IMSE/CIS 381 Industrial Robotics
Lab Manual

Lab 3 Inspection using robot vision system

1. OBJECTIVES

The objective of this experiment is to let students have hands-on experience on Fanuc robot vision system and using the vision system for finding the defective parts.

2. INSTRUMENT SET-UP

Fanuc robot LR Mate 200iD

3. CONTENT TASKS

- Camera Setup Tools
- Vision Process Tools

4. OPERATION PROCEDURES

Condition:

• All personnel and unnecessary equipment are out of the workcell.

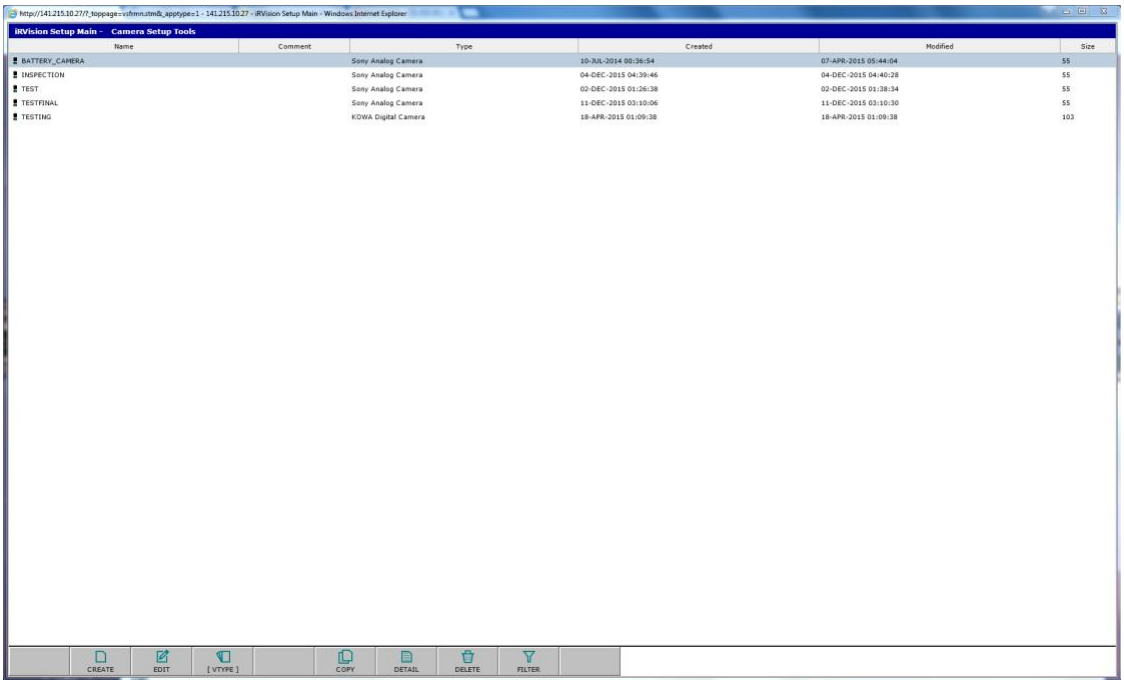
• The mode select switch is in the T1 position.

• Fault lights are not illuminated.

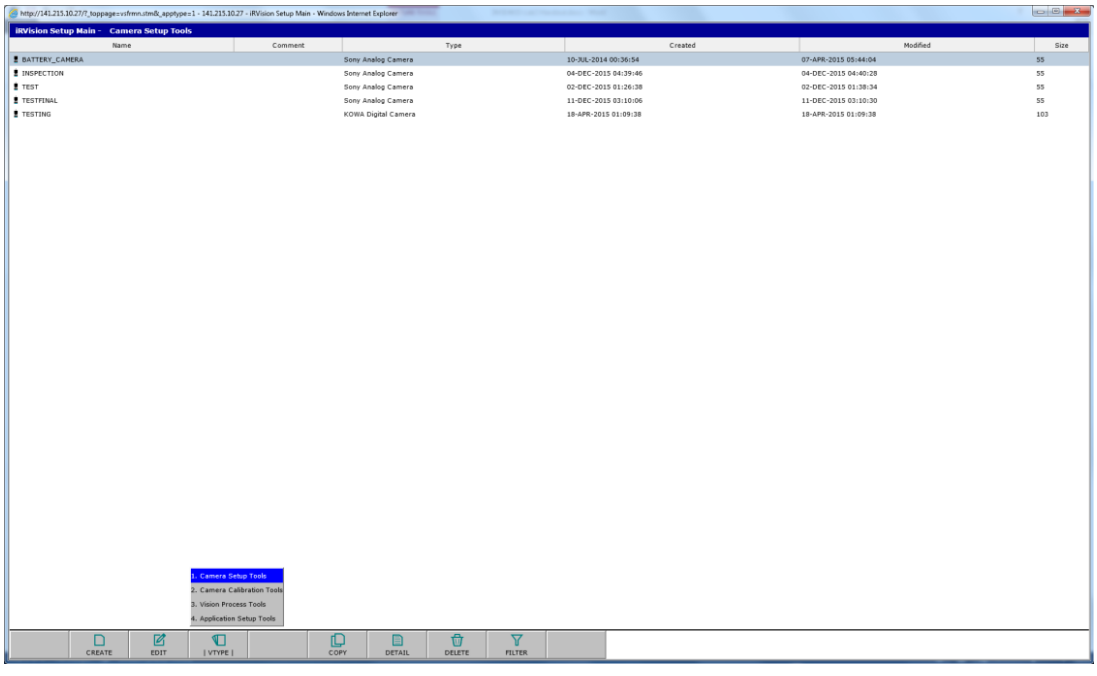
Power up the robot by turning on the circuit breaker on the robot controller.

Camera Setup Tools (Teach Pendant)

1. Select the menu in the teach pendant and choose iRVision.

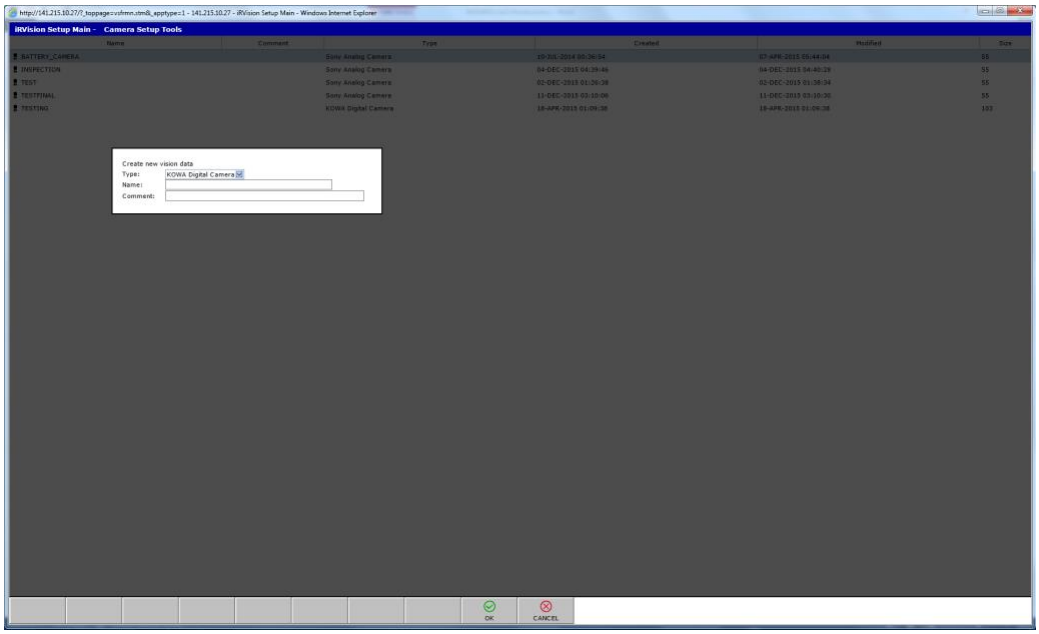


2. From the VTYPE (F4) select the camera setup tools option.



3. Press CREATE (F2) to create a new camera vision data file.

   Choose Sony Analog Camera, Name the camera (e.g. Inspection) and press Ok

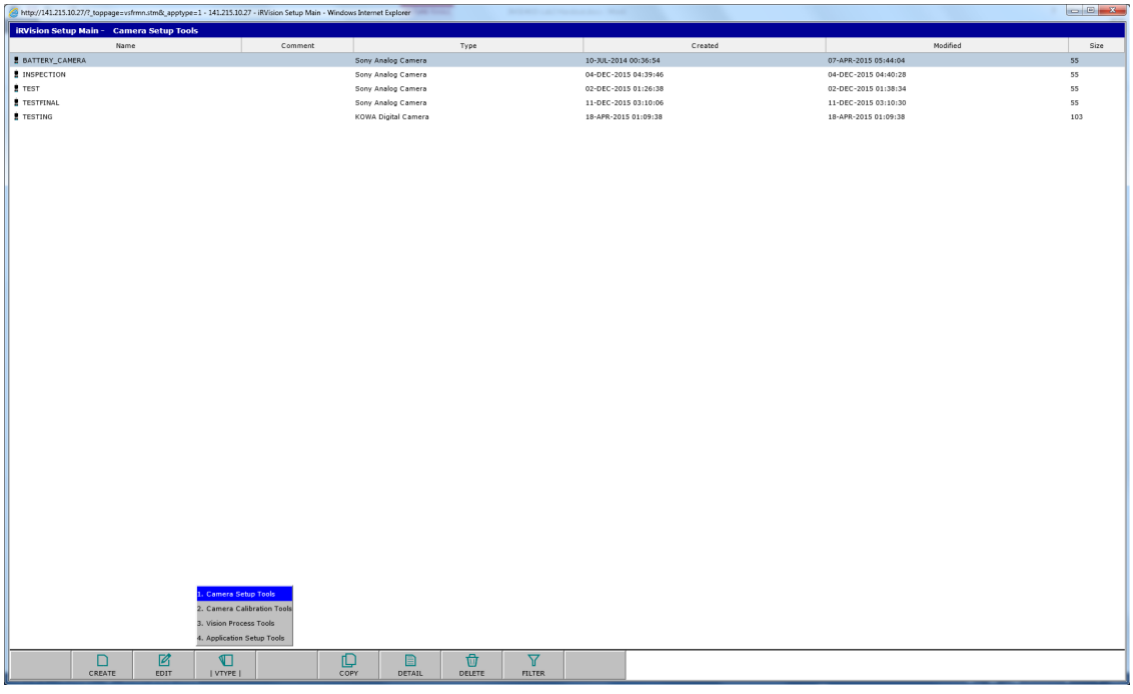


4. With the camera file selected press EDIT to edit the completed camera file.

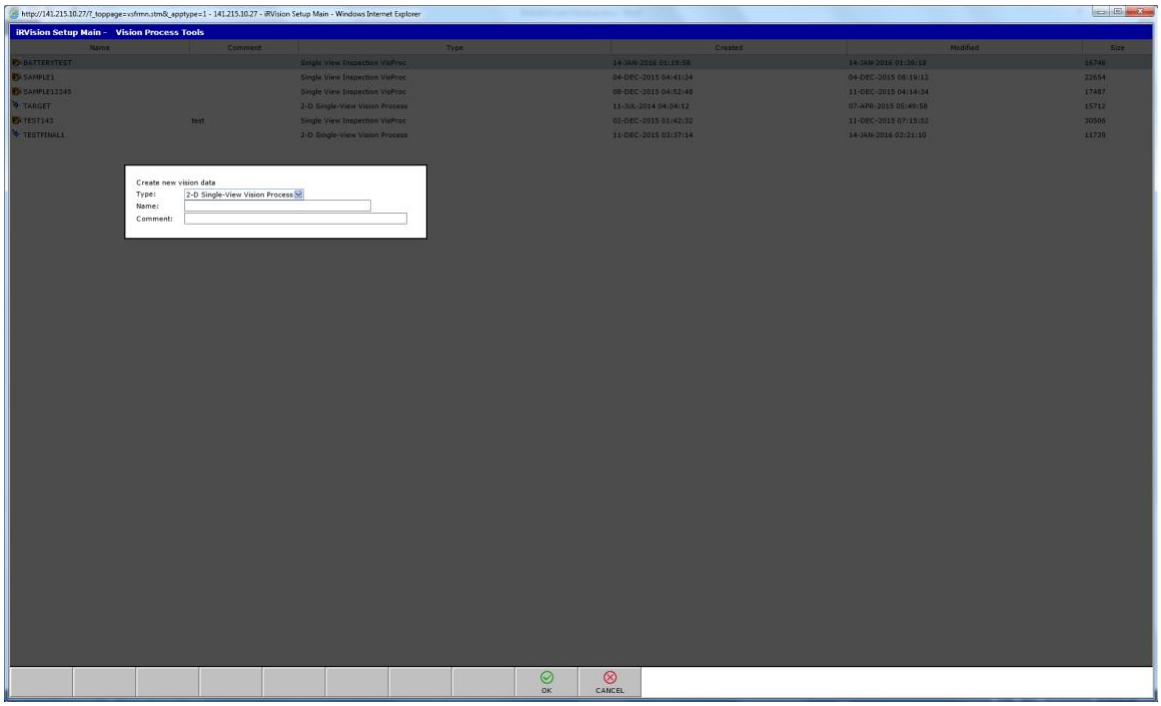
   Choose the approximate exposure time 1ms and press next to save (F5).

Vision Process tools

1. From the VTYPE (F4) choose Vision Process Tools.

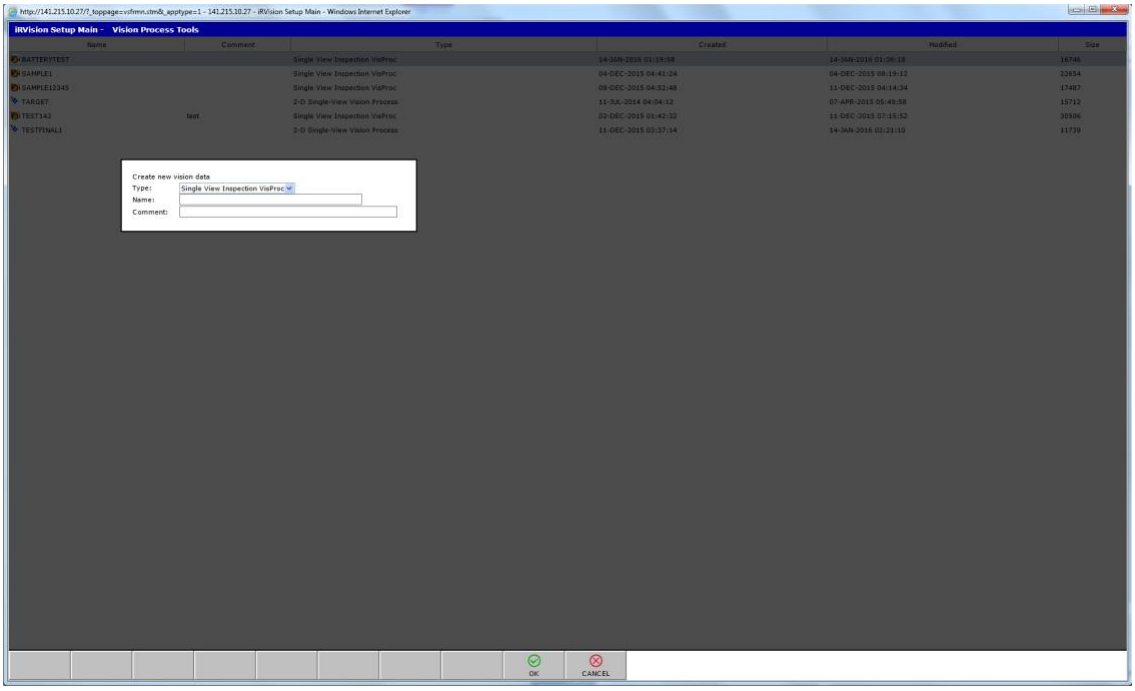


2. Press Create (F2) to create a new vision process.

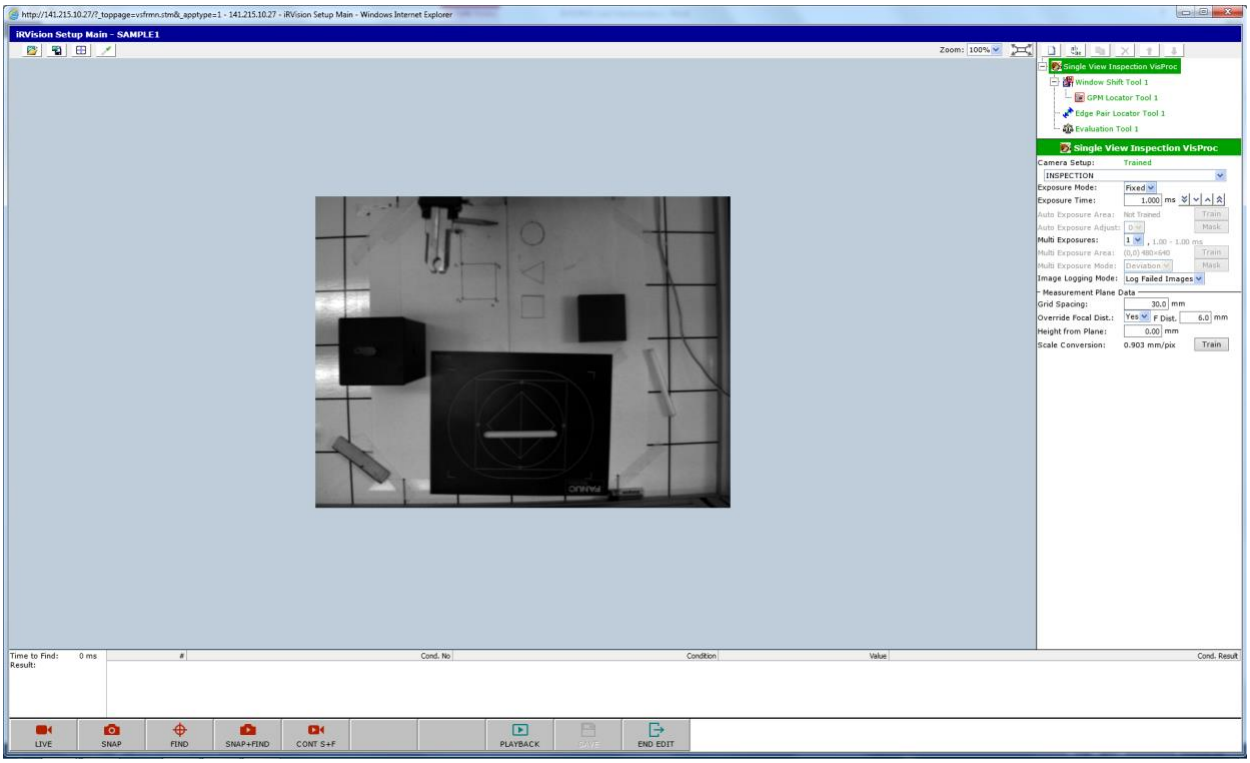


3. Select Single view Inspection VisProc

   Name the vision process (e.g. Sample1) and press Ok when done.



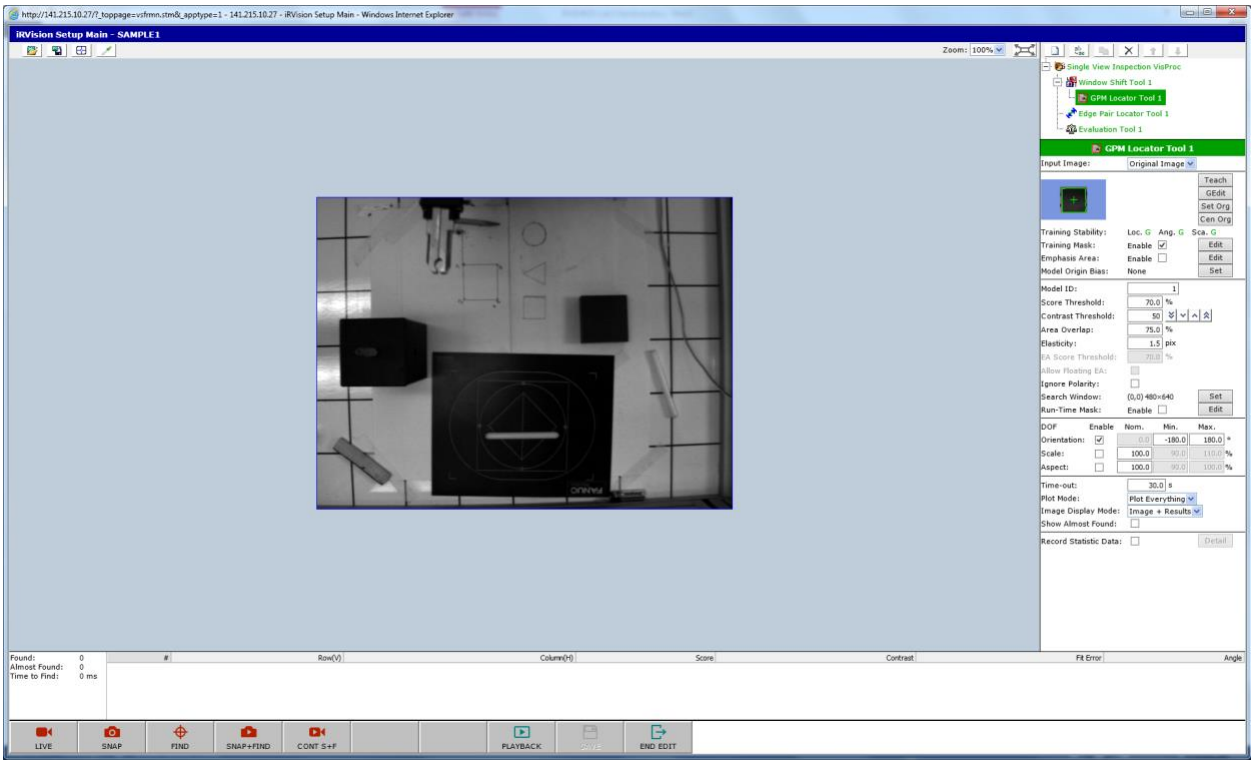
4. Press EDIT (F3) to begin editing the file



5. Select the camera to be used for the inspection process (e.g. Inspection)
6. Select the Exposure time as 1ms
7. To evaluate length in millimeters setup the Measurement Plane Data as shown below
    - Put a vision grid under the camera and press SNAP
    - Input the grid spacing of the vision grid as 30 mm
    - Choose YES from the Override Focal Dist. Dropdown
    - Enter the nominal focal distance of the lens as 6mm
    - If the part height differs from the grid plane, enter the difference
    - Press Train to complete the scale conversion
    - Adjust the box boarder to include only the grid circles and press OK
    - When finished the scale conversion will display
8. Click on the Tree tab beside the image
9. With the selection on Single View Inspection VisProc, click on the New File folder to add a window shift tool to single view Inspection VisProc
    - Under type select Window shift tool and press OK

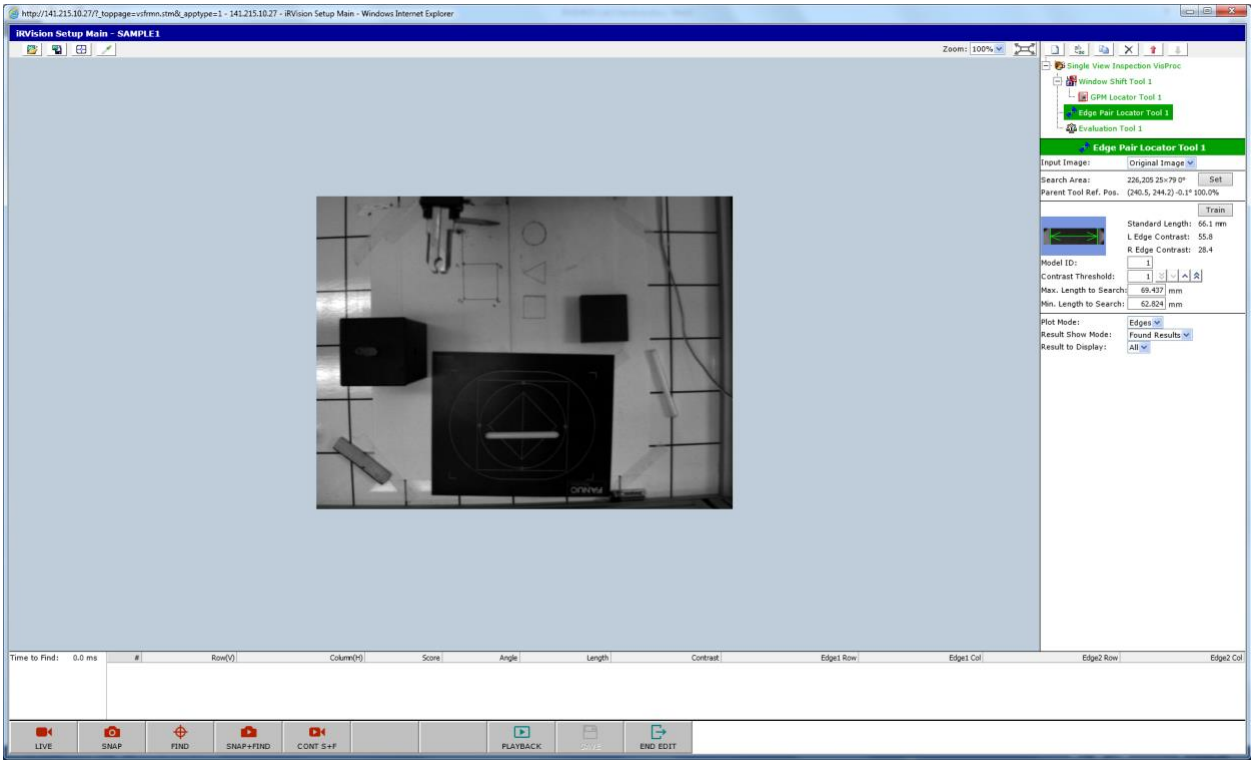
- A window shift tool will be added to the process tree

10. Click on the GMP Locator Tool

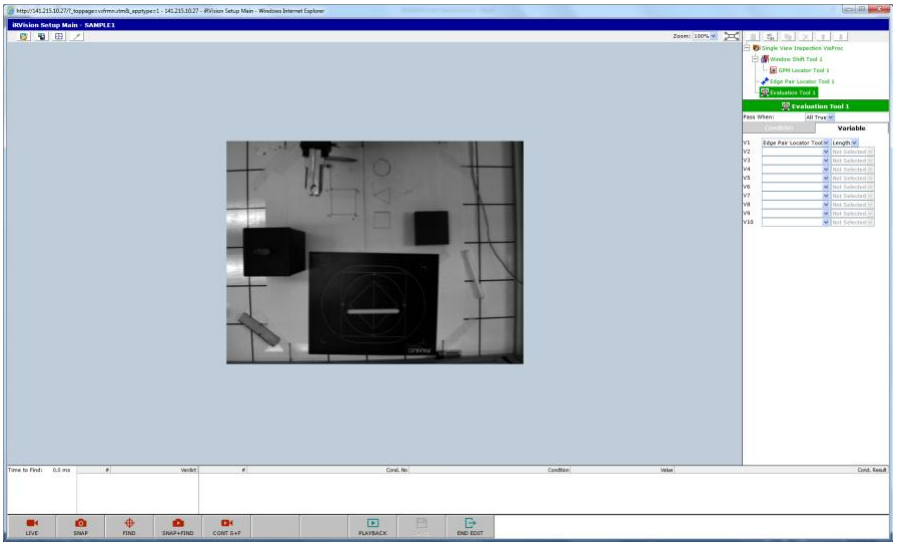


- Put a part under the camera and Press SNAP (F3)
- Press teach to begin teaching vision to find the part
- Size the box to enclose any features that you want vision to find and press OK when you are done
- The found edges will be outlined in green
- To test the system's ability to locate the part, Press SNAP and then FIND
- To mask out undesirable features, press EDIT under training mask
- Use the drawing tools to mask out the undesired features. When finished press OK
- The masked regions will be shown up in red

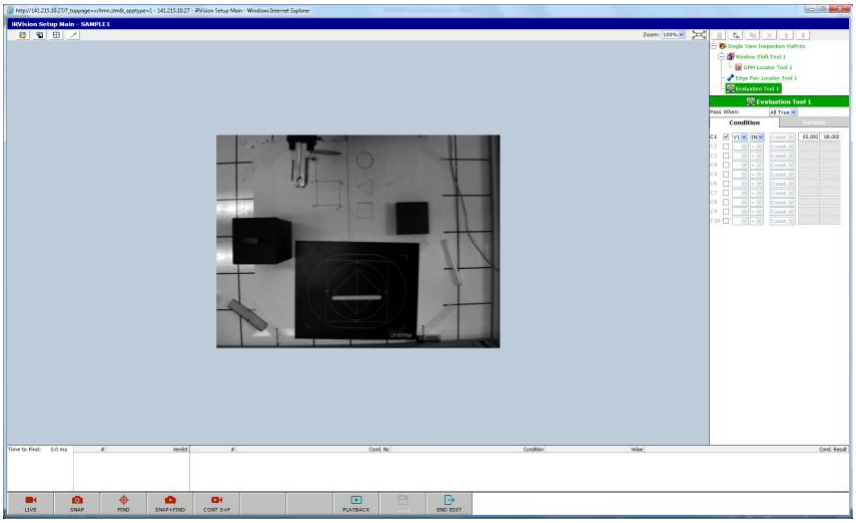
11. Click on the tree tab, choose the single view inspection process and click on the new file folder to create an Edge Pair Tool file.
    - Under type select Edge Pair Tool and press OK.
    - An Edge pair tool will be added to the process tree



12. Press Set to set the search area for the measurement
    - Size the box to set the search area for the measurement and press OK when you are done.
    - Press Train to set the edges for measurement
    - Train the edges for measurement and press OK when finished
    - Note: - Reduce the Contrast Threshold if you are not able to locate the edges
    - The trained edges will be displayed
    - To test the system's ability to measure the edges, press SNAP and then FIND.
    - Press Next and Press Save to save the vision process
13. Click on the Tree tab and click on the Evaluation Tool
14. Click on the variable tab
    - Under V1: Select Edge pair locator tool and length



15. Click on the condition tab
    - Under pass when choose all true
    - Click the C1 box and setup a condition such that the length must be within the tolerance of your part
    - Press next and press save when you are done



16. To test the overall process, with Single View Inspection VisProc highlighted, press SNAP and then FIND
17. The result will display as either Pass or Fail
18. Notice the measured result

Note: Select multiple dimensions to measure by defining more than one Edge Pair Tool.