



Phoenix Operation Manual

For Phoenix Systems

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Revision B

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1. Typographical Conventions

Before you start using this guide, it is important to understand the terms and typographical conventions used in the documentation. The following kinds of formatting in the text identify special information.

Bold Items you must select, such as menu options, command buttons or items in a list.

Courier Used to emphasize the importance of a point or for variable expressions such as parameters.

CAPITALS Names of keys on the keyboard, for example, SHIFT, CTRL or ALT.

KEY + KEY Key combinations for which the user must press and hold down one key and then press another, for example, CTRL + P or ALT + F4.

Familiarize yourself with the following icons. These are used throughout the manual and highlight important or useful information:



WARNING

This symbol warns of situations that could result in loss of life or severe injury. Be sure to read and follow all information presented.



CAUTION

This symbol warns of situations that could result in injury to personnel working in or around the system as well as damage to the system itself.



ATTENTION

This symbol points out information that can affect the outcome of the procedure and is therefore worth special attention.



NOTE

This symbol supplies useful, additional information intended to enhance your understanding of the subject under discussion.



TIP

This symbol supplies useful advice intended to simplify the procedure at hand.

2. Overview

The Phoenix Operation Manual is intended for individuals involved in the daily operation of Phoenix machines in a production environment. The guide describes the flow of work through the machine from opening job files through setup and alignment to inspection scans and subsequent verification of defects (for those environments where a CVR100 system is not used).

3. Safety First

Phoenix was designed to meet safety guidelines and in normal operation, does not present a danger to operators and other personnel working with or around the system. In this chapter, we present material that is intended to help you perform your tasks as safely as possible. Please read the following information thoroughly before attempting to perform any of the procedures outlined in this guide.

To ensure the safe and satisfactory operation of this machine, all applicable local and national standards and codes must be followed. Since codes vary internationally and are subject to revision, the user is responsible for ensuring compliance with all relevant regulations and standards.

3.1. Guidelines

- Only qualified personnel should undertake installation, setup and maintenance-related tasks on the Phoenix system.
- Do not disable the safety interlock system or operate the system with the safety covers open. Operation of the system with the covers open presents a safety hazard that may result in serious injury to personnel and/or damage to the equipment.
- Do not plug in, turn on or attempt to operate an obviously damaged system.
- Do not stand such that your hands (or other parts of your body) are on moving parts during power up. At the same time, ensure that all moveable parts on the Phoenix are free from other types of obstruction as well.
- Keep long hair pinned back and avoid wearing unsecured or loose clothing, jewelry, and/or ornaments that may become entangled with moving parts.
- Do not place fingers in areas of potential electrical hazard such as Terminal Blocks, exposed connections, and capacitors.
- Do not connect the power supply or power up Phoenix before all maintenance tasks have been completed.
- Do not connect or disconnect any electrical connections while power is supplied to the system. Such actions can result in damage to the equipment.
- Do not attempt to operate the system with any electrical cable disconnected. Serious injury to personnel may result.
- Do not leave tools or test equipment cables where they might obstruct movement of the system's mechanical assemblies.
- Use only Site Grade grounded electrical outlets and a Site Grade power supply cord.
- Do not connect any other external equipment to Phoenix except that which has been specified and approved by Camtek, Ltd.
- Do not use Phoenix if any part is wet or has been exposed to liquids, flammable or otherwise.
- Use only Camtek-approved cables and accessories as non-approved items can damage the system or interfere with scanning and measurements.
- Leave space around Phoenix to ensure proper ventilation of the machine.
- To prevent accidental injury during operation, it is highly recommended that you surround the machine with a rope barrier.

3.2. Safety Features

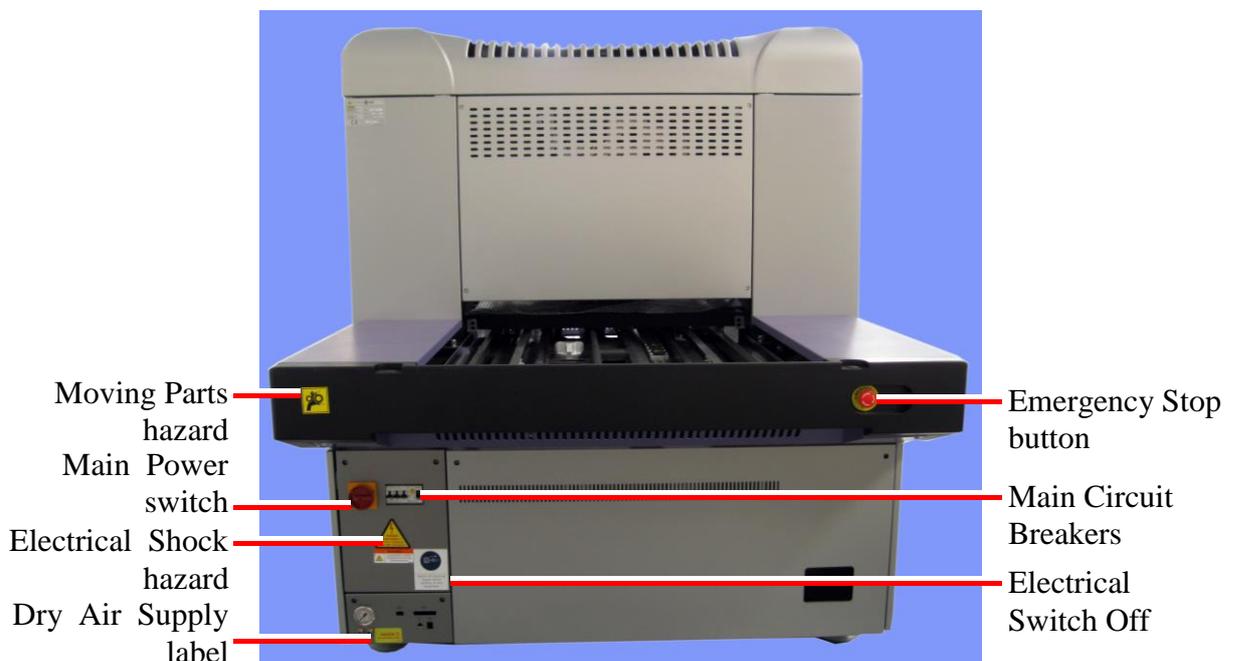
Take the time to get to know the safety measures built into the Phoenix systems.

3.2.1. Phoenix Safety Overview

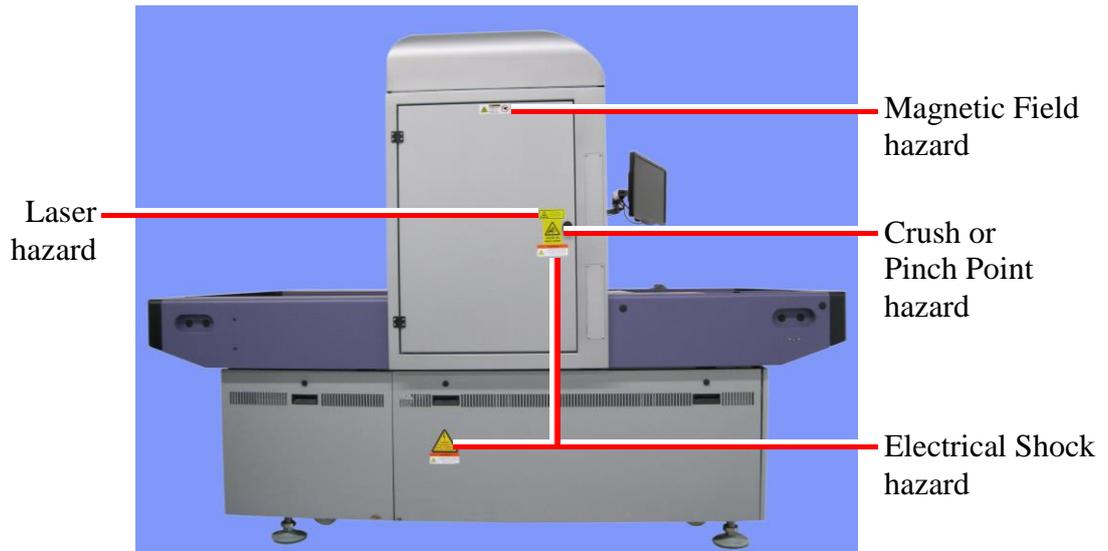
Machine Front Side



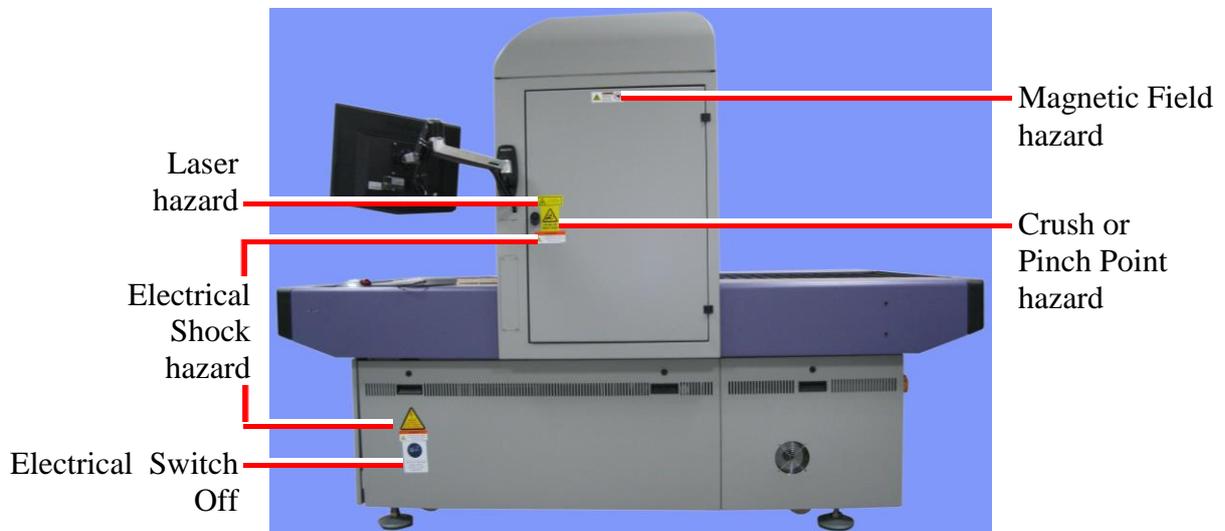
Machine Back Side



Machine Left Side



Machine Right Side



3.2.2. Emergency Stop

When you press Emergency Stop, all moving parts, e.g., motors, stop immediately.

Please note that the Emergency Stop button is not intended to circumvent normal shut down procedures. Rather, the Emergency Stop button is provided in the event a condition arises where damage to personnel, the equipment or the product is imminent.

To begin working once more, the Emergency Stop button must be released.



3.2.3. Electrical Panel Covers

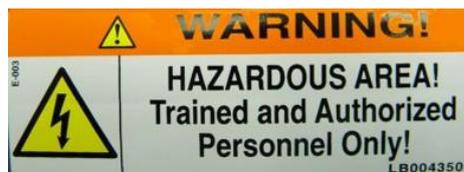
Access to the Electrical Panels is restricted to a Camtek Service Engineer and requires use of an Allen (hex) wrench.

3.3. Warning and Potential Hazard Labels

Hazard-warning labels are affixed directly to the machine in areas where you should pay special attention. Individual warnings are described in detail in this section:

3.3.1. Electrical Shock

The Electrical Shock Warnings warn of the potentially lethal voltage present inside the electrical system. The voltage is present as long as Phoenix is plugged into the wall socket. Under no circumstances should you open the panel.



3.3.2. Electrical Hazard

Withdrawal of main plug may result in exposure to dangerous voltage on plug pins. Wait for 30 seconds before touching these pins.

3.3.3. Magnetic Field Hazard

This label, attached to the covers adjacent to the X and Y linear motors. Linear motors are operated by magnets which can induce currents in the body that can interfere with the proper operation of pacemakers. Users with pacemakers are required to take safety precautions and stay back from the machine 30 cm (12 ft).



3.3.4. Mechanical Hazard

Be very careful when working with Phoenix. Moving parts can crush, pinch or cut. Stand only in front of the machine, at the Operation Station. Do not stand behind or next to the machine while it is running. Never start the machine with people standing behind or next to it.

Moving Parts Hazard

Be very careful when working around moving parts such as Table or Illumination Block. When working within these moving parts, make sure your:

- Hair is tied back, or covered with a hat.
- Clothing is not loose (this refers to shirts, coats, ties and laces).
- Body parts, such as hands, arms and head are kept out of motion area.
- Equipment is taken out of the system.



Crush or Pinch Point Hazard

Moving parts can crush, pinch or cut. Keep your hands away from the machine when working around moving parts.



3.3.5. Electrical Switch Off

Located at the back of Phoenix, this label advises the user to remove the power socket before working on the machine.



3.3.6. Laser Hazard

Phoenix has **class 2** laser pointer installed on the optic head and located on the machine front side.

Class 2 lasers are low power lasers or laser system in the visible range (400 - 700 nm wavelengths Laser) that may be viewed directly under carefully controlled exposure conditions. Class 2 laser used in Phoenix systems has a wavelength 635 nm, maximum output 0.95 mw. It complies with the standard IEC/EN 60825 - 1:2007. Because of the normal human aversion responses, these lasers do not normally present a hazard, but may present some potential for hazard if viewed directly for long periods of time.



- Personnel who install and operate Phoenix should be properly trained and comply with all national and local safety codes and standards pertaining to lasers.
- **Never**, under any circumstances, look directly or indirectly at an exposed laser beam.
- In case of maintenance, use the optical density protection, appropriate to laser **class 2**.
- Relevant eye protection shall be reviewed on customer site according to local safety rules.

3.3.7. Dry Air Supply Only

This label, attached to the pneumatic air supply connector located at the rear of Phoenix, reminds you that the pneumatic air supply must be dry since humidity will interfere with proper functioning of the system. The air supply should also be clean and free from dust and oil contamination.



3.4. Ergonomic Hazard

Phoenix setup console is not intended for continuous use, but for infrequent use only.

3.5. Burn Hazard

Halogen Lamps generate extreme heat - as much as 140 degrees Celsius (284 degrees Fahrenheit). Care should be taken not to touch the Halogen Lamps until sufficient time has passed for the bulb to cool down.

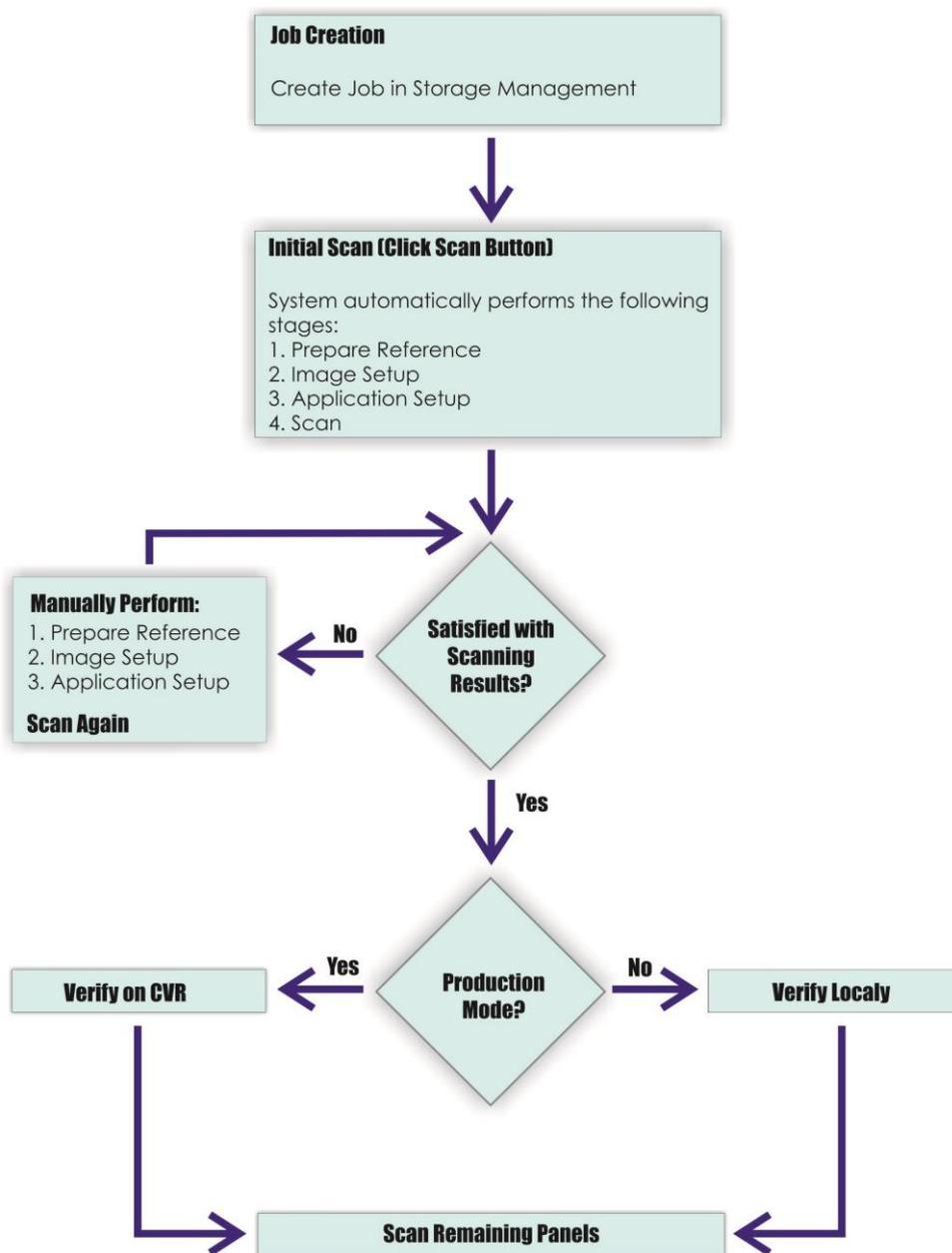
3.6. Explosion Hazard

Do not use or store flammable liquids, such as ammonia, phenol or acetone-based cleaning products, on or near Phoenix. If such liquids are near the equipment, do not operate Phoenix until the liquids are removed.

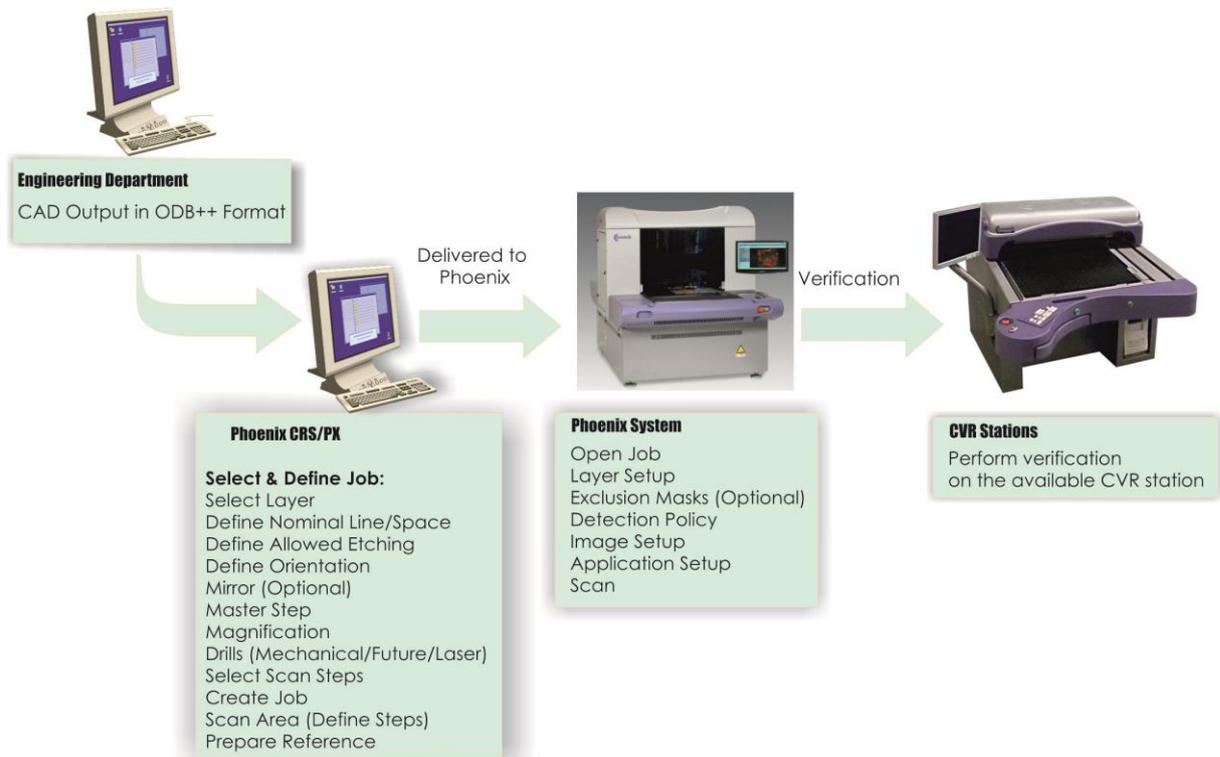
4. Standard Work Stages

4.1. Standard Workflow

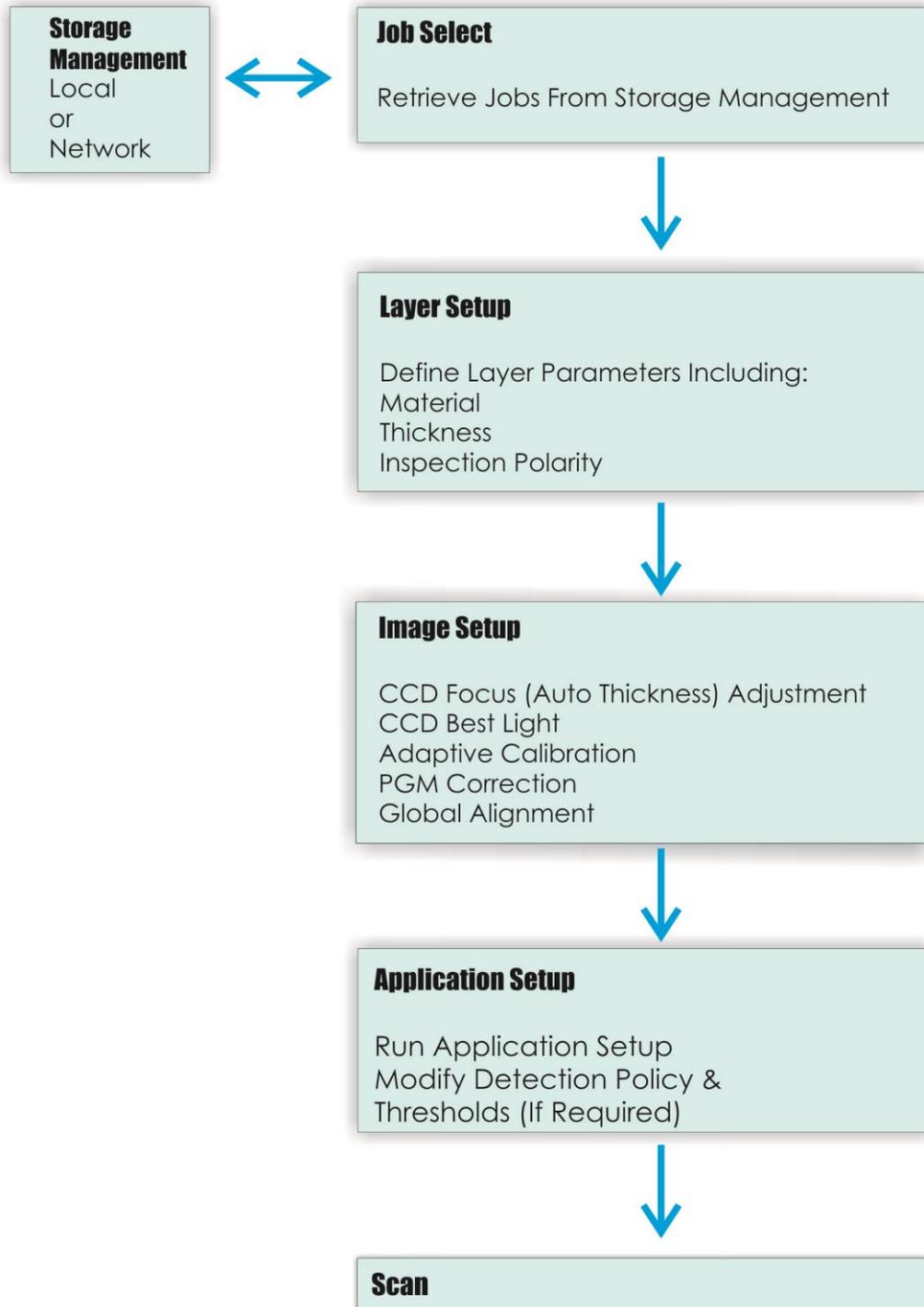
During the standard working stages, the user creates a job, and then clicks the **Scan** button. Once clicked, system automatically performs the following stages: Prepare Reference, Image Setup, Application Setup, Scan, and Verification (if Local Verification option is selected). If the scan results are not satisfactory, user can perform each stage manually. Refer to the instructions provided later in this manual.



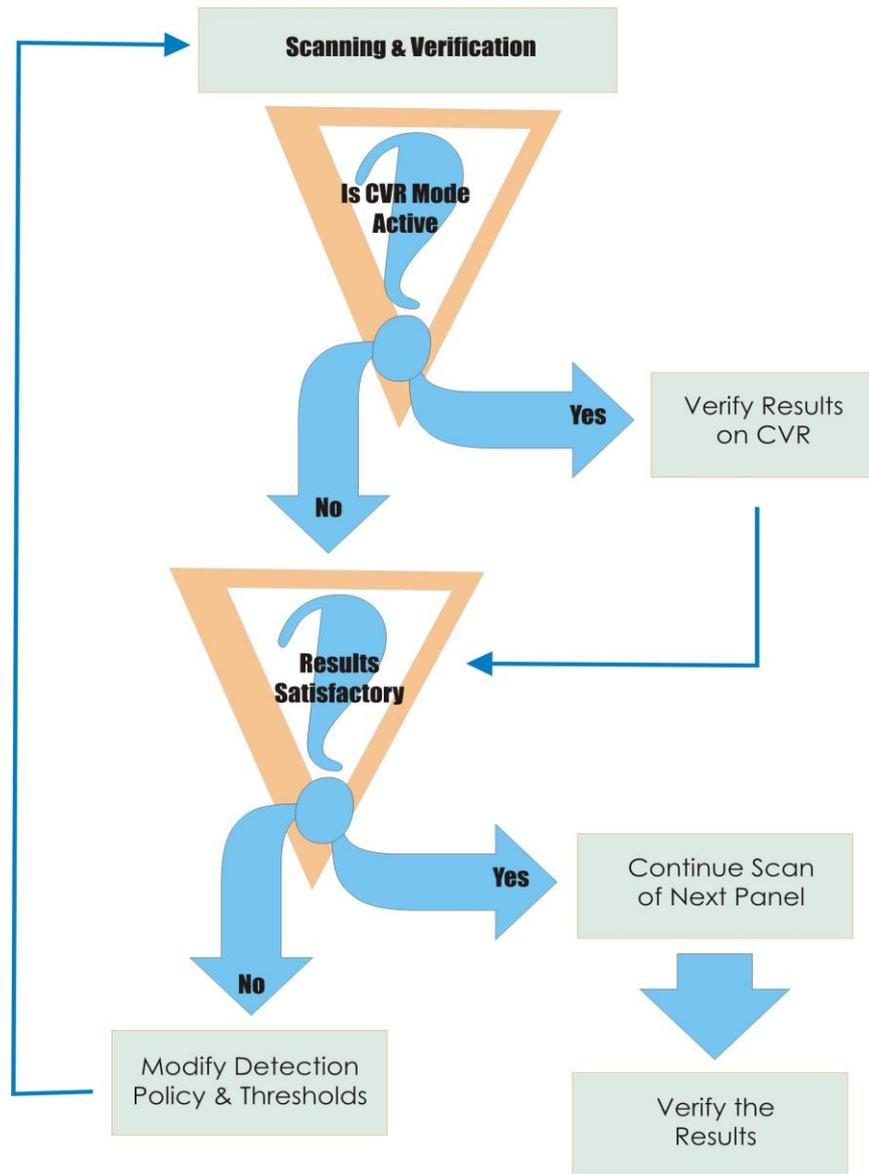
4.2. Standard Data Workflow



4.3. Job Select and Layer Setup



4.4. Scan and Verify



5. Getting Started

5.1. Hardware Layout



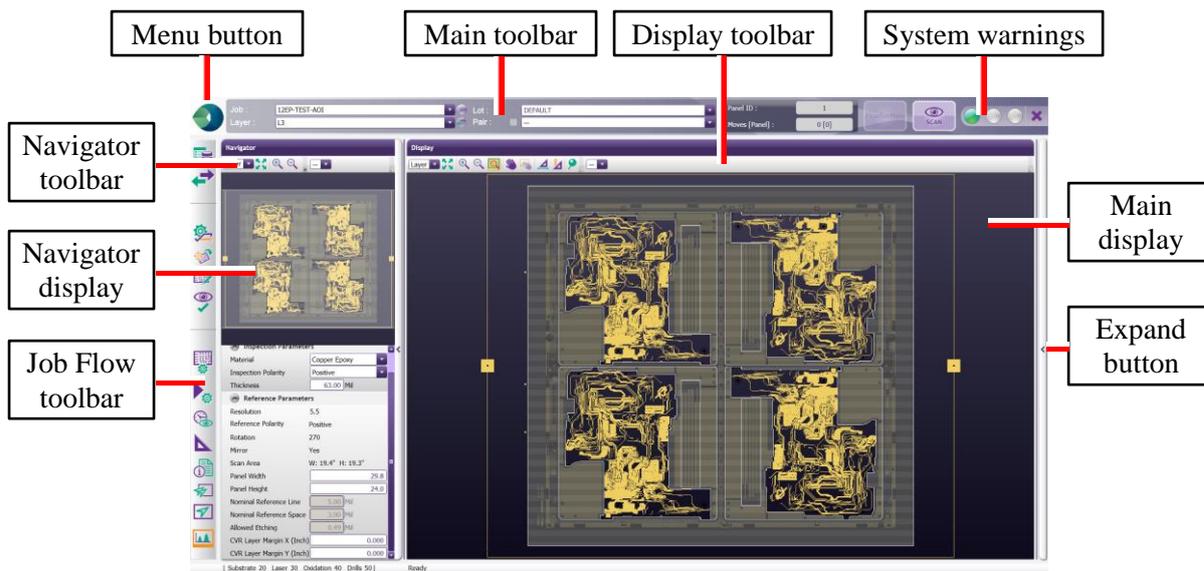
1. **Left service door:** used for maintenance purposes.
2. **Vacuum table:** holds the panel during the scanning and verification processes.
3. **Scan buttons:** press both buttons simultaneously to start scanning.
4. **Monitor:** displays PHOENIX user interface.
5. **Right service door:** used for maintenance purposes.
6. **Keyboard:** full keyboard used for interaction with the software.
7. **Mouse:** use to interact with the software.
8. **Functional keypad:** provides shortcuts for software functions.
9. **Power On/Off button:** press green side to switch on the system and press red side to switch off the system.
10. **Emergency Stop button:** safety feature that halts all motor movement by removing power from PHOENIX. For more information, refer to [Safety First](#).

5.1.1. Functional Keypad



Keypad button	Description
Movement arrows	Click to move the table left/right/up/down.
Skip PCB	Active only during the Verification stage. Click to skip current PCB, and continue to the next PCB.
Vacuum	Click to enable\disable vacuum.
Enter	Click to start scanning.
Esc	Click to cancel the currently running process.
Start	Click to start the verification process.
Mark	Active only during the Verification stage. Click to mark a defect on the panel if Marker exists.
Prev. Defect	Active only during the Verification stage. Click to return to previous defect.
Next Defect	Active only during the Verification stage. Click to view the next defect.

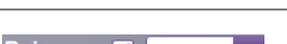
5.2. Main Screen Overview



5.2.1. Toolbars

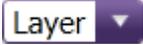
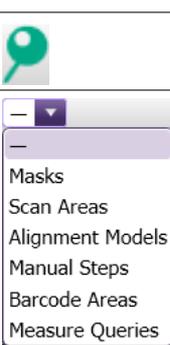
Main toolbar

The following table describes the main toolbar buttons available to the user that are organized according to their order of appearance on the toolbar.

Icon	Description
	Job: Current job name, the drop-down list displays the previous jobs.
	Layer: Current layer name, the drop-down list displays the job layers.
	Clear Job History: Click to clear the job history in the Job drop-down list.
	Switch Layers: Enabled only if the layer Pair mode is enabled. Click to switch to the CAD data of the other side of the panel.
	Lot: Displays the Lot name or ID. To change the lot name, either select the required name from the list, or enter the lot name in the text field.
	Pair: Select the second layer of the pair, and then mark the check box to enable Layer Pair mode.
	Panel ID: Displays the panel ID to be scanned. Moves [Panel]: Displays the number of moves found for the panel specified in the squared brackets.
	Production: Enabled only if the job is ready for production. Click to switch to the production mode.
	Scan: Click to perform a scan.
	Cancel: Appears instead of the Scan button when every process is in progress. Click to cancel the currently running process.

Display toolbar

The following table describes the Display toolbar buttons available to the user that are organized according to their order of appearance on the toolbar. The name of each button is specified according to the tool tip that appears when you hover over the button.

Button	Description
	Select/Change Current Display Mode: Drop-down list to select the display view: Layer, Step, Video.
	Zoom to Fit: Click the button to fit the image to the display area.
	Zoom In: Click the button to zoom in the display view.
	Zoom Out: Click the button to zoom out the display view.
	Fit Selected ROI to Display: Mark a rectangle on the display area to increase the view of the selected ROI.
	Move Display Contents by Dragging: Select the icon to move the image on the display area.
	Adjust Alignment ROI Position: Active only during global alignment, allows to adjust the ROI position.
	Measure Distance Between Two Points: Select the icon and draw the line on the display screen from one selected point to another, the distance between the two points is displayed.
	Measure Pad/Line Dimensions (On Double Click): Select the icon and double click on a Pad or Line on the display screen, the dimension of the Pad or Line is displayed.
	Set Layer Registration Pin Position: Use only in Production mode. Click to define the location of the registration pin for Camtek Verification Station.
	<p>Masks: Select to enable the use of exclusion masks.</p> <p>Scan Areas: Select to enable user-defined (manual) scan areas.</p> <p>Alignment Models: Select to enable changes of the big models for alignment.</p> <p>Manual Steps: Select to enable user-defined (manual) steps.</p> <p>Barcode Areas: Select to enable drawing of the barcode areas.</p> <p>Measure Queries: Select to enable area definition for different measurements.</p>
	Undo: Click the button to cancel the last performed action.
	Redo: Click the button to repeat the last performed action.
	Add Rectangled Mask: Click the button to define a rectangular area (used for Masks, Scan Areas, Manual Steps and Barcode Areas).
	Add Elliptic Mask: Click the button to define an elliptic area (used only for Masks).
	Add Polygon Mask: Click the button to define a polygonal area (used for Masks, Scan Areas, Manual Steps and Barcode Areas).

	<p>Edit Mask(s): Click the button to select, resize or move a mask (used for Masks, Scan Areas, Manual Steps, Barcode Areas and Measure Queries).</p> <ul style="list-style-type: none"> • Click the Edit Mask(s) button. The icon becomes enabled. • Click the required mask to select it. • Drag the shape corners to change its size as needed or put the mouse on the mask to move it to a new position.
	<p>Duplicate Mask: Click the button to enable the duplicate function (used for Masks, Scan Areas, Manual Steps and Barcode Areas).</p> <ul style="list-style-type: none"> • Click the Duplicate Mask button to enable it. • Select the required shape, and draw it on the Display screen. <p><i>The mask is duplicated per each PCB step unit.</i></p>
	<p>Clone Selected Mask: Used for Masks, Scan Areas, Manual Steps and Barcode Areas.</p> <ul style="list-style-type: none"> • Select the required mask. • Click the Clone button. <p><i>The mask is cloned and you can move it to a new position.</i></p>
	<p>Delete Selected Mask: Used for Masks, Scan Areas, Alignment Models, Manual Steps, Barcode Areas and Measure Queries.</p> <ul style="list-style-type: none"> • Select the required mask. • Click the Delete Selected Mask button. <p><i>The selected mask is deleted. If the Duplicate Mask button is active, the same masks which are duplicated from the selected one are deleted also.</i></p>
	<p>Delete All Masks: Used for Masks, Scan Areas, Manual Steps, Barcode Areas and Measure Queries.</p> <ul style="list-style-type: none"> • Click the Delete All Masks button. <p><i>A dialog box appears.</i></p> <ul style="list-style-type: none"> • Click Yes to confirm the action.
	<p>Reject Changes: Used for Alignment Models, active once a change has been made to the big models, click this button to cancel all modifications and bring back the original big models. (To add a big model, double click on the Display screen)</p>
	<p>Preview Changes Vector: Used for Manual Steps, click to preview the manual steps searching result performed based on the vector image.</p>
	<p>Preview Changes Raster: Used for Manual Steps, click to preview the manual steps searching result performed based on the raster image. Compares with using vector image, using raster image is much slower, but more accurate.</p>
	<p>Sensitivity: Used for Manual Steps, adjusts the sensitivity level for manual steps searching process. As you increase the level of sensitivity, the search becomes more accurate (takes longer to accomplish). The default sensitivity is set to 80% and slider values range is non-linear.</p>
	<p>Accept Changes: Used for Manual Steps, click to accept the manual steps searching result. This action cannot be revoked.</p>
	<p>Tools: Used for Barcode Areas, click to open the Configuration window and change the barcode settings locally for the current job.</p>
	<p>Add Profile 3D Measure: Used for Measure Queries, click to define the location where you would like to perform the height measurement. This can mainly be used to perform plated laser drills dimple surface analysis.</p>

	Add Width Measure Using Video: Used for Measure Queries, click to define the object which you would like to perform the width measurement.
	Add Panel Dimension Measure: Used for Measure Queries, click to define points on the panel which are used for the system to calculate the panel stretch for X and Y.
	Add Panel Dimension Measure Pair: Used for Measure Queries, click to define a 'Pair' of two measure queries for panel dimension measurement.

Navigator toolbar

Navigator toolbar contains the same buttons as the Display toolbar except for Adjust Alignment ROI Position button that appears only on the Display toolbar.

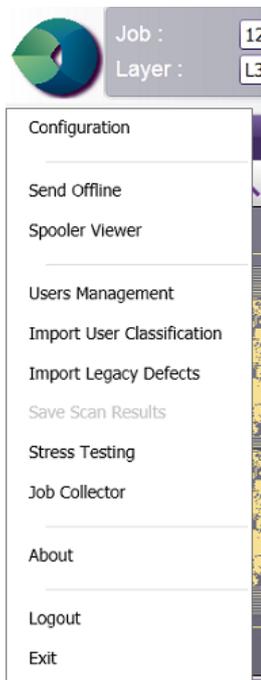
Job Flow toolbar

The following table describes the Job Flow toolbar buttons available to the user that are organized according to their order of appearance on the toolbar. The name of each button is specified according to the tool tip that appears when you hover over the button.

Icon	Description
	Storage Management: Click to open the Storage Management window.
	Switch Displays: Switches between the navigator view and the display view.
	Prepare Reference: Click to start the job preparation process. You can track the progress of the job preparation on the Display view.
	Image Setup: Click the button to perform image setup.
	Application Setup: Click to scan the first panel of the batch. System detects the optimal panel settings and uses them for the remaining panels of the batch.
	Verification: Click the button to enter the Verification mode. Use this button only when working in local verification mode.
	Layer Setup: Click to open the Layer Setup tab and define the inspection and reference parameters.
	Run Settings: Click to open the Run Settings tab and define: <ul style="list-style-type: none"> • Panel settings • Job Flow settings • Scan Flow settings
	Scan History: Click to open the Scan History tab and view a list of previous scan results.
	Measurement: Click to open the Measurement tab and view the results of 3D measurement, panel dimension measurement and video measurement.
	Defects Information: Click to open the Defects Information tab and select specific defect type(s) to verify.
	General Defects Distribution: General Defects Distribution table provides all defects information of the last performed scan. The table is automatically displayed during the verification stage.

	<p>Defects Zone Distribution: Defects Zone Distribution table provides true defects statistics per zone.</p>
	<p>Thresholds: Click to open the Thresholds tab for:</p> <ul style="list-style-type: none"> • Viewing the histogram • Viewing the Gray Level and thresholds image • Adjusting the threshold values

Menu button options



Option	Description
Configuration	Select to open System configuration definitions.
Send Offline	Select to send CAD/Job data to CRS/PX for job reference preparation, and data storage.
Spooler Viewer	Select to view the status of CAD/Job data that has been send to offline.
Users Management	Select to manage user permissions.
Import User Classification	Select to import classification results from another AOI running Spark application.
Import Legacy Defects	Select to import defects from a legacy machine.
Save Scan Results	Active only during verification, click to save scan results for current verified panel.
Stress Testing	Select to open a window to define the testing flow and the number of scans for night run.
Job Collector	Select to collect data for debugging purposes.
About	Select to view information about the software version.
Logout	Select to log out, and sign in as a different user.
Exit	Select to exit the software.

6. Powering Up and Powering Down the System

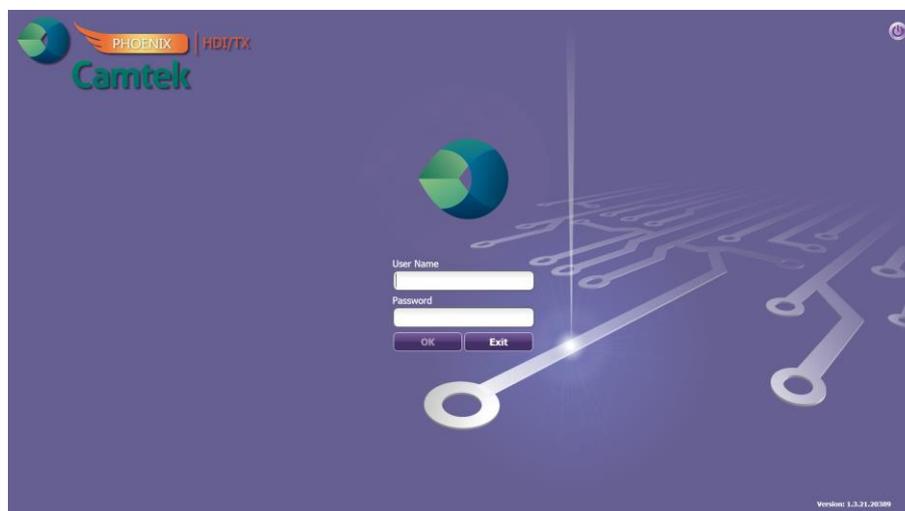
6.1. Powering Up the System

1. Press the green side of the **ON/OFF** button.



PHOENIX automatically logs onto Windows. At the end of the process, the Logon screen for the Spark software appears.

2. In the **User Name** field, enter the user name.
3. In the **Password** field, enter the password.

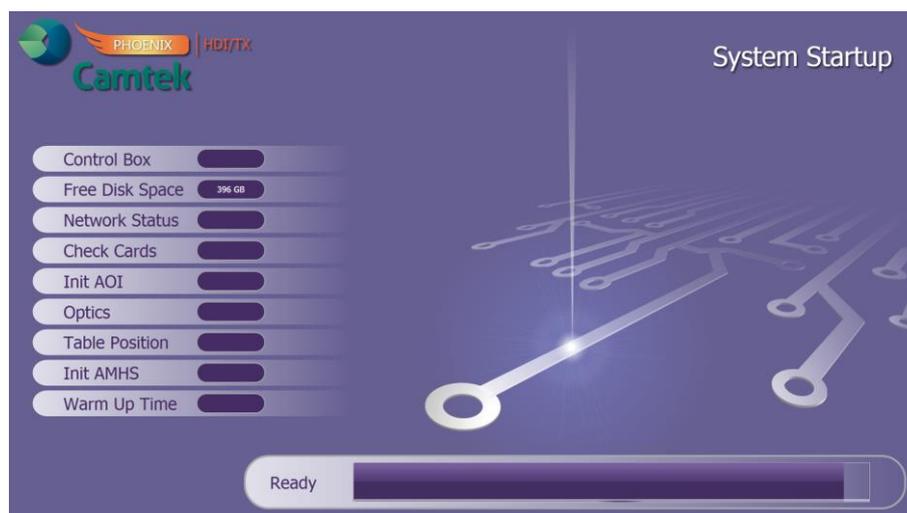


NOTE

The **User Name** and the **Password** fields are case sensitive.

4. Click **OK**.

*The **System Startup** screen appears. System runs automatically through a series of start-up procedures. You can track the initialization process on the progress bar.*



The Spark main screen appears.

6.2. Powering Down the System

To power down the system, click the red side of the **ON/OFF** button.

1. The Spark software closes.
2. The computer shuts down.
3. The machine powers down.

7. Storage Management

7.1. Overview

Storage Management window is used for all CAD and Job data management:

- Creating new job
- Updating existing job
- Managing storages
- Renaming the job/layer/CAD name
- Deleting job/layer/CAD
- Archiving CAD/job data
- CAD/Job data extraction

7.2. Using Storage Management

To open the Storage Management, on the Job Flow toolbar, click the **Storage Management** button.

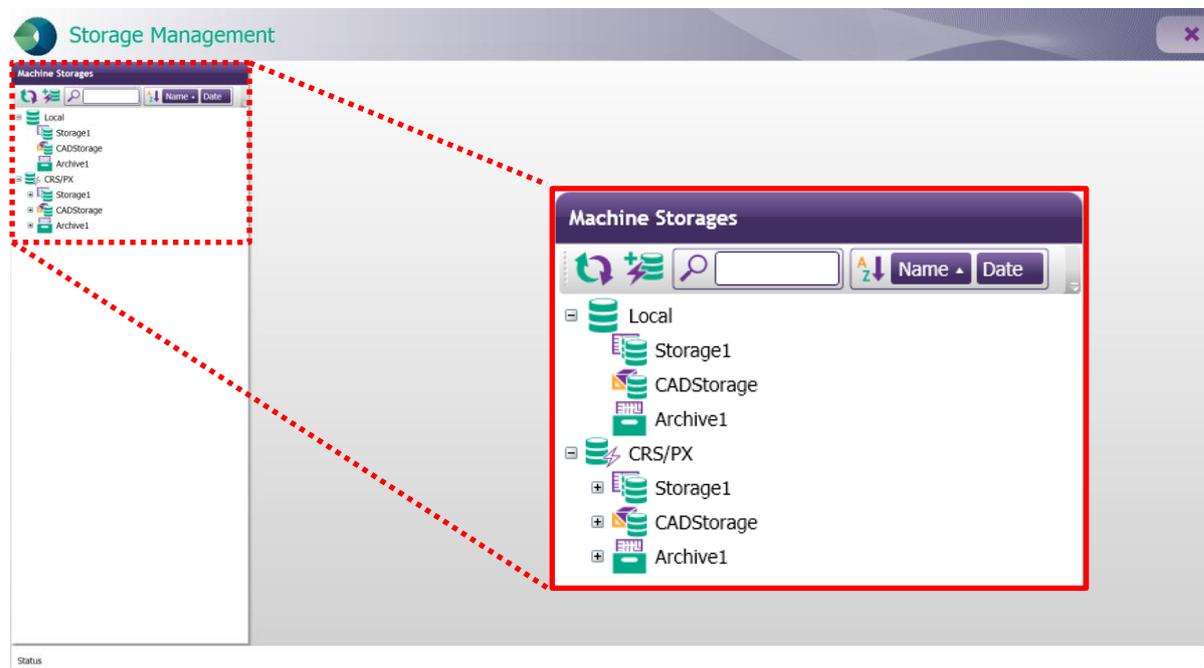


The **Storage Management** window appears. When opening for the first time, there are no stored jobs, and the window looks as follows.

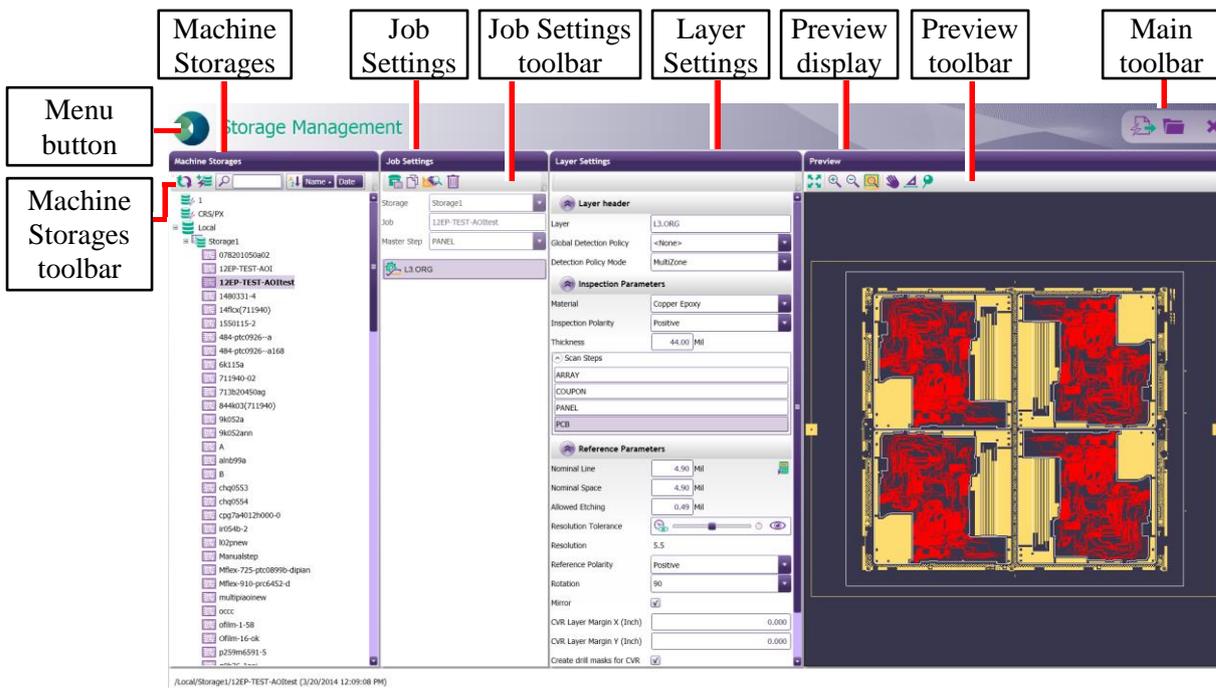


NOTE

The remote storage (CRS/PX) appears only if the remote storage is defined in the system.



When there is a running job on the system, opening Storage Management displays the following data on this job:

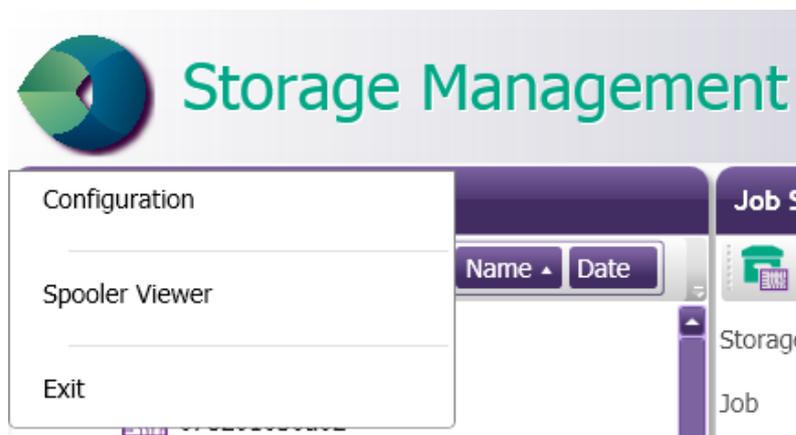


The currently running job and layer are highlighted:

Highlighted Job	Highlighted Layer
<ul style="list-style-type: none">  713b20450ag  844k03(711940)  9k052a  9k052ann  A 	<ul style="list-style-type: none">  CS-CAMTEK5  CS-CAMTEK5BAD  L6  PS-CAMTEK6  TEST

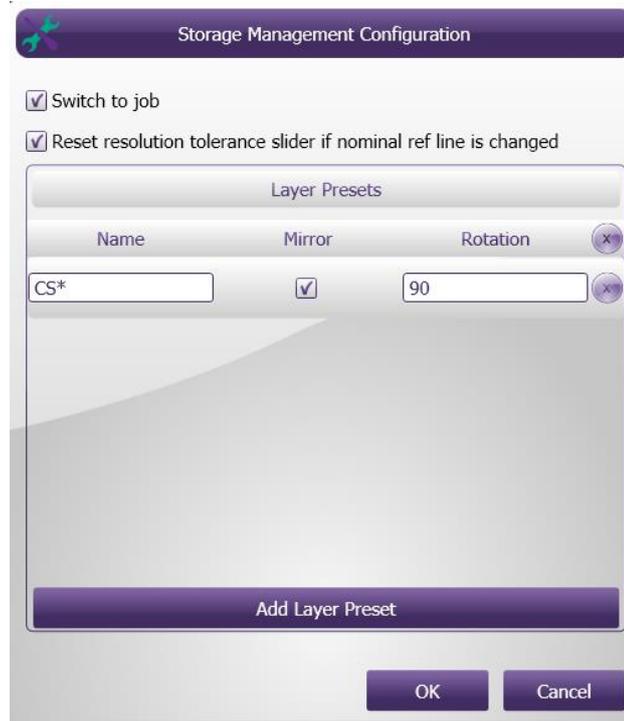
7.3. Menu Button

Clicking the Menu button opens the following options:



7.3.1. Configuration

Select the Configuration option to open the Storage Management Configuration window:



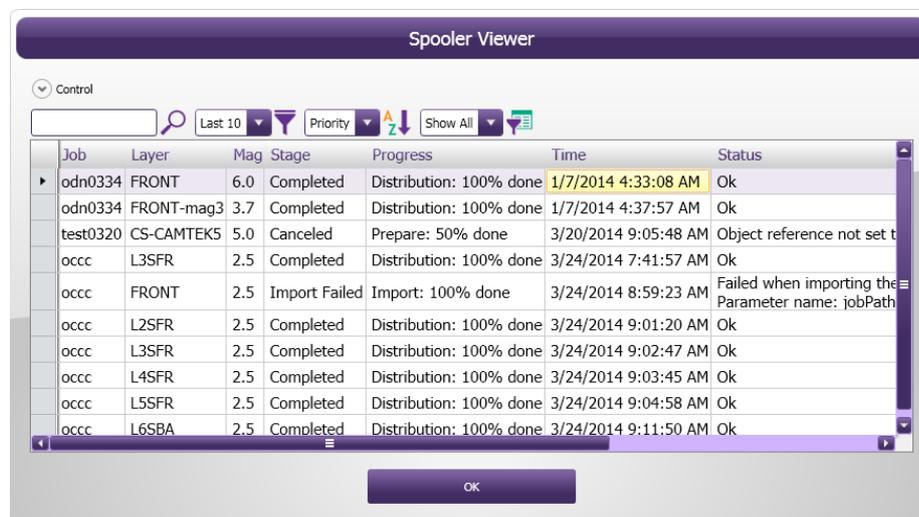
Switch to job: Select to enable an automatic opening of the updated/created job in the Spark software.

Reset resolution tolerance slider if nominal ref line is changed: Select to enable an automatic resetting of the resolution when the nominal reference line value is changed.

Add Layer Preset: click to add layer preset definitions for Mirror and Rotation according to the layer name.

7.3.2. Spooler viewer

Select the Spooler Viewer option to view the status of all jobs sent to the remote offline station.



7.3.3. Exit

Select Exit, to close the Storage Management window.

7.4. Main Toolbar

	Send Offline: Click to send the selected Cad/job layer to the remote offline station. The offline station prepares reference, archives the files into zip file, and stores it in the remote archive storage.
	Create Layer: Appears only when creating a new job. Click to create the job.
	Update: Applies only for the existing jobs. The button appears when: <ul style="list-style-type: none"> • Updating an existing layer • Adding new layer to the existing job
	Open Layer: Click to open an existing job. Appears when selecting an existing job from the Machine Storages.
	Close: Click to close the Storage Management window.

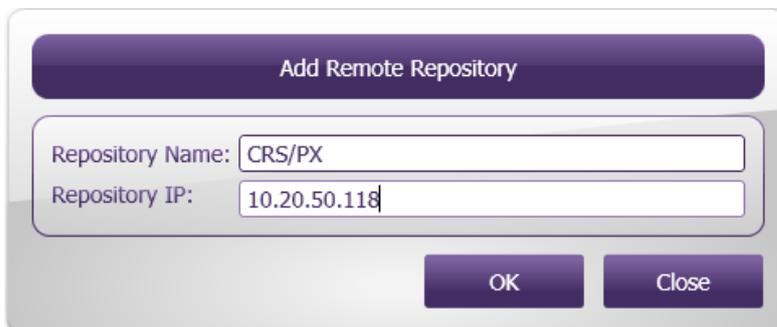
7.5. Machine Storages Toolbar

	Refresh: Click to refresh the Machine Storages tree.
	Add Remote Repository: Select to add new remote storage to the Machine Storages.
	Search: Enter the keyword of the CAD/job name and click the search button to filter out the suitable jobs in the Machine Storages tree. For example: <ul style="list-style-type: none"> • If search “CA”, all jobs with the name beginning with “CA” are filter out • If search “*CA”, all jobs with the name including “CA” are filter out
	Sorting Options (Name/Date): click to sort the CAD/Jobs according to the name or creation time in ascending or descending order.

7.5.1. Add remote repository

To add a new remote storage to the Machine Storages:

1. Click the **Add Remote Repository** button.
2. Enter the required storage name and IP address.
3. Click **OK**.



Make sure the system connected successfully to the new remote storage. View the connection status near the remote storage name.

Connection Succeeded



Connection Failed



If the connection fails, check network communication, and verify the IP address is correct.

7.6. Job Settings Toolbar

	Archive: Appears when a job is selected. Click to open the Archiving Options window, and select an archive destination. The job is archived as a zip file.
	Copy: Appears when a job is selected. Click to open the Copying Options window (if multi job storages exist), and select a job storage destination for the copied job.
	Goto CAD: Appears when a job is selected. Click to open the CAD file of the selected job.
	Delete: Appears when a job is selected (not an open job). Click to delete the selected layer from the selected job.
	Extract: Appears only when an archived job is selected. Click to open the Extraction Options window, and select a storage destination for the extracted job.

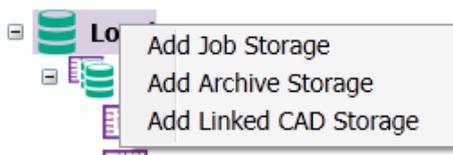
7.7. Preview Toolbar

	Zoom to Fit: Click to fit the image to the display area.
	Zoom In: Click to zoom in the display view.
	Zoom Out: Click to zoom out the display view.
	Fit Selected ROI to Display: Enable the icon and mark a rectangle on the display area to increase the view of the selected ROI.
	Move Display Contents by Dragging: Enable the icon to move the image on the display area.
	Measure Distance Between Two Points: Enable the icon and draw the line on the display screen from one selected point to another.
	Set Layer Registration Pin Position: Enable the icon and select a point on the display area to set it as the layer registration pin.

7.8. Right-click Menus

Right-click menu appears when you right-click on the local storage or a selected CAD/job name in the Machine Storages tree.

7.8.1. Local repository menu

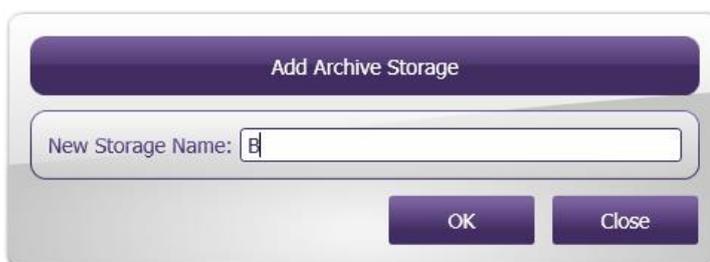


The local repository menu appears when right-clicking on Local.

Add Job Storage: Select to add new job storage to the local repository. Enter the required job storage name, and click **OK**.

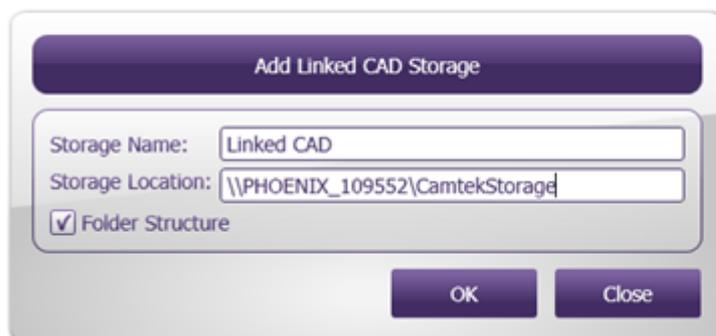


Add Archive Storage: Select to add new archive storage to the local repository. Enter the required archive storage name, and click **OK**.

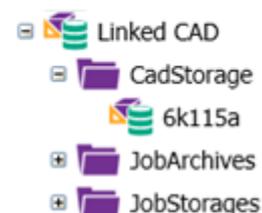


Add Linked CAD Storage: Select to add linked CAD storage to the local repository. Enter the required linked CAD storage name and the location, and click **OK**.

- Folder Structure:** select the checkbox to show the folder structure or clear the checkbox to hide the folder structure (show CAD files only).



Show folder structure



Hide folder structure



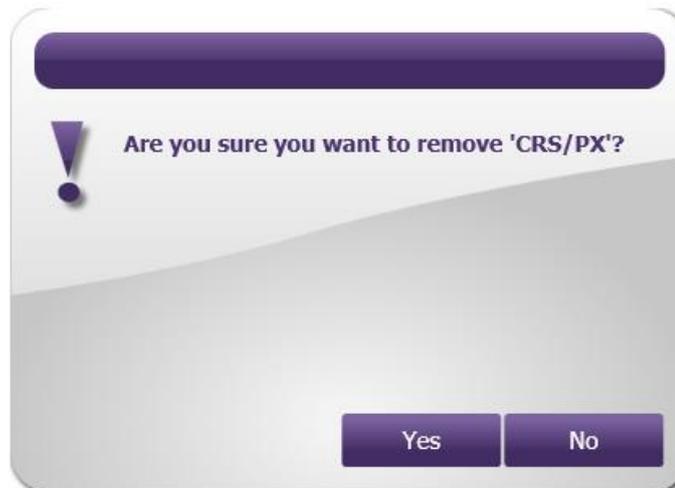
To remove an added storage from the Machine Storages:

1. Select required storage and right click.



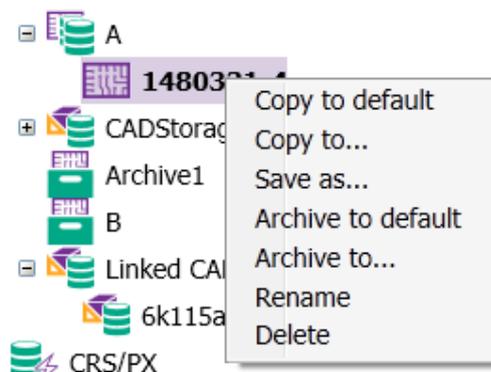
2. Click **Remove Repository**.

A confirmation window appears.



3. Click **Yes** to remove the selected storage.

7.8.2. Job menu



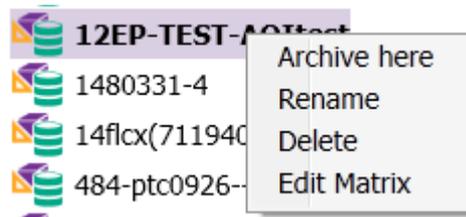
The job menu appears when right click on a selected job name. The job menu provides the actions that can be applied for the selected job.

- **Copy to default:** appears when the job is not stored in the default storage. Click to copy the job to the default storage (Storage1).
- **Copy to:** appears when multi job storages exist. Click to open the Copying Options window and select the required job storage for the copied job.
- **Save as:** click to save the selected job under a new name, and select the required job storage directory.
- **Archive to default:** click to archive the file as zip. The zip file is stored in the default archive storage.
- **Archive to:** appears when multi archive storages exist. Click to archive the file as zip. Select the required archive storage for the archived job.

- **Rename:** click to rename the job (not available for an open job).
- **Delete:** click to delete the selected job (not available for an open job).

**NOTE**

You cannot rename or delete an open job. To rename or delete the open job, switch to another job, and then select the required job from the Machine Storages tree.

7.8.3. CAD menu

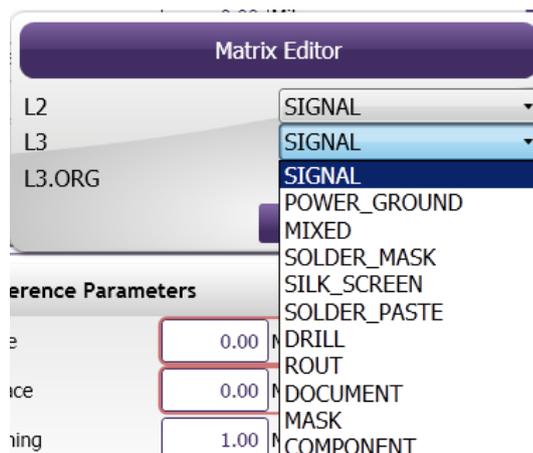
The CAD menu appears when right click on a selected unzipped CAD data. The CAD menu provides the actions that can be applied for the selected unzipped CAD.

- **Archive here:** click to archive the file as zip. The zip file is stored in the CAD storage.
- **Rename:** click to rename the CAD.
- **Delete:** click to delete the selected CAD.
- **Edit Matrix:** click to open the Matrix Editor window.

Matrix Editor Window

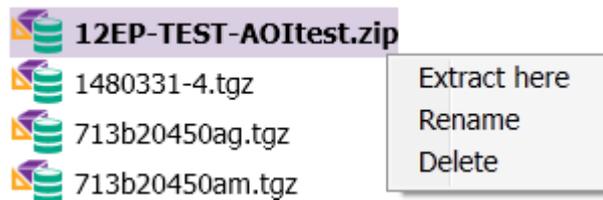
Matrix Editor window displays all CAD layers and their attributes. To change the attribute for a certain layer:

1. Click the arrow button to open the attributes list.



2. Select the required attribute, and click **Save** to apply changes to the CAD.

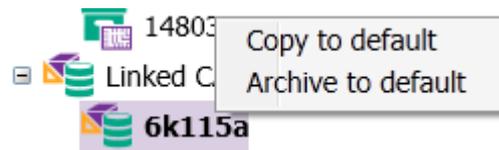
7.8.4. Archived CAD menu



The archived CAD menu appears when right click on a selected archived CAD data. The CAD menu provides the actions that can be applied for the selected archived CAD.

- **Extract here:** click to extract the file to the Cad storage in the Local Repository.
- **Rename:** click to rename the archived CAD.
- **Delete:** click to delete the selected archived CAD.

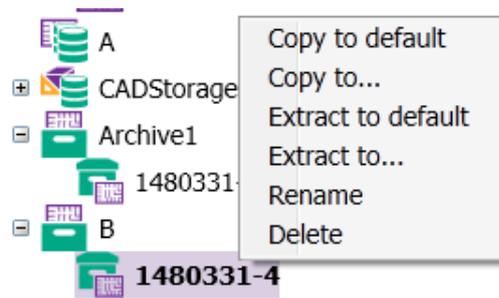
7.8.5. Linked CAD menu



The linked CAD menu appears when right click on a selected CAD which is in the linked CAD storage. The linked CAD menu provides the actions that can be applied for the selected linked CAD.

- **Copy to default:** click to copy the file to the Cad storage in the Local Repository.
- **Archive to default:** click to archive the file as zip. The zip file is stored in the CAD storage.

7.8.6. Archived job menu



The archived job menu appears when right click on a selected archived job name. The archived job menu provides the actions that can be applied for the selected archived job.

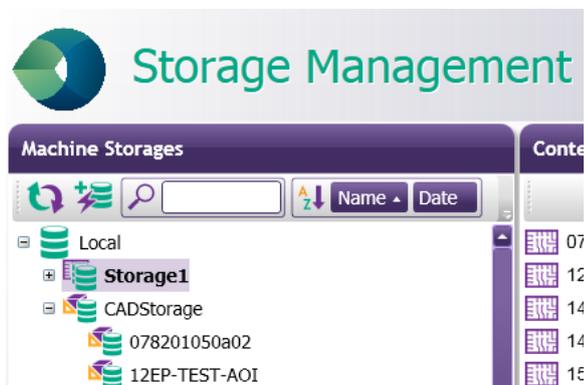
- **Copy to default:** appears when the archived job is not stored in the default archived storage. Click to copy the archived job to the default archived storage (Archive1).
- **Copy to:** appears when multi archived storages exist. Click to open the Copying Options window and select the required archived storage for the copied archived job.
- **Extract to default:** click to extract archived job to the default job storage in the local repository.
- **Extract to:** appears when multi job storages exist. Click to extract archived job to the selected job storage in the local repository.
- **Rename:** click to rename the archived job.
- **Delete:** click to delete the selected archived job.

8. Creating and Updating Jobs

8.1. Creating New Job

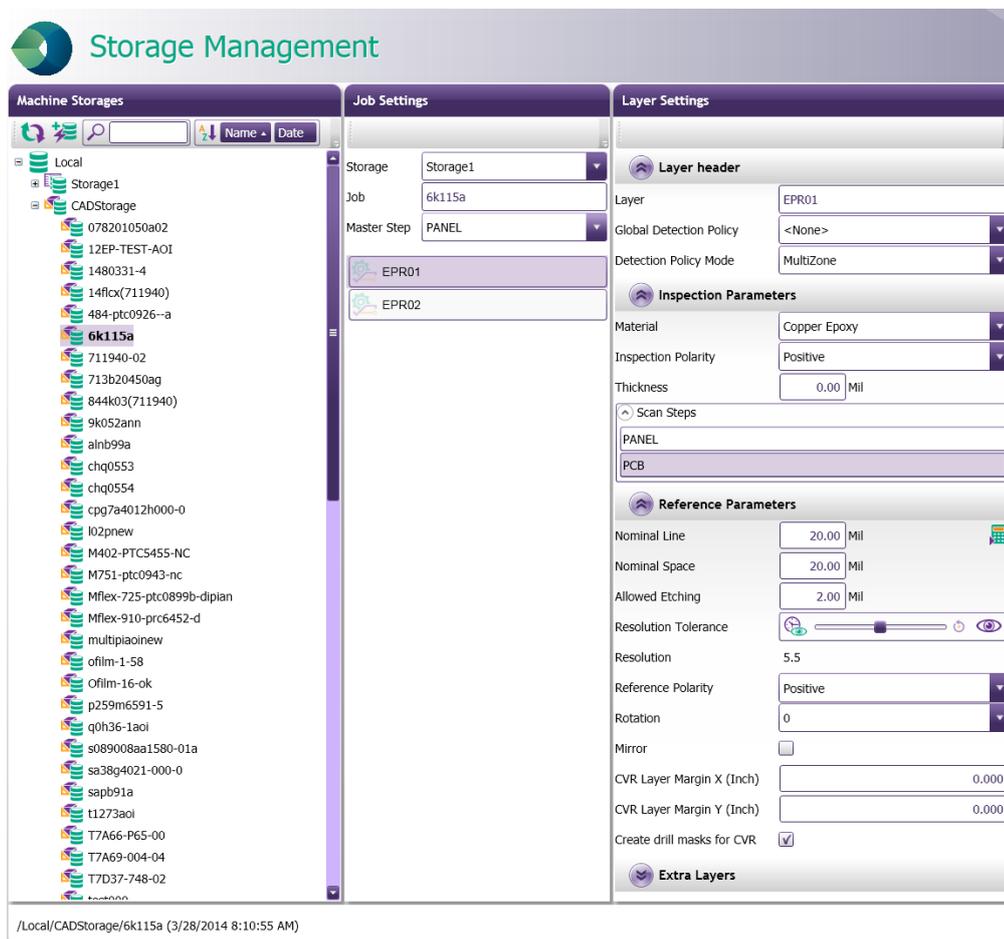
1. On the Job Flow toolbar, click the **Storage Management** button.

The Machine Storages directory opens.



2. From the CAD storage, select the required CAD data.

The Job Settings list and Layer Settings list are displayed.



3. Define the following job details in the Job Settings pane:

Job Settings

Storage: Storage1

Job: 6k115a

Master Step: PANEL

EPR01

EPR02

- From the **Storage** list, define the job destination storage.
 - In the **Job** field, change the job name if required. The default job name is the same as the selected CAD name.
 - From the **Master Step** list, select the maximum scan area of the job, such as panel, array or PCB. The maximum scan area is selected by default. Change the master step only if required.
 - Select the required layer.
4. Define the following layer details in the Layer Settings pane:

Layer Settings

Layer header

Layer: EPR01

Global Detection Policy: <None>

Detection Policy Mode: MultiZone

- In the **Layer** field, change the layer name if required. The default layer name is the same as the selected CAD layer name.
 - From the **Global Detection Policy** list, select the required detection policy. Details refer to [Detection Policy](#) section.
 - From the **Detection Policy Mode** list, select one of the three available modes: **Flat**, **MultiZone**, **MultiStepAndZone**.
5. Define the following inspection parameters in the Layer Settings pane:

Inspection Parameters

Material: Copper Epoxy

Inspection Polarity: Positive

Thickness: 0.00 Mil

Scan Steps

- PANEL
- PCB

- From the **Material** list, select the material type best suited for the panel. Each selection loads parameter settings that affect lighting, aperture and filter setting, etc.
- From the **Inspection Polarity** list, select the polarity for the inspection image.
 - Positive**—copper is white
 - Negative**—copper is black
- In the **Thickness** field, define the thickness of the scanned panel.
- From the **Scan Steps** list, select the steps for scanning.
 - The selected scan steps are colored in red in Preview Display.



NOTE

Defects will be reported only for the selected scan steps.

Click a step name to include it in the scan steps. Click again to remove the selection.

The screenshot displays the software interface for PCB inspection. On the left is the 'Layer Settings' panel, and on the right is the 'Preview' panel.

Layer Settings Panel:

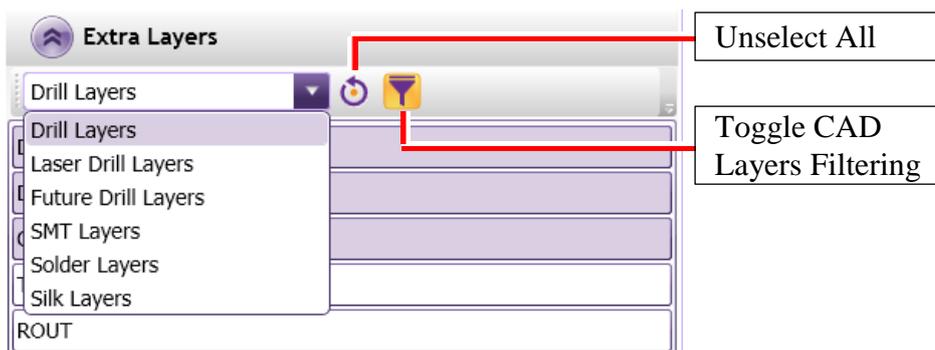
- Layer header:** Layer: wiring-L3; Global Detection Policy: Inner_Layer; Detection Policy Mode: MultiZone.
- Inspection Parameters:** Material: Copper Epoxy; Inspection Polarity: Positive; Thickness: 10.00 Mil.
- Scan Steps:** A list of scan steps including 155SHIFT-COUPON, ARRAY, HDI-VIACHAIN, IMP, IMPA, IMPB, PANEL, PCB (highlighted in red), PCBA, and SUB-ARRAY.
- Reference Parameters:** Nominal Line: 4.00 Mil; Nominal Space: 4.00 Mil; Allowed Etching: 0.40 Mil; Resolution Tolerance: (slider); Resolution: 5.5; Reference Polarity: Positive.

Preview Panel: Shows a 3x2 grid of PCB inspection images. The PCB traces are highlighted in red, indicating detected defects or scan step results.

6. Define the following reference parameters in the Layer Settings pane:

- **Nominal Line:** Manually enter the Nominal Line based on current job, or click the **Calculator** icon to automatically search for the Nominal Line. The Nominal Space value is automatically set and is identical to the Nominal Line value.
- **Nominal Space:** Manually enter the Nominal Space based on current job, or click the **Calculator** icon to automatically calculate the data based on the Nominal Line.
- **Allowed Etching:** Manually enter the Allowed Etching value based on current job, or click the **Calculator** icon to automatically calculate the value based on the Nominal Line.
- **Resolution Tolerance:** Move the slider to automatically calculate the resolution according to the throughput and detection ability requirements. Move the slider to the left to focus on the throughput and move the slider to the right to focus on the detection ability. The default setting is focus on both throughput and detection ability (in the middle). The **Reset** button is activated after you change the default setting, click to restore the default setting.
- **Resolution:** Read only field to show the resolution used for the current layer.
- **Reference Polarity:** Select either positive or negative reference image based on the panel.
- **Rotation:** Select panel orientation.
- **Mirror:** Select the check box to mirror CAD image. This check box is optional.
- **CVR Layer Margin X (Inch):** Define margin in X direction for CVR. It will be used for SUM. Keep it “0” in most cases.
- **CVR Layer Margin Y (Inch):** Define margin in Y direction for CVR. It will be used for SUM. Keep it “0” in most cases.
- **Create drill masks for CVR:** Select the checkbox to show the drill mask on the BMR map on the CVR.

7. Select the extra layers if required:



- Select the required type of the extra layer: Drill Layers/Laser Drill Layers/Future Drill Layers/SMT Layers/Solder Layers/Silk Layers.
System automatically selects the matching drill layers if they are defined in the CAD data.
- View the selected extra layers on the Preview Display to make sure the correct layers are selected.
- If the drill layers are not defined in CAD data or the wrong drills are selected, select the correct drills manually.

8. Click the **Create Layer** button to create a new job according to the selected parameters.

If **Switch to job** check box is selected (refer to [Configuration](#)) the newly created job will automatically open in the Spark software.

If **Switch to job** check box is cleared, once job creation is complete, manually open the job by clicking the **Open Layer** button.

8.1.1. Extra layers

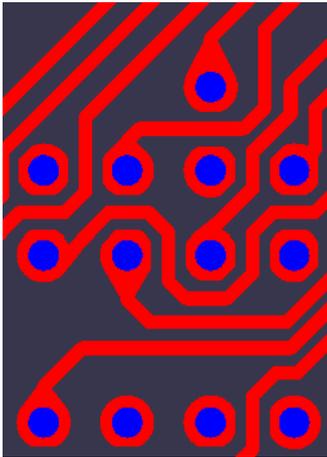
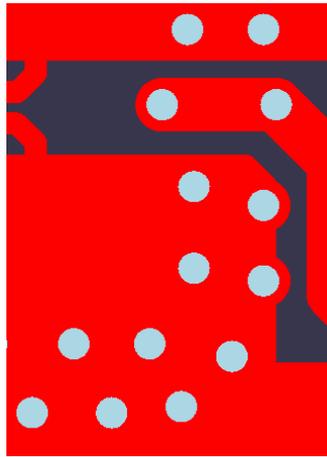
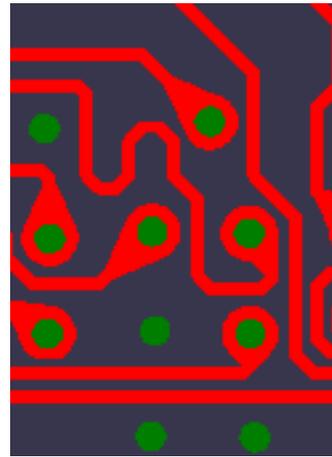
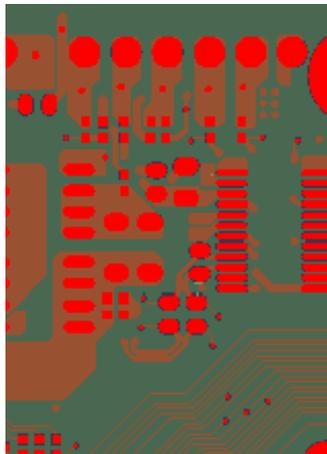
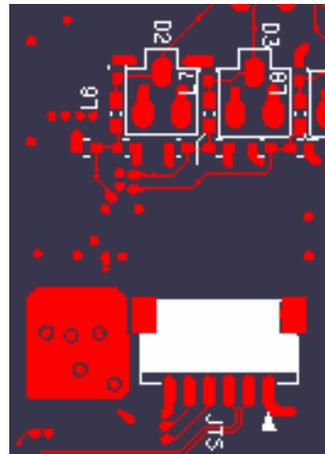
There are six layer types available to the user:

- Drill Layers
- Laser Drill Layers
- Future Drill Layers
- SMT Layers (for manually define the SMT zones)
- Solder Layers (for final inspection, license is required)
- Silk Layers (for final inspection, license is required)

Select the relevant extra layer type to view and select from the list of available extra layers.



Make sure the correct drill layers are selected for each drill layer type. If not, manually select the correct drill layers. Each layer type is colored in different color except SMT layers:

Drill Layers**Laser Drill Layers****Future Drill Layers****Solder Layers****Silk Layers**

8.2. Updating an Existing Job

The following section details how to update an existing job. The following options are available:

- [Adding new layer/layers to the existing job](#)
- [Updating an existing layer of the existing job](#)

8.2.1. Adding new layer/layers to the existing job

To add new layer/layers to the existing job, perform the following steps.

1. Click the **Storage Management** button.
The Storage Management window opens displaying the current job's layer.
2. In the **Job Settings** toolbar, click **Goto CAD** button.
The current job's CAD automatically opens.
3. Select the required layer to be added.
4. Perform Steps 4-7 of [Creating New Job](#).

5. To add the new layer for the existing job, click the **Add Layer** button (the icon is the same as **Create Layer**).



6. To add additional layers to the existing job, repeat Steps 1-5.
7. View the added layer/layers in the **Layer** list, on the main toolbar.

8.2.2. Updating an existing layer

To change the existing layer setup of an existing job, perform the following steps:

1. Click the **Storage Management** button.
The Storage Management window opens displaying the current job's layer.
2. Select the relevant layer to change and perform the necessary changes.



NOTE

The storage location, job name and master step cannot be changed.

3. Click the **Update** button.
*If the **Switch to job** option is selected in Storage Management Configuration window, you are prompted to the Spark main screen.*
4. View the performed changes on the Spark main screen.

9. Prepare Reference

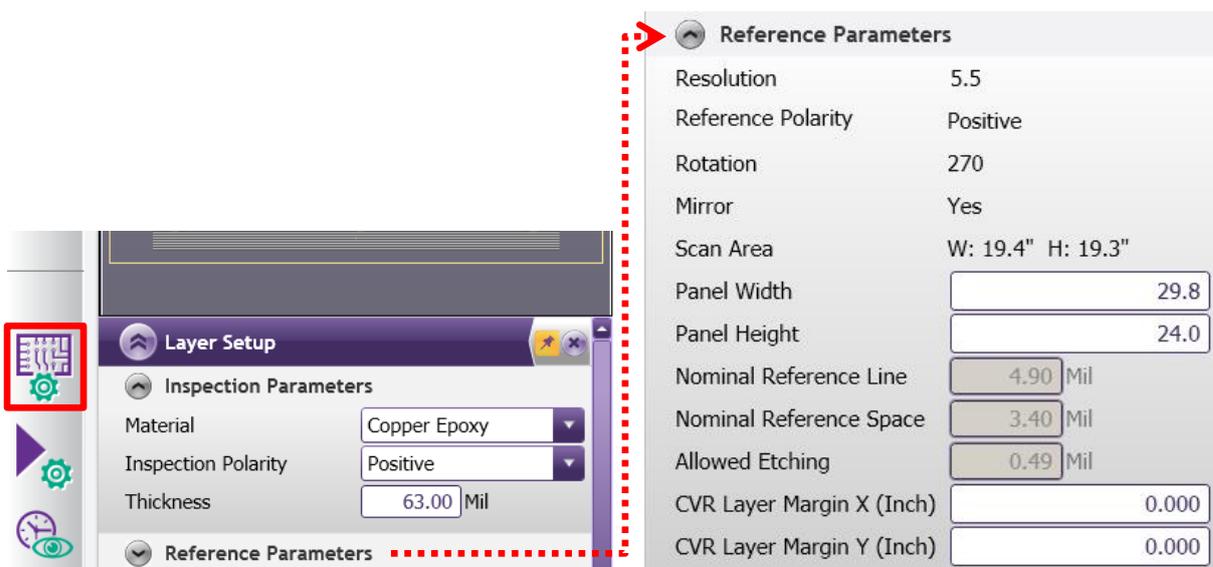
This section details how to prepare the job for the Image Setup stage. It includes the following stages:

- [Reference & Inspection Parameters](#)
- [Scan Steps Selection](#)
- [Prepare Reference](#)

9.1. Reference and Inspection Parameters

Before defining the scan steps, make sure the layer setup parameters are correct.

1. On the **Job Flow** toolbar, click the **Layer Setup** button to open the Layer Setup pane.

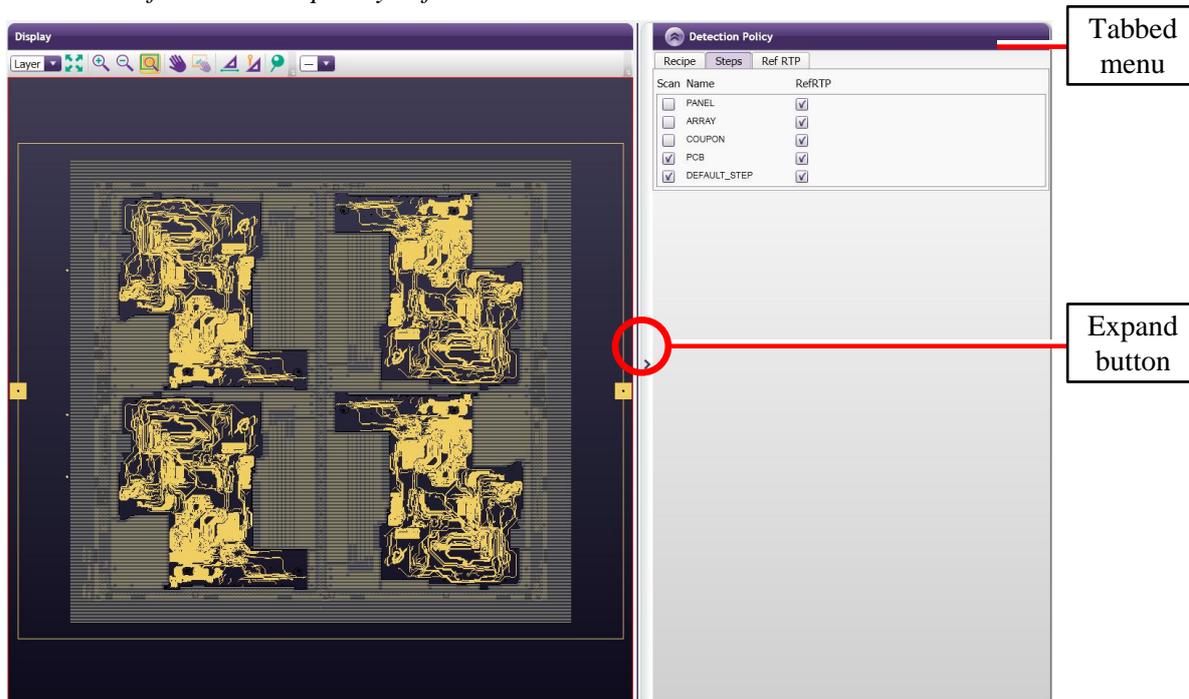


2. Verify that the reference parameters match the job requirements. If not, update the existing job parameters. Refer to [Updating an existing layer](#).
3. Update the **Panel Width** and **Panel Height** if required.
4. Update the inspection parameters if required:
 - a. **Material**: select the required material from the list according to the panel type. Each selection loads parameter settings that affect lighting, aperture and filter setting, etc.
 - b. **Inspection Polarity**: make sure the selected inspection polarity is correct (**Positive**—copper is white, **Negative**—copper is black).
 - c. **Thickness**: make sure the defined thickness is the same as job specifications.

9.2. Scan Steps Selection

1. Click the expand button to open the **Detection Policy** tabbed menu.

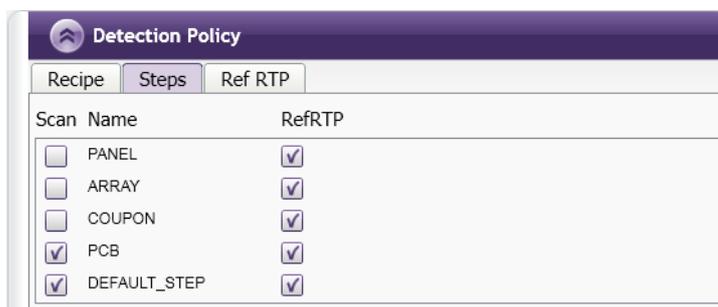
The Ref RTP tab is open by default.



2. To view the selected steps, click the **Steps** tab.

The steps defined during the Job/Layer creation are displayed as selected.

The **RefRTP** checkboxes are checked by default, meaning that all Ref RTP masks are applied to all steps. If you don't want the Ref RTP masks applied to a certain step, clear the **RefRTP** check box. For more information about Ref RTP masks, refer to [Ref RTP](#).

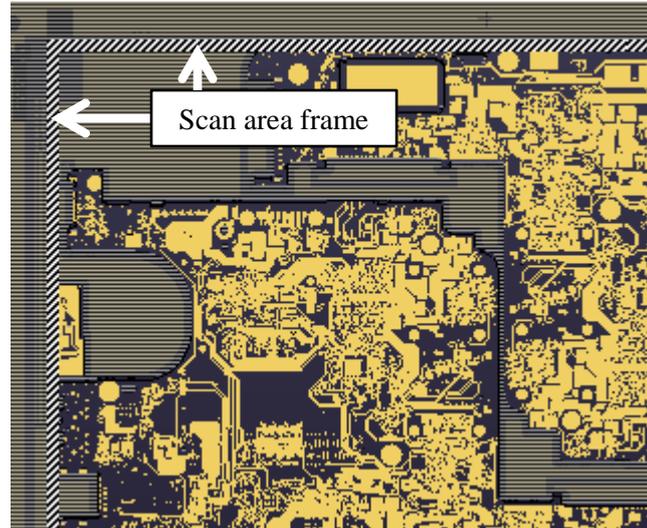


3. To change the selected step or to add another step:
 - a. Click on the step name to preview the scan units on the main display.
All selected units, except for the Master Step, are highlighted in red on the main display.
 - b. To preview multiple steps, press the **Ctrl** key and click on the required steps names.
 - c. To cancel the selected step, clear the **Scan** check box.
 - d. To add a scan step, select the **Scan** check box.



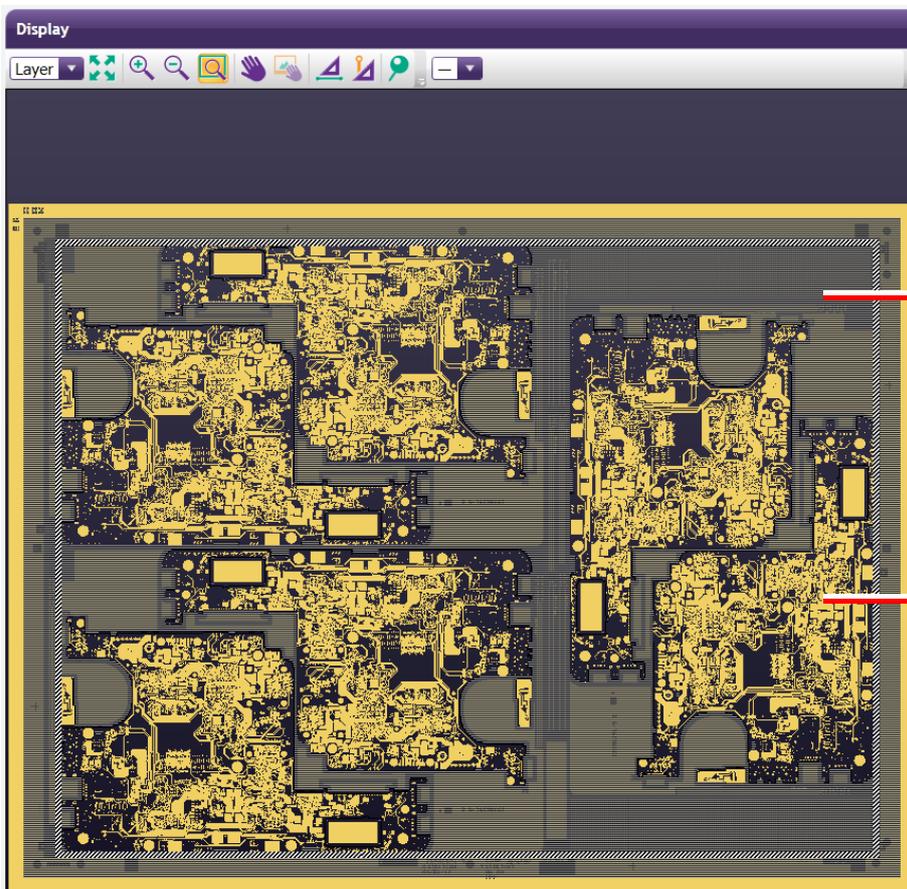
NOTE

Step selection affects the scan area that it outlined by the scan area frame.



NOTE

The steps that are NOT selected will be masked, meaning no defects will be reported for these areas.



Masked areas:
No defects will
be reported

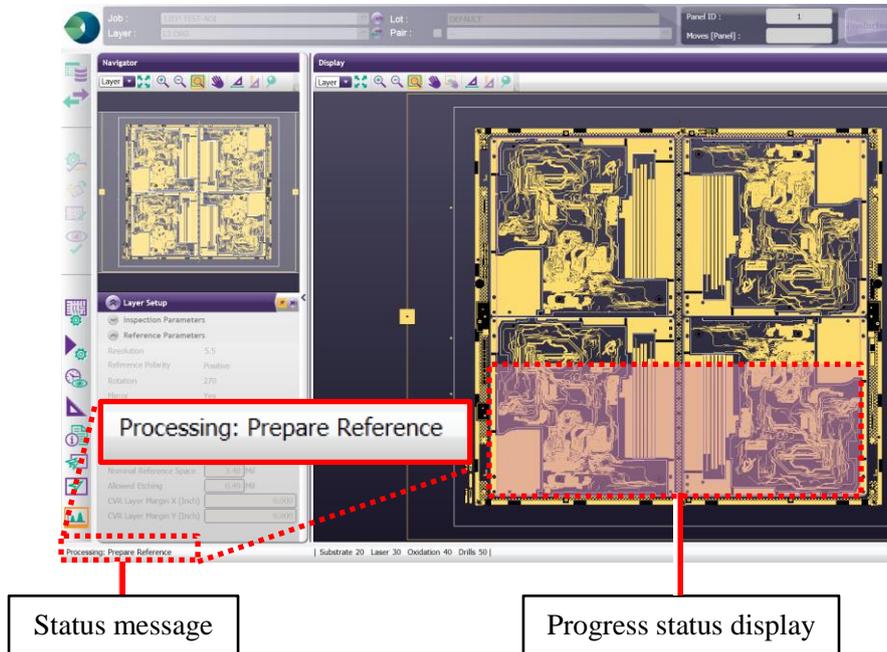
Unmasked areas:
Defects will be
reported

9.3. Prepare Reference

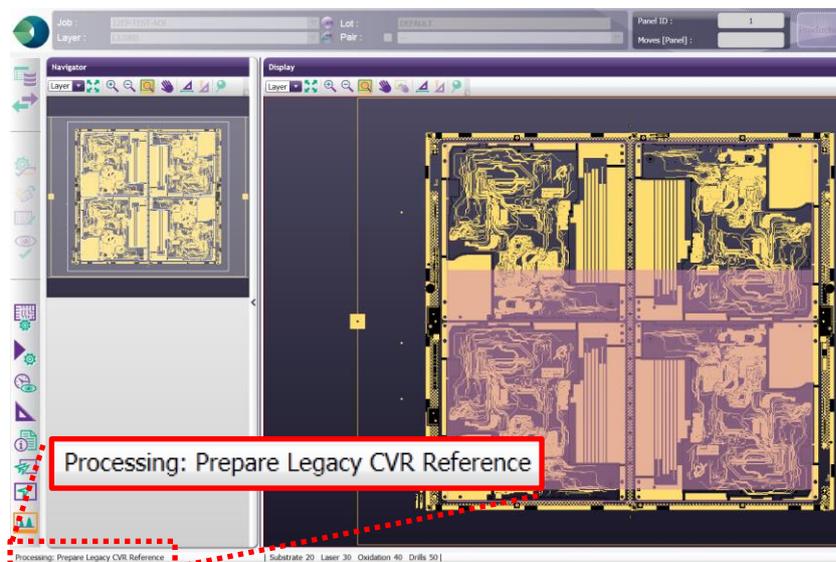
1. On the **Job Flow** toolbar, click the **Prepare Reference** button.



Reference preparation is in progress and is indicated by the status message and on the image display.



If *Generate Legacy CVR Reference Data* is enabled (Refer to [CVR tab settings](#)), CVR reference preparation starts immediately after the reference preparation is complete.



10. Image Setup

10.1. Overview

The following section details how to perform the Image Setup process which includes the following stages:

- Global Alignment (manual or automatic)
- CCD Focus Adjustment
- CCD Best Light Adjustment
- PGM Correction
- Adaptive Histogram Calibration

10.2. Alignment Toolbar

The alignment toolbar appears when:

- Automatic alignment fails on one of the alignment model.
- Manual alignment mode is selected.

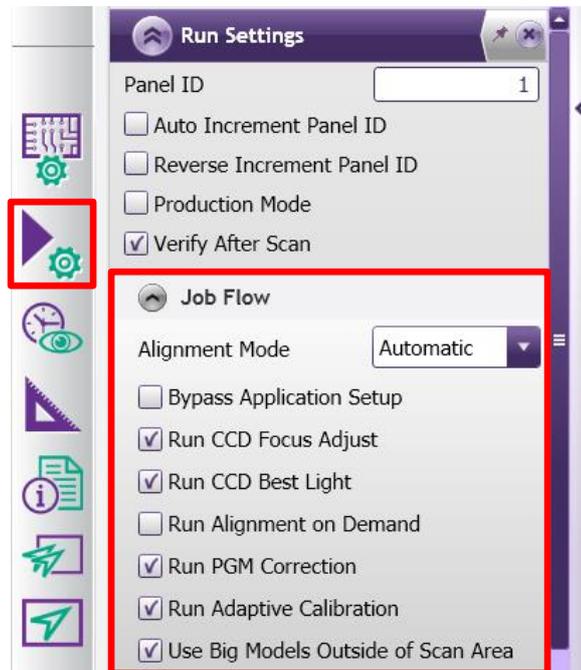


Button	Function
Retry	Click to retry the alignment for the failed alignment model.
Skip	Click to switch to another alignment model.
Back	Click to return to the previous alignment model.
Next	Click to move to the next alignment model.
Cancel	Click to cancel the global alignment process.

10.3. Automatic Alignment

1. On the **Job Flow** toolbar, click the **Run Settings** button.

The **Run Settings** tabbed page is displayed.



2. In the **Job Flow** section select the **Alignment Mode – Automatic** option.
3. In the **Job Flow** section select **Use Big Models Outside of Scan Area** if you want the system uses the models outside of the scan area for alignment.
4. On the **Job Flow** toolbar, click the **Image Setup** button.



The system moves to the first alignment model and performs the following processes, if they are selected, on the first alignment model:

Run CCD Focus Adjust: The CCD and lens moves along the Z axis until it reaches the optimal focus position, then the illumination block moves along the Z axis accordingly.

Run CCD Best Light: The illumination block moves along the Z axis until it gets the converged lights on the panel (automatic thickness).

Run Adaptive Calibration: The system adjusts the light settings (light intensity, aperture, gain and clock) to improve light contrast.

The system continues with the automatic global alignment process for the remaining three alignment models. After all models are aligned, the system performs the PGM correction on the panel (if it is selected).

Run PGM Correction: The system corrects the light profile for all three channels according to the reflection from the panel.

5. If the automatic alignment succeeded, system returns to idle mode. Continue to [Application Setup](#).
6. If the automatic alignment fails on one of the alignment models, the [Alignment Toolbar](#) appears. On the alignment toolbar, click **Cancel**, and then continue to [Manual Alignment](#).

10.4. Manual Alignment

Manual alignment should be performed in the following cases:

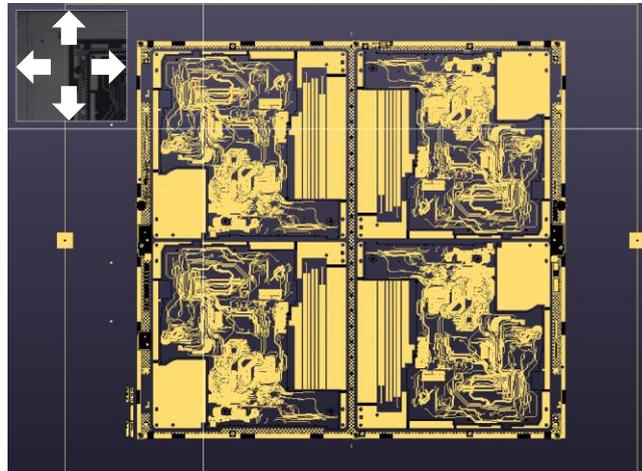
- When the automatic alignment fails, meaning the inspection image does not match the reference image.
- To select another alignment model.

1. On the **Run Settings** tab, select the manual alignment mode.
2. On the **Run Settings** tab, select **Use Big Models Outside of Scan Area** if you want the system uses the models outside of the scan area for alignment.
3. On the **Job Flow** toolbar, click the **Image Setup** button.

System performs the alignment on the first alignment model.

4. Click **Zoom to Fit** to view the whole panel on the display.
5. Make sure the **Adjust Alignment ROI Position** button is enabled.
6. On the **Alignment** toolbar, click **Retry**.

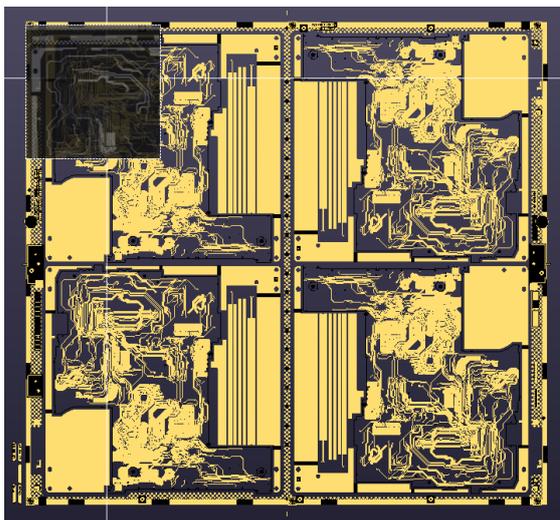
The ROI area is outlined by the dotted line.



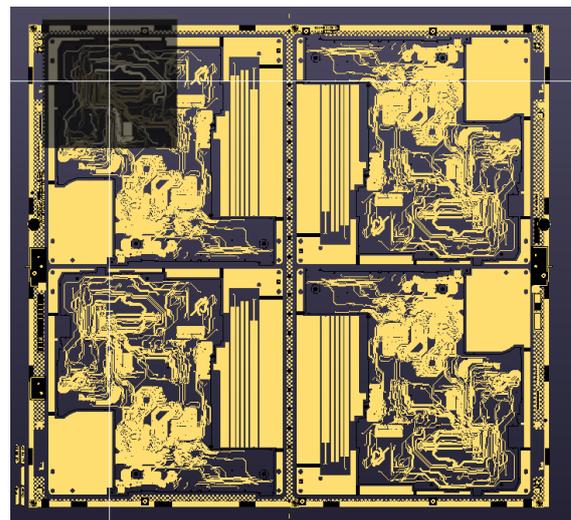
7. Drag the ROI area to the approximate location of the reference image. Click **Retry**.

The scanner moves according to the dragged ROI area. View the results on the image display.

Inspection image does not fit the reference



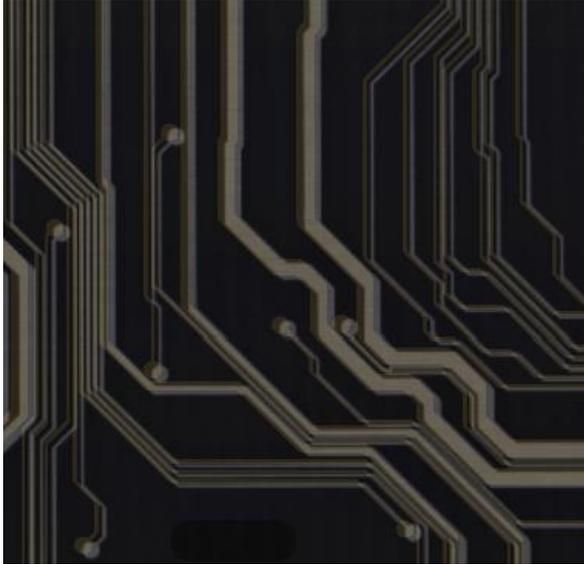
Inspection image fits the reference



8. If there is a shift between the reference image and the ROI area, with the mouse pointer move the ROI area to overlap with the reference image. Click **Retry**.

**TIP**

For more accurate overlap, use the **Zoom In** button.

No overlap**Overlap**

The inspection image fits the reference image on the first alignment model.

**NOTE**

If the alignment fails, click the **Skip** button for system to display the next alignment model. After switching to another alignment model, click **Retry**.

9. Click **Next** to accept the alignment result of the first alignment model.
The system then performs the following processes, if they are selected, on the first alignment model:
 - Run CCD Focus Adjust:** The CCD and lens moves along the Z axis until it reaches the optimal focus position, then the illumination block moves along the Z axis accordingly.
 - Run CCD Best Light:** The illumination block moves along the Z axis until it gets the converged lights on the panel (automatic thickness).
 - Run Adaptive Calibration:** The system adjusts the light settings (light intensity, aperture, gain and clock) to improve light contrast.
10. Click **Next** to continue to the following alignment model.
11. Repeat Step 10 for the remaining alignment models.
After all models are aligned, the system performs the PGM correction on the panel (if it is selected).
 - Run PGM Correction:** The system corrects the light profile for all three channels according to the reflection from the panel.

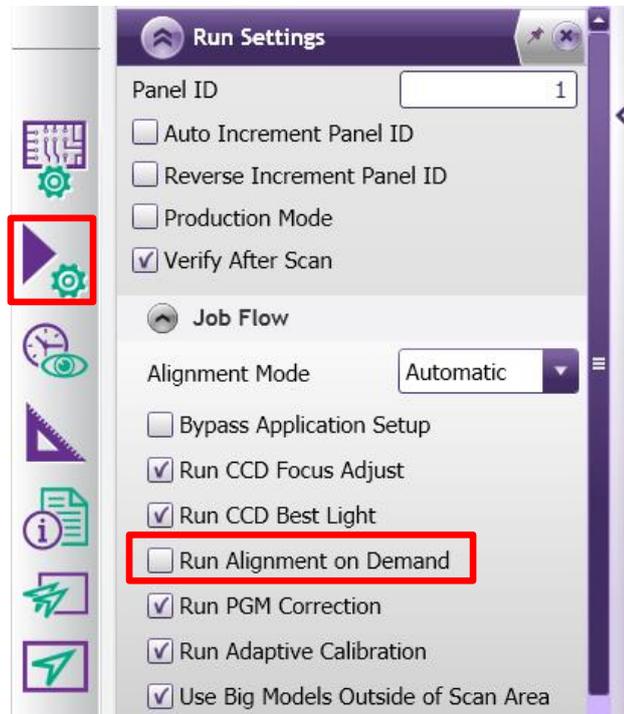
The manual alignment is complete.

10.5. Alignment on Demand

While scanning the panel, the system performs alignment on-the-fly by default. The system learns the panel orientation based on two models within the first scan strip and then corrects alignment accordingly.

If the alignment on-the-fly results are not satisfactory, due to poor alignment (for example, improper placement of panel on table), select **Run Alignment on Demand** check box and repeat scan.

At the start of the scan, the system learns the panel orientation based on two diagonal models, corrects alignment accordingly and then proceeds with the scan.



11. Application Setup

The application setup is performed after the Image Setup stage. During the application setup, system scans the first panel of the batch, and based on the performed scan, detects the optimal panel settings and uses them for the remaining panels of the batch. System performs this stage by default.

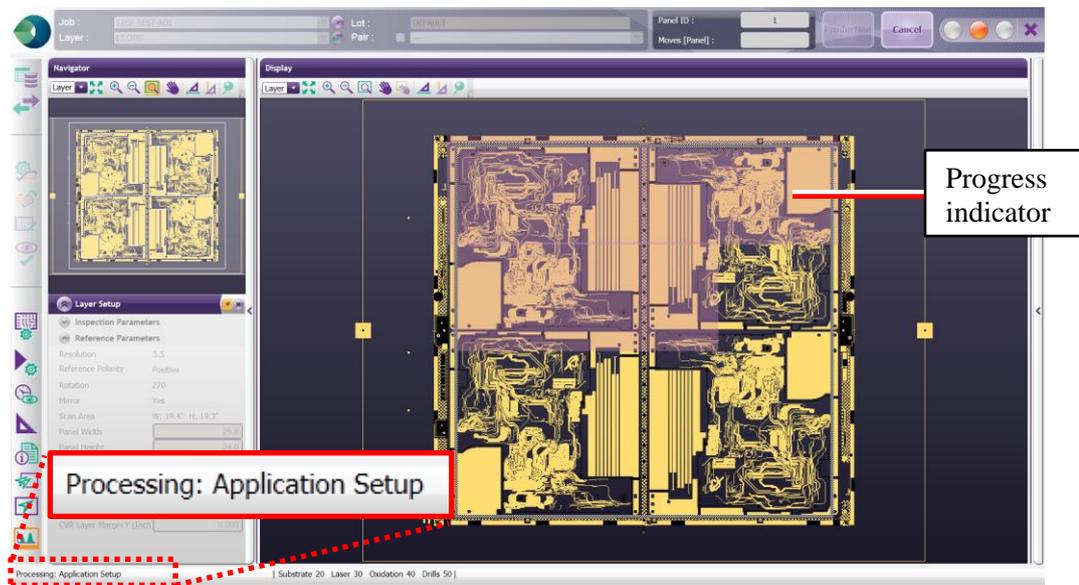
To skip the application setup, select the **Bypass Application Setup** check box on the **Run Settings** tabbed page.

1. On the **Job Flow** toolbar, click the **Application Setup** button.



System scans the panel and prepares the initial setup.

The progress of the application setup is indicated by the status message.



2. After the application setup is complete, system returns to idle mode.
3. Continue to [Scanning](#).

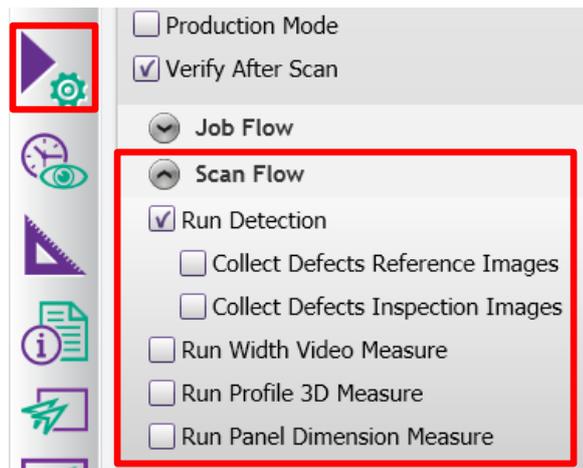
12. Scanning

12.1. Scan Flow

The Scan Flow section allows user to define which process the system should perform during scanning.

On the **Job Flow** toolbar, click the **Run Settings** button.

The *Run Settings* tabbed page is displayed.



In the **Scan Flow** section, the following options are available to the user:

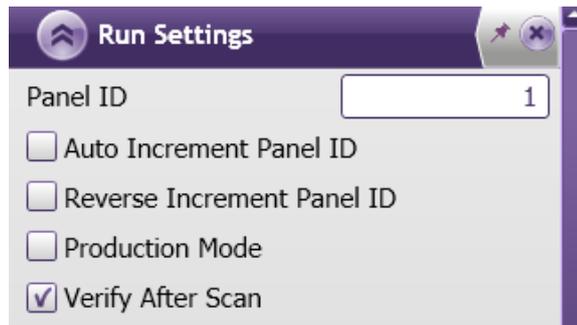
- **Run Detection:** selected by default. When selected, the system performs defects detection during the scanning stage.
 - **Collect Defects Reference Images:** cleared by default. When selected, the system saves all defects reference images for CDB server further analysis.
 - **Collect Defects Inspection Images:** cleared by default. When selected, the system saves all defects inspection images for CDB server further analysis.
- **Run Width Video Measure:** cleared by default. When selected, the system performs video measurement on the predefined measure queries during the scanning stage.
- **Run Profile 3D Measure:** cleared by default. When selected, the system performs 3D measurement on the predefined measure queries during the scanning stage.
- **Run Panel Dimension Measure:** cleared by default. When selected, the system performs panel dimension measurement on the predefined measure queries during the scanning stage.

12.2. Scanning in Inspectify (Non-production) Mode

The Inspectify mode is used for the initial setup on the first panel of the batch, or when the verification is performed locally on the system.

To enable the Inspectify mode:

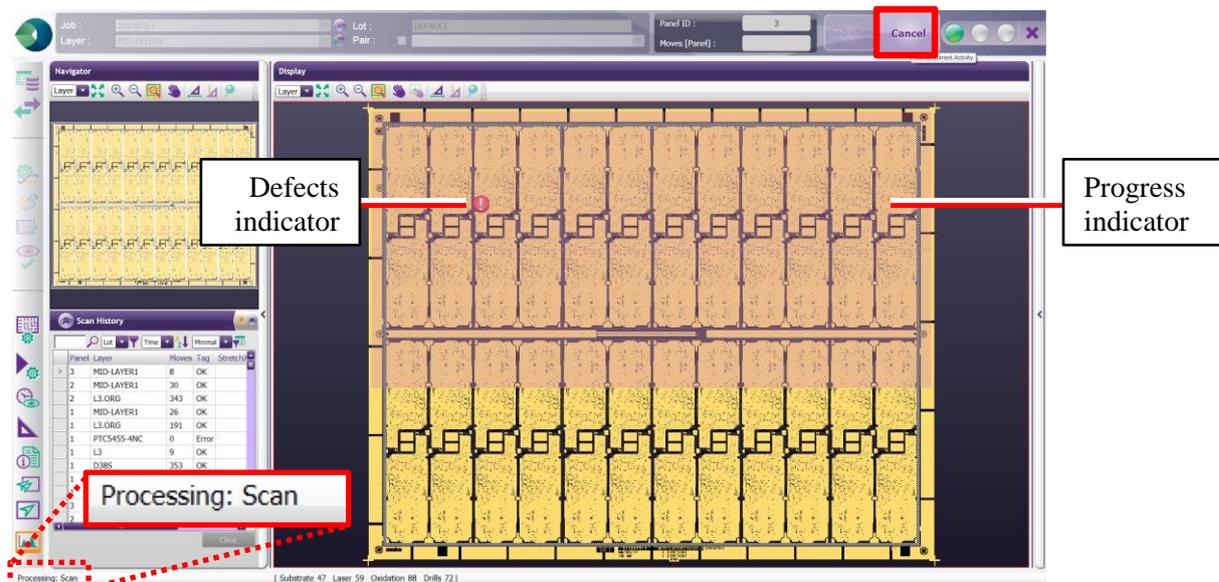
1. On the **Run Settings** tab, clear the **Production Mode** check box.
2. Make sure the **Auto Increment Panel ID** check box is cleared.



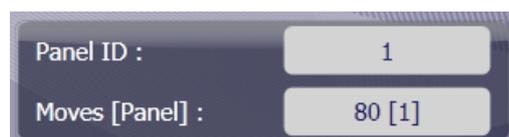
3. Make sure the **Verify After Scan** check box is selected.
4. Click **Scan** to scan the remaining panels of the batch.

*The **Scan** button becomes the **Cancel** button.*

The status of the scan is indicated by the progress indicator on the image display and the status message at the bottom of the screen.



*After the scanning is complete, the system automatically switches to the verification stage (Refer to [Verification](#)). After the verification is complete, the system switches to idle mode. The panel ID is always **1**. The number of moves found for the panel specified in the squared brackets is displayed in the **Moves [Panel]** field.*



12.3. Scanning in Production Mode

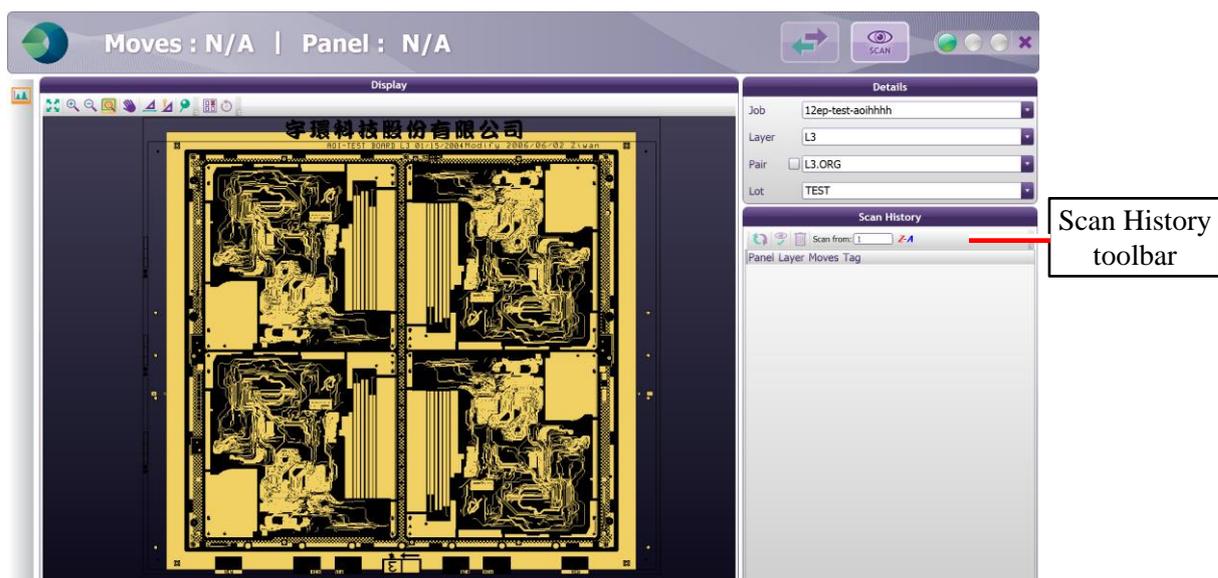
Production mode allows consecutive scanning of all panels of the batch, after completing the initial setup on both sides (layer-pair) of the first panel of the batch. In this mode, there is NO verification stage on the system. All scanning results are automatically sent to a remote verification station for offline verification.

To switch to the Production mode, click the **Production** button on the main toolbar.

If the **Production** button is inactive, the problem is that the reference date for CVR has not been prepared.



The production window appears.



Scan history toolbar

The following table describes the scan history toolbar buttons available to the user that are organized according to their order of appearance on the toolbar.

Icon	Description
	Rescan: Available only if a scan history item is selected. Click to rescan the selected scan history item.
	Verification: Available only if a scan history item is selected. Click to verify the selected scan history item.
	Clear: Available only if a scan history item is selected. Click to delete the selected scan history item.
Scan from: <input type="text" value="1"/>	Scan from: Displays the next panel ID for scan. If a new lot is selected, make sure the panel ID is set to 1 .
	Reverse Increment Panel ID: The panel ID is starting from 1 for a new lot and is in increasing mode for batch scan by default. Enable this button to make the panel ID decrease from a specified number entered in Scan from text field.

To start a batch scan:

1. Enable layer pair if required.
2. Select the required lot name from the list, or enter the lot name in the text field.

Details	
Job	12ep-test-aoihhh
Layer	L3
Pair	<input type="checkbox"/> L3.ORG
Lot	TEST

3. If a new lot is selected and **Reverse Increment Panel ID** button is not enabled, make sure the **Panel ID** is set to **1**.
4. Make sure the layer registration pin position is set.

*If the layer registration pin position is not set and you click **Scan**, the system will prompt you to set it before production.*



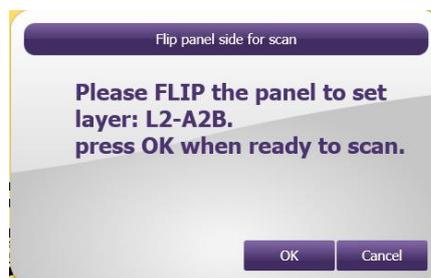
5. If the layer pair mode is enabled and you want to switch to the CAD data of the other side of the panel, click the **Switch Layer** button.



6. Click **Scan** button or press **Enter** on the keypad to scan the panel.



*A message appears asking user to flip the panel if layer pair is enabled. Flip the panel, and click **OK** to scan the other side of the panel.*



The scan result is displayed.

Scan History						
		Scan from: 3		Z-A		
Panel	Layer	Moves	Tag	Pair	Moves	Tag
2	L1-A1B	153	OK	L2-A2B	15	OK
1	L1-A1B	204	OK	L2-A2B	29	OK

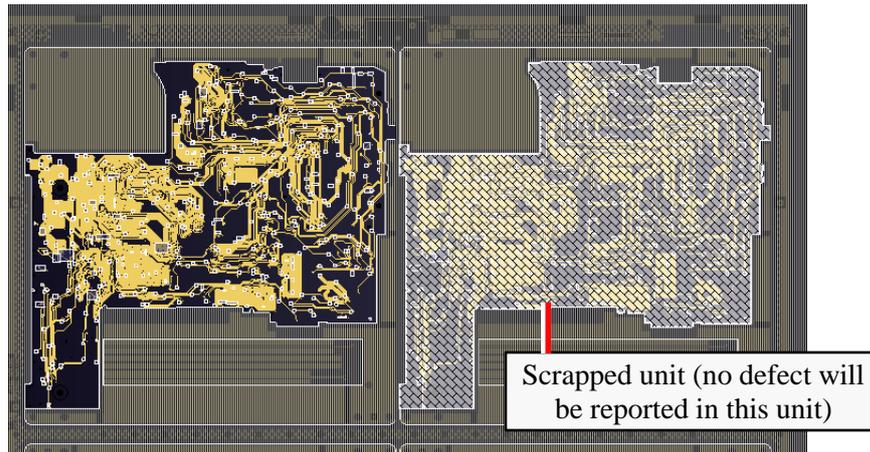
7. Perform scan for the remaining panels of the batch.

To manually define scrap units for the next panel:

1. Click the **Manually Scrap Units** button on the display toolbar to enable it.



2. Select the unit which is scrapped on the main display.



TIP

To cancel the selection, click on the scrapped unit again or click the **Reset** button on the display toolbar.



3. Click **Scan** button or press **Enter** on the keypad to scan the panel.

The defined scrapped units will be deleted automatically after the scanning of current panel is complete.

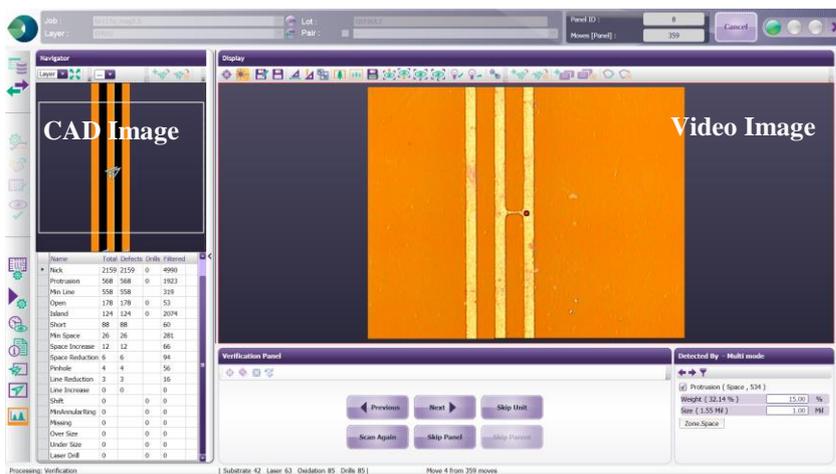
13. Verification

After the scanning is complete, the system automatically switches to the verification stage.

To perform the verification in idle mode:

On the Job Flow toolbar, click the **Verification** button.

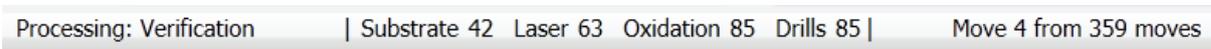
System performs verification. Video image is displayed on the main display. CAD image is displayed on the navigator display.



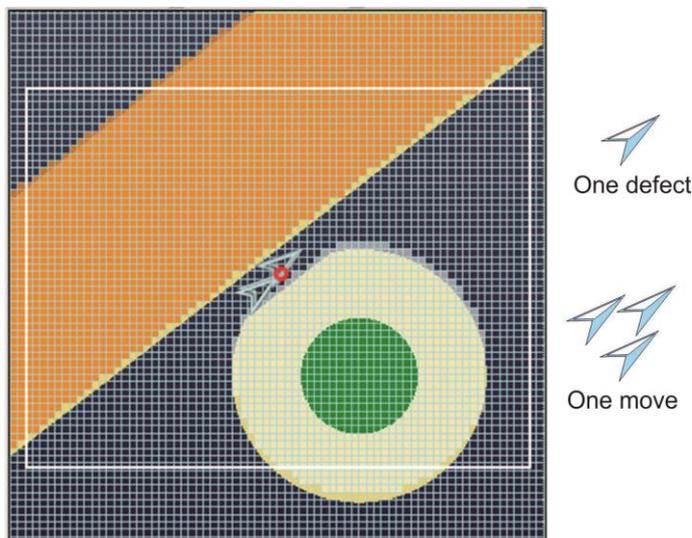
During the verification, panel ID, and number of moves for the current panel are displayed.



The status message shows the thresholds applied for the current panel and the number of moves.



Number of moves refers to the location area of a group of defects.

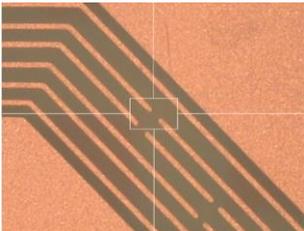
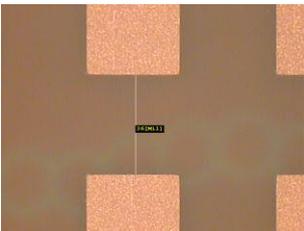
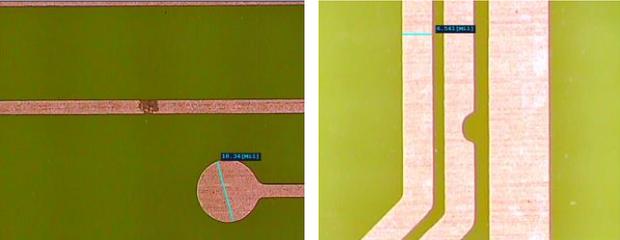


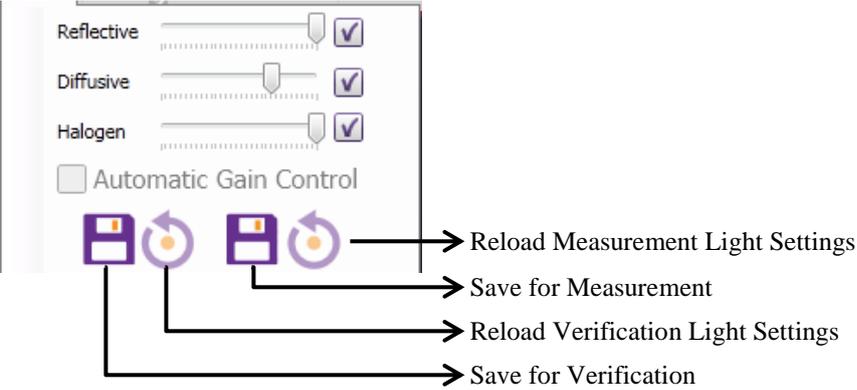
13.1. Display Toolbar in Verification Mode

In verification mode, the following buttons related to the video image appear on the display toolbar:



The following table describes the video image options on the display toolbar available to the user that are organized according to their order of appearance on the toolbar.

Button	Function
	Display Cross: click to display a cross in the center of the FOV. 
	Laser Pointer: click to enable/disable the laser pointer.
	Save Video Image As: click to save image in bmp format in the selected directory, with the selected name.
	Save Video Image: click to save image in C:\VideoImages folder, with the naming convention VideoimageX (X is a consecutive number).
	Measure Distance Between Two Points: click the button to enable the option. Then, click on the selected point and draw a line to the required second point. The measurement result is displayed on screen. 
	Measure Pad\Line Dimensions (On Double Click): Double click on a pad or a line, the measurement result is displayed on screen. 
	Pixel Size Calibration: click to perform the pixel size calibration. Calibrate when: <ul style="list-style-type: none"> • Video zoom changes • Video measurement is inaccurate
	Zoom In: click to zoom in the video image. <i>Note: The button is active only for systems that support the video zoom option.</i>

Button	Function
	<p>Zoom Out: click to zoom out the video image. <i>Note: The button is active only for systems that support the video zoom option.</i></p>
	<p>Save as Default Zoom: click to save the current zoom as the default zoom for verification. <i>Note: The button is active only for systems that support the video zoom option.</i></p>
	<p>Video Focus Up: click to move up the video camera for manual focus adjustment.</p>
	<p>Video Focus Down: click to move down the video camera for manual focus adjustment.</p>
	<p>Fine Focus: click to perform fine auto-focus on the video image.</p>
	<p>Coarse Focus: click to perform coarse auto-focus on the video image.</p>
	<p>Run Best Light: click for system to automatically find the optimal video light.</p>
	<p>Video Light Control: click for manual adjustment of video light. The manual video light control allows user:</p> <ul style="list-style-type: none"> • Make fine tuning adjustment during verification • Save and reload the video light settings for verification • Save and reload the video light setting for measurement. 
	<p>Table Positioning Correction Calibration: click to perform table mapping. It ensures the accuracy of the panel dimension measurement.</p>
	<p>Add Repeated Defect to Current Layer: click to add repeated defect. <i>Note: The button is active only when the repeated defect is showed in the display window.</i></p>
	<p>Delete Current Layer's Repeated Defects: click to delete all repeated defects in the current layer. <i>Note: The button is active only when the repeated defect is showed in the display window.</i></p>
	<p>Add/Modify User Classification Defect: click to add/modify user classification defect. <i>Note: The button is active only when the user classification defect is showed in the display window.</i></p>
	<p>Delete User Classification Defects: click to delete all user classification defects. <i>Note: The button is active only when the user classification defect is showed in the display window.</i></p>

Button	Function
	Select/Move User Defect(s): click to select or move repeated defects or user classification defects.
	Delete Selected Defect(s): click to delete the selected repeated defect or user classification defect.

13.2. Verification Panel

When the system enters the verification mode, the verification panel appears at the bottom of the main display.



Button	Function
Previous	Click to return to the previous move.
Next	Click to go to the next move.
Scan Again	Click to scan again the area around the currently viewed defect. <i>Note: The option is useful only after performing changes in the detection policy.</i>
Skip Unit	Click to skip the verification of the current unit, and continue to the next unit. Use in case of scrap unit.
Skip Panel	Click to skip the verification of the current panel, and continue to the next panel. Use in case of scrap panel.
Skip Parent	Click to skip the verification of the current unit and its parent, and continue to the next unit. Use in case of scrap unit causing scrap parent.
Detected By	Shows the relevant defect settings for the currently verified defect. For more information, refer to Detected By Options .
	Mark: click to mark the location of the currently viewed defect on the panel. <i>Note: The button is active only for systems that support marker option.</i>
	Remark All Previously Marked Defects: click to remark the locations of all previously marked defects on the panel. <i>Note: The button is active only for systems that support marker option.</i>
	Mark Unit With Marker And Skip Remaining Unit Defects: click to mark the current unit and skip the verification of the current unit (continue to the next unit). <i>Note: The button is active only for systems that support marker option.</i>

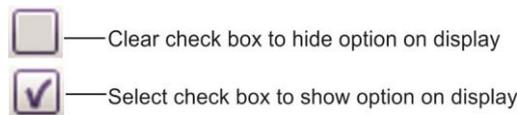
	<p>Go To Replace Marker Position: click to go to the predefined position for replacing the marker.</p> <p><i>Note: The button is active only for systems that support marker option.</i></p>
	<p>Local Mask: click to place a fixed size exclusion mask around the currently viewed defect.</p>
	<p>Duplicated Local Mask: click to place a fixed size exclusion mask around the currently viewed defect and duplicate to other PCBs with the same step name.</p>

14. Display Options

Display options are available to the user through the **Visible Set** menu. To display the menu, right-click the required display. To view the available display options, click the relevant expand button.



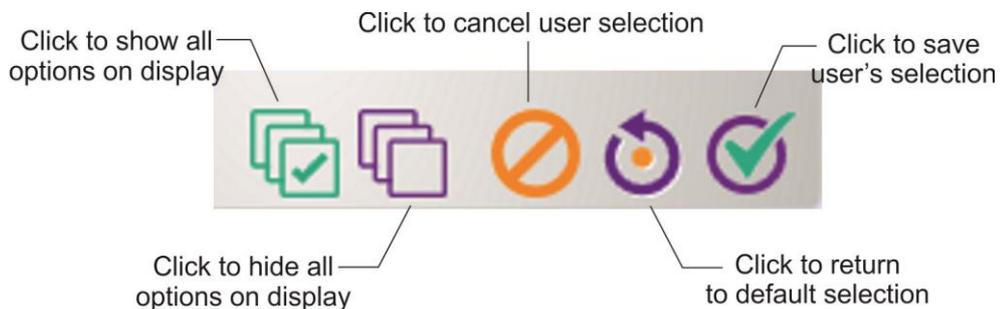
Each group contains the relevant display options. Select or clear the check box of the required display option to show or hide the selected view on the display.



For each display group, the following control buttons are available:



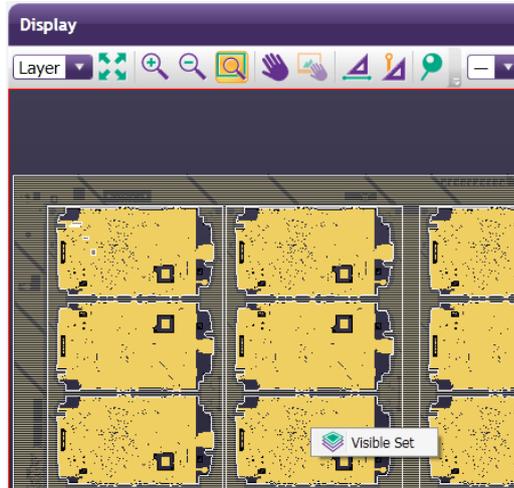
For all **Visible Set** display options, the following control buttons are available:



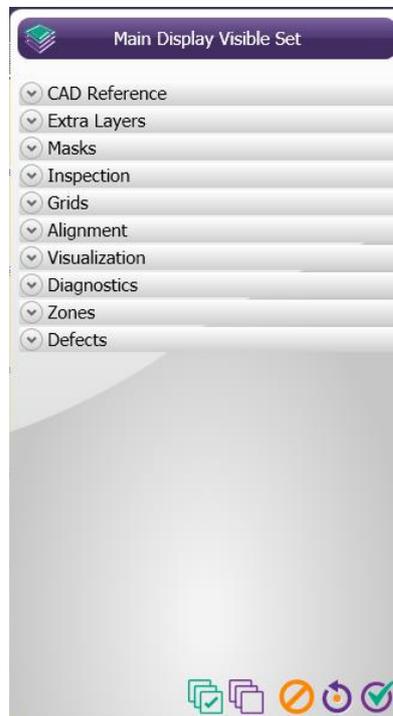
14.1. Idle Mode

14.1.1. Main display visible set

Right-click on the main display, and select **Visible Set**.



The Main Display Visible Set menu opens.



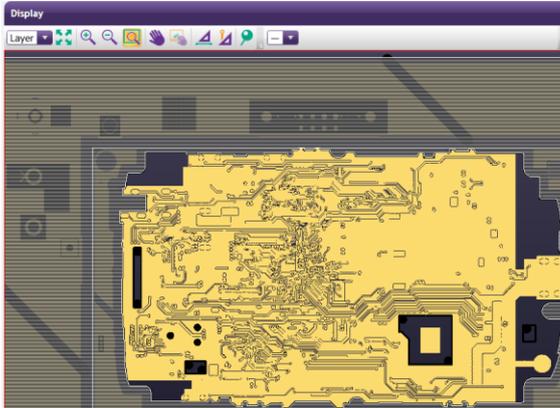
CAD Reference



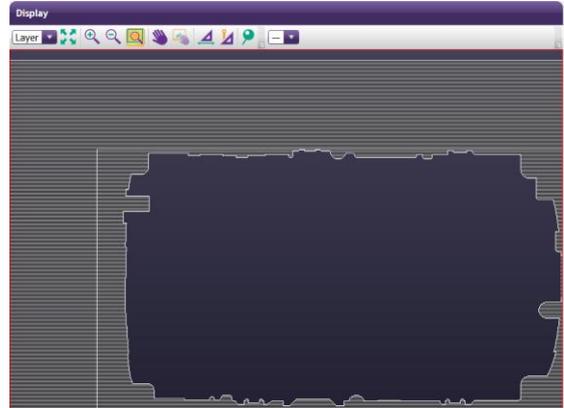
CAD Reference display options include:

- **Signal:** selected by default. Select the check box to show vector image on display or clear the check box to hide the vector image on display.

Show Signal



Hide Signal



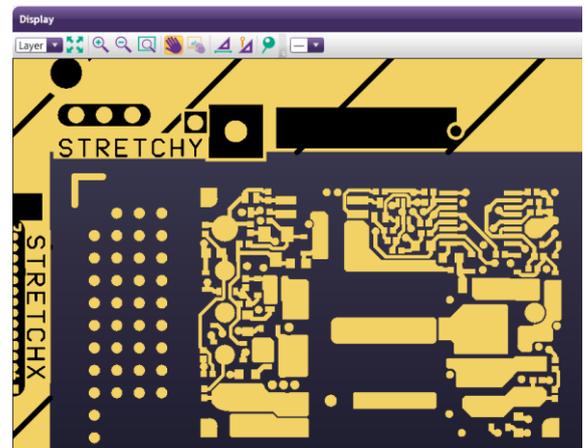
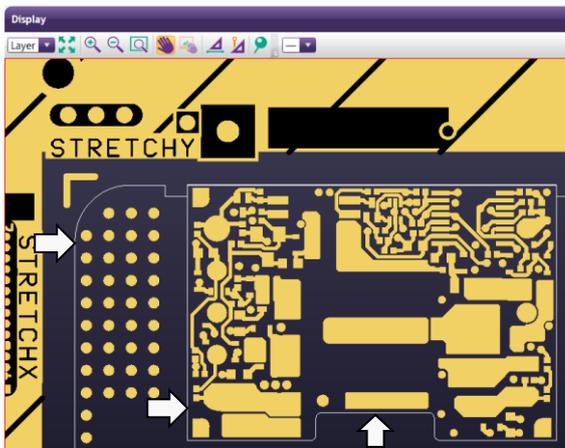
- **Step Profile:** selected by default. Select the check box to show the step profile on the display or clear the check box to hide the step profile on the display.

Show Step Profile



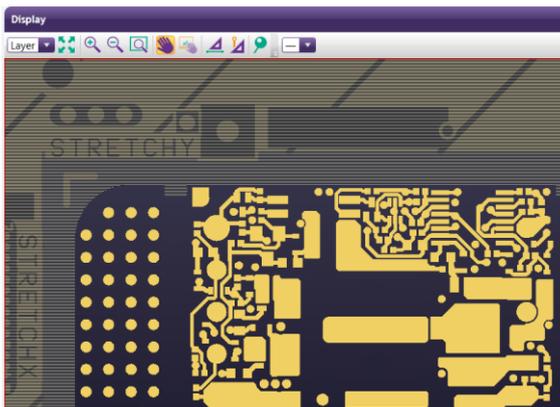
Step Profile

Hide Step Profile

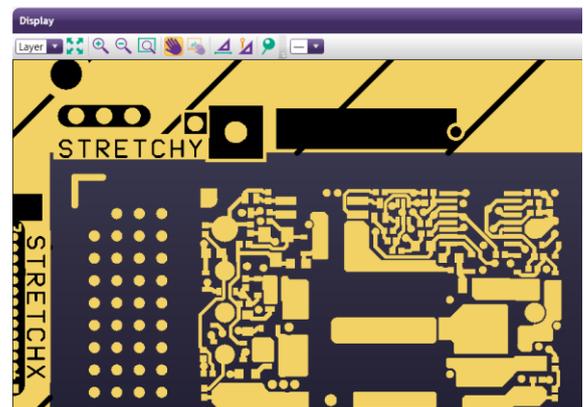


- **Don't Detect Area:** selected by default. Masked areas that are not part of the selected step/steps. No defects will be detected for these areas. Clear the check box to hide the Don't Detect Areas on display.

Show Don't Detect Area

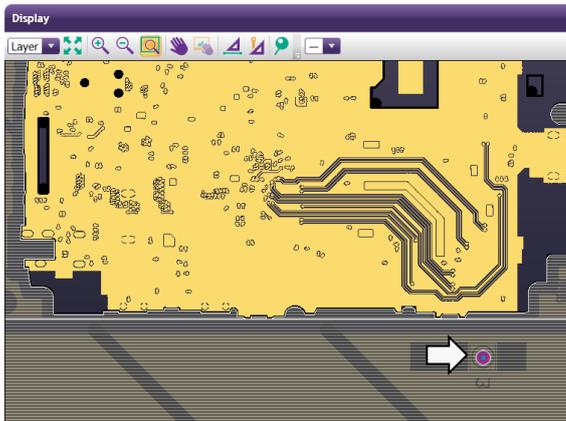


Hide Don't Detect Area

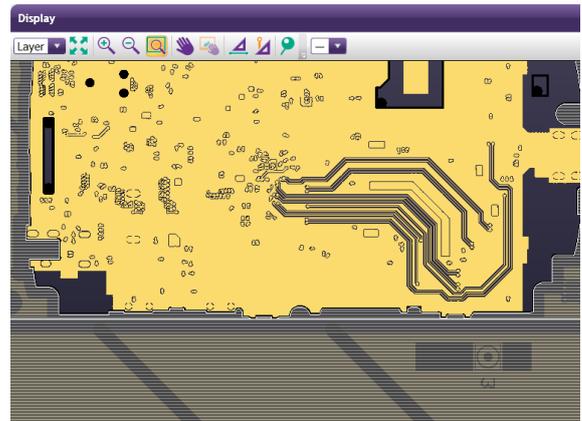


- **CVR Registration Pin:** selected by default. When selected, the CVR registration pin is displayed on the screen.

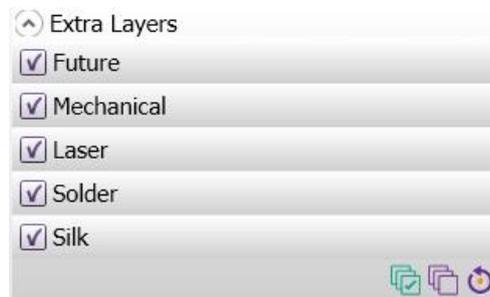
Show CVR Registration Pin



Hide CVR Registration Pin



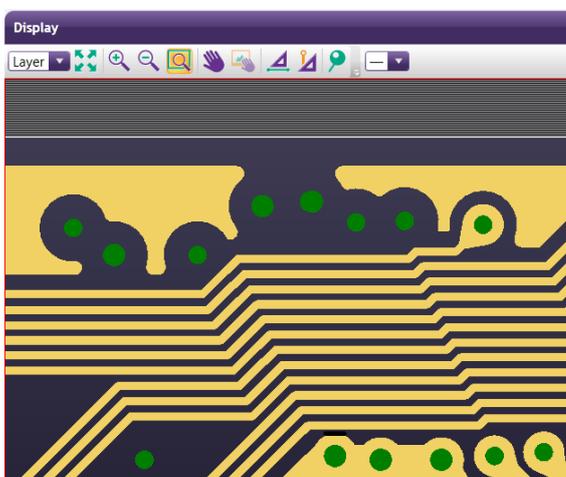
Extra Layers



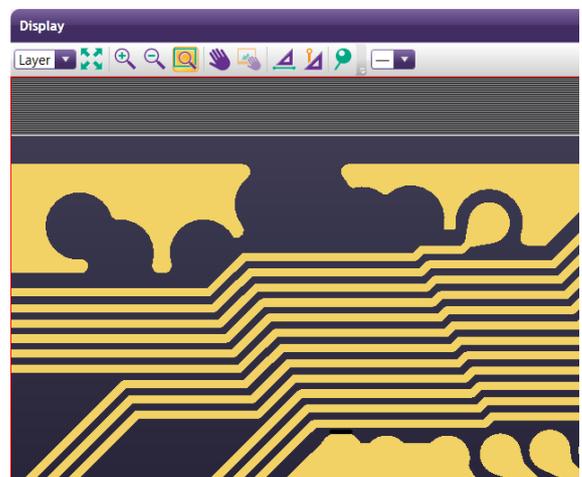
Extra Layers display options include:

- **Future:** select the check box to show future drills on the display or clear the check box to hide future drills on the display. Future drills are represented by the green dots.

Show Future

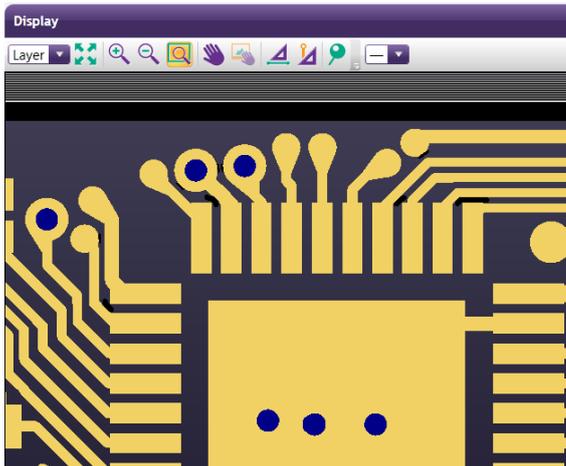


Hide Future

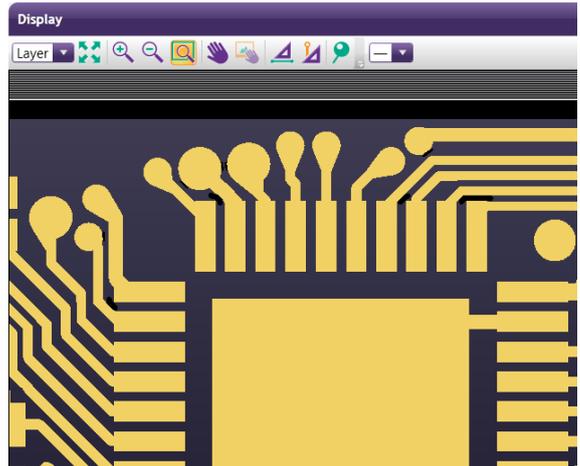


- **Mechanical:** select the check box to show mechanical drills on the display or clear the check box to hide mechanical drills on the display. Mechanical drills are represented by the blue dots.

Show Mechanical

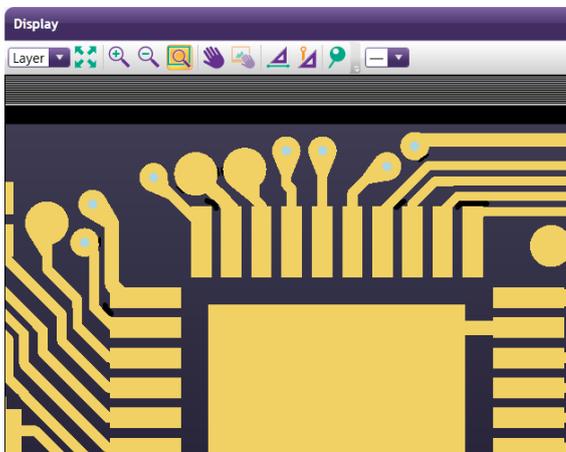


Hide Mechanical

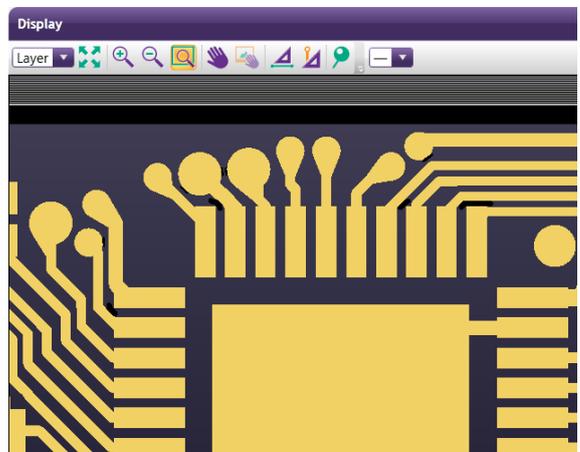


- **Laser:** select the check box to show laser drills on the display or clear the check box to hide laser drills on the display. Laser drills are represented by the light blue dots.

Show Laser

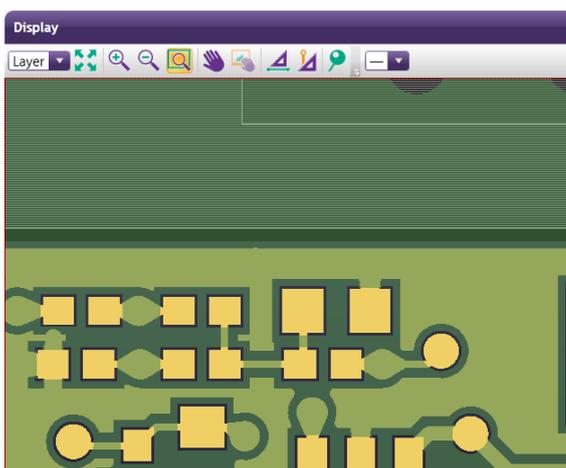


Hide Laser

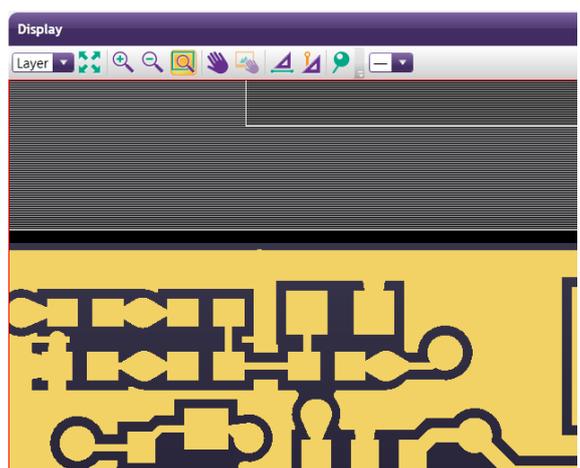


- **Solder:** select the check box to show solder mask area on the display or clear the check box to hide solder mask area on the display.

Show Solder

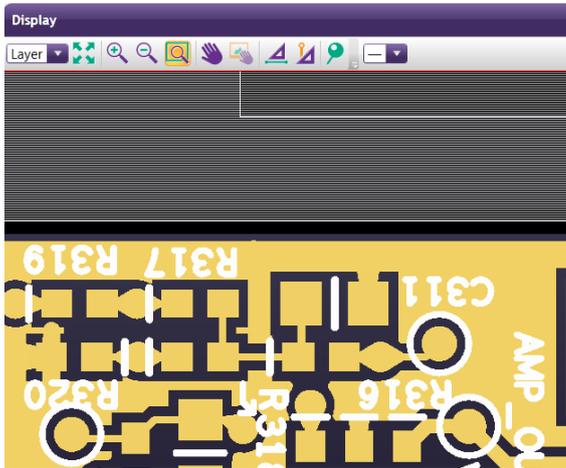


Hide Solder

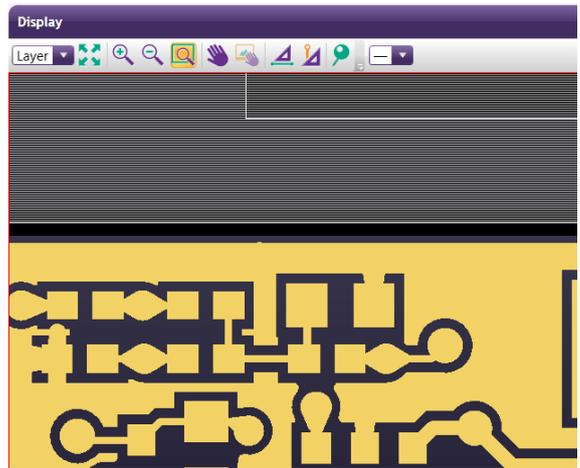


- **Silk:** select the check box to show silk screen area on the display or clear the check box to hide silk screen area on the display.

Show Silk



Hide Silk



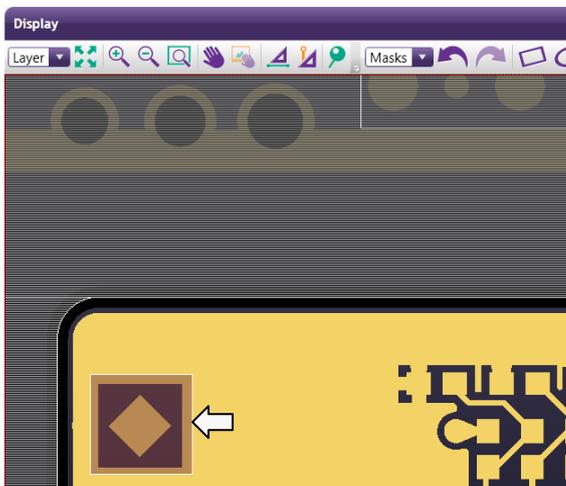
Masks



Masks display options include:

- **Exclusion Masks:** select the check box to show existing exclusion masks on the display, or clear the check box to hide the existing exclusion masks on the display. The color of the exclusion mask can be changed in the Configuration (refer to [Display tab settings](#)).

Show Exclusion Masks



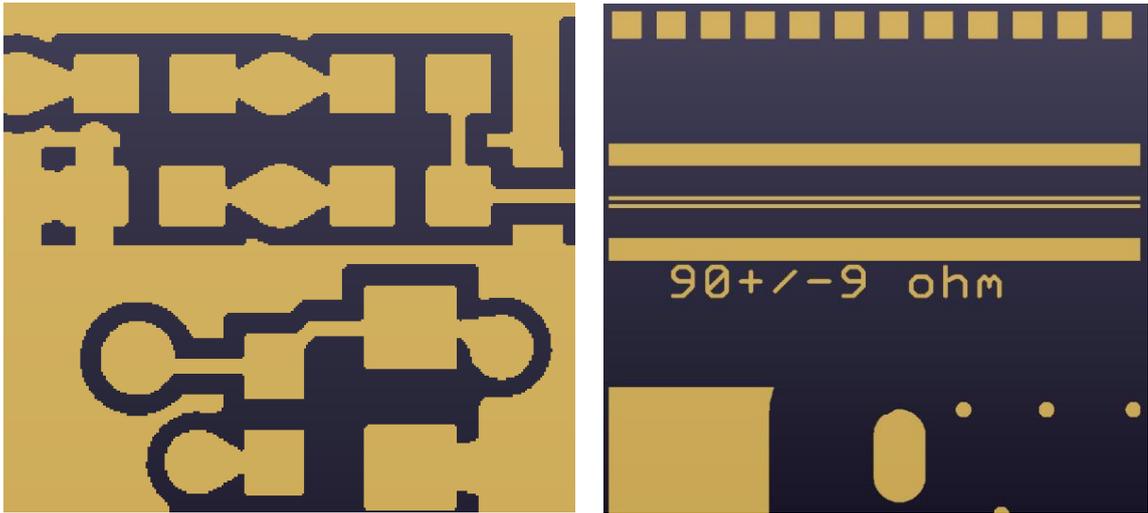
Hide Exclusion Masks



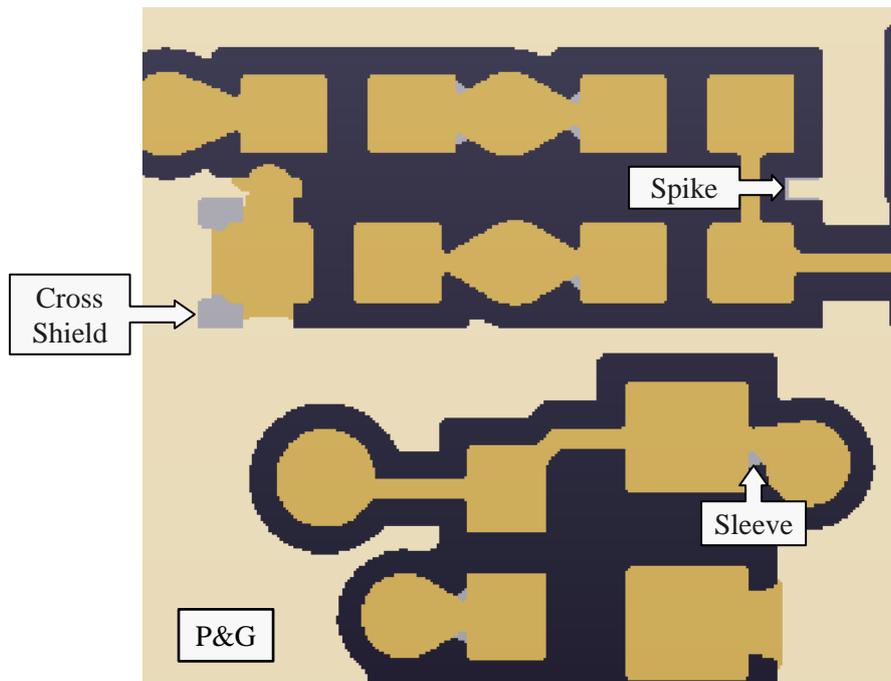
- **Hardware Mask:** select the check box to show existing hardware masks on the display, or clear the check box to hide the existing hardware masks on the display. The hardware masks are created by the system based on the raster (bitmap) reference image in the prepare reference stage. The hardware masks are visible in block (1024×1024 pixels). The following hardware masks are available: Cross Shield, Spike, Sleeve, Non Function Pad, Non Plated Drill, Text, Slot and Power & Ground (P&G). No defects will be detected for the Cross Shield, Spike, Sleeve, Non Function Pad, Non Plated Drill and Text masked areas. For Slot and Power & Ground masked areas, specific defects will be detected according to the zone defects definitions.

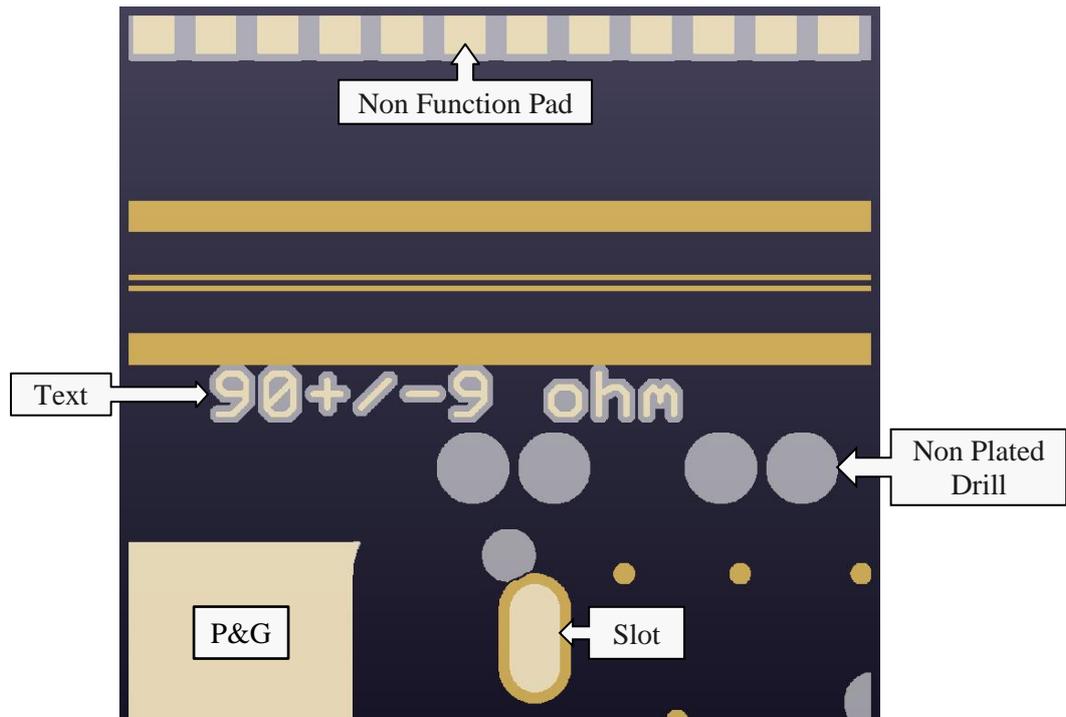
In idle mode, press CTRL and double click on the main display to view the reference images in blocks.

Hide Hardware Mask



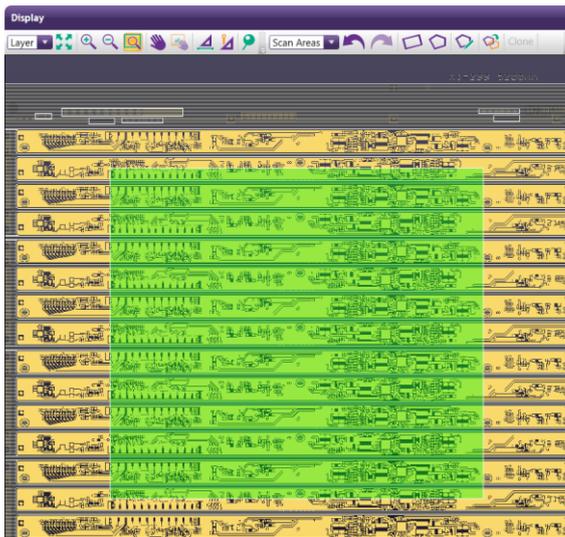
Show Hardware Mask





- User Scan Areas:** select the check box to show existing user-defined (manual) scan areas on the display, or clear the check box to hide the existing user-defined scan areas on the display. The areas outside of the user-defined scan areas will not be scanned. Defects will be reported only inside the user-defined scan areas.

Show User Scan Areas

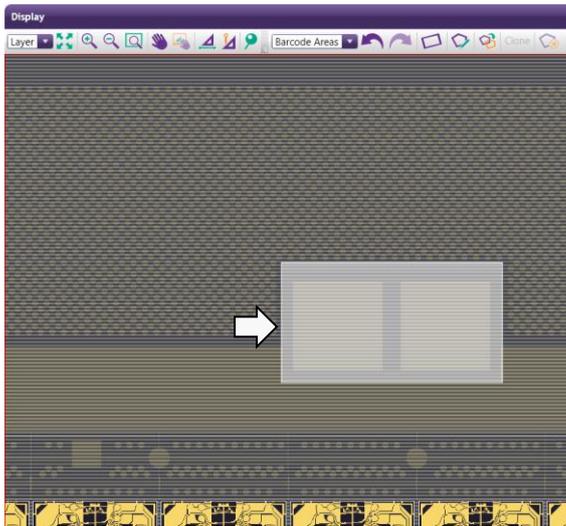


Hide User Scan Areas

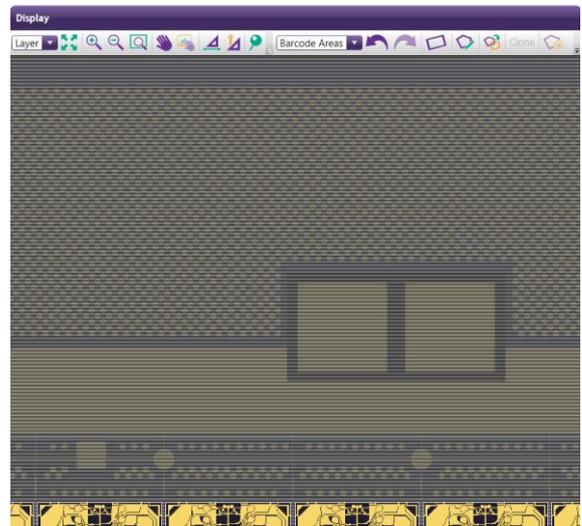


- **Barcode Areas:** select the check box to show existing barcode areas on the display or clear the check box to hide the existing barcode areas on the display.

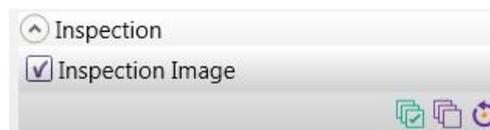
Show Barcode Areas



Hide Barcode Areas



Inspection



- **Inspection Image:** select the check box to show inspection image on the display or clear the check box to hide the inspection image on the display.



NOTE

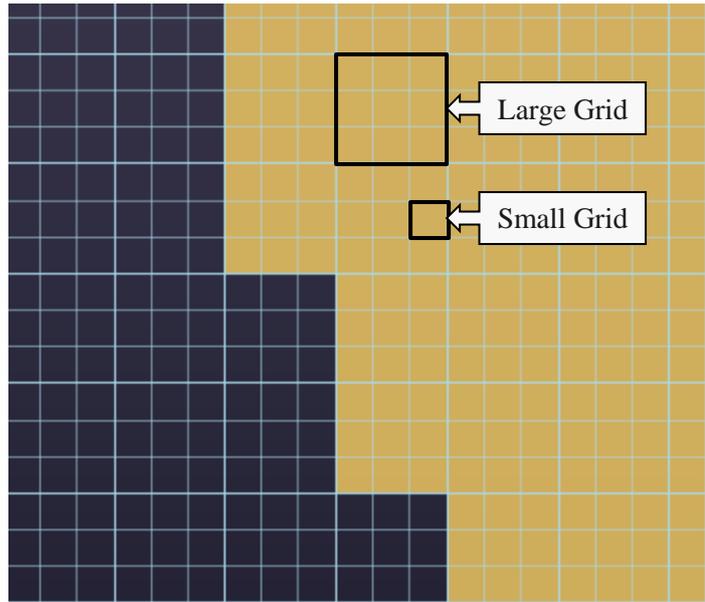
The inspection image is displayed only when using the **Get Image** option. Refer to [Thresholds](#).

Grids



Grids display options include:

- **Large Grid:** select the check box to show large grids on the display, or clear the check box to hide large grids on the display. Each grid represents a pixel. The number of the large grids represents the number of pixels on the source image.
- **Small Grid:** select the check box to show small grids on the display, or clear the check box to hide small grids on the display. The number of the small grids represents the number of pixels on the interpolated image. To make defect detection much easier and decrease false defect detection, the source image uses interpolation 3 for image enlargement of 300%.



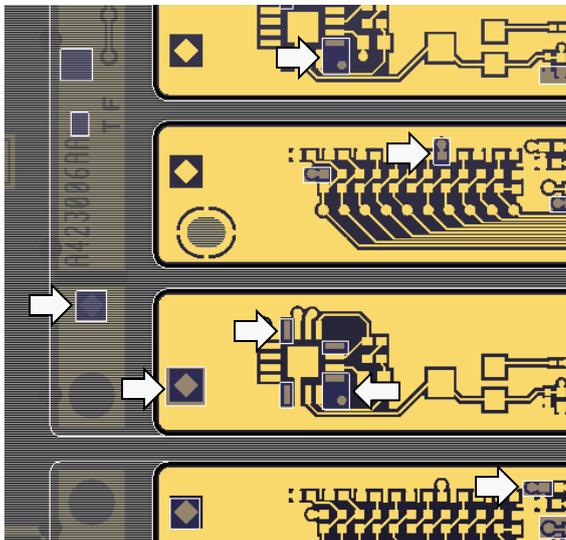
Alignment



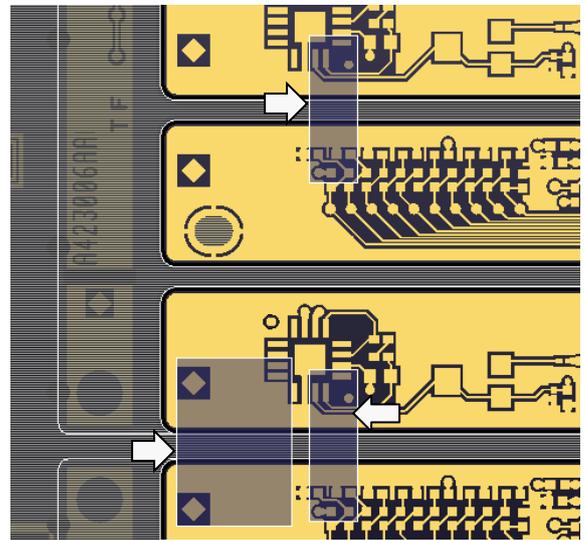
Alignment display options include:

- **Small Alignment Models:** select the check box to show small alignment models on the display, or clear the check box to hide small alignment models on the display. Small alignment models are used for online registration during application setup and scanning.
- **Big Alignment Models:** select the check box to show big alignment models on the display, or clear the check box to hide big alignment models on the display. Big alignment models are used for global alignment during image setup.

Show Small Alignment Models



Show Big Alignment Models



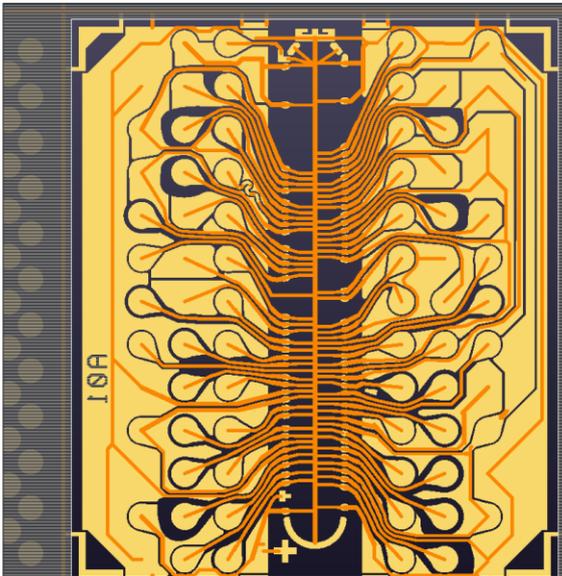
Visualization



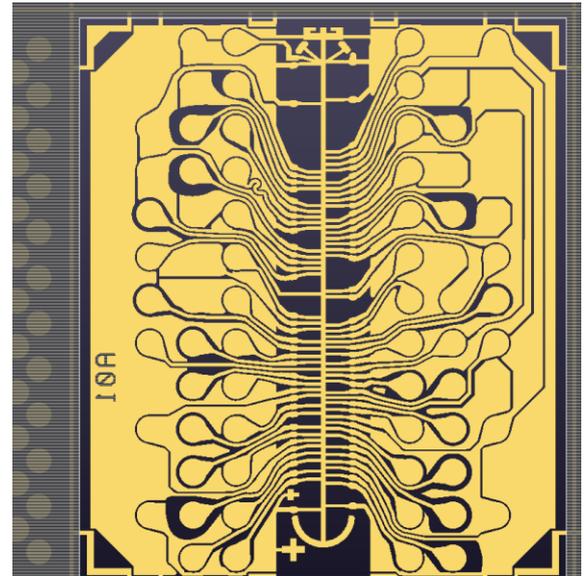
Visualization display group includes the following display options:

- **Minimum Lines:** cleared by default. Select the check box to show the thinnest lines on the display. The minimum lines are colored in orange.

Show Minimum Lines

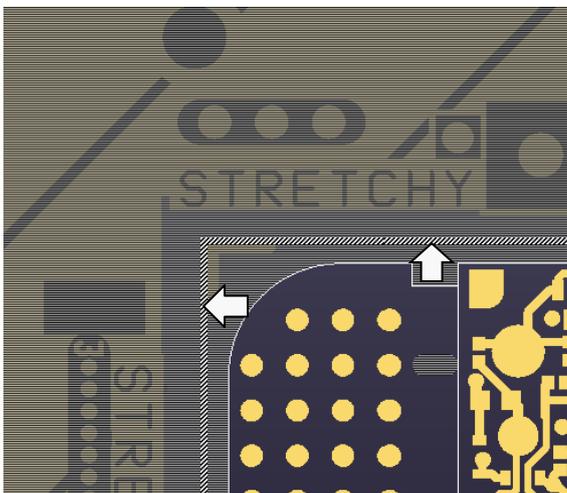


Hide Minimum Lines

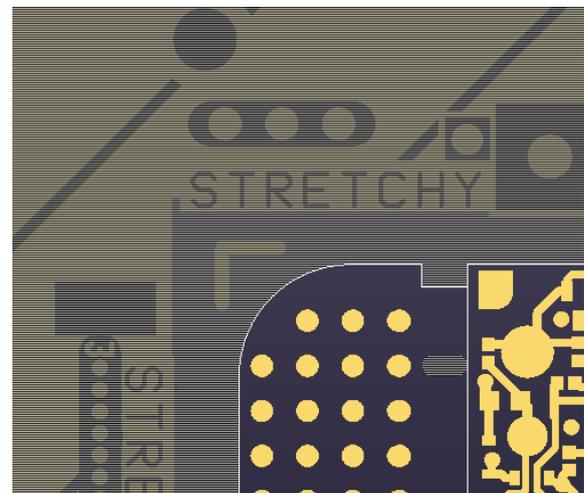


- **Scan Area:** selected by default. Clear the check box to hide the scan area on the display.

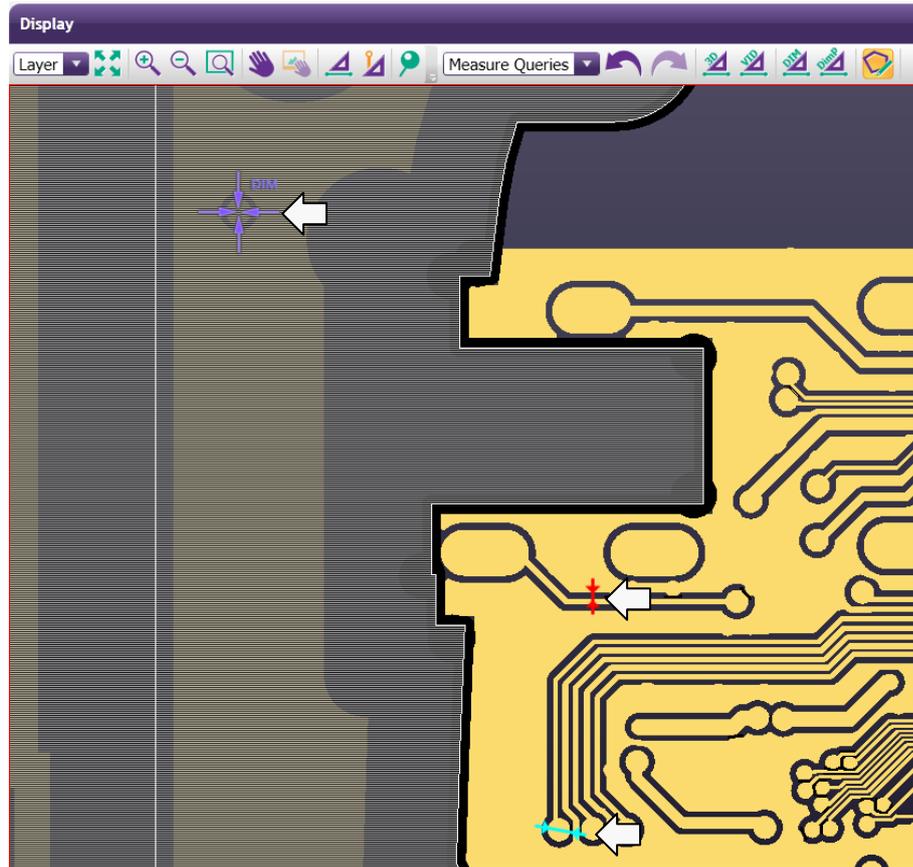
Show Scan Area



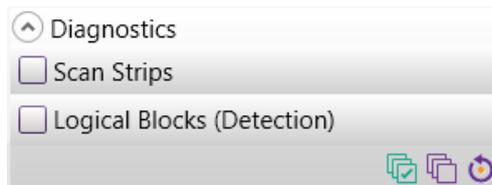
Hide Scan Area



- **Measure Queries:** selected by default. Clear the check box to hide the existing measure queries on the display.

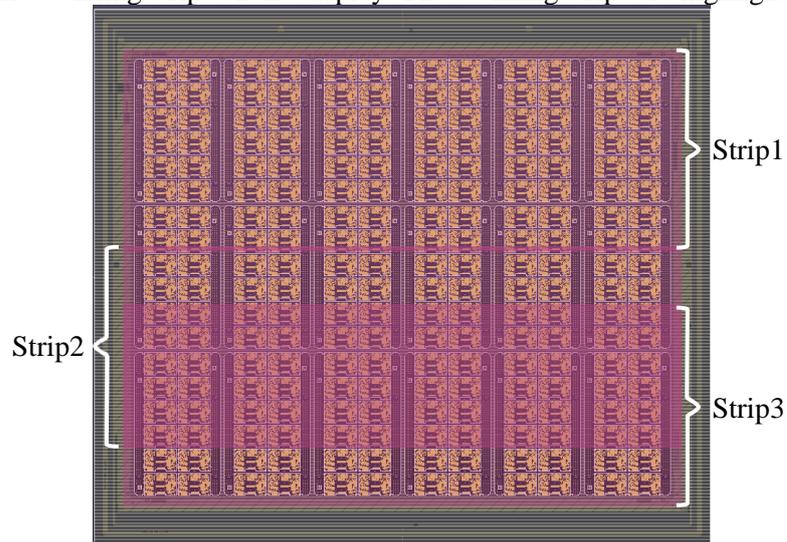


Diagnostics

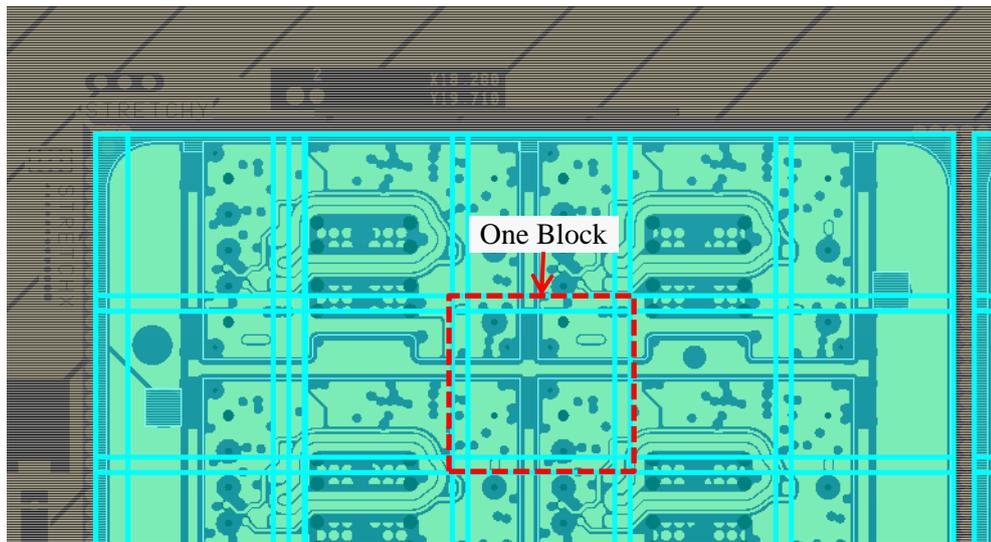


Diagnostics display group includes the following display options:

- **Scan Strips:** select the check box to show the scanning strips on the display, or clear the check box to hide the scanning strips on the display. The scanning strips are highlighted in purple.



- **Logical Blocks (Detection):** select the check box to show the block profiles of detection areas on the display, or clear the check box to hide the block profiles of detection areas on the display. Each block contains 1024 pixels in width and 1024 pixels in length.

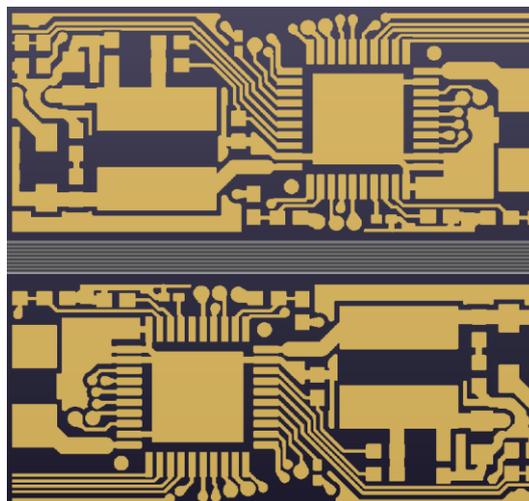


Zones

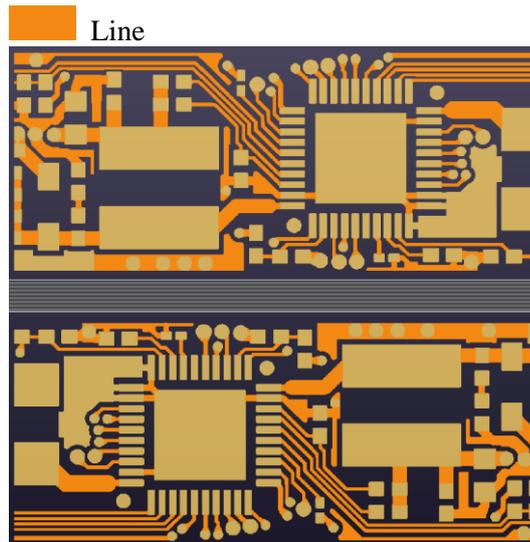


Zones are visible in block. To view the reference images in blocks in idle mode, press CTRL and double click on the main display. Zone display group includes the following display options:

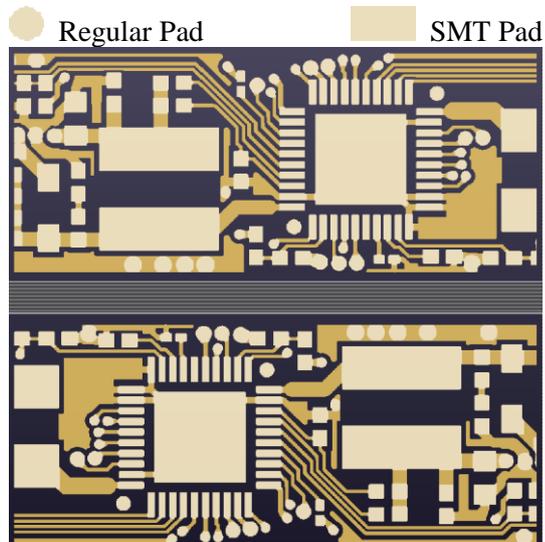
- **Reference:** select the check box to show the raster reference image on the display.



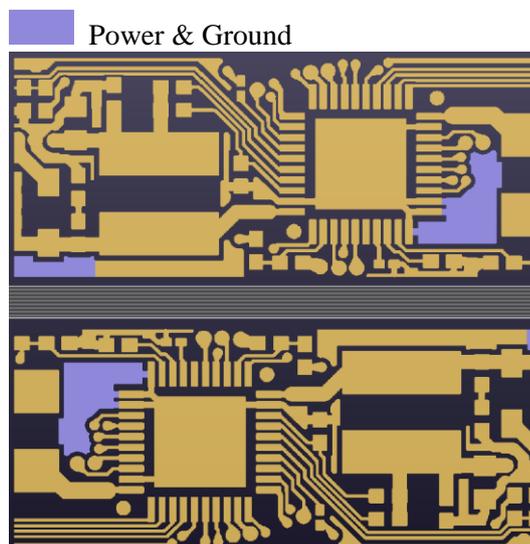
- **Line:** select the check box to show the line zones on the display.



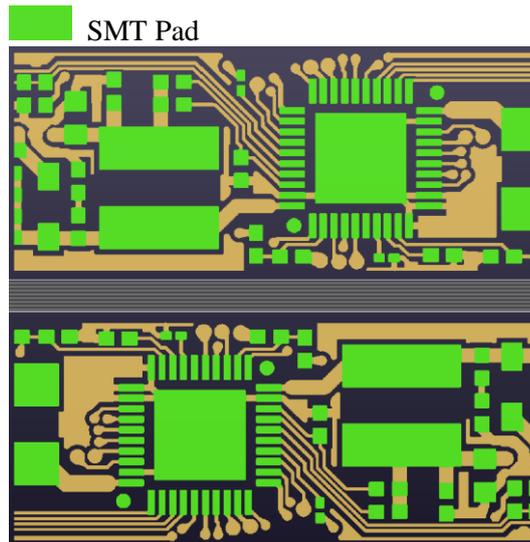
- **Pad:** select the check box to show both regular pads and SMT pads on the display.



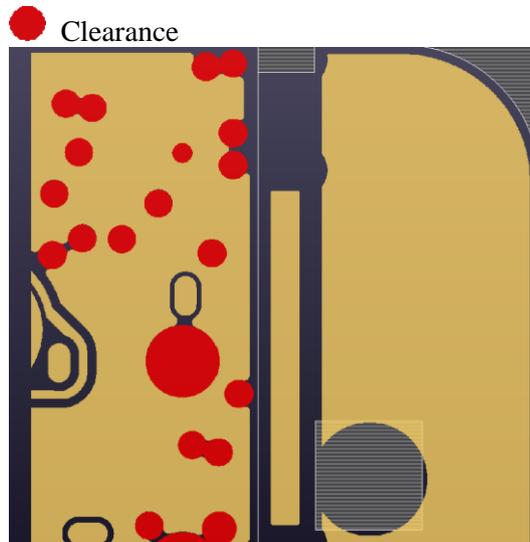
- **Power and Ground:** select the check box to show Power & Ground zones on the display.



- **SMT Pad:** select the check box to show the SMT pads on the display.



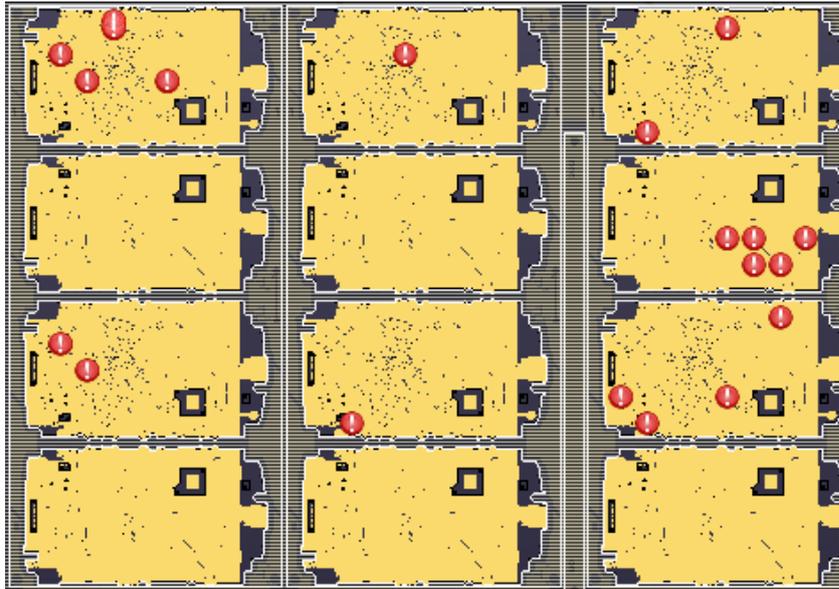
- **Clearance:** select the check box to show the clearance areas on the display.



Defects

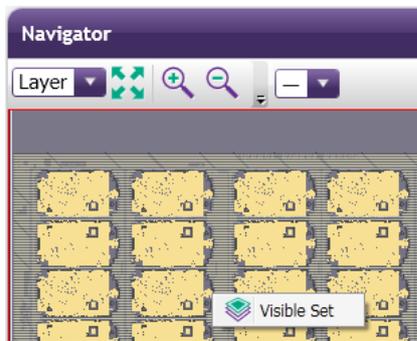


- **Defects Distribution:** when checked, the defects are displayed as red dots with white exclamation points inside. This option allows viewing the defects distribution over the panel.



14.1.2. Navigator display visible set

Right-click on the navigator display, and select **Visible Set**.



The Navigator Display Visible Set menu opens.



CAD Reference



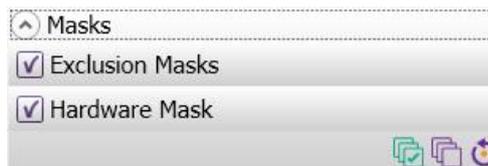
Refer to [CAD Reference](#) of the Main Display Visible Set (idle mode).

Extra Layers



Refer to [Extra Layers](#) of the Main Display Visible Set (idle mode).

Masks



Masks display options include:

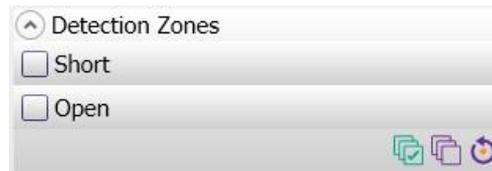
- **Exclusion Masks:** select the check box to show existing exclusion masks on the display, or clear the check box to hide the existing exclusion masks on the display. Refer to [Masks](#) of the Main Display Visible Set (idle mode).
- **Hardware Mask:** select the check box to show existing hardware masks on the display, or clear the check box to hide the existing hardware masks on the display. Refer to [Masks](#) of the Main Display Visible Set (idle mode).

Grids



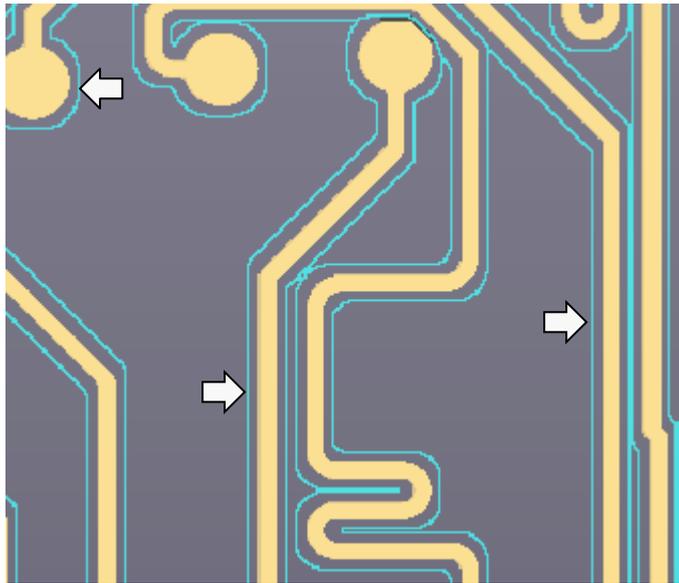
Refer to [Grids](#) of the Main Display Visible Set (idle mode).

Detection Zones

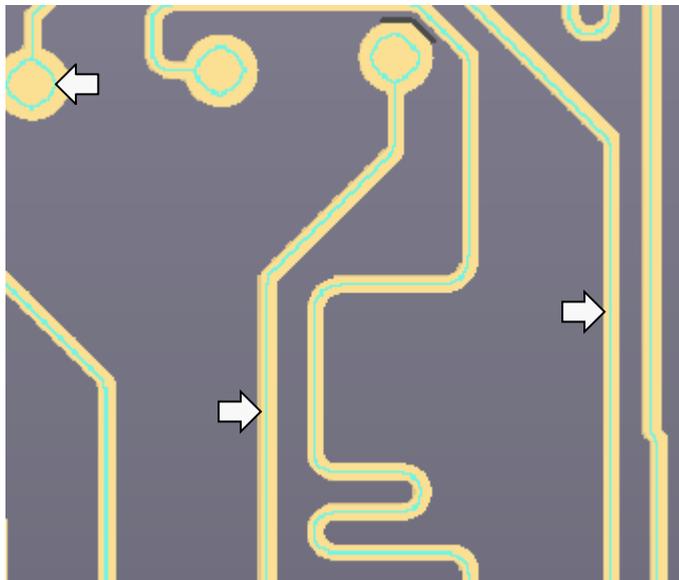


Detection Zones are visible in block. To view the reference images in blocks in idle mode, press CTRL and double click on the navigator display. Detection Zones display group includes the following display options:

- **Short:** cleared by default. Select the check box to show the sensors for detecting short defects on the display. Sensors for short are represented by the light blue lines.



- **Open:** cleared by default. Select the check box to show the sensors for detecting open defects on the display. Sensors for open are represented by the light blue lines.



Zones

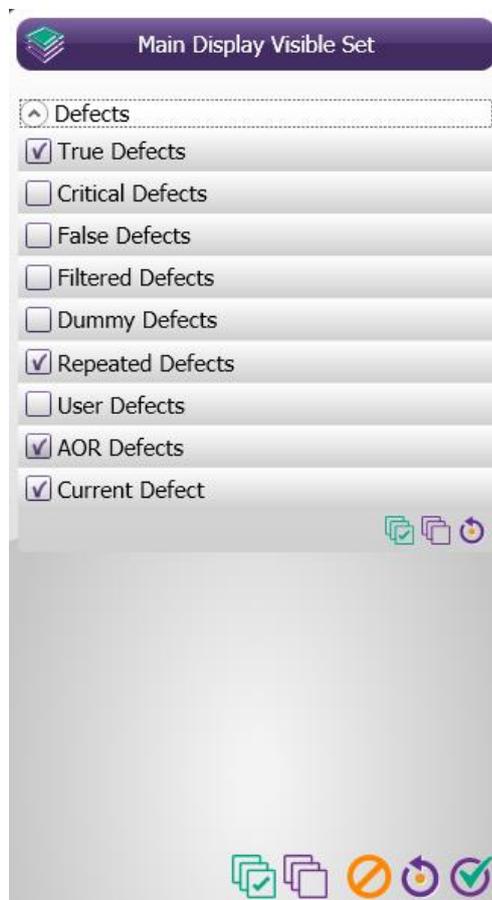


Refer to [Zones](#) of the Main Display Visible Set (idle mode).

14.2. Verification Mode

14.2.1. Main display visible set

In the verification mode, the following display options are available through the **Main Display Visible Set** menu:



Defects

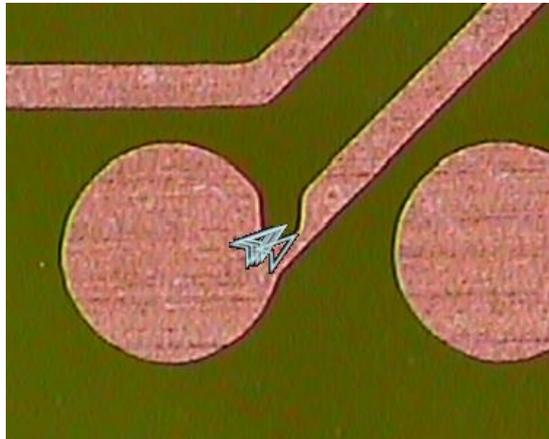


NOTE

The defects display options are NOT selected by default.

Defects display options include:

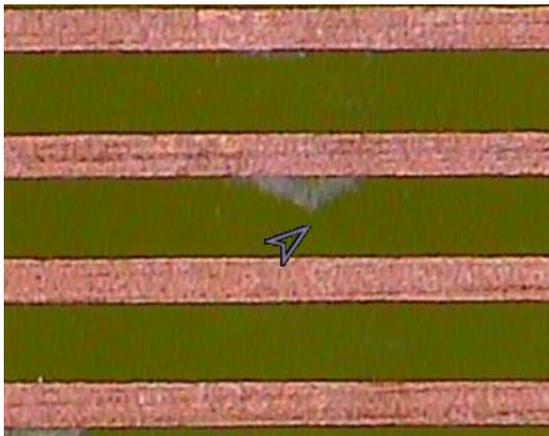
- **True Defects:** select the check box to show defects defined as true after all filtering stages are complete. True defects are indicated by light gray arrows.



- **Critical Defects:** select the check box to show the defects defined as critical defects by the rules (refer to [Detection Policy](#)). Critical defects are indicated by red arrows.



- **False Defects:** select the check box to show the defects filtered by the rules (refer to [Detection Policy](#)) as NOT true. False defects are indicated by gray arrows.

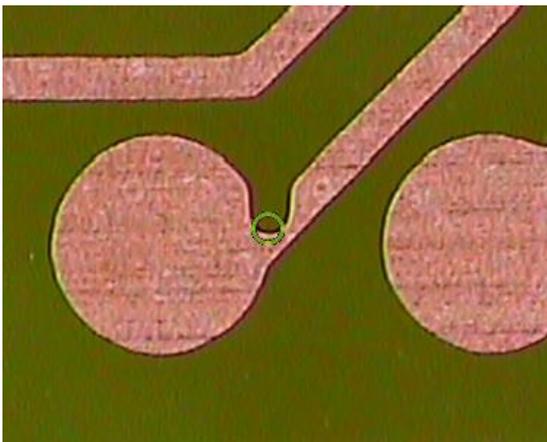


- **Filtered Defects:** select the check box to show the defects filtered by the initial filtering performed by the system (under exclusion mask). Filtered defects are indicated by gray arrows (the same as false defect).
- **Dummy Defects:** select the check box to show the defects classified by the system as dummy defects. Dummy defects are indicated by small gray arrows.

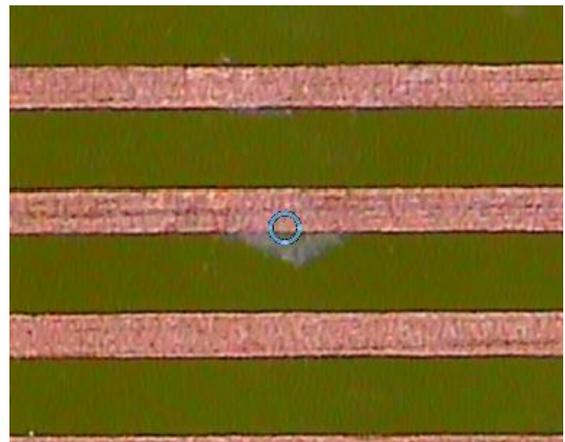


- **Repeated Defects:** select the check box to show the defects classified by the user as repeated defects. Repeated defects are indicated by light gray arrows (the same as true defect).
- **User Defects:** select the check box to show the defects classified by the user. User defects are indicated by:
 - Green circle for critical (true) defects
 - Blue circle for non-critical (false) defects.

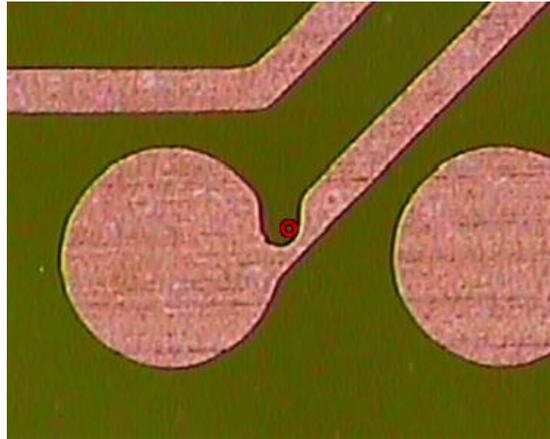
Critical (True) Defect



Non Critical (False) Defect



- **AOR Defects:** select the check box to show the defects classified by the user as AOR defects. AOR defects are indicated by red arrows (the same as critical defect).
- **Current Defect:** select the check box to show the defect currently verified. Current defect is indicated by red circle.



14.2.2. Navigator display visible set

In the verification mode, the following display options are available through the **Navigator Display Visible Set** menu.



CAD Reference



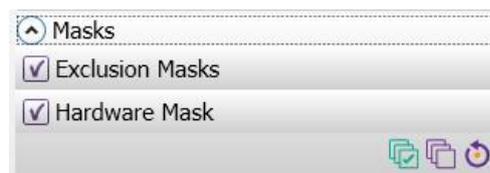
Refer to [CAD Reference](#) of the Main Display Visible Set (idle mode).

Extra Layers



Refer to [Extra Layers](#) of the Main Display Visible Set (idle mode).

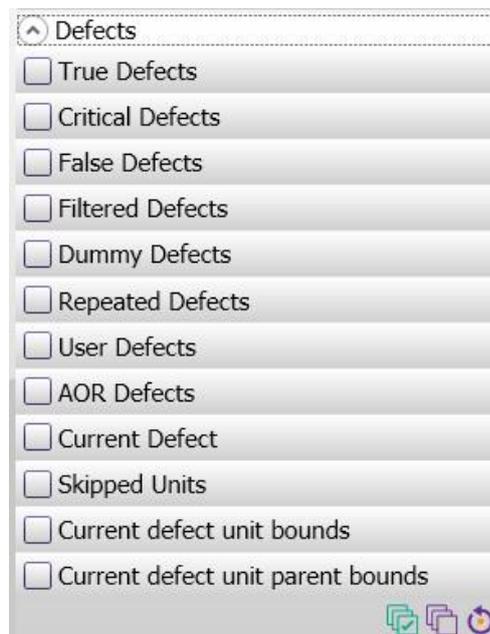
Masks



Masks display options include:

- **Exclusion Masks:** selected by default. Clear the check box to hide the existing exclusion masks on the display. Refer to [Masks](#) of the Main Display Visible Set (idle mode)
- **Hardware Mask:** selected by default. When selected, shows hardware masks created by the system based on the raster (bitmap) reference image. In verification mode, the reference images in blocks are displayed automatically. For the available hardware masks, refer to [Masks](#) of the Main Display Visible Set (idle mode).

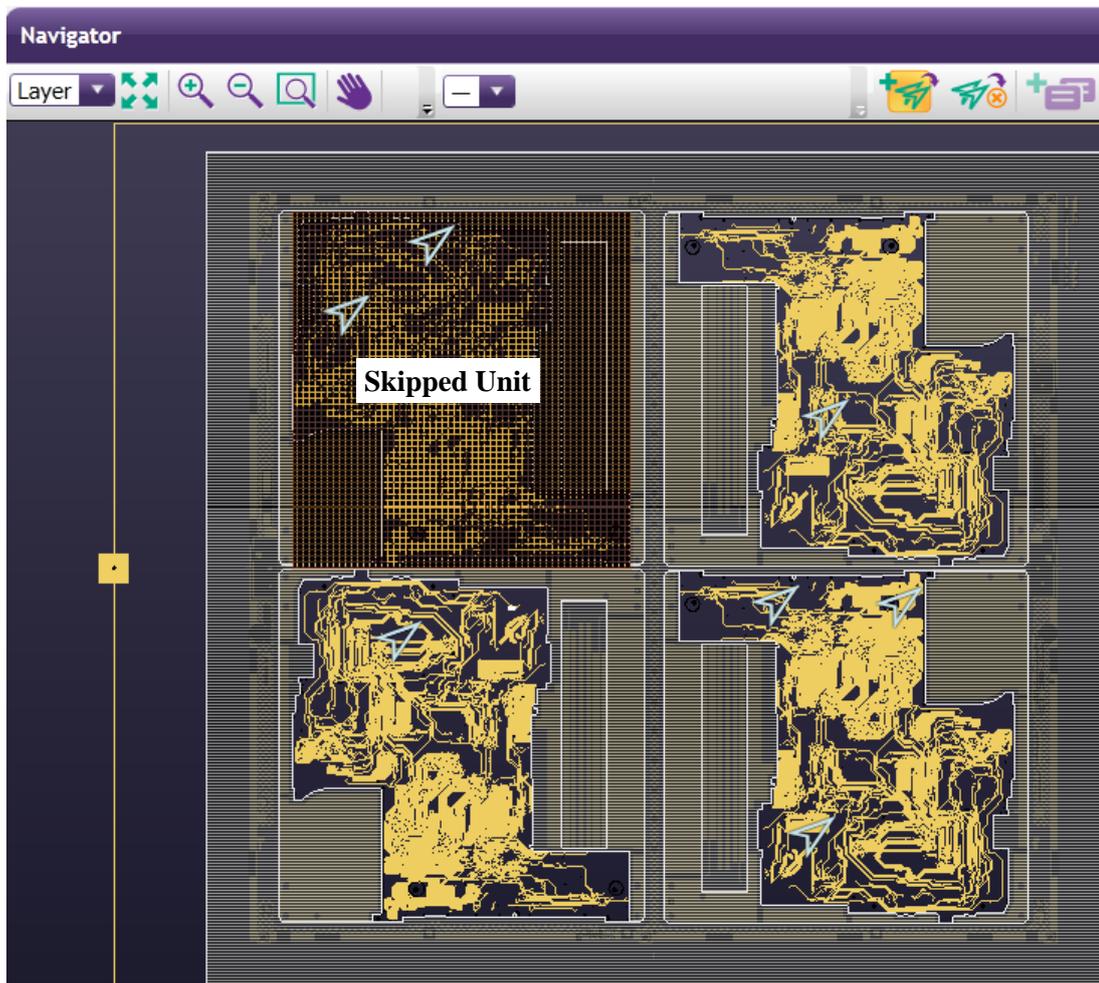
Defects



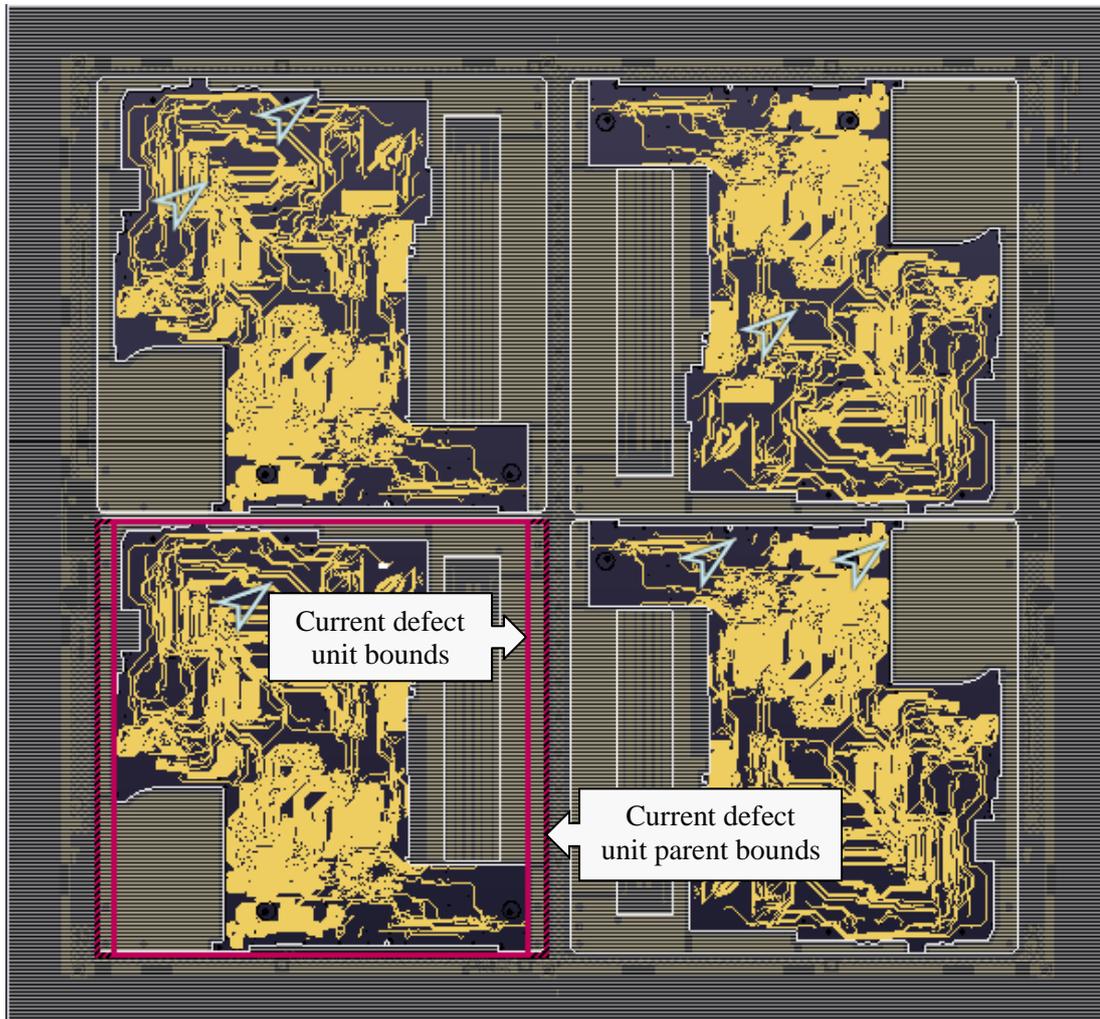
Defects display group includes the following display options:

- **True Defects:** select the check box to show defects defined as true after all filtering stages are complete. Refer to [Defects](#) of the Main Display Visible Set (verification mode).

- **Critical Defects:** select the check box to show the defects defined as critical defects by the rules. Refer to [Defects](#) of the Main Display Visible Set (verification mode).
- **False Defects:** select the check box to show the defects filtered by the rules as NOT true. Refer to [Defects](#) of the Main Display Visible Set (verification mode).
- **Filtered Defects:** select the check box to show the defects filtered by the initial filtering performed by the system (under exclusion mask). Refer to [Defects](#) of the Main Display Visible Set (verification mode).
- **Dummy Defects:** select the check box to show the defects classified by the system as dummy defects. Refer to [Defects](#) of the Main Display Visible Set (verification mode).
- **Repeated Defects:** select the check box to show the defects classified by the user as repeated defects. Refer to [Defects](#) of the Main Display Visible Set (verification mode).
- **User Defects:** select the check box to show the defects classified by the user. Refer to [Defects](#) of the Main Display Visible Set (verification mode).
- **AOR Defects:** select the check box to show the defects classified by the user as AOR defects. Refer to [Defects](#) of the Main Display Visible Set (verification mode).
- **Current Defect:** select the check box to show the defect currently verified. Refer to [Defects](#) of the Main Display Visible Set (verification mode).
- **Skipped Units:** select the check box to show the units which are skipped during verification.



- **Current defect unit bounds:** select the check box to show the bounds of the current defect unit.
- **Current defect unit parent bounds:** select the check box to show the bounds of the current defect unit's parent.



Grids



Refer to [Grids](#) of the Main Display Visible Set (idle mode).

Detection Zones



Refer to [Detection Zones](#) of the Navigator Display Visible Set (idle mode). In verification mode, the reference images in blocks are displayed automatically.

Inspection



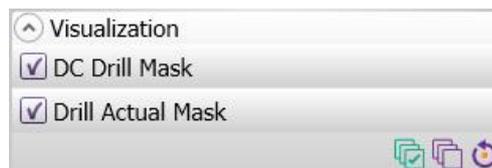
Refer to [Inspection](#) of the Main Display Visible Set (idle mode).

Zones



Refer to [Zones](#) of the Main Display Visible Set (idle mode). In verification mode, the reference images in blocks are displayed automatically.

Visualization

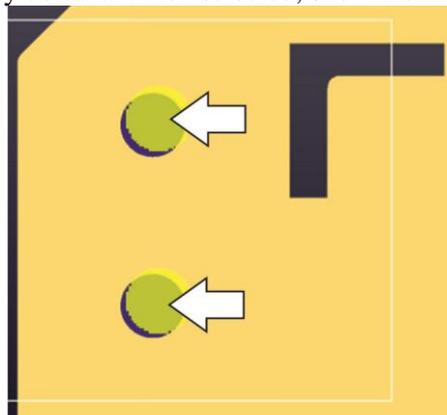


NOTE

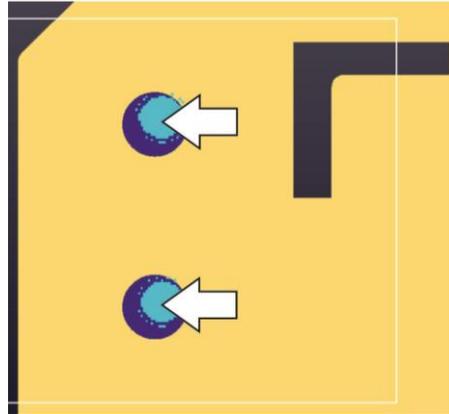
To actually see the selected mask, click the **Scan Again** button (refer to [Verification Panel](#)) after selecting the required mask.

Visualization display options include:

- **DC Drill Mask:** selected by default. When selected, show the DC (**Don't Care**) drill masks.



- **Drill Actual Mask:** selected by default. When selected, show the actual drill masks.



Video

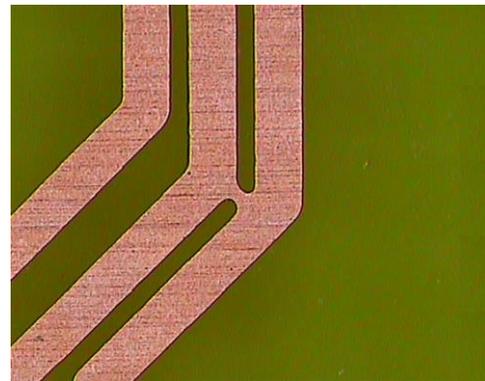


- **Video FOV Rectangle:** select the check box to display the video FOV rectangle. The video FOV rectangle indicates the area displayed on the video image.

Video FOV Rectangle

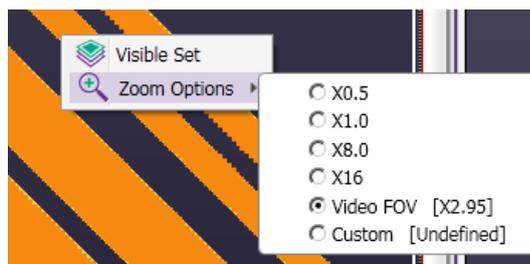


Video Image



14.2.3. Navigator display zoom options

In the verification mode, right-click on the navigator display and select **Zoom Options**, the following zoom options are available for the navigator display.



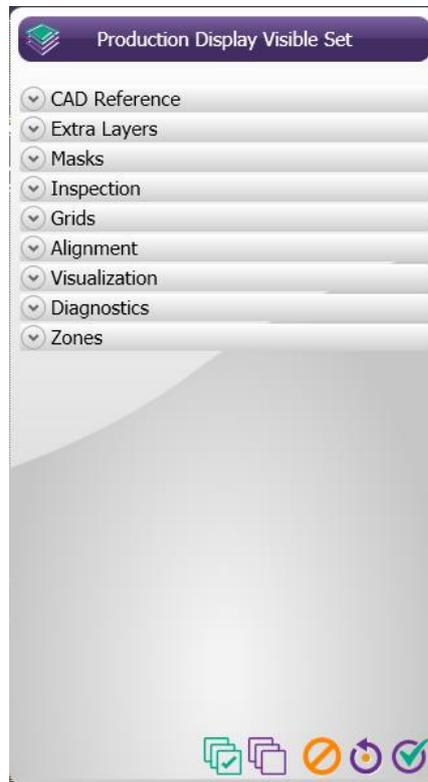
To define the custom zoom option, zoom the display as required, select **Custom** and click **Save Verification Custom Zoom** button on the Navigator toolbar.



14.3. Production Mode

14.3.1. Production display visible set

In the production mode, the following display options are available through the **Production Display Visible Set** menu:



CAD Reference



Refer to [CAD Reference](#) of the Main Display Visible Set (idle mode).

Extra Layers



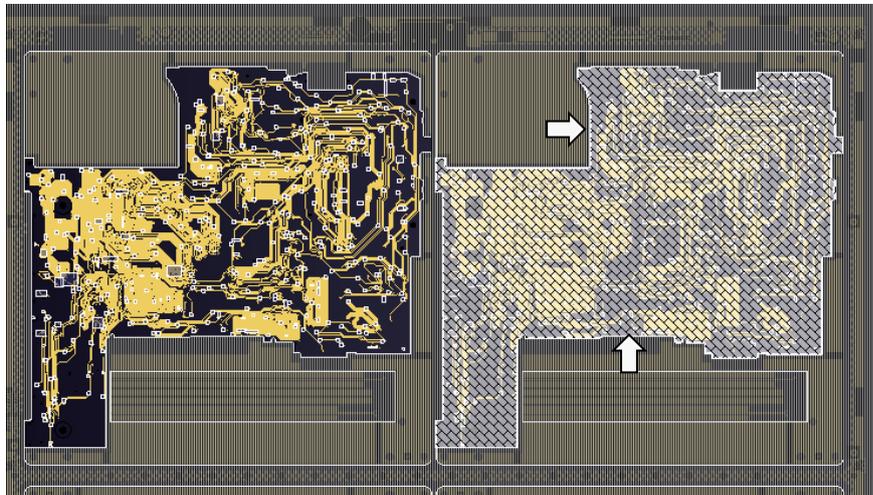
Refer to [Extra Layers](#) of the Main Display Visible Set (idle mode).

Masks

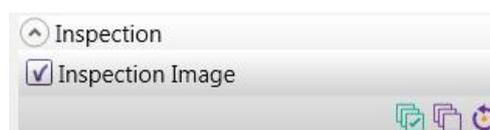


Masks display options include:

- **Exclusion Masks:** selected by default. Clear the check box to hide the existing exclusion masks on the display. Refer to [Masks](#) of the Main Display Visible Set (idle mode).
- **Hardware Mask:** selected by default. When selected, shows hardware masks created by the system based on the raster (bitmap) reference image. Refer to [Masks](#) of the Main Display Visible Set (idle mode).
- **User Scan Areas:** selected by default. Clear the check box to hide the existing user-defined scan areas on the display. Refer to [Masks](#) of the Main Display Visible Set (idle mode).
- **User Scrapped Steps:** selected by default. When selected, shows the units scrapped by the user before scanning.



Inspection



Refer to [Inspection](#) of the Main Display Visible Set (idle mode).

Grids



Refer to [Grids](#) of the Main Display Visible Set (idle mode).

Alignment



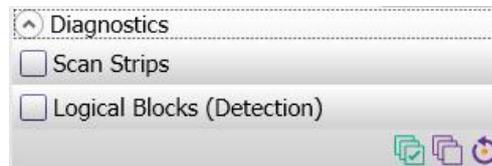
Refer to [Alignment](#) of the Main Display Visible Set (idle mode).

Visualization



Refer to [Visualization](#) of the Main Display Visible Set (idle mode).

Diagnostics



Refer to [Diagnostics](#) of the Main Display Visible Set (idle mode).

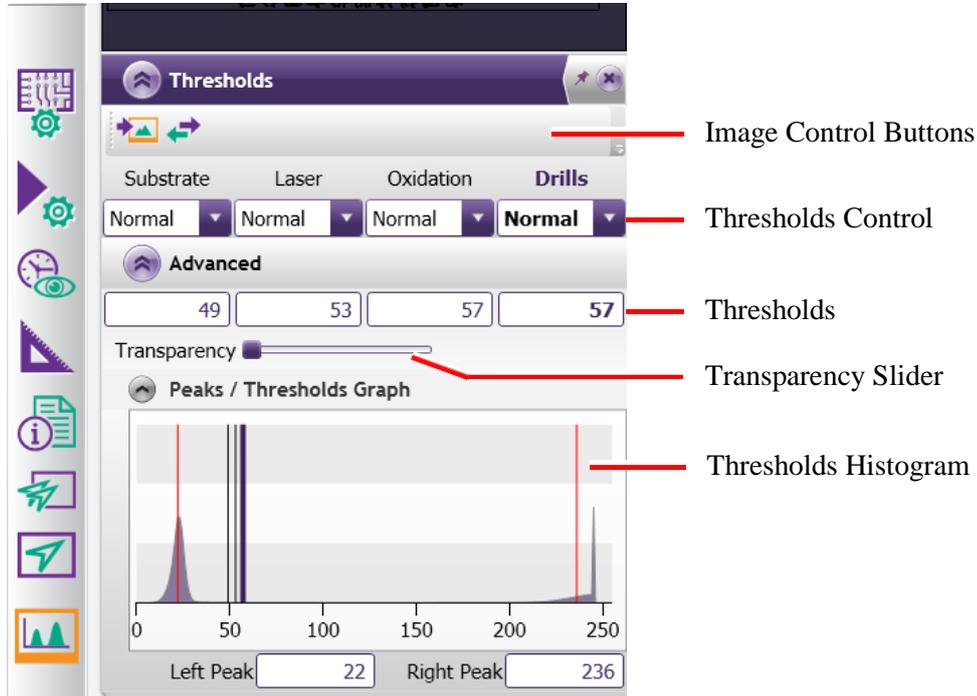
Zones



Refer to [Zones](#) of the Main Display Visible Set (idle mode).

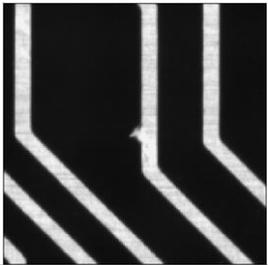
15. Thresholds

After the global alignment stage and application setup, system finds thresholds for optimal defects detection on the panel. To adjust the thresholds, on the Job Flow toolbar, click the **Thresholds** button to open the tab.



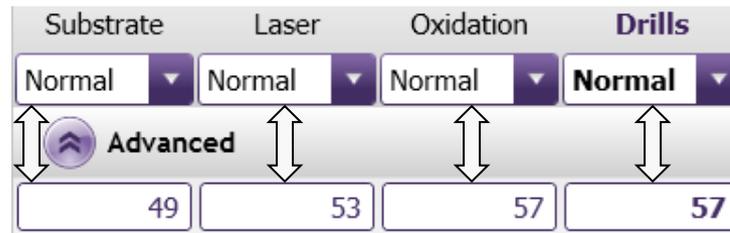
15.1. Image Control Buttons

The following image control buttons are available:

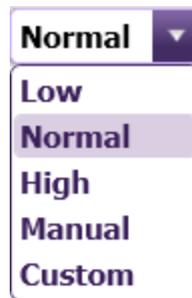
Button	Function	Illustration
	<p>Get Image: click for system to scan the currently viewed defect area and display the gray level image with the system thresholds applied.</p> <hr/> <p>Note: In idle mode, the image is displayed on the main display; whereas in verification mode the image is displayed on the navigator display (the inspection image display option should be checked).</p>	
	<p>Gray Level: click to view the actual gray level image without system thresholds applied.</p>	

15.2. Thresholds Control

If optimal thresholds found by the system are insufficient (due to panel reflectiveness, oxidized panel, or other reasons), fine tune the thresholds manually using thresholds control fields.



1. To view the system thresholds applied on the image, click on the required threshold to select it.
The selected threshold name becomes bold.
The displayed image changes according to the selected threshold.
2. To adjust the thresholds, perform one of the following actions:
 - a. Change the thresholds control parameters from the list.



- b. Change the thresholds value manually by clicking the up and down arrows next to the values.



Substrate

- For more sensitivity to white defects, decrease the value.
- For less sensitivity to white defects, increase the value.

Laser

- For more sensitivity to white defects inside the laser drill area, decrease the value.
- For more sensitivity to black defects inside the laser drill area, increase the value.

Oxidation

- For more sensitivity to black defects, increase the value.
- For less sensitivity to black defects, decrease the value.

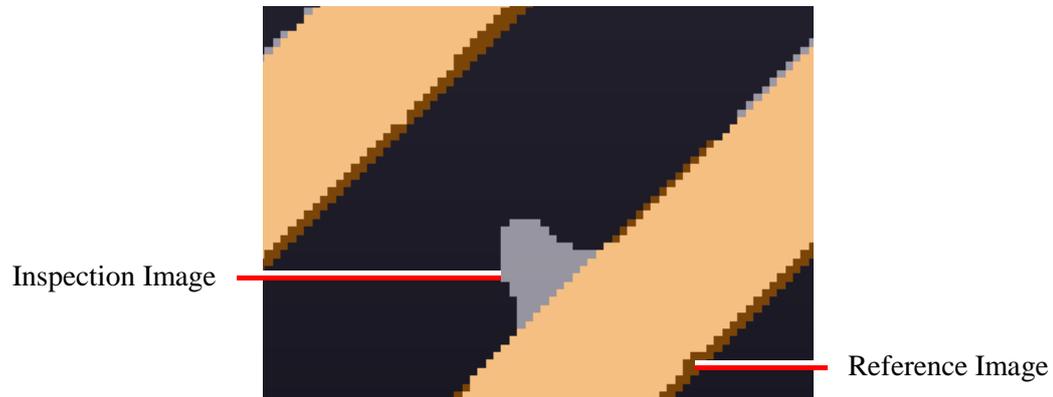
Drills

- For more sensitivity to white defects inside the mechanical drill area, decrease the value.
- For more sensitivity to black defects inside the mechanical drill area, increase the value.

15.3. Transparency

To determine the transparency of the inspection image, use the transparency slider.

- Move the slider to the right to increase the transparency, and to see the reference image behind the inspection image.



- Move the slider to the left to decrease the transparency.

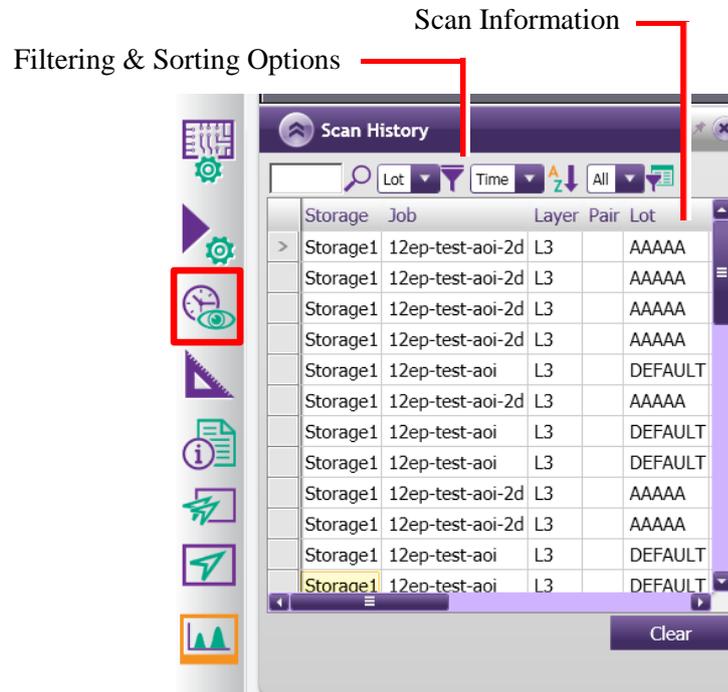


NOTE

The transparency slider becomes available only after clicking the **Get Image** button.

16. Scan History

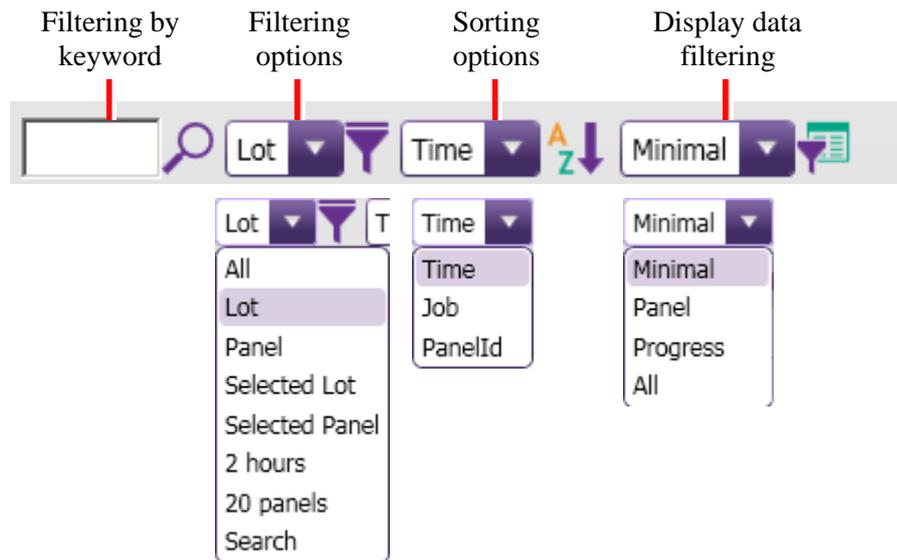
To view the scan information on all panels scanned on the system, on the Job Flow toolbar, click the **Scan History** button.



The full scan information includes:

- **Storage:** storage location of the job.
- **Job:** job name.
- **Layer:** layer name.
- **Pair:** the second layer name of the pair if layer pair mode is enabled.
- **Lot:** lot name.
- **Panel:** panel ID.
- **Tag:** shows the scan status:
 - **OK:** scan was completed successfully.
 - **Cancel:** scan process was canceled.
 - **Scan Again:** certain area of the panel was scanned again.
 - **Error:** scan was completed with an error.
- **Moves:** a number of moves for verification.
- **Defects:** total number of defects detected on the panel.
- **Stretch X:** panel stretch in X direction if panel dimension is measured.
- **Stretch Y:** panel stretch in Y direction if panel dimension is measured.
- **Started:** start time of a scan.
- **Duration:** scan duration in seconds.

The following filtering and sorting options are available:



16.1. Filtering options

The following filtering options are available:

- **All:** select to show all history data.
- **Lot:** select to filter the data according to lot number.
- **Panel:** select to filter the data according to panel ID number.
- **Selected Lot:** select to display data only for the selected lot.
- **Selected Panel:** select to display data only for the selected panel.
- **2 Hours:** select to show the data on panels scanned in the last two hours.
- **20 Panels:** select to show the data on last 20 panels that were scanned.
- **Search:** Select to enable data filtering according to the keyword.

16.2. Sorting options

The available sorting options are:

- **Time:** select to sort the displayed data according to time from the latest scan to the earliest scan.
- **Job:** select to sort the displayed data according to the job name.
- **Panel Id:** select to sort the displayed data according to the panel ID.

16.3. Display data filtering

The available display data filtering options are:

- **Minimal:** select to display the following data:
 - Panel
 - Layer
 - Moves
 - Tag

- Stretch X
- Stretch Y
- Pair
- **Panel:** select to display the following data:
 - Job
 - Layer
 - Defects
 - Started
 - Pair
 - Panel
- **Progress:** select to display the following data:
 - Panel
 - Moves
 - Defects
 - Duration
 - Started
- **All:** select to display all data.

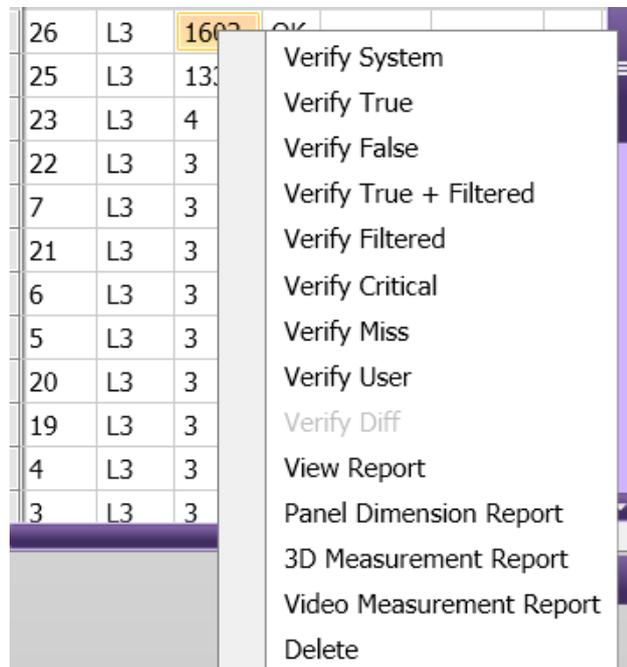
16.4. Verification Options

1. Right-click on the required job from the scan history to open the verification options menu.



NOTE

The options are enabled only in idle mode.



Verify System	Click to verify defects of the selected panel.
Verify True	Click to verify only the defects classified as True by the system.
Verify False	Click to verify only the defects classified as False by the system.
Verify True + Filtered	Click to verify True defects, including defects filtered by the system.
Verify Filtered	Click to verify defects filtered by the system.
Verify Critical	Click to verify defects classified as Critical by the system.
Verify Miss	Click to verify all defects that are not user-classified.
Verify User	Click to verify all user-classified and repeated defects.
Verify Diff	Option active only for multiple jobs selection. Click to view only the uncommon defects for the selected jobs.
View Report	Click to generate a report of scan results statistics. The report is opened in a new window, and can be exported to different formats.
Panel Dimension Report	Click to generate a report of panel dimension measurement. The report is opened in a new window, and can be exported to different formats.
3D Measurement Report	Click to generate a report of 3D measurement. The report is opened in a new window, and can be exported to different formats.
Video Measurement Report	Click to generate a report of critical dimension measurement. The report is opened in a new window, and can be exported to different formats.
Delete	Click to delete the selected job from Scan History.

17. Measurement

Measurement table shows the results of:

- 3D profile measurement
- 2D panel dimension measurement
- 2D critical dimension measurement

To view the table, click the **Measurement** button on the **Job Flow** toolbar.



The **3D** tab is opened by default. It shows the results of 3D profile measurement.

Measurement		
3D	Panel	Video
Label Height		
	0.6736712	

Click the **Panel** tab to view the results of 2D panel dimension measurement.

Measurement				
3D	Panel	Video		
1st point	2nd point	Reference	Inspection	Difference
1	2	19200.01	19209.8	9.792969
2	3	28676.3	28689.84	13.53516
3	4	19199.98	19209.48	9.498047

Click the **Video** tab to view the results of 2D critical dimension measurement.

Measurement			
3D	Panel	Video	
Label	Reference	Inspection	Difference
	5.13527965545654	4.16455507278442	-0.970724582
	5.13527965545654	0.300902366638184	-4.834377288
	5.13527965545654	4.45450305938721	-0.680776596
	5.04189729690552	4.36560583114624	-0.676291465

18. Defects Information

Defects Information table shows true defects list and allows user to select specific defect type to verify.

To view the table, click the **Defects Information** button on the Job Flow toolbar.

Diagram illustrating the Defects Information dialog box. The dialog displays a table of defect types with columns for Name, True, False, Main, and Navigator. A red arrow points to the 'Show/Hide false defects column' button on the left, and another red arrow points to the 'Display data filtering' button on the right.

Name	True	False	Main	Navigator
Nick	861	6400	0	0
Protrusion	2990	16413	0	0
PinholeOnLargeCopper	0	69	0	0
Island	2591	903	1	1
Pinhole	95	56	0	0
Open	31	10	0	0
LineMinimal	209	1	0	0
SpaceMinimal	134	4	0	0
SpaceIncrease	0	6	0	0
Short	133	0	0	0
SpaceReduction	33	37	0	0

The full defects information includes:

- **Name:** defect types found on the current verified panel.
- **True:** true defects number of each defect type.
- **False:** false defects number of each defect type.
- **Main:** true defects number of current main display view.
- **Navigator:** true defects number of current navigator display view.

18.1. Using defects information table

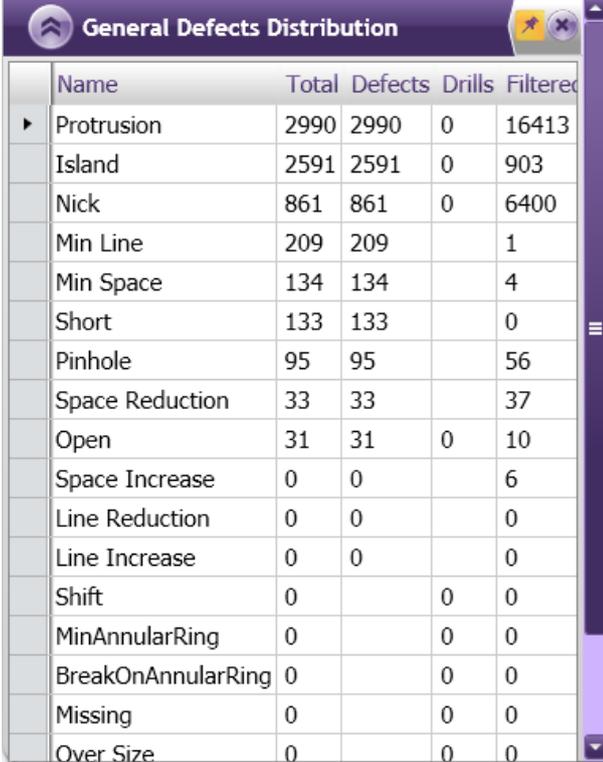
The available display data filtering options are:

- **All:** select to display all data.
*The false column is hided if **Show/Hide False Defects Column** button is enabled*
- **Minimal:** select to display Name and True columns only.

To filter out certain defect type for verification, clear the check box next to the defect name.

19. General Defects Distribution

General Defects Distribution table provides all defects information of the last performed scan. The table is automatically displayed during the verification stage.



Name	Total Defects	Drills	Filtered
Protrusion	2990	2990	0
Island	2591	2591	0
Nick	861	861	0
Min Line	209	209	1
Min Space	134	134	4
Short	133	133	0
Pinhole	95	95	56
Space Reduction	33	33	37
Open	31	31	0
Space Increase	0	0	6
Line Reduction	0	0	0
Line Increase	0	0	0
Shift	0	0	0
MinAnnularRing	0	0	0
BreakOnAnnularRing	0	0	0
Missing	0	0	0
Over Size	0	0	0

19.1. Using defects distribution table

General Defects Distribution table helps to improve the functioning of the system. If there are too many defects of a certain type, reduce the sensitivity of the defect.

To reduce the sensitivity of the defects, perform changes in the Detection Policy recipe (refer to [Detection Policy](#)).

19.2. General defects distribution in idle mode

To view the General Distribution table in the non-verification mode, click the **General Defects Distribution** button on the Job Flow toolbar.



20. Defects Zone Distribution

Defects Zone Distribution table provides true defects statistics per zone.

To view the table, click the **Defects Zone Distribution** button on the Job Flow toolbar.



Defects Zone Distribution									
	Name	Total	Drills	LinesZoneDefects	Space	Laminate	SMT	Pads	PG
▶	Min	343		209	134			0	
	Reduction	33	0	0	33		0	0	
	Increase	0	0	0	0		0	0	
	Island	2591	0		1498	1093			
	Nick	861	0	861			0	0	0
	Protrusion	2990	0		2990	0	0	0	
	Pinhole	95	0	95			0	0	0
	Open	31	0	31			0	0	
	Short	133			133	0			
	Shift	0	0						
	Annular Ring	0	0						
	Missing	0	0	0	0	0	0	0	0
	Laser Drill	0							

Highlight Cell Threshold

20.1. Using defects zone distribution table

Defects Zone Distribution table helps to improve the functioning of the system.

Operator can define the required defects threshold to be highlighted per zone. This can help to identify problems in production line.

If there are too many true defects of a certain type, it can mean one of the following:

- Setup is too sensitive. Reduce the sensitivity of the highlighted defects count (refer to [Detection Policy](#)).
- Problems in production line.

21. Advanced Settings

21.1. Working with Exclusion Masks

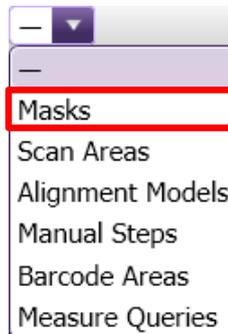
Use exclusion masks to select areas for which no defects will be reported. This section details how to work with exclusion masks. The following actions are explained:

- [Drawing exclusion mask](#)
- [Duplicating exclusion mask](#)
- [Changing size of an exclusion mask](#)
- [Deleting single exclusion mask](#)
- [Deleting all existing exclusion masks](#)
- [Deleting all masks on PCBs of the same step](#)

21.1.1. Drawing exclusion mask

To draw an exclusion mask:

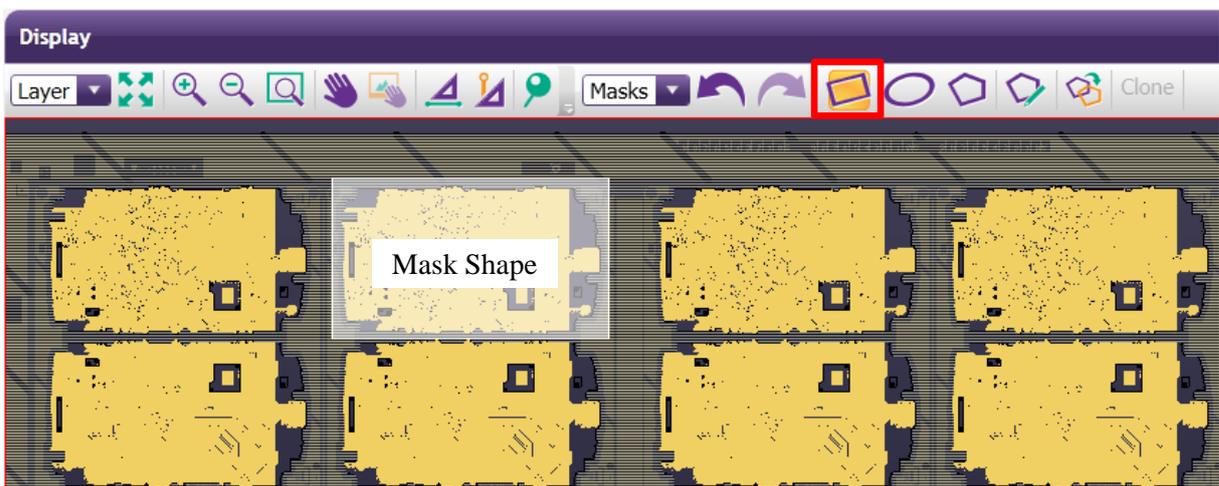
1. On the **Display** toolbar, select **Masks**.



2. On the **Display** toolbar, click the required mask shape.



3. With the mouse pointer draw the shape on the required area.

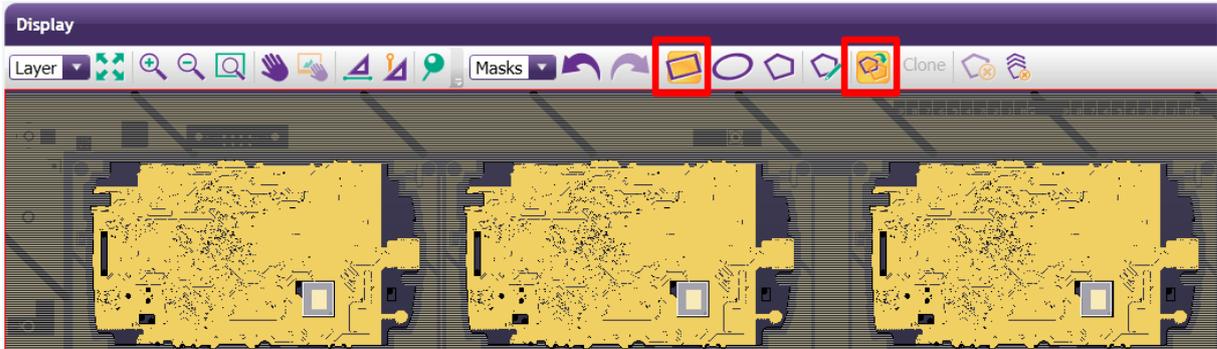


21.1.2. Duplicating exclusion mask

To duplicate the exclusion mask to all PCBs of the same step:

1. On the **Display** toolbar, select **Masks**.
2. Click the **Duplicate Mask** button.
3. Select the required shape of the mask.
4. With the mouse pointer, draw the mask on the required area of a PCB.

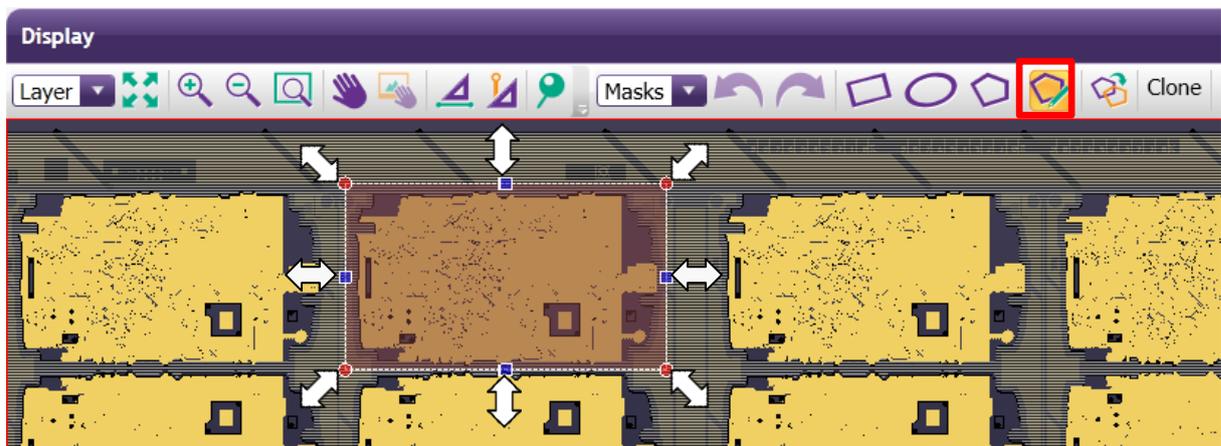
Mask is automatically duplicated to all PCBs of the same step.



21.1.3. Changing size of an exclusion mask

To change the size of an exclusion mask:

1. Draw the required exclusion mask. Refer to [Drawing exclusion mask](#).
2. Click the **Edit Mask(s)** button to enable it.
3. Click the required mask to select it, and with the mouse pointer change the size of the mask as needed.



NOTE

If the **Duplicate Mask** button is enabled, the size of all masks on the PCBs of the same step will change.

21.1.4. Deleting exclusion mask

Deleting single exclusion mask

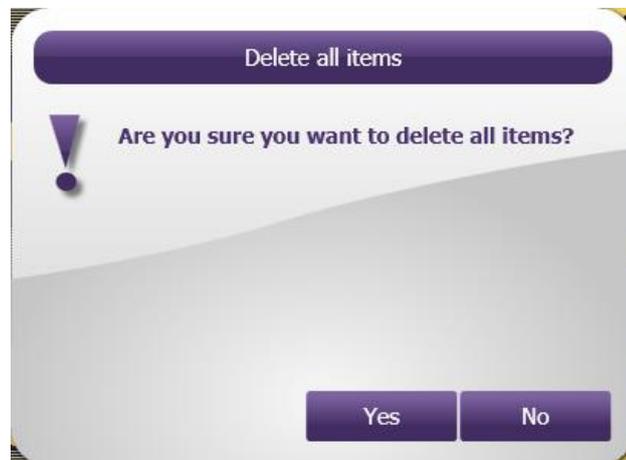
To delete an exclusion mask:

1. On the **Display** toolbar, select **Masks**.
2. Click **Edit Mask(s)** to enable the button.
3. Click on the required mask to select it.
Delete Selected Mask button becomes enabled.
4. Click the **Delete Selected Mask** button.
The selected mask is deleted.

Deleting all existing exclusion masks

To delete all existing exclusion masks:

1. On the **Display** toolbar, select **Masks**.
2. Click the **Delete All Masks** button.
The Delete all items dialog box appears.



3. Click **Yes** to confirm the action.
All exclusion masks on the panel are deleted.

Deleting all masks on PCBs of the same step

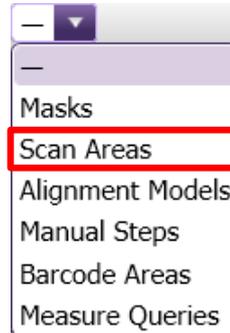
To delete all masks on the PCBs of the same step:

1. On the **Display** toolbar, select **Masks**.
2. Click **Edit Mask(s)** to enable the button.
3. Click on one of the masks of the required step to select it.
Delete Selected Mask button becomes enabled.
4. Make sure the **Duplicate Mask** button is selected.
5. Click the **Delete Selected Mask** button.
All masks on PCBs of the same step are deleted.

21.2. Manual Scan Areas

User can manually define the scan areas and their shape. Only the defined areas will be scanned for defects. To manually define the scan areas, perform the following:

1. On the **Display** toolbar, select **Scan Areas**.

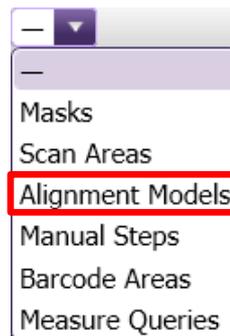


2. The available scan area shapes are enabled on the **Display** toolbar.
3. Working with scan areas is the same with exclusion masks. For more information, refer to [Working with Exclusion Masks](#).

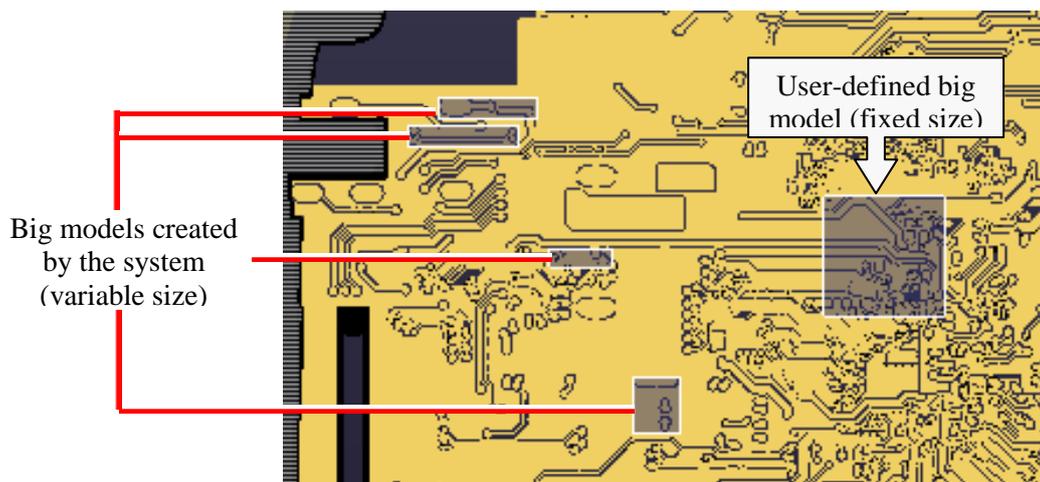
21.3. Changing Alignment Models

User can manually define the big models which are for global alignment. To change the alignment models, perform the following:

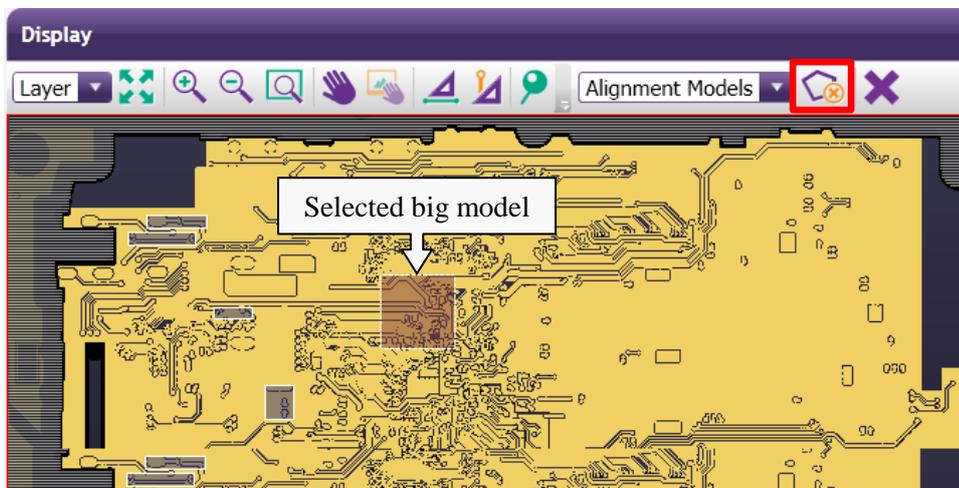
1. On the **Display** toolbar, select **Alignment Models**.



2. Zoom in the area you'd like to change/add big models manually.
3. Double click on the display window to add a new additional big model.



4. To delete an existing big model:
 - a. Click on the big model to select it.
Delete Selected Mask button becomes enabled.
 - b. Click the **Delete Selected Mask** button.
The selected big model is deleted.

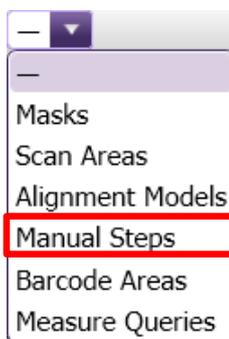


5. To move an existing big model, select it and drag it to another location on the display.
6. To cancel all modifications and bring back the original big models, click the **Reject Changes** button.

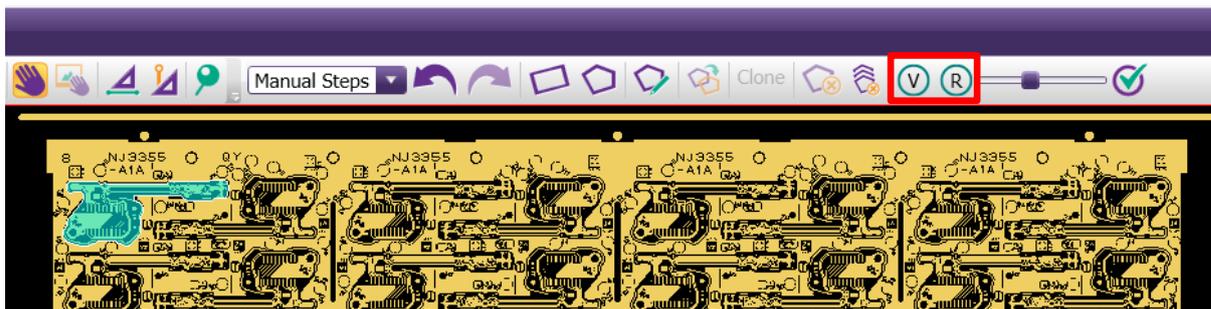
21.4. Defining Manual Steps

If the CAD data doesn't include the steps information, user can manually define the steps and their shape. To manually define the steps, perform the following:

1. On the **Display** toolbar, select **Manual Steps**.



2. Click the required mask shape and with the mouse pointer draw the shape on the required area.



- Click **Preview Changes Vector** button to search according to vector image or click **Preview Changes Raster** button to search according to raster image.

**TIP**

Compares with using vector image, using raster image is much slower, but more accurate. The default searching sensitivity is set to 80%. Using **Sensitivity** slider to adjust the accuracy for the searching if required.

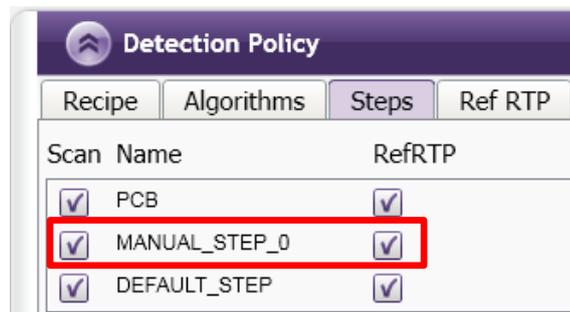


- Click **Accept Changes** button to accept the searching result or click the **Preview Changes** button again to cancel the preview.

**NOTE**

The action of **Accept Changes** cannot be revoked.

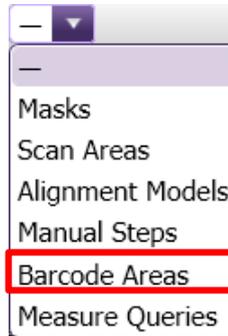
- After clicking the **Accept Changes** button, the manual step is created for the job.



21.5. Defining Barcode Areas

User can define one or more barcode areas for the system to scan and read the panel information automatically (this function is license limited). To manually define the barcode areas, perform the following:

1. On the **Display** toolbar, select **Barcode Areas**.



2. The available barcode area shapes are enabled on the **Display** toolbar.
3. Working with barcode areas is the same with exclusion masks. For more information, refer to [Working with Exclusion Masks](#).

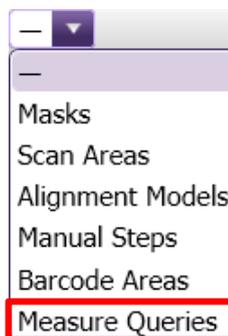
21.6. Defining Measure Queries

If the system supports 2D and 3D measurement, use measure queries to define the locations where you would like to perform the measurement. This section details how to define different type measure queries.

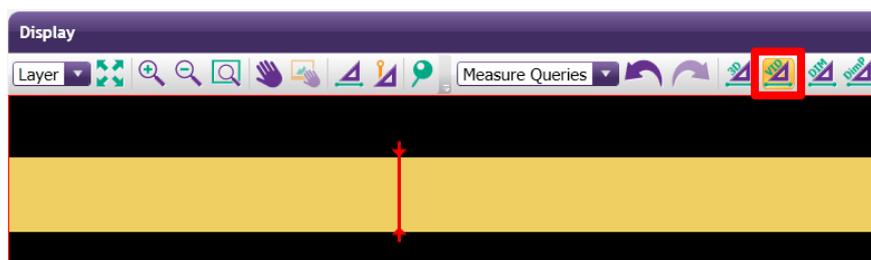
21.6.1. 2D critical dimension

To define objects for 2D critical dimension measurement:

1. On the **Display** toolbar, select **Measure Queries**.



2. On the **Display** toolbar, click **Add Width Measure Using Video** button to enable it.



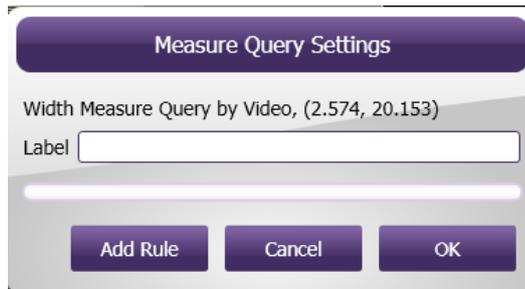
3. On the display window, double click on the element that needs to be measured.
A red line with double-headed arrow indicates the location for measurement.

4. To edit the label of the measure query:
 - a. Click the **Edit Mask(s)** button to enable it.
 - b. Select a required measure query and right click.



- c. Select **Settings....**

The Measure Query Settings window opens.



- d. Set the required label in the text field and click **OK**.

21.6.2. 2D panel dimension

To define objects for 2D panel dimension measurement:

1. On the **Display** toolbar, select **Measure Queries**.
2. On the **Display** toolbar, click **Add Panel Dimension Measure** button to enable it.



3. On the display window, define four round elements at the four corners of the panel for measuring.



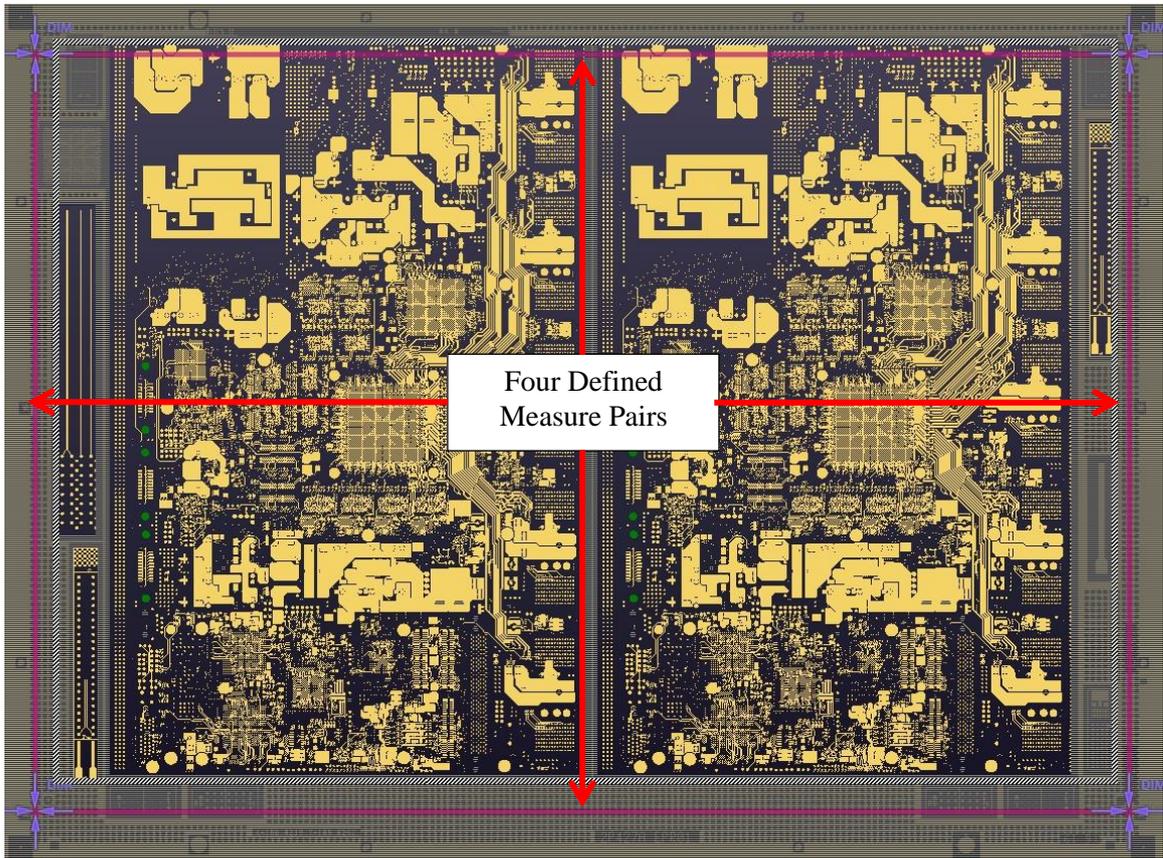
The size of the round elements for measuring should be 70% of the video FOV. If your selection is too big, the video cannot calculate the coordinates of the round elements on the panel.

4. On the **Display** toolbar, click **Add Panel Dimension Measure Pair** button to enable it.



5. Click a defined Panel Dimension Measure Query and drag the line toward a second Panel Dimension Measure Query, then click again to lock on the second Panel Dimension Measure Query.

A measure pair is defined between the two Panel Dimension Measure Queries.

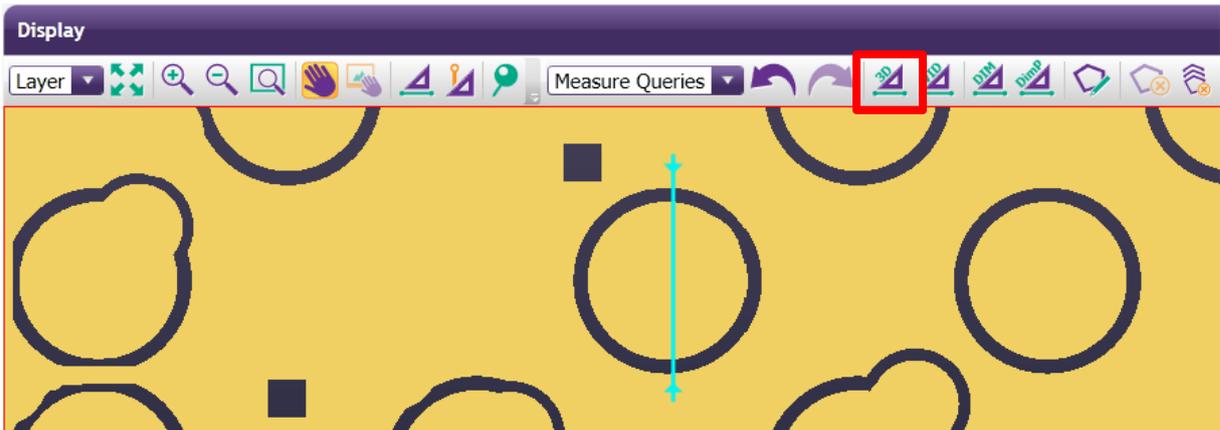


6. To edit the label of the measure query, refer to [2D critical dimension](#).

21.6.3. 3D profile

To define objects for 3D profile measurement:

1. On the **Display** toolbar, select **Measure Queries**.
2. On the **Display** toolbar, click **Add Profile 3D Measure** button to enable it.



3. On the display window, double click on the element that needs to be measured.
A light blue line with double-headed arrow indicates the location for measurement.
4. To edit the label of the measure query, refer to [2D critical dimension](#).

21.7. Configuration Menu

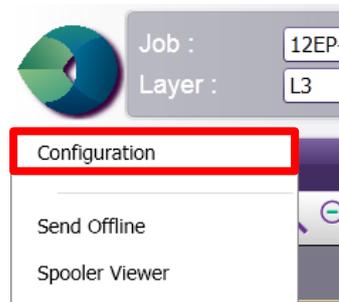
Configuration menu defines the job default settings. It is determined once when installing the system. The default settings are configured according to customer requirements and normally should not be changed.



ATTENTION

Do NOT change the settings intended only for Camtek engineers' use. Changing these settings may result in improper system functioning.

1. Click the menu button to open the Spark menu.
2. Select **Configuration**.



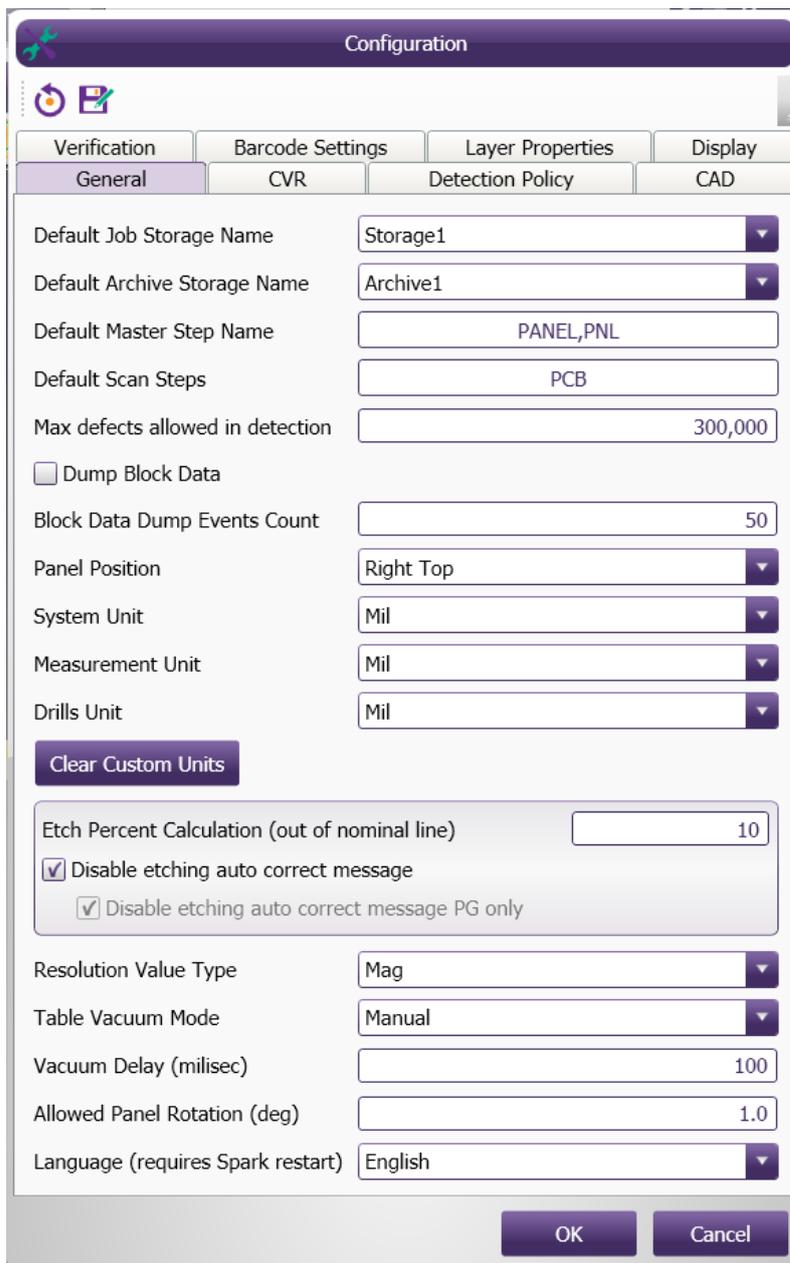
The Configuration window appears. The General tab is open by default.

21.7.1. Configuration window action buttons

	Click to select and load previously saved settings.
	Click to save all modified settings to a selected directory with the specified name.
	Click to apply the modified settings, and close the Configuration window.
	Click to cancel the performed changes, and close the Configuration window.

21.7.2. General tab settings

- To configure the general settings, select the **General** tab.



Setting	Description
Default Job Storage Name	Available only for Administrators. Defines the default storage for all new created jobs (refer to Creating new job). To change the default storage, select one of the available storages from the list.
Default Archive Storage Name	Available only for Administrators. Defines the default archive storage name for archiving jobs.
Default Master Step Name	Defines the default master step when creating a new job (refer to Creating new job). To change the default master step, in the text field, enter the required master step name.

Default Scan Steps	<p>Defines the default scan steps for Scanning (refer to Creating new job). To change the default scan step, in the text field, enter the required scan step.</p> <p>For multiple selection of default scan steps, use one of the following wildcards:</p> <ul style="list-style-type: none"> • After the step name, use the asterisk (*), meaning all steps containing the entered name, will be selected (for example typing <i>TC*</i> will select steps <i>TC1</i>, <i>TC2</i> and all other steps containing the name <i>TC</i>). • When typing the step name, use a question mark (?). Each question mark represents one character. <p>Use comma to separate multiple scan steps names.</p>
Max defects allowed in detection	Available only for Administrators. Defines the maximum defects allowed during scanning. If exceeds the defined value, the system will stop scanning and popup an error message.
Dump Block Data	Available only for Administrators. Cleared by default. When selected, the system will define dump block according to the value defined in Block Data Dump Events Count .
Block Data Dump Events Count	Available only for Administrators. Define the dump events count for defining a dump block.
Panel Position	Select one of the four panel positions to define the default alignment corner.
System Unit	Defines the default system units. To change the system units, select the required units from the list.
Measurement Unit	The default selection is Mil . Select one of the available options to change the measurement unit.
Drills Unit	The default selection is Mil . Select one of the available options to change the drill diameter unit.
Clear Custom Units	Click this button to clear all custom units in the GUIs.
Etch Percent Calculation (out of nominal line)	Defines the default etching percentage. The default Allowed Etching Value (Storage Management) is calculated according to the defined etch percentage.
Disable etching auto correct message	Select to disable Etching Difference message for all layer types. When cleared, the message appears when there is a difference (bigger than 1.5 pixels) between the measured etching and the user setup etching.
Disable etching auto correct message PG only	Select to disable Etching Difference message only for pure P&G layers.
Resolution Value Type	The default selection is Mag . Select one of the available options to change the resolution display unit.
Table Vacuum Mode	<p>The default selection is Automatic.</p> <p>Select Automatic mode for system to automatically turn the vacuum on/off.</p> <p>Select Manual for user to manually turn the vacuum on/off (use Vacuum button on the keypad or space bar on the keyboard).</p>
Vacuum Delay (milisec)	Available only for Administrators. Defines the time interval after the vacuum is enabled and before the table starts moving for scan.

Allowed Panel Rotation (deg)	Available only for Administrators. Defines the allowed degree for panel rotation. The value affects the block overlaps and the number of scan strips.
Language	The default selection is English . Select one of the available options to change the default language. To make the change to take effect, the Spark application should be restarted.

2. Click **OK** to apply the settings and close the **Configuration** menu.

21.7.3. CVR tab settings

1. To configure the verification settings for CVR, select the **CVR** tab.

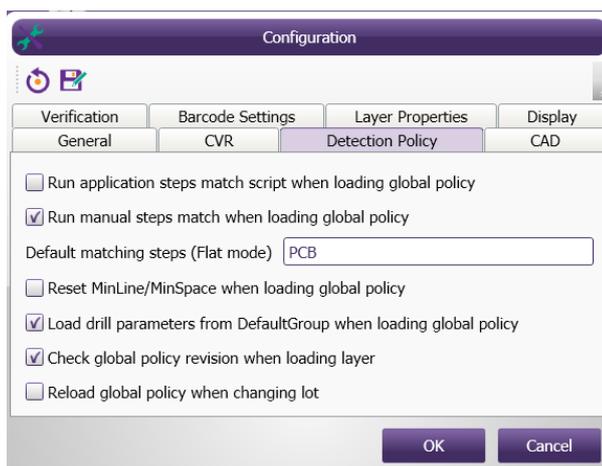


Setting	Description
Generate Legacy CVR Reference Data	Select the check box to enable the reference data generation for CVR (Camtek Verification Station).
Compress Legacy CVR Reference Files	Select the check box to compress the CVR reference files to zip format.
Legacy CVR Export Path	Defines the storage directory for CVR reference files and Ver (verification) files. To set the directory, in the text box, type the required path.

2. Click **OK** to apply the settings and to close the **Configuration** menu.

21.7.4. Detection Policy tab settings

1. To configure the detection policy settings, select the **Detection Policy** tab.



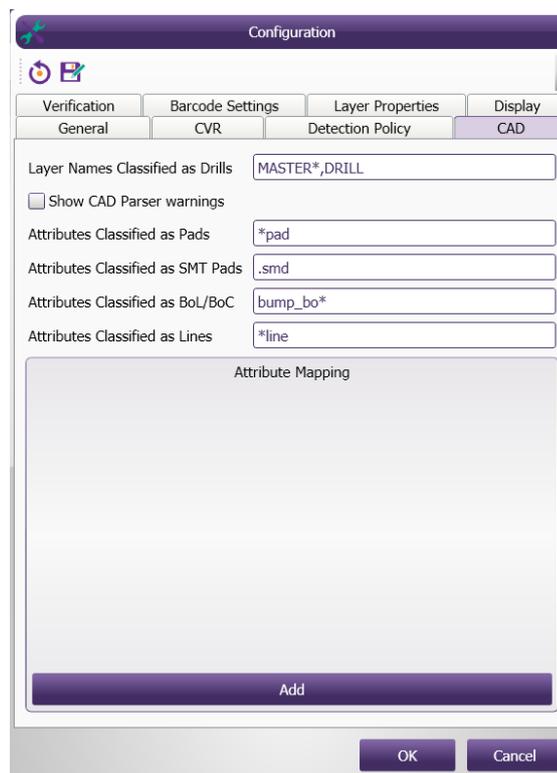
Setting	Description
Run application steps match script when loading global policy	Select the check box to automatically put the same recipe parameters to all scan steps when loading global policy.
Run manual steps match when loading global policy	Select the check box to match local steps to global steps manually when loading global policy.
Default matching steps (Flat mode)	Defines the default global step for filling the detection tree in flat mode.
Reset MinLine/MinSpace when loading global policy	Select the check box to reset the Min Line and Min Space parameters from global detection policy when loading global policy.
Load drill parameters from DefaultGroup when loading global policy	Select the check box to load drill parameters from the previously saved drill default parameters when loading global policy.
Check global policy revision when loading layer	If selected, when loading layer, the system will automatically check if the global detection policy is revised and load the revision automatically.
Reload global policy when changing lot	Select the check box to automatically reload the global detection policy when the lot is changed. Thus, forcing the system to re-run prepare reference before scanning the new lot.

- Click **OK** to apply the settings and to close the **Configuration** menu.

21.7.5. CAD tab settings

- To configure the CAD settings, select the **CAD** tab.

The options in the CAD tab are available only for Administrators.

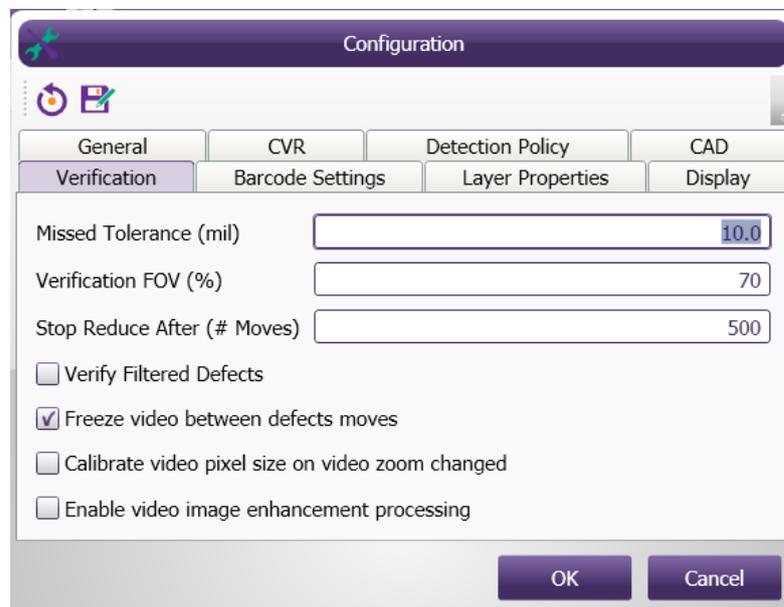


Setting	Description
Layer Names Classified as Drills	Defines additional user-defined drill layer names. During the job creation process, all layers with the names defined in the text field will be automatically selected as drill layers.
Show CAD Parser warnings	Select the check box to show warning messages when an error occurs while loading CAD.
Attributes Classified as Pads	Defines the attributes name for pad. During the prepare reference process, all objects with the attribute names defined in the text field will be classified as Pad zone.
Attributes Classified as SMT Pads	Defines the attributes name for SMT pad. During the prepare reference process, all objects with the attribute names defined in the text field will be classified as SMT Pad zone.
Attributes Classified as Bol/Boc	Defines the attributes name for Bol/Boc. During the prepare reference process, all objects with the attribute names defined in the text field will be classified as Bol/Boc zone.
Attributes Classified as Lines	Defines the attributes name for line. During the prepare reference process, all objects with the attribute names defined in the text field will be classified as Line zone.
Attribute Mapping	Use it to rename the attribute names. Click Add button, two text fields appears. Enter the current attribute name in the left text field, and enter the new attribute name in the right text field.

2. Click **OK** to apply the settings and to close the **Configuration** menu.

21.7.6. Verification tab settings

1. To configure the verification settings, select the **Verification** tab.

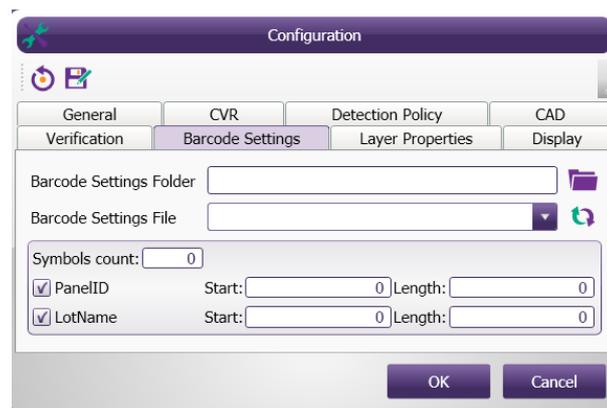


Setting	Description
Missed Tolerance (mil)	Available only for Administrators. Defines the missed tolerance for comparing defects with the imported defects from a legacy machine.
Verification FOV (%)	Define the size of the video FOV. All defects shown in the defined FOV are considered as one move.
Stop Reduce After (# Moves)	Available only for Administrators. Define the maximum number of moves for reducing defects. If the number of moves exceeds this value, the system will stop the reduce process.
Verify Filtered Defects	Cleared by default. If selected, the filtered defects will be verified in verification.
Freeze video between defects moves	Selected by default. When selected, the video image does not change while the camera moves between the defects.
Calibrate video pixel size on video zoom changed	Select it to automatically calibrate video pixel size when video zoom is changed.
Enable video image enhancement processing	Select it to enable video image enhancement processing. If selected, press CTRL+1 to turn on/off noise cancel and press CTRL+2 to show digital interpolation video image during verification stage.

- Click **OK** to apply the settings and to close the **Configuration** menu.

21.7.7. Barcode Settings tab settings

- To configure the barcode settings, select the **Barcode Settings** tab.



Setting	Description
Barcode Settings Folder	Defines the folder for storing the pre-set barcode settings files. The default path is C:\Camtek\App\BarCodeSettings .
Barcode Settings File	Select the barcode settings file according to the customer's barcode type.
Symbols count	Defines total characters of the barcode string.
PanelID/LotName	Defines the start character and length for panel ID and lot name (the barcode string is started from 0).

- Click **OK** to apply the settings and to close the **Configuration** menu.

21.7.8. Layer Properties tab settings

- To configure the layer properties settings, select the **Layer Properties** tab.



Setting	Description
Detection Policy Mode	Defines the default detection policy mode when creating a new job (refer to Creating New Job).
Global Detection Policy	Defines the default global detection policy when creating a new job (refer to Creating New Job).
CVR Layer Margin X (Inch)	Defines the default value for CVR Layer Margin X when creating a new job (refer to Creating New Job).
CVR Layer Margin Y (Inch)	Defines the default value for CVR Layer Margin Y when creating a new job (refer to Creating New Job).
Verify-Include Repeated	Selected by default. When cleared, the repeated defects will not be verified in verification (the change take effects only for new jobs).
Bypass Application Setup	Defines the default selections for job flow when a new job is opened (refer to Image Setup).
Run CCD Focus Adjust	
Run CCD Best Light	
Run Alignment on Demand	
Run PGM Correction	
Run Adaptive Calibration	
Use Big Models Outside of Scan Area	

- Click **OK** to apply the settings and to close the **Configuration** menu.

21.7.9. Display tab settings

The option allows user to define a different color for exclusion mask. By clicking on the **Change** button, the screen with palette editor is pop up and provides different colors for choosing.

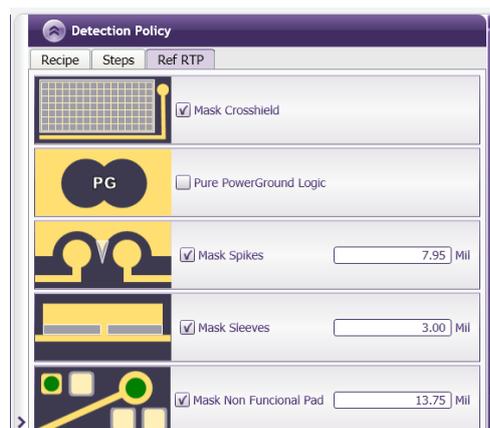


21.8. Detection Policy

Detection Policy provides advanced settings for defects detection. The user can change the following settings according to the user specific needs:

- [Recipe](#): recipe settings allow controlling detection sensitivity for different defect types.
- [Steps](#): steps settings allow adding/changing scan steps and disabling Ref RTP masks in certain steps.
- [Ref RTP](#): Ref RTP settings allow controlling run time parameters of the reference image.

To access the Detection Policy settings in idle mode, click the right expand button. The Detection Policy pane appears. The Ref RTP tab is open by default.



During the verification, the detection sensitivity settings for the currently verified defect are displayed on the [Verification Panel](#) in the [Detected By](#) section.

21.8.1. Recipe

Recipe toolbar

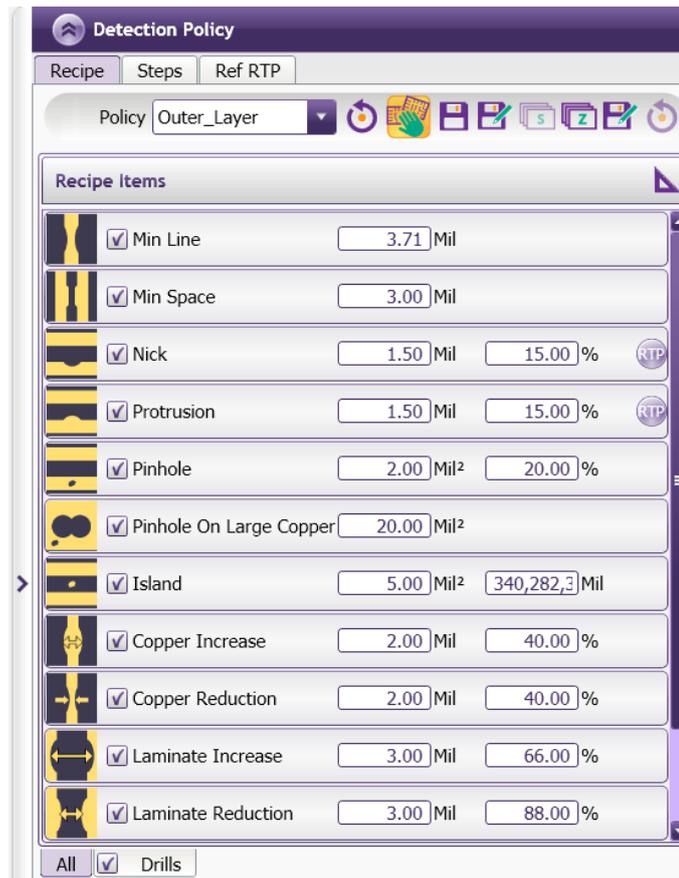
The Recipe toolbar is displayed when opening the Recipe tab.



	<p>Policy: a list of global detection Policies. Select the required detection policy according to panel design.</p>
	<p>Reload Global Policy: click to reload the global policy parameters of the currently selected global detection policy.</p>
	<p>Manual Step Match: click to enable manual step match when reload the global policy.</p>
	<p>Save to Current Global Policy: click to save the current parameters to the currently selected global detection policy. Password is required for this action.</p>
	<p>Save to Other Global Policy: click to save the current parameters to other global detection policy. You can specify the global policy name in the popup window (the name can be an existing one or a new one). Password is required for this action.</p>
	<p>Multi-Step: click to enable the Multi-Step and Zone mode. Available only when the Multi-Zone mode is enabled.</p>
	<p>Multi-Zone: Click to enable the Multi-Zone mode.</p>
	<p>Save Recipe to Temporary File: click to save the current recipe to the temporary file.</p>
	<p>Restore Recipe from Temporary File: click to restore the recipe from the temporary file.</p>

Flat mode

Flat mode is available when both Multi-Step and Multi-Zone buttons are disabled. In this mode, user can adjust the defect detection sensitivity for all available defect types. The detection sensitivity will be the same for the entire panel (all zones except for drills and laser drills of the panel).



Multi-Zone mode

Multi-zone mode is available when only the Multi-zone button is enabled. In this mode, user can adjust the defect detection sensitivity separately for each zone. Only zone-specific defects will be displayed according to the selected zone tab.

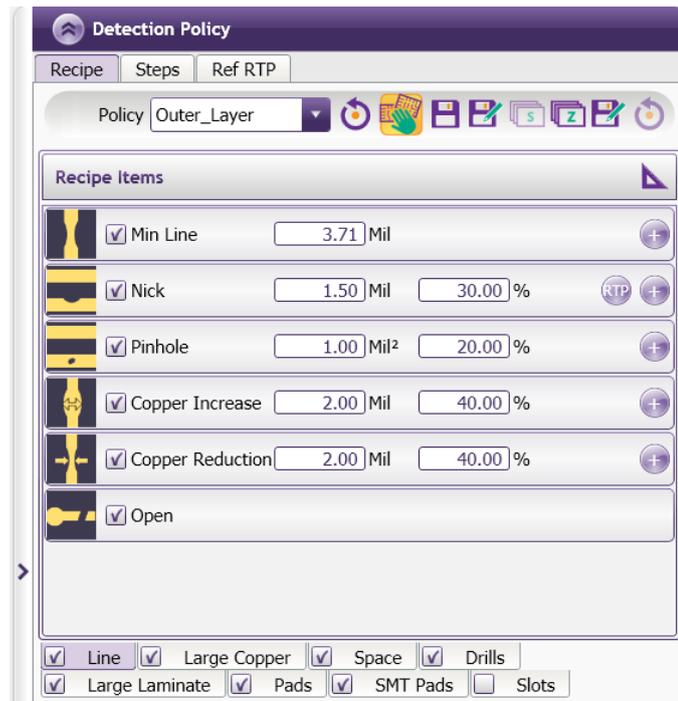
Certain defect types may occur in different zones, and can be assigned different parameters for each zone. To view a list of zones and the parameters assigned for each zone, click the **Show on all zones** (plus) button near the relevant defect type. To mark certain defect as critical defect, click the red dot to enable it.



The available zone tabs depend on the CAD data and panel design.

All available zone tabs include:

Line, Large Copper, Space, Large Laminate, Clearance, Pads, SMT Pads, Slots, Drills, and Laser Drills.

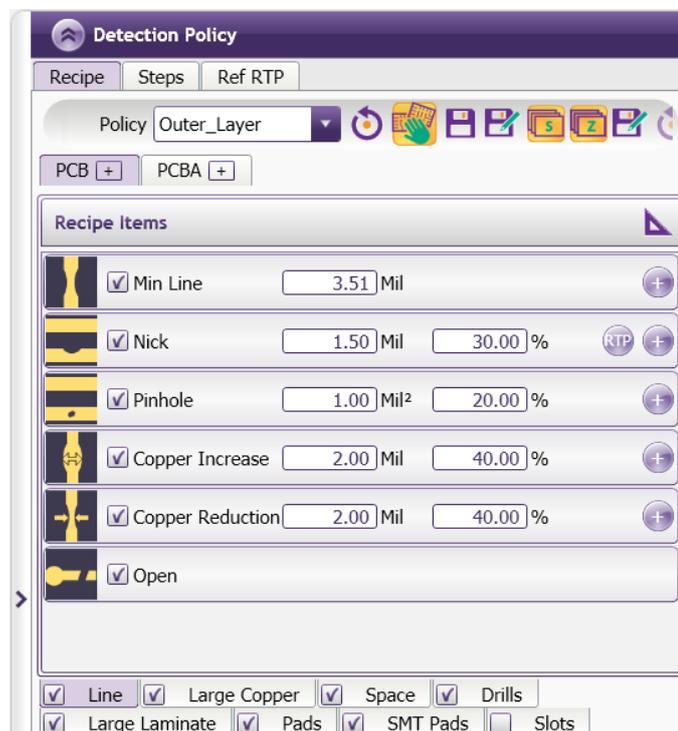


Multi-Step and Zone mode

Multi-Step and Zone mode is available when both the Multi-Zone and Multi-Step buttons are enabled. In this mode, user can adjust the defect detection sensitivity separately for each zone, and for each step. Only zone-specific defects will be displayed according to the selected zone tab.

The available zone tabs depend on the CAD data and panel design.

Certain defect types may occur in different zones, and can be assigned different parameters for each zone. To view a list of zones and the parameters assigned for each zone, click the **Show on all zones** (plus) button near the relevant defect type. To mark certain defect as critical defect, click the red dot to enable it



Non drill detection sensitivity parameters

Defect Type	Explanation
Min Line	Defines the minimum acceptable line width. Lines that exceed the defined width will be reported as true Minimal Line defects.
Min Space	Defines the minimum acceptable space width. Spaces that exceed the defined width will be reported as true Minimal Space defects.
Nick	<ul style="list-style-type: none"> ● Depth cosmetic: defines the maximum allowed depth of nick. Nicks that exceed the defined depth will be reported as true nick defects. ● Weight: defines the maximum allowed nick percentage relative to the line/pad/SMT pad. Nicks that exceed the defined percentage will be reported as true nick defects. ● RTP: advanced sensitivity parameter. Defines the acceptable roughness level and tolerance for line/space. The default Roughness value is 2. Adjust the parameter according to actual line roughness if necessary. The adjustment range is from 0 (most sensitive) to 13 (least sensitive). The Tolerance options are: Low (small tolerance and most sensitive), Normal, High (big tolerance and least sensitive).
Protrusion	<ul style="list-style-type: none"> ● Size: defines the maximum allowed depth of protrusion. Protrusions that exceed the defined depth will be reported as true protrusion defects. ● Weight: defines the maximum allowed protrusion percentage relative to the space. Protrusions that exceed the defined percentage will be reported as true protrusion defects. The parameter is available only for Space zone. ● RTP: advanced sensitivity parameter. Defines the acceptable roughness level and tolerance for line/space. The default Roughness value is 2. Adjust the parameter according to actual line roughness if necessary. The adjustment range is from 0 (most sensitive) to 13 (least sensitive). The Tolerance options are: Low (small tolerance and most sensitive), Normal, High (big tolerance and least sensitive).
Pinhole	<ul style="list-style-type: none"> ● Area: defines the maximum allowed pinhole area. Pinholes that exceed the defined area will be reported as true pinhole defects. ● Depth: defines the maximum allowed pinhole width percentage relative to the line. Pinholes that exceed the defined percentage will be reported as true pinhole defects. The parameter is available only for Line zone.
Pinhole On Large Copper	<ul style="list-style-type: none"> ● Area: defines the maximum allowed pinhole area on the Large Copper zone. Pinholes that exceed the defined area will be reported as true pinhole defects.
Island	<ul style="list-style-type: none"> ● For Space zone: no detection sensitivity parameters are available. Only the number of detected Island defects is displayed in Verification mode. ● For other zones: the Area and Distance parameters are available. The Area parameter defines the maximum allowed island area. The Distance parameter defines the minimum allowed distance from the nearest object. Only when the island properties exceed both defined parameters, the detected island will be reported as a true defect.
Copper Increase	<ul style="list-style-type: none"> ● Difference: defines the maximum allowed copper increase. Copper objects that exceed the defined difference will be reported as true Copper Increase defects. ● Percent: defines the maximum allowed copper increase percentage relative to the CAD. Copper objects that exceed the defined percentage will be reported as true Copper Increase defects.

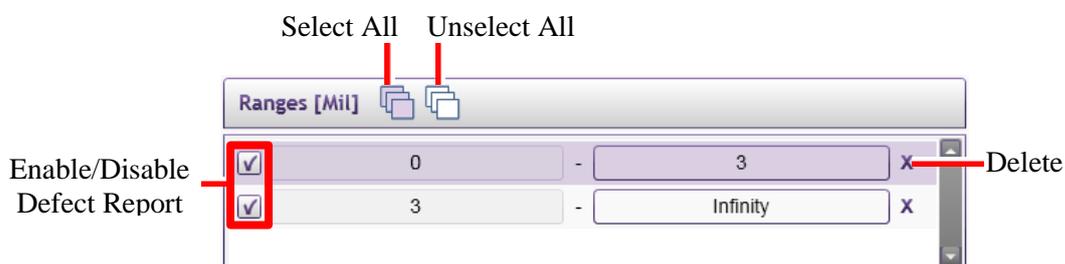
<p>Copper Reduction</p>	<ul style="list-style-type: none"> ● Difference: defines the maximum allowed copper reduction. Copper objects that exceed the defined difference will be reported as true Copper Reduction defects. ● Percent: defines the maximum allowed copper reduction percentage relative to the CAD. Copper objects that exceed the defined percentage will be reported as true Copper Reduction defects.
<p>Laminate Increase</p>	<ul style="list-style-type: none"> ● Difference: defines the maximum allowed laminate increase. Laminate objects that exceed the defined difference will be reported as true Laminate Increase defects. ● Percent: defines the maximum allowed laminate increase percentage relative to the CAD. Laminate objects that exceed the defined percentage will be reported as true Laminate Increase defects.
<p>Laminate Reduction</p>	<ul style="list-style-type: none"> ● Difference: defines the maximum allowed laminate reduction. Laminate objects that exceed the defined difference will be reported as true Laminate Reduction defects. ● Percent: defines the maximum allowed laminate reduction percentage relative to the CAD. Laminate objects that exceed the defined percentage will be reported as true Laminate Reduction defects.
<p>Open</p>	<ul style="list-style-type: none"> ● For Line zone: no detection sensitivity parameters are available. Only the number of detected Open defects is displayed in Verification mode. ● For other zones: the RTP parameters (Fine Pad Sensitivity & Fine Pad Size) are available. The Fine Pad Sensitivity options are: Off (disable CMTS algorithm), Low (least CMTS sensitive), Normal, High, Very High (most sensitive). The Fine Pad Size defines the defect size (the smaller value the more sensitive).
<p>Short</p>	<ul style="list-style-type: none"> ● For Space zone and Large Laminate zone: no detection sensitivity parameters are available. Only the number of detected Short defects is displayed in Verification mode. ● For other zones: the RTP parameters (Fine Pad Sensitivity & Fine Pad Size) are available. The Fine Pad Sensitivity options are: Off (disable CMTS algorithm), Low (least CMTS sensitive), Normal, High, Very High (most sensitive). The Fine Pad Size defines the defect size (the smaller value the more sensitive).

Setting ranges for Line zone and Space zone

For Line zone and Space zone, user can define different detection sensitivity parameters individually for each line/space range.

To set parameters for individual line/space range:

1. In the **Ranges** section, enter required line/space width in the **Infinity** text field and press **Enter**.
The lines/spaces are split into different ranges.



2. Click the required line/space range, and make sure it is selected (highlighted in purple).
3. In the **Line/Space** section, set the required defect type parameters.

The parameters are automatically applied for the selected line/space range.

To set the same parameters for multiple line/space ranges:

1. Use the **Ctrl** key to select the required line/space ranges, and make sure they are selected (highlighted in purple).



TIP

To select all line/space ranges, press **Ctrl+A** keys, or click the **Select All** button. To clear the selection, click the **Unselect All** button.

2. In the **Line/Space** section, set the required defect type parameters.

The parameters are automatically applied for the selected line/space ranges.

Drill detection sensitivity parameters

The following drill defect types appear on the **Drills** tab only if there are drills defined for the layer. When the Drills tab is selected, you can view both the existing defect types, and a list of all existing [Drill groups](#).

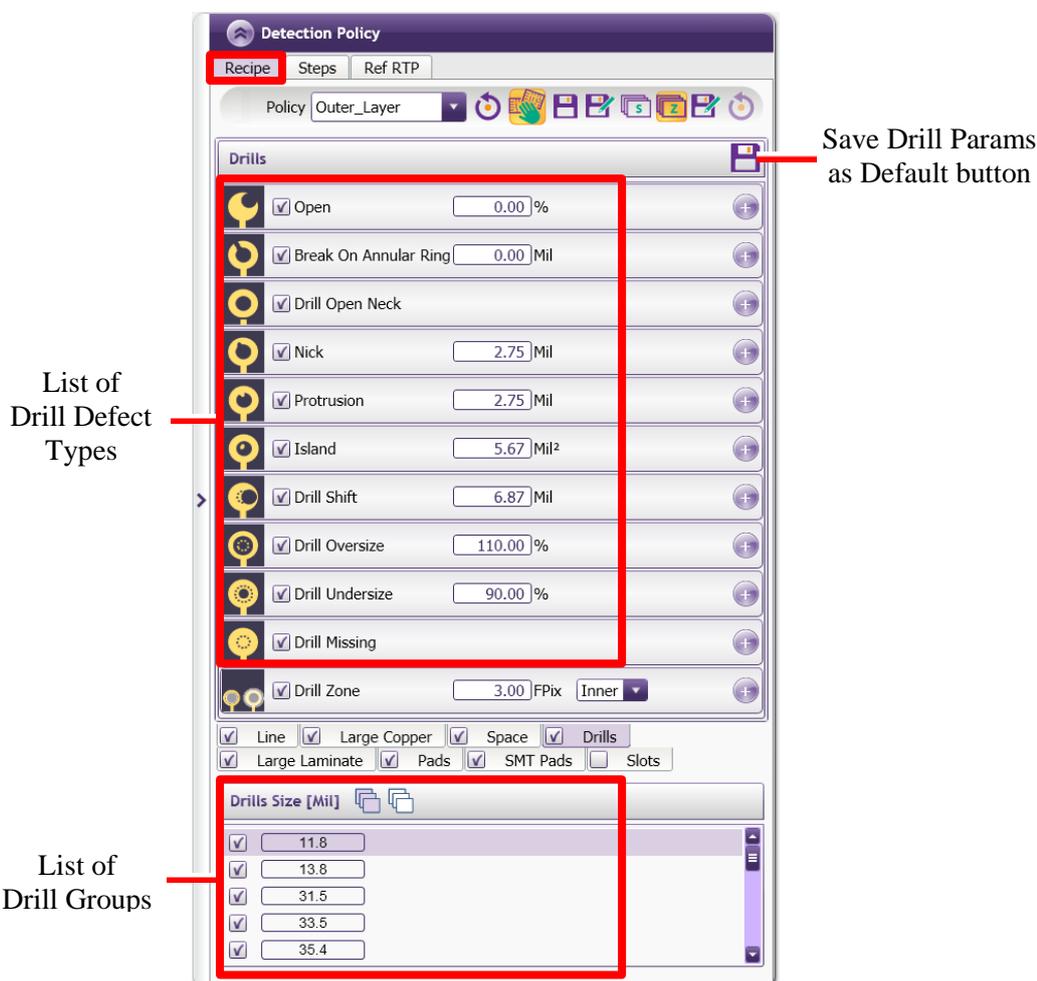
Defect Type	Explanation
Open	Break Percent: defines the maximum allowed drill break percentage. Drills that exceed the defined percentage will be reported as true open defects.
Break On Annular Ring	Break On Annular Ring: defines the maximum allowed annular ring break size. Annular rings that exceed the defined size will be reported as true Break On Annular Ring defects.
Drill Open Neck	No parameters are available for the user. Only the number of detected Drill Open Neck defects is displayed in Verification mode.
Nick	Nick Depth: defines the maximum allowed drill nick depth. Drills that exceed the defined depth will be reported as true nick defects.
Protrusion	Protrusion Depth: defines the maximum allowed drill protrusion depth. Drills that exceed the defined depth will be reported as true protrusion defects.
Island	Island Area: defines the maximum allowed drill island area. Drills that exceed the defined area will be reported as true island defects.
Drill Shift	Max Shift: defines the maximum allowed offset of the actual drill center from the CAD drill center. Drills that exceed the defined offset will be reported as true Drill Shift defects.
Drill Oversize	Drill Oversize: defines the maximum allowed drill oversize percentage. Drills that exceed the defined percentage will be reported as true Drill Oversize defects.
Drill Undersize	Drill Undersize: defines the maximum allowed drill undersize percentage. Drills that exceed the defined percentage will be reported as true Drill Undersize defects.
Drill Missing	No parameters are available for the user. Only the number of detected Drill Missing defects is displayed in Verification mode.

Drill Zone Defines the drill mask in which the drill defects will be detected.

- **Zone Expansion:** defines the margin (in fixed pixels) for the drill mask.
- **Inner Outer:** defines the location of the drill mask. The available options are: **Inner** (inner drill edge) and **Outer** (outer annular ring).

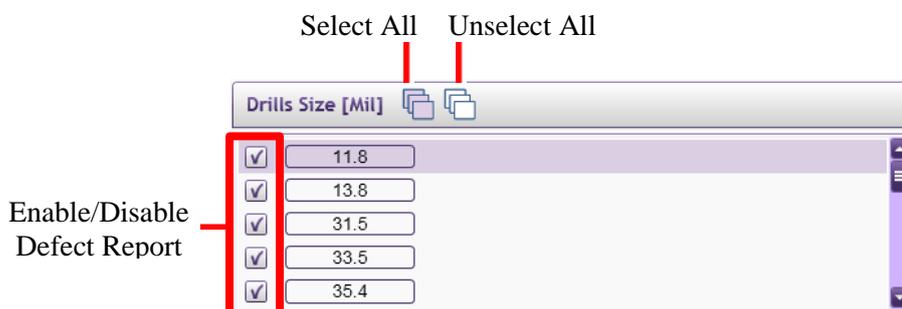
Drill groups

When the **Drills** tab is selected, the **Drill Size** list of all existing drill groups is displayed at the bottom of the **Recipe** tab. The groups are displayed according to the drill size.



The list of drill groups allows the user to define different detection sensitivity parameters individually for each drill group.

To filter the defect report according to a certain drill group, clear the check box of the drill group for which the report is not required.



To set parameters for individual drill group:

1. In the **Drills Size** section, click the required drill group, and make sure it is selected (highlighted in purple).
2. In the **Drills** section, set the required defect type parameters.

The parameters are automatically applied for the selected drill group.

To set the same parameters for multiple drill groups:

1. Use the **Ctrl** key to select the required drill groups, and make sure they are selected (highlighted in purple).

**TIP**

To select all drill groups, press **Ctrl+A** keys, or click the **Select All** button. To clear the selection, click the **Unselect All** button.

2. In the **Drills** section, set the required defect type parameters.

The parameters are automatically applied for the selected drill groups.

Laser drill detection sensitivity parameters

The **Laser Drills** tab exists only if there are laser drills defined for the layer. There are three types of laser drill are available:

The screenshot shows three instances of the 'Recipe Items' dialog box, each with a red box highlighting the 'Type' dropdown menu. The first instance has 'PlatedLegacy' selected, the second has 'Plated', and the third has 'NonPlated'. Each instance also shows a 'Plating' checkbox and a numerical value in a text box.

Type	Plating	Other Parameters
PlatedLegacy	0.25 Mil ²	None
Plated	0.25 Mil ²	None
NonPlated	None	Missing, Particle (100.00 Mil), Hole Shift (10.00 Mil), Copper Shift (10.00 Mil), Oversize (200.00 %), Undersize (50.00 %)

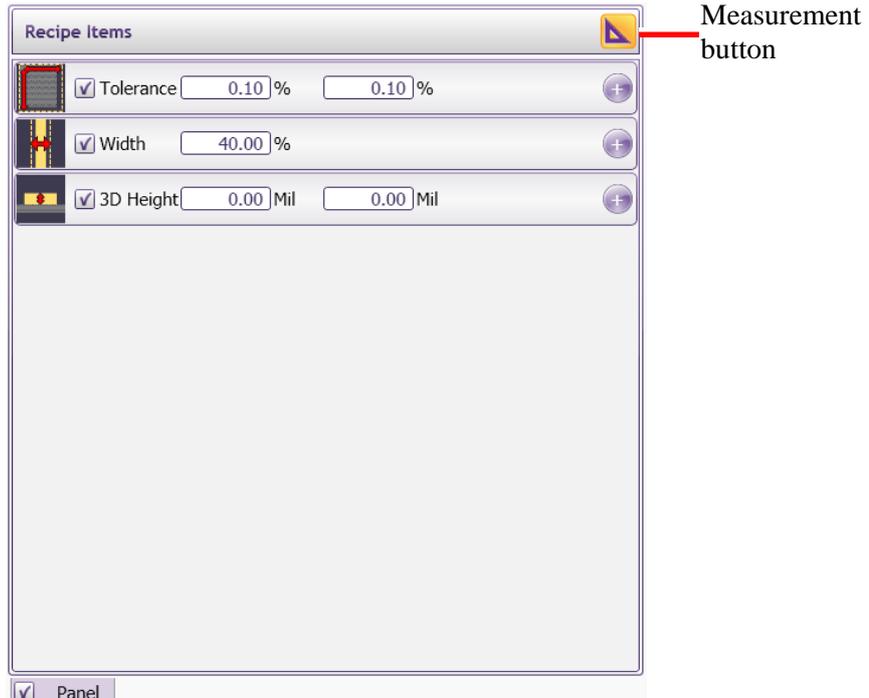
- **PlatedLegacy:** used for plated laser drill detection. It is an old type of plated laser drill. When PlatedLegacy is selected, Laser Via Zone parameter (refer to [Ref RTP](#)) will be available to control the laser drill mask dilate.
- **Plated:** used for plated laser drill detection. It is a new type of plated laser drill. When Plated is selected, all the three Ref RTP parameters related to laser drill (refer to [Ref RTP](#)) will be available to control the laser drill detection and false alarm.
- **NonPlated:** used for non-plated laser drill detection.

The following laser drill defect types appear on the **Laser Drills** tab.

Defect Type	Explanation
Plating	Area: defines the maximum allowed unplated (black) area. Laser drills that exceed the defined area will be reported as true plating defects.
Missing	No parameters are available for the user (works on gray level image). Only the number of detected Missing defects is displayed in Verification mode.
Particle	Size: defines the maximum allowed size of particle. Particles that exceed the defined size will be reported as true particle defects.
Hole Shift	Hole Shift: defines the maximum allowed shift of the upper layer relative to CAD drill positions (works on gray level image). Laser drills that exceed the defined shift will be reported as true Hole Shift defects.
Copper Shift	Copper Shift: defines the maximum allowed shift of the bottom (inner) layer relative to the upper layer. Laser drills that exceed the defined shift will be reported as true Copper Shift defects.
Oversize	Oversize: defines the maximum allowed laser drill oversize percentage. Laser drills that exceed the defined percentage will be reported as true oversize defects.
Undersize	Undersize: defines the maximum allowed laser drill undersize percentage. Laser drills that exceed the defined percentage will be reported as true undersize defects.

Measurement detection sensitivity parameters

Click the **Measurement** button to open and close the Measurement recipe.



The following measurement defect types appear on the **Panel** tab.

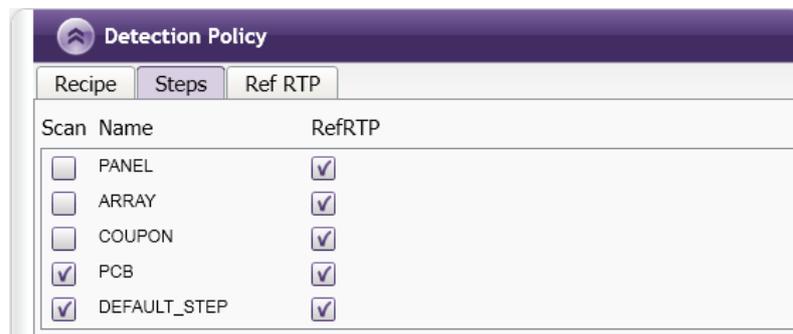
Defect Type	Explanation
Tolerance	<p>Rule.PanelStretch.Tolerance X: defines the maximum allowed panel stretching percentage in X direction. Panel Stretch Warning window pops up at the beginning of the Verification stage if the panel stretching exceed the defined percentage.</p> <p>Rule.PanelStretch.Tolerance Y: defines the maximum allowed panel stretching percentage in Y direction. Panel Stretch Warning window pops up at the beginning of the verification if the panel stretching exceed the defined percentage.</p>
Width	<p>Width Difference: defines the maximum allowed width difference percentage of the measure queries relative to CAD. Measure queries that exceed the defined percentage will be reported as true width defects.</p>
3D Height	<p>MinAverageHeight: defines the minimum allowed average height of the measure queries.</p> <p>MaxAverageHeight: defines the maximum allowed average height of the measure queries.</p> <p>Measure queries that exceed the defined range will be reported as true 3D Height defects.</p>

21.8.2. Steps

The scan steps are selected during the job creation stage, and are displayed on the **Steps** tab.

To add/remove scan steps, select or clear the relevant **Scan** check boxes.

To disable Ref RTP masks for certain step, clear the relevant RefRTP check box. For more information about Ref RTP masks, refer to [Ref RTP](#).



NOTE

If the scan steps are modified, system will automatically perform the Prepare Reference process before the initial scan.

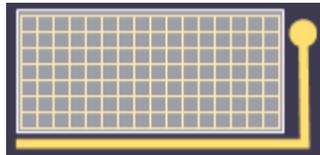
21.8.3. Ref RTP

Select the Ref RTP tab to select and modify the **Run Time Parameters (RTP)** of the Reference.

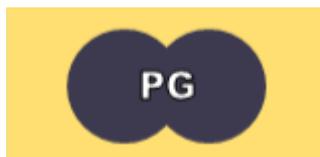


NOTE

If the changes are applied to the Ref RTP, system will automatically perform the Prepare Reference process before the initial scan.



Mask Crossshield: Selected by default. When selected, system creates reference hardware masks for the cross-shield areas.



Pure PowerGround Logic: Not selected by default. Automatically selected when the **PurePowerGround** global policy is selected. Select this option for **Pure Power** and **Ground** panels to mask all power & ground surfaces, including pads and thermal pads.

When selected, only big pinhole defects will be reported on power & ground areas.



Mask Spikes: Selected by default. When selected, system creates reference hardware masks for spike areas.

To define the depth of the spike hardware masks, enter the required value, or click up/down arrows to modify the default parameter.



Mask Sleeves: Selected by default. When selected, system creates reference hardware masks for sleeve areas.

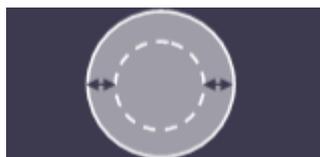
To define the depth of the sleeve hardware masks, enter the required value, or click up/down arrows to modify the default parameter.



Mask Non Functional Pad: Selected by default. When selected, all nonfunctional pads* are hardware masked.

The spaces between the nonfunctional pads are hardware masked also if the space is less than the defined value. Enter the required value, or click up/down arrows to modify the parameter.

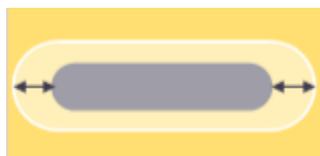
*Nonfunctional pads are pads that do not contain any mechanical or future drill, or pads that are used for copper balance.



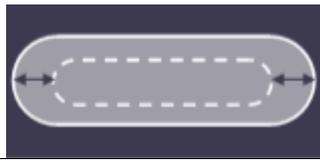
Non plated drill dilate: Hardware mask is always automatically applied if non plated drills exist. The parameter defines the mask margins. Enter the required value, or click up/down arrows to modify the parameter.



Text area dilate: Hardware mask is always automatically applied to text area (if defined in the CAD). The parameter defines the mask margins. Enter the required value, or click up/down arrows to modify the parameter.



Slot On Copper dilate: Hardware mask is always automatically applied on areas with slots on copper. The parameter defines the mask margins. Enter the required value, or click up/down arrows to modify the parameter.



Slot On Laminate dilate: Hardware mask is always automatically applied on areas with slots on laminate. The parameter defines the mask margins. Enter the required value, or click up/down arrows to modify the parameter.

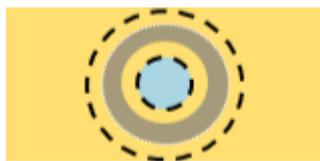


Big Area Analyzer: Selected by default. When selected, system applies hardware masks to big areas defined by width parameter.

To define the width for big area, enter the required value, or click up/down arrows to modify the default parameter.

CAD Surface: Selected by default. When selected, system applies hardware masks to big surfaces based on CAD data.

Pad Zone around drills: Not selected by default. When selected, force searching of pads around the drills.



Laser Via Zone: Laser drill mask is always automatically applied if laser drills exist. The parameter defines the mask margins. Enter the required value, or click up/down arrows to modify the parameter. Only laser drill defects will be reported within the masked area.

Laser Via Max Shift: Defines the maximum allowed shift of the inspection laser drill relative to the reference laser drill mask. It is active only when Plated laser drill type is selected (refer to [Laser drill detection sensitivity parameters](#)).

Laser Via Detection Region: Defines the region for detecting laser drill defects. No defect is reported on other region of the laser drill mask. It is used for reducing the false call rate. It is active only when Plated laser drill type is selected (refer to [Laser drill detection sensitivity parameters](#)).

Enable Fine Copper: Not selected by default. Select to enable high sensitivity for fine copper defects on curved lines and copper corners.

Enable Fine Space: Not selected by default. Select to enable high sensitivity for fine space defects on curved spaces and laminate corners.

21.8.4. Detected By options

The **Detected By** window appears during the Verification stage and it is a part of the [Verification Panel](#).

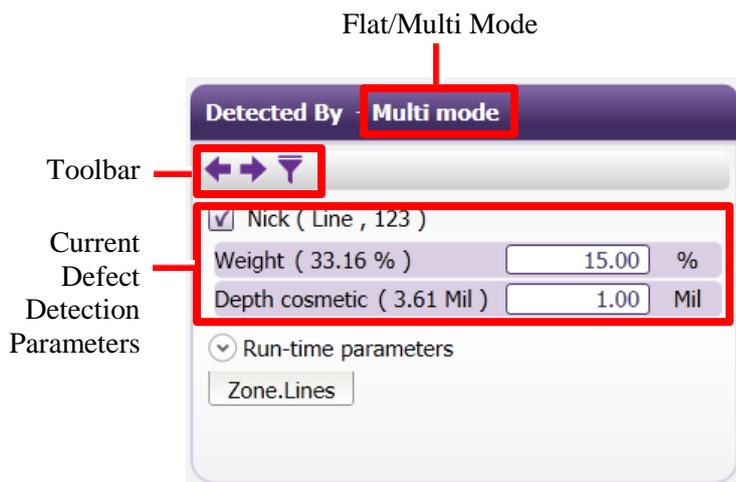
The **Detected By** window appears both in **Flat** and **Multi** modes. It displays the current verified defect information and parameters. The highlighted parameter indicates the exceeded value.

To filter the defect, change the highlighted parameter, and click the **Filter** button to apply the changes.



NOTE

The modified parameters apply to all defects of the same type on the same zone.

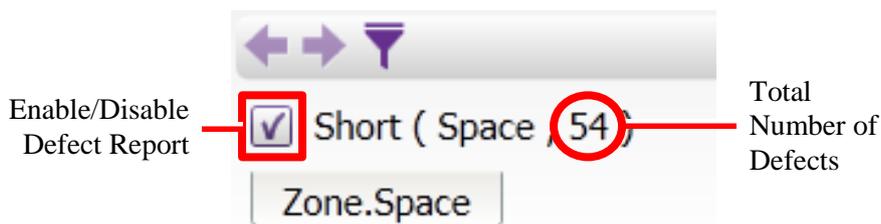


Detected By toolbar

Button	Explanation
	Filter: Click to apply parameter changes.
	Previous Defect: Click to move to previous defect within the video FOV. If there is only one defect in the FOV, the arrow is disabled.
	Next Defect: Click to move to next defect within the video FOV. If there is only one defect in the FOV, the arrow is disabled.

To enable/disable the report for the defect detection of a certain type, select/clear the check box near the required defect. Click the **Filter** button to apply the changes.

The **Total Number of Defects** represent the number of defects of the current defect type detected on a certain zone type on the whole panel.



22. User Maintenance Procedures

22.1. Halogen Lamps Replacement

Perform this procedure if the halogen lamp is burnt out.

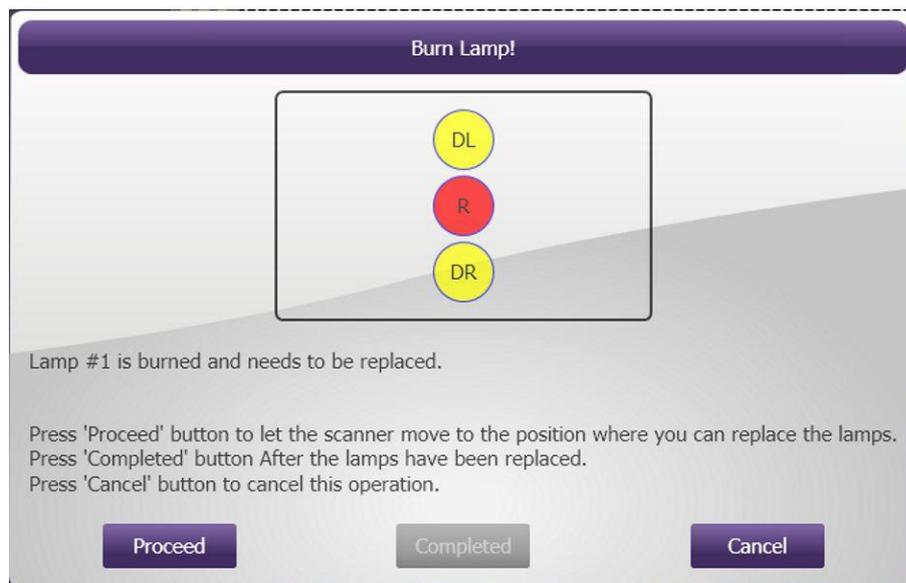
Required tools: Metric Allen keys set.



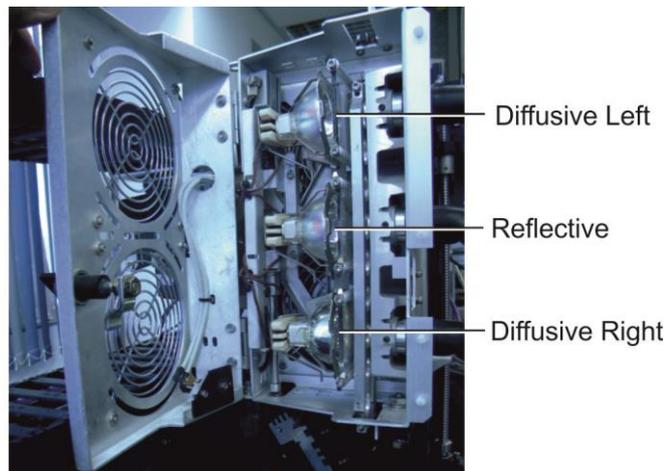
NOTE

The storage and disposal of the halogen lamps must comply with all national and local safety codes and standards pertaining to the halogen lamps.

1. Identify the lamp to be replaced according to the notification image displayed on the main screen.

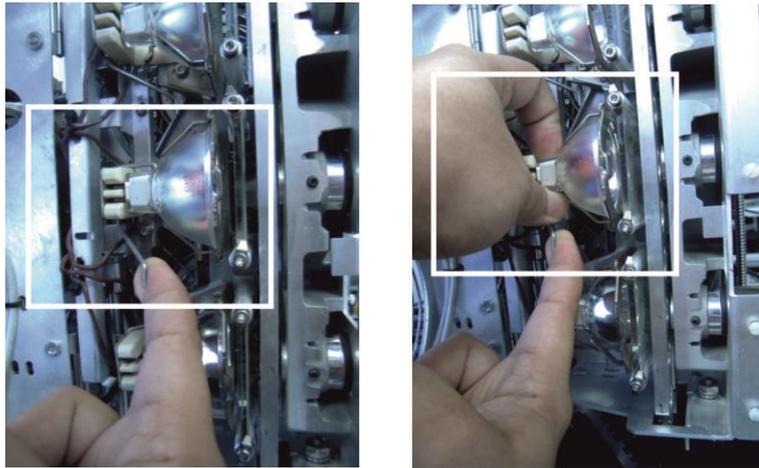


2. Press **Proceed** button to let the scanner move to the position where you can replace the lamps.
3. Open the left service door of the machine. Use Allen key to open the service door.
4. Open the cover of the illumination box.



5. Wait for the lamps to cool down.

6. Pull out the burnt lamp.



7. Install the new lamp, and close the cover of the illumination box.
8. Close the left service door of the machine.
9. Press **Completed** button to continue the scanning.

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