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1

Safety Information

Overview

Introduction

Many safety features have been incorporated into the design and manufacture of the XyflexPro system. This chapter describes the safety features, cautions and warnings associated with the day to day operation of the XyflexPro system.

All personnel responsible for operating the system must read and understand the provided documentation, before attempting to run the system. Safety must be considered and practiced at all times.

Failure to adhere to the recommendations and procedures could expose personnel to potentially hazardous conditions.

In This Chapter

This chapter contains the following topics.

Safety Precautions

List of Safety Precautions

The following general safety precautions must be considered and practiced at all times:

- All personnel must read all instructions carefully. Failure to comply with the instructions could result in injury or property damage.
- Lift and move the system using only equipment with adequate weight capacity and only at designated lift points.
- Be sure that the system is operating properly. The system will not operate with the safety door open.
- Keep hands away from heads, needles, belts, etc. during operation and whenever electrical power and air are on.
- Do not attempt to operate the system with any doors open or covers removed.
- Do not attempt to defeat safety interlocks.
- Should any malfunction occur, press the white **MACHINE OFF** push button or one of the red **E-Stop** switches.
- Never reach for parts in progress or a fixture that has become loose. Press one of the red **E-Stop** switches.
- Never put fingers or objects into the openings of the system.
- Always wear eye protection.
- Wear proper apparel. Do not wear loose clothing or jewelry.
- Maintain a clean working environment.
- Disconnect the air and electrical power when handling, moving or servicing.

Safety Labels And Terms

Usage

Safety labels are used to identify potentially hazardous conditions or materials that are encountered during system setup and operation. International symbols (pictograms) are used to identify the hazard type. Labels are affixed to the equipment in the vicinity of the potential hazard and appear throughout this manual. Labels appearing in the manual are accompanied by a “signal” word that indicates the severity of the hazard.

SEMI S13-0298 classifies hazard severity via specific signal words.

Classification of Hazards

Caution - Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Warning - Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Danger - Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Definitions

The following pictograms are used on the labels that are affixed to the machine. Each label contains a “signal” word which indicates the type and/or severity of consequences associated with the exposure or operation.

Some or all of the following labels may be used depending on optional equipment supplied.

Attention

Attention - Indicates a practice or recommendation which, if ignored, could cause damage or malfunction of the system.
Is also used to provide supplementary information or clarification of a specific statement or procedure.

Caution

Caution - General caution statement

Hand Cut Hazard

Moveable axes or sharp edges are present

Keep Hands Clear

Keep hands clear - Moving parts.

Pressurized Device

Release air pressure before servicing.

Consult Manual

Consult manual before performing this operation.

Eye Protection Required

Eye protection required.

Chemical Hazard

Chemical hazard - Consult Material Safety Data Sheet (MSDS) for hazards listing.

Laser Hazard

Laser in use.

Protective Gloves Required

Protective gloves required.

Burn Hazard

Burn Hazard - Hot surface -Allow to cool before servicing.

Poison

Hazardous materials.

Hazardous Voltage

Danger of electrical shock or burn - Disconnect power before servicing.

Exposed Belt Drive

Exposed belt drive - Lockout and Tagout before servicing.

Equipment Starts Automatically

Equipment starts automatically. Lockout and Tagout before servicing.

Safety Features

Introduction

The following safety features are intended to protect personnel from injury, while protecting the machine from damage. See Figure 1-1 and Figure 1-2.

Protective Covers

Protective covers have been designed to fully enclose the machine (except the conveyor openings). The covers restrict access to any moving parts, dangerous voltages, pneumatic pressures, or dispensing materials used in the machine.

Safety Relay Circuit

This circuit is directly hard wired to the controllers that drive all axis and conveyor motion and will disable any and all motion on the machine if the safety door is opened.

Safety Door Interlock Switch

The Interlock switch prevents the safety door from being opened while the machine is operating. The control system continuously checks the status of the **door closed** and **door locked** signals.

The interlocks are spring loaded; even in a machine power-off condition, the door remains locked. A reset must be performed, and power applied to the machine, before the operating system will permit the door to be opened.

Emergency Stop Palm Switches

Emergency stop (**E-Stop**) palm switches are the fastest and most effective method of halting machine operation in the event of a malfunction. **E-Stop** switches are located at the front and rear of the machine. All electrical power and pneumatic pressure to the machine is terminated when an **E-Stop** switch is pressed, except the uninterruptible power supply (UPS). This allows the computer to remain on until the operator shuts it down or until the automatic shutdown feature of the computer activates.

Main Power Switch (Lockout/Tagout)

The Main power (**Lockout/Tagout**) switch allows service personnel to disable all electrical power and pneumatic pressure to the machine for repair or maintenance. A long-stemmed padlock can be inserted to ensure that power cannot be inadvertently applied to the machine.

Safe Touch Controls

The lower access panel on the front of the machine does not require interlocks or access panel locks. The layout of components has been designed such that no voltages or other hazards can be reached without manually removing covers within this compartment.

Access Panel Locks

Access panel locks are designed to eliminate casual opening of panels wherever a dangerous condition can exist.

Pneumatic Dump Valve

The pneumatic dump valve (located behind the rear access panel) (Figure 1-2) works in conjunction with the three emergency stop palm switches. Whenever an **E-Stop** switch is pressed, the spring-loaded dump valve opens, discharging all pneumatic pressures safely within the machine.

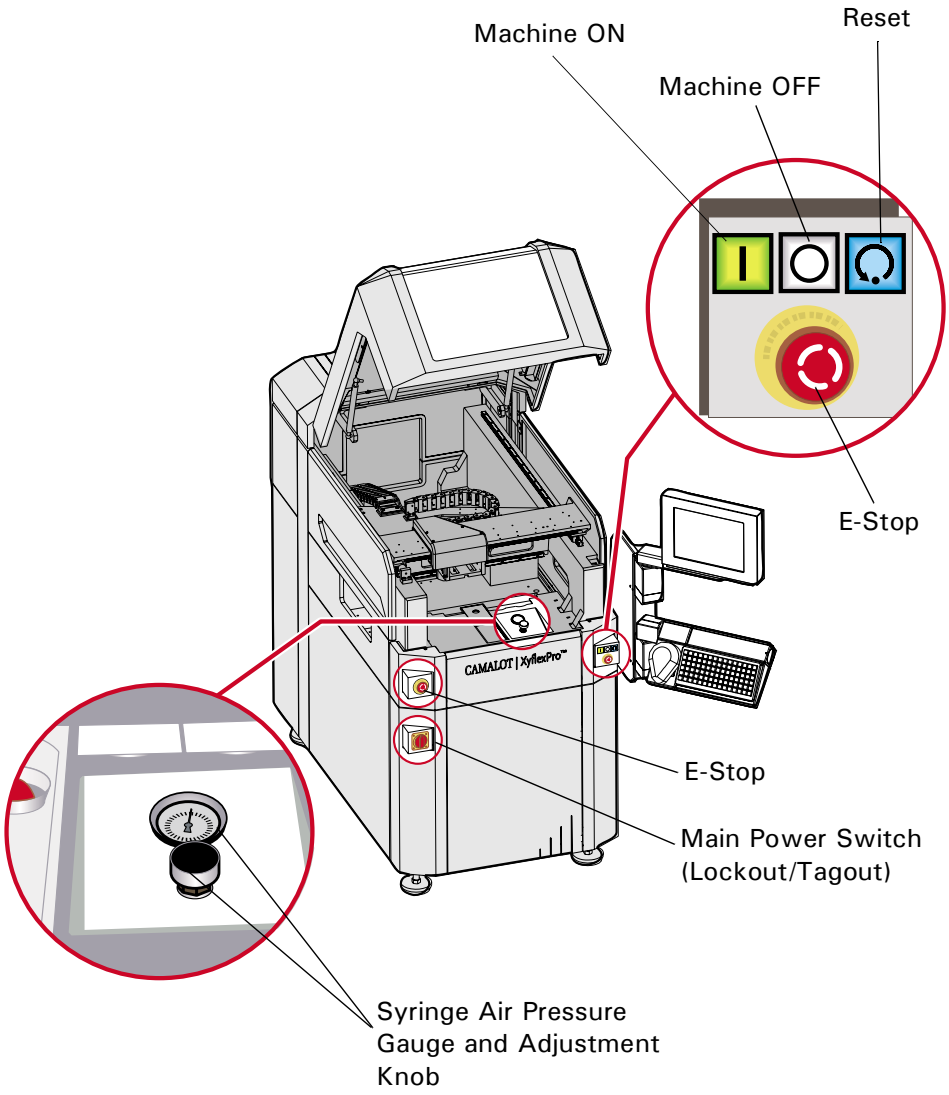


Figure 1-1

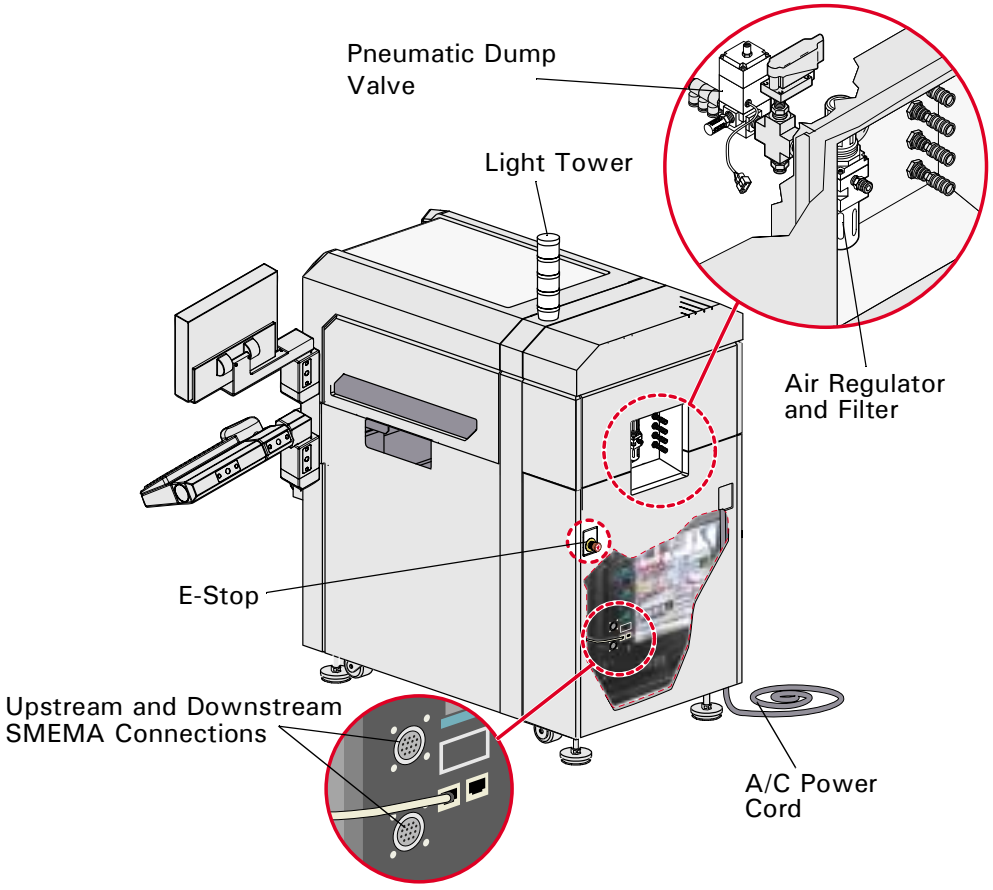

Pneumatic Dump Valve
Light Tower
Air Regulator and Filter
E-Stop
Upstream and Downstream SMEMA Connections
A/C Power Cord

Figure 1-2

Material Handling

Introduction

Many materials used in the dispensing process, during cleaning and lubrication are potentially hazardous.

Dispensing Material Disposal

Used (empty) syringes and dispense material that was deposited onto a rag or wipe during the dispense unit purging process should be fully cured and then disposed of in accordance with National and Local regulatory requirements.

Material Safety Data Sheets (MSDS)

Material Safety Data Sheets (MSDS) are provided by manufacturers and distributors of hazardous substances. There is no single standard MSDS form, therefore many different types of MSDS forms may be used. What is consistent, is the type of information included on each MSDS form.

It is required that all personnel have ready access to the MSDS.

A table is provided in the **Maintenance and Repair Guide** for identifying potentially hazardous materials. We have listed materials supplied in the machine support kit for you and inserted the appropriate MSDS sheet(s) following the table for your convenience.

In order to keep the table current, you will need to add all other materials that are present in your environment and insert the appropriate MSDS.

2

System Components

Overview

Introduction

This chapter explains the function of the various major components of the XyflexPro system. The process sequence that occurs during the running of a dispense program is also described.

The operator should understand and become familiar with the function of all the components before attempting to startup or operate the system.

Attention

When performing any calibration procedure in this section, the command word **"Select"** refers to clicking the left trackball button.

In This Chapter

This chapter contains the following topics.

Process Overview

Description

The board is accepted into the XyflexPro system on the conveyor when a SMEMA (Surface Mount Equipment Manufacturer's Association) signal is sent (board available) from the upstream machine to the XyflexPro computer.

As the board enters the system the leading edge of the board is sensed by a sensor located on the base plate. The signal from the sensor raises the hard stop and slows the conveyor belt down after a predetermined period of time. The leading edge of the board is stopped by the hard stop at the dispense station and the board is clamped and raised to the dispense position by edge clamps. The conveyor stops running until the dispense program is complete.

Two types of dispensing processes are available SMT (Surface Mount Technology) or Underfill and Encapsulation. The dispensing process is set by the software in the Properties screen. Refer to the Chapter titled - **Creating and Managing Process Programs**.

If the SMT process is chosen, the software has an option available to optimize the process program (refer to Chapter titled - **Toolbars And The Process Program Grid**) to achieve the maximum throughput. This will also vary if different size dots or materials are used.

If Underfill and Encapsulation process is chosen, all dispensing is accomplished when the head is available. This is to prevent time sensitive dispensing material from aging in case the upstream machine cannot accept a board.

A Dispense Unit or Multi-Piston Pump (mounted on the Z-axis) will dispense the loaded dispense program onto the board clamped at the dispense station. Upon completion of the dispense program in the dispense zone, the conveyor starts running and the edge clamps and hard stop are lowered and the board continues downstream.

The board remains at the dispense station until the downstream machine sends a signal (machine ready) to the XyflexPro computer. This signal allows the board to be released from the dispense station and continue downstream exiting the machine.

Software Overview

Introduction

The XyflexPro system utilizes a Windows NT® based software called **Benchmark®**. **Benchmark** software allows the user two different screen views with the ability to toggle between them using the View menu at the top of the screen.

Machine Screen

The first view upon startup is of the Machine screen. At machine startup the Benchmark software is launched automatically requiring only that the user log in and initialize the machine. The Machine screen appears as in Figure 2-1. Alternatively, the Machine screen can be displayed by selecting **View > Machine** from the menu bar at the top of the screen or the **machine icon** .

It contains several tool tips that enable the operator to control or monitor standard functions without the need to view numerous menus and dialogs. The controls become visible when the screen arrow (cursor) passes over their "hot" location on the screen.

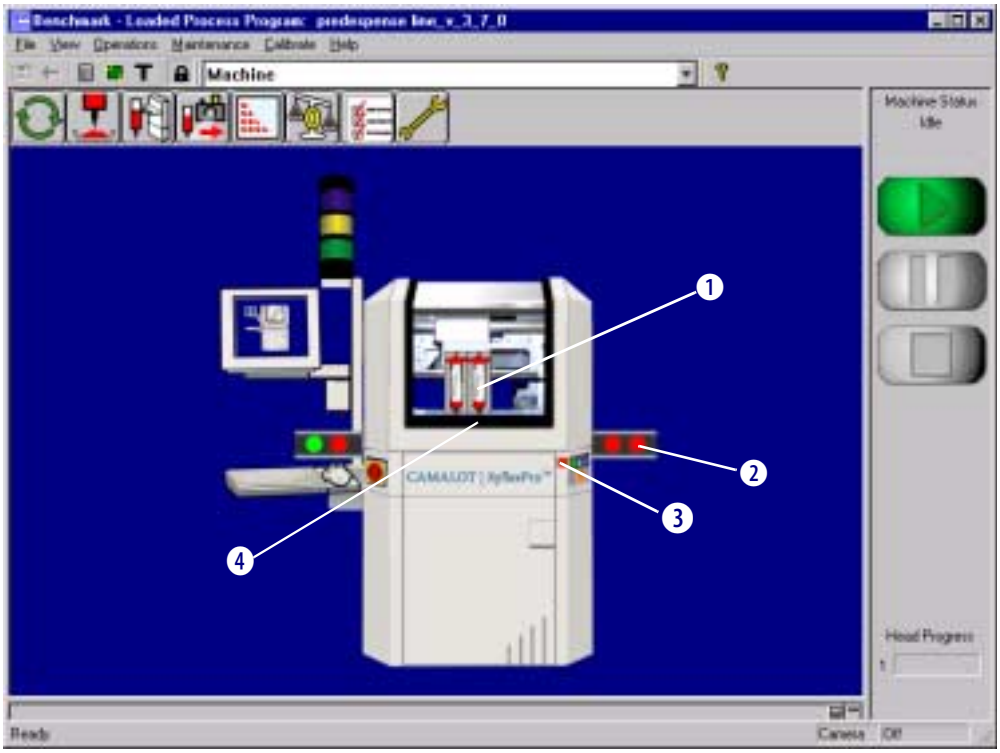


Figure 2-1

On Screen Controls

The controls are identified on the Machine screen as follows (See Figure 2-1):

❶ Dispense Head Status and Syringe Level

❷ SMEMA Signals

❸ Heat Controller Switch

❹ Door Lock / Unlock

Machine Status Display

Machine Status- This displays the current condition of the machine. The possible conditions are as follows:

- **Running** (machine is running the loaded process program)
- **Running with Err** (machine is running with an Error)
- **Running with Acked Err** (machine is running with an acknowledged Error)
- **Running with Warning** (machine is running with a Warning)
- **Running with Warning Acked** (machine is running with an acknowledged Warning)

- **Paused** (machine is paused from dispensing the process program)
- **Paused Error** (machine is paused with an Error)
- **Paused Err Acked** (machine is paused with an acknowledged Error)
- **Paused Warning** (machine is paused with a Warning)
- **Paused Warn Acked** (machine is paused with an acknowledged Warning)
- **Paused Not Ready** (machine is paused, not ready for operation)

- **Resuming** (machine is continuing its original operation)
- **Aborting** (machine is stopping the operation it is running)
- **Diagnostics** (machine is being diagnosed using the I/ O of the system software)
- **Error** (the system encountered an error while in operation)
- **Idle** (machine is stopped waiting for the next operation)

Dispense Head Indicator

This is a visual indicator (located in the lower right-hand corner of the screen) which will display how far the head has progressed into the dispensing program. The display box will fill as the head moves along into the process program.

Conveyor Mode

This displays (located at the lower right-hand corner of the screen) the mode of the conveyor. Three modes are available, **Off**, **Automatic**, and **Pass Through**. To change the selection, right click over the field and a drop down menu will appear.

Dispense Head Mode

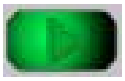
This displays (located at the lower right-hand corner of the screen) the mode of the dispense head. Three modes are available, **Dry Run, Dispense,** and **Camera**. To change the selection, right click over the field and a drop down menu will appear.

Alarm Information Display

This will display all the alarms which have occurred during a dispensing process.The alarm information (located at the lower right-hand corner of the screen) may be displayed as a half screen or a single line. To change the selection, left click over the desired display.

Process Operation Buttons

The **Start Operation**, **Pause** and **Abort Process** buttons allow the operator to control the dispensing of a process program from the Machine screen. The buttons are identified as follows on the right side of the screen:



The **Start Operation** button (top button) is **green** in color when the machine is idle and ready to run a dispense process program. When the machine is running a process program the button will be gray in color.

The **Pause** button (middle button) is **yellow** in color when the machine is running a dispense process programprocess program. When the machine is idle, not running a process program, the button will be gray in color.

The **Abort Process** button (bottom button) is **red** in color when the machine is running a dispense process program. When the machine is idle, not running a process program, the button will be gray in color.

Configurable Toolbar (large icons)

The Configurable Toolbar (located at the top of the Machine screen) is used to perform various system calibrations, and offsets. Additionally, it gives the operator the ability to change syringes and clean predispense plates. When the cursor is placed over the icon a pop-up display appears to identify the function or title of each icon. See Figure 2-2.

Figure 2-2

Major Assemblies

Introduction

The XyflexPro system consists of a gantry, with a single or optional dual head Z-axis, and a single or optional dual lane conveyor system with a customized graphical user interface.

Gantry Assembly

The XyflexPro Gantry assembly is designed for high-speed high-precision positioning. Its base is constructed of a cast polymer composite. It is a formulation of a high strength epoxy, mixed with a scientifically blended quartz aggregate filler. In addition, the system includes chemical additives to improve the strength and durability of the composite. This serves as the support structure to which precision guideways are attached and support the Y-axis of the machine. A high strength aluminum casting forms the moving Y carriage. To it another pair of precision guideways are attached. These rails form the X-axis of the system. Accurately machined features in the casting assure that the X and Y-axes are perpendicular to each other. To these X-axis guideways an X axis carriage is attached. This is the mounting platform to which the Z axis housings attach.

The force to move the X and Y carriage elements is provided by powerful iron core linear motors. Position feedback to the motion controller is by 1-micron linear encoders. This arrangement provides a true closed loop servo system by utilizing a DSP based motion controller.

Care has been taken in the design to minimize the size and amount of cables required to run the system.

Conveyor Assembly

The XyflexPro Conveyor system can transport parts on a single lane up to 10 inches in width on a small format machine (7100), and up to 22 inches in width on a large format machine (7200). This varies based on whether the machine is set up for Surface Mount or Semiconductor applications.

Parts ride on static dissipative rails and belts. The rails are constructed such that belt surface exposure can be adjusted down to.101" part edge clearance by moving the top cap of the rail. Standard part underboard clearance is 30 mm.

Conveyor belt speed is controlled by encoded DC servo motors. Part positioning along the rails is accomplished by using optical sensors and pneumatically actuated hard stops.

Part positioning can be done with either a board edge clamping mechanism or with chuck assemblies. Additional support for large parts in an SMT application is achieved using pneumatically actuated board supports which can be randomly dispersed under the component.

Chuck assemblies may have heat, vacuum or a combination of both.

The conveyor width opening is adjusted using DC-servomotors.

The UPS System

Introduction

XyflexPro is equipped with a **UPS** (Uninterruptible Power Source). The UPS, illustrated in Figure 2-3, provides a temporary source of power for the XyflexPro computer in the event of any power failure or electrical disconnect such as the use of an E-STOP. The UPS is located behind the front door underneath the computer and amplifiers in the lower front bay of the system.

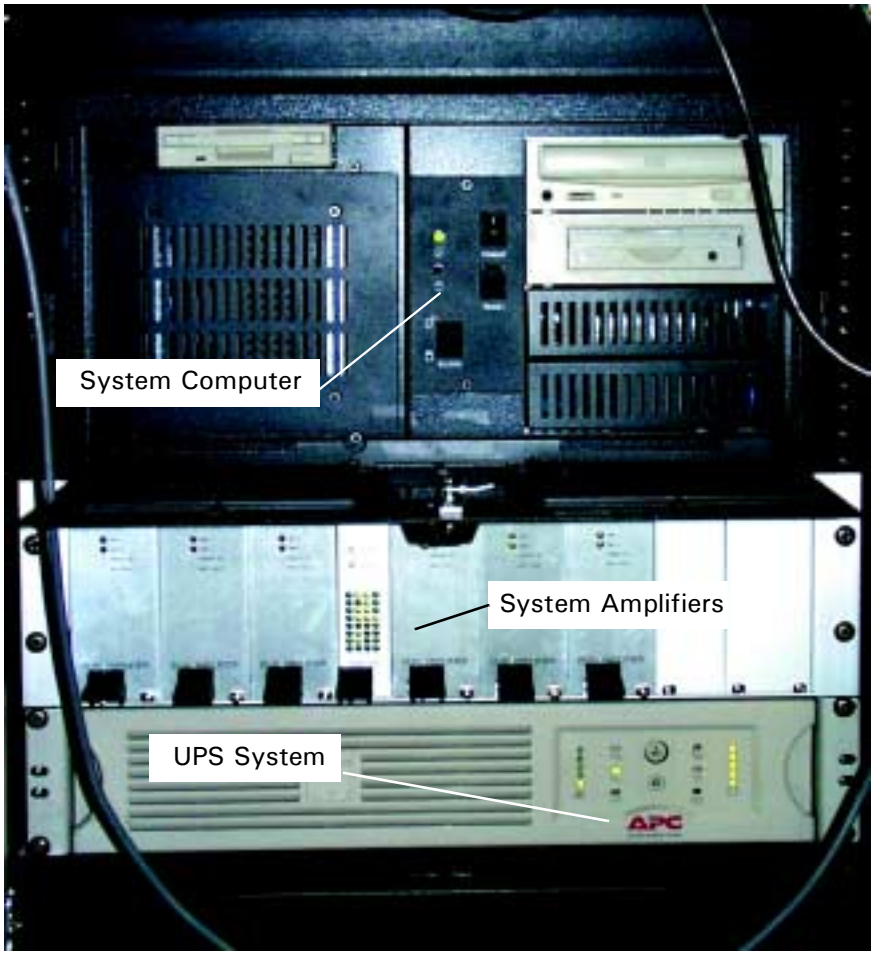


Figure 2-3

Under normal conditions, the operator would perform a shutdown sequence as part of the standard power down procedure. This shutdown procedure is required to avoid corruption of the system software or user files.

A battery in the UPS is constantly charged during normal system operation. In the event of an unexpected power failure or E-STOP the UPS switches it's battery power to the XyflexPro's computer, and initiates a controlled shutdown of the computer so as to avoid damage to the computer and corruption of important file data.

UPS Indicators

Figure 2-4 illustrates the UPS front control panel which contains several LED displays and buttons.

The UPS controls function as follows:

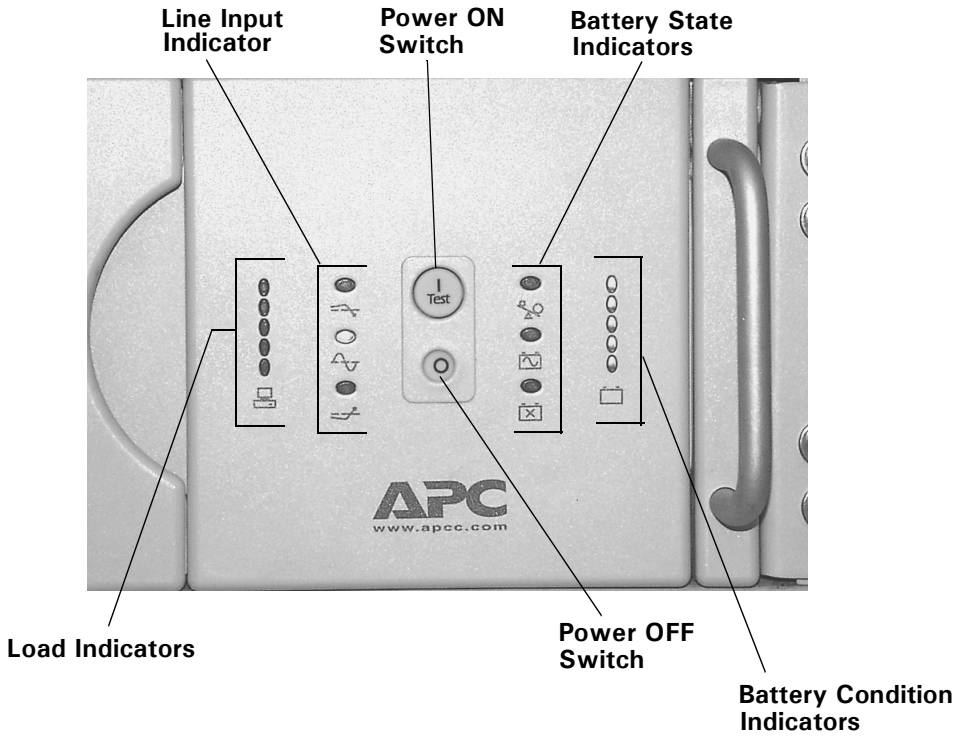


Figure 2-4

Line Input Indicator - Monitors the line voltage entering the UPS. The center LED indicates a normal (correct) voltage. The upper LED indicates that the UPS is compensating for a higher voltage. The lower LED indicates that the UPS is compensating for a lower voltage.

Power ON Switch - Turns UPS power ON.

Battery Condition Indicators - Indicates level of charge on the UPS battery. All LEDs illuminated indicates a full charge.

Power OFF Switch - Turns UPS power OFF. Power is still supplied to the computer as long as there is sufficient charge remaining in the UPS' battery.

Load Indicators - Indicates the percentage of the UPS' rated capacity is being utilized by the computer.

Battery State Indicators - Normally all LEDs are off.

The top LED indicates an overload (power consumption exceeds the UPS' capacity).

The middle LED indicates that the UPS' battery is being utilized to power the computer.

The bottom LED indicates that the battery needs replacement.

For detailed information concerning the functions and operation of the UPS, consult the UPS users guide that is supplied.

3

Controls And Indicators

Overview

Introduction

The XyflexPro system is operated using a combination of mechanical operator controls and menu/dialog settings within the **Benchmark®** software interface.

This section shows the locations and explains the function of the various push buttons and operating controls on the XyflexPro.

The operator should understand and become familiar with the function and location of all system operating controls and major assemblies before attempting to start-up or operate the system.

In This Chapter

This chapter contains the following topics.

Front Panel Controls

Introduction

The following Front Panel Controls are illustrated in Figure 3-1.

Emergency Stop Switches

There are two **red Emergency Stop (E-STOP)** palm switch located on the front panel. The entire system is shutdown when an **E-STOP** is pressed. If the emergency situation is not cleared, the uninterruptible power supply (UPS) will begin a controlled computer shutdown. Refer to Chapter titled- **System Components** for a detailed description on the UPS.

Machine ON Push-button

The **green MACHINE ON** push button is used to start the system. The button has an indicator light that is illuminated when power is supplied to the system. The button is identified with the international symbol **I**.

Machine OFF Push-button

The **white MACHINE OFF** push button is used to shut down the system at the end of an operation. Be sure to follow the proper shut down sequence of the system. The button is white and is identified with the international symbol **O**.

Machine RESET Push-button

The **blue MACHINE RESET** push button is used to reset the safety relay circuit after:

- An E-STOP button has been pressed
- A circuit ground fault has occurred
- Power has been lost
- The Main Power (Lockout/Tagout) switch has been turned off.

The button is identified with the international symbol of a dot and a circular arrow  .

Syringe Air Pressure Gauge and Adjustment Knob

The dispense bay is equipped with an air pressure adjustment knob and air pressure gauge used to set the pressure on the syringe. Adjust the knob as desired based on the current reading on the gauge. Turning the knob clockwise increases the air pressure. Turning the knob counterclockwise decreases the air pressure.

Main Power Switch (Lockout / Tagout)

The **Main Power Switch** is used to disconnect the entire system from any external electrical power source. The switch is used primarily during maintenance or in the event of a system down condition. The switch is also referred to as a **Lockout/ Tagout** switch, because in the OFF position, it can be fitted with a padlock, to perform maintenance and prevent power from being applied to the system.

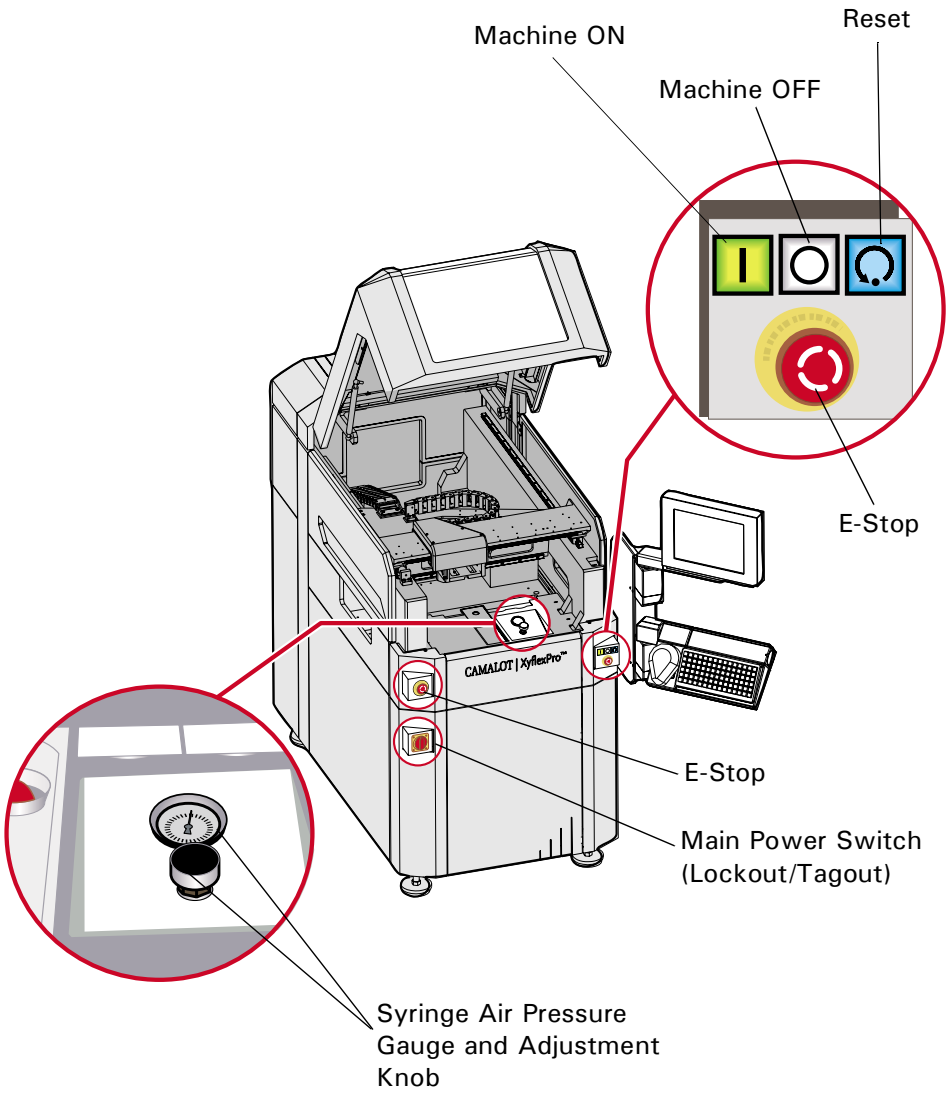

Machine ON
Reset
Machine OFF
E-Stop
CAMALOT | XyflexPro™
E-Stop
Main Power Switch
(Lockout/Tagout)
Syringe Air Pressure
Gauge and Adjustment
Knob

Figure 3-1

Rear Panel Controls

Introduction

The following Rear Panel Controls are illustrated in Figure 3-2.

Emergency Stop Switch

There is one **red Emergency Stop (E-STOP)** palm switch located on the left-hand side on the back of the system. The entire system is shutdown when an **E-STOP** is pressed. If the emergency situation is not cleared, the uninterruptible power supply (UPS) will begin a controlled computer shutdown. Refer to Chapter titled- **System Components** for a detailed description on the UPS.

Air Regulator and Filter

The **Air Regulator/Filter** controls the incoming air pressure. XyflexPro works with a recommended 80 PSI (5.6 kgf/ccm^2). To adjust the pressure pull up on the black adjustment knob until it “snaps”. Rotate the knob clockwise to increase the inlet air pressure or counterclockwise to decrease the inlet air pressure. When the desired pressure is shown on the gauge, push the black adjustment knob down until it snaps into place. This locks in the current setting.

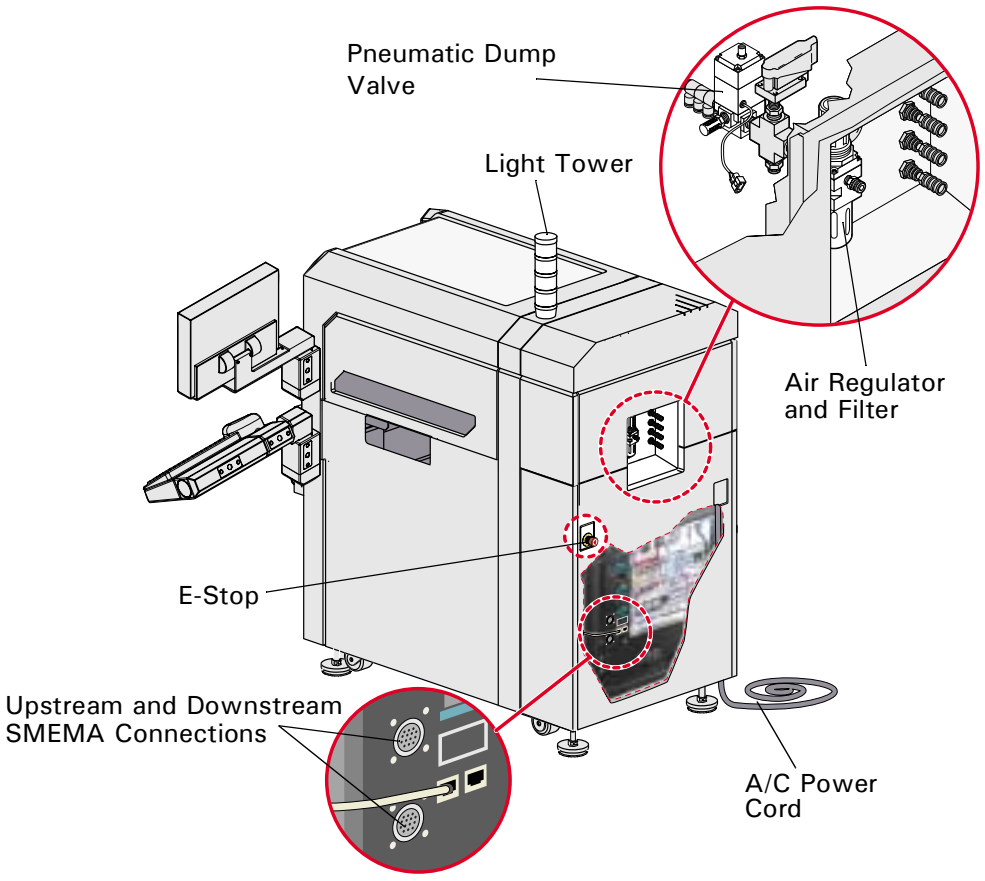


Figure 3-2

Light Tower

Introduction

The light tower (located on the top of the system, see Figure 3-2) features different colored lights which are used as visual indicators to identify the system's operating status.

Light Indicators

Blue Light (CE systems) - Flashes when operator attention is needed, such as a material low condition. This light can be On with the amber and/or green lights.

Red Light (Non-CE systems) - Flashes when operator attention is needed, such as a material low condition. This light can be On with the amber and/or green lights.

Amber Light - Flashes when the safety door is open or there is a system error such as a motion control error.

Green Light - On constantly while the system is dispensing. Flashes when idle. Will not go On if Amber light is On.

Trackball

Introduction

The XyflexPro system uses a trackball pointing device to provide easy access to menu controls, software loading, and PC operation. It is used extensively in programming and running process programs.

Controls

Ball - The ball controls cursor movement.

Left Button - The left trackball button is used to execute commands, to make menu and dialog selections, and to select entries.

Right Button - The right trackball button is used to bring up a secondary dialog window that will be used to: Select a head to move, a camera, or perform a process program offset or close boxes.

The right button is also used to lock an axis (X or Y) for precise placement. This is accomplished by pressing the right button while moving the head. The axis which has moved the least is zeroed to the coordinate of the previous command.

4

Startup And Shutdown

Overview

Introduction

This chapter details the procedures for routine start-up and shutdown of the XyflexPro system. A procedure is included on how to recover from a power failure or E-STOP condition. A brief description is also included of daily maintenance and cleanup prior to shutting down the system.

The operator should be familiar with the location and function of all system operating controls before attempting to startup or operate the system. See Chapter titled - **Controls and Indicators** for further information.

Attention

When performing any procedure in this section, the command word **"Select"** refers to the operator to use the trackball and click the left button.

In This Chapter

This chapter contains the following topics.

System Startup

Introduction

Routine start-up of the XyflexPro system involves a combination of mechanical and software tasks.

Equipment Starts Automatically

Use extreme caution if the system is reset without a full Power Down. Motion from the Lift Chuck and Edge Clamping can result during a partial system reset.

Refer to section titled - **System Shutdown** for a complete procedure on Powering Down the System.

Attention

This procedure is for normal system startup of the XyflexPro. It is assumed that the system was powered down using the standard shutdown procedure. If the blue light on the front panel indicator is flashing, refer to section titled - **E-Stop and Recovery** for instructions on restarting the system.

Procedure

The following procedure is for daily system startup:

Check to be sure that the inlet air supply is at least 80 PSI (5.6 kgf/cm^2). Adjust the air/filter regulator on the back of the XyflexPro if necessary.

Remove any loose articles (clothing, tools, fixtures, etc.) from the work area.

Ensure the safety door is closed and locked.

1. Push the **green Machine On** push-button (identified by an **I**)(located on the right front panel) to turn On the system.
2. Open the front door to gain access to the **Uninterruptible Power Source (UPS)** and **Computer**. See Figure 4-1.

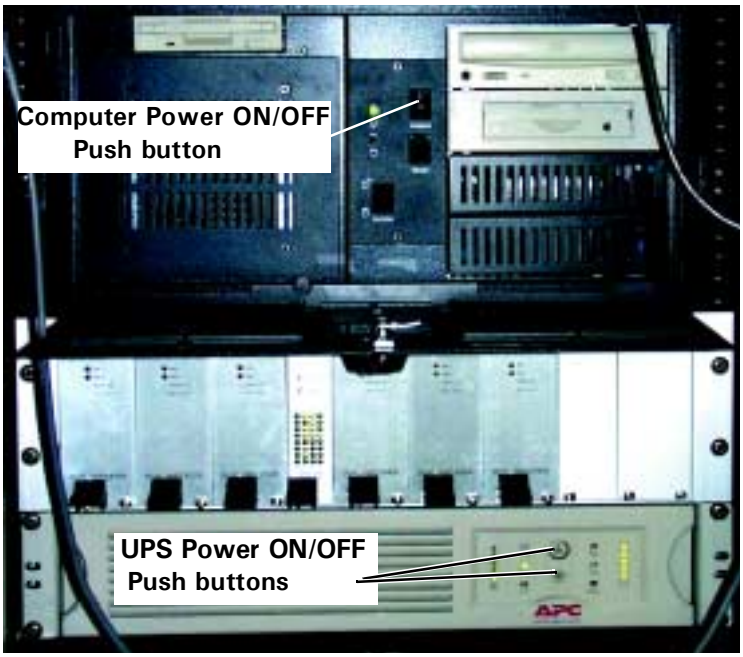


Figure 4-1

3. Press the round **Power On** push-button (identified by an **I**) on the front panel of the **UPS**.
4. The computer starts up. If the computer does not start up, press the **Power On** push-button located on the front of the computer to turn it On.

The computer goes through a standard boot sequence and eventually a screen prompt appears:

5. Press **Ctrl** + **Alt** + **Delete** keyboard keys together when prompted. A login window appears.

Attention

All users must be assigned a user name and password in order to access the Benchmark software. If you are unable to login, see your system administrator.

6. Type your user **name** and **password** and press **Enter**. The Benchmark Main screen will appear. See Figure 4-2.

Figure 4-2

7. Select **File** > **Connection.** The **Connection** dialog box appears. See Figure 4-3.

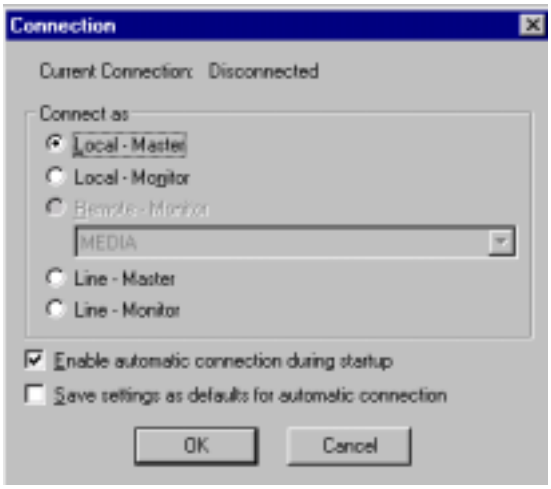


Figure 4-3

8. Select the following: Connect as **Local - Master** radio button and the **Enable automatic connection during startup** box.
9. Select **OK**.

The **Initialize** screen appears. See Figure 4-4.

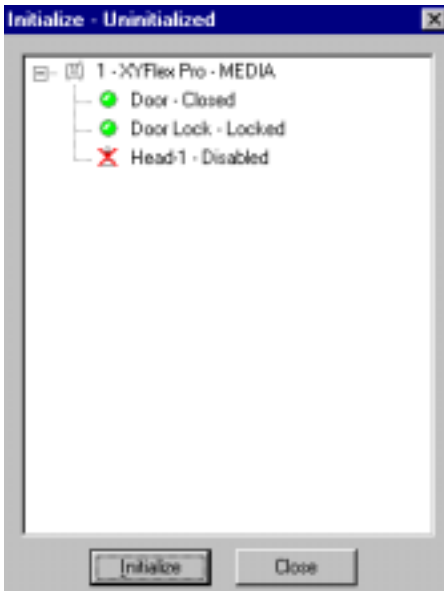


Figure 4-4

10. Select the **Initialize** button.

If the XyflexPro system is equipped with a weight scale and is enabled, the **Replace Weight Scale cups(s)** message screen appears. See Figure 4-5.

This message only appears once, until the system is shutdown and restarted.

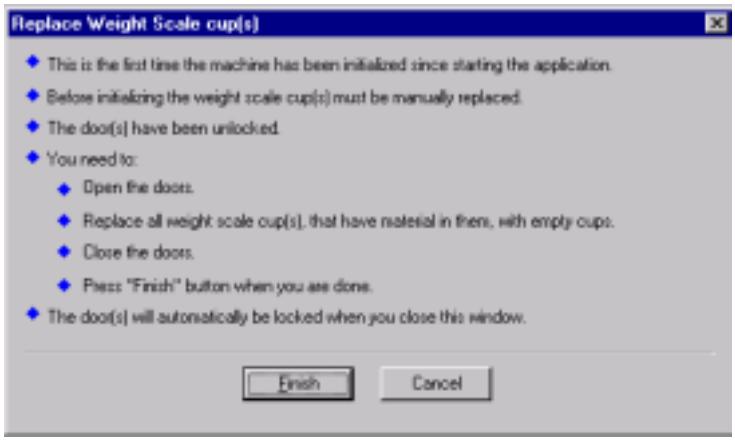


Figure 4-5

11. Unlock the safety door and remove and replace the purge cups at each head as described on the on screen message.
12. When all the purge cups have been replaced and the safety door is down and **locked**, press the **Finish** button.

The system will continue its normal initialization process and will also zero out the weight scale automatically. When the system has finished its initialization the XyflexPro is now ready for operation.

Safety Door Lock/Unlock

Introduction

In order to gain access to the dispensing area it is necessary to deactivate the safety door lock. The XyflexPro door lock is operated from the padlock icon located on the Main toolbar.

Additionally, the safety door has an access hole to insert a tool to open the door manually in case of a power failure.

Door Lock/Unlock Icon

When the system is running and you need access to the dispense area, select the **padlock** from the Main toolbar. This will Lock or Unlock the safety door. See Figure 4-6.

Figure 4-6

Unlocking the Safety Door Manually

The safety door may be opened manually in case a power failure or during initial installation of the system.

Open the safety door manually as follows:

1. Insert the tapered end of the manual release tool into the access hole in the right side of the safety door. See Figure 4-7.

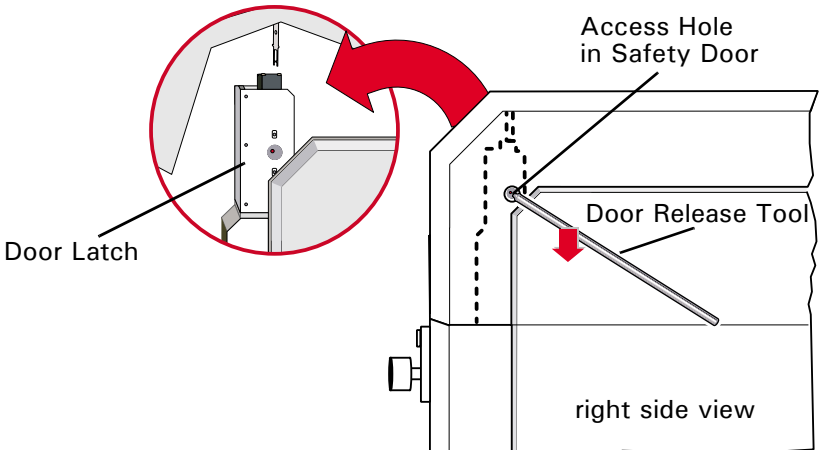


Figure 4-7

2. Push the tool straight in until the end engages the lock mechanism.
3. While lifting the door, move the tool straight down until the lock releases.
4. Raise the safety door.

System Shutdown

System Disconnect

The following procedure is for normal daily shut down:

1. Make sure safety door is closed and locked.
2. Select **File > Disconnect** from the Machine screen.

The CAMALOT BENCHMARK screen will appear with the word Disconnected at the top right-hand side of the screen. See Figure 4-8.

Figure 4-8

Attention

The operator has a choice at this point either to leave the system alone (idle) at this screen for the next operator or to continue powering down the system. Refer to section titled - **Powering Down the System**.

Powering Down the System

This procedure assumes the system has already been Disconnected, with the CAMALOT BENCHMARK on the screen. See Figure 4-8.

Power down the system as follows:

1. Exit the Benchmark software by clicking on the **X** in the upper right-hand corner of the screen.
2. Select the Windows NT® **Start** menu (located in the lower left-hand corner).
3. Select **Shut Down** from the menu.
4. Select **Shut down the computer?** radio button from the list. See Figure 4-9.

Figure 4-9

Equipment Starts Automatically

If the computer is reset without having fully powered down the machine, motion from the Lift Chuck and Edge Clamping can result.

Follow the complete **System Shutdown** procedure to avoid this condition.

Select the **Yes** button and wait for the message: **It is now safe to turn off your computer**. If **Restart** is selected, the computer will not get powered down. See Figure 4-10.

Figure 4-10

5. Press the white **MACHINE OFF** push button on the right front panel. See Figure 4-11.
6. Turn **Off** the UPS with the round **Push button**. See Figure 4-1.

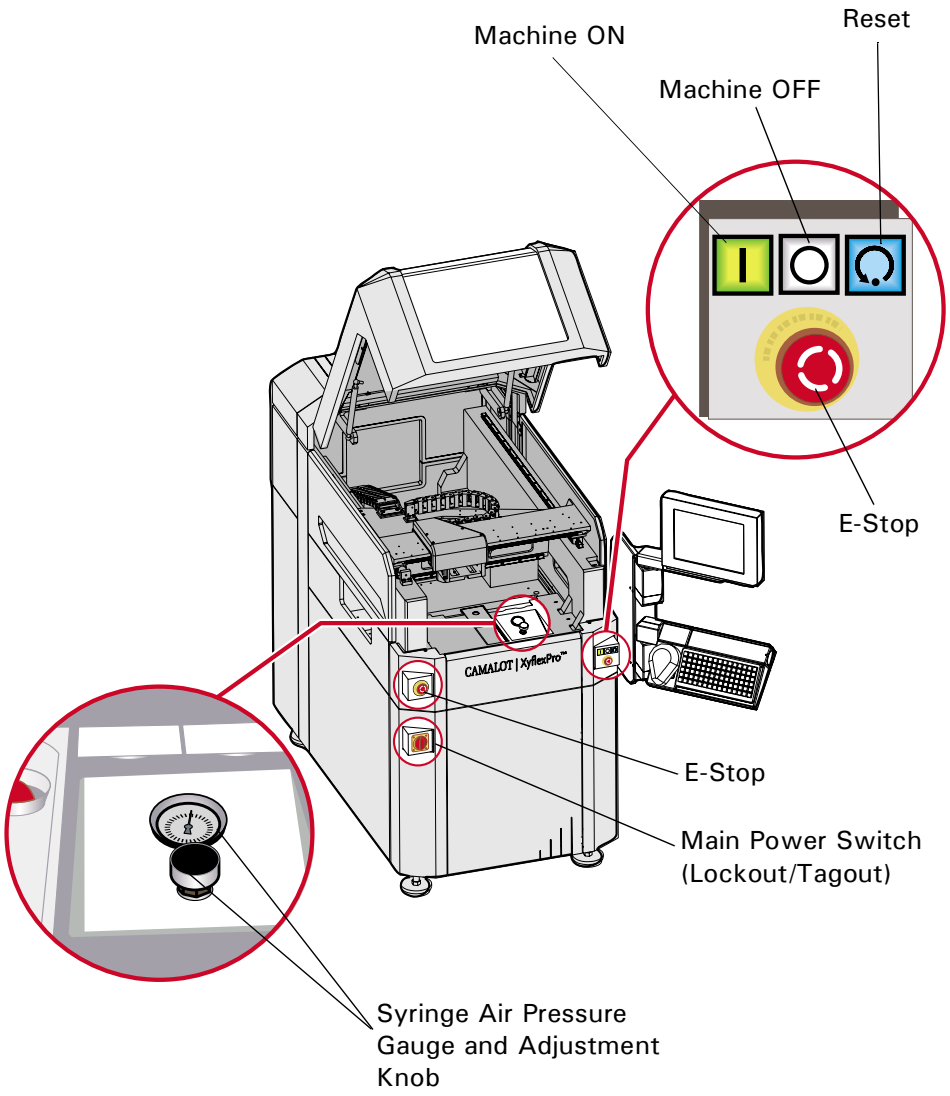

Machine ON
Reset
Machine OFF
E-Stop
CAMALOT | XyflexPro™
E-Stop
Main Power Switch
(Lockout/Tagout)
Syringe Air Pressure
Gauge and Adjustment
Knob

Figure 4-11

E-Stop And Recovery

Introduction

There are three **red E-STOP** palm switches located on the XyflexPro system. Two on the front and one in the rear. When any one of the palm switches is pressed, or a power failure occurs, all electrical power and pneumatic pressure is terminated with the exception of the XyflexPro computer which is automatically switched over to the UPS's battery power.

Attention

If the UPS is not turned off, the battery will gradually discharge until normal system power is restored.

In the event that the XyflexPro is powered down with an E-STOP switch, you need to log out, shut down the computer and the UPS system. Refer to section titled - **System Shutdown**.

The blue light indicator on the front panel will be flashing following an E-STOP occurrence or power failure.

Recovery Procedure

To restart the XyflexPro after a power failure or E-STOP occurrence:

1. Turn the **E-STOP** switch clockwise while pulling it out.
   (If E-STOP was used.)
2. Press the **blue Reset** button on the right front system panel. See Figure 4-11.
3. Startup the XyflexPro normally. Refer to section titled - **System Startup**.

Routine Maintenance

Dispense Units

Prior to shutting down the system, you should clean the dispense material that may have spilled or leaked onto the system according to the applicable MSDS sheet. Remove all loose tooling and dispense units. Refer to the appropriate **dispense unit option** for the proper **daily** cleaning procedure.

Chemical Hazard

Be sure the applicable Material Safety Data Sheet (MSDS) Warnings are observed.

Conveyor Rails

Once a month apply a thin coat of Rust Preventive to all slide rails. Refer to Chapter titled - **Preventive Maintenance**.

5

Conveyors And Heated Chucks

Overview

Introduction

Conveyor hard stops are used on XyflexPro models configured for semiconductor and SMT applications. Systems configured to SMT applications will have the sensor attached to the hardstop. Systems configured to semiconductor applications will have the sensor(s) mounted on the rear conveyor rail.

The hard stops are adjustable from front to back on a slide mounted on the base plate. The stop is positioned between the conveyor rails and is mounted on the slide at the extreme right in the dispense zone. The sensor reacts to the leading edge of the board as it passes by the sensor, this slows the conveyor belt down.

Heated chucks are an option used to heat the substrate to a set temperature. The chuck heat is set and maintained using system software which is set through the Temp Control screen. The software monitors the temperature and will trigger an Alarm condition when the temperature either drops below or goes above the set temperature range. Heated chucks may be placed and used at Predispense, Dispense, and Postdispense stations.

Equipment Starts Automatically

Use extreme care when working around Conveyor Hard Stops, Lift Chucks, and Edge clamps. These components will cycle if the system was partially reset during system shutdown.

Refer to Chapter titled - **Startup And Shutdown** for a complete procedure on Powering Down the system properly to avoid this condition.

Attention

When performing any procedure in this section, the command word **"Select"** refers to clicking the left trackball button.

In This Chapter

This chapter contains the following topics.

Adjusting Conveyor Hard Stops

Procedure

Adjust the conveyor hard stops as follows:

1. Loosen the socket head cap screw and position stop along the slide. Position stop so that the board does not become skewed when conveyor is in motion. See Figure 5-1.
2. Tighten the cap screw after the stop is set at the desired location between the front and rear conveyor rails. See Figure 5-1.

Figure 5-2 shows a typical board sensor mounted on the conveyor rear rail.

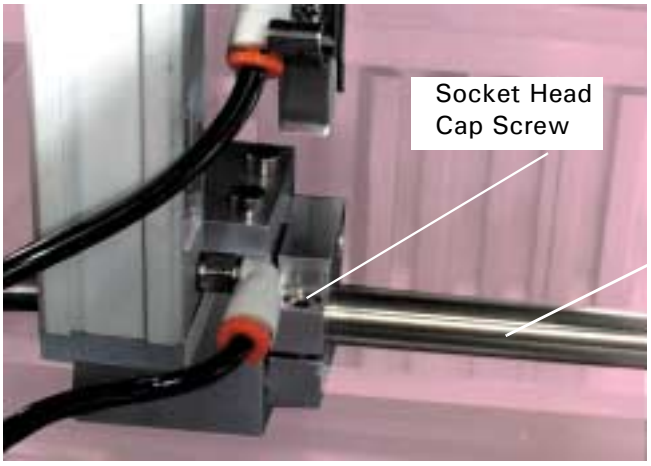


Figure 5-1

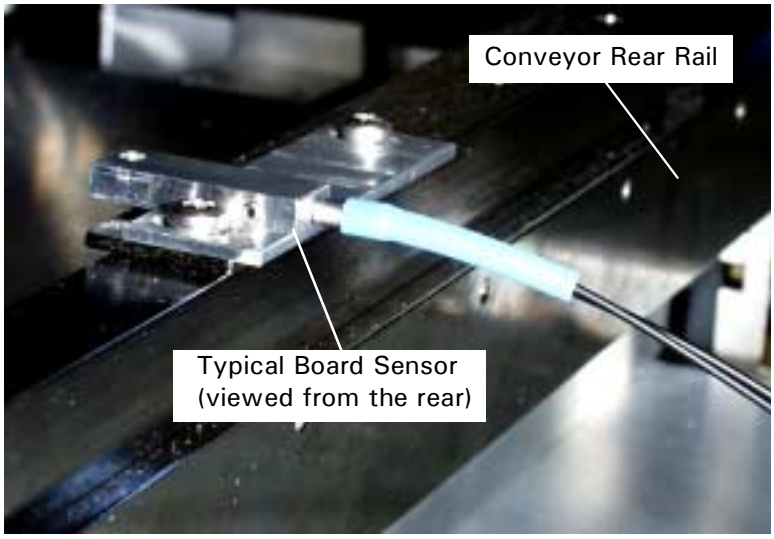


Figure 5-2

Adjusting Conveyor Width

Procedure

The conveyor width can be adjusted to handle different board sizes. Adjust conveyor rail width to match the process board width as follows:

1. Select **View** > **Diagnostics** or select the **Diagnostics**  **icon**.

   Select the **Conveyor Maintenance** tab. See Figure 5-3.

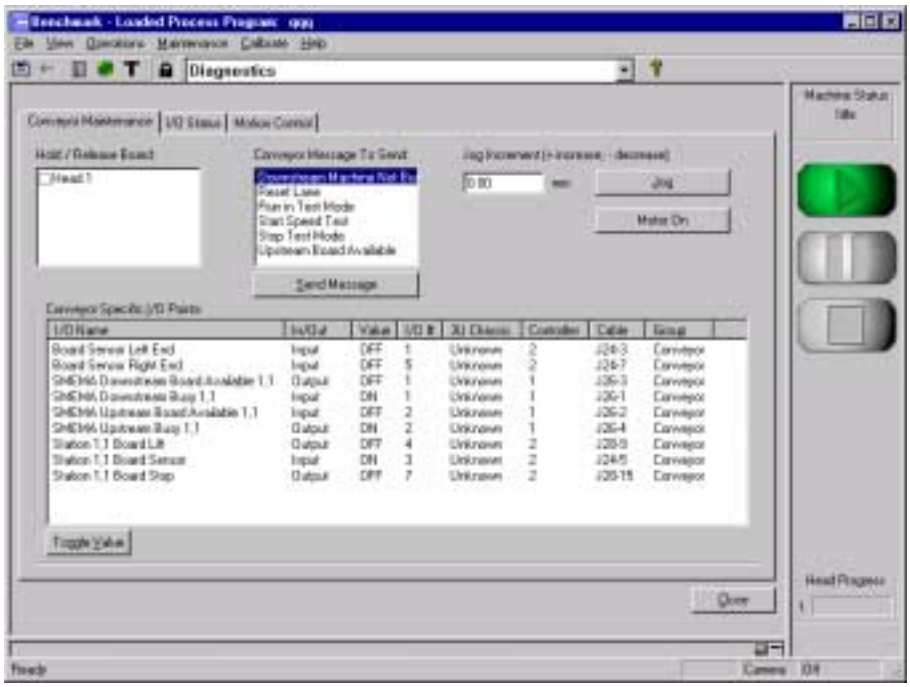


Figure 5-3

2. Place the process board onto the conveyor belts. Determine whether or not the conveyor rail width needs to be adjusted to match the process board width.
3. Select the **Jog Increment** field. Enter a value that will jog the rear rail either open or close.
4. Press the **Jog** button until the conveyor width opening matches the process board width.
5. Select the **Close** button to close the **Diagnostics** screen.

The conveyor rail width is now set.

Setting Conveyor Speed

Introduction

Setting the Conveyor Speed is part of the system calibration, refer to Chapter titled - **Calibration and Offsets** for this procedure and more detailed information.

Loading Boards Onto The Conveyor

Conveyor Modes

There are three modes of conveyor operation - **Off**, **Automatic,** and **Pass Through**.

When the **Off** mode is selected, the conveyors do not operate. A dispense program can be created and fiducials taught without concern of boards being moved through the system.

When the **Automatic** mode is selected, a loaded process program can be dispensed. This mode is used when the XyflexPro machine is operating in a production process.

When the **Pass Through** mode is selected, a board enters the system and moves to the predispense or dispense position where the board stop sensor is made. The board briefly remains at this position until the **Upstream Board Available** signal is received. The board then exits the machine as another board enters the system. The process of boards entering and exiting the system is continuously repeated as long as the **Pass Through** Mode is selected. This mode is used when the XyflexPro system has no function in the overall production process. The boards are ignored by the system and pass through to the downstream system.

Procedure

Load boards onto the conveyor as follows:

1. Select **Operations > Conveyor Mode > Automatic** from the **Machine screen**. See Figure 5-4.
2. The conveyor mode may also be selected as follows:
   a. Move cursor from the **Machine screen** down to the **Conveyor Status window**, located in the lower right-hand corner of the screen. See Figure 5-5.
   b. Click the right button on the trackball and a pop-up list of conveyor modes will appear.
   c. Click the left or right button to select the **Automatic** mode.

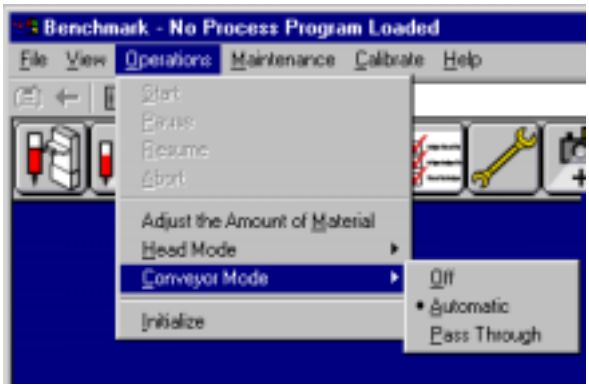


Figure 5-4

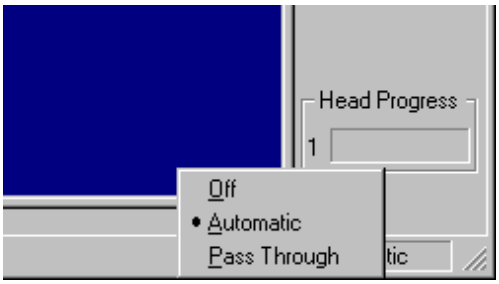


Figure 5-5

3. Select **View** > **Diagnostics** or select the **Diagnostics**  **icon** from the Machine screen.
4. Select the **Conveyor Maintenance** tab. See Figure 5-3.
5. Select the Heads to which you want to load boards by placing a check in the **Hold/Release Board** list box ☑ .
6. Place a board onto the conveyor upstream of Head 1 so that the upstream (input) sensor is made.
7. Select **Upstream Board Available** from the **Conveyor Message To Send** list box.

Attention

The **Motor On** button may be pressed at any time to activate the conveyor. This is normally used to clear a board from within the machine.

8. Select the **Send Message** button.

The board will enter the system and be clamped at the dispense station.

Setting The Heated Chuck Temperature

Introduction

Temperature controls are used to set and regulate heated chuck temperature using system software. There is no physical push button for the temperature controllers located on the front of the system.

Go to the Machine screen, place the cursor over to the **TEMP CONTROLLER** button shown on the right front panel of the machine. This button either turns the power **ON** or **OFF** to all of the temperature controllers. See Figure 5-6.

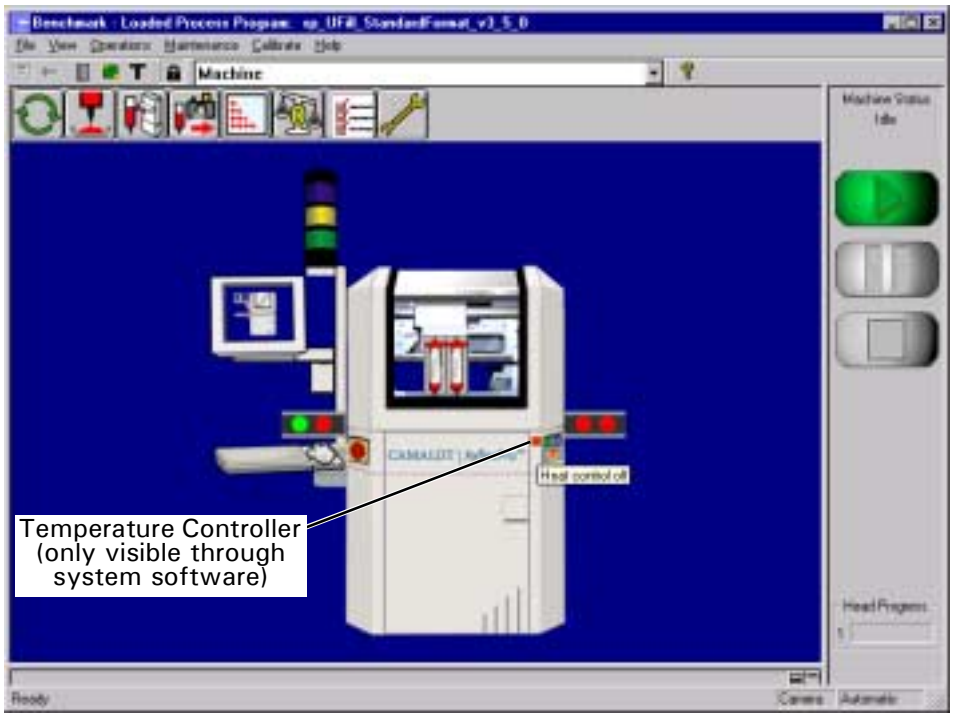


Figure 5-6

The button will be colored **Green** if the POWER is **ON** to all of the temperature controllers.

The button will be colored **Red** if the POWER is **OFF** to all of the temperature controllers.

To change the temperature controllers condition, place cursor on the **Temp Controller button** and click the left button on the trackball. The button will change color according to the desired condition.

Procedure

Set the temperature for each heated chuck as follows:

1. Select **View > Configuration > Temperature** tab from the Machine screen. Each heated chuck temperature is set from this screen. See Figure 5-7.

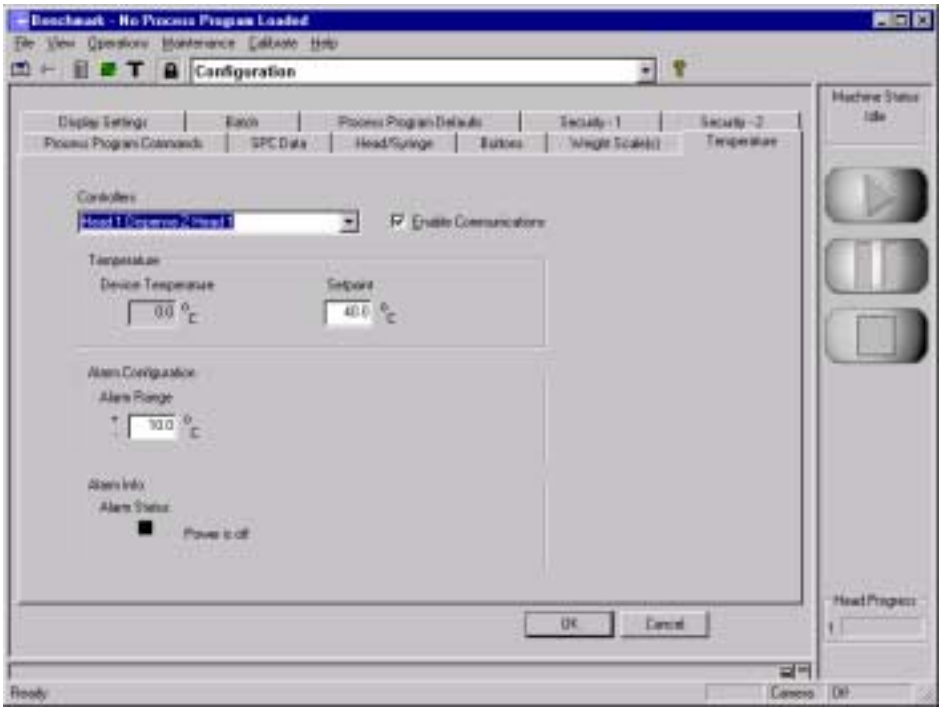


Figure 5-7

2. Select the arrow next to the **Controllers** drop down box. Scroll down the list until the desired chuck appears. Select the chuck.
3. Check the **Enable Communications** box☑ to supply heat to chuck in the **Controllers** field.

If the **Enable Communications** box is blank, the chuck selected in the **Controllers** field is disabled.

4. Select the **Setpoint** field. Using the keyboard enter the desired temperature.
5. Select the **Alarm Range** field. Using the keyboard enter the desired temperature deviation from **Setpoint** field to alert an Alarm Condition.
6. Select the **OK** button.
7. Repeat step 2 through step 6 for the remaining heated chucks.

Heated Chuck Alarm Condition

The **Alarm Info** field displays a color coded box under the **Alarm Status**. The color indicates the condition of the chuck. If an Alarm condition occurs, review the table below and troubleshoot accordingly.

The following is a chart indicating a Color Display and Message indicating what caused the Alarm Condition.

Color Display	Message
Black	Controller disabled
Black	Power is off
Black	Communication failure
Green	In temperature range
Yellow	Ramping up to operating temperature
Red	Out of temperature range

To clear an alarm condition, refer to Chapter titled - **Alarms and Troubleshooting**.

6

Calibration And Offsets

Overview

Introduction

This chapter contains several calibration and offset procedures which are required prior to a running a process program. The various calibrations are not always required every time the machine is ready to run a process program. Read each calibration description to determine when the procedure should be performed.

Attention

Only those individuals assigned privileges are allowed to perform or change system calibrations and offsets. Refer to Chapter titled - **System Administration and Security**.

Attention

When performing any calibration procedure in this section, the command word **"Select"** refers to placing the pointer on an object and clicking the left trackball button.

In This Chapter

This chapter contains the following topics.

Camera Calibration

Introduction

Camera Calibration is used to teach the system the relationship between the camera's measurement of distance and actual physical movement of the dispense unit. The camera uses individual picture elements called pixels to measure size and distance.

Accurate Camera Calibration is essential in order for the vision system to:

- Accurately compensate for misaligned programs.
- Provide the operator with an accurate view of the exact dispense location.

Camera Calibration is required during initial installation. This process does not need to be repeated unless the camera position or focal length is altered.

Procedure

Attention

Selecting the **Cancel** button at any point aborts the procedure.

Perform the Camera Calibration as follows:

1. Be sure that the safety door is closed and locked.
2. Select **Calibrate > Camera**.
   The **Camera Calibration** screen appears. See Figure 6-1.

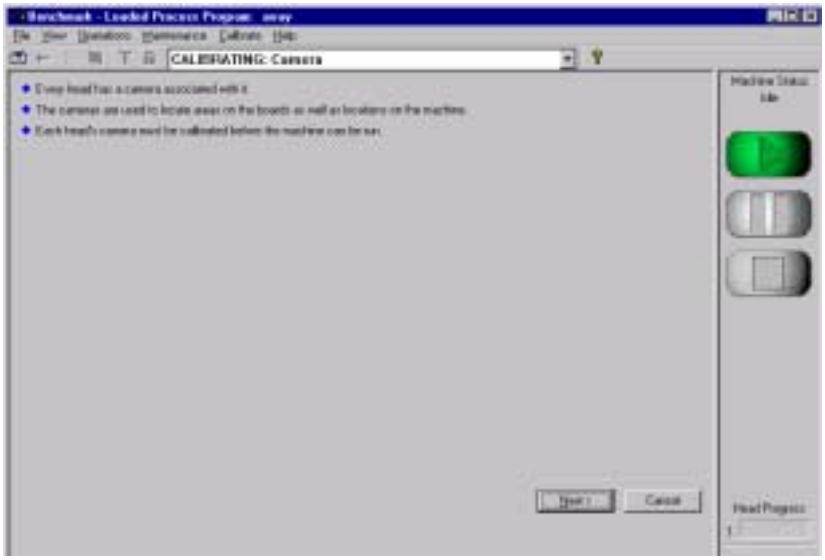


Figure 6-1

3. Read the on-screen notes regarding the calibration and select the **Next>** button.
   A selection box appears within the **Camera Calibration** screen.
   See Figure 6-2.

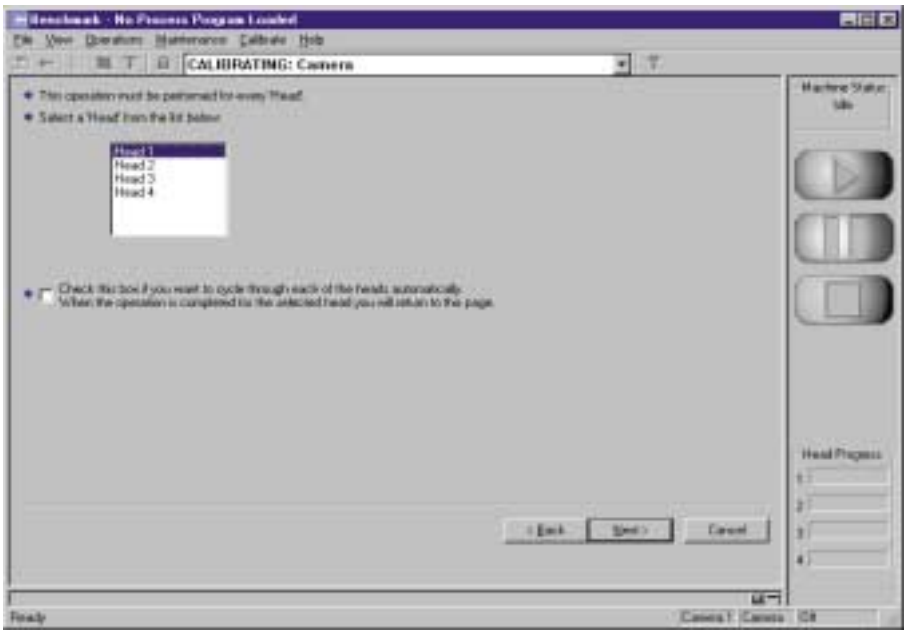


Figure 6-2

4. Select Head 1 in the selection box, and select the **Next>** button.
   A vision window appears in the **Camera Calibration** screen.
   See Figure 6-3.

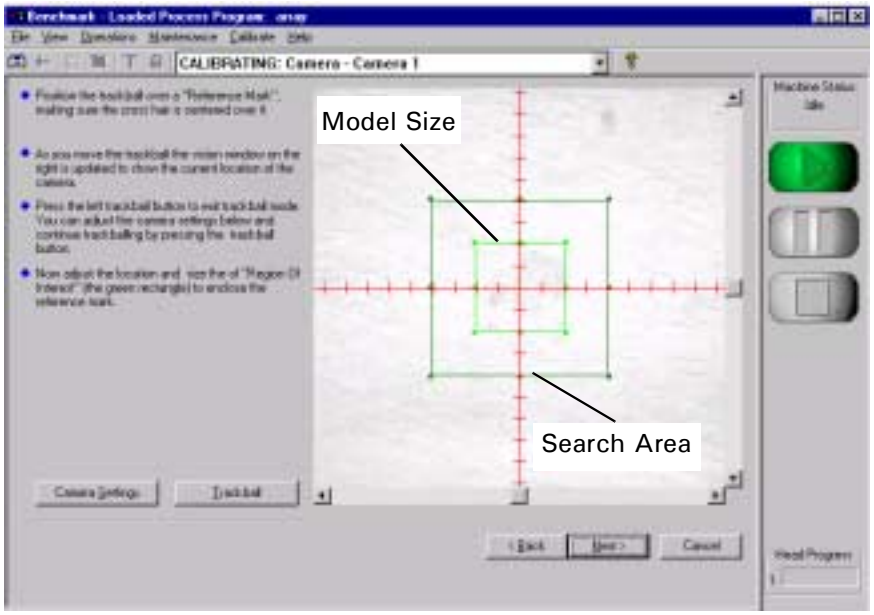


Figure 6-3

5. Select the **Trackball** button.
6. Using the trackball, move the crosshairs in the **Vision** window to the center of a unique reference mark on the board such as a fiducial mark. Be sure that the reference mark is in focus and has proper illumination. This determines the quality of the image.
7. If necessary, adjust the camera focus and lighting to desired settings as follows:
   a. Select the **Camera Settings** button. The **Camera Settings** screen appears. See Figure 6-4.
   b. Adjust the **Zoom, Brightness,** and **Contrast** as desired by selecting the applicable up or down arrow for each field.
   c. After desired settings are complete, select the **Close** button.

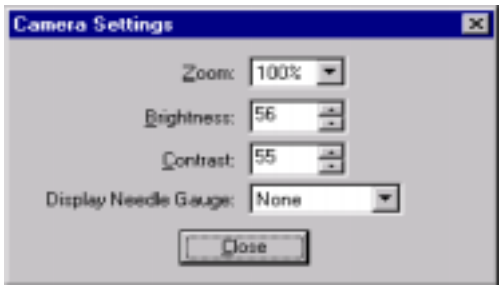


Figure 6-4

8. If necessary, adjust the **Model Size** and/or **Search Areas** as follows. See Figure 6-3.

Attention

The **Model Size** and **Search** areas are represented in the vision window by green bounding boxes. The bounding boxes have square handles at each corner which are used to resize them.

   a. Place the pointer on any one of the square handles at the corners of the bounding box.
   b. Click on a handle (a double headed arrow appears).
   c. Using the trackball change the size of the box to properly surround the reference mark.
   d. Click the left trackball button to accept the change.
9. Select the **Next>** button.
   The system attempts the Camera Calibration with the above information.

Calibration Successful

If the Camera Calibration was a **Success,** the **Camera Calibration** screen displays a "successful" message, a new set of scale factors, and how many degrees the camera is inclined from zero.
See Figure 6-5.

If the Camera Calibration encountered an error, an error message and vision window are displayed.

Refer to the section titled - **Calibration Error**.

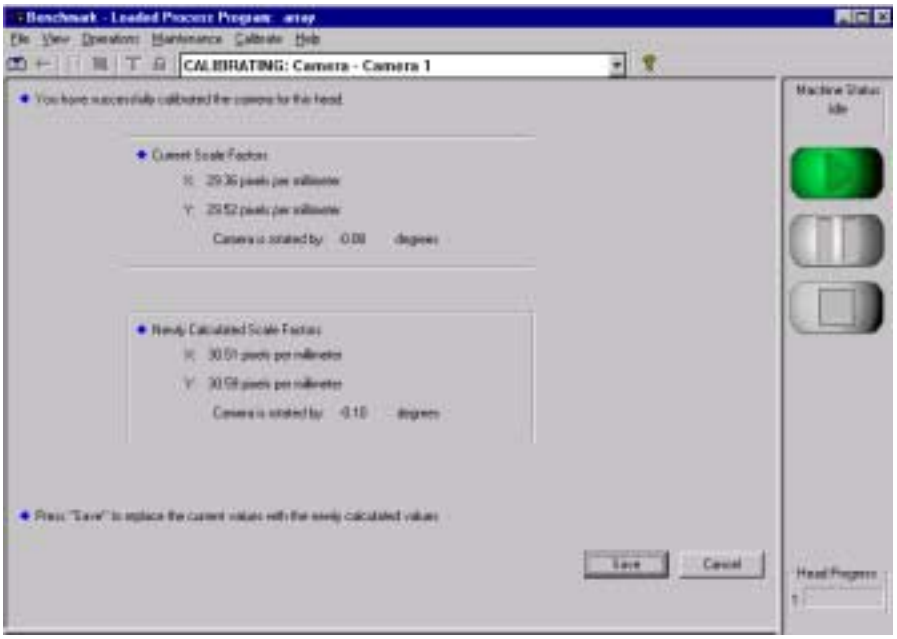


Figure 6-5

Select the **Save** button to accept the X/Y pixel count.

The saved pixel count replaces the previously stored values in the database.

You are returned to the **Machine** screen.

Calibration Error

If a calibration error occurs, an error message and a vision window are displayed in the **Camera Calibration** screen. See Figure 6-6.

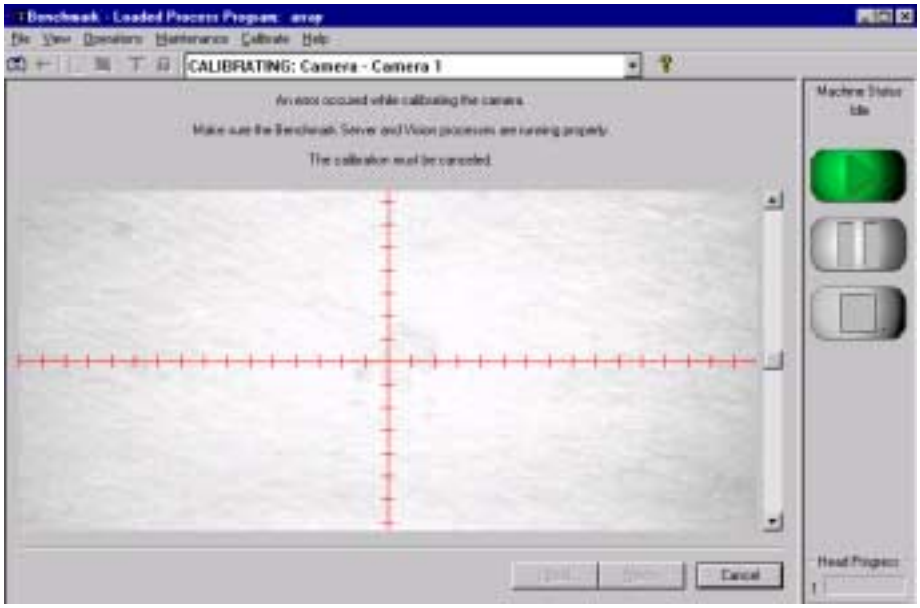


Figure 6-6

Select the **Cancel** button and repeat the Camera Calibration procedure.

Check the following prior to repeating the calibration.

- Loose camera mounting
- Loose Lens
- Benchmark Server
- Vision Processor

Manual Calibration Of Camera-To-Needle Offset

Introduction

In order for the software to determine the distance (offset) between the camera and the dispense needle, the Camera-to-Needle Offset must be taught.
The Camera-To-Needle Offset must be taught whenever the needle or dispensing unit is moved or changed.

During the calibration, three test dots are dispensed on the dispense pad or some other user taught location. The center of the middle dot is used by the vision system to establish the offset.

The Manual procedure is used when dispensing parameters or the dispense process is changed.

Head Selection And Dispense Properties

Calibrate the Camera-to-Needle Offset for each needle as follows:

Attention

Selecting the **Cancel** button at any point aborts the process.

1. Select **Calibrate > Camera-to-Needle Offset** or select the **Camera-to-Needle Offset** icon  (if enabled) on the Machine toolbar.

Attention

If the Camera-to-Needle Offset icon does not appear on the Configurable toolbar, refer to chapter titled - **Toolbars And The Process Program Grid**, for a detailed procedure on enabling and arranging buttons.

The **Camera-to-Needle Offset** screen appears. See Figure 6-7.

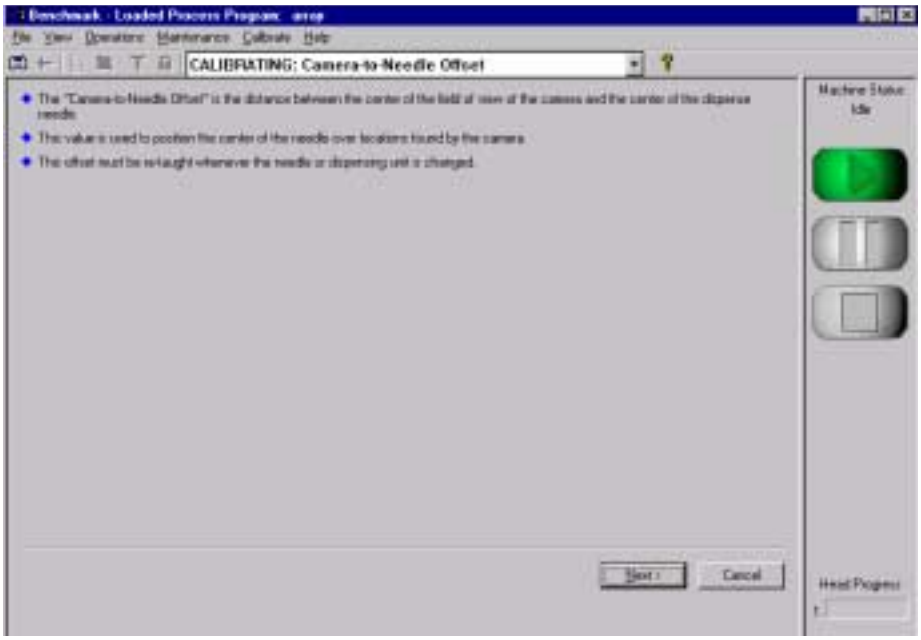


Figure 6-7

2. Read the on-screen notes and select the **Next >** button.
   A selection box is displayed in the **Camera-to-Needle Offset** screen.
   See Figure 6-8.

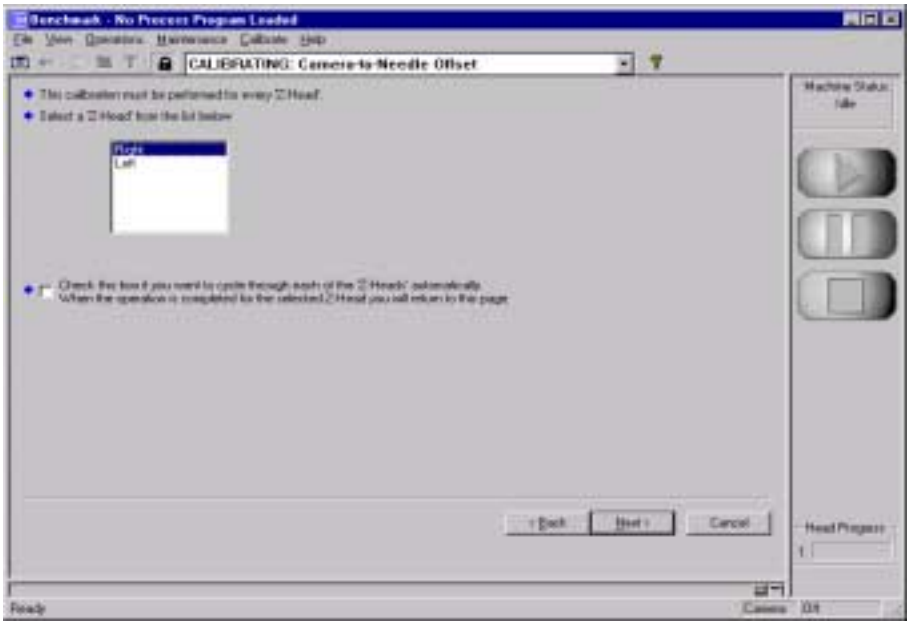


Figure 6-8

3. Select the **Head** you wish to calibrate from the list or select the check box below the list if you want to cycle through all heads consecutively.

4. Select the **Next>** button.
   Two buttons are displayed in the **Camera-to-Needle Offset** screen.
   You have the choice of dispensing test dots on the dispense pad or at a taught location of your own choosing. See Figure 6-9.

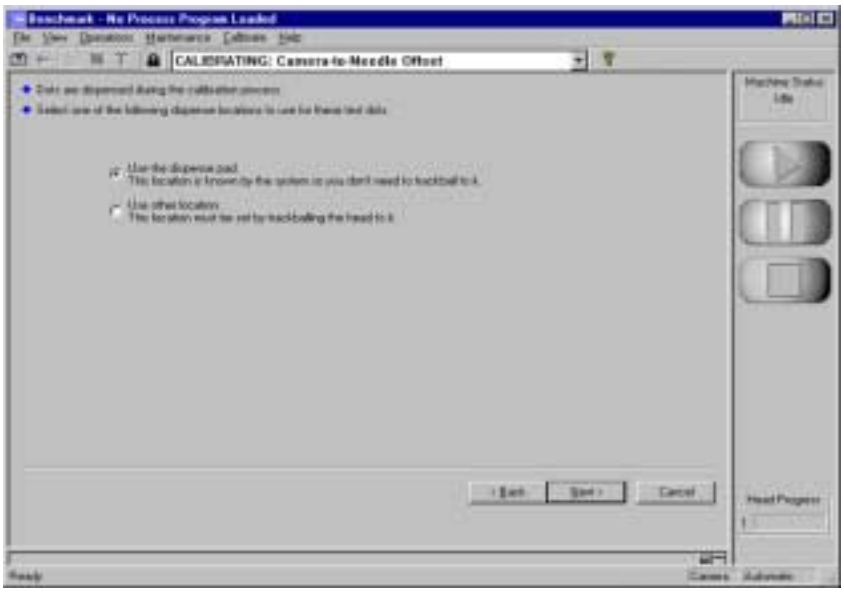


Figure 6-9

5. If you want to use another location, see the section titled - **Teaching An Alternate Test Dot Location**; Otherwise select the **Use dispense pad** button.
6. Select the **Next>** button.
   A group of dispense properties fields is displayed in the **Camera-to-Needle Offset** screen as shown in Figure 6-10.

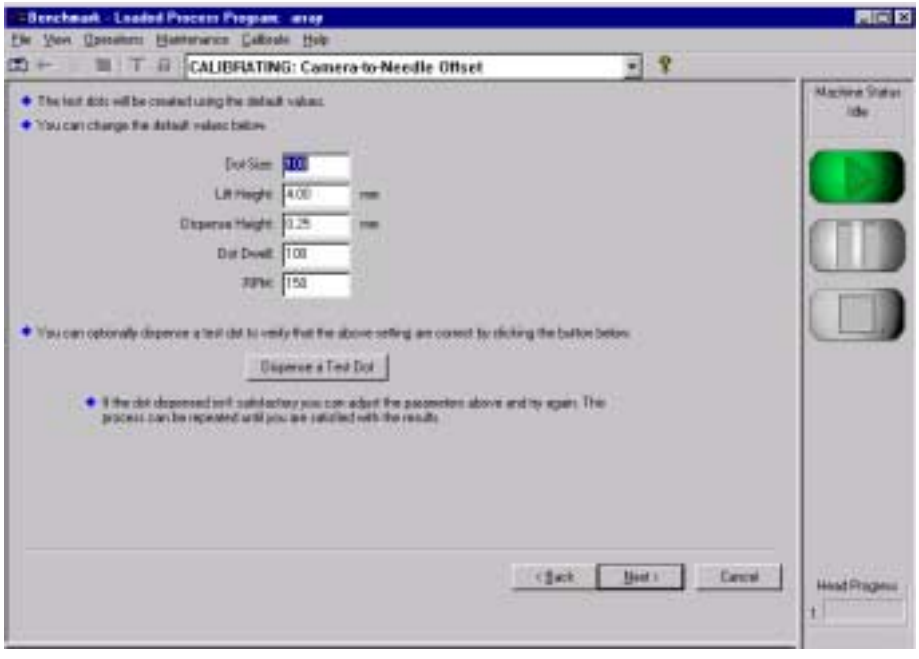


Figure 6-10

7. Adjust the dispense properties values for the **Dot Size**, **Lift Height**, **Dispense Height** (**0** if using a footed needle), **Dot Dwell**, and **RPM** if desired.
8. Verify the modified dispense properties by selecting the **Dispense a Test Dot** button.
9. Repeat steps 7-8 until the test dot is acceptable.
10. Select the **Next>** button.
    The **Dispensing Test Dot** screen appears. See Figure 6-11.
    The test dot dispense location must be clean in order for the vision system to properly evaluate the camera image. If the test dot area needs cleaning, follow the on-screen instructions before proceeding.

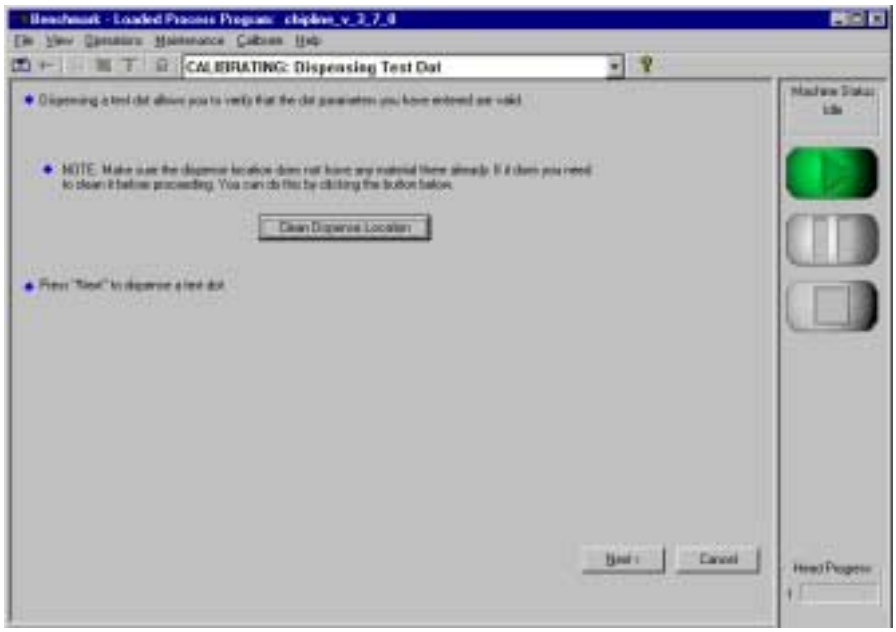


Figure 6-11

11. Proceed to the next section titled - **Performing The Calibration.**

Performing The Calibration

Perform all steps as outlined in the previous section titled - **Head Selection And Dispense Properties**.

1. From the **Dispensing Test Dot** screen, select the **Next>** button to start the calibration.
   The needle height is calibrated, and three test dots are dispensed at the dispense pad or user taught location. The vision system then attempts to find the center dot.
2. Refer to the sections titled - **Calibration Successful** or **Calibration Error**.

Calibration Successful

If the calibration was successful, a vision window is displayed with the camera crosshairs centered over the reference mark. See Figure 6-12.

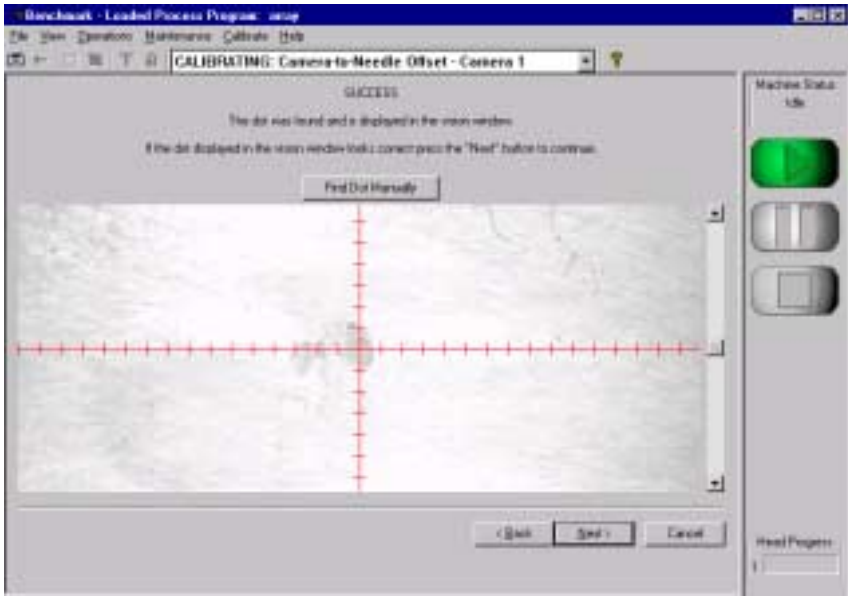


Figure 6-12

1. Select the **Next>** button to display the newly calculated X and Y Camera-to-Needle Offset values. See Figure 6-13.
2. Select the **Save** button to accept the new calibration coordinates.
   You are returned to the **Machine** screen.

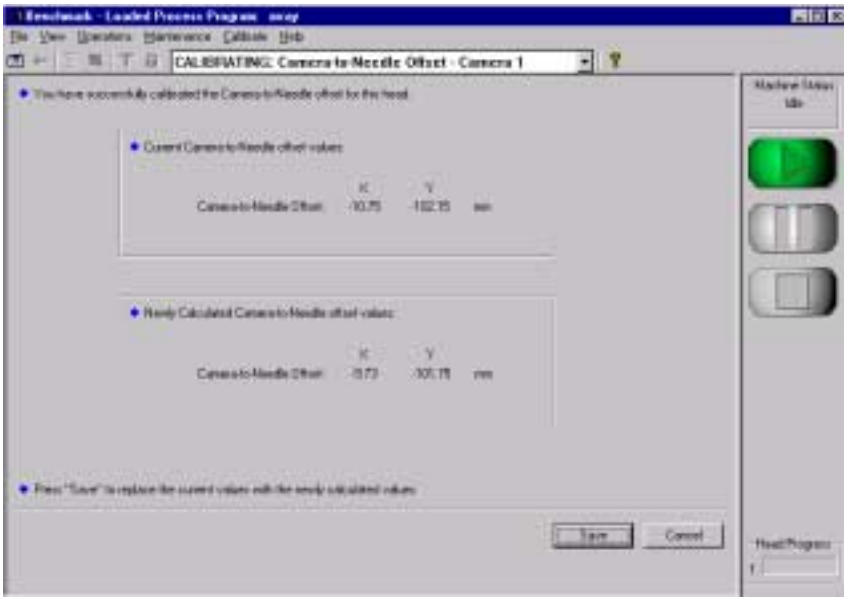


Figure 6-13

Calibration Error

If a calibration error occurs, the **Camera-to-Needle Offset** screen displays an error message and a vision window. See Figure 6-14.

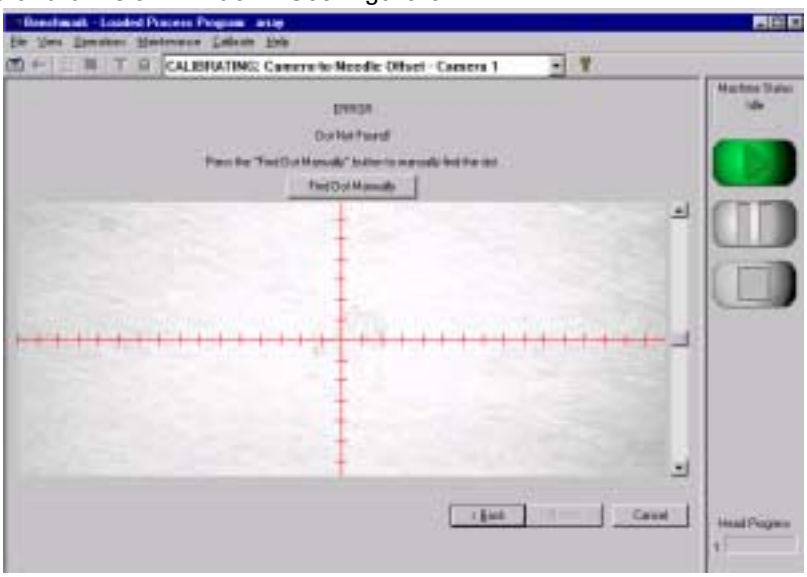


Figure 6-14

The following procedure will allow you to manually locate the center test dot:

1. Select the **Find Dot Manually** button.
   Camera Settings and **Trackball** buttons are displayed in the **Camera-to-Needle Offset** screen. See Figure 6-15.

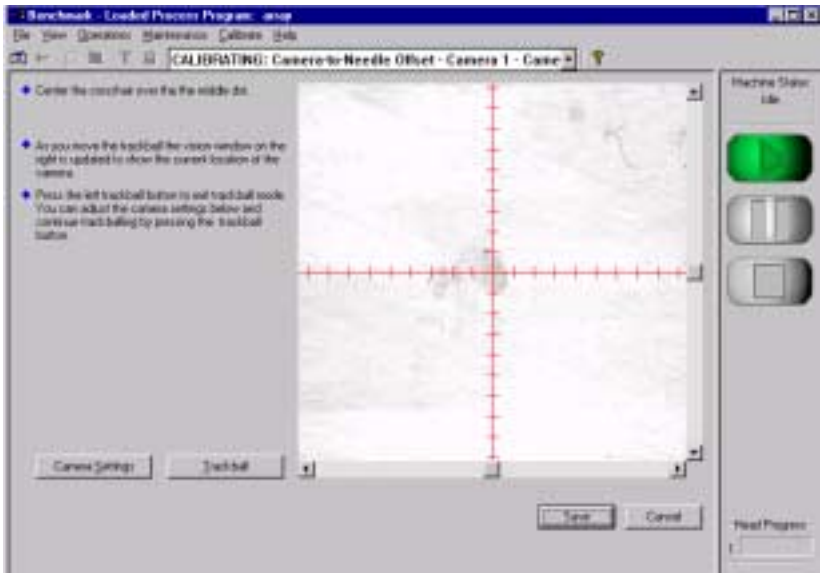


Figure 6-15

2. Select the **Trackball** button and align the crosshairs in the vision window over the center of the middle dot.
3. When the crosshairs are properly aligned, click the left trackball button. This teaches the X and Y coordinates.
4. Select the **Save** button.

You are returned to the **Machine** screen.

Teaching An Alternate Test Dot Location

The following procedure is used to teach an alternate location for dispensing the test dots during the Camera-to-Needle Offset calibration.

1. Select the **Use other location** radio button from the **Camera-to-Needle Offset** screen. See Figure 6-9.
   A vision window appears in the **Camera-to-Needle Offset** screen.
2. Select the **Trackball** button.
3. Position the camera crosshairs over the desired location.
4. When the crosshairs are positioned correctly, click the left trackball button.

This teaches the X and Y coordinate.

5. Select the **Next >** button.

The test dot dispensing parameters are displayed in the **Camera-to-Needle Offset** screen.

Calibration Of Camera-To-Needle Offset (Automatic)

Introduction

In order for the software to determine the distance (offset) between the camera and the dispense needle, the Camera-to-Needle Offset must be taught. Camera-To-Needle Offset must be taught whenever the needle or dispensing unit is moved or changed.
The Automatic Camera-to-Needle Offset procedure is used when the established dispense properties are known to be acceptable. This version saves setup time by eliminating the need to set the parameters for the dispensed dot. The Automatic Calibration uses default settings for dispensing the three test dots onto the dispense pad.

If your test dispense dot requires the parameters to be adjusted, refer to section titled - **Manual Calibration of Camera-to-Needle Offset**.

Procedure

1. Select **Calibrate > Camera-to-Needle Offset Auto** or select the **Camera-to-Needle Offset Automatic** icon  on the **Machine** toolbar.

   The **Camera-to-Needle Offset** screen appears. See Figure 6-16.
2. The test dot dispense location must be clean in order for the vision system to properly evaluate the camera image. If the test dot area needs cleaning, select the **Clean Dispense Location** button and follow the on-screen instructions.

Figure 6-16

3. Select the **Next >** button to perform the calibration.
   A vision window is displayed briefly while the vision system is aligning with the test dot. See Figure 6-17.
   If the calibration is successful, you are returned to the **Machine** screen.

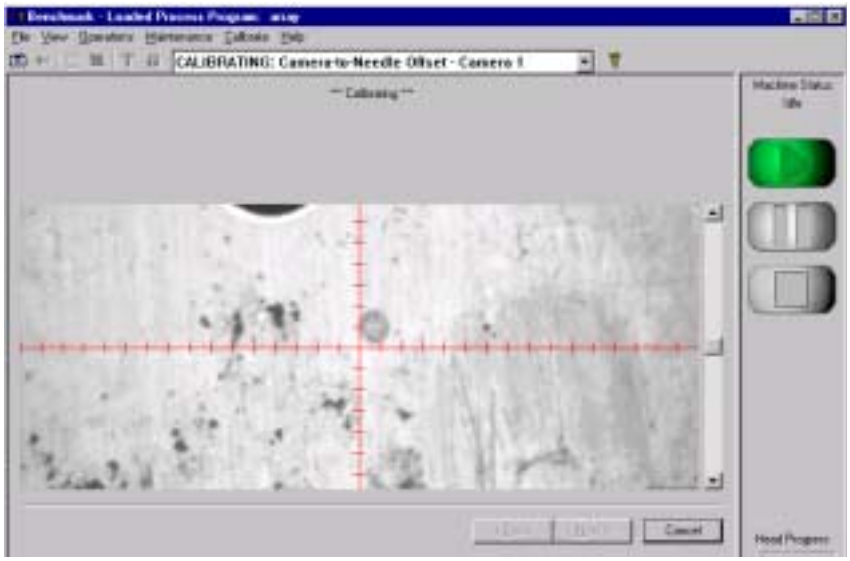


Figure 6-17

If the calibration encountered an error, refer to section titled - **Calibration Error**.

Setting Dispense Head Park Position

Introduction

Setting the Dispense Head Park Position allows the dispense head to move to a "park" position at the end of a dispense cycle. This increases throughput by allowing a park position which is in close proximity to the next dispense operation. The Park position is taught in the **Properties screen**. See Figure 6-18.

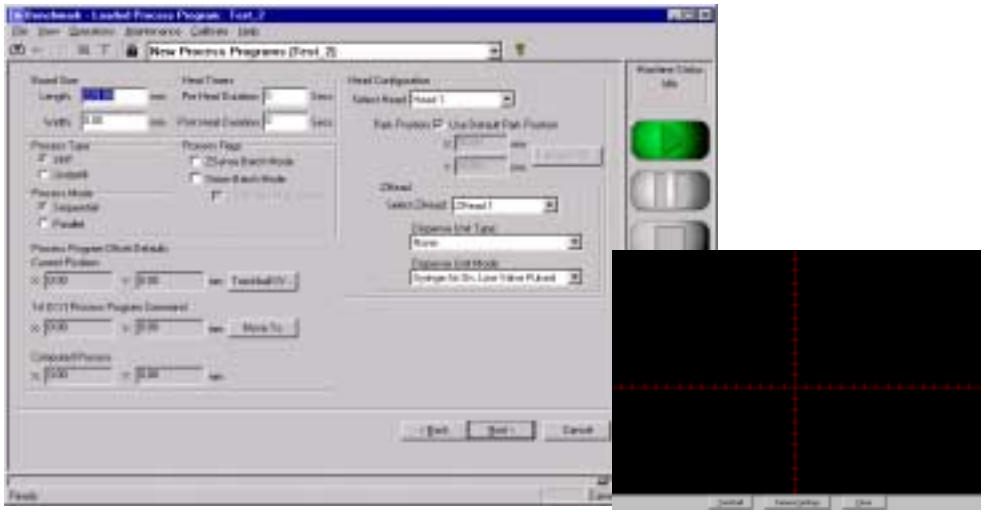


Figure 6-18

Procedure

1. Create or load a process program.
2. Navigate to the **Properties** screen:
   - Select the **Next >** button when creating a new program.
   - Select the **Properties** tab from the **Process Program Grid** within a loaded program.

     The **Properties** screen appears. See Figure 6-18.
3. Select a head from the **Select Head** field.
4. Select a **Dispense Unit** from the **Dispense Unit Type** field.
5. Select the **Trackball XY** button, the vision window appears next to the properties screen.
6. Using the trackball, position the cross-hairs to the desired position and click the left trackball button to teach this coordinate.
   If the **Use default park position** box is checked, the system automatically places the park position at the default setting for the Head chosen in step 3.
7. Select the **Save** button.
8. Select the **Close** button.

The system returns to the **Machine** screen.

Teaching Fixture Position Offset

Introduction

In order for the software to know the distance (offset) between the camera and the fixture (process board), the fixture position must be taught. This procedure is done during initial setup and only needs to be performed if the hardstop or sensor is moved. The following procedure is used to teach the fixture position for each dispensing head.

Procedure

Teach the Fixture Position as follows:

1. Load a board onto the conveyor into the dispense zone.
2. Select **View** > **Diagnostics**
   The **Diagnostics** screen appears.
3. Select the **Motion Control** tab.
   The **Motion Control** screen appears. See Figure 6-19.

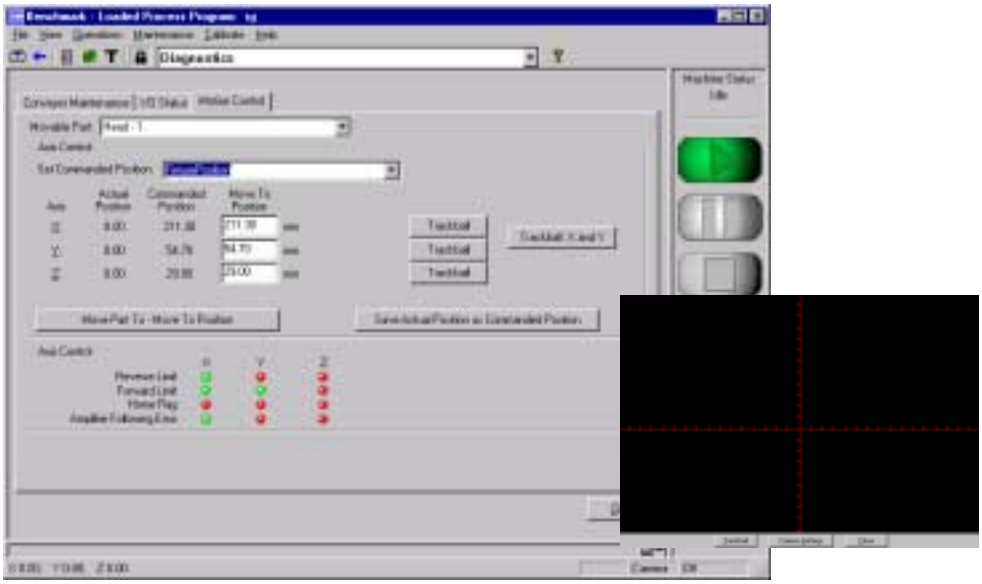


Figure 6-19

4. Select Head 1 from the **Moveable Part** field.
5. Select **Fixture Position** from the **Set Commanded Position** field.
6. Select the **Trackball X and Y** button. A vision window with a set of crosshairs appears. The trackball is active at this point.

Attention

The X and Y coordinates are shown in the **Actual Position** column and change when the head is moved using the trackball.

7. Using the trackball, align the intersection of the crosshairs with the front-right corner of the clamped board. See Figure 6-20.

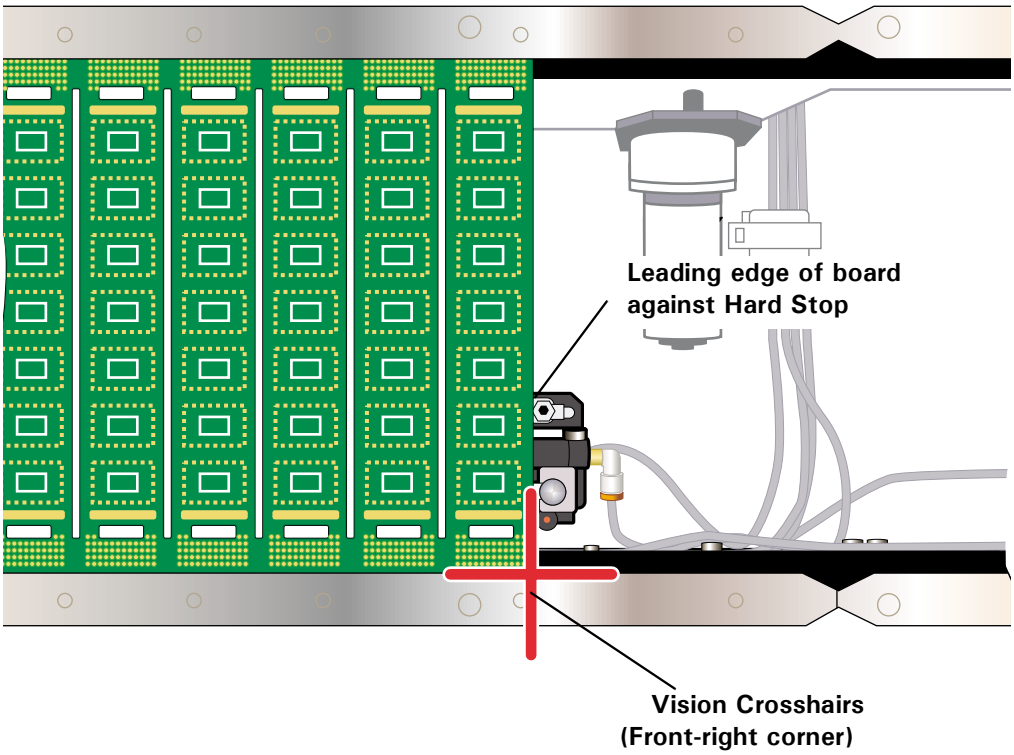


Figure 6-20

8. When the crosshairs are aligned properly, click the left button on the trackball (this teaches the X/Y coordinate).
9. If further adjustment is required, select the **Trackball** button in the vision window and repeat steps 6-8.
10. Select the **Close** button in the vision window.
11. Select the **Save Actual Position as Commanded Position** button.
    The new Fixture Position is stored with the program.
12. Select the **Close** button to close the **Diagnostics** screen.

Setup Of The Pre-Dispense Station

Introduction

The Pre-Dispense Station may contain one or more ceramic dispense plates. The coordinates of the left-hand plate and the coordinates of the right-hand plate must be taught to give the system software a starting point.

The setting of the X/Y coordinates for the Pre-Dispense station are normally only required on initial setup or whenever the Pre-Dispense station is moved.

Procedure

Setup the Pre-Dispense Station as follows:

1. Select **Calibrate > Pre-Dispense Plate(s)**.
   The **Pre-dispense plate** calibration screen appears as shown in Figure 6-21.

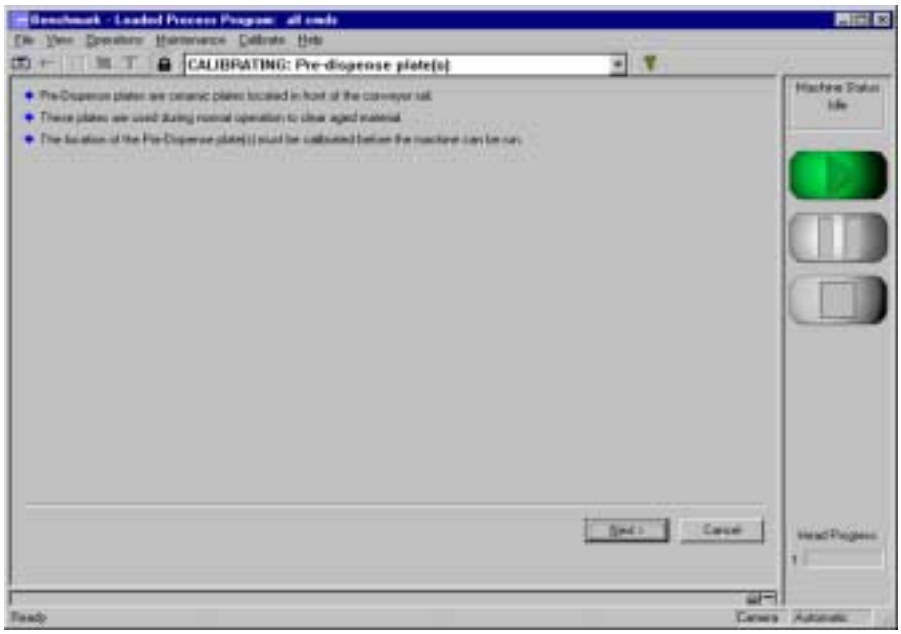


Figure 6-21

2. Read the on-screen notes and select the **Next >** button
3. Using the keyboard, enter the number of dispense plates (1 or 2) in the box provided.
4. Select the **Next >** button.
   A vision window appears in the **Pre-dispense plate** calibration screen.
   See Figure 6-22.

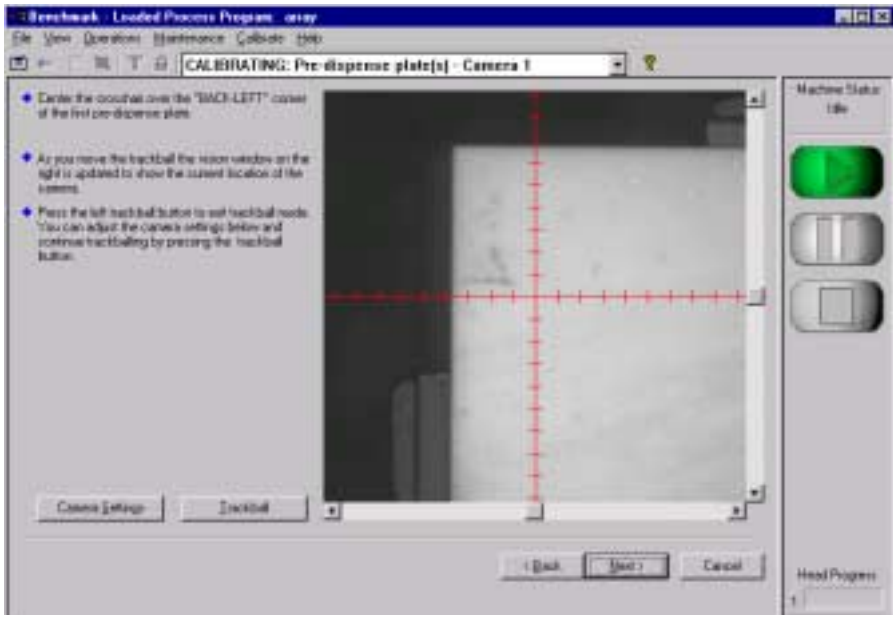


Figure 6-22

Attention

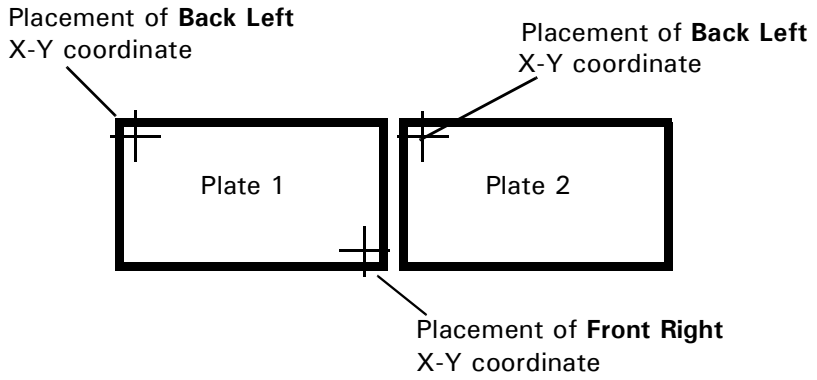
The starting point for the Pre-Dispense Station is always set on the Back-Left corner of plate 1. See Figure 6-24.

5. If necessary, adjust the camera focus and lighting to desired settings as follows:
   a. Select the **Camera Settings** button.
   The **Camera Settings** screen appears. See Figure 6-23.

Figure 6-23

   b. Adjust the **Zoom, Brightness,** and **Contrast** as desired by selecting the applicable up or down arrow for each field. After desired settings are complete, select the **Close** button.

6. Select the **Trackball** button.
7. Using the trackball, move the crosshairs to a position near the Back- Left corner of plate 1. The crosshairs must be on the plate as shown in Figure 6-24.
8. Click the left trackball button to teach this point. If further adjustment is required, select the **Trackball** button and repeat step 6 and 7.



Pre-Dispense Station (configured left to right)

Figure 6-24

9. Select the **Next>** button.
10. Using the trackball, move the crosshairs to a position near the Front- Right corner of plate 1. The crosshairs must be on the plate as shown in Figure 6-24.
11. Click the left trackball button to teach this point. If further adjustment is required, select the **Trackball** button and repeat step 10.
12. Select the **Next>** button.
13. Using the trackball, move the crosshairs to a position near the Back-Left corner of plate 2. Click left to teach this point. This point must be on the plate. See Figure 6-24.
14. If further adjustment is required, select the **Trackball** button and repeat step 13.
15. Select the **Next>** button.
    The current and newly calculated Pre-dispense coordinates are shown in the **Pre-dispense plate** calibration screen. See Figure 6-25.
16. Select the **Save** button to accept the new Pre-dispense coordinates.
    You are returned to the **Machine** screen.

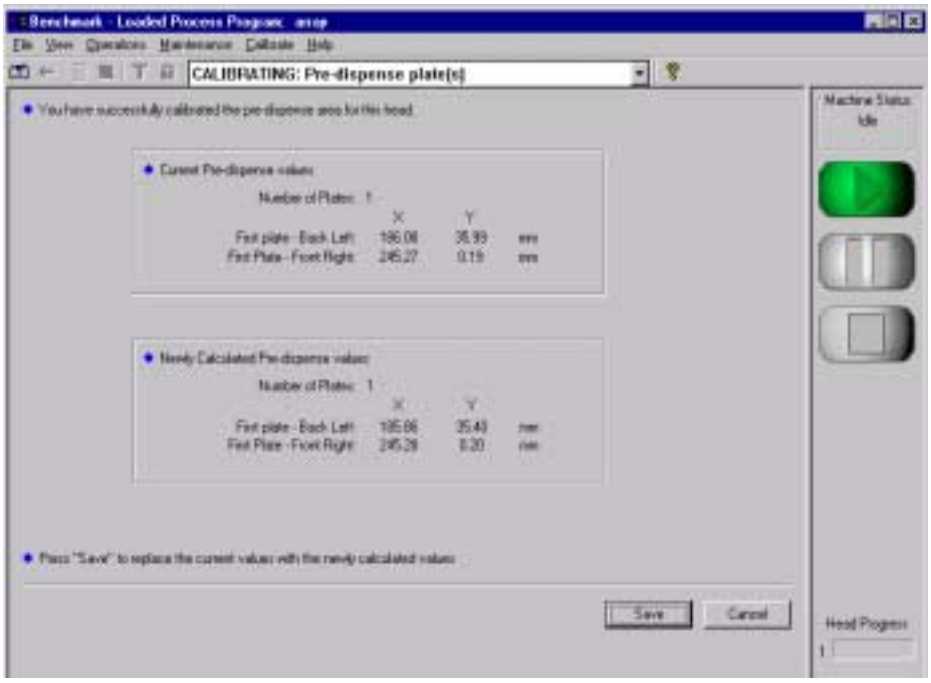

Benchmark - Loaded Process Program: .prop
File View Operations Maintenance Calibrate Help
CALIBRATING: Pre-dispense plate(s)
You have successfully calibrated the pre-dispense area for this head.
Current Pre-dispense values:
Number of Plates: 1
X
Y
First plate - Back Left: 186.08 38.99 mm
First Plate - Front Right: 245.27 0.19 mm
Newly Calculated Pre-dispense values:
Number of Plates: 1
X
Y
First plate - Back Left: 185.88 35.43 mm
First Plate - Front Right: 245.28 0.20 mm
Press "Save" to replace the current values with the newly calculated values.
Save
Cancel
Machine Status
Idle
Head Progress
1

Figure 6-25

Teaching The Camera-To-ZSense Offset

Introduction

In order for **ZSense** program commands to be executed at the correct board location, an offset must be taught between the camera and the sensing device (touch probe or laser). This procedure is completed during initial setup and only needs to be performed if the Camera or ZSense (touch probe) is removed.

Camera-to-ZSense Offset

Teach the Camera-to-ZSense offset as follows:

1. Load a sample board at the dispense position on the conveyor.
2. Select **Calibrate > Camera-to-ZSense Offset**.
   The **Camera-to-ZSense Offset** screen appears. See Figure 6-26.

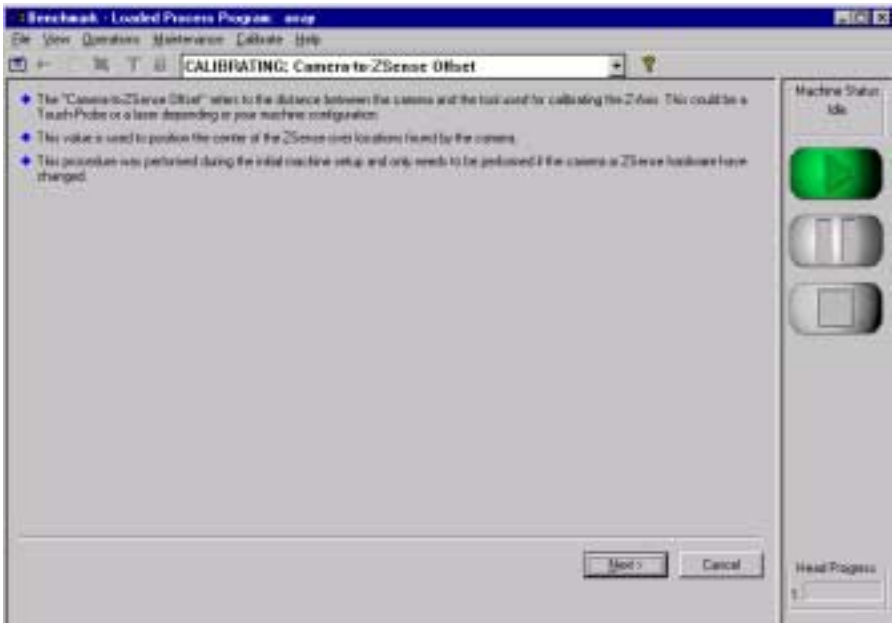


Figure 6-26

3. Read the on-screen notes, and select the **Next >** button.
4. A vision window appears in the **Camera-to-ZSense Offset** screen. See Figure 6-27.

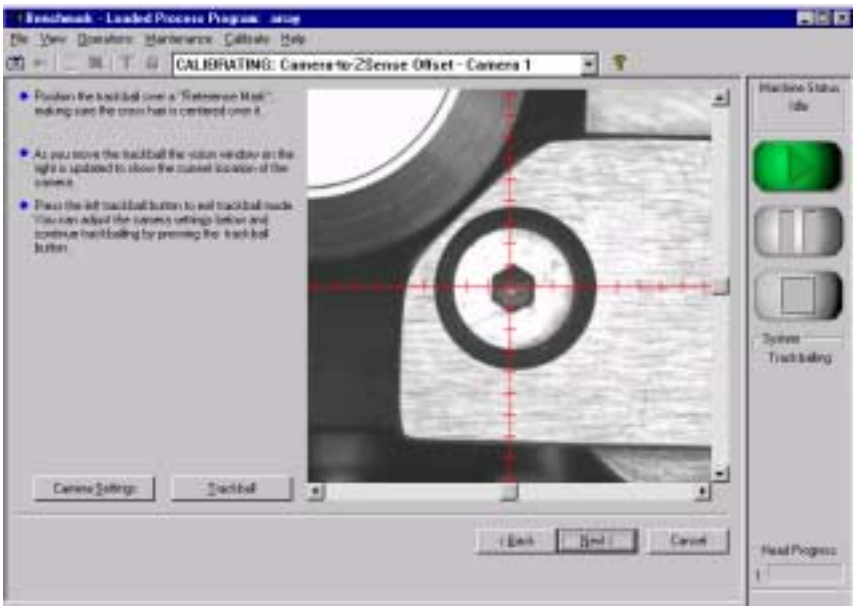


Figure 6-27

5. If necessary, adjust the camera focus and lighting to the desired settings as follows:

   a. Select the **Camera Settings** button. The **Camera Settings** screen appears. See Figure 6-28.

Figure 6-28

   b. Adjust the **Zoom, Brightness,** and **Contrast** as desired by selecting the applicable up or down arrow for each field. After the desired settings are complete, select the **Close** button.

6. Select the **Trackball** button.
7. Using the trackball, center the crosshairs over a reference mark such as a fiducial on the sample board.
8. Click the left trackball button when the crosshairs are properly positioned.
9. If further adjustment is required, select the **Trackball** button and repeat steps 6 and 7.

Equipment Starts Automatically

When the **Next>** button is selected the head moves over and fires the ZSense device. The safety door must be closed otherwise the head will not move.

10. Select the **Next>** button.
    The system attempts to align the ZSense with the reference point you established in step 7.
11. If the Zsense is not aligned properly with the reference mark:
    a. Select the **Trackball** button in the **Camera-to-ZSense Offset** screen. See Figure 6-29.

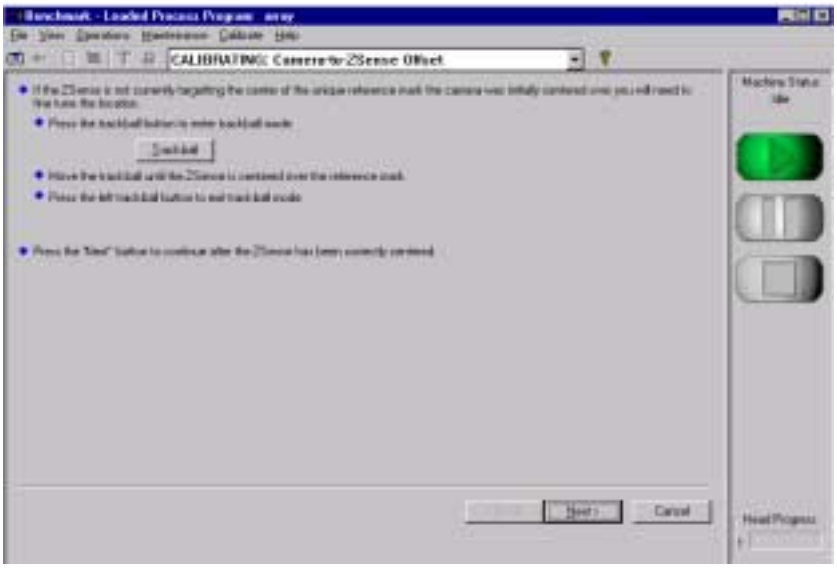


Figure 6-29

    b. Using the trackball, visually align the ZSense with the reference point.
    c. Click the left trackball button.
12. Select the **Next>** button after the correct the ZSense location is taught.
    The current and newly calculated offset values are displayed in the **Camera-to-ZSense Offset** screen. See Figure 6-30.
13. Select the **Save** button to accept the new calibration offset.

You are returned to the **Main** screen.

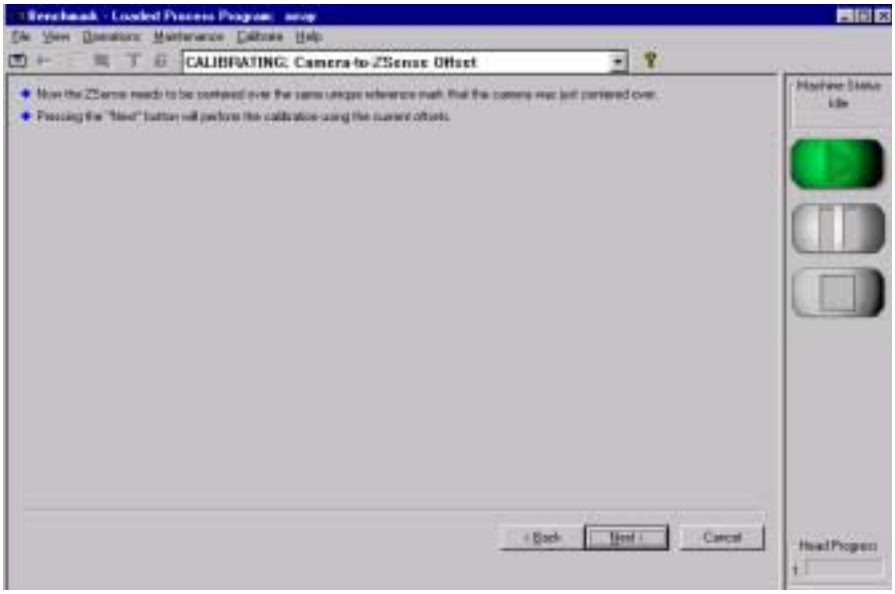

File View Operations Maintenance Calibrate Help
CALIBRATING: Camera-to-ZSense Offset
Machine Status
Idle
Back
Next
Cancel
Head Progress

Figure 6-30

Setting The Location Of The Weight Scale (Option)

Introduction

The Weight Scale option incorporates a sliding glass cover. The cover is used to prevent drafts or other air currents from disturbing the pan and measurements. The cover has a hole cut through it which allows the dispense unit to dispense onto the scale. The location of this hole must be taught in the X, Y, and Z- axes.

The taught position settings are normally required only on initial setup or whenever the weight scale assembly is moved.

Procedure

Attention

Selecting the **Cancel** button at any point aborts the procedure.

Teach the hole position of the Weight Scale as follows:

1. Select **Calibrate > Weight Scale Position**.
   The **Weight scale(s)** calibration screen appears. See Figure 6-31.

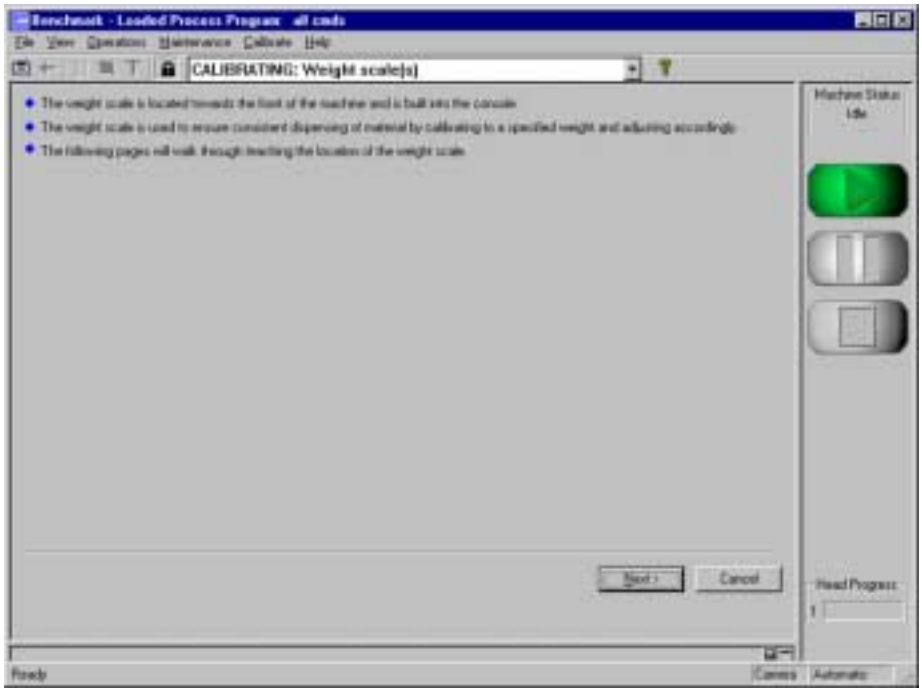


Figure 6-31

2. Read the on-screen notes, and select the **Next>** button.
   Trackball and **TrackballZ** buttons are displayed in the **Weight scale(s)** calibration screen. See Figure 6-32.

Figure 6-32

Attention

Prior to teaching any coordinates for the Weight Scale, be sure the sliding glass cover is in the closed position.

3. Select the **Trackball** button.
4. Using the trackball, move the dispense unit over the sliding glass cover. The needle tip should be positioned over the center of the hole.
   See Figure 6-33.

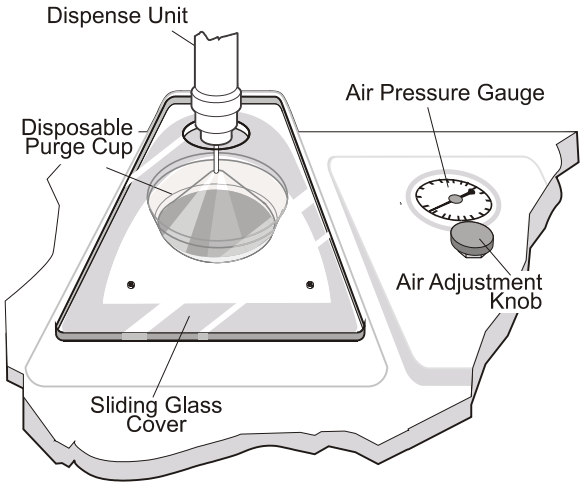


Figure 6-33

5. When the needle tip is in the desired location click the left trackball button.
6. Select the **Trackball Z** button. Using the trackball, lower the needle of the dispense unit through the hole in the sliding glass cover until the needle is below the top surface of the sliding glass. See Figure 6-34.

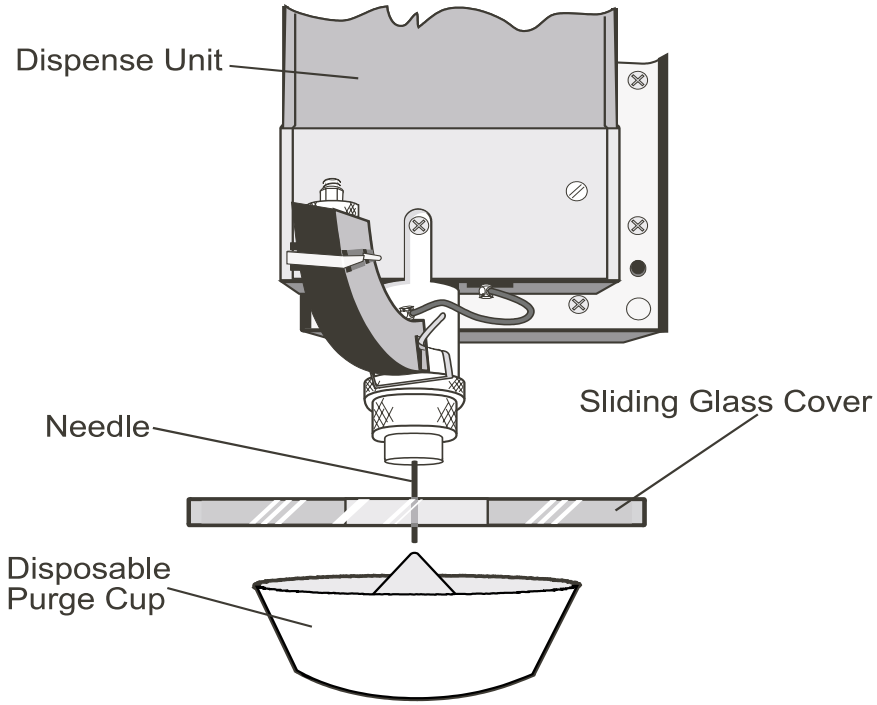


Figure 6-34

7. Click the left trackball button.
8. Select the **Next >** button in the **Weight scale(s)** calibration screen. The current and newly calibrated locations are displayed in the **Weight scale(s)** calibration screen. See Figure 6-35.

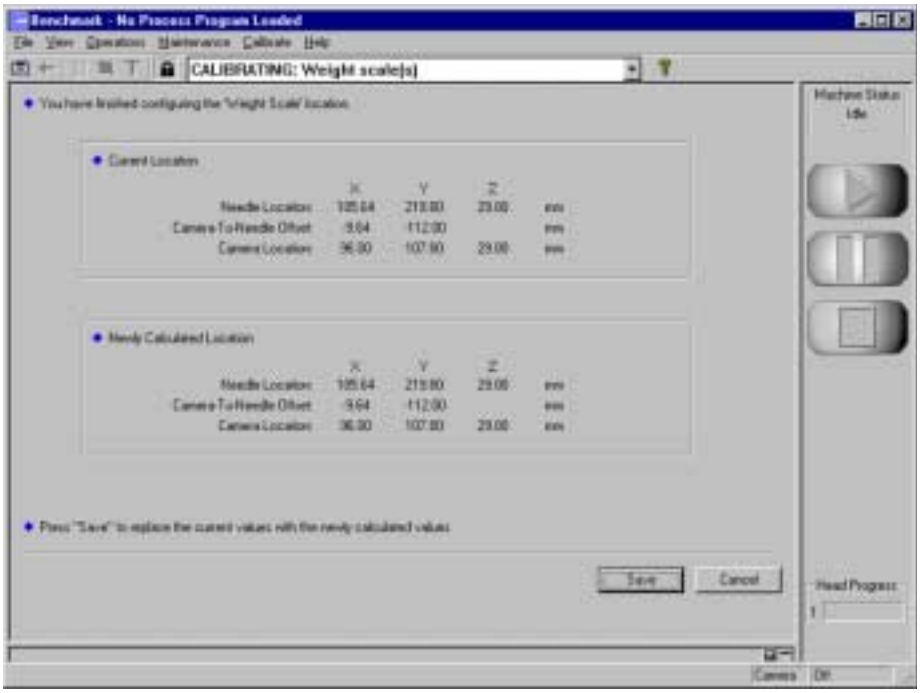


Figure 6-35

9. Select the **Save** button to accept the new calibration coordinates.

Teaching The Needle Calibrator Sensor Position

Introduction

The Needle Calibrator Sensor position must be taught to identify its location.

This procedure is done during initial setup and only needs to be performed if a needle is changed.

Procedure

Teach the Needle Calibrator Sensor Position as follows:

1. Select **View > Diagnostics.**
2. Select the **Motion Control** tab from the **Machine** screen.
   The **Motion Control** screen appears. See Figure 6-36.

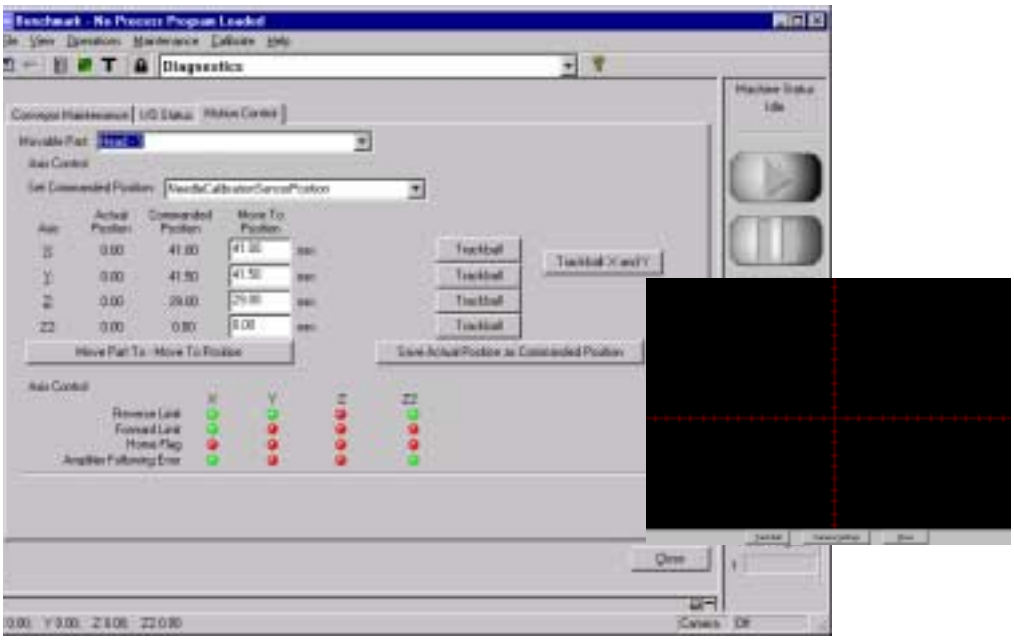


Figure 6-36

3. At the **Moveable Part** drop down list, select the head you wish to teach.
4. In the **Set Commanded Position** field, select **Needle Calibrator Sensor Position**.
5. Select the **Trackball X and Y** button.
   A vision window with a set of crosshairs appears and the trackball is activated.

6. Using the trackball, move the head until the intersection of the crosshairs is aligned over the center of the Needle Calibrator sensor. See Figure 6-37.

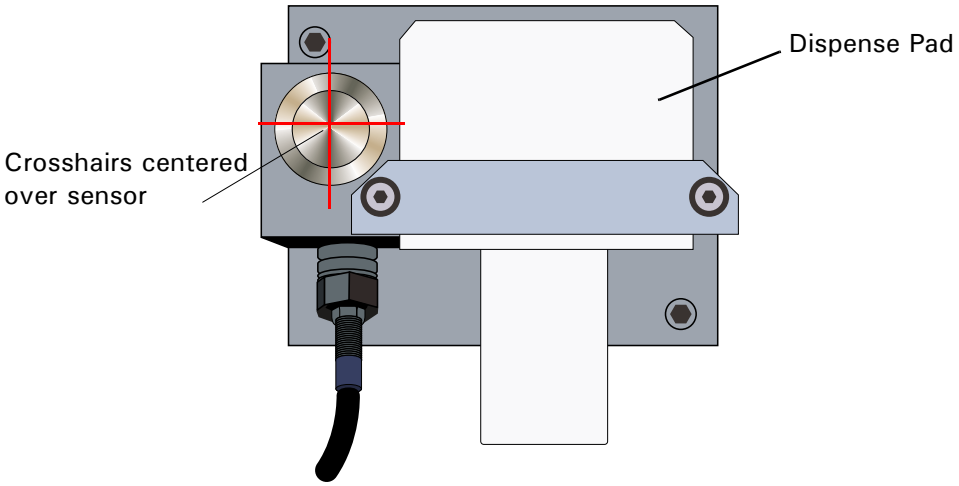


Figure 6-37

Attention

As you move the head with the trackball, the current X and Y coordinates are updated in the **Move To Position** field on the **Motion Control** screen.

7. When the crosshairs are positioned correctly, select the left trackball button.
8. If further adjustment is required, select the **Trackball** button in the vision window and repeat steps 6-7.
9. Select the **Close** button in the vision window.
10. Select the **Save Actual Position as Commanded Position** button.
    The system saves the new sensor position.
11. Select the **Close** button to close the **Diagnostics** screen.
    You are returned to the **Machine** screen.

Conveyor Speed Calibration

Introduction

The Conveyor Speed Calibration is required to ensure that the conveyor will slow down before parts reach a hard stop. The system software calculates the time as the board passes each sensor (at all stations) and adjusts the conveyor speed automatically.

This calibration is only required at initial setup or when the process board is changed.

Procedure

Calibrate the Conveyor Speed as follows:

1. Select **Operations > Conveyor Mode > Off** from the **Machine** screen.
2. Load a board onto the output sensor of an upstream machine.
   The board waits for the system to give an available signal.
3. Close and lock the safety door(s).
4. Select **View > Diagnostics**.
   The **Diagnostics** screen appears.
5. Select the **Conveyor Maintenance** tab.
   The **Conveyor Maintenance** screen appears. See Figure 6-38.

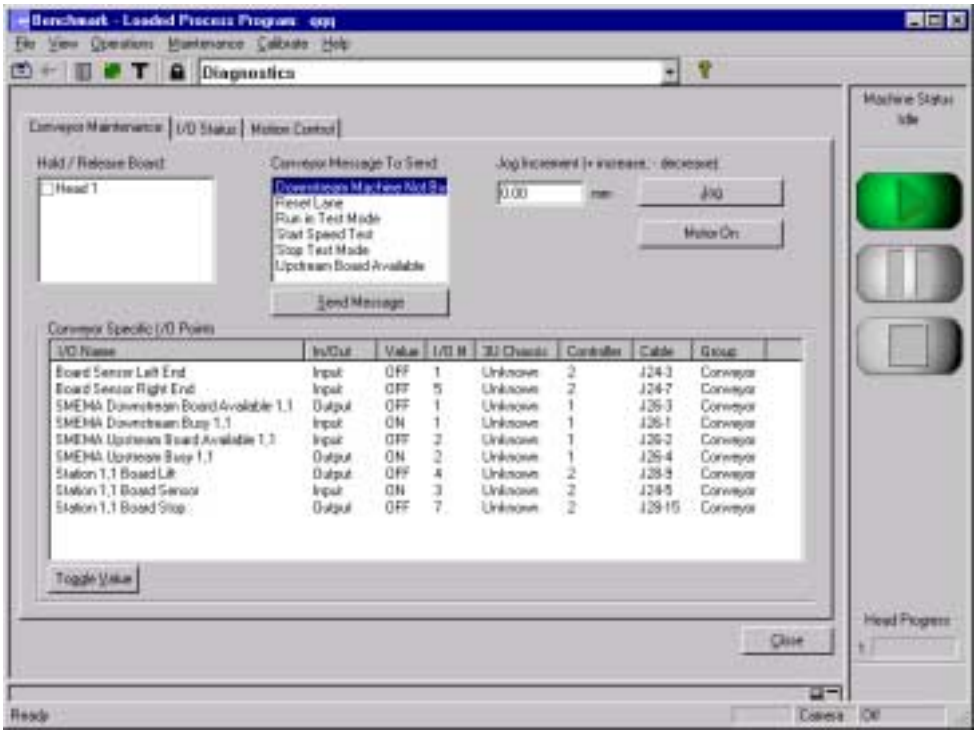


Figure 6-38

6. Select the **Start Speed Test** message in the **Select Conveyor Message To Send** list box.

Attention

The **Motor On** button may be pressed at any time to activate the conveyor. This is normally used to clear a board from within the machine.

7. Select the **Send Message** button.
   After approximately 2 seconds, the board that was placed in the Upstream machine is transported through the system and stops at the Downstream machine.
8. Select the **Close** button to close the **Diagnostics** screen.
   You are returned to the **Machine** screen.

Teaching The Purge Cup Position

Introduction

The Purge Cup position must be taught to identify its location.

This procedure is done during initial setup and only needs to be performed if the position is moved.

This position is taught visually by looking into the machine as you drive the dispense head to the correct position.

Procedure

Teach the Purge Cup Position as follows:

1. Select **Calibrate > Purge Cup Position**. See Figure 6-39.

Figure 6-39

A list of screen notes appear. See Figure 6-40.

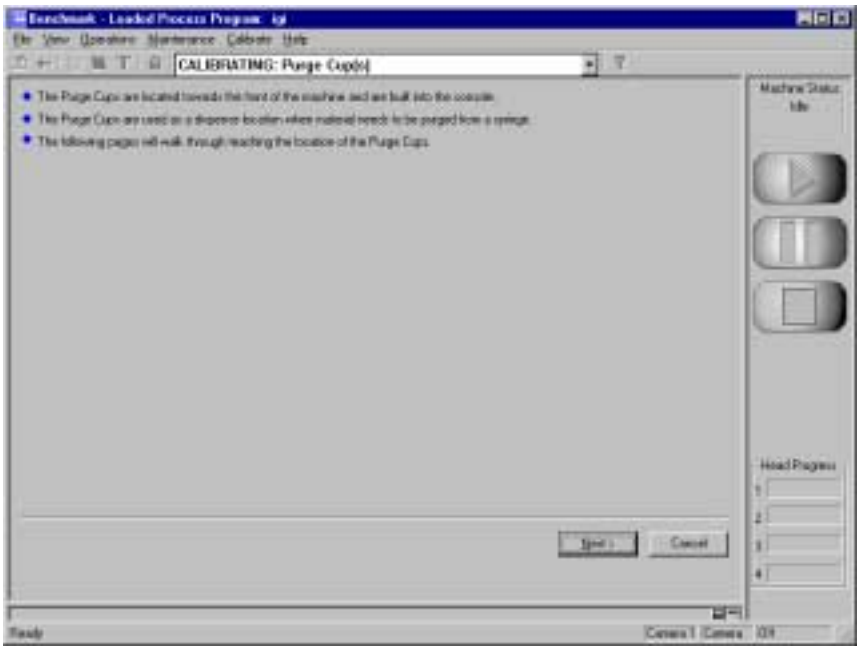


Figure 6-40

2. Read the on screen notes and select the **Next >** button.

A Head selection box appears. See Figure 6-41. This position must be taught at all heads.

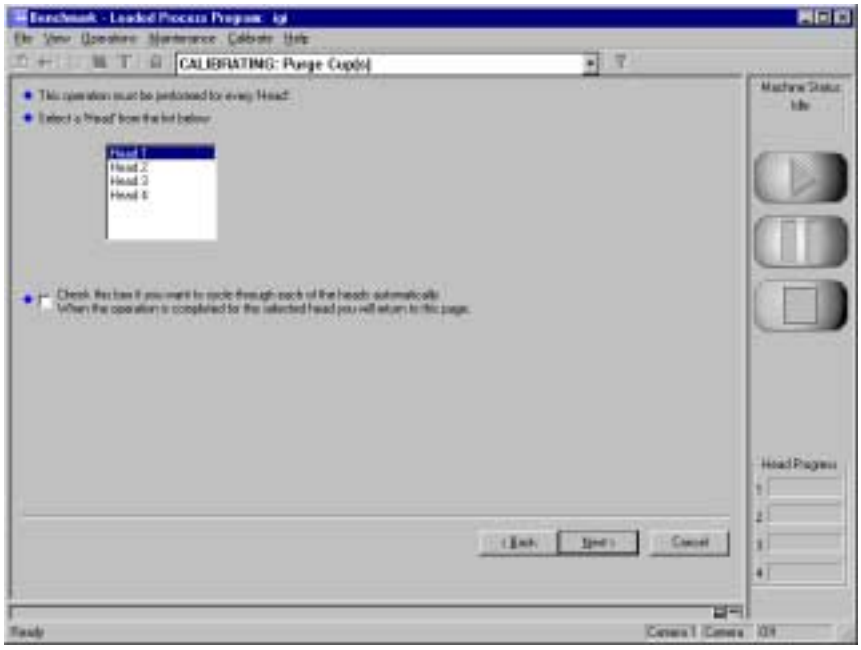


Figure 6-41

3. Select the desired **Head** from the list and select the **Next>** button.

The purge cup procedure appears with **Trackball** and **Trackball Z** buttons. See Figure 6-42.

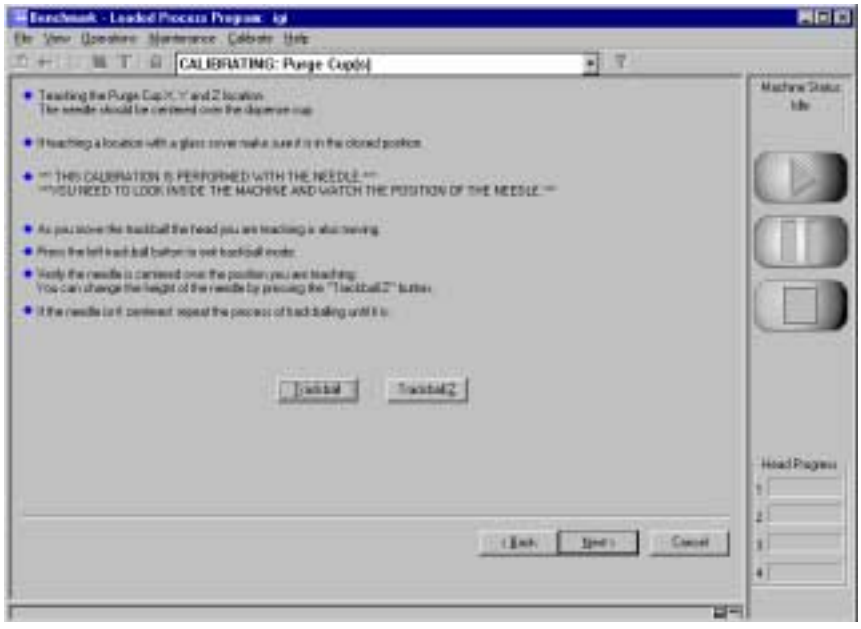


Figure 6-42

Attention

Prior to teaching any coordinates for the Purge Cup, be sure the sliding glass cover is in the closed position (if equipped).

4. Select the **Trackball** button.
5. Using the trackball, move the dispense unit over the sliding glass cover. The needle tip should be positioned over the center of the hole.
   See Figure 6-43.

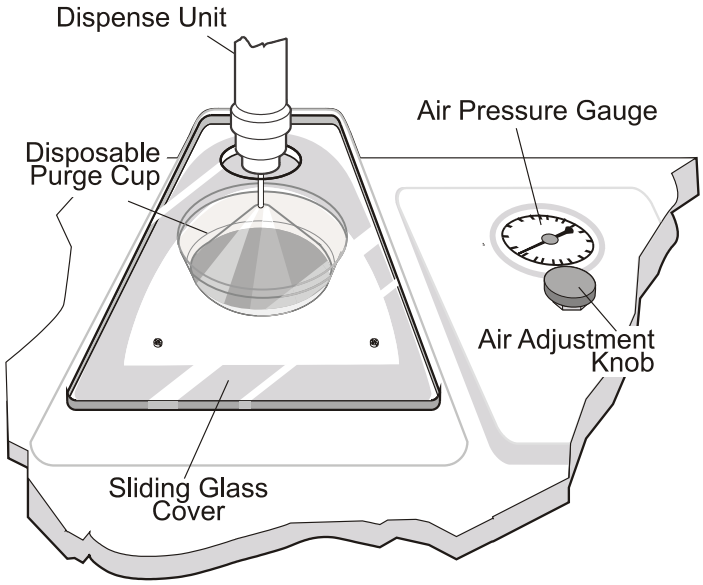


Figure 6-43

6. When the needle tip is in the desired location click the left trackball button.
7. Select the **Trackball Z** button.
8. Using the trackball, lower the needle of the dispense unit as necessary to contact the cone style purge cup (if equipped) or to a height where you can wipe the needle if the flat style purge cup is used.
9. Click the left trackball button.
10. Select the **Next>** button in the calibration screen.
    The current and newly calibrated locations are displayed in the **Purge Cup(s)** calibration screen. See Figure 6-44.

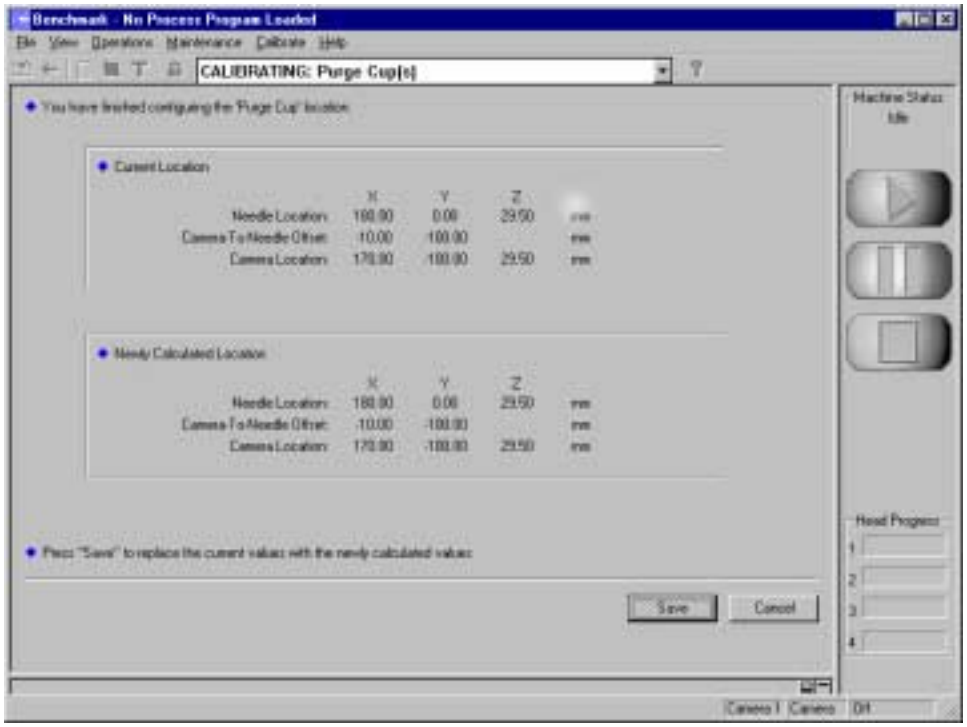


Figure 6-44

11. Select the **Save** button to accept the new coordinates.

Teaching The Syringe/DU Change Position

Introduction

The position for changing the Syringe/DU is taught to make it convenient for the day to day operator to remove and replace hardware.

This procedure is performed at all heads during initial setup and may be changed to any desired location.

This position is taught visually by looking into the machine as you drive the dispense head to the desired location.

Procedure

Teach the Syringe/DU Change Position as follows:

1. Select **Calibrate > Syringe/DU Change Position**. See Figure 6-45.

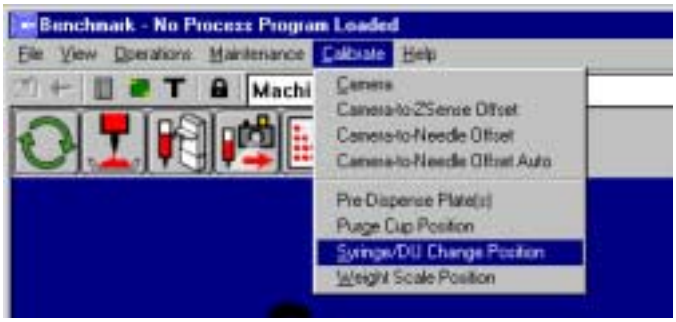


Figure 6-45

A list of screen notes appear. See Figure 6-46.

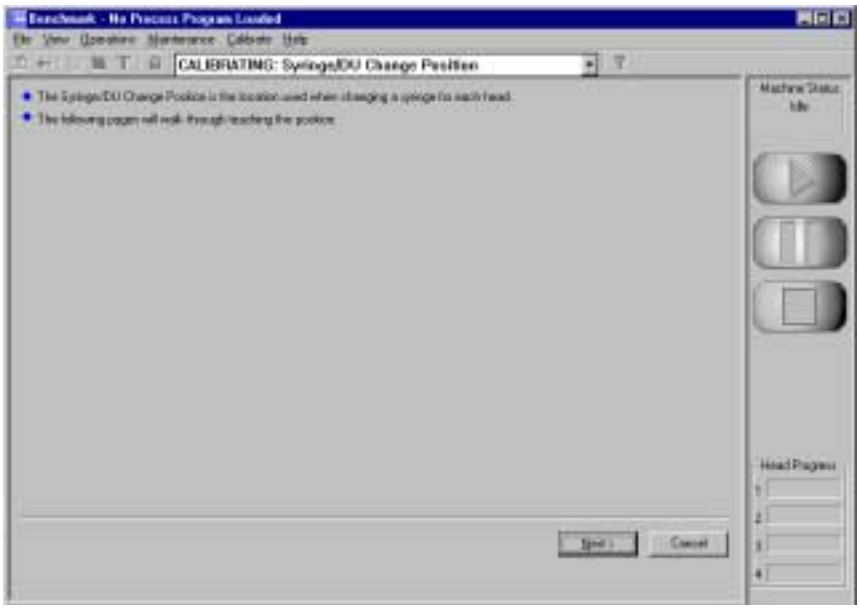


Figure 6-46

2. Read the on screen notes and select the **Next >** button.

A Head selection box appears. See Figure 6-47. This position must be taught at all heads.

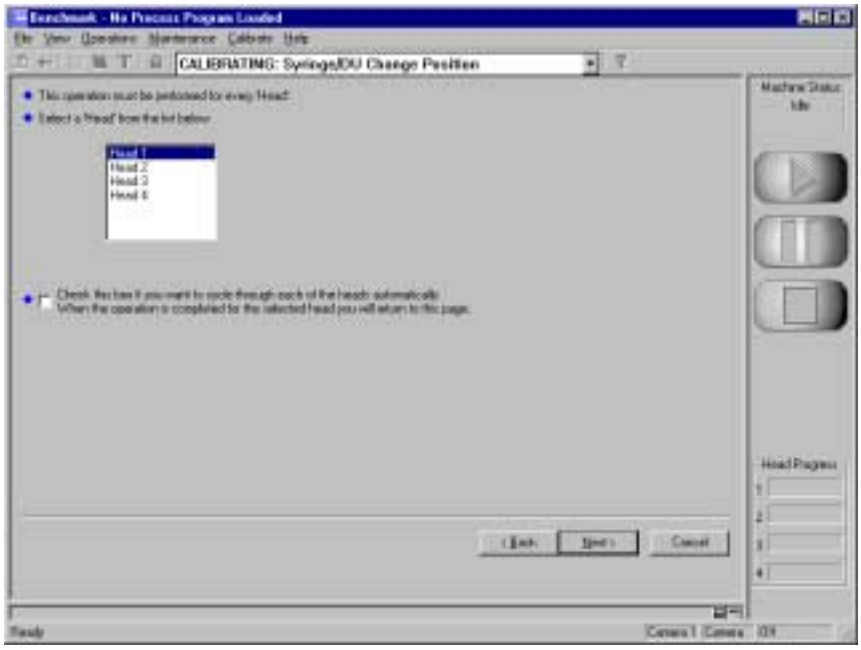


Figure 6-47

3. Select the desired **Head** from the list and select the **Next>** button.

The Syringe/DU Change procedure appears with a **Trackball** button. See Figure 6-48.

Figure 6-48

4. Select the **Trackball** button.

Attention

When moving and removing the dispense unit or syringe be careful not to damage the needle. Hold the gantry steady.

5. Using the trackball, move the dispense unit towards the front of the machine in a convienent location. Be careful not to place the DU in a location where the needle may be damaged.
6. When the DU is in the desired location click the left trackball button.
7. Select the **Next >** button.
   The current and newly calibrated locations are displayed in the **Syringe/DU Change Position** calibration screen. See Figure 6-49.

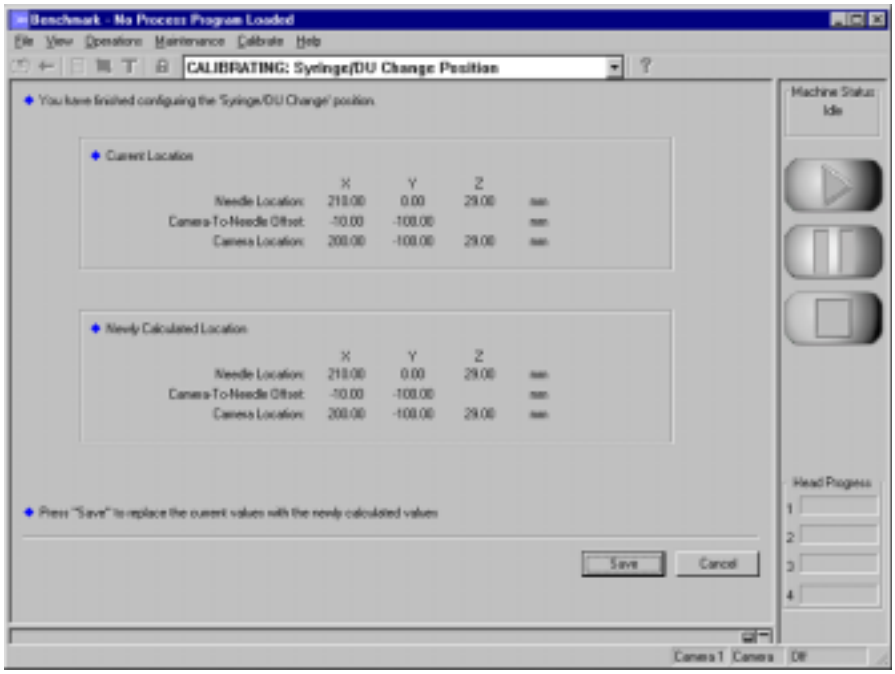


Figure 6-49

8. Select the **Save** button to accept the new coordinates.

7

Toolbars And The Process Program Grid

Overview

Introduction

The system utilizes three toolbars. Two on the Machine screen, the **Main Machine** toolbar and the **Configurable** toolbar. The third toolbar is located on the Process Program Grid, and is named the **Process Program Commands** toolbar. The icons contained on each toolbar may be used as alternate methods to perform system functions in place of the drop down menu selections (located at the top of the screen). The definitions for each icon are explained in this chapter.

The Process Program Grid is a spreadsheet-like display that allows you to specify values and/or settings for the many system dispensing commands. The **Process Program Commands** toolbar (located at the top of the grid) is used to insert commands into the grid for a process program.

Attention

When performing any procedure in this section, the command word **"Select"** refers to the operator to use the trackball and click the left button.

In This Chapter

This chapter contains the following topics.

Main Machine Toolbar

Introduction

The Main Machine toolbar is always visible at the top of the screen and is used to navigate through various software screens.

Toolbar Icons

The icons shown below will be observed and are functionally described as follows:

	Machine Screen- Select to view the Main Machine screen.
	Return To- Select to return to the previous software screen.
	Process Programs- Select to Load, Name, Create a New, Edit, Save As, Rename, or Delete process programs.
	Fiducials- Select to Load, Name, Create a New, Edit, Save As, Rename, or Delete fiducial templates.
	Templates- Select to Load, Name, Create a New, Edit, Save As, Rename, or Delete system templates.
	Door Lock / Unlock- Select to Lock or Unlock the safety door.

Configurable Toolbar

Introduction

The large icons contained in the Configurable toolbar are used to perform various system operations. This toolbar is only displayed on the Main Machine screen.

The icons may be arranged in a different order or not displayed at all. This is accomplished by selecting **View > Configuration**. At the Configuration screen, select the **Buttons** tab. See Figure 7-1.

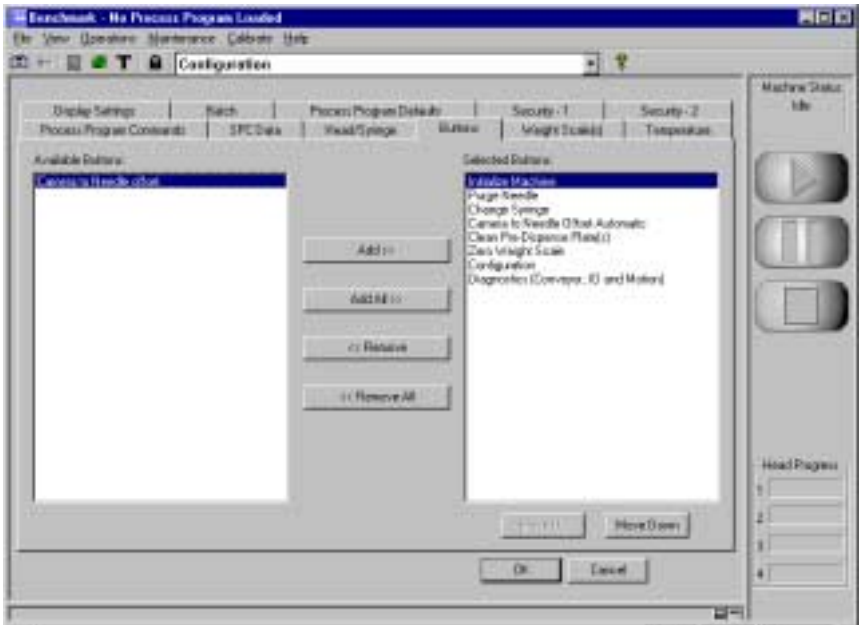


Figure 7-1

The Buttons tab allows the user to display the Configurable Toolbar icons and arrange icons as desired.

Displaying Icons

Display the toolbar icon(s) as follows:

1. Select the button(s) to be displayed and select the **Add>>** or **Add ALL>>** button.
2. Select the **OK** button.

You are returned to the Machine screen.

Removing Icons

Remove the toolbar icon(s) from the display as follows:

1. Select the button(s) to be removed and select the **<<Remove** or **<<Remove All** button.
2. Select the **OK** button.

You are returned to the Machine screen.

Rearranging Icons

Rearrange the toolbar icon(s) as follows:

1. Select the button(s) to be rearranged and select the **Move Up** or **Move Down** button as desired.
2. Select the **OK** button.

You are returned to the Machine screen.

Toolbar Icons

All icons contained on this toolbar are described below, however, only individuals assigned privileges are allowed to perform certain system functions. When a person does not have a particular assigned privilege that icon will not be displayed on screen.

Attention

Only those individuals assigned privileges are allowed to perform or change system calibrations and offsets. Refer to Chapter titled - **System Administration and Security**.

The icons shown below will be observed and are functionally described as follows:

	Change Syringe- Select to bring dispense head to the front of the machine. This will allow you to remove and replace the syringe.
	Camera to Needle Offset Automatic- Select to perform a Camera to Needle offset Automatic. This method of calibration is a less detailed procedure than the Manual Camera to Needle offset in that the dispense parameters are not set during this procedure. Refer to Chapter titled - **Calibration and Offsets** for a detailed procedure.
	Clean Pre-dispense Plate(s)- Select to open the safety door to clean the ceramic pre-dispense plate(s).

	Initialize Machine- Select to initialize the machine. This will zero out the dispensing head and weight scale.
	Zero Weight Scale- Select to open the safety door and replace full disposable purge cups with empty ones. This also zeros out the weight scale.
	Configuration- Select to display all configuration tabs which include: Head Syringe, Buttons, Weight Scale(s) Temperature, Display Settings, Process, Process Program Defaults, Security-1, Security-2, Process Program Commands, and SPC Data.
	Diagnostics (Conveyor, I/O, and Motion)- Select to display the Conveyor Maintenance, I/O Status, and Motion Control tabs.
	Purge Needle- Select to perform a purge. This allows the selected head to be purged by following the on screen notes. Typically used to remove air or aged material from the needle.
	Camera to Needle Offset- (Normally not visible) Select to perform a Camera to Needle offset. This method of calibration places three dispense test dots onto the dispense pad. The vision system then aligns itself with the center dot and establishes the offset. Test dot parameters may be modified (dot size, lift height, dispense height) as required. Refer to Chapter titled - **Calibration and Offsets** for a detailed procedure.

Process Program Grid

Description

The Process Program Grid (Figure 7-3) is a spreadsheet-like display that allows you to specify values and/or settings for the many system dispensing commands. The fields (at the top of the grid) that are visible are dependent on the commands entered on each command line. This narrows the display to only those fields that are applicable to each individual process program.

Vertical and horizontal scroll bars are provided at the bottom and right side of the screen since there are too many fields to display simultaneously. You may also alter the field display by dragging the vertical bar between the field column names to change the width of the field or hide it altogether.

Process Program Commands Toolbar

Description

Process Program Commands (located at the top of the Process Program Grid, see Figure 7-3) are used to insert commands into the process program.

Toolbar Icons

The icons shown below will be observed and are functionally described as follows:

	Vision Window- Select to display the vision window on the monitor.
	Trackball Z- Select to move the dispense head in the Z-axis using the trackball.
	Enable / Disable Selected Commands- Select to disable or enable command lines. This is performed by selecting either a single or several lines in the command column. When the program is run the system will skip over this command line(s).

	Edit- Select to perform typical edit functions. The drop down box includes: Undo, Redo, Cut, Copy, Paste, Delete, Find, Replace, Grid Filter, Enable/Disable Command(s), Find Closest Command.
	Tools- Select to rotate a process program (90, 180, or 270 degrees), Optimize, or Normalize New Coordinates.
	Available Commands- Select to display all available dispensing commands. The drop down box includes: Locate, Zsense, Dot, Line, Link Line, Filled Rectangle, Unfilled Rectangle, Array, Pre-Dispense Dot, Pre-Dispense Line, New Coordinate, Old Coordinate, Move, Wait, End, Do Pass, Break, Pass, Chip Line, Timer, Weigh Selected Commands, and Bad Marks.
	Locate- Select to display the library of Fiducials or to create a new Fiducial. The Fiducial types available in the drop down list include: All, Taught, Chip Definition, and One Snap. Select the desired file and select **OK** to insert into the program.
	Zsense- Select to perform a Zsense. This will activate the trackball so you may move to the desired X, Y coordinate.
	Dot- Select to insert a Dot command line into the process program. System will default to values set from the previous Dot command.
	Line- Select to insert a Line command into the process program. System will default to values set from the previous Line command.

	Link Line- Select to insert a Link Line command into the process program. This command allows the head to draw a continuous line without raising the head. Link Line default values are set from the previous Link Line command.
	Filled Rectangle- Select to display the library of Filled Rectangle templates. This command allows the head to draw a continuous line without raising the head. The three types of fill routines are: Spiral In, Spiral Out, and ZigZag. Refer to chapter titled - **Creating and Managing Process Programs** for detailed description on **Templates**. Select the desired file and select **OK** to insert into the program.
	Unfilled Rectangle- Select to display the library of Unfilled Rectangle templates. This command allows the head to draw a continuous line without raising the head. Refer to chapter titled - **Creating and Managing Process Programs** for detailed description on **Templates**. Select the desired file and select **OK** to insert into the program.
	Array- Select to display the library of Array templates. This template is used to automate the programming of multiple dots that are equally spaced within a specific area. Refer to chapter titled - **Creating and Managing Process Programs** for detailed description on **Templates**. Select the desired file and select **OK** to insert into the program.
	Pre-Dispense Dot- Select to display the library of Pre-Dispense Dot templates. Allows dots to be placed onto the predispense plate. Refer to Chapter titled - **Creating and Managing Process Programs** for detailed description on **Templates**. Select the desired file and select **OK** to insert into the program.
	Pre-Dispense Line- Select to display the library of Pre-Dispense Line templates. Allows lines to be placed onto the predispense plate. Refer to Chapter titled - **Creating and Managing Process Programs** for detailed description on **Templates**. Select the desired file and select **OK** to insert into the program.

	New Coordinate- Select to insert a new X-Y coordinate command into the process program.
	Old Coordinate- Select this command to revert back to the original taught coordinate in the process program. This command must be placed after a New Coodinate in the program.
	Move- Select to insert a Move command into the process program. This moves the dispense head from one place to another between dispensing commands.
	Wait- Select to insert a Wait command into the process program. This will pause the head (for a set amount of time) before continuing.
	End- Select to insert an End command into the process program. This command signals the end of the process program. Any commands listed after this line will be ignored by the system.
	Do Pass- Select to insert a Do Pass command into the process program. This command is used to call out one or more groups of commands that are defined by the Pass command. The system will execute the commands based on the numbers in the First Pass Num and Last Pass Num fields.
	Break- Select to insert a Break command into the process program. This command is used as a timer to control the maximum time between passes. The primary purpose is to prevent application problems caused by premature curing of dispense material.

	Pass- Select to insert a Pass command into the process program. This command divides the individual segments of a process program. Each Pass command is identified with a sequential number. All commands following this command are considered part of the set, until the next Pass command is reached in the program.
	Chip Line- Select to insert a Chip Line command into the process program. This command is used to dispense individual line segments. Differs from a regular Line because there are no X-Y coordinates.
	Timer- Select to insert a Timer command into the process program. This will delay the execution of a program segment until a prescribed amount of time has elapsed. This is set in the Timer Timeout field.
	Weigh Selected Commands- Select to insert a Weigh command into the process program. This will place a Begin Weigh and an End Weigh command before and after the highlighted command lines to be weighed. The library of Weigh Templates will appear. Refer to Chapter titled - **Creating and Managing Process Programs** for detailed description on **Templates**. Select the desired file and select **OK** to insert into the program.
	Bad Mark- Select to insert a Bad Mark into the process program. The library of Bad Mark Templates appear. Refer to Chapter titled - **Creating and Managing Process Programs** for detailed description on **Templates**. Select the desired file and select **OK** to insert into the program. The Mark Level field on each Bad Mark command line must be labeled as: Global, Row, or Local.

Process Program Grid Fields

Introduction

The following are basic definitions of the process program grid fields shown in Figure 7-4. Detailed information for all process program grid fields, and use of, are found in the following Chapters - titled:

- Creating and Managing Process Program Files
- Dispensing SMT Applications
- Dispensing Underfill & Encapsulation

Field Definitions

Command - Displays the command necessary to create a process program. New process program commands will always be inserted after the current highlighted step in the program and will be executed in the order specified.

X Position - Specifies the X-axis dispense position.

Y Position - Specifies the Y-axis dispense position.

X' Position - Specifies the X end position for a Line or Linkline command.

Y' Position - Specifies the Y end position for a Line or Linkline command.

Theta - Performs a rotation of a block of commands contained within a New Coord command.

Head - Specifies the head that will be used when dispensing a particular dispense process program command.

Valve - Specifies the valve used to dispense (**Right** or **Left**) when a dual dispense unit is mounted on the system.

Line Width - Specifies the volume of material dispensed in a line.

Dot Size - Determines the amount of dispense valve auger rotation, when a dispense command is executed. Measured in degrees of rotation.

Lift Height - Sets the height the head moves between dispense commands.

Dispense Height - The distance the needle just contacts the board and the tip of the needle (this is considered Board Zero). Dimension is established from Home position of the Z-axis. This is taught by just contacting the needle to the substrate.

Name - Displays the file name that is associated with a Locate or Template command.

Reference Designator - Identifies a specific component on the process board. Some examples of this are: C101, R203, and U7. These are normally printed on the board, provided there is space. The reference designator enables the user to search for a specific component.

Shape Code - Defines a generic component type. Each component has a shape code based on its physical configuration and dimensions. One example of this is for 1206 resistor. There is one part number for each resistor value.

Line Delay - Determines the amount of auger rotation that the system delays the XY motion prior to the start of dispensing a Line command. During the delay, air pressure is applied to the head and the dispensing unit motor turns. Line Delay allows time for higher viscosity materials to start coming out of the needle.

Line Off Advance - Determines the amount of travel distance to turn off material to the dispensing unit prior to the end of a Line command. Line Off Advance allows low viscosity materials time to stop flowing from the needles.

Dot Dwell - Determines the amount of time dispense unit stays in the down position after a dot is dispensed. This allows the dispense material time to finish flowing from the needle. The dwell starts when the Dot Size ends.

Transition Up Height - Sets the distance for which the head will run at slow speed when rising from a dispense operation. Used to eliminate tailing tendency of some dispense materials.

Transition Down - Sets the distance for which head will run at slow speed when lowering to a dispense operation. Used to eliminate overshoot in the Z-axis.

RPM - Determines the rotation speed (in revolutions per minute) of a dispense unit while dispensing.

Length Offset - Establishes how a line of material will be dispensed relative to the length of the part. A value of zero (0) would indicate a line equal to the length of the part (corner to corner). A positive number would indicate a line beyond the length of the part (offset from the corners). A negative number would indicate a line short of the length of the part (offset from the corners). This field is used with an underfill application.

Position Offset - Establishes how far away a line of material will be dispensed relative to the edge of a part.

Dispense On Down - Allows a dot to begin to be dispensed on the down stroke of the dispense unit.

Optimize - If the box is **checked**, the command **will not** be optimized. Dot command lines with checked boxes are dispensed first. Typically used for Predispense dots.

Link Line Last - Establishes when the cartridge in the dispense unit will lift after connecting multiple Linkline commands together.

First Pass Num - Indicates which **Pass** group will be executed first. A **Do Pass** command triggers a specific Pass group or groups. This field is used with underfill applications.

Last Pass Num - Indicates which **Pass** group will be executed last. A **Do Pass** command triggers a specific Pass group or groups. This field is used with underfill applications.

Pass Num - The specific number assigned to a **Pass** group of commands. This field is used with underfill applications.

Timer Timeout - The amount of time assigned to a system timer command. A **Timer** command assures that a specified amount of time has passed between the execution of one command and the execution of the next. This field is used with underfill applications.

Start Corner - Determines where dispensing will start in an underfill application. Values range from zero (0) to three (3) clockwise, with zero indicating the upper right corner. This field is used with underfill applications.

End Corner - Determines where dispensing will end in underfill applications. Values range from zero (0) to three (3) clockwise, with zero indicating the upper right corner. This field is used with underfill applications.

Mark Level - This is used to identify the type of Bad Mark for a command line. The options available are Global, Row, and Local. Refer to Chapter titled - **Bad Mark Sensing** for a detailed description.

Block Editing

Introduction

Multiple entries may be edited on the Process Program Grid in a specific column. This feature saves time during programming by allowing the whole column to be edited verses single entries on each command line.

Procedure

Perform a block edit to the Process Program Grid as follows:

1. Load the Process Program to be edited. See Figure 7-2.

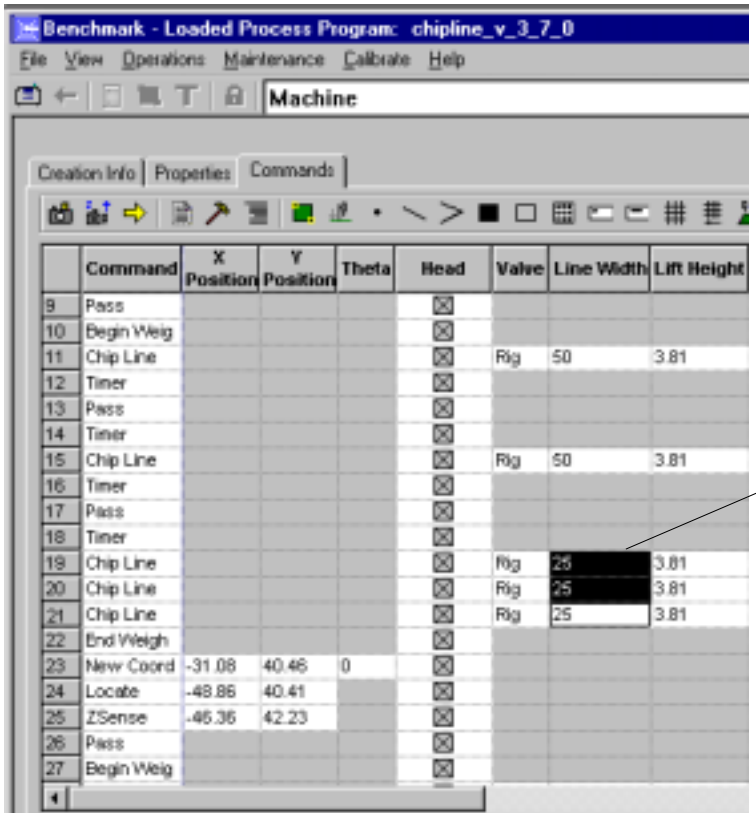


Figure 7-2

2. Select the column to be edited. The example in Figure 7-2 shows the Line Width column selected. Select the cells to be edited as follows:
   a. Using the trackball, move the cursor over the cells to be edited. Press the left button on the trackball.
   b. Press and hold the **Shift** key on the keyboard. Move the cursor vertically to the last cell to be edited in the column. Press the left button on the trackball. The example in Figure 7-1 shows lines 19 through 21 selected.
3. Change the values in the selected cells by using the number pad on the keyboard. Press **Enter** to change the values in the whole string selected. See Figure 7-3.

Note that the original value was **0.25** in Figure 7-2 and the cells were edited to **0.28** under the Line Width shown in Figure 7-3.

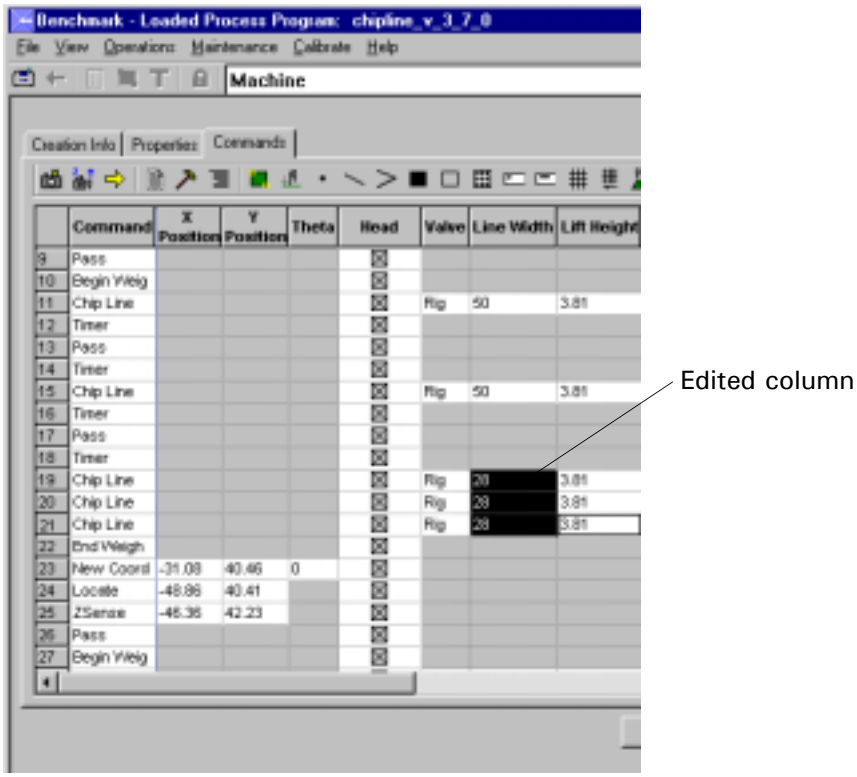

Benchmark - Loaded Process Program: chipline_v_3_7_0
File View Operations Maintenance Calibrate Help
Machine
Creation Info Properties Commands
Command
X Position
Y Position
Theta
Head
Valve
Line Width
Lift Height
9 Pass
10 Begin Weig
11 Chip Line Rig 50 3.81
12 Timer
13 Pass
14 Timer
15 Chip Line Rig 50 3.81
16 Timer
17 Pass
18 Timer
19 Chip Line Rig 28 3.81
20 Chip Line Rig 28 3.81
21 Chip Line Rig 28 3.81
22 End Weigh
23 New Coord -31.08 40.46 0
24 Locate -48.86 40.41
25 ZSense -46.36 42.23
26 Pass
27 Begin Weig
Edited column

Figure 7-3

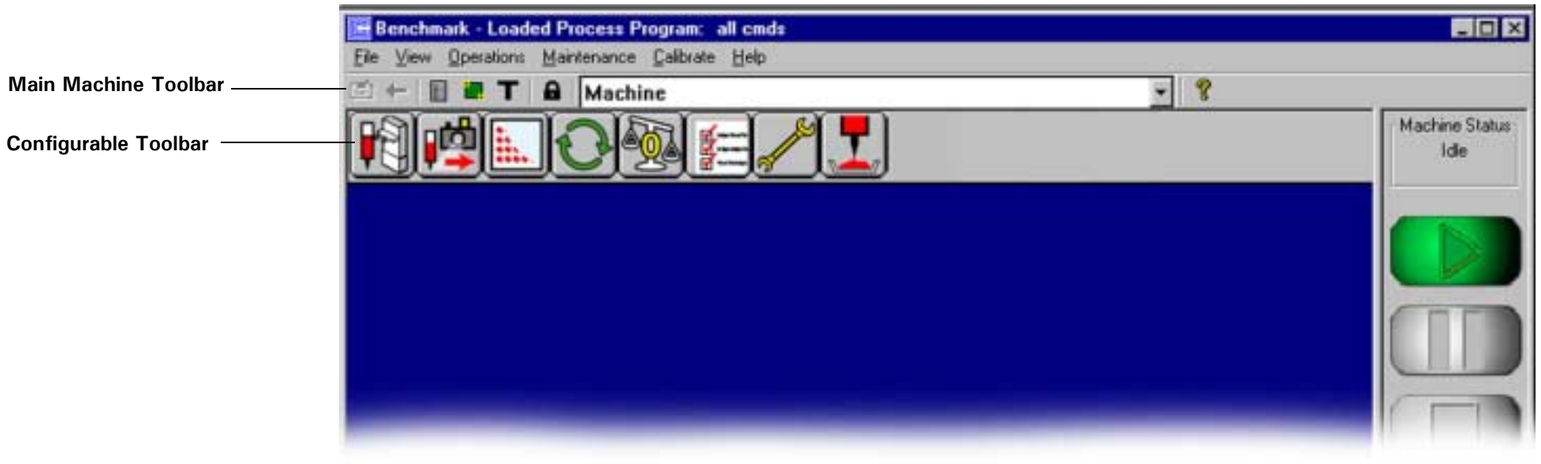

Main Machine Toolbar
Configurable Toolbar
Benchmark - Loaded Process Program: all cmds
File View Operations Maintenance Calibrate Help
Machine
Machine Status
Idle
Process Program Grid
Process Program Commands Toolbar
Typical Process Program Grid Field
Creation Info
Properties
Commands

Figure 7-4

8

Creating And Managing Process Programs

Overview

Introduction

This chapter describes how to create, load, and modify process programs, as well as the requirements for files created off-line.

Each process program contains a set of application specific file properties which need to be assigned. If you are importing ASCII text files, they need to be structured with a specific format.

This section also describes the use of fiducials and templates, which eliminate repetitive programming.

Before attempting any procedure in this section the system should be calibrated properly and you should be familiar with the following:

- System Startup and Shutdown
- Installing a Dispense Unit
- Setting up the Conveyors and Loading a Board(s)
- Toolbars and the Process Program Grid

Attention

When performing any procedure in this section, the command word **"Select"** refers to clicking the left trackball button.

In This Chapter

This chapter contains the following topics.

Creating A New Process Program

Introduction

You need to be familiar with several tasks when creating process programs. The following sections describe each task:

- Creating the Process Program
- Assigning File Properties
- Creating and Assigning Fiducials
- System Templates, including the Weight Scale
- Inserting Program Commands

Procedure

1. Select **File > Process Programs**.
   A list box of existing process programs is displayed. See Figure 8-1.

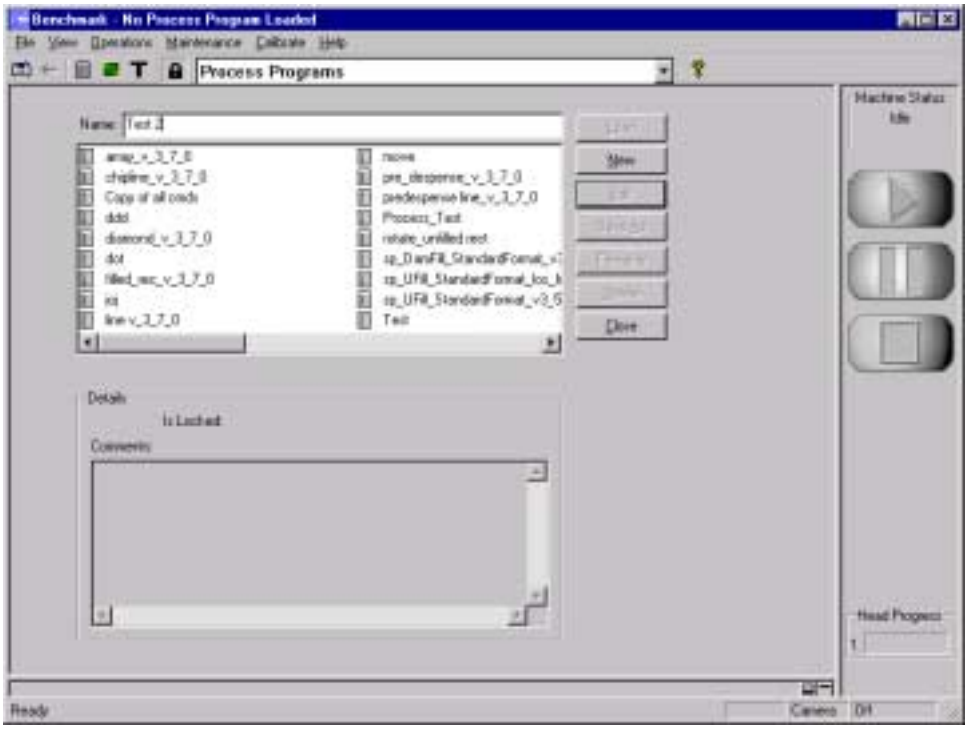


Figure 8-1

2. Click the left trackball button to activate the **Name:** field.
3. Type a new program name of your choice in place of the existing name.
4. Select the **New** button.
   A **Comments:** box is displayed. See Figure 8-2.
5. Enter any relative information about this new program. (Part Number, Board Size, Material, etc.) in the space provided.

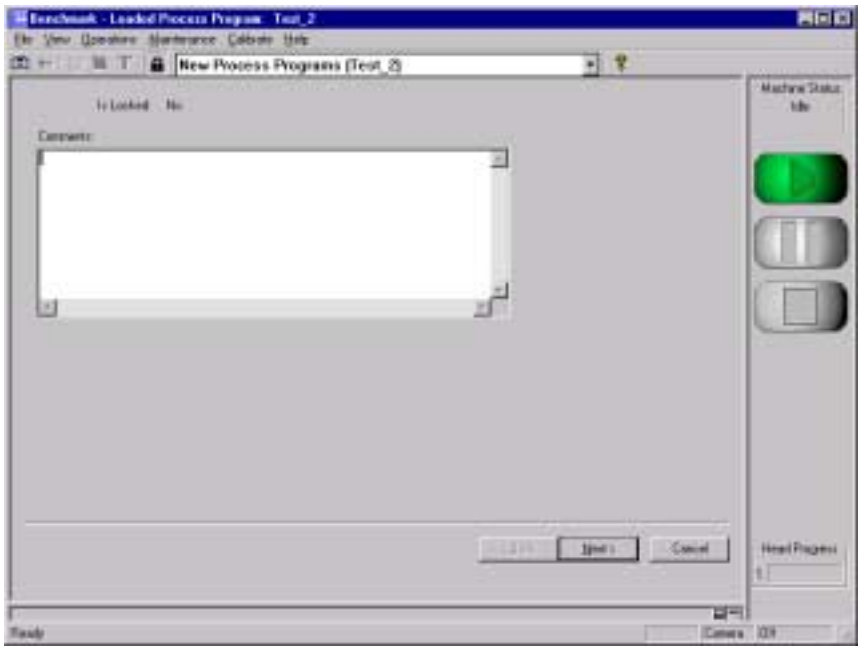


Figure 8-2

6. Select the **Next** button.
   Several buttons and Properties fields are displayed. See Figure 8-3.
7. Assign program properties as required.
   See the section titled - **Assigning File Properties**.
8. Select the **Save** button.

Assigning Properties

Introduction

Each Process Program that you create can be configured in terms of the dispensing application. The program is configured via a number of properties fields that are displayed during new program creation or via the **Properties** tab when displayed from a loaded program.
See Figure 8-3.

Property Fields

The following are general field descriptions and guidelines.

Board Size - Specifies the length and width of the board.

Process Type - Select SMT or Underfill. This setting determines how the conveyor will pass boards through the system.
In Underfill mode, a carrier with multiple parts would be treated by the system as though it was a single part.

Process Mode - **Sequential** mode is used primarily for dispensing dots.
Each program command is assigned to a specific head, this allows for different combinations of needle and dispense properties.

Selecting **Parallel** mode is used to dispense underfill, encapsulation or other applications where all heads dispense identical commands.

Process Program Offset Defaults - Determines the position of the substrate relative to the board's clamped position in the conveyor.

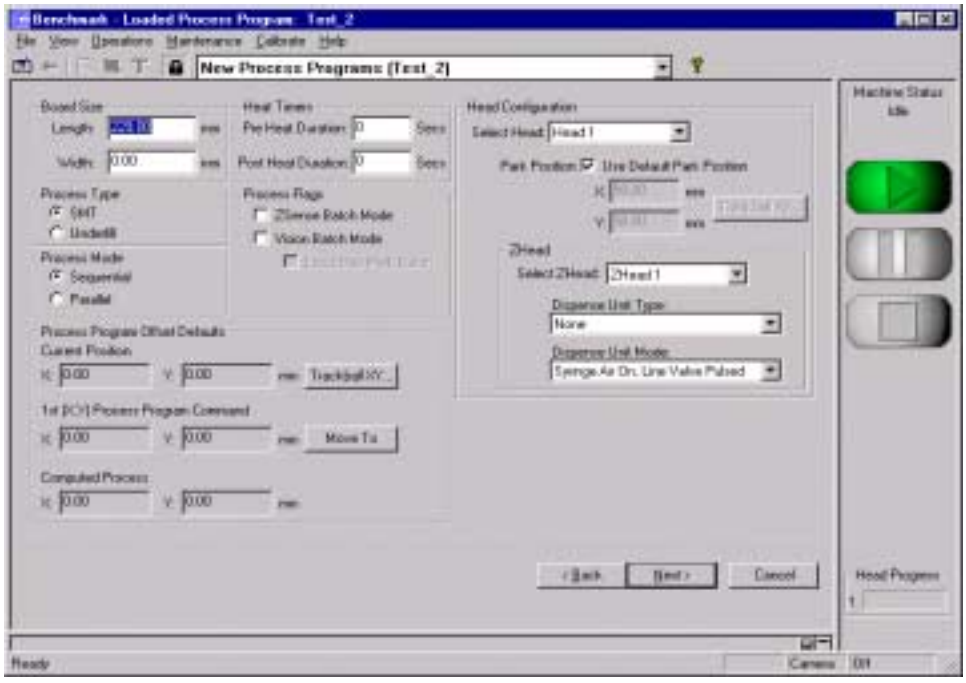


Figure 8-3

Heat Timers - This is used if the system is equipped with heated chucks to set the duration of time (in seconds) that the substrate will remain at the Pre-heat or Post-heat stations.

Process Flags - The system has the ability to process various commands in batch mode. When their respective boxes are checked, all like commands (Locate, Z-Sense) are all processed together at the beginning of program execution, regardless of their position in the program.

Dispense Unit Types - For each dispense head, select the type to be used. The choices in the drop down list are: None, Dot, Line, Heated Line, 3X Line, 3X Heated Line, Flux Jetter, or 645 Piston Pump.

Dispense Unit Mode- This mode contains two settings which control how air is delivered to the dispense unit.
The two settings are:
Syringe Air On, Line Valve Pulsed - Used with Line and Dot Dispense Units for dispensing low viscosity materials.
Syringe Air Pulsed, Line Valve Open - Used for dispensing high viscosity materials or when constant air pressure is required to assure an adequate flow of material.

Park Position - This allows a user to set a specific park location for each head. The head moves to the park position following a dispense cycle. When taught properly, dispense head movement is minimized by teaching the Park Position in close proximity to the next dispense operation.
Refer to section titled - **Setting the Park Position.**

The selections that you make in the **Properties** view are saved with the program so that the correct parameters are applied automatically when the program is loaded.

See Chapters titled - **SMT Application** and **Underfill/Encapsulation** for more detailed information for these specific applications.

Setting File Properties

After establishing the appropriate settings, select the **Next >** button, if you are creating a new process program.
Select the **Save** button if you wish to apply changes to an existing program.

Importing Files

Introduction

The Import function allows you to utilize Process Program data created off-line. Process Program files can be imported from any accessible drive.
The following file types are supported:

- All Benchmark files (*.Cam), (*.txt), (*.*Template), (*.*Fid), (*.ChipDef), (*.BadMark)
- Camalot GFX software files can be imported but must be saved as **.txt** files.

Procedure

Import a File as follows:

1. Select **File > Import** from the **Machine** screen. See Figure 8-4.

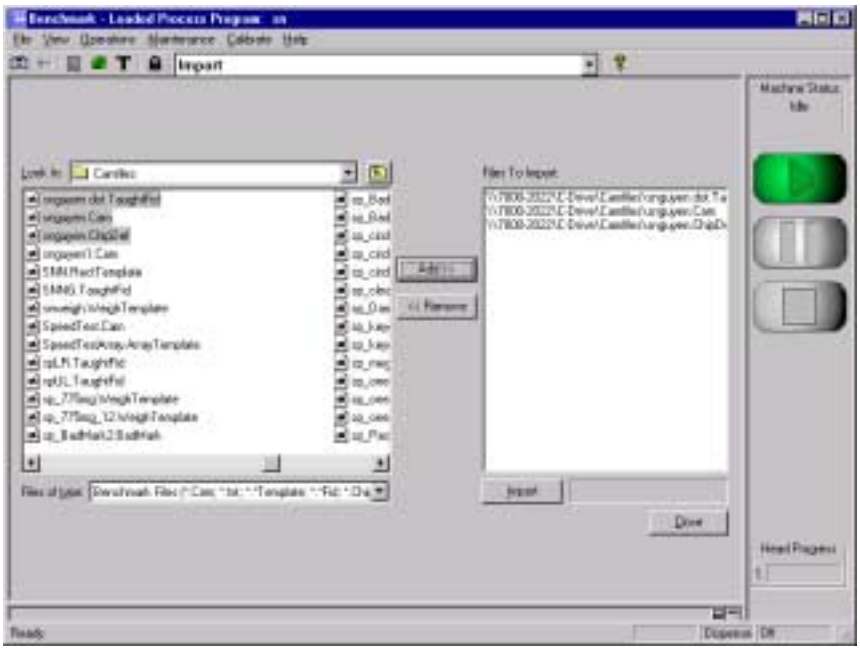


Figure 8-4

2. Select the **Look In** field and select the folder that contains the file to be imported. If necessary, use the drop down list to find the correct folder.
3. Select the files to be imported from the left-hand column.
   In Figure 8-4 three files are selected.
4. Select the **Add > >** button to move the files over to the right-hand column under the field labeled **Files To Import**.
5. If a file was placed in the **File To Import** column inadvertently, select the file and then the **< < Remove** button.
6. Select the **Import** button when all the required files are in the **File To Import** column.

An indicator just to the right of the **Import** button will show the files being transferred. Figure 8-5 appears when all the files are imported.

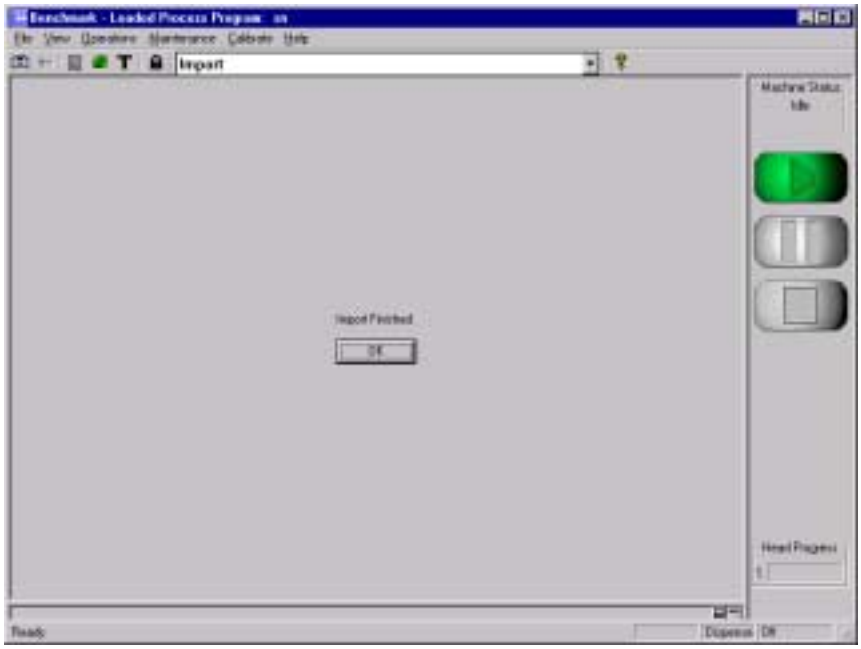


Figure 8-5

7. Select the **OK** button on the screen.
   You are returned to the **Import** screen.
8. Repeat step 2 through step 7 for additional files to be imported or select **Close** to return to the **Machine** screen.

Inserting Program Commands

Introduction

Program commands can be entered into the Program Grid two different ways:

- Select from the **Process Program Command** toolbar. See Figure 8-6.
- Select the **All Commands** icon from the Program Command toolbar. See Figure 8-6.

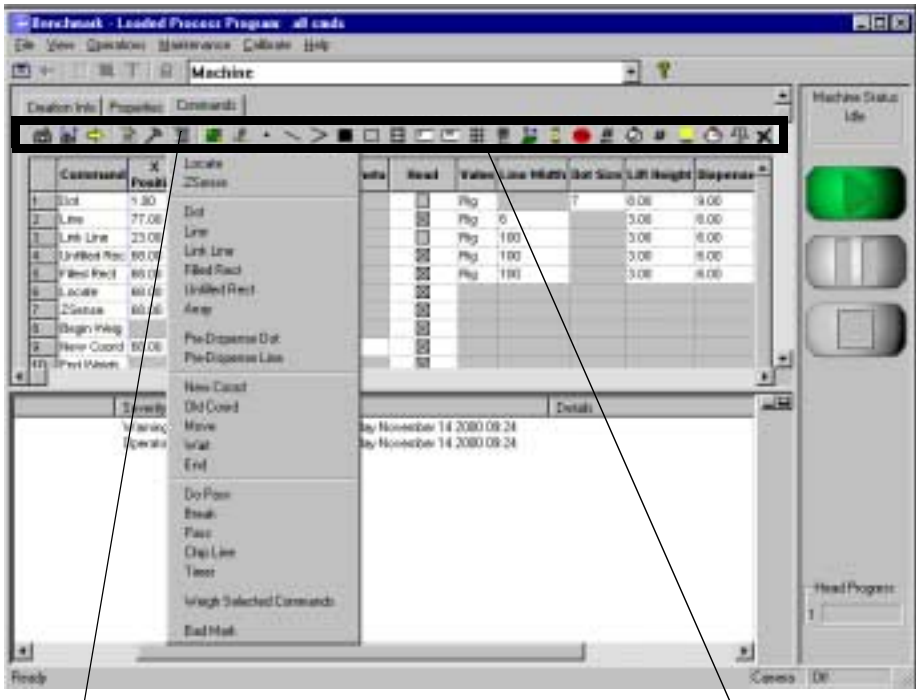


Figure 8-6

Add commands to the program by selecting a row in the first column of the Program Grid and selecting a Program Command icon or by inserting from the **All Commands** icon. New commands are added on the command line (row) following the one currently selected. Inserting a command activates the applicable fields in the Program Grid. You may leave the default values or enter new ones.
See the Chapter titled - **Toolbars And The Process Program Grid** for detailed descriptions of all the system commands.

Saving The Process Program

When you create a new dispense program and establish the appropriate settings, select the **Next>** button.

Select the **Save** button if you wish to apply changes to an existing program. See Figure 8-7.

When viewing an existing program on the Program Grid, changes or additions to the program are saved by selecting one of the following:

Save Program Changes	Select
To modify the original file	**Save** button
To create a new file name	**Save As** button

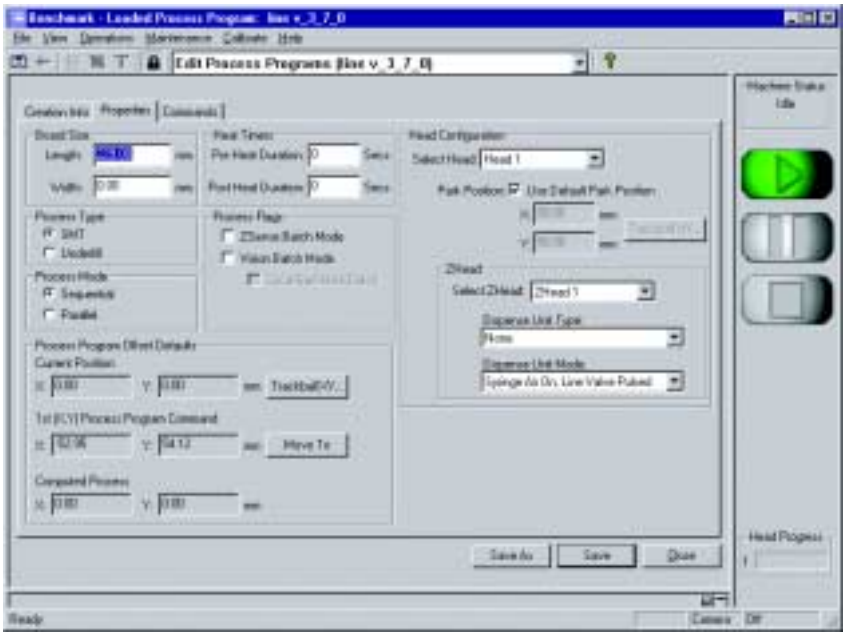


Figure 8-7

Editing An Existing Process Program

Procedure

1. Select **File > Process Programs**.
   A list of existing Process Programs appears. See Figure 8-8.
2. Select a program from the list.

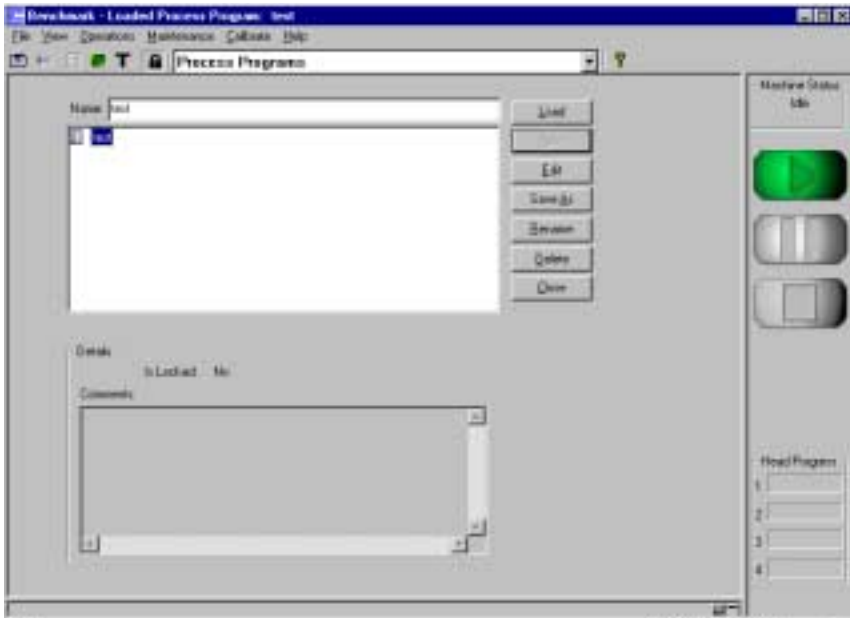


Figure 8-8

3. Select the **Edit** button.
4. To view the program, select **View > Process Program**.
   The program commands are displayed in the program grid.

Assigning Units Of Measure

Introduction

System settings and commands can be displayed in inches or millimeters.

Procedure

To change the Units of Measure:

1. Select **View > Configuration** and select the **Display Settings** tab. The **Configuration** view appears. See Figure 8-9.
2. Select **Inches** or **Millimeters** from the **Display Units** group.
3. Use the up and down arrows in the **Decimal Precision** field to establish the number of decimal places required. The range is from 0 to 5.
4. Select **OK** to return to the **Machine** screen.

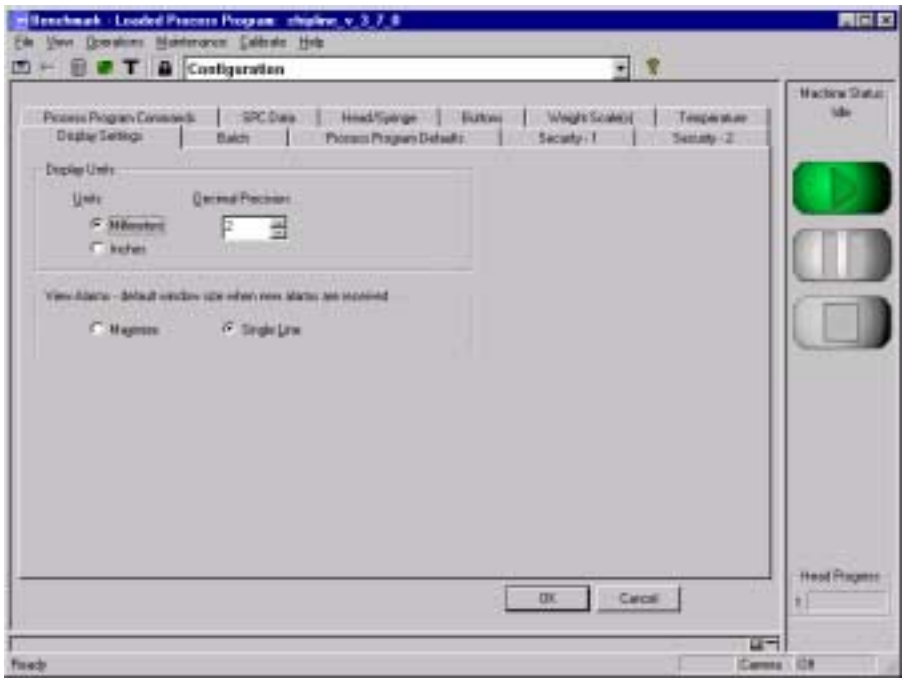


Figure 8-9

Creating And Assigning Fiducials

Attention

Before teaching any fiducials, be sure that the vision system is calibrated. Refer to the Chapter titled - **Calibration And Offsets**.

Introduction

Fiducials are used by the system to offset programs to accommodate skewed boards or components. If the program utilizes fiducials, the fiducials must be taught before program creation. There are four different types of fiducials that can be defined based on your application:

Taught fiducials are user defined. Actual board details are captured by the system and used to offset programs in production. Taught fiducials must be defined by the user and are retained by the system for use in dispensing process programs.

Synthetic fiducials are industry standard board markings which are supplied with the Benchmark software. Although the form or shape of the fiducials is pre-defined, you must setup the fiducial before it can be used.

Chip Definition fiducials are used in the underfill process to locate the edges and orientation of the chip. In underfill applications the dispensing takes place very close to the edge of the part and the dispensing needle is actually below the top of the part. Refer to chapter titled - **Dispensing Underfill And Encapsulation** for a detailed description and procedure.

One Snap fiducials are used to identify a component which are confined to a small image area. The system will take one snap shot of two taught areas on a component.

Creating A Taught Fiducial

Attention

If all of the fiducials you use are identical, you need only teach one, which can be applied to all reference points.

Procedure

Before teaching a fiducial, you need to load a sample board(s) into the system.

Teach one or more fiducial reference marks on the process board as follows:

1. Select **File > Locate**.
   A list of previously created fiducials appears. See Figure 8-10.

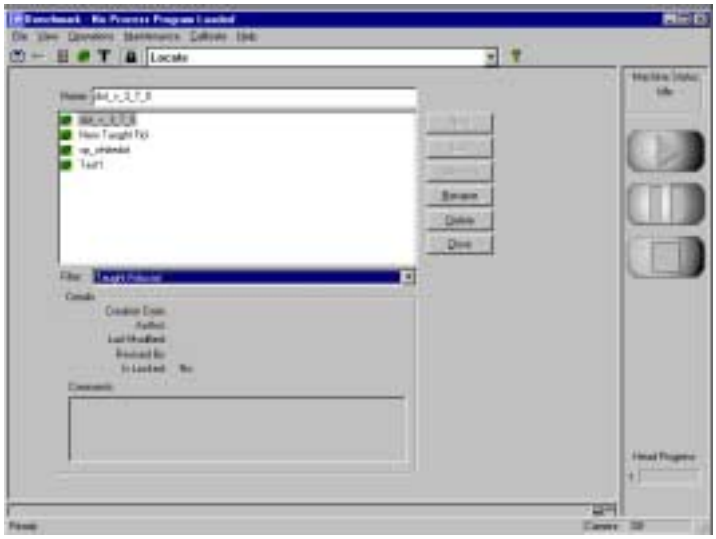


Figure 8-10

2. Type a new name for the fiducial.
3. Select the **New** button.
   A pop up list of fiducial types appears.
4. Select **Taught** from the list.
   A comment box appears. See Figure 8-2.
5. Enter any relative information about this new file (Part Number, Board Size, Material, etc.) in the space provided.
6. Select the **Next>** button.
   A vision window appears. See Figure 8-11.

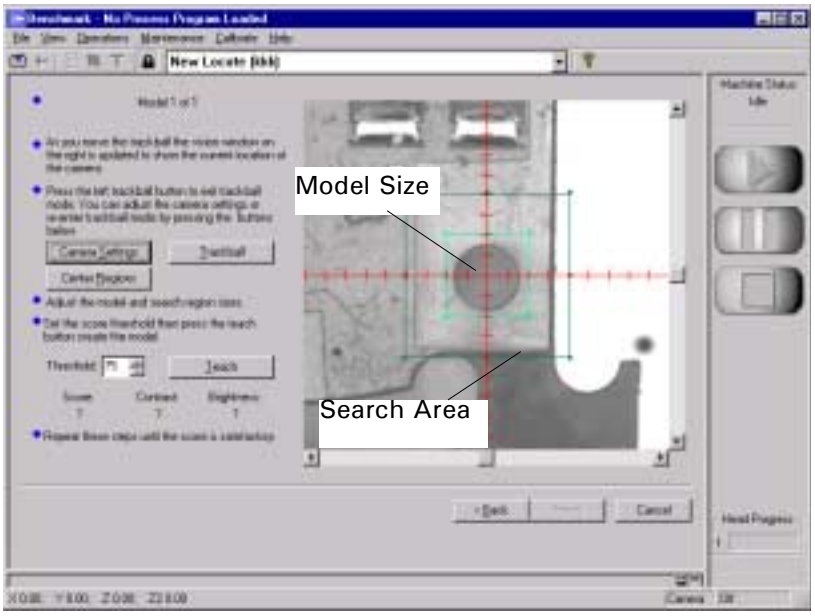


Figure 8-11

Attention

A clear image with well defined edges is required in order to correctly identify fiducials. This is achieved by adjusting zoom, brightness, and contrast settings prior to teaching the fiducial.

7. If necessary, adjust camera focus and lighting to desired settings as follows:
   a. Select the **Camera Settings** button. **Camera Settings** screen appears. See Figure 8-12.

Figure 8-12

   b. Adjust the **Zoom, Brightness,** and **Contrast** as desired by selecting the applicable up or down arrow for each field. After desired settings are complete, select the **Close** button.

Attention

The **Model Size** and **Search** areas are represented in the vision window by green bounding boxes. The bounding boxes have square handles at each corner which are used to resize them. The model size box should be large enough so that the camera can distinguish the fiducial from the area surrounding it. The Search Area should be just large enough to account for the maximum possible skewing of the substrate.

8. If necessary, adjust the **Model Size** and/or **Search Areas** as follows (See Figure 8-11):
   a. Place the pointer on any one of the square handles at the corners of the bounding box.
   b. Click on a handle (a double headed arrow appears).
   c. Using the trackball change the size of the box to properly surround the reference mark.
   d. Click the left trackball button to accept the change.
9. Select the **Center Regions** button, this makes the Model Size and Search Area boxes concentric.
10. Select the **Trackball** button and use the trackball to align the intersection of the crosshairs with the center of the fiducial.
11. When the fiducial is properly centered, click the left trackball button.

Attention

The vision system validates each fiducial based on the quality of the image. A user specified Threshold value determines the minimum quality factor. Any value above the Threshold is accepted. Any value below the Threshold setting is rejected.
A typical Threshold setting is 75. A satisfactory score appraised by the vision system when the Teach button is selected is normally in the 90s.

12. Select the **Threshold** field and type in the desired value. See Figure 8-11.
13. Select the **Teach** button.
    The **Score**, **Contrast** and **Brightness** values are displayed.
14. If the values are acceptable, select the **Finish** button.
    You are returned to the list of fiducials.

Configuring Synthetic Fiducials

Introduction

The system software provides a library of industry standard fiducial marks. You can use these marks to create fiducials based on your application.

Procedure

To configure a synthetic fiducial:

1. Select **File** > **Locate**.
   A list of previously created fiducials appears. See Figure 8-10.
2. Select the file listed in the **Name** field.
3. Type a new file name of your choice in place of the existing file name.
4. Select the **New** button.
   A pop up list appears with the four types of fiducials.
5. Select **Synthetic** from the list.
   A comment box appears. See Figure 8-2.
6. Enter any relative information about this new file (Part Number, Board Size, Material, etc.) in the space provided.
7. Select the **Next** button.
   A Shape window and several fields and buttons are displayed on the screen. See Figure 8-13.

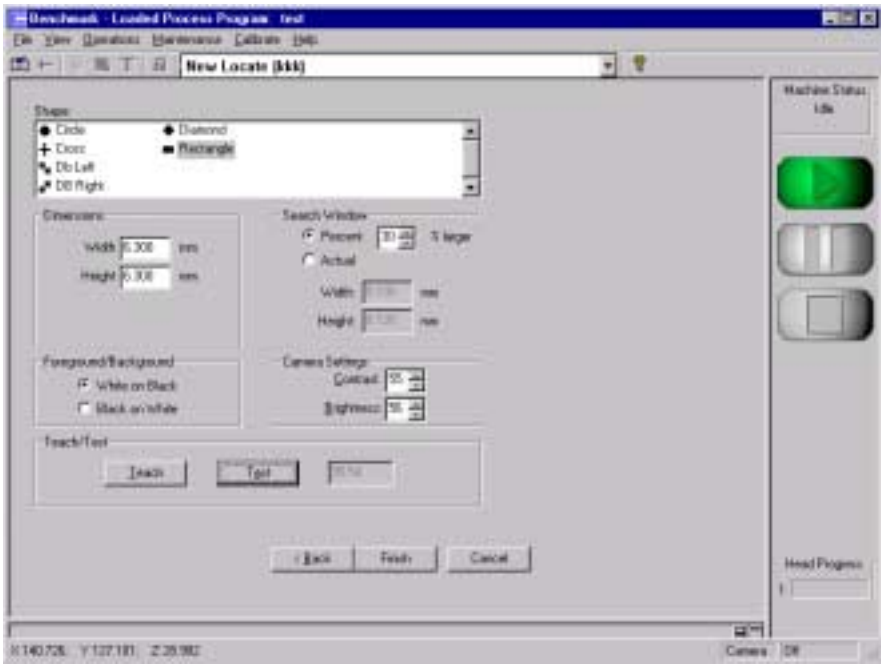


Figure 8-13

8. Enter/select the appropriate settings to establish the characteristics of the new fiducial according to the table on the next page.

Field/Button	Description
Shape	Circle, Cross, Db left, Db right, Diamond, and Rectangle.
Dimensions	Enter the dimensions of the fiducial.
Search Window	You can define the search area numerically or as a percentage of the fiducial size. If you select the **Percentage** button, the size of the search area is calculated, based on the dimensions of the fiducial and the value you specify in the **% Larger** field. The minimum value is 20%. The maximum is 100%. If you select the **Actual** button, the Width, and Height fields are activated and you may specify exact dimensions for the search area.
Foreground/ Background	Defines the color scheme for the fiducial and background.
Camera Settings	Displays Contrast and Brightness values currently in affect. Set to desired value using the up or down arrow.
Teach / Test	When the **Teach** button is selected, the values entered in the above fields are saved to memory and the **Test** button is enabled. By selecting the **Test** button, the system will produce a score of the model.
Scoring	A good fiducial should yield a score of 90 or above.

9. After specifying the properties for the new fiducial, select the **Teach** button.
10. Select the **Test** button.
11. Note the score value in the box to the right of the **Test** button.
    A score of 90 or above is considered satisfactory.
12. If necessary modify the fiducial properties and retest until a satisfactory score is achieved.
13. Select the **Finish** button.

Creating One Snap Fiducials

Introduction

Using One Snap fiducials increases throughput because both fiducials associated with the part are located by the vision system simultaneously. Thus head movement is cut in half.

Procedure

1. Select **File > Locate**.
   A list of previously created fiducials appears. See Figure 8-14.

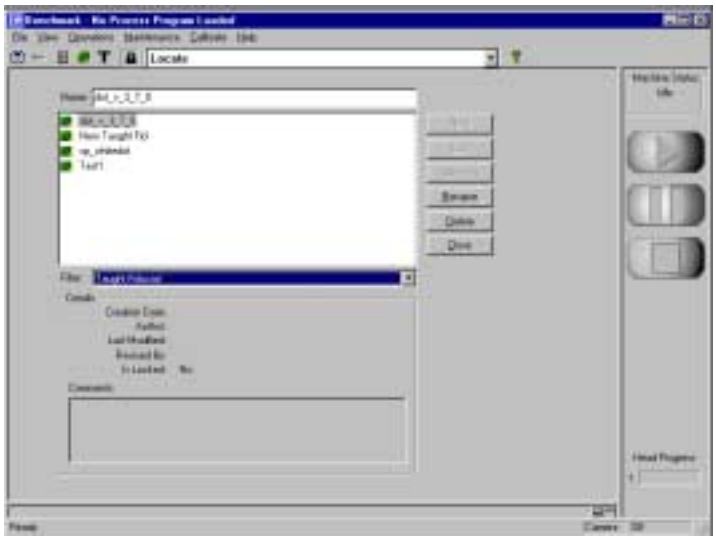


Figure 8-14

2. Type a new name for the fiducial.
3. Select the **New** button.
   A pop up list of fiducial types appears.
4. Select **One Snap** from the list.
   A comment box appears. Refer to Figure 8-2.
5. Enter any relative information about this new file (Part Number, Board Size, Material, etc.) in the space provided.
6. Select the **Next >** button.
   A vision window appears as shown in Figure 8-11.
7. If necessary, make adjustments to the camera's focus and lighting and to the **Model Size** and **Search Area** bounding boxes.
   Refer to the section titled **Creating A Taught Fiducial**.
8. Select the **Trackball** button and use the trackball to position the camera so that both fiducials are visible in the vision window.
9. When properly positioned, click the left trackball button.
10. Using the handles drag and adjust the **Search Area** and **Model Size** bounding boxes so that they are centered over the first fiducial. See Figure 8-15.
11. Select the **Teach** button.

12. The **Score**, **Contrast** and **Brightness** values are displayed.
13. If the values are acceptable, select the **Next** button.

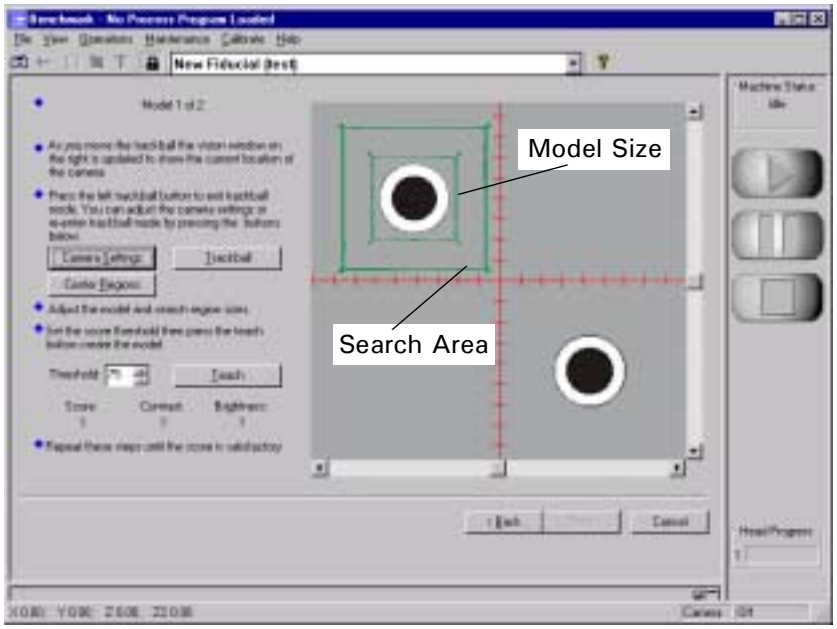


Figure 8-15

14. Select the Trackball button.
15. Using the handles drag and adjust the **Search Area** and **Model Size** bounding boxes so that they are centered over the second fiducial. See Figure 8-16.
16. Select the **Teach** button.

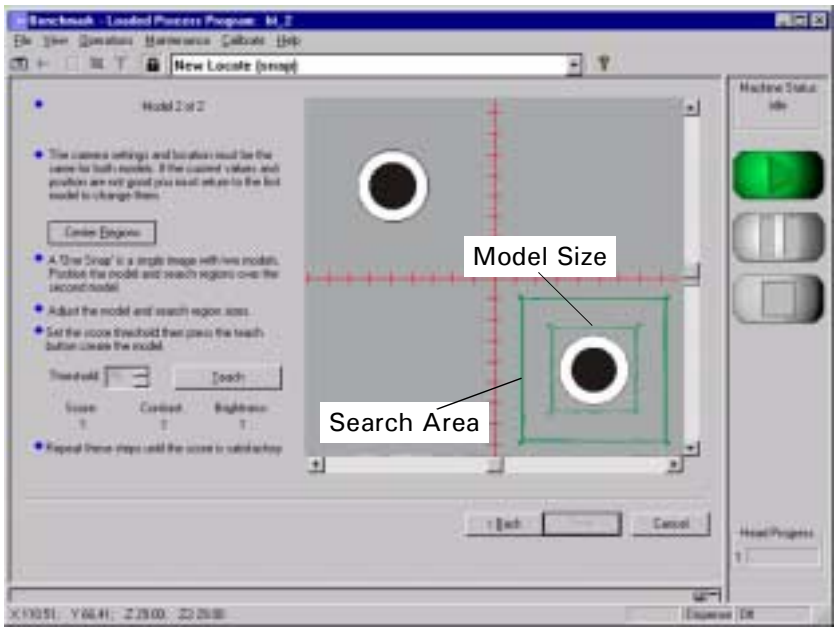


Figure 8-16

17. The **Score**, **Contrast** and **Brightness** values are displayed.
18. If the values are acceptable, select the **Finish** button.

System Templates

Introduction

Templates allow the convenience of storing and applying dispense properties used in dispense routines.

Templates are generally applied to individual program commands, however some are applied to a group of commands.

There are several application-based template styles:

- Dot
- Line
- Move
- Unfilled Rectangle
- Filled Rectangle
- Pre-Dispense Dot
- Pre-Dispense Line
- Array
- Weigh

Templates can be created during the programming process, or as a standalone function.

Creating A Template

Introduction

All templates are created using the same general procedure regardless of the template type. The only difference between template types are the properties that are stored in the templates themselves.

Procedure

1. Select **File > Template**.
   A screen appears with a list of existing templates.
   See Figure 8-17.

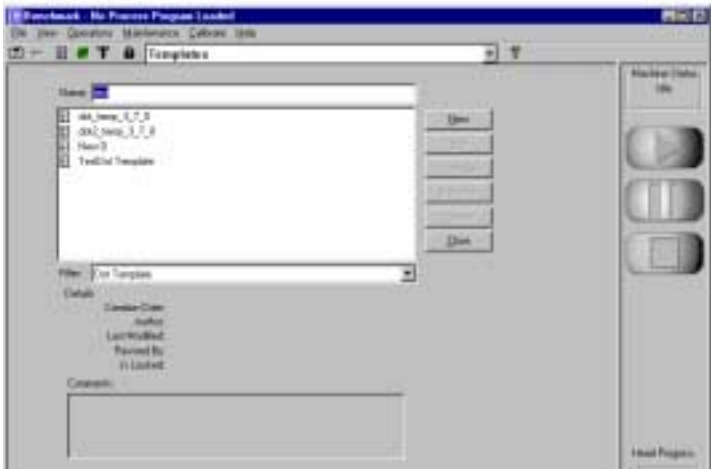


Figure 8-17

2. Select the desired template type from the drop down **Filter** list.
   The **Name** field is highlighted.
3. Type a file name of your choice over the highlighted file name.
4. Select the **New** button.
   A comment box appears on the screen.
5. Enter any relative information about this template (Part Number, Board Size, Material, etc.) in the space provided.
6. Select the **Next** button.
7. A list of property fields and buttons, appropriate to template type is displayed.

Attention

The section titled **Process Program Grid Fields** contains detailed information on all dispensing properties.

8. After entering values for each field, select the **Finish** button.
   The template data is saved in the database.

Specific template types are discussed in detail in subsequent sections of this chapter.

Dot, Line And Move Templates

Introduction

Figure 8-18 illustrates the Dot, Line and Move template types.

The section titled **Process Program Grid Fields** in Chapter 7 contains detailed information on all dispensing properties.

Applying The Template

1. Insert or select an existing **Dot**, **Line** or **Move** command.
2. Use the scrollbar at the bottom of the Program Grid if necessary to display the **Name** column.
3. Place the pointer over the **Name** column cell on the command line and double click the left trackball button. A list of appropriate templates is displayed.
4. Select the desired template name from the drop down list.
5. Select the **OK** button.
   The properties of the selected template are applied to the command.

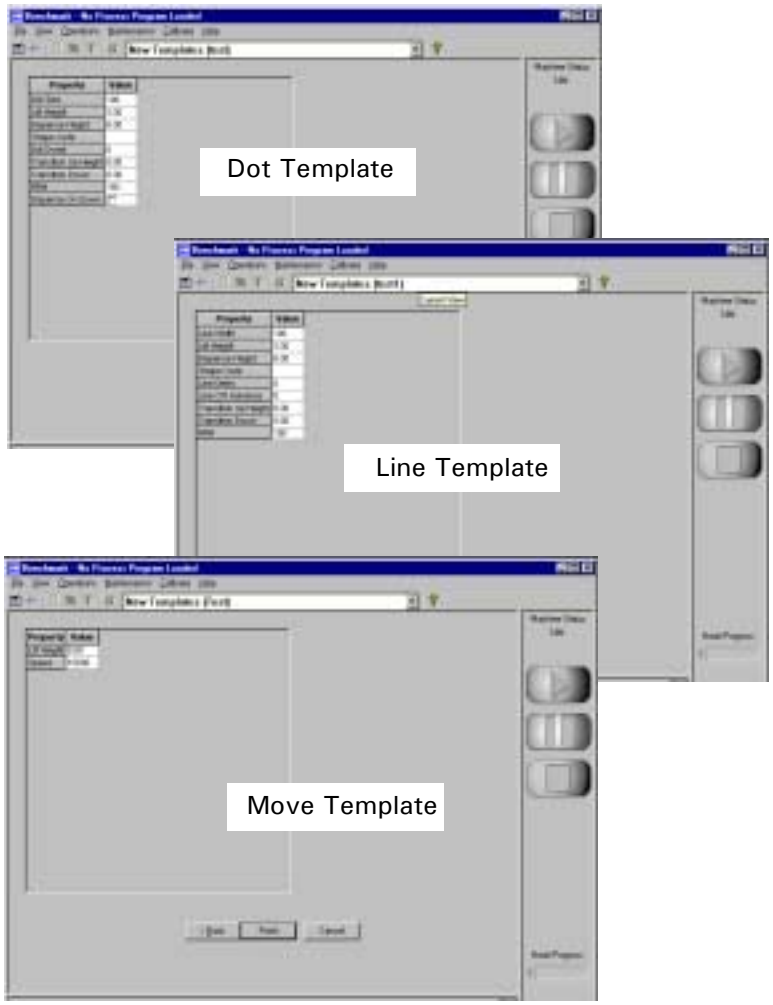


Figure 8-18

Weight Scale Templates

Introduction

The Weight Scale template properties are used to establish and maintain precise and consistent dispense amounts.

Creating The Template

1. Select **File > Template**.
   A screen appears with a list of existing templates.
   See Figure 8-17.
2. Select the **Weight Scale** template type from the drop down **Filter** list.
3. Type a new file name in the **Name** field.
4. Select the **New** button.
   A comment box appears on the screen.
5. Enter any relative information about this template (Part Number, Board Size, Material, etc.) in the space provided.
6. Select the **Next** button.
7. A list of property fields and buttons is displayed on the screen.
   See Figure 8-19.

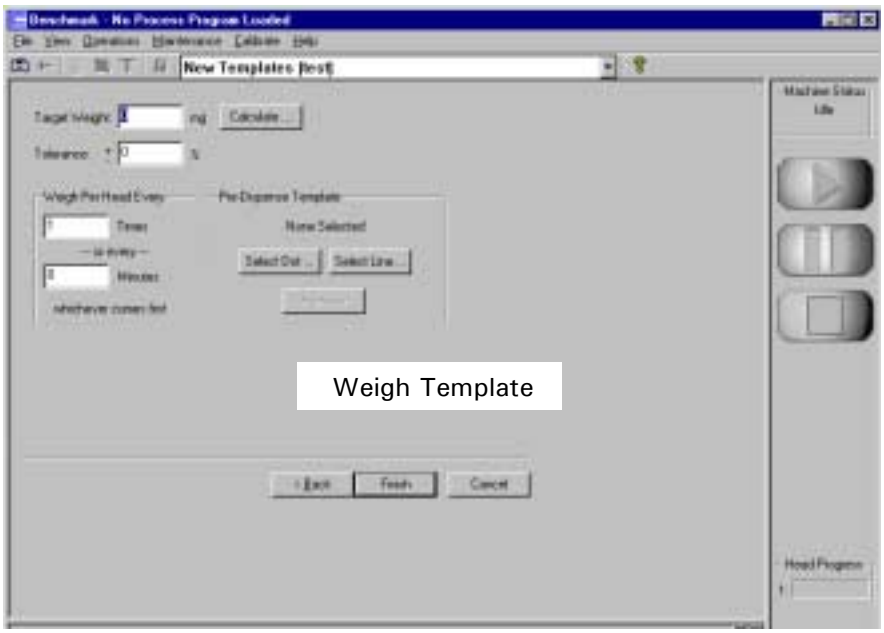


Figure 8-19

8. Enter the template properties.
   See the section titled **Weight Scale Template Properties**.
9. Select the **Finish** button.

Weight Scale Template Properties

Weight Scale template properties are based on a specific process coupon and material.

The following table describes the individual property fields and buttons:

Field/Button	Description
Target Weight	The desired weight of the dispensed material. Determined by performing a sample test (dispense and weigh) on a process coupon (user defined) or with the Calculator. See the section titled - **Using The Weight Scale Calculator** for more information.
Tolerance	The amount of allowed deviation from the Target Weight. (Can be established when performing the sample test on the process coupon.)
Weigh Per Head Every	Controls the frequency of the weigh operation. **Times**: The weight will be checked after a specified number of dispense occurrences. A value of zero indicates that the user wants to ignore the **Times** factor and default to the **Minutes** control. **Minutes:** The weight will be checked after a specified number of minutes has elapsed. A value of zero indicates that the user wants to ignore the **Minutes** factor and default to the **Times** control. The **Times** and **Minutes** are synchronized with each other. Whichever occurs first triggers a weigh sequence.
Pre-Dispense Template	An optional **Dot** or **Line** pre-dispense command may be executed after a successful weigh sequence. This ensures that no residual material remains on the needle prior to dispensing on the actual product. The **Pre-dispense** command will dispense onto the pre-dispense plate. Select the **Select Dot...** or **Select Line ...** button to choose a pre-dispense template.
Calculate	A pop-up calculator appears which is used to determine a Target Weight. See the section titled - **Using The Weight Scale Calculator** for more information.

Using The Weight Scale Calculator

The Weight Scale Calculator provides an alternate means of establishing the target weight of a dispense sequence.

Selecting the **Calculate ...** button in the **New Templates** screen displays the **Calculate Target Weight** screen as shown in Figure 8-20.

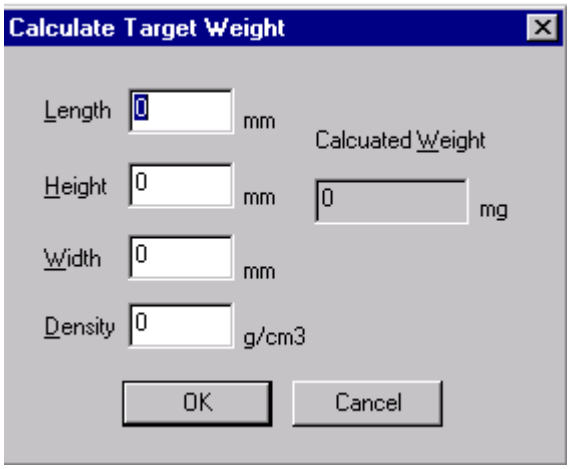


Figure 8-20

The calculator fields are described as follows:

Field	Description
Length	Length of a particular program entity.
Height	Height of a particular program entity.
Width	Width of a particular program entity.
Density	Density of the material that is being dispensed.
Calculated Weight	Calculated weight from the values entered in the above fields. This number automatically calculates when values are placed in fields for Length, Height, Width, or Density.

To perform a calculation:

1. Insert the proper information into the appropriate fields.
2. Select the **OK** button.
   The calculation is performed.
3. If the value in the **Calculated Weight** field is acceptable, select the **OK** button.
   The calculated weight is applied to the **Target Weight** field.

Applying The Template

A Weight Scale template is applied to a selected series of dispensing commands.

To insert a weight scale template into a Process Program:

1. Load a process program.
2. Select **View** > **Process Program** to display the Program Grid.
3. Using the trackball, select the command lines that will be subject to the weigh process.
   In Figure 8-21, command lines 5 and 6 are selected.

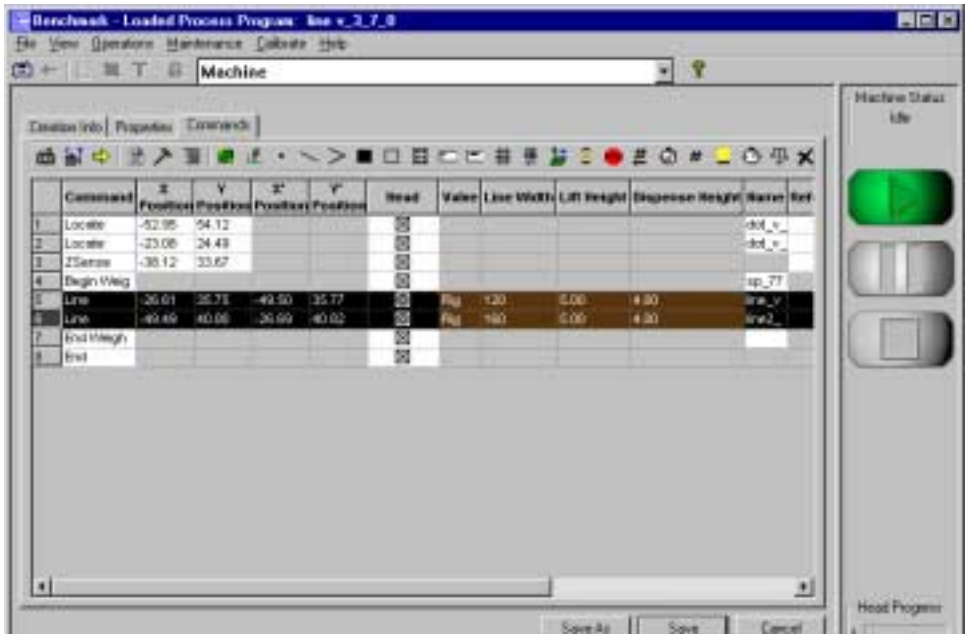


Figure 8-21

4. Select the **Weigh Selected Commands** icon  from the toolbar.
   A list of Weight Scale templates appears.
5. Select the appropriate Weight Scale template.
6. Select the **OK** button.
   A **Begin Weigh** command is inserted before the selected lines and an **End Weigh** command is inserted after the selected lines.
7. Use the scrollbar at the bottom of the Program Grid if necessary to display the **Name** column.
   The name of the selected Weight Scale template appears in the **Name** field on the **Begin Weigh** command line.

Filled And Unfilled Rectangle Templates

Introduction

The **Filled Rectangle** and **Unfilled Rectangle** templates contain the same dispense properties as the Line template type as well as some additional fields that are specific to these applications. See Figures 8-23 and 8-24.

The section titled - **Process Program Grid Fields** in Chapter 7 contains detailed information on all dispense properties.

Special Fields

The table below describes the additional fields that are used with the **Filled** and **Unfilled Rectangle** templates.

Field	Description
X and **Y Position**	Defines the first corner of a Filled or Unfilled rectangle.
X' and **Y' Position**	Defines the second corner of a Filled or Unfilled rectangle.
X" and **Y" Position**	Defines the third corner of a Filled or Unfilled rectangle.
Rect Offset Start	Places the start point of the dispensed line between the first two corner points. This eliminates a buildup of material that can occur when the start and end points are in a corner. See Figure 8-22.
Fill Type (Filled Rectangle Only)	This drop down list allows you to select a **Spiral In**, **Spiral Out** or **Zig Zag** dispense program.
Line Offset (Filled Rectangle Only)	Assigns the spacing (offset) between each line that is used to create the fill.

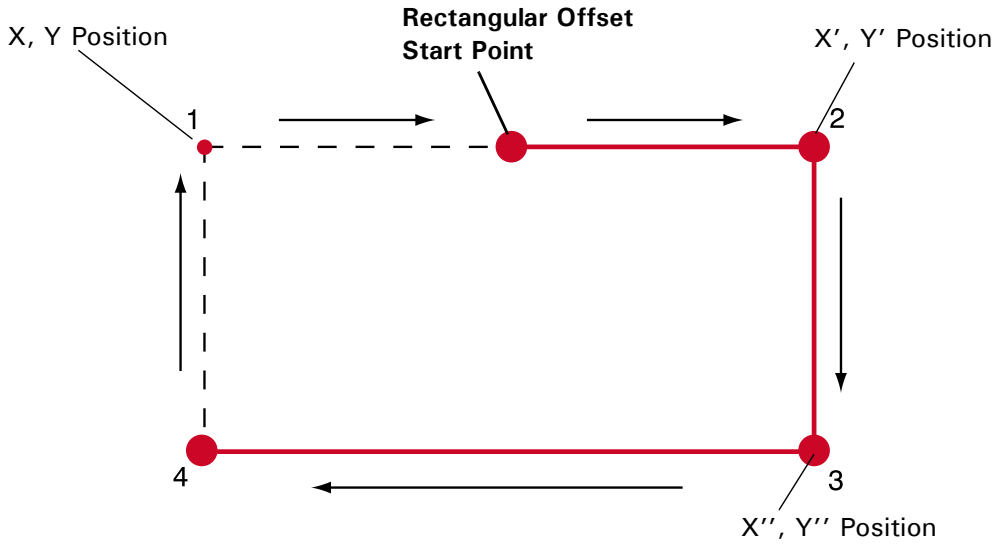


Figure 8-22

Figure 8-22 illustrates the typical path of the dispense unit when the process program is run using the Rectangular Offset Start.

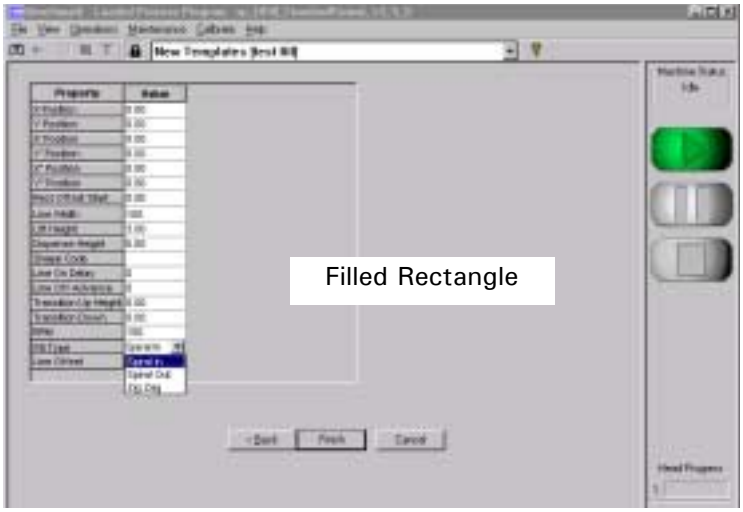


Figure 8-23

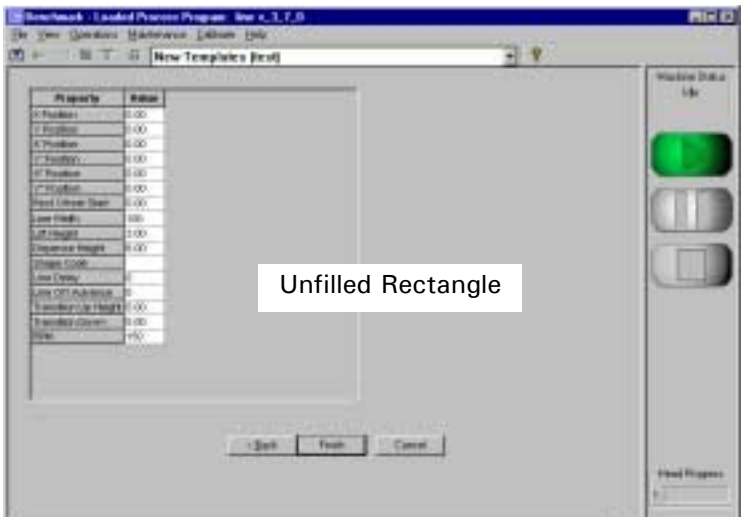


Figure 8-24

Applying The Template

1. Insert or select an existing **Filled Rectangle** or **Unfilled Rectangle** command.
2. Use the scrollbar at the bottom of the Program Grid if necessary to display the **Name** column.
3. Place the pointer over the **Name** column cell on the command line and double click the left trackball button.
   A list of appropriate templates is displayed.
4. Select the desired template name from the drop down list.
5. Select the **OK** button.

The properties of the selected template are applied to the command.

Creating A Diamond Shape

Procedure

Create a diamond shape as follows:

1. Place the pointer on a line of the program grid where you wish to place a diamond. Select **Unfilled Rectangle** from the top of the Process Program Commands Toolbar  .
2. Type a file name of your choice over the highlighted file name.
3. Select the **New** button.
   A comment box appears on the screen.
4. Enter any relative information about this template (Part Number, Board Size, Material, etc.) in the space provided.
5. Select the **Next** button.
6. A list of property fields and buttons, appropriate to template type is displayed.
7. Using the trackball, place the cursor over the grid of the template and right click.

A pop-up menu appears. See Figure 8-25.

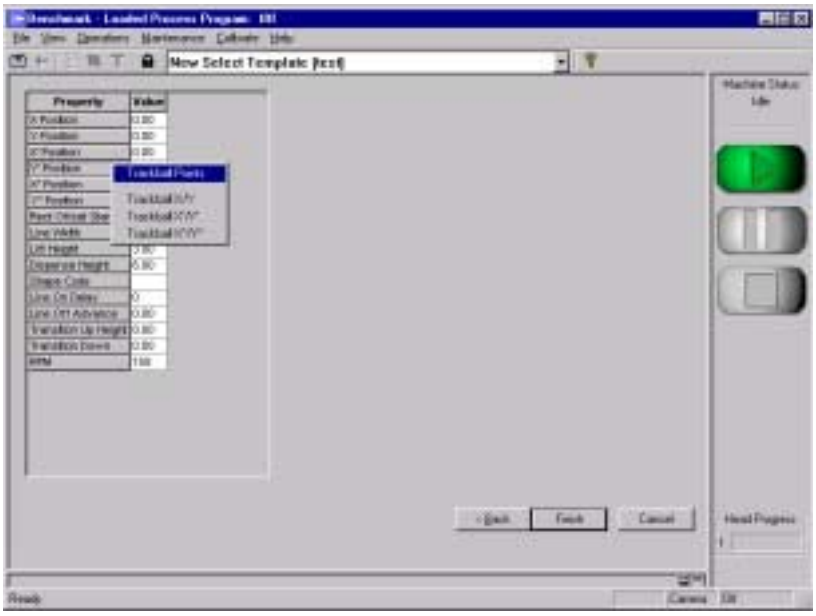


Figure 8-25

8. Left click the trackball and a vision window appears.
9. Using the trackball and the vision window, drive the crosshair over to the first point of the diamond. See Figure 8-26. Select the left button to teach the first point.

Attention

The system has the capability of dispensing in either a clockwise or counterclockwise direction. The software determines the dispensing direction from the second point. Figure 8-26 is an example dispensing in a clockwise direction.

10. Repeat step 4 for the second and third points.

The software calculates the placement of the line from point 3 to 4 and the line from point 4 to 1 without any operator input.

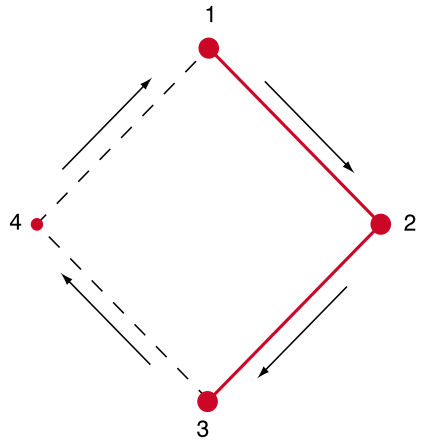


Figure 8-26

Running The Diamond Shape

Run the diamond shape template as follows:

1. Load a process program.
2. Place the cursor on the command line of the grid where the diamond shape is to be inserted.
3. Select **Unfilled Rectangle** from the top of the Process Program Commands Toolbar  .
4. Select the unfilled rectangle template previously created.
5. Select **OK**.

You are placed back in the program grid with the trackball active.

6. Move the crosshair over to a desired start point. Select the left trackball button.
7. Select the **Start Operations** button.

Adding A Rectangular Offset To The Diamond Shape

Create a Rectangular Offset to the diamond shape as follows:

1. Create the Unfilled Rectangle template for a diamond shape. Refer to section titled - **Creating A Diamond Shape**.

Attention

The Rectangular Offset places the start point of the dispensed line between the first two points. This eliminates a buildup of material that can occur when the start and end points are in a corner. See Figure 8-27.

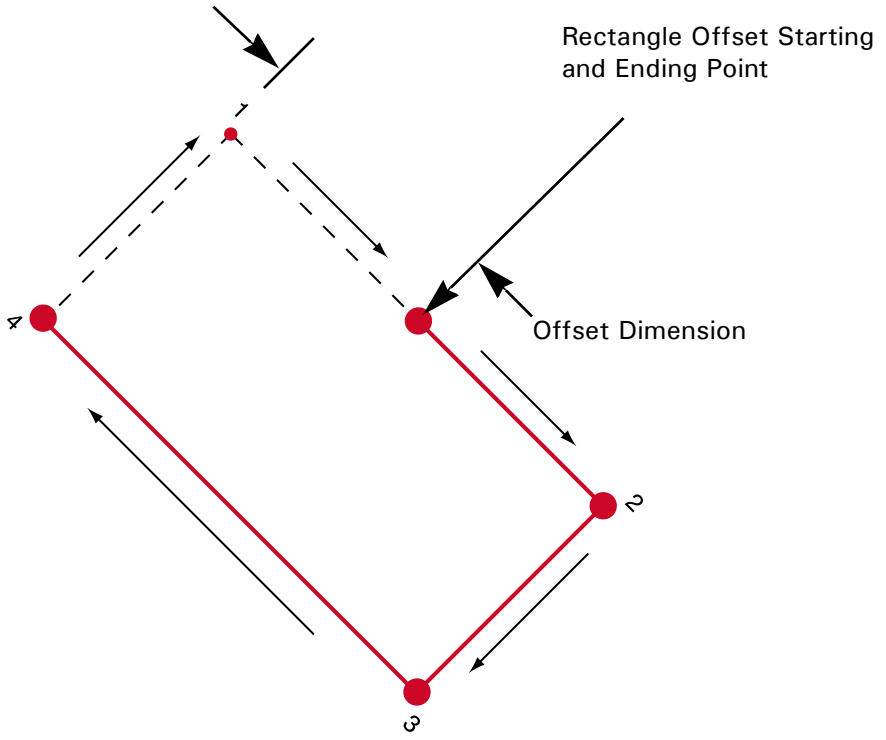


Figure 8-27

2. Open the Unfilled Rectangle template with the diamond shape.
3. Select the **Rect Offset Start** field. Enter a desired value in the field (this dimension is from the first point).
4. Select the **Finish** button.

Pre-Dispense Templates

Introduction

The Pre-Dispense templates contain the same dispense properties as the Dot and Line templates as well as some additional fields that are specific to these applications. See Figure 8-28.

The section titled - **Process Program Grid Fields** for detailed information on all dispense properties.

Property Fields

The table below describes the additional fields that are contained in the Pre-Dispense templates.

Field	Description
Process Program Spacing X **Process Program Spacing Y**	Establishes the offset between individual executions of the pre-dispense program.
Executions Per Cycle	Defines how many dots/lines are dispensed per cycle.
Line Length (Pre-Dispense Line only)	Defines the length of each line in a pre-dispense execution.

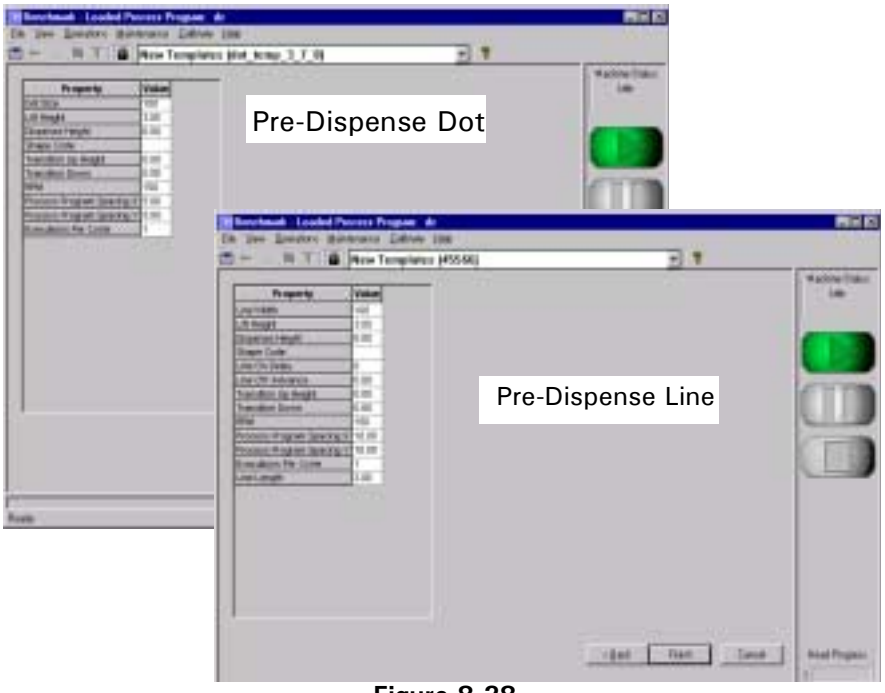


Figure 8-28

Applying The Template

1. Create or load a Process Program.
2. Insert or select an existing **Pre-Dispense Dot** or **Pre-Dispense Line** command.
3. Use the scrollbar at the bottom of the Program Grid if necessary to display the **Name** column.
4. Place the pointer over the **Name** column cell on the command line and double click the left trackball button.
   A list of appropriate templates is displayed.
5. Select the desired template name from the drop down list.
6. Select the **OK** button.

The properties of the selected template are applied to the command.

Array Templates

Introduction

The Array template is used to create a matrix of equally spaced dots.

Property fields

The Array template contains several unique property fields. See Figure 8-29. The table below describes the specialized property fields that are used.

Field	Description
X and **Y Position** **X′** and **Y′ Position** **X″** and **Y″ Position**	Defines three corner points which determine the shape and dimensions of the matrix.
Number Of Rows **Number Of Columns**	Establishes the number of dots within the matrix as well as the spacing of the dots.
Style	Defines the dispensing sequence. Zig Zag dispenses in a back and forth motion. Raster dispenses in a single direction.

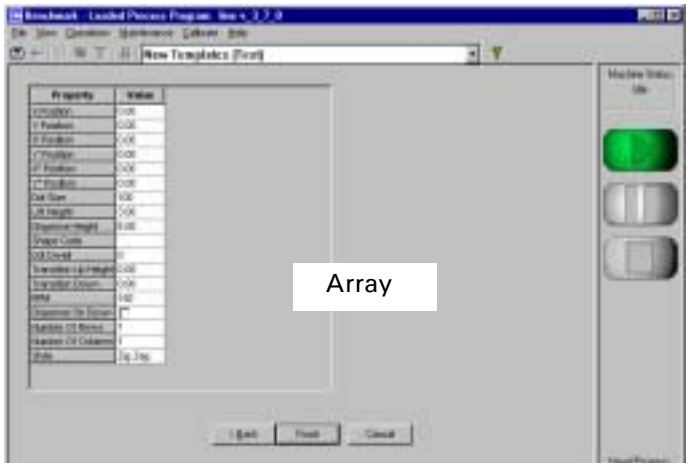


Figure 8-29

Applying The Template

1. Create or load a Process Program.
2. Insert or select an existing **Array** command.
3. Use the scrollbar at the bottom of the Program Grid if necessary to display the **Name** column.
4. Place the pointer over the **Name** column cell on the command line and double click the left trackball button.
   A list of appropriate templates is displayed.
5. Select the desired template name from the drop down list.
6. Select the **OK** button.

The properties of the selected template are applied to the command.

Renaming A Template

Procedure

1. Select **File > Template.**
   The **Template** screen appears. See Figure 8-30.
2. Select the template file to be renamed.
   The name template file name appears in the **Name** field.
3. Select the **Rename** button.
4. Type the new file name.
5. Hit the keyboard **Enter** key or select the **Rename** button.

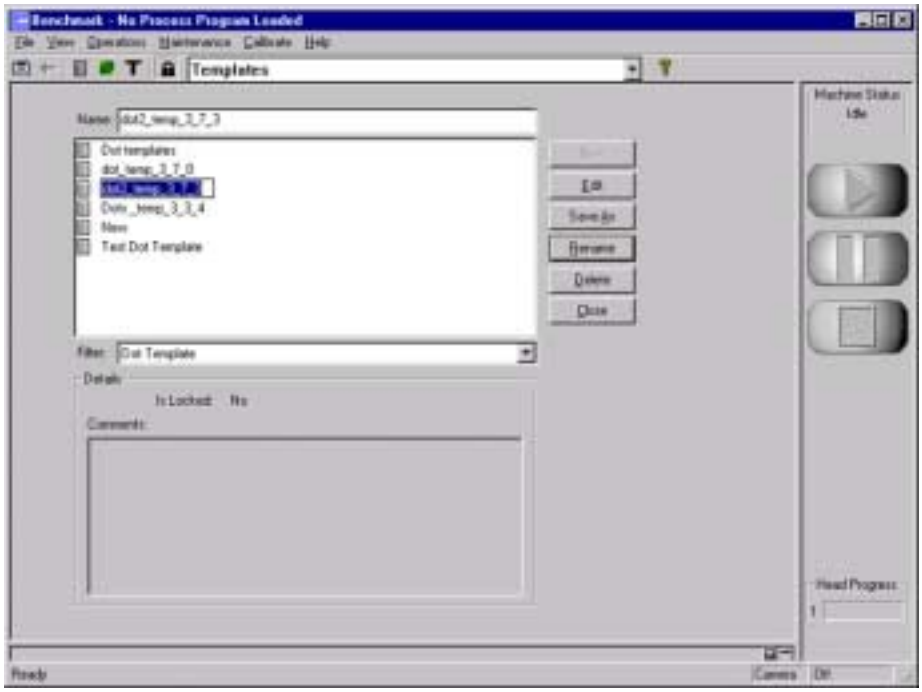


Figure 8-30

Editing Or Copying A Template

Introduction

This section explains how to modify a template or create a new template from an existing one.

Procedure

1. Select **File > Template**
   A list of existing templates appears. See Figure 8-31.

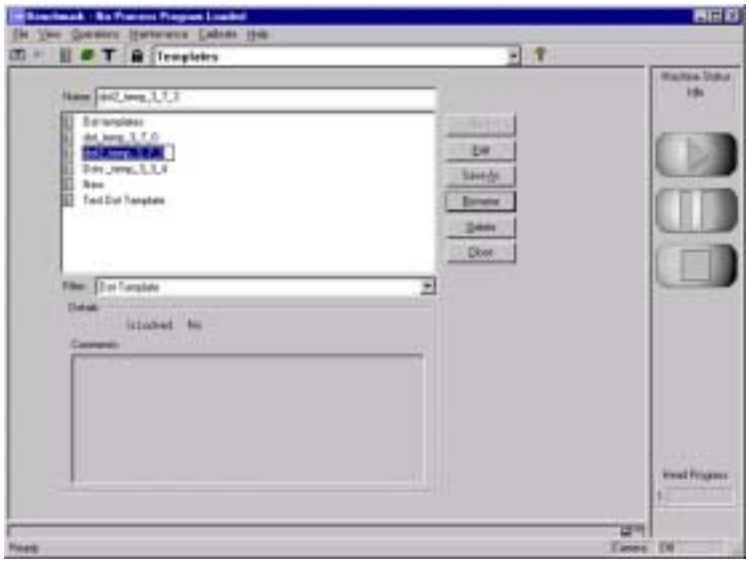


Figure 8-31

2. Select the template file to be edited.
3. Select the **Edit** button.
   The screen displays a group of property fields. See Figure 8-32.

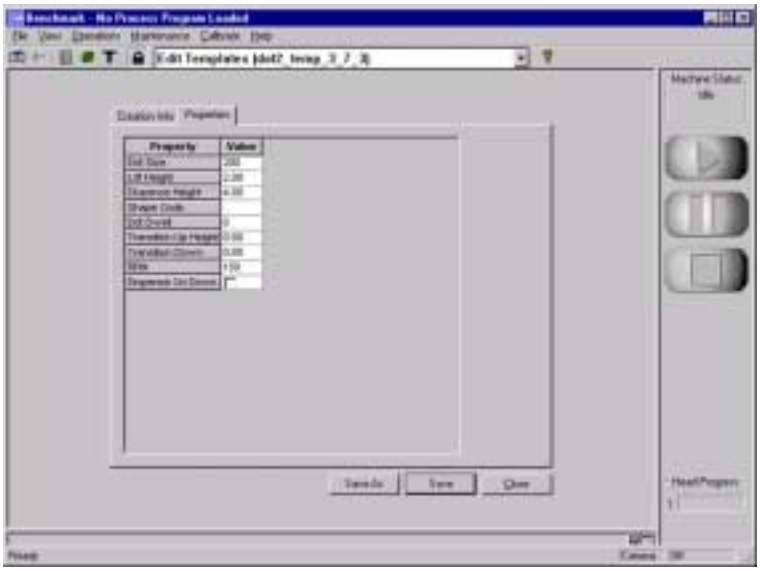


Figure 8-32

4. Modify the property values as needed.
5. If you want to modify an existing template, select the **Save** button.
6. If want to create a new template using the current properties values:
   a. Select the **Save As** button.
   The **Save As** template screen appears. See Figure 8-33.
   b. Enter the new template name in the **Enter the New Name** field.
   c. Select the **OK** button to accept the new name.
7. Select the **Close** button.

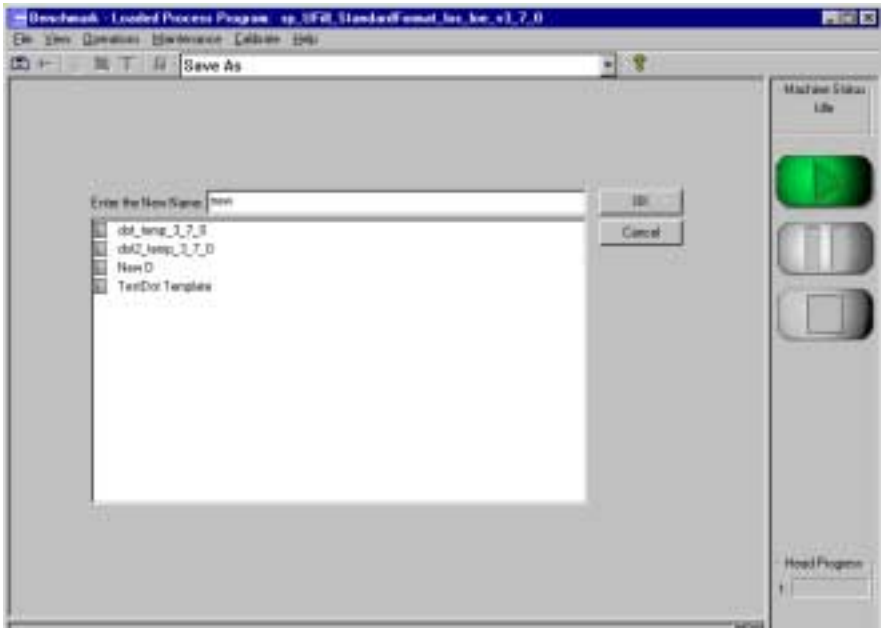


Figure 8-33

Duplicating A Template

1. Select **File > Templates**
   A list of existing templates appears. See Figure 8-31.
2. Select (highlight) the template file to be copied.
3. Select the **Save As** button.
   A duplicate file name appears preceded by the words "**Copy of**".
4. Type a name for the duplicate file.
5. Left click in a neutral (white)area of the file list or select the **Close** button.

Running A Process Program

Introduction

This section describes the procedure for loading and running a process program.

Attention

Before loading or running a Process Program make sure that the system is properly calibrated. Refer to the Chapter titled - **Calibration And Offsets**.

Procedure

1. Select **File > Process Programs**.
   A list of existing Process Programs appears. See Figure 8-34.
2. Select a program from the list.

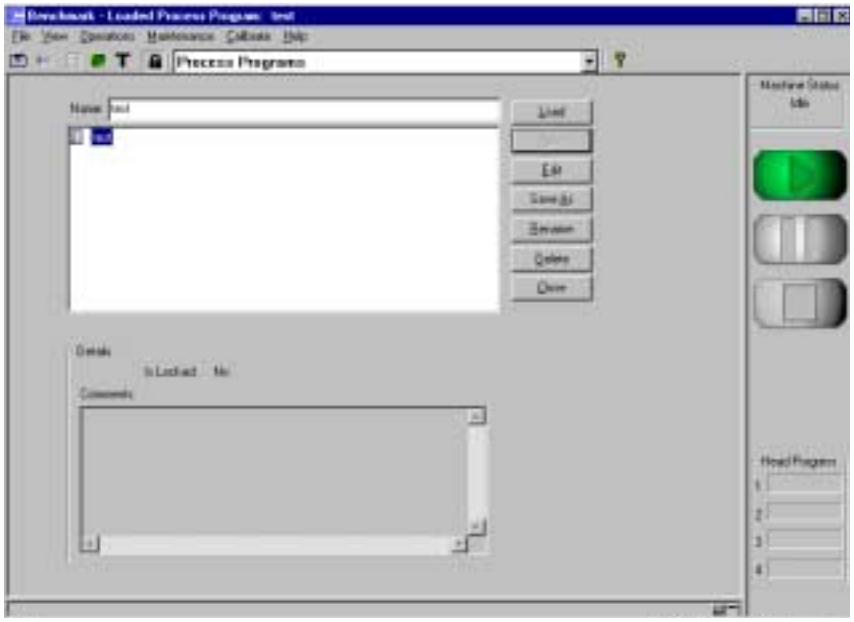


Figure 8-34

3. Select the **Load** button.
4. Position a process board on the conveyor.
5. Select **Operations > Conveyor Mode**.
   A pull down menu will appear showing the following:

   Off

   Automatic

   Pass Through
6. Select **Automatic** mode.
7. Select the **Start Operation** button on the **Machine** screen. See Figure 8-35.

If a SMEMA (Surface Mount Equipment Manufacturers Association) signal is confirmed (made) that the **Upstream Board Available**, the board will move to the dispense station, be raised, clamped, and the program will begin execution.

8. To pause the run, select the **Pause** button on the Machine screen.
9. To abort the run, select the **Abort Process** button on the Machine screen.
10. If you are already in the Program Grid, and you wish to run the program, repeat step 2 through step 5.

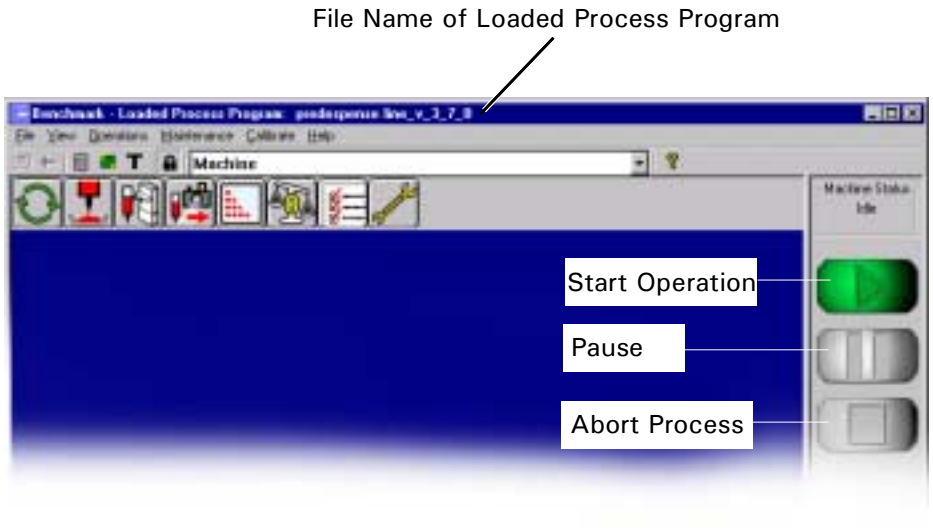


Figure 8-35

Optimizing A Process Program (Xyflex)

Introduction

Optimizing a dot program ensures that the program dispenses with the least amount of head travel by distributing commands between multiple heads. This in turn provides increased throughput.

The Optimize function works with Dot, Move, Fiducial, New_Coord, and Old Coord commands. All other commands are dropped automatically from the output file.

Procedure

To optimize a program:

1. Select **File > Process Programs**.

Attention

The optimize function only supports files containing Dot commands.

2. From the list of existing process programs select the file to be optimized and select the **Edit** button.

The selected file appears on the Program Grid. See Figure 8-36.

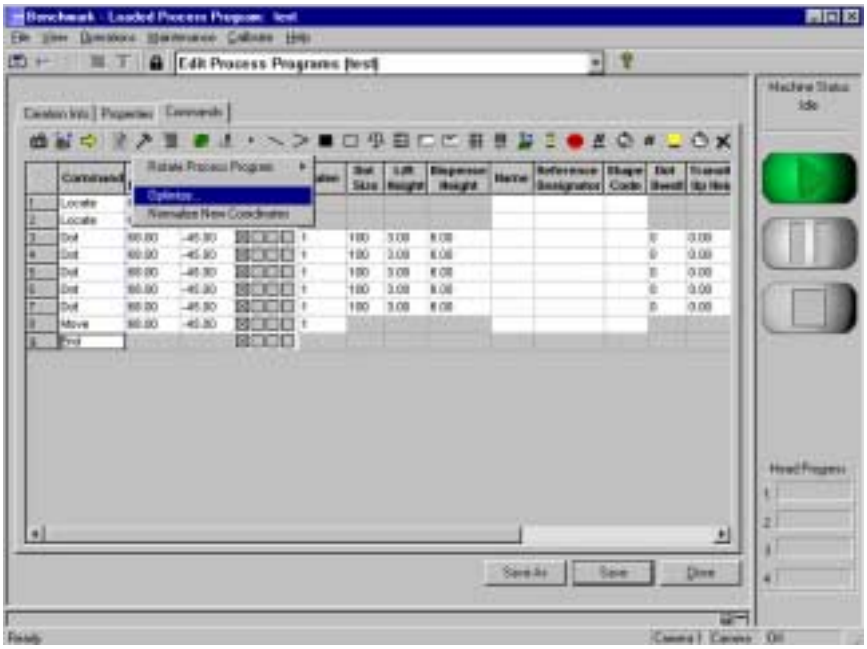


Figure 8-36

3. Select the Tools icon  from the Program Commands Toolbar.
4. Select the **Optimize** command from the drop down list.

The Optimize screen appears. See Figure 8-37.

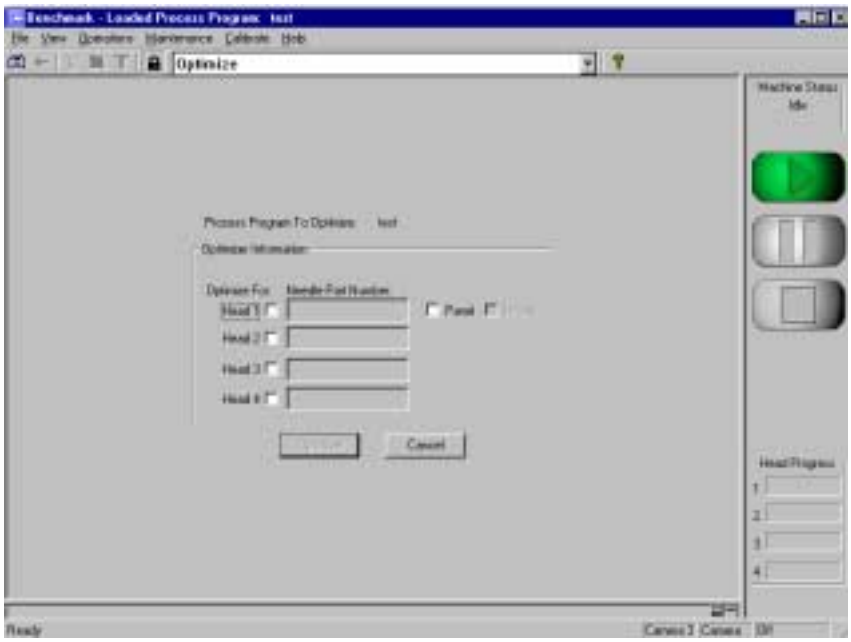


Figure 8-37

5. Select the **Heads** that will run the optimized program by placing a check in the appropriate **Head** number box.
   This enables the **Optimize** button.
6. Enter the appropriate six digit, Needle Part Number for each Head.

The **Panel** box is only selected when you have multiple **identical** sub-boards. This will equalize and line balance the time spent dispensing on several heads.

The **Divide** box is selected when you have several new coordinates and want to divide the dispensing between multiple heads.

7. Select the **Optimize** button.

The loaded file is optimized and you are returned to the Program Grid.

8. If the software optimized the program to meet your needs, select the **Save** button.
9. If you do not like how the system optimized the program, select the **Close** and the program will return to its original state before optimizing.

Optimizing A Process Program (XyflexPro)

Introduction

Optimizing a dot program ensures that the program dispenses with the least amount of head travel by distributing commands between multiple machines. This in turn provides increased throughput.

The Optimize function works with Dot, Move, Fiducial, New_Coord, and Old Coord commands. All other commands are dropped automatically from the output file.

Procedure

To optimize a program:

1. Select **File > Process Programs**.

Attention

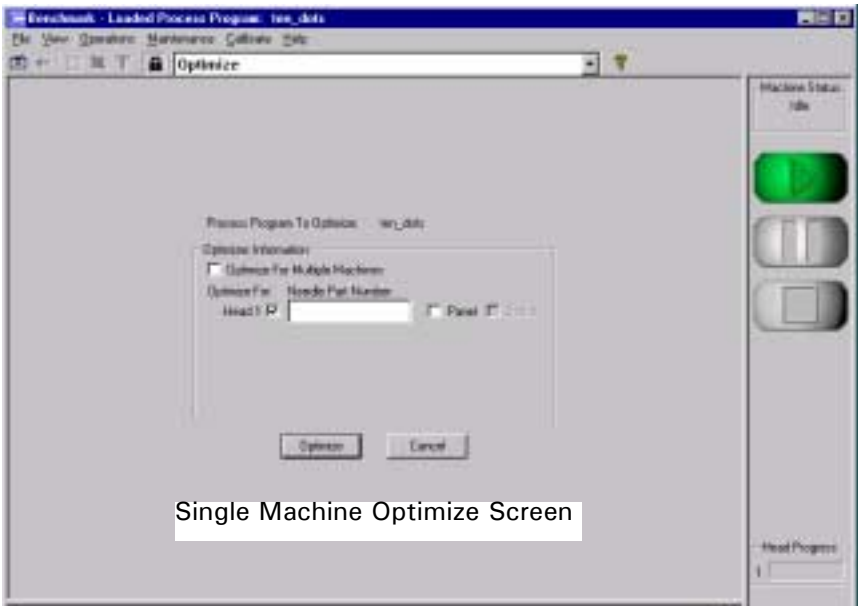
The optimize function only supports files containing Dot commands.

2. From the list of existing process programs select the file to be optimized and select the **Edit** button.

The selected file appears on the Program Grid. See Figure 8-36.

3. Select the Tools icon  from the Program Commands Toolbar.
4. Select the **Optimize** command from the drop down list.

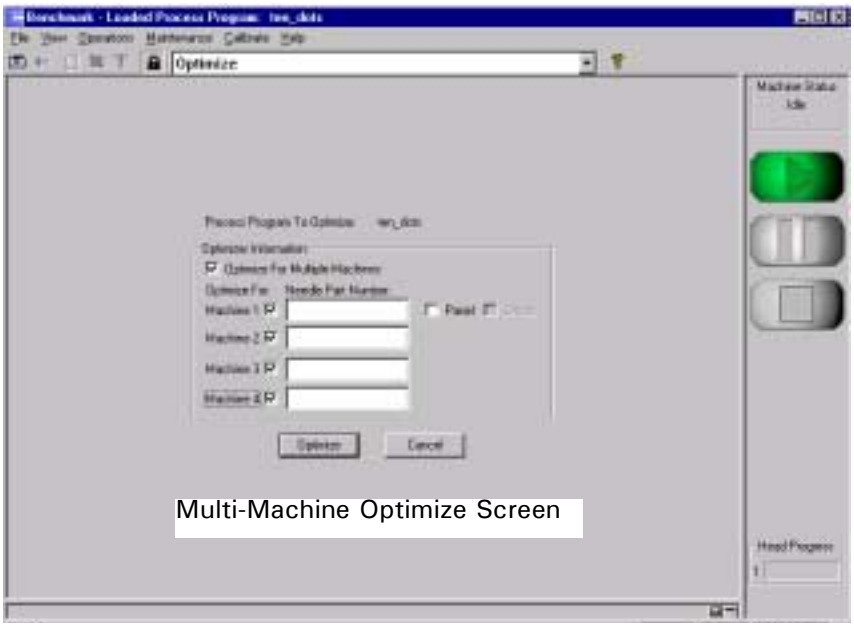
The Optimize screen appears. See Figure 8-38.



Single Machine Optimize Screen

Figure 8-38

5. If you have a single XyflexPro machine, place a check in the Head I box. This enables the **Optimize** button.
6. If your line is setup with multiple XyflexPros, place a check in the **Optimize for Multiple Machines**. See Figure 8-39.
7. Select the **Machines** that will run the optimized program by placing a check box in the appropriate **Machine** number box.
   This enables the **Optimize** button.
8. Enter the appropriate six digit, Needle Part Number for each Head or Machine.



Multi-Machine Optimize Screen

Figure 8-39

The **Panel** box is only selected when you have multiple **identical** sub-boards. This will equalize and line balance the time spent dispensing on several machines.

The **Divide** box is selected when you have several new coordinates and want to divide the dispensing between multiple machines.

9. Select the **Optimize** button.

The loaded file is optimized and you are returned to the Program Grid.

10. If the software optimized the program to meet your needs, select the **Save** button.
11. If you do not like how the system optimized the program, select the **Close** and the program will return to its original state before optimizing.

9

System Administration And Security

Overview

Introduction

Security is based on user group hierarchies. The groups are comprised of one or more individuals with rights or restrictions to specific functions of the system.

These groups are listed in **CAM_groups** where "groups" are the names given to those single or collective individuals (users) and where their level of responsibility are assigned.

Initial user privilege is issued from the Windows NT® Network Administrator's level where the Administrator provides restricted access to the network. The network level is the only place where groups can be added or deleted.

The highest level group determines the system's function access. This could be an engineer, manager, supervisor or chief responsible individual or group of individuals.

Attention

When performing any procedure in this section, the command word **"Select"** refers to the operator to use the trackball and click the left button.

In This Chapter

This chapter contains the following topics.

User Groups

Creating Groups

The following list is an example of groups:

- CAM_LINEENGINEER
- CAM_MAINTENANCE
- CAM_OPERATOR
- CAM_SUPERVISOR
- CAM_FIELDSERVICE

These groups are default groups, new groups may be created by the Windows NT® Network Administrator.

Each group whether comprised of one user or more, can then access the system once issued network rights. In this manner groups are created and users are assigned to the proper groups.

The machine restrictions are then controlled by a responsible system group, again comprised of a single individual or more.

Privileges

Security Screens

After creating the User Groups and assigning users to the proper groups, privileges can be enabled for these groups using the **Security 1** and **Security 2** tabs in the **Configuration** screen. See Figures 9-1 and 9-2.

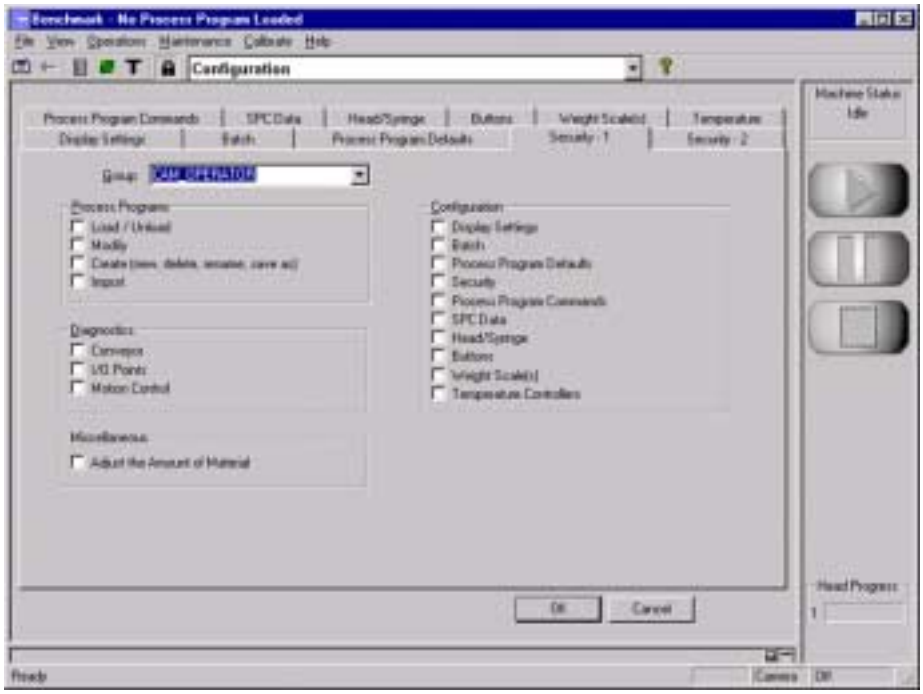


Figure 9-1

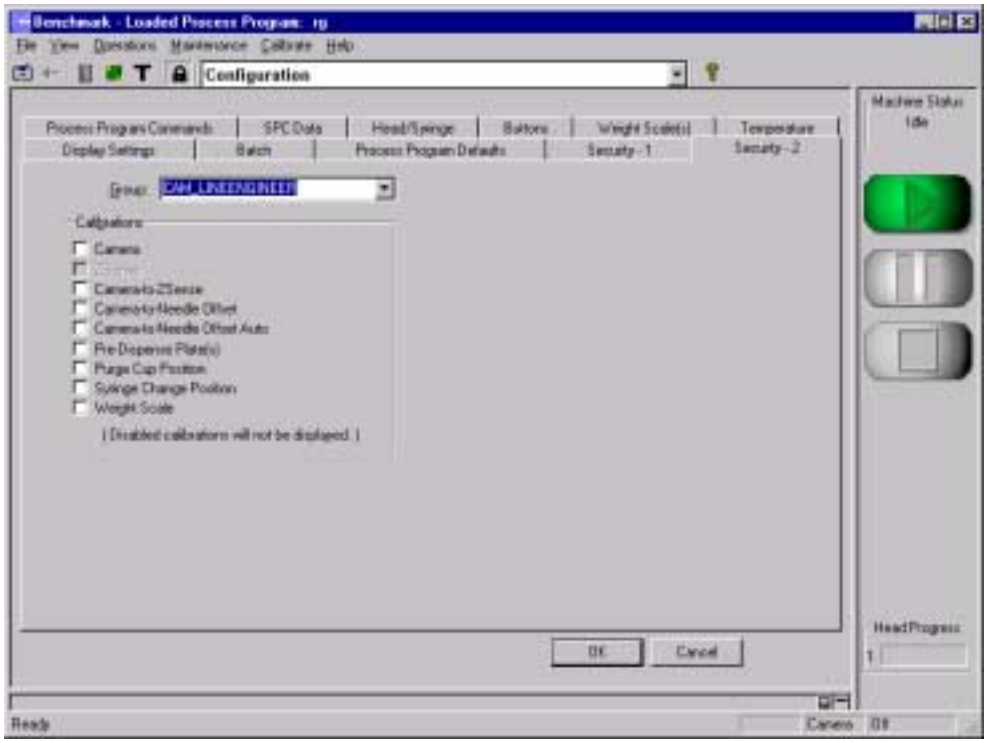


Figure 9-2

These screens allow you to turn on/off application level features for all users of a given CAM group. For example, you can configure the settings so that only users that are members of the CAM_SUPERVISOR group can change the security privileges.

To display the Configuration screen and display privileges, perform the following steps:

1. Select **View > Configuration** from the **Machine screen**. The Configuration screen will appear. There are two Security tabs titled **Security 1** and **Security 2**. The two are related and the reason for the second is lack of space in the first. For purpose of examples we will address them in order. Choose Security 1.
2. Select the **Group** drop down list.

There are four collective privilege groups including the Security 2 tab.

- Process Programs
- Diagnostics
- Miscellaneous
- Configuration
- Calibrations

Each of these contain check boxes that enable or disable the functions described to their right.

Creating or Assigning Privileges

Selecting groups and assigning certain privileges allows the ability to fine tune each group's ability to alter machine settings.

To create/assign privileges:

1. Select a User Group by placing the cursor on the group's Cam_ name and left clicking.
2. Enable or disable a privilege by clicking left in the checkbox to the left of the privilege. A checked box enables a privilege, an unchecked box disables a privilege.
3. Click left on the **OK** button to save the changes and dismiss the screen.

Modifying Privileges

To modify privileges:

1. Select a group from the desired security tabs.
2. Select the privilege box to modify. If unchecked and the desire is to enable it, click in the box to check it.
3. To disable a checked box (or enabled privilege), left click in the box to remove the check mark.
4. Select the **OK** button to accept the changes and dismiss the screen.

10

Bad Mark Sensing

Overview

Introduction

Bad mark sensing saves process time by identifying any bad part(s) on a substrate. Bad parts are identified with some sort of marking (black marker or equivalent) on the substrate and skipped over during program dispensing.

Attention

A bad mark sensing location may be inserted into any existing program. This command is placed within the program using the Process Program Grid.

Attention

When performing any procedure in this section, the command word **"Select"** refers to the operator to use the trackball and click the left button.

In This Chapter

This chapter contains the following topics.

Identifying A Bad Mark In The Process Program Grid

Description

Three choices of identification are used when identifying a bad mark in the Process Program Grid. This is set under the Mark Level field in the Process Program Grid. See Figure 10-1.

- Global
- Row
- Local

Attention

The vision system software will follow the sequence of Global then Row and end with Local. The use of Row may be eliminated from programming if an entire row is considered one part.

When the system is running a program all vision commands are processed first through the software. The Bad Mark sense commands are processed in the following order: Global, Row, and Local.
The vision system is set to **Vision Batch Mode** to process this sequence in the order described. Refer to section titled - **Setting the Vision System for Batch Mode**.

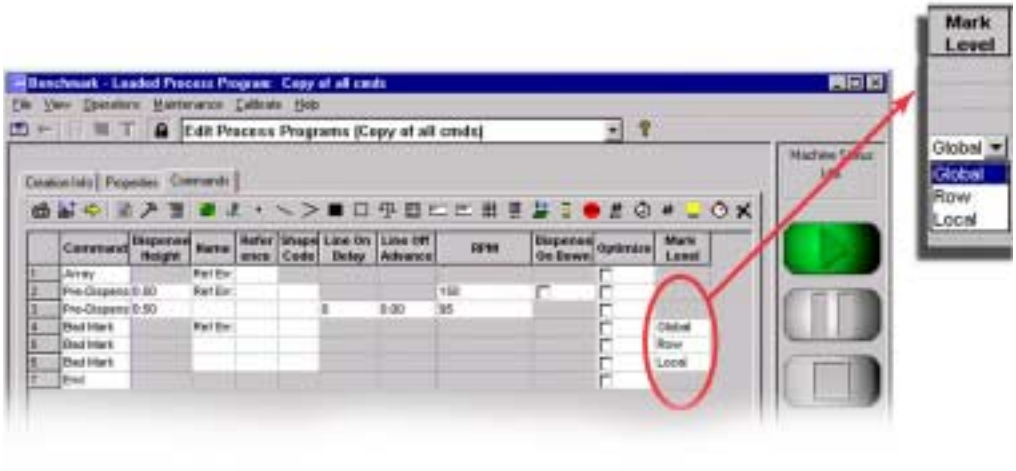


Figure 10-1

Global - Used to identify that a bad mark exists on a board. When inserting a Bad Mark command into the process program the **Global** level is always the first level that the system will read. This is identified with the word **Global** under the column **Mark Level** (in the Process Program Grid). See Figures 10-2.

Row - Used to indicate that a bad mark(s) are within a row. This is identified with the word **Row** under the column **Mark Level** (in the Process Program Grid).

Local - Used after a Row, to identify an individual component has a bad mark. This is identified with the word **Local** under the column **Mark Level** (in the Process Program Grid).

Figure 10-2 illustrates a typical board using Bad Mark sensing. Note that the board is marked (with a black marker or equivalent) at each reference point (Global, Row, and Local). Each of these points are taught and named and placed within the program (using the Process Program Grid).

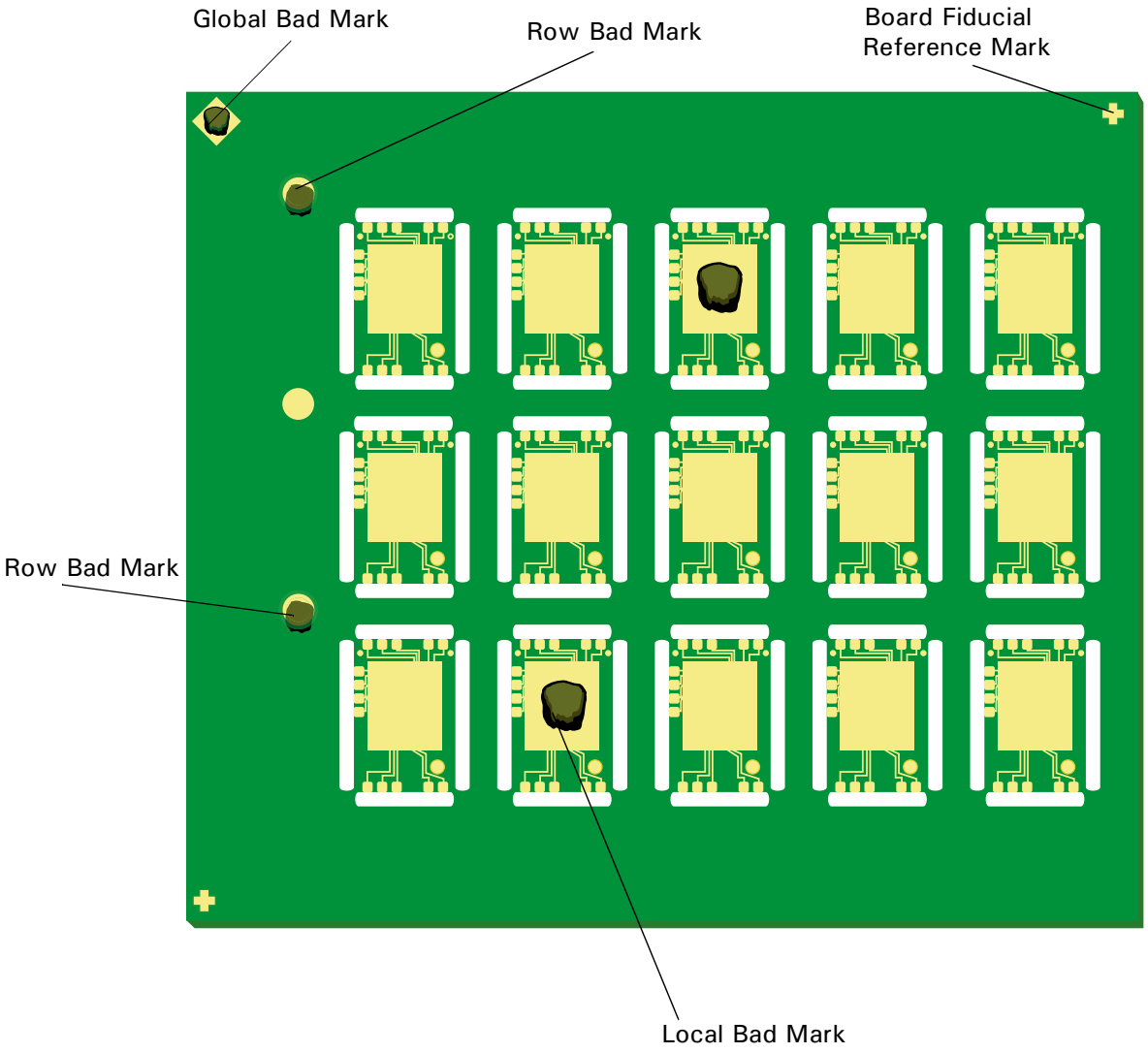


Figure 10-2

Setting The Vision System For Batch Mode

Introduction

Vision Batch Mode is a setting contained in the software, when enabled allows the software to process all related vision commands first within the program. This will minimize X and Y movements and is designed to maximize throughput. This setting is located on the Process Program Properties screen.

Attention

In order for the vision system to process any Bad Mark sense the setting for **Process Flags - Vision Batch Mode** must be enabled. This setting is found in the Properties tab screen. See Figure 10-3.

Local Bad Mark Batch is an optional selection which is determined by the location of the Bad Marks on a substrate. This is determined by the following:

- If the local bad marks are in close proximity of each other this selection would be enabled.
- If the local bad marks are scattered on the substrate this selection would not be enabled.

Prior to adding any Bad Mark commands into a program enable the **Vision Batch Mode** in the **Process Flags Group**.

Procedure

Select the **Properties** tab as follows:

1. Select the **Properties** tab from the top of the loaded process program. The **Properties** screen appears. See Figure 10-3.

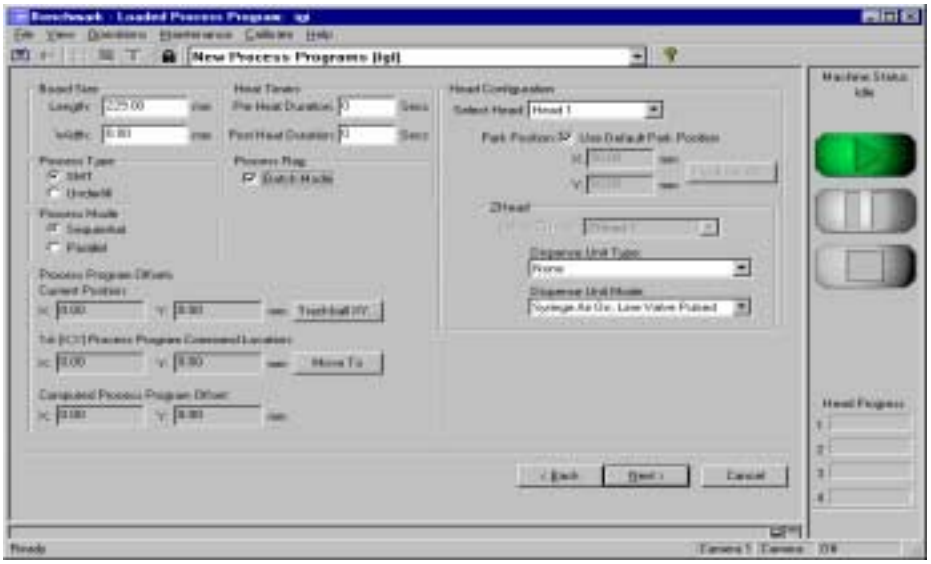


Figure 10-3

2. Select the **Vision Batch Mode** located in the **Process Flags** group. See Figure 10-3.
3. If the bad marks are contained to one local area on the substrate, select the **Local Bad Mark Batch**.
4. Select the **Save** button.
5. Select the **Close** button.

Creating And Naming The Bad Mark File

Introduction

The bad mark files are stored in a library which allows the convenience of recalling when required to place into a program.

Procedure

To create a Bad Mark File:

1. Select **File > Bad Mark** from the menu bar. The Bad Mark Template screen appears. See Figure 10-4.

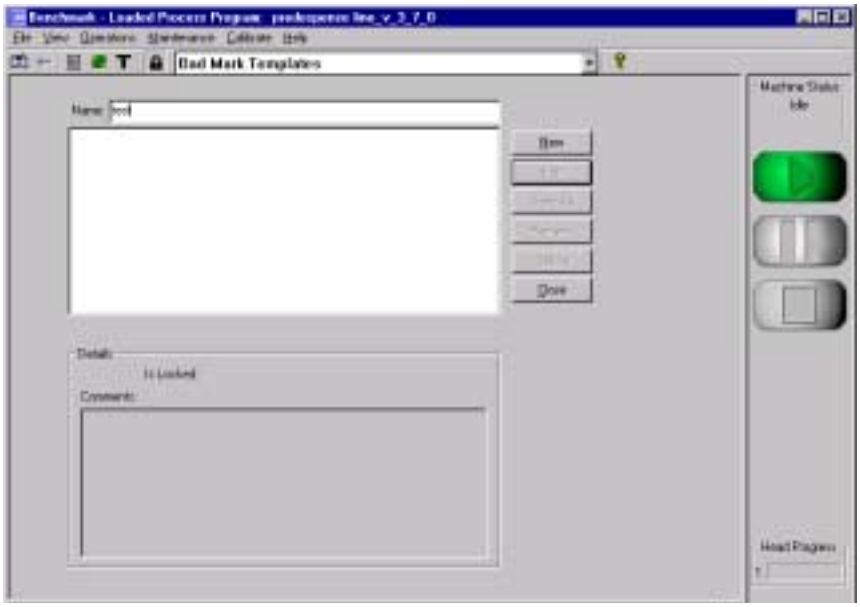


Figure 10-4

2. Type a name for the new bad mark in the Name field.
   The New button becomes enabled.
3. Select the **New** button.

The Bad Mark Template Comment screen appears. See Figure 10-5.

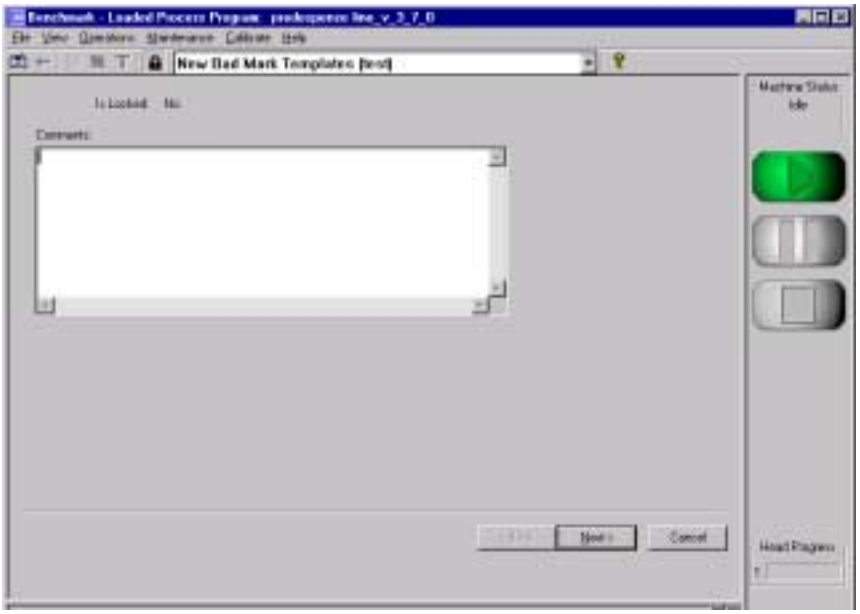


Figure 10-5

Enter any relative information about this new file (Part Number, Board Size, Material, etc.) in the space provided.

4. Select the **Next** button.

A Bad Mark screen to teach the gray scale of a Blank Bad Mark appears. See Figure 10-6.

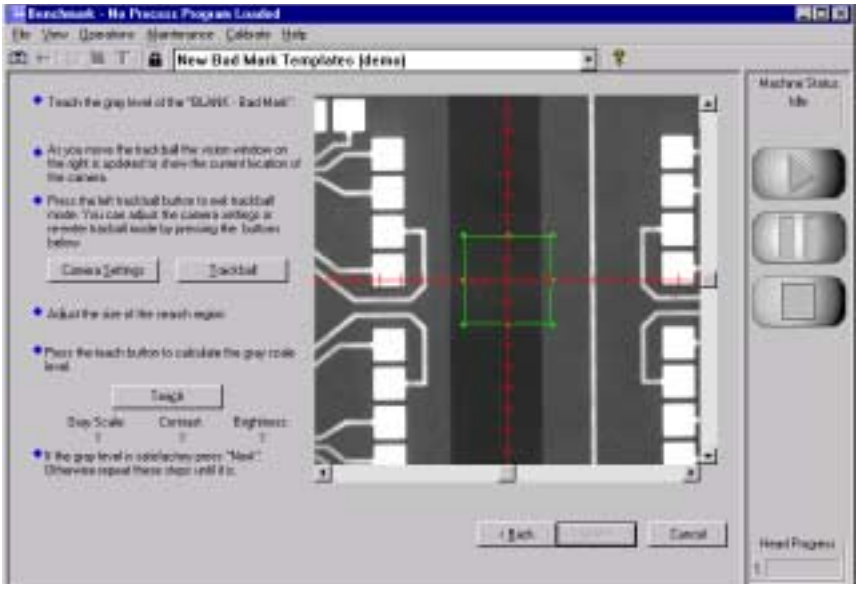


Figure 10-6

Teaching the Blank Bad Mark

In determining whether to dispense a part, the system needs to determine if a part has been bad marked.

This is achieved by comparing the gray scale values of an area on or near the part. The gray scale values are measured with (marked) and without (blank) the Bad marking. From these two values a threshold is calculated.

At run-time the vision system measures the gray scale area of each part and compares it to the above threshold to determine, whether to dispense the part or skip it.

Configuring the gray scale area requires:

- Adjustment of Contrast and Brightness
- Definition of the Gray Scale area (Search Area)
- Teaching the Gray Scale values

Teach the Blank Bad Mark gray scale as follows:

1. Select the **Trackball** button. While viewing the vision screen, move the crosshair over to a reference point that **does not** contain a bad mark. See Figure 10-7.

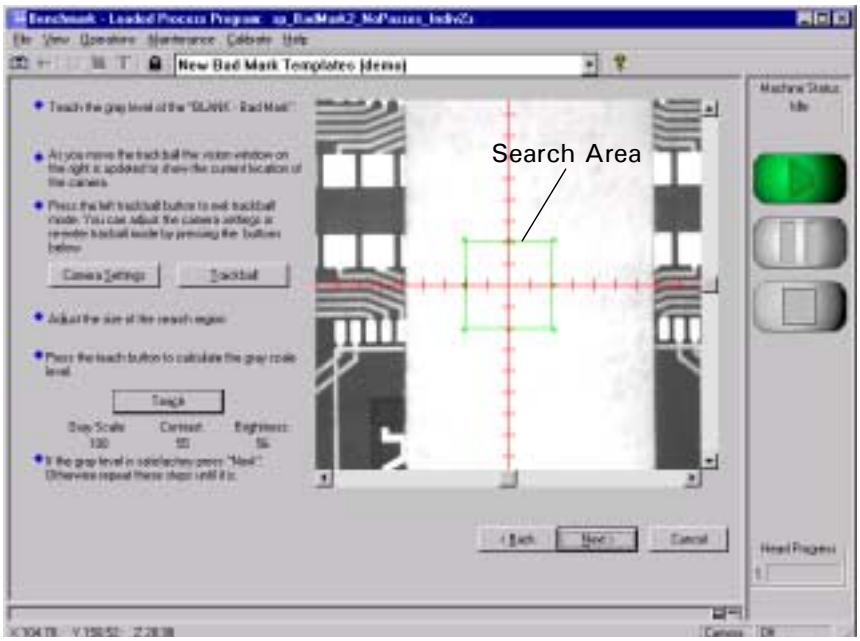


Figure 10-7

2. Adjust the Search Area so that the reference point is within the frame.

Decrease or enlarge search box by placing the cursor on any corner of the box.

3. Select the **Teach** button.

The vision system measures a gray scale within the Search Area. These values are displayed under the Teach button.

0 = darkest shade of gray. (Gray Scale)

100 = lightest shade of gray. (Gray Scale)

A value close to 100 (Gray Scale) is desired when teaching the Blank Bad Mark. See Figure 10-7.

4. If the Gray scale value is acceptable, select the **Next** button.

A Bad Mark screen to teach the gray scale of a Marked Bad Mark appears. See Figure 10-8.

Teaching the Marked Bad Mark

Teach the Marked Bad Mark gray scale as follows:

1. Select the **Trackball** button. While viewing the vision screen, move the crosshair over to the same reference point (taught during the Blank Bad Mark) that contains a Bad Mark. See Figure 10-8.

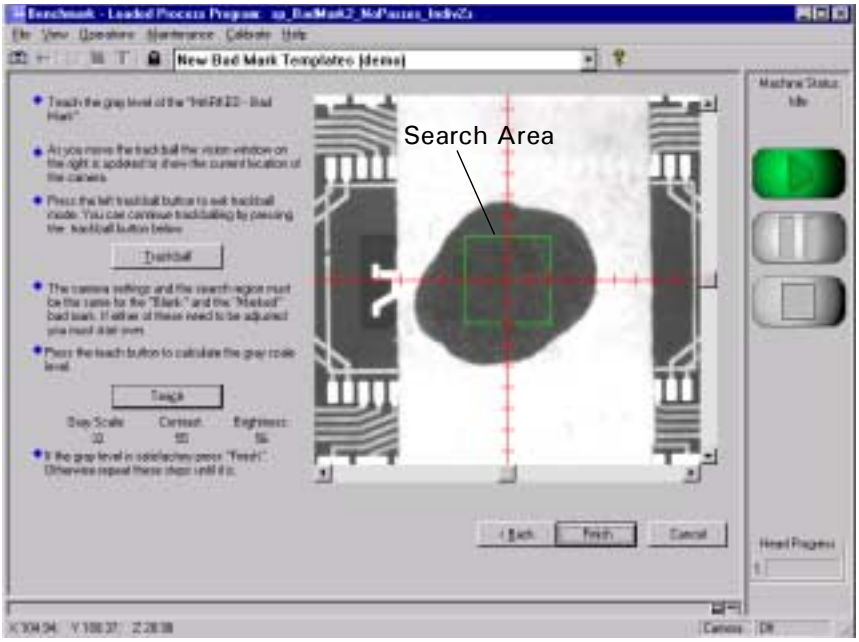


Figure 10-8

2. Adjust the search area so that the reference point is within the frame.

Decrease or enlarge search box by placing the pointer on any corner of the box.

3. Select the **Teach** button.

The vision system measures a gray scale within the Search Area. These values are displayed under the Teach button.

0 = darkest shade of gray. (Gray Scale)

100 = lightest shade of gray. (Gray Scale)

Values displayed in the Marked Gray Scale are typically lower than those in the taught in the Blank Gray Scale.

4. If the Gray Scale value is acceptable, select the **Finish** button.

Inserting The Bad Mark Template Into The Process Program

Introduction

A Bad Mark sense template may be placed within any program. This command line is typically placed near the beginning of the program (one of the first few commands). The reason for this placement, is to notify the vision system right away whether a Bad Mark exists (normally a Global mark) on the board which will save process time.

Procedure

Insert a Bad Mark template into the program as follows:

1. Load an existing program that you wish to place a Bad Mark in. Figure 10-9 illustrates a typical program containing Bad Marks.

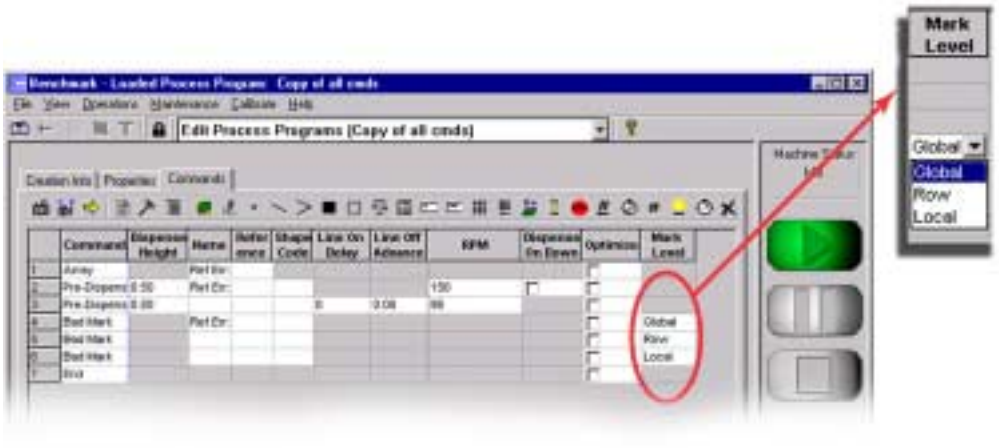


Figure 10-9

2. Place a Bad Mark command by selecting the **line before** any dispense command.
   The command line becomes highlighted.

3. Select the **Bad Mark** icon  from the Process Program Commands toolbar.

The library of previously created Bad Mark files appears.

4. Select the **Bad Mark file** that is to be inserted into the loaded program.
5. Select the **OK** button.

The selected Bad Mark file appears in the process program grid prior to a dispensing command line.

6. Select the **Bad Mark Level** (Global, Row, or Local) for each bad mark command line placed within the program. See Figure 10-9.
7. Select the **Save** button on the Process Program Grid.

11

SPC Data

Overview

Introduction

The system is equipped to record SPC (Statistical Process Control) data of certain events selected from the SPC Data tab menu on the Configuration screen. Each event that is selected from the menu is logged onto a text file (**.txt**) and may be analyzed offline as an Excel® file.

Attention

When performing any procedure in this section, the command word **"Select"** refers to the operator to use the trackball and click the left button.

In This Chapter

This chapter contains the following topics.

Setting The SPC Data Log

Procedure

Set the SPC Data log as follows:

1. Select **View > Configuration > SPC Data** tab from the Machine screen. See Figure 11-1.

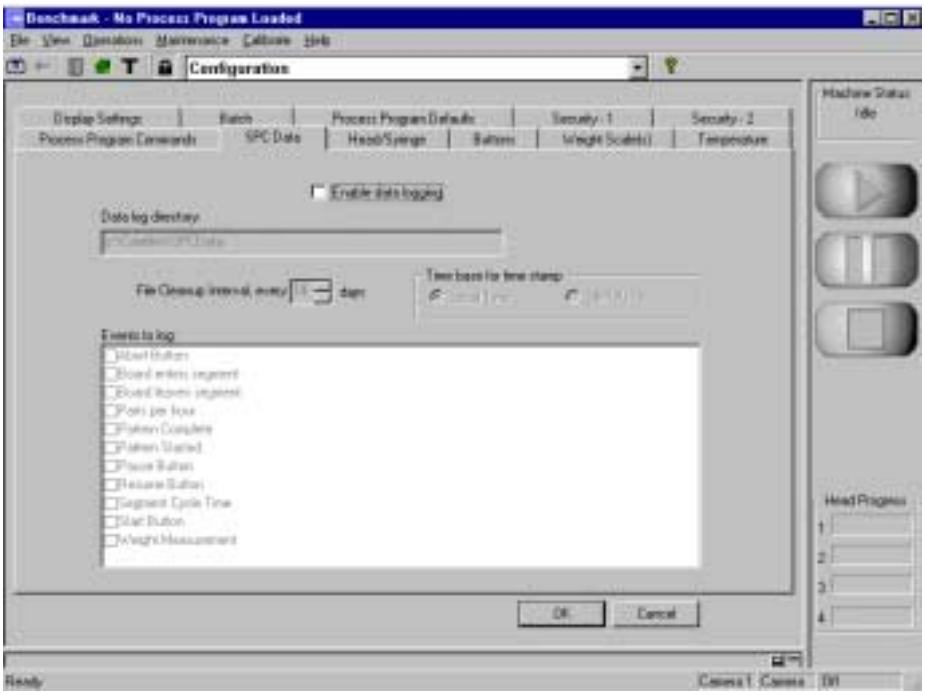


Figure 11-1

2. Select the **Enable data logging** field. This makes all the SPC Data fields active.
3. Select the **Data log directory** field. This field is where the logged information (selected from the menu) is stored as a text (**.txt**) file. The example displayed has the information being logged going to c:\Camfiles\SPCData.
4. Select the **File Cleanup Interval** field.

The **File Cleanup Interval** is the amount of time before the files are purged. This duration of time is in **days**. The minimum number is 1 and up to a maximum of 30 days. This example shows 14 days in the field.

5. Select a number from 1 to 30 using the up or down arrow.
6. Select the **Time base for time stamp** field.

The **Time base for time stamp** is divided into two categories. The first is **Local Time** which is on the local computer terminal. The second is **GMT/UTS** which is Greenwich Mean Time or Universal Time Stamp.

7. Select one of the time stamps described above using the left button on the trackball.
8. Select the **Events to log** menu list.

The **Events to log** menu is a list of trackable events listed in alphabetical order. A minimum of one event must be checked. However, multiple events may be checked to track.

9. Select a minimum of one event from the menu by placing a check in the desired event using the left button on the trackball. The selected event or events will be logged onto a (.txt) file and viewed offline as a Excel® file.
10. Select **OK** to accept the entered information for the SPC Data Log and to close the screen.

Selecting the **Cancel** button aborts the process.

Viewing SPC Data

Description

The system will create a (.txt) file if the SPC Data log is enabled. This file must be downloaded onto a disk and viewed offline using Excel® software.

Figure 11-2 shows a typical file created on the SPC Data log.

01/20/2000, 09:57:43, Start Button, 0
01/20/2000, 09:57:43, Program Started, 4, 1, 1
01/20/2000, 09:57:43, Program Started, 4, 2, 1
01/20/2000, 09:57:43, Program Started, 4, 3, 1
01/20/2000, 09:57:43, Program Started, 4, 4, 1
01/20/2000, 09:57:43, Board leaves segment, 7, 3, 1
01/20/2000, 09:57:43, Segment Cycle Time, 8, 3, 1, 0.01
01/20/2000, 09:57:43, Program Complete, 5, 3, 1
01/20/2000, 09:57:43, Board leaves segment, 7, 1, 1
01/20/2000, 09:57:43, Segment Cycle Time, 8, 1, 1, 0.04
01/20/2000, 09:57:43, Program Complete, 5, 1, 1
01/20/2000, 09:57:43, Board leaves segment, 7, 2, 1
01/20/2000, 09:57:43, Segment Cycle Time, 8, 2, 1, 0.03
01/20/2000, 09:57:43, Program Complete, 5, 2, 1
01/20/2000, 09:57:43, Board leaves segment, 7, 4, 1
01/20/2000, 09:57:43, Segment Cycle Time, 8, 4, 1, 0.03
01/20/2000, 09:57:43, Program Complete, 5, 4, 1

Figure 11-2

Downloading SPC Data

Procedure

Place the SPC DATA file onto a disk as follows:

1. Insert a floppy or a ZIP disk into the computer.
2. Using the trackball move the cursor to the **Start** button on the bottom left-hand corner of the monitor. Select the left button on the trackball.
3. Move the cursor to the right and find the **NT Explorer**. Go to the data log directory that was established in Figure 11-1. This example shows c: \ Cam-files \ SPC Data.
4. Copy the file that you want to view onto the floppy or Zip disk already inserted in the computer.
5. Remove disk from the computer and place in an standalone computer.
6. On the standalone computer, start up the Excel® Application.
7. Select **File**, **Open** from the top of the screen.
8. Select the file to be viewed from the disk. The Text Import Wizard will appear. See Figure 11-3.

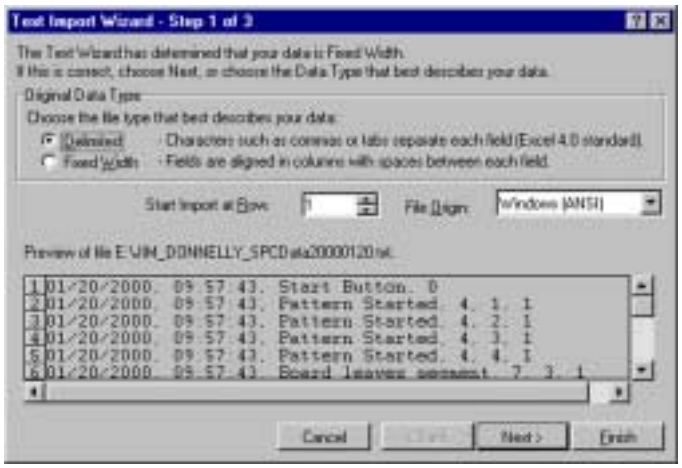


Figure 11-3

9. Select the **Delimited** radio button.
10. Select the **Next >** button.

Page two of the Wizard appears. See Figure 11-4.

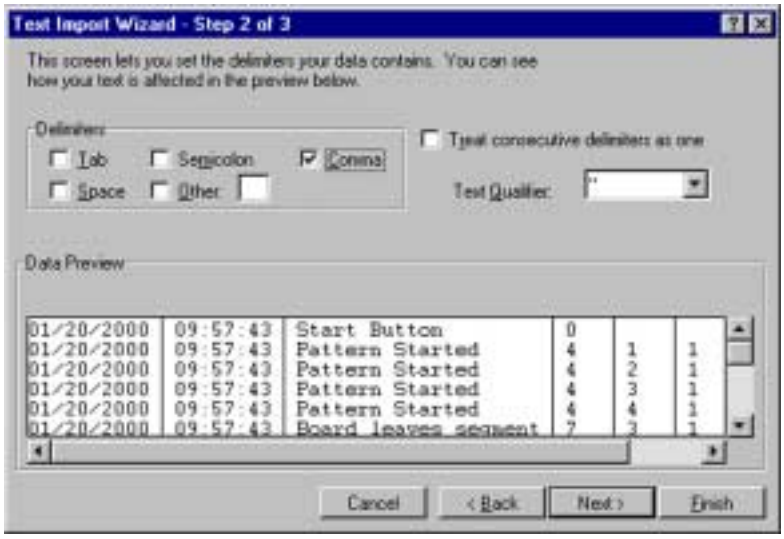
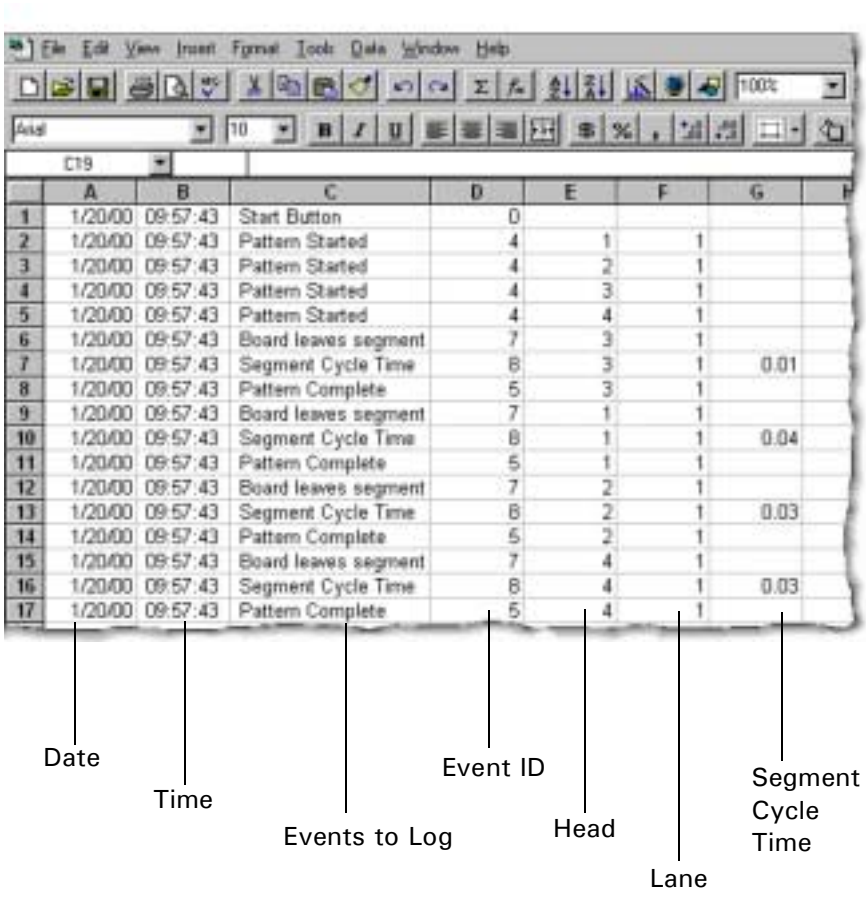


Figure 11-4

11. Select the **Comma** box in the **Delimiters** group.
12. Select the **Finish** button. The file from the disk is now pasted into the Excel® Application. See Figure 11-5. The column width may be expanded by clicking and holding the vertical line at the top of the desired column.



	A	B	C	D	E	F	G
1	1/20/00	09:57:43	Start Button	0			
2	1/20/00	09:57:43	Pattern Started	4	1	1	
3	1/20/00	09:57:43	Pattern Started	4	2	1	
4	1/20/00	09:57:43	Pattern Started	4	3	1	
5	1/20/00	09:57:43	Pattern Started	4	4	1	
6	1/20/00	09:57:43	Board leaves segment	7	3	1	
7	1/20/00	09:57:43	Segment Cycle Time	8	3	1	0.01
8	1/20/00	09:57:43	Pattern Complete	5	3	1	
9	1/20/00	09:57:43	Board leaves segment	7	1	1	
10	1/20/00	09:57:43	Segment Cycle Time	8	1	1	0.04
11	1/20/00	09:57:43	Pattern Complete	5	1	1	
12	1/20/00	09:57:43	Board leaves segment	7	2	1	
13	1/20/00	09:57:43	Segment Cycle Time	8	2	1	0.03
14	1/20/00	09:57:43	Pattern Complete	5	2	1	
15	1/20/00	09:57:43	Board leaves segment	7	4	1	
16	1/20/00	09:57:43	Segment Cycle Time	8	4	1	0.03
17	1/20/00	09:57:43	Pattern Complete	5	4	1	

Figure 11-5

Figure 11-5 displays the imported file displayed in the Excel® Application. The columns are labeled to identify the data listed. Each column may be sorted as desired.

Additional columns not shown that may be tracked for SPC Data are as follows:

- Template
- Attempt Number
- Desired Weight
- Measured Weight
- Percent Tolerance
- Scale Factor

12 Network Communications

Overview

Introduction

This chapter describes the networking issues that must be considered when setting up a "Remote" connection that connects to a **CAMALOT** system running the Benchmark® software. The Benchmark® software is designed to run under the Windows NT™ operating system (OS) and utilizes the networking and security features built into the OS.

There are two different configurations of the Windows NT™ operating system; Windows NT Workstation and Windows NT Server.

The descriptions in this chapter provide you with the fundamental concepts needed to configure two computers using the Benchmark® software.

Attention

Do not change the "name" of the system NT computer. Changing the computer name under NT will adversely affect the operation of the system after being mapped.

In This Chapter

This chapter contains the following topics.

Windows NT Workstation

Windows NT Workstation is the OS (Operating System) generally used by stand-alone computers (i.e. computers that are not connected to a network), computers on a network which act as “peers” (including computers that belong to a “workgroup”), and by computers that act as “clients” to a “domain”.

A domain is a group of servers that share common security policy and user account databases (Windows NT Resource Kit - Windows NT Networking Guide).

Windows NT Server

The Windows NT Server is essentially a superset of the Windows NT Workstation OS and provides additional services such as the ability to create and manage “domains”, provide centralized mail services, etc.

Networking Configurations

Stand Alone Configuration

Each computer running Windows NT Workstation has a local database of user accounts and a local database of security policies (or permissions granted to users and/or user-groups). In order to "log on" to this computer, the user must enter a user name and password that matches an account in the user account database. See Figure 12-1.

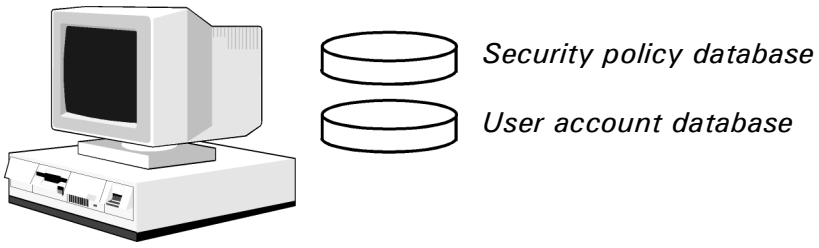


Figure 12-1

Two NT Workstations in a Peer-to-Peer Configuration

In a "peer-to-peer" configuration, each user logs onto their local machine (A) which requires that they have a user account in the local user account database. This gains them access to whatever local resources they've been given permissions to access locally.

When the user subsequently attempts to access a resource on a different computer (B), for example he attempts to access a "shared" drive on the second computer, his user name and password are forwarded to the computer (B) for "authentication". If the user name and password match a user account on the target computer (B), then the user can access the resources that have been permitted by the security policy database on the target computer (B). See Figure 12-2.

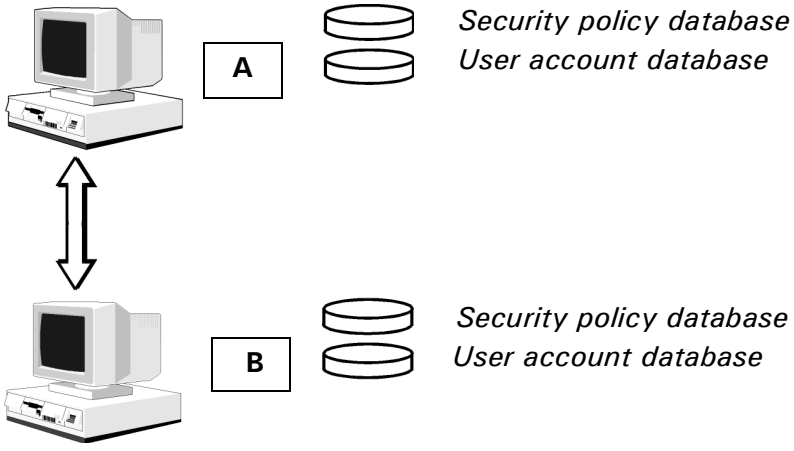


Figure 12-2

NT Workstation and NT Server Configuration

In a “client-server” configuration, each user can either log onto their local machine or log onto a domain. By selecting the name of the local computer as the “Domain” at the logon screen, the user is logging on to the local computer. By selecting any other name they are logging on to the selected domain.

When logging on locally, the user account must exist in the local user account database (as described in previous sections).

When logging onto a domain, the user name & password must exist in the “server’s” user account database. In this scenario, the user will be permitted to access the domain’s resources based on the permissions granted in the server’s security policy database. See Figure 12-3.

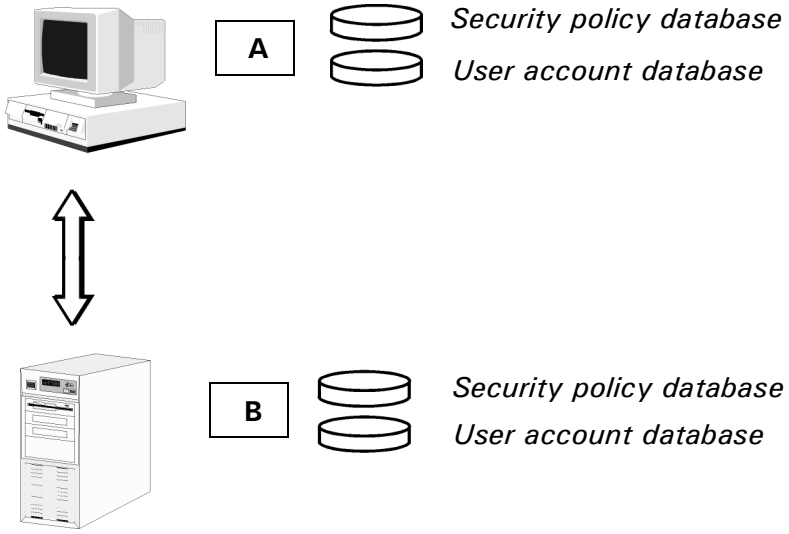


Figure 12-3

Benchmark® Software

Introduction

The Benchmark® software consists of two primary components: a client component and a server component. The client component (Benchmark.exe) is essentially the user-interface (UI). The server component (ServerBenchmark.exe) is essentially the hardware control portion. There's an additional component (VisionBenchmark.exe) which provides the "vision" services (e.g. program-recognition); this component is considered to be an extension of the server component.

The UI can be run on the same computer as the Benchmark-Server or it can be run on a different computer that's connected to the computer running the Benchmark-Server by a network connection (which can include a modem connection).

The Benchmark-Server is designed to run as a "service" on the computer that controls the hardware (e.g. a machine). A single Benchmark-Server can support multiple UI's (i.e. one local UI and multiple remote UI's). Running as a service has the following benefits:

- Services can be run under a specific user account which means that they can run with different (generally higher) privileges than the typical user. The Benchmark-Server runs (by default) under the "system account" which means that it has "administrative" privileges.
- Services do not stop running when the user logs off the computer. This allows a user to log onto the computer, start the **CAMALOT** system (via the UI), and log off leaving the system in the desired mode of operation.
- Services can be configured to start automatically when the computer is powered on.

The Benchmark® software is designed to run under version 4.0 (with Service Pack 4) of the Windows NT Workstation operating system.

Stand Alone Configuration

When the computer in a **CAMALOT** system boots (generally following powering on the system), the Benchmark-Server will automatically start up as a service. By default, it will run under the "system account" (i.e. the user account with a user name of "Administrator"). A user then logs onto the local machine at the system terminal.

Attention

When performing remote connections, it is important to have a two-way connection. One connection from the UI to the Benchmark-Server and the second from the Benchmark-Server to the UI.

When the user subsequently runs the UI (which will generally happen automatically when the user logs onto the machine) and "connects" the UI to the local Benchmark-Server, there is NOT an attempt (by the program) to "log on" since both components are already running on the same computer. The UI is able to connect to the Benchmark-Server AND the Benchmark-Server is able to connect to the UI. See Figures 12-4 and 12-5.

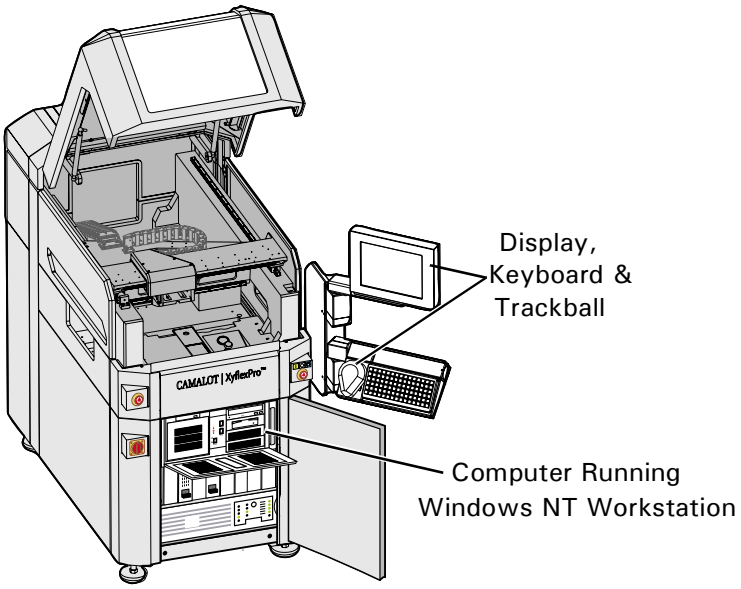


Figure 12-4

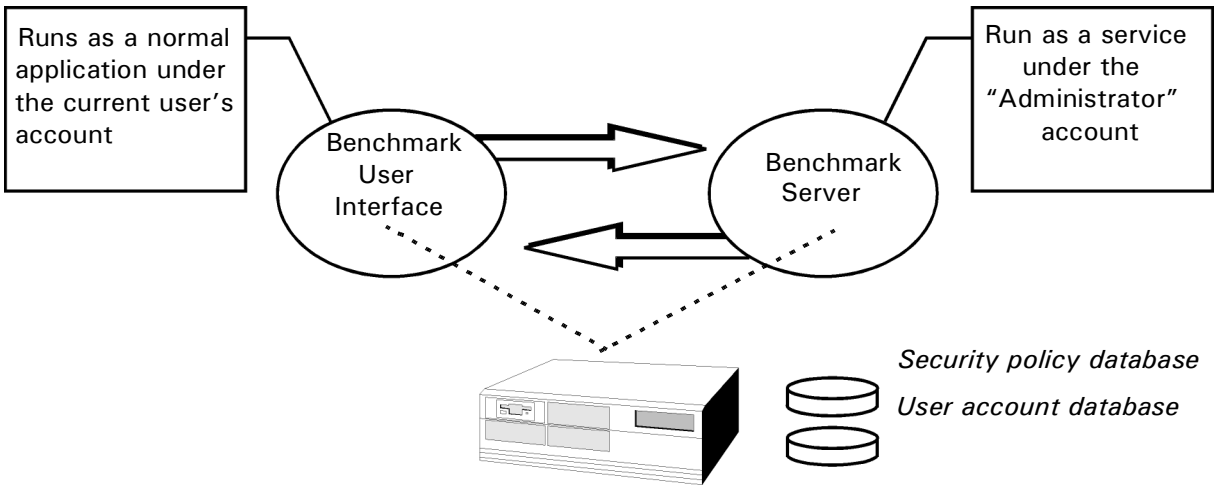


Figure 12-5

Software in a Peer-to-Peer Configuration

As described in the previous section, when the computer in a **CAMALOT** system boots, the Benchmark-Server will automatically start up as a service. In order to allow a remote client (i.e. a copy of the UI running on a different computer) to "connect" to this server, the Benchmark-Server MUST run under an account that also exists on the client's computer. This is necessary in order to allow the server to connect "back" to the client's computer; if the account (i.e. user name & password) does not exist on the (remote) client's computer, then the attempt by the server to "log onto" the remote computer will be denied by the operating system.

Similarly, the account (i.e. user name & password) under which the remote UI is running MUST also exist on the computer running the Benchmark-Server. If the account does not exist on the (Benchmark-Server) computer, then the attempt by the UI to "log onto" the Benchmark-Server computer will be denied by the operating system.

It is NOT necessary for these accounts to have identical permissions on both computers; they simply need to be present so that the "log on" process (which occurs automatically when 2 computers attempt to "communicate" for the first time) can succeed, thereby allowing the UI and Benchmark-Server to communicate.

Figure 12-6 and Figure 12-7 illustrate a configuration with a local and remote UI connected to the same Benchmark-Server.

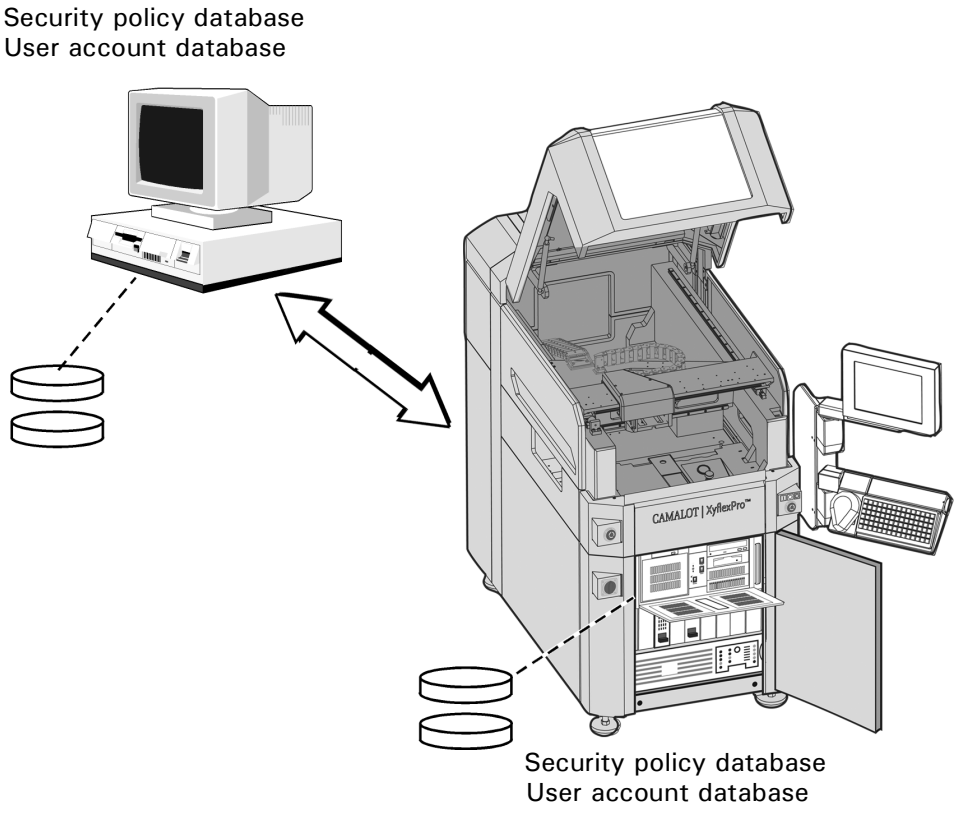


Figure 12-6

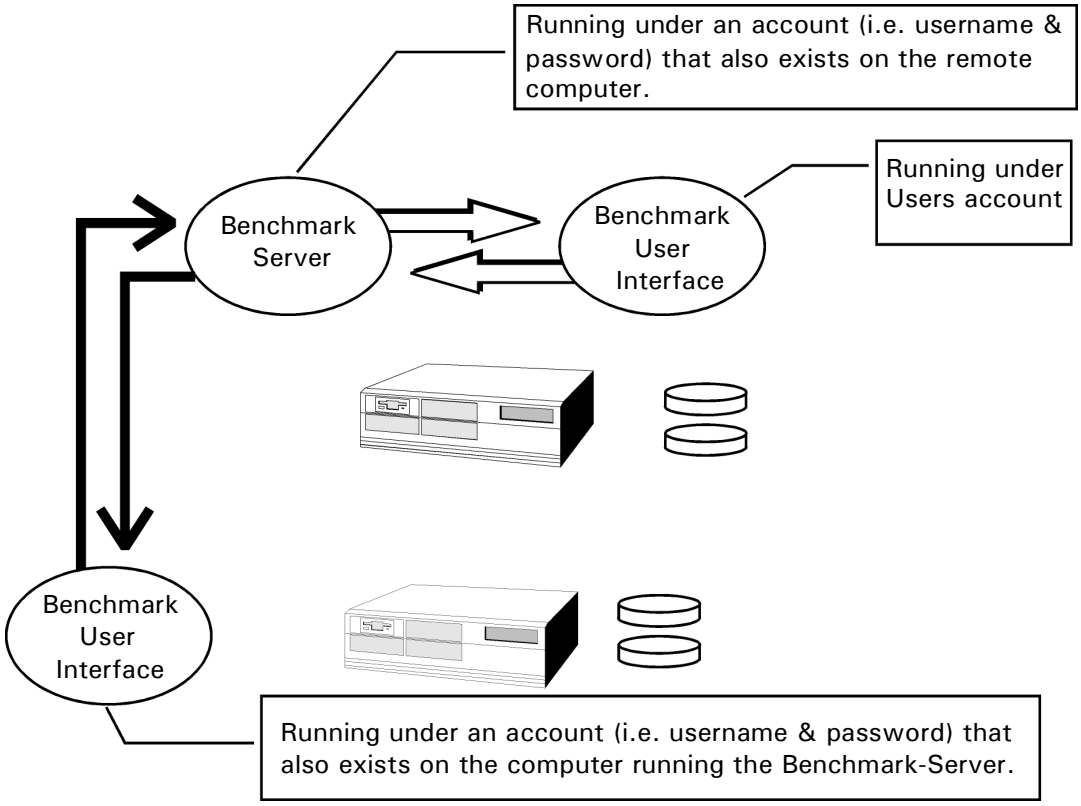

Running under an account (i.e. username & password) that also exists on the remote computer.
Running under Users account
Benchmark Server
Benchmark User Interface
Benchmark User Interface
Running under an account (i.e. username & password) that also exists on the computer running the Benchmark-Server.

Figure 12-7

Configuring The Benchmark® Software For Remote UI's

Procedure

In order to configure the Benchmark® software so a remote UI can connect to a Benchmark-Server, perform the following procedure.

1. Configure the Benchmark-Server to run under a new account:
   a. Using the "User Manager" program, add a user account with "Administrator" level privileges. This will become the account under which the Benchmark-Server will run which is why "Administrator" level privileges are required. The new account should have a password that never expires (See User Manager for details).
   b. Go to **Start** > **Settings** > **Control Panel** > **Services** screen.
   c. Click on the service named **CAMALOT Benchmark Server**.
   d. Click on the **Startup** button.
   e. Select the "**This Account**" radio button and enter the user name (as the account) and password that was created in substep a. The account specified MUST have "Administrator" level privileges or the service will not start.

Attention

The Benchmark-Server is now configured to run under the new account. The computer must be rebooted OR the service must be stopped (if running) and then restarted for the change to take affect.

2. Using the "User Manager" program, add a user account that matches the user account under which the remote UI will be run. Repeat this step for each account that will be used when running the UI at the remote computer. The Passwords must be the same on each machine.

On the Remote Computer

Using the "User Manager" program, add a user account that matches the user account under which the Benchmark-Server is running.

This account does NOT need to have "Administrator" privileges on the client machine.

For example, if in step 1.a. in the previous section a user account with a name of "Benchmark" and a password of "camalot" was created, then create a local account with the same username and password; this will allow the Benchmark-Server to "log on" to this computer when it attempts to establish a connection "back" to the UI.

13

Dispensing SMT Applications

Overview

Introduction

The SMT (Surface Mount Technology) application is designed for accurate and highly-repeatable dispensing of surface mount epoxies, glues, and solder pastes through use of different leadscrews, needle combinations, and material syringes.

In This Chapter

This chapter contains the following topics.

SMT/SemiConductor Process Program Grid

Introduction

The Process Program Grid is used to create a program and allows you to specify values and settings for the dispensing commands.

Vertical and horizontal scroll bars are provided at the bottom and right side of the screen since there are too many fields to display simultaneously. You may also alter the field display by dragging the vertical bar between the field column names to change the width of the field or hide it altogether. A right click on the mouse will restore the grid by selecting **Restore Grid Columns**.

To create and name a new process program, refer to Chapter titled - **Creating and Managing Process Programs**.

Setting The System For SMT

Select the process program grid as follows:

1. Select **View > Process Programs** from the menu on the Main screen.

The list of existing process programs appears. See Figure 13-1.

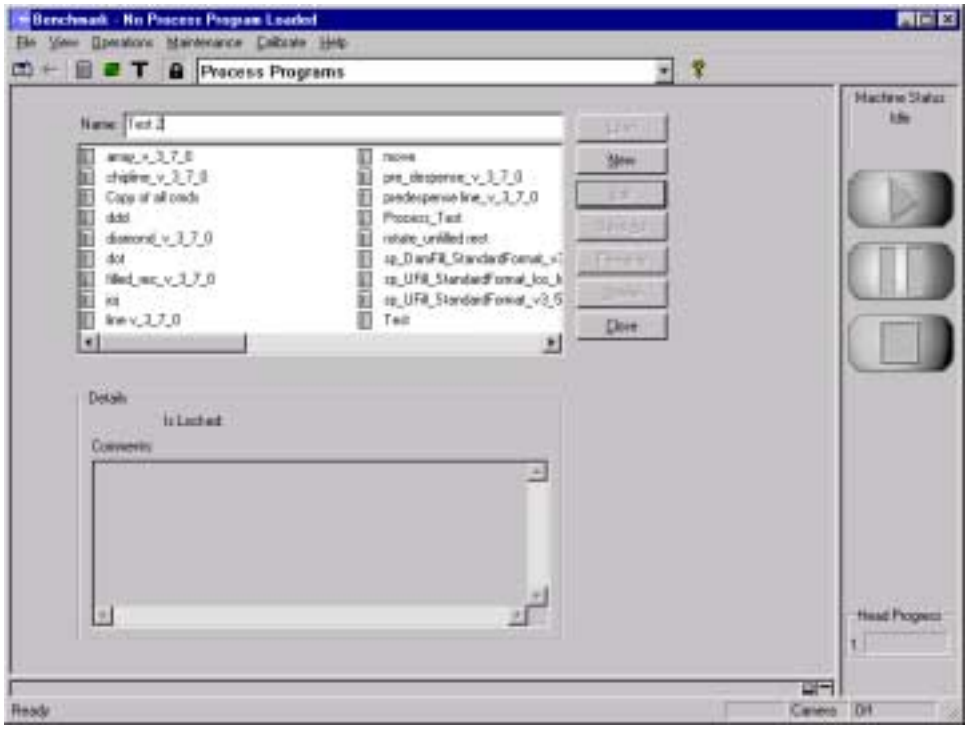


Figure 13-1

2. Select the file listed in the **Name** field.
3. Type a new file name of your choice over the existing file name.

The **New** button becomes enabled.

4. Select the **New** button.

The view area changes to a comment box. See Figure 13-2.

5. Enter any relative information about this new file (Part Number, Board Size, Material, etc.) in the space provided.

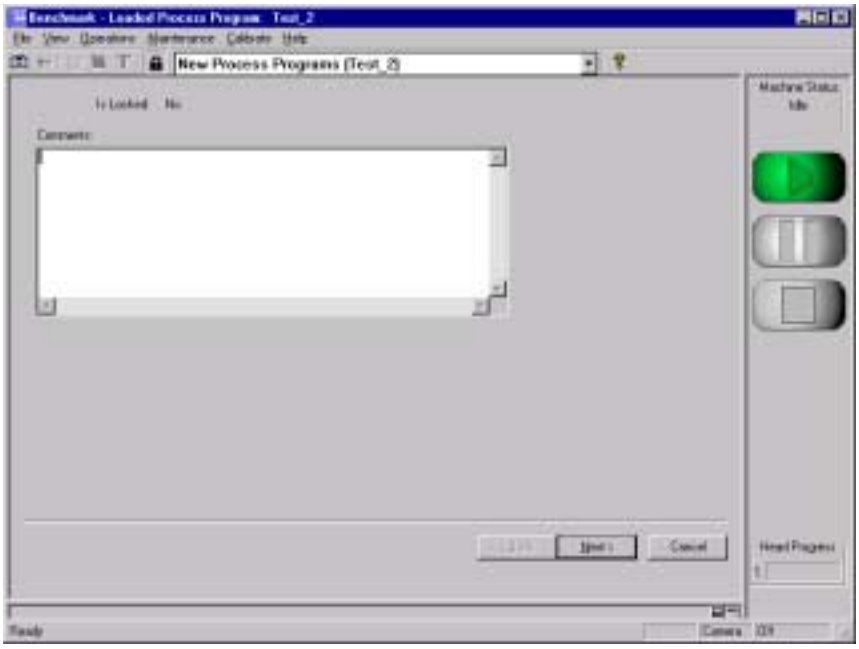
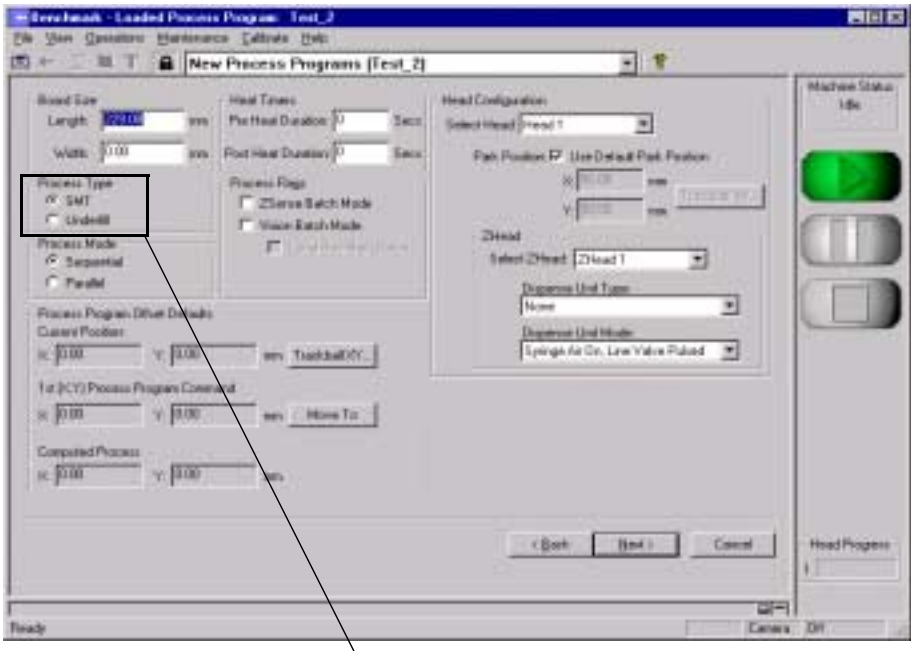


Figure 13-2

6. Select the **Next** button. The view area changes to the **Properties view**. See Figure 13-3.



SMT Radio Button

Figure 13-3

The system Properties screen (Figure 13-3) allows you to assign application specific attributes to a process program; for instance a glue dot SMT program would have different properties than an Underfill application.

7. Select the **SMT** radio button in the **Process Type** field. See Figure 13-3.
8. Select the **Save** button.
9. Select the **Commands Tab**.

The Process Program Grid appears. See Figure 13-4.

SMT/Semiconductor Process Program Grid Fields

The fields used for SMT/Semiconductor are described below. The fields used for this process differ from those used for Underfill.

Grid Fields	Description
Command	Displays the command necessary to program a dispense program. New program commands are always inserted after the current selected step in the program. Each command is executed in the order specified
X Position	Displays the X location that a command will be executed.
Y Position	Displays the Y location that a command will be executed.
Theta	Performs a rotation of a program section. Used with the New Coordinate command.
Head	Specifies the head that is used when dispensing a particular dispense program command.
Dot Size	Determines the amount of dispense valve auger rotation, when a dispense command is executed. Measured in degrees of rotation.
Lift Height	Sets the distance (up height) that the cartridge moves (in the dispense unit) between dispense commands. Correct lift height causes the material to snap-off cleanly. Minimum lift height will yield a higher throughput. This height is relative to the dispense height.
Dispense Height	Distance from Home position of Z to the board. This is taught by just contacting the needle to the substrate.
Name	Displays the file name that is associated with a Fiducial, Template, or Array command.
Reference Designator	Identifies a specific component on the process board. The identifier is normally printed on the board, provided there is space. For example: C101, R203, and U7. The reference designator provides a means to search for a specific component.
Shape Code	Defines a generic component type. Each component has a shape code based on its physical configuration and dimensions. For example: 1206 resistor There is one part number for each resistor component.

Grid Fields	Description
Dot Dwell	Determines the amount of time (in Milliseconds) that the dispense unit will stay in the down position after a dot is dispensed. This allows the dispense material time to finish flowing from the needle. The dwell time starts when the Dot Size ends. More viscous materials do not flow as easily a less viscous materials. Less dwell increases throughput. Reduce dwell after establishing well formed, correct size dots.
Transition Up Height	Sets the distance for which the head will run at a slow speed when raising from a dispense operation. Used to eliminate tailing tendency of some dispense materials.
Transition Down	Sets the distance for which the head will run at slow speed when lowering to a dispense operation. Used to precisely position the needle when working at small dispense heights.
RPM	Determines the rotation speed (in revolutions per minute) of the leadscrew in the dispensing unit while dispensing. The default value is 360 RPM.
Dispense On Down	Allows a dot to be dispensed on the down stroke of the cartridge in the dispense unit. Provides a head start for flow of material for high speed dispensing. Dispense unit motor starts turning before reaching the dispense area. Dot starts to form before needle approaches board. Reduces amount of dwell needed.
Optimize	Reduces the amount of head travel to improve throughput. This is normally performed for any SMT process. Refer to Chapter titled - **Creating and Managing Process Programs** for detailed description on **Optimizing**.

Typical SMT Application

Introduction

The process board must be loaded before any commands can be placed in the process program grid. Refer to Chapter titled - **Conveyors and Heated Chucks**.

The following is a typical example of SMT/Semiconductor program. See Figure 13-4.

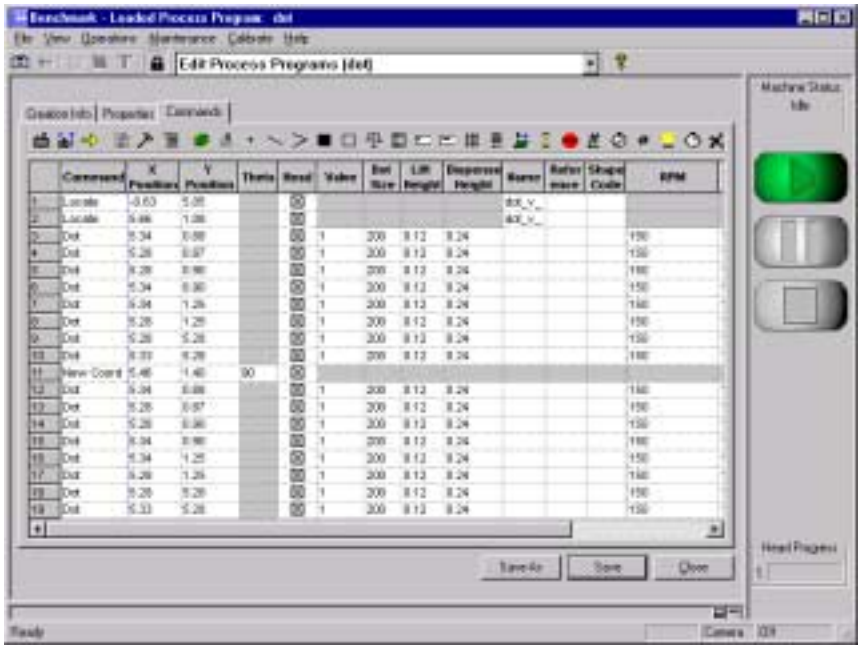


Figure 13-4

This sample board is broken into four quadrants and we will dispense eight dots in each quadrant. After dispensing eight dots in each quadrant, we will rotate the program (Theta) 90 degrees because of the layout of the board.

The first two commands in the program are normally the fiducials. By using fiducials the system can offset the program for misaligned boards. For best results, fiducial reference marks should be diagonally opposed. Refer to Chapter titled - **Creating and Managing Process Programs** for detailed description on **Fiducials**.

Breakdown Of Commands

This above example lists the first two lines in the Command line as follows:

Command	X Position	Y Position
1 LOCATE	- 0.63	5.05
2 LOCATE	5.66	1.08

Command lines 3 through 10 are used as dispense points for DOTs. This is listed in the process program grid as follows:

Command	X Position	Y Position
3 Dot	5.34	0.88
4 Dot	5.28	0.87
5 Dot	5.28	0.90
6 Dot	5.34	0.90
7 Dot	5.34	1.25
8 Dot	5.28	1.25
9 Dot	5.28	1.28
10 Dot	5.33	1.28

The same parameters for Dot Size, Lift Height, Dispense Height, and RPM are repeated on Command Lines 3 through 10.

This is listed in the process program grid next to the DOT Command Lines 3 through 10 as follows:

Dot Size	Lift Height	Dispense Height	RPM
200	0.12	0.24	150

Command line 11 moves the whole dispense program to a new coordinate on the board and turns the program (Theta) 90 degrees. This is listed in the process program grid under the Command Line as follows:

Command	X Position	Y Position	Theta
11NEW_COOD	5.46	1.40	90.00

Figure 13-5 illustrates how the rotation of the program occurs.

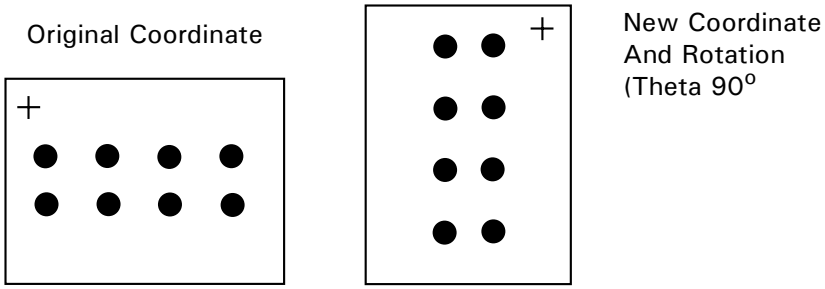


Figure 13-5

The program ends with the OLD_COORD and an END command after all four quadrants of the board have been dispensed upon.

Running The Process Program

Once you have inserted all program commands and made the necessary adjustments, you can run (dispense) the program.

To run the program:

Select the  (Start) button from the Main screen or select: **Operations** > **Start** from the menu.

Pause Or Aborting The Process Program

1. Select the  (Pause) button to pause dispensing or select **Operations** > **Pause** from the menu.
2. Select the  (Resume) button to resume dispensing or select **Operations** > **Resume** from the menu.
3. Select the  (Abort) button to abort the program or select **Operations** > **Abort** from the menu.

Optimizing A Process Program (Xyflex)

Introduction

Optimizing a dot program ensures that the program dispenses with the least amount of head travel by distributing commands between multiple heads. This in turn provides increased throughput.

The Optimize function works with Dot, Move, Fiducial, New_Coord, and Old Coord commands. All other commands are dropped automatically from the output file.

Procedure

To optimize a program:

1. Select **File > Process Programs**.

Attention

The optimize function only supports files containing Dot commands.

2. From the list of existing process programs select the file to be optimized and select the **Edit** button.

The selected file appears on the Program Grid. See Figure 13-6.

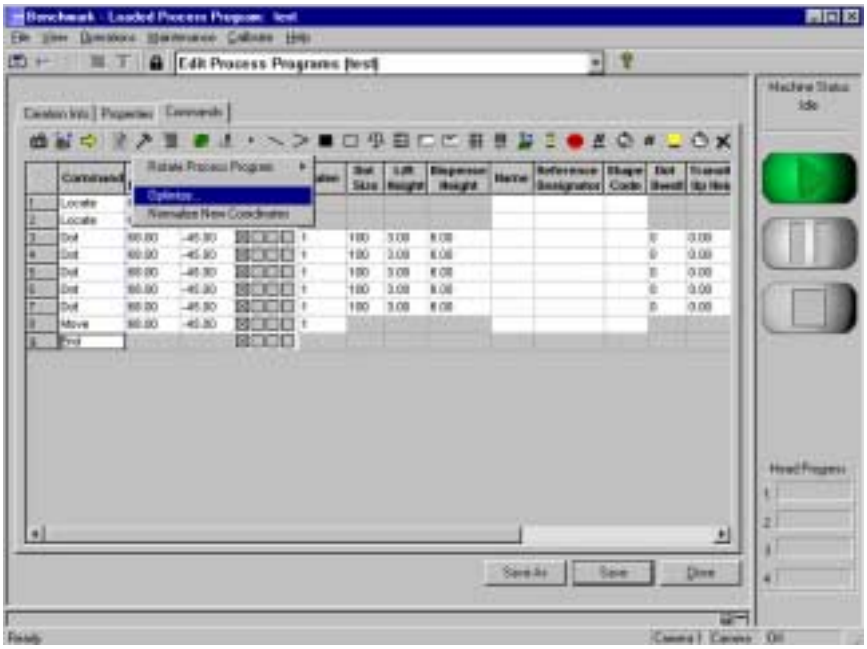


Figure 13-6

3. Select the Tools icon  from the Program Commands Toolbar.
4. Select the **Optimize** command from the drop down list.

The Optimize screen appears. See Figure 13-7.

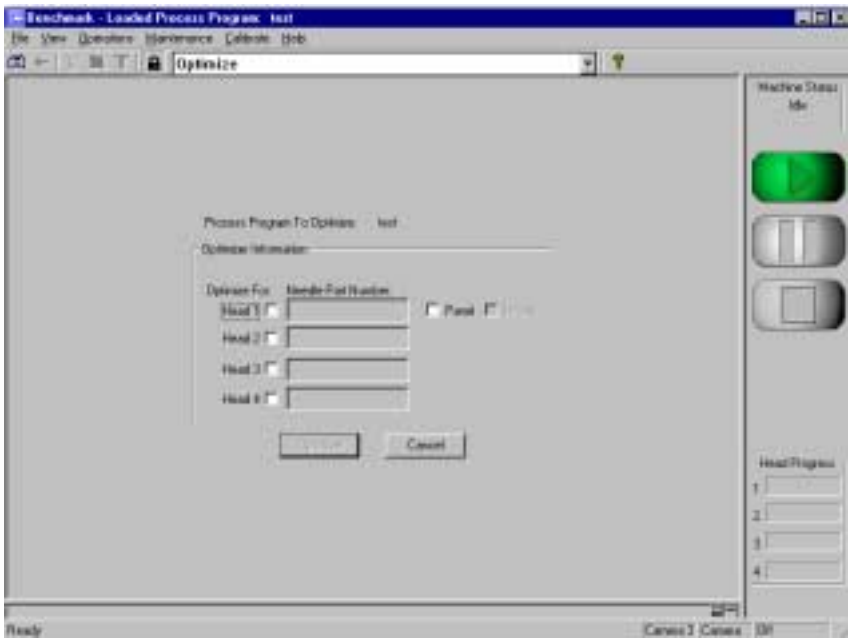


Figure 13-7

5. Select the **Heads** that will run the optimized program by placing a check in the appropriate **Head** number box.
   This enables the **Optimize** button.
6. Enter the appropriate six digit, Needle Part Number for each Head.

The **Panel** box is only selected when you have multiple **identical** sub-boards. This will equalize and line balance the time spent dispensing on several heads.

The **Divide** box is selected when you have several new coordinates and want to divide the dispensing between multiple heads.

7. Select the **Optimize** button.

The loaded file is optimized and you are returned to the Program Grid.

8. If the software optimized the program to meet your needs, select the **Save** button.
9. If you do not like how the system optimized the program, select the **Close** and the program will return to its original state before optimizing.

Optimizing A Process Program (XyflexPro)

Introduction

Optimizing a dot program ensures that the program dispenses with the least amount of head travel by distributing commands between multiple machines. This in turn provides increased throughput.

The Optimize function works with Dot, Move, Fiducial, New_Coord, and Old Coord commands. All other commands are dropped automatically from the output file.

Procedure

To optimize a program:

1. Select **File > Process Programs**.

Attention

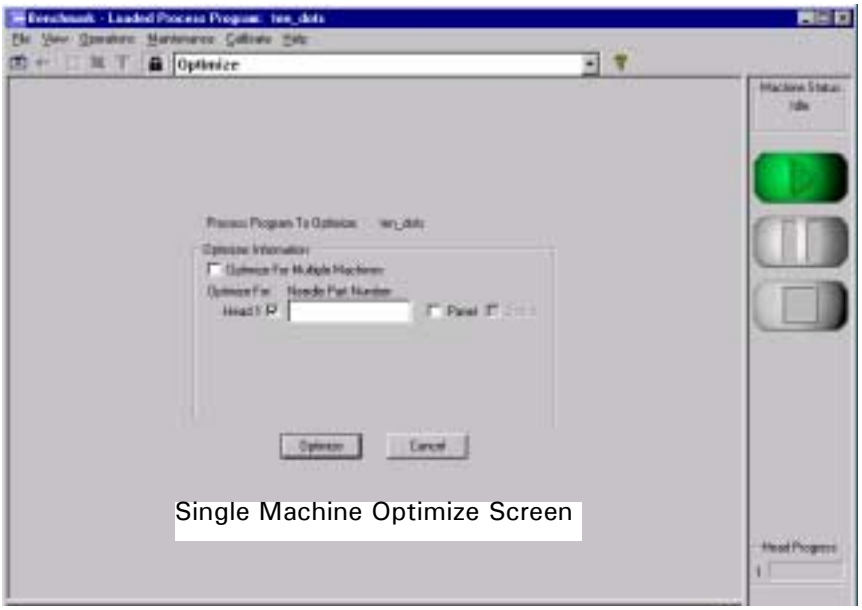
The optimize function only supports files containing Dot commands.

2. From the list of existing process programs select the file to be optimized and select the **Edit** button.

The selected file appears on the Program Grid. See Figure 13-6.

3. Select the Tools icon  from the Program Commands Toolbar.
4. Select the **Optimize** command from the drop down list.

The Optimize screen appears. See Figure 13-8.



Single Machine Optimize Screen

Figure 13-8

5. If you have a single XyflexPro machine, place a check in the Head I box. This enables the **Optimize** button.
6. If your line is setup with multiple XyflexPros, place a check in the **Optimize for Multiple Machines**. See Figure 13-9.
7. Select the **Machines** that will run the optimized program by placing a check box in the appropriate **Machine** number box.
   This enables the **Optimize** button.
8. Enter the appropriate six digit, Needle Part Number for each Head or Machine.

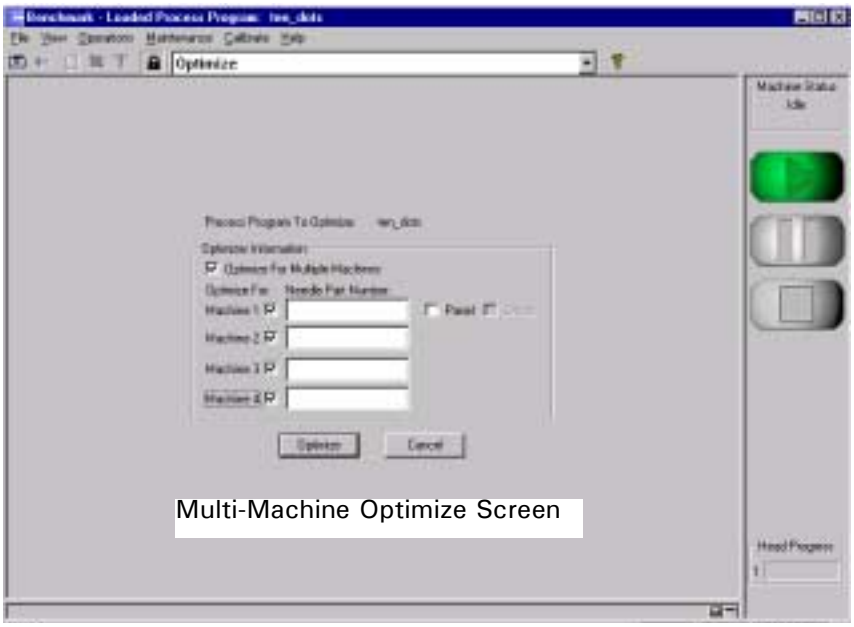


Figure 13-9

The **Panel** box is only selected when you have multiple **identical** sub-boards. This will equalize and line balance the time spent dispensing on several machines.

The **Divide** box is selected when you have several new coordinates and want to divide the dispensing between multiple machines.

9. Select the **Optimize** button.

The loaded file is optimized and you are returned to the Program Grid.

10. If the software optimized the program to meet your needs, select the **Save** button.
11. If you do not like how the system optimized the program, select the **Close** and the program will return to its original state before optimizing.

14

Dispensing Underfill And Encapsulation

Overview

Introduction

This chapter describes XyflexPro programming for Encapsulation and Underfill applications. It also illustrates how to use Multi-Pass programming to increase productivity and maximize throughput.

Attention

It is extremely important to set the values in the Properties screen correctly for the intended application whenever a new file is created. Otherwise, incorrect dispensing will occur. Refer to Chapter titled - **Creating & Managing Process Programs**.

In This Chapter

This chapter contains the following topics.

Underfill Applications

Introduction

The XyflexPro Benchmark software includes several features that aid in the programing of the Underfill application. In order to use XyflexPro commands effectively, it is necessary to understand how the Underfill application is handled by the **Benchmark** software.

Process Description

When underfilling a chip, 2 or more lines of material are dispensed parallel and in close proximity (.003 - .005 inch, to one edge of the chip). The underfill application requires very accurate positioning of the dispense needle during the dispense cycle because the needle is so close to the edge of the chip laterally, and below the top surface of the chip vertically. Seemingly minor errors in positioning could cause the needle to contact the side of the chip.

Underfill programs are created and executed in segments. After the first line is dispensed, the timing of each additional application of material is critical. The material must have sufficient time to wick underneath the die before the next application, so as to prevent formation of air pockets.

After the underfill segments are completed, a series of lines or fillets can be dispensed to finish off the remaining three edges. Ordinarily this is the final segment of the program.

To provide the required accuracy, XyflexPro uses a chip definition, which you create, to define the length and width of the chip. The chip definition also includes a set of vertical and horizontal calipers which the system uses to establish a search area. This enables the system to offset and/or rotate the dispensed segments accordingly. See the Section titled - **Creating Chip Definitions** for detailed instructions on creating chip definitions.

In creating the program file, chips are positioned based on an **X**/**Y** coordinate representing the center of the chip. During program execution, the vision system will go to the specified **X**/**Y** coordinate and using the chip definition information, find the edges of the chip and adjust the dispense as necessary.

Typically in underfill, chips are brought into the dispensing area via a carrier such as an Auer boat containing multiple parts. Maximum productivity is achieved by dispensing each segment of the program on all or some of the parts on the carrier so as to make use of the waiting time that is required between segments.

Commands And Fields

The following are commands that are associated with the underfill application:

See Chapter titled - **Tool Bars and the Process Program Grid** for additional field information.

Chipline - used to dispense individual line segments. The command is similar to a regular **LINE** command except that there are no **X/Y** coordinates.

Length Offset Start- field, determines the start point of the line. A positive number would cause a line length equal to the chip dimension plus (+) the amount specified. A negative number would cause a line equal to the chip dimension minus (-) the amount specified. See Figure 14-4 and 14-5. Refer to section titled - **Chipline Start and End Offsets** to set this position.

Length Offset End- field, determines the end point of the line. A positive number would cause a line length equal to the chip dimension plus (+) the amount specified. A negative number would cause a line equal to the chip dimension minus (-) the amount specified. See Figure 14-4 and 14-5. Refer to section titled - **Chipline Start and End Offsets** to set this position.

Position Offset -field, determines the gap between the edge of the chip and the center of the needle.

Link Line Last - field, - X indicates the last in a series of consecutive Chiplines. This feature insures a continuous line by preventing the needle from being lifted between segments.

Pass - used to delineate the individual segments of a dispense program. This allows individual segments to be executed via a callout (**DOPASS)** within the program.

Each **PASS** command is identified by a sequential number and all commands after the **PASS** up to the next **PASS** command are considered part of the set.

Dopass - used to callout one or more groups of commands that were defined by the **PASS** command. The system will execute the commands based on the numbers in the **First Pass Num** and **Last Pass Num** fields. In Figure 1 the **DOPASS** command at line 1 instructs the system to execute all commands defined by Pass 1 then Pass 2.

TIMER - delays the execution of a program segment until a prescribed amount of time has elapsed as determined by the **Timer Timeout** field. This means that the **CHIPLINE** command on line 14 (2nd pass of the underfill) will not be dispensed on this chip unless 10.00 seconds have elapsed since the **CHIPLINE** command on line 10 (1st pass of the underfill) was dispensed. Careful use of the **TIMER** command can maximize throughput by eliminating excessive wait times between passes.

LOCATE - This command is used two ways:

1. To find fiducials
2. To position the center of a part to be underfilled and to identify the chip definition that is to be used for the dispense routine. Upon program execution, the system will go to the **X/Y** coordinate of the **LOCATE** command. The vision system then attempts to locate the edges of the chip based on the profile of the chip definition selected in the **Name** field.

New_COORD_1 - used to step and repeat applications such as underfill. Inserting the command allows you to create an offset at the beginning of each execution of the program or execution blocks.

OLD_COORD - restores the original offsets that were in affect prior to using the New_COORD_1 command.

BREAK - is a timer used to control the maximum time allowed between Passes. In doing so, it also determines how many parts will be dispensed within the current Pass. Using the **BREAK** command effectively, prevents applications problems caused by premature curing of the material.

The **Break Timer** duration is assigned in the **Timer Timeout** field.

When a Pass on the first part is completed, the **Break Timer** is reset to 0 and a new countdown begins. Dispensing on subsequent parts will continue as long as the Break Timer has not expired.

If/when the Break Timer expires, the system returns to the first part and begins to dispense the next pass and the process is repeated.

ZSENSE - is used to determine the substrate height at the point where dispensing is to occur. This assures consistent needle distance from the substrate for every part.

Creating Chip Definitions

Introduction

When dispensing for underfill applications, each chip must be defined individually in terms of its width and length. XyflexPro uses an invisible set of calipers to determine where edges of the part are located and to establish if the chip is skewed. This information is used to offset and rotate the program so that the underfill lines are dispensed at the proper distance from the chip edge, and to make sure the lines are parallel to the chip.

When you create a chip definition the **Locate** screen is used to enter the dimensions of the chip as well as lighting information in the dispense area.

Locate Screen

The Locate screen is used to set the parameters of the chip.

1. Select **File > Locate**.
   A list of previously created chip files appear.
2. Select the file listed in the **Name** field.
3. Type a new file name of your choice over the existing file name.

The **New** button becomes enabled.

4. Select the **New** button.

A pop up list appears with all four types of fiducials.

5. Select **Chip Def** from the list to assign the fiducial type.

The view area changes to a comment box.

Enter any relative information about this new file (Part Number, Board Size, Material, etc.) in the space provided.

6. Select the **Next** button and Figure 14-1 appears.

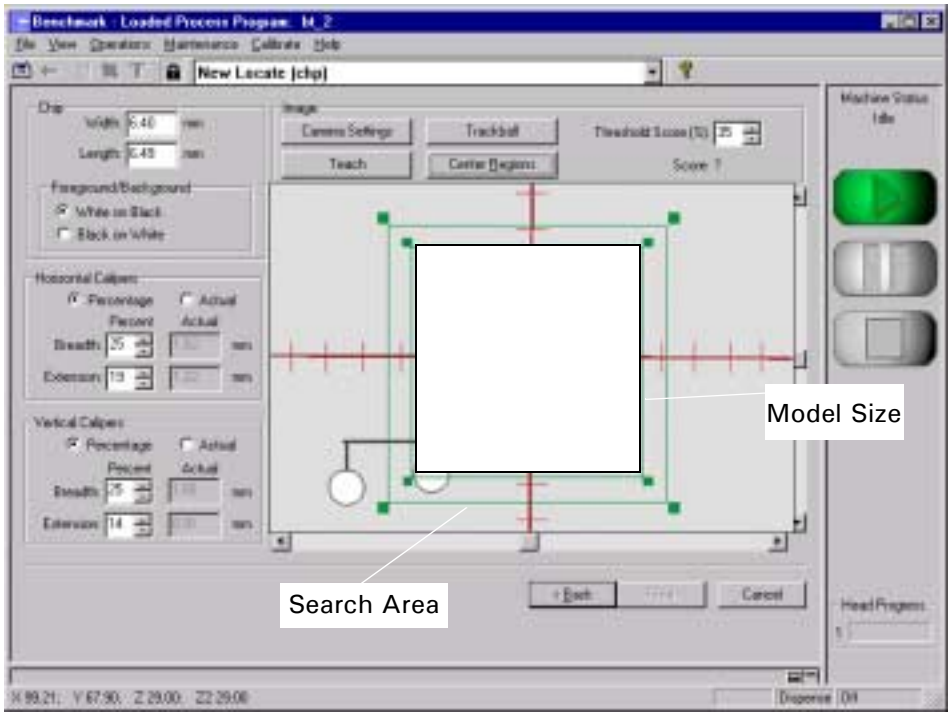


Figure 14-1

The Locate screen fields are defined as follows:

Chip:

Chip Width (A, Figure 14-2) - The Width describes the chip size from side to side. Chip width must be within the **Min** and **Max** fields dimensions.

Chip Length - The Length describes the chip size from front to back. Chip length must be within the **Min** and **Max** fields dimensions.

Fore/Background - Select the appropriate combination based on your application.

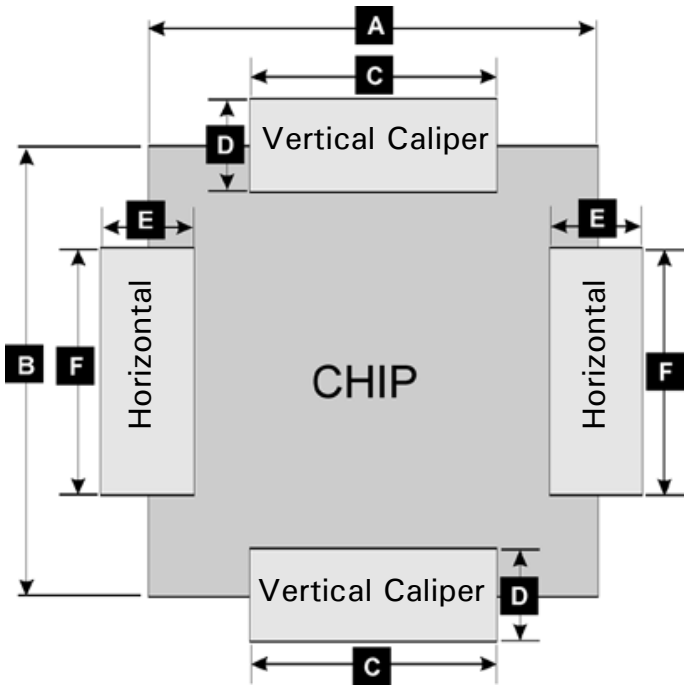


Figure 14-2

Horizontal Calipers :

Breadth (F, Figure 14-2) - The **Breadth** value is the dimension of the caliper that is parallel to the edge of the chip.
The horizontal breadth = the percentage of the length of the chip (**B**, Figure 14-2) that you specify.

Extension (E, Figure 14-2) - The **Extension** value is the dimension of the caliper that is perpendicular to the edge of the chip.
The horizontal extension = the percentage of the length of the chip (**A**, Figure 14-2) that you specify.

Percentage/Actual Buttons - You can specify caliper dimensions either as a specific size or as a percentage of the chip size.

Vertical Calipers:

Breadth (C, Figure 14-2) - The **Breadth** value is the dimension of the caliper that is parallel to the edge of the chip.
The vertical breadth = the percentage of the length of the chip (**A**, Figure 14-2) that you specify.

Extension (D, Figure 14-2) - The **Extension** value is the dimension of the caliper that is perpendicular to the edge of the chip.
The vertical extension = the percentage of the length of the chip (**B**, Figure 14-2) that you specify.

Percentage/Actual Buttons - You can specify caliper dimensions either as a specific size or as a percentage of the chip size.

Image:

Camera Settings- When selected a popup menu appears which adjusts Zoom, Brightness, Contrast, and Displays the Needle Gauge (when required).

Trackball- This button allows the camera to be moved in the X and Y direction.

Teach- Selecting this button will produce a score of the chip in the camera's view.

Center Regions- Selecting this button centers the Model Size and Search Areas over the chip in the vision window.

Threshold Score (%) - This number is used by the vision system to determine if contrast and brightness are acceptable. 35 is the default value and generally should not require adjustment.

Scoring - When the **Teach** button is selected a score is produced and compared against the value that was entered in the **Threshold Score** field.

Selecting the **Finish** button saves the data and you are returned to the list of chip definition files.
Cancel merely exits the screen. No changes are made.

Display Vision Window During Test- If this box is checked, allows the vision window to be displayed when the Teach button is selected.

Creating a New Chip Definition

To create a new chip definition:

1. Position a sample chip under the camera in the dispense area.
2. Select **File > Locate** from the menu.
   A list of previously created chip files appear.
3. Select the file listed in the **Name** field.
4. Type a new file name of your choice over the existing file name.

The **New** button becomes enabled.

5. Select the **New** button.

A pop up list appears with all four types of fiducials.

6. Select **Chip Def** from the list to assign the fiducial type.

The view area changes to a comment box.

Enter any relative information about this new file (Part Number, Board Size, Material, etc.) in the space provided.

7. Select the **Next** button and Figure 14-1 appears.

8. If necessary, adjust camera focus and lighting to desired settings as follows:

Attention

A clear image with well defined edges is required in order to correctly identify fiducials. This is achieved by adjusting zoom, brightness, and contrast settings prior to teaching the fiducial.

   a. Select the **Camera Settings** button. A popup menu appears. See Figure 14-3.

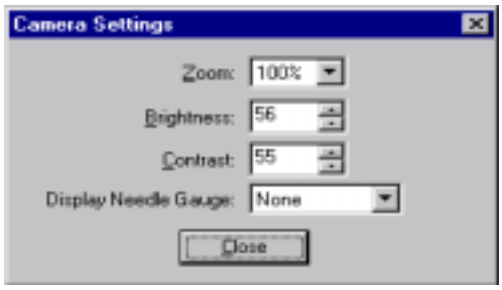


Figure 14-3

   b. Adjust the **Zoom, Brightness,** and **Contrast** as desired by selecting the applicable up or down arrow for each field. After desired settings are complete, select the **Close** button.

9. If necessary, adjust the **Model Size** and **Search Areas** (green calipers) as follows (See Figure 14-1):
   a. Place the **pointer** on one of the square handles on any corner of the box.
   b. Select the **handle** (a double headed arrow will appear, at any corner) using the trackball change the size of the box over the fiducial.
   c. Select the **left button** on the trackball to accept the change.
10. Select the **Center Regions** button, this centers the Model and Search boxes around the chip.
11. Select the **Teach** button.

The system will produce a score of the model and will be displayed. See Figure 14-1. An acceptable value is normally in the high 90's to 100.

12. Select the **Finish** button if the values of the model are acceptable.

You are returned to the list of fiducials.

Chipline Start And End Offsets

Introduction

The Chipline command allows you to control the start and end point of the line using extensions at each end of the chip. Two columns in the Process Program Grid accommodate this feature.

Setting the Length Offset Start and End Dimension

Set the Offset Start and Offset End dimension for a Chipline as follows:

1. Place the cursor on a line of the process program grid where you wish to place a Chipline. Select the **Chip Line** icon  from the top of the Process Program Grid. See Figure 14-4.

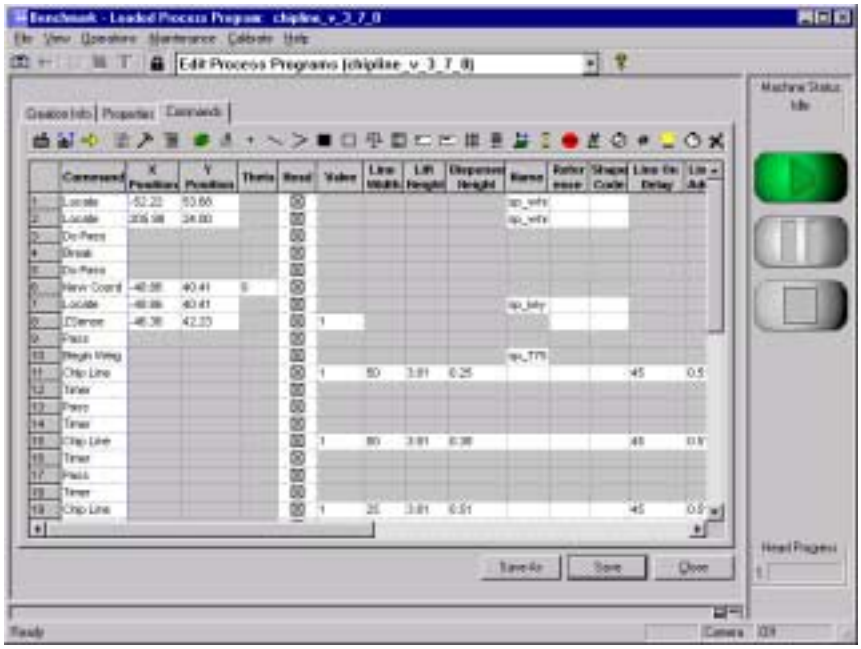


Figure 14-4

2. Select the **Length Offset Start** field on the Chipline command line. Enter a positive or negative offset start value. Refer to Figure 14-5 to determine if you require a positive or negative extension. This is determined by the dispensing direction of the dispense unit.
3. Select the **Length Offset End** field on the Chipline command line. Enter a positive or negative offset end value. Refer to Figure 14-5 to determine if you require a positive or negative extension. This is determined by the dispensing direction of the dispense unit.

Modify the Start and End Offsets as required to achieve the desired results.

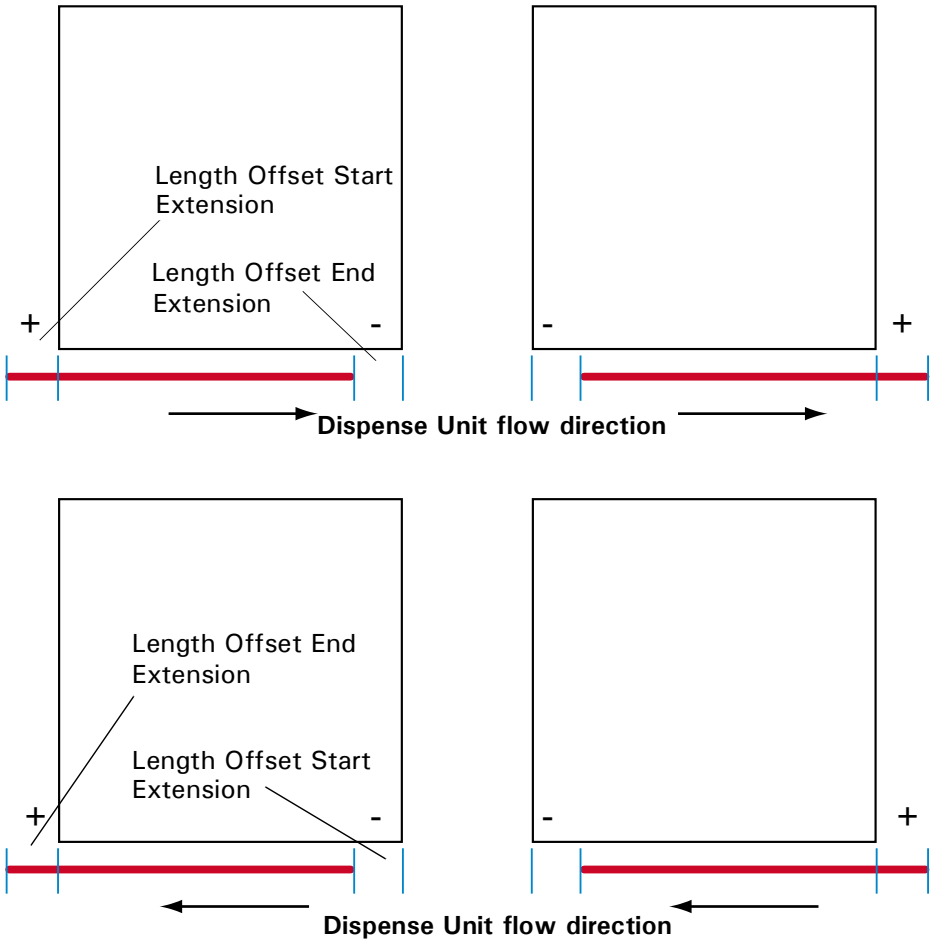

Length Offset Start Extension
Length Offset End Extension
+
-
-
+
Dispense Unit flow direction
Length Offset End Extension
Length Offset Start Extension
+
-
-
+
Dispense Unit flow direction

Figure 14-5

Underfill Sample Program

Introduction

The commands listed below represent the programming required to underfill the sample parts in Figure 14-6.

The sample program was created to dispense the underfill of five chips per Auer boat.

Each part requires two applications of material for the actual underfill and a fillet line around the 3 remaining edges of the chip.

Commands

The following is a step-by-step explanation of the initial program settings and the commands for dispensing the first chip.

Command	Description
1 DOPASS	Establishes that Passes 1 and 2 are executed sequentially.
2 BREAK	Create a timer that establishes a maximum dispensing gap of 20 seconds between Pass 2 and Pass 3 on any chip.
3 DOPASS	Establish execution of Pass 3.
4 NEW_COORD_1	Assign a new offset value that coincides with the first location of the first part in the carrier.
5-6 LOCATE	Find 2 local fiducials to compensate for skewing of the substrate in the carrier.
7 LOCATE	Assign X/Y coordinates for the center of the first chip. Find the edges and positioning of the chip based on the chip definition in the NAME field.
10 ZSENSE	Measure the height of the substrate so as to insure correct dispense height.
9 PASS(1)	Mark the beginning of the first program segment.
10 CHIPLINE	Dispense a line of material along the edge of the chip designated by the Start Corner and End Corner fields. Shorten or lengthen the line according to the values in the Length Offset field. Position the line away from the edge of the chip as specified in the Position Offset field.
11 TIMER	Create a timer for the first application of material. Assign a Timer Timeout value of 0 so that the time elapsed between the first and second material application will not include the time used by commands 4 - 10.
12 PASS(2)	Marks the beginning of the second program segment.
13 TIMER	Create a timer to ensure a settling time of 10 seconds between Pass 1 and Pass 2.
14 CHIPLINE	Dispense a second line of material along the edge of the chip designated by the Start Corner and End Corner fields. Shorten or lengthen the line according to the values in the **Length Offset** field. Position the line away from the edge of the chip as specified in the **Position Offset** field.

Command	Description
15 TIMER	Create a timer specifically for the application of fillet lines. Assign a **Timer Timeout** value of 0 so that the time consumed by the second underfill application will not impact the **TIMER** on line 17 below.
16 PASS(3)	Marks the beginning of the third and final segment.
17 TIMER	Create a timer which will ensure a gap of 15 seconds after the last underfill segment before executing the following **CHIPLINE** commands. (Lines 18 - 20)
18-20 CHIPLINE	Dispense fillet lines around 3 edges of the chip designated by the **Start Corner** and **End Corner** fields. Shorten or lengthen the line according to the values in the **Length Offset** field. Position the line away from the edge of the chip as specified in the **Position Offset** field. Do not raise the needle until after the third **CHIPLINE** so as to create a continuous line.

The above program commands represent the first chip in the carrier. Commands 4 - 20 are copied and pasted to the program for the second chip. (commands 22-37, not shown).

The only modification required for subsequent chips is to teach the correct **X/Y** coordinate in the **NEW_COORD_1** command which offsets the program to the location of the next chip.

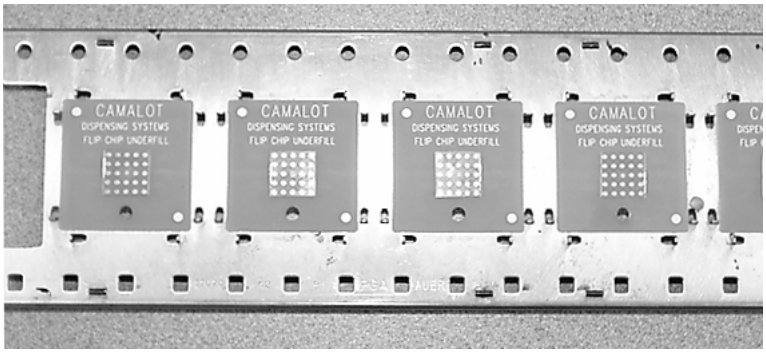


Figure 14-6

Encapsulation Applications

Introduction

Dispensing encapsulation programs require the use of the **Filled** and **Unfilled Rectangle** templates. If you are not familiar with the procedures for creating templates see Chapter titled - **Creating & Managing Process Programs.**

Inserting an Unfilled Rectangle is useful particularly for Dam and Fill applications. A Dam of material is dispensed surrounding the part to be encapsulated. The purpose of the dam is to contain the fill material to the specific area to be filled.

Usually the Dam material is of higher viscosity then the Fill material so that when it is dispensed it will stand up high enough to contain the fill material which is generally heated and has a lower viscosity.

Procedure

To insert an unfilled rectangle:

1. Place the cursor on the command line of the Process Program Grid where you wish to place the unfilled rectangle.
2. Select the  icon from the Process Program Grid toolbar.

The list of previously created Unfilled Rectangle templates appears.

3. Select the desired template from the list.
4. Select the **OK** button.

The **Unfilled Rectangle** command is inserted on the command line. Notice that the template name appears in the **Name** field of the process program grid.

If you want to use a different template you can double click the left trackball button while pointing at the **Name** field. The list of previously created Unfilled Rectangle templates appears. You can then select from the list and select the **OK** button.

Filled Rectangles

The Filled Rectangle is used particularly for Dam and Fill and Globtop applications. In Globtop applications a fill is dispensed directly in the desired location. In the Dam and Fill application a Dam is dispensed around the area to be encapsulated prior to dispensing the fill. The purpose of the dam is to contain the fill material to that specific area.

Usually the Fill material is a lower viscosity and typically would involve the use of a heated dispense unit.

Procedure

To insert a filled rectangle:

1. Place the cursor on the command line of the Process Program Grid where you wish to place the filled rectangle.
2. Select the filled rectangle  icon from the Process Program Grid toolbar.

The list of previously created Filled Rectangle templates appears.

3. Select the desired template from the list.
4. Select the **OK** button.

The **Filled Rectangle** command is inserted on the command line. Notice that the template name appears in the **Name** field of the process program grid.

If you want to use a different template you can double click the left trackball button while pointing at the **Name** field. The list of previously created Filled Rectangle templates appears. You can then select from the list and select the **OK** button.

Using The Weight Scale For The Underfill Process

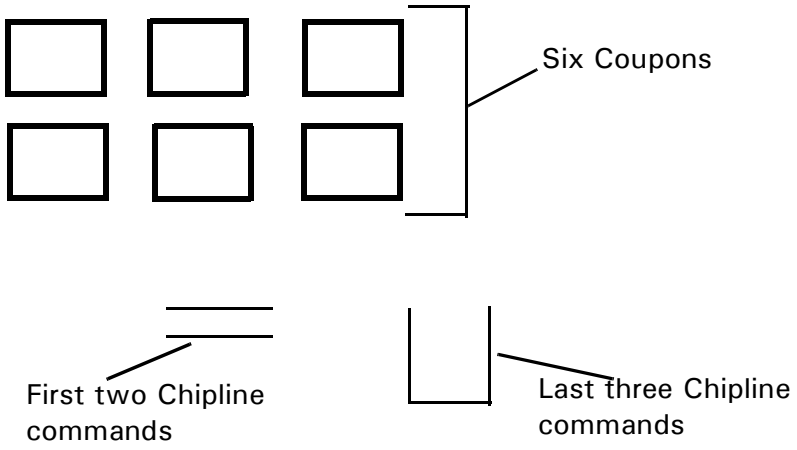
Introduction

The weight scale commands require special attention when using the underfill process. The placement of the commands is critical within the Process Program Grid. This critical placement is to ensure the sensitive timing necessary in the underfill process.

For more detailed description of the weight scale screens and fields refer to Chapter titled - **Creating and Managing Process Programs**.

Example Program

This example program will place 5 Chiplines on 6 coupons.



The above example has six coupons to be underfilled. The bottom part of the illustration shows the typical movement of the line dispense unit to perform this process.

Figure 14-7 lists the commands used to perform this process on the six coupons.

Placement of the weight scale commands are critical. Note that the BEGIN_WEIGH command is placed before the first dispense command (placed on Line 27, noted by the letter **A**). The END_WEIGH is placed after the last dispensed command (placed on Line 39 of the Process Program Grid, noted by the Letter **B**).

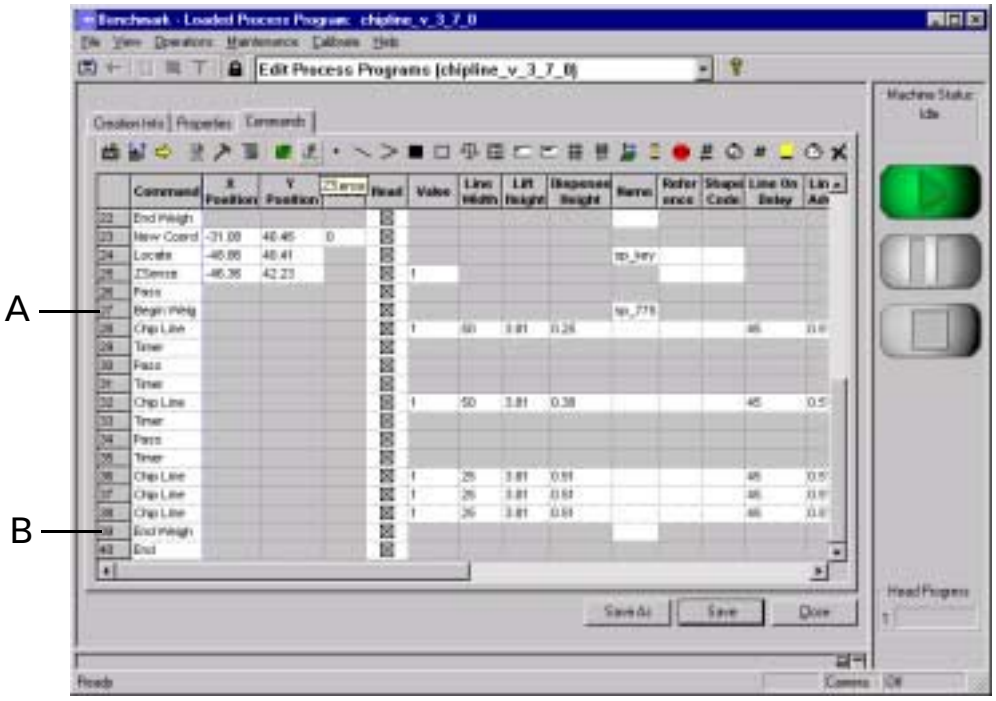


Figure 14-7

Procedure

Place the weigh command into the Process Program Grid as follows:

1. To place the weigh command into the program, highlight the first Chipline command (line 26) and all the commands down until the last Chipline command (line 38).

2. Select the weight scale template icon  from the Process Program Grid toolbar. A BEGIN WEIGH and an END WEIGH command will automatically appear before and after the selected lines to be weighed.

The system will perform a weigh prior to the first Chipline command and will be matched against the previously set Weigh template.

For more detailed description of the weight scale screens and fields refer to the Option titled- **725- Weight Scale**.

Glossary

A

Alarms

There are several alarm types. Some alarms are informative, and alert the operator to a condition such as a low material supply. Other alarms require more immediate attention, such as those that indicate a machine failure or process error. In some cases a triggered alarm will automatically cause the machine to stop.

The corrective action for any particular alarm depends on what type of alarm it is.

Each alarm condition is assigned a severity based on one of four types. They are: Operator, Equipment, Material and Warning.

Array Template

See **XyflexPro Templates**.

Auger

See **Leadscrew**.

Automatic Correction Vision

The Auto Correction Vision System enables the XyflexPro system to automatically compensate for misaligned patterns by comparing the misaligned fiducial (see **Fiducials**) location with the location in memory. It also allows the operator to see, using the monitor display, the exact point at which the needle will dispense.

Automatic Needle Calibrator

The Automatic Needle Calibrator provides automatic calibration of the needle length to maintain a consistent needle gap relative to the tip of the touch probe (see **Touch Probe**). The calibrator also adjusts for any deviation of the position of the needle tip when the needle is replaced.

B

Bad Mark Sensing

Bad mark sensing saves process time by identifying any bad part(s) on a substrate. Bad parts are identified with some sort of marking (black marker or equivalent) on the substrate and skipped over during program dispensing.

Benchmark® Software

Benchmark software consists of two basic components: the client component which is essentially the user interface (UI), and the server component which is the hardware control portion. There's an additional component which provides the "vision" services (such as pattern recognition); this component is considered to be an extension of the server component.

It is designed to work under Windows NT® (see Windows NT operating system (See OS) utilizing the networking and security features of the OS).

C

Camera Calibration — Camera calibration is used to teach the system the relationship between the camera's view of the dispense area (in pixels) to the amount of physical movement of the dispense unit.

Cartridge — Device for dealing out portions of liquid or semi-liquid (dispense) material utilizing an internal rotating device (see Leadscrew).

Command — Displays the command necessary to program a dispense pattern. New pattern commands will always be inserted after the current highlighted step in the pattern and will be executed in the order specified.

Converge — When the dispense material at the weight scale meet the set goal (which includes the target weight and tolerance).

CPU — Central Processing Unit –Computer.

D

Dispense Height — The distance the needle just contacts the board and the tip of the needle (this is considered Board Zero). Dimension is established from Home position of the Z-axis. This is taught by just contacting the needle to the substrate.

Dispense On Down — Allows a dot to begin to be dispensed on the down stroke of the dispense unit.

Dispense Unit — A device that administers or deals out liquid or semi-liquid parts or portions.

Dot Dwell — Determines the amount of time dispense unit stays in the down position after a dot is dispensed. This allows the dispense material time to finish flowing from needle. The dwell starts when the Dot Size ends.

Dot Size — Determines the amount of dispense valve auger rotation, when a dispense command is executed. Measured in degrees of rotation.

Dot Template — See **XyflexPro Templates**.

DU — See **Dispense Unit.**

E

Emergency Stop Palm Switches — Three switches are provided on the XyflexPro for the fastest and most effective means to halt machine operation, should a malfunction occur. All electrical power and air pressure to the machine is terminated when pressed except the uninterrupted power supply (see **UPS**). The computer stays on until an operator shuts it down or until the computer's automatic shutdown feature activates.

Encapsulation — The process of completely covering a printed board component with dispensed material.

End Corner — Determines where dispensing will end in an underfill application. Values range from zero (0) to three (3) clockwise, with zero indicating the upper right corner. This field is used with an underfill application.

E-Stops — See **Emergency Stop Palm Switches.**

F

Fiducials

Also refereed to as "reference" points are used by the XyflexPro system to offset and accommodate skewed boards or components. There are four types:

Taught fiducials – are user defined. Actual board details are captured and used to off set patterns in production.

Synthetic fiducials – are industry standard board markings which are supplied with the XyflexPro Benchmark software. Although the form and shape of fiducials are pre-defined, they must be set up before the can be used.

Chip fiducials – are defined fiducials used in the underfill process to locate precisely the edges and orientation of the chip.

One Snap fiducials - are defined fiducials normally used on small components. This allows the vision system to take one snap shot to capture two reference points, which in turn increases throughput by minimizing head movement.

Filled Rectangle Template

Stores specific X and Y coordinates, used with:

Dam and Fill applications – In Dam and Fill applications a dam is dispensed around the area to be encapsulated prior to dispensing the fill. The purpose of the dam is to contain the fill material to a specific area.

Globtop Applications – In globtop applications a fill is dispensed directly into the desired location.

See **Underfill.**

See **Unfilled Rectangle.**

First Pass Num

Indicates which Pass group will be executed first. A Do Pass command triggers a specific Pass group or groups. This field is used with an underfill application.

Fixture Offset

Distance (offset) between camera and the fixture (process board).

G

Gantry

Rail and beam movable support system traveling in the X and Y axis. This system supports the XyflexPro dispense unit Z axis components. These are referred to as the **X** and **Y** gantry axii.

H

Hard stops

Switching device to stop magazine travel.

Head

Part of the XyflexPro machine that holds the dispense unit and travels in the up and down "Z" axis.

Heated Chucks

Heated chucks are an option used to heat the substrate to a set temperature.

Heated Line Dispense Unit

Liquid and semi-liquid precision dispensing device. This is designed for encapsulation and underfill dispensing operations with the capability of pre-heating the dispense material prior to dispensing.

I

Initialization Process — System program designed to prime the machine at startup before running.

L

Last Pass Num — Indicates which **Pass** group will be executed last. A **Do Pass** command triggers a specific Pass group or groups. This field is used with an underfill application.

Leadscrew — Referred to as an **auger**. - Located inside the dispensing cartridge and is one of the methods utilized in dispensing material onto substrate. Leadscrews contain loosely pitched screw like threads to move the dispensing material along. The greater the pitch, the larger the dispensed volume. Conversely the smaller the pitch, the less material is dispensed. The leadscrew pitch is determined by the material being dispensed. Coarser and stickier material needs a looser pitch. Leadscrew rotation speed, time, air pressure and needle gauge also factor into how much material is dispensed – controlled via the software User Interface.

Length Offset — Establishes how a line of material will be dispensed relative to the length of the part. A value of zero (0) would indicate a line equal to the length of the part (corner to corner). A positive number would indicate a line beyond the length of the part (offset from the corners). A negative number would indicate a line short of the length of the part (offset from the corners). This field is used with an underfill application.

Lift Height — Sets the height the head moves between dispense commands.

Line Delay — Determines the amount of auger rotation that the system delays the XY motion prior to the start of dispensing a Line command. During the delay, air pressure is applied to the head and the dispensing unit motor turns. Line Delay allows time for higher viscosity materials to start coming out of the needle.

Line Off Advance — Determines the amount of travel distance to turn off material to the dispensing unit prior to the end of a Line command. Line Off Advance allows low viscosity materials time to stop flowing from the needles.

Line Dispense Unit — A liquid and semi-liquid precision dispensing device designed for encapsulation and underfill dispensing operations. (See **Encapsulation**, see **Underfill**).

Line Template — See **XyflexPro Templates**.

Line Width — Specifies the volume of material dispensed in a line.

Link Line Last — Establishes when the cartridge in the dispense unit will lift after connecting multiple Linkline commands together.

Lockout/Tagout — A switch provided to safely disable all power and air from the machine for maintenance purposes. Unlike the emergency palm switch, the Lockout/Tagout switch will also instantly remove power from the UPS (see **UPS**).

Luer Lock — Locking fittings with corresponding male/female ends that join a feed tube to a syringe or cartridge.

Luer Lock Fitting — A joining fitting that accepts Luer Locks (see **Luer Lock**).

M

Move Template — See **XyflexPro Templates**.

MSDS — Material Safety Data Sheets are provided by manufacturers and distributors of hazardous substances.

N

Name — Displays the file name that is associated with a Locate or Template command.

Needle Gap — Needle gap is the specifically measured space between the very tip of the needle and the surface of the substrate. Deviation from a specified dimension will cause dispensed lines or dots undesirable shapes and coverage.

Needle Gauge — Needle bore dimension (ID, inside dimension). Appropriate needle gauge is determined by the relation to material to be dispensed.

Needle-to-Camera Offset — The distance which is taught or programmed to compensation for the distance from needle to camera.

O

Offsets — Offsets are measured distances (via software) that compensate for the displaced distances between one device, usually a sensor or dispense unit, and another. These define and establish that the coordinate of one is recognized by the other.

Examples are; needle to camera distance (offset), camera to sensor offset.

Optimize — Used to rearrange sequence of dispense pattern commands to ensure most efficient path for X- and Y-axes to travel.

OS — Operating System – system software upon which specific computer applications can be run.

P

Park Position — The park position is the "X" and "Y" coordinates for the dispense head to move to while the next board is being loaded.

Pass Num — The specific number assigned to a **Pass** group of commands. This field is used with an underfill application.

Pattern Files — Dispensing pattern files that are application specific. These files are either created on the local XyflexPro computer or introduced as imported CAD based data.

Pixels — The smallest image-forming unit of a video display.

Pneumatic Dump Valve — The Pneumatic Dump Valve works in conjunction with the three emergency stop palm switches. Whenever a emergency stop switch is pressed, the dump valve opens, discharging all air pressure safely from within the machine.

Position Offset — Establishes how far away a line of material will be dispensed relative to the edge of a part.

Pre-Dispense Dot Template — See **XyflexPro Templates**.

Pre-Dispense LineTemplate — See **XyflexPro Templates**.

Pre-Dispense Station — Pre-dispensing is a submenu that is programmed that serves as a dispensing primer to assure consistent dots or lines on the substrates. This ensures that there is no residual material on the needle prior to dispensing on the actual product. The submenu is repeated after specified number of substrate cycles.

Process Programs — These are files containing the values and parameters created for a particular process run.

Purge — The method of normally expelling material from the dispense unit when a new syringe is installed (to remove air) or to expel aged material.

R

Reference Designator — Identifies a specific component on the process board. Some examples of this are C101, R203, and U7. These are normally printed on the board, provided there is space. The reference designator enables the user to search for a specific component.

RPM — Determines the rotation speed (in revolutions per minute) of a dispense unit while dispensing.

S

Shape Code — Defines a generic component type. Each component has a shape code based on its physical configuration and dimensions. One example of this is for 1206 resistor. There is one part number for each resistor value.

SMEMA — A handshaking signal standard established by the Surface Mount Equipment Manufacturer's Association for the communication between feed and receive devices in the semiconductor/PCB industry.

Start Corner — Determines where dispensing will start in an underfill application. Values range from zero (0) to three (3) clockwise, with zero indicating the upper right corner. This field is used with an underfill application.

SPC Data — The XyflexPro system is equipped to record SPC (Statistical Process Control) data of certain events selected from the SPC Data tab menu on the Configuration screen. Each event that is selected from the menu is logged onto a text file (**.txt**) and may be analyzed offline as an Excel® file.

Syringe — A small container, much like a hypodermic syringe, filled with liquid or semi-liquid dispense material.

Syringe Adapter — Adapter that connects the dispense unit's air supply (from the top of the DU) to the top of the syringe. See **Syringe**.

Syringe Low Level Limit Switch — The Syringe low level limit switch is used to set material limits in a syringe. This alerts the operator when material limits are getting low in the syringe by an alarm condition on the monitor.

T

Target Weight — This is the ideal weight to achieve and maintain for a particular process pattern. This is set when using the optional weight scale.

Templates — Templates allow the convenience of storing and recalling dispense parameters used for dispense routines.

Theta — Performs a rotation of a block of commands contained within a NewCoord command.

Timer Timeout — The amount of time assigned to a XyflexPro timer command. A **Timer** command assures that a specified amount of time has passed between the execution of one command and the execution of the next. This field is used with an underfill application.

Tolerance — The amount of deviation allowed from the Target Weight and still be able to Converge. This is set when using the optional weight scale.

Touch Probe — The Touch Probe sensor allows the dispense head to maintain an appropriate and consistent dispense height when varying heights on the substrate are encountered.

Trackball — A graphic user interface pointing and selection device. Similar to a PC mouse but remains stationary while a ball above the device is rotated for cursor/pointer navigation. Selections are made with attached selection buttons.

Transition Down — Sets the distance for which head will run at slow speed when lowering to a dispense operation. Used to eliminate overshoot in the Z-axis.

Transition Up Height — Sets the distance for which head will run at slow speed when raising from a dispense operation. Used to eliminate tailing tendency of some dispense materials.

U

Underfill — Underfilling is the process of dispensing material under a component such that it wicks under that component from one end to the other. This is done in critically timed application pattern segments to allow this wicking process to take place without the formation of air pockets. The dispense needle is placed very close to the surface of the component.

Unfilled Rectangle Template — Useful particularly for dam and fill applications. A dam of material is dispensed surrounding the part to be encapsulated. The purpose of the dam is to contain the fill material to the specific area to be filled.

Usually the dam material is of higher viscosity than the fill material so that when it is dispensed it will stand up high enough to contain the fill material which is generally heated and has a lower viscosity.

UI User Interface – software controls.

UPS Uninterrupted Power Supply. A backup power source for the internal computer. If the main power fails, it allows time to perform a controlled computer shutdown.

V

Vision Window Window in Benchmark software that allows camera viewing.

W

Weight Scale This optional measurement system is used to ensure exactness and consistency in the amount of material deposited. The system software performs the adjustments as required to meet a Target Weight.

Weight Template The template used with the weight scale to set the Target Weight and Tolerance. This template is placed in the program by inserting a command line in the Pattern Grid.

Windows NT® Operating system for networks and network security.

Windows NT® Server Operating system generally used by network shared services.

Windows NT® Workstation Operating system generally used as a stand alone computer not connected to a network.

X

X Axis Side to side (left to right) travel.

X Position Specifies the X-axis dispense position.

X' Position Specifies the X end position for a Line or Linkline command.

XyflexPro Templates XyflexPro templates allow the convenience of storing and recalling often used dispense routines.

Dot - Contain settings for all the basic dispensing parameters that are related to the SMT process.

Line - Contain settings for all the basic dispensing parameters that are related to Underfill or Encapsulation process.

Move - Contain settings related to moving the dispense unit.

Unfilled Rectangle - Store specific X and Y coordinates.

Filled Rectangle - Store specific X and Y coordinates.

Predispense Dot - Store information related to the execution of pre-dispense.

Predispense Line - Store information related to the execution of pre-dispense.

Array - Template are used to create a pattern of multiple equally spaced dots within a defined space (matrix).

Weight - The template used with the weight scale to set the Target Weight and Tolerance. This template is placed in the program by inserting a command line in the Pattern Grid.

Y

Y Axis Forward and backward (front to back) travel.

Y Position Specifies the Y-axis dispense position.

Y′ Position Specifies the Y end position for a Line or Linkline command.

Z

Z Axis Up and down travel.

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