INTELLISPEC™ SV

Software Guide (5.2)

Pressco Technology Inc.

5.2.037

Part Number 71810 Rev. 02

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Chapter 1
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 very powerful tool that provides inspection much more reliably than the human eye or sampling methods. The latest PC technology, powerful new 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

KEEP 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.

This manual:

- Is considered to be valid as of release 5.2.037 of the Intellispec Series V software. 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 Series V Operator's Guide which has Operator-level user instructions, and is a good place to start if you are new to Intellispec

Typographical Conventions

Following is a list of typographical conventions used in this manual:

- **Bold type** indicates a topic heading or an important item or statement.
- *Italicized type* indicates emphasis.
- Names of main components and system control signals have the first letter of each word capitalized. For example: Processor Cabinet.
- Danger messages appear as shown below:

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. These messages are set off from the body text as shown here.

- Caution messages appear as shown below:

Caution

Caution messages indicate important information which must be observed to prevent: loss of data, poor system performance, or equipment damage. These messages are set off from the body text as shown here.

- Notes appear as shown below:

❖ *Note: Notes contain special information that warrants being set off from the body text as shown here.*

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 door closed.

Static Discharge Protection

Caution

Electronic components can be damaged by static electricity discharge.

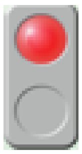
Always observe the following precautions before removing, installing or handling any electronic components within the Inspection System:

- Wear an anti-static wristband which is grounded to the Inspection System.
- Stand on an anti-static, grounded floor mat, and lay circuit boards on the mat during any board replacement.
- Keep circuit boards in static shield bags when storing and transporting. Ensure the bag is sealed.

Chapter 2

Operating the Intellispec Series V System

Online / Offline



- The stoplight is the online/offline indicator for each lane. A red light indicates the lane is offline; a green light indicates the lane is online.
- 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 can be offline while another is online.

Part Changeover

When you change your production line from one part type to another, you can quickly change the part program.

Important

FHCP 3X EZ systems may require hardware adjustments during part changeover. Refer to the Intellispec Series V Hardware Reference Guide for your system.

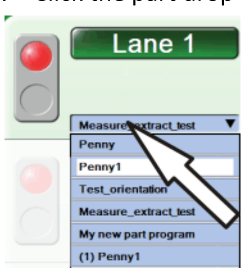
❖ *Note: Some menu items are only available to advanced level users.*

➢ ***What you need:***

- User permission to Switch Part Program

➢ ***To change parts:***

1. ***Log in*** (see "***Logging in and logging out***" on page 17).
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. 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, regions, enhancements, and analyses.

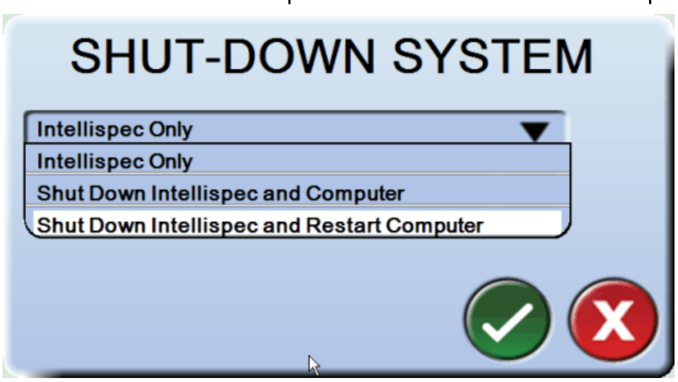
Lane Specific Information	Definition
Cameras (or other sensor)	All information for each camera or other sensor is contained in the Part Program.
Lighting	Each camera has different lighting settings for each part. When you load your Part Program after a Part Changeover, the lighting will be specific for 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.
Regions, Registrations, Orientations, Enhancements, Analyses, Dimensions, and Correlations	All Inspections will be contained in your Part Program. Also, parameter changes are saved for each Part Program.

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. Click the Home button .
3. Click the Tools button to display the Tools menu.
4. Click the Exit System option.
5. A drop-down menu allows you to choose an option:
   - Shut down the Intellispec software only
   - Shut down the Intellispec software and computer
   - Shut down the Intellispec software and restart the computer



6. Choose the desired option from the menu and click the OK button. The Intellispec software and/or computer shuts down (and restarts if applicable).

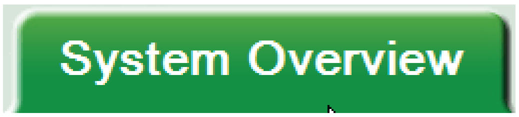
Chapter 3

Navigating Through the System

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.

User Interface Display - Four Levels

The display on the user interface has four levels for viewing:

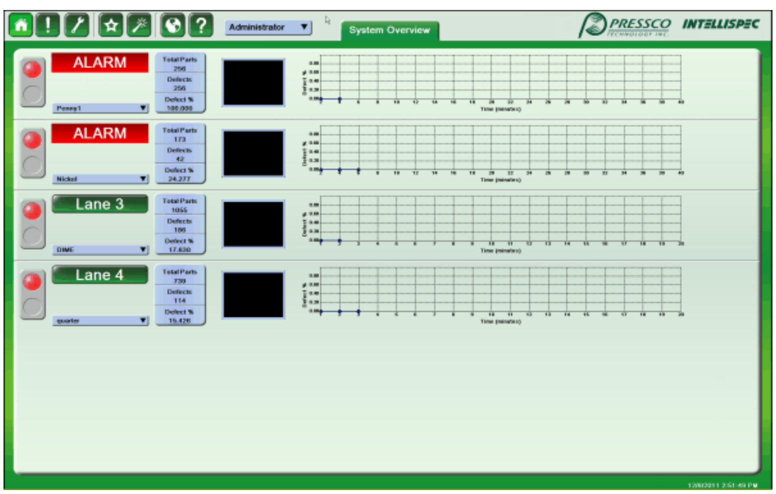


Look at the tab at the top of the screen to quickly determine which level you are viewing (from System Overview to Sensor Overview). The tab will read "System Overview" [level 1], "Lane n" [level 2], or "sensor name" [level 3]. In the Inspection Screen [level 4], the tab also reads "sensor name," but the inspection graphs and parameters are available to view and edit.

❖ *Note: when you switch between System Overview and Lane Overview modes, you will see one screen 'minimize' to the task bar while your selected screen is displayed. This is normal.*

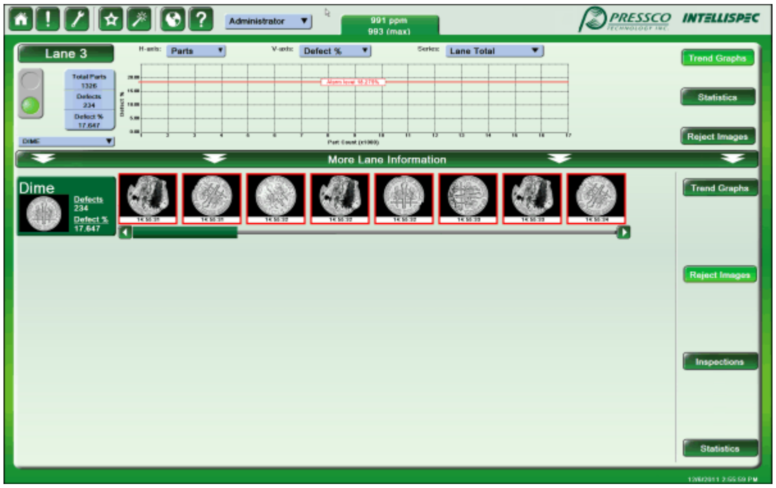
➢ ***To view the four viewing levels:***

1. Click the Home button  to go to level 1, System Overview.
   - **System Overview** - Displays information that represents the complete system as well as a thumbnail line for each Lane that is configured.



2. Click a Lane button  to go to level 2, Lane Overview.

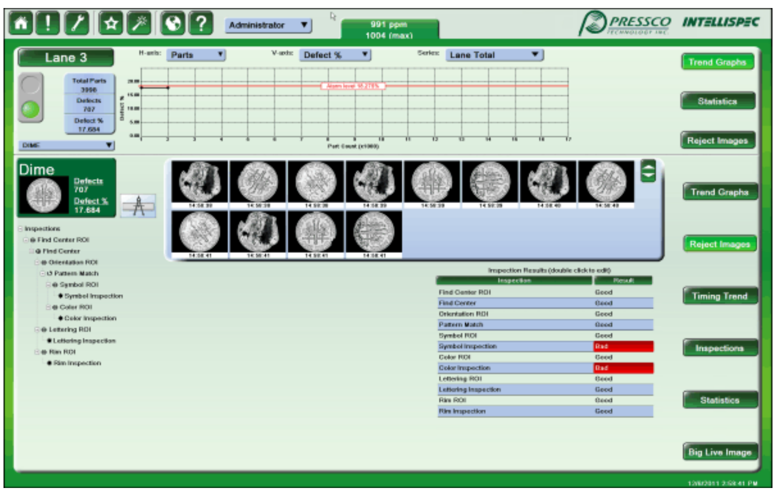
- **Lane Overview** - Displays information for a particular Lane as well as a thumbnail line for each sensor used in that Lane.



3. Click a Sensor button 

to go to level 3, Sensor Overview.

- **Sensor Overview** - Displays information for a particular sensor, including an image area, sensor statistics, a graphics area that displays user-selectable graphs, and a user-selectable inspection list.

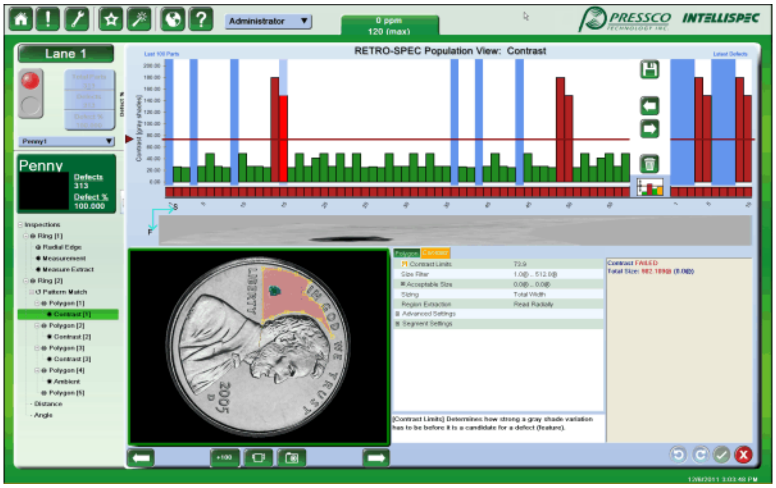


4. Double-click an inspection name 

in the Analysis Inspections list to get to level 4, Inspection Screen.

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

- **Inspection Screen** - Double-click on any inspection name to see this view, which allows you to see inspection parameters and make changes if necessary.



5. Click the exit button  to go back to level 3 Sensor Overview mode.

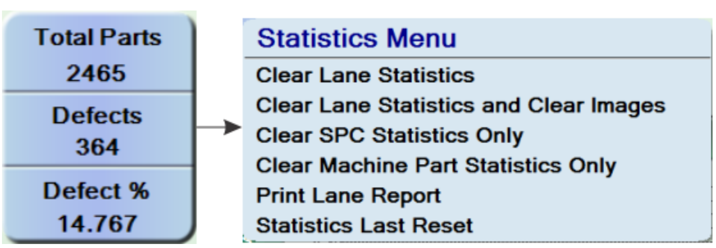
Statistics menu

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

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

➢ ***To view the Statistics menu:***

1. Go to the Lane Overview screen by clicking a Lane n button.
2. Click over a statistics box. The Statistics menu is displayed. The items in the menu are described below.



Clear Lane Statistics

Clear the statistics for the lane only.

Clear Lane Statistics and Clear Images

Clear the statistics for the lane and empty the defective image buffer.

Clear SPC Statistics Only

(Only available if you have Retro-Spec inspections enabled to keep SPC data) Clear the statistics statistical process control. See ***Statistical Process Control*** (see "***Statistical Process Control (SPC) Charting***" on page 52).

Clear Machine Part Statistics Only

(Only available if machine part correlation is enabled on your system) Clear the statistics for the machine parts. See ***Machine Part Correlation*** (on page 84).

Print Lane Report

Send the lane statistics report to the default configured printer.

Statistics Last Reset

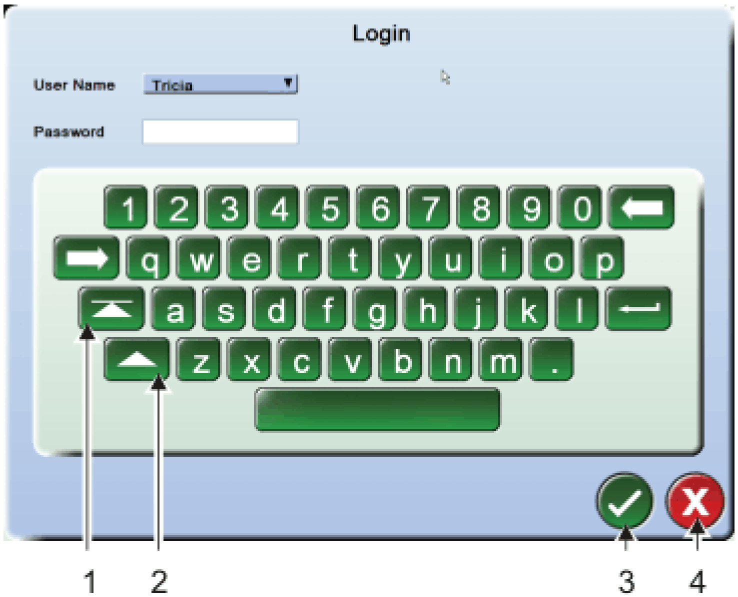
Display the date and time when the lane statistics were last reset.

On Screen Keyboard (OSK)

Different types of on screen keyboards will be displayed depending on what kind of input is needed. When you want to type text or numbers into a field, right-click or double-click on a text input field to display the appropriate keyboard.

- If alphanumerical input is needed, a full alphanumeric keyboard will be displayed
- In numeric input only is needed, a smaller, numeric keypad only will be displayed

Alphanumeric keyboard

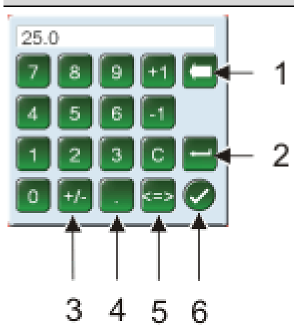


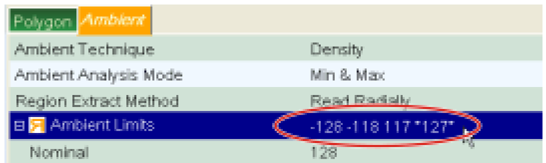
1	Shift lock button - capitalizes all letters until you press this button again.
2	Shift button - capitalizes one letter, then returns to uncapitalized letters automatically.
3	OK button - accepts the typed information and closes the keyboard screen.
4	Cancel button - disregards the typed information and closes the keyboard screen.

Numeric keyboard

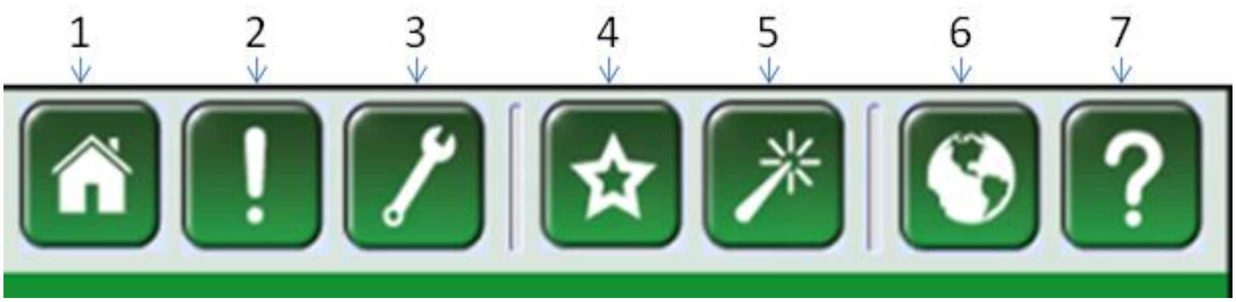
The numeric keypad is displayed when the input field requires a numeric entry. Most of the buttons are self-explanatory. Additional buttons are described below.

❖ *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	 accepts your changes and closes the numeric keypad

Menu Toolbar



1	Home
2	Alarms
3	Tools
4	Star
5	Wizards
6	Language
7	Help

Home

Click Home to return to the System Overview Screen. If a region or inspection editor menu is open, you must close it before anything else can be selected. The Home button is highlighted in the System Overview screen.

Alarms **(on page 55)**

When this icon is selected, a different pop-up window appears depending on what screen you are on.

Tools menu **(on page 69)**

When this icon is selected, a different pop-up window appears depending on what screen you are on.

Star menu **(on page 119)**

From the Lane and Sensor Overview screens, select Take Screen Shot or Background Tasks.

Wizards

From the Lane or Sensor Overview screens, select wizards that assist in setting up certain features. At the present time the only wizard is for setting up the Walk By graphic. This allows you to select group names, inspections assigned to each group, and values that determine when areas of the Walk By graphic turn to yellow, red, or back to normal (green).

Language **(on page 14)**

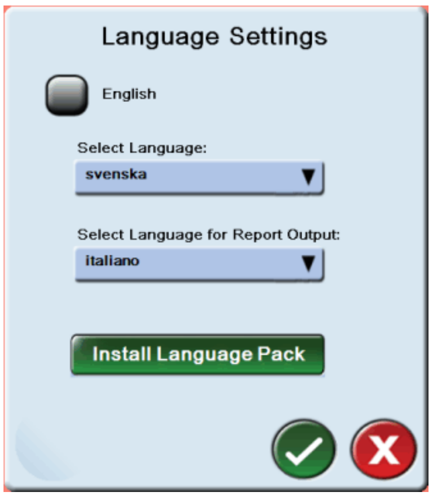
Select an available language.

Help **(on page 14)**

Access the help documents, support package utility, remote support, launch Windows Explorer, and determine software version.

Language

 Click the language button to select a different language. Choose from the available options.



English

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

Select Language

Select the language to display on the user interface.

Select Language for Report Output

Select the language for the reports, such as the Lane Report from the ***Statistics menu*** (on page 11).

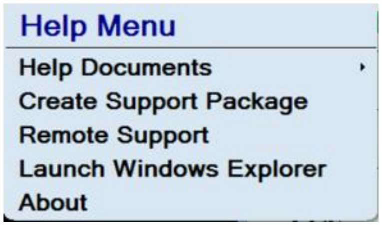
Install Language Pack button

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.

Help

Click the Help icon to:

- use the help files
- ***create a support package*** (on page 112)
- access Pressco ***remote support*** (see "***Help - Remote Support***" on page 114)
- open Windows Explorer (administrators only)
- obtain your current software version



➢ ***To access the user manuals:***

1. Click the Help icon .
2. Select Help Documents, then select a manual from the list. The user manual is displayed.

Chapter 4

User Accounts and Login Information

This section describes how to log in and how to manage user accounts.

Logging in and logging out

Each user account has a list of permissions and restrictions. This is to give administrators more control over the system, and restrict others from performing tasks like changing lighting, or adding and editing inspections. When you log in, you can perform the tasks made available to you.

➢ ***To log in, follow either of the steps below:***

- Click the Log In button 

to display the login dialog box. Select your user name from the drop-down list. Enter your password using the On Screen Keyboard by touch screen or trackball and buttons. The password characters will not be shown for security reasons.
- [With the optional **biometric sensor**] Press your finger to the sensor. The system will automatically determine your identity and log you in. If the system fails to recognize your identity after three attempts, the log in dialog box will appear, to allow you to log in with your user name and password.

➢ ***To log out, follow either of the steps below:***

- Click the Log In button that displays your user name. The account drop-down menu appears. Select the Log Out button. The system logs you out.
- [With the optional **biometric sensor**] Press your finger to the sensor. The system logs you out.

❖ *Note: When another users 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.*

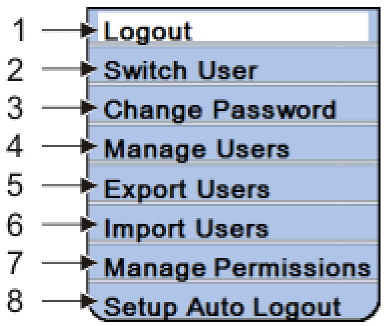
*Some tasks can be configured so that users do not need to log in. This is done through ***Manage Permissions*** (see "***Managing Permissions***" on page 24).

❖ *Note: Accounts may be shared by a group of people (example: Shift 1).*

➢ ***To view the Log In menu:***

1. Click the Log In button 

 and enter your password. The text on the button changes to indicate who is logged in.
2. Click the Log In button again (which has your user name displayed on it). The Log In menu is displayed. Some options in this menu are only available to authorized users.



1	Logout - Logs out whoever is logged in
2	Switch user - Allows you to switch from one user to another
3	***Change Password*** (see "***Changing your password***" on page 19)- Allows you to change only your password
4	***Manage Users*** (see "***Managing user accounts***" on page 19) – Used to assign, remove, or edit users. This is where users are given access to specific tasks (example: one user is given the access to edit inspections and another is not given this access). You can also give users access to specific tasks through ***Manage Permissions*** (see "***Managing Permissions***" on page 24).
5	***Export Users*** (see "***Exporting user accounts***" on page 22) - Allows you to export user profiles from one Intellispec to another
6	***Import Users*** (see "***Exporting user accounts***" on page 22) - Allows you to import user profiles from one Intellispec to another
7	***Manage Permissions*** (see "***Managing Permissions***" on page 24) – This is where the system can be configured to allow pre-defined tasks to be performed with no log-in
8	***Setup Auto Logout*** (see "***Setting up Auto Logout***" on page 29)– This feature will automatically log you out if there is no activity for a defined amount of 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.*

Switching users

The Switch Users option from the Log In menu logs out the current user, and allows a new user to log in.

➢ ***To switch users:***

1. Click the Log in button (which has the current user's name displayed).
2. Select Switch Users from the menu.
3. Select the new user name from the drop-down menu.
4. Enter the new user's password. The new user is logged in. The previous user is logged out.

➢ ***If you have a biometric sensor:***

Press your finger to the biometric sensor device to log in. The previous user will be automatically logged out by the system.

Changing your password

The Change Password function is available to all users.

❖ *Note: an Administrator can reset a password if necessary.*

➢ ***To change your password:***

1. Log in.
2. Click the Log In button with your user name to see the Log In menu.
3. Select Change Password. The Change Password dialog box is displayed.
4. Enter your Old Password.
5. Enter a New Password.
6. Confirm your New Password.
7. Click the OK button  to accept the changes. The dialog box closes and your password is changed.

Managing user accounts

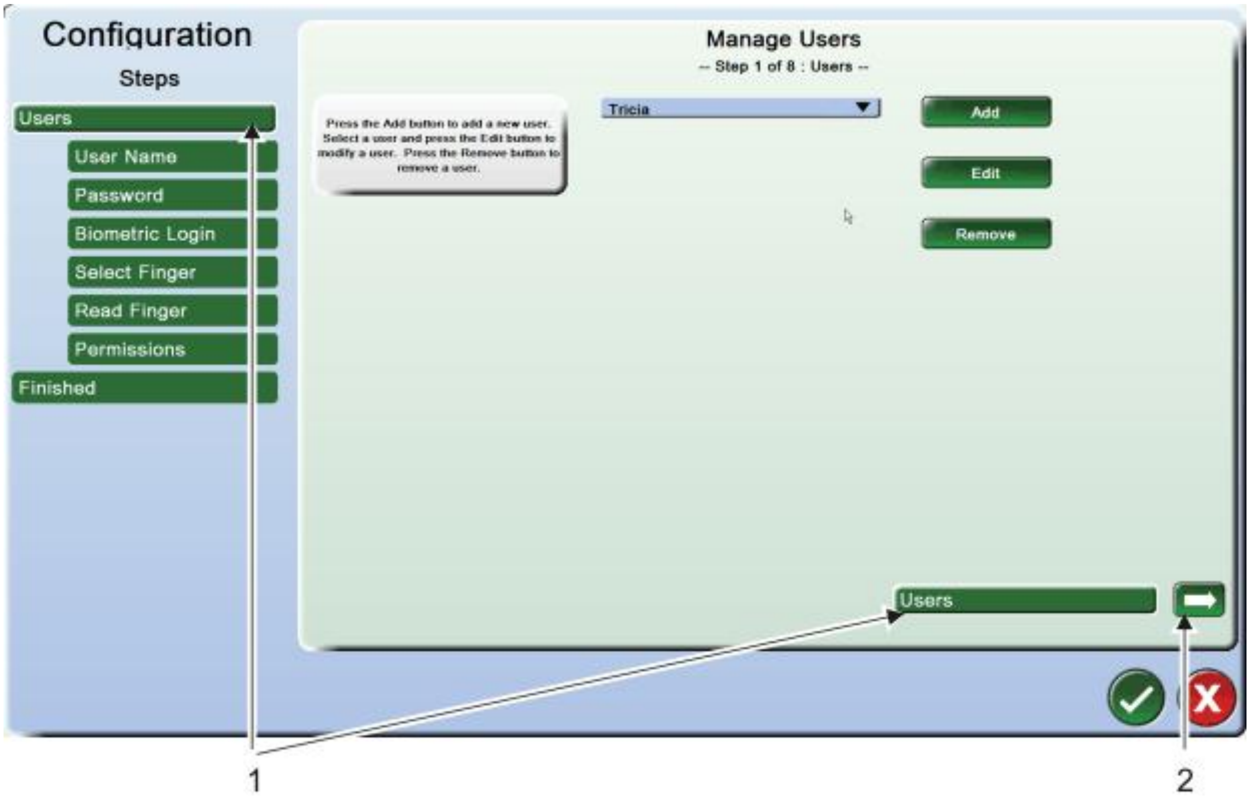
The Manage Users button is only available to those with the Manage Users permission. This feature provides a wizard that allows you to Add a new user, Edit a current user or Remove any user. You may create one user account for a group of people and give that group the password to the account (example: 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 administrative user.
2. Click the button with your user name to see the login drop-down menu.
3. Select Manage Users. The Manage Users dialog box is displayed.
4. Select Add, Edit, or Remove a user. Follow the information on screen to complete these actions. The current step is highlighted on the left side of the configuration screen [item 1 in illustration below], and is repeated at the bottom of the screen.

5. Use the forward arrow button [item 2] to move to the next screen after you have entered the appropriate information. Use the back arrow button (not shown in first step) to return to the previous step. You do not need to enter information in each screen to move from one screen to the next.



1	Current step in the wizard is highlighted.
2	Forward navigation to move to the next step. A back arrow (not shown) is available in later steps.

Adding a user with the biometric login device

When you have the optional biometric login device installed, you will need the user present. The biometric login uses finger recognition software to log in rather than selecting a user name and entering a password. You can always ***log in*** (see "***Logging in and logging out***" on page 17) using your user name and password, even if you have a biometric login device. The maximum number of biometric accounts is 40.

- *Note: use of one account by a group of people is not supported with the biometric device. Each user must have his or her own account.*
- *Additionally, 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 an administrative user.
2. Click the button with your user name to see the login drop-down menu.
3. Select Manage Users. The Manage Users dialog box is displayed.
4. Click the Add button.
5. Add the user name when prompted. Click the forward arrow.
6. Enter a password, then Confirm it. Click the forward arrow.
7. [Biometric login] The next screen gives you the option of creating a biometric login or skipping over it. If you chose Skip, go to step 10. If you chose Create, go to step 8.
8. [Select Finger] Choose which finger the biometric sensor will read. Select any finger by using the touch screen or trackball and buttons to choose the circle above the finger. Only one finger can be used, and you must use this finger every time when logging in. Click the forward arrow.

9. [Read Finger] Click the Start Button at the top of the screen. The system will ask you to place the finger you selected on the biometric sensor. To ensure an accurate biometric measurement, you are asked for three readings. Instruct the user to place his or her finger on the biometric sensor three times when prompted. Click the forward arrow.
10. [Permissions] This is where you can set up what each user can and cannot do within the system. After you have selected the desired permissions, click the forward arrow. You can also change permissions later. For more information, see ***Managing Permissions*** (on page 24).
11. [Finished] Click the OK button to accept changes and exit.

Exporting user accounts

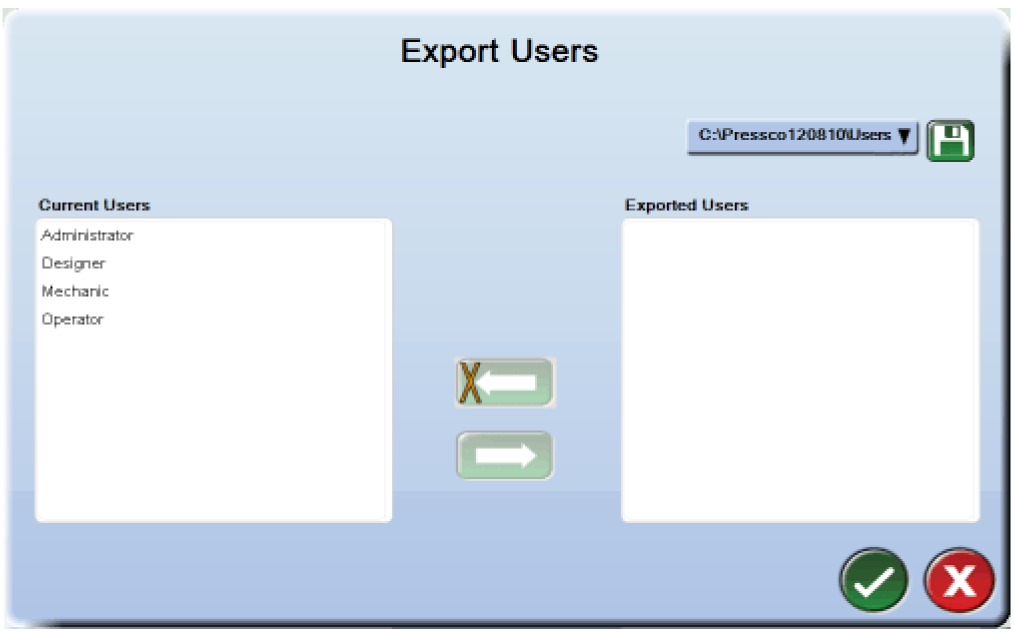
This allows you to export user accounts from one system to another. The user accounts may be used in other Intellispec Series V systems in your plant. You may also want to back up your user accounts in the event they are changed in the system.

➢ ***What you need:***

- A USB memory device to export or import data
- User access permission to change permissions

➢ ***To export a user account:***

1. Log in as an administrative user.
2. Insert the USB device into an available slot on the Intellispec Series V system.
3. Click the button with your user name to see the login drop-down menu.
4. In the user login drop-down menu, click Export Users. The Export Users dialog box is displayed.



5. Select the user account that you want to export.
6. Click the right arrow to export the user account.
7. Choose the destination to save the user account from the drop-down menu, or click the Save button to browse to the USB device.
8. Click OK to accept changes and exit the screen. The user account is exported.

Importing user accounts

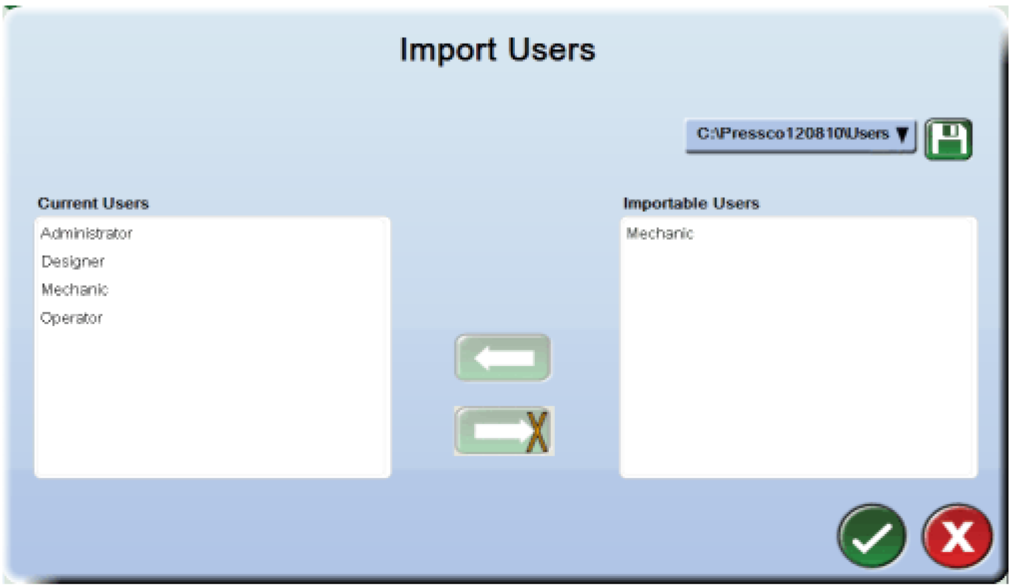
This allows you to import user accounts from one system to another. The user accounts may be used from other Intellispec Series V systems in your plant.

➢ ***What you need:***

- A USB memory device with user accounts already saved on it, or a folder on the Intellispec hard drive with valid user accounts
- Administrative access to user accounts

➢ ***To import a user account:***

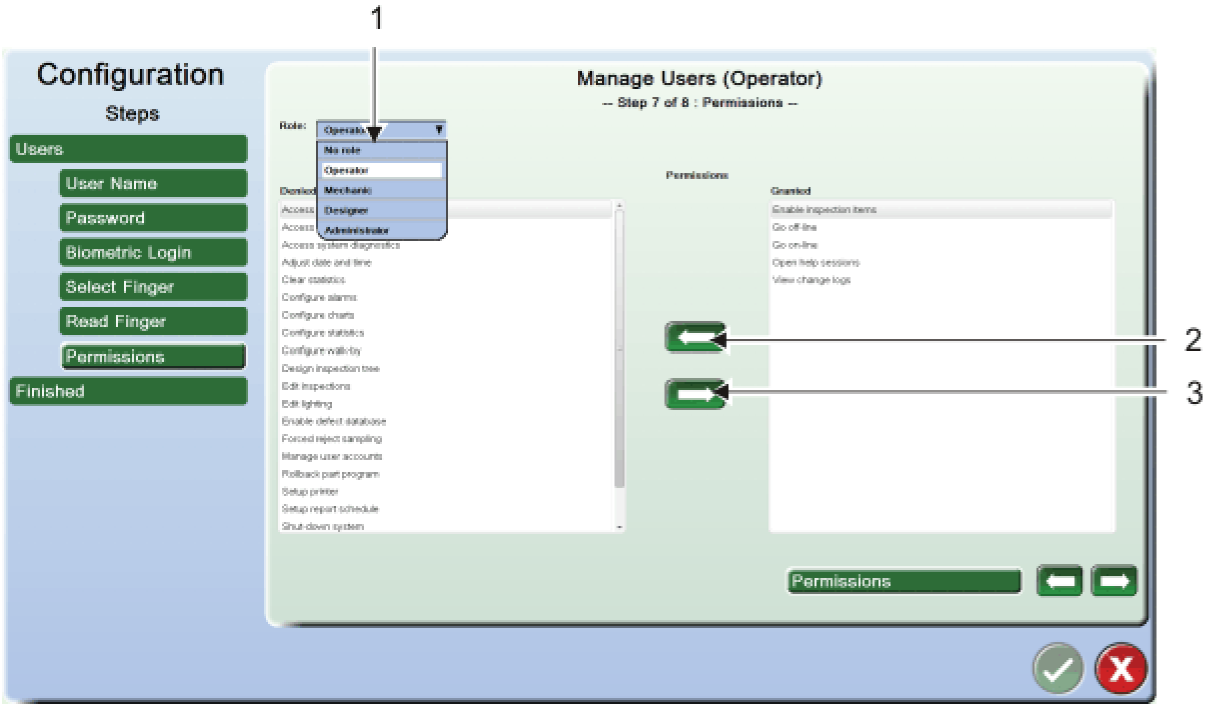
1. Log in as an administrative user.
2. Insert the USB device into an available slot on the Intellispec Series V system.
3. Click the button with your user name to see the login drop-down menu.
4. In the user login drop-down menu, click Import Users. The Import Users dialog box is displayed.



5. Select the user account that you want to Import from the right column. If you do not see any users available, click the Save button to browse to a location where the user account is saved.
6. Click the left arrow to import the user account.
7. Click OK to accept changes and exit the screen. The user account is imported.

Managing 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*** (on page 28).

Key: ROLES: **O** = Operator; **M** = Mechanic; **D** = Designer; **A** = Administrator

	Permission	Description	O	M	D	A

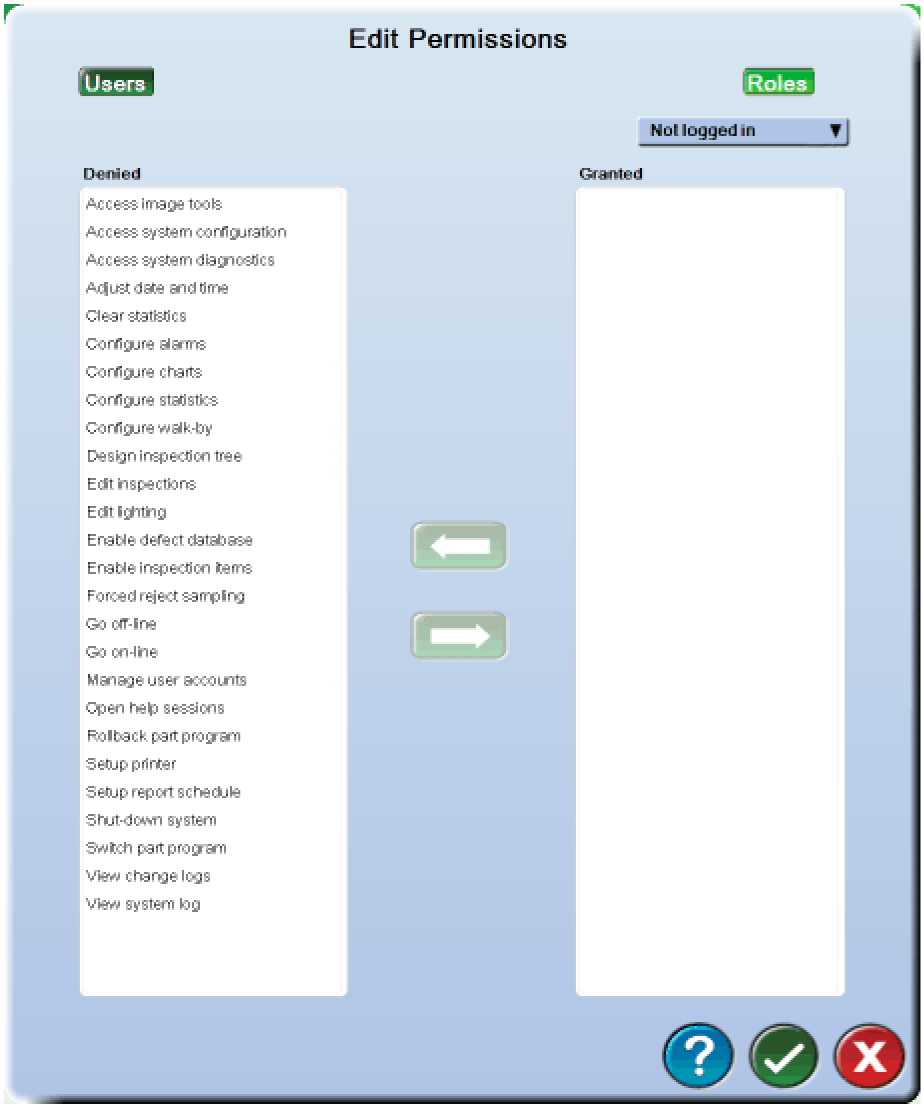
	Permission	Description	O	M	D	A
1	Access advanced inspection parameters (***Editor Options*** (on page 189))	Access advanced parameters inside of the inspections, and access some inspection tree items (such as regions).			X	X
2	Access image tools	Access the ***Image Analysis*** (on page 132) Tools.		X	X	X
3	Access system configuration	Perform ***Lane Setup*** (on page 81)		X	X	X
4	Access system diagnostics	Perform system functions including ***I/O*** (see "***I/O Diagnostics***" on page 97) and ***correlation diagnostics*** (on page 99).		X	X	X
5	***Adjust date and time*** (on page 111)	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*** (on page 120)	Cancel a background task if it is interfering with inspection.				X
9	***Clear Alarms*** (see "***Viewing and Clearing Alarms***" on page 57)	Clear the alarms	X	X	X	X
10	***Clear statistics*** (see "***Statistics menu***" on page 11)	Reset inspection statistics.	X	X	X	X
11	***Configure alarms*** (see "***Lane Alarm Configuration***" on page 59, "***Sensor Alarm Configuration***" on page 63)	Configure the lane and sensor alarms.		X	X	X
12	***Configure charts*** (see "***Lane Setup***" on page 81)	Configure trend charts and other statistics charts.		X	X	X
13	***Configure Global Auto-Learn settings*** (on page 365)	Enable Auto-Learn and set Extended I/O settings		X	X	X
14	***Configure Hang Dump*** (on page 122)	Create a log file for Pressco engineers. This permission is not automatically granted for any level user.				
15	***Configure statistics*** (see "***Statistics Configuration***" on page 49)	Configure how the statistics graphs are displayed.		X	X	X
16	***Configure walk-by*** (see "***Walk By Setup***" on page 32)	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	***Design inspection tree*** (see "***Inspection menu***" on page 175)	Add or delete inspections.			X	X
18	***Edit inspections*** (on page 185)	Edit existing inspections.		X	X	X
19	***Edit Lighting*** (see "***Sensor Menu***" on page 129)	Change the lighting settings for each camera.		X	X	X

	Permission	Description	O	M	D	A
20	***Edit Part Notes*** (see "***Part Setup***" on page 78)	Add information to the part setup file.		X	X	X
21	***Enable defect database*** (see "***Reporting***" on page 70)	Enable the optional defect database.			X	X
22	***Enable inspection items*** (see "***Inspection menu***" on page 175)	Enable or disable individual inspections and the rejecter for those individual inspections.		X	X	X
23	***Forced Reject*** (on page 93) Sampling	Request forced reject sampling.	X	X	X	X
24	Go ***Offline*** (see "***Online / Offline***" on page 7)	Put a lane offline.	X	X	X	X
25	Go ***Online*** (see "***Online / Offline***" on page 7)	Put a lane online.	X	X	X	X
26	***Install language pack*** (see "***Language***" on page 14)	Update the language files for the user interface, if provided by Pressco.				X
27	Launch Windows Explorer	Launch Windows Explorer from Task Manager or from the desktop.				X
28	***Manage part programs*** (see "***How to Create, Copy, or Import a Part Program***" on page 171)	Create, import, export, copy, or load part programs.		X	X	X
29	***Manage user accounts*** (see "***Managing user accounts***" on page 19)	Open Manage Users which lets you add, edit and remove users.				X
30	***Open help sessions*** (see "***Help - Remote Support***" on page 114)	Start a remote help session with Pressco Technical Support.	X	X	X	X
31	***Rollback part program*** (see "***Part Program Change Log***" on page 177)	Roll the current part program back to a previous state.		X	X	X
32	Run Mass Manager	Used with mass sensors - select appropriate Scaling Recorder sessions to scale the Intellimass readings.		X	X	X
33	Run Mass Recorder	Used with mass sensors - enter sample data from cut and weighed bottles.	X	X	X	X
34	***Select Features*** (on page 82)	Enable optional features			X	X
35	***Setup printer*** (see "***Set up a printer***" on page 111)	Set up a printer for Intellispec reports.				X
36	Setup report schedule	Schedule statistics reports to be generated periodically.		X	X	X
37	***Shut down system*** (see "***Exiting the Intellispec software***" on page 8)	Shut down the Intellispec system.		X	X	X
38	***Start Auto-Learn*** (see "***Operator Trigger***" on page 368)	Manually start an Auto-Learn process		X	X	X

	Permission	Description	O	M	D	A
39	***Stop Auto-Learn*** (see "***Stopping Auto-Learn***" on page 375)	Manually stop an Auto-Learn process		X	X	X
40	Switch part program	Change the currently running part program. This also allows you to add a new part program.	X	X	X	X
41	***Switch report language*** (see "***Language***" on page 14)	Choose a language for the Intellispec reports.				X
42	***View change logs*** (see "***Part Program Change Log***" on page 177)	View the inspection change logs.		X	X	X
43	View system ***logs*** (see "***Log Reader***" on page 76)	View the system logs.	X	X	X	X

Editing 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. Click the Log in button with your name on it to see the Log in menu.
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

Be sure you 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 to see the Log in menu.
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 manage 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 to see the Log in menu.
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.

Setting up Auto Logout

This feature will automatically out any user after a set number of minutes of inactivity.

➢ *To set up Auto Logout:*

1. Log in as an administrative user.
2. Click the button with your user name to see the login drop-down menu.
3. Select Setup Auto Logout. The setup menu is displayed.
4. Click the box next to "Auto Logout" to enable the feature. A check mark is displayed in the box when it is enabled.
5. Set the Wait time in minutes by clicking the up or down arrows, or by highlighting the number of minutes and typing a new value (from 1 to 9999 minutes).
6. Click the OK button . All users will be logged out automatically after the set number of minutes of inactivity.

Chapter 5
Graphs and Image Displays

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

This feature uses 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** areas indicate that parts are passing inspection.
- **Yellow** warning areas notify you that the spoilage rate is approaching, but has not yet reached a critical level. This allows you to make necessary changes to the manufacturing process before the failure rate gets too high.
- **Red** areas indicate the spoilage rate has exceeded user defined limits.

The defect percentage rate at which each group reaches warning or failure limits is defined in ***Walk By Setup*** (on page 32).

There are two available 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:***

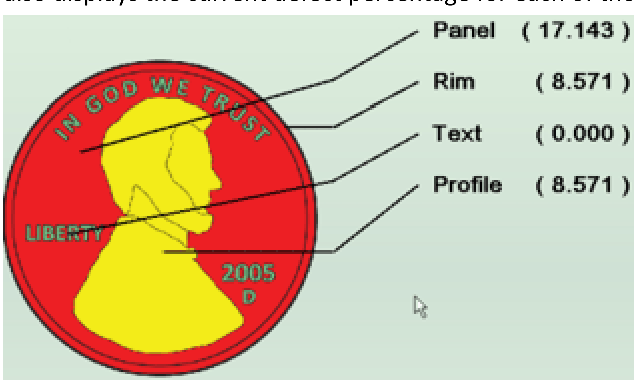
1. Click a Lane n button to view the Lane Overview mode. 

2. Click the More Lane Information bar in the center of the screen to display more graph options.


3. Click the Walk By button on the right side of the screen. 

The Walk By Graphic is displayed in the center of the screen.

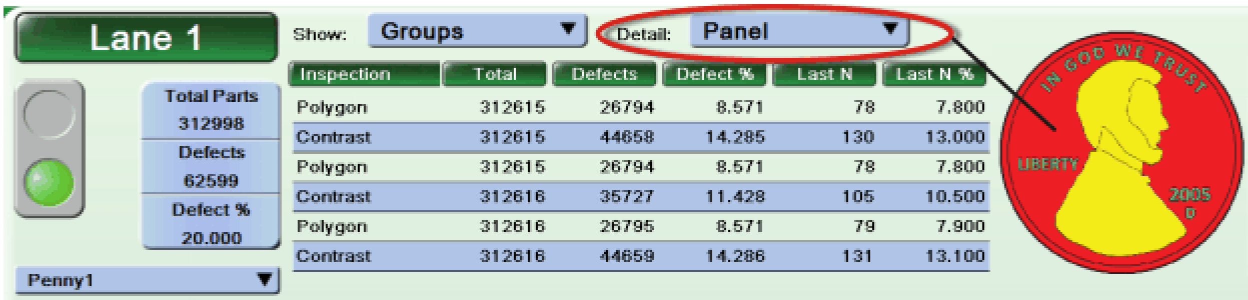
The large Walk By Graphic displays the group names, pointing to the appropriate areas on the part. It also displays the current defect percentage for each of those groups, from inspection results.



Using the Walk By Graphic

You can view inspection information by clicking on the areas of the graphic. The Intellispec will display the configured inspection group and detail. The example below shows:

- The Panel group was clicked - 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*** (on page 32)



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

Walk By Setup

This screen allows you to set up the Walk By Image. Each Lane can be set up differently if needed.

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, go to the ***Part Setup*** (on page 78) menu > Change Part Type.

To get to the Walk By Setup screen: From the Lane or Sensor Overview screen, click the Tools button > 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, click the OK button at the bottom of the screen to accept your changes and exit the screen.

Group

Each graphical area on the part is assigned to a group - this is defined in the graphic file. Assign as many inspections as you wish to a group, preferably those inspecting that area of the part. Inspections can be from any sensor within the same part program on the lane. Some drop-down menus on the user interface refer to 'groups' - these represent groups of inspections that inspect one area of a part.

A group can be a contiguous area, or a group of related areas on a part, as shown in red below.

Warning Percent

Set the value at which the group on the Walk By Graphic turns yellow. **Yellow** warning areas notify you that the spoilage rate is approaching, but has not yet reached a critical level. This allows you to make necessary 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.*

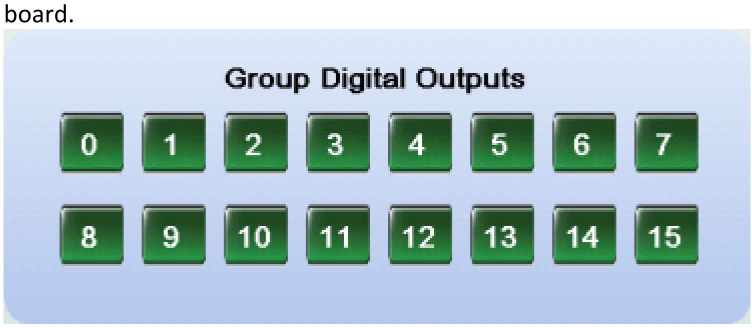
Failure Percent

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.



- The outputs pulse when any inspection within the assigned 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:

- 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.

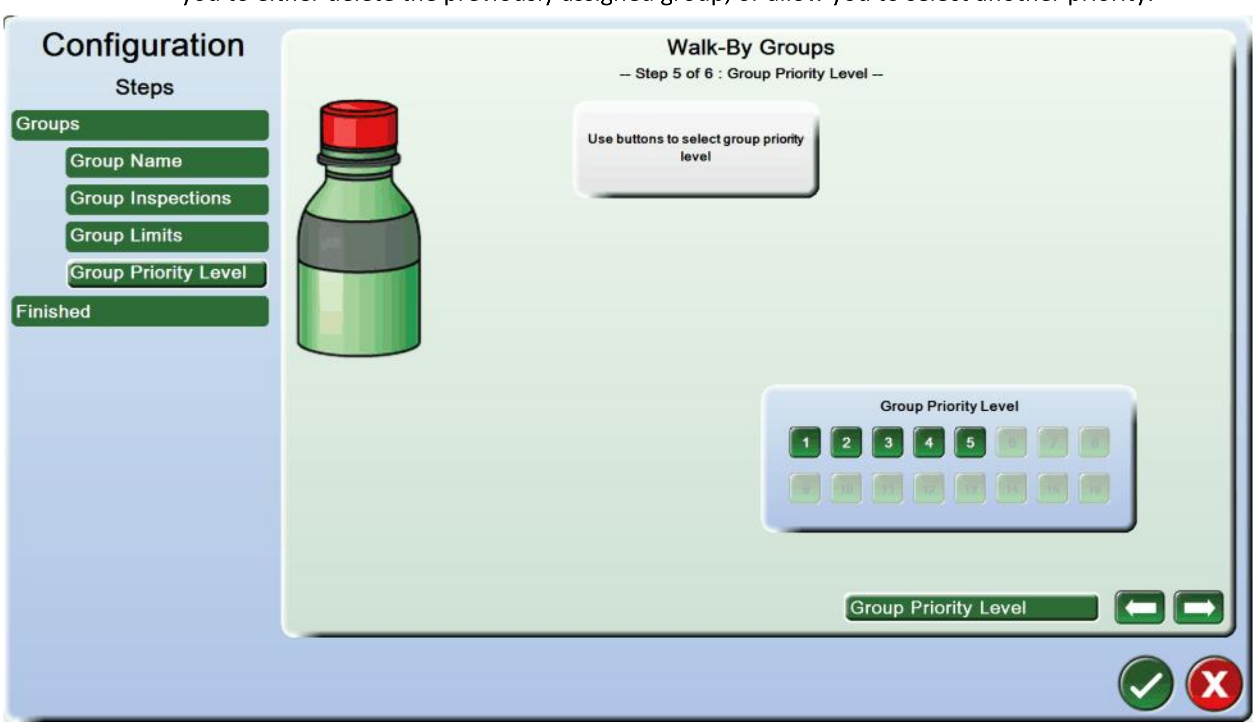
➢ *To enable Group Priority Level:*

1. From Lane or Sensor Overview mode, click the Tools button > Lane Setup > Select Features > and select Group Priority Level Reporting. The feature is enabled when there is a check mark next to the name.
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 the OK button to accept and go to the Walk By setup wizard.

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 Setup*** (on page 32).

➢ *To set up Group Priority Level:*

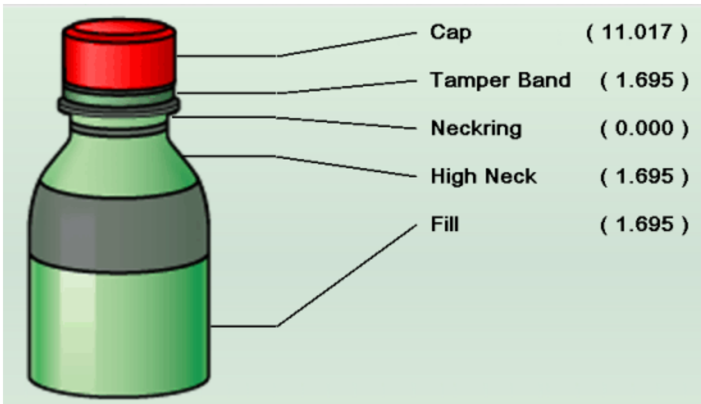
1. From Lane or Sensor Overview mode, click the Tools button > Lane Setup > Walk By Setup. You will see an additional step (six instead of five) in the wizard.
2. Follow the instructions on screen for steps one through four. This is where you assign inspections to a group.
3. In step five of the wizard, 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 available because that is the total number of groups available on this type of part. The priority number you assign will become 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 allow you to select another priority.



4. After you select a group priority in Step 5, the wizard will return 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. Click the OK button to finish and exit.

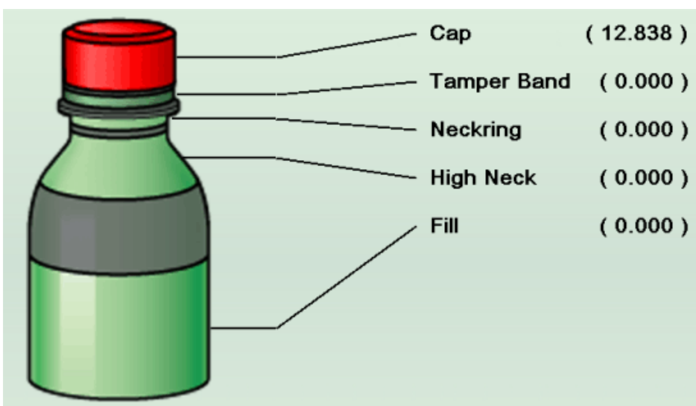
Example

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.

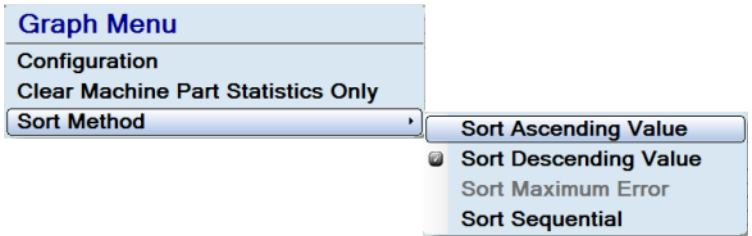


Sorting Data in Graphs

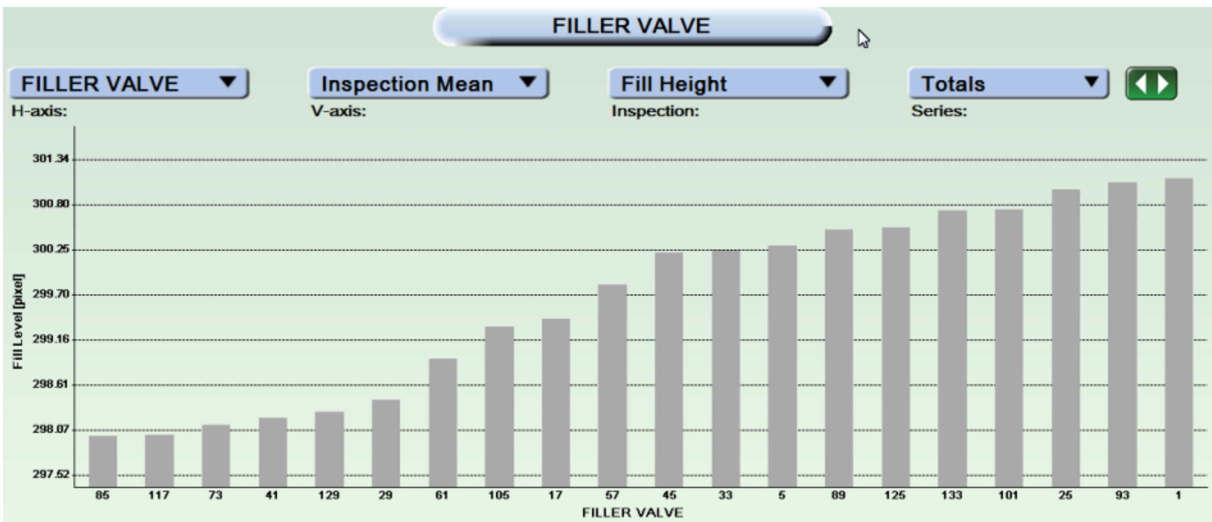
You can change the order of the displayed data in the Trend Graphs or Machine Part Graphs. The Machine Part graphs are only displayed if your system is configured for machine parts.

❖ *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.*

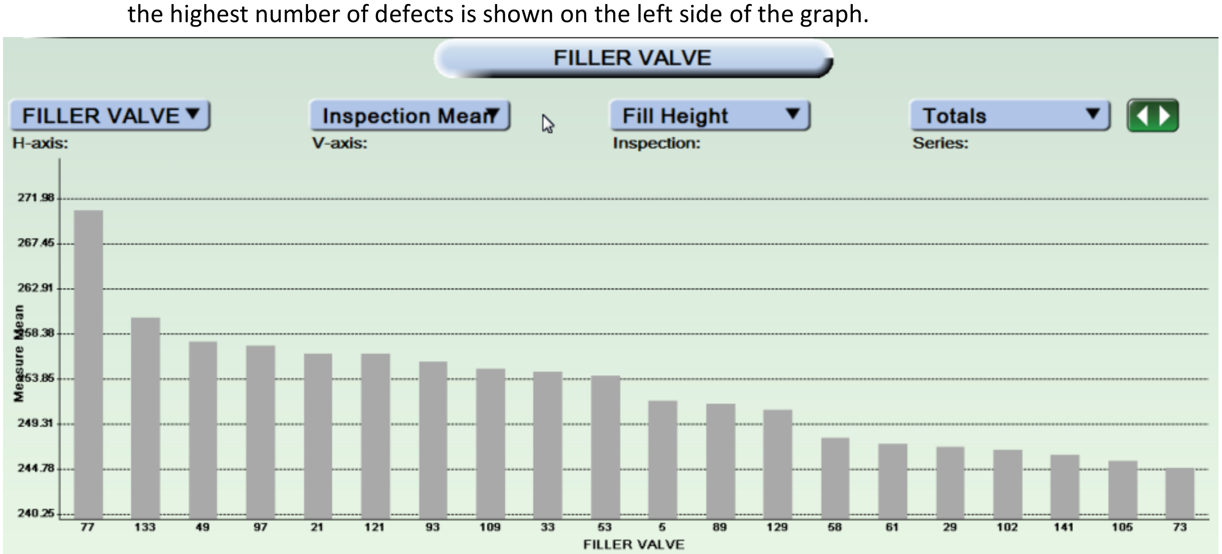
To sort the graph data: Right-click over a graph > select Sort Method > select an option. The data on the graph is sorted. The options are explained below.



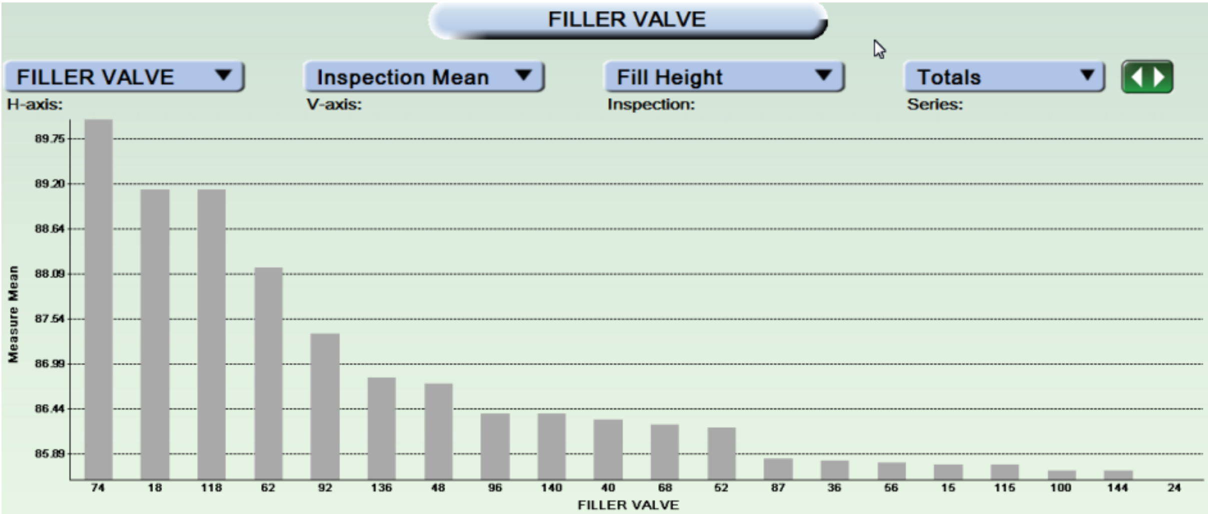
- **Sort Ascending Value** – Sort from low to high result. In the example below, the machine part with the highest number of defects is shown on the right side of the graph.



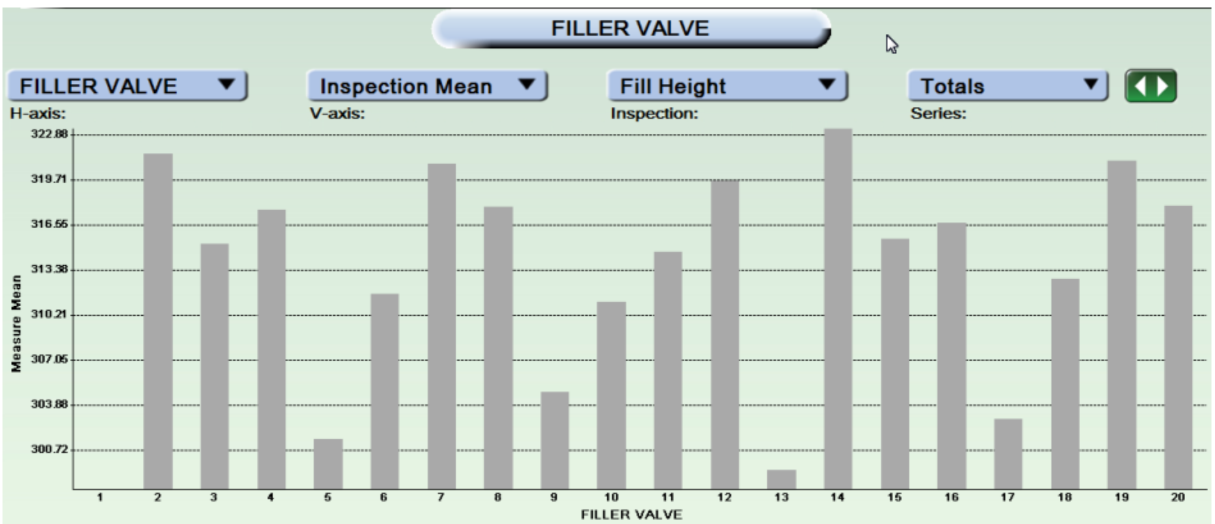
- **Sort Descending Value** – Sort from high to low result. In the example below, the machine part with the highest number of defects is shown on the left side of the graph.



- **Sort Maximum Error** – [Available when Keep Retro-Spec 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.



Clearing Machine Part Graph Data

This option is only available if machine part correlation is enabled on your system. You can clear the statistics for the machine parts only, if desired. This does not affect the remaining system statistics.

➤ ***To clear Machine Part statistics:***

1. Right-click over one of the trend graphs or machine part graphs.

2. From the Graph Menu, select Clear Machine Part Statistics Only. The machine part statistics are cleared. The remaining statistics are unchanged.

Scrolling 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

See ***Trend Chart Configuration - System Overview*** (on page 40) or ***Trend Chart Configuration - Lane Overview*** (on page 41) to learn more about setting the time per update or number of parts on a graph.

Trend Graphs

➤ ***To view the Lane trend graphs:***

1. Select a lane (click a Lane n button).
2. Click 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 are available to view statistics based on specified criteria. These graphs are available for each lane and each sensor within that lane. You can select criteria for the H-axis, the V-axis, and Series. There is an adjustable Alarm Level for Defect %. Both the H-axis and V-axis adjust automatically to higher and lower values. The Alarm Level will adjust as well. Below is a list of possible combinations for Time and Parts based graphs.

If you have an inspection enabled that collects ***Retro-Spec Statistics*** (on page 45), then an additional column of **Inspection*** data is available.

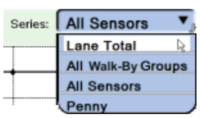
*These items are available for Trend Graphs (only in the upper screen) if:

- You have an inspection that collects Retro-Spec Statistics, and that feature is enabled, AND
- You select Inspection Mean, Inspection STD, or Inspection CPK for the V-axis, AND
- You select Lane Total from the Series drop-down menu

For more information about these items, see ***Retro-Spec Statistics*** (on page 45)

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

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



Lane Total

Displays the statistics averaged for all sensors within the lane.

All Walk-By Groups

Displays the 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

Displays the statistics for each sensor.

Individual Sensors [names vary]

Displays the 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. Click 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.

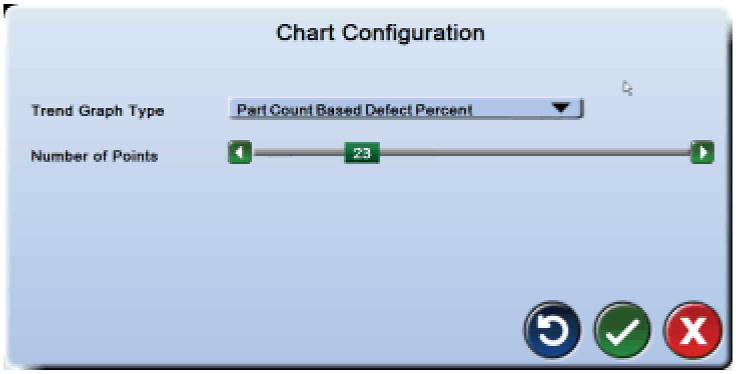
Trend Chart Configuration - System Overview

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

❖ *Note: the vertical axis setting is automatically scaled to best represent the data on the chart.*

➢ ***To change the chart configuration:***

1. Click the Home button  to view the System Overview screen.
2. Right-click over the trend chart. The Chart Configuration menu is displayed.



3. Choose from the available trend chart types, and select the number of points to display on the chart.
4. Click the OK button  to accept changes and exit the menu. The selected chart is displayed in the System Overview screen.

❖ *Note: these changes affect all trend charts in the System Overview screen*

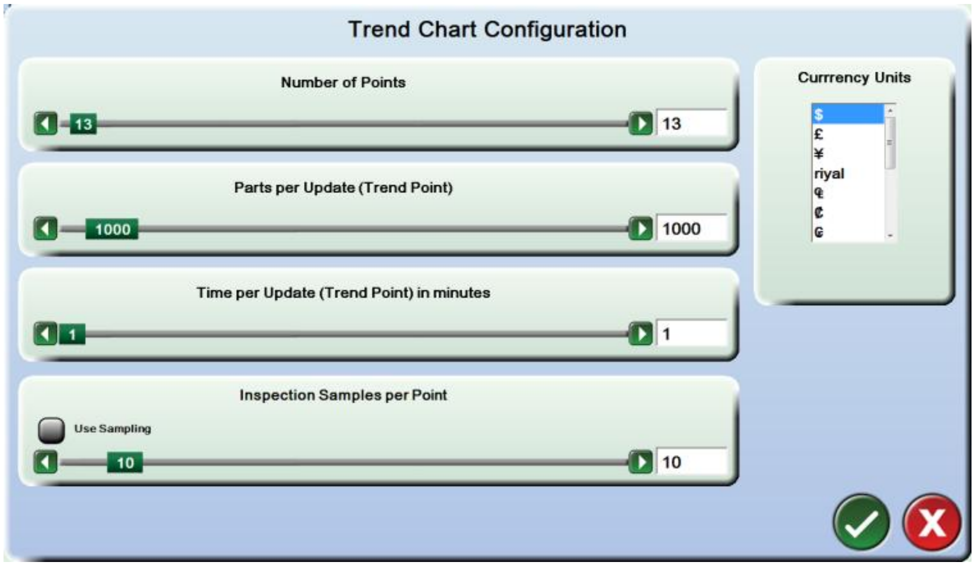
Trend Chart Configuration - Lane Overview

These settings affect the display of all the trend charts 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 chart display:***

1. View the Lane Overview or Sensor Overview screen by clicking either a Lane n button or a Sensor n button.
2. Click one or all of the Trend Charts buttons on the right side of the screen to display a trend chart.
3. Right-click over one of the trend charts. The Graph Menu is displayed.
4. From the Graph menu, select Configuration. The Trend Chart Configuration menu is displayed.

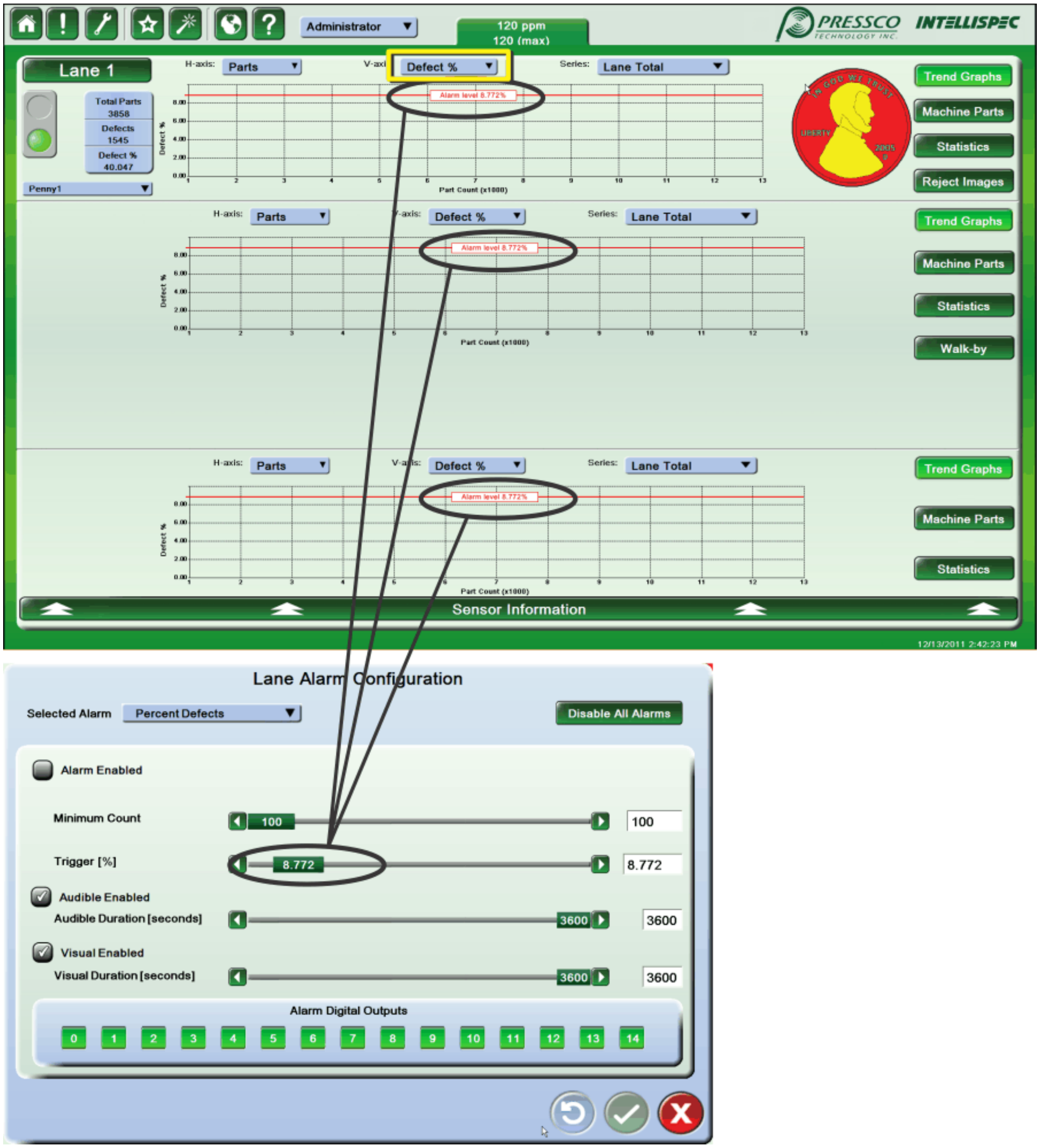


5. Select the desired settings from all the available parameters.
6. Click the OK button to save your changes and exit the screen. All the trend charts for the selected lane are updated to reflect your changes.

Alarm Percentages in Trend Charts

The alarm level can be adjusted when Defect % is selected for the V-axis. Click and drag on the red Alarm Level line to adjust it. This also changes the alarm percentage in the ***Lane Alarm Configuration*** (on page 59) menu. The illustration below shows Sensor Overview mode with Trend Charts displayed for both Lane and Sensor. Changing the alarm percentage in any one of the Trend Charts or Lane Configuration menu changes the percentage in all the other locations.

❖ *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. Machine Parts Graphs display defect information for each machine part. Below is a list of possible combinations for the machine part graphs. The name on the button(s) matches your system configuration. Examples of machine parts include "Cavity," "Filler Valve," or "Capper."

If you have an inspection enabled that collects ***Retro-Spec Statistics*** (on page 45), then an additional column of **Inspection** data is available.

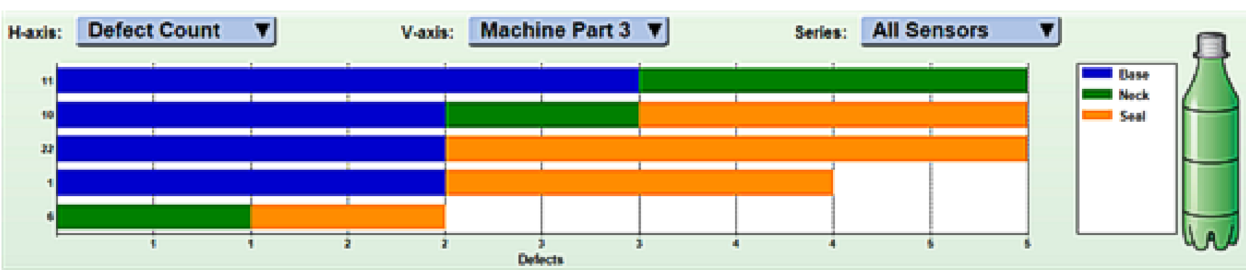
H-axis	V-axis	Inspection*	Series
Machine Part (depending on correlation configuration)	▪ Defect % ▪ Defect Count ▪ Inspection Mean* ▪ Inspection STD* ▪ Inspection CPK*	Inspection name (the names of the inspections that have Retro-Spec statistics enabled)	In the upper screen: ▪ Lane Total ▪ All Sensors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

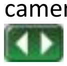
*These items are available for Machine Parts graphs if:

- You have an inspection that collects Retro-Spec Statistics, and that feature is enabled, AND
- You select Lane Total (upper screen) or Total (lower screen) from the Series drop-down menu

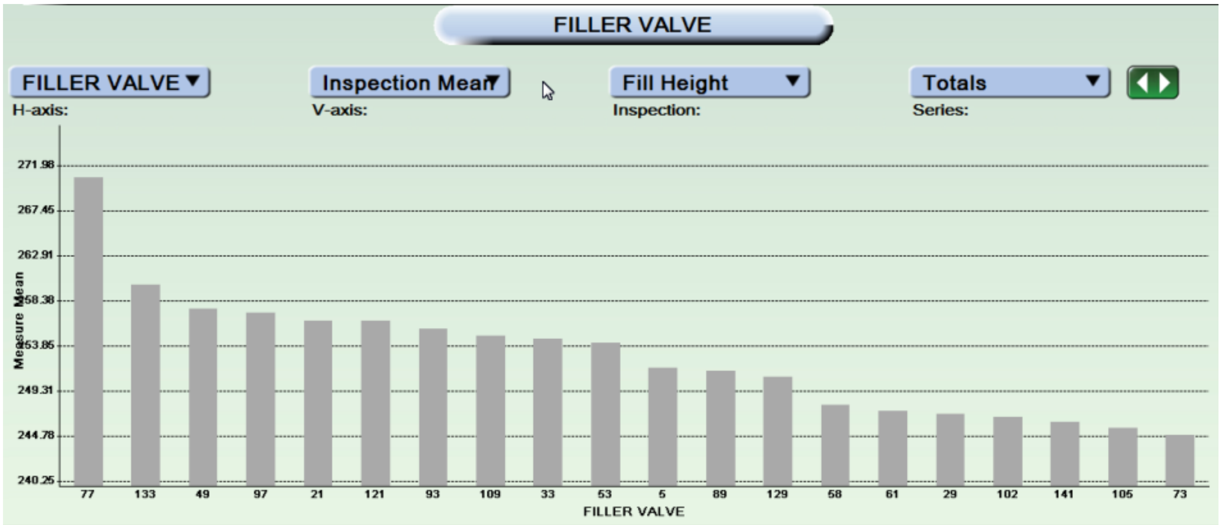
For more information about these items, see ***Retro-Spec Statistics*** (on page 45).

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 mean fill height for each machine part, for one camera. The machine part numbers are displayed at the bottom of the graph. Use the scroll button  to view other filler machine parts. Use the "X" button to close the scroll bar.

To change the sorting order, right-click on the graph. For more information, see ***Sorting Data in Graphs*** (on page 36).



Retro-Spec Statistics

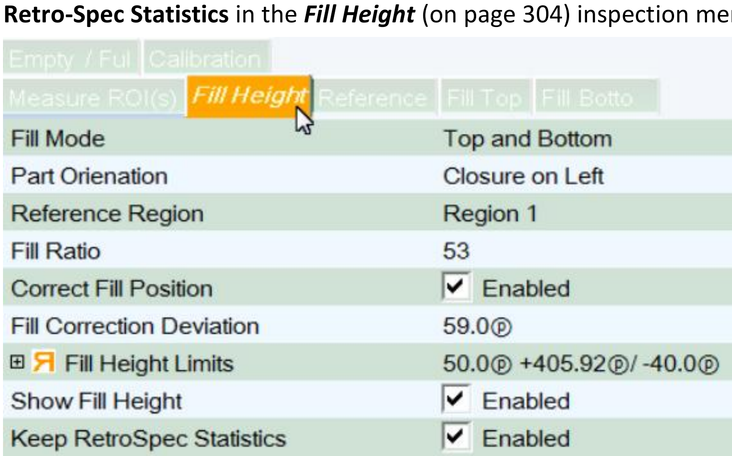
Inspections that collect measurement data have the ability to collect Retro-Spec statistics, which can be displayed in Machine Parts or SPC graphs. These inspections have a check box called "**Keep Retro-Spec Statistics**.*" This feature must be enabled in each inspection in order for the system to keep this data. The inspections include:

- ***Ambient*** (on page 282)
- ***Measurement*** (on page 292)
- ***Fill Height*** (on page 304)
- ***Fill Height - Segmented*** (on page 311)
- ***Label Skew Extract*** (on page 332)
- ***Distance*** (on page 337)
- ***Angle*** (on page 341)

*In ***Measurement*** (on page 292) Inspection, the graphs are enabled by "**Plotting**" check boxes.

For Fill Height applications

You can use the system graphs to plot fill level over time. First, you must check the box to **Keep Retro-Spec Statistics** in the ***Fill Height*** (on page 304) inspection menu.



The statistics that are kept include:

- 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)

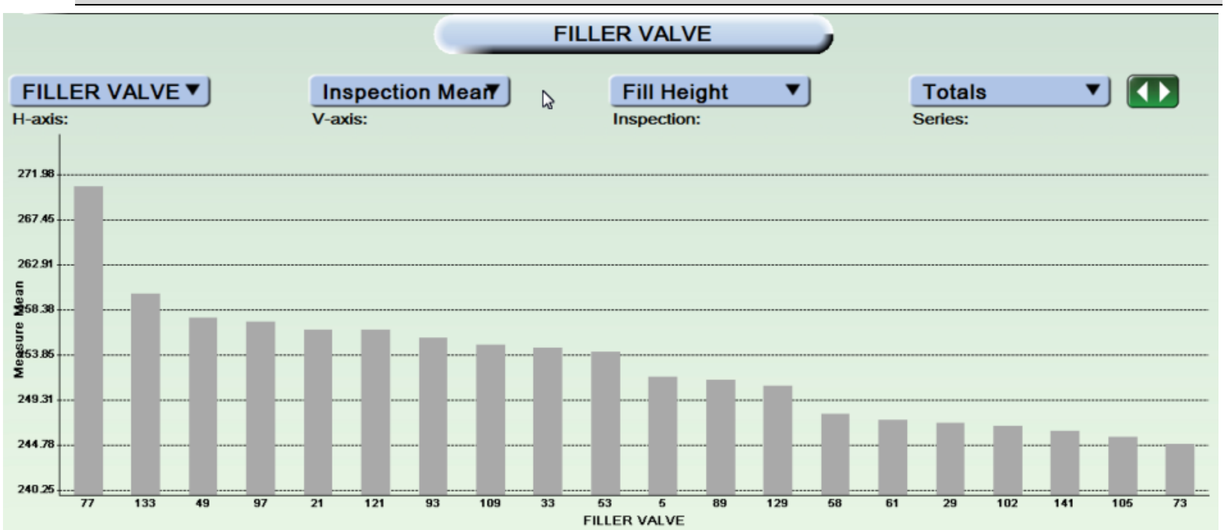
➢ ***To view the statistics:***

In either the Lane Overview Screen or Sensor Overview Screen, click the **Machine Parts** button on the right side of the screen. A machine parts correlation graph is displayed.

There are **Machine Parts** buttons in both the top and lower portions of the screen. The button in the upper screen allows you to view machine part data for the entire lane. If you are viewing the Sensor Overview screen, the Machine Parts button in the lower screen allows you to view machine part data for one sensor.

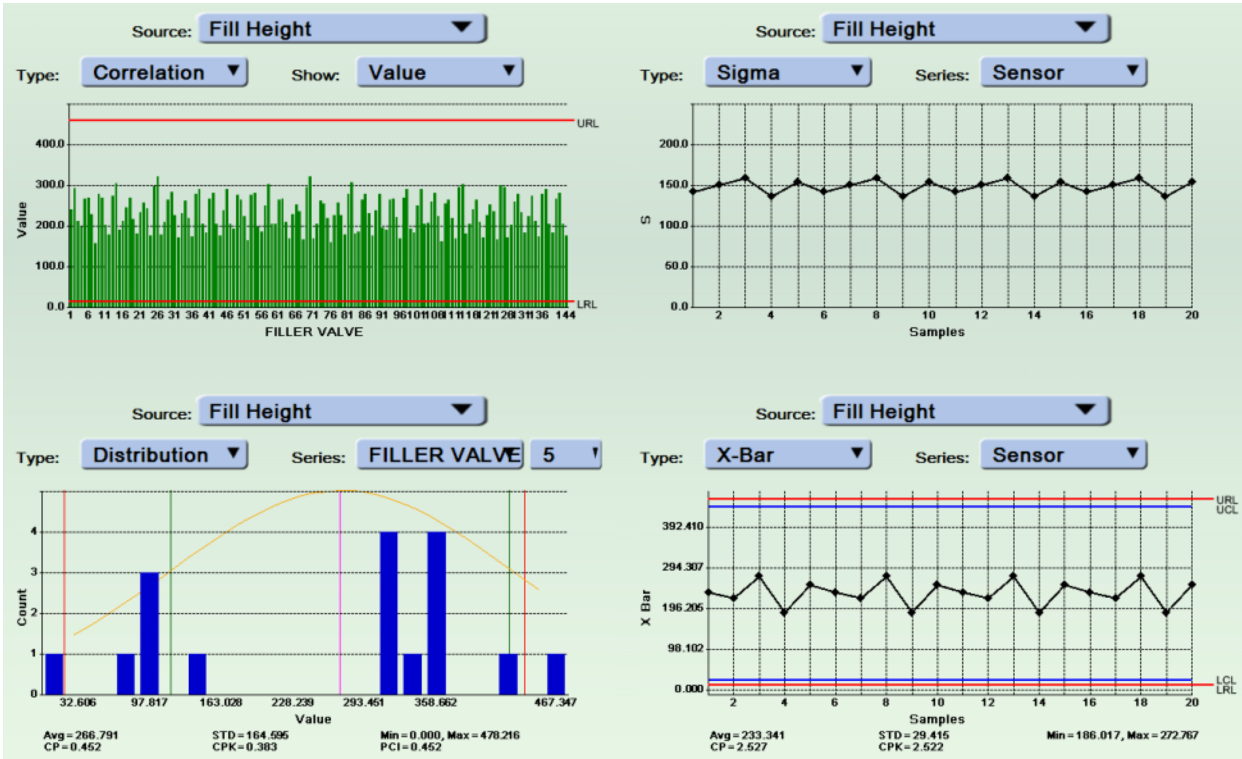
From the drop-down menus, select an option for H-axis, V-axis, Inspection (if shown), and Series. In our example, we have selected **Filler Valv**e as the correlation graph, **Inspection Mean** as the type of graph to display, **Fill Height** as the inspection, and **Totals** as the series.

❖ *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.*

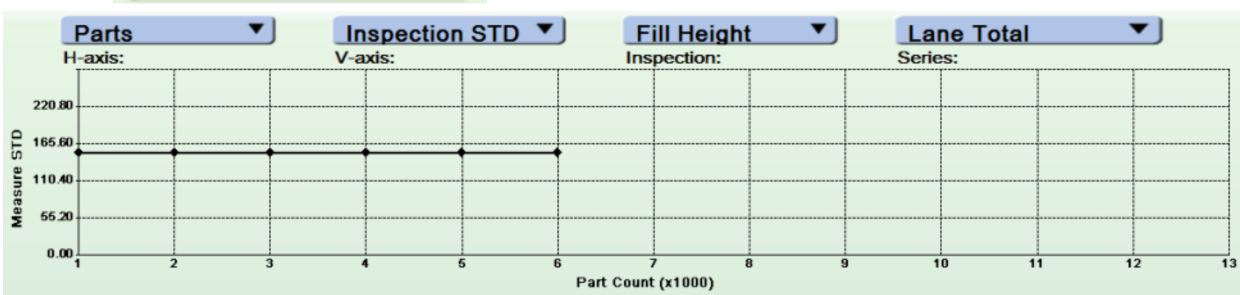


The example above shows the mean fill height for each valve, for one camera. The valve numbers are displayed at the bottom of the graph. Use the scroll button  to view other filler valves. Use the "X" button to close the scroll bar.

In addition to displaying fill height data in the Machine Parts graphs, you can plot the fill level in the ***SPC graphs*** (see "***Statistical Process Control (SPC) Charting***" on page 52) to show the data for the inspection in several different ways.



Another way to view fill height data is through the ***Trend Graphs*** (on page 39) in the upper screen.

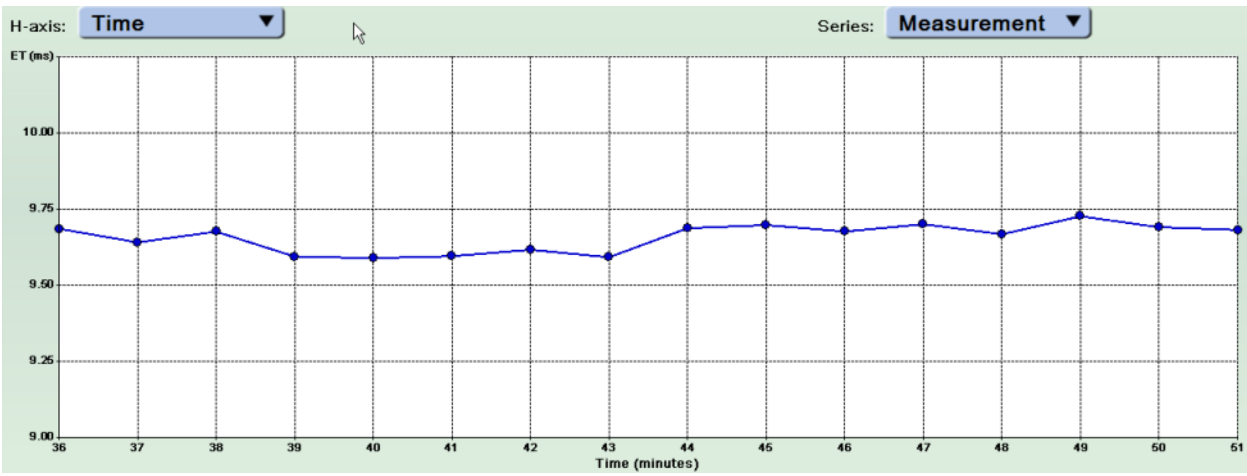


Timing Trend

❖ *Note: this chart 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.*

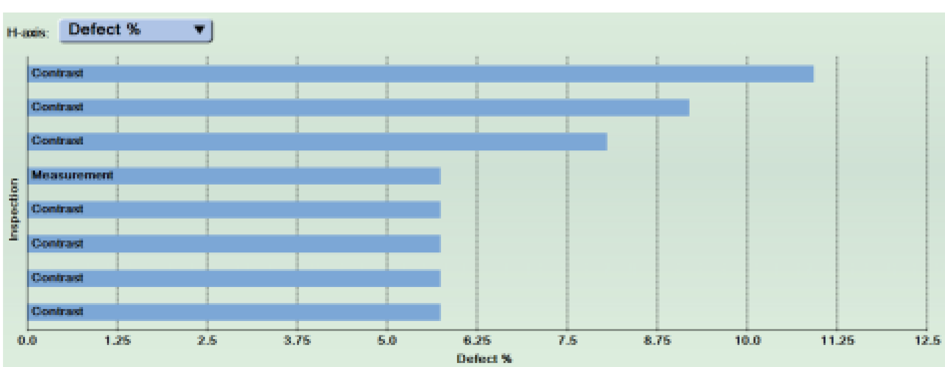
This chart displays the time required to run inspections. It is important to view the inspection timing, especially if you have multiple sensors or multiple lanes, to make sure that the system is inspecting all parts before they reach the reject station.

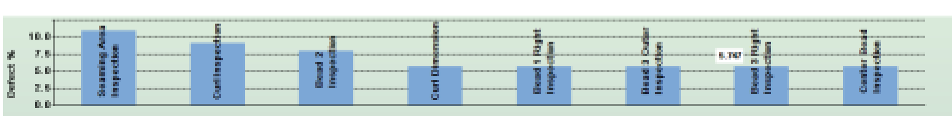
The choices for the Series in the Timing Trend chart allow you to choose Sensor Total, which is all inspections for that sensor, or any individual inspection for that sensor.



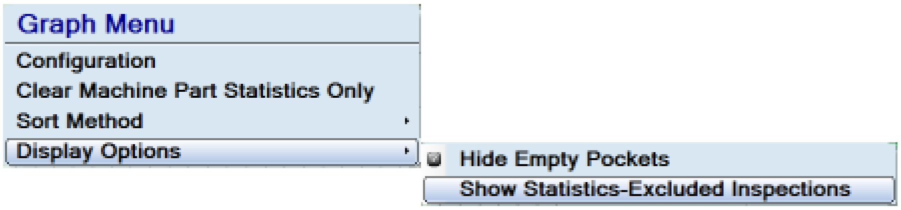
Inspections graph

Click the Inspections button on the right side of the screen to see the Inspections Graph. This graph displays 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*** (see "***Inspection menu***" on page 175).



Statistics Grid

The Statistics Grid displays information about each Sensor. There are two different 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 %.

Show: Sensors Detail: All

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** *(see "***Statistics Grid options***" on page 51) the statistics display. Your system may not display all of the above-mentioned items.*

To display the statistics grid, click the Statistics button on the right side of the screen. There may be multiple buttons, depending which screen you are viewing.

Sorting order

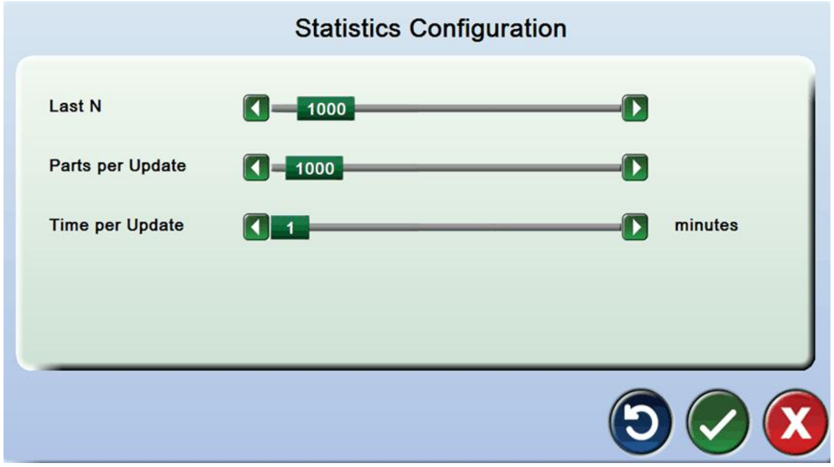
To sort any column in ascending or descending order, click the button at the top of the column. Click it again to toggle to the opposite order. Right-click to clear sorting in the statistics grid.

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

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

To get to this screen: From the Lane or Sensor Overview screen, click the Tools button  > Lane Setup > Statistics Configuration.



Last N

Specify how many parts to include in recent statistics, such as the column "Last N" which displays the number of defects in the Last N parts, or "Last N %" which displays the percentages of defects within the Last N parts.
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

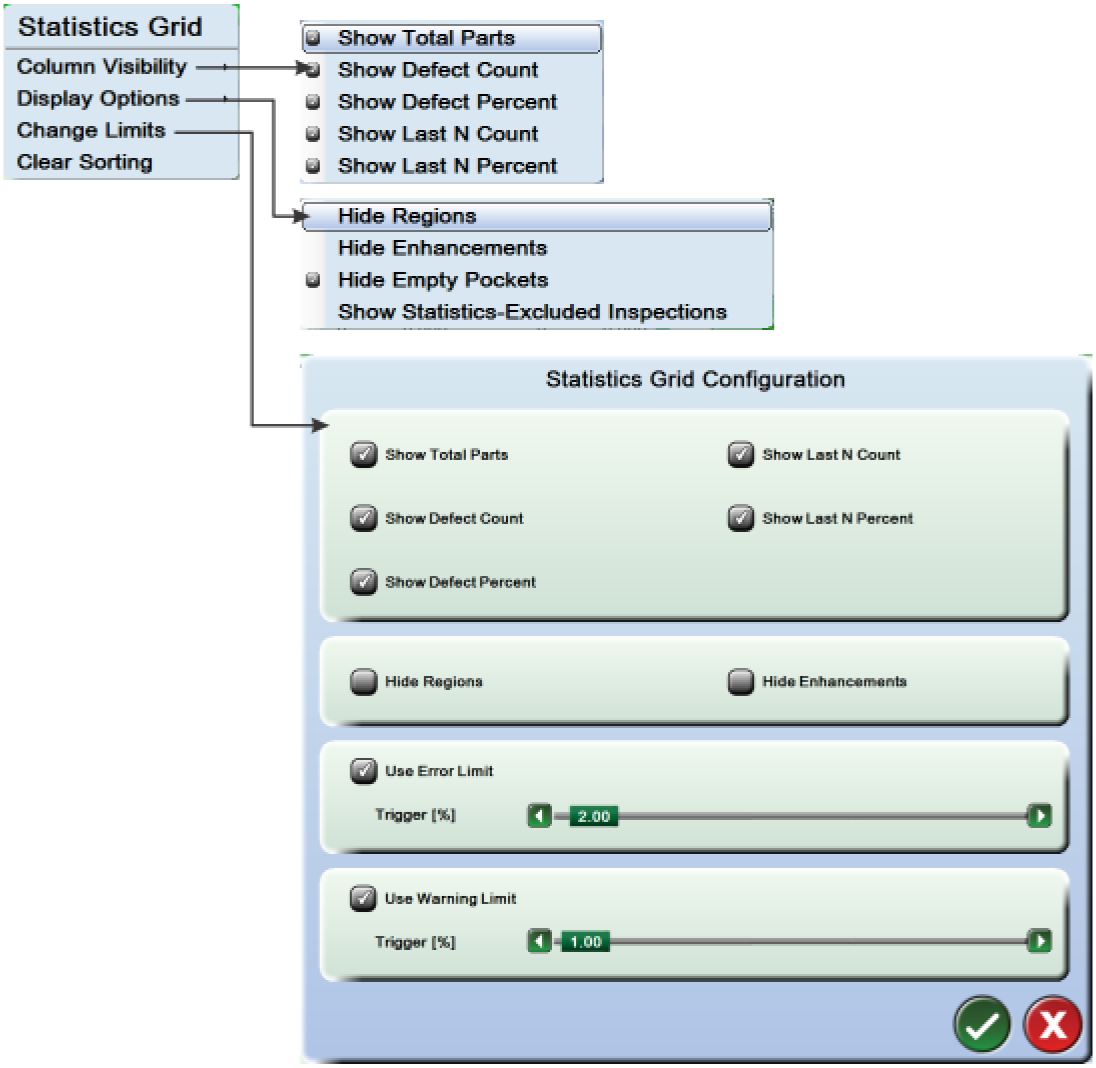
Determines the graduations on the horizontal axis for the Trend Chart and Timing Trend if "Parts" is selected.

Time per Update

Determines the graduations on the horizontal axis on the Trend Chart and Timing Trend if "Time" is selected.

Statistics Grid options

To change what is displayed in the statistics grids, use the options menu. These settings are applied to all statistics grids, whether in the Lane Overview screen, or Sensor Overview screen. Right-click over any statistics grid to see the options. These are explained below.



Column Visibility

Change the number of columns that are displayed in the grid.

Display Options

Change the number of rows that are displayed in the grid. This only affects the statistics grids in the Sensor Overview level.

Hide Regions

If this is checked, then the inspection regions are not displayed in the grid. This means the Ring, Polygon, Rectangle, or Adaptive regions that identify the inspection area, but do not have any reject criteria.

Hide Enhancement

If this is checked, then the inspection enhancements such as Clipping, Stretch Grayshades, or Power Filter are not displayed in the grid.

Hide Empty Pockets and Show Statistics-Excluded inspections

Show or hide Empty Pocket or Statistics-Excluded ***inspections*** (see "***Inspection menu***" on page 175).

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.

The lower two sections of this menu allow you to enable and change limits for inspection.

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. To sort any column in ascending or descending order, click the button at the top of the column. Click it again to toggle to the opposite order.

Statistical Process Control (SPC) Charting

This option is available if you have a sensor that measures specific data, or you have an inspection with "Keep Retro-Spec Statistics" enabled. The measured data can be displayed in a number of views. To view more than one graph at once, select a sensor button (Sensor Overview mode), and then select the SPC graph button on the right side of the screen.

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

Select the inspection from which the data is derived.

- For mass sensors, the only choice under Source is the mass inspection because the empty pocket inspection does not have appropriate data for these views.
- 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*** (on page 45) 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 chart. 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. A curve of a standard distribution is shown in yellow to indicate a normal distribution around the average value.
- **Correlation** - the display of the average sensor values by individual cavity

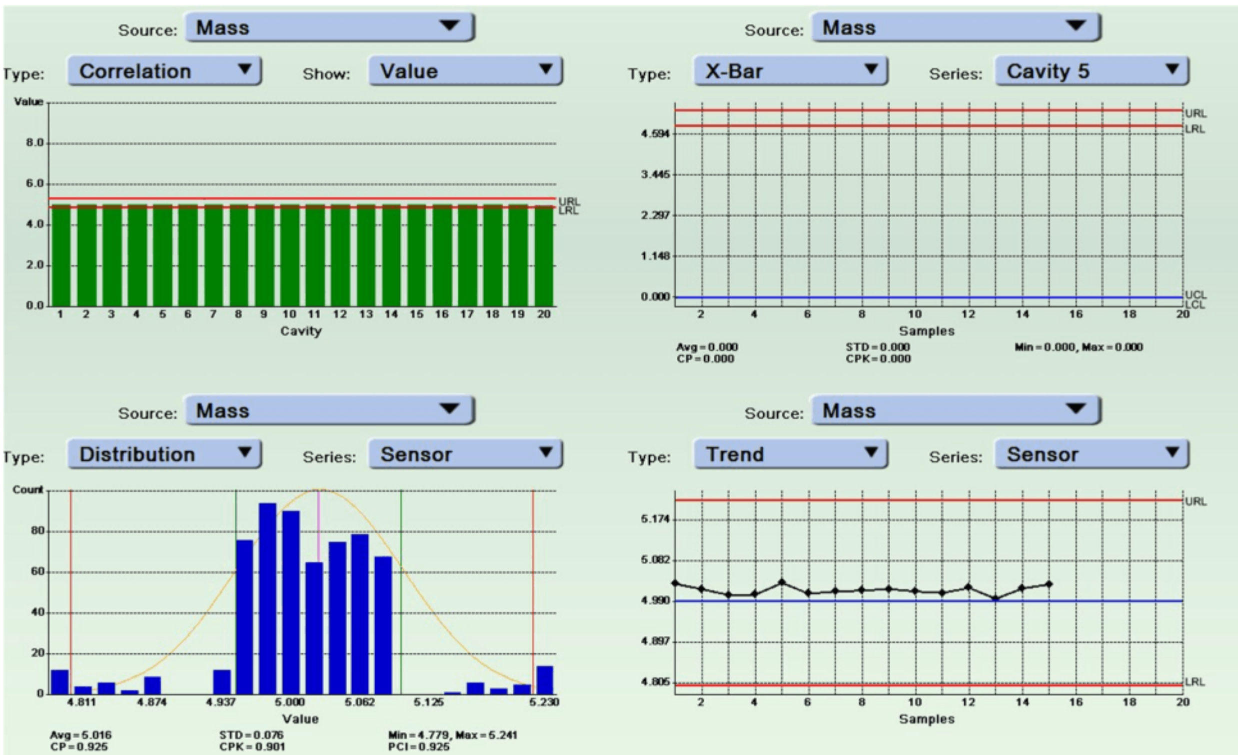
Series/ Show

On the first five chart 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, such as 'Cavity' which selects the data from an individual machine part. You can choose a machine part from a drop-down menu displayed next to the Series drop-down menu.

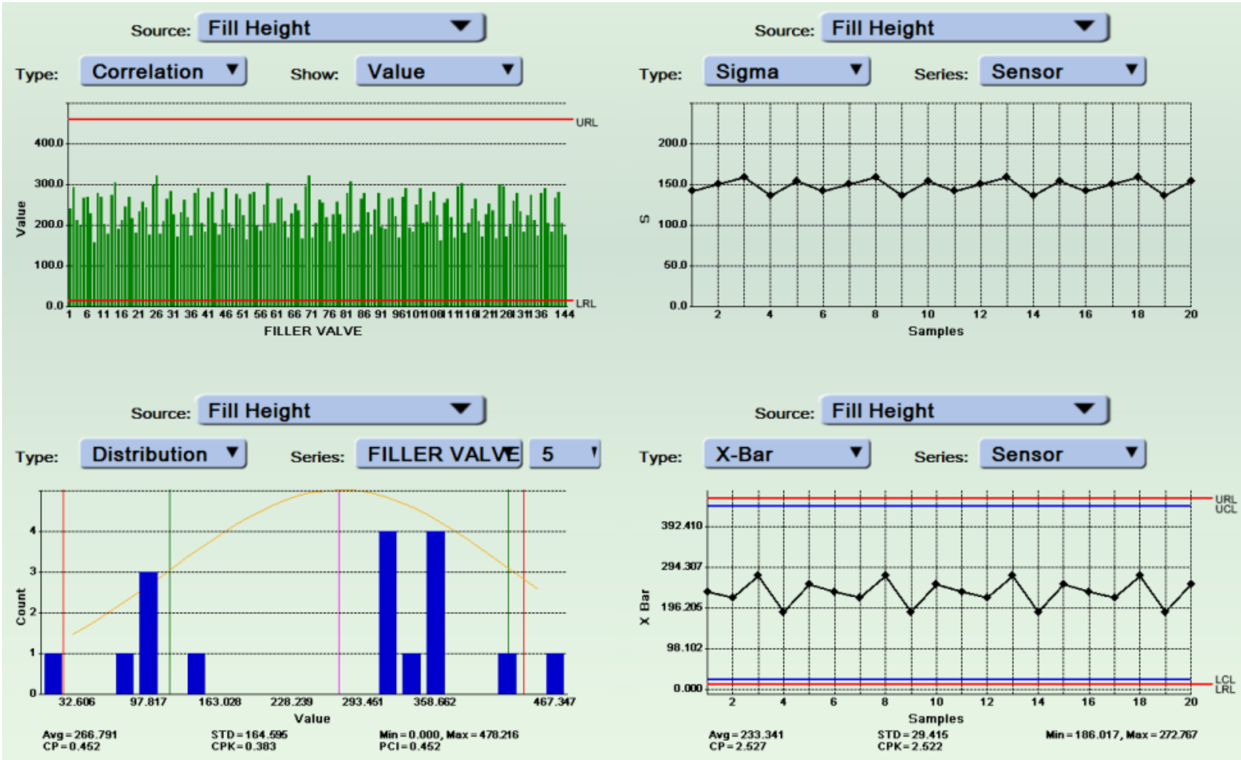
When the Correlation chart is selected, the **Show** category allows the selection of:

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

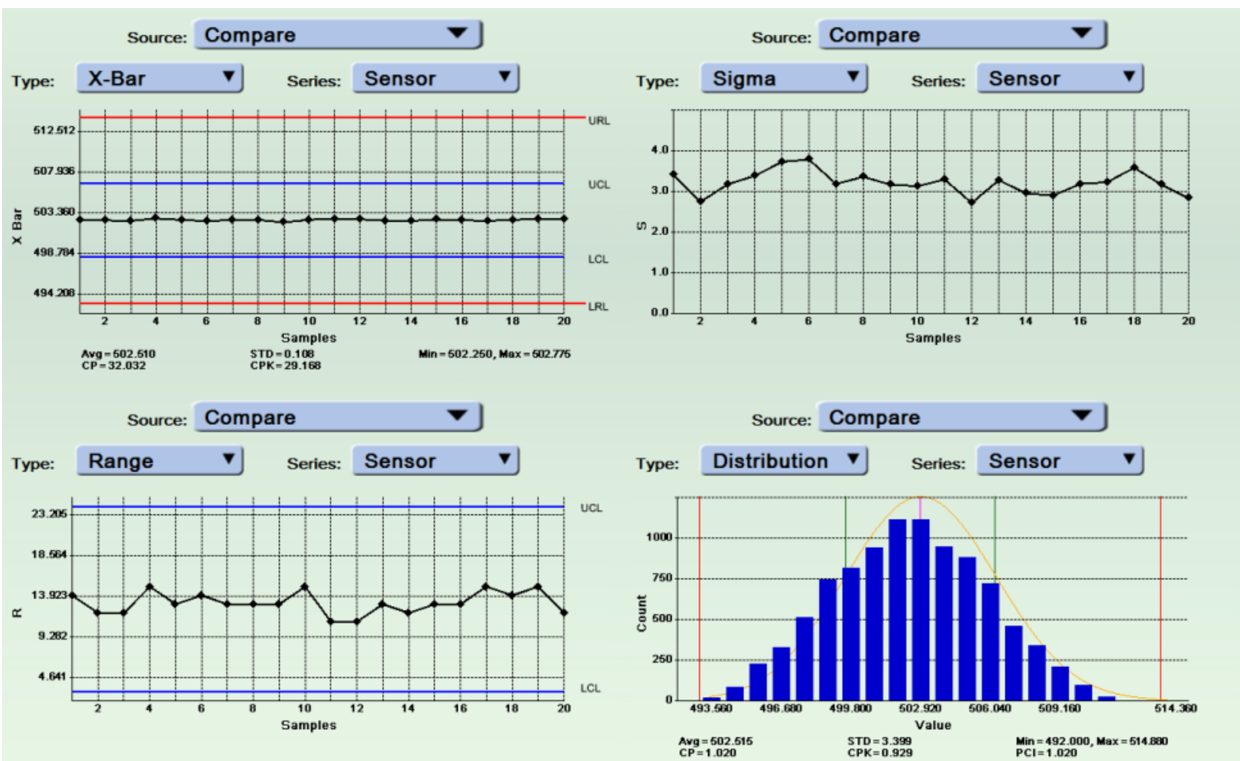
The picture below shows sample data from **mass** sensors.



The picture below shows sample data from **camera** sensors.



The picture below shows sample data from **x-ray** sensors.



Chapter 6

Alarms

There are three levels of alarms within the Intellispec system: System, Lane, and Sensor alarms. Most of these are configurable. The table below lists the alarms, possible causes for triggering the alarm, the reset mechanism, and color of the indicator on the light tree. Also refer to the light tree status for more information about the lights.

The information in this section is valid as of software version 5.2.037 and 5.3.017

❖ *Note: Alarms are recorded in the system* **log reader** *(on page 76), even when the alarms are automatically cleared.*

<table>
<tr><th>Alarm Name</th><th>Cause</th><th>Reset Mechanism</th><th>Color in light tree</th></tr>
<tr><td colspan="4">System Alarms (see "System Alarms Description" on page 58)</td></tr>
<tr><td colspan="4">Note: If a system alarm occurs, an alarm icon is displayed in the lower right of the screen (in the Windows system tray)</td></tr>
<tr><td rowspan="2">UPS</td><td>Battery is dead.
Or:</td><td>Manually [you must first replace battery]</td><td>Not applicable (N/A)</td></tr>
<tr><td>Plant power is lost and the UPS shutdown time is exceeded. The Intellispec shuts down.</td><td>If plant power is restored before the Intellispec shuts down, then the alarm condition is automatically cleared.
Otherwise, you must restart the system manually.</td><td>N/A</td></tr>
</table>

Alarm Name	Cause	Reset Mechanism	Color in light tree
Over temperature	CPU temperature exceeds highest recommended operating temperature. The Intellispec system shuts down. You must wait till the processor cools before resuming operation.	Manually	N/A
Lost network connection	If the plant network is configured to communicate with the Intellispec and the network connection is lost, a lost network icon appears in the Windows system tray	Restoring plant network connection	N/A
Lane Alarms **(see "*Lane Alarms Description*" on page 62)**			
Percent Defects[1]	Percentage of defects exceeds the set limit	Manually	Red
Offline[1]	Lane goes offline	Manually	Green when system is online Red when system goes offline
Chute Full[1]	Reject chute is full	Manually [you must first clear chute]	Red
Blow Molder Door Open[1]	Blow molder door is open	Automatically [by closing blow molder door]	Red
Power Status[1]	Lane AC Power is lost	Automatically	Off when AC power is lost Blue when power is OK
Good Parts[1]	Used as a part counter. When specified number of parts is reached, then alarm is triggered.	Manually	Red
Blocked Reject Confirm[1]	The reject confirm path has been blocked too long	Manually	Red
Missed Reject[1]	System missed rejecting a part. Works with ***Reject Confirm*** (see "***Reject Confirm Calibration (Optional)***" on page 108).	Manually	Red
System Error[1]	Part tracker or other internal system errors	Manually	Red
Sensor Alarms **(see "*Sensor Alarms Description*" on page 66)**			
Percent Rejects[1]	Percentage of rejected parts exceeds the set limit	Manually	Red
Excessive Rejects[1]	Excessive number of rejects	Manually	Red
Excessive Warnings[1]	Excessive number of warnings	Manually	Amber

Alarm Name	Cause	Reset Mechanism	Color in light tree
Consecutive Defects[1]	Too many consecutive defects	Manually	Red
System Error[1]	Missed part, missed acquisition, missed result, or other internal error	Manually	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.

Viewing and Clearing Alarms

Use the View/Clear Alarms menu to see which alarms are enabled and disabled. A green light indicates that the alarm has not been triggered, while a red light indicates the alarm has been triggered.

➢ *To get to the View/Clear Alarms menu:*

- Click an Alarm button 

. The View/Clear Alarms menu is displayed.

Or:

1. View the Lane Overview or Sensor Overview screen by clicking either a Lane n button or Sensor button.
2. Click the Alarms button  to view the Alarms menu.
3. Select View/Clear Alarms from the menu. The menu shown below is displayed.

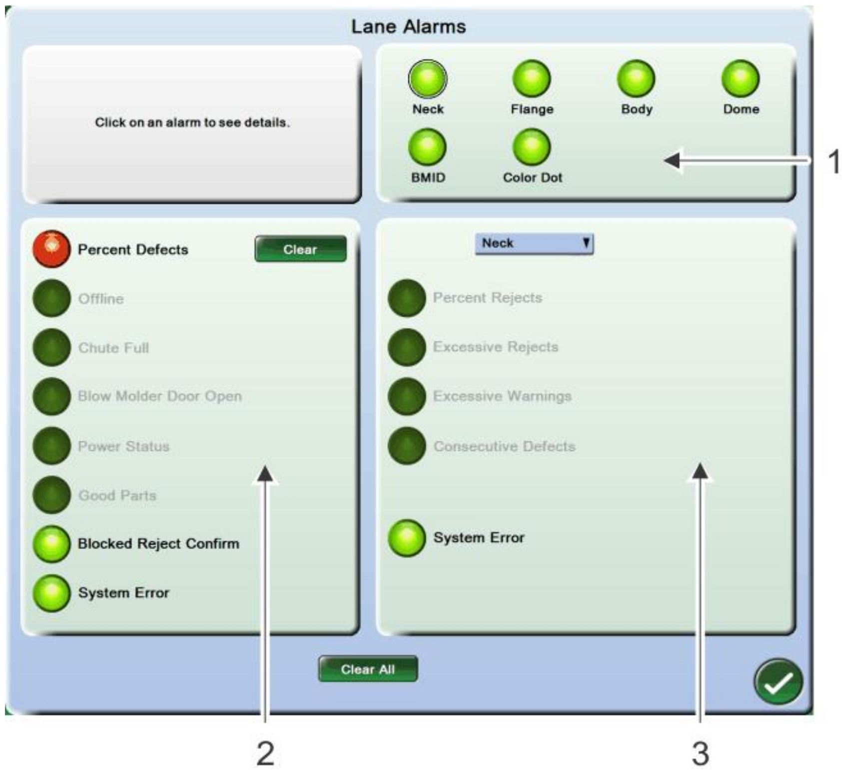
➢ *To view when an alarm was triggered and who last cleared it:*

Click an LED in the View/Clear Alarms screen.

➢ *To clear an alarm:*

- Click the Clear button next to any alarm to clear a single alarm. Or:
- Click the Clear All button at the bottom of the screen to clear all alarms.

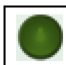
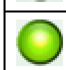
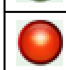
❖ *Note: some triggered alarms may be from another sensor - click the red sensor indicator [in item 1] to see that sensor's alarms*



1	List of sensors in the selected lane. Click an LED to select a sensor.
2	List of Lane alarms
3	List of Sensor alarms. Use the drop-down menu to select a sensor.

❖ *Note: The LED with a white circle around it in the list of sensors [item 1] is the selected sensor. The drop-down menu also indicates the selected sensor.*

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

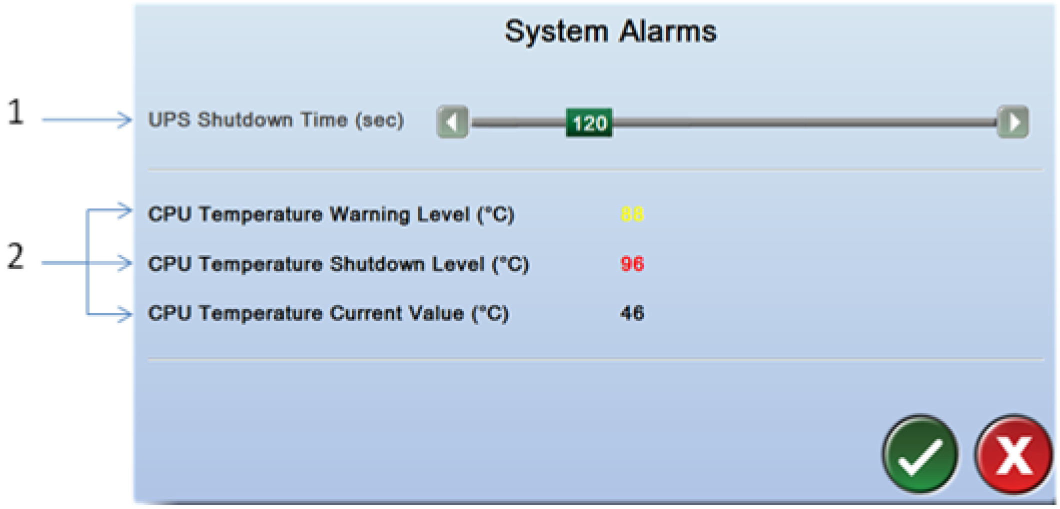
	Green Off - the alarm is not enabled nor triggered
	Green On - the alarm is enabled, but has not been triggered
	Red On - the alarm is both enabled and triggered

System Alarms Description

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

➢ ***To get to this menu:***

1. Click the Home button  to view the System Overview screen.
2. Click the Alarms button  to view the system alarms. The screen shown below is displayed.



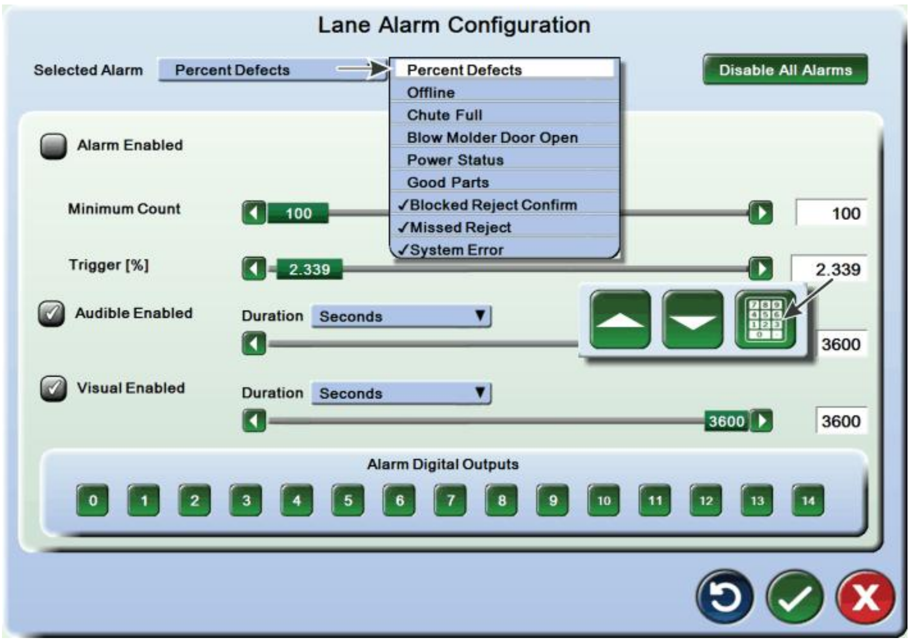
1	UPS Shutdown Time – Set the number of seconds that the UPS will maintain power to the system if AC power has been lost. The Intellispec system shuts down after this time period. This allows for a normal Windows shutdown.
2	CPU Temperature – Displays the current, warning, and shutdown temperatures associated with the computer CPU. 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 Alarm Configuration

Edit alarms for an entire lane. To see a description for each type of alarm, see ***Lane alarms description*** (on page 62).

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

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. You can enable or disable parameters for each alarm individually. A check mark appears in the box next to the parameter, and the name of the alarm, when it is enabled. The parameters are described below.

For numeric values, you can change the numbers with the slider bars or click in the box to the right of the slider to nudge the number up or down, or bring up a numeric keypad to enter a new value.

Alarm Enabled

Enables alarm.

Minimum Count

Specify 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.
Minimum Count is used in the **Percent Defects** alarm.

Trigger [%]

Define 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.
Trigger [%] is used in the **Percent Defects** alarm.

❖ *Note: you can change this percentage in the* **Trend Charts** *(see "***Alarm Percentages in Trend Charts***" on page 42) in Lane Overview mode when Defect % is selected for the V-axis.*

Trigger (thousands)

[Good Parts alarm] The number of parts that must pass inspection to trigger the alarm. The number is expressed in thousands.

Audible Enabled

If this parameter is enabled, the audible alarm will sound when triggered.

Audible Duration

The number of seconds the audible alarm will sound if triggered. It will remain on until the alarm is cleared. Use the slider to set values up to 3600 seconds (60 minutes), or use the drop-down menu option to allow the alarm to remain on forever (until cleared).

Visual Enabled

If this parameter is enabled, this alarm will switch on the appropriate light on the light tree when triggered.

Visual Duration

The number of seconds the light will remain on when the alarm is triggered. It will remain on until the alarm is cleared. Use the slider to set values up to 3600 seconds (60 minutes), or use the drop-down menu option to allow the alarm to remain on forever (until cleared).

Alarm Outputs

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

❖ *Note: if your system has firmware version F168 or higher, there are 16 Alarm Digital Outputs. They are numbered 0-15. Firmware versions below F168 support 15 Alarm Digital Outputs numbered 0-14.*

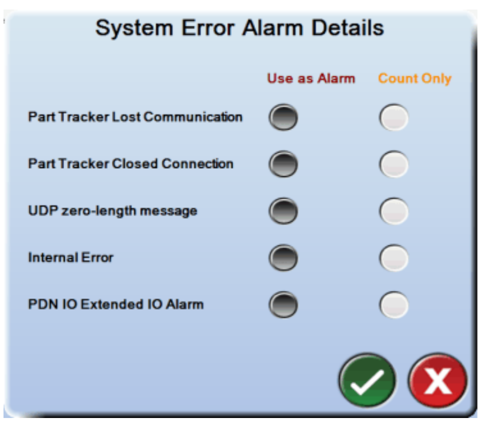
- There are 15 available **Inspection Alarm** outputs that correspond to the extended I/O signals. Click one of the output numbers to assign the current alarm to an output.
- These outputs go active when the alarm is triggered, and go inactive when the alarm is cleared.
- The outputs can be monitored by your plant equipment, such as a PLC, to notify you when certain alarms are triggered.

Disable All Alarms

Click this button to disable all the current alarms at once. This disables only the alarms for the current sensor or lane. This is used in emergencies when you cannot repair a situation immediately, or when setting up the system. The remaining parameter settings for each alarm are saved for future use. You must re-enable each alarm individually when you are ready.

Missed Reject and System Error Alarm Details

The Missed Reject and System Error Alarms cannot be disabled. However, there is a **Details** button that shows whether they are being used as an alarm (to light the red light of the light tree, turn on the horn, or turn on the audible alarm). Alarms may be added or subtracted from the software without notice.



Use as Alarm

This is the normal setting.

Count Only

If one or more of the System Error alarms or Missed Reject have Count Only selected, then those alarms will be used as a warning. In the View/Clear Alarms screen, the LED will be yellow if the alarm is triggered (instead of red). The Count Only alarms will NOT light any light in the light tree, sound the horn, nor cause the red flashing **ALARM** button over the Lane button.

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

Click the OK button to apply changes and exit the menu.

Lane Alarms Description

The available Lane alarms are as follows:

Percent Defects

This alarm is triggered when the percentage of defective parts from a Lane exceeds the Percent Trigger. It will remain triggered until you clear the alarm. It uses the red light of the light tree as a visual indicator.

Offline

This alarm indicates whether the system is online or offline. The green light of the light tree is on when the system is online. The green light turns off and the red light turns on when the system goes offline.

Chute Full

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 is triggered when the blow molder's internal reject chute is full. This alarm may not apply to your system. It uses the red light of the light tree as a visual indicator.

If this alarm is enabled and 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.

❖ *Note: This alarm is disabled when the Intellispec is offline.*

Blow Molder Door Open

This alarm is used for systems that have inspection modules installed within a blow molder. It is triggered when the blow molder door is opened. It will remain triggered until the door is closed. It uses the red light of the light tree as a visual indicator. This alarm may not apply to your system.

❖ *Note: In PET Preform applications, this alarm is triggered when the Bypass Gate opens.*

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.

The red light of the light tree will switch on when Lane AC power is lost. The blue light should remain on as long as the Lane power is on.

Good Parts

This 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 will count the number of good inspected parts, and notify 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.

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. It uses the red light of the light tree as a visual indicator. Note that clearing this alarm also clears the Good Parts count.

See also information about the optional Extended I/O board.

Blocked Reject Confirm

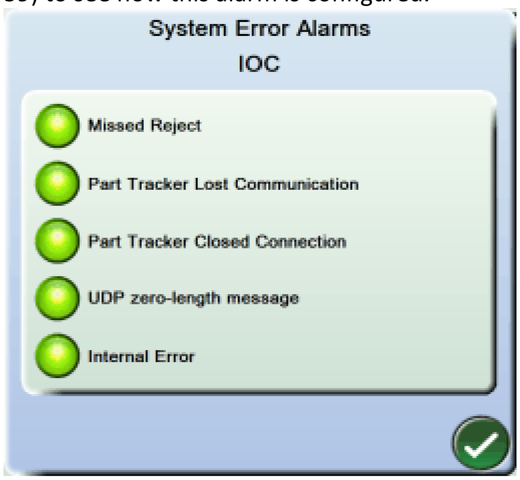
This alarm is used with the ***Reject Confirm Calibration (Optional)*** (on page 108). The alarm is triggered when the reject path has been blocked too long.

Missed Reject

This alarm works in conjunction with the ***Reject Confirm Calibration (Optional)*** (on page 108). It is triggered when a missed reject occurs. It uses the red light of the light tree as a visual indicator. There will be two Missed Reject alarms available if two ***rejectors*** (see "***Rejector Enable/ Disable***" on page 92) are enabled and two Reject Confirm rejectors are enabled.

System Error

System Error is a group of several internal system alarms. Click the System Error LED on the Lane Alarms screen to see all the alarms and their statuses. See also ***Lane Alarm Configuration*** (on page 59) to see how this alarm is configured.



These errors are recorded in the ***Log Reader*** (on page 76). Some of these are described below. Other system error alarms may be added and shown on the screen, or removed without notice.

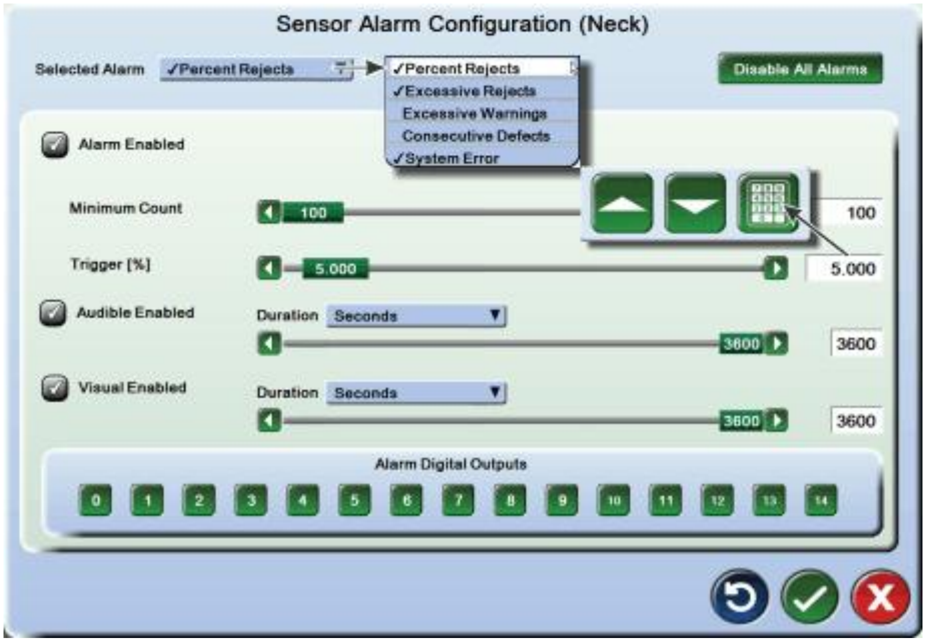
- **Part Tracker Lost Communication** - You may be able to reset the Part Tracker to re-establish communication. See Resetting the Part Tracker Board in FHCP 3X.
- **Internal Error** - an internal error was logged. This usually requires Pressco technical assistance.

Sensor Alarm Configuration

Edit alarm settings for a Sensor. To see a description of each type of alarm, see ***Sensor alarms description*** (on page 66).

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

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. You can enable or disable parameters for each alarm individually. A check mark appears in the box next to the parameter, and the name of the alarm, when it is enabled. The parameters are described below.

For numeric values, you can change the numbers with the slider bars or click in the box to the right of the slider to nudge the number up or down, or bring up a numeric keypad to enter a new value.

Alarm Enabled

Enables alarm.

Minimum Count

Specify 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.
Minimum Count is used in the **Percent Rejects** alarm.

Sample Size

Define 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.
Sample Size is used in the **Excessive Rejects** and **Excessive Warnings** alarms.

Trigger [%]

Define 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.
Trigger [%] is used in the **Percent Rejects**, **Excessive Rejects**, and **Excessive Warnings** alarms.

❖ *Note: you can change this percentage in the* **Trend Charts** *(see "***Alarm Percentages in Trend Charts***" on page 42) in Sensor Overview mode when Defect % is selected for the V-axis.*

Consecutive Triggers

Define the number of defects in a row that the system must have to trigger the alarm. This number is selectable between two and 100. The default value is 25.
Consecutive Triggers is used with the **Consecutive Defects** alarm.

Audible Enabled

If this parameter is enabled, the audible alarm will sound when triggered.

Audible Duration

The number of seconds the audible alarm will sound if triggered. It will remain on until the alarm is cleared. Use the slider to set values up to 3600 seconds (60 minutes), or use the drop-down menu option to allow the alarm to remain on forever (until cleared).

Visual Enabled

If this parameter is enabled, this alarm will switch on the appropriate light on the light tree when triggered.

Visual Duration

The number of seconds the light will remain on when the alarm is triggered. It will remain on until the alarm is cleared. Use the slider to set values up to 3600 seconds (60 minutes), or use the drop-down menu option to allow the alarm to remain on forever (until cleared).

Alarm Outputs

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

❖ *Note: if your system has firmware version F168 or higher, there are 16 Alarm Digital Outputs. They are numbered 0-15. Firmware versions below F168 support 15 Alarm Digital Outputs numbered 0-14.*

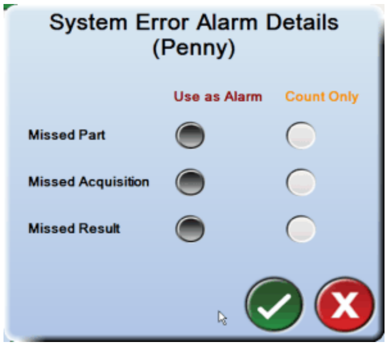
- There are 15 available **Inspection Alarm** outputs that correspond to the extended I/O signals. Click one of the output numbers to assign the current alarm to an output.
- These outputs go active when the alarm is triggered, and go inactive when the alarm is cleared.
- The outputs can be monitored by your plant equipment, such as a PLC, to notify you when certain alarms are triggered.

Disable All Alarms

Click this button to disable all the current alarms at once. This disables only the alarms for the current sensor or lane. This is used in emergencies when you cannot repair a situation immediately, or when setting up the system. The remaining parameter settings for each alarm are saved for future use. You must re-enable each alarm individually when you are ready.

System Error Alarm Details

The System Error Alarm cannot be disabled. However, there is a **Details** button that shows whether it is being used as an alarm (to light the red light of the light tree, turn on the horn, or turn on the audible alarm). Alarms may be added or subtracted from the software without notice.



Use as Alarm

This is the normal setting.

Count Only

If one or more of the System Error alarms or Missed Reject have Count Only selected, then those alarms will be used as a warning. In the View/Clear Alarms screen, the LED will be yellow if the alarm is triggered (instead of red). The Count Only alarms will NOT light any light in the light tree, sound the horn, nor cause the red flashing **ALARM** button over the Lane button.

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

Click the OK button  to apply changes and exit the menu.

Sensor Alarms Description

The available Sensor alarms are as follows:

❖ *Note: parameters, such as Percent Trigger, are adjusted in the* **Sensor Alarm Configuration** *(on page 63).*

Percent Rejects

This alarm is triggered when the total percentage of defects for the current sensor exceeds a defined percentage. This percentage is defined with the Trigger [%] parameter. It will remain triggered until you clear the alarm. It uses the red light of the light tree as a visual indicator.

Excessive Rejects

This alarm is triggered when a percentage of the last *n* parts have been found defective. It will remain triggered until you clear the alarm. *n* = Sample Size. The percentage is defined with the Trigger [%] parameter. It uses the red light of the light tree as a visual indicator.

Excessive Warnings

This alarm is triggered when a percentage of the last *n* parts have been found with a warning status. It will remain triggered until you clear the alarm. *n* = Sample Size. The percentage is defined with the Trigger [%] parameter. It uses the amber light of the light tree as a visual indicator.
Warnings are enabled in the ***Retro-Spec Options*** (on page 193) when you are editing an inspection.

Consecutive Defects

This alarm is triggered when the sensor has had too many consecutive defects. The number of defects is defined by the Consecutive Triggers parameter. It will remain triggered until you clear the alarm. It uses the red light of the light tree as a visual indicator.

System Error

System Error is a group of several internal system alarms. Click the System Error LED on the right side of the View/Clear Alarms screen to see all the alarms and their statuses. See also ***Sensor Alarm Configuration*** (on page 63) to see how this alarm is configured. Alarms may be added or subtracted from the software without notice.

These errors are recorded in the ***Log Reader*** (on page 76).

- **Missed Part** - No current function.
- **Missed Acquisition** - This alarm is triggered if the sensor misses acquiring the image of a part. For example, the inspection time was too high, or the part was too deformed to properly detect. It will remain triggered until you clear the alarm. It uses the red light of the light tree as a visual indicator. See also ***Sequence of Events*** (see "***Sequence of Events During Inspection***" on page 171).
- **Missed Result** - This alarm is triggered if the sensor misses the inspection results of a part. For example, the inspection time was too high, or the processor was too busy to process the inspection results before the part reached the reject position. It will remain triggered until you clear the alarm. It uses the red light of the light tree as a visual indicator. See also ***Sequence of Events*** (see "***Sequence of Events During Inspection***" on page 171).

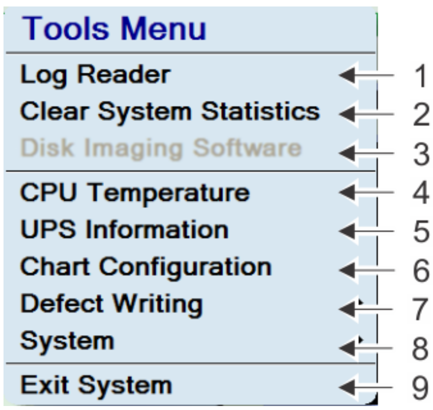
Chapter 7
Tools Menu

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

Tools menu - System Overview Screen

➢ ***To view the Tools menu:***

1. Log in. (Some items may be grayed out if you do not have permissions to use the items)
2. Click the Home button  to view the System Overview screen.
3. Click the Tools button  to view the Tools menu.



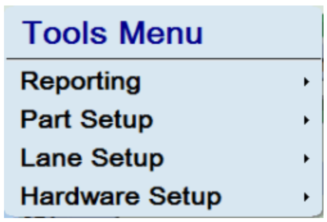
1	***Log Reader*** (on page 76) – Open the Intellispec log
2	Clear System Statistics – Clear the entire system statistics (all Lanes)
3	Disk Imaging Software – Open Acronis Echo software for backing up system hard drive
4	CPU Temperature – Displays the current, warning, and shutdown temperatures associated with the computer CPU. If a multiple core computer is used, the highest temperature is displayed. If the shutdown CPU temperature is reached, the Intellispec system shuts down.
5	UPS Information – Display Uninterruptible Power Supply (UPS) information and settings
6	Chart Configuration – Choose the Trend Graph Type and the number of divisions for the horizontal axis for the chart displayed in the System Overview Screen
7	***Defect Writing*** (see "***Enabling/ Disabling Defect Writing***" on page 382) - [Only available if Defect Database option is installed and enabled] Enable or disable defect recording for multiple lanes.
8	System - Set system date and time or set up a printer
9	Exit System – Shut down Intellispec software

Tools menu - Lane Overview and Sensor Overview Screens

The Tools menu is the same in both Lane Overview and Sensor Overview screens.

➢ ***To view the Tools menu:***

1. Log in. (Some items may be grayed out if you do not have permissions to use the items)
2. Click a Lane *n* button to view the Lane Overview screen.
3. Click the Tools button to view the Tools menu.



Reporting (on page 70)

Part Setup (on page 78)

Lane Setup (on page 81)

Hardware Setup (on page 96)

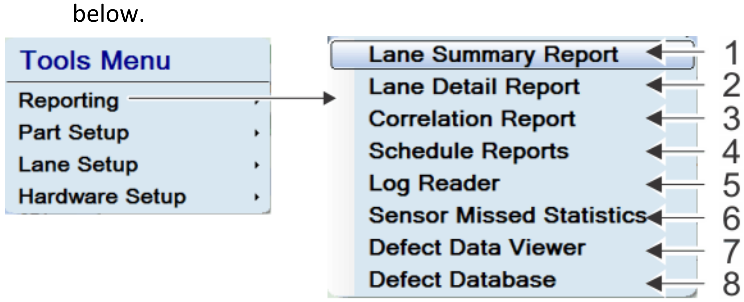
Reporting

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:***

1. View the Lane Overview screen by clicking a Lane n button.
2. Click the Tools button to view the Tools menu.
3. From the Tools menu select Reporting, then select your desired option. These are described below.



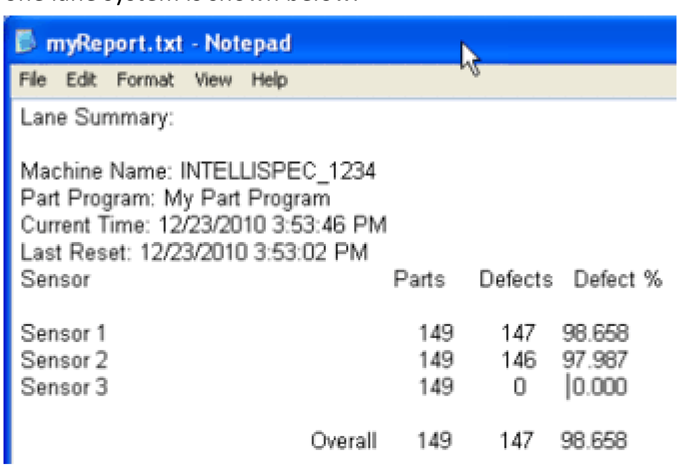
1	***Lane Summary Report*** (on page 71) - Generate a summary of the statistics for the current lane.
2	***Lane Detail Report*** (on page 72) - Generate a report with the lane and sensor defect statistics broken down to inspection-by-inspection data.
3	***Correlation Report*** (on page 73) - (Only available if correlation is enabled on your system) Generate a report with the percentage of defects by machine part
4	Schedule Reports - Define the frequency and destination for automatic statistics reporting.
5	***Log Reader*** (on page 76) – Open the Intellispec log
6	***Sensor Missed Statistics*** (on page 77) - Display the number of missed parts for the lane.
7	***Defect Data Viewer*** (see "***Defect Data (Images) Viewer***" on page 383) - [Only shown if this option is enabled] View the images in the defect database
8	***Defect Database*** (see "***Defect Database Viewer***" on page 385) - [Only shown if this option is enabled] View the inspection data and reports from the defect database

Lane Summary Report

This report lists the statistics summary 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 Detail Report

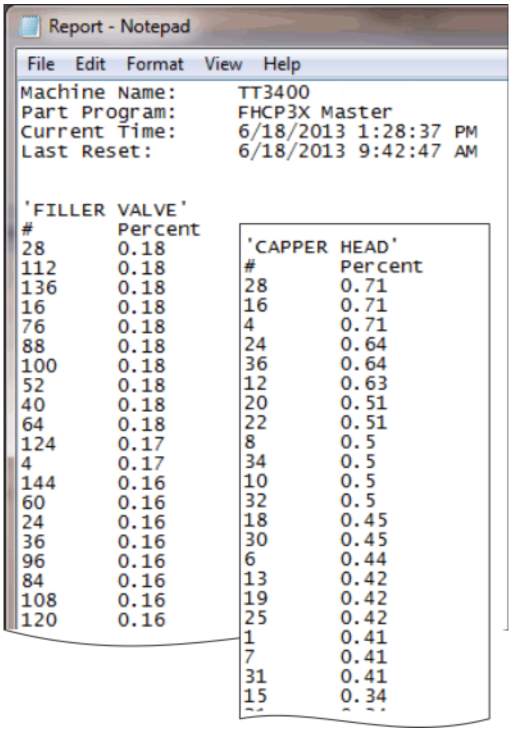
This report contains all the information in the ***Lane Summary Report*** (on page 71), plus inspection detail for each sensor with the number of defects found by each inspection. An example is shown below.

mySummary.txt - WordPad

```
Lane Summary:

Machine Name: INTELLISPEC_1234
Part Program: MyPartProgram
Current Time: 12/23/2010 3:54:39 PM
Last Reset: 12/23/2010 3:53:02 PM
Sensor                                  Parts     Defects    Defect %

Sensor 1                                  149        147     98.658
Sensor 2                                  149        146     97.987

                              Overall     149        147     98.658


Machine Name: INTELLISPEC_1234
Part Program: MyPartProgram
Current Time: 12/23/2010 3:54:39 PM
Last Reset: 12/23/2010 3:53:02 PM
Sensor 1 :

Inspection                               Parts     Defects    Defect %

Ring                                       149          0      0.000
Measurement                                149        147     98.658
Ambient                                    149          0      0.000
Contrast                                   149        147     98.658
Polygon                                    149          0      0.000
Centerline                                 149        147     98.658
Adaptive                                   149        147     98.658
Ring                                       149          0      0.000
Ambient                                    149          0      0.000
Measure Extract                            149         57     38.255
Distance                                   149        147     98.658

                             Overall       149        147     98.658

Sensor 2 :

Inspection                                Parts     Defects    Defect %

Polygon                                    149          0      0.000
Centerline                                 149        146     97.987

                              Overall      149        146     97.987
```

Correlation Report

This report contains the percentage of defects by machine part, sorted from highest to lowest percentage of failure. An example is shown below.


Report - Notepad

File Edit Format View Help

Machine Name: TT3400
Part Program: FHCP3X Master
Current Time: 6/18/2013 1:28:37 PM
Last Reset: 6/18/2013 9:42:47 AM

'FILLER VALVE'

#	Percent
28	0.18
112	0.18
136	0.18
16	0.18
76	0.18
88	0.18
100	0.18
52	0.18
40	0.18
64	0.18
124	0.17
4	0.17
144	0.16
60	0.16
24	0.16
36	0.16
96	0.16
84	0.16
108	0.16
120	0.16

'CAPPER HEAD'

#	Percent
28	0.71
16	0.71
4	0.71
24	0.64
36	0.64
12	0.63
20	0.51
22	0.51
8	0.5
34	0.5
10	0.5
32	0.5
18	0.45
30	0.45
6	0.44
13	0.42
19	0.42
25	0.42
1	0.41
7	0.41
31	0.41
15	0.34

Schedule Reports

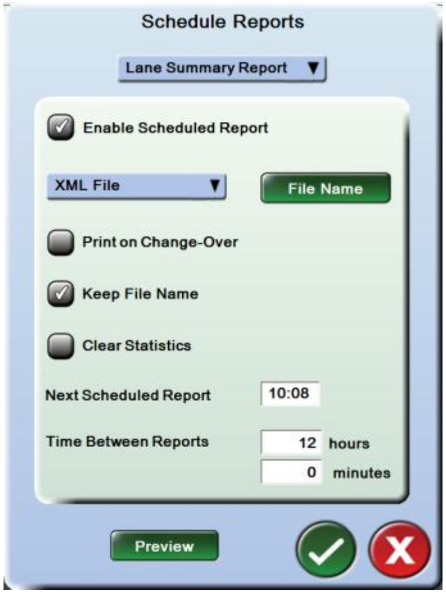
Set up a schedule where the Intellispec generates reports automatically. This is a Lane-level setting. To schedule reports for more than one lane, you must repeat the process for each lane.

❖ *Note: the information included below is valid as of software versions 5.0.504, 5.2.037, and 5.3.017. If your system has software with an earlier version, consult an older version of the manual.*

➢ ***To schedule reports:***

1. From Lane Overview mode, select the Tools button > Reporting > Schedule Reports. The screen shown below is displayed.
2. Change the settings as desired. These are described below.

3. Click the OK button to save changes and exit the screen.



Report drop-down menu

Select which report to schedule, then change the settings in the menu. Each report must be set up separately.

See also ***Lane Summary Report*** (on page 71), ***Lane Detail Report*** (on page 72), and ***Correlation Report*** (on page 73).

Report settings

Enable Scheduled Report

Choose whether to schedule the selected report. When this box is checked, the settings below are active.

Destination drop-down menu

Choose whether to send the report to the default printer or a file. When Text File is selected, you can enter a file name by clicking 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." Subsequently saved reports include a time stamp in the file name, unless you enable **Keep File Name**.

Print on Change-Over

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. See ***Change-over Report Example*** (on page 76).

Keep File Name

When a report is printed to file and this feature is enabled, the system will write the inspection statistics to the same file name each time, rather than creating new files with unique names. The system overwrites the file each time. You will need to click the **File Name** button, browse to the location where you want to save it, and create a name for your report.

An example of where this feature might be used is 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.

Reset Statistics

The Lane statistics are cleared after each report.

Next Scheduled Report

Using a 24 hour clock, set the time when the Intellispec should save or print the next report. This is the time of day that the first report prints. 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.

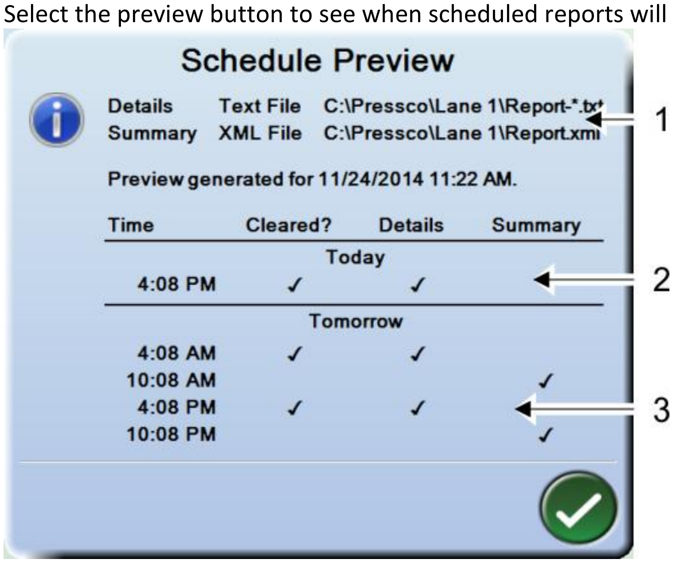
Time Between Reports

Set the time interval when the Intellispec should 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.
Using the example under Next Scheduled Report, if Time Between Reports = 5 hours, then the next reports will print the next day at 15:00 as scheduled, then at 20:00. The following day, the scheduled reports occur at 00:00, 05:00, 10:00, 15:00*, and 20:00. (*15:00 = Next Scheduled Report time) This repeats each following day, until you change the numbers in the menu. The system divides the 24 hours by the Time Between Reports interval, and schedules report times accordingly.
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.

Preview

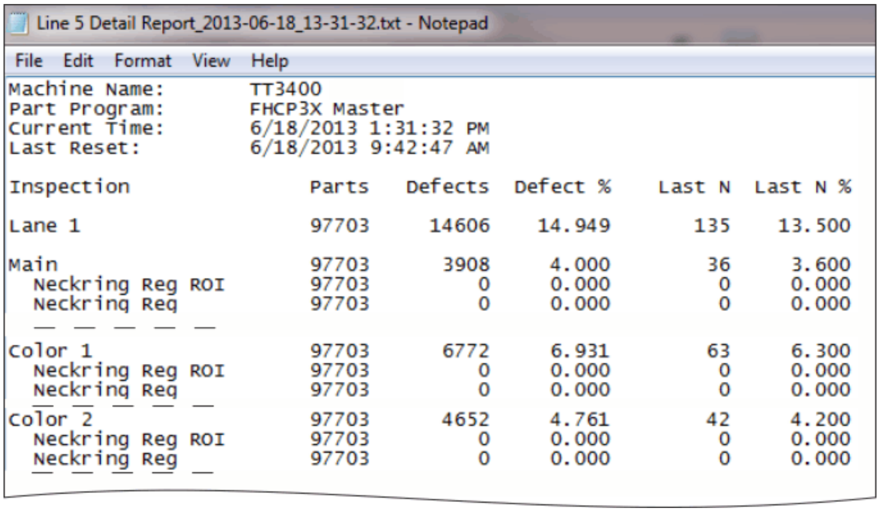
Select the preview button to see when scheduled reports will print.



1	Which reports are enabled: Lane Detail Report, Lane Summary Report, and/or Correlation Report
2	A check mark is present in each column to show whether that report will print today at the time shown. Cleared = Clear Statistics is enabled for that report.
3	A check mark is present in each column to show whether that report will print tomorrow and each day thereafter at the time shown. "Cleared?" = Clear Statistics is enabled for that report.

Change-over Report Example

This report contains defect information for the most recent parts. It specifies 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
```

Log Reader

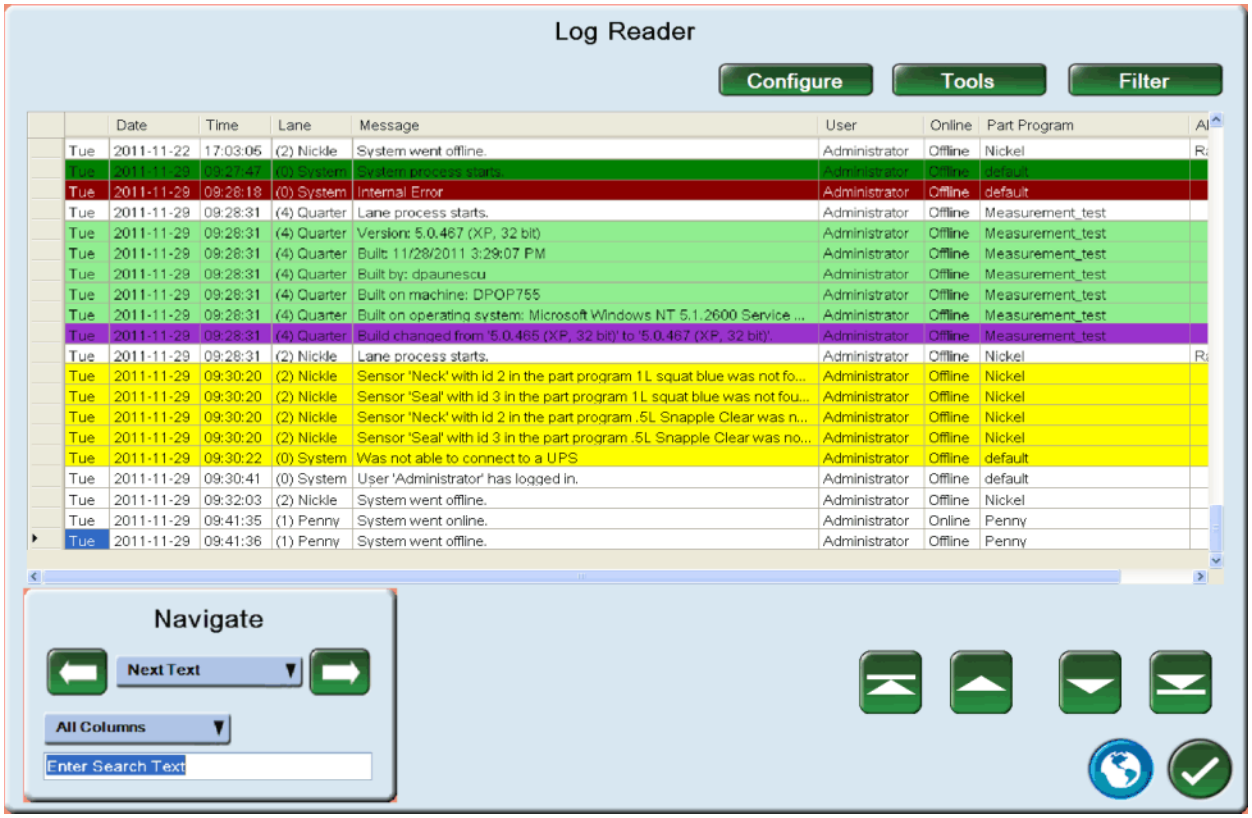
The log reader displays the Intellispec event history including:

- User log in and log out information
- Part program changes

❖ *Note: detailed part program changes are found in the* **Part Program Change Log** *(on page 177)*

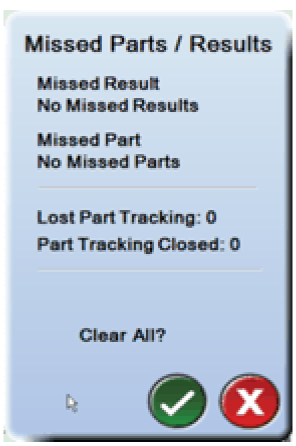
- Alarms, when triggered and cleared
- System errors
- System starting information
- Lane online/ offline history
- Lighting changes

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.



This information is recorded in the ***Log Reader*** (on page 76).

Missed Results

This can occur if you set the ***Reject Delay Calibration*** (on page 101) incorrectly. Another cause could be kinks or intermittent connections to cables, or the inspection time for the lane is too long.

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.

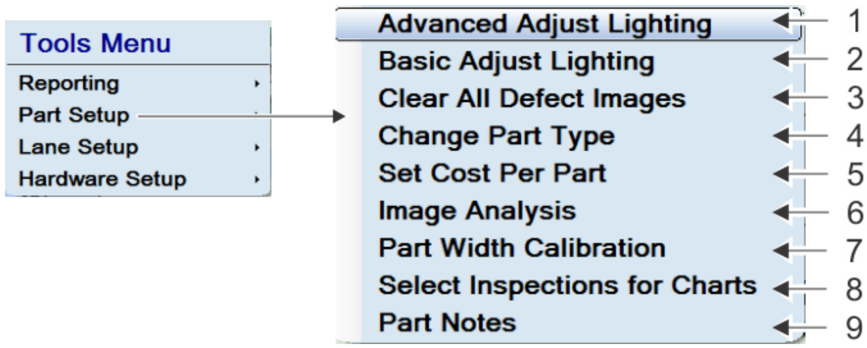
Part Setup

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

Some menu items are only available to advanced level users.

➢ ***To view the Part Setup menu:***

1. View the Lane Overview screen by clicking a Lane n button.
2. Click the Tools button to view the Tools menu.
3. From the Tools menu select Part Setup >> then your desired option. These are described below.

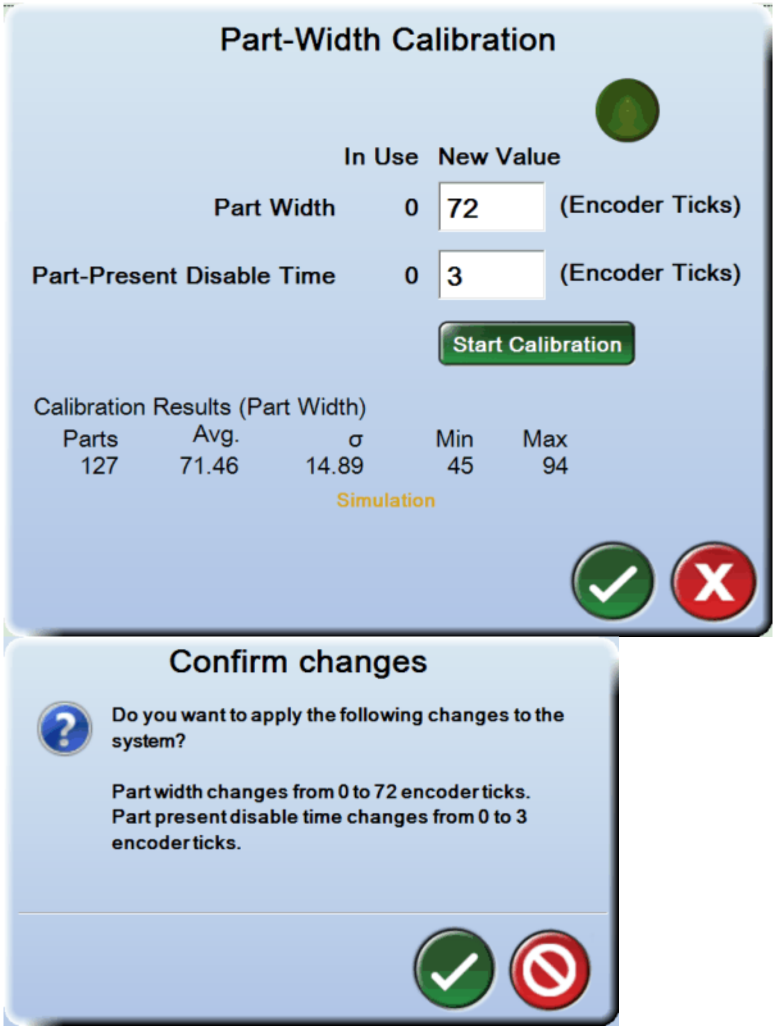


1	***Advanced Adjust Lighting*** (on page 138)
2	***Basic Adjust Lighting*** (on page 137)
3	Clear All Defect Images - Remove all images from the Reject Images buffer.
4	Change Part Type - Select the type of part to be displayed on the Walk By Graphic for the current lane.
5	Set Cost Per Part - Set the cost of each product, to be used with the "Defect Cost" trend chart.
6	***Image Analysis*** (on page 132) - Determine the gray shade value for any pixel or group of pixels in your image.
7	***Part Width Calibration*** (on page 79) - Set the number of encoder pulses that the part detect sensor "sees" the part.
8	Select Inspections For Charts - Select which inspections (up to 8) to display on the Trend Chart and Timing Trend.
9	Part Notes - Add setup and programming information about the part. This is especially helpful if you or someone else need to modify the part program later.

Part Width Calibration

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

To get to the Part Width menu: From the Sensor Overview mode, right-click on a sensor button > Part Tracking > Part Width Calibration.



➢ ***To calibrate the Part Width:***

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

Part Rate

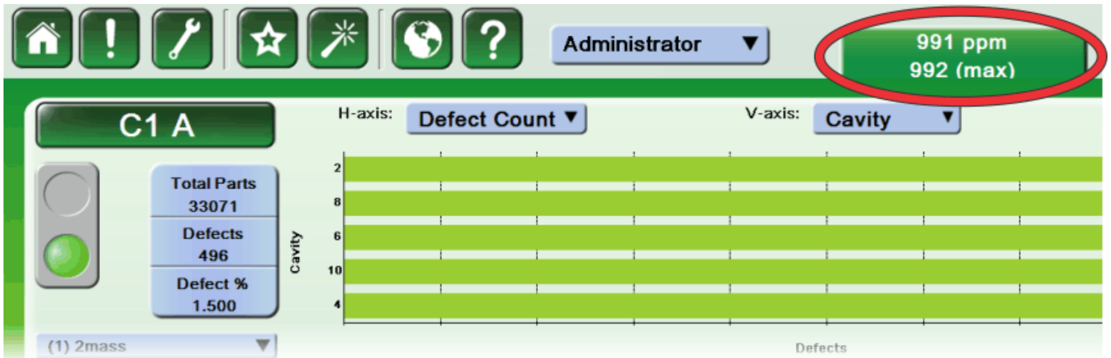
In Intellispec systems with software version 5.0.440 and later, the part rate is displayed in Lane Overview and Sensor Overview modes.

You can reset the part rate by right-clicking over the part rate tab and clicking **Reset Part Rate**.

The part rate displays:

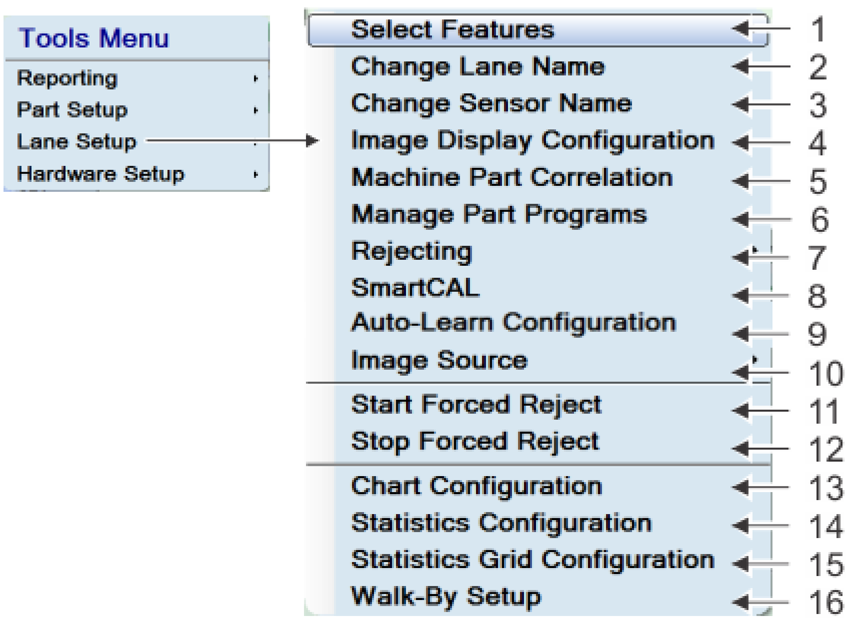
a) **ppm (parts per minute)** - The average rate over the last five seconds. It is updated once per second.

b) **max** - The maximum rate found for all individual parts in the last five seconds determined in [a]. The displayed value is the largest value found in the last five minutes.



Lane Setup

Some menu items are only available to advanced level users.

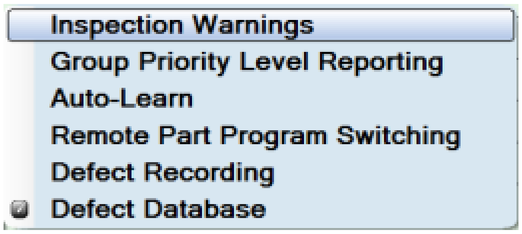


1	***Select Features*** (on page 82) - Enable optional features.
2	Change Lane Name - Change the name of the current lane.
3	Change Sensor Name - Change the name of the selected sensor.
4	***Image Display Configuration*** (on page 83) - Set the frequency, rotation, and other display options for the sensor images.
5	***Machine Part Correlation*** (on page 84) - Configure up to four different machine parts for correlation. [This option only appears when Correlation is configured] (This is usually done by the Pressco installer)
6	***Manage Part Programs*** (on page 86) - Create, delete, or edit part programs.
7	Rejecting - ***Rejector Enable/ Disable*** (on page 92) and ***Reject Missed Results*** (on page 93)
8	***SmartCAL*** (on page 141) - SmartCAL is a tool that allows you to load a set of images, run them with the current part program, and make sure the part program is passing or rejecting parts as you expect.
9	***Auto-Learn Configuration*** (see "***Configure Global Auto-Learn settings***" on page 365) - [This option only appears if you have an Extended I/O board, and you have enabled Auto-Learn] Configure the Extended I/O bits to use with Auto-Learn.
10	***Image Source*** (on page 144) - Select images to display on the lane.
11 and 12	Start ***Forced Reject*** (on page 93) - Force parts to be rejected based on correlation to a specific machine part. Stop Forced Reject - Stop the Forced Reject process.
13	Chart Configuration – Set the number of columns in the Trend Chart and the currency type to be used in the "Cost per Part" trend chart.
14	***Statistics Configuration*** (on page 49) - Change the display settings for the charts displayed by the Statistics buttons.
15	***Statistics Grid Configuration*** (on page 95) - Change the amount of information for the charts displayed by the Statistics buttons.
16	***Walk By Setup*** (on page 32) - Set up the group names, inspections assigned to each group, and the criteria determining when the areas of the graphic turn green, yellow, or red.

Select Features

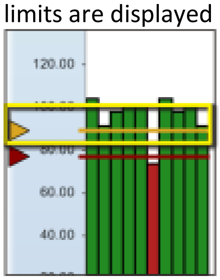
Select features to enable them. A check mark is visible next to a feature if it is enabled. Some features may not be displayed or available depending on your system configuration. You must have user permission to Select Features. See ***Managing Permissions*** (on page 24). This menu is available as of Software versions: 5.0.502, 5.2.033, and 5.3.012.

To get to this menu: From Sensor or Lane Overview mode, select the Tools button > Lane Setup > Select Features.



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).



Group Priority Level

This feature allows you to assign a priority to each group within the Walk By graphic. You can designate which defects are more important and prioritize the reporting structure accordingly. See ***Group Priority Level*** (on page 34).

Auto-Learn **(on page 365)**

Auto-Learn is an optional feature. Your system must be configured properly. This feature works with certain inspections to automatically learn a new set of parts based on inspection settings and trigger criteria. It is used with certain inspection types, such as Distribution.

Remote Part Program Switching **(on page 90)**

Select one of two part programs remotely.

Defect Recording **(see "*Preparing the Database*" on page 379)**

Enable recording of images to the Defect Data File. This is an optional feature and your system must be properly configured.

Defect Database **(see "*Preparing the Database*" on page 379)**

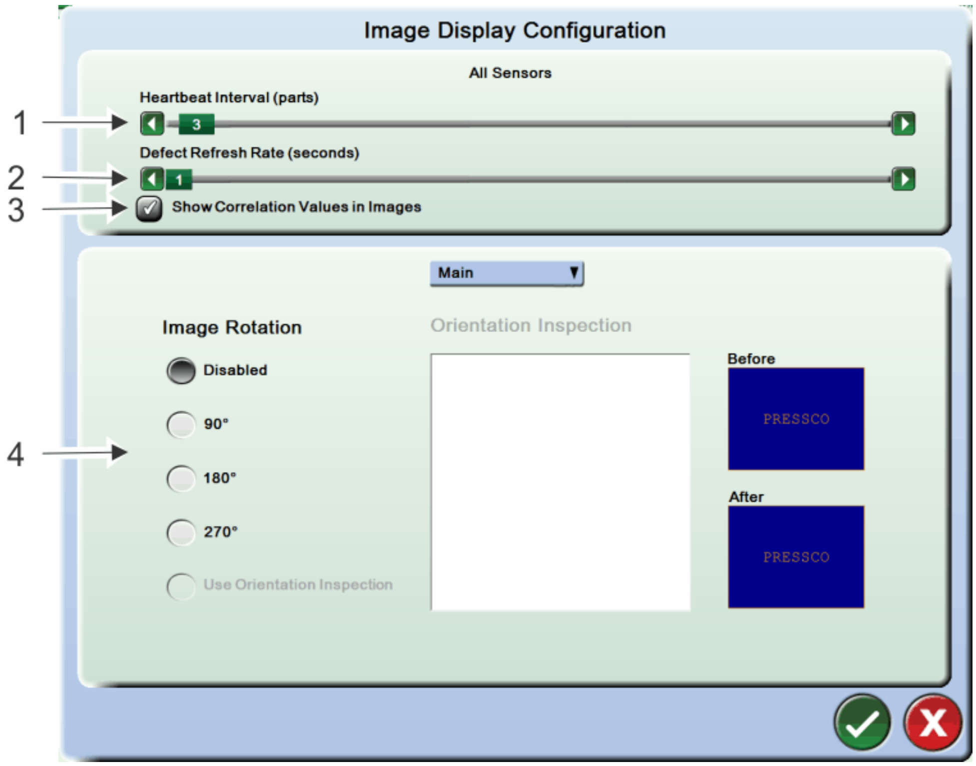
Enable saving of defect information (non-image information) to the Defect Database. This is an optional feature and your system must be properly configured.

Image Display Configuration

Adjust the display settings for images.

➢ ***To get to this screen:***

From the Lane or Sensor Overview screen, click the Tools button > 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 defect images and Big Live Image.
4	Rotate the defect images, sensor display images (heartbeat), and the inspection images by selecting rotation in degrees with respect to camera position, or rotation with respect to the orientation (if an orientation is being used).

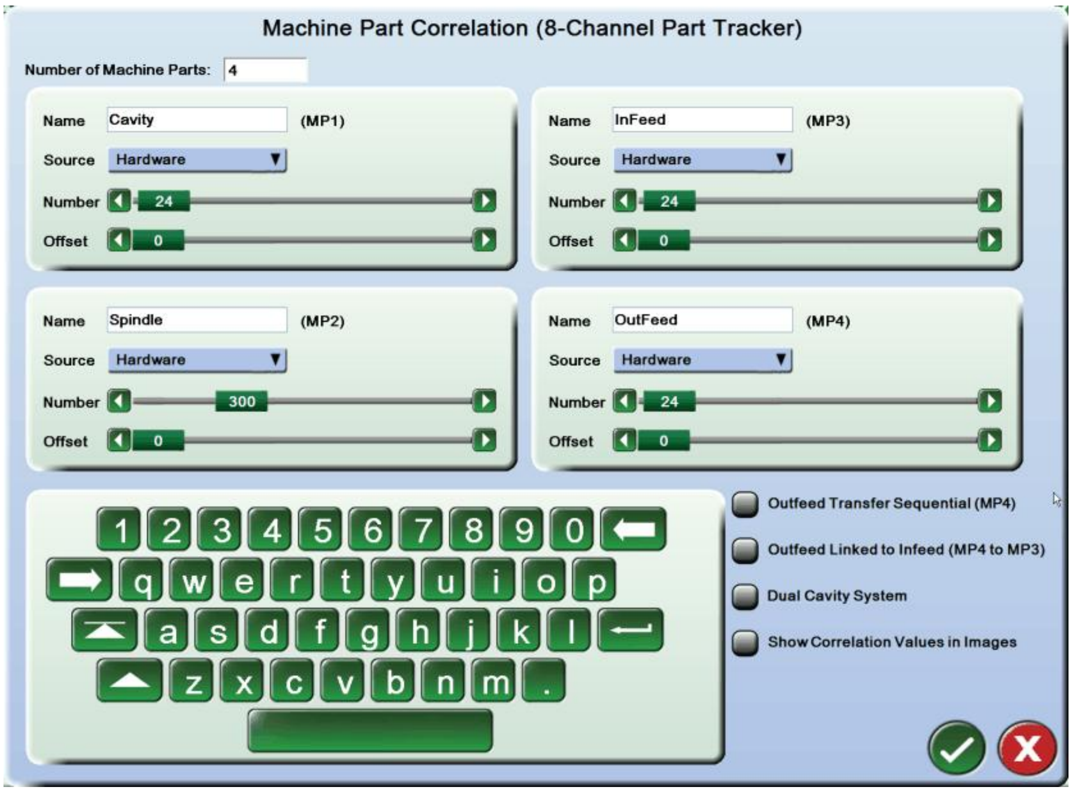
Machine Part Correlation

Configure up to four different machine parts for correlation. Each machine part can be named and assigned the correct number of stations. The offset bar is used for calibrating the displayed part with the actual machine part.

❖ *Note: This screen is usually set up by the Pressco installer.*

➢ ***To get to this screen:***

From the Lane or Sensor overview screen, click the Tools button > Lane Setup > Machine Part Correlation.



Number Of Machine Parts

Select the number of correlation sensors in your system (1-4).

❖ *Note: If you only see two Machine Parts available, you probably have a two channel Part Tracker board. This is the default configuration.*

❖ *If your system has an eight channel part tracker board, you must run the Discovery software and configure the lane for an eight channel part tracker board. Use the Edit Existing Lane function. This will provide the capacity for four Machine Parts to be configured.*

Name

Rename each machine part to something more recognizable to you (examples: Cavity, Spindle, or Liner Gun #1). This name will be displayed on the Intellispec screens and throughout correlation reports.

Source

Select between Hardware and Part Program to provide correlation. Some applications have inspections from which you can derive correlation information.

Number

Set the number of components in each machine part (example, number of pockets in a starwheel).

Offset

This allows you to change the mapping between what the inspection system considers part #1 (or pocket #1) and the actual parts. For example, if you try to reject a part from cavity #1, and the system rejects the part from cavity #2, then you would set offset at 1. This information is required to be correct for the inspection system to track components properly.

Outfeed Transfer Sequential

(only available when four sensors are used, and only applicable to blow molder installations) Specify whether the infeed and outfeed transfer arms are numbered Independently or Sequentially. For example, say your machine has 10 infeed transfer arms and 10 outfeed transfer arms. If they are numbered Independently, the infeed transfer arms would be numbered 1 - 10, and the outfeed transfer arms would be numbered 1 - 10 as well. If they are numbered Sequentially, the infeed transfer arms would be numbered 1 - 10, and the outfeed transfer arms would be numbered 11 - 20.

Outfeed Linked to Infeed (MP4 to MP3)

(applicable to 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. 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.

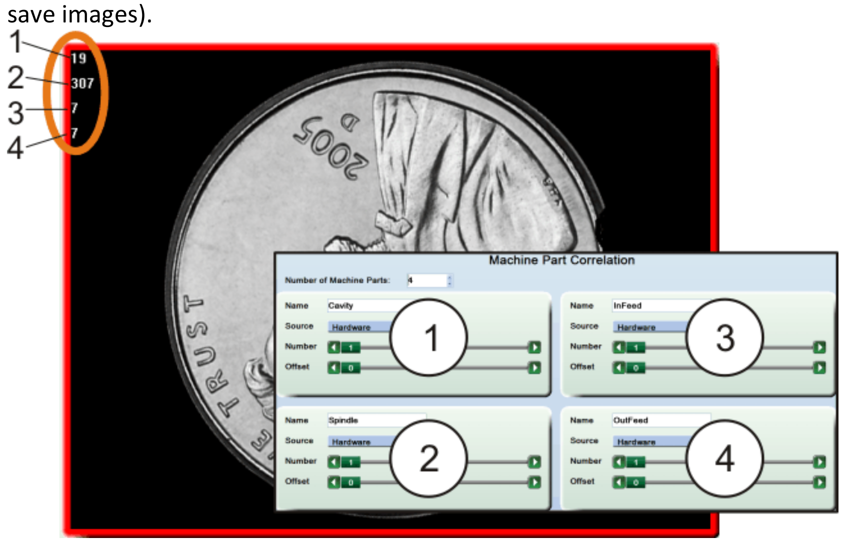
- *Note: When this feature is enabled, the number of components is forced to be equal (number of components in MP3 = number of components in MP4).*
- *Note: There is no index sensor for MP4 in the hardware configuration.*

Dual Cavity System

(only available when four sensors are used, and only applicable to blow molder installations) Enable this if your system is a dual cavity machine.

Show correlation values in images

Displays the correlation value in the images. These values are saved as part of the image file (if you save images).

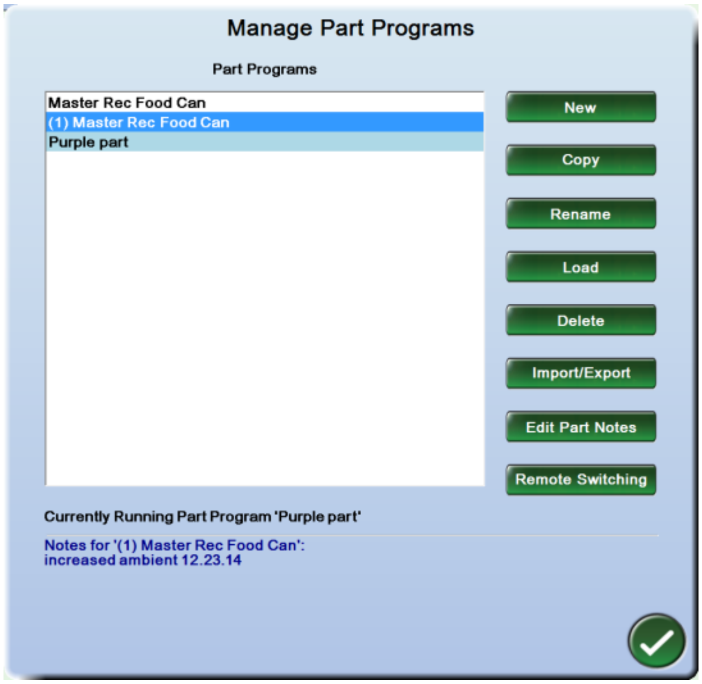


Manage Part Programs

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

➢ ***To get to this screen:***

- From the Lane or Sensor Overview screen, click the Tools button  > Lane Setup > Manage Part Programs. Or:
- Right-click the Part Program drop-down menu.



Edit Part Notes

Add setup and programming information about the part. This is especially helpful if you or someone else 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.

For more information on using this screen see:

- ***How to Create, Copy, or Import a Part Program*** (on page 171)
- ***Export a part program*** (on page 88)
- ***Load a Part Program*** (on page 87)
- ***Remote Part Program Switching*** (on page 90)

Load a part program

You can switch part programs by loading a different part program from disk.

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

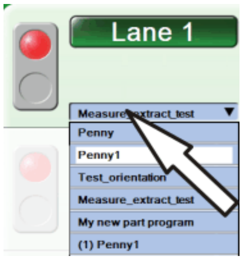
➢ ***What you need:***

- User permission to Switch Part Program

➢ ***To change parts:***

1. ***Log in*** (see "***Logging in and logging out***" on page 17).

2. Click the part drop-down menu.



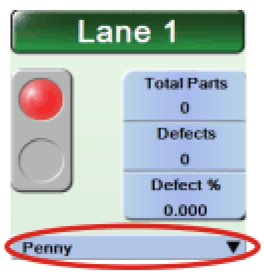
3. Click the name of the new part to inspect. The new part program is loaded on the Intellispec.
4. Put the lane online to begin inspecting new parts.

Delete a part program

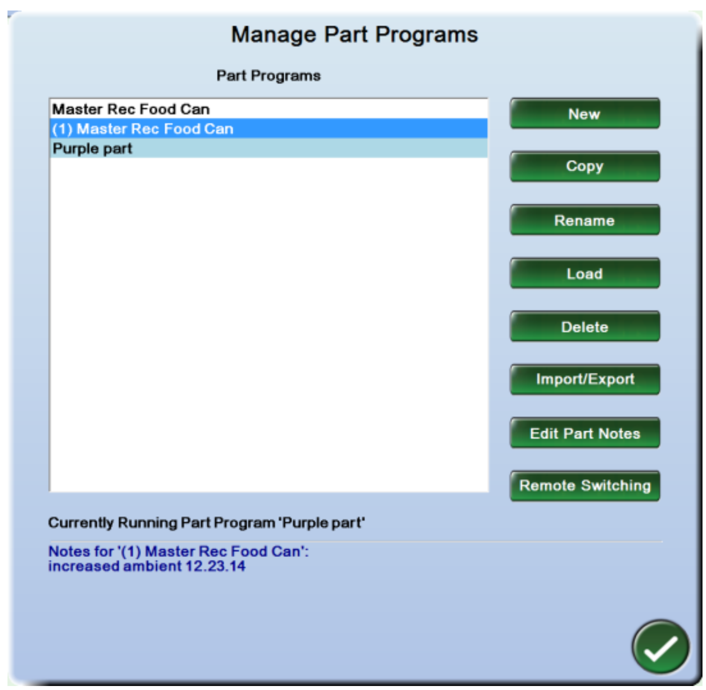
You can delete a part program to prevent other users from running it.

➢ *To delete a part program:*

1. Go to a Lane Overview or Sensor Overview screen [from Home: Lane button > Sensor button].
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. The Manage Part Programs menu is displayed.
4. Highlight the program name in the Manage Part Programs menu, then click the **Delete** button.
5. A warning box will ask you if you are sure you want to delete the program. Click the OK button to delete the program. The program is deleted from memory.

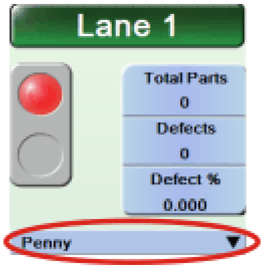


Right-click

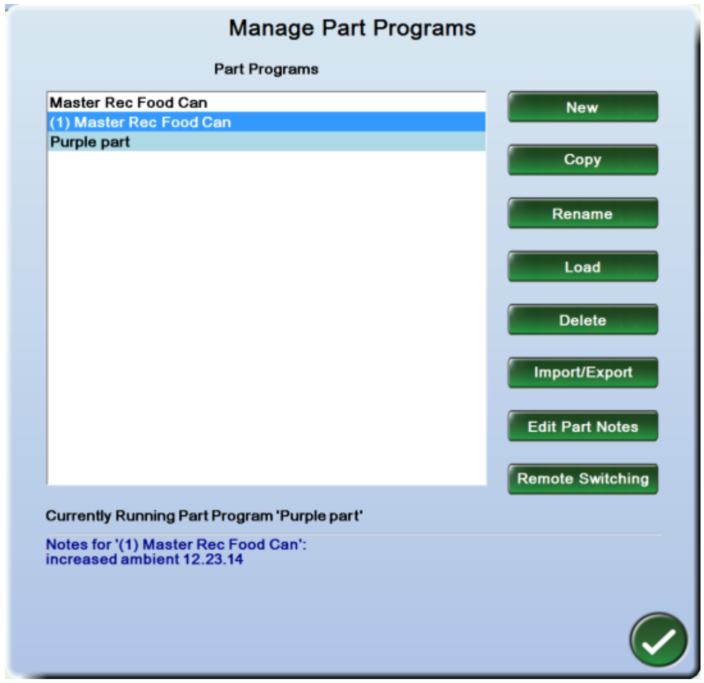


Export a part program

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



Right-click



➢ *To export a part program:*

1. Go to a Lane Overview or Sensor Overview screen [from Home: Lane button > Sensor button].
2. Right-click over the part program drop-down menu. The Manage Part Programs menu is displayed.
3. Click the **Import/Export** button. The Import or Export Part Programs menu is displayed.

4. Click the disk icon  to browse to the folder or USB destination to export the part program.
5. Highlight the part program that you want to export in the Current Part Programs column.
6. Click the right arrow button  to export the part program.
7. Click the OK button  to exit the Import or Export Part Programs menu. The part program is exported.

8. Click the OK button to exit the Manage Part Programs menu.

Remote Part Program Switching

❖ *Note: this feature is available in versions 5.0.493, 5.2.026, 5.3.005 and higher versions of software.*

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 ***Managing Permissions*** (on page 24).
- You must have at least two part programs already configured
- You must first enable the feature

➢ To enable Remote Part Program Switching:

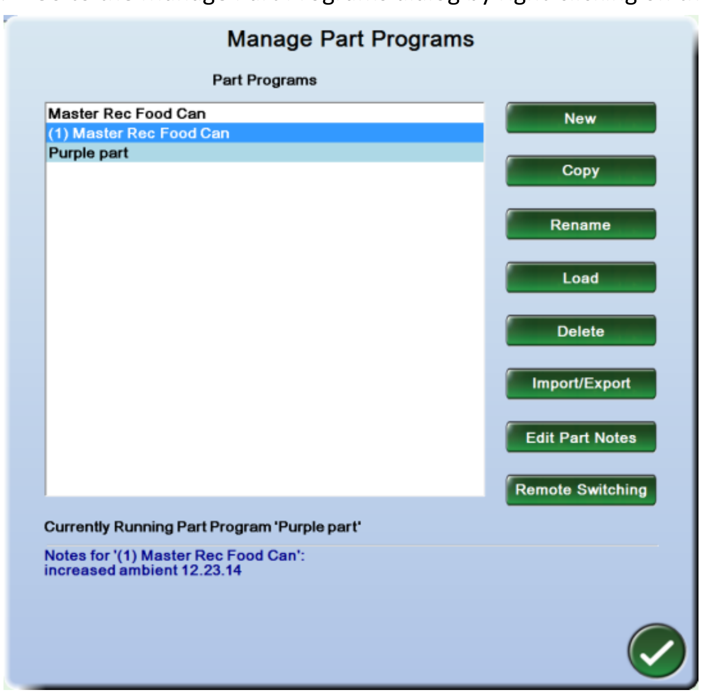
1. From Lane or Sensor Overview mode, select the Tools button > Lane Setup > Select Features > select Remote Part Program Switching. The item has a check mark next to it when it is enabled. [This item will be disabled if there is no Extended I/O board or if the system is online.] A dialog is displayed 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 disable Remote Part Program Switching:

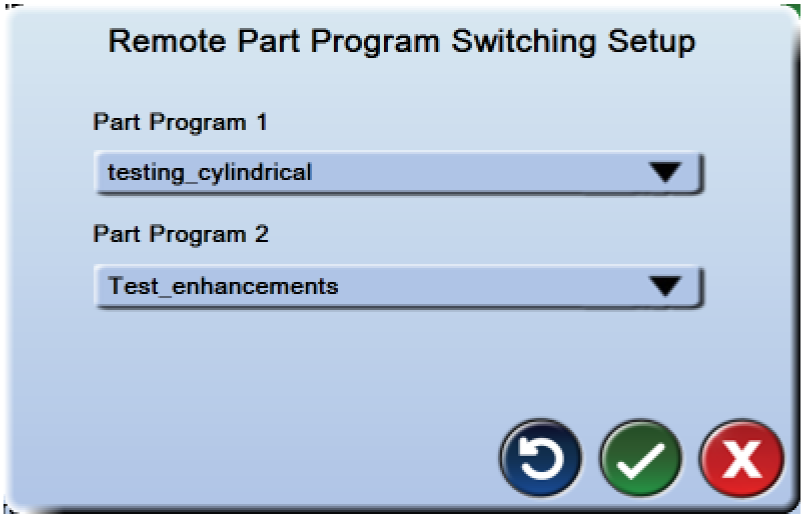
From Lane or Sensor Overview mode, select the Tools button > Lane Setup > Select Features > select Remote Part Program Switching. A dialog is displayed that says the feature is disabled.

➢ 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:

- 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.

Rejecting

Select rejector options. From Lane or Sensor Overview mode, select Tools button > Lane Setup > Rejecting, and select the desired option.

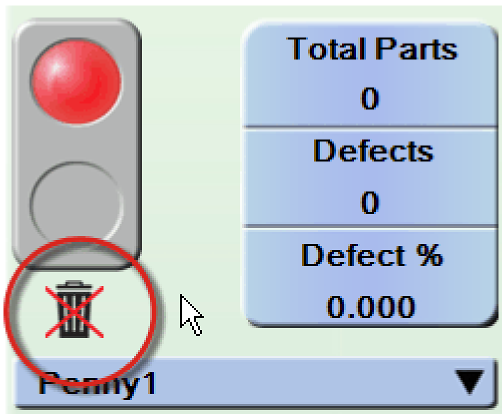
Rejector Enable/ Disable (on page 92)

Reject Missed Results (on page 93)

Rejector Enable/ Disable

Enable or disable the rejector at the Sensor level or at the Lane level.

- If one or more Sensors are checked, the reject device for all inspections performed by those Sensors is disabled.



- If all Sensors are checked, the reject device is disabled at the Lane level. An icon is displayed in the Lane window to indicate that the rejector is disabled.

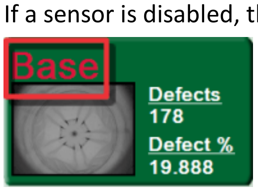
❖ *Note: the trash can symbol is only displayed if ALL sensors within the lane are disabled.*

➢ ***To enable or disable the rejector for one sensor only:***

1. Go to Sensor Overview mode.
2. Right-click over the desired sensor button to see the Sensor menu.
3. Click "Reject Enabled" to toggle it to "Reject Disabled" or vice versa. If Reject Enabled is displayed, the rejector is enabled.

If you put the system online when the Sensor rejector is disabled, you will see a message stating "Sensor Rejector Disabled - Do you want to go online?"

If a sensor is disabled, the sensor name is displayed in red instead of white, as shown below.

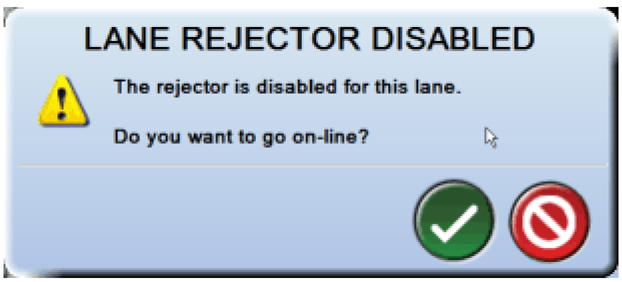


➢ ***To enable or disable the rejector for one or more sensors within a lane:***

1. From Lane Overview or Sensor Overview mode, click the Tools button > Lane Setup > Rejecting > Rejector Enable/Disable.
2. Check or un-check the box next to the sensor(s) to enable or disable the rejector.

3. Click the OK button to apply the changes and exit the menu. The new setting is applied. If the rejector for all sensors within the lane is disabled, you will see the trash can icon near the statistics for that lane.

If you put the system online when the lane rejectors are disabled, you will see a message stating "Lane Rejector Disabled - Do you want to go online?"



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.

Enable this option from the ***Rejecting*** (on page 91) option if you want the system to reject parts from any missed results in the current Lane.

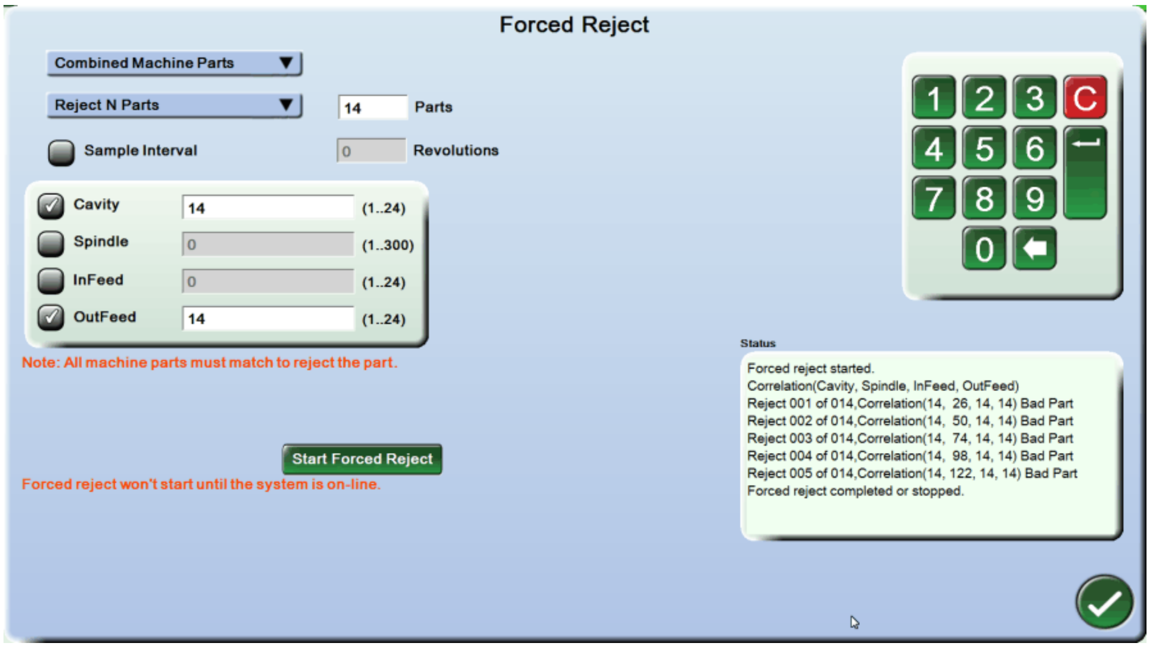
Forced Reject

The Forced Reject feature allows you to force any part to be rejected. The system will reject all parts associated with the checked components, regardless of the pass/fail condition of those parts. This provides a means of handling an emergency situation until repairs on a blow-molder or other machine can be made. If you know there is a serious problem with a particular component, you can use this method to ensure that no part from the defective machine component passes the inspection process.

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

➢ ***To get to this menu:***

From the Lane or Sensor Overview screen, click the Tools button > Lane Setup > Start Forced Reject. The Forced Reject screen is displayed.



The different parts of the menu are as follows:

❖ *Note: The lane must be online to force rejects.*

Any Part/ Single Machine Part/ Combined Machine Parts (drop-down menu)

Any Part - Reject any part, regardless of correlation to a machine part.
Single Machine Part - Reject a part correlated to one type of machine part (example: cavity, or fill valve). The system displays a drop-down menu to select the desired machine part. Use the numeric keypad to enter the machine part number or series of machine part numbers.
Combined Machine Parts - All correlated machine parts are displayed (as in the example above). Check the boxes next to the desired machine parts. Use the numeric keypad to enter the desired machine part number.

❖ *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 no part will be rejected. In our example, if we typed Cavity 14 and Outfeed 17, no such part exists; therefore none would be rejected.*

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

Reject one part, 'N' parts, or continuously reject from a specific machine part. To begin rejecting, click the **Start Forced Reject** button.
Reject One Part - Rejects the next part that reaches the reject station, regardless of its inspection status. If you select Single or Combined Machine Parts in the above drop-down menu, the part must meet that criterion.

Reject N Parts - The numeric field next to this drop-down menu becomes active. Enter a number of parts you want to reject, regardless of their inspection status. If you select Single or Combined Machine Parts in the above drop-down menu, the part(s) must meet that criterion.
Continuous Reject - Rejects all parts regardless of their inspection status, until you click the **Stop Forced Reject** button. If you select Single or Combined Machine Parts in the above drop-down menu, the part(s) must meet that criterion.

Sample Interval

Instead of rejecting every part specified with the Reject N Parts and Correlation menus, this option only rejects 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.

Cavity /spindle/ infeed/ outfeed

The names displayed in this section will correspond to the names of your machine part components. These are only shown if you select Single or Combined Machine Parts in the first drop-down menu.

Rejector

(Not shown in the above screen) Specify which rejector to force rejection of part. If you only have one rejector, then this button is not applicable.

Numeric Keypad

This is used to type values for numbers or series of rejected parts or correlation to machine parts.

Start Forced Reject/ Stop Forced Reject

When you click **Start Forced Reject**, the criteria specified in the menu are applied and the parts are rejected. Click 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.

Status Box

Displays information about the rejection process.

Statistics Grid Configuration

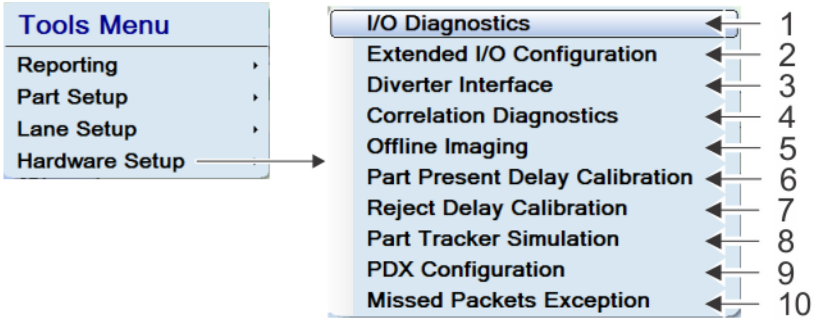
Choose how the statistics grids are displayed.

To get to this screen: From the Lane or Sensor Overview screen, click the Tools button  > Lane Setup > Statistics Grid Configuration.

1	Checking these boxes determines what information is shown on the Statistics Grid screen.
2	These two slidebars allow you to enable/disable and determine the setting for warning and error limits applied to the Statistics Grid screen.

Hardware Setup

Some menu items are only available to advanced level users.



1	***I/O Diagnostics*** (on page 97) - Verify the presence of input and output signals.
2	Extended I/O Configuration - Configure the optional Extended I/O board.
3	Diverter Interface - [only used with optional diverter hardware] Operate the diverter.
4	***Correlation Diagnostics*** (on page 99) - Verify correlation signals.
5	***Offline Imaging*** (on page 132) - Choose how the Intellispec acquires images when the lane is offline.
6	***Part Present Delay Calibration*** (on page 99) - Calibrate the distance (in encoder pulses) from the part detect sensor to the camera centerline.
7	***Reject Delay Calibration*** (on page 101) - Calibrate the distance (in encoder pulses) from the part detect sensor to the rejector.
8	Use ***part tracker simulation*** (on page 106) for troubleshooting or if a part detect sensor is bad. A simulated part rate would allow inspection to continue.
9	***PDX Configuration*** (on page 106) - Set up the part detect generator. Only used in some applications.
10	***Missed Packets Exception*** (on page 108) - Set the number of missed packets to trigger the part tracker to send a Lost Part Tracking message to the Intellispec.

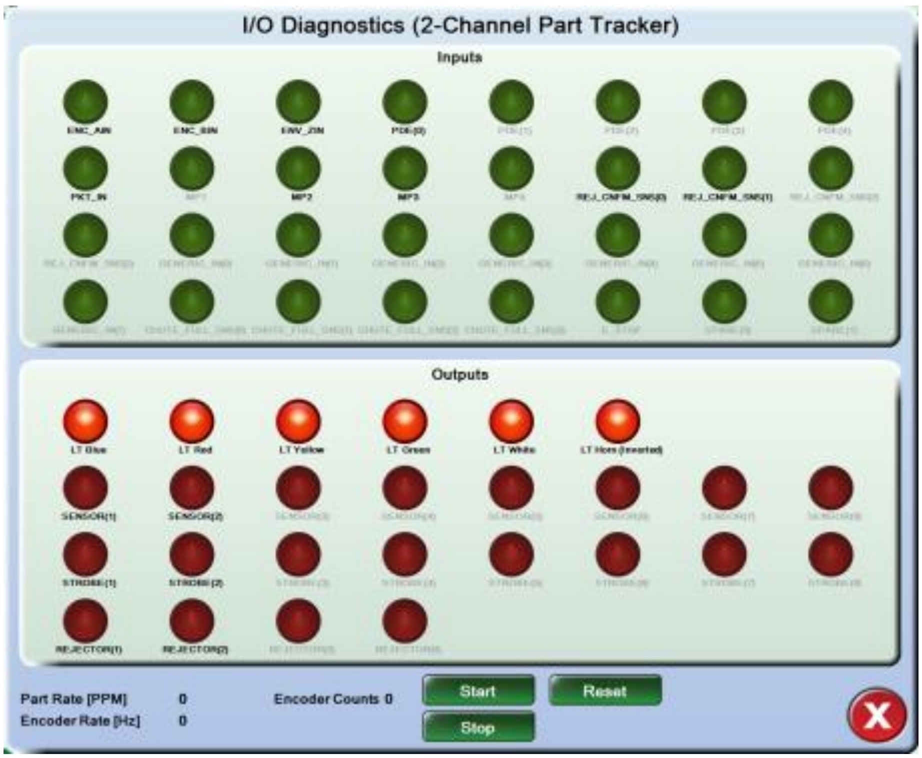
I/O Diagnostics

➢ ***To get to this screen:***

From the Lane or Sensor Overview screen, click the Tools button  > Hardware Setup > I/O Diagnostics.

This screen can be used to verify the presence of input and output signals. Part rate and encoder rate are also displayed.

- Green lights are input signals (signals that originate outside the Intellispec and are communicated to the system). When an input is received the light is on.
- Red lights are output signals (signals that originate inside the Intellispec and are transmitted out of the system). When an output is generated the light is on. You can test an output signal by clicking on the appropriate light.



The outputs correspond to the hard-wired input and output signals throughout the Intellispec system.

Encoder counts

At the bottom of the screen, you can use the diagnostics and buttons to count encoder pulses. This is used as an approximate number of encoder counts to assist in setting up part tracking sensors along with other machine part hardware.

❖ *Note: due to start and stop time of machine components, the encoder count will not be exact. This tool is used for approximation of encoder counts.*

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 pulses.

Stop button

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

Reset button

Reset the part tracker board encoder count.

Correlation Diagnostics

This is a troubleshooting tool to verify that correlation sensor information is being received by the Intellispec.

➢ ***To get to this screen:***

From the Lane or Sensor Overview screen, click the Tools button > Hardware Setup > Correlation Diagnostics.

For systems that have correlation sensors, this screen is used to verify that the correlation sensor information is being received by the system. It is a troubleshooting tool.

As the production unit is operating, if the correlation sensor is transmitting pulses, it will come up in the appropriate window. For example, if you have a cavity sensor attached to machine part one (MP1) and are running an 8-cavity blow molder, you will see MP1 increment from 1-8 repeatedly.

Make sure that each machine part (MP) increments according to the number of components in your system.

MP = Machine Part. MP1 through MP4 correspond to the correlation sensors that you have configured in the ***Machine Part Correlation*** (on page 84) 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 FHCP 3X, and Asynchronous Correlation Software Setup FHCP 3X.

Part Present Delay Calibration

Part Present Delay is the distance (in encoder pulses) from the part detect sensor to the camera centerline. Two independent signals are generated: 1) light strobe and 2) camera snap.

❖ *Note: if your system is using a PDX, set up* **PDX Configuration** *(on page 106) before Part Present Delay.*

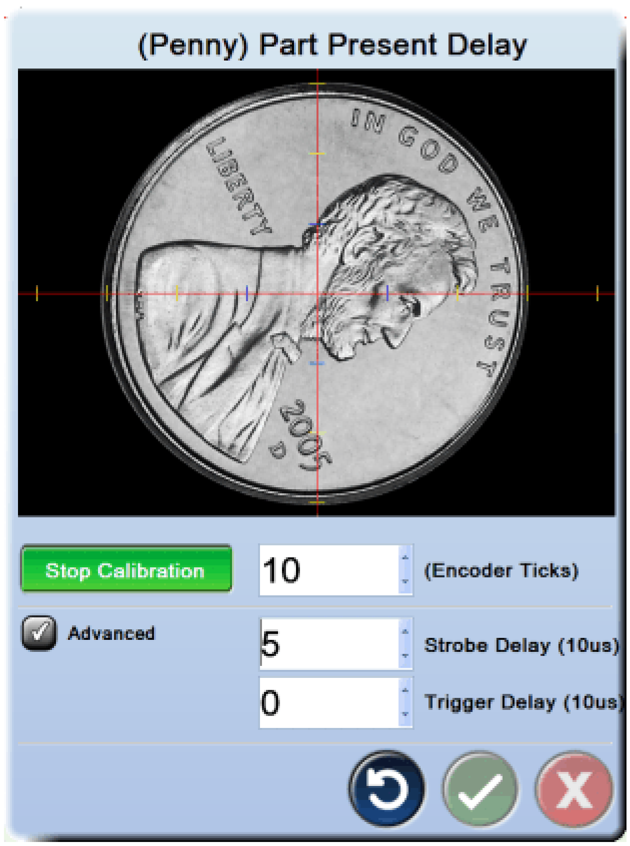
The Part Present Delay ensures that your part is in the center of the image when the camera snaps its picture. Depending on the orientation of your camera, your part could be moving from left to right, right to left, top to bottom or bottom to top as it travels through the camera's field of view. You need to be aware of the part flow direction in order to set up the Part Present Delay Calibration.

For an illustration of Part Present Delay within the inspection process, refer to the ***Sequence of Events During Inspection*** (on page 171).

Even if you are unsure what the Part Present Delay value should be, you can view the strobing of the lights to gauge whether the delay has been set too long or too short. When the Part Present Delay value has been set too short, the lights will strobe before the part reaches the camera; likewise when the delay is set too long, the lights will strobe after the part has passed the camera. When the part is close enough to be in the actual image that the camera acquires, 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.

Calibration

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.



➢ ***To calibrate the Part Present Delay:***

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

1. From Sensor Overview mode, right-click on a sensor button > Part Tracking > Part Present Delay Calibration.
2. Click 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 pulses 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, click the **Stop Calibration** button. The Part Present Delay calibration value is saved and stored in a Lane configuration file.

Advanced settings

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

Set a Base/Neck configuration as follows:

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

Also check ***Advanced adjust lighting - set delay*** (on page 140) to make sure that the Neck lighting delays are set correctly.

Reject Delay Calibration

Reject Delay is the distance (in encoder pulses) from the part detect sensor to the rejector. This signal ensures that the correct part is rejected.

During Reject Delay calibration, the reject device will activate for each part that flows through the system. Ensure that the rejector is activated properly and that each part is rejected properly. 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 171).

➢ ***To calibrate the Reject Delay:***

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

1. From Sensor Overview mode, right-click on a sensor button > Part Tracking > Reject Delay Calibration.
2. Click the **Start Calibration** button.
3. Place a part on the running conveyor or into the part stream. After the number of encoder pulses 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 the 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, click the **Stop Calibration** button. The Reject values are saved and stored in a Lane configuration file.

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 efficiently rejected, and short enough to ensure that only one part is rejected for each reject pulse.

Adaptive Reject

Adaptive Reject (optional) (on page 102)

Adaptive Reject (optional)

This topic applies if your system has Part Tracker firmware version **F185 or higher**. If you have this firmware, the Reject Delay Calibration will show "**Max Encoder Frequency**" in the lower menu. If your menu shows "Diff. from Calibration [%],", then go to ***Adaptive Reject (optional) - older version*** (see "***Adaptive Reject (optional)***" on page 104).

This feature is used to compensate 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*** (see "***Reject Delay Calibration***" on page 101) 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 set Adaptive Reject:***

1. Go to the ***I/O Diagnostics*** (on page 97) screen and record the encoder rate while the line is running at max speed.
2. Go to the Reject Delay Calibration menu: Right-click over a sensor button > Part Tracking > Reject Delay Calibration.
3. Click the check box next to Use Adaptive Reject in the ***Reject Delay Calibration*** (on page 101) menu to enable the feature.
4. Set the Max Encoder Frequency to the value you recorded in step 1.
5. Set the reject device Turn On Time (usually about 10 ms for air rejectors and about 15 ms for the pusher rejector).

6. Click the OK button to save changes and exit the Reject Delay Calibration menu.

Settings for Adaptive Reject:

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.

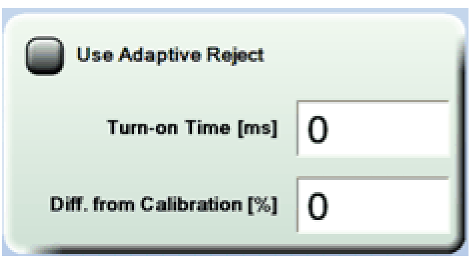
The table below shows the computed value of the delay based on encoder speed and how the resultant delay (in encoder ticks) is the same regardless of speed.

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

Adaptive Reject (optional)

This topic applies if your system has a part tracker **firmware version below F185.** You can tell by the Reject Delay Calibration menu. If the lower part of the menu has "Diff. from Calibration [%]" then follow the instructions in this topic. If the menu shows "Max Encoder Frequency" then go to ***Adaptive Reject*** (see "***Adaptive Reject (optional)***" on page 102).



This feature is used to compensate 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.

If you do not know the fastest conveyor or production speed when you are setting Reject Delay, you could calibrate the Reject Delay again when you run a different part at a different production speed. Adaptive Reject allows for different speeds without having to recalibrate between part types.

➢ ***For best results when using Adaptive Reject:***

- Calibrate the ***Reject Delay*** (see "***Reject Delay Calibration***" on page 101) 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

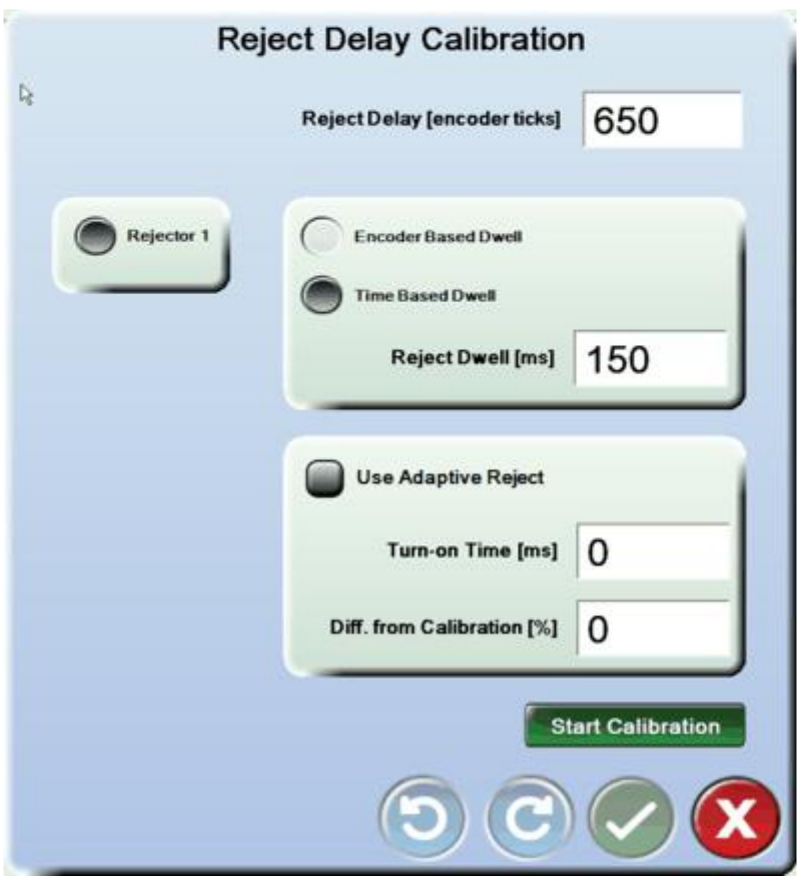
❖ *Note: Adaptive Reject will not function properly if the reject device delay is greater than the spacing between parts.*

➢ *Before calibrating Adaptive Reject:*

1. If you have not done so already, calibrate Reject Delay and Dwell. See ***Reject Delay Calibration*** (on page 101) for more information.
2. Write down or make note of the Reject Dwell value after Reject Delay calibration. You will need to temporarily change this during Adaptive Reject calibration.

➢ *To calibrate Adaptive Reject:*

1. Click the check box next to Use Adaptive Reject in the ***Reject Delay Calibration*** (on page 101) menu to enable the feature.
2. Set Reject Dwell to zero during the Adaptive Reject calibration process.
3. Run the conveyor or production line at the fastest speed that you will use, and click the **Start Calibration** button.
4. Let the conveyor or production line run for about 20 seconds. The part tracker will record the maximum encoder frequency. It will use this number to determine the amount of delay to be applied to the rejector at all other encoder frequencies.
5. Click the **Stop Calibration** button.
6. Set the Reject Dwell back to the value originally calibrated during Reject Delay calibration (the number you noted *before calibrating Adaptive Reject*).
7. Enter the Turn On time of the reject device installed in your system.
8. Enter a value for **Max Encoder Frequency** or **Diff. from Calibration %**, if applicable. See more information below.
9. Click the OK button to save changes and exit the Reject Delay Calibration menu.



Settings for Adaptive Reject:

Turn On Time

Latency of the rejector mechanism in milliseconds.

Diff(erence) from Calibration (%)

This number is used if the maximum speed of the conveyor or production line is greater than the speed at which the Reject Delay was calibrated. For example, if you calibrated the conveyor for one part where the conveyor runs at a slower speed, and know that you will run the conveyor 20% faster for another part, then enter 20 for Diff. from Calibration.
The ideal setting is zero. However, a value of approximately 10 is acceptable, to allow for speed fluctuations due to power surges.

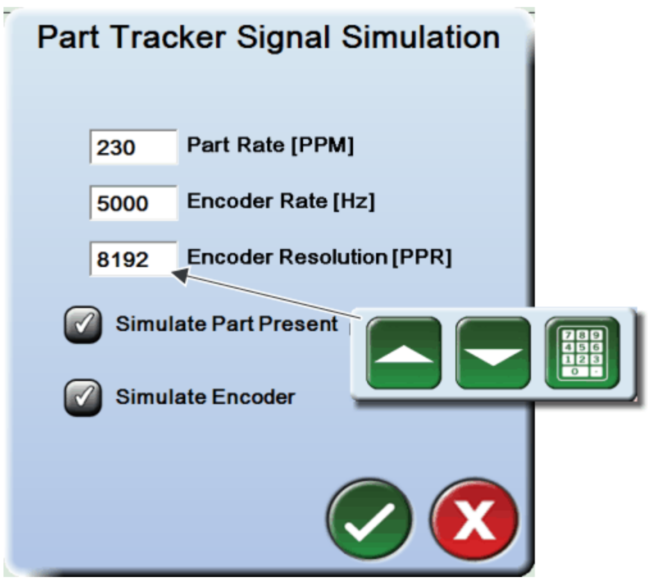
❖ *Note: this value only applies to potential speeds greater than calibration speeds, not slower speeds.*

Part Tracker Simulation

Use part tracker simulation for troubleshooting or if a part detect sensor is bad. A simulated part rate would allow inspection to continue.

➢ ***To get to this screen:***

From Lane or Sensor Overview mode, click the Tools button > Hardware Setup > Part Tracker Simulation.



To enable the simulated part tracker, click the check box and then enter the desired part rate in the window.

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

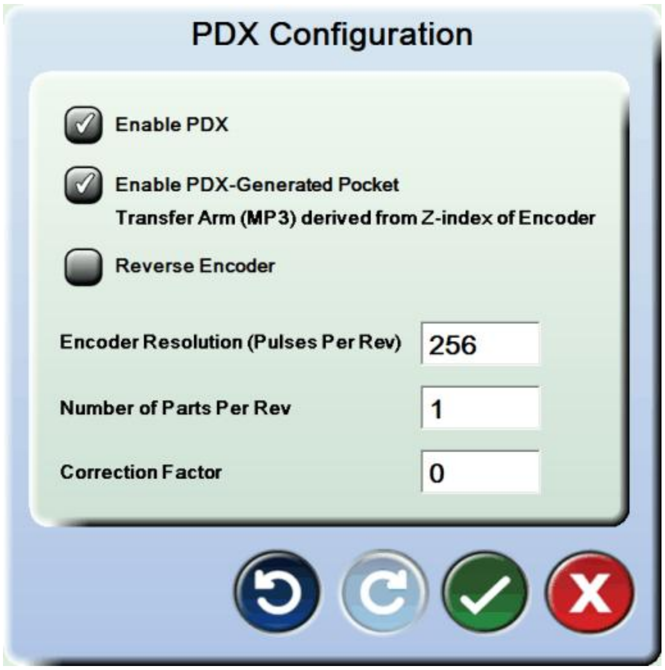
Encoder Rate and **Resolution** - Enter the simulated encoder properties.

❖ *Note: the system cannot run in both* **PDX** *(see "***PDX Configuration***" on page 106) mode and* **Part Tracker Simulation** *(on page 106) 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.*

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** *(see "***PDX Configuration***" on page 106) mode and* **Part Tracker Simulation** *(on page 106) 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 Overview or Sensor Overview mode, click the Tools button > Hardware Setup > PDX configuration.

Enable PDX

Enables the PDX circuit.

Enable PDX-Generated Pocket

- If your system is using a physical pocket disk with an index pin, leave this box un-checked.
- 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.

Reverse Encoder

Reverses the direction of the encoder pulses. Instead of the normal A, B sequence of pulses, the pulses switch to B, A.

Encoder Resolution (Pulses Per Rev)

Enter the resolution of the encoder installed on your machine.

Number of Parts Per Revolution

Enter the number of machine parts (example, number of Transfer Arms) to which the encoder is attached.

➢ ***To configure the PDX:***

1. Click 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. Click the OK button to accept changes and exit.

Missed Packets Exception

For each part and for each camera, two packets of information are communicated:

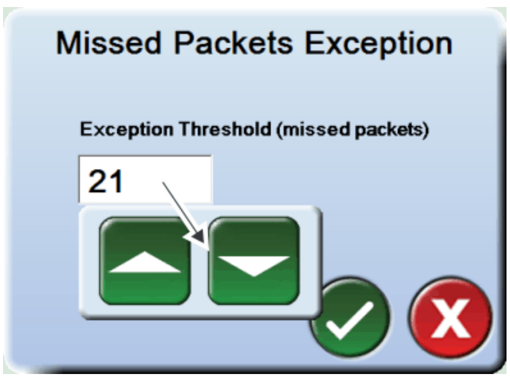
- The part tracker sends the host PC a signal stating the camera has been triggered (correlation signal)
- The host PC then sends a pass/fail signal back to the tracker (results signal) when the inspections are done

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 default is set at 6.

When this number has been met a **Lost Part Tracking** input is received on the ***Sensor Missed Statistics*** (on page 77) screen.

➢ ***To get to this screen:***

From the Lane or Sensor Overview screen, click the Tools button > Hardware Setup > Missed Packets Exception.



Set the number of missed packets to trigger the part tracker to send a Lost Part Tracking message to the Intellispec.

Reject Confirm Calibration (Optional)

Reject Confirm can detect missed rejects. Coupled with the ***Missed Reject Alarm*** (see "***Lane Alarms Description***" on page 62), Reject Confirm will reliably detect and notify you of any missed reject condition. There are two types of Reject Confirm sensors. The type used in your process depends on your plant's needs.

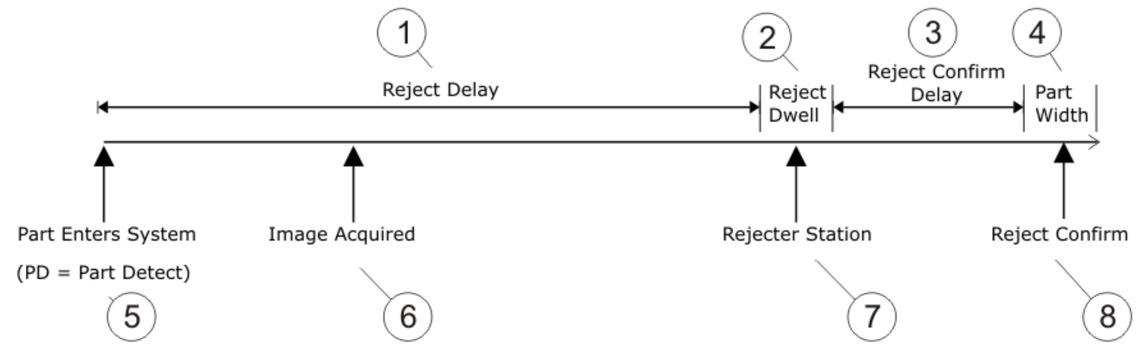
❖ *Note: Reject Confirm is an optional feature, and an additional sensor must be installed at your site.*

A. Encoder-based sensor

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

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*** (see "***Lane Alarms Description***" on page 62) will be triggered (if enabled). Below is a timing diagram of the Reject Confirm process.



1	***Reject Delay*** (see "***Reject Delay Calibration***" on page 101)
2	***Reject Dwell*** (see "***Reject Delay Calibration***" on page 101)
3	Reject Confirm Delay, set by Reject Confirm Calibration
4	***Part Width*** (see "***Part Width Calibration***" on page 79)
5	Part Detect (PD) - where the part is first detected by the sensor
6	Image Acquired - image is taken, inspection is performed
7	Rejector Station - standard rejection point
8	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. The 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.

This method uses additional parameters in setup, which are described below.

➢ ***To set up Reject Confirm Calibration:***

1 - Enable the Missed Reject alarm

Go to the ***Lane Alarm Configuration*** (on page 59) to enable the Missed Reject alarm. If you are using **time-based reject confirm**, you may also want to enable the **Blocked 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

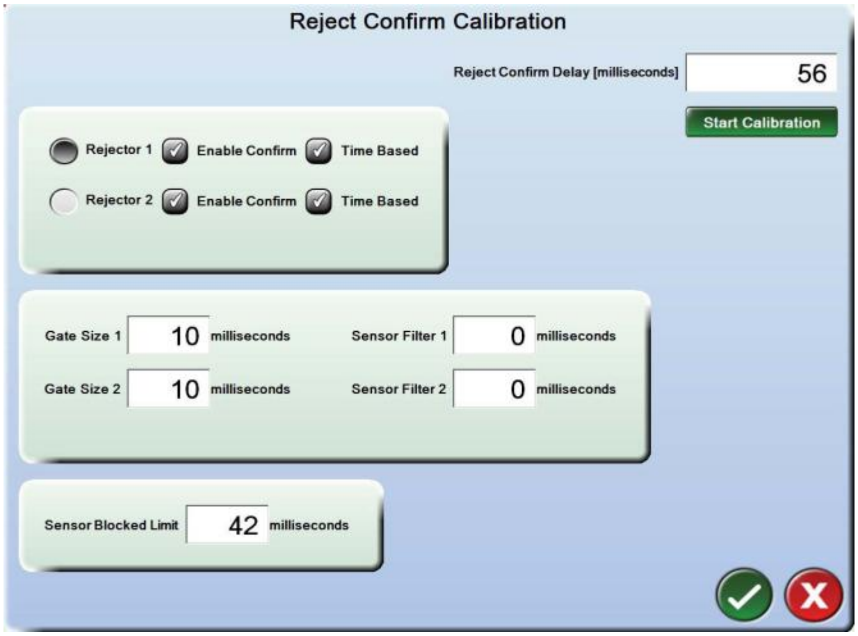
Calibrate the standard ***reject delay*** (see "***Reject Delay Calibration***" on page 101) using normal procedures.

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 pulses 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 on a sensor button > select Part Tracking > Reject Confirm Calibration.
2. Enable Reject **Confirm**.
3. If using time-based Reject Confirm, then also check the Time-Based box, and set Gate Size, Sensor Filter and Sensor Blocked Limit (described below).
4. Click 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, click 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.

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 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.

Sensor Blocked Limit

Specifies how long the sensor is blocked before the **Blocked Reject Confirm** alarm is triggered. This alarm must be enabled through ***Lane Alarm Configuration*** (on page 59). The valid range is 1 to 32000 milliseconds.

Chapter 8
Software Utilities

This section includes various software utilities that assist with Windows settings, help and support from Pressco, and sensor configuration.

Go Online at Startup

Use this option to have the Intellispec system 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 as a result.

To use this option: Click the Home button > Tools button > System > Go Online at Startup. A check mark is displayed next to the menu item when this is enabled.

Adjust Date and Time

Adjust the date and time for the Intellispec system. The Windows operating system time is also changed.

➢ ***To adjust date and time:***

1. Click the Home button > Tools button > System > Set Date and Time. The System Date and Time menu is displayed.

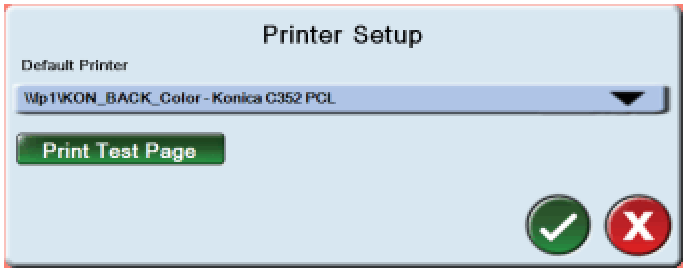
2. Choose your time zone from the drop-down menu.
3. Enable the check box to automatically adjust for daylight savings time if applicable.
4. Click the OK button to save changes and exit.

Set up a printer

Configure a USB or networked printer to print Intellispec reports. The driver for the printer must be set up by an Administrator that has access to Windows.

➢ *To set up a printer:*

1. Click the Home button > Tools button > System > Setup Printer. The printer configuration screen is displayed.



2. Select the printer to configure from the drop-down menu. The Intellispec system recognizes printers through the Windows drivers.
3. To test the printer, click the **Print Test Page** button. A basic "Intellispec Test Page" message is printed.
4. Click the OK button to save changes and exit. The printer will be ready to use.

Create a Support Package

A support package is a set of files that is gathered by the Intellispec system to help determine system problems. You will send this package to Pressco service specialists so that they can troubleshoot your system.

➢ *What you need:*

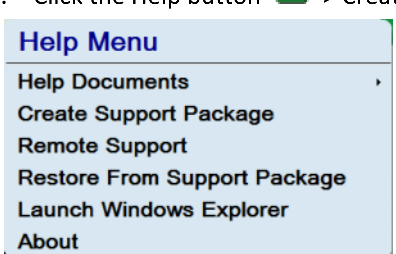
- Mechanical keyboard (MKB) to enter problem description
- USB flash drive (128MB or larger)
- If a Pressco Support representative sent you a ".pcf" file to acquire additional system information, then copy that file to the USB drive prior to connecting it to the Intellispec system
- If you want to save 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*** (on page 149).

➢ *To set up for the support package procedure:*

- Connect the mechanical keyboard (MKB) to the convenience USB port on the side of the user interface.

➢ *To create the support package:*

1. Click the Help button > Create Support Package. The support package wizard is displayed.



2. Follow the instructions on screen.
3. Use the forward arrows to move to the next screens.

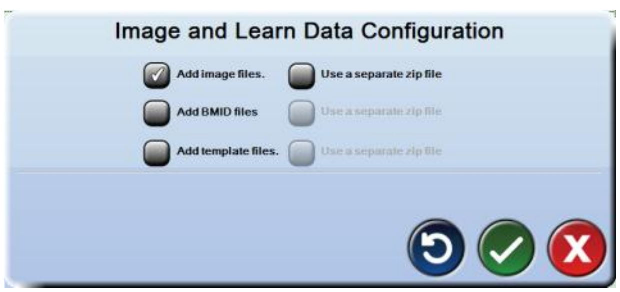
4. When asked to describe the problem, use the mechanical keyboard to enter information.
5. Optional: At Step 3: Configure:

- Check the **Load custom configuration** box. A .pcf file is custom Pressco configuration file that gathers additional information (beyond the standard Support Package) from your system. A Pressco Support representative will send you a .pcf file to load before you run the Support Package option.

a) If a Pressco Support representative sent you a .pcf file to acquire additional system information, then connect the USB device that contains the .pcf file.

b) Click the disk icon  and browse to the location (usually your USB drive) where the .pcf file is stored. The system locates the .pcf file.

- Check the **Add images and learned data to package** box. A dialog (shown below) allows you to choose the type of images to include. Images must be saved prior to creating the support package. Use the default image folders when saving images: C:\Pressco\Lane n\Images\Sensor n.



  - **Add image files** - selects the 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).

6. When the steps are completed, verify that the Step 5: Export screen is displayed.

7. Select the USB Flash Drive in the "Copy to:" location. You may need to remove the mechanical keyboard and then insert a USB flash drive into the USB port.
8. Click the Copy button. The support package files are copied to the USB flash drive, then a "Copy Succeeded" message is displayed.

9. Click the OK button to continue.
10. Click the OK button at the bottom of the Support Packaging screen to exit.
11. Remove the USB flash drive.
12. Remove the mechanical keyboard (MKB).
13. Send the support package files to Pressco.

➢ *To send the files to Pressco:*

1. Copy the files that were saved, including images, from the USB drive to your computer.
2. Send an e-mail to ***techsupport@pressco.com*** (***mailto:techsupport@pressco.com***) and attach the support package files. Pressco service/ tech support will respond within one business day, if possible.

Help - Remote Support

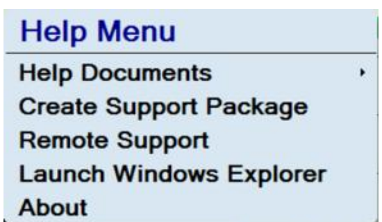
Remote Support is used to allow remote access to the Intellispec software. iTivity software is the method used by Pressco to provide remote system support if a Maintenance Agreement is purchased for that Intellispec system. With this software Pressco can log in and operate the Intellispec remotely.

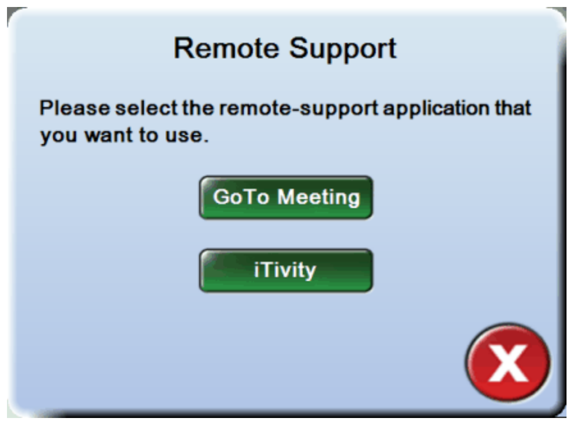
➢ ***You will need:***

- A functioning Intellispec (systems without power, or systems that are not capable of running Intellispec software, cannot be remotely accessed)
- An internet connection to your Intellispec. This can be established through your network, and is usually set up during installation. You may use DSL, Cable, Mobile Broadband, or plant network connections to connect to the internet. Contact your network administrator for help.

➢ ***To use Remote Support:***

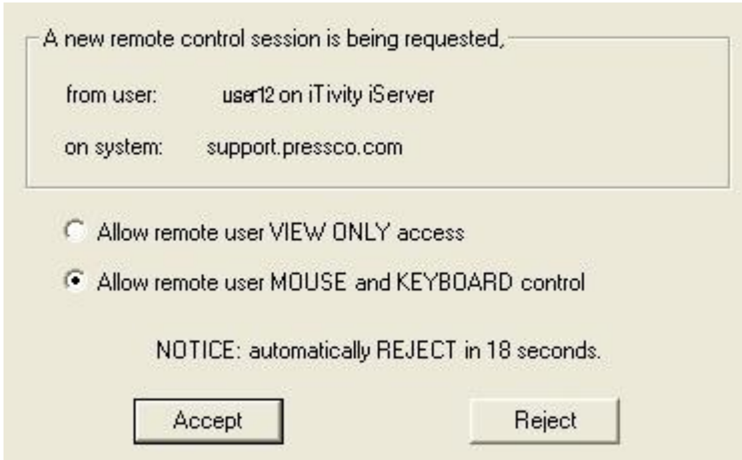
1. Notify a ***Technical Support*** (see "***How to Contact Pressco***" on page 411) representative that you require remote support. You will need to identify yourself, your location, and the Intellispec to which he should connect.
2. In the Intellispec software, Click the Help button . From the Help menu, select Remote Support.





3. Select the **iTivity** button. If the 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 Pressco Tech Support representative is connected, you will be asked to give him control of your Intellispec system. Check Allow remote user MOUSE and KEYBOARD control and click Accept. The Tech Support representative will now perform the necessary troubleshooting of your system.



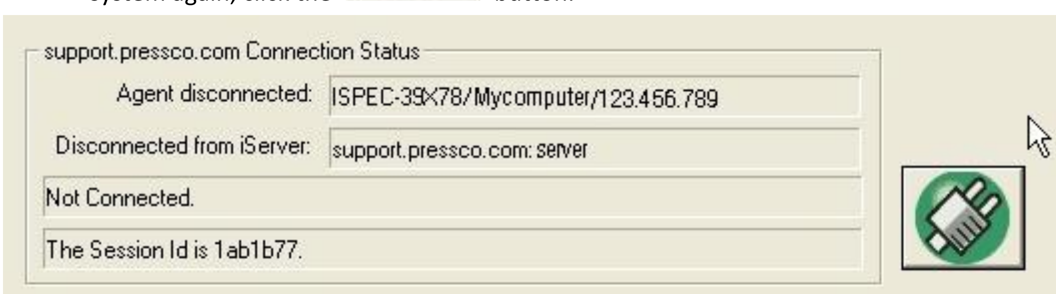
5. When the Tech Support representative is finished, he will disconnect your Intellispec from the remote session.

If you need to disconnect your Intellispec from the remote session yourself, follow the steps below.

➢ ***To disconnect from remote support:***

1. Click 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?" click OK. The system will be disconnected.

- Note: if you click the  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, click the  button.



Restore From Support Package

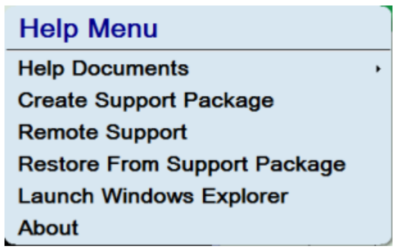
You can restore (import) a support package to a working Intellispec system. This allows you to use the same configuration on multiple systems without having to duplicate your efforts, or use a known good configuration created on another system or by Pressco Technical Support.

➢ *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. Click the Home button  > Help button . The help menu is displayed. This feature is only available from System Overview mode.



2. Select the Restore from Support Package option. The restore wizard is displayed.
3. The system will suggest that you back up your current system. We recommend that you select the **Create a Support File** button to ***Create a Support Package*** (on page 112) in the first step. The support file is the system backup.
4. Follow the instructions on screen, and select the location of the USB drive that contains the support package you want to restore, when prompted.
5. Select the support package from the USB drive that you want to restore.
6. Use the forward arrows  to move to the next screens.
7. When the system says "Series V Application detected," select the **Stop Application** button to shut down the Intellispec software. This is necessary to restore the support package.
8. At step 4, select the **Unpack Zip File** button to restore the support package and wait for the system to unpack the files.
9. When the system says "Unpacking Complete," select the forward arrow  to move to the next screen.
10. Select the **Restart Discovery** button to restart the Intellispec application.

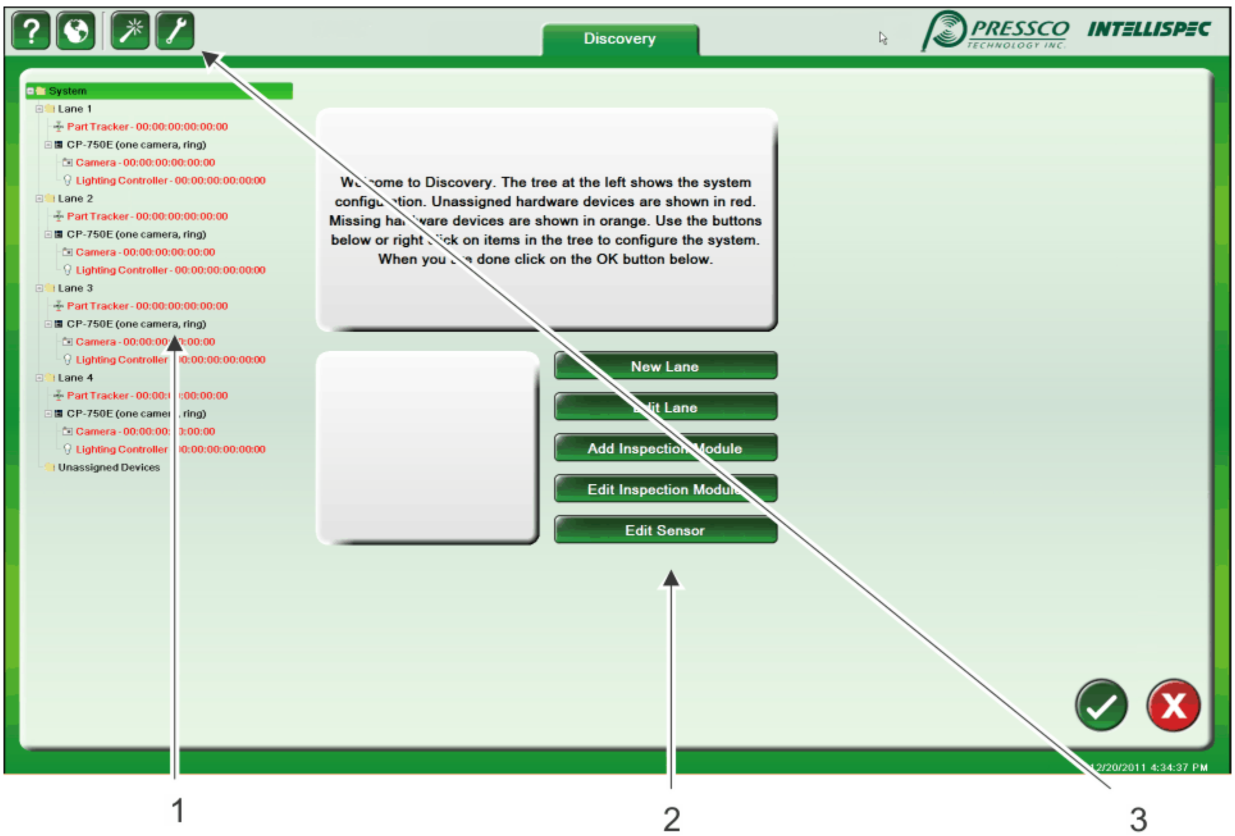
Discovery Software - What is Discovery?

Discovery is software installed on the Intellispec hard drive that automatically looks for and identifies certain components installed on each lane. Specifically, the software identifies any 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.*

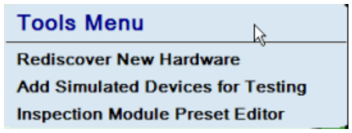
Additionally, during system startup, if a previously configured component fails to communicate with the Intellispec software, the discovery software screen will automatically appear on the user interface, alerting you to the problem.

Discovery software screen



1	The tree on the left side of the screen shows the system configuration including the lanes in the name and MAC address of each component in that lane. ▪ Unassigned hardware devices are shown in red ▪ Missing hardware devices are shown in orange
2	This menu allows you to perform specific actions, such as add or edit lanes or sensors, by clicking on the designated button.
3	The ***Discovery menu toolbar*** (on page 119) allows you to perform additional actions.

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 - lists 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

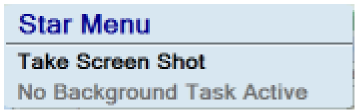
- The initial configuration of all hardware devices will be performed by the Pressco installer, and it is not anticipated that plant personnel will normally need to use Discovery software.
- The Discovery screen is automatically displayed during system startup anytime a hardware device that was previously 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:
  - During system startup camera does not communicate with the Intellispec software
  - 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.
  - As a first step you should open the tools menu icon and select "Rediscover New Hardware." This will trigger the software to search for the missing camera.
  - 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.
  - If the camera does not re-establish communication this indicates a hardware problem and the camera will most likely need to be replaced.

Star Menu

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

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

❖ *Note: This item is called Star menu as of software versions: 5.0.502, 5.2.032, and 5.3.012. (was Favorites)*



This menu allows you to access the following utilities:

Take Screen Shot (on page 120)

Manage ***Background Tasks*** (on page 120)

Take Screen Shot

This utility allows you to capture an Intellispec screen image. This is different from saving individual part images through the ***Save Image*** (see "***Saving Images Through the Sensor Menu***" on page 149) function. A screen shot is useful to illustrate a problem to technical support, or to capture settings for future setup.

➢ ***To capture the current full Intellispec screen:***

1. Click 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. Click OK to save the image. The image is saved as a Portable Network Graphic (.png) file to C:\Pressco\DataExport\ScreenShots.

Background Tasks

You can control the Intellispec system's background tasks. If you are saving or copying several images, especially to a USB device, this process is slow. Therefore the Intellispec considers it 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.

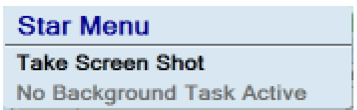
PERMISSIONS:

- You must have the "Cancel Background Task" permission to use these features.
- These icons are also used during ***Auto-Learn*** (on page 365). 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 ***Managing Permissions*** (on page 24) for more information.

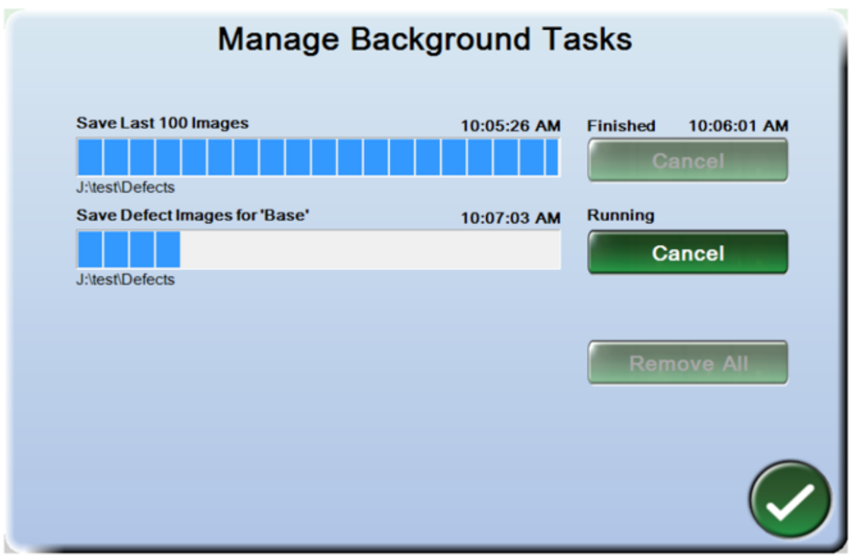
Background task management is found under the Star icon (except in System Overview mode). You may see different icons depending on whether the system is performing background tasks.

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. Click 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.



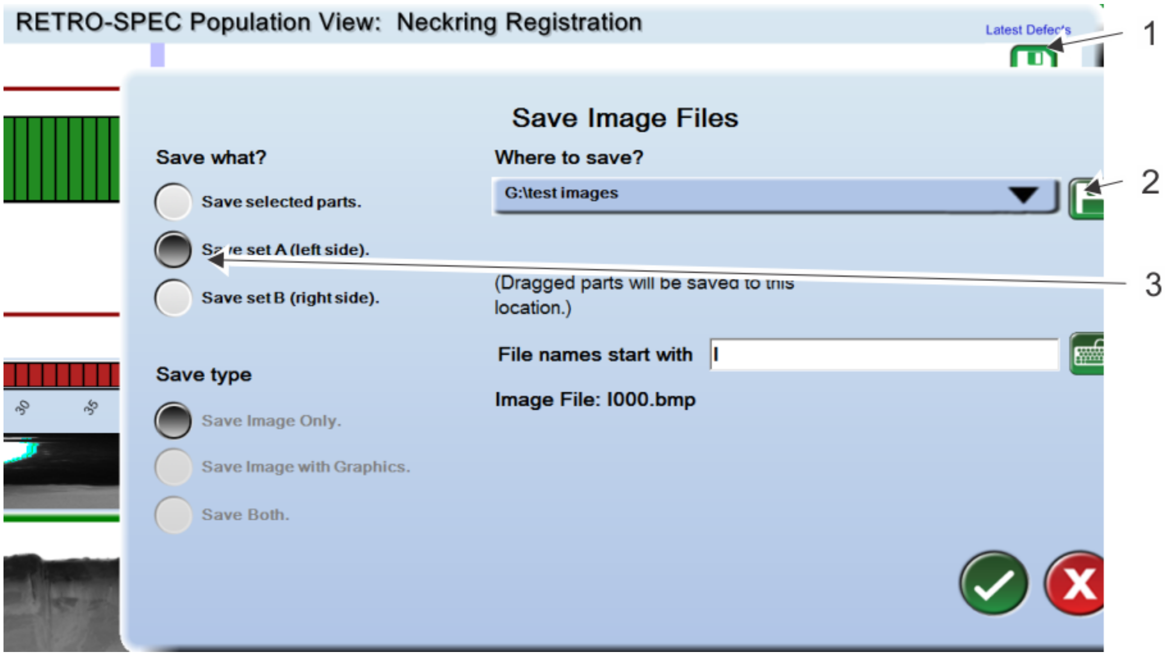
Notes:

- 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.

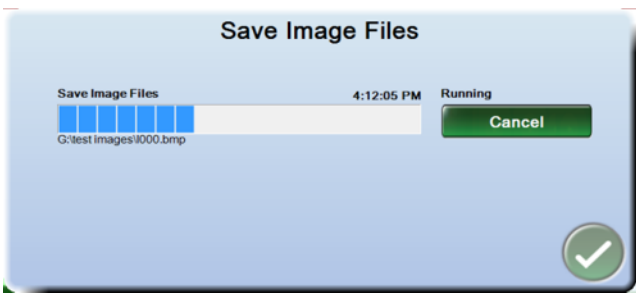
Saving images to USB using the Retro-Spec interface

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 - click the Save button. 2 - Choose the USB device. 3 - Save a data set (A or B). For more information about this menu see ***Saving Images through the Retro-Spec interface*** (on page 151).



You may cancel the task if necessary.



Configure Hang Dump

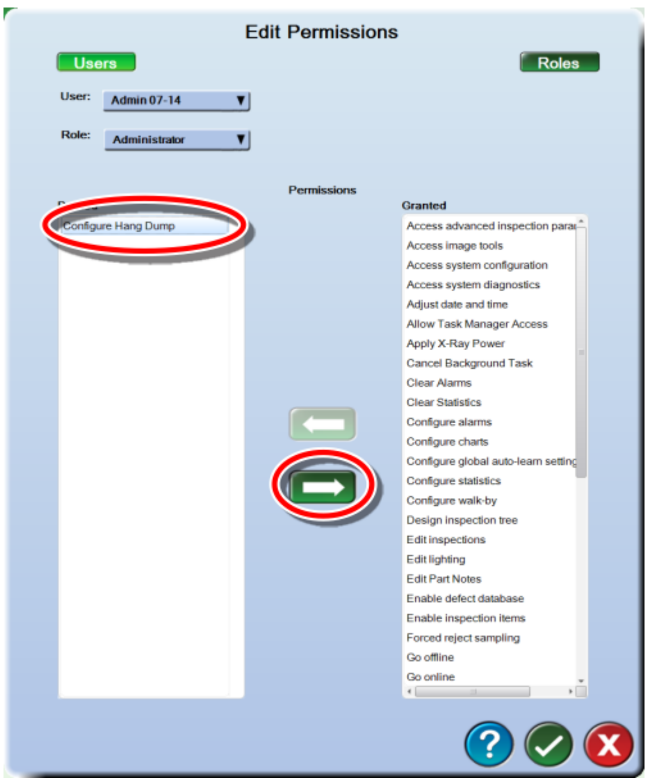
A hang dump is a log file created by the Intellispec system to help Pressco engineers troubleshoot a system. It is used when an Intellispec system is sometimes unresponsive (none of the buttons respond, nor does the display update - not even the clock). This feature can catch errors even if no one is 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:***

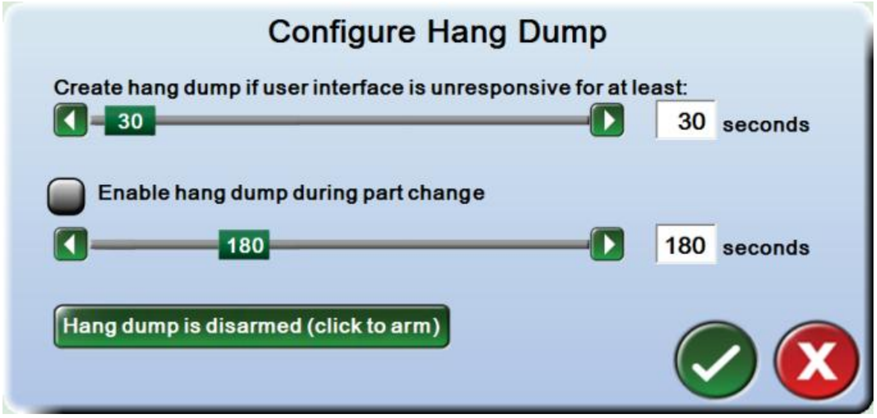
Grant permission for you or an authorized user to configure a hang dump. Permissions are not automatically granted for Administrators or other level users when default roles are applied. For more information see ***Managing Permissions*** (on page 24). You must have user permission to change permissions (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:*

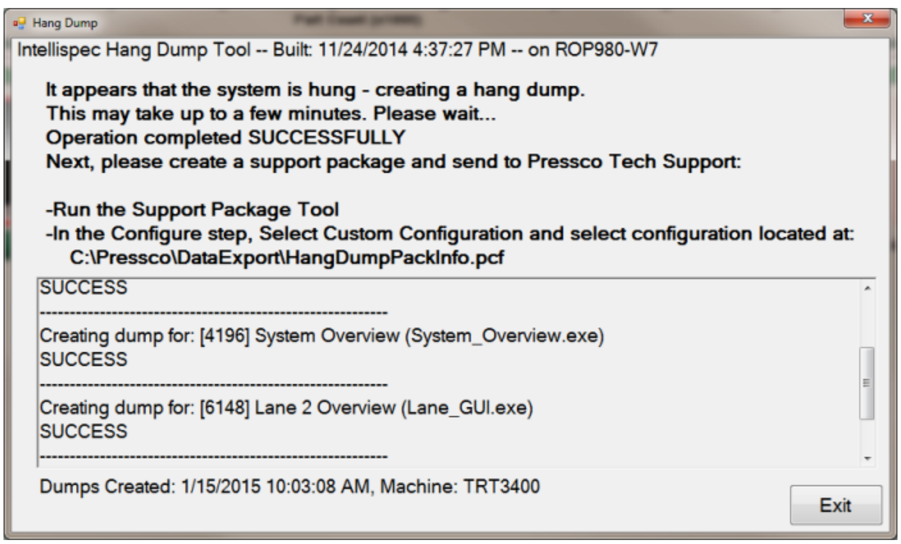
1. From System Overview mode  > select the Help button  > Configure Hang Dump.



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*** (on page 112). Be sure to use the ".pcf" file at step 3 of the Support Package Wizard.
7. Send the support package to Pressco Tech Support.

Chapter 9
Lighting and Images

This section includes information about:

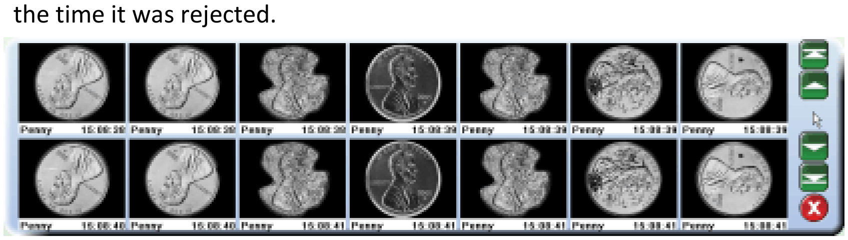
Reject Images

Reject Images are images from the last 100 defects from a sensor (or all sensors for Lane Overview mode). These images are available in both Lane Overview and Sensor Overview modes.

➢ ***To view Reject Images:***

- From Lane Overview mode, click a **Reject Images** button on the right side of the screen. Note: there are buttons for Lane and Sensor levels - these display images for the entire lane or just the sensor.
- **Lane Reject Images** show a variety of images from different Sensors. Below the image is the name of the Sensor it came from and what time it was rejected. You can scroll through the images using the arrows. Clicking on an image will bring you to the Sensor from which it failed.

- **Sensor Reject Images** show snapshots of failed images from that Sensor only. Below the snapshot is the time it was rejected.



➢ *To use the images:*

- Click an image from the Lane Reject images to display the corresponding Sensor information in the lower part of the screen.

- Click any one of the small images to display a larger version of that image.
- Click on the large image to display a magnified portion of the image. This is useful to see small defects. Click and drag on the magnified portion to navigate around the image.

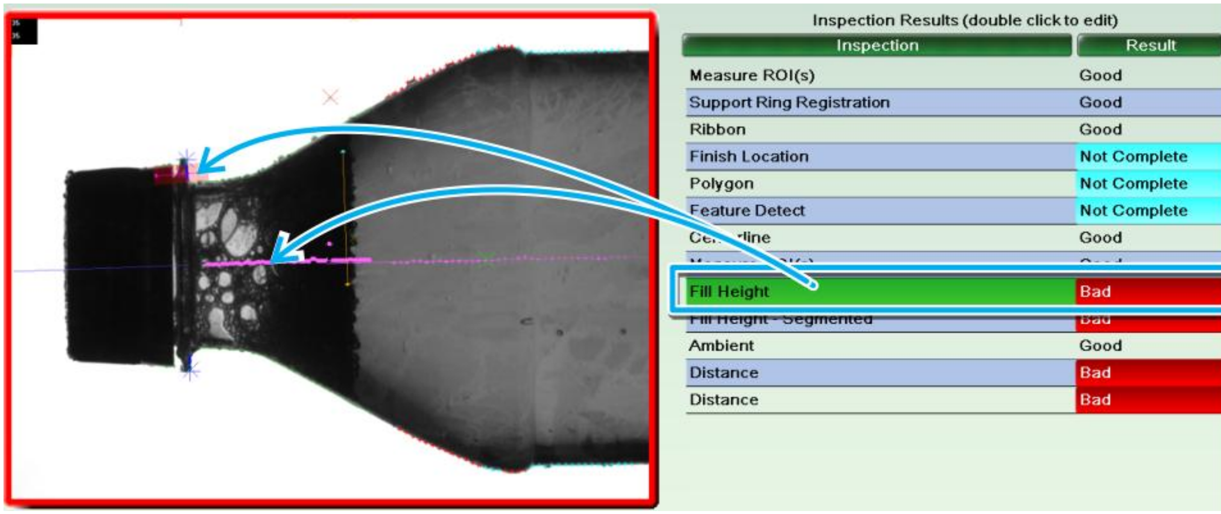
Accessing Inspections from Reject Images

After selecting one of the reject images, you can quickly access the inspections that are related to the part. This allows you to see which inspections failed.

➢ *To use the images:*

- Click an image from the Lane Reject images to display the corresponding Sensor information in the lower part of the screen.

- Click an inspection in the list to the right of the large image. This will show defect graphics for the specific inspection, such as the region and any diagnostics that are associated with that inspection.



- Double-click the name of any inspection to edit it. In the above example, if you double-click the Fill Height inspection, then the ***Fill Height*** (on page 304) inspection editor opens. See also ***Inspection Editor*** (see "***Edit Inspections***" on page 185).

❖ *Note: you must have user permissions to enter the inspection editor. Contact your system administrator if you need permissions.*

- Click an inspection name in the inspection tree. The set of reject images will change to those that are associated with that inspection (only if there are defects associated with that inspection). This is useful if you want to know what types of defects are being caught by that inspection.

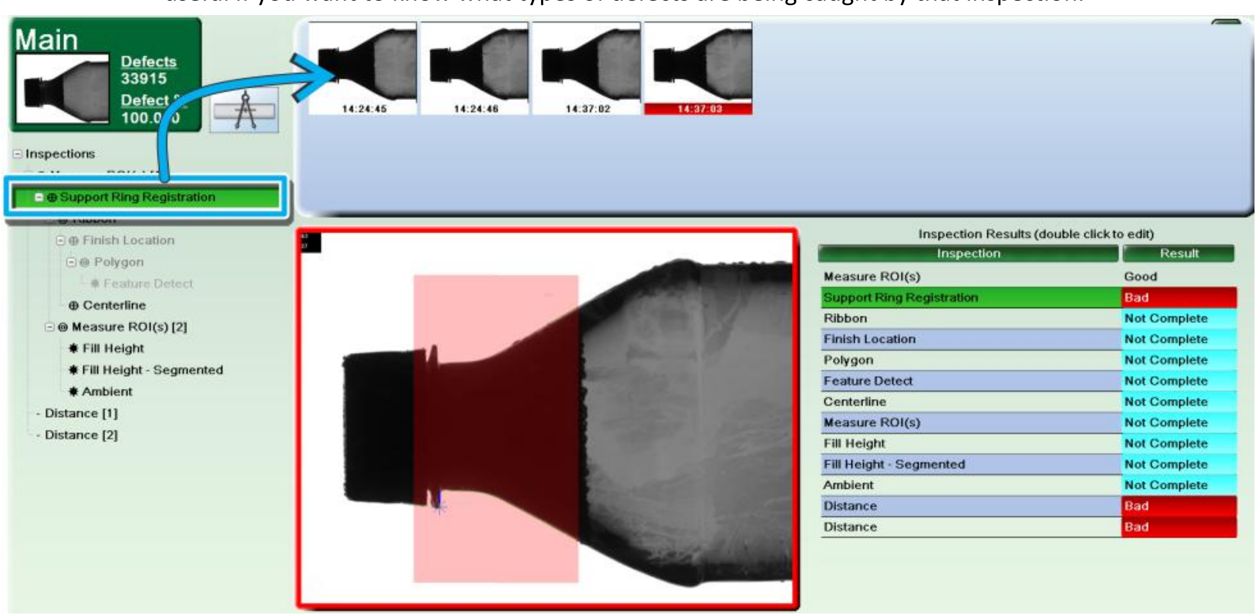
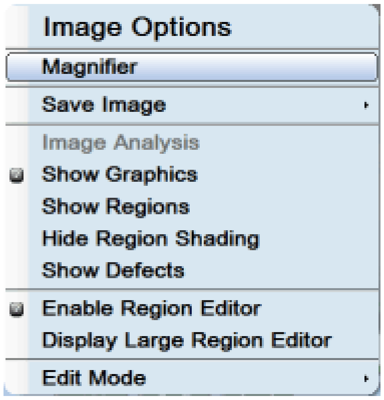


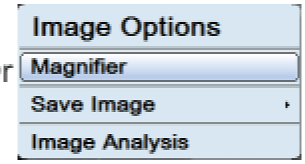
Image Magnifier

This tool is available from either the ***Image Options*** (on page 164) menu while you are editing an inspection, or when looking at ***Reject Images*** (on page 125).

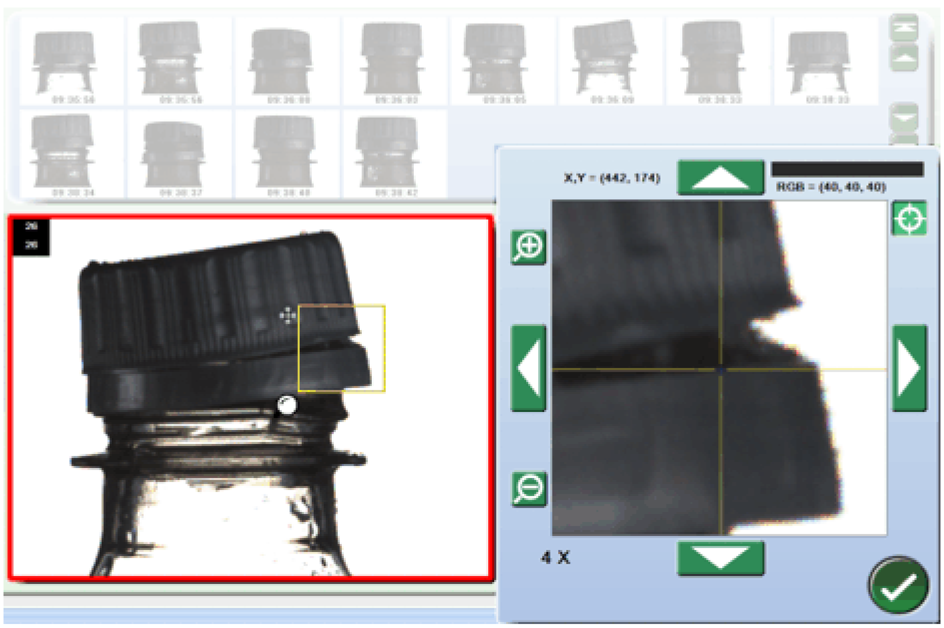
- If looking at Reject Images, simply click on the large image at the bottom of the screen to see the magnifier. Or:
- Right-click over a large image to see the Magnifier option. Select **Magnifier** to use the tool. The magnifier tool is displayed.



Or



An example of the magnifier tool from Reject Images is shown below.



➢ ***To use the magnifier:***

- When you first open the tool, the yellow box area over the original image is magnified. The magnified area 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  in the magnifier tool become available to move the magnified image.
- Select the zoom in button  to increase magnification. The amount of magnification available depends on the camera resolution.
- Select the zoom out button  to decrease magnification.
- 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.
- Click the OK button  to exit the magnifier.

Big Live Image

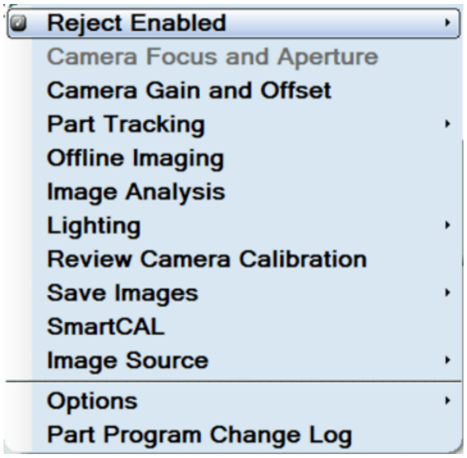
Click the Big Live Image button in Sensor Overview mode to view an enlarged image of the last part that was inspected.

This image is updated when the lane is online and the camera is snapping images. The image is outlined in green if the part is passing, yellow if it is in a warning state, or red if the part is failing. You can view this image from a distance to quickly see how the inspection process is performing.

Sensor Menu

The Sensor Menu provides access to part tracking, lighting, and image options. Right-click the Sensor button to view the Sensor menu from the Lane Overview or Sensor Overview mode. The items at the bottom of the menu are only available in Sensor Overview mode.

❖ *Note: the lane must be offline to access the items in the Sensor menu.*



The items in the Sensor menu are as follows:

Reject Enabled

(Toggles to Reject Disabled) This option enables or disables the rejecter for the **Sensor** only. If you disable a sensor and put the system online, you will see a message that a rejecter is disabled.
See also ***Rejector Enable/ Disable*** (on page 92).

Camera Focus and Aperture **(on page 131)**

Calibrate the focus and aperture of some cameras. This menu item will be grayed out if your system does not have cameras that can be adjusted through the software.

Camera Gain and Offset

❖ *Note: This menu normally should not be adjusted. It is usually set by the Pressco installer. Improper adjustment of these parameters can cause a distortion of the image.*

- Camera gain is the amplification of the video signal
- Offset adjusts the grayscale reference values

Part Tracking

Opens Part Tracking options for:

- ***Part Present Delay Calibration*** (on page 99)
- ***Reject Delay Calibration*** (on page 101)
- ***Reject Confirm Calibration*** (see "***Reject Confirm Calibration (Optional)***" on page 108)
- ***Part Width Calibration*** (on page 79)

Offline Imaging **(on page 132)**

Choose how the Intellispec acquires images when the lane is offline.

Image Analysis **(on page 132)**

This tool displays the gray shade value for any pixel or group of pixels in your image. This is useful in programming part programs or setting up lighting. You can measure grayscale values of pixels in horizontal or vertical lines, or over a circle. Image Analysis also allows you to calibrate the pixel scale for the sensor.

Lighting

Opens lighting options: ***Basic Adjust Lighting*** (on page 137) and ***Advanced Adjust Lighting*** (on page 138).

Review Camera Calibration **(on page 140)**

This tool shows how the current camera is calibrated - the number of image pixels to an actual measurement on your part. Calibration is used in measurement inspections.

Save Images **(see "***Saving Images Through the Sensor Menu***" on page 149)**

Allows you to save captured images to disk.

SmartCAL **(on page 141)**

SmartCAL is a tool that allows you to load a set of images, run them with the current part program, and make sure the part program is passing or rejecting parts as you expect.

Image Source **(on page 144)**

Allows you to choose which images to display, and select between live sensor images or saved images.

The two following options are available from Sensor Overview mode.

Options **(see "***Options (sensor menu)***" on page 181)**

Provides different inspection tree views.

Part Program Change Log **(on page 177)**

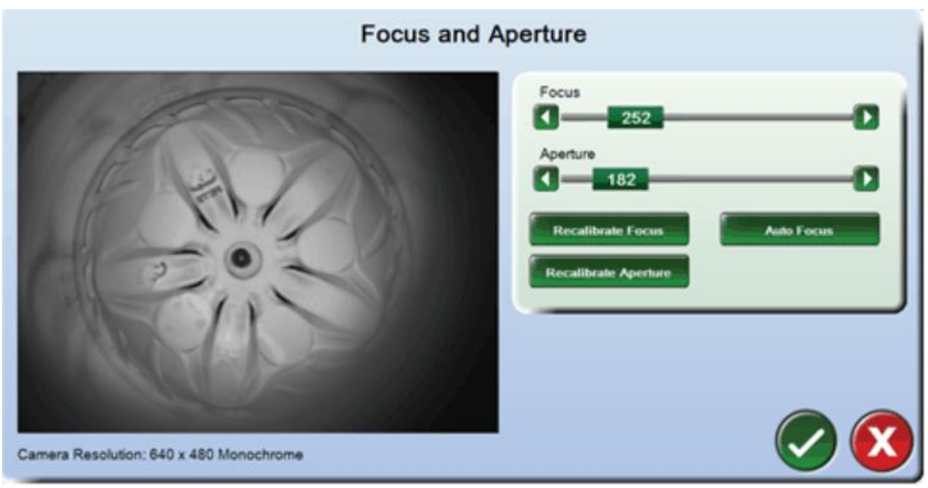
Display the Part Program Change Log. This lists the inspections and the edit history for each. You can view all inspections from one sensor, other sensors, or other part programs.

Camera Focus and Aperture

This menu allows you to adjust the focus and aperture of some cameras. 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. The Camera Focus and Aperture menu item will be grayed out in the Sensor menu if your system does not support this feature.*

To get to this screen: From the Lane or Sensor Overview screen, right-click the Sensor button > Camera Focus and Aperture.



Make adjustments as necessary.

Focus slider

Sets the focus position of the lens.

Aperture slider

Sets the aperture position of the lens.

Recalibrate/ Calibrate Focus

Determines and sets the usable range of focus positions for the lens.

Recalibrate/ Calibrate Aperture

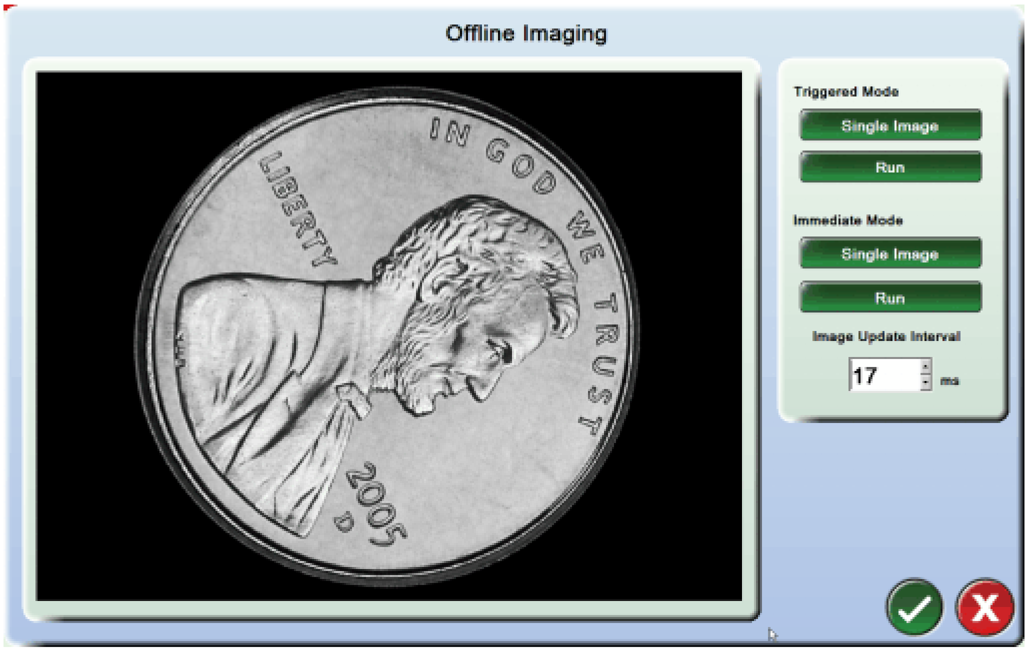
Determines and sets the usable range of aperture positions for the lens.

Auto Focus

Automatically determines and sets the best focus position for the image.

Offline Imaging

Choose how the Intellispec acquires images when the lane is offline.



Triggered Mode

- **Single Image** – using the part detect sensor, an individual picture is taken every time the button is clicked.
- **Run** – using input from the part detect sensor, pictures are taken continuously at the rate set in "Image Update Interval."

Immediate Mode

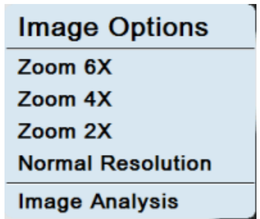
- **Single Image** – NOT using the part detect sensor, an individual picture is taken every time the button is clicked.
- **Run** – the camera takes a continuous picture, the light array is on, and you instantly see whatever is under the camera.

Image Analysis

This tool displays the gray shade value for any pixel or group of pixels in your image. This is useful in programming part programs or setting up lighting. You can measure grayscale values of pixels in horizontal or vertical lines, or over a circle. Image Analysis also allows you to calibrate the pixel scale for the sensor.

➢ ***To get to Image Analysis:***

- Make sure the lane is offline. Image Analysis is not available in online mode.
- Right-click an image in the Sensor Overview screen > Image Options > Image Analysis.

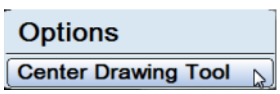


- OR -

- Right-click the ***Sensor menu*** (on page 129) and choose Image Analysis from the menu.

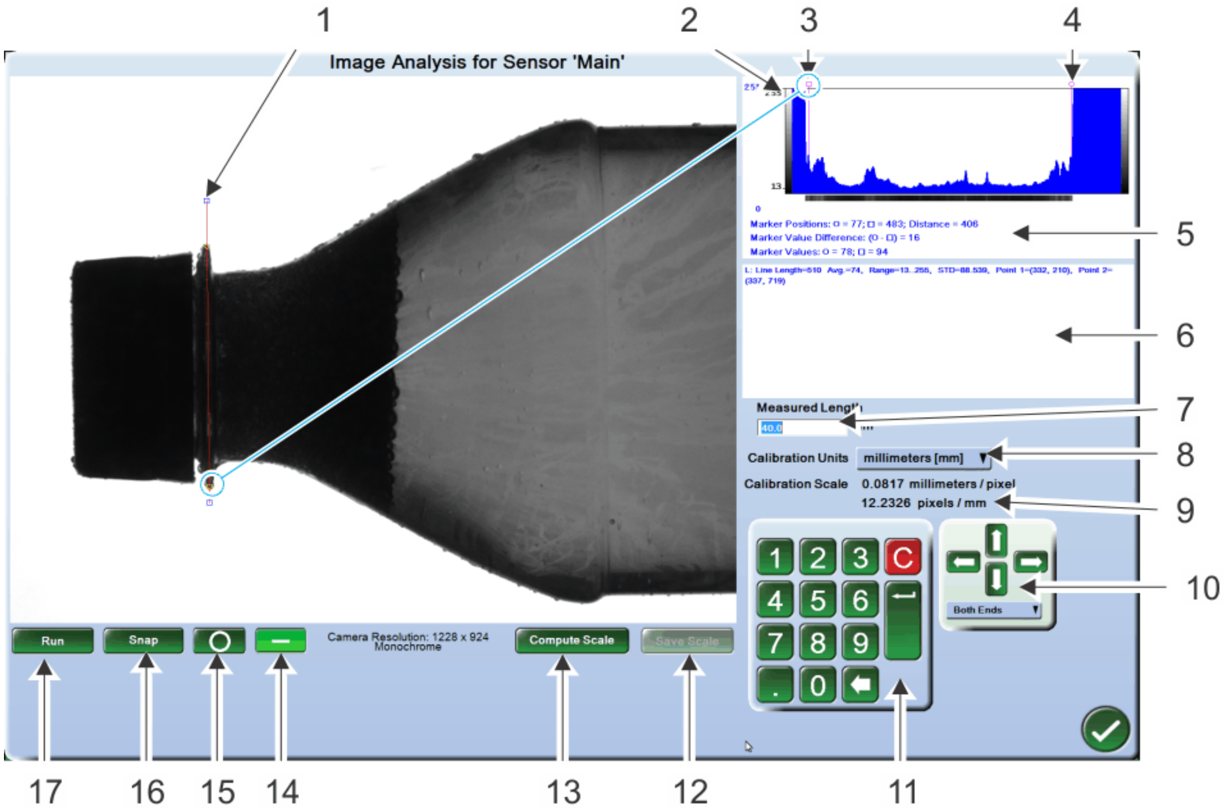
❖ *Note: you must have proper* **user access** *(see "***Managing Permissions***" on page 24) to use Image Analysis; otherwise, the option will be grayed out*

To quickly center the line or circle, right-click over the image to display the Options menu > Center Drawing Tool. The line or circle is centered on the image.



The Image Analysis screen shown below is from a high resolution camera. The regular 640 x 480 camera Image Analysis screen has the same controls, but is laid out differently. See the example below the table.

❖ *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.*



Under the histogram graph, the information displayed is as follows:

Marker Positions

The distance in pixels that the square or circle 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

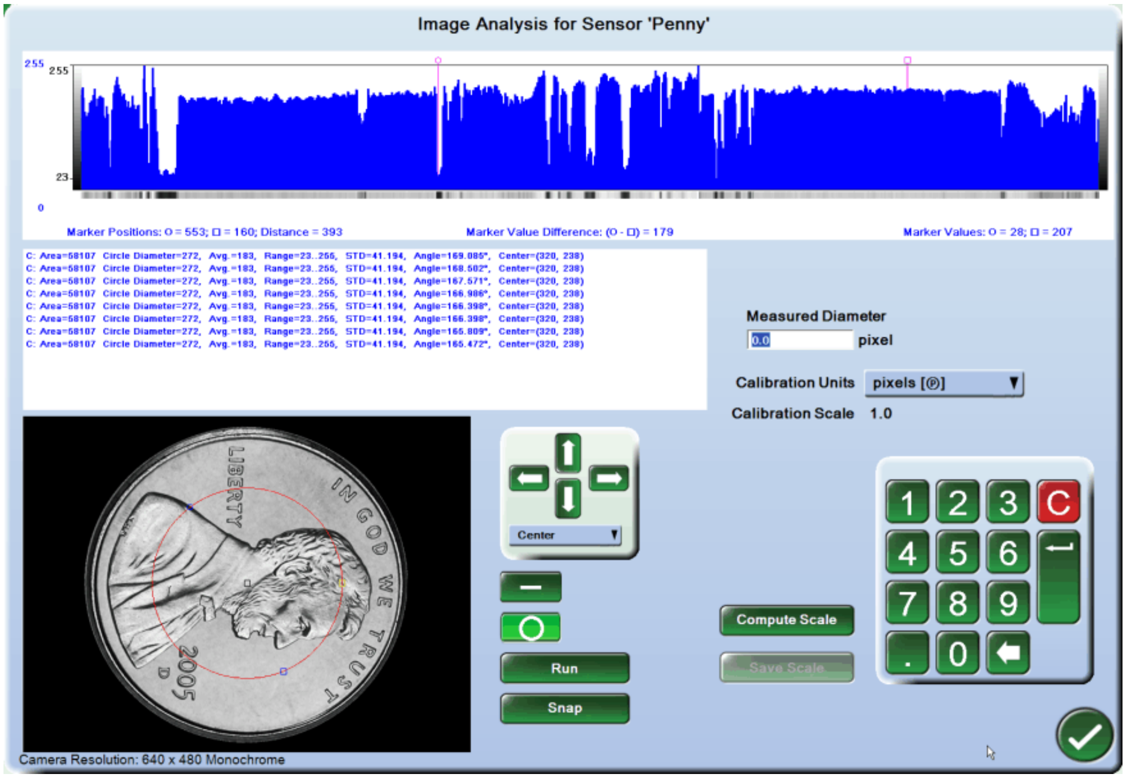
The difference in gray shade between the values of the two markers.

Marker Values

Gray shades of markers.

1	Click and drag an end square to change the length or location of the line. If you are using a circle for image analysis, use the middle square to re-position the circle on the image.
2	The highest and lowest gray shade values along the line or circle are displayed on the left of the graph
3	**Square marker** - click and drag the square to any point on the line or circle (either in the image or in the graph)
4	**Circle marker** - click and drag the circle to any point on the line or circle (either in the image or in the graph)
5	The gray shade values of the pixels at the markers are displayed, along with the differences between the markers.
6	Values for each image are displayed so that you can see 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 [items 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 the part's diameter.
8	Choose your calibration units that you used to measure your part
9	This is a computed number that is updated after you click 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	The keypad with the four arrows allows you to re-position the line or circle with buttons. The drop-down menu allows you to choose the point or feature to move.
11	Use this keypad to enter the measured value of your part.
12	**Save Scale** - (available after you Compute the scale) Click this button to save the number of pixels per unit of measure to the sensor file. This calibration unit can then be used in inspections such as Measurement or Distance.
13	**Compute Scale** - Click this button **after** you have entered your measured valued [item 4] and set up your line or circle. The system computes the units of measure per pixel.
14	Click the line button to view gray shades along a line
15	Click the circle button to view gray shades along a circle
16	Click **Snap** to acquire one new image. This option is only available if you accessed Image Analysis by right-clicking the Sensor button.
17	Click **Run** to continually snap new images. Different images are only displayed if your production line is running. This option is only available if you accessed Image Analysis by right-clicking the Sensor button.

The Image Analysis screen shown below is from a standard resolution (640 x 480) camera.



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 (refer to the illustration for*** Image Analysis ***(on page 132)):***

1. Using a known good part, measure the length or diameter of an area on your part.
2. Enter that value into the Measured box [item 4].
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 [item 9]. The system computes the pixel scale and displays the values [item 6].
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 use pixel scale calibration are:

- ***Measurement*** (on page 292)
- ***Fill Height*** (on page 304)
- ***Fill Height - Segmented*** (on page 311)
- Support Ring Registration or ***Neckring Registration*** (on page 260)
- ***Distance*** (on page 337)

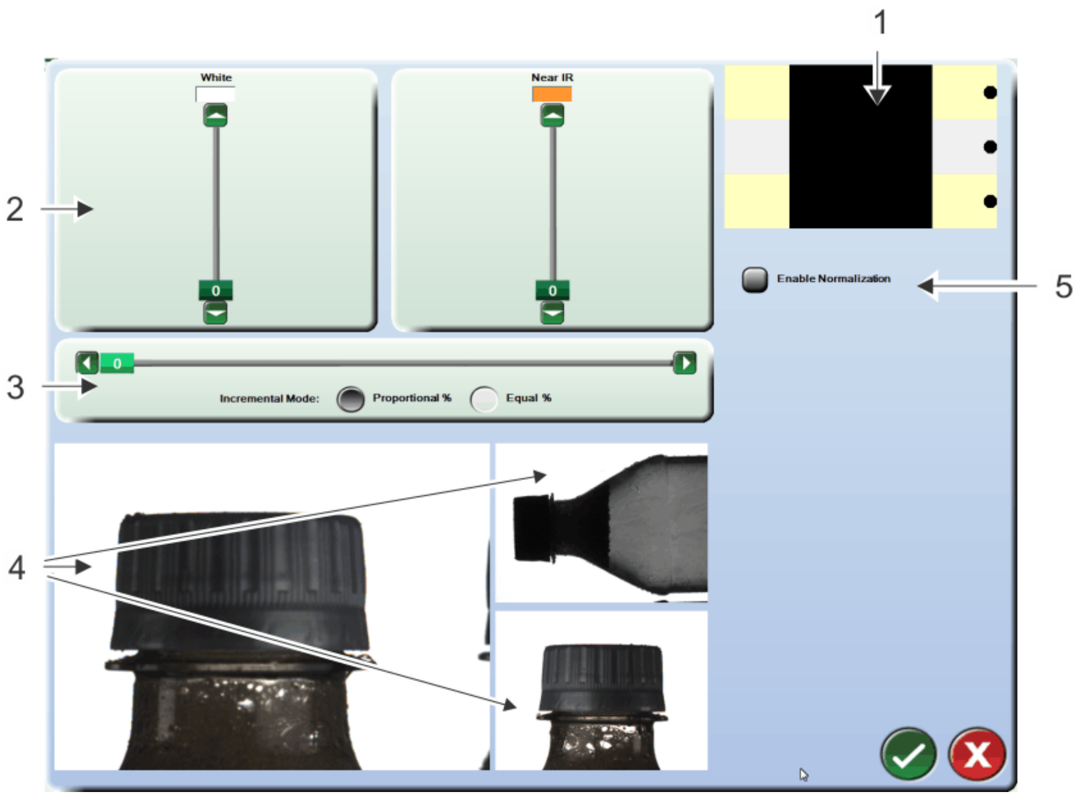
See the descriptions for the individual inspections using the links provided.

Basic Adjust Lighting

The Basic lighting provides most of the lighting adjustments you will use.

❖ *Note: lighting must be adjusted while the lane is offline.*

To get to this screen: From the Lane Overview or Sensor Overview screen, right-click over the desired sensor button > Lighting > Basic Adjust Lighting.



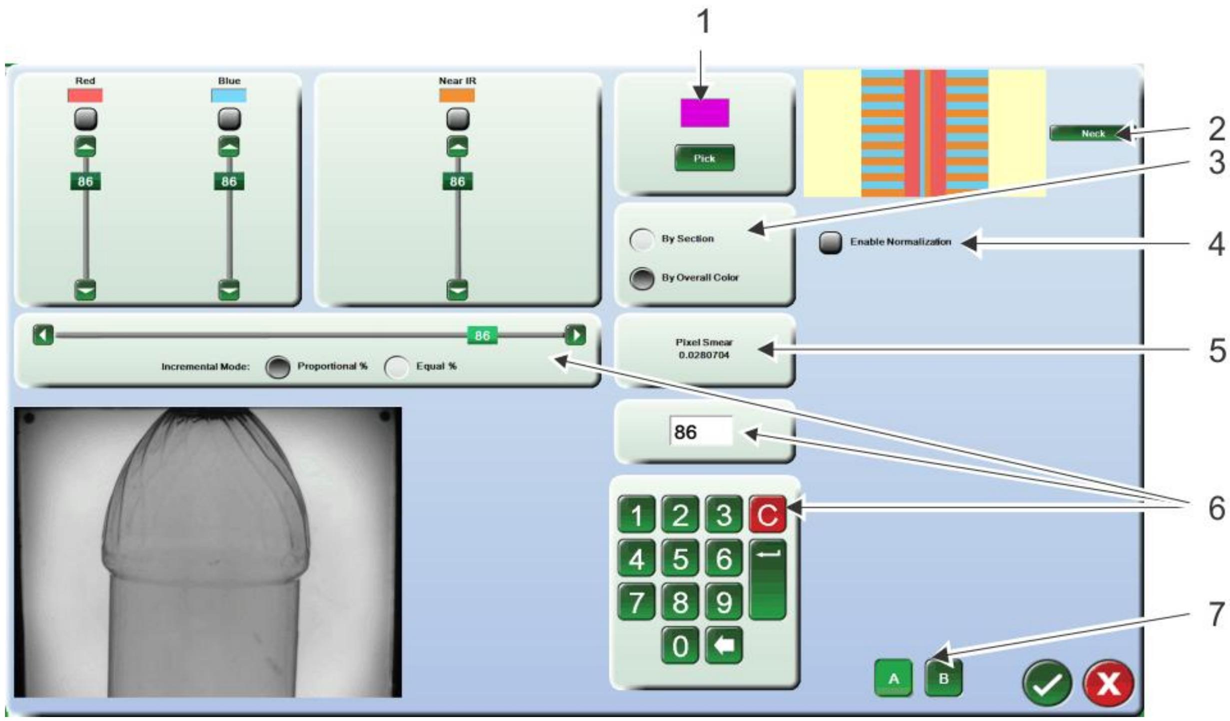
1	Upper right corner displays each zone. Click a zone to adjust it. You can select a single zone or multiple zones at any one time. As lighting is changed, the zone and the button next to it change color.
2	Separate slider bars for each color (red, green, blue, and infrared) allow individual adjustment.
3	Incremental mode **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	Click any image (if applicable to your system) to select the camera to adjust its lighting.
5	**Enable Normalization** - (in some systems, Disable Normalization). For most applications leave normalization disabled. If you are modifying a part program that has normalization enabled, then leave it enabled. This function was previously used to limit the brightness of certain LEDs. It is no longer required.

Advanced Adjust Lighting

This screen provides additional lighting setup. This is mostly used by Pressco engineers, or for making infrequently performed specialized settings.

❖ *Note: lighting must be adjusted while the lane is offline.*

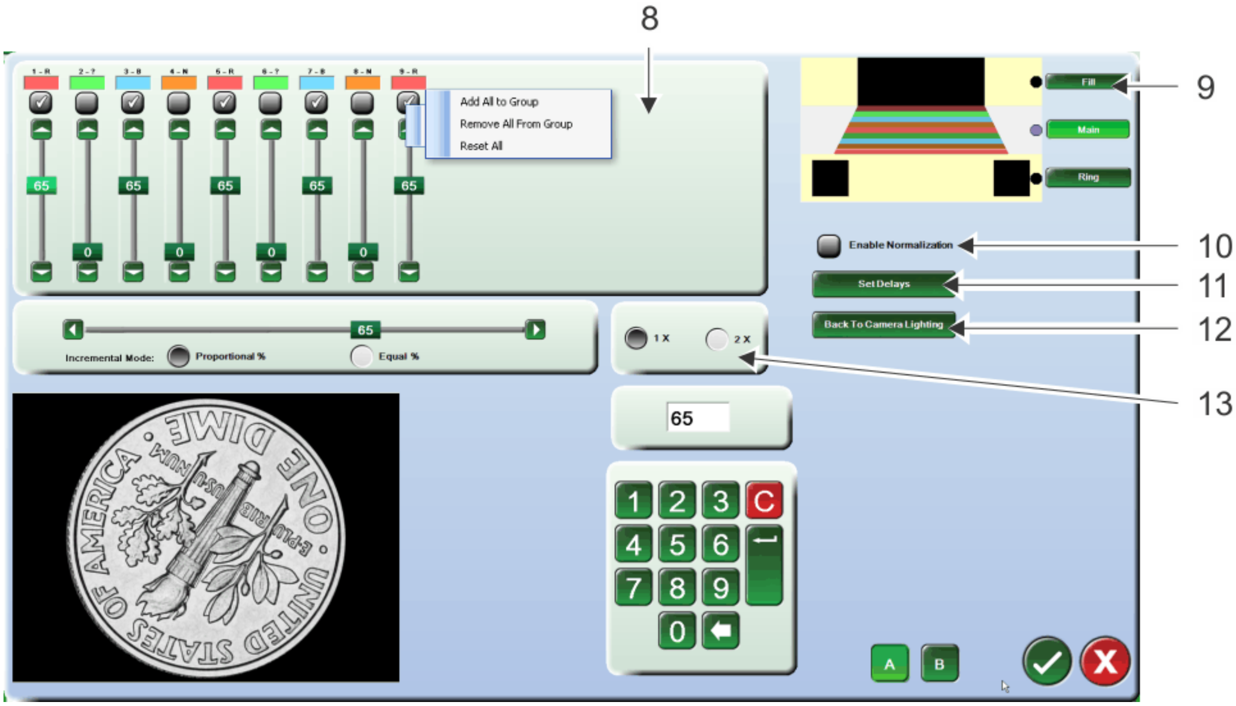
To get to this screen: From the Lane Overview or Sensor Overview screen, right-click over the desired sensor button > Lighting > Advanced Adjust Lighting.



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.
3	**By Section** - Allows you to change lighting by each individual section. **By Color** - Allows you to change lighting for multiple sections at once.
4	**Enable Normalization** - (in some systems, Disable Normalization). For most applications leave normalization disabled. If you are modifying a part program that has normalization enabled, then leave it enabled. This function was previously used to limit the brightness of certain LEDs. It is no longer required.
5	**Pixel Smear** - The Intellispec computes the amount of pixel smear based on lighting, image size, and part rate. It should be kept below one.
6	**On-screen keypad (OSK)** - enter the percentage of color. Type the number in the empty box (using the onscreen keypad). This also moves the percentage slider.
7	**A/B buttons** - Allows you to set up two different lighting settings for the same part so you can view each and compare.

Advanced adjust lighting - zones

When you select one of the array buttons from the Advanced Lighting screen, you can adjust each zone independently.



8	Adjust any zone within the light array. Options: ▪ Adjust any zone with the slider or arrows ▪ Select several zones by checking their gray box to adjust those zones as a group (intensity will be the same for the whole group) ▪ Right-click over any zone for options to add all zones to the group, remove all zones from the group, or reset all zones to zero
9	Click another array button to adjust lighting zones for that array
10	**Enable Normalization** - (in some systems, Disable Normalization). For most applications leave normalization disabled. If you are modifying a part program that has normalization enabled, then leave it enabled. This function was previously used to limit the brightness of certain LEDs. It is no longer required.
11	***Set Delay*** (see "***Advanced adjust lighting - set delay***" on page 140) is only available in a BNS application.
12	Click the **Back to Camera Lighting** button to go back to the main Advanced Adjust lighting screen
13	1X - 2X is an intensity multiplier. 1X is the normal setting. 2X doubles the intensity without having to adjust the intensity through the sliders. Maximum intensity is 100% - if a slider is already at 100%, then the intensity will not be doubled.

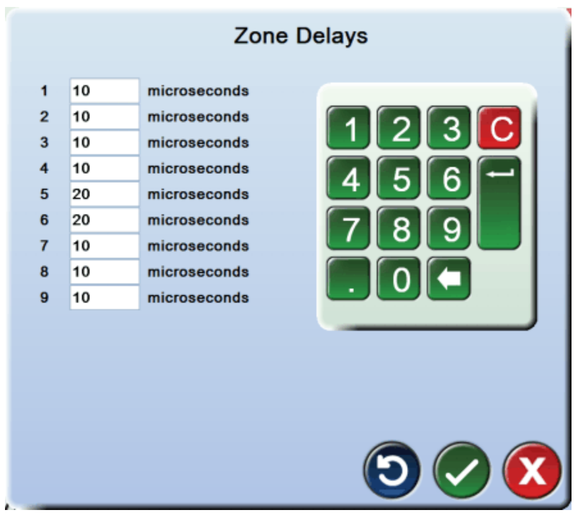
Advanced adjust lighting - set delay

Setting the zone delay is only available in a BNS application. It provides a strobe delay on the light control board for the Neck camera, so that the Neck lighting fires after the Base camera (and not at the same time). Since 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. From a Lane Overview or Sensor Overview screen, 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 OSK. 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.

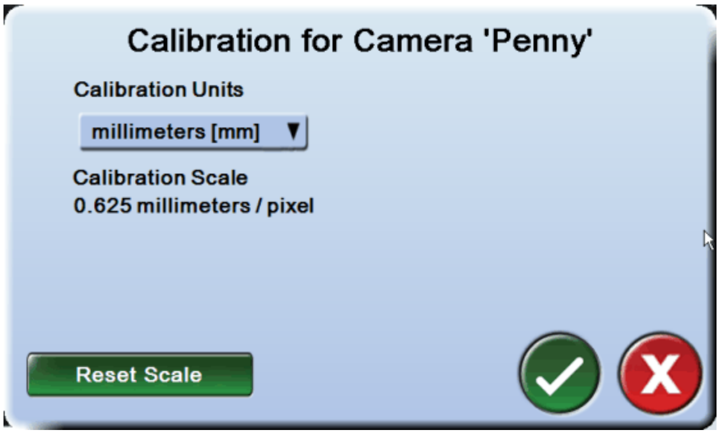
❖ *Note: this delay is separate from the Strobe Delay set in* **Part Present Delay Calibration** *(on page 99).*

Review Camera Calibration

This menu allows you to switch between inches and millimeters, select a custom scale, or go back to pixels. If you switch between inches and millimeters, the pixel scale is automatically converted. Calibration to pixel scale is performed in ***Image Analysis*** (on page 132) 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: Ⓟ for pixels, mm for millimeters, " for inches, or [ ] blank for custom units.

To get to this menu, right-click over the Sensor button in the Lane Overview or Sensor Overview screen > Review Camera Calibration.



Notes:

- If you switch from mm to inches, or inches to mm, 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.

SmartCAL

What is SmartCAL?

SmartCAL is a tool that allows you to load a set of images, run them with 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.

Before using SmartCAL

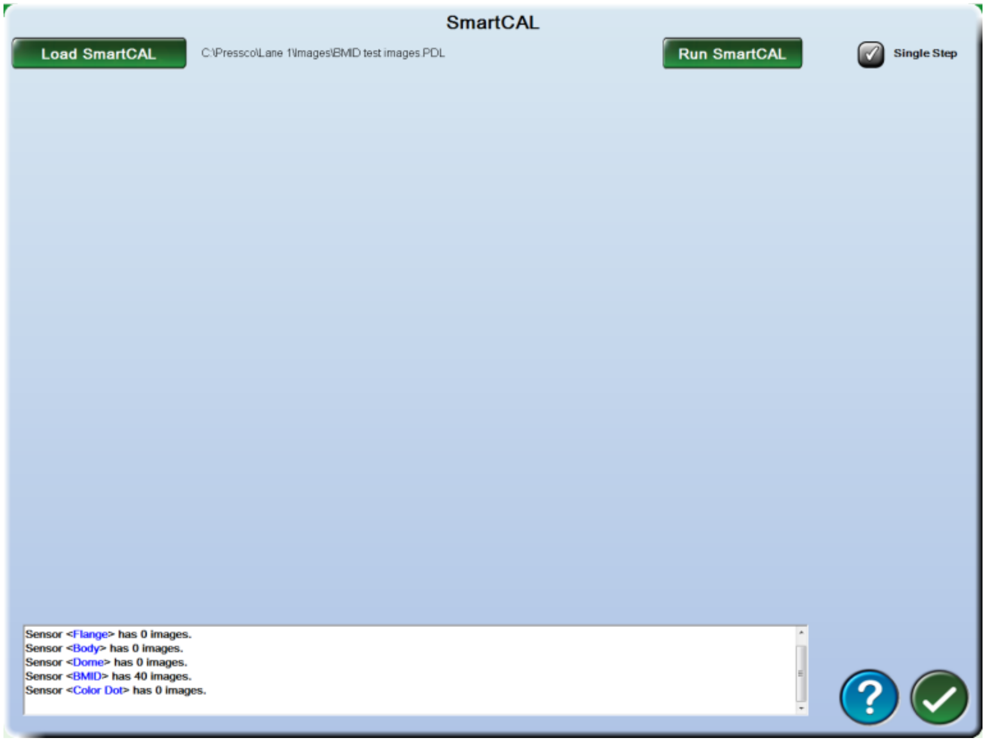
To use SmartCAL you must save good and defective images to the hard drive. Carefully name the images you save to make it easier to determine if the part program is working correctly. For example, save good images as "Good0001.bmp, Good0002.bmp, Good0003.bmp" and bad part images as "Bad0001.bmp, Bad0002.bmp, Bad003.bmp," etc.

Using SmartCAL

➢ *To use SmartCAL:*

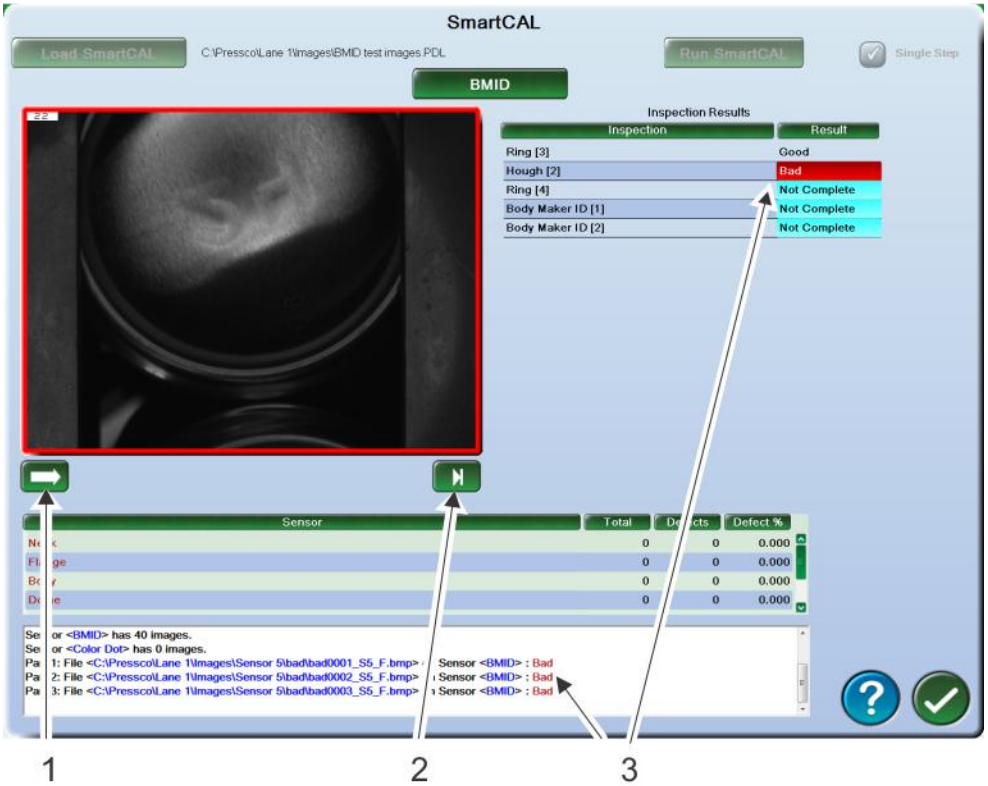
1. Save two sets of images, one good set and one bad set, for each sensor. Use a tool such as ***Auto-Save*** (see "***Saving Images Automatically***" on page 150) and save a set of good images using **passing** status, and label the images as good. Save another set of defective images using **failing** status, and label the images as bad.

2. Create a ***PDL*** (see "***Manage Simulated Lane Images (PDL)***" on page 145) file containing both the good and bad images from each sensor.
3. Open SmartCAL: right-click the sensor button and select SmartCAL.
4. Click the **Load SmartCAL** button.
5. Select the PDL file you created in step 2, and click the OK button to continue. The system will load the images.



6. Click the **Run SmartCA**L button. If the **Single Step** box is checked, you will be able to run the part program on one image at a time. Otherwise, the system will run the part program on all the images in the PDL file. The results are displayed in the lower window.

7. View the results [item 3] 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	Automatically run the part program for all the images
3	View the results for each image

Select any sensor in the table to view the results, as shown below.

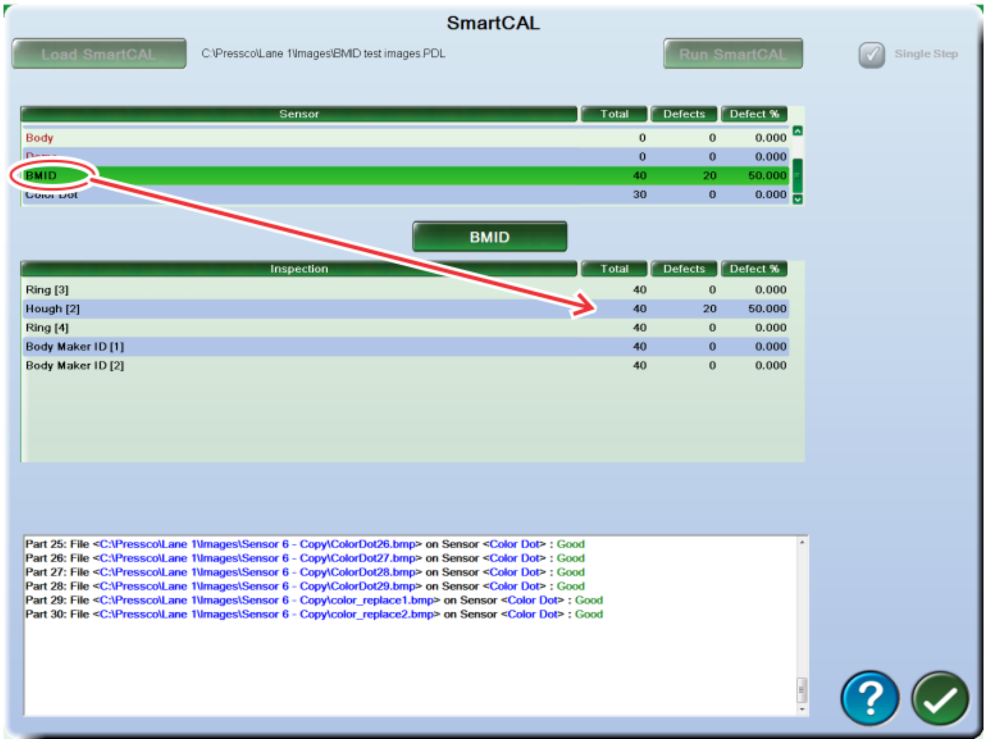
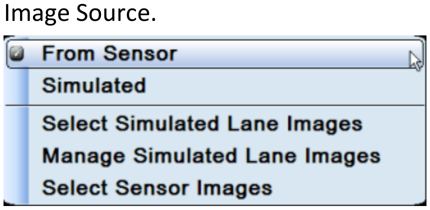


Image Source

Choose which images to display for the lane or sensor. You can load images to simulate inspection if your production line is not running, or choose live images from the sensor.

To get to this menu, right-click the Sensor button from Lane Overview or Sensor Overview screen > Image Source.



From Sensor

Display the live images from the current sensor.

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 sensor(s) is displayed in **red** to indicate that the rejector is disabled.
- You must specify images through one of the following options: Select Simulated Lane Images (PDL), Manage Simulated Lane Images (PDL), or Select Sensor Images.

Select Simulated Lane Images

Load a PDL file (on page 146)

Manage Simulated Lane Images (see "***Manage Simulated Lane Images (PDL)***" on page 145) (PDL)

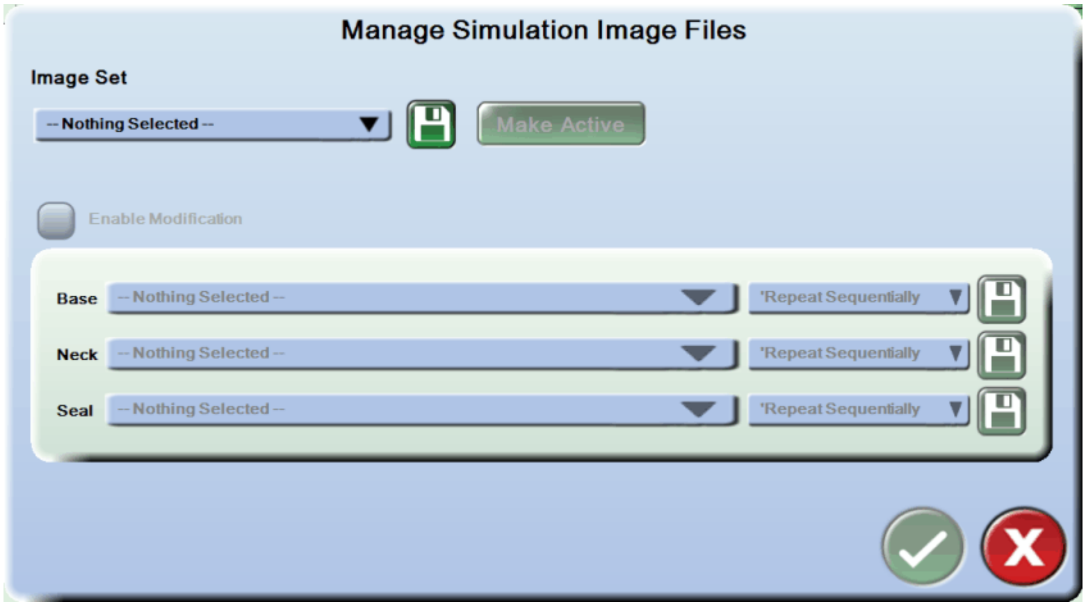
Select Sensor Images (on page 148)

Manage Simulated Lane Images (PDL)

Create a Pressco Data List file [.PDL] that lists the images to load. This way, you can easily load the same images another time. It allows you to save and load images for all sensors within the lane.

Before creating a PDL file, you must save a set of images; choose from one of the options: ***How to Save Images*** (see "***Saving Images***" on page 149)

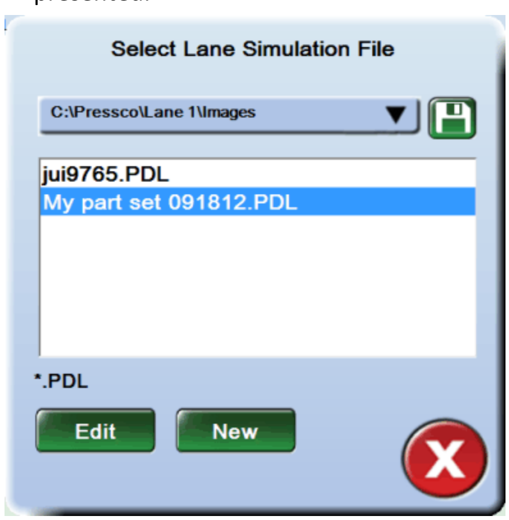
To get to this menu, right-click on a Sensor button in Lane or Sensor Overview mode > Image Source > Manage Simulated Image Files.



➢ ***To create a new PDL file:***

❖ *Note: this process creates one file where you can load images from all sensors within the lane.*

1. Click the disk icon  under **Image Set**.
2. In the **Select Lane Simulation File** screen, click the **New** button. An on-screen keyboard is presented.



3. Type a name for the image file and click the OK. A file is created and saved in the default directory for the sensor (example: C:\Pressco\Lane 1\Images). The file path is displayed in the **Image Set** drop-down menu.

4. To add images to the set, highlight the file name in the **Select Lane Simulation File** screen. The **Edit** button becomes active.
5. Click the **Edit** button. The Select Lane Simulation File screen closes, and the selected file name is displayed in the **Manage Simulation Image Files** screen.
6. Check the **Enable Modification** box, then click the disk icon  next to the 'Repeat Sequentially' drop-down menu. The **Select Sensor Images** screen is displayed.
7. Select images for the set using the instructions under the ***Select Sensor Images*** (on page 148) section, and click the OK button to save.
8. Choose how to display the images using the drop-down menu on the right of the 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.
9. Click the **Make Active** button. A check mark is displayed next to the PDL file name, and the file is activated.
10. Exit from the Manage Simulation Image Files screen.

Next, display the list of images.

➢ *To display the simulation images:*

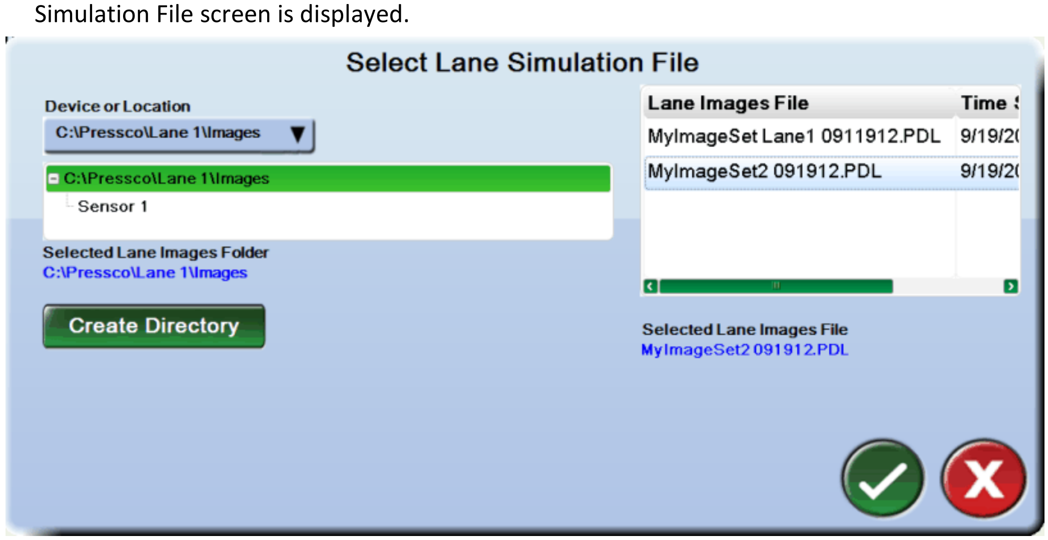
1. Right-click over a sensor button > choose Image Source > Simulated. A check mark next to Simulated indicates the system will display images from disk, and not the camera.
2. To clear the previous images from the lane, right-click over the ***Statistics menu*** (on page 11), and select Clear Lane Statistics and Clear Images.
3. The next time you put the lane online, the selected PDL images will be displayed.

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: ***Manage Simulated Lane Images*** (see "***Manage Simulated Lane Images (PDL)***" on page 145).

➢ *To load a previously created PDL file:*

1. Take the lane offline (if necessary).
2. In Lane Overview or Sensor Overview mode, right-click a sensor button > Image Source > Simulated. A check mark next to Simulated indicates the system will display images from disk, and not the camera.
3. Right-click the sensor button > Image Source > Select Simulated Lane Images. The Select Lane Simulation File screen is displayed.



4. In the right side of the screen, select the PDL file to display. Browse to a different directory (in the left side of the screen) if necessary. Click the OK button to save the selection and exit the screen.
5. To clear the previous images from the lane, right-click over the ***Statistics menu*** (on page 11), and select Clear Lane Statistics and Clear Images.
6. The next time you put the lane online, the selected PDL images will be displayed.

Edit a PDL file

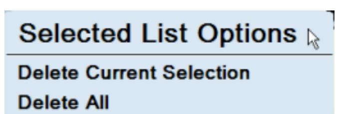
You can edit an existing PDL file by adding or deleting images. If your system does not already have a PDL file, create one: ***Manage Simulated Lane Images*** (see "***Manage Simulated Lane Images (PDL)***" on page 145).

➢ To edit an existing PDL file:

1. Right-click a sensor button > choose Image Source > Manage Simulated Lane Images.
2. In the **Manage Simulation Image Files** screen, click the drop-down menu under **Image Set**, and select the PDL file to edit. The PDL file name is displayed in the Image Set box.
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. You can add or delete images as desired.

➢ To delete images:

1. Follow the instructions "To edit an existing PDL file" above.
2. Click the drop-down menu next to the sensor name to display the list of images in the PDL file, and select an image name to delete. Release the trackball buttons or click outside of the menu to collapse the drop-down menu.
3. Right-click over the drop-down menu next to the sensor name to see the **Selected List Options** menu.



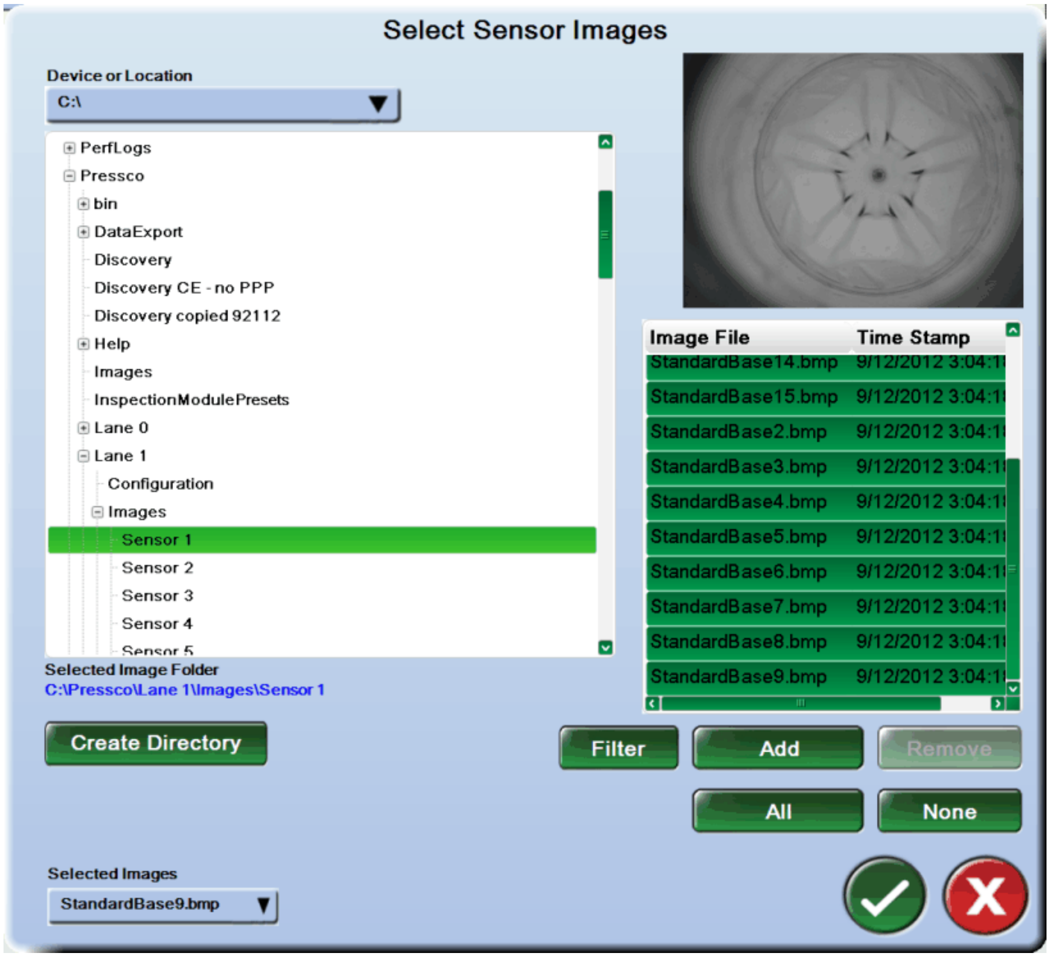
4. From the menu, choose to delete the currently selected image or all the images in the PDL file. The image(s) is deleted.
5. Click the OK button to save the changes and exit.

➢ To add images:

1. Follow the instructions "To edit an existing PDL file" above.
2. Click the disk icon next to the 'Repeat Sequentially' drop-down menu. The ***Select Sensor Images*** (on page 148) screen is displayed.
3. Add or remove images by browsing through the directories, using the **Add** or **Remove** buttons.
4. Exit from the **Select Sensor Images** screen. The modified list of images is displayed in the drop-down menu next to the sensor name in the Manage Simulation Image Files screen.
5. Click the OK button to save the changes and exit.

Select Sensor Images

Select individual images or a group of images to display on the **sensor**. (To select images for all sensors within a lane, use ***Select Simulated Lane Images*** (see "***Image Source***" on page 144)) To see this menu, right-click on a Sensor button > Image Source > Select Sensor Images. (It is also displayed when you check the Enable Modification box in the Manage Simulated Lane Images screen.)



➢ *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. Click the **All** button to select all images in the directory, or click **None** to de-select all the images.
   - To select a subset of common images, click the **Filter** button. This allows you to specify a portion of the file name.
     - A wild card (asterisk [*]) is required in the filter name
     - An example is using "*good*" as a filter. Since many images are saved as either good or bad parts, this allows you to select the set of images you want.
     - Another example is using "*.bmp" as a filter. The Intellispec system can only load bitmap (.bmp) images. If your directory has different image types, you can use the filter to select only the .bmp files.
3. The **Selected Images** drop-down menu contains the set of images you have chosen. Use the **Remove** button to remove an image from the set.
   - You can add images from more than one directory. After adding selected images from one directory, browse to another directory in the left panel and add more images. The drop-down menu below **Selected Images** shows all the image files you have selected.

4. Click the OK button  to save the set of images. The next time you put the lane online, it displays the set of images you have selected.

Saving Images

There are several ways to save an image within the Intellispec system. Through most of these options, you can save images to create a ***PDL*** (see "***Manage Simulated Lane Images (PDL)***" on page 145) file to load at any time, to create or troubleshoot part programs. Images can be saved whether the lane is online or offline, except the option: "Saving Images Automatically" - that option allows you to save information while the lane is online.

Save any image: In most parts of the system, right-click over any image to save it. A Save Image menu item will be displayed. Select the desired type of image, and save it. When the system asks you where to save it, use the disk icon to browse to a location. If you are using a USB device, insert the device and browse to it. This is useful to save images to include with a **Support Package**.

More information about how to save images from different locations can be found through the links below:

Saving Images Through the Sensor Menu (on page 149)

Saving Images Automatically (on page 150)

Saving Images through the Retro-Spec interface (on page 151)

Saving Individual Images While Editing an Inspection (on page 156)

Saving Reject Images (on page 157)

Saving a Region of Interest (Unwrapped) Image (on page 161)

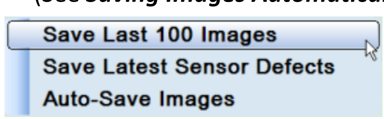
Saving Images Through the Sensor Menu

Save a set of images from one sensor (up to 100 images). You can use these images to set up and test part programs. You can save images whether the lane is online or offline.

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

➢ ***To save images:***

1. Right-click over the Sensor button in Lane Overview or Sensor Overview mode > Save Images, then choose whether to save the last 100 images, the latest sensor defect images, or auto-save images. (See ***Saving Images Automatically*** (on page 150)).



2. For the last 100 images or latest sensor defects, a dialog box prompts you to change directories. Click the disk button  to browse to a different folder if desired.
3. Type a prefix for the set of image files, if desired. The default "Defects" prefix is provided for you.

4. Click the OK button to save the images.

Save Last 100 Images

Save the last 100 images captured by the current sensor.

Save Latest Sensor Defects

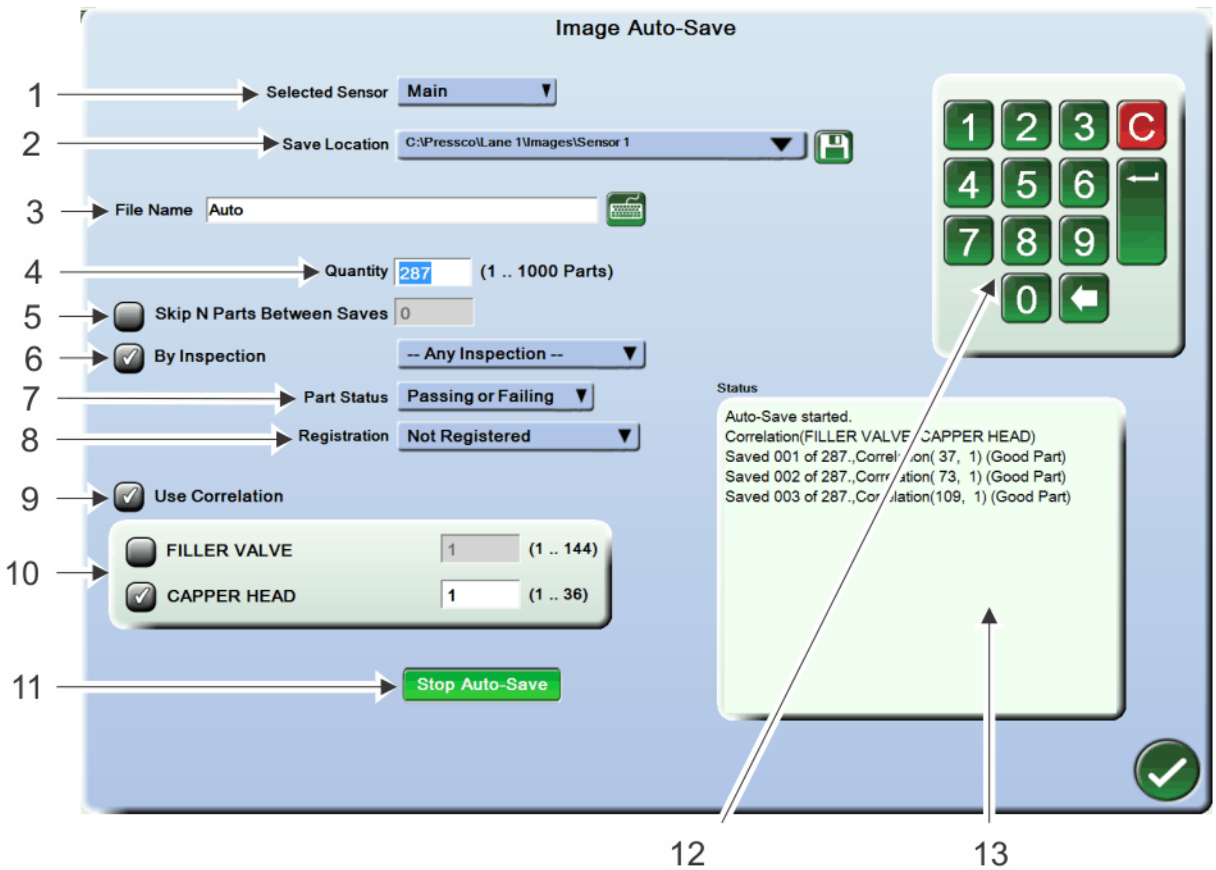
Save the latest defect images shown in the Reject Images thumbnails, up to 100 images.

Saving Images Automatically

Automatically save images from one sensor when the lane is online. You can set up this feature to save up to 1000 images, and specify which images to save. The images can be related to an inspection in the current part program, and they can be images from parts that pass, fail, or both.

> ❖ *Note: to save images, Save Online must be enabled, and the Start Auto-Save button must be clicked.*

To get to this menu: Right-click a sensor button > Save Images > Auto-Save Images.



1	**Selected Sensor** - Select the sensor in the current lane from which to save images
2	**Save Location** - Select the location to save the images. A default image path is provided. To change the location, click the disk icon and browse to the desired location.
3	**File Name** - Create a file name, preferably something descriptive of the part you are inspecting. When you click in the file name box, an on-screen keyboard is provided. The system automatically appends and increases a number in the name, and indicates whether the part passed [P] or failed [F]. An example name is "Auto0001_S1_P.bmp." This name indicates the first image saved [0001], from sensor 1 [S1] and it passed inspection [P].
4	**Quantity** - Select how many images to auto-save, between 1 and 1000. Use the numeric keypad [item 11] to enter a number.
5	**Skip N Parts Between Saves** - Check the box if you do not want to save consecutive images. Place the cursor in the number box and use the numeric keypad [item 11] to enter the number [N] of parts to skip between saved images.
6	**By Inspection** - This is only available when you have one sensor selected [in item 1]. Check the box to enable saving images related to a specific inspection. Use the drop-down menu to select the inspection from the current part program.
7	**Part Status** - Select whether to 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	**Registration** - Select whether to save images that failed registration [Not Registered], had a found center [Centered], or had a found center and orientation [Centered and Oriented].
9	**Use Correlation** - [available if the correlation option is installed] Check this box to enable saving images correlated to specific machine parts.
10	**Machine parts** - if Use Correlation is enabled, select the machine part(s) to which the saved images are correlated. Also enter a machine part number in the box provided.
11	**Start Auto-Save** - Click the **Start Auto-Save** button to begin automatically saving images. Note that images are only saved when the lane is online. To stop the automatic saving of images before the process is complete, click the button when it reads **Stop Auto-Save**. If all the specified images have been saved, the button returns to the default Start Auto-Save state.
12	**Numeric keypad** - Use the numeric keypad to enter values for quantity of images to save [item 4], or to skip a number of images between saves [item 6].
13	**Status** - This area displays the status of the auto-save process.

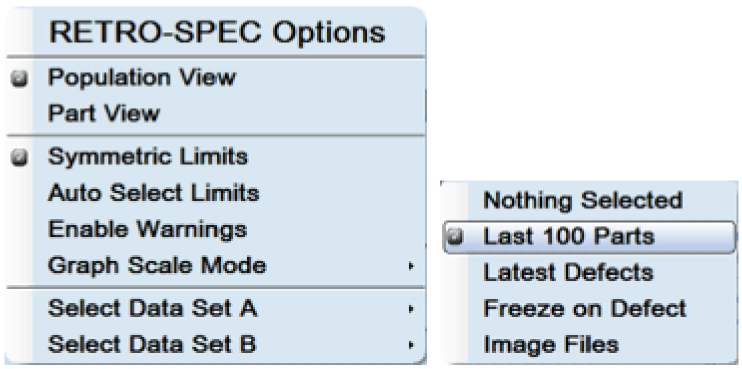
Saving Images through the Retro-Spec interface

This topic covers how to save images through the Retro-Spec interface. You may want to save images to reference later, to send to Pressco for troubleshooting help, or to set up a part program. Saving images is done through the Retro-Spec interface from Registrations, Orientations, or Analyses. You must first have at least a temporary ***Part Program*** (see "***How to Create, Copy, or Import a Part Program***" on page 171) loaded. You must have user permissions to edit part programs.

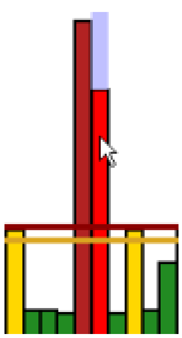
Images can be saved whether the lane is online or offline. Images are saved as grayscale bitmap images, at 302 KB in size. No graphics are saved with the images.

➢ ***To save one or more images:***

1. Go to Sensor Overview mode [from Home, click Lane button, then Sensor button].
2. Put the lane online for a while to acquire several part images.
3. Take the lane offline to stop acquiring images (if desired).
4. Double-click the name of any Registration, Orientation, or Analysis in the inspection tree to view the Retro-Spec interface. Note: you cannot save images through a Region of Interest (ROI).
5. Right-click the Retro-Spec graph to see the ***Retro-Spec options*** (on page 193) menu.

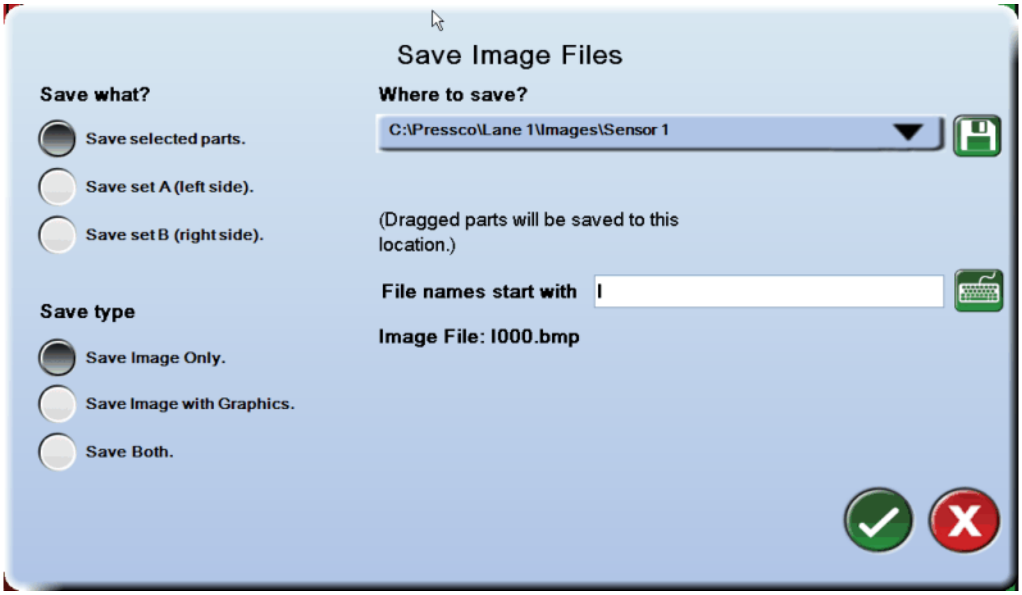


6. Select an option for Data Set A and/or Data Set B (from **Select Data Set A** and **Select Data Set B**). The Retro-Spec graph is updated with the selected part data.
7. In the Retro-Spec graph, click the bar corresponding to the image you want to save.

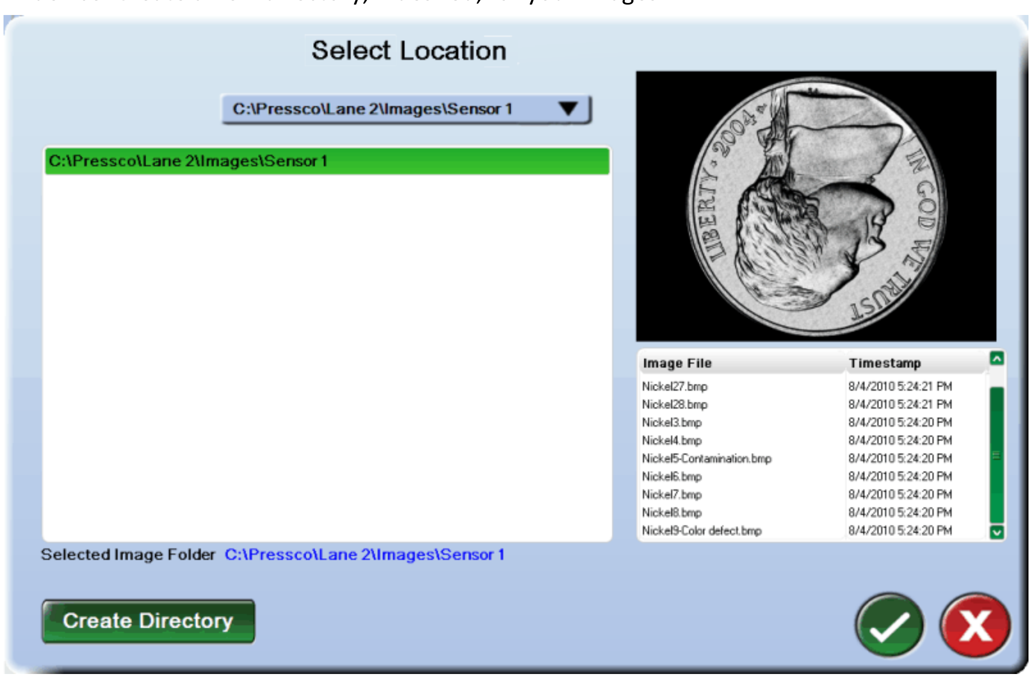


❖ *Note: You can save a whole data set from the Save Image Files menu.*

8. Click the disk icon  on the Retro-Spec graph. The Save Image Files menu is displayed.



9. Choose which images to save under the "Save What?" column. Save only the selected part image, or all the images from Data Set A or Data Set B.
10. Choose the type of image to save under the "Save Type" column. Save the image only, the image with the graphics overlaid, or two separate images (both).
11. To name the image files, enter a prefix in the "File names start with" box. The default prefix is "I" for "image." This step is important if you already have saved images and you do not wish to overwrite them.
12. Use the disk icon  under "Where to Save?" to browse to the location where you want to save images. Use the **Select Location** menu to save images to the Intellispec hard drive or to a USB device. Create a new directory, if desired, for your images.



13. Click the OK button  twice to save the image(s). The images are saved.

❖ *Note: all images in a data set will be named with unique file names. However, if you save another data set to the same folder at a later time using the same prefix, the original images will be overwritten. See* **Recommendations for Image File Management** *(on page 154).*

14. To save subsequent single images to the same location, click the bar on the Retro-Spec graph for another part, and then click the disk icon on the graph. Click the OK button. The part image will be saved.

You can ***load*** (see "***Loading Saved Images***" on page 162) saved images at a later time for reference, setting up a part program, or testing.

❖ *Note: Part images can be dragged to the disk icon and saved if the Lock/Move Parts button is unlocked: See more information about this button in the* **Retro-Spec Population View Graph** *(on page 191).*

Recommendations for Image File Management

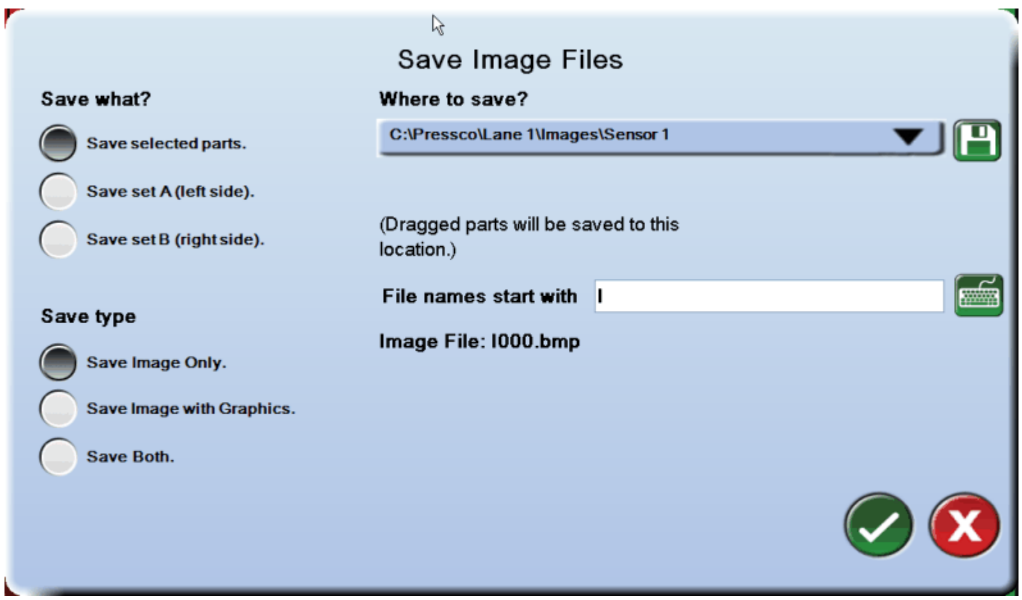
When you save the images for data sets to a folder, each image is given a unique name. However, if you save another data set to the same folder, those original images are overwritten. Therefore we recommend that you create new folders when you save data sets. Our recommendations are:

- 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

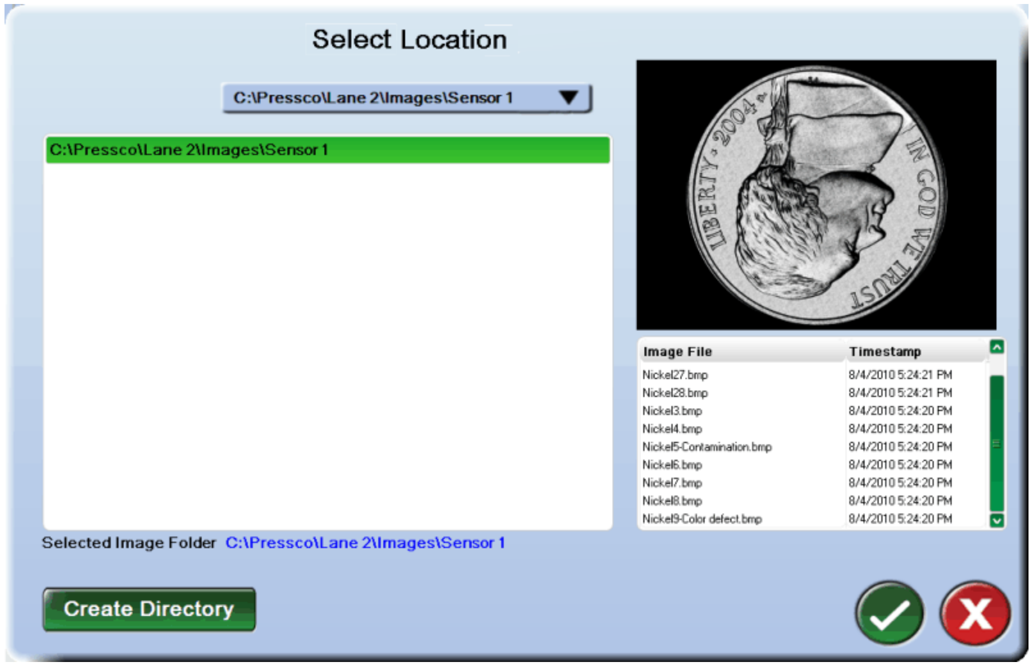
When you are ***saving images*** (see "***Saving Images through the Retro-Spec interface***" on page 151), you can create new folders (directories).

➢ ***To create a new folder while saving images:***

1. Click the disk icon on the Retro-Spec graph. The Save Image Files menu is displayed.



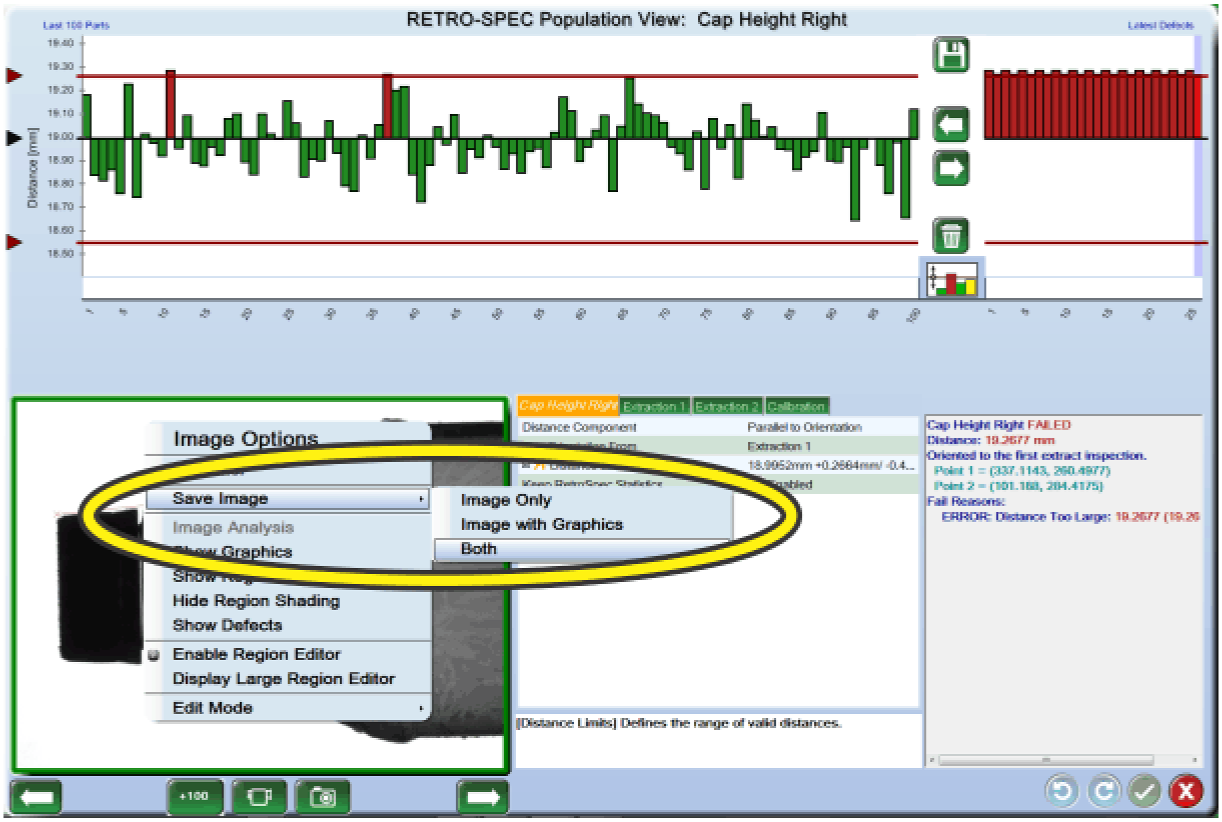
2. Click the disk icon  to browse folders. The Select Location menu is displayed.



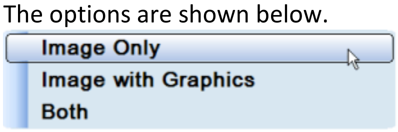
3. Click the button at the top of the menu to browse to the location that makes sense to the sensor (example, "C:\Pressco\Lane 1\Images\Sensor 1\"). Note that you can also save images to a USB device.
4. Click the **Create Directory** button to create a new folder. Rename the folder something meaningful, such as the area of inspection (example, Countersink). If you are saving images of defects, use Defects in the folder name.
5. Click the OK  button to complete browsing and return to the Save Image Files menu.
6. Click 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.

Saving Individual Images While Editing an Inspection

Save one image while editing an inspection. To save the image, right-click over the image > Save Image > choose the desired option. The image can be saved whether the lane is online or offline.



The options are shown below.



- **Image Only** - Saves a bitmap (.bmp) image with no graphics.

❖ *Note: only bitmap images can be loaded back into the Intellispec*

- **Image with Graphics** - Saves the current image with inspection graphics on the image. It is saved as a Portable Network Graphic (.png) file.
- **Both** - Saves both files - (.bmp) with no graphics, and (.png) with graphics.

When you save an image, a dialog box, as shown below, provides options for saving the image. The image is saved to the default location shown in the box, unless you click the disk icon and specify a different location. A default file name including Lane name, date, and time is provided for you. You can rename the image by clicking on the keyboard icon and typing a new name using the on screen keyboard.

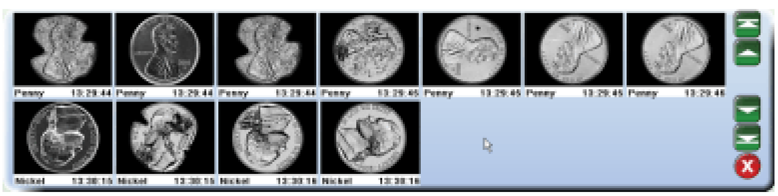
Saving Reject Images

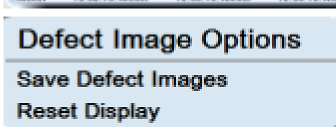
Save images from parts that were considered defective, either from **Lane Overview** or **Sensor Overview** mode. This can be done when the **Reject Images** button on the right side of the screen is selected. Up to 100 images can be saved at a time. These images can be loaded at a later time as simulated images to assist in programming inspections or training.

Images can be saved whether the lane is online or offline.

➢ ***To save reject images:***

1. Right-click over any image displayed in the reject image area on the screen (Images in Sensor Overview mode shown below). The Defect Image Options menu is displayed.





2. Select **Save Defect Images** from the menu. The Save Image menu allows you to change the directory or name of the images to be saved. A default name and directory are provided for you.
3. Change the directory or file name if desired and click the OK button to exit. The images are saved as bitmap (.bmp) images. Each image is given a unique name.

Reset Display

Resets the reject image display to show all failed parts. If you select an inspection name in the inspection tree or statistics grid, for example, you only see those images that failed that inspection. Sometimes you see no images if no parts failed the selected inspection. Select Reset Display to show all reject images.

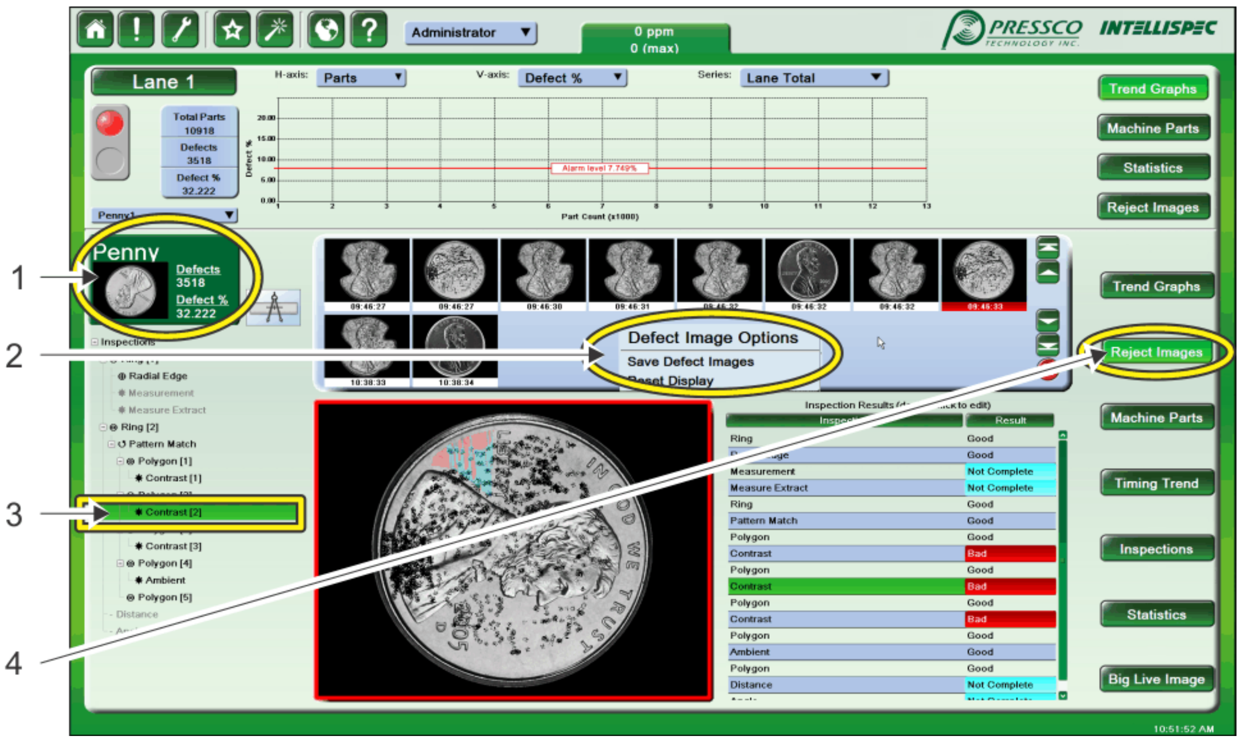
Saving Reject Images by Inspection

Save images that failed a specific inspection in **Sensor Overview** mode [from System Overview mode, select a lane, then click a Sensor button [item 1] to go to Sensor Overview mode]. There are two ways to save inspection-specific images. Refer to the illustration below.

❖ *Note: If you select an inspection that did not fail any parts, all reject images from that sensor, up to 100 images, are saved.*

➢ ***If the** Reject Images **button [item 4] is selected on the right side of the screen:***

1. Click the name of an inspection [item 3] in the inspection tree. The images associated with that inspection are displayed in the thumbnail image area.
2. Right-click over the set of images to see the Defect Image Options menu [item 2].
3. Select Save Defect Images from the menu. The Save Image menu allows you to change the directory or name of the images to be saved. A default name and directory are provided for you.
4. Change the directory or file name if desired and click the OK button to exit. The images are saved as bitmap (.bmp) images. Each image is given a unique name.

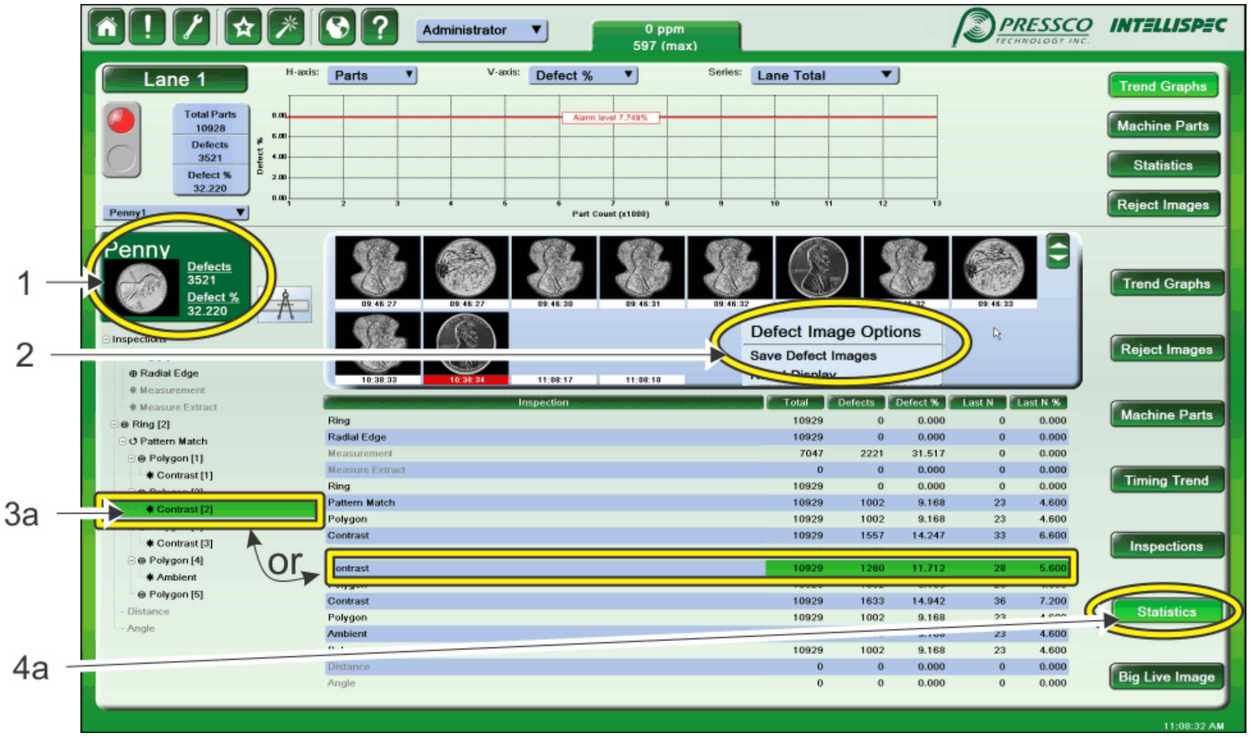


1	Sensor button
2	Right-click over image thumbnails to see Defect Image Options menu
3	Select one inspection to view defect images associated with that inspection
4	Select the Reject Images button to view thumbnails of images from defective parts

➢ ***If the** Statistics **button [item 4a] is selected on the right side of the screen (refer to the illustration below):***

1. Click the name of an inspection [item 3a] in the inspection table. The images associated with that inspection are displayed in the thumbnail image area.
2. Right-click over the set of images to see the Defect Image Options menu [item 2].

3. Select Save Defect Images from the menu. The Save Image menu allows you to change the directory or name of the images to be saved. A default name and directory are provided for you.
4. Change the directory or file name if desired and click the OK button to exit. The images are saved as bitmap (.bmp) images. Each image is given a unique name.



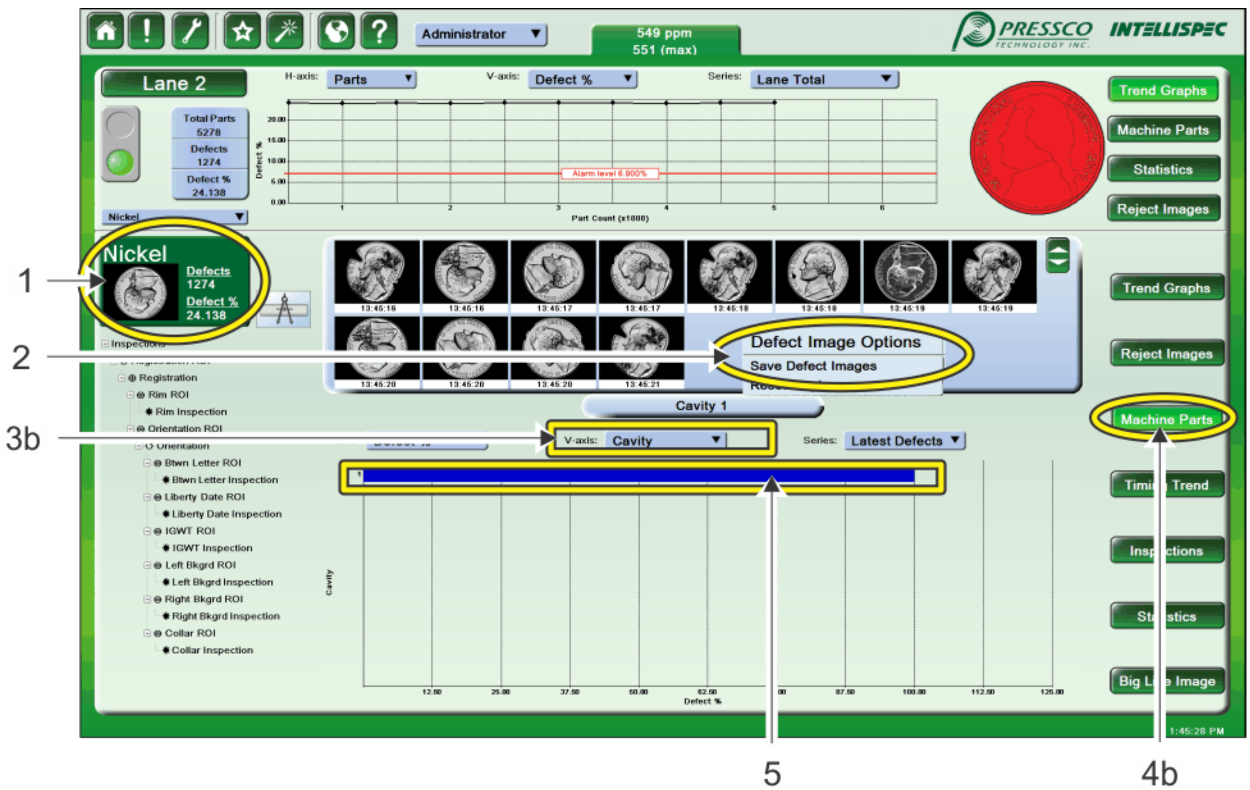
1	Sensor button
2	Right-click over image thumbnails to see Defect Image Options menu
3a	Select one inspection to view defect images associated with that inspection
4a	Select the Statistics button to view detailed inspection statistics

Saving Reject Images by Machine Part

Save images that failed inspection and are associated with specific machine parts.

➢ ***To save images associated with a machine part (refer to the illustration below):***

1. Go to Sensor Overview mode: from System Overview mode, select a lane, then click a **Sensor** button [item 1] to go to Sensor Overview mode.
2. Click the **Machine Parts** button [item 4b] on the right side of the screen. The images associated with machine parts are displayed in the thumbnail area.
3. Select a different machine part from the drop-down menu [item 3b], if desired or applicable.
4. Select a specific machine part from the graph [item 5]. The name of the machine part is displayed in the button above the V-axis selection.
5. Right-click over the set of images to see the Defect Image Options menu [item 2].
6. Select Save Defect Images from the menu. The Save Image menu allows you to change the directory or name of the images to be saved. A default name and directory are provided for you.
7. Change the directory or file name if desired and click the OK button to exit. The images associated with that machine part are saved as bitmap (.bmp) images. Each image is given a unique name.



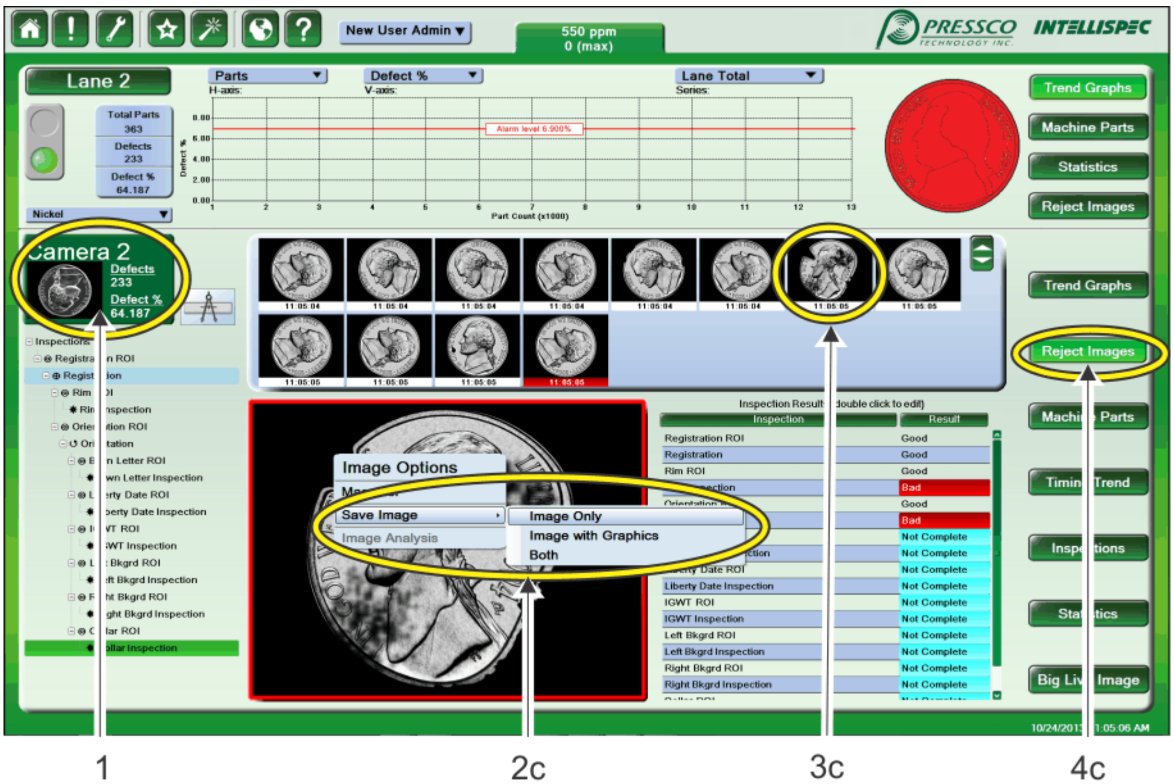
1	Sensor button
2	Right-click over image thumbnails to see Defect Image Options menu
3b	Select a machine part type
4b	Select the Machine Parts button to view thumbnails of defective parts associated with specific machine parts
5	Select a specific machine part from the graph

Saving Individual Reject Images

Select any thumbnail image in **Sensor Overview** mode and save it.

➢ ***To save an image (refer to the illustration below):***

1. Go to Sensor Overview mode: from System Overview mode, select a lane, then click a **Sensor** button [item 1] to go to Sensor Overview mode.
2. Click any thumbnail image [item 3c] (available when Reject Images, Machine Parts, or Statistics button is selected). The Reject Images button becomes selected after you select the thumbnail image.
3. Right-click over the large image at the bottom of the screen to see the Image Options menu [item 2c].
4. Select Save Image from the menu. Choose to save the Image Only, Image with Graphics, or Both. For information about these options, refer to ***Saving Individual Images While Editing an Inspection*** (on page 156). The image is saved.



1	Sensor button
2c	Right-click over the image to see Image Options menu
3c	Select a thumbnail image
4c	When you select a thumbnail image, the Reject Images button becomes selected for you

Saving a Region of Interest (Unwrapped) Image

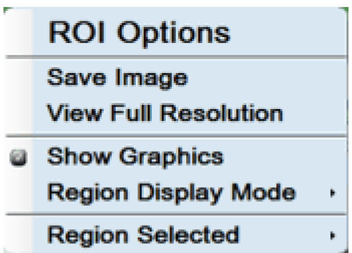
Save the unwrapped region display while you are editing an inspection. The image will be saved as a Portable Network Graphic (.png) file. An example unwrapped image is shown below. The image will be the same dimensions as the defined region of interest. Note that the Intellispec stretches some images to fit the region of interest window.

The image can be saved whether the lane is online or offline.

❖ *Note: whether regions, edges, or other graphics are saved depends on the settings when you save the image. If diagnostics are on, or if Show Graphics is enabled, those items are saved with the image.*

➢ ***To save the unwrapped image while editing an inspection:***

1. Right-click in the unwrapped image area to view the ***ROI Options menu*** (see "***Unwrapped Region of Interest Options***" on page 190).



2. Choose Save Image from the menu. The Save Image menu allows you to change the directory or name of the image to be saved.
3. Change the directory or file name as desired and click the OK button to exit. The image is saved as a .png file.

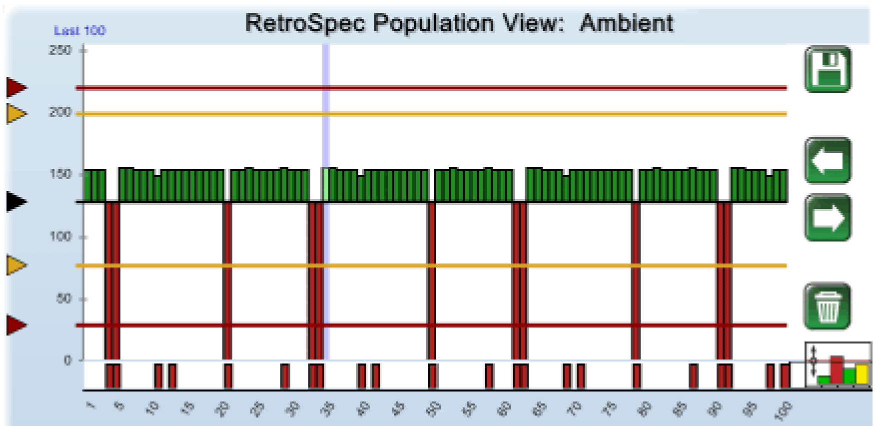
Loading Saved Images

This topic covers how to load images through the Retro-Spec interface. You can also choose an ***Image Source*** (on page 144) through the Sensor menu.

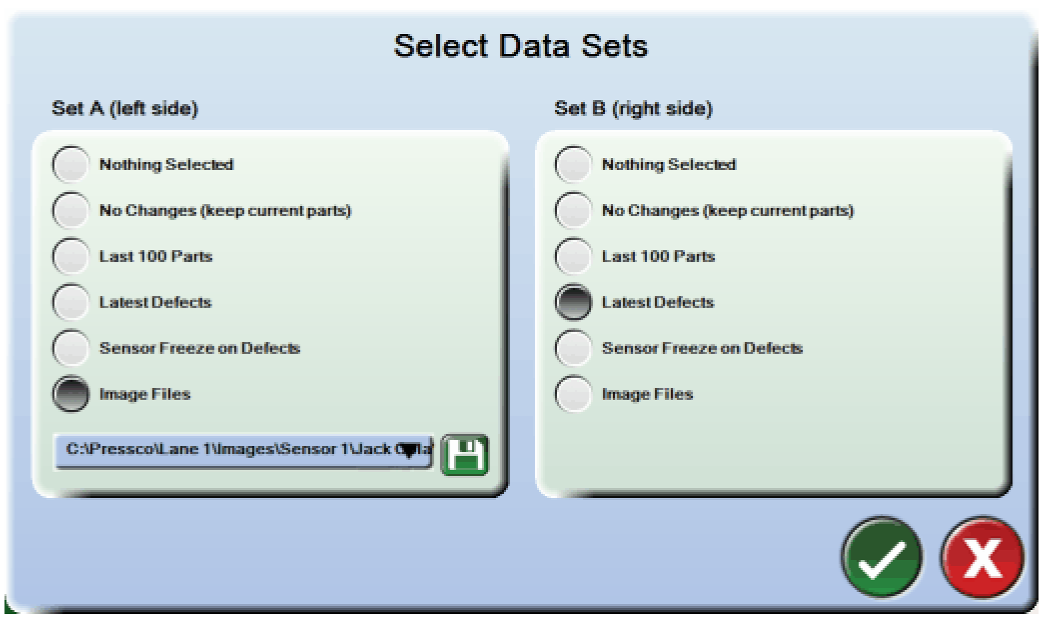
You can load images previously ***saved*** (see "***Saving Images through the Retro-Spec interface***" on page 151) on the Intellispec to use as reference, test part sets, or to set up a part program without the production line running. You must have user access to edit part programs.

➢ ***To load images:***

1. Go to Sensor Overview mode [from Home, click Lane button, then Sensor button].
2. Double-click the name of any Registration, Orientation, or Analysis in the inspection tree to view the Retro-Spec interface graph. A partial graph is shown below.

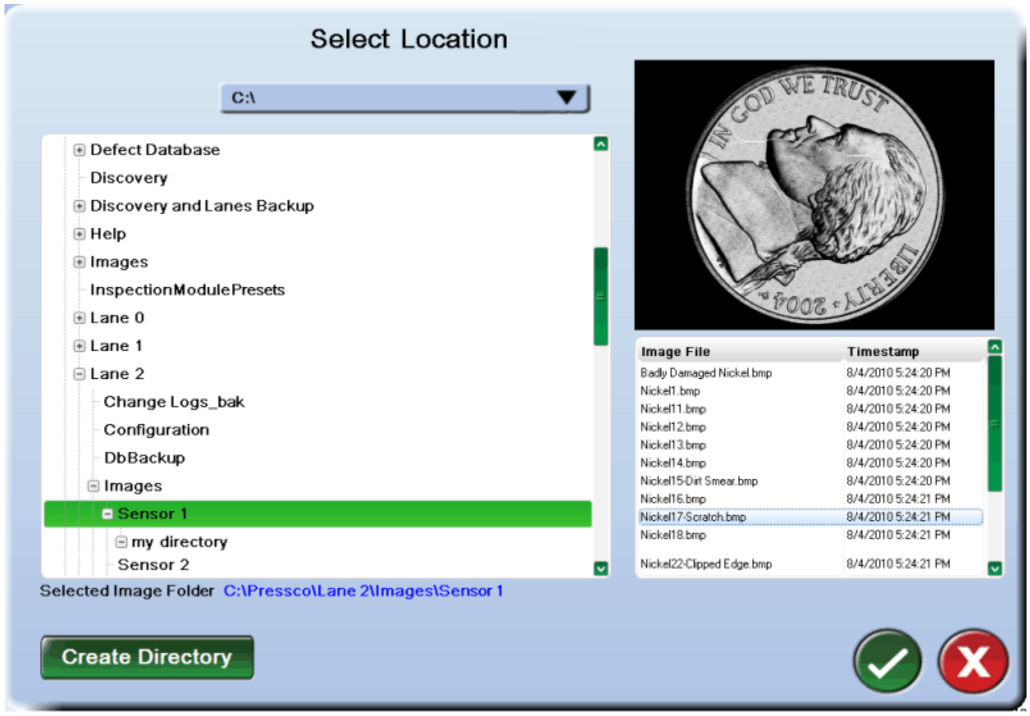


3. Click one of the left or right arrow buttons  to view the **Select Data Sets** menu.



4. Click the Image Files button for either Set A or Set B.

5. Click the disk icon to browse to the folder where the images were saved. The **Select Location** menu is displayed.



6. Browse to and select the folder that contains the images you want to load.

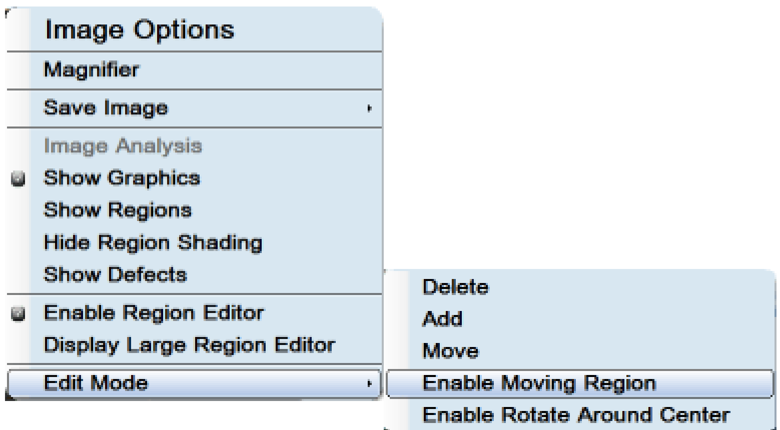
- To preview the images in the folder, browse through the file names in the window on the right of the Select Location menu.

7. Click the OK button twice. The Intellispec loads all the bitmap images that were previously saved in the selected folder.

Image Options

While editing an inspection, right-click in the part image to see the Image Options menu. A small check indicates that the option is currently active. Click an option to make it active or toggle it to inactive. The default Image Options menu is shown below.

❖ *Note: some menu items are not shown when you are viewing a registration or orientation. You see a slightly different menu in* **Measure ROI** *(on page 205) inspection.*



There are options for certain regions. Options are grayed out if they do not apply to the current inspection.

Magnifier

Open the ***Image Magnifier*** (on page 127).

Save Image

Save an individual image. Refer to ***Saving Individual Images While Editing an Inspection*** (on page 156).

Image Analysis

Not available from this menu as of this printing. See also ***Image Analysis*** (on page 132).

Show Graphics

Display the region and graphics for the current inspection.

Show Regions

Display the region(s) from other inspections in the same part program.

Hide Region Shading

Remove the shaded graphics from the screen so that you can see more of the part image.

Show Defects

Does not function from this menu as of this printing.

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) to edit the region.

Display Large Region Editor

Display a large part image on which you can change the shape and 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.

Enable Moving Center

[Available when you are editing a region inspection] Change the center of the region when you are using Region Editor directly on the image.

Enable Region Resizing

Resize the region directly on the image.

Enable Set Region Direction

[Available in certain inspections such as Measure ROI] When this feature is enabled, click on the region in the image. The region box will be displayed in yellow with diamonds around the box. Click on one of the diamonds to make the inspection search in the direction of the selected diamond. The selected diamond is filled in solid yellow.

Center Ring

[Available when you are using Region Editor directly on the image and Enable Moving Center is checked.] Click 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.

Edit Mode

This mode is available while you are editing a Ribbon or Polygon region. A Polygon inspection has the option to “Complete Build Mode” to add points to the polygon. Edit Mode becomes available after a Build Mode is complete. Options below are only active if a check mark appears next to the option in the menu.

Delete - Click all polygon or end points that you want to delete. To stop deleting points, right-click to see Image Options menu. Select Edit Mode > and un-check Delete.

Add - Click anywhere between two points to add another point. To stop adding points, right-click to see Image Options menu. Select Edit Mode > and un-check Add.

Move - move one point in the polygon or ribbon. Move the cursor over the point you want to move, then click and drag the point.

Enable Moving Region - [only available when Move is enabled] Move the entire region at once. To move the region, click anywhere on the image except on one of the yellow polygon or ribbon points. Click and drag the region to move it.

Enable Rotate Around Center - [only available when Move is enabled] Rotate the entire region with respect to the center. To rotate the region, click anywhere on the image except on one of the yellow polygon or ribbon points. Click and drag the region to rotate it.

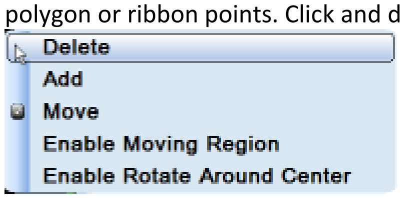
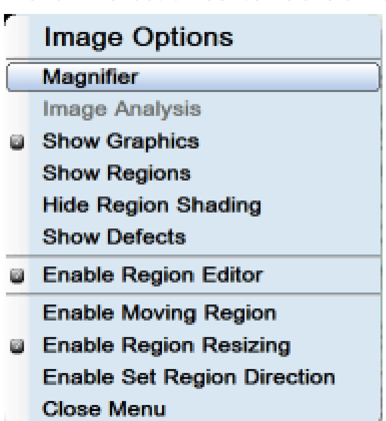


Image Options - Measure ROI and Cylindrical Regions

When you right-click the image while setting up a region, you will see a different image options menu for some regions. Most of the menu items are the same as in the default ***image options*** (on page 164) menu. The last three items are different.



To avoid confusion, we recommend that you make each adjustment one at a time. For example, Enable Moving Region to move the region, then disable it. Then Enable Region Size to adjust the size, then disable it. Then Enable Region Direction to set the direction.

Enable Moving Region

Enable Region Editor must be enabled before you can move the region. Click and drag the entire region.

Enable Region Resizing

Adjust the region size by clicking on the image and moving the yellow points.

Enable Set Region Direction

Click a diamond on any side of the ribbon to change the search direction for the ***Measure Extract*** (on page 321) inspection.

Close Menu

Until you use Close Menu or click on the image, the Image Options menu stays open.

Chapter 10

Inspection Overview

This section includes basic information about part programs, part tracking, and Retro-Spec graphs. For detailed information about adding or adjusting inspections, see the section about ***Inspections*** (on page 197).

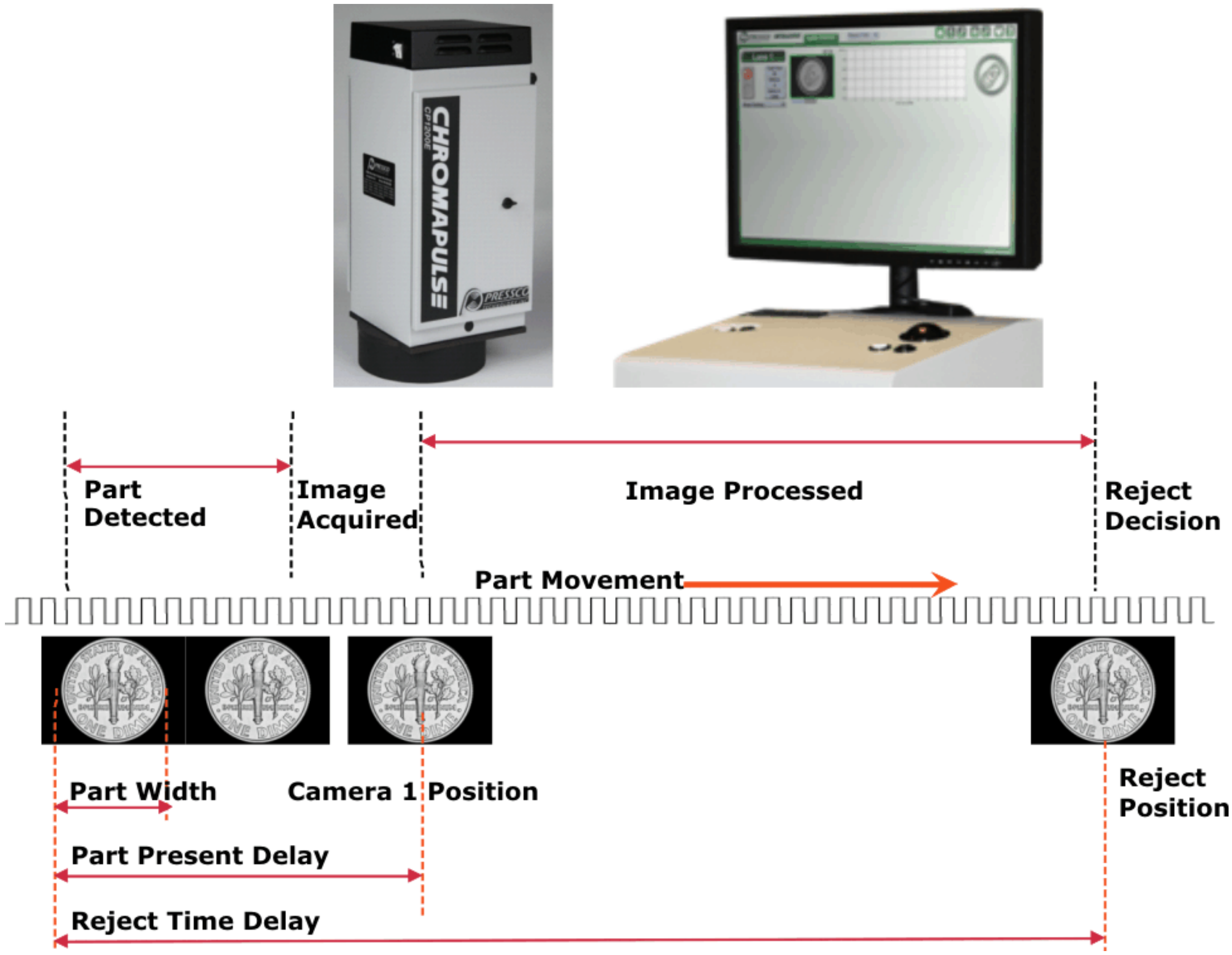
Inspection Terminology

The following terms are used throughout this manual and the software. A basic understanding of this terminology will help you understand how the system operates.

Term	Description
Analyses (on page 281)	An analysis usually analyzes the pixel shade information within a region and compares it to programmed 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.
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.
Enhancements (on page 211)	Enhancements are used to alter images for the purpose of 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 products. Sometimes referred to as a tunnel. The inspection module can consist of a different sensor than a camera to make measurements of your product.
Lane	A lane usually refers to one production line, and can contain multiple sensors.
Orientations (on page 272)	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 (on page 171)	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 (see "***Regions of Interest (ROI)***" on page 198)	The Region indicates where on the part the analyses will take place. You may have as many analyses, enhancements, registrations, or orientations as you like in one region.
Registrations (on page 231)	A registration compensates for part movement by calculating 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 used in inspections 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 would have affected the most recent inspection population, without unnecessarily rejecting parts.
Sensor	A camera, Intellimass, or other sensor that acquires images, measurements, or other data from your product.

Sequence of Events During Inspection

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



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.

Part Tracking includes:

Part Present Delay Calibration (on page 99)

Reject Delay Calibration (on page 101)

Reject Confirm Calibration (see "***Reject Confirm Calibration (Optional)***" on page 108)

Part Width Calibration (on page 79)

How to Create, Copy, or Import a Part Program

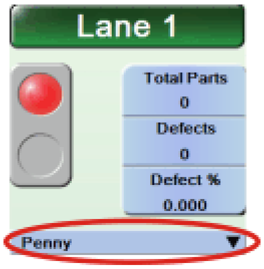
A new Part Program can be created from scratch, imported or exported to/from disk, or copied from an existing part program. A Part Program is created in the Lane Overview or Sensor Overview screen.

You will need:

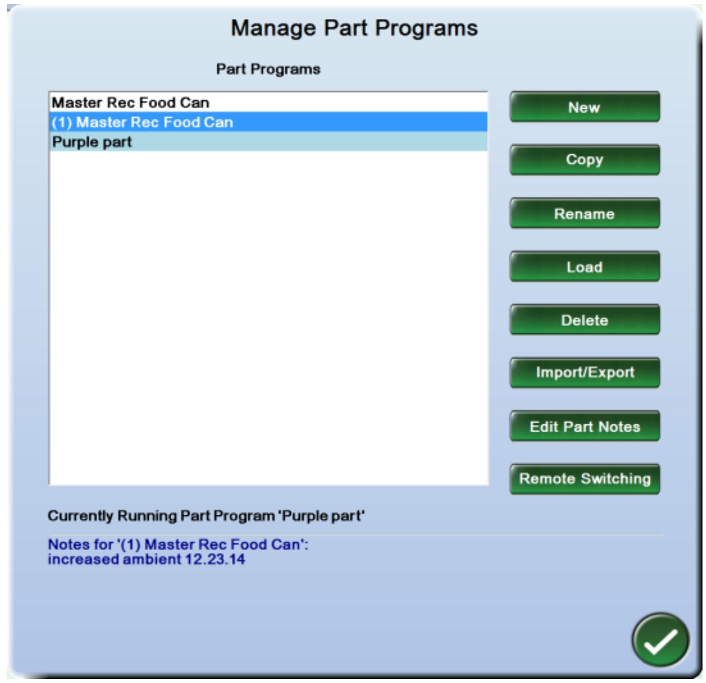
- User access to create part programs

To create a Part Program:

1. Go to a Lane Overview or Sensor Overview screen [from Home: Lane button > Sensor button].
2. Right-click over the part program drop-down menu. The Manage Part Programs menu is displayed. Choose from the available options described below.



Right-click



To create a new program:

1. Click the **New** button. An on-screen keyboard is presented.
2. Name the new part program. We recommend that you use your part's name and size in the part program name.
3. Click the OK button  to save the new part program. The new part program is automatically loaded and displayed in the drop-down menu below the traffic light. No inspections are created yet.
4. Click the OK button again to close the Manage Part Programs menu.
5. Add inspections as appropriate for your part. Use inspections recommended by Pressco technicians to best inspect your part.

To copy a program:

You can use a copy of a part program to modify it to inspect a slightly different part, or modify the copied part program without changing the original program.

1. Right-click over the part program drop-down menu (under the traffic light). The Manage Part Programs menu is displayed
2. Select one of the available part programs, then click the **Copy** button. A copy of that part program is saved under a default name such as "(1) Penny."
3. Select the new part program, and use the **Rename** button to rename the program to something more meaningful to you.

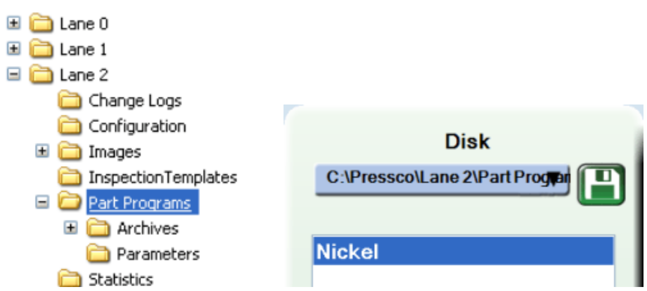
To import an existing program:

You may have used a part program in another Intellispec system, or Pressco may have sent you a part program to use. Import that program to use it on your current system.

1. Right-click over the part program drop-down menu (under the traffic light). The Manage Part Programs menu is displayed

2. Click the Import/Export button. An "Import or Export Part Programs" menu allows you to choose a part program from disk.

3. To browse to another location on the computer, click the disk icon .
4. Locate the desired folder and click OK in the menu. The Intellispec will only choose part program names with a ".PPP" extension. You will not be able to see the names nor extensions when choosing through this menu.
   - In this example, we clicked the Part Programs folder, then clicked OK to view the available part programs.



5. To import the part program, highlight the name in the right side of the menu under "Disk."
6. Click the left arrow. The part program is imported into the "Current Part Programs" list.
7. Click the OK button to exit the menu.

➢ ***To load the new program:***

1. Highlight the program name in the Manage Part Programs menu, then click the **Load** button. The program name will appear in the Part Program drop-down menu on the Lane Overview or Sensor Overview screen.
2. Click the OK button  to exit the Manage Part Programs menu.

See also ***Export a part program*** (on page 88)

Part Changeover

When you change your production line from one part type to another, you can quickly change the part program.

Important

FHCP 3X EZ systems may require hardware adjustments during part changeover. Refer to the Intellispec Series V Hardware Reference Guide for your system.

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

➢ ***What you need:***

- User permission to Switch Part Program

➢ ***To change parts:***

1. ***Log in*** (see "***Logging in and logging out***" on page 17).
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. Put the lane online to begin inspecting new parts.

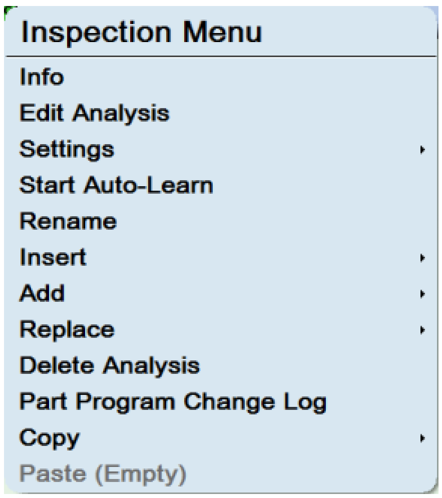
Lane-specific information is contained in each Part Program. Everything you set up have previously set up is stored: camera information, lighting information, calibration information, regions, enhancements, and analyses.

Lane Specific Information	Definition
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.
Regions, Registrations, Orientations, Enhancements, Analyses, Dimensions, and Correlations	All Inspections will be contained in your Part Program. Also, parameter changes are saved for each Part Program.

Inspection menu

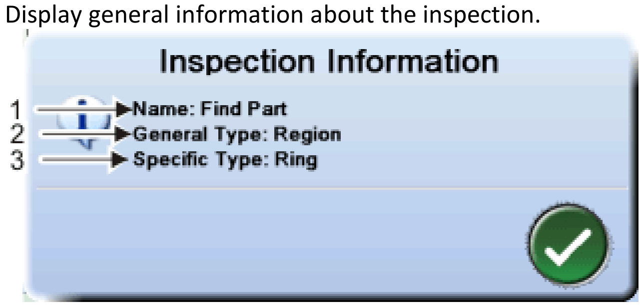
The Inspection menu is used to create and edit part programs. Right-click over any analysis, region, orientation, or registration name to see the Inspection menu.

- *Note: We use the term **'inspection'** as a generic term for analyses, regions, enhancements, registrations, dimensions, etc.*
- *Note: 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.*



Info

Display general information about the inspection.



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)

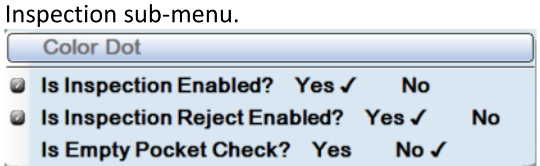
Edit Analysis/ Region/ Orientation/ Registration

Open the Inspection Editor - performs the same action as double clicking.

For the items below, the name of the inspection becomes color-coded. See the illustration below.

Settings

Inspection sub-menu.



Is Inspection Enabled?

Yes = the inspection is enabled.

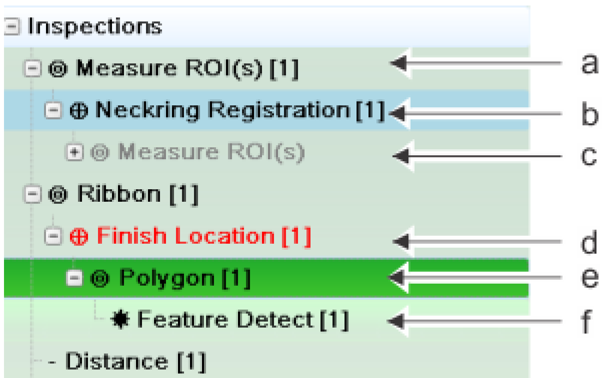
No = the inspection is disabled. All of its dependent inspections are also disabled. The inspection name is grayed out in the inspection tree when it is disabled [item c in the illustration below].

Is Inspection Reject Enabled?

If "Yes" is checked, then inspection reject is enabled. If "No" is checked, then you can temporarily pass all parts regardless of whether they pass or fail the current inspection.
Click the menu item to disable the inspection reject; "No" becomes checked in the menu. The inspection name is displayed in red when the inspection reject is disabled [item d in the illustration below].
Some items, such as Regions, do not have pass/fail criteria. This option is grayed out if reject is not applicable (N/A).

Is *Empty Pocket* (on page 197) Check?

Is the current inspection used as an Empty Pocket check? If "Yes" is checked, then inspection is being used as an empty pocket check.
When the Empty Pocket Check is enabled, the inspection is highlighted in blue in the menu as shown below [item b].



a	Inspection in normal state
b	Inspection is an empty pocket check
c	Inspection is disabled
d	Inspection reject is disabled
e	Inspection is currently selected by the cursor
f	Inspection is excluded from statistics

Start (or Stop) Auto-Learn

[Present when ***Operator Trigger*** (on page 368) is enabled in Auto-Learn] Manually start or stop an Auto-Learn process. See ***Auto-Learn*** (on page 365).

Rename

Rename the inspection to something that makes sense to you. This name will appear in the inspection tree, graphs, and anywhere else the inspection name occurs.

Insert

Choose from the available list to add one item above the currently selected item.

Add

Add an item from the available list. The list varies, depending on the current item.

Replace

Replace the current item with a similar item. Regions can be replaced with other regions, registrations replaced with other registrations, etc.

Delete Analysis/ Region/ Orientation/ Registration

Delete the current item from the inspection tree list. If the item has other items below it (at a lower hierarchy), those items are deleted as well.

Delete All Inspections

[only shown when you right-click on "Inspections" at the top of the inspection tree] Delete all inspections from the current part program.

Part Program Change Log (on page 177)

Display the Part Program Change Log. This lists the inspections and the edit history for each. You can view all inspections from one sensor, other sensors, or other part programs.

Copy

Copy the current item and descendants (if applicable). The items are copied to the clipboard. Use Paste to place them in the inspection list. You may copy a part program to the same sensor, a different sensor, or different lane.
To copy the part program to another Intellispec system, use the Export function. See ***Export a part program*** (on page 88).

Paste

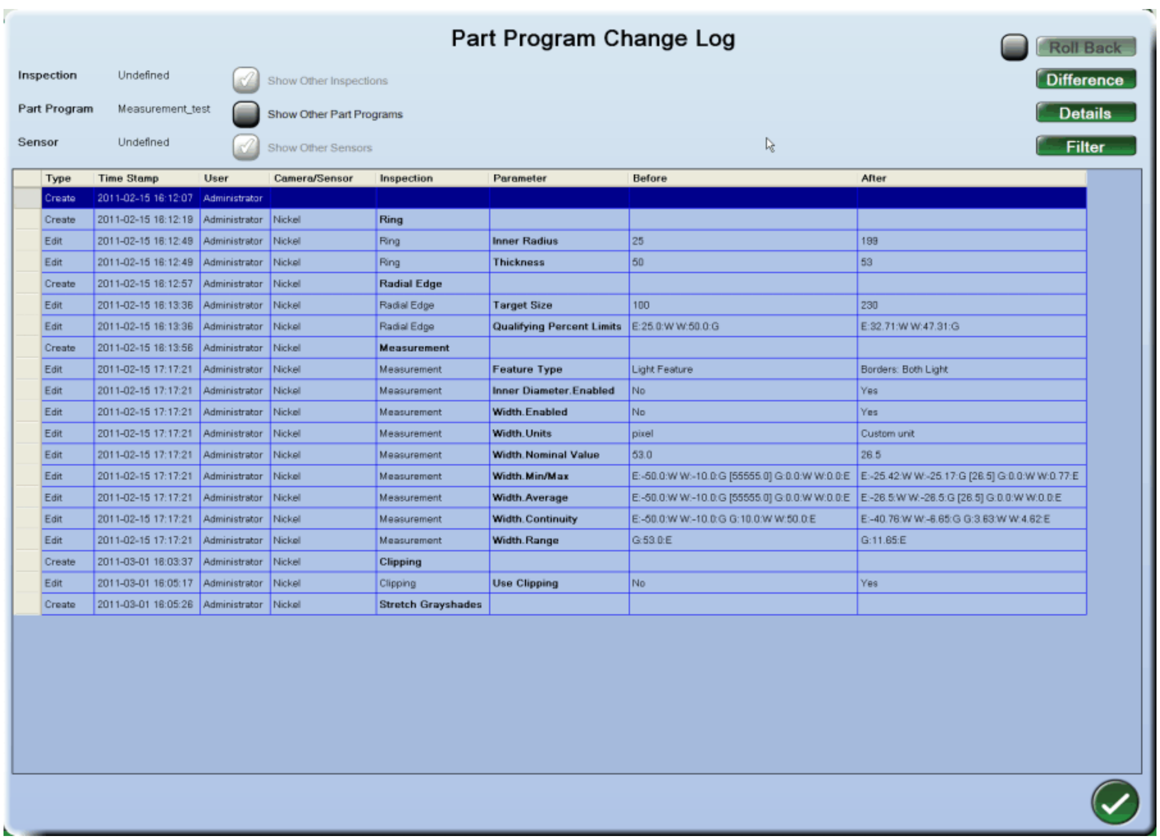
Paste the contents of the clipboard into the inspection list. The contents are pasted below the currently selected item.

Collapse All

[only shown when you right-click on "Inspections" at the top of the inspection tree] Collapse the inspection tree to the top level inspection. This does not affect inspection.

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.



Type	Time Stamp	User	Camera/Sensor	Inspection	Parameter	Before	After
Create	2011-02-15 16:12:07	Administrator					
Create	2011-02-15 16:12:19	Administrator	Nickel	Ring			
Edit	2011-02-15 16:12:49	Administrator	Nickel	Ring	Inner Radius	25	199
Edit	2011-02-15 16:12:49	Administrator	Nickel	Ring	Thickness	50	53
Create	2011-02-15 16:12:57	Administrator	Nickel	Radial Edge			
Edit	2011-02-15 16:13:36	Administrator	Nickel	Radial Edge	Target Size	100	230
Edit	2011-02-15 16:13:36	Administrator	Nickel	Radial Edge	Qualifying Percent Limits	E:25.0:W W:50.0:G	E:32.71:W W:47.31:G
Create	2011-02-15 16:13:56	Administrator	Nickel	Measurement			
Edit	2011-02-15 17:17:21	Administrator	Nickel	Measurement	Feature Type	Light Feature	Borders: Both Light
Edit	2011-02-15 17:17:21	Administrator	Nickel	Measurement	Inner Diameter.Enabled	No	Yes
Edit	2011-02-15 17:17:21	Administrator	Nickel	Measurement	Width.Enabled	No	Yes
Edit	2011-02-15 17:17:21	Administrator	Nickel	Measurement	Width.Units	pixel	Custom unit
Edit	2011-02-15 17:17:21	Administrator	Nickel	Measurement	Width.Nominal Value	53.0	26.5
Edit	2011-02-15 17:17:21	Administrator	Nickel	Measurement	Width.Min/Max	E:-50.0:W W:-10.0:G [55555.0] G:0.0:W W:0.0:E	E:-25.42:W W:-25.17:G [26.5] G:0.0:W W:0.77:E
Edit	2011-02-15 17:17:21	Administrator	Nickel	Measurement	Width.Average	E:-50.0:W W:-10.0:G [55555.0] G:0.0:W W:0.0:E	E:-26.5:W W:-26.5:G [26.5] G:0.0:W W:0.0:E
Edit	2011-02-15 17:17:21	Administrator	Nickel	Measurement	Width.Continuity	E:-50.0:W W:-10.0:G G:10.0:W W:50.0:E	E:-40.76:W W:-6.65:G G:3.63:W W:4.62:E
Edit	2011-02-15 17:17:21	Administrator	Nickel	Measurement	Width.Range	G:53.0:E	G:11.65:E
Create	2011-03-01 16:03:37	Administrator	Nickel	Clipping			
Edit	2011-03-01 16:05:17	Administrator	Nickel	Clipping	Use Clipping	No	Yes
Create	2011-03-01 16:05:26	Administrator	Nickel	Stretch Grayshades			

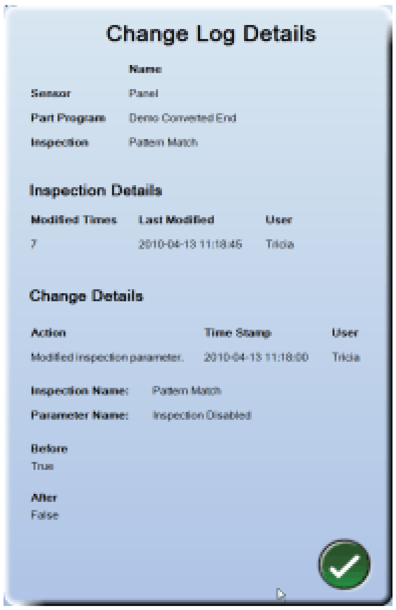
➢ *To view the part change log:*

1. Click a sensor button 

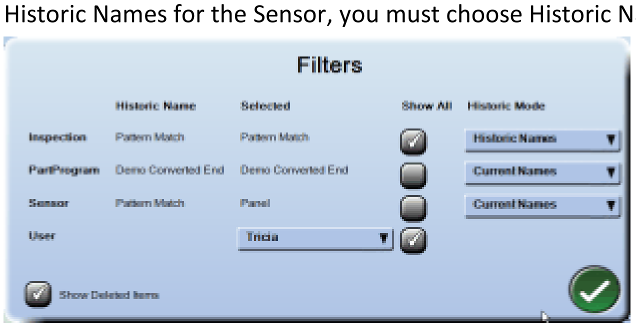
 to go to Sensor Overview mode.
2. Right-click over a sensor button or inspection name and select **Part Program Change Log** from the Inspection menu. If you right-clicked over an inspection name, and the current inspection has never been changed since it was set up, no data is displayed.
3. Click any 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 click a dark gray check box before a light gray check box becomes active.

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

Click 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.



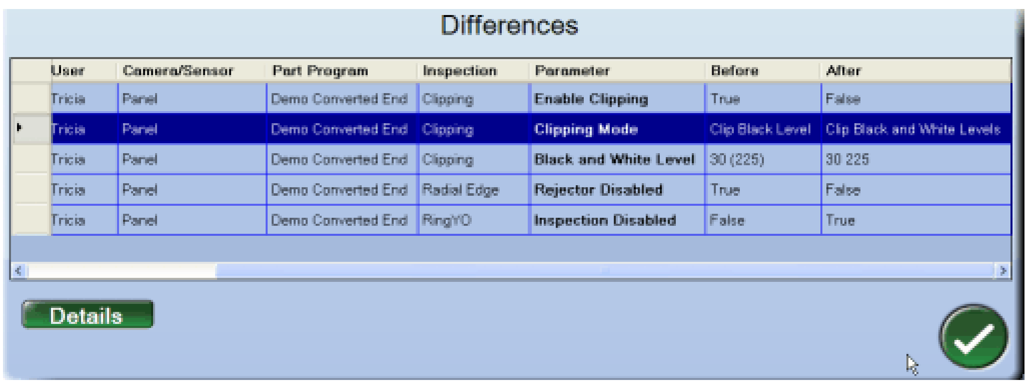
Click the **Filter** button to choose the items to display in the log. As soon as you select any option, the Change Log is updated. Some options are dependent on others; for example, if you want to see the Historic Names for the Sensor, you must choose Historic Names for Inspection first.



➢ *To see inspection differences:*

1. Click 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. Click the **Mark Start** button.
3. Click on 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. Click the **Mark Stop** button.
5. Click on the last item in the list where you want to view inspection differences. Your selected items are highlighted in magenta.
6. Click 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.



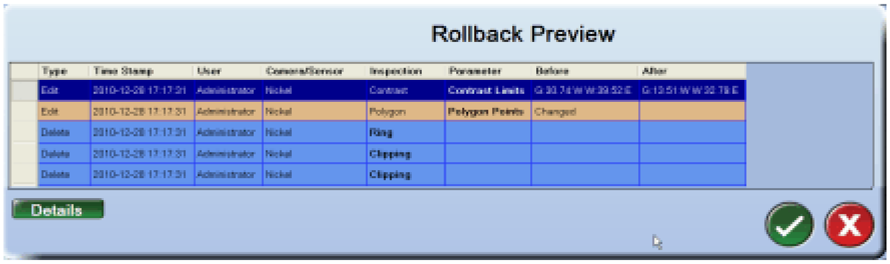
Rollback

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

➢ *To use the Rollback feature:*

1. Check the box next to the Rollback button at the top of the Part Change Log Viewer screen.
2. Scroll down towards the bottom of the inspection list. The latest changes are at the bottom of the list.
3. Choose a line where you want to delete the latest changes, including the selected line.

4. Click the Rollback button near the top of the screen. A Rollback Preview is displayed so that you can see what will be deleted.

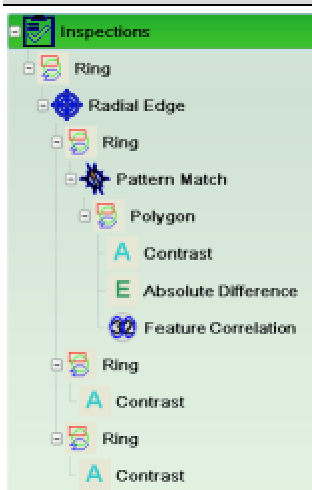


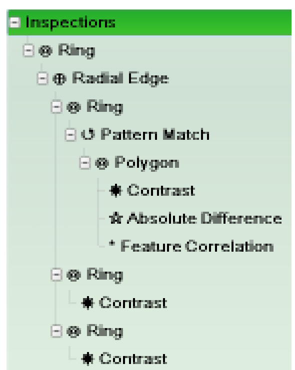
5. If desired, click the Details button to see the inspection change details of each line.
6. If you are ready to delete the displayed lines, click the OK button. The lines are deleted, and the part program is changed back to a previous state.

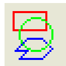
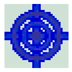
Inspection type icons

In the Inspection tree, you may see icons or symbols that indicate the General Type of inspection for each item. These allow you to quickly identify these inspections, without the need to view more information through the menus.

❖ *Note: these are options. To enable icons or symbols, right-click on a Sensor button in the Sensor Overview mode and select Options > check Show Icons or Show Symbols.*





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

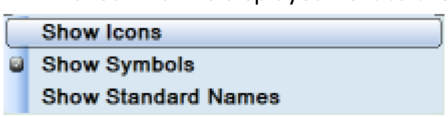
Options (sensor menu)

The Sensor Options menu allows you to display the inspection tree the best way for you. Some options hide objects from the inspection tree which makes it easier for adjustments. Other options display icons or symbols to help you quickly identify inspection types.

❖ *Note: these settings apply to the current sensor view only.*

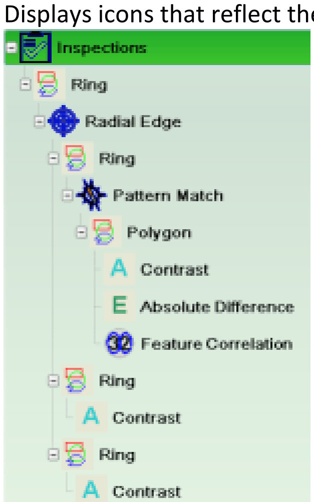
➢ ***To enable an option:***

1. From the Sensor Overview mode, right-click a Sensor button.
2. Select Options > then select one of the options described below. An option is enabled when a check mark is displayed next to the option.



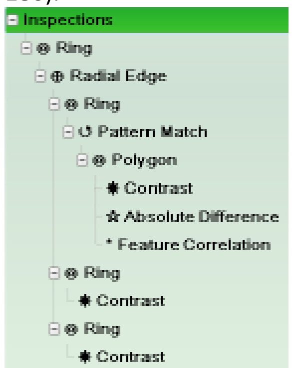
Show Icons

Displays icons that reflect the different ***inspection types*** (see "***Inspection type icons***" on page 180).



Show Symbols

Displays symbols that reflect the different ***inspection types*** (see "***Inspection type icons***" on page 180).

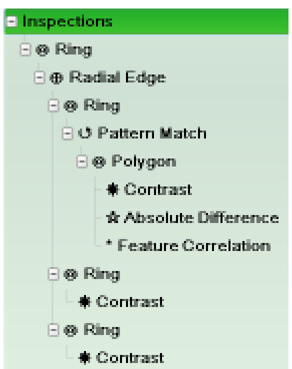


Show Standard Names

Displays the default Intellispec inspection names. You may have other inspection names that make sense to the inspection of your part. Showing Standard Names is useful to Pressco engineers or to someone troubleshooting your machine, so that they quickly know the exact inspection type.

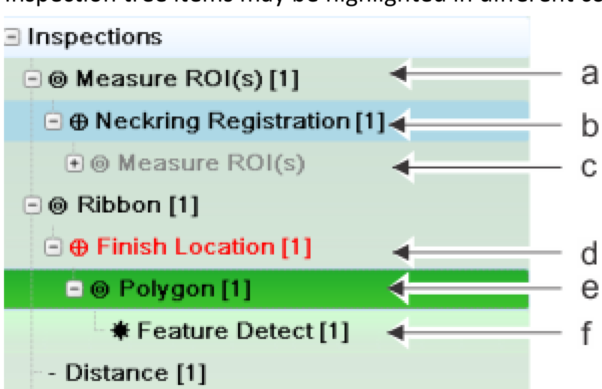
Inspection Tree Relationships

The inspection tree shows the relationship of each inspection. Indented objects are dependent on the object above it. Indented objects are created when you "Add" an item from the Inspection menu.



Some items in the menu may be turned off. The ability to access some items depends on your user access.

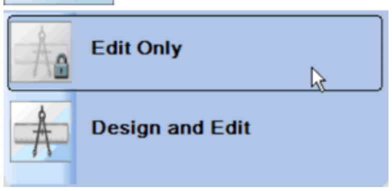
Inspection tree items may be highlighted in different colors. Below is a key.



a	Inspection in normal state
b	Inspection is an empty pocket check
c	Inspection is disabled
d	Inspection reject is disabled
e	Inspection is currently selected by the cursor
f	Inspection is excluded from statistics

Design Mode Icon

The **Design Mode** icon provides additional part program restrictions. Click the icon to see the options.



- If you select **Edit Only**, then users are allowed to edit, but not add, the inspections. This also restricts access to regions.
- If you select **Design and Edit**, then 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* **Managing Permissions** *(on page 24).*

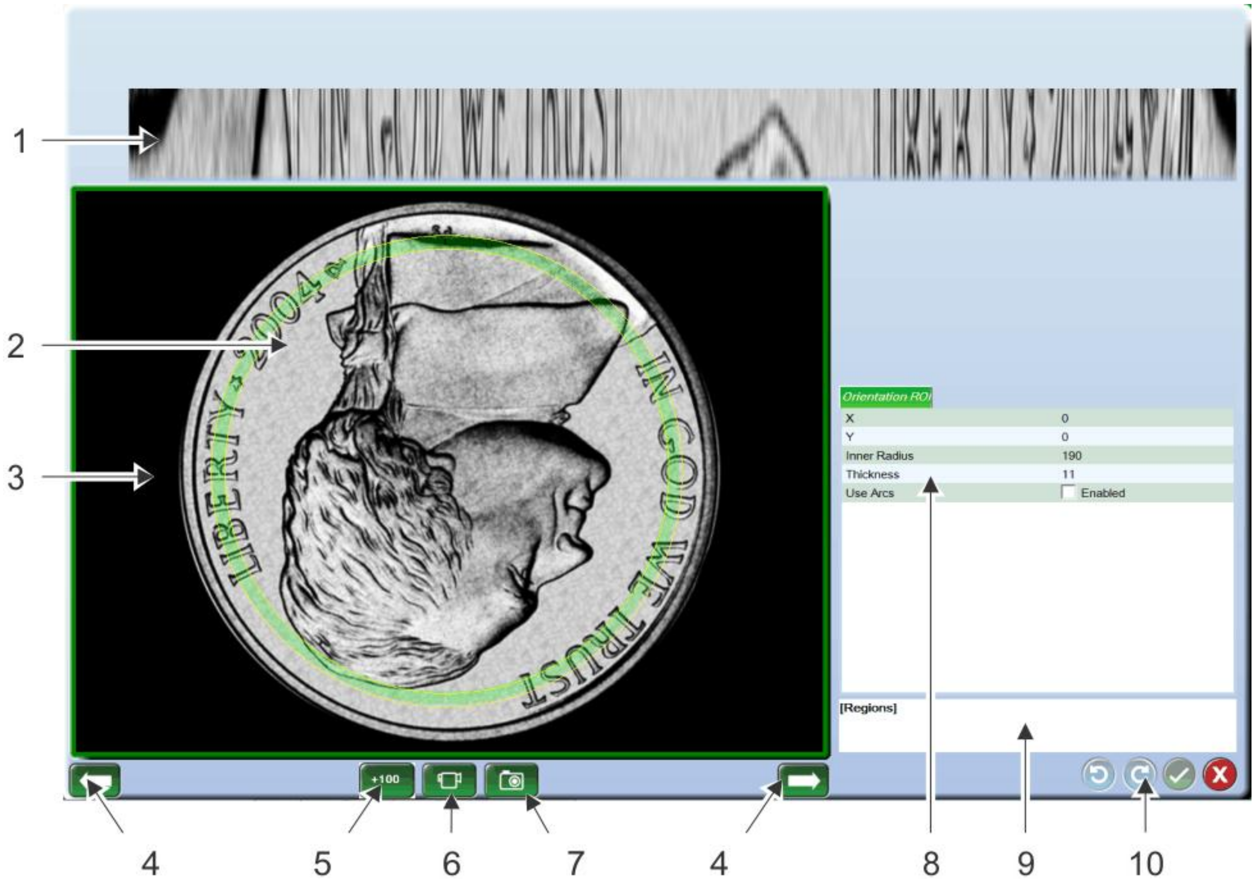
See also ***how to create a part program*** (see "***How to Create, Copy, or Import a Part Program***" on page 171)

Add Regions and Inspections

To add an Analysis, Enhancement, etc., you must first add a Region. The Region indicates where on the part Analyses or Enhancements 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. If you have proper user access, you can edit a region by double-clicking the region name, or right-clicking the region name, then selecting Edit Region from the pop-up menu.



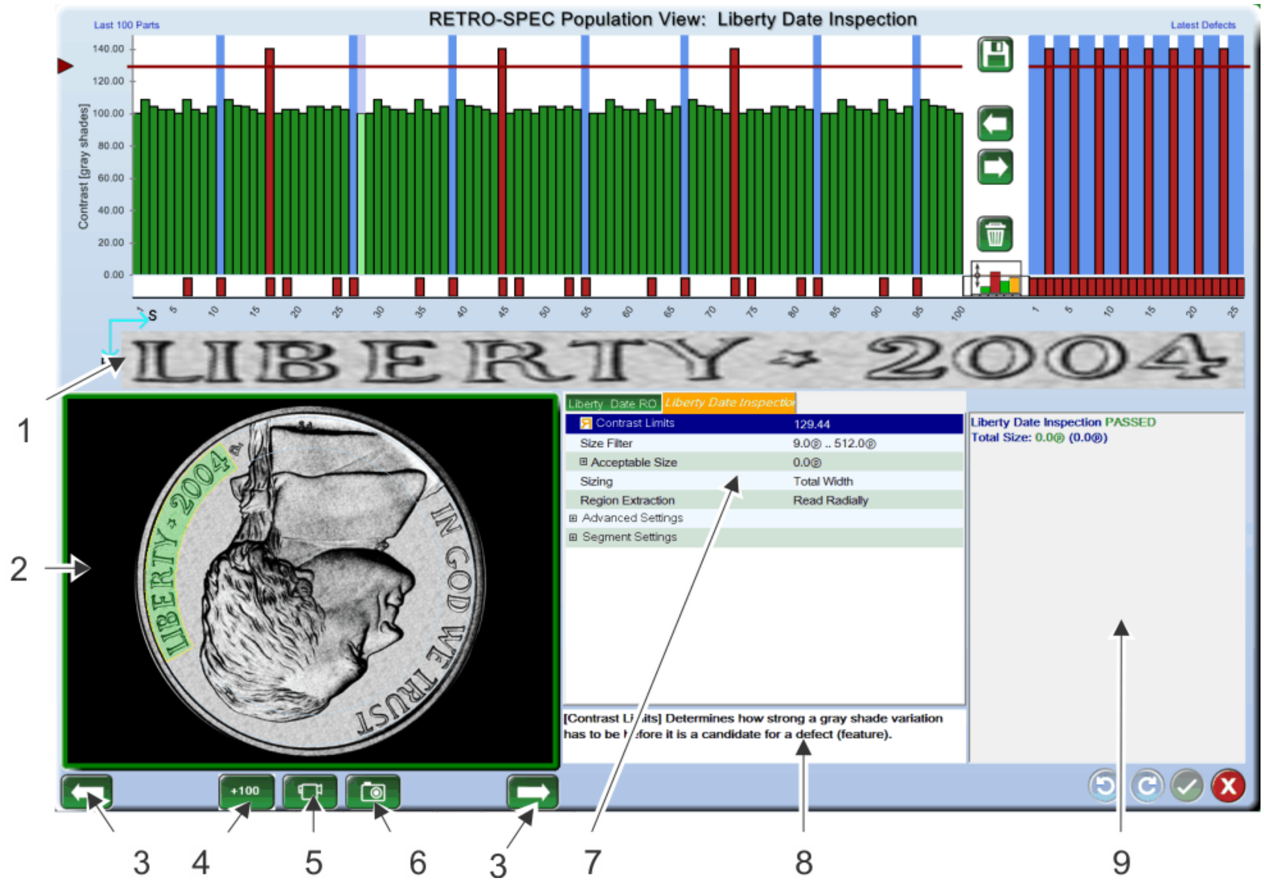
❖ *Note: In Region editor, you will not see anything happen if you click numbers 5, 6, or 7. The data set is changed, but you will not see the data set until you view the* **Inspection Editor** *(see "***Edit Inspections***" on page 185).*

1	Unwrapped Region of Interest	Displays a linear view of the region from the edited inspection.
2	Part Image	Displays a view of the part with the editable region on the part.
3	Editable Region	This is the region on the image that can be edited. When the lines are yellow, they can be edited. To enable region editing, right-click on the region and check "Enable Region Editor." The region can be sized and moved using the track ball and buttons or by using the optional touch screen.
4	Previous and Next Image	Allows you to select the next or previous image.
5	Get 100 images	Takes up to 100 images with the current sensor and replaces Data Set A.
6	Refresh Data Set	Takes up to 100 images with the current sensor and replaces Data Set A. When you click this button, the images are refreshed. They will continue to be refreshed until you click the button again.
7	Snap Image	Takes one image with the sensor and adds it to the end of Data Set A.
8	Edit Parameters	Adjust different parameters associated with the current region.
9	Parameter Description Window	Gives a brief description of the selected parameter.
10	Undo, Redo, Accept, and Cancel	Allows you to undo, redo, accept or cancel any changes made throughout the process of editing.

Edit Inspections

The following illustration shows the various parts of the screen displayed when you edit an inspection.

❖ *Note: the* **Retro-Spec graph** *(see "***Retro-Spec Population View Graph***" on page 191) at the top of the screen is described separately.*



1	Unwrapped Region of Interest	Displays a linear view of the region from the edited inspection. This region is marked with two directions: "S" for "Slow direction" and "F" for "Fast direction." These designations are used in some inspection descriptions to help you understand how they work.
2	Part Image	Displays a view of the part with the editable region on the part.
3	Previous and Next Images	Allows you to select the next or previous image.
4	Get 100 images	Takes up to 100 images with the current sensor and replaces Data Set A.
5	Refresh Data Set	Takes up to 100 images with the current sensor and replaces Data Set A. When you click this button, the images are refreshed. They will continue to be refreshed until you click the button again.
6	Snap Image	Takes one image with the sensor and adds it to the end of Data Set A.
7	Inspection Parameters	Displays the available parameters for the selected inspection. Note: there can be multiple tabs; the parameters will vary per inspection.
8	Parameter Description Window	Gives a brief description of the selected parameter.
9	Results Box	Shows the results from the current inspection with the option to see results from other inspections and timing information.

Right-click over the various areas of the menu to see image options, editor options, result options, and region of interest options.

Edit Parameters

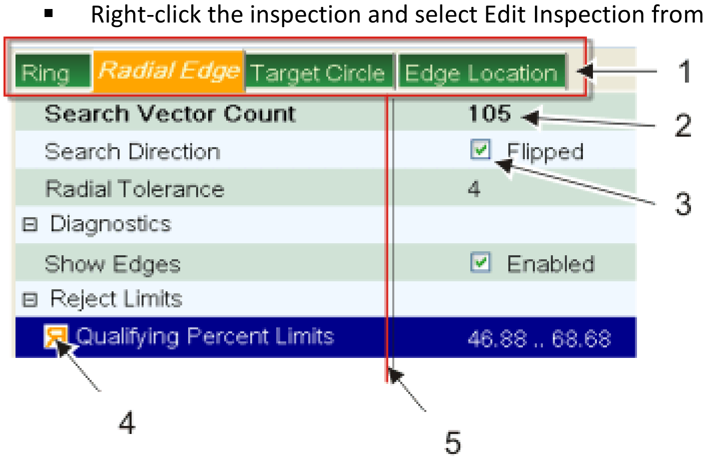
You can change values, display settings, and options that will alter the outcome of an inspection. For the purpose of this discussion, we refer to **inspections**, but the information applies to regions, registrations, orientations, enhancements, measurements, and correlations as well.

❖ *Note: you must have appropriate user permissions to edit parameters*

➢ ***To edit parameters:***

Open the inspection from the Sensor Overview screen:

- Double-click the inspection name in the inspection tree. Or:
- Right-click the inspection and select Edit Inspection from the pop-up menu.



1	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 displayed depend on the inspection itself, and its relationship within the inspection tree.
2	Numeric value can be adjusted by Large Slider or Numeric Text Entry [described below]
3	Check box to enable or disable the feature
4	Backwards R indicates the current parameter that can be adjusted in the Retro-Spec graph (example: the red and yellow limits bars). Note that you can also adjust parameter limits by right-clicking over the Retro-Spec graph.
5	Column division for parameter settings (this line is not actually displayed in the Intellispec). You can see Large Slider AND numeric entry pad if you click in the left column, or just the numeric entry pad if you click in the right column (this only applies if Numeric Input setting = both).

There are several ways to change parameters:

- Numeric values
- Check boxes
- Drop-down menus
- Buttons
- Adjusting the bars on the Retro-Spec graph

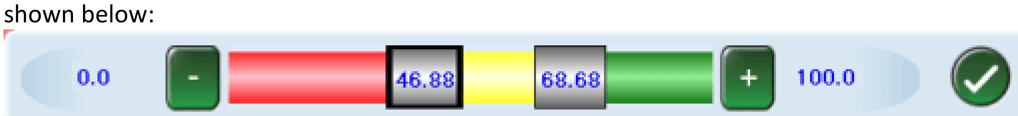
❖ *Note: Drop-down menus and buttons are discussed separately in the inspections where they are used*

Edit Numeric Values

There are a few ways in which to change values and settings which include large slider, numeric text entry, or drop down. The method available depends on **Editor Options** as described below.

Large Slider

Allows you to make changes using a sliding bar. It displays the value in the menu as you slide the bar. Changes made on the Large Slider are reflected in the Numeric Text Entry as well if both are open. 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:



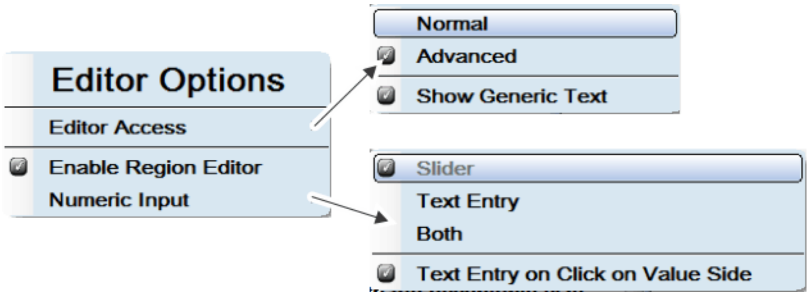
- Red = failure limit. Any part whose parameter value falls in the red zone fails inspection.
- Yellow = warning limit. Any part whose parameter value falls in the yellow zone is tagged as a warning level part.
- Green = passing. Any part whose parameter value falls in the green zone passes (at least this parameter).

Numeric Text Entry

Allows you to type in a specific number. You can use the +1 and -1 feature to make minor adjustments. Changes made on the Numeric Text Entry are reflected in the Large Slider as well if both are open.
For more information about the numeric keyboard, see ***On Screen Keyboard (OSK)*** (on page 12)

Editor Options

The information displayed when you are editing parameters depends on the Editor Options settings. Right-click over the parameters menu to see the Editor Options.



Editor Access

Choose how menus are displayed:

- **Normal** - display the normal menus (for most users)
- **Advanced** - display the advanced parameters (for power users)

> ❖ *Note: you must have the appropriate* **permissions** *(see "***Managing Permissions***" on page 24) to see the advanced parameters: "Access advanced inspection parameters"*

- **Show Generic Text** - default Intellispec names. Some parameter names were changed in templates to make more sense for a particular application.

Enable Region Editor

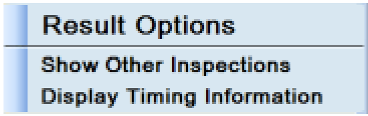
Available when the inspection has an associated region that can be modified.

Numeric Input

- **Slider** = Large Slider as described above
- **Text Entry** = Numeric Text Entry as described above
- **Both** = both Large Slider and Numeric Text entry. After you make changes to either input, you must click the OK button on both to close them.
- **Text entry on click on value side** = if you click an item the right column of the menu, you will see only the Numeric Text Entry box, even if you have Both checked

Result Options

There is additional display information for the Results Box. Right-click to see the menu. To stop displaying the other inspections, right-click the menu again, then un-check the option.



Show Other Inspections

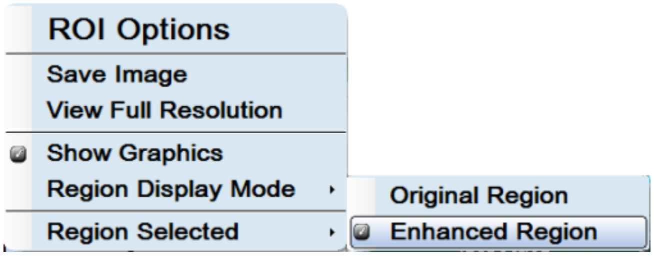
Displays whether a part has passed or failed other inspections on the current sensor. Right-click the menu again to see the option to hide good inspections. If that option is checked, then only the failed inspections are displayed.

Display Timing Information

Displays timing information for each inspection on the current sensor and the total time in milliseconds.

Unwrapped Region of Interest Options

Right-click in the Unwrapped Region of Interest to display the region of interest (ROI) options menu. To stop displaying either option, right-click the menu again and un-check the option.



Save Image (see "*Saving a Region of Interest (Unwrapped) Image*" on page 161)

Save the Region of Interest image.

View Full Resolution

Display the unwrapped region at full resolution to see more detail. This example shows a Fill Height - Segmented inspection.

Click either rotate button  to change the orientation of the unwrapped ROI image on the screen. Click the OK button  to exit.

Show Graphics

Displays any graphics that are selected, like vectors or edges, on the Unwrapped Region of Interest.

Region Display Mode

Gives you the option to show the original region, or the enhanced region, if it has an enhancement.

Region Selected

(Only available if the inspection has more than one region; example: Fill Height) Select which region to display.

Retro-Spec Population View Graph

The Retro-Spec graph is displayed when you edit a Registration, Orientation, or Inspection.

The Retro-Spec Graph can display up to 200 parts at a time, 100 in each set. Each bar on the graph represents a different part. A green bar means that the part has passed. A yellow bar means that the part has exceeded the warning limit but not the reject limit. A red bar means that the part has exceeded the reject limit. A lighter shade of green, red or yellow will be displayed when a part is selected. To select a part, simply click on a bar in the graph. When you click a bar, the part's unique Part Image, Unwrapped Region of Interest, and Results will be displayed.

Population View

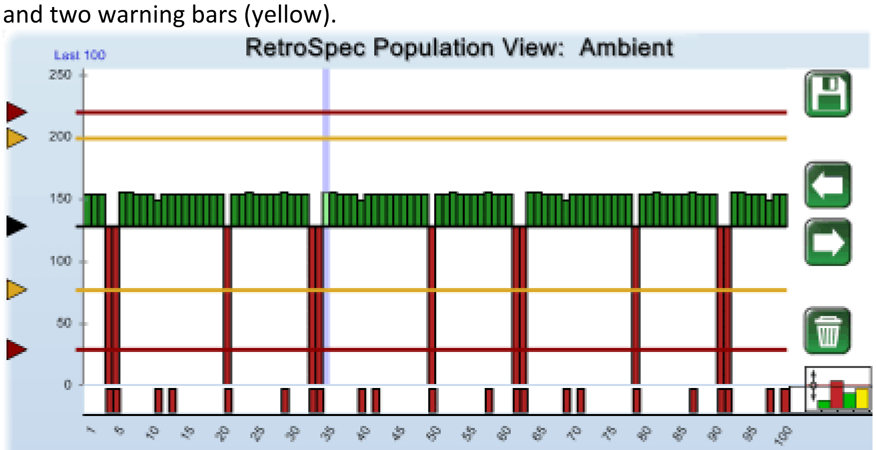
Displays details for up to the last 200 parts. The parts can be the last 100 run, the latest 100 defects for the inspection, or a set of parts previously saved to the hard drive.

Graphs with One Reject Bar

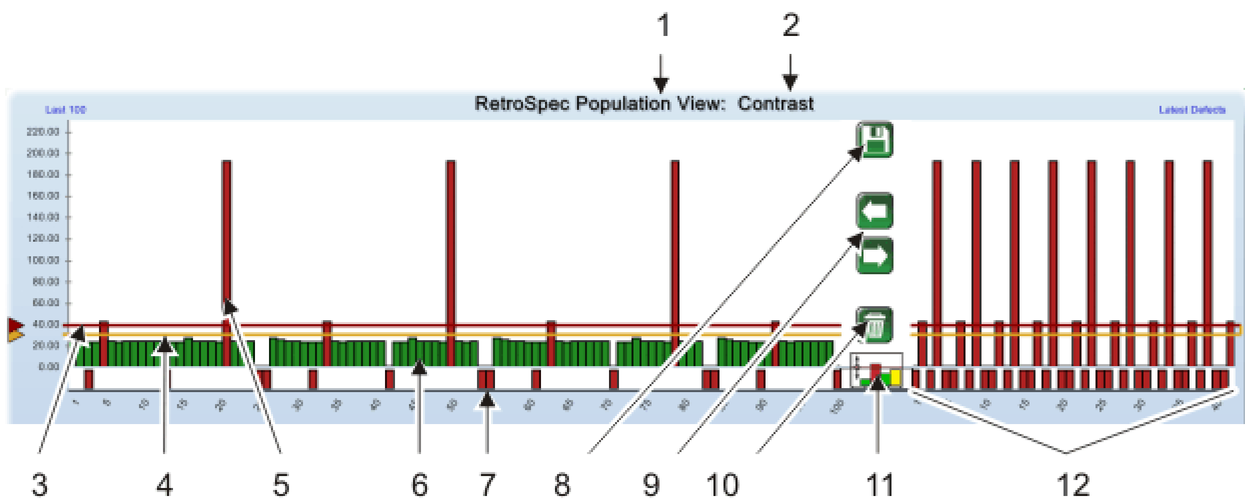
Some inspections have one reject bar on the Retro-Spec Graph. The Warning/Reject Bar can be a minimum requirement where the part Retro-Spec value must be higher than the reject bar in order to pass. The Warning/Reject Bar can also be a maximum requirement where the part Retro-spec value cannot exceed the reject bar in order to pass.

Graphs with Two Reject Bars

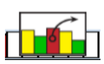
Some inspections have two reject bars. The part's value must be between the two reject limits to be considered a good part. The example below shows an ambient inspection with two reject bars (red) and two warning bars (yellow).



The components of the Retro-Spec graph are as follows:



Retro-Spec Graph item		Description
1	Selected View	Shows which Retro-Spec graph view is being displayed.
2	Selected Inspection	Shows the type of inspection.
3	Reject Bar (red)	Shows the inspection limits. Parts that fall outside the reject limits are considered defective.
4	Warning Bar (yellow)	Shows the inspection warning limits. Parts that fall outside the warning limits are not considered defective, but are approaching reject status.
5	Reject Part	Reject Parts are displayed in Red.
	Warning Part	Warning Parts are displayed in Yellow. [not shown in this example]

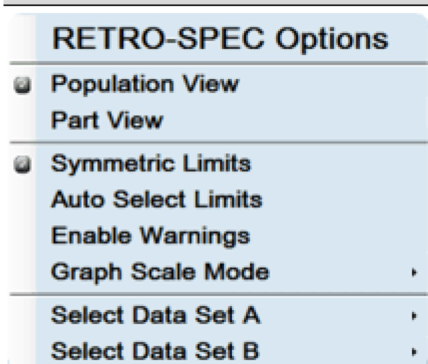
Retro-Spec Graph item		Description
6	Passing Part	Passing Parts are displayed in Green.
7	Other Results Indicator	Indicates whether a part has failed or had a warning on a different inspection. A small red box will appear under a part that has failed a different inspection. A small yellow box will appear under a part that has had a warning from a different inspection.
8	Save Parts	Allows you to save a set of parts which can be reloaded later. You can save the Selected Parts, Set A, or Set B. You can also choose where to save them by clicking the Save Parts button under "Where to save?"
9	Select Parts	Allows you to select a set of parts, set A or Set B, to be displayed in the Retro-spec Graph. Clicking on either the left or right arrow will bring up the Select Parts Menu below. You can choose from Last 100, Latest Defects, or Custom Set.
10	Delete Part [Trash can icon]	Gives you the ability to delete a single part. Can only be used when the lock [item 11] is unlocked. To delete a part: highlight the part, then click the trash can icon, or highlight the part then drag it to the trash can icon and release the trackball button. A message appears above the icon stating that the part has been deleted.
11	Lock/ Move Parts Toggles to: 	When the graph is locked, parts cannot be moved or deleted. When the graph is unlocked, part sets can be modified. Parts can be saved, moved within the same set, moved to the set on the other side of the divider, or deleted. Dragging the part to the Select Parts arrows [item 9] will move the part into the corresponding side. Dragging the part to the Save Parts button will allow you to save the part. Dragging the part to the Delete Parts button will delete the part.
12	Data Set B	The parts on the right side of the divider make up data Set B.

Once a part has been deleted or moved, the term **Scratch Parts** is displayed at the top of the data set. To save the data set with your changes, click the Save Parts icon [item 8]. This will allow you to save the data set on either side of the divider, or just the selected parts.

Retro-Spec Options

Right-click the Retro-Spec graph to see the Retro-Spec options menu.

❖ *Note: some options are not displayed if they are not applicable to the current inspection.*



Population View

When this is checked, the ***Retro-Spec population view graph*** (on page 191) is displayed.

Part View

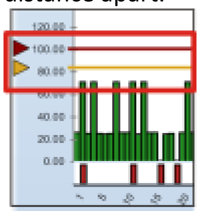
When this is checked, the Retro-Spec part view graph is displayed.

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

Locks the yellow warning bar to the red reject bar in the Retro-Spec graph, keeping them the same distance apart.



Auto Select Limits

Automatically adjusts warning and reject levels to make all parts in the data set pass.

Enable Warnings

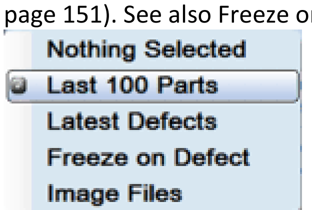
Provides a warning level (yellow) sensitivity bar. A warning level does not reject parts, but indicates that the process is approaching the reject status. When you enable warnings, they are enabled for all inspections for the current sensor.

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.

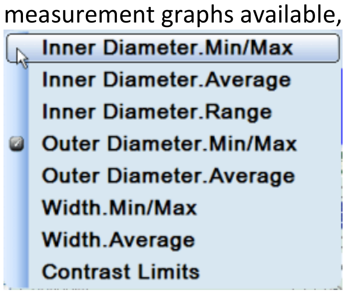
Select Data Set A or B

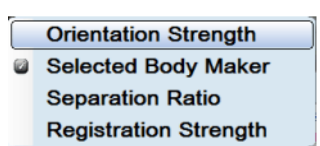
For each Data Set, you can select what you want to display. You can choose to display Nothing, Last 100 Parts, Latest Defects, a Freeze on Defect image, or a set of Image Files that have been previously saved to the computer.
See information about ***Saving Images*** (see "***Saving Images through the Retro-Spec interface***" on page 151). See also Freeze on Defect Image in Retro-Spec.



Select Parameter

Choose a graph to display. This is available for some inspections where you have a choice to display different graphs. An example is Measurement Analysis, where there are several different measurement graphs available, as shown below. Another example is in the BMID inspection.



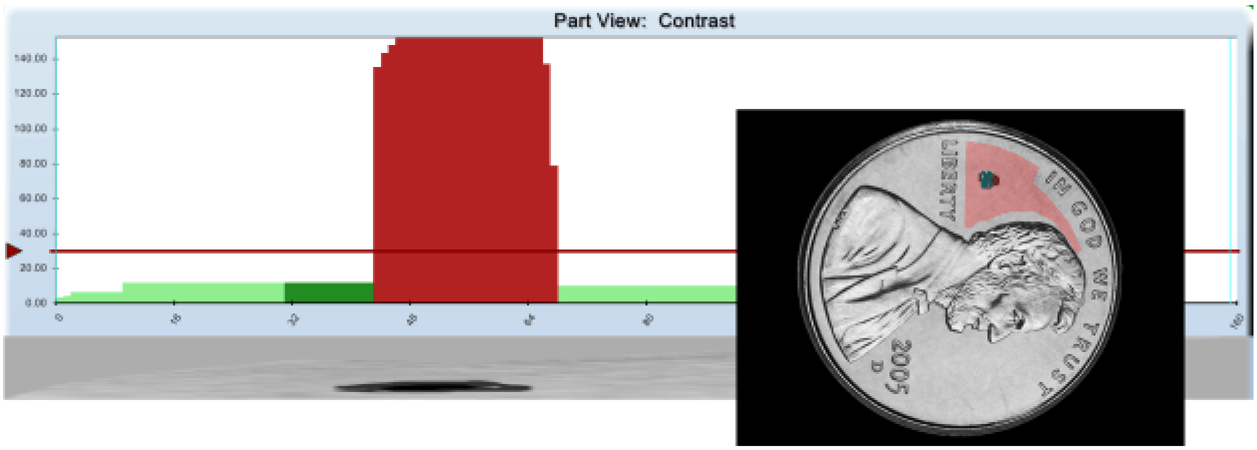


Retro-Spec Part View Graph

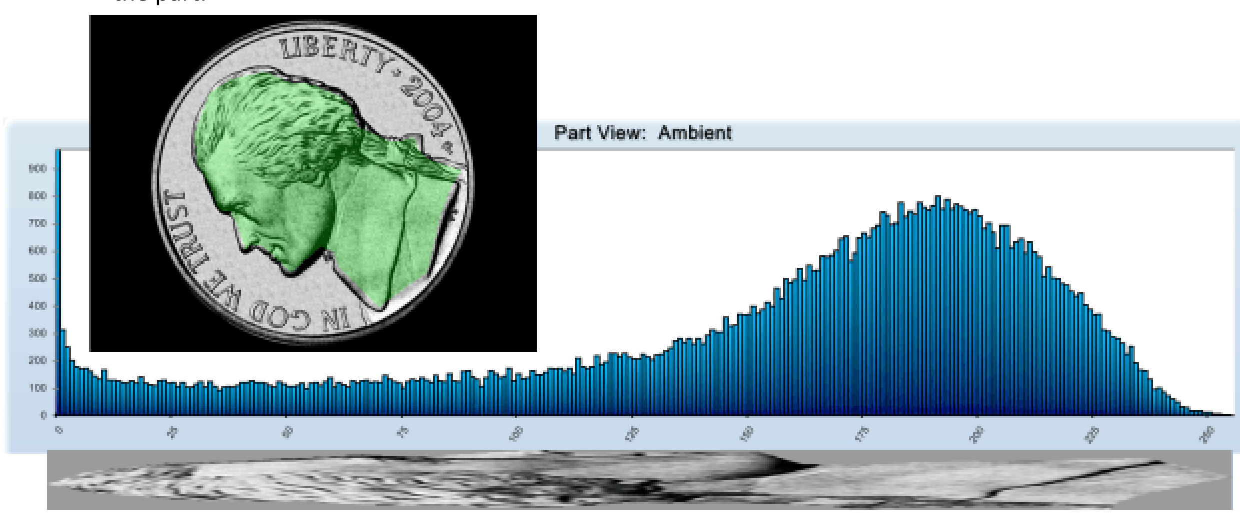
The Part View shows specific information unique to each part. To display the Part View, right click on a part and choose Population View, or double-click a part from the Population View. There are different types of Part Views that vary by inspection.

❖ *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.



Chapter 11
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, for simplicity.

The information in this section is valid as of software version 5.2.037.

Empty Pocket

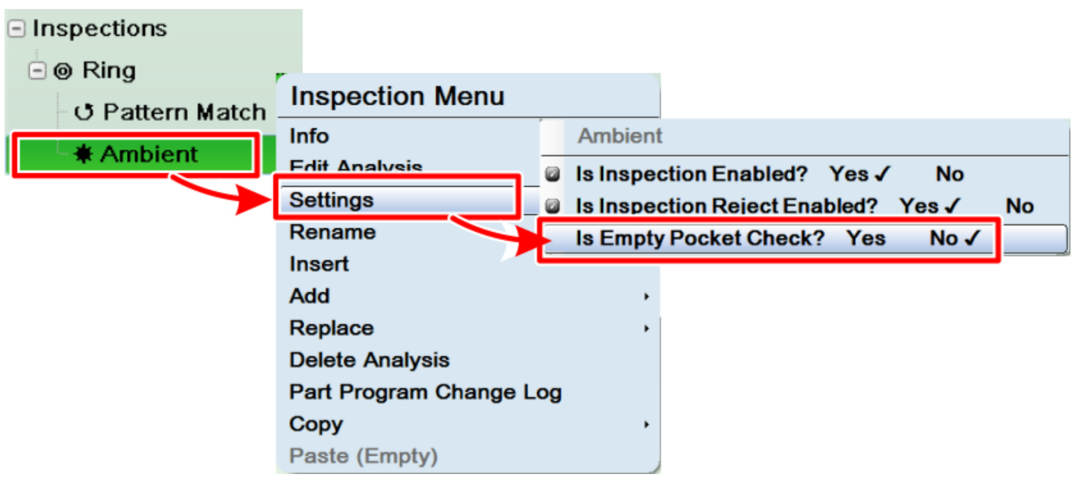
The Empty Pocket feature checks to see whether a part is present or not. This is used for applications where you must determine whether a part is present before proceeding with inspection. A common use for this test is in Starwheel applications where the encoder is used, based on pocket position, rather than a part present signal. Locating an empty pocket is important for production numbers to be accurate. If an empty pocket is found, no inspection takes place for that pocket. Otherwise, an empty pocket would be recorded as a defect.

Notes:

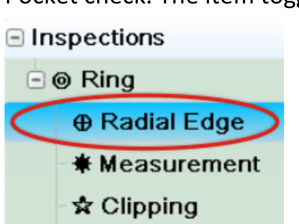
- You may run the Empty Pocket check on any inspection. We recommend that you use it with an inspection that has pass/fail criteria. Ambient and Contrast inspections are most commonly used.
- You may add as many empty pocket checks to the part program as desired.

➢ ***To add an Empty Pocket check to an existing part program:***

1. In the inspection tree, right-click over the name of the inspection to which you want to add the Empty Pocket check.
2. From the Inspection menu, select Settings > then select the "Is Empty Pocket Check?" menu item. The "Yes" item will be checked.



That inspection is highlighted in blue, and will remain highlighted unless you disable the Empty Pocket check. The item toggles between Yes and No to enable or disable the feature.



Statistics updates using Empty Pocket

To make sure that the statistics totals do not count empty pockets as defects, you must set up an Empty Pocket check for all sensors in each lane. For example, if you have three sensors in Lane 1, all three sensor part programs must contain an Empty Pocket check.

The statistics are counted as an OR function. If any of the sensors within a lane detects an empty pocket, then that part ID is not counted in the defect statistics.

Regions of Interest (ROI)

Regions of Interest (ROI) are the locations where the registrations, enhancements, analyses, orientations, and correlation inspections take place. There is no inspection done in a Region of Interest. However, there is no limit to the number of inspections that can be placed in one Region of Interest.

There are six region types available to set up the region of interest on a part. 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*** (on page 200)
- ***Polygon Region*** (on page 201)
- ***Ribbon Region*** (on page 202)
- ***Measure ROI*** (on page 205)
- ***Cylindrical Region*** (on page 206)
- ***Adaptive Region*** (on page 209)

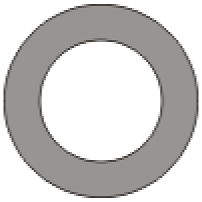
Region of Interest Compatibility Chart

The following chart shows whether each inspection is compatible with each region type.

Region Type:	**Ring**	**Polygon**	**Ribbon**	**Measure ROI**	**Cylin-drical**	**Adaptive**
Enhancements (All)	Yes	Yes	Yes	Yes	Yes	Yes
Registrations						
Feature	Yes	Yes		Yes		Yes
Center of Mass	Yes		Yes			Yes
Hough	Yes					
Radial Edge	Yes					
Centerline			Yes			
Finish Location			Yes			
Template Registration	Yes	Yes		Yes	Yes	
Neckring Registration				Yes		
Measure Registration	Yes	Yes	Yes	Yes	Yes	Yes
Orientations						
Pattern Match	Yes					
Template Orientation	Yes				Yes	
Analyses						
Ambient	Yes	Yes	Yes	Yes	Yes	Yes
Shape Check						Yes
Contrast	Yes	Yes	Yes	Yes	Yes	Yes
Measurement	Yes		Yes			Yes
Light Meter	Yes	Yes	Yes	Yes	Yes	Yes
Fill Height - Segmented	Yes	Yes	Yes	Yes	Yes	Yes
Measure Extract	Yes	Yes	Yes	Yes	Yes	Yes
Distribution	Yes	Yes	Yes	Yes	Yes	Yes
Label Skew Extract	Yes	Yes	Yes	Yes	Yes	Yes
Feature Detect	Yes	Yes				Yes
Dimensions (All)	Dimensions do not use regions; they get data from other inspections.					
Correlations						
Body-Maker ID	Yes	Yes		Yes		
Color Dot	Yes	Yes		Yes		

Ring Region

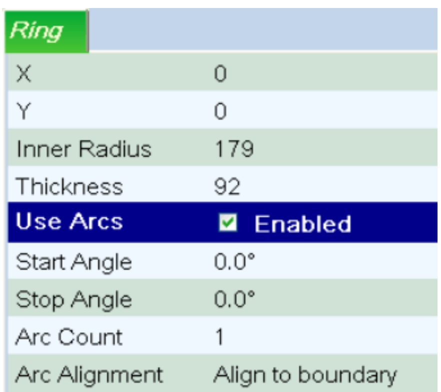
The Ring region is circular or donut-shaped. You can create arcs or multiple arc segments in the region. The inner and outer radii are adjustable, and the region's position is adjustable.



➢ *To add a Ring Region:*

1. If you plan to use Arcs for the Ring Region, place an ***Orientation*** (see "***Orientations***" on page 272) 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. (The menu is described below) Adjust the placement of the ring and parameters as necessary.

Ring menu



The following parameters can be set graphically (on the image), or through a slider bar or numeric keypad, which pop up when you click on a numeric value. Also refer to more information about ***Editing Parameters*** (see "***Edit Parameters***" on page 187).

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

Allows you to inspect an arc instead of the whole region. The system will inspect a segment of 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 Count

Set the number of segments you want to create in the region.

Arc Alignment

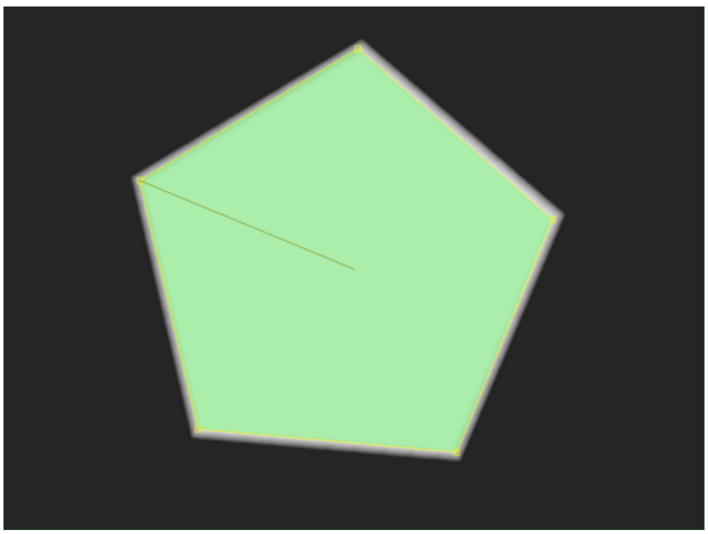
Not currently used.

Polygon Region

Similar to the ***Ribbon Region*** (on page 202), 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

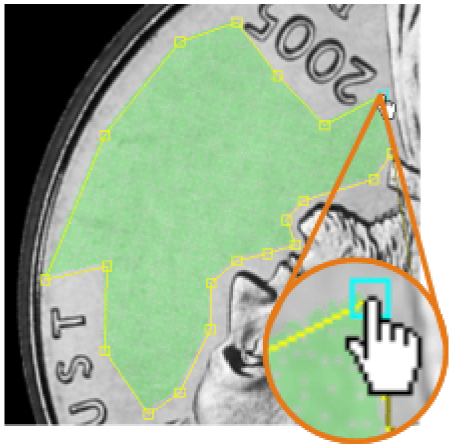
❖ *Note: we recommend that you place a Registration and Orientation (if applicable) prior to adding a polygon region. This will ensure that the polygon is placed correctly on the part, regardless of the part's placement or rotation.*



➢ ***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*** (on page 164) 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. Allows from 1 to 10 polygons that are centered and rotated around the registered position.

Repeat Count

(Available when using multiple polygons) Choose the number of duplicate polygons to place on the image. The system automatically distributes these polygons around the image. A common use for this feature is for the feet of a PET bottle.

Rotate Polygon

Rotate the polygon around the center of the polygon. If you have duplicate polygons, they are also rotated.

Expand or Contract

Resize the region. A negative number contracts the region, and a positive number expands the region.

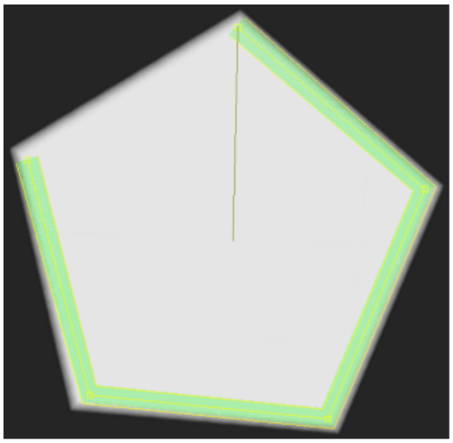
❖ *Note: be careful not to contract the region too much. This will distort the original shape.*

Ribbon Region

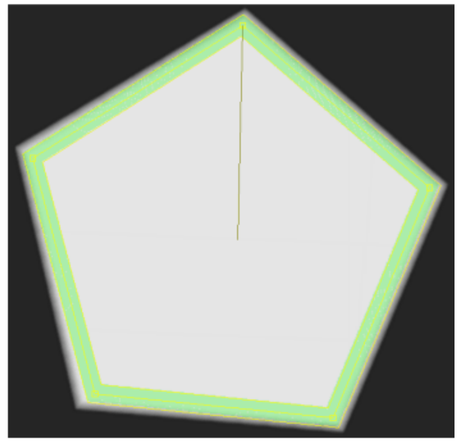
Similar to the ***Polygon Region*** (on page 201), the Ribbon Region is a customizable region and can come in two different forms: ribbon, and loop. This type of region is used for:

- free-form inspection areas on a part
- areas that do not fit a circle or other standard inspection region

❖ *Note: we recommend that you place a Registration and Orientation (if applicable) prior to adding a Ribbon region. This will ensure that the ribbon is placed correctly on the part, regardless of the part's placement or rotation.*



1



2

1	**Ribbon** - a customizable region that does not close, similar to a rubber band that has been cut. Thickness remains the same throughout the region.
2	**Loop** - a closed version of the ribbon region, similar to a rubber band. Thickness remains the same throughout the region.

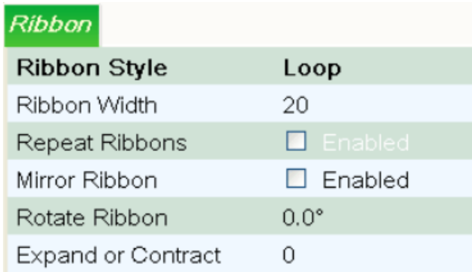
➢ *To add a Ribbon Region:*

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. When you want 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 164) menu. Use Edit Mode to Delete, Add, or Move any ribbon point or the entire region.

Ribbon menu



Ribbon Style

Choose between Ribbon and Loop as described above.

Ribbon Width

Set the width of the region.

Repeat Ribbons

Create duplicate copies of the original ribbon. Allows from 1 to 10 ribbons that are centered and rotated around the registered position.

Mirror Ribbon

(Only used when Repeat Ribbons is disabled) Create a flipped duplicate of the region. This is typically used for the ***Centerline*** (on page 242) 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 the number of duplicate ribbons to place on the image. The system automatically distributes these ribbons around the image. A common use for this feature is for the feet of a PET bottle.

Rotate Ribbon

Rotate the ribbon around the center of the ribbon. If you have duplicate ribbons, they are also rotated.

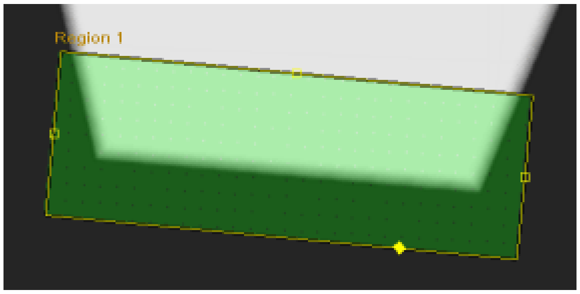
Expand or Contract

Resize the region. A negative number contracts the region, and a positive number expands the region.

❖ *Note: be careful not to contract the region too much. This will distort the original shape.*

Measure ROI

Measure ROI is a region that is intended to be used in measurement type operations (such as ***Label Skew Extract*** (on page 332), ***Measure Extract*** (on page 321), ***Fill Height*** (on page 304), and Support Ring Registration or ***Neckring Registration*** (on page 260)).

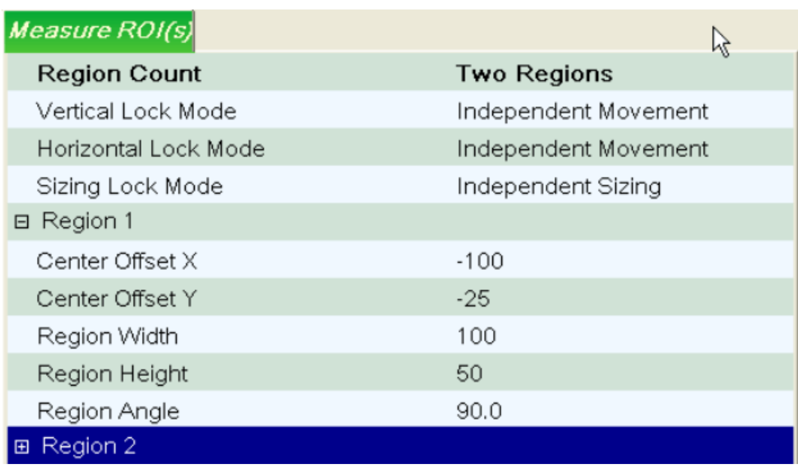


➢ ***To add a Measure ROI Region:***

❖ *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 - Measure ROI and Cylindrical Regions*** (on page 166).

Measure ROI menu



Region Count

Leave this set at One Region unless you have a Fill Height application. Most measurements require one region. Fill Height applications require two regions: one for reference, and one for fill level.

Region 1 or 2

Contains the settings for each region.

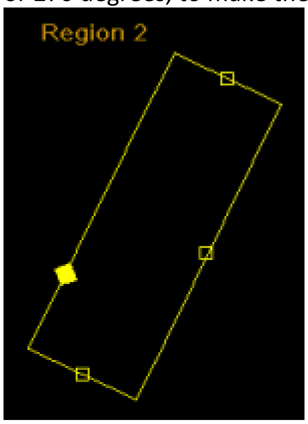
Center Offset X and Y

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

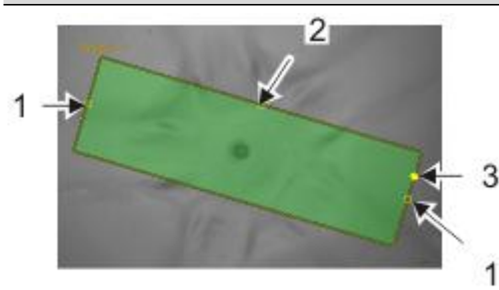
Adjust the size and rotation of the region. You can also click on the image and adjust the region graphically (if Enable Region Editor is checked in the Image Options menu). To adjust, click and drag one of the empty yellow squares.

The Region Angle allows you to ensure that the region is a rectangle. After resizing and moving the region, it can become non-rectangular. Use the **Region Angle** parameter to quickly set 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	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

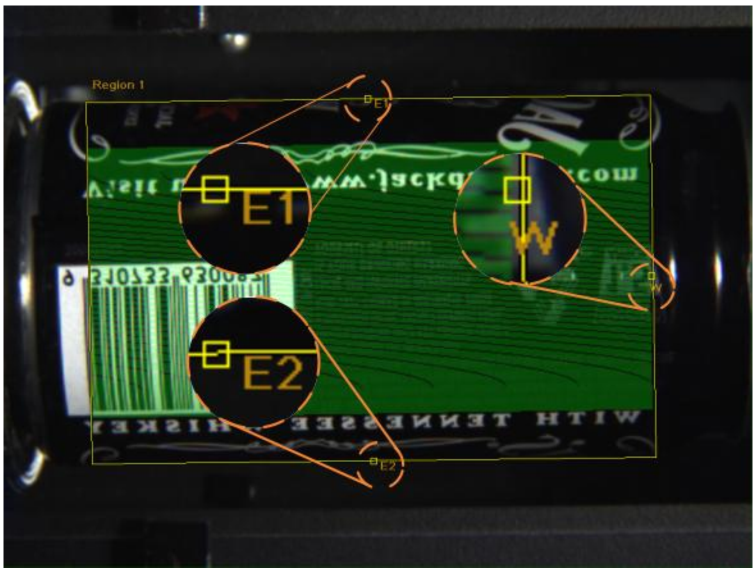
Choose whether to move the two regions independently, or to lock the regions (move the regions together). When you choose to mirror the regions, the regions move in opposite directions.

Cylindrical Region

Cylindrical Region is used for outside of can inspection. Its main purpose is to allow you to add a ***Template Orientation*** (on page 275) 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 in the inspection tree to see the Inspection menu.
2. From the Inspection menu, select Add > Region > Cylindrical Region. The region is added to the inspection tree. Re-name it to something more meaningful to you.
3. The Cylindrical menu is displayed and the region is shown on the image. (The menu is described below) Adjust the placement of the region as necessary. Align the "E" boxes with the top and bottom edges of the can, and the "W" to one side, as seen below.



4. Right-click over the image to see more image options. See ***Image Options - Measure ROI and Cylindrical Regions*** (on page 166).
5. Adjust the parameters as necessary. The menu is described below.

Cylindrical menu

Cylindrical	
Sampling Window	50
Center Offset X	-1
Center Offset Y	-12
Region Width	307
Region Height	480
Region Angle	0.75

Sampling Window

Set this to a number of pixels on which to focus in the inspection region. A typical value is 50. It is used to eliminate distortion that may occur towards the edges of the inspection region, since the part you are inspecting is not flat. In our example below, we are focusing on the center part of the inspection region. The system tries to flatten the image of the curved can. With the Sampling Window at 100 [item 1], you can still see the distortion in the letters on the can. With the Sampling Window at 50 [item 2], you can see how the image is less distorted - the letters on the can are straighter.

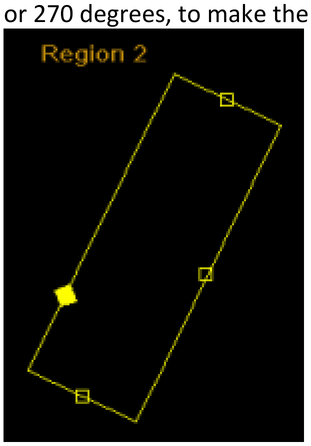
Center Offset X and Y

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

Adjust the size and rotation of the region. You can also click on the image and adjust the region graphically (if Enable Region Editor is checked in the Image Options menu). To adjust, click and drag one of the empty yellow squares.

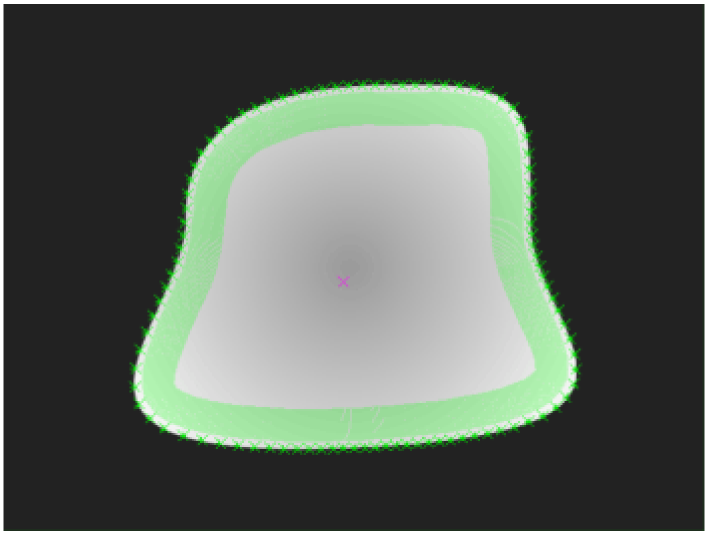
The Region Angle allows you to ensure that the region is a rectangle. After resizing and moving the region, it can become non-rectangular. Use the **Region Angle** parameter to quickly set to 0, 90, 180, or 270 degrees, to make the region a rectangle.



Adaptive Region

This is a region that is built from the edge points found in registrations (except from Template Registration). The region adapts to whatever edge points are found. It can follow the shape of your part.

Series IV users: this is similar to Tracker or Shape Adapt registrations.



❖ *Note: Adaptive Region can be added only after one or more* **Registrations** *(on page 231).*

➢ ***To add an Adaptive Region:***

1. Make sure at least one ***Registration*** (see "***Registrations***" on page 231) 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** *(on page 201) and* **Ribbon Region** *(on page 202). 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.

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.

Diagnostics

Show Found Edges

Display the found edges on the image.

Show Corrected Edges

Show the edges that were corrected using Correction Mode.

Show Region Edges

Show the location of the edges after using Region Offset.

Correction Settings (Used with Dual Edge Correction)

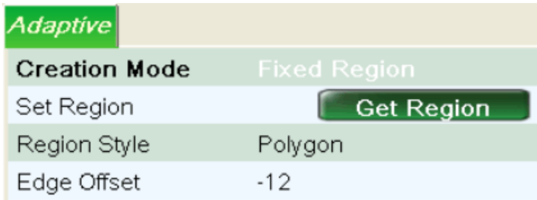
Maximum Deviation

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** *(on page 201) and* **Ribbon Region** *(on page 202). 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 are used to alter images for the purpose of better defect detection, or for making certain features stand out. They are applied to any region type and you can add as many as needed to a region.

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.

➢ ***To add an enhancement:***

1. Make sure at least one ***region*** (see "***Regions of Interest (ROI)***" on page 198) 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.

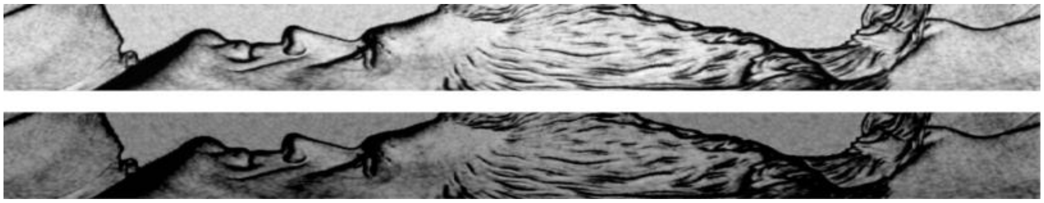
The available enhancements are:

- ***Subtract Bias*** (on page 213)
- ***Clipping*** (on page 213)
- ***Stretch Grayshades*** (on page 214)
- ***Binary*** (on page 216)
- ***Gamma Correction*** (on page 217)
- ***Grow Dark Areas*** (on page 218)
- ***Grow Light Areas*** (on page 219)
- ***Absolute Difference*** (on page 220)
- ***Color Distance*** (on page 220)
- ***Color Replacement*** (on page 223)
- ***Color Extraction*** (on page 226)
- ***Color Conversion*** (on page 228)
- ***Template*** (see "***Template Enhancement***" on page 228)

❖ *Note: Your system (and this book) may show only those items that apply to your application.*

Subtract Bias

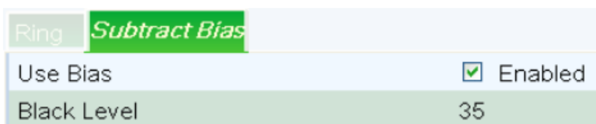
Subtract Bias is a simple value subtraction across the entire region. Subtract the given value from all pixels in the region. The example below shows the result (bottom image) of subtracting a gray level of 80 from the top image.



➢ ***To add a Subtract Bias enhancement:***

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Subtract Bias. The enhancement is added to the inspection tree. Re-name the inspection to something more meaningful to you.
4. The Subtract Bias menu is displayed and the region is shown on the image. (The menu is described below) Adjust the parameters as necessary.

Subtract Bias menu



Use Bias

Enable the enhancement.

Black Level

Set the gray level value to subtract from the original value of each pixel in the region of interest.

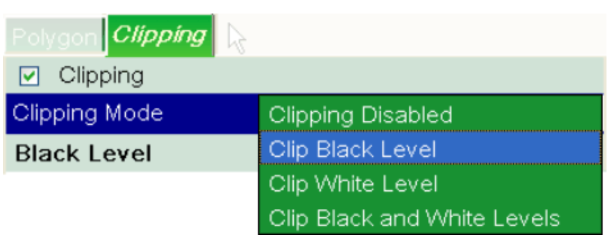
Clipping

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.

➢ ***To add a Clipping enhancement:***

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Clipping. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Clipping menu is displayed and the region is shown on the image. (The menu is described below) Adjust the parameters as necessary.

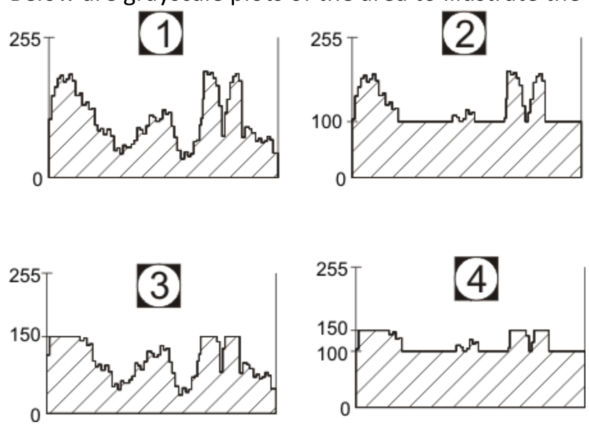
Clipping menu



Clipping mode

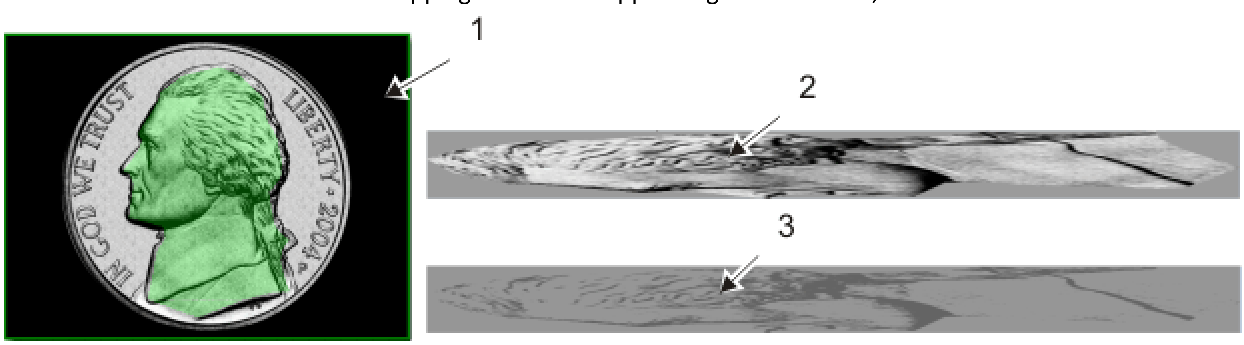
The available modes are as follows - also refer to the illustration below:

Disabled [item 1] – no clipping.
Clip Black Level [item 2] – set a dark gray shade value. A dark clipping value of 100 would take all pixels with gray levels of 0-99 and make them a gray level of 100.
Clip White Level [item 3] – set a light gray shade value. A light clipping value of 150 would take all pixels with gray levels of 151-255 and make them 150.
Clip Black and White Levels [item 4] – set both dark and light levels.
Below are grayscale plots of the area to illustrate the effects of clipping.



1	Original grayscale plot- Clipping Disabled
2	Clip Black Level - example uses 100 as black level
3	Clip White Level - example uses 150 as white level
4	Clip Black and White Levels - example uses 100 as black level and 150 as white level

You will see the effects of clipping in the Unwrapped Region of Interest, as shown below.



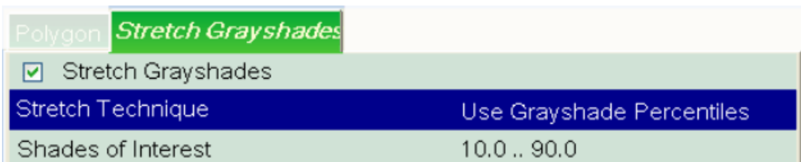
1	Region
2	Clipping Disabled
3	Clip Black and White Levels applied

Stretch Grayshades

Stretch Grayshades is used when you want to make one feature stand out from the rest of the part. This technique works essentially how it sounds: 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.

➢ ***To add a Stretch Grayshades enhancement:***

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Stretch Grayshades. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Stretch Grayshades Menu is displayed and the region is shown on the image. (The menu is described below) Adjust the parameters as necessary.



Stretch Grayshades

Enable the enhancement.

Stretch Technique

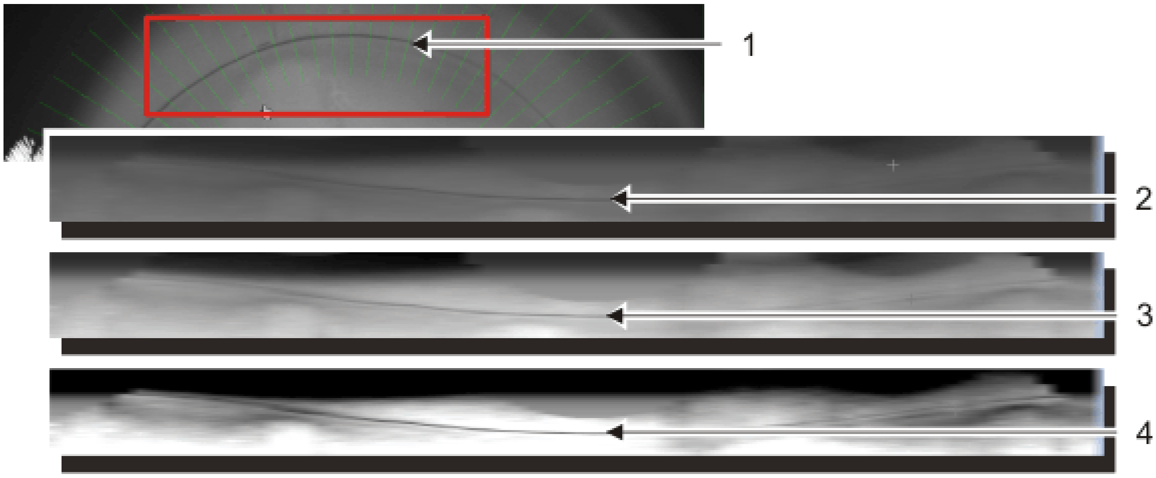
Zoom in on any range of gray shades.
Use Min/Max of Region - the system uses the lowest gray shade found and the highest gray shade found, and stretches that range from 0 to 255.
Use Grayshade Percentiles - Specify lower and upper values in the Shades of Interest box in terms of percentage of pixels. 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 grayshades 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.

Stretch Grayshades example

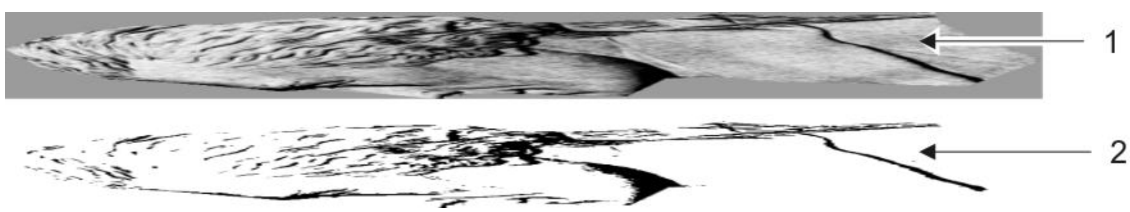
In the example below, we use the mold line as a reference point. We want that mold line to stand out, so we use Stretch Grayshades.



1	Original image
2	Unwrapped region of interest with no enhancement
3	Unwrapped region of interest with Use Min/Max of Region applied
4	Unwrapped region of interest with Use Grayshade Percentiles and Shades of Interest applied

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 Binary enhancement is shown below.

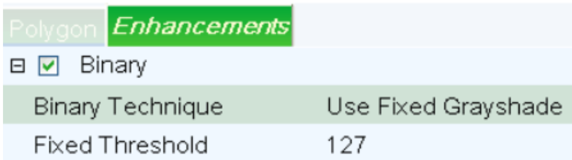


1	Unwrapped region of interest with no enhancement
2	Unwrapped region of interest with Binary Enhancement applied

➢ ***To add a Binary Enhancement:***

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Binary. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Enhancements menu is displayed and the region is shown on the image. (The menu is described below) Adjust the parameters as necessary.

Binary enhancement menu



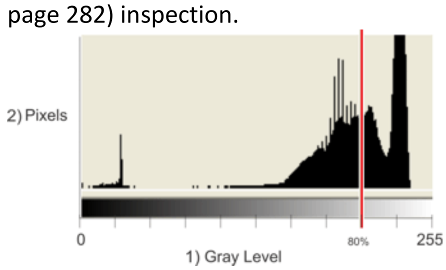
Use the technique and threshold that best suits your application.

Binary Technique

Choose between Fixed Grayshade and Adaptive Grayshade. Set the related threshold as described below.

Adaptive Threshold

The system computes the ambient level for the region. Set Adaptive Threshold to the percentage of pixels to use in the region. This is similar to the Peak Percentile technique used in the ***Ambient*** (on page 282) inspection.



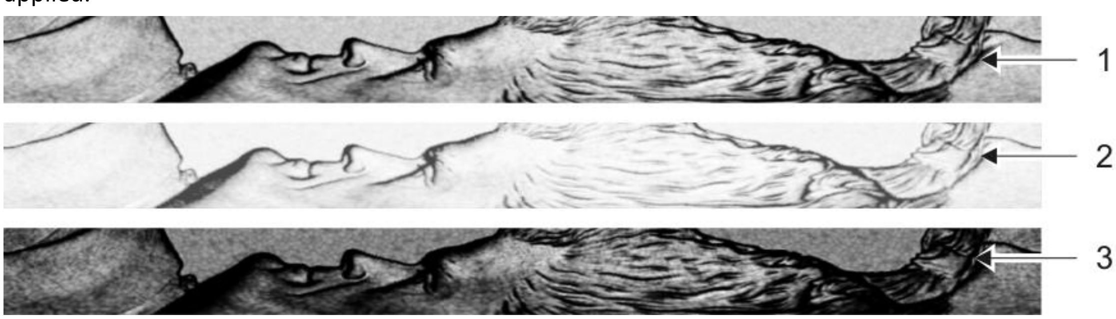
1	Gray level - choose a percentage
2	Pixels in the histogram of the image

Fixed Threshold

The system uses the number you enter. All pixels at or below the threshold will be turned black. All pixels at or above the threshold will be turned white.

Gamma Correction

Gamma Correction lets you reveal detail in a low-contrast image without significantly affecting the shadows or highlights. The example below shows the results of the Gamma Correction enhancement applied.

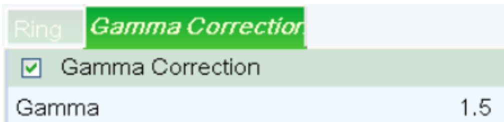


1	Original image
2	Decreased contrast - Gamma value less than one
3	Increased contrast - Gamma value greater than one

➢ ***To add a Gamma Correction enhancement:***

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Gamma Correction. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Gamma Correction menu is displayed and the region is shown on the image. (The menu is described below) Adjust the parameters as necessary.

Gamma Correction menu



Gamma Correction

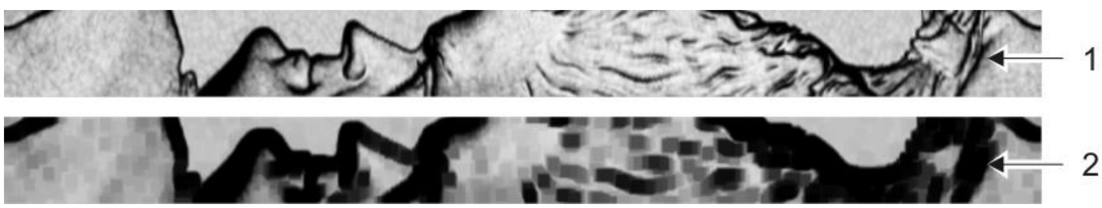
Enable the enhancement.

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. The example below shows how Grow Dark Areas enhances the image.



1	Normal image
2	Image with Grow Dark Areas applied

➢ ***To add a Grow Dark Areas enhancement:***

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Grow Dark Areas. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Grow Dark Areas menu is displayed and the region is shown on the image. (The menu is described below). Adjust the parameters as necessary.

Enhancements menu

Grow Dark Areas

Enable the enhancement.

Growth Rate

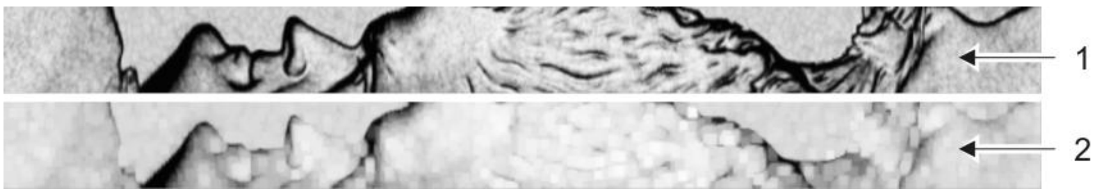
Increase this value to grow the areas more.

Max. Shade Delta

Specify 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. The example below shows how Grow Light Areas enhances the image

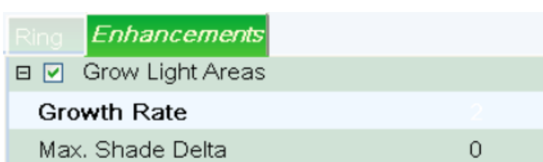


1	Normal image
2	Image with Grow Light Areas enhancement applied

➢ ***To add a Grow Light Areas enhancement:***

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Grow Light Areas. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Grow Light Areas menu is displayed and the region is shown on the image. (The menu is described below) Adjust the parameters as necessary.

Enhancements menu



Grow Light Areas

Enable the enhancement.

Growth Rate

Increase this value to grow the areas more.

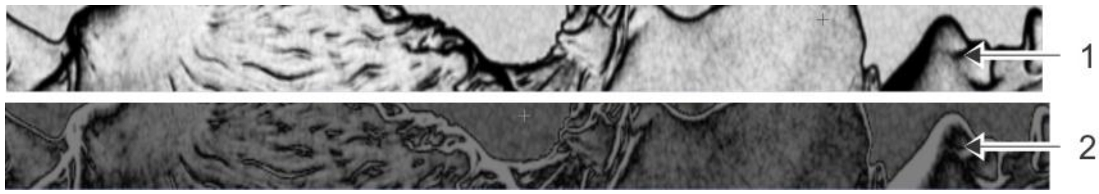
Max. Shade Delta

Specify 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 will subtract 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. 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).

The example below shows an Absolute Difference of 100 applied.

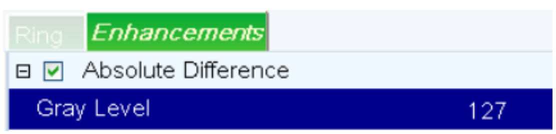


1	Normal image
2	Image with Absolute Difference enhancement applied

➢ ***To add an Absolute Difference enhancement:***

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Absolute Difference. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Enhancements menu is displayed and the region is shown on the image. (The menu is described below) Adjust the parameters as necessary. Experiment with values to enhance features you want to see more clearly on your part.

Enhancements menu



Absolute Difference

Enable the enhancement.

Gray Level

The resulting pixel gray shade is the absolute difference between this value and the original pixel gray shade.

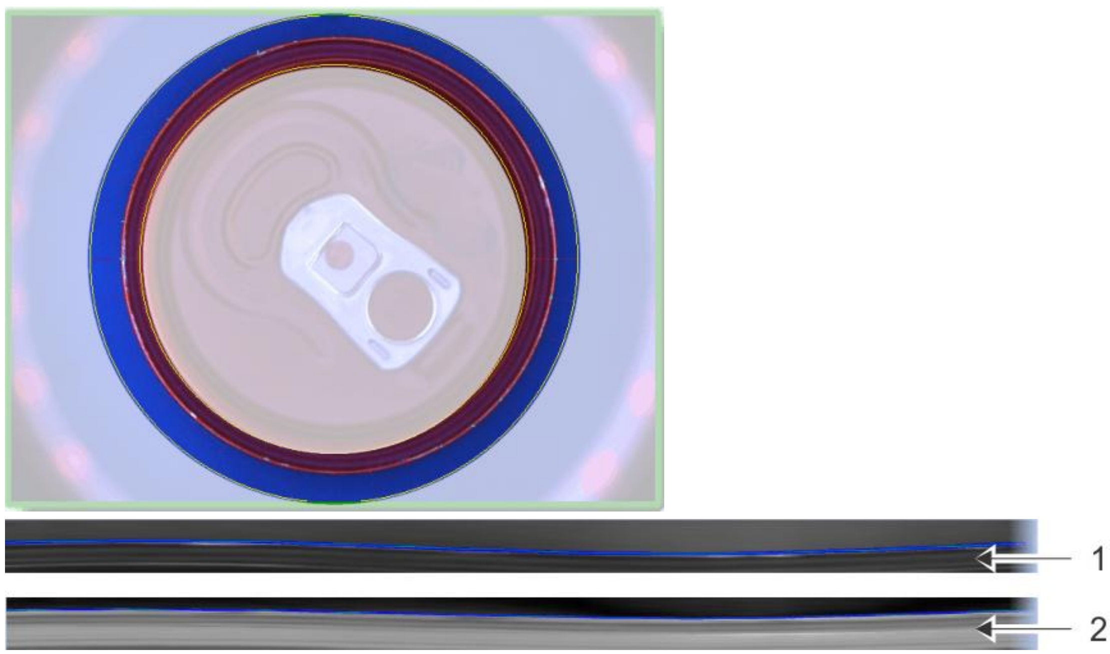
Color Distance

Color Distance is used to provide more contrast between similar colors on an image to make certain defects or features stand out. This enhancement only applies to images produced by color cameras. It is similar to the ***Absolute Difference*** (on page 220) 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 in the search region 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. This difference in pixel appearance is only displayed in the unwrapped region - not the full part 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 Distance enhancement to this image to make purple and blue stand out from each other, as shown in the unwrapped image [item 2].

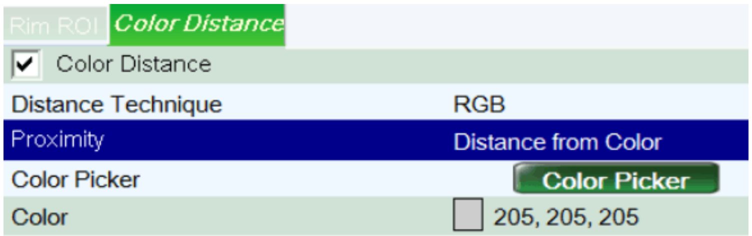


1	Normal image
2	Image with Color Distance enhancement applied

➢ ***To add a Color Distance enhancement:***

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Color Distance. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Color Distance menu is displayed and the region is shown on the image. (The menu is described below) Adjust the parameters as necessary. Experiment with values to enhance features you want to see more clearly on your part.

Color Distance menu



Color Distance

Enable the enhancement.

Distance Technique

Select how to determine the distance between two colors.
RGB - Uses the red, green, and blue components of a color.
Delta E - Uses 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.*

Proximity

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.
Closeness to Color - the closer the pixel is to the selected color, the lighter the resulting pixel will be after the enhancement.

Color Closeness

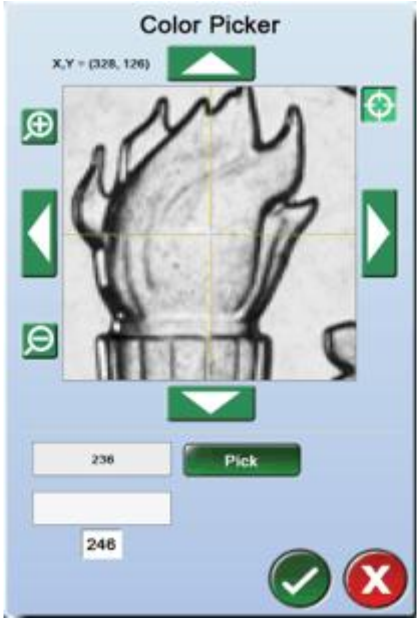
This is only displayed if Closeness to Color is selected for Proximity. Choose how large a range of pixel values can be considered close to the selected color. For example, if the setting is 6.0, then pixels within six grayscale values of the selected color have the enhancement applied. Those pixels that do not fall within the range of six grayscale values have a value of zero (black) applied.

Color Picker **(on page 223)**

Choose the desired reference color.

Color Picker

This tool is available through several Enhancements. It may be opened by Color Picker, Target Color Picker, Replacement Color Picker, or Technique Picker buttons. Regardless of the button that opens this menu, it works the same in each Enhancement. It works similar to the ***Image Magnifier*** (on page 127) found in Image Options menus.



➢ ***To use the magnifier:***

- When you first open the tool, the yellow box area over the original image is magnified. The magnified area 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  in the magnifier tool become available to move the magnified image.
- Select the zoom in button  to increase magnification. The amount of magnification available depends on the camera resolution.
- Select the zoom out button  to decrease magnification.
- 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.
- Click the OK button  to exit the magnifier.

➢ ***To pick a color:***

1. Move the cursor over the image, magnifying the image if necessary, until the desired RGB value, or color, is displayed in the box next to the Pick button. The value displayed is from the pixel in 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. Click the OK button  to exit the Color Picker.

Color Replacement

Color Replacement is used to replace a color in an image with either a different single color or a background color. This enhancement can be used with a registration, orientation, or analysis.

- *Note: this enhancement only works with images produced by a color camera.*
- *Note: the color replacement is only visible in the unwrapped image area. The part image does not change.*

To add a Color Replacement enhancement:

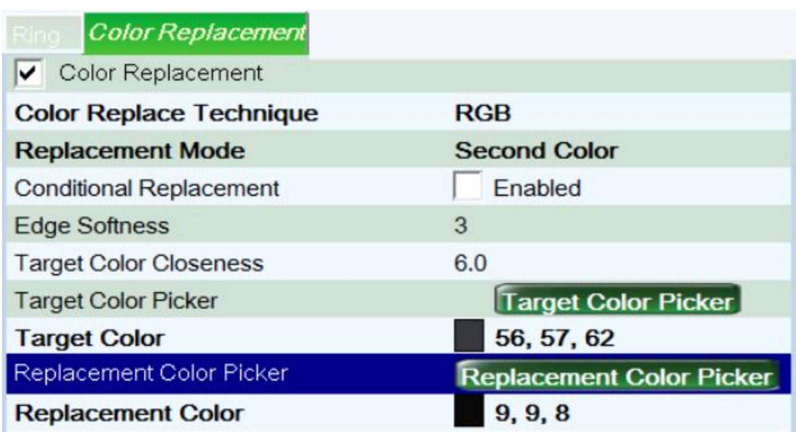
1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Color Replacement. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Color Replacement menu is displayed and the region is shown on the image. (The menu is described after the procedure) Adjust the parameters as necessary. Experiment with values to enhance features you want to see more clearly on your part.

To adjust the Color Replacement enhancement:

The parameters are described below this procedure.

1. Choose the **Color Replace Technique**. RGB is used most often.
2. Choose the **Replacement Mode** to determine whether to replace the color with another color or with the background average color.
3. Choose the color to replace by using the **Target Color Picker**, or by selecting a **Target Color** from the drop-down menu.
4. Look at the unwrapped image area to see the results. If the replaced color is not what you expected, then try another **Target Color**, or change **Replacement Mode**, or change **Color Replace Technique**.
   - To improve color replacement around the edges of color transitions, adjust **Edge Softness**.
   - To expand the range of colors to replace, adjust **Target Color Closeness**.
5. Adjust remaining parameters as necessary until you achieve the desired results.

Color Replacement menu



Color Replacement

Enable the enhancement.

Color Replace Technique

Select how to replace the color.
RGB - Uses the red, green, and blue components of a color. This is the default technique and used most often.
Delta E - Uses the color L*a*b definition of a color. See also ***Delta E in Retro-Spec Distribution inspection*** (on page 329) for more information.

Color Extract - Uses the same technique used in ***Color Extraction*** (on page 226) during the color replacement

IRY - Intensity, redness, and yellowness. This is a custom color space. See ***Color Conversion*** (on page 228) for more information.

Replacement Mode

Select how the replacement color is chosen.

Background Average - replaces the chosen color with the background color in the search region. This color is the average of all colors except the chosen color.

Second Color - replaces the chosen color with a second unique color by using either a Replacement Color Picker or the Replacement Color parameters. These items are displayed when Second Color is selected.

Conditional Replacement

This option requires a ***Template Registration*** (on page 251) 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.

Conditional Threshold

[Used when Conditional Replacement is enabled] Set the threshold to determine whether the color will be replaced.

Conditional Edge Softness

[Used when Conditional Replacement is enabled] This is used to reduce the noise impact around the color transitions.

Edge Softness

This is used to reduce the noise impact 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, thus improving the replacement of colors in these areas.

Target Color Closeness

The target color is the color to replace. A larger value allows the system to use a wider range of target colors to be replaced. For example, if you pick a white pixel and use a larger Target Color Closeness value, the system will use the white pixels as well as almost-white pixels that are close to the color you picked.

Target Color Picker

See ***Color Picker*** (on page 223).

Target Color

This is the color you want to replace. You can use the Target Color Picker (above), or select the drop-down arrow to choose from a palette.

Replacement Color Picker

[Available if Second Color is selected for Replacement Mode] See ***Color Picker*** (on page 223).

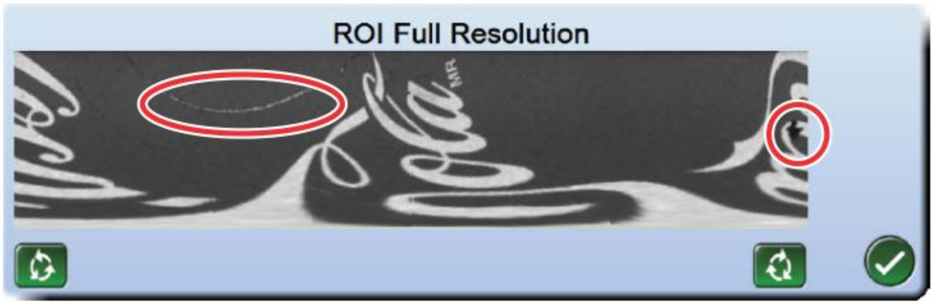
Replacement Color

This is the new color that the target color should be replaced with. You can use the Replacement Color Picker (above), or select the drop-down arrow to choose from a palate.

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** *(see "***Template Enhancement***"* *on page 228)* *enhancement instead.*



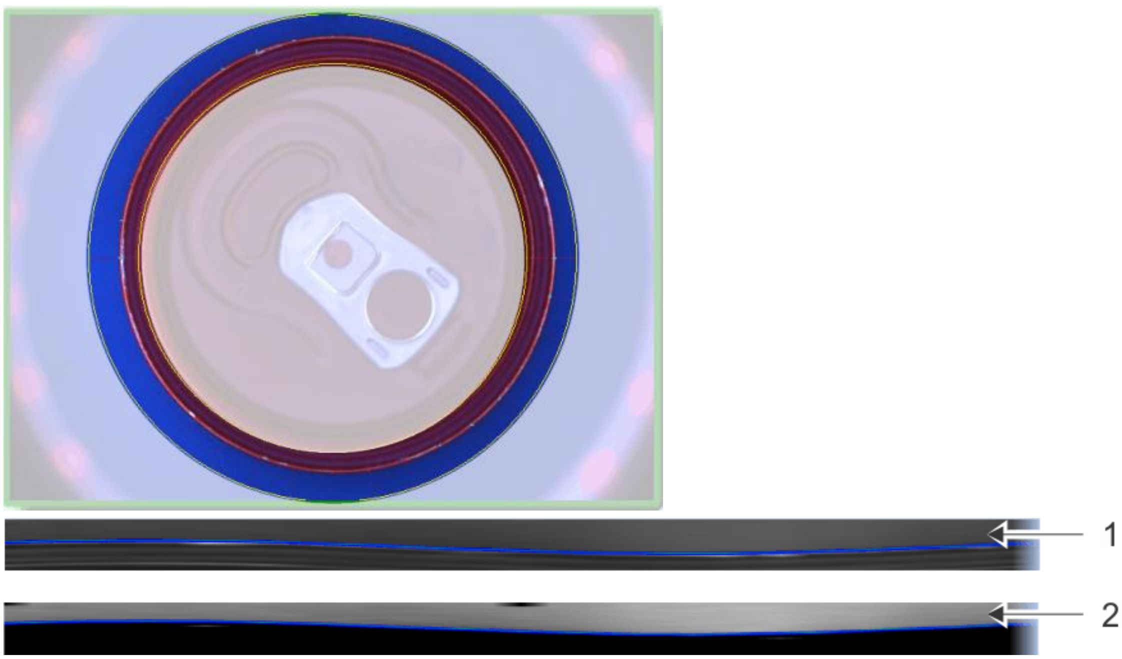
Color Extraction

Color Extraction allows you to choose a color and then the system lightens all pixels with that color. This makes certain defects or features stand out. This enhancement only applies to images produced by color cameras.

> ❖ *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].

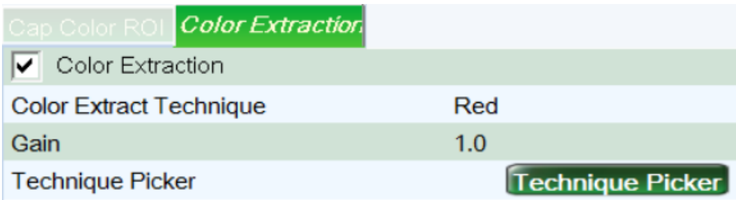


1	Normal image
2	Image with Color Extraction enhancement applied

➢ *To add a Color Extraction enhancement:*

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Color Extraction. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Color Extraction menu is displayed and the region is shown on the image. (The menu is described below) Adjust the parameters as necessary. Experiment with values to enhance features you want to see more clearly on your part.

Color Extraction menu



Color Extraction

Enable the enhancement. Use one of the following selections to choose the color you want to enhance.

Color Extraction Technique

From the drop-down menu, select the color closest to the color you want to enhance. 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 especially helpful on darker color extractions.

Technique Picker

Choose a reference color from the image. The system will determine the closest color to the choices available. Note that the system has a limited set of color filters. See ***Color Picker*** (on page 223).

Color Conversion

Color Conversion is used to convert RGB color to L*a*b* color. 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 enhancement can be used with a registration, orientation, or analysis.

- *Note: this enhancement only works with images produced by a color camera.*
- *Note: this enhancement uses a significant amount of inspection time, and should only be used when needed.*

➢ ***To add a Color Conversion enhancement:***

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Color Conversion. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you. The Color Conversion menu is displayed and the region is shown on the image.

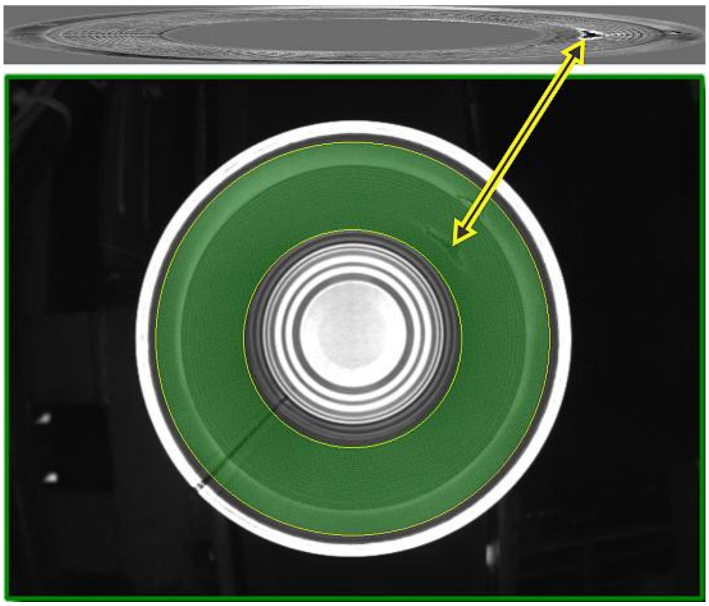
This enhancement has no parameters associated with it. You enable it or disable it. When it is enabled, this enhancement converts the image colors from RGB to L*a*b* format.

Template Enhancement

Template Enhancement creates a *difference* image between the learned population and the current part. The resulting image shows defects in the region of interest - those pixels that appear different from the learned template. This enhancement works with all inspections on all types of regions.

If you have a color image, we recommend using a ***Color Conversion*** (on page 228) prior to the Template Enhancement.

Examples of where Template Enhancement is used are when you have parts with print on the part, such as shown below. The example below shows the unwrapped region of interest after the enhancement is applied. It makes the defects stand out, making it easier to detect defects.



➢ ***To add a Template enhancement:***

1. Make sure at least one region is placed in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Enhancement > Template. The enhancement is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Template menu is displayed and the region is shown on the image. (The menu is described below) Adjust the parameters as necessary. Experiment with values to enhance features you want to see more clearly on your part.

Template menu

Set the parameters as recommended by a Pressco engineer, or use what works best for your application. As you change the parameters, look at the Unwrapped Region of Interest Display to see the results of the enhancement.

Cylindrical | *Template*

Use Color Data	☑ Enabled
Template Source	Use Internal Template
Deviation Type	Standard Deviation
Enhancement Mode	Absolute Difference
Edge Softness	3
Deviation Power	1.0
Deviation Floor	1.0
Deviation Scale	50.0

Use Color 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 enhancement then check this box. If you have a grayscale image, then uncheck the box.

Template Source

Choose the source of the template to which to compare the current image. **Internal** - the Template Enhancement creates its own template. **External** - the Template Enhancement uses a template from a previous Template Registration or Template Orientation, whichever is the closest one to the current Template Enhancement.
After you add an inspection, the template learns the data from Set A in the Retro-Spec interface.

Deviation Type

Choose the source of the data to which to compare the current image.
Standard Deviation - the differences used in the template are from the standard deviation of the learned set of images. This is the default setting and should be used unless you are instructed otherwise.
Range - the differences used in the template are from a min-max range of data.

Enhancement 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 when you have 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.

Signed Zero Level

This is only used if Enhancement Mode = Signed Difference. This is the grayshade 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 Softness

This applies to the standard deviation template image. If Edge Softness is increased, it reduces sensitivity to areas like edges and color transition areas.

Deviation Power

This raises or lowers the impact of the standard deviation value on the mismatch calculation. Leave this value at one (1) unless instructed to do otherwise by Pressco engineers.

Deviation Floor

The minimum standard deviation value that a pixel can have. Adjusting this value can reduce mismatches. We recommend leaving this value at or around six (6), and not much lower.

Deviation Scale

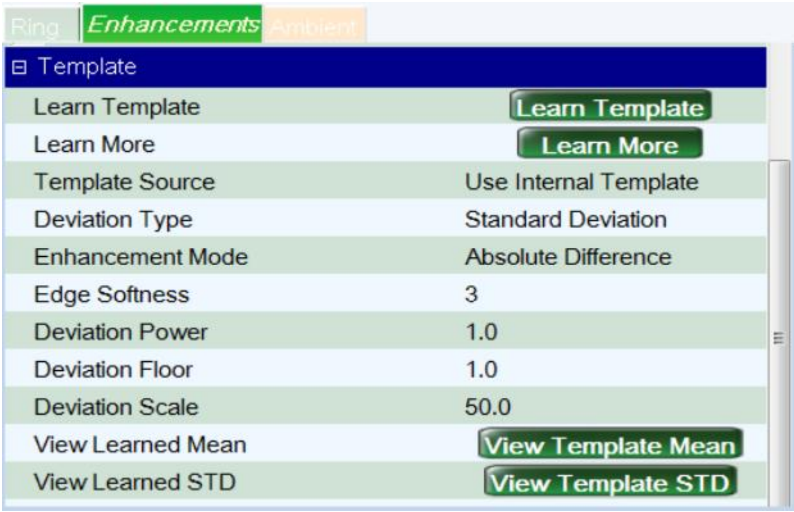
This is a multiplier. The enhancement multiplies the original difference by this amount so that defects stand out better.

Advanced Parameters for Template Enhancement

Additional parameters are available for this inspection. They are only visible when:

1. You have another inspection added after Template Enhancement, AND

2. You are viewing the Template enhancement through the other inspection mentioned in condition number 1.



Learn Template

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. Therefore, you will need a set of images in Data Set A. The data set should contain a good sample of your production line. Ideally, you should store the images of about 100 good parts in Data Set A. The larger the sample population, the better the inspection results.

- ❖ *Note: if there are any defective parts in Data Set A, they will be included in the learned data. Therefore, you might want to look through the data set using the Comparison View graph, and move defective parts 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. Use this to learn new parts where the colors might be slightly different than your original data set, but are still good parts. This builds a wider tolerance of colors for your parts. This feature can be used at any time - for example: immediately after the initial learn, or several weeks later.

- ❖ *Note: We recommend that after running the Learn function on 100 parts, you use the **Learn More** button several times to get a good sample population.*

View Learned Mean

Click the **View Template Mean** button to view the template learned when after you use the **Learn Template** button above.

View Learned STD

Click the View Template STD (standard deviation) button to to the image of the standard deviation. The darker pixels show that there is less deviation of those pixels, and the brighter pixels (usually around the edges or features) show that there is more deviation of those pixels. If there are no lighter pixels, this means that the part is good - it matched the template.

Registrations

A registration compensates for part movement by calculating the reference point on the part. All analyses follow a registration.

❖ *Note: you must first place a* **Region of Interest** *(see "***Regions of Interest (ROI)***" on page 198) where you want the Registration to take place.*

Available registrations include:

- ***Feature*** (on page 232)
- ***Center of Mass*** (on page 234)
- ***Hough*** (on page 236)
- ***Radial Edge*** (on page 240)
- ***Centerline*** (on page 242)
- ***Finish Location*** (on page 247)
- ***Template Registration*** (on page 251)
- ***Neckring Registration*** (on page 260)
- ***Measure Registration*** (on page 269)

❖ *Note: Your system (and this book) may show only those items that apply to your application.*

Hough vs. Radial Edge

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 **(on page 236)**	*Radial Edge* **(on page 240)**
Finds edges on not quite round parts	Finds edges on round parts
Works on incomplete circular features	Works on complete circular features
Takes slightly more processing time	Faster

Feature

This registration searches for the center of a specific feature that may not fall into a standard inspection shape. It looks for all the pixels within a specified gray shade range. Then you can choose whether to select the center from all the found features or just the largest feature. 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. This can work on any region type.

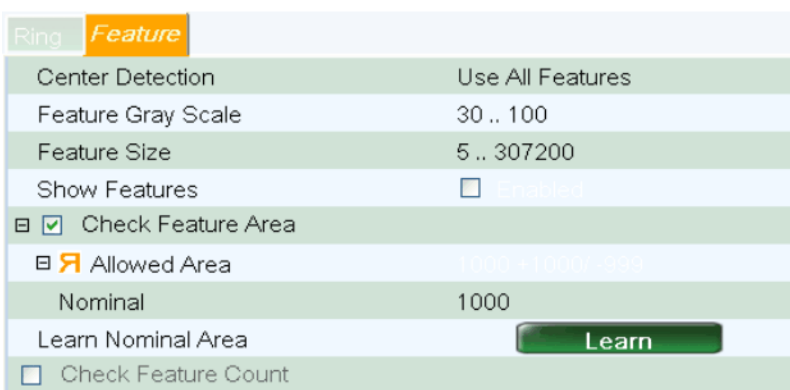
Series IV users: this is similar to Blob Registration.

The example below shows a Feature registration to find the largest feature. The center of the largest feature is used as the registration point.

➢ ***To add a Feature Registration:***

1. Make sure at least one 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 > Feature. The Feature registration is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Feature 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.

Feature menu



Center Detection

Choose whether to use the largest feature found, or all features.

Feature Gray Scale

Set the range of gray shades of the feature you want to locate.

Feature Size

Set the allowable size of the feature you want to locate.

Show Features

Highlight the found features on the image.

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 Feature Count

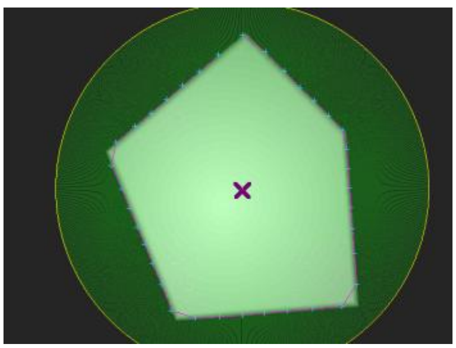
Check to see that the correct number of features is found.

Center of Mass

Center of Mass is a simple edge center routine that will take the average of all found edges and use that as the center position. This can work on any region type.

❖ *Tip: Center of Mass can be used to find edges before an* **Adaptive Region** *(on page 209) 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 add a Center of Mass registration:*

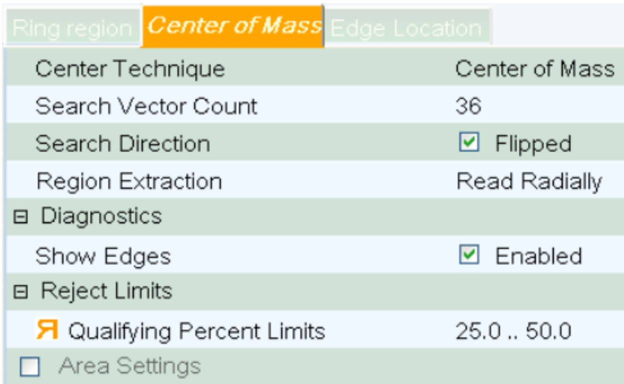
1. Make sure a Region of Interest has been added to the inspection tree. This inspection will work with any region type.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Registration > Center of Mass. The registration is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Center of Mass 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.

➢ *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

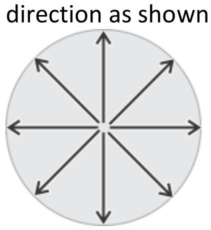
Set the number of search vectors to locate the feature on the container. More vectors provide a more accurate search, but also take more processing time.

Search Direction

Change the search to the opposite direction.

Region Extraction

Choose how the Intellispec should read the information from the region. This usually depends on the shape of your region. In this inspection, only Read Radially is used. The data is extracted in a radial direction as shown in the illustration below.



Show Edges

Show the found edges on the image.

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

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

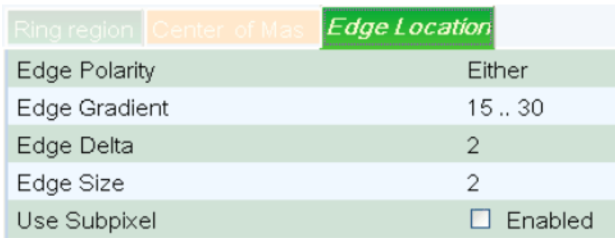
The expected area size. This number is populated when you press the **Learn** button.

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. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Edge Size

Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Use Subpixel

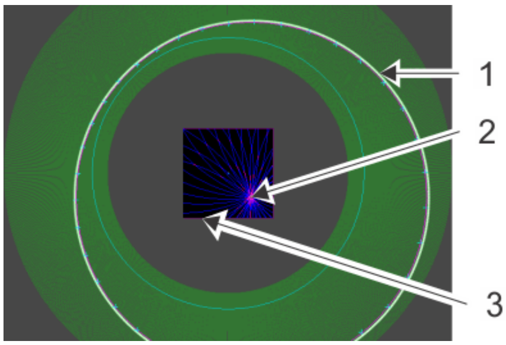
Finds edges based on their subpixel location, rather than rounding off to the nearest pixel. This gives greater centering accuracy.

Hough

This registration locates a circular feature within an image and computes the center point of that feature. It also works with features that are not quite round. An important strength of this registration is that the feature you wish to find does not need to fit completely within the camera image. As long as a good portion of the feature can be found within the image, the computed center point is accurate. It also works well if the feature you wish to find is not clearly defined for 360 degrees.

❖ *Note: Hough registration only works with a* ***Ring*** **region** *(on page 200).*

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.

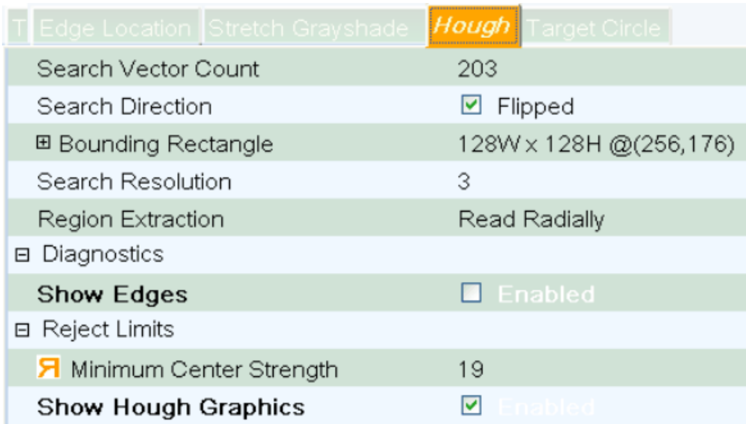
➢ *To add a Hough registration:*

1. Make sure a ***Ring Region*** (on page 200) 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 > Hough. The registration is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Hough 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.

➢ *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 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 Location parameters are set correctly, the system will automatically detect the proper 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. These menus are discussed next.

Hough menu



Search Vector Count

Set the number of search vectors to locate the feature on the container. 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.

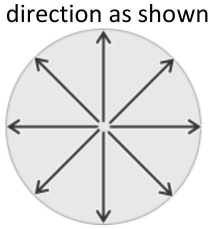
❖ *Note: larger sized Bounding Rectangles take more processing time.*

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 usually depends on the shape of your region. In this inspection, only Read Radially is used. The data is extracted in a radial direction as shown in the illustration below.



Show Edges

Show the found edges on the image.

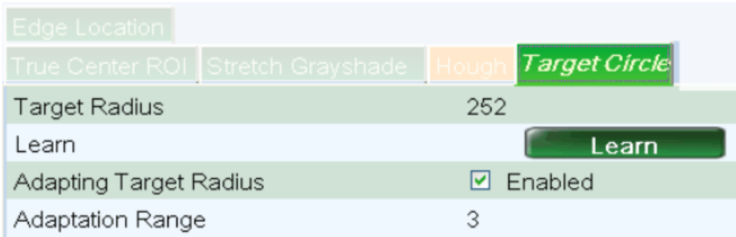
Minimum Center Strength

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. You could 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

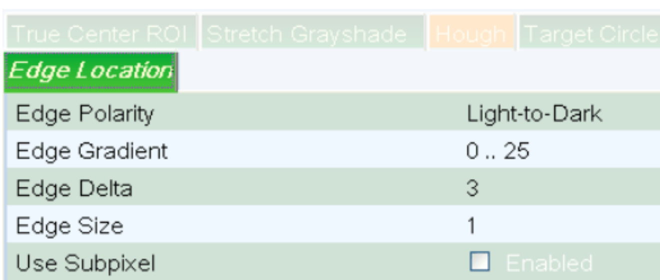
When this is enabled, the system automatically figures out the best fit for the target radius, within the inner and outer radius of the region.

❖ *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. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Edge Size

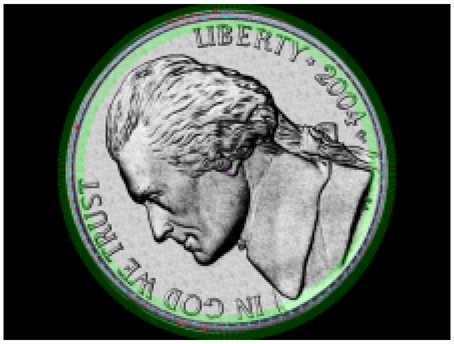
Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Use Subpixel

Finds edges based on their subpixel location, rather than rounding off to the nearest pixel. This gives 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. This only works with a Ring region. Place the Ring region where you would expect the edges of the part to fall. The system searches for edges from the inner to the outer radius (or outer to inner radius), searching for a transition from light to dark or dark to light pixels. Each search vector tries to detect an edge, using the Edge Location parameters. Found edges are marked with a cyan or red '+' for pass or fail status.



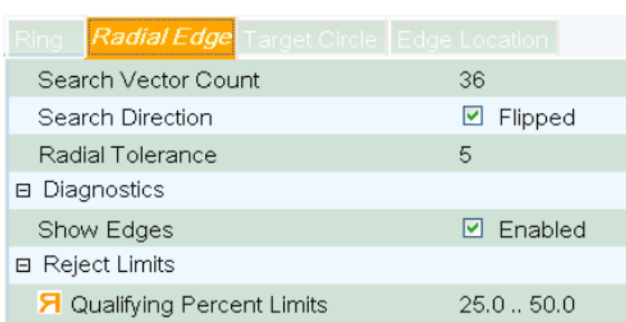
➢ ***To add a Radial Edge registration:***

1. Make sure a ***Ring Region*** (on page 200) has been added to the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Registration > Radial Edge. The Radial Edge registration is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Radial Edge 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.

➢ ***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 will automatically detect 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. These menus are discussed next.

Radial Edge menu



Search Vector Count

Set the number of search vectors to locate the feature on the container. 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.

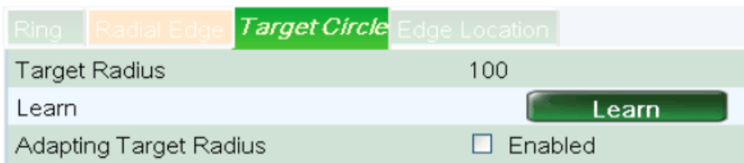
Show Edges

Show the found edges on the image.

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.

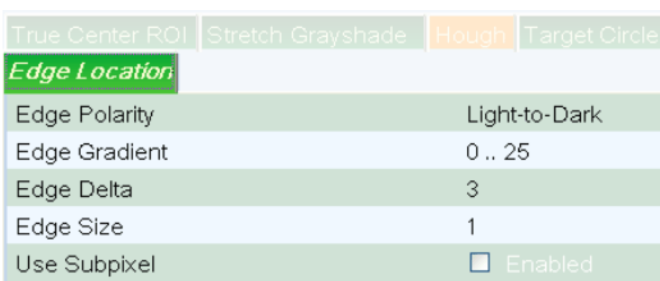
Learn button

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



Edge Polarity

Choose the type of edge to search for – Light to Dark, Dark to Light, or Either. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Edge Size

Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Use Subpixel

Finds edges based on their subpixel location, rather than rounding off to the nearest pixel. This gives greater centering accuracy.

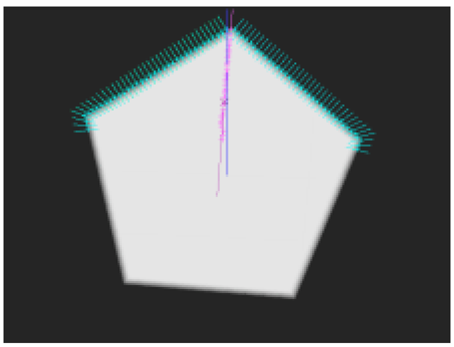
Centerline

Centerline Registration finds the sides of a container and determines the center line between them. It also computes an orientation of the container. This registration uses the mirrored polygon ribbon region. 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.

FHCP applications: *Centerline is used in place of Support Ring Registration in cases where bottles have caps that cover the support ring. In these cases, the system cannot register on the support ring, so a refined centerline is used instead. Centerline also tracks the vertical position of the part in version 5.1.021 and higher.*

Series IV users: this replaces Midline Orientation, and is similar to Shape Adapt Registration.

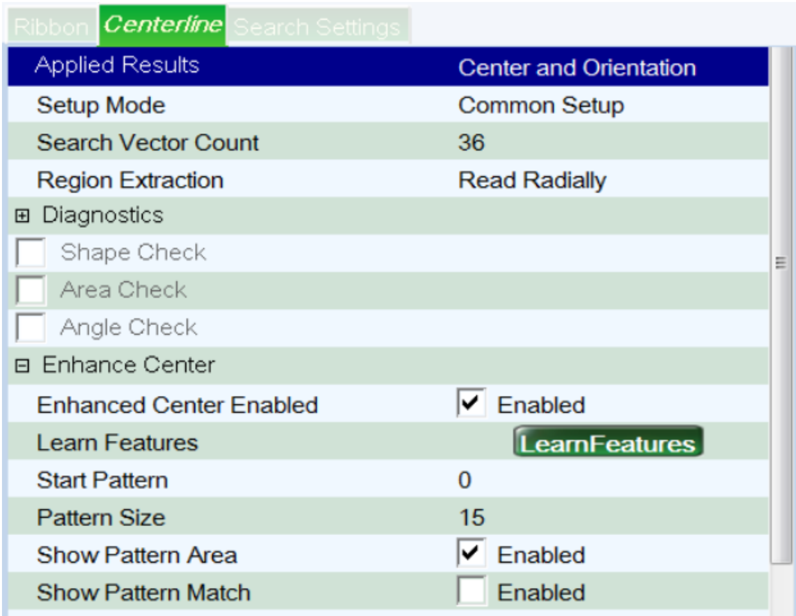
- *Note: this registration requires a* **Ribbon Region** *(on page 202) using settings: Ribbon Style = Ribbon, and Mirror Ribbon = Enabled.*
- *Tip: you can use Centerline to determine Registration plus Orientation, or just Orientation.*



To add a Centerline Registration:

1. Place a ***Ribbon Region*** (on page 202), using a mirrored ribbon.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Registration > Centerline. The Centerline registration is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Centerline 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.

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

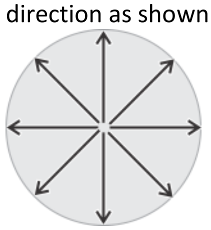
Use the same parameters to find both sides of the container (Common Setup), or set up the parameters differently for each side of the container (Individual Setup).

Search Vector Count

Set the number of search vectors to locate the feature on the container. 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 usually depends on the shape of your region. In this inspection, only Read Radially is used. The data is extracted in a radial direction as shown in the illustration below.



Diagnostics

Show Vectors

Show the search lines on the image.

Show Edges

Show the found edges on the image.

Show Alignment

Display the alignment of the current part with respect to the previous alignment.

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. The range is from one to 100 with one being the least sensitive and 100 being the most sensitive. The value of 90 is good sensitivity in almost all 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.*

Enhanced Center Enabled

Enable the search for the vertical position of the part.

Learn Features

Click the **Learn Features** 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.

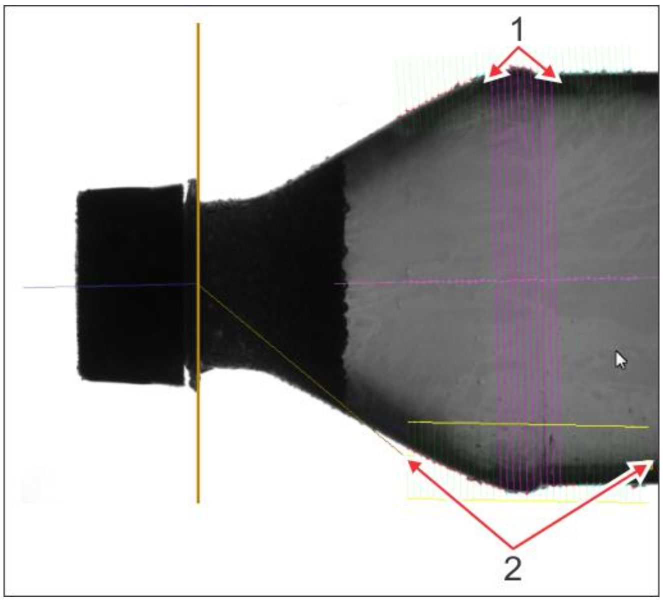
Start Pattern

Specify how many vectors down from the top of the ribbon that the pattern area should start. Check the Show Pattern Area box 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. Pattern Size in this example = 10.
2	Ribbon search region

Show Pattern Area

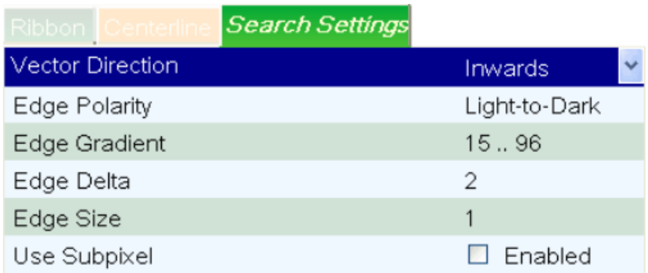
Show the vectors in the pattern area. The pattern is shown in magenta.

Show Pattern Match

Show the edges that best match the learned pattern. The pattern in shown in dark blue. When you also show the pattern area, it will overwrite the pattern area. This shows how much from the original pattern that the part has moved.

A light green line is also displayed at the top of the pattern between search vectors. The line is drawn with a cross on each side and the center position. This center position will be the part placement position.

Search Settings menu



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. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Edge Size

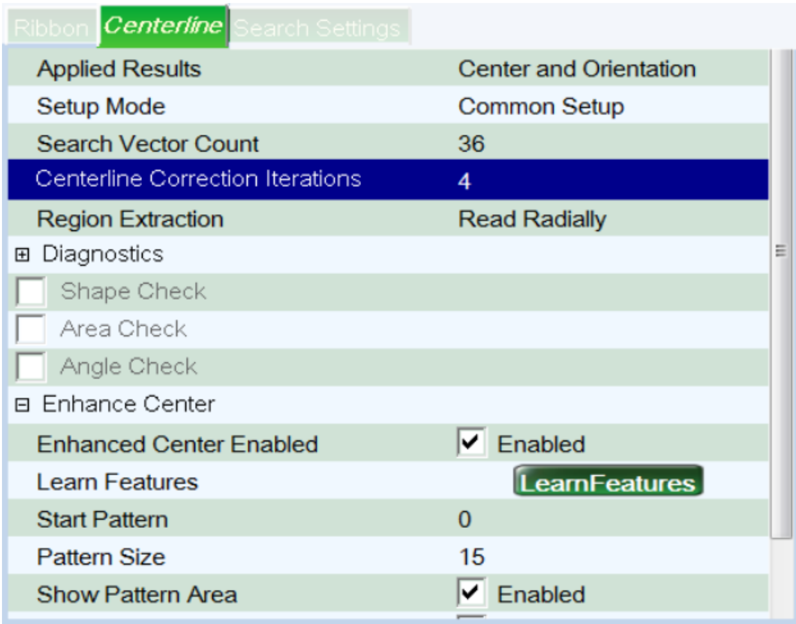
Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Use Subpixel

Finds edges based on their subpixel location, rather than rounding off to the nearest pixel. This gives greater centering accuracy.

Advanced Parameters for Centerline

One or more additional parameters are available for this inspection, only visible when you have ***Advanced parameters*** (see "***Editor Options***" on page 189) shown. You must have the "Access advanced inspection parameters" ***permission*** (see "***Managing Permissions***" on page 24) to access these parameters. The advanced parameters are described in this topic. For other parameters, refer to the description of ***Centerline*** (on page 242) inspection.



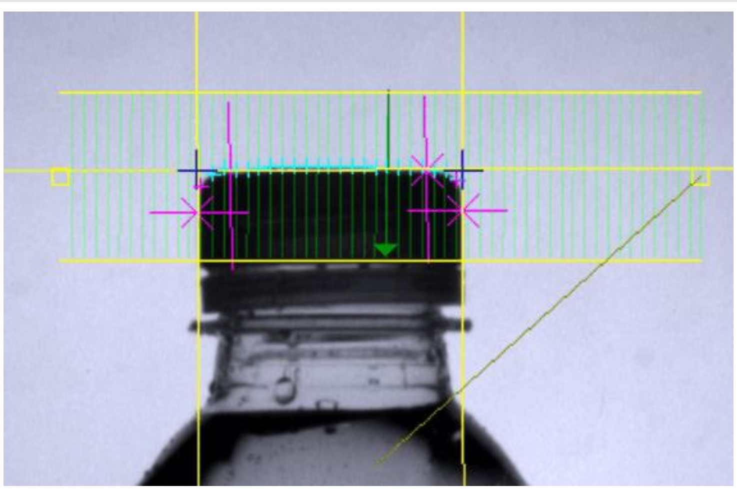
Centerline Correction Iterations

This re-computes the centerline. It allows the inspection to get a better alignment of the two sides to produce a more accurate centerline angle. Note that this adds inspection time. A setting of zero means no correction.

Finish Location

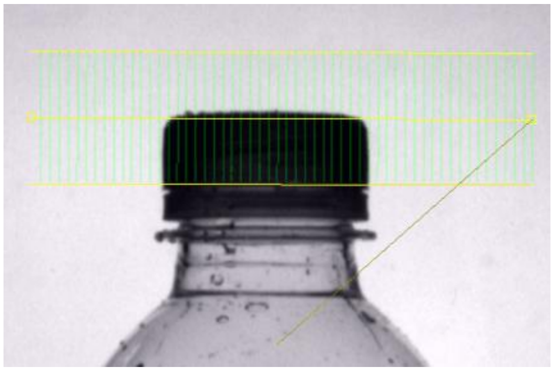
Finish Location is used to locate the top corners of a bottle. It uses a ***ribbon region*** (on page 202). Finish Location also determines part orientation, and passes on the orientation to subsequent inspections.

Series IV users: Finish Location is similar to Finish Registration in Series IV



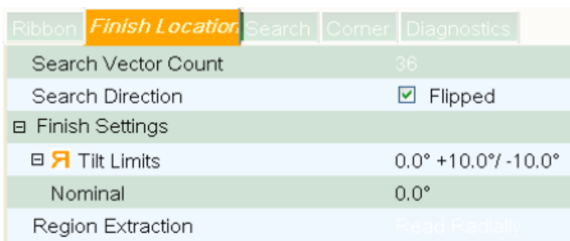
➢ *To add a Finish Location registration:*

1. Make sure a ***Ribbon Region*** (on page 202) of Interest has been added to the inspection tree. An example of region placement is shown below.



2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Registration > Finish Location. The registration is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Finish Location 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.

Finish Location menu



Search Vector Count

Set the number of search vectors to locate the feature on the container. More vectors provide a more accurate search, but also take more processing time.

Search Direction

Change the search to the opposite direction.

Finish Settings

Tilt Limits

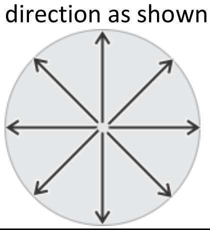
Set the allowed range of tilt of the part within the image.

Nominal

The expected degree of tilt. This is usually set to the target tilt value with the **Tilt Limits** being around this nominal. On most vertical 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 usually depends on the shape of your region. In this inspection, only Read Radially is used. The data is extracted in a radial direction as shown in the illustration below.



Search menu

Ribbon | Finish Locatio | Search | Corner | Diagnostics

Edge Polarity	Either
Edge Gradient	15 .. 30
Edge Delta	2
Edge Size	2
Use Subpixel	☐ Enabled
Edge Thickness	1

Edge Polarity

Choose the type of edge to search for – Light to Dark, Dark to Light, or Either. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Edge Size

Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Use Subpixel

Finds edges based on their subpixel location, rather than rounding off to the nearest pixel. This gives greater centering accuracy.

Edge Thickness

The number of consecutive times that the gradient must be met to define an edge.

Corner menu

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.*

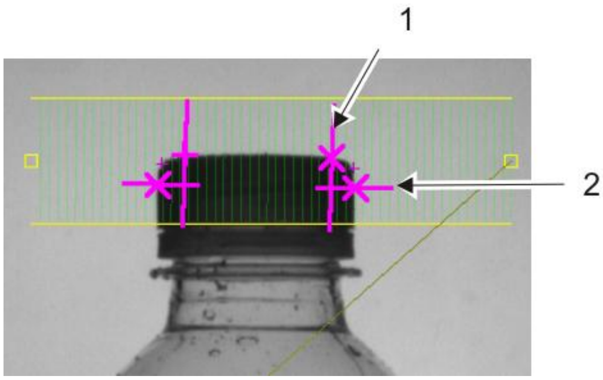
Cap Reg ROI | Cap Reg | Search | Corner | Diagnostics

Corner Desensitization	10
Top Search: Side Shift	30
Top Search: Vector Count	60
Top Search: Edges Percentage	20
Side Search: Down Shift	25
Side Search: Side Shift	-8
Side Search: Vector Count	30
Side Search: Vector Length	70
Side Search: Edges Percentage	50

Corner Desensitization

Larger values are used to 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. Note that your image may be rotated depending on application. Regardless of orientation, the top vectors search for the top of your part, and the side vectors search for the sides of your part.



1	Top vector (perpendicular to the ribbon)
2	Side vector (parallel to the ribbon)

Top Search: Side Shift

Move the top vectors closer or further away from the corner.

Top 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 minimize errors in locating the corner of the cap.

Top Search: Edges Percentage

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: Side Shift

Move the side vectors closer to or further away from the midpoint of the cap or part.

Side Search: Vector Count

Set the number of vectors to search for the sides of the cap.

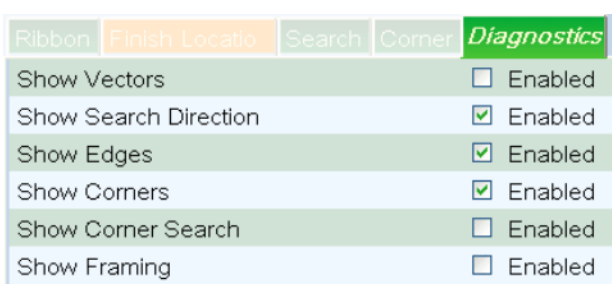
Side Search: Vector Length

Increase or decrease the length of the side search vectors.

Side Search: Edges Percentage

Set the percentage of vectors that will determine the sides of the cap. This helps ignore water droplets.

Diagnostics menu



Show Vectors

Show the search lines on the image.

Show Search Direction

Show the search direction of the vectors with an arrow.

Show Edges

Show the found edges on the image.

Show Corners

Display the location of the finish corners.

Show Corner Search

Display the search used to find the corners. You must also enable 'Show Graphics' in the ***Image Options*** (on page 164) menu.

Show Framing

Display the lines that show where the finish is located based on the projected corners.

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** *(on page 275) 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.*

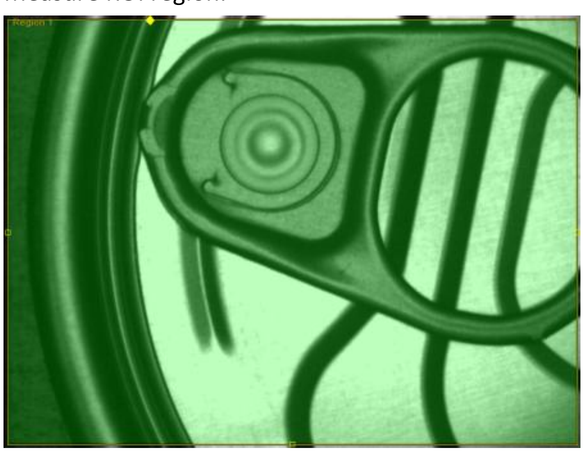
Series IV users: This is similar to Series IV Template Registration

Before adding the Template Registration:

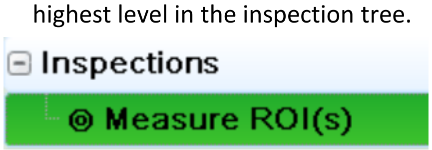
Choose Option 1 or Option 2 from the choices below.

- ***Option 1: If your part's feature appears in an unpredictable location in the image, then use the Measure ROI method:***

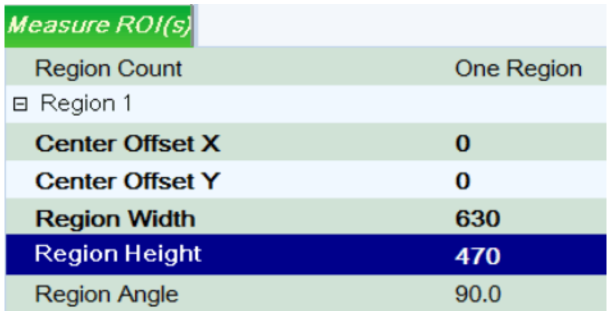
Example: for this EZO closure, we are not sure where the rivet will appear in the image. We are using Measure ROI region.



1. Add a ***Measure ROI*** (on page 205) region of interest to the part program. This can be placed at the highest level in the inspection tree.



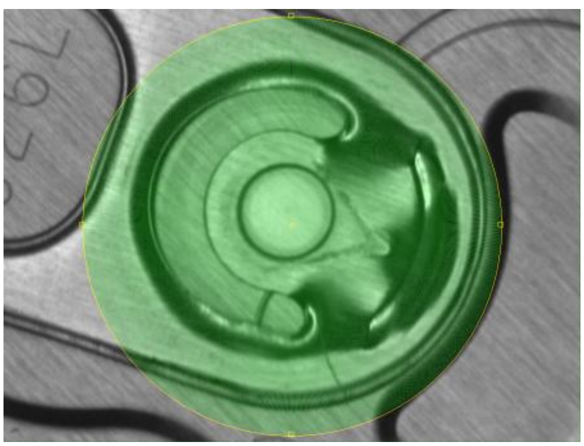
2. Leave Region Count at One Region.
3. In the Measure ROI menu, set the Center Offset X and Y to zero.



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, respectively. This allows a five pixel margin around the inspection window.
   - If you have a 1360 x 1024 image, then set Region Width and Region Height to 1350 x 1014, respectively. This allows a five pixel margin around the inspection window.
5. Click the OK button to save changes and exit the menu.
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 to save changes and exit the menu.
3. Add a Template Registration.

➢ *To add a Template Registration:*

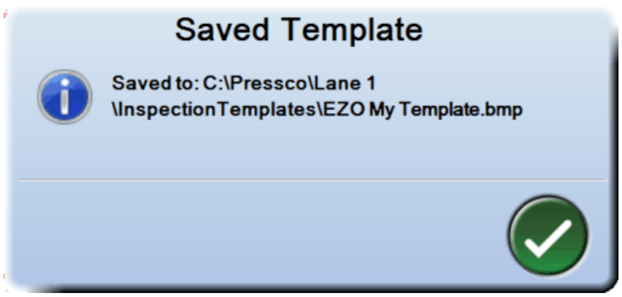
1. Make sure a region has been added to the inspection tree, as described above in either Option 1 or Option 2.
2. Acquire about 100 images to get a good sample population of part images:
   - Put the lane online, long enough to acquire about 100 images. Take the lane offline.
   - **OR**: Use ***Offline Imaging*** (on page 132). Right-click the Sensor button to see the Sensor menu > select 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 > Registration > Template Registration. The registration is added to the inspection tree. Re-name it to something more meaningful to you. The Template Registration menus are displayed and the region is shown on the image. (The menus are described below)
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**."
6. If you are inspecting a part with deco, then leave the Perform Orientation box checked.
7. Go to the Settings menu and click the **Standard Settings** button.

Next, choose an image and save it as a seed image. A **"seed" image** is a sample image that the system uses when creating an average image for the template.

➢ *To save a seed image:*

1. From the Retro-Spec inspection screen, find an image that represents a regular part - not the best image, not the worst image, but a typical part image. Use the forward/ backward arrows to scroll through the acquired images.
2. If necessary, adjust the region size and placement to cover an area where there is a repeatable and distinct grayscale pattern.
3. Go to the Template menu (described below) and click the **Save Seed** button. An on screen keyboard is displayed.
4. Name the seed image and click the OK button to save. A Saved Template dialog box is displayed with the name and location of the saved template image.



5. Click the OK button to close the message.
6. 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. You can set the remaining parameters of the Template menu at a later time.

OPTIONAL: Select a **Template Region type**. The system will look at a smaller portion of the region to save inspection time (In our example, we want to 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**."*

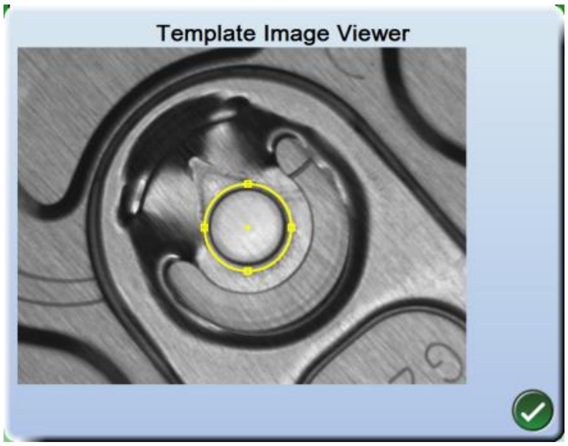
➢ *To select a Template Region type:*

1. In the Template menu, select a Template Region type: either Ring Region or Polygon Region, depending on the feature you want to locate. In our example, we want to find a circle, so we choose Ring region. (The region types are discussed in the section titled "Template menu")
   - Notes about using Ring or Polygon region:

   a) The registration does not perform an orientation when looking for this region. The feature used for the polygon or ring region must be located in the same place on each part.

   b) Template Region is only used with a **seed** image. If you later use "Create Template," then the inspection uses the entire created prior to adding the Template Registration inspection. It ignores this ring or polygon region.
2. Click the **View Editor** button. The Template Image Viewer is displayed with the template image.

3. Click inside the region in the Template Image Viewer image to adjust its size and position. Use the yellow boxes as points to adjust the region. Moving one yellow box adjusts all four boxes, making the ring either larger or smaller. Wait while the system updates the image. An example is shown below.
   - Right-click in the Template Image Viewer to view the **Image Options** menu. Turn on or off options to change the region and use as needed.
   - If using a **Polygon Region**, 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.
   - Remember that the center point is also a ring (if using a Ring Region). It can be adjusted to create a donut shaped region.

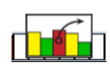


4. Click the OK button in the Template Image Viewer to save changes and exit.

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 Template Region, then you will NOT use the Create Template section described below.

➢ ***FOR MOST APPLICATIONS: To adjust the registration:***

1. In the Retro-Spec graph, or using the forward and backward arrows below the image, view all the images in Data Set A. If necessary, use the  or 

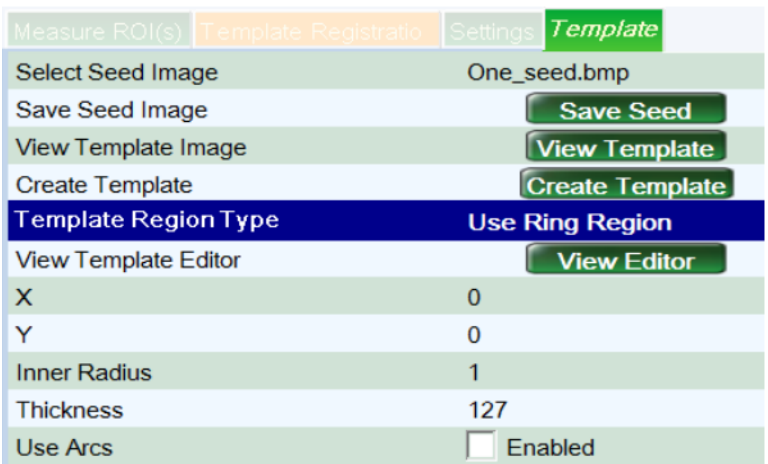
buttons to acquire more images. You want a range of part images that represent your production line. They do not have to be perfect images, but you should remove images of parts that should obviously be rejected.
2. Delete images of any parts that should not be part of the sample population:
   a) Click 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*** (on page 191).
   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 Settings 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  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



Select Seed Image

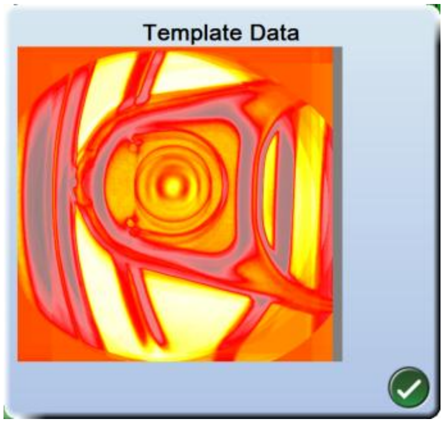
Select the image from the drop-down menu to use as the template. You must first "Save Seed" image(s) to create a list of images from which to choose.

Save Seed Image

Choose the best possible image from the part images in the Retro-Spec interface, and click the **Save Seed** button. Name the image using the onscreen keyboard provided. When you click the OK button to save, the bitmap image is saved to the current lane and sensor. For example: C:\Pressco\Lane 1\InspectionTemplates\dime_10.bmp.

View Template Image

To verify that you have selected the correct template image, click the **View Template** button. A pop-up window displays the saved template image. An example is shown below. Note: displaying the template image does not display it in the Intellispec image area.



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.

Template Region Type

❖ *Note: most applications use Inspection Region. If you use **Ring** or **Polygon** region, then the system only uses a **seed** image as the template (not Data Set A, as is used when you click Create Template).*

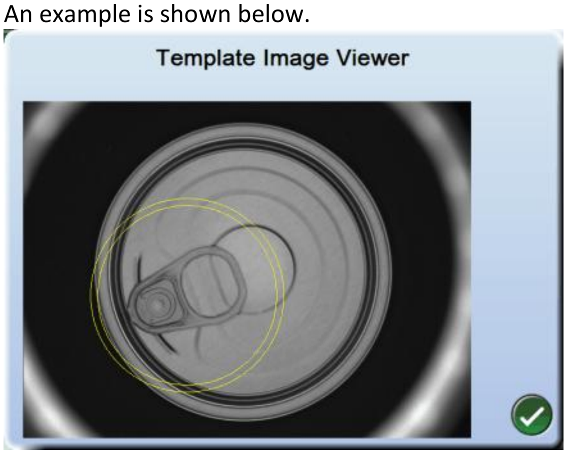
Select the region to use for the template region.

- **Use Inspection Region** - Use the region of interest already set up prior to this inspection.
- **Use Ring Region** - Create a region smaller than the search region, to speed up inspection time.
- **Use Polygon Region** - 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 View Editor button to create the polygon. In the Template Image 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 Use Ring Region is selected for Template Region Type. View Template Editor is also used when Use Polygon Region is selected.*

View Template Editor

To move the region, click the **View Editor** button. A pop-up window displays the saved template image with a region. Click in the image to move the region. Right-click in the viewer for more options. An example is shown below.



Note: the content in the image viewer does not display in the Retro-Spec image area.

X and Y

Enter the X and Y offset coordinates for the center of the region you want to establish as your template region. These values are set as a number of pixels away from the center of the search region.

Inner Radius

Size of the inner ring.

Thickness

The thickness of the ring; outer radius minus inner radius.

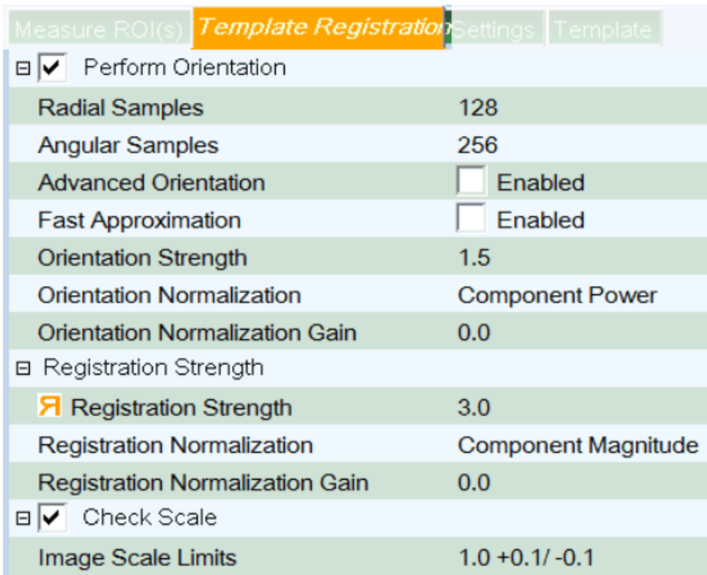
Use Arcs

This is normally NOT used in this inspection. If enabled, it divides the ring region into arc segments.

View Seed or View Editor

View the selected seed image through the Template Image Viewer. This is the image you selected through "Select Seed Image."

Template Registration menu



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*** (on page 275) to save inspection time.

The following parameters are only used if Perform Orientation is enabled.

Radial Samples

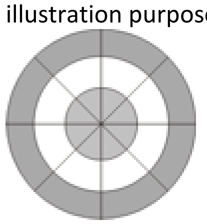
This number divides the region into a number of rings. See example under Angular Samples below.

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

This number divides the region into a number of arcs. See example below.

Example: This example shows a region with three (3) radial samples and eight (8) angular samples. (Note: these values are not available in the inspection. These examples and shading are for illustration purposes only.)



Advanced Orientation

If this is enabled, it provides an enhanced technique to perform the orientation. Note that this increases inspection time.

Fast Approximation

This is not used.

Orientation Strength

Set the minimum strength, or quality, you require for 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.

Orientation Normalization

Normalization 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. Use the technique that works best for your parts. We recommend trying the techniques in this order:

- Component Power- default, used in most applications.
- Component Magnitude - try this as a second option.
- Global Power - try only if Component Magnitude or Component Power do not work for your part.
- Phase Only - not used.

Orientation Normalization Gain

Leave this set at zero.

Registration Strength

Set the minimum strength, or quality, you require for registration between the inspected image and the template image. This sets the pass/ fail limits. You can set this using the horizontal bar on the Retro-Spec graph (after you select this parameter in the menu).

Registration Normalization

Normalization uses template data as a reference and compares it to current part data. Normally this does not need to be changed from Component Magnitude. If you are getting inconsistent results, try another technique. Use the technique that works best for your parts. We recommend trying the techniques in this order:

- Component Magnitude - default, used in most applications.
- Component Power - try this as a second option.
- Global Power - try only if Component Magnitude or Component Power do not work for your part.
- Phase Only - not used.

Registration Normalization Gain

Leave this set at zero.

Check Scale

We recommend that you 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.

Image Scale Units

[Only used when Check Scale is enabled] Restrict how much the size of the inspected image is allowed to be adjusted to match the template image. A value of one (1) indicates that the size matches exactly. A value less than one means that the image needs to be reduced to match the template. A value greater than one means that the image needs to be enlarged to match the template. If you use this parameter, be aware that it adds time to the inspection. Also know that a setting of 0.9 to 1.1 means that there could be 10% variation in either direction from an ideal part.

Settings menu

Use the suggested rules, described below, for optimum inspection.

Measure ROI(s) | Template Registratio | Settings | Template

Standard Settings	Standard Settings
Downsize Level	Disabled
Grain Reduction Technique	Disabled
Contrast Compression Technique	Disabled
View Filtered Region	View Filtered Region
Polar Inner Radius	0
Polar Outer Radius	90.0
Offset Center X	**4**
Offset Center Y	0
Select Center Offset	Select Center
Color to Grayscale	☐ Enabled

Standard Settings

Click the **Standard Settings** button to automatically set **Radial Samples** and **Angular Samples** based on the current region settings. In Template Registration, this refers to settings in the Template Registration menu only if Perform Orientation is enabled.

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.
Enabling this option looks at the region differently by grouping pixels. The system will look at pixels in groups of 4 (Level 1), 16 (Level 2), or 64 (Level 3). Larger values reduce the image further, speeding up the inspection at the cost of resolution.

Grain Reduction Technique

This is an optional filter. 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.

Contrast Compression Technique

This is an optional filter. Enable this feature only if your part has low-frequency changes such as shadows that are causing inspection problems. Use the technique that works best on your part.

View Filtered Region

[Only applicable if any of the filter techniques above are being used] This displays the image area using the filters.

Polar Inner and Outer Radius

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.

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.

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.

Color to Grayscale

Not used.

Neckring Registration

The Neckring Registration is used in the filling application to locate both sides of the neck ring on a bottle and then position the following inspections with respect to these points. This registration always uses a ***Measure ROI*** (on page 205) Region. The Neckring registration finds the edges of the neck ring, then it computes the tilt of the bottle.

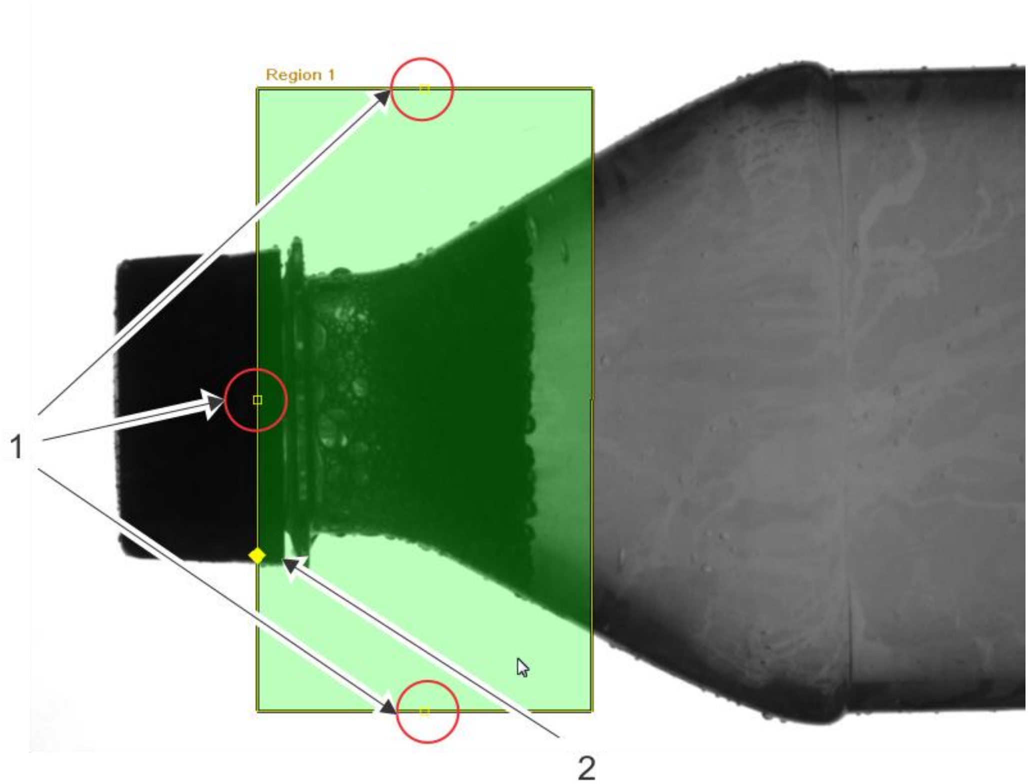
Note: Neckring is the new name for Support Ring Registration that was available in version 5.1 software.

❖ *Note: Neckring Registration requires a* **Measure ROI** *(on page 205) region.*

➢ ***Before adding a Neckring registration:***

Add a ***Measure ROI*** (on page 205) Region of Interest to the inspection tree (if you do not already have one). This region of interest should cover the neckring, a portion of the cap, and enough of the bottle so that it can accurately determine the tilt of the bottle. It should also be wide enough to accommodate some part movement in the camera's field of view, but not so wide that adjacent bottles can be seen in the region of interest.

- The Measure ROI region of interest should be oriented such that the search direction (yellow diamond) is pointing towards the cap.
- A sample Measure ROI placement is shown below.

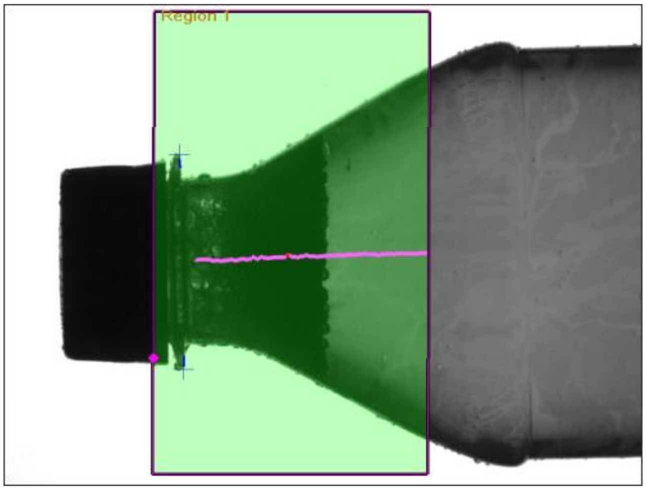


Measure ROI placement for Neckring Registration	
1	Measure ROI re-sizing handles. Make sure these are oriented towards the cap and sides.
2	Yellow diamond indicates search direction. Make sure search direction is towards cap.

Next add a Neckring registration.

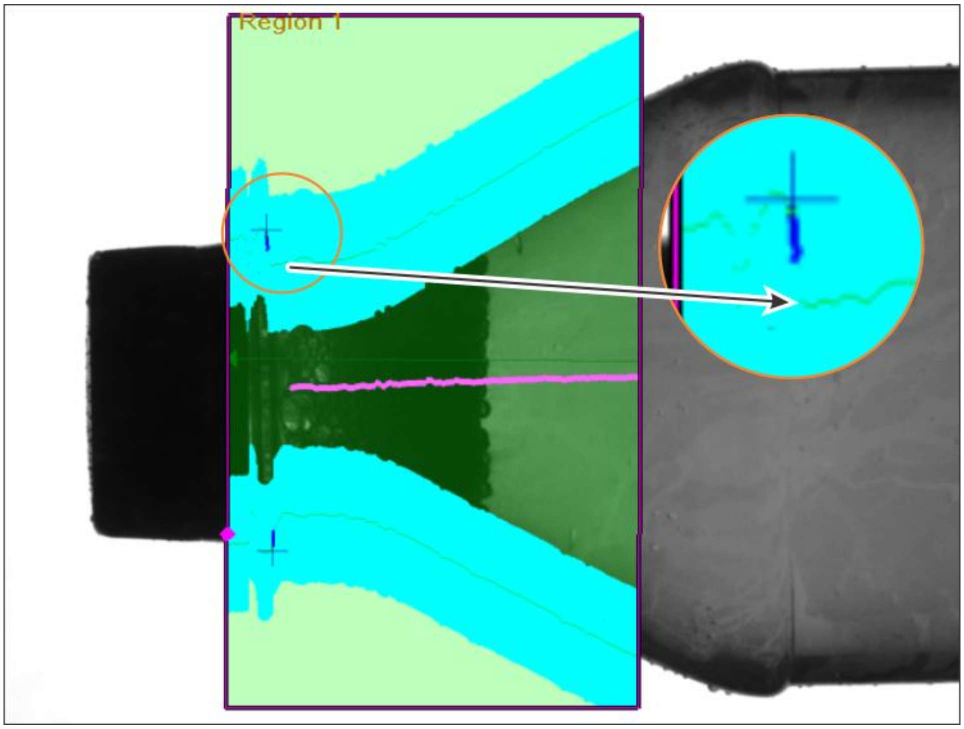
➢ *To add a Neckring registration:*

1. Make sure a Measure ROI region of interest has been added to the inspection tree. A sample Measure ROI placement is shown above.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Registration > Neckring Registration. The registration is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Neckring menus are displayed and the region is shown on the image. (The menus are described after the procedures) Adjust the placement of the region and parameters as necessary.

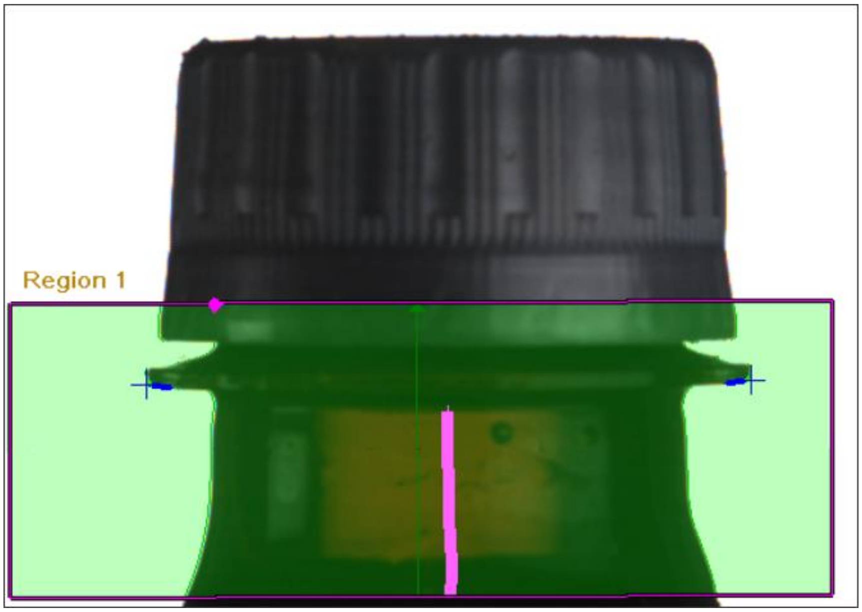


➢ *To set up the Neckring Registration:*

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).
   a) To see the effects of these settings, go to the Neckring Registration menu and enable Show Vectors, Show Search Direction, and Show Edges.
   b) 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 disable "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 normally use a wide range for Tilt Limits values.
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 neckring search is shown below.



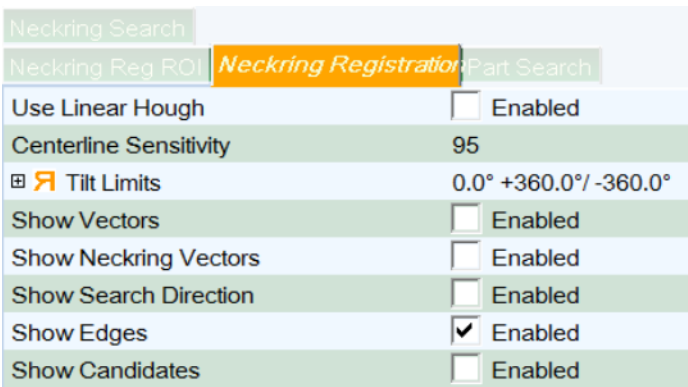
How the neckring search works

➢ ***The registration finds the neckring as follows:***

1. It uses the parameters in the Part Search menu to search from the bottom of the bottle to the top, looking for edges on the outside of the bottle, as well as the neckring and cap.
2. It finds edges on the bottle and compares the edges, looking for a large jump in the direction perpendicular to the bottle (indicating the neckring). It creates "neckring candidates" when it finds these large jumps. You will see a blue "X" in the candidate location if you check the Show Candidates box in the Neckring Registration menu. You will see a red "X" if a candidate was found but did not meet inspection criteria. For example, this could happen if the system sees a large water droplet.
3. When a potential neckring candidate is found, the inspection uses the parameters in the Part Search menu to verify that the candidate is part of the actual neckring and not a piece of flash or large water droplet.
4. When the inspection determines the actual neckring points, it places a blue "+" in those locations.
5. The parameters in the Neckring Search are used to locate the underside of the neckring for more accuracy.

Neckring Registration menu

Use the Neckring Registration menu to locate the neckring. Use the settings recommended by Pressco support engineers, and adjust as necessary for your part.



Use Linear Hough

Do not use this feature, as of the date of this publication.

Centerline Sensitivity

Set the orientation sensitivity. The range is from one to 100 with one being the least sensitive and 100 being the most sensitive. The value of 90 is good sensitivity in almost all cases.

Tilt Limits

Set the allowed range of tilt of the part within the image.

Nominal

The expected degree of tilt.

❖ *Note: for the following parameters, you must also Show Graphics. Right-click over the part image and make sure Show Graphics is checked.*

Show Vectors

Show the search lines on the image.

Show Neckring Vectors

Show the gray vectors that are searching for the neckring.

Show Search Direction

Show the search direction of the vectors with an arrow.

Show Edges

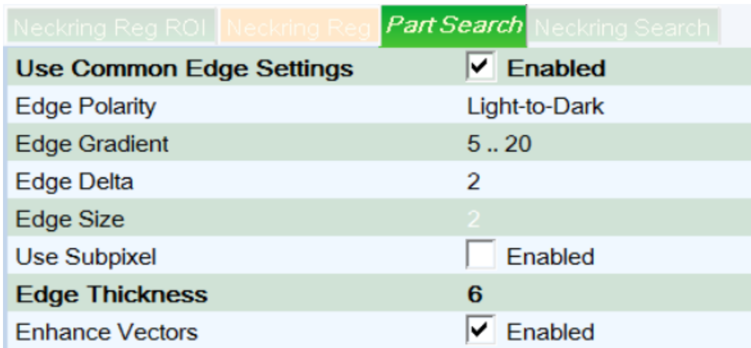
Show the found edges on the image.

Show Candidates

Show the potential neckring positions.

Part Search menu

The settings in this menu determine which edges are used to find the sides of the bottle and the neckring.



Use Common Edge Settings

Typically, you would leave this box un-checked. This allows the search for the neckring 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. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Edge Size

Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Use Subpixel

Finds edges based on their subpixel location, rather than rounding off to the nearest pixel. This gives greater centering accuracy.

Edge Thickness

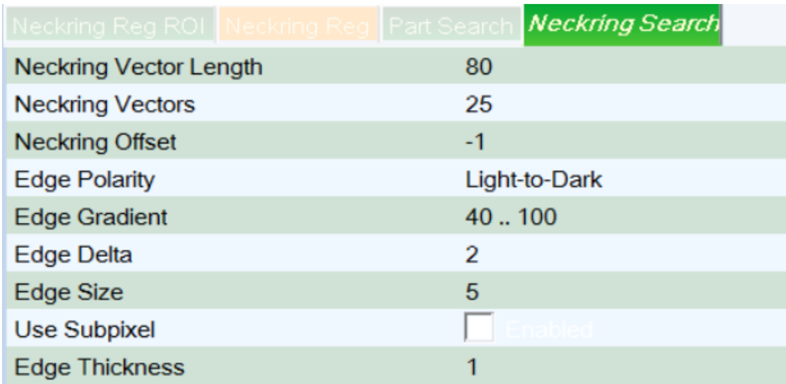
The number of consecutive times that the gradient must be met to define an edge.

Enhance Vectors

Computes an average pixel value from a neighborhood of 3x3 pixels around each pixel of the vector.

Neckring Search menu

Use the Neckring Search menu to find the edges along the underside of the neckring and then locate the outer edges.

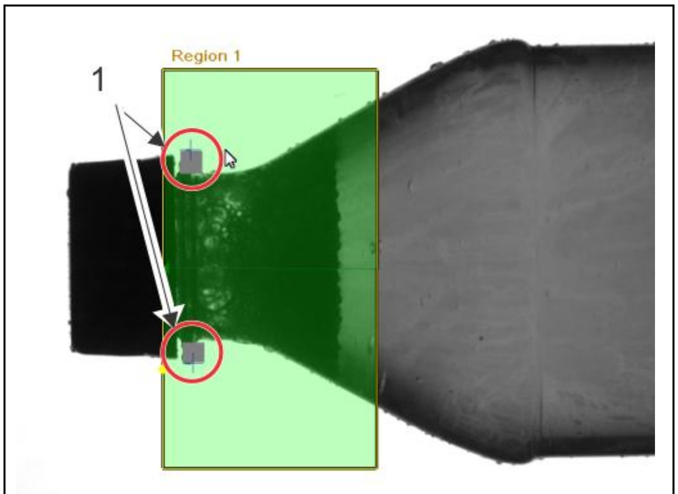


Neckring Vector Length	80
Neckring Vectors	25
Neckring Offset	-1
Edge Polarity	Light-to-Dark
Edge Gradient	40 .. 100
Edge Delta	2
Edge Size	5
Use Subpixel	Enabled
Edge Thickness	1

❖ *Note: if "Use Common Edge Settings" is enabled on the Part Search menu, then only the first three parameters are shown in this menu.*

Neckring Vector Length

The length, in pixels, 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.

Neckring Offset

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. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Edge Size

Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Use Subpixel

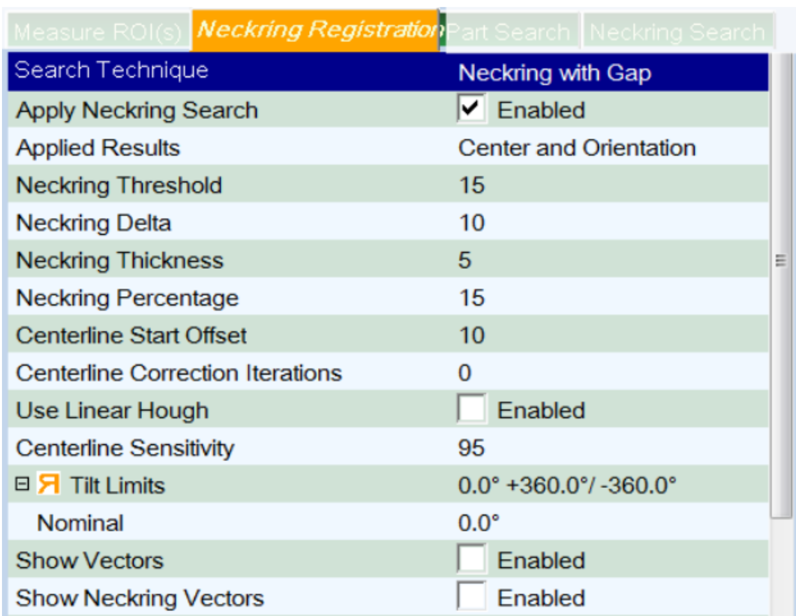
Finds edges based on their subpixel location, rather than rounding off to the nearest pixel. This gives greater centering accuracy.

Edge Thickness

The number of consecutive times that the gradient must be met to define an edge.

Advanced Parameters for Neckring Registration

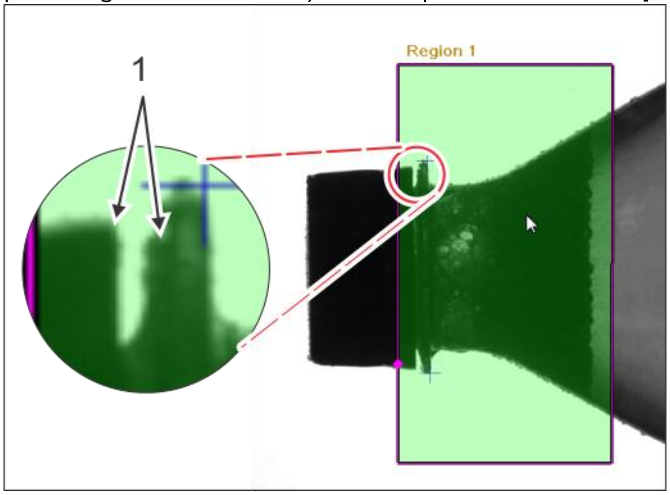
One or more additional parameters are available for this inspection, only visible when you have ***Advanced parameters*** (see "***Editor Options***" on page 189) shown. You must have the "Access advanced inspection parameters" ***permission*** (see "***Managing Permissions***" on page 24) to access these parameters. The advanced parameters are described in this topic. For other parameters, refer to the description of ***Neckring Registration*** (on page 260).



Search Technique

Choose a technique based on your part type:

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. The system looks for a transition out from the part (Neckring Threshold), followed by a width (Neckring Thickness), then a return back toward the part (automatically set as a percentage of the threshold). An example is shown below. [item 1 = gap].



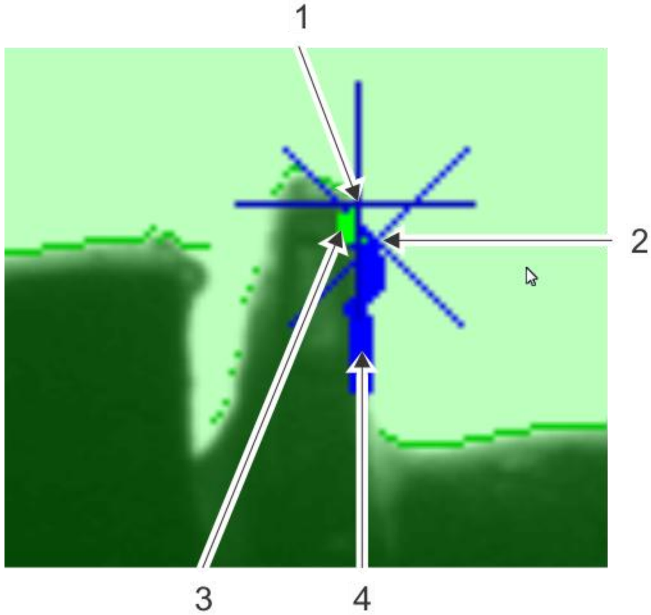
Neckring with No Gap - This works well when the closure sits right on top of the Neckring. The system looks for a transition out from the part (Neckring Threshold), followed by a width (Neckring Thickness).

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. An example of a part where this feature would be used is shown below.

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, shown [item 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. The example orange juice bottle shown above (under Furthest Out Feature) is a case where the necking cannot be used for the search. Therefore, we would keep Apply Neckring Search off for the orange juice bottle.



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 Percentage**.
4	Blue edges are ignored. Percentage of edges is set by **Necking Percentage**.

Applied Results

The Neckring Registration can produce a left and right position, centerline, as well as orientation of the bottle. This parameter allows you to choose which results to use. In some cases, you may not want the orientation result, for example.

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.

Neckring Threshold

The minimum distance you expect the Neckring to extend from the profile of the bottle. Set this value at a minimum distance, such as 15. Setting this value too high may make the inspection less accurate if there is water under the Neckring.

Neckring 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.

Neckring Thickness

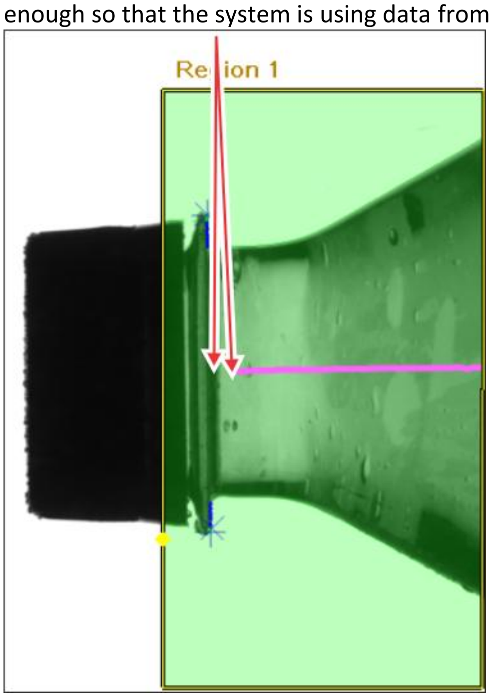
The minimum width (in pixels) that you expect the Neckring to be. You can usually set this to a small value, such as five.

Neckring Percentage

The percentage of vectors that will determine the bottom of the Neckring. This is used to eliminate false edges that might occur if water droplets are hanging from the bottom of the Neckring. It also helps to ignore flash that might occur on the bottle. For example, 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. For example, if this is set to 10, then the registration will determine the tilt of the bottle starting at the 10th vector down from the Neckring corner points. 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. A value of zero does no correction.

Measure Registration

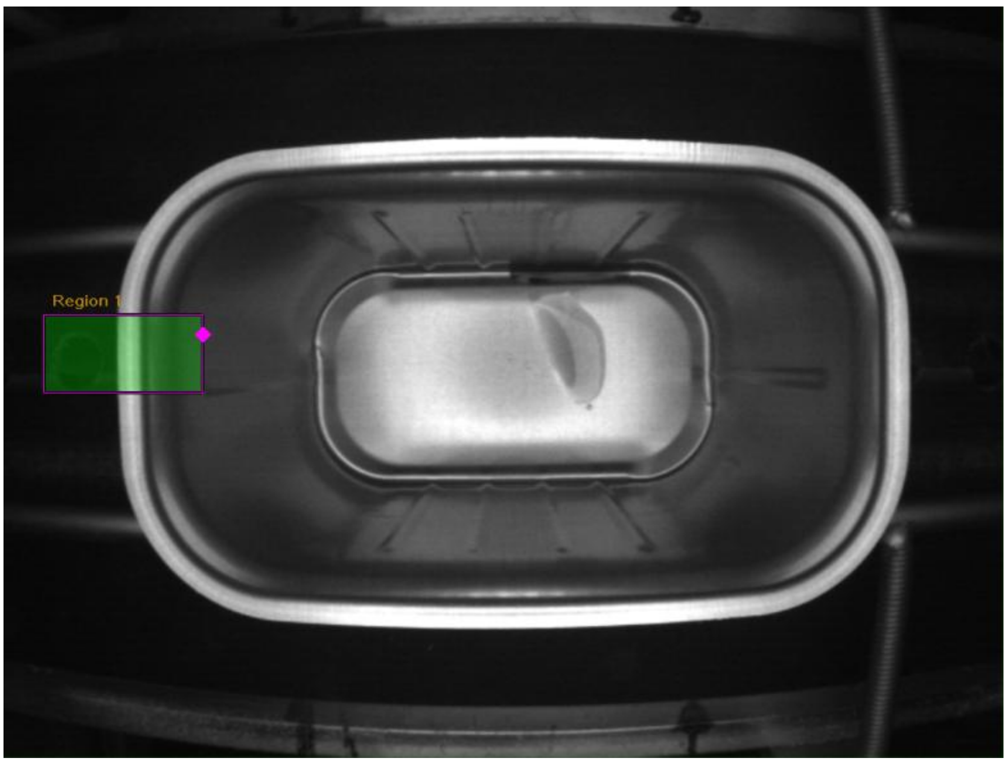
Measure Registration is used for rectangular or other non-round parts. This registration finds one edge of a part (vertically, horizontally, or at an angle) and places inspections relative to this edge. It uses edge search criteria to find the average edge location in a Measurement ROI region.

Series IV users: This registration is similar to X-Y registration, except that you set up separate regions for the X and Y searches.

❖ *Note: This registration uses a* **Measure ROI** *(on page 205) region.*

➤ ***To add a Measure registration:***

1. Add a ***Measure ROI*** (on page 205) region of interest to the inspection tree. Place the region where the system will consistently see an edge. An example is shown below. If you want to search both X and Y directions, place one region that will search in the X direction. You can set up another region and Measure Registration for the Y direction later. You can even set up a diagonal region to locate a corner, if desired.



2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Registration > Measure Registration. The registration is added to the inspection tree. Re-name it to something more meaningful to you.
4. The 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. The menu is described below.

Measure Registration menu

Set the registration parameters to locate the edges.

Measure ROI(s)	Measure Registration
Vector Spacing	1
Max Missed Edges	2
Edge Polarity	Dark-to-Light
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
Average Edge Percentage	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. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Size

Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Enhance Vectors

Computes an average pixel value from a neighborhood of 3x3 pixels around each pixel of the vector.

Show Edges

Show the found edges on the image.

Show Vectors

Show the search lines on the image.

Show Search Direction

Show the search direction of the vectors with an arrow.

Show Measurement Positions

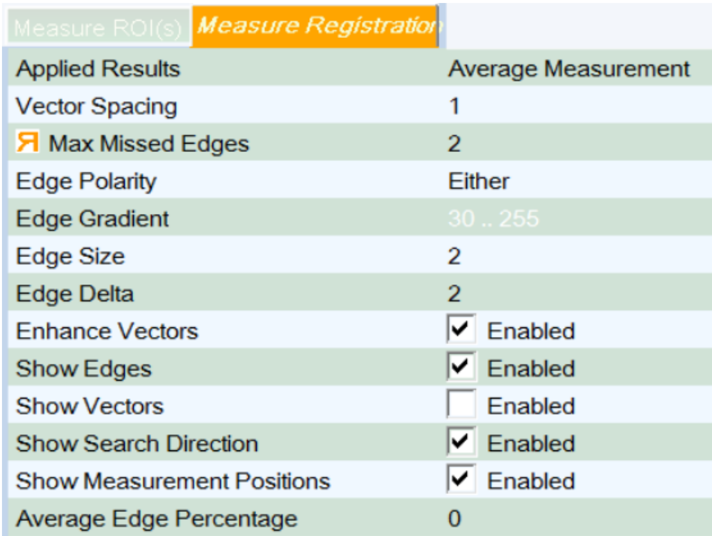
Show the location of the measurement positions (minimum, maximum, and average).

Average Edge Percentage

Ignore the extreme edges found. If you set a percentage, the inspection will ignore X percent of the minimum and maximum edges found. This helps determine an average edge position.

Advanced Parameter for Measure Registration

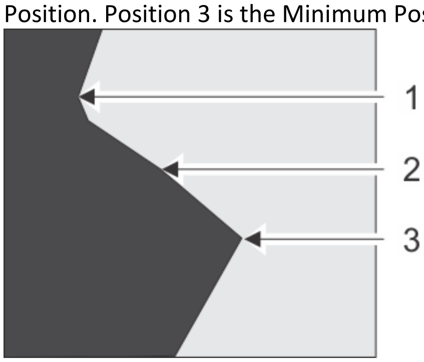
One or more additional parameters are available for this inspection, only visible when you have ***Advanced parameters*** (see "***Editor Options***" on page 189) shown. You must have the "Access advanced inspection parameters" ***permission*** (see "***Managing Permissions***" on page 24) to access these parameters. The advanced parameters are described in this topic. For other parameters, refer to the description of ***Measure Registration*** (on page 269).



Measure ROI(s)	Measure Registration
Applied Results	Average Measurement
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
Average Edge Percentage	0

Applied Results

Choose which edges to use when computing the registration center.
Minimum Measurement -- The system will use the minimum distance of the search region.
Maximum Measurement -- The system will use the maximum distance of the search region.
Average Measurement -- The system will use the average distance of the search region.
Suppose the illustration below indicates a search region, in which the system is searching from right to left, seeking a light to dark transition. Position 1 is the Maximum Position. Position 2 is the Average Position. Position 3 is the Minimum Position found in the search region.



Orientations

An orientation compensates for part rotation by finding a grayscale pattern. An analysis which must rotate with the part must follow an orientation.

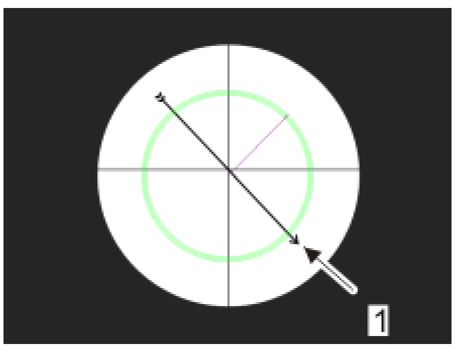
❖ *Note: you must first place a* **Region of Interest** *(see "***Regions of Interest (ROI)***" on page 198) where you want the Orientation to take place.*

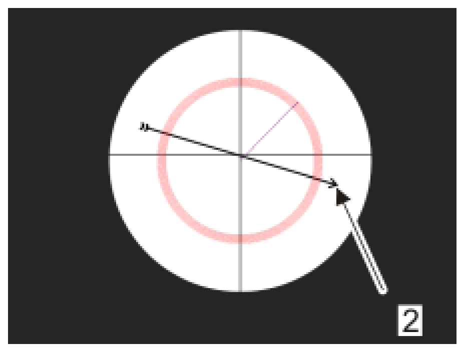
Available orientations include ***Pattern Match*** (on page 273) and ***Template Orientation*** (on page 275).

❖ *Note: the* **Centerline** *(on page 242) and* **Template** *(see "***Template Registration***" on page 251) Registrations also contain an orientation angle that can be used to orient regions.*

Pattern Match

Pattern Match Orientation creates a pattern to be matched. A Pattern Match reference must be set on one part that you consider to have the desired pattern. The Pattern Match reference sets the standard to which all other parts inspected must meet. The Pattern Match is based on percentages; the referenced pattern will be 100%. All other parts will be compared to the referenced pattern and given a percentage depending on how the two patterns match up. In other words, a part with an 88% Pattern Match rating is 88% similar to the referenced part. If the inspected part has too low of a percentage, the part will fail the orientation.





1	Normal orientation
2	Incorrect orientation

❖ *Note: Pattern Match only works with a* **Ring Region** *(on page 200).*

➢ ***To add a Pattern Match Orientation:***

1. Make sure a ***Ring Region*** (on page 200) 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. The Pattern Match orientation is added to the inspection tree.
4. The Pattern Match 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.

Pattern Match menu

Ring	Pattern Match
Symmetry Repeat	1
Radial Spacing	1
Select Offset Angle	Select Angle
Offset Angle	0.0°
Set Reference	-->|<--
Show Orientation	☑ Enabled
Part View Display	Show Pattern
Show Pattern Match	☐ Enabled
Region Extraction	Read Radially
⊟ Reject Limits	
Pattern Match Confidence	**28**

❖ ***Important**: Set Reference before adjusting other parameters.*

Symmetry Repeat

Divide the donut-shaped region into a number of pie-shaped sections. The system need only match the gray shade 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. The system uses a gray shade pattern in one-fifth of the region, and you are assured proper orientation because these gray shade patterns are identical in the other four sections of the region.

This feature can speed up this orientation. The time required for the orientation is reduced by 1/symmetry squared. If you have a symmetry of five, this orientation takes 1/25th the amount of time it would take with a symmetry of one.

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

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.

Show Orientation

Display the orientation line on the image.

Part View Display

Allows you to look at different results for the part. You must enable 'Show Pattern Match' to see the information in the unwrapped image.

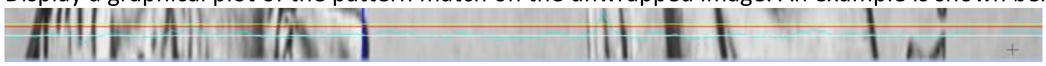
Show Correlation Plot - Displays a plot to show the correlation between the reference pattern and the current image in the unwrapped image.

Show Pattern - Displays the extracted grayscale pattern of the current image.

Show Normalized Pattern - Displays the extracted grayscale pattern of the current image; the values are normalized so that the highest value is one.
Show Pattern Delta - Displays a plot of the differences in the pattern.

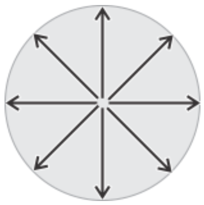
Show Pattern Match

Display a graphical plot of the pattern match on the unwrapped image. An example is shown below.



Region Extraction

Choose how the Intellispec should read the information from the region. This usually depends on the shape of your region. In this inspection, only Read Radially is used. The data is extracted in a radial direction as shown in the illustration below.



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.

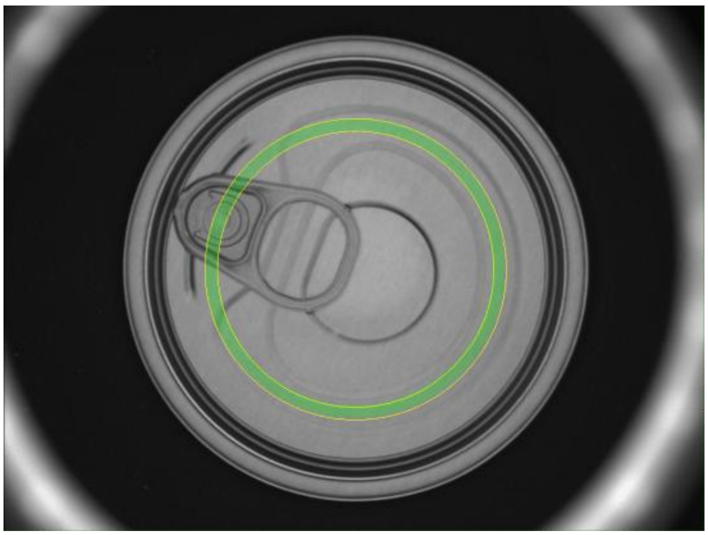
Template Orientation

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. However, it can be used on any 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** *(on page 273) 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:

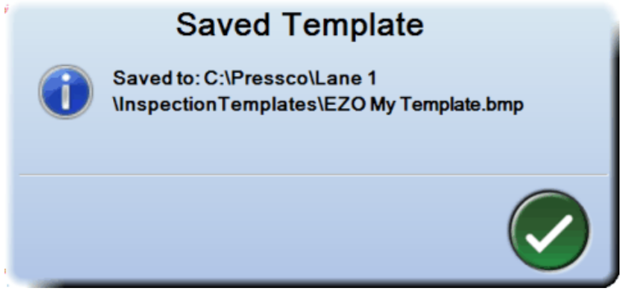
1. Make sure a region of interest has been added to the inspection tree. A sample Ring region placement is shown above.
2. Acquire about 100 images to get a good sample population of part images:
   - Put the lane online, long enough to acquire about 100 images. Take the lane offline.
   - **OR**: Use ***Offline Imaging*** (on page 132). Right-click the Sensor button to see the Sensor menu > select 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, choose an image and save it as a seed image. A **"seed" image** is a sample image that the system uses when creating an average image for the template.

To save a seed image:

1. From the Retro-Spec inspection screen, find an image that represents a regular part - not the best image, not the worst image, but a typical part image. Use the forward/ backward arrows  to scroll through the acquired images.
2. If necessary, adjust the region size and placement to cover an area where there is a repeatable and distinct grayscale pattern.

3. Go to the Template menu (described below) and click the **Save Seed** button. An on screen keyboard is displayed.
4. Name the seed image and click the OK button  to save. A Saved Template dialog box is displayed with the name and location of the saved template image.

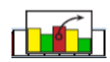


5. Click the OK button to close the message.
6. To verify that you have saved a good image, click the **View Seed or View Template** button. The Template Image Viewer will display the seed image you saved. If you want to save a different image, select another image and click the Save Seed button.
7. In the Template menu, make sure Template Region Type = Use Inspection Region.

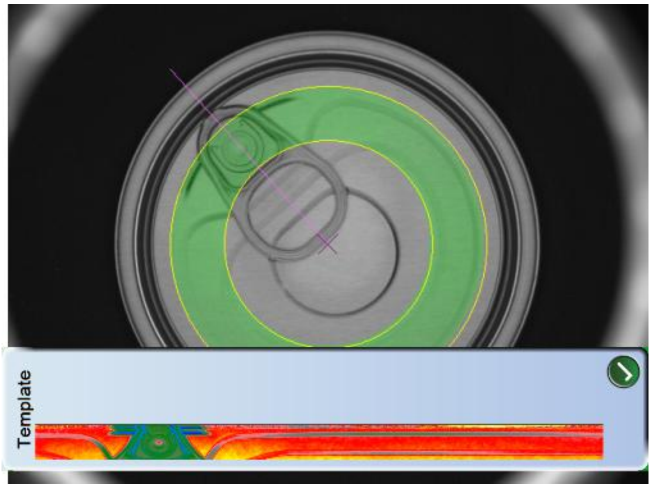
Next, create a template. The system will use the seed image as the first image when creating the template, then add information from Data Set A.

➢ ***To create a template:***

1. In the Retro-Spec graph, or using the forward and backward arrows below the image, view all the images in Data Set A. If necessary, use the  or  buttons to acquire more images. You want a range of part images that represent your production line. They do not have to be perfect images, but you should remove images of parts that should obviously be rejected.

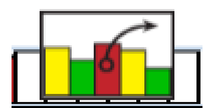
2. Delete images of any parts that should not be part of the sample population:
   a) Click the **Lock/ Move Parts** button to unlock the data set. 
   b) Click the bar on the graph for any part you want to delete, then click the trash can icon to delete the part from the set.
   c) For information about how to use the graph, see ***Retro-Spec Population View Graph*** (on page 191).
   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, positioned against 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.



➢ *To refine the template:*

1. In the Retro-Spec graph, or using the forward and backward arrows below the image, view all the images in Data Set A. If necessary, use the  or 

buttons to acquire more images. You want a range of part images that represent your production line. They do not have to be perfect images, but you should remove images of parts that should obviously be rejected.
2. Delete images of any parts that should not be part of the sample population:
   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*** (on page 191).
   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.

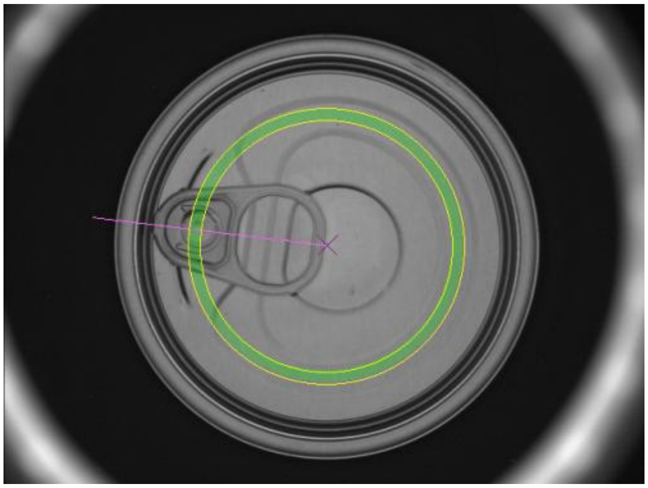
Next, set the parameters in the other menus. Use the steps below for quick setup of the orientation. Depending on your part and application, you may need to make other adjustments after these steps. The parameters for each of the menus are described at the end of this section.

➢ *To set up the Template Orientation:*

1. In the Settings menu, click the **Standard Settings** button so that the system can adjust to the image.
2. In the Settings menu, click the **Select Angle** button. Click in the image where the orientation should point to. Wait while the system populates the Offset Angle parameter. Then click the **Select Angle** button again to complete the process.

3. In the Template Orientation menu, adjust Orientation Strength to pass or fail the part. This can be adjusted using the bars on the graph.
4. Acquire more images and test the orientation. 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.

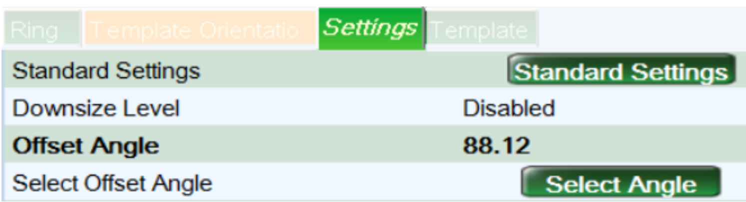


The menu parameters are described below.

Settings 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** (in the Template Orientation menu), **Downsize Level**, and **Offset Angle**, using the guidelines described below.



Standard Settings

Click the **Standard Settings** 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.
Enabling this option looks at the region differently by grouping pixels. The system will look at pixels in groups of 4 (Level 1), 16 (Level 2), or 64 (Level 3). Larger values reduce the image further, speeding up the inspection at the cost of resolution.
For Template Orientation, this can be left disabled for most applications.

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.

Template Orientation menu

Set the parameters in this menu to pass or fail the part based on orientation.

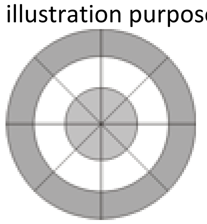
Ring | Template Orientation | Settings | Template

Angular Samples	**1024**
Orientation Strength	**52.0**
Orientation Normalization	Component Power
Orientation Normalization Gain	0.0

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 and eight (8) angular samples. (Note: these values are not available in the inspection. These examples and shading are for illustration purposes only.)



Orientation Strength

Set the minimum strength, or quality, you require for 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.

Orientation Normalization

Normalization 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. Use the technique that works best for your parts. We recommend trying the techniques in this order:

- Component Power- default, used in most applications.
- Component Magnitude - try this as a second option.
- Global Power - try only if Component Magnitude or Component Power do not work for your part.
- Phase Only - not used.

Orientation Normalization Gain

Leave this set at zero.

Template menu

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.

Ring | Template Orientation | Settings | Template

Select Seed Image	**Dime6.bmp**
Save Seed Image	Save Seed
View Seed	View Seed
Create Template	Create Template
Refine Template	Refine Template
Learn Passes	1
View Template Image	View Template
Template Region Type	Use Inspection Region

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 from which to choose.

Save Seed Image

Choose the best possible image from the part images in the Retro-Spec interface, and click the **Save Seed** button. Name the image using the onscreen keyboard provided. When you click the OK button to save, the bitmap image is saved to the current lane and sensor. For example: C:\Pressco\Lane 1\InspectionTemplates\dime_10.bmp.

View Seed or View Editor

View the selected seed image through the Template Image Viewer. 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

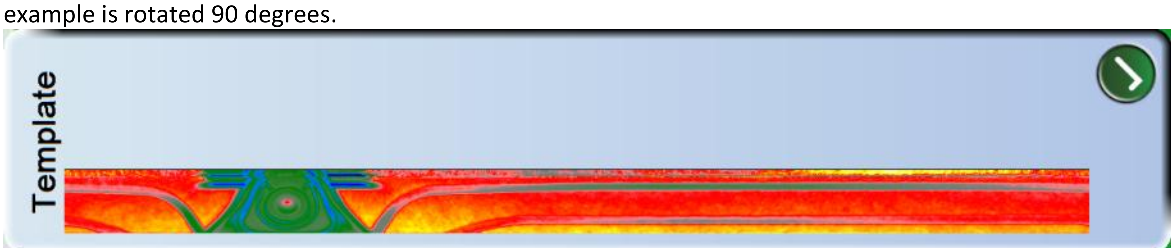
Add images to the average template, from the images in Data Set A. For best results, delete all defective images, or images that you do not want as part of the template, from Data Set A. This process is beneficial to run at a later time from when the inspection was created, because over time materials 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.



Template Region Type

Make sure that **Use Inspection Region** is selected. This setting should be used unless otherwise instructed by Pressco.

Analyses

These inspections analyze the part for defects, features, measurements, or gray shades.

❖ *Note: you must first place a* **Region of Interest** *(see "***Regions of Interest (ROI)***" on page 198) where you want the analysis to take place. We also recommend a* **Registration** *(see "***Registrations***" on page 231) and an* **Orientation** *(see "***Orientations***" on page 272) (depending on the part type) prior to an analysis.*

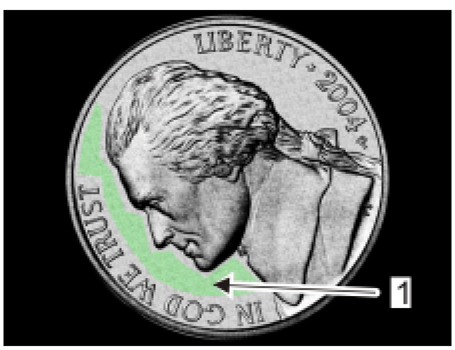
The available types of analyses are:

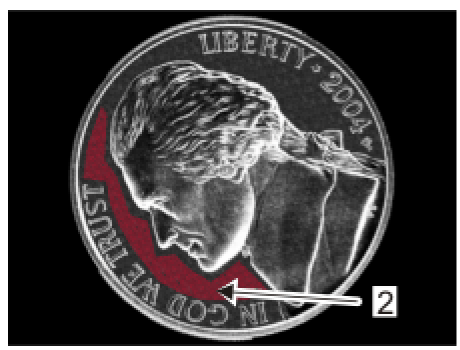
- ***Ambient*** (on page 282)
- ***Shape Check*** (on page 284)
- ***Contrast*** (on page 286)
- ***Measurement*** (on page 292)
- ***Light Meter*** (on page 300)
- ***Fill Height*** (on page 304)
- ***Fill Height - Segmented*** (on page 311)
- ***Measure Extract*** (on page 321)
- ***Distribution*** (on page 323)
- ***Label Skew Extract*** (on page 332)
- ***Feature Detect*** (on page 335)

❖ *Note: Your system (and this book) may show only those items that apply to your application.*

Ambient

Ambient is a measure of gray levels in a selected region and looks for abnormal gray levels. There are three ways in which to measure a part's ambient: Max Amplitude, Peak Percentile, and Density. You can set the Ambient Analysis Mode to have maximum reject limits, minimum reject limits, or a combination of maximum and minimum reject limits.



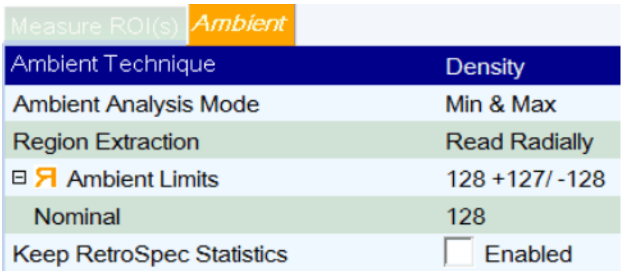


1	Normal Ambient
2	Incorrect Ambient

➢ *To add an Ambient analysis:*

1. Make sure a ***Region of Interest*** (see "***Regions of Interest (ROI)***" on page 198) has been added to the inspection tree. We also recommend a ***Registration*** (see "***Registrations***" on page 231).
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Analysis > Ambient. The Ambient analysis is added to the inspection tree.
4. The Ambient 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.

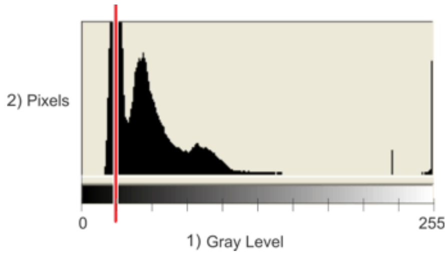
Ambient menu



Ambient Technique

This method determines the region's ambient. Choose the method through the drop-down menu.

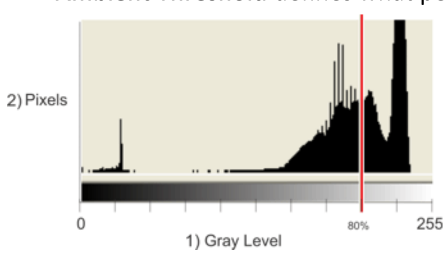
- **Max Amplitude** looks for the maximum gray level amplitude — the gray level with the most pixel counts — within the histogram of the search area.



1	Gray level
2	Pixels in the 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	Pixels in the histogram of the image

- **Density** computes the average of all the pixel gray levels — total gray level divided by pixels.

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.

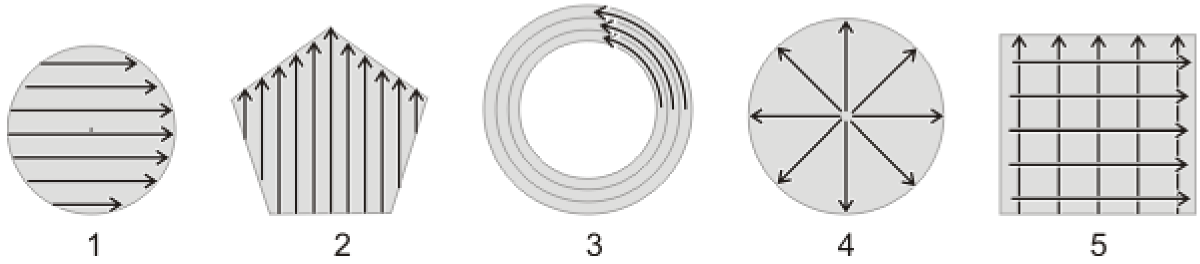
Max Only - The maximum acceptable ambient gray level value. Any computed ambient found greater than this value will cause the inspection to fail.

Region Extraction

Choose how the Intellispec should read the information from the region. This usually depends on the shape of your region.

❖ *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.

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*** (on page 45).

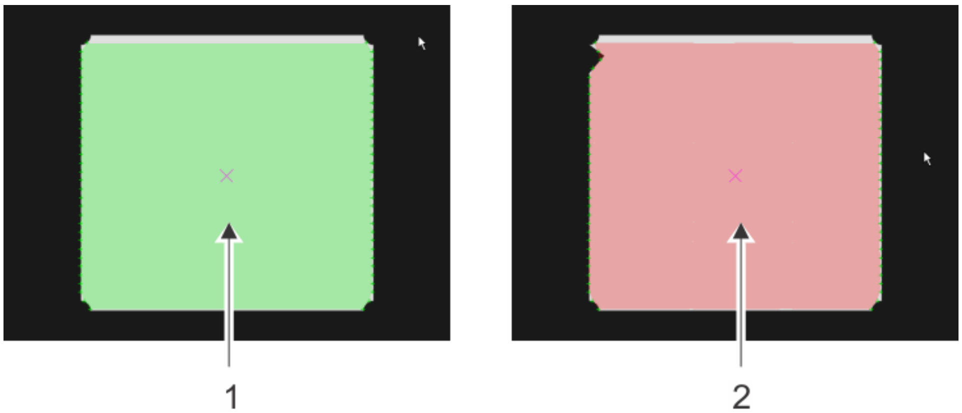
Shape Check

Shape Check looks for a certain shape in the search region and will reject a part if it is out of tolerance. This feature helps ensure that the custom search region does not get fooled by an irregularly shaped container.

❖ *Note: This inspection is only available for Adaptive Regions.*

Series IV users: Shape Check is similar to the Shape Adapt region analysis in Series IV.

The example below shows a normal part [item 1], and a part that failed the Shape Check [item 2].



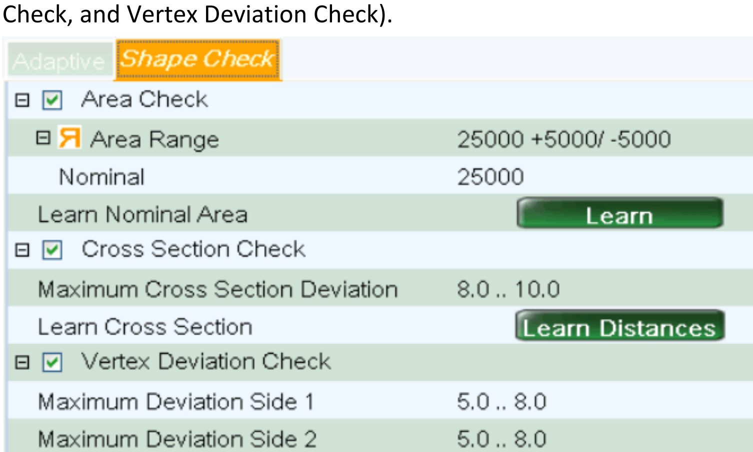
1	Normal part
2	Part failed Shape Check

➢ ***To add a Shape Check inspection:***

1. Make sure an ***Adaptive Region*** (on page 209) 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 > Analysis > Shape Check. The analysis is added to the inspection tree. Re-name the inspection to something more meaningful to you.
4. The Shape Check 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.

Shape Check menu

Select between three different methodologies 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

Enable the Cross Section portion of the inspection. This is only used when an Adaptive region is added to a Centerline registration. 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

Enable the Vertex Deviation Check portion of the inspection. This is only used when an Adaptive region is added to a Centerline registration. This check looks at the deviation between consecutive edge points, and is performed on each side. An example where this feature might be used is when 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

The Contrast analysis looks for light and dark defects within your desired region. You can set the Contrast analysis to 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.

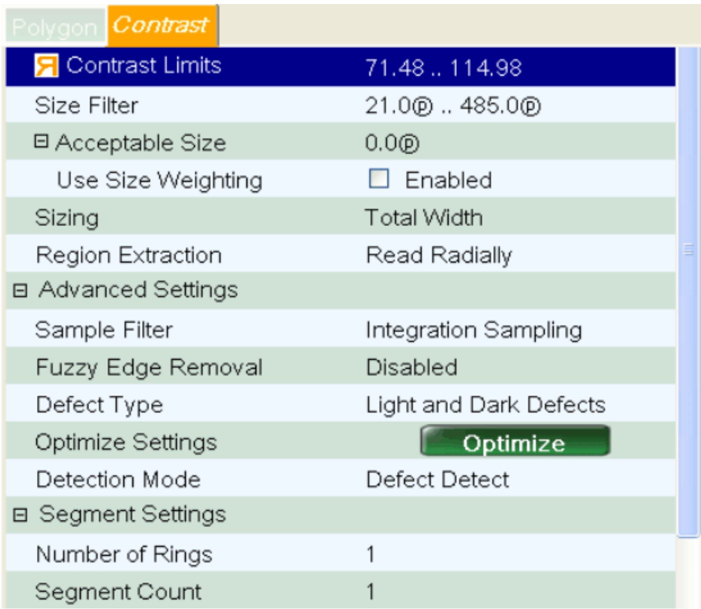
➢ ***To add a Contrast analysis:***

1. Make sure a ***Region of Interest*** (see "***Regions of Interest (ROI)***" on page 198) has been added to the inspection tree. We also recommend a ***Registration*** (see "***Registrations***" on page 231).
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Analysis > Contrast. The Contrast inspection is added to the inspection tree. Re-name it to something more meaningful to you.

4. The Contrast 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.

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** *(on page 140) or* **Image Analysis** *(on page 132) for the current sensor.*



Contrast Limits

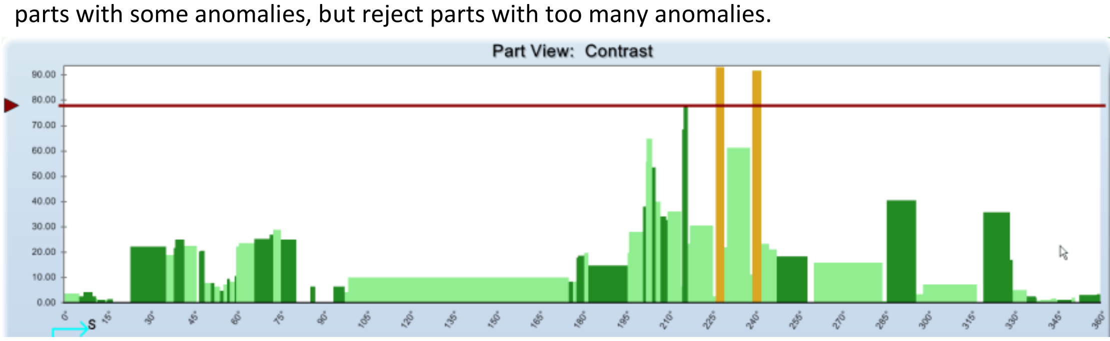
Set the sensitivity of the inspection. You can also move the red and yellow bars on the Retro-Spec graph by selecting the arrows to the left of the graph.

Size Filter

Choose a defect size you want to catch. For example, you may want to pass very small defects but fail larger ones. For example, if Size Filter is set to 3 -- 80, any defects 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 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.

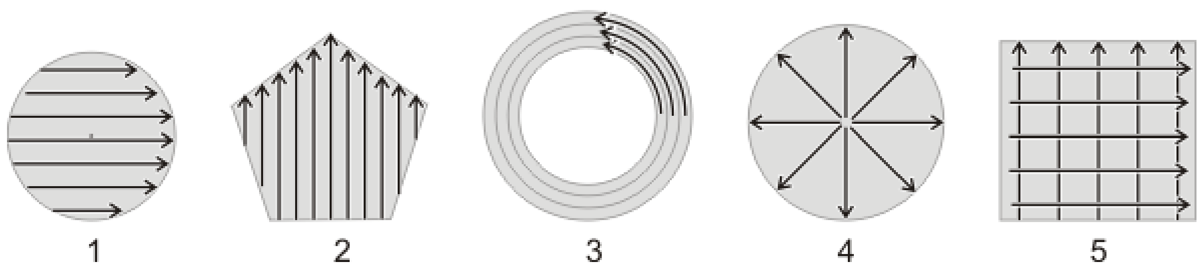
- **Total Width**, the default setting, adds the number of units (pixels, millimeters, etc.) of defective bars at or above the sensitivity level within an inspection region or segment.
- **Total Area** adds all the defect pixels. Suppose your part had two small defects along the same radial line. Normally, 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 usually depends on the shape of your region.

❖ *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.

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 settings

Described below.

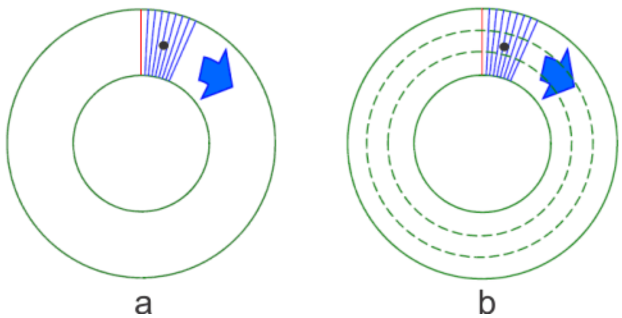
Detection Mode

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

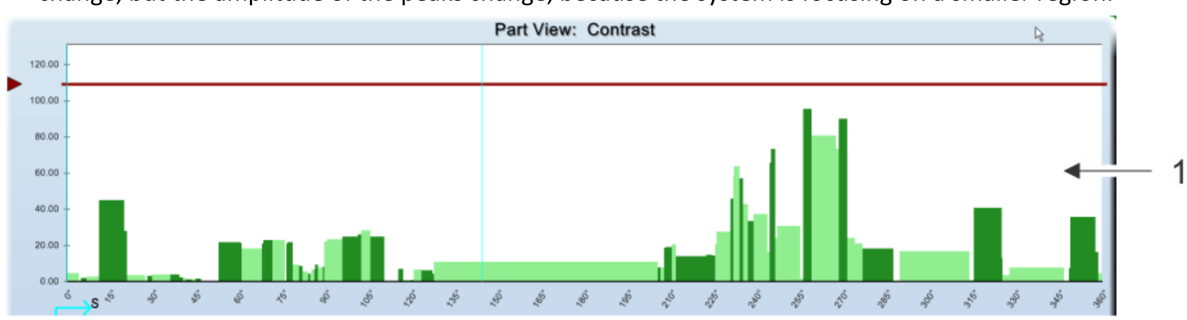
Number of Rings

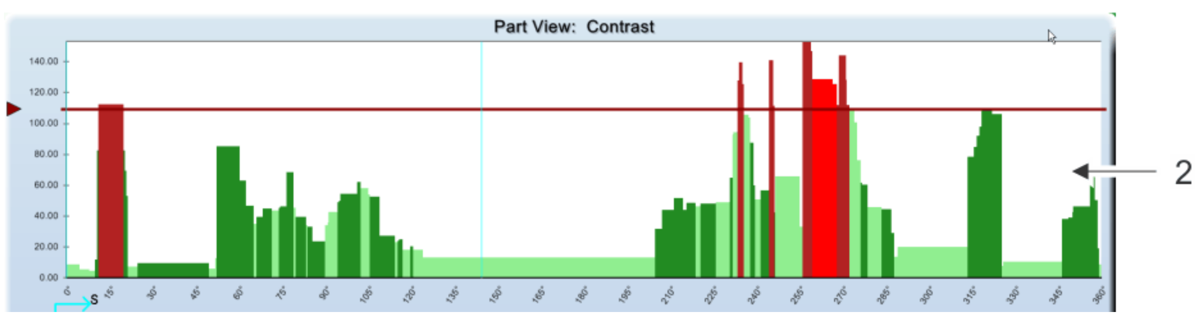
The number of concentric rings the region is divided into (for Read Circularly or Read Radially Region Extractions only). More rings generally means more sensitive.



a	Region with one ring
b	Region divided into 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.





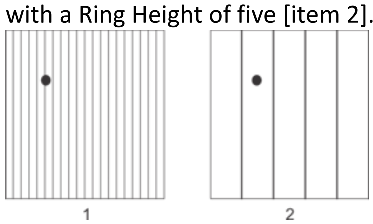
1	Part with region with one ring
2	Same part with region divided into several rings

Number of Segments

The number of angular segments the region is divided into.

Ring Height

Ring Height is similar to Number of Rings, but applies to a polygon region. 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 inspection 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, suppose 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

Using the Optimize feature

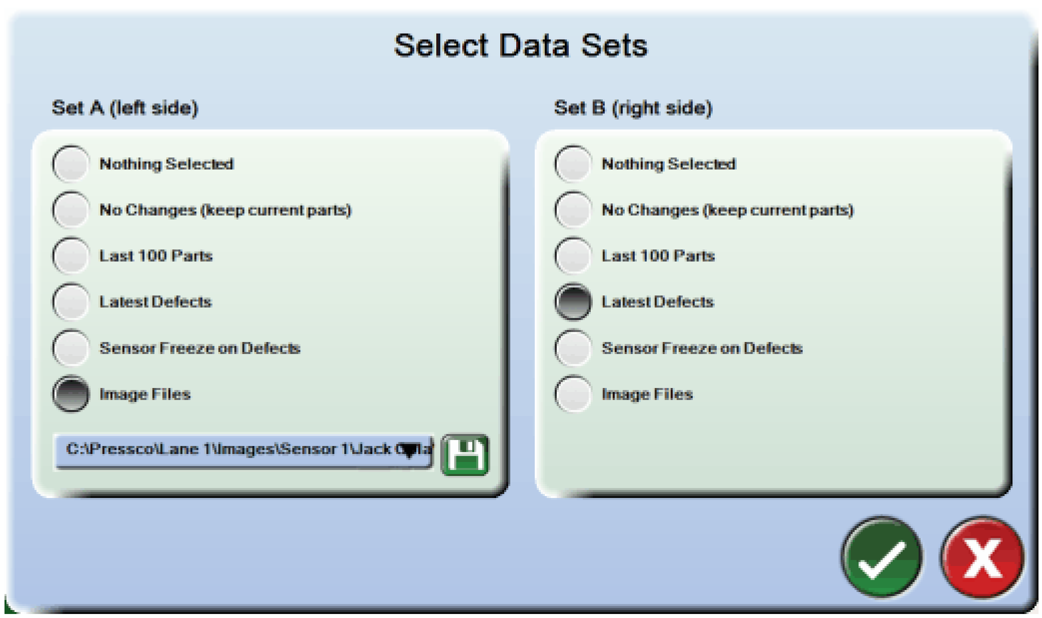
The Optimize feature automatically sets the optimum settings for many inspection parameters. It is processor-intensive and must be done off-line. For this to work correctly, ensure that you have moved all acceptable images to the left side of the Retro-Spec graph (Set A), and the defect images to the right side of the graph (Set B). Optimize is available under the **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 parts into Data Set A using the steps below.

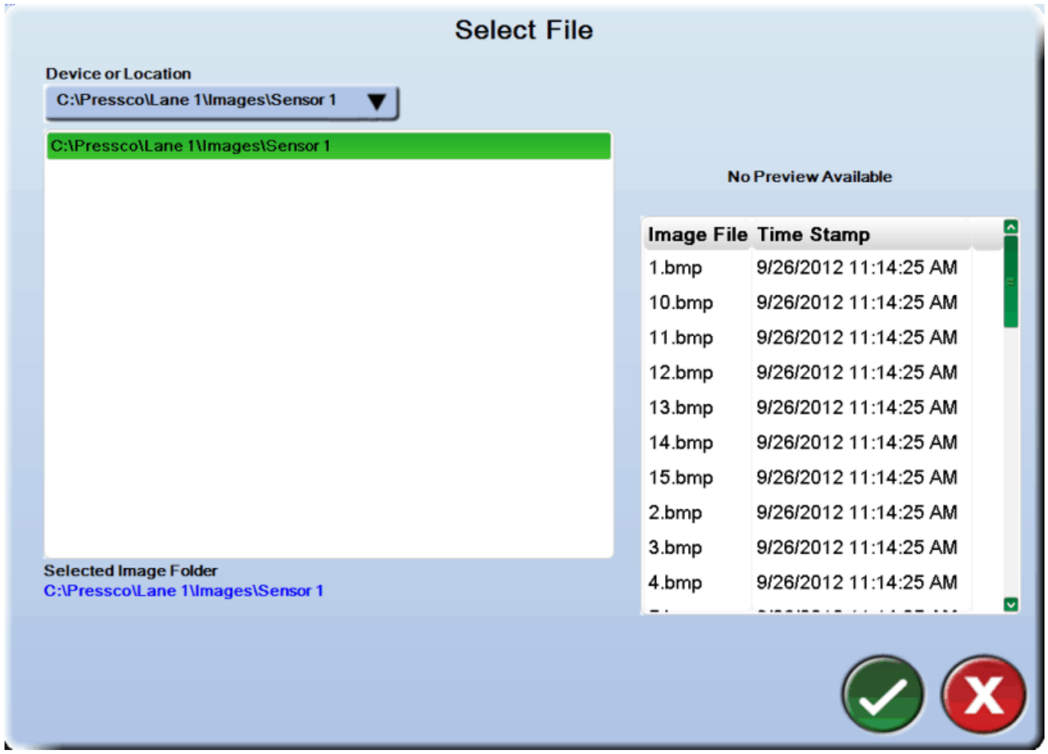
➢ *To load Data Set A:*

1. Look at the ***Retro-Spec Population View Graph*** (on page 191).
2. Click the left arrow  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 File** 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 Select Location and Select Data Sets menus to load all the bitmap images that were previously saved in the selected folder.

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.

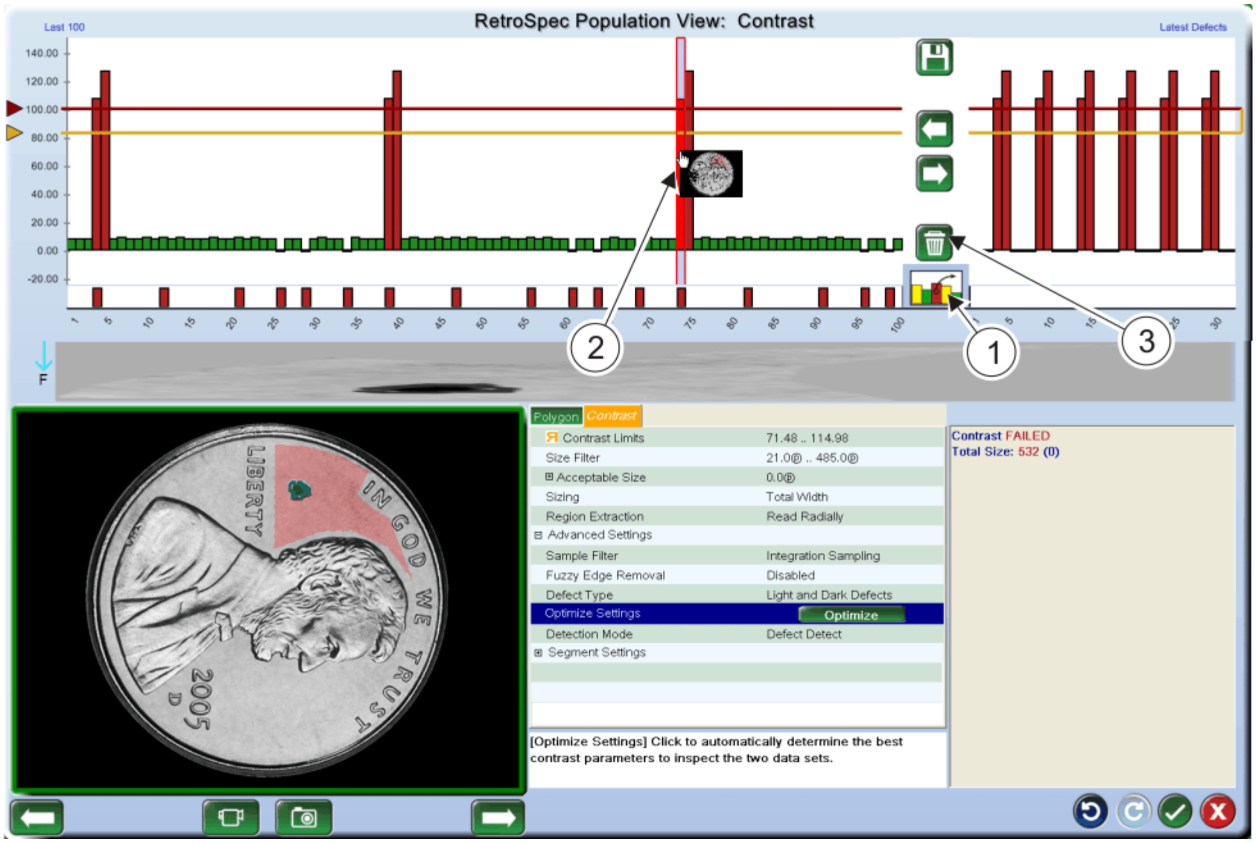
➢ *To load images of bad parts:*

1. Click the right arrow 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. If you choose Image Files, select images similarly as you did for Set A, except this time choose defect images.
3. Exit the Select Data Sets menu.

If there are any parts that do not belong in either sample set, try moving or deleting those samples [refer to the illustration below].

- To move an image:
  - Click on the image lock icon [item 1] to allow images to be moved.
  - Then click and hold the desired image's peak [item 2] - it displays a small image - and drag it to the other side of the center.
- To delete an image:
  - Click on the image lock [item 1] to allow images to be moved.
  - Then click on the desired image's peak [item 2] - it displays a small image - and drag it to the trash can icon [item 3].
  - OR: Click on the desired image's peak [item 2] - and then click the trash can icon [item 3].

- The system displays a "Deleted!" message above the trash can icon when it is deleted.



➢ *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. Look at the Retro-Spec graph to determine whether the good parts are still passing and the bad parts are failing. Most likely, you will see a significant separation of contrast between good and bad parts.
5. Test the inspection by ***loading*** (see "***Loading Saved Images***" on page 162) more images. You can make slight adjustments in the Contrast menu if necessary.

Measurement

This analysis measures 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.

Series IV users: this inspection is similar to Circle Width Dimension or Retro-Spec Measurement inspection

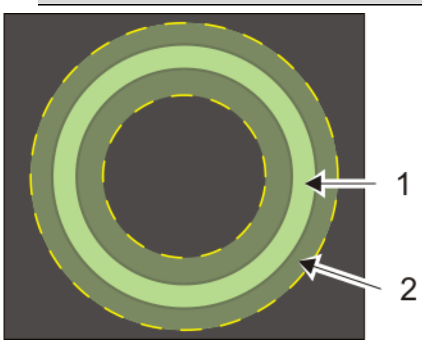
➢ ***Before you set up the Measurement analysis:***

1. Decide which feature you want to measure: inner diameter, outer diameter, width, or all three.
2. With calipers or other measuring tools, 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*** (see "***Regions of Interest (ROI)***" on page 198) 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 add a Measurement analysis:***

1. Make sure a ***Region of Interest*** (see "***Regions of Interest (ROI)***" on page 198) has been added to the inspection tree to surround the areas you want to measure. We also recommend a ***Registration*** (see "***Registrations***" on page 231) before the measurement region of interest.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Analysis > Measurement. The Measurement analysis is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Measurement 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.

➢ ***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.

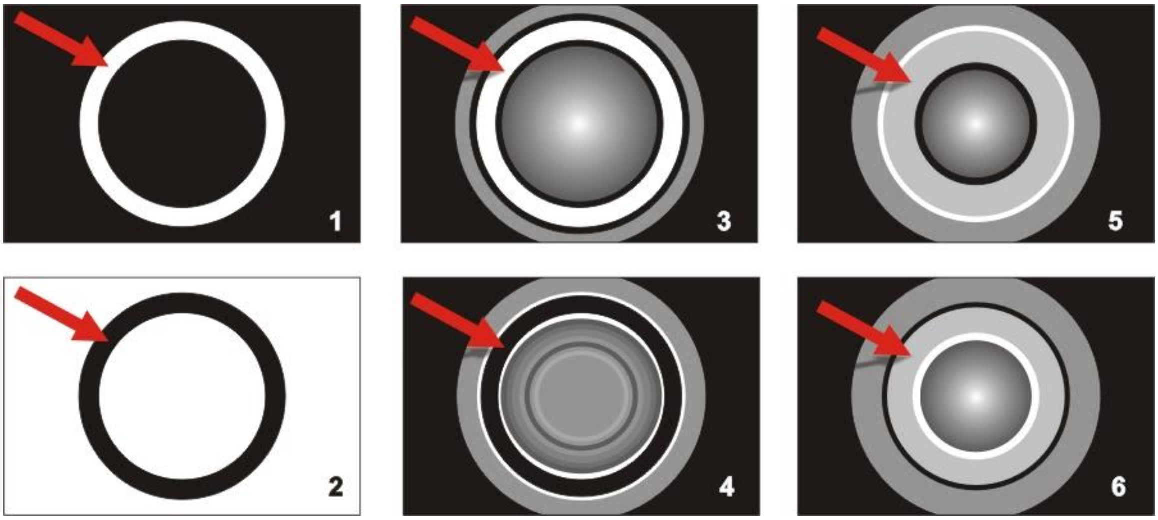
❖ *Note: if you make significant changes to the parameters in this menu or the other Measurement menus, click the Learn button again to update the information.*

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

Determine the type of feature you want the inspection to search for. Use the type 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.

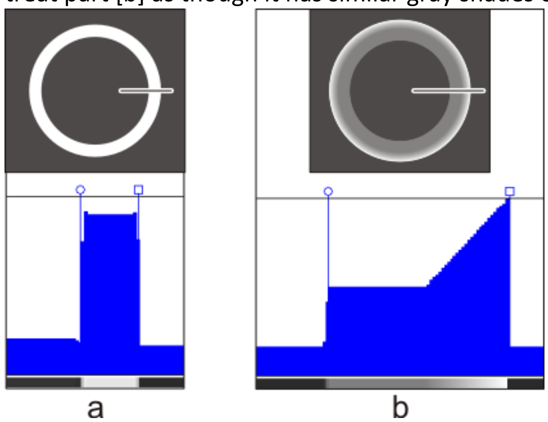
❖ *Tip: for most applications, leave Border Sharpness, Balance, Balance Side, and Allowed Gap Size at their default settings.*

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

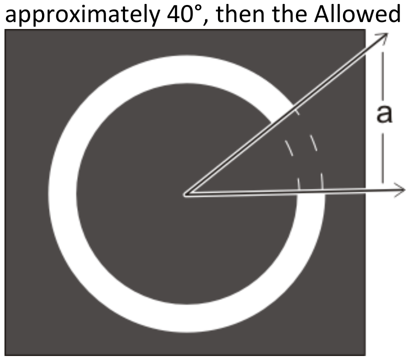
When using Balance, choose which side's contrast needs to be reduced.

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

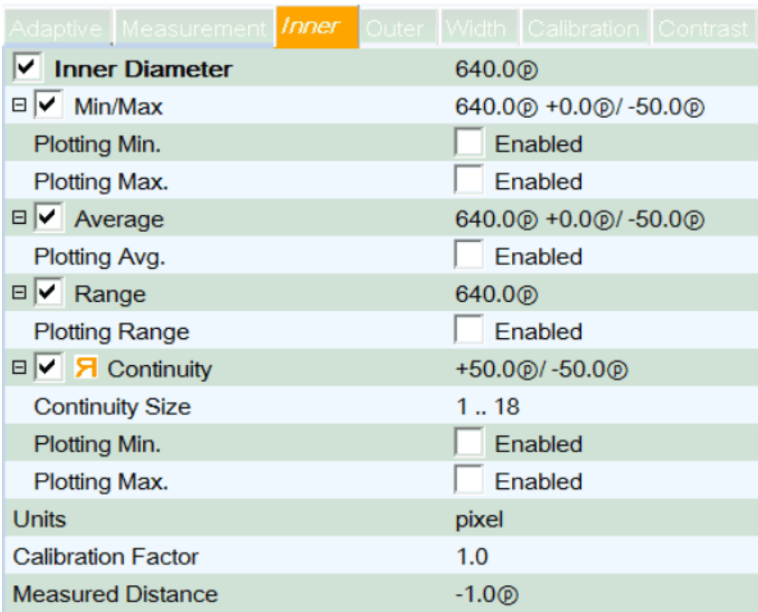
This is used in special cases where you want to ignore a number of segments. Set this to the number of search vectors you want to ignore. For example, if Sample Count is 36, and the gap is approximately 40°, then the Allowed Gap Size would be four.



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

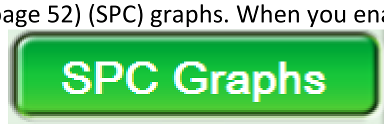
Check the box under the appropriate menu to perform this measurement.

❖ *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.*

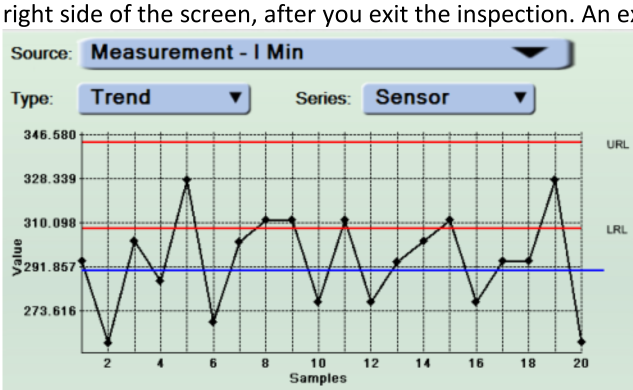
Min/Max

Set the minimum and maximum allowable measurement.

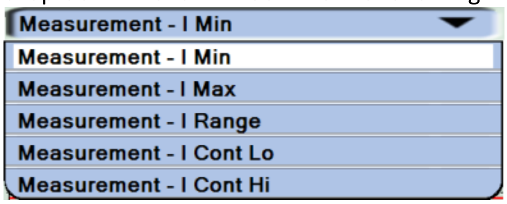
Plotting - Min., Max., Avg., Range

Each of the Plotting parameters enables a different graph in the ***Statistical Process Control*** (see "***Statistical Process Control (SPC) Charting***" on page 52) (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 measurements and Plotting check boxes 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 ***Retro-Spec Statistics*** (on page 45) or ***Statistical Process Control*** (see "***Statistical Process Control (SPC) Charting***" on page 52) for more information about the SPC graphs.

Average

Set the average measurement for the part.

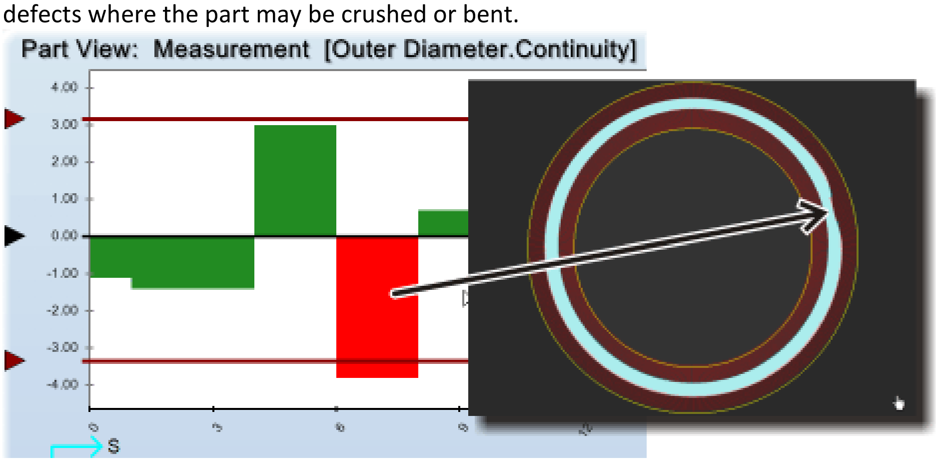
> ❖ *Tip: for most applications, Range and Continuity are disabled.*

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

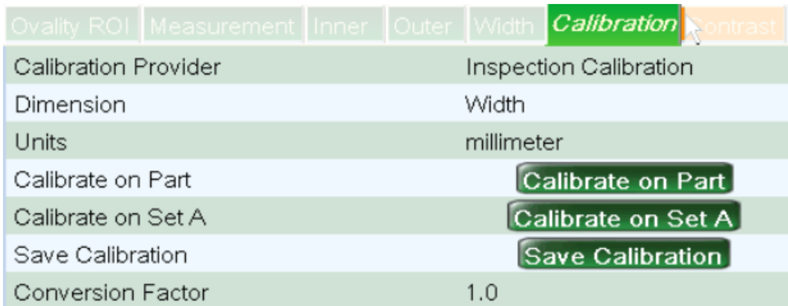
Choose your preference in the reporting of the measurements. Choose from millimeters, inches, pixels, and custom. Custom allows any calibration factor to be used.

Measured Distance

Measure your part with calipers or another tool, then enter the actual value for Measured Distance. This is used to help calibrate the measurement.

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*** (on page 132), 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. Choose from millimeters, inches, pixels, and custom. 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

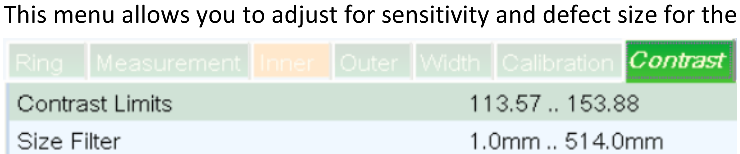
Click the **Save Calibration** button to save the calibration scale and units to the sensor for use by other inspections.

Conversion Factor

This indicates the pixel size and is used to convert one pixel into the units selected. The initial conversion will be controlled by the Learn Calibration results. You can adjust this value 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.

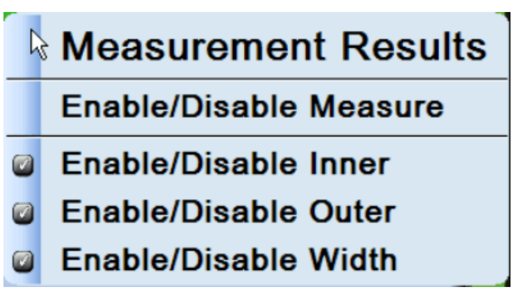
Results window

The results displayed for a measurement inspection are different than other inspections. In addition to the parameters, a measurements table is displayed.

You can perform several functions through this results window, including:

- Go directly to the parameters to adjust a particular measurement. If you click the [6.01] in the example, the Width menu is displayed and the Min/ Max parameter is highlighted for you.
- View the corresponding Retro-Spec graph. If you click [6.01] under Width in the example, the Width Min/ Max graph is displayed at the top of the screen.

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.



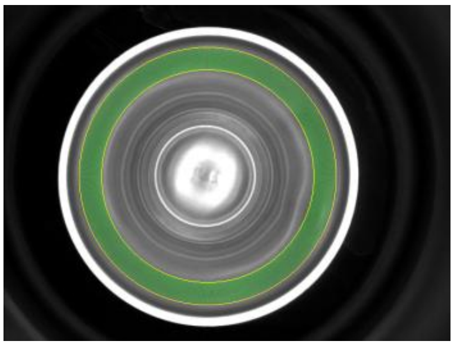
Light Meter

The Light Meter inspection 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

Series IV users: this is similar to the Light Meter inspection in Series IV.

An example of a light meter inspection is shown below.

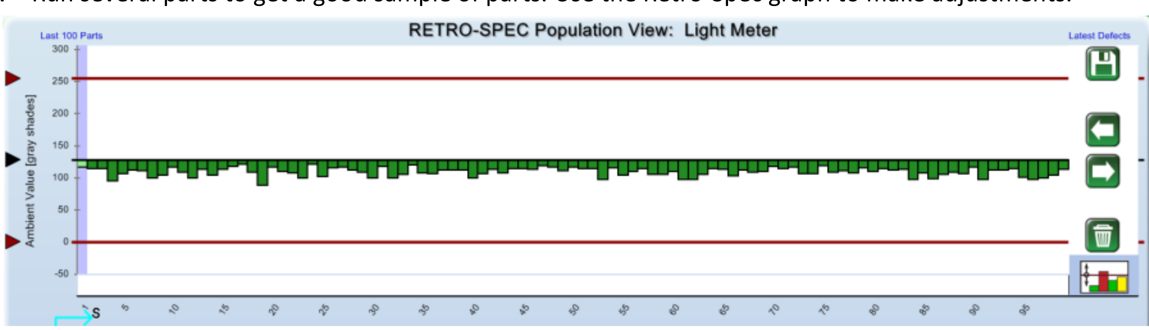


➢ *To add a Light Meter inspection:*

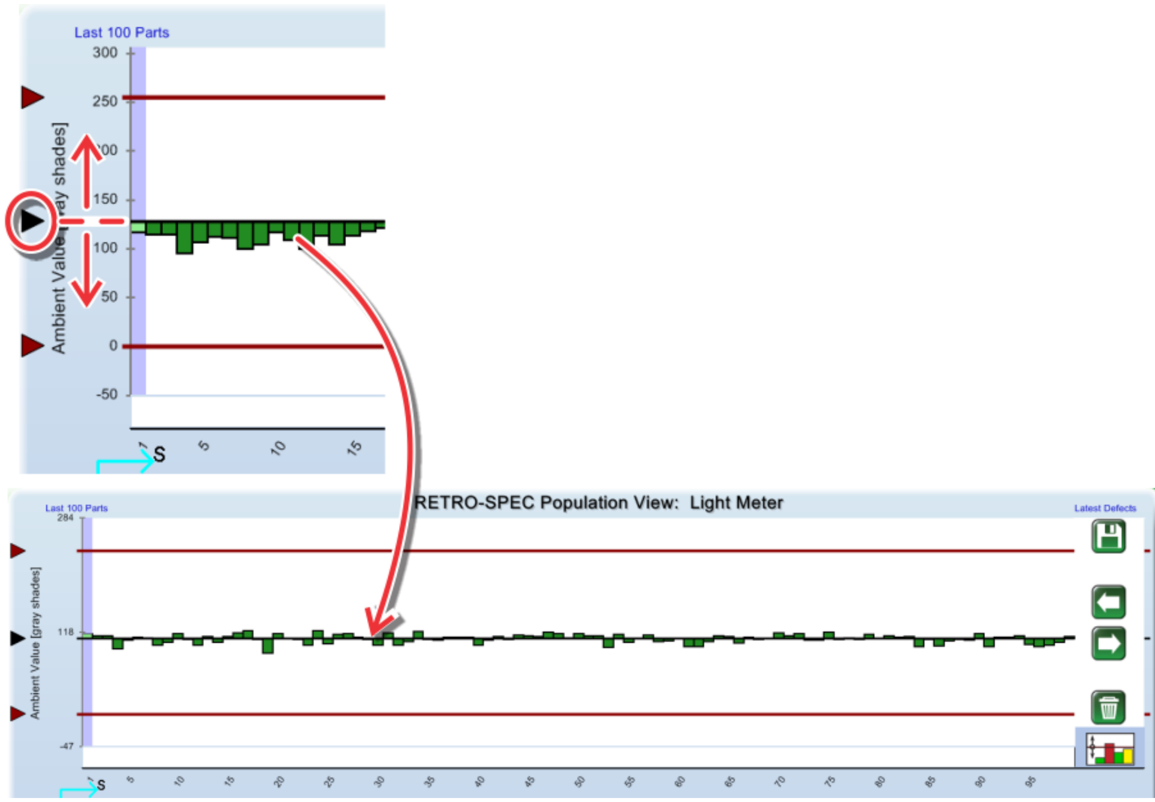
1. Make sure a Region of Interest has been added to the inspection tree. Place the region on an area of the part that is usually consistent in gray levels from part to part.
2. Highlight the region name in the inspection tree.
3. Right-click on the item you just added.
4. From the Inspection menu, select Add > Analysis > Light Meter. The inspection is added to the inspection tree. Re-name the inspection to something more meaningful to you.
5. The Light Meter 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.

Tips for setting up Light Meter:

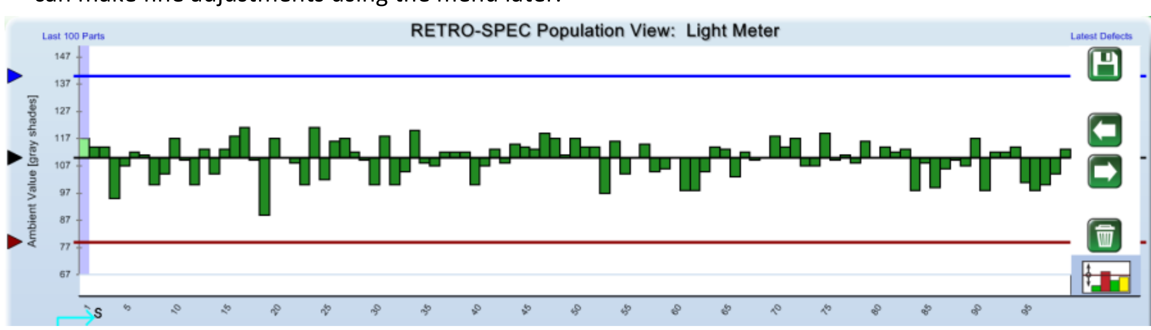
1. Run several parts to get a good sample of parts. Use the Retro-Spec graph to make adjustments.



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.



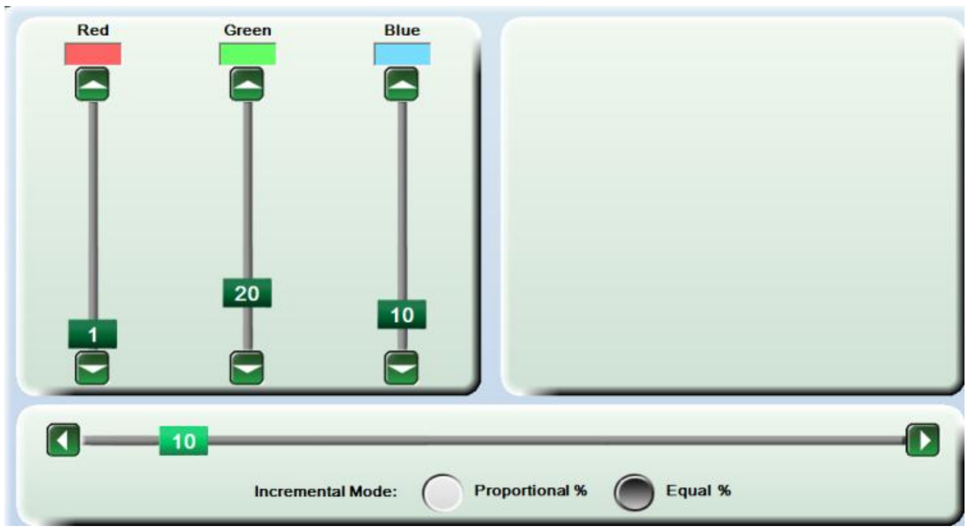
4. Set the number of Parts per Check in the menu, as recommended by your quality control supervisor, or a Pressco service engineer. See menu description below.

How it works

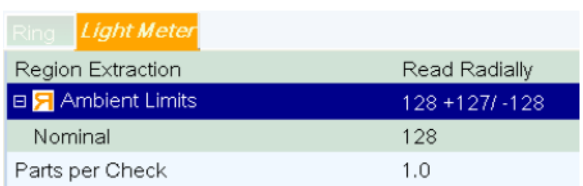
- The Light Meter inspection compares the average gray level of an inspection region to the Ambient Limit values. If the average gray scale does not fall within this range, the lighting will be automatically adjusted to compensate.
- The system checks N parts to create an average gray shade. N = Parts 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

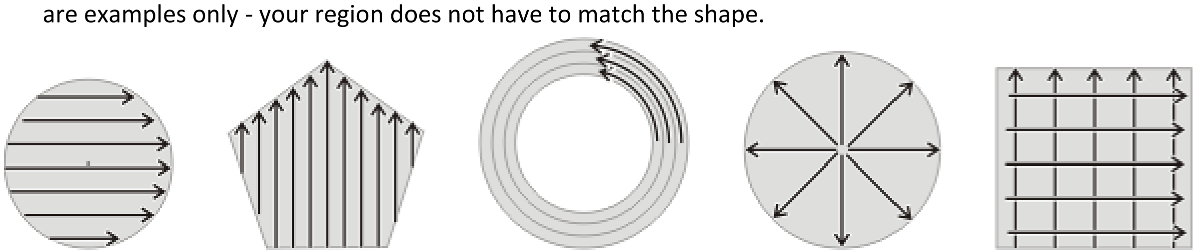


Region Extraction

Choose how the Intellispec should read the information from the region. This usually depends on the shape of your region.

❖ *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 2 3 4 5

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.

Ambient Limits

The minimum and maximum acceptable ambient gray level values.
The system measures the gray level of each pixel of the inspection 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

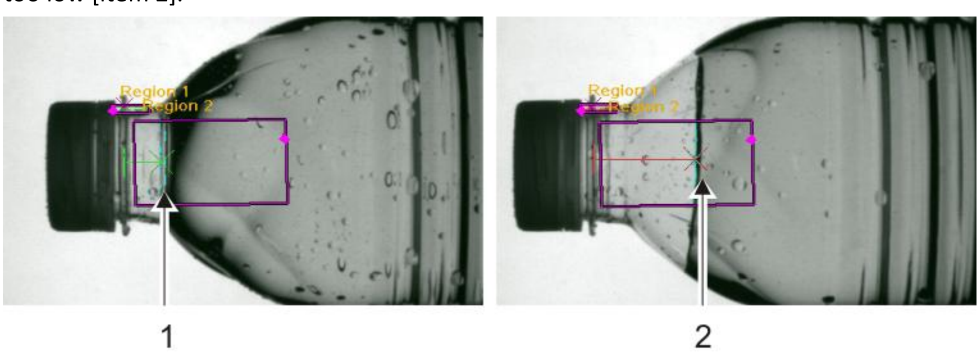
The number of parts that will be inspected between gray level checks. The faster your inspection line, the more parts should be used (at least 20-50).

Fill Height

Fill Height inspection is used for determining the fill level of containers, mainly to find containers with high fill or low fill. The Fill Height inspection compares the fill level of the liquid to a standard reference point, which is typically the neckring of a container.

- ❖ *Notes: This inspection requires a* **Measure ROI** *(on page 205) Region using two regions.*
- ❖ *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** *(on page 311) inspection for these cases.*

The example below shows a bottle with a normal fill height [item 1], and a bottle with a fill height that is too low [item 2].

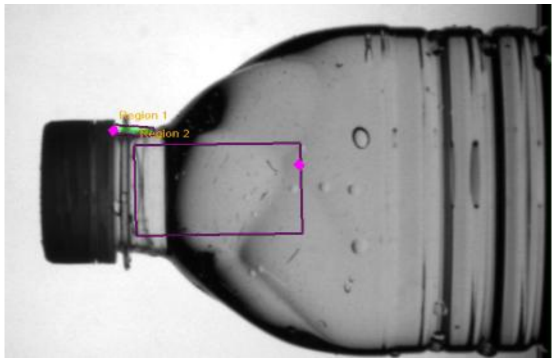


1	Normal fill height
2	Fill height too low

➢ *Before adding a Fill Height inspection:*

Make sure a ***Measure ROI*** (on page 205) Region of Interest has been added to the inspection tree. Suggested settings are as follows:

- In the Measure ROI menu, set Region Count to 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.



➢ ***To add a Fill Height inspection:***

1. Highlight the Measure ROI region name in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Analysis > Fill Height. The analysis is added to the inspection tree. Re-name the inspection to something more meaningful to you.
4. The Fill Height menus are displayed and the regions are shown on the image. (The menus are described below) Adjust the placement of the regions and parameters as necessary.

Fill Height 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** *(on page 140) or* **Image Analysis** *(on page 132) for the current sensor.*

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.

Empty / Ful | Calibration
Measure ROI(s) | *Fill Height* | Reference | Fill Top | Fill Botto

Fill Mode	Top and Bottom
Part Orienation	Closure on Left
Reference Region	Region 1
Fill Ratio	53
Correct Fill Position	☑ Enabled
Fill Correction Deviation	59.0ⓟ
⊞ Fill Height Limits	50.0ⓟ +405.92ⓟ/ -40.0ⓟ
Show Fill Height	☑ Enabled
Keep RetroSpec Statistics	☑ Enabled

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.

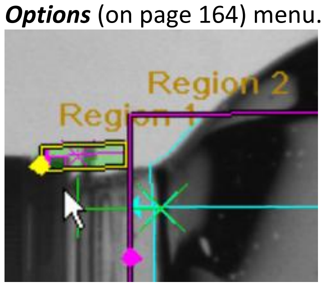
Top and Bottom is used mainly for carbonated beverages, or beverages that foam when the liquid sloshes around in the container as it moves in front of the inspection module. The inspection can measure the distance from the reference point to the top of the foam, and also from the reference point to the bottom of the foam.

Part Orientation

Choose the orientation of your part. In many cases, the part image is sideways to optimize the inspection area on the screen.

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*** (on page 164) 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.

Fill Height Limits

Define the valid fill height range per your specifications. This value is measured with respect to your reference point (the neck ring, in our example). You can use the bars on the Retro-Spec graph to adjust the limits.

Nominal

The ideal fill height value.

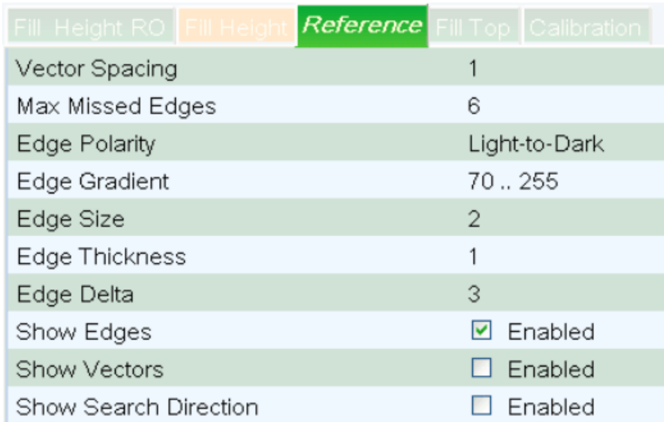
Show Fill Height

Show the fill height measurement on the image.

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*** (on page 45).

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. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Size

Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Edge Thickness

The number of consecutive times that the gradient must be met to define an edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Show Edges

Show the found edges on the image.

Show Vectors

Show the search lines on the image.

Show Search Direction

Show the search direction of the vectors with an arrow.

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. Normally kept at one.

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. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Size

Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Edge Thickness

The number of consecutive times that the gradient must be met to define an edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Show Edges

Show the found edges on the image.

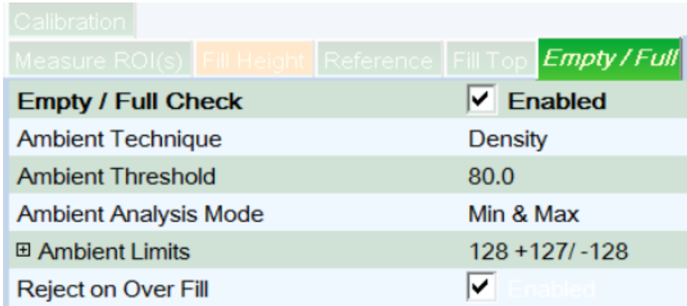
Show Vectors

Show the search lines on the image.

Show Search Direction

Show the search direction of the vectors with an arrow.

Empty/ Full menu

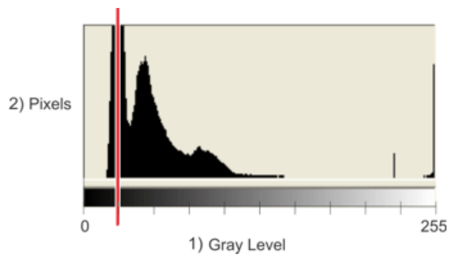


Use this check to determine whether the bottle is empty or full. The system performs an ambient check in the Fill Height region to determine whether the bottle is empty or full.

Ambient Technique

This method determines the region's ambient. Choose the method through the drop-down menu.

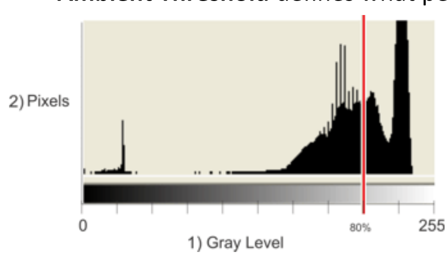
- **Max Amplitude** looks for the maximum gray level amplitude — the gray level with the most pixel counts — within the histogram of the search area.



1	Gray level
2	Pixels in the 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	Pixels in the histogram of the image

- **Density** computes the average of all the pixel gray levels — total gray level divided by pixels.

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.

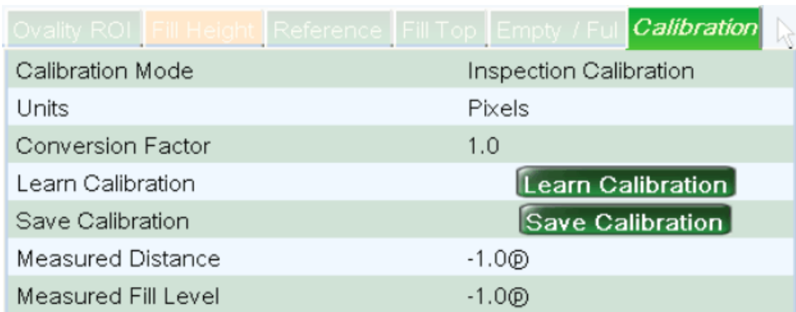
Nominal

The expected gray level value of the region of interest.

Reject on Over Fill

Check this box to reject bottles that are too full. Un-check the box to pass bottles that are too full.

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** *(on page 140) or* **Image Analysis** *(on page 132) 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*** (on page 132) or through another inspection.
Inspection Calibration -- Use the calibration from this inspection only.

Units

Choose your preference in the reporting of the measurements. Choose from millimeters, inches, pixels, and custom. Custom allows any calibration factor to be used.

Conversion Factor

This indicates the pixel size and is used to convert one pixel into the units selected. The initial conversion will be controlled by the Learn Calibration results. You can adjust this value 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 actual value for Measured Distance. This is used to help calibrate the measurement. 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

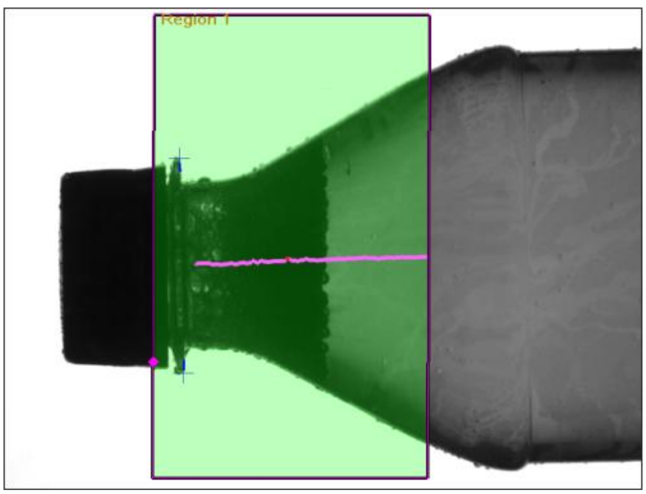
Fill Height - Segmented inspection is used for determining the fill level of containers. It can determine whether containers have high fill, low fill, or no fill. The Fill Height - Segmented inspection compares the fill level of the liquid to a standard reference point, which is typically the neckring of a container.

The differences between Fill Height and Fill Height - Segmented inspection 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 Heigh**t inspection uses edge point analysis to find the fill line.

➢ ***A. Before setting up the Fill Height - Segmented inspection:***

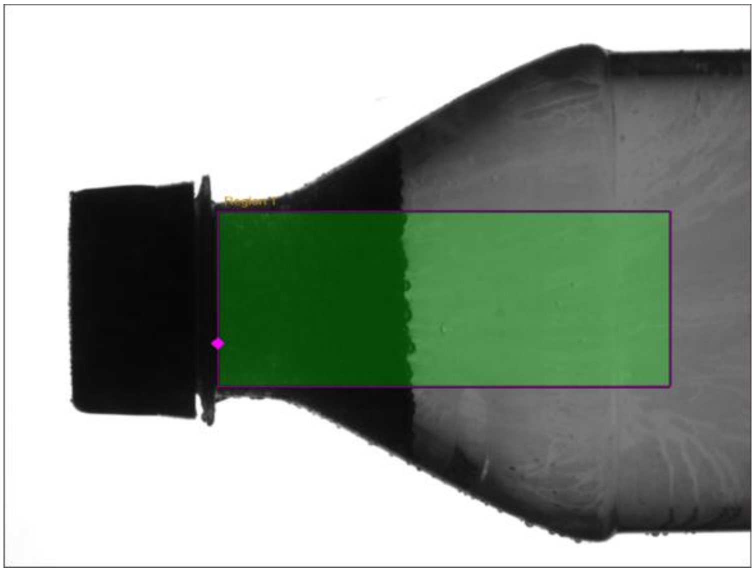
1. Set up a ***Neckring Registration*** (on page 260) that locates the neckring, and allows the system to place inspections with respect to the neckring location. An example is shown below.



2. Set up a ***Measure ROI*** (on page 205) region of interest for the Fill Height - Segmented inspection. Suggested settings are as follows:

- In the Measure ROI menu, set Region Count to One Region.
- Place the region on the bottle so that:
  - The region is high enough on the bottle as possible, but does not overlap the neckring
  - The region is far down enough on the bottle to accommodate the normal fill range of the bottle
  - The region is as wide as possible but does not fall outside of the bottle. It should be narrow enough to fit inside the narrow part of the bottle.
  - The search direction goes from the bottom of the bottle towards the top: place the diamond towards the top of the bottle.

- An example is shown below.



- Save and close the Measure ROI region menu.

Next add the Fill Height - Segmented inspection.

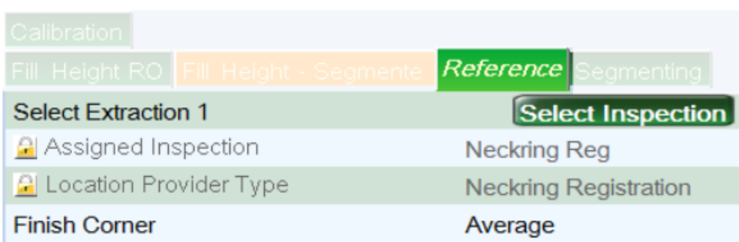
➢ *B. To add a Fill Height - Segmented inspection:*

1. Highlight the Measure ROI region name in the inspection tree.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Analysis > Fill Height - Segmented. The analysis is added to the inspection tree. Re-name the inspection to something more meaningful to you.
4. The Fill Height - Segmented 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.

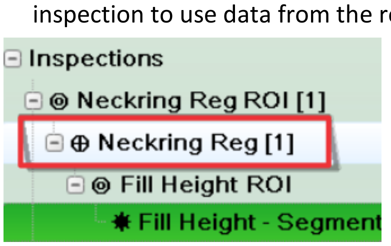
First, you will set the reference to the registration that you placed earlier.

➢ *C. To set up the Fill Height - Segmented inspection reference:*

1. Go to the Fill Height ROI menu and select One Region for Region Count.
2. Go to the Reference menu and click the **Select Inspection** button.



3. 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.

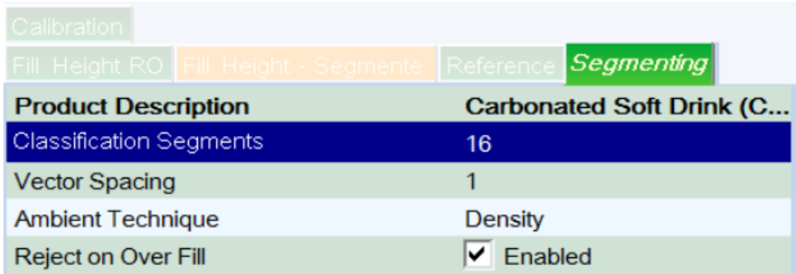


4. Click the **Select Inspection** button again to complete the selection.
5. From the Finish Corner drop-down menu in the Reference menu, select Average.

Next, set up the product description for the type of bottle you will be inspecting.

D. To set up the product description:

1. Go to the Segmenting menu.

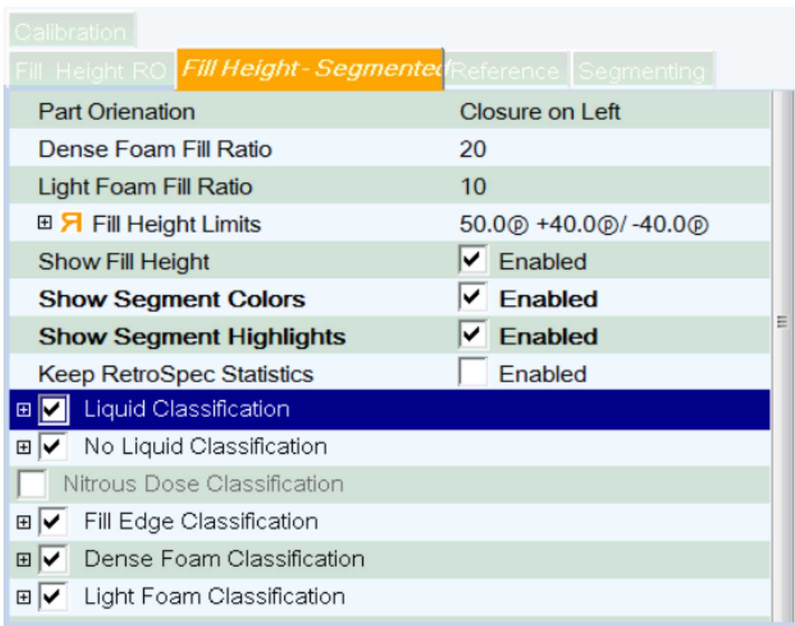


2. Optional: from the Product Description drop-down menu, select the type of product you are inspecting. At this time, this selection does not affect inspection. It is only a label.
3. If you want the system to reject bottles that are over-filled, check the Reject on Over Fill box. Otherwise leave it un-checked.
4. Leave the default values for the remaining parameters for now. You can change them later, if necessary. These are described later in this section.

Next, set up the segments to determine fill height.

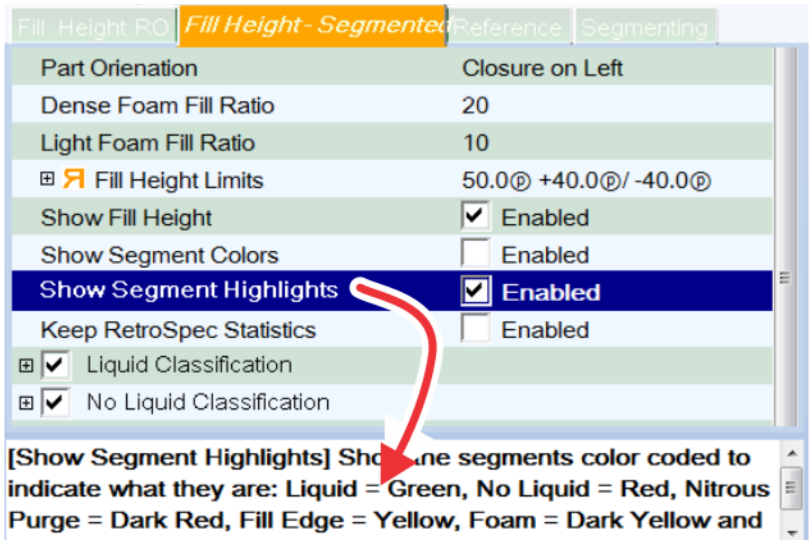
E. To set up the segments:

1. Go to the Fill Height - Segmented menu.



2. From the Part Orientation drop-down menu, select the appropriate orientation. In our example, the closure is on the left.
3. 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.
4. In the Fill Height - Segmented menu, check all the classifications that pertain to your bottle. The classification key is shown below. The abbreviations are used in the Results window next to the inspection menus.

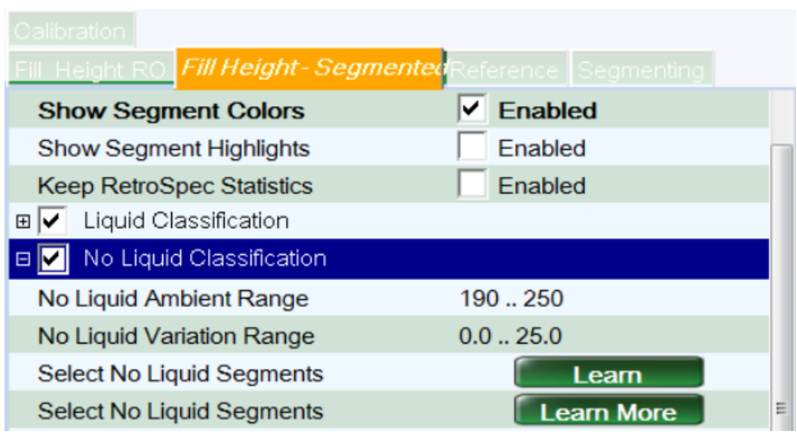
❖ *Note: these classifications are color coded. The colors are listed in the information box when you select Show Segment Colors or Show Segment Highlights in the menu.*



Next, set up the inspection to learn the ambient values of each classification.

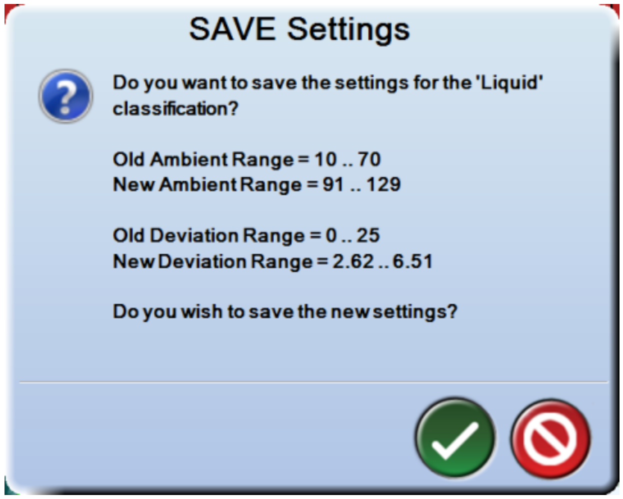
➢ ***F. To learn the classifications:***

1. In the Fill Height - Segmented menu, expand the classification you want to learn by clicking the [+] sign next to the classification. Start with Liquid Classification. More menu items are displayed. (See also Tips for Setting Classifications below)



2. Click the **Learn** button.
3. In the image to the left of the menu, click all the segments that match the classification, using the crosshair cursor. For example, for liquid classification, click all the segments that have only liquid showing in the current image. If you inadvertently select an undesired segment, click it again to de-select it.

4. Click the Learn button again to complete the selection. A menu is displayed, asking you to confirm your selections. Click the OK button to accept the selections. The system displays the ambient values it measured for the selected segments.



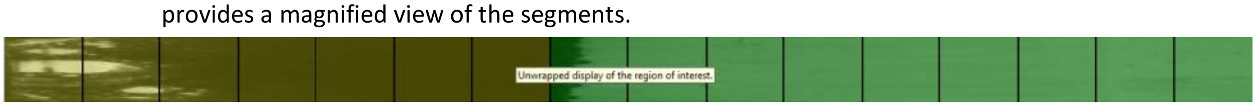
5. Click the OK button to accept and save the new settings.

❖ *Note: this inspection uses only the displayed image to learn. You may need to use the Learn More button on additional images to get a good sample population.*

6. Click the right arrow button below the image to display a new image. If the new image does not contain a good example of the classification (light foam, for example), select a new image.
7. Click the **Learn More** button. This adds data to the information already learned using the Learn button.
8. Use the crosshair cursor to select all the segments that match the current classification.
9. Click the **Learn More** button again to complete the selection.
10. Click OK twice to confirm your selections.
11. Repeat steps 6-10 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.
12. Repeat steps 1-11 above for the remaining classifications. Tips are provided below.

Tips for setting classifications:

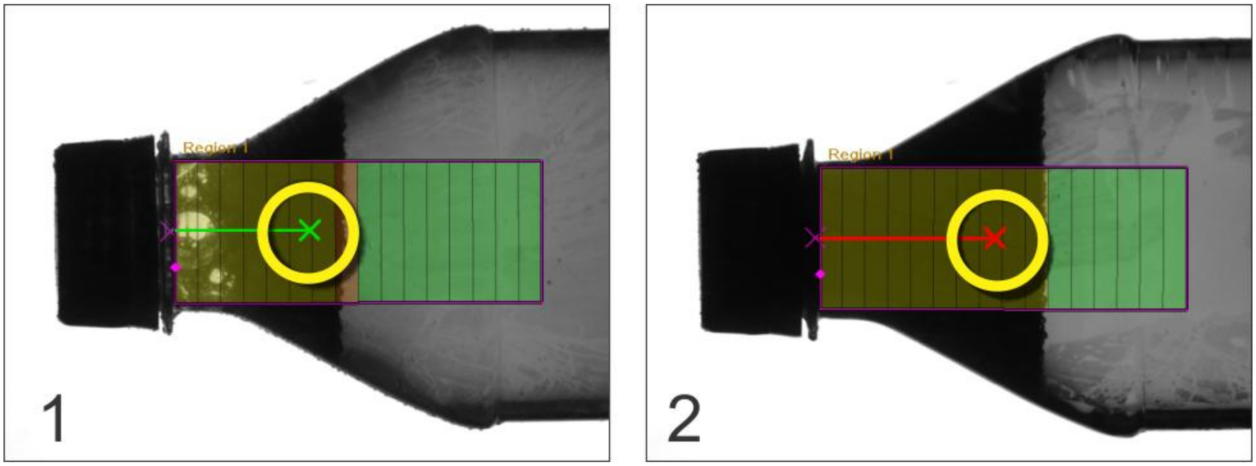
- You might be able to see the differences between segments better by using **Show Segment Highlights** rather than Show Segment Colors. This allows you to see the fill line, and when the segments change classification.
- Use the unwrapped Region of Interest on the Retro-Spec screen to view the segments better. This provides a magnified view of the segments.



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, or you may need to adjust the number of segments to make the fill line fall in the middle of a segment. The system uses only one segment at a time 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. To test the Fill Height - Segmented inspection:***

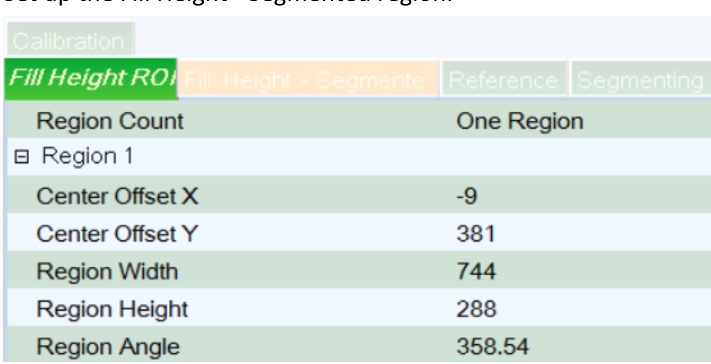
1. In the Retro-Spec graph, right-click to see the Retro-Spec Options menu. Select Auto Select Limits. This sets the pass/fail limits for the inspection based on current settings.
2. Test the inspection by looking at selecting more images on the Retro-Spec graph. Make sure each bottle passes or fails 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 in the Retro-Spec screen.
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 menu descriptions are for reference.

Fill Height ROI menu

Set up the Fill Height - Segmented region.



Region Count

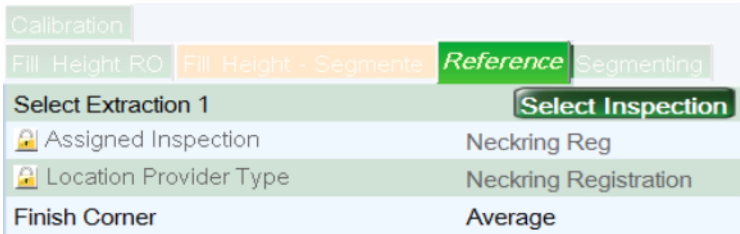
For this inspection, only use One Region.

Region 1

Usually the region can be set up using the tools on the image. Refer to "A. Before setting up the Fill Height - Segmented inspection" for tips to set up the region using the Measure ROI tools.

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 Extraction

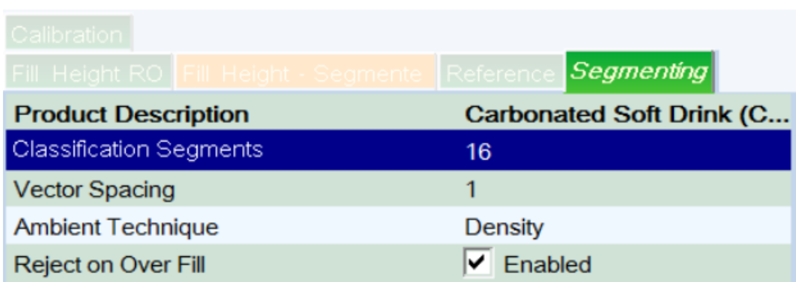
These menus allow you to choose an inspection to use as a reference point for the measurement. Click the **Select Inspection** button, then choose an inspection from the inspection tree. Click the **Select Inspection** button again to set the choice. The Assigned Inspection and Location Provider Type information is filled in -- you cannot manually change these.

Finish Corner

If the inspection chosen for the Extraction has multiple reference points, then this parameter allows you to 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. As of this publication, this selection does not affect inspection. It is used as a label.

Classification Segments

Divide the search region into a number of segments between one and 32. The default is 16 and usually works well. Increasing the number of segments may be more accurate; however this may increase inspection time and it may be affected by sloshing or decorative features on the bottle.

Vector Spacing

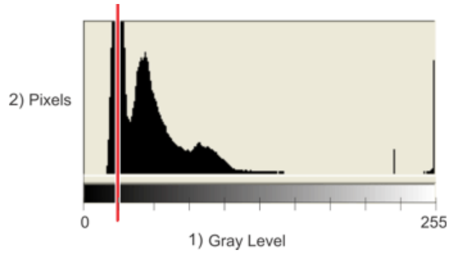
The distance between search vectors. For this inspection, leave the value at one.

For Fill Height - Segmented inspection, **Ambient Technique** is usually set to the default **Density**.

Ambient Technique

This method determines the region’s ambient. Choose the method through the drop-down menu.

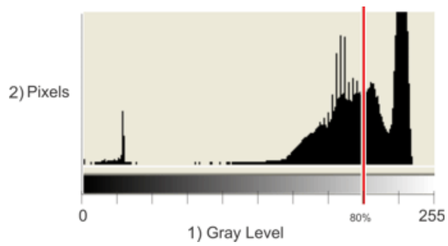
- **Max Amplitude** looks for the maximum gray level amplitude — the gray level with the most pixel counts — within the histogram of the search area.



1	Gray level
2	Pixels in the 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	Pixels in the histogram of the image

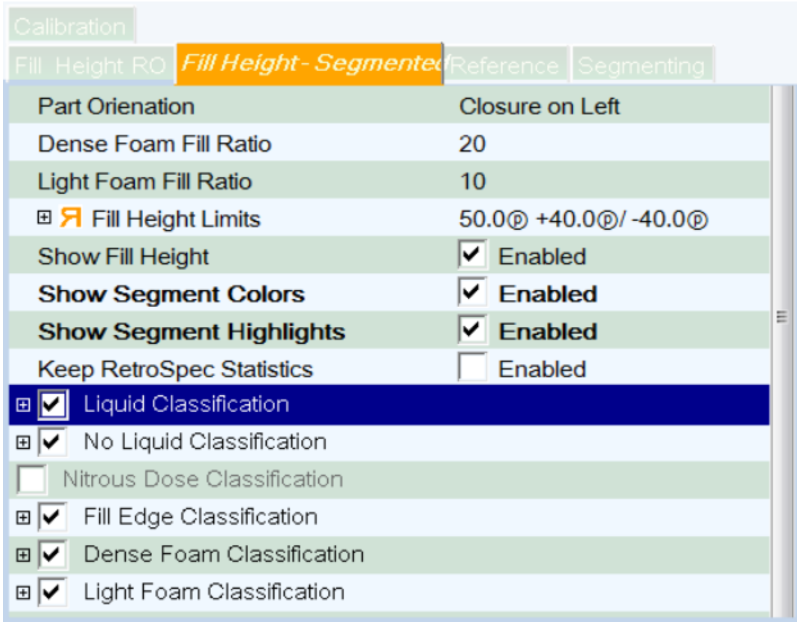
- **Density** computes the average of all the pixel gray levels — total gray level divided by pixels.

Reject on Over Fill

If you want the system to reject bottles that are too full, then check this box.

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. In many cases, the part image is sideways to optimize the inspection area on the screen.

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 range per your specifications. This value is measured with respect to your reference point (the neck ring, in our example). You can use the bars on the Retro-Spec graph to adjust the limits.

Nominal

The ideal fill height value.

❖ *Note: for the following parameters, you must have Show Graphics enabled. Right-click over the image and make sure Show Graphics is checked.*

Show Fill Height

Show the fill height measurement on the image. A large 'X' is displayed to indicate the computed fill height.

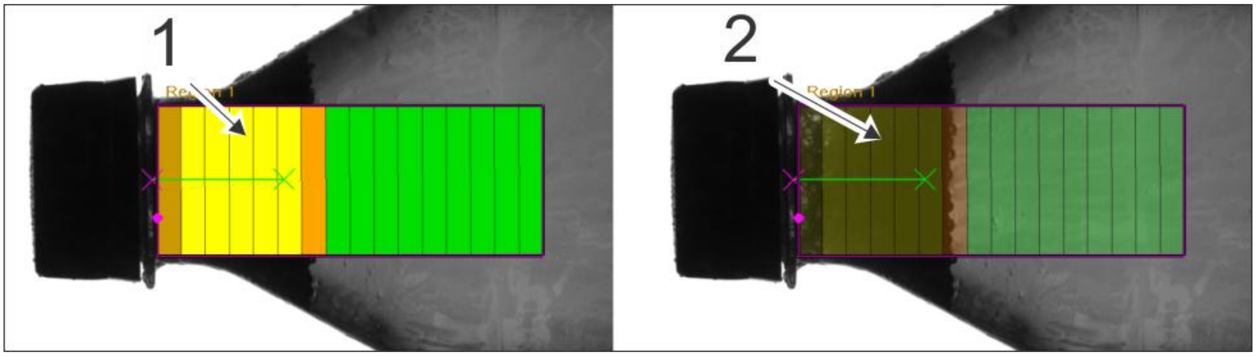
Show Segment Colors

Show the segments with the color-coding based on classification.

Show Segment Highlights

Show the segments with transparent color-coding based on classification.

❖ *Note: If you have both Show Segment Colors and Show Segment Highlights enabled, only Show Highlights is displayed.*



1	Show Segment Colors
2	Show Segment Highlights

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*** (on page 45).

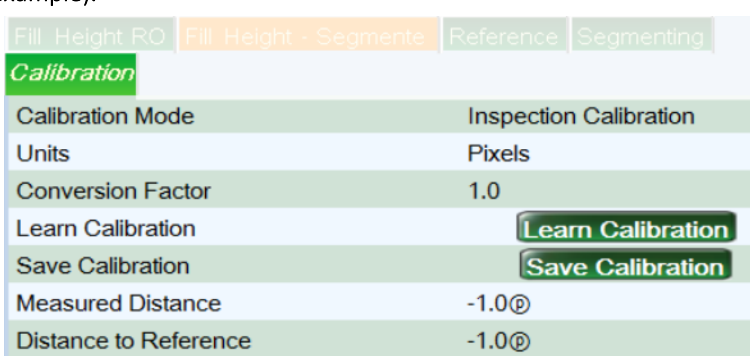
Classifications

Enable the proper classifications based on the product you are inspecting. The following parameters are available for each classification.
Ambient Range - This is automatically populated during the learn process.
Variation 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 the **Learn** button again.
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 the **Learn More** button again.

❖ *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

Use this menu to program the system to translate pixels into your desired units of measure (mm, for example).



Calibration Mode	Inspection Calibration
Units	Pixels
Conversion Factor	1.0
Learn Calibration	Learn Calibration
Save Calibration	Save Calibration
Measured Distance	-1.0ⓟ
Distance to Reference	-1.0ⓟ

❖ *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** *(on page 140) or* **Image Analysis** *(on page 132) 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*** (on page 132) or through another inspection.
Inspection Calibration -- Use the calibration from this inspection only.

Units

Choose your preference in the reporting of the measurements. Choose from millimeters, inches, pixels, and custom. Custom allows any calibration factor to be used.

Conversion Factor

This indicates the pixel size and is used to convert one pixel into the units selected. The initial conversion will be controlled by the Learn Calibration results. You can adjust this value 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

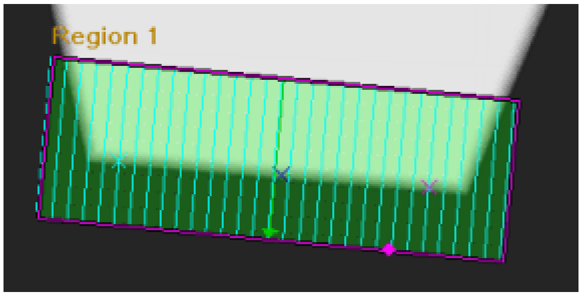
Measure your part with calipers or another tool, then enter the actual value for Measured Distance. This is used to help calibrate the measurement. The measurement should be the physical length from the neckring to the normal fill height, in your selected unit of measurement.

Distance to Reference

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 Distance to Reference. This is used to help calibrate the measurement.

Measure Extract

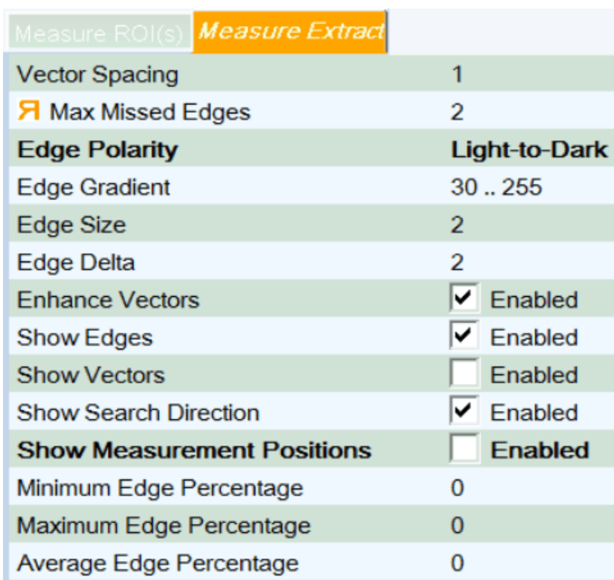
This analysis will use edge search criteria to find the minimum, maximum, and average edge location in a Measurement ROI. You then add a Dimension - ***Distance*** (on page 337) inspection to do the measurement of the found feature position.



➢ ***To add a Measure Extract analysis:***

1. Make sure a ***Measure ROI*** (on page 205) Region of Interest has been added to the inspection tree. Make sure the region is placed over the feature(s) you want to measure.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Analysis > Measure Extract. The Measure Extract analysis is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Measure Extract 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.

Measure Extract menu



Measure ROI(s)	Measure Extract
Vector Spacing	1
Max Missed Edges	2
Edge Polarity	**Light-to-Dark**
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**
Minimum Edge Percentage	0
Maximum Edge Percentage	0
Average Edge Percentage	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. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Size

Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Enhance Vectors

Computes an average pixel value from a neighborhood of 3x3 pixels around each pixel of the vector.

Show Edges

Show the found edges on the image.

Show Vectors

Show the search lines on the image.

Show Search Direction

Show the search direction of the vectors with an arrow.

Show Measurement Positions

Show the location of the measurement positions (minimum, maximum, and average).

Minimum/ Maximum Edge Percentage

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.

Average Edge Percentage

Ignore the extreme edges found. If you set a percentage, the inspection will ignore X percent of the minimum and maximum edges found. This helps determine an average edge position.

Distribution

The Distribution inspection looks at color printing on parts, detecting 'tramp cans' or gross decoration errors on parts. If you are familiar with the Pressco Extractor product, the Distribution inspection will seem familiar to you.

See also ***Auto-Learn*** (on page 365).

This inspection 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.

The Distribution inspection 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*** (see "***Distribution Histogram Types***" on page 328) 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.

➢ ***To add a Distribution analysis:***

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 > Analysis > Distribution. The analysis is added to the inspection tree. Re-name the inspection to something more meaningful to you.
4. The Distribution 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.

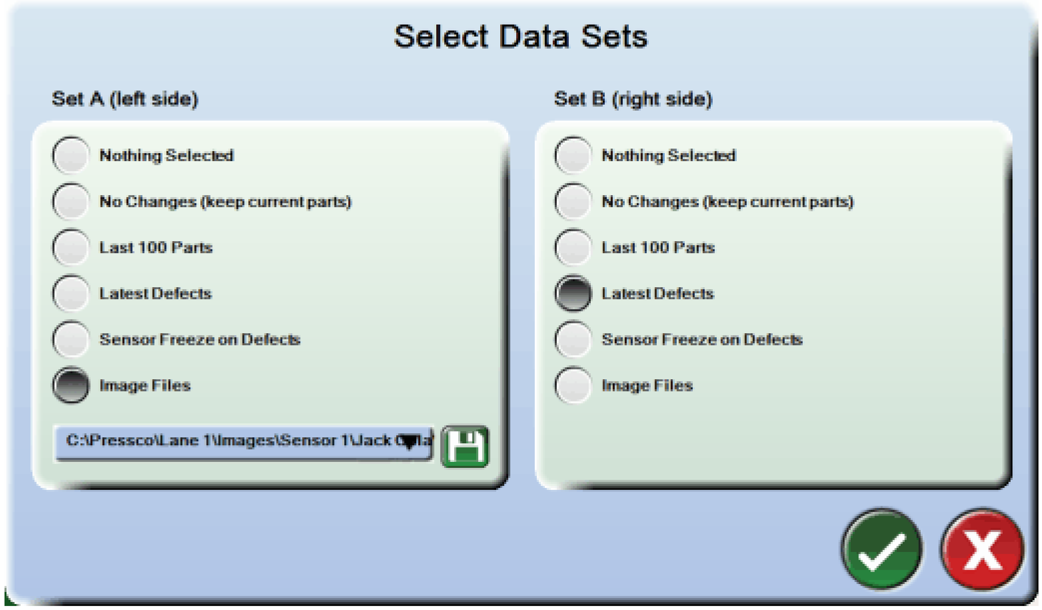
Load a set of good images into Data Set A

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.

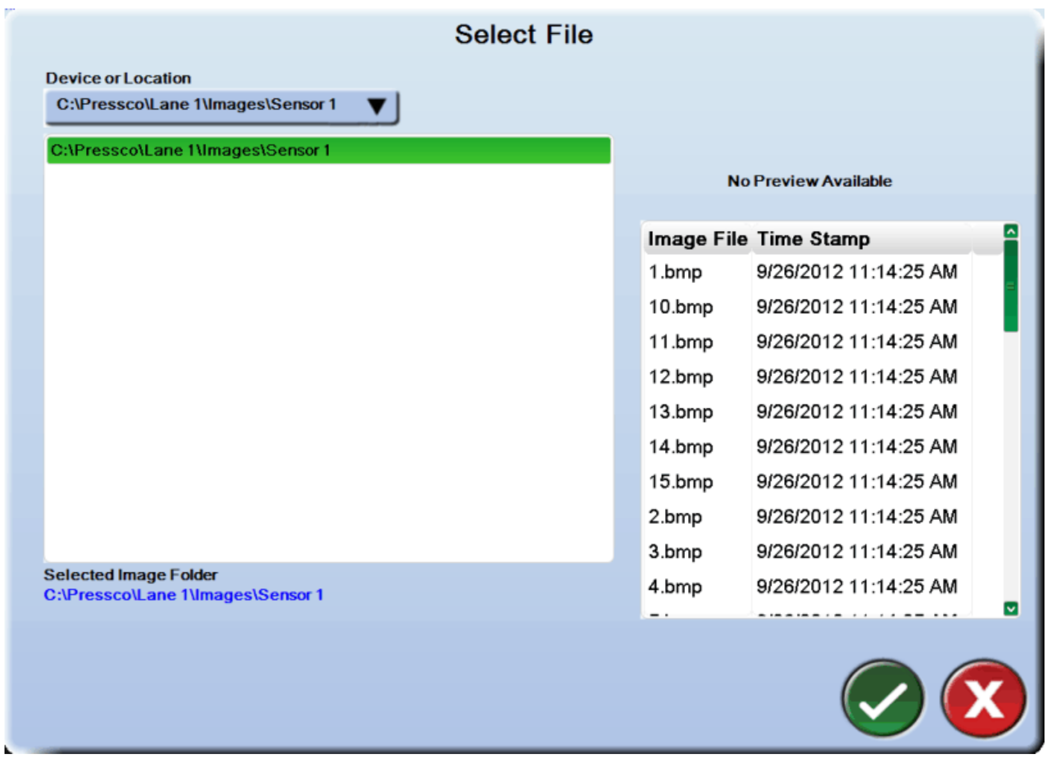
➢ ***To load Data Set A:***

1. Look at the ***Retro-Spec Population View Graph*** (on page 191).

2. Click the left arrow 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 File** 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 Select Location and Select Data Sets menus to load all the bitmap images that were previously saved in the selected folder.

Set up the Distribution inspection

➢ *To set up a Distribution inspection:*

1. Make sure a good set of images is loaded into Data Set A (see above).

> ❖ *Note: descriptions of the parameters mentioned are described under the Distribution menu section below.*

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 will 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. To load more images, use the instructions to "Load a set of good images into Data Set A" listed above.*

Distribution menu

Histogram Type

Select one of the ***Distribution Histogram Types*** (on page 328). 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. Therefore, you will need a set of images in Data Set A. The data set should contain a good sample of your production line. Ideally, you should store the images of about 100 good parts in Data Set A. The larger the sample population, the better the inspection results.

- ❖ *Note: if there are any defective parts in Data Set A, they will be included in the learned data. Therefore, you might want to look through the data set using the Comparison View graph, and move defective parts 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

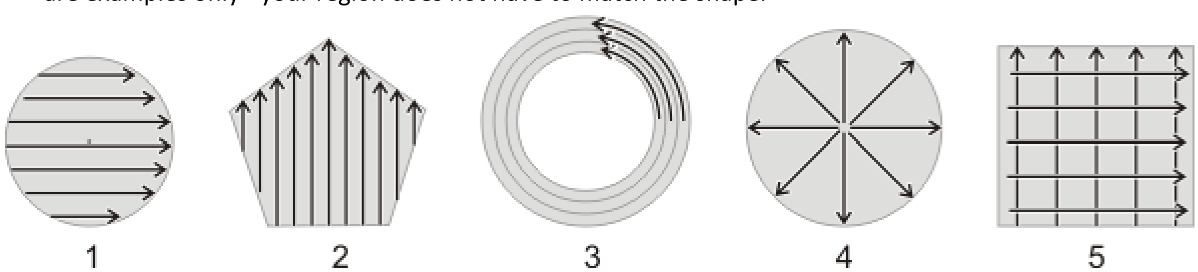
[Only available after you use Learn] - After you have used the Learn function, you can add to the learned data. Use this to learn new parts where the colors might be slightly different than your original data set, but are still good parts. This builds a wider tolerance of colors for your parts. This feature can be used at any time - for example: immediately after the initial learn, or several weeks later.

Region Extraction

Choose how the Intellispec should read the information from the region. This usually depends on the shape of your region.

- ❖ *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.

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 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*** (on page 328).

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*** (on page 323) 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*** (on page 195).

1	New Retro-Spec Color Histogram
2	Special Color Histogram (Chartreuse, Green, Spring Green shown)
3	Classic Extractor Histogram
4	White Level Histogram - not shown

➢ ***To see a different histogram:***

1. Select a different from the **Histogram Type** drop-down menu.
2. Switch to Population View on the graph by right-clicking the Retro-Spec graph, then selecting Population View from the Retro-Spec Options menu.
3. Switch to Part view by right-clicking on the Retro-Spec graph, then selecting Part View from the Retro-Spec Options menu. 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

(As of this printing, the white level histogram is not displayed under the Retro-Spec graph)

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 shade.

Delta E in Retro-Spec Distribution inspection

Delta E is a measurement used to indicate how much a color deviates from an accepted standard. The Distribution inspection provides Delta E detection by measuring color separation on a scale of 0 - 100. A value of zero indicates that there is no discernible difference in color from the reference value. A value of one indicates the minimum human perceptible difference in color. The colors are measured in an L*a*b*color space.

When using Delta E, the optional Luminance, Chrominance, and Hue features can all be enabled or disabled separately. You can also set separate sensitivity values for each of these components.

❖ *Tip: set up one Distribution inspection to measure Delta E. Use a separate Distribution inspection to detect tramp parts or gross decorator defects.*

➢ ***What you will need:***

Your plant's L*a*b* color specifications for the part you are inspecting. You should have values from a Gold Standard part, as well as measured values from a random sample part. (example: if your can is painted primarily Blue, Red, and Gold, then obtain L*a*b* values for those three colors)

➢ ***Before adding the Distribution inspection with Delta E:***

1. Make sure a Region of Interest has been added to the inspection tree.
2. Snap several images of parts - if possible, put the lane online for about a minute to capture several images. Alternately, you may choose to load a set of saved parts after adding the inspection.
3. Take the lane offline.

➢ ***To add the Distribution inspection:***

1. Highlight the region name in the inspection tree.
2. Right-click in the inspection tree to see the Inspection menu.

3. From the Inspection menu, select Add > Analysis > Distribution. The analysis is added to the inspection tree. Re-name the inspection to something more meaningful to you. The Distribution menu is displayed and the region is shown on the image. For more information about the Distribution menu, see ***Distribution*** (on page 323).
4. Go to the Delta E menu and check the Delta E box to enable the feature.
5. If you have already captured several images and want to use them, go to the next step. If you have a saved set of images that you want the system to learn, load those images into Data Set A.
6. Go to the Distribution menu and click the **Learn** button. You should see a difference in the population graph.
7. Next, set the Delta E colors.

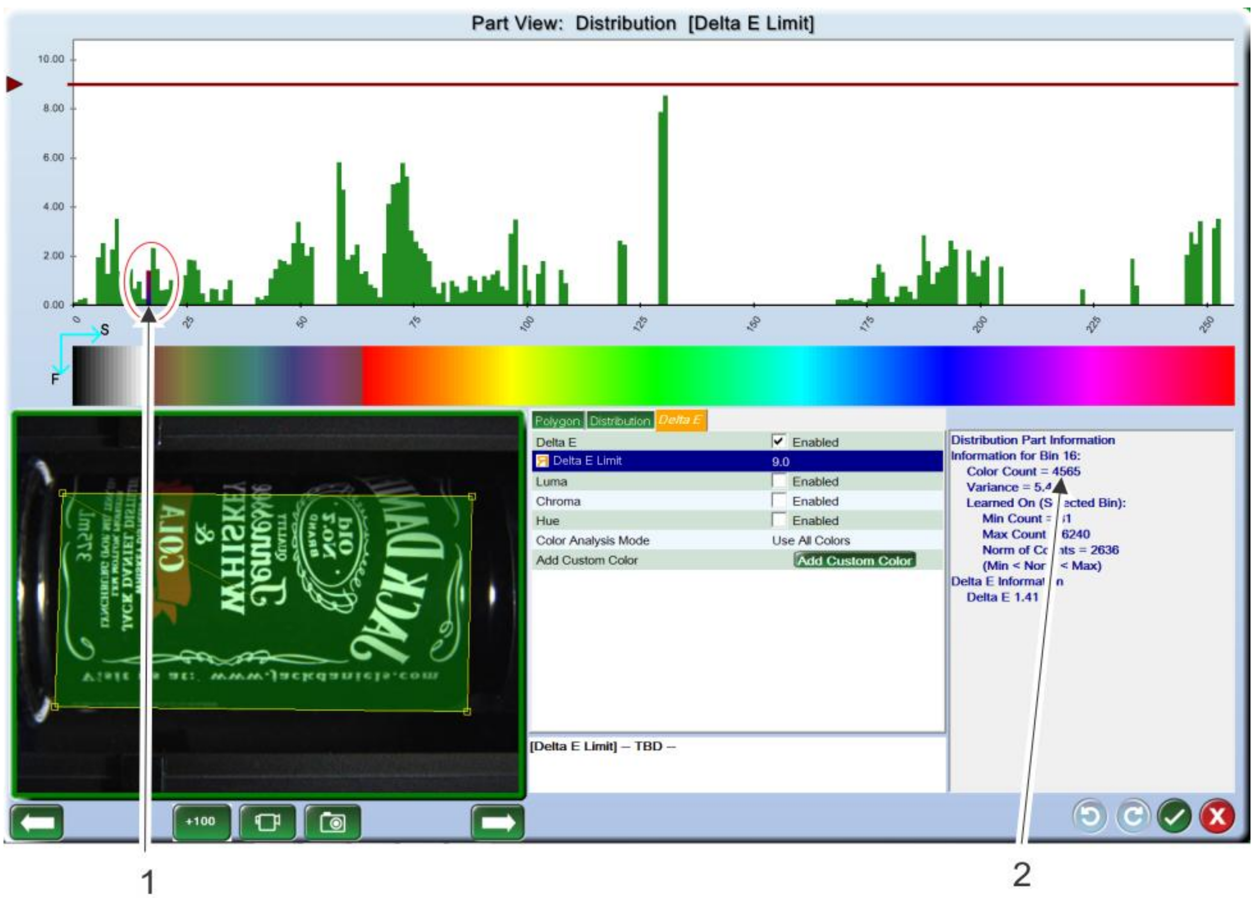
Setting Delta E Colors

➢ *To set a Delta E color:*

1. Scroll through the available part images to locate one that has a good representation of the Delta E colors you want to define.
2. Switch to Part View in the Retro-Spec graph: highlight, then double-click the bar for the part identified in step 2. You should see peaks on the graph that correspond to the colors on your part.

❖ *Note: the height of the peak is not proportional to the number of pixels in the bin. You may see a low peak with a large Color Count.*

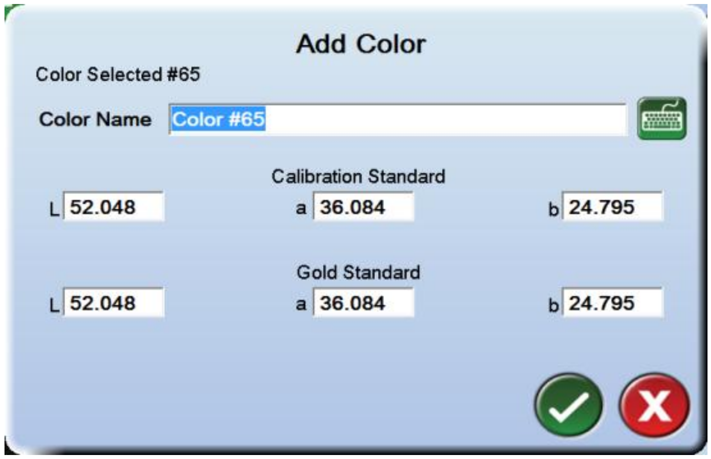
3. Click on the various peaks on the graph while looking at the Results window. Locate a bin (peak) that is close to the Delta E color you want to define (colors are displayed below the graph). Find one that has a high Color Count.



- 1 - Select a peak (bin) that is close to the Delta E color you want
- 2 - Results window - look at Color Count

4. Go to the Delta E menu and highlight the **Delta E Limit** item in the menu.

5. When you have located a bin that is close to your Delta E color with a high Color Count, click the **Add Custom Color** button (this is available after you highlight the Delta E Limit item). The Add Color menu will be displayed.



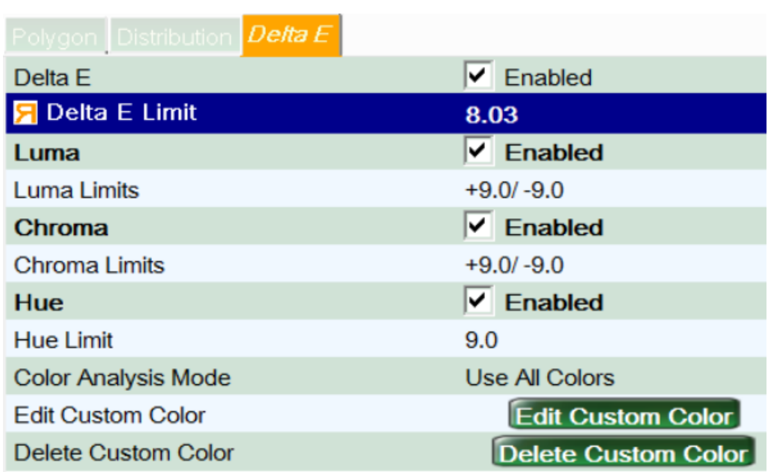
6. Add the L*a*b* colors for either the Calibration Standard (from your random sampled part) and/or Gold Standard row, depending on your plant requirements.
7. Click the OK button to save changes and exit. Once you have added a Custom Color, the **Edit Custom Color** and **Delete Custom Color** buttons become available in the Delta E menu. The Results window now displays information about the custom colors you have defined (when you select that color in the graph).
8. To add another color, select another bin on the graph that is close to the Delta E color you want to define, and that has a high Color Count (if necessary, scroll through images to find one that has a good representation of that color).
9. Next, set the sensitivity.

➢ ***To set the sensitivity:***

1. Make sure the **Delta E Limit** parameter is highlighted in the Delta E menu.
2. Switch to the Population View graph: Right-click over the Retro-Spec graph and select Population View from the Retro-Spec Options menu.
3. Move the red sensitivity bar on the graph to determine pass/ fail limits for the inspection. For example, if your plant allows a Delta E value to be no greater than six (6), then set the sensitivity bar at six.

The parameters in the Delta E menu are described below.

Delta E menu



Enable measurements for Delta E, Luma (Luminance), Chroma (Chromaticity), and/ or Hue, if desired. Use these measurements only if required by your plant.

Delta E

Enable the Delta E check.

Delta E Limit

Set the reject limit for the Delta E check. This can be entered manually by selecting this row and using the pop-up numerical tools, or by sliding the reject line on the Retro-Spec graph.

Luma (Luminance)

The luminous intensity of a surface in a given direction per unit of projected area. [Source: ***http://www.merriam-webster.com/dictionary/luminance***]

Chroma (Chromaticity)

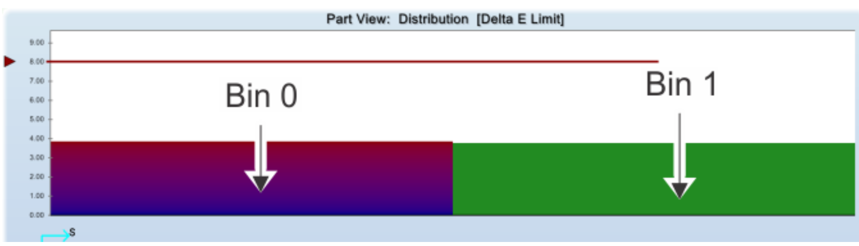
The aspect of color that includes consideration of its dominant wavelength and purity. [Source: ***http://www.thefreedictionary.com/chromaticity***]

Hue

The attribute of color that enables an observer to classify it as red, green, blue, purple, etc., and excludes white, black, and shades of gray. [Source: ***http://www.thefreedictionary.com/hue***]

Color Analysis Mode

Choose to evaluate All Colors or Custom Colors for Delta E limits.
All Colors - the system uses all the colors on the part to evaluate Delta E limits.
Custom Colors - you must first select a bin from the Part View Retro-Spec graph to define a color. See "Setting Delta E Colors" above for instructions. If you select "Custom Colors," then the system will only evaluate parts for the defined custom color(s).
If you select Custom Colors then only the bins that contain pixels for the custom colors are displayed on the Retro-Spec graph. In the example below, we have two custom colors defined; therefore only two bins are displayed.



Edit Custom Color

This button is available only after you have defined a custom color, and you have selected the bin corresponding to the color on the Retro-Spec graph. Click this button to edit the values for Calibration Standard or Gold Standard.

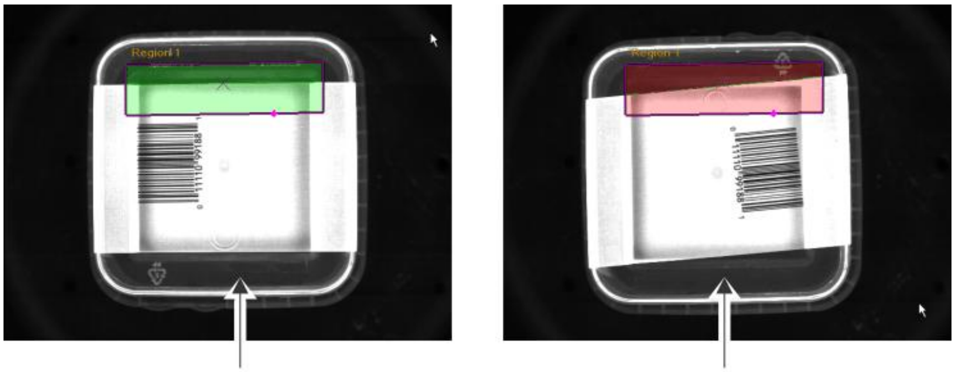
Delete Custom Color

This button is available only after you have defined a custom color, and you have selected the bin corresponding to the color on the Retro-Spec graph. Click this button to delete the current custom color.

Label Skew Extract

Label Skew Extract is similar to ***Measure Extract*** (on page 321). 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 inspection can reject a part if the label is not consistent enough, such as a flagged label.

Label Skew requires a ***Measure ROI*** (on page 205) to set up the region(s). The actual skew inspection is handled by the ***Angle*** (on page 341) dimension.



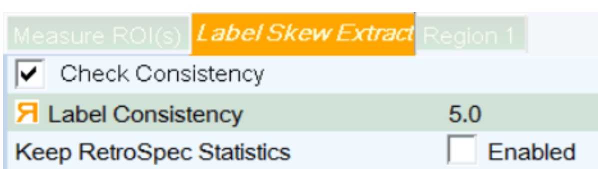
1 2

1	Normal label
2	Skewed label

➢ *To add a Label Skew Extract inspection:*

1. Make sure a ***Measure ROI*** (on page 205) Region of Interest has been added to the inspection tree. Set up the Measure ROI for one or two regions.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Analysis > Label Skew Extract. The analysis is added to the inspection tree. Re-name the inspection to something more meaningful to you.
4. The Label Extract and Region 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.
5. After setting up the Label Skew extract, add an ***Angle*** (on page 341) 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*** (on page 45).

Region 1 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*** (on page 164) menu. Right-click over the image to see the Image Options menu.

Region 1

Vector Spacing	1
Max Missed Edges	20
Edge Polarity	Either
Edge Gradient	15 .. 30
Edge Size	2
Edge Delta	2
Edge Thickness	1
Use Subpixel	☐ Enabled
Enhance Vectors	☑ Enabled
Show Edges	☑ Enabled
Show Vectors	☐ Enabled
Show Search Direction	☑ Enabled

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. For example, if the feature you want to find is very bright, choose Dark to Light.

Edge Gradient

The minimum and maximum difference in gray shades, between two pixels, to be considered an edge.

Edge Size

Indicates how many pixels in a row to compare (1 to 1, 2 to 2, etc.). The larger the Edge Size, the stronger the edge will need to be. This parameter acts like a filter that looks at a length in pixels before and after the edge.

Edge Delta

The distance between pixels being compared when seeking an edge. A higher Delta value is more sensitive because it finds more edges.

Edge Thickness

The number of consecutive times that the gradient must be met to define an edge.

Use Subpixel

Finds edges based on their subpixel location, rather than rounding off to the nearest pixel. This gives greater centering accuracy.

Enhance Vectors

Computes an average pixel value from a neighborhood of 3x3 pixels around each pixel of the vector.

Show Vectors

Show the search lines on the image.

Show Search Direction

Show the search direction of the vectors with an arrow.

Feature Detect

Feature Detect analysis can be used to detect a range of specific 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 200) or* **Polygon Region** *(on page 201) of interest.*

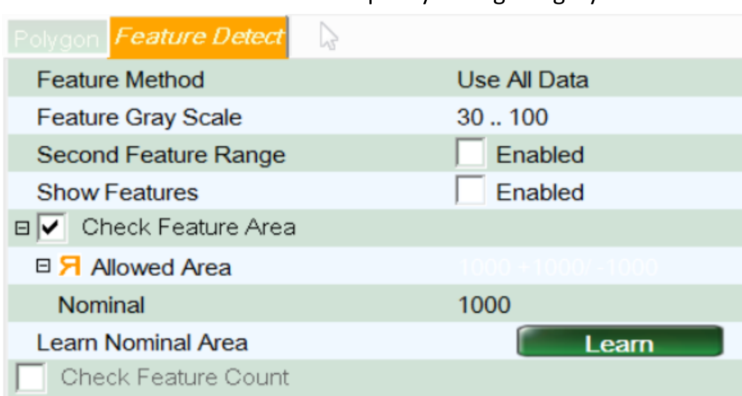
Series IV users: Feature detect is similar to Zones Inspection.

➢ ***To add a Feature Detect analysis:***

1. Make sure a ***Ring Region*** (on page 200) or ***Polygon Region*** (on page 201) of interest is already added to the inspection tree. Adjust the region to examine the area of interest where you will place the Feature Detect inspection.
2. Right-click on the item you just added.
3. From the Inspection menu, select Add > Analysis > Feature Detect. The analysis is added to the inspection tree. Re-name it to something more meaningful to you.
4. The Feature Detect 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.

Feature Detect menu

Use the Feature Detect menu to specify a range of gray shades to find.



Feature Method

Choose a method to determine the ambient value in a search region.
Use All Data - Analyzes all the pixels in the search region, and counts the total number of pixels that meet the criteria set in **Feature Gray Scale**.
Use Qualified Features - Analyzes all the pixels in the search region, but only counts pixels if:

- The pixels meet the **Feature Gray Scale** criteria, AND
- The pixels meet the **Feature Size** criteria.

Feature Gray Scale

Set the range of gray shades of the feature you want to locate.

Second Feature Range

Set a second range of gray shades to locate within the search region.

Second Feature Gray Scale

[Only shown if Second Feature Range is enabled] Set the range of gray shades of the second feature you want to locate.

Show Features

Highlight the found features on the image.

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 Feature Count

Check to see that the correct number of features is found.

The following parameters are available when **Feature Method = Qualified Features.**

Feature Size

Set the allowable size of the feature you want to locate.

Show Feature Centers

Show the center points of the found features, marked with an 'X.'

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*** (on page 337)
- ***Angle*** (on page 341)

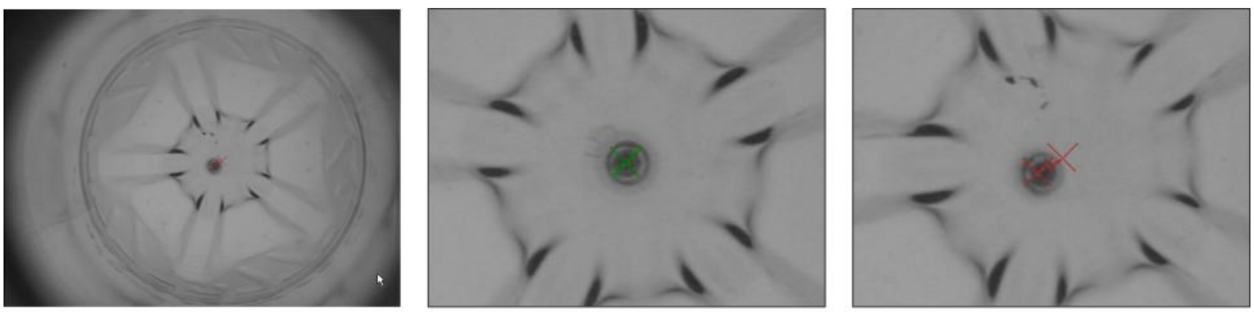
❖ *Note: Your system (and this book) may show only those items that apply to your application.*

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.

Series IV users: this inspection produces the same results of Dimension inspection, but in Series V the measurement points are found by other inspections.

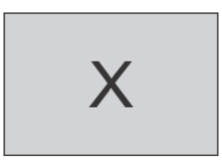
Examples of where Distance inspection might be used is for detecting swung gates or high caps on bottles, turned tabs on converted or EZO ends, or computing finish dimensions. The example below shows a gate position computed with respect to the center of the base.



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 center of the screen, if desired.



➢ ***To add a Distance measurement:***

1. Make sure at least one ***Registration*** (see "***Registrations***" on page 231) or ***Measure Extract*** (on page 321) 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.

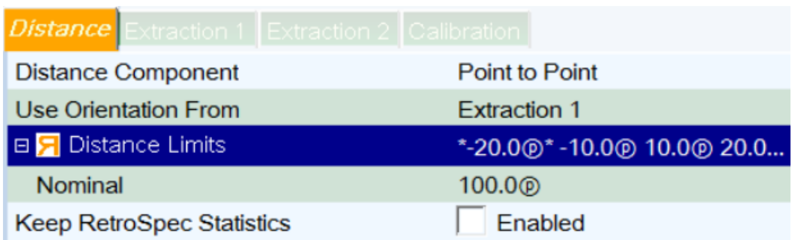
4. The Distance menus are displayed and the region is shown on the image. (The menus are described below) Adjust the parameters as necessary.

➢ ***To set up a basic Distance measurement:***

1. Choose a Distance Component from the Distance menu.
2. Go to the Extraction 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 **Select Inspection** button again to complete the selection.
4. Go to the Extraction 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 **Select Inspection** button again to complete the selection.
6. Go back to the Distance menu and set the Distance Limits.
7. Adjust other parameters as necessary.

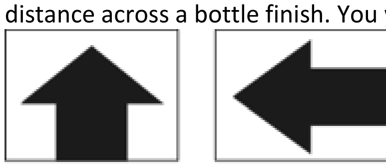
Distance menu

❖ *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** *(on page 140) or* **Image Analysis** *(on page 132) 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** -- These two modes are good for measuring distance across a bottle finish. You would set this mode depending on the part orientation.



1 2

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 extractions, 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

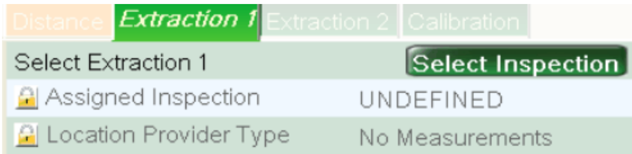
The ideal distance.

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*** (on page 45).

Extraction 1 and Extraction 2 menus

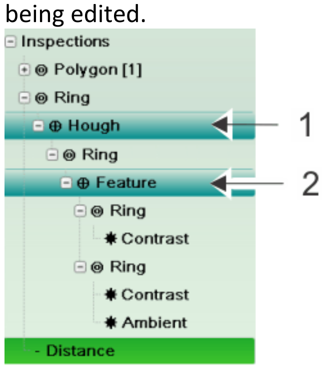
❖ *Note: when only one inspection is used for Extraction, the second reference point used is the center of the screen.*



Select Extraction

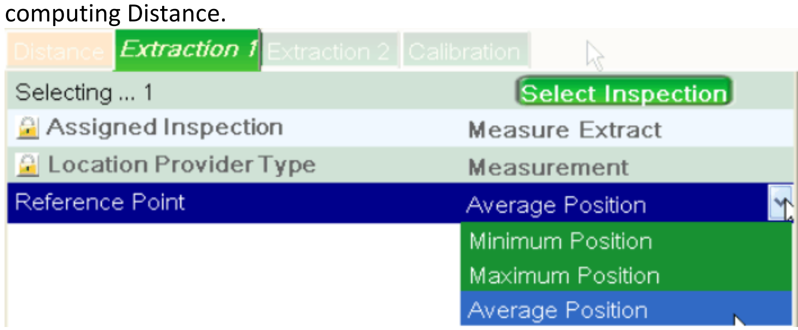
These menus allow you to choose an inspection to use as a reference point for the measurement. Click the **Select Inspection** button, then choose an inspection from the inspection tree. Click the **Select Inspection** button again to set the choice. The Assigned Inspection and Location Provider Type information is filled in -- you cannot manually change these.

In this example, we chose Hough as Extraction 1 and Feature as Extraction 2 from the inspection tree. Those inspections become highlighted when Distance is selected in the inspection tree and/or is being edited.



Reference Point

(Available when you use the Measure Extract inspection) Choose which edges to use when computing Distance.

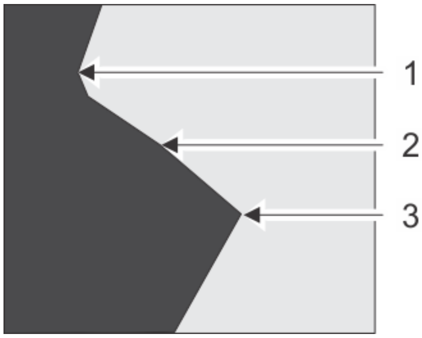


Minimum Position -- The system will use the minimum distance of the search region, and reject parts if the measurement is out of limits.

Maximum Position -- The system will report the maximum distance of the search region, and reject parts if the measurement is out of limits.

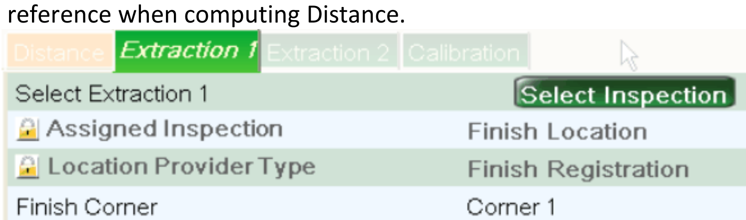
Average Position -- The system will report the average distance of the search region, and reject parts if the measurement is out of limits.

Suppose the illustration below indicates a search region, in which the system is searching from right to left, seeking a light to dark transition. Position 1 is the Maximum Position. Position 2 is the Average Position. Position 3 is the Minimum Position found in the search region.



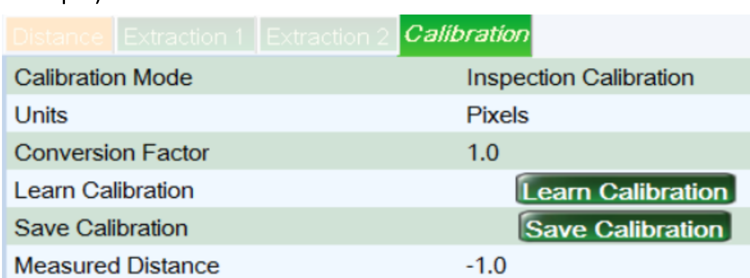
Finish Corner

(Available when you use Finish Location as the extraction for Distance) Choose which corner to use as a reference when computing Distance.



Calibration menu

Use this menu to 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*** (on page 132) or through another inspection.
Inspection Calibration -- Use the calibration from this inspection only.

Units

Choose your preference in the reporting of the measurements. Choose from millimeters, inches, pixels, and custom. Custom allows any calibration factor to be used.

Conversion Factor

This indicates the pixel size and is used to convert one pixel into the units selected. The initial conversion will be controlled by the Learn Calibration results. You can adjust this value 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 actual value for Measured Distance. This is used to help calibrate the measurement.

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 242)

Finish Location (on page 247)

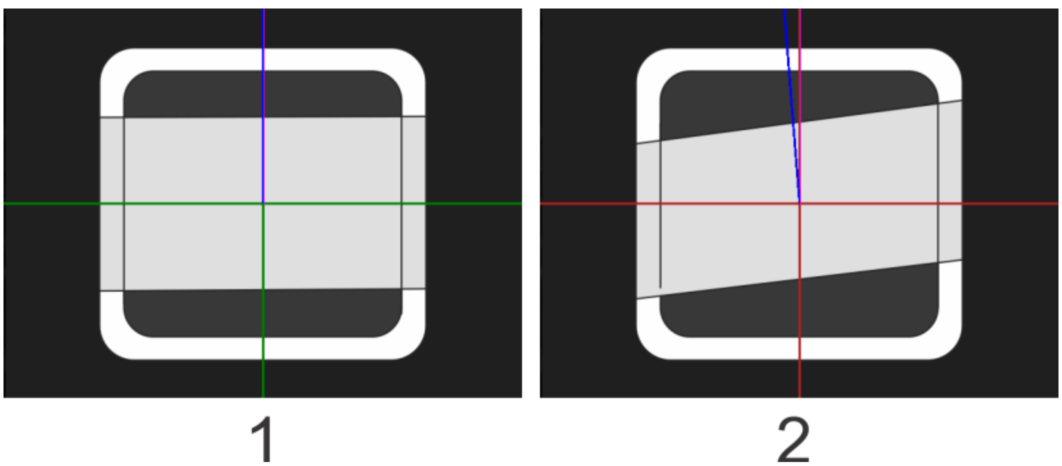
Template Registration (on page 251)

Pattern Match (on page 273)

Template Orientation (on page 275)

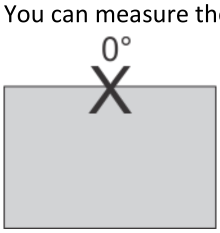
Label Skew Extract (on page 332)

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:***

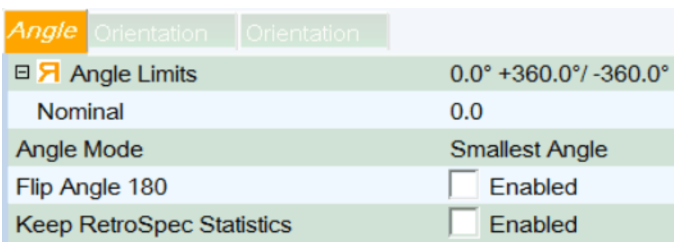
1. Make sure at least one inspection that produces an orientation has been added to the inspection tree. [see list above]
2. Right-click on the item you just added.

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. The Angle menu (along with two Orientation menus) 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.

➢ *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. See list at the beginning of this topic.
4. Click the **Select Inspection** button again 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.

Angle Mode

Use the Smallest or Largest Angle. An example: the system could measure an angle at 2° or 358° depending which direction it is measuring. Choose whether to use the smallest or largest angle found.

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.

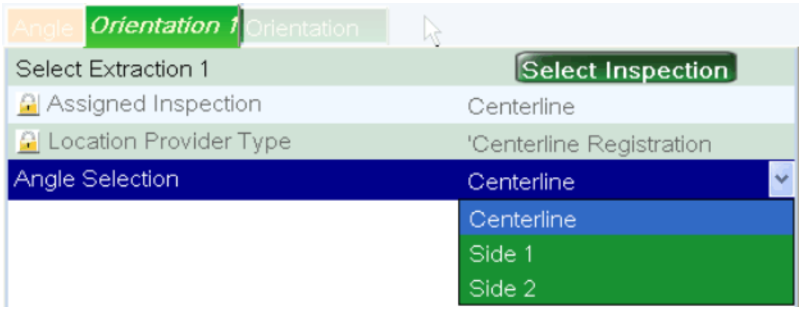
Keep Retro-Spec Statistics

Check this box to keep statistics such as Mean, Standard Deviation, and CPK, from this inspection. For more information see ***Retro-Spec Statistics*** (on page 45).

Orientation menu (1 or 2)

Pick the reference point(s) to measure the angle.

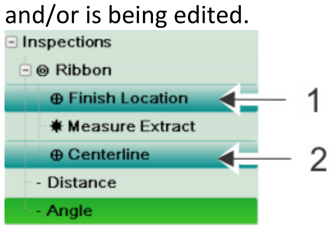
❖ *Note: when only one inspection is used for Extraction, the reference angle used is zero degrees, so the inspection would measure the angle with respect to zero degrees.*



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.

In this example, we chose Finish Location as Extraction 1 and Centerline as Extraction 2 from the inspection tree. Those inspections become highlighted when Angle is selected in the inspection tree and/or is being edited.



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.

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.

❖ *Note: you must first place a* **Region of Interest** *(see "***Regions of Interest (ROI)***" on page 198) where you want the correlation inspection to take place. We also recommend a* **Registration** *(see "***Registrations***" on page 231) and an* **Orientation** *(see "***Orientations***" on page 272) (depending on the part type) prior to the inspection.*

The available types of correlation inspections are:

- ***Body-Maker ID*** (on page 344)
- ***Color Dot*** (on page 359)

❖ *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 would be because the ID mark cannot be read or is unknown.

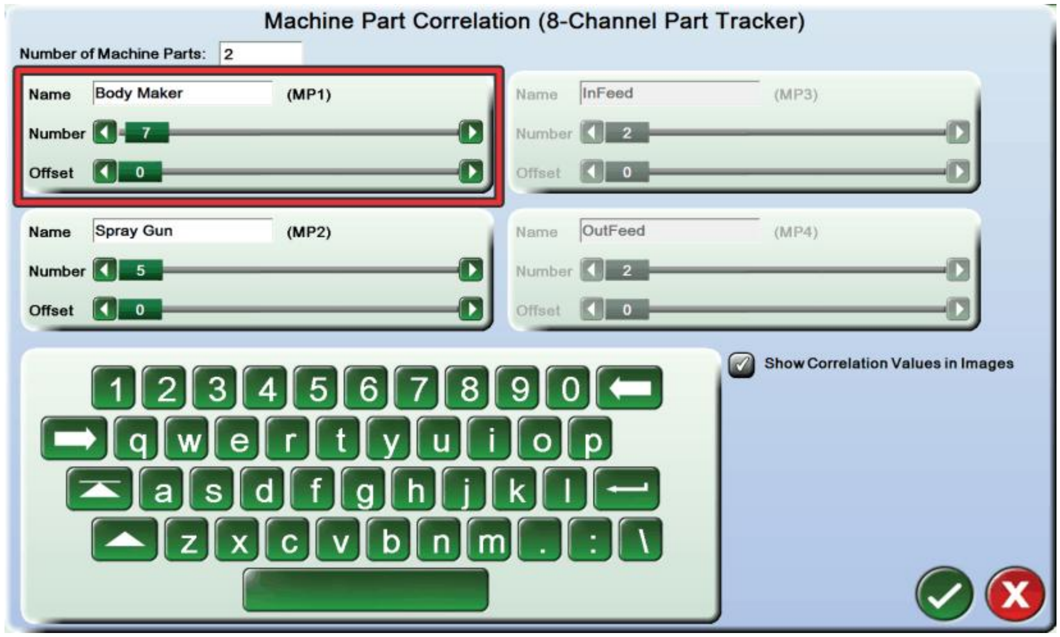
You will need cans with Body-Maker ID marks on them running through the inspection system. Make sure your camera and lighting setup provides the best image possible of the ID marks. You will run several hundred cans through the system, identify them yourself, sort them into the proper ID category, then 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.*

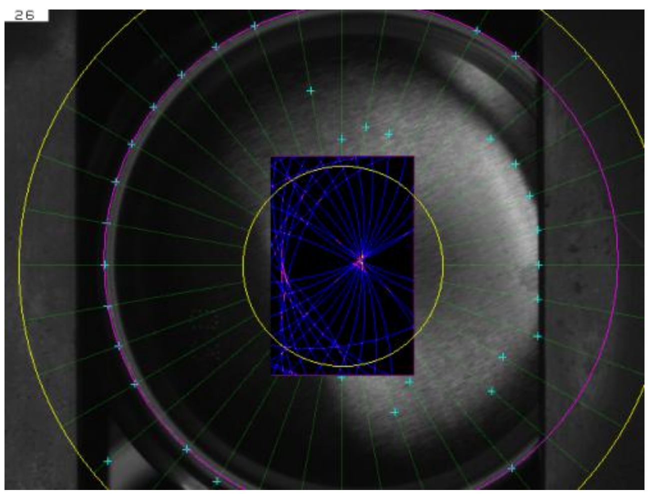
➢ ***Before adding a Body-Maker ID inspection:***

1. Make sure that your system has a Body-Maker configured in the ***Machine Part Correlation*** (on page 84) 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.

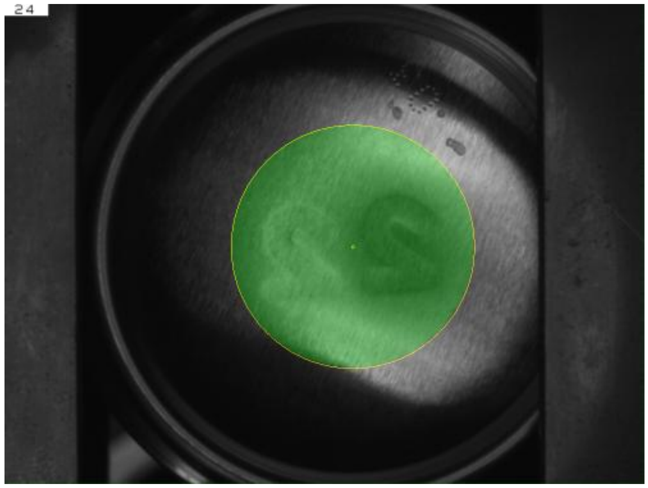
❖ *Note: The extra body-maker ID is used to report machine parts that the Intellispec system cannot identify (for example, if a part is damaged). The system will record those parts as "Unknown."*



2. Use a region and registration to find the center of the part. For example, place a ***Ring Region*** (on page 200) and ***Hough*** (on page 236) registration to determine the center of the part. An example is shown below.



3. Add another ***Ring Region*** (on page 200) to cover the area where the Body-Maker ID will be found. An inner radius of one, and an outer radius of ~127 works well. The outer radius will depend on the size of the Body-Maker ID marks on your parts.



Next, add a Body-Maker ID inspection.

➢ *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. Messages stating "You need to run the 'Create Body Maker' operation for the best results" are displayed. You will set those up in the following procedures. Click OK to continue.

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.

1. Set the Machine Part

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 = Body-Maker Identification.

Ring | Body Maker ID | Settings | BMID

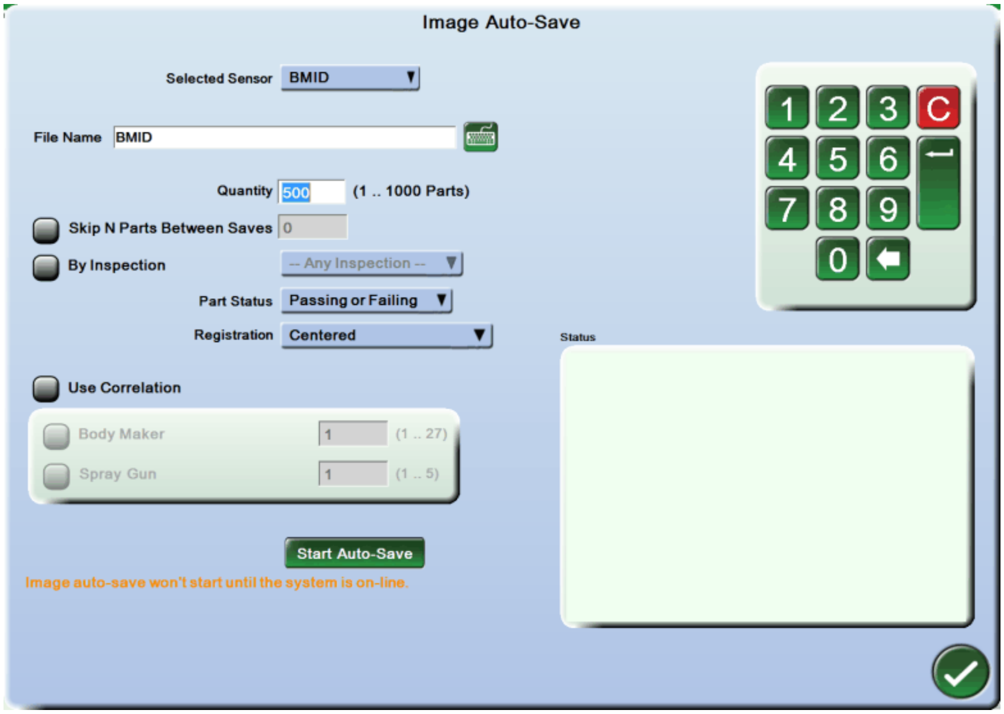
Selected Machine Part	Body Maker
Categorization Method	Orientation Only
Extract Bounding Region	☐ **Enabled**
Selected Body Maker	**22**
View Body Maker	View Body Maker
Load Sorted Images	Load Sorted Images
Sort Images Centered	☑ Enabled
Collect Images	Collect Images
Mirror Sort Images	☑ Enabled
Sort Images	Sort Images
Learn Iterations	20
Create Body Maker	Create Body Maker

2. Acquire images to learn the ID marks

You will acquire images, sort them, then program the inspection to identify the proper ID marks.

➢ ***To acquire the sample images:***

1. From the BMID menu, click 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 acquire body maker images. For additional information about this menu, see ***Saving Images Automatically*** (on page 150).



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.

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 an average template image for each body maker.

➢ ***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 images 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).
   - You will be able to review images later to make sure the proper images are in the proper bins

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 buttons at the bottom of the menu, and scroll through all the images.
   - Select the best image from each ID and click the **Assign as Seed** button. (for more information, see Assign as Seed description below)
   - If you find any un-readable images, or images that were assigned incorrectly, use the **Un-Sort Image** or **Delete All** buttons.
3. 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).

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, choose the best possible image for the ID, and click the **Assign as Seed** button. Click the other ID buttons at the bottom of the screen and assign the best image from each ID as a seed image.

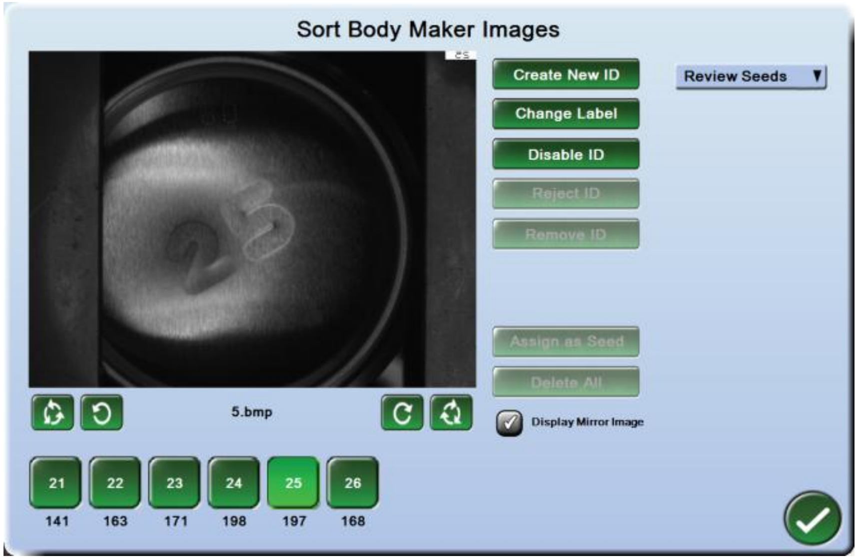
Delete All

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.

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. 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.

4. Set the Parameters

You may set other parameters before using the learn process, but as a minimum, set the following.

➢ ***To set the parameters:***

1. In the Settings menu, click the **Standard Settings** 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 Iterations**. The default setting is 20, which usually works well. A higher setting may improve the results slightly, but takes more time.

Next, have the system learn the images.

5. 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.

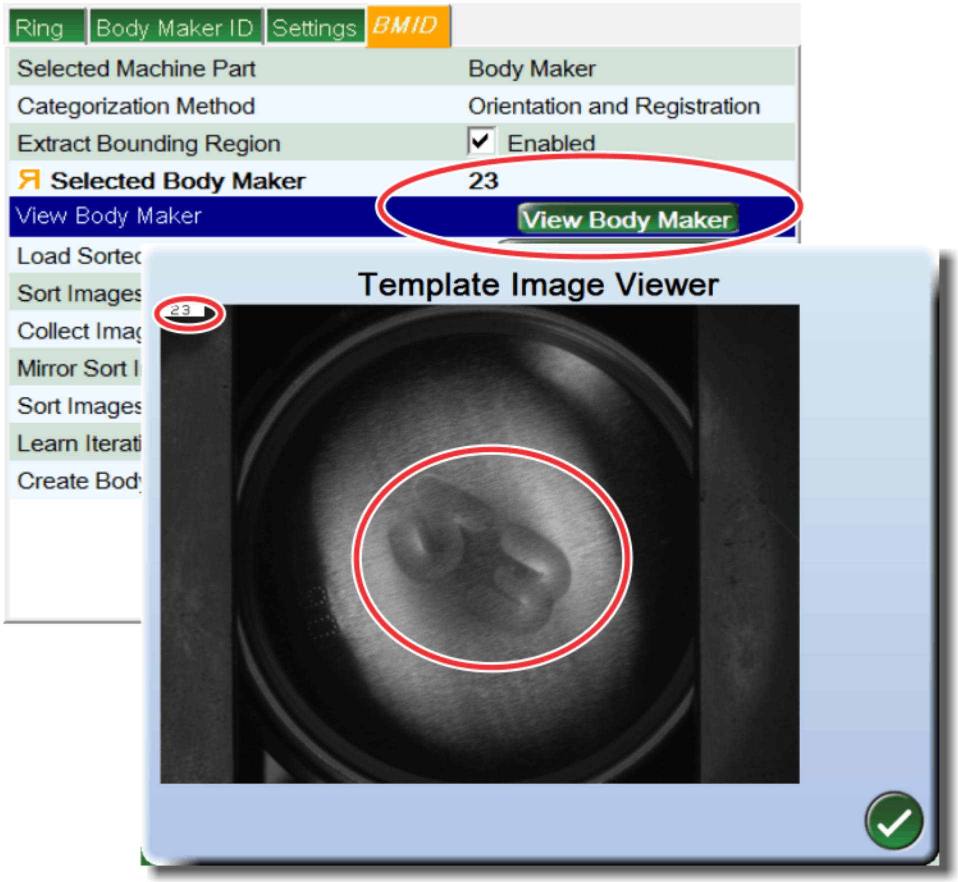
➢ ***To learn the images:***

1. Make sure you have acquired images as described above in sections 2 and 3.
2. In the BMID menu, click the **Create Body Maker** 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 iterations.*

3. When the learn process is complete, the progress bar is removed from the screen.
4. View the template image for each body maker by making a selection for **Selected Body Maker**, and clicking the **View Body Maker** button.

- If the image looks good for each body maker, no further adjustments are necessary. A good example is shown below.



- If the image is not clear and sharp, you may need to collect more images or adjust parameters, and re-learn.

5. Test the inspection by scrolling through the images in the Retro-Spec interface and comparing the image to the results. 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 find that the inspection matches the images to the correct ID, but perhaps not all the time. You may need to adjust some parameters for best results. The section below explains the main parameters to adjust.

❖ *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.*

6. Adjust the parameters

❖ *Note: If additional adjustments are necessary, such as changing grain settings or contrast compression level, you must perform another learn process. A new average image will be created using the new parameters.*

➢ To adjust the parameters:

1. Adjust the following parameters for best results:
   - **Grain Reduction Technique** - [Settings menu] the default setting is **enabled.** Try **Moving Average** first, with a reduction level 15.
   - **Contrast Compression** - [Settings menu] the default setting is **enabled**. Try **Moving Average** first, with a setting of 20.
   - **Registration Normalization** - [Body Maker ID menu] the inspection works best with **Phase Only**, but you may try another setting for your body maker images.
   - **Orientation Normalization** - [Body Maker ID menu] the inspection works best with **Component Magnitude**, but you may try another setting for your body maker images.

- **Categorization Method** - [BMID menu] the inspection works best with **Orientation Only**, but you may try another setting for your body maker images. If you are only checking the orientation, then the Registration Normalization is not being used.

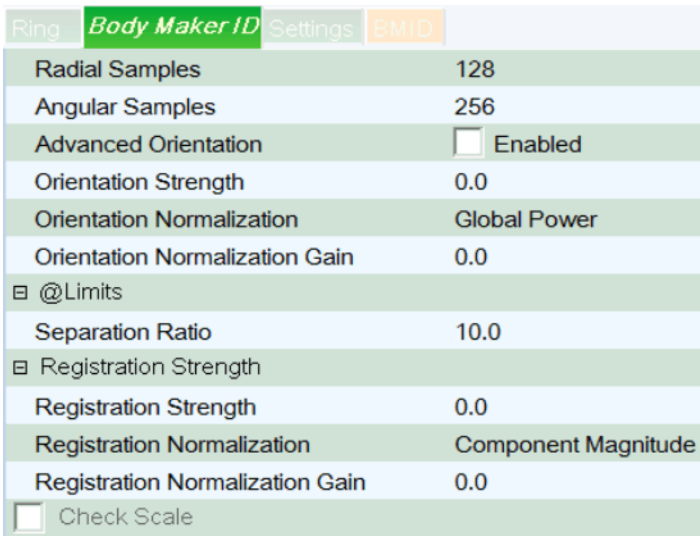
2. If you have made any changes, click the **Create Body Maker** button. A progress bar is displayed to show progress.

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 contains the parameter explanations for the Body-Maker ID inspection, for your reference. To set up the inspection, refer to ***Body-Maker ID*** (on page 344).

Body Maker ID menu

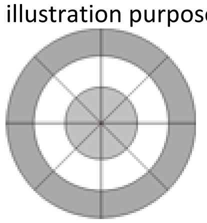


Radial Samples

This number divides the region into a number of rings. See example under Angular Samples below.
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.
It is best to use the **Standard Settings** button in the Settings menu to set **Radial Samples** and **Angular Samples**.

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 and eight (8) angular samples. (Note: these values are not available in the inspection. These examples and shading are for illustration purposes only.)



Advanced Orientation

Not used.

Orientation Strength

Set the minimum strength, or quality, you require for 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. This parameter is ignored if **Registration Only** is selected for **Categorization Method** in the BMID menu.

Orientation Normalization

Normalization uses template data as a reference and compares it to current part data. Normally this does not need to be changed from Component Magnitude. If you are getting inconsistent results, try another technique. Use the technique that works best for your parts. We recommend trying the techniques in this order:

- Component Power- try this as a second option.
- Component Magnitude - default, used in most applications.
- Global Power - try only if Component Magnitude or Component Power do not work for your part.
- Phase Only - not used.

Orientation Normalization Gain

Leave this set at zero.

Limits

Separation Ratio

This is a measure of 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 would mean twice as strong (such as strength 20 versus 40).

Registration Strength

Set the minimum strength, or quality, you require for registration between the inspected image and the template image. This sets the pass/ fail limits. You can set this using the horizontal bar on the Retro-Spec graph (after you select this parameter in the menu). This parameter is ignored if **Orientation Only** is selected for **Categorization Method** in the BMID menu.

Registration Normalization

Normalization uses template data as a reference and compares it to current part data. Normally this does not need to be changed from Component Magnitude. If you are getting inconsistent results, try another technique. Use the technique that works best for your parts. We recommend trying the techniques in this order:

- Component Magnitude - default, used in most applications.
- Component Power - try this as a second option.
- Global Power - try only if Component Magnitude or Component Power do not work for your part.
- Phase Only - not used.

Registration Normalization Gain

Leave this set at zero.

Check Scale

We recommend that you 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.

Settings menu

Ring	Body Maker ID	Settings	BMID
Standard Settings	Standard Settings		
Downsize Level	Disabled		
Grain Reduction Technique	Moving Average		
Grain Reduction Level	15		
Contrast Compression Technique	Moving Average		
Contrast Compression Level	20		
View Filtered Region	View Filtered Region		
Polar Inner Radius	8		
Polar Outer Radius	100.0		

Standard Settings

Click the **Standard Settings** 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.
Enabling this option looks at the region differently by grouping pixels. The system will look at pixels in groups of 4 (Level 1), 16 (Level 2), or 64 (Level 3). Larger values reduce the image further, speeding up the inspection at the cost of resolution. For cans, this is normally disabled. If you want to improve inspection time, try a setting of 4, but the inspection will probably not work well with a setting of 16 or 64.

Grain Reduction Technique

This is an optional filter. 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 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.

Contrast Compression Technique

This is an optional filter. Enable this feature only if your part has low-frequency changes such as shadows that are causing inspection problems. Use the technique that works best on your part. For this inspection, the default is enabled, set at Moving Average, and the Contrast Compression Level is set at 20.

Contrast Compression Level

The size of the compression filter. A larger value results in more contrast compression.

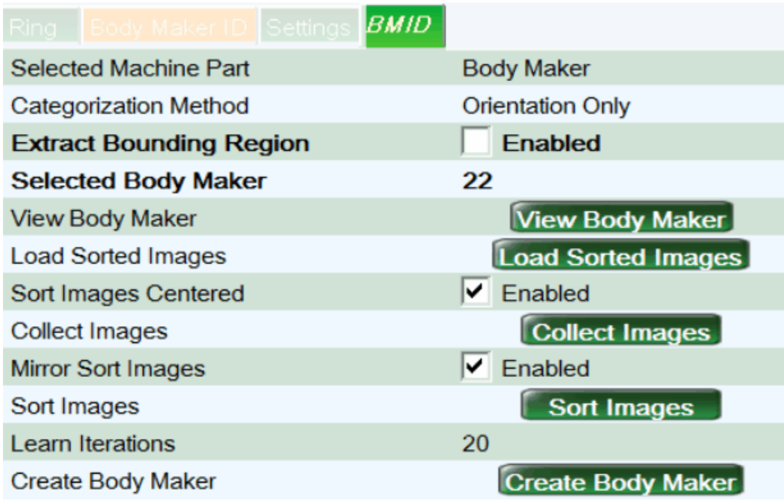
View Filtered Region

[Only applicable if any of the filter techniques above are being used] This displays the image area using the filters.

Polar Inner and Outer Radius

This is only used when both Orientation and Registration are selected for Categorization Method in the BMID menu. The defaults are 8 for inner radius, and 100 for outer radius, and probably do not need to be adjusted. These values are used when computing the polar extraction data.

BMID menu



Selected Machine Part

Select the machine part to which you want to correlate the body maker ID. The items in the drop-down menu must be configured during system setup. See ***Machine Part Correlation*** (on page 84).

Categorization Method

This allows the system to determine the body maker by using registration strength, orientation strength, or both. This inspection works best with Orientation Only.

Extract Bounding Region

This is not used. Leave it un-checked. If this is enabled, the system reads a rectangle of data instead of just a circle of data.

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

First, select a body maker from the parameter above, then click the **View Body Maker** button to see the template image. If the image is not a good, sharp image, then you may need to re-learn the template and/or collect and sort more images.

Load Sorted Images

Load all the images you have sorted for the Selected Body Maker. 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.

Sort Images Centered

This should be left at the default value of enabled. It allows the sorted images to be centered by the registration.

Collect Images

This opens the Image Auto-Save menu to allow you to collect images. For instructions on using this feature, see "2. Acquire images to learn the ID marks" in the ***Body-Maker ID*** (on page 344) section.

Mirror Sort Images

This causes the images in the Sort Manager to be reversed on screen. This helps if your images are normally reversed because of hardware setup.

Sort Images

This brings up the image sort manager. Use this to sort and review collected images and place the images into ID bins. For instructions on using this feature, see "3. Sort the images" in the ***Body-Maker ID*** (on page 344) section.

ALSO: Use the image sort manager to reject parts that are correlated to specific Body Maker IDs. For information about this feature, see Sorting parts using Body-Maker ID.

Learn Iterations

The learn process will 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.

Create Body Maker

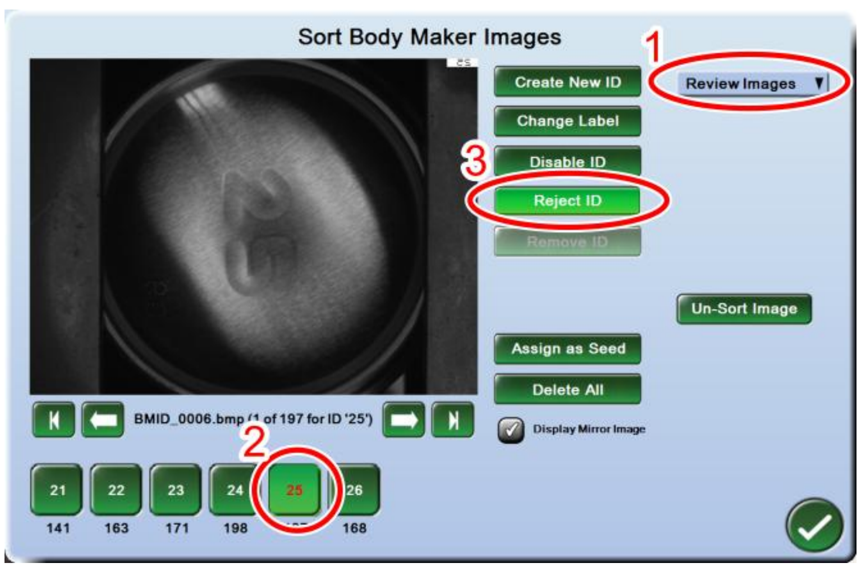
This creates the templates for all body makers using the sorted images. For instructions on using this feature, see "5. Learn the images" in the ***Body-Maker ID*** (on page 344) section.

Sorting parts using Body-Maker ID

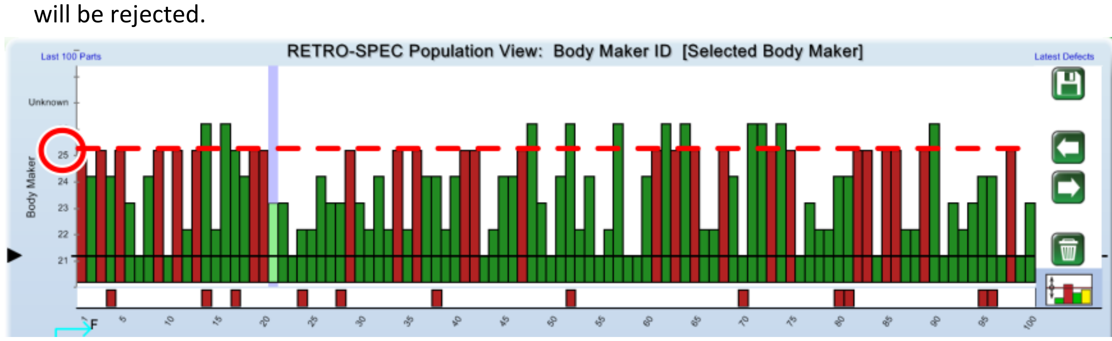
You can set up the system to reject parts correlated to specific Body Makers. First, set up the ***Body-Maker ID*** (on page 344) inspection.

➢ ***To 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 [item 1 shown below].
3. Select an ID button at the bottom of the menu [item 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 [item 3]. The Reject ID 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.

Color Dot

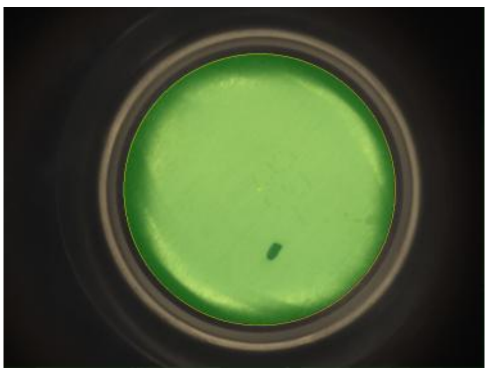
This inspection correlates cans to the spray gun that the can passed by during manufacturing. The inspection could pass or fail parts based on the size and number of color dots sprayed on the can.

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. Also add a separate Color Distance Enhancement prior to each Color Dot inspection.*

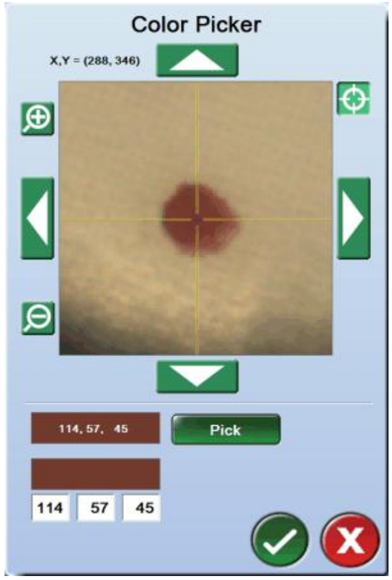
➢ ***Before setting up Color Dot Correlation:***

1. Set up an appropriate registration (usually a ***Hough*** (on page 236) or ***Radial Edge*** (on page 240)) to find the center of the bottom of the can.
2. Add a ***Ring Region*** (on page 200) to include the area where the dot will be found. Size the Ring Region so that it covers the whole circle formed by the bottom of the can. An example is shown below.

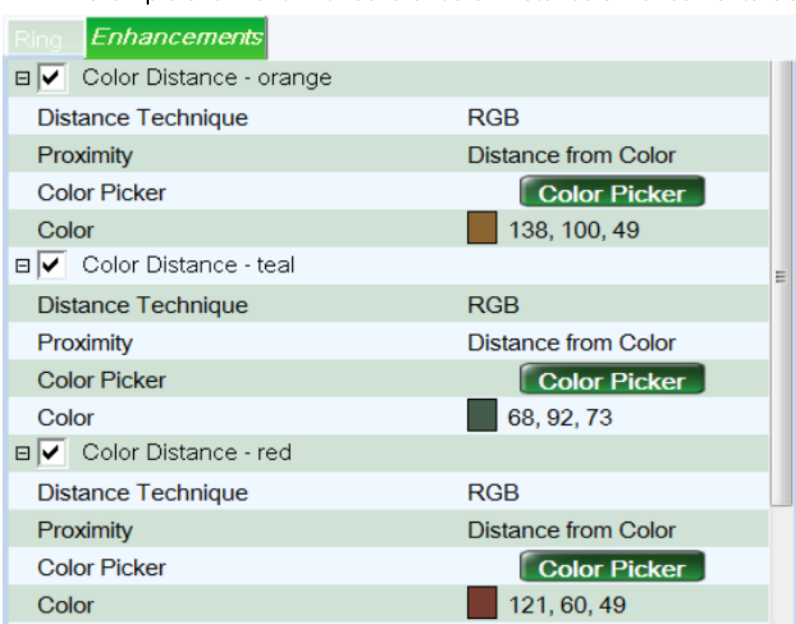


3. Add a ***Color Distance*** (on page 220) Enhancement to specify the range of colors acceptable for the color dot. This will allow the inspection to ignore all other color dots.

- In the Color Distance menu, click the **Color Picker** button, then use the ***Color Picker*** (on page 223) 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.



Next, set up Color Dot Correlation.

➢ *To add a Color Dot Correlation:*

1. Highlight the Color Distance Enhancement name in the inspection tree.
2. Right-click on the item you just added.

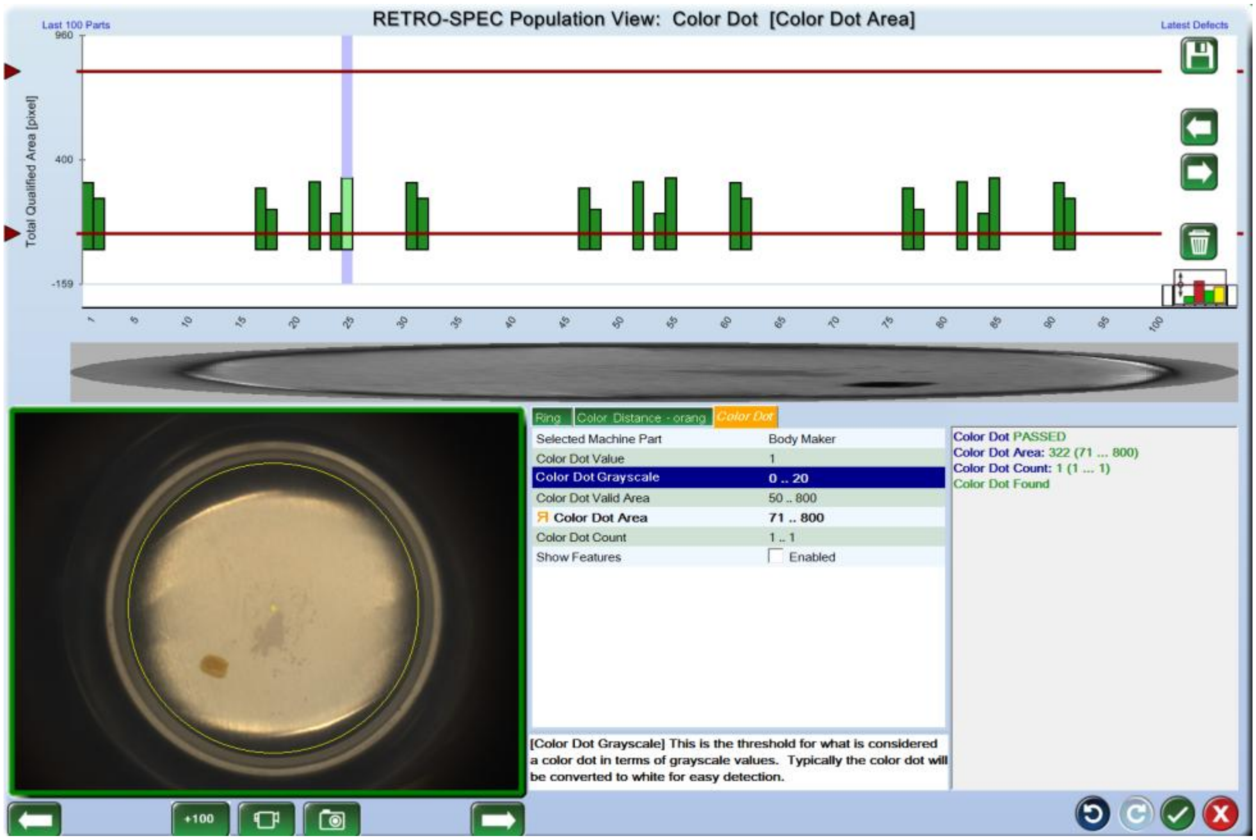
3. From the Inspection menu, select Add* > Correlation > Color Dot. *If you have already added several Color Distance Enhancements, then use Insert > Correlation > Color Dot after each Color Distance enhancement. You may need to drag and drop the Color Dot inspection to the correct place in the inspection menu.
4. The inspection is added to the inspection tree. Re-name the inspection to something more meaningful to you. The inspection tree should look something like the one shown below.

5. Adjust the Color Dot parameters as necessary.

➢ ***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 Selected 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. For Color Dot Value, select the value for the color dot you are currently finding. For example, if you are searching for an orange color dot from Spray Gun #1, then select "1."

4. For Color Dot Grayscale, 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. If the system is not consistently finding the correct color dots, you may need to adjust Color Dot Area and Color Dot Count. These are described below.
6. Repeat steps 1-5 above for each of the other color dots in your process.

Color Dot menu

Ring	Color Distance - orang	Color Dot
Selected Machine Part		Spray Gun
Color Dot Value		1
Color Dot Grayscale		0 .. 20
Color Dot Valid Area		50 .. 800
Color Dot Area		71 .. 800
Color Dot Count		1 .. 1
Show Features		Enabled

Selected 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*** (on page 84).

Color Dot Value

Assign a number to correlate the color dot to the machine part. Example: orange dot comes from Spray Gun number 1.

Color Dot Grayscale

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]

Color Dot Valid Area

When the system counts the number of color dots, if a found dot is larger or smaller than these values, it is ignored.

Color Dot Area

When the system finds color dots, this parameter puts an upper and lower limit on the size of the dot.

Color Dot Count

Set the number of acceptable dots. This is normally set at one.
If you have two small dots and you want to pick out one dot of a specific color, then set **Color Dot Area** to accommodate the small dot size, and set **Color Dot Count** to [1...2] as a range. This allows the system to choose pixels that have more than one dot's worth of data.

Show Features

Highlight the found features on the image.

Chapter 12

Auto-Learn

Auto-Learn is an optional feature. Your system must be configured properly. This feature works with certain inspections to automatically learn a new set of parts based on inspection settings and trigger criteria. 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. Auto-Learn must be enabled, separately for each lane, before use.

➢ ***Auto-Learn works with the following inspections:***

Distribution (on page 323)

➢ ***Auto-Learn Prerequisites:***

- 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*** (on page 368). See ***Managing Permissions*** (on page 24).
- A ***Distribution*** (on page 323) 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 originally 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*** (on page 367)
- Any part that fails the current histogram, if ***Learn More*** (see "***Learn modes***" on page 374) 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.

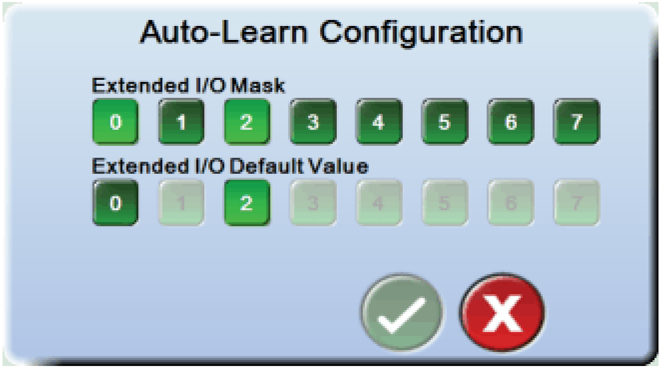
Configure Global Auto-Learn settings

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 the Tools button > Lane Setup > Select Features > and select Auto-Learn. A check mark is present next to Auto-Learn when it is 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 371).

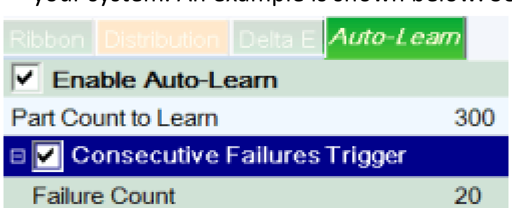
Add Auto-Learn to an inspection

➢ *Before adding Auto-Learn to an inspection:*

1. ***Configure Global Auto-Learn settings*** (on page 365).
2. Add an inspection that supports ***Auto-Learn*** (on page 365).

➢ *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 367)



Note: Operator Trigger requires that Advanced parameters are enabled. See ***Operator Trigger*** (on page 368).

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, 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 372). 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 page 367).

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*** (see "***Operator Trigger***" on page 368)
- ***Applying voltage to Extended I/O bits*** (see "***Extended I/O Trigger***" on page 371)
- ***Number of consecutive failures of an inspection*** (see "***Consecutive Failures Trigger***" on page 369)
- ***No parts seen*** (see "***No Parts Seen Trigger***" on page 369)
- ***Defect rate percentage*** (see "***Defect Rate Trigger***" on page 370)
- ***Number of parts specified*** (see "***Part Interval Trigger***" on page 370)
- ***Part program change*** (see "***Part Program Changed Trigger***" on page 371)

A trigger will start an Auto-Learn session only if all the following conditions are met:

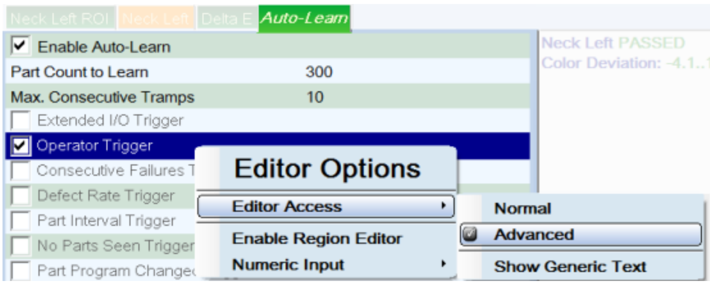
1. Auto-Learn is globally enabled for the lane
2. Auto-Learn is enabled for the inspection, and
3. The trigger is enabled for the inspection.

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 ***Managing Permissions*** (on page 24))
- Advanced parameters enabled: right-click over the inspection menu > Editor Access > Advanced

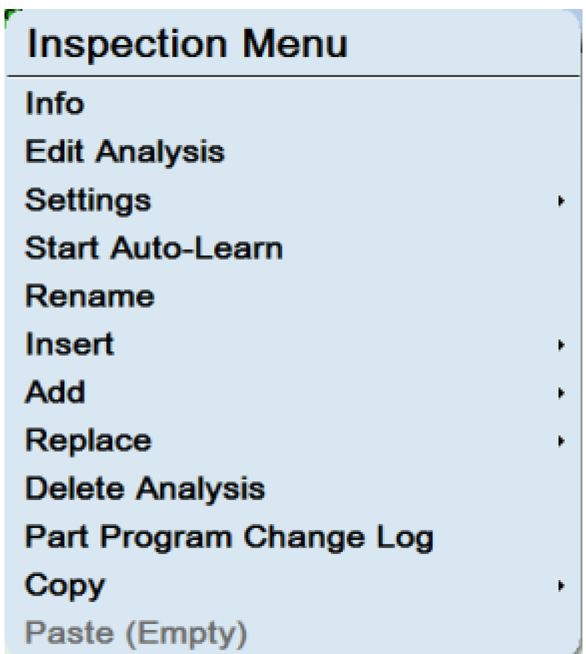


The Start Auto-Learn item is shown (and enabled) in the inspection menu if all of the following apply:

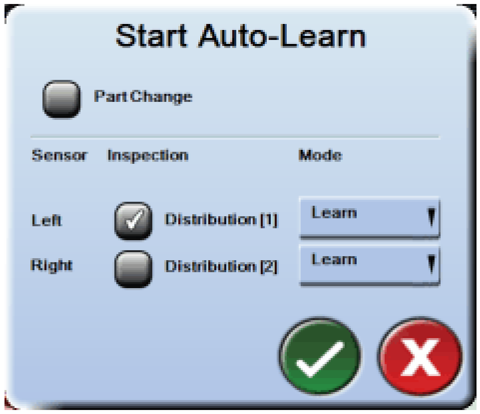
1. Auto-Learn is globally enabled for the lane.
2. The selected inspection supports Auto-Learn.
3. Auto-Learn is enabled for the inspection.
4. The inspection is not currently auto-learning (Stop Auto-Learn will be shown instead).
5. Operator Trigger is enabled for the inspection.
6. The logged in user has permission to start Auto-Learn.

➢ ***To start Auto-Learn:***

1. Right-click over the inspection tree to see the Inspection menu.



2. Select Start Auto-Learn. The Start Auto-Learn dialog is shown.

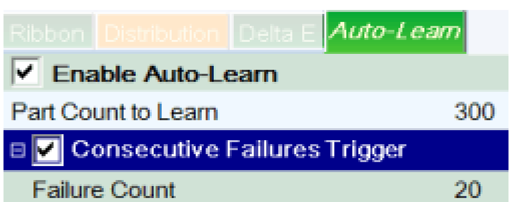


3. If desired, select Part Change if you want to start Auto-Learn when the system detects a part (or decoration) change. If you select Part Change, then the Mode selections will not be shown. The system will use Learn mode and ***Tramp detection*** (on page 367).
4. Select the inspections for which you 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 372).

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 372).

See also ***Learn modes*** (on page 374).

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

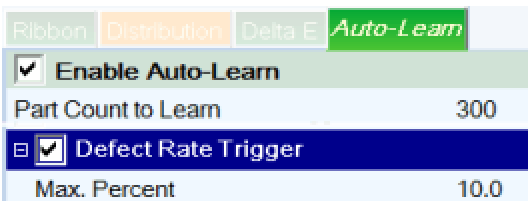
Number of minutes for no parts seen to trigger an Auto-Learn session.

See also ***Advanced parameters for Auto-Learn*** (on page 372).

See also ***Learn modes*** (on page 374).

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)



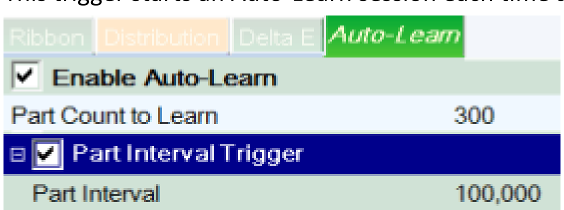
Max. Percent

If the defect rate exceeds this number, an Auto-Learn session is started.

See also ***Advanced parameters for Auto-Learn*** (on page 372).

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:

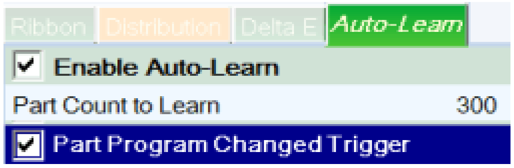
- The last start of an Auto-Learn, or
- The system starts, or
- The part program is switched.

See also ***Advanced parameters for Auto-Learn*** (on page 372).

See also ***Learn modes*** (on page 374).

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 374).) This trigger does not engage ***Tramp detection*** (on page 367).



See also ***Advanced parameters for Auto-Learn*** (on page 372).

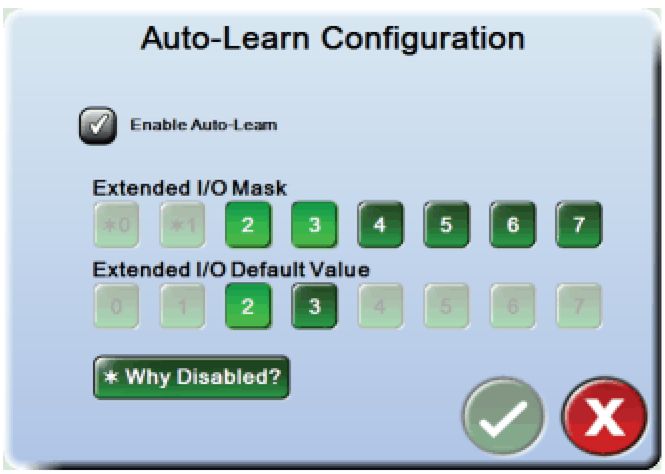
Extended I/O Trigger

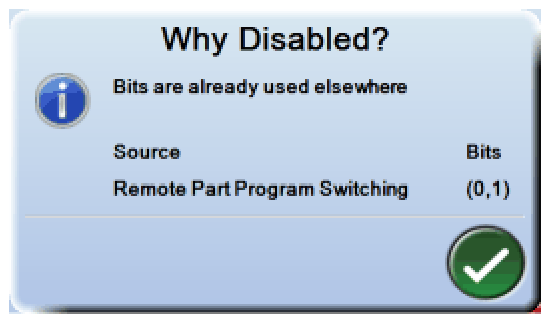
You may use your (optional) Extended I/O board to trigger an Auto-Learn session. Auto-Learn uses the Generic Input Ports 0 through 7 on connector pins J1-3 through J1-10. Note that availability on the Extended I/O board may be limited depending on your system configuration.

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 90), bits 0 and 1 may already be used
- If you are using Asynchronous Correlation, any or all of these bits may already be used

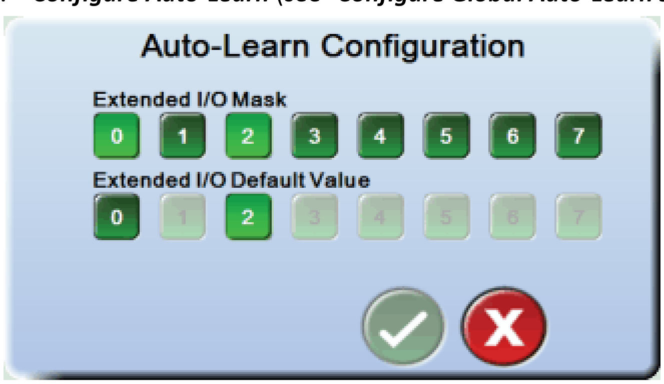
If the bits are already used, they are indicated in the dialog and the bits are grayed out, as shown below. Select the **Why Disabled** button to see where they are used.





➢ ***To use Extended I/O:***

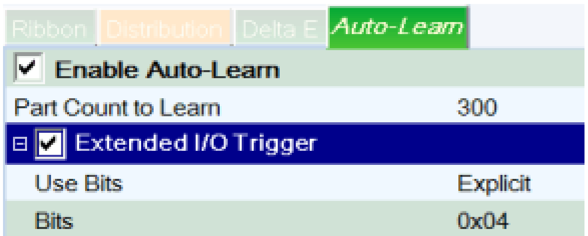
1. ***Configure Auto-Learn*** (see "***Configure Global Auto-Learn settings***" on page 365).



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.

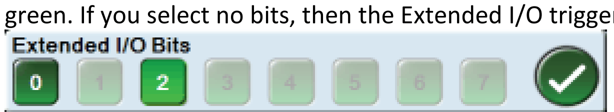


Use Bits

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.

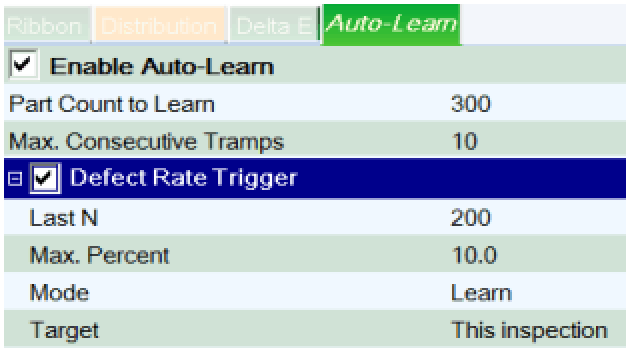


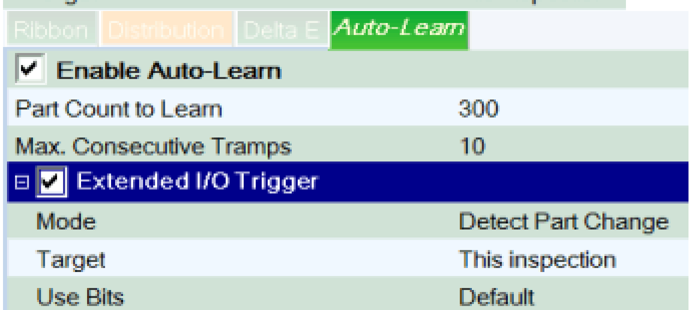
See also ***Advanced parameters for Auto-Learn*** (on page 372).

Advanced parameters for Auto-Learn

One or more additional parameters are available for this inspection, only visible when you have ***Advanced parameters*** (see "***Editor Options***" on page 189) shown. You must have the "Access advanced inspection parameters" ***permission*** (see "***Managing Permissions***" on page 24) to access these parameters. The advanced parameters are described in this topic. For other parameters, refer to the description of the trigger options.

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 page 374).

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 th "+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 367).
- 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 371) (the system checks the next five parts)
  - ***Defect Rate Trigger*** (on page 370) (the system checks the five most recent parts)
  - ***No Parts Seen Trigger*** (on page 369) (the system checks the next five parts)

Assume Part Change is used by ***Consecutive Failures Trigger*** (on page 369). 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 367).

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.

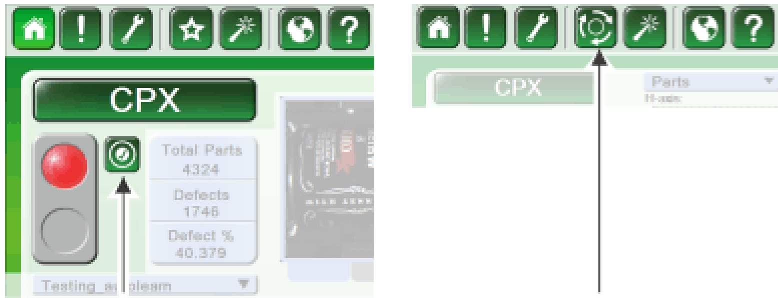
	Auto-learn is in progress
	Auto-learn is complete

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 120) 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 2

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:

- 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 368), 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 374).
- Have N consecutive parts that fail the current histogram, if ***Learn More*** (see "***Learn modes***" on page 374) 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 369) stops an Auto-Learn session in progress and then starts another session immediately in the selected mode.
- Another inspection has Target = All Inspections and is triggered. Example: Inspection B is auto-learning, and Inspection A has an auto-learn inspection where the target is All Inspections. If Auto-Learn is triggered on Inspection A, then Auto-Learn on Inspection B is restarted.

Chapter 13

Defect Database Tool (option)

❖ *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** *(on page 411).*

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.

This information is valid as of 5.2.037 and 5.3.012 software.

What is the Defect Database?

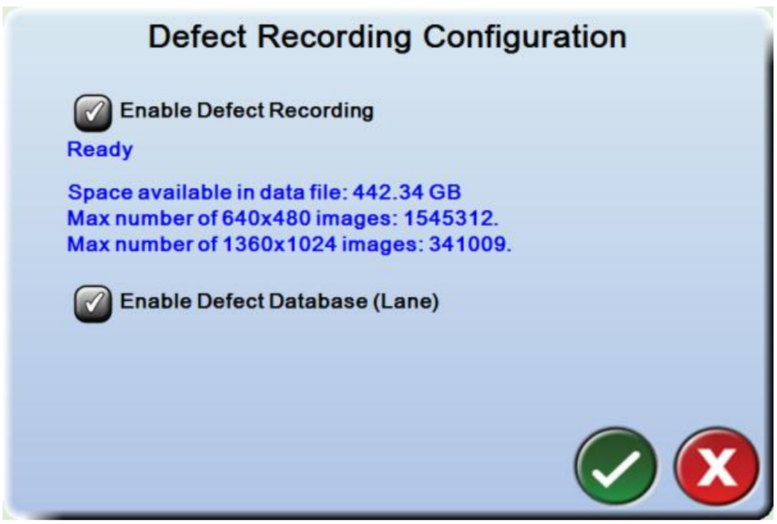
The Defect Database is a tool within the Intellispec system that uses a separate hard drive used to archive information associated with rejected parts. This tool has two components:

- 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*** (on page 385).

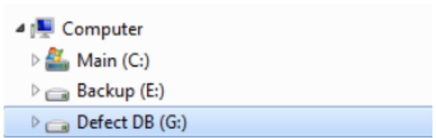
- Defect images can be accessed from the Defect Database by looking at details of a search result record.
- You can create defect rate reports over a time span for any or all part programs.
- You can search the database by criteria including:
  - Part program
  - Sensor
  - Inspection (your name for 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.

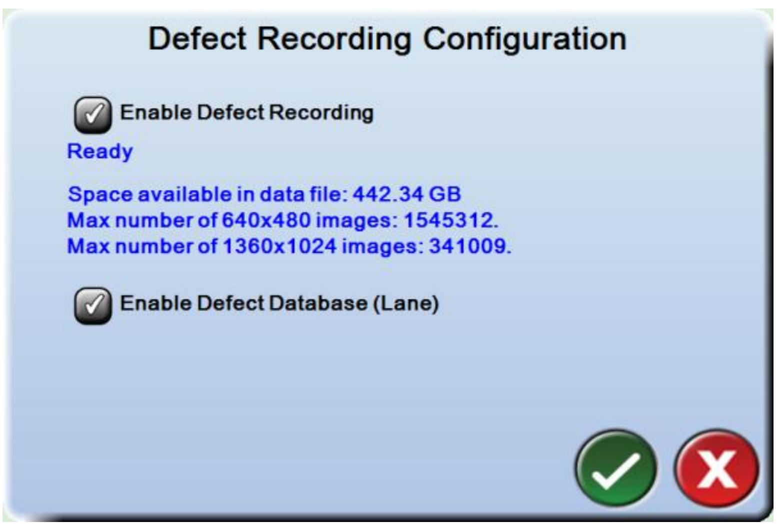


Enabling Defect Recording versus Defect Database

Enabling **Defect Recording** will start saving **images** to the Defect Data File, which can be accessed by using the ***Defect Data (Images) Viewer*** (on page 383). 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:***

1. 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.

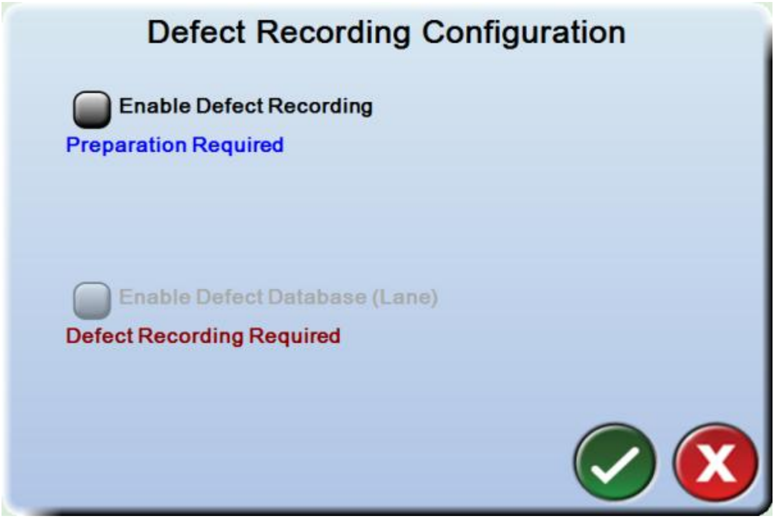
Prepare the hard drive for defect recording. This process needs to be done only once.

➢ *To prepare the hard drive:*

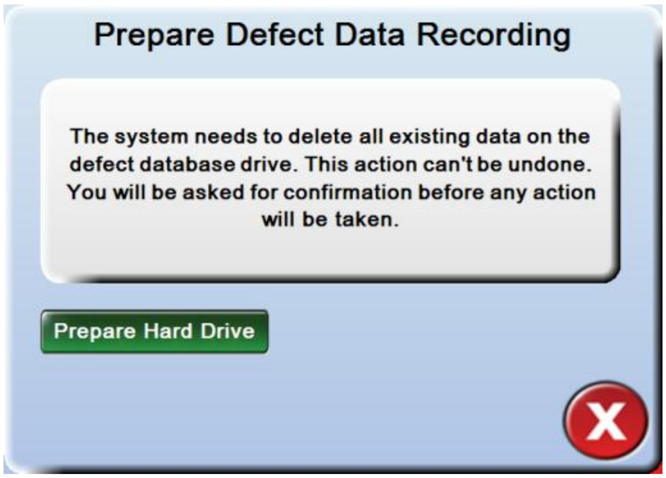
Warning

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 to see the tools menu.
2. Select Lane Setup > Select Features > Defect Recording. The configuration menu is displayed. It should indicate that preparation is required.



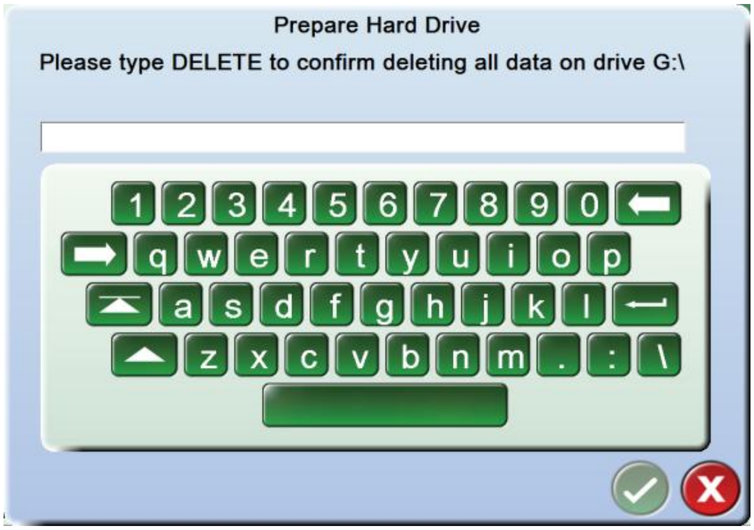
3. Check the **Enable Defect Recording** box. A message will explain that the Intellispec system will delete everything from the hard drive that it recognizes as "Defect DB."



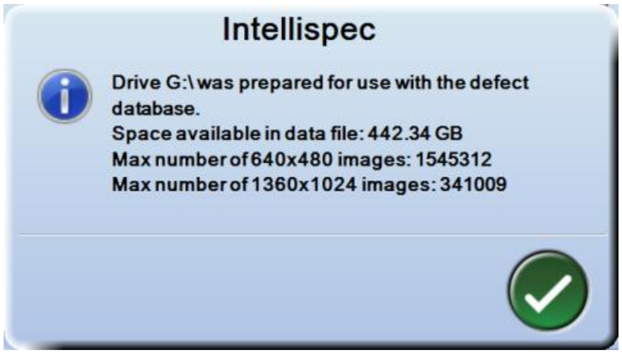
4. Click the **Prepare Hard Drive** button. As a safety precaution, the system asks you to type the word "DELETE" before it prepares the hard drive.
5. If you are sure that you want all information deleted from the "Defect DB" hard drive, type DELETE in all capital letters on the displayed keyboard, then click the OK button. This action does two things:

- Formats the hard drive, and

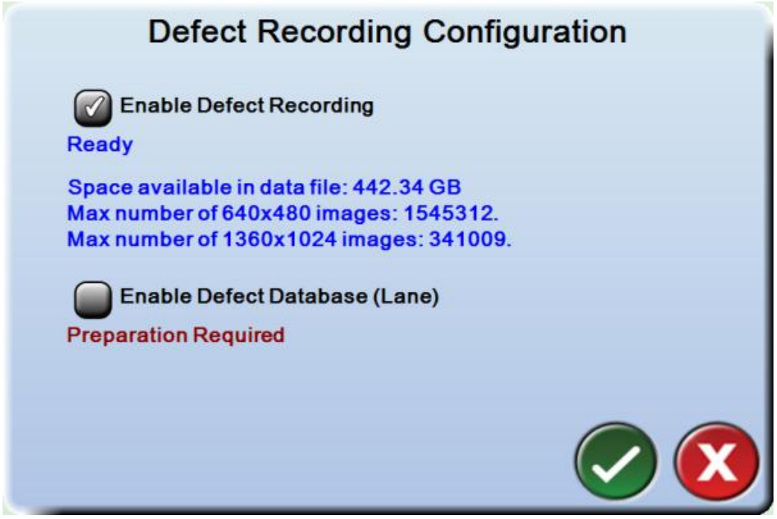
- Creates a large file on the hard drive that holds the images and the non-image sensor data. This file is shared by all lanes.



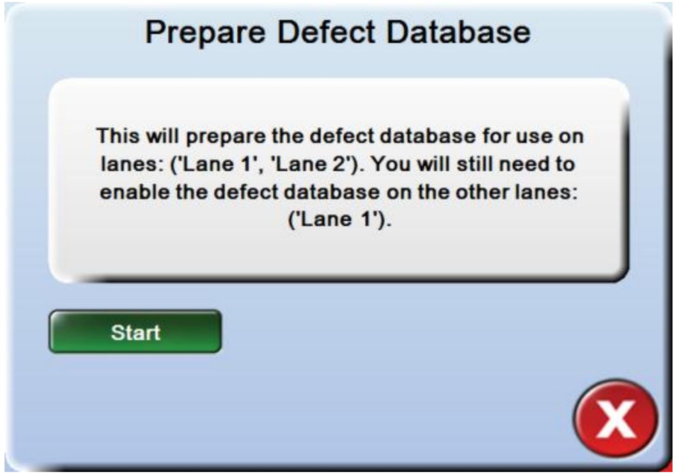
6. The hard drive is prepared. A message indicating the space available on your hard drive is displayed. Click the OK button to continue.



7. 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.



8. 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*** (see "***Enabling/ Disabling Defect Writing***" on page 382).

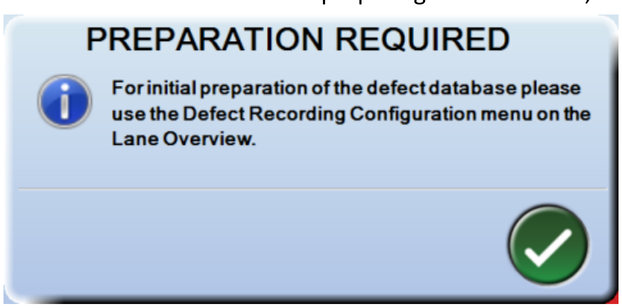
Enabling/ Disabling Defect Writing

From System Overview mode, you can enable or disable Defect Recording (images) and the Defect Database (data) for all lanes.

❖ *Note: this feature is available in software versions 5.0.493, 5.2.026, 5.3.005 and later.*

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 379) 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.*

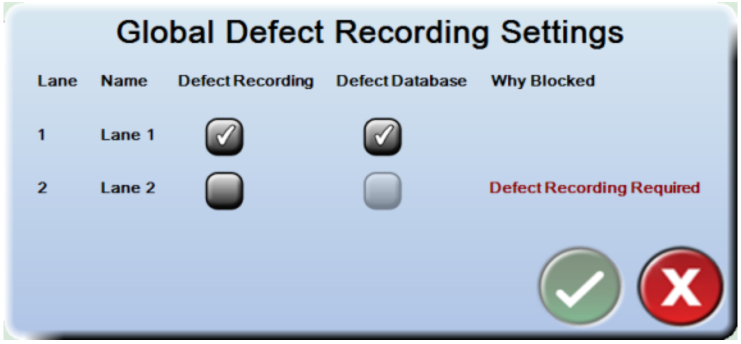
Subsequent usage

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 the Tools button  to see the tools menu.

2. Select Defect Writing > Configure Defect Writing. The Global Defect Recording Settings menu is displayed.



3. To enable Defect Recording (the recording of images), check the **Defect Recording** box.
4. Check the **Defect Database** box to enable recording of non-image sensor data. The database is enabled for the selected lane(s).
5. 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 379).

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.

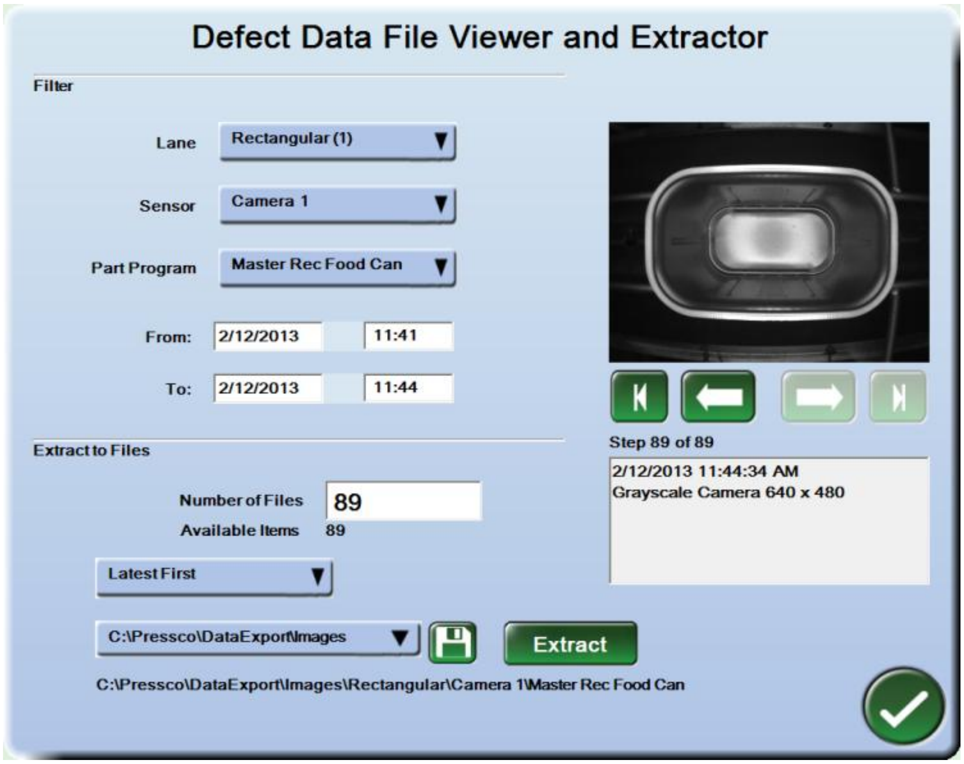
❖ *Note: when the database is prepared, the entire hard drive space is used, so the "Defect DB" hard drive will appear full. The Defect Database Tool places images and defect information into the database, using allocated placeholders in the database. You will not be able to tell whether the database 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, click the Tools button , and select Reporting > Defect Data Viewer. The Defect Data File Viewer and Extractor screen is displayed.



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.

Defect Database Viewer

This tool allows you to:

- Search the defect database
- Examine and export images of defects
- Export search results, and
- Create and export defect rate reports from the database.

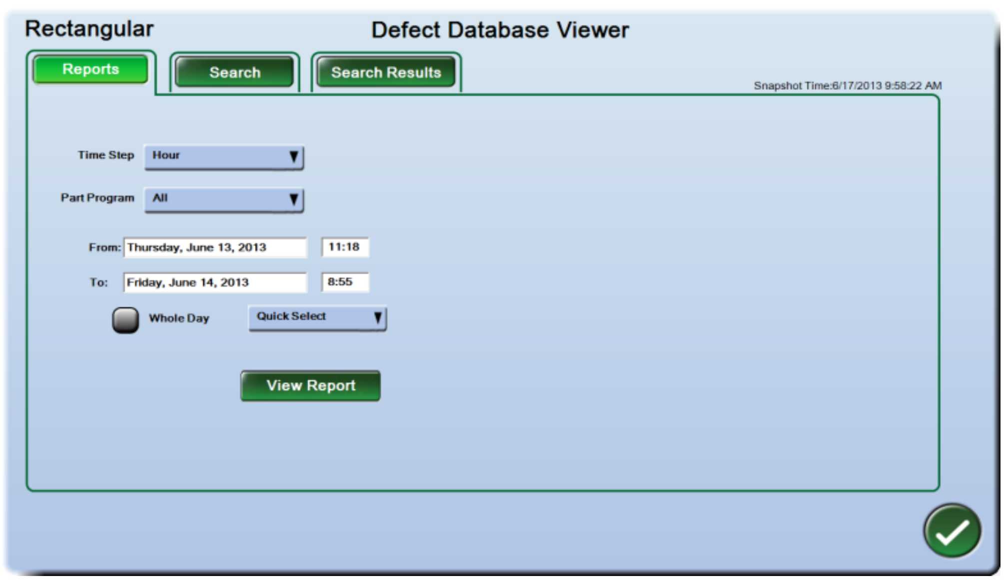
➢ *To open the Defect Database Viewer:*

From Lane Overview or Sensor Overview mode, click the Tools button and select Reporting > Defect Database. The Defect Database Viewer is displayed.

In the upper right corner, a **Snapshot** time is displayed. This is the time when you entered this menu. If the lane is online, the Intellispec keeps saving defect data and images, but any data collected while this window is open will not be available for searching. You can close and re-open the menu for the most recent data.

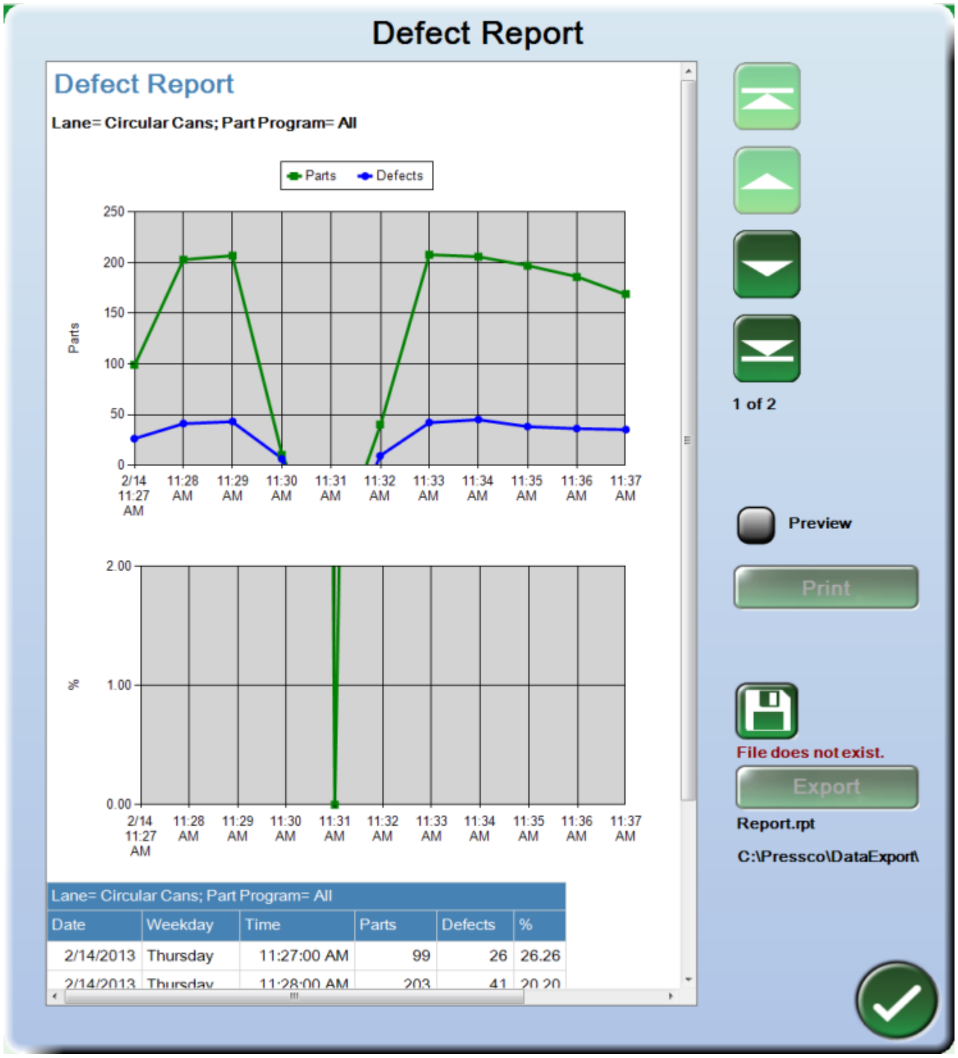
Reports

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 ***Setting up a printer*** (see "***Set up a printer***" on page 111))

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.

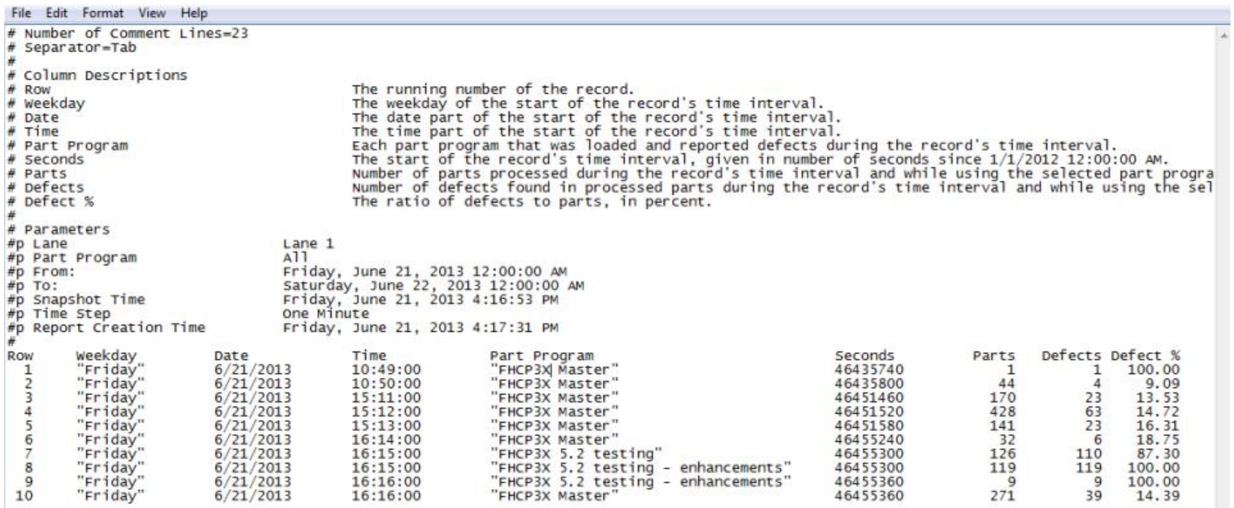
- ***To save new data to an existing report name:***

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.

Exported Report Example

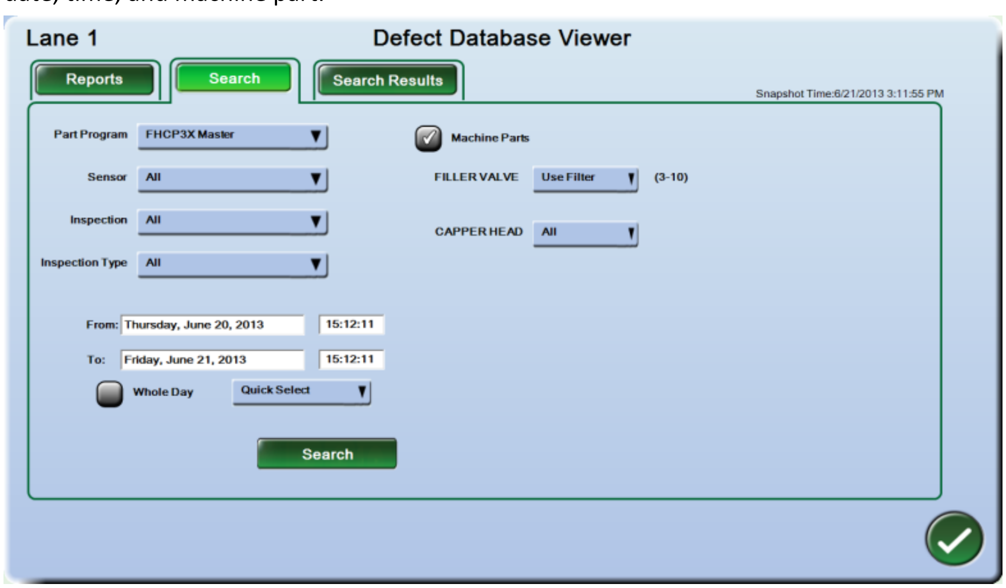
The file below is an example of a text file exported from the Defect Database. The file is tab-separated, and you can import it into your preferred reporting software. The header describes the contents in detail. The header text and all number and time formatting depend on the currently chosen language.



```
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.



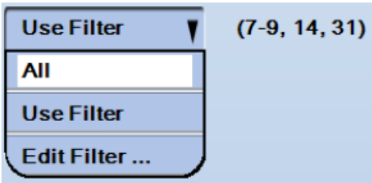
- ***To start the search:***

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.

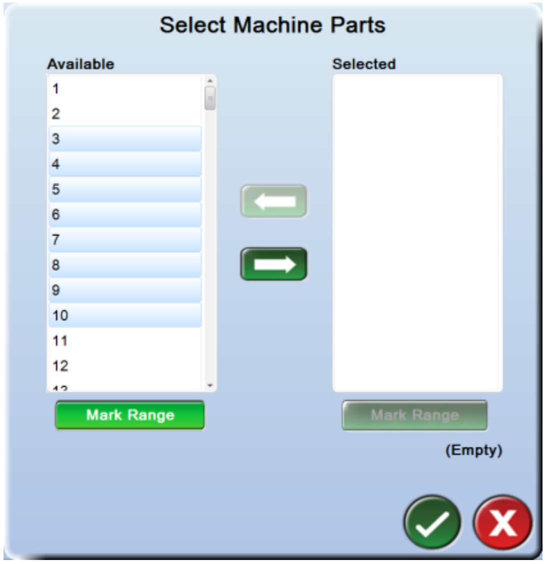
If your system uses machine parts, you have the option of searching for defects by machine part.

➢ *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."



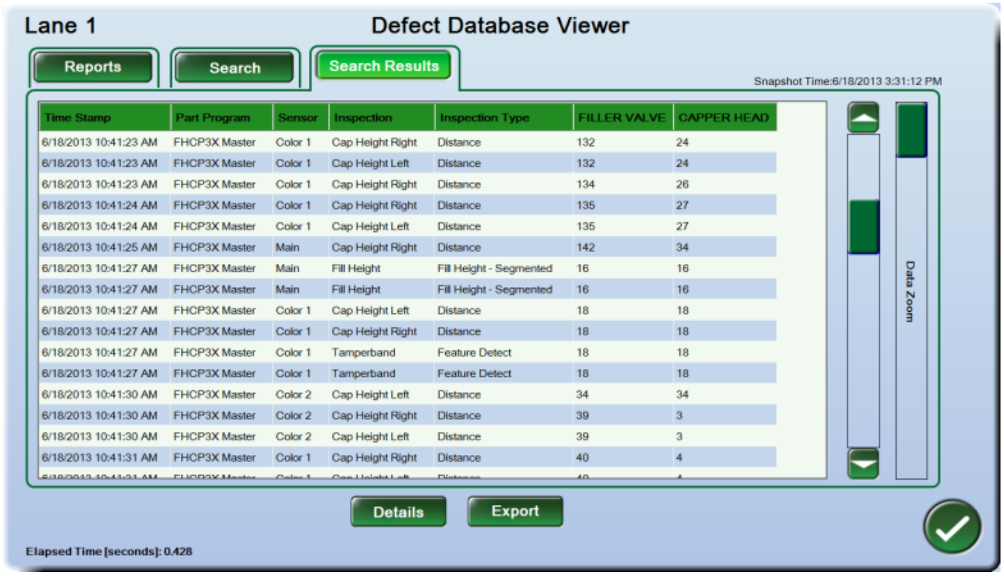
3. To select specific machine parts, select "Use Filter" in the drop-down menu. The Select Machine Parts screen is displayed.



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.

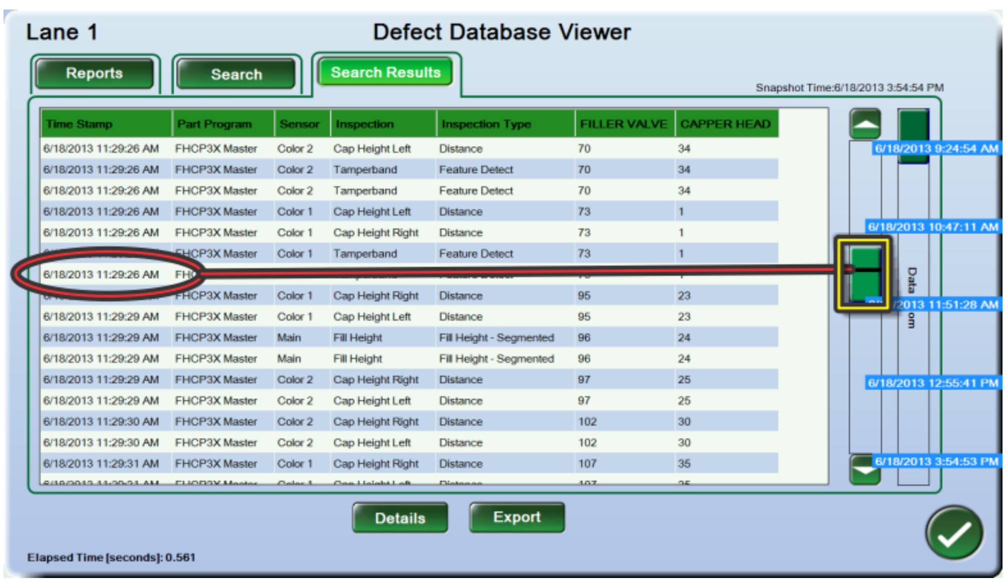
Search Results

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.

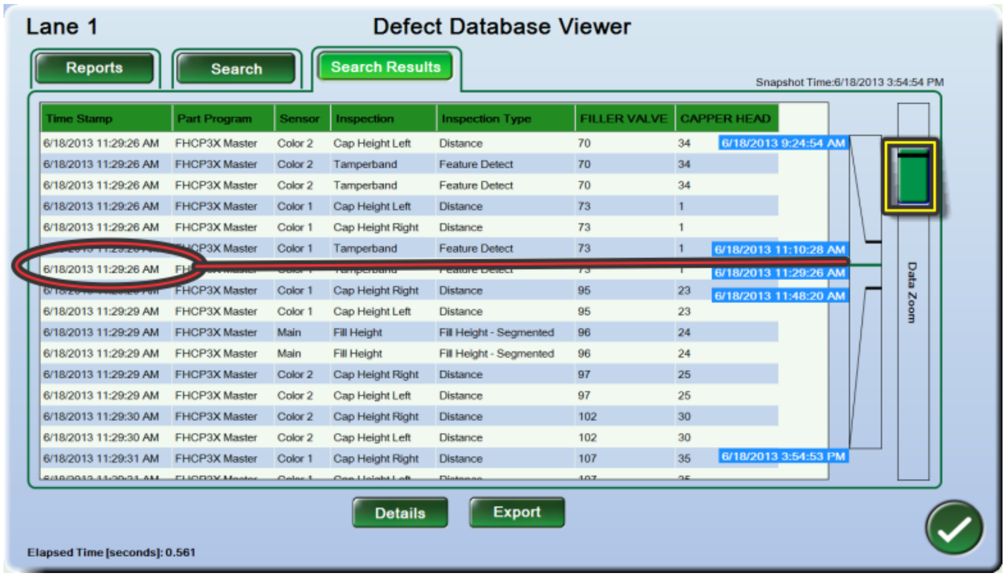


Scrolling through the data

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.



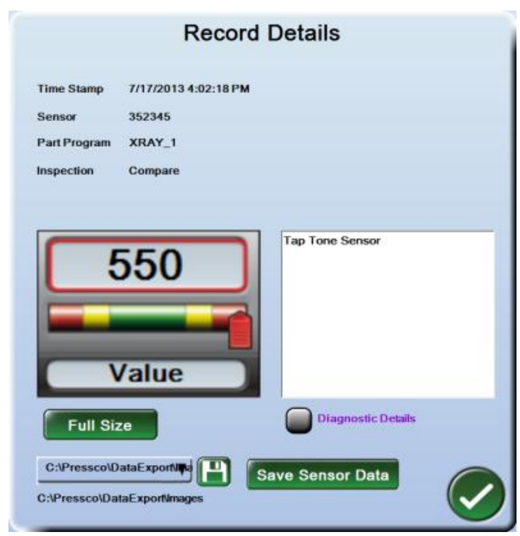
For larger data sets (more than about 160 records) a second scrollbar “Data Zoom” appears to the right of the first scroll bar. This allows narrowing in on the time of interest. While moving the Data Zoom scroll bar two thick lines appear in the first scroll bar, which indicate the time span to which 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

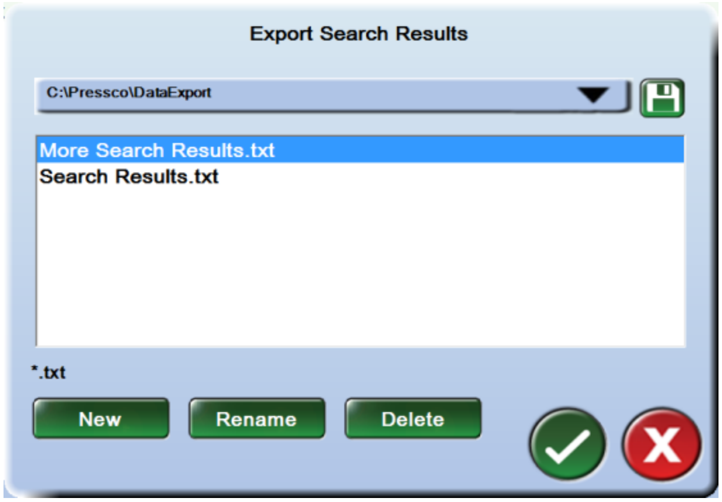


❖ *Note: The details viewer will not always show a specific text such as “Distance too Large.” This depends on the type of inspection and the specific type of defect.*

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*** (on page 392).

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.

Results June 24 04.txt - Microsoft Excel

	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

Results June 24 04

Ready

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 14

About OPC

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 http://www.OPCFoundation.org***

Pressco has been an OPC Foundation Member since Spring of 2004, and participated in their Interoperability Workshop of April 2005.

The Intellispec OPC Server

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*** (see "***How to Contact Pressco***" on page 411) your Pressco sales manager for details.

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.

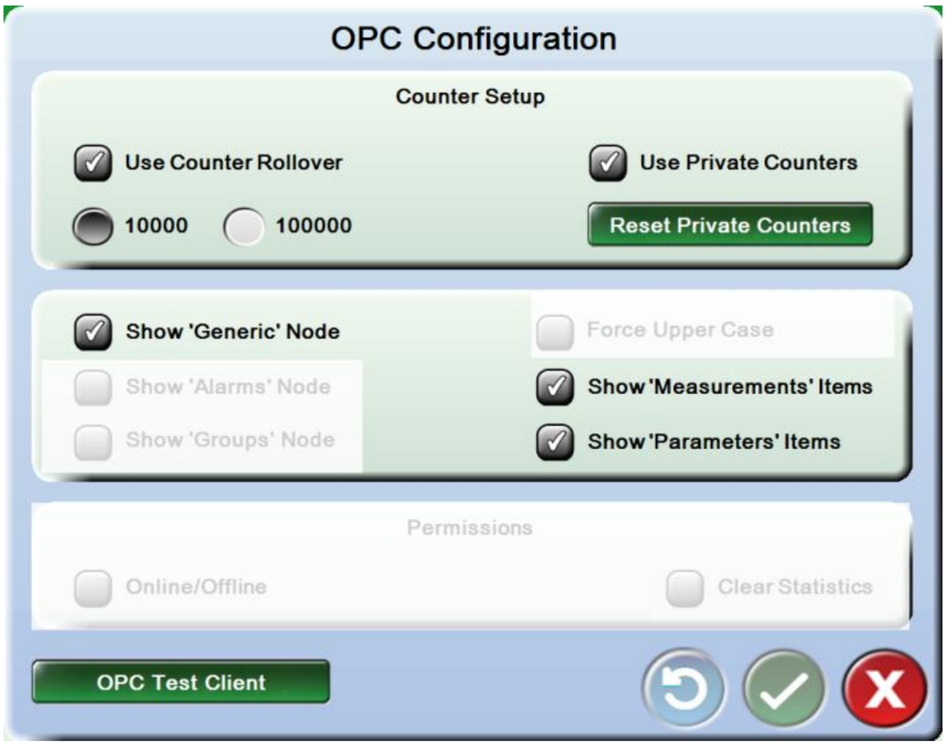
The exact names of the levels containing these data items are automatically derived from the names given to the lanes, cameras and inspections programmed into the Intellispec system. This makes "browsing the tree" of available data items extremely intuitive and eliminates the tedious and time-consuming 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. Click the button > Tools button > select OPC Configuration. The OPC Configuration menu opens. Please see the information about each section below.



Counter Setup

See ***Counter Rollover*** (on page 405) or ***Using the OPC Private Counters option*** (on page 403).

Options

"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.*

Show 'Measurements' Items

See ***Measurement data items*** (on page 401).

Show 'Parameters' Items

See ***Parameter data items*** (on page 402).

Permissions

Reserved for Pressco Technicians only.

OPC Test Client button

Click this button to open ***The Intellispec OPC test client*** (on page 397).

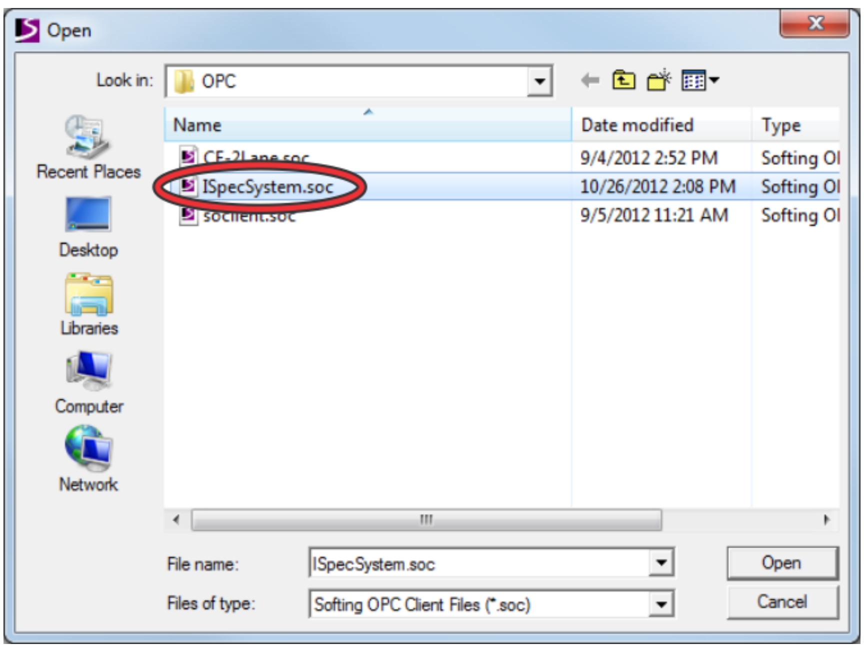
The Intellispec OPC test client

USER LEVEL: ADMINISTRATOR

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.

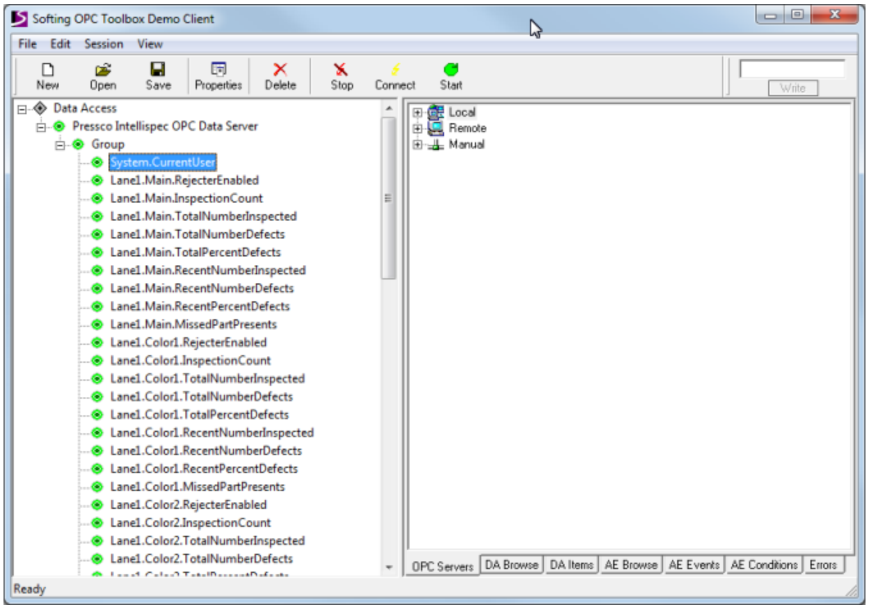
➢ *To use the OPC test client:*

1. Log in.
2. Click the  button.
3. Click the Tools button  to see the Tools menu > select OPC Configuration. The OPC Configuration menu opens.
4. Click the **OPC Test Clien**t button. The Softing OPC Toolbox Demo Client opens.
5. Click Open on the program's toolbar. The File Open dialog box is displayed.

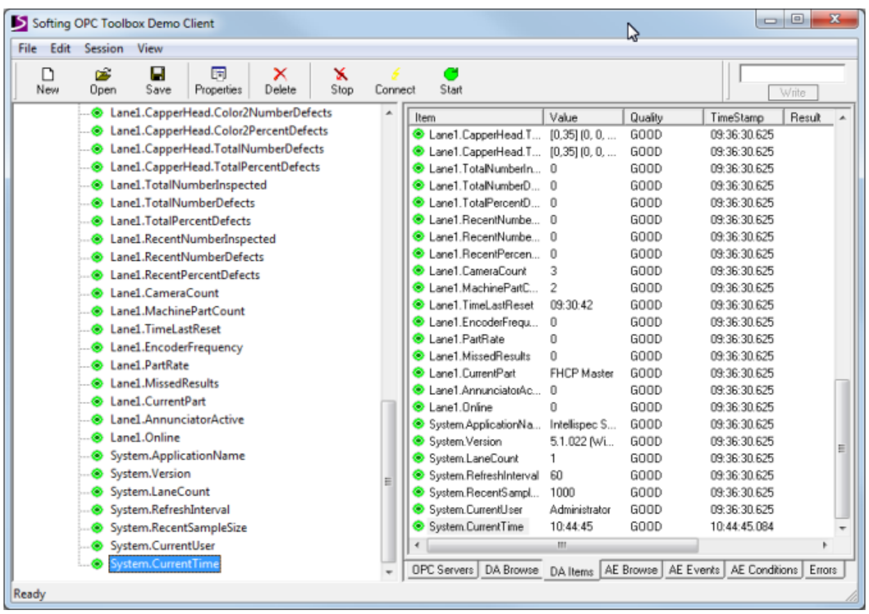


6. Click the IspecSystem.soc file >> click Open.

- 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.

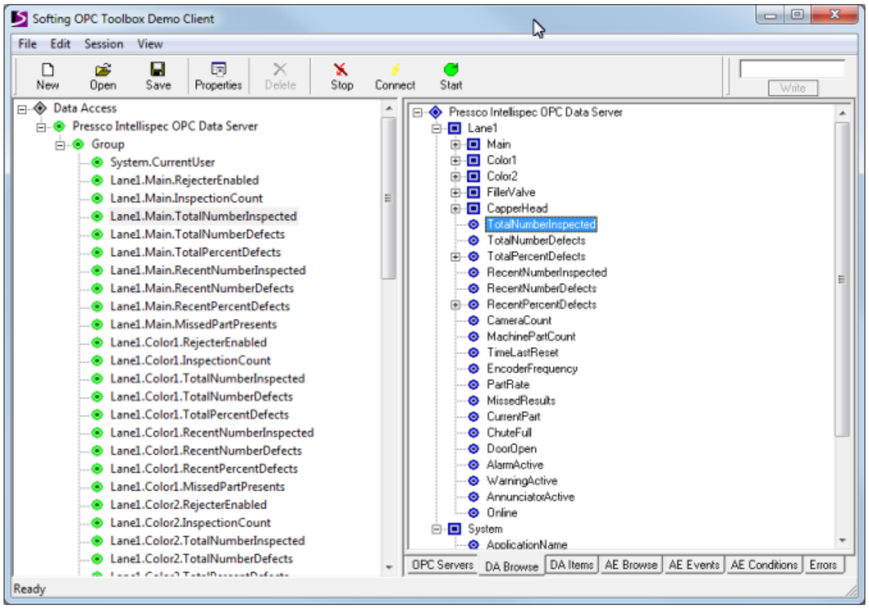


7. Click the DA Items tab at the bottom of the window. Note that there are columns for Item, Value, Quality, and Time Stamp for each of the items in the left window frame.



8. Verify that all data items have a solid green circle next to them.
9. Verify that all data items have GOOD status in the Quality column.
10. Verify that data item "System.Current.Time" is being updated once per second.
11. In the left window frame, select Pressco Intellispec OPC Data Server.
12. At the bottom of the right window frame, select the DA Browse tab.

13. 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.



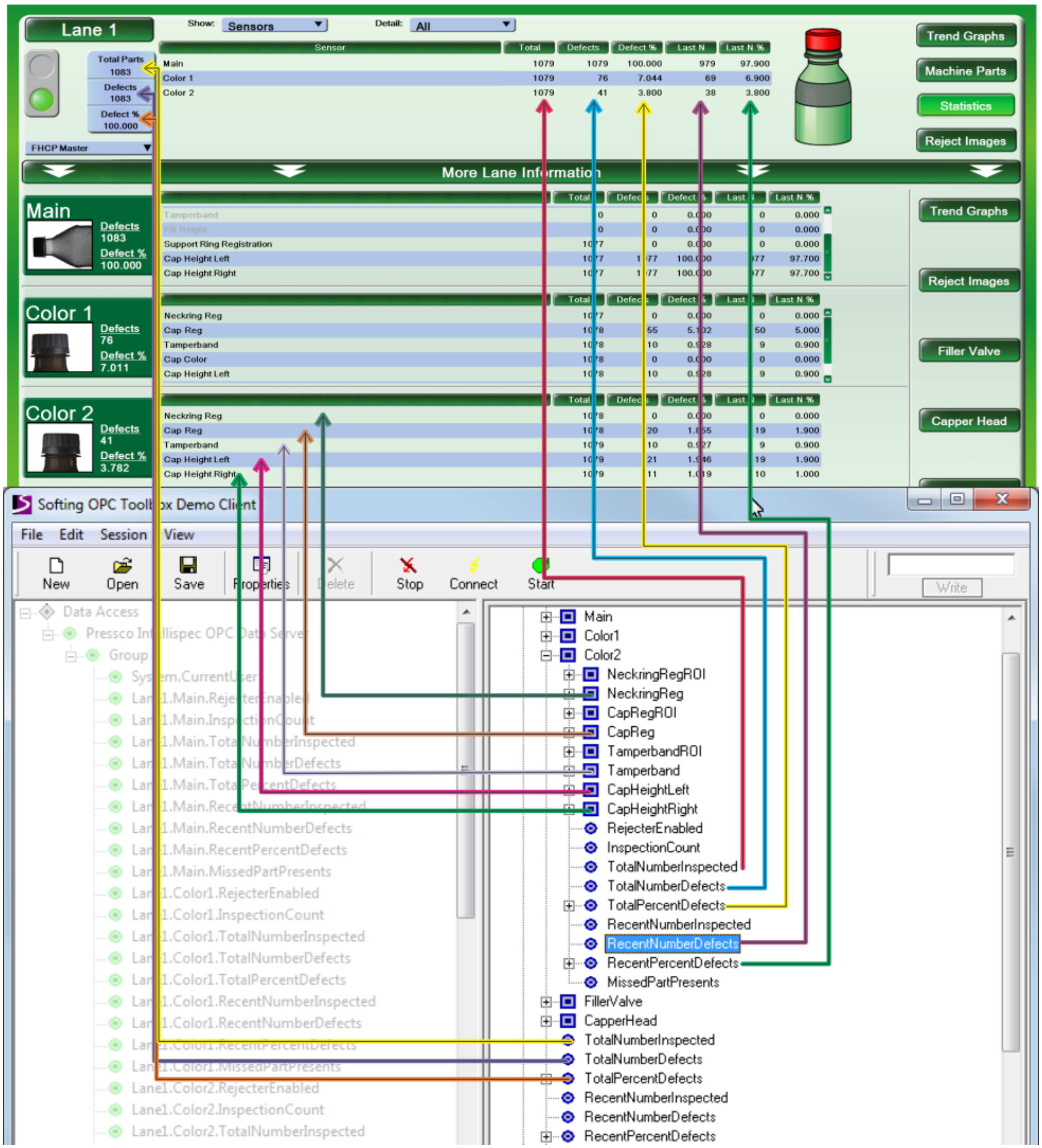
Interpreting the Data

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.

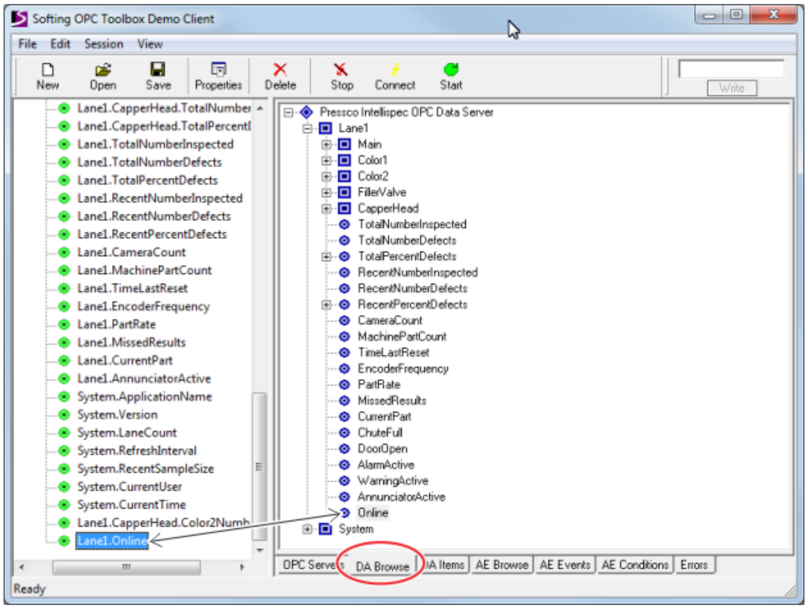
3. Click on the '+' next to the blue square for a camera. This will display a nested blue square for each inspection currently programmed for that camera, plus several blue circles for the data items summarizing that camera. These items correspond to the statistics on the screen, as shown below.



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*** (on page 396) screen.

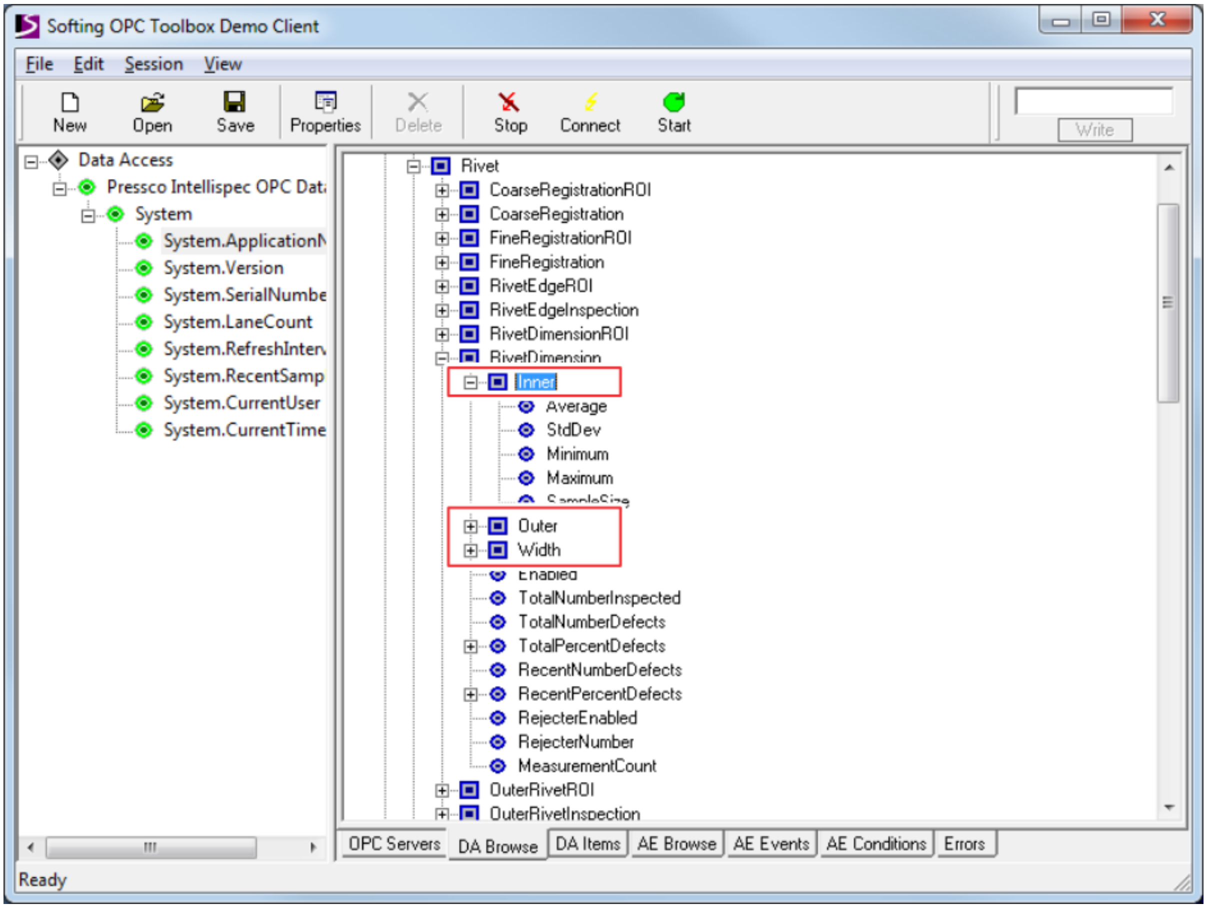
A number of inspections include data items providing measurements, including:

- **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)

❖ *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.*

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.

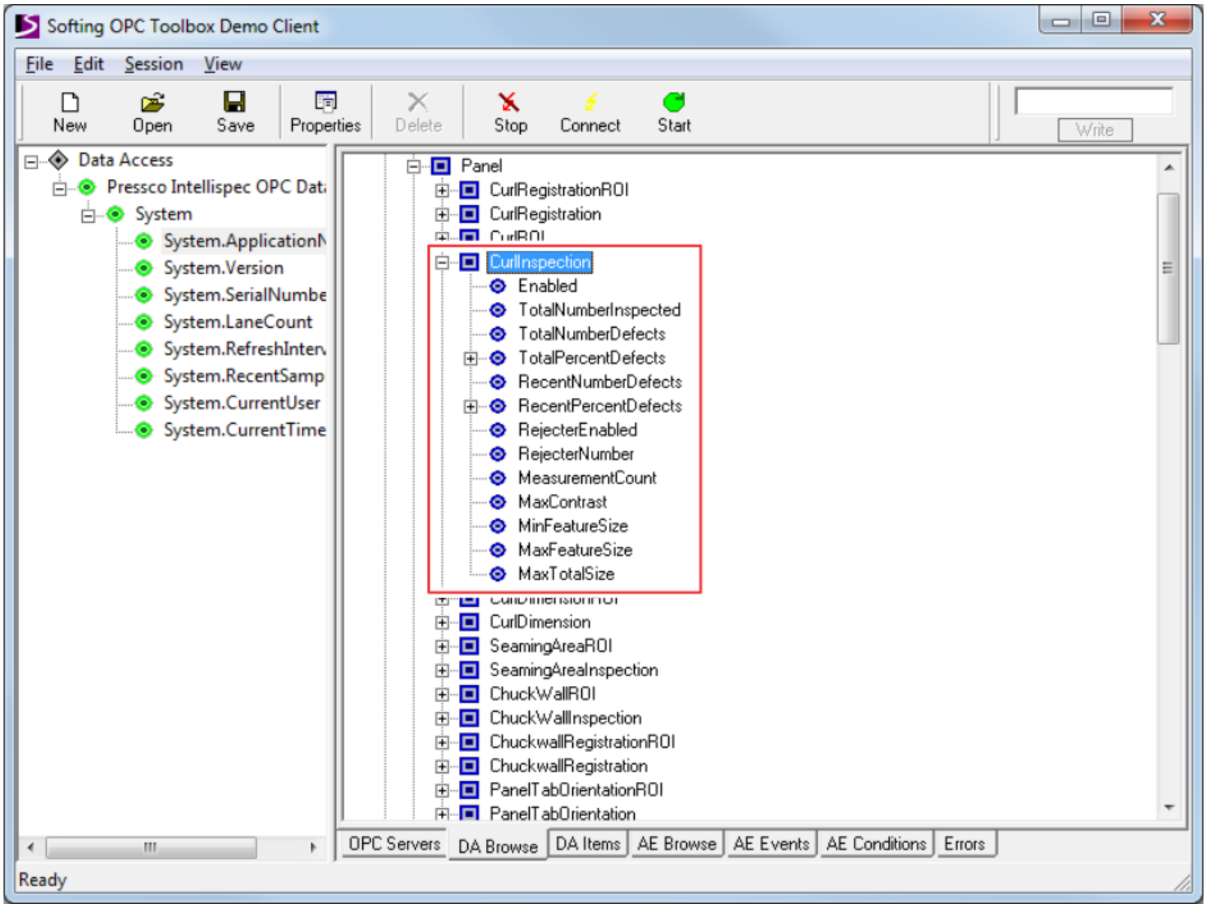


Parameter data items

Additional inspection data is presented for some inspections.

To see parameter data items, check the **Show 'Parameters' Items** box in the ***OPC Configuration*** (on page 396) 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.



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.

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.

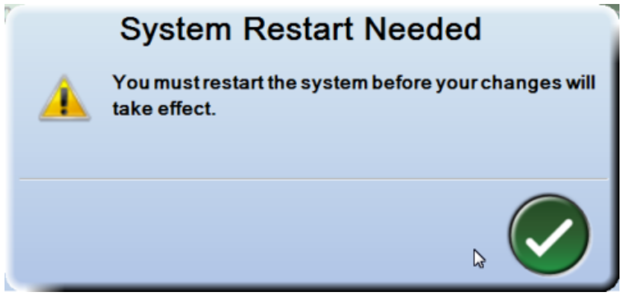
When the Private Counters option is enabled, the OPC Counters will only reset when:

- A new part program is loaded, or:
- You use the Reset Private Counters button

➢ ***To enable the OPC Private Counters:***

1. Log in as Administrator.
2. Click the  button.

3. Click the Tools button  to see the Tools menu > select OPC Configuration from the menu. The ***OPC Configuration*** (on page 396) menu is displayed.
4. Check the Use Private Counters box.
5. Click the OK button to save changes and exit.
6. The Intellispec must re-start for changes to take effect. Click the OK button (check mark) to acknowledge the message.

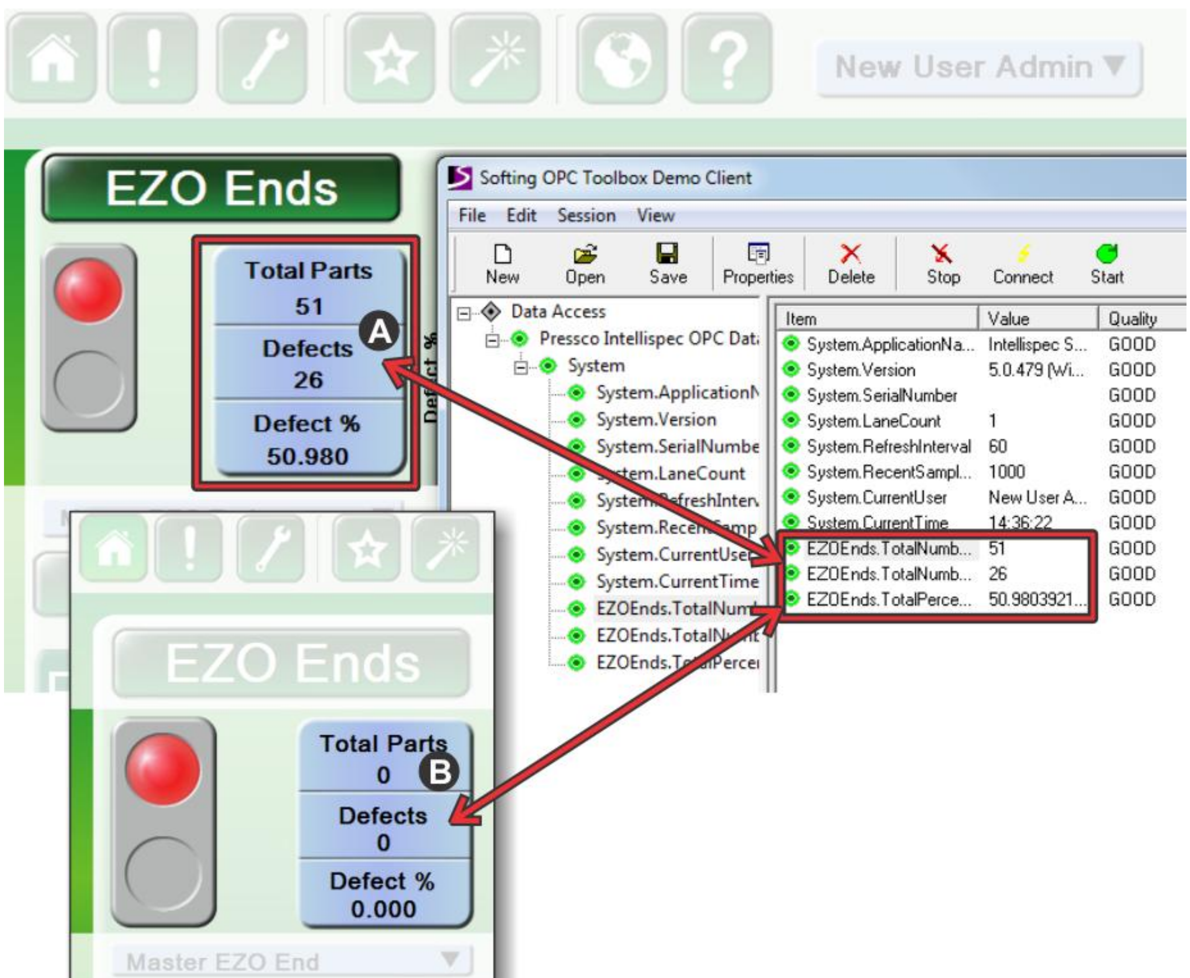


7. Click the Tools button  to see the Tools menu > select Exit System from the menu.
8. Select "Shut Down Intellispec and Restart Computer" from the drop-down menu. The Intellispec system shuts down and restarts. The Private Counters are enabled.

To see the difference between the statistics on the Intellispec screen and the OPC Private Counters, use ***The Intellispec OPC test client*** (on page 397).

To view only items such as parts inspected, number of defects, etc., see how to ***View only defect data*** (on page 406).

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. Click the button.
4. Click the Tools button to see the Tools menu > select OPC Configuration. The OPC Configuration menu opens.
5. Click the **Reset Private Counters** button. A confirmation box appears to notify you that the counters will be reset on the OPC server.
6. Click OK. The OPC counters are reset.

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. Click the button.
4. Click the Tools button to see the Tools menu > select OPC Configuration. The ***OPC Configuration*** (on page 396) menu opens.
5. Check the **Use Counter Rollover** button.
6. Click either the 10,000 or 100,000 button.
7. Click the OK button to save changes and exit. The Intellispec needs to re-start for the changes to take effect.
8. Click the button.
9. Click the Tools button to see the Tools menu > select Exit System.
10. Select Shut Down Intellispec and Restart the Computer from the drop-down menu. The Intellispec software shuts down and restarts.
11. Log in after the software restarts, and continue operation.

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.

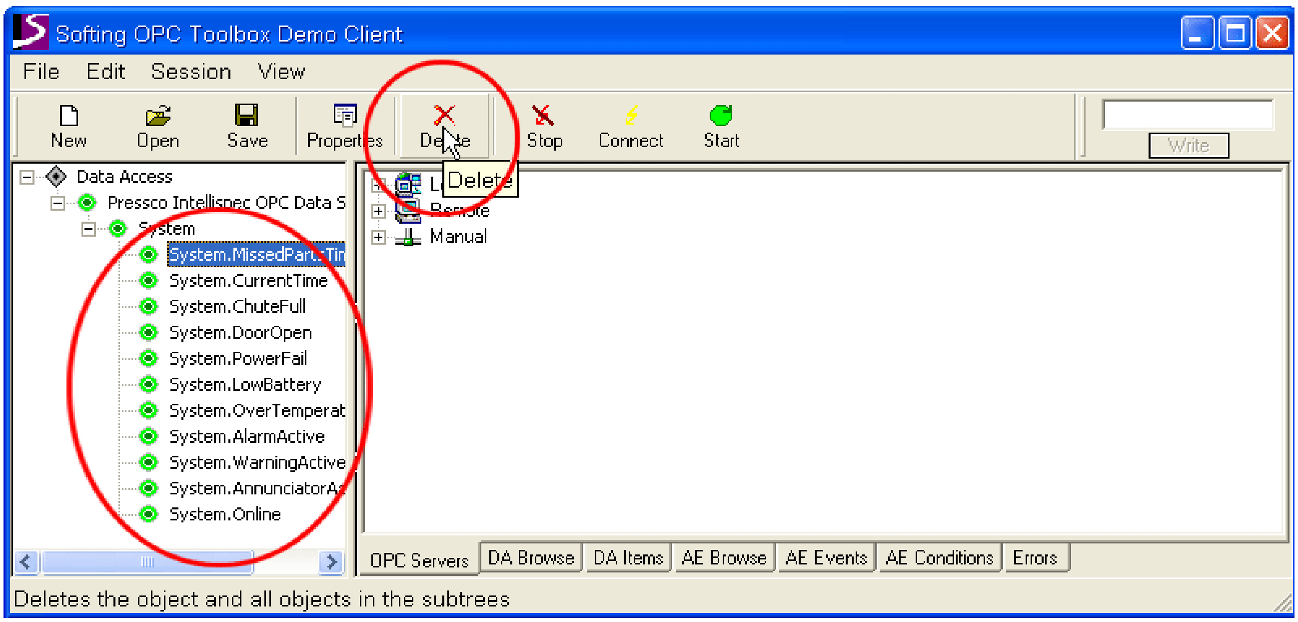
Open the ***The Intellispec OPC test client*** (on page 397).

Next, set up the data items to display only defect information.

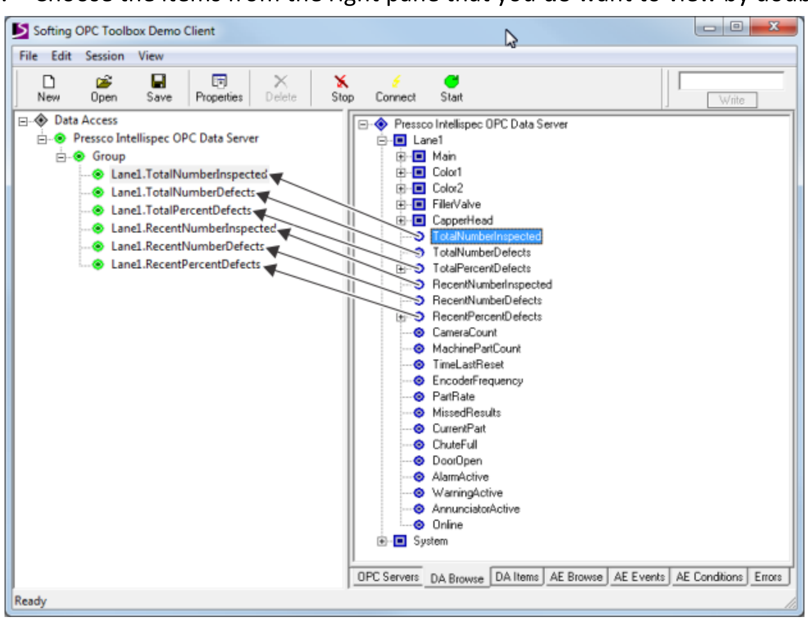
➢ ***To see the defect items:***

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.

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 pulses 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.

References

To learn more about OPC, visit these links:

OPC Foundation
(***http://www.opcfoundation.org/Default.aspx/01_about/01_whatis.asp?MID=AboutOPC***)

OLE for process control (***http://en.wikipedia.org/wiki/OLE_for_process_control***)

Or perform a search on the Internet, using "OLE for process control" as the search criteria.

Chapter 15

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