SCORPION
VISION SOFTWARE®

Getting Started Tutorial

Part 2 - Classification

Tordivel AS • Storgata 20, N-0184 OSLO, Norway • Phone: +47 2315 8700 • Fax: +47 2315 8701 • office@tordivel.com • www.scorpionvision.com
© 2000-2010 Tordivel AS

TORDIVEL

Goals of this Tutorial

- Developing 'Washer Classification System' using Scorpion Vision Software and seeing it in action.
- The inspection set consists of a few small size washers and a few large size washers. The 'Washer Classification System' detects the washers and classifies them as 'Small' or 'Large'.

Before Starting the Tutorial

- Scorpion Vision Software version 7.2 or higher needs to be installed on the test machine and the license should be activated
- An actual camera is not needed since you will be using the 'simulator' feature available in Scorpion Vision Software
- The data files available with this tutorial should be copied to the test machine:
  (1) 'GettingStartedTutorial_Part2_Classification.zip' which is pre-configured profile
- It is assumed that 'Getting Started Tutorial Part 1 - Presence Verification' is already completed. This tutorial ('Getting Started Tutorial Part 2 – Classification') uses the Scorpion Vision Software profile from 'Getting Started Tutorial Part 1 - Presence Verification', as a starting point.

© 2000-2010 Tordivel AS

Washer Presence Verification System

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

- Learns 'Small' washer and 'Large' washer.
- 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
- If washer is present in the captured image, it is further analyzed against the learnt classes and classified as 'Small' washer or 'Large' washer.
- Displays the classification result to the user and generates statistical data

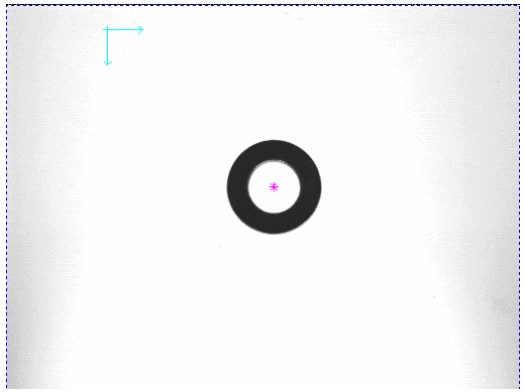

Figure 1: Image with 'Small' washer

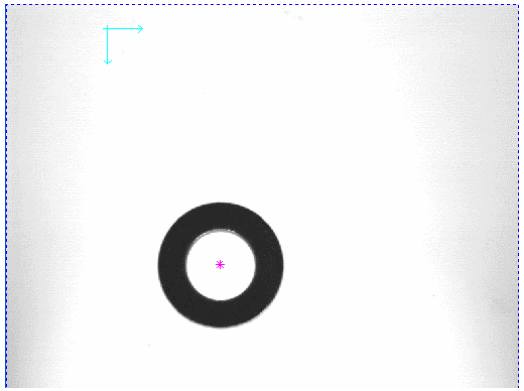

Figure 2: Image with 'Large' washer

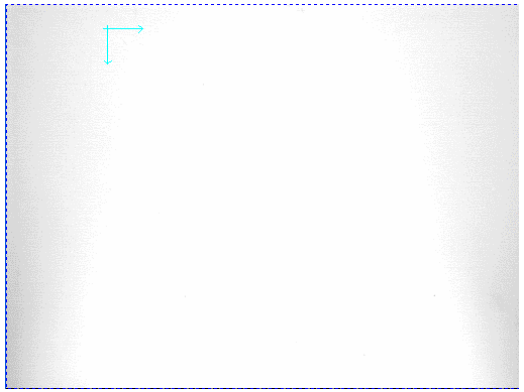

Figure 3: Image with no washer

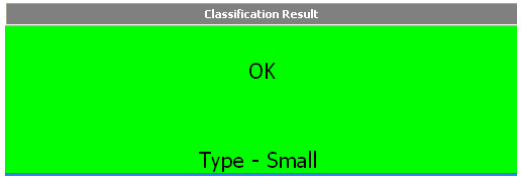

Figure 4: 'OK' and 'Type – Small' is the expected result after inspection by the system

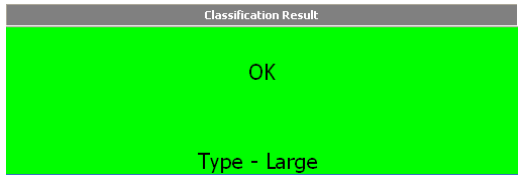

Figure 5: 'OK' and 'Type – Large' is the expected result after inspection by the system

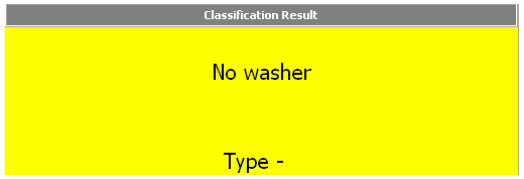

Figure 6: 'No washer' is the expected result after inspection by the system

© 2000-2010 Tordivel AS

Table of Contents

1.	Pre-Configured Profile	5
2.	Trying out the Pre-Configured Profile	6
3.	Creating New Profile and Copying Configurations	9
4.	Result Panel Updates	12
5.	Learning 'Small' Washer and 'Large' Washer	13
6.	Displaying Classification Results	18
7.	Running the system	21
8.	Tutorial Summary	22

© 2000-2010 Tordivel AS

1. *Pre-Configured Profile*

- The GettingStartedTutorial_Part2_Classification.zip available with this tutorial is a pre-configured profile for the 'Washer Classification System'
- This profile can be used on any computer to see the 'Washer Classification' 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 by making a few updates to the profile we have created in 'GettingStartedTutorial_Part1_PresenceVerification'

© 2000-2010 Tordivel AS

2. 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.

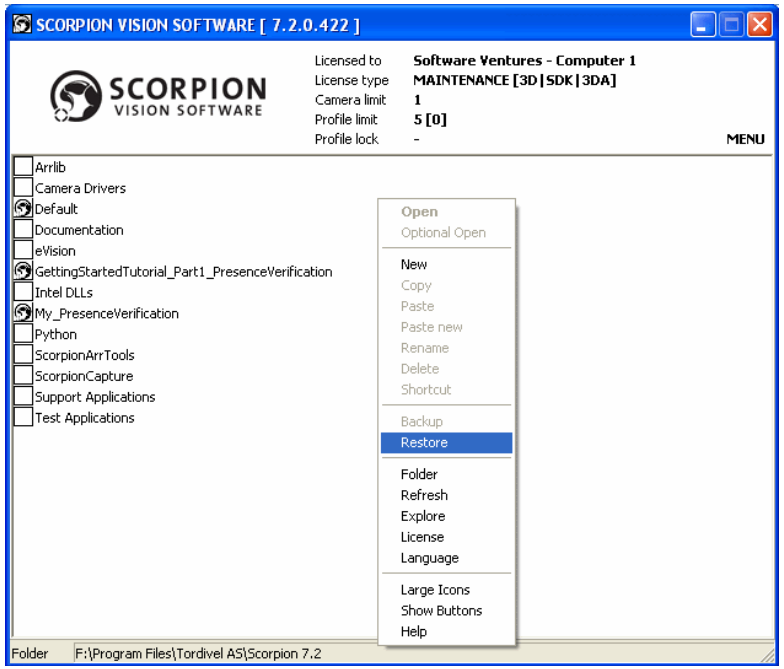

Figure 7: Restore Profile

Navigate to the directory where GettingStartedTutorial_Part2_Classification.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_Part2_Classification**' and click on '**Open**' sub-menu to launch Scorpion vision software with this profile loaded.

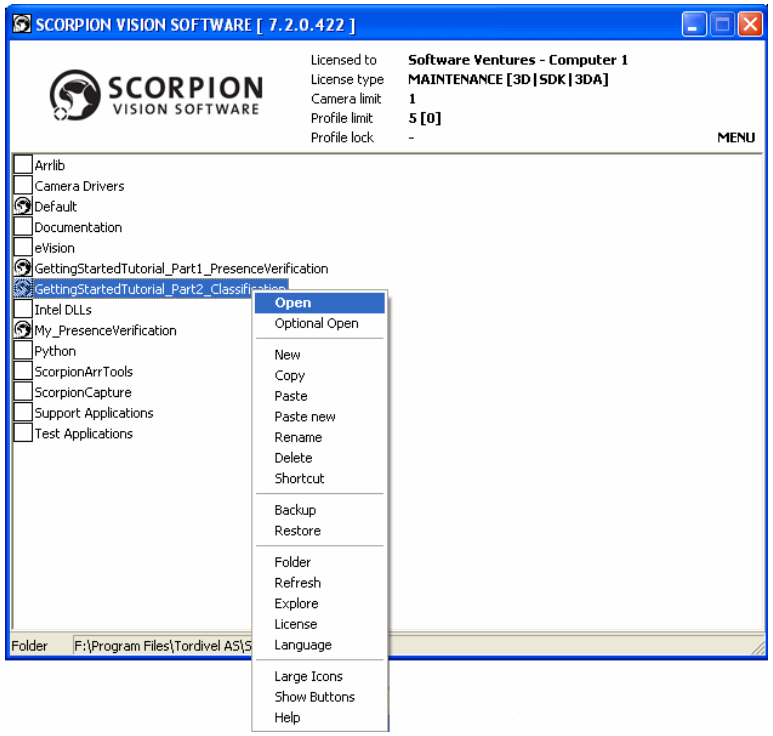

Figure 8: Open Profile

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

© 2000-2010 Tordivel AS

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.

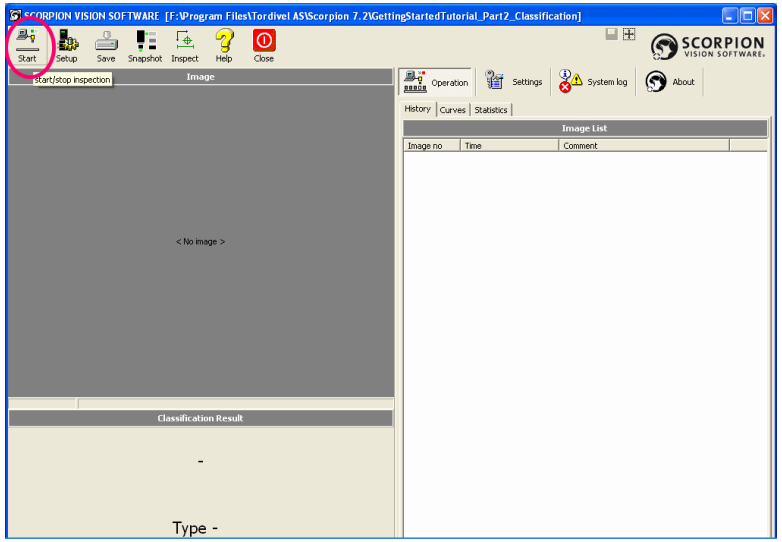

Figure 9: Start the inspection

There are some captured images which have small washers present, some captured images which have large washers present and a few captured images which do not have any washer.

Scorpion analyses each captured frame and updates the result as '**OK**' or '**No washer**', and also updates the classification result as '**Small**' or '**Large**', 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.

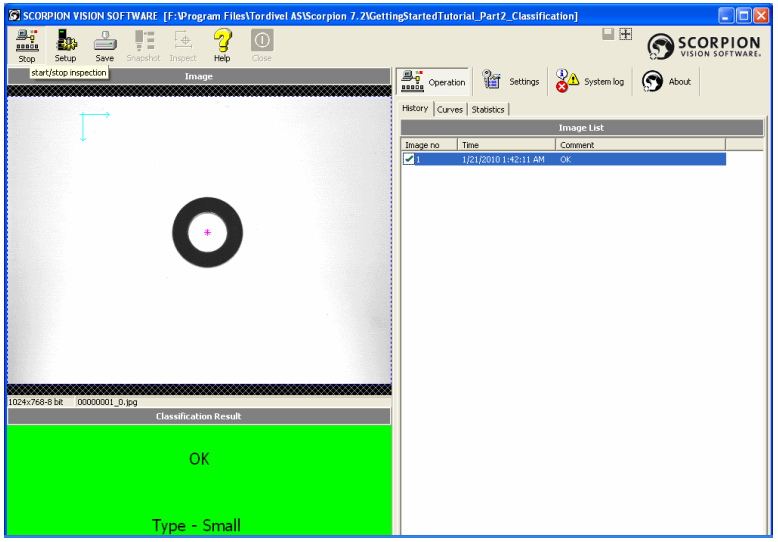

Figure 10: Result 'OK', classification 'Small'

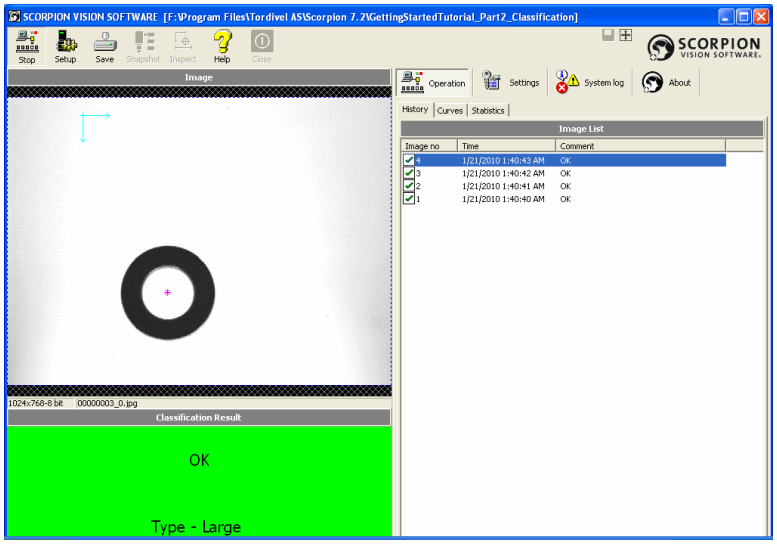

Figure 11: Result 'OK', classification 'Large'

© 2000-2010 Tordivel AS

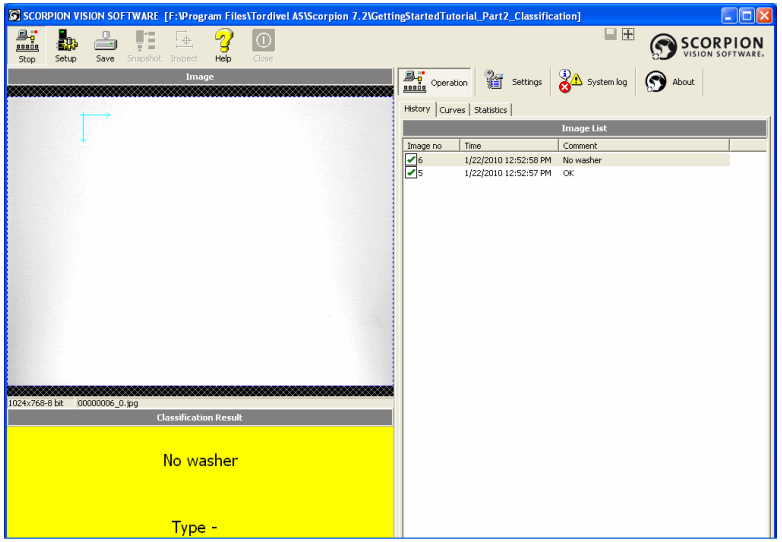

Figure 12: Result 'No washer', hence no classification

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

Congratulations!
You have successfully used Scorpion Vision Software for 'Classification'!

Now we are ready to update the profile we have created in 'GettingStartedTutorial_Part1_PresenceVerification' to get the same 'Classification'.

© 2000-2010 Tordivel AS

3. Creating New Profile and Copying Configurations

Close the Scorpion instance which had the pre-configured 'Classification' 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 the '**New**' sub-menu. This will ask for a name of the new profile. Type '**My_Classification**' (or you may choose any name of your choice) and click on the '**OK**' button. This will add the new profile to the list.

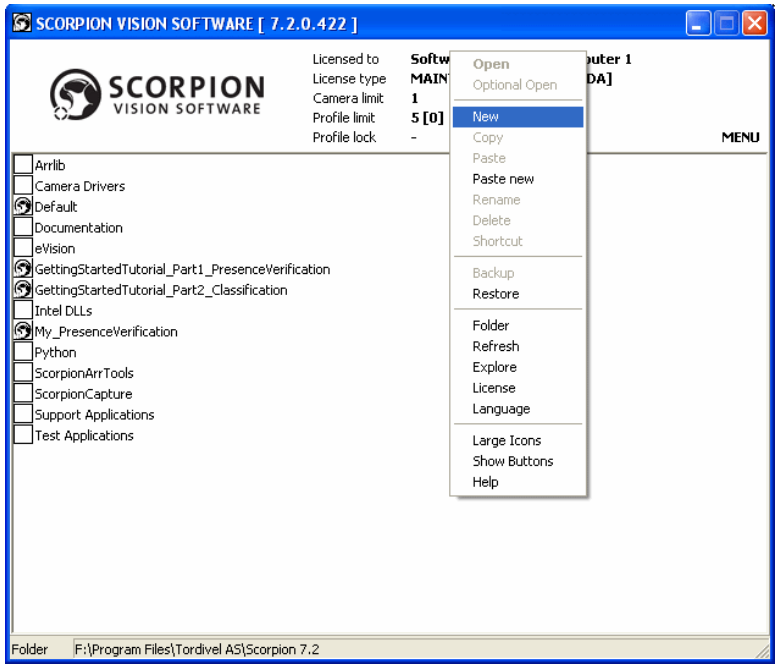

Figure 13: New profile

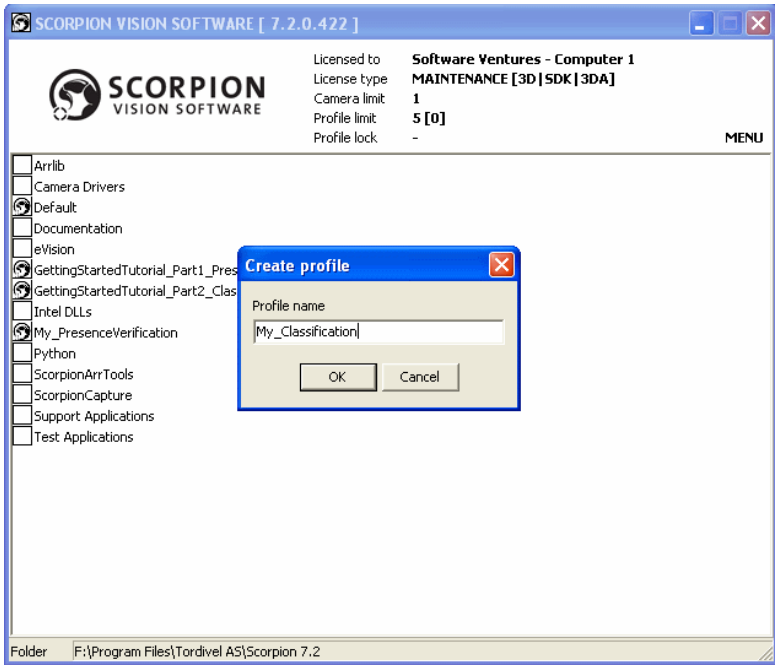

Figure 13: New profile name

© 2000-2010 Tordivel AS

Right click on the previously created profile '**My_PresenceVerification**' and click on '**Copy**'.

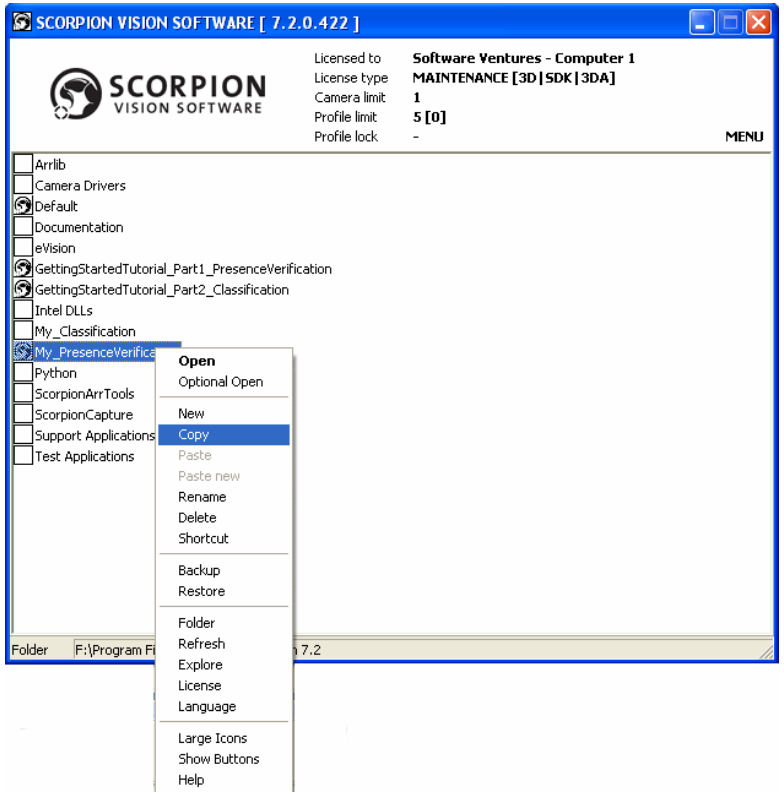

Figure 15: Copy Profile Settings

Right click on the newly created profile '**My_Classification**' and click on '**Paste**'. Scorpion will pop up a confirmation dialog, click on the '**Yes**' button to confirm pasting.

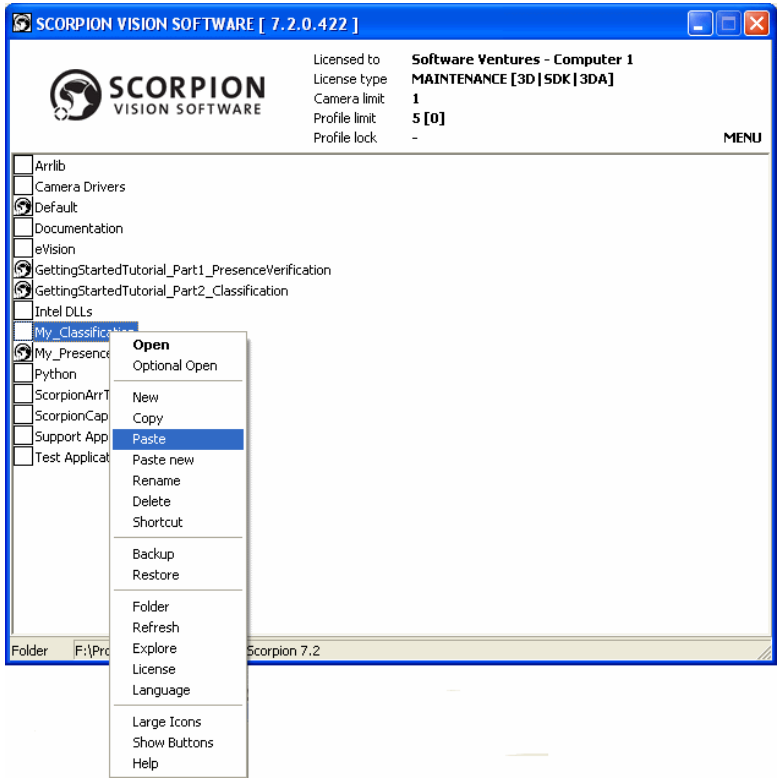

Figure 16: Paste Profile Settings

© 2000-2010 Tordivel AS

Right click on the newly created profile name in the list and click on '**Open**'. This will also launch Scorpion with the new profile loaded.

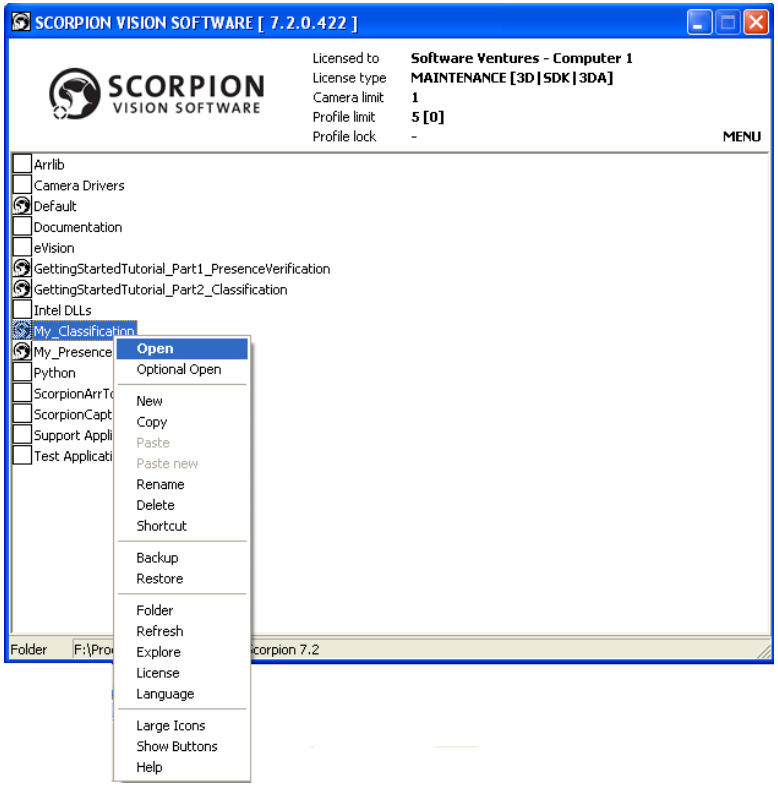

Figure 17: Open profile

Click on the '**Setup**' tool bar button. This will pop up a password dialog. Type **911** and click on the '**OK**' button. This will switch Scorpion to 'Service mode'

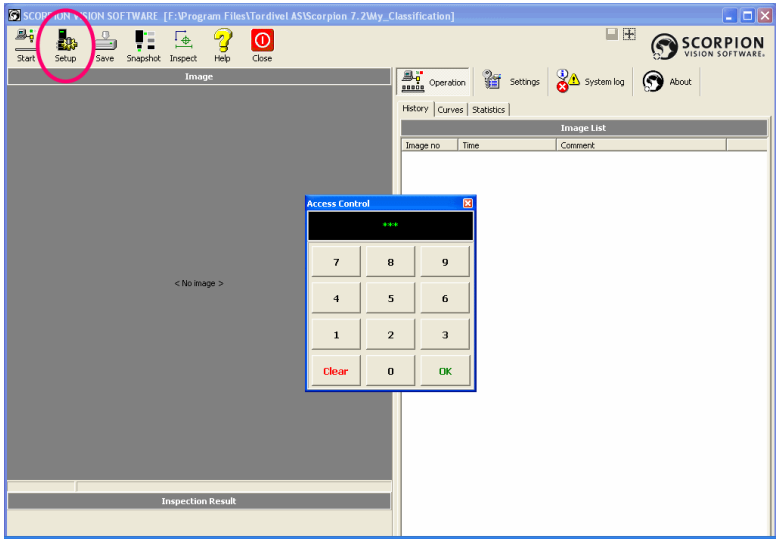

Figure 18: 'Service Mode Password

Scorpion provides a very easy and convenient way to copy configuration from a profile to another profile. We have used the same to re-use configurations from a previously created profile, instead of doing all configurations once again.

© 2000-2010 Tordivel AS

4. Result Panel Updates

In this tutorial, we need to show 2 results; 'washer presence' inspection result ('OK' or 'No washer') and 'classification' result ('Small or 'Large'). So we will need a bigger result panel. We increased the height of the result panel for the same.

Also since we are doing 'Classification', we have changed the result panel caption to match it.

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

Select the '**General**' sub-tab and '**Panels**' option under it.

Select the '**Result panel**' from the list of panels. Click on the '**Height**' button which will pop up the '**Height**' dialog. Type '**Value**' as 200 and click on the '**OK**' button to close the dialog. The result panel height in Scorpion UI will increase after this setting.

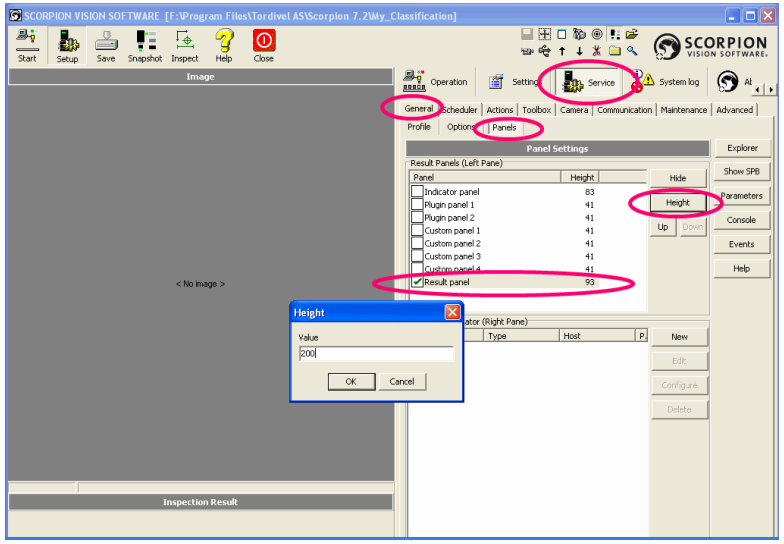

Figure 19: Result Panel Height Change

Right click anywhere in the '**Inspection Result**' pane available at the left-bottom. Select the '**General**' menu and the '**Caption**' sub-menu under it.

This will pop up the '**Configuration**' dialog. Type '**Caption**' as '**Classification Result**'. Click on the '**OK**' button to close the dialog.
The result panel caption will now change to '**Classification Result**'.

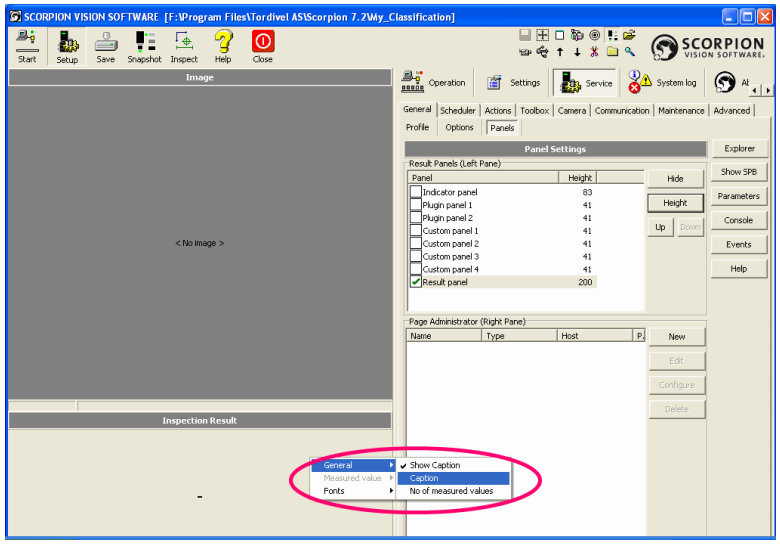

Figure 20: Result Panel Caption Change

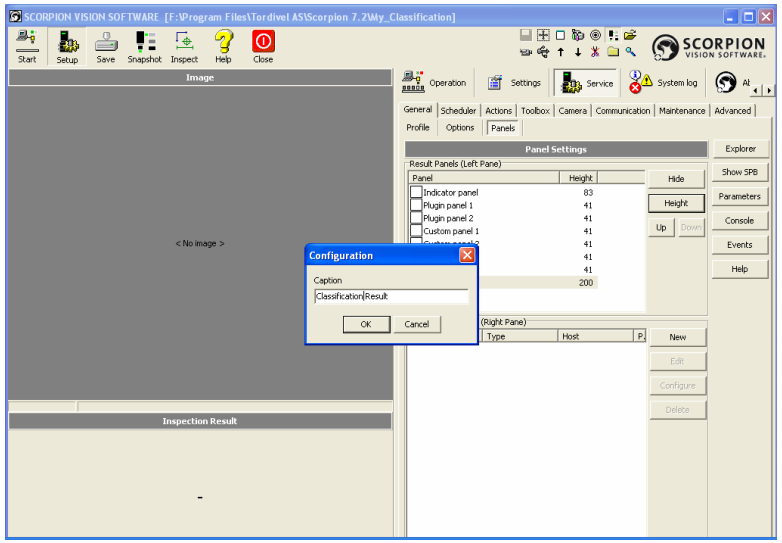

Figure 21: Result Panel New Caption

© 2000-2010 Tordivel AS

5. Learning 'Small' Washer and 'Large' Washer

Click on the '**Snapshot**' toolbar button. This will capture and show '00000001_0.jpg' in the image panel. '00000001_0.jpg' has a small washer.

Click on the '**Inspect**' toolbar button. This will analyze the captured image.

It is important to confirm that the inspection is complete. The calibration indicator (horizontal and vertical arrows) displayed at the left-top corner on Image panel, and the 'OK' state in Result panel confirm that inspection is done.

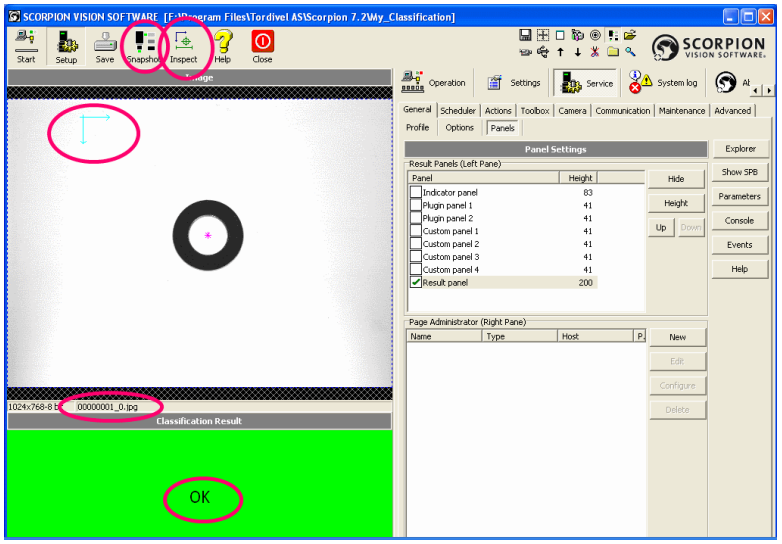

Figure 22: Inspect 'Small Washer' Image

Click on the '**Toolbox**' tab in the right window. Select the Blob4 tool named 'Locate', available in the list of configured tools.

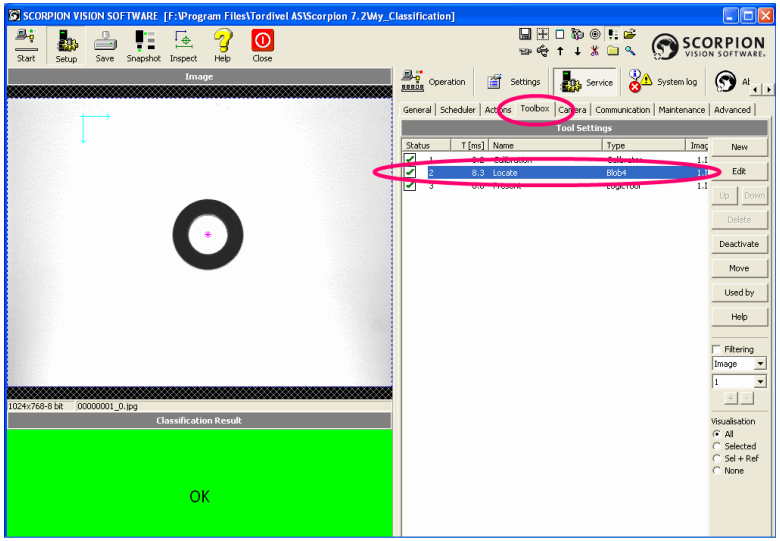

Figure 23: Edit Tool 'Locate'

Click on the '**Edit**' button. This will pop up the '**Change Locate**' dialog. Select the '**Constraints**' tab and '**Feature Classification**' sub-tab under it.

© 2000-2010 Tordivel AS

Right click on the list of classes which is empty right now and click on the '**Add class**' menu.

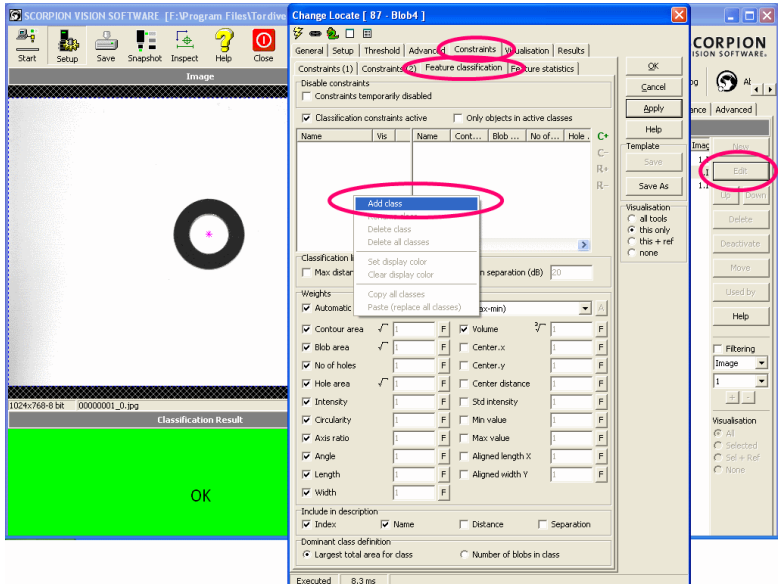

Figure 24: Add Class

This will pop up the '**Add class**' dialog. Type '**Name**' as **Small** and click onthe '**OK**' button. Even though any name can be specified for the class; for this tutorial, please make sure the name is correctly typed as **Small** with correct spelling and uppercase 'S'. This is required later since we will be using class names as references.

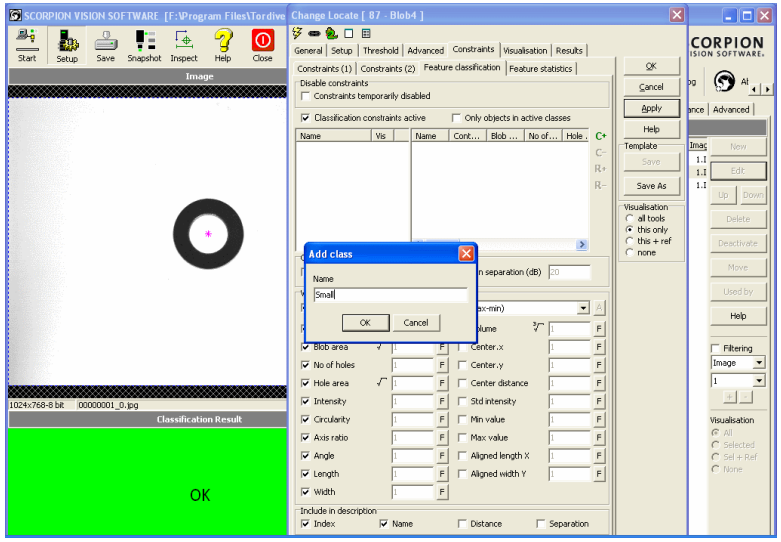

Figure 25: New Class Name

© 2000-2010 Tordivel AS

Select the newly added class '**Small**' and click on the '**R+**' button to add a reference for the class.

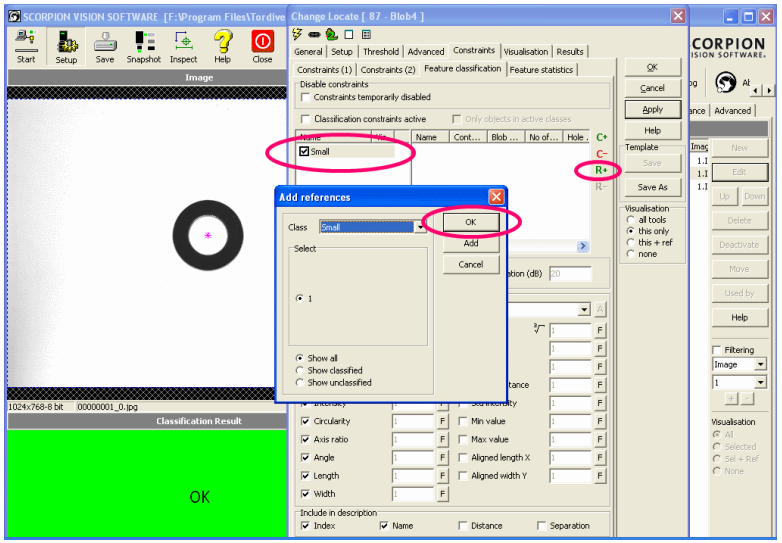

Figure 26: Add Reference

This will pop up the '**Add references**' dialog. Keep all default settings and click on the '**OK**' button to close this dialog. A new reference is now added for class 'Small'.

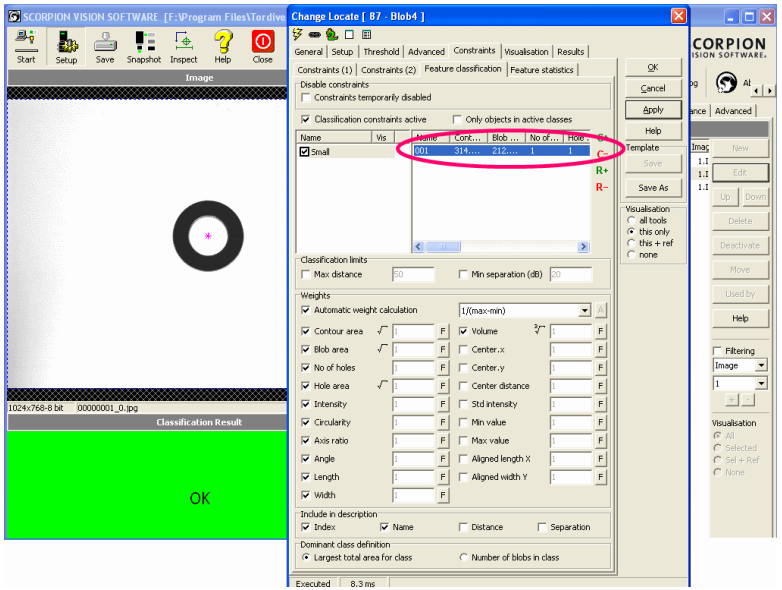

Figure 27: Reference added

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

Click on the '**Snapshot**' toolbar button 2 times. This will capture and show '00000003_0.jpg' in the image panel. '00000003_0.jpg' has a large washer.

© 2000-2010 Tordivel AS

Click on the '**Inspect**' toolbar button. This will analyze the captured image.

It is important to confirm that the inspection is complete. The calibration indicator (horizontal and vertical arrows) displayed at the left-top corner on the Image panel, and the 'OK' state in the Result panel confirm that an inspection is done.

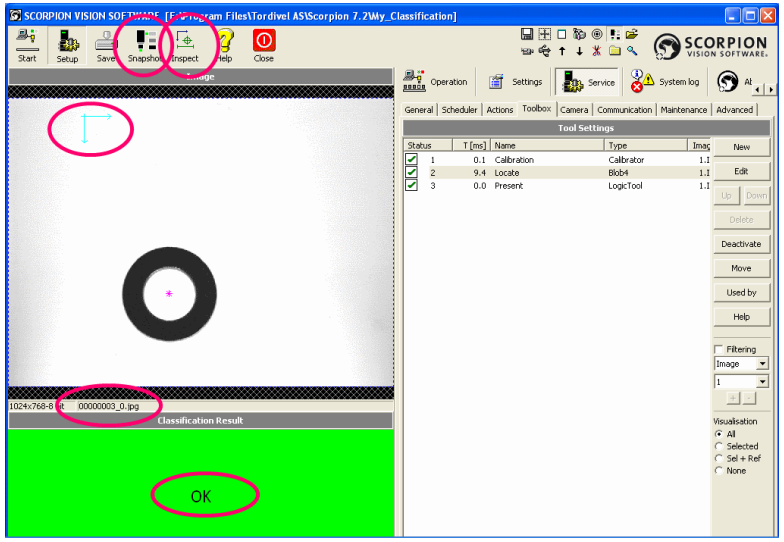

Figure 28: Inspect 'Large Washer' Image

Click on the '**Toolbox**' tab in the right window. Select the Blob4 tool named '**Locate**', available in the list of configured tools.

Click on the '**Edit**' button. This will pop up the '**Change Locate**' dialog. Select the '**Constraints**' tab and the '**Feature Classification**' sub-tab under it.

Right click on the list of classes and click on the '**Add class**' menu.

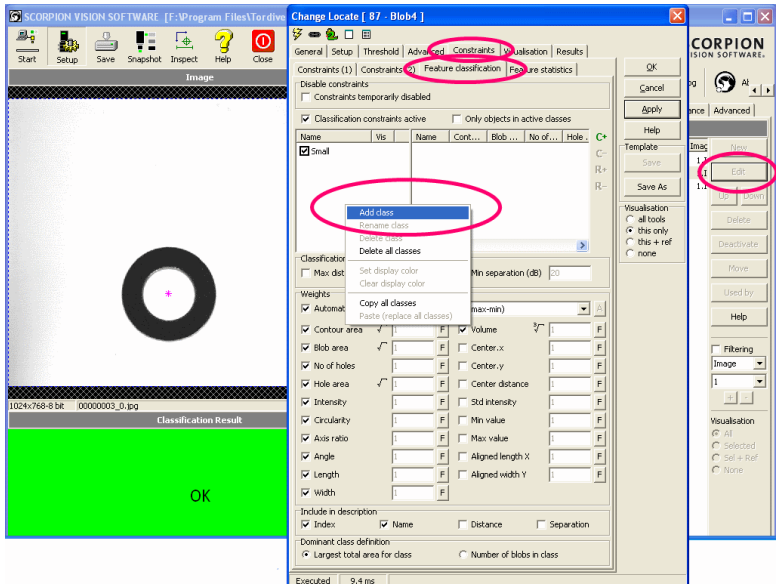

Figure 29: Add Class

This will pop up the '**Add class**' dialog. Type '**Name**' as **Large** and click on the '**OK**' button. Even though any name can be specified for the class; for this tutorial, please make sure name is correctly typed as **Large** with correct spelling and uppercase 'L'. This is required later since we will be using class names as references.

© 2000-2010 Tordivel AS

Select the newly added class '**Large**' and click on the '**R+**' button to add a reference for the class.

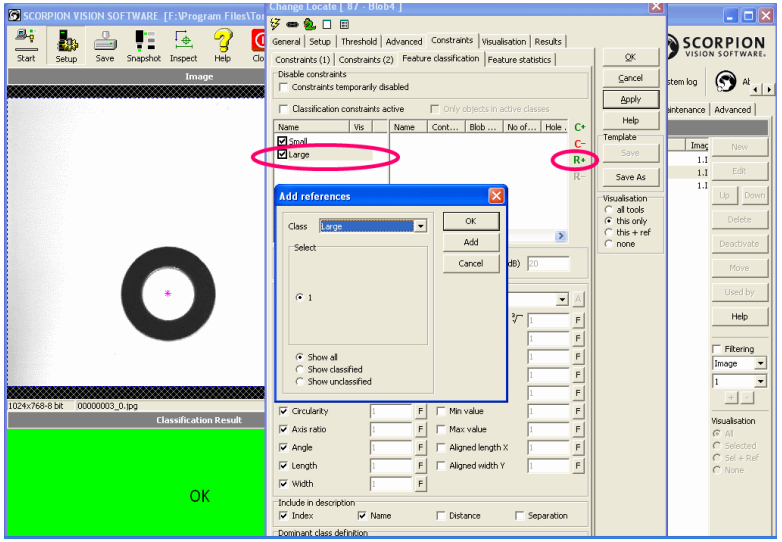

Figure 30: Add Reference

This will pop up the '**Add references**' dialog. Keep all default settings and click on the '**OK**' button to close this dialog. A new reference is now added for class '**Large**'.

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

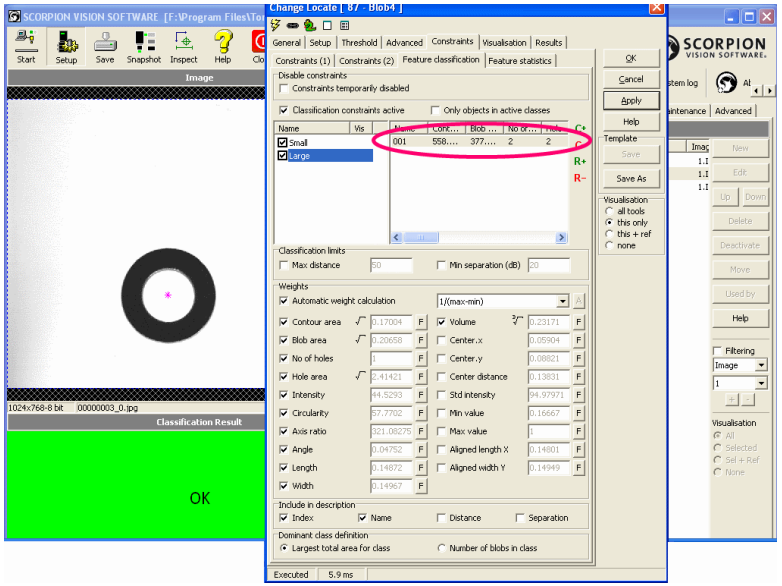

Figure 31: Reference added

Scorpion has now learnt 'Small' washers and 'Large' washers, just in few simple steps!

We provided image with small washer in it, and Scorpion analyzed it and learnt 'Small' washers.

Then we provided image with large washer in it, and Scorpion analyzed it and learnt 'Large' washers.

Scorpion learns properties / features for every class or type added. There are several features including 'contour area', 'blob area', 'number of holes' etc. Currently we have used default features for classification, but these can be changed from 'Feature Classification' settings (Not in the scope of this tutorial).

It is also possible to add multiple references for a single class, which makes Scorpion learn possible/expected variations and do better classification.

© 2000-2010 Tordivel AS

6. Displaying Classification Results

Right click in the Results panel available on the left-bottom in Scorpion. Click on the '**General**' menu and '**No of measured values**' sub-menu.

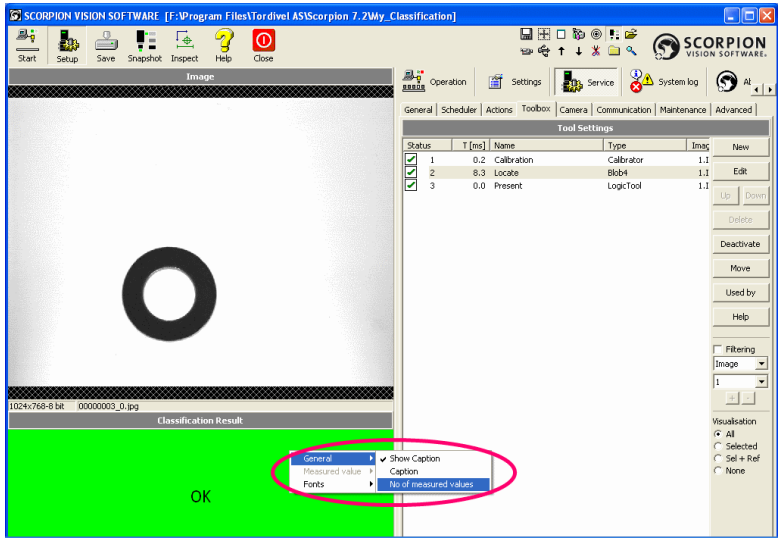

Figure 32: Edit Number of Measured Values

This will pop up the '**Configuration**' dialog. Type '**Number of measured values**' as **1**. Click on the '**OK**' button to close the dialog.

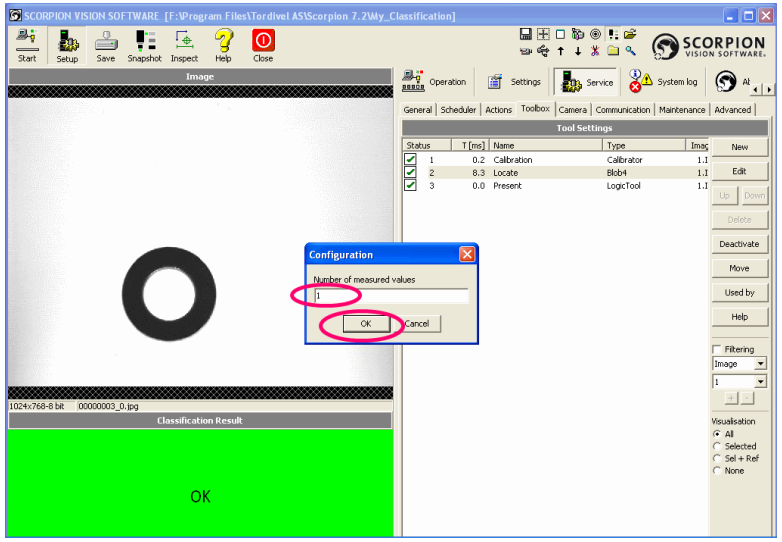

Figure 33: Set Number of Measured Values

© 2000-2010 Tordivel AS

Now new text '**Tagvalue 1 -**' will be added in the results panel, under inspection result text (which is 'OK' right now). Right click on the new text '**Tagvalue 1 -**' and click on the '**Measured value**' menu and '**Caption**' sub-menu under it.

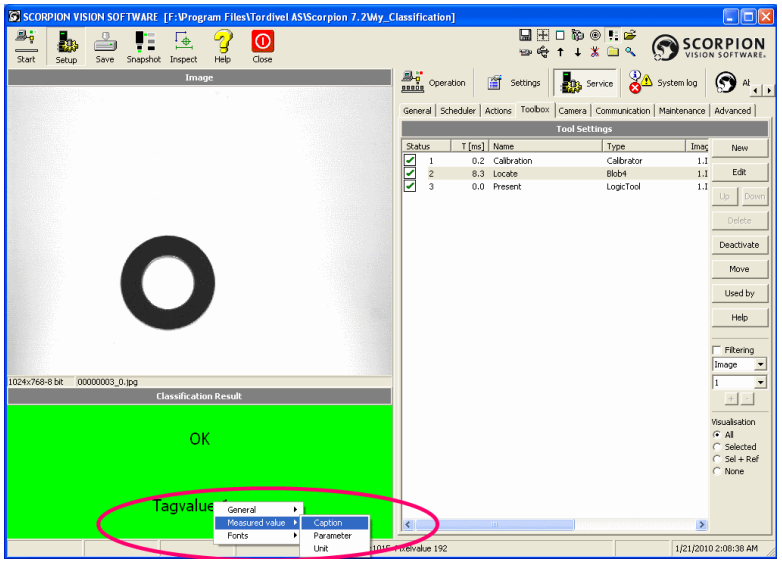

Figure 34: Edit Measured Value Caption

This will pop up the '**Configuration**' dialog. Type 'Caption' as '**Type -**' and click on the '**OK**' button to close the dialog.

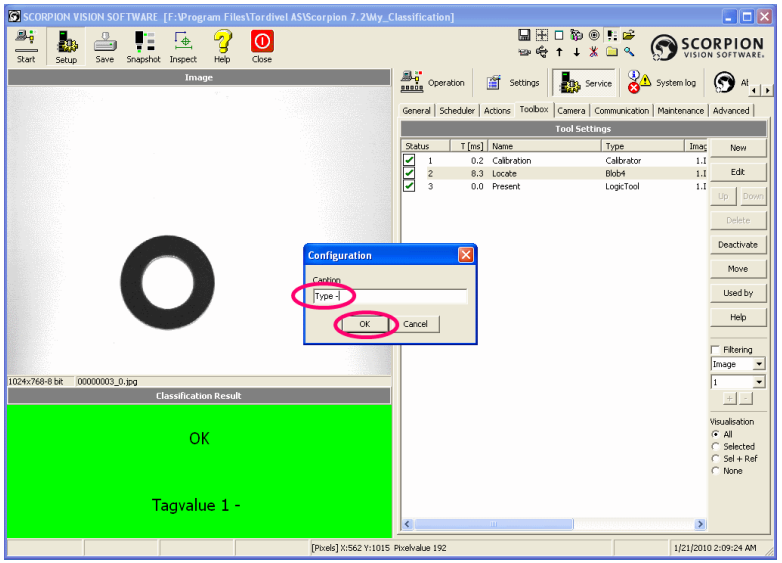

Figure 35: Set Measured Value Caption

© 2000-2010 Tordivel AS

This will change the new text '**Tagvalue 1 -**' to '**Type -**'. Right click on this '**Type –**' text and click on the '**Measured value**' menu and '**Parameter**' sub-menu under it.

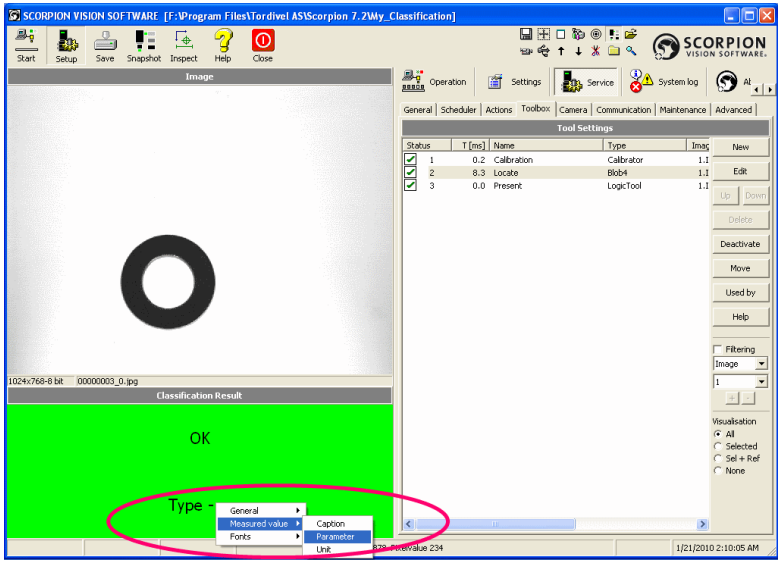

Figure36: Edit Measured Value Parameter

This will pop up the '**Tool Parameter**' dialog. Click on '**...**' to pop up another dialog for tool parameter selection. Select the tool '**Locate**' from the left panel and select parameter '**DominantClass**' from the right panel.

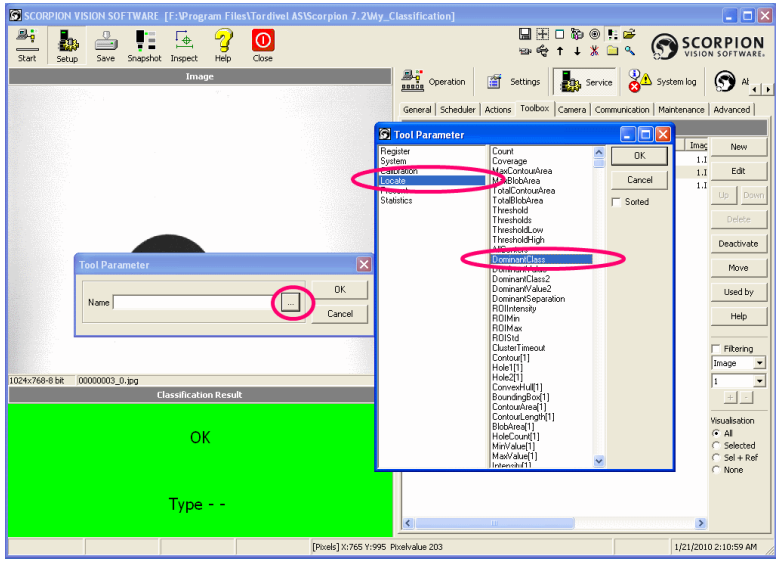

Figure 37: Set Measured Value Parameter

Click on the '**OK**' button to close the parameter selection dialog. Click on the '**OK**' button to close the '**Tool Parameter**' dialog.

We configured the results panel to show additional 'classification' result, along with the default 'inspection result'.

We also configured the caption for the new classification result text and associated a parameter with it. The associated parameter indicates the classification result which is displayed for each processed image.

The system is now ready for classification.

© 2000-2010 Tordivel AS

7. 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 analysis for the 'Washer classification'.
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 small washer is present in the captured image, the '**Result**' panel shows green color with '**OK**' text. The Result panel also shows classification result text as '**Type – Small**'.

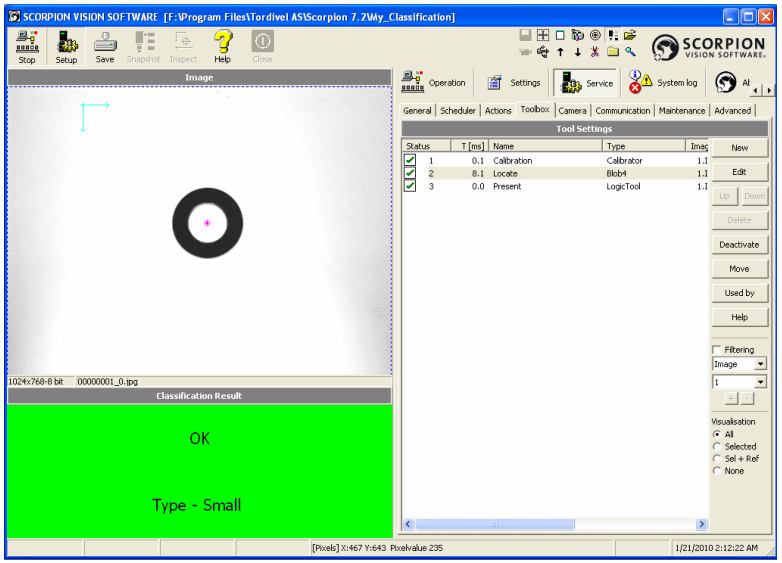

Figure 38: Result 'OK', Classification Result 'Small'

Congratulations!
You have successfully created a 'Classification' system using Scorpion Vision Software!

When a large washer is present in the captured image, the '**Result**' panel shows green color with '**OK**' text. The Result panel also shows classification result text as '**Type – Large**'

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

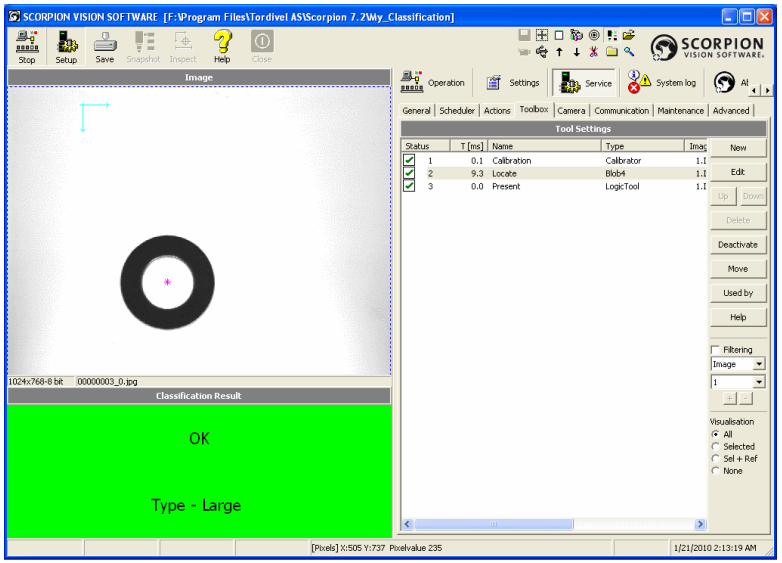

Figure 39: Result 'OK', Classification Result 'Large'

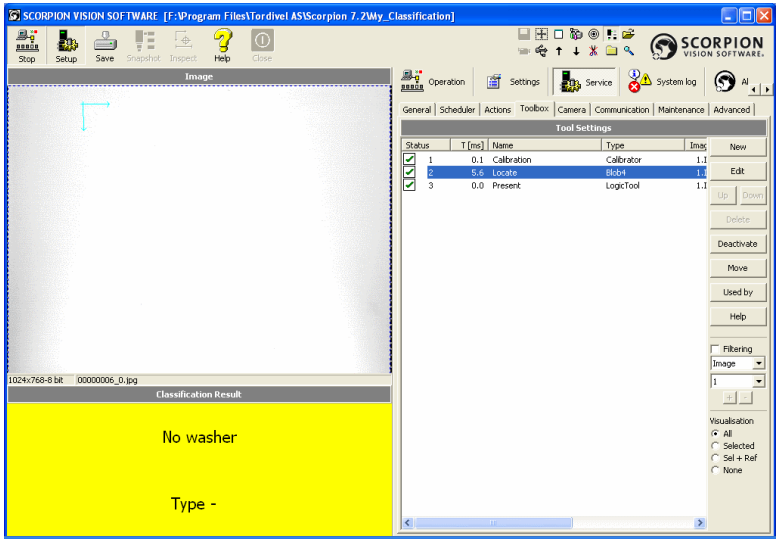

Figure 40: Result 'No washer', hence No Classification Result Available

© 2000-2010 Tordivel AS

8. Tutorial Summary

- We tried out the pre-compiled profile 'GettingStartedTutorial_Part2_Classification' for classification of washers available in the images captured by Scorpion Vision Software.

- Then we updated the 'Presence Verification' profile from the last tutorial 'GettingStartedTutorial_Part1_PresenceVerification' and configured the 'Classification' profile and saw it in action. The profile updates included changing the results panel size and caption, learning small washer, learning large washer and displaying classification results in the results window.

© 2000-2010 Tordivel AS