OptiSure Automated Optical Inspection

Operating Manual

Electronic pdf files of Nordson EFD manuals are also available at www.nordsonefd.com

Nordson EFD

Contents

Introduction

This manual provides operating instructions for the OptiSure™ Automated Optical Inspection (AOI) integrated software add-on and confocal laser accessory. This advanced technology add-on includes features that provide optical assurance and improve deposit accuracy and process control using closed loop feedback. The OptiSure AOI add-on is compatible with all EFD vision-guided automated dispensing systems and is available within the DispenseMotion software (version 2.36-RS and higher).

This OptiSure AOI technology allows a vision-guide system to inspect fluid deposit widths and diameters with exceptional certainty and determine if dispense requirements have been met. For PROX / PROPlus / PRO and GVPlus systems, the OptiSure AOI confocal laser produces 3D images of deposits and detects deposit measurements regardless of the transparency of the fluid.

Applicability of this Manual

This manual applies only to the optional OptiSure AOI software add-on and the confocal laser. The OptiSure AOI add-on can be unlocked on any vision-guided automated dispensing system. The confocal laser can be installed only on PROX / PROPlus / PRO and GVPlus systems.

NOTE: For all other information pertaining to an automated dispensing system, refer to the respective system's operating manual.

The OptiSure Automated Optical Inspection add-on can be unlocked on any vision-guided automated dispensing system

The confocal laser is an optional accessory for PROX / PROPlus / PRO and GVPlus systems that allows 3D verification of deposit accuracy

About OptiSure AOI

All OptiSure AOI functions are accessed by selecting the Arrow icon on the Camera screen and then by right-clicking in the Primary View screen.

The OptiSure AOI feature includes the following capabilities:

- Optical two-dimensional (X and Y) inspection and verification of deposits to determine if the dispense requirements are met; if they are not met, the system can automatically adjust the dispense program to correct the inaccuracy. All vision-based automated dispensing systems can perform this verification.
- On systems with the optional confocal laser, optical three-dimensional (X, Y, and Z) inspection to determine if the dispense requirements are met, including dispense volume; if they are not met, the system can automatically adjust the dispense program to correct the inaccuracy.
- Advanced methods for making a mark easier for the system to find by adding details to it based on its characteristics. These functions are similar to the Area function of the Template Match window, but are specifically designed for workpiece surfaces that present unique challenges, such as multiple circles, unclear or fuzzy elements, or even workpieces that have no distinguishing features.

Location of the Arrow icon on the Camera tab (turns yellow when selected)

Enabling the OptiSure AOI Feature

Two important actions are required to use the full functionality of the OptiSure AOI add-on:

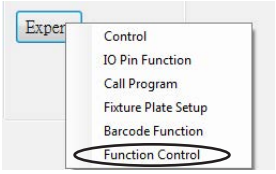
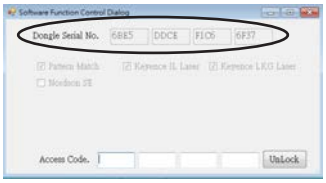
- An access code must be used to unlock the OptiSure AOI add-on. To obtain the access code, you must provide the Dongle Serial No. to Nordson EFD as described in this section.
- For some OptiSure AOI features to function properly, a script file must be present on the DispenseMotion controller. Obtain this script file from your Nordson representative.

NOTE: If you have not purchased the OptiSure AOI software key, refer to “OptiSure AOI Kit Part Numbers” on page 61 for the kit part numbers. Contact your Nordson EFD representative for assistance.

PREREQUISITES

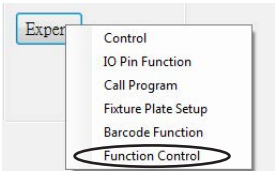
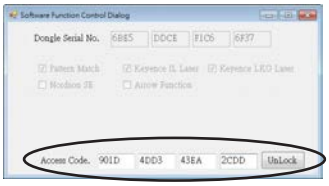
- ☐ The complete automated dispensing system is properly installed and set up in accordance with the respective system’s operating manual.
- ☐ You have purchased your OptiSure AOI kit(s).
- ☐ You have obtained the main.bas file from your Nordson EFD representative.
- ☐ If purchased, the optional confocal laser is installed in accordance with the installation instructions.
- ☐ The DispenseMotion software is open.

Obtain the Access Code

#	Click	Step	Reference Image
1	System Setup > Open > Expert	• Click SYSTEM SETUP > OPEN > EXPERT.	
2	**11111111 >** OK	• Enter 11111111, then click OK.	
3	Function Control	• Click FUNCTION CONTROL. The Software Function Control Dialog window opens.	
4	**xxxx xxxx xxxx xxxx >** > Exit	• Make a note of the Dongle Serial No., or obtain a screen capture of the number. • Close the dialog box and click EXIT.	
5		• Provide the Dongle Serial No. number to your Nordson EFD representative. Nordson EFD will provide an Access Code. When you receive the code, continue to “Enter the Access Code” on page 6.	

Enabling the OptiSure AOI Feature (continued)

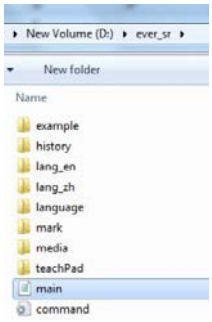
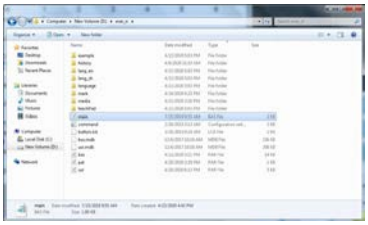
Enter the Access Code

#	Click	Step	Reference Image
1	System Setup > Open > Expert	• Click SYSTEM SETUP > OPEN > EXPERT.	
2	**11111111 >** OK	• Enter 11111111, then click OK.	
3	Function Control	• Click FUNCTION CONTROL. The Software Function Control Dialog window opens.	
4	**xxxx xxxx xxxx xxxx >** UnLock > > Exit	• Enter the ACCESS CODE and click UNLOCK. • Close the dialog box and click EXIT.	
5		• Continue to “Add the Script File to the DispenseMotion Controller” on page 7.	

Enabling the OptiSure AOI Feature (continued)

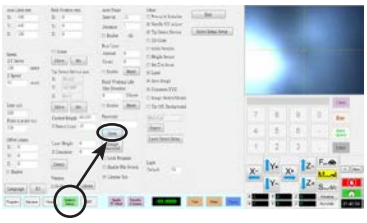
Add the Script File to the DispenseMotion Controller

NOTE: The main.bas script file is not required for all OptiSure AOI functions, but Nordson EFD recommends adding it to the DispenseMotion controller as a best practice.

#	Click	Step	Reference Image
1		• If you have not already done so, contact your Nordson EFD representative to obtain the main.bas script file. • Place the main.bas file on a USB drive.	
		• Insert the USB drive into an empty USB port on the back of the DispenseMotion controller. **NOTE:** On most controllers, USB-3 is an unused USB port.	
2		• Switch ON the DispenseMotion controller. **NOTE:** Do not open the DispenseMotion software at this time.	
3		• Using the file explorer application, navigate to the USB drive and copy the main.bas file. • Navigate to the D:\ever_sr directory and paste the main.bas file into the directory.	
4		• Close the file explorer application. The OptiSure AOI add-on is now unlocked and ready for use. Refer to the remaining sections of this manual for detailed procedures for using the OptiSure AOI features. • If you also installed the confocal laser, continue to “Setting Up the Confocal Laser” on page 9.	

Setting Up the System to Save Images

To ensure full functionality of all OptiSure AOI features, set up the system to automatically save any captured images.

#	Click	Step	Reference Image
1	System Setup > Open	• Click SYSTEM SETUP > OPEN.	
2	Save Image	• Under OTHER, select the SAVE IMAGE checkbox. The change is automatically saved.	

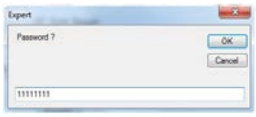
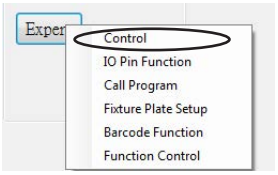
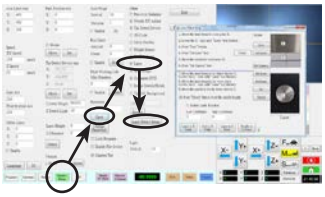
Setting Up the Confocal Laser

If you installed the confocal laser (Laser C), follow this procedure to ensure that the laser is properly selected and set up in the system.

NOTE: The confocal laser can be installed only on PROX / PROPlus / PRO and GVPlus systems.

PREREQUISITES

- ☐ If purchased, the optional confocal laser is installed in accordance with the installation instructions.
- ☐ The DispenseMotion software is open.

#	Click	Step	Reference Image
1	System Setup > Open > Expert	• Click SYSTEM SETUP > OPEN > EXPERT.	
2	11111111 > OK	• Enter 11111111, then click OK.	
3	Control	• Click CONTROL.	
4	Machine Model PRO3 PRO3L/A PRO3L/B PRO3L/C PRO4 PRO4L/A PRO4L/B PRO4L/C > OK	• Select the applicable Laser C model from the Machine Model drop-down menu. • Click OK to save.	
5	Exit > Dispense Motion	• Click EXIT to close the software. • Switch off the robot. • Re-open the DispenseMotion software and switch on the robot for the change to take effect.	
6	System Setup > Open > Laser > Laser Detect Setup	• Click SYSTEM SETUP > OPEN. • Under Other, ensure that LASER is checked. • Click LASER DETECT SETUP and follow the steps in the Laser Detect Setup window. **NOTE:** If you want to use the centering feature for the most precise laser calibration, complete steps 1-3 of the wizard and then skip to “Using the Center Button for Laser C Setup” below to complete laser setup. • Close the window after you have completed all the steps.	

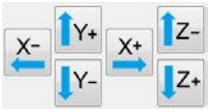
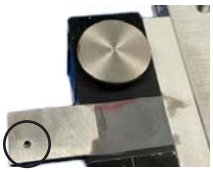
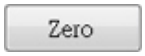
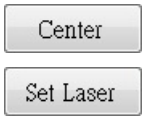
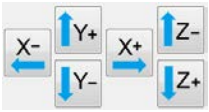
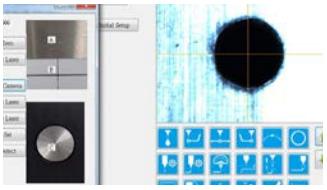
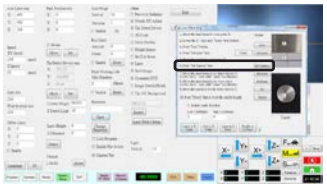
Setting Up the Confocal Laser (continued)

Using the Center Button for Laser C Setup

On systems with Laser C, the Laser Detect Setup window has a Center button that can be used for more precise laser calibration. Using the Center button is optional, but is recommended to obtain the most accurate calibration. Follow these steps to use the Center button during Laser C setup.

PREREQUISITES

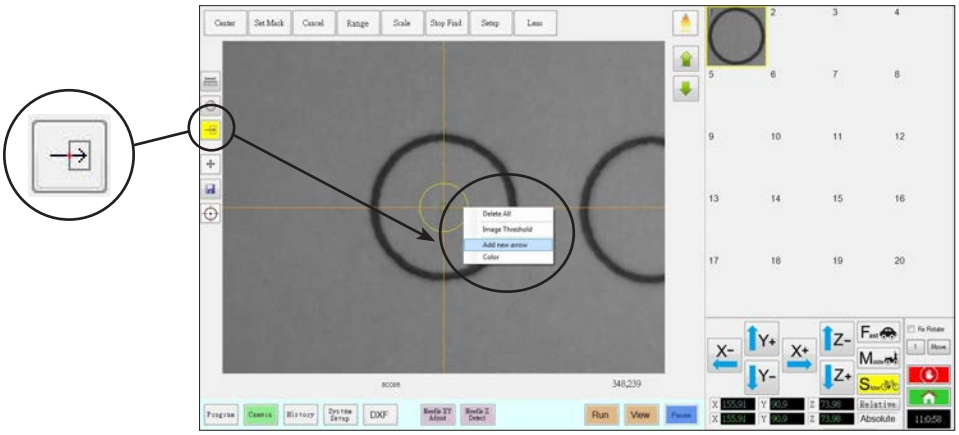
- ☐ You have completed "Setting Up the Confocal Laser" on page 9.
- ☐ You have completed steps 1–3 of the Laser Detect Setup wizard.

#	Click	Step	Reference Image
1		• Move the laser to the centering hole on the laser calibration plate, which is mounted on the tip detector.	
2		• Click the ZERO button. The Z axis moves down until the laser readout is close to zero.	
3	 >	• Click CENTER next to Set Laser. The laser moves in two directions (left to right, then north to south) to calibrate itself and then moves to the center of the hole. • Click SET LASER.	
4		• Jog the camera to center the crosshairs over the centering hole on the laser calibration plate.	
5		• Click SET CAMERA. The laser-to-camera offset is now precisely calibrated. • Complete the remaining steps of the Laser Detect Setup wizard and close the window after you have completed all the steps.	

Overview of the OptiSure AOI Functions

Click the Arrow icon, then right-click in the Primary View screen to view the Arrow menu.

Arrow Menu Item		Description	Refer to...
Delete All	Delete All	Deletes all arrows associated with a mark image.	n/a
Image Threshold	Image Threshold	Allows you to isolate a specific portion of an image for future adjustment; the isolated portion remains visible on the screen when you are adjusting the parameters in an Arrow dialog box: • Recommended for use in tandem with any Arrow Type • Provides more accurate results than Template / Area	"Using Image Threshold" on page 12
Add New Arrow	Add new arrow	Adds an arrow to a mark image; added arrows can be manipulated individually or collectively to improve the system's ability to find a mark image, or to optically check a dispense. Select the arrow type to use based on the characteristics of the mark image.	"Using the Arrow Types" on page 13
Color	Color	Changes the color of the on-screen arrows, circles, and other visual aids of the Arrow functions.	n/a



Location of the Arrow icon on the Camera tab (turns yellow when selected) and the resulting menu when you right-click in the Primary View screen

Using Image Threshold

Image Threshold allows you to view changes to a mark image as you make adjustments. This feature can be used alone or in tandem with an Add New Arrow function. Nordson EFD recommends first using Image Threshold before using some of the Arrow Type functions, so that you can view the changes to the image on the screen.

NOTE: A quicker alternative to using Image Threshold is to use the Threshold slider inside each Arrow Type dialog box. If you want to use the quicker method, do not enable Image Threshold.

PREREQUISITES

☐ The mark image you want to adjust is saved in the Mark Library.

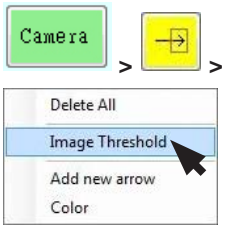
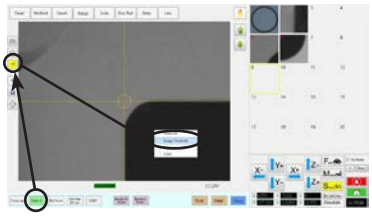
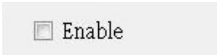
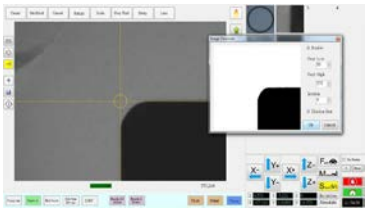
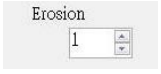
#	Click	Step	Reference Image
1		• Click CAMERA to go to the camera screen. • Click the ARROW icon. • In the Primary View screen, right-click and select IMAGE THRESHOLD. The Image Threshold window opens.	
2		• In the Image Threshold window, select the Enable checkbox. • Adjust the Image Threshold settings until you have successfully isolated the mark. Refer to “Image Threshold Window Parameters” for details.	
3		• Click OK to save the adjustments or click CANCEL to exit without saving.	

Image Threshold Window Parameters

Parameter		Function
Enable		If checked, enables the Image Threshold function.
Gray Low		Adjusts the minimum value of the threshold — the lower the setting, the less visible the image will be; when a valid setting is entered, the image is visible on the screen. Range: 0–255 (0 is full dark; 255 is full white)
Gray High		Adjusts the maximum value of the threshold — if the maximum value is exceeded, the image will not be visible; when a valid setting is entered, the image is visible on the screen. Range: 0–255
Erosion		Reduces and then enlarges the image to remove impurities (as long as Dilation First is not checked).
Dilation		If checked, enlarges and then reduces the image to remove impurities.

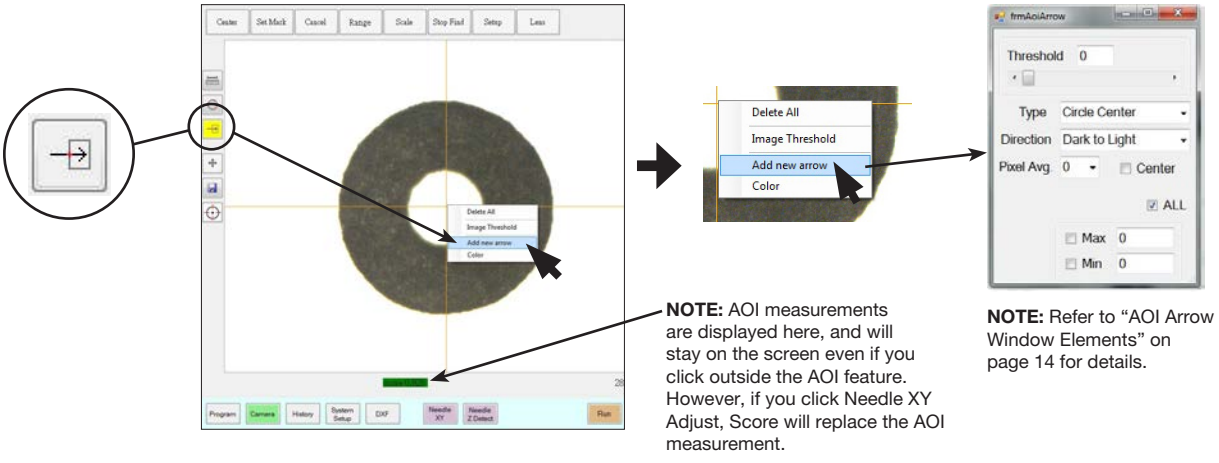
Using the Arrow Types

The Add New Arrow icon accesses advanced features that allow you to:

- Add details to a mark image to improve the system's ability to match the mark image to the corresponding location on a workpiece.
- Verify the width, length, or depth of a dispense based on parameters saved in a mark image.

There are five types of arrow function, shown below. An example procedure for using each function is provided.

Arrow Menu Type Selection		Recommended Use	Refer to...
Circle Center	Type: Circle Center	Create a mark image that defines the center of a circular area with poorly defined boundaries.	"Circle Center Example" on page 21
Gravity Point	Type: Gravity Point	Create two mark images on a line so that you can use Fiducial Marks to ensure that line dispenses are made down the center of a line, regardless of its thickness.	"Gravity Point Example" on page 16
Intersect Line	Type: Intersect Line	Create a mark image for a workpiece that does not have any obvious marks for the system to find; in this case, you must use the upper left and bottom right corners of the workpiece to create marks.	"Intersect Line Example" on page 35
Mea. Point To Line	Type: Mea. Point To Line	Create a mark image that allows you to measure the width between any two points on a line. Then, using the Arrow Check Point command, the system can check the width between the specified points; if the width does not meet the criteria specified within the mark image, the system takes the specified action.	"Mea. Point To Line Example" on page 41
Mea. Width (Automated Optical Inspection)	Type: Mea. Width	Create a mark image that sets the desired width for a line. Then, using the Arrow Check Point or Arrow Check Line commands, the system can check the width of a dispensed line; if the dispensed line does not meet the criteria specified within the mark image, the system takes the specified action.	"Mea. Width Example for Verifying Line Width" on page 46

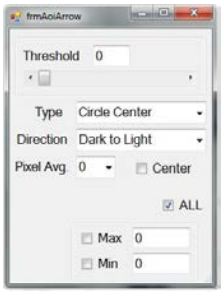


Accessing the Add New Arrow function on the Camera tab, and the resulting AOI Arrow parameter window

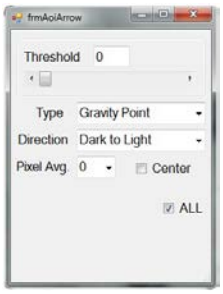
Using the Arrow Types (continued)

AOI Arrow Window Elements

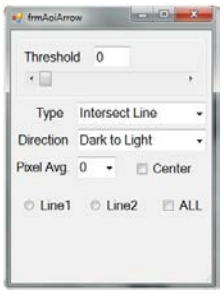
The parameters in the AOI Arrow window vary depending on the selected arrow Type.



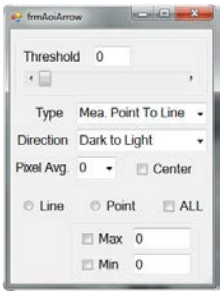
Circle Center parameters



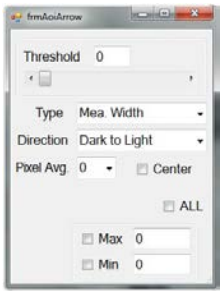
Gravity Point parameters



Intersect Line parameters



Measure Point to Line parameters



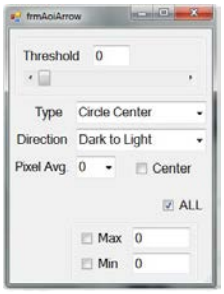
Measure Width parameters

Parameter		Applicability	Description
Threshold	Threshold 0 Range: 0–255	All arrow types	As long as Image Threshold is not enabled, you can use this parameter to adjust the mark image automatically. If Image Threshold is enabled, this parameter is disabled. Refer to “Using Image Threshold” on page 12 for details.
Type	Type Circle Center	n/a	Sets the arrow type. Refer to “Using the Arrow Types” on page 13 for an explanation of each.
Direction	Direction Dark to Light Other value: Light to Dark	All arrow types	The direction of the light on the thresholded image that matches the direction of the inserted arrow. For accurate results, the selected Direction must match the direction of that inserted arrow points toward. **EXAMPLES:** • If (1) an isolated mark is black, and (2) the empty space around it is white, and (3) the inserted arrow points inward toward the mark, then the light direction is white to black, in which case the correct selection for Direction is LIGHT TO DARK. • If (1) an isolated mark is white, and (2) the empty space around it is black, and (3) the inserted arrow points inward toward the mark, then light direction is black to white, in which case the correct selection for Direction is DARK TO LIGHT. **NOTE:** If you enable Image Threshold, the system converts the image to black and white, where black is the isolated mark and white is the dead space, or vice versa.

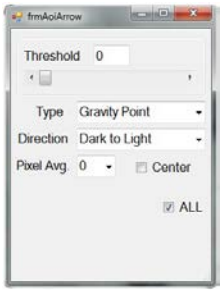
Continued on next page

Using the Arrow Types (continued)

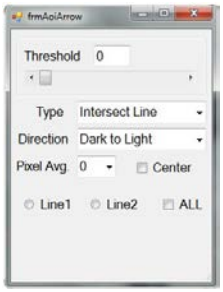
AOI Arrow Window Elements (continued)



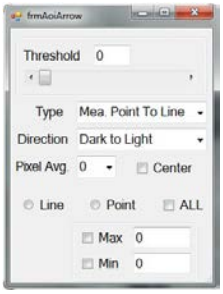
Circle Center parameters



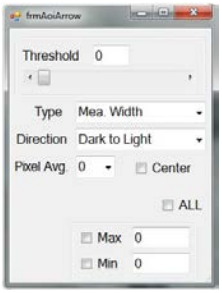
Gravity Point parameters



Intersect Line parameters



Measure Point to Line parameters



Measure Width parameters

Parameter		Applicability	Description
Pixel Avg.	Pixel Avg. 0	All arrow types	Averages the pixel density, allowing higher accuracy when the system searches for the mark.
Center checkbox	Center	All arrow types	If enabled, the system attempts to use the mark image to center the camera over the mark before acting upon the data specified in an arrow feature. By default, Center is deselected. **NOTE:** Most arrow features also attempt to center a mark, so enabling this feature might cause the system to center the camera twice: Once using the mark image in the mark library and then again using the arrow feature.
ALL checkbox	ALL	All arrow types	If checked, the system adjusts any changed settings for all the arrows. By default, ALL is deselected. This setting must be selected before any other changes are made in an AOI Arrow window.
Max and Min checkboxes	Max 0 Min 0	Circle Center, Mea. Point To Line, Mea. Width	If checked, you can enter values to specify maximum and minimum values for the selected arrow Type.

Using the Arrow Types (continued)

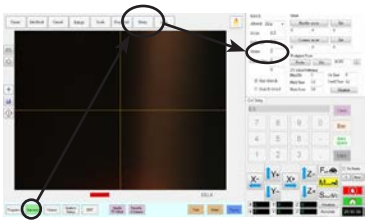
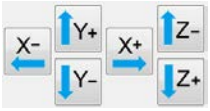
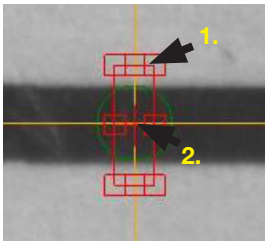
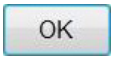
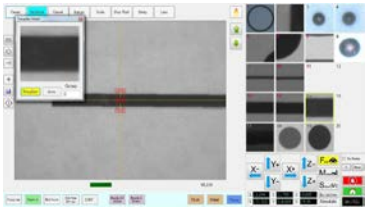
Gravity Point Example

Gravity Point is an OptiSure AOI feature that allows you to create two Fiducial Marks in the center of a line, one at the beginning of the line and the other at the end of the line. Then, if a subsequent dispense must be made on a line that is thicker or thinner, the system can dispense through the center of that line using the Fiducial Mark offsets.

PREREQUISITES

- ☐ To learn how to use this feature, draw two lines of different thicknesses on a sheet of white paper and use it as a workpiece template.

To Create a Gravity Point Mark Image

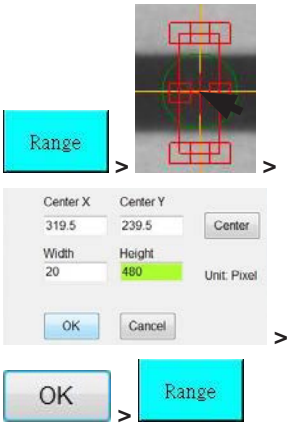
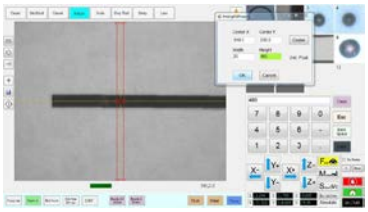
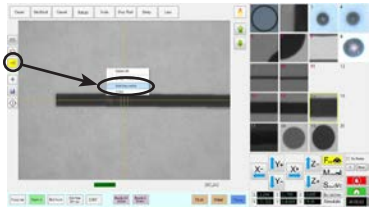
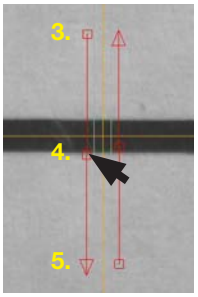
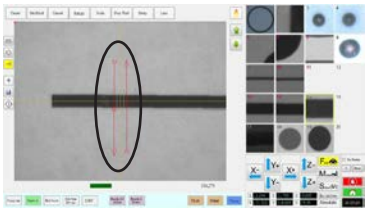
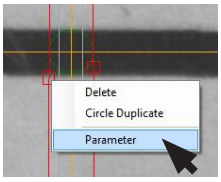
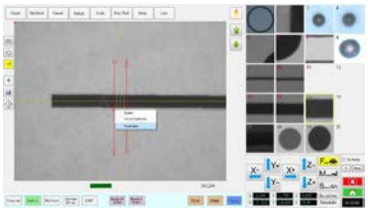
#	Click	Step	Reference Image
1	 >	• Click CAMERA > SETUP and enter a lower score for SENSE (1 is used in this example). **NOTE:** You may need to adjust this value based on the results as you work through this procedure.	
2	 >  >  > 	• Jog the camera to a location near the beginning of the thicker line. • Click SET MARK, then click and drag the red box (item 1) over the line. • Double-click the crosshairs in the center of the red box (item 2) and then enter the desired values for Width and Height (20 and 60 in this example). • Click OK to save the values.	
3	> 	• Click a socket in the Mark Library to save the mark, then click TEMPLATE when the Template Match window appears. The system saves the image in the Mark Library.	

Continued on next page

Using the Arrow Types (continued)

Gravity Point Example (continued)

To Create a Gravity Point Mark Image (continued)

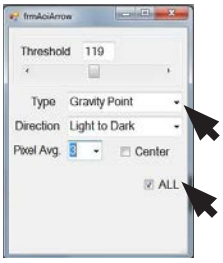
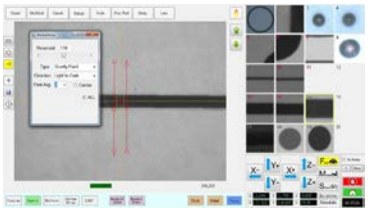
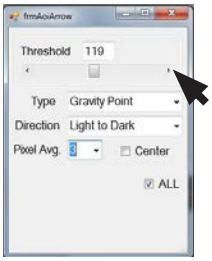
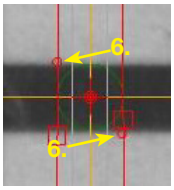
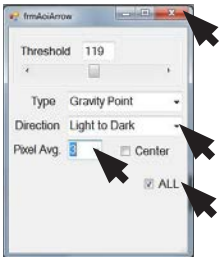
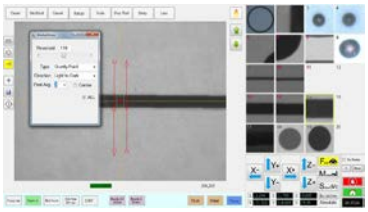
#	Click	Step	Reference Image
4		• Click RANGE to set where the system searches for the mark. • Double-click on the crosshairs in the center of the mark and enter Width and Height values (20 and 480 in this example). **NOTE:** The Width value must be the same as the Width specified in step 2 on page 16. • Click OK. • Click RANGE again to save.	
5		• Click the ARROW icon. • In the Primary View screen, right-click and select ADD NEW ARROW. The system adds an arrow to the screen.	
6		• Repeat step 5 to add another arrow, and then use the mouse to manipulate the arrows so they form an array, as shown. - To move the entire arrow, click and drag the middle box (item 4). - To elongate or shorten the arrow, click and drag the arrow (item 5) or the end box (item 3).	
7		• Right-click on the middle box of an arrow and then select PARAMETER. The AOI Arrow window opens.	

Continued on next page

Using the Arrow Types (continued)

Gravity Point Example (continued)

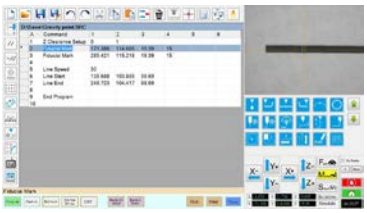
To Create a Gravity Point Mark Image (continued)

#	Click	Step	Reference Image
8		• Select the ALL checkbox (because two arrows are used). • For Type, select GRAVITY POINT.	
9		• Adjust THRESHOLD until the two small red circles (item 6) are positioned on the top and bottom edges of the line.	
10		• Select LIGHT TO DARK. • Adjust PIXEL AVG to make the mark image easier for the system to find. **NOTE:** Select CENTER if you want to center the image based on the image in the mark library. • Close the dialog box to save the settings. The saved mark image now contains additional data that will allow the system to accurately find it upon reaching its corresponding Fiducial Mark command in a program. • Continue to “To Use a Gravity Point Mark Image in a Program” on page 19 to use the Gravity Point mark image.	

Using the Arrow Types (continued)

Gravity Point Example (continued)

To Use a Gravity Point Mark Image in a Program

#	Click	Step	Reference Image
		• In the dispense program, insert one Fiducial Mark command near the beginning of the thicker line and one Fiducial Mark command near the end of the thicker line, specifying in each the Mark No. of the Gravity Point mark you created in the previous procedure.	
		• Insert a Line Speed command and set the value at 30. **NOTE:** This setting might need to be adjusted depending on thickness of the line.	
		• Enter Line Start and Line End commands for the thicker line.	
		• Insert one Fiducial Mark command near the beginning of the thinner line and one Fiducial Mark command near the end of the thinner line, specifying Mark No. of the Gravity Point Mark you created in the previous procedure. **NOTE:** These Fiducial Mark commands can specify the same Mark No. because both lines are similar in composition.	
		• Insert a Line Speed command that is double the previous line speed, so that less fluid is dispensed. **NOTE:** This setting might need to be adjusted depending on the thickness of the line.	
		• Insert Line Start and Line End commands for the thinner line. When the system dispenses on any line with fiducial offsets, it will align the dispense in the middle of the line, regardless of the thickness or thinness of the line. **NOTE:** The complete example program is provided on the next page.	

Using the Arrow Types (continued)

Gravity Point Example (continued)

To Use a Gravity Point Mark Image in a Program (continued)

D:\Save\GravityPoint.SRC

	A	Command	1	2	3	4	5	6
	1	Z Clearance Setup	1	1				
	2							
	3	// Thicker Line						
	4	Fiducial Mark	171.386	114.686	19.39	30		
	5	Fiducial Mark	285.421	115.218	19.39	30		
	6							
	7	Line Speed	30					
	8	Line Start	135.688	103.885	98.69			
	9	Line End	723	104.417	98.69			
	10							
	11	// Thinner Line						
	12	Fiducial Mark	171.386	119.804	19.39	30		
	13	Fiducial Mark	285.421	120.336	19.39	30		
	14							
	15	Line Speed	60					
	16	Line Start	135.688	109.003	98.69			
	17	Line End	249.723	109.535	98.69			
	18							
	19	End Program						
▸	20							

Example program that contains Fiducial Mark commands for a Gravity Point mark

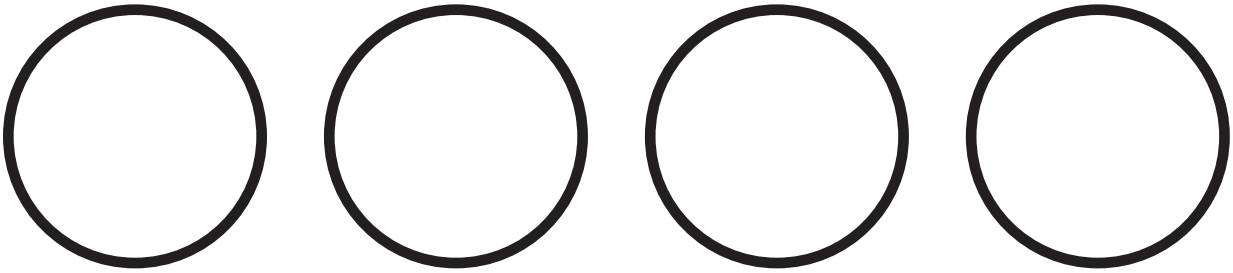
Using the Arrow Types (continued)

Circle Center Example

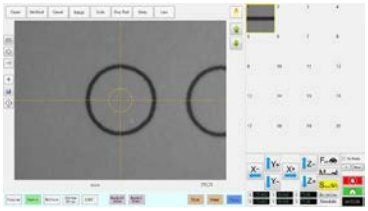
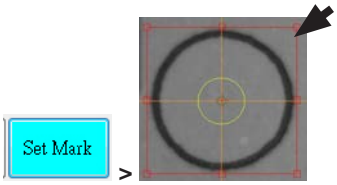
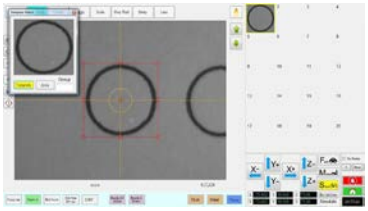
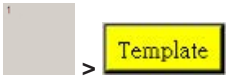
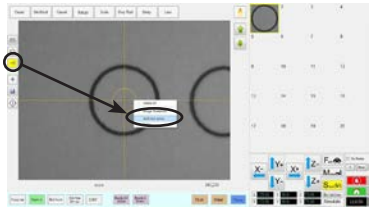
Circle Center is an OptiSure AOI feature that allows you to add details to a mark image of a circular area that has poor definition, thus allowing the system to find the mark image faster and more accurately.

PREREQUISITES

- ☐ To learn how to use this feature, draw four large circles on a sheet of white paper and use it as a workpiece template.



To Create a Circle Center Mark Image

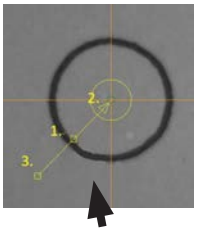
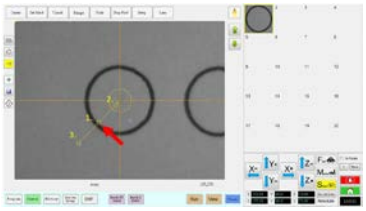
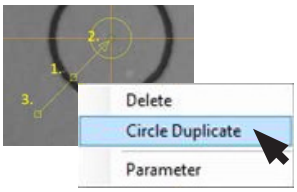
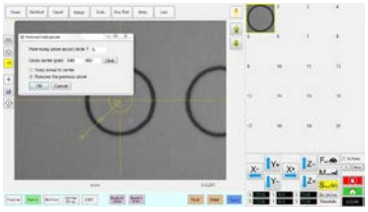
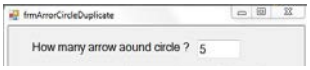
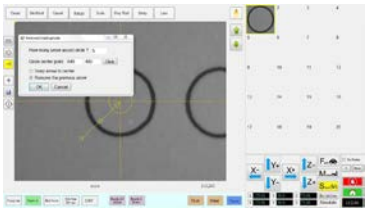
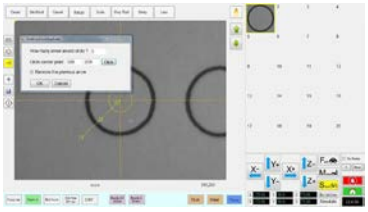
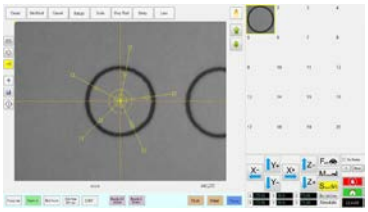
#	Click	Step	Reference Image
1		• Click CAMERA to go to the camera screen. • Position the workpiece template on the fixture plate and bring the circle you want to use for the mark into view.	
2		• Click SET MARK, then drag to position the red box around a circle.	
3		• Click a socket in the Mark Library to save the mark, then click TEMPLATE when the Template Match window appears. The system saves the image in the Mark Library.	
4		• Click the ARROW icon. • In the Primary View screen, right-click and select ADD NEW ARROW. The system adds an arrow to the screen.	

Continued on next page

Using the Arrow Types (continued)

Circle Center Example (continued)

To Create a Circle Center Mark Image (continued)

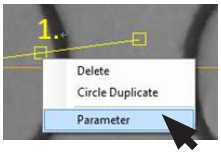
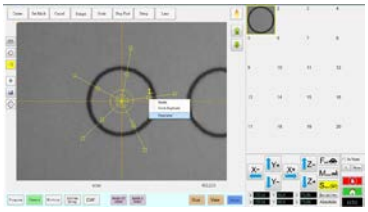
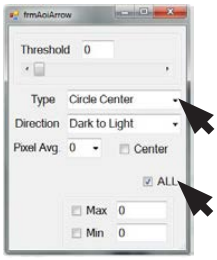
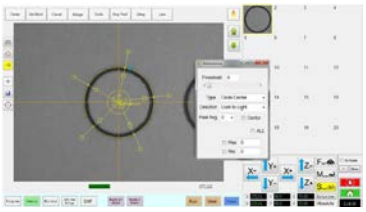
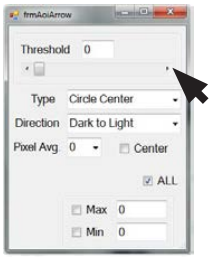
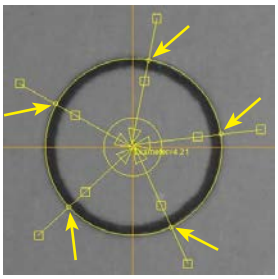
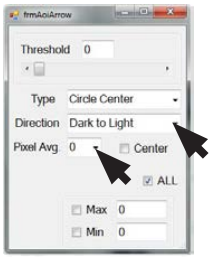
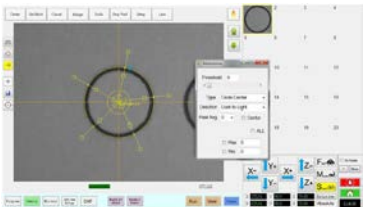
#	Click	Step	Reference Image
5		• Use the mouse to manipulate the arrow so that it extends from the center of the circle to outside of the circle: - To move the entire arrow, click and drag the middle box (item 1). - To elongate or shorten the arrow, click and drag the triangle (item 2) or the lower box (item 3).	
6		• Right-click the upper box on the arrow and select CIRCLE DUPLICATE. The Arrow Circle Duplicate window opens.	
7		• In the Arrow Circle Duplicate window, increase the number of arrows around the circle. In this example, the number of arrows is increased to 5. **NOTE:** When SNAP ARROW TO CENTER is checked, the system snaps the arrows to a calculated center point.	
8		• Click the CLICK button next to Circle Center Point, then click on the center of the circle. The system automatically enters the Circle Center Point coordinates.	
9		• Click OK. Five arrows appear on the image.	

Continued on next page

Using the Arrow Types (continued)

Circle Center Example (continued)

To Create a Circle Center Mark Image (continued)

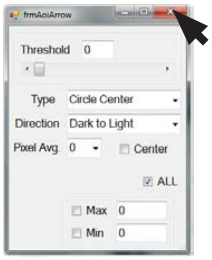
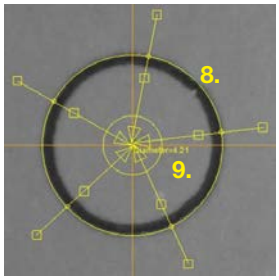
#	Click	Step	Reference Image
10		• Right-click on any middle box (item 1) of an arrow and then select PARAMETER. The AOI Arrow window opens.	
11		• Select the ALL checkbox (to cause the system to enter the same settings for all arrows). **NOTE:** If you want to enter settings for each arrow individually, deselect ALL. • For Type, select CIRCLE CENTER.	
12		• Adjust THRESHOLD until the all the yellow circles are located on the circumference of the circle.	
13		• Select LIGHT TO DARK. • Adjust PIXEL AVG to make the mark image easier for the system to find. **NOTES:** - Check CENTER if you want to center the image based on the image in the mark library. - MAX and MIN are not used in this example.	

Continued on next page

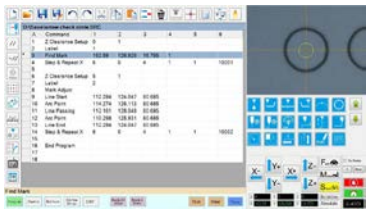
Using the Arrow Types (continued)

Circle Center Example (continued)

To Create a Circle Center Mark Image (continued)

#	Click	Step	Reference Image
14		• Close the dialog box to save the settings. The system adds the circle diameter (item 8) and its value (item 9) to the mark image of the circle. The saved mark image now contains additional data that will allow the system to accurately find it upon reaching its corresponding Find Mark command in a program. • Continue to “To Use a Circle Center Mark Image in a Program” below to use the Circle Center mark.	

To Use a Circle Center Mark Image in a Program

#	Click	Step	Reference Image
1		• In the dispense program, insert a Find Mark command and specify the Mark No. for the Circle Center mark you created in the previous procedure. **NOTE:** The complete example program is provided below.	

D:\Save\arrow check circle.SRC

A	Command	1	2	3	4	5	6
1	Z Clearance Setup	0	1				
2	Label	1					
3	Find Mark	162.59	126.926	16.755	1		
4	Step & Repeat X	6	0	4	1	1	10001
5							
6	Z Clearance Setup	5	1				
7	Label	2					
8	Mark Adjust						
9	Line Start	112.284	124.047	80.685			
10	Arc Point	114.274	126.113	80.685			
11	Line Passing	112.161	128.049	80.685			
12	Arc Point	110.298	125.931	80.685			
13	Line End	112.284	124.047	80.685			
14	Step & Repeat X	6	0	4	1	1	10002
15							
16	End Program						

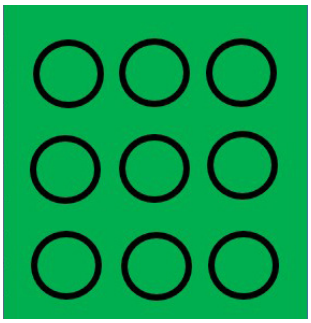
Example program that contains a Find Mark command for a Circle Center mark

Using the Arrow Types (continued)

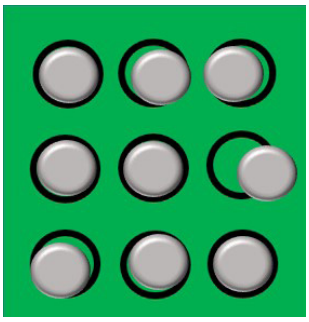
Positional Checking Example

Positional Checking is an OptiSure AOI feature that allows you to determine the exact X and Y offsets of a dispensed dot that deviates from a designated dispense location. Positional Checking is accomplished by using the Circle Center arrow type and the Positional Checking and Step & Repeat commands. The overview below shows how this feature works.

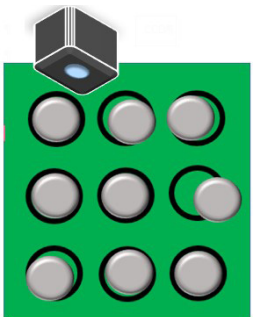
Overview of the Positional Checking Feature



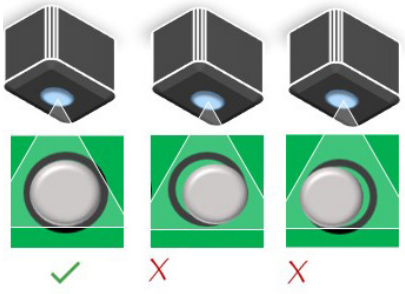
1. A workpiece with defined dispense locations.



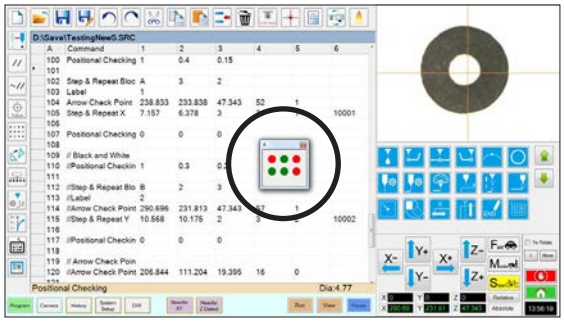
2. Dispensed dots on the workpiece.



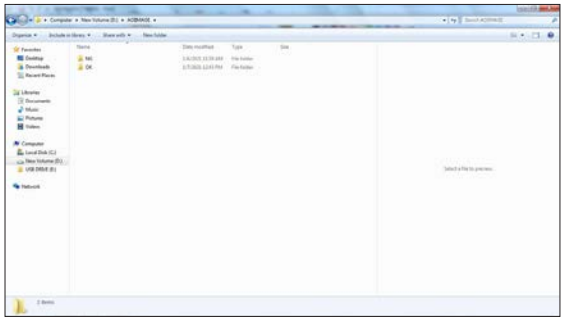
3. Using a Step & Repeat program, the camera examines each dispensed dot.



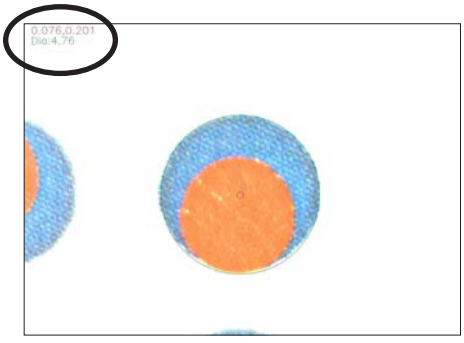
4. If a dispensed dot fits within the specified X and Y offset range, it passes; if not, it fails.



5a. Pass / fail status is displayed in a Positional Checking window. The system also captures and saves image files for all pass / fail results.



5b. Pass / fail images are saved in the D:\ directory into two folders: NG (not good) and OK.



6. Open an image to view details, including diameter and XY offset.

Using the Arrow Types (continued)

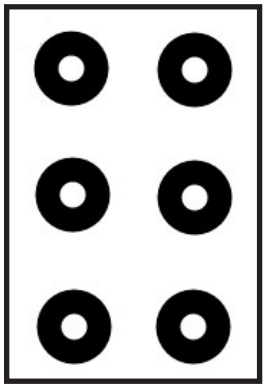
Positional Checking Example (continued)

This example uses a set of six concentric circles in which dots of white fluid are dispensed in the center of larger black circles. A Positional Checking program is created to verify the accuracy of dot placement in relation to the larger black circles.

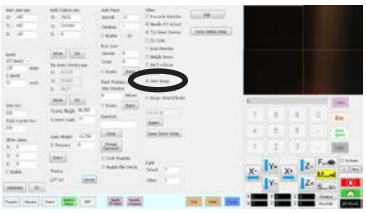
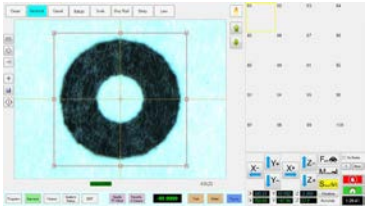
Positional Checking allows the camera to determine the X and Y offset of a dispensed circle from a given or defined location. The Step & Repeat Block command causes a window to open that shows the pass / fail status of each dispensed dot: Green for dots that pass and red for dots that fail. The camera also takes a screen capture of each dot and saves the image; the images provide dispense details, including diameter and XY offset.

PREREQUISITES

- ☐ The system is set up to save images. Refer to “Setting Up the System to Save Images” on page 8 as needed.
- ☐ To learn how to use this feature, create a workpiece template with defined, circular dispense locations, similar to the one shown below.



To Create a Circle Center Mark Image

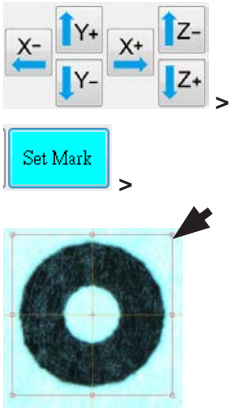
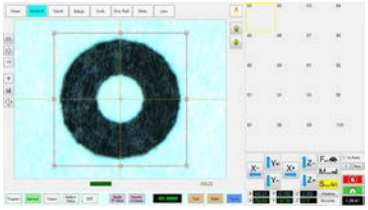
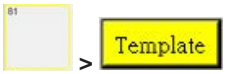
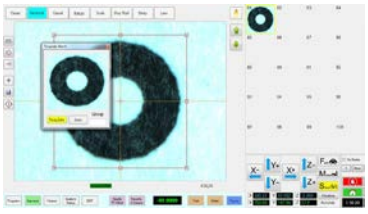
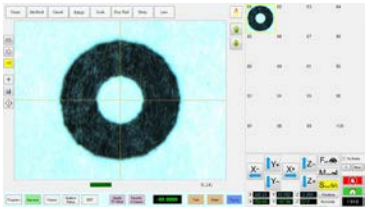
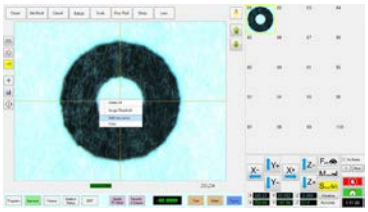
#	Click	Step	Reference Image
1	System Setup > Open > Save Image	• Under System Setup > Other, ensure that the SAVE IMAGE checkbox is selected.	
2	Camera	• Click CAMERA to go to the camera screen. • Position the workpiece template on the fixture plate and bring the circle you want to use for the mark into view. **NOTE:** Nordson EFD recommends using the top-left dot, but any dot will work.	

Continued on next page

Using the Arrow Types (continued)

Positional Checking Example (continued)

To Create a Circle Center Mark Image (continued)

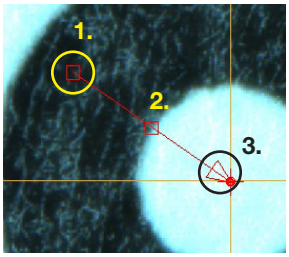
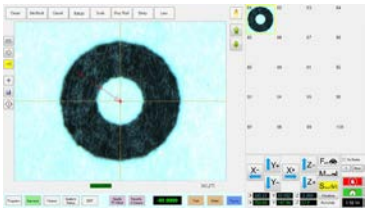
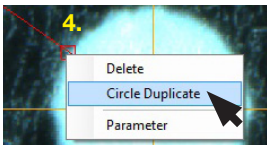
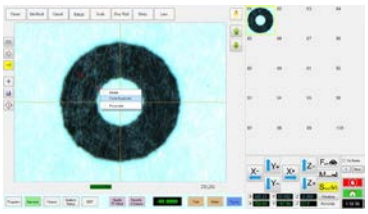
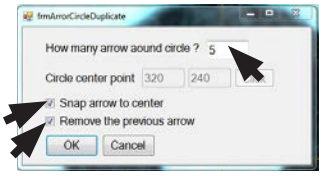
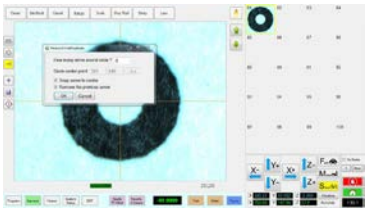
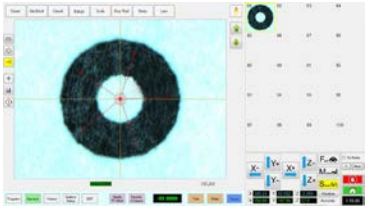
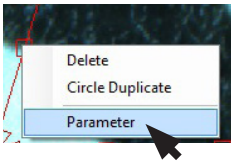
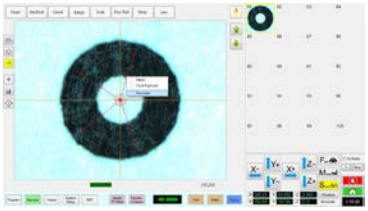
#	Click	Step	Reference Image
3		• Jog the camera to center the crosshairs over one of the circles. • Click SET MARK, then drag to position the red box around a circle.	
4		• Click a socket in the Mark Library to save the mark, then click TEMPLATE when the Template Match window appears. The system saves the image in the Mark Library (no. 81 in this example).	
5		• Click the ARROW icon.	
6		• In the Primary View screen, right-click and select ADD NEW ARROW. The system adds an arrow to the screen.	

Continued on next page

Using the Arrow Types (continued)

Positional Checking Example (continued)

To Create a Circle Center Mark Image (continued)

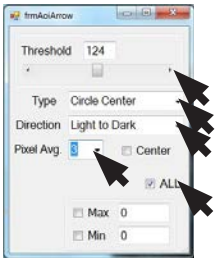
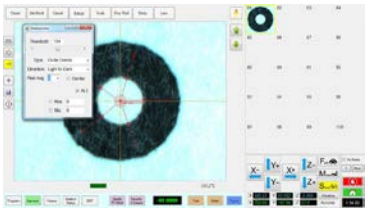
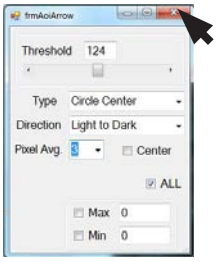
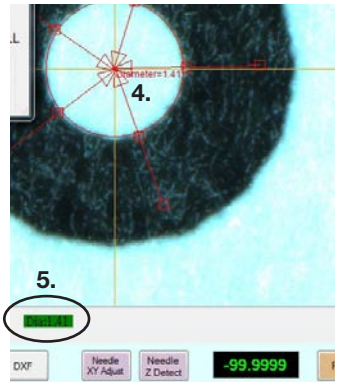
#	Click	Step	Reference Image
7		• Drag the triangle of the arrow (item 3) close to the center of the circle. • Drag the upper box of the arrow (item 1) such that the middle box (item 2) is located on the outer circumference of the circle. **NOTES:** - To move the entire arrow, click and drag the middle box (item 2). - To elongate or shorten the arrow, click and drag the triangle (item 3) or the upper box (item 1).	
8		• Right-click on a box on the arrow (item 4) and select CIRCLE DUPLICATE. The Arrow Circle Duplicate window opens.	
9		• Enter 5 for the number of arrows around the circle. • Select the SNAP ARROW TO CENTER checkbox (checked by default). • Select the REMOVE THE PREVIOUS ARROW checkbox (checked by default).	
10		• Click OK. Five arrows appear on the image.	
11		• Right-click on any middle box of an arrow and then select PARAMETER. The AOI Arrow window opens.	

Continued on next page

Using the Arrow Types (continued)

Positional Checking Example (continued)

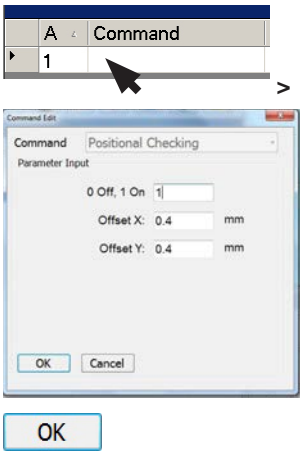
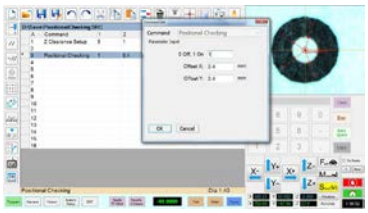
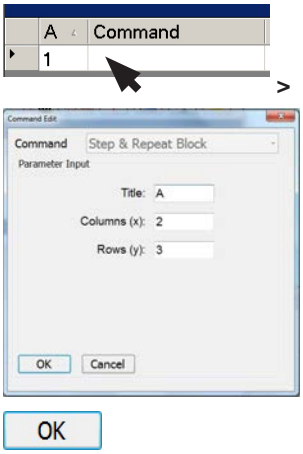
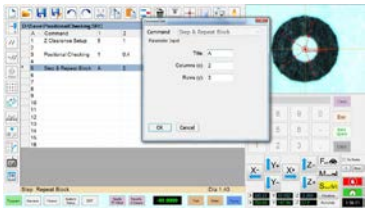
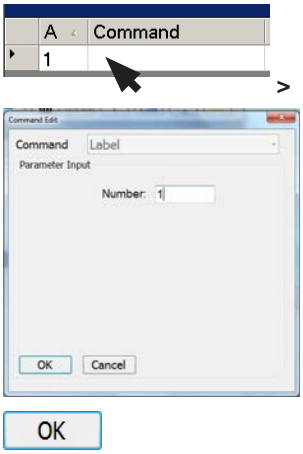
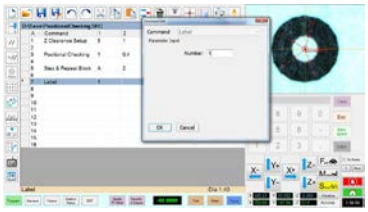
To Create a Circle Center Mark Image (continued)

#	Click	Step	Reference Image
12		• Select the ALL checkbox (to cause the system to enter the same settings for all arrows). • For Type, select CIRCLE CENTER. • Select LIGHT TO DARK. • Set PIXEL AVG to 3. • Adjust THRESHOLD until the circumference measurement appears and is stable. **NOTES:** - Alternatively, you can use the Image Threshold feature by right-clicking in the Primary View screen and selecting Image Threshold. Refer to “Using Image Threshold” on page 12 for details. - CENTER is not used in this example. - MAX and MIN are not used in this example but can be selected and added if desired.	
13		• Close the dialog box to save the settings. The system adds the circle diameter and its value (item 4) to the mark image of the circle and displays the measurement at the bottom of the Primary View screen (item 5). The saved mark image now contains additional data that will allow the system to accurately find it upon reaching its corresponding Find Mark or Arrow Check Point command in a program. • Continue to “To Use Positional Checking in a Program” on page 30.	

Using the Arrow Types (continued)

Positional Checking Example (continued)

To Use Positional Checking in a Program

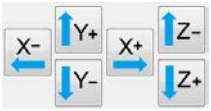
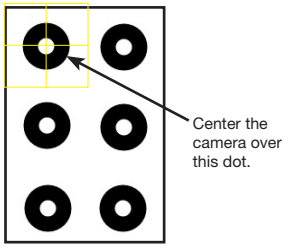
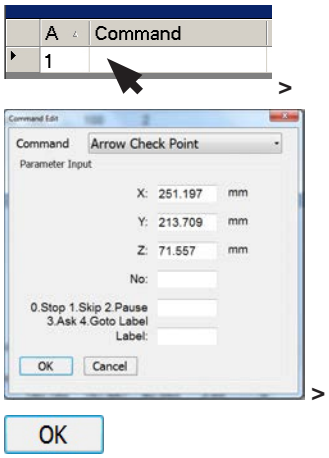
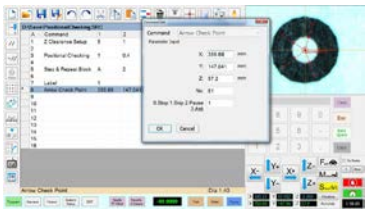
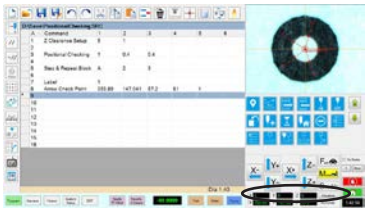
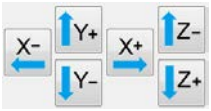
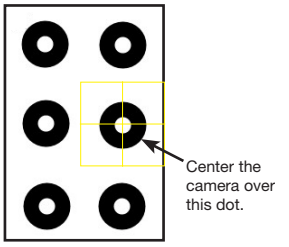
#	Click	Step	Reference Image
1		• At the beginning of the program, insert a Positional Checking command and enter the following: - 1 ON - OFFSET X: 0.4 (mm) - OFFSET Y: 0.4 (mm) • Click OK. **NOTES:** • The offset values are the maximum allowable deviation of the inner dots from the larger circle. • This example program includes a Z Clearance Setup command, but it is not required.	
2		• Insert a Step & Repeat Block command and enter the following: - TITLE: A (in this example) - COLUMNS (x): 2 - ROWS (y): 3 • Click OK.	
3		• Insert a Label command and enter a number (1, in this example). • Click OK.	

Continued on next page

Using the Arrow Types (continued)

Positional Checking Example (continued)

To Use Positional Checking in a Program (continued)

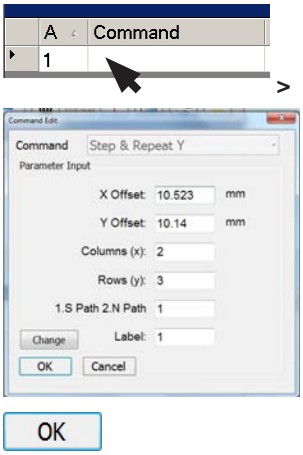
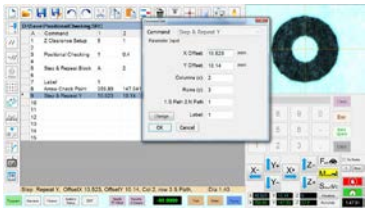
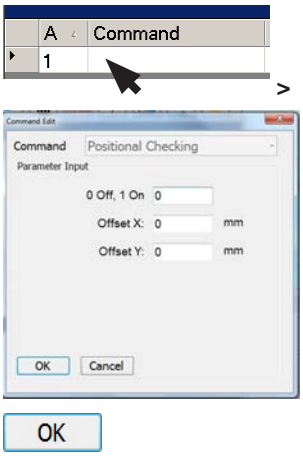
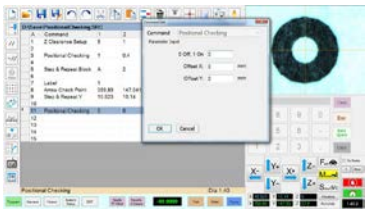
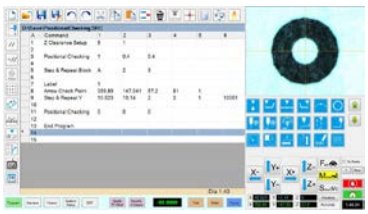
#	Click	Step	Reference Image
4		• Jog the camera to center it directly over the top left dot. **NOTE:** Because this dot is the one used during setup, the camera should already be at this location. • Focus the camera. **Tip:** Click the Match icon ( ) to cause the camera to center over the mark.	
5		• Insert an Arrow Check Point command and enter the following: - NO.: 81 **NOTE:** This is the number of the Mark Image that was saved in the Mark Library during the previous procedure. Use the correct Mark Image No. for your program. - 0.STOP 1.SKIP 2.PAUSE 3.ASK 4.GO TO LABEL: 1 (for Skip, so the system will continue through the program without stopping in order to demonstrate this feature) • Click OK.	
6		• Click RELATIVE to set the coordinates to 0, 0, 0.	
7		• If you already know the X and Y offsets of each dot (how far away each dot is from another dot), then skip this step. • To determine the X and Y offsets of each dot, jog the camera to center it directly over the dot located in the 2nd row, 2nd column. **Tip:** When at the second dot, click the Match icon ( ) to center the camera over the mark. • Make a note of the offsets.	

Continued on next page

Using the Arrow Types (continued)

Positional Checking Example (continued)

To Use Positional Checking in a Program (continued)

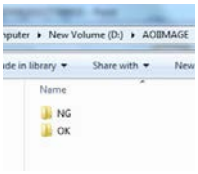
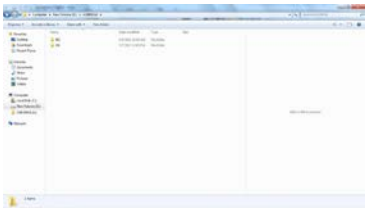
#	Click	Step	Reference Image
8		• Insert a Step & Repeat Y command and enter the following: - X OFFSET: Determined in step 7 on page 31. - Y OFFSET: Determined in step 7 on page 31 - COLUMNS (x): 2 - ROWS (y): 3 - 1.S PATH 2.N PATH: 1 - LABEL: 1 (from step 3 on page 30) **NOTE:** The Change button toggles this parameter between Label and Address. • Click OK.	
9		• Insert a Positional Checking command and enter 0 to turn the command OFF. **NOTE:** Offset X and Offset Y can be blank. • Click OK.	
10		• Insert an END PROGRAM command to complete the program. **NOTE:** The complete example program is provided on page 34.	

Continued on next page

Using the Arrow Types (continued)

Positional Checking Example (continued)

To Use Positional Checking in a Program (continued)

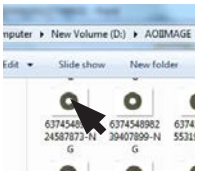
#	Click	Step	Reference Image
11		• Click RUN to view the program and to observe the results of the Positional Checking.	
		As the program runs, the following occurs: • A window opens to show green or red dots (for this example, in a grid of two columns and three rows), indicating whether a deposit (the white dot) passes (green) or fails (red): - Pass: The deposit is within both Offset X and Offset Y values. - Fail: The deposit is outside one or both of the Offset X / Offset Y values. **NOTES:** - The window is named A (from step 2 on page 30). - In this example, all dots are green because all white dots are within the specified X and Y offsets. • If a dot fails, the system takes the action specified by the Stop, Skip, Pause, Ask, Go to Label parameter (Skip, in this example). Refer to “Arrow Check Point” on page 62 for details. • Screen captures of both passed and failed dots are saved as images and named automatically. **NOTE:** If the screen captures are not automatically saved, ensure that the Save Images checkbox in System Setup is selected. Refer to “Setting Up the System to Save Images” on page 8 for details.	
12		• To view the images of the marks, use the file explorer application to navigate to D:\AOIIMAGE: - Dots that passed (green) are saved in the OK folder. - Dots that did not pass (red) are saved in the NG folder.	

Continued on next page

Using the Arrow Types (continued)

Positional Checking Example (continued)

To Use Positional Checking in a Program (continued)

#	Click	Step	Reference Image
13		• Open an image to view more information, including Diameter and X and Y offsets. Example images for both a passed and failed dot are provided below.	

Location of diameter and offset details in the image of a dot that PASSED a positional check

Location of diameter and offset details in the image of a dot that FAILED a positional check

D:\Save\PositionalChecking.SRC

	A	Command	1	2	3	4	5	6
	1	Z Clearance Setup	5	1				
	2							
	3	Positional Checking	1	0.4	0.4			
	4							
	5	Step & Repeat Block	A	2	3			
	6							
	7	Label	1					
	8	Arrow Check Point	359.89	147.041	57.2	81	1	
	9	Step & Repeat Y	10.523	10.14	2	3	1	10001
	10							
	11	Positional Checking	0	0	0			
	12							
	13	End Program						
▸	14							

Example program using Positional Checking and Step & Repeat commands to check dispensed dots

Using the Arrow Types (continued)

Intersect Line Example

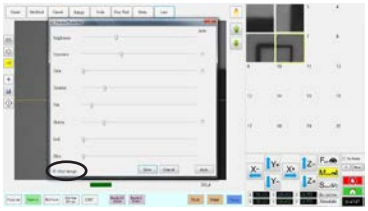
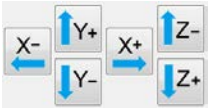
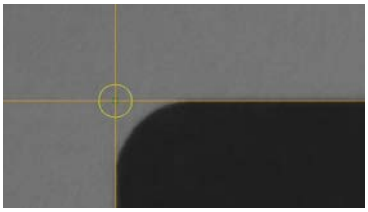
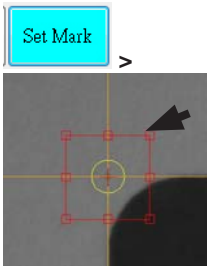
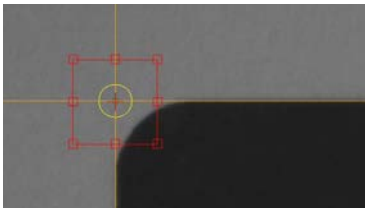
Intersect Line is an OptiSure AOI feature that allows you to create mark images for a workpiece that does not have any obvious features. To do so, you create marks using the corners and edges of the workpiece. This function also works for creating marks for an R-shaped area.

NOTE: If the rounded corners are too large to use Intersect Line, try using the Edge Adjust command. Refer to the operating manual for details.

PREREQUISITES

- ☐ To learn how to use this feature, draw a large black rectangle with rounded corners on a sheet of white paper and use it as a workpiece template.

To Create an Intersect Line Mark Image

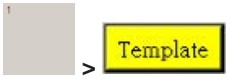
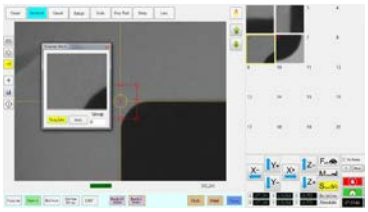
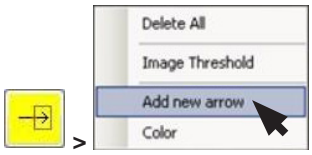
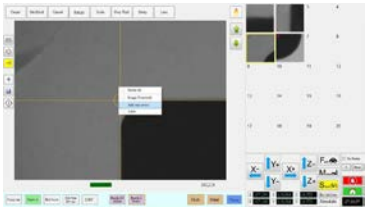
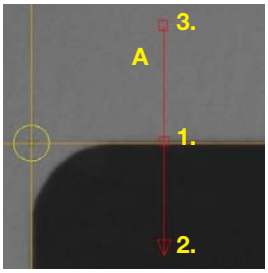
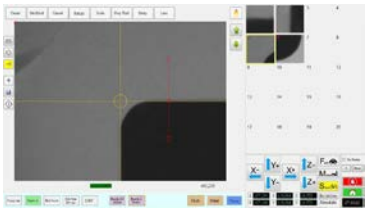
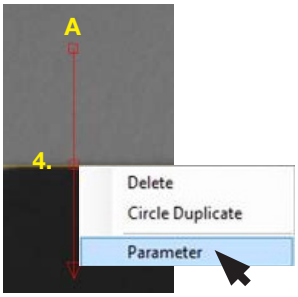
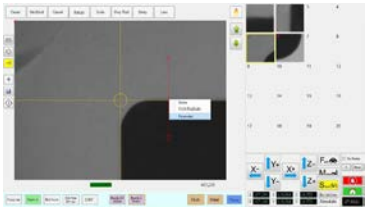
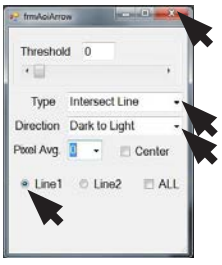
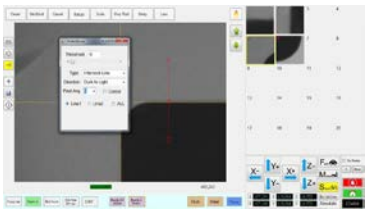
#	Click	Step	Reference Image
1		• Click CAMERA > LENS. • Select the GRAY IMAGE checkbox. **NOTE:** Selecting Gray image is optional, but doing so provides a sharper image and also slightly zooms out the image.	
2		• Jog the camera to the top left corner of the workpiece template, positioning the crosshairs along the top and left sides of the template.	
3		• Click SET MARK, then drag to position the red box at the top left corner of the workpiece template. **NOTE:** If needed, refer to the robot operating manual for a detailed procedure on how to create a mark.	

Continued on next page

Using the Arrow Types (continued)

Intersect Line Example (continued)

To Create an Intersect Line Mark Image (continued)

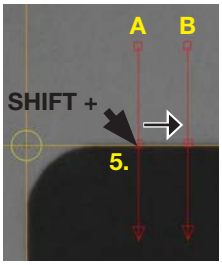
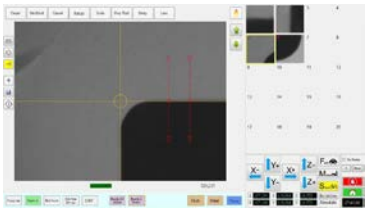
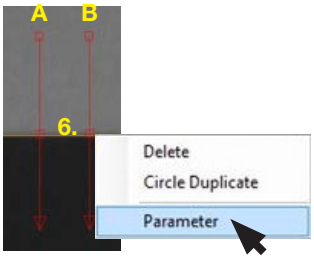
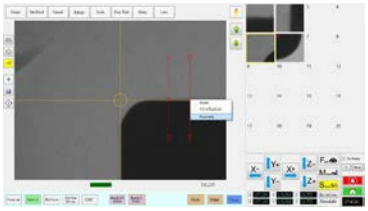
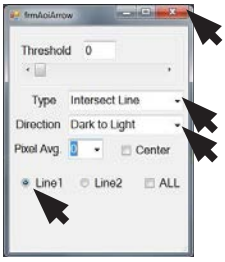
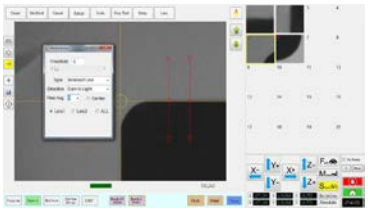
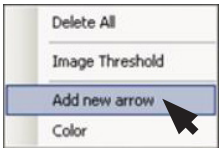
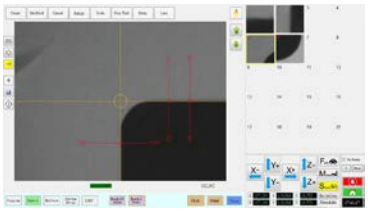
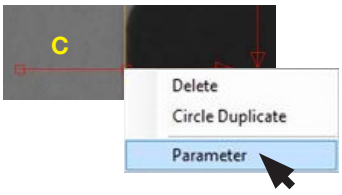
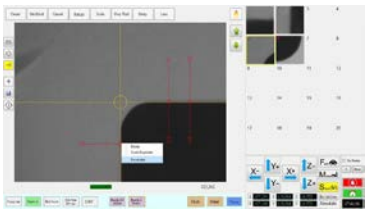
#	Click	Step	Reference Image
4		• Click a socket in the Mark Library to save the mark, then click TEMPLATE when the Template Match window appears. The system saves the image in the Mark Library.	
5		• Click the ARROW icon. • In the Primary View screen, right-click and select ADD NEW ARROW. The system adds an arrow (called Arrow A in this example) to the screen.	
6		• Use the mouse to manipulate the arrow so that it extends from the outside of the rectangle to the inside, as shown. - To move the entire arrow, click and drag the middle box (item 1). - To elongate or shorten the arrow, click and drag the arrow point (item 2) or the upper box (item 3).	
7		• Right-click the middle box (item 4) of the arrow and then select PARAMETER. The AOI Arrow window opens.	
8		• Select the following for Arrow A: - Type: INTERSECT LINE. - Directon: DARK TO LIGHT. - LINE1. • Close the dialog box to save the settings.	

Continued on next page

Using the Arrow Types (continued)

Intersect Line Example (continued)

To Create an Intersect Line Mark Image (continued)

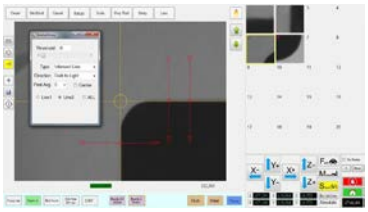
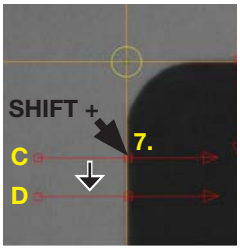
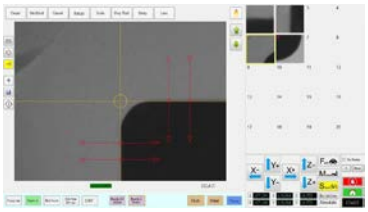
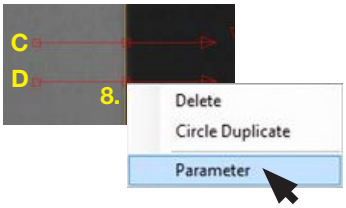
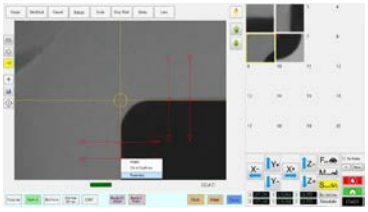
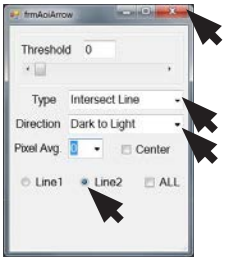
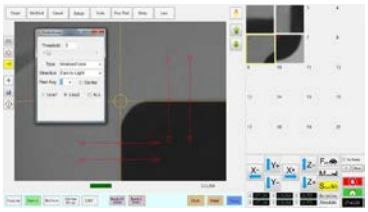
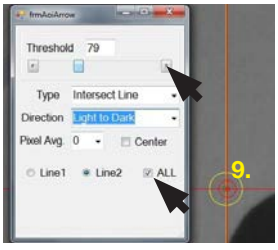
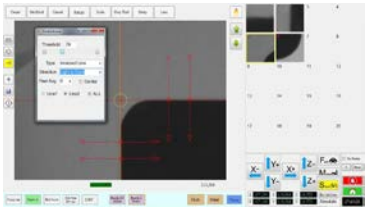
#	Click	Step	Reference Image
9		• Create Arrow B by copying Arrow A. **NOTE:** To copy an arrow, press and hold the SHIFT key, click and hold the middle box (item 5), and then drag to duplicate the arrow. The copied arrow will have the same Parameter settings.	
10		• Right-click the middle box (item 6) of the new Arrow B and then select PARAMETER.	
11		• Verify the following for Arrow B: - Type: INTERSECT LINE. - Directon: DARK TO LIGHT. - LINE1. • Close the dialog box.	
12		• In the Primary View screen, right-click and select ADD NEW ARROW to create Arrow C on the vertical edge of the workpiece.	
13		• Right-click the middle box of the new Arrow C and then select PARAMETER.	

Continued on next page

Using the Arrow Types (continued)

Intersect Line Example (continued)

To Create an Intersect Line Mark Image (continued)

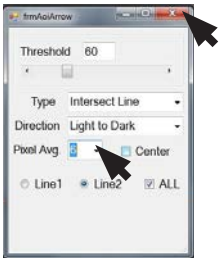
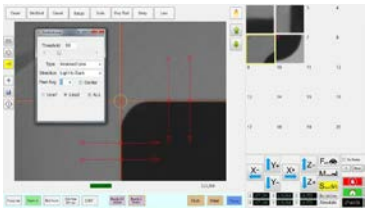
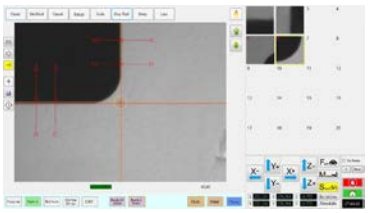
#	Click	Step	Reference Image
14		• Select the following for Arrow C: - Type: INTERSECT LINE. - Directon: DARK TO LIGHT. - LINE2. • Close the dialog box to save the settings.	
15		• Copy Arrow C and drag the copy down to create Arrow D.	
16		• Right-click the middle box (item 8) of the new Arrow D and then select PARAMETER.	
17		• Verify the following for Arrow D: - Type: INTERSECT LINE. - Directon: DARK TO LIGHT. - LINE2. **NOTE:** Do not close this dialog box. The next steps will make adjustments to all the arrows.	
18		• Select the ALL checkbox (to cause the system to enter the same settings for all arrows). • Change Direction to LIGHT TO DARK. • Adjust THRESHOLD until the crosshairs (item 9) appear on the camera screen.	

Continued on next page

Using the Arrow Types (continued)

Intersect Line Example (continued)

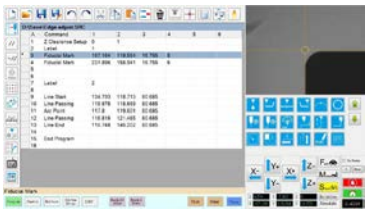
To Create an Intersect Line Mark Image (continued)

#	Click	Step	Reference Image
19		• Adjust PIXEL AVG to make the mark image easier for the system to find. • Close the dialog box to save the settings. The first mark image (No. 5 in this example) is now complete. • If you have not already done so, start creating your program and add a Fiducial Mark command that references this mark image (No. 5 in this example). **NOTE:** Refer to “To Use Intersect Line Mark Images in a Program” on page 40 for the complete example program.	
20		• Repeat the applicable steps in this procedure to create a mark image and set of arrows for the bottom right corner of the workpiece template. This set of arrows will be the second mark image (No. 6 in this example). • In your program, add a second Fiducial Mark command that references this mark image (No. 6 in this example). **NOTE:** Refer to “To Use Intersect Line Mark Images in a Program” on page 40 for the complete example program.	

Using the Arrow Types (continued)

Intersect Line Example (continued)

To Use Intersect Line Mark Images in a Program

#	Click	Step	Reference Image
1		• In the dispense program, ensure that Fiducial Mark commands are inserted as noted in the previous procedure: One for the top left corner mark image and one for the bottom right corner mark image that you created. The complete example program is provided below.	

D:\Save\Edge adjust.SRC

A	Command	1	2	3	4	5	6
1	Z Clearance Setup	0	1				
2	Label	1					
3	Fiducial Mark	167.164	119.564	16.755	5		
4	Fiducial Mark	231.896	158.941	16.755	6		
5							
6							
7	Label	2					
8							
9	Line Start	134.733	118.713	80.685			
10	Line Passing	119.975	118.669	80.685			
11	Arc Point	117.8	119.601	80.685			
12	Line Passing	116.816	121.485	80.685			
13	Line End	116.748	146.202	80.685			
14							
15	End Program						
16							

Example program that contains Fiducial Mark commands (lines 3–4) for Intersect Line marks

Using the Arrow Types (continued)

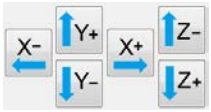
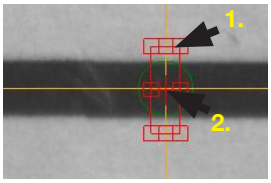
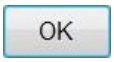
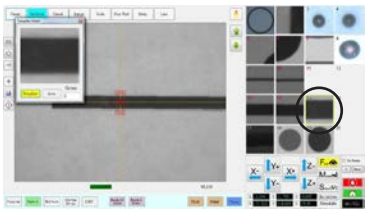
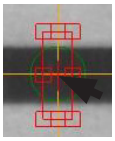
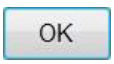
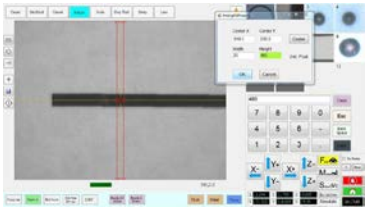
Mea. Point To Line Example

Mea. Point to Line is an OptiSure AOI feature used in tandem with the Arrow Check Point command. This feature measures the width between two specified points on a dispensed line, compares the measurement to a set of points on a subsequent dispense, and then, depending on the user-specified parameters, determines if the dispense is acceptable. If the dispense does not meet the specified criteria, the system takes the action specified in the Arrow Check Point command.

PREREQUISITES

☐ To learn how to use this feature, draw a line on a sheet of white paper and use it as a workpiece template.

To Create a Mark Image for the Desired Line Width

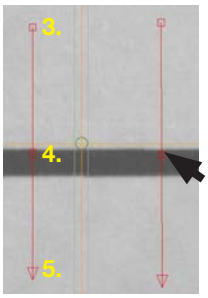
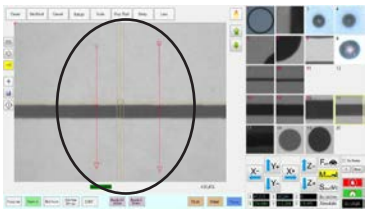
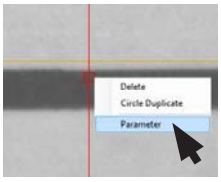
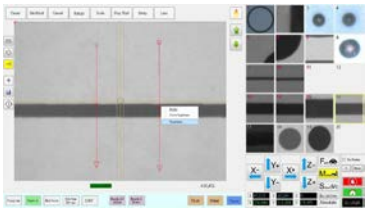
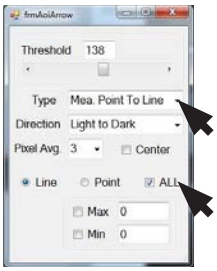
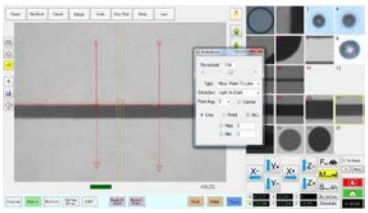
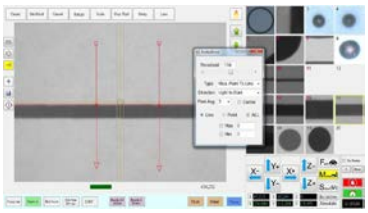
#	Click	Step	Reference Image
1	 >  >  > 	• Jog the camera to a location on the line. • Click SET MARK, then drag to position the red box (item 1) over the line. • Double-click the crosshairs in the center of the red box (item 2) and then enter the desired values for Width and Height (20 and 60 in this example). • Click OK to save the values.	
2	> 	• Click a socket in the Mark Library to save the mark, then click TEMPLATE when the Template Match window appears. The system saves the image in the Mark Library.	
3	 >   >  > 	• Click RANGE to set where the system searches for the mark. • Double-click on the crosshairs in the center of the mark and enter Width and Height values (20 and 480 in this example). **NOTE:** The Width value must be the same as the Width specified in step 1 above. • Click OK. • Click RANGE again to save.	

Continued on next page

Using the Arrow Types (continued)

Mea. Point To Line Example (continued)

To Create a Mark Image for the Desired Line Width (continued)

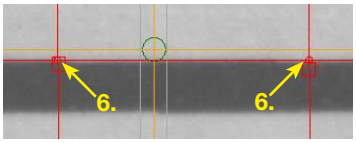
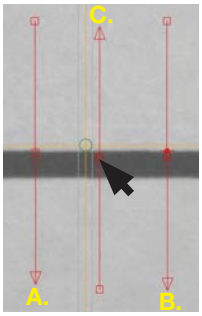
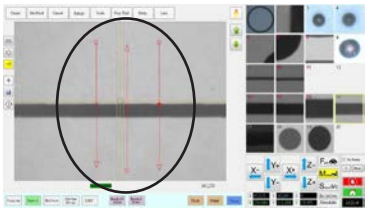
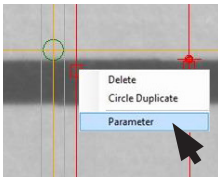
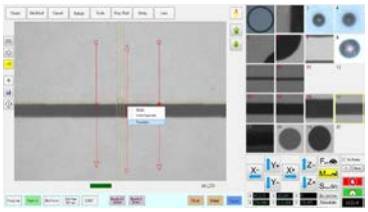
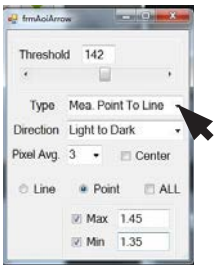
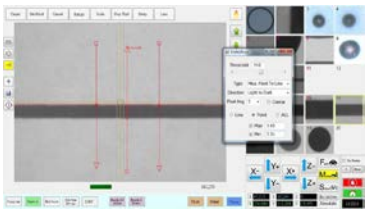
#	Click	Step	Reference Image
4		• Click the ARROW icon. • In the Primary View screen, right-click and select ADD NEW ARROW. The system adds an arrow to the screen.	
5		• Repeat step 4 to add another arrow, and then use the mouse to manipulate the arrows so they form an array, as shown. - To move the entire arrow, click and drag the middle box (item 4). - To elongate or shorten the arrow, click and drag the arrow (item 5) or the end box (item 3).	
6		• Right-click on the middle box of an arrow and then select PARAMETER. The AOI Arrow window opens.	
7		• Select the ALL checkbox. • For Type, select MEA. POINT TO LINE.	
8		• Select LIGHT TO DARK. • Adjust PIXEL AVG to make the mark image easier for the system to find. • Check CENTER if you want to center the image based on the image in the mark library. • Select the LINE radio button. • Deselect the MAX and MIN checkboxes.	

Continued on next page

Using the Arrow Types (continued)

Mea. Point To Line Example (continued)

To Create a Mark Image for the Desired Line Width (continued)

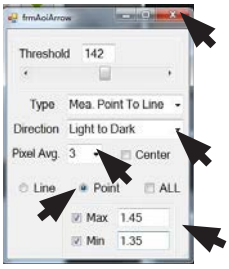
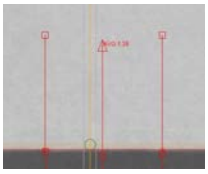
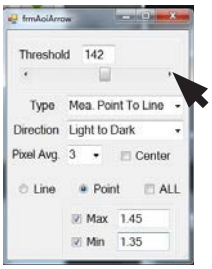
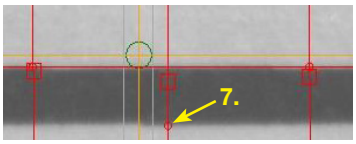
#	Click	Step	Reference Image
9		• Adjust THRESHOLD until the two small red circles (item 6) are positioned on the top edge of the line. • Close the dialog box to save the settings.	
10		• Repeat step 4 to add another arrow, and then use the mouse to manipulate the new arrow C such that it is in the middle between arrows A and B, as shown. **NOTE:** This function will still work properly if arrow C is not exactly in the middle.	
11		• Right-click on the middle box of an arrow C and then select PARAMETER. The AOI Arrow window for Arrow C opens.	
12		• For Type, select MEA. POINT TO LINE.	

Continued on next page

Using the Arrow Types (continued)

Mea. Point To Line Example (continued)

To Create a Mark Image for the Desired Line Width (continued)

#	Click	Step	Reference Image
13		• Select LIGHT TO DARK. • Adjust PIXEL AVG to make the mark image easier for the system to find. • Select the POINT radio button. • For MAX, select the checkbox and enter the maximum allowable width of the line. The displayed AVG (average) value is equal to the line width. • For MIN, select the checkbox and enter the minimum allowable width of the line.	
14		• Adjust THRESHOLD until the small red circle of the middle arrow (item 7) is positioned on the bottom edge of the line. • Close the dialog box to save the settings.	

The saved mark image is now ready to be specified in an Arrow Check Point command to cause the system to check the width of a dispensed line anywhere on the line. In this example, the checked width must be within 1.35–1.45 mm (as defined in step 13). If the width is greater or lower, a warning box appears.

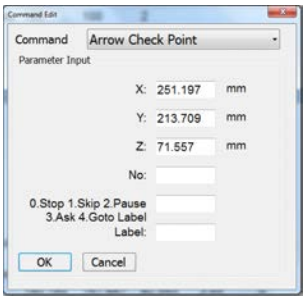
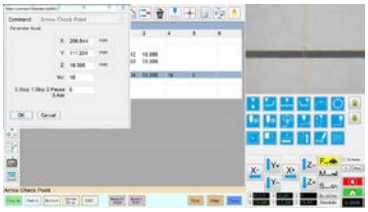
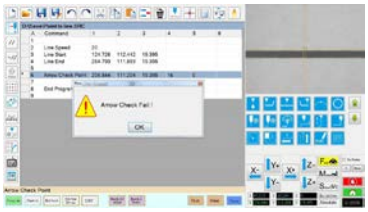
Continue to “To Use Arrow Check Point in a Program (Mea. Point to Line Example)” on page 45 to use the mark image.

NOTE: The system can return to the middle of a dispensed line only if the middle of the line is within the range specified in step 3 on page 41.

Using the Arrow Types (continued)

Mea. Point To Line Example (continued)

To Use Arrow Check Point in a Program (Mea. Point to Line Example)

#	Click	Step	Reference Image
1	Program > **ARROW CHECK POINT** >  > OK	• Click the PROGRAM tab. • Insert commands to dispense a line over the line on the workpiece template. **NOTE:** The complete example program is provided below. • Jog the camera to a location on the line where you want the system to check the width of a section. • Insert an ARROW CHECK POINT command and enter parameters as follows: - Enter the number (No.) of the mark image created for the line in the previous procedure. - Select the action you want the system to take if the measured line section is above the Max value or below the Min value specified for the mark image (step 13 on page 44). Refer to “Arrow Check Point” on page 62 for details. • Click OK.	
	When the system executes the Arrow Check Point command and finds an unacceptable line section, it takes the action specified by the Stop, Skip, Pause, Ask, Go to Label parameter. Refer to “Arrow Check Point” on page 62 for details.		

D:\Save\Point to line.SRC

	A	Command	1	2	3	4	5	6
	1							
	2	Line Speed	20					
	3	Line Start	124.726	112.442	19.395			
	4	Line End	264.799	111.869	19.395			
	5							
▸	6	Arrow Check Point	206.844	111.204	19.395	16	0	
	7							
	8	End Program						

Example program that contains an Arrow Check Point command for verifying line width

Using the Arrow Types (continued)

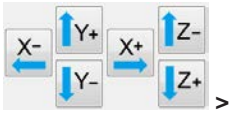
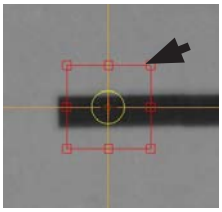
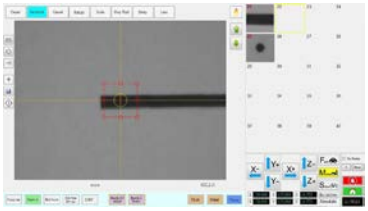
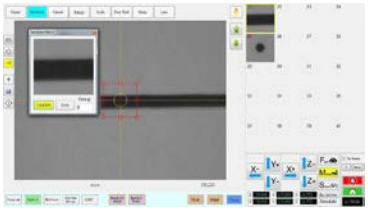
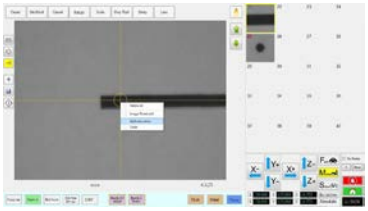
Mea. Width Example for Verifying Line Width

Mea. Width (Measure Width) is an OptiSure AOI feature that can be used in tandem with the Arrow Check Point or Arrow Check Line commands to measure the width of a predefined line, compare that measurement to subsequent dispenses (for either one section of the line or the complete line), and then, depending on the user-specified parameters, determine if the dispense is acceptable. If the dispense does not meet the specified criteria, the system takes the action specified in the Arrow Check Point or Arrow Check Line command.

PREREQUISITES

☐ To learn how to use this feature, draw a line on a sheet of white paper and use it as a workpiece template.

To Create a Mark Image for the Desired Line Dispense

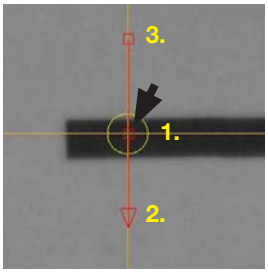
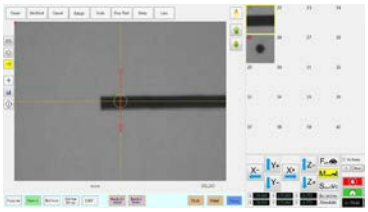
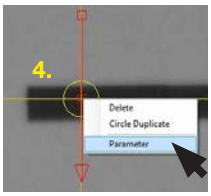
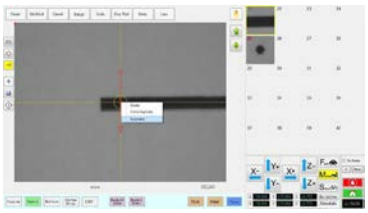
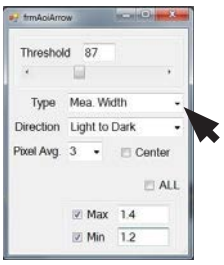
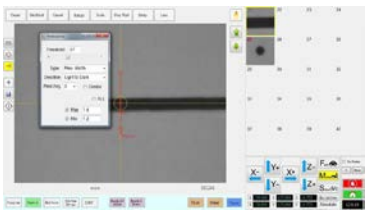
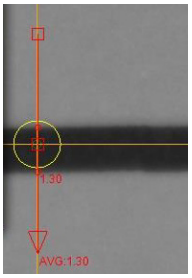
#	Click	Step	Reference Image
1	 >  > 	• Jog the camera to a location near the beginning of the line. • Click SET MARK, then drag to position the red box over the line.	
2	> 	• Click a socket in the Mark Library to save the mark, then click TEMPLATE when the Template Match window appears. The system saves the image in the Mark Library.	
3		• Click the ARROW icon. • In the Primary View screen, right-click and select ADD NEW ARROW. The system adds an arrow to the screen.	

Continued on next page

Using the Arrow Types (continued)

Mea. Width Example for Verifying Line Width (continued)

To Create a Mark Image for the Desired Line Dispense (continued)

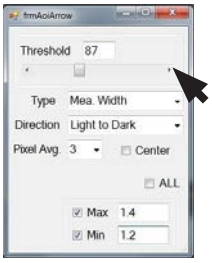
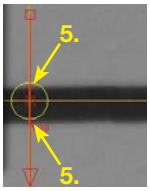
#	Click	Step	Reference Image
4		• Use the mouse to drag the arrow to the line: - To move the entire arrow, click and drag the middle box (item 1). - To elongate or shorten the arrow, click and drag the arrow point (item 2) or the upper box (item 3).	
5		• Right-click the middle box (item 4) of the arrow and then select PARAMETER. The AOI Arrow window opens.	
6		• For Type, select MEA. WIDTH.	
7		• Select LIGHT TO DARK. • Adjust PIXEL AVG to make the mark image easier for the system to find. • Check CENTER if you want to center the image based on the image in the mark library. • For MAX, enter the maximum allowable width of the line. The displayed AVG (average) value is equal to the line width. • For MIN, enter the minimum allowable width of the line.	

Continued on next page

Using the Arrow Types (continued)

Mea. Width Example for Verifying Line Width (continued)

To Create a Mark Image for the Desired Line Dispense (continued)

#	Click	Step	Reference Image
8		• Adjust THRESHOLD until the two small red circles (item 5) are positioned on the top and bottom edges of the line. • Close the dialog box to save the settings.	

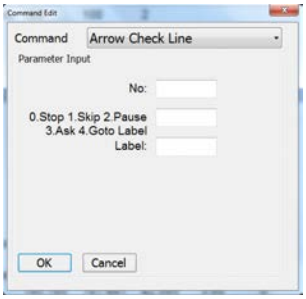
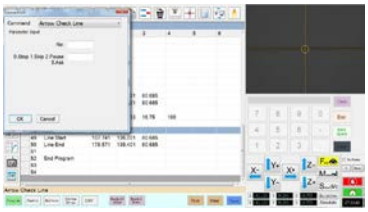
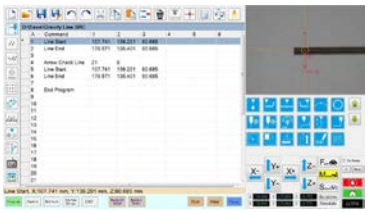
The saved mark image is now ready to be used in a program to check the width of a dispensed line:

- If you want the system to check the width of a complete line, use Arrow Check Line. Continue to “To Use Arrow Check Line in a Program (Mea. Width Example for Verifying Line Width)” on page 49.
- If you want the system to check the width of a section of line, use Arrow Check Point. Continue to “To Use Arrow Check Point in a Program (Mea. Width Example for Verifying Line Width)” on page 50.

Using the Arrow Types (continued)

Mea. Width Example for Verifying Line Width (continued)

To Use Arrow Check Line in a Program (Mea. Width Example for Verifying Line Width)

#	Click	Step	Reference Image
1	Program > **ARROW CHECK LINE** >  > OK	• Click the PROGRAM tab. • Insert commands to dispense a line directly over the line on the workpiece template. **NOTE:** The complete example program is provided below. • Jog the camera to a location on the line where you want the system to check the width of the middle of a line section. • Insert an ARROW CHECK LINE command and enter parameters as follows: - Enter the number (No.) of the mark image created in the previous procedure. - Select the action you want the system to take if the measured line section is above the Max value or below the Min value specified for the mark image (step 7 on page 47). Refer to “Arrow Check Line” on page 63 for details. • Click OK.	
2		• Under the Arrow Check Line command, insert Line Start and Line End commands that include the coordinates for the start and end points of the line you want the system to check.	
	When the system executes the Arrow Check Line command and finds an unacceptable line section, it takes the action specified by the Stop, Skip, Pause, Ask, Go to Label parameter. Refer to “Arrow Check Line” on page 63 for details. **NOTE:** The complete example program is provided below.		

D:\Save\Gravity Line.SRC

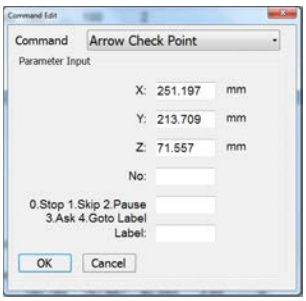
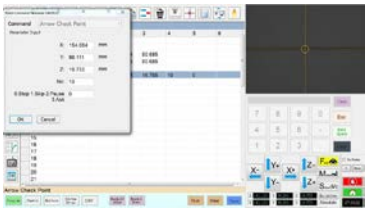
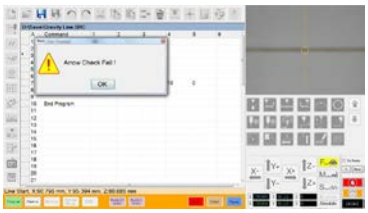
	A	Command	1	2	3	4	5	6
▸	1	Line Start	107.741	136.201	80.685			
	2	Line End	178.571	135.401	80.685			
	3							
	4	Arrow Check Line	21	0				
	5	Line Start	107.741	136.201	80.685			
	6	Line End	178.571	135.401	80.685			
	7							
	8	End Program						

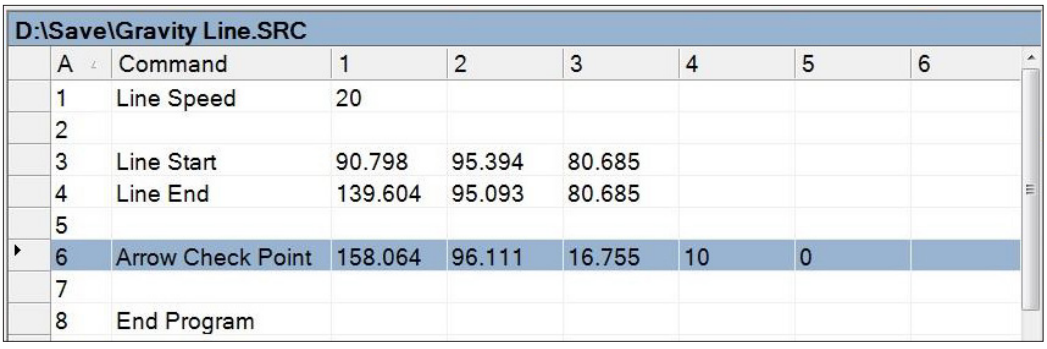
Example program that contains an Arrow Check Line command for verifying line width

Using the Arrow Types (continued)

Mea. Width Example for Verifying Line Width (continued)

To Use Arrow Check Point in a Program (Mea. Width Example for Verifying Line Width)

#	Click	Step	Reference Image
1	Program > **ARROW CHECK POINT** >  > OK	• Click the PROGRAM tab. • Insert commands to dispense a line directly over the line on the workpiece template. **NOTE:** The example program is provided below. • Jog the camera to a location on the line where you want the system to check the width of a section of the line. • Insert an ARROW CHECK POINT command and enter parameters as follows: - Enter the number (No.) of the mark image created for the line in the previous procedure. - Select the action you want the system to take if the measured line section is above the Max value or below the Min value specified for the mark image (step 7 on page 47). Refer to “Arrow Check Point” on page 62 for details. • Click OK.	
	When the system executes the Arrow Check Point command and finds an unacceptable line section, it takes the action specified by the Stop, Skip, Pause, Ask, Go to Label parameter. Refer to “Arrow Check Point” on page 62 for details. **NOTE:** The complete example program is provided below.		



D:\Save\Gravity Line.SRC

	A	Command	1	2	3	4	5	6
	1	Line Speed	20					
	2							
	3	Line Start	90.798	95.394	80.685			
	4	Line End	139.604	95.093	80.685			
	5							
▸	6	Arrow Check Point	158.064	96.111	16.755	10	0	
	7							
	8	End Program						

Example program that contains an Arrow Check Point command for verifying line width

Using the Laser to Measure and Record Profiles

You can use the Laser Program and Laser Profile commands to measure and record the profile (displacement or thickness) of a fluid or a workpiece, to display the measurement data in real time, and to make the system check the laser measurement results against maximum and / or minimum threshold values. When a Laser Profile command is executed, the resulting graph and measurements are also exported as a *.JPEG image and a *.CSV file, respectively.

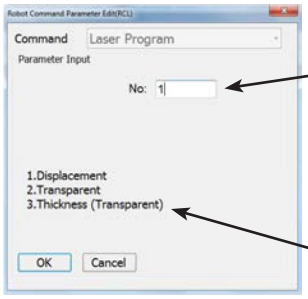
NOTE: This section applies only to systems with a confocal laser.

About the Laser Program and Laser Profile Commands

The Laser Program command is used to specify a number setting (from 0–7) that corresponds to a laser program that contains measurement settings. Laser measurement settings programs are created and saved in the CL-NavigatorN software. Laser programs 1–3 include default settings for Displacement (Non-Transparent), Displacement (Transparent), and Thickness (Transparent), respectively. Programs 0 and 4–7 are user-programmable via the CL-NavigatorN software. For information on using the CL-NavigatorN software, refer to the documentation supplied with the laser.

NOTE: Laser programs 1–3 can be edited using the CL-NavigatorN software.

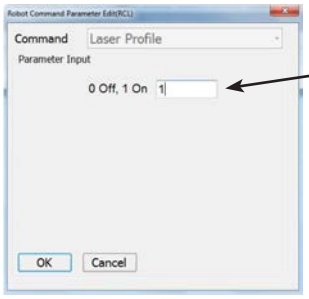
The Laser Profile command is used to turn laser measurement on and off in a dispense program. When turned on, the Laser Profile command also exports the graph and measurement data to a *.JPEG and *.CSV file, respectively.



Specifies the number (from 0–7) of the laser program to use

Default laser measurement settings programs contained in the “All.cldt” file

Laser Program command window

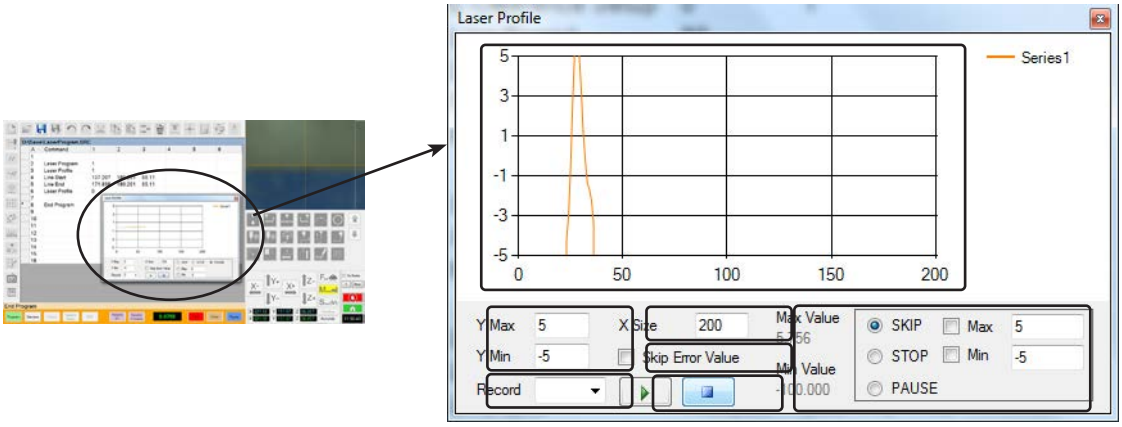


Turns laser measurement ON or OFF

Laser Profile command window

About the Laser Profile Window

The Laser Profile command causes the system to open the Laser Profile window — this window shows the laser measurement data in real time. You can also use the settings in this window to make the system check the laser measurement results against maximum and / or minimum threshold values. Refer to “Laser Profile Window Fields” on page 58 for additional details.



The Laser Profile window opens when the system executes a Laser Profile command with a value of 1 (ON)

Using the Laser to Measure and Record Profiles (continued)

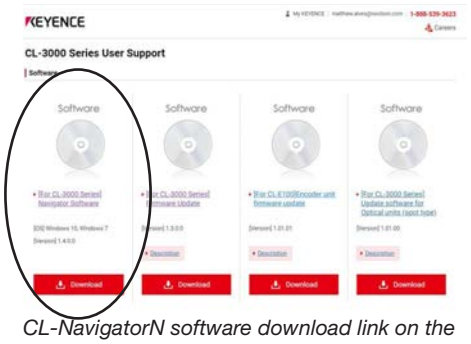
To Install CL-NavigatorN on the DispenseMotion Controller

The CL-NavigatorN software for the KEYENCE CL-3000 Series laser is provided on a CD, but can also be downloaded from the KEYENCE Corporation website as described below.

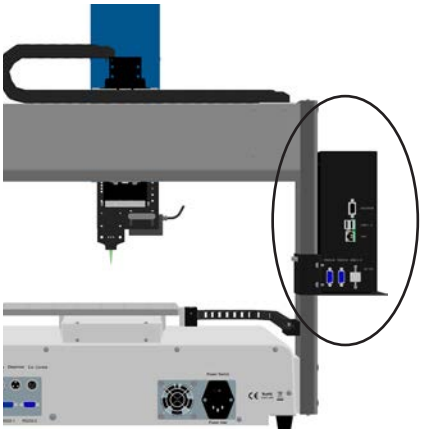
1. Using an Internet-connected computer, go to KEYENCE.com/CLsupport.
2. Create a KEYENCE account, or sign in if you already have an account.
3. Download the latest version of CL-NavigatorN to a USB drive.

   NOTE: If you cannot readily find the download link, contact KEYENCE for technical support.
4. Insert the USB drive into an open USB port on the DispenseMotion controller.
5. Navigate to the executable file on the USB drive and install the software.

   After the installation completes, the CL-NavigatorN shortcut appears on the DispenseMotion controller desktop.



CL-NavigatorN software download link on the KEYENCE website



USB ports on the DispenseMotion controller

To Obtain the All.cldt File

The All.cldt file is required for the laser measurement feature to work correctly.

1. Contact your Nordson EFD representative to obtain the All.cldt file.
2. Place the All.cldt file on a USB drive.
3. Insert the USB drive into an open USB port on the DispenseMotion controller.

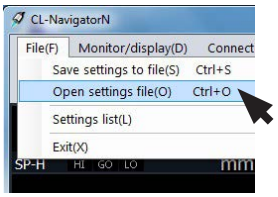
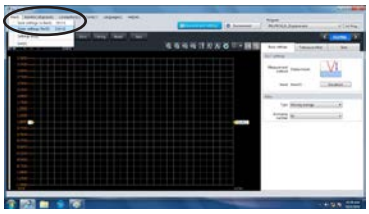
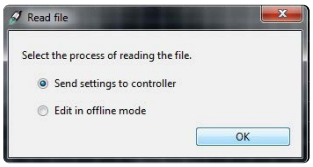
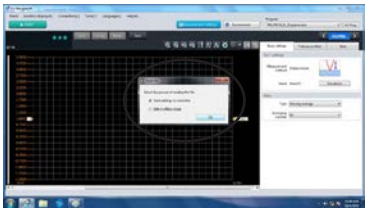
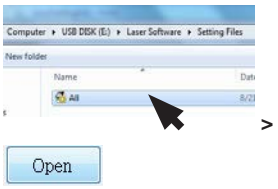
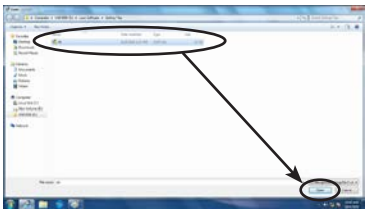
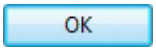
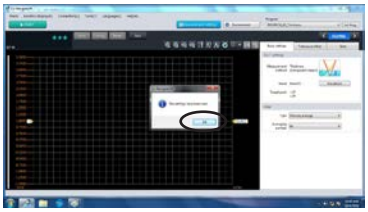
   NOTE: You can leave All.cldt on the USB drive or copy it anywhere onto the DispenseMotion controller. Just be sure to remember where the file is located.

Using the Laser to Measure and Record Profiles (continued)

PREREQUISITES

- ☐ The confocal laser (Laser C) is properly installed and set up using the Laser Setup wizard. Refer to “Setting Up the Confocal Laser” on page 9.
- ☐ The CL-NavigatorN software has been installed on the DispenseMotion controller. Refer to “To Install CL-NavigatorN on the DispenseMotion Controller” on page 52.
- ☐ The All.cldt file has been obtained from Nordson EFD and can be located for transfer to the DispenseMotion conroller. Refer to “To Obtain the All.cldt File” on page 52.

To Send “All.cldt” to the DispenseMotion Controller

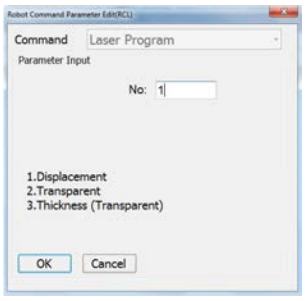
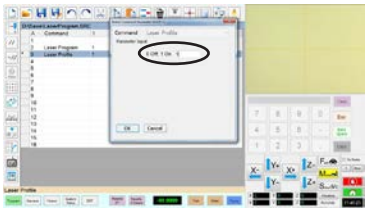
#	Click	Step	Reference Image
1		• On the DispenseMotion controller desktop, open CL-NavigatorN.	
2		• Click FILE(F) and select OPEN SETTINGS FILE(O).	
3		• Ensure that SEND SETTINGS TO CONTROLLER is selected. • Click OK.	
4		• Navigate to the location where “All.cldt” is stored. • Select “All.cldt” and click OPEN.	
5		• Click OK to clear the message. • Continue to the next procedure to use the “All.cldt” settings file to measure and record the profile (displacement or thickness) of a fluid or a workpiece in real time.	

Using the Laser to Measure and Record Profiles (continued)

To Measure and Record the Profile of a Fluid or a Workpiece

PREREQUISITES

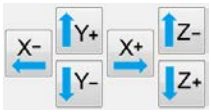
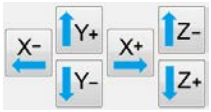
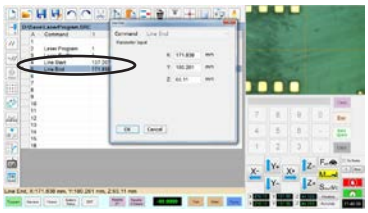
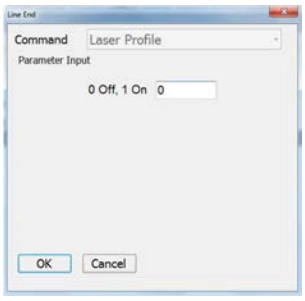
☐ The “All.cldt” file has been sent from CL-NavigatorN to the DispenseMotion controller as described under “To Send “All.cldt” to the DispenseMotion Controller” on page 53.

#	Click	Step	Reference Image
1		• On the DispenseMotion controller desktop, open DispenseMotion.	
2	**LASER PROGRAM >**  > OK	• Insert a LASER PROGRAM command and specify the laser program you want to use. For this example, enter 1. **NOTE:** Selection 1 is the Displacement laser program for non-transparent materials or surfaces. • Click OK.	
3	**LASER PROFILE >**  > OK	• In the next empty command address, insert a LASER PROFILE command. • Enter 1 to turn Laser Profile ON. • Click OK.	

Continued on next page

Using the Laser to Measure and Record Profiles (continued)

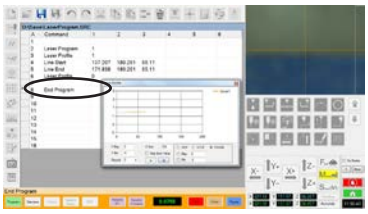
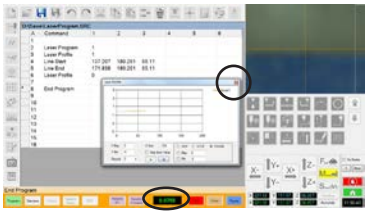
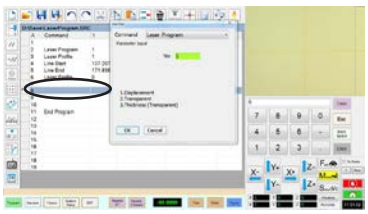
To Measure and Record the Profile of a Fluid or a Workpiece (continued)

#	Click	Step	Reference Image
4	 **> LINE START**  **> LINE END**	• Jog the camera to the location on the workpiece where you want the laser to **start** reading. • Enter a LINE START command. • Jog the camera to the location on the workpiece where you want the laser to **stop** reading. • Enter a LINE END command.	
5	**LASER PROFILE >**  **>** OK	• In the next empty command address, insert a LASER PROFILE command. • Enter 0 to turn Laser Profile OFF. • Click OK.	
6	END	• Insert an END PROGRAM command to complete the program.	

Continued on next page

Using the Laser to Measure and Record Profiles (continued)

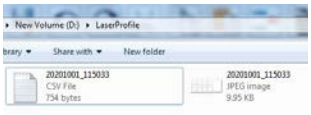
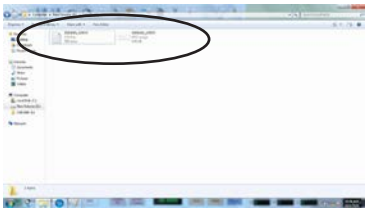
To Measure and Record the Profile of a Fluid or a Workpiece (continued)

#	Click	Step	Reference Image
7	Run	• Click RUN to test the program, observing that the Laser Profile window opens. The laser uses the specified laser program to measure whatever is under the camera, whether it is a dispensed fluid or a workpiece surface. For correct laser measurement results, the laser program must be tailored to the characteristics (transparency, thickness, etc.) of the fluid or workpiece being measured. **NOTES:** - For details on the Laser Profile window, refer to “Laser Profile Window Fields” on page 58. - To use the Laser Profile window to check whether laser measurements are within a specified range of threshold values, refer to “To Check Laser Measurements Against Threshold Values” on page 58.	
8	or 0.0755	• Click the red X to close the Laser Profile window. • Double-click the LASER READ-OUT field to re-open the Laser Profile window.	
9		• Optional: Repeat steps 2–5 and enter another laser program selection in the Laser Program command window; also try different workpieces to test other laser program settings.	

Continued on next page

Using the Laser to Measure and Record Profiles (continued)

To Measure and Record the Profile of a Fluid or a Workpiece (continued)

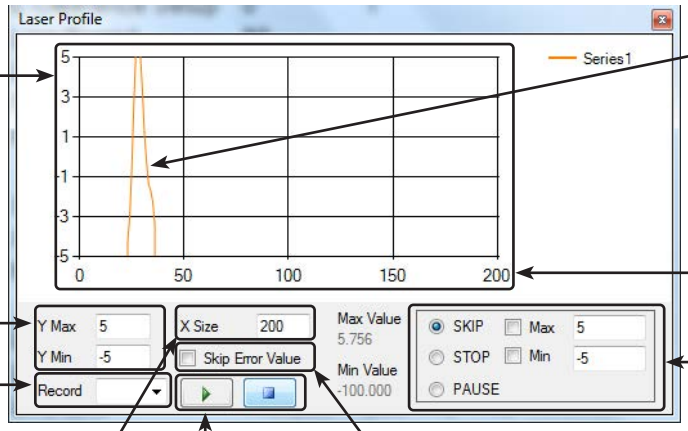
#	Click	Step	Reference Image
10		• Go to D:\Laser Profile to see the saved graph and data point (measurement data) files. Graphs and data points are saved automatically after every run cycle.	

NOTES:

- All *.CSV and *.JPEG files are named with the date and time using the following format:
  - ProgramName-YYYYMMDD_HrMinSecs.CSV
  - ProgramName-YYYYMMDD_HrMinSecs.JPEG
- Every subsequent laser program will have an underscore and a number. For example:
  - ProgramName-YYYYMMDD_HrMinSecs_1.CSV, ProgramName-YYYYMMDD_HrMinSecs_1.JPEG
  - ProgramName-YYYYMMDD_HrMinSecs_2.CSV, ProgramName-YYYYMMDD_HrMinSecs_2.JPEG

Using the Laser to Measure and Record Profiles (continued)

Laser Profile Window Fields



Graph

Sets the maximum and minimum values for the vertical axes (in mm)

Shows the record number associated with the laser program that is running (for example, if the robot dispense program specifies laser programs 1 and 2 (in that order), then Record 0 is tied to laser program 1 and Record 1 is tied to laser program 2)

Sets the number of laser readings to show in the graph (minimum is 101)

Play or pause the graph

If Skip Error Value is checked, then the graph excludes any measurements outside of Y Max and Y Min

Shows the number of laser readings that will be in the *.CSV file. For example, if recording is stopped at 60, then there will be 60 laser readings inside the *.CSV file.

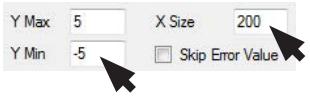
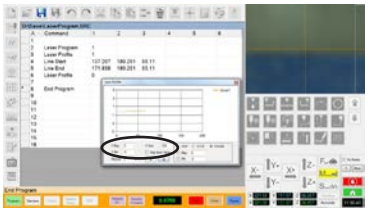
X Size value (200, in this example)

Sets maximum and minimum threshold (tolerance) values for the measurement results and, if enabled by checking Max and / or Min, specifies the desired system response (Skip, Stop, or Pause) when a measured value is out of range. Refer to “To Check Laser Measurements Against Threshold Values” on page 58 for details.

NOTE: Recording can continue past the X Size. For example, if the X Size is set to 200, but you have 300 laser readings, only the first 200 readings are shown on the graph. You can change the X Size value during or after laser measurement.

To Check Laser Measurements Against Threshold Values

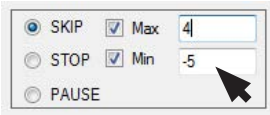
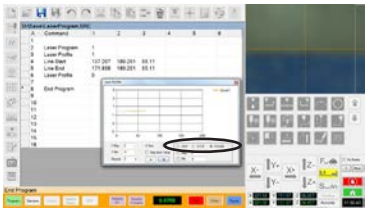
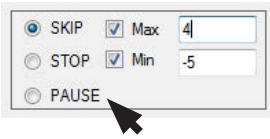
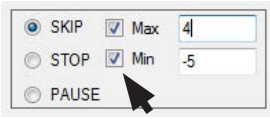
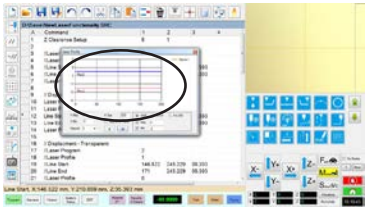
When the laser is measuring and recording, you can use the Laser Profile window to specify Max and Min threshold (tolerance) values and to select the alert option to appear when a measurement is outside of the specified Max and / or Min thresholds.

#	Click	Step	Reference Image
1		• Ensure that the following values are properly set: - Y MAX and Y MIN: The maximum and minimum values for the vertical axes (in mm). - X SIZE: The number of laser readings to show in the graph (the minimum is 101).	

Continued on next page

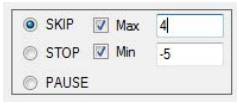
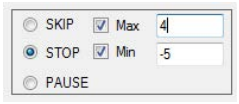
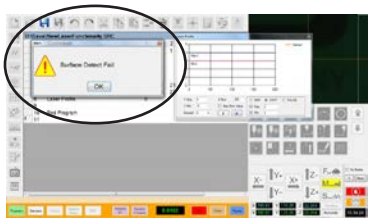
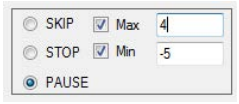
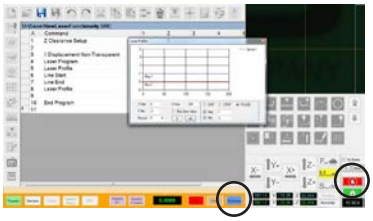
Using the Laser to Measure and Record Profiles (continued)

To Check Laser Measurements Against Threshold Values (continued)

#	Click	Step	Reference Image
2		• Enter values for MAX and MIN. These are the values the laser will use to determine whether a measurement is within the desired threshold.	
3		• Select the alert option you want to receive when a measurement is outside the specified Max and Min values. Refer to “System Responses for Laser Threshold Measurement Checks” on page 60 for an explanation of each.	
4		• Enable the threshold check by selecting the Max and / or Min checkboxes. When a Max and / or Min threshold check is enabled, the system adds blue and red threshold lines to the graph and immediately begins checking laser measurements against the entered Max and Min values: - If a measurement is within the Max and Min values, the measurement PASSES regardless of the selected alert. No action is required. - If a measurement is not within the Max and Min values, the system takes the action specified by the selected alert option. Refer to “System Responses for Laser Threshold Measurement Checks” on page 60 for the user action to take.	

Using the Laser to Measure and Record Profiles (continued)

System Responses for Laser Threshold Measurement Checks

Action		Reference Image
	When SKIP is selected: • If a measurement is outside a Max or Min value, the program stops running after the laser measurement is done and then prompts to go to the HOME position. When this occurs, click HOME.	
	When STOP is selected: • If a measurement is **below** the Min value, the program stops running and the system generates a Surface Detect Fail warning. When this occurs, click OK and then click HOME.	
	• If a measured value is **above** the Max value, the program stops running and the system prompts to go to the HOME position. When this occurs, click HOME.	
	When PAUSE is selected: If a measurement is outside a Max or Min value, the program stops running: • Select CONTINUE  to continue running the program. **OR** • Select STOP  to stop the program, then click HOME to return the robot to the HOME position.	

OptiSure AOI Kit Part Numbers

Nordson EFD's OptiSure Automated Optical Inspection (AOI) software is available within the current DispenseMotion software as an optional add-on. The AOI feature inspects fluid deposit widths and diameters with exceptional certainty and determines if dispense requirements have been met. When paired with the OptiSure AOI confocal laser, the AOI feature provides three-dimensional (3D) deposit verification by measuring the height, width, and diameter of a fluid deposit and comparing it to a 3D image of a desired deposit to determine true volume accuracy. The OptiSure AOI feature also includes advanced functions for augmenting mark images to make them easier for the system find.

Item	Part #	Description
	7365229	Software key, OptiSure Automated Optical Inspection (AOI)
	7364992	Laser C accessory kit (includes the confocal laser and laser controller) **NOTES:** • For use only with the OptiSure AOI add-on • Includes the OptiSure AOI software key • Takes the place of Laser A or Laser B

Appendix A, Command Function Reference

This appendix provides detailed information for each setup and dispense command. Commands are in alphabetical order.

The following rules apply to all commands:

- A command is in effect until it is superseded by another command.
- Command settings override system settings.

<table>
<tr><th colspan="3">Arrow Check Point</th></tr>
<tr><th>Click</th><th colspan="2">Function</th></tr>
<tr><td rowspan="4">Double-click address and select from drop-down menu</td><td colspan="2">Used in tandem with the Mea. Width, Mea. Point to Line, and Positional Checking options of the OptiSure AOI feature to check the width of a section of a dispensed line (between two specified points) against a saved mark image that can specify Max and Min parameters for line width; if the width of a section of dispensed line is not within the allowable range, the system takes the action specified by the Skip, Stop, Pause, Ask, Go to Label parameter.</td></tr>
<tr><td>Parameter</td><td>Description</td></tr>
<tr><td>No.</td><td>The number of the mark image saved for the line section.</td></tr>
<tr><td>0.Stop, 1.Skip, 2.Pause, 3.Ask, 4.Go to Label</td><td>The action the system takes if a dispensed line section does not meet the parameters specified for the saved mark image.
0.Stop — The system stops running the program and displays an Arrow Check Fail warning: Click OK to acknowledge the warning, then click HOME to move the Z axis to the Home position (0, 0, 0).
1.Skip — The system skips the dispense and goes to the next command in the program.
2.Pause — The system stops running the program and displays a “Waiting [Start] Button]” box: Click START or CONTINUE to continue running the program; click STOP and then HOME to stop the program and send the robot to the Home position (0, 0, 0).
3.Ask — The system stops running the program and displays a “Find Again, Find Next, or Stop Find” box: Click FIND AGAIN to make the system check the point again. Click FIND NEXT to go to the next command in the program. Click STOP FIND to stop the program.
4.Go to Label — The dispense program jumps to the specified Label.</td></tr>
</table>

Appendix A, Command Function Reference (continued)

Arrow Check Line		
Click	**Function**	
Double-click address and select from drop-down menu	Used in tandem with the Mea. Width option of the OptiSure AOI feature to check the width of a dispensed line against a saved mark image; if the width of a dispensed line is not within the allowable range, the system takes the action specified by the Skip, Stop, Pause, Ask, or Go to Label parameter.	
	Parameter	**Description**
	No.	The number of the mark image saved for the line.
	0.Stop, 1.Skip, 2.Pause, 3.Ask, 4.Go to Label	The action the system takes if a dispensed line does not match the saved mark image. 0.Stop — The system stops running the program and displays an Arrow Check Fail warning: Click OK to acknowledge the warning, then click HOME to move the Z axis to the Home position (0, 0, 0). 1.Skip — The system skips the dispense and goes to the next command in the program. 2.Pause — The system stops running the program and displays a “Waiting [Start] Button]” box: Click START or CONTINUE to continue running the program; click STOP and then HOME to stop the program and send the robot to the Home position (0, 0, 0). 3.Ask — The system stops running the program and displays a “Find Again, Find Next, or Stop Find” box: Click FIND AGAIN to make the system check the line again. Click FIND NEXT to go to the next command in the program. Click STOP FIND to stop the program. 4.Go to Label — The dispense program jumps to the specified Label.

Laser Profile		
Click	**Function**	
Double-click address and select from drop-down menu	Used in tandem with Laser Program to start or stop laser measurement. When turned ON, the system uses the laser to measure and record the profile (displacement or thickness) of a fluid or a workpiece. The resulting graph and measurements (data points) are exported as a *.JPEG and a *.CSV file, respectively. When Laser Profile turns ON, the Laser Profile window opens to show the measurement data in real time. In the Laser Profile window, you can enter threshold (tolerance) values and then enable them to cause the system to check the laser measurements against the threshold values. If a measured value is outside the threshold range, the system takes the action specified by the selected Stop, Skip, or Pause radio button in the Laser Profile window. Refer to “To Check Laser Measurements Against Threshold Values” on page 58 for details. **NOTES:** • This command applies to laser systems only. • Refer to “To Measure and Record the Profile of a Fluid or a Workpiece” on page 54 for an example of how to use this command in a program. • The Laser Program command tells the system which laser measurement settings program to use. Refer to “Laser Program” on page 64 for details.	
	Setting	**Description**
	0 Off	Turns Laser Profile OFF, stopping laser measurement.
	1 On	Turns Laser Profile ON, starting laser measurement and opening the Laser Profile Window. The Laser Profile window can be closed and reopened during active measurement.

Appendix A, Command Function Reference (continued)

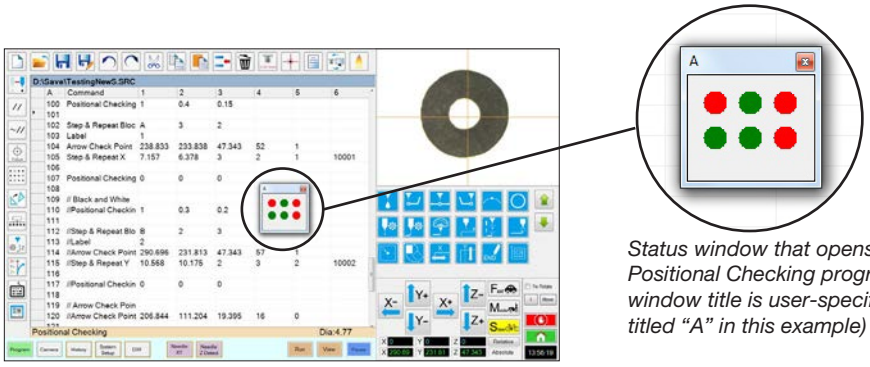
<table>
<tr><th colspan="3">Laser Program</th></tr>
<tr><th>Click</th><th colspan="2">Function</th></tr>
<tr><td>Double-click address and select from drop-down menu</td><td colspan="2">Specifies the laser measurement settings program to use when the laser is measuring and recording a fluid or workpiece profile. Laser programs are edited in the CL-NavigatorN software. Program numbers 1–3 contain the following default, pre-programmed laser programs:
• 1. Displacement (Non-Transparent)
• 2. Displacement (Transparent)
• 3. Thickness (Transparent)
Program numbers 0 and 4–7 are programmed by the user.

NOTES:
• This command applies to laser systems only.
• Laser programs 1–3 can be user-edited via the CL-NavigatorN software.
• Refer to “To Measure and Record the Profile of a Fluid or a Workpiece” on page 54 for an example of how to use this command in a program.
• The Laser Profile command starts and stops laser measurement. Refer to “Laser Profile” on page 63 for details.</td></tr>
<tr><td></td><td>Parameter</td><td>Description</td></tr>
<tr><td></td><td>0-7</td><td>Sets the CL-NavigatorN laser program to use when laser measurement and recording is turned on.</td></tr>
</table>

<table>
<tr><th colspan="3">Positional Checking</th></tr>
<tr><th>Click</th><th colspan="2">Function</th></tr>
<tr><td>Double-click address and select from drop-down menu</td><td colspan="2">Used in tandem with the Step & Repeat Block command to cause the camera to evaluate the dispensed dots on an array against user-specified X and Y offsets: If a dispensed dot fits within the specified offsets, it passes; if not, it fails. If Save Image under System Setup > Other is checked, the system also takes screen captures of all dispensed dots and saves the image files in the D:\ AOIIMAGE directory. Each image file includes details about the dispensed dot, including diameter and XY offset values.
Refer to “Positional Checking Example” on page 25 for an example of how to use this command in a program.</td></tr>
<tr><td></td><td>Parameter</td><td>Description</td></tr>
<tr><td></td><td>0 Off, 1 On</td><td>Turns Positional Checking OFF or ON.</td></tr>
<tr><td></td><td>Offset X</td><td>In the X direction, the maximum allowable deviation of an inner dot from the larger circle.</td></tr>
<tr><td></td><td>Offset Y</td><td>In the Y direction, the maximum allowable deviation of an inner dot from the larger circle.</td></tr>
</table>

Appendix A, Command Function Reference (continued)

Step & Repeat Block		
Click	**Function**	
Double-click address and select from drop-down menu	Used in tandem with the Positional Checking command to allow the camera to evaluate the dispensed dots on an array against user-specified X and Y offsets. When a Positional Checking program runs, the Step & Repeat Block command causes a window to open to show the status of each dot as a green (pass) or red (fail) dot. Refer to “Positional Checking Example” on page 25 for an example of how to use this command in a program.	
	Parameter	**Description**
	Title	A user-specified title for the window, with a maximum of 42 characters visible.
	Columns (x)	The number of columns in the X direction.
	Rows (y)	The number of rows in the Y direction.



Status window that opens during a Positional Checking program; the window title is user-specified (it is titled “A” in this example)

NORDSON EFD ONE YEAR LIMITED WARRANTY

This Nordson EFD product is warranted for one year from the date of purchase to be free from defects in material and workmanship (but not against damage caused by misuse, abrasion, corrosion, negligence, accident, faulty installation, or by dispensing material incompatible with equipment) when the equipment is installed and operated in accordance with factory recommendations and instructions.

Nordson EFD will repair or replace free of charge any defective part upon authorized return of the part prepaid to our factory during the warranty period. The only exceptions are those parts which normally wear and must be replaced routinely, such as, but not limited to, valve diaphragms, seals, valve heads, needles, and nozzles.

In no event shall any liability or obligation of Nordson EFD arising from this warranty exceed the purchase price of the equipment.

Before operation, the user shall determine the suitability of this product for its intended use, and the user assumes all risk and liability whatsoever in connection therewith. Nordson EFD makes no warranty of merchantability or fitness for a particular purpose. In no event shall Nordson EFD be liable for incidental or consequential damages.

This warranty is valid only when oil-free, clean, dry, filtered air is used, where applicable.

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