

Chapter **5**

SJ-10 Tools

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Summary

This chapter describes the various SJ-10 tools that are available to the user relating to the SJ-10 inspection, user interface, calibration, global thresholds, XY table, and cameras.

5.1 Tools Overview



Select "Tools" from the Upper Toolbar to bring up the SJ-10 Tools form displayed in Figure 4.1. The user should click on a folder in the "Category" panel to reveal the options associated with that folder.



Figure 5.1 SJ-10 Tools form

Interface

Allows the user to configure the language, monitor setup, and input mode. In addition various options can be enabled such as allowing operators mark false fails etc.

Inspection

Allows the user to enable various options associated with 2D board Inspection.

2D Calibration

Allows the user to perform various calibration tests including the Position in View (PIV) test, R & R test, Accuracy test, and Pi test.

XY Table

Allows the user to home the XY table, set the XY table accelerations, and set the XY table software limits.

Camera

This tool presents various options for the camera including setting the camera aperture, scaling the system, and focusing the camera, and those associated with setting the lighting for the camera.

Digital IO

Used to check Opto Module Inputs and Outputs.

Maintenance

Package System and Board Files.

Image Save

Allows the user to save images of specific device types in Good, Bad or non specific image directories .

MVC Tools

The **Multi Variable Classifier** (MVC) allows the user to use multiple variables to generate a robust measure of presence. It uses a database of known good and known bad components and compares the results for each new component inspected.

The use of multiple variables improves the opportunity for having more clearly defined 'good' and 'bad' regions, with no overlap and thus minimises false fails and false accepts. The MVC tool is available for chip components, resistors and transistors. This is described in more detail in the SJ Series Pre and Post Reflow Manuals (Document Numbers 5000-0089 and 5000-0090 respectively)

5.2 Interface

Click on the **Interface** folder in the **Category** panel to bring up the associated options (see Figure 5.1).

Language

Click on the **Language** button to reveal a list of flags designating the various languages. English is the only language currently available and is represented by the British flag.



Console Output

Click on **Console Output** to obtain a console window, which is used to display the results of various calibration procedures, such as R & R tests. The console window is disabled by default.

Reset Board Count

Click on this checkbox if you wish to reset the board count to **0**



Allow Operators Mark False Fails

Click on this check box to allow operators to mark **False fails** from the **Operator Action on Failure** menu. It is disabled by default.



No Action on Failure for operators

Click on this checkbox if you do not want operators to have access to the AOF toolbar.

No Action on Failure for Operators

Disable Confirmation Dialogues

Click on this checkbox if you want to disable all dialogues requesting you to confirm/cancel a recent command.

Disable Confirmation Dialogues

Automatic Inspect and Release

Click on this check box if you want to enable automatic inspect and release of the PCB.

Automatic Inspect & Release

5.3 Inspection

Inspection (General)

Click on the **Inspection** folder in the **Category** panel to bring up the general inspection options

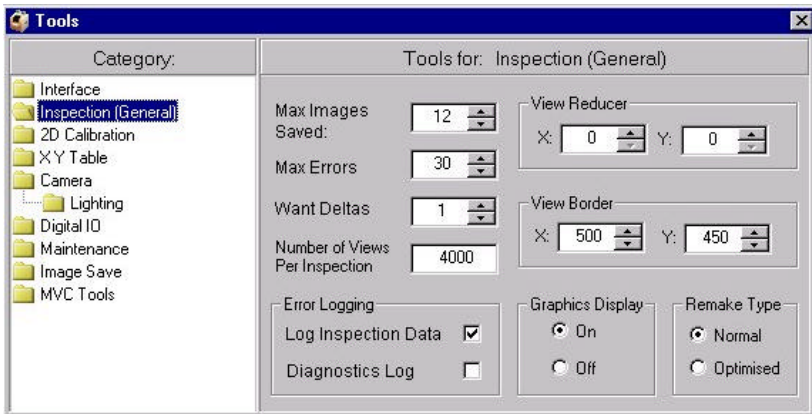


Figure 5.2 Inspection Tools

Max Images Saved

This sets how many error images will be saved per inspection to the `img` directory of the `cpi`. This is set to **12** by default.

Max Errors

The value in this form represents the maximum number of errors that the SJ-10 can detect on a board before the SJ-10 will abort the inspection. In other words if this value is set to 100 then the SJ-10 will automatically abort the inspection the instance the SJ-10 has detected the 100th error on a particular board. This is set to **30** by default.

If you set **Max Errors** to **999**, the system will enter a "Reverse Logic" mode. This mode is used for testing bare boards (unpopulated boards) to ensure that all component locations fail as missing. For pre-reflow, a pasted bare board is used (i.e a board with just paste deposits on pads). For post-reflow, a reflowed bare board is used (i.e a board which has joints but no components). The system will then pass all components which are failures, and fail components which the system sees as present (false accepts). This allows the user to select false accepts from the Action on Failure (AOF) menu easily.

Want Deltas

This option, which is enabled by default, allows the user to specify whether the SJ-10 will use compensation to deal with the variation in brightness across the cameras field of view. It only applies to inspection of paste deposits. The brightness at the edge of the field of view is likely to be slightly lower than at the centre of the field of view, leading to possible differences in presence values being returned.

A greymap test accommodates for this distortion and inputs the calibration results in a file called *greymapedeltas.txt*. The *WantDeltas* field should be set to **1** so that the values in the *greymapedeltas.txt* file are used to compensate for potential brightness variations across the camera's field of view.

It is recommended by MVT that the *WantDeltas* value be set to **1**.

Number of Views per Inspection

This option displays the number of views permitted per inspection. The default is 4000

Error Logging

There are two types of error logging available to the user.

- Log Inspection Data
- Diagnostics Log

Log Inspection Data

Log Inspection Data is used to log all errors found during an inspection and is stored in the *errors.log* file that is located in

C:\cpi\log

It is the default setting for **Error Logging**.

Diagnostics Log

Diagnostics Log is used to log diagnostic results of inspection data, to *C:\tmp\jmcpi.log*. It should only be used when this type of information is required as it utilizes a lot of system resources that may slow the SJ-10 system down. The following pop-up warning is displayed:

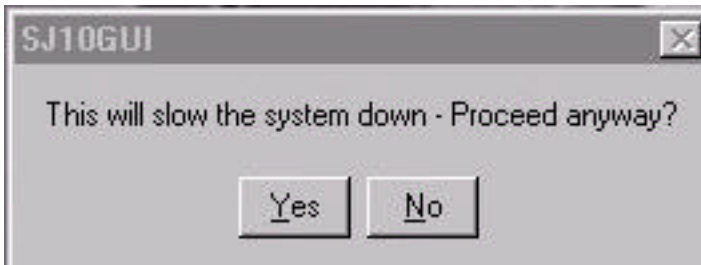


Figure 5.3 Diagnostic Log Warning

View Reducer

The **View Reducer** is used to reduce the view surrounding a component so that the view is enhanced. However it does slow the system, so only use when absolutely required. It's default value is 0.

View Border

View Border works in much the same way as View Reducer. It sets the border so that the outside pixels are ignored. The default values for **X** and **Y** are **500** and **450** respectively. These values should not be modified

Graphics Display

Graphic Display specifies whether the graphics display is on or off during inspection.

Remake Type

Remake Type is used to specify the type of remake. There are two options, **Normal** and **Optimised**. Optimised is used when you want to reduce the number of views in an inspection so that the cycle time is reduced.

5.4 2D Calibration

Click on the **2D Calibration** in the **Category** panel to bring up the associated options (see Figure 5.4). The procedures for carrying out the **2D Calibration** options are detailed in the SJ-10 Hardware Manual (doc. no. 5000-0088).

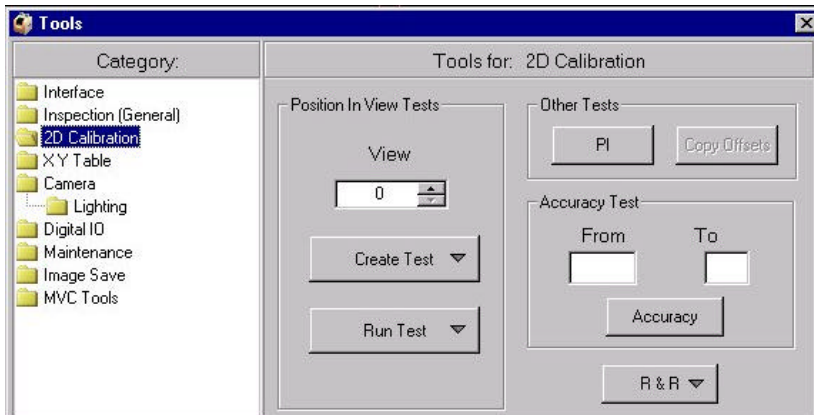


Figure 5.4 2D Calibration Tools Options

Position In View Test

The **Position In View Test** (PIV) is used to improve the accuracy of the system across the whole field of view. This is required because the position of components located near the edge of the field of view may be calculated slightly offset because of camera distortion. The PIV test accommodates for this distortion.

View

This indicates the order in which the PIV will be performed.

Create Test



Clicking on the **Create Test** button allows the user to create and customize the PIV test to be run. It contains the following options:

Full

This will perform the test using a 5 x 5 point test.

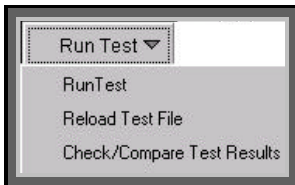
Tiny

This will perform the test using a 9 x 9 point test

Add Current Part to Test File

This option allows you to add extra components to the previously selected test file

Run Test



Clicking on the **Run Test** button provides the user with options for running and completing the PIV test.

RunTest

Select this option to run the first PIV test.

Reload Test File

Select this option to re-run the PIV test once the board has been re-loaded into the machine

Check/Compare Test Results

Select this option to compare the results of the first and second PIV tests. These results will be displayed in a console window.

Other Tests

Pi Test

This is the 180-degree test. The board is tested in normal orientation and then rotated 180 degrees. The offsets are calculated with the **pi_test** program and used to re-run the test. It is repeated and the results are compared to the first uncalibrated run.

Select **PI** to run the **PI Wizard** that guides you through the **PI test**. The **Instructions for PI Test** are outlined in Figure 4.5:

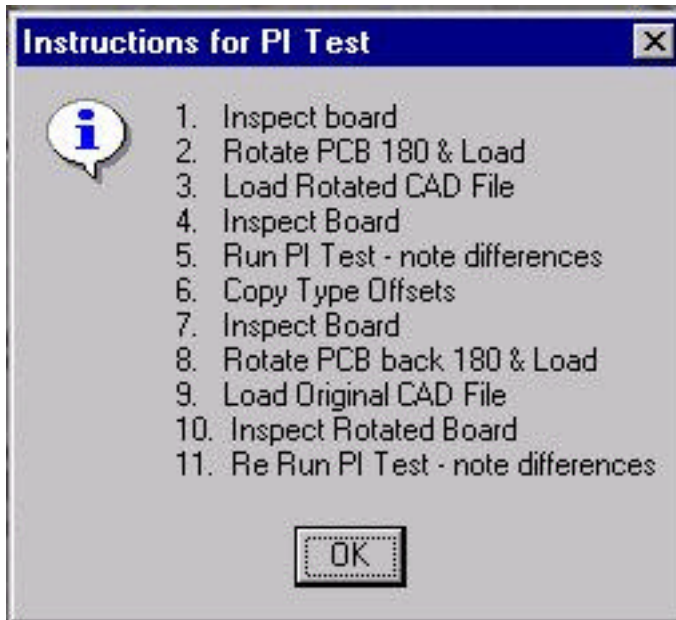
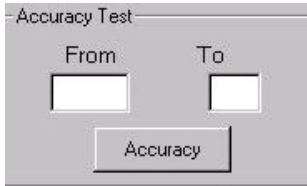


Figure 5.5 Instructions for PI Test

Accuracy Test



The **Accuracy Test** is based on the report file data produced in the **R&R Test** on the glass fiducial plate, by setting the number of inspection report files you want to test. This is done using the **From** and **To** fields:

From: Specify the *rep* file you want to run to start the test from . The number of this rep file corresponds to the inspection number, for example *cpi0001.rep* indicates the first inspection file.

To: Specify the inspection report file you want to end the test on, for example *cpi00049.rep*

Accuracy: Click the **Accuracy** button to produce the results of the **Accuracy Test**

R&R Test



The **R&R Test** enables the user to perform various repeatability tests on the SJ-10. The results are displayed in the console window, which the user must first maximize.

5.5 XY Table

This menu allows the user to set various options relating to the XY Table.

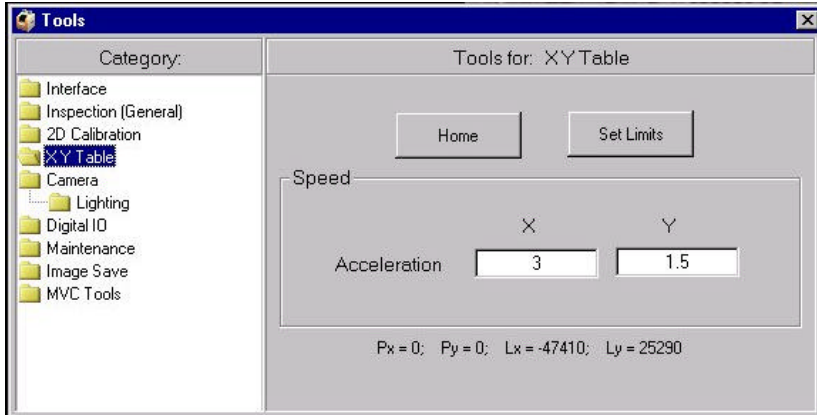


Figure 5.6 XY Table options from the Tools menu

Home XY Table

This function sends the XY Table to its home position. In a standard SJ-10 the home position is in the back right-hand corner of the machine.

Set Limits

Click on this button to set the XY Table software limits, which are a safety feature used by the SJ-10. These limits define the operational area within which the XY table can be operated by software.

XY Table Acceleration

These fields allow the user to set the accelerations of the XY table in the X and Y directions. These should typically be set to 3 in X and 1.5 in Y.

5.6 Camera

The **2D Camera** menu allows the user to set the camera aperture, scale the system, and focus the camera. Refer to the Hardware Manual (doc no -5000-0088), which details the procedures for carrying out these tasks.

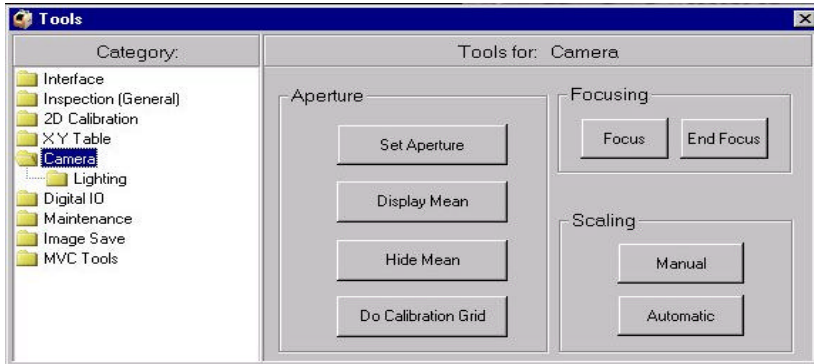


Figure 5.7 2D Camera options

Set Aperture

The **Set Aperture** option can be used to adjust the camera's aperture, which determines the size of the iris allowing light into the camera.

Display Mean

Click on **Display Mean** button so that the measured brightness intensity value of the board or grey card under the camera, is displayed on the graphics screen.

Hide Mean

Click on **Hide Mean** button so that the measured brightness intensity value of the board or grey card under the camera is removed from the graphics screen.

Do Calibration Grid

This calibration procedure accounts for any possible variation in brightness at the edge of the camera's field of view. Click on this button to perform this procedure, which should only need to be performed once on installation of the SJ-10. A grey card must be used to carry out this procedure.

Focusing

Focus

The **Focus** button enables the user to focus the camera with the main hood door as the system will display a live image, while at the same time disabling the XY table for safety reasons. Focusing is performed manually and verified visually. When you select this option, you disable the **Set Aperture**, **Display Mean**, **Hide Mean** and **Do Calibration** options (see Hardware Manual- doc no 5000-0088).

End Focus

The **End Focus** is used to notify the system you have finished focusing, so that the system can enable the **Set Aperture**, **Display Mean**, **Hide Mean** and **Do Calibration** options.

Scaling

Scaling sets the ratio between camera pixel dimensions and actual physical dimensions. The fiducial score should be as high as possible before scaling is performed, preferably over **930** but preferably not less than **800**. The SJ-10 should always be scaled when the camera lens is moved, the camera is focused, or the camera height is changed.

Automatic

Click on the **Automatic** button to automatically scale the system. This is the standard method of scaling the SJ-10. This is illustrated in Figure 5.8.

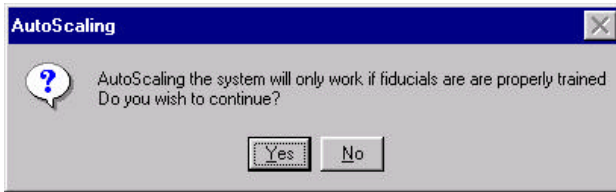


Figure 5.8 AutoScaling Dialog

Manual

Click on the *Manual* button to manually scale the system. In some instances where the scaling is very bad, a manual scaling may be necessary. Because manually scaling the system can seriously damage your scaling setup, you are prompted to save a backup as illustrated in Figure 5.9

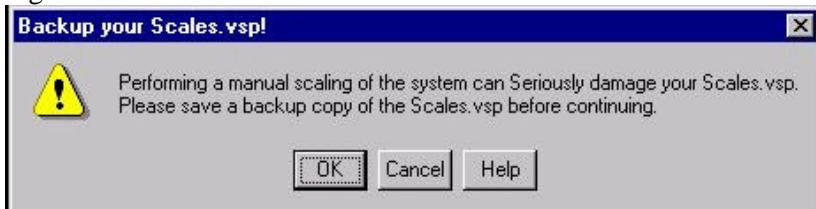


Figure 5.9 Backup Prompt

A dialogue box, as illustrated in Figure 4.10 is then displayed, and the user clicks **OK** to automatically make a backup of the scale file. The user can specify the name and location of the backup scales file. The user is then presented with the option of saving a backup as illustrated in Figure 5.10:

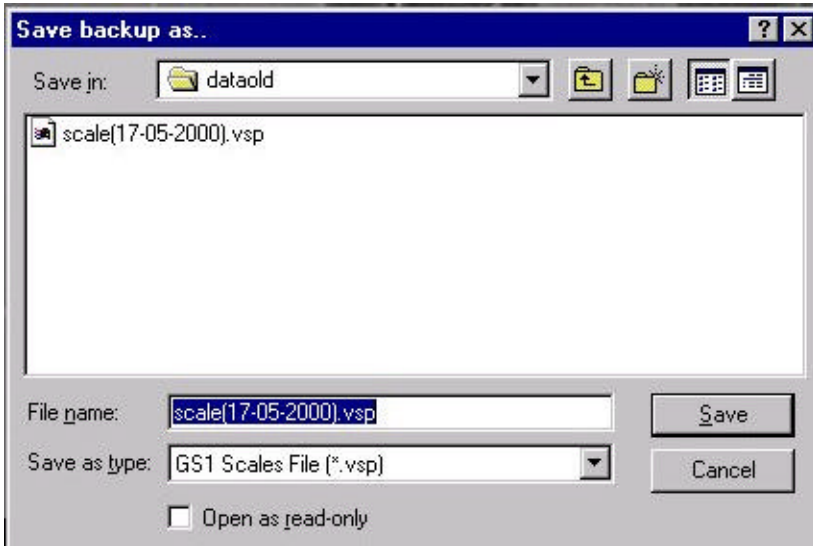


Figure 5.10 Scaling Backup

A **Manual Scaling** menu is then displayed.

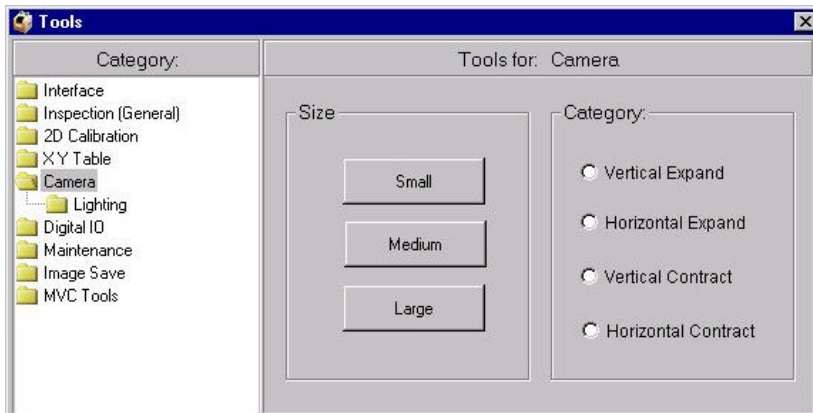


Figure 5.11 Manual Scaling Menu

Click on **Small**, **Medium** or **Large** so that the system is scaled by amounts of **10**, **50**, and **500** microns, respectively.

Click on **Vertical Expand**, **Horizontal Expand**, **Vertical Contract**, or **Horizontal Contract** so that the camera view vertically expands, vertically contracts, horizontally expands, or horizontally contracts when scaling.

Lighting

This option allows is available to check the lighting intensity of each of the rings of LEDs by placing a grey card on the conveyer. This tool allows the user to switch the lighting modes from application to application, for example, from pre-reflow to post-reflow inspection. A full lighting intensity calibration procedure is documented in the *Hardware Manual* (Document Number 5000-0082).

5.7 Digital IO

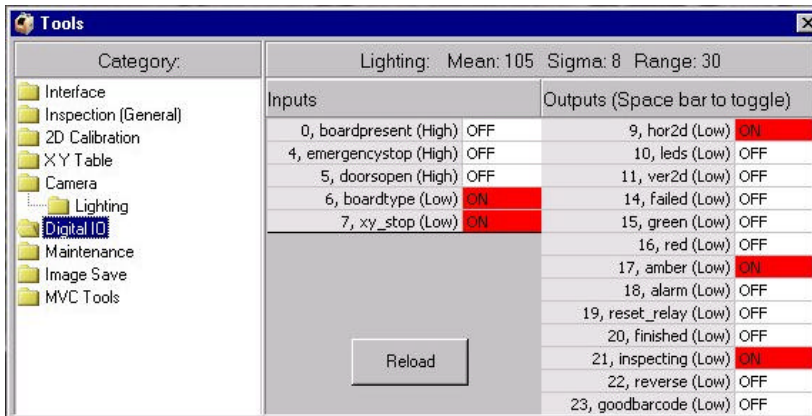


Figure 5.12 Digital IO

Can be used to check Opto Module Inputs and Outputs.

5.8 Maintenance

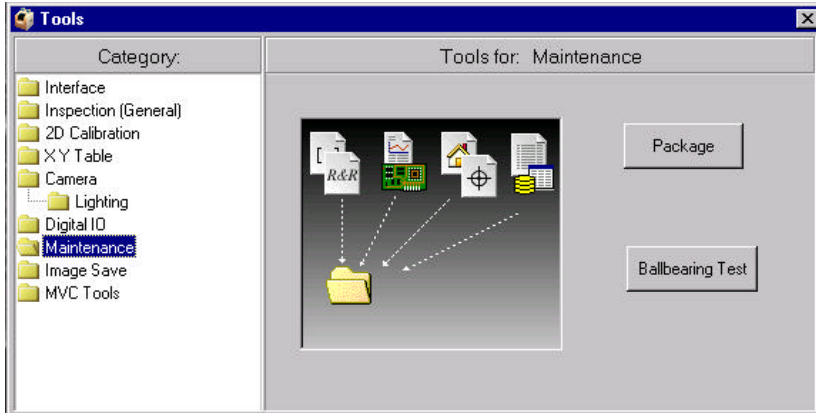


Figure 5.13 Maintenance

Package

Package System takes a snapshot of Board Files

Ballbearing Test

This feature is reserved for future releases.

5.9 Image Save

This tool provides the following functionality:

- Select the types of Device Types you wish to save images for in the **Save images of device types** box. If you want images of all Device Types, check the **All** box. This is checked by default.
- If you want to save images based on components, enter a value for the parameter **Save images of components**, for example ***r12**. Once a value has been entered in this box, the **Save images of device types** box is disabled.

- Select **good**, **bad** or **none** from the **Image Directories** box. This will save the images into directories *img_good*, *img_bad* or neither of them, if you don't want to save any images. These directories are located at *C:\cpi*.
- Select the number of inspections you want to save. The default is **1**.
- Clear obsolete images by checking the **Clear Old Images** box.
- Click **Apply** when you want to add these changes to the database.

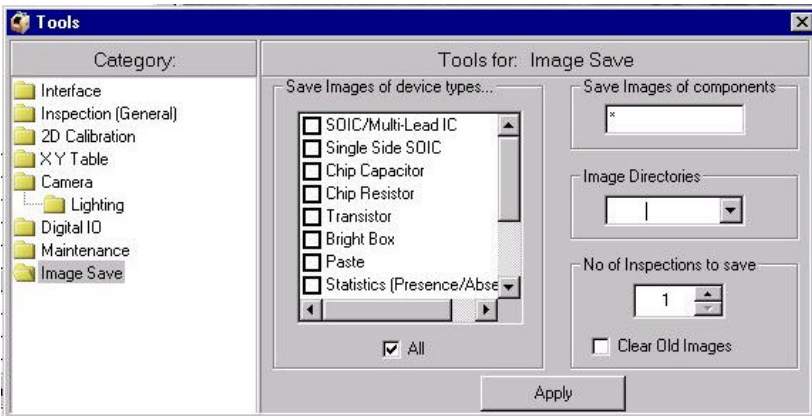


Figure 5.14 Image Save

5.10 MVC Tools

This tool provides the following functionality:

Use it to enable Joint MVC on a per-board basis. (For more information on Joint MVC, (see Chapter XXXX))

View Joint MVC status. This is enabled for Post-reflow but disabled for pre-reflow.

View MVC Status (see Pg.121 for a general description of MVC)

View Colour MVC Status. This is enabled for pre-reflow, but disabled for post-reflow. This is only available if you have colour functionality enabled in the *config.txt* file.

This is illustrated in Figure 5.15:

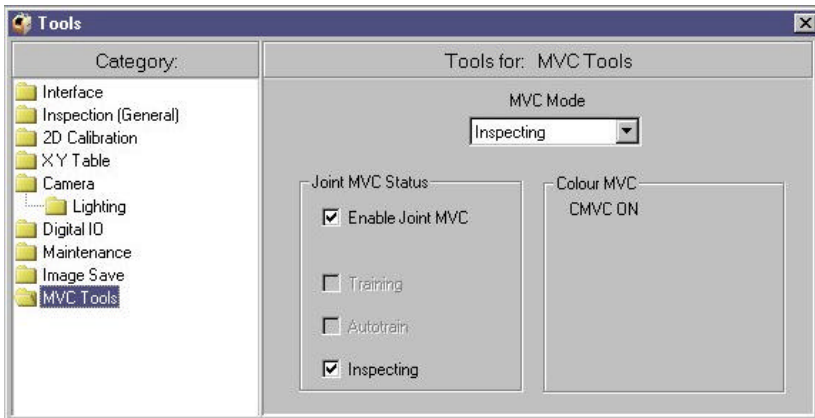


Figure 5.15 MVC