OptiSure Automated Optical Inspection

Operating Manual

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Nordson EFD

You have selected a reliable, high-quality dispensing system from Nordson EFD, the world leader in fluid dispensing. Nordson EFD automated dispensing systems are designed specifically for industrial dispensing and will provide you with years of trouble-free, productive service.

This manual will help you maximize the usefulness of your automated dispensing system.

Please spend a few minutes to become familiar with the controls and features. Follow our recommended testing procedures. Review the helpful information we have included, which is based on more than 50 years of industrial dispensing experience.

Most questions you will have are answered in this manual. However, if you need assistance, please do not hesitate to contact EFD or your authorized EFD distributor. Detailed contact information is provided on the last page of this document.

The Nordson EFD Pledge

Thank You!

You have just purchased the world's finest precision dispensing equipment.

I want you to know that all of us at Nordson EFD value your business and will do everything in our power to make you a satisfied customer.

If at any time you are not fully satisfied with our equipment or the support provided by your Nordson EFD Product Application Specialist, please contact me personally at 800.556.3484 (US), 401.431.7000 (outside US), or Srini.Subramanian@nordsonefd.com.

I guarantee that we will resolve any problems to your satisfaction.

Thanks again for choosing Nordson EFD.

Srini Subramanian

Srini Subramanian, General Manager

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 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 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 PROPlus / PRO Series system the OptiSure 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 add-on can be unlocked on any vision-guided automated dispensing system. The confocal laser can be installed only on PROPlus / PRO 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 PROPlus / PRO Series systems that allows 3D verification of deposit accuracy

About OptiSure

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

The OptiSure 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.

An overview of all the OptiSure functions is provided on the next page, and a detailed example for using each function follows.

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

Enabling the OptiSure Feature

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

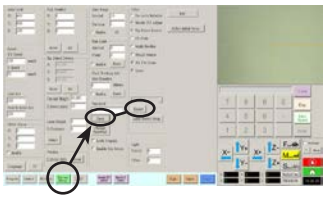
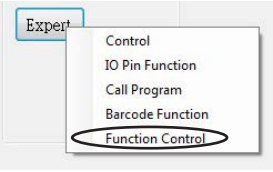
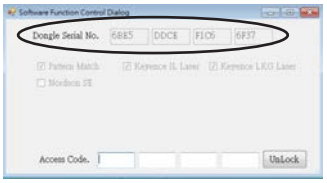
- An access code must be used to unlock the OptiSure add-on. To obtain the access code, you must provide the Dongle Serial No. to Nordson EFD as described in this section.
- For some OptiSure features to function properly, a script file must be present on the DispenseMotion controller. Obtain this script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

NOTE: If you have not purchased the OptiSure software key, refer to “OptiSure Kit Part Numbers” on page 44 for the kit part numbers. Contact your Nordson EFD representative for assistance.

PREREQUISITES

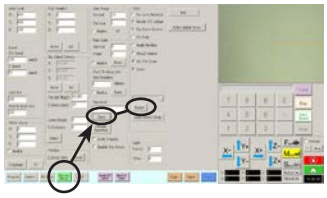
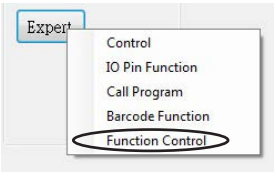
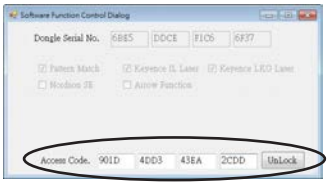
- ☐ The complete automated dispensing system is properly installed and set up in accordance with the respective system’s operating manual.
- ☐ You have purchased your OptiSure kit(s).
- ☐ You have obtained the main.bas file from your Nordson EFD representative.
- ☐ If purchased, the optional confocal 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 to return to the main screen.	
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 7.	

Enabling the OptiSure Feature (continued)

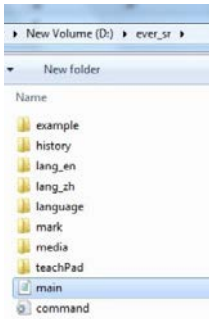
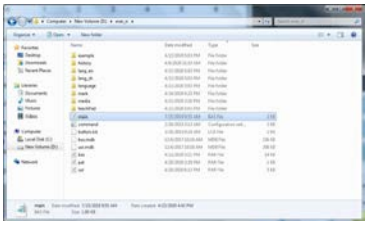
Enter the Access Code

#	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 to return to the main screen.	
5		• Continue to “Add the Script File to the DispenseMotion Controller” on page 8.	

Enabling the OptiSure Feature (continued)

Add the Script File to the DispenseMotion Controller

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

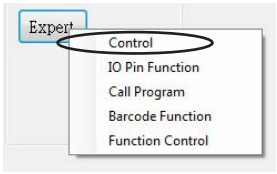
#	Click	Step	Reference Image
1		• If you have not already done so, contact your Nordson EFD representative to obtain the main.bas script file. • Place the main.bas file on a USB drive.	
		• Insert the USB drive into an empty USB port on the back of the DispenseMotion controller. **NOTE:** On most controllers, 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 add-on is now unlocked and ready for use. Refer to the remaining sections of this manual for detailed procedures for using the OptiSure features. • If you also installed the confocal laser, continue to “Changing the Laser Model Selection” on page 9.	

Changing the Laser Model Selection

If you installed the confocal laser, follow this procedure to select the laser on the System Setup screen.

PREREQUISITES

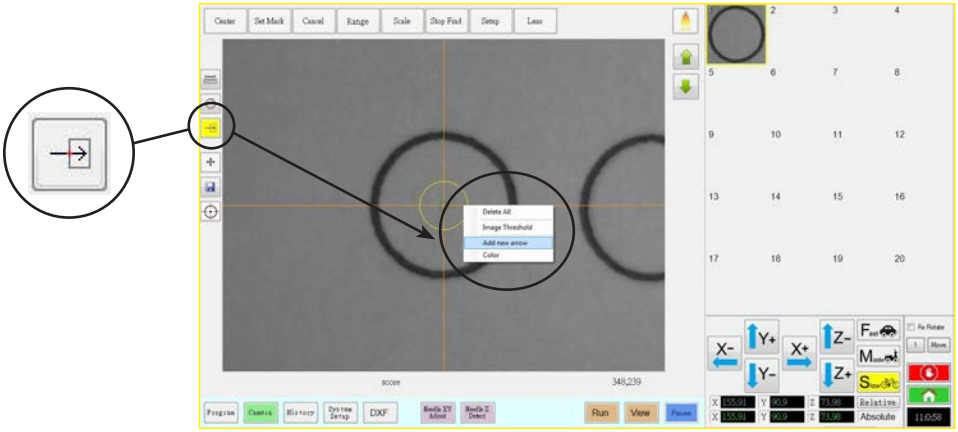
- ☐ If purchased, the optional confocal laser is installed in accordance with the installation instructions.
- ☐ The DispenseMotion software is open.

#	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	• 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.	

Overview of the OptiSure 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 11
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 12
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.

- ☐ The system is in the CCD Mode.
- ☐ The mark image you want to adjust is saved in the Mark Library.

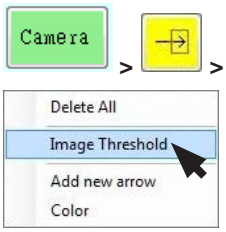
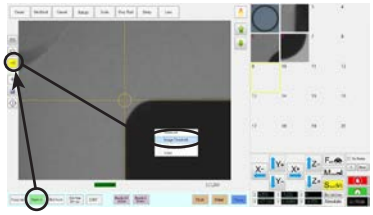
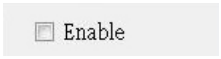
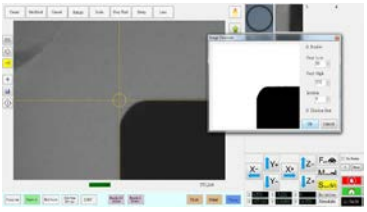
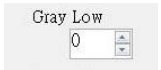
#	Click	Step	Reference Image
1		• Click CAMERA to go to the camera screen. • Click the ARROW icon. • In the Primary View screen, right-click and select IMAGE THRESHOLD. The Image Threshold window opens.	
2		• In the Image Threshold window, select the Enable checkbox. • Adjust the Image Threshold settings 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

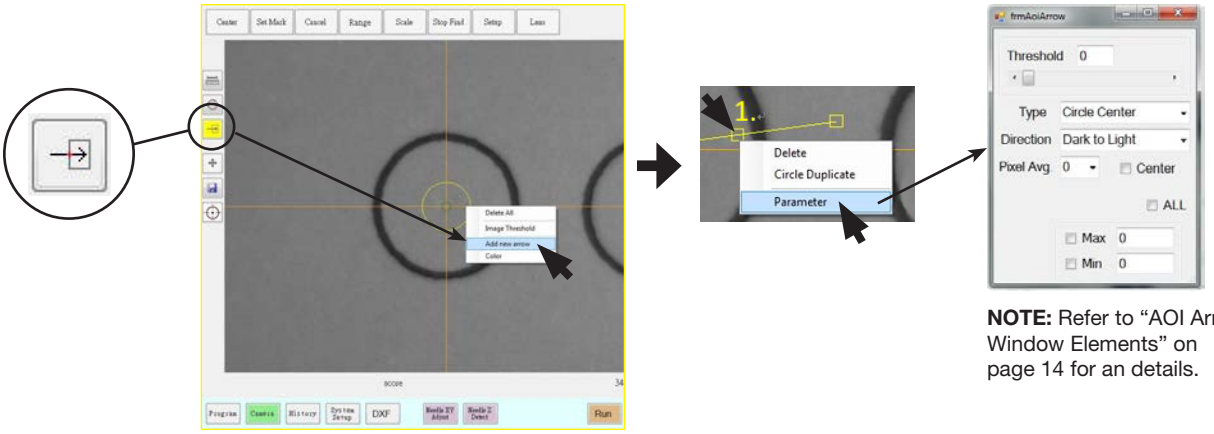
The Add New Arrow icon accesses advanced features that allow you to:

- 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 19
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 15
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 23
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 28

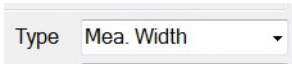
Continued on next page

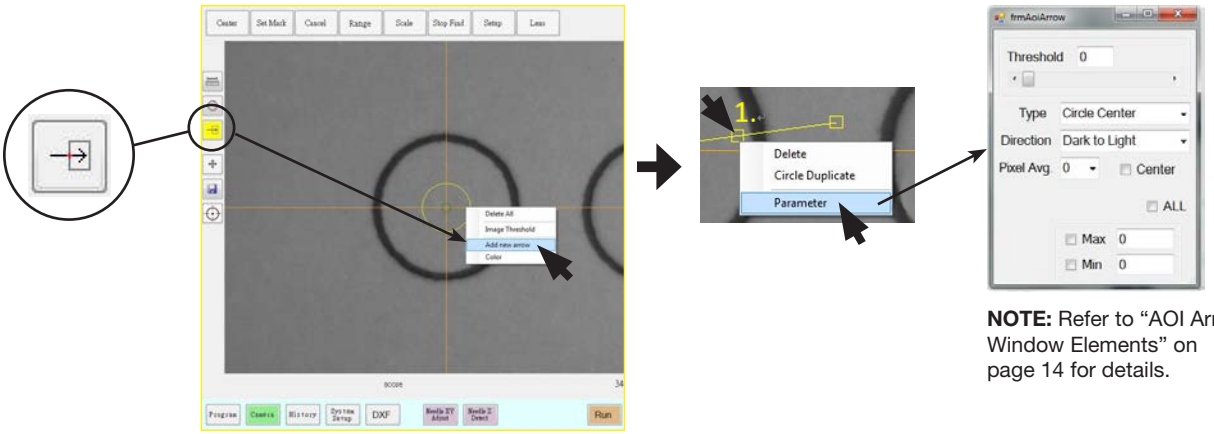


NOTE: Refer to "AOI Arrow Window Elements" on page 14 for an details.

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

Using the Arrow Types (continued)

Arrow Menu Type Selection		Recommended Use	Refer to...
Mea. Width (Automated Optical Inspection)		Create a mark image that sets the desired width for a line; this mark image can then be used as follows: • When used with 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. • When used with the Auto Speed Setup, Measure Width, and Auto Speed commands, the system can automatically adjust the speed of the dispenser to maintain the desired line width for specified line dispenses. **NOTE:** This capability can be used only when the main.bas file has been added to the d:\ever_sr directory. Contact your Nordson EFD representative to obtain this file.	"Mea. Width Example for Verifying Line Width" on page 33 "Mea. Width Example for Dispense Width Adjustment" on page 38



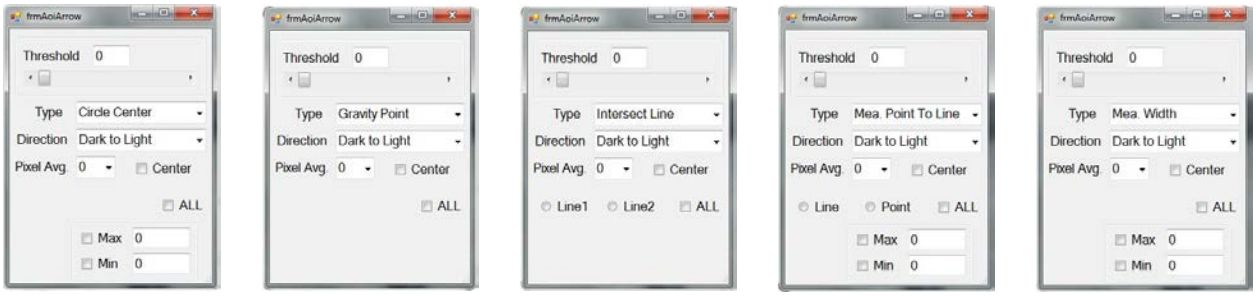
NOTE: Refer to "AOI Arrow Window Elements" on page 14 for details.

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 AOI Arrow window varies based on the selected arrow Type.



How the AOI Arrow window changes based on the selected arrow Type

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 11 for details.
Type	Type Circle Center	n/a	Sets the arrow type. Refer to “Using the Arrow Types” on page 12 for an explanation of each.
Direction	Direction Dark to Light Other value: Light to Dark	All arrow types	Sets the direction in which the arrows point, which will also be the direction in which the camera searches for the location of the mark on the workpiece. **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.
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. **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.
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)

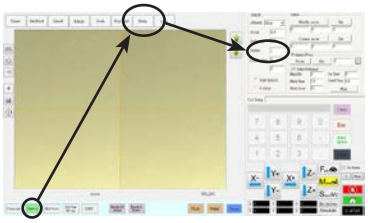
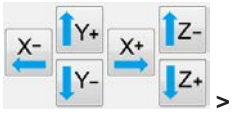
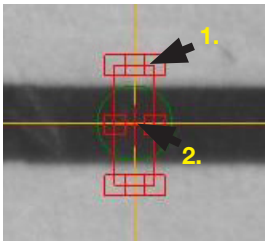
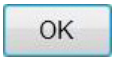
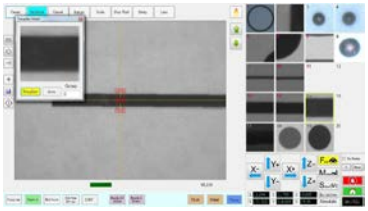
Gravity Point Example

Gravity Point is an OptiSure 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

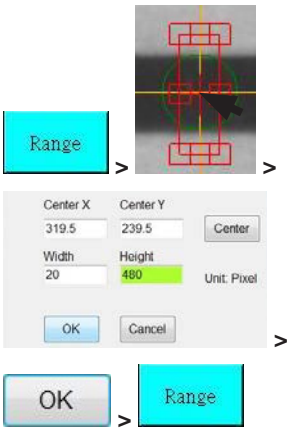
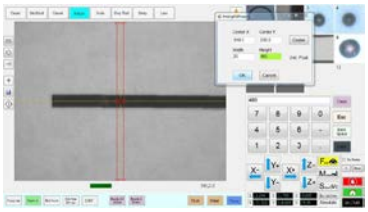
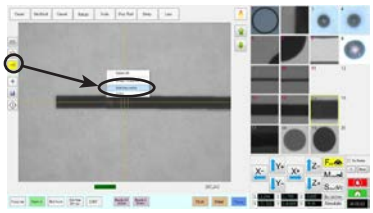
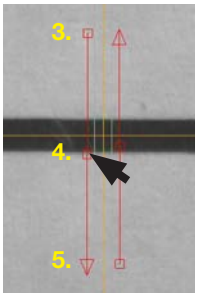
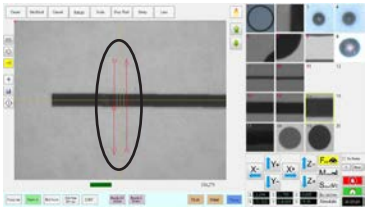
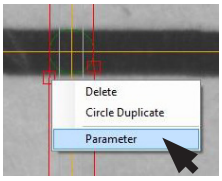
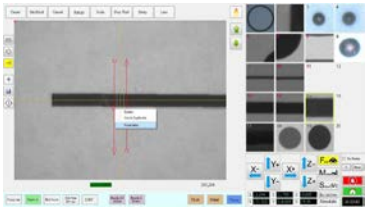
#	Click	Step	Reference Image
1	 >	• Click CAMERA > SETUP and enter a lower score for SENSE (1 is used in this example). **NOTE:** You may need to adjust this value based on the results as you work through this procedure.	
2	 >  >  > 	• Jog the camera to a location near the beginning of the thinner line. • 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)

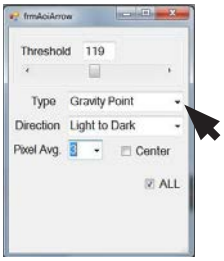
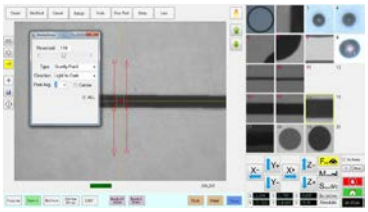
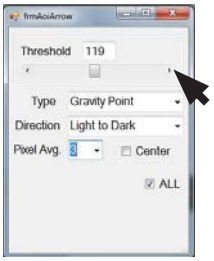
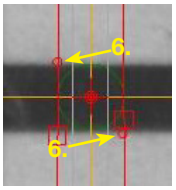
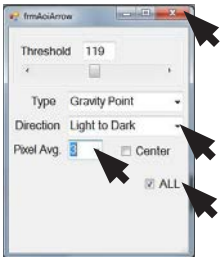
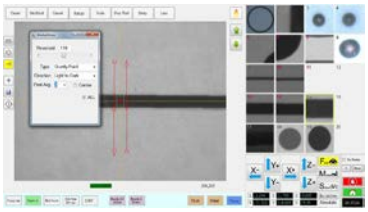
#	Click	Step	Reference Image
4		• Click RANGE to set where the system searches for the mark. • Double-click on the crosshairs in the center of the mark and enter Width and Height values (20 and 480 in this example). **NOTE:** The Width value must be the same as the Width specified in step 2 on page 15. • 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 square (item 4). - To elongate or shorten the arrow, click and drag the arrow (item 5) or the end square (item 1).	
7		• Right-click on the middle square 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)

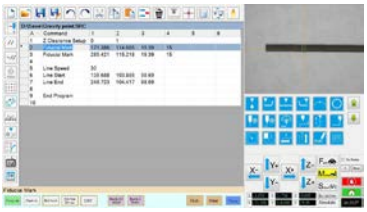
To Create a Gravity Point Mark Image (continued)

#	Click	Step	Reference Image
8		• 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. • Enable ALL because two arrows are used. **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 Find Mark command in a program. • Continue to “To Use a Gravity Point Mark Image in a Program” on page 18 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 two Fiducial Mark commands and specify the Mark No. for the Gravity Point mark you created in the previous procedure. When the system dispenses on a subsequent line (commands 6 and 7 in the example program) that is thinner than the original line, it will dispense on the center of the line, automatically offsetting as needed. **NOTE:** The complete example program is provided below.	

D:\Save\Gravity point.SRC

A	Command	1	2	3	4	5	6
1	Z Clearance Setup	0	1				
2	Fiducial Mark	171.386	114.686	19.39	15		
3	Fiducial Mark	285.421	115.218	19.39	15		
4							
5	Line Speed	30					
6	Line Start	135.688	103.885	98.69			
7	Line End	249.723	104.417	98.69			
8							
9	End Program						
10							

Example program that contains Fiducial Mark commands (lines 2–3) for a Gravity Point mark

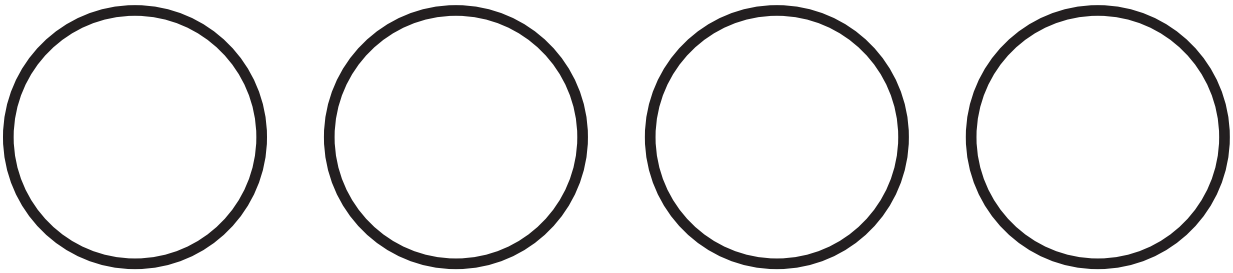
Using the Arrow Types (continued)

Circle Center Example

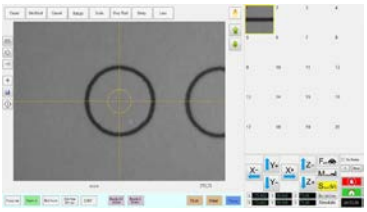
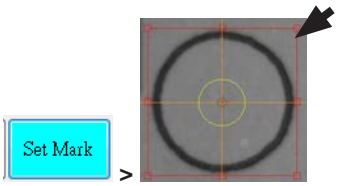
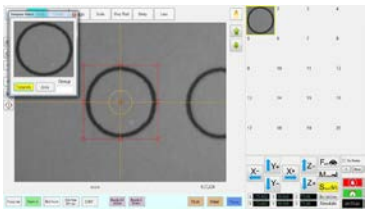
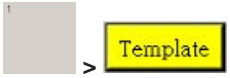
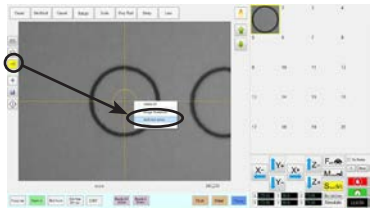
Circle Center is an OptiSure feature that allows you to add details to a mark image of a circular area that has poor definition, thus allowing the system to find the mark image faster and more accurately.

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

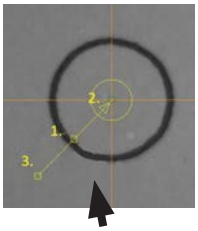
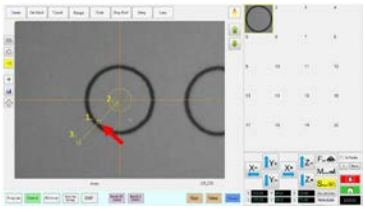
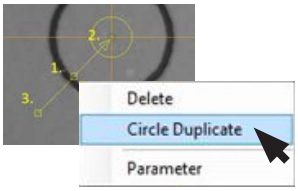
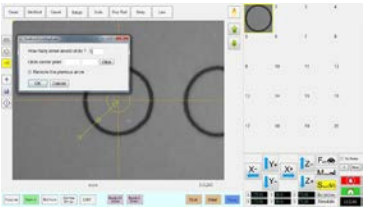
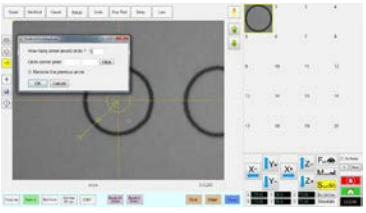
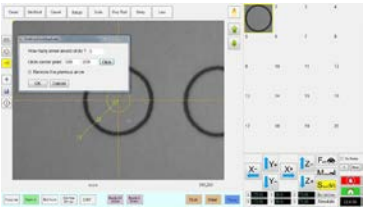
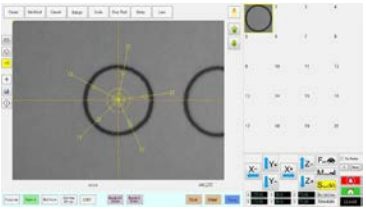
#	Click	Step	Reference Image
1		• Click CAMERA to go to the camera screen. • Position the workpiece template on the fixture plate bring the circle you want to use for the mark into view.	
2		• Click SET MARK, then drag to position the red box around a circle.	
3		• Click a socket in the Mark Library 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)

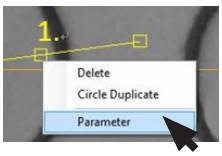
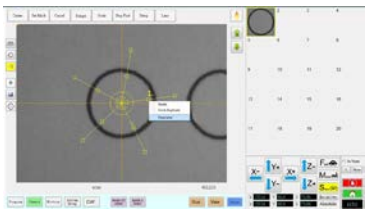
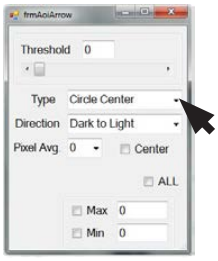
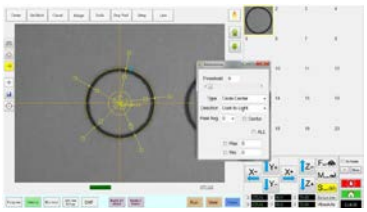
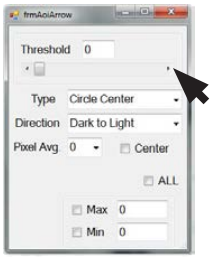
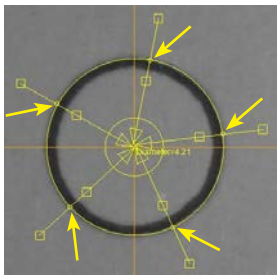
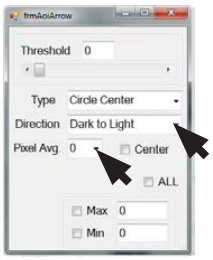
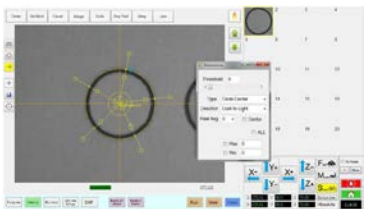
#	Click	Step	Reference Image
5		• Use the mouse to manipulate the arrow so that it extends from the center of the circle to outside of the circle: - To move the entire arrow, click and drag the upper diamond (item 1). - To elongate or shorten the arrow, click and drag the triangle (item 2) or the lower diamond (item 3).	
6		• Right-click the upper diamond 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.	
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)

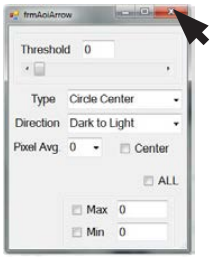
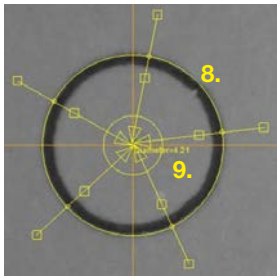
#	Click	Step	Reference Image
10		• Right-click on any middle diamond (item 1) of an arrow and then select PARAMETER. The AOI Arrow window opens.	
11		• For Type, select CIRCLE CENTER.	
12		• Adjust THRESHOLD until the all the yellow circles are located on the circumference of the circle.	
13		• Select 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. - Selecting ALL causes the system to enter the same settings for all arrows. If you want to enter settings for each arrow individually, deselect ALL. - MAX and MIN are not used in this example.	

Continued on next page

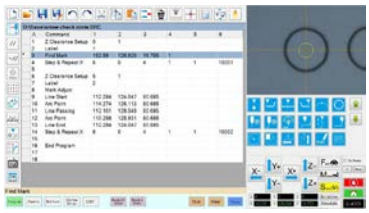
Using the Arrow Types (continued)

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
		• 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)

Intersect Line Example

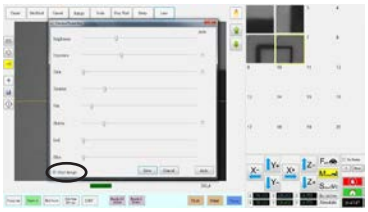
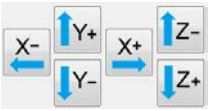
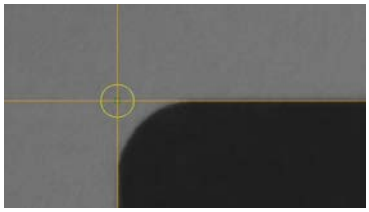
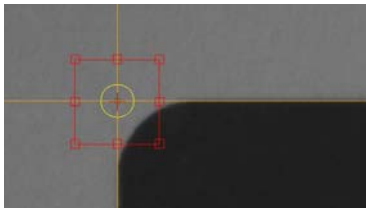
Intersect Line is an OptiSure feature that allows you to create mark images for a workpiece that does not have any obvious features. To do so, you create marks using the corners and edges of the workpiece. This function also works for creating marks for an R-shaped area.

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

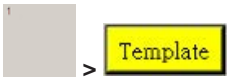
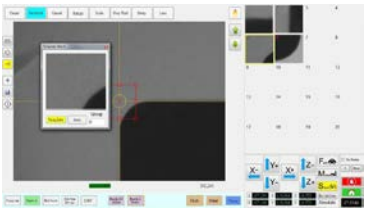
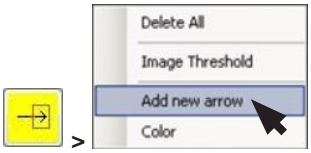
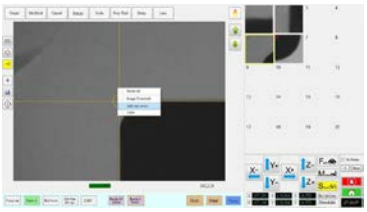
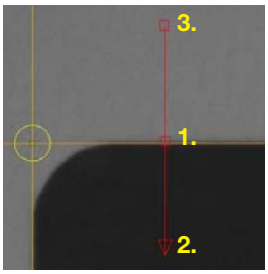
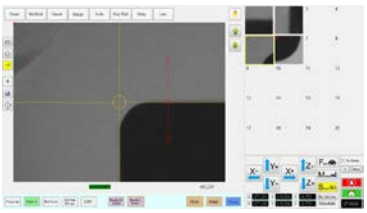
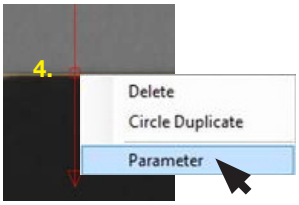
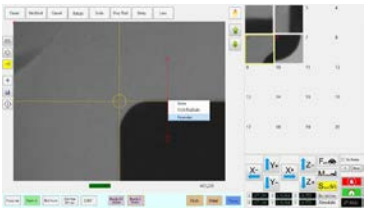
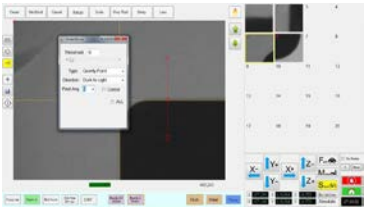
#	Click	Step	Reference Image
1		• Click CAMERA > LENS. • Select the GRAY IMAGE checkbox. **NOTE:** Selecting Gray image is optional, but doing so provides a sharper image and also slightly zooms out the image.	
2		• Jog the camera to the top left corner of the workpiece template, positioning the crosshairs 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)

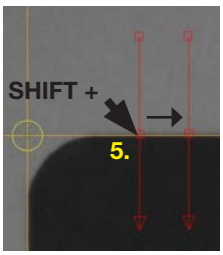
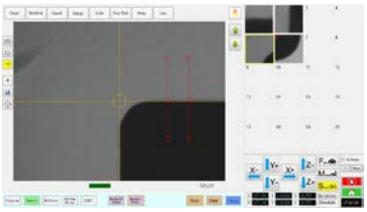
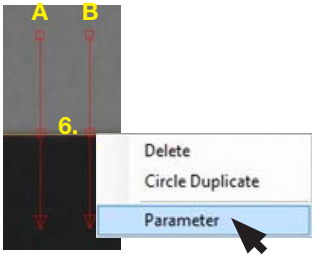
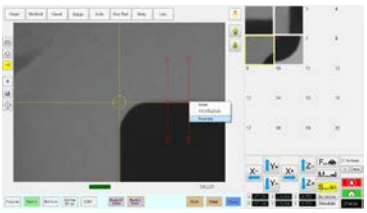
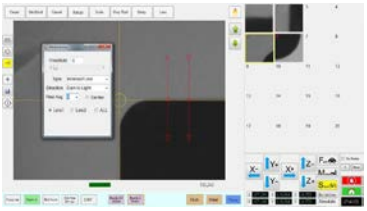
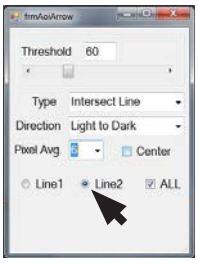
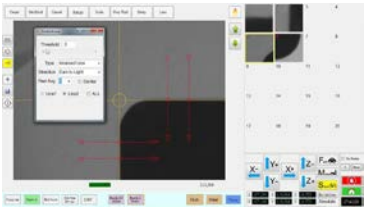
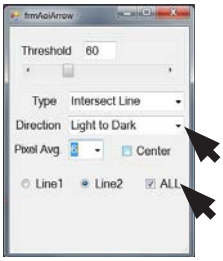
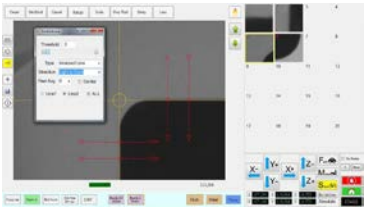
#	Click	Step	Reference Image
4		• Click a socket in the Mark Library to save the mark, then click TEMPLATE when the Template Match window appears. The system saves the image in the Mark Library.	
5		• Click the ARROW icon. • In the Primary View screen, right-click and select ADD NEW ARROW. The system adds an arrow 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		• For Type, select INTERSECT LINE. • Select DARK TO LIGHT. • Select the LINE1 radio button. • Close the dialog box to save the settings. **NOTE:** For this example, Center and ALL are de-selected.	

Continued on next page

Using the Arrow Types (continued)

Intersect Line Example (continued)

To Create an Intersect Line Mark Image (continued)

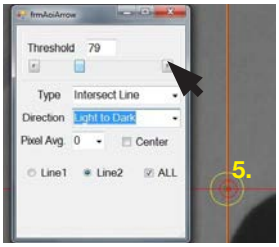
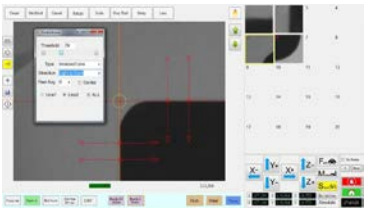
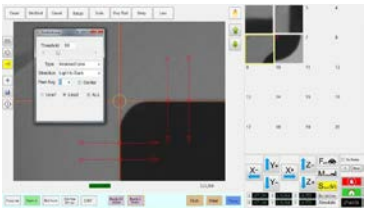
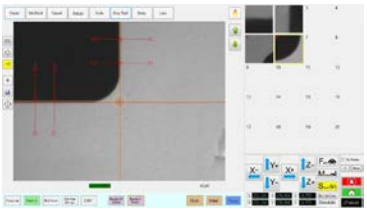
#	Click	Step	Reference Image
9		• Press and hold the SHIFT key, click and hold the middle box (item 5), and then drag to the right to duplicate the arrow.	
10		• Right-click the middle box (item 6) of the new Arrow B and then select PARAMETER.	
11		• Ensure that the parameters of Arrow B are the same as Arrow A (including the LINE1 selection). • Close the dialog box to save the settings.	
12		• Repeat steps 5-11 to create a new set of arrows (Arrows C and D) on the vertical edge of the workpiece mark image, as shown. • In the parameter window for these arrows, select LINE2.	
13		• Select LIGHT TO DARK. • Select the ALL checkbox.	

Continued on next page

Using the Arrow Types (continued)

Intersect Line Example (continued)

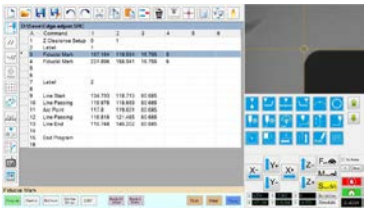
To Create an Intersect Line Mark Image (continued)

#	Click	Step	Reference Image
14		• Adjust THRESHOLD until the crosshairs appear (item 5) on the camera screen.	
15		• 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 complete.	
16		• 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. The second mark image (No. 6 in this example) is complete. • Continue to “To Use Intersect Line Mark Images in a Program” on page 27 to use the mark images.	

Using the Arrow Types (continued)

Intersect Line Example (continued)

To Use Intersect Line Mark Images in a Program

#	Click	Step	Reference Image
		• In the dispense program, insert Fiducial Mark commands for the top left corner mark and the bottom right corner mark images you created in the previous procedure. **NOTE:** 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 a Fiducial Mark commands (lines 3–4) for Intersect Line marks

Using the Arrow Types (continued)

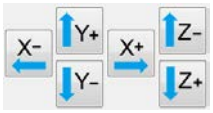
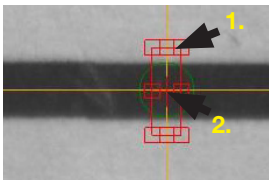
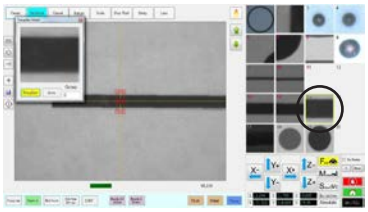
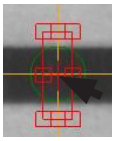
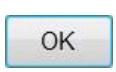
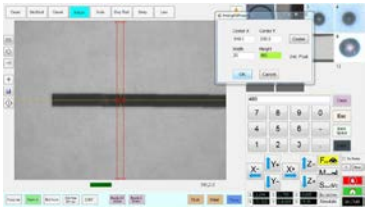
Mea. Point To Line Example

Mea. Point to Line is an OptiSure 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

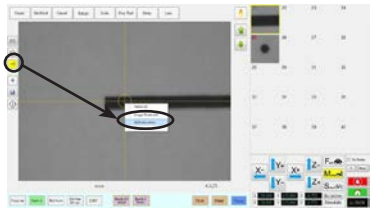
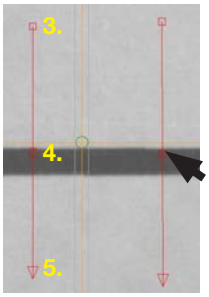
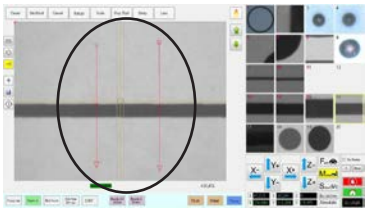
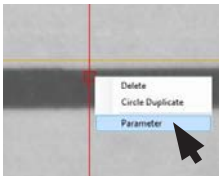
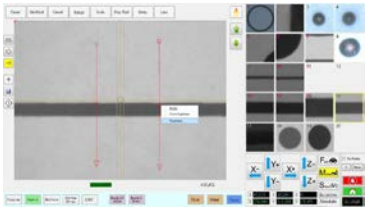
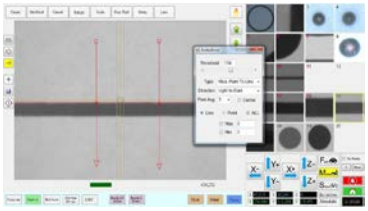
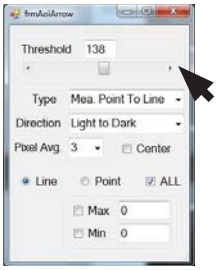
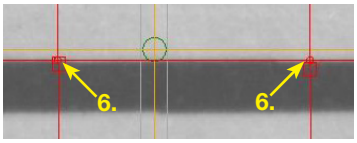
#	Click	Step	Reference Image
1	 >  >  > 	• Jog the camera to a location near the beginning of the line. • Click SET MARK, then drag to position the red box (item 1) over the line at the point where you want the system to measure each time. • Double-click the crosshairs in the center of the red box (item 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)

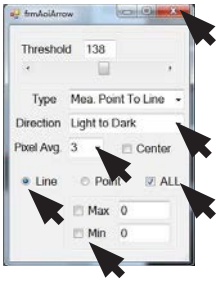
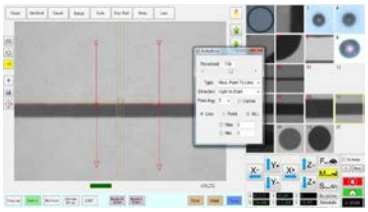
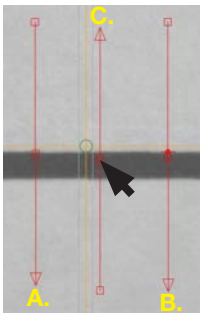
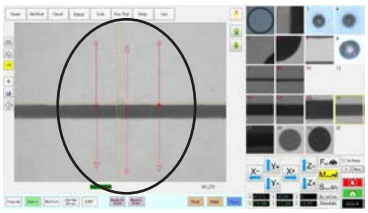
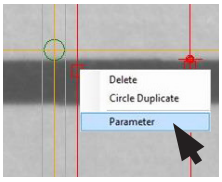
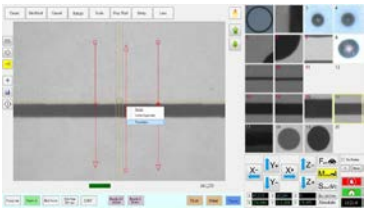
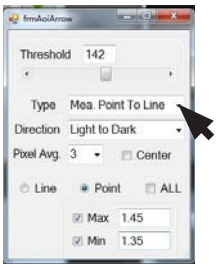
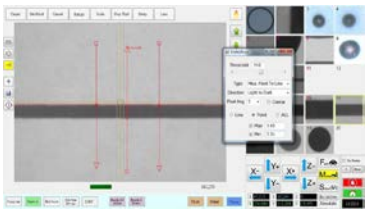
#	Click	Step	Reference Image
4		• Click the ARROW icon. • In the Primary View screen, right-click and select ADD NEW ARROW. The system adds an arrow to the screen.	
5		• Repeat step 4 to add another arrow, and then use the mouse to manipulate the arrows so they form an array, as shown. - To move the entire arrow, click and drag the middle square (item 4). - To elongate or shorten the arrow, click and drag the arrow (item 5) or the end square (item 3).	
6		• Right-click on the middle square of an arrow and then select PARAMETER. The AOI Arrow window opens.	
7		• For Type, select MEA. POINT TO LINE.	
8		• Adjust THRESHOLD until the two small red circles (item 6) are positioned on the top and bottom edges of the 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
9		• 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. • Select the ALL checkbox. • Deselect the MAX and MIN checkboxes. • 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 square of an arrow C and then select PARAMETER. The AOI Arrow window for Arrow C opens.	
12		• For Type, select MEA. POINT TO LINE.	

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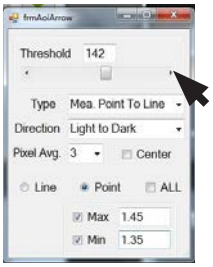
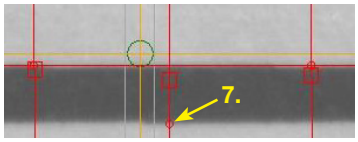
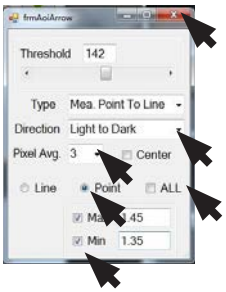
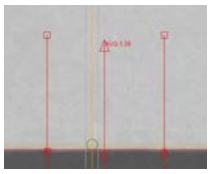
Using the Arrow Types (continued)

Mea. Point To Line Example (continued)

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

#	Click	Step	Reference Image
13		• Adjust THRESHOLD until the small red circle of the middle arrow (item 7) is positioned on the bottom edge of the line.	
14		• Select LIGHT TO DARK. • Adjust PIXEL AVG to make the mark image easier for the system to find. • De-select CENTER. • Select the POINT radio button. • De-select the ALL checkbox. • 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. • 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 somewhere near the middle of that line. In this example, the checked width must be within 1.35–1.45 mm (as defined in step 14). If the width is greater or lower, a warning box appears.

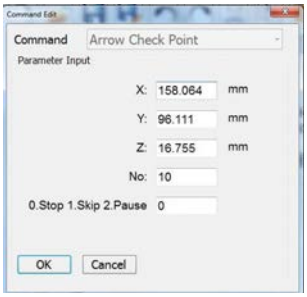
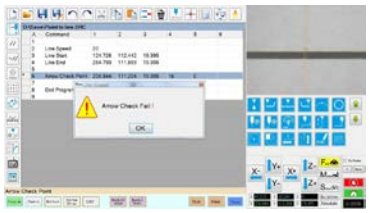
Continue to “To Use Arrow Check Point in a Program (Mea. Point to Line Example)” on page 32 to use the mark image.

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 28.

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 >** 	• Click the PROGRAM tab. • Double-click the command address where you want the system to confirm the width of the middle of a line section, select ARROW CHECK POINT, and enter parameters as follows: - Enter the X, Y, and Z coordinates of the line section to check. - 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 or below the Max and Min values specified for the mark image (step 14 on page 31). Refer to “Arrow Check Point” on page 45 for details. - Click OK to save the settings.	
2		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 parameter. Refer to “Arrow Check Point” on page 45 for details. **NOTE:** The complete example program is provided below.	

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)

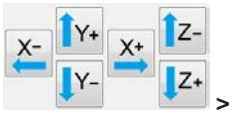
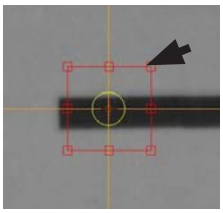
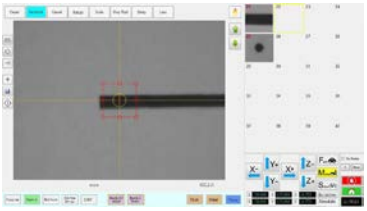
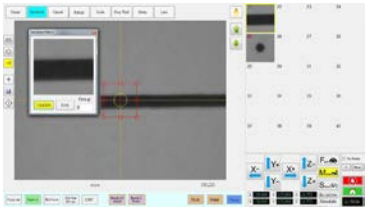
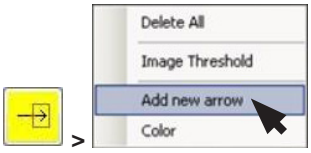
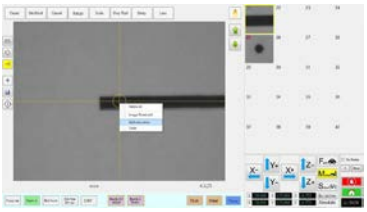
Mea. Width Example for Verifying Line Width

Mea. Width (Measure Width) is an OptiSure 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

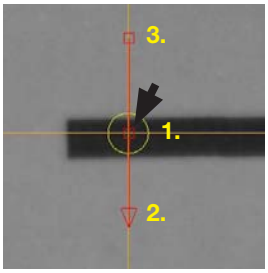
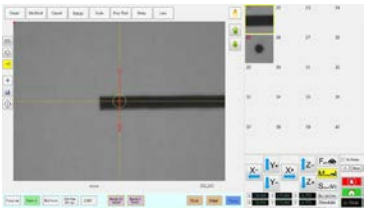
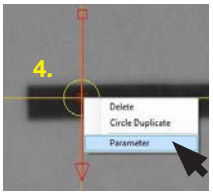
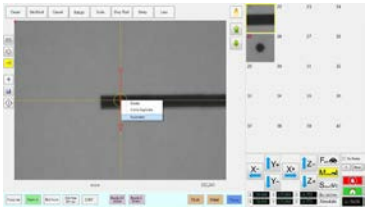
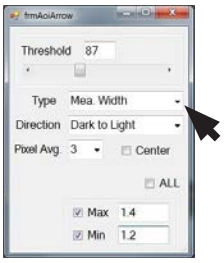
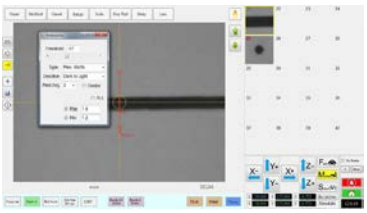
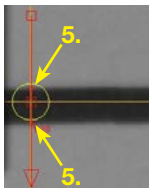
#	Click	Step	Reference Image
1	 >  > 	• Jog the camera to a location near the beginning of the line. • Click SET MARK, then drag to position the red box over the line.	
2	> 	• Click a socket in the Mark Library to save the mark, then click TEMPLATE when the Template Match window appears. The system saves 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)

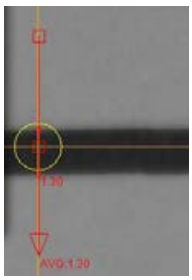
#	Click	Step	Reference Image
4		• Use the mouse to drag the arrow to the line: - To move the entire arrow, click and drag the middle box (item 1). - To elongate or shorten the arrow, click and drag the arrow point (item 2) or the upper box (item 3).	
5		• Right-click the middle box (item 4) of the arrow and then select PARAMETER. The AOI Arrow window opens.	
6		• For Type, select MEA. WIDTH.	
7		• Adjust THRESHOLD until the two small red circles (item 5) are positioned on the top and bottom edges of the line.	

Continued on next page

Using the Arrow Types (continued)

Mea. Width Example for Verifying Line Width (continued)

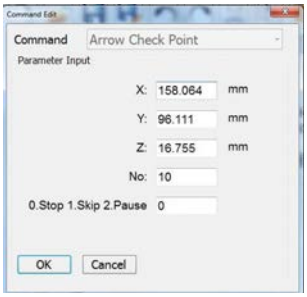
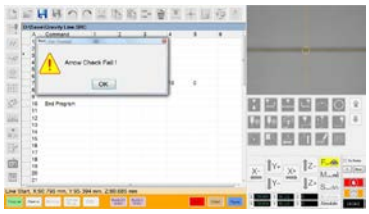
To Create a Mark Image for the Desired Line Dispense (continued)

#	Click	Step	Reference Image
8		• Select DARK TO LIGHT. • 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. **NOTE:** ALL is disabled in this example because only one arrow is used. • 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. • Close the dialog box to save the settings.	
9		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 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 36. • 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 37.	

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 >** 	• Click the PROGRAM tab. • Double-click the command address where you want the system to confirm the width of the middle of a line section, select ARROW CHECK POINT, and enter parameters as follows: - Enter the X, Y, and Z coordinates of the line section to check. - 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 or below the Max and Min values specified for the mark image (step 8 on page 35). Refer to “Arrow Check Point” on page 45 for details. - Click OK to save the settings.	
2		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 parameter. Refer to “Arrow Check Point” on page 45 for details. **NOTE:** The complete example program is provided below.	

D:\Save\Gravity Line.SRC

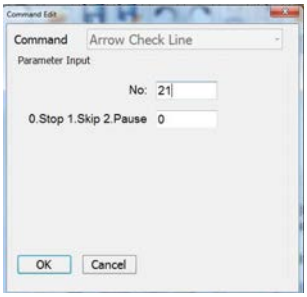
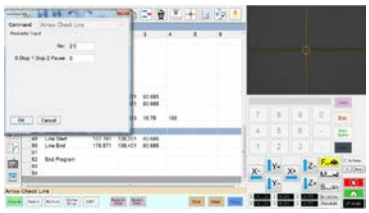
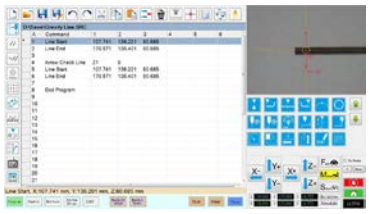
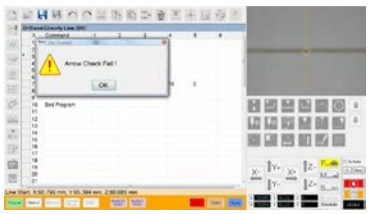
	A	Command	1	2	3	4	5	6
	1	Line Speed	20					
	2							
	3	Line Start	90.798	95.394	80.685			
	4	Line End	139.604	95.093	80.685			
	5							
▸	6	Arrow Check Point	158.064	96.111	16.755	10	0	
	7							
	8	End Program						

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

Using the 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 >** 	• Click the PROGRAM tab • Double-click the command address where you want the system to confirm the width of the middle of a line section, select ARROW CHECK LINE, 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 or below the Max and Min values specified for the mark image (step 8 on page 35). Refer to “Arrow Check Line” on page 45 for details. - Click OK to save the settings.	
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.	
3		When the system executes the Arrow Check Line command and finds an unacceptable line section, specified by the Stop, Skip, Pause parameter. Refer to “Arrow Check Line” on page 45 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)

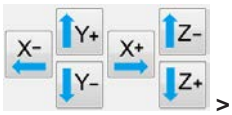
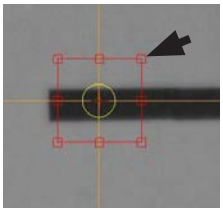
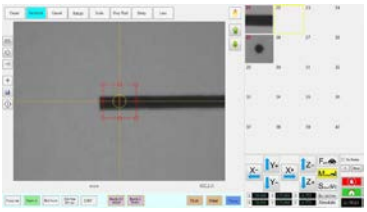
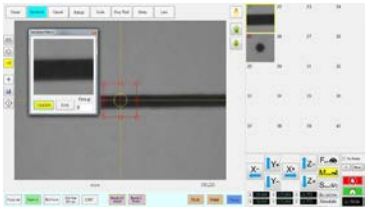
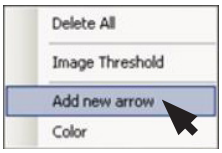
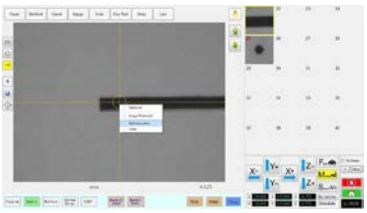
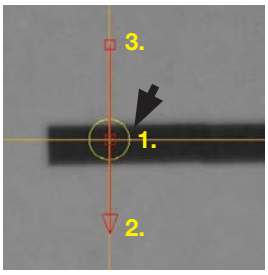
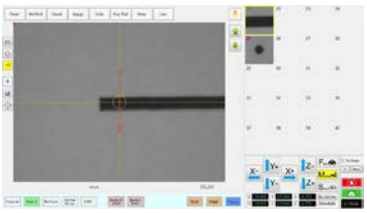
Mea. Width Example for Dispense Width Adjustment

Mea. Width (Measure Width) is an OptiSure feature that can be used in tandem with the Arrow Check Point, Auto Speed Setup, and Auto Speed commands to specify the desired width for a line and then cause the system to automatically adjust the speed of the dispenser to maintain that desired line width for subsequent dispenses.

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.

To Create a Mark Image for the Desired Line Width

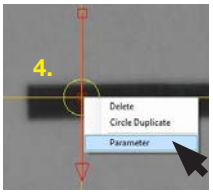
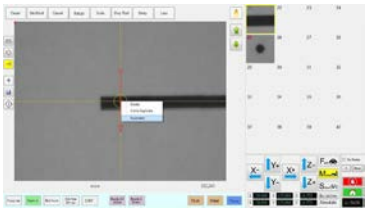
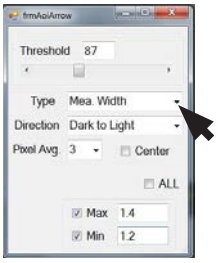
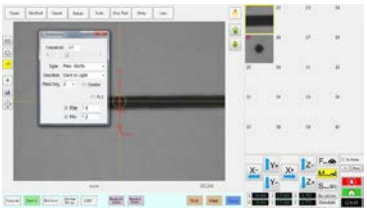
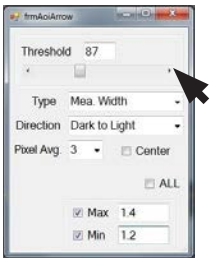
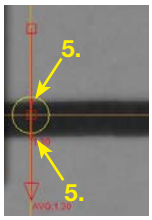
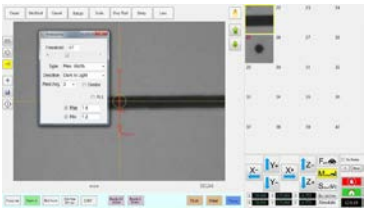
#	Click	Step	Reference Image
1	 >  > 	• Jog the camera to a location near the beginning of the line. • Click SET MARK, then drag to position the red box over a portion of the thinner line.	
2	> 	• Click a socket in the Mark Library to save the mark, then click TEMPLATE when the Template Match window 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.	
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).	

Continued on next page

Using the Arrow Types (continued)

Mea. Width Example for Dispense Width Adjustment (continued)

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

#	Click	Step	Reference Image
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		• Adjust THRESHOLD until the two small red circles (item 5) are positioned on the top and bottom edges of the line.	
8		• Select DARK TO LIGHT. • 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. **NOTE:** ALL is disabled in this example because only one arrow is used. • 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. • Close the dialog box to save the settings.	

Continued on next page

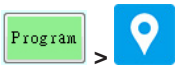
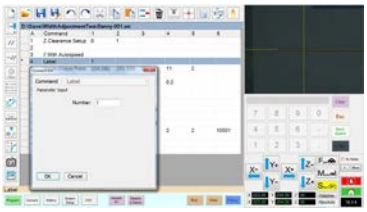
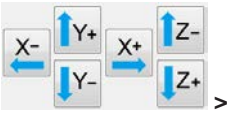
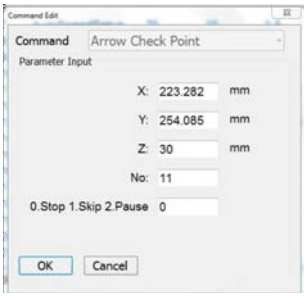
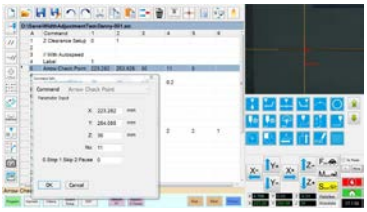
Using the Arrow Types (continued)

Mea. Width Example for Dispense Width Adjustment (continued)

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

#	Click	Step	Reference Image
9		The saved mark image is now ready to be used in a program to cause the system to adjust the dispenser speed as necessary to maintain the width of a dispensed line. Continue to “To Create a Program for Dispense Width Adjustment” on page 40 for an example dispense program.	

To Create a Program for Dispense Width Adjustment

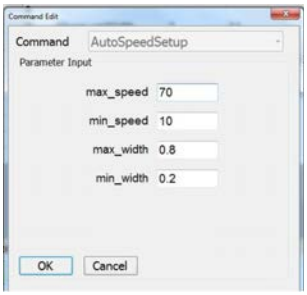
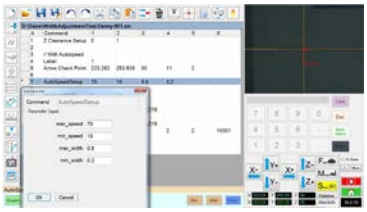
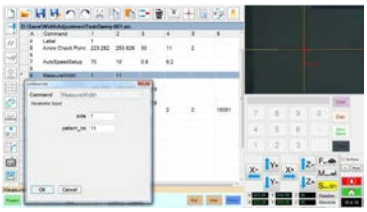
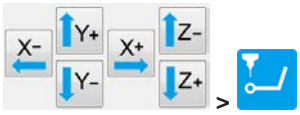
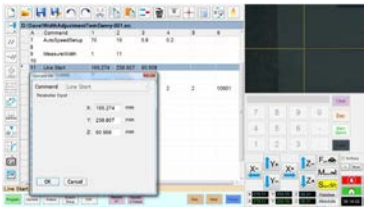
#	Click	Step	Reference Image
1	 >	• Click the PROGRAM tab. • Place the cursor in an empty command address near the top of the program and then click the LABEL icon. In this example, the Label Number is 1.	
2	 > **ARROW CHECK POINT >** 	• Jog the camera to the location on the thinner line where you want the width measurement to be checked during subsequent dispenses. • Double-click a command address below the LABEL command, select ARROW CHECK POINT, and enter parameters as follows: - Enter the number (No.) of the mark image created for the thinner line in the previous procedure (No. 11 in this example). - Select the action you want the system to take if the measured line section is above or below the Max and Min values specified for the mark image (step 8 on page 39). Refer to “Arrow Check Point” on page 45 for details. - Click OK to save the settings.	

Continued on next page

Using the Arrow Types (continued)

Mea. Width Example for Dispense Width Adjustment (continued)

To Create a Program for Dispense Width Adjustment (continued)

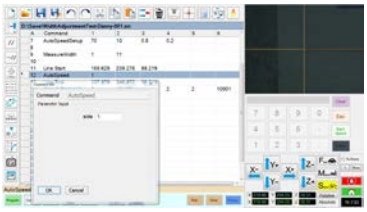
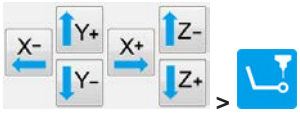
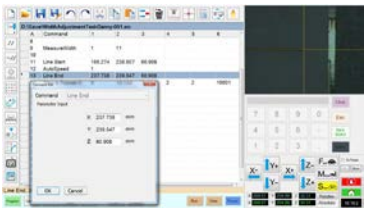
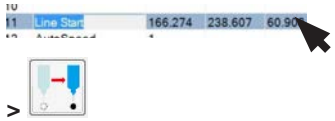
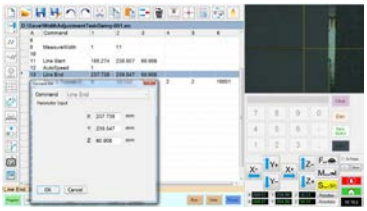
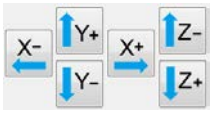
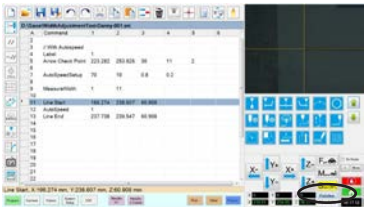
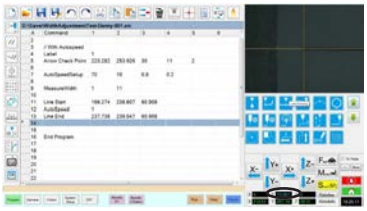
#	Click	Step	Reference Image
3	**AUTO SPEED SETUP >** 	• Double-click a command address below the Arrow Check Point command, select AUTO SPEED SETUP, and enter parameters as follows: - Max. Speed: Enter the maximum allowable robot line speed. - Min. Speed: Enter the minimum allowable robot line speed. - Max. Width: Enter the maximum allowable width of the line. - Min. Width: Enter the minimum allowable width of the line. **NOTE:** If Max and Min are defined in the mark image (step 8 on page 39), then enter the same values here; otherwise, enter your own values.	
4		• Double-click a command address below the Auto Speed Setup command, select MEASURE WIDTH, and enter parameters as follows: - Side: Enter a SIDE number to specify the line to be measured (refer to “Auto Speed” on page 46 for a diagram that explains this parameter). - Pattern No: Enter the number of the mark image created for the line in the previous procedure. **NOTE:** This command measures the width of the dispensed line using the coordinates specified in the Arrow Check Point command.	
5	 >	• Jog the camera to the beginning of the thinner line. • In the next empty command address, enter a LINE START command.	

Continued on next page

Using the Arrow Types (continued)

Mea. Width Example for Dispense Width Adjustment (continued)

To Create a Program for Dispense Width Adjustment (continued)

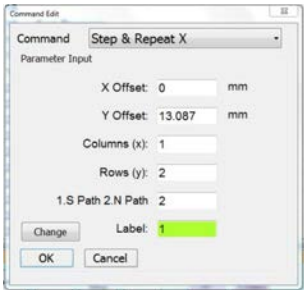
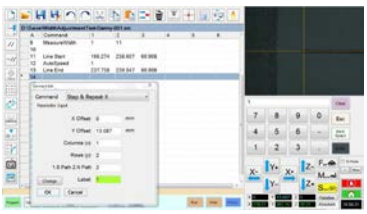
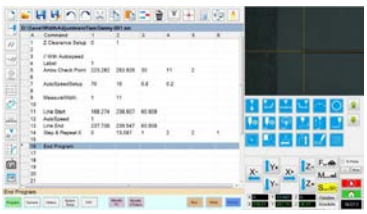
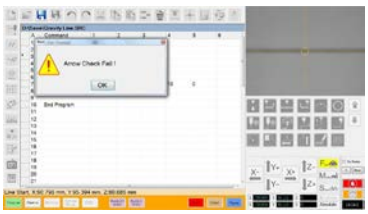
#	Click	Step	Reference Image
6	**AUTO SPEED >** 	• In the next empty command address, double-click and select AUTO SPEED. • For Side, enter the SIDE number specified previously (in step 4, which is Side 1 in this example).	
7	 > 	• Jog the camera to the end of the thinner line. • In the next empty command address, enter a LINE END command.	
8	 > 	• Highlight (select) the Line Start command. • Click Move to return the camera to the beginning of the thinner line.	
9	 > 	• Click RELATIVE. • Jog the camera to the thicker line on the workpiece template.	
10		• Stop when you reach the new line, then make a note of the relative Y offset (13.087 in this example).	

Continued on next page

Using the Arrow Types (continued)

Mea. Width Example for Dispense Width Adjustment (continued)

To Create a Program for Dispense Width Adjustment (continued)

#	Click	Step	Reference Image
11	 > 	• Double-click the command address below the Line End command, select STEP & REPEAT X, and enter parameters as follows: - X Offset: Enter 0. - Y Offset: Enter the relative Y offset determined in step 10 on page 42 (13.087 in this example). - Columns (x): Enter 1. - Rows (y): Enter 2. **NOTE:** In this example, there is one column and two rows of lines. - 1.S Path 2.N Path: Enter 2 so that dispensing starts at the beginning of the line. - Label: Enter 1 so the program returns to the top and repeats.	
12		• Double-click the next command address and select END PROGRAM.	
		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 parameter. Refer to “Arrow Check Point” on page 45 for details. Once the line width is verified, the system continues running the program, automatically adjusting the dispenser speed as needed to produce the correct line width. **NOTE:** The complete example program is provided on the next page.	

Using the Arrow Types (continued)

Mea. Width Example for Dispense Width Adjustment (continued)

To Create a Program for Dispense Width Adjustment (continued)

D:\Save\WidthAdjustmentTest-Danny-001.src

A	Command	1	2	3	4	5	6
1	Z Clearance Setup	0	1				
2							
3	// With Autospeed						
4	Label	1					
5	Arrow Check Point	223.282	253.926	30	11	2	
6							
7	AutoSpeedSetup	70	10	0.8	0.2		
8							
9	MeasureWidth	1	11				
10							
11	Line Start	166.274	238.607	60.908			
12	AutoSpeed	1					
13	Line End	237.738	239.547	60.908			
14	Step & Repeat X	0	13.087	1	2	2	1
15							
16	End Program						

Example program using Mea. Width to cause the system to automatically adjust line speed to maintain a specified line width

NOTE: In this example, command address 3 is a comment.

OptiSure 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 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 feature also includes advanced functions for augmenting mark images to make them easier for the system find.

Item	Part #	Description
	7364993	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:

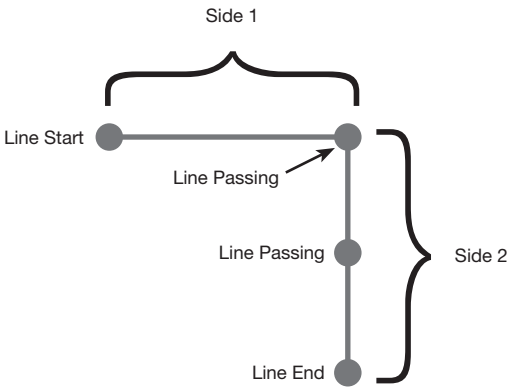
- A command is in effect until it is superseded by another command.
- Command settings override system settings.

Arrow Check Point		
Click	**Function**	
Double-click address and select from drop-down menu	Used in tandem with the Mea. Width or Mea. Point to Line options of the OptiSure feature to check the width of a section of dispensed line (between two specified points) against a saved mark image that specifies 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 Stop, Skip, Pause parameter.	
	Parameter	**Description**
	No.	The number of the mark image saved for the line section.
	0.Stop, 1.Skip, 2.Pause	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 moves to the next command in the program. 2.Pause The system stops running the program and displays an Arrow Check Pause - Waiting 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).

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 feature to check the width of a dispensed line against a saved mark image (for either one section of the line or the complete line); if the width of a dispensed line does not match the mark image, the system takes the action specified by the Stop, Skip, Pause parameter.	
	Parameter	**Description**
	No.	The number of the mark image saved for the line.
	0.Stop, 1.Skip, 2.Pause	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 moves to the next command in the program. 2.Pause The system stops running the program and displays an Arrow Check Pause - Waiting 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).

Appendix A, Command Function Reference (continued)

<table>
<tr><th colspan="3">Auto Speed</th></tr>
<tr><th>Click</th><th colspan="2">Function</th></tr>
<tr><td rowspan="3">Double-click address and select from drop-down menu</td><td colspan="2">Used in tandem with the Mea. Width option of the OptiSure feature, this command causes the system to adjust the dispenser speed as needed to maintain the desired width of a dispensed line (based on the limits defined by the Auto Speed Setup command). The line width to maintain is determined when the system executes the Measure Width command, which identifies which line to measure based on its Side number.

NOTE: This command is present in the drop-down menu only when the main.bas file has been added to the d:\ever_sr directory. The main.bas file is required for the dispense width adjustment feature.</td></tr>
<tr><td>Parameter</td><td>Description</td></tr>
<tr><td>Side</td><td>A number assigned to the dispensed line to check. See below for a diagram that explains this parameter.
NOTE: This value must match the value defined for the Measure Width command, which is also needed in the dispense program.</td></tr>
<tr><td colspan="3"> 
</td></tr>
</table>

Appendix A, Command Function Reference (continued)

Auto Speed Setup		
Click	**Function**	
Double-click address and select from drop-down menu	Used in tandem with the Mea. Width option of the OptiSure feature, this command defines the allowable line speeds and widths for the Auto Speed command. **NOTE:** This command is present in the drop-down menu only when the main.bas file has been added to the d:\ever_sr directory. The main.bas file is required for the dispense width adjustment feature.	
	Parameter	**Description**
	Max. Speed	The maximum line speed for the dispenser. **NOTE:** This value cannot exceed the maximum line speed shown in the specifications section of the robot manual.
	Min. Speed	The minimum line speed for the dispenser. **NOTE:** This value cannot exceed the maximum line speed shown in the specifications section of the robot manual.
	Max. Width	The maximum width allowed for the line. **NOTE:** This value must match the values specified in an Arrow Check Point command, if used in the program.
	Min. Width	The minimum width allowed for the line. **NOTE:** This value must match the values specified in an Arrow Check Point command, if used in the program.

Measure Width		
Click	**Function**	
Double-click address and select from drop-down menu	Used in tandem with the Mea. Width option of the OptiSure feature, this command causes the system to measure the width of a dispensed line, as identified by its Side number, against the Max Width and Min Width values specified in a saved mark image. **NOTE:** This command is present in the drop-down menu only when the main.bas file has been added to the d:\ever_sr directory. The main.bas file is required for the dispense width adjustment feature.	
	Parameter	**Description**
	Side	A number assigned to the dispensed line to measure (refer to “Auto Speed” on page 46 for a diagram that explains this parameter).
	Pattern No	The mark image number that defines the maximum and minimum allowable widths for a line.

Move To	
Click	**Function**
Double-click address and select from drop-down menu	Moves the tip to the specified coordinates. **NOTE:** This command is present in the drop-down menu only when the main.bas file has been added to the d:\ever_sr directory. The main.bas file is required for the dispense width adjustment feature.

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.

Nordson EFD

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