



Ultra IV, Supra E, and Spectra Series Operator Manual



Revision 1A
07-19-13
SWV 5.4 & 6.4

Machine Vision Products, Inc.

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Revision History:

Revision	Date	Description
1.0	08/05/10	Initial release
1A	07/18/13	All sections spell checked, and updated the format.

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Section

1

Manual Introduction

Manual Introduction

This document describes those processes required to effectively operate the Machine Vision Products, Inc. (MVP) Auto Inspector Model Ultra IV, and Supra E model machine on a daily basis.

The manual layout is designed to train the user in a logical sequence that will decrease the time required to reliably operate the machine. The first sections will aid the user in understanding the machines basic nomenclature and safety precautions. From there the user will begin learning material handling and machine operation. Included are topics on operator level error recovery and a section on advanced operator functions.

Textual Conventions

Convention	Use	Examples
All caps	Any section of a file that is typically in caps.	LIBRARY
Italics	Includes file names and their extensions, documents, directories, and their paths.	<i>filename.ext</i> <i>/opt/mvp/part_lib/types.</i>
Bold, Courier new	Major headings, program commands to be executed exactly as they appear, in a Linux terminal window or as input to the MVP software, and tool names.	Dbgen r c p -r . / PPU AI : /opt/mvp/. UI
Bold	Names of MVP software buttons, software headings, and other software features that have to be selected via the mouse, also hardware switches and actions to be done by hand.	Database Edit Flying Inspect Reset and Enter
Underlined text	This Underlined text is used to denote messages that the software automatically feeds back to the user. For example, a warning or a prompt for input.	<u>Snaps Not Calculated</u>
{ }	A generic name to be replaced by a specific name.	{board name}
[]	Required variable.	
< >	Optional variable in italics, keyboard key in standard type.	<disk> <enter>
Shaded Text	Shaded text emphasizes all examples of output from the system. These examples appear throughout this manual.	

Mouse/Trackball Button Terminology

This manual describes mouse buttons by function. The middle button and right button have different functions, depending on whether Linux O/S or MVP software is being used. This will be described in more detail later on. For Linux O/S the following holds true.

- Left button – SELECT: this button is used to select or unselect objects and activate screens.
- Middle button – ADJUST: this button is used to adjust a selected group of objects or deselecting a group.
- Right button – MENU: this button is used to display and choose from menus.

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Section

2

Machine Features and System Introduction

The first half of this section points out the elemental components of the machine coupled with a basic description of those devices.

The second half introduces the system interfaces and programs that the user will become familiar with as the manual progresses.

Machine Features

The following table illustrates the features readily found on the external Front and Rear of the Ultra IV, Supra E, and Spectra model machines.

Feature	Description
Light Tower	Machine status and error indicator.
Front/Rear Upper/Lower Doors	Safety features tied into the emergency machine power off system when opened. Requires tool to latch and unlatch. Gas Spring type hangers prevent door from slamming and aids in opening/closing with mechanical control.
Monitor/Keyboard/Mouse	HMI devices for interfacing with the machine operating system.
Conveyor Input/Output bays	Configuration dependent; default left to right setup.
Rears Fans	Exhaust air from inside machine.
EMO Switch –Front/Rear	Emergency Machine Off switch. Powers off motor drive, air, and conveyors upon activation.



Shown Ultra IV; Supra E and Spectra same

Main Disconnect Switch	Allows facility power to pass into the machine.
------------------------	---

The front base of the machine consists of the material handling controls for machine operation and access doors for entry into the machine. The following devices are accessible from the front when the lower doors are opened.

Feature	Description
Power Distribution Box	Distributes AC/DC power to machine devices.
UPS (optional)	Provides momentary backup power upon facility power failure.
Personal Computer (PC)	Source of machine controls. Consists of RTC PWB used to communicate with the Ultra Input/Output board.
XYZ Motor Controller Power Box (not shown)	Supplies power to the XYZ motor controllers for the Supra E.
Conveyor Motor Controller Power Box	Supplies power to the conveyor motors.

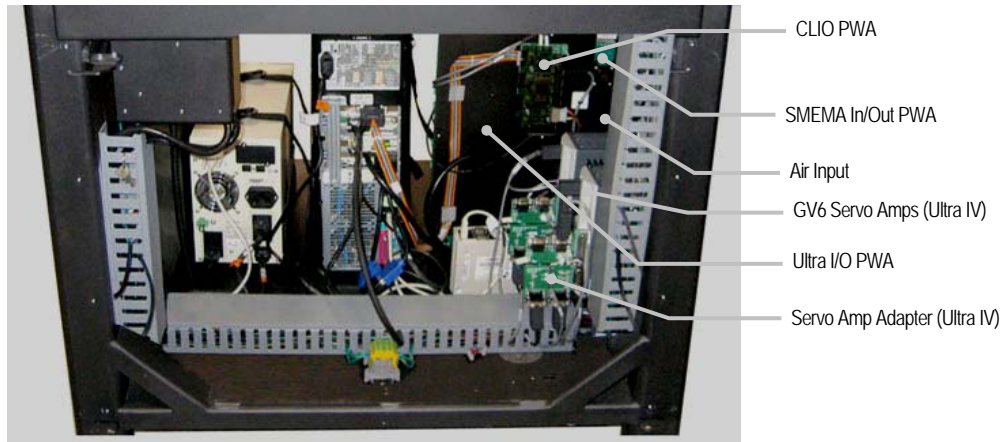


Shown Ultra IV; Supra E and Spectra do not use similar XYZ controllers.

The rear of the machine consists of facility connections, and system controls for machine operation. The following devices are accessible from the rear when the lower doors are opened.

Feature	Description
Servo Amps	GV6 model servo controllers that drive the XY Stage motors for the Ultra IV. The Supra E Motor Controllers are attached to the Y stage and under the X motor. The Spectra has a single motor controller that operates the XY, and Z axis.
Servo Amp Adapter	Adapter between the machine and the servo amps for the Ultra 4. The Supra E and Spectra does not use these devices.
Air Input	Facility air installed at this location.
SMEMA In/Out PWA	Controls communication between upstream/downstream material handling devices.
Ultra I/O PWA	Signal interface for the following: <ul style="list-style-type: none"> • CTC Controller • Digital Input/Output • Strobe circuitry • Encoder Feedback • Others
CLIO PWA (Camera Link IO)	Interface between the computer and camera systems.

Shown Ultra IV. The only difference is that the Spectra and Supra E do not use the GV6 Servo Amp motor controllers.

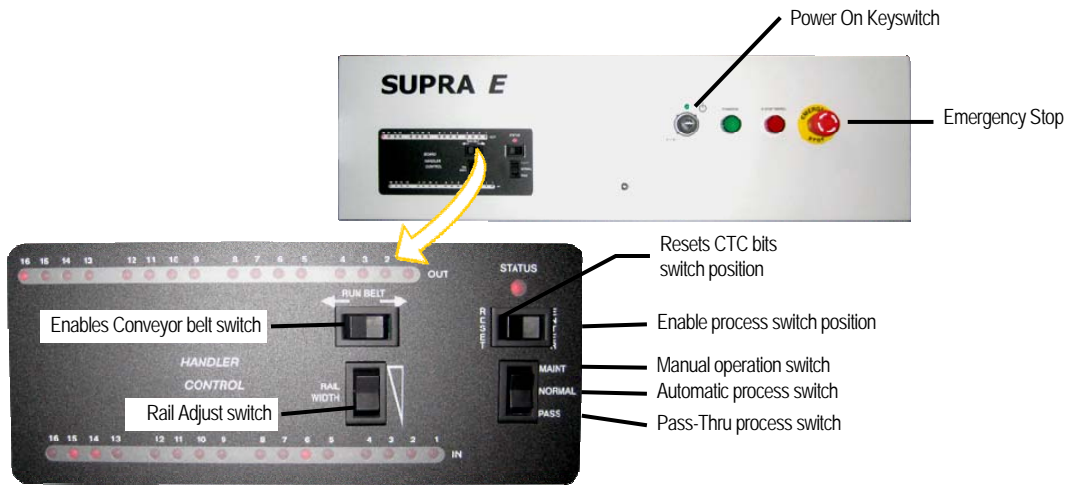


The material handling panel consists of user interface conveyor controls, power on (PC), e-stop, and input/output material handling indicators. The following is identical to both Ultra IV and Supra E.

Feature	Description
Power On Keyswitch	Powers up the PC.
E-Stop	Emergency Power Off switch. Powers off motor drive, air, and conveyors upon activation.
Run Belt Switch	Allows you to manually move all belts in the direction of the arrow.
Reset / Enter Switch	Reset: Resets the controller. Enter: Allows for normal functions, or resume operation after a board jam or e-stop situation.

Maint / Normal / Pass	<p>Maint: Normally used for testing and debugging database programs. This mode is also used for manual loading of boards into the AOI. Upstream SMEMA signaling is ignored. This keeps the boards from loading into the AOI.</p> <p>Normal: The AOI is ready to inspect boards and conveyor operates using SMEMA signaling.</p> <p>Pass: The AOI is not ready to inspect and conveyor passes boards through the AOI using SMEMA signaling.</p>
Input / Output LEDs	Informs the user of the status of product as it travels through the machine from upstream to downstream units.
CTC PLC Controller	Material handling controller located on the inside of the panel.

Shown is the Supra E. The Ultra IV is identical except with a black panel color. The Spectra is the same as the Supra E.



The electro-mechanical inspection mechanisms consist of 3 components: camera module, XY Stage, and the conveyor systems. The following devices are accessible from the front or rear of the machine when the upper doors are opened.

Feature	Description
2D Camera / Lens	A high-resolution color progressive scan CCD camera with a telecentric lens.
Strobe lights	A series of 3 rows of color LEDs (green, white, red, and blue) that emit light to the target area at different angles. Located underneath the main strobe light housing is the Low Level light housing. This emits a blue low light level of strobe lighting.
Conveyor System	Depending on the model, there can be either dual lanes or single lane conveyors. Each setup uses the same devices for material handling of the product as it travels through the machine.
XY Stages	The X axis stage travels front to back as the stage moves. The Y axis is side to side.
Encoder Reader / Strip	Non-contact linear style optical encoder that reads a reflective tape scale. Used for XY Stage positioning.
Linear Motor system	The Ultra IV X axis uses an iron core linear motor that drives along a magnetic track. The Y axis uses an ironless motor encapsulated between magnetic tracks. The Spectra uses same Y Axis setup but with mirrored setup on the right side that pivots to allow for simultaneous movement. The Supra E X axis uses a ball screwdriver system. The Y axis uses an ironless motor encapsulated between magnetic tracks.
Z-Axis Controller	An optional device if machine configured with the Z-Height controller system. Used for applications with mixed height variables (i.e., tall, short components).requiring inspections of OCR, OCV, and polarity.
Limit Switches	Each axis contains 2 sets of photo optical sensors located on each end of the granite stage block.

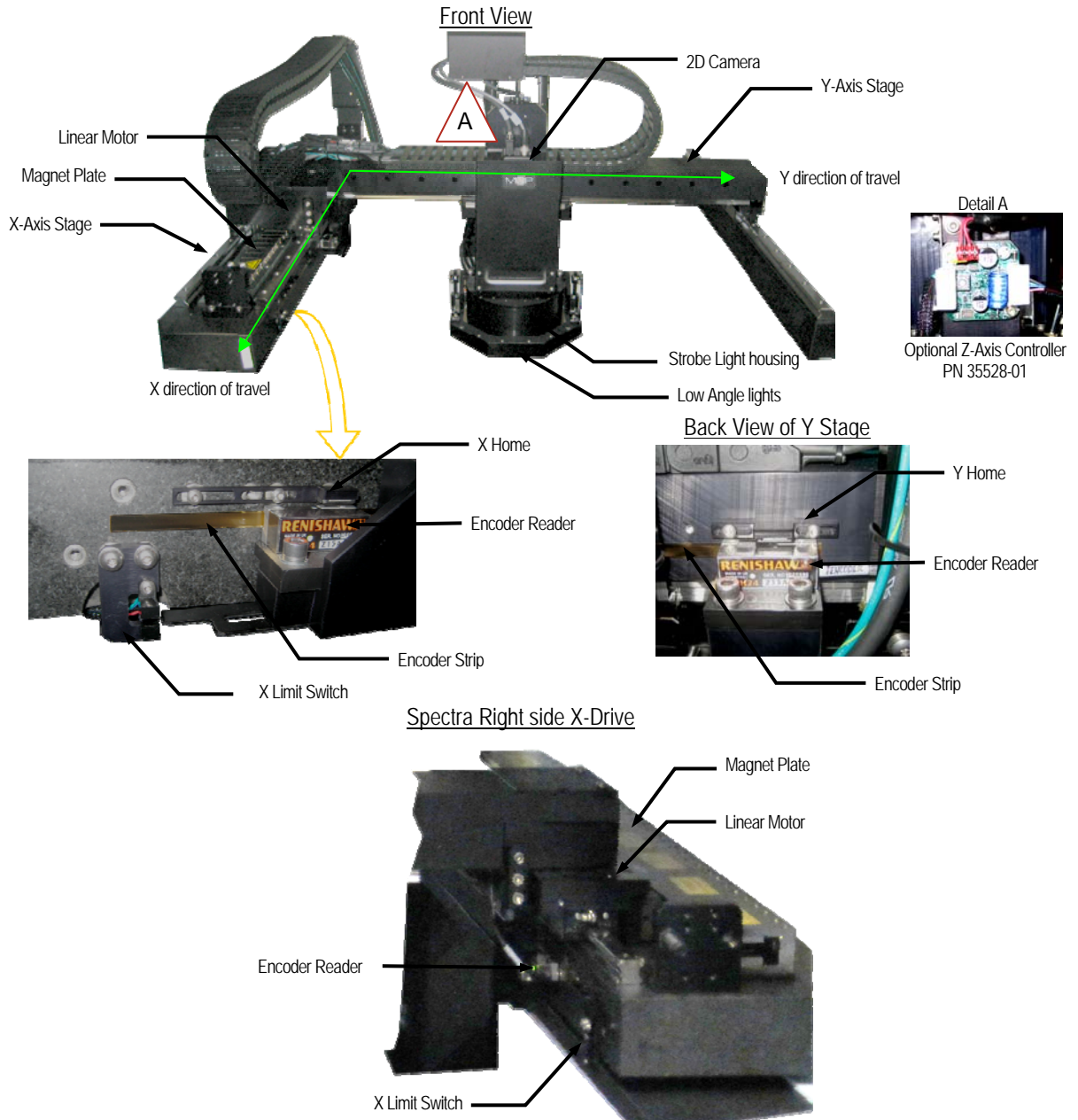
Motor Controllers

The Supra E uses an MVP Designed I/O motherboard with an attached AMC Motor Controller. The X axis motor controller is attached below the X motor to the machine frame. The Y axis is attached directly behind the camera module on a carrier.

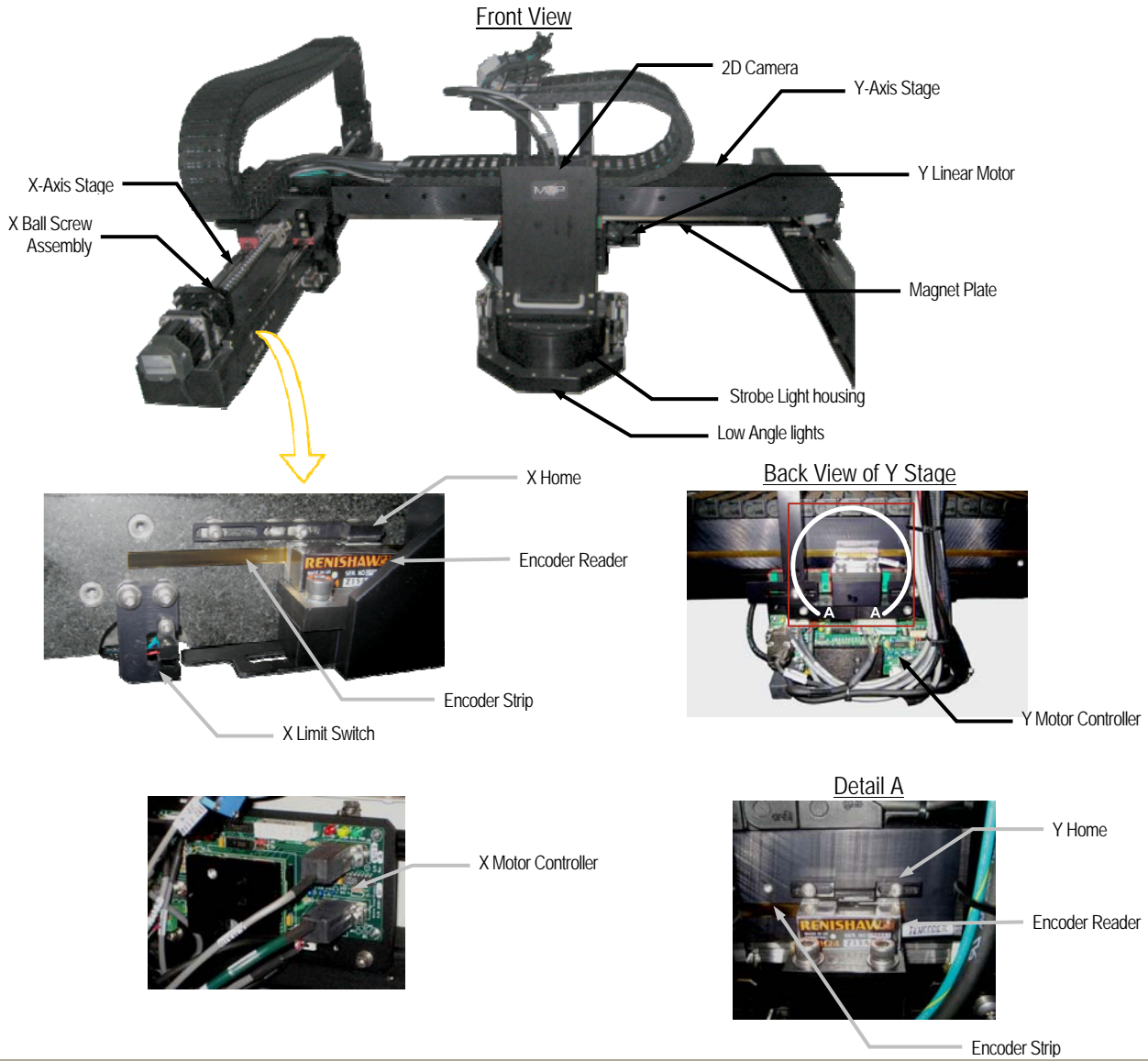
The Ultra IV uses GV6 motor controllers attached to the inside of the left rear (looking from the front) frame wall. Refer to the rear view illustration for the position.

The Spectra uses a single AMC brand SPiPlus CM3 controller for the XY, and Z.



Ultra IV and Spectra Stage Elements. The Spectra is identical except the Spectra have 2 X Drive Linear Motors.

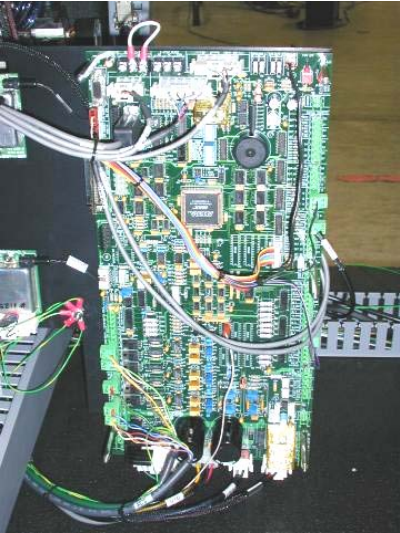



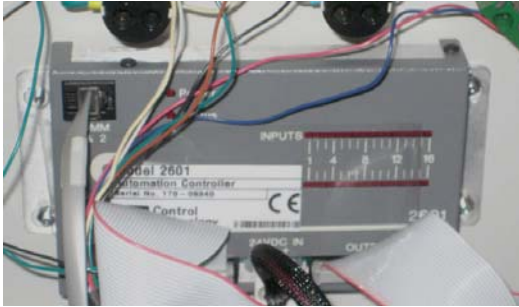
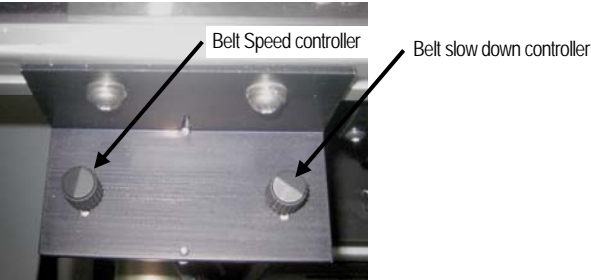
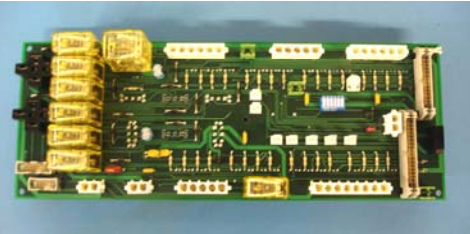
Supra E Stage Elements

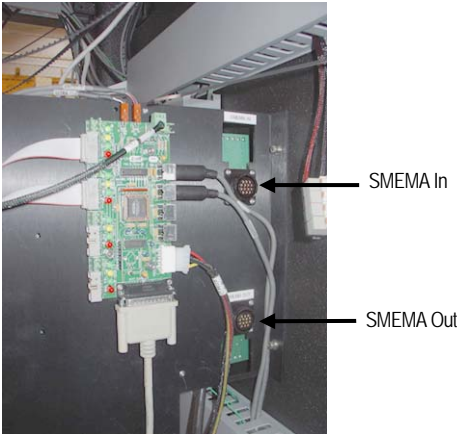



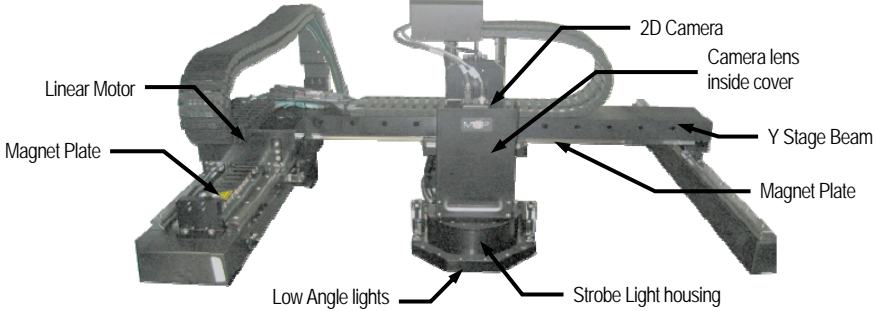
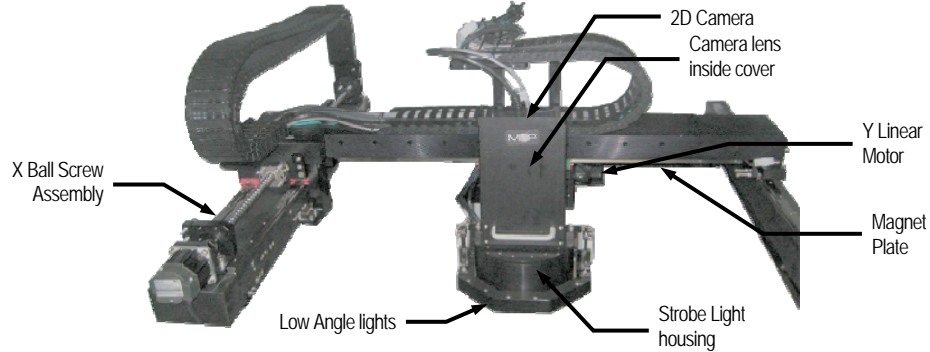
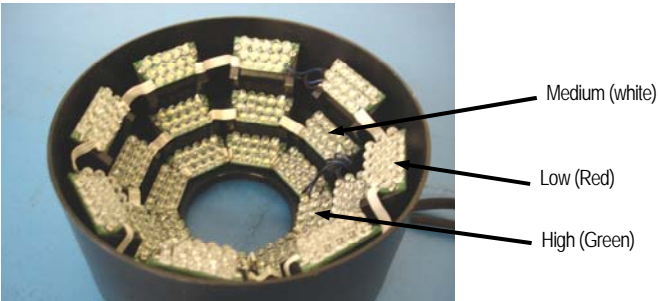
Maint Electronic Components Identification

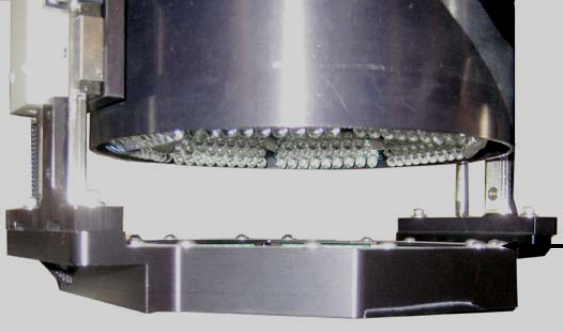
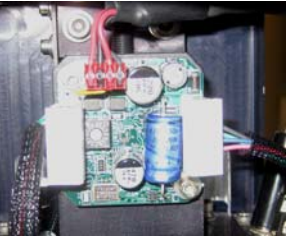
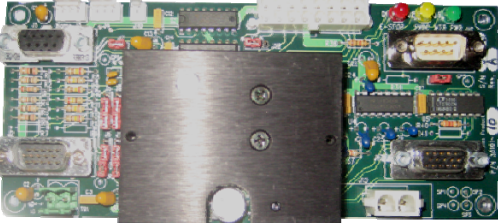
1	UPS (Uninterruptible Power Supply)--Option
Location	<p>The UPS is located next to the Main Power Distribution Box. Model 9130 UPS</p>  <p>Figure: UPS</p>
Function	<p>The UPS is a backup in case power fails from outside of the Ultra IV, Supra E, and Spectra. The UPS will power down and safely power off the AOI.</p>
2	Main Power Distribution Box
Location	<p>The main power distribution box is the black box located on the lower right side of the machine attached to the side panel.</p>  <p>Figure: Main Power Distribution Box</p>
Function	<p>This box supplies;</p> <ul style="list-style-type: none"> • 120V AC – UPS, Motor Drivers, Computer, Monitor, Material Handling, Fans. • 24V AC – Ultra I/O, Rear E-Stop & Front Panel. • 48V DC – Ultra I/O (Strobe). • 24V DC – CTC (MATERIAL HANDLING) Controller. • 12V DC – Ultra I/O, CLIO. • 5V DC – Ultra I/O, CLIO.




3	Ultra I/O Location The location of this board is behind the Dell computer. It can be accessed through the lower front / back doors.  Figure: Ultra I/O board
Function	This board is the interface for the following circuitry; <ul style="list-style-type: none">• Strobe Circuitry – One Shot Timer / Watchdog Timer.• Digital Input / Output Connectors.• Encoder Connector.• Audible Alarm.• Power On Circuitry.
4	CLIO (Camera Link Input/Output) Board Location The location of this board is behind the Ultra I/O board in the back of the AOI. It can be accessed through the lower rear doors.  Figure: CLIO Board


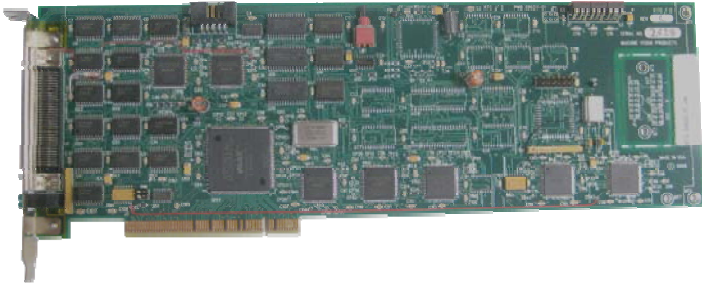
<p>Function</p>	<ul style="list-style-type: none"> • This board is the interface between the computer and camera. • Supplies 12V DC to the camera. • Trigger signal to camera to acquire images (From RTC to Ultra I/O to CLIO). • Camera Serial Communications (For camera setup).
<p>5</p>	<p>CTC (MATERIAL HANDLING) Controller</p>
<p>Location</p>	<p>The location of this CTC (MATERIAL HANDLING) controller is behind the front panel on the right, inside the cover (CTC is named because of the manufacture of the PLC – Control Technology Corporation).</p>  <p>Figure: CTC (Material Handling) Controller</p>
<p>Function</p>	<p>The CTC (MATERIAL HANDLING) Controller is a PLC that controls the conveyor and SMEMA protocol.</p>
<p>6</p>	<p>Conveyor Speed Adjustment Knobs</p>
<p>Location</p>	<p>The conveyor speed adjustment knobs are located behind the CTC panel in the center.</p>  <p>Figure: Supra M Conveyor Speed Adjustment Knobs</p>
<p>Function</p>	<p>These knobs control the conveyor speed and slow speed of the conveyor. The slow speed activates when an incoming board drives over the slow speed sensor approximately 4 inches from the board stop in the bay. Input LED IN-6 of the Control panel will be lit when sensor blocked.</p>
<p>7</p>	<p>CTC (MATERIAL HANDLING) Board</p>
<p>Location</p>	<p>The CTC (MATERIAL HANDLING) boards are located behind the CTC (MATERIAL HANDLING) LED lights on the front of the material handling panel.</p>  <p>Figure: CTC (MATERIAL HANDLING) Board</p>
<p>Function</p>	<p>The CTC (MATERIAL HANDLING) Board is the interface from the CTC (MATERIAL HANDLING) controller and the Dell computer.</p>

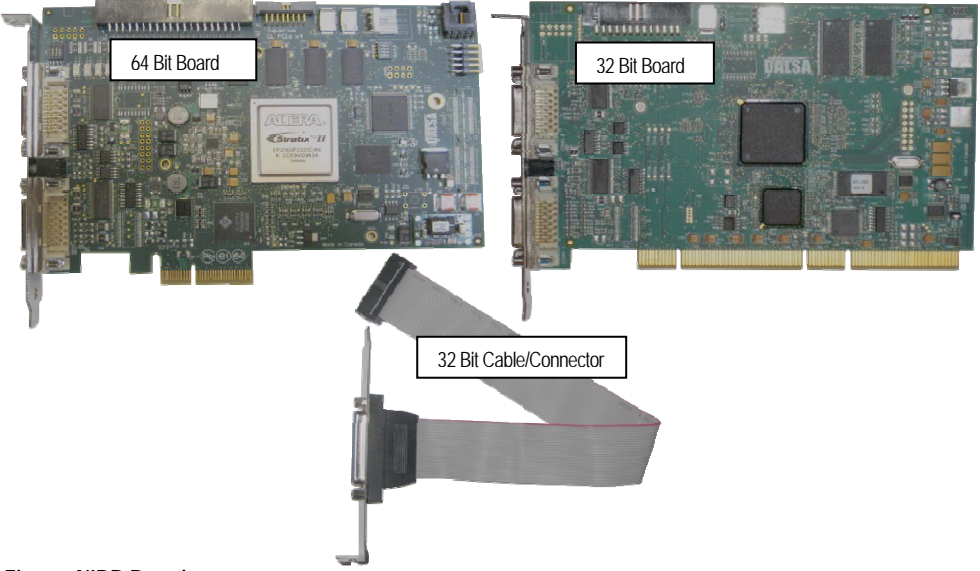
8	SMEMA Boards
Location	<p>The 2 SMEMA boards are located at the back of the AOI. Open the lower rear doors. The SMEMA boards are located to the right of the Ultra I/O board.</p>  <p>Figure: SMEMA Boards</p>
Function	<p>These SMEMA boards control Material Handling of boards between the AOI and the upstream and downstream conveyors on the front lanes.</p>
9	GV6 Drivers—Ultra IV
Location	<p>These drivers are mounted on the right hand side (facing from the rear) attached to the vertical panel.</p>  <p>Figure: GV6 Drivers</p>
Function	<p>This driver is the main controller for the stage X and Y Linear Motors.</p>

<p>10</p>	<p>Camera & Stage—Ultra IV/Spectra</p>
<p>Location</p>	<p>The camera and stage is located in the middle of the AOI. Open the front upper hatch to access the assembly. The Spectra repeats the left mechanism to the right side. The Spectra Y stage is driven by 2 linear motors each located on the left and right sides. Otherwise the components are the same.</p>  <p>Figure: Ultra IV and Spectra Camera and Stage</p>
<p>Function</p>	<p>This is the main assembly that acquires snap acquisition and gives the stage movements.</p>
<p>11</p>	<p>Camera & Stage—Supra E</p>
<p>Location</p>	 <p>Figure: Supra E Camera and Stage</p>
<p>Function</p>	<p>This is the main assembly that acquires snap acquisition and gives the stage movements.</p>
<p>12</p>	<p>Strobe Lights Assembly</p>
<p>Location</p>	<p>The strobe light assembly is located under the camera.</p>  <p>Figure: Strobe Lights</p>
<p>Function</p>	<p>The strobe lights are flashed to acquire snaps at set intervals. There are 3 different lights used: red, white, and blue that are set at 3 different levels – high, medium and 45°.</p>

13	Low Angle Strobe Lights
Location	<p>Low angle lighting is a module attached to the base of the main strobe lighting housing. It is pneumatically actuated down when strobing, then rises up after completion. Uses blue LED's for low level lighting.</p>  <p>Figure: Low angle lighting module</p>
Function	Performs low angle lighting to FOV during inspection.
14	Z Axis Motor Controller—Ultra IV, Supra E, and Spectra Option
Location	<p>The controller is installed directly on top and in the back of the camera mounting plate.</p>  <p>Optional Z-Axis Controller PN 35528-01</p> <p>Figure: Z-Axis Motor Controller</p>
Function	Controls the automated Z-Axis motion when performing passes.
15	X and Y Motor Controllers—Supra E
Location	<p>Attached directly below the X-axis ball screw motor and behind the camera module for the Y-axis. PN X-Axis: 36161-10 PN Y-Axis: 36161-20</p>  <p>Figure: XY Motor Controller</p>
Function	This driver is the main controller for the stage X-Axis ball screw motor and the Y-Axis Linear Motors.

<p>16</p>	<p>XY and Z Motor Controller--Spectra</p>
<p>Location</p>	<p>Located from the rear of the machine, inside the access doors and attached to the base frame. PN 36529-31, 3 axis controller</p>  <p>Figure: XYZ Motor Controller</p>
<p>Function</p>	<p>Multi-Axis motion controller that drives the XY and Z axis motors.</p>
<p>17</p>	<p>Autowidth Motor Controller--Option</p>
<p>Location</p>	<p>Top of the back of the Ultra I/o Board mount. PN 36230-01</p>  <p>Figure: Autowidth Motor Driver</p>
<p>Function</p>	<p>Motor Controller for the autowidth option.</p>
<p>18</p>	<p>USB To Serial Port Connector</p>
<p>Location</p>	<p>This Edgeport box is mounted on the front of the AOI, next to the Dell computer on the left side.</p>  <p>Figure: USB to Serial Port Edgeport box</p>
<p>Function</p>	<p>The Edgeport boxes establishes direct communication between the computer and;</p> <ul style="list-style-type: none"> • Motor (GV6 Drivers) • Material Handling (CTC) • Barcodes • Printer, and Camera

<p>19</p> <p>Location</p>	<p>Main Computer Boards, 1 Camera</p> <p>The main computer is located in the middle of the machine. Inside the main computer, there are 2 main components: RTC Board, and NIBB board.</p>  <p>Figure: Inside Main Computer</p>
<p>20</p> <p>Location</p>	<p>RTC Card</p> <p>The RTC (Real Time Controller) card is located in the bottom PCI slot of the PC. PN 32032-22</p>  <p>Figure: RTC Card</p>
<p>Function</p>	<p>The RTC card controls all functions between the host computer and the Ultra I/O board;</p> <ul style="list-style-type: none"> • Strobe Timing • Digital Input/Output • Controls snap acquisition

<p>21</p>	<p>NIBB (Camera Link Image Buffer Board) Cards</p>
<p>Location</p>	<p>The NIBB card is located in the PCI slots of the PC. PN 32 Bit:: 34783-01 w/cable connector PN 64 Bit:: 35894-01 w/cable connector</p>  <p>Figure: NIBB Boards</p>
<p>Function</p>	<p>The NIBB board grabs images from the cameras and stores them in local memory.</p>

Introduction to Inspection and Theory of Operation

Machine Vision Products, Inc. (MVP) employs a technique of Automated Optical Inspection (AOI), which involves the analysis of the grayscales of picture elements (pixels) within a specified area of a color image. The concept behind this approach will be described in this document, in addition to the methodology behind obtaining an image suitable for analysis based on reflection levels from the components under the strobe lighting.

Lighting—Gray Scale Levels

The camera measures gray scale levels in a range from 0 to 255 but for stability the actual gray scale levels used for the MVP algorithms are 0 to 63. These are the original 255 grayscale levels that are classified into groups of four (essentially divided by four). As cameras are calibrated, the gray level of an opaque white is set to 180. This value divided by four is 45. This scale is useful to determine the gray levels expected to be found on a certain feature.



Figure 2.1: Gray Scale Brightness level reference

Overview of Algorithms

An algorithm is a set of rules that is followed when carrying out a mathematical equation. Through the use of algorithms, the light reflected from a component to the cameras can be analyzed in order to determine whether a component is defective or compliant.

There are two levels of algorithms the MVP AutoInspector uses for component inspection. **Level 1 algorithm (Item Level)** is used to inspect items (leads, solder fillets, etc.) with respect to the images taken by the camera. **Level 2 algorithms (Part Level)** assess the Level 1 results to determine whether the part meets specified criteria such as placement accuracy, rotation, geometry component specification, etc.

For example, when examining a 64 pin QFP, each lead (item) is inspected using a Level 1 algorithm to determine whether it is within specified parameters for each item. Hence, there will be 65 (one additional item for polarity) Level 1 inspections on this QFP. A component will only have one Level 2 (Part Level) algorithm. The results of the Level 1 inspection are collected. Subsequently, the Level 2 algorithm determines whether the component meets the required criteria for each part.

2D Image Processing

The process of obtaining images for carrying out analysis on different types of components is illustrated below.

Basically, with the common post-reflow high-angle lighting, any flat reflective surface will feed light back to the cameras, while any dark non-reflective or angled surface will not. This principle will assist in determining if there is a solder connection between the component and the board, lifted leads, or bridges. The figure below illustrates how the Ultra IV and Supra E camera module detects an object.

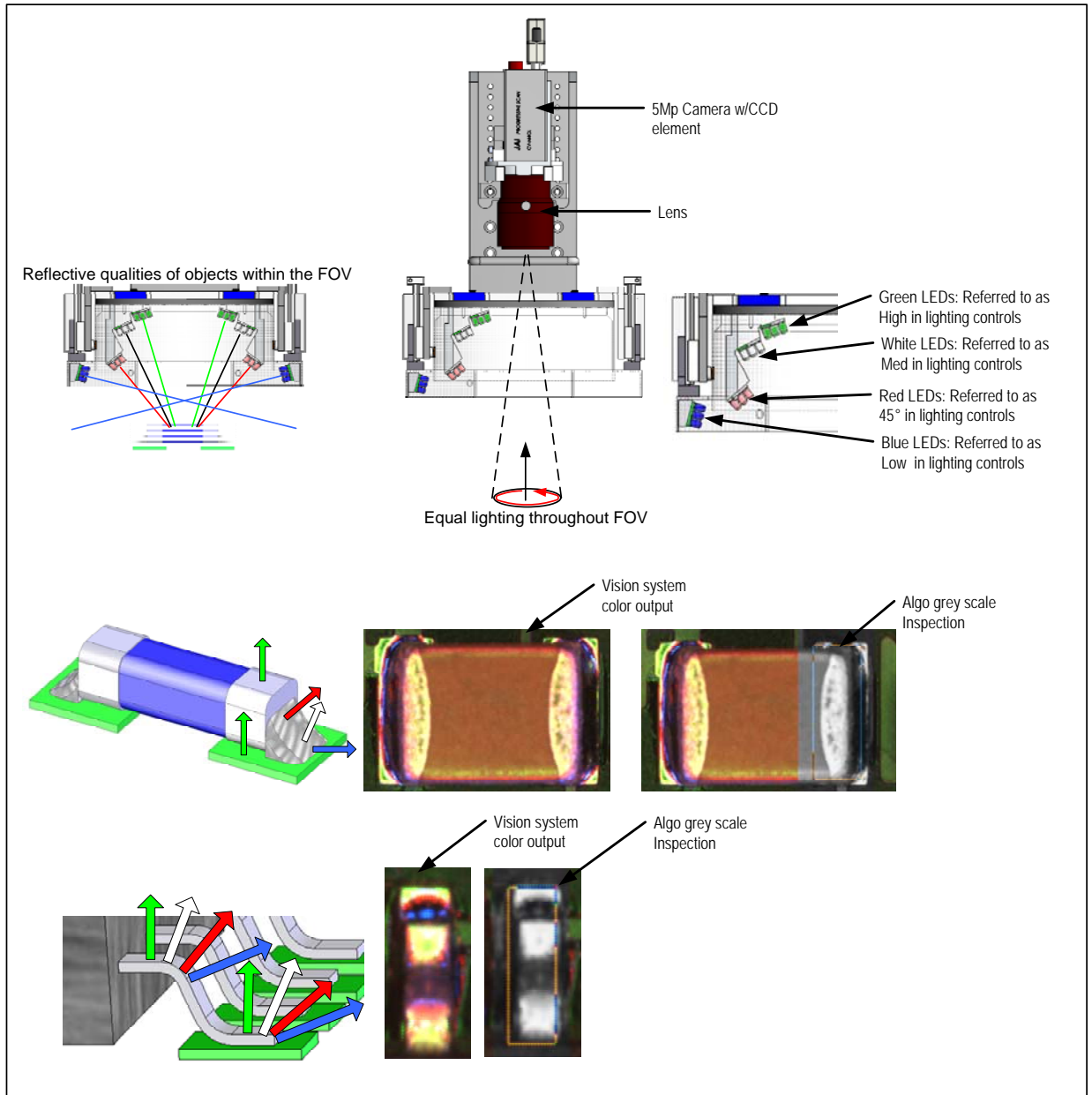


Figure 2.2: 2D Image Processing reference

MVP Machine Control Software Programs

The MVP operating system uses a Linux based Fedora environment which is UNIX based architecture.

The integrated MVP operating program loads when the user logs into the system. The user can log in as 1 of 3 levels depending on the type of work required by the system. One method is to log in as “root”. This option is used for advanced user applications used for setting up network connections and installing new software versions. Another is to log in as “maint” which allows the user to open all features of the MVP programs. The third is to log in as “operator” which allows the user to operate only the inspection program with limited access to system features. This document is geared to the programmer which will use “maint” as a general login procedure.

The below flowchart breaks down the MVP operating system into its basic program structure when logged in as “maint”, “root”, or “operator”.

The following 2 section segments briefly describe those programs that are accessible by the level of login used by the programmer.

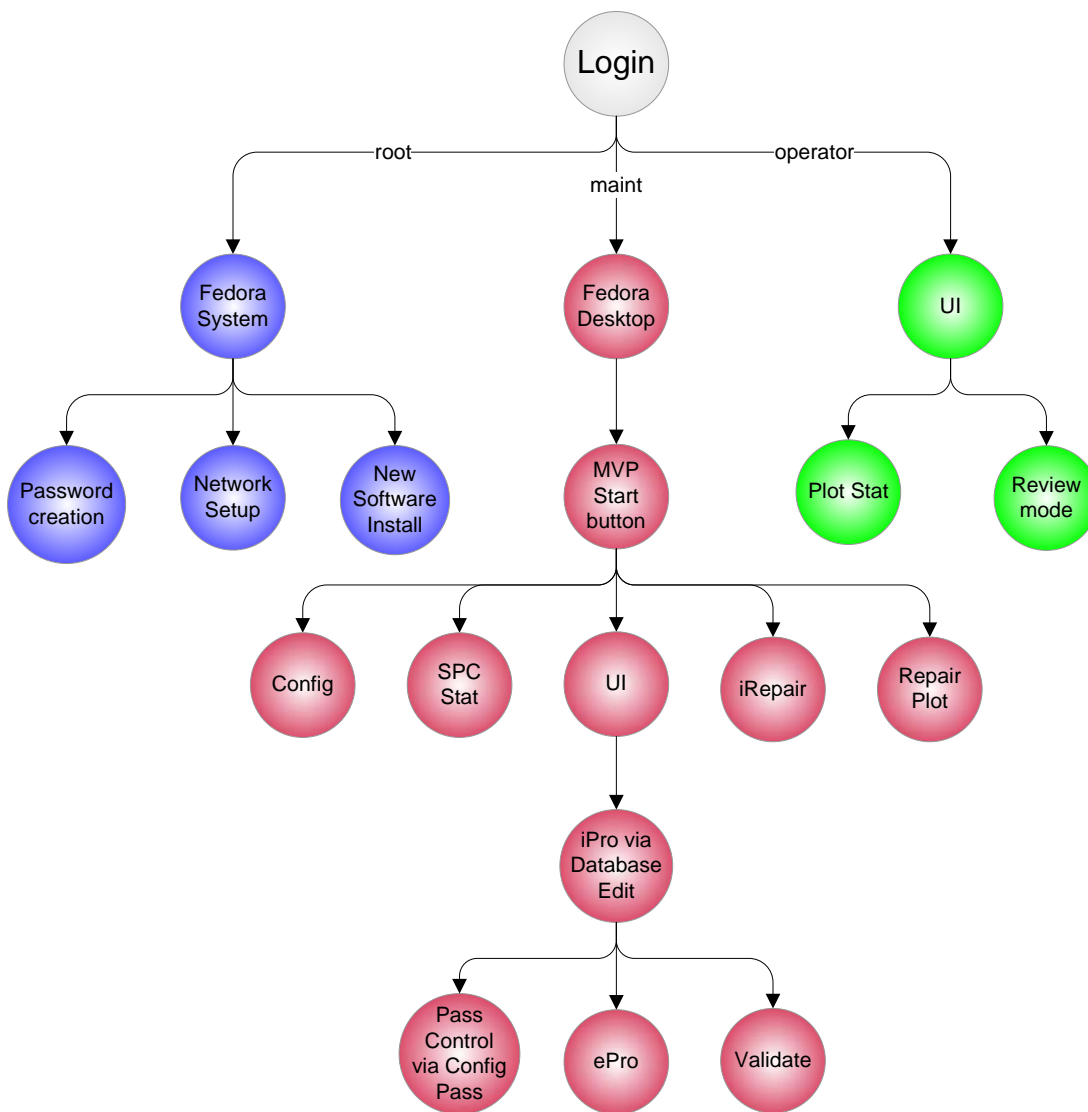


Figure 2.3: MVP Program Login Flowchart

Programs available when logged in as Operator

The basic operating UI program is available when logged in as an operator. The system opens directly to the UI (user interface) window as shown in the below illustration. The UI window allows the operator to run inspection programs, various SPC programs, and inspection Review mode.



Figure 2.4: Log in as operator to open the UI interface

- The Plotstat SPC program is selected by clicking on the Plotstat Config button on the UI window.

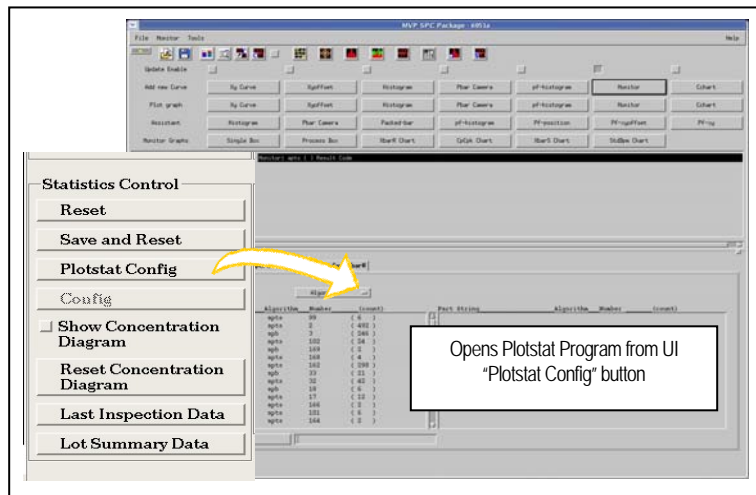


Figure 2.5: Plotstat and Review Programs (shown below) reference windows

- The Review program opens automatically at the end of an inspection program when faults are detected by the process. The operator then decides whether the faults are real or false using the features of this program. This is also described in detail in the Operator manual.

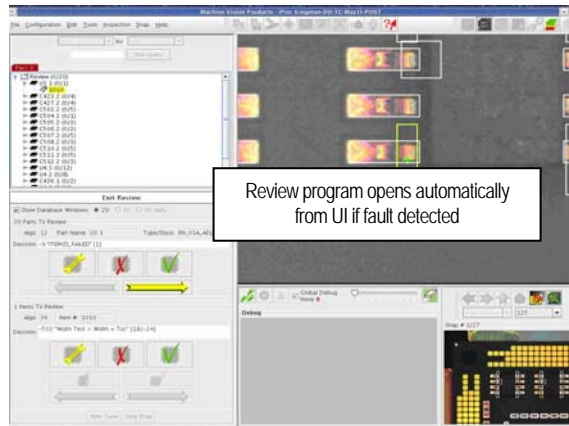


Figure 2.6: The Review Program

Note: Review mode is enabled or disabled by the set up of the Configuration routine for a given machine. If the Review Mode toggle button of the UI window is deselected and Review Mode set to OFF in Configuration then the board defaults to a Repair station for review of the defects. Refer to Section 6, Basic Operation, Review Mode, for details on this feature.

- A feature located in the Alternate Functions group on the UI screen is a method for changing the login requirement to “maint” without exiting the system and logging back on. This is a handy method for the programmer when they need time on the machine to edit databases. The programmer could click on the “Maintenance” button that opens a pop up window allowing the programmer to change the login to “maint”. This updates the Alternate Functions group features to maintenance level.

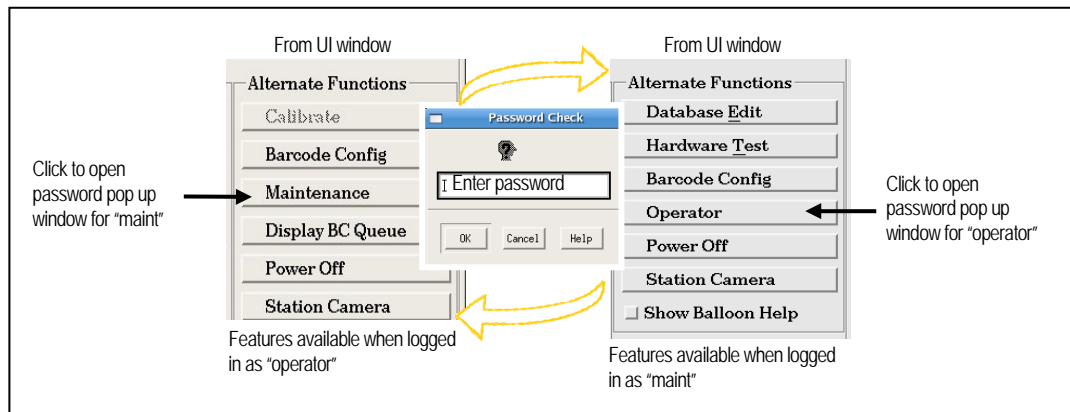


Figure 2.7: Toggling between Operator and Maint login features

- The most common feature used by the programmer is the Database Edit button. This opens the iPro Database Editor program as shown in the below image.

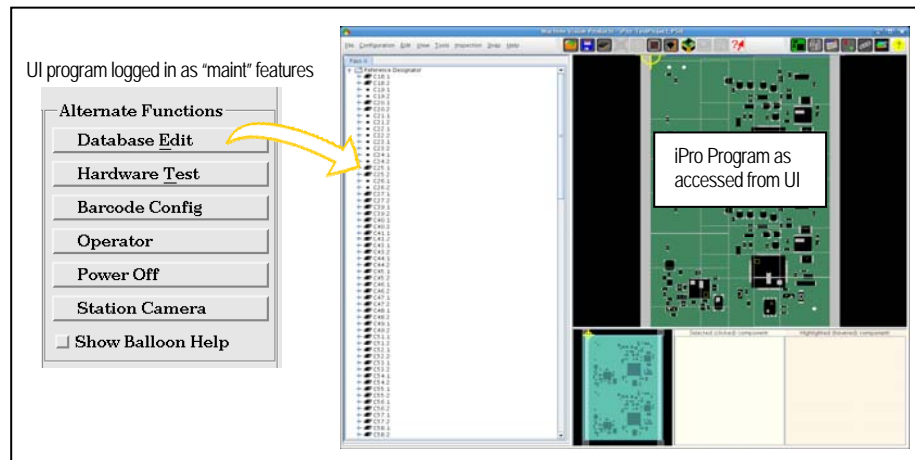


Figure 2.8: Database Edit button to open iPro reference

- The iPro program offers the tools needed for database editing available to the programmer. One of the major tools used is the ePro Project creation program. It's opened by clicking the ePro icon from the top tool bar in iPro.

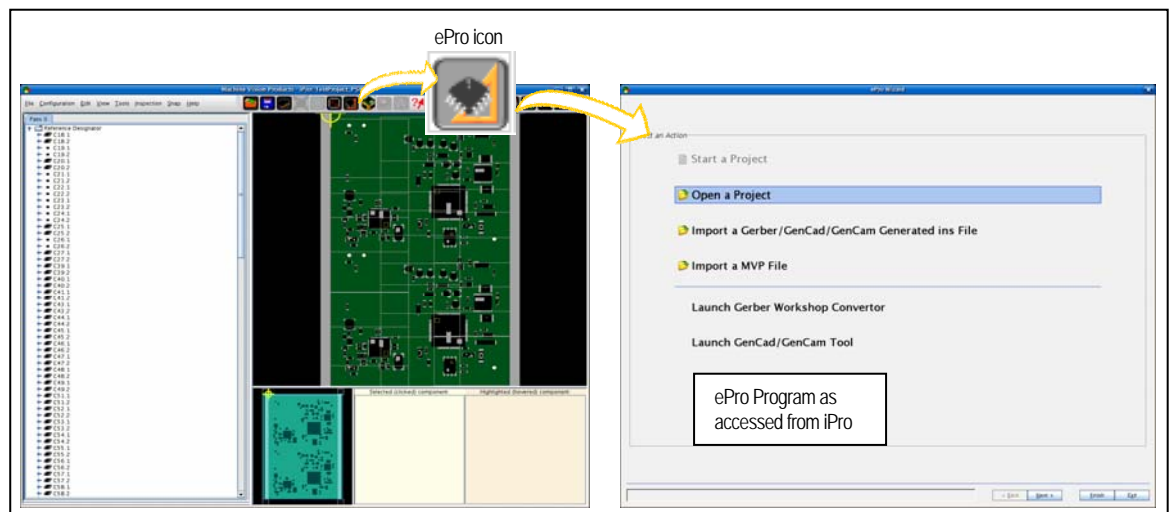


Figure 2.9: ePro icon open window

This program is used to combine CAD data into a structured format for the creation of inspection programs (referred to as .ins extensions in the system). A detailed explanation of the program is given in later sections of this manual.

- Another program tool for the programmer is also available within iPro and that's Validate. Validate takes the program created in ePro and analyzes the correctness of the algorithms and the snap images used for inspection. The program can be fine tuned so that the algorithms applied to the images create consistent results.

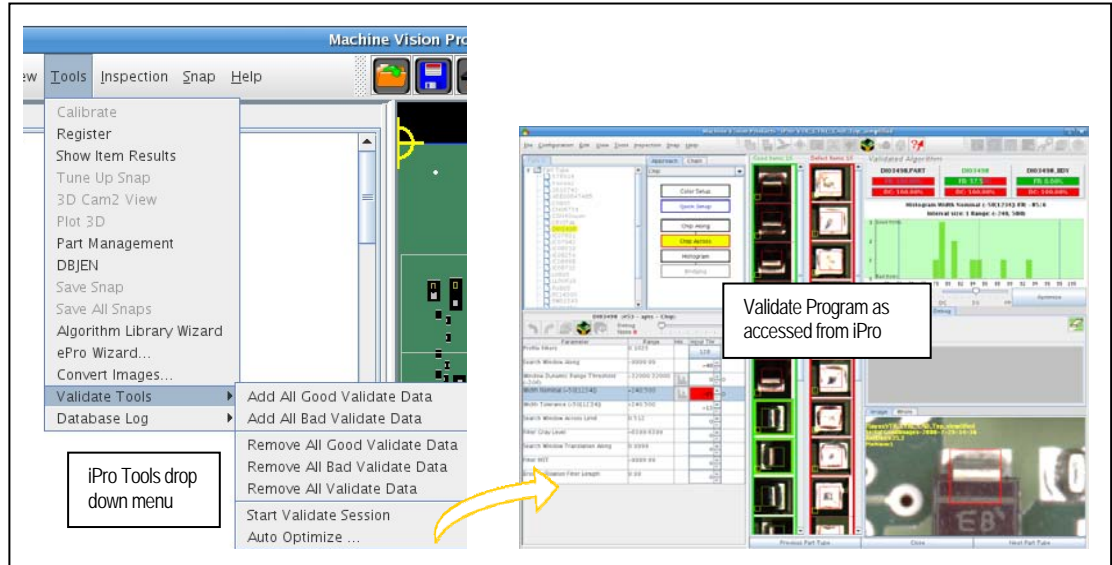


Figure 2.10: Validate open window reference

The Validate program is accessed by clicking on the Tools drop down menu and selecting the Validate Tools menu item. From there the programmer can select the features required to complete the database edit process. This is also explained in detail in later sections of the manual.

- Included with the set of tools previously described is the Pass Control feature. This tool is used to set up the lighting controls and Z height (optional Camera Lift) for a given inspection program. Also, controls for 3D camera and Laser if installed. It is accessed by selecting the Configuration drop down menu and by clicking on the Configure Pass menu item.

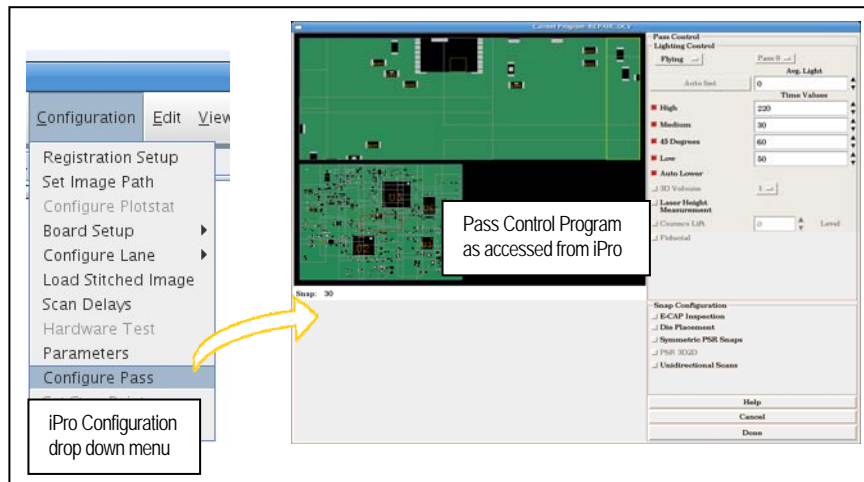


Figure 2.11: Config Pass open window reference

iPro has many tools and features available to the programmer that will be discussed in later sections.

Programs available when logged in as Maint

The Fedora operating system opens when logged in as “maint” (maintenance). The main feature of the OS screen that a programmer uses is the MVP Program Access bar located on the bottom left of the system toolbar.

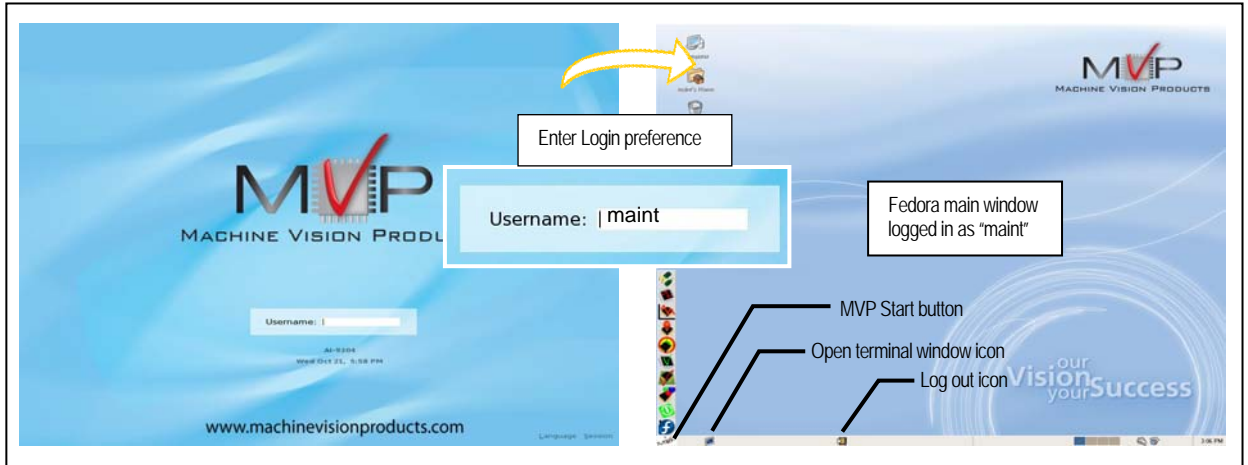



Figure 2.12: Log in as maint to open the Fedora desktop

- 
 The tool bar opens by clicking the MVP Start button. Programs and their features are opened by clicking on the preferred icon on the bar.

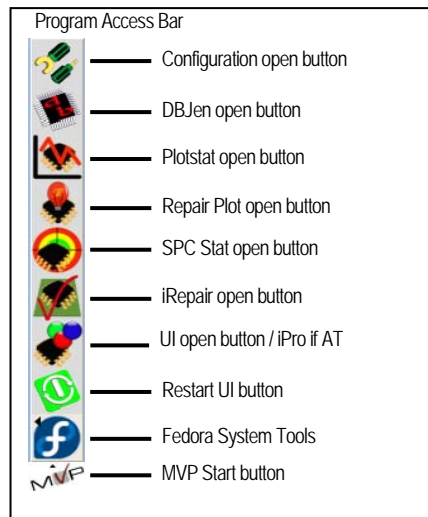


Figure 2.13: Program Access Bar features





-  The Fedora System tool allows access to all the features available for the network setup and access to other OS programs that may benefit the user.



Figure 2.14: Fedora system tools

-  The UI Restart button is used to reset the MVP program when the system is shut down incorrectly.
-  The UI open button opens the UI inspection program on the AI machine. On an AT (Auto Trainer) the UI button opens iPro.
-  The iRepair button opens the iRepair program on the AI, AG or AT systems. The iRepair program is optional and may not reside on all systems. If the icon is clicked and nothing opens then the program has not been allowed to operate (no Vision Key installed). Contact MVP for details.

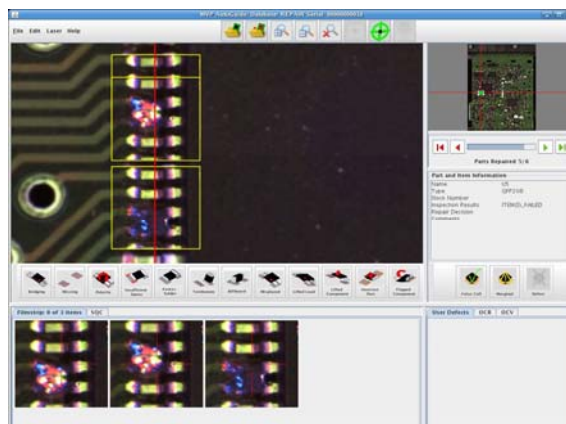


Figure 2.15: iRepair window reference



- 
 The SPC Stat button collects data for repair reports. Saved to the error folder of the mvp directory.



Figure 2.16: SPC Stat window reference

- 
 The Repair Plot button opens the Repair Plot program. This is used for graphing fault types as collected by the iRepair station (AG repair station).

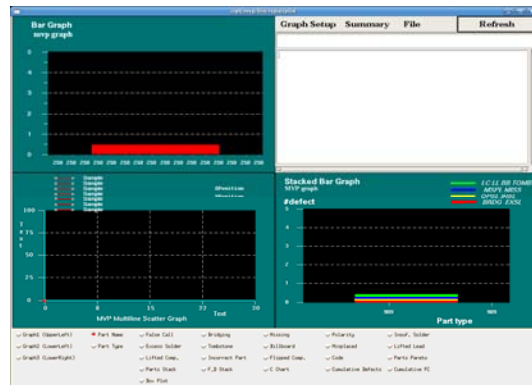



Figure 2.17: Repair Plot window reference

- 
 The Configuration button opens the system Configuration utility. This utility enables and/or disables features used for hardware, system, and operator functions.

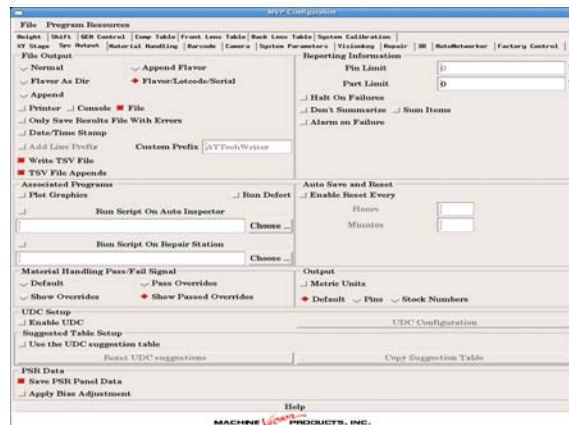


Figure 2.20: Configuration window reference



- The Plotstat open button opens the Plotstat program. The Plotstat statistical Process Control (SPC) Package is a process control system which not only tracks defects and provides alerts, but also monitors trends, all during product production and without adding to cycle time. These instant feedback mechanisms allow the user to control and improve the production process. Refer to Operator manual for details on this feature.

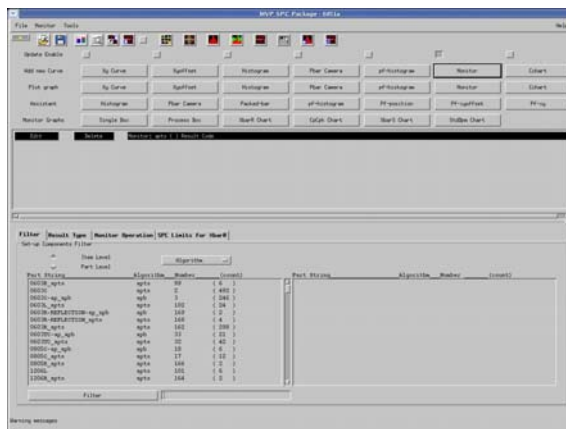


Figure 2.18: Plotstat window reference



- The DBJen button opens the DBJen database editing program. This is an advanced programming feature.

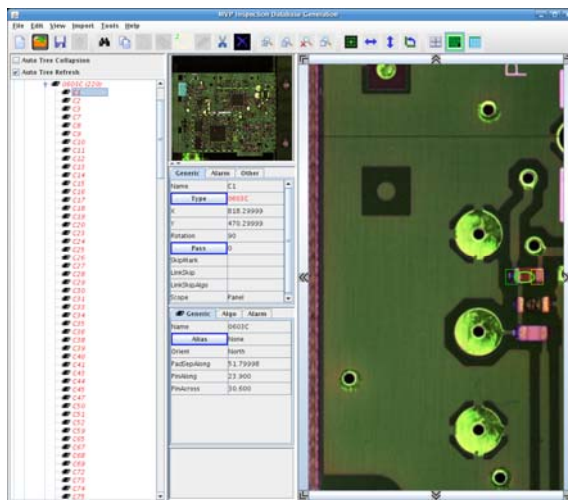


Figure 2.19: DBJen window reference

Section

3

Safety

Read this section before beginning any procedure. The following provides safety precautions to follow when working on the Ultra IV, Supra E, and Spectra model AOI machines.

General Safety

Read this section before beginning any procedure. The following provides safety precautions to follow when working on an AutoInspector or AutoGuide.

All Factory safety and ESD rules apply at all times when performing this procedure.

Personal Protective Equipment

The MVP Ultra IV, Supra E, and Spectra require no special Personal Protective Equipment. Standard factory-floor Protective Equipment is sufficient.

Alert Boxes

Definitions of the easily distinguishable alert boxes used (WARNING, CAUTION, and NOTE) should be in bold type or otherwise highlighted.

Equipment Related Hazards for this Procedure

This procedure includes both mechanical and electrical hazards.

- Cameras can move on the stage if the e-stop is not engaged.
- Electrical shock can occur if the technician accidentally touches the strobe board.
- All other hazard areas on the Autoinspector are labeled with standard warning symbols. Operating, setting up, or troubleshooting this equipment involves potential pinch or cut injuries in the following areas:
 - Inside the tester when conveyors or cameras are moving.

Lock Out Procedure

1. Notify all affected personnel of Lockout/Tag-out.



2. Stop and/or shut off the hazardous energy in the Danger zone/Energy location to be entered. See Table A.
3. Lockout/Tag-out the hazardous energy in the Danger zone/Energy location at the Isolation point identified in Table B.
4. Disconnect and/or dissipate any stored energy.
5. Block any mechanical parts and remove any mechanical links. Lock block in place.

NOTE: Two physical blocks are required to break and secure any gas/liquid line.

6. Verify personnel are clear of hazards.
7. Verify zero energy exists at the source.
8. Attempt to restart equipment through normal means (**MAIN POWER SWITCH ON**), and then switch off.
9. Perform required work.

Removal of Lockout/Tag-out

1. Verify Danger zone is clear of equipment, workers, tools, and test equipment.
2. Unlock and remove any blocking devices used. Remove linkages or other disconnecting devices.
3. Reposition safety devices.
4. Warn workers to stay clear of the area.
5. Remove all locks and tags from energy control points.
6. Verify the area is clear of personnel.
7. Restart/energize the equipment.
8. Notify all affected persons that the LO/TO has been cleared.

Control of Hazardous Energies (COHE)

Use the information in Tables A through D to control hazardous energy sources when performing preventive maintenance or repair of this equipment.

Table A: Types of Hazardous Energies Present in Supra/Ultra model machines.

Electrical
○ High Voltage (220 VAC)
○ Low voltage (5 -48 VDC)
Pressure (pneumatic)
Mechanical (capable of crushing, pinching, cutting, snagging, striking)
Non-ionizing radiation
○ Laser
○ Magnetic
Stored (Front and upper rear doors, monitor, keyboard, trackball, capacitors, UPS)

Table B: Control Points for Each Hazardous Energy Present

Type/Level	Danger zone/ Energy location	Isolation point	Disconnect/ Dissipate area and/or process	Method to verify 0 energy	
1	Electrical— 208/230 V AC	Incoming power distribution area,	Main Disconnect Switch EMO Switch	De-energize, then wait 1 minute before contacting surface	Test Meter Visual check, Power Distribution box - Primary power, UPS Output On and UPS AC voltage indicators are not lit
2	Electrical— 208/230 V AC Modulated	GV6 Drivers.	Main Disconnect Switch EMO Switch	1-2 Sec.	Test Meter Physical check,
3	Electrical— 208/230 V AC	Fans (rear panel)	Main Disconnect switch EMO Switch	De-energize, then wait 1 minute before contacting surface	Test Meter Visual check, verify fans stopped spinning
4	Electrical— 208/230 V AC	Material Handling	Main Disconnect switch. EMO Switch	1-2 Sec	Test Meter Physical check, On the CTC panel, press Run Belt switch, belts should not move
5	Electrical— 208/230 V AC	Power Distribution Box	Main Disconnect switch EMO Switch	De-energize, then wait 1 minute before contacting surface	Test Meter Visual check, Main Power indicator and UPS Out Put indicator is not lit
6	Electrical— 208/230 V AC	Tower & LCD Monitor	Main Disconnect Switch EMO Switch	De-energize, then wait 1 minute before contacting surface	Test Meter Visual check, Power On indicator is not lit
7	Electrical— 208/230 V AC	Uninterruptible Power Supply (UPS)	Main Disconnect switch, UPS On/Off button	De-energize, then wait 1 minute before contacting surface	Test Meter Visual check, AC indicator not lit.

			EMO Switch		
8	Electrical—48 V DC	Ultra I/O assembly	Main Disconnect switch EMO Switch	De-energize, then wait 1 minute before contacting surface	Test Meter, Visual check, In the UI, strobe LED's, LED's should not strobe
9	Mechanical	Conveyor assembly area, X-Y Stage	Main Disconnect Switch EMO Switch	Instantaneously	Visual check, On the CTC panel. Press Run Belt switch, belts should not move. Press "Home Stage" button in UI, stage should not move
10	Non-ionizing radiation (Laser)	Bar Code Reader(s) *	Main Disconnect switch EMO Switch	Instantaneously	Visual check, No visible light
11	Non-ionizing radiation (Magnetic)	X Y stage linear motor Powerful permanent magnet	Machine covers	N/A	Always present
12	Pressure (Pneumatic)	Conveyor assembly area Camera module	Main power switch, Air Regulator control knob	N/A	Air regulator reads 0 PSI
13	Non-ionizing radiation (Laser-3D)	Laser Camera	Main Power Switch EMO Switch	Instantaneously	Visually check that the laser is off
14	Stored (Capacitors)	Strobe Section of UIO circuit board	Main Disconnect switch EMO Switch	De-energize, then wait 2 minutes before contacting surface	Test Meter Visual check, In the UI, Hardware Test, strobe LED's, LED's should not strobe

*= Optional Equipment

Main Power Switch

Note: This procedure is only required if the AI is in an Emergency State: smell of smoke, hard grinding noise, etc...

The Main Power Switch is located at the rear of the machine.

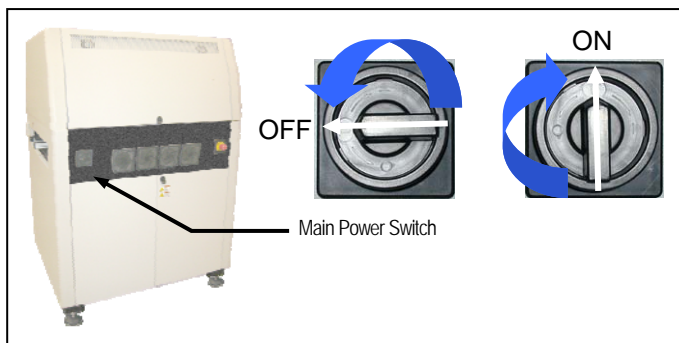


Figure 3.1: Main Power Switch

To power down the Ultra IV, Supra E, and Spectra, turn the switch Counter Clock Wise to the OFF position. This will shut power off to the machine. If the machine has UPS, then the battery power allows enough time to save data to the PC if required.

Emergency Machine Power OFF Procedures



The EMO (emergency machine off) switch system removes power from the motors, and conveyors—it will not remove power to the machine. Main Power Switch and Power distribution box will have AC input power!

The EMO switches (e-stops) are located in 2 places: the front right corner of the material handling control panel and the rear of the machine.

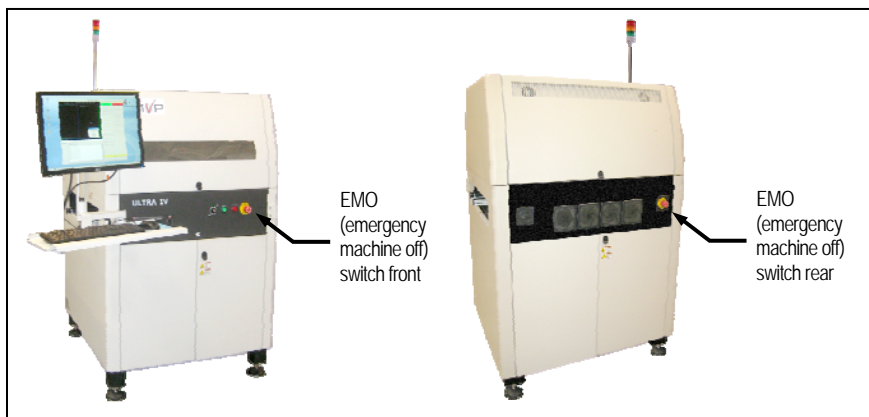


Figure 3.2: EMO switch locations

1. Push in an e-stop switch (Front or Back)—the machine will respond with the following:
 - Power to the stage motors is removed.
 - Power to the conveyor belts is removed.

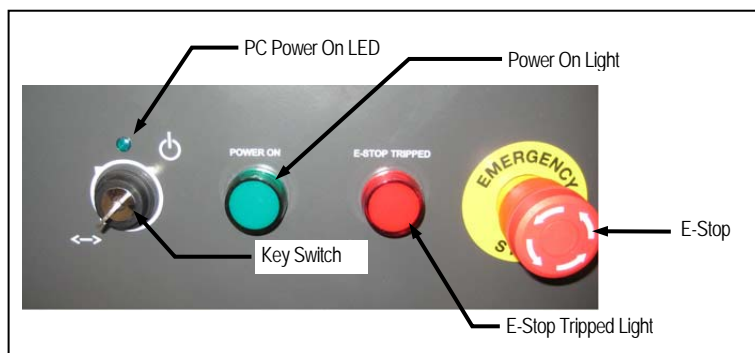


Figure 3.3: Key Switch

2. A display message will appear on the screen “E-Stop Detected” and an audible alarm with a flashing yellow tower light (the audible alarm and yellow tower light are optional and enabled by the SPC Configuration setting). Click the OK button in response to the alert message.



Figure 3.4: E-Stop Detected pop up window

3. Pull the e-stop out and a pop up message will appear--select OK--the Stages will home.



Figure 3.5: E-Stop Cleared

4. Clear the Material Handling Error Condition, press the Reset and Enter switch on the Material Handling control panel.

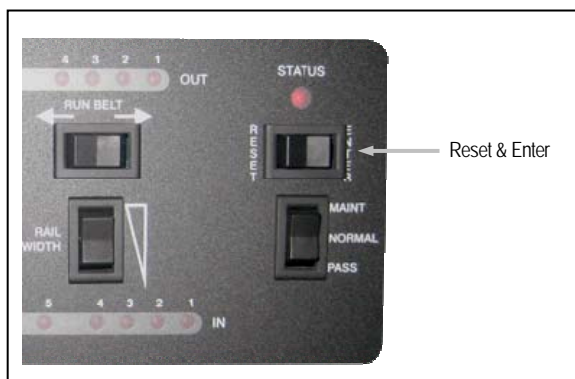


Figure 3.6: Reset & Enter Switch

Basic Board Error Recovery

1. Stop the Inspection.
2. Open the front upper door.
3. E-Stop will be detected.
4. Clear all products from the 850G.
5. Close the front upper door.
6. E-Stop Cleared Alert window pops up as a result of the door sensed closed.
7. Select OK.
8. Press Reset and Enter on the Material Handling panel to reset Material Handling.
9. Start Normal Inspection.

Opening Upper and Lower Access Doors

The machine access doors are equipped with keyed latches. The upper front / rear doors have 1 latch each along with the lower. The key is a 4mm or 5/32 Allen key wrench.

The upper doors use a gas filled shock type hanger to prevent the door from closing on its own. However, never place fingers on the lip of the Material Handling Panel while closing the upper doors to prevent the possibility of pinching.

Note: The lower doors use a single key that latches both swing-out doors when closed. These doors are not part of the e-stop system. All doors must always be latched when in operation.

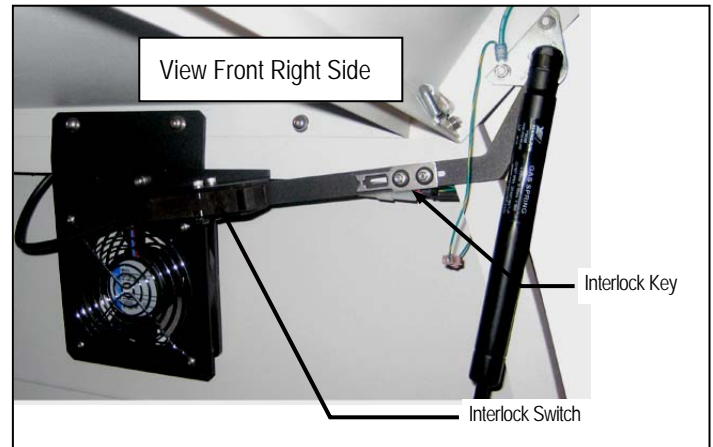


Figure 3.7: Interlock Switch locations

Upper Door Interlock Switches

The Ultra IV, Supra E, and the Spectra systems are equipped with safety Interlock switches for the front upper door.

1. With the main interface screen open (UI), open the Upper Front Door. The Interlock key will disengage from the Interlock switch.

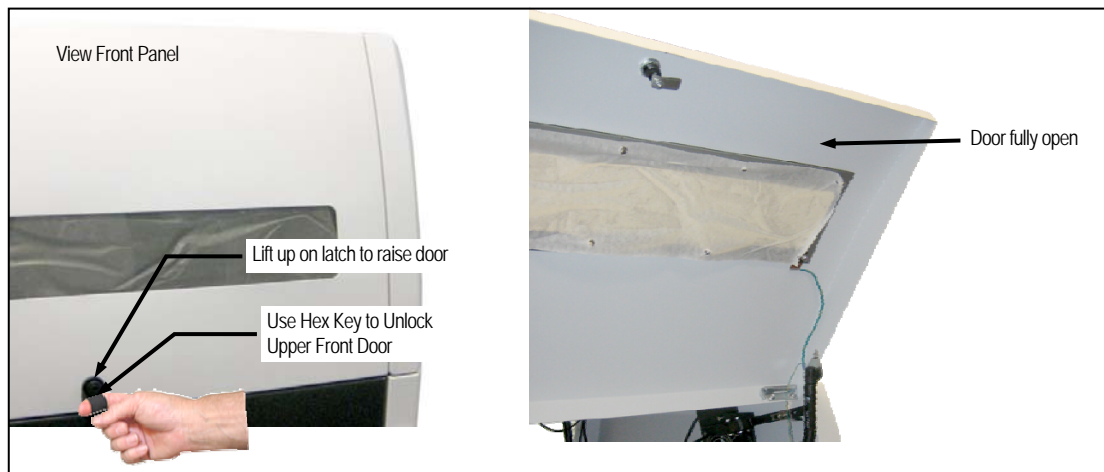


Figure 3.8: Opening /Closing Upper Access Doors

2. A message appears on the screen “E-Stop Detected”. Power is removed from the conveyor assembly, stage motors and the camera module automatically to prevent potential contact with moving parts.

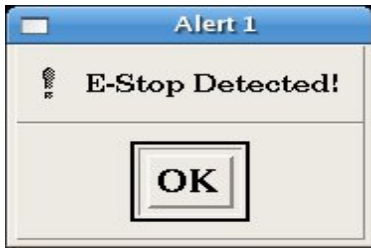


Figure 3.9: E-Stop Detected pop up window

3. There will be an intermittent audible alarm and the tower light will be flashing Red. At this point, carriers may be removed and minor maintenance may be done.
4. When ready, close the Upper Front Door. A message appears when the door is sensed closed--select OK in response to the message.



Figure 3.10: E-Stopped Cleared pop up message

Note: The above warning message appears only when the MVP main User Interface (UI) window is running. Otherwise, the alarms will sound and the Red Tower light will be flashing.

5. To discontinue the audible alarm sound, press the **Reset** and **Enter** switch on the Material Handling assembly.

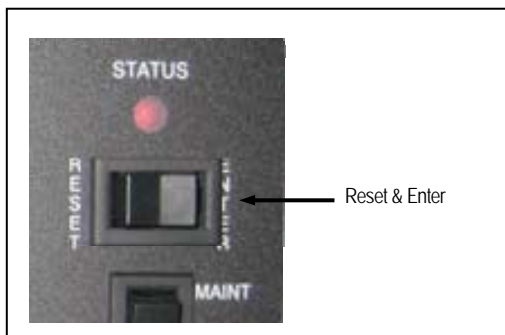


Figure 3.11: Reset / Enter Switch reference

Bypass Switch

The Bypass switch overrides the Interlock switch. When the front upper door is opened and the Bypass switch is in the UP position, power is restored to the Conveyors, Stage Motors and the Camera module. The switch is commonly used when in maintenance mode for doing calibrations and other maintenance procedures—never used in operation mode.

The switch is located inside the upper right panel towards the front of the Ultra IV and the Supra E.

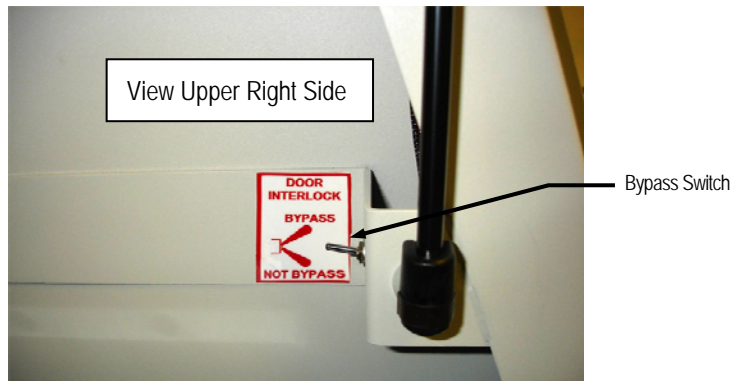


Figure 3.12: Bypass Switch reference



CAUTION!

Power is engaged when the upper front door is opened and bypass switch is in the up position. Safety precautions must be taken as the stage motors and conveyors may move.

1. When the Upper Front Door is opened, and the Bypass switch is flipped to the UP position, a warning message will appear--select OK--the stage will home.



Figure 3.13: E-Stopped Cleared pop up window

Note: The above warning message appears only when the MVP main User Interface (UI) window is running. Otherwise, the alarms will sound and the Red Tower light will be flashing.

Machine Response relative to Door Interlocks & Bypass Condition


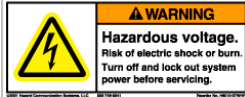









The following table is a synopsis of the status of the machine relative to an open upper door and or the bypass switch as described in the previous 2 sections. Refer to previous topics on Door Interlocks and Bypass Switch on how to respond to the various conditions.

		Device Condition							
		Condition 1	Condition 2	Condition 3	Condition 4	Condition 5	Condition 6	Condition 7	Condition 8
Front Top Door	Front Top Door	CLOSED	OPEN	OPEN	CLOSED	CLOSED	OPEN	OPEN	CLOSED
	Bypass Switch	DOWN (Normal)	DOWN (Normal)	DOWN (Normal)	DOWN (Normal)	UP (Bypass)	UP (Bypass)	UP (Bypass)	UP (Bypass)
		Result							
E-Stop msg.	E-Stop msg.	NONE	ON	ON	ON	ON	NONE	NONE	NONE
	E-Stop Tripped Light	OFF	ON	ON	ON	OFF	ON	ON	ON

- Example Condition 3: Bypass switch DOWN (normal) and Front top door open causes an E-stop message and the front panel E-Stop Tripped Light to be on.

Reproduction of SEMI or CE Warning Labels

Description of the hazard and full size reproduction of any SEMI or CE pictorial warning labels present on the equipment.

Label	Meaning
	6014-ISO General Danger - Caution sign explains situations where personal injury or damage to the equipment could result.
	H6010 Hazardous Voltage- Risk of electric shock or burn. Turn off and lock out system power before servicing.
	6010-ISO Electrical Shock – Warning sign indicates that hazardous voltages are present and that there is a risk of electrical shock.
	H1105 Keep hands clear – Moving parts.
	1102-ISO Hand Pinch Drawing in Rollers - Conveyor belts at input/output roller location could pinch hand/fingers.
	1013-ISO Hand Entanglement Notched Belt Drive - Inspection stage belt and pulleys could cause entanglement.
	H6048 Strong Magnetic Field – Interaction with metallic objects might produce pinch hazards. People with medical implants keep 12 inches.
	8004H-ISO Magnetic Field – Strong Magnetic field present.
	I5017 Earth Ground – Grounded terminal generally connected to equipment frame.
	Protective Earth-ISO
	XE Platform (Epoxy) Hot Surface Inside. Contact may cause burns. Do not touch. Wear protective gear before servicing internal parts.

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Section

4

Powering Up & Down the AI

Power Up the Machine

Note: This procedure is only required if the machine is completely shut down with power removed and UPS powered off.

1. Turn the Main Power Switch to the ON position—"ON" is with the switch turned clockwise with the switch handle facing up. The switch is located on the back left corner (as viewed from the back) of the machine.

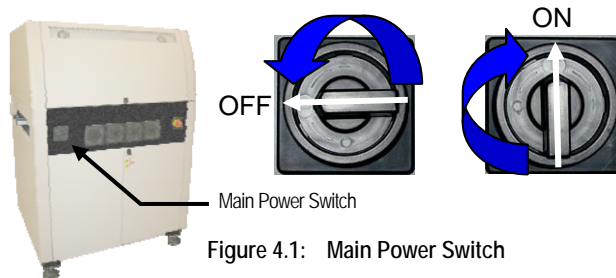


Figure 4.1: Main Power Switch

2. Using a 4mm (5/32) hex key, unlock and open the lower front door panel. This allows access to the UPS assembly if installed.
3. ¹**UPS Model 9130:** This is an optional device. If your machine does not have this device, then skip this step.

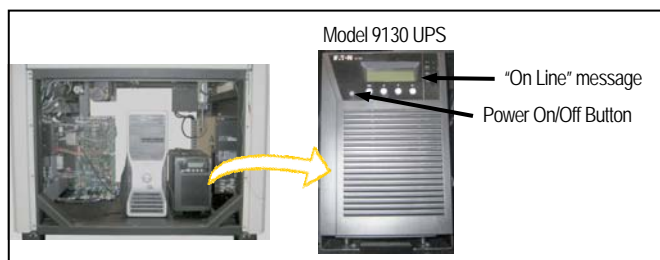
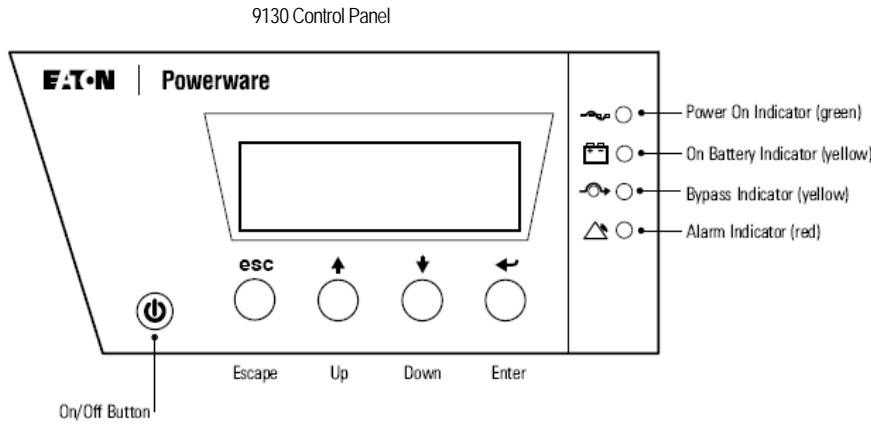


Figure 4.2: UPS On Line reference

- a. Verify that the UPS power cord is plugged in.
- b. Press and hold the UPS power on button for approximately 5 seconds--the display initializes to "UPS Start" and continues to "UPS on Battery". The green power on indicator and yellow (UPS on Battery) indicator will be lit at the end of initialization.

Note: The display on the 9130 times out after 15 minutes of inactivity. Slightly press any key to bring the display up if required.

¹ Refer to Eaton® 9130 UPS (700–3000 VA) User's Guide _ 164201718 Rev 2



4. Close and lock the lower access front door panel using the hex key.
5. Insert the switch key into the keyhole located on the right end of the material handling panel assembly.

Note: The adjusting board width key position is for models with adjustable conveyor rail width option installed.

6. Turn the key to its furthest right position (clockwise) and hold for 5 seconds and the green LED (PC on indicator) above the key switch is lit—relax the key--the system computer comes on-line and starts to boot.
7. The system proceeds to power up to the following conditions:
 - Computer boots to the Fedora logon screen as shown in Figure 4.4.

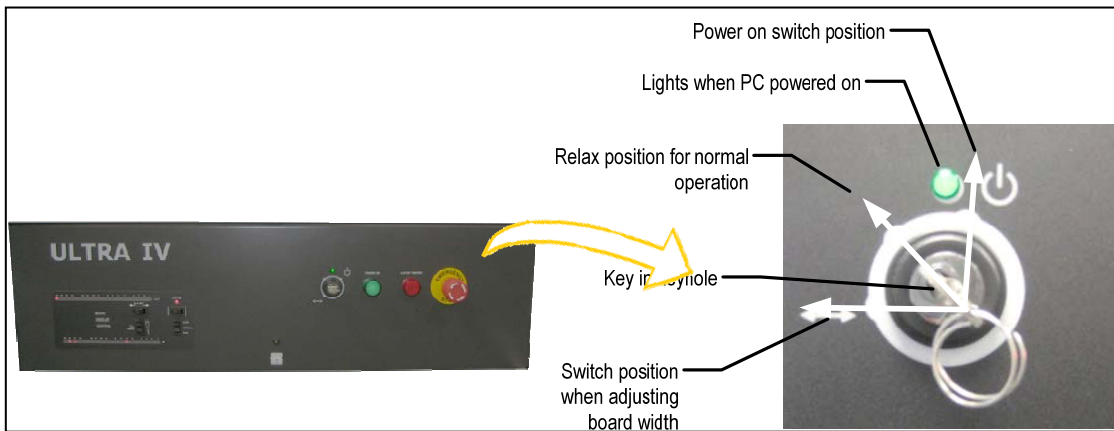


Figure 4.3: Power On key switch positions

- The UPS display changes to “UPS on Line”.



Figure 4.4: MVP login screen

If the PC does not Power Up!

If the PC does not power up with the key switch activated for 5 seconds then do the following:

- Unlatch the lower front door.
- Activate the key switch to its fullest clockwise position then push / hold the PC power on button for 5 seconds--the green LED (PC on indicator) above the key switch will light
- Release the PC button and relax the key switch. The system should start to boot.
- Relatch the lower front doors.

Note: The above condition usually occur when the PC power on switch was turned off manually or powering the machine from a cold start (Main Power Switch off and UPS off) as opposed to following the directions provided in this section.

Login Process

Now that the system has booted to the login screen, the user then decides what level of login is required to continue in the process. The 3 levels of login are described below. The screens that first appear after login are displayed on the right.

- **Level 1 Operator--Operation:** The Operation mode, which allows access to all the features needed to run the inspection system in production mode. User name to enter the system (login) is "operator". Logged in as operator generally does not require a password, however, it can set up to do so if required.
- **Level 2 Maintenance--Programming:** This mode allows the user to customize and to perform such tasks as creating and editing recipes and setting up barcodes. User name to enter the system (login) is "maint". The password window pops up after the login is entered.
- **Level 3 Root--Systems Administrators.** This allows access to the systems level administration tasks, such as networking, software installations, and adding and removing users. User name to enter the system (login) is "root". The password window pops up after the login is entered.

Once the required screen appears, the MVP system programs are ready to operate or are accessible.

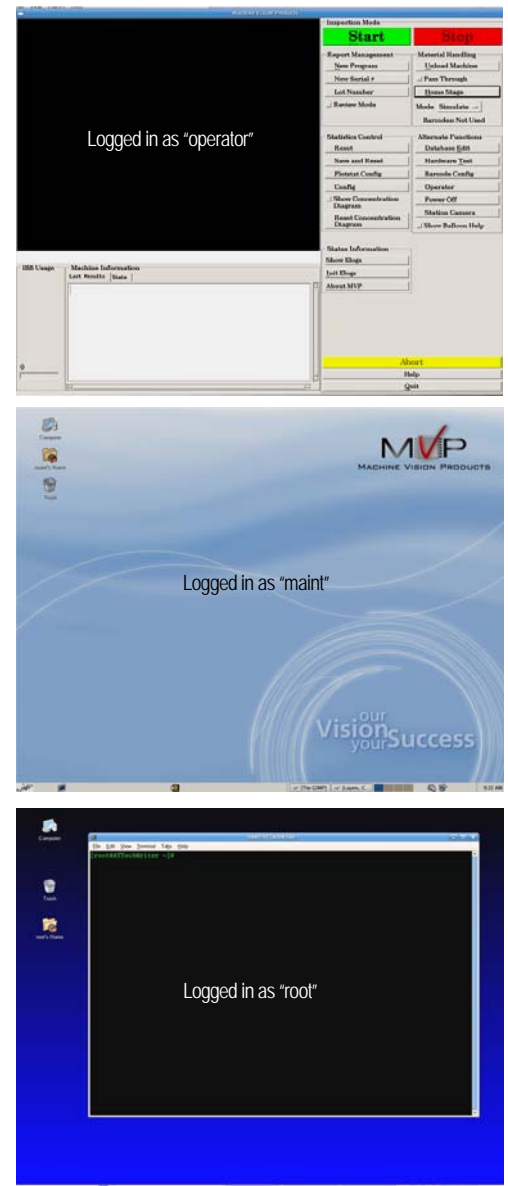


Figure 4.5: 3 types of desktops

Power Up Routine with Main Power and UPS Pre-Powered

Normally, the machine will have power unless the machine was taken off-line for repairs or other situations. The operator would only need to power on the system computer to enable the MVP programs as described in the previous topic.

Note: This procedure describes a method for powering on the machine with the Main Power switch and UPS powered up.

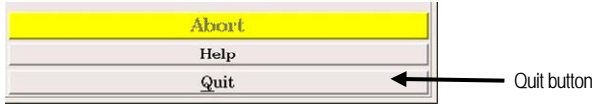
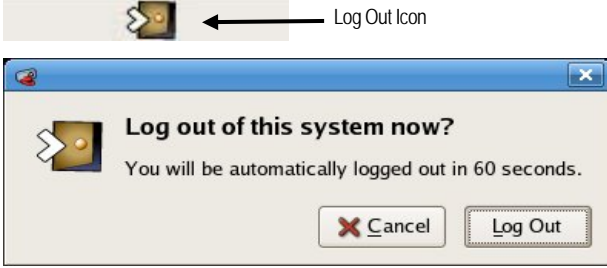
1. Insert the switch key in the keyhole (if not already present) on the switch control group of the Material Handling Panel assembly.
2. Turn the key to its furthest right position (clockwise) and hold for 5 seconds (you will hear drivers turn on twice) and the green LED (PC on indicator) above the key is lit—relax the key--the system computer comes on-line and starts to boot. Refer to Figure 4.3 for switch positions.
3. The computer boots to the Fedora logon screen as shown in Figure 4.4.

Power Down the AI



Even though the machine power is shut down there is still AC voltage present throughout the base machines electrical components.

Refer to the following table to exit and power down the machine from the above programs.

<p>Logged in as Operator</p>	<p>Select the "Quit" button located at the bottom of the UI window.</p> 
<p>Logged in as Maintenance / Root</p>	<p>Select the "Log Out" icon located on the bottom tool bar. A message box opens to confirm the request. Select "Log Out".</p> 

Referring to the table above, 2 options resets the operating system to the login window. From the login window direct the mouse cursor over to the “Action” features area of the window. Click the Actions character name and the “Choose an Action” pop up window appears. Once open, select the “Shut down the computer” radio button then click OK. The computer will proceed to shut down along with power and air.

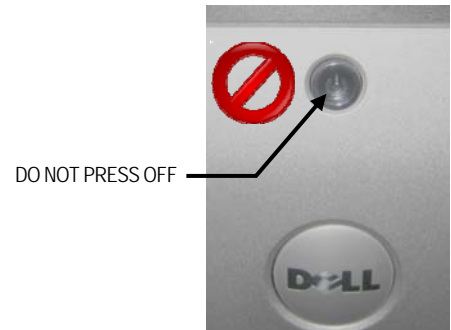


Figure 4.6: MVP Fedora Login window



Do not power off the PC by pressing its On/Off switch. This prevents the machine from powering up correctly when turning the key switch. Refer to the topic “If the PC does not Power Up!” for instructions on how to recover.

The one caveat to the above statement is when the operating system locks up or “freezes” not allowing for keyboard or mouse interaction. This would require that the PC be shutdown by holding its ON/OFF button for 5 seconds or until it powers down. Refer to the topic “if the PC does not Power UP” for instructions for recovering from such situations.



Using the Fedora Shut Down Process when logged in as Maint or Root

There is an alternative procedure for shutting the computer down by bypassing the login window when logged in as maint or root.

- Select the **MVP Start button > Fedora icon > select Shut Down > select the “Shut Down”** button from the pop up window as illustrated in the figure--the system will power down.

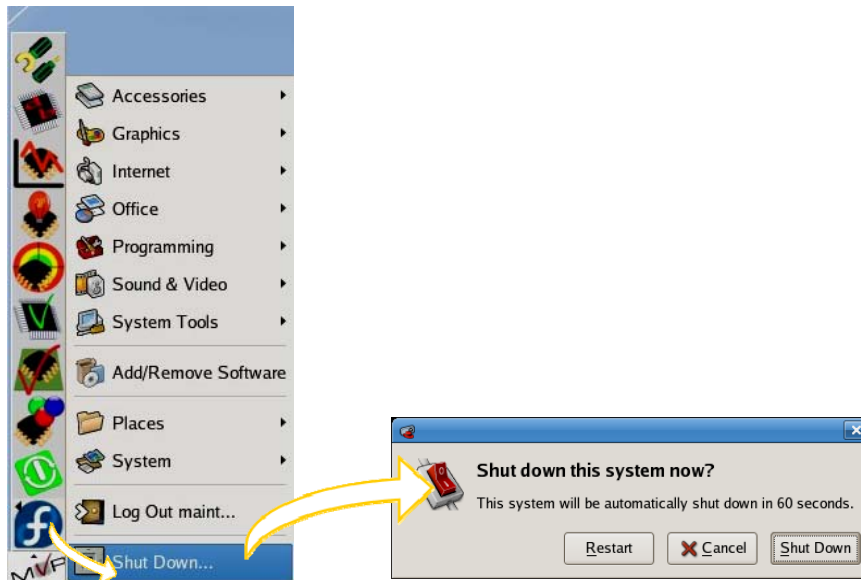


Figure 4.7: Fedora Shut Down power reference

Section 5

User Interface

Section Description

The operator has now learned how to correctly power up the machine and log in. This section introduces the operator to:

- Understanding the features of the user interface.

The User Interface Window—UI

With the system logged in as “operator” the system will boot to the following window. This window is referred to as the UI or user interface window. This window allows the operator to load programs, run inspection mode along with other various features for data collection.

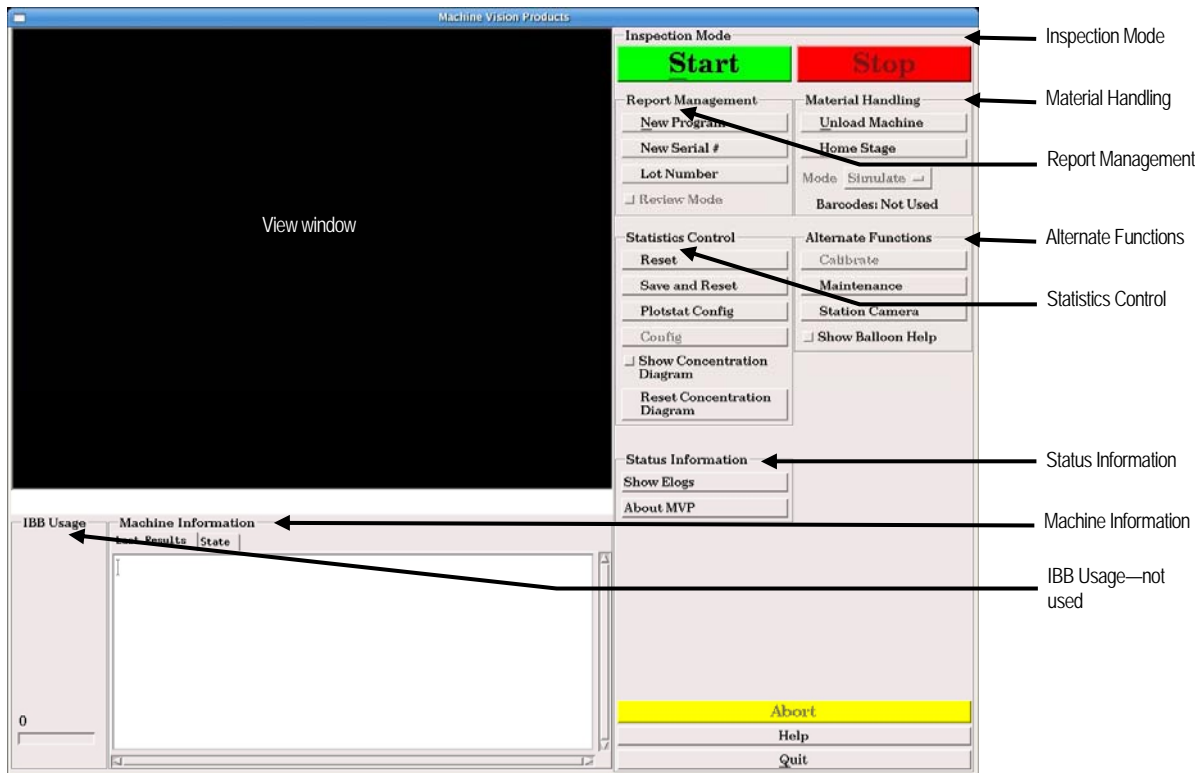

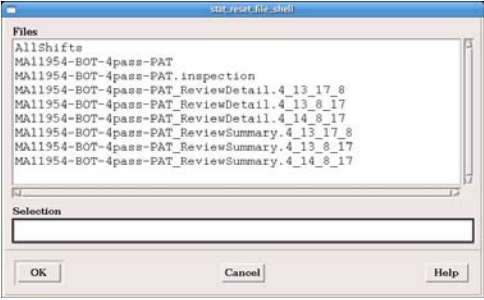
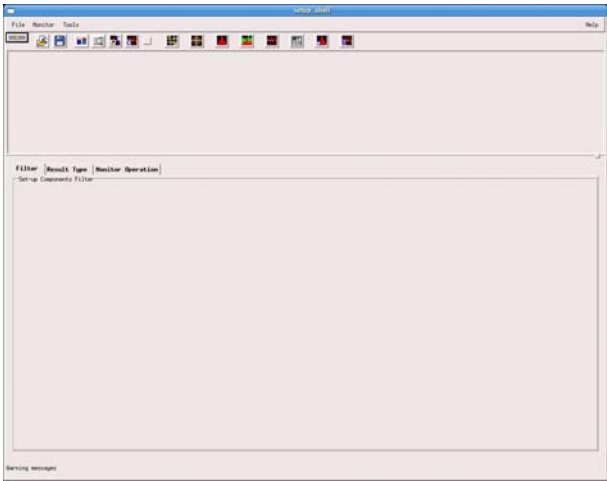


Figure 5.1: UI window reference

A brief description of the UI window interface features is described in the following table.

Feature Button	Description
Inspection Mode	
Start	Starts the inspection program that is loaded. If no program loaded, a file selection pop up window opens prompting the operator to select from the list.
Stop	Stops the inspection process after the current inspection is completed.
Abort	Is active during inspection. It stops the program instantly returning control to the operator.
Help	Opens a web content file similar to the manuals.
Quit	Terminates the current program and exits to the login prompt.
Report Management	
New Program	Removes the current program from being active. The operator must load a new program by selecting the Start button.
New Serial #	If barcodes are not used, products will be numbered consecutively starting from zero. Allows the operator to enter the starting number for product which is then counted consecutively there after.
Lot Number	Allows the operator to assign lot numbers to product.
Review Mode	Management function. Is grayed out in operator mode. If the checkbox is red, the AOI displays all defects found during the inspection on the operator's screen. The operator then has to review the defects before inspecting the next product. If the checkbox is not red, then the defects for the inspection are saved in a file, sent to a printer, or sent by SMEMA to a repair station. Management sets these options.
Material Handling	
Unload Machine	Allows the operator to release product from the machine and send it downstream.
Home Stage	Allows the operator to move the cameras to the home position or the zero position.
Mode / Simulate	<p>Management function. Is grayed out in operator mode. Available only in maint / root login. Continuously inspects product loaded in machine—product does not exit downstream. Material Handling not active—manual operation. Barcodes ignored.</p>  <p>Click the tab button to open listing</p>
Mode / Normal	Normal operation mode. Uses material handling and SMEMA signals.
Mode / Reject	Product brought in, inspected, and passed out. The reject bit is set on all boards, so they are handled by the reject board handler.

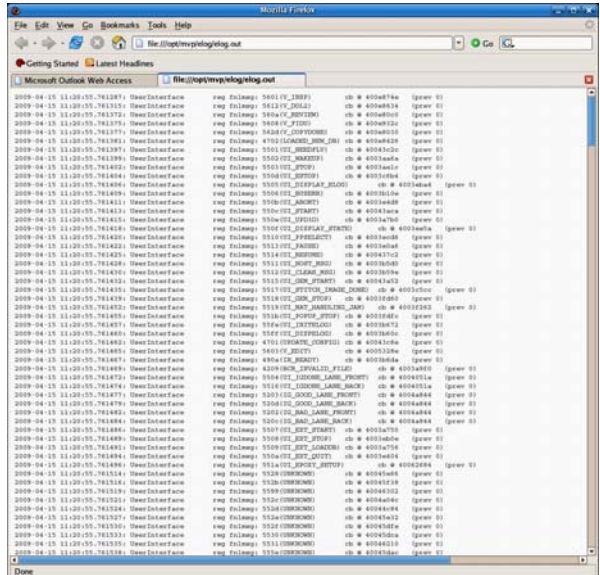
Mode / Hold	Repeatedly inspects product in the inspection bay while keeping the same serial / barcode number.
Barcodes: Not Used	<p>It is a display button not toggle button.</p> <p>Barcodes display the current configuration for barcodes that's set by management.</p> <p>If barcodes not used the display displays "Not Used".</p> <p>If barcodes are used, then the display shows "OK".</p>
Statistical Control	
Reset	<p>Resets the inspection file back to no data saved. Opens the following window when selected. Select a file from the list then click the OK button to reset the file.</p> 
Save and Reset	<p>Saves the inspection file with an extension consisting of the date and time of the save.</p> <p>The inspection file is reset for future collection of data.</p>
Plotstat Config	<p>Allows the operator to display Plotstat real-time displays of particular components.</p> 
Config	<p>Management function. Is grayed out in operator mode.</p> <p>Allows for the setting of the camera, the field of view, and the snap overlap.</p>
Show Concentration Diagram	<p>Can be toggled on or off.</p> <p>If on, then a red image is displayed on the product image for all defects found. Red image grows larger for each successive inspection for a specified part. Is displayed in a view window during the inspection.</p> <p>If off, then displays each part that failed for that particular inspection.</p>
Reset Concentration Diagram	<p>Resets the concentration diagram when selected.</p>

Alternate Functions

Calibrate	Is normally grayed out in operator mode—open database (program) to activate the toggle. Opens iPro feature for calibrating fiducials. If toggled off, the calibration point in the program is used.
Maintenance	Management function. Opens password window to change from operator mode to maintenance mode. Allows for database editing and lighting setups.
Station Camera	Moves the camera module to a park position if one is set or the default.
Show Balloon Help	Displays a yellow balloon help window when the operator passes over any of the buttons on the screen.

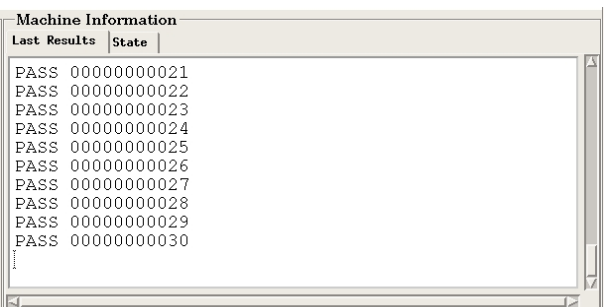
Status Information

Show Elogs	Contains a list of all internal commands being executed. It's used as a debug tool for MVP personnel to ensure that the system is executing properly.
About MVP	Displays MVP contact information and software revision.



Machine Information

Last Results	Displays the inspection results from the last inspection. The information continues to append as additional inspections are run.
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State

Displays the current state of the machine during operation. Displays all processes being executed during an inspection. Data can be saved to disk if logged in as "maint" and the Init Elogs is set. Normally used as a system troubleshooting tool.

Machine Information

Last Results	State		
Coord	22762	INSP	Digio In 000000c0
UI	22731	Running	
Spngen	22795	Run	Digio Out 00008134
Dngen	0		Barcode Ok
Plotstat	22802	Run	High Med Running
Barcode	22810	Success	
Mat	22787	No Board	
Inspect	22741	Ready	
Net	22839	Pass	
Sync	1 of 1		
Pass	1 of 1		
Scan	1 of 10		
Stage	Calibrated, Can Fly, Motor Online		
stat(x y):	R R		

Non Standard Operator Features Available by Configuration

The table described above lists those features that are considered standard operator functions when logged in as operator. However, operators can be allowed access to further control by the setting of permissions located in the Configuration > User Interface program which is set by management when logged in as maint or root. Refer to the following table for a description of operator features that may be encountered when logged in as operator.

The screenshot shows the operator interface with several sections and buttons. Arrows point from text labels to specific features in the interface:

- Enabled Pass Through:** Points to the Pass Through button in the Material Handling section.
- Enabled Review Mode:** Points to the Review Mode button in the Report Management section.
- Enabled Barcode status:** Points to the Barcodes: Not Used text in the Material Handling section.
- Enabled Calibrate:** Points to the Calibrate button in the Alternate Functions section.
- Enabled Barcode Config:** Points to the Barcode Config button in the Alternate Functions section.
- Enabled Barcode Queue:** Points to the Display BC Queue button in the Alternate Functions section.
- Enabled Power Down:** Points to the Power Off button in the Alternate Functions section.
- Enabled Run OCR:** Points to the Run OCR button in the Alternate Functions section.
- Enabled Last Inspection data:** Points to the Last Inspection Data button in the Statistics Control section.
- Enabled Summary Data:** Points to the Lot Summary Data button in the Statistics Control section.

Figure 5.2: Enabled Operator features

Note: Standard can be misinterpreted as static settings. Certain features that are enabled can be set to disabled if the operator's access to those features is not desirable.

Feature Button	Description
Report Management	
Review Mode	Clicking the checkbox allows the operator to selectively turn Review mode off or on. Checked means that the host system opens the Review mode program for operator control. Unchecking it moves the feature to a repair station.
Material Handling	
Pass Through	Allows the operator to allow product to pass through the AOI without inspection.
Alternate Functions	
Calibrate	Allows the operator to register the fiducial in iPro. Enables after a database is loaded. Normally Grayed out.
Barcode Config	Allows the operator to open the barcode editing window.
Display BC Queue	Allows the operator to open a window that displays barcodes in queue.
Power Off	Allows the operator to power down directly from the UI.
Run OCR	Allows the operator to selectively turn the OCR feature off / on. Primary use is to turn the feature off because manufacturer of components updates the parts alphanumeric characters often enough to cause false rejects for the correct part.
Statistics Control	
Last Inspection Data	Opens comprehensive report running the program in PSR mode. Similar to elogs. Enabled in SPC Output > PSR Data of Configuration.
Lot Summary Data	Opens Lot summary data report while in PSR mode. Similar to elogs. Enabled in SPC Output > PSR Data of Configuration. Same enable check box in configuration opens both reports.

Section

6

CTC Panel Features

Section Description

The operator is now familiar with the system user interface. This section introduces the operator to:

- Understanding the features of the CTC Panel.

CTC Panel Features

Introduced in Section 1, the CTC Panel consists of the Material Handling and Control Panel functions. Material Handling includes features that allow the operator to control how material is moved through the AOI. The Control Panel features allow the operator to control the power to the system.

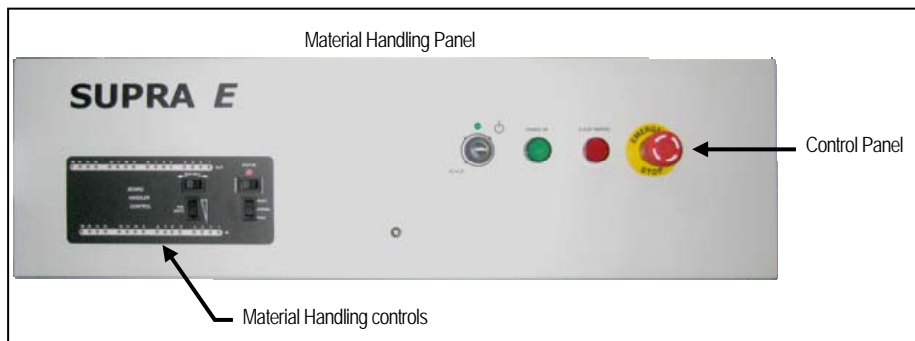


Figure 6.1: CTC Panel reference

Control Panel

- EMO Switch: Emergency Off Switch. Removes power from the XY stage, camera module, and air

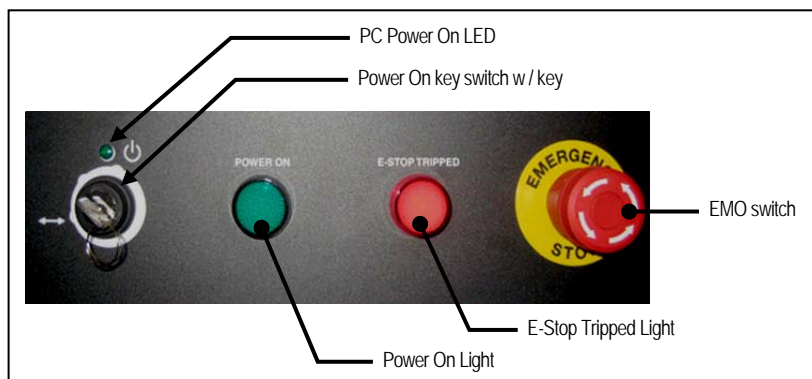


Figure 6.2: Control Panel reference

- E-Stopped Tripped light: Indicates that the system is in e-stop loop.
- Power On light: Indicates that the system is powered on.
- Key switch: Applies power to the PC and then the system.
- PC Power On LED: indicates that the PC is powered up

Key Switch Positions

The Key switch has 3 positions: full CW (position 3), middle location (position 2), and full CCW (position 1).



Figure 6.3: Key switch reference

- Position 1: Rotate the key to this position to adjust the rail dimension to the product.
- Position 2: Rotate the key to this position after adjusting the rails. Default operation position (run mode). The key is typically removed from the switch in this position (if so desired the key can be left in).
- Position 3: Power on position. Key returns to position 2 when released during power on.

Material Handling Controls

The Material Handling tools control how a product passes through the machine; adjust rail width, manually cycle the conveyor belt, and LED array of system status indicators.

Maint/Normal/Pass Switch

- Maint: Maintenance mode allows the operator to manually load and unload product.
- Normal: Normal mode is selected when SMEMA controls are required. If SMEMA control not required, then use the setting to operate the machine through the conveyor board location sensors.
- Pass: Pass mode allows the operator to use the machine as a pass through junction. Product enters the machine, idles at the inspection location then exits the machine. No inspection takes place.

Reset / Enter Switch

- Combined usage is used for clearing product and material handling issues. The process is to press the Reset then toggle the Enter.
- Operator error recovery practices generally require engaging the Enter switch minus the Reset.

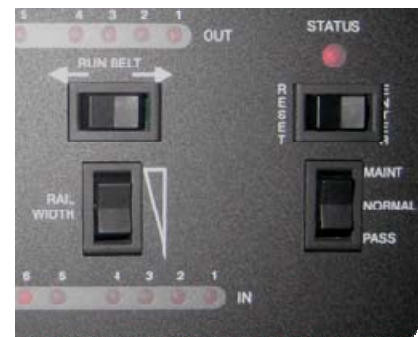


Figure 6.4: Material Handling section of CTC Panel

- **Reset:** Resets the CTC controller. The material handling devices react in the following manner;
 1. Hardstop disengages.
 2. Crowders disengage.
 3. Lifters disengage.
 4. SMEMA sensors reset.
- **Enter:** Enables conveyor belts. Product exits the machine downstream.

Run Belt Switch

- Run belt is used to manually operate the belts to exit product or position product inside the machine. The switch has 3 positions:
 1. The neutral position is set for normal operation or home position.
 2. Left toggle causes the conveyor belts to rotate right to left (CCW).
 3. Right toggle causes the conveyor belts to rotate left to right (CW).

Rail Width – Supra E / Ultra IV models

- The Rail Width switch is used to adjust the conveyor width to the product.
- The key switch must be in the #1 position.
- Using the triangle shape stencil next to the switch as reference; press the switch on the top of the slope to adjust the rails out—press the switch on the bottom to adjust the rails in.
- Return the key switch to the #2 position when completed (the machine can operate with the key switch in position 1).

Manual Width / Fast – Ultra models w/auto width option

- These switches are used primarily to adjust the conveyor rails for initial set up of a board for creating the stitch image.
- Manual Width is used to adjust the conveyor rail to fine tune its position to the product (moves extremely slow but it is moving).
- Fast is used in sync with the Manual Width switch to move the conveyor rail in large increments at normal speed. The Fast switch does not operate if pressed separately from the Manual Switch.

Auto Width Option Function

If there is a board detected in the system, the CTC will not clear output bit 8 (refer to below table). If the CTC is reset (Reset switch is toggled) and a board is not detected over a sensor, the CTC will think the rails are clear. When the rails clear output bit 8 is detected by the software, the system will adjust the rails if required.

When the system adjusts the rails, it first makes a move that opens the rails further. The result is if there is a board in the system that is not detected it will drop out onto the chip catcher tray below the rails. The rails will then close down to the rails home switch and then adjust to the programmed board width.

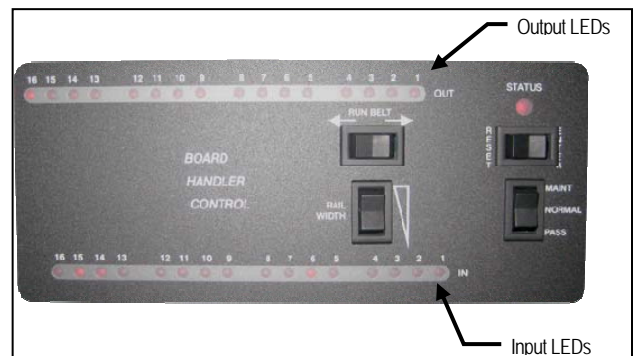


Figure 6.5: IN / Out LED rows reference

In / Out LED Display

The display is split into 2 rows. The top row is for output signals and the bottom row is for input signals. At various times during an inspection, different LEDs illuminate showing the operator what action is currently taking place or just occurred.

The below tables describe the signal name for the individual LEDs.

The following table represents the Ultra IV signal name.

CTC Out	Output Bits	CTC In	Input Bits
1	Engage inspection STN hardstops	1	Inspection Complete
2	Ready to inspect (Rear Lifter-option)	2	Reject Status CLR
3	Not busy to upstream (SMEMA)	3	Reset Switch (software)
4	Engage load stn hardstops	4	Load hardstop clear
5	Conveyor motor (inspection) Off/On	5	Board at Input (PS1)
6	Conveyor motor slow/fast speed	6	Inspection stn pho-det (PS2)
7	Inspection stn pho-set LED off/on	7	Bar Code OK and Pass Thru switch (IN1A and IN7A)
8	Rails Clear/not clear, OK to adjust	8	Not Busy from downstream (SMEMA)
9	Board avail to downstream (SMEMA); off/on	9	Board available from upstream (SMEMA)
10	Reject board relay to downstream (SMEMA); off/on	10	Maint Mode Switch
11	Board Crowders on/off	11	Spare
12	Front Lifter; down/up	12	Inspection active
13	Spare	13	Spare
14	Audible Alarm off/on	14	Inspection hardstop clear
15	Reverse Belt Motors; Normal Dir	15	E-Stop Active
16	Status LED (Flash red tower light)	16	Enter Pressed

The following table represents the Supra E signal name.

CTC Out	Output Bits	CTC In	Input Bits
1	Engage inspection STN hardstops	1	Inspection Complete
2	Ready to inspect (Rear Lifter-option)	2	Reject Status CLR
3	Not busy to upstream (SMEMA)	3	Reset Switch (software)
4	Conveyor motor (inspection); Slow/Fast	4	Load St hardstops CLR
5	Spare	5	Board at Input (PS1)
6	Engage Load hardstops	6	Inspection stn pho-det (PS2)
7	Inspection stn pho-set LED off	7	Bar Code OK and Pass Thru switch (IN1A and IN7A)
8	Rails Clear/not Clear, OK to adjust	8	Not Busy from downstream (SMEMA)
9	Board avail to downstream (SMEMA)	9	Board available from upstream (SMEMA)
10	Reject board relay to downstream on (SMEMA)	10	Maint Mode Switch
11	Board Crowders on	11	Spare
12	Front Lifter; up/down	12	Inspection active
13	Conveyor motor slow speed; on/off	13	Spare
14	Audible Alarm; on/off	14	Inspection hardstop clear
15	Reverse/Normal dir Belt Motors	15	E-Stop Active
16	Status LED (Flash red tower light)	16	Enter Pressed

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Section

7

Basic Operation

The user is now familiar with powering on the machine, the UI, and the CTC panel. This section introduces the user on how to:

- Power up the machine to the UI
- Set up material handling to the product
- Load a program
- Run an inspection program

Getting Started

Power on the AI

1. Refer to Section 4.

Login

2. Type “operator” at the login prompt. Refer to Section 4 for assistance if required.
3. Enter the “operator” password when prompted.
4. If entered correctly the system will boot to the Desktop.

Product Set Up

Note: If the machine is set up with the dual lane conveyor option, then rail width process is not required. Refer to steps 1 and 2 only.

1. Position the Maint/Normal/Pass switch of the material handling panel to “Normal”. Refer to Section 2, page 2-3 for information on switch position details.
2. Toggle the Reset / Enter switch on the material handling panel.
3. Turn the key switch to its horizontal position to enable the rail width adjust switch (if single lane conveyor).



Switch in Normal position

Figure 7.1: Normal switch position



Toggle Switch Reset > Enter

Figure 7.2: Reset/Enter switch reference

Keyswitch shown in horizontal position for rail adjust

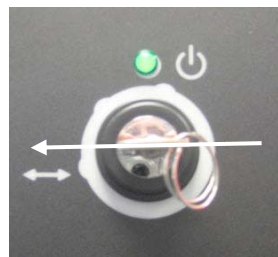


Figure 7.3: Key switch in rail adjust position

Note: Prior to adjustment be sure that there are no products on the conveyor rails—it may prevent the rails from activating. Also check the Input LED display on the front panel and confirm that IN5, IN6, and IN13 of the front rail are unblocked. If dual conveyors then check the rear rail LEDs IN21, IN22, and IN29 are unblocked. If so, then verify and remove any blockages, or if the camera module is sitting over any of the sensors.

4. Place a product sample to either end of the conveyor rail.
5. Press and hold the Rail Width switch until the product sample fits onto the conveyor belts.

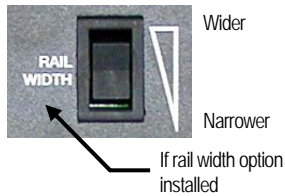
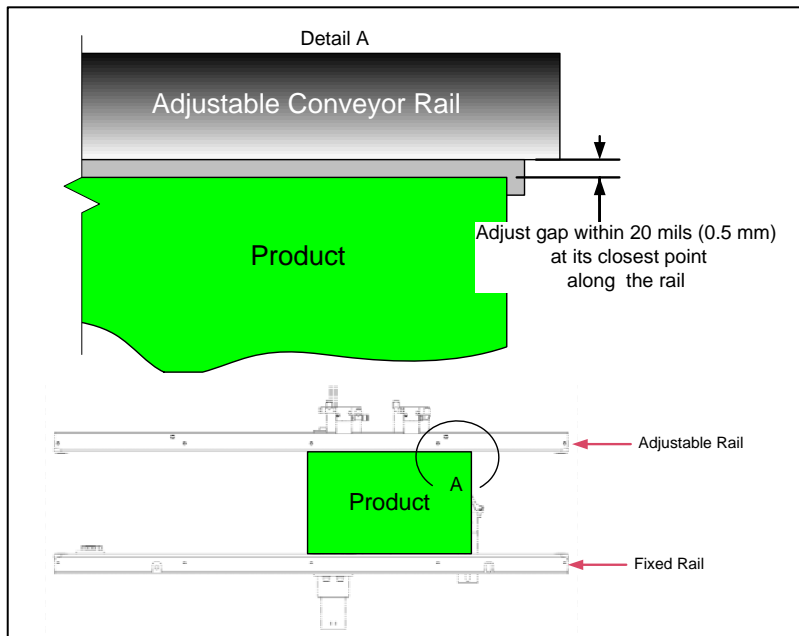


Figure 7.4: Rail Width switch reference

6. Fine tune the width so that the product can slide along the length of the conveyor without restricting its movement along the edge of the conveyor rails. Adjust the rail width to a minimal gap (within 20mils / 0.5 mm) between the adjustable rail and the back edge of the product at its closest point along the rail.



- a. Check the rail width at both ends of the conveyor.
 - b. Toggle the Reset / Enter switch.
7. When the adjustment is good, rotate the key switch to its normal position (operation mode). Refer to Section 4, figure 4.3 for information on switch positions.

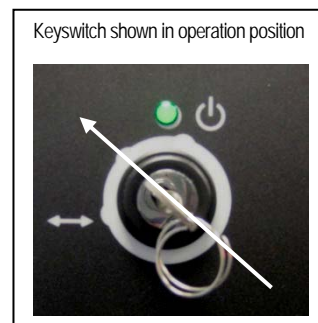


Figure 7.5: Key switch in operation mode position

Note 1: The key can be removed if company operating conditions require it.

Note 2: The key switch will allow operation of the machine when in the rail adjust position. Rotating it to the operation position prevents the rail from accidental activation.

Start the Program—No Barcode

The following procedure is based on a user logged in as “maint”.

Note: The “Lot Number” button is enabled by Configuration settings. If this button is grayed out (disabled) then ignore step 3.

1. Select the MVP Start button located in the lower left corner of the desktop toolbar—this opens the Program Access Bar.
2. Click the UI Open button—this opens the UI (user interface) program.
3. Open the Serial Number window (if required) by clicking on the “New Serial #” button of the UI window and enter a number. The number entered can be up to 11 characters.

Program Access Bar

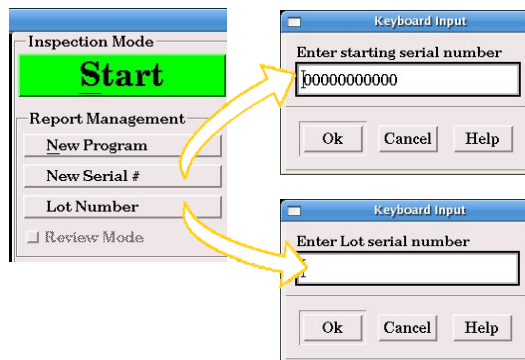
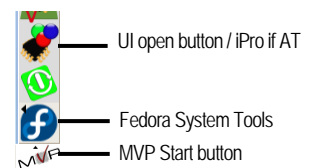


Figure 7.6: Serial Number and Lot Serial Number data entry windows

Example: If the number 10 is entered as “10” minus the rest of the zeros the program automatically saves the file as consecutive numbers “0000000010, 0000000011, 0000000012, etc”. Or the number can be entered at the end of the zero string as shown in the previous sentence as long as it does not exceed the character length of 11.

Note: The Serial Number is the name used by the system to save the file in the “error” and “image” directories. However, Configuration allows for the option of a prefix to be added to the serial number if required. The file would save as <prefix (all characters)> + <serial number (all characters)>. Also, Configuration can be set up to automatically include a Date Stamp to the file name. For all intensive purposes, this data would be invisible to the operator.

4. Open the Lot Number window (if required) by clicking on the “Lot Number” button of the UI window and enter a number – all numbers are consecutive thereafter.

Note: The Lot Number is used along with the serial number in storing the inspection file into the opt/mvp/error output directory.

Example: opt/mvp/error/<database Name>/<Lot ID>/<Prefix (if used) + <Serial Output Name>

- On the UI screen click the Start button. The File Selection window pops up. Scroll through the list and select the required database, and then click the OK button.

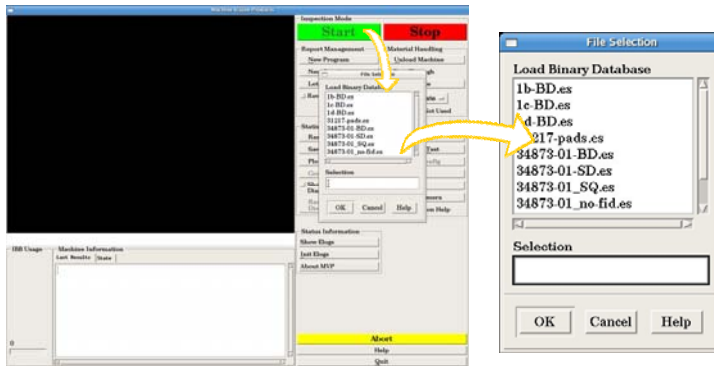


Figure 7.7: Selecting the Recipe (database) for inspection

- Place a board or carrier over the input sensor (board available) located at the beginning of the left end of the conveyor (or right side if so configured) or if using SMEMA place a board so it's available upstream of the machine.

Note: If there is no board or carrier sensed by the conveyor system with SMEMA setup then an alert pop up window appears informing the user of the discrepancy. Place a board or carrier over the correct board available sensor (Input LED 5 if Front Lane is lit or Input LED 21 if Rear Lane is lit of the CTC LED display) and then the system automatically loads the board and the Alert message goes away.

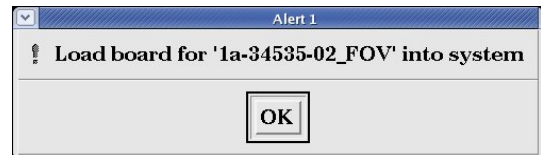


Figure 7.8: Load board alert message window

If the machine is not set up as SMEMA, then place the board over the sensor and press the Enter switch (do not engage the Reset)—the message will go away when the board is latched at the board stop for both cases.

Note: The message window shown in figure 7.8 can be turned off (to not display) from within the Material Handling tab of the Configuration setup.

- The program begins by loading product into the machine and starting inspection.

Start the Program—Barcode

When Configuration is set to “Single or Multiple without Match”

This configuration setting requires the operator to open the database program along with manually entering the barcode using a barcode scanner. The operator interfaces with the machine following the below directions.

- On the UI screen click the **Start** button. The **File Selection** window pops up. Scroll through the list and select the required database, and then click the **OK** button.

2. A flashing “Please enter barcode” message window pops up requesting that a barcode needs to be read into the system (for this example it is a hand held unit). Scan a barcode and continue.



Figure 7.9: Enter Barcode pop up window reference


3. The program begins by loading product into the machine and starting inspection.

When Configuration is set to “Single or Multiple with Match”

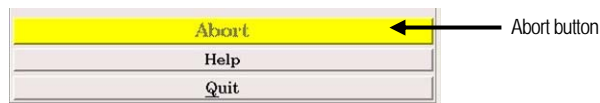
This configuration setting automates the process by having the system select the database by the code selection of the scanned barcode. The scanned code contains the name of the database that must reside in the local AI database. The system then loads that database into memory and begins the load and inspection process. The machine opens an alert message window if no match is found during the barcode scan process.

The operator function is to click the “Start” button to begin the process. After the process starts, the operator ensures that the product is entering the machine correctly and clearing errors that may occur.

Stop the Program

The program currently in inspection can be stopped by clicking the “Stop” button  located at the top of the UI window. The program will then stop at the completion of the inspection (complete inspection--not partial). The program can be restarted by pressing the “Start” button if changing the recipe (database) is not required. If changing the recipe is required then follow the next topic.

Another method is to select the “Abort” button. The Abort button causes the current inspection program to complete its current scan (does not scan entire board—only the direction where the camera module is currently traveling), stops, and then dumps all data. The program can be restarted by pressing the “Start” button.



Note: The Abort button feature is conditional upon the setting of PSR mode in Configuration. If PSR is disabled in Configuration then the Abort button is enabled and appears on the UI window—if PSR is enabled then the Abort button is disabled and removed from the UI window.

Start a New Program

This process is followed when a new recipe (database) is required at the completion or interruption of an existing recipe.

1. On the UI screen click the Stop button to complete the current inspection program.



2. Click the New Program button which removes the current database from the queue.
3. Click the Start button then follow the same rules previously described.

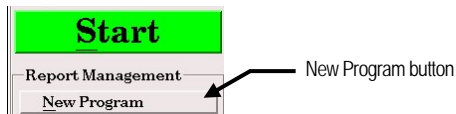


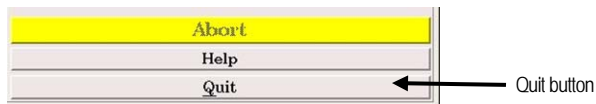
Figure 7.10: New Program button reference

Power Down the AI

1. Click the Stop button to complete the inspection process.



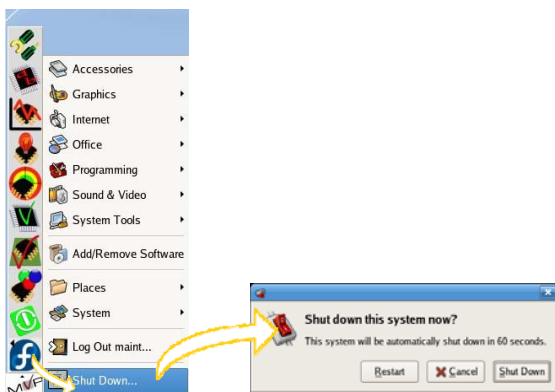
2. Click the Quit button to exit the program.



3. The UI program closes and exits to the login process.

The following process can be followed if logged in as “maint”.

1. Select the MVP Start button > Fedora icon > select Shut Down > select the “Shut Down” button from the pop up window as illustrated in the figure--the system will power down.



2. The computer will proceed to shut down along with power and air.

Review Mode

Note: Review mode is enabled or disabled by the set up of the Configuration routine for a given machine. The figure below illustrates that Configuration was set up with Review Mode enabled. If the Review Mode toggle button of the UI window is deselected and Review Mode set to OFF in Configuration then the board defaults to a Repair station for review of the defects.

At the completion of each inspection an alert pop up window appears if defects were found during the process of the inspection. The user then interacts with the window by clicking the OK button. This causes the UI window to transpose itself into the Review Mode window. Review Mode allows the user to instruct the machine on identifying which defects are false calls or false accepts.

Review Mode Interface

The review interface appears when parts or items failed the requirements to pass an inspection. The review window displays each failure with a rectangular window or both rectangular and circles depending on the user configuration settings. Also displayed is a listing of the part types that failed. This listing displays the total number of failures at the top followed by the part types name and total failures for each part type name. The operator interacts with the program by determining whether a noted failure in the geometric shaped window is a false call or a true defect by clicking on the appropriate button.

The program is exited by clicking the "Exit Review" button. The board or carrier exits the machine either to a repair station (if so configured) or to downstream processes. The machine is ready to accept new product and start a new inspection.

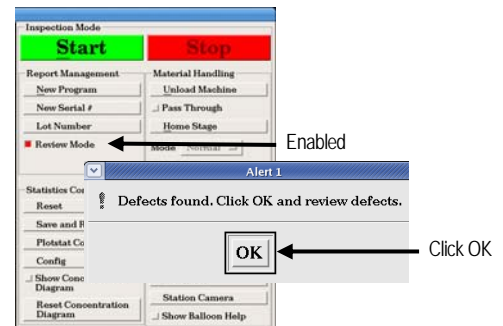


Figure 7.11: Defects found alert window reference

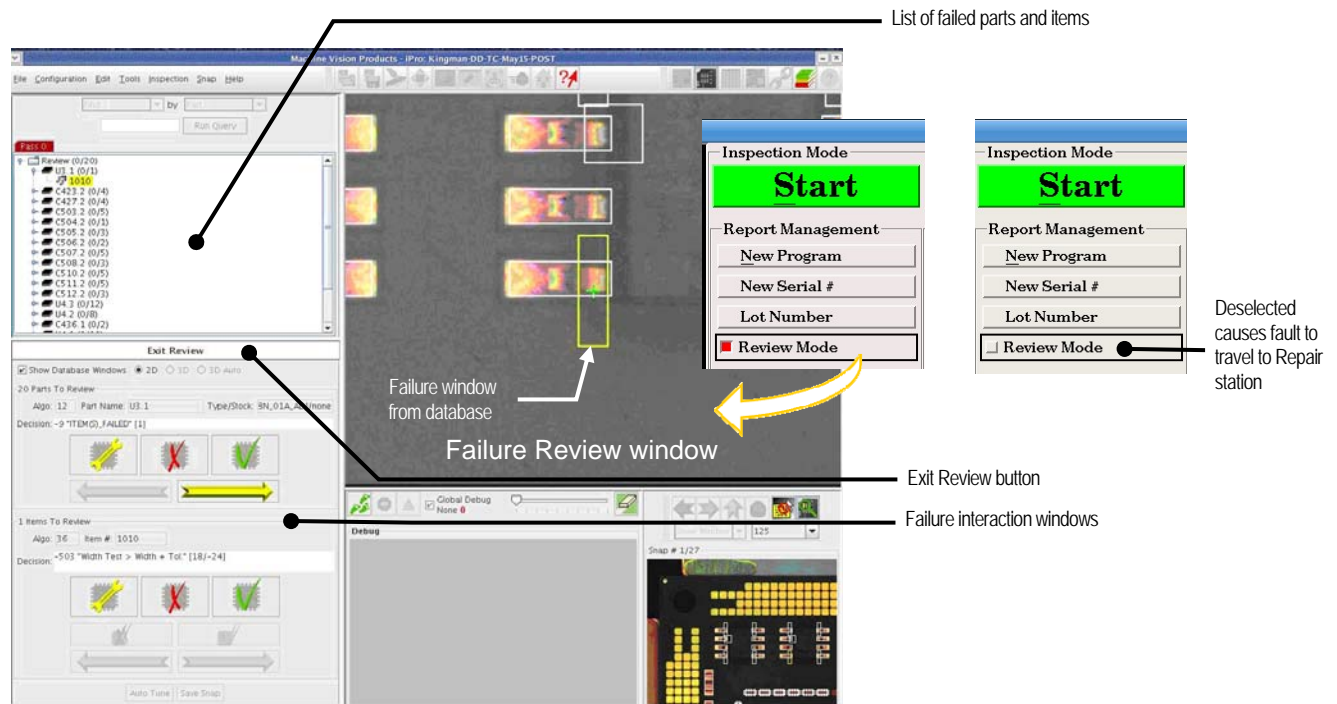

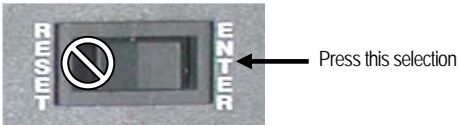




Figure 7.12: Review window interface reference

Resolving Common Problems in Operator Mode

Refer to the following table for instructions on resolving conflicts when in operator mode.

Symptoms	What to Do
UI Screen frozen No Mouse control Keyboard OK	If the UI screen hangs up or freezes and the keyboard is still active; <ol style="list-style-type: none"> 1. Press Ctrl +Alt + Backspace simultaneously—this brings the system back to the login screen. 2. Unlatch and open the front upper door and remove any product that may be inside. 3. Clear any product from the upstream and downstream conveyors. 4. Close the front upper doors and lock. 5. Press the Reset / Enter switch on the material handling panel. 6. Login as operator and operate machine normally.
UI Screen frozen No Mouse or Keyboard control.	<ol style="list-style-type: none"> 1. Unlatch and open the front lower doors. 2. Press and hold the computer power button until it shuts down. 3. Unlatch and open the front upper doors and remove any product from within. 4. Clear any product from the upstream and downstream conveyors. 5. Close and lock any open doors. 6. Power up the machine using the Key switch. 7. If the machine will not power up then simultaneously turn the key switch and press and hold the computers power on button. 8. Follow normal login procedure. 9. Press the Reset / Enter switch on the material handling panel. 10. Operate normally.
Condition	In5 LED is lit—product resting over input sensor. Red tower light and audible alarms are on.
Input product not loading. System functional	<ol style="list-style-type: none"> 1. Unjam the product and manually place onto the conveyor—enough so that the belts can carry it. 2. Press the run belt switch of the material handling panel and drive the product so it's over the second sensor (anywhere over it). The second sensor is the next sensor after the conveyor input sensor.  <ol style="list-style-type: none"> 3. LED 6 of the CTC input LED array should be lit when the product is located correctly. 4. Press the Enter switch of the material handling panel. Do not toggle the switch to the Reset position!  <p>Note: Pressing the Reset switch erases barcode data from the CTC material handling system register. This requires the operator to remove all product(s) from inside, input, and output locations of the machine. Removing product from inside the machine requires opening the front door that causes the machine to go into the e-stop loop. Follow directions from section 3 on recovering from an e-stop condition if this occurs.</p> <p>The product will continue to the board stop location and the inspection process will proceed.</p> <p>Note: If pressing the Run Belt switch is not advancing the product, then the board will require that the operator opens the front door and manually unjam the product. Proceed to door Interlock e-stop</p>

	recovery section for instructions then continue with this procedure.
Condition	Product is located inside the machine with In6 not lit. The red tower light and audible alarms are on.
Product jammed between input and board stop scenario 1—system functional.	<ol style="list-style-type: none"> 1. Press the run belt switch of the material handling panel and drive the product so it's over the second sensor (anywhere over it). The second sensor is the next sensor after the conveyor input sensor. 2. LED 6 of the CTC input LED array should be lit when the product is located correctly. 3. Press the Enter switch of the material handling panel. Do not toggle the switch to the Reset position! <p>Note: If pressing the Run Belt switch is not advancing the product, then the board will require that the operator opens the front door and manually unjam the product. Proceed to door Interlock e-stop recovery section for instructions then continue with this procedure.</p>
Condition	Product is located inside the machine with In6 lit. The red tower light and audible alarms are on.
Product jammed between input and board stop scenario 2—system functional.	<ol style="list-style-type: none"> 1. Press the run belt switch of the material handling panel and drive the product so it's over the second sensor (anywhere over it). The second sensor is the next sensor after the conveyor input sensor. 2. LED 6 of the CTC input LED array should be lit when the product is located correctly. 3. Press the Enter switch of the material handling panel. Do not toggle the switch to the Reset position! <p>Note: If pressing the Run Belt switch is not advancing the product, then the board will require that the operator opens the front door and manually unjam the product. Proceed to door Interlock e-stop recovery section for instructions then continue with this procedure.</p>
Condition	Product advanced to board stop—locked in position, but no inspection is taking place. Green tower light is on and no audible alarm.
No inspection being performed with product in ready position for inspection—system functional.	<ol style="list-style-type: none"> 1. Click the Stop button on the UI screen.  2. Wait until the Start button becomes active. This indicates that the software is responsive and for whatever reason an inspection didn't occur.  3. Click the Start button on the UI. If the inspection process doesn't start then proceed to the next step. 4. Click the Stop button on the UI screen. 5. Click the Quit button to exit the program. This will exit the program to the login window. 6. Open the front upper door and remove any product from inside. 7. Clear any product from the upstream and downstream conveyors. 8. Press the Reset / Enter switch on the CTC panel. 9. Log in normally and the UI screen will come up—camera stage homes. 10. Proceed to run inspection programs.
Condition	Product is released by the board stop but does not travel over to the exit sensor. IN13 is not lit. Red tower light and audible alarm are on.
Product jammed prior to output (exit) sensor—system functional	<ol style="list-style-type: none"> 1. Press the Run Belt switch to advance the product so its over the exit sensor (sensor 4) located at the end of the conveyor. Or manually position the product over the sensor. 2. LED 13 of the CTC input array should be lit when the product is located correctly. 3. Press the Enter switch on the CTC panel. Do not toggle the switch to the reset position! 4. The product should exit the machine downstream allowing upstream product to enter the machine.

<p>Condition</p>	<p>Board stop releases the product but jams over the exit sensor—In13 is lit. Red tower light and audible alarm are on.</p>
<p>Product jammed over the exit sensor—system functional.</p>	<ol style="list-style-type: none"> 1. Press the Run Belt switch to advance the product or manually position the product downstream from the sensor. 2. Press the Reset/Enter switch on the CTC panel. 3. The machine restarts allowing upstream product to enter the machine.
<p>Bad Barcode Read</p>	<ol style="list-style-type: none"> 1. Reposition product on the conveyor and rescan.
<p>Registration Failure</p>	<p>Registration failures are handled as rejections and exit the machine downstream.</p>
<p>E-Stop Recovery--Door Interlock</p>	<p>The e-stop loop occurs when the front or rear doors are opened. The recovery process for either type is the same.</p> <ol style="list-style-type: none"> 1. An Alert window pops up displaying a message that an e-stop is detected (in this case it's a door). 2. Remove any product from inside the machine if required. 3. Close any opened doors. 4. Another Alert window pops up displaying that the cause of the alert is cleared. Click the OK button to continue. 5. The stages will home to their respective locations. 6. Press the Reset / Enter switch on the CTC material handling panel to continue. <div data-bbox="1170 617 1414 789" data-label="Image"> </div> <div data-bbox="1024 793 1414 995" data-label="Image"> </div>
<p>E-Stop Recovery—E-Stop</p>	<p>The e-stop loop occurs when either of the e-stops have been activated. The recovery process for either is the same.</p> <ol style="list-style-type: none"> 1. An Alert window pops up displaying a message that an e-stop is actuated. 2. Reset the e-stop that was actuated. 3. Remove any product from inside the machine if required. 4. Close all opened doors (if required). 5. If the machine is left alone (no operator intervention) it will power down in a couple of minutes. Follow machine power up procedures. 6. If the machine was accidentally e-stopped then proceed with the next step. 7. Turn the key switch CW until an audible alarm stops and the green power indicator (LED) is lit and that the monitor screen displays the PC boot process. If the key switch is rotated for approximately one minute and the boot screen does not appear then proceed with the next step. 8. Unlatch and open the lower front door. Turn the key switch on then press the PC On button—the boot screen should start to display. Relax the key switch. 9. Close the lower doors and continue. 10. Follow procedure for logging on. 11. The stages will home to their respective locations allowing the operator to continue running programs. 12. Press the Reset/Enter switch on the CTC panel to reset material handling. <div data-bbox="1154 1075 1398 1247" data-label="Image"> </div>

Tower Light Indicators

Refer to the table for information on the status of the AOI when in alarm mode. The table reflects the settings for those machines that are not modified for the user.

Alarm	Light Tower Status
E-Stop / Limit Alarm	Steady Red/Flash
Excess Fails	Steady Yellow/Flash
Power On / no E-Stop	Steady Green/Flash

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Section 8

Review Mode

Depending on the configuration set by management, after a product is inspected, the results of the inspection are sent downstream to a repair station without any operator intervention, or reviewed by the operator at the AOI machine.

If the operator reviews the results of the inspection, the operator must interpret each defect found as either a true defect or a false call.

Review Mode Interface

The review interface appears when parts or items failed the requirements to pass an inspection. The review window displays each failure with a rectangular window or both rectangular and circles depending on the user configuration settings. Also displayed is a listing of the part types that failed. This listing displays the total number of failures at the top followed by the part types name and total failures for each part type name. The operator interacts with the program by determining whether a noted failure in the geometric shaped window is a false call or a true defect by clicking on the appropriate button.

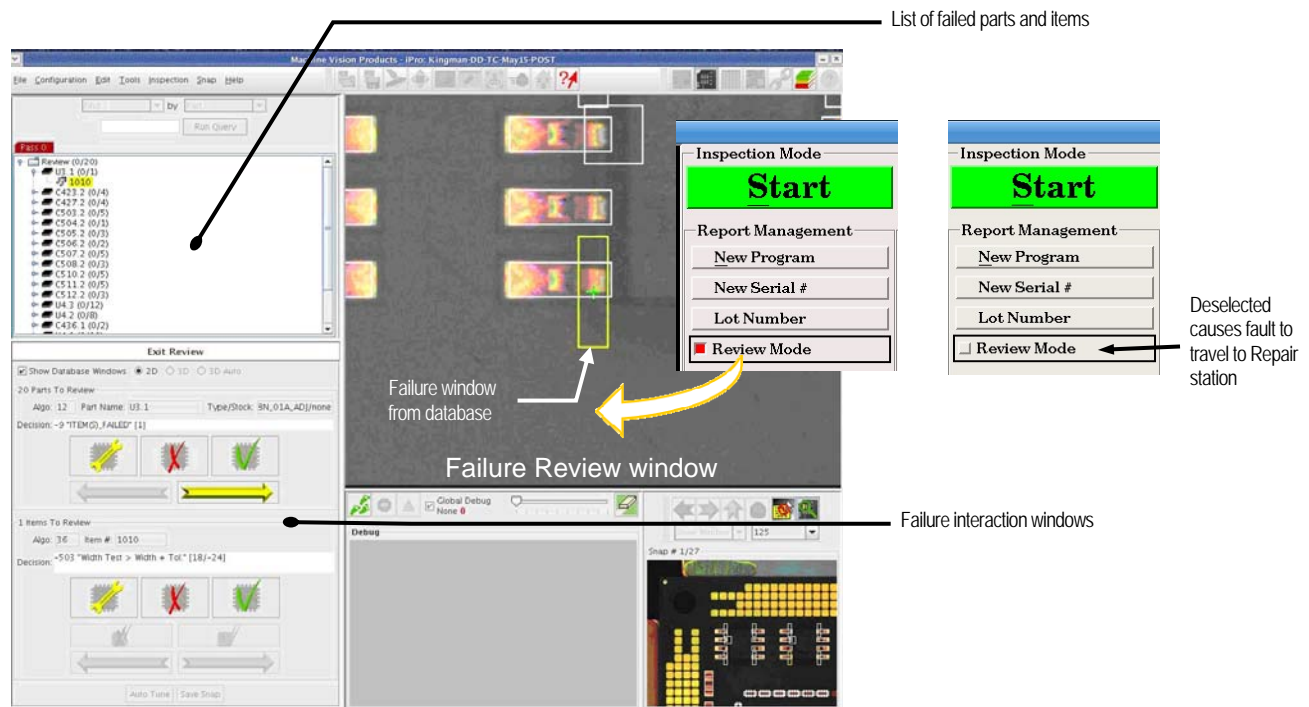


Figure 8.1: Operator Review Mode Interface

Part / Item Interface Details

The Part and Item interface is controlled by the permissions set in configuration for the operator by the user when logged in as maint or root. Settings can be established for the operator to allow lower to advanced levels of interaction with the algorithm for tuning, as well as marking failures as a defect or a false call.

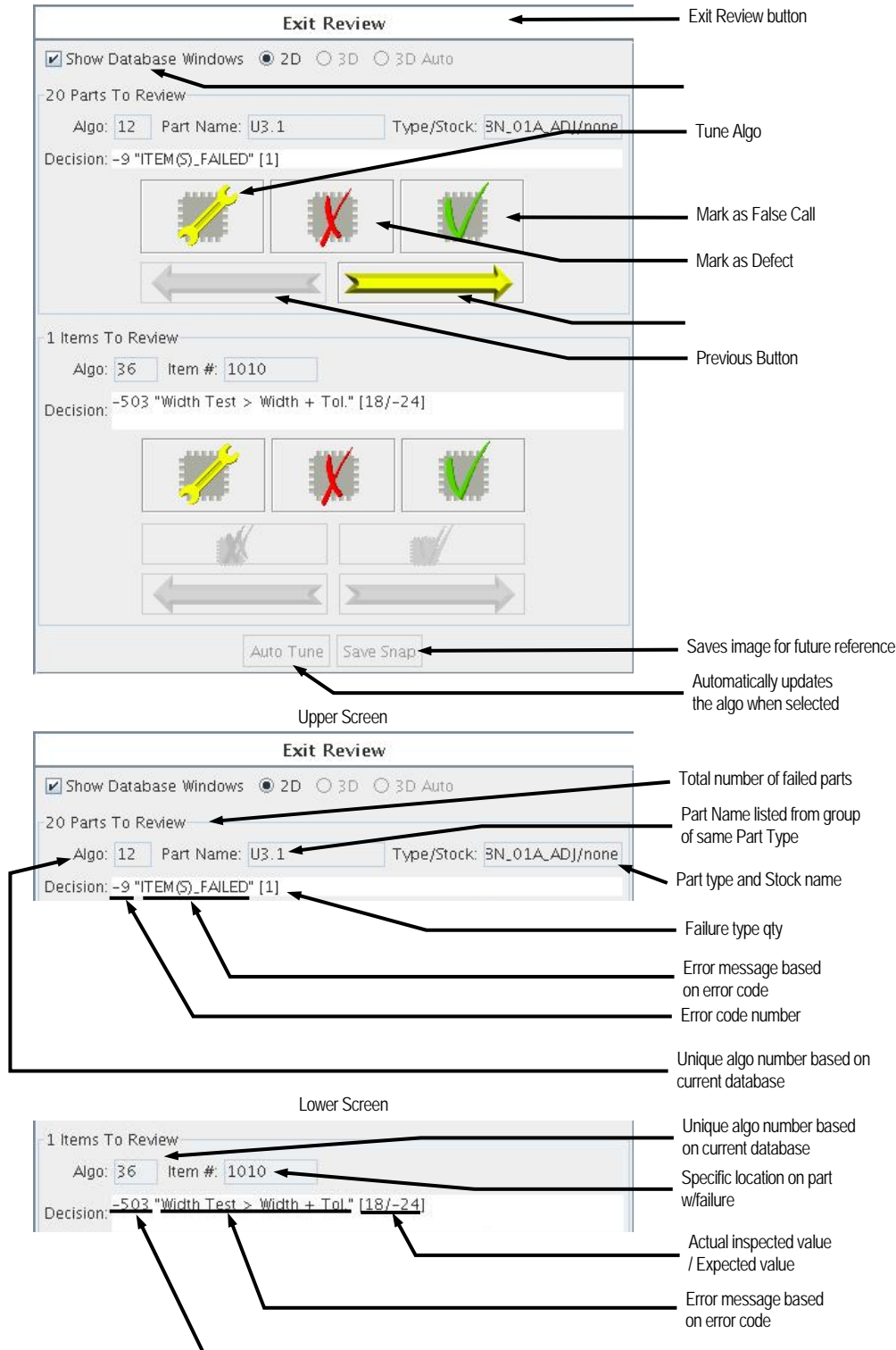


Figure 8.2: Review screen elements

The following table describes the elements of the Review program.

Feature	Description
Exit Review button	Is defined in Configuration > User Interface. If the button is enabled then the operator can click the button at any time to exit Review mode. However, exiting Review mode prior to completing all reviews causes all non-reviewed items to be classified as defects and sent to the error log. If the button is disabled (grayed out) then the program exits automatically at the completion of the last review.
Show Database Windows check box	The view window display boxes around the questionable failures determined during inspection. Clicking the check box causes the program to display all failures with boxes in the view window. Deselecting the check box causes the display to add boxes only to the part being reviewed. Configuration > User Interface allows an option so that the view window displays only rectangles around the failed parts. Normal display can show circles or rectangles.
2D / 3D /3D Auto radio buttons	2D is normally checked when inspecting components. 3D is checked when inspecting paste or height of components (other 3D items as well) and displays a static 3D image. 3D Auto displays an active 3D image with some user control.
Parts to Review Group: This window displays when 1 st level or 2 nd level errors occur.	
Parts to Review	Displays a total quantity of part types with failures attached to the header.
Algo	Displays a number pertaining to an algo assigned to the part type currently under review. The number is randomly assigned within the database of the program in inspection. This is only a display with no operator interaction.
Part Name	Displays the part name of the part in review.
Type / Stock	Type is the part type of the part name in review. Stock is an optional parameter within the users CAD data.
Decision	This Is the failure designation of the part in review. The number displayed at the beginning of the line is the error code number. The text within the quotes is the message assigned to the error code number. The number within the brackets is the total number of part types with that error code.
Tune Algo button	Is defined in Configuration > User Interface. If the button is enabled then the operator has access to the iPro algo tuning program by clicking on the button. This would be recommended for experienced users only—not typical for operators. Normally grayed out in operator mode.
Defect Button	The operator clicks this button when it's determined that the part in review has an actual defect. The button opens a submenu of a listing of defect types that the operator selects to define the actual error. This button can be defined in Configuration > User Interface to allow the operator to define a single error type or multiple types. When configuration is set to true (enabled) then the submenu exits automatically with the single selection of an error type. When set to false (disabled) then the operator can select multiple error types then click the Apply button to exit the menu. Note that the Apply button is enabled when set to false.
False Call button	Is defined in Configuration > User Interface. The operator clicks this button when it's determined that the part in review is within reasonable limits. Normally enabled in operator mode. Not recommended to disable in configuration.
Next / Previous arrow buttons	The Next arrow button allows the operator to advance to the next part in review. The Previous arrow allows the operator to backspace to the previous part. The arrow buttons are active when there are multiple errors detected for that part name. For example, a multi-pinned component detected with errors on several pins can forward or back up to inspect a particular error within that part name.

Items to Review Group: This window displays when 1 st level errors occur. These errors are items related to the Part Type displayed in the upper screen. There could be multiple item errors related to a single part type.	
Items to Review	Displays a total quantity of items with failures attached to the header.
Algo	Displays a number pertaining to an algo assigned to the item currently under review. The number is randomly assigned within the database of the program in inspection. This is only a display with no operator interaction.
Item #	The item number is a number assigned to a pin location of a part type (which typically start sequential numbering starting at 1001), OCV, polarity, and other algos that make up a part type (these would be numbered differently from pins).
Decision	This Is the failure designation of the item in review. The number displayed at the beginning of the line is the error code number. The text within the quotes is the message assigned to the error code number. The number within the brackets is the actual inspected value followed by the expected value. The inspected value is the value determined when inspected. The expected value is the value as entered in the database. If the expected value is a negative number—then the values are in pixels not mils.
Defect / False Call buttons	Same as above.
Next / Previous arrow buttons	Same as above.
Review Mode Feature buttons	
Save Snap	Saves selected snap for future reference.

Basic Review Mode Operation

At the end of an inspection run, the Review Mode window is opened for fault determination. This only occurs if the system configuration program allows this and the Review Mode checkbox is checked in the UI window—otherwise the fault program defaults to a repair station.

The program opens with the first part preselected. The screen displays the error as either a 1st level or 2nd level. The first level error displays a top and bottom selection. The top is for the part type—the bottom is for the item type (refer to figure 8.3). In the example, the screen notes that there are 20 total Parts to review along with the features described in the table above. It illustrates that for part U3.1, that 1 item failed with an “Items_Failed” error message. The bottom screen displays the specific error for that item. In this case it has failed the “Width Test > Width + Tol.” algo which the system measured as 50 while the database (program) expected 60. Since the lower screen displays output then this is a 1st level fault. The operator then observes the image in the view area and decides if it is a False Call or a Defect. If determined that it’s a defect then choose the Defect button to continue in the process.

Once the button is clicked then the screen changes and opens a submenu (refer to figure 4). The submenu lists generic type errors. The operator then selects the best choice for the type of error observed. For example, if the part observed is smaller than the part expected (per the Decision message error on the lower screen) then the operator could select the Wrong Part check box. Or it could be smaller because the part is Tombstoned—if so then select that check box. Also, observe that in this example the Apply button is grayed out (not enabled)--therefore the operator can make 1 choice only. The submenu exits with the selection of the checkbox. If the Apply button is enabled, then the operator can select multiple error types and click the Apply button when completed. Clicking the Apply button exits the submenu back to the review main window.

With the completion of the first review click the yellow arrow (from the lower screen) and advance to the next item for that part type. Continue with the process to the end of the item faults for that part type. On the upper



Figure 8.3: First and Second Levels review windows examples

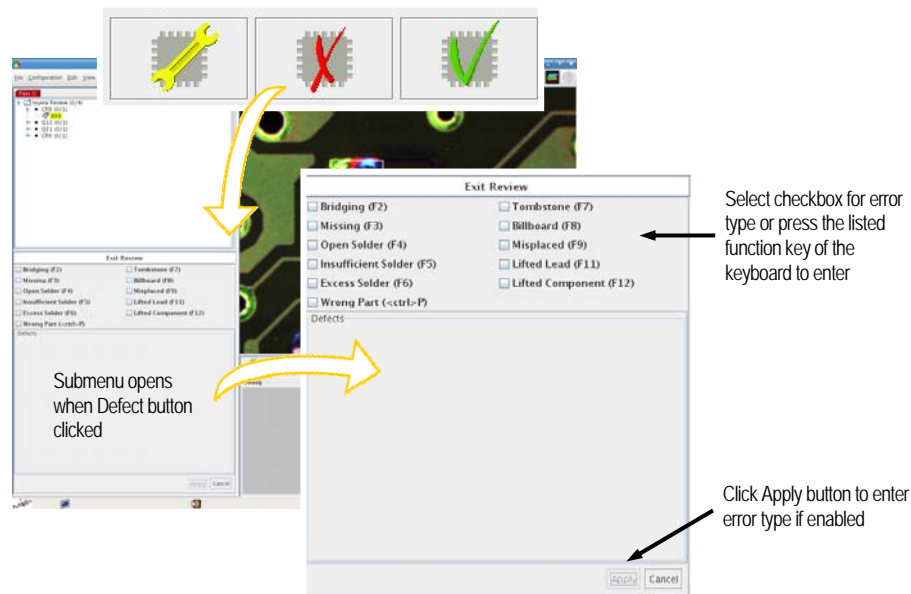


Figure 8.4: Error type submenu when Defect key selected

portion of the review window (Parts to Review) click the Defect button if defects were determined from the item screen then click the yellow arrow to advance to the next part in review. The Review window exits automatically when the last error is concluded if the system is configured thusly—if not then the operator clicks the Exit Review button. Either method allows the machine to start inspection on the next product.

Note on Exiting Review Mode: If Review mode is exited without assessing all listed faults then the program automatically classifies all unreviewed parts and or items as defects.

Another choice by the operator at the beginning of the process could be that the part in question is the correct part but below the limits of the database (different vendor part?). If so, then the operator can select the False Call button. After selection, continue by clicking the yellow arrow button to the next part in review. Exit the program using the methods described previously.

Note when reviewing large components: When reviewing item errors for large component part types (for example 200 pin QFPs) click the False Call button in the lower window until an actual defect is noted. From there, select the Defect button on the upper window. Reason is because large components require many snaps that may not display all defects in one snap. Each snap could have false calls or actual defects for that one part type. If defects are found on the first snap then click the Defect button on the top menu. If false calls, then continue reviewing each item snap until a defect is found (or not) then select the appropriate button from the top menu. This ensures that parts are fully inspected while minimizing defects that could make it downstream.

Advanced Review Mode Features

The previous section describes a few configuration permissions that are considered typical for operators when working in Review Mode. This section introduces advanced features that could be encountered by the operator depending on configuration settings.

Tune Up Button

The Tune Up button becomes active per permissions set up in Configuration > User Interface. The Tune Up button opens an advanced Algo debugging tool typically used by the programmer for tuning /

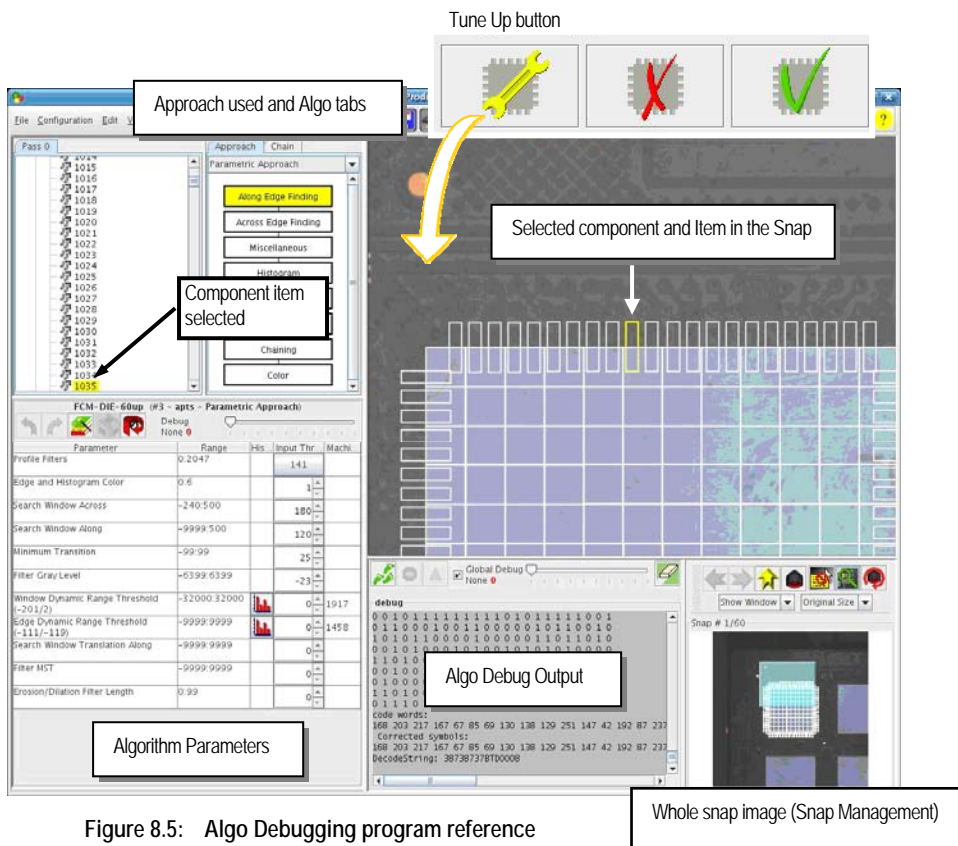


Figure 8.5: Algo Debugging program reference

debugging algo data. Clicking on the part type tune up button opens the part level algorithm. Clicking on the item tune up button opens the item level algorithm. This permission requires much training so a lot of thought should be given prior to allowing this feature. Refer to the v54 Programming manual for information regarding tuning / debugging algorithms.

Auto Tune Button

Not used.



Figure 8.6: Auto Tune reference

Other Configuration Settings

The below table describes other features that may be encountered during Review Mode.

Feature	Description
Automatically review failed items and parts and override it they pass	Normally set to false. Normal review requires operator intervention for each part type in the listing. Set to true for the system to automatically pass the tuned algo parameters of a passed part type from the top of the listing to the next listed beneath the same part type. The system continues to pass the tuned parameters to each subsequent like part type until it comes upon an unlike part type.
Allow review to call all items on part good/bad	<p>Normally set to false. The operator reviews each snap and makes a decision for each part type / items within a snap image.</p> <p>If set to true, the operator makes a decision that all items of a part type are false calls or defects.</p> <p>Exception:</p> <p>The system takes individual snaps (image) based on the FOV inherent to the system. Each snap is inspected per the algos set up in the database for each part type within each snap. There are some cases where the part type within 1 snap is larger than the FOV—so only a partial analysis takes place for that 1 part type in that snap—the rest of the part inspection takes place on other snaps (refer to figure 8.5 image). If set to true the operator makes a decision on 1 snap that all items of a partial part are false calls or defects without reviewing the other snaps of that part. Could create a situation where multi-leaded parts with defects are passed.</p>

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Section

9

Plotstat—SPC Utility

Plotstat

The operator has the ability to configure Plotstat to gather data during inspections. This data gathering can be in real time allowing the operator to detect problems in machinery upstream and take corrective action.

The Plotstat statistical Process Control (SPC) Package is a process control system which not only tracks defects and provides alerts, but also monitors trends, all during product production and without adding to cycle time. These instant feedback mechanisms allow the user to control and improve the production process.

Instructions are given on running menu driven reports, which show the entire spectrum of results after each product inspection as well as extracting results on extended runs. Information is also given on creating graphic results from the reports.

Running SPCgen reports, such as a log on inspection results, and outputting in ASCII is covered.

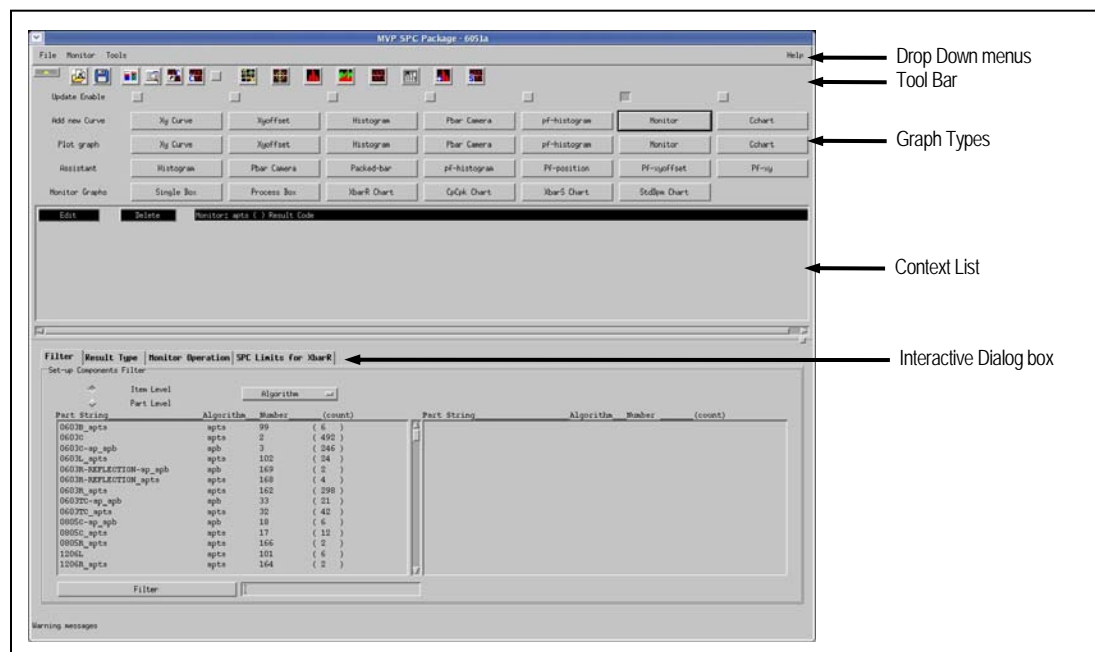


Figure 9.1: Plotstat main window

Plotstat Features and Capability

MVP's software offers the ability to collect data on any variable after each inspection. It is possible to collect and set monitor alarms, as many as needed, and independently from plotting graphs, to track variable and attribute data. Upper and lower control limits can be specified either manual or automatic with a mouse click. Alarms are triggered when process drifts or irregularities occur. Warning options include displays on system monitors, activated lights, and / or stopping the line.

Group Data both by Range and by Mean over time on a graph

There are improved features to filter data in many ways, such as part numbers, part items, placement head, or any custom defined variable, such as the top 10 parts by type. On each of the filtering options, various statistics can be computed including the mean, range, standard deviation, and CpK.

Grouping Cluster Data

It is possible to plot data from the MVP AutoGuide Repair Station using Pareto and p-chart functions as well as XY line graphs, multiple plots in color, histogram bar charts, and XY scatter graphs, from the AutoInspector. The software also features the RepairPlot, which allows user-friendly data acquisition of repaired carriers, systematically organizing error code assignments and occurrence.

Plotstat Feedback in Real Time

The Ultra and Supra series models are equipped with the PC host front end, provides a way for the user to access all the inspection results in near real time. This facility allows the user to run any third party application software on the PC that is called automatically at the end of each carrier inspection.

This flexibility means the user has many options when compiling and displaying the statistics generated from thousands of variables measured in real time and without having to integrate standard statistical packages on the PC. Using the MVP AutoInspector as a statistic / measuring tool has many benefits, including:

- Flexible SPC feedback in real time
- Powerful tool for experimental design on the production line
- Improved setting time of the algorithm parameters
- Diagnosis tool for errors
- Alarm setting and continuous monitoring

Plotstat Access

Plotstat is accessed by the operator by clicking the Plotstat Config button from the main UI window.

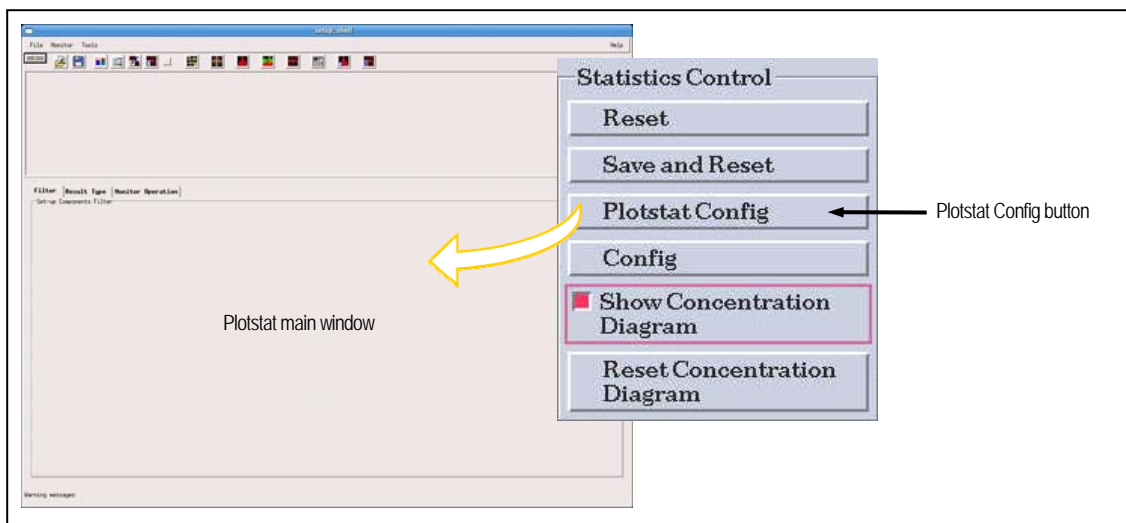
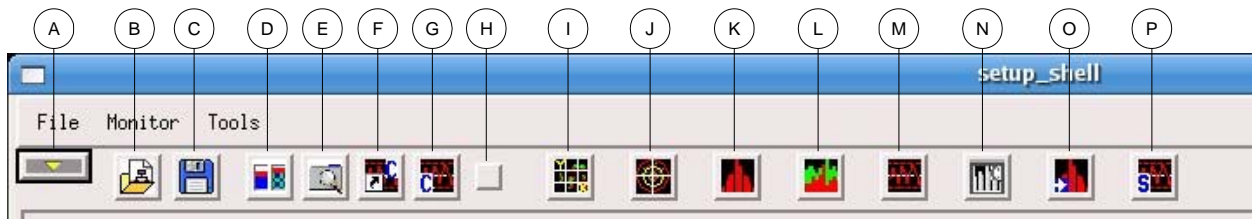


Figure 9.2: Opening the Plotstat Config program

Tool Bar Features



Icon	Description
A	Open Primary Workspace (Shrink / Expand). Once clicked, it displays the Primary Workspace. If the icon arrow points upward, it shrinks the button area. If the icon arrow points downward, it expands the button area.
B	Select a new flavor to be the data resource for the graphs.
C	Curve setup save button.
D	Start Overview graphs.
E	Defect Components button. Shortcut for 'Monitor—Defect Components.'
F	Setup C Chart Graph. Is a shortcut for 'Add New Curve—C Chart' on the primary workspace.
G	Plot C Chart Graph. Is a shortcut for ': Plot Curve—C Chart' on the primary workspace.
H	Update C Chart Real Time button.
I	XY Graph button. Expands to 3 buttons <ul style="list-style-type: none"> • Update Enable • Xy Curve button under 'Add new curve' line • Xy Curve button under 'Plot Graph' line These buttons are shortcuts for buttons on the Primary workspace.
J	XY Offset Graph. Expands to 3 buttons <ul style="list-style-type: none"> • Update Enable • Xyoffset button under 'Add new curve' line • Xyoffset button under 'Plot Graph' line These buttons are shortcuts for buttons on the Primary workspace.
K	Histogram button. Expands to 3 buttons. <ul style="list-style-type: none"> • Update Enable • Histogram button under 'Add new Curve line. • Histogram button under 'Plot graph' line. These buttons are shortcuts for buttons on the Primary workspace.

L	<p>Pass Fail Histogram. Expands to 3 buttons.</p> <ul style="list-style-type: none"> • Update Enable • Pf-histogram button under 'Add new Curve' line. • Histogram button under 'Plot graph' line. <p>These buttons are shortcuts for buttons on the Primary workspace.</p>
M	<p>Monitor button. Expands to 3 buttons.</p> <ul style="list-style-type: none"> • Update Enable • Add new curve • Plot curved <p>These buttons are shortcuts for buttons on the Primary workspace.</p>
N	<p>Camera Histogram button. Expands to 3 buttons.</p> <ul style="list-style-type: none"> • Update Enable • Add new curve • Plot curve <p>These buttons are shortcuts for buttons on the Primary workspace.</p>
O	<p>Assistant. Expands to 7 buttons</p> <ul style="list-style-type: none"> • Histogram • PBarCamera • PackedBar • pf-histogram • Pf-position • Pf-xyoffset • Pf-xy <p>These buttons are shortcuts for buttons on the Primary workspace.</p>
P	<p>Monitor Assistant button. Expands to 6 buttons.</p> <ul style="list-style-type: none"> • Single box • Process box • XbarR chart • CpCpk chart • XbarS chart • StdDpm Chart <p>These buttons are shortcuts for buttons on the Primary workspace.</p>

File Drop Down Menu

The File drop down menu has three buttons available to the operator: Open, Save, and Exit.

Open

The Open button opens the file select pop up window. Scroll through the list and select the required '.inspection' file. Click the OK button after selecting. This loads the graph setup.

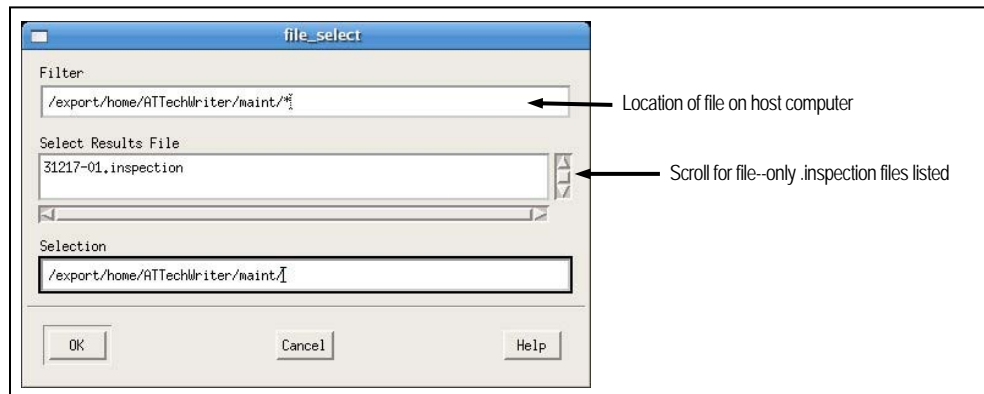


Figure 9.3: Opening the Inspection file

Save

Saves all the graph setups into ASCII files. The files are stored at the following AOI local host location: opt/mvp/stats/ [name] _GS.

The saved files are stored in the following formats:

- [name].XY_GS: for the xy curves configuration file.
- [name].Yoffset_GS: for the xyoffset curves configuration file.
- [name].Hist_GS: for the histogram configuration file.
- [name].Monitor_GS: for the monitor curves configuration file.
- [name].PF_GS: for the PF histogram configuration file.
- [name].Cchart_GS: for the Cchart for review data configuration file.

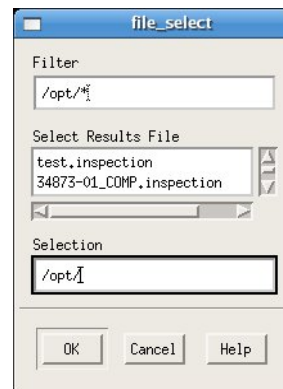


Figure 9.4: Saving the graph setup

Close / Exit

The label of this button is displayed as 'Close' if the Plotstat is started from the UI program. The action of the button is close plotstats main window. The program keeps on running in the background.

The label of this button is displayed as 'Exit' if the plotstat is started from the command line. The action of the button is to terminate the program.

Monitor Drop Down Menu

Reset All

The following window pops up if the 'Reset All' button is clicked.

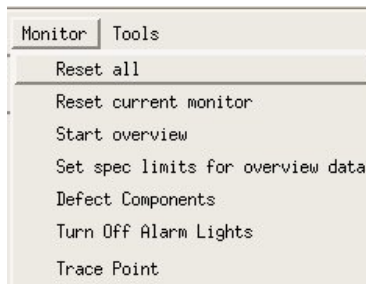


Figure 9.5: Monitor Drop Down Menu

If the user chooses 'Yes' the program cleans the history data for all the monitors from memory and disk. If the user chooses 'No' the program closes.

The action for this button resolves the monitors index number and inspection index number.

Reset Current Monitor

If cleans the history data fro the current monitor from the memory and disk.



Figure 9.6: Reset Monitor data

Start Overview

The following window opens with the selection of the Start Overview button. When the overview window opens, the main plotstats window is disabled until the user clicks the 'Close' button on the overview window.

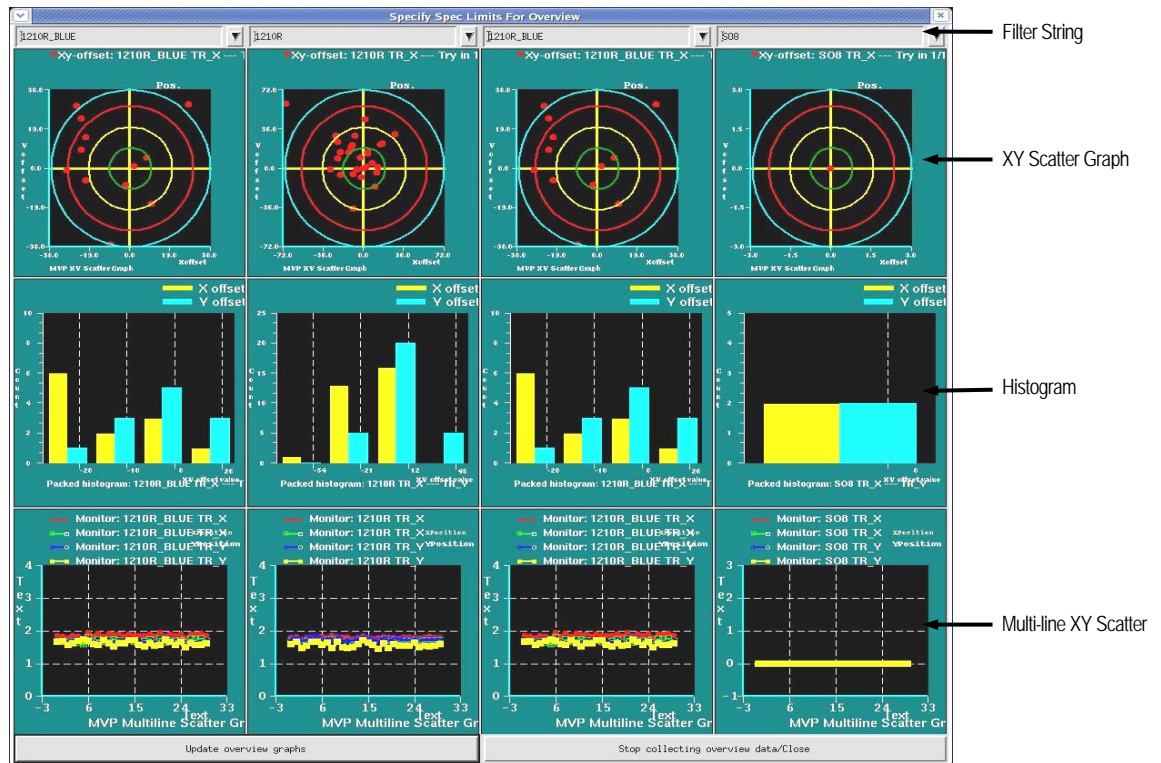


Figure 9.7: The Start Overview window

General Functionality:

- Gather the XY offset inspection data for level 2 parts.
- Group the XY offset inspection data by user defined filters.
- Calculate the monitor data for the grouped inspection data.
- Plot the statistical graphs for the XY offset data.
- Warn the user if the process is not capable ($CP < 1.33$ or $Cpk < 1$).

Filter String:

Each column in the window is one study case for the part level placement data. Each 'Filter String' defines a group of parts. The program uses the 'Filter String' to compare the parts 'part type' string to decide if the part belongs to a group or not. For example, if entering 0402 in the filter matches the following part types from a group: SE0402, SE0402D, SE0402_225, SE0402_315, and SE0402_45. If there is a total of 225 parts of the selected program that match the part types, then the filter string of '0402' defines a group of 225 parts. The user can edit the 'Filter String' to accommodate any specified data.

The program collects two sets of data for each group of parts:

- Tr_x (x-offset) data for the parts. In this case another 225 integers where each one is the tr-x in 1/10 mils.
- Tr_y (y-offset) data for the parts. In this case another 225 integers for the tr-y.

Scatter Monitor Graph—the first row on the graph table

This displays the XY offset of the filtered parts in mils of an inch.

Packed Histogram for the Placement Data—the second row on the graph table

Process the two sets of data into two histograms and put them in one graph.

XY Scatter graph for Placement Data—the third row on the graph table

Put the XY offset data on the XY scatter graph. Given the two variables of the tr-x and tr-y for all the parts in a group, each part is represented as a dot at x, y position corresponding to the measured value of tr-x and tr-y for that part.

Update the Overview Graph button

Refresh all 12 graphs with the new data. This feature is not necessary if the overview window is open, because the graphs are automatically updated after each inspection.

Start Collecting Overview Data / Stop Collecting Overview Data button/Close

Initially the button is 'Start collecting Overview data', after the user clicked on the button. The button becomes 'Stop collecting overview data'. Depending on the status of the button, the program either starts or stops collecting data and updating the graphs and closes the graph window.

Close

Closing the Overview window makes the plotstats main window active again. However, the program continues to collect data as set forth in the filters if the program is not stopped. A warning message appears if the capability data are less than 1.

Set Spec Limits for Overview Data

The following window opens when this button is selected.

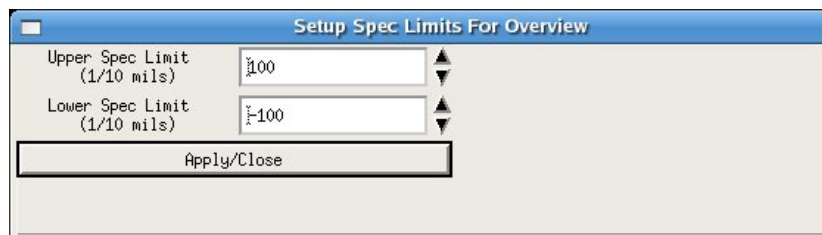


Figure 9.8: Set Specification Limits

For the Overview data, all four filters have the same upper and lower specification limits. Part level x and y offset units is 1/10 mil. Normally the upper and lower specification limit is set to ± 40 (1/10 mil). The user can customize the limits to whatever suits them.

Defect Components

The following window opens when this button is selected.

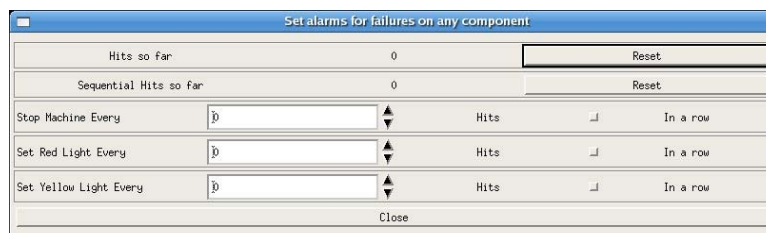


Figure 9.9: Defect components set up

General Functionality

The program records the number of failures for every level 2 component inspected. The program takes action according to the configuration defined in the setup window.

Hits so Far

The regular counter for the number of failures for any part inspected. The 'Reset' button resets the counter to zero.

Sequential Hits so Far

This is the counter for the number of sequential failures for any part that's inspected. The 'Reset' button resets the counter to zero.

Stop Machine every 'n' Hits

This defines the number of failures on any part that makes the machine stop. The toggle button decides whether to use the sequential counter or the regular counter.

Set Red Light Every 'n' Hits

This defines the number of failures on any part that turns on the red light. The toggle button decides whether to use the sequential counter or the regular counter.

Set Yellow Light ever 'n' Hits

This defines the number of failures on any part that turns on the yellow light. The toggle button decides whether to use the sequential counter or the regular counter.

Close button

This closes the window. The program continues collecting the pass / fail data for each part.

Turn Off Alarm Lights

This button turns off the alarm lights from the stacker lights if any are turned on by one of the alarms.

Trace Point

This is a toggle button (on / off). When this function is turned on, it displays detailed information when looking at monitor data. Basically, this button displays information for each point on the graph. The information is displayed in a special window that looks like the illustration below.

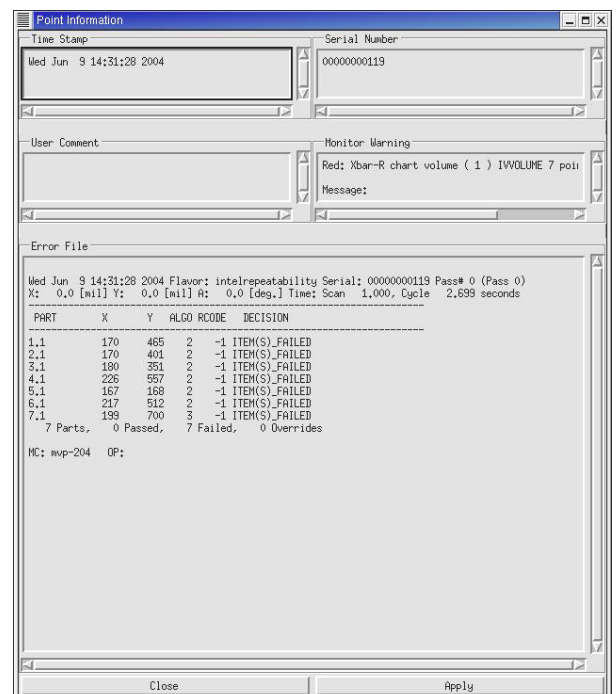


Figure 9.10: Trace Point toggled on

Tools Drop Down Menu

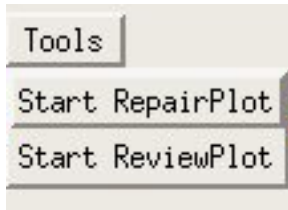


Figure 9.11: Tools Drop Down Menu

Start RepairPlot:

- This button starts the MVP RepairPlot application.

Start ReviewPlot:

- This button starts the MVP ReviewPlot application



Figure 9.12: Start Review Plot

Context List

Each entry in the list represents a curve. A new entry appears in the list when a new curve is selected.

Edit

Selecting the Edit button highlights the selection making it the current curve.

- All assistant graphs work on this entry.
- The interactive dialog box displays the information for this entry.

Delete Curve

Selecting the Delete button removes the curve from the context list.

- The program no longer plots the curve.
- If the curve just removed is the current curve, then the first entry in the list becomes the new curve. In addition, the interactive dialog box displays the information for the new curve.

Curve Title

Gives the following information:

- Curve type
- Algorithm name, label and number for the parts filter.
- Result type for the inspection data filter.

Interactive Dialog Boxes

The Interactive Dialog boxes are a series of tabbed menus that allow the user to define the type of data to be filtered for a curve graph.

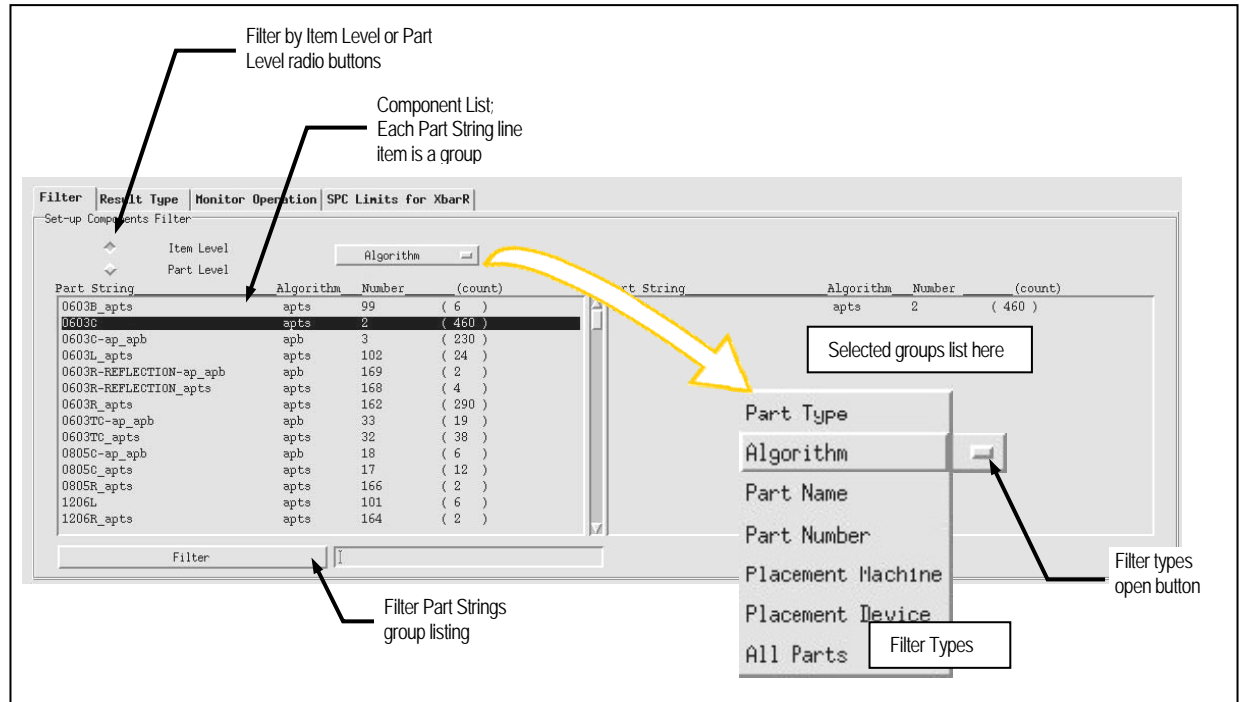


Figure 9.13: Interactive Dialog Box description

Filter Tab

The filter tab consists of a component list, filter type drop down menu, list filter, and Item/Part level radio buttons. The Component list displays the grouped listing of the selected filter type. Each group is an individual line item of the list.

- The Filter types drop down menu opens for the user to select the type of data to be listed.
- The algorithm and number columns record the assigned database algorithm and the algo number allocated to it.
- The count column records the number of instances of that part recorded in the log.
- Use the Filter textbox to narrow searches to list only specific part types in the component list.
- Use the Item / Part Level radio buttons to filter the list to the specified requirement.
- The right side of the window is a depository for the selected components from the left listing. The components listed are the ones that the data is used to create the required curves graphs.

Result Type Tab

This is a listing of test outputs for the specified algorithm. The listing is dependent on the filtered parts selected also parameter from the Filter tab.

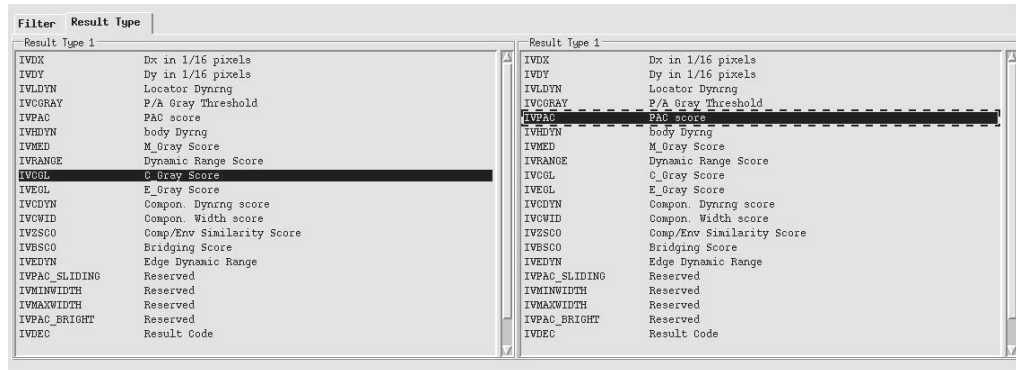


Figure 9.14: Result Type tab

Monitor Operation Tab

This tab is available only by selecting the Monitor curve button or icon. Used to monitor the cp and Cpk processes during an inspection. The user selects the values for the specified fields.

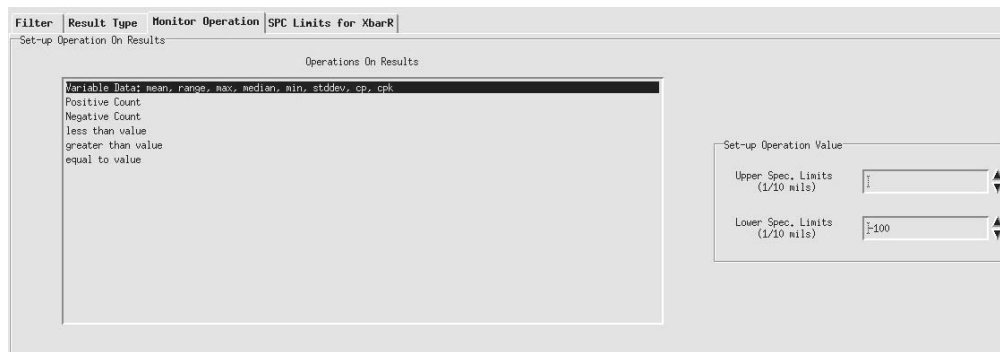


Figure 9.15: Monitor Operation tab

SPC Limits for the Xbar-R Tab

This tab is available only by selecting the Monitor curve button or icon--is used to monitor the cp and Cpk processes during an inspection. The user applies values to setup limits and alarm actions.

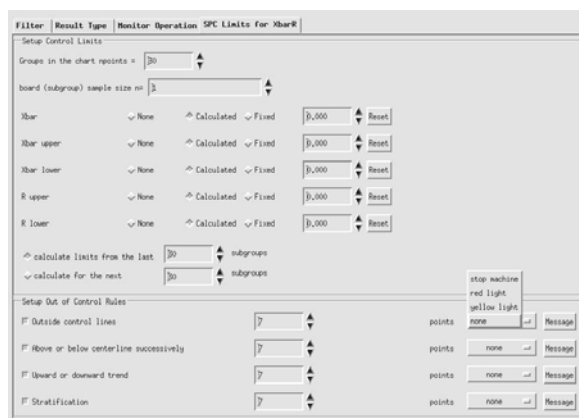


Figure 9.16: Xbar-R tab

Setting Up Curves

Curves are basically plots of graph results. Thus, a user can have more than one curve per graph, each plotting results specified by the user. It is possible to set up to 13 curves for each of the three graph types. The New curve button on the bottom right of the config window allows the user to add new curves to a graph. All the curves of a certain graph use the same component filter. The other buttons regarding the graph curves are explained below.

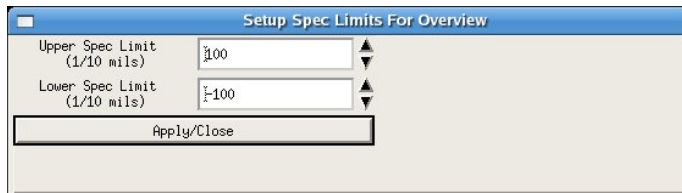


Figure 9.17: Setting the Curves

The Cchart Graph

The Cchart graph is created by clicking the Cchart button which displays the editing button, or select from the curves menu.

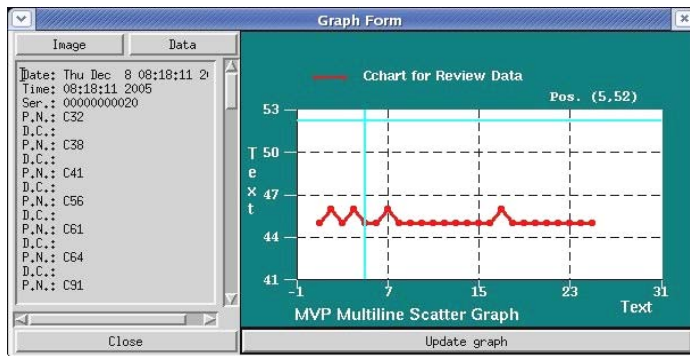


Figure 9.18: Cchart graph example

The curve editing menu appears. It allows the user to customize the graph; how many points, how often to plot, and alarms and actions.

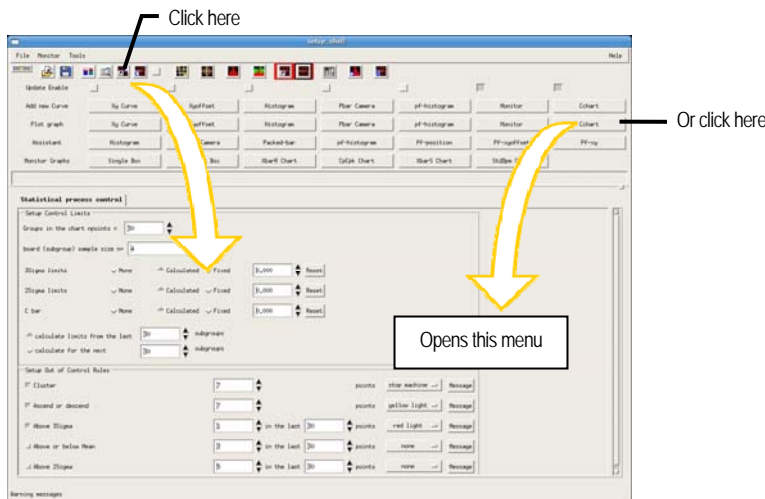


Figure 9.19: Curve editing menu

Plot the graph by clicking either of the 2 places shown in the illustration.

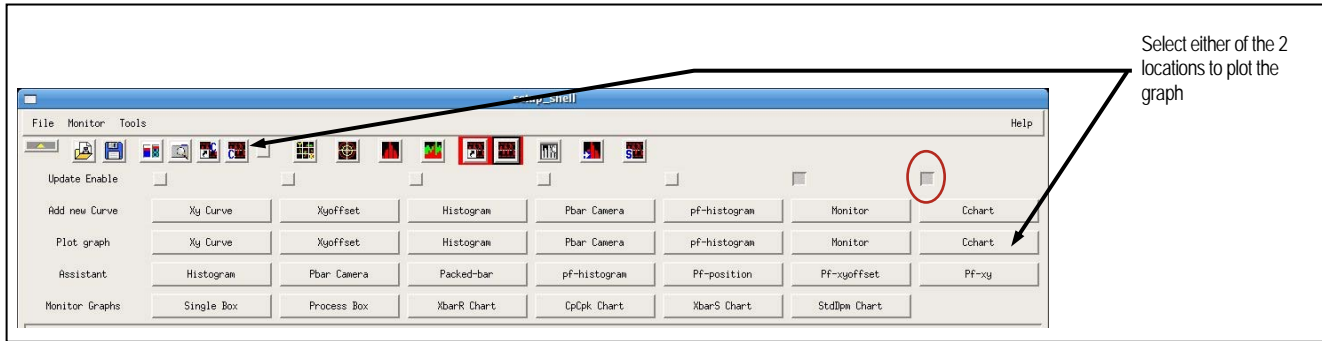


Figure 9.20: Plotting the graph

The XY Curve Graph

The Xy curve plots an X variable or inspection result against the y position of a filtered part.

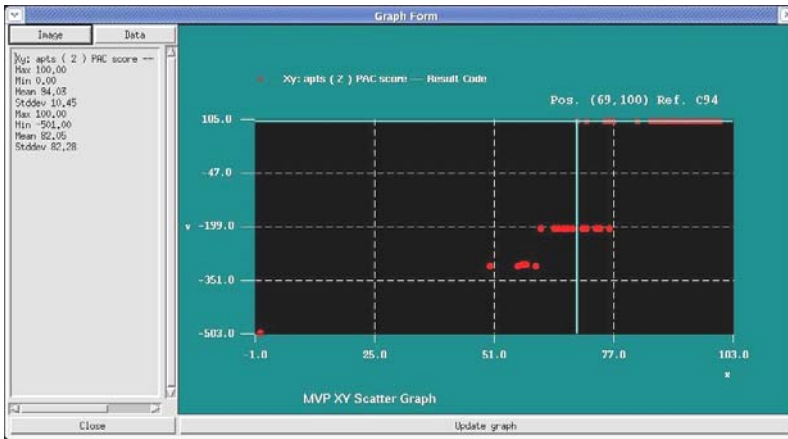


Figure 9.21: XY Curve graph example

The graph is created by first opening the XY Filter menu by clicking either XY Graph or Xy Curve buttons as shown in the illustration.

The curve editing menu appears. From the Filter tab, select the item required to plot the curve from; either filter by Part Type, algorithm, Name, etc.

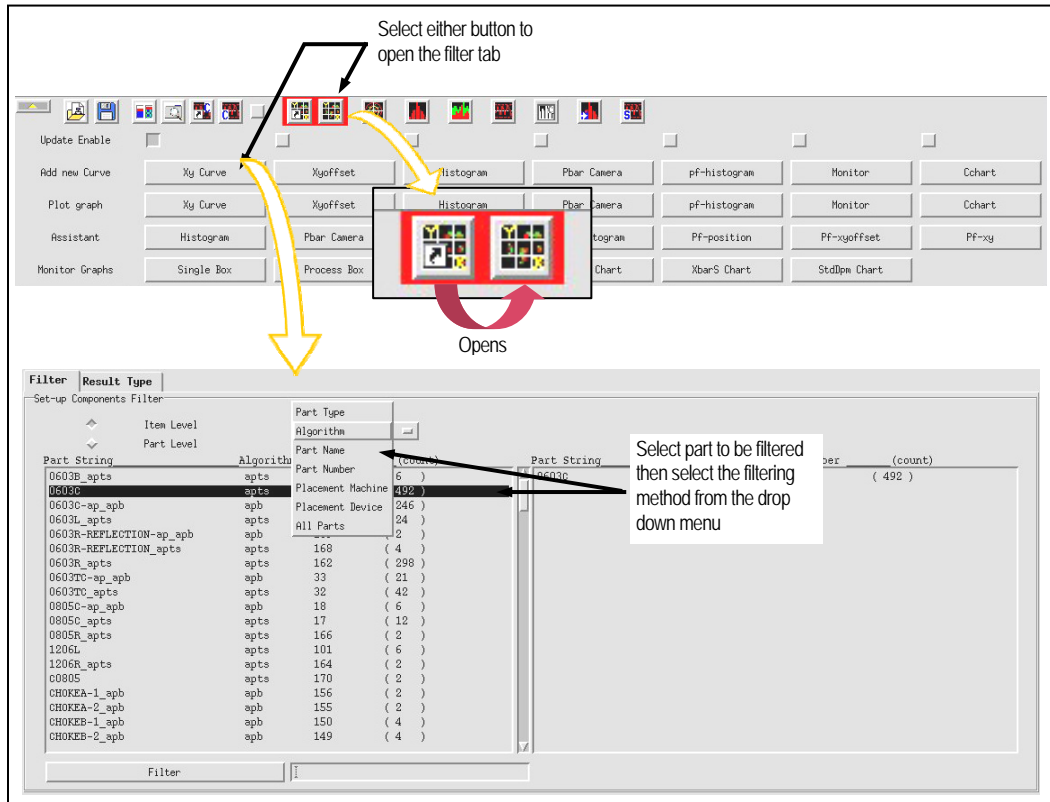


Figure 9.22: Selecting the Filtering XY method

Click the Result tab then select the variable or the inspection result required to plot.

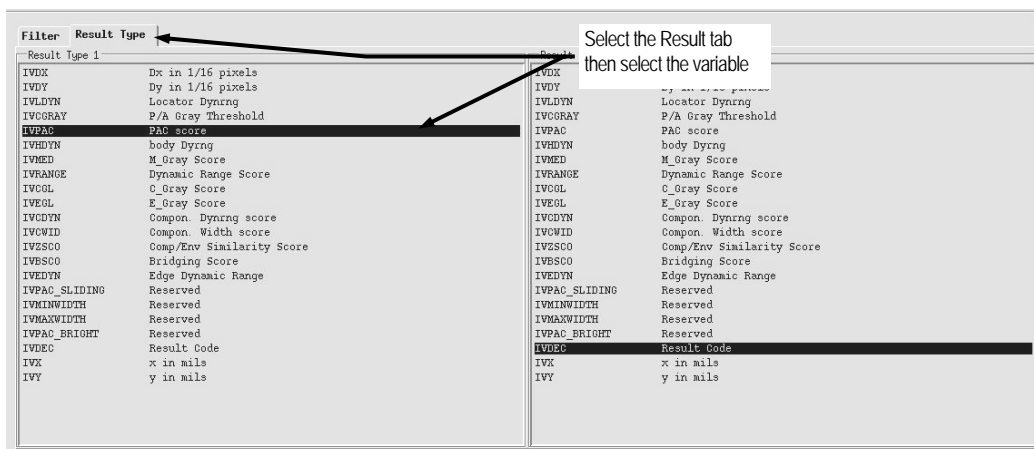


Figure 9.23: Selecting the variable from the Result tab

Plot the graph by clicking either the XY Graph button, or select the Plot XY Curve button from the menu.

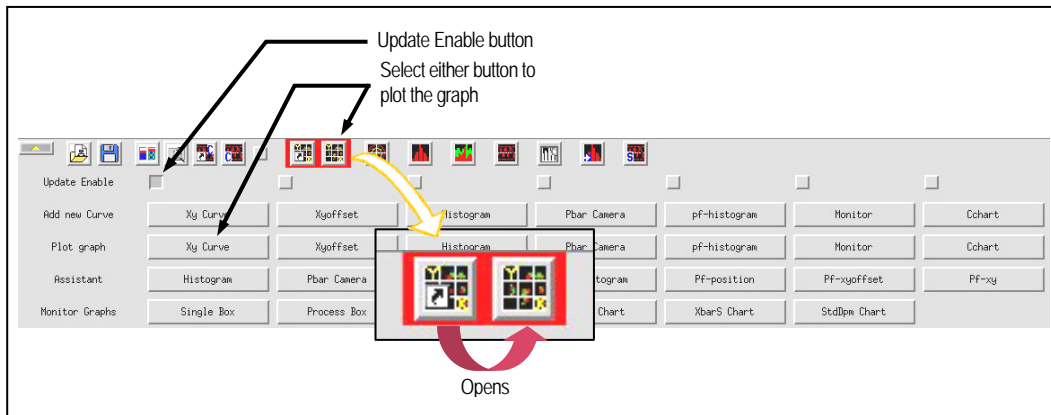


Figure 9.24: Plot the graph

The update enable button automatically updates the graph after every inspection.

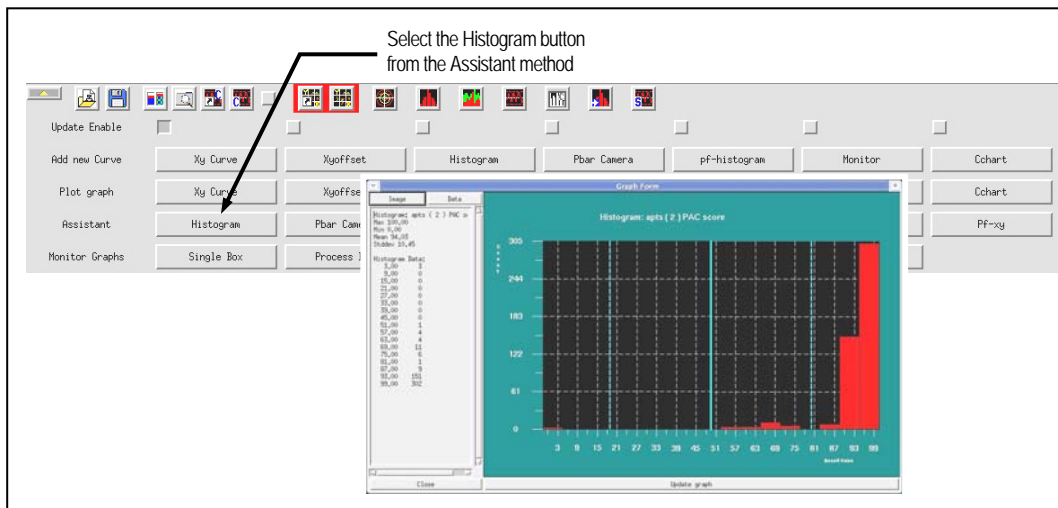


Figure 9.25: Selecting the Histogram Graph

Different graphs can be plotted when using this curve that provides more information about the process of the specific data being filtered. Use the Assistant Histogram button to create a histogram graph using the parameters used previously.

The Xy Offset Curve Graph

The Xy Offset curve plots the XY position of parts while comparing them to the CAD target.

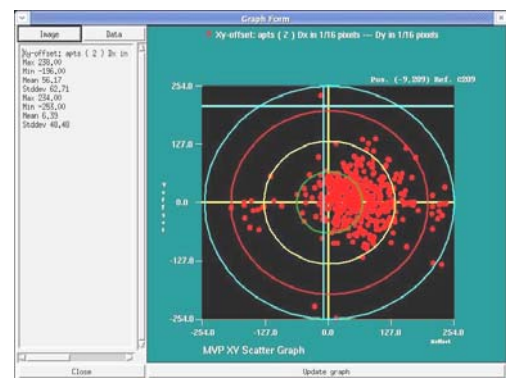


Figure 9.26: XY Offset Curve example

The graph is created by first opening the XY Filter menu by clicking either Xyoffset Graph icon or the Xyoffset Curve button as shown in the illustration.

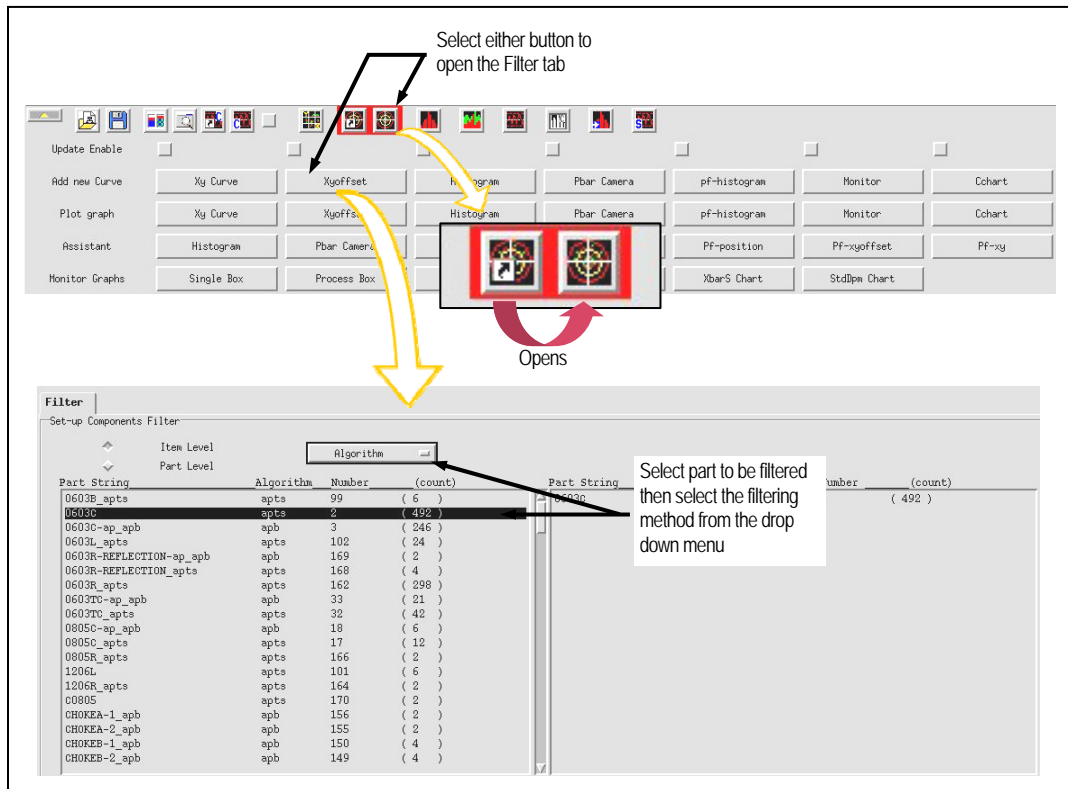


Figure 9.27: Selecting the XY Filter

The curve editing menu appears. From the Filter tab select the item required to plot the curve from; filter by Part Type, Algorithm, Name, etc. The only condition is to select a part that uses DCIP or Adjust as second level algorithm.

Plot the graph by clicking either the Xyoffset button, or select the Plot Xyoffset graph button from the menu. The update enable button automatically updates the graph after every inspection.

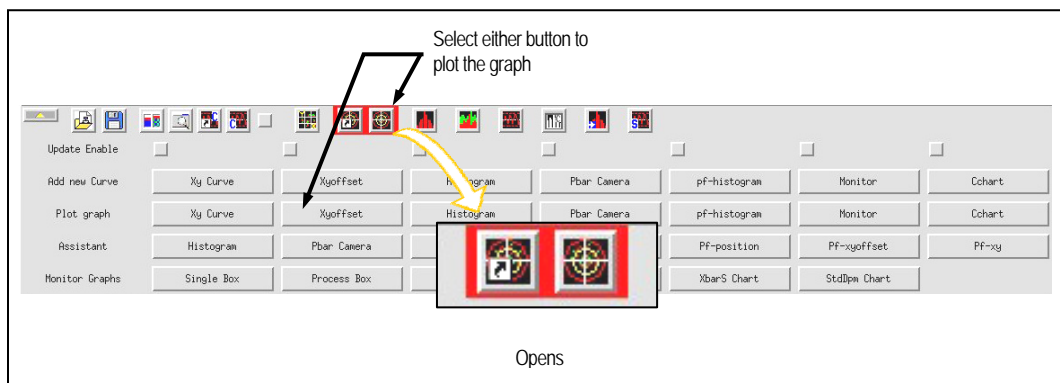


Figure 9.28: Plot the graph

The Histogram Graph

The Histogram graph is created by clicking the Histogram button which displays the Histogram editing button, or select from the curves menu.

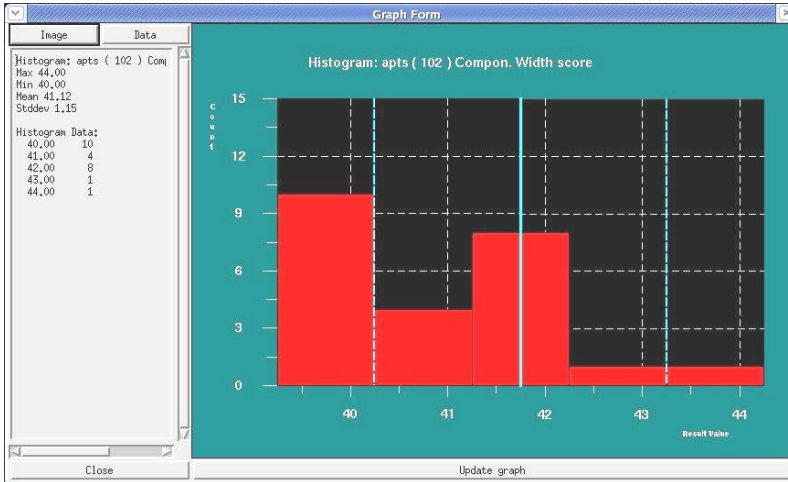


Figure 9.29: Histogram graph example

The curve editing menu appears. From the Filter tab select the item required to plot the curve from; filter by Part Type, Algorithm, Name, etc.

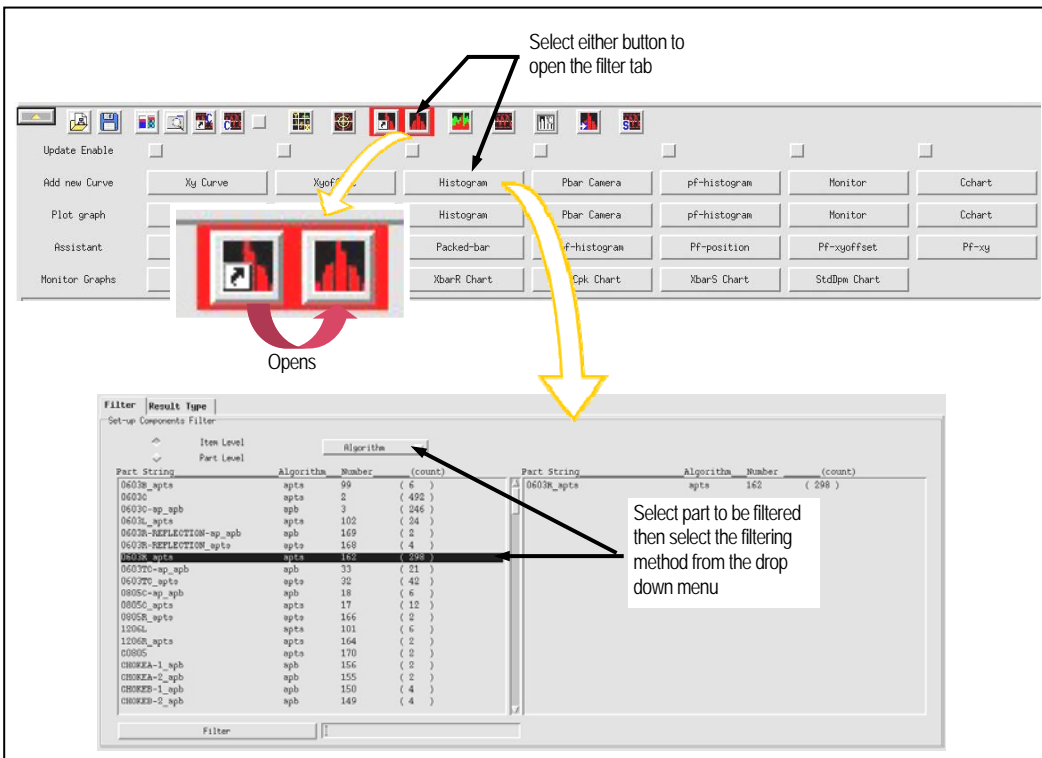


Figure 9.30: Selecting the filter

From the Result Type tab select the variable or inspection result required to plot.

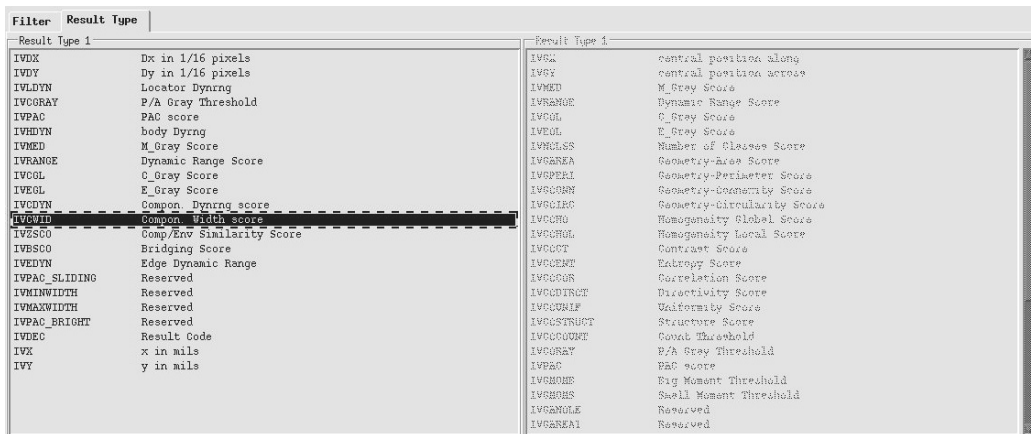


Figure 9.31: Selecting the variable from the Result tab

Plot the graph by clicking either the Histogram button, or select the Plot Histogram button from the menu. The update enable button automatically updates the graph after every inspection.

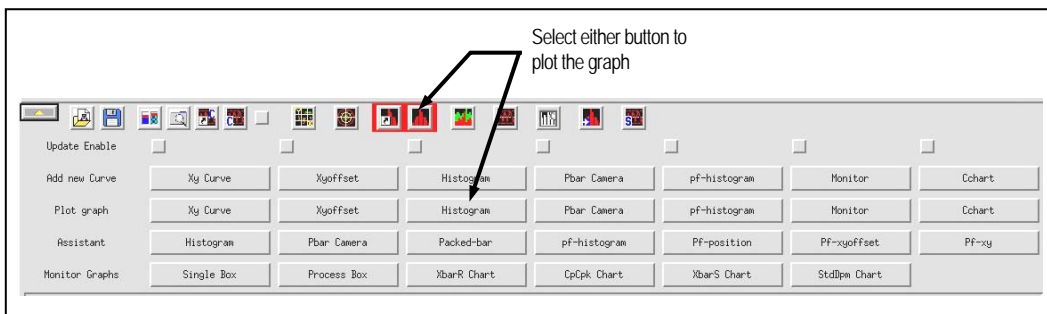


Figure 9.1: Plot the graph

Assistants

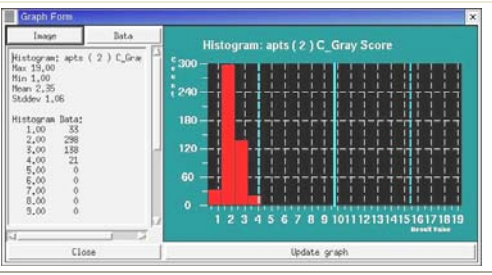
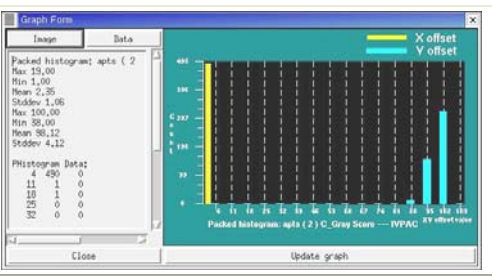
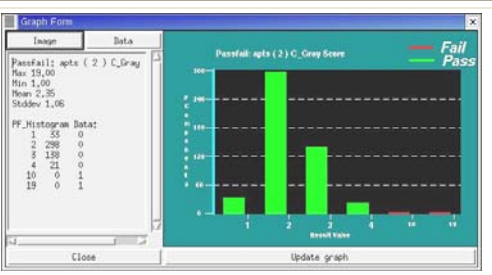
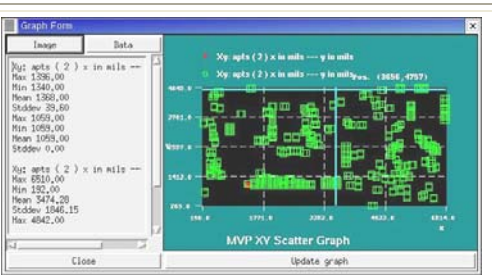
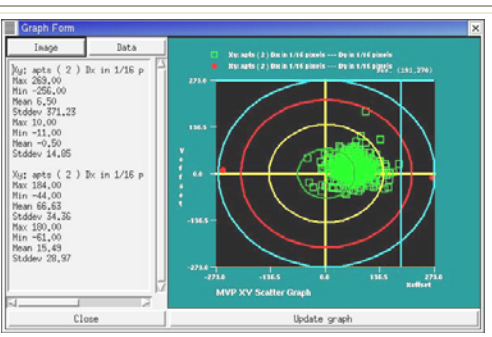
Assistants are graphs associated with data from a preexisting curve located in the context area. They do not list in the context area and do not update automatically after each inspection. If the assistant graph is invalid for the selected curve, the program opens a message box with the following explanation: "Current curve is invalid for the graph".

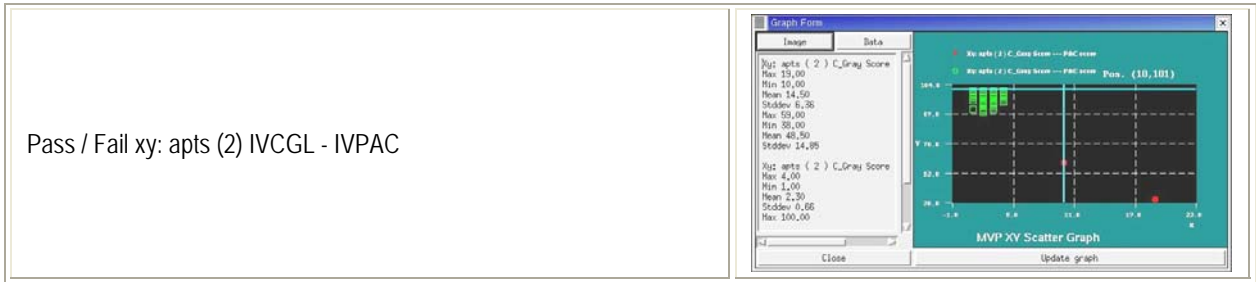
The following table lists which assistants are valid with the selected curves.

	Assistant button					
Curve Type	Histogram	Packed Bar	Pf Histogram	Pf Position	Pf XY Offset	Pf XY
Xy Curve	For X data	Applicable	For X data	Applicable	Applicable	Applicable
Xy Offset	For x-offset	Applicable	For x-offset	Applicable	Applicable	Applicable
Histogram	Applicable	Not Applicable	Applicable	Applicable	Applicable	Not Applicable
*Pf-Histogram	Applicable	Not Applicable	Applicable	Applicable	Applicable	Not Applicable
Monitor	Applicable	Not Applicable	Applicable	Applicable	Applicable	Applicable

* Pf—Pass / Fail

The following table illustrates the Assistant type graph associated with the same curve data.

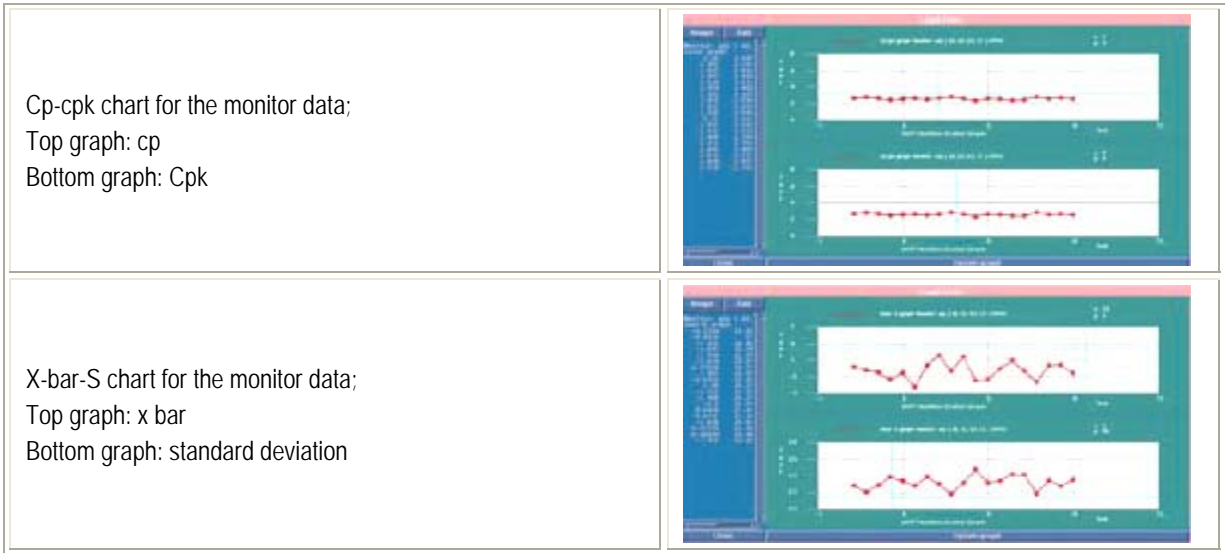
Assistant Graph Type	Graph
<p>Histogram: apts (2) IVCGL</p>	
<p>Packed Histogram: apts (2) IVGL - IVPAC</p>	
<p>Pass / Fail: apts (2) IVCGL</p>	
<p>Pass / Fail position: apts (2) The red points are the position of the failed parts. The green points are the position of the passed parts.</p>	
<p>Pass / Fail offset: apts (2) The Red points showed the offset for the failed parts. The green points showed the offset for the passed parts.</p>	



Monitor Graphs

They do not list in the context area and do not update automatically after each inspection. If the monitor graph is invalid for the selected curve, the program opens a message box with the following explanation: "Current curve is invalid for the graph".

Monitor Graph Type	Graph
<p>Single Box for monitor data; Box components: Blue dash line: maximum and minimum. Green dot: median Red box: 3 sigma</p>	<p>The graph displays several red vertical bars representing data points. A horizontal green dot indicates the median, and two horizontal blue dashed lines represent the maximum and minimum values. The bars are contained within a red box representing 3 sigma.</p>
<p>Process Box for process data; Box components: Blue dash line: maximum and minimum. Green dot: median Red box: 3/4 and 1/4 value in the vector.</p>	<p>The graph displays several red vertical bars representing data points. A horizontal green dot indicates the median, and two horizontal blue dashed lines represent the maximum and minimum values. The bars are contained within a red box representing the 3/4 and 1/4 values in the vector.</p>
<p>X-bar-R chart for the process data; Top graph: x bar Bottom graph: range</p>	<p>The chart consists of two vertically stacked line graphs. The top graph shows the x-bar (mean) values over time, and the bottom graph shows the range values over time. Both graphs have a red line for the data and a horizontal green line for the target or mean.</p>
<p>X-bar-R chart for monitor data; Top graph: x bar Bottom graph: range</p>	<p>The chart consists of two vertically stacked line graphs. The top graph shows the x-bar (mean) values over time, and the bottom graph shows the range values over time. Both graphs have a red line for the data and a horizontal green line for the target or mean.</p>



Section
10

Advanced Operator Features

Section Description

This section describes those features that are available to the operator when logged in as “maint” and accessed on the UI window. These features include program tuning, program debugging, camera setup, and some feature configuration processes. This manual will not spend a lot of time on the “how to’s” for those features but refer the user to the appropriate manual.

Barcode Config Feature

Barcode Config was briefly introduced in Section 5. This feature is enabled as configuration permission by a user logged in as “maint” or “root”. The barcode parameters are used to configure the system to read and process barcodes.

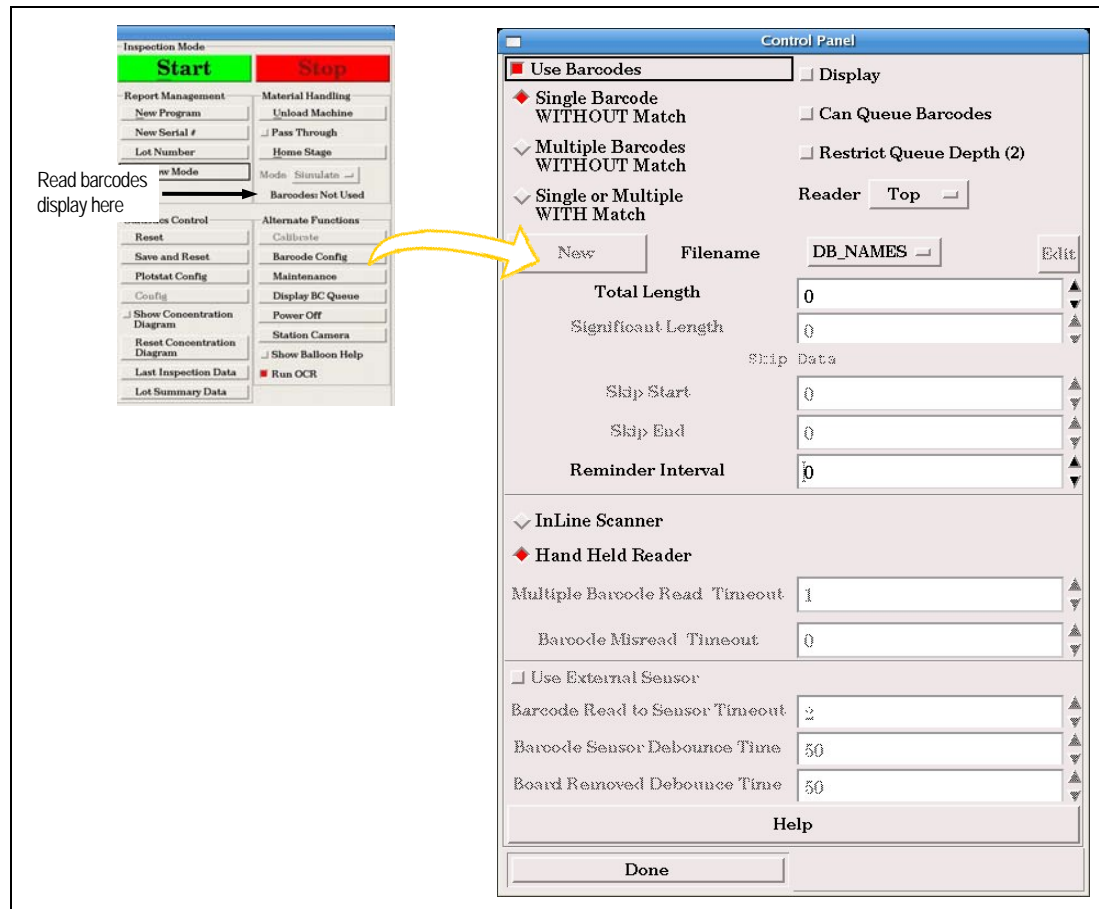


Figure 10-1: Set up Barcodes in Configuration

Feature	Description
The Single or Multiple without Match radio buttons	If the 'Match Database' is off, and 'Use Barcodes' is requested, then the user is required to enter (open) a database before starting inspection, and then the user is requested to enter a barcode. This barcode must match the total length value or an error display.
The Single or Multiple with Match radio button	Selecting 'Match Database' requires that any barcode read by the system have a match of 'significant length' in the filename file. Further, the database entered in the filename file must match a valid .es file in the dbase directory. If no match exists, no database is loaded and an error is displayed.
Display check box	Displays the read barcode on the UI screen location if it is valid.
Can Queue Barcodes check box	Up to 16 barcodes can be entered before a board is loaded into the system. Once the queue is full, additional reads are thrown away. As boards are loaded into the system, the queue is worked off and additional reads are allowed.
Restrict Queue Depth (2) check box	Changes the maximum reads allowed from 16 to 2. Additional reads are thrown away until boards are loaded and the queue is worked off.
Reader selection menu	<p>Top: Loads top side databases Bottom: Loads bottom side databases.</p> <p>Dual: If dual barcodes are installed (one pointing up other pointing down) then the system automatically loads the proper (top / bottom) database depending on which barcode reader reads the barcode. For example, the reader pointing down (typical) loads the top side databases, the pointing up reader loads the bottom side databases.</p>
Filename	<p>This parameter specifies which file contains the information to match the significant part of the barcode to a database. Usually this is not changed from the default setting. Changing this value can cause problems in certain applications using barcodes.</p> <p>The format for each entry in this file is: Significant Barcode #of panels database Where the 3 entry's is separated by a < space>;</p> <ul style="list-style-type: none"> • Significant Barcode represents the significant part of the barcode that identifies which database to run the inspection. • # of Panels represents the number of panels in the database. This is used for reading multiple barcodes for one panel. (i.e., a panel contains 3 cards and each card has a unique barcode to be read. Then the # of panels would be set to 3). • The database identifies which database inspection file to load then run the inspection file. The file name used in this file should not contain the .es file extension. There must be an .es file with the same name in the: opt/mvp/dbase directory. <p>Example: Test1 1 mvpdatabase</p> <ul style="list-style-type: none"> • This would match any board that has a barcode with the significant part being "Test1" to the database file opt/mvp/dbase/mvpdatabase.es for the inspection. Only one barcode is required to be read for each panel before being loaded into the system.
New / Edit buttons	Are enabled with the selection of the 'Single or Multiple With Match' radio button. Opens the vi editor windows. Is used to create new barcode database folders. Not recommended to use these features. Use the default DB_Names folder.
Total Length value box	Specifies the total length of the barcode that is going to be read. The system is expecting all the barcodes to be the same length.
Significant Length value	This parameter is only used if 'Match' is selected. This specifies how many characters in the barcode identify the product to be matched to a database.

Skip Start / Skip End values	<p>The skip start / skip end fields allow the user to skip some portion of the barcode to locate the significant portions of the barcode.</p> <p>If a barcode has 20 digits, and the significant portion of the barcode is split into 2 segments like the following: 999999999xxx8888www (20 characters)</p> <p>9 = product type (9 characters) X = serial no. (4 characters) 8 = rev. no. (4 characters) W = week year (3 characters)</p> <p>The user could set the 'Skip Start' to 9 and the 'Skip End' to 13. Since the first 9 characters are significant, and you want to skip 4 in the middle—your configuration would look like the following:</p> <p>Total Length: 20 Significant Length: 17 Skip Start: 9 Skip End: 13</p>
Reminder Interval value	Sets the flashing delay of the Barcode Request window on the UI screen. The units are in micro-seconds and the default setting of zero will flash the window every 2 seconds.
Inline Scanner radio box	Enables the following options: Multiple Barcode Red Timeout, Barcode Misread Timeout, and Use External Sensor.
Hand Held Reader radio box	Disables the Inline Scanner features.
Multiple Barcode Read Timeout value	When Multiple barcode reads are required, how long should the system wait before it determines it will not succeed. The timeout value is in seconds.
Barcode Misread Timeout value	Barcode labels can be damaged. If a successful read is detected at the leading edge of the label, the reader will not issue another read until a different barcode value is detected (this is the required setup for Barcode readers connected to the MVP system—one unique read per label). Because of a damaged or marred label, another unique read may occur on a same label. This is not reasonable. A timeout value can be set to ignore a read if it occurs too close to the last one. Timeout value is in milliseconds.
Use External Sensor check box	An optional external sensor can be placed on the conveyor between a barcode reader and the entrance to the Autoinspector. The sensor is connected to the systems digital input bit 6. It detects if an operator has illegally removed a board after it was read by the barcode reader but before it was loaded into the system. This prevents board serial numbers getting out of sync. Enables the following options: Barcode Read Sensor Timeout, Barcode Sensor Debounce Time, and Barcode Removed Debounce Time.
Barcode read to Sensor Timeout value	This is the time from a successful barcode read to the maximum time to expect the board to reach the sensor. Timeout is in seconds.
Barcode Sensor Debounce Time value	Boards can have holes in them. To avoid a ghost or false detect the sensor must be valid and in an 'On' steady state for the debounce time. Time is in milliseconds.
Barcode Removed Debounce Time value	Boards can have holes in them. To avoid a host or false board gone state, the sensor must be in an 'Off' steady state for the debounce time. Time is in milliseconds.
Done button	Click the Done button to enter and exit the edits.

Config—SPC File Generator

The Statistical process Control Generation program is the keeper of the data. This section of the configuration menu allows the user to tailor the output of the 'spcgen' program to match that which other departments wish to see.

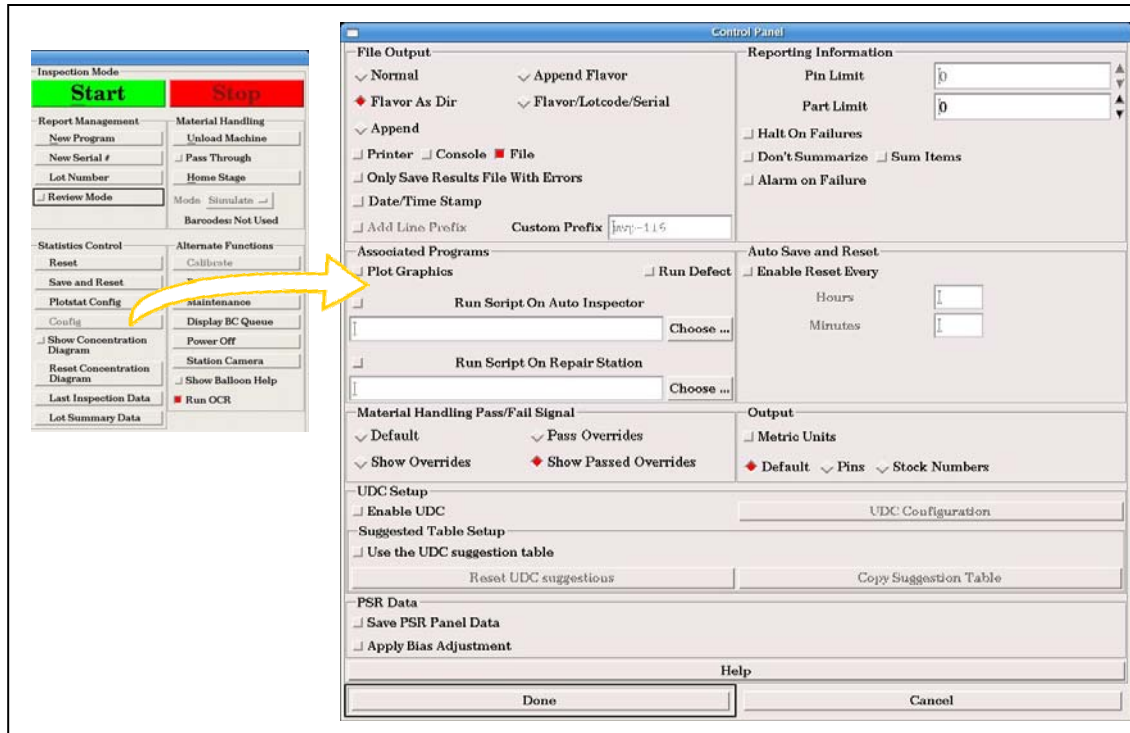


Figure 10-2: Configuring for SPC Generator

Feature	Description
File Output Group	<p>The file output section controls how and where the reports are saved on the host computer. The following are paths to where the SPC error files are located if selected.</p> <p>Normal: opt/mvp/error/Serial Number Flavor As Dir: opt/mvp/error/Flavor/Serial Number Append: opt/mvp/error/ERR-File Append Flavor: opt/mvp/error/SerialNumber-Flavor Flavor/Lotcode/Serial: opt/mvp/error/Flavor/Lotcode/Serial Number</p> <p>Definitions: Serial Number = A serial number or barcode number Flavor = Database program used for inspection Lotcode = A client can urn inspections in lot with unique lot codes. Append is different in that all results are appended to the file opt/mvp/error/err-file. Is retained for backward compatibility.</p>
Printer selection box	The.mvp error report file is sent to the default printer for the AutoInspector hosts computer.
Console selection box	The.mvp error report file is displayed in the Spcgen pop up window at the end of each inspection.

File selection box	The mvp error report file is saved in the file system > opt/mvp/error/[name]
Only Save Results With Errors selection box	This is enabled when the File option is selected. When this option is selected, an mvp error report file is saved if there are defects reported by the system. If a panel passes the inspection, no file is created. This effects statistical tracking on panels inspected.
Date/Time Stamp selection box	Sets the error file name to date default format 'YYYYMMDDhhmmss'.
Add Line Prefix selection box	This is enabled when Date/Time Stamp is selected.
Custom Prefix value box	This is enabled when Add Line Prefix is selected. The user can enter a prefix or use the default value. The format for the file name is 'prefixYYYYMMDDhhmmss'. Note: If an AutoGuide station is used, the 'Only Save Results file with the Errors' option should not be selected. If selected, the AutoGuide station may not operate properly.
Reporting Information Group	The default limit for parts is 50. Changing this limit allows more or less [parts to be reported as failed for an inspection.
Pin Limit value box	Enabled when 'Pins' selection box is selected located on the Output group. Max number of failed pins to be reported.
Part Limit value box	Max number of failed parts to be reported. Note: The Part Limit also sets the total number of snaps taken when 'Save Bad Snaps" is selected under the System Parameters menu tab in Configuration.
Halt on Failures selection box	Halts the system if a system failure (Too Much Rotation, XY Stage Error, Overrun Error, etc.) occurs.
Don't summarize selection box	Turns off part and item statistics gathering. This can increase the throughput speed of the system if required.
Sum Items selection box	Not supported. Do not use.
Alarm on Failure selection box	Enables the yellow tower light and audible alarm before a review is invoked. Clicking OK in the accompanying dialog box clears the condition.
Auto Save and Reset Group	This is used to automatically save and reset the statistics at a specific interval to assist in SPC data gathering and tracking.
Enable Reset Every ...selection box	Enable / disable automatically save and reset statistics.
Hours value box	Enabled when Enable Reset Every selection box selected. Time intervals in hours of the timer for saving and reset.
Minutes value box	Enabled when Enable Reset Every selection box selected. Time intervals in minutes of the timer for saving and reset.
Output group	Sets what information is displayed for each failure found during an inspection.
Metric Units	Uses microns when enabled—defaults to mils when disabled.
Default radio selection box	Reports part level failures.
Pins radio selection box	Reports pin level failures
Pin radio selection box	Enables the Pin Limit value box of the 'Reporting Information' group.
Stock Numbers selection box	Reports the part failed with users stock number (if part of database parameter) for that part.

Associated Programs group	A selection of user or predefined scripts that gather SPC data for file output. These can format error data to customer specific formats for tracking purposes. Such scripts will transfer the error data at a specified time and format for communication with user tracking systems.
Plot Graphics selection box	Runs the 'Plotstat' process in the background, and draws its results at the end of each inspection pass. This slows down the number of boards which passed through the machine depending on the time to draw the plot of the results.
Run Script selection boxes	Allows the user to enter any script in the text box below it. If this script is executed by the Spcgen program at the time the preliminary statistics is gathered, then it will run and Spcgen waits for it to complete before allowing another inspection to proceed. Example: If you want to run 'igs' on any given inspection, enter 'igs-a' into a file, and make that file the script to be executed by Spcgen. Note: In normal operation Spcgen starts another inspection before displaying the results on the console window. This is done as Spcgen now caches the results. This means that more boards per hour is processed by the system.
Run Script on Auto Inspector value list	Runs the script after an inspection is finished on Auto Inspector. Select the Choose button to open a directory of scripts to choose from.
Run Script on Repair Station value list	Runs the script after a board is repaired on the repair station. Select the Choose button to open a directory of scripts to choose from.
Material Handling Pass/Fail Signal Group	Shows what modifications to the output are reflected in the Spcgen output after the operator reviews what the system had flagged as bad (if the operator has permissions as set in System Parameters).
Default radio selection box	Displays a 'False Call' in the output, but fails every board that was flagged during inspection and passes every board that has no flags.
Show Overrides radio selection box	Displays the string '___OVERRIDE___' where a part failed but was marked as a False Call during the operators review process. Any board that was flagged during the flying inspection is considered as a failed board.
Pass Overrides radio selection box	Causes parts marked as False Call during the operators review process considered as passed and not reported. Only boards with verified defects are considered as failed boards.
Show Passed Overrides radio selection box	Displays the string '___OVERRIDE___' where a part failed and marked as a False Call during the operators review process and counts the part as passed to the output. Only boards with verified defects are considered as failed boards.
UDC Setup group	UDC (Universal Defect Code) allows standardized terminology and classification used for defects captured by the inspection process.
Enable UDC selection box	Enable / Disable UDC.
UDC Configuration button	Starts a wizard to create the UDC mapping.
Suggested Table Setup group	
Use the UDC suggestion table selection box	Enable / Disable suggestion table. When enabled the suggestion table is updated every time a part is reviewed or repaired.
Reset UDC Suggestions button	Remove the suggestion table file to clear the suggestion data.
Copy Suggestion Table button	Copy the suggestion table from one flavor to another to make it reusable by different databases.
PSR Data group	

Save PSR Panel Data selection box	Support for PSR Panel Data.
Apply Bias Adjustment selection box	Support for panel die bias compensation.

Calibrate Feature

The Calibrate feature is enabled for the operator to use as set up in Configuration. The Calibrate button is enabled on the UI screen when in Operator mode—not in Maint or root. Another process is followed for those modes within the Database Edit feature which opens the iPro program. When this feature is disabled for the operator the program automatically refers to the sync point created within the original program.

The calibrate feature allows the operator to adjust the position of the sync point (could be a fiducial of sorts) of a program to align the XY coordinates of the placement program. This may not be an

Left click on the sync point to open edit window

Click inside the area of the object to maneuver the crosshairs to the center of the object

Alternate method

Navigation Arrows

Check box selected

Calibration point X: 243080 Y: 266730

Enter value or use slider bar

Move Distance: 0 mils/10

Adjust slider to adjust move distance

Click Done to exit

issue if the program used was created on the same machine. However, if the program is moved to a machine other than from where the program originated, it may be necessary to calibrate the sync points to match the current machine settings. So in those instances, allowing the operator access to this feature could be a benefit to the process.

Refer to the following process for using the Calibrate feature.

1. From the UI screen select the Start button and open a program.
2. Select the Stop button to pause the process and enable the Calibrate button.
3. Click the Calibrate button.
4. This opens the Calibrate screen in iPro.
5. The screen displays the current sync point in a blue box. Follow the directions on the screen or left click on the object to open the edit window.
6. Once opened, the object displays with a crosshair pattern somewhat close to the object.
7. Click inside the object in the direction that the crosshair pattern needs to move in order to center the pattern to the object. Continue with the process until the crosshair is centered to the object. Click the Done button to exit.
8. An alternate process for moving the crosshairs is to select the “Click to use arrow keys to navigate” check box—this opens a pattern of 4 navigation buttons.
9. Click the appropriate navigate button to shift the crosshair pattern to the center of the object. The navigate button motion is controlled by the Move distance value box. The value is in increments of mils. The amount of motion per click of the navigate button can be adjusted by typing in a value or by using the slider bar—where ever the bar is adjusted to set the value of the motion per click. Leave the value to default zero for fine adjustments.
10. Once the crosshair pattern is centered to the object click the Done button to exit.
11. The screen exits to the UI window. Select the Start button to begin the inspection program.

Database Edit Features

When the Database Edit button is selected the iPro database editor program generator features opens. This feature is available when logged in as “maint” or “root”. Refer to manual “v5.4 Basic Programming Training Manual” for instructions on using the features accessible in this program.

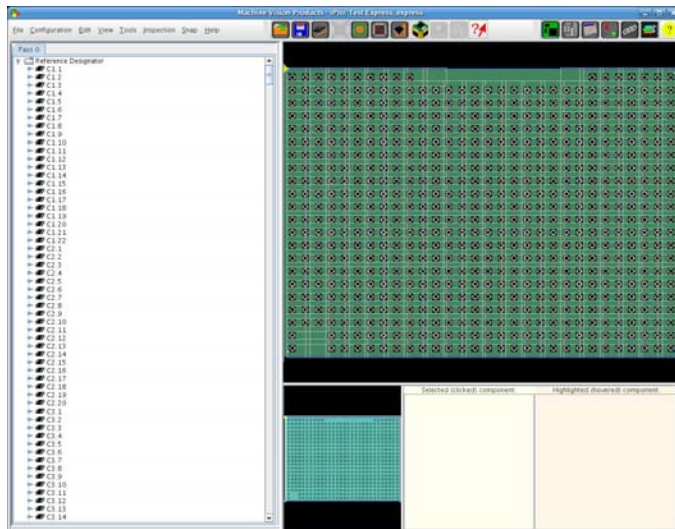


Figure 10-3: Main iPro database editor screen

Hardware Test Features

When the Hardware Test button is selected the Hardware Test/Setup features opens. This feature is available when logged in as “maint” or “root”. Refer to current maintenance manual for instructions on using the current features accessible in this program.

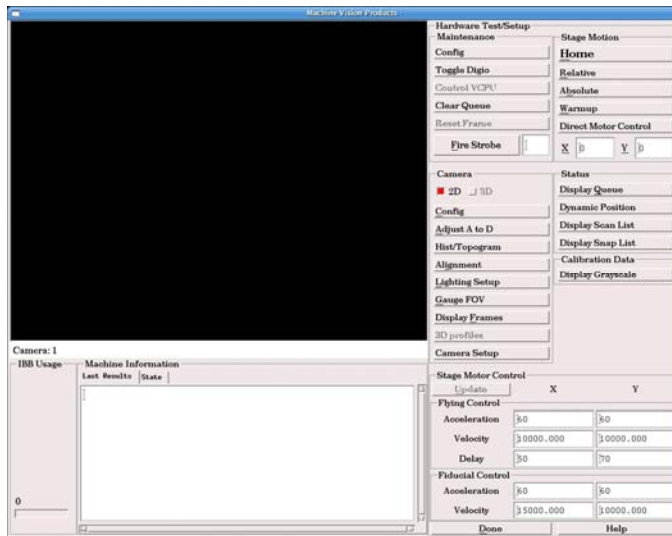


Figure 10-4: Hardware Test screen

Creating Passwords

Access to system files and functions is limited by a combination of login name and password. System operators are limited to those functions required to operate the machine in the production mode. Operator mode automatically brings up the UI window that displays those features configured for the operators. Other modes intended for use by systems administrators and maintenance, allow access to all resources and files.

To create or edit passwords the user must be logged in as ‘root’. When the system window completes booting to the desktop, a terminal window automatically opens similar to the one shown in the illustration. At the terminal prompt enter the command “passwd + [account name]” (account name = root, maint, or operator) <enter>. At the next prompt type the password for the appropriate account.

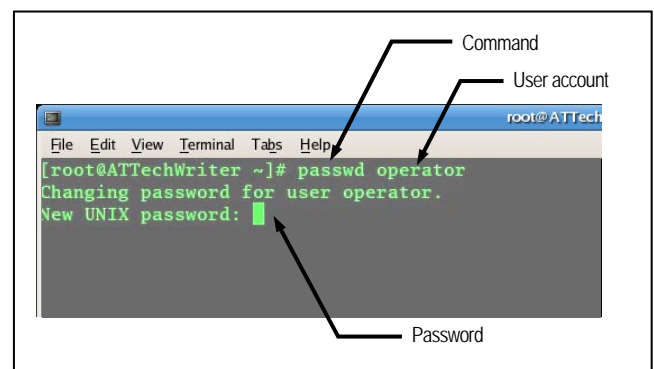


Figure 10-5: Creating passwords at the line prompt

Note: When typing the password, note that no characters or spaces display in the terminal. Enter the password carefully plus make a note of it that’s easily accessible by system administration.

A new prompt appears requesting to reenter/verify the password. As before, carefully enter the password. A message in the terminal will inform the user if the password was entered correctly. If not then try again.

Changing a password follows the same process except the system will request that the current password be entered then followed by the new password.

Note: Currently, the system can only accept one each password for root, maint, and operator--cannot enter multiple accounts.

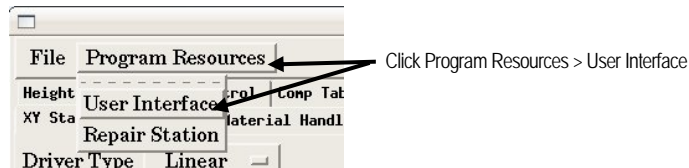
Appendix
A

Configurations--User Interface Table

The following information can be edited when logged in as 'maint' or 'root.'



1. Close any MVP programs that are opened (i.e., UI and or iPro).
2. Click the MVP Start icon located on the extreme left corner of the bottom toolbar.
3. Click on the top icon which opens the Configuration utility. The User Interface window opens.
4. Select the Program Resources drop down menu then select User Interface from the list.



5. The User Interface window opens.
6. Search the listing for the permission to be set (refer to the table) and change value to true / false or enter a value where indicated.

Allow operator to select New Program button	Normally set to true. Set to false if programs are controlled offline or by barcode. Button normally active in operator mode.
Allow operator to select Lot Number button	Normally set to true. Set to false if the Lot number is controlled offline. Button normally active in operator mode.
Allow operator to select Home Stage button	Normally set to true. Set to false if the operator is not allowed access to this feature. Button normally active in operator mode
Allow operator to select the Calibrate button	Normally set to false. Set to true if the operator is allowed access to this feature. Button normally grayed out in operator mode; active in maintenance mode
Allow operator to select Show Elogs button	Normally set to true. Set to false if the operator is not allowed access to this feature. Button normally active in operator mode.
Allow operator to Reset Concentration Diagram	Normally set to true. Set to false if the operator is not allowed access to this feature. Button normally active in operator mode.
Allow operator to Show Concentration Diagram	Normally set to true. Set to false if the operator is not allowed access to this feature. Button normally active in operator mode.
Allow operator to select Plotstat Config button	Normally set to true. Set to false if the operator is not allowed access to this feature. Button normally active in operator mode.
Allow operator to select Save And Reset button	Normally set to true. Set to false if the operator is not allowed access to this feature. Button normally active in operator mode.

Allow operator to select Reset button	Normally set to true. Set to false if the operator is not allowed access to this feature. Button normally active in operator mode.
Allow operator select FalseCall in Review	Normally set to true. Set to false if the operator is not allowed access to this feature. Button normally active in operator mode.
Allow users to Abort the inspection	Normally set to true. Set to false if the operator is not allowed access to this feature. Button normally active in operator mode.
Allow operator to change Review mode on the line	Normally set to true—enables the review feature for operator mode. Set to false if the operator is not allowed access to this feature. A false setting forces the system to import the review data to a repair station.
Allow operator to see the current Barcode queue	Normally set to false. Set to true to activate the barcode view button to display the current barcode in inspection. This is a view feature not a toggle button.
Allow operators to Power Down	Normally set to False. Is true in Maint mode. Set to true to activate the Power Off button in Alternate Functions.
Allow operators to force items/groups to always pass inspection	Normally set to false. Set to true to enable the Auto Tune button in review mode. The Auto tune feature optimizes algos associated with a part type defect; improving its chances of higher pass yields.
Allow operators to put the machine in the Pass through mode	Normally set to false. Set to true to enable the Pass Through check box to the Material Handling group section of the UI screen in operator mode. Is enabled in maintenance mode (although set to false).
Allow operators to change barcode settings on the line	Normally set to false. Set to true to enable the Barcode Config button in operator mode. Is true in Maint mode.
Allow operators to tune up algos in review mode on the line	Normally set to false. Set to true to enable the Tune Algo button in review mode. Normally grayed out in operator mode. Opens the Algo debugging program.
Selecting defect reason automatically advances to the next part	Normally set to false. Review mode opens a Defect listing submenu when the Defect button is clicked. Set to true to allow the selection of a single defect which then exits to the main Review mode window where the part type selection tree advanced to the next part type automatically.
Show both passing and failing pins on a part during the review	
Barcode / Serial number out of sync error forces UI to quit	Normally set to true. Externally read barcodes are sent to the registers of the machines CTC via SMEMA. The same product when read by the machine's barcode reader must match that of the externally read code—this makes them in sync and the machine continues with the inspection. When the machine reads a barcode that does not match then the system is considered out of sync and the UI program automatically exits—this prevents unlike product from entering the system. If set to false, then the system ignores the sync issues.
Display only the failing pin in review	User preference. Is normally set to false. Database windows and snap images display in the Review image pane. Set to true to display just the failed pins.
Display the review windows as rectangles	Normally set to true. During algo creation for some part types the completed image displays as a circle for geometry and others display rectangles. When set to true, all geometry displays as rectangles. When set to false, the geometry of the original algo is displayed (circles and rectangles).
Display the vcpu meters as absolute framebuffer counts	Selection not critical. Feature disabled.

Display to use for the external review program	The feature is for those cases where multiple monitors are required. Is not True / False—is value. Normally leave as is as the default.
Allow exit of Review mode without clicking button	Normally set to false. The Operator clicks the Exit Review button to exit Review mode. Set to true for Review mode to exit automatically after the last part type review is performed.
Automatically review failed items and parts and override if they pass	Normally set to false. Normal review requires operator intervention for each part type in the listing. Set to true for the system to automatically pass the tuned algo parameters of a passed part type from the top of the listing to the next listed beneath the same part type. The system continues to pass the tuned parameters to each subsequent like part type until it comes upon an unlike part type.
Allow the reviewer to detail the defect at Review Mode	Normally set to false. Review mode opens a Defect listing submenu when the Defect button is clicked. Set to true to allow the selection of multiple defects. Click the Apply button at the bottom of the screen to exit to the Review mode window.
Allow review to call all items on part good/bad	Normally set to false. The operator reviews each snap and makes a decision for each part type / items within a snap image. If set to true, the operator makes a decision that all items of a part type are false calls or defects. Exception: The system takes individual snaps (image) based on the FOV inherent to the system. Each snap is inspected per the algos set up in the database for each part type within each snap. There are some cases where the part type within 1 snap is larger than the FOV—so only a partial analysis takes place for that 1 part type in that snap—the rest of the part inspection takes place on other snaps. If set to true the operator makes a decision on 1 snap that all items of a partial part are false calls or defects without reviewing the other snaps of that part. Could create a situation where multi-leaded parts with defects are passed.
Set min pixel value for enhancement of image	Normally set to 0 for normal operation. Values from 1(darkest)-50 (lightest) could be used to lighten / darken the image display.
Rotate display screen 90 deg from normal	Normally set to false (standard display). Set to true to rotate the displayed image to that of how it is viewed in the machine.
Show part names	
Software version number—do not change	This is the software version of the installed system. This is not a selection box—leave the default value.
Allow users to not run OCR algo	Normally set to false for normal operation. Set to true to enable an OCR button that allows the operator to selectively turn off the OCR inspection process.

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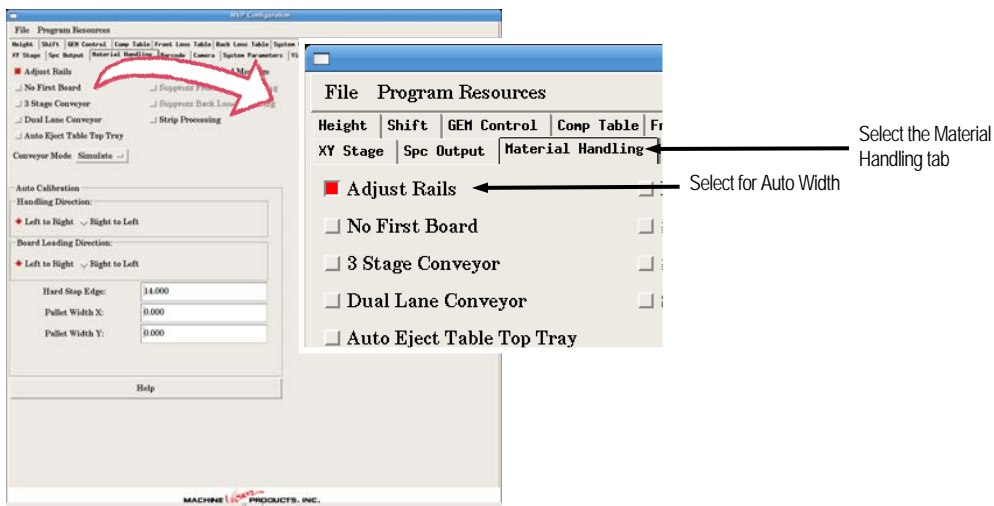
Appendix

B

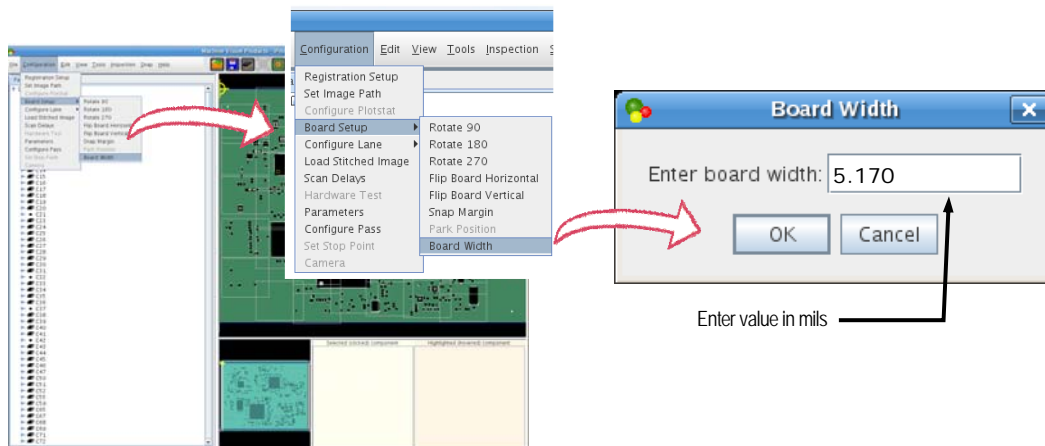
Setting the Auto Width Parameter to the Database

The following procedure describes the process for setting the width parameter on a machine with the Auto Width option.

1. Refer to Appendix A for opening the Configuration utility.
2. Select the **Material Handling** tab.
3. Click the “**Adjust Rails**” selection box to enable the Auto Width feature.



4. Click the **File** drop down menu and select “**Apply**”. This will set the features.
5. Click the **File** drop down menu again and select “**Exit**” to close the Configuration utility.
6. Open the **UI** program logged in as “**maint**”.
7. Click the “**Database Edit**” button to open the iPro feature.
8. Open a database by clicking on the “**File**” drop down menu or by clicking on the “**Load ES**” icon button to open the database listing. Select the program and click the “**OK**” button to exit and open the database.



9. Click the **“Configuration”** drop down menu from the top toolbar then select **Board Setup > Board Width**—this opens the Board Width data entry window.
 10. Enter the board width in inches. Click the OK button to save the value and exit the window.
-

Note: It would be advisable to add 20mils (.020 inches) to the width to compensate for any binding or dragging on the rails that may occur when the board travels through the conveyors. Recheck and adjust accordingly.

11. Save the database in both ES and AS formats.
 12. Exit iPro. The Auto Width feature will now automatically adjust the rails to the dimension indicated when the database is opened in the UI feature.
-

Note: The conveyor rails will close to a dimension of 2.2 inches when homed and then open to the required setting.

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