MANIATECHNOLOGIE

Titan T8000 & T8T

Automatic Optical Inspection System

User's Guide

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Standards Compliance

U.S. EMI (FCC) Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This product conforms to the applicable requirements of 21 CFR Subchapter J at the date of manufacture.

WARNING: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Shielded cables must be used with this unit to ensure compliance with FCC Class A limits.

Canada EMI Compliance

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

CE Compliance

This device conforms to Council Directive 89/336/EEC as demonstrated by adherence to standards EN55022, EN50082-1 and EN60825; and Council Directive 73/23/EEC as demonstrated by adherence to standards EN61010, EN 60825 and EN 50116.

U.S. FDA Compliance

This product conforms to the applicable requirements of 21 CFR Subchapter J at the date of manufacture.

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Safety Guidelines

This section provides guidelines that will ensure safe operation of the Titan products.

General Precautions

The Titan is designed to meet or exceed the Class IIIa requirements of Title 21 of the United States Code of Federal Regulations, Chapter 1, Subchapter J, Parts 1040.10 and 1040.11, as applicable.

Safety Warnings and Procedures

- Read this and all documentation accompanying the TITAN prior to use.
- Follow standard safety precautions for use of electrical equipment.
- Keep all covers on the inspection table closed during operation.
- Do not open the base of the system with the power on.
- Keep hands, fingers, hair and clothing away from the inspection platform while the platform is in motion.
- Do not look directly at the camera light.
- Keep marker ink away from heat, sparks, and open flame.
- Always keep the inkmarker cartridge closed when not in use.
- When using the inkmarker, avoid all contact with eyes, repeated or prolonged contact with skin, prolonged breathing of vapors, or accidental ingestion of marker ink.

  In case of eye contact, irrigate with clean water for 15 minutes.

- In case of ingestion, give two glasses of lukewarm water, induce vomiting, and get medical attention. The ink contains methyl carbitol, methyl cellosolve, cellosolve solvent, diacetone alcohol, and ethyl alcohol.

  To remove from skin or clothing, wash with soap and water. Remove soiled clothing.

The Titan protects the operator from exposure to moving parts, high voltage, and laser energy while operating the equipment. All moving parts, lasers and electronics are enclosed within a cabinet.

For your protection, observe the following safety precautions when using the Titan:

- Follow all warnings and instructions.
- Ensure the voltage and frequency of your power source matches the voltage and frequency inscribed on the equipment's electrical rating label.
- Except for loading media, never push objects of any kind through openings in the equipment. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock or damage to equipment.
- To reduce the risk of electrical shock, always plug the Titan into an approved power outlet with ground. Complete power requirements are described in the Titan Pre-Installation Site Preparation Guide (P/N: 414150157).
- Not all power cords have the same current ratings. Household extension cords do not have overload protection and are not meant for use with computer systems. Do not use household extension cords with the Titan.

Laser Characteristics

The Titan uses a 650 nanometer red laser diode operating at ½ mw. Laser light exhibits many characteristics that are different from conventional light. Its safe use depends on awareness of these characteristics and proper treatment of the laser instrument. If a laser beam passes directly into the eye, serious damage may occur, including vision loss. In addition, because the beam remains coherent even when reflected, it can cause injury if it is contacted indirectly from reflective surfaces.

CDRH Information

When the Titan covers are open for operation, maintenance and service, the laser emits Class II energy - up to 3mW (peak) continuous wave - at its aperture. The laser emission is a maximum energy level rating.

Compliance Features

The features of the Titan listed here conform to Title 21 of the United States Code of Federal Regulations, Chapter 1, Subchapter J, as administered by the Center for Devices and Radiological Health (CDRH).

Safety Interlocks

Safety interlocks on the Titan stop table movement when the door to the scanning area is opened.

Maintenance Required to Ensure Compliance

The Titan complies with Title 21 of the United States Code of Federal Regulations, Chapter 1, Subchapter J, Parts 1040.10 and 1040.11, as applicable. To maintain this compliance, once a year (or whenever the product has been subjected to adverse environmental conditions such as fire, flood, mechanical abrasion, solvent spillage, etc.) a check must be made to see that all compliance features are functioning properly.

- Verify that all required labels are firmly in place.

Safety During Installation and Service

When conditions require opening the Titan service doors and disabling the interlocks (such as for servicing or troubleshooting by trained service personnel), the accessible energy is in the Bureau of Radiological Health (BRH) Class II category. Under these conditions, personnel should observe all normal electrical and mechanical safety precautions as well as those applicable to lasers.

Laser safety

IT IS ESSENTIAL THAT ONLY TRAINED PERSONNEL PERFORM SERVICE AND TROUBLESHOOTING ON THE EQUIPMENT.

Access to the equipment during these times should be restricted, unless supervised by a Mania Technologie engineer or technician.

At all times during installation or operation of the laser, avoid possible exposure to laser radiation in excess of the allowable emission limits as listed in Title 21 of the United States Code of Federal Regulations, Chapter 1, Subchapter J, Parts 1040.10 and 1040.11, as applicable.

Use of controls or adjustments or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.

Limit access to the laser to authorized service personnel. Keep the laser out of the hands of inexperienced or untrained personnel.

NEVER LOOK DIRECTLY INTO THE MAIN LASER BEAM. NEVER SIGHT DOWN A BEAM INTO ITS SOURCE.

Do not allow reflective objects to be placed in the laser beam. Laser light scattered from a reflective surface can be as damaging as the original beam. Even objects such as rings, watchbands, and metal pens or pencils can be hazardous.

Electrical Safety

The operating power of the Titan is a dedicated, single-phase circuit from 208 VAC to 230 VAC, 50/60 Hz. An internal isolation transformer converts all incoming power to 120 VAC, 50/60 Hz, 20 amp service. All other internal components, except the vacuum pump, run on 120 VAC power.

The following safety precautions should be observed when doors and covers are opened and the equipment is energized.

Observe the normal electrical precautions you would for any system consisting of 120 VAC dedicated circuit, single-phase power and DC power supplies.

Assume that all portions of the Titan electrical system–including the printed circuit areas–are at line voltage.

If access to the interior of the power supply is necessary while the laser is operating.

EXERCISE EXTREME CAUTION. ONLY QUALIFIED SERVICE PERSONNEL SHOULD HAVE ACCESS TO THE INTERIOR.

For clarification of these guidelines, consult user standards such as American National Standards Institute (ANSI), ACGH, or Occupational Safety and Health Administration (OSHA).

Mechanical Safety

When the access doors are opened, mechanical motion may continue for a period of time. Keep hands, hair and clothing away from all moving parts.

Introduction

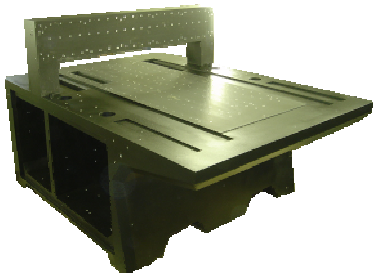
Welcome to Titan T8T Models of AOI

The Titan T8T models are new generation Automatic Optical Inspection (AOI) systems designed to locate defects on printed circuit boards and Photo Tools at any stage in the manufacturing process.

Material can be scanned on one or two tables having a maximum material size of 24" x 30" (609.6mm x 762mm). Material thickness can range from 0.002” to 0.400” (0.050mm to 10.2mm)

New ergonomic principles have been combined with Mania Technologie’s patented pixel-to-pixel defect detection to produce a remarkably effective inspection tool. Some of the new hardware components include the following:

Cast Granite Base. “ZANITE”



- Provides vibration absorbance for Long term Optical protection
- Provides temperature Stability and Inspection repeatability.
- Result… Same Accuracy on day 1 and year 10

Improved Linear Motion System.

- Maintenance free brushless Linear motion System
- New Faster Acceleration – reducing cycle time
- Easy Access for serviceability

Improved Vacuum System

- A new High-Flow High-Vacuum pump is installed to handle the newly designed vacuum tables
- The new vacuum tables allow for both pinned and pin-less panel operation

Improved Live Video Display and Lighting

- Multiple Optical Zoom Levels
- Adjustable light levels near the keypad for close defect inspections

These new software elements have been assembled into a package that is attractive and simple to use. The operator display panel moves in three dimensions and can be shifted to the optimal viewing point. Integral tool holders contribute to operator convenience, and provide space for special requirements, such as tooling pins and cleaning rollers.

Titan has been designed to simplify operation and minimize training of personnel. A new, multi-level user interface allows supervisors to access the more complex functions in the system, and to customize operation of these so the everyday user works from a simpler menu. All user interactions with the system are through a function keypad, so very little keyboard or mouse operations are required. All required user screens are combined onto a single 19" flat panel display, so operator focus stays constant. All necessary operator adjustments are automatic, so inspections are constant from operator to operator, and are accomplished quickly.

Defects can be reviewed online, ink-marked, or output to a verification station.

The system will inspect bare copper, etched double-treated or reverse-treated copper, developed photo-resist over double-treated or reverse-treated copper, tin plating, palladium, silver-halide or Diazo artworks. Defects can include opens, shorts, mouse bites, pinholes, excess copper, dish-downs, and others.

Titan can inspect any layer of a single-sided, double-sided, or multilayer printed wiring board. Inner layer inspection can be performed on bare copper and resist over copper, including double-treat. Outer layer inspection can be performed on bare copper and bare copper with holes. Silver halide photo tools can also be inspected.

How Titan Works

The Titan identifies defects by scanning a panel mounted on an inspection table and compares the scanned image, pixel-by-pixel, to the CAD Reference data (a database created from the actual design data.

The CAD data may be read in from the network, a CD, or a memory stick. A separate program called SmartArgos, a subset of UCAM, is used to prep the CAD data for inspection.

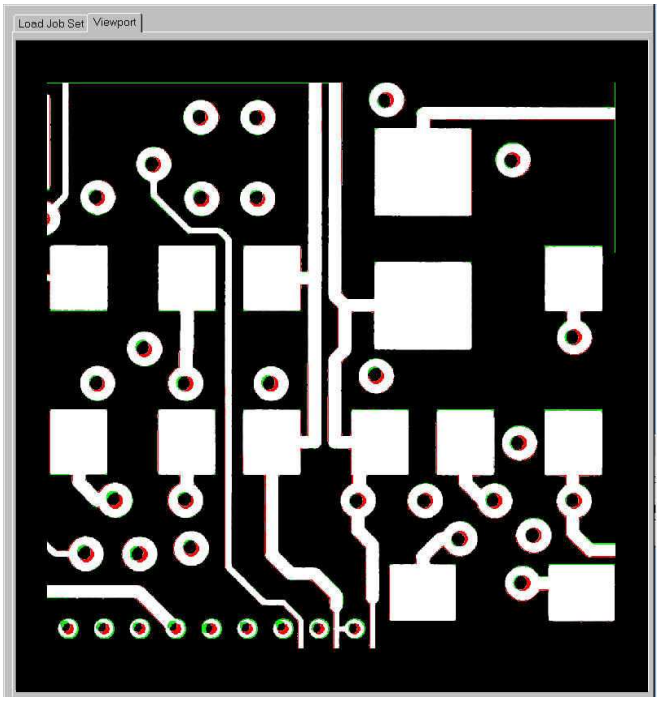
Note: *For more information on UCAM and SmartArgos, please refer to UCAM's on-line User's Guide.*

Titan compares the scanned image of a panel to the reference database and notes any differences. Anything that exceeds specified tolerances is identified as a defect.

Inner and outer tolerances are applied to the aperture data in SmartArgos. This can be either an absolute value, or a percentage of the line width. Another set of tolerances, called EMV2 tolerances can be applied to large copper areas – or large substrate areas. This allows you to set separate defect sizes for normal inspection areas and EMV2 areas.

For example, you can select to report a defect size of 0.5 square mils (12.7 microns) for both missing and excess defects in the normal inspection area. At the same time, you can select an EMV2 Missing defect size of 50 square mils, and an EMV Excess defect size of 100 square mils.

To evaluate individual defects, you can display an image of a selected defect on the screen along with the associated CAD data. In this display, the defect type is identified by a color: Red, indicates Missing data; Green, indicates Excess data.



To minimize flagging defects that have no significance, you can specify don't inspect regions and a don't care tolerance in the UCAM program (See UCAM User's Guide). Once identified, defects can be reviewed immediately following inspection or at a later time by remounting the panel on the inspection table.

The Titan can also mark defects by stamping a mark in ink directly on the panel. All defects can be marked immediately following inspection or at a later time. Defects can also be marked one at a time, either immediately after inspection or at a later time.

A number of system settings may be used to speed, simplify, and customize inspection. The settings include maximum number of defects and ink marks, minimum defect size, inspection parameter defaults, and more.

For more information on system settings, see the **Getting Started** chapter.

Titan T8T Models

The following table describes the various models that are available in the Titan family.

Titan AOI Models

Model	Selectable Pixel Resolutions (mils)	Table Sizes	Feature Sizes
T8000	0.5, 0.4, 0.33, 0.25, 0.2	21x30"	50 Micron
T8000s	0.5, 0.4, 0.33, 0.25, 0.2	21x30	50 Micron

Models listed below have the newer T8T scan Head			
DT	0.5, 0.4, 0.33, 0.25, 0.2	21x30”	50 Micron
DTx	0.5, 0.4, 0.33, 0.25, 0.2	24x30”	50 Micron
DTS	0.5, 0.4, 0.33, 0.25, 0.2	21x30”	50 Micron
DTSx	0.5, 0.4, 0.33, 0.25, 0.2	24x30”	50 Micron
DTR	0.5, 0.4, 0.33, 0.25, 0.2, 0.15	21x30”	35 Micron
DTRS	0.5, 0.4, 0.33, 0.25, 0.2, 0.15	21x30”	35 Micron
DTRSx	0.5, 0.4, 0.33, 0.25, 0.2, 0.15	24x30”	35 Micron
ST	0.5, 0.4, 0.33, 0.25, 0.2	24x30”	50 Micron
STS	0.5, 0.4, 0.33, 0.25, 0.2	24x30”	50 Micron

DT – Dual Table S – High Speed x – Extended Table Sizes
ST – Single Table R – High Resolution

Standard on all T8T Systems

All Titan T8T systems come standard with the following features:

- High-Performance Internal Vacuum Pump
- Inner and Outer layer Inspection Filters
- Diazo and Blue Resist Inspection Filters
- Automatic lamp selection
- Variable resolution scanning, operator selectable
- Linear motor motion systems, both axes
- Single combined XP Professional Workstation
- Two 16 button keypads for operator input
- Live video online verification system with high magnification lens
- Ink marking system with automatic ink capping
- Two adjustable tooling pins
- Pin-less Registration
  - Allows inspection of panels with as much as 0.010”/inch rotation (approx. 0.33” on a 30-inch panel). Panels will line up against reference edges in the platen.
- Single user license for Ucam AOI seat
- Documentation
- Installation/checkout, operator training, parts, labor, and software warranty as described in contract
- Network integration

- Starter supply kit consisting of:
  - 5 Dry-Erase Ink Marker Cartridges
  - 6 sheets of high-contrast backing paper
  - Two Test Films (used for system verification and setup)
  - 6 spare high-intensity inspection lamps
  - Allen wrenches for the removable pins
  - A blank CD-RW disk

Options

Options for the Titan include:

- DV8 Offline AOI Verification and Repair Station. Includes the following:
  - Statistical Process control
  - High Magnification verification camera for video image acquisition
  - High Speed servo motors with unique sensory motion system
  - 15° Angle of operation preventing user fatigue
  - Windows environment and optional multilingual interface
  - Simultaneously overlays the CAD Reference data with the digital error data.
- Drilled Hole Displacement (DHD) Upgrade.
  - Allows you to detect annular ring violations that result from misplaced drill holes. (This is a password-enabled option).
- High Speed Upgrade.
  - Allows you to scan at twice the speed of a regular system. (This is a password-enabled option on a T8T system. Older systems may need a camera change for this option.)

Consumable Spares

- Additional backing paper, 50 sheets.
- Two coated or two uncoated spare high-intensity inspection lamps.
- Spectral filters to match the light source to the reflective and refractive characteristics of the material being inspected (Resist or Non-Resist material).
- Additional Ink Marker cartridges (Black, Blue, or Red).
- Additional Ink Marker Refill bottles (Black, Blue, or Red).

The Titan Hardware Overview

The Titan system is a self-contained unit that consists of the system base, enclosure, the motion systems, the scan head, the live video camera, the monitor, and the user interface (keypad, keyboard and mouse). The system is ergonomically designed for ease of use, as well as easy accessibility.

1. **Optical Scan Head and Live Video Assembly**

   At the heart of the Titan system is a custom-designed telecentric, low distortion, zooming, Image Lens optical system. The lens is completely motorized and obtains desired zoom positions automatically based on the resolution of the data.

2. **Inspection Tables**

   The two inspection platforms support the panels during scanning. The platforms move front-to-back (along the X axis) under the camera and perpendicular to the scan head assembly's left-to-right motion (the Y axis). A vacuum system is used to draw the media to the surface of the table and keep it secure and flat.

3. **Power Switch**

   Turns power on and off to all the table components. The Workstation has its own power switch and is not controlled by this switch.

4. **Keyboard and Mouse drawer**

   A full-function keyboard with a mouse is conveniently stored in a roll out drawer here.

5. **Workstation**

   The workstation consists of a two Dual-Core Xeon Processors, a 400 GB disk drive, 4GB of memory, a camera interface, a motion system interface, and a DVD-RW drive.

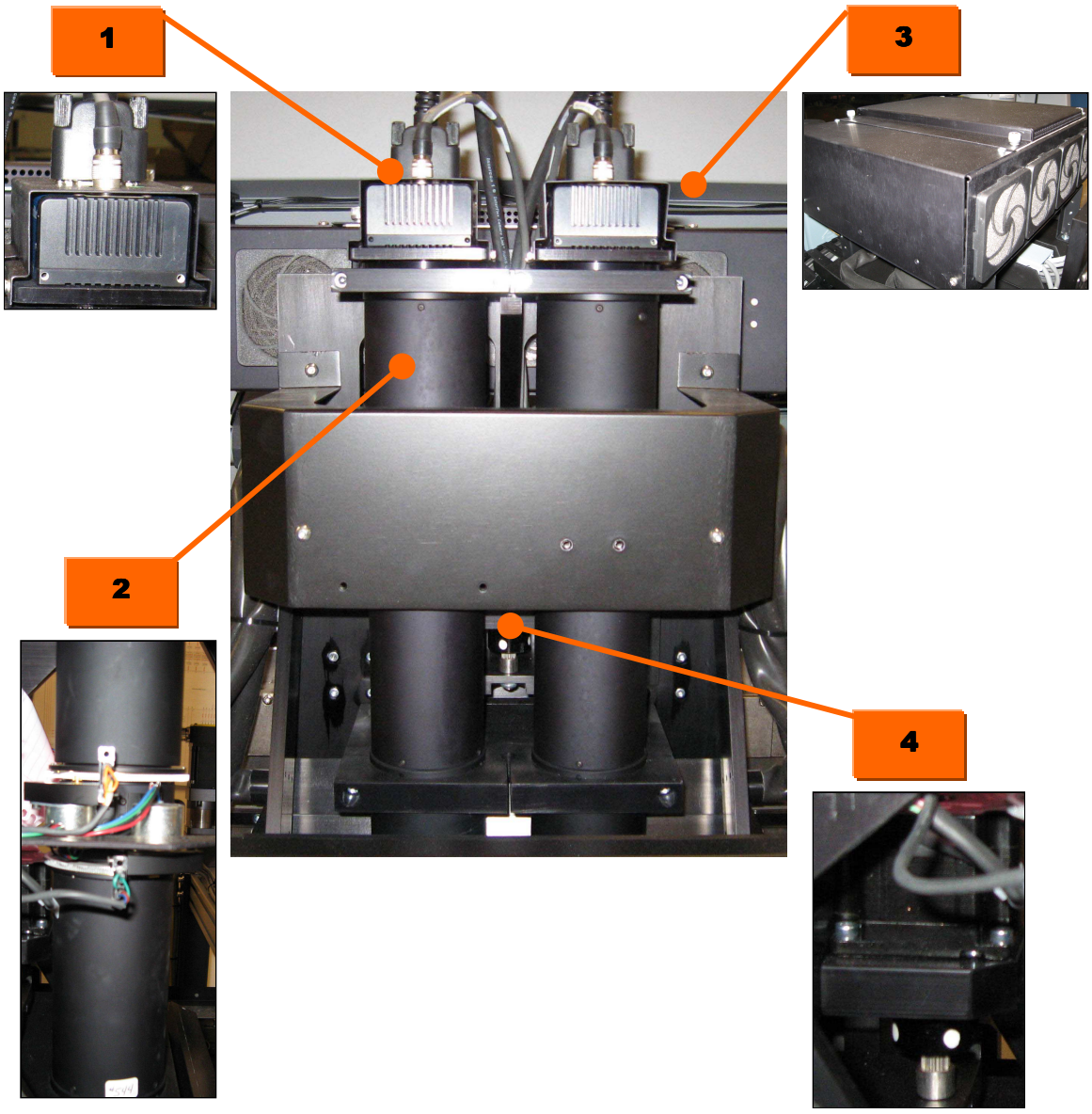
6. **Keypad**

   The system includes 2 custom 16-key keypads that allow the operators to easily complete all inspection and defect review processes.

7. **19” Flat Panel Display**

   The Display Panel…

The T8T Optical Scan Head



8. Line Scan Camera

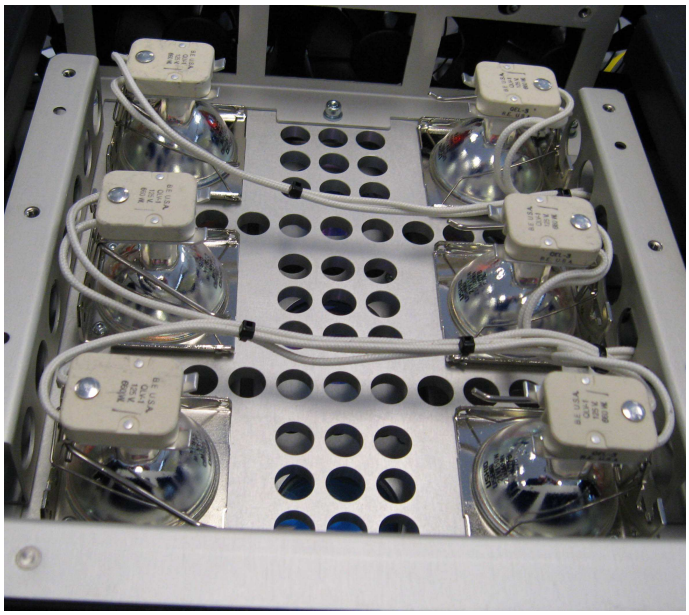
Based on the Titan model, the line scan camera will contain either 2048 or 4096 pixels. And scan at a rate of 18000 or 36000 lines per second.

9. Zoom Lens Assembly

At the heart of the Titan system are two custom-designed telecentric, low distortion, Zoom Lens optical systems. The lenses are motorized and obtain desired zoom positions automatically based on the resolution of the data.

10. Light Box

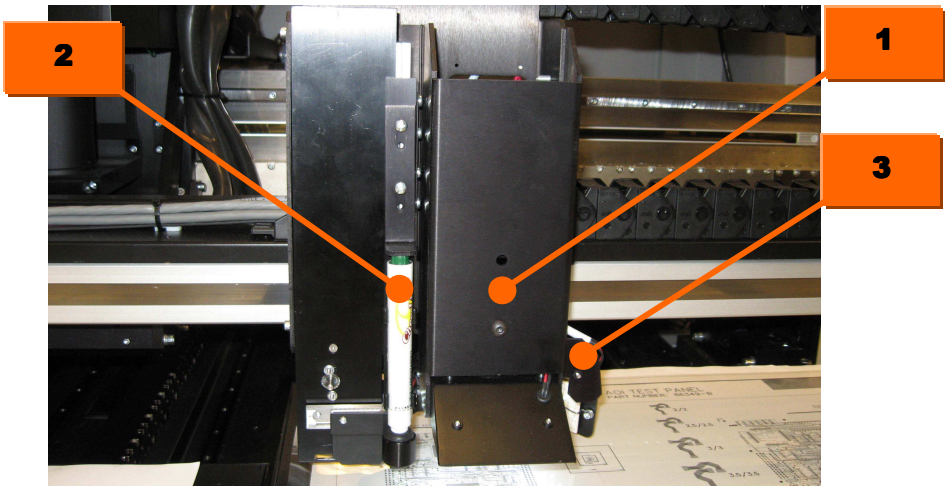
The Light Box contains the lamps and two standard filter sets for the multi-surface inspections. Four thumb screws provide easy access to the lamps. The filters are automatically selected based on the settings in the material file.



11. Z-axis Motor

The Z-axis motor keeps the scan head at the correct optical height based on the material thickness being used. This can be anywhere from 0.002” to 0.400 inches.

The Live Video Axis



1. **Live Video System**

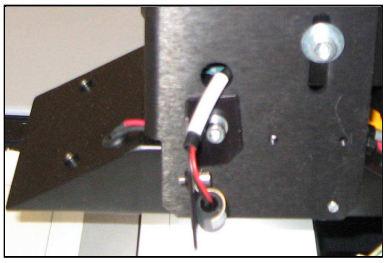
   The live video system is made up of video camera with zoom lens and the video frame grabber board. Both the camera and frame grabber offer optical and digital zoom capabilities. The video camera includes zoom control, auto focus, brightness, and white balance control. The frame grabber features crosshair display when using the live video as the system pointing device.

2. **Ink Marker System**

   The Ink Marker system consists of a removable marker that stamps a dot next to all or selected defects directly on the panel under inspection, making defects easy to locate later.

3. **Light Pointer**

   The light pointer shines on the inspection surface to indicate camera position. An operator uses the arrow keys on the keypad to position the camera as desired.



Installation Requirements

The Titan T8T AOI System requires the following:

- Incoming voltage – 208 to 230 VAC, 50/60 Hz, 20 amp dedicated circuit
- A 2 KVA transformer included with TITAN accepts 208 - 230 VAC input and supplies 120 VAC, 50/60 Hz output to the Titan components.
- The line supply should be free of transients over 300VAC in amplitude.
- An uninterruptible safety earth ground connection of no more than 2 ohms impedance should be provided to the system.
- 60° to 80° F (16° to 26° C) ambient temperature
- 40% to 60% relative humidity (non-condensing)
- Heat dissipation: 6127 Btu/hour (1543Kcal/hour)

Equipment Dimensions:

Dimension	Titan *(Crated)*	Titan *(Uncrated)* All Access doors closed	Titan *(Uncrated)* All Access doors open
Length	90” (2,286 mm)	80" (2,032 mm)	108" 99.2 (2,743.2 mm)
Width	76” (1,930.4 mm)	70" (1,778 mm)	64" (1,625.6 mm)
Height	76” (1,930.4)	72" (1,828.8 mm)	81" (2,057 mm)
Weight	5000 lb. (2268 kg)	4800 lb. (2177 kg)	4800 lb. (2177 kg)

How to Use This Manual

This User’s Guide describes how to use the Titan T8000 AOI System for inspection. Turn to the following sections for more information on…

Getting Started

The Getting Started chapter is intended for both operator and supervisory-level users. This chapter contains general usage procedures that includes sections on starting the Titan system, configuring users, setting passwords, defining and setting parameters for materials, configuring the system, calibrating devices, defining job templates, organizing files, and describing jobs and their structures.

Inspection

The Inspection chapter and its processes are intended for an operator-level user. This chapter includes sections on the operator workflow, inspection procedures for first panels and for subsequent panels; including setting pins, job management, auto thresholding, and performing auto registration. This section also includes information on using the flip panel features, re-ripping, and using the new EMV2 tolerance zones.

Defect Review

The Defect Review chapter, which is also intended for an operator-level user, details the defect review process. Included in this chapter are the different defect types, how to inspect defects, how to run auto review, how to set review parameters, how to mask defects, and how to set up subsequent panels.

Save/Retrieve

This section describes how to handle save, retrieve, and delete files. Since there will probably be large volumes of jobs and job data, users need ways to effectively archive files and to retrieve them at later times. There must also be ways of deleting files once they are no longer viable. In addition, this section enables users to set parameters and options for the save, retrieve, and delete functions.

Dpf2Cad

This section describes the use of a program called Dpf2Cad, which normally runs in the background, but is sometimes required when a user wants to make changes to a job.

Where to go for help

Should you need assistance, you can contact the Mania Technologie Customer Care Department Monday through Friday between 8 AM and 8 PM (Eastern Time) at **1-888-257-2264**.

You can also contact the Mania Technologie Customer Care Department by:

Fax:	1-860-371-3374
email:	**CustomerCare@maniaamerica.com**
Web:	www.maniagroup.com

Getting Started

Overview

This chapter takes you from turning the machine on, through the entire setup and configuration process, and enables you to ready materials for inspection. This chapter is intended for a supervisory-level user, since it includes setup procedures that can only be accessed by a supervisor; although, most Titan systems provide Supervisor privileges for all of its users.

This chapter includes:

- Turning on the system
- The Titan Application interface
- System administration
- Materials management
- Live video configuration
- System setup
- Job template manager
- Scanner tools
- File structure

Turning on the System

System Overview

There are several applications that need to run successfully when the system is first turned on. The minimum applications needed to fully start up the machine are:

Gat24Viper.exe – Sometimes this is referred to as Viper. It is the software that controls the backend hardware, such as x and y axis motion control and lamp control. This is started from a service when the logon window appears and normally runs in the background. It is not necessary to log in for the Viper to start.

Vrac4Proxy.exe *(for HR systems only)* – This is the software that interfaces with the scan-camera/frame-grabber hardware on the High Resolution systems. This is also started from a service when the logon window appears, but does not run in the background.

Inspect.exe – This is the software that communicates with the frontend software and is responsible for executing inspections. It is started only after logging in. It can also be restarted from an icon on the desktop if necessary.

Titan.exe – This is also known as the frontend application software. It provides a graphical user interface that allows an operator to prepare jobs, perform inspections, manage the system, etc. This can only be started manually, from an icon on the desktop.

The Viper and Vrac4Proxy application must run before the Inspect application.

The Inspect application must run after the Viper and Vrac4Proxy and before the frontend application.

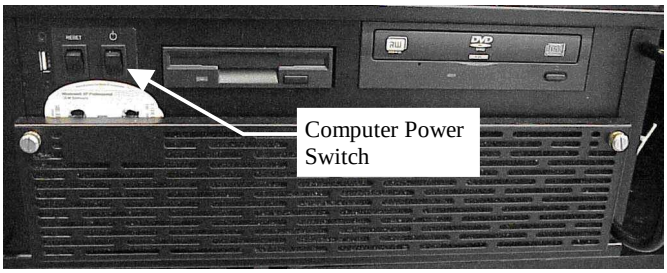
The frontend application must run after the Viper, Proxy, and Inspect.

How to turn on the system

First, turn on the inspection table by turning the red mushroom knob located on the left side of the inspection tables. This knob will pop out and the table will power up. This turns on the part of the system that is referred to as the "back end," which includes the inspection table, motion system, the live video system, the scan head, the keypad, and the vacuum pump.

Next, turn on the computer by pressing the toggle switch located on the upper left corner of the computer. This computer is commonly referred to as the system's "front end" and includes the flat screen monitor, keyboard, and mouse.

The system boots up to the logon message. At this point, a background service (called Gat24Viper) starts to "phase" the four axes of the motion system.



At the log-on screen's User ID field, enter:

Aoi

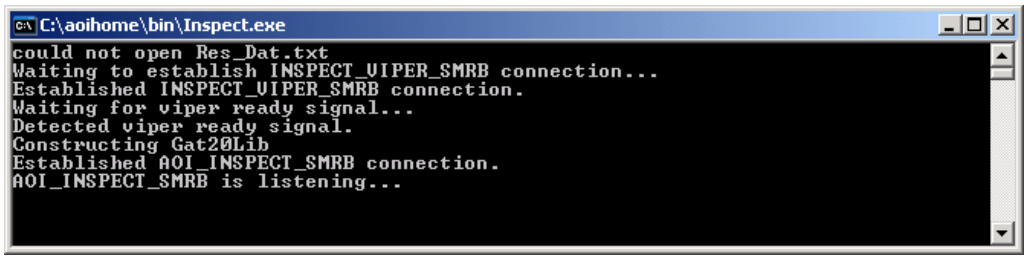
In the password field, enter:

mania1

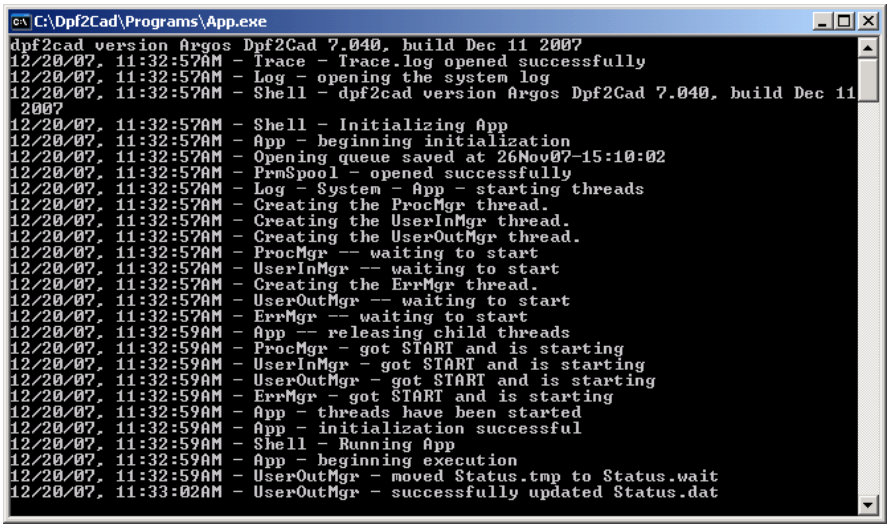
After you have logged in, the following programs may be seen:

1. **The Gat24Viper**.
   This is usually running in the background and not visible by the operator. However, it may be made visible during service calls or when isolating software issues.

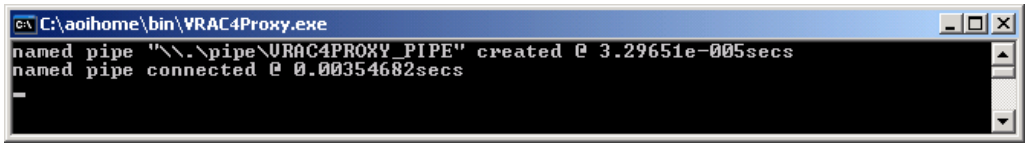
2. **The Inspect program** – as shown below. This can be minimized if desired.



3. **The Dpf2Cad program**
   as shown below. This can be minimized if desired.



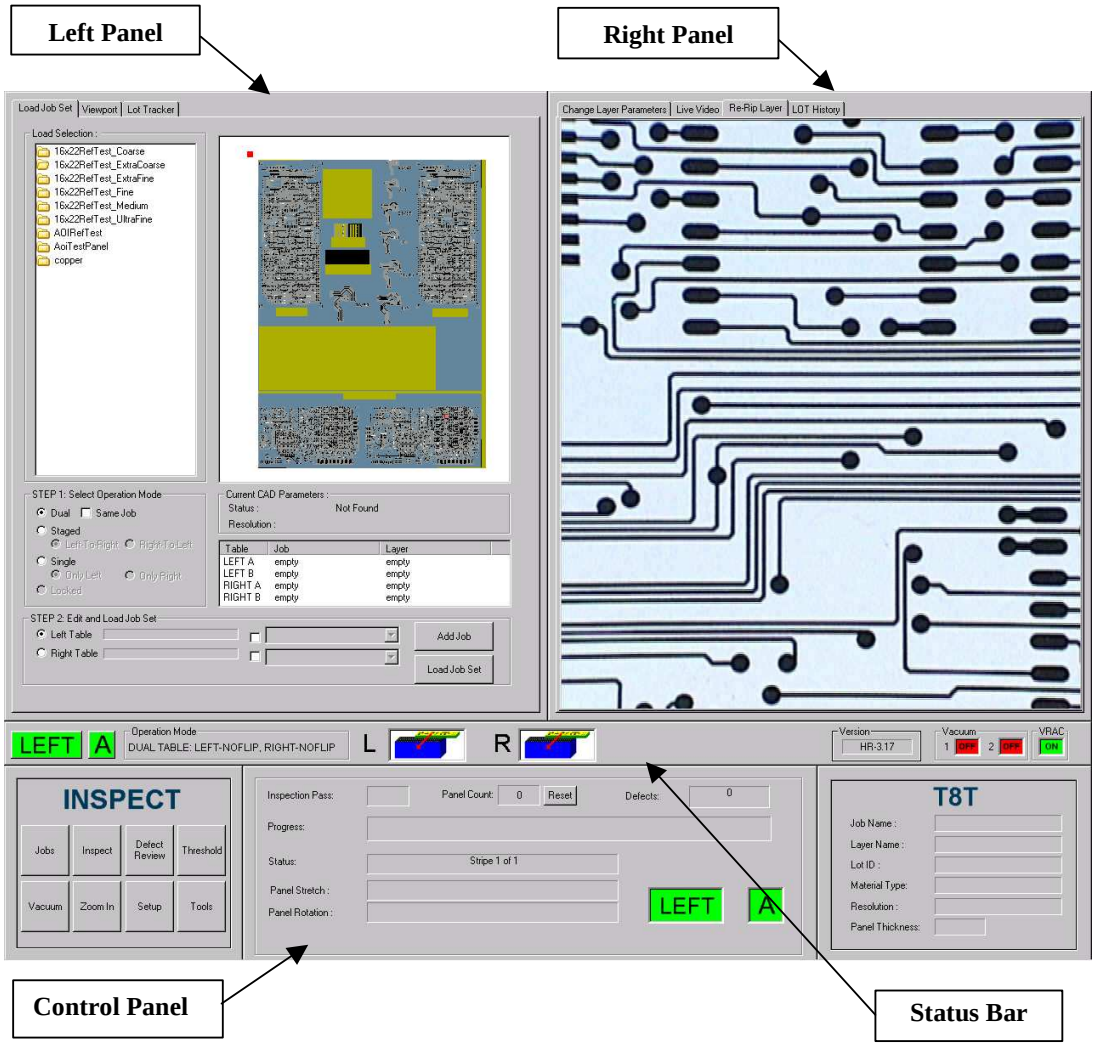
4. **The Vrac4Proxy program *(on HR Systems only)***
   This can be minimized if desired.



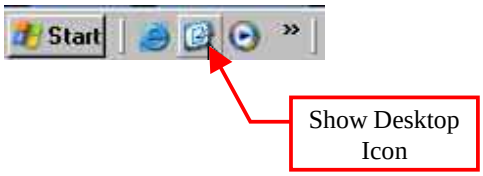
Double click the mouse on the **Titan** icon. After the Mania Technologie banner appears, the Titan application interface opens.

The Titan Application Interface

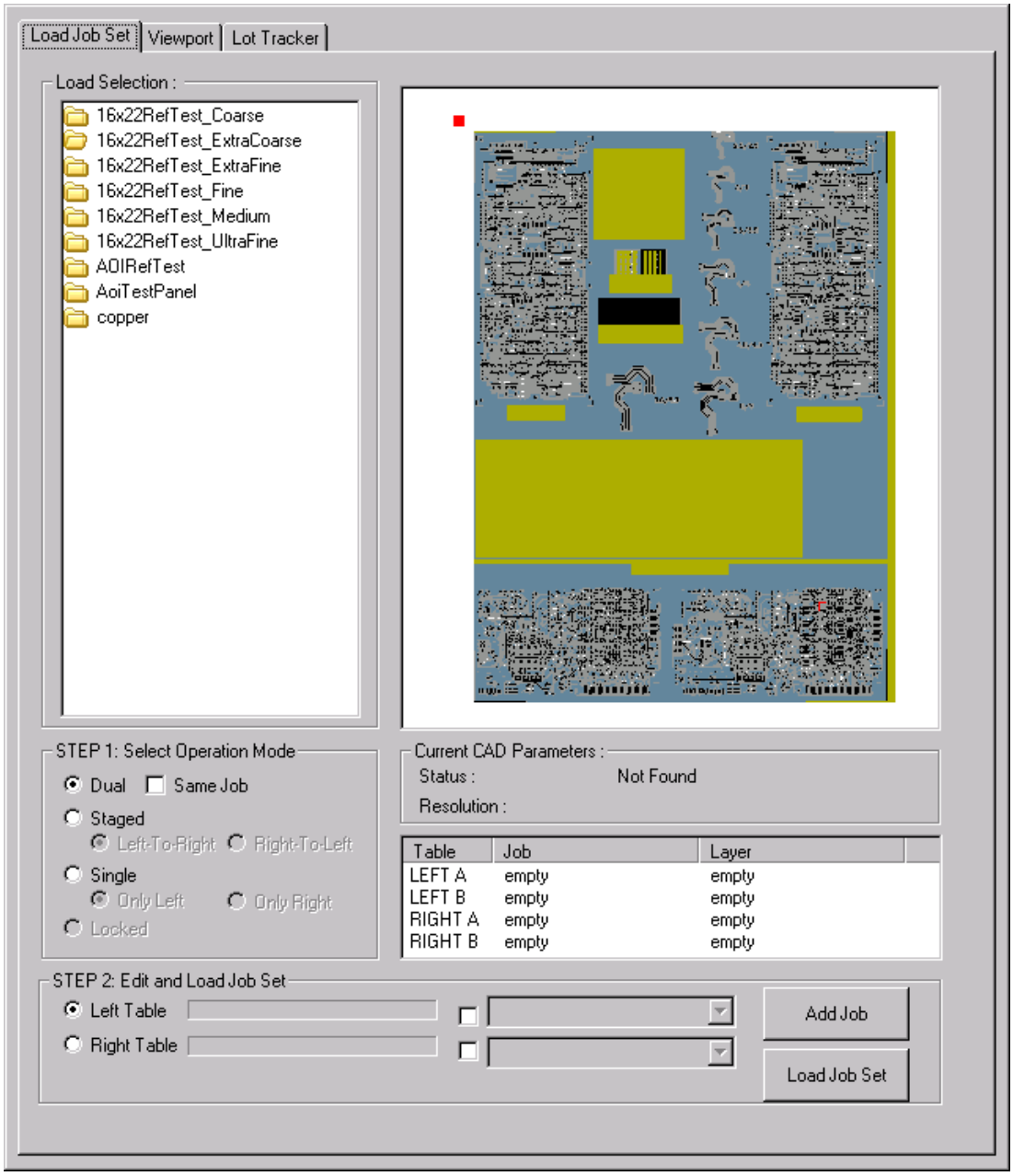
The Titan interface is designed to use the maximum amount of monitor real estate available. For this reason, the four main window panes (Left, Right, Status Bar, and Control Panel) of the Titan Graphical User Interface (GUI) are static, meaning they cannot be resized. This ensures that all possible space is used at all times.



Other Windows programs can be started by clicking on the **Show Desktop** icon located on the Task Bar – near the Start button.



The Left Panel



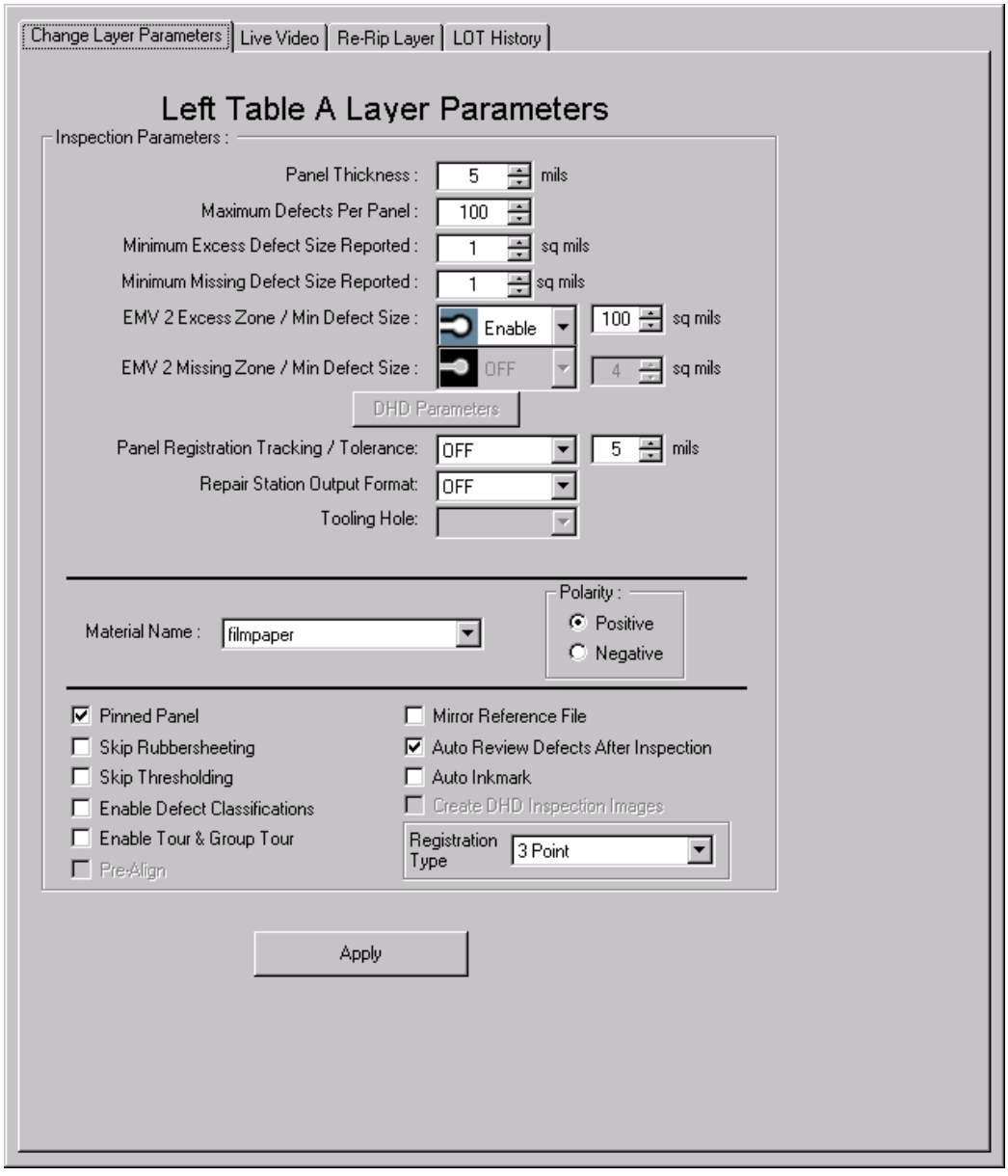
The Left panel has three Tabs along the top of the window:

Load Job Set – is used for setting up the Operation modes and for loading the job data.

ViewPort – is used to display either the actual CAD data, or an overlay that includes CAD data overlaid by the scanned result of the panel being inspected.

Lot Tracker – is used to display inspection results for the current lot

The Right Panel



The Right panel also has three Tabs along the top of the window:

Change Layer Parameters – This has all the layer parameters for the job that was loaded.

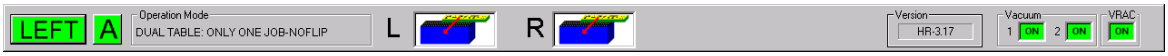
Live Video – This is used for the live video display when the live video is active. When necessary, this area displays dialog boxes used during configuration or setup procedures. In addition, feature measurements can be performed from the live video screen using live video measurement tools.

Re-Rip Layer – This is used to change CAD parameters and re-rip a job.

Lot History – This is used to display all the inspect results for the current or selected lot and it will display charts that show the statistical distribution of defects.

The Status Bar

This area shows the state of the system at a glace.



➔**The active table** (Left or Right) and layer (A or B) are displayed on the left side of the Status Bar. The different states are as follows:

…Left table active with layer A loaded.

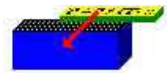
…Left table active with layer B loaded (Flip Panel).

…Right table active with layer A loaded.

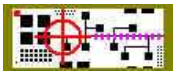
…Right table active with layer B loaded (Flip Panel).

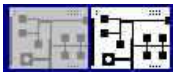
➔**The Operation Mode** displays the selected mode from the *Load Job Set* window.

➔**The Left and Right table icons** change their shape depending on the operation being performed. The seven different states are as follows:


…Ready to load a panel.

…Waiting to Inspect.


…Performing the Registration process.


…Performing the Threshold process.


…Inspecting.


…Performing the Defect Review process.

…Inspection Aborted.

➔**The Version display** indicates the version of software that is currently installed.

➔**The Vacuum indicators** indicate whether the vacuum is on or off.

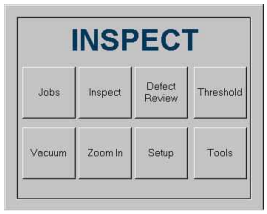
➔**The VRAC indicator** indicates whether VRAC (Pinless Registration) is on or off.

Control Panel

This area of the GUI is used as the main dialog area. When a job is opened, pertinent information regarding the job is displayed in this panel.

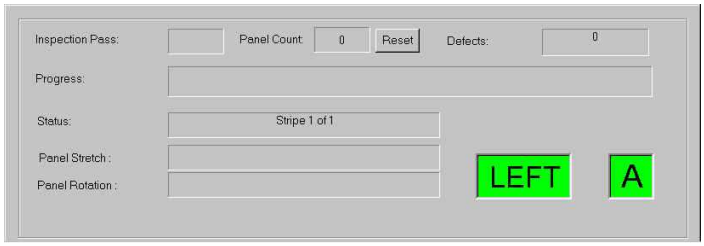
Control Panel:

The left side of the Control Panel displays a representation of the function keys F1 through F8. These may be used interchangeably with the keys on the Titan Keypad.



(See the next page for a full description of the Keypad keys.)

The middle section of the Control Panel shows the status of the inspections. The Defects, Progress bar, and Status boxes change during the inspection process. The other boxes are described below.



Inspection Pass: The number of inspections performed with this Lot.

Panel Count: A resettable counter that can be used by operators.

Panel Stretch: The X and Y axis stretch values are determined by the registration process that precedes an inspection.

Panel Rotation: The rotation value is determined by the registration process that precedes an inspection. This number is a value per inch.

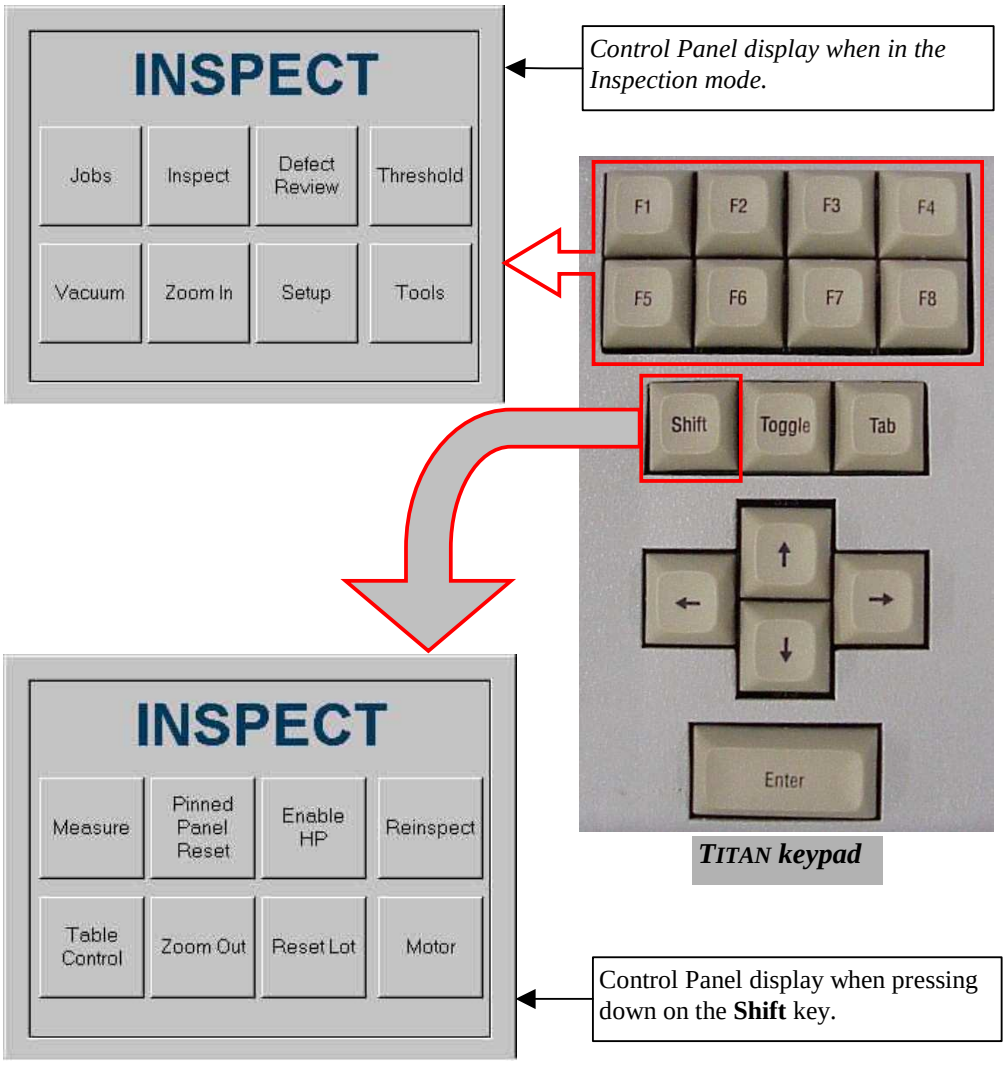
The right side of the Control Panel displays the job name, the layer name, the lot, the material, the resolution, and the panel thickness.

This window will be labeled according to the machine type. Current labels are:

TITAN
T8T
autom8tor.

The Titan Keypad

The Titan keypad is an easy-to-use 16-key interface that allows a user to conduct all inspection and defect review procedures. For ease of use, there are two keypads – one on each side of the Titan. The eight function keys on the keypad mirror the corresponding function buttons on the Control panel of the Titan application interface (as shown below). This makes it possible to navigate the application's software functions using only the keypad. Holding the Shift key down by itself will display the (Shift) functions on the Titan application's Control Panel *(as shown below)*.



TITAN keypad

Note: *In addition, these function buttons correspond to the F1 through F8 function buttons on the system's keyboard.*

The functionality of each key is described below and on the following page:

F1 through F8 - These function keys change depending on the current menu on the Control panel of the Titan interface. For example, if you were in the Inspection mode, the F1 through F8 function keys would operate as shown above.

Note: *The Vacuum can only be turned on and off with the F5 Key on the Titan keypad. It will not work with the F5 Function key on the system's keyboard or by clicking the Vacuum key in GUI with the mouse.*

Tab – The Tab button is used to proceed from the current input focus of a user interface to the next logical interface control. Every user interface screen has a defined "Tab order."

Toggle – Pressing the Toggle button alone causes the light pointer to toggle on or off. Pressing the Toggle key together with either the Shift or Tab keys also has the following functions:

Toggle + Shift – Toggles the X-axis slew keys ⇧⇩ between the left and right tables (called X1 and X2 respectively).

Toggle + Tab – Toggles the Y-axis slew keys ⇦⇨ between the scan head and the Live Video heads (called Y1 and Y2 respectively).

Shift – The Shift key extends the operation of the other keys on the keypad.

In addition, simultaneously pressing the Shift with the Tab key causes the current input focus of the user interface to move to the previous control in the menu tab order.

Finally, simultaneously pressing the Shift key and the Toggle button causes a change in state when the current input focus of the user interface is a check box control.

Holding down the shift key while pressing the function keys can activate additional hidden functions as shown on the previous page. The following functions are defined:

Measure (Shift + F1) – Activates the measure function, which allows you to measure between any two points on the panel using the Live Video Display.

Reset Pinned Panel (Shift + F2) – Allows you to Reset the ☑ Pinned Panel selection (if checked in the Layer Parameters window) for the next inspection only – when you press F2.

Enable HP (Shift + F3) – Put the system into a High Production Mode.

Reinspect (Shift + F4) – Allows the operator to re-do an inspection using the same Inspection Pass number.

Table Control (Shift + F5) – Activates the table control that switches the arrow keys to move the table. Note that this can only be accessed via the Titan Keypad.

Zoom Out (Shift + F6) – Allows you Zoom-Out in the Live Video display.

Reset Lot (Shift + F7) – Allows you to reset (rename) the active Lot. A popup window appears asking you… Are you sure?

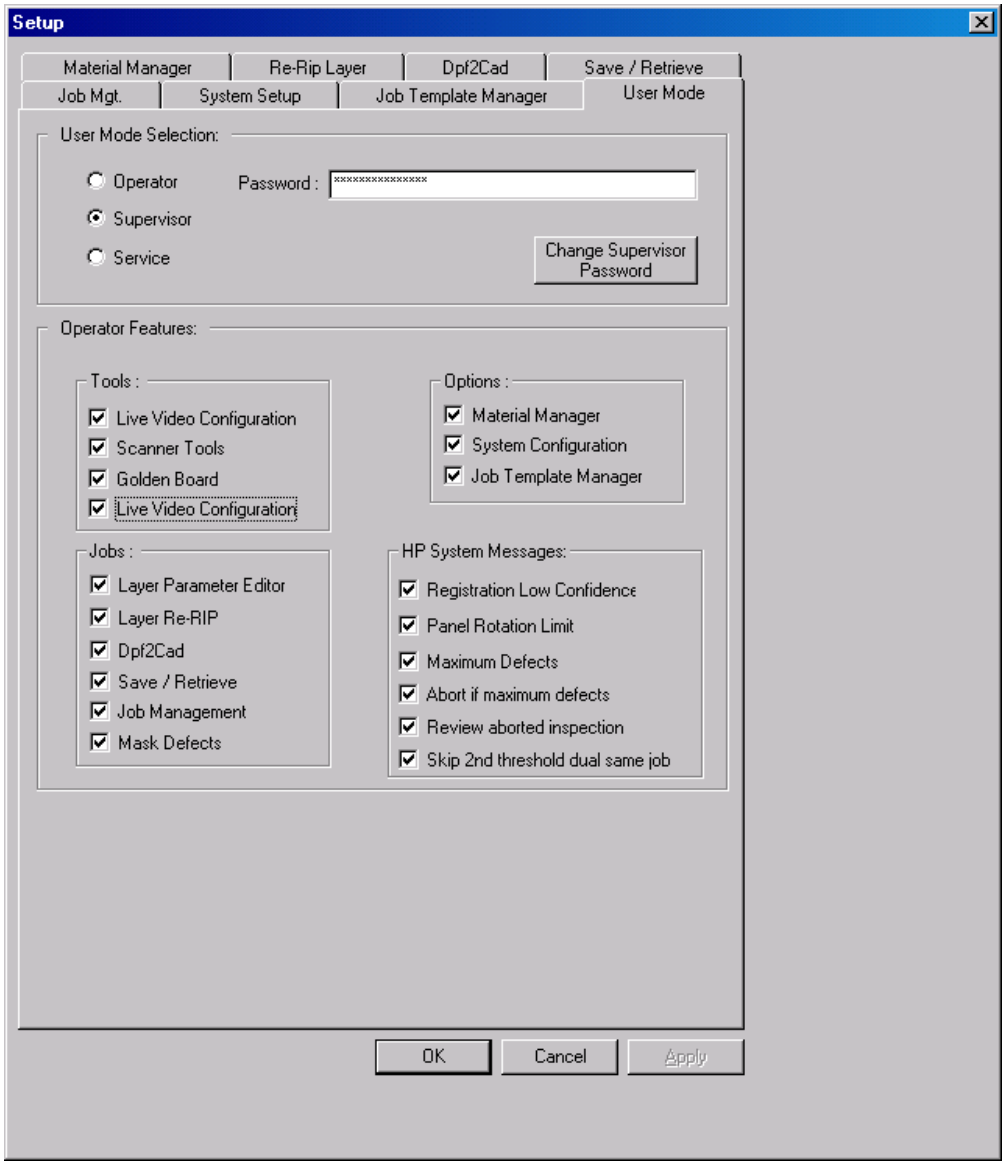
Motor (Shift + F8) – Toggles the vacuum motor on or off. Accessible only from the Titan Keypad.

Arrows – The arrow keys are used both for controlling the table motion and controlling the menu components. Pressing two buttons (except opposite buttons) will move the table diagonally. Also… Simultaneously pressing the Shift key and an arrow button causes the speed of the table motion to slow.

Enter – The Enter key accepts the changes you've made to a dialog box or window. In most cases, the Enter key defaults to the OK button of the dialog box.

System Administration

The Titan system is specifically designed with two distinct users in mind: a supervisory-level user and an operator-level user. The system interface is designed for a supervisory-level user who is familiar with computer operations, file management, and system configuration, and who has a good understanding of material management and inspection processes. A supervisor would most commonly configure the System Administration dialog. He or she would use this dialog to determine access rights of operators as well as set or change passwords.



The **Operator Features** are described below:

Tools:

Live Video Configuration – Determines whether an operator can use the live video configuration page to change live video settings, calibration, etc.

Scanner Tools – Determines whether an operator can access scanner tools.

Golden Board – Determines whether an operator can use golden board functionality.

Note: *Golden Board functionality is not available on High Resolution systems.*

Options:

Material Manager – Determines whether an operator can create, edit, or delete materials with Material Manager.

System Configuration – Determines whether an operator can modify system configuration parameters.

Job Template Manager – Determines whether an operator can create, edit, or delete job templates with Job Template Manager.

Jobs:

Layer Parameter Editor – Determines whether an operator can edit layer parameters with the Layer Parameters Editor.

Layer Re-Rip – Determines whether an operator can modify CAD parameters and re-rip layers.

Dpf2Cad – Determines whether an operator can manage the Dpf2Cad application from the Dpf2Cad dialog.

Save/Retrieve – Determines whether an operator can save, retrieve, edit, or delete jobs form the Save/Retrieve dialog.

Job Management – Determines whether an operator can delete, rename, or copy a job from the Job Mgt dialog.

Mask Defects – Determines whether an operator can mask defects during the Defect Review process.

HP System Messages:

The high production system message options allow the supervisor to streamline high production mode operation. During high production mode, the system may ask the operator to handle various abnormal conditions. Typically, most of the system prompts ask the operator whether he would like to continue or abort an inspection.

Registration Low Confidence – If in high production mode and this option is enabled, the Registration Low Confidence message will not be displayed to the operator if Inspect determines that registration has low confidence and inspection is allowed to continue.

Panel Rotation Limit – If in high production mode and this option is enabled, the Panel Rotation Limit message will not be displayed to the operator if Inspect determines that the panel has excessive rotation and inspection is allowed to continue.

Maximum Defects – If in high production mode and this option is enabled, the Maximum Defects message will not be displayed to the operator if the inspection has exceeded the maximum number of defects and inspection is allowed to continue.

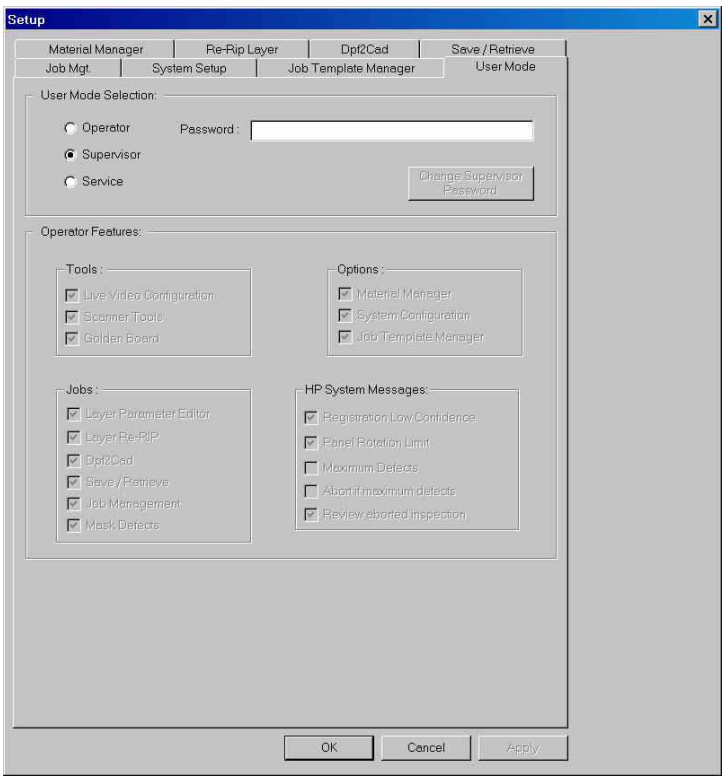
Abort if maximum defects – If in high production mode and this option is enabled, the system will automatically abort an inspection if the inspection has exceeded the maximum number of defects.

Review aborted inspection. If in high production mode and an inspection was aborted, then the system will not ask the operator whether he would like to review defects from the aborted inspection.

Skip 2nd threshold dual same job – If this option is enabled, the system will automatically use threshold information from the left table for the right table. Otherwise, the threshold operation must be performed for both tables.

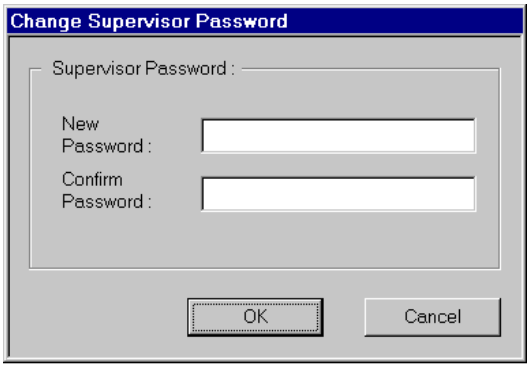
How to establish Access rights for operators

1. Select the **Setup** button on the ***Inspect*** section of the Control panel and then select **User Mode**.
2. Select the **Supervisor** radio button.
3. Type in the password. *(Default password = argossupervisor)*
4. Press the **Tab** or **Enter** key. The operator features will be highlighted. Make the changes as needed.
5. When done, select the **Operator** button and click **OK**.



How to change a supervisor password

1. Select the **Setup** button on the ***Inspect*** section of the Control panel, then select User Mode.
2. Select the Supervisor radio button.
3. Enter the password.
4. Press the **Tab** key.
5. Click the Change Supervisor Password button. A message box appears.



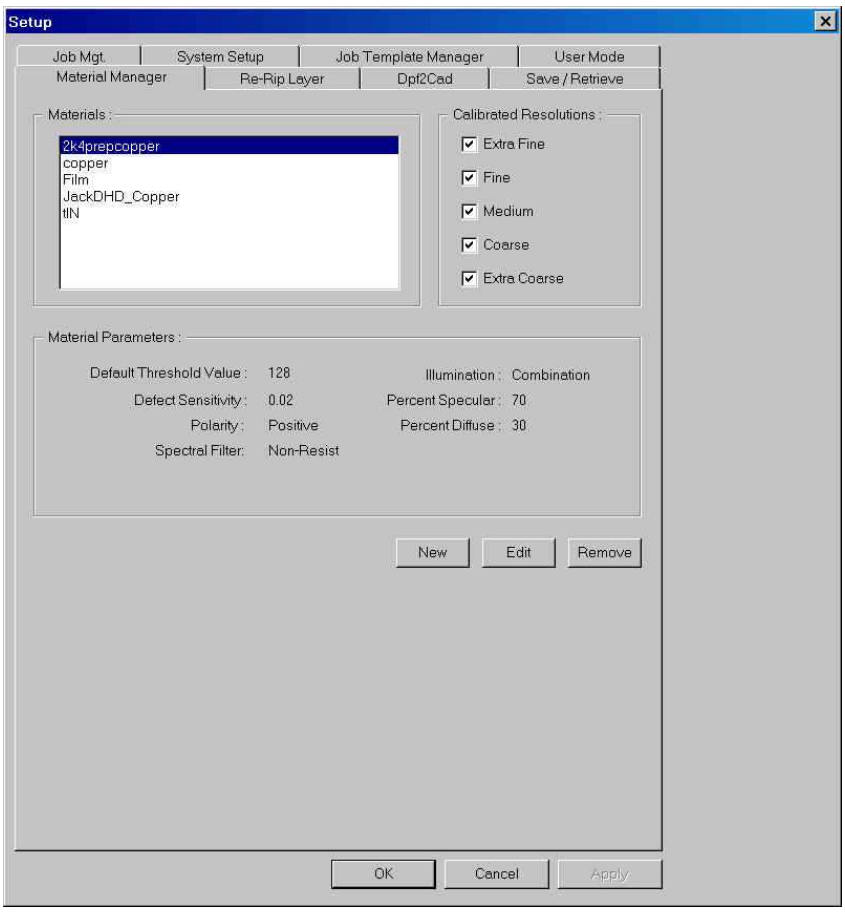
6. Enter a new password in the New Password field.
7. Re-type the new password in the Confirm Password field.
8. Click **OK**.

Materials Management

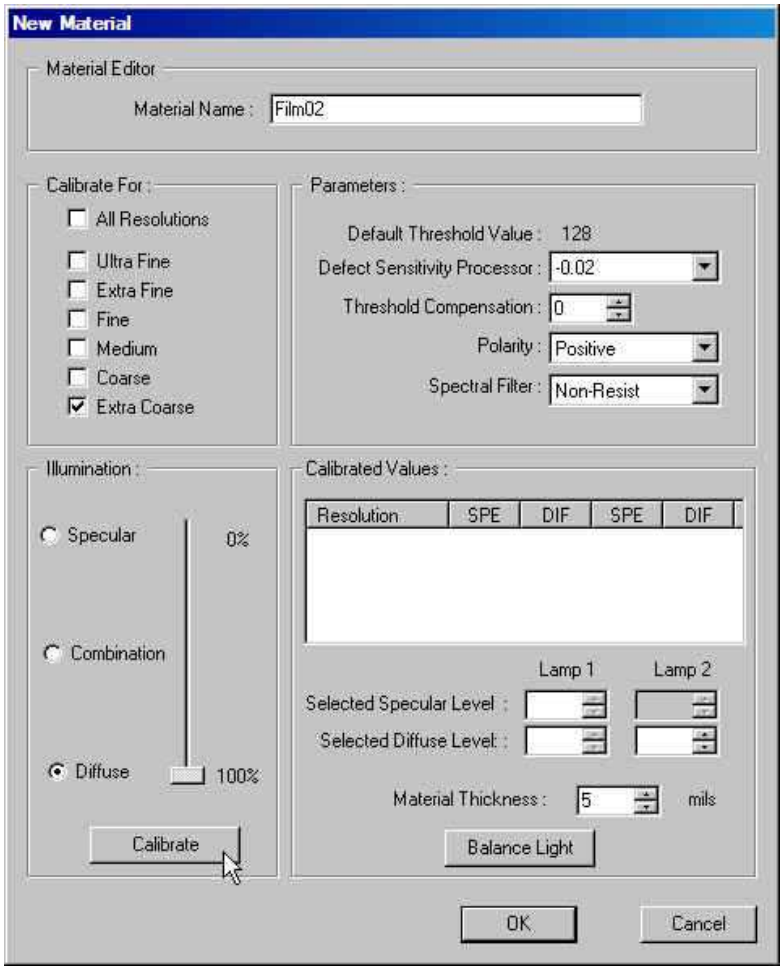
The Materials Management dialog is intended for supervisory-level users. A user who sets up materials for inspection must be familiar with the type of material, as well as the particular qualities of that material. When a material is properly setup within this dialog, the operator can inspect it quite easily. This dialog allows you to create or edit a material, calibrate the selected material to specific resolutions, set illumination, and select polarity.

How to create a new material

1. Click the **Setup** button on the ***Inspect*** section of the Control panel. In the **Setup** window, select the **Material Manager** Tab.



2. Click the **New** button on the Material Manager Tab. The New Material window opens.



3. Type in a name for the new material in the **Material Name** field.
4. In the **Calibrate For:** box, select the resolutions for which you want to calibrate. The resolutions selected here relate to the CAD data. You will want to calibrate for every resolution that you will encounter. For example, if you create a material called "Film" and you know that you will have lots that have resolutions of Extra Coarse and Extra Fine, you will want to calibrate for these resolutions.
5. In the **Parameters** section, select the desired values as follows:
   - Set the desired **Defect Sensitivity Processor (DSP)** value by selecting a value from the pull down list. This can be used to either increase or decrease the sensitivity of the inspection.

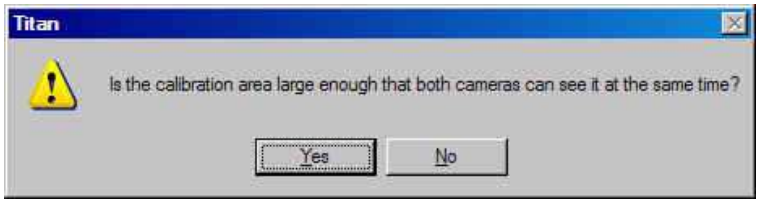
For example, if you want to *Increase* the system's sensitivity to small defects, decrease the DSP value. If you want to *Decrease* the systems sensitivity to tarnish and stains, increase the DSP value. *This can be left as **0.00 Medium** for new materials and fine tuned later (if necessary).*

- Set the desired **Threshold Compensation** by using the arrow keys or entering a positive or negative number. This setting modifies the threshold value by the entered amount. For example, if the system has a threshold value of 88 and the Threshold Compensation is set to –6 the system will use a value of 82. *This also, can be left as the default value, **0** for new materials and fine tuned later (if necessary).*
- Set the **Polarity** to Positive or Negative. A positive polarity indicates that the material is a light background and the etching is dark (Film). A negative polarity indicates that the background is dark and the etching is light (Copper).
- Select a filter from the **Spectral Filter** pull down list. An operator can select either Resist or Non-Resist as the Spectral Filter. Resist is generally used for Diazo film or blue resist on copper, while Non-Resist is generally used for film and shiny copper. The system will automatically adjust the filters depending upon your selection here.

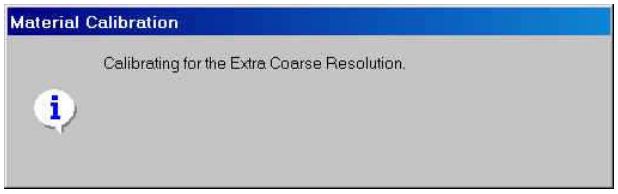
Note: *The system must be equipped with the **Multi Surface Inspection for low contrast Dry film and Resist materials** option to automatically select the Resist spectral filter.*

6. In the **Illumination**: section, select the type of illumination for which you'd like the material calibrated. ⊙ **Specular** shines directly on the material and is most often used for materials such as copper etched boards. ⊙ **Diffuse** light shines on the material at an angle and is most often used for film. You may also balance the illumination by selecting the ⊙ **Combination** radio button. *See Guidelines for Setting up Specular and Diffuse Percentages on page xxx (TBD later) for more setup information on common materials*.
7. Adjust the **Material Thickness** to the thickness of the material in mils.
8. In the **Calibrated Values:** section, click the Calibrate button. A message box appears.

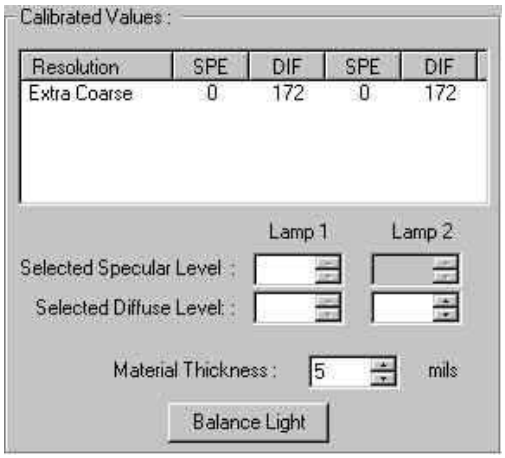
9. Depending on the current system pointer setting, the operator is asked to position either the light pointer or the live video crosshair over a suitable area for material calibration. Typically, an area of the material that is most reflective is best. For example, for film, an area of all white is best; for a copper panel, an area of all copper is best.
10. When the pointer is in position, click on **OK**. A secondary message box appears.



11. If the calibration area is wide enough so that when the left camera moves to the indicated position the right camera will also be over the calibration area, click **Yes** for a faster calibration. If only the left camera will fit, click **No.** In that case, first the left camera will use the area and then the right camera will use it. That will take more time.
12. When calibration starts the **Calibrate** button changes to an **Abort** button. If the **Abort** button is clicked, the calibration in progress will finish but no remaining ones will start.
13. The Material Calibration message box appears, indicating which resolution is being calibrated.



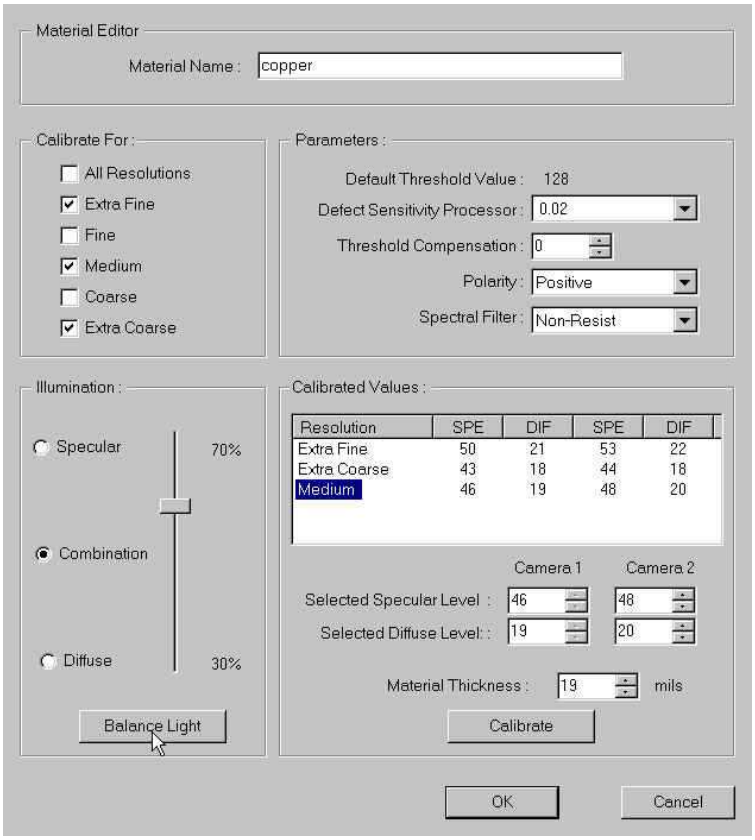
When calibration is complete, the system populates the Calibrated Values table with the result of the calibration.



14. Click **OK** if you are done; otherwise, continue with the next section to make advanced light parameter adjustments.

Using the Light Balance Feature

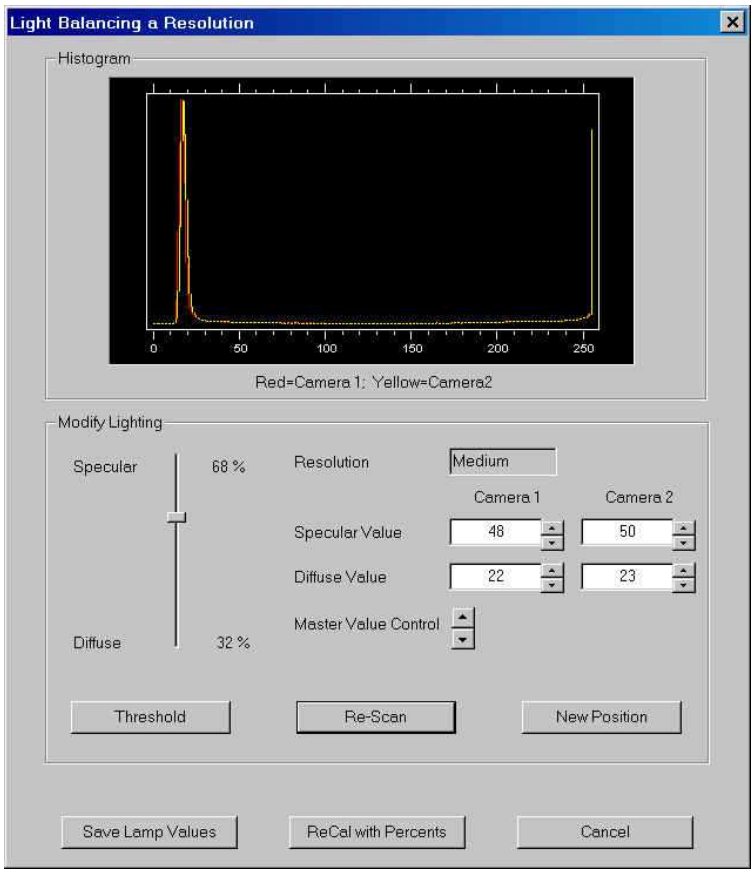
1. Select the resolution from the Calibrated Values table. The resolution will become highlighted and the **Selected Specular Level** and **Selected Diffuse Level** fields become active.



2. Click the **Balance Light** button. A message appears:

3. Position the cursor over an area that is a good representation of the entire panel. For example, an area that includes a section of circuitry and has equal amounts of black and white data.

4. Click **OK** in the message box. The *Light Balancing a Resolution* window appears.



Note: *The Histogram shows values between 0 and 255. These values represent the pixels of the scanned area. A completely black pixel has a value of 0, while a completely white pixel has a value of 255. Pixels with varying amounts of black and white (gray) have values in between. A perfect scan would have a spike at 0 and a spike at 255, with no other values represented on the histogram. However, since perfect scans are nearly impossible to obtain, the histogram will show varying values between 0 and 255. The goal when balancing a resolution is to obtain a peak as close to 0 as possible, a peak as close to 255 as possible, and have the greatest distance possible between the two values.*

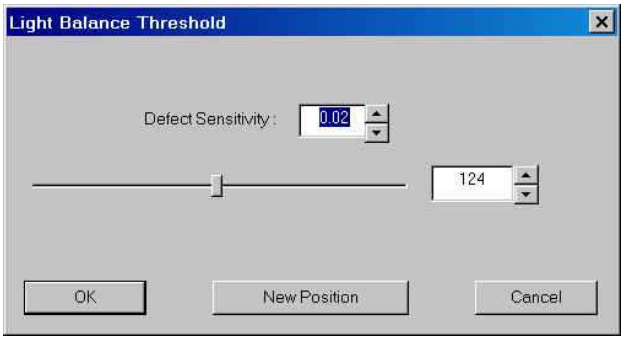
5. In the **Modify Lighting** area, adjust the **Specular – Diffuse** slider as desired to adjust the percentages of light.

Note: *Any adjustments you make using the controls in the Modify Lighting area will not change the histogram until after you click the Re-Scan button.*

6. If desired, in the **Specular Value** box, type or select a value between 0 and 255.
7. If desired, in the **Diffuse Value** box, type or select a value between 0 and 255.
8. Use the **Master Control Value** arrows to increase or decrease the Specular and Diffuse values proportionately.

Note: *Each click of the Master Control Value changes the larger of the two values, and then changes the smaller value by the percentage. So for example, if you had a 67%-33% slider (a 2 to 1 ratio) and the values were 100 and 50 respectively, every click would change the larger value by one and every 2 clicks would change the smaller by one.*

9. Click the **Threshold** button if you'd like to verify that proper threshold settings exists for the current light values. The *Light Balance Threshold* dialog box appears.



   - In the **Defect Sensitivity:** box, type or select a sensitivity number.
   - Use the slider, or type, or select a threshold value. As you change the slider or value, the image changes accordingly.
   - Click **OK**. The *Light Balancing a Resolution* screen re-appears.

10. Click the **Re-scan** button if you'd like to update the picture and histogram based on the changes you made in the Modify Lighting area.
11. Click the **New Position** button if you'd like to re-position your cursor over a different area of the panel. The original prompt re-appears.

   - Position the cursor over a different area of the panel.
   - Click **OK**. The Light Balancing a Resolution screen re-appears, displaying the values of the new area.

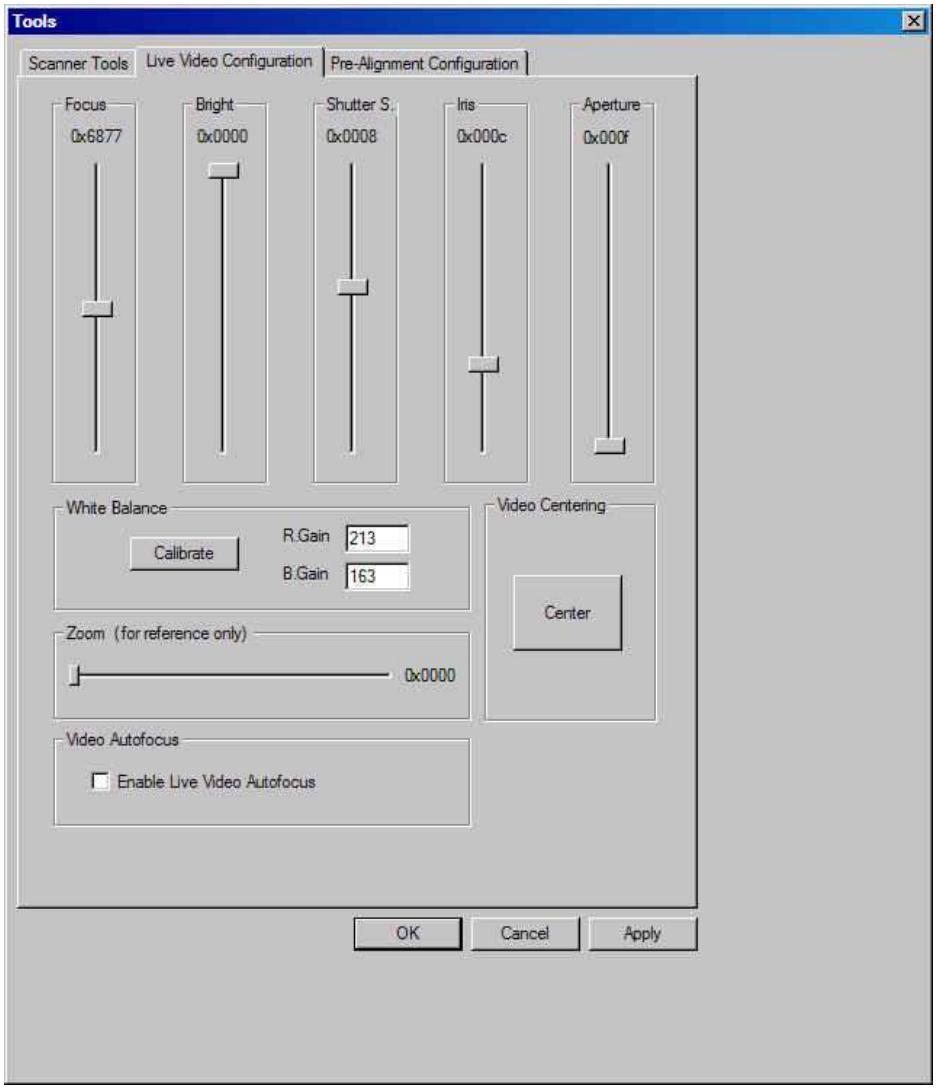
12. Exit the Light Balancing a Resolution screen in one of the following ways:
   - **Save Lamp Values** – Saves the lamp values you inputted in the Modify Lighting area.
   - **ReCal with Percents** – This recalibrates the value with the new percentages.
   - **Cancel** – Cancels any changes you made and returns you to the New Material screen.
13. Click **OK** in the Material Editor window and **OK** in Setup.

Live Video Configuration

The Titan system includes tools that allow you to fine-tune the live video configuration. Controls are included that allow you to adjust the focus, brightness, Shutter Speed, Iris, White Balance, and Zoom Level.

First, Setup the Controls and the White Balance

1. Select the **Tools** button from the Inspect area of the Control Panel. The Tools window appears in the CAD Panel area of the Titan GUI. Click on the **Live Video Configuration** Tab.



2. Position the Live Video over a white background on the Titan Test film. Zoom in just enough so the light ring LED's do no show in the display.
3. Click on the **Calibrate** button in the White Balance box. The system updates the gain values.

4. Position the live video over a section of the panel that includes circuitry and background representative of the panel.

Note: *The Focus slider can be used here, if necessary, to get a good image. However, the focus setting is not saved on the Titan machine. Instead, a Focus Table is created for each of the focus levels – and for each material thickness used on the system.*

5. Set the **Shutter S.** slider to 0x0007 (or 0x0008) as a default starting point.
6. Set the **Iris** slider to value that gives enough light.
7. Set the **Aperture** all the way open and adjust the **Bright** slider for the best display. This should require very little adjustment. The lower the value of the Bright slider, the less chance for noise in the Live Video display.

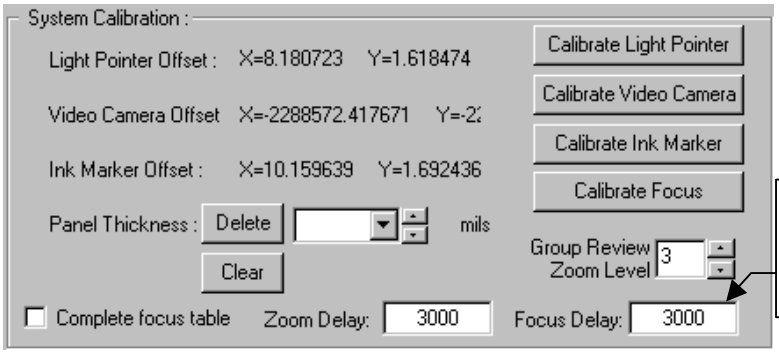
Note: *Film will usually appear a little brighter than copper.*

8. When satisfied with the results, click **OK**.

Create a Focus Table for Film

Unlike the Argos systems, the Titan's Live Video camera is on a separate axis from the scan head. For this reason, the Live Video camera is not automatically in focus when a new material thickness is used. A Focus table needs to be set up for each material thickness that will be used. Create a Focus Table for Film (5 mils) as follows…

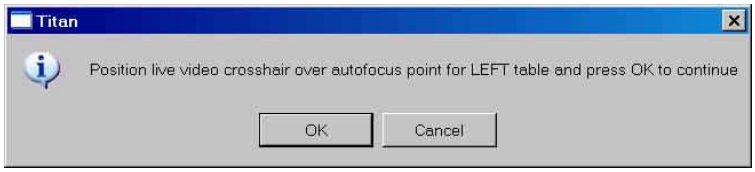
1. Click the **Setup** button on the ***Inspect*** section of the Control panel.
2. Select the **System Setup** Tab in the *Setup* window.
3. In the System Calibration section, select (or enter) **5.00** mils in the Panel Thickness box – if using film.



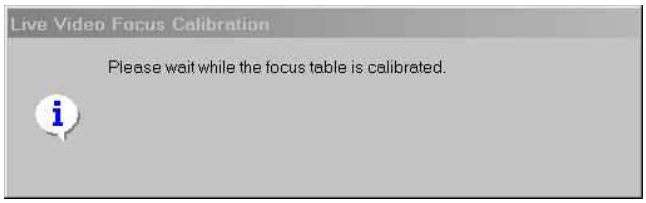
Ensure the ☑ **Complete focus table** box is checked and both the delays are set to 3000 – at least. By default, these numbers allow 3 seconds for the camera to zoom to each level and for the auto focus to settle before recording the numbers.

Note: *If this focus calibration give poor results, it might be necessary to increase these numbers slightly.*

4. Click on the **Calibrate Focus** button. You will be prompted along as follows.



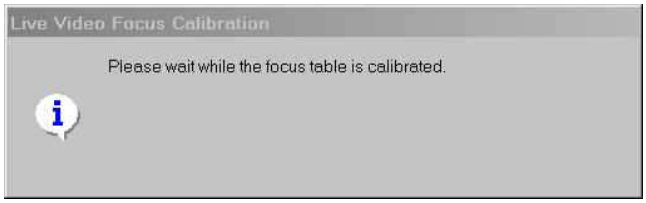
5. Position the Live Video crosshair over a busy area of the film or panel on the left table and click **OK**.



6. The Live Video camera zooms in to each of its 5 levels of zoom and records the focus numbers from that zoom level in the focus table.

7. Position the Live Video crosshair over a busy area of the film or panel on the right table and click **OK**.

Note: *The camera can stay on the left table if you know that both tables are the same height – or if you don't have material on the right table right now.*

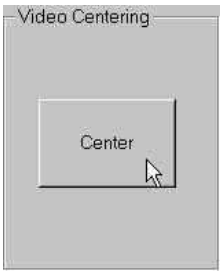


8. When done, click **OK** in the System Setup window.

Live Video Camera Centering

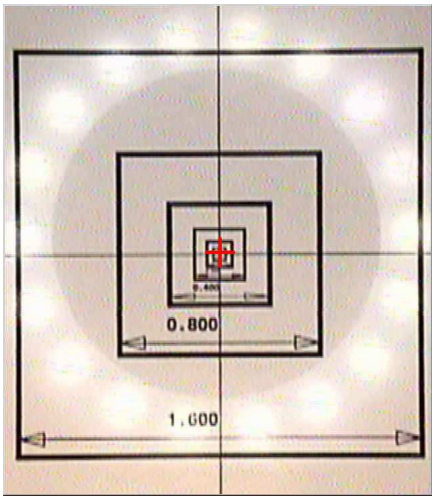
Before performing the Live Video Centering procedure, you must have created a Focus table for film (5 mils). This is usually done in the factory.

1. If necessary, select the **Tools** button from the Control Panel and click on the **Live Video Configuration** Tab.
2. From the Live Video Configuration window, click on the Video Centering **Center** button.

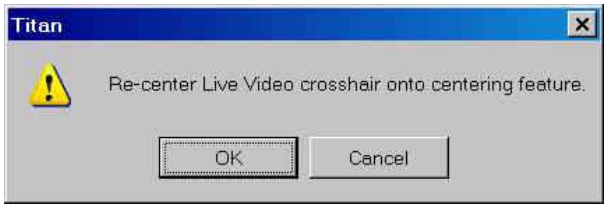


3. You will see the following message:

4. Position the live video cross hair over the center of the boxes on the Titan test film as shown below. This is the best place to do this adjustment because as you zoom in during this procedure, you always know where you are.



5. Click **OK** when you are properly centered. The Live Video camera will zoom in to the next zoom level and ask you to re-center the crosshair as shown.



6. Center the crosshair on the target again by using the slew buttons on the Titan keypad. Click **Ok** when done. This will repeat for each of the 5 zoom levels used by the Titan system.

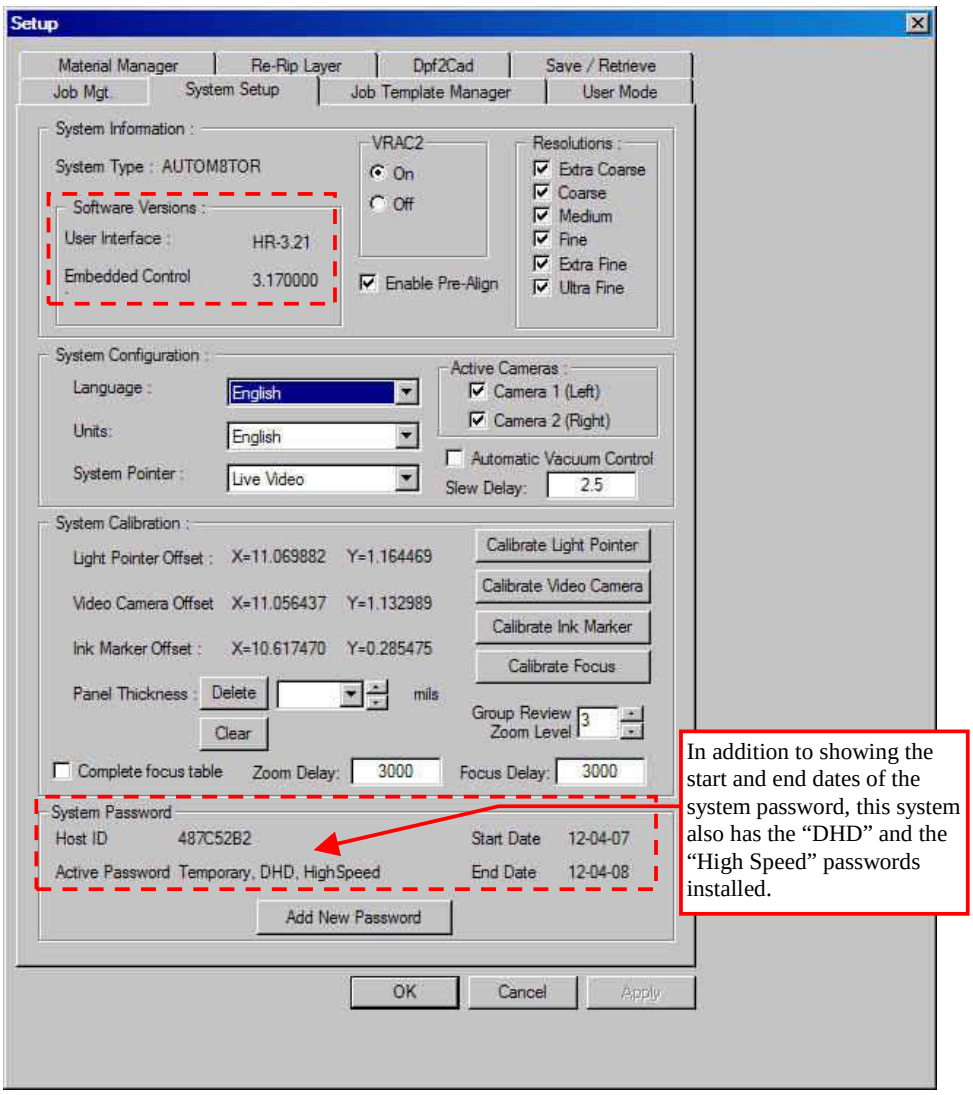
7. When done, click **OK** here and click **Apply** in the Live Video Configuration window. Click **OK** to close the window.
8. The Live Video Calibration procedure must be performed after doing the Centering. Go to the Live Video Calibration procedure in the next section.

System Setup

The System Setup Tab allows you to view the information about the current setup of the system as well as making configuration choices. The information available is shown below in the red dotted boxes – The software version being used and passwords installed.

System Configuration

1. Click the **Setup** button on the ***Inspect*** section of the Control panel.
2. Select the **System Setup** Tab in the *Setup* window. The System Setup screen appears.



3. In the **System Information** box, the only thing that can be changed is the state of VRAC2 (Pinless Registration) function. We recommend that the VRAC2 be set to **Not Wired** if it is NOT going to be used.

4. In the **System Configuration** box, configure the system as follows:

- Select a *language* from the **Language** pull down list.
- Select the *English* or *Metric* in the **Units** pull down list.
- Select either a *Light Pointer* or *Live Video* from the **System Pointer** pull down list.
- In the **Active Cameras** area, you can turn off the left or the right camera by unchecking its check box.

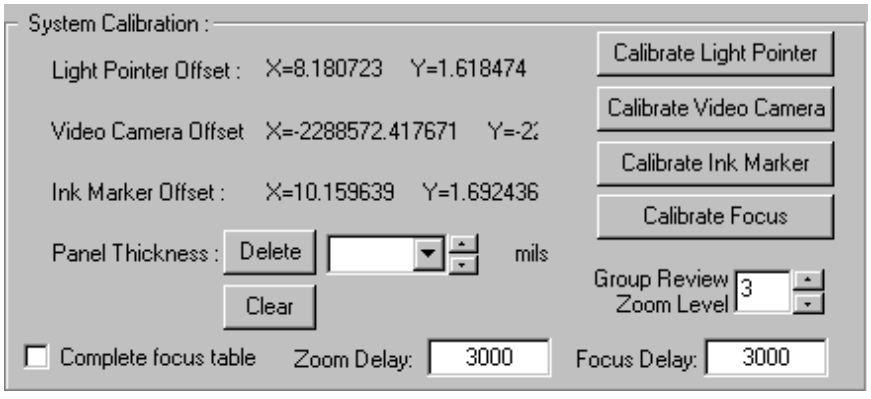
Note: *Restarting the Titan application always sets the Active Cameras back to two-camera mode.*

- Select **Automatic Vacuum Control** to have the system turn the vacuum on and off automatically.
- The **Slew Delay** is used when slewing the servos using the arrow keys on the keypad. When you hold the shift key down while slewing the servos, they will move very slowly for the number of seconds in the Slew Delay. When the Slew Delay times out, the servos kick-in to a faster slew speed. Releasing the Shift key moves the servos at the fastest speed.

The System Calibration Area

Calibrating the light pointer, the Live Video camera, and the Ink Marker is necessary so the system knows the exact distance to each from the center of the left inspection camera. Either the light pointer or the Live Video can be used as the system's pointing device. And the Ink Marker is needed for marking defects – if necessary.

In the **System Calibration** box, you can calibrate the system pointers, the Ink Marker, and the Live Video Focus for different material thicknesses.



Calibrating the Light Pointer

1. Load the Medium resolution test film job on either table.
2. Place the Titan Test Film on a piece of white backing paper on the inspection table.
3. Turn on the vacuum.

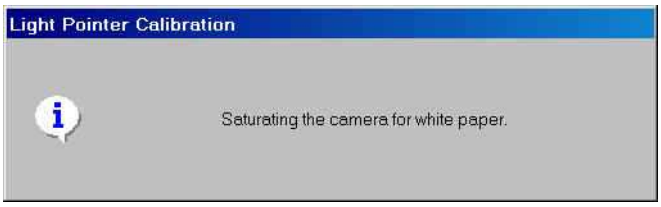
Note: *The only reason to set the resolution to Medium is to save time. The system will set the resolution to Medium in order to calibrate system pointers. When done, it will set the resolution back to the previous resolution.*

4. In the System Calibration section of the System Setup screen, click on the Calibrate Light Pointer button. A Titan message box appears.

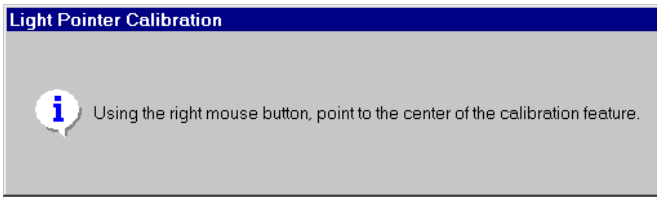
5. Use the keypad arrow keys to position the light pointer over a crosshair on the Test film (or, the crosshair you drew on a piece of paper). Press the Toggle key (if necessary) to turn the Light Pointer on.

Note: *The ideal target for this is the boxes with the crosshair in them – that was used for the Live Video Centering procedure.*

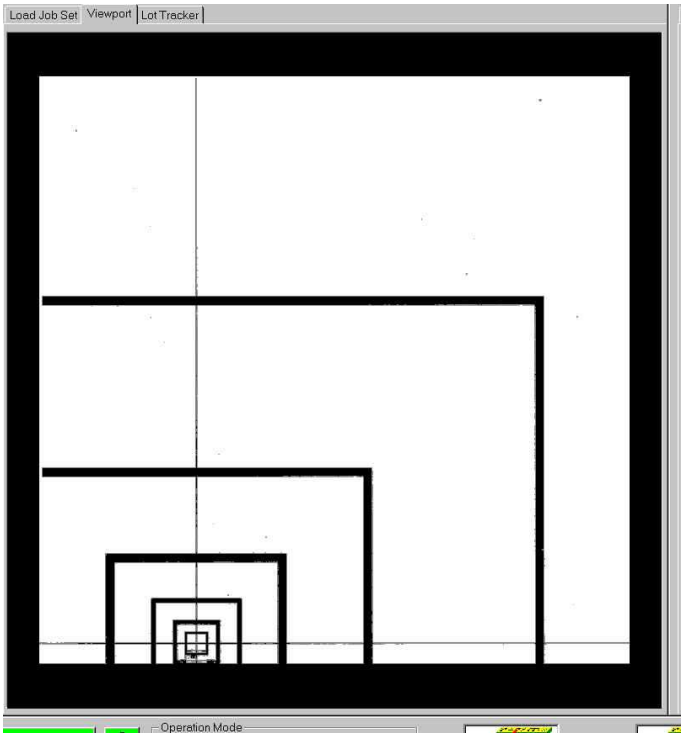
6. Click **OK** in the message box. The system will calibrate the camera for white paper at Medium resolution.



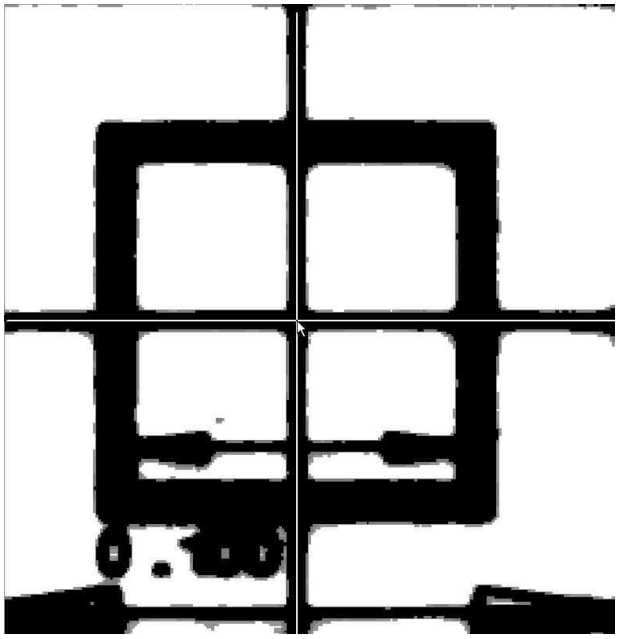
7. After calibration, the system will scan the area you pointed to and display the scan image in the ViewPort. A Titan message will appear.



8. Position your cursor over the center of the scanned crosshair image in the ViewPort area and click the Right mouse button.



9. If necessary, you can zoom in to the scanned crosshair to get a more accurate calibration. Simply click and drag the Left mouse button. Then, center the crosshair in the zoomed image and click the Right mouse button *(as shown below)*.



10. The System Setup window returns and the light pointer calibration is complete.

Calibrating the Live Video Camera

The calibration procedure is almost identical to the light pointer calibration described above.

1. Load the Medium resolution test film job on either table.
2. Place the Titan Test Film on a piece of white backing paper on the inspection table.
3. Turn on the vacuum.

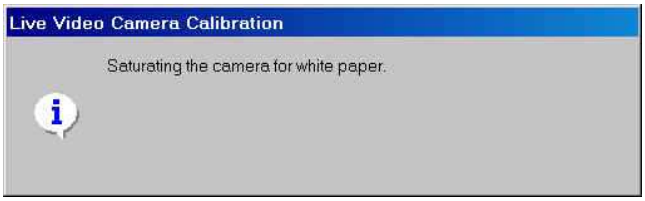
Note: *The only reason to set the resolution to Medium is to save time. The system will set the resolution to Medium in order to calibrate system pointers. (It will set the resolution to Extra Fine on High Resolution systems.) When done, it will set the resolution back to the previous resolution.*

4. In the System Calibration section of the System Setup screen, click on the Calibrate Live Video button. A Titan message box appears.

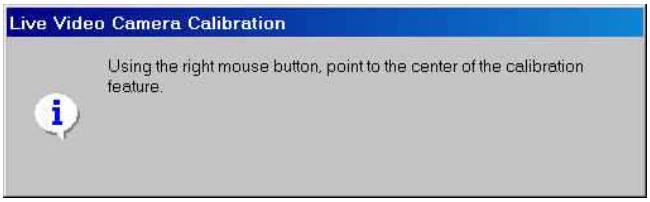
5. Using the key pad arrow keys, position the red live video crosshair over a crosshair on the Test film.

Note: *The ideal target for this is the boxes with the crosshair in them – that was used for the Live Video Centering procedure.*

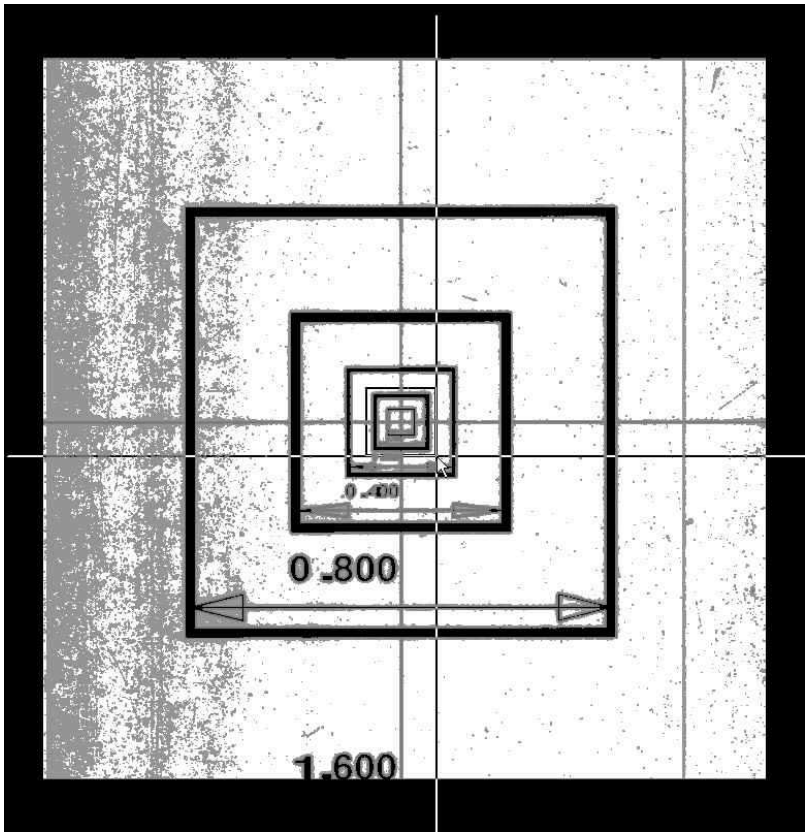
6. Click **OK** in the message box. The system will calibrate the camera for white paper at Medium resolution.



7. After calibration, the system will scan the area you pointed to and display the scan image in the ViewPort. A Titan message appears.



8. Use the keypad arrow keys to position the light pointer over the crosshair on the Test film. Press the Toggle key (if necessary) to turn the Light Pointer on.



9. Position your cursor over the center of the scanned crosshair image in the ViewPort area and click the Right mouse button. If necessary, you can zoom in to the scanned crosshair to get a more accurate calibration as described above in the Light Pointer section
10. The System Setup window returns and the Live Video calibration is complete.

Calibrating the Ink Marker

The calibration procedure is similar to the light pointer and live video calibrations described above. This can be done on Paper only – no film is needed. Black ink should be used.

1. Verify the cover protecting the ink marker has been removed.
2. Place a white sheet of paper on the inspection table and turn on the vacuum.
3. In the System Calibration box, click on the **Calibrate Ink Marker** button. A Titan message box appears.

4. Using the keypad arrow keys, position the ink marker over the paper on the inspection table.

5. Click **OK** in the message box. At this point, the system will place an ink mark on the paper and scan the area.
6. Position your cursor over the center of the ink marked image in the ViewPort area.

Note: *If you are using Blue ink, the image will not be seen after scanning. In this case draw around the ink mark with black ink – without moving the table. Then, repeat the procedure by clicking on the* ***Calibrate Ink Marker*** *button again. It will mark in the same place.*

7. Click the right mouse button. The ink marker calibration is complete.

A Word about Titan Passwords

New systems are shipped with a 90-day Temporary password. You might need to install another Temporary Password before receiving the 1-year Password. The 1-year Password is issued when Mania Technologie receives the final payment for the machine.

If you start the Titan application after the Temporary Password expires, you will see the following message before Titan appears:

If you click **OK**, the following message appears telling you when the password expired:

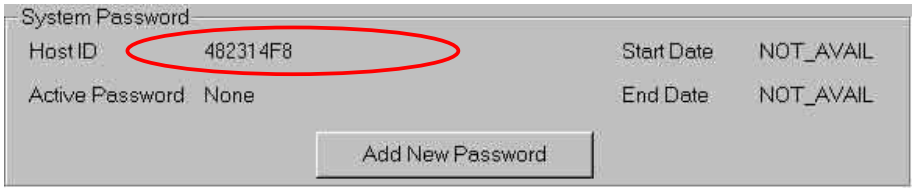
Clicking **OK** again produces the following message:

When this happens, you will not be able to inspect a job. Pressing the Inspect button will reproduce the above message. To get another password, contact the Mania Technologie Customer Care Department (see page 15) with the Titan HostID number.

New passwords are issued automatically every 3 months.

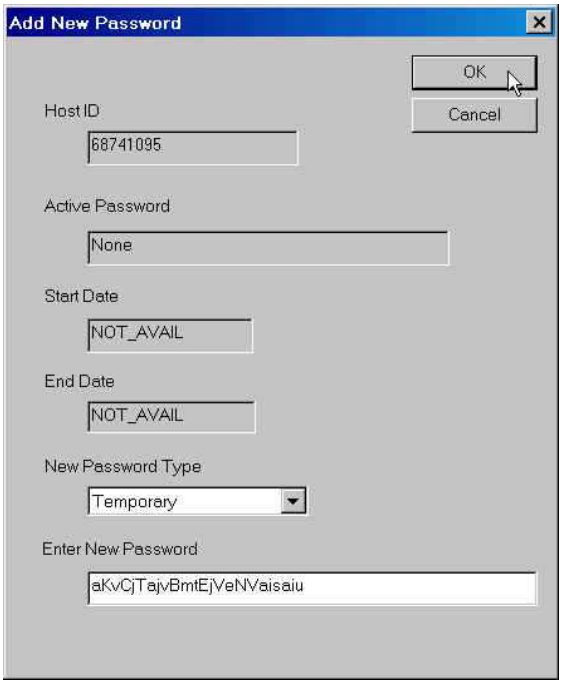
How to find the HostID number

➔ **To get the HostID Number:** Click on **Setup** and select the **System Setup** Tab (as described in the popup message shown above). The following information appears in the bottom of the **System Setup** window…



How to Add a New Password

➔ **To Add a New Password:** Click on the **Add New Password** button. The Add New Password dialog box appears.



1. Select a **New Password Type** – **Temporary**.
2. Enter a new password in the **Enter New Password** field and click **OK**. The following window should appear:

3. Click **OK**.
4. Repeat the above steps, selecting **New Password Type** – **Permanent** for each new *(Permanent)* password being entered.

Note: *Permanent passwords can have multiple numbers. Temporary passwords can have only one at a time.*

The following shows the System Password section of the System Setup window with the Titan password and both Permanent passwords entered.

- The Titan password
- The optional DHD password
- The optional High Speed (HS) password

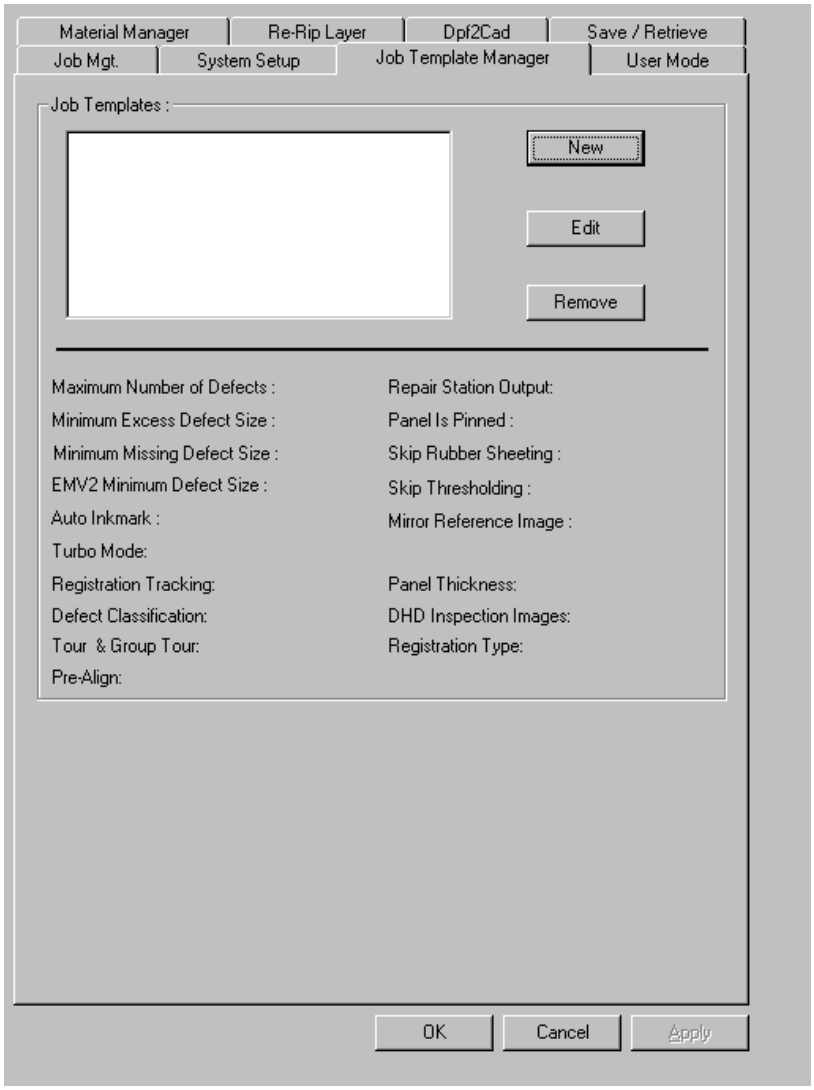
Remember, DHD and High Speed (HS) are software options that are enabled through passwords.

Job Template Manager

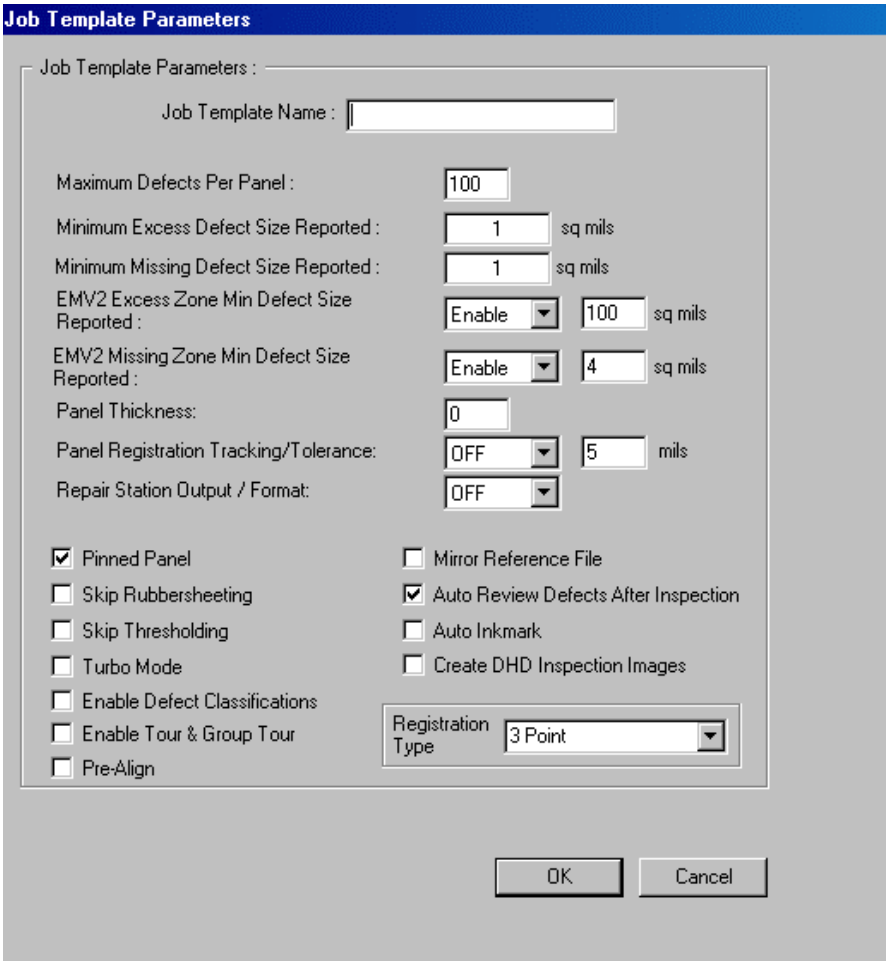
The Job Template Manager allows a supervisor (or user, if he or she has been give access rights) to create or edit a job template. A job template provides the operator with the ability to quickly set up a newly arrived job for inspection. Job templates supply defaults to all inspection parameters for a given job. It should be noted that changing a specific job template does NOT change any existing jobs that may have been configured with the template being edited. Please see the section that describes the editing of layer parameters later in this document. This dialog allows you to set up automatic features such as defect review and auto ink marking.

How to create a new job template

1. Click the **Setup** button from the Inspect panel of the Control area.
2. Select the **Job Template Manager** Tab from the Setup screen. To reveal the Template Manager screen below.



3. Click the **New** button in the **Job Templates:** box. The *Job Template Parameters* dialog box appears.



4. Type a name for your template in the **Job Template Name** field.
5. Input the Job Template Parameters as follows:

Maximum Defects Per Panel	This number represents the maximum number of defects per inspection the system will tolerate before warning the user of excessive defects. When this number is exceeded, the system asks you if you wish to continue the inspection, or if the inspection should be cancelled. This is helpful in the event a panel or material is mounted incorrectly. This can save you considerable time.
Minimum Defect Size Reported (Sq. Mils)	This allows you to determine how large a defect is acceptable. The smaller the number you enter into this parameter, the smaller the defect the system will detect and more defects will be detected.
EMV	
Panel Thickness	This parameter allows you to set the panel thickness.
Panel Registration Tracking / Tolerance	This feature is designed to detect registration problems with pinned panels in one of two ways. In **Absolute mode**, panel registration point coordinates are compared to the expected position relative to a physical pinning point. In **Relative** mode, registration point coordinates are compared against other panels in the lot. If points are outside a user supplied tolerance a warning dialog box is

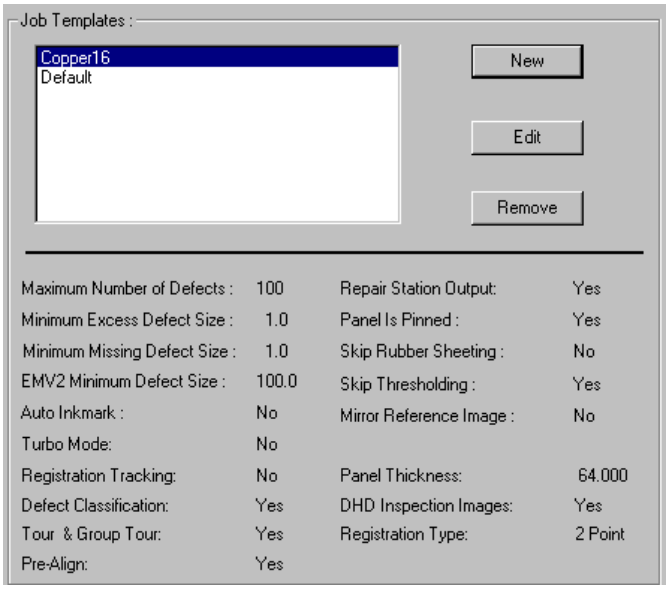
	displayed. A log file, suitable for spreadsheet input, is also generated. By default this is created in the directory D:/aoihome/spc.
Repair Station Output / Format	Defect locations are output on a panel by panel basis for input to the Mania verification/repair station. Output files are sent to directory specified by the REPAIR_OUTPUT_DIR environment variable *(D:\Verification by default)*.

6. Select the Job Template Parameter check boxes as follows:

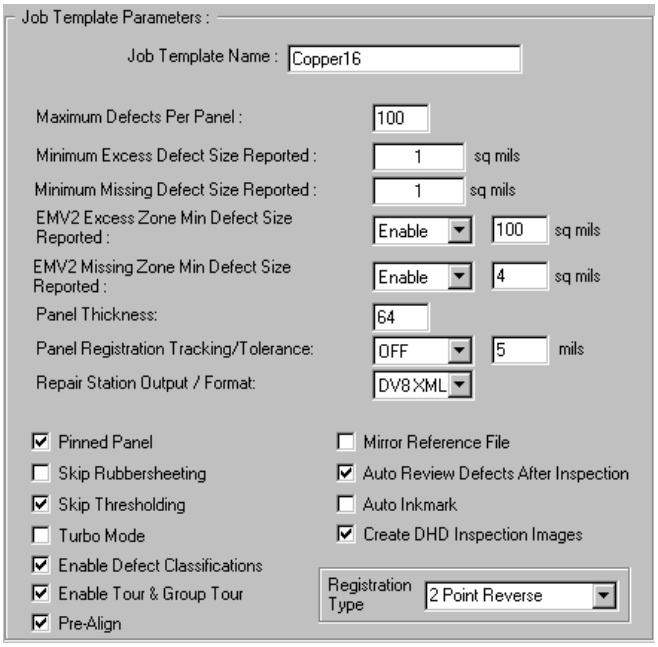
Pinned Panel	Select this check box if the panel you are inspecting is pinned. The system will automatically prompt you to point to the first registration point on the first panel in the lot. After that, the system will remember the panel's registration points.
Skip Rubber Sheeting	Select this check box if you do not want the system to perform rubber sheeting after the first panel in the lot is done. This saves time scanning the registration points when all the panels in that lot have the same stretch/shrink values.
Skip Thresholding	Select this check box if you want the system to skip thresholding on a new job. Under normal inspection routines, the system will automatically threshold the first time a new job is loaded.
Use Defect Classifications	Mark this if you want Inspect to use advanced classification types to distinguish each defect
Enable Tour & Group Tour	Mark this if you want the defect review path to be optimized for speed and grouped by location
Pre-Align	Pre-Align is used when switching between tables. While one side is scanning, the live video camera will do a 3-point alignment on the waiting table. Mark this to enable the function.
Mirror Reference File	Select this check box if you want the CAD data to be flipped along the Y-axis. Certain materials, such as film, need to be mounted with a particular side up. If after mounting the panel, the CAD data is in the opposite orientation of the panel, you can select this check box to flip the CAD data along the Y-axis, which results in the panel and CAD data being oriented correctly.
Auto Review Defects After Inspection	Select this check box if you want the system to go into Review Defect mode immediately after inspection. If unchecked, the table will return to the load position immediately after inspection.
Auto Inkmark	Select this check box if you want the system to automatically inkmark the defects while reviewing defects after inspection.
Create DHD Images	Select this to create thumbnail sized images of each DHD defect found. During defect review the image will pop up when the mouse is positioned over a DHD in the CAD window. Note: *These images are only retained for the last inspection on each table.*
Registration Type	Use this combo box to select how many registration points the system will check before starting an inspection. Note: *a 3-point check must be done on a job before any of the others can be used*

How to edit a job template

1. Select the **Job Template Manager** Tab from the Setup screen. The Job Template Manager screen appears.



2. Select a job template from the **Job Template** field and click the **Edit** button. The Job Template Parameters dialog appears.



Note: *Alternatively, you may double-click the job template that you'd like to edit.*

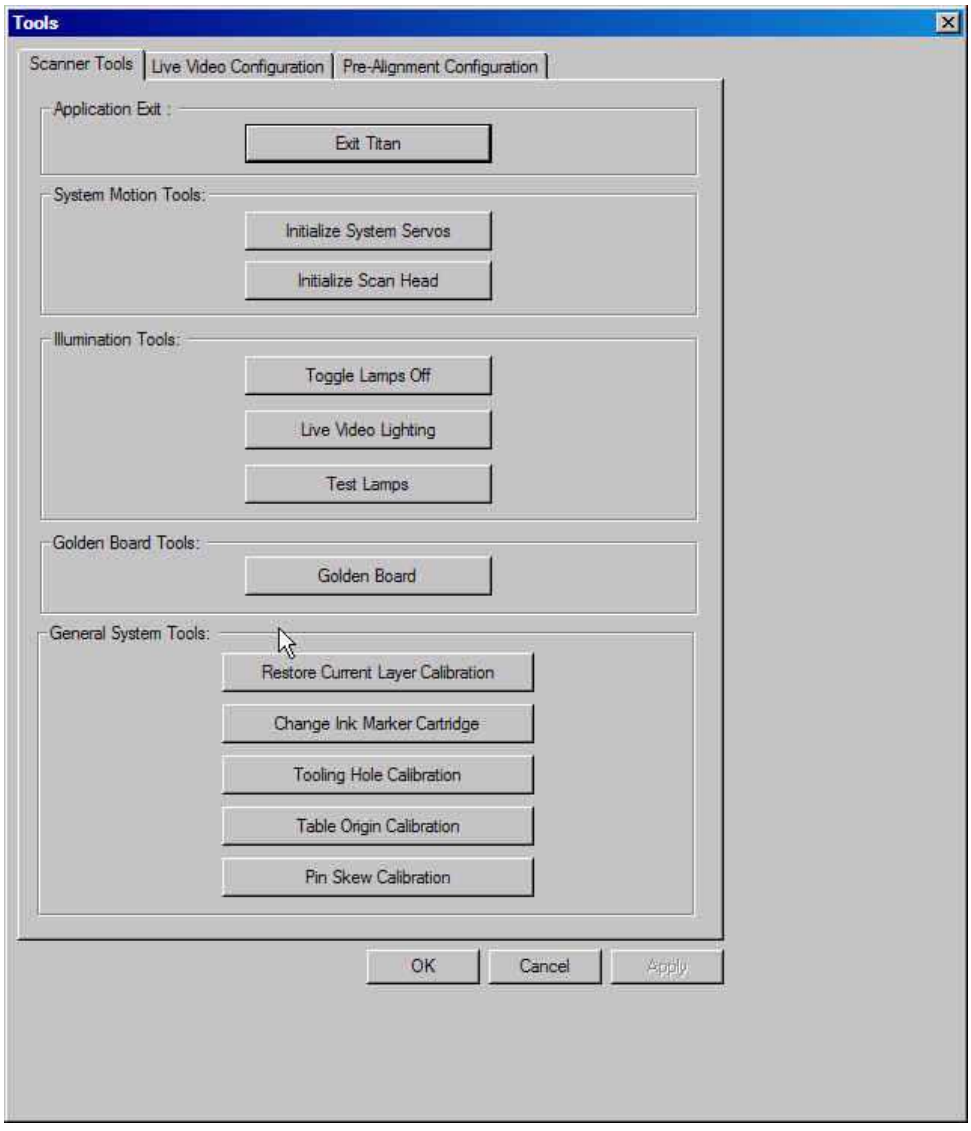
3. Set the parameters as desired. See steps 4 and 5 in the How to create a job template procedure above.
4. Click **OK**.

Scanner Tools

The Scanner Tools provide a variety of functions, including exiting the application, initializing the system servos and scan head, toggling lamps on and off, restoring current layer calibration, and changing the ink marker cartridge.

How to Configure Scanner Tools

1. Select the Tools button from the Inspect panel of the Control area.
2. Select the Scanner Tools tab. The Scanner Tools window appears.

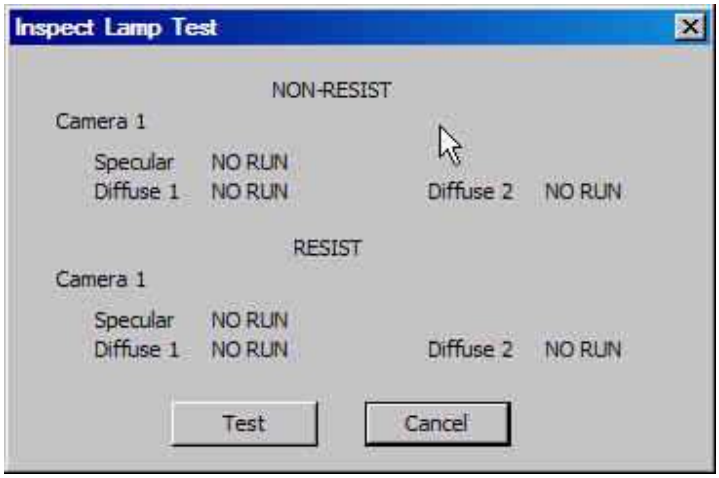


3. Select the buttons found on the Scanner Tools tab as necessary, as described below.

Button	Description
Exit TITAN	Use this button to exit the TITAN application.
Initialize System Servos	Select this button to initialize the X and Y servos from the vacuum table and scan head. You may want to use this button if a system interlock has been tripped.
Initialize Scan Head	Select this button if you encounter a Z-axis fault or zoom lens fault.
Toggle Lamps Off	Select this button if you're going to be away from the machine for an extended period of time. This helps to extend the life of the bulbs.
Live Video Lighting	Select this to turn any of the three live video lighting banks on or off. Check a box to turn the light on or uncheck it to turn the light off. Brightness of the lights is controlled by the three twist knobs near the keypad. (see picture below)
Test Lamps	Select this to test the scanner lamps. (see picture below)
Golden Board	Select this button when you want to scan a Golden Board. This function does not work with the High Resolution systems (DTR or DTRS).
Restore Current Layer Calibration	Select this button if you've adjusted settings and you want to restore the latest saved layer data.
Change Ink Marker Cartridge	Select this button when you want to change the ink marker. This positions the scan head to the extreme right, providing access to the ink marker for replacement.
Tooling Hole Calibration	Select this button when you want to define the tooling hole positions on the table. You will assign a number to each one. This will be used with the new "Smart Argos" feature in Ucam.
Table Origin Calibration	Select this button only if you will be using the Panel Registration Tracking feature. This will allow you to define the origin point or zero reference point for the Absolute mode in this feature.
Pin Skew Calibration	This button is also used only for the Panel Registration Tracking feature. This allows the user to compensate for any locating pin position errors when using this feature. The live video camera is used for setting pin skew and the user must select two tooling pins that are on axis.

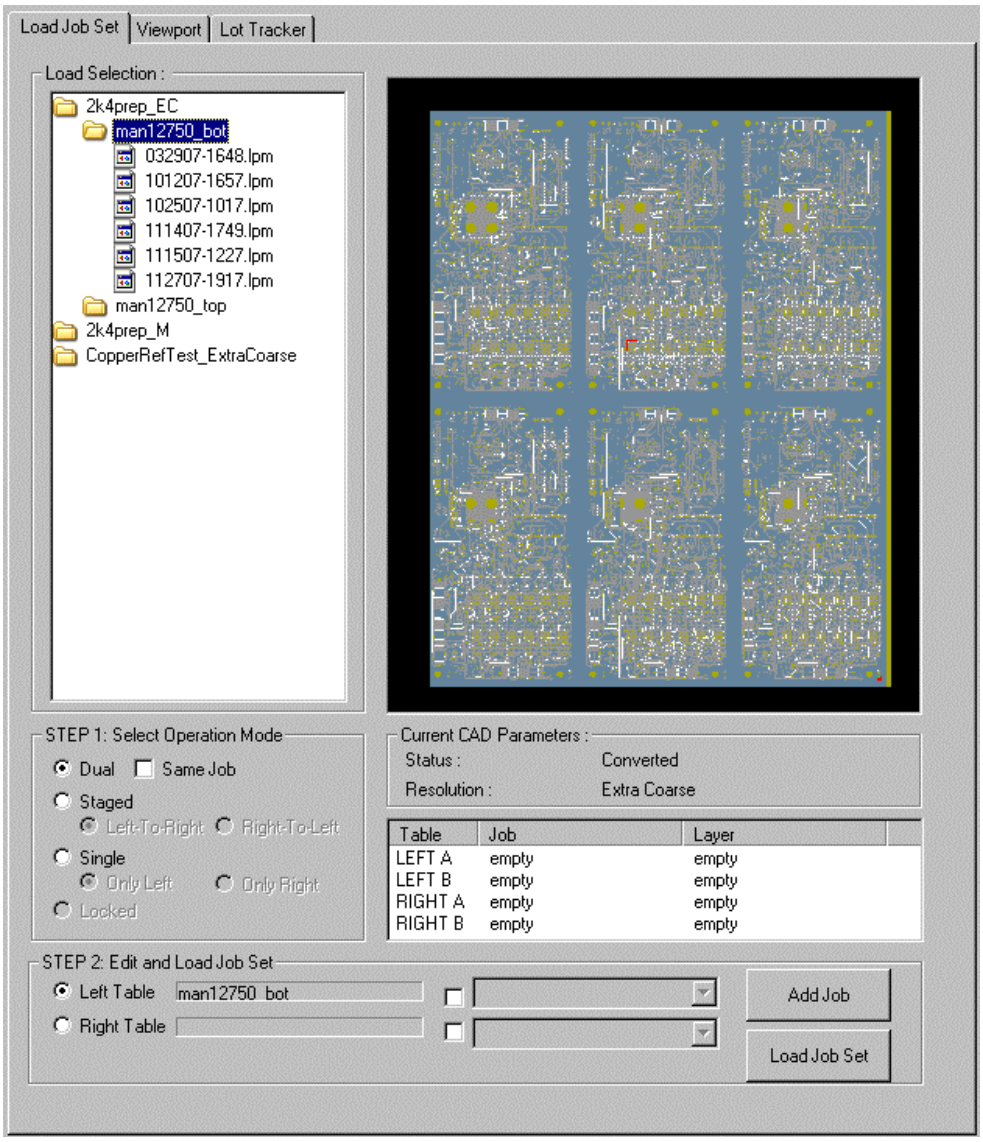
4. In the Live Video Lighting window, check the lights that you want turned on and then click **OK**.

5. To test the scanner lamps, click on **Test.** The lamps that pass the test will have "NO RUN" change to "PASSED".



File Structure

The files used in the Titan system are created using the UCAM application (See UCAM User's Guide). Titan uses a job-based approach to its directory structure. All of the components of a particular job are put under a single job directory tree.



A directory structure is hierarchical, with Jobs at the top, which contain Layers, which in turn contain Lots.

Jobs

A Job contains all of the components that make up a single circuit board, which include layers and lots.

Layers

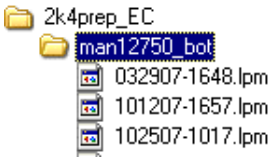
A Layer is an individual component of a job. There may be multiple layers within a single job, each with its own unique name.

Information associated with a layer includes:

- CAD filename
- Flip Panel ON/OFF
- Name of the Layer for Flip Panel Option
- Number of Registration Points
- List of Registration Point Objects
- Expected X Location of Registration Point 1-4
- Expected Y Location of Registration Point 1- 4
- Material Type
- Resolution
- Polarity
- Mirror Reference
- Pinned Panel
- Skip Rubber Sheeting
- Material Thickness
- Defect Classifications
- Tour & Group Tour
- Pre-Align
- DHD Inspection Images
- Registration Type

Lots

A Lot is a batch of layers produced by a single manufacturing cycle. A specific layer may have many lots associated with it, but each lot must have a unique name. Each lot has a file extension of “lpm”. Associated with each lot is a folder with its unique name which contains every inspection of the lot. These inspections are stored as *.pass files, starting at 1 and incrementing from there. (ie, 1.pass, 2.pass, 3.pass, etc.)



Information associated with lots include:

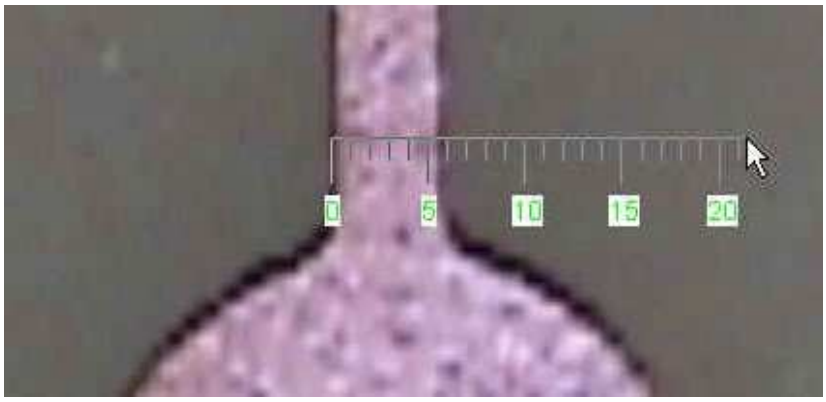
- Number of Inspections
- List of Inspection Objects
  - Time/Date of Inspection
  - Number of Defects
  - List of Defect Objects
  - X, Y Location
  - Type
  - X, Y Minimum
  - X, Y Maximum
  - Area
  - Total Excess
  - Total Missing Masked
  - Auto Ink Mark
  - High Resolution Mode
  - Threshold Nominal
  - Threshold Low
  - Threshold High
  - Threshold Point
  - Specular Intensity

Live Video Measurement Tools

The live video panel supports two modes of measuring features that are displayed by the live video camera.

In mode 1, the cursor can be used to determine the distance between two points that are within the field of view of the camera.

To use this feature, move the cursor to start point of what you want to measure. Click and drag the right mouse button to the end point of what you want to measure. A ruler, measuring the distance in mils or microns will be displayed between the features.



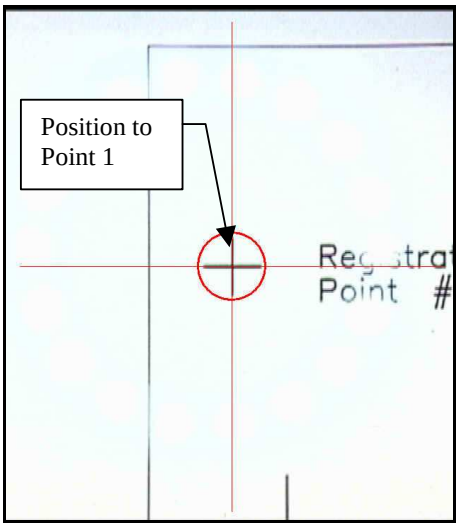
The ruler will auto-scale, depending on your zoom level. In this example, the line measures 5.5 mils.

Mode 2 allows you to measure the distance between any two points that are not within your field of view on the board. To do so, hold down the shift key and select F1. The F1 label will change to Measure. The measure points dialog will appear and ask you to position the live video crosshair over the first feature that you wish to measure.

The crosshair will change to a thin full screen crosshair with an adjustable circle in the middle as shown below.

Use the Right mouse button change the size of the circle diameter by clicking and dragging it.

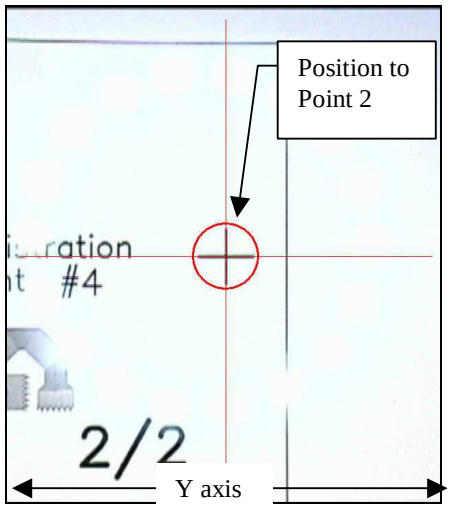
Use the Arrow keys on the keypad to position the crosshair on the center of the feature. Or, adjust the circle over a pad. When done, click OK.



Then the dialog box will prompt you to move to the second point.

Move to the desired point using the Arrow keys on the keypad to position the crosshair on the center of the second feature. When done, click OK.

The measurement dialog box will provide the X travel, Y travel and straight-line distance between the two points as shown below.



Inspection

Overview

This chapter is intended for an operator-level user. The inspection instructions guide the operator through all the steps required to inspect a panel. This chapter includes:

- Inspection Workflow
- Loading a Job Set
- The Different Operation Modes
- Match the Panel Position
- Performing Inspection
- Using High Production Mode
- Changing Layer Parameters
- Auto Thresholding
- Auto Registration
- Inspection Procedures for Subsequent Panels
- Job Management
- Re-Rip Layer Procedure

Pins or No Pins

The Titan T8T systems include both pinless registration and the ability to use precision locating pins. Two sets of sliding pins are provided for each inspection table. Additionally, the left and bottom plates on the vacuum tables serve as a reference guides if Pinless Registration will be used. It is up to the operator.

Using pins

1. Turn the VRAC function OFF in the System Setup page.
2. Line up the pins using the narrow slots in the inspection table.
3. Place the panel to be inspected on the inspection table.

Using Pinless Registration

1. Turn the VRAC function ON in the System Setup page.

2. Place the panel to be inspected on the inspection table. Justify the panel to the lower left corner of the table, using the guide plates provided.

Inspection Workflow

The workflow for setting up a new job will almost always follow this basic sequence.

Prepare the Job.

- Jobs are first prepared in the Ucam Smart-Argos interface. Here, the Inspection area, Aperture thresholds, Don't-Inspect areas, and Registration areas are defined.

Load a Job Set. (See page 66.)

- The Titan scanner provides several ways to load jobs. For instance, depending on your needs at the time, you could choose Single Table Mode, Dual Table – same job, Dual Table – different job, or Staged Mode. See *Loading a Job Set* in the next section.

Select the Job Template and the Material. (New jobs only – See page 67.)

- In the Getting Started section, we created a Job Template (on page 51) and calibrated some materials (on page 30) that will be used for inspections. These will be selected the first time the job is loaded. Thereafter, it will become a part of the Layer information and will be automatic. Of course, any of these settings can be modified at any time.

Match the Panel Position (and Polarity) to the Data. (See page 71.)

- After loading the layer, the artwork will be displayed in the CAD data area of the GUI. Here, you will ensure that the data matches the layout of the actual board.

First Registration Point. (See page 71.)

- The first time you start the Inspection process, you will be asked to point to the first registration point – even if you have selected Auto Registration. This was created in the Ucam interface and is shown in Red in the display. If you are not sure what this is, you can zoom-in on the red box in the CAD data area of the screen to get a closer look.
- You can force the system re-pick the first registration point at any time by pressing the SHIFT-F2 keys before pressing the Inspect button. This will also force a 3-point registration to be performed for this one inspection, regardless of the inspection mode selected.

Threshold.

- After selecting the First Registration Point, the system will attempt to find the best threshold value for the camera and then, display the results. If the area that was automatically selected does not show up correctly, you can relocate to a better area of the panel. You then have the choice of accepting the auto threshold value or changing it.

- The auto threshold function works best if the inspection panel's line sizes match the line sizes in the CAD data.

Inspect the Job on the First Table.

- The layer is then scanned and compared to the CAD data. A list of defects is kept for later review. The system can be configured so that future inspections do not require you to point to anything. You just load the layer and inspect.

Inspect the Job on the Second Table (if not in Single Table Mode).

- Point to the First Registration Point on the second table and repeat the process.

Select High Production Mode (if desired).

- After both tables are initially set up with their respective jobs, you have the choice of continuing in this manner or enter the High Production (HP) mode where you are prompted to load the job and on which table. Essentially, you will be loading the panel where directed and pressing Enter. If Auto Review Defects is enabled, you can also review defects on one table while the other is inspecting. See the High Production Mode section on page xx.

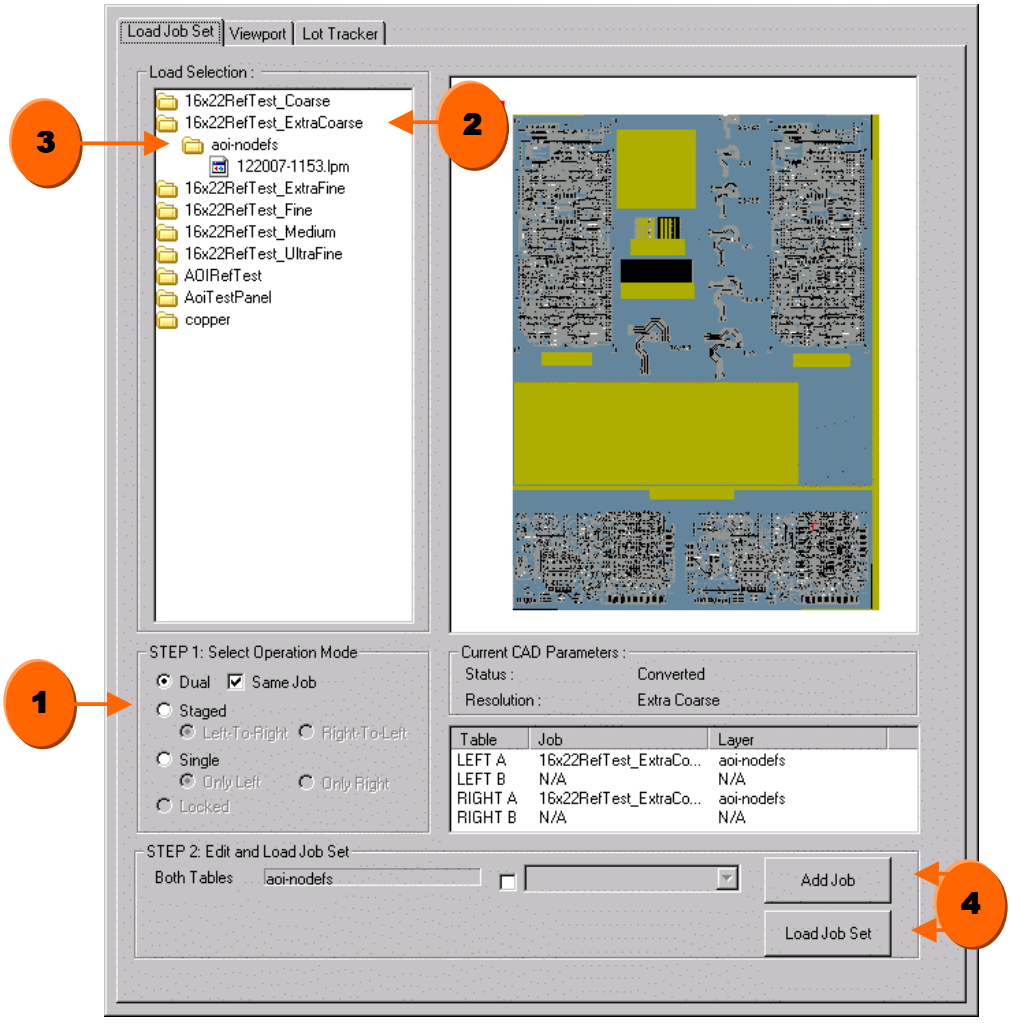
The following sections describe these steps and how, in some cases, the system can be set to do most of the work for you.

Loading a Job Set

Loading a job for the first time requires a few preliminary steps. Whenever you load a job for the first time, you must apply a Job Template and Material Template. The steps required for loading a job for the first time are described below.

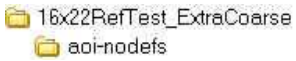
Loading a Job Set

1. In the **Load Job Set** Tab on the left side of the Titan GUI, first select an Operation Mode.

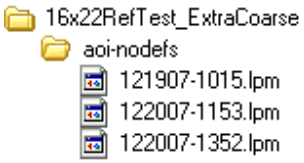


2. Double-click the job you'd like to open. The directory tree expands to display the job's layers.

Note: *You can also type in the first few letters of the job folder you'd like to open. The list will automatically scroll to folders beginning with that letter.*

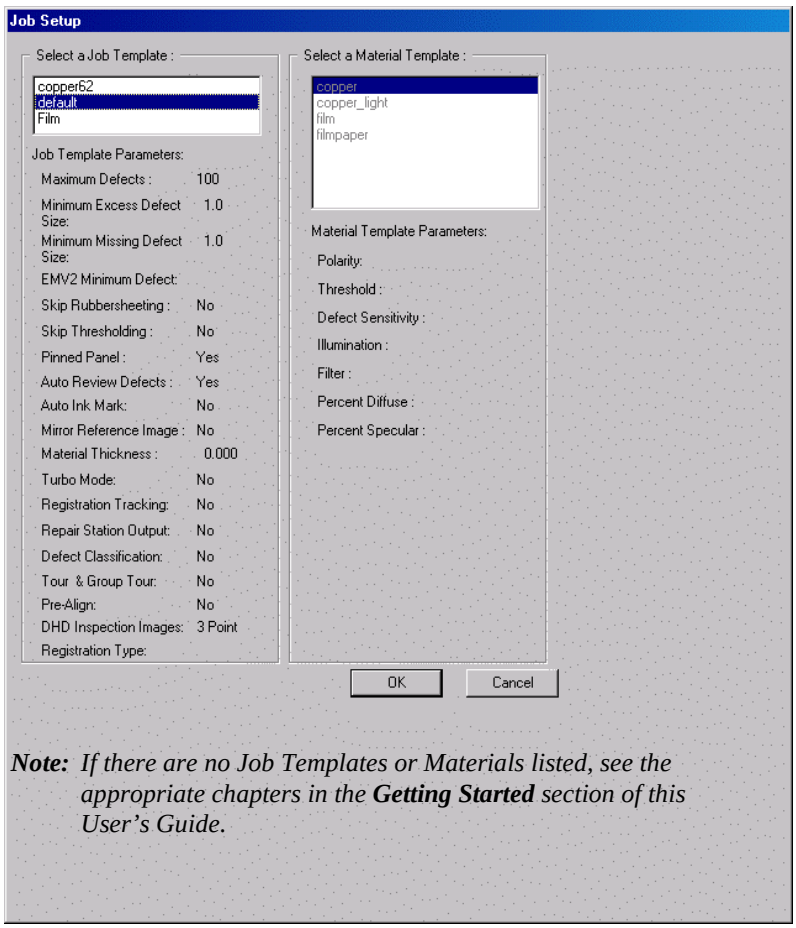


3. Double-click the layer you'd like to open. The directory tree expands to display the layer's lots. Select the layer (or the Lot) you would like to open.



4. Click the **Add Job** button. If this is the first time this job was ever loaded, you will see the following message.

5. Click **Yes** to choose a Job Template and a Material Template…



Note: *If there are no Job Templates or Materials listed, see the appropriate chapters in the* ***Getting Started*** *section of this User's Guide.*

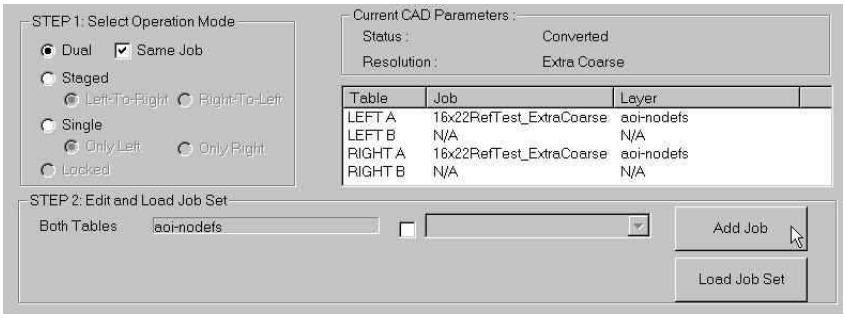
6. Click the **Load Job Set** button, the selected images will load and provide you with a display similar to the one on the previous page.

Selecting the different Operation Modes

Dual Table Mode – Same Job

This operation mode is intended to be used for high volume production. If the same job is used on both tables, then the machine's scanner has to be configured (resolution, head height, light settings, etc) as little as possible. As a result, you will be able to inspect panels at the highest throughput.

1. Select Dual and Same Job…

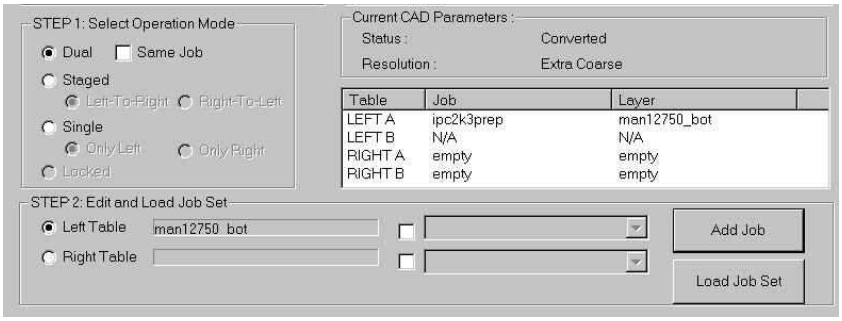


2. Select Layer (or Lot) to load to both tables.
3. Click the **Add Job** button to add the job to both tables
4. And click the **Load Job Set** button to load the images. The Status bar will show…

Dual Table Mode– Different Job

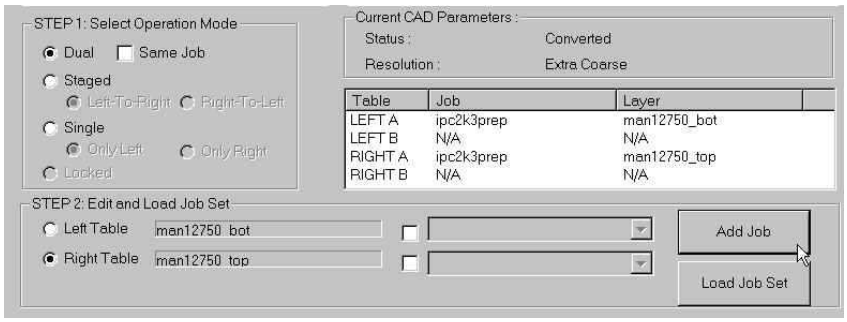
Use this mode if you want to inspect different jobs on each table. Sometimes operators use this option when a high priority job arrives and needs to be inspected, but they do not want to stop inspection of the current job. An operator can then configure the job set so that the current job only runs on one table and the high priority job runs on the other table. This operation mode does not have the highest throughput because the scanner may need to be configured differently for the different jobs as it goes back and forth.

1. Select **Dual** only and ensure that the **Left Table** is selected.



2. Select the Layer (or Lot) to load.
3. Click the **Add Job** button to add the job to the **Left Table**.

4. Select the **Right Table**.



5. Select the next Layer (or Lot) to load.
6. Click on the **Add Job** and **Load Job Set** buttons to load the images. The Status bar will show…

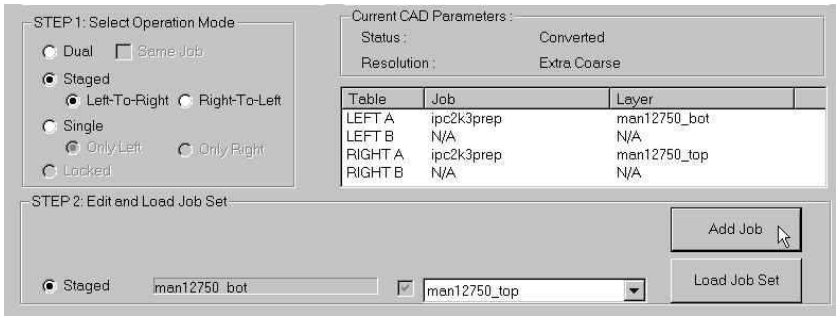
Staged Mode

Use this mode for double-sided panels only. One side will be scanned on one table and the other side will be scanned on the opposite table. Staged Mode is not intended for high-volume operations. This option is very useful for those customers who load un-inspected panels from a cart on one side of the machine and unload inspected panels on a cart on the opposite side of the machine.

1. Select **Staged** and either **Left-To-Right** or **Right-To-Left** workflow direction.

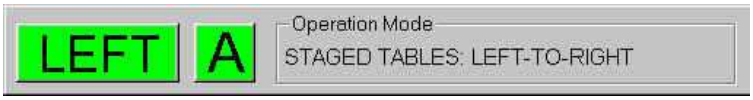
   Left-To-Right. If the Left-To-Right direction is selected, then side A of a panel will be loaded and inspected on the left table and then side B of the same panel will be loaded on the right table. As a result, panels will move from the left table (for side A) to the right table (for side B).

   Right-To-Left. If the Right-To-Left direction is selected, then side A of a panel will be loaded and inspected on the right table and then side B of the same panel will be loaded on the left table. As a result, panels will move from the right table (for side A) to the left table (for side B).



2. Select the Layer (or Lot) to load on the first table.
3. In the ***Edit and Load Job Set*** area, the flip side will automatically be selected for the other table.

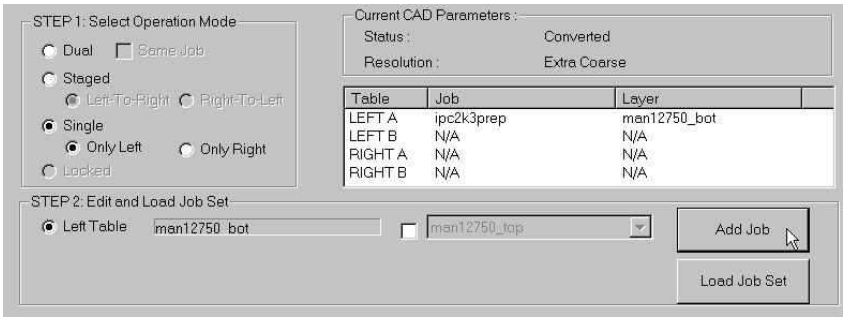
4. Click the **Add Job** and **Load Job Set** buttons to add the jobs to the correct tables. The Status bar will show…



Single Table Mode

Single table operation mode can be used if one of the tables is malfunctioning. In order to use single table mode, at least one of the tables must be fully functioning and the motion system should be able to initialize both tables.

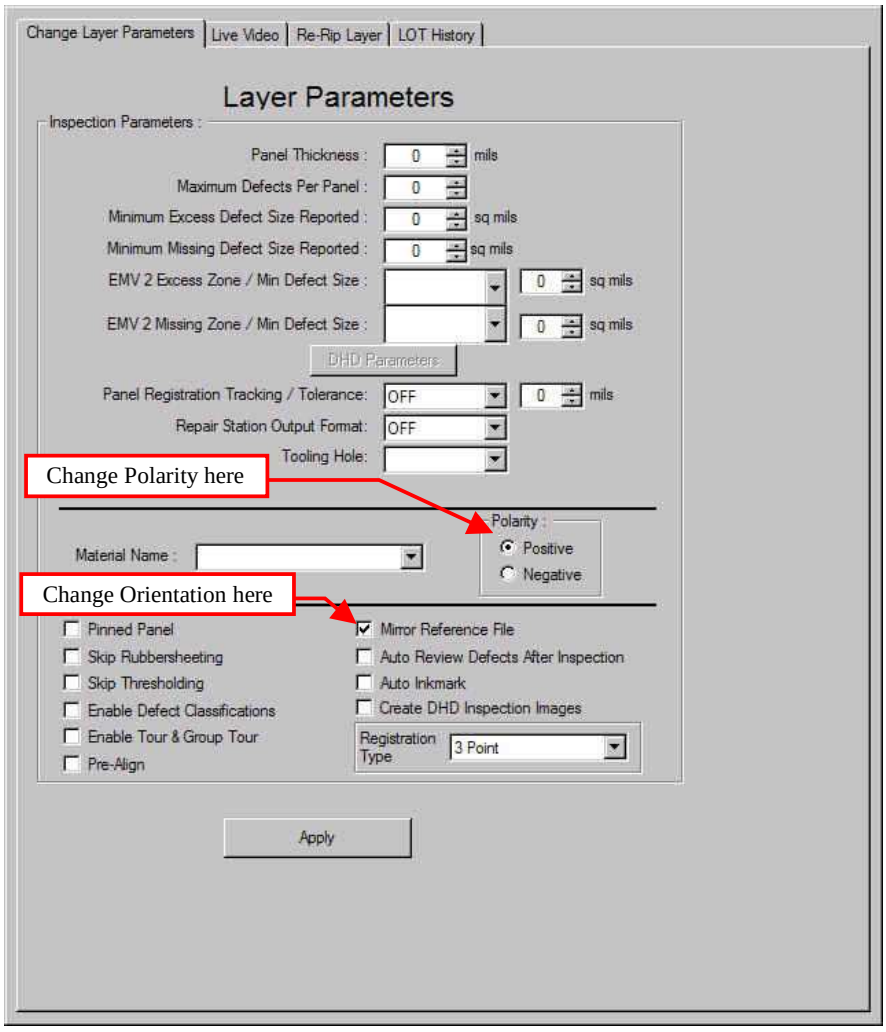
1. Select **Single** table and either **Only Left** or **Only Right…**



2. Select the Layer (or Lot) to load.
3. Click the **Add Job** and **Load Job Set** buttons to add the job to selected table. The Status bar will show…

Match the Panel Position (and the Polarity) to the Data

1. Verify that the polarity of the data is correct for what is being inspected. Whatever is reflective on the panel should be white on the data display.



2. Verify that the panel is orientated on the table the same way as in the data display. Either rotate the panel or mirror the data to accomplish this.

Inspect the Panel

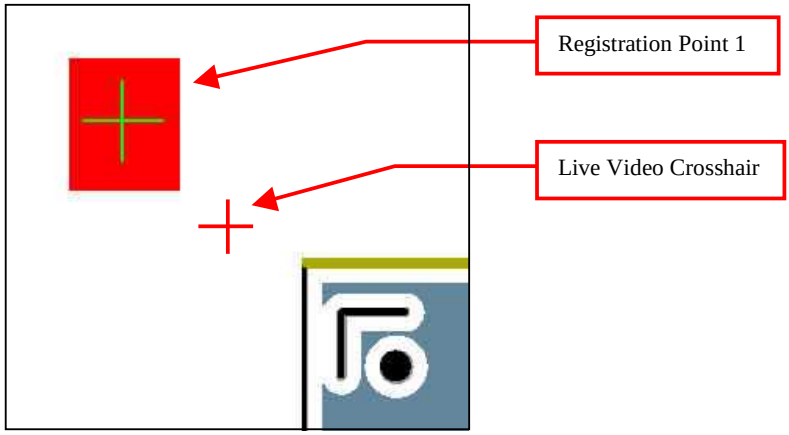
First Registration Point

1. The following message should appear after pressing the Inspect 

button.

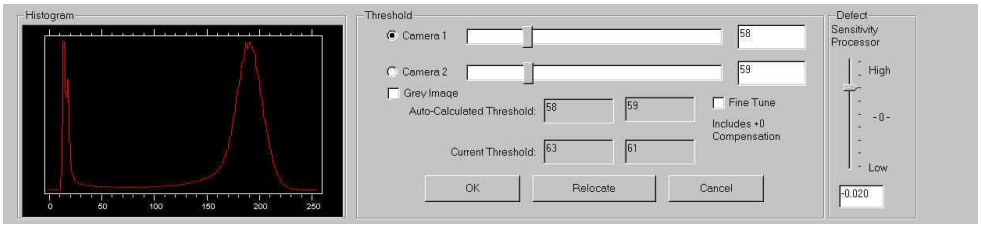
Note: *This step only occurs the first time a panel is loaded if* ***Pinned Panel*** *is checked ☑ in the Layer Parameters. However, this can be forced to happen by pressing the* ***Shift*** *and* ***F2*** *keys together before the next Inspection (****F2*** *key).*

2. Position the system pointer over the first Registration point on the panel. The first Registration point can be identified in the ViewPort by a red box over the feature as shown below.



Threshold

1. After pointing to the first Registration point and clicking **OK**, the system automatically goes to the pre-determined threshold area

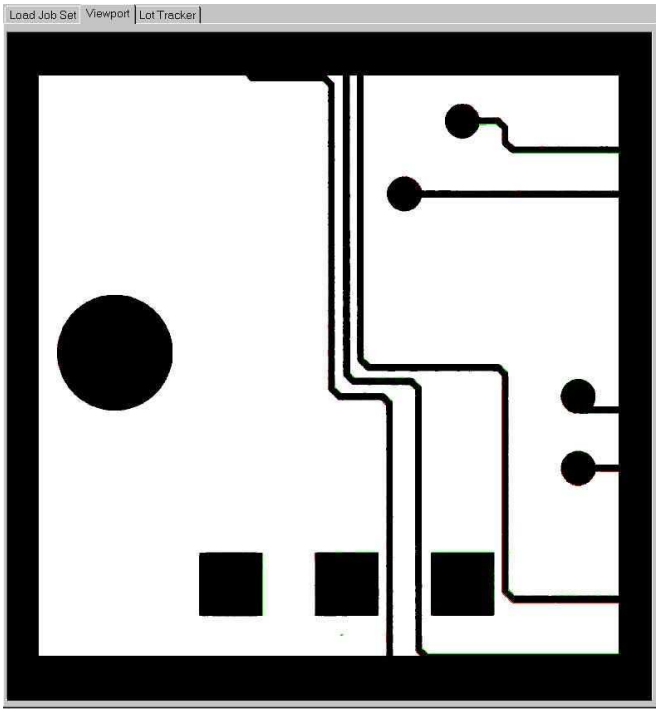


Note: *This step only occurs the first time a panel is loaded if* ***Skip Thresholding*** *is not checked in the Layer Parameters.*

2. If necessary, click on the **Relocate** button to pick a new Threshold area. The following message should appear.

3. Position the system pointer over a new area for thresholding and click **OK**. This can be any area that has equal amounts of circuitry and background. However, there should be a good mix of horizontal and vertical lines.

   The system will scan the new area and theViewport will display the Threshold Scan again…



4. If the threshold numbers look good, click **OK** in the Threshold Panel. The Inspection process will begin.

Inspection can be performed when…

…Live video and light pointer calibration has been performed on both tables

…The layer is loaded

...It has the correct material associated with it

…It has the correct thickness

…Has the correct Polarity

…It is orientated correctly

…The tolerances were set up correctly during data preparation

…The Etch Factor is correct

…And, the vacuum is holding the panel flat on the table.

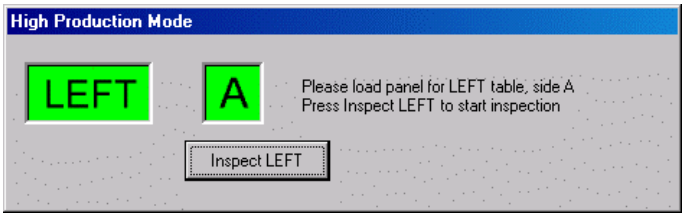
Using the High Production (HP) Mode

After the job is loaded and at least one inspection has been done on both tables, HP mode allows you to load panels and Inspect in the fastest way. When in high production mode, minimal operation interaction is need with the graphical user interface. The following is a description of how this works for the different job sets.

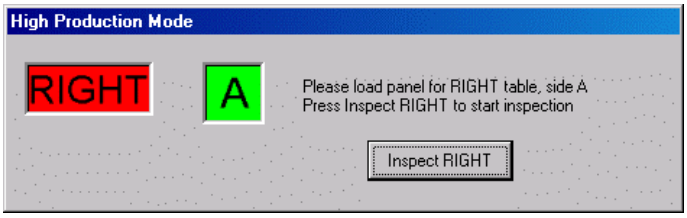
Dual Table – Same Job – No Flip w/HP

Prior to entering high production dual table mode, a panel is loaded on the left and right table. An inspection is performed on the left table. If required, the placement, registration, thresholding, or other things can be modified so that a good inspection can ***be achieved on the left table. Once the left table inspect well, the same procedure can be*** repeated with the right table. The operator is now ready to enter high production mode.

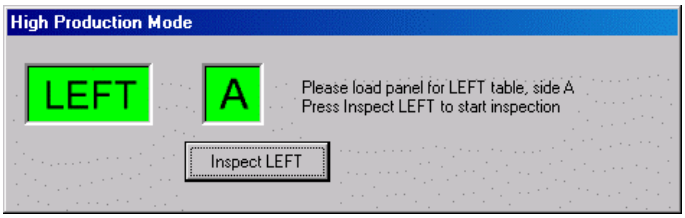
1. Press the “Enable HP” function (SHIFT + F3) to enable high production mode. The following High Production Mode dialog should be displayed:



2. Load the left table and press the “Inspect LEFT” button by pressing ENTER on the keypad. An inspection will begin on the left table. The High Production Mode dialog will display that it is ready to inspect the right table:



3. While inspecting on the left table, load a panel on the right table and press the “Inspect RIGHT” button by pressing ENTER on the keypad. If the left table has finished inspection, then the High Production Mode dialog will now display that it is ready to perform an inspection on the left table:



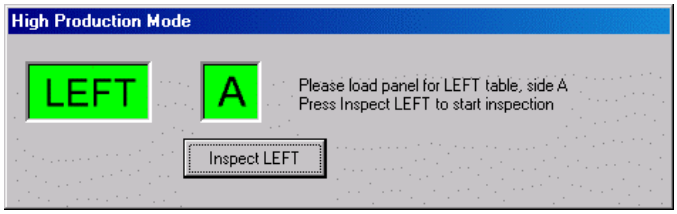
4. While an inspection is running on the right table, unload the panel on the left table, load a new panel on the left table, and press the “Inspect LEFT” button by pressing ENTER.

5. When the right table finishes inspecting, unload the right table and press the inspect button to start a new inspection on the right table. Continue this process until all panels have been inspected.

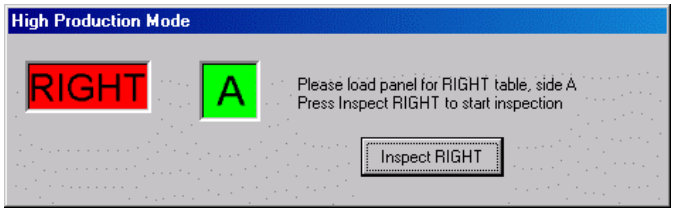
Dual Table – Same Job – Flip w/HP

Prior to entering Dual Table – Same Job Flip high production mode, please make sure that you can perform a good inspection on both tables with both sides (similar what had been done for Dual Table – Same Job high production mode). You are now ready to enter high production mode.

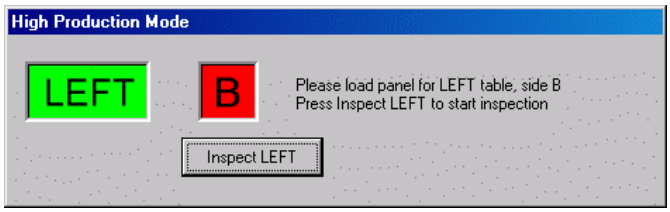
6. Press the "Enable HP" function (SHIFT + F3) to enable high production mode. The following High Production Mode dialog should be displayed:



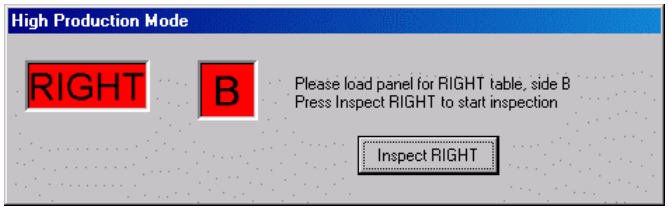
7. Load the left table with Side A and press the "Inspect LEFT" button by pressing ENTER on the keypad. An inspection will begin on the left table. The High Production Mode dialog will display that it is ready to inspect the right table:



8. While inspecting on the left table, load the right table with Side A and press the "Inspect RIGHT" button by pressing ENTER on the keypad. If the left table has finished inspection, then the High Production Mode dialog will now display that it is ready to perform an inspection on the left table:



9. While inspecting on the right table, load the left table with Side B and press the "Inspect LEFT" button by pressing ENTER on the keypad. If the right table has finished inspection, then the High Production Mode dialog will now display that it is ready to perform an inspection on the right table:



10. While inspecting on the left table, load the right table with Side B and press the "Inspect RIGHT" button by pressing ENTER on the keypad. If the left table has finished inspection, then the High Production Mode dialog will now display that it is ready to perform an inspection on the left table.

11. At this point, we are ready to inspect Side A on the left table. Continue this process until all panels have been inspected.

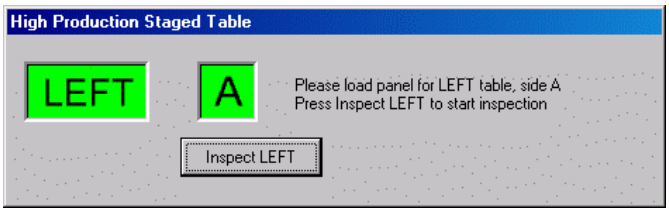
Dual Table – Different Job No Flip or Flip w/HP

The Dual Table – Different Job **and** Dual Table Different Job Flip **high production mode process workflow is the same as** Dual Table – Same Job **and** Dual Table – Same Job Flip**, respectively.**

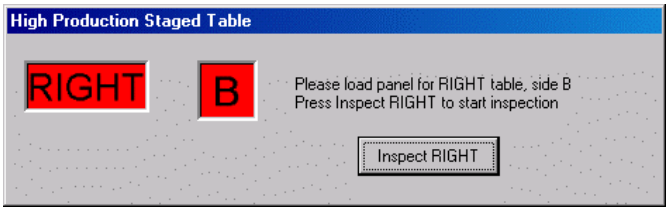
Staged Mode w/HP

Prior to entering Staged Table high production mode, please make sure that you can perform a good inspection on both tables with the appropriate side on each table (similar what had been done for Dual Table – Same Job high production mode). You are now ready to enter high production mode.

12. Press the "Enable HP" function (SHIFT + F3) to enable high production mode. The following High Production Mode dialog should be displayed:



13. Load the left table with Side A and press the "Inspect LEFT" button by pressing ENTER on the keypad. An inspection will begin on the left table. The High Production Mode dialog will display that it is ready to inspect the right table for Side B:



14. While inspecting on the left table, load Side B on the right table and press the "Inspect RIGHT" button by pressing ENTER on the keypad. If the left table has finished inspection, then the High Production Mode dialog will now display that it is ready to perform an inspection on the left table for Side A.

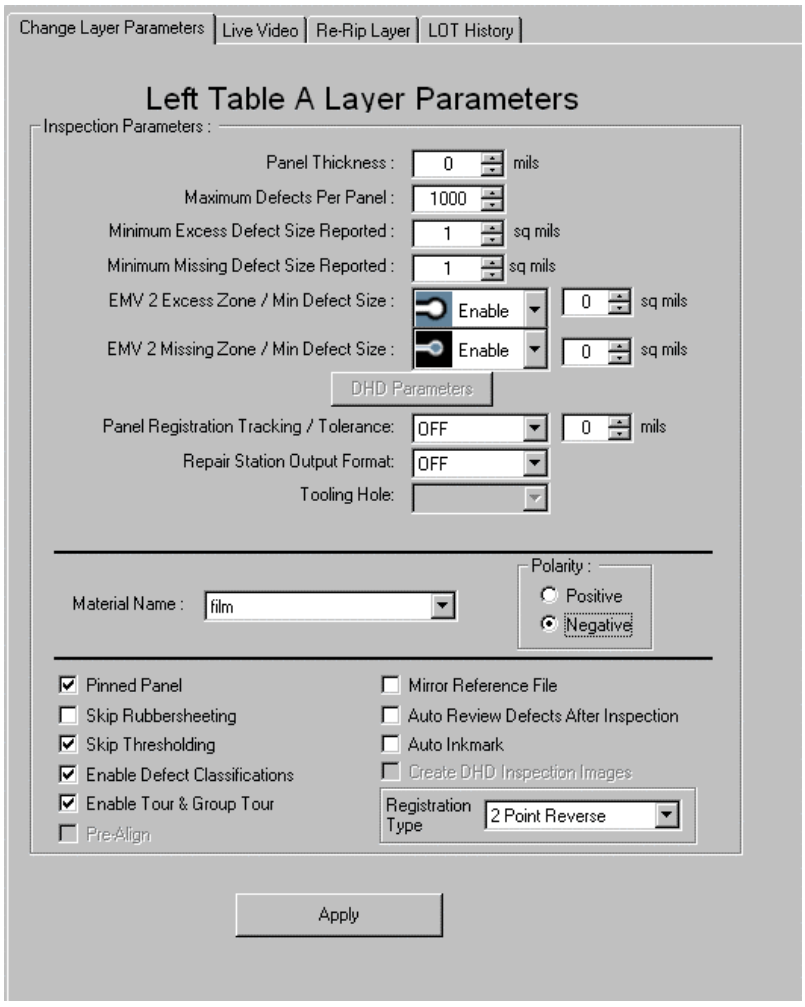
Continue this process until all panels have been inspected.

Changing Layer Parameters

There may be times when you'll want to make changes to a layer before you begin the inspection. The parameters for a layer are originally set up in the Job and Material Templates. However, you may want to change only one or two parameters for a certain job, and you might not want to change the entire template. In those cases, you can use the Change Layer Parameter screen.

How to make changes to a layer

1. You can click on the Change Layer Parameters tab in the right-side window at any time to display it and change the properties (even in the middle of an inspection).



Note: *The Change Layer Parameters Tab will appear after loading a job.*

2. Make the desired changes to the layer's parameters.
3. Click **Apply**. You will be asked to save the changes by clicking **Yes**.

Auto Thresholding

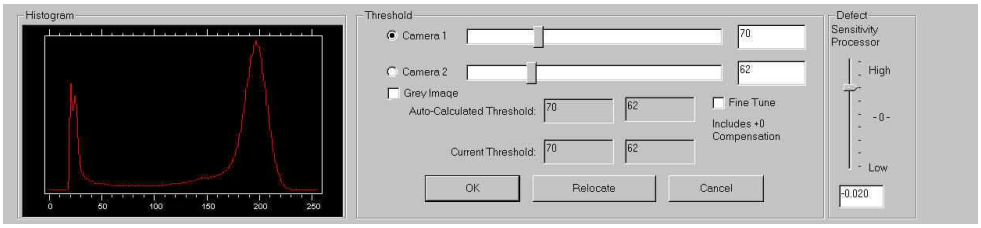
The Threshold function enables the Titan system to accurately distinguish between circuit and background and affects the accuracy of inspection. The Titan system features an auto threshold tool that correctly sets the proper threshold.

How to set thresholding

1. Select the Threshold button from the Inspect toolbar on the Control area. An Titan system message appears prompting the user for the first registration point (if it is not already known).

2. Use the arrow keys on the system keypad to position either the live video or light pointer (depending on the current system pointer definition) over the first registration point. When this has been entered, the following Titan message appears:

3. Use the arrow keys on the system keypad to position the video over an area of the panel that contains background and circuitry representative of the panel.
4. Click OK in the Titan system message. The CAD data area will display a scanned image that represents a sample of the material for which you've just set the threshold.



The control panel will display the results of the thresholding operation. The auto-calculated threshold is the result of the thresholding function. It is the sum of the measured threshold and any threshold compensation value set in the material management screen. The current threshold is the threshold value currently in use for the inspected material. Selecting OK will replace the value in current threshold with the value from the auto-calculated threshold.

5. To manually modify the threshold, drag the cursor over a section that includes background and circuitry representative of the material. Release the mouse button to zoom in on this area.

6. Adjust the slider in the Threshold Margin box of the Control area. As you adjust the slider, the scanned image changes accordingly. The goal is to minimize the amount of red and green pixels that are displayed. Also, you may highlight the slider itself and use the Right and Left arrow keys to adjust the slider setting or enter a new value directly.

Note: *You are essentially telling the system what you deem acceptable. If you set up the threshold so that the scanned image appears perfect, the system considers anything less than perfect as a defect. It is recommended that you try to set the threshold level to reasonable levels.*

   If you change the value in the Threshold Margin field, click the Tab key to accept the change. This allows you to test a setting before clicking the **OK** button. Once you click OK, the changes you make are accepted, and the Threshold dialog closes.

7. Click **OK** when you are satisfied with the threshold level. Click on Relocate if you wish to perform a threshold in a different location.

Registration Types

In the Layer Parameters window, one of four Registration Types can be selected; 3 Point, 2 Point, 2 Point Reverse, and Auto. All of these can be used for both Pinned and Pinless registration modes.

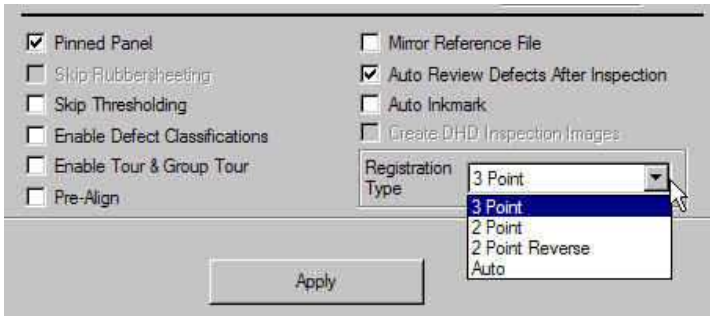
If Pinned Panels are being used, the VRAC function can be turned off (in the System Setup screen) and the Skip Rubbersheeting box becomes available. With VRAC turned ON (Pinless Registration Mode), Skip Rubbersheeting will always be grayed out.

Using Skip Rubbersheeting

This mode can be used for Pinned Panels only.

1. Ensure ☑ Pinned Panel is selected and VRAC is turned OFF (Pinned Panel Mode).
2. Scan the first panel of the batch using 3 Point registration.
3. Enable ☑ Skip Rubbersheeting and click on **OK**.

All of the other Panels will use the Stretch/Shrink and rotation values from the first panel. At any time in the Inspection process, a 3 Point registration can be forced by pressing the SHIFT-F2 keys before pressing Inspect (F2). This will reset the Stretch/Shrink and rotation values to the last panel scanned with 3 Point Registration.



Note: *The ☑ Pinned Panel check box does not mean Pinned Panel Mode. It only means that the system will remember the position of the First Registration Point.*

Using 3 Point Registration

This mode can be used for both Pinned and Pinless registration modes.

1. Ensure ☑ Pinned Panel is selected.
2. Select **3 Point** Registration Type and click on **OK**.

Use this mode to get the most accurate Stretch/Shrink and rotation values for every panel. The problem with this mode is that it adds about 4 seconds to the inspection time for each panel.

Using 2 Point Registration

In 2 Point Registration mode, the first 2 registration points are scanned and inspection starts from the top of the panel. This can save time when the second registration point is at the top of the panel. This mode can be used for both Pinned and Pinless registration modes.

1. Ensure ☑ Pinned Panel is selected.
2. Select **2 Point** Registration Type and click on **OK**.

The two registration points allow for a good rotation and X-axis stretch calculation. The Y-axis stretch is calculated from the ratio of the X to Y-axis stretch achieved from the last good 3 Point Registration. A new 3 Point registration can be forced by pressing the SHIFT-F2 keys before pressing Inspect (F2) again. A new ratio will be recorded at this time.

Using 2 Point Reverse Registration

In 2 Point Reverse Registration mode, the first 2 registration points are scanned and inspection starts from the bottom of the panel – in the reverse direction. This saves time when the second registration point is also at the bottom of the panel. This mode can be used for both Pinned and Pinless registration modes.

1. Ensure ☑ Pinned Panel is selected.
2. Select **2 Point Reverse** Registration Type and click on **OK**.

The two registration points allow for a good rotation and X-axis stretch calculation. The Y-axis stretch is calculated from the ratio of the X to Y-axis stretch achieved from the last good 3 Point Registration. A new 3 Point registration can be forced by pressing the SHIFT-F2 keys before pressing Inspect (F2).

Using Auto Registration

In Auto-Registration mode, the Titan will pre-select two cad tiles that exist in the first physical stripe as “Registration Tiles”. These tiles will be selected from each end of the stripe, with one as near to the top of the stripe as possible, and one as near to the bottom as possible.

1. Ensure ☑ Pinned Panel is selected.
2. In the Registration Type box, select **Auto** and click on **OK**.

Auto Registration cannot be used when VRAC is ON (Pinless Registration mode).

If there is not much data in the first stripe, the **Auto Registration** choice could be grayed out in the *Layer Parameters* window.

If you are scanning a drilled panel with poorly registered drilled holes, excessive tiling errors could occur. For these jobs, choose another registration method.

Performing the Inspection

Once a job has been loaded, with Job and Material Templates applied, and the auto thresholding has been completed, you are ready to perform the inspection procedure.

How to run the inspection

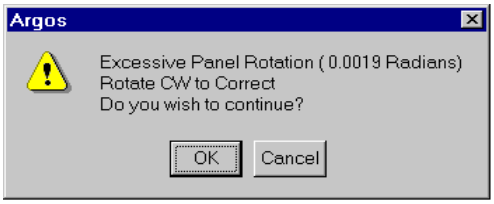
If you are inspecting a pinned panel, ensure the pins are set properly.

If the panel is not pinned, ensure that the circuitry is square horizontally and vertically. This can be done in two ways:

- Simply line up the edge of the panel to the edge of the inspection table. This works only if the circuitry is parallel to the edge of the panel.
- Line up the light pointer on a long line or on the first of two aligned features and use the arrow keys on the keypad to move the panel the full length of the inspection table until the light pointer reaches the end of the long line or the second aligned feature on the opposite end of the panel. If at the end of the panel, the light pointer is centered on the line or the second aligned feature, the panel is square. If not, adjust the panel until the line or feature is in the center of the light pointer, and repeat the process.

1. Engage the vacuum.
2. Select the Inspect button on the Inspect toolbar of the Control area. If this is the first inspection, a prompt appears telling you to pick the first registration point.
3. Pick the first registration point. Make sure that the registration point you select is not closer than 1/8” (3mm) to other similar features.
4. Click OK on the message dialog. The system then prompts you to select a threshold area.
5. Follow the instructions on the message dialog box.
6. Click OK. The system begins the inspection process and displays a status panel in the center of the Control area.

Note: *When the system first begins the inspection process, it checks the registration points to ensure the panel is mounted correctly. If the panel is not square, the following message displays, indicating how far off the panel is from square and which way it needs to be adjusted.*



7. When inspection is complete, perform Defect Review with the instructions detailed in the next chapter.

Inspection Procedure for Subsequent Panels

In most cases, operators perform multiple inspections on identical boards. Once a panel has been set up initially, subsequent, identical board inspection is a relatively easy process.

For the easiest inspection, ensure that ☑Pinned Panel is checked in the Change Layer Parameters page and ☑Automatic Vacuum Control is enabled in the Setup > System Setup window.

How to run the inspection for subsequent panels

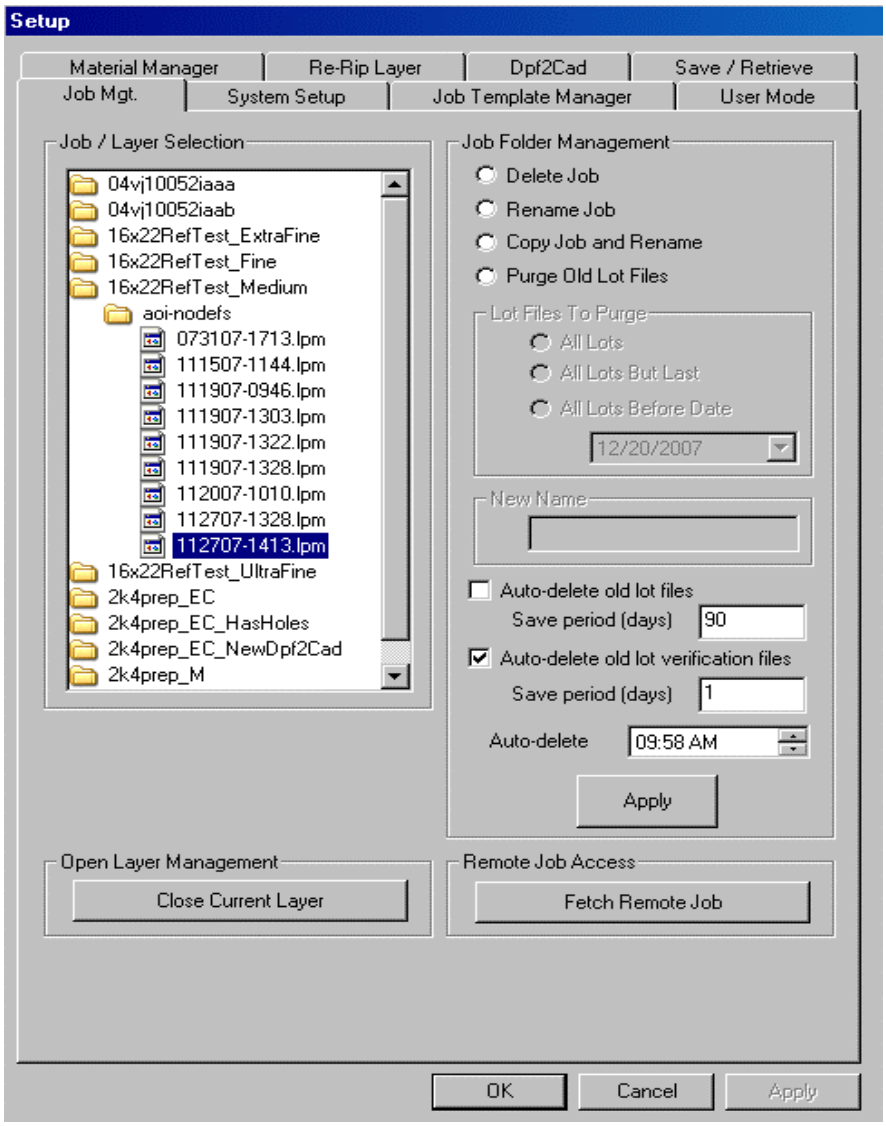
1. Disengage the vacuum by pressing F5 on the keypad. (If Automatic Vacuum Control is enabled, this step is not necessary).
2. Remove the initial panel.
3. Place the next panel on the inspection table.
4. Line up the panel with the inspection table pins.
5. Engage the vacuum (If Automatic Vacuum Control is enabled, this step is not necessary).
6. Click the Inspect button on the Inspect toolbar of the Control area. The command will be sent to the Inspect thread and the system will begin scanning the board.
7. When steps are complete, perform the Defect Review with the instructions detailed in the next chapter.

Job Management

Jobs, layers, and lots, can eventually run into the thousands and you'll need a way to effectively manage these items. The Job Management feature allows you to control all aspects of Job Management, including copying, deleting, and renaming of files. It also allows you to fetch remote elements.

How to use the Job Management feature

1. Select the Jobs button from the Inspect panel of the Control panel. When the Job Control window appears, select the Job Mgt. Tab…



2. To select a Job, click its folder. To open a Job double-click the appropriate folder in the Job/Layer Selection box.

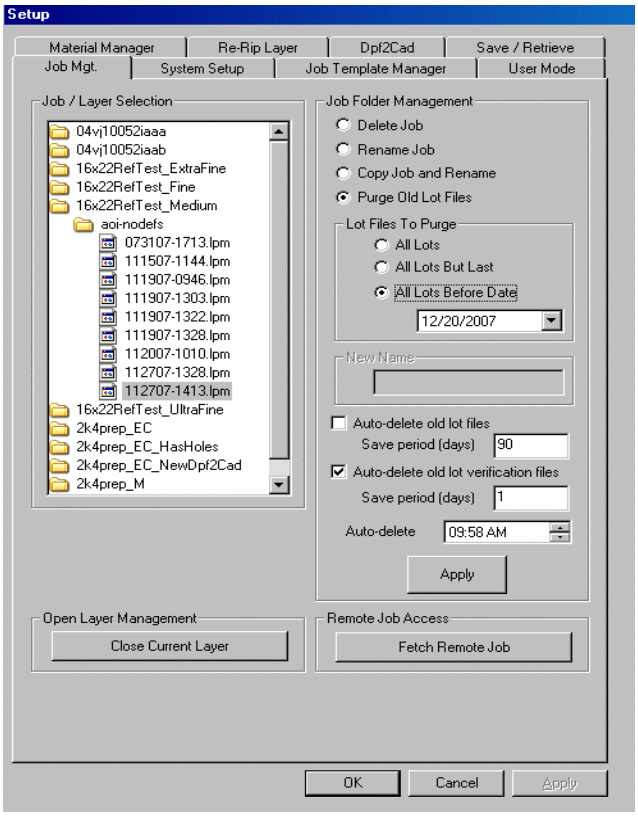
3. Continue working your way through the hierarchy until you've reached the job you're interested in and highlight it. You may select the entire Job, a Layer within the Job or a Lot within a Layer.

   In the Job Folder Management area, do one of the following:

   - **Delete Job** – Select this radio button to delete the highlighted job.
   - **Rename Job** – Select this radio button to rename the job. Once you select this button, the **New Name** field becomes active. Enter a new name in the **New Name** field.

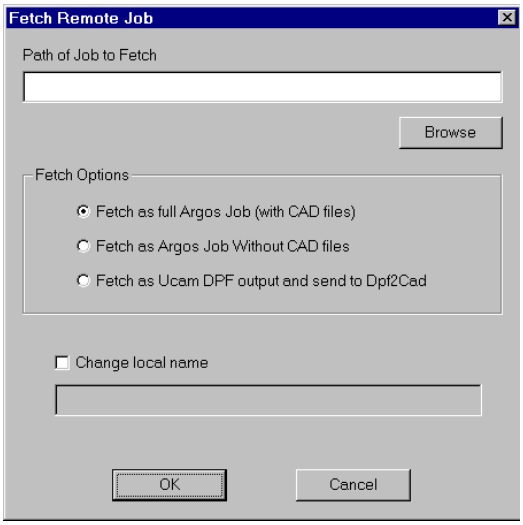
*Note: When Renaming a Job, **Do Not** use spaces in the name.*

   - **Copy Job and Rename** – Select this radio button to make a copy of a job and rename it at the same time. Once you select this button, the **New Name** field becomes active. Enter a new name for the copied file in the **New Name** field.
   - **Purge Old Lot Files** – Select this radio button to purge old lot files. Once you select this button, the **Lot Files to Purge** area becomes active. Select one of the following:
     - **All Lots** – Select this button to purge all lots.
     - **All but last** – Select this button to purge all the lots except the last lot that you saved.
     - **All lots before date** – Select this button and enter a date in the date field to purge all lots before that date.



- **Auto-delete old lot files** – Mark this checkbox if you want the lot files (*.lpm) to be auto-deleted after a certain age.
- **Auto-delete old lot verification files** – Mark this checkbox if you want to delete inspections (*.pass) files associated with the lot. Will automatically decrement the number of inspections in a lot.
  - **Save period (days)** – age of file (in days) to delete.
- **Auto-Delete –** sets the time of day the system will check for auto-deletion.

4. Click the Apply button. The action you selected in the Job Folder Management area is executed.
5. If desired, in the Open Layer Management area, click the Close Current Layer button to close the current layer. This is helpful when you want to re-rip a layer.
6. If desired, in the Remote Job Access area, click the Fetch Remote Job button. The Fetch Remote Job dialog box appears.



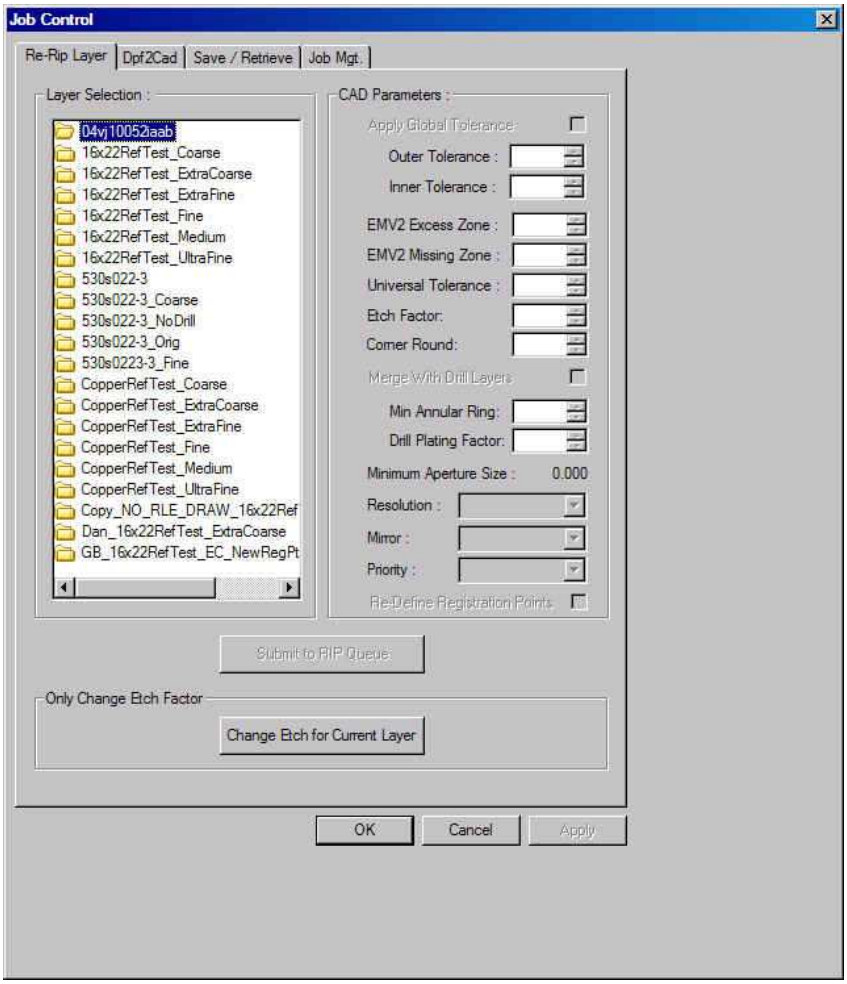
7. Type in the path of the job you want to fetch in the Path of Job to Fetch field.
8. Optionally, you can select the Browse button. This launches a conventional directory structure.
9. Select the job from the directory and double-click. The job and the job's path populate the Path of Job to Fetch field.
10. In the Fetch Options area, select one of the following:
    - **Fetch as Full Titan Job (with CAD files)** – Select this button to fetch the job complete with CAD files.
    - **Fetch as Titan Job Without CAD files** – Select this button to simply fetch the Titan job.
    - **Fetch as Ucam DPF output and send to Dpf2Cad** – Select this button to regenerate the job to CAD.
11. If desired, check the Change Local Name box and enter a new name for the file to be stored locally.
12. Click OK. The Job Mgt. Screen appears once again.

Re-Rip Layer Procedure

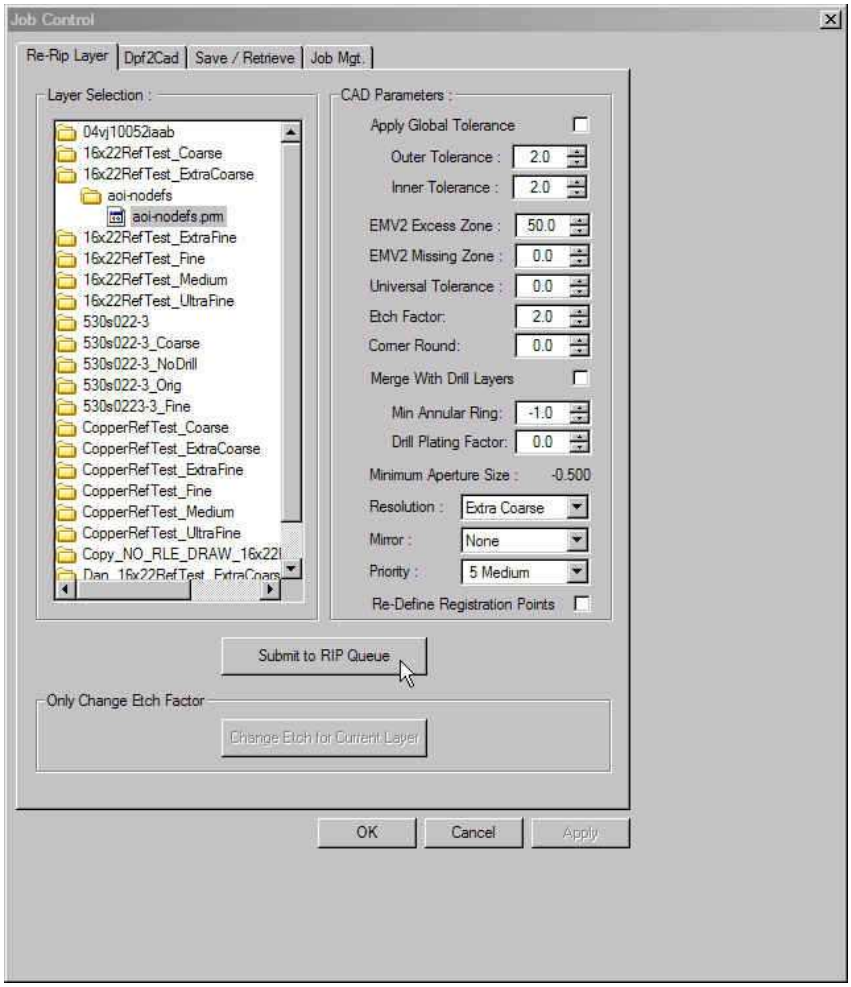
Behind the scenes of Titan, an application takes each layer and converts it from its CAD form, as established with UCAM, into a rasterized image that can be viewed on the system monitor. This is called Raster Image Processing (RIP). On occasion, you may want to make changes to the CAD data, in which case you'll need to run this rasterizing process over. This process is called re-ripping.

How to re-rip a layer

1. Click on the Jobs button of the Inspection tool bar in the Titan control panel.
2. Click on the Re-Rip Layer tab. The Re-Rip Layer page appears.



3. Navigate to the layer you'd like to re-rip. The CAD Parameters section of the Re-Rip Layer page becomes populated with the data originally associated with the selected layer.
4. If you choose Yes, Titan closes the layer and allows you to change the parameters and RE-Rip the layer. If you choose No, Titan allows you to review the parameters that are being used for the current job but not change them.

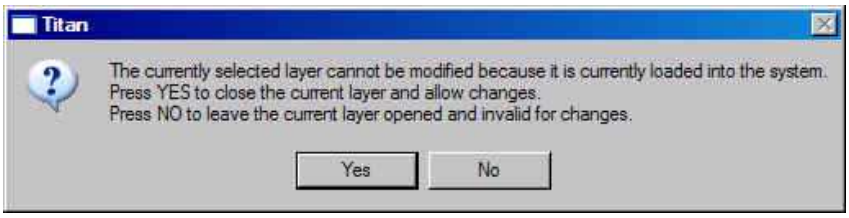


5. Set the CAD parameters as desired. Each parameter is described below.

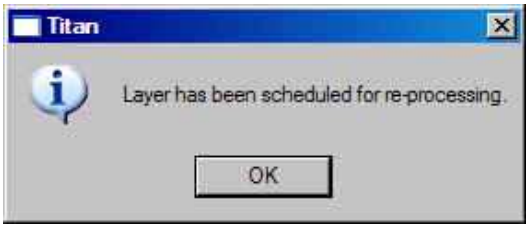
Apply Global Tolerance	Will put the same inner and outer tolerance (specified below) on every aperture.
Outer Tolerance	Sets the outer tolerance globally at this setting.
Inner Tolerance	Sets the inner tolerance globally at this setting.
EMV2 Excess Zone	Anything beyond this tolerance can be set to a different defect size from the rest of the panel. This is for detecting excess copper in the substrate areas.
EMV2 Missing Zone	Anything beyond this tolerance can be set to a different defect size from the rest of the panel. This is for detecting missing copper in the copper areas.
Universal Tolerance	Added to every inner and outer aperture tolerance if you don't use Global Tolerance.
Etch Factor	Assigned number to compensate for over or under etching on the board.
Corner Round	Chip off the corner by this tolerance.
Merge with Drill Layer	Applies drill layers to show in the layers.
Min Annular Ring	Set to a positive number to enable the DHD software functions. (The DHD password must also be installed.)
Drill Plating Factor	Currently not used. Leave it set to 0.0
Minimum Aperture Size	Shows the minimum tolerance found the last time it was run.

Resolution	Determines how many pixels per inch are plotted.
Mirror	Allows you to set mirroring.
Priority	Sets a priority, 1 being lowest; 10 highest.
Re-Define Registration Points	If the selected layer is the current layer, you are allowed to Re-Define the registration points before re-ripping the job.

6. Click the **Submit to RIP Queue** button.
7. If the layer is the current layer for Titan, the following message appears…



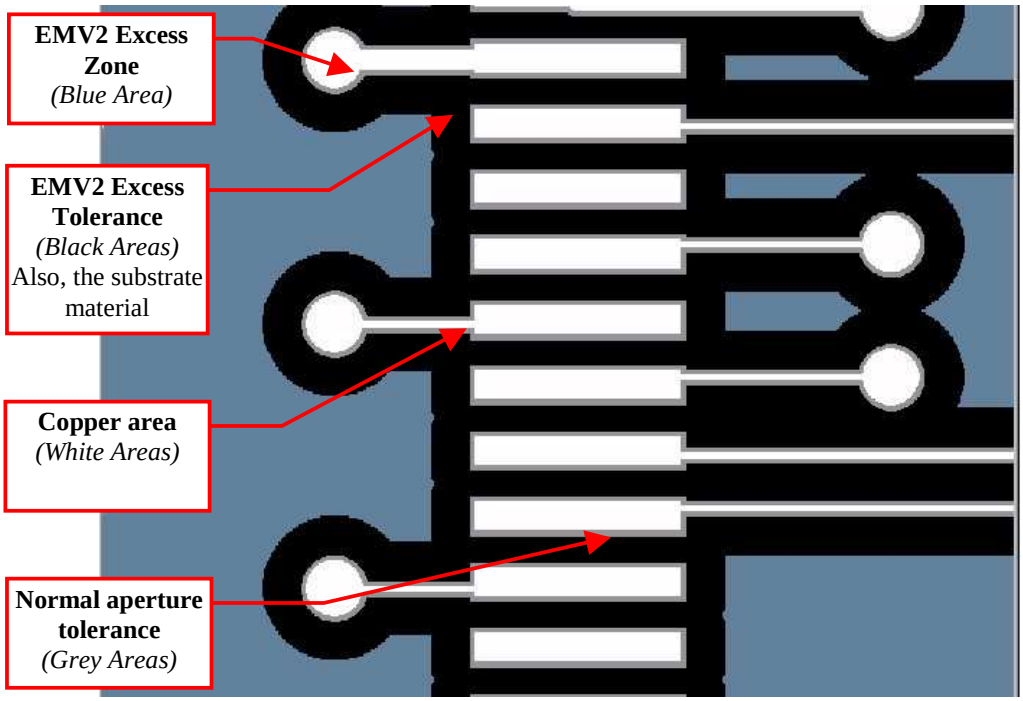
8. Click **Yes** to close the current layer and allow the changes. The following message appears when the job was sent over to Dpf2Cad.



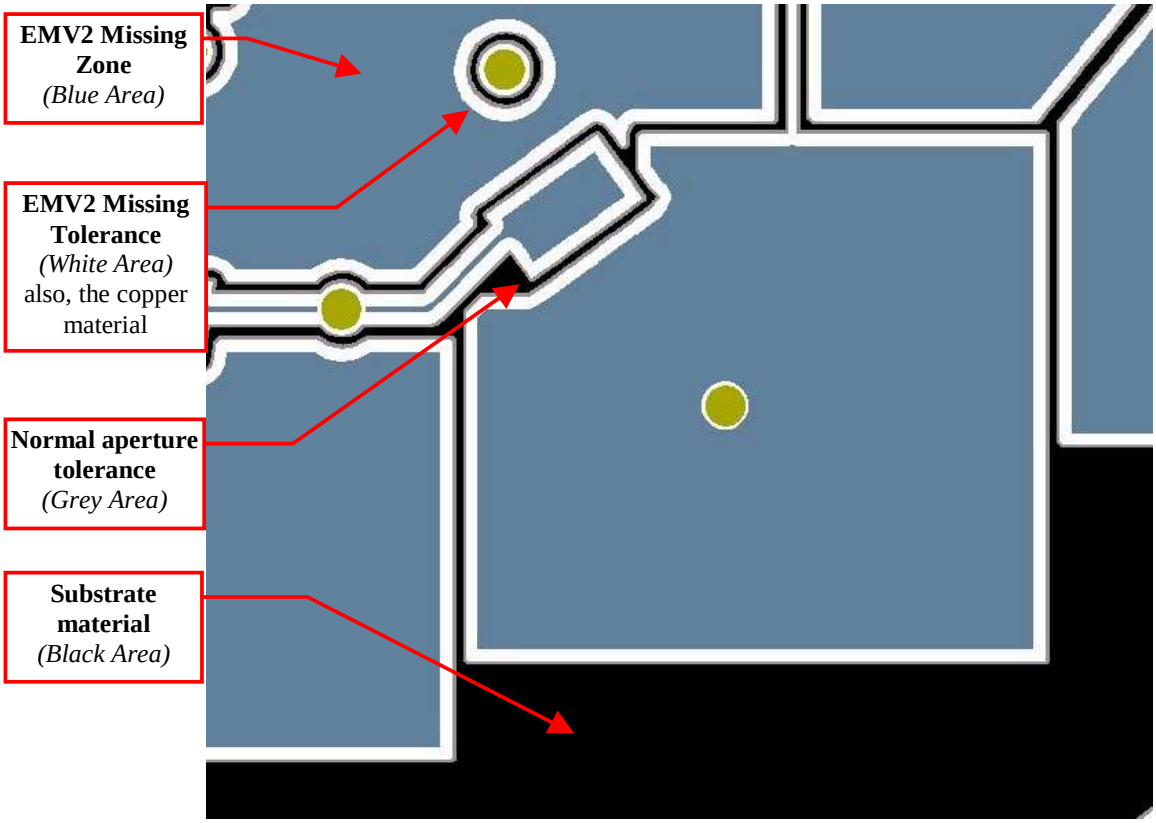
Using EMV2 Tolerances

EMV2 is the 2nd level of Error Measurement and Verification. You already know you can set a minimum defect size in the critical area of the job (known as EMV excess and EMV missing defects). EMV2 is a method of selecting an independent minimum defect size in less critical areas such as substrate or large areas of copper ground-plane. Starting with software version 5.40, there will be two new defect types: EMV-2 Excess and EMV-2 Missing.

- **EMV2 Excess Zone…** *(Previously known as the Don't care Tolerance)* Is a tolerance zone that is added to the nominal size of the tracks and pads. It is used on the background or substrate material to reduce call-outs of small splashes of copper and other extra amounts of copper that would not effect the PCB. In the following example, the EMV2 Excess zone is the area shown in blue. A separate defect size can be set for defects in this area.



- **EMV2 Missing Zone…** is a tolerance zone that is subtracted from the nominal size of the tracks or copper pads. It is used on ground planes to reduce call-outs of pinholes and other missing amounts of copper that would not effect the PCB.



Setting one of the EMV2 Tolerances (listed above) when re-ripping a job enables the EMV2 zones.

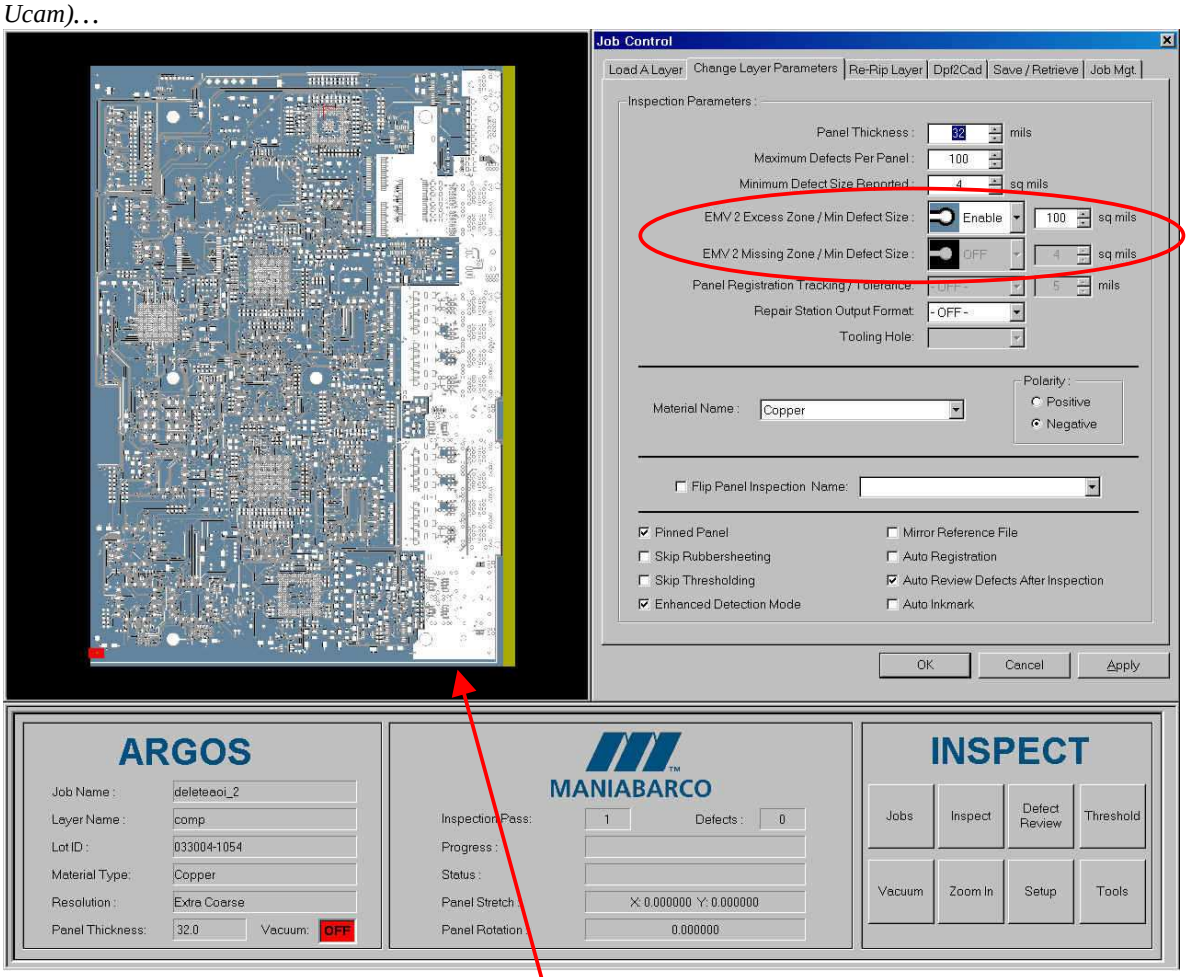
At present, when setting a Don't Care Tolerance in Ucam and sending the job to Dpf2Cad, it is received by Titan as the EMV2 Excess Zone.

Note: *Ucam version 7.1-1b (and below) still calls the **EMV2 Excess Zone** a "Don't Care Tolerance" A new Ucam release will correctly call out both the **EMV2 Excess** and **EMV2 Missing** zones.*

The following example shows a job that was prepared in Ucam version 7.1-1b and sent to Titan with a 25 mil Don't Care tolerance. Unlike the previous example (and most jobs), this one has both a large copper area as well as a large bare board area. It serves to explain the EMV2 Excess and Missing zones very well. After loading the job into Titan, the Jobs button is pressed to produce the display on the following page.

EMV2 Example

A new job sent to Titan with a 25 mil *Don't Care Tolerance (soon to be renamed EMV2 Excess Zone in Ucam)…*



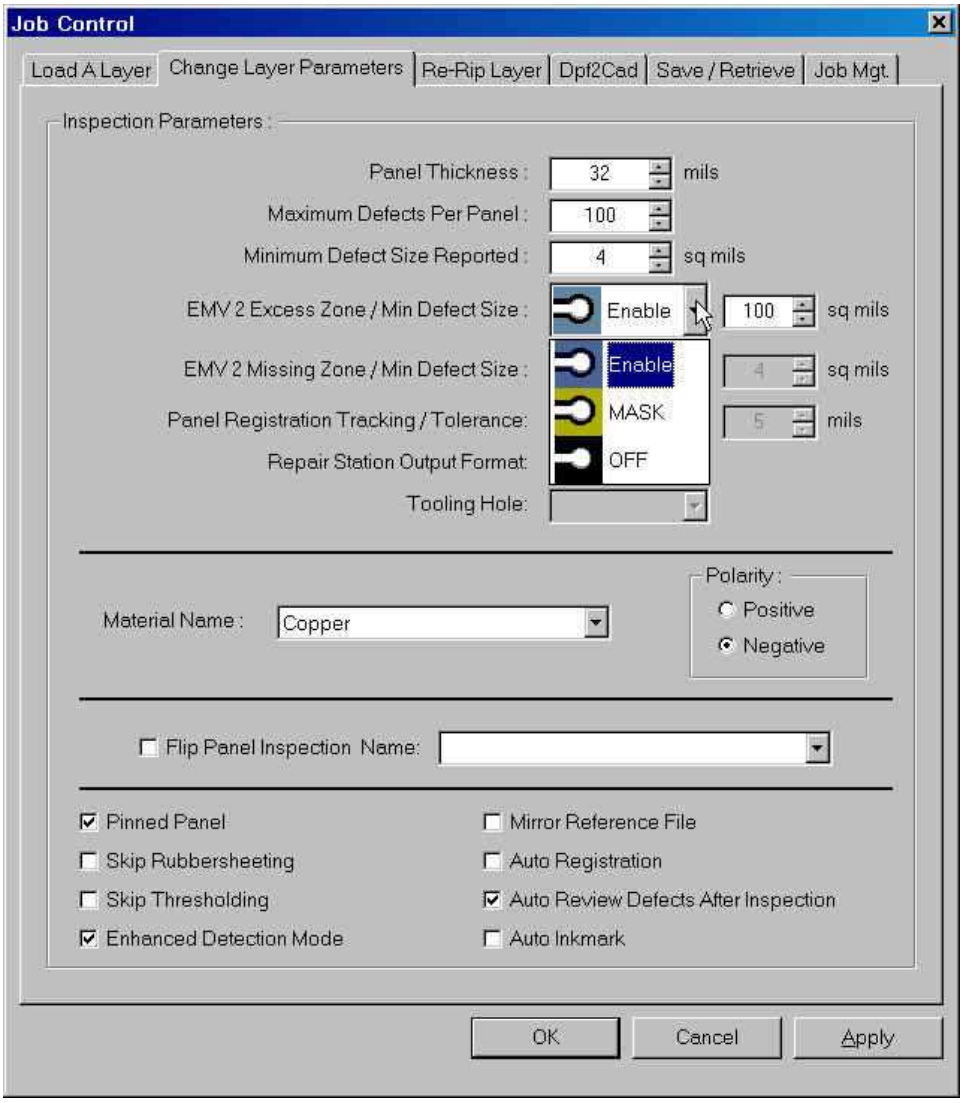
EMV2 Missing Zone*: (Copper Area)*

Currently shown as disabled (grayed out) in the Inspection Parameters box above. The job will have to be re-ripped in order to use this zone.

The EMV2 Excess Zone (when enabled) allows you to select a Minimum Defect Size in this area; independent of the Min Defect Size you have for the standard inspection. In this case, we have 100 mils selected (see circled area above). We will now find large copper splashes that appear in the EMV2 Excess Zone (the blue area) and exceed 100 square mils in size.

We can do the same thing in the EMV2 Missing Zone. After we enable it, we will be able to find pinholes in the copper by setting the Min Defect Size. We will re-rip this job in a minute. First, lets look at the choices we have when these EMV2 zones are enabled.

When you click the mouse on the EMV2 Excess Zone / Min Defect Size: window, you get three choices as shown below.



Enable: Sets the EMV2 (Excess or Missing) Zone area blue and allows you to set a Min Defect Size in this area.

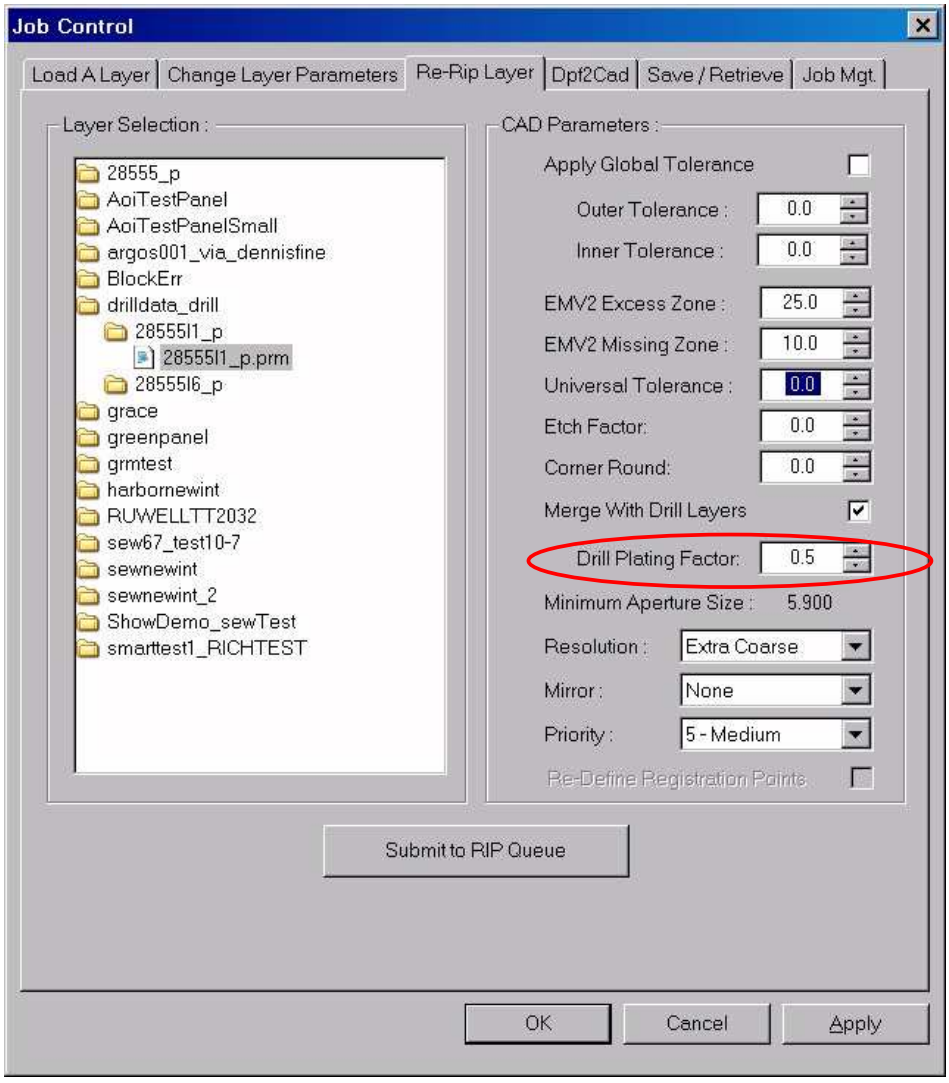
MASK: Sets the EMV2 (Excess or Missing) Zone area yellow and does not allow you to set a Min Defect Size. The Defect Size window will be grayed out. All defects in this area will be masked and not reported.

OFF: Sets the EMV2 (Excess or Missing) Zone areas white and will allow all EMV defects to be reported

The EMV2 Missing Zone / Min Defect Size: window will offer the same choices after it is enabled. Like we said before, you must re-rip new jobs to use this option until Ucam is properly updated. The next page shows the parameters to set during the re-rip.

Re-Ripping the Job

If we click on the Re-Rip Layer Tab and select the job we want to re-rip; the display appears as follows…



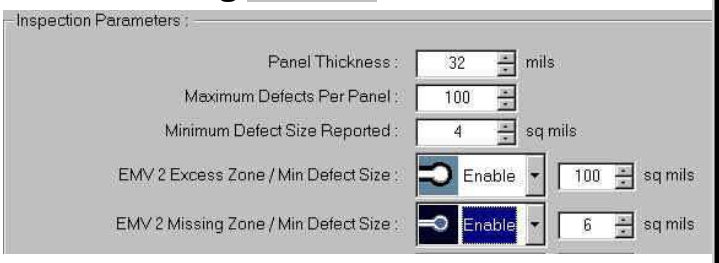
Change the EMV2 Missing Zone: from 0.0 (turned off) to the desired number (10 in this example) and click on the Submit to RIP Queue button.

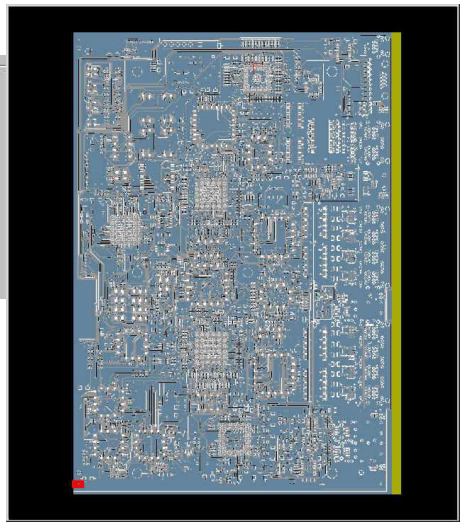
Note: *The **Submit to RIP Queue** button is initially grayed out until a selection is made in the CAD Parameters area.*

The Cad Data will re-rip. If the data is still loaded, you will be asked if you want to close the current layer. Answer Yes to continue.

After the re-rip, the EMV2 Missing area (like the EMV2 Excess area) can be turned OFF, MASKED, or ENABLED without re-ripping the layer. See the following page for samples of each setting in the EMV2 Missing area.

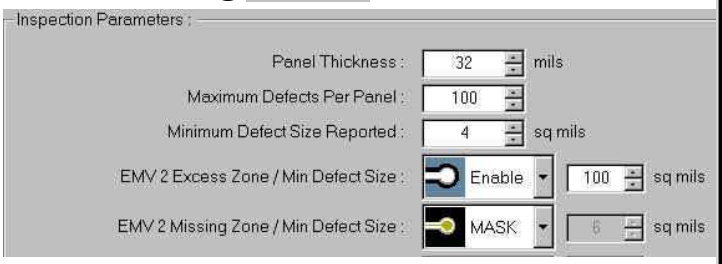
EMV2 Missing Enabled

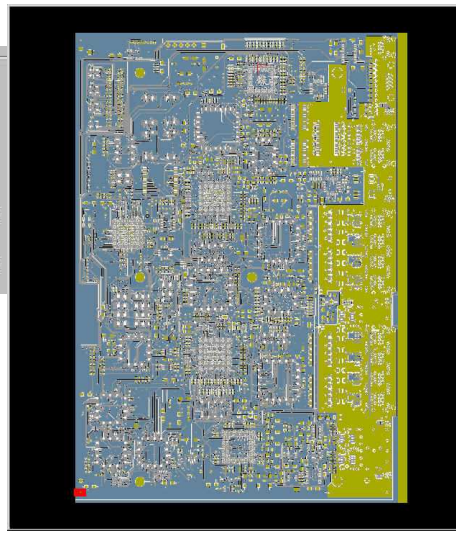




On this job that contains both a lot of bare board material *(EMV2 Excess area)* and a large copper area *(EMV2 Missing)*, there is no distinction when they are both enabled as shown here. However, the inspection will pick up 4 sq. mil defects in the black and white areas, 100 sq. mil solder/copper splashes in the EMV2 Excess zone, and 6 sq. mil pinholes in the EMV Missing zone.

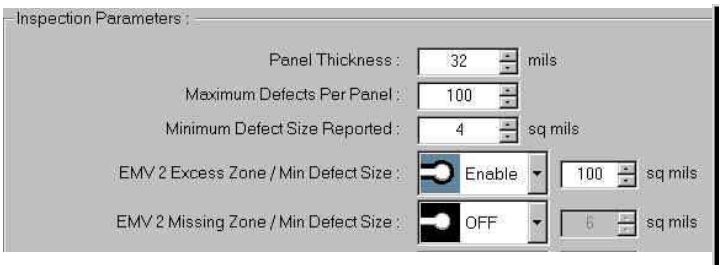
EMV2 Missing Masked

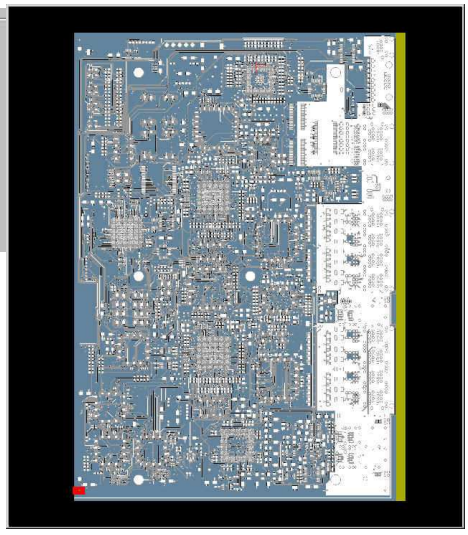




With the EMV2 Missing Zone area Masked, it turns to a yellow/green color like the original Don't Care area. All defects in this area are masked and will not be reported. The rest of the board will be inspected as described above.

EMV2 Missing OFF



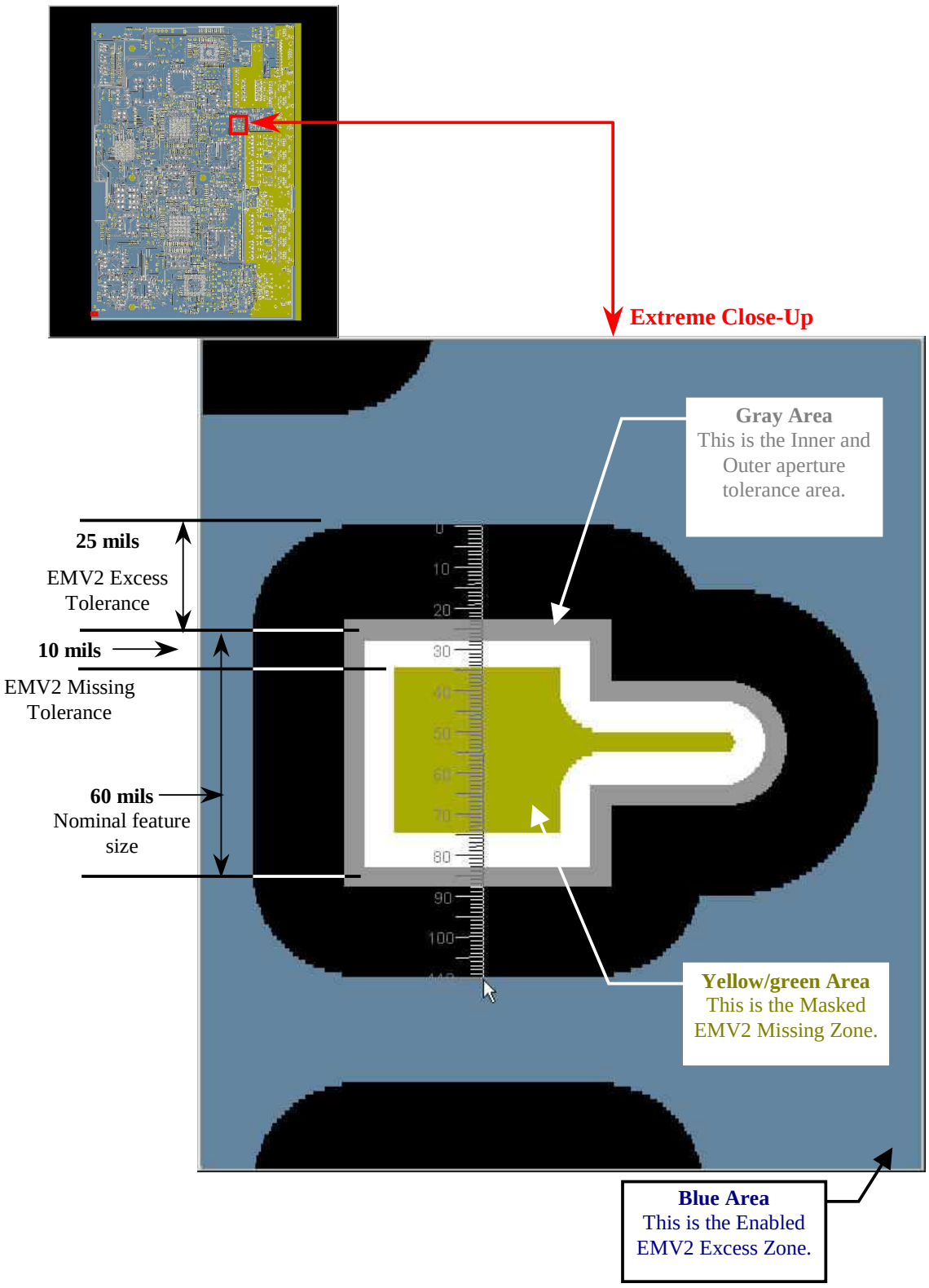


With the EMV2 Missing Zone area OFF, it turns white and will be checked for all defects, missing or excess, that are 4 sq. mils or more.

The rest of the board will be inspected as described above.

See the following page for a close-up view of a feature and a description of the tolerances.

EMV2 Excess Enabled and Missing set to MASK



Notice that both the ***EMV2 Excess Tolerance*** and the ***EMV2 Missing Tolerance*** are measured from the "*Nominal*" feature size – Not from the edge of the inner or outer tolerance.

Defect Review

Overview

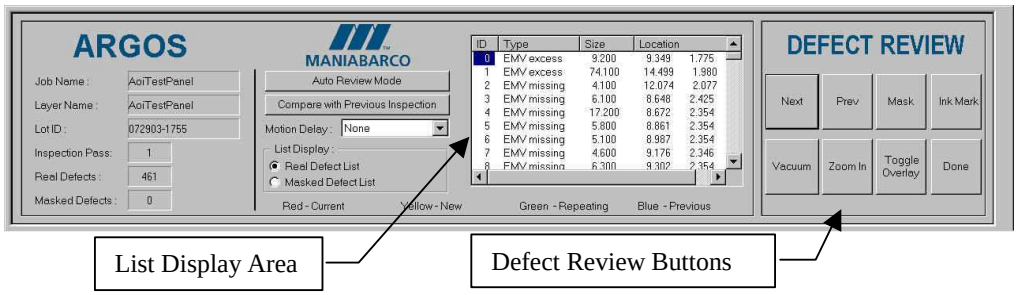
The Defect Review process enables the operator to access the defects on a particular panel. The defects can help manufacturers determine whether a panel is defective due to a manufacturing process or if the panel has one-time problems peculiar to that panel.

This chapter details the Defect Review process, which includes the following sections:

- How to configure the defect review
- How to perform the defect review

How to configure the defect review

Complete the instructions for ***How to run the inspection*** described in the *Inspection* chapter. When the inspection is complete, the Control area will be populated with the results of the inspection and the Defect Review buttons replace the Inspection buttons in the Control area.



From the **List Display** area, select either **Real Defect List** or **Masked Defect List**. The Real Defect list shows all of defects that were found during the inspection. The Masked Defects shows all of the defects you masked during the Defect Review *(as described in the next step*).

Note: *A masked defect is a defect that the operator does not want flagged as a defect in subsequent inspections for this panel. For example, if the system detects a defect that is known as a non-critical defect, the operator can mask it so that it is not flagged in subsequent inspections.*

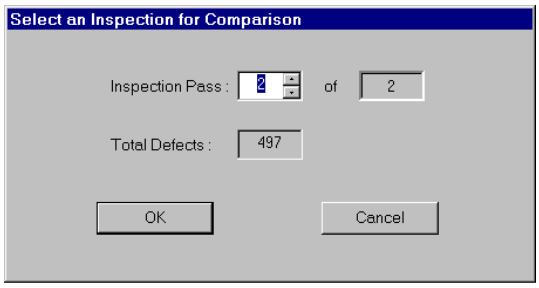
Select a motion delay time from the **Motion Delay** pull down list. This is the delay time between the CAD data panel display of the next defect and the live video display during defect review. If you want the live video to be in sync with the CAD data, you would select **None**. If, however, you want to quickly scan through the defects and you don't want to wait for the live video, you would select a longer delay time, such as **2** or **3** seconds. This allows you to move quickly to a specific defect before the live video has a chance to catch up. When you get to a defect you're interested in and stop to look at it, the live video times out (based on your delay selection) and catches up to the defect you are presently inspecting.

How to perform the defect review

Once the inspection is complete, the Defect Review buttons become enabled on the Control panel. Follow the instructions below to perform the Defect Review.

Select the **Auto Review** Mode toggle button if you'd like the Defect review to run automatically. Select it again to return to Manual Mode.

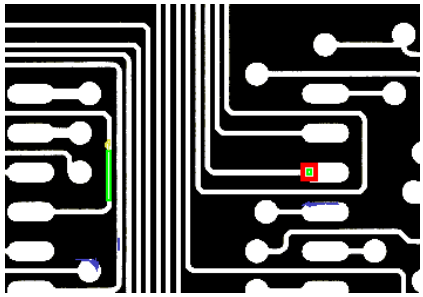
Select the **Compare with Previous Inspection** if you'd like the system to show a color-coded compilation of two reviews. When you select this button, the following dialog appears.



Select an **Inspection Pass.** This represents an inspection done prior to the current inspection

Click **OK**. A compilation of two passes is displayed (a sample is shown below), with colors representing the following:

- **Red – Current:** This indicates the current defect under review. If you click the Next button, the Red square will encompass the next defect.
- **Yellow – New:** This indicates a defect that is new to this pass.
- **Green – Repeating:** This indicates a defect that has appeared in both passes.
- **Blue – Previous:** This indicates a defect that occurred on the previous pass, but not on this pass.



Select the **Next** button to view the next defect. The CAD data panel and the live video zoom in on the next defect. This increments the defect list.

ID	Type	Size	Location	
0	Missing	2.700	0.126	-0.001
1	Excess	2.300	9.295	2.143
2	Missing	82.200	14.271	2.583
3	Missing	87.900	16.472	2.632
4	Missing	1.500	16.821	2.513
5	Missing	1.600	14.267	2.838
6	Excess	14.200	15.852	2.838
7	Missing	3.500	8.392	2.990
8	Missing	1.300	8.392	3.083

Note: *The columns in the defect list are sortable. Click on any column heading to sort on that column's data. The ID column sorts the defects in the order in which they were found during the inspection. The Type and Size column sort the defects so all missing are before Excess and larger are before smaller. The Location column sorts the defects so that there is the least distance between defects, thereby reducing the time for defect review.*

Select the **Prev** button to view the previous defect. Once again, the CAD data and live video panels adjust accordingly.

Select the **Mask** button if you'd like to mask the selected defect. A dialog screen will prompt you to accept the defect, redefine the defect or cancel.

Accept will mask the currently highlighted defect. **Redefine** will allow you to draw a box around an area containing the defect that you wish to mask out. **Cancel** will return you to the defect review screen. Once a defect is masked, it is not displayed in the defect list upon subsequent inspections. You can review the masked defects by selecting the **Masked Defect List** radio button in the **List Display** box.

Select the **Ink Mark** button if you'd like to ink mark the selected defect. This is the manual ink mark feature. The system can also be set up to automatically ink mark all defects. (See ***How to set up the job template*** in the *Getting Started* chapter.)

Select the **Zoom In** button to magnify the selected defect.

Select the **Zoom Out** button to see a broader view of the selected defect.

Select the **Toggle Overlay** button when you want to toggle between the view of the CAD data with scanned image overlay and without.

Select the **Done** button when complete. The Inspect buttons replace the Defect Review buttons in the Control area.

Save/Retrieve

About the Save/Retrieve Feature

New jobs may arrive faster than old jobs are finished and deleted. Also, it may be desirable to keep some jobs that may be reprocessed in the future. Since CAD files can be very large, the aoihome\jobs folder can get so large that it fills the disk or partition. Saving a job to an archive allows it to be deleted from the jobs folder to regain disk space. If the job is needed again, it can be retrieved from the archive and put back in the jobs folder.

For normal operation, CAD files will not be saved with the job, but will be re-created when the job is retrieved. However, there is an option to save the CAD files as well. If the CAD files are not saved, the archive size may be further reduced by saving only the last lot file.

The UCAM job file is saved in all cases, as are all of the UCAM layer (DPF) files, and all of the layer parameter (PRM) files. The main job folder and all of the layer subfolders are combined into a tar (UNIX tape archive format) file, which is then compressed with a program called **gzip**.

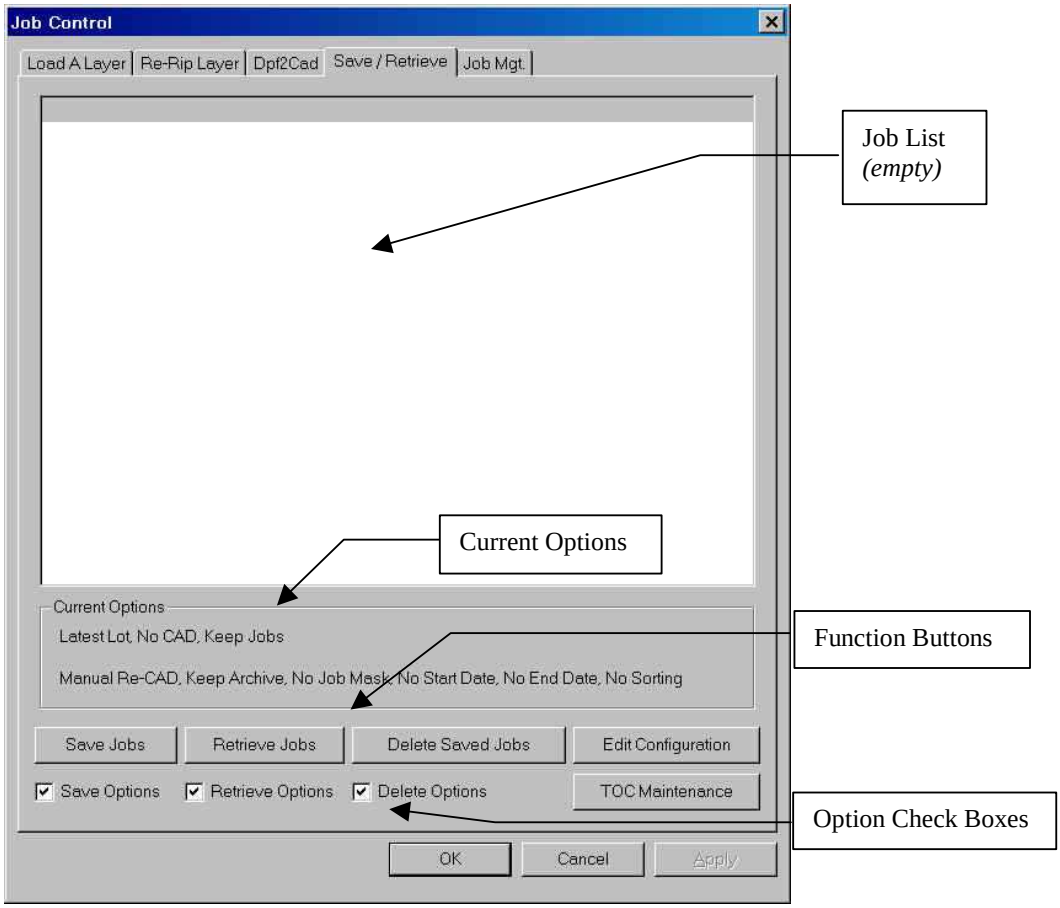
There are two options for the archive media. One is a network disk drive or RAID that can be connected to the TITAN system as a drive letter using Map Network Drive in the Windows Explorer. The other is a formatted CD-RW compact disc. To that end, each TITAN system comes with a CD-RW drive and one CD-RW disc. A CD-RW holds about 550 MB of data. Media is inexpensive enough that a different CD-RW could be used for each job. However, it is also permissible (especially when not saving CAD) to put more than one job on a CD-RW.

> ***Note:*** *A CD-R disc can be used in place of the CD-RW disc. However, it will first have to be formatted using the DirectCD utility on the system.*

TITAN maintains a Master Table of Contents (MTOC) of all jobs that have been saved, when they were saved, and on which CD-RW (volume name and serial number) they were saved. A Volume Table of Contents (VTOC) is also put on each CD, listing all jobs on that CD. The TITAN operator is responsible for naming the CD-RW's and keeping track of their location so that TITAN is able to call them when needed.

About the Save/Retrieve Graphical User Interface (GUI)

The Save/Retrieve feature is found under TITAN's Jobs Management page. When the Save/Retrieve Tab is selected, it is displayed in **Function Mode**.



In Function Mode, a large white empty list area is displayed at the top. Below the display are the **Current Options**. Below the options are the **Function Buttons** and the **Options Check Boxes**.

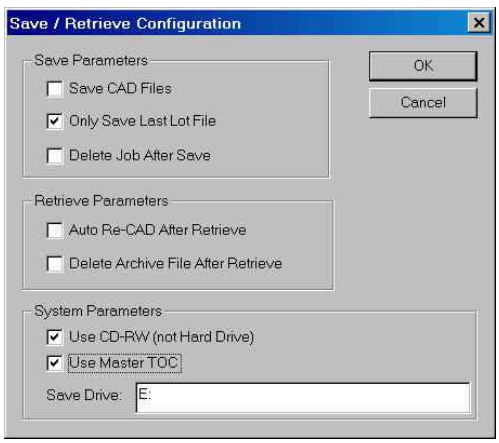
Editing the Configuration

It is best to set up the Save/Retrieve configuration before you attempt to save, retrieve, or delete any jobs, since each time you perform a new save, retrieve, or delete action, the settings default to this configuration. If you do not want the settings to default to this configuration, you must check the corresponding options check box when performing a new save, retrieve, or delete action.

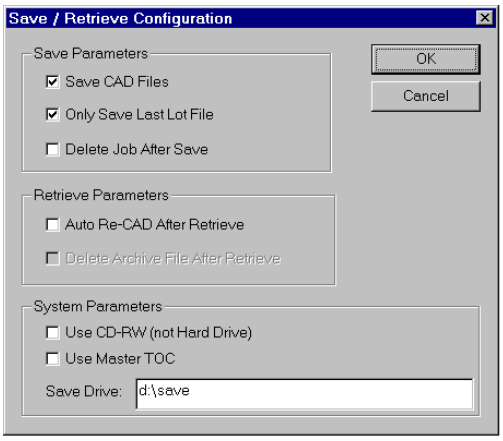
How to edit the configuration

Select the **Jobs** button on the Inspect tool bar of the TITAN control pane and click on **Save/Retrieve** Tab to get the window shown above.

Click the **Edit Configuration** button. The *Save/Retrieve Configuration* dialog appears.



Default settings for CD-R/CD-RW Disc



Sample settings for saving to a network drive

Configure the parameters as desired. Each parameter is described below.

The Save Parameters

Save CAD Files	Check this box to save all CAD files.
Only Save Last Lot File	Check this to save only the last lot; otherwise, all lot files are saved.
Delete Job After Save	Check this box to delete the job after it is saved; otherwise it is kept in aoihome\jobs.

The Retrieve Parameters

Auto Re-CAD After Retrieve	Check this box to auto re-CAD; otherwise you must use the re-rip capability manually.
Delete Archive File After Retrieve	Check this box to delete the archive file. It can also be deleted later using the Delete function.

The System Parameters

Use CD-RW	Check this box if you are using a CD-RW; otherwise use a (network) hard drive for saving.
Use Master TOC	This is normally checked when using a CD-RW. However, when reading a CD-RW disc from another system, (or computer) this should be unchecked in order to read the VTOC on the CD-RW disc. but the normal use of a hard drive is only to have a Volume TOC.
Save Drive	You must specify drive path of the CD-RW or the network hard drive area to use.

Click **OK.**

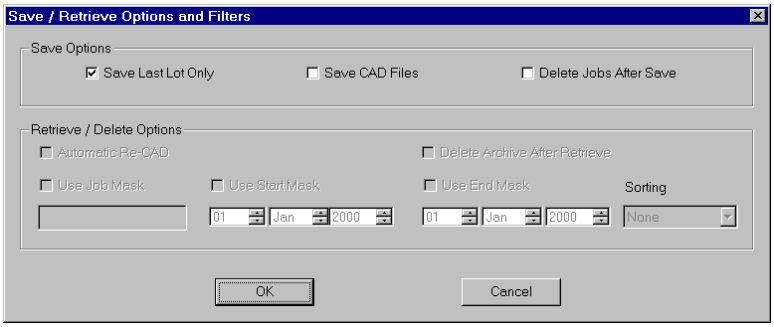
How to save jobs

Select the **Jobs** button on the Inspect tool bar of the TITAN control pane and click on the **Save/Retrieve** Tab.

Check the ☑**Save Options** check box.

Note: *Checking this box is not a requirement; however, if you are dealing with a large list of jobs, it is best to set up the Save Options each time you save jobs, since you'll be able to narrow your job list each time.*

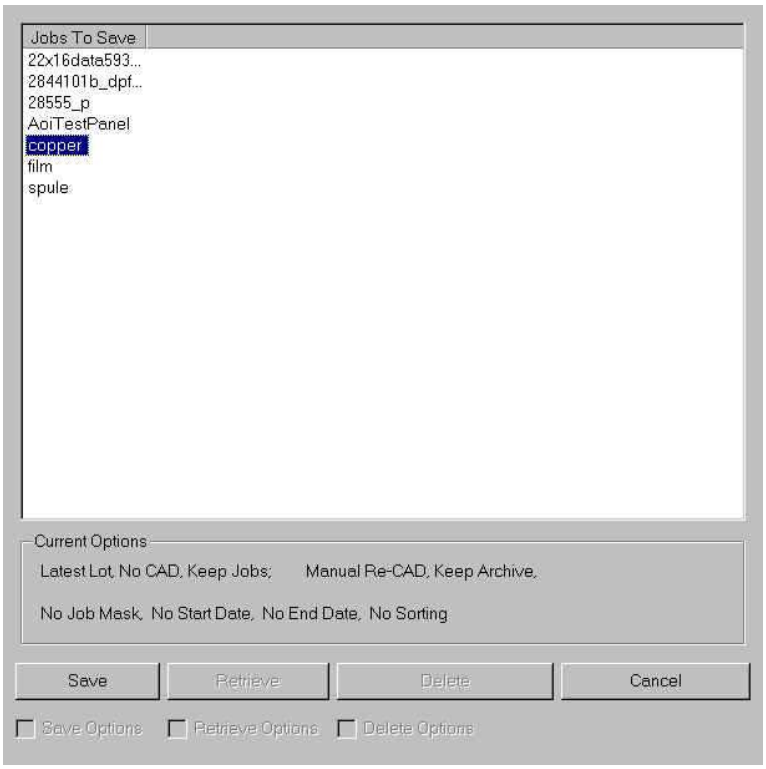
Click the **Save Jobs** button. The *Save/Retrieve Options and Filters* dialog appears.



Select the **Save Options** as desired. Each option is described below.

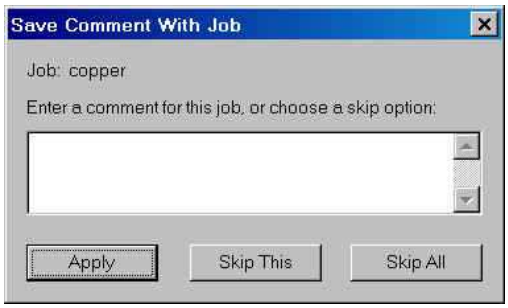
- **Save Last Lot Only** – Select this check box if you want to save the last lot only; otherwise, all lot files will be saved.
- **Save CAD Files –** Select this check box to save CAD files. If not selected, CAD files will have to be re-ripped after retrieving.
- **Delete Jobs After Save** – Select this check box to automatically delete the job from aoihome\jobs after the save.

Click **OK**. The Save Selection Mode window appears.



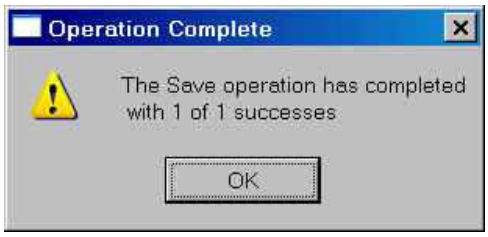
Select the jobs you'd like to save from the **Jobs to Save** list, using normal Windows conventions to select multiple jobs.

Click the **Save** button. The following window will appear for each job saved. Comments entered here will show up next to the job name when Retrieving jobs from the CD.



- Enter a comment *(if desired)* and click **Apply**. Or,
- Click **Skip This** to skip this job. The window will re-appear for each job selected. Or,
- Click **Skip All** if you don't want to enter any comments for any job.

When done, the following window will appear confirming the save.



How to retrieve jobs

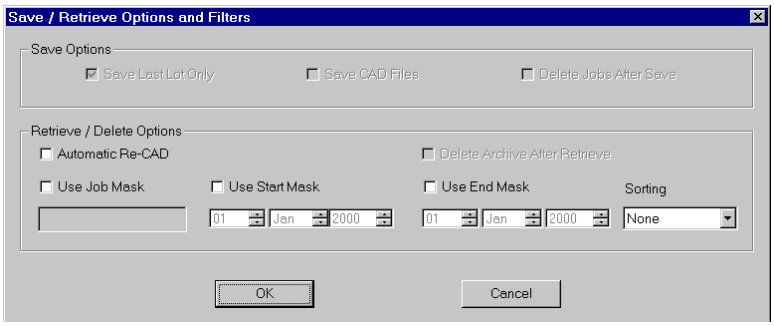
Select the **Jobs** button on the Inspect tool bar of the TITAN control pane.

Click the **Save/Retrieve** tab.

Click in the ☑**Retrieve Options** check box.

Note: *Checking this button is not a requirement; however, if you are dealing with a large list of jobs, it is best to set up the Retrieve Options each time you retrieve jobs, since you'll be able to narrow your job list each time.*

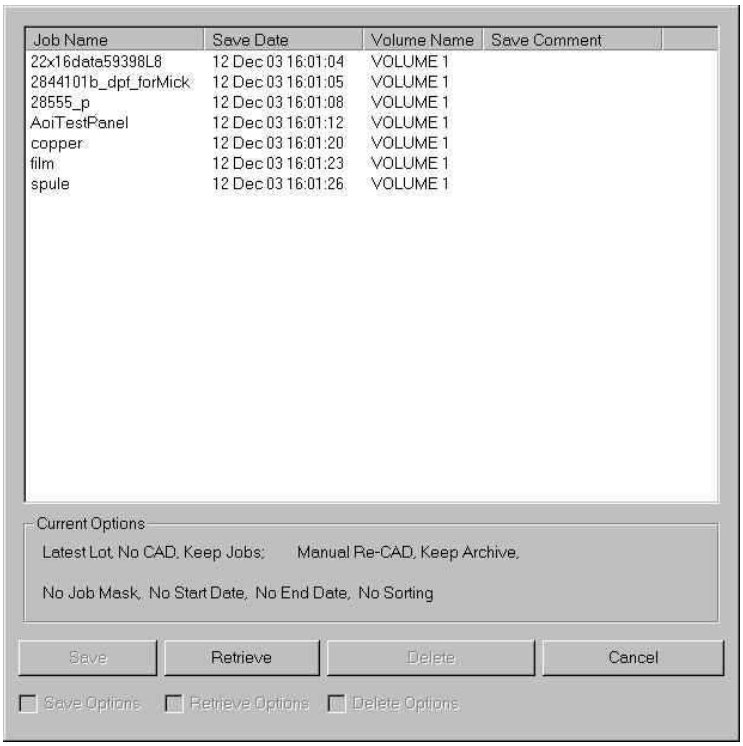
Click the **Retrieve Jobs** button. The *Save/Retrieve Options and Filters* dialog appears.



Select the **Retrieve/Delete Options** as desired. Each option is described below.

- **Automatic Re-CAD -** If CAD files are not saved (see "***How to set save options***" above) and this is checked, all the layers with PRM files will put them into the PrmSpool to be re-ripped. If not checked, you must schedule re-ripping using the Re-Rip page (Retrieve only).
- **Delete Archive After Retrieve** - If you are completely finished with the archive, this deletes it. (Retrieve only).
- **Use Job Mask -** Checking this allows you to enter a wildcard mask using "*****" to match any characters and "**?**" to match a single character in the job name. Only jobs that match that mask are displayed for selection. For example, using "MyJobs*" would return jobs such as MyJobsABC, MyJobs123, MyJobs1, MyJobsA, etc.; using "MyJobs?" would return MyJobs1 and MyJobsA, but would not return MyJobsABC, nor MyJobs123.
- **Use Start/End Mask -** Checking either one of these allows entering a date. If it is the start date, then jobs earlier that the date selected will not be displayed. If it is the end date, then jobs later than the date selected will not be displayed.
- **Sorting -** There are four sorting options: "None" displays the jobs in the order they are found. "Name" sorts them alphabetically by name. "Date" sorts them from oldest to newest. "Volume" groups the jobs by the volume name of the CD-RW on which they are saved.

Click **OK**. The Selection Mode window appears.



Select the jobs from the **Jobs Name** list that you'd like to retrieve.

Click the **Retrieve** button.

How to delete jobs

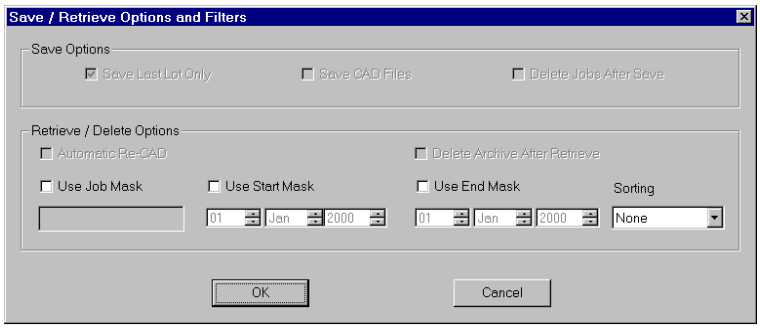
Select the **Jobs** button on the Inspect tool bar of the TITAN control pane.

Click the **Save/Retrieve** tab.

Click in the ☑**Delete Options** check box.

Note: *Checking this box is not a requirement; however, if you are dealing with a large list of jobs, it is best to set up the Delete Options each time you delete jobs, since you'll be able to narrow your job list each time.*

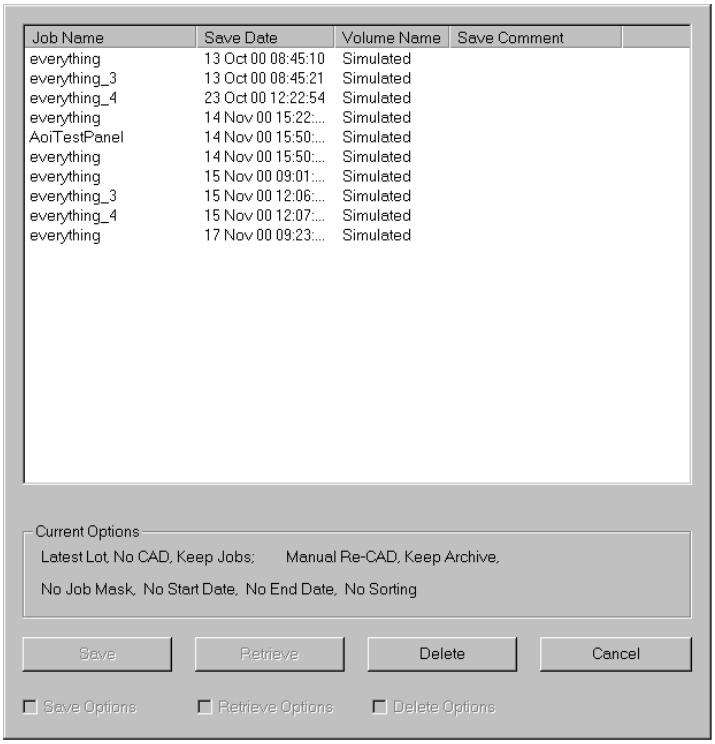
Click the **Delete Saved Jobs** button. The Save/Retrieve Options and Filters dialog appears.



Select the **Retrieve/Delete Options** as desired. Each option is described below.

- **Use Job Mask** - Checking this allows you to enter a wildcard mask using "*" to match any characters and "?" to match a single character in the job name. Only jobs that match that mask are displayed for selection. For example, using "MyJobs*" would return jobs such as MyJobsABC, MyJobs123, MyJobs1, MyJobsA, etc.; using "MyJobs?" would return MyJobs1 and MyJobsA, but would not return MyJobsABC, nor MyJobs123.
- **Use Start/End Mask** - Checking either one of these allows entering a date. If it is the start date, then jobs earlier that the date selected will not be displayed. If it is the end date, then jobs later than the date selected will not be displayed.
- **Sorting** - There are four sorting options: "None" displays the jobs in the order they are found. "Name" sorts them alphabetically by name. "Date" sorts them from oldest to newest. "Volume" groups the jobs by the volume name of the CD-RW on which they are saved.

Click **OK**. The Selection Mode window appears.



Select the jobs you'd like to delete from the job list, using normal Windows conventions for selecting multiple jobs.

Click the **Delete** button.

TOC Maintenance

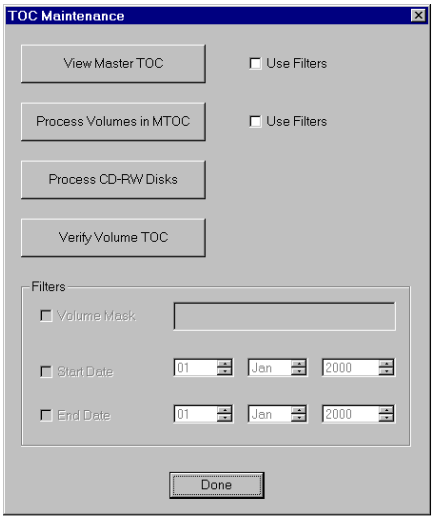
The size and volume of jobs makes it necessary for users to save to other directories and media. After time, these volumes and directories can become enormous. The TITAN Save/Retrieve feature provides a TOC Maintenance tool to maintain this large body of data. The TOC Maintenance utility allows you to view the Master TOC, as well as Volume TOCs. It also allows you to process the TOCs, meaning you can check what is on a TOC against its volume, and you can check volumes against the Master TOC. The system will locate problems, such as finding a job that is not listed on a TOC, and report this to the user.

Using TOC Maintenance

Select the **Jobs** button on the Inspect tool bar of the TITAN control pane.

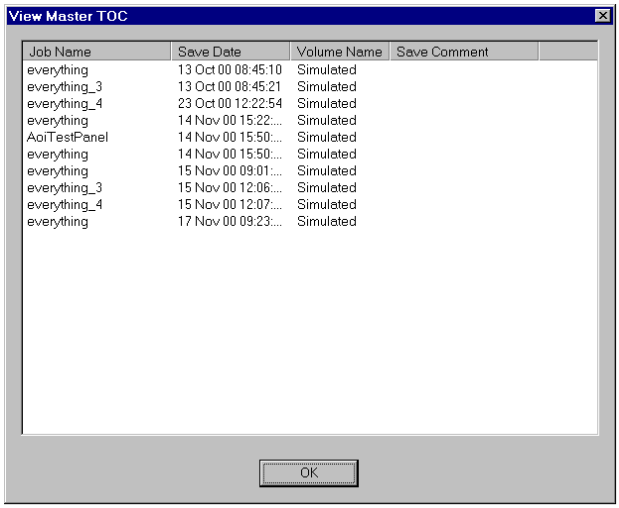
Click the **Save/Retrieve** tab.

Click in the **TOC Maintenance** button. The TOC Maintenance dialog appears.



Click on the **View Master TOC** button if you have a Master TOC and want to view its contents. The View Master TOC window appears. This window is for viewing only.

Note: *Click on the **Use Filter** check box and fill in the filter parameters on the bottom of the TOC Maintenance window if you like to narrow the view of the Master TOC.*



If desired, click on the **Process Volumes in MTOC** button.

Note: *Click on the **Use Filter** check box and fill in the filter parameters on the bottom of the TOC Maintenance window if you like to narrow the view of the Master TOC.*

Follow the instructions in the subsequent popup dialog boxes as desired.

If desired, click on the **Process CD-RW Disks** button.

Follow the instructions in the subsequent popup dialog boxes as desired.

If desired, click on the **Verify Volume TOC** button.

Follow the instructions in the subsequent popup dialog boxes as desired.

Dpf2Cad

About Dpf2Cad

Dpf2Cad is the application that takes AOI jobs from UCAM and creates a CAD file for each layer to be inspected. The Dpf2Cad program normally operates invisibly in the background; however, through the TITAN interface, you are able to keep track of the Dpf2Cad status.

When UCAM-AOI sends a job to be inspected, it actually saves a job folder that contains the JOB file and the DPF files for all of the layers. This folder must be saved into the Dpf2Cad JobSpool folder. UCAM has a database setting in which the path to the job spool must be entered.

When the job folder arrives in the JobSpool, Dpf2Cad moves it to the Aoihome\Jobs folder as a sub-folder. The JOB file and all of the DPF files are put into the job sub-folder (TITAN will also put the job and material template files in the job sub-folder). For each layer to be inspected, Dpf2Cad creates a layer sub-sub folder and creates a PRM file in it. When the layer is ripped, the CAD file will also be put in this sub-sub-folder.

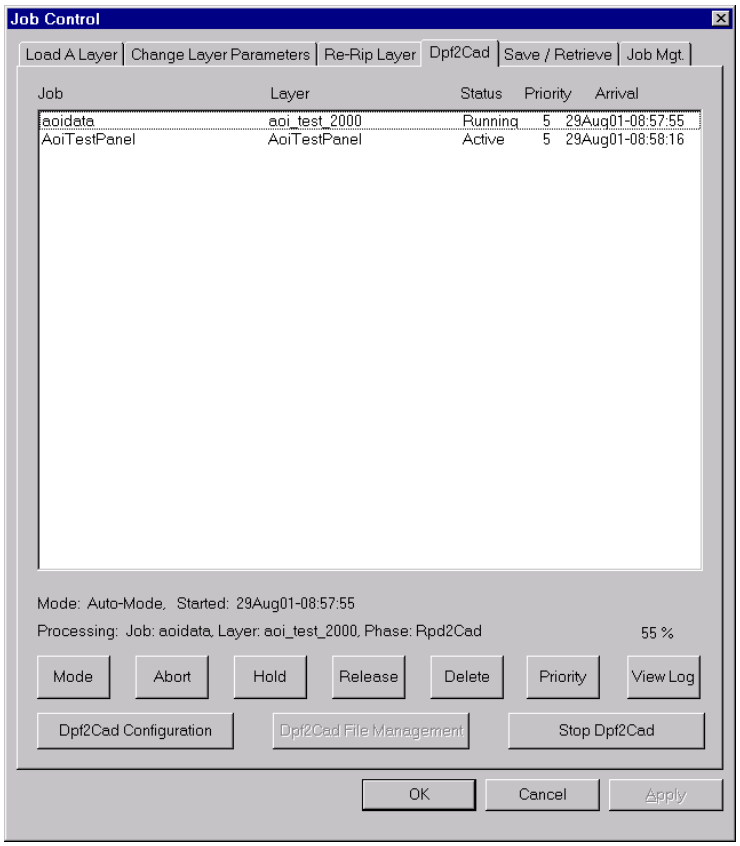
Dpf2Cad consists of three separate executable files. **App.exe** is the main program, which maintains the queue of layers to rip, status outputs, user request inputs, and error reporting. When a layer is to be processed, App.exe invokes two auxiliary programs **DPF2RPD** and **RPD2CAD**. The DPF2RPD program converts the UCAM DPF representation of the layer into an intermediate RPD form. The RPD2CAD program converts the RPD form into the CAD file that TITAN uses.

The Dpf2Cad Interface

The Dpf2Cad interface is viewed from a tab in the Job Control window. The interface includes a large white queue area in the center of the interface. The queue lists the jobs to be done. Layers are sorted in priority order, and the top active layer in the list is the one that will be stated next.

Each layer includes the following information:

Job	The name of the job in which the layer occurs *(no spaces allowed)*.
Layer	The name of the layer itself *(no spaces allowed)*.
Status	This includes Processing, Active, Held, Running, or Error
Priority	1 is the highest; 10 is the lowest
Arrival	The day and time the layer arrived in the queue



Dpf2Cad control buttons

The Dpf2Cad interface includes several control buttons that allow you to act upon selected layers in the Dpf2Cad queue. They include:

Mode	This button toggles Dpf2Cad between **Active** mode and **Inactive** mode. In Active, once one layer is complete, the next layer in the queue automatically begins processing. In Inactive, the next layer will not start without operator intervention.
Abort	This button stops the processing of the current layer and puts the layer back in the queue.
Hold	The Hold button allows you to select one or more layers to be put on hold. Held layers are skipped and remain in the queue indefinitely.
Release	This button allows you to release jobs that are on hold or jobs that encountered errors.
Delete	This button allows you to delete job(s) from the queue. Jobs are only deleted from the queue; they are not deleted permanently.
Priority	This button allows you to change the priority of one or more layers.
View Log	
Dpf2Cad Configuration	This button allows you to change the Dpf2Cad configuration. The configuration data is contained in **Dpf2Cad\Config.dat** file.
Dpf2Cad File Management	This button allows you to view or delete data files in the Dpf2Cad directory tree.
Stop Dpf2Cad	This button terminates Dpf2Cad. If a layer is processing, it will continue to completion before termination.

The Dpf2Cad Directory structure

The directory structure of Dpf2Cad contains several directories, which are described below.

Dpf2Cad Home Directory	Dpf2Cad is installed in this directory. In addition to several subdirectories, it also includes two files: **Config.dat,** the configuration; and **Queue.dat,** the current state of the queue.
Status Directory (Status)	Dpf2Cad writes **Status.dat** files and stores them in this directory. TITAN then reads them from here.
Requests Directory (Requests)	TITAN writes files to this directory and Dpf2Cad reads them from here. After reading, Dpf2Cad deletes the file. If there are multiple files in the directory, Dpf2Cad reads them in order of their creation timestamp. Dpf2Cad only reads files with the **.req** extension.
Job Spooler (JobSpool)	When adding a job to the spooler directory, UCAM must first determine whether there is already a directory with that name. Then it creates the directory and, within it, creates a file named "**lock**." While this file exists, Dpf2Cad will not process this directory. After all the JOB and DPF files have been written into the directory, the lock file is deleted and Dpf2Cad will begin processing the next time it checks.
Layer Spooler (PrmSpool)	Dpf2Cad only looks for files with the "**.prm**" extension. These are created by Dpf2Cad when Dpf2Cad breaks a job into layers. They can also be copied here by the TITAN Re-Rip function.
Data Directory (Data)	The names of the subdirectories in the data directory are arbitrary. Dpf2Cad may change the original names to avoid duplicates. The name of the job is the name of the JOB file. The names of the layers are the names within the JOB file. Dpf2Cad creates a new subdirectory whenever a new job arrives from UCAM. Dpf2Cad deletes an old directory when it gets a request to do so. It is illegal for TITAN to respool a parameter file for a data set that has been deleted. Dpf2Cad does not do any automatic deletion, archiving or restoring of these subdirectories. Any layer or job that has an error will be put in the **Error** subdirectory of the Data Directory.
CadOutput Directory (CadOutput)	This is a test directory for CAD output. Normally, the TITAN JOBs directory will be the CAD output directory.
Working Directory (Temp)	This is a temporary working directory for intermediate results from Dpf2Rpd and Rpd2Cad.
Log Directory (Logs)	This holds the **Trace.log**, and **System.log** files, as well as the **JOB_LAYER.LOG** file for each layer in the system.
Programs Directory (Programs)	This contains the programs needed to run Dpf2Cad (the main **App.exe**) as well as **Dpf2Rpd.exe** and **Rpd2Cad.exe**. It also contains a sample **Gui.exe** for testing without TITAN. The **LMBR326B.DLL** is also shipped in this directory for use by Dpf2Rpd.
Fonts Directory (Fonts)	The definitions of UCAM fonts are kept here for use in Dpf2Rpd.
Urd Directory (Urd/English)	This contains UCAM error message strings for use in Dpf2Rpd.

Dpf2Cad Configuration

The global configuration consists of a set of environment variables and the Config.dat file.

For Dpf2Cad to run properly, several environment variables must be set. Normally the installation process sets theses variables automatically. The variables include:

Dpf2CadHome	Set to the install directory
FNTDIR	Set to the Fonts subdirectory in Dpf2CadHome
UFNTDIR	Also set to the Fonts subdirectory in Dpf2CadHome
URDPATH	Set to the Urd subdirectory in Dpf2CadHome

Config.dat contains the configuration values. Below is a sample of the configuration values.

```
D:\Dpf2Cad\Data # path to input jobs
D:\aoihome\jobs # path to output jobs
1 # job output mode (1=ARGOS, 0=AM2)
1 # cad output mode (1=Local, 0=UCAM)
30 # max days to keep layer logs (0=forever)
1 # get all errors (1=yes, 0=only sys and mine)
D:\aoihome\temp\Dpf2CadErros # path to error folder
```

Details of Configuration Variables

Path to Input Jobs	Not used in TITAN. In AccuMatch 2 mode, jobs sent from UCAM to the JobSpool are put here, normally d:\Dpf2Cad\Data. If Dpf2Cad cannot put any file where it belongs or cannot delete it, the file will be put in an Error subfolder under the Data folder.
Path to Output Jobs	For ARGOS, TITAN or AccuMatch2, this should give the full path to the JOBS folder inside AOIHOME. For TITAN, this path is normally d:\aoihome\jobs.
Job Output Mode	For TITAN, CAD files are named LAYER.CAD and are put in aoihome\jobs\JOB\LAYER. For AccuMatch2, CAD files are named JOB_LAYER.CAD and are put in aoihome/jobs.
CAD Output Mode	UCAM includes a parameter that tells where to put the AccuMatch 2 output files. Local mode ignores this and uses the Path to Output Jobs. UCAM mode puts the CAD files where UCAM instructs them to be put.
Max Days to Keep Layer Logs	To prevent a buildup of old layer logs, they can be deleted after a specified number of days has passed. To keep them until you wish to delete them manually, set this value to zero.
Get all Errors	Dpf2Cad sends error notifications to a specified directory where some GUI is supposed to read them and alert you that attention may be required. This feature is needed because Dpf2Cad normally runs invisibly in the background. If an error occurs while processing a layer, that error is always sent to aoihome\temp\Dpf2CadErros on the TITAN system that would have gotten the CAD file. Normally, the only GUI watching for errors is TITAN, and this is set to 1 to send all errors here.
Path to Error Folder	This is where errors are sent. From the normal situation described above, the path should be d:\aoihome\temp\Dpf2CadErrors. That will make sure that both system errors and layer errors are sent to TITAN.

Dpf2Cad Log Files

There are three different types of log files that are generated in the **Logs** folder:

Trace.log	As the program executes many detailed acts are written to the trace log. This file keeps growing as long as Dpf2Cad runs. When Dpf2Cad is stopped and restarted, this file is deleted and restarted. Between turns it remains until Dpf2Cad is started again. The purpose of the trace is to help determine what happened if something goes wrong. It is not used in normal operation.
System Logs	System logs contain any system errors, any layer errors and most status changes (layer arrival, layer start, layer completion, etc.). These can be consulted to review what has happened over the past seven days. The first file is named System 01.log the next is System02.log, etc. When System 08.log is created, System 01.log is deleted to keep the total at seven. After System 10.log, numbering returns to System 01.log. The dates on the logs can help to determine which is the newest. Even if Dpf2Cad is never stopped, a new System log will be opened each day.
Layer Logs	As a new job is broken into layers, a layer log is started for each one. The naming format for layer logs is Jobname_Layername.log. Whatever happens relative to a layer is recorded in its log. Because a heavy workload can result in many layer logs, the Config.dat file contains the ability to have layer log files deleted when nothing has happened to the layer after a number of days.

Dpf2Cad Errors

All errors are written to the System logs. Any error for a layer is written to the layer log. However, since Dpf2Cad is often run in the background, the operator might never know that an error had occurred. To prevent this, Dpf2Cad provides for two special error file locations. Normally, these are both the same, **d:\aoihome\temp\Dpf2CadErrors**. When TITAN is running, it periodically checks this location. If there are any errors, they are displayed in a popup window. These messages do not explain what the error was in any detail, they just provide notification that an error has occurred. The System, Layer, and Trace logs provide better information for what has failed.

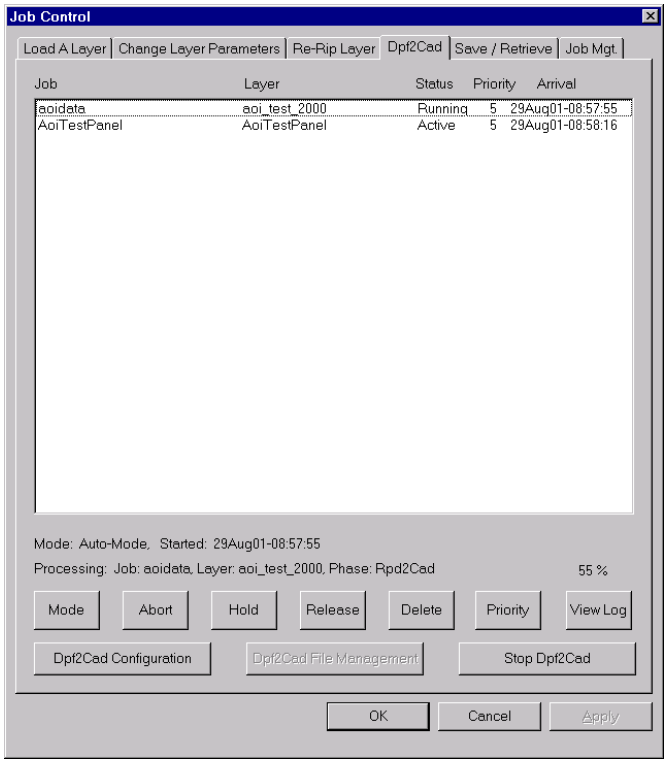
Making Changes to Dpf2Cad

Dpf2Cad includes several control buttons that allow you to act upon the application (See the ***Dpf2Cad control buttons*** section above). The following sections describe how to use each of the control buttons.

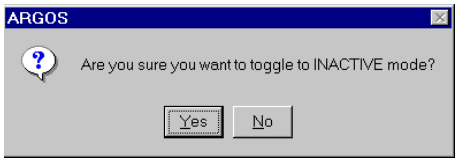
How to change modes in Dpf2Cad

Select the **Jobs** button on the Inspect tool bar of the TITAN control pane.

Select the **Dpf2Cad** tab. The Dpf2Cad window appears.



Click on the **Mode** button. A TITAN message appears.



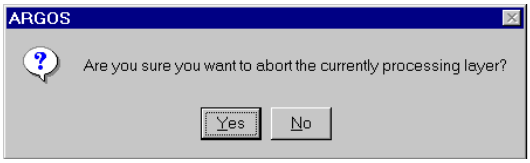
Click **OK** in the message box.

Change the setting as desired.

Click **OK.**

How to abort a layer

While a layer is processing, click the **Abort** button. A TITAN message appears.



Click **OK** in the message box. The layer you selected stops processing and is put back in the queue.

How to put a layer or layers on hold

In the Dpf2Cad queue, select a layer you want to put on hold.

Note: *To select a single layer, click on it. To select multiple layers, click on the first layer, then hold down the **Shift** key while clicking the last layer you'd like to select. To select multiple layers that are not next to one another, hold down the **CTRL** key as you click on each layer you'd like to select.*

Click on the **Hold** button. A TITAN message appears.

Click **OK** in the message box. The layers you've selected are put on hold and remain in the queue.

How to release a layer or layers that have been put on hold

In the Dpf2Cad queue, select a layer you want to release from hold.

Note: *To select a single layer, click on it. To select multiple layers, click on the first layer, then hold down the **Shift** key while clicking the last layer you'd like to select. To select multiple layers that are not next to one another, hold down the **CTRL** key as you click on each layer you'd like to select.*

Click on the **Release** button. A TITAN message appears.

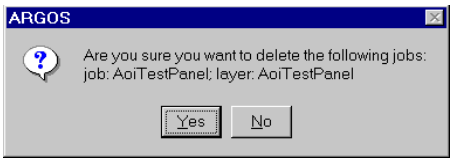
Click **OK** in the message box. The layers you've selected are released.

How to delete a layer or layers

In the Dpf2Cad queue, select a layer you want to delete.

Note: *To select a single layer, click on it. To select multiple layers, click on the first layer, then hold down the **Shift** key while clicking the last layer you'd like to select. To select multiple layers that are not next to one another, hold down the **CTRL** key as you click on each layer you'd like to select.*

Click on the **Delete** button. An TITAN message appears.



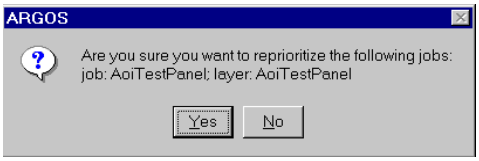
Click **OK** in the message box. The layers you've selected are deleted.

How to re-set the priority of a layer or layers

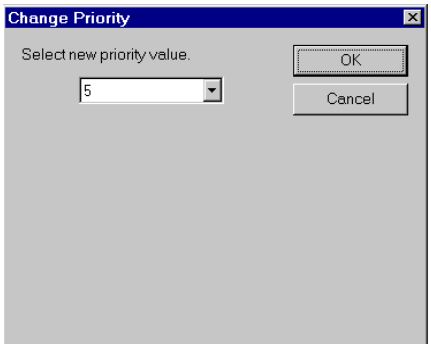
In the Dpf2Cad queue, select a layer whose priority you'd like to change.

Note: *To select a single layer, click on it. To select multiple layers, click on the first layer, then hold down the **Shift** key while clicking the last layer you'd like to select. To select multiple layers that are not next to one another, hold down the **CTRL** key as you click on each layer you'd like to select.*

Click on the **Priority** button. An TITAN message appears.



Click **Yes**. The Change Priority dialog appears.

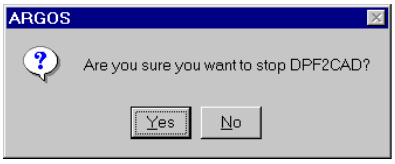


Enter a new Priority value for the selected layers.

Click **OK** in the message box. The layers you've selected are re-prioritized.

How to stop Dpf2Cad

Click on the **StopDpf2Cad** button. An TITAN message appears.



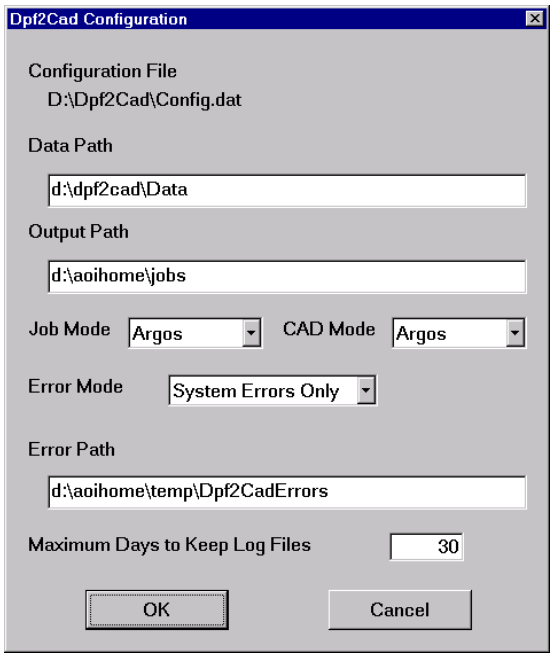
Click **OK** in the message box. If a layer is processing, Dpf2Cad will terminate after the layer has run to completion.

How to configure Dpf2Cad

Click on the **Dpf2Cad Configuration** button. The **Dpf2Cad\Config.dat** file is displayed.

Make edits as desired.

Click **OK.**



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