



AutoVISION Software

Quick Start Guide





AutoVISION Quick Start Guide

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Introduction

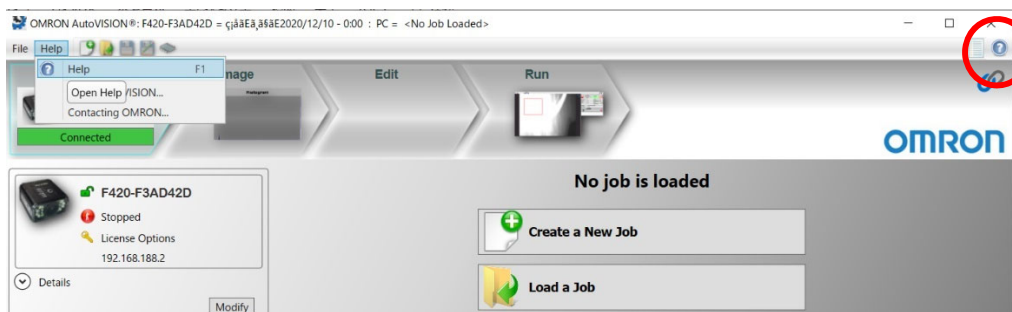
Thank you for purchasing your MicroHawk smart camera. This document is designed as a quick overview on how to use the AutoVISION software to set up a simple vision application.

This document will guide you through software installation, and then through the 5 simple steps to deploy your vision application which are Connect to the camera, create “new” job, get a good Image, program and Edit your job, and then finally to Run it.



AutoVISION Help

Full details for the operation of AutoVISION can be found in Help. You can access the HELP from the UI two ways, either through the menu or by clicking on the help icon .



Additional Material for the purchase, setup and operation of your Omron Vision System can be found on your local Omron Website. These include:

Name of Manual
Camera specific Datasheets
Quickstart Guides
Camera specific Hardware User's manual
Communication and Industrial protocol manual

The symbols used in this manual have the following meanings



Precautions for Correct Use

Precautions on what to do and what not to do to ensure proper operation and performance.



Additional Information

Additional information to read as required.

This information is provided to increase understanding or make operation easier.

1. Install and Start AutoVISION

- a. Download the latest version of AutoVISION software from the Omron website.
- b. Double click (run) the downloaded installer.
(File name example : SetupAutoVISION_522_3016.exe)
- c. Double click (run) the AutoVISION icon(*) on your desktop

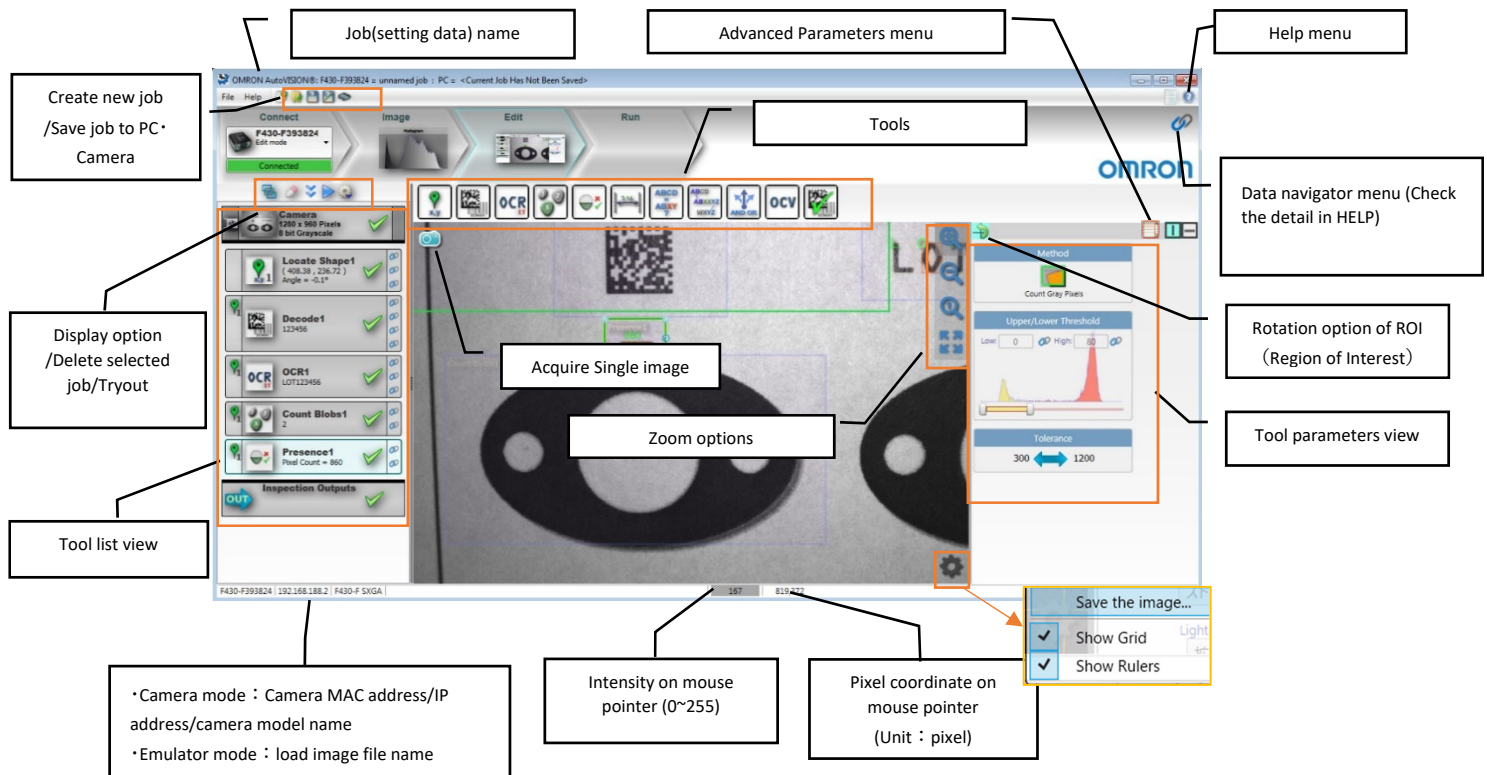


Minimum PC Requirements

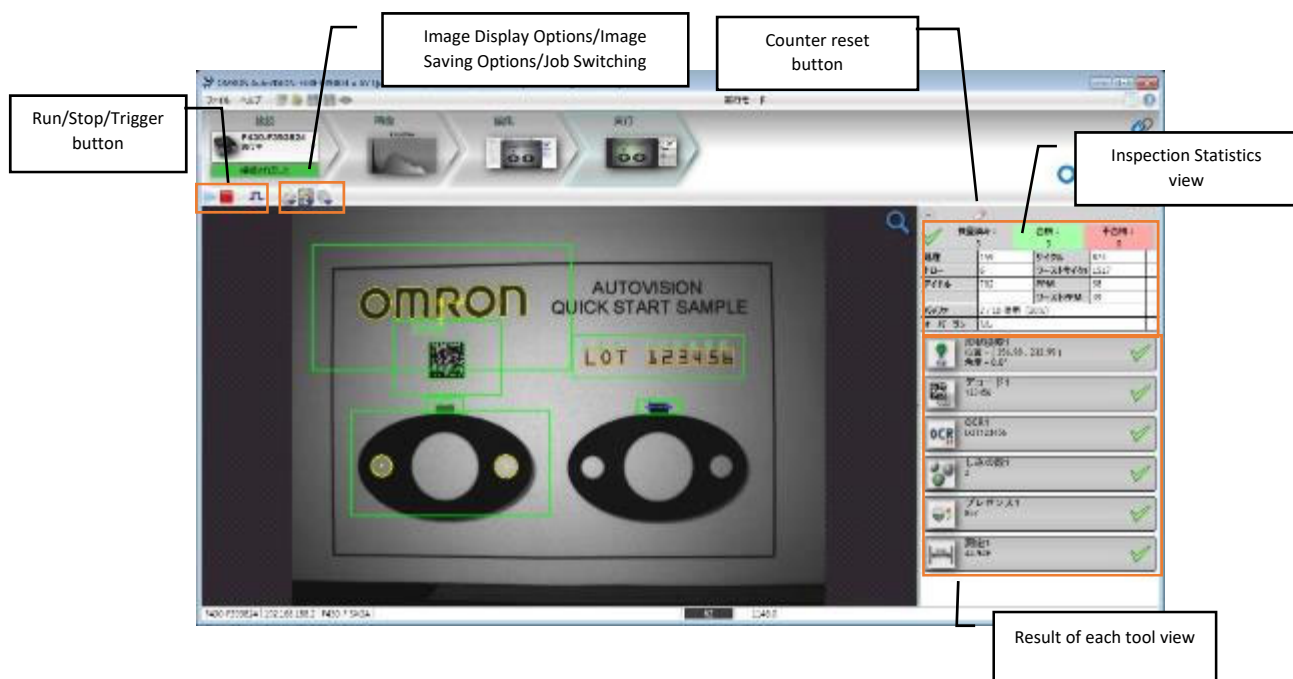
- Intel® Core™ i3 Processor @1.6GHz
- Internet Explorer 11 / Google Chrome
- 2GB RAM (Windows 7 SP1 / Windows 7 Embedded Standard SP1)
- 64GB hard drive space
- 32-bit color display, 1366 x 768 or 1280 x 960
- 4.0 Windows Experience Index (particularly for graphics)
- 1 USB 2.0 port and 1 Network port

2. AutoVISION Display and basic operation

a. Edit mode



b. Run mode



c. Basic operation

- Left click : Select
- Drag with right click : Reposition image
- Upper scroll/Pinch out/Swipe down with 2 fingers/Double tap : Zoom in
- Lower scroll/Pinch in/Swipe up with 2 fingers : Zoom out

3. Connect to the Camera

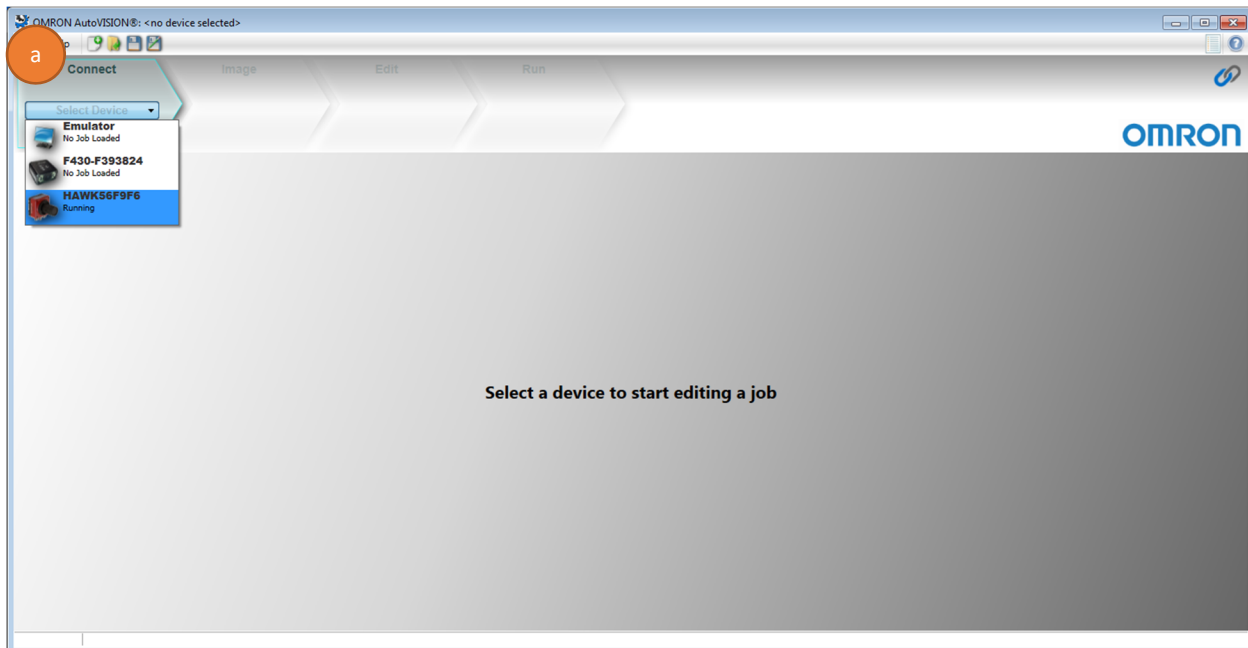
Select the device to be used with AutoVISION.

- a. Select the camera in the drop-down box.



Additional Information

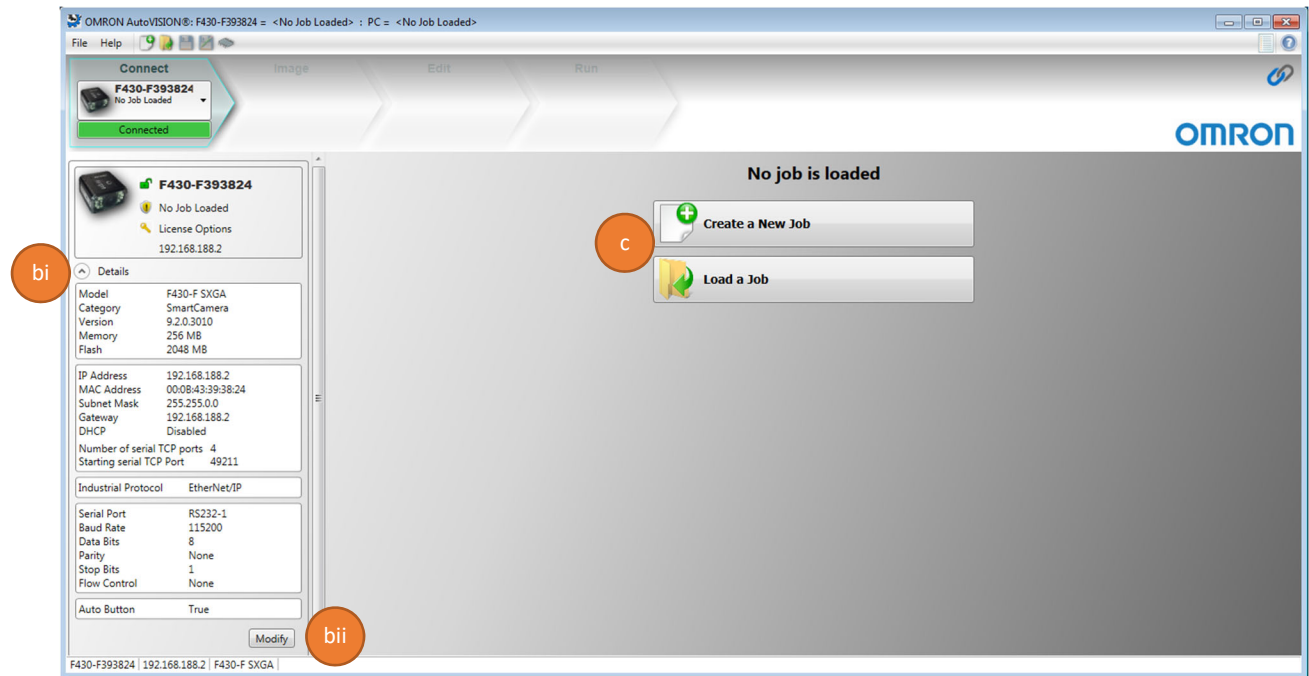
Select [Emulator] if you want to verify by saved images



- b. The F430-F camera is set by default as below. Set your computer to a compatible address or if the network parameters need to be changed.

IP address	192.168.188.2
Subnet mask	255.255.0.0

- i. Click [Details] button to see the IP Address
 - ii. Click [Modify] to make changes. This may request to reboot your camera. Modification is reflected when reconnection is completed.
- c. Select [Create a New Job].



4. Capture an Image

Adjust the camera and lighting settings to produce the best image.

- Select the Image view on Navigator bar to adjust your image for best performance. Creating a New Job will move you automatically to Image view.
- Capture images by clicking on the blue camera icon. If you have hardware connected, you will also have live image icon.



Additional Information

Using the Emulator

Section 5.1 describes how to load “saved images” into AutoVISION.

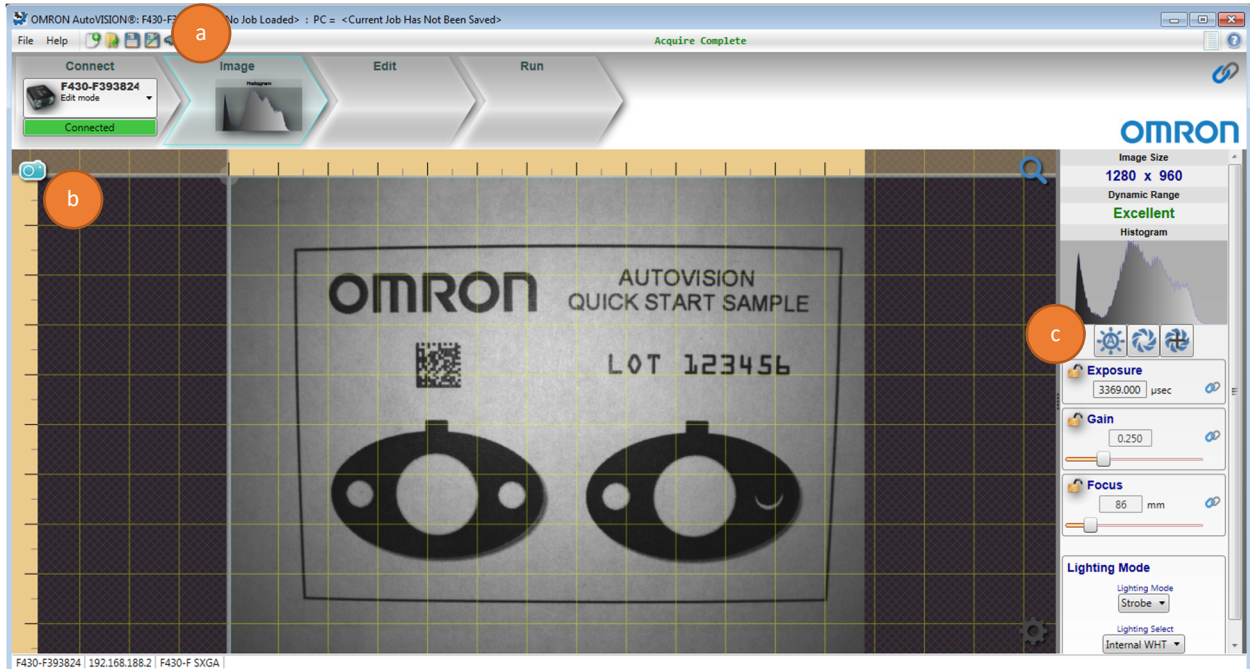
- The camera and lighting settings are available on the right side. These settings include [Exposure], [Gain], [Focus] and [Lighting] Modes.



Additional Information

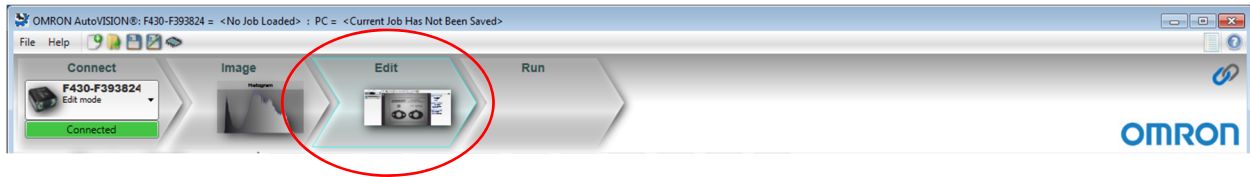
About Exposure, Gain, Focus adjustment

Click the Auto Calibration icon  for optimal camera parameters to be set automatically. This feature works best if there are high contrast features in the center of the image. After Auto Calibration has completed, click the blue camera icon to capture a new full screen image with these settings.



5. Edit Vision Job

Select the Edit view on Navigator bar to add or adjust the VISION Tools used in your job.



5.1 Set Camera Parameters

Adjust camera parameters, including the camera trigger. Load saved images if using an Emulator.

- a. To the left of the image is the tool list with the Camera at the top. Select the Camera in the tool list. The selected tool will turn light blue.
 - i. To use saved images, click the camera icon on the left side of the Camera tool. This will change the icon to a folder and a dialog box will be displayed allowing you choose the folder that contains the saved images.



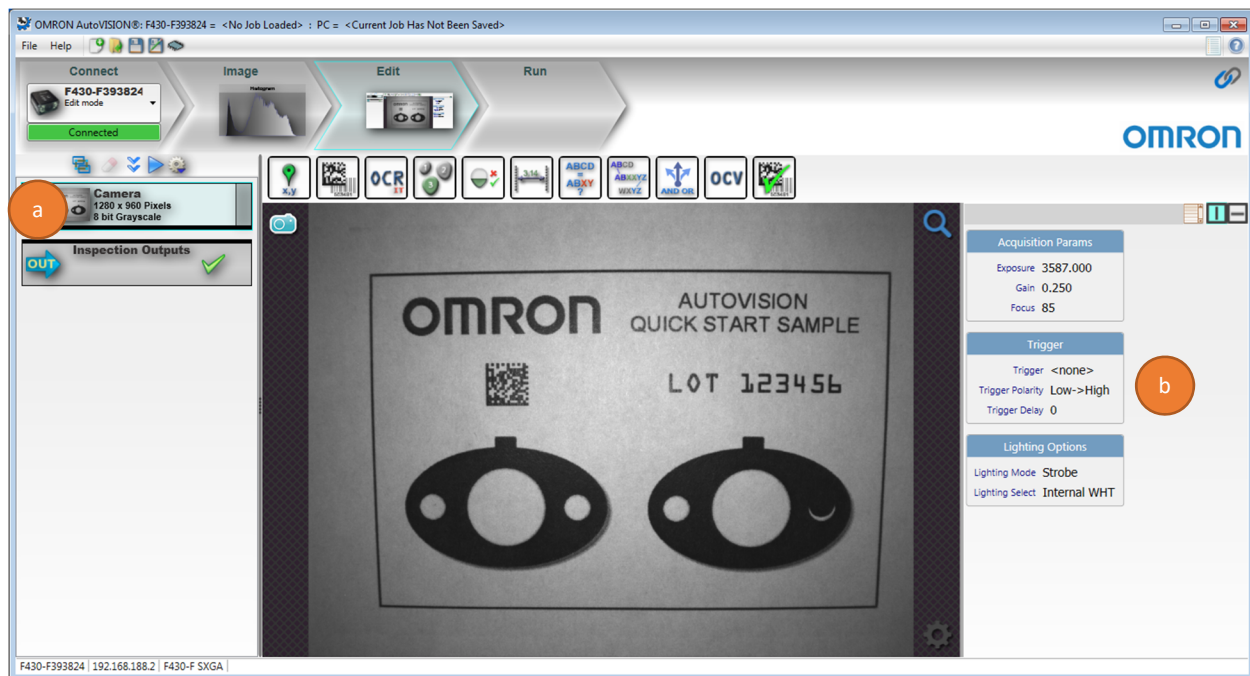
- ii. Clicking on the Folder will toggle back to taking images from the connected hardware.



Additional Information

The images for this AutoVISION quick tutorial are located at:
C:\Omron\AutoVision\TestImages\AV Quick Start

- b. To the right of the image are the settings associated with the selected tool. Set the desired trigger settings. In this example, leave this setting at [none] or [Virtual] for this job.

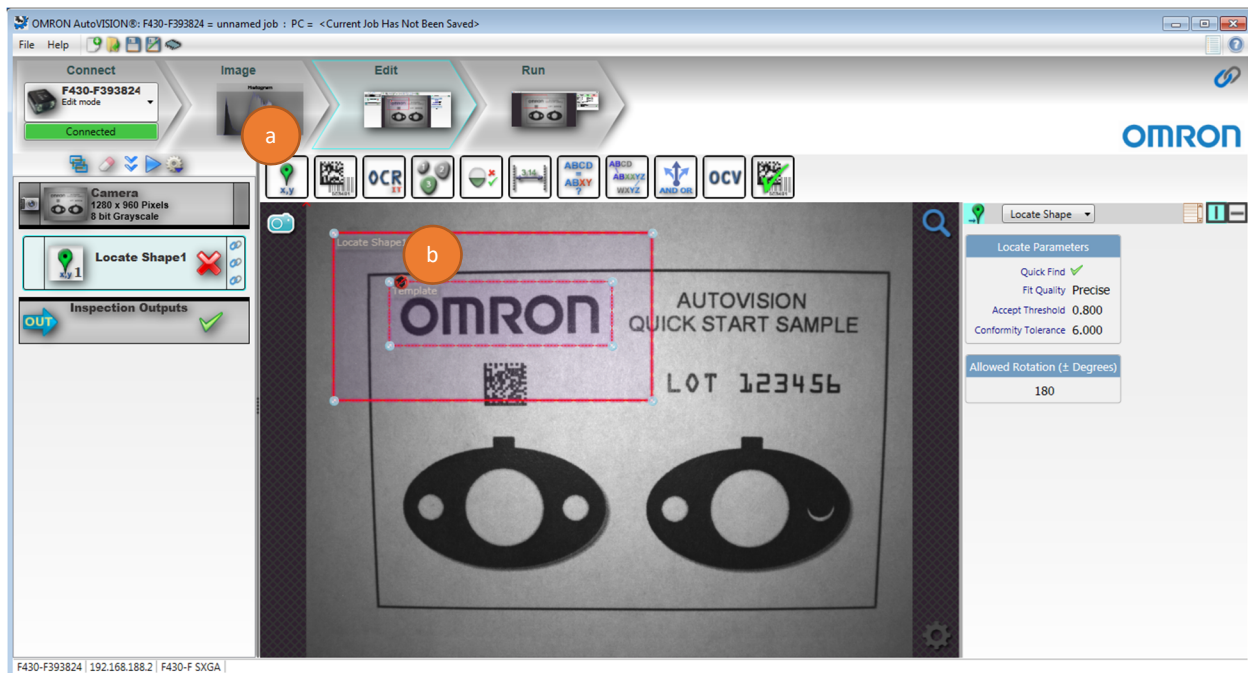


5.2. Use Locate tool

The Locate tool is used to detect a parts position and orientation. Locators can also be used compensate for part movement and rotation by moving subsequent tools into place based on the found location point.

In this example, set the tool up to locate “OMRON” logo position and rotation.

- The available tools are shown in a toolbar just above the image. Click on the [Locate Tool] icon to add this tool to the job.
- This tool has two regions of interest (ROIs). The inner ROI (Template ROI) is the locate pattern (“OMRON” log in this example) to learn. The outer ROI (Locate Shape ROI) is the search area for this pattern. Adjust the regions as shown below.



- Click the Red Train icon  in the upper left of the Template ROI. After training the ROIs will become green and a yellow outline should be seen around the learned pattern.

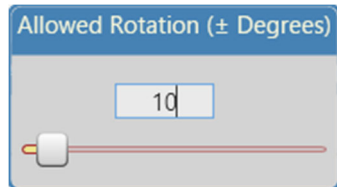




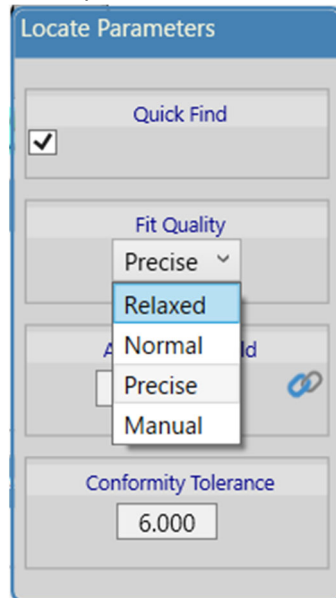
Precautions for Correct Use

Direction of adjust parameters

- a. To reduce inspection time
Adjust [Allowed Rotation] as small as possible
Ex.) If the work will not rotate, set from +/-180(Default) to 10 degree or less. Just enough for normal rotation.



- b. To optimize location of the target model
- Prevent the algorithm from choosing the incorrect edges by setting [Fit Quality] to [Precise]
 - To allow the algorithm to find parts that may have variance in edge locations, set [Fit Quality] to [Relaxed or Manual] (*). You may also lower the Accept Threshold percentage.



(*)[Accept Threshold] and [Conformity Tolerance] are automatically set. If part is being located correctly, click [Show Advanced Parameters Window] and adjust other parameters. To check the detail, see HELP.

5.3. Use Decode Tool ,Enable Location and Rotation based on Locator

The Decode Tool is used for reading 1D/2D codes. In this example, read the Data Matrix symbol

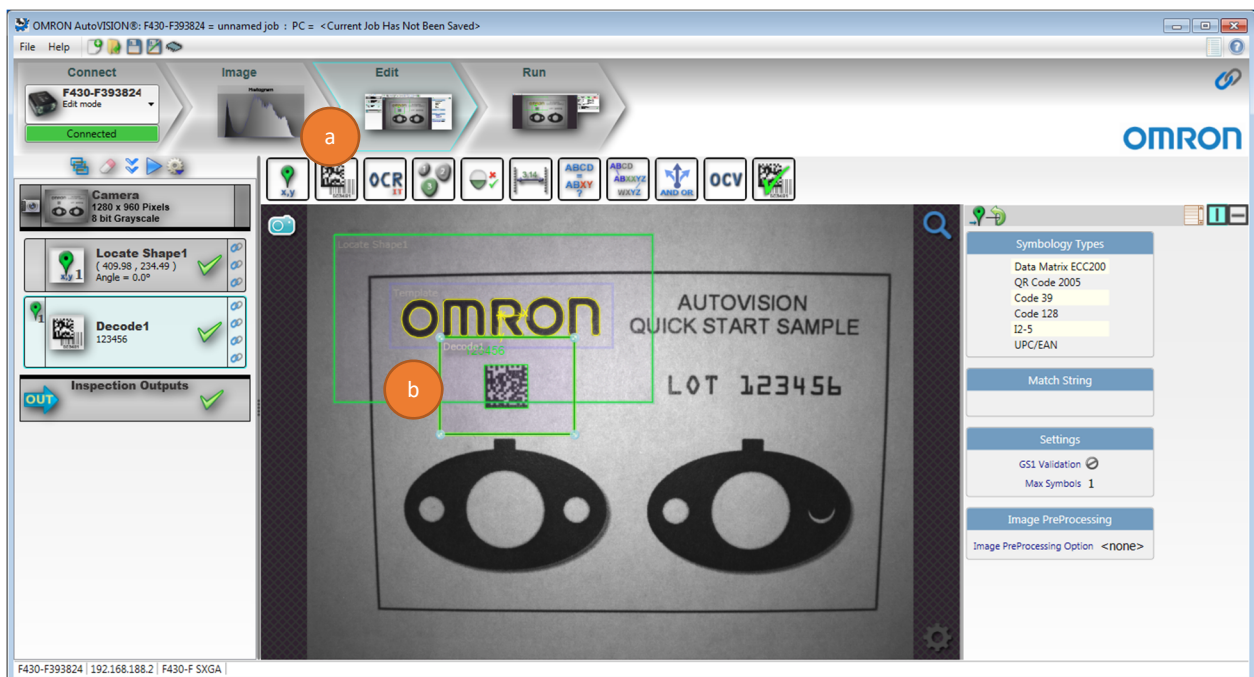


Additional Information

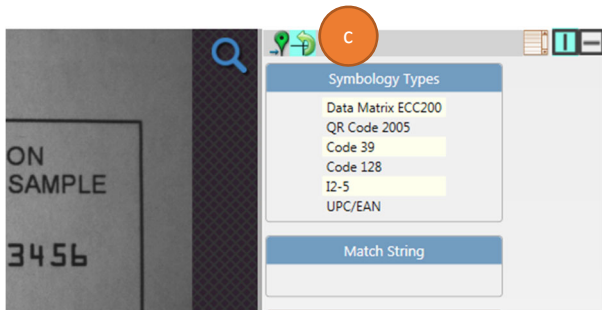
To display only the selected tool's ROI

You can see and control all the ROIs for multiple tools in default. Click [Show only the ROI of the selected Tool] icon , then you can prevent from changing other ROI's position. It is available if the icon changes to .

- Select the [Decode (barcode) Tool] icon to add this tool to the job.
- Resize the Decode tool ROI around the Data Matrix Symbol. This tool typically works well with default settings. No parameter changes are required in this example.



- c. Enable the [rotate option] in the Decode tool parameters. When enabled the icon will be light blue. This will allow the tool to rotate based on the angle of the [Locate tool].



Additional Information

ROI rotation option

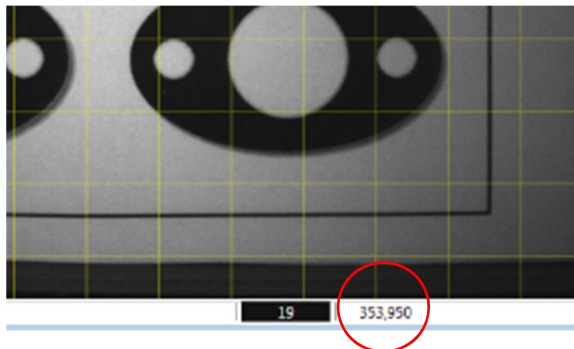
The tool rotation can be adjusted by clicking on the blue round rotation handle seen on the right side of the ROI and dragging to the desired rotation.



Precautions for Correct Use

Direction of adjust parameters

- a. ROI size
- i. Make the Decode tool ROI 20 % larger than the 1D/2D code to allow for the quiet zone. To detect the code size, mouse over to code symbol and check the pixel coordinate shown in bottom part of AutoVISION.

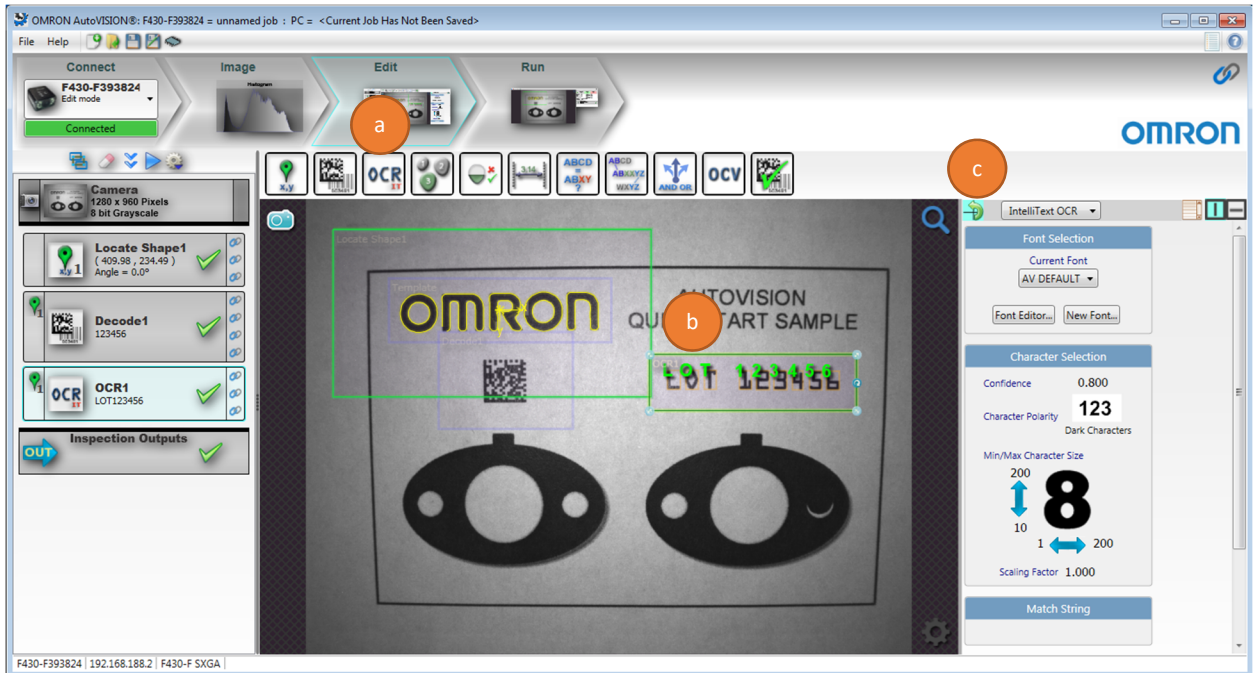


-
- ii. If the 2D code is rectangular, enable both DataMatrix ECC200, and DataMatrix DMRE at the bottom of the code selection list. DMRE is necessary to guarantee that the system properly finds rectangular codes.
 - b. When faced with other difficult to read applications, try to use [Custom features]. You can use this in [Shown the Advanced Parameters Window]. See HELP for more detail.
-

5.4. Use OCR Tool

This tool is used to read expiration date and LOT numbers etc. Read “LOT 123456” string in this example.

- Select the [OCR Tool] icon to add this tool to the job.
- Resize the OCR tool ROI around the text, “LOT 123456”.
- Enable rotation for this tool.





Precautions for Correct Use

Direction of parameter adjustment

To read correctly, click on character selection on the right side of the screen. The OCR algorithm works in 2 steps: Segment characters→Recognize characters. Some keys for success are described below. To check the detail for each parameter, see HELP.

- a. Segment characters
 - i. Adjust min/max character size according to actual size in AutoVISION image view. To detect the character size, mouse over to characters and check the pixel coordinate shown in bottom part of AutoVISION.
 - ii. Set [Scaling factor] as “Character width” x “Scaling factor” = 30 pixel.

- b. Recognize characters

Adjust Confidence below 0.8 (80%) to increase read rate. It is not uncommon that the same character has different shapes. Even at 50% it will not tend to misread, but will read the correct character in the face of more variation

You can increase the recognition rate by adding characters which are miss-classified into the Font Library. Click on the character which should be added to library. The “Add sample” pop-up will appear. Type in correct character and it will be added to the sample set.

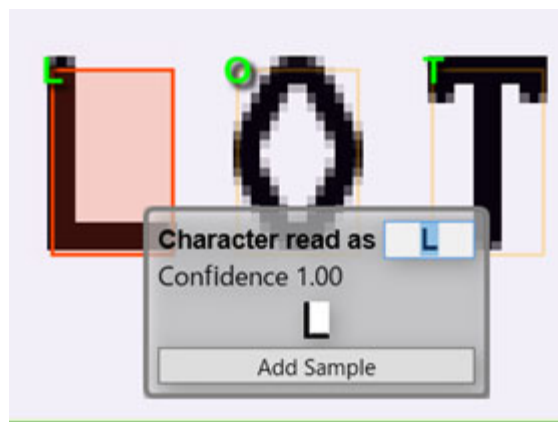
The read confidence for each character can also be seen as a value of 0 to 1 when hovering over a character and has a color associated with the read confidence.

The colors are defined as below in relationship to match score:

-Green: 81 – 100%

-Orange: 51 – 80%

-Red: 0 – 50%



5.5. Use Count Tool

This tool detects the number of objects based on color or shape information. In this example, verify that two small holes are in the gasket.

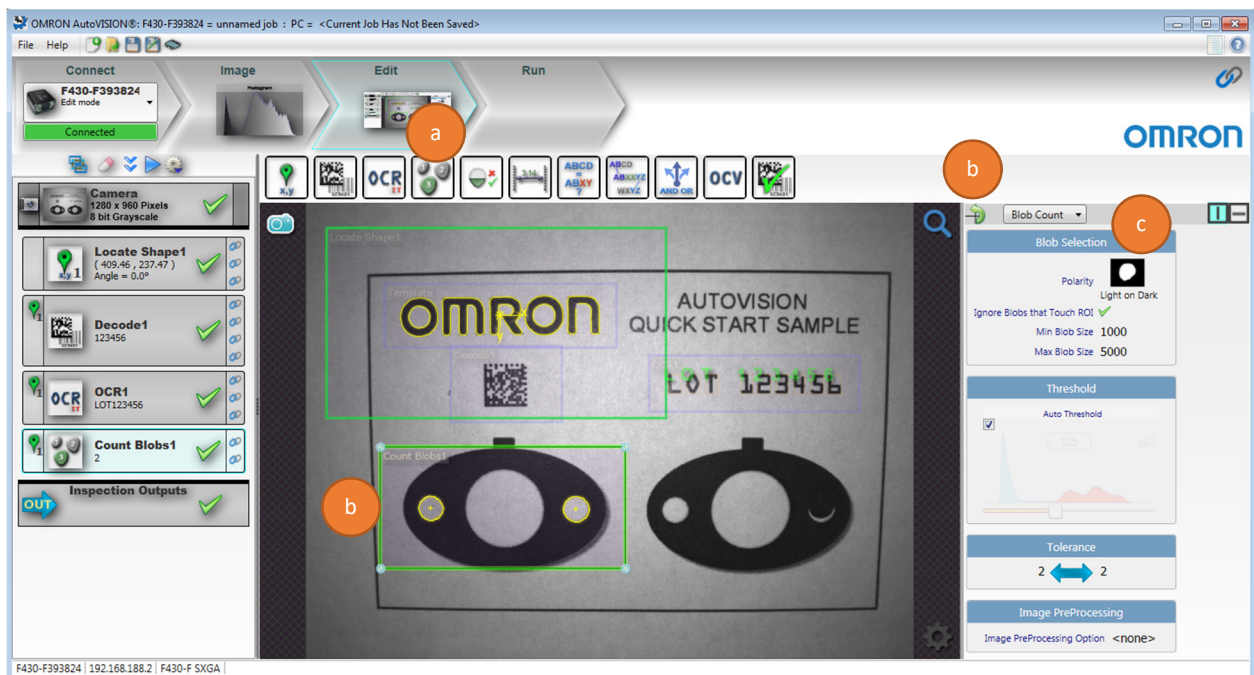
- Select the [Count Tool] icon to add this tool to the job.
- Resize the Count Blobs tool ROI around the left gasket. Enable rotation for this tool.
- Change the Blob settings to find the desired objects. Each blob will have a yellow perimeter with a crosshair (+) in the center. In the parameter settings on right side of screen:
 - Set [Polarity] to [Light on Dark]
 - Adjust [Min and Max blob size] to count the two smaller white circles on each gasket.
 - Change the max and min range of the [Tolerance] to 2 <--> 2 to make sure the tool only passes if it finds the correct number of holes, which is 2 in this case.



Additional Information

To detect optimal maximum/minimum blob size

This tool does not provide you the number of pixels of each blob. You will easily detect the size of each blob by using [Presence/Absence tool] stated in next section. You can also change the Min and Max size to determine empirically the correct value.

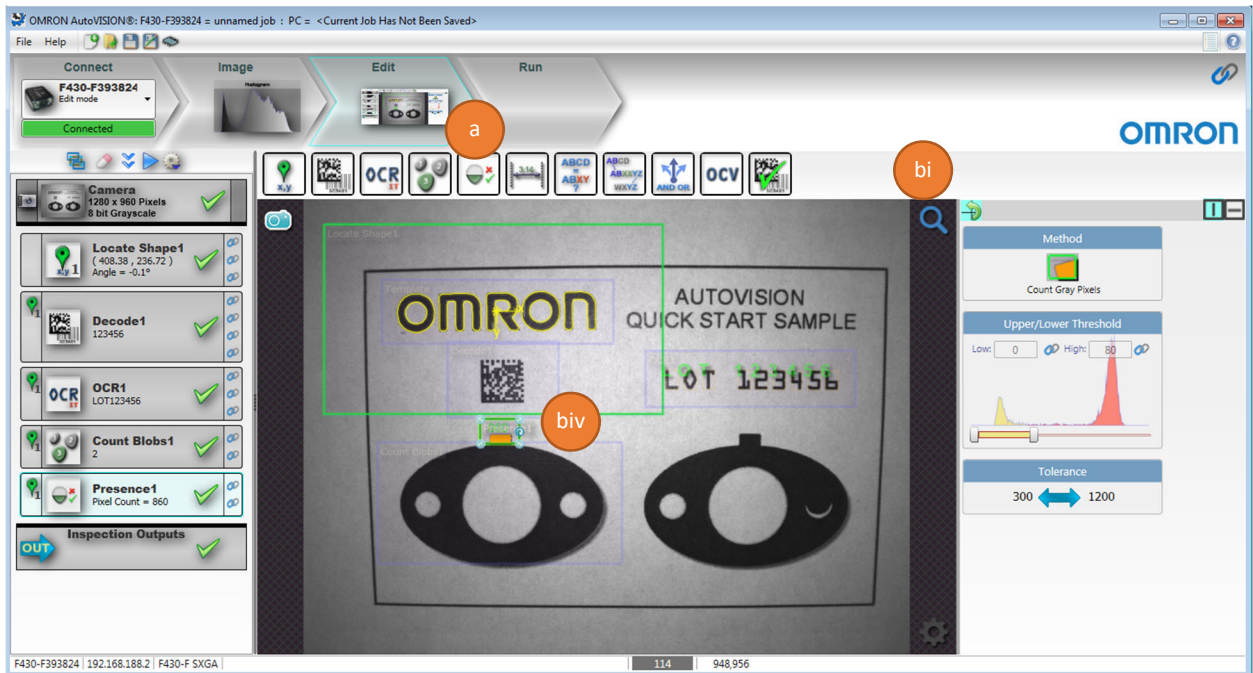


5.6. Use Presence/Absence Tool

Use Zoom options

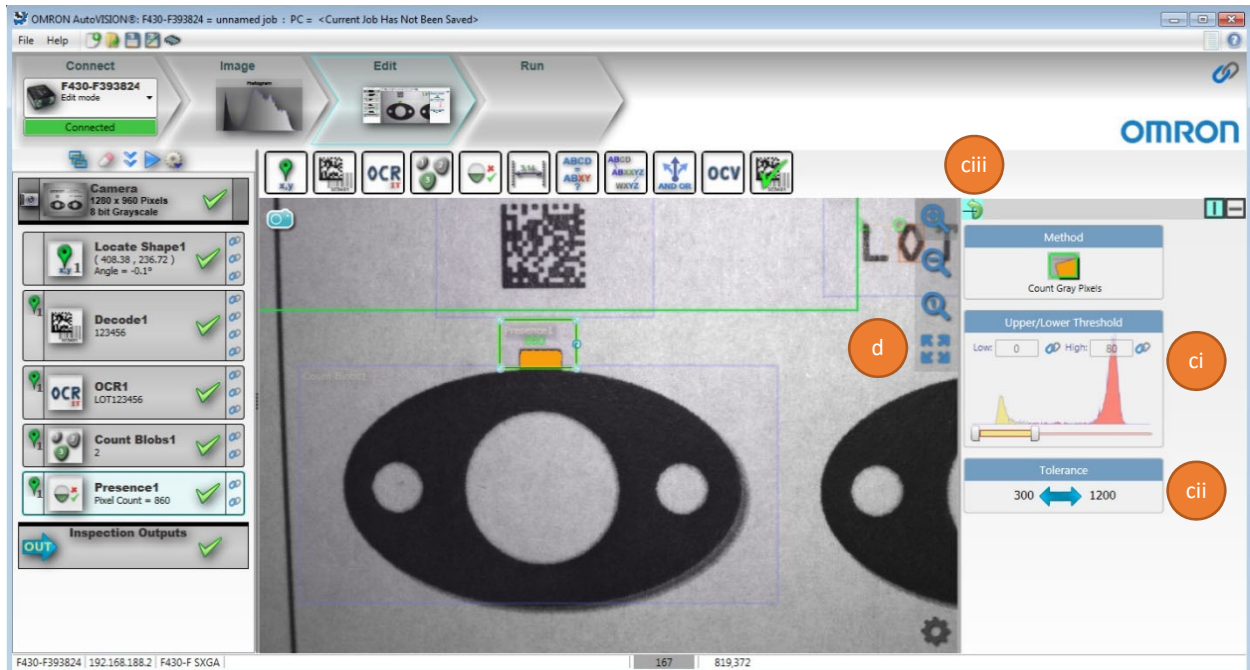
This tool detects the presence of a feature based on pixel intensity or contrast. Verify that the tab is present in the gasket in this example.

- a. Select the [Presence Tool] icon to add this tool to the job. Enable rotation for this tool.



- b. Use the Zoom button to make it easier to position the tool
 - i. Move the mouse over the [Zoom] icon to see the Zoom options
 - ii. Click [Zoom in (+)]
 - iii. Right click and drag to reposition image
 - iv. Resize and position the ROI over the left gasket tab

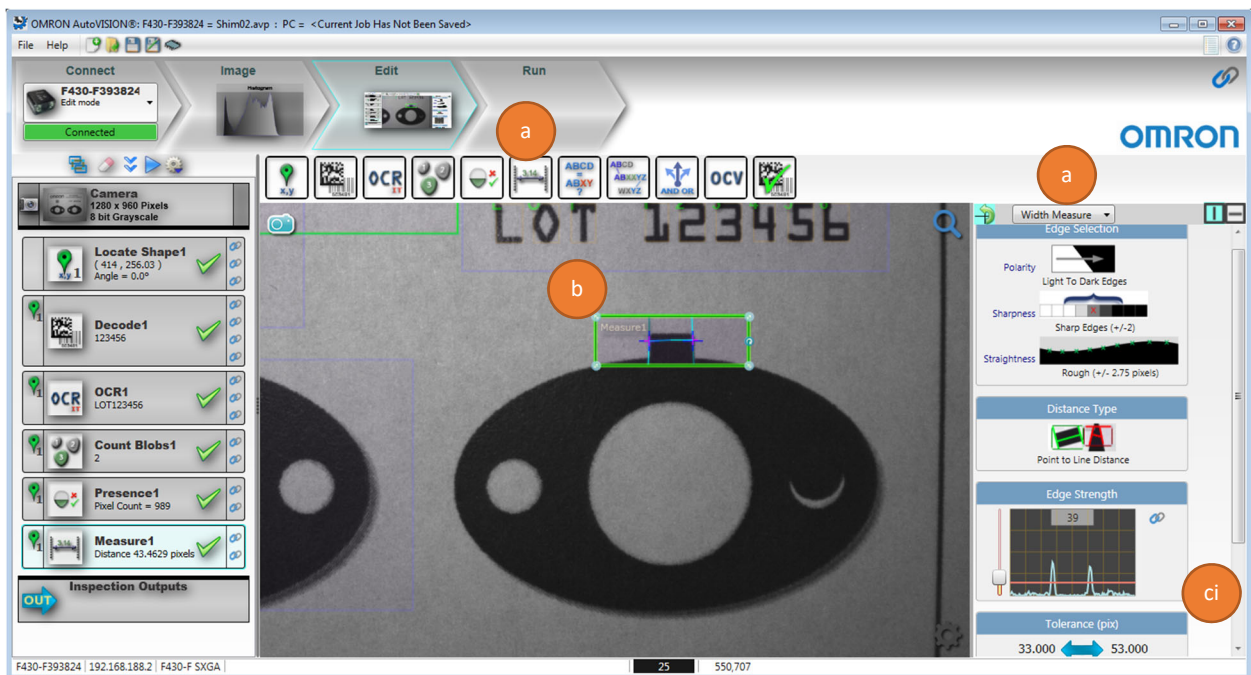
- c. Change the Presence tool settings to pass when the gasket tab is present in the tool. The orange pixels inside the tool are the pixels that are counted.
 - i. Adjust the Upper/Lower Threshold, using the sliders, to make the gasket tab appear orange.
 - ii. Set the [Tolerance] so that the Presence tool will pass when a gasket tab is in the tool but fails when the tool contains all light or dark pixels. Note the pixel count in the [Presence1] tool on the left side of the screen. The lower and upper tolerance settings should bracket this value to determine if the tab is present.
 - iii. Enable the Rotate option.
- d. Click [Zoom to Fit] to see the entire image



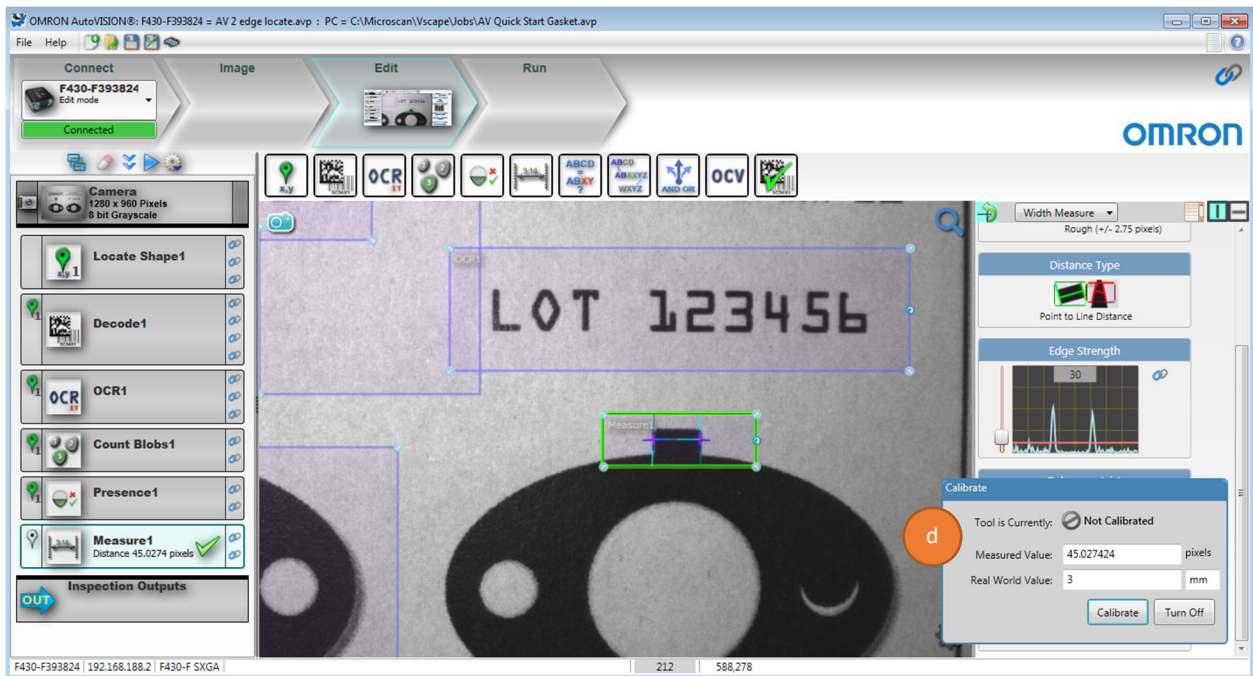
5.7. Use Measure Tool

This tool allows you to perform width or height measurements between two edges or circle radius etc. Measure the width of the gasket tab in this example.

- a. Select the [Measure Tool] icon to add this tool to the job. Width measure is default.
- b. Resize and position the ROI over the right gasket tab. Zoom in if desired. Enable rotation in this tool.
- c. Change the Measure tool settings to pass when the gasket tab is the correct width.
 - i. Adjust the [Edge Strength] to find the desired edge.
 - ii. Adjust the [Tolerance] so that the tab only passes when it is the correct width. The current width is shown in [Measure1] in the tool list on left side of screen.



- d. The [Measure tool] also has a calibration options. The first is Simple Calibrate You can convert the measurement result from pixel to required unit. To use this feature:
 - i. Click [Calibrate]
 - ii. The current measurement in pixels is displayed in the [Measured Value] field (Default: pixel to inch conversion value)
 - iii. In the [Real World Value] field enter the current measurement
 - iv. Enter the measurement units (Ex. In. to mm)
 - v. Click [Calibrate]
- e. AutoVISION also allows full non-linear calibration based on inputting data from a target. Use the Omron Device Non-linear Calibration Utility in the start menu. This will create a calibration file that you can load into your job through the AutoVISION File menu.



5.8. Try All Tools

Try all the vision tools in the job to confirm that they are configured as desired.

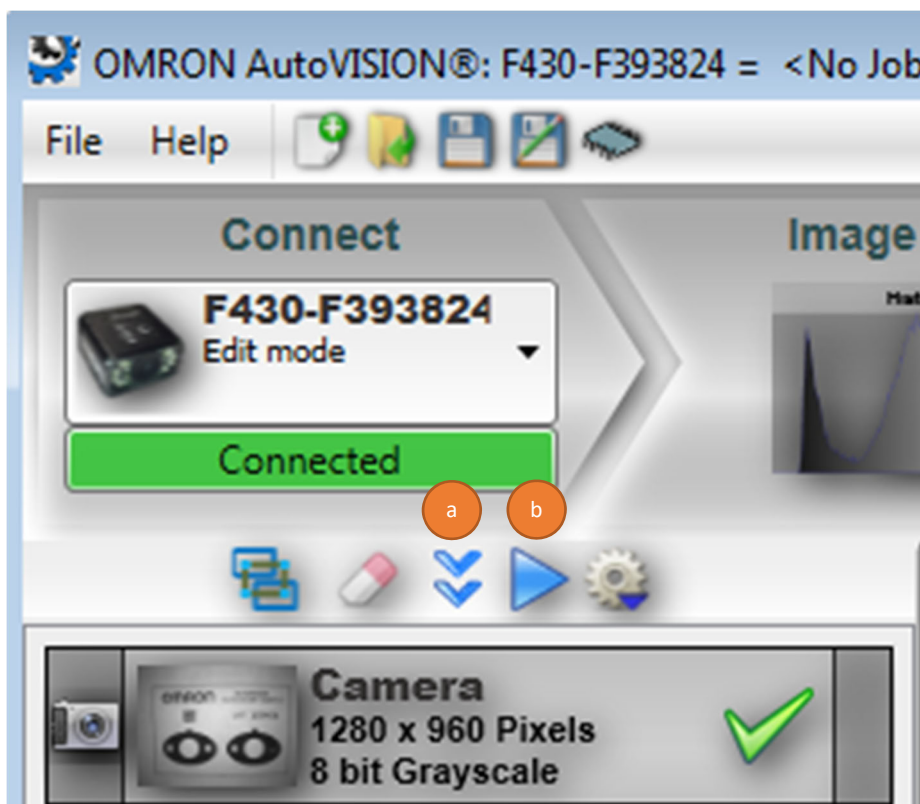
- [Tryout Once] button  will capture a new image and run all tools, once on the PC. Look at status indicators. A green check  means the tool has passed. A red X  means the tool has failed, for reason such as wrong count, or out of tolerance.
- Tryout Loop button  will capture a new image and run all tools. Once completed it will repeat this process continuously until the Stop Loop button  is pressed.



Additional Information

In case of using Emulator mode

- Tryout the images in selected folder one by one.
- The available image are the one acquired by MicroHawk smart camera series or TIFF/BMP/PNG image of same resolution.



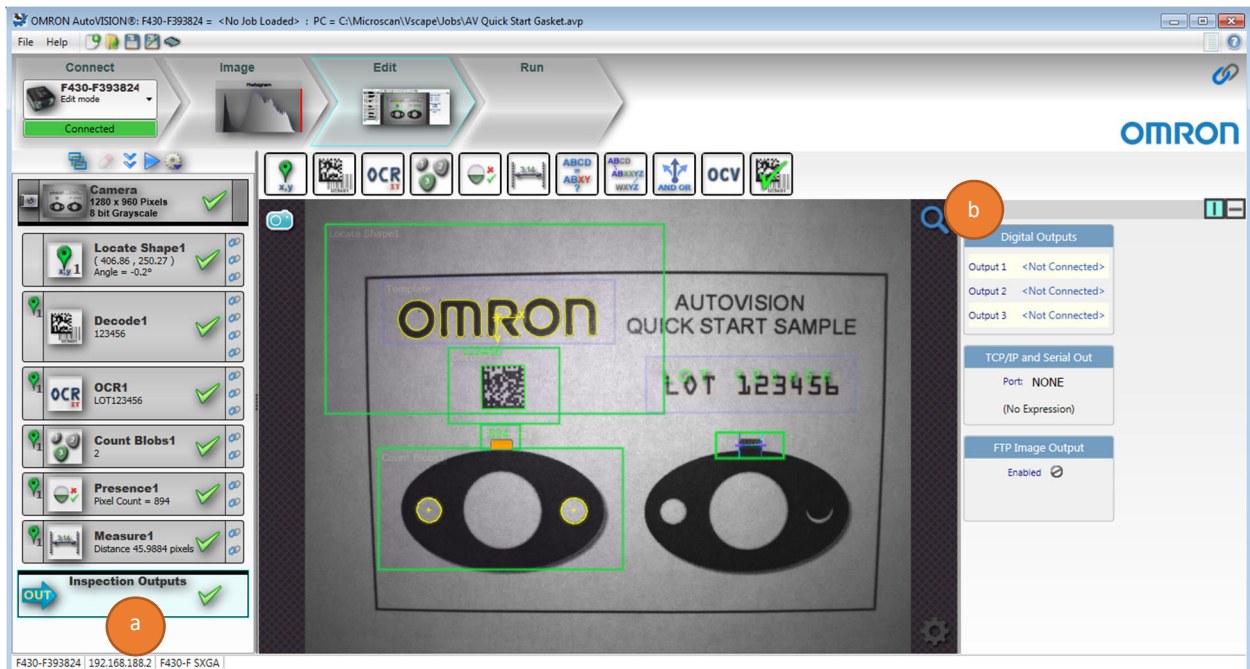
5.9. Set Inspection Outputs

This tool communicates inspection results to another device. Basic means are [Digital output] and [TCP/IP and Serial Output String]. In addition, you can use some MSLink and industrial protocols. In this example, see how to use [Digital output] and [TCP/IP and Serial Output String].

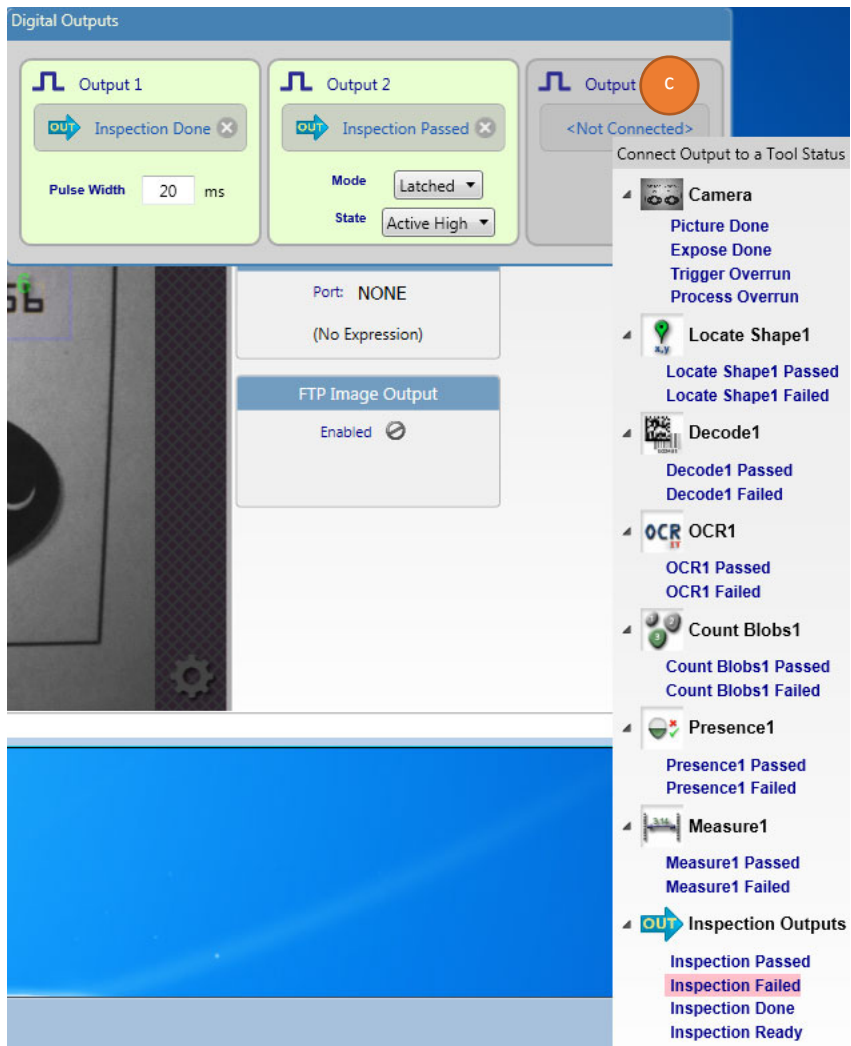
5.9.1. Digital Outputs

Digital Outputs are a fast, easy method of indicating the inspection results to another device, like a PLC or stack light.

- Select the [Inspection Outputs] in the tool list
- Click the [Digital Outputs]



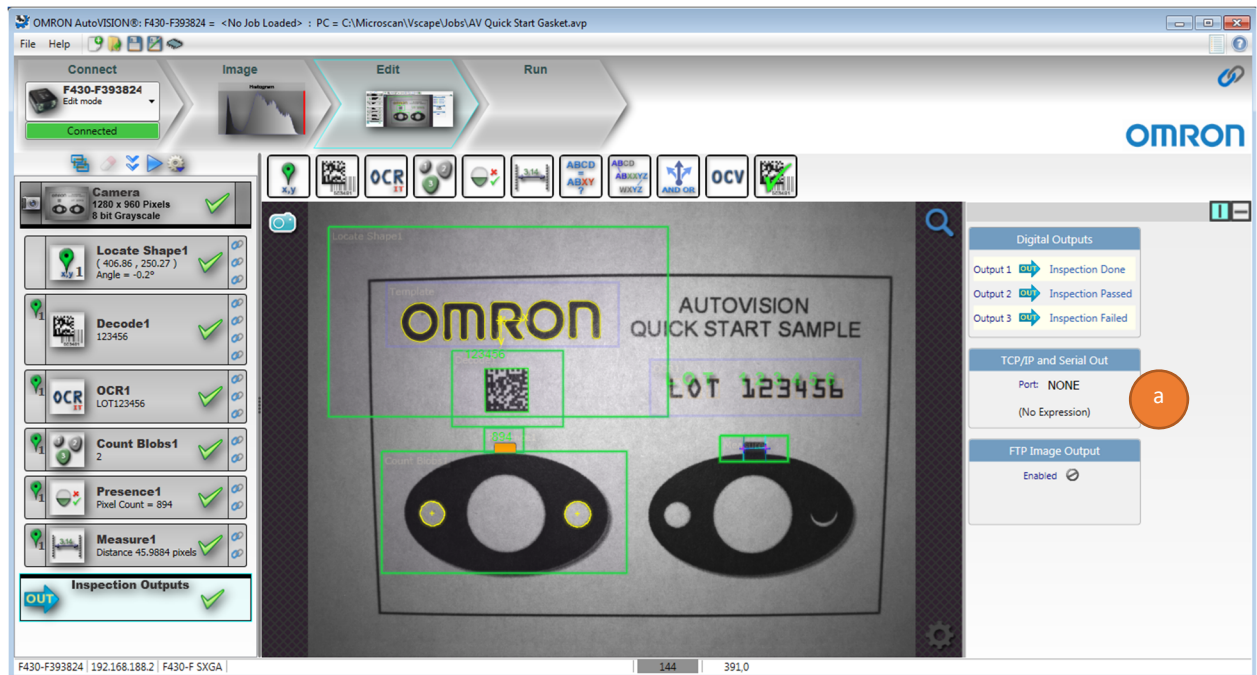
- Assign the outputs in the Digital Outputs pop up window. Click under Output 1/2/3 and select Inspection Done. Set the desired pulse width time, in this job make it 20 ms (milliseconds).



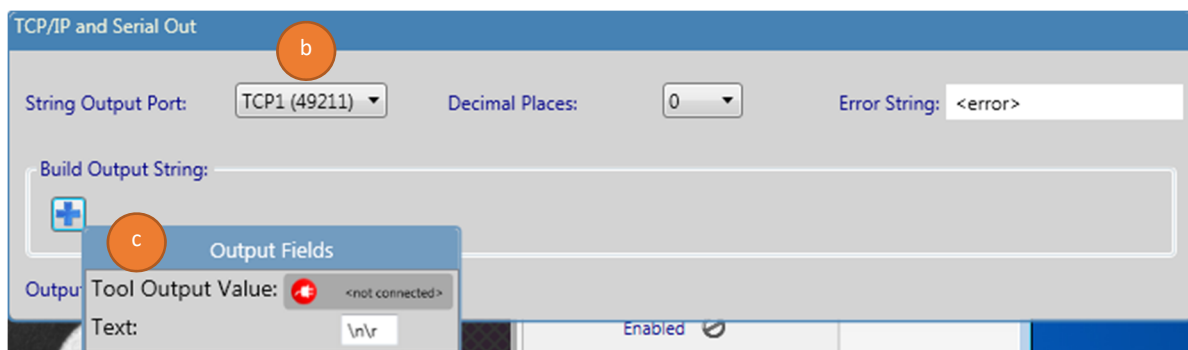
5.9.2.TCP/IP and Serial Output String

TCP/IP or Serial output messages provide the ability to transmit inspection results like a barcode or measurement to another device. In this example we will send the Decode1 tool string followed by CR LF (Carriage Return + Line Feed) characters.

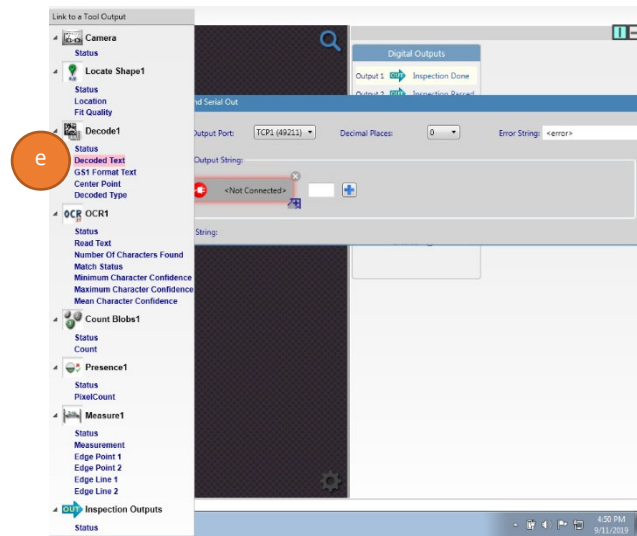
- a. Select TCP/IP and Serial Out



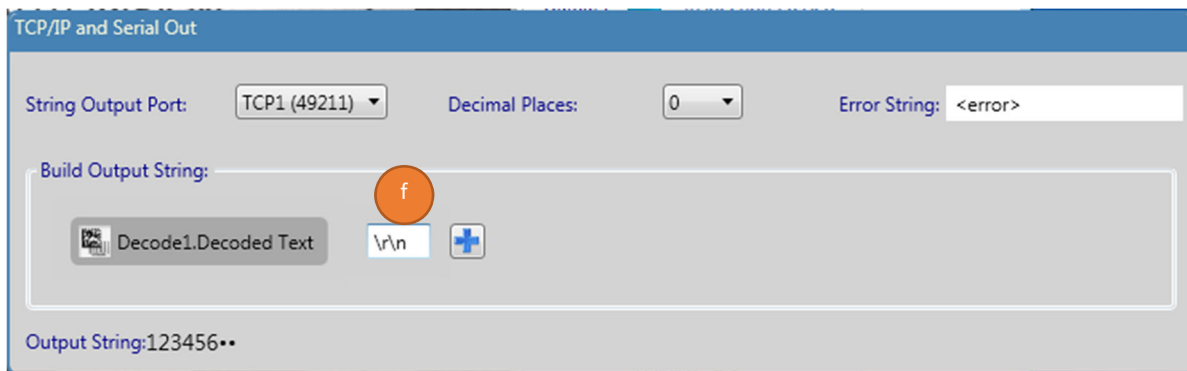
- b. Select String Output Port and choose TCP1 (49211).
- c. In the TCP/IP and Serial Out window we need to build the output string. Select the blue + symbol  and select Tool Output Value. This will add a field to the Build Output String region that states [Not Connected].
- d. Select the blue + symbol  and select Text. This will enter a field to allow you to add characters to the output string.



- e. Click on the [Not Connected] field, under [Decode1], select [Decoded Text].



- f. Click in the blank text field and enter: `\r\n`



- g. The results can be seen in a telnet client window when an inspection is completed in Edit mode using the [Try Once] or [Try Loop] buttons and in Run mode.

5.9.3. Opening Telnet Client to view results



Additional Information

Reason to test using Telnet Client

Quickly see the results that are output from your camera over a specific TCP/IP Socket and Port.

If the Telnet Client has not been enabled in Windows, please go to the link below and follow the instructions to enable this Windows feature.

<https://social.technet.microsoft.com/wiki/contents/articles/38433.windows-10-enabling-telnet-client.aspx>

- a. Click the Windows Start button, type cmd.exe and hit the Enter key.
- b. In the cmd.exe window type the following command listed. Replace the 192.168.188.2 (Default setting) with your camera IP address.



Precautions for Correct Use

Using Emulator

Your camera IP address can be found if you click on the word Connect in AutoVISION. If using the Emulator use IP address: 127.0.0.1 (Loop back address).

Typical Example: Type **telnet 192.168.188.2 49211**

b

```
Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\Solutions>telnet 192.168.188.2 49211_
```

- c. Click the [Try Once] button in AutoVISION. Each time the Inspection is run the decoded text is shown in the Telnet window on a new line.

c

```
Telnet 192.168.188.2
123456
123456
```

6. Save Job

Go to the [File] menu > [Save or click the Save] icon



Additional Information

About the [File] menu > [Archive Job] function

This will save the AutoVISION job and will make an additional Archive file that has an .AVZ extension. The Archive file contains the AutoVISION job and all the additional support files (ex. Font Library for the OCR Tool, Images, Locators, etc.) used by that job.

7. Run the Job

Download the job to the selected camera and run.

- a. Select the [Run] view in Navigator bar.

The job is downloaded to the selected camera; once completed, the counters and tools are seen to the right of the image area.

- b. Counters and Tool results field. See HELP for details.
- c. Trigger button
 - i. If the trigger was set to none, the inspection will start running continuously.
 - ii. If the camera was set to use a virtual trigger, click the Trigger icon to provide a trigger to the camera.

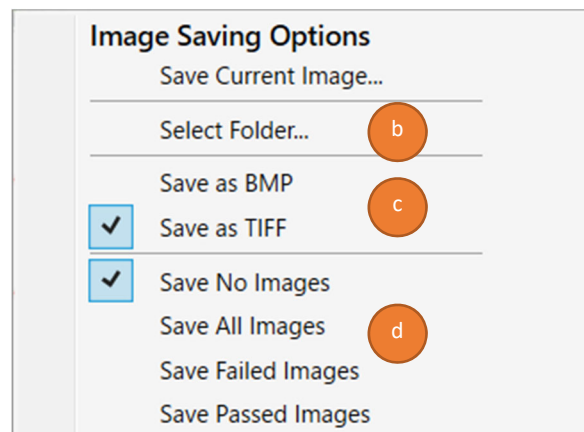
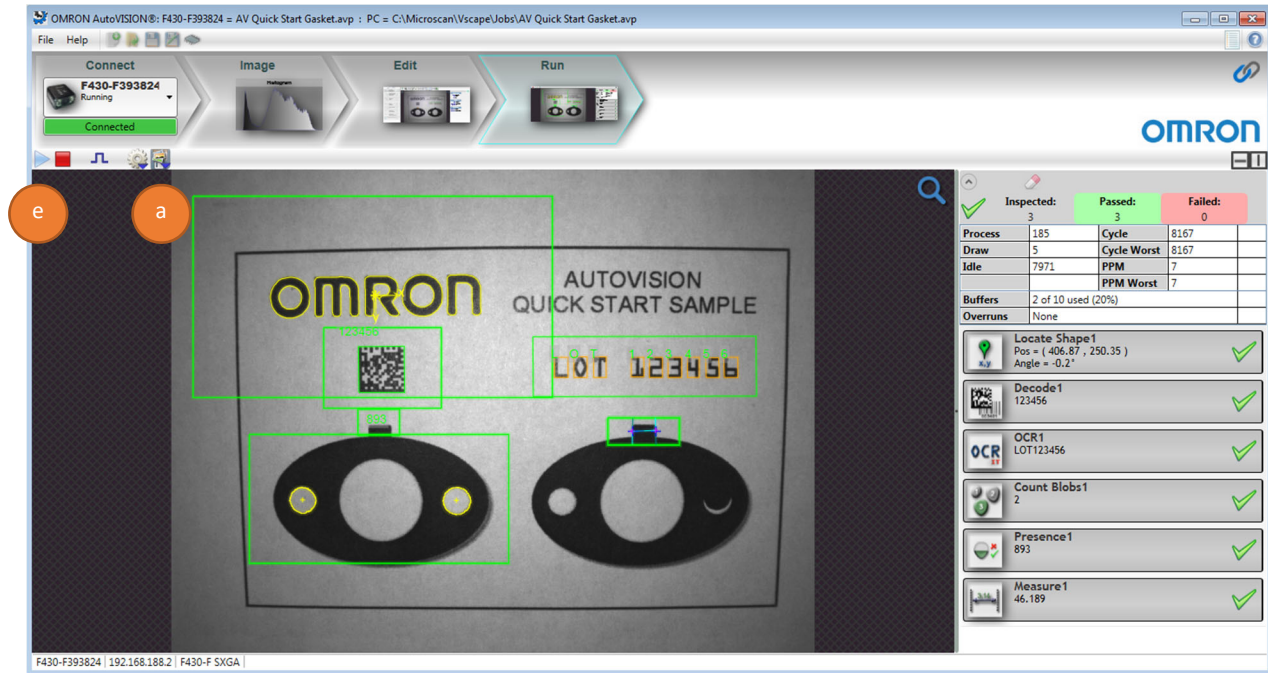
The screenshot shows the OMRON AutoVISION software interface. The top menu bar includes 'File' and 'Help'. The left sidebar has four tabs: 'Connect', 'Image', 'Edit', and 'Run' (labeled 'a'). The main image area (labeled 'cii') displays a live inspection of a sample. The sample has 'OMRON' and 'AUTOVISION QUICK START SAMPLE' text, a QR code, and two circular features. The right sidebar (labeled 'b') displays inspection results and tool status.

Inspected: 3		Passed: 3		Failed: 0	
Process	185	Cycle	8167		
Draw	5	Cycle Worst	8167		
Idle	7971	PPM	7		
		PPM Worst	7		
Buffers	2 of 10 used (20%)				
Overruns	None				
Locate Shape1	Pos = (406.87 , 250.35) Angle = -0.2°				
Decode1	123456				
OCR1	LOT123456				
Count Blobs1	2				
Presence1	893				
Measure1	46.189				

F430-F393824 | 192.168.188.2 | F430-F SXGA

8. Saving setup or runtime images

- Click [Image Saving Options] .
- Click [Select Folder] and find the folder you would like to save images.
- Select [Save as TIFF] or [Save as BMP].
- Select the condition of saving images from: [Save All Images] [Save Failed Images] [Save Passed Images].
- Click [Run Job].



9. Save Job to flash memory on camera

Saving the job to flash memory on the camera is required to allow the camera to load and restart the job on power up.

- a. Select the [Edit] view in navigator bar.
- b. Confirm that the job is correct and has been saved to the PC.

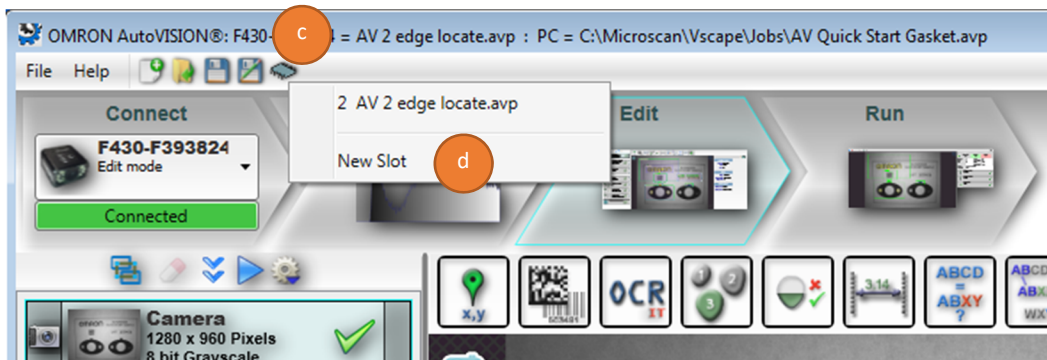


Additional Information

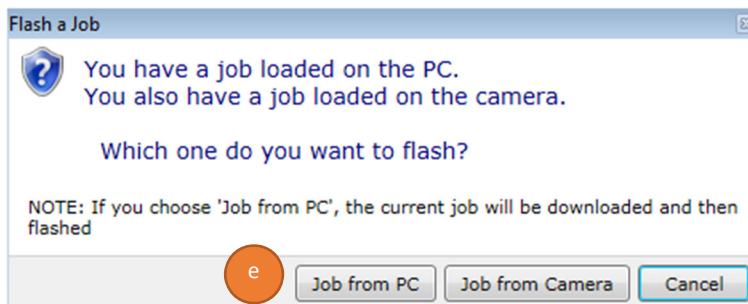
About file save type

It is recommended that you select File > Archive Job... This will save the job to the PC and create an Archive file (*.avz) that contains the job and additional support files used by the job.

- c. Select the camera flash memory icon
- d. Select the memory slot to write
 - i. Select [New Slot] to write this job to the camera.
 - ii. If jobs exist on the camera, selecting an existing slot will overwrite that memory slot.



- e. A pop-up window may appear which will allow you to overload the desired job to the camera.



10. Switch Job which is saved in camera

- Select [Connect] view in navigator bar
- Below the [Load a Job] button is a listing of the jobs stored in flash memory on the camera.
- If multiple jobs are stored in flash memory, select the desired job slot that should be loaded on camera power up, and click [Make Current].



Additional Information

About management of job size

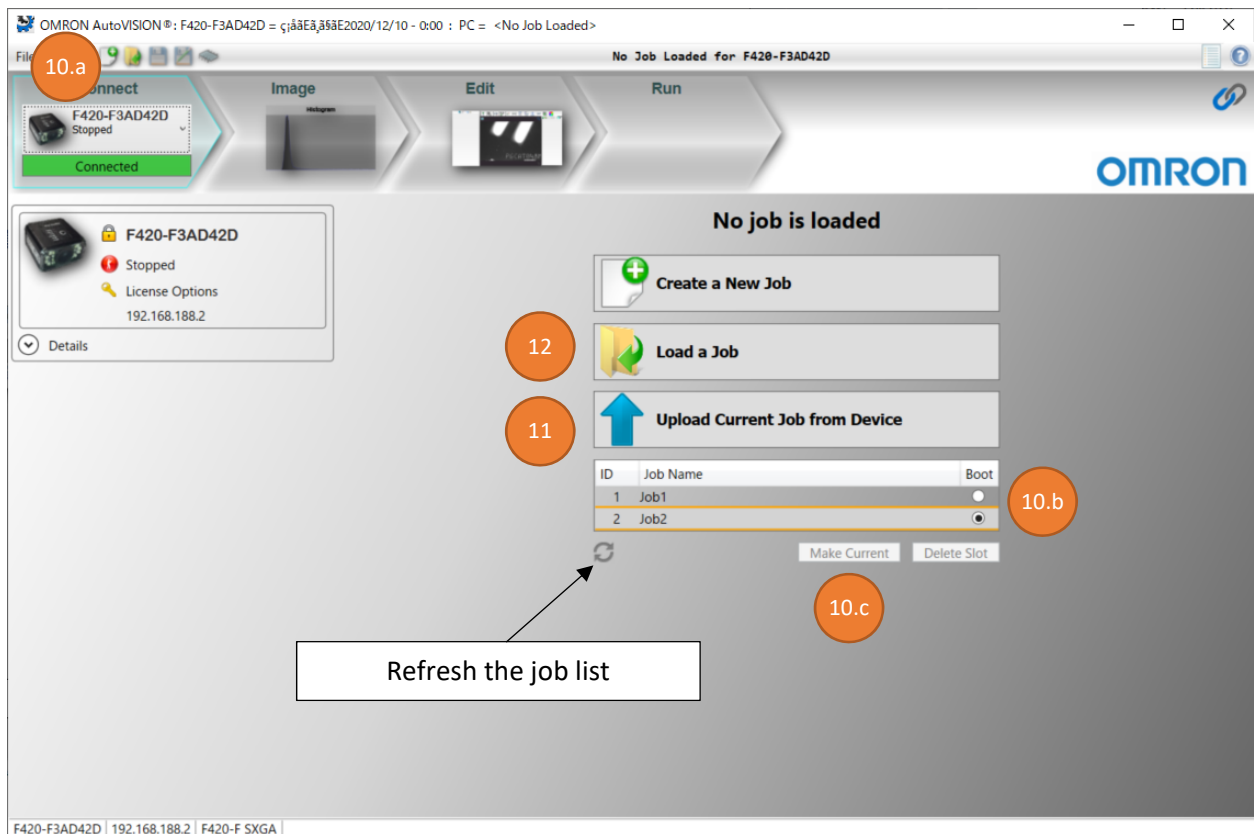
Click [Refresh the job list] , then you can see the list of file size for each job and free memory size.

11. Edit job which is saved in camera

Select the job to be edit, click [Upload Current Job from Device]

12. Edit job which is saved in camera

Click [Load a Job] and select target *.avp/*.avz file.



Appendix A – Quick Start Samples

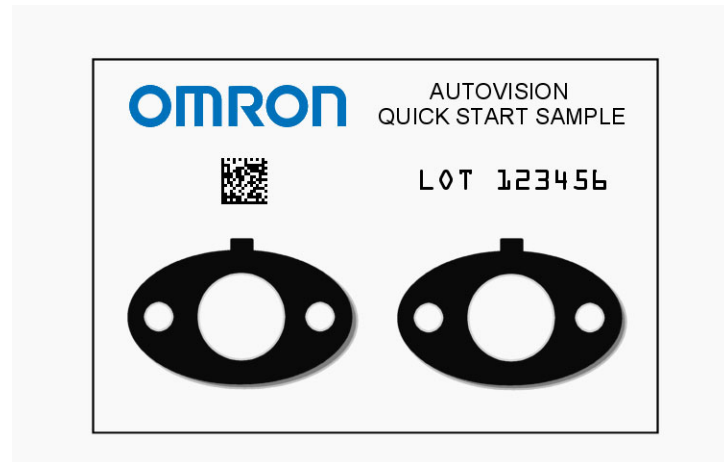
The AutoVISION quick start images used in this document are located at:

C:\Omron\AutoVision\TestImages\AV Quick Start

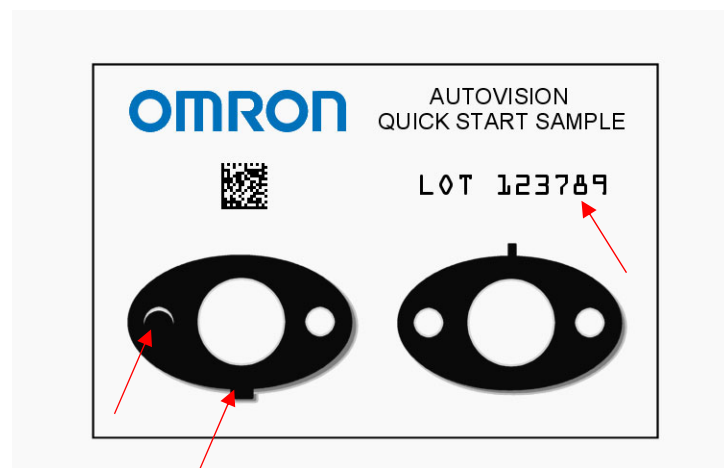
There are another sample images and jobs in below folder. Use them for your reference located at:

C:\OMRON\AutoVision\TestImages

Good Sample



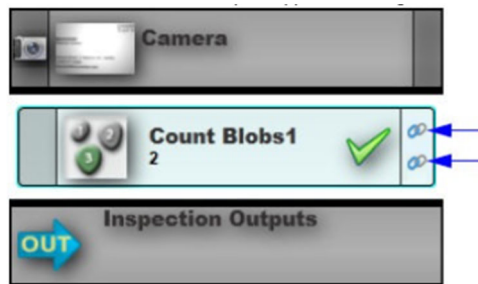
Bad Sample



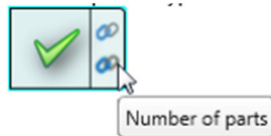
Appendix B – Use Omron Microscan Link

AutoVISION allows you to link tool parameters to tags within the software's Global Data Service GDS . This makes it possible to "set and get" the parameter values via any GDS-supported protocol, including serial, **TCP/IP**, **EtherNet/IP**, and **PROFINET I/O**. Example of count tool setting is below. See HELP for more detail.

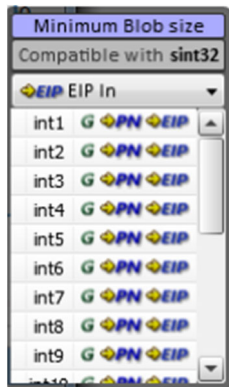
- a. Set up [Count tool].
- b. Click the link button in [Count tool] in tool list.



- c. Hovering the mouse over the link buttons identifies their associated parameter as shown below. Clicking the link button displays the Link Menu populated with GDS tags of a compatible type.



- d. Select the variable to be linked.



- e. Once a parameter is linked, the background of the link button turns green.



- f. There are other parameters to be linked which is not shown in tool list. To check all, click [Data navigator] . To check each parameter, see HELP.



Additional Information

Memory map of MicroHawk smart camera

The memory map for each type of variable is pre-defined as below. To check details, see industrial protocol manual (*).

(*)C:\OMRON\Vscope\Documentation\industrialprotocolmanual.en.pdf

Ex.) Input assembly layout of Ethernet/IP

Byte		Byte		Byte		Byte		Byte
0	STATUS	64	long5	128		192		256
2	ECHO	66		130		194		258
4	CMD CODERSLT	68	long6	132		196		260
6		70		134		198		262
8	CMD RET	72	long7	136		200		264
10		74		138		202		266
12	reserved	76	long8	140		204		268
14	STATE	78		142		206	string1	270
16	VIO	80	long9	144		208	(cont)	272
18	reserved	82		146		210		274
20	bool1...16	84	long10	148		212		276
22	bool17...32	86		150		214		278
24	bool33...48	88	float1	152		216		280
26	bool49...64	90		154		218		282
28	int1	92	float2	156		220		284
30	int2	94		158	string1	222		286
32	int3	96	float3	160		224		288
34	int4	98		162		226		290
36	int5	100	float4	164		228		292
38	int6	102		166		230		294
40	int7	104	float5	168		232		296
42	int8	106		170		234		298
44	int9	108	float6	172		236		300
46	int10	110		174		238	string2	302
48	long1	112	float7	176		240		304
50		114		178		242		306
52	long2	116	float8	180		244		308
54		118		182		246		310
56	long3	120	float9	184		248		312
58		122		186		250		314
60	long4	124	float10	188		252		316
62		126		190		254		318

Appendix C – Use FTP Image Output

To save images to server via PLC, you can use FTP protocol by below step.

- Click [Edit] in Navigator bar and click [Inspection Output] in left tool list.
- Click [FTP Image Output] in right image view.
- Fill each parameters of FTP server and other options.



Precautions for Correct Use

About File name format

There is a different in file name format between using AutoVISION soft trigger and PLC command trigger.

- Trigger from AutoVISION : "Characters set in Job"+yy-mm-dd-....tif
- Trigger from PLC : "Characters set in Job"+TimeStamp.tif



Precautions for Correct Use

Specification of TimeStamp

There is a different in file name format between using AutoVISION soft trigger and PLC command trigger.

- TimeStamp is the time count[us] after booting.



Additional Information

How to change file name

You can change base file name from PLC by using Omron MicroScan Link Tag (stringN)

Ex). If the goal format is "ABC000-01_TIMESTAMP.tif", the serial command is "SET stringN ABC000-01"

Appendix D – Correlation table with Omron FH/FQ series

The definition of specific words is different between MicroHawk smart camera and Omron FH/FQ. This section introduces the customer who is familiar with Omron FH/FQ series to understand the meanings easier by showing the list of each word. Note that these are the explanation of similar functions. No compatibility for them.

MicroHawk smart camera main functions	Omron FH/FQ similar functions	MicroHawk smart camera's FAQ
Locate (Locate Shape mode)	Shape Search III	Can I add or delete some of model edges to get more stable result? →No
Decode	Barcode/2D code	Can I change the match strings from external device ?
OCR	OCR	→Yes. Use OmronMicroScanLink.
Count	Labeling	Can I check the number of pixel for each Blob? →No. But you can check Min/Max number of Blobs in data navigator.
Presence/Absence	Gravity	Can I output gravity coordinate? →No. Use [Locate tool] and select [Locate Blob] mode.
Measure	Edge Position/Scan Edge Position/Circular Edge Position	Can I calibrate using calibration plate? →Yes. See [Multi Dot Calibration Utility] in HELP.
Image Preprocessing	Filtering	Can I use multiple preprocessing unit? →No
Save Image	Image logging	Can I select any folders to save images (Ex. USB folder)? →Yes
Job	Scene	How many jobs can I save in camera? →Until you use all the free memory.
Calibration (Exposure/Gain/Focus)	None	
Calibration(Pixel→mm)	Same as left	

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