coloring may be subject to change).



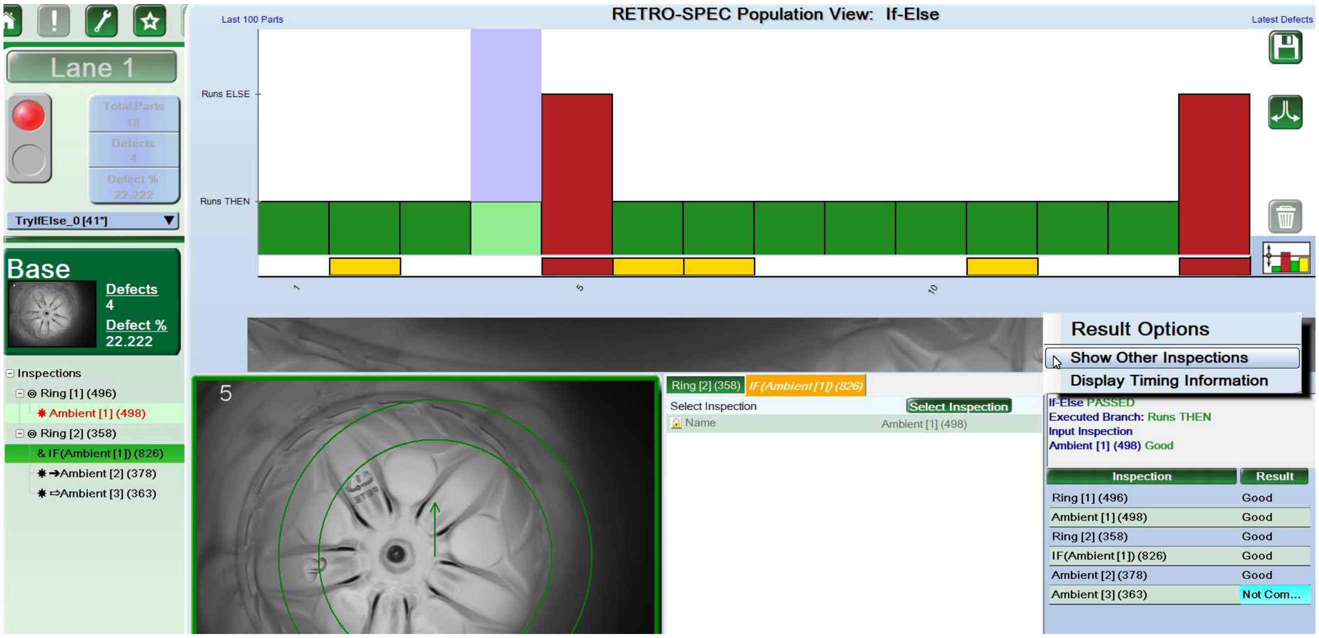
The END IF marker is only shown when inspections are following on the region that are not part of the IF block (these run unconditionally).

Example

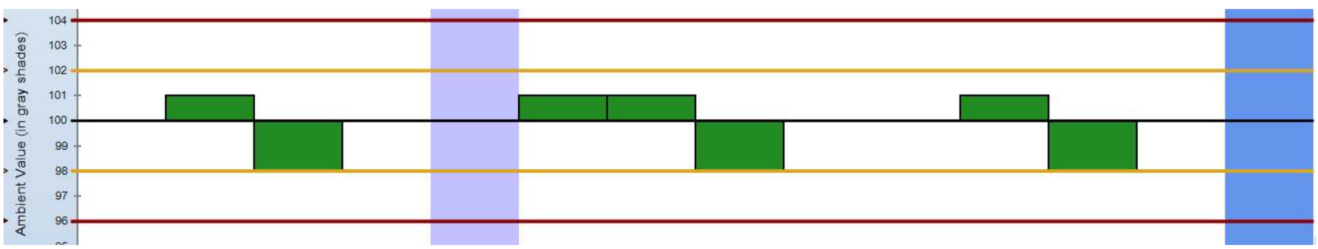


The input inspection is configured to fail on the 5th and 14th part. Note that if you use warnings, a warning result (the yellow bars) is considered a Good result for the purpose of IF. The inspections in the Then branch will run if the input has a Warning result.

“Show Other Inspections” in the results window at the lower right shows that the inspections that will not run for this input as “Not Complete.”



Opening the inspection on the Then branch shows the parts that were not run as blue bars.



Multiple IFs on the same region

You can add multiple IF blocks on the same region. These blocks must either be:

- Separate: the next IF is somewhere after the END IF of the first IF, or:
- Nested: the second IF is between the first IF and its corresponding END IF. The second IF’s END IF cannot be past the first one’s.

Adjacent / Subsequent:

IF (condition1)

➔inspection 1

END IF

Inspection 2

IF (condition2)

➔inspection 3

END IF

Inspection 4

Or:

IF (condition1)

➔inspection 1

END IF

IF (condition2)

➔inspection 3

Nested:

IF (conditon1)

➔inspection 1

➔IF (condition2)

·➔Inspection 3

·⇨Inspection 4

➔END IF

END IF

Inspection 5

Or (no trailing inspection after END IF):

IF (conditon1)

➔inspection 1

➔IF (condition2)

·➔Inspection 3

·⇨Inspection 4

Or (nested block as an END IF, followed by an inspection). The indentation and dots in front of the arrows make clear which IF block controls the inspection. A dot in front of the arrow indicates this is a nested block and the inspection are controlled by the IF inspections with one fewer dots in front of its arrow (here: zero dots since this is the first nested level).

IF (conditon1)

➔inspection 1

➔IF (condition2)

·➔Inspection 3

·⇨ Inspection 4

➔ END IF

➔ Inspection 5

END IF

Inspection 6

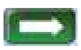
Chapter 16 User Management

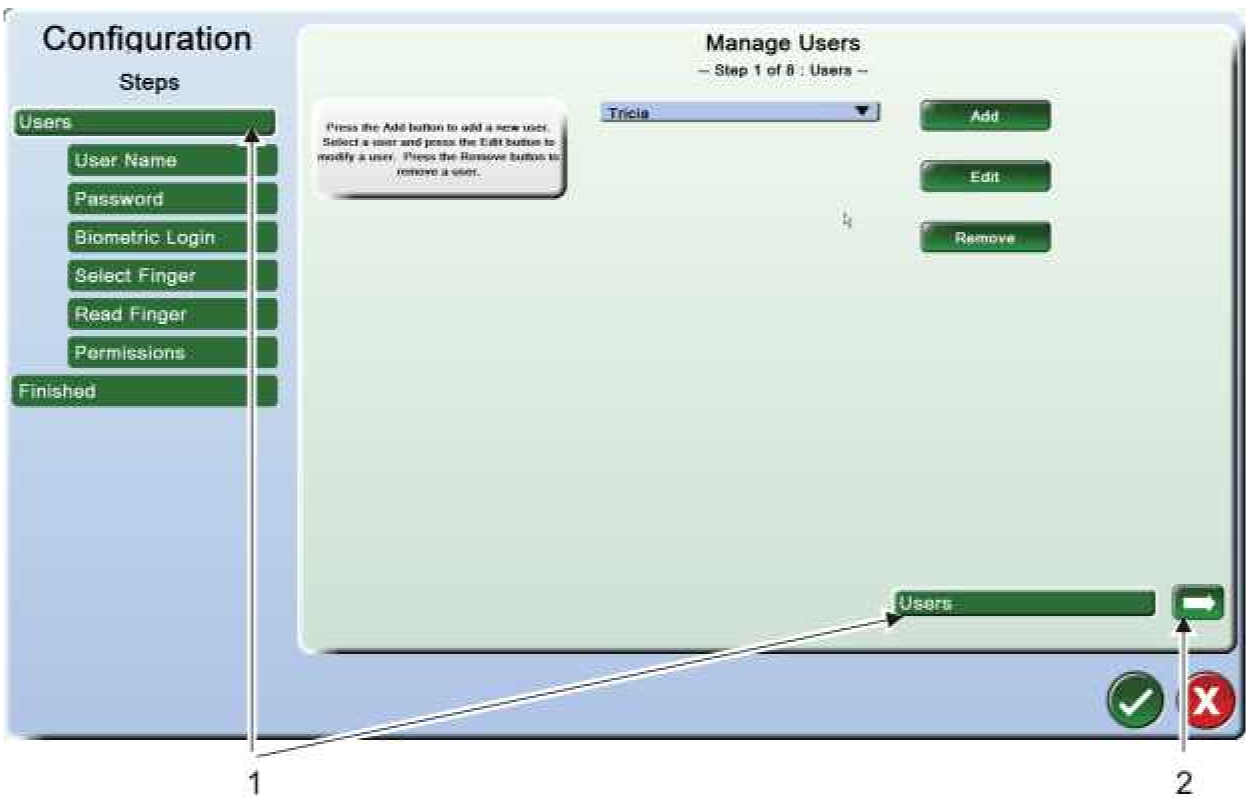
Administrator only

Add, Edit, or Remove users. You may create one user account for a group of people (example: Shift 1).

> *Note: the biometric login features are only used when the optional biometric login device is installed*

To manage a user account:

1. Log in as an administrator.
2.  Select the button with your user name | Manage Users.
3. Select Add, Edit, or Remove a user. Follow the information on screen to complete these actions. The current step is highlighted [item 1 in illustration].
4.  Use the forward arrow button [item 2] to move to the next screen(s).

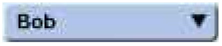


Add a user with the biometric login device

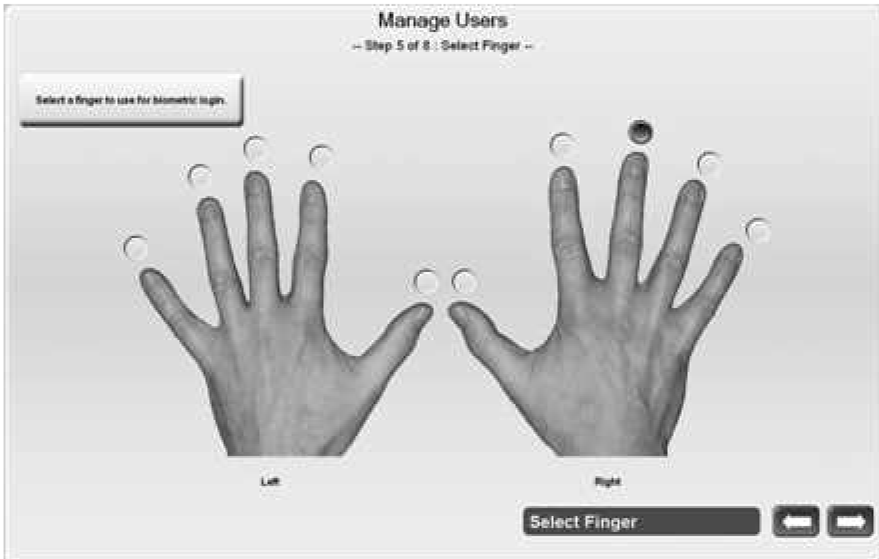
The biometric device uses finger recognition software to log in. You can always log in using your user name and password, even if you have a biometric login device. The maximum number of biometric accounts is 40.

> *Note: You cannot create two accounts for the same finger print. You could create two accounts for one person, but you must use two different fingers*

To add a user with the biometric login device:

1. Log in as Administrator.
2. 

Select the button with your user name | Manage Users | Add.
3. Add the new user name when prompted. Select the forward arrow.
4. Enter a password, then Confirm it. Select the forward arrow.
5. [Biometric login] Select Biometric.



6. [Select Finger] Choose which finger the biometric sensor will read. This finger must be used every time when logging in.
7. [Read Finger] Select the Start button at the top of the screen. Instruct the user to place his or her finger on the biometric sensor three times (for accuracy) when prompted.
8. [Permissions] Select the desired permissions.
9. [Finished]  Select the OK button to save changes and exit.

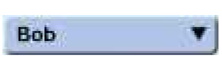
Export Users

Export user accounts from one system to another, or back up your user accounts.

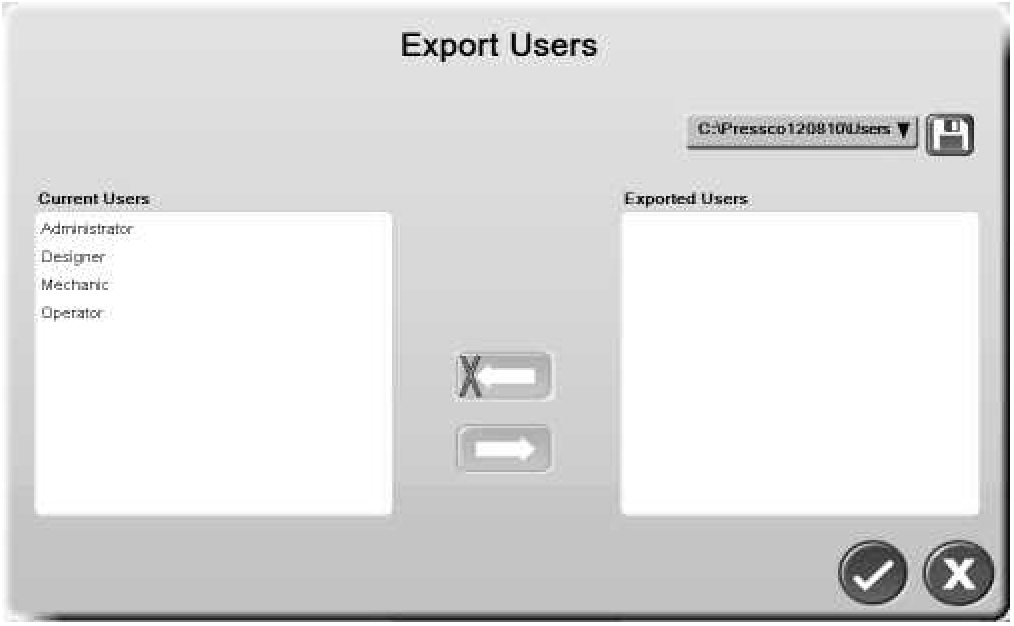
What you need:

- A USB device
- Administrator access

To export a user account:

1. Insert the USB device into an available slot on the Intellispec Series V system.
2. 

Select the button with your user name | Export Users.



3. Select the user account that you want to export.
4.  Select the right arrow to export the user account.
5. Choose the destination to save the user account from the drop-down menu, or select the disk icon to browse to the USB device.
6.  Select the OK button to save changes and exit. The user account is exported.

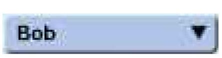
Import Users

Import user accounts from one system to another, or from a backup USB device.

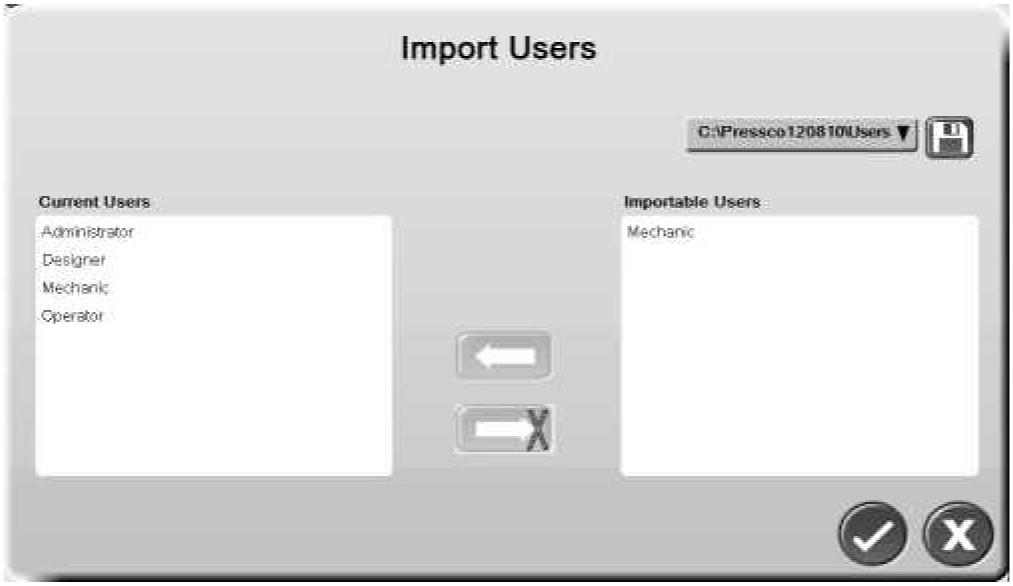
What you need:

- A USB device with user accounts already saved on it, or a folder on the Intellispec hard drive with valid user accounts
- Administrator access

To import a user account:

1. Insert the USB device into an available slot on the Intellispec Series V system.
2. 

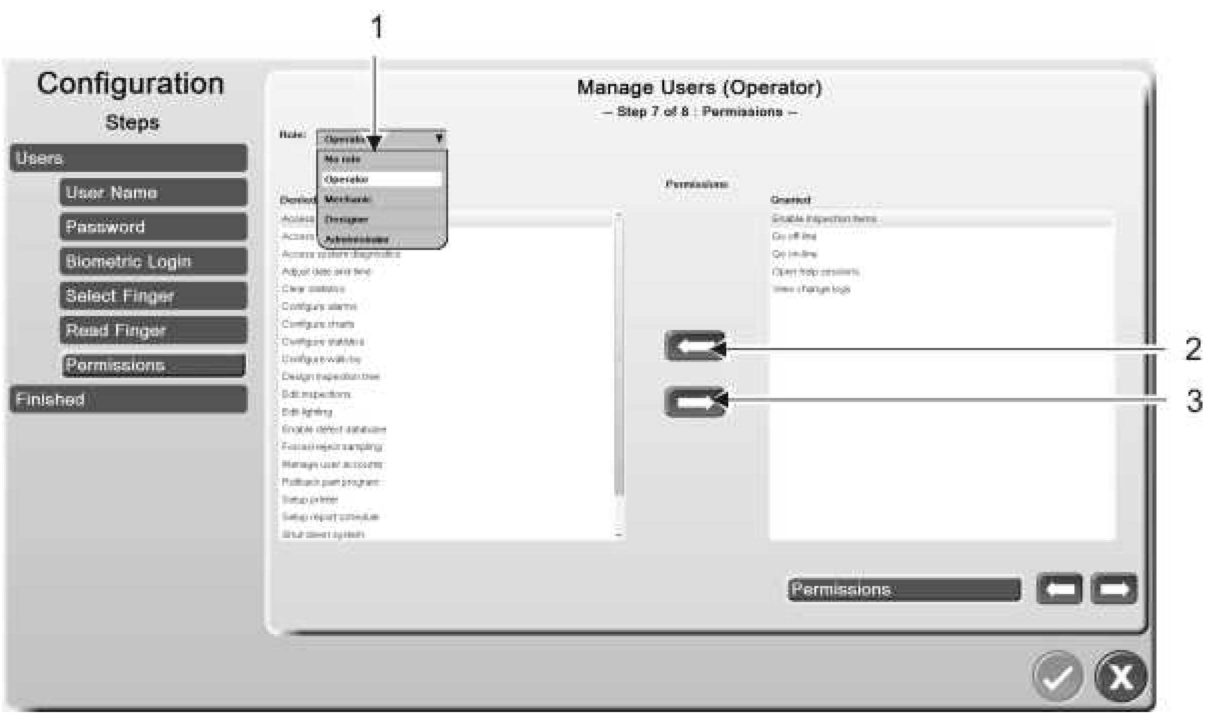
Select the button with your user name | Import Users.



3. Select the user account that you want to import from the right column. If you do not see any users available, select the disk icon to browse to a location where the user account is saved.
4. Select the left arrow to import the user account.
5. Select the OK button to save changes and exit.The user account is imported.

Manage Permissions

The Intellispec has some default permissions that you can use to quickly set up users. To grant these permissions, click the appropriate button in the Manage Users screen. When you select these default permissions, you could also add or subtract specific permissions for the user.



1 - Choose from one of the predefined Roles to use the default permissions

2 - Subtract one of the Granted Permissions. First highlight the permission in the list, then click the left arrow.

3 - Grant one of the Denied Permissions to the selected user. First highlight the permission in the list, then click the right arrow.

Notes about roles and permissions:

- Granted permissions have priority over roles. If you change the permissions of a role, or change the role of a user, the granted permissions persist.
- When you change permissions for a role, all users with that role get the new permissions of that role. This is useful to change permissions for groups of users.

The following table provides a brief description of all the available default permissions. Note that some permissions may not be available in your list. For more information, refer to Editing Permissions.

	Permission	Description	Operator	Mechanic	Designer	Administrator
1	Access advanced inspection parameters (Editor Options)	Access advanced parameters inside of the inspections, and access some inspection tree items (such as regions)			X	X
2	Access image tools	Access the Image Analysis Tools		X	X	X
3	Access system configuration	Perform Lane Setup		X	X	X
4	Access system diagnostics	Perform system functions including I/O and correlation diagnostics		X	X	X
5	Adjust date and time	Adjust Intellispec system date and time				X
6	Allow Task Manager Access	Access Windows Task Manager.		X	X	X
7	Apply X-Ray Power	[only applicable to x-ray modules] Turn on the x-ray power to the module		X	X	X
8	Cancel Background Tasks	Cancel a background task if it is interfering with inspection				X
9	Clear Alarms	Clear the alarms	X	X	X	X
10	Clear statistics	Reset inspection statistics	X	X	X	X
11	Configure alarms	Configure the lane and sensor alarms		X	X	X

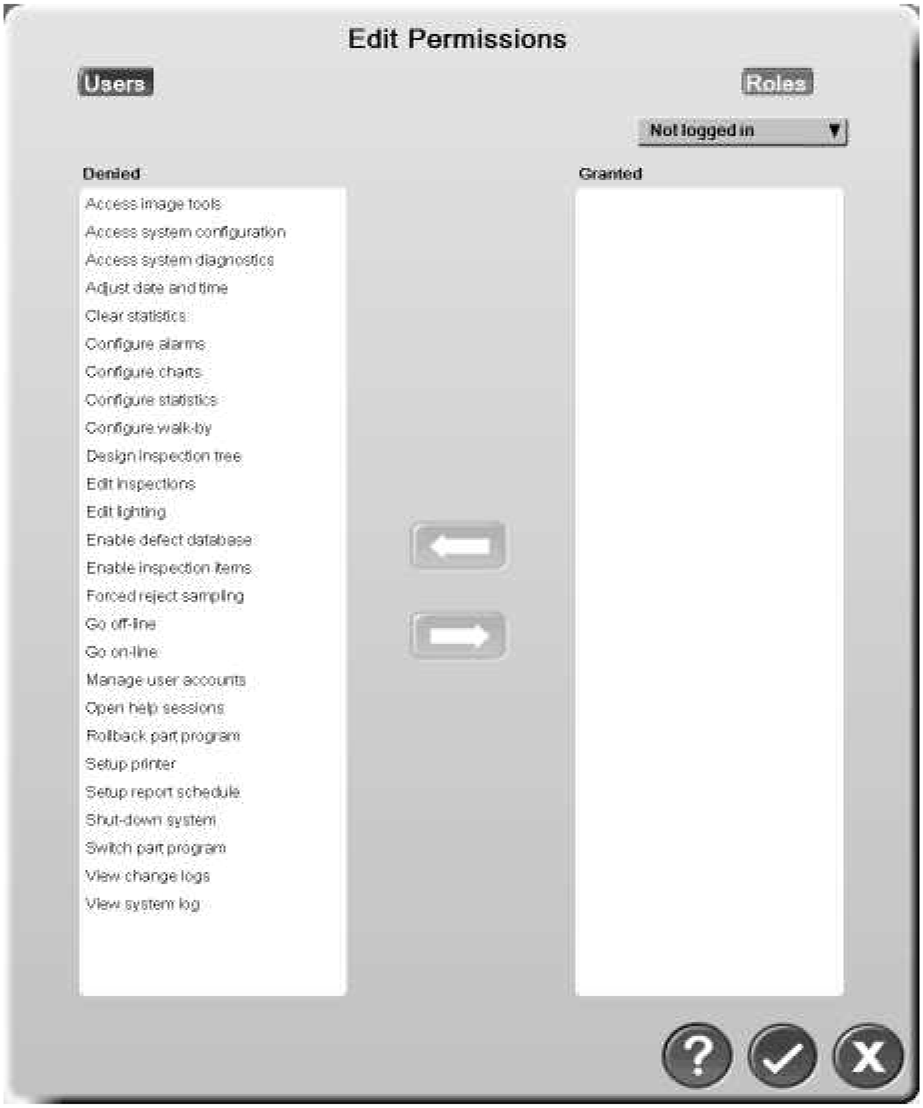
	Permission	Description	Operator	Mechanic	Designer	Administrator
12	Configure charts	Configure trend charts and other statistics charts		X	X	X
13	Configure Global Auto-Learn settings	Enable Auto-Learn and set Extended I/O settings		X	X	X
14	Configure Hang Dump	Create a log file for Pressco engineers. This permission is not automatically granted for any level user.				
15	Configure statistics	Configure how the statistics graphs are displayed		X	X	X
16	Configure walk-by	Name, set up alarms, and set up which inspections will be used with a particular region on a part. These regions are displayed in the walk-by graphic		X	X	X
17	Delete Generated Data	For Snapshot Sampling				X
18	Design inspection tree	Add or delete inspections			X	X
19	Disable Touch Screen for Cleaning		X	X	X	X
20	Download Data	For Snapshot Sampling	X	X	X	X
21	Edit inspections	Edit existing inspections		X	X	X
22	Edit Lighting	Change the lighting settings for each camera		X	X	X
23	Edit Part Program Notes	Add information to the part setup file		X	X	X
24	Enable defect database	Enable the optional defect database			X	X
25	Enable inspection items	Enable or disable individual inspections and the rejecter for those individual inspections		X	X	X
26	Forced Reject Sampling	Request forced reject sampling	X	X	X	X

	Permission	Description	Operator	Mechanic	Designer	Administrator
27	Go Offline	Put a lane offline	X	X	X	X
28	Go Online	Put a lane online	X	X	X	X
29	Install language pack	Update the language files for the user interface, if provided by Pressco				X
30	Launch Windows Explorer	Launch Windows Explorer from Task Manager or from the desktop				X
31	Manage part programs	Create, import, export, copy, or load part programs		X	X	X
32	Manage user accounts	Open Manage Users which lets you add, edit and remove users				X
33	Open help sessions	Start a remote help session with Pressco Technical Support	X	X	X	X
34	Rollback part program	Roll the current part program back to a previous state		X	X	X
35	Run Mass Scaling Manager	Used with mass sensors - select appropriate Scaling Recorder sessions to scale the Intellimass readings		X	X	X
36	Run Mass Scaling Recorder	Used with mass sensors - enter sample data from cut and weighed bottles	X	X	X	X
37	Select Features	Enable optional features			X	X
38	Setup printer	Set up a printer for Intellispec reports				X
39	Setup report schedule	Schedule statistics reports to be generated periodically		X	X	X
40	Shut down system	Shut down the Intellispec system		X	X	X
41	Start Auto-Learn	Manually start an Auto-Learn process		X	X	X

	Permission	Description	Operator	Mechanic	Designer	Administrator
42	Stop Auto-Learn	Manually stop an Auto-Learn process		X	X	X
43	Switch part program	Change the currently running part program. This also allows you to add a new part program	X	X	X	X
44	Switch report language	Choose a language for the Intellispec reports				X
45	View change logs	View the inspection change logs		X	X	X
46	View inspection in editor	View the Retro-Spec interface (double-click an inspection name). No changes allowed.	X	X	X	X
47	View system logs	View the system logs	X	X	X	X

Edit Permissions

This feature allows you to set up permissions that will be available when no one is logged in. It also gives the selected permissions to all users. Once a permission has been selected, it will no longer appear in the available or selected columns when adding or editing a user in the Manage Users option. This feature is only available to Administrators (with Manage Users permissions).



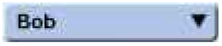
To grant permissions to all users:

1. Log in as Administrator.
2. Bob Click the Log in button with your name on it.
3. Select Manage Permissions. The Edit Permissions screen is displayed.
4. Click the Roles button.
5. From the drop-down menu below Roles, select "Not Logged In."
6. Highlight the desired permission in the left column.
7. Click the right arrow to move the permission to the right column.
8. Repeat the above two steps for all desired permissions.
9. Click the OK button to accept changes and exit.

You can also remove permissions from all users that are assigned specific roles.

Caution - Select the User name from the drop-down menu before you change Roles. Otherwise, you could change your Administrator permissions (example: from Administrator to Operator, and not be able to Manage User Permissions afterwards).

To remove permissions from a role:

1. Log in as Administrator.
2. 

Click the Log in button with your name on it.
3. Select Manage Permissions. The Edit Permissions screen is displayed.
4. Click the Roles button.
5. From the drop-down menu below Roles, select the role from which you want to remove the permissions.
6. Highlight the desired permission in the right column.
7.  Click the left arrow to move the permission to the left column.
8. Repeat the above two steps for all desired permissions.
9.  Click the OK button to accept changes and exit.

You can also edit permissions for any user.

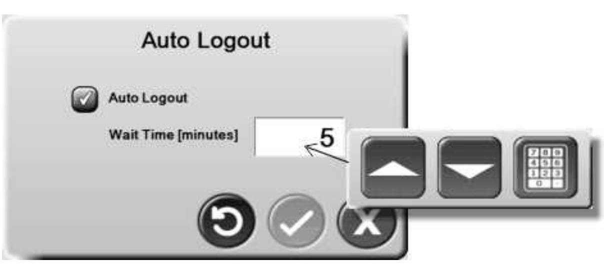
To edit a user's permissions:

1. Log in as Administrator.
2. 

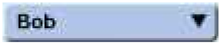
Click the Log in button with your name on it.
3. Select Manage Permissions. The Edit Permissions screen is displayed.
4. Select a user from the User drop-down menu.
    - Move the desired permissions between Denied and Granted. Or:
    - Assign that user a new role. For example, change Jane's permissions from Operator to Mechanic. The user will acquire all permissions for that role, including any that you have assigned separately from Pressco's default settings.
5. Repeat the above step for all desired permissions.
6.  Click the OK button to accept changes and exit.

Set Up Auto Logout

This feature will automatically log out any user after a number of minutes of inactivity.



To set up Auto Logout:

1. Log in.
2.  Select the button with your user name.
3. Select Setup Auto Logout. The setup menu is displayed.
4. Enable Auto Logout. A check mark is displayed in the box when it is enabled.
5. Set the Wait time in minutes (from 1 to 9999 minutes).
6.  Select the OK button to save changes and exit. All users will be logged out automatically after the set number of minutes of inactivity.

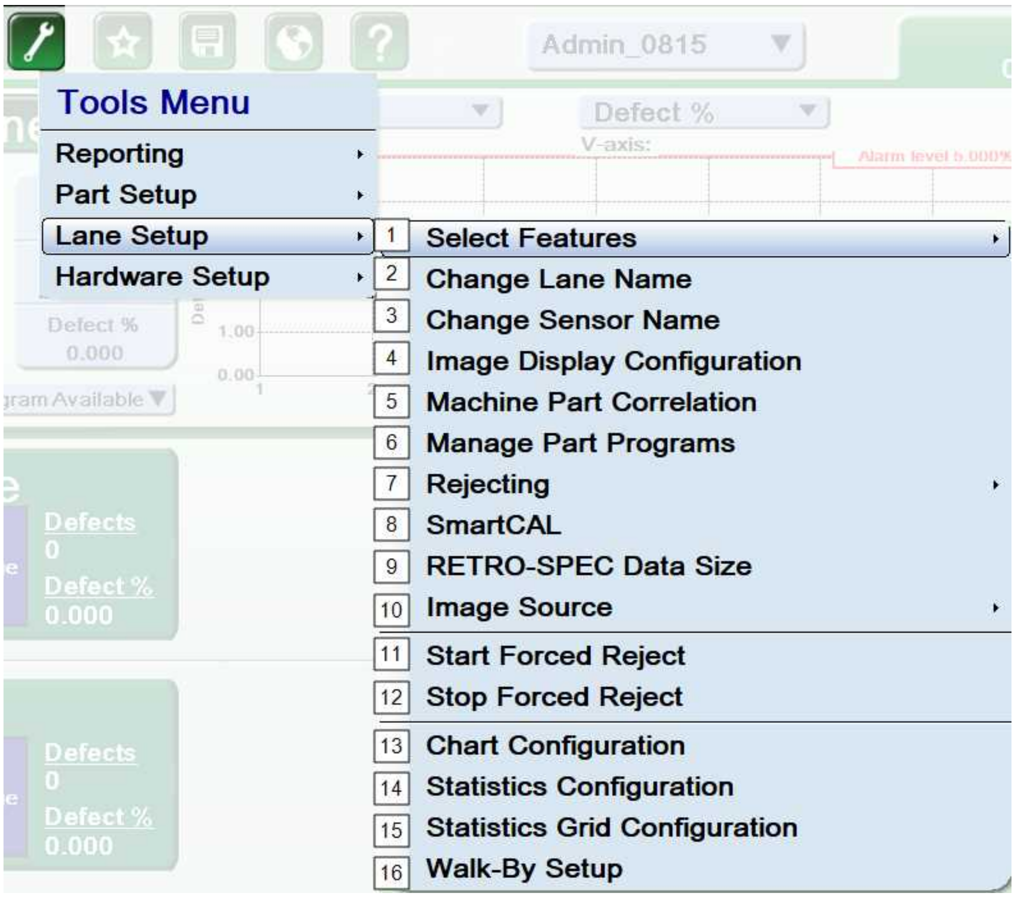
Chapter 17 System Setup

This section contains additional tools and system setup. This information is intended for Administrators or advanced users.

Lane Setup

Note: Some menu items are available to advanced users only

Some menu items are only displayed if enabled through Select Features



1 - Select Features - Enable optional features.

2 - Change Lane Name

3 - Change Sensor Name

4 - "Image Display Configuration" on page 487 - Set the display options for the sensor images.

5 - "Machine Part Correlation" on the next page - Configure up to four different machine parts for correlation. [if Correlation is enabled] (This is usually done by the Pressco installer)

6 - "Manage Part Programs" on page 99

7 - "Rejecting" on page 107

8 - "SmartCAL" on page 175 - Run a set of images on the current part program, and make sure the part program is passing or rejecting parts as you expect.

(not shown) "Configure Global Auto-Learn Settings" on page 543 - [if you have an Extended I/O board, and Auto-Learn = enabled] Configure the Extended I/O bits to use with Auto-Learn.

(not shown) "Alternate Part Processing - Setup" on page 518 - Process the first N parts different than normal when your machine starts back up (after you stop it).

(not shown) - "Color Lane Indicator" on page 487 configuration - Identify a lane by use of color.

9 - "Retro-Spec Data Size" on page 200 - select the size of the data sets in the Retro-Spec editor

10 - "Image Source" on page 182- Select images to display on the lane.

11 - Start "Forced Reject" on page 119 - Force parts to be rejected based on correlation to a specific machine part.

12 - Stop Forced Reject

13 - **Chart Configuration** Set the Trend Chart columns and currency type in "Cost Per Part."

14 - "Statistics Configuration - Lane" on page 31- Change the display settings for the charts displayed by the Statistics buttons.

15 - "Statistics Grid Configuration - Lane" on page 32 - Change the amount of information for the charts displayed by the Statistics buttons.

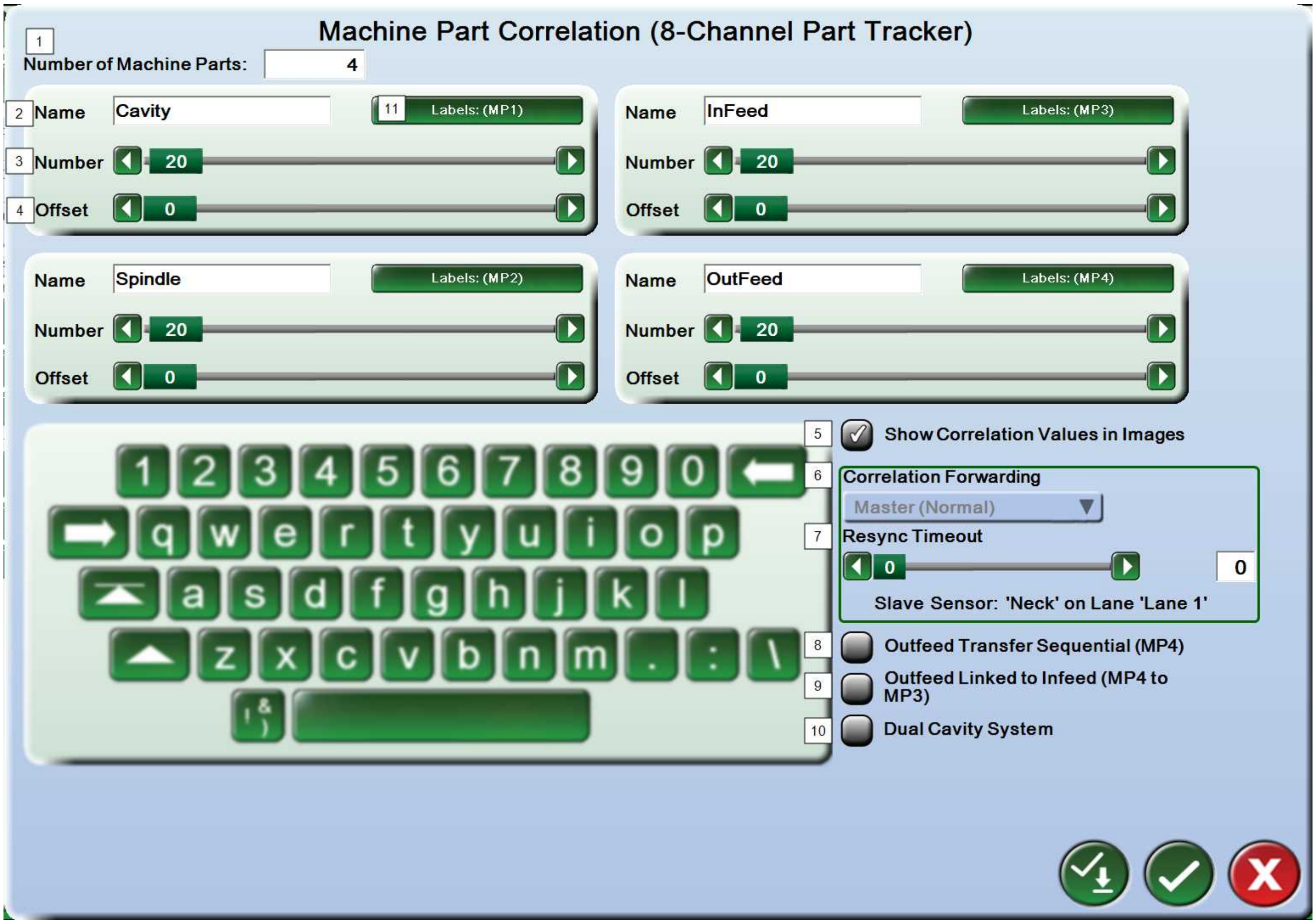
16 - "Walk-by Graphic Setup" on page 17 - Set the group names, groups of inspections, and the criteria to turn the part graphic green, yellow, or red.

Machine Part Correlation

Configure up to four parts for correlation.

> *Note: this screen is usually set up by the Pressco installer*

 To get to this screen: From Lane or Sensor Overview mode, select Tools | Lane Setup | Machine Part Correlation.



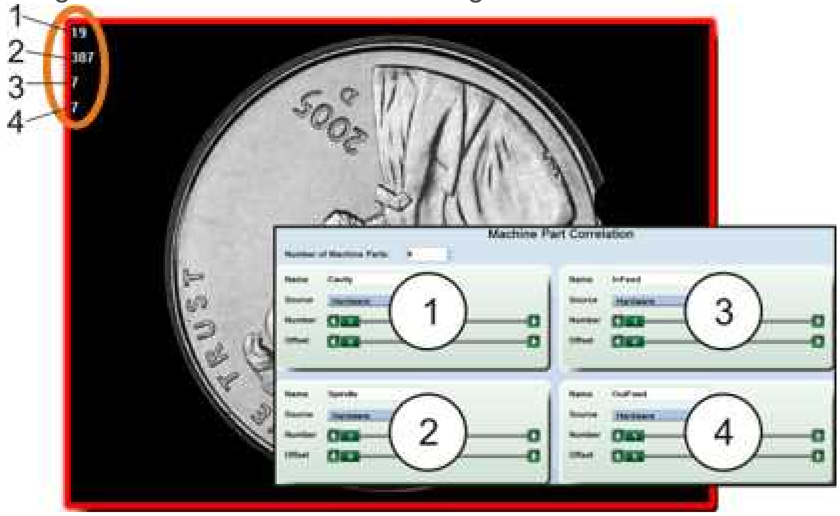
1 - **Number of Machine Parts** Select the number of correlation sensors in your system (1-4). If you are using inspection-based correlation such as BMID, AlphaNumeric or Color Dot you will need to reserve a machine part for tracking the inspection-based correlation, and a correlation sensor is not needed for this machine part. The correct part tracker type should already be selected but if the title shows a part tracker type different from what you have you will need to run the Discovery software and select the correct type. (Edit the lane and select the Correlation step.)

2 - **Name (correlation)** Name each machine part to something recognizable to you (examples: Cavity, Spindle, or Liner Gun #1). This name is displayed on the Intellispec screens and throughout correlation reports.

3 - **Number** Set the number of components in each machine part (example, number of pockets in a starwheel).

4 - **Offset** Change what the inspection system considers part #1 (or pocket #1) and the actual part. For example, if you reject a part from cavity #1, and the system rejects the part from cavity #2, then set the offset at 1. This ensures the inspection system tracks components properly.

5 - **Show Correlation Values in Images** Displays the correlation values in the large defect images and in Freeze on Defect images.



6 - **Correlation Forwarding** This feature takes correlation information from one lane of inspection (slave lane) and forwards it to another lane (master lane). This is used when one lane has software correlation (inspections) set up, and the other lane does not. See also "Correlation Forwarding" on page 489 topic in Intellispec software guide.

7 - **Resync Timeout** This parameter applies to the master lane only. If part flow stops for this number of seconds, the system re-synchronizes the correlation between master and slave. This is an opportunity taken to reduce the chance that the correlation between slave and master is incorrectly offset, which can occasionally happen due to double-triggers at the slave's part detect.

8 - **Outfeed Transfer Sequential** (Only when four sensors are used, and only in blow molder installations) Specify whether the infeed and outfeed transfer arms are numbered Independently or Sequentially.

Example of Outfeed Transfer Sequential

For example, your machine has 10 infeed transfer arms and 10 outfeed transfer arms. If they are numbered Independently, the infeed transfer arms are numbered 1 - 10, and the outfeed transfer arms are also numbered 1 - 10. If they are numbered Sequentially, the infeed transfer arms are numbered 1 - 10, and the outfeed transfer arms are numbered 11 - 20.

9 - **Outfeed Linked to Infeed (MP4 to MP3)** (Only in blow molder installations) Enable this to derive the outfeed correlation count (MP4) from the infeed correlation count (MP3). This is typical of most blow molders

Example of Linked to Infeed

For example, in an SBO20 machine, the infeed count will be from 1 - 10. The outfeed count will be from 11 - 20. Infeed count 1 will correspond to outfeed 11, and so forth.

Note: When this feature is enabled, the number of components is forced to be equal (number of components in MP3 = number of components in MP4).

Note: For linked outfeed there is no index sensor for MP4 in the hardware configuration.

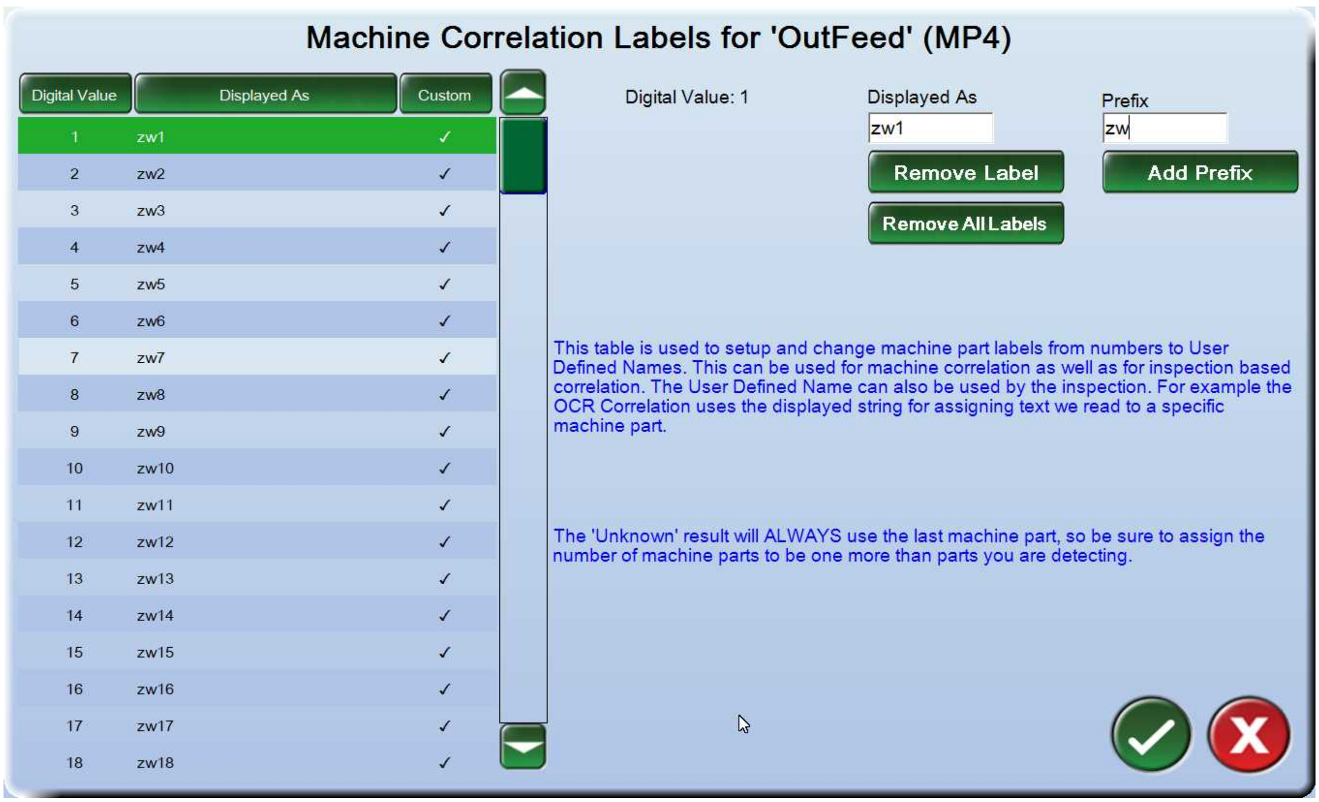
10 - Dual Cavity System - no function at this time.

11 - "Machine Correlation Labels" below

Machine Correlation Labels

Use this dialog to change machine part labels to user defined names. It can be used for machine correlation as well as inspection based correlation. The user defined name is used by some inspections. For example, the OCR Correlation uses the displayed string for assigning text we read to a specific machine part.

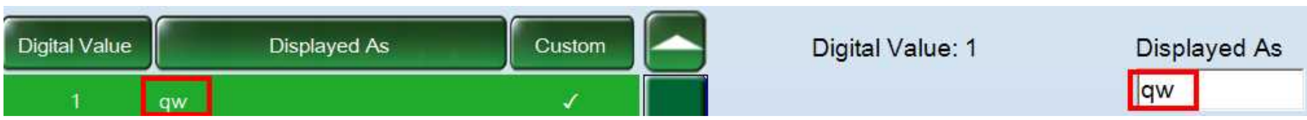
> *Note: for inspection based correlation, the "Unknown" result will always use the last correlation value, so be sure to assign the number of correlation values for the machine part to be one more than the number of correlation values you are detecting. For example, if you are detecting 10 body makers in BMID, set the number of correlation values for the BMID machine part to 11.*



To change the label:

1. Select the row to rename.
2. Click in the "Displayed As" box. A pop-up keyboard allows you to type in a different label.

3. Type the new label, and click the Enter button to save. The new label is populated in the table.



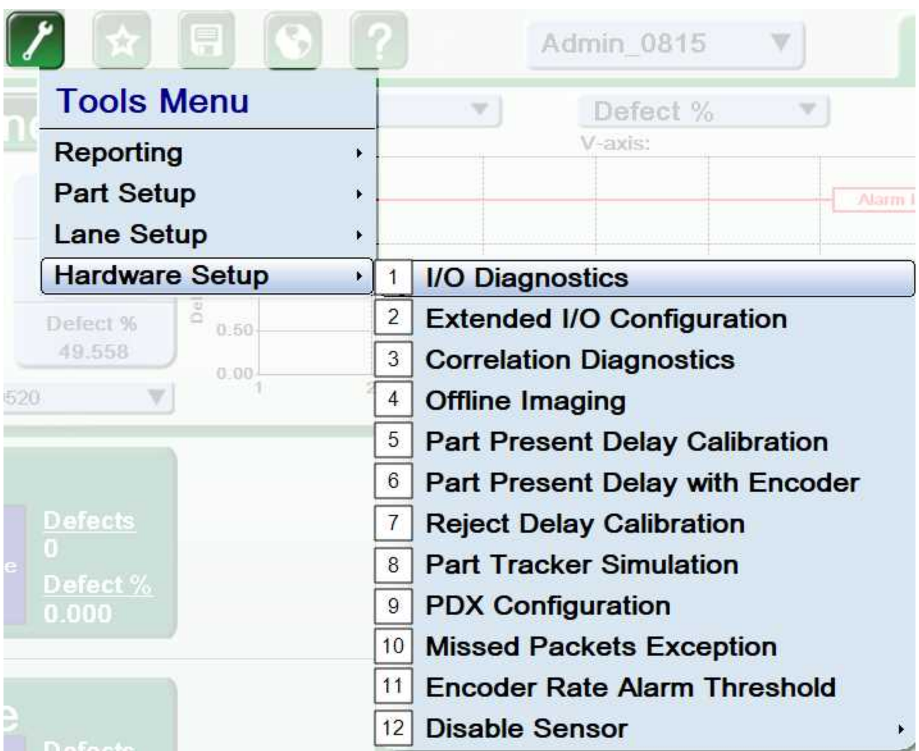
Remove Label replaces custom labels with the default numbers.

Remove All Labels replaces custom labels in all rows with the default numbers.

Add Prefix displays the keyboard and allows you to enter a prefix to add to the labels in all rows.

Hardware Setup

Note: Some menu items are available to advanced users only



1 - "I-O Diagnostics" on the next page - Verify the presence of input and output signals.

2 - "Extended I-O Configuration" on page 524 - Configure the optional Extended I/O board.

3 - "Correlation Diagnostics" on page 478 - Verify correlation signals.

4 - "Offline Imaging" on page 143 - Acquire images when the lane is offline.

5 - "Part Present Delay Calibration" on page 89 - Calibrate the distance (in encoder ticks) from the part detect sensor to the camera centerline.

6 - "Part Present Delay with Encoder" on page 91 - Coarsely calibrate the part present delay by using encoder counts.

7 - "Reject Delay Calibration" on page 93 - Calibrate the distance (in encoder pulses) from the part detect sensor to the rejector.

8 - "Part Tracker Simulation" on page 92 - Used for troubleshooting. A simulated part rate allows inspection to continue.

9 - "PDX Configuration" on page 528 - Set up the part detect generator. Only used in some applications.

10 - "Missed Packets Exception" on page 480 - Set the number of missed packets to trigger the part tracker to send a Lost Part Tracking message to the Intellispec.

11 - "Encoder Rate Alarm" on page 80 - Set the Threshold to determine when the encoder rate is too high.

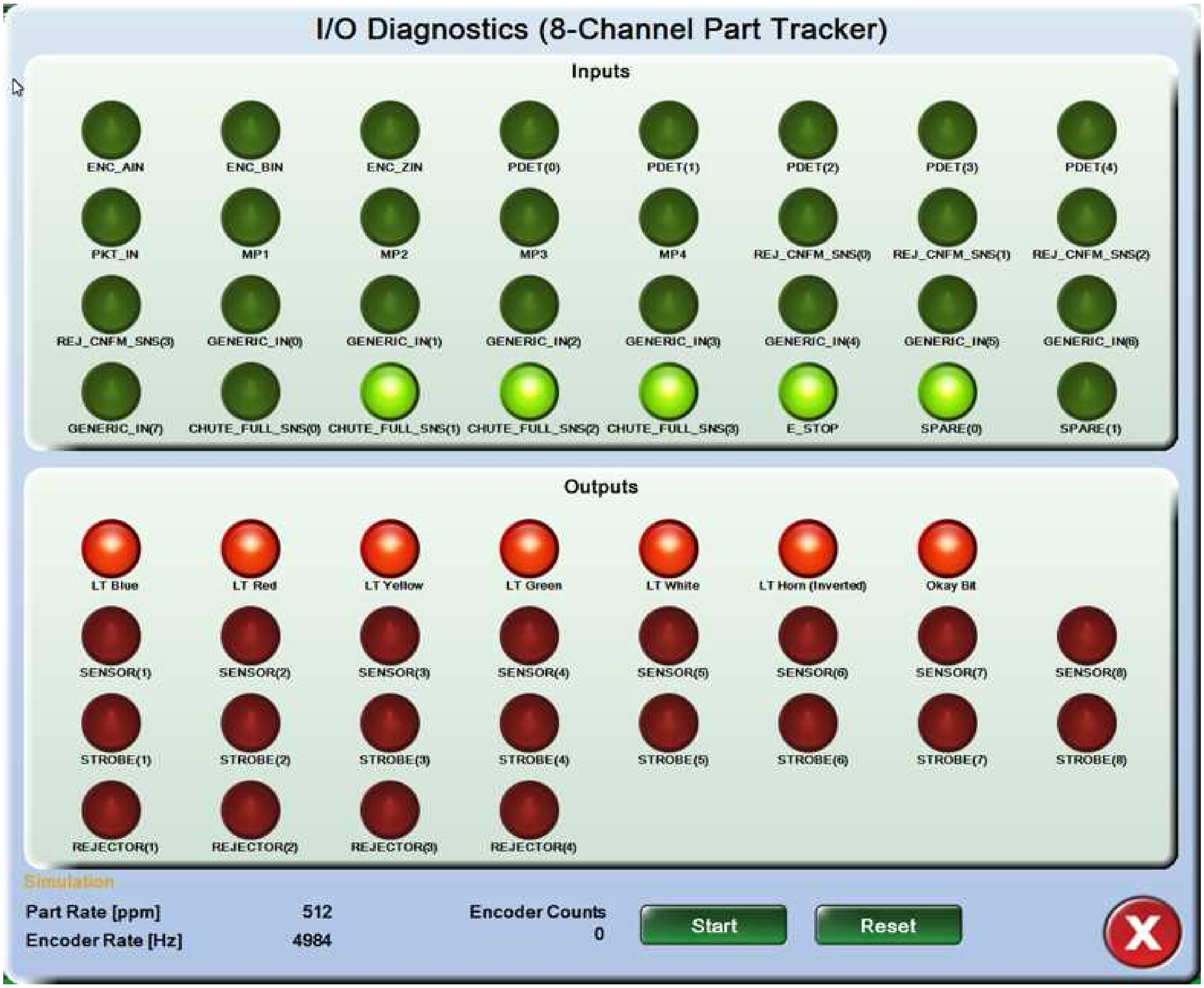
12 - "Disable Sensor" on page 481

I-O Diagnostics

 To get to this screen: From Lane or Sensor Overview mode, select Tools | Hardware Setup | I/O Diagnostics.

Verify the presence of input and output signals. Part rate and encoder rate are also displayed.

- Green = input signal (signals that originate outside the Intellispec and are communicated to the system). Light is on when an input is received.
- Red = output signal (signals that originate inside the Intellispec and are transmitted out of the system). The light is on when an output is generated. You can test an output signal by selecting the appropriate light.



Encoder counts

At the bottom of the screen, you can use the diagnostics and buttons to count encoder ticks. This estimates the number of encoder counts to help set up part tracking sensors and other machine part hardware.

> *Note: due to start and stop time of machine components, the encoder count will not be exact*

Encoder Counts The encoder count from the part tracker board. The board continually counts, and restarts at zero when you press the Reset button.

Start button Begin displaying encoder ticks. This toggles with Stop.

Stop button Stop updating the encoder tick display. The part tracker will remain counting, but the display will stop updating.

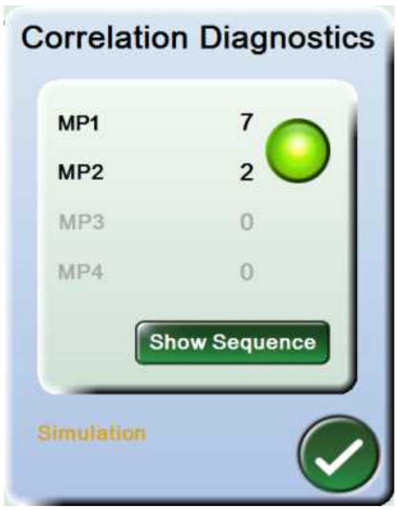
Reset button Reset the part tracker board encoder count.

Correlation Diagnostics

Verify that correlation sensor information is being received by the Intellispec [if correlation is enabled]. The lane must be online, and the cameras must capture images.

From Lane or Sensor Overview mode, select Tools | Hardware Setup | Correlation Diagnostics.

> *Note: If asynchronous correlation is enabled, then more options are shown on screen. "Asynchronous Correlation" on page 499*



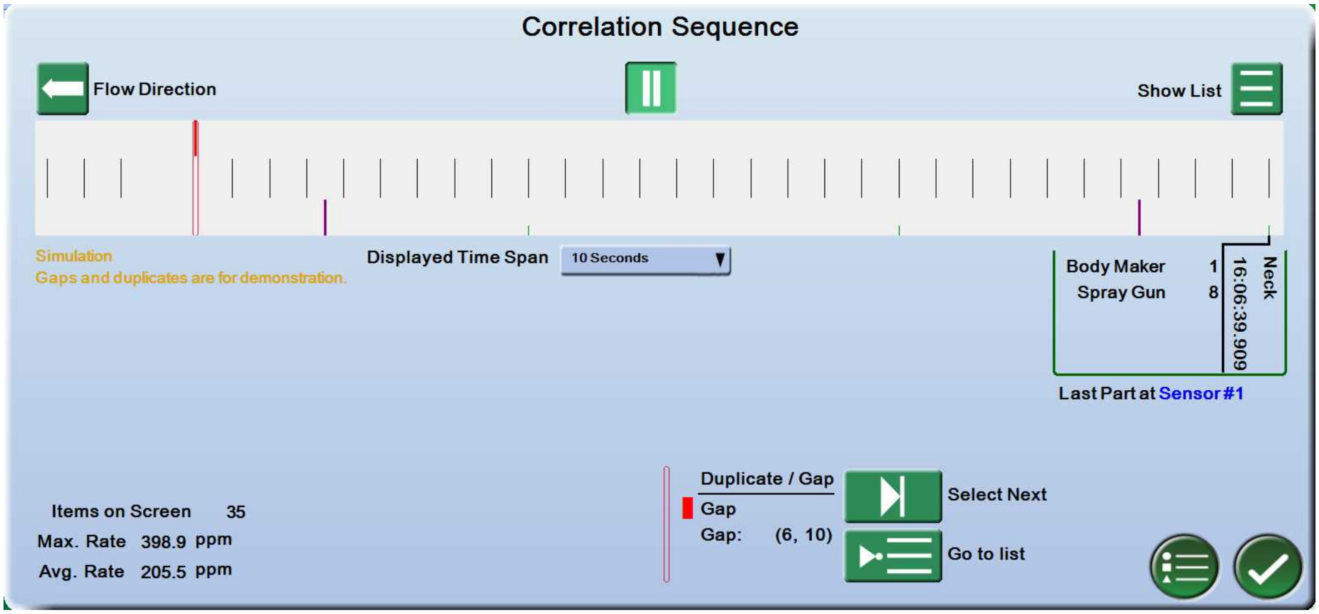
Verify that the correlation sensor information is being received by the system. Make sure that each machine part (MP) increments according to the number of components in your system.

As the production unit is operating, the correlation sensor transmits pulses. For example, if you have a cavity sensor attached to MP1 and are running an 8-cavity blow molder, you will see MP1 increment from 1-8 repeatedly.

MP = Machine Part. MP1 through MP4 correspond to the correlation sensors that you have configured in the "Machine Part Correlation" on page 471 screen.

Asynchronous Correlation is used in certain applications. For a description of how to use this feature and to set the parameters in the FHCP application, see: "Asynchronous Correlation" on page 499

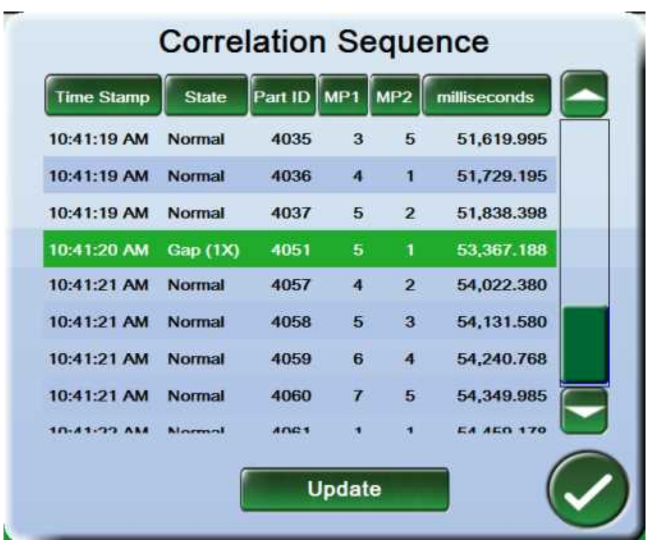
Select the "Show Sequence" button to view a graph of the correlation sequence. Use the buttons at the top of the graph to change part flow direction, or to pause or resume the animation.



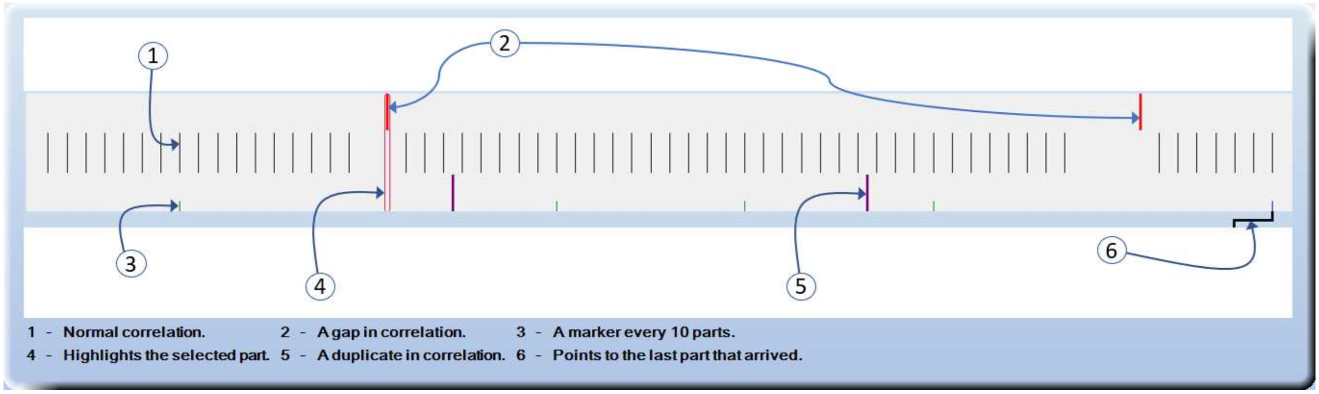
If you have more than one sensor, select the blue "Sensor #1" to switch to a different sensor. This should show the same sequence but the starting point will be different. This can be useful when sensors are far apart.

 Select the Show List button to show a list of all parts with correlation information. (shown below)

 Select the Go to List button to show the same list. The highlighted part in the list is the highlighted part in the sequence graph.



 Select the legend button to see an explanation of the graph. Select the button again to hide the graphic.



> *Note: up to 500 parts are recorded. If more than 500 parts move past during the selected time interval, only up to 500 bars will be shown (the panel partially filled). The amount of 500 parts is subject to change.*

Missed Packets Exception

Missed Packets Exception - Set the number of missed packets to trigger the part tracker to send a Lost Part Tracking message to the Intellispec.

For each part and for each camera, two packets of information are communicated:

- The part tracker sends the host PC a signal stating the camera has been triggered (correlation signal)
- The host PC then sends a pass/fail signal back to the tracker (results signal) when the inspections are done

A missed packet exception occurs when the part tracker has sent out X number of correlation signals without receiving any results signals back from the PC.

The threshold is set by the system. When this number has been met:

- A Lost Part Tracking number is updated on the "Sensor Missed Statistics" on page 42 screen, and
- A Part Tracker Lost Communication alarm is raised and the alarm trigger count is increased for this alarm. This is a System Error Alarm that is set up through "Lane Alarm Configuration" on page 58.

 To get to this screen: from Lane or Sensor Overview mode, select Tools | Hardware Setup | Missed Packets Exception.

The default value is computed by the system, and should work for most applications.

If your system is experiencing excessive "Part Tracker Exception" errors, then you can set an explicit value.

> *Note: This value should only by changed by Pressco engineers. Contact Pressco if you have questions.*

- If the Missed Packets Exception threshold is too low, then you may see errors that say "Temporarily lost communication to the part tracker."
- If the Missed Packets Exception threshold is too high, then you may not be able to detect network connection problems.

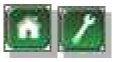
Disable Sensor

Disable a sensor temporarily if something is wrong with the hardware or inspection path. REMEMBER: enable the sensor again when the hardware is fixed.

 From Lane or Sensor Overview mode, select Tools | Hardware Setup | Disable Sensor. Select the sensor to disable. You must re-start the system for this to take effect.

The sensor button shows that it is disabled. Follow the same path above to re-enable the sensor.

System Tools

 To get to this menu: Select Home | Tools | System.

"Go Online at Startup" below

"Set Date and Time" below

"Set Up a Printer" on the next page

"Disable Touch Screen for Cleaning" on page 484

Go Online at Startup

Go online to inspect when you start the software (or reboot the computer). This saves the extra step of putting each lane online, and it automatically puts the system into inspection mode if power is lost and the computer reboots.

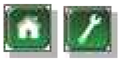
 To use this option: Select the Home button | Tools button | System | Go Online at Startup. Checked = enabled

Set Date and Time

Administrator only

Set the date and time for the Intellispec system. The Windows operating system time is also changed.

To set date and time:

1.  Select Home | Tools | System | Set Date and Time.

2. Choose your time zone from the drop-down menu.
3. Adjust for daylight savings time if applicable. Checked = enabled
4.  Select the OK button to save changes and exit.

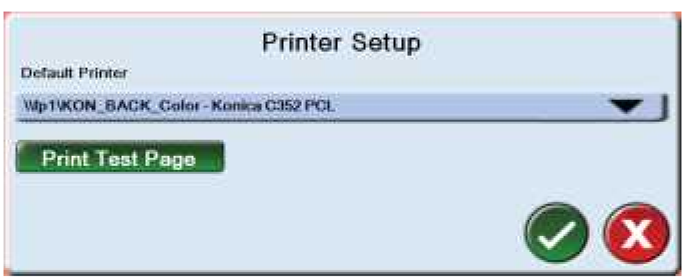
Set Up a Printer

Administrator only

Configure a USB or networked printer to print Intellispec reports. The printer driver must be set up by an Administrator who has access to Windows.

To set up a printer:

1.  Select Home | Tools | System | Setup Printer.

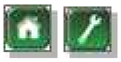


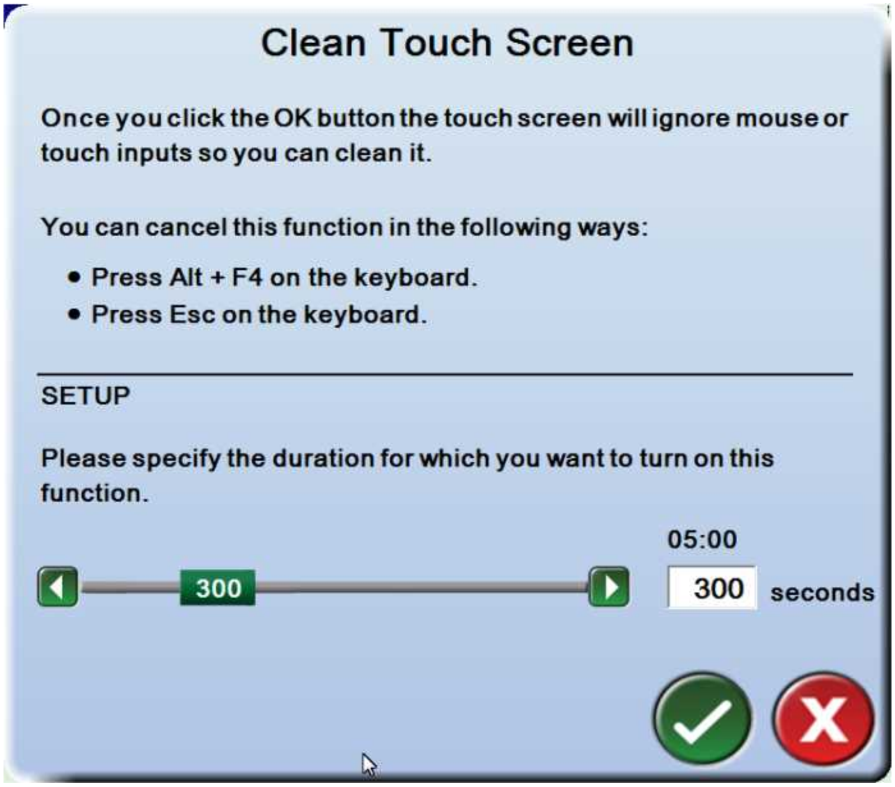
2. Select the printer from the drop-down menu. The Intellispec system recognizes printers through the Windows drivers.
3. To test the printer, select the Print Test Page button. An "Intellispec Test Page" message is printed.
4.  Select the OK button to save changes and exit.

Disable Touch Screen for Cleaning

Disable the Intellispec screen buttons when cleaning the touch screen.

To disable the touch screen:

1.  Select Home | Tools | System | Disable Touch Screen for Cleaning.
2. Follow the directions on the screen, and clean the screen.



To clean the LCD screen:

Use an acceptable cleaning agent such as:

- Water
- Vinegar (mixed with water)
- Isopropyl Alcohol
- Petroleum Benzene

> *Warning - Do not use harsh chemicals such as acetone, ethyl alcohol, ethyl acid, ammonia, or methyl chloride. These chemicals will damage the touch screen.*

Use an appropriate cloth such as:

- Soft cotton cloth
- Computer wipes. Only use these if they state on package that they are designed for LCD laptop screens.

> *Warning - Some materials such as paper towels or old rags could cause scratches and damage the LCD screen*

Clean the screen properly:

1. Apply the solution to your cloth first - do not spray liquid onto LCD screen directly.
2. Stroke the cloth across the display in one direction, moving from the top of the display to the bottom.

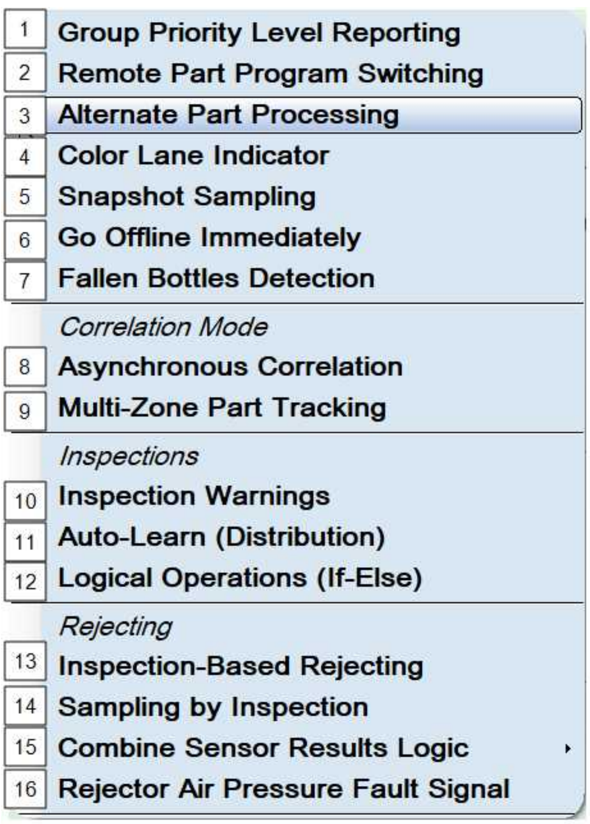
Re-enable the touch screen:

- Press [Alt + F4] or [ESC] on the keyboard.
- If you have a biometric reader, touch the device to re-enable the touch screen. You do not need a biometric user account.

Select Features

Select features to enable them. Some features may not be available depending on your system configuration. You must have user permission to Select Features. See "Manage Permissions" on page 462.

From Lane Overview mode, select Tools | Lane Setup | Select Features. Then select an option. Checked = enabled



1 - "Group Priority Level" on page 18 - Assign a group priority in the Walk By graphic.

2 - "Remote Part Program Switching" on page 515 - Select one of two part programs remotely.

3 - "Alternate Part Processing - Setup" on page 518 - Process the first N parts different than normal when your machine starts back up (after you stop it).

4 - "Color Lane Indicator" on the next page - Identify a lane by use of color.

5 - "Snapshot Sampling" on page 169 - Validate the current performance of the system setup.

6 - "Go Offline Immediately" on page 488- Overrides the part queue and takes the system offline before all parts reach the rejector.

7 - "Fallen Bottles Detection" on page 495 - (Option) A push rejector removes the fallen bottles from the production line; used with Fill Height Cap Placement inspection systems.

8 - "Asynchronous Correlation" on page 499 - (Option) A combination of hardware and software that ensures the Intellispec system is tracking parts properly.

> *Note: you can enable either Asychronous Correlation or Multi-Zone Part Tracking, but not both at the same time.*

9 - "Multi-Zone Part Tracking" on page 508 (Option) Thisis an extension of Asynchronous correlation that permits bottles being added or removed within certain zones while maintaining correlation.

10 - "Inspection Warnings" below - Enable warning levels in Retro-Spec graphs.

11 - "Auto-Learn" on page 543- Automatically learn a new set of parts based on inspection settings and trigger criteria.

12 - Logical Operations - "If Else" on page 450

13 - "Inspection-Based Rejecting" on page 113

14 - "Sampling by Inspection" on page 125- This feature allows you to reject parts without affecting defect statistics.

8 - Defect Recording - Enable recording of images to the Defect Data File. This is an optional feature and your system must be properly configured.

9 - "Defect Database" on page 555 - Enable saving of defect information (non-image information) to the Defect Database. This is an optional feature and your system must be properly configured.

15 - "Combine Sensor Results Logic" on page 488 - No longer used.

16 - "Rejector Air Pressure Fault Signal" on page 63 - This is used with filter/regulator/lubricator 79854 on some systems. It triggers the alarm when the air pressure is too low.

Inspection Warnings

Inspections can have reject and/or warning limits. A warning allows you to perform maintenance or adjustments before the system starts rejecting parts. The warning limits are represented by the yellow adjustable slider bar on the Retro-Spec graphs. If this feature is disabled, then only reject limits are displayed (red bars).

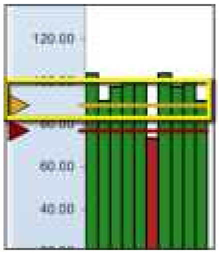
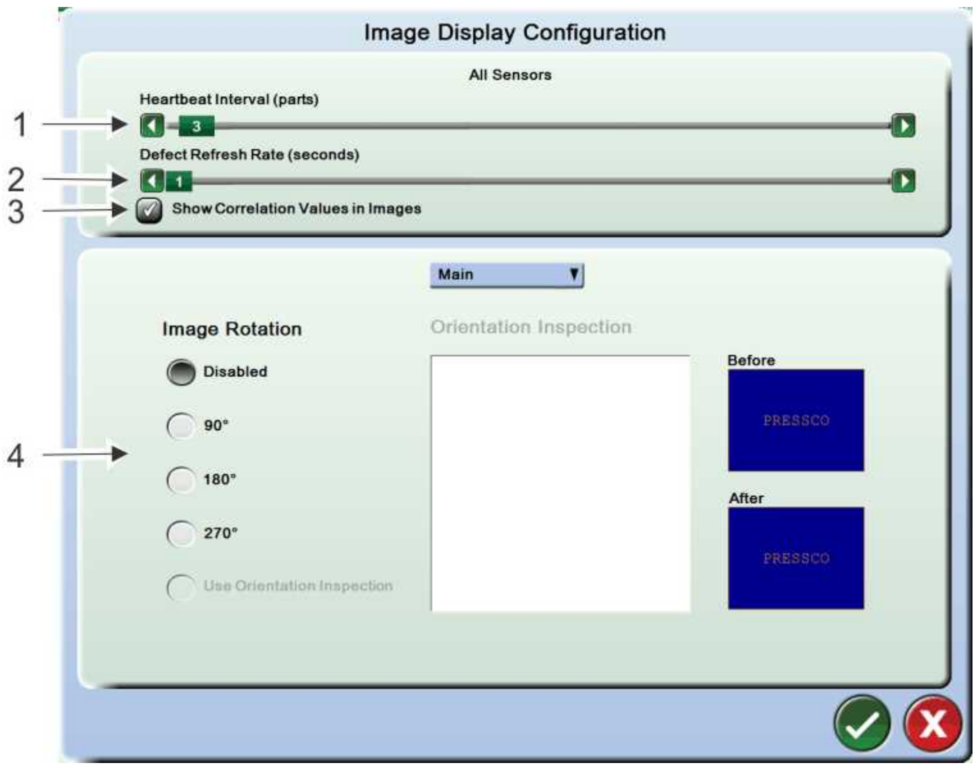


Image Display Configuration

Adjust the display settings for images.

 To get to this screen: From the Lane or Sensor Overview screen, select Tools | Lane Setup | Image Display Configuration.



1 - Set the frequency to update the image in the sensor view window.

2 - Set the frequency to update the defective images when the system is online

3 - If correlation is used, check this box to display correlation information in the inspection images.

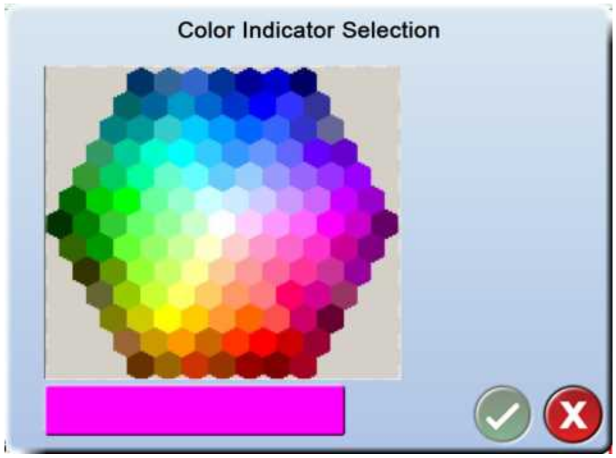
4 - Rotate the defect images, sensor display images (heartbeat), and the inspection images.

Color Lane Indicator

Identify a lane by use of color. You can set different colors for each lane, and see activity from a distance. You must enable the feature for each lane separately.

To enable Color Lane Indicator:

1.  From Lane Overview mode, select | Lane Setup | Select Features | Color Lane Indicator. The system will prompt you to select a color for that lane.



2. Select a color and select OK. You will see the color lane indicator on your screen.
3. Repeat for additional lanes as necessary.

To change the lane color:

Click on the color rectangle for the lane. The selector dialog is displayed, allowing you to select a different color.

To disable Color Lane Indicator:

 From Lane Overview mode, select Tools | Lane Setup | Select Features | un-check Color Lane Indicator.

Go Offline Immediately

In normal system operation, bad parts that are already in the part queue are rejected before the system goes offline. This feature overrides this operation. When this feature is checked, the system does not wait for the part queue to clear and goes offline as soon as you take it offline.

> *Note: there is the possibility of bad parts going through the production line because they are not rejected by the Intellispec.*

To enable this feature, from Lane Overview, select Tools | Lane Setup | Select Features | Go Offline Immediately. Checked = enabled

When it is not checked, the system waits until all parts already detected have passed the rejector before going offline.

Combine Sensor Results Logic

This feature is no longer used. However, if your system still has it programmed, it operates as follows.

The feature was designed to be used with Country Code Validation, where individual camera images were captured, and not multiplexed together. Six images were used to determine the country code, but most likely, five out of six of those images did not contain the code in the field of view, and therefore failed inspection. This logic allows the system to use one good image (containing the country code) to pass inspection.

It must be enabled through Select Features.

One Good to Pass If one of the images contains the country code, then the part passes.

All Bad to Fail If none of the six images contain the country code, then the part fails.

Correlation Forwarding

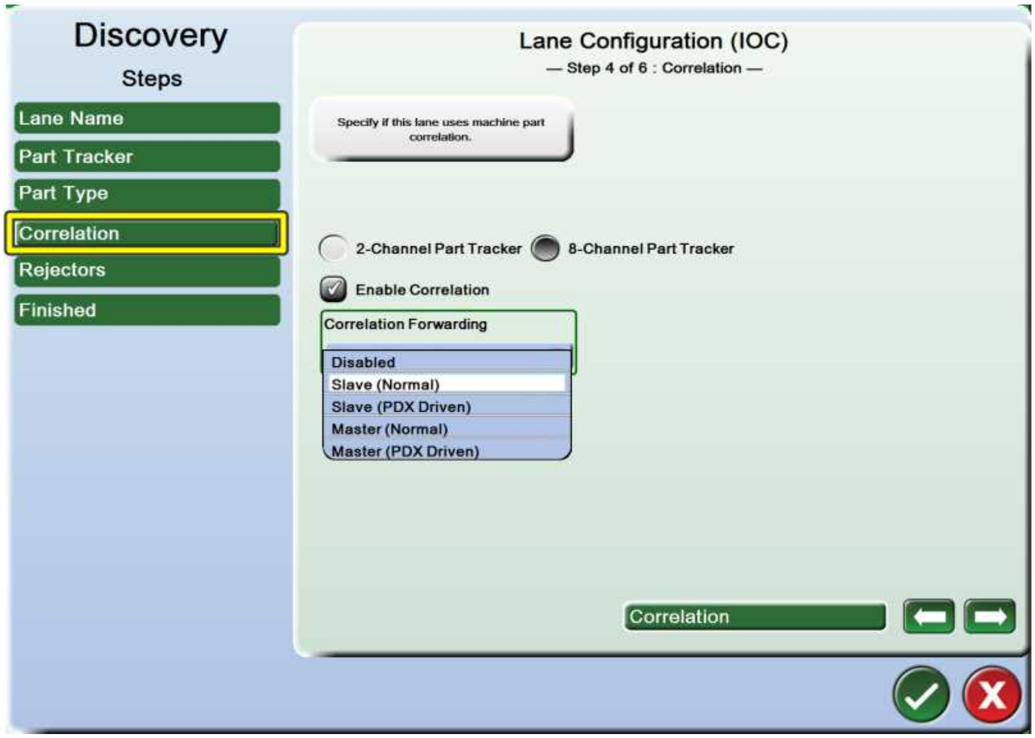
This feature takes correlation information from one lane of inspection (slave lane) and forwards it to another lane (master lane). This is used when one lane has software correlation (inspections) set up, and the other lane does not. The slave lane sensor must be placed in the production line ahead of the master lane sensor(s). This allows time for the Intellispec system to forward the correlation information from the slave lane to the master lane.

An example for using Correlation Forwarding is using Body-Maker ID. A system could be set up such that one lane (slave lane) has software correlation (Body-Maker ID). Another lane (master lane) has other cameras looking at the inside of a can. When the Intellispec system identifies the Body-Maker on one lane, it forwards correlation information to the inside of can lane. Now the Intellispec system can identify which Body-Maker line is associated with every part. Correlation information can be analyzed through statistics reports to help you identify trends in your production lines, such as excessive failures from one machine part.

See examples for two modes: "Correlation Forwarding - Normal Mode" on page 492, and "Correlation Forwarding - PDX Driven Mode" on page 493

Before using correlation forwarding:

1. The feature must be enabled by Pressco technicians in Discovery. Go to Edit Lane | select a lane | select Correlation (under Discovery Steps). NOTES:
   - Enable the "slave lane" before enabling the master lane. The slave lane must be the lane immediately before the master lane (example: Slave Lane = Lane 1, Master Lane = Lane 2). The slave lane forwards information to the master lane.
   - Choose the number of part tracker channels in each lane in Discovery.
2. Enable Correlation by checking the box.
3. Under Correlation Forwarding, select a mode for Slave Lane.

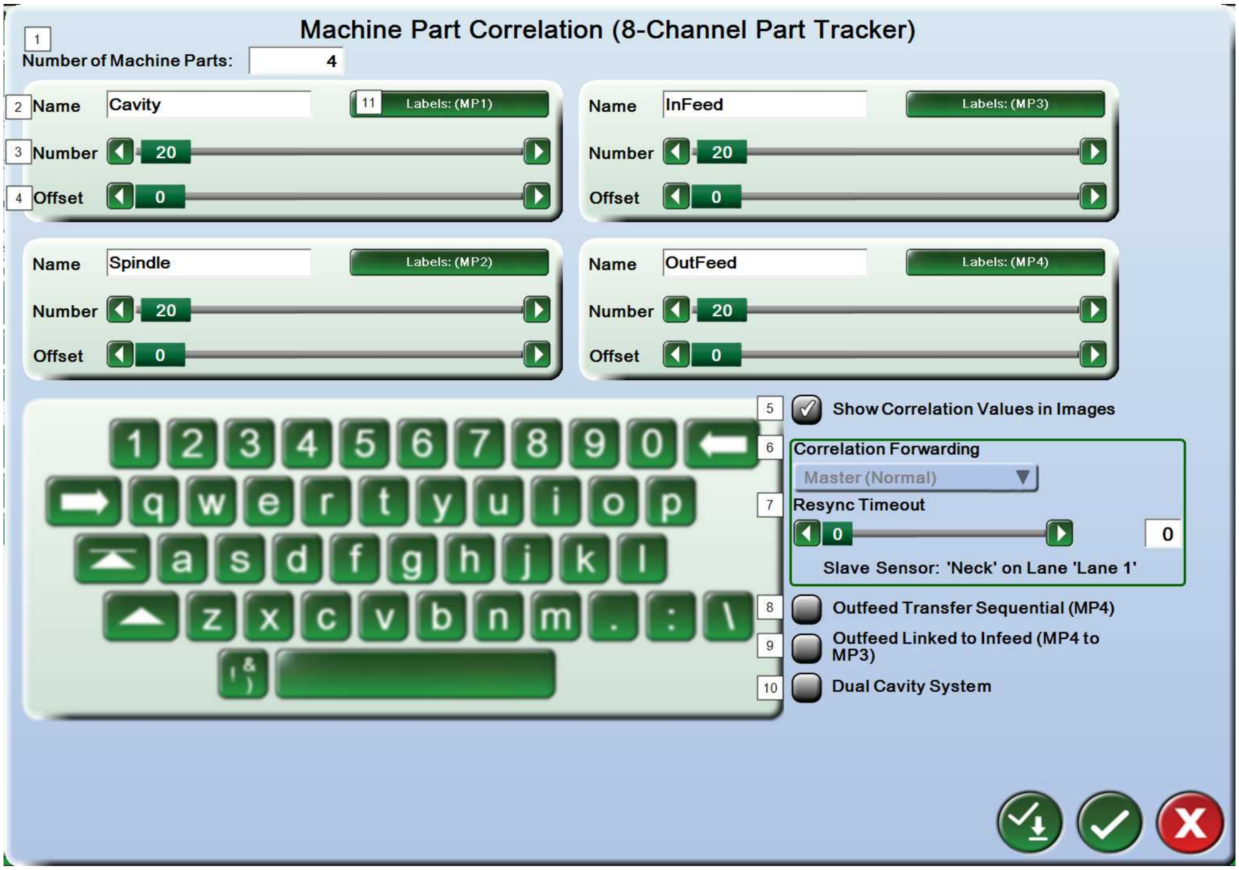


4. Repeat steps 1-3, selecting a correlation forwarding mode for Master Lane.
5. Save changes and exit Discovery.

In the Intellispec application:

1.  Set up Machine Part Correlation. From Lane Overview of Slave Lane, select Tools | Lane Setup | Machine Part Correlation.
2. Make sure the number of machine parts is set to your number of machine parts plus one, for the machine parts being used on the slave lane. For example, if you have body-makers numbered 21-26, you have six body makers: set the number of machine parts to seven. Always leave the offset at zero.

   > *Note: The extra machine part ID is used to report machine parts that the Intellispec cannot identify (for example, if a part is damaged). The system records those parts as "Unknown."*
3. Check the Show Correlation Values in Images box in the Machine Part Correlation dialog. This information is used when you view the correlation data on the Intellispec screen.



4. Save changes.
5.  Go back to Lane Overview of the Master Lane. Select Tools | Lane Setup | Machine Part Correlation.
6. For the master lane, set the Resync Timeout value (described below).
7. Make sure Show Correlation Values in Images is checked in the master lane.

Resync Timeout This applies to the master lane only. If part flow stops for this number of seconds, the system resynchronizes the correlation between master and slave. This reduces the chance that the correlation between slave and master is incorrectly offset, which can occasionally happen due to double-triggers at the slave's part detect.

To test Correlation Forwarding:

1. Use "Freeze on Defect" on page 134.
2. Set up an easily recognizable part to fail. If possible, attach a piece of paper or tape to a part. Make sure you know that part will be identified by its machine part (for example, Body-Maker 5). Make sure the part fails inspection for the master camera.
3. Look at the Freeze on Defect images for the master camera.

Example:

In our example, we placed a ring on the neck of a bottle [item 2]. The Intellispec identified the bottle as ID "five" during inspection on the slave lane sensor. In Freeze on Defect on the master lane, we see that ring in the image. We also see the "five" as the correlation value in the image [item 1]. This means the bottle was correctly identified.

Correlation Forwarding - Normal Mode

This mode was designed for a can inspection operation, using two lanes - one lane on an airveyor, and one lane on a vacuum conveyor. The Correlation Forwarding feature keeps track of the cans between the two lanes, so that parts on the second lane can be tracked back to the machine parts (body-makers) from the first lane.

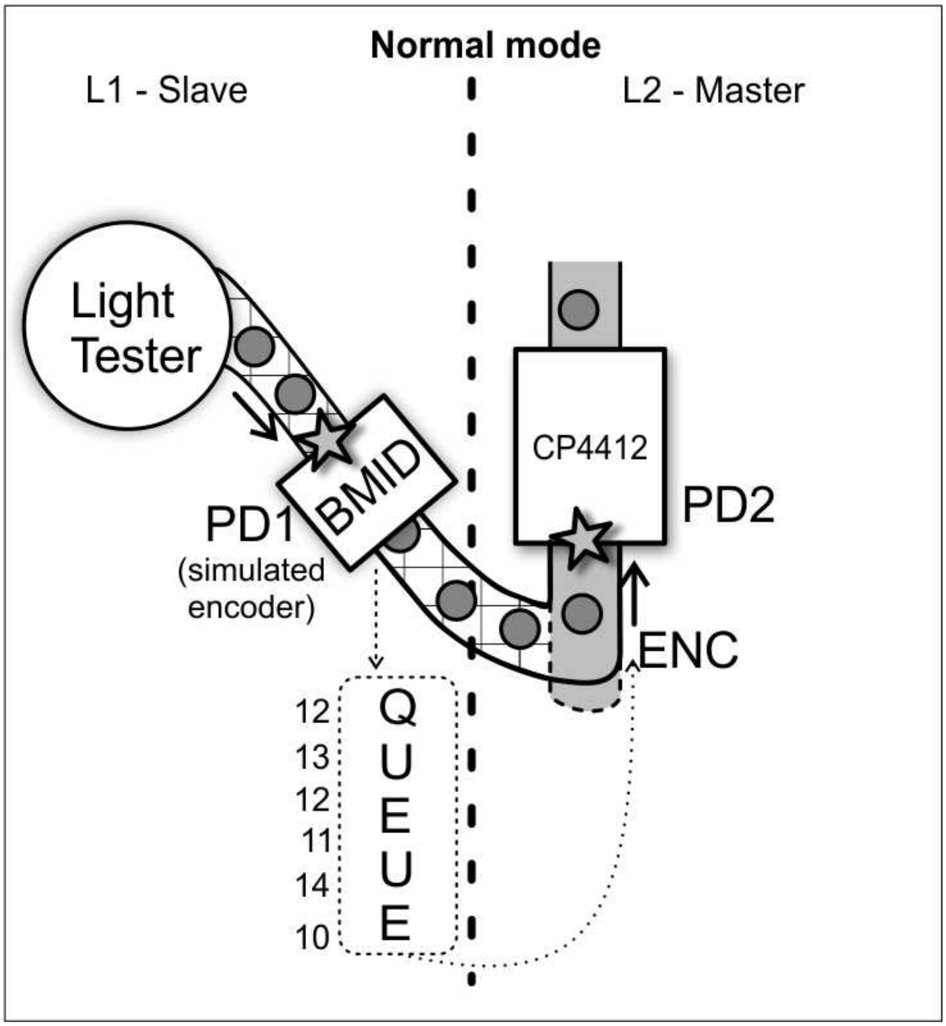
[Refer to the illustration below] In this example, a Light Tester feeds cans along an airveyor, through a Pressco BMID inspection tunnel. This is Lane 1. It uses a simulated encoder part detect signal (PD1).

The cans transition to a vacuum conveyor. This is Lane 2. The cans flow through a Pressco inside of can inspection tunnel (CP4412). The vacuum conveyor uses an encoder signal, which the Intellispec uses for the part detector (PD2).

Parts in Lane 1 are inspected by a Body-Make ID correlation inspection. Once a part is identified (example, Body-Maker 12), that information is put into a queue. The queued information is sent to the second lane, matching the part with the encoder tick and part detect signal. If the Intellispec finds a defect within the inspection tunnel (CP4412), then we know that part was made with Body-Maker 12. This information is used by the plant to track trending failures, and the plant can make necessary repairs or adjustments.

- L1 - Lane 1
- L2 - Lane 2
- LT - Light Tester
- PD - Part Detect
- ENC - Encoder

- BMID - Body-Maker Identification (Pressco inspection)
- CP4412 - Chromapulse inside can inspection tunnel



Correlation Forwarding - PDX Driven Mode

This mode was designed for a can inspection operation, using a pocket-based tracking method, such as a Belvac machine. It uses an encoder-based PDX signal for part detection. The distance between the two Pressco inspection tunnels might be hundreds of cans apart. The Correlation Forwarding feature keeps track of parts between the two lanes, so that parts in the second lane can be tracked back to machine parts (body-makers or spray dots) from the first lane.

You will need to know: the number of pockets on each turret, and the distance (number of pockets) between the first inspection tunnel on Lane 1 and the inspection tunnel on Lane 2. In our example, it is 210 pockets.

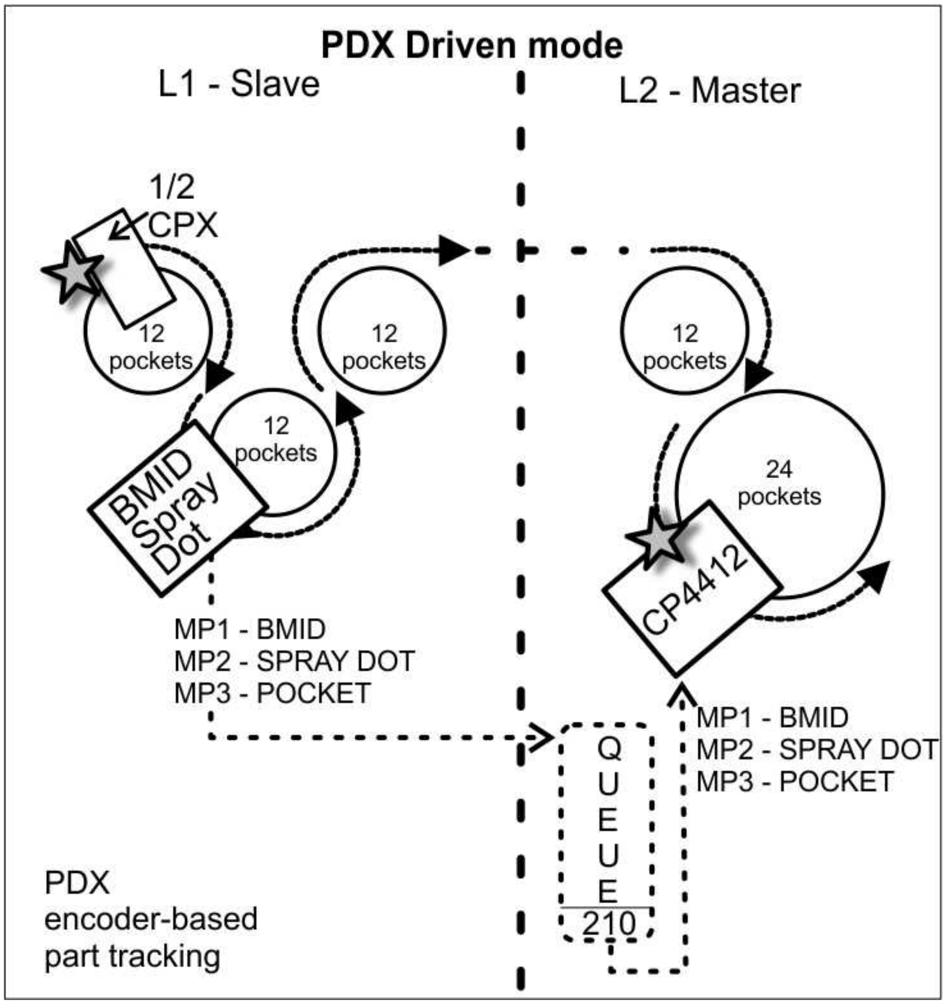
[Refer to the illustration below] Lane 1 uses a Pressco inspection tunnel with the correlation inspections: Body-Maker ID, and Spray Dot, to identify parts.

Lane 2 uses a Pressco inspection tunnel (CP4412) to inspect the inside of the parts.

In this example, parts in Lane 1 are inspected by a half CPX tunnel to inspect the outside of the cans. Then the cans are inspected by a Body-Maker ID and Spray dot correlation inspection. Once a part is identified, this information is put into a queue (example: BMID 12, and Spray Dot orange). The queued information is sent to the second lane at the appropriate time, matching the part with the correct pocket inside the CP4412 tunnel. In this example, the distance between the 1/2 CPX inspection tunnel and the CP4412 tunnel is 210 cans.

If a part inspected by the tunnel in Lane 2 fails, then the Intellispec can correlate to that part back to the machine part (example, Body-Maker 12, and Spray Dot orange) that made the part. This information is used by the plant to track trending failures, and the plant can make necessary repairs or adjustments.

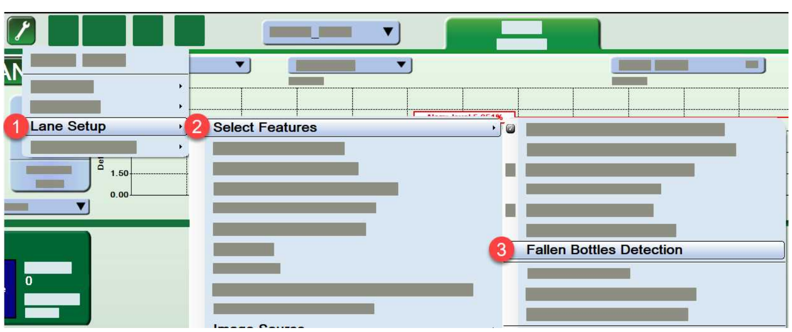
- L1 - Lane 1
- L2 - Lane 2
- LT - Light Tester
- PDX - Part Detect Generator circuit
- ENC - Encoder
- MPx - Machine Part
- BMID - Body-Maker Identification (Pressco inspection)
- CP4412 - Chromapulse inside can inspection tunnel
- CPX - Chromapulse outside can inspection tunnel



Fallen Bottles Detection

Fallen Bottles Detection is sold as an optional feature and used with Fill Height Cap Placement inspection systems. A push rejector removes the fallen bottles from the production line.

This feature must be enabled through Select Features. Checked = enabled.



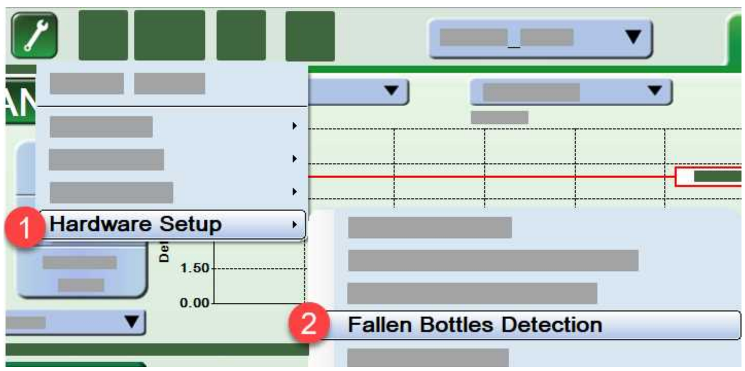
Selecting the check mark from the dialog box above takes you to the setup menu. The Fallen Bottles feature will not operate until calibration is performed for the selected part program.

Calibration

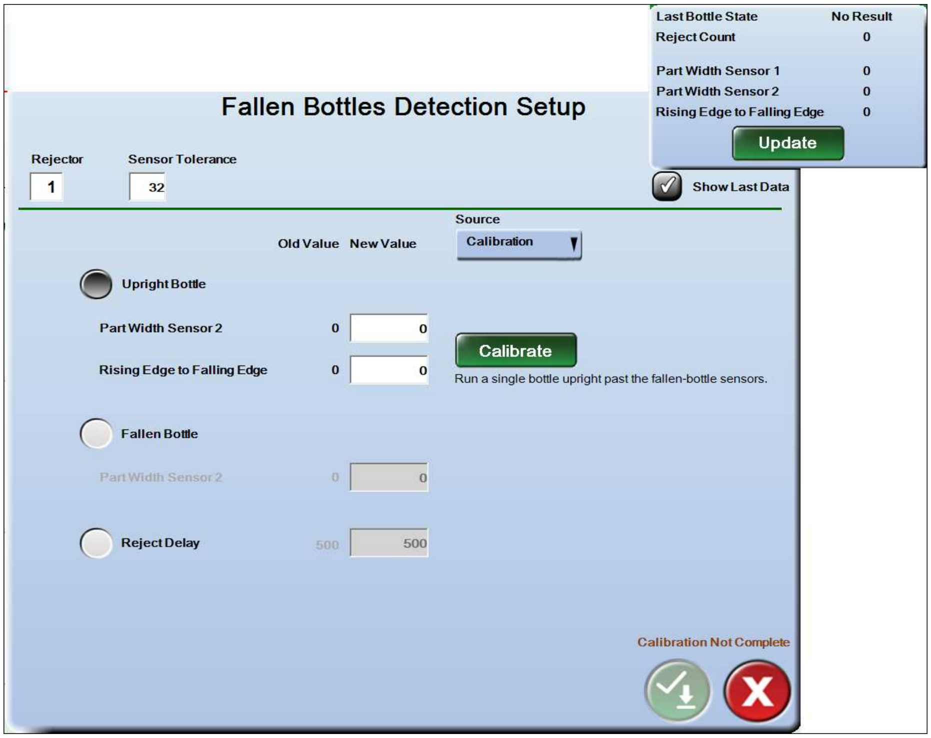
To calibrate Fallen Bottles Detection:

1. Make sure the lane is offline.
2. Select the check mark from the dialog box shown above (when Select Feature is first enabled), or select Fallen Bottles detection from the Hardware Setup.

   To select Fallen Bottles Detection in Hardware Setup:

3. Select Upright Bottle.



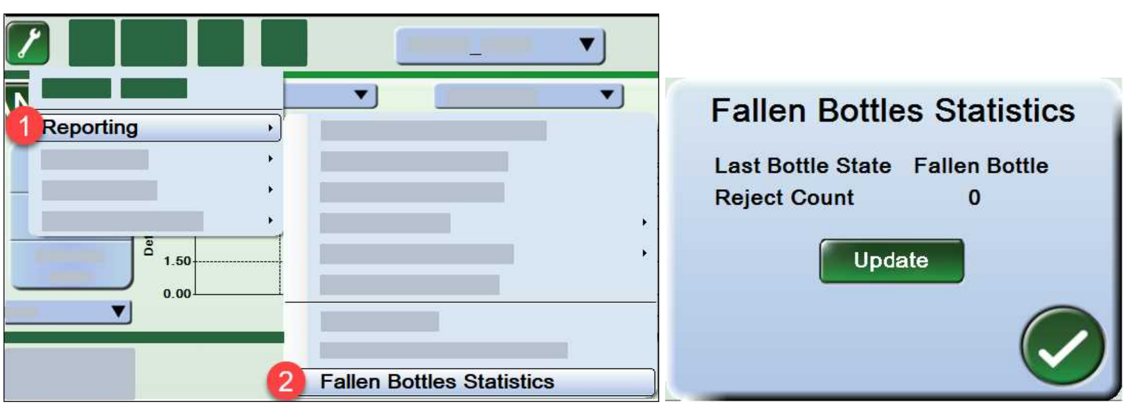
4. Select the Calibrate button. The button remains active until calibration is complete or until you select it again.
5. Run a single bottle upright past the sensors. After the bottle passes by the sensors, select the Update button to populate new numbers.
6. Select Fallen Bottle.

7. Run a single bottle lying down past the sensors. After the bottle passes by the sensors, select the Update button to populate new numbers.
8. Select Reject Delay.

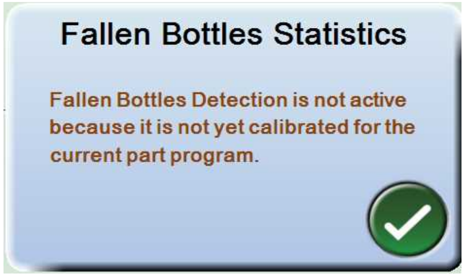
9. Calculate the expected reject delay and enter it in the box.
10. Select the Calibrate button.
11. Run bottles past the sensors and ensure that all the bottles are rejected by the selected rejector.
12. After the bottles pass the sensors, select the Update button to populate new numbers.
13.  Select the OK button to save changes and exit.

Statistics

Once Fallen Bottles is calibrated, look at the reject count and the last state in the Fallen Bottles Statistics.



If this feature is not calibrated, a dialog box will show that this is not active because it is missing calibration. (See Calibration above)



Asynchronous Correlation

Asynchronous Correlation is an optional feature. It consists of a combination of hardware and software. It ensures the Intellispec system is tracking parts properly.

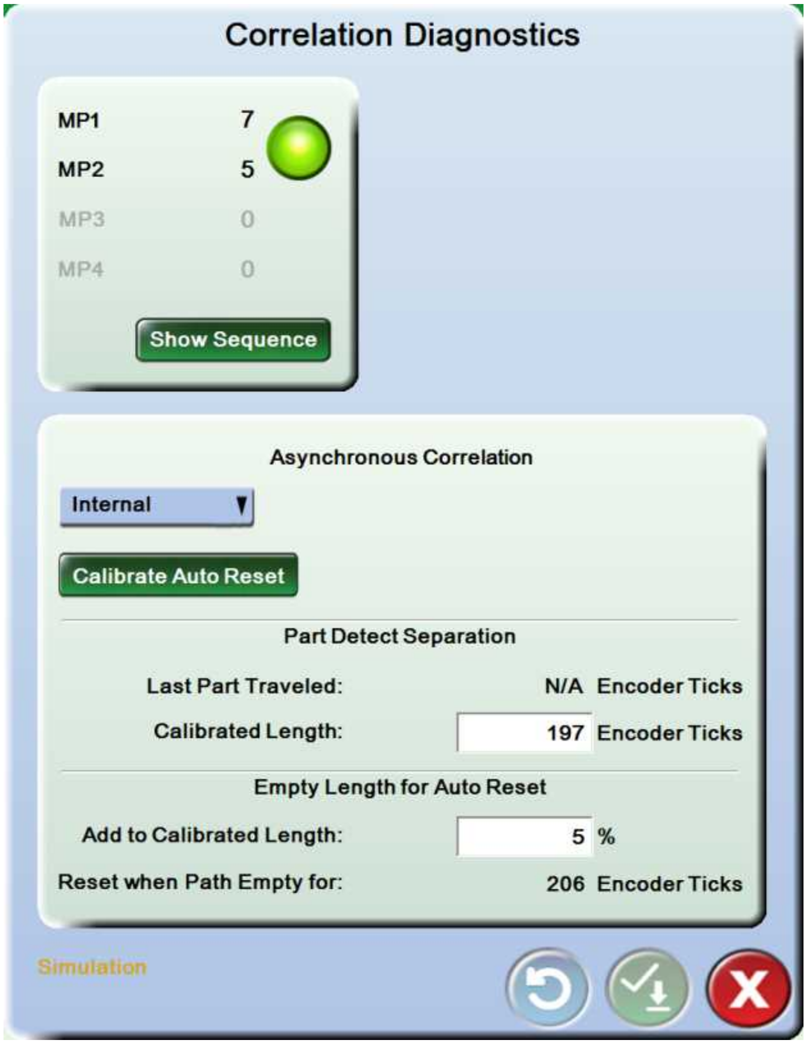
> *Note: you can enable either Asychronous Correlation or Multi-Zone Part Tracking, but not both at the same time.*

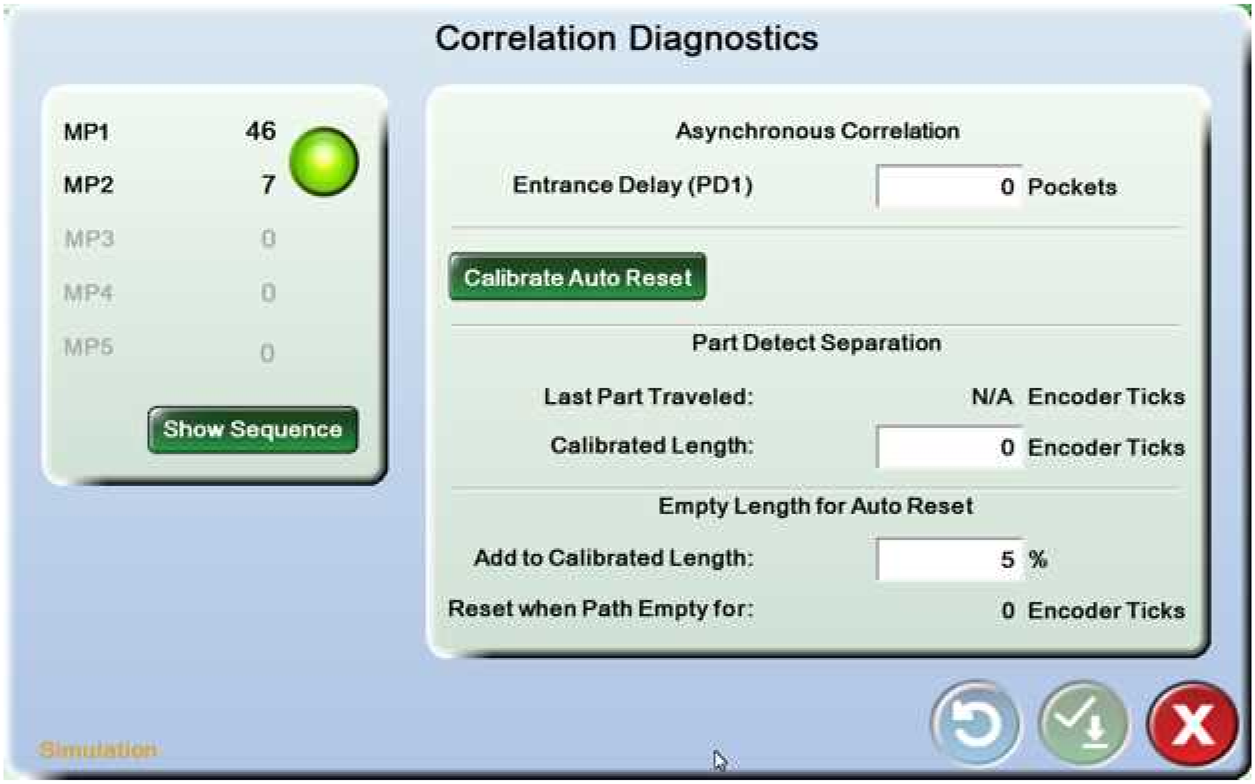
The instructions below are for a filling/ capping operation. Assume there are 144 filling stations and 36 capping stations. For other configurations, the procedure is the same, but the numbers differ. For more information, see "Asynchronous Correlation Drawing" on page 507

Software Setup

To enable Asynchronous Correlation:

 From Lane or Sensor Overview mode, select Tools | Lane Setup | Select Features | check Asynchronous Correlation. The system will take you to the Correlation Diagnostics dialog. For information about "Show Sequence," see "Correlation Diagnostics" on page 478


Correlation Diagnostics
MP1 7
MP2 5
MP3 0
MP4 0
Show Sequence
Asynchronous Correlation
Internal
Calibrate Auto Reset
Part Detect Separation
Last Part Traveled: N/A Encoder Ticks
Calibrated Length: 197 Encoder Ticks
Empty Length for Auto Reset
Add to Calibrated Length: 5 %
Reset when Path Empty for: 206 Encoder Ticks
Simulation

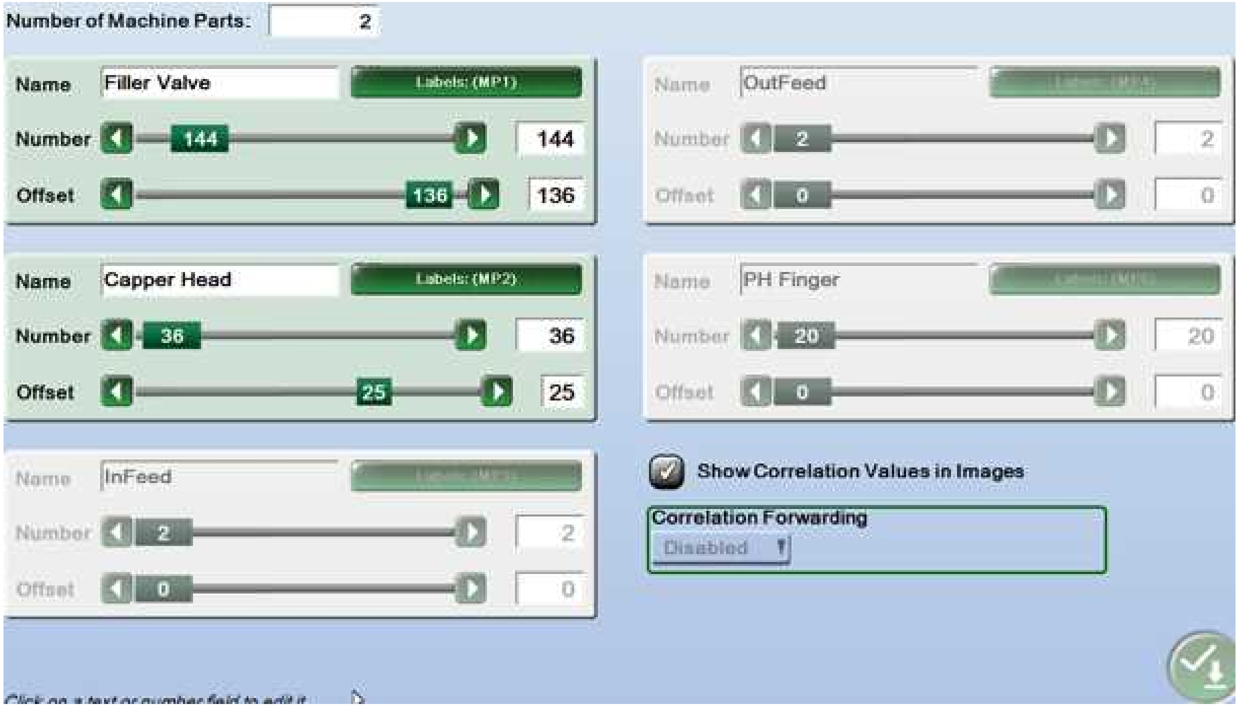


Correlation Setup

Next, set up the correlation.

To set FHCP correlation:

1.  Set up the correlation machine parts: from Lane or Sensor overview mode, select Tools | Lane Setup | Machine Part Correlation.



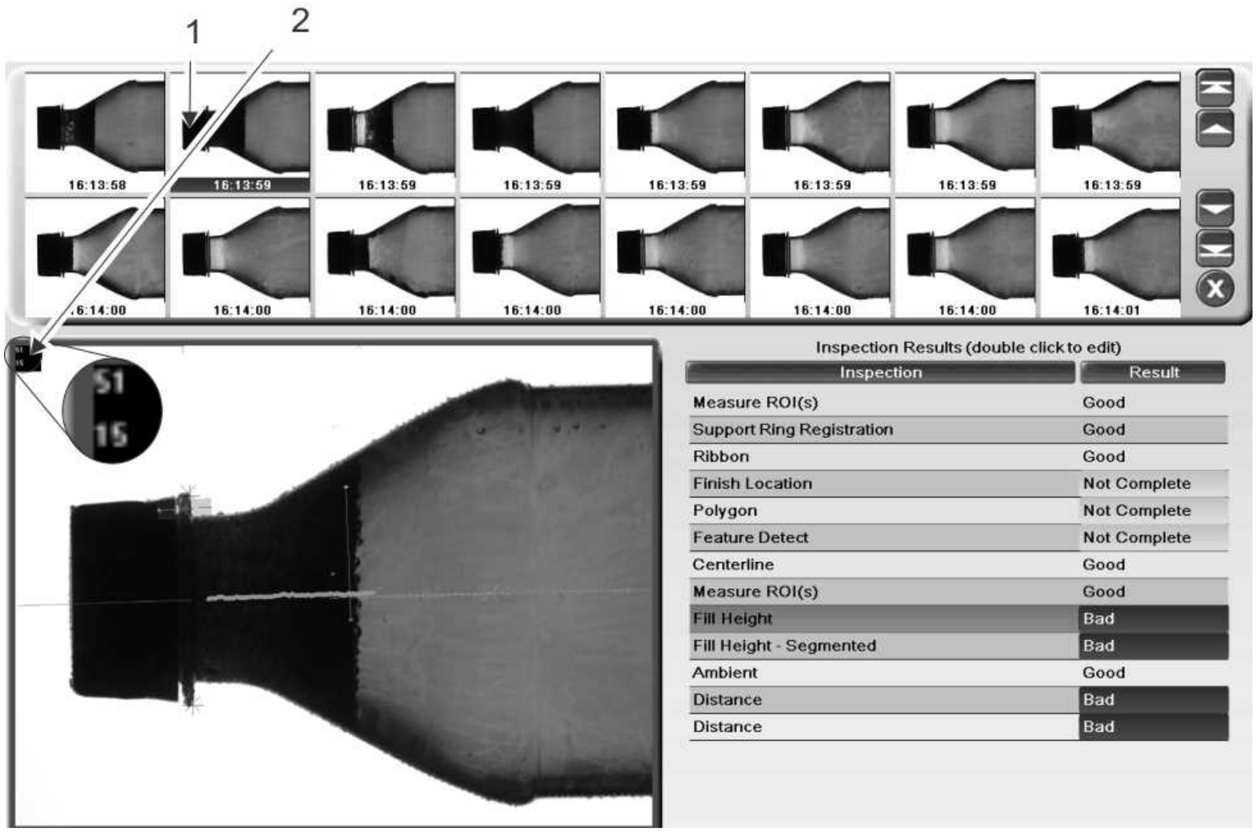
2. Set MP1 as Filler Valve with 144 parts.
3. Set MP2 as Capper Head with 36 parts, as shown above. Offsets should remain at zero at this time.
4. Check the box to Show Correlation Values in Images.
5.  Select the OK button to save changes and exit.

Sensor Count Verification

Next, verify that the sensors are set up properly.

To verify the sensor count:

1.  Disable the rejectors for all cameras: from Lane Overview mode, select Tools | Lane Setup | Rejecting, then select Sensor Reject Enable/Disable.
2. From the Enable Reject menu, click the None button to disable the rejector for all cameras. Select OK to accept the changes and exit. You should see a trash can with a line through it underneath the stop light on the Intellispec screen (on the selected lane).
3. Change your inspection so that all cameras produce a reject, perhaps by inserting a sheet of paper over the tunnel inspection window.
4. Put the lane online to inspect at least 100 parts. Put the lane offline.
5. Look at the Reject Images from the last 100 parts, and verify that the correlation values tagged in the image are incrementing by one and not skipping. Skipped numbers or double counting is a sign that there is a setup problem with one of the sensors. Look at the sensor setup, or contact Pressco to determine the problem.
6. Enable the rejectors for all cameras through the Rejector Enable/ Disable menu. You should no longer see the trash can on the Intellispec screen.



1 - Reject Images - look at each one to verify correlation sequence

2 - Look at correlation values to determine correlation sequence

Offset Setup

Next, set the offsets.

To set the offsets:

1. Designate a station to produce a reject. This must be done for both machine parts (filler and capper head). You can do this simultaneously or one at a time. Since the offset must be verified by running more defective parts, it is best to set the station to produce a reject for the duration of this procedure.
2. Once the designated stations have been disabled (set to produce rejects), clear the Intellispec statistics, and begin to run the production line.
3. After a few revolutions of the wheels, you should see several defects logged. Stop the bottle flow and check the correlation data.
4.  Set the offsets: From the Lane or Sensor overview screen, select Tools | Lane Setup | Machine Part Correlation. Enter the correct offset values for both the Filler Valve and Capper Head.
   - Example 1: If station 86 on the filler was set to fail, and the system logs it as 19, then set the MP1 offset = 67. [86-19 = 67]

- Example 2: If station 12 on the filler was set to fail, and the system logs it as 73, then set MP1 offset = 83. [(144-73) + 12 = 83]. This is because you cannot enter a negative offset. 144 is the number of filling stations.

5. Set the capper offsets in the same manner.
6. Once the offsets have been made, then continue to run the system for a few more cycles to verify that the designated reject stations are being logged in the correlation data correctly.
7. Re-enable the machine part stations to no longer produce defective parts.

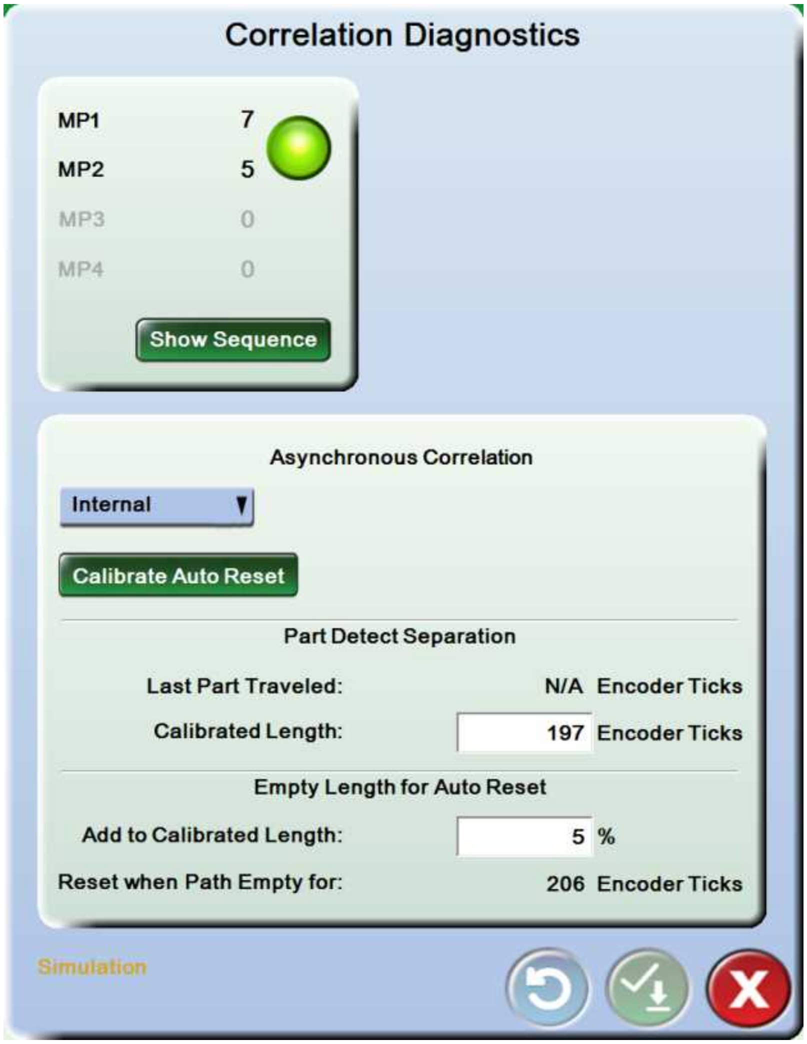
Auto Reset Setup

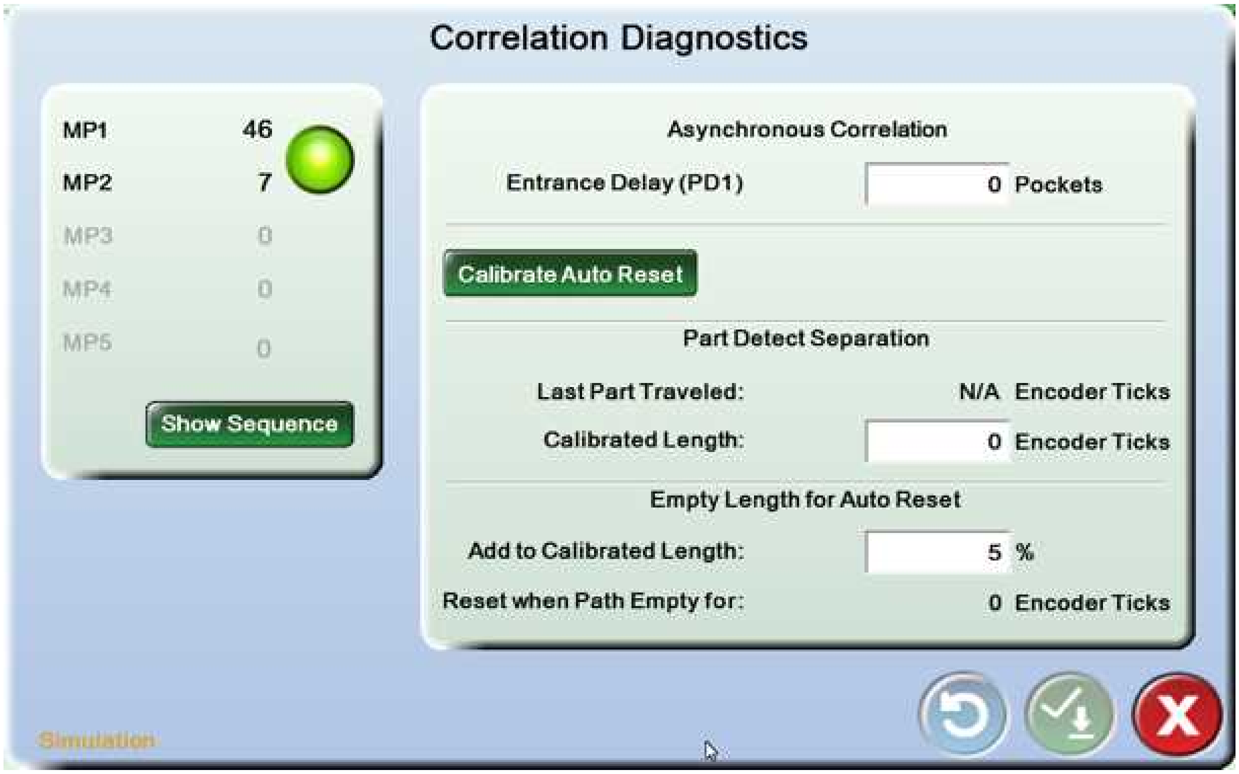
Auto Reset enables the Intellispec system to clear the FIFO shift register if it has not seen encoder ticks for a certain distance. Occasionally, correlation data can become out of sync due to the addition, or removal, or falling bottles on the conveyor. To get the system back in sync, the FIFO must be reset. The Auto Reset feature will automatically reset the correlation FIFO when it detects that bottles are clear of the zone between PD1 and PD2.

The system must first be calibrated before the Auto Reset feature will work.

To calibrate Auto Reset:

1. Make sure that:
    a. The capper is stopped
    b. The conveyor is running
    c. There are no bottles between PD1 and PD2
2.  Go to the Correlation Diagnostics menu: from the Lane or Sensor Overview screen, select Tools | Hardware Setup | Correlation Diagnostics.


Correlation Diagnostics
MP1 7
MP2 5
MP3 0
MP4 0
Show Sequence
Asynchronous Correlation
Internal
Calibrate Auto Reset
Part Detect Separation
Last Part Traveled: N/A Encoder Ticks
Calibrated Length: 197 Encoder Ticks
Empty Length for Auto Reset
Add to Calibrated Length: 5 %
Reset when Path Empty for: 206 Encoder Ticks
Simulation



3. Click the Calibrate Auto Reset button.
4. Place a bottle on the line, first triggering the PD1 sensor, and allow the conveyor to carry the bottle past PD2.
5. Click the Calibrate Auto Reset button again to stop the count. The system learns the distance between PD1 and PD2 in encoder ticks. The value will be displayed in the Calibrated Length box.

Asynchronous Correlation parameters

Entrance Delay is used by "Multi-Zone Part Tracking" on page 508

Entrance Delay (PD1)

The Entrance Delay (PD1) field allows positioning of a physical PD1 part detect further upstream from the zone entrance. As this sensor is ideally placed right at the handoff from starwheel to conveyor, it is often not possible due to interferences with other equipment. Entering a “5” in this field would indicate the PD1 sensor was installed exactly 5 pockets upstream of the handoff. Special timing is required for the PD1 Entrance Delay to work properly: When PKT goes high, the tracker checks to see that PD1 is high. So, the PD1 must be placed such that it is detecting the part before the PKT pulse goes high.

Last Part Traveled This is the measured distance between PD1 and PD2, for the last part that passed PD2. It is updated for each part seen during calibration.

Calibrated Length The distance (in encoder ticks) between part detects PD1 and PD2 to be used by the system. It is set automatically when using Calibrate Auto Reset, or can be changed manually.

Empty Length for Auto Reset The length where no part is seen in the path. Auto Reset will happen after this length.

Add to Calibrated Length If you want the system to perform the Auto Reset at a position AFTER the FHCP 3X module on the conveyor, then use Add to Calibrated Length. Example: set this to 20 (%) if you want Auto Reset to occur about 20% of the conveyor length beyond the FHCP 3X module. This is 20% of the distance between PD1 and PD2.

Reset when Path Empty for: This value is the Calibrated Length between PD1 and PD2 plus the Add to Calibrated Length value. Example: if Calibrated Length is 3000 encoder ticks and Add to Calibrated Length is 10, then "Reset when Path Empty for:" is 3300 encoder ticks. This is sent to the Part Tracker. If the Part Tracker does not see a part detect on PD1 for 3300 encoder ticks, it triggers the Auto Reset logic.

Asynchronous Correlation Drawing

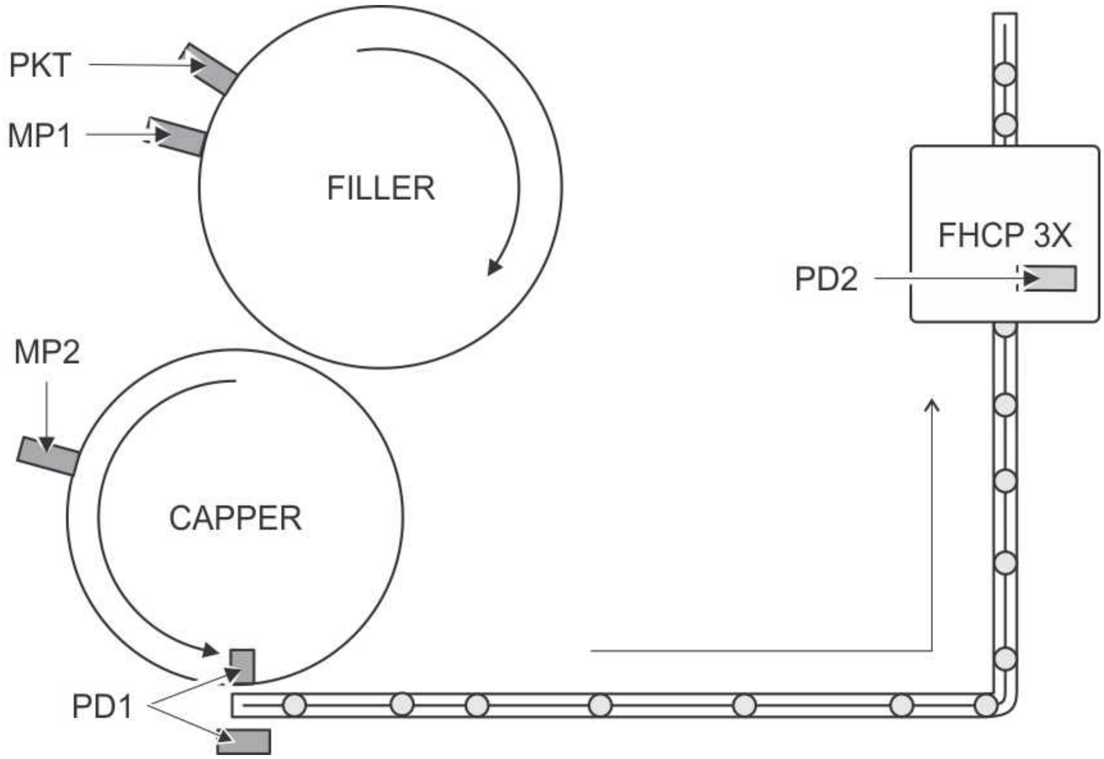
In FHCP 3X systems, a set of sensors (PKT, MP1, MP2, and PD1) gather correlation information from the filler and capper, and transfer it to the Intellispec via a shift register. The shift register is loaded with correlation information at the PD1 sensor. See the diagram below.

A second part detect sensor, PD2, which is located inside the FHCP 3X inspection module, unloads the information from the shift register. Parts inspected by the FHCP 3X module have the correct machine part data, so that defects can be correlated back to the machine parts.

Below is a basic system diagram showing the locations of the asynchronous correlation sensors. Your plant may be configured differently.

Some plants may choose to provide the correlation signals via their PLC. In this case, the PKT, MP1, MP2, and in some cases, the PD1 sensors would not be required.If this is done, it is important that the plant verify proper timing of their PLC generated signals.

> *Important - To maintain proper correlation during inspection, do not remove bottles between PD1 and PD2. Also make sure that bottles do not fall - fallen bottles between PD1 and PD2 will shift the correlation data.*



Multi-Zone Part Tracking

Note: you can enable either Asychronous Correlation or Multi-Zone Part Tracking, but not both at the same time.

Overview

The Multi-Zone Part Tracking feature is an extension of Asynchronous correlation that permits bottles being added or removed within certain zones while maintaining correlation. The conveyance is classified in two types of zones:

- Belt zones where the bottle movement is rigid or synchronous. The location of a bottle, to within about half a part width, is known to the system while transported in a rigid Belt zone, so adding and removing of a bottle is allowed and the system can maintain correlation even for missing or added bottles.
- Queue zones such as chutes or crab-overs, where the system only knows that N bottles entered and M bottles exited the zone. In a Queue zone, if a bottle were removed, the system could not determine which of the bottles in the queue was removed or even whether one was removed, which breaks the correlation.

Below is an example of a system with five zones, including a bend and a crabover. FBI = full bottle inspection (such as FHCP system). Systems with more than two zones require an interface box and an additional encoder.

Note: Exact sensor locations can vary based on line conditions.

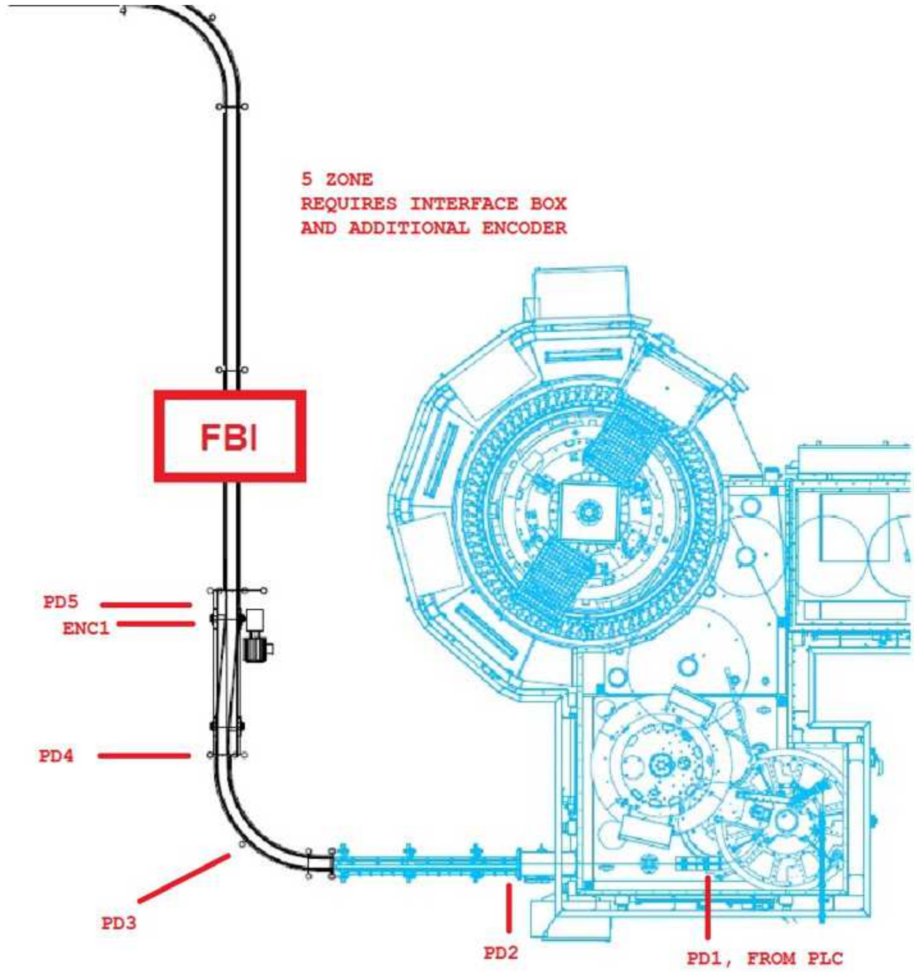
Sensor definitions

PD1 (part detect) Whether physical sensor or PLC generated, this sensor must be timed to the handoff of the bottle to the conveyor.

PKT (pocket). This increments correlation counters.

MP1, MP2, etc (machine part) These reset correlation counts at each revolution.

PD2, PD3, PD4, PD5, PD6 (part detect) When one of these sensors is at the exit of a “queue” zone, it simply loads the bottle correlation data into the next zone. When one of these sensors is at the exit of a “belt” zone, it updates the precise position of the bottle, and loads the correlation data into the next zone.



Before setting up Multi-Zone Part Tracking

You will need:

User permissions for:

- Select Features
- Access System Configuration

> *Note: no special permissions are needed for viewing the setup*

Your system administrator can grant access through "Manage Permissions" on page 462

Setting up Multi-Zone Part Tracking

Enable the feature

If this is the first time your system is using Multi-Zone Part Tracking, you must enable it.

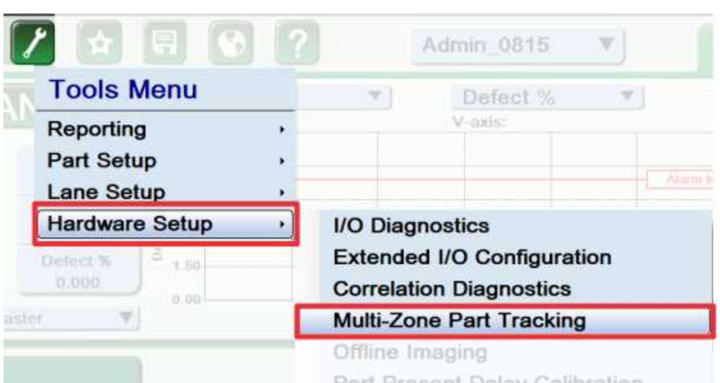
 From Lane Overview mode, go to the Tools menu | Lane Setup | Select Features. Select Multi-Zone Part Tracking. Checked = enabled

When you enable the feature, the system takes you to the configuration dialog.

> *Note: an additional Lane Alarm is available when Multi-Zone Part Tracking is enabled. See "Consecutive Bottles Added Alarm" on page 62*

Open the Multi-Zone Part Tracking dialog

If your system had this feature enabled previously, then you will need to open the dialog. From Lane Overview, go to the Tools menu | Hardware Setup | Multi-Zone Part Tracking.



Parameters

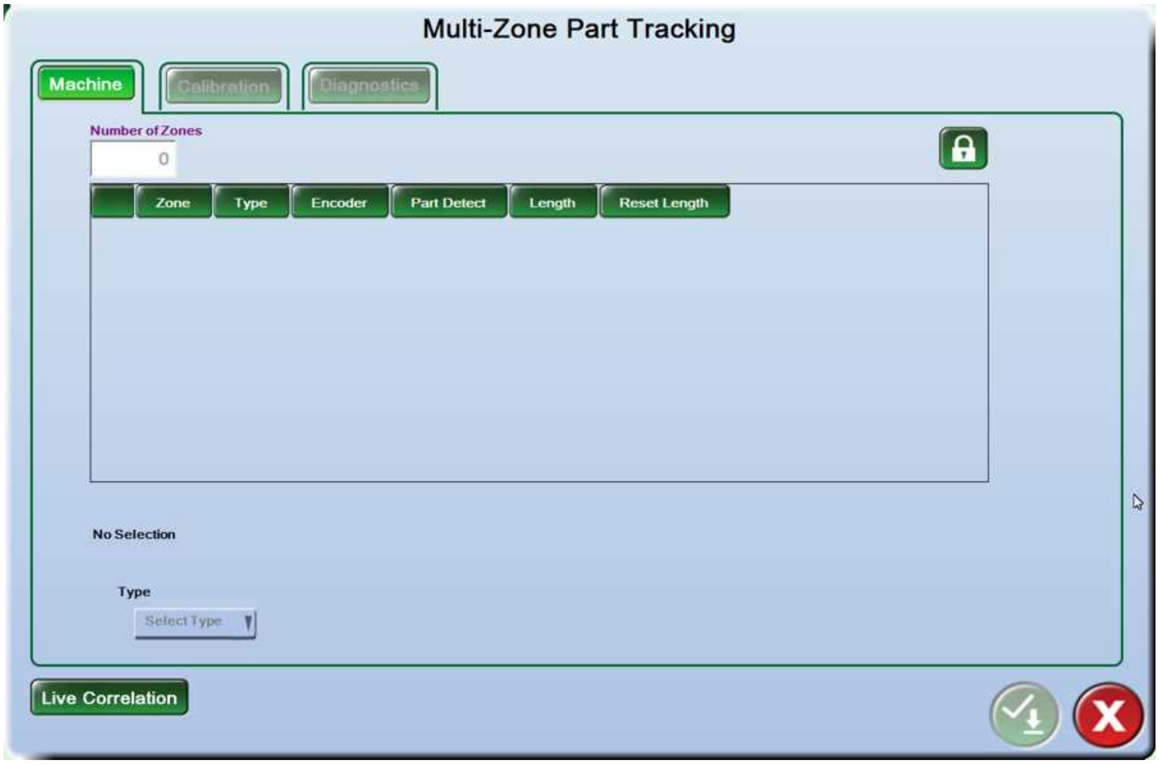
These are described throughout this section. Parameters are saved either on a per lane basis, or per part program:

Per Lane – Part Width Multiplier, PD1 Entrance Delay, Zone Lengths, Zone Types, Encoder Selection

Per Part Program – Calibrated Part Widths, Part Present Disable Lengths

Machine Setup

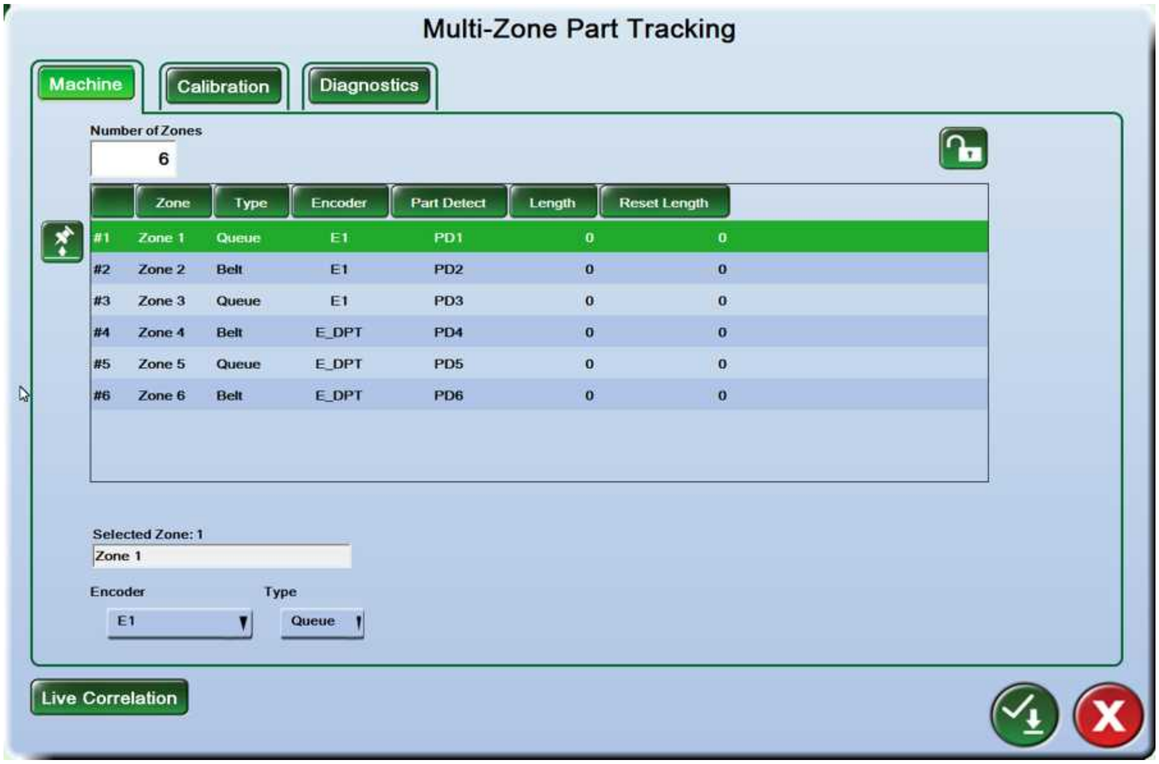
When no zones are set up, or not all encoders are assigned, the Calibration and Tools tabs will be unavailable. On the Machine tab click the Lock icon to unlock the machine configuration.



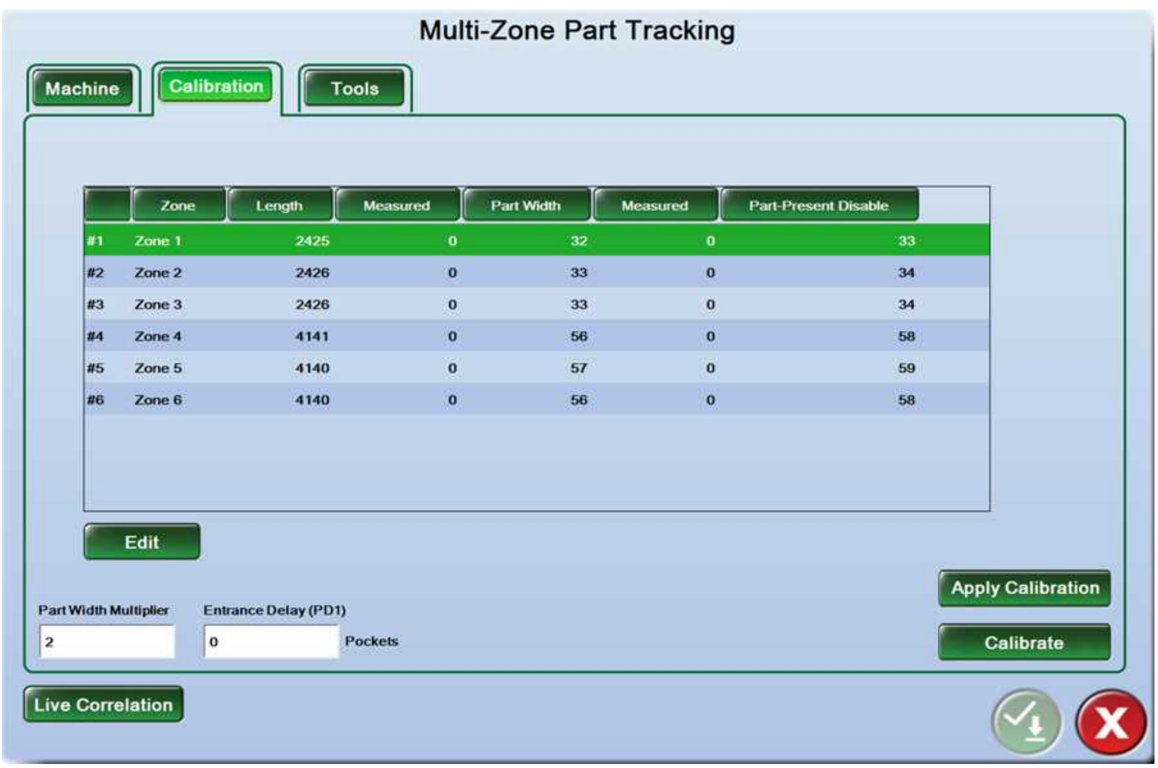
1. Click the Number of Zones field to set the number of zones in your configuration.
2. From the Type drop-down menu, select a zone type for each zone. Zone Type = Belt or Queue. (Part removal and addition are forbidden in Queue zones, and permitted in Belt zones).
3. From the encoder drop-down menu, select an encoder for each zone. The available encoders are E1 through E3 as well as E_DPT, the last one the encoder of the inspection system (DPT = Digital Part Tracker). Adjacent zones can share an encoder.

> *Note: The pin button is for touch-screen support of range selection: pushing it pins the selected zone and clicking the other zone in the range will select a range of zones. (You can use a keyboard by shift-clicking).*

When encoders are selected for all zones, the Calibration tab becomes available. You can also give each zone a user-defined name (where it says "Selected Zone 1." This is for display purposes only.



Calibration



Calibration consists of two parts:

- Measuring the zone lengths: Zone lengths are stored in the lane configuration (independent of part programs).
- Measuring the part widths for the zones: Part widths are stored in the part programs. This means that the calibration step is always needed when first setting up a new part program.

In order to calibrate, a single bottle has to be run through all zones. That is, all zones must be cleared of all bottles before calibration. Then a single bottle must be run through all zones without additional bottles coming in during the procedure.

To calibrate:

1. Press the Calibrate button before the single bottle enters the first zone.
2. Run the bottle through all zones and see the Measured values being filled in. When all Measured values have been filled in the Apply Calibration button becomes enabled again.
3. Press the Apply Calibration button to save the result to the lane configuration and part program.

Part Width Multiplier

The Part Width Multiplier field sets the part tolerance window for belt zones. In other words, how much is the bottle allowed to slip before we must consider that the bottle was most likely removed. The rule of thumb is to shoot for +/- ½ bottle width. It is important to note that the bottle width we are referring to is the width at the widest part of the bottle. We point this out because the sensor beam is pointed more at the cap or neck of the bottle, which is much more narrow than the largest width of the bottle. If the sensor measured the full width of the bottle, we could simply use a multiplier of .5, which would set the window at +/- ½ part width. But since this is not the case, a larger value for Part Width Multiplier must be used.

For this example, assume 1 encoder count per mm.

Example: If a bottle is 70 wide, but measures 20 at the cap, then we would want the part tolerance window to be +/- 35. The Part Width Multiplier would then be determined by the equation:

(Part Width Multipler) * 20 = 35,

or,

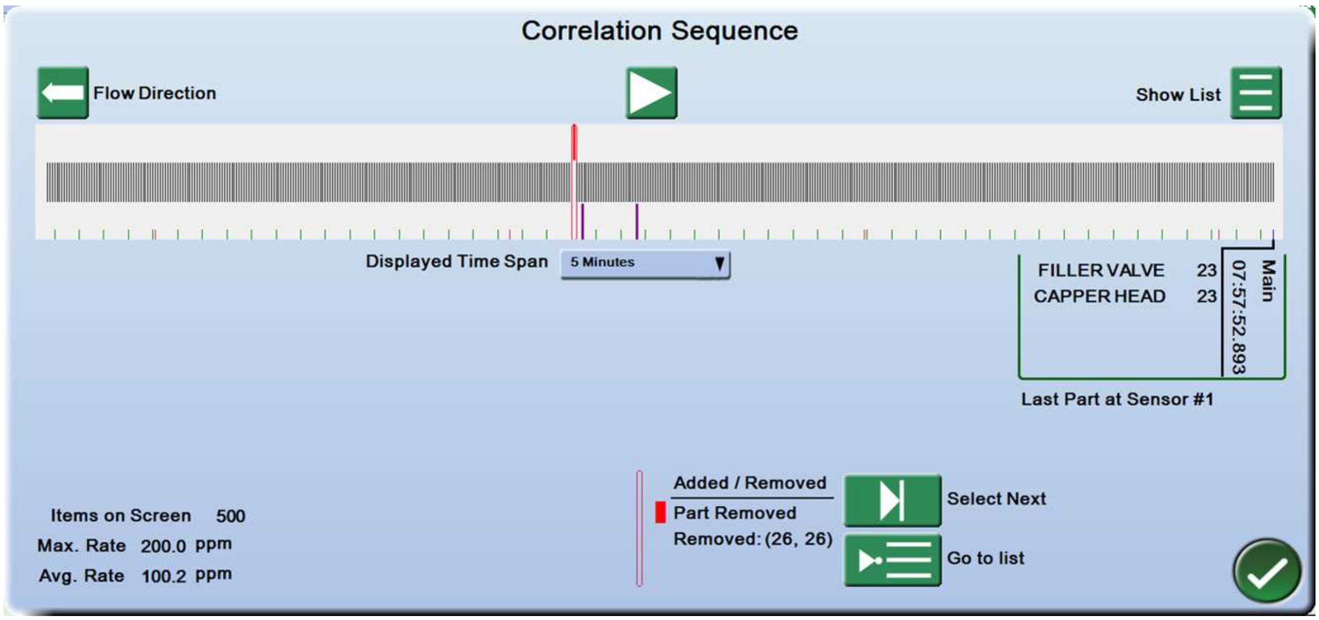
Part Width Multiplier = 35/20 = 1.75

The Multi-Zone Part Tracking will reset the internal queue when no parts have been seen in any of the zones for the auto-reset length for each zone. This length is 105% of the calibrated zone length by default but can be changed using the Edit button. The part present disable length is 103% of the measured part width and can also be changed using the Edit button.

Entrance Delay (PD1)

The Entrance Delay (PD1) field allows positioning of a physical PD1 part detect further upstream from the zone entrance. As this sensor is ideally placed right at the handoff from starwheel to conveyor, it is often not possible due to interferences with other equipment. Entering a “5” in this field would indicate the PD1 sensor was installed exactly 5 pockets upstream of the handoff. Special timing is required for the PD1 Entrance Delay to work properly: When PKT goes high, the tracker checks to see that PD1 is high. So, the PD1 must be placed such that it is detecting the part before the PKT pulse goes high.

Validation



The "Live Correlation" button accesses the Correlation Sequence dialog, which shows the correlation history of the 500 most recent parts. The play / pause button allows stopping the update, allowing to have a closer look at the current state. The Flow Direction button is for display purposes only: it allows matching the flow of the displayed lines to the flow of the parts seen when looking at the conveyor.

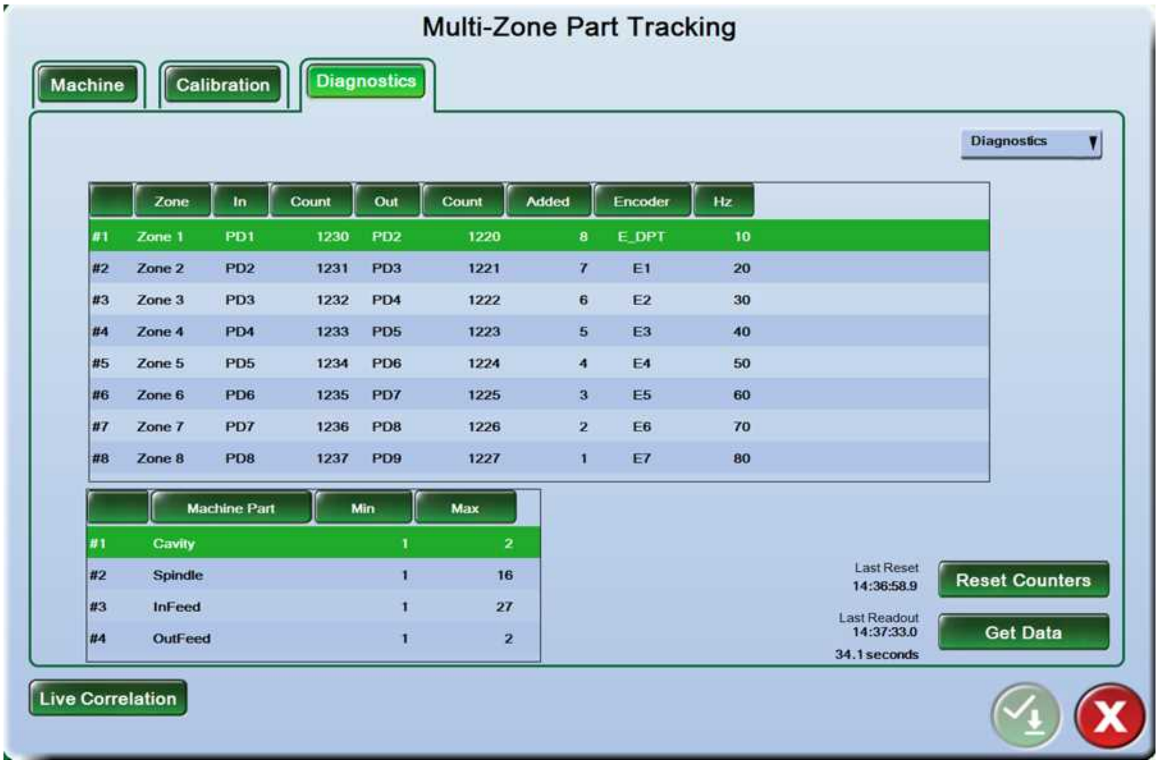
The part strip shows vertical lines on a white background. The black lines are normal correlation, i.e. has advanced by one from the previous part. Added bottles are represented by purple lines below the center, removed bottles by red lines above the center. Added / Removed bottles are also represented in a separate field, which includes showing the correlation of the removed bottle, or the correlation after which a bottle was added. Correlation values for added bottles are always zero.

The information is also available in list form. Clicking on the Show List button just shows the list, while the Go to list button shows the list and selects the Added or Removed part in the list and scrolls to it.

The field below the part strip shows information about the last part in the strip, which is the part that passed the indicated sensor most recently (before pausing). It shows the sensor’s name, the correlation values and machine part names, and the local time at which the part passed.

Diagnostics

The diagnostics tab allows trouble shooting the hardware setup. Press the Clear button to reset the statistics. The Get Data button gets the latest values from the part tracker. This includes: The number of bottles having entered and left each zone (In/Out), the part detects at the entrance/exit of each zone, the encoder used by each zone and its frequency. In addition, it shows the range of correlation values reported by the part tracker for each machine part.



Remote Part Program Switching

The Remote Part Program Switching function is used to select one of two part programs remotely through a PLC.

To use Remote Part Program Switching:

- Your system must have an Extended I/O board connected to the tracker board for the lane on which you are using the function, and
- You must have user access permission to Manage Part Programs. See Manage Permissions
- You must have at least two part programs already configured
- You must first enable the feature

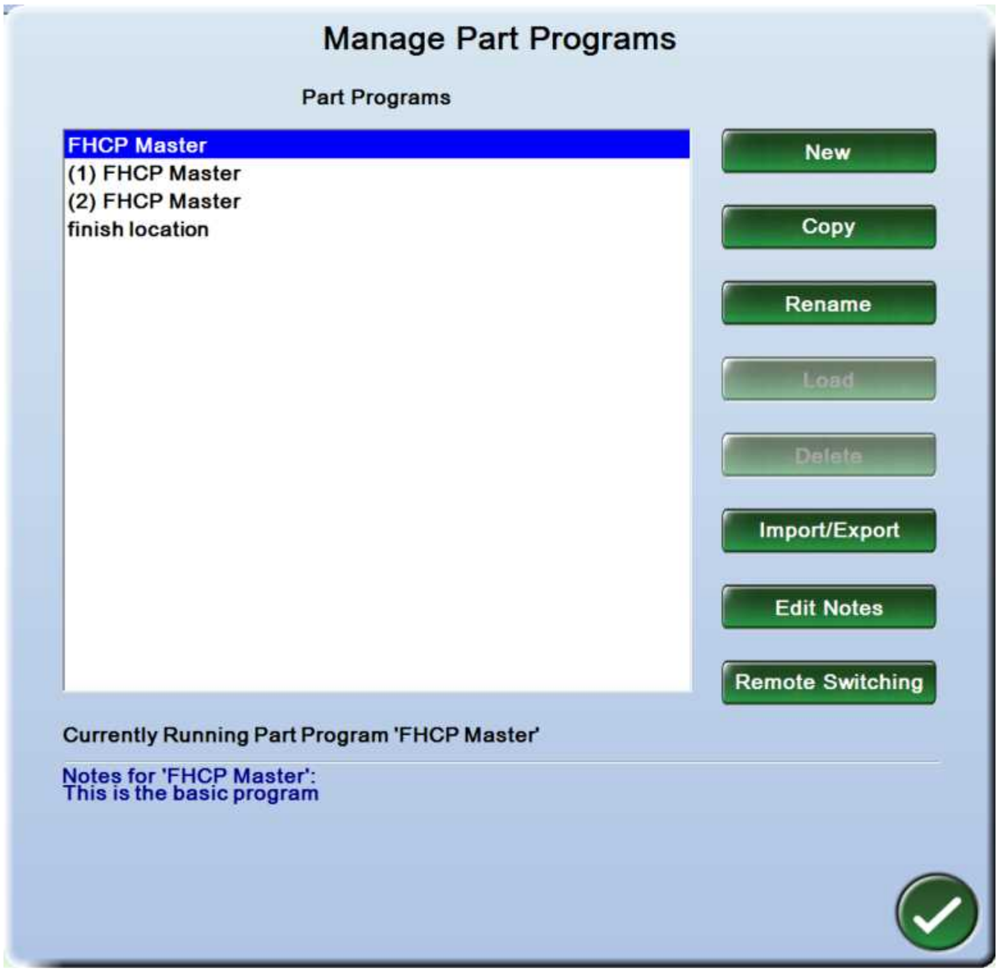
To enable Remote Part Program Switching:

1.  From Lane or Sensor Overview mode, select Tools | Lane Setup | Select Features | Remote Part Program Switching. Checked = enabled [This item will be disabled if there is no Extended I/O board or if the system is online.] A dialog is displayed that says the feature is enabled.

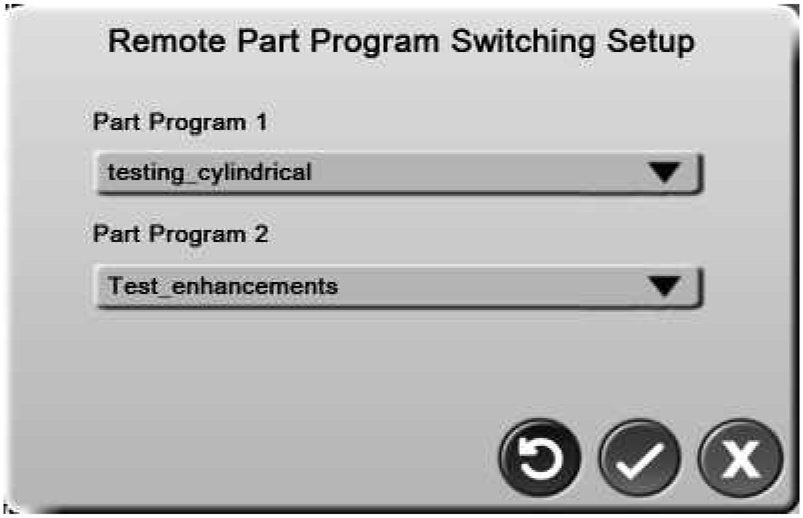
2. When prompted from the Remote Part Program Switching dialog, select the OK button to go to the Manage Part Programs dialog.

To use Remote Part Program Switching:

1. Make sure this feature is enabled. See above.
2. Go to the Manage Part Programs dialog by right-clicking on the part program drop-down menu.



3. Select the Remote Switching button. The Remote Part Program Switching Setup dialog is displayed.



4. Select Part Program 1 from the drop-down list available.
5. Select Part Program 2 (different from Part Program 1) from the drop-down list available.
6. Select the OK button to complete the selection and exit.

Connect to the Extended I/O board. Reference these topics in the Intellispec Hardware Guide:

- Extended I/O board
- Extended I/O signals
- Extended I/O circuits (for information about how to connect your equipment to the board)

On the Extended I/O board, follow this sequence to select a part program:

1. Set Input Port Strobe (J1-11) low.
2. Set Generic Input 0 (J1-3) and Generic Input 1 (J1-4) low.
3. Pulse Input Port Strobe high and then low. (This clears the input state.)
4. Set either Generic Input 0 or Generic Input 1 high.
5. Pulse Input Port Strobe high and then low. (This selects part program 1 if Generic Input 0 is high or part program 2 if Generic Input 1 is high.)

Timing considerations are as follows:

- Generic Input change to Pulse Input Port Strobe transition 10 microseconds minimum.
- Input Port Strobe high time 10 microseconds minimum.
- When the above sequence is performed, the system will go offline which brings System State (J4-16) low. The part program is changed and then the system is put back on line which sets the System State output high.
- The part selection sequence can be commanded when the system is offline. In this case, the part program is changed but the system does not go online automatically.

To disable Remote Part Program Switching:

From Lane or Sensor Overview mode, select Tools | Lane Setup | Select Features | de-select Remote Part Program Switching. A dialog is displayed that says the feature is disabled.

Alternate Part Processing - Setup

Process the first N parts different than normal when your machine starts back up (after you stop it).

Example: remove the first group of parts that may have ink or residue from a previous part run.

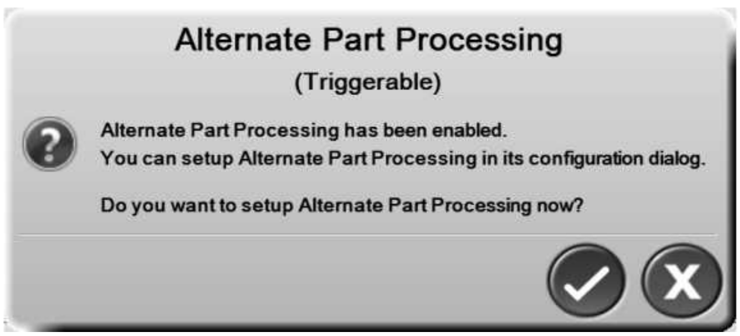
> *Note: this feature is different from Reject the First Parts After a Part Changeover. With Alternate Part Processing, you do not change the part program.*

What you need:

- An Extended I/O board. You must provide an input signal through the Extended I/O board to notify the Intellispec that your machine is starting.
- User level = Designer or Administrator

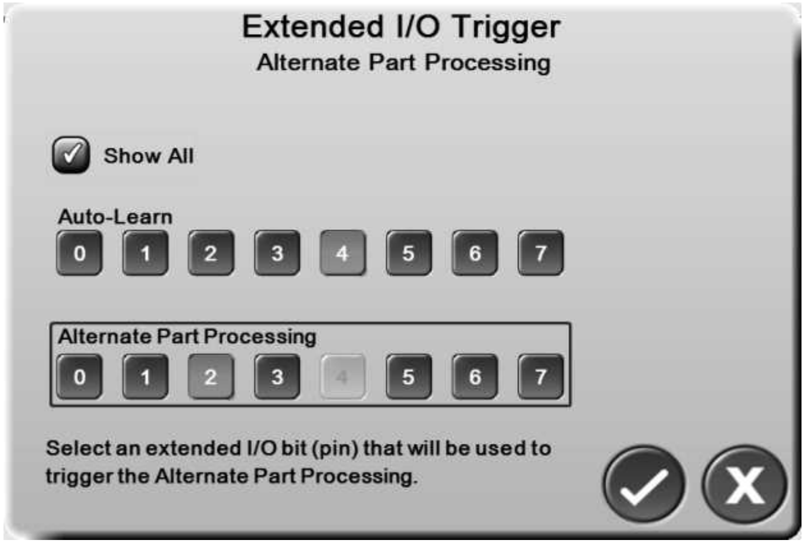
 To enable: from Lane or Sensor Overview mode, select Tools | Lane Setup | Select Features. Select Alternate Part Processing. Checked = enabled

When you enable Alternate Part Processing, the system directs you to the setup menu.

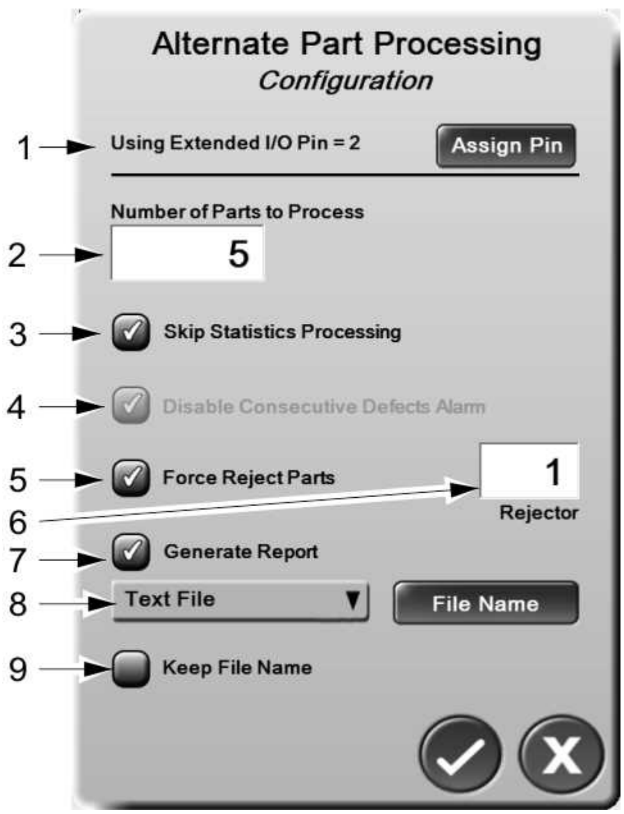


First, select the Extended I/O pin.

1 - Assign Pin - Extended I/O pin



Note: some pins may already be used. See Extended I/O Trigger or Extended I/O signals for more information.



Checked = enabled

2 - **Number of Parts to Process** Up to 200 parts can be processed.

3 - **Skip Statistics Processing** The Intellispec will not include any of the Number of Parts to Process in the system statistics, machine part statistics, SPC statistics, nor graphs.

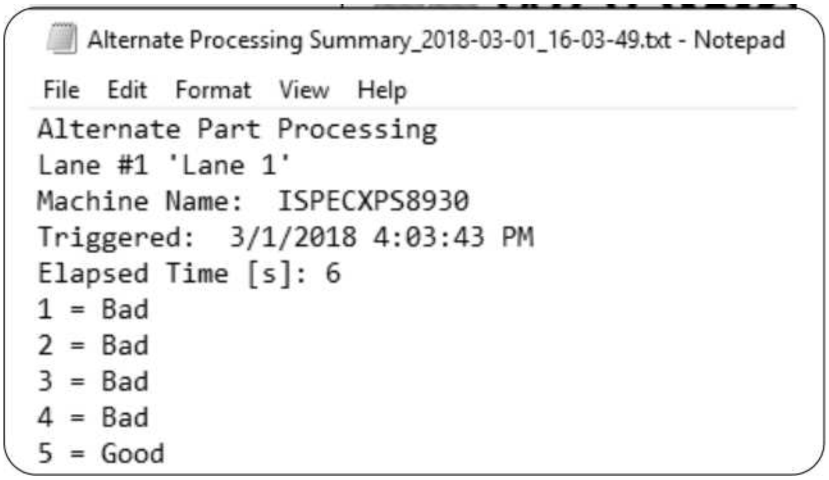
4 - **Disable Consecutive Defects Alarm** Disable the alarm only for Alternate Part Processing. This box is grayed out when #3 is enabled because this is already included in #3.

5 - **Force Reject Parts** Reject the Number of Parts to Process. All parts are rejected, regardless of inspection pass/fail.

6 - **Rejector** Select which rejector to reject the Number of Parts to Process. Rejectors vary per system configuration.

7 - Generate Report

Generate a report when the alternate parts are processed. The report includes the time from the Extended I/O trigger until the next part comes through. It also includes how many parts failed inspection after your machine started up.



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8 - Destination drop-down menu

Send the report to the default printer or a file. When Text File is selected, you can enter a file name by selecting the File Name button.

If you do not choose the name or location of the file, then the file is named "Alternate_Processing_Summary.txt" and is saved at the hard disk location "c:\Pressco\Lane X." (X = the lane you are using this feature on) Subsequently saved reports include a time stamp in the file name, unless you enable Keep File Name.

---

9 - Keep File Name

The system overwrites the file each time, rather than creating unique names for files. Select the File Name button, browse to the location where you want to save it, and create a name for your report.

Example: a plant where the Intellispec is networked. Say the office computer is programmed to poll the Intellispec at regular intervals to get the latest statistics report. With the same file name, the office computer just needs to request the same file name each time, regardless of the date and time the report was saved.

Discovery Software - What is Discovery?

Discovery is software installed on the Intellispec hard drive that automatically looks for and identifies certain components installed on each lane. The software identifies sensors, cameras, lighting drivers, part trackers, and if used, Intellimass drivers that are attached to the system. Each one of these devices communicates with the Intellispec software via Cat -6 cabling and is assigned a unique MAC address.

> *Note: You should rarely need to use this software. However, if a new component (for example, camera) is installed on the system the software would be used to configure the new camera.*

Additionally, during system startup, if a previously configured component fails to communicate with the Intellispec software, the discovery software screen will automatically appear on the user interface, alerting you to the problem.

Discovery software screen

1) The Discovery menu toolbar allows you to perform additional actions.

2) The tree shows the system configuration. Red indicates unassigned hardware devices. Orange indicates missing hardware devices.

3) Select one of the buttons to perform specific actions, such as add or edit lanes or sensors.

Discovery Menu Toolbar

 Tools Menu

- Rediscover New Hardware - when this command is initiated this software will perform another search of all hardware communicating with the Intellispec and displayed in the tree on the left side of the screen.
- Add Simulated Devices for Testing - this is software used by Pressco engineers to assign devices on an Intellitrainer.*
- Inspection Module Preset Editor - this is software used by Pressco engineers to assign new components as they become available.

 Wizard Menu - the same choices as those listed in the green buttons in the center of the screen.

 Language Menu - displays language choices that can be displayed.

 Help - provides software and systems for users.

*Intellitrainer = portable Intellispec training computer.

Discovery - Access and Use

The initial configuration of all hardware devices will be performed by the Pressco installer, and it is not anticipated that plant personnel will normally need to use Discovery software.

- The Discovery screen is automatically displayed during system startup anytime a hardware device that was previously configured is not communicating with the Intellispec software.
- If you need to run the Discovery screen manually, you must log in as an Administrator, shut down the Intellispec software, and run the Discovery program from Windows
- An example of a situation where plant personnel may use the Discovery software and actions to be taken is described next:
    a. During system startup camera does not communicate with the Intellispec software
    b. The Discovery screen sees this as a missing piece of hardware and automatically displays the Discovery screen. The configuration tree shows the camera in the expected location but displayed in orange, indicating that hardware device is missing.
    c. As a first step you should open the tools button and select "Rediscover New Hardware." This will trigger the software to search for the missing camera.
    d. If the camera re-establishes communication, as seen by the camera name changing to black, you can close the discovery software and resume normal operation.
    e. If the camera does not re-establish communication this indicates a hardware problem and the camera will most likely need to be replaced.

Configure Hang Dump

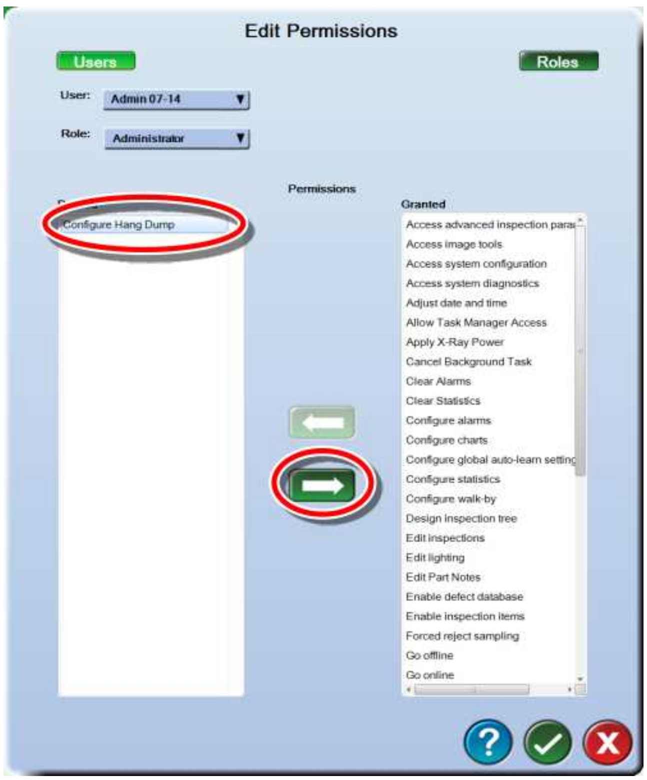
A hang dump is a log file created by the Intellispec system to help Pressco engineers troubleshoot a system. It is used when an Intellispec system is unresponsive (none of the buttons respond, nor does the display update - not even the clock). This feature can catch errors even if no one is currently using the system.

> *Note: This feature is not normally enabled. It should only be enabled when requested by Pressco engineering.*

Before configuring a hang dump:

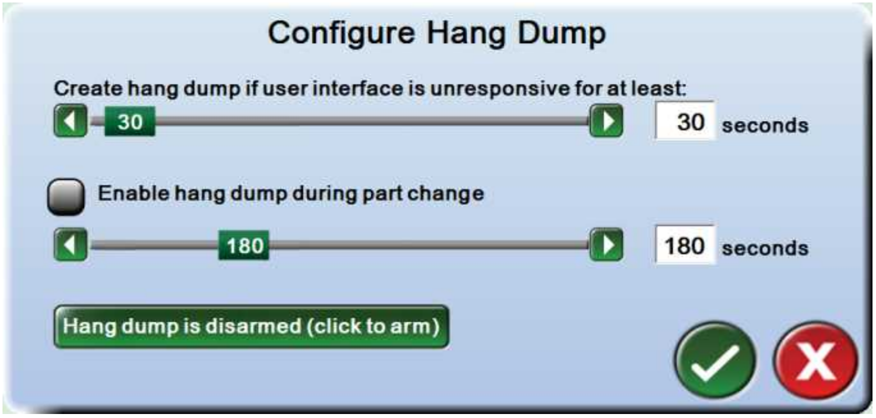
Grant permission to configure a hang dump. Permissions are not automatically granted for any user. For more information see Manage Permissions. You must have user permission to change permissions (such as an Administrator).

1. Log in.
2. Select the login button | Manage Permissions | select the user to grant the permission.
3. Select the permission from the left column, then select the right arrow to move the permission to the "Granted" column.
4. Select the OK button to save changes and exit.



To create the hang dump:

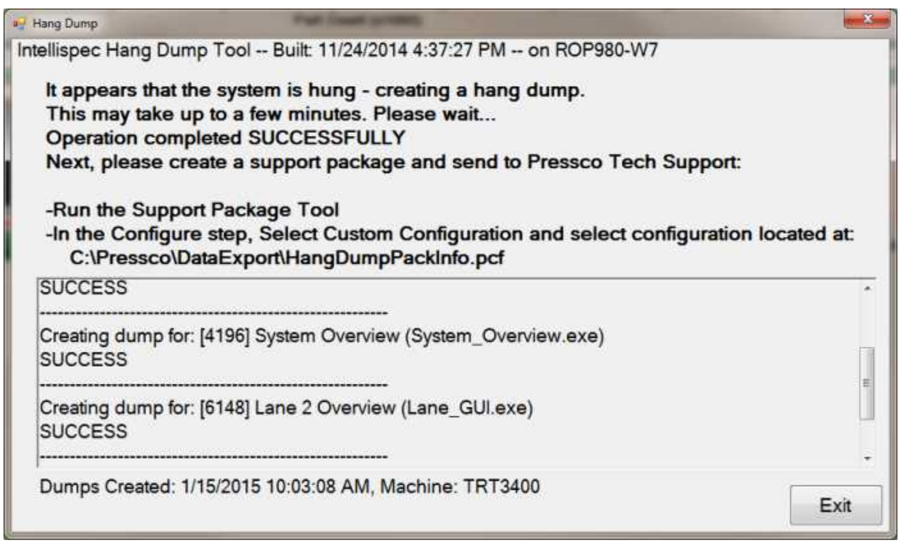
1.   Select Home | Help | Configure Hang Dump.



2. Leave the time settings at default values unless instructed to change them by Pressco engineers.
3. If desired, enable the hang dump during part change box.
4. Select the Hang dump is disarmed button to arm the feature.

> *NOTE: once a hang dump is created, it becomes disarmed. You must arm it again if you need to create further hang dumps.*

5. When the system detects that it is unresponsive, a hang dump report is created and displayed. Note the location of the .pcf file that is created, as specified in the report.



6. Create a Support Package. Be sure to use the ".pcf" file at step 3 of the Support Package Wizard.
7. Send the support package to Pressco Tech Support.

Extended I-O Configuration

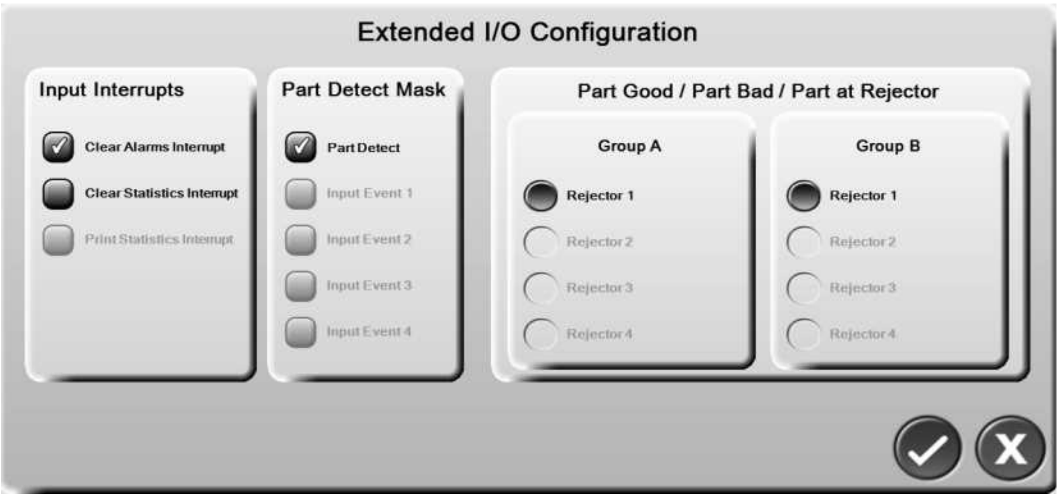
Enable input or output signals to perform a function on the Intellispec system or monitor the production lane in your plant. These settings must be done for each Extended I/O board for each lane.

See also the sections about Extended I/O and Extended I/O Signals in the Intellispec Hardware Guide.

 To get to this screen: From Lane or Sensor Overview mode, select Tools | Hardware Setup | Extended I/O Configuration.

This screen displays some of the inputs and outputs on the optional extended I/O board.

If one of the extended I/O ports is used it must be enabled here in the software, and the hardware must be connected appropriately.



Input Interrupts

These signals produce an input pulse to the Intellispec to perform the following functions.

Clear Alarms Interrupt Clear the lane alarms.

Clear Statistics Interrupt Clear the lane statistics.

Print Statistics Interrupt Print the lane statistics to the currently configured printer or file. See also Schedule Reports.

Part Detect Mask

Choose which Part Detect or other input events to trigger the Part Present output on the Extended I/O board. This is an OR function. Any enabled Part Detect signal or Input Event that goes active will activate the Extended I/O Part Present output.

Part Detect The signal goes active when the sensor detects a part.

Input Event N The Part Tracker board accepts up to five* input events (Part detectors or other sensors). Part tracking is always controlled by the Part Detect signal (Input Event 0). You might use other input events (1 - 4) in your system to trigger the Part Present output signal. *Only if your system has an 8-channel Part Tracker board. If your system has a 2-channel Part Tracker board, then only one Part Detect signal is used. The other input events are not available.

Part Good/ Part Bad/ Part at Rejector

Choose which rejector signal to activate the Part Good, Part Bad, and Part at Rejector signals on the Extended I/O board. After a part is inspected, the system determines whether the part is good or bad. As the part passes by Rejector 1, 2, 3, or 4, the Part Good/ Part Bad/ and Part at Rejector signals are activated on the Extended I/O board. There are two groups of Part Good/ Part Bad/ and Part at Rejector signals - Group A and Group B. You choose which rejector is associated with Group A and/or Group B. You can have both groups associated with the same rejector, if desired. See Extended I/O signals in the Intellispec hardware guide

Note: If your system has a 2-channel Part Tracker board, then the lane has up to two rejectors. If your system has an 8-channel Part Tracker board, then the lane has up to four rejectors.

Example 1 below

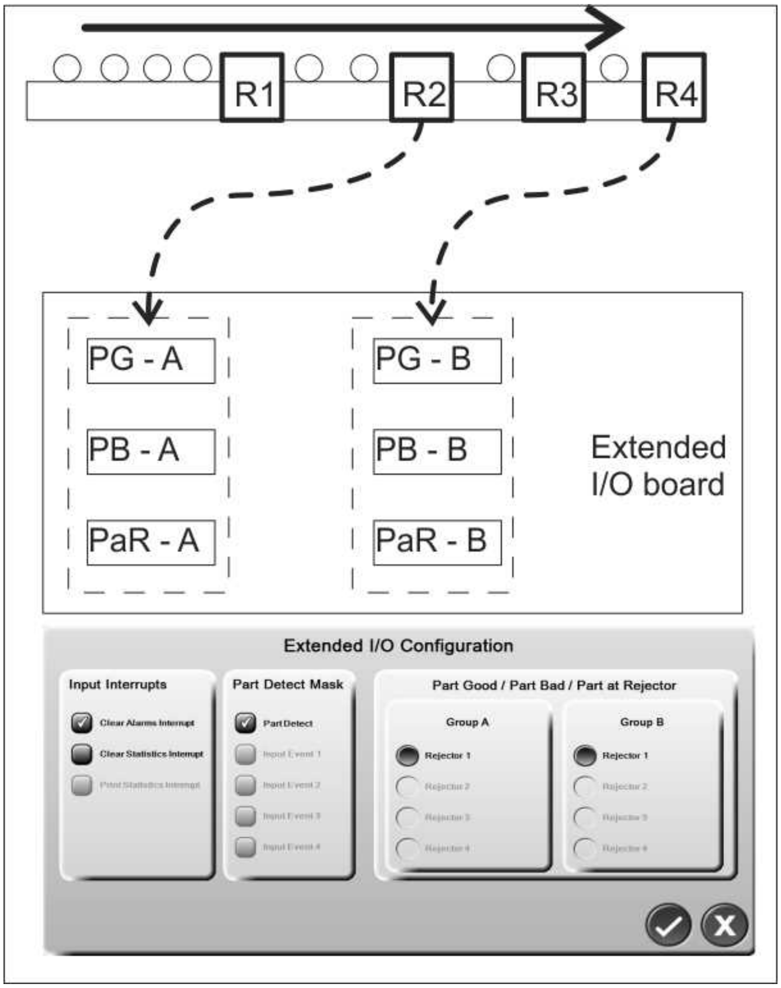
Group A is triggered when the part passes Rejector 2, and Group B is triggered when the part passes Rejector 4. The illustration below shows a basic block diagram with a conveyor with four rejectors. Those rejectors output a signal to the Extended I/O board, based on the Extended I/O configuration.

R = Rejector

PG = Part Good signal, Group A and Group B

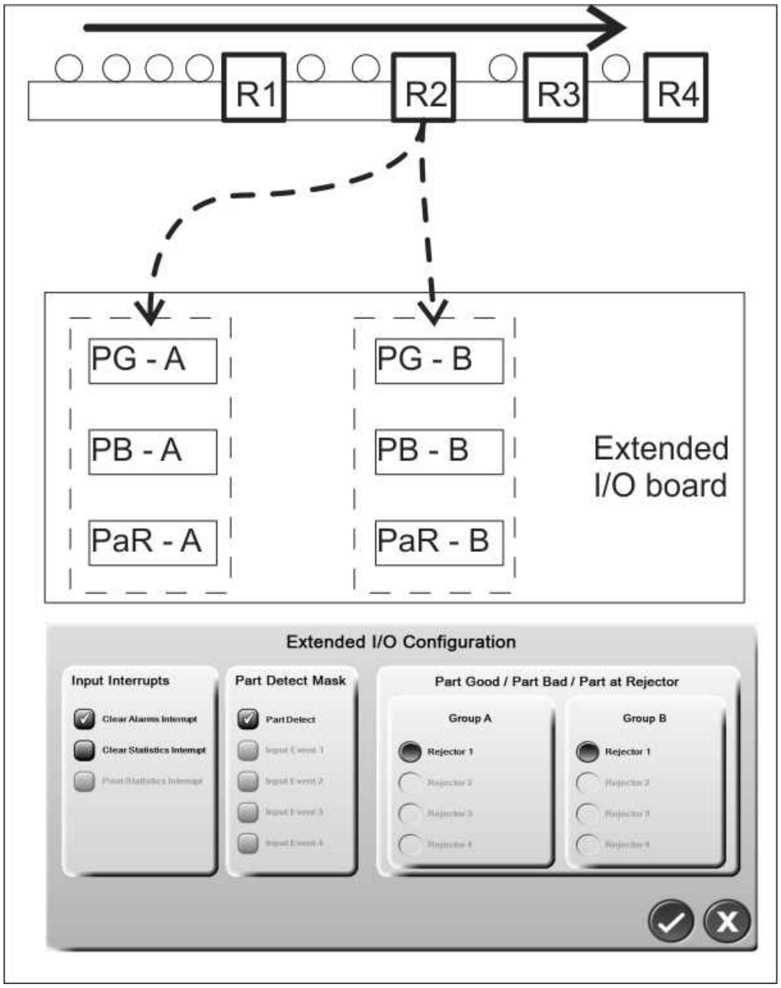
PB = Part Bad signal, Group A and Group B

PaR = Part at Reject signal, Group A and Group B



Example 2 below:

Group A is triggered when the part passes Rejector 2, and Group B is also triggered when the part passes Rejector 2.

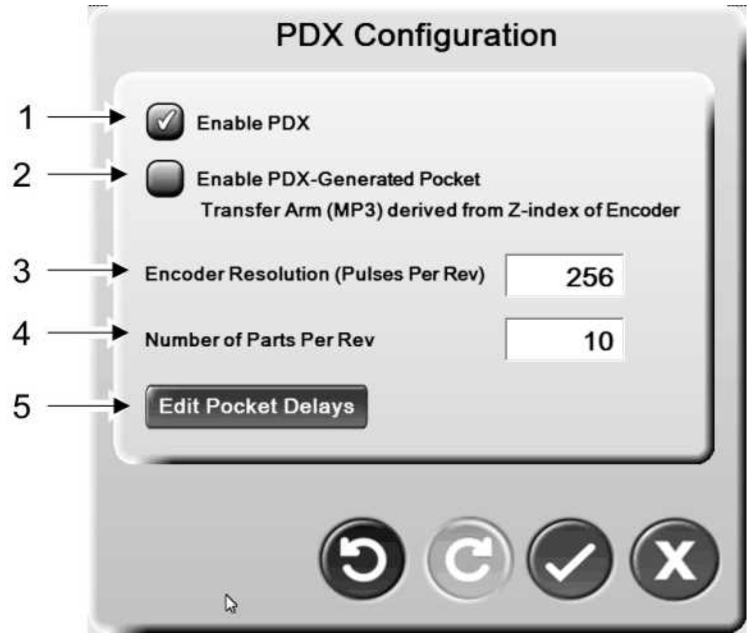


PDX Configuration

The Part Detect Generator (PDX) is used in some applications where the Intellispec system inspects directly on a machine, rather than on a conveyor. The PDX is a circuit built into the Part Tracker board.

> *Note: the system cannot run in both PDX mode and Part Tracker Simulation mode at the same time. If one mode is already running and you enable the other mode, the system displays a warning that the latest setting will override the previous mode.*

To get to this screen: From Lane or Sensor Overview mode, select Tools | Hardware Setup | PDX Configuration.



To configure the PDX:

1. Select the Enable PDX check box.
2. Enter the encoder resolution used on your system (example, 8192 pulses per revolution).
3. If your system is NOT using a pocket disk to generate the index signal, check the Enable PDX-Generated Pocket box.
4. Select the OK button to accept changes and exit.

1 - **Enable PDX** Enables the PDX circuit.

2 - **Enable PDX-Generated Pocket** On most systems - If your system is not using a pocket disk, and you need the Z-index signal of the encoder, check this box. This eliminates the need for a pocket disk. The index signal is handled on the Part Tracker board. Or, if your system is using a physical pocket disk with an index pin, leave this box un-checked.

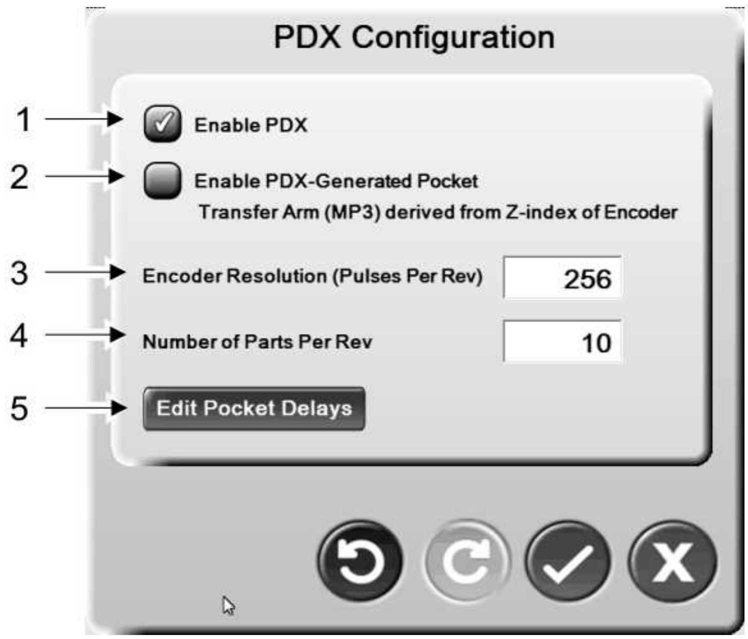
3 - **Encoder Resolution (Pulses Per Rev)** Enter the resolution of the encoder installed on your machine.

4 - **Number of Parts Per Revolution** Enter the number of machine parts or pockets (example, number of Transfer Arms) where the encoder is attached.

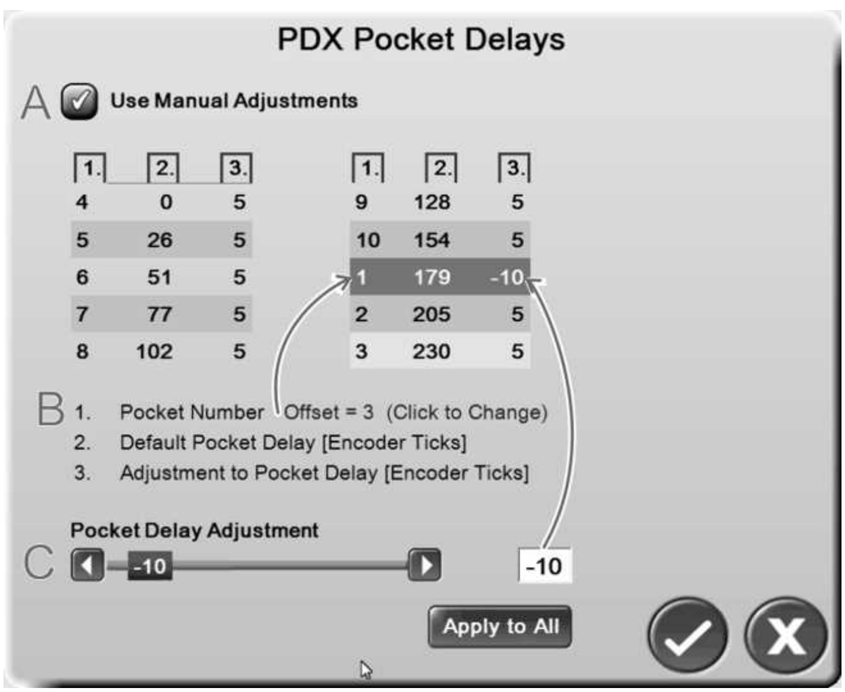
5 - Edit Pocket Delays

This feature only needs to be used if machine parts become unevenly spaced. If your system has rigid machine parts and consistent spacing part to part, then no further action is needed.

For this explanation, Encoder Resolution [3] = 256. Number of Parts Per Rev [4] = 10.



When you click the Edit Pocket Delays button, you can manually change the delays, as shown below.



A - Checked = enabled

B - Pocket Number [Column 1] - If you have a pocket (physically) marked as pocket #1, but the index pulse is 3 pockets away, you can use 3 as an offset (as shown in the above example). If the index pulse is located at pocket #1, then no offset is necessary.

Default Pocket Delay [Column 2]- This is computed for you. The system divides Encoder Resolution [3] by the Number of Part Per Rev (pockets) [4], and computes the delay between each pocket.

C - Pocket Delay Adjustment [Column 3] - You can change the delay for one pocket, or Apply to All. If just one machine part has shifted, then you may only need to change the delay for one pocket.

You may notice that sometimes you can enter a negative number, and sometimes not, or a value for the last pocket is limited more than others. Pocket delays are sent as a list of values to the part tracker. The system computes valid values for the part tracker rules, which include: non-negative values, subsequent delays are larger than the previous delays, and the last delay must be fewer ticks than the encoder resolution.

Chapter 18 Help and Support

This section contains information on:

- Built-in help
- Backup and restore functions
- How to connect with Tech Support through your Intellispec system

Help

Select the Help icon to:

- use the system manuals
- access Pressco remote support
- obtain your current software version

To access the user manuals:

1. Select the Help icon.
2. Select Help Documents, then select a manual from the list. The user manual is displayed.

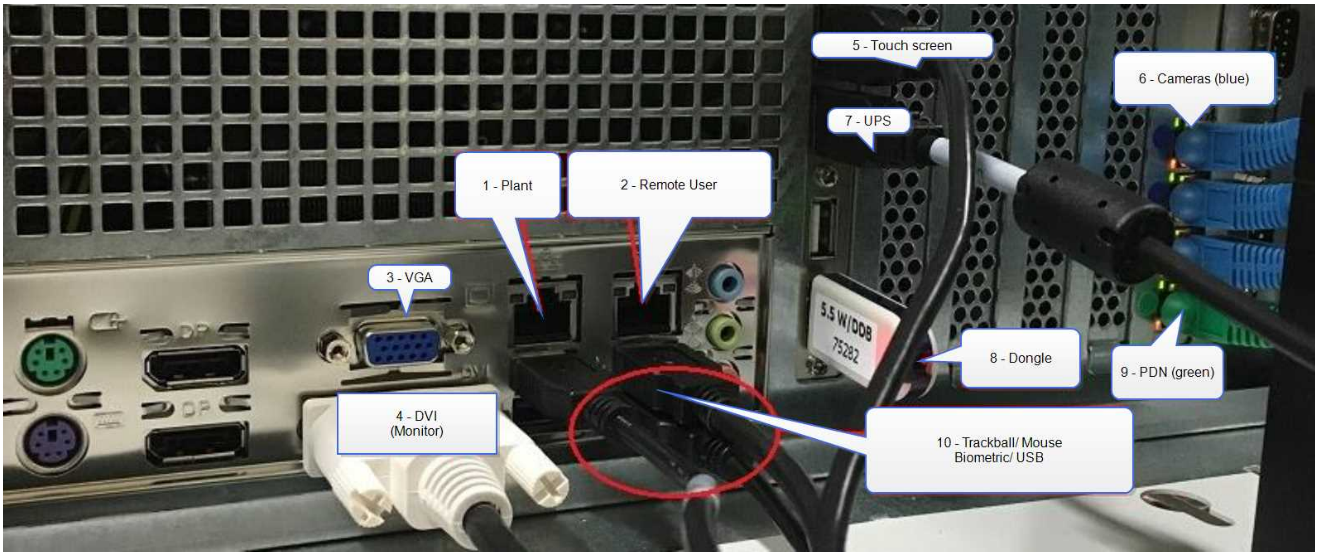
Remote Support

Each Pressco system is equipped with iTivity and Team Viewer agent software that provide a safe and effective means of allowing remote support connections to the system. These allow Pressco engineers to access your Pressco system remotely, and assist with troubleshooting and optimizing system performance.

To use remote support, you must provide an Ethernet connection to the Pressco and outgoing Internet access to the specific support server, described in the "Intellispec iTivity remote support" on page 534 and "Teamviewer" on page 536 topics.

The images below show the typical layout of the Intellispec Ethernet ports. Either the Plant or Remote User ports can be used for the remote support connection. Those ports default to “Get IP Address Automatically” but they can be assigned a fixed IP address to accommodate your network requirements.

Series V ethernet ports:



1 - Plant

2 - Remote User

3 - VGA

4 - DVI (Monitor)

5 - Touch Screen

6 - Cameras (blue)

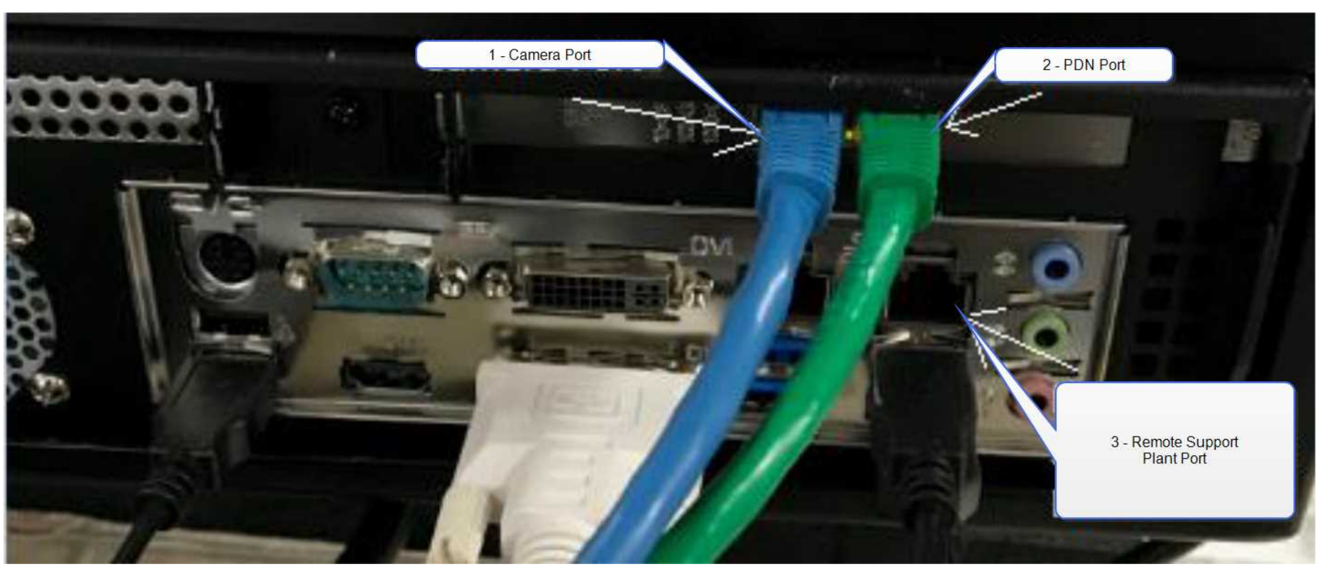
7 - UPS (Uninterruptible Power Supply)

8 - Dongle

9 - PDN (Pressco Data Network) (green)

10 - Trackball/ Mouse/ Biometric/ USB

CSL system ethernet ports:

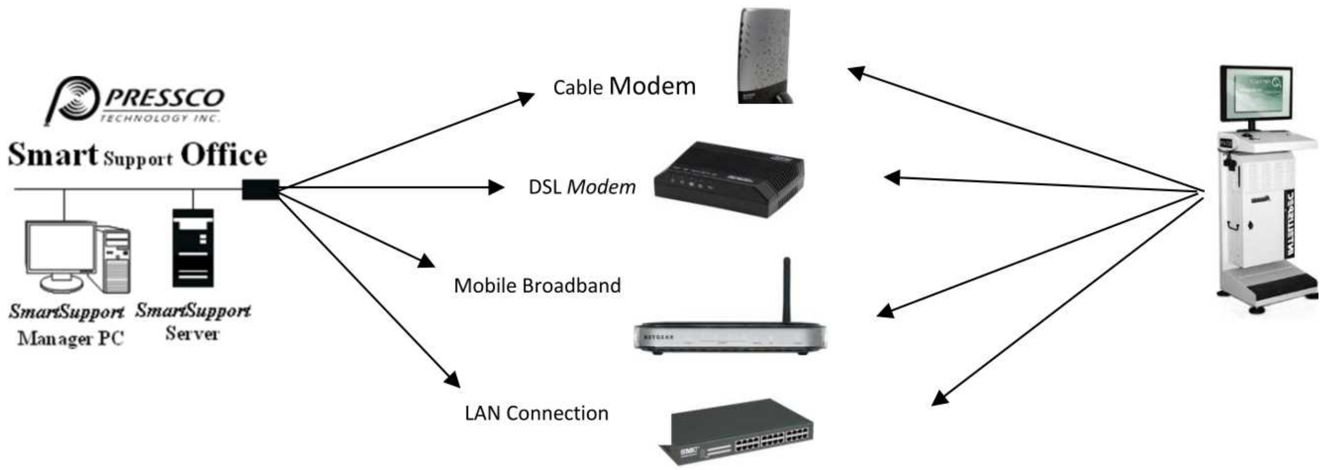


1 - Camera Port

2 - PDN Port

3 - Remote Support Plant Port

Connection Methods: The remote support connection can operate over a variety of networks. However, these are image and video based systems so the higher the bandwidth available the better we will be able to navigate through the system and assist with any issues you encounter.



Intellispec iTivity remote support

Remote Support allows remote access to the Intellispec software. iTivity software is used by Pressco to provide remote system support if a Maintenance Agreement is purchased for that Intellispec system.

Each Intellispec™ system is equipped with iTivity agent software that, when initiated, will establish an encrypted connection to a server located behind the Pressco firewall. This allows Pressco engineers to access your Intellispec system remotely. Only registered members of the Pressco support team can gain access to the remote support server.

To use remote support, you must provide an Ethernet connection to the Intellispec system, and outgoing Internet access to support.pressco.com via port 23800. If you do not have a DNS, Pressco can provide you with the IP address of the remote support server. If connecting through a firewall you will need to add a rule allowing outgoing access from the Intellispec's IP address to support.pressco.com:23800. All other connections can remain blocked.

Once the session is established, the Intellispec system shows up on Pressco's server and is identified by the serial number of the system. Our Engineers can then connect and offer assistance.

To request a Pressco support session:

Contact Pressco support. Provide the serial number of the system that needs to be accessed. Pressco will log into your Intellispec system and perform troubleshooting as necessary.

You will need:

- A functioning Intellispec (systems without power, or systems that are not capable of running Intellispec software, cannot be remotely accessed)

To use Remote Support:

1. Notify a Technical Support representative that you require remote support. You will need to identify yourself, your location, and the Intellispec to which he should connect.
2.  In the Intellispec software, Select Help | Remote Support.

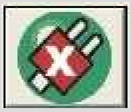
3. Select the iTivity button. If your system has a valid internet connection, the iTivity agent will attach to the server at Pressco. A connection status screen will appear indicating that the session has been established, as shown below. Intellispec systems are identified by computer name, which, in most cases, is the serial number.

4. When the Tech Support representative is finished, he will disconnect your Intellispec from the remote session.

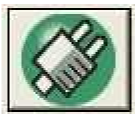
If you need to disconnect your Intellispec from the remote session yourself, follow the steps below.

To disconnect from remote support:

1. Select the X in the upper right corner of the 'iTivity Live Support Agent Connection Status' box.
2. When the system asks "Do you really wish to exit the iTivity Live Support Agent?" select OK. The system will be disconnected.



Note: if you select this button, the session will be disconnected, but this does not close the remote support program.



If the session is disconnected and you want to allow Tech Support to be able to access your system again, select the button.

Teamviewer

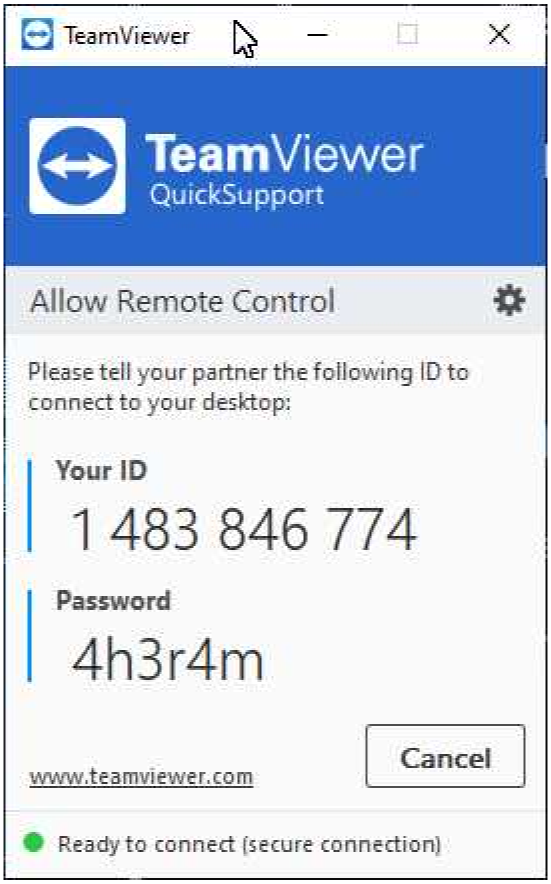
Each Intellispec™ system is equipped with Team Viewer agent software.

Team Viewer is installed at the Pressco factory on the Intellispec system, in systems with version 5.7 software and higher.

To use the Team Viewer connection method, the Intellispec will need outgoing Internet access to TeamViewer.com via port 5938. Firewall rules may need to be set to allow outbound traffic over port 5938.

To initiate a Pressco support session:

1. Launch Team Viewer: go to Help | Remote Support | TeamViewer. When the connection is established you will see a dialog box with an ID number and password. Those are the logon credentials needed for others to gain access to that computer.



2. Contact Pressco support, via email, support chat, text message, or by phone call. See below.
3. Notify Pressco with the TeamViewer ID and Password. Pressco will log into your Intellispec system, and perform troubleshooting or maintenance as necessary.

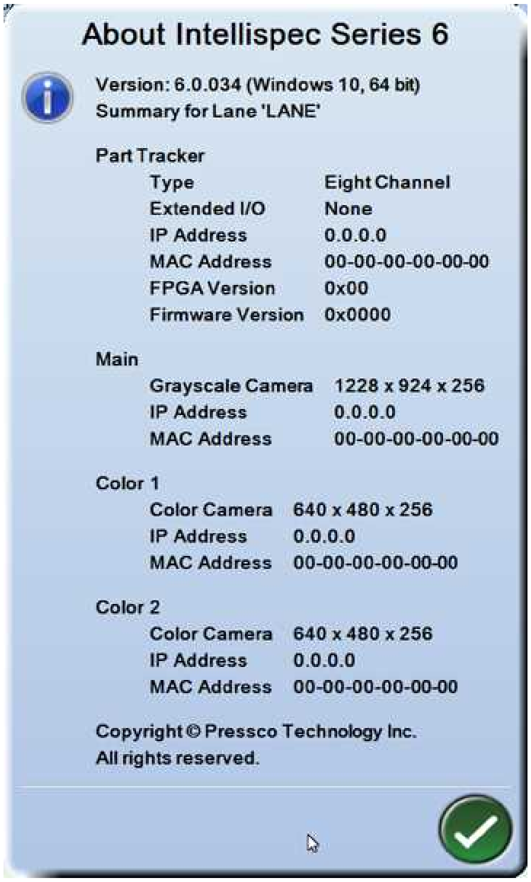
Request technical support and remote support: techsupport@pressco.com

24/ 7 Customer Support (for urgent system help): +1-440-498-2000

About Intellispec

Use this screen to view the Intellispec software version, options installed, and information about your system. A Pressco technical support representative may need this information to help troubleshoot your system, when necessary.

To access this screen, select Help | About.


About Intellispec Series 6
Version: 6.0.034 (Windows 10, 64 bit)
Summary for Lane 'LANE'
Part Tracker
Type Eight Channel
Extended I/O None
IP Address 0.0.0.0
MAC Address 00-00-00-00-00-00
FPGA Version 0x00
Firmware Version 0x0000
Main
Grayscale Camera 1228 x 924 x 256
IP Address 0.0.0.0
MAC Address 00-00-00-00-00-00
Color 1
Color Camera 640 x 480 x 256
IP Address 0.0.0.0
MAC Address 00-00-00-00-00-00
Color 2
Color Camera 640 x 480 x 256
IP Address 0.0.0.0
MAC Address 00-00-00-00-00-00
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Chapter 19 Backup and Restore Menu

 This section includes information about creating a support package as a backup, and restoring the system from a support package.

1 - "Create a Support Package" below

2 - "Restore From Support Package" on page 541

3 - Launch Windows Explorer - *Administrator only* - Opens a Windows Explorer window so that you can browse, move, and edit contents on the computer.

4 - Disk Imaging Software - refer to Pressco document 71789 "True Image 2013."

Create a Support Package

A support package is a set of files gathered by the Intellispec system to help find system problems. You will send this package to Pressco service specialists so that they can troubleshoot your system. This file can also back up your system configuration (not the entire system database).

> *Note: On rare occasions, the Intellispec software cannot be started, so you will not be able to access the support package tool from the user interface. It is possible to create the support package without Intellispec running by starting the following executable from Windows: C:\Pressco\bin\SupportPackaging.exe.*

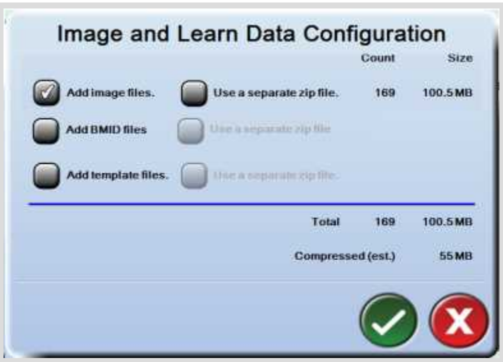
What you need:

- USB flash drive (128MB or larger). Connect this to the USB port
- If you have a ".pcf" file from a Pressco Support representative (to acquire additional system information), then copy that file to the USB drive prior to connecting it to the Intellispec system
- If you want to save images to send with the support file, then save images prior to creating the support file. Be sure to save them in the default image folders: C:\Pressco\Lane n\Images\Sensor n. See Saving Images.

To create the support package:

1.  Select the Backup and Restore Menu | Create Support Package. The support package wizard is displayed.
2. (optional) At Step 1: Configure: add the ".pcf" file or images.

3. (optional) Check the Load custom configuration box. A .pcf file is a custom Pressco configuration file that gathers information beyond the standard Support Package. If a Pressco Support representative sent you a .pcf file, then connect the USB device that contains the .pcf file. Select the disk icon and browse to the location (USB drive) where the .pcf file is stored. The system locates the .pcf file.
4. (optional) Check the Add images and learned data to package box. A dialog (shown below) allows you to choose the type of images to include.



- **Add image files** select images in the default image folder (example: C:\Pressco\Lane 1\Images\Sensor 1). All sensors and lanes for which you have images are included.
- **Use a separate zip file** a zip file with "IMAGES" in the name is created along with the Support Package zip file. All sensors and lanes for which you have images are included. If you do not check this box, then the images are included in the main Support Package zip file.
- **Add BMID files** if you have an inspection using BMID correlation, the images from the BMID folder are included (example: C:\Pressco\Lane 1\BMID).
- **Add template files** if you have a Template Registration or Template Orientation inspection, the images from the InspectionTemplates folder are included (example: C:\Pressco\Lane 1\InspectionTemplates).

5. Follow the instructions on screen. Use the forward arrows to move to the next screens.

6. When the steps are completed, verify that the Step 3: Export screen is displayed.

7. Select the USB Flash Drive in the "Copy to:" location.
8. Select the Copy button. The support package files are copied to the USB flash drive, then a "Copy Succeeded" message is displayed.

9. Select the OK button to continue.
10. Select the OK button at the bottom of the Support Packaging screen to exit.
11. Remove the USB flash drive.
12. Copy the files that were saved, including images, from the USB drive to your computer.
13. Send an e-mail to techsupport@pressco.com and attach the support package files. Pressco service/ tech support will respond within one business day, if possible.

Restore From Support Package

You can restore (import) a support package to a working Intellispec system. This allows you to use the same configuration on multiple systems without having to duplicate your efforts, or use a known good configuration created on another system or by Pressco Technical Support.

What you need:

A USB flash drive with a known good support package on it

Mechanical keyboard (MKB) to enter a problem description (if backing up your current configuration)

To restore the support package:

1. Select the Backup and Restore menu | Restore from Support Package.

2. The system will suggest that you back up your current system. We recommend that you select the "Create Support File" button to back up the system.
3. Follow the instructions on screen, and select the location of the USB drive that contains the support package you want to restore, when prompted.
4. Select the support package from the USB drive that you want to restore.
5. Use the forward arrows to move to the next screens.
6. When the system says "Series V (or 6) Application detected," select the Stop Application button to shut down the Intellispec software. This is necessary to restore the support package.
7. At step 4 on screen, select the Unpack Zip File button to restore the support package and wait for the system to unpack the files.
8. When the system says "Unpacking Complete," select the forward arrow to move to the next screen.
9. Select the Restart Discovery button to restart the Intellispec application.

Chapter 20 Auto-Learn

Auto-Learn works with the "Distribution" on page 357 inspection

Automatically learn a new set of parts based on inspection settings and trigger criteria.

Auto-Learn is optional, and may require additional hardware. Your system must be configured properly. Auto-Learn must be enabled separately for each lane before use.

The system performs an Auto-Learn session when a lane is online. It learns parts in the background. You can edit inspections without Auto-Learn interrupting your tasks.

What you need:

- Intellispec software version: 5.2.037, or 5.3.016 or later
- User permissions to Configure Global Auto-Learn settings and/or permissions to "Start Auto-Learn" or "Stop Auto-Learn" if using Operator Trigger. See "Manage Permissions" on page 462
- A "Distribution" on page 357 inspection
- If you use Extended I/O to trigger Auto-Learn, you need part tracker firmware F174 or later, and available pins

What is learned:

When you first set up an inspection that uses Auto-Learn, you allow the system to learn the colors or gray shades of your product. You typically use Data Set A within the inspection, and the system learns up to 100 parts. During inspection setup, you can have the system learn more parts to increase the data of the inspection population. The system builds a histogram of the number of pixels for each color and gray shade found.

Auto-Learn adds new part data over time. It decides whether to include data in the learned histogram after inspection is complete on a part. Auto-Learn helps detect:

- Tramp parts
- Slight changes in your printing process over time

Learned data does NOT include:

- Empty pockets
- Parts that failed any inspection, except those currently auto-learning and any other Distribution inspection
- Any part that matches the previous histogram, if you are using Tramp detection
- Any part that fails the current histogram, if Learn More is in use. This includes newly learned data during the current auto-learn session.

The system begins inspection using the new learned data when a minimum number of parts have been learned. Parts failing the inspection will be rejected and not included in the new learned data.

Configure Global Auto-Learn Settings

Auto-Learn must be enabled and configured before you can use it in any inspection. It must be enabled separately for each lane.

To configure Auto-Learn:

1.  From Lane or Sensor Overview, select Tools | Lane Setup | Select Features | Auto-Learn.Checked = enabled. If you do not have an Extended I/O board, then configuration is complete.
2. If you have an Extended I/O board, the following configuration setup applies.
   a. When you enable Auto-Learn, a dialog prompts you to go to Auto-Learn Configuration. Select the OK button to continue. The Auto-Learn Configuration dialog is displayed. If you do not have an Extended I/O board, then the configuration screen does not display.

   b. Select the Extended I/O bits that you want to trigger Auto-Learn.
   c. If you have an Extended I/O board, but do NOT want to use it to trigger Auto-Learn, make sure all the Extended I/O Mask buttons on this menu are dark green (not selected). If you do not select the Mask buttons, the Extended I/O Default Value buttons will not be displayed.
   d. Select the OK button to accept changes and exit.

See also "Extended I-O Trigger" on page 549

Add Auto-Learn to an Inspection

Before adding Auto-Learn to an inspection:

1. Configure Global Auto-Learn settings.
2. Add an inspection that supports Auto-Learn (Distribution).

To add Auto-Learn to an inspection:

1. Check the "Enable Auto-Learn" box from the Auto-Learn tab in the inspection.
2. Set the Part Count to Learn. We recommend leaving the count at the default value of 300 to begin. You may change it later.
3. Select which type of trigger will start an Auto-Learn session and set up the parameters based on your system. An example is shown below. See "Triggering Auto-Learn" on page 546

> *Note: Operator Trigger requires that Advanced parameters are enabled. See* *"Operator Trigger" on the next page*

Editing Other Inspections when using Auto-Learn

- You can edit another inspection while Auto-Learn is in progress, except the inspection that is currently auto-learning
- An Auto-Learn in progress must be completed before a new session starts, EXCEPT when you edit an inspection that affects Auto-Learn, such as below
- If you edit an inspection and it affects the location, size, orientation, or enhancements that affect a region, then inspections below it in the inspection tree that have Auto-Learn enabled may be affected. Auto-Learn may begin on the other inspections once you finish editing the original inspection.
- If you edit an inspection below the Auto-Learn-enabled inspection in the inspection tree, or if the inspection is on another sensor, then Auto-Learn is not affected

Tramp Detection

In some applications, such as Distribution using a CPX inspection module, the inspection results are used to determine whether a part belongs to a previous set of inspected parts. With this check in place, you can use the same part program to inspect different sets of parts as long as they are the same size and shape. If the decoration has changed, then parts that match the old decoration have been left accidentally in the part flow. These tramp parts need to be rejected and not included in the learned data.

During Tramp detection the system uses two sets of learned data: 1) the original set before the trigger and 2) the set currently learned. This allows the system to decide whether a part belongs to the old set. Tramp detection remains in place until the number of "Part Count to Learn" has been reached. Then Auto-Learn completes and the inspection works normally.

Tramp detection auto disable

Tramp detection is only valid if there is an actual part change. Tramps are assumed to be a rare event. If the system sees too many consecutive tramps, it assumes the part has remained the same and turns off tramp detection.

A number for "Max. Consecutive Tramps" is available in "Advanced Parameters for Auto-Learn" on page 551. This number is applied globally to the lane.

Tramp detection continue

If Auto-Learn is restarted, the system will continue using tramp detection on the restarted Auto-Learn. Auto-Learn may be restarted if you edit an inspection that affects another inspection that uses Auto-Learn. See "Editing Other Inspections when using Auto-Learn" on the previous page.

Triggering Auto-Learn

A trigger is a condition that starts an Auto-Learn session on an inspection. You can use any or all of the triggers in the same inspection. Triggers include:

- Operator starting an Auto-Learn session - "Operator Trigger" below
- Applying voltage to Extended I/O bits - "Extended I-O Trigger" on page 549
- Number of consecutive failures of an inspection - "Consecutive Failures Trigger" on the next page
- No parts seen - "No Parts Seen Trigger" on page 548
- Defect rate percentage - "Defect Rate Trigger" on page 548
- Number of parts specified - "Part Interval Trigger" on page 548
- Part program change - "Part Program Changed Trigger" on page 549

A trigger will start an Auto-Learn session only if all the following conditions are met:

1. Auto-Learn is globally enabled for the lane
2. Auto-Learn is enabled for the inspection, and
3. The trigger is enabled for the inspection.

Operator Trigger

If Operator Trigger is enabled, you will able to start an Auto-Learn session manually.

Operator Trigger requires:

- Permission to Start Auto-Learn (see"Manage Permissions" on page 462)
- Advanced parameters enabled: right-click over the inspection menu | Editor Access | Advanced

The Start Auto-Learn item is shown (and enabled) in the inspection menu if all of the following apply:

- Auto-Learn is globally enabled for the lane.
- The selected inspection supports Auto-Learn.

- Auto-Learn is enabled for the inspection.
- The inspection is not currently auto-learning (Stop Auto-Learn will be shown instead).
- Operator Trigger is enabled for the inspection.
- The logged in user has permission to start Auto-Learn.

To start Auto-Learn:

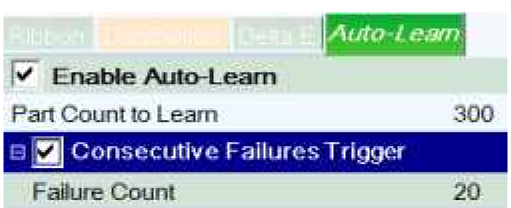
1. Right-click over the inspection tree for the Inspection menu | Start Auto-Learn. The Start Auto-Learn dialog is shown.

2. If desired, select Part Change if you want to start Auto-Learn when the system detects a part (or decoration) change. If you select Part Change, then the Mode selections will not be shown. The system will use Learn mode and "Tramp Detection" on page 545
3. Select the inspections for which you want to start Auto-Learn, and in which mode. The inspections available are those in the lane for which Auto-Learn Operator Trigger is enabled. The system will start Auto-Learn.

See also "Advanced Parameters for Auto-Learn" on page 551.

Consecutive Failures Trigger

This trigger starts an Auto-Learn session when the auto-learning inspection fails a number of consecutive parts. Parts that fail empty pockets, registrations*, or enhancements* are not included in the count. (*that affect the auto-learning inspection) If a part has inspection warnings but no failures, it is considered a good part.



Failure Count The number of consecutive failures that will trigger an Auto-Learn session.

Note that the consecutive count is not reset after the first good part, but is incremented for each bad part, and decremented for each good part. Good parts cancel out bad parts. This is to ensure that consecutive defects will trigger even if there are clusters of defects with a few good parts in the line. Example:

- Failure Count = 5; (B = Bad, G = Good)
- These parts trigger Consecutive Failure: BBBBB, BBBBGBB, BBBGGGBBBBB
- These parts DO NOT trigger Consecutive Failure: BBBBGBGBGBGBGBG

See also "Advanced Parameters for Auto-Learn" on page 551.

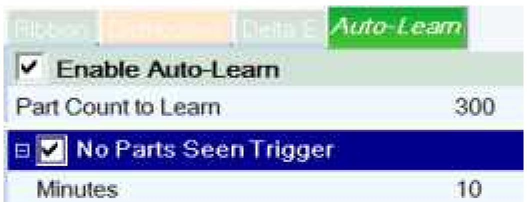
See also "Learn Modes" on page 552.

No Parts Seen Trigger

This trigger starts an Auto-Learn session when, for a specified time, either:

- No images have been acquired, or
- All images have been determined to be empty pockets

No Parts Seen Trigger is similar in purpose to Extended I/O Trigger.



Minutes Number of minutes for no parts seen to trigger an Auto-Learn session.

See also "Advanced Parameters for Auto-Learn" on page 551.

See also "Learn Modes" on page 552

Defect Rate Trigger

This trigger starts an Auto-Learn session when an inspection fails a percentage of recent parts. Parts that fail empty pockets, registrations*, or enhancements* are not included in the count. (*that affect the auto-learning inspection)

Max. Percent If the defect rate exceeds this number, an Auto-Learn session is started.

See also "Advanced Parameters for Auto-Learn" on page 551.

Part Interval Trigger

This trigger starts an Auto-Learn session each time a number of parts has been inspected.

Part Interval

The number of parts that will trigger an Auto-Learn after:

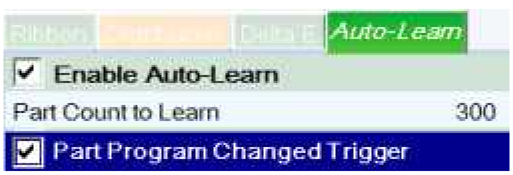
- The last start of an Auto-Learn, or
- The system starts, or
- The part program is switched.

See also "Advanced Parameters for Auto-Learn" on page 551.

See also "Learn Modes" on page 552.

Part Program Changed Trigger

This trigger will start an Auto-Learn session when the part program containing the inspection (with Auto-Learn enabled) is loaded. It will always use Learn mode, never Learn More. (See "Learn Modes" on page 552.) This trigger does not engage "Tramp Detection" on page 545.



See also "Advanced Parameters for Auto-Learn" on page 551.

Extended I-O Trigger

You may use your (optional) Extended I/O board to trigger an Auto-Learn session. Auto-Learn uses the Generic Input Ports 0 through 7 on connector pins J1-3 through J1-10. Note that availability on the Extended I/O board may be limited depending on your system configuration.

In the Auto-Learn dialog, the Extended I/O Generic Input Port 0 = bit 0. Generic Input Port 7 = bit 7.

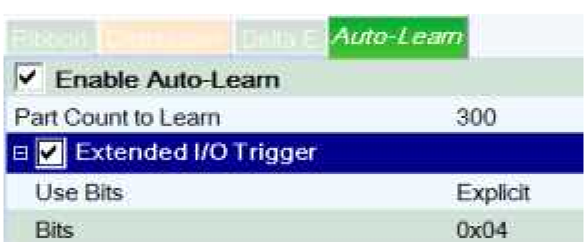
- If you are using "Remote Part Program Switching" on page 515, bits 0 and 1 may already be used
- If you are using "Asynchronous Correlation" on page 499, any or all of these bits may already be used

If the bits are already used, they are indicated in the dialog and the bits are grayed out, as shown below. Select the "Why Disabled" button to see where they are used.

To use Extended I/O:

1. "Configure Global Auto-Learn Settings" on page 543.

2. To enable Extended I/O signals for Auto-Learn, select the desired bits under Extended I/O Mask. (selected bits are light green)
   - The simplest configuration is to select one bit for Extended I/O mask, and select that same bit for Extended I/O Default Value. Use that same setup for all inspections that use Auto-Learn.
   - If you have an Extended I/O board, but do not want to use it for Auto-Learn, then do not select any bits.
3. To specify which of the enabled bits to use as default signals for Auto-Learn, select the desired bits under Extended I/O Default Value. Selecting a default value can speed up the setup process. The default value will be used unless you set explicit values in the inspection. (see below)
4. Select the OK button to save changes and close the dialog. You will specify how the Extended I/O triggers Auto-Learn within the inspection parameters.



Use Bits

Select Default or Explicit.

Default - uses the default bits set in the Auto-Learn Configuration dialog.

Explicit - specify which bits to use by setting the Bits parameter.

Bits

Use when Use Bits = Explicit is selected. When you click on the Bits parameter in the menu, a pop-up menu prompts you to select the desired bits. Only those bits specified in the Extended I/O Mask in Auto-Learn Configuration are available. Select a bit to enable it. Selected bits are highlighted in bright green. If you select no bits, then the Extended I/O trigger is disabled for this inspection.

See also "Advanced Parameters for Auto-Learn" below

Advanced Parameters for Auto-Learn

Right-click over the inspection parameters | Editor Options | Advanced = Checked. You must have the "Access advanced inspection parameters" permission.

The screens below show two examples of triggers where advanced parameters are used.

Max. Consecutive Tramps If more than this number of consecutive tramps are seen, tramp detection is turned off. This prevents filling the bin with good parts if auto-learn mis-detected a part change. This parameter applies globally to the lane.

Last N The number of parts over which to evaluate the defect rate.

Mode - see "Learn Modes" on the next page

Target

This inspection: the inspection on which the trigger is configured. If this is selected, the trigger will start an Auto-Learn only on this inspection. The same trigger may apply to more than one inspection, such as when multiple inspections use the same extended I/O bits for triggering.

All inspections: The trigger starts an Auto-Learn on all inspections that:

- Have Auto-Learn enabled
- Are the same inspection type (example, Distribution)
- Are on the same lane

All inspections start with the Learn mode of the triggered inspection. Example, if Distribution 1 is configured to start Auto-Learn with Learn More mode when triggered, then Distribution 2 will also start in Learn More mode, as long as Auto-Learn is enabled.

> *Tip: You could configure one inspection as a master that triggers Auto-Learn on all other inspections by using the All Inspections criteria. This eliminates the need to edit multiple inspections and adjusting trigger conditions. You only need to enable Auto-Learn on the other inspections.*

Learn Modes

"Learn" mode clears all learned data before learning.

"Learn More" mode adds to the existing data.

Auto-Learn will use either mode, depending on the type of trigger. They operate the same way as the Learn and Learn More buttons in the Distribution menu*. However, in the Distribution menu, the system is limited to learning up to 100 parts. In Auto-Learn, you configure the number of parts to learn, up to 5000. (set this through Part Count to Learn in the Auto-Learn menu) You can also select the "+100" button to learn an additional 100 parts.

*Learn More excludes data that does not match the current histogram, including newly learned data during the current auto-learn session.

Detect Part Change

- Auto-learn determines whether the trigger was initiated because the part has changed. By default it checks the five most recent parts (or the next five parts, depending on the trigger).
- If all those parts have failed, the system determines that you are running a new part. It starts Auto-Learn in the Learn mode and uses "Tramp Detection" on page 545
- If some parts passed inspection, the system assumes that you are still running the same part, and (by default) starts Auto-Learn in Learn More mode.
- Detecting part change uses the most recent parts when triggered by the inspection failing. Otherwise it waits for the required number of parts after the trigger to make the decision.

- Detect part change is used by the following triggers:
  - "Extended I-O Trigger" on page 549 (the system checks the next five parts)
  - "Defect Rate Trigger" on page 548 (the system checks the five most recent parts)
  - "No Parts Seen Trigger" on page 548(the system checks the next five parts)

"Assume Part Change" is used by "Consecutive Failures Trigger" on page 547. This works like Detect Part Change mode, except that the decision has already been made that this is a part change. When triggered, Auto-Learn starts in Learn mode and uses "Tramp Detection" on page 545.

Seeing if Auto-Learn is Running or Completed

When Auto-Learn starts, the Background Tasks icon displays the whether there is a background task running.

	Auto-learn is in progress
	Auto-learn is complete

You can clear the icon (change it back to a star), or stop the session by selecting the icon. The Manage Background Tasks dialog includes:

- When Auto-Learn was started
- Inspection name
- Sensor name where Auto-Learn was started
- The reason Auto-Learn was started

See "Background Tasks" on page 13 for more information.

View these icons in the menu toolbar at the top of the screen, or near the lane name in System Overview mode.

1) Icon displayed near lane in System Overview mode

2) Icon displayed in menu toolbar in Lane or Sensor Overview modes

Stopping Auto-Learn

The inspection will stop the Auto-Learn session if you do one of the following:

-  Select the Background Task icon while Auto-Learn is running | select Manage Background Tasks | and select the Cancel button (as long as you have the correct permissions).
- If using "Operator Trigger" on page 546, right-click in the inspection tree where the inspection with Auto-Learn is located | select Stop Auto Learn | and select the Cancel button from the Manage Background Tasks dialog.
- Make a change to an inspection that affects Auto-Learn while the system is in the Auto-Learn session when you finish editing the inspection. Auto-Learn starts again automatically in Learn mode. See "Learn Modes" on page 552.
- Have N consecutive parts that fail the current histogram, if Learn More is used. N = Part Count to Learn.
- Restart the system*
- Switch to a different part program*

> *Note: *If you restart the system or switch to a different part program, the system remembers that it was learning when Auto-Learn was stopped. It automatically starts Auto-Learn from the beginning when you put the original part program online again. It remembers which learn mode was used and uses those settings.*

Restarting Auto-Learn

Once Auto-Learn has started, it will continue until it is complete. The only way to restart is to first stop the Auto-Learn session and then trigger it again.

There are three exceptions:

- If you edit an inspection that affects an Auto-Learn. That Auto-Learn session stops automatically and then another session starts immediately in Learn mode.
- The "No Parts Seen Trigger" on page 548 stops an Auto-Learn session in progress and then starts another session immediately in the selected mode.
- A part change is indicated: the Mode is either Assume Part Change, or it is Detect Part Change and a part change was detected. This will restart auto-learning in progress for the given target: This Inspection or All Inspections. After this restart the inspection(s) will be learning in mode Learn and using Tramp Detection.

Chapter 21 Defect Database

> *Note: the Defect Database tool is an optional feature. To purchase this feature, please contact your Pressco Sales Manager. Additional hardware may be required, depending on your system. How to Contact Pressco.*

The Series V Intellispec system is capable of archiving data associated with defective parts. The archiving of this data may be enabled or disabled. The defect data collected includes information related to the part program, lanes, inspections, sensors and correlated machine parts. The information can be from any type of sensor - camera, x-ray, mass, etc. The Defect Database tool allows you to search, view, and report defect information.

What is the Defect Database?

The Defect Database is a tool within the Intellispec system that uses a separate hard drive used to archive information associated with rejected parts. This tool has two components:

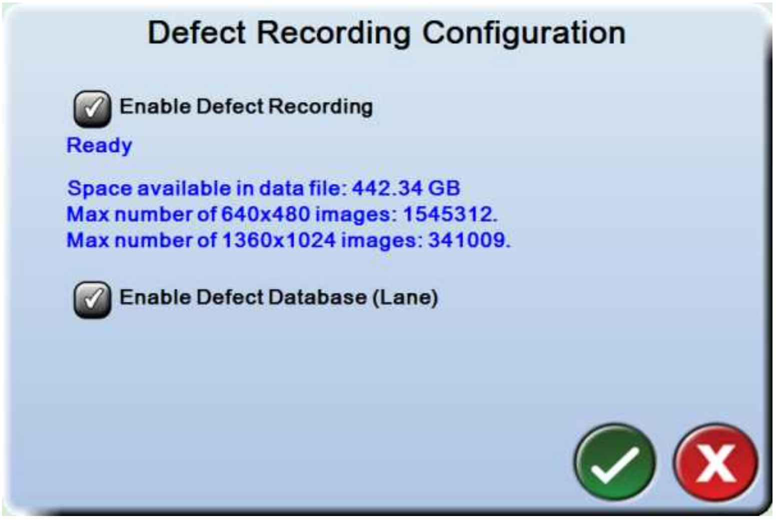
- The Defect Data File that contains images of parts that have been rejected, and
- The Defect Database that stores defect information for each part that has been rejected.

Defect Database Specifications and Limitations

- The Defect Database is an option and therefore has to be part of the original install, or purchased as an upgrade.
- A separate hard drive is installed to support this database. A minimum 500GB hard drive is recommended.
  - If your system has a part number 70315 or higher, then it is hardware-ready. This means that the system has the hardware capable of running the Defect Database.
  - If your system has a part number below 70315, then additional hardware (hard drive and possibly memory) may be required. Contact Pressco.
- The Defect Database is maintenance-free.
- A separate database is created for each lane. You must enable the Defect Database individually for each lane.
- The Defect Database supports up to 500,000 records for each lane.
- The number of images available depends on the size of the Defect DB hard drive installed. You can see this information on the Intellispec screen on your system. (see example below) This total number of images is shared between all lanes. As defect images are written first-come first-served, more images are stored for a lane with a higher number of defects.
- There may be more records for all lanes than available image space. Therefore the oldest records may have no valid image associated.
- We cannot guarantee that all records and all images are saved because of memory constraints and available time for writing images to a hard drive.
- The Defect Database is designed to limit interference with the inspection system. This means that under high system load data may not be recorded as the database has to yield to the inspection system.
- The Defect Database file size is fixed. The entire hard drive space is allocated upon initial setup. When the database reaches its maximum number of records or images, it overwrites

the oldest information.

- Example file size and number of images available:



Note the following about the Defect Database

The information below refers to content you can find by using the Defect Database Viewer.

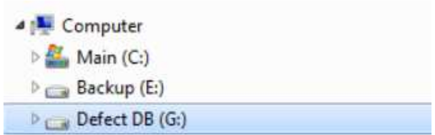
- Defect images can be accessed from the Defect Database by looking at details of a search result record.
- You can create defect rate reports over a time span for any or all part programs.
- You can search the database by criteria including:
  - Part program
  - Sensor
  - Inspection (your name for the inspection, such as "Find Center")
  - Inspection type (Intellispec inspection type, such as "Contrast")
  - Sets of machine parts (such as "Cavity 3 through 10" or "Spindle 1 through 100")
  - Time span of calendar dates and clock times

Preparing the Database

> *Note: the Pressco installer will configure your database upon installation if you have purchased this option with your system. However, if you purchase this option as an upgrade, you may need to configure the database as described below.*

What you need:

- A dongle with the Defect Database feature enabled (provided with the purchase of the feature).
- A hard drive labeled “Defect DB” The size of the hard drive determines the number of images that can be stored. (At least 500 GB of storage is recommended, more if you are using cameras of resolutions higher than 640x480). Name the hard drive "Defect DB" using the Computer or Windows Explorer on the Intellispec system. The drive letter does not matter. Make sure to use the exact capitalization and spacing as shown.

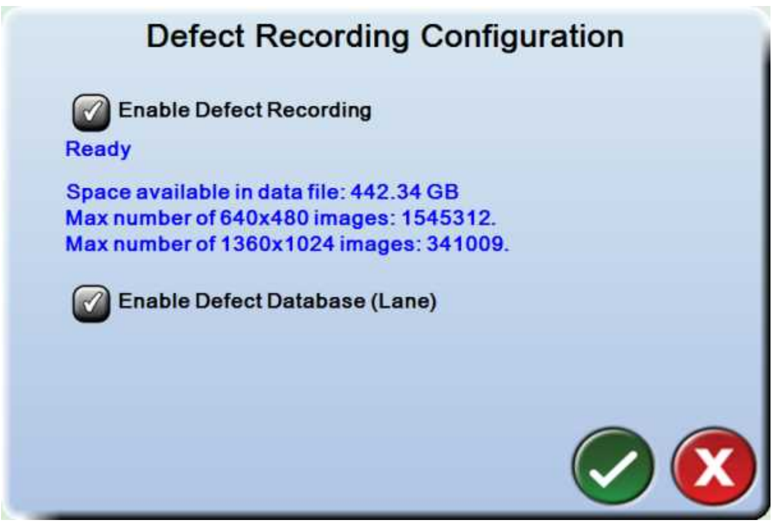


Enabling Defect Recording versus Defect Database

Enabling Defect Recording will start saving images to the Defect Data File, which can be accessed by using the Defect Data (Images) Viewer. You can disable Defect Recording (recording of images and data of non-image type sensors) for each lane individually. However, in order to enable the Defect Database that stores defect information for each part that has been rejected, Defect Recording must be enabled. Enabling the searchable Defect Database is described next.

To enable the Defect Database:

From Lane Overview or Sensor Overview mode, select the Tools button | Lane Setup | Select Features | Defect Recording. The configuration menu is displayed. (This menu is only available when you have the configured dongle and hard drive as described above)



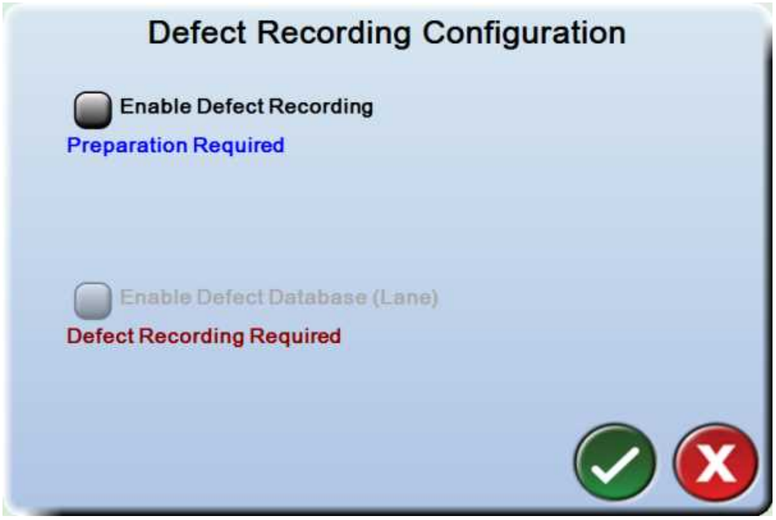
- If Preparation Required is displayed, then you need to set up the Defect Database; see below. Otherwise, if any box is unchecked you can enable the option by checking it. You can only check “Enable Defect Database (Lane)” if “Enable Defect Recording” is already checked.
- If both boxes are checked, then the Defect Database is ready to use.

Prepare the hard drive for defect recording. This process needs to be done only once.

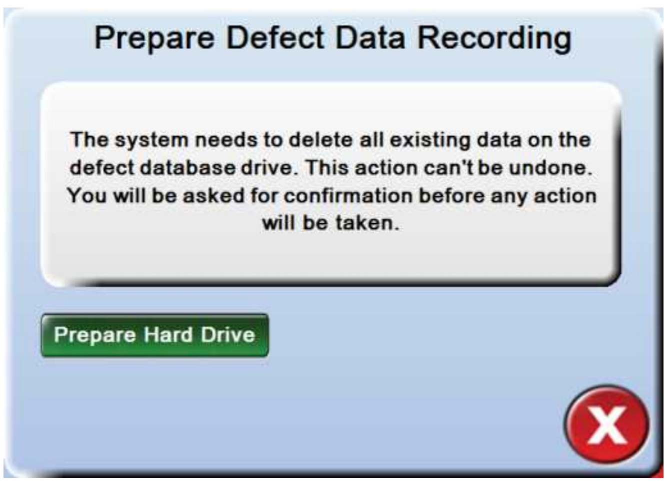
To prepare the hard drive:

> *Warning - When you complete these steps, all information from the Defect DB hard drive is deleted. In addition, if you are upgrading from a system with software earlier than 5.0.480 that was already using the Defect Database, then the entire old database will be erased. This action cannot be undone.*

1.  From the Intellispec application, go to Lane Overview or Sensor Overview mode and click the Tools button | Lane Setup | Select Features | Defect Recording. The configuration menu is displayed. It should indicate that preparation is required.

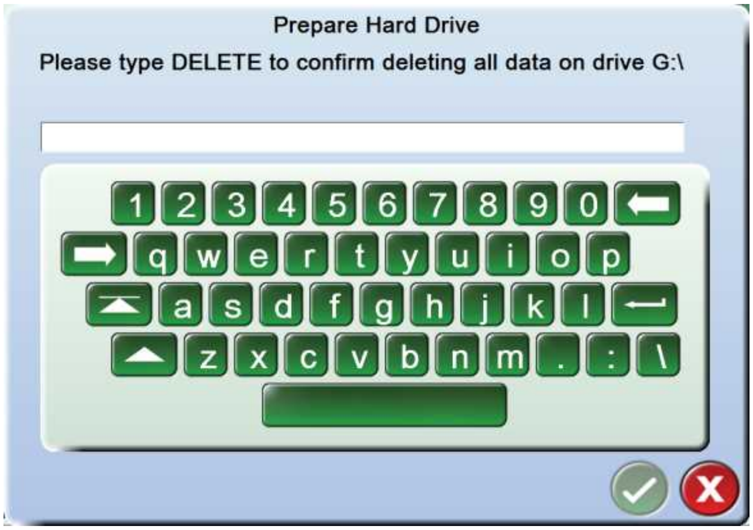


2. Check the Enable Defect Recording box. A message will explain that the Intellispec system will delete everything from the hard drive that it recognizes as "Defect DB."

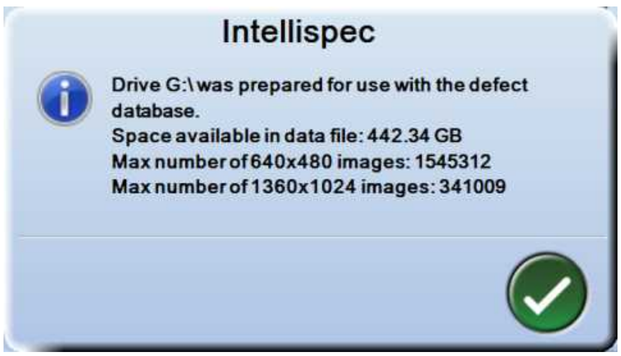


3. Click the Prepare Hard Drive button. As a safety precaution, the system asks you to type the word "DELETE" before it prepares the hard drive.
4. If you are sure that you want all information deleted from the "Defect DB" hard drive, type DELETE in all capital letters on the displayed keyboard, then click the OK button. This action does two things:
   a. Formats the hard drive, and
   b. Creates a large file on the hard drive that holds the images and the non-image sensor

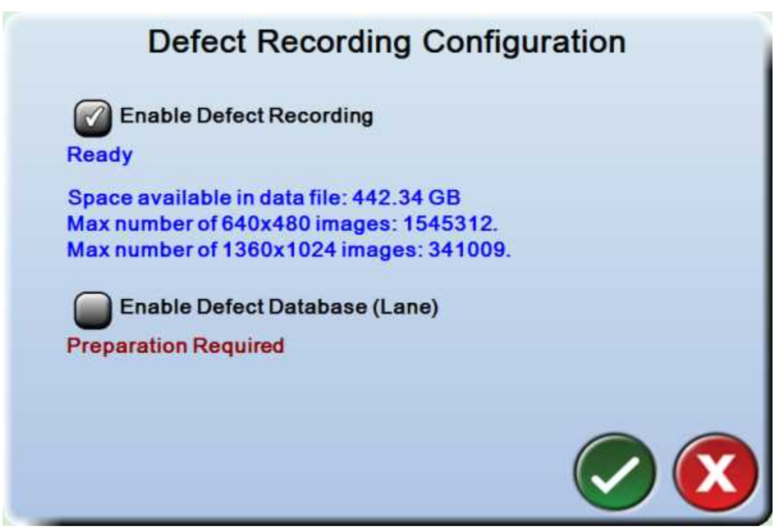
data. This file is shared by all lanes.



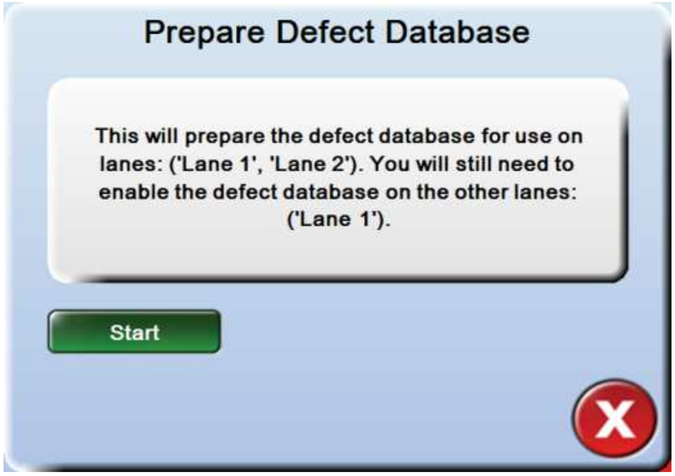
5. The hard drive is prepared. A message indicating the space available on your hard drive is displayed. Click the OK button to continue.



6. The configuration menu is displayed, showing that Defect Recording has been enabled. The Defect Database (non-image sensor data) still needs to be prepared. Check the Enable Defect Database (Lane) box to begin preparation.



7. The system displays a message stating that it will prepare the database for all lanes. Click the Start button to continue.



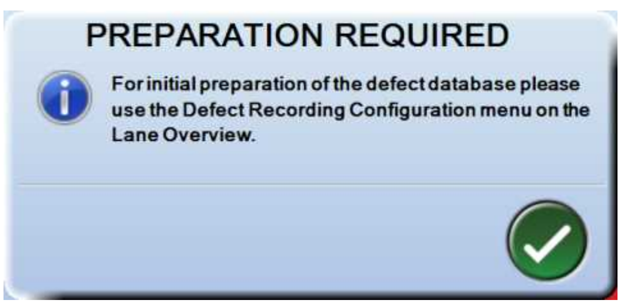
The Defect Database is ready to use on the lane on which it was enabled. The database will record defects and images each time you put the lane online. Enable the Defect Database for other lanes through the Defect Writing menu.

Enabling or Disabling Defect Writing

From System Overview mode, you can enable or disable Defect Recording (images) and the Defect Database (data) for all lanes.

First time usage

If this is the first time you are using this feature, you must prepare the hard drive once from Lane Overview mode. If you select Defect Writing | Configure Defect Writing from the Tools menu in System Overview mode without first preparing the hard drive, the following message will be displayed.



Go to "Preparing the Database" on page 556 for information on setting up the hard drive to configure your defect database.

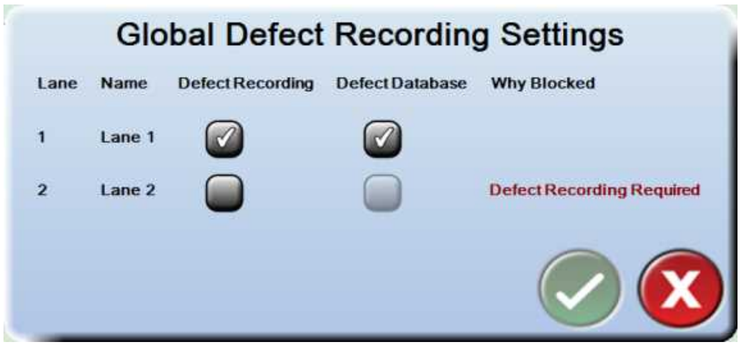
> *Note: once the hard drive is prepared initially, you do not need to prepare it again for additional lanes, except if you add a lane subsequent to preparing the database the first time. If you have added a lane, then you will need to prepare the database through Lane Overview mode on the new lane.*

Subsequent usage

If you have previously used the Defect Database and disabled it from any or all lanes, you can enable it for multiple lanes at once. No further hard drive preparation is required after initial setup.

To enable the Defect Database on any lane:

1.  From System Overview mode , select Tools | Defect Writing | Configure Defect Writing.

2. To enable Defect Recording (the recording of images), check the Defect Recording box.
3. Check the Defect Database box to enable recording of non-image sensor data. The database is enabled for the selected lane(s).
4. Click the OK button to save changes and exit.

The system is ready to record defect images and data as you selected.

Saving Items to the Database

To save items to the database, the database must first be enabled. See "Preparing the Database" on page 556.

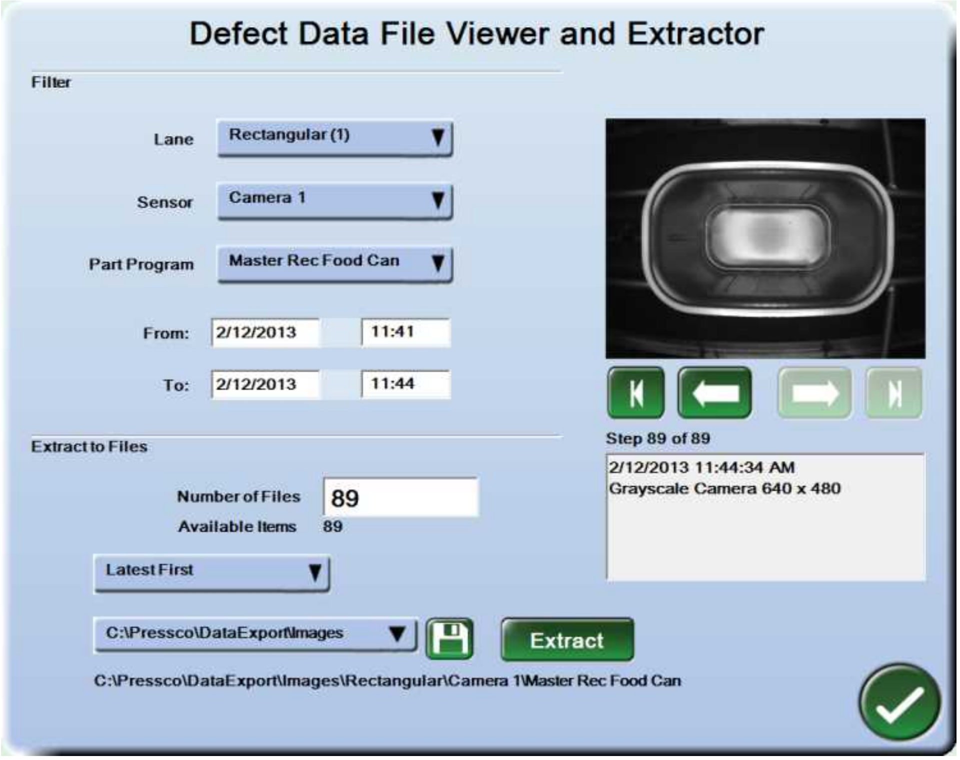
Each time you put a lane online, the Intellispec saves defect information and images to the database. The defect database for each lane has a fixed number of 500,000 records, and once this number is reached the oldest records will be overwritten with the newest ones.

> *Note: when the database is prepared, the entire hard drive space is used, so the "Defect DB" hard drive will appear full. The Defect Database Tool places images and defect information into the database, using allocated placeholders in the database. You will not be able to tell whether the database is full by looking at hard drive space.*

Defect Data (Images) Viewer

The defect data viewer is an auxiliary tool that allows access to the contents of the Defect Data File, which is a very large file containing image data and data of non-image sensors, such as Mass. This tool is not part of the defect database but provided for your convenience.

 To open the Defect Data Viewer: From Lane Overview or Sensor Overview mode, select Tools | Reporting | Defect Data Viewer.



If the lane was online when you opened the viewer, the database will continue to collect defect data and images. However, the information in the viewer reflects only the data as of the time you opened the viewer. To see more recent data, you must close and re-open the Defect Data Viewer.

Filtering images In the upper part of the menu, you can filter the images you want from the database. Choose from lane, sensor, part program, and date range. This affects the list of images available to view on the right of the menu, as well as the images you may export from the lower part of the menu.

Viewing defect images Images are displayed on the right side of the viewer. Use the buttons below the image to scroll through the available images.

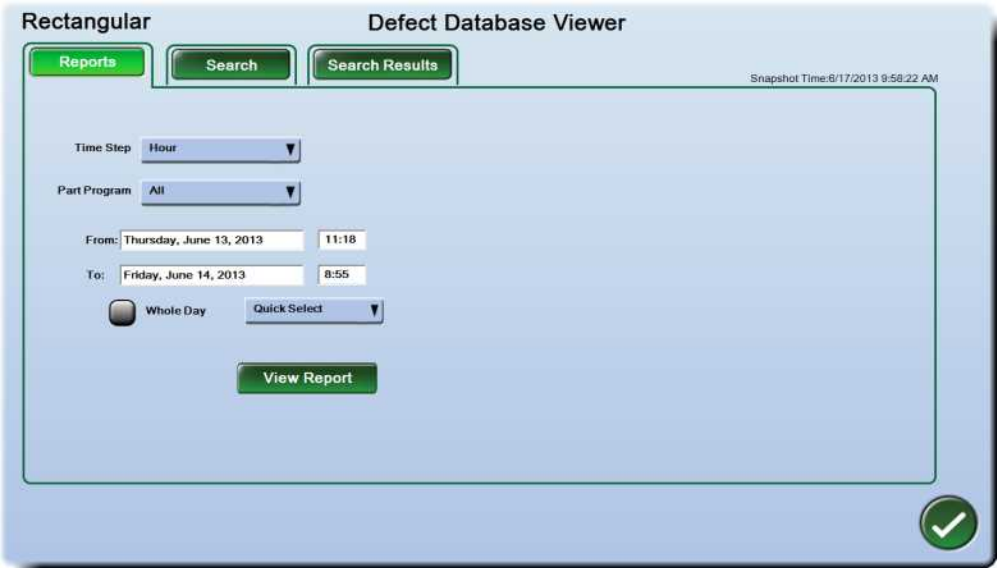
Extracting images In the lower part of the menu, you can extract images from the database for use in another location or during part program setup. The images available for extracting are determined by the filter settings in the upper menu.

To extract images:

1. Enter the Number of Files if you want to save a different number of images than the available items.
2.  Click the disk icon to change the location to which to extract the images, and browse to the desired location.
3. Click the Extract button to save the selected images.

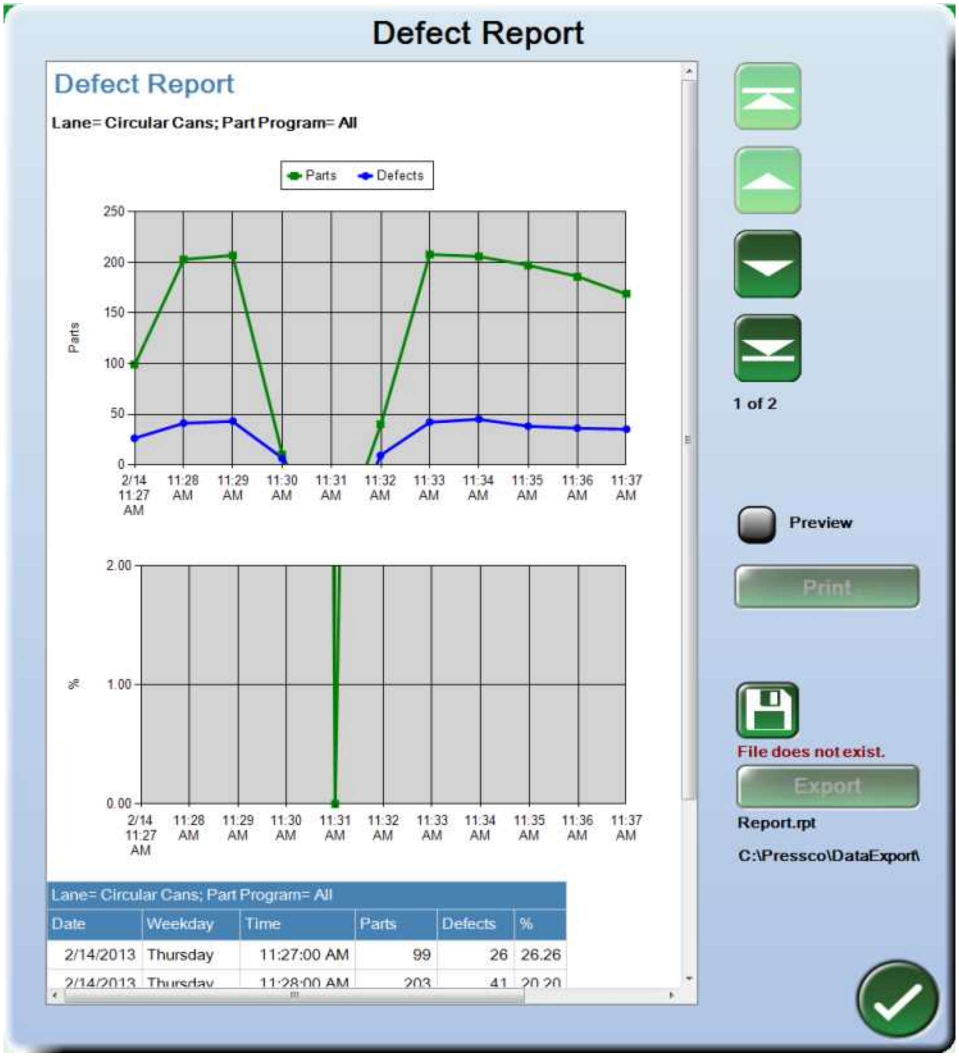
Reports

The Reports tab allows you to view reports by minute, hour, or day. You can choose from all or a single part program. A date/time range picker is provided to limit the report to a specific period. The Quick Select drop-down menu allows you to choose a time period of the last 24 hours, today's data (until the snapshot time), or all available data.



Click the View Report button to see the report from the selected criteria.

The example below shows a report with a time step of one minute. Use the buttons on the right side of the window to page through the reports.



Printing the report

Click the Preview button to enable the print function. A print preview is displayed. Use the Print button to print the report to the configured printer. (For more information, see "Set Up a Printer" on page 483)

Saving the report to file

If you have not yet saved any reports, then a message stating "File Does Not Exist" is displayed below the disk icon.

To save a new report:

1.  Click the disk icon. The Select File window is displayed.
2. If desired, use the disk icon in the Select File window to browse to a different location on the hard drive, or a USB drive. Browse to the desired location and click the OK button to continue.
3. Click the New button in the Select File menu to create a new report file name. The onscreen keyboard is displayed.

4. Type the report name, and click the OK button to continue. A file is created at C:\Pressco\DataExport (or another location that you selected in step 2) but no data is saved yet.
5. Click the Export button from the Defect Report window. The report is saved as a text (.txt) file and the file name contains lane, time interval, and time stamp information. You can use this data in your own spreadsheets or other databases to chart your plant's defect data.

To save new data to an existing report name:

You can use an existing report name to save more data to a new file. The last used report name is displayed under the Export button.

Click the Export button to save new data. The report is saved as a new text (.txt) file. The file name contains lane, time interval, and time stamp information. You can use this data in your own spreadsheets or other databases to chart your plant's defect data.

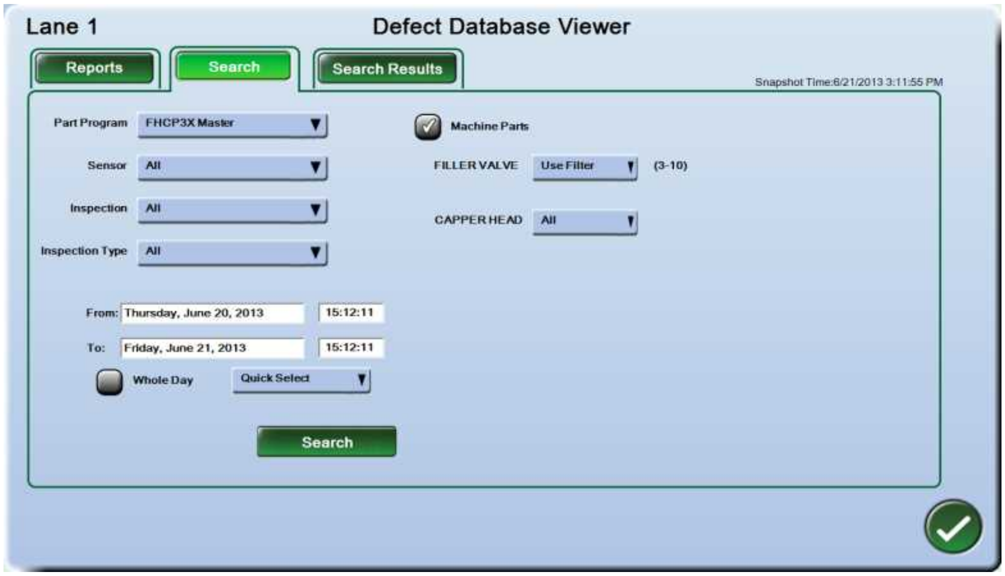
Example of an exported report

The file below is an example of a text file exported from the Defect Database. The file is tab-separated, and you can import it into your preferred reporting software. The header describes the contents in detail. The header text and all number and time formatting depend on the currently chosen language.

```
File  Edit  Format  View  Help
# Number of Comment Lines=23
# Separator=Tab
#
# Column Descriptions
# Row                          The running number of the record.
# Weekday                      The weekday of the start of the record's time interval.
# Date                         The date part of the start of the record's time interval.
# Time                         The time part of the start of the record's time interval.
# Part Program                 Each part program that was loaded and reported defects during the record's time interval.
# Seconds                      The start of the record's time interval, given in number of seconds since 1/1/2012 12:00:00 AM.
# Parts                        Number of parts processed during the record's time interval and while using the selected part progra
# Defects                      Number of defects found in processed parts during the record's time interval and while using the sel
# Defect %                     The ratio of defects to parts, in percent.
#
# Parameters
#p Lane                    Lane 1
#p Part Program            All
#p From:                   Friday, June 21, 2013 12:00:00 AM
#p To:                     Saturday, June 22, 2013 12:00:00 AM
#p Snapshot Time           Friday, June 21, 2013 4:16:53 PM
#p Time Step               One Minute
#p Report Creation Time    Friday, June 21, 2013 4:17:31 PM
#
Row   Weekday    Date        Time       Part Program                            Seconds     Parts   Defects Defect %
  1   "Friday"   6/21/2013   10:49:00   "FHCP3X Master"                         46435740        1         1   100.00
  2   "Friday"   6/21/2013   10:50:00   "FHCP3X Master"                         46435800       44         4     9.09
  3   "Friday"   6/21/2013   15:11:00   "FHCP3X Master"                         46451460      170        23    13.53
  4   "Friday"   6/21/2013   15:12:00   "FHCP3X Master"                         46451520      428        63    14.72
  5   "Friday"   6/21/2013   15:13:00   "FHCP3X Master"                         46451580      141        23    16.31
  6   "Friday"   6/21/2013   16:14:00   "FHCP3X Master"                         46455240       32         6    18.75
  7   "Friday"   6/21/2013   16:15:00   "FHCP3X 5.2 testing"                    46455300      126       110    87.30
  8   "Friday"   6/21/2013   16:15:00   "FHCP3X 5.2 testing - enhancements"     46455300      119       119   100.00
  9   "Friday"   6/21/2013   16:16:00   "FHCP3X 5.2 testing - enhancements"     46455360        9         9   100.00
 10   "Friday"   6/21/2013   16:16:00   "FHCP3X Master"                         46455360      271        39    14.39
```

Search

The Search tab allows you to search the database by part program, sensor, inspection, inspection type, date, time, and machine part.



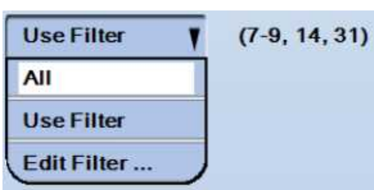
To start the search:

1. Choose the desired filters from the available options.
2. Click the Search button. The search may take a few seconds depending on the search criterion and the size of the database. Afterwards, the Search Results tab is automatically selected.

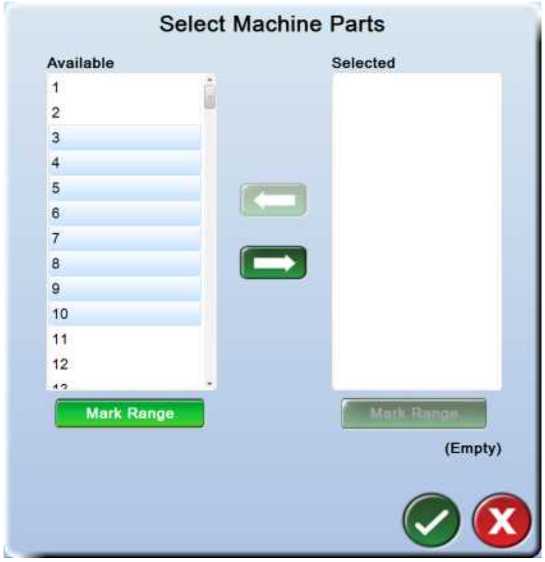
If your system uses machine parts, you have the option of searching for defects by machine part.

To search by Machine Part:

1. Check the box next to "Machine Parts" to enable the search filters.
2. If you want to search by all machine parts, leave the drop-down menu at "All."



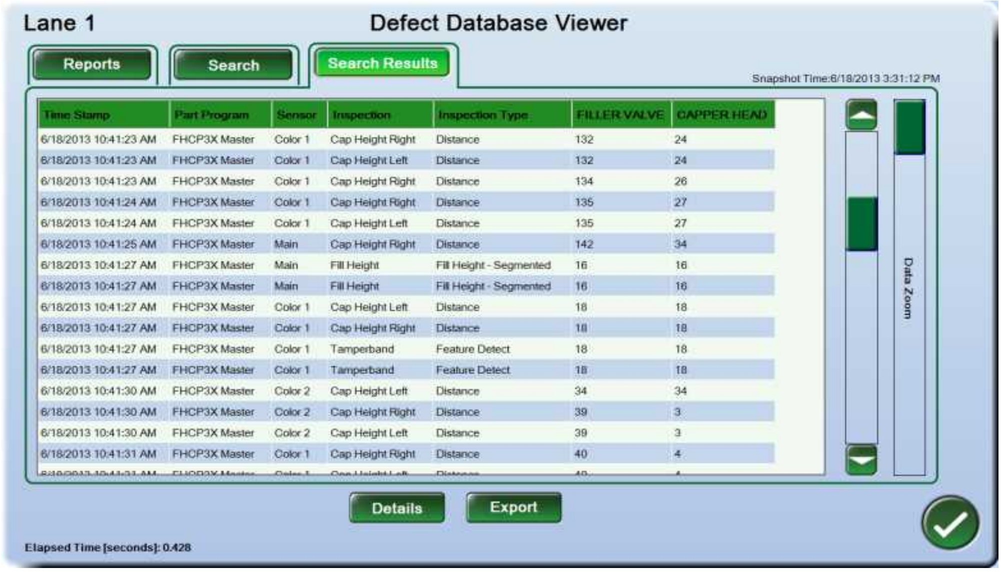
3. To select specific machine parts, select "Use Filter" in the drop-down menu. The Select Machine Parts screen is displayed.



4. Select a machine part number in the "Available" column. Click the right arrow button to move that machine part number to the "Selected" column.
   a. To select additional machine parts, select each machine part, then click the right arrow button to move each into the "Selected" column.
   b. To select contiguously listed machine parts, select the first desired machine part, then click the Mark Range button. Select the last listed machine part you want to search for. The system selects all machine parts between the first and last machine part you selected. Click the right arrow button to move all those machine parts to the "Selected" column.
5. To de-select any machine part, highlight it in the "Selected" column, then click the left arrow button to move it to the "Available" column. Use the Mark Range feature to select a group of contiguously listed machine parts.
6. All selected machine parts are listed below the "Selected" column. Click the OK button to save changes and exit. The selected machine parts are also displayed in the Defect Database Viewer Search screen.
7. In the Defect Database Viewer Search tab, an "Edit Filter" option is added to the drop-down menu. You can change the list of machine parts to search using the "Edit Filter" option.

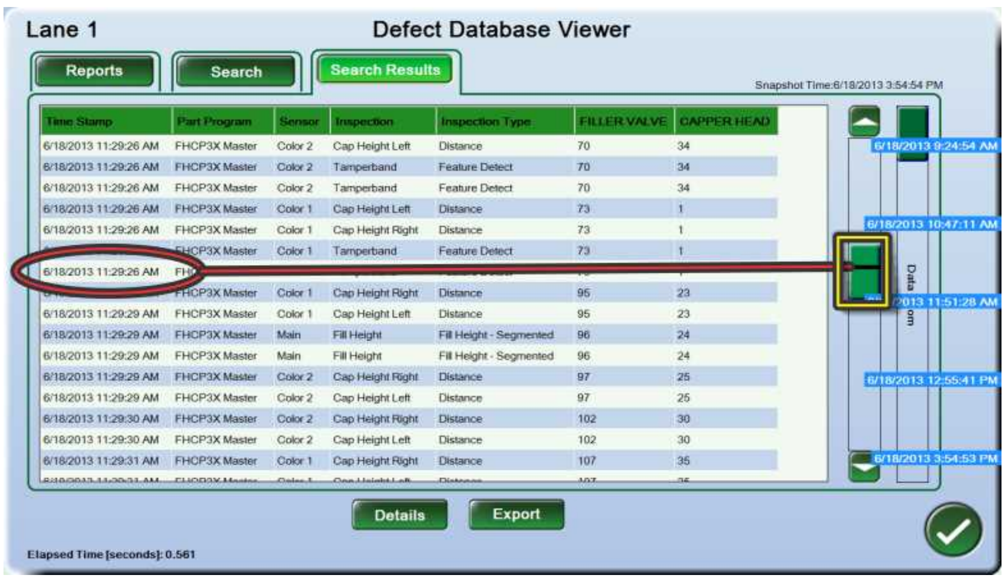
Search Results

After performing a search, the Search Results tab is automatically selected. Defect data returned as search results is presented within the grid. Each row represents an inspection associated with a defective part based on the search criteria. Each column represents specific information about the inspection (for example, part program, inspection name, sensor, status, time stamp, etc.). Use the scroll bars to see data from a specific time period.

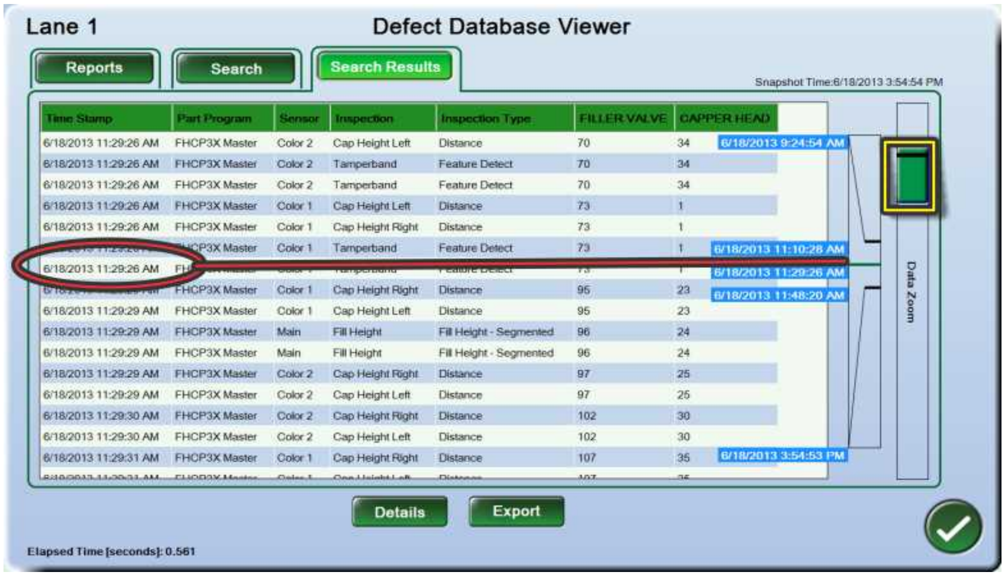


Scrolling through the data

Click the scroll bar to the immediate right of the grid to scroll to a specific record. Labels appear indicating the time stamps that will be scrolled to when moving the button next to the label. Note that the labels are spaced by records not by time.



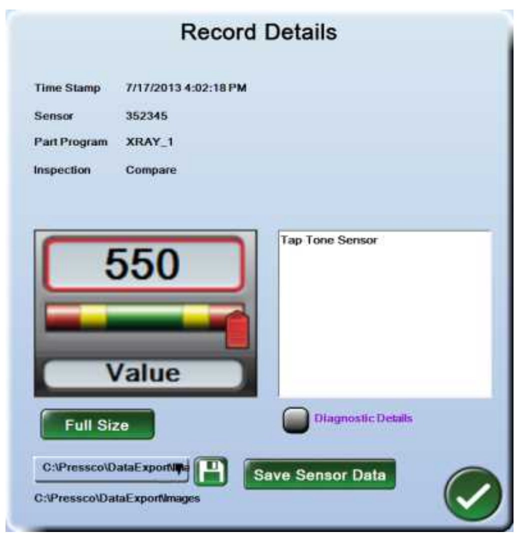
For larger data sets (more than about 160 records) a second scrollbar “Data Zoom” appears to the right of the first scroll bar. This allows narrowing in on the time of interest. While moving the Data Zoom scroll bar two thick lines appear in the first scroll bar, which indicate the time span to which scrolling will be restricted. Labels indicate the times of the first and last record of the search result; the first and last record of the current scroll restriction selected by Data Zoom and of one currently displayed record. Use the first scroll bar to get closer to the desired time and repeat the process as needed.



Viewing result details

Click the Details button for a highlighted item to view the Record Details. This window displays the associated image and inspection information. It also allows you to export the image. The Full Size button brings up a viewer showing the unscaled image in full resolution (screen resolution may restrict this for images of very high resolution).

or

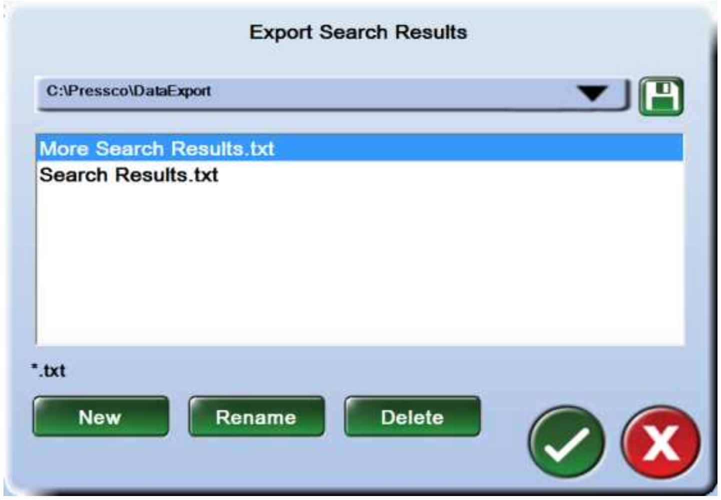


> *Note: The details viewer will not always show a specific text such as “Distance too Large.” This depends on the type of inspection and the specific type of defect.*

Exporting the results

To export the results:

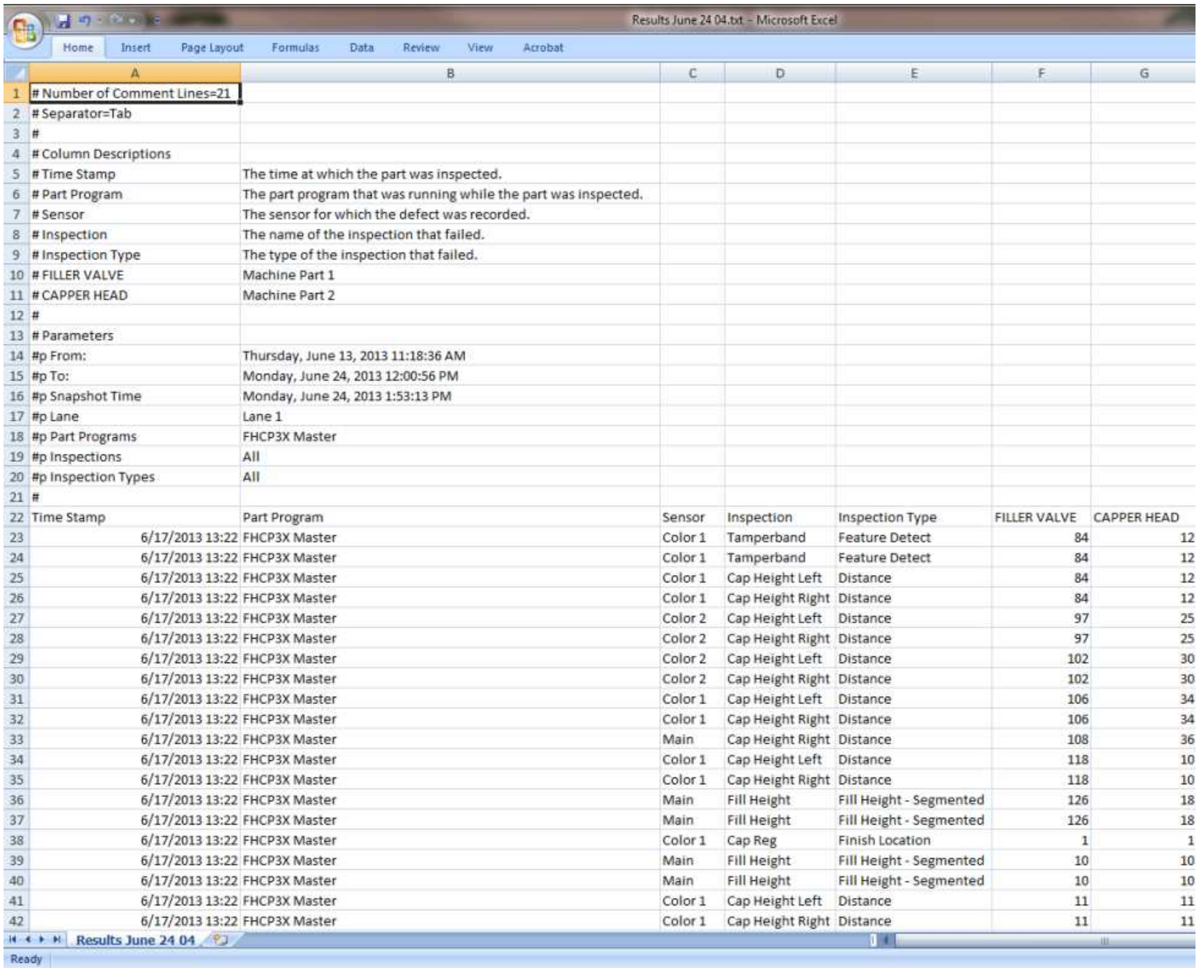
1. Click the Export button at the bottom of the Defect Database Viewer Search Results screen. The Export Search Results window is displayed.



2. If desired, use the disk icon to browse to a different location on the hard drive or a USB drive. Browse to the desired location and click the OK button to continue.
3. Select an existing file from the displayed box, or click the New button to create a new report file name.
4. (If creating a new file) In the on-screen keyboard type a file name, and click the OK button to continue. A file is created at the location displayed in the drop-down but no data is saved yet. Highlight the new file as in step 3.
5. Click the OK button. The search results are saved as a text (.txt) file. You can use this data in your own spreadsheets or other databases to chart your plant's defect data.

Exported Search Results Example

The file below is an example of a text file exported from the Defect Database after using the Search feature. The file is tab-separated, and you can import it into your preferred reporting software. The header describes the contents in detail. The header text and all number and time formatting depend on the currently chosen language.



	A	B	C	D	E	F	G
1	# Number of Comment Lines=21						
2	# Separator=Tab						
3	#						
4	# Column Descriptions						
5	# Time Stamp	The time at which the part was inspected.					
6	# Part Program	The part program that was running while the part was inspected.					
7	# Sensor	The sensor for which the defect was recorded.					
8	# Inspection	The name of the inspection that failed.					
9	# Inspection Type	The type of the inspection that failed.					
10	# FILLER VALVE	Machine Part 1					
11	# CAPPER HEAD	Machine Part 2					
12	#						
13	# Parameters						
14	#p From:	Thursday, June 13, 2013 11:18:36 AM					
15	#p To:	Monday, June 24, 2013 12:00:56 PM					
16	#p Snapshot Time	Monday, June 24, 2013 1:53:13 PM					
17	#p Lane	Lane 1					
18	#p Part Programs	FHCP3X Master					
19	#p Inspections	All					
20	#p Inspection Types	All					
21	#						
22	Time Stamp	Part Program	Sensor	Inspection	Inspection Type	FILLER VALVE	CAPPER HEAD
23	6/17/2013 13:22	FHCP3X Master	Color 1	Tamperband	Feature Detect	84	12
24	6/17/2013 13:22	FHCP3X Master	Color 1	Tamperband	Feature Detect	84	12
25	6/17/2013 13:22	FHCP3X Master	Color 1	Cap Height Left	Distance	84	12
26	6/17/2013 13:22	FHCP3X Master	Color 1	Cap Height Right	Distance	84	12
27	6/17/2013 13:22	FHCP3X Master	Color 2	Cap Height Left	Distance	97	25
28	6/17/2013 13:22	FHCP3X Master	Color 2	Cap Height Right	Distance	97	25
29	6/17/2013 13:22	FHCP3X Master	Color 2	Cap Height Left	Distance	102	30
30	6/17/2013 13:22	FHCP3X Master	Color 2	Cap Height Right	Distance	102	30
31	6/17/2013 13:22	FHCP3X Master	Color 1	Cap Height Left	Distance	106	34
32	6/17/2013 13:22	FHCP3X Master	Color 1	Cap Height Right	Distance	106	34
33	6/17/2013 13:22	FHCP3X Master	Main	Cap Height Right	Distance	108	36
34	6/17/2013 13:22	FHCP3X Master	Color 1	Cap Height Left	Distance	118	10
35	6/17/2013 13:22	FHCP3X Master	Color 1	Cap Height Right	Distance	118	10
36	6/17/2013 13:22	FHCP3X Master	Main	Fill Height	Fill Height - Segmented	126	18
37	6/17/2013 13:22	FHCP3X Master	Main	Fill Height	Fill Height - Segmented	126	18
38	6/17/2013 13:22	FHCP3X Master	Color 1	Cap Reg	Finish Location	1	1
39	6/17/2013 13:22	FHCP3X Master	Main	Fill Height	Fill Height - Segmented	10	10
40	6/17/2013 13:22	FHCP3X Master	Main	Fill Height	Fill Height - Segmented	10	10
41	6/17/2013 13:22	FHCP3X Master	Color 1	Cap Height Left	Distance	11	11
42	6/17/2013 13:22	FHCP3X Master	Color 1	Cap Height Right	Distance	11	11

Abnormal Results

Sometimes you may see results in the database that do not show defect data. These are rare situations, but can be caused by high part rates, high defect rates, or a heavy processor load on the system. You may also have less space for images in the defect data file than the total number of defect database records over all lanes, so images in the defect data file may already have been overwritten for the oldest records in the defect database.

Stale Data

This happens when the real time processor was busy for too long while the image was pending a write to the hard drive. This condition may happen when there is a high defect rate and a high load on the system. In this case the record exists in the database but the image is not valid because it was never written in the first place.

Recycled Data

This happens for the oldest records in the defect database when their images in the defect data file have been overwritten.

Spilled Record

This happens when the defect record (not image) cannot be written to the hard drive. This may occur if the system is too busy writing images to the hard drive. The screen will indicate how many defect records were spilled during which time interval.

Chapter 22 Intellispec OPC

OPC Introduction

OPC (OLE {Object Linking and Embedding} for Process Control) is a data communication standard developed by leading manufacturing equipment and software vendors, in conjunction with Microsoft. Its purpose is to promote interoperability between a wide variety of data sources and the consumers of that data, eliminating the need for diverse and incompatible “drivers” for each separate device or program.

The OPC specifications are developed and administered by the OPC Foundation: http://www.OPCFoundation.org

The Pressco OPC Server for Intellispec systems supports the OPC Foundation “Data Access” specification. It is compatible with all versions of the specification in widespread use today (1.0a, 2.05 and 3.00). The OPC Server does not support other OPC specifications (including Alarms & Events, Historical Data or XML Data or Unified Architecture).

The Intellispec OPC Server is an optional feature - contact your Pressco sales manager for details.

To learn more about OPC, visit these links:

What is OPC?: https://opcfoundation.org/about/opc-technologies/opc-classic/

Open Platform Communications: https://en.wikipedia.org/wiki/Open_Platform_Communications

Or perform a search on the Internet, using "OLE for process control" as the search criteria.

The Intellispec OPC Server

Sampling rate

Sampling of data is based on an ‘update rate,’ which is specific to a group of OPC data items. There may be several groups of items, each having an update rate appropriate for the items in that group. The maximum update rate supported by the OPC Server is 100 milliseconds (i.e. 10 updates / second); this may be less depending on the system configuration, part programs and part rates. Note that OPC does NOT support event-driven data updates; example, every 10,000 parts inspected or every rotation of a machine part.

Defect statistics

The data items available from the Intellispec OPC Server include most inspection defect statistics produced by the system. In particular, the following five items will be found:

- TotalNumberInspected: the number of parts inspected since last reset.
- TotalNumberDefects: the number of defective parts identified since last reset.
- TotalPercentDefects: the defective part rate expressed as a percentage of total number inspected, since statistics were last reset.
- RecentNumberDefects: the number of defective parts over the last “N” number of parts inspected, where “N” is a configurable system parameter.
- RecentPercentDefects: the defective part rate expressed as a percentage of the last “N” parts inspected, where “N” is a configurable system parameter.

These data items appear repeatedly within a hierarchical ("multi-level") structuring of the data items and represent a variety of different subsets of the parts inspected. More specifically, they are maintained for every lane in the system (top level), every camera or sensor within each lane (second level) and every individual inspection within each camera (third level). Some values are also available for correlated machine parts when the system is so configured.

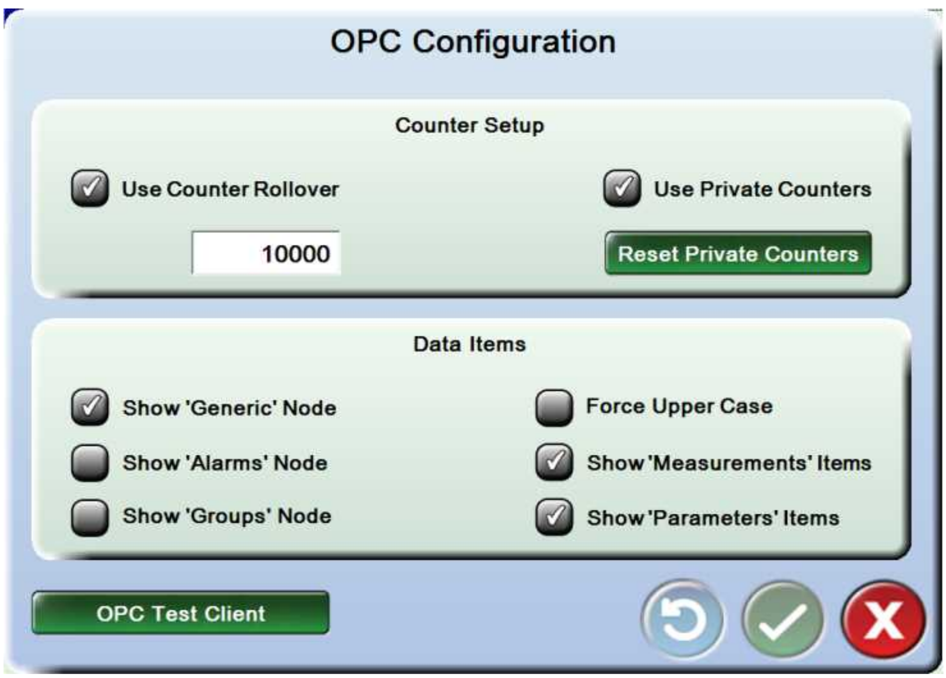
The exact names of the levels containing these data items are automatically derived from the names given to the lanes, cameras and inspections programmed into the Intellispec system. This makes "browsing the tree" of available data items extremely intuitive and eliminates the tedious and time-consuming process of OPC server configuration.

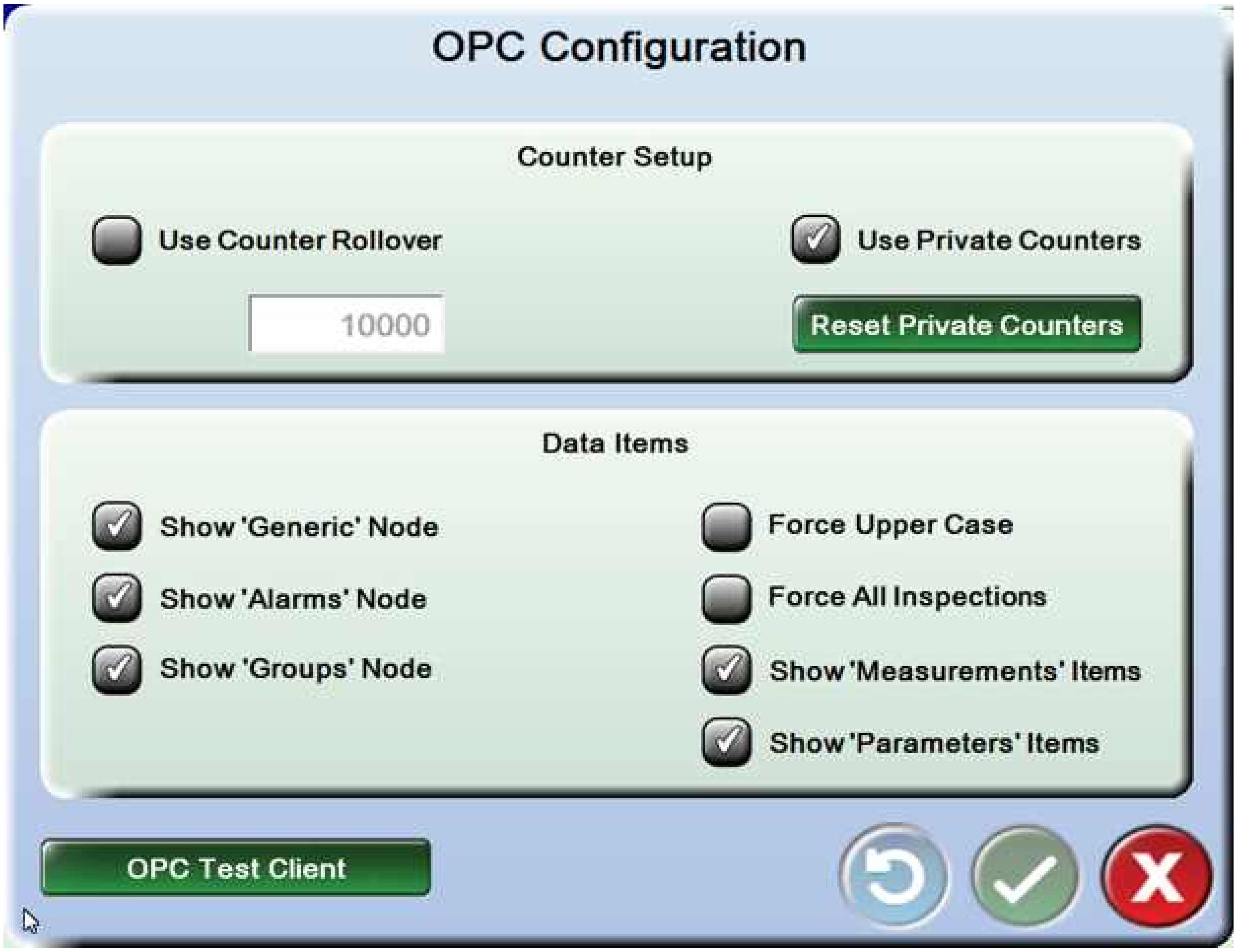
OPC Configuration

The OPC Configuration screen provides access and settings to the OPC server.

To access OPC Configuration:

1. Log in.
2.   Select Home | Tools | OPC Configuration. The OPC Configuration dialog opens. Please see the information about each section below.





Counter Setup

See Counter Rollover or Using the OPC Private Counters option.

Data Items

"Show Alarms Node" and "Show Groups Node" are not used. "Force Upper Case" is only used for compatibility with a specific OPC client - in most cases it is not used.

Show 'Generic' Mode Use this to view items when inspection names or other parameters have been re-named using non-ASCII characters. Note that everything is named generically, including sensors, lanes, and inspections.

> *Tip: This can be used by Pressco Service Engineers to view data that is not in English.*

Force Upper Case This is only used for compatibility with a specific OPC client. In most cases, it is not used.

Force All Inspections When this is not enabled (the default), any inspections of type (“category”) Region, Registration, Orientation, or Enhancement will not be included in the OPC item namespace. If it is enabled, then all inspections will be included in the namespace.

Show 'Measurements' Items - See "Measurement Data Items" on page 580.

Show 'Parameters' Items - See "Parameter Data Items" on page 581.

Permissions Reserved for Pressco Technicians only.

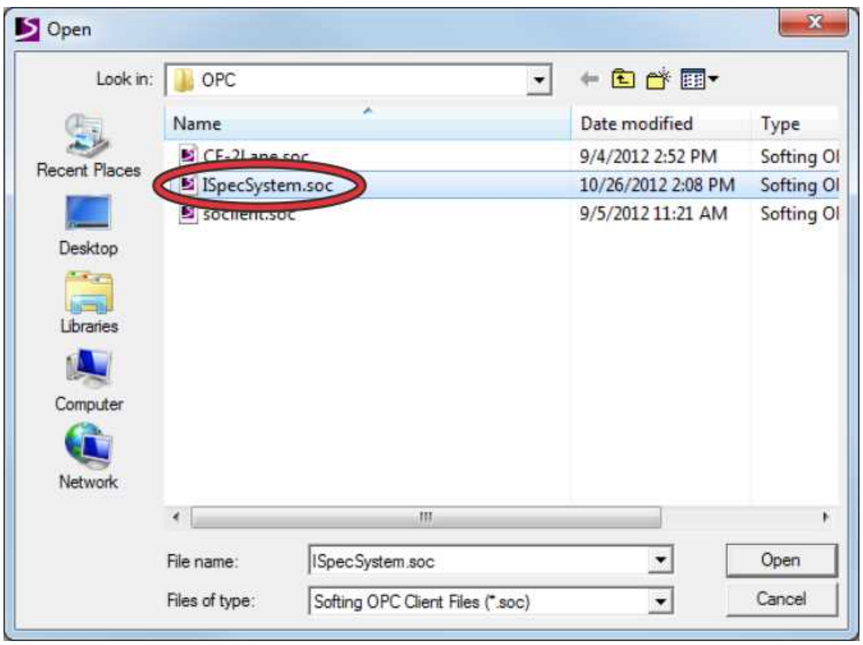
OPC Test Client button Click this button to open The Intellispec OPC test client.

The Intellispec OPC Test Client

The Intellispec provides test client software to make sure that the OPC server is properly working. It is not a fully functional software client - it is only intended to be used to verify the functionality of the server. This is only available if your system has been configured for OPC.

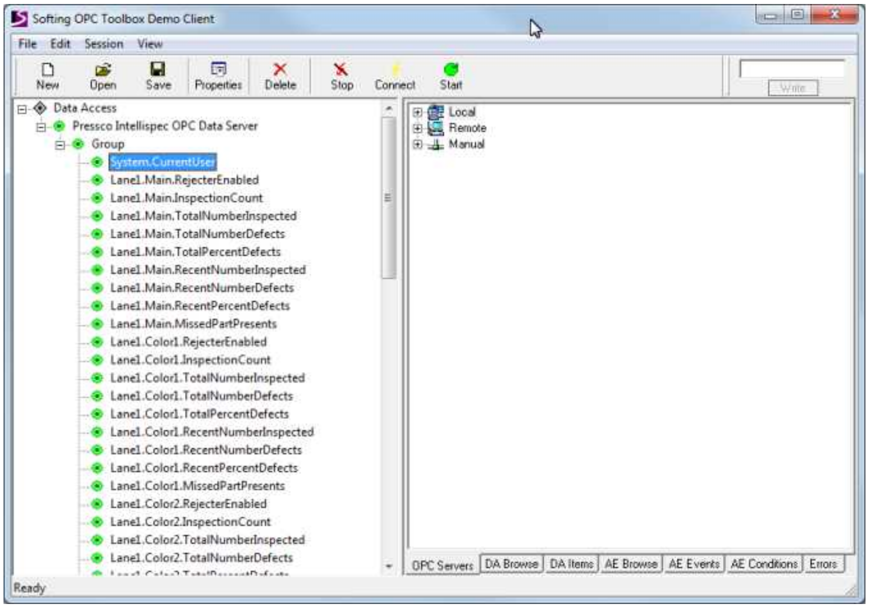
To use the OPC test client:

1. Log in.
2.  From the Star menu, select OPC Test Client. The Softing OPC Toolbox Demo Client opens.
3. Click Open on the program's toolbar. The File Open dialog box is displayed.
4. Look in: C:\Program Files (x86)\Common Files\Softing\OPC

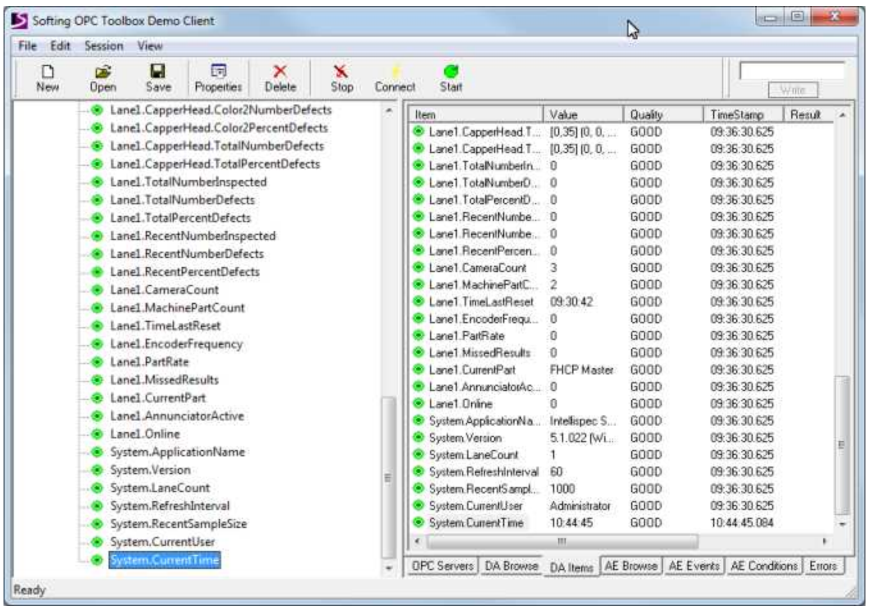


5. Click the IspecSystem.soc file | click Open.
   - The left pane of the demo client window should now display ‘Data Access’ at the very top, with ‘Pressco Intellispec OPC Data Server’ below that, a group below that, and a list of data items (all beginning with Lane.’) below the group. Each of these items (except ‘Data Access’) should have a solid green circle containing a black dot to the left

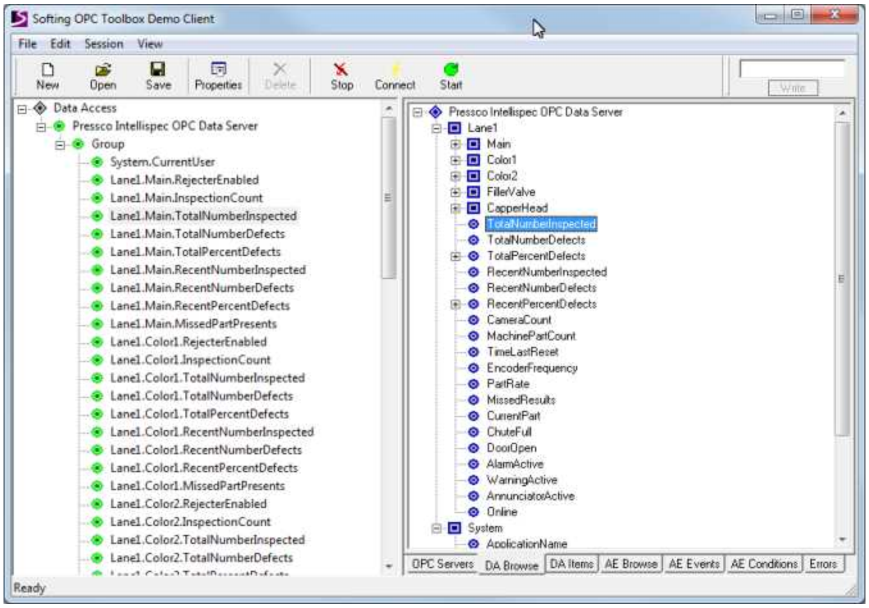
of it.



6. Click the DA Items tab at the bottom of the window. Note that there are columns for Item, Value, Quality, and Time Stamp for each of the items in the left window frame.



7. Verify that all data items have a solid green circle next to them.
8. Verify that all data items have GOOD status in the Quality column.
9. Verify that data item "System.Current.Time" is being updated once per second.
10. In the left window frame, select Pressco Intellispec OPC Data Server.
11. At the bottom of the right window frame, select the DA Browse tab.
12. At the top of the right window frame, click the '+' to the left of the blue diamond. There should be one blue square for each lane configured on the Intellispec, plus a blue square named System. Each blue square is a container for whatever data items are available for each group, and additional nested containers if appropriate.



Checking for Errors

At the bottom of the right window frame, click the Errors tab. Verify that no errors have been reported.

Exiting the Test Client

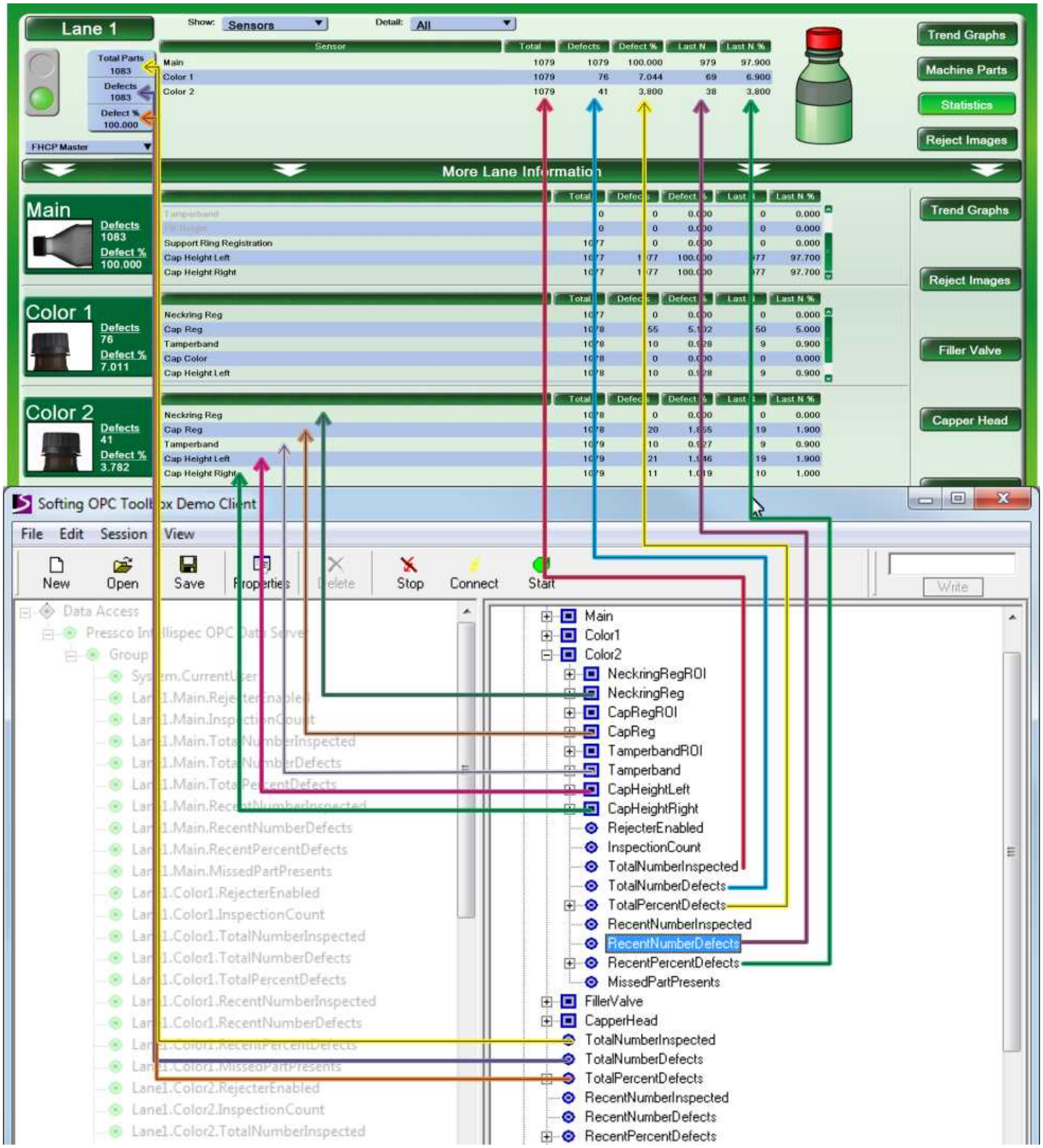
Click the ‘X’ in the upper right corner of the Softing OPC Toolbox Demo Client window to close the program. If you are prompted to save changes (probably due to changing the list of data items being monitored), click No.

Interpreting the Data

The data items in the OPC test client correspond to the statistics on the Intellispec screen.

To see the individual data items:

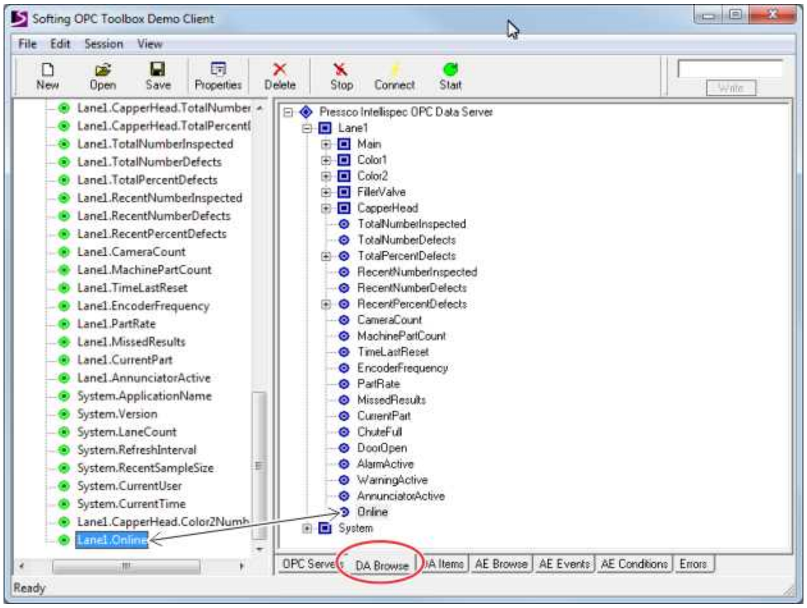
1. Click the 'DA Browse' tab on the lower right screen.
2. Click on the '+' next to the blue square for a lane. This will display a nested blue square for each camera and machine part configured on that lane, plus several more blue circles for the data items summarizing that lane, including: TotalNumberInspected, TotalNumberDefects, TotalPercentDefects and TimeLastReset.
3. Click on the '+' next to the blue square for a camera. This will display a nested blue square for each inspection currently programmed for that camera, plus several blue circles for the data items summarizing that camera. These items correspond to the statistics on the screen, as shown below.



4. Click on the '+' next to the blue square for an inspection (example, Tamperband). This will display several more blue circles for the data items summarizing that inspection, including: Enabled, TotalNumberDefects, TotalPercentDefects, RecentNumberDefects and RecentPercentDefects.
5. Click the '+' next to the blue square for a machine part (if any) (example, CapperHead). This will display a blue circle for each camera in the lane, named '<CameraName>NumberDefects', '<CameraName>PercentDefects,' plus 'TotalNumberDefects' and 'TotalPercentDefects.' Note that each of these data items is an array containing defect counts for the machine part correlation feature.

Adding Data Items to those being monitored

Double-click a data item (blue circle) in the ‘DA Browse’ tab to add that data item to the list of those which are being monitored in the ‘DA Items’ tab.



Measurement Data Items

Additional inspection data is presented for some inspections.

To see measurement data items, check the Show 'Measurements' Items box in the OPC Configuration screen.

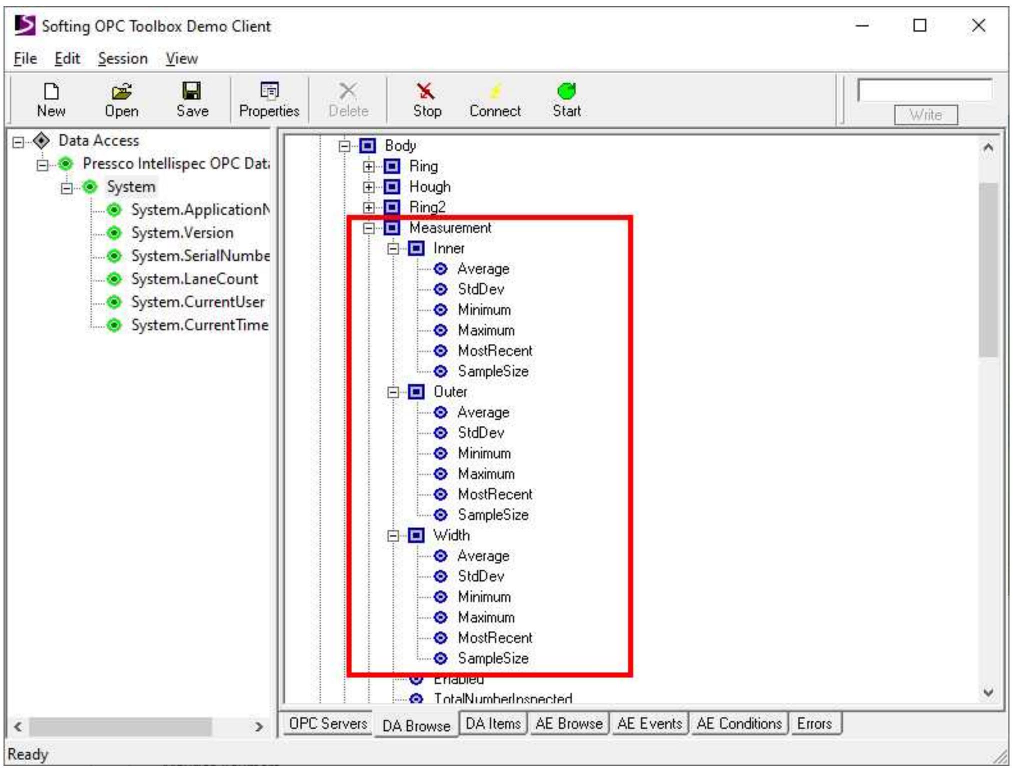
A number of inspections include data items providing measurements, including:

- Measurement inspection: the measurements “Inner,” “Outer,” and “Width” are available (see note 1 below)
- Distance inspection: the measurement “Distance” is available
- Angle inspection: the measurement “Angle” is available
- Mass inspection: the measurement “Value” is available (see note 2 below)
- Ambient inspection: the measurement “Value” is available (range of 0 to 100, i.e. percent full scale and NOT 0 to 255).
- Closure Angle inspection: the measurement “Value” is available (see note 3 below).
- Distribution inspection: the measurements “ColorLower”, “ColorUpper”, “LuminanceLower”, “LuminanceUpper”, “ChromaLower”, “ChromaUpper”, “DeltaE”, and “Hue” are available.
- Fill Height inspection: the measurements “FillHeight”, “FoamWidth”, and “FoamLiquid” are available.
- Fill Height Segmented inspection: the measurements “FillHeight”, “BottleFillLevel”, “DenseFoamWidth”, “DenseFoamLiquid”, “LightFoamWidth”, and “LightFoamLiquid” are available.
- Limit Check inspection: the measurement “Value” is available.

Notes:

- Note 1: some of the measurements for the “Measurement” inspection may not be active, depending on the specific configuration of the inspection.
- Note 2: if machine part correlation is available on the system, the single “Value” measurement will instead be named “AllCavities” and the per-cavity measurements “Cavity1,” “Cavity2,” Cavity3,” … “Cavity(N)” where (N) is the total number of cavities configured will also be available.
- Note 3: if machine part correlation is available on the system, the single “Value” measurement will instead be named “AllCappers” and the per-capper-head measurements “Capper1”, “Capper2”, “Capper3”, … “Capper(N)” where (N) is the total number of capper heads configured will be available.

For each available measurement, the data items “Average,” “StdDev,” Minimum,” and “Maximum” are presented, based upon a running sample of the last 100 good parts inspected while online. The following example shows the items for a Measurement inspection.

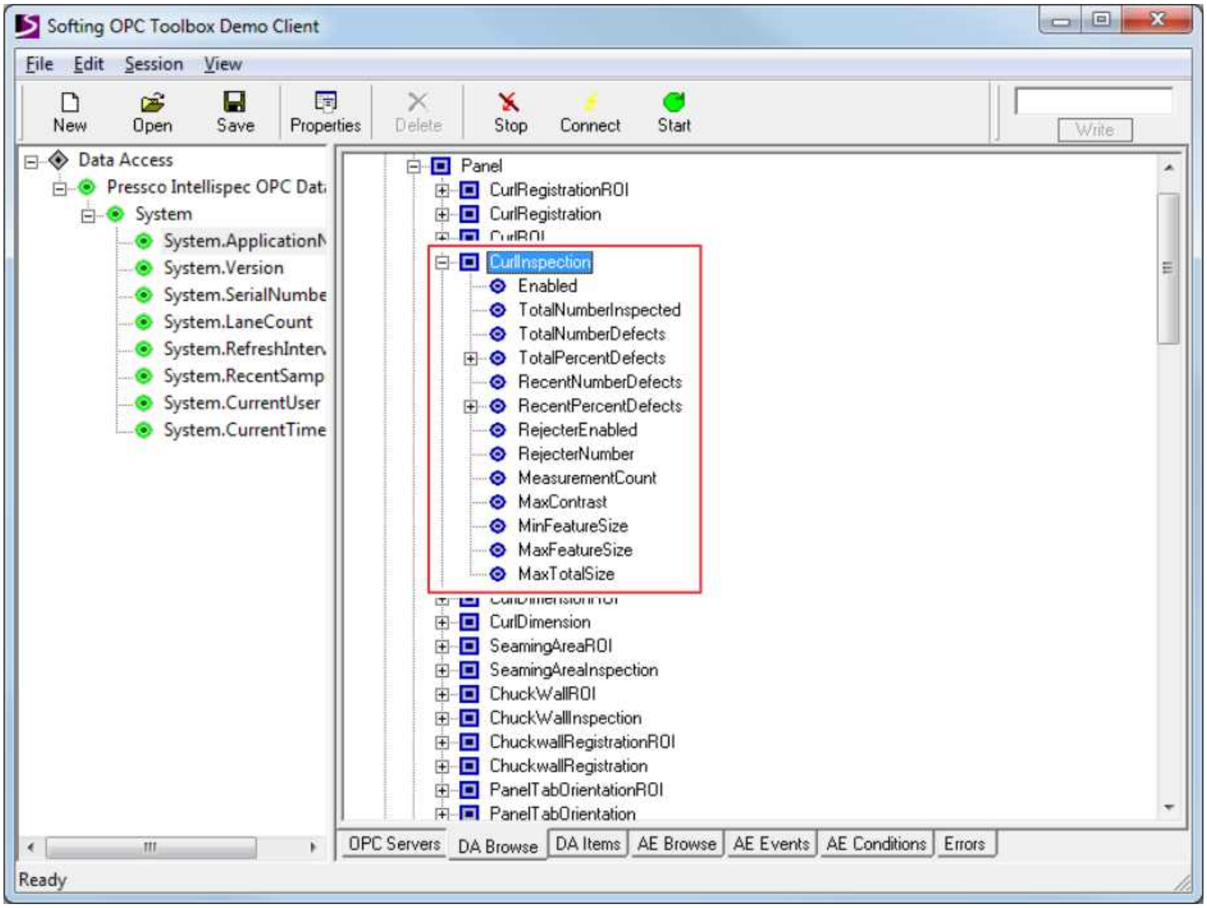


Parameter Data Items

Additional inspection data is presented for some inspections.

To see parameter data items, check the Show 'Parameters' Items box in the OPC Configuration screen.

Contrast inspection includes parameter values (user settings affecting the performance of the inspection), including: “MaxContrast," “MinFeatureSize," “MaxFeatureSize,” and “MaxTotalSize” are presented. An example of a Contrast inspection is shown below.



Using the OPC Private Counters Option

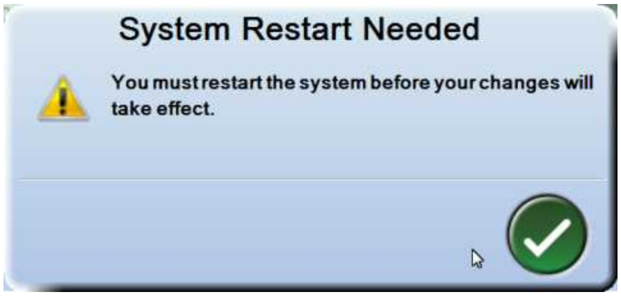
A separate set of OPC counters is available for long-term statistics tracking.

- When this feature is enabled, OPC counters are unaffected when the system statistics are reset either manually or automatically.
- When this feature is not enabled, the OPC counters are reset the same as the system statistics you see on the Intellispec screen.
- When the Private Counters option is enabled, the OPC Counters will reset when you use the Reset Private Counters button.
- When a new part program is loaded, the OPC Counters will revert back to the value they were when the part program was last in use.

To enable the OPC Private Counters:

1. Log in as Administrator.
2.  Select Home | Tools | OPC Configuration. The OPC Configuration menu is displayed.
3. Check the "Use Private Counters" box.
4. Click the OK button to save changes and exit.

5. The Intellispec must re-start for changes to take effect. Click the OK button (check mark) to acknowledge the message.

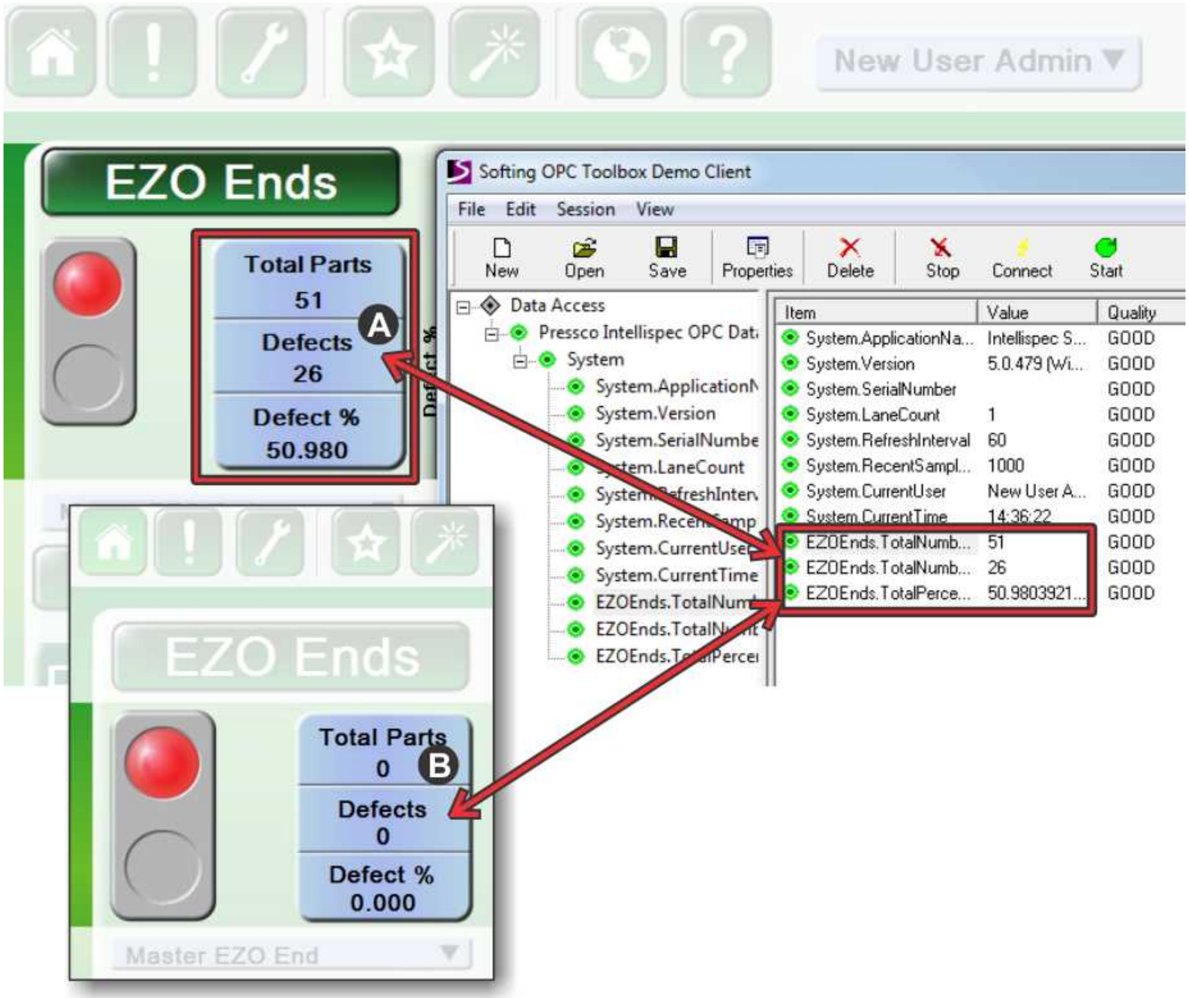


6.  Select Tools | Exit System.
7. Select Shut Down Intellispec and Restart Computer from the drop-down menu. The Intellispec system shuts down and restarts. The Private Counters are enabled.

To see the difference between the statistics on the Intellispec screen and the OPC Private Counters, use "The Intellispec OPC Test Client" on page 576.

To view only items such as parts inspected, number of defects, etc., see how to View only defect data.

The example below shows what happens when Private Counters is used.



A - Normal condition. Intellispec and OPC statistics are the same.

B - Private counters enabled. The Intellispec statistics are reset, but the OPC statistics do not get reset.

Reset Private Counters

When you use the OPC Private Counters option, you may need to manually reset the OPC data.

To reset the OPC Private Counters:

1. Take the Intellispec system offline.
2. Log in.
3.  Select Tools | OPC Configuration. The OPC Configuration dialog opens.
4. Select the Reset Private Counters button. A confirmation box appears to notify you that the counters will be reset on the OPC server.
5. Select OK. The OPC counters are reset.

View Only Defect Data

To see the effects of Private Counters, set up the OPC test client to show only the defect items such as parts inspected and number of defects.

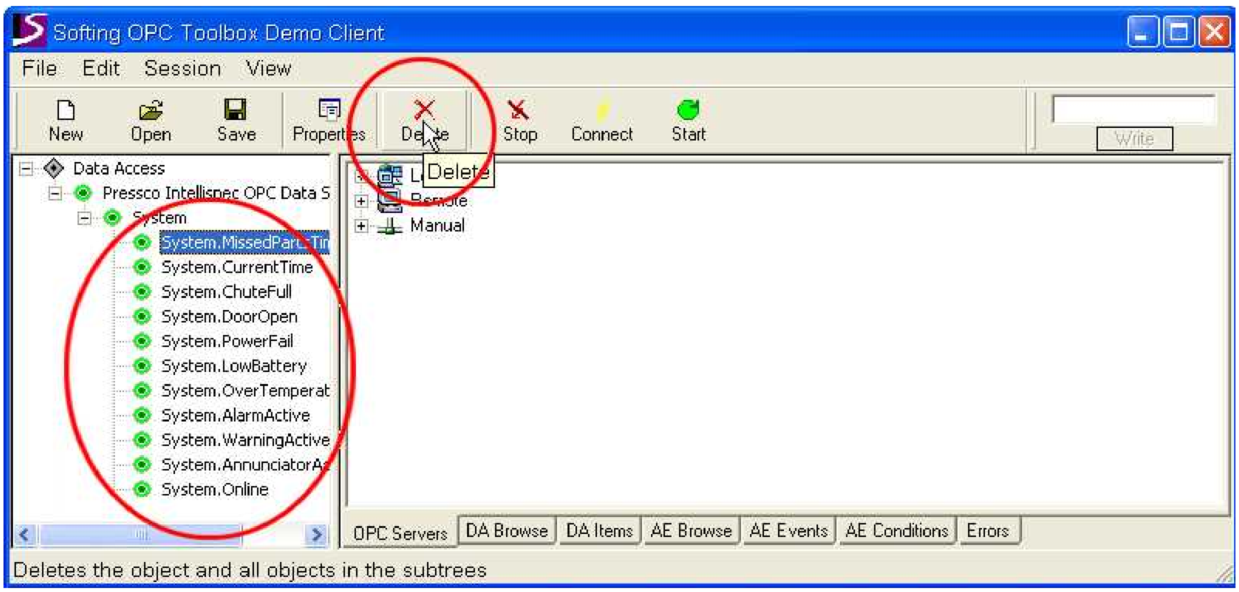
Open the The Intellispec OPC test client.

Next, set up the data items to display only defect information.

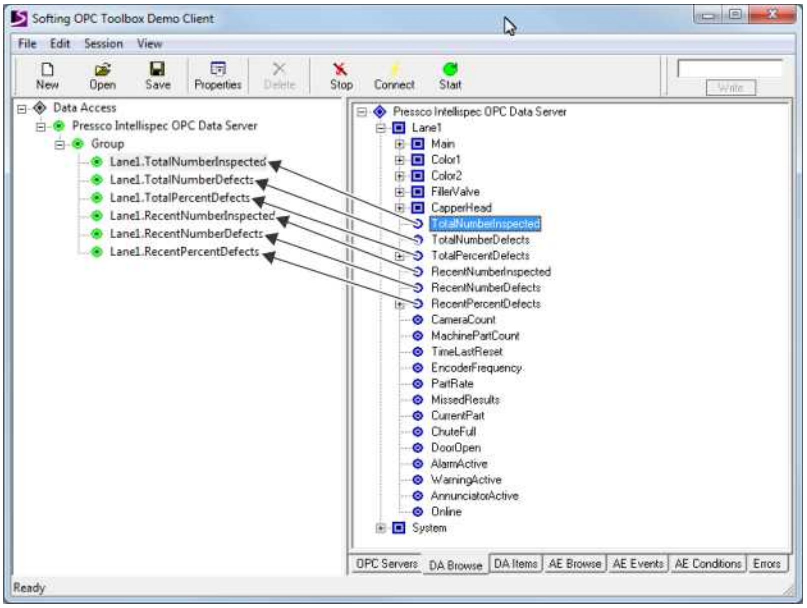
To see the defect items:

1. Remove the items that you do not want to see by clicking each item, then clicking the Delete button at the top of the menu.

   Note: do not click the "System" item in the left pane. If you remove that item, then none of the statistics items will be available to view.



2. Click the DA Browse tab at the bottom of the window. The "Pressco Intellispec OPC Data Server" item is displayed in the right pane.
3. Click the '+' next to the Data Server item to expand the tree.
4. Click the '+' next to a Lane name to expand the Lane tree.
5. Choose the items from the right pane that you do want to view by double-clicking each item.



6. Continue choosing all the items you want to see. Expand the individual camera trees and choose the defect statistics for each camera, if desired.
7. Once you have all the items you want to see in the left pane, click the DA Items tab at the bottom of the window. Your selected items appear in the right pane.

Next, test the Private Counters: Put the Intellispec system online. Observe the defect data on screen and in the OPC test client. Notice that the numbers are essentially the same. Due to different update rates, the numbers may be slightly off at times.

Counter Rollover

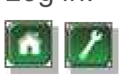
Counter Rollover is an advanced option for the OPC server. It allows the OPC server to behave like PLC counters if the digits are limited. For example, you may use a PLC where the data rolls over after 9,999. In this example, set the Counter Rollover value to 10,000. This would make the OPC data roll over after 9,999 to be compatible with your PLC.

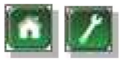
> *Note: if your plant is not limited in the number of digits for your OPC counter, make sure the Use Counter Rollover box is un-checked.*

If you have a PLC that has limited digits, set the Counter Rollover to a number equal to one greater than your PLC's highest number.

- If your PLC rolls over after 9,999, set Counter Rollover to 10,000
- If your PLC rolls over after 99,999, set Counter Rollover to 100,000

To set Counter Rollover:

1. Take the Intellispec system offline.
2. Log in.
3.  Select Tools | OPC Configuration. The OPC Configuration menu opens.
4. Check the Use Counter Rollover button.

5. Enter a value for the OPC counter to roll over. Example: if your PLC rolls over after 9,999, then enter 10,000.
6. Click the OK button to save changes and exit. The Intellispec needs to re-start for the changes to take effect.
7.  Select Tools | Exit System.
8. Select Shut Down Intellispec and Restart the Computer from the drop-down menu. The Intellispec software shuts down and restarts.
9. Log in after the software restarts, and continue operation.

List of Data Items

The following list contains the common data item IDs that are available on the Intellispec OPC Server. Note that the names of the data items depend on your system configuration.

TotalNumberInspected Total number of parts inspected since statistics were last reset. Present for each lane, camera and inspection.

TotalNumberDefects Total number of defective parts found since statistics were last reset. Present for each lane, camera and inspection, and also for each machine part when machine part correlation is in effect (in which case this item is a one-dimensional array with each array element representing the defect count for one occurrence of the machine part).

TotalPercentDefects Percentage of defective parts per the total number of parts inspected since statistics were last reset. Present for each lane, camera and inspection, and also for each machine part when machine part correlation is in effect (in which case this item is a one-dimensional array with each array element representing the defect percentage for one occurrence of the machine part).

RecentNumberDefects The number of defective parts found in the last “N” number of parts inspected, where “N” is a configurable parameter. Present for each lane, camera and inspection.

RecentPercentDefects Percentage of defective parts found per the last “N” number of parts inspected, where “N” is a configurable parameter. Present for each lane, camera and inspection.

RecentSampleSize Gives the value of the configurable parameter “N” mentioned in the preceding “Recent…” data items. Present for System.

Enabled True if the inspection is currently enabled or False if it is disabled. Present for each inspection.

RejecterEnabled True if the rejecter for this camera or inspection is currently enabled or False if it is disabled. Present for each camera and inspection.

RejecterNumber Gives the rejecter number assigned to this camera in lanes configured to have multiple rejectors. Present for each camera.

TimeLastReset Gives the date and time statistics were last reset to zero. Present for each lane.

CurrentPart Name of the currently selected part program. Present for each lane.

ChuteFull True if the defective part container for this lane is currently full or False if it is not. Present for each lane.

MissedResults The number of parts that reached the reject point on the conveyor before the system was able to determine if the part was defective or not. Present for each lane.

PartRate The number of parts to be inspected being encountered per minute. Present for each lane.

EncoderFrequency The number of encoder ticks being produced per second (which is proportional to the conveyor speed). Present for each lane.

AlarmActive True if the red light on the light tree is currently illuminated or False if it is not. Present for each lane.

WarningActive True if the yellow light on the light tree is currently illuminated or False if it is not. Present for each lane.

AnnunciatorActive True if the horn or buzzer on the light tree is currently sounding or False if it is not. Present for each lane.

Online True if parts are currently being inspected with defective parts being rejected or False if they are not. Present for each lane.

MissedPartPresents Total number of parts for which a usable image was not received from the camera. Present for each camera.

Average Arithmetic mean of measurement. Present for each inspection measurement.

StdDev Standard deviation of measurement. Present for each inspection measurement.

Minimum Lowest value of measurement. Present for each inspection measurement.

Maximum Highest value of measurement. Present for each inspection measurement.

Version String giving the major, minor and build numbers of the software currently running on the Intellispec system. Present for System.

SerialNumber String giving the system serial number. Present for System.

CurrentUser String giving the name of the user currently logged onto the system, or empty string if no user is currently logged on. Present for System.

CurrentTime Current date and time as given by system clock. Present for System.