



HELM-PAK AUTOMATION CONTROLLER



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INTRODUCTION

The Helm-Pak automation controller is based on the Allen-Bradley MicroLogix platform. The system is configured with Bulletin 1769 rack, power supply, processor and standard I/O modules. The specialty module(s) are manufactured by Helm and provide precise position feedback from the resolver and/or strain gage sensors.

The operator interface (MMI) is a Pentium™ processor based industrial computer. The computer features a 10GB hard drive, with a special mounting feature to absorb vibration. The active matrix touch screen features an overlay that is replaceable if scratched or marred. The computer is configured with serial ports, commonly used for interfacing with feeders or other devices capable of communication via serial ports. A parallel port is available for attaching a printer or other parallel device. An Ethernet port is standard to provide plant networking for data acquisition and supervisory control.

The system runs under the Microsoft™ Windows 98 platform. The application software is a custom Helm product tailored for your specific application. On boot-up, the system automatically runs the application to avoid access to the Windows operating system. The method to enable access to the operating system is available from your Helm project manager.

Additional functionality can be achieved with your Helm-Pak Automation Controller. The open architecture approach with the Allen-Bradley platform allows for expansion as your automation needs increase.

Many Helm-Pak users adapt a modem into the system for on-line program upgrades and troubleshooting via a direct connect to our offices in Maumee, OH.

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SECTION 1

INTRODUCING PLS / DM SOFTWARE

1.1 WHAT IS PLS / DM SOFTWARE?

PLS / DM software is a group of engineered press-control products for PLC processors. This software controls the operation-of:

- ◆ Programmable Limit Switch (PLS) for crankshaft synchronization
- ◆ Die Monitoring (DM) to protect your press dies and machinery

The PLS / DM Software Contains:

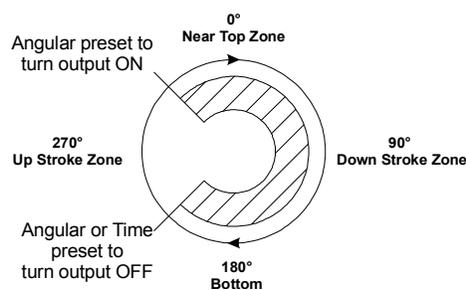
- ◆ Counters for monitoring system or job duration
- ◆ Spare setpoints for controlling custom functions
- ◆ part-file management to store and retrieve job setups
- ◆ interface to Machine Stop Circuits

1.2 WHAT IS A PROGRAMMABLE LIMIT SWITCH (PLS)?

The Programmable Limit Switch is ladder logic for a PLC -based control system that times or sequences outputs according to precise and repeatable positions of a crankshaft. Crankshaft positions are monitored by a resolver. You can use PLS to integrate auxiliary press machinery such as lifters, grippers, blow-off valves, and inter-press automation into your stamping press control system.

1.3 HOW A PLS CHANNEL WORKS

You preset the rotational position (preset angle) at which you want the PLS output to turn ON. You select how you want the PLS output to turn OFF: by preset angle or preset time.



Then, you can program your application-specific output response, such as using the PLS output bit as a trigger to:

- ◆ initiate part movement between presses in a transfer line
- ◆ look for correct part movement with a die monitor track function
- ◆ initiate die automation devices such as grippers and lifters

1.4 WHAT IS DIE / AUTOMATION (DM) MONITORING?

Die/Automation Monitor software is designed to monitor sensors that report correct part movement relative to the crankshaft angle of a stamping press, and to detect a variety of deviant conditions. You can use this product to detect the absence, mis-alignment, or the unwanted presence of parts moving through an automated stamping process. When the software detects a fault, it responds according to what you selected as the fault response:

- ◆ warning (programmable response)
- ◆ top stop (initiates relay output to machine)
- ◆ e-stop (initiates relay output to machine clutch stop)

1.5 BENEFITS OF THE DIE/AUTOMATION MONITOR

- ◆ Helps protect expensive tooling with high-speed sensor monitoring. For example, if the software and sensors detect a misaligned part, a programmed response stops the machine.
- ◆ When retooling, an operator can call up a preconfigured job setup from a control panel and save setup time.
- ◆ You can reconfigure the system with a variety of input sensors and programmed output responses to suit a variety of control requirements.

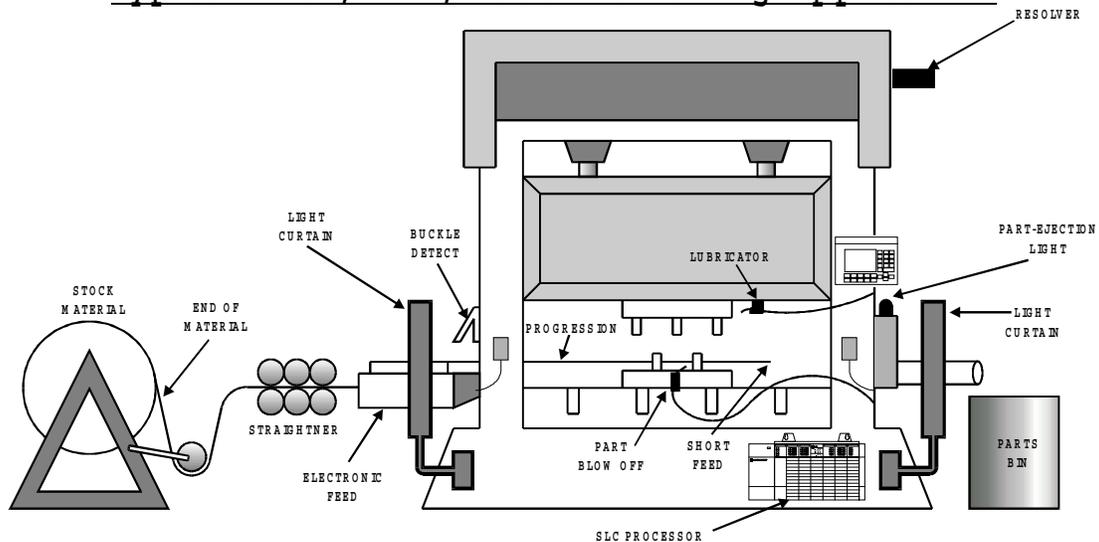
1.6 FEATURES OF THE DIE/AUTOMATION MONITOR

- ◆ User-friendly operation with HMI (Human/Machine Interface) terminal
- ◆ Keyboard configuration of up to 16 inputs of each type
- ◆ Part file management to store job setups
- ◆ Monitor the crankshaft angle when an input turns On or Off
- ◆ Monitor sensor On/Off, synchronized with the crankshaft
- ◆ Uses standard PLC programmable controller technology

Cyclic Mode Transition Diagram	Expected Transition Occurs Within Window	Input is NOT ALLOWED When Sensor:	Which Results in a Fault SIGNAL Sent After:
	Sensor turns ON then OFF within window a-b (Pulse-type signal)	1. stays ON beyond the window	window goes OFF
		2. turns ON outside the window	sensor turns ON
		3. remains OFF for the cycle	next window goes ON

1.7 YOU CAN APPLY DM SENSORS TO A STAMPING PROCESS IN A VARIETY OF WAYS.

Typical PLS / DM / Load Monitoring Application



For example:

Sensors to detect movement of a part

- ◆ part in position
- ◆ part ejected
- ◆ feed
- ◆ coil
- ◆ misfeed

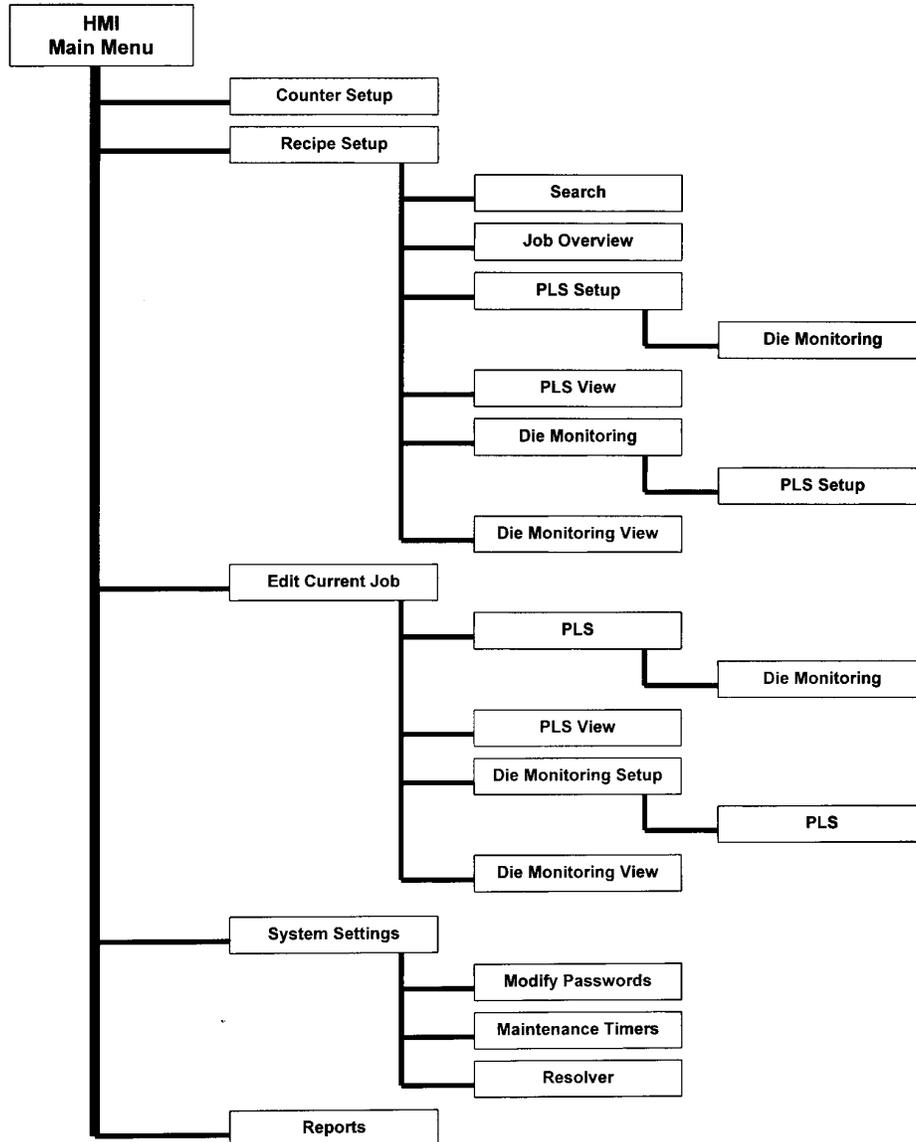
Sensors to detect static conditions

- ◆ lube
- ◆ end of feed
- ◆ die clamps
- ◆ air pressure

SECTION 2

SYSTEM OVERVIEW

The Helm Autograph Operator Interface is designed to provide easy operator interface to the control functions of the Helm-Pak Automation Controller. The touch screen enables the operator to move among the various displays and set up screens with simple touch buttons or touch areas on the screens.



SECTION 3

OPERATOR INTERFACE

In this manual, reference is made to a numeric touchpad to enter numeric data into fields.

To use the touchpad:

- ◆ Enter the password or value as required. In many cases the required value range will show on the touchpad. Example: Enter Value (0 to 999999) as shown below.
- ◆ Press Escape to Exit touchpad without saving
- ◆ Press Enter to Save and Exit touchpad
- ◆ Press Back to Backspace one character at a time.



In this manual, reference is made to an alphanumeric keypad to enter alphanumeric data into fields.

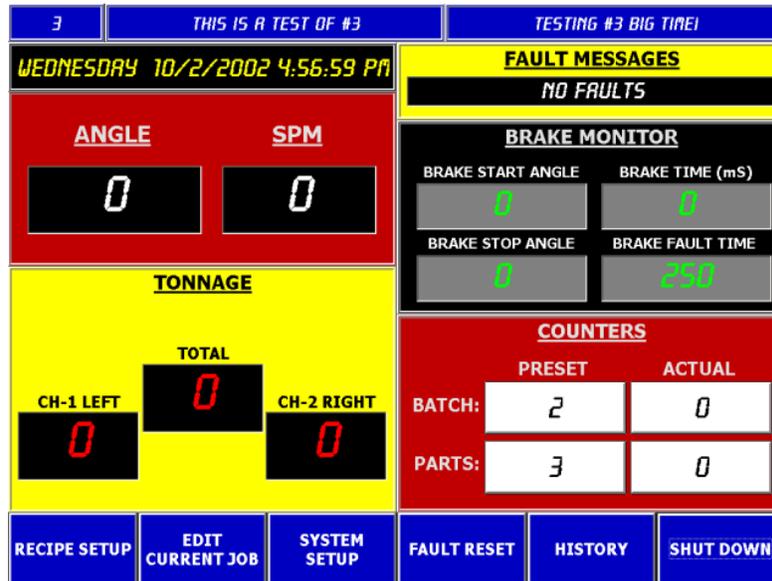
To use the keypad:

- ◆ Enter the name or data as required.
- ◆ Press Escape to Exit keypad without saving
- ◆ Press Enter to Save and Exit keypad
- ◆ Press BK to Backspace one character at a time.
- ◆ Press CAPS to toggle capital letters On/Off.



SECTION 4

MAIN MENU



4.1 MAIN SCREEN TOUCH AREAS

- ◆ Counters
- ◆ Recipe Setup PLS / DM / Counters
- ◆ Edit Current Job Online PLS / DM / Counters
- ◆ Reset Fault
- ◆ Reports
- ◆ Shut Down

4.2 MAIN SCREEN

The MAIN SCREEN provides the displays critical information about the current run, including the FAULT AND PROMPT description when a machine stop occurs.

4.2.1 CURRENT JOB

The CURRENT JOB is shown on the blue bar at the top of the MAIN SCREEN. The Job number and Job description are entered in the SETUP PLS/DIE MONITORING screen as part of the job recipe.

4.2.2 CURRENT JOB, ANGLE, SPM

- ◆ Current Job – Values currently loaded in PLC
- ◆ CURRENT ANGLE (stroke position in degrees)
- ◆ SPEED (strokes per minute)
- ◆ Brake Stop Time

(Note: there is no user input for these items on this screen)

4.2.3 TOUCH AREAS

The MAIN SCREEN has touch areas for launching actions such as COUNTER SETUP, RECIPE SETUP, EDIT CURRENT JOB, SYSTEM SETUP, FAULT RESET, REPORTS and SHUTDOWN.

4.2.4 SETUP PLS / DM, ONLINE PLS / DM AND SYSTEM SETUP BUTTONS

The Touch "buttons" at the bottom of the screen are used to go to the RECIPE SETUP, EDIT CURRENT and SYSTEM SETUP screen.

RECIPE SETUP FOR PLS / DM

The setup differs from the online button in that the setup stores the recipe parameters to a file on the disk for later recall and/or download.

EDIT CURRENT PLS / DM

This button is used to change the parameters currently running in the PLC.

SYSTEM SETUP

In the SYSTEM SETUP, you may MODIFY PASSWORDS, SETUP and RESET MAINTENANCE TIMERS and ZERO RESOLVER. Password is required to enter SYSTEM SETUP screen.

4.2.5 COUNTER DISPLAY

The COUNTER block is a touch area to allow user to enter or reset the PARTS and BATCH counters. When touched, a keypad is displayed for operator entries.

4.2.6 BRAKE MONITORING DISPLAY

BRAKE MONITORING information is displayed on the MAIN SCREEN. The Brake Fault Time is initially set in the SYSTEM SETUP screen.

4.2.7 FAULTS DISPLAY

FAULTS are indicated in the "Fault Message" area.

4.2.8 RESET BUTTON

When the cause of the fault has been corrected, press the RESET to clear the fault that is indicated.

4.2.10 SHUTDOWN PROCEDURE

To prevent an inadvertent shutdown, touch SHUTDOWN button 3 times to confirm.



The Shutdown button allows the user to shut down the computer. Press this button and wait until the systems tells you that It Is Now Safe To Turn Off Your Computer.

SECTION 5

REPORTS

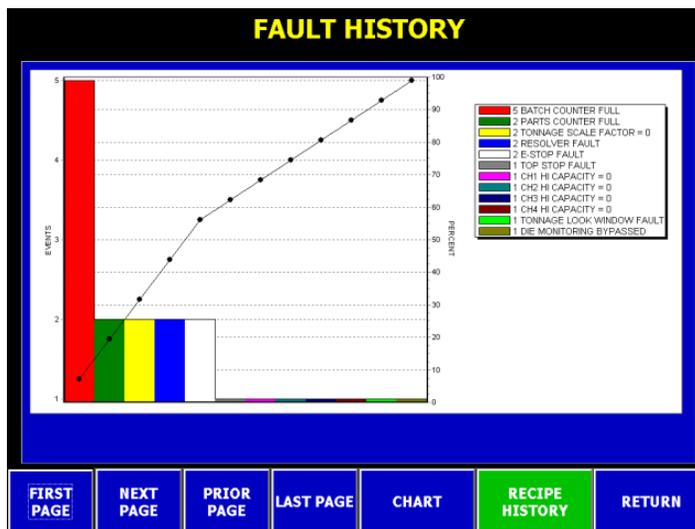
5.1 **REPORTS BUTTON** provides entry into the Fault History Screen. All downtime on the system is recorded into an Access database. Using the Microsoft Access database engine allows the user flexibility on the style and content of the reporting form.

FAULT HISTORY

RECORD DATE	FAULT DESCRIPTION	JOB#	PART#	DIE
7/25/2002 3:38:12 PM	278 PARTS COUNTER FULL			
9/11/2002 10:32:40 AM	285 TONNAGE SCALE FACTOR = 0	3	TESTING #3	TEST #3
9/11/2002 10:32:42 AM	286 RESOLVER FAULT	3	TESTING #3	TEST #3
9/11/2002 10:32:44 AM	280 E-STOP FAULT	3	TESTING #3	TEST #3
9/11/2002 10:55:25 AM	280 E-STOP FAULT	3	TESTING #3	TEST #3
9/11/2002 10:55:48 AM	281 TOP STOP FAULT	3	TESTING #3	TEST #3
9/11/2002 10:55:50 AM	285 TONNAGE SCALE FACTOR = 0	3	TESTING #3	TEST #3
9/11/2002 10:55:52 AM	287 CH1 HI CAPACITY = 0	3	TESTING #3	TEST #3
9/11/2002 10:55:54 AM	288 CH2 HI CAPACITY = 0	3	TESTING #3	TEST #3
9/11/2002 10:55:56 AM	289 CH3 HI CAPACITY = 0	3	TESTING #3	TEST #3
9/11/2002 10:55:58 AM	290 CH4 HI CAPACITY = 0	3	TESTING #3	TEST #3
9/11/2002 10:56:18 AM	292 TONNAGE LOOK WINDOW FAULT	3	TESTING #3	TEST #3
9/18/2002 2:57:58 PM	293 DIE MONITORING BYPASSED	1	TESTING #1	TEST #1
9/18/2002 2:58:04 PM	293 DIE MONITORING BYPASSED	1	TESTING #1	TEST #1
9/18/2002 3:01:46 PM	293 DIE MONITORING BYPASSED	1	TESTING #1	TEST #1
9/18/2002 3:09:02 PM	293 DIE MONITORING BYPASSED	1	TESTING #1	TEST #1
9/18/2002 3:10:39 PM	293 DIE MONITORING BYPASSED	1	TESTING #1	TEST #1
9/30/2002 2:31:49 PM	278 PARTS COUNTER FULL	3	THIS IS A TEST OF	TESTING #3 BIG T
9/30/2002 2:31:51 PM	281 TOP STOP FAULT	3	THIS IS A TEST OF	TESTING #3 BIG T

FIRST PAGE NEXT PAGE PRIOR PAGE LAST PAGE CHART RECIPE HISTORY RETURN

Toggle EVENT and CHART to produce these reports



SECTION 6 SYSTEM SETUP

	WEBVIEW	TIMERS	TONNAGE CALIBRATION	USER OPTIONS	
EXTERNAL	DOWNTIME	RESOLVER	PASSWORDS	TAGS	MAIN MENU

6.1 SETUP BUTTONS

System screens are password protected. A numeric keypad will pop up before this screen is displayed. You must enter the four digit master password to gain access to this screen.

Webview

Provides an entry field for user to type in networking path.
Example://server_1/webpath/HelmPak

Timers:

Enter presets for Brake, clutch and motor idle timers.

Tonnage Calibration:

Enter press calibration factors and set scale.

User Options:

Enables user to customize editing access.

External:

Provides user the capability of launching an application from the HelmPak system.

Downtime:

Enables edit of Downtime Reason Codes

Resolver:

Includes Brake Fault Stop Time Test

Used to zero resolver
Brake Fault Time is set in Milliseconds – should not be set higher than OSHA specs based on guarding distance.

Includes Speed Compensation Setup

Used to calculate offset for higher speed operations

Passwords:

Setup and Maintain System and Edit Passwords

Tags:

Used by Helm personnel

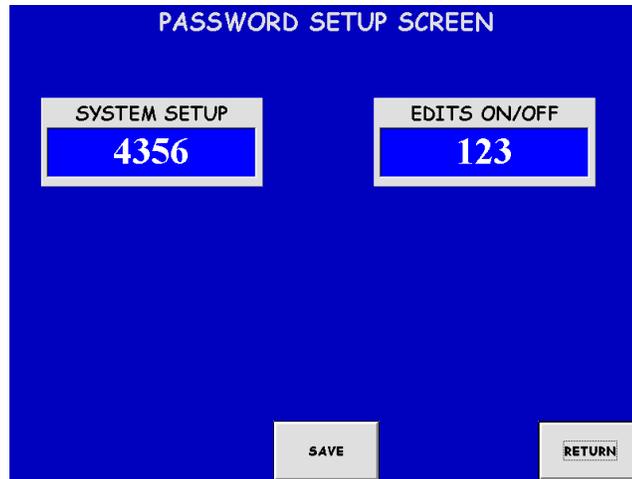
Main Menu:

Return to the Main Menu.

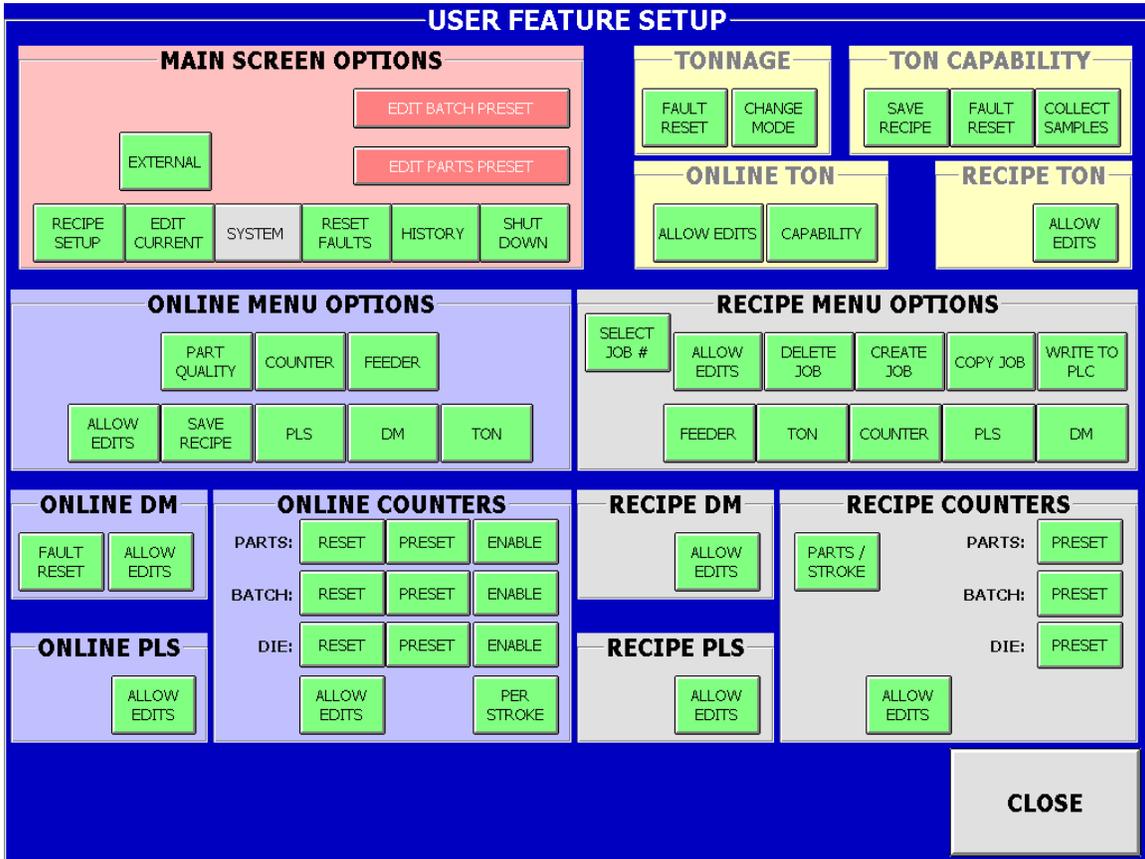
6.2 MODIFY PASSWORDS

Use The SETUP PASSWORD as a supervisory password. This password is required to access the SYSTEM SETTINGS screens.

Use the EDITS PASSWORD for setup personnel or operators to allow access to recipe and on-line parameter editing.



6.3 USER SETUP OPTIONS



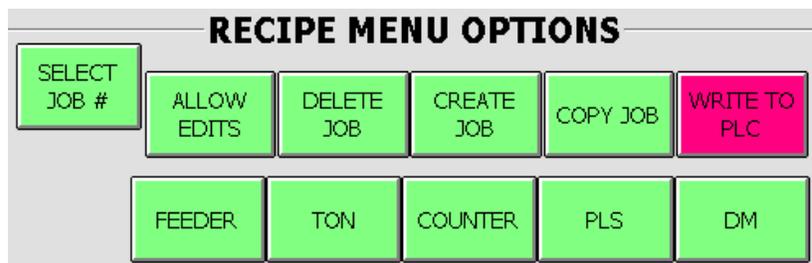
Use this screen to setup user accessibility and customize the Helm-Pak operation. Each button is a toggle to ENABLE (GREEN) or DISABLE (RED) key functions.

The USER SETUP screen is only accessible with a SUPERVISOR password.

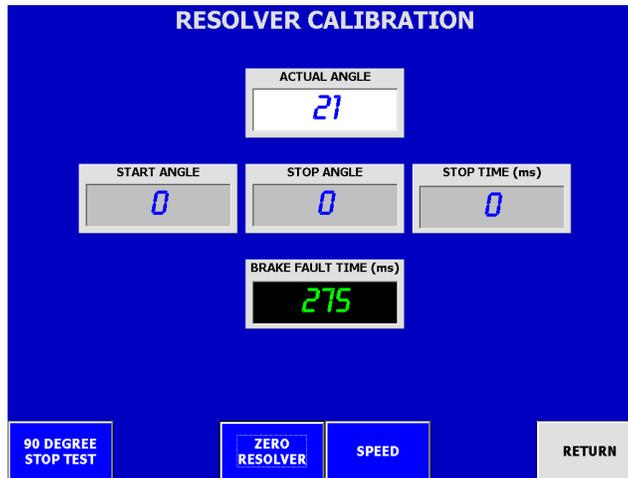
Use this feature to disable operator access to certain functions and screens.

For example, The Main Screen allows access to Counters for performing a Batch or Part RESET. You can disable access to this area by DISABLING EDIT BATCH and EDIT PARTS RESET in the Main Screen Options.

Another example using the Recipe Menu Option section allows supervisor to DISABLE WRITE TO PLC during a recipe setup.



6.4 RESOLVER CALIBRATE SCREEN



RESOLVER CALIBRATE AND BRAKE FAULT TIME SCREEN USAGE

Zero Resolver

Press this button to zero the resolver position.

Brake Fault Time:

In Milliseconds – should not be set higher than OSHA specs based on guarding distance. Touch entry display field under Preset and enter value using keypad pop-up

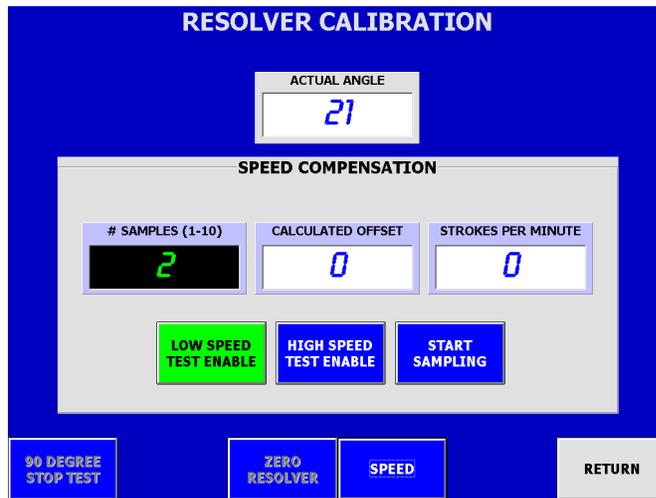
Brake Stop Time Test:

With press idle, press 90 stop time test button, Run press. Valves will disengage at 90 degrees and press will stop. If stopping time exceeds preset a fault condition will occur. Press fault reset to clear fault.

NOTE: When doing a brake test if the stopping time exceeds value, the processor declares a brake-test fault.

Replace or repair the brake.
Before you can re-start the press, you must press the Fault Reset button.

6.4.1 SPEED COMPENSATION USAGE SCREEN



Enter System Setup, then Resolver. Bring press to topmost position and zero resolver by pressing ZERO RESOLVER button on resolver screen.

The speed compensation routine requires an input assigned to Die Monitoring Channel 1. The input sensor can be a proximity probe mounted on the crankshaft, or a cam wired to channel 1.

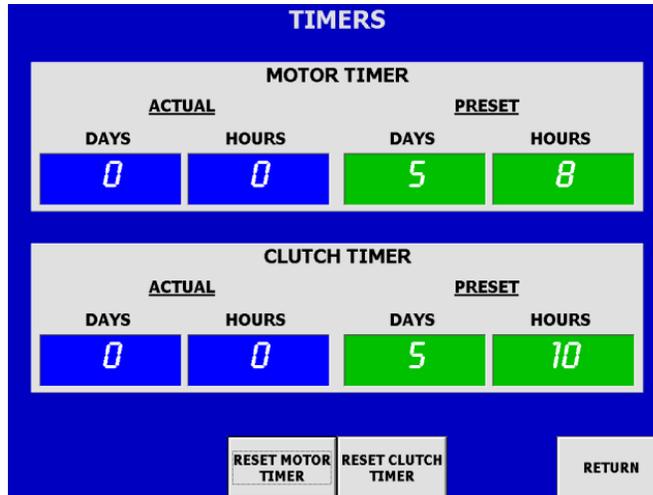
Begin the speed compensation calculation by entering the number of Samples (crank angle rotations), recommendation is a value 10.

1. Set press to run at a minimum speed, e.g. 100SPM
2. Run press in Continuous.
3. Press START SAMPLING.
4. Run press at maximum speed
5. Press START SAMPLING.

The calculated offset (in degrees) will be displayed.

Use the Die Monitoring ONLINE screens to view offsets while running.

6.5 PRESS TIMERS



This screen requires a password to enable access.

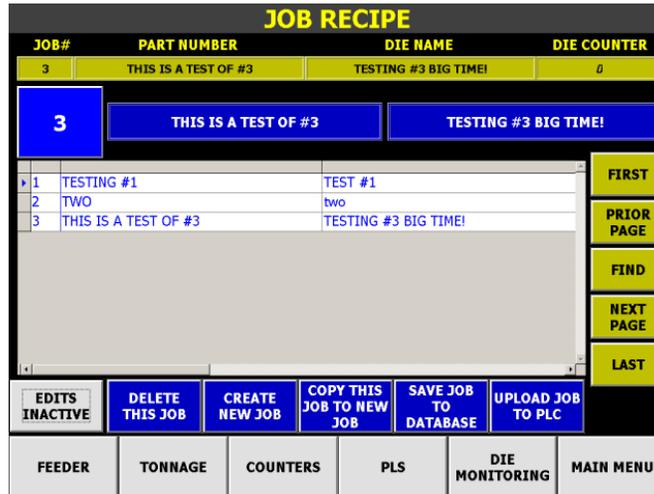
Allows user to set maintenance timers for the motor and clutch. The actual time shown on the screen reflects time since the timers were last reset.

To change a value touch the preset display that you want to change and a touchpad will pop-up to allow you to enter the preset values.

The user can select which type of output is required when the actual time reaches the preset time.

SECTION 7

RECIPE SETUP
Job Information



7.1 Recipe Editing

The number of jobs currently stored in the recipe is indicated on the # of JOBS display on the right side of the screen.

The JOB# button on the left side is used to select which JOB# to setup or edit or download.



Jobs are stored sequentially.

A password is required to turn EDITS ON before additions/changes can be made to the recipe.

To enter a new job, you can COPY the current job and current values into the next available number or touch NEW JOB to clear existing values and create a new job.

7.1 Recipe Editing

Touch the **Material**, **Die Number** and **Part Number** display areas for the keyboard display to enter values for these recipe fields. The Die Number and Part Number are stored in the Access database for reporting purposes. The Material Number is used for a reference value only. *A Valid name can be up to 20 characters long.*

To recall stored jobs, you can scroll through the stored jobs using the **JOB+** and **JOB-** buttons. Or use the **Search** or **Job Overview** screens to select a specific job to edit or download.

Use the **SAVE** button to store data into recipe file.

Return to this screen after making additions or edits to PLS and Die Monitoring parameters to **SAVE** and/or **DOWNLOAD** data to the PLC.

SECTION 8

**PLS
(Recipe)**

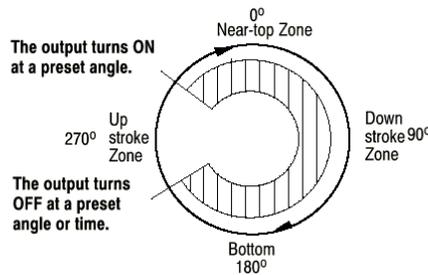
PLS RECIPE						FAULT
CH	SENSOR	MODE	ANGLE		TIME	CYCLES
			ON	OFF		
1	x1	INTERMITTENT TIMER	11	110	11	10
2	x2	TIMER	22	120	12	20
3	x3	INTERMITTENT TIMER	33	130	13	30
4	x4	TIMER	44	140	14	40
5	x5	INTERMITTENT TIMER	55	150	15	50
6	x6	TIMER	66	160	16	60
7	x7	INTERMITTENT TIMER	77	170	17	70
8	x8	TIMER	88	180	18	80

EDITS INACTIVE	SAVE CHANGES	DIE MONITORING	RETURN TO MENU
-------------------	-----------------	-------------------	-------------------

8.1 OPERATION OF THE PROGRAMMABLE LIMIT SWITCH (PLS)

The Programmable Limit Switch software is designed to turn outputs ON and OFF at precise crankshaft positions synchronized with crankshaft rotation monitored with a resolver. You can preset up to 16 ON/OFF settings at angles from 0-359°. You can also turn the output OFF with a timer. Timer settings are 010 to 10.0 seconds.

Turn ON a PLS Output with a:	Turn OFF a PLS Output with a:
crankshaft ON angle that you preset	crankshaft OFF angle that you preset, or
	PLS timer that you preset



A PLS output turns ON and OFF according to how you program it with a HMI data-entry screen.

For example:

As a result, you can use PLS outputs to effectively control auxiliary press machinery such as lifters, gripper blow-off valves, and inter-press automation by programming your application-specific output responses. Ladder logic is used to initiate some action when the PLS output turns On and/or Off.

Screen displays show how you enter the time and/or angles to control PLS operation.



Note: To make changes to this screen the **EDITS ON** display must be showing. If it is not, go to the **CREATE PLS / DM MENU** and enter the Password.

The **CREATE PLS / DM** are for recipe only. To modify the current running job parameters go to **CURRENT PLS / DM SETUP**.



When editing PLS outputs, remember these points:

Always turn On a PLS output with an angular position
Turn Off a PLS output with an angular position or a preset time



Note: To make changes to this screen the **EDITS ON** display must be showing. If it is not, go to the **RECIPE SETUP MENU** and enter the Password.

The **PLS / DM SETUP** screens are for recipe only. To modify the current running job parameters go to **CURRENT PLS / DM SETUP**

8.3 JOB SETUP FOR PLS

Touch the **PLS CH# TO EDIT** display or use the < and > buttons to change channels.

Touch the **NAME:** display area to enter a description for each channel.

Touch **OUTPUT:** to select type of output from these selections:

- **OFF**
- **ANGLE**
- **TIMER**
- **INTERMITTANT ANGLE**
- **INTERMITTANT TIMER**

For Angle Mode:

Touch **ANGLE ON** to enter the start angle (0-359)

Touch **ANGLE OFF** to enter the stop angle (0-359)

For Timer Mode:

Touch **ANGLE ON** to enter the start angle (0-359)

Touch **TIME** to enter value in seconds (0 to 10.0)

For Intermittent ANGLE:

Touch **ANGLE ON** to enter the start angle (0-359)

Touch **ANGLE OFF** to enter the stop angle (0-359)

Touch **INTERMITTENT CYCLES** to enter how often in # of cycles to turn the PLS on.

For Intermittent TIMER:

Touch **ANGLE ON** to enter the start angle (0-359)

Touch **TIME** to enter value in seconds (0 to 10.0)

Touch **INTERMITTENT CYCLES** to enter how often in # of cycles to turn the PLS on.

The four buttons at the bottom of the page will:

- ◆ Go to the **DIE MONITORING** setup screen
- ◆ **SAVE** current screen values to recipe file.
- ◆ Return to **RECIPE SETUP** screen

Press **SAVE** to save your edits to recipe file before leaving this screen.

You must **RETURN** to the RECIPE SETUP screen to **DOWNLOAD** new job values to the PLC.

SECTION 9

9.1 Die Monitoring Recipe Edit

DIE MONITORING RECIPE							FAULT
1	TESTING #1			TEST #1			
CH	SENSOR NAME	MODE	STATE	ANGLE		OUTPUT	CYL
				ON	OFF		
1	ONE	STATIC	NORMALLY CLOSED	50	250	E-STOP	1
2	TWO	BYPASS	NORMALLY CLOSED	2	12	T-STOP	2
3	THREE	BYPASS	NORMALLY CLOSED	3	13	E-STOP	3
4	FOUR	BYPASS	NORMALLY CLOSED	4	14	T-STOP	4
5	FIVE	BYPASS	NORMALLY CLOSED	5	15	E-STOP	5
6	SIX	BYPASS	NORMALLY CLOSED	6	16	T-STOP	6
7	SEVEN	BYPASS	NORMALLY CLOSED	7	17	E-STOP	7
8	EIGHT	BYPASS	NORMALLY CLOSED	8	18	T-STOP	8

NEXT PAGE **EDITS INACTIVE** SAVE CHANGES PLS RETURN TO MENU



Note: To make changes to this screen the **EDITS ON** display must be showing. If it is not, by touching the password display, enter the Password.

The Recipe Setup Screen is for recipe only. To modify the current running job parameters go to **EDIT CURRENT JOB** screen.

Touch the **Sensor Name** display area to use the keyboard for entering values.
Valid name up to 20 characters long.

Touch the **DM CH# TO EDIT** display or use the < and > buttons to change channels.

The four buttons at the bottom of the page will:

- ◆ Go to the **PLS JOB SETUP** screen
- ◆ **SAVE** current screen values to recipe file.
- ◆ Return to **RECIPE SETUP** screen

Press **SAVE** to save your edits to recipe file before leaving this screen.

You must **RETURN** to the RECIPE SETUP screen to **DOWNLOAD** new job values to the PLC.

9.1.1 OPERATION OF DM INPUT MODES

The purpose of DM channels is to verify that predictable conditions in your press operation take place. When the software detects a fault condition, it sets a selectable output condition. You select the type of input mode for each channel from the following:

- ◆ bypassed
- ◆ cyclic
- ◆ intermittent cyclic
- ◆ in-position
- ◆ transfer
- ◆ static
- ◆ analog

Use the following table to help you select the types of channel input modes required for your application.

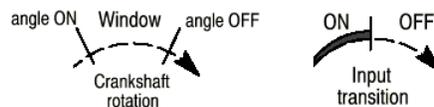
When Input Signals Are:	We Call This Input Mode:	Used, For Example To:
Synchronized with crankshaft rotation, and detected within a zone or rotation (window)	Cyclic, Single-part, or In position	detect parts in position, or ejected
Within a preset timed interval started with a PLS output	Track	verify that a programmed PLS action took place
Synchronized with crankshaft rotation as parts are moved through multiple transfer locations	Transfer	verify the progression of the part from one transfer location to the next
Independent of press stroke	Static	detect the end of stock
Based on measurement with an analog sensor	Analog	measure stripper position or counter-balance pressure

9.2 A COMMENT ON CYCLIC AND IN POSITION MODES

Input signals for these modes are synchronized with the rotation of the crankshaft and must be detected within a zone of crankshaft rotation. We call this zone of crankshaft rotation a window.

For example, a part-detect signal could be expected within a window of 80-110° to indicate that a part was inside a die before it was hit by a stroke.

When the software detects input signals that are different from those described here, the software generates a fault signal. We graphically define these (window) inputs as follows:



9.2.1 CYCLIC (CYC) Use this mode to verify that a pulse from the sensor (OFF-ON-OFF) occurred within the window once each stroke. For example, use it to detect that a part moved past a monitor.

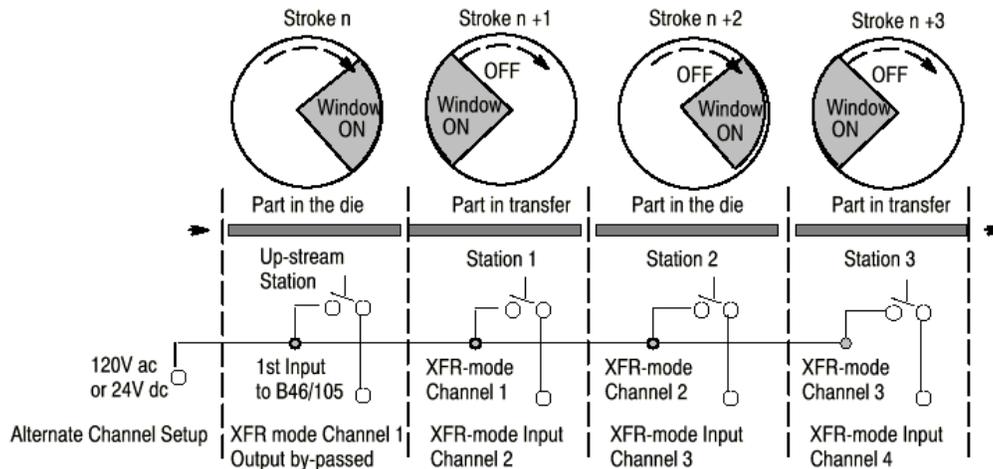
Transition Diagram	For These Expected Transitions	Input is NOT ALLOWED When Sensor:	Which Results in a Fault Signal Sent After:
	Sensor turns ON then OFF within window	1. stays ON beyond window 2. turns ON outside window 3. remains OFF for the cycle	window goes OFF sensor turns ON next window goes ON

9.2.2 IN POSITION (POS) Use this mode to verify that the sensor signal remained ON within the entire window once each stroke. The signal must cycle OFF outside the window. Use it to detect if ejector and other automation parts are retracted to home position.

Transition Diagram	For These Expected Transitions	Input is NOT ALLOWED When the Sensor Signal:	Which Results in a Fault signal Sent After:
	Sensor turns ON before, and OFF after window	1. turns OFF before window goes OFF 2. does not turn OFF outside window 3. remains OFF for the cycle	sensor turns OFF next window goes ON next window goes OFF

Program each channel to set a stop command when it detects a fault.

In the following 4-station example, the software looks for signals from part-detect switches to be in correct state when the window is ON. It monitors the up-stream switch, and then die locations in pairs.



9.2.5 STATIC MODE (STC) Use this mode to detect that an event occurred independent of the press stroke. When a static-mode input turns Off, the programmed output is turned On. For example, use it to detect end of stock.

9.2.6 ANALOG (ALG) Use this mode to verify that a signal from an analog sensor remained within minimum and maximum limits during the programmed window. The software declares a fault signal when it detects the analog signal outside either limit. For example, use it to monitor the thickness of ribbon material moving continuously.

9.3 OUTPUT RESPONSES FOR DM CHANNELS

When the software detects a channel fault, it displays the channel number and type of fault on the HMI screen. The software also sets a fault bit that you select from the following:

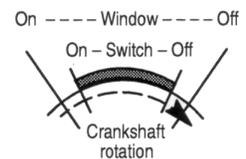
- ◆ Warning
- ◆ Top Stop - stop on top (initiates relay output to users machine top stop circuit)
- ◆ E-Stop - stop now (initiates relay output to users clutch stop circuit)
- ◆ Bypassed - used for XFR-mode channel entry station or when the channel is not used

Output Responses for DM Channels

When a stop command stops the press, you may program additional machine responses, such as controlling part movement between presses. When you select warning, you can program the activation of a sound device, visual display, or some other means of conveying a warning.

WHEN SETTING UP A DM CHANNEL, REMEMBER THESE POINTS:

- ◆ For CYC, POS, and SGP modes, the window defines the zone of rotation within which or outside of which the input must be detected. Enter ANGLE ON/OFF angles in whole numbers.
- ◆ For TRK mode, enter timer preset (seconds) in TRACK TIME field. Use track mode with PLS by giving the same channel number to both.
- ◆ For XFR mode, assign the "upstream" input to B46/105, or to a channel with bypassed output and that precedes the first transfer-mode channel.
- ◆ For ALG mode, enter ANGLE ON/OFF angles.



OUTPUT: toggle to select one of the following

- ◆ warning (you program the response)
- ◆ stop on top (initiates relay output to users machine top stop circuit)
- ◆ stop now (initiates relay output to users clutch stop circuit)
- ◆ output by-passed, used for XFR-mode channel entry station or when the channel is not used

ANGLE ON: start angle (0-359) entered from numeric keypad
 ANGLE OFF: stop angle (0-359) entered from numeric keypad
 ANALOG MIN.: value (0-10.0) entered from numeric keypad
 ANALOG MAX.: value (0-10.0) entered from numeric keypad
 TRACK TIME.: in seconds (0-10.0) entered from numeric keypad

The five buttons at the bottom will:

- ◆ go to SETUP PLS screen
- ◆ go to DM CH's 5-8 screen
- ◆ go to SETUP SPARE screen
- ◆ Save current screen values to recipe.file.
- ◆ return to Create PLS / DM screen

SECTION 10 COUNTERS

CURRENT COUNTERS SETUP				
1	TESTING #1	TEST #1		
PARTS COUNTER				
CURRENT 1192	PARTS RESET	PRESET 0	ENABLED	PER STROKE 1
BATCH COUNTER				
CURRENT 295	BATCH RESET	PRESET 0	ENABLED	
DIE MAINTENANCE COUNTER				
CURRENT 7	DIE RESET	PRESET 500	ENABLED	
EDITS ACTIVE	SAVE CHANGES TO PLC	RETURN TO MENU		

Counter Setup requires a password. The COUNTER SETUP SCREEN allows the user to enter a preset part counter value and a batch counter value. Bottoms are available to enable/disable both counters.

To enter a number, touch appropriate display and a numeric keypad will appear. The current part and batch counter quantities are shown in the "QTY" (display only) field. The "Parts Preset" can be used with a batch counter to control the number of parts a container can hold while the parts counter can be set for the total number of parts to be produced. Valid counter numbers range from 0 – 999999.



The indicated quantity count depends on when the operator last reset the counter. The count could indicate total strokes on the machine, strokes for the active job, strokes for the day or night shift, etc. Count information is *not* stored with the indicated job recipe file.

SECTION 11

EDIT CURRENT PLS / DM MENU

CURRENT JOB SETUP FAULT

JOB #
3

DIE NAME
680395 #21439

PART NUMBER
2517 9838 - END CONE C/K

EDITS ACTIVE | SAVE TO RECIPE | PLS | DIE MONITORING | COUNTERS | MAIN MENU

Enter the password to turn EDITS ON before attempting to change current values.

The Current Edit Menu allows the user to edit parameters for the job currently loaded into the processor. The job has been downloaded using the recipe setup section of the software. You can also save any edits to the stored recipe using these screens.

NOTE: Any changes made to values on the CURRENT screens are automatically downloaded to the current running job in the PLC.

Use the **SAVE** button to save edits in the stored recipe of the current job. You must use the SAVE button on each screen, including the CURRENT PLS/ DM screen to save to the recipe.

11.1 CURRENT PLS SCREEN

PLS SETUP						FAULT
1	TESTING #1	TEST #1				
CURRENT ANGLE: 27						
CH	SENSOR	MODE	ANGLE		TIME	CYCLES
			ON	OFF		
1	x1	INTERMITTENT TIMER	11	110	11	10
2	x2	TIMER	22	120	12	20
3	x3	INTERMITTENT TIMER	33	130	13	30
4	x4	TIMER	44	140	14	40
5	x5	INTERMITTENT TIMER	55	150	15	50
6	x6	TIMER	66	160	16	60
7	x7	INTERMITTENT TIMER	77	170	17	70
8	x8	TIMER	88	180	18	80

EDITS INACTIVE	SAVE CHANGES TO PLC	DIE MONITORING	RETURN TO MENU
-------------------	---------------------------	-------------------	-------------------

Use the PLS JOB SETUP screen to make changes to current settings

This screen can be used to adjust setpoints and/or temporarily turn off a PLS output.

Use the SAVE button to save changes to recipe.

12.1 CURRENT DM

DIE MONITORING SETUP														
1	TESTING #1				TEST #1									
STATUS: DIE MONITORING CHANNEL 12 TOP STOP														
CH	SENSOR	MODE	STATE	ANGLE		ACTUAL		CURRENT: 27	OUTPUT	CYL				
				ON	OFF	ON	OFF							
1	ONE	STATIC	NORMALLY CLOSED	50	250	21	297		E-STOP	1				
2	TWO	BYPASS	NORMALLY CLOSED	2	12	21	297		T-STOP	2				
3	THREE	BYPASS	NORMALLY CLOSED						E-STOP	3				
4	FOUR	BYPASS	NORMALLY CLOSED						T-STOP	4				
5	FIVE	BYPASS	NORMALLY CLOSED						E-STOP	5				
6	SIX	BYPASS	NORMALLY CLOSED						T-STOP	6				
7	SEVEN	BYPASS	NORMALLY CLOSED						E-STOP	7				
8	EIGHT	BYPASS	NORMALLY CLOSED					8	18	21	297		T-STOP	8
NEXT PAGE		FAULT RESET	EDITS INACTIVE					SAVE CHANGES TO PLC	PLS	RETURN TO MENU				

Use the Die Monitoring Edit Current screen to make changes to current settings.

This screen can be used to adjust setpoints and/or turn off a DM input..

12.1.1 Die Tryout

Use this feature to display setting vs. actual in a 0-359 degree window.

Touch on the ACTUAL ON display area for the channel you wish to view.

The GREEN band represents the On/Off window recipe setting.

The YELLOW bands represent the On/Off actual angles.

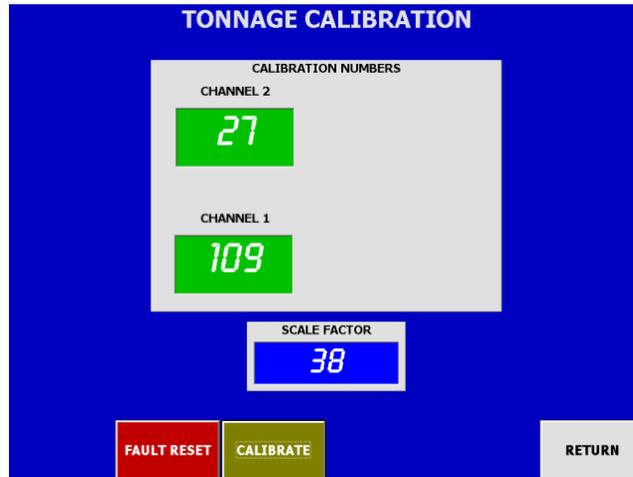
Touch the viewing window to collapse and view other channels.

12.1.2 Speed Compensation

If you system is equipped with the Speed Compensation option, use the Die Tryout feature to view setting vs. actual with speed compensation window indicated with RED bands for On/Off angles.

SECTION 13 TONNAGE MONITORING

13.1 Tonnage Calibrate



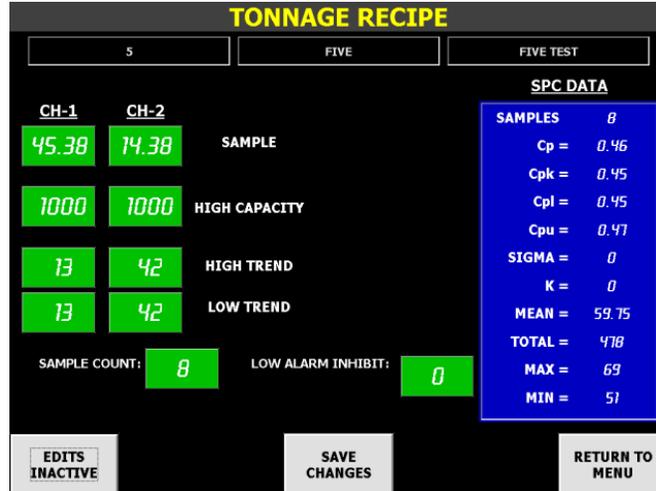
Enter the Tonnage Calibration from the System Setup Menu. System password is required.

Calibration factors are set by Helm technician upon completion of calibration. Record settings before changing. Values should not be changed unless press is re-calibrated or tonnage modules are replaced.

Press CALIBRATE button to set the tonnage module into the calibrate mode. Adjust gain balance pot on HM1520 module until calibration numbers are correct for channel 1 and channel 2. Refer to the HM1520 instruction manual for detailed information on setting the cal numbers.

Scale - Value used to describe the press/machine overall tonnage. Set for maximum value of one channel. For example, settings for a 150 ton press = 75.

13.2 TONNAGE RECIPE



Enter Tonnage Recipe Setup form the Recipe Setup Screen. Edits must be active to change recipe values.

SAMPLE

HIGH CAPACITY

Value is typically set for the capacity of the press divided by the number of channels. Capacity Alarms are enabled in Peak and Monitor Parts Mode.

For example, on a 75 Ton gap/obi with 2 channels of tonnage monitoring, set each channel to 37.5 high capacity.

HIGH and LOW TREND

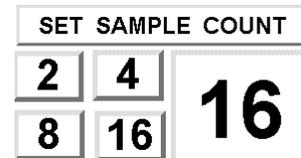
Values are set in percent from 0% to 99%. A value of 0% disables Trend Alarms. Trend alarms are enabled in Monitor Parts Mode.

The Trend alarms are used in addition to the Capacity Alarms to establish a quality window the process must run within.

For example on a gap/obi press with two channels of tonnage monitoring, each sensor indicates a job running at 50 tons per side. A High Trend setting of 10% would set the high tonnage alarm at 55 tons. A Low Trend setting of 20% would set the low tonnage alarm at 40 tons.

SET SAMPLE COUNT

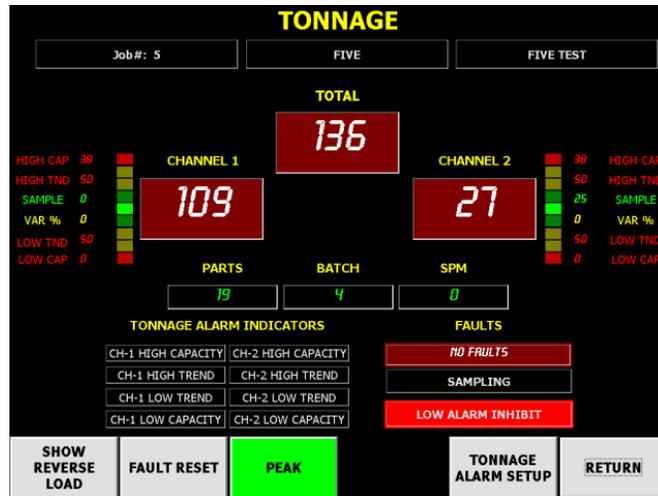
The sample count is a parameter that tells the processor how many machine strokes are required to establish sample or benchmark load values. Valid settings are 2, 4, 8, or 16.



LOW ALARM INHIBIT

In some processes it may be necessary to inhibit the Low Trend alarm during machine ramp up. Enter the number (valid number 0-32767) of strokes that you want to inhibit.

13.3 TONNAGE MAIN SCREEN



TREND DISPLAY-QUALITY WINDOW

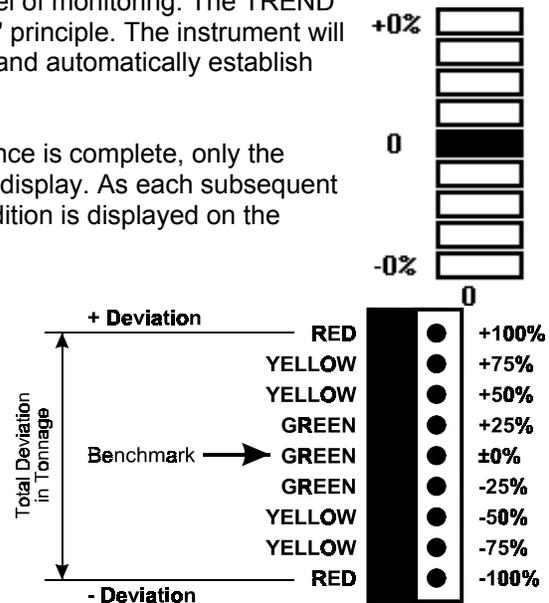
Each vertical TREND column represents one channel of monitoring. The TREND portion of tonnage screen works on the "benchmark" principle. The instrument will take a sample of the forming loads at each channel and automatically establish the high and low alarm limits.

After the load sampling and the alarm setting sequence is complete, only the center green GOOD bars will be on in each TREND display. As each subsequent part is formed, the load deviation from the ideal condition is displayed on the TREND display.

The center green GOOD bar of each column represents the average benchmark level. When only the GOOD bars are on, the last part was formed at the same load as the sampled benchmark (no deviation in load). The top red bars of each column represent the HIGH alarm trip point as set by the tolerance setting. A red bar indicates that the last part was formed at a force higher than the setting of the HIGH tolerance.

The bottom red bars of each column represent the LOW alarm trip point as set by the tolerance setting. The bottom red bars indicate that the last part was formed at a force lower than the setting of the LOW tolerance setting.

The green bars above and below the center and any yellow bars represent caution. They indicate that the last part was formed at a force level that was higher or lower than the optimum, but was still within the pre-selected tolerance bands. These bars indicate that something has changed in the forming process.



13.4 TONNAGE MAIN SCREEN



SHOW REVERSE LOAD

Press to toggle digital meter display to show the Reverse or Snap-Thru tonnage values.

FAULT RESET

Faults are present when button is RED. Press to reset tonnage faults.

PEAK/MONITOR PARTS

Press to toggle mode of operation

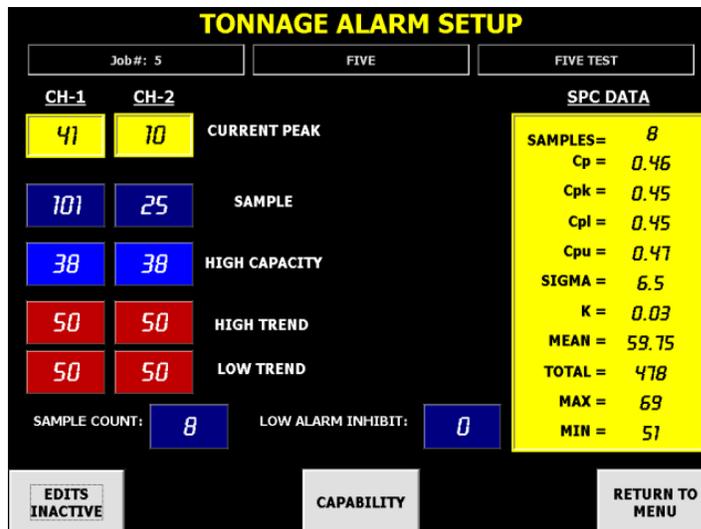
PEAK MODE

In Peak mode, the High Capacity alarms are active. There is no sample calculation and high and low Trend alarms are inactive. This mode is used primarily during machine setup operations.

MONITOR PARTS MODE

In Monitor Parts mode, the sample is calculated based on the number of sample counts and the high and low Trend alarms are activated. The High Capacity Alarms remain active.

13.5 TONNAGE ALARM SETUP



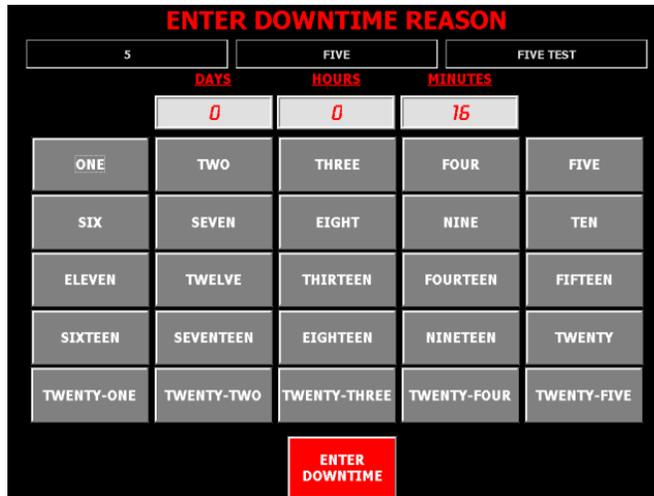
Allows on-line edit of current parameters. Edits must be active to change settings. Changes are not stored to recipe. Enter Tonnage Recipe Setup screen to change stored recipe values.

SECTION 14 DOWNTIME SETUP



Enter Downtime Setup via the System Setup Screen. System password is required to edit Downtime Reasons. Touch Downtime Reason button to enable a keyboard for data entry. Changes are automatically saved when enter key is pressed.

14.1 DOWNTIME USAGE



When system detects a press idle condition after a 5 minute lapse, the Downtime screen is activated. The screen displays current lapsed downtime in days, hours and minutes.

A downtime reason must be entered before pressing the enter key. When the enter key is pressed following a downtime selection, the Main Menu screen will be activated.

The downtime data is stored in a Microsoft Access data base located in the C:/program files/press subdirectory. Downtime can be viewed on the Helm-Pak by pressing Reports button from the main screen.

SECTION 14 DOWNTIME VIEWING

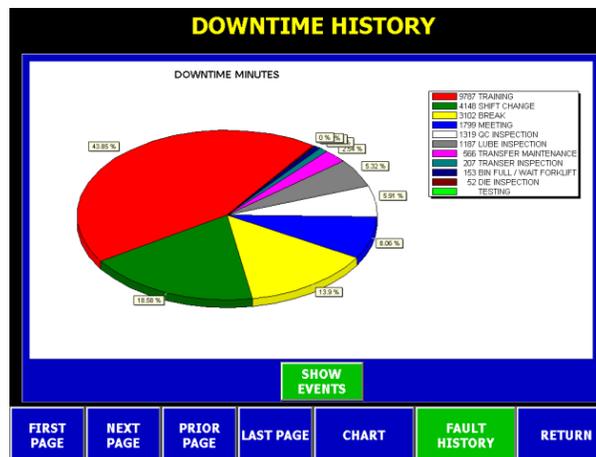
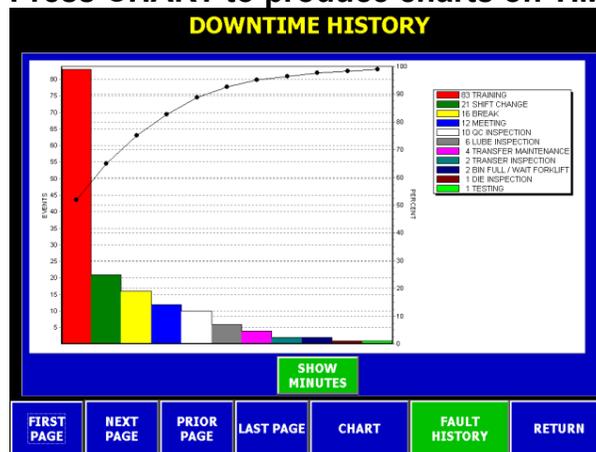
Example of Downtime by Event

DOWNTIME HISTORY

RECORD DATE	DOWN	DESCRIPTION	JOB#	PART#	DIE
10/1/2002 11:20:02 AM	7	TRANSER INSPECTION	3	THIS IS A TEST OF	TESTING #3 B
10/1/2002 11:27:58 AM	8	QC INSPECTION	3	THIS IS A TEST OF	TESTING #3 B
10/1/2002 11:33:40 AM	6	BREAK	3	THIS IS A TEST OF	TESTING #3 B
10/1/2002 11:43:23 AM	10	TRANSER INSPECTION	3	THIS IS A TEST OF	TESTING #3 B
10/1/2002 12:18:22 PM	35	TRANSER INSPECTION	3	THIS IS A TEST OF	TESTING #3 B
10/1/2002 12:27:34 PM	9	TRAINING	3	THIS IS A TEST OF	TESTING #3 B
10/1/2002 3:09:33 PM	162	TRANSER INSPECTION	3	THIS IS A TEST OF	TESTING #3 B
10/1/2002 3:41:34 PM	32	TRAINING	3	THIS IS A TEST OF	TESTING #3 B
10/1/2002 4:02:11 PM	21	TRANSER INSPECTION	3	THIS IS A TEST OF	TESTING #3 B
10/1/2002 4:40:19 PM	38	TRANSER MAINTENANCE	3	THIS IS A TEST OF	TESTING #3 B
10/1/2002 4:59:45 PM	19	TRAINING	3	THIS IS A TEST OF	TESTING #3 B
10/2/2002 8:44:23 AM	0	TESTING	3	THIS IS A TEST OF	TESTING #3 B
10/2/2002 8:49:50 AM	5	TRANSER INSPECTION	3	THIS IS A TEST OF	TESTING #3 B
10/2/2002 8:56:48 AM	7	TRAINING	3	THIS IS A TEST OF	TESTING #3 B
10/2/2002 9:01:59 AM	5	TRANSER INSPECTION	3	THIS IS A TEST OF	TESTING #3 B
10/2/2002 9:21:17 AM	19	QC INSPECTION	3	THIS IS A TEST OF	TESTING #3 B
10/2/2002 2:26:23 PM	305	BREAK	3	THIS IS A TEST OF	TESTING #3 B
10/2/2002 3:19:59 PM	54	TRAINING	3	THIS IS A TEST OF	TESTING #3 B
10/2/2002 4:56:26 PM	96	TRANSER INSPECTION	3	THIS IS A TEST OF	TESTING #3 B

FIRST PAGE NEXT PAGE PRIOR PAGE LAST PAGE CHART FAULT HISTORY RETURN

Press CHART to produce charts on TIME or EVENT.



SECTION 14 FAULT VIEWING

Press **FAULT HISTORY** from Main Menu to view list of faults.

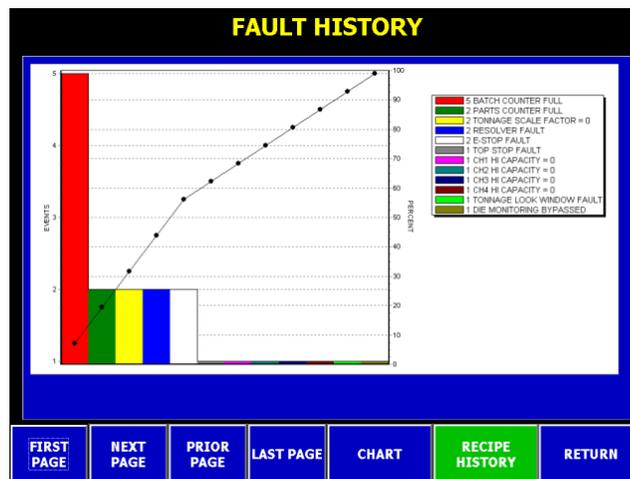
Use Page buttons to scroll through list of faults.

FAULT HISTORY

RECORD DATE	FAULT	DESCRIPTION	JOB#	PART#	DIC
7/25/2002 3:38:12 PM	276	PARTS COUNTER FULL			
9/11/2002 10:32:40 AM	285	TONNAGE SCALE FACTOR = 0	3	TESTING #3	TEST #3
9/11/2002 10:32:42 AM	286	RESOLVER FAULT	3	TESTING #3	TEST #3
9/11/2002 10:32:44 AM	280	E-STOP FAULT	3	TESTING #3	TEST #3
9/11/2002 10:55:25 AM	280	E-STOP FAULT	3	TESTING #3	TEST #3
9/11/2002 10:55:48 AM	281	TOP STOP FAULT	3	TESTING #3	TEST #3
9/11/2002 10:55:50 AM	285	TONNAGE SCALE FACTOR = 0	3	TESTING #3	TEST #3
9/11/2002 10:55:52 AM	287	CH1 HI CAPACITY = 0	3	TESTING #3	TEST #3
9/11/2002 10:55:54 AM	288	CH2 HI CAPACITY = 0	3	TESTING #3	TEST #3
9/11/2002 10:55:56 AM	289	CH3 HI CAPACITY = 0	3	TESTING #3	TEST #3
9/11/2002 10:55:58 AM	290	CH4 HI CAPACITY = 0	3	TESTING #3	TEST #3
9/11/2002 10:56:18 AM	292	TONNAGE LOOK WINDOW FAULT	3	TESTING #3	TEST #3
9/18/2002 2:57:58 PM	293	DIE MONITORING BYPASSED	1	TESTING #1	TEST #1
9/18/2002 2:58:04 PM	293	DIE MONITORING BYPASSED	1	TESTING #1	TEST #1
9/18/2002 3:01:46 PM	293	DIE MONITORING BYPASSED	1	TESTING #1	TEST #1
9/18/2002 3:09:02 PM	293	DIE MONITORING BYPASSED	1	TESTING #1	TEST #1
9/18/2002 3:10:39 PM	293	DIE MONITORING BYPASSED	1	TESTING #1	TEST #1
9/30/2002 2:31:49 PM	276	PARTS COUNTER FULL	3	THIS IS A TEST OF /TESTING #3 BIG \	
9/30/2002 2:31:51 PM	281	TOP STOP FAULT	3	THIS IS A TEST OF /TESTING #3 BIG \	

FIRST PAGE NEXT PAGE PRIOR PAGE LAST PAGE CHART RECIPE HISTORY RETURN

Press **CHART** to view Fault History chart.

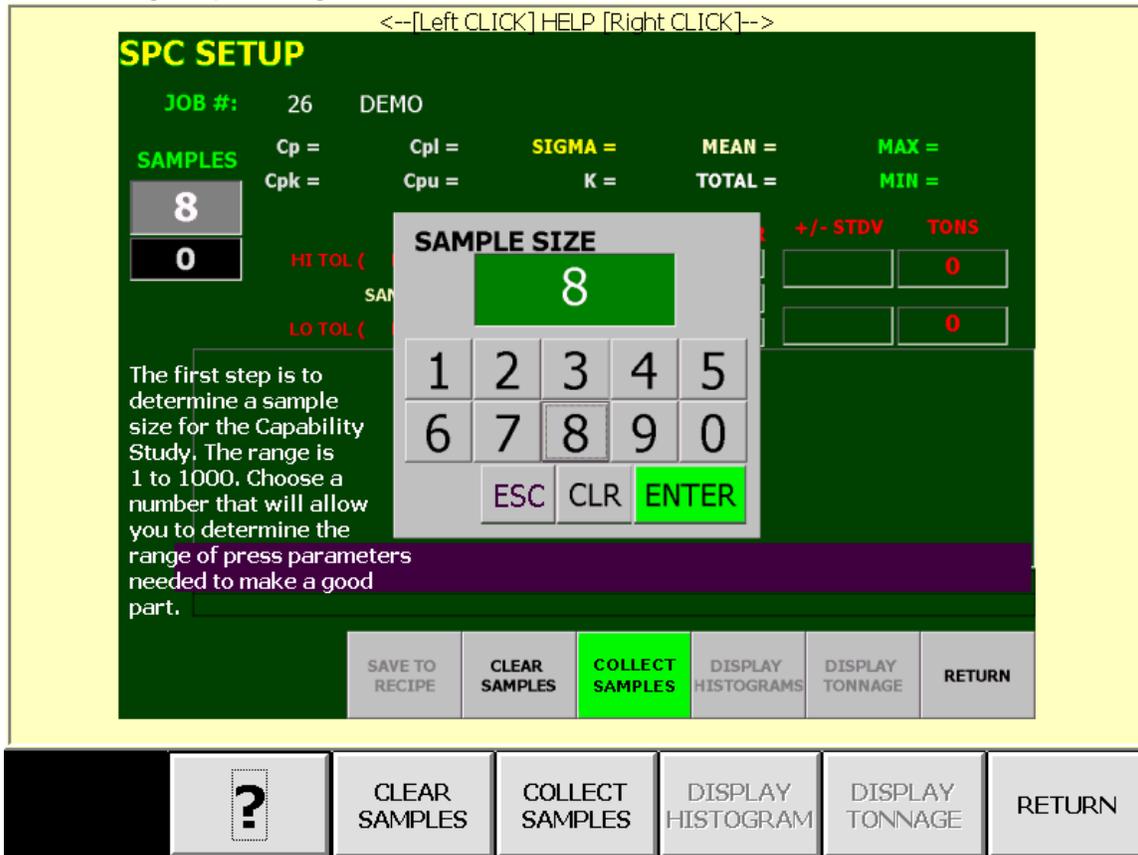


SECTION 15 SPC CAPABILITY

ENTER SAMPLE SIZE – Touching the sample size box opens a keypad to allow you to enter the sample size value. Its range is 1 to 1000. Pressing the COLLECT SAMPLES button when the size box is empty will also open the keypad.

Each time you cycle the press the tonnage information is recorded and displayed on this screen. It is shown as a bar representing the total tons for the stroke and the statistics for all recorded samples are updated.

Statistical calculations are based on the total forming load using the Minimum and Maximum for control limits. This allows you to “test” these limits during the sampling process in order to establish a “good part” range.



SECTION 15 SPC CAPABILITY

Samples may be deleted from a statistical survey. Touch on the Tonnage Bar to be deleted and you are prompted to CONFIRM or CANCEL. The statistical calculations are refreshed to reflect the deleted sample.

<--[Left CLICK] HELP [Right CLICK]-->

SPC SETUP

JOB #: 26 DEMO

SAMPLES Cp = 0.4 Cpl = 0.37 **SIGMA = 2.5** MEAN = 431.75 MAX = 435
 Cpk = 0.37 Cpu = 0.43 K = 0.08 TOTAL = 1727 MIN = 429

8

4

HI TOL (%):	4 RR	+/- STDV	TONS
3	3		0
SAMPLE	3.75		
LO TOL (%):	3		0

If you make a "bad" part, you can remove the sample from the Capability Study. In this example, the 4th sample is 429 tons and that produced a bad part. The lower limit of the good part range has been exceeded. You would delete the sample and change the press parameters to raise the tonnage.

Click/Touch any sample to delete

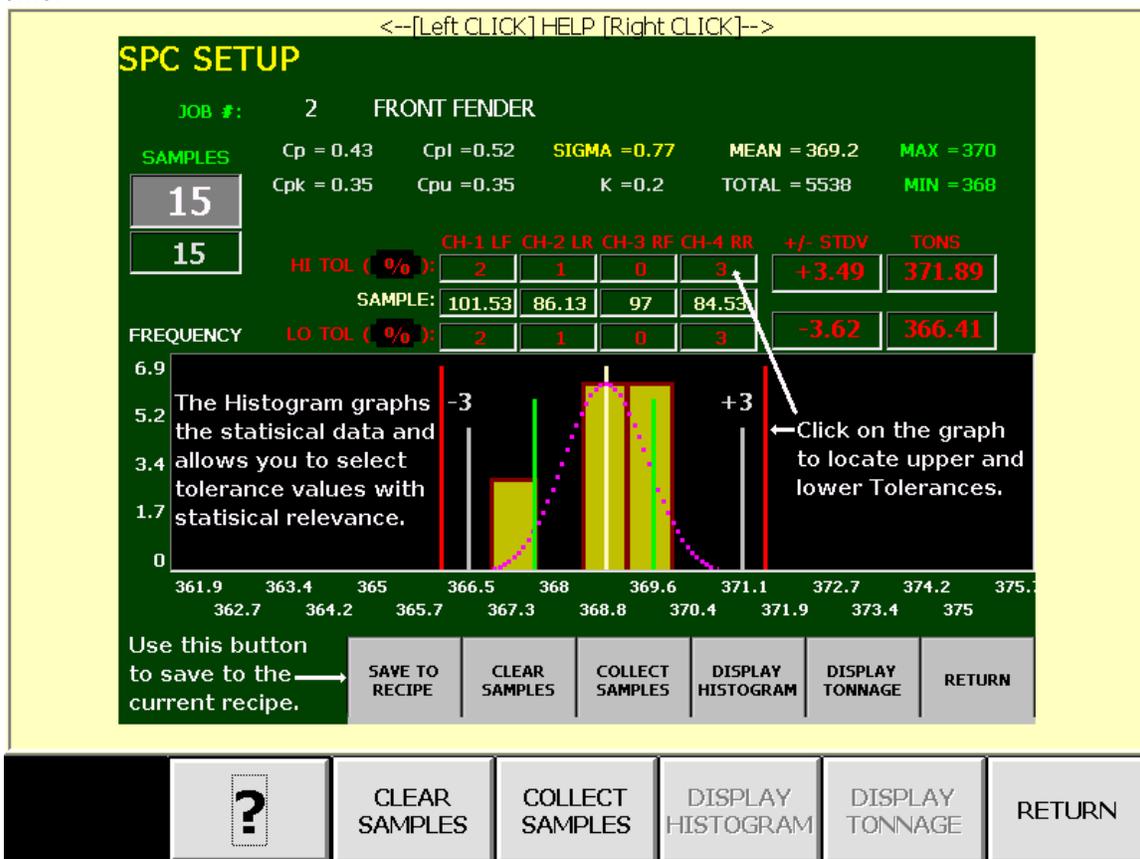
SAVE TO RECIPE
CLEAR SAMPLES
COLLECT SAMPLES
DISPLAY HISTOGRAMS
DISPLAY TONNAGE
RETURN

?
CLEAR SAMPLES
COLLECT SAMPLES
DISPLAY HISTOGRAM
DISPLAY TONNAGE
RETURN

SECTION 15 SPC CAPABILITY

Selecting the HISTOGRAM button generates this display.

1. Each bar represents a quantity of strokes at the indicated tonnage. The captions below the graph are the tonnage values.
2. The MEAN is shown as a light yellow line at the center of the display.
3. Two grey lines captioned “-3” and “+3” represent minus and plus three STANDARD DEVIATIONS from the mean.
4. A graph of the NORMAL DISTRIBUTION is shown as a magenta colored dotted line. You may toggle between the histogram and tonnage displays at any time.



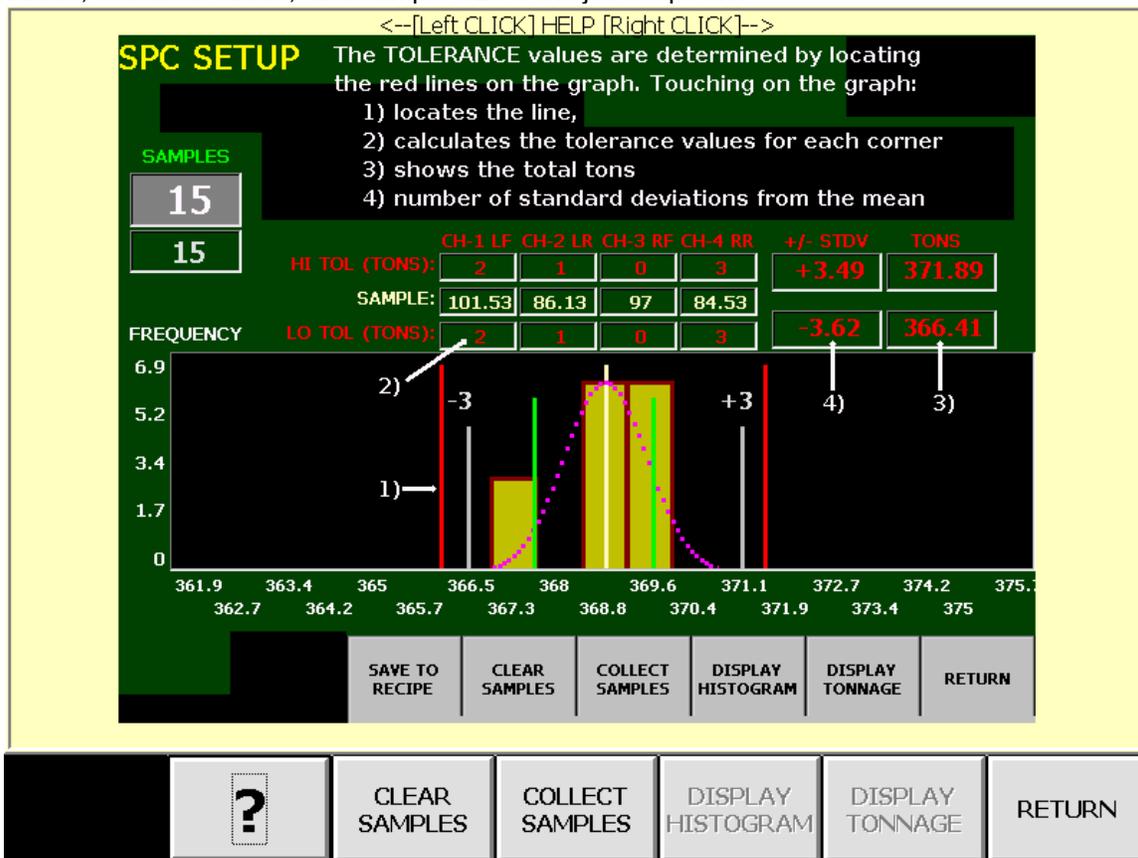
SECTION 15 SPC CAPABILITY

Statistical calculations are performed using total tons of forming force. Sample and Tolerance values are initiated from the current recipe and then updated from the individual channels of tonnage during the sampling process.

The Sample values displayed in the center of the screen are the “channel means” and are re-calculated as each sample is taken.

Tolerance values may be suggested by touching the histogram display at the desired high and low points. This produces a red line indicating the position on the display. The total tons at for that point and the number of standard deviations are show in the boxes at center right. Tolerance values for the individual corners are generated and displayed at center left.

Use these features to determine a good tolerance operating range that will produce quality parts without generating nuisance alarms. Press the SAVE TO RECIPE button to write the sample values, tolerance values, and sample size to the job recipe file.



SECTION 15 SPC CAPABILITY

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<--[Left CLICK] HELP [Right CLICK]-->

SIGMA = 0.77
SIGMA is the Sample Standard Deviation with n-1 degrees of freedom.

MEAN = 369.2
The MEAN is the arithmetic average of the Tonnage Samples, computed by adding them and dividing by the number of samples.

TOTAL = 5538
TOTAL TONS is the sum of all the Tonnage Samples.

		CLEAR SAMPLES	COLLECT SAMPLES	DISPLAY HISTOGRAM	DISPLAY TONNAGE	RETURN
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