



SCORPION
VISION SOFTWARE®

GETTING STARTED TUTORIAL

Part 1 - Presence Verification



Goals of this Tutorial

- Understanding the basic working, configuration and usage of Scorpion Vision Software.
- Developing your first 'Washer Presence Verification System' using Scorpion Vision Software and seeing it in action.

Before Starting the Tutorial

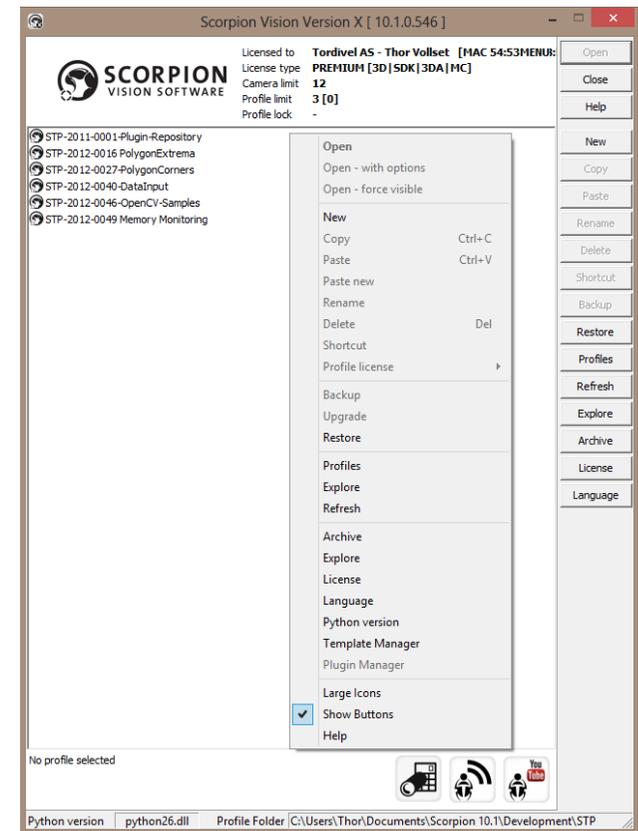
- Scorpion Vision Software version 7.2 or higher needs to be installed on the test machine and a license should be activated.
- An actual camera is not needed since you will be using the 'simulator' feature available in Scorpion Vision Software.
- Users of Scorpion Version X or later should read the section Using Scorpion Vision X
- We are working hard to update the software with new features and Metro Look - this will continue most of 2013. We have scheduled a complete remake of the Scorpion documentation and tutorials in the second half of 2013.
- The data files available with this tutorial should be copied to the test machine:
 - (1) 'GettingStartedTutorial_Part1_PresenceVerification.zip' which is a pre-configured profile
 - (2) 'CameraSimulationImages' folder which has a set of 10 JPEG images
 - (3) 'CalibrationImages' folder which has 1 BMP image

Using Scorpion Vision Version X

- Scorpion Vision X is a major upgrade to Scorpion Vision Software with a new exciting Metro Look
- The Scorpion Vision Version X up to build 10.0.0.540 has only minor changes in the gui details from version 10.1.0.546 the gui have also changed a lot also in the details with toolbar everywhere. If you do not like the toolbars they can be removed by the following procedure:
- Start Scorpion from the shortcut
- The profile selection dialog is activated
- Activate the mouse menu - select Show Buttons - this global settings restores the old button look in the complete application
- To restore Metro look - unselect the Show Button item in the Profile Selection Dialog

Hints

- The following hints are important - keep them until you need them.
- The Scorpion Vision Installer makes it a lot easier to install and deploy a Scorpion Vision Software System
- The latest tutorials and demonstration profiles are available from the Scorpion Installer
- The New Profile Wizard makes it a lot easier to create a profile.
- The States Tab is moved from Settings to Service
- Scorpion Tool Components - STC - makes it possible to create tools using Python scripting
- Data Input Pages are significantly enhanced in Scorpion Version X
- Scorpion Version 9 is still available from download use this version to run the tutorials if you want to be compatible with the tutorial content.
- The integrated Scorpion html-help file contains up to date information about every version
- The TordiveBlog - <http://www.tordivelblog.com> contains up to date information about Scorpion Vision



Washer Presence Verification System

In this tutorial, we will be creating 'Washer Presence Verification System' using powerful, flexible, and easy to use Scorpion Vision Software. The Washer Presence Verification System' will have following features:

- Periodically reviews the image captures from camera (or simulator image in case of this tutorial)
- Analyzes the image to understand washer presence or absence in the captured image
- Displays the presence verification result to the user and generate statistical data

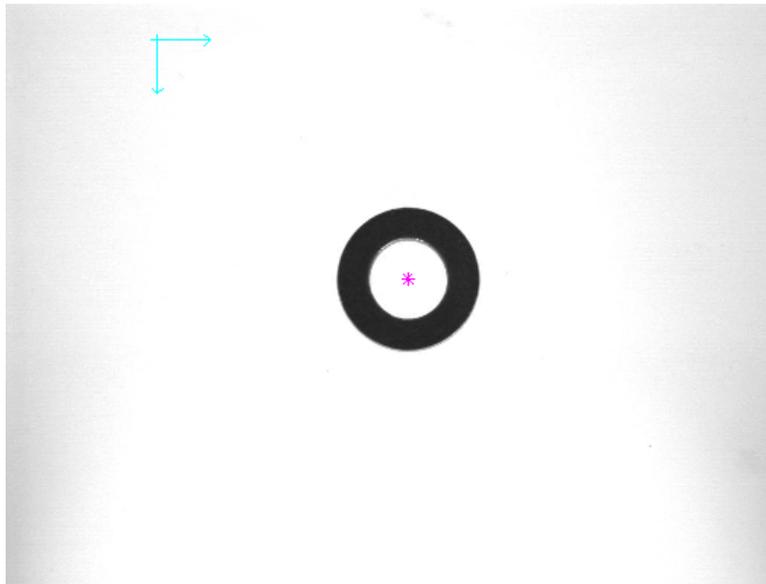


Figure 1: Image with washer present

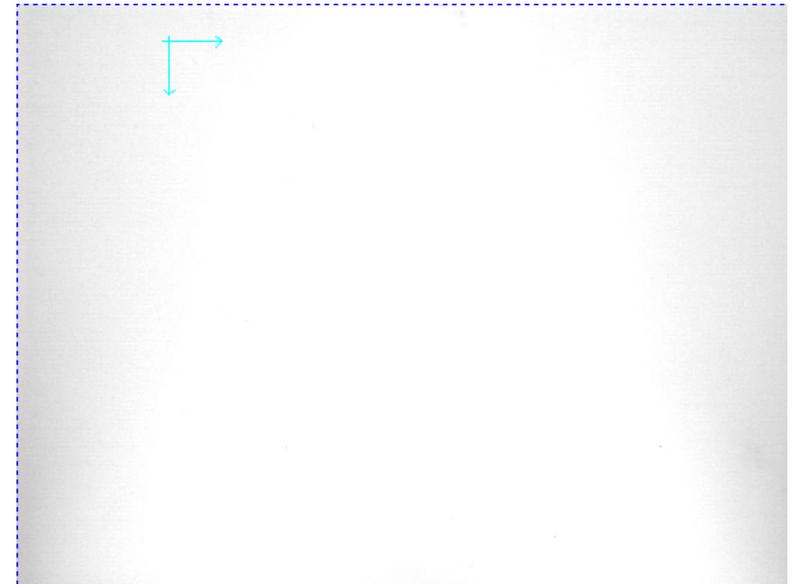


Figure 2: Image with no washer present



Figure 3: 'OK' is the expected result after inspection by the system

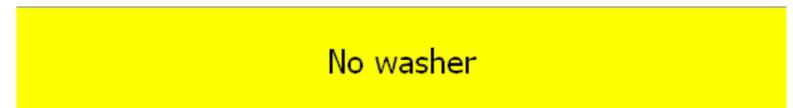


Figure 4: 'No washer' is the expected result after inspection by the system

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2. Scorpion Vision Software Configuration

Configurations available in Scorpion Vision Software, can be categorized as:

1. Camera configuration – camera selection, trigger settings
2. Detection logic configuration – as per the project requirements
3. Output configuration – user interface, RS232, TCP/IP

All configuration data is saved as a 'Profile'. A profile can be created, saved, copied, exported and restored across different computers

3. Pre-Configured Profile

- GettingStartedTutorial_Part1_PresenceVerification.zip - available with this tutorial is a pre-configured profile for 'Washer Presence Verification System'
- This can be used on any computer to see 'Washer Presence verification' in action, without needing any additional changes.
- We will first try this pre-configured profile and see it in action.
- Then later in this tutorial, we will create this same profile from scratch.

4. Trying out the Pre-Configured Profile

Launch Scorpion Vision software from 'Start->All Programs->Tordivel Vision Solutions->Scorpion 7->Scorpion 7.2'

Right click on the application window and select 'Restore' sub-menu. This will pop up zip file selection dialog.

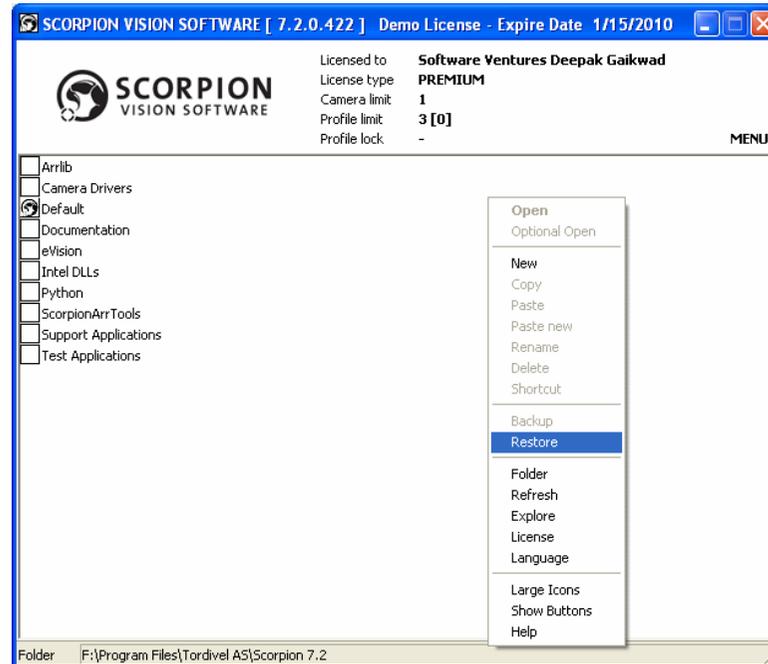


Figure 5: Restore Profile

Navigate to the directory where GettingStartedTutorial_Part1_PresenceVerification.zip is available, select it and click on 'Open' button. Scorpion will restore the profile and it will be added to the available list of profiles.

Right click on the new profile 'GettingStartedTutorial_Part1_PresenceVerification' and click on 'Open' sub-menu to launch Scorpion vision software with this profile loaded.

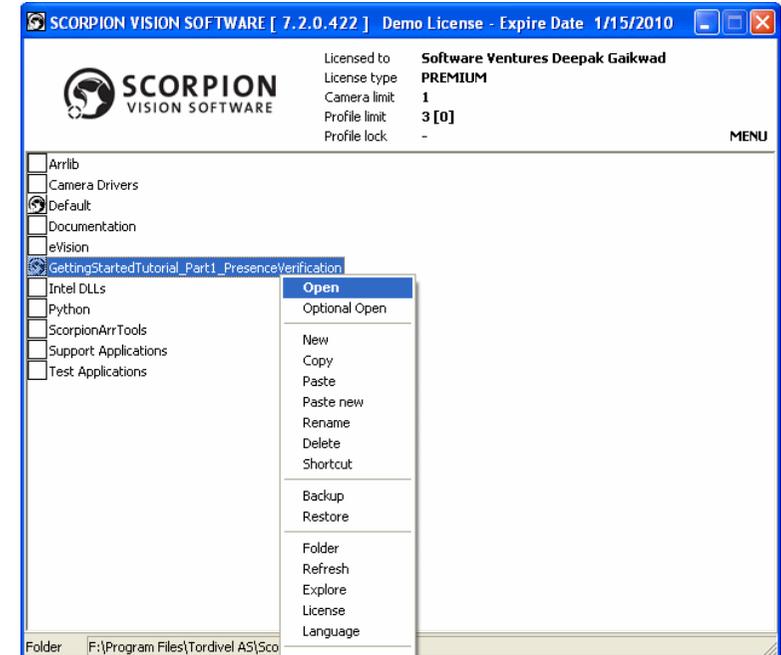


Figure 6: Open Profile

Scorpion has a toolbar available at the top for quick navigation to various commonly used features.

Click on the 'Start' button on the toolbar to start the inspection. Scorpion starts capturing images (from simulator configured in this profile) after every 1000 milliseconds, processes them and generates the results.

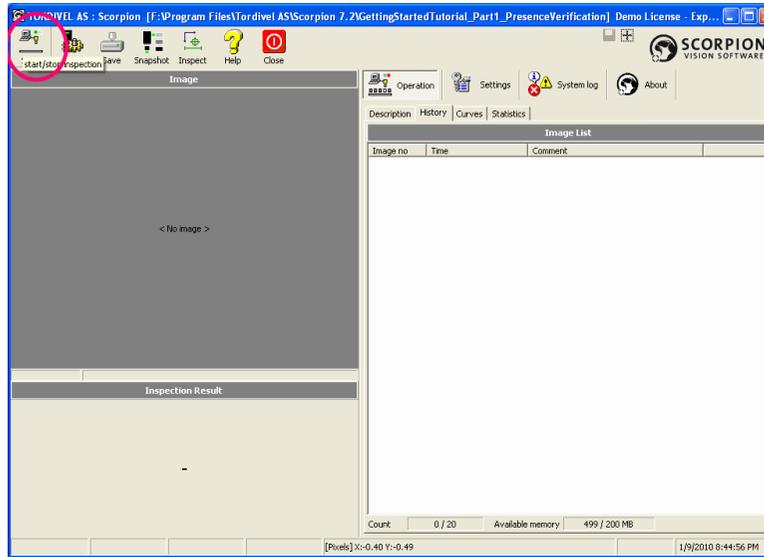


Figure 7: Start the inspection

There are several captured images which have washer present and few which do not have washer.

Scorpion analyses each captured frame and updates result as 'OK' or 'No washer', in the inspection result panel visible in left bottom corner. Color of the inspection result panel also changes to green for 'OK' and changes to yellow for 'No washer' results.

Click on the 'Stop' toolbar button (previously available 'Start' button is changed to 'Stop' now) to stop the inspection.

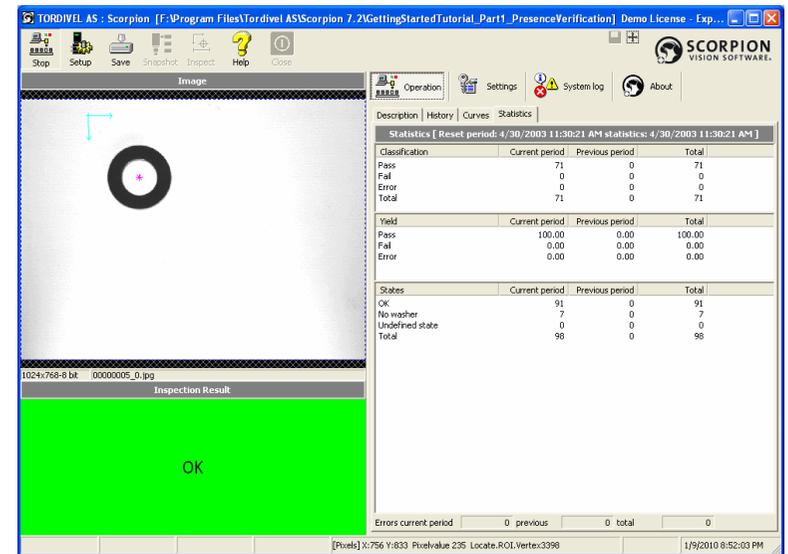


Figure 8: Result 'OK'

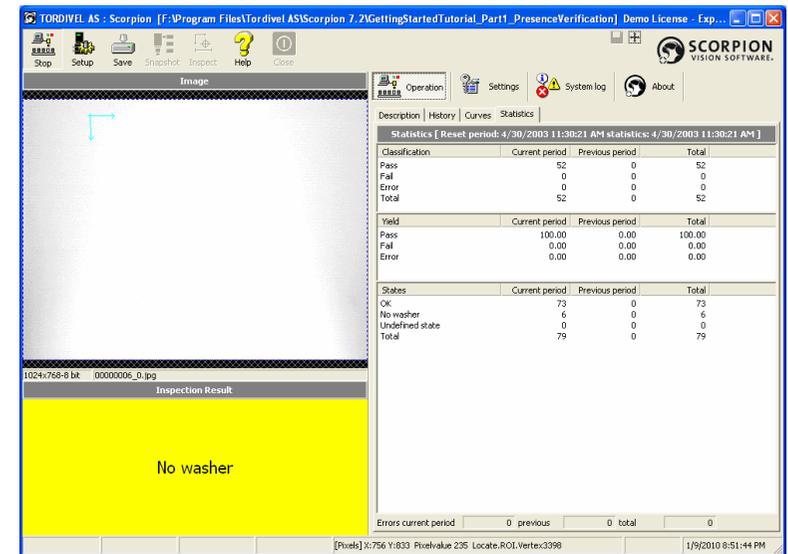


Figure 9: Result 'No washer'

Click on the 'History' tab available on the right hand side. This shows the inspection history with image number, time stamp and inspection result.

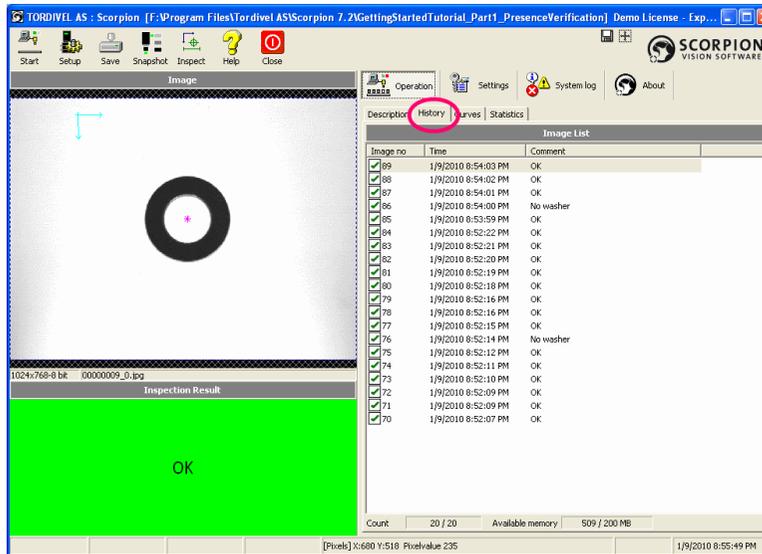


Figure 10: History tab

Click on 'Statistics' tab next to 'History' tab. This shows various statistics related to inspection results.

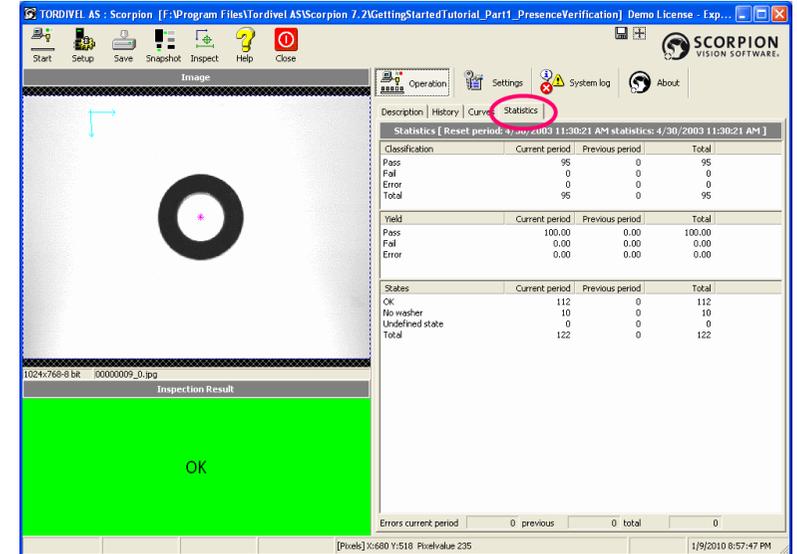


Figure 11: Statistics tab

Congratulations! You have successfully used Scorpion Vision Software for 'Presence Verification'!

5. Scorpion - User Interface

Scorpion User Interface is very simple and intuitive.

There is a toolbar at the top which has buttons for all commonly used features.

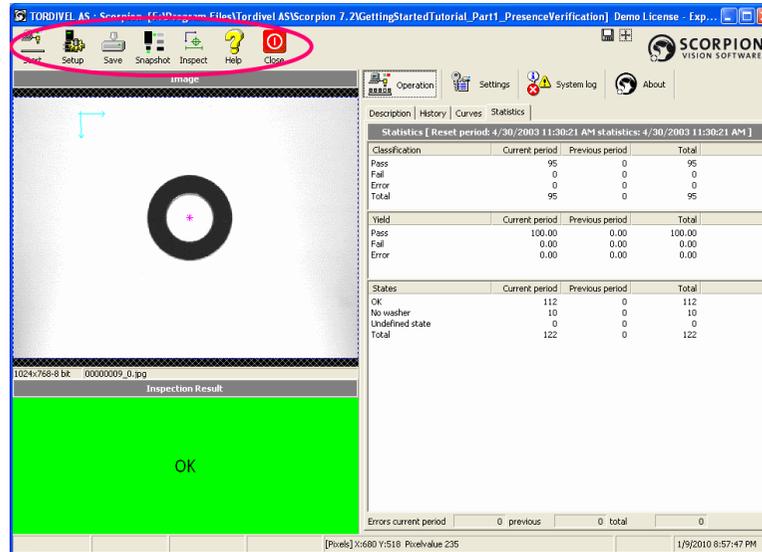


Figure 12: Toolbar

Below the tool bar is 'Image' panel which displays the captured images. Captured images are overlaid with user defined status indicators, detection indicators and information text.

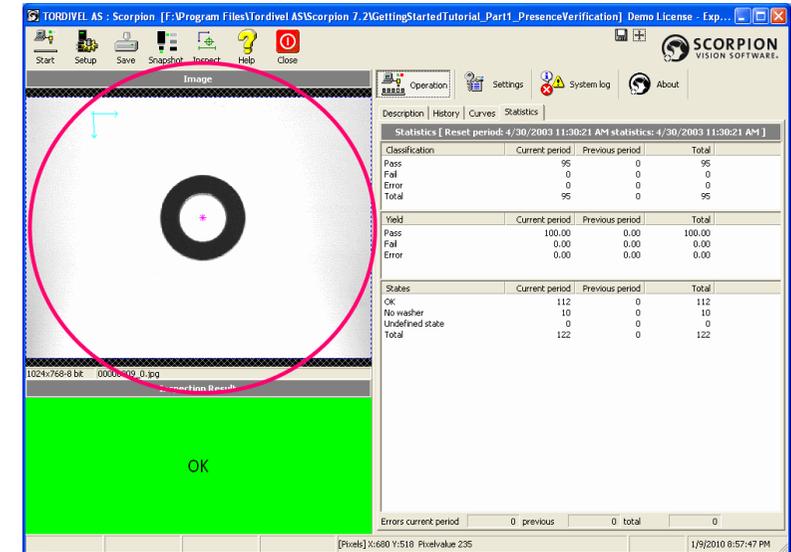


Figure 13: Image Panel

Below 'Image' panel, is the 'Inspection Result' panel which shows the inspection result text

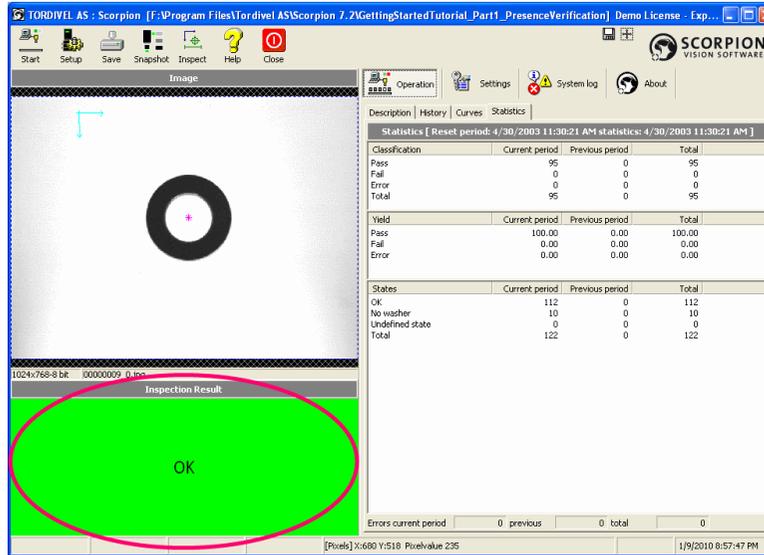


Figure 14: Inspection result panel

On right hand side, there are four main tabs – 'Operation', 'Settings', 'System log' and 'About'

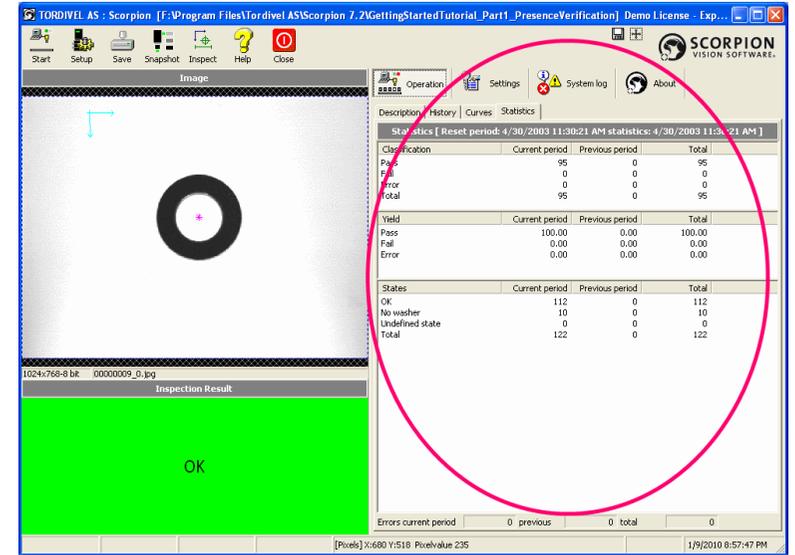


Figure 15: Main tabs

6. Scorpion – Operation modes

There are 3 modes of operation available in Scorpion.

Default is 'Operator mode'. In this mode only start/stop inspection and viewing history, curves and statistics is supported. No settings / configuration are allowed in this mode.

There is a password protected (password = 1234) 'Settings mode' for certified operators. In this mode limited settings can be changed.

There is a password protected (password = 911) 'Service mode'. This mode has full access to all settings.

To switch to 'Settings mode' or 'Service mode', click on 'Setup' toolbar button. This pops up access control password dialog. Type the password and click on 'OK' button.

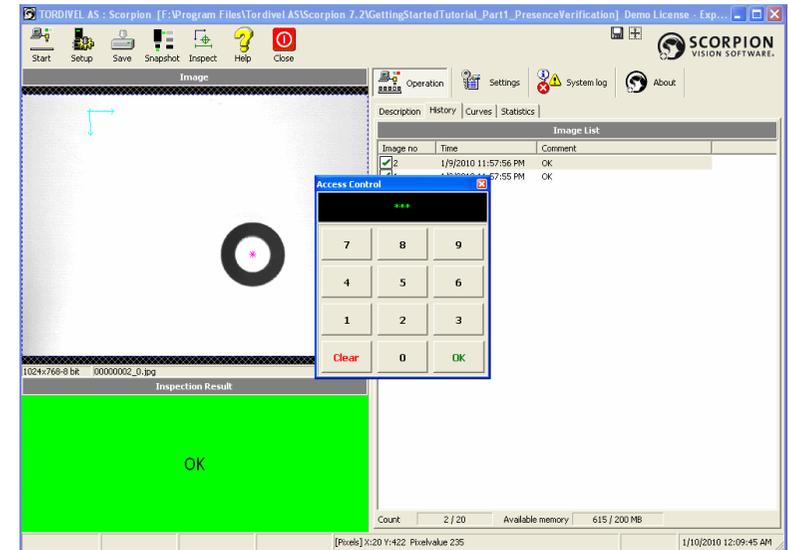


Figure 16: Enter Password

While in 'Service mode', additional tab 'Service' is added to the user interface.

Now we are ready to create our own 'Presence Verification' profile from scratch. All configurations described in next sections can be done from 'Service mode'.

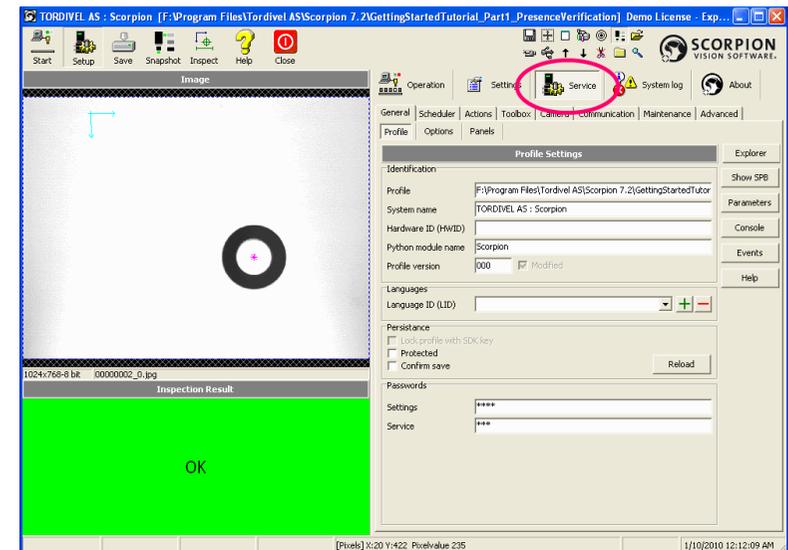


Figure 17: 'Service' tab

7. Creating a New Profile

Close Scorpion instance which had the pre-configured 'Presence Verification' profile loaded.

Launch Scorpion Vision software from 'Start->All Programs->Tordivel Vision Solutions->Scorpion 7->Scorpion 7.2'

Right click on the main dialog and click on 'New' sub-menu. This will ask for name of the new profile. Type 'My_PresenceVerification' (or you may choose any name of your choice) and click on 'OK' button. This will add the new profile to the list.

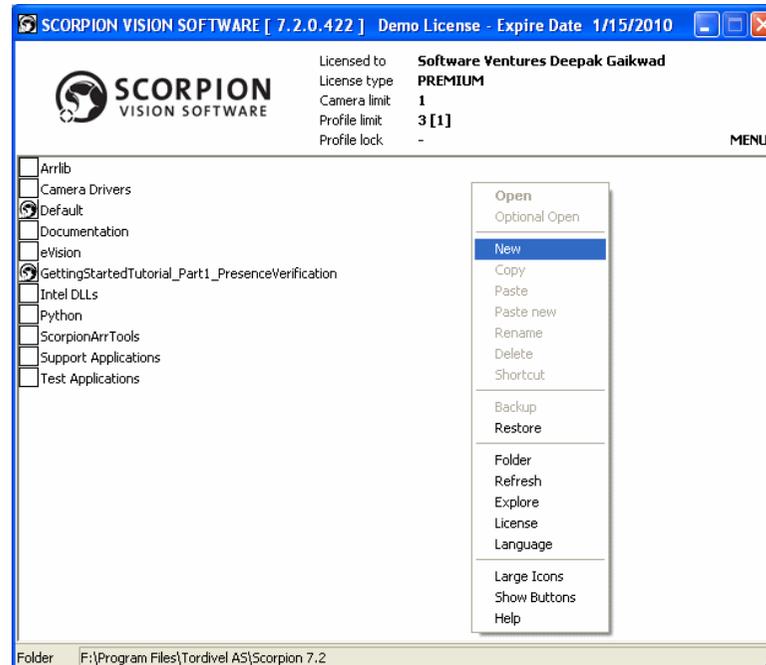


Figure 18: New Profile

Right click on the newly created profile name in the list and click on 'Open'. This will pop up the confirmation message-box 'My_PresenceVerification is empty profile! Create?'. Click on the 'Yes' button to create the new profile. This will also launch Scorpion with the new profile loaded.

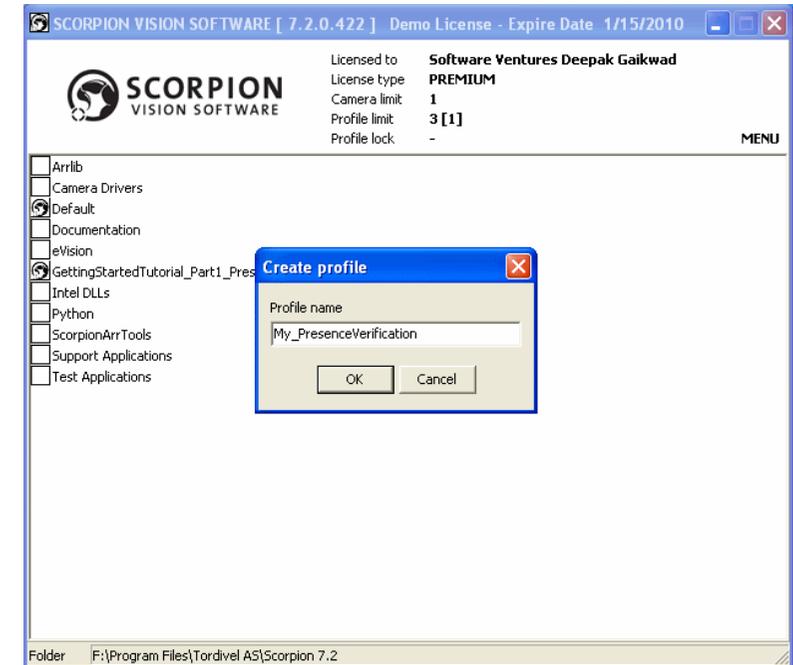


Figure 19: New Profile Name

Click on the 'Setup' tool bar button. This will pop up the pass-code dialog. Type 911 and click on the 'OK' button. This will switch to 'Service mode'.

8. Camera Set Up

Click on 'Service' tab, which one of the 5 main tabs on right hand side configuration area.

Select the 'Camera' sub tab. There are 2 panels available under 'Camera' – 'Camera Settings' and 'Image Settings'. We will be using simulator for this tutorial and hence will only be using the 'Image Settings' panel. In 'Image Settings', enable 'Simulate' checkbox.

In real-life installations, we need to set up camera from 'Camera Settings' panel. However in this tutorial we are using 'Camera simulator' which iterates through the available images, as per selected folder and filter, and uses the images as 'captured frames'.

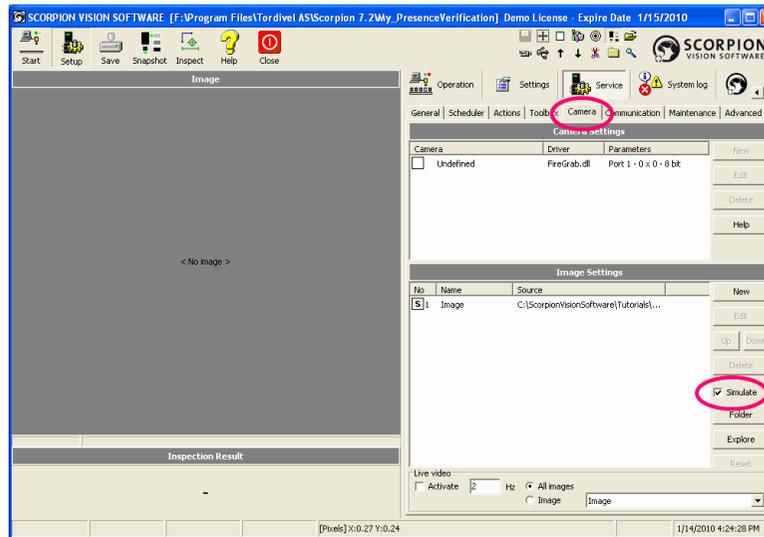


Figure 20: Enable camera simulation

Select the only entry names 'Image' in the list under 'Image Settings', and click on the 'Edit' button. This will pop up the 'Image Configuration' dialog.

Click on the 'Select Folder' button next to the 'Simulation->Path' text box. Navigate to the 'CameraSimulationImages' folder which is available with this tutorial and is copied on the test machine. Then click on the 'OK' button.

Type '*.*' in 'Simulation->Filter' textbox. Click on 'Folder' button in front of the text box, for confirmation. This will pop up 'Result for filter '*.*' dialog and will display names of the 10 JPEG images. Click on 'OK' buttons to close all open dialogs.

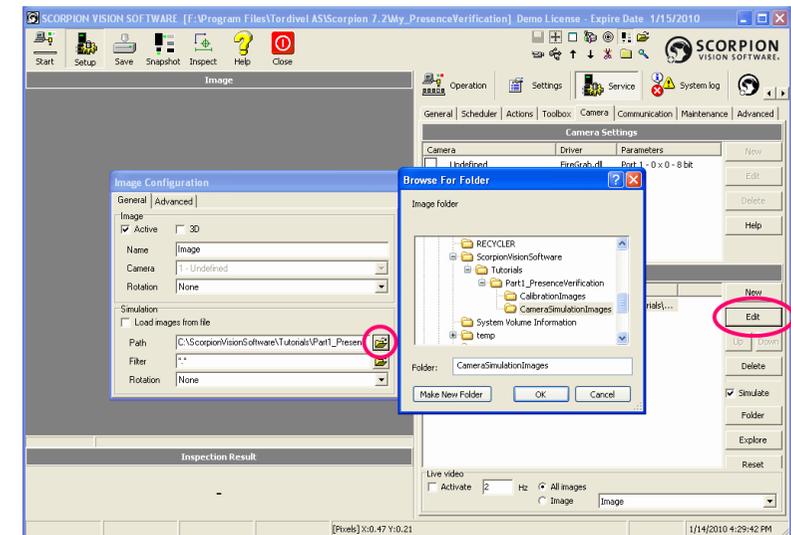


Figure 21: Select Images folder

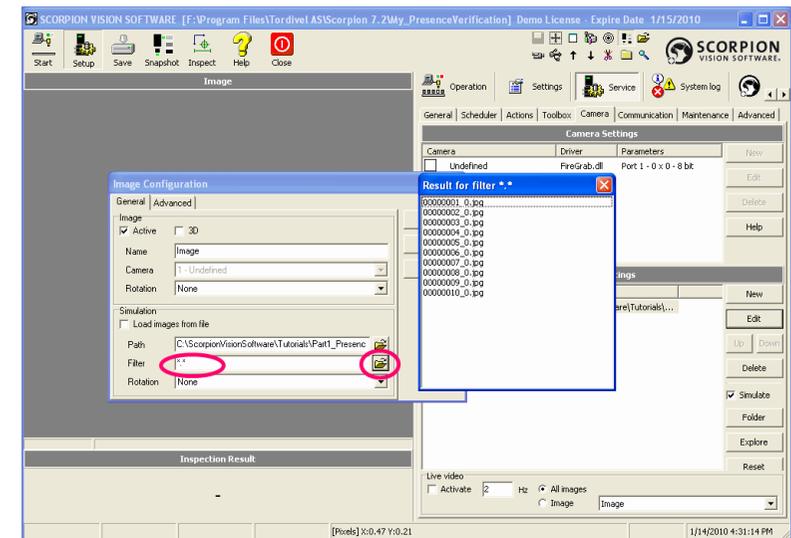


Figure 22: Apply image filter

9. Scheduler Set Up

Click on the 'Scheduler' sub tag from the 'Service' tab, which is one of the 5 main tabs on the right hand side configuration area.

Click on the 'New' button. This will pop up the 'Add Event' dialog.

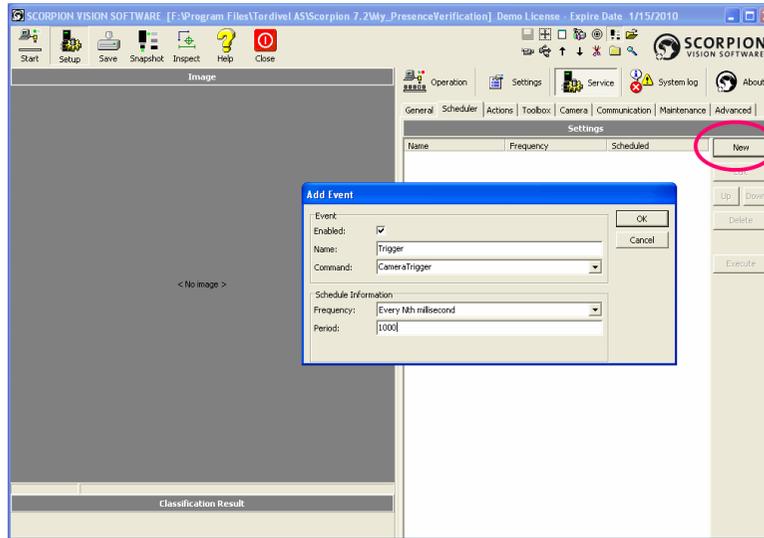


Figure 23: Add new event

Check 'Event->Enabled'

Type 'Event->Name' as 'Trigger' (or any name of your choice).

Type 'Event->Command' as 'CameraTrigger' ('CameraTrigger' is special command and this text can not be changed).

Select 'Schedule Information->Frequency' as 'Every Nth millisecond'.

Type 'Schedule Information->Period' as 1000.

Click on the 'OK' button to close the 'Add Event' dialog. This will also add a new entry in the 'Settings' list.

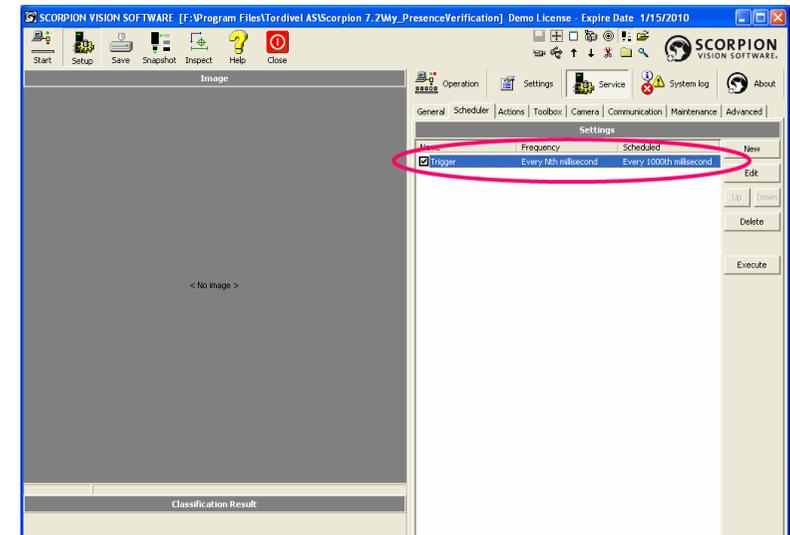


Figure 24: New event added

We have now set up the scheduler so that the 'CameraTrigger' command will be called after every 1000 milliseconds. This command captures images from the camera (camera simulator in case of this tutorial) and also executes scripts associated with this command. In the next section, we will associate scripts with this 'CameraTrigger' command.

10. System Events and Commands Set Up

Click on the 'Actions' sub tag from the 'Service' tab, which is one of the 5 main tabs on the right hand side configuration area.

Default system events and commands sequences associated with each of them are displayed.

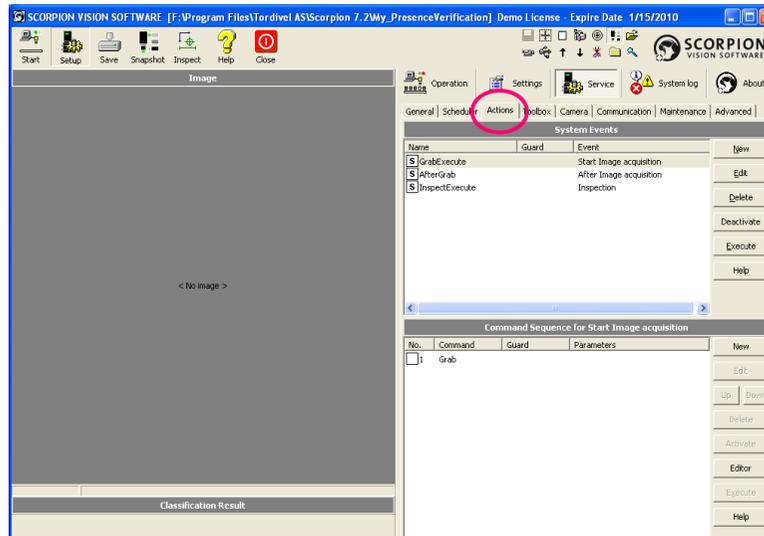


Figure 25: Default system events

Click on the 'New' button under 'System Events'. This will pop up the 'Event Properties' dialog.

Click on the '...' button in front of the 'Name' text box, and select 'CameraTrigger' event from the available list and click on the 'OK' button.

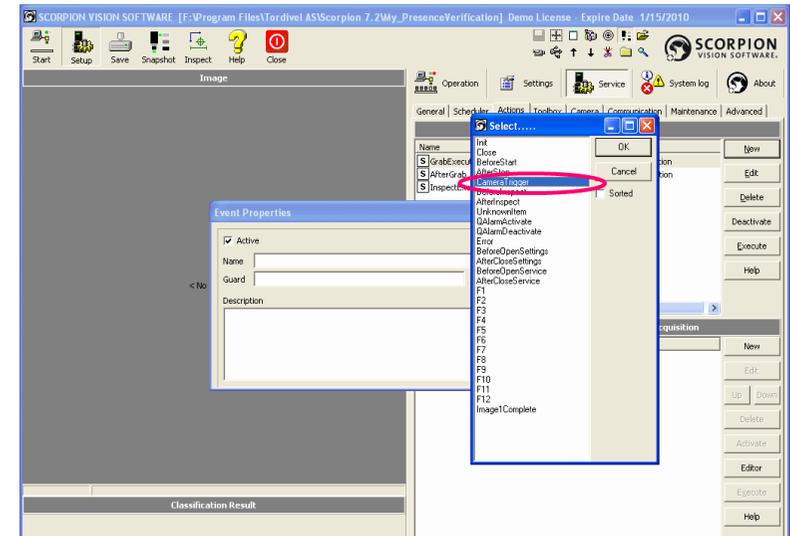


Figure 26: Select 'CameraTrigger' event

Click on the 'OK' button to close the 'Event Properties' dialog.

Select the newly added 'CameraTrigger' Event under the 'System events' list and click on the 'New' button under 'Command Sequence for Camera trigger'. This will pop up the 'Command Properties' dialog.

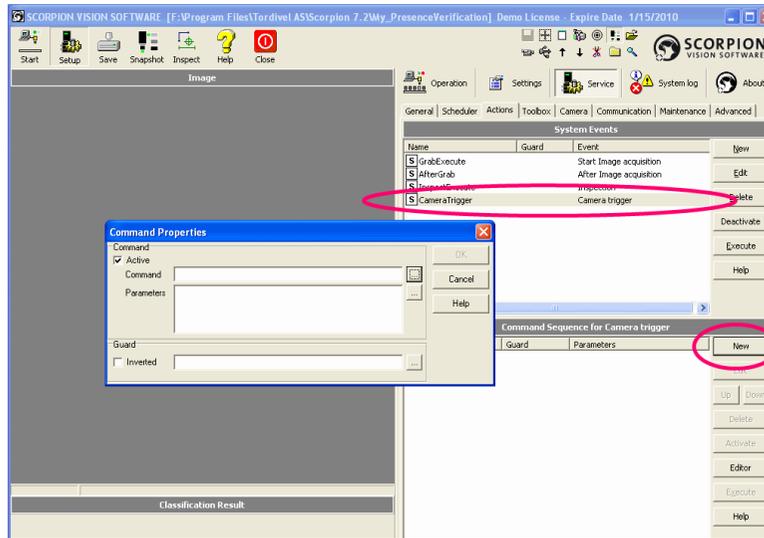


Figure 27: New command

Click on the '...' button next to the 'Command' textbox. This will pop up the command selection dialog.

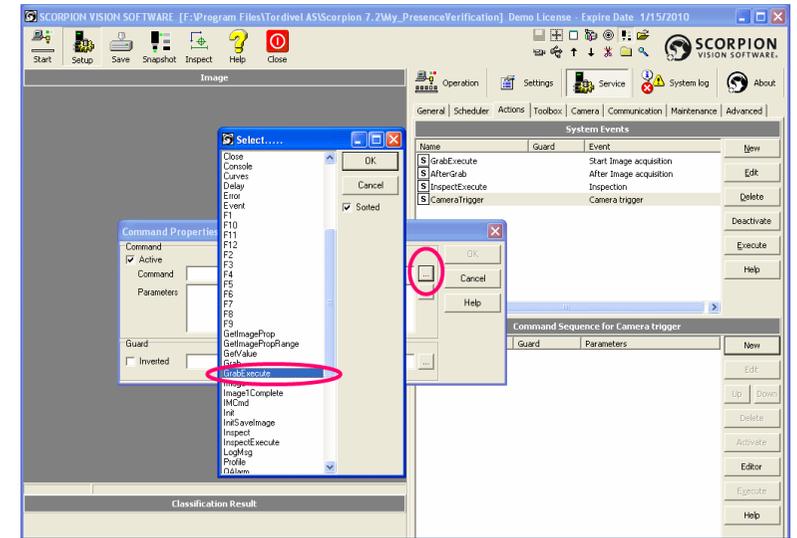


Figure 28: Command selection

Select 'GrabExecute' and click on the 'OK' button.

Select 'Guard' as 'Running' (This indicates that the command will be executed only in 'Running' state, which means only when the inspection is started eg - by clicking on the 'Start' button.).

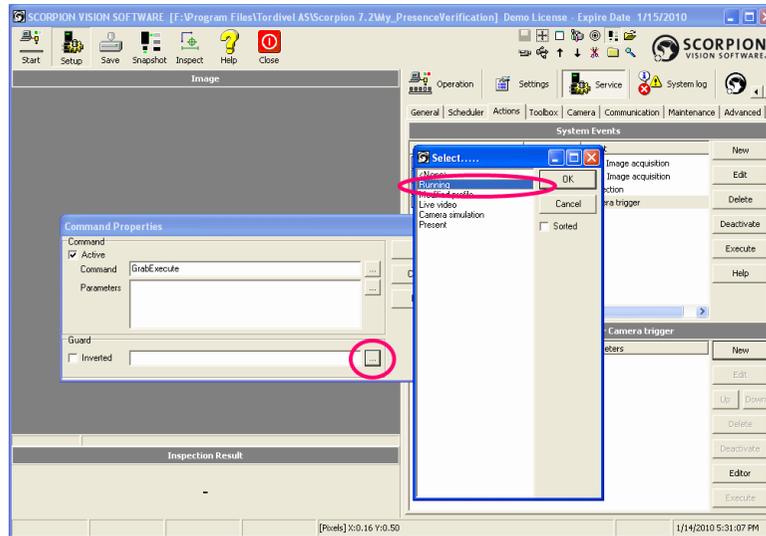


Figure 29: Select Guard

Click on the 'OK' button in the 'Command Properties' dialog to close it.

We have now associated the 'GrabExecute' command with the 'CameraTrigger' event which means that whenever a camera is triggered GrabExecute will be called and inspection will happen as per further settings.

The Start/Stop inspection button on the toolbar will now start/stop displaying captured images. Before this step, it was not possible since basic association was incomplete.

11. Detection Logic Set Up – Setting Reference

Click on the 'Toolbox' sub tag from the 'Service' tab, which is one of the 5 main tabs on the right hand side configuration area.

Click on the 'New' button under 'Tool Settings'. This will pop up the 'New Tool' dialog.

Type name as 'Calibration'.

In the 'Tools' sub-tab select 'Reference' and then select 'Calibrator' in the right hand pane.

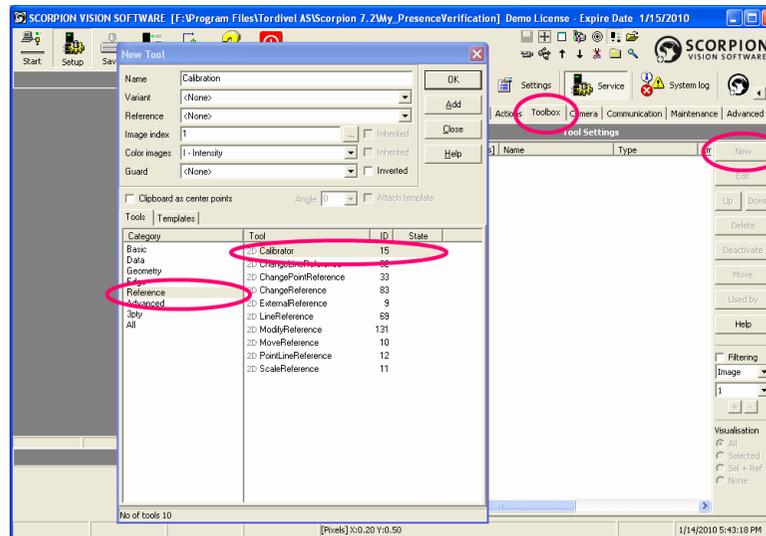


Figure 30: Select tool Calibrator

Click on the 'OK' button to close the 'New Tool' dialog. This will add an entry related to the new 'Calibrator' tool, under 'Tool Settings'.

Select the newly added 'Calibrator' tool and click on the 'Edit' button. This will pop up the 'Change Calibration' dialog.

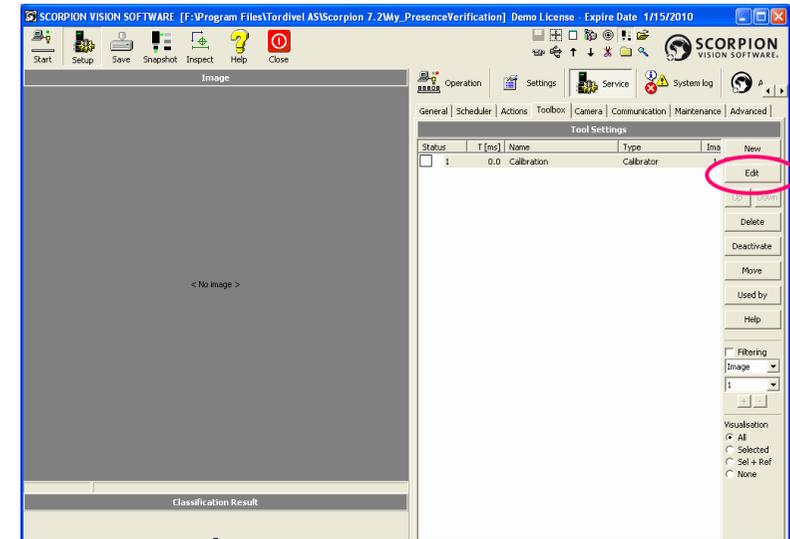


Figure 31: Edit Calibrator tool

In the 'Setup' tab, click on the 'Calibration Image->Load' button, which will pop up the image selection dialog. Navigate to the 'CalibrationImages' folder which is available with this tutorial and is copied on the test machine. Select the '0001.bmp' image. This will show the thumbnail of the selected image on the right hand side of the dialog. Then click on the 'Open' button to close the image selection dialog.

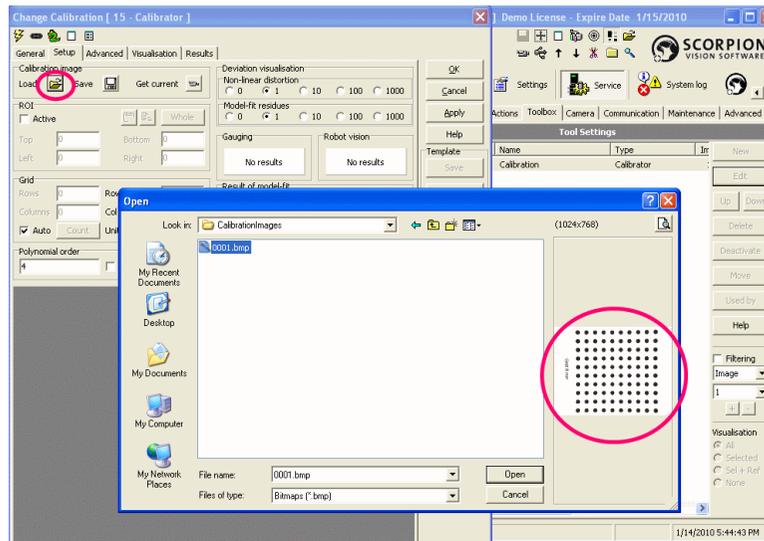


Figure 32: Select Calibration image

Now the 'Change Calibration' dialog shows the selected image in the bottom portion.

In the 'Grid->Row spacing' text-box, type '8'. In 'Grid->Col spacing' text-box, type '8'. In 'Grid->Unit' text-box, type 'mm'. Then click on the 'Compute' button. This will do the calibration calculations and will show the 'OK' result under 'Gauging' and 'OK' result under 'Robot vision' and will update results under 'Results of model-fit'.

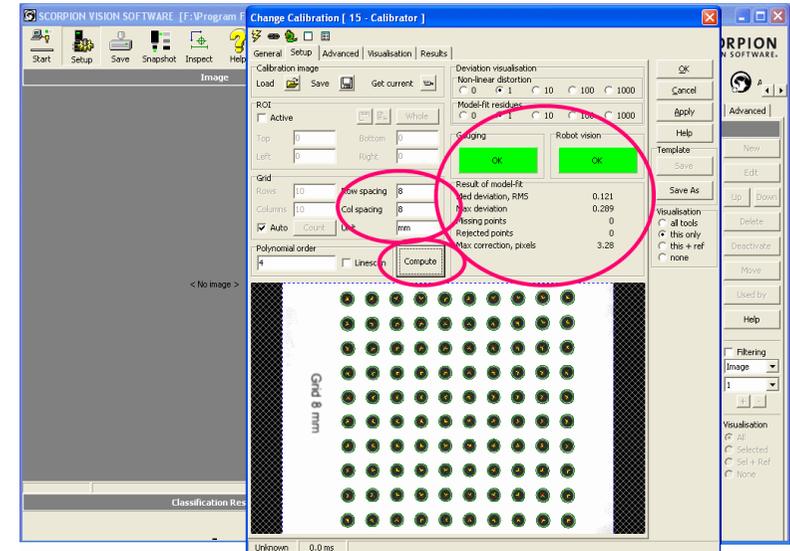


Figure 33: Calibration settings

Click on the 'OK' button to close the 'Change Calibration' dialog. The Calibrator tool is now set up and ready to use.

We have now set up the reference for the system.

The reference provides pixel to actual distance mapping information to Scorpion. We have used an 8mm grid image as an example which means distance between grid centres is 8 mm vertically as well as horizontally. Hence we have entered 8mm for 'Row spacing' and 8mm for 'Col spacing' during set up.

Calibrator is also used for calculating wide-angle lens deformations inside Scorpion (this is out of scope of this tutorial though).

For this tutorial of 'Presence Verification', Calibrator is not a must, since we are not using any measurement feature. But in general it's a good practice to set up a reference system as the first step in detection logic set up.

12. Detection Logic Set Up – Setting Blob4 Tool

Click on the 'New' button under 'Tool Settings'. This will pop up the 'New Tool' dialog.

Type name as 'Locate'.

In the 'Tools' sub-tab select 'Advanced' and then select 'Blob4' in the right hand pane.

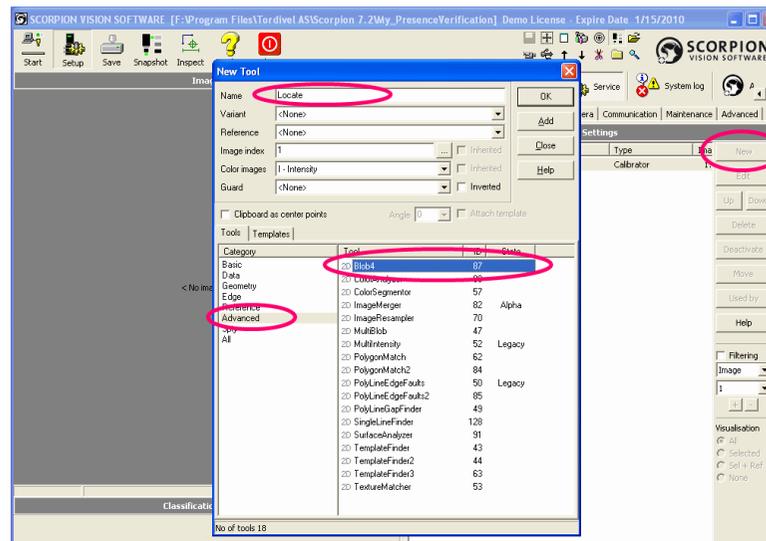


Figure 34: Select tool Blob4

Click on the 'OK' button to close the 'New Tool' dialog. This will add an entry related to the new 'Locate' tool, under 'Tool Settings'.

Select the newly added 'Locate' tool and click on the 'Edit' button. This will pop up the 'Change Locate' dialog.

In the 'Setup' tab, select 'Reference' as 'Calibration'. Also select 'Search Area->Use whole picture'.

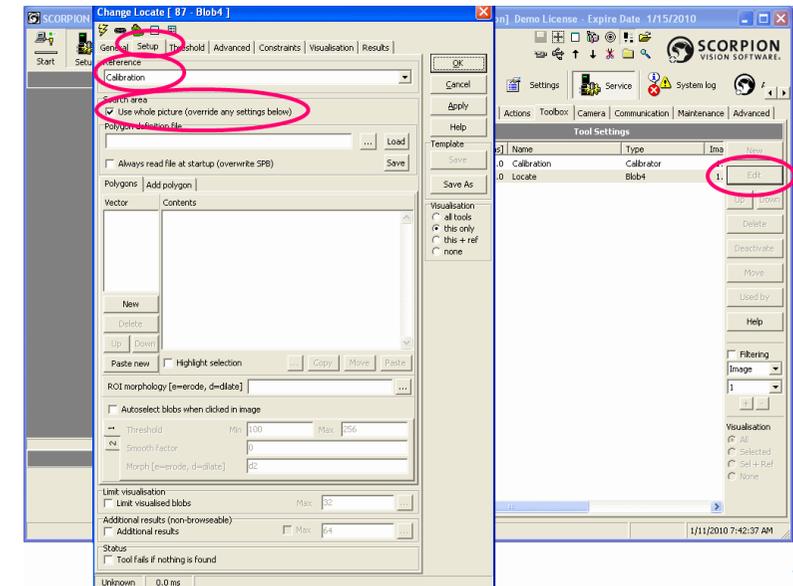


Figure 35: Blob4 tool setup

In the 'Threshold' tab, 'Specify' threshold as 'Minimum' = 0 and 'Maximum' = 100

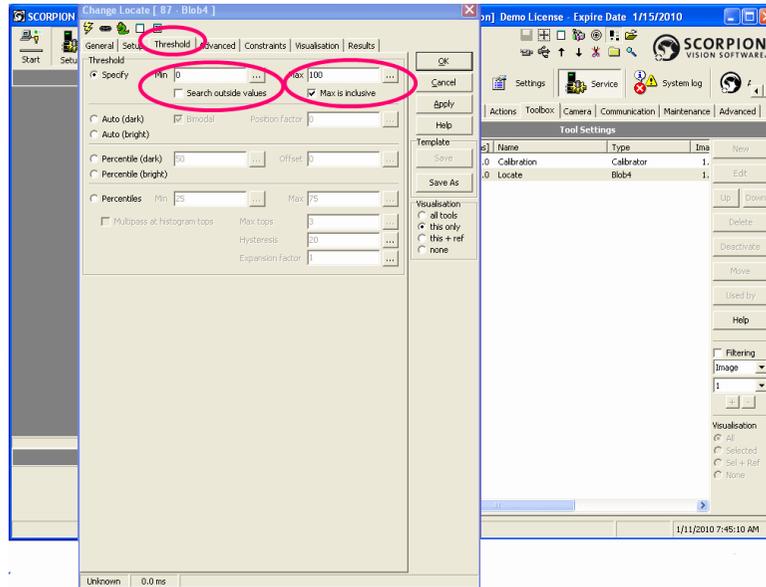


Figure 36: Blob4 tool threshold

In the 'Visualization' tab, select 'Center' and 'ROI' visualizations. De-select all other visualizations.

Click on the 'OK' button to close the 'Change Locate' dialog. The Blob4 tool is now set up and ready to use.

We have now set up a blob detector tool. Every image has 'foreground' pixels which are associated with objects under detection (eg – washer in this tutorial) and remaining 'background' pixels. Blob is a set of foreground pixels connected to each other. Every image can have zero or more blobs in it. The Blob4 tool finds all such blobs.

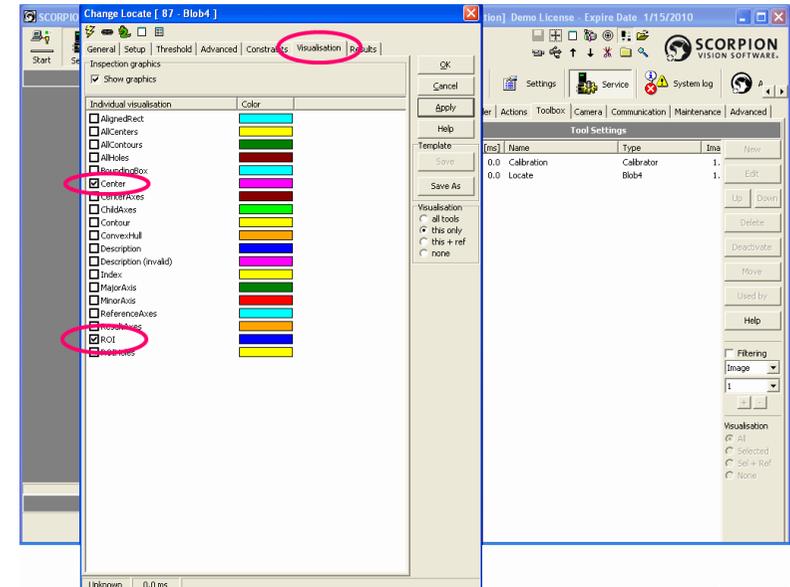


Figure 37: Blob4 tool visualization

We have set up foreground pixels range as 0 to 100. Which means, that pixels with intensity value 0 to 100 (which indicates black color on image) are 'foreground pixels' and remaining are 'background' pixels (which are pixels in the white color range).

We have set up the 'Search area' for blob detection as a complete scene.

Blob4 tool is a powerful tool which also calculates several properties of every detected blob and also calculates ranges based on all blobs found in the image.

For this tutorial we will be using 'blob count' detected by Blob4 tool. If blob count is more than 0, washer exists in the image, and if blob count is 0, washer is not present in the image.

By doing these settings, we have now included processing for 'Presence Verification'.

13. Detection Logic Set Up – Setting LogicTool

Click on the 'New' button under 'Tool Settings'. This will pop up the 'New Tool' dialog

Type name as 'Present'.

In the 'Tools' sub-tab select 'Basic' and then select 'LogicTool' in the right hand pane.

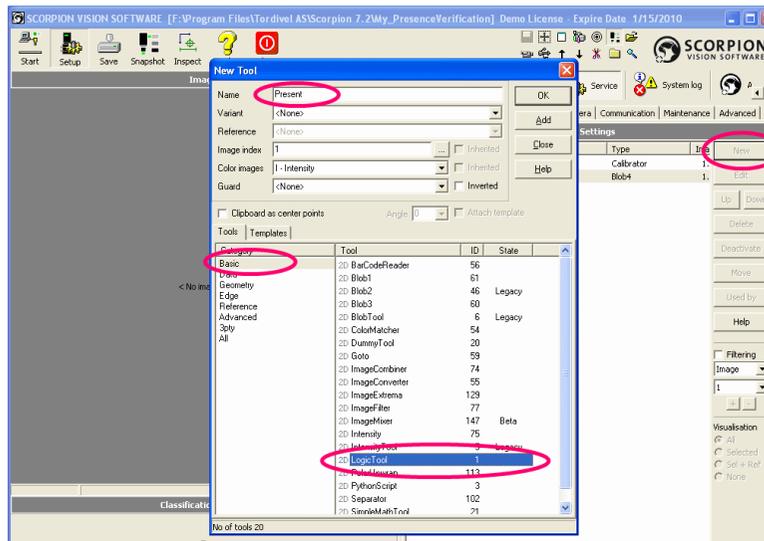


Figure 38: Select LogicTool

Click on the 'OK' button to close the 'New Tool' dialog. This will add an entry related to the new 'Present' tool, under 'Tool Settings'

Select the newly added 'Present' tool and click on the 'Edit' button. This will pop up the 'Change Present' dialog.

In the 'Setup' tab, click on the 'New' button, this will pop up the 'Logic Parameter' dialog.

In the 'Logic Parameter' dialog, select 'Tool' as 'Locate' and 'Parameter' as 'Count'. Under 'Conditions', enable 'minimum' and type '1' in the text box next to it. Click on 'OK' button to close 'Logic Parameter' dialog.

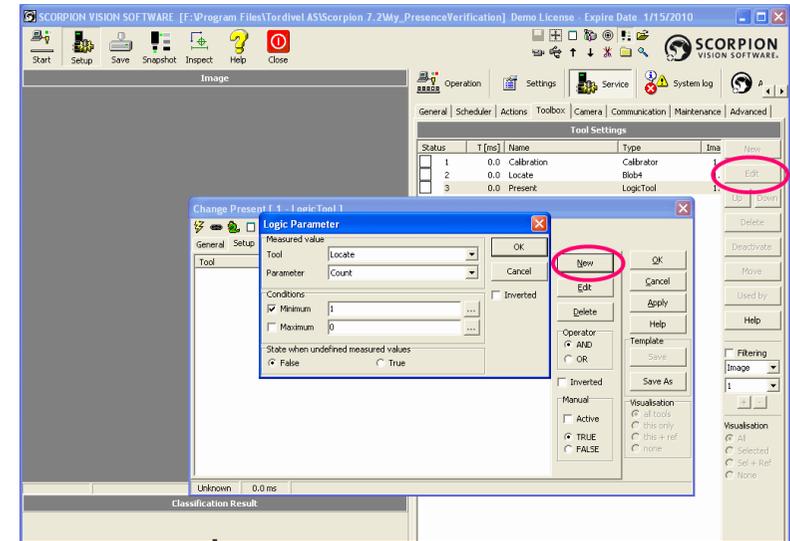


Figure 39: New logic parameter setup

In the 'Change Present' dialog, now there will be an entry for the logic parameter we have newly added.

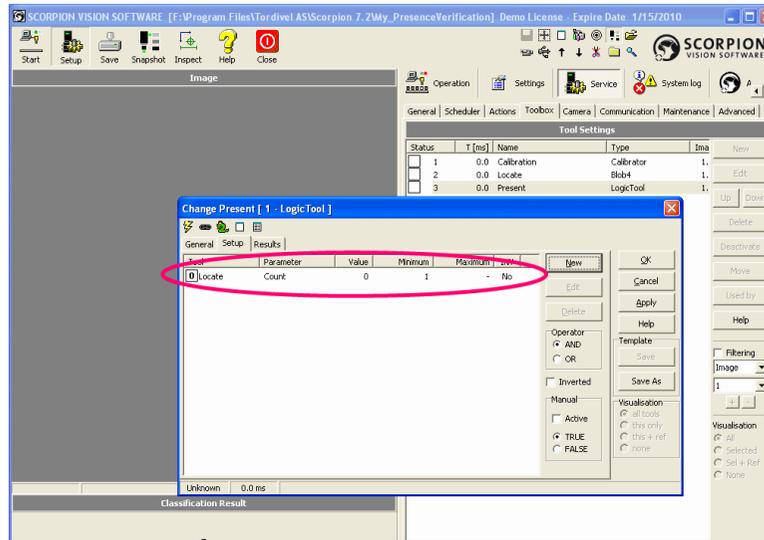


Figure 40: New logic parameter added

We have now set up logic tool. As the name suggests, a logic tool is used for combining results from various tools and calculating single yes or no result.

This is a powerful tool which can act as 'formula evaluator', where formula is defined as combination of different logic parameters based on available results and calculations from individual tools.

Click on the 'OK' button to close the 'Change Present' dialog.

14. Detection Results Handling

Click on the 'Settings' tab, which is one of the 5 main tabs on the right hand side configuration area and is just before the 'Service' tab.

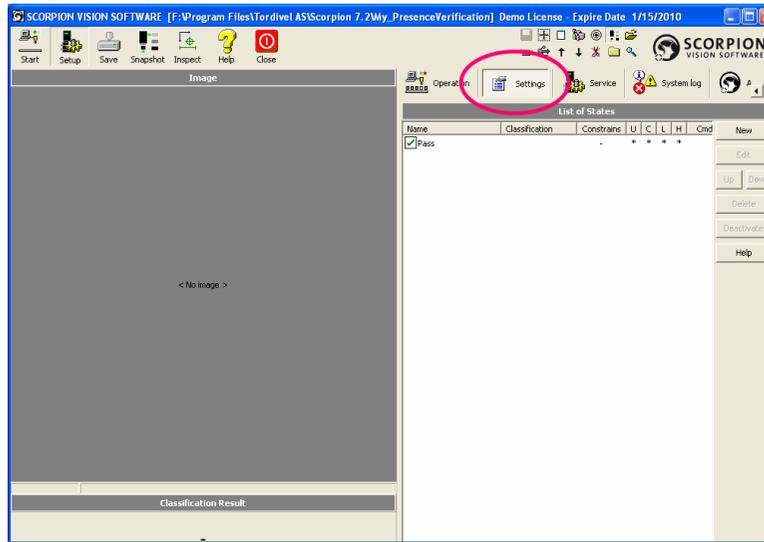


Figure 41: Settings tab

There is a default entry 'Pass' under 'List of States'. Select the 'Pass' state and click on the 'Delete' button. This will ask for confirmation 'Delete state Pass?'. Click on the Yes button to delete the default state.

Click on the 'New' button under 'List of States'. This will pop up the 'Create new state?' dialog box. Type the name 'OK' and click on the 'OK' button to add a new state to 'List of States'.

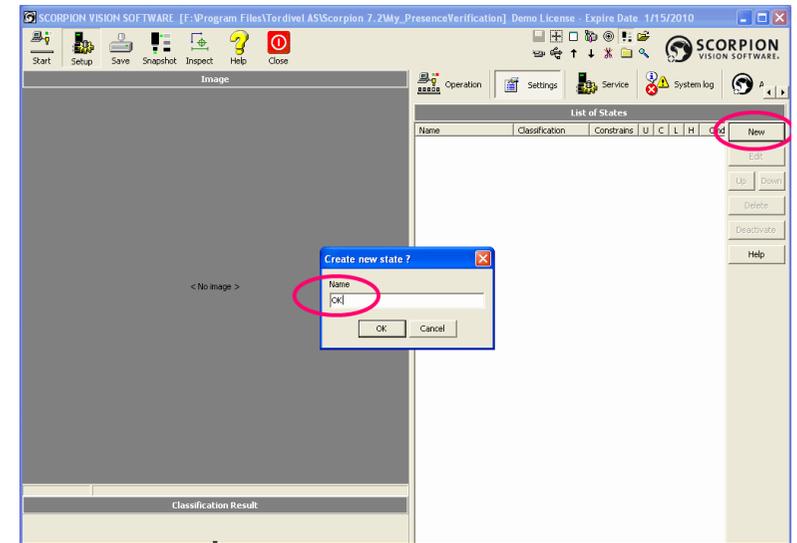


Figure 42: Add new state 'OK'

Select the newly added 'OK' state and click on 'Edit' button. This will pop up the 'Settings for state OK' dialog.

Under the 'General' tab, click on the 'State colors->Back' button, which will pop up the color selection dialog. Select green color and click the 'OK' button to close the color selection dialog. Green color will also be displayed on the 'Settings for state OK' dialog.

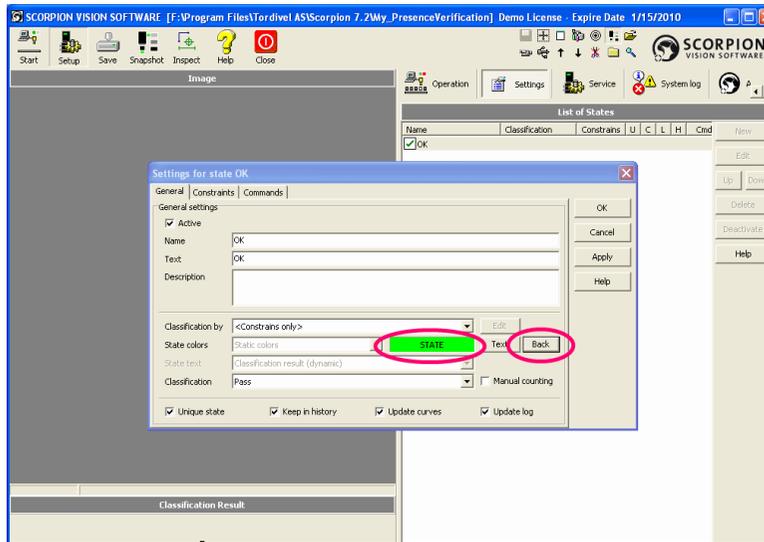


Figure 43: 'OK' state settings

In the 'Constraints' tab, click on the 'New' button. This will pop up the 'Guard' selection dialog which lists several available guards.

Select 'Present' and click on the 'OK' button to close the 'Guard' dialog. This will add an entry to the list available under the 'Constraints' tab.

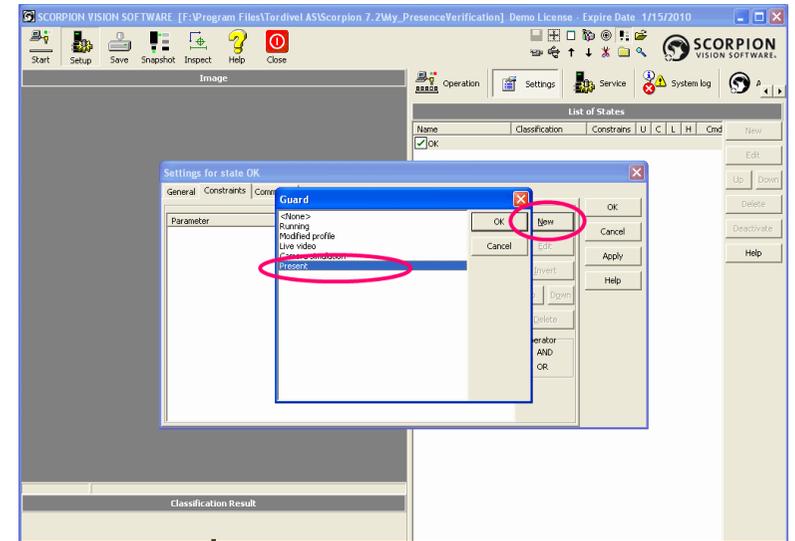


Figure 44: New Constraint settings

Click on the 'OK' button to close the 'Settings for state OK' dialog.

Click on the 'New' button under 'List of States'. This will pop up the 'Create new state ?' dialog box. Type the name 'No washer' and click on the 'OK' button to add a new state to 'List of States'.

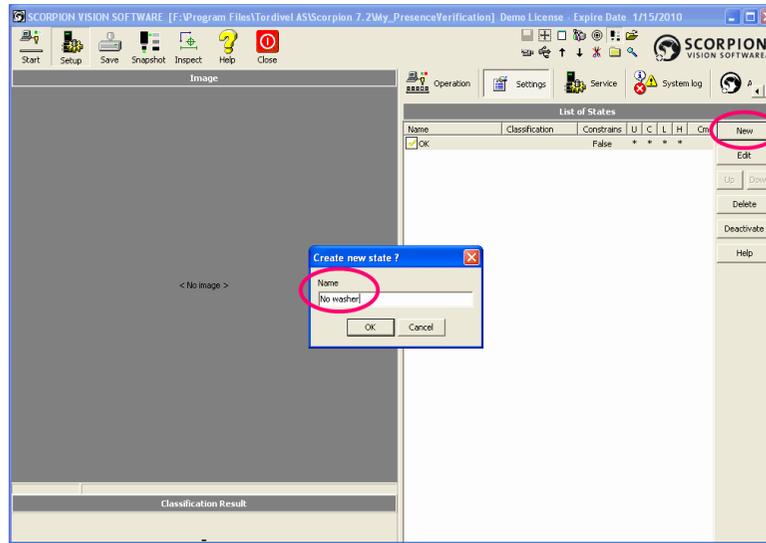


Figure 45: Add New State 'No washer'

Select the newly added 'No washer' state and click on the 'Edit' button. This will pop up the 'Settings for state No washer' dialog.

Under the 'General' tab, select 'Classification' as 'Ignore'.

Click on the 'State colors->Back' button, which will pop up the color selection dialog. Select the yellow color and click the 'OK' button to close the color selection dialog. The yellow color will also be displayed on the 'Settings for state No washer' dialog.

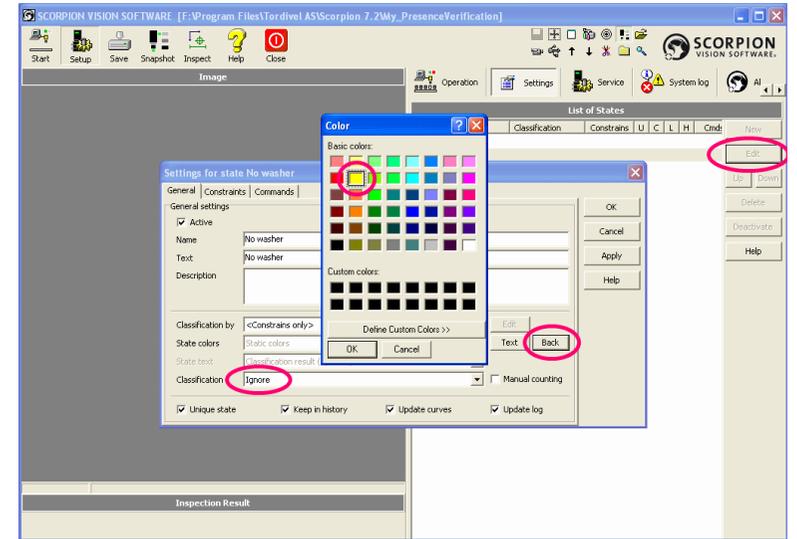


Figure 46: 'No washer' State Settings

In the 'Constraints' tab, click on the 'New' button. This will pop up the 'Guard' selection dialog which lists several available guards.

Select 'Present' and click on the 'OK' button to close the 'Guard' dialog. This will add an entry to the list available under the 'Constraints' tab.

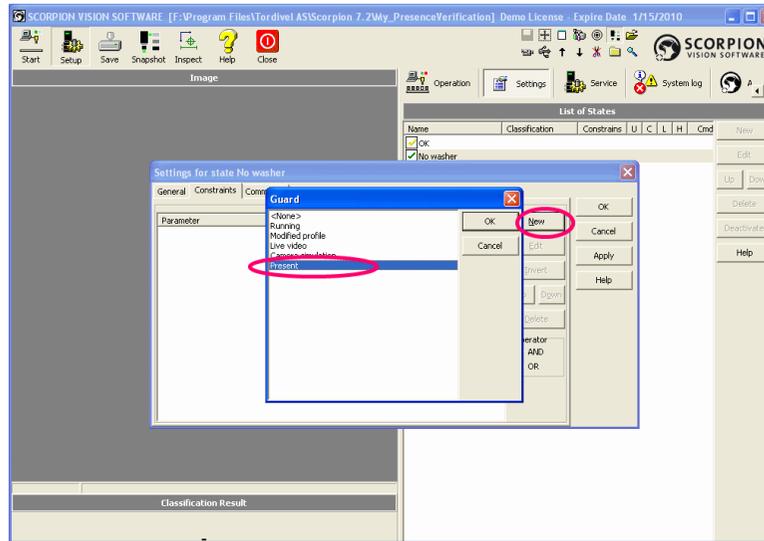


Figure 47: 'New Constraint Settings'

Click on the new entry 'Present' in the list of 'Constraints' and click on 'Invert' button. This will change the 'Inverted' column text from 'No' to 'Yes'.

Click on the 'OK' button to close the 'Settings for state No washer' dialog.

We have now set up the states for the detection system. States can be defined to handle results and associate them with display and reports.

We have defined the 'OK' state which indicates 'Washer Present', we have set up a green color for it for better visual understanding about the inspection result.

We have also defined the 'No washer' state which indicates 'Washer Absent', we have set up a yellow color for it so that the inspection result stands out from the 'OK' state.

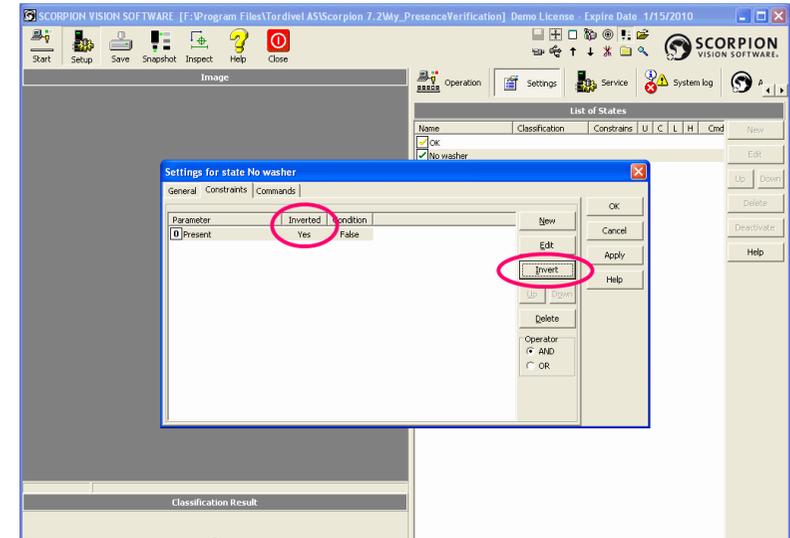


Figure 48: 'Invert Constraint'

Please note that we are checking the same constraint 'Present' (which is a LogicTool) for both these states. For the 'OK' state it is used normally and for the 'No washer' state, it is inverted.

We have set the 'Classification' for 'No washer' state as 'Ignore'. This classification is related to statistics ('Operation' mode 'Statistics' tab). We have set the 'No washer' state to be ignored during statistics generation. Every new state defined can be linked to any one of the 4 statistics classifications:

1. Pass – This is the default and indicates a positive inspection result and part is accepted
2. Fail – This indicates a negative inspection result and part is rejected
3. Ignore – This indicates that the state should be ignored from statistics calculations
4. Error – This indicates error in processing

15. Running the System

Set up is complete and we are now ready to run the system.

Click on the 'Start' tool bar button. This will start capturing the images (from camera simulator as per our settings) and will also do the detection for 'Washer presence verification'.

The captured image is displayed below the toolbar buttons and it also has visualization updates done by Scorpion (center and RIO as set up during Blob4 tool set up).

When a washer is present in the captured image, the 'Result' panel shows a green color with an 'OK' text.

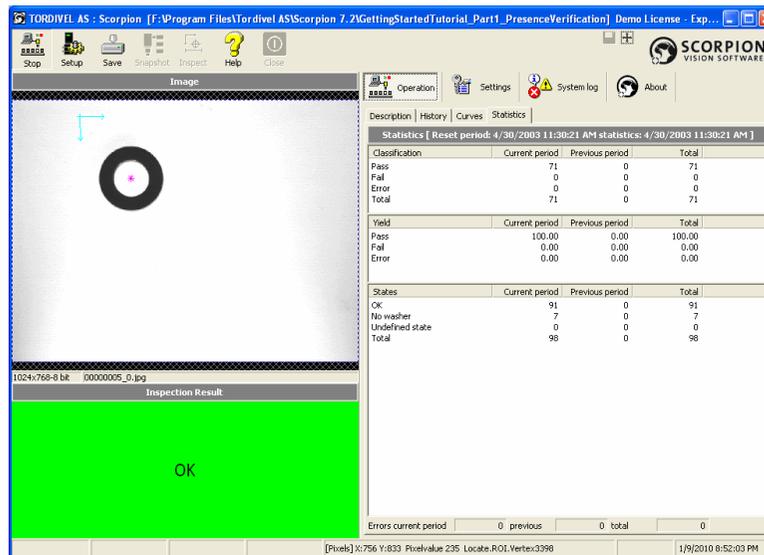


Figure 49: Result 'OK'

When the washer is not present in the captured image, the 'Result' panel shows a yellow color with 'No washer' text.

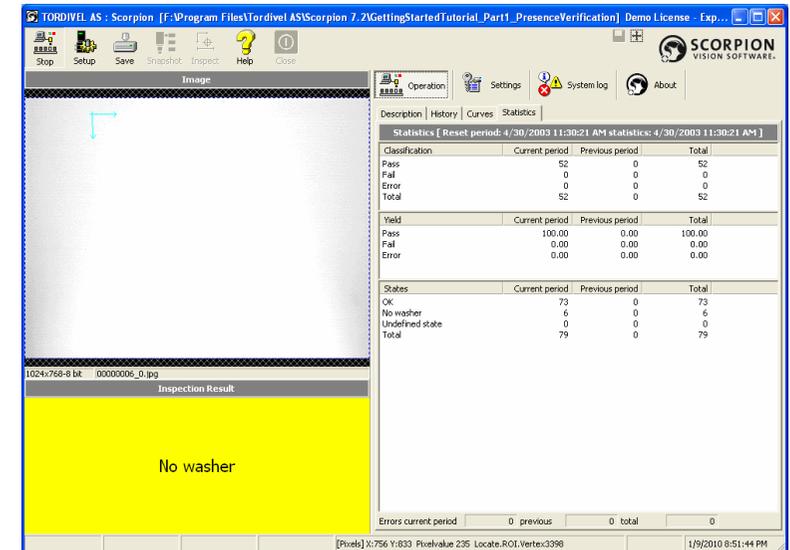


Figure 50: Result 'No washer'

Congratulations!

You have successfully created your first 'Presence Verification' system using Scorpion Vision Software!

16. Using Statistics

Click on 'Operation' mode. Go to the 'Statistics' tab.

The first section gives 'Classification' statistics. It has 4 rows – Pass (accepted parts), Fail (rejected parts), Error (error in processing), and Total.

The second section gives 'Yield' statistics. It has 3 rows – Pass (% accepted parts), Fail (% rejected parts), Error (% error in processing).

The third section gives the 'States' statistics. It has one row for every defined state, one row for 'Undefined state' when the inspection result does not fall under any of the defined states, and one row for 'Total'.

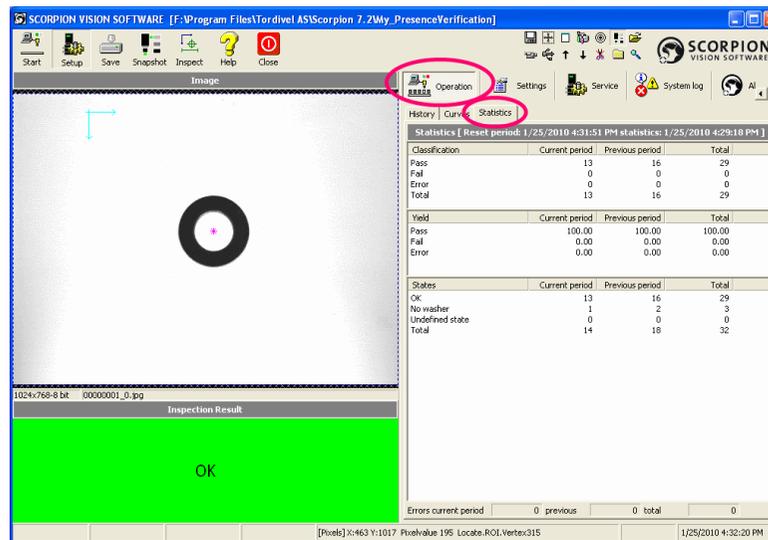


Figure 51: Statistics Tab

Right click anywhere on the 'Statistics' tab. Click on 'Reset Period'. This will copy the 'Current Period' statistics to the 'Previous Period' statistics and will reset the current period statistics to zero.

This is used for starting a new period for statistics calculations.

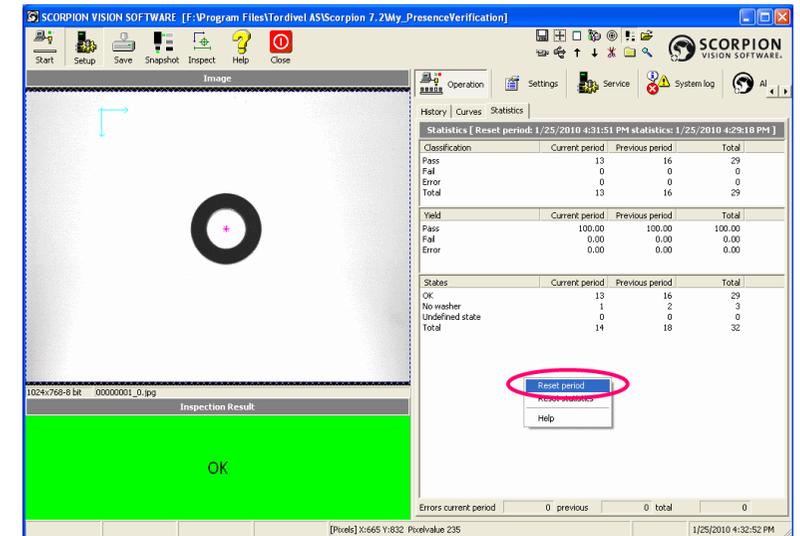


Figure 52: Reset Period

Right click anywhere on the 'Statistics' tab. Click on 'Reset Statistics'. This resets all statistics to zero, including Current period, Previous period and Total.

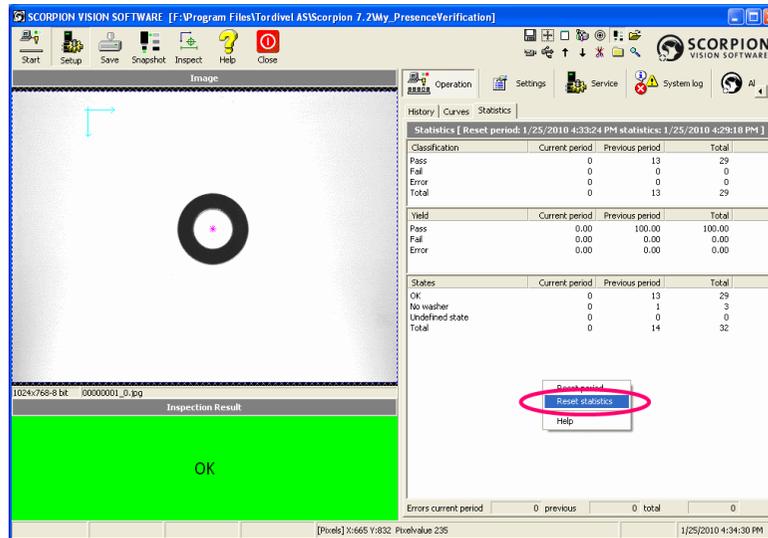


Figure 53: Result Statistics

The statistics can easily be reset from the convenient 'User Interface', as described in this section. However, statistics can also be reset from Scorpion commands (this is out of scope of this tutorial though).

- Statistics;cmd=zero => resets the period statistics
- Statistics;cmd=reset => resets all statistics
- Statistics;cmd=save => saves the statistics to file

The statistics are remembered by Scorpion. They are saved when Scorpion is closed and re-loaded when Scorpion starts again next time.

17.A Few Important Features

A 'Help' button is available on every set up dialog in Scorpion. When the user clicks on the 'Help' button on any dialog, Scorpion Help is launched and it displays help related to that dialog.

As we have observed, clicking on the 'Start' toolbar button starts inspection. When inspection is on, the same button changes to 'Stop'. Clicking on the 'Stop' toolbar button, stops the inspection. This is called an automatic inspection.

We can also do a manual inspection. Clicking on the 'Snapshot' toolbar button captures a new frame from camera (or simulator in case of this tutorial). Clicking on the 'Inspect' toolbar button inspects the recently captured image.

We can change the title of the inspection results panel (located under the image display area). Right click on the panel area and select 'General->Caption'. This will pop up the 'Configuration' title. Type a new title and click on the 'OK' button to close the dialog. A new title will now be displayed for the inspection results panel.

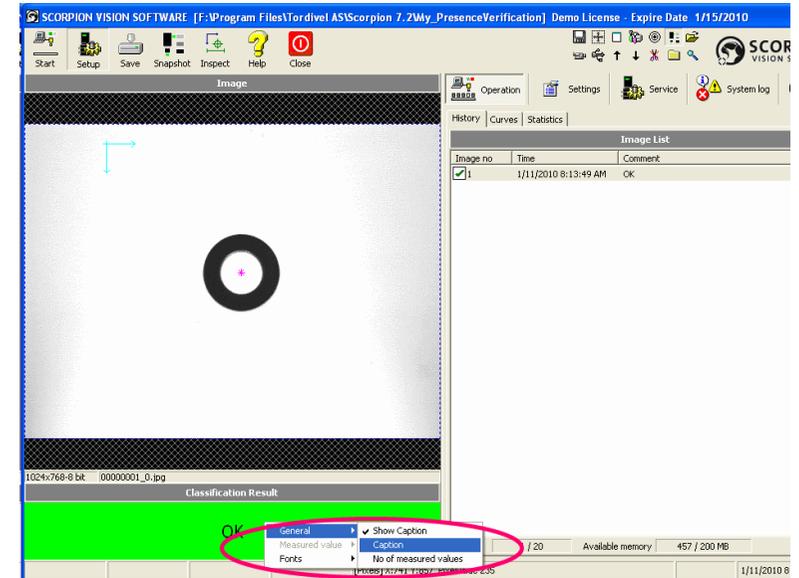


Figure 54: Inspection Result Panel Caption Edit

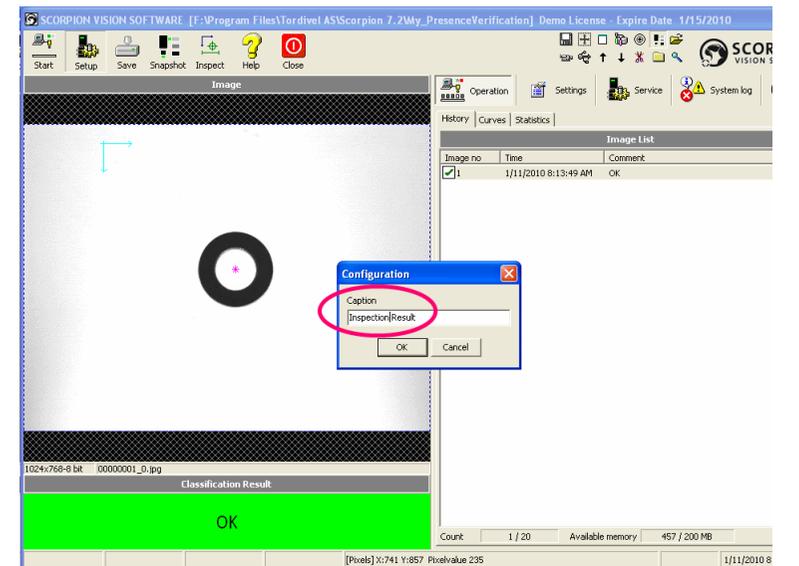


Figure 55: Type new Caption

18. Defining Region of Interest (ROI)

During the Blob4 tool set-up under the 'Setup' tab, we have selected the option 'Search area' -> 'Use whole picture'. Instead of selecting this, we can very easily define a 'Region of Interest (ROI)'. When 'Use whole picture' is not selected and an ROI is defined, blob detection happens only in the defined ROI, everything outside the ROI is ignored.

Scorpion provides a very simple way for defining ROI polygons. Hold the keyboard 'Control' (Ctrl) button and **mouse left-button-click** on the image panel. First click will add a point on image. From 2nd click, it will draw connecting line with previously added point.

Holding 'Control' (Ctrl) button and **mouse right-button-click** removes the last added point and line if associated with it. This 'undo' can be done repeatedly to undo all points added so far.

Polygons of any shape, including the ones with hole inside can be defined and Scorpion can use them as ROIs for detection.

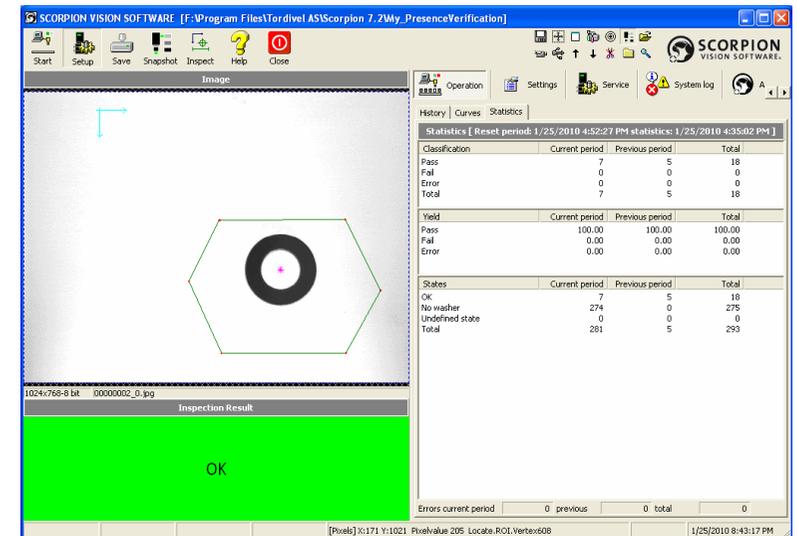


Figure 56: Define ROI using 'Ctrl+Mouse LButton'

Go to 'Service' mode. On the 'Toolbox' tab, select the tool 'Locate' which is a Blob4 tool.

Use keyboard short-cut 'Ctrl+Z' (or right-click on 'Locate', click on 'Tool' menu and click on 'Set ROI' sub-menu).

This will add the selected polygon ROI to the 'Locate' tool.

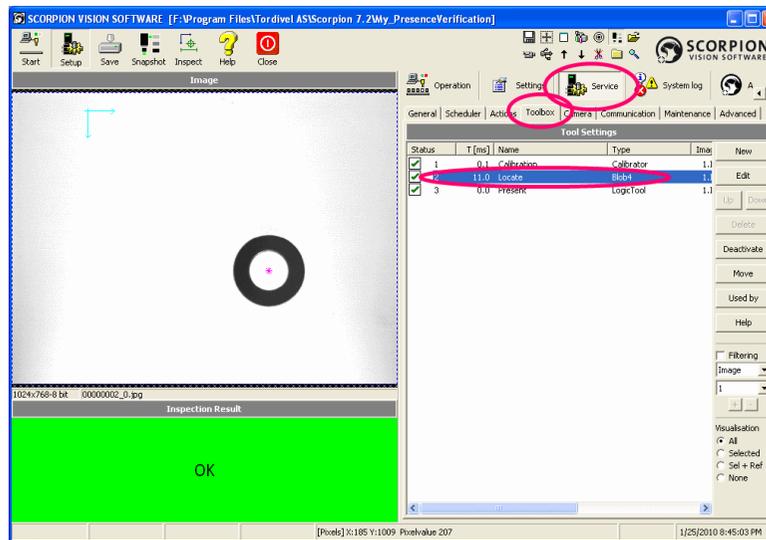


Figure 57: Add ROI to 'Locate' Tool

Click on the 'Edit' button. This will pop up the 'Change Locate' dialog box.

The polygon ROI will be available under 'Search Area' -> 'Polygons'.

Uncheck 'Search Area' -> 'Use whole picture'.

Click on the 'OK' button to close the 'Change Locate' dialog box.

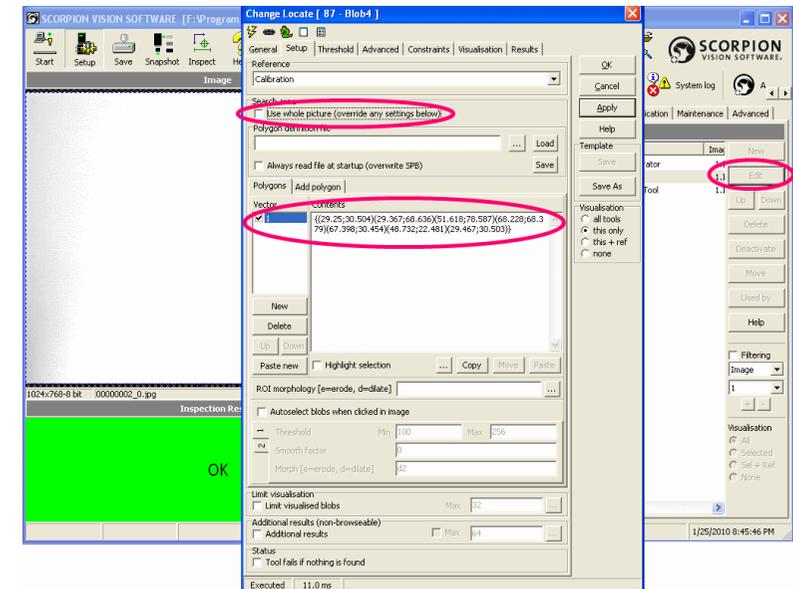


Figure 58: Edit 'Locate' Tool

Click on the 'Start' button to start the inspection.

The ROI will be displayed on the image, as inspection happens.

All washers which are partially or fully in the ROI are detected.

Washers completely outside the ROI are not detected, and state shows 'No washer'.

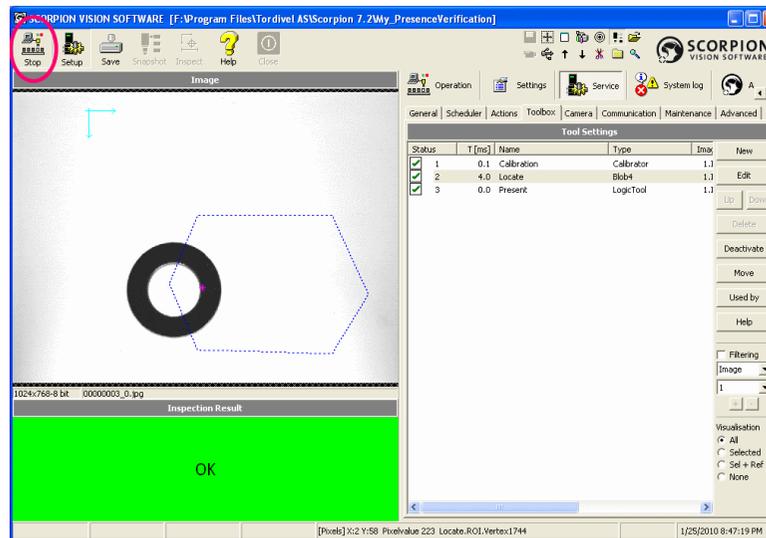


Figure 59: Inspection with ROI, Result 'OK'

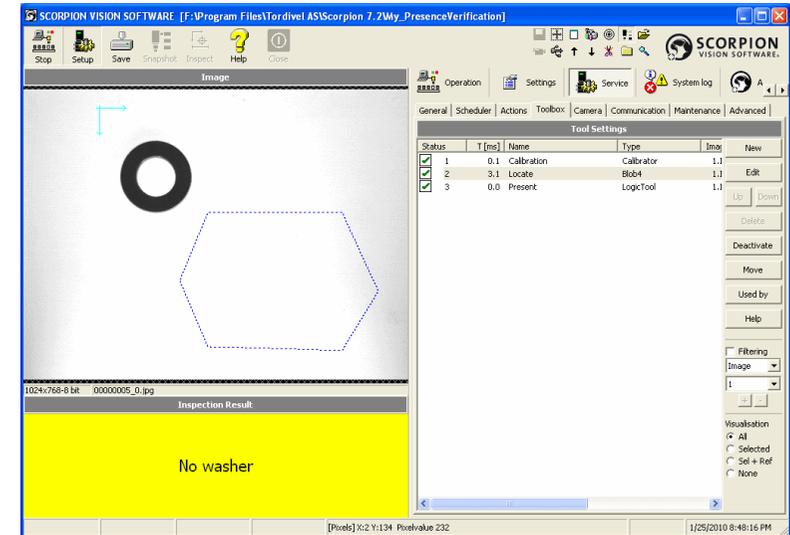


Figure 60: Inspection with ROI, Result 'No washer'

In Scorpion, defining ROI and associating it with a tool in the Toolbox is very easy.

ROI is a useful feature, normally used for increasing the detection accuracy and also for lowering the processing time by only processing the required region and ignoring all other regions.

19. *Tutorial Summary*

- We have learnt about overall working of the powerful Scorpion Vision Software and also got familiar with its intuitive user interface.
- We tried out the pre-compiled profile 'Presence Verification' for detecting presence of washers in the images captured by Scorpion.
- Finally we created our own 'Presence Verification' profile and saw it in action. The profile set up included camera set up, scheduler set up, system events and command set up and detection logic / tools set up.