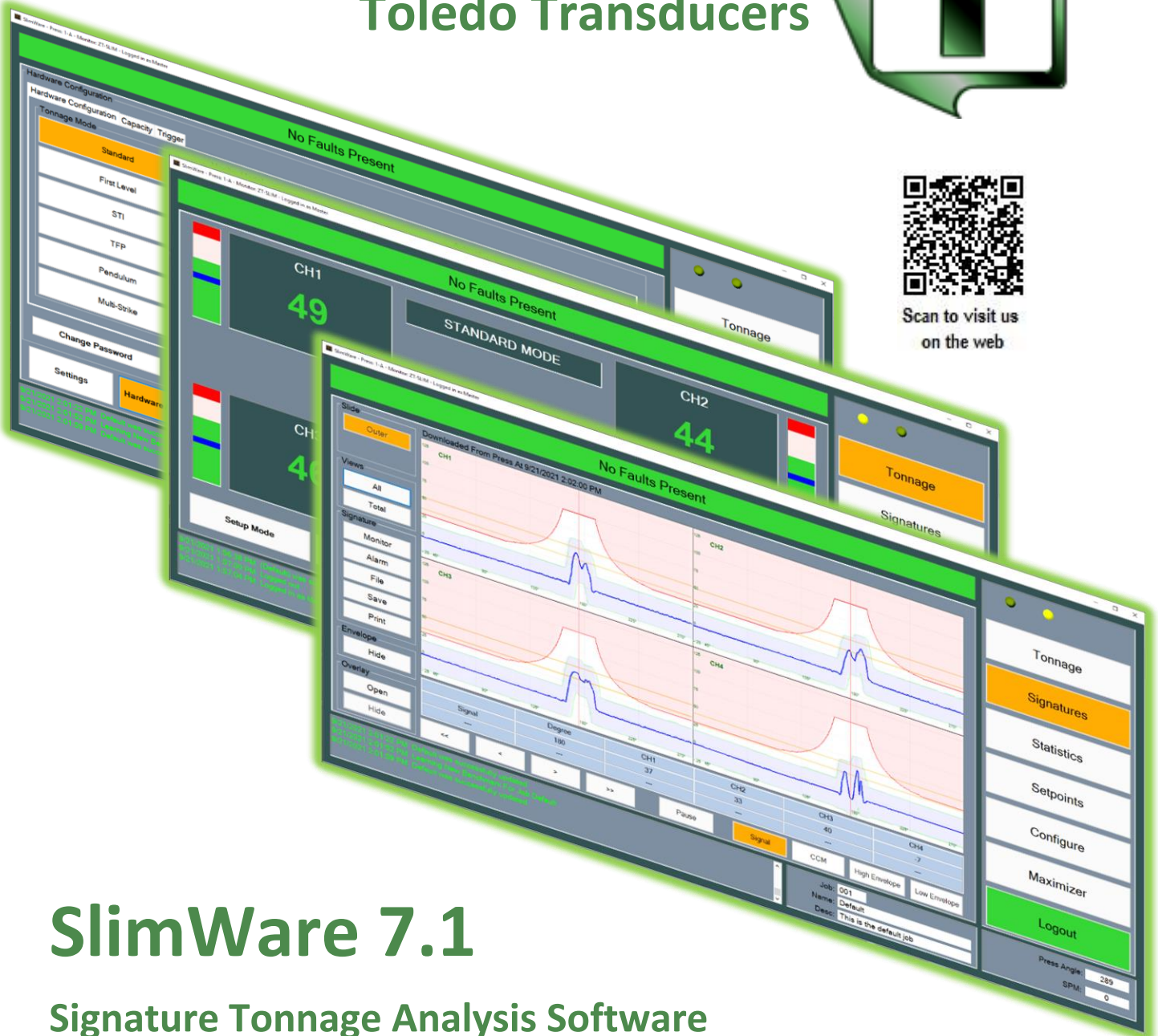# Toledo Integrated Systems
Toledo Transducers

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on the web

SlimWare 7.1

Signature Tonnage Analysis Software

Technical Manual

Article I.   Limited Warranty

The software is warranted by the manufacturer, Toledo Integrated Systems, to be free from defects in workmanship for one year from the date of manufacturer's shipment. This warranty is limited to the functions of SlimWare as stated in this manual. If modifications are made to the software, Toledo Integrated Systems will not be responsible for SlimWare.

All products subject to this warranty must be returned for examination, repair, or replacement to:

  F.O.B. Toledo Integrated Systems
      6834 Spring Valley Dr.
      Holland, OH 43528

The express warranty set forth herein is in lieu of all other warranties, expressed or implied, including without limitation any warranties of merchantability or fitness for particular purpose. All such warranties are hereby disclaimed and excluded by the manufacturer.

Repair or replacement of defective products as provided above is the sole and exclusive remedy provided there under. The manufacturer shall not be liable for any further loss, damages, or expenses, including incidental or consequential damages, directly or indirectly arising from the sale or use of this product.

Any unauthorized changes to the program will void this warranty.

There are no warranties that extend beyond those expressly set forth herein.

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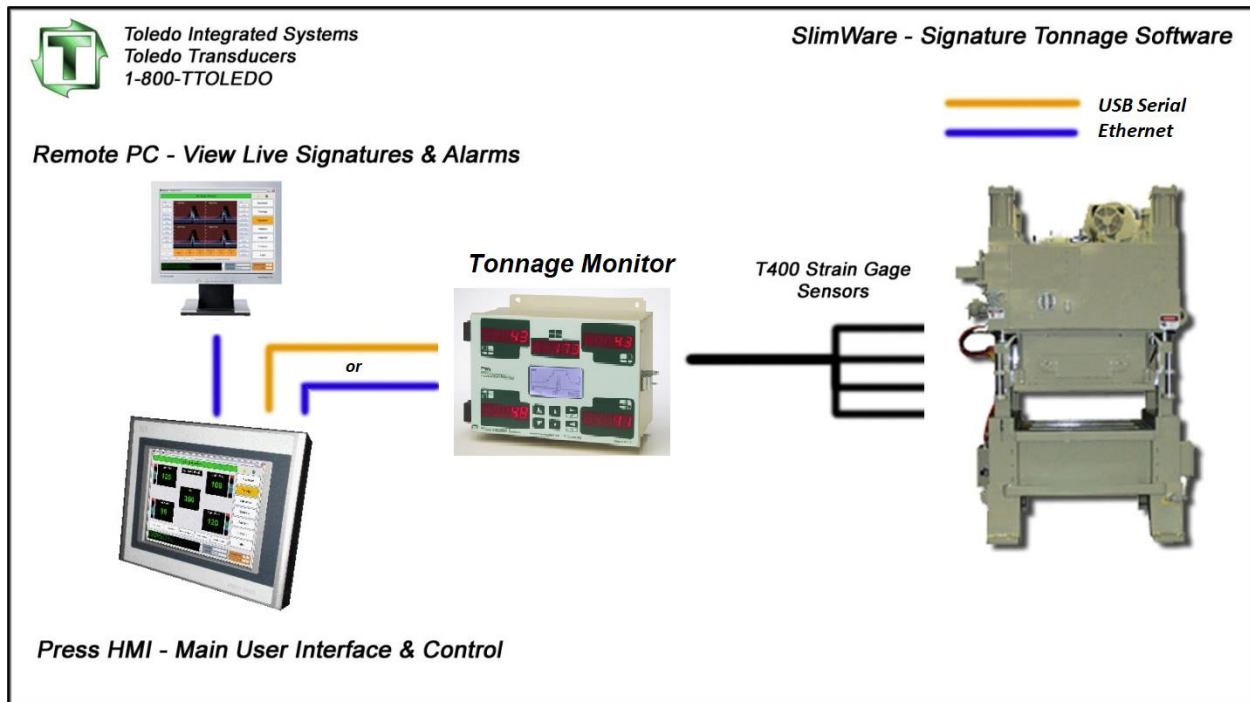
1. Overview

Figure 1.1 – Tonnage Monitor / SlimWare System Overview

SlimWare 7.1 is the user interface for a variety of our tonnage monitors. SlimWare can provide and monitor all information stored in the tonnage modules including tonnage, setpoints, alarm history and signatures (tonnage curves).

Tonnage monitors do more than protect your press and dies from hard hits. They provide at least two levels of alarms (Capacity, and High & Low Setpoint), while some provide additional support for CCM, High & Low Envelope, and Reverse Setpoint. Each alarm type can be enabled/bypassed and configured for top or immediate stop (depending on the model of tonnage monitor).

Another feature of the tonnage monitor is to provide users with signature-based tonnage analysis. These signatures are extremely helpful in determining problems in the forming process. Problems can include excessive tonnage through the stroke, loose tie-rods, low nitrogen cylinders or reverse (strike-through) tonnage. Some monitors support resolver-based signatures, while others support time-based signatures.

NOTE: All tonnage monitor features are discussed in this manual, but **not all tonnage monitors support all features**. Features not supported for a particular model of tonnage monitor will not be accessible in SlimWare.

2.   Installation

Included on the installation media (or via download) is the SlimWare setup.exe file. Double click on the setup.exe and the installation wizard will load.

Figure 2.1 – SlimWare Installation Wizard

The default installation location is **C:\Program Files\Toledo Integrated Systems\SlimWare 7**. All installation files reside in this folder while the job, hardware, software, and user configuration files are found in **C:\ProgramData\Toledo Integrated Systems\SlimWare 7**. The default location for saving and storing signatures is the subfolder "Signatures".

After the installation in complete, SlimWare can be started by selecting the shortcut on the desktop or by following this path: Start >> All Programs >> Toledo Integrated Systems >> SlimWare 7.

3. Initial Startup

SlimWare can communicate with all tonnage monitors via Serial connection. The ZT-SLIM tonnage monitor also provides the option of Ethernet connectivity. The initial communications settings loaded during the installation are as follows:

Common settings
- Communication Mode: Serial
- Comm Address: 0

Ethernet Settings (ZT-SLIM only)
- Remote IP Address: 192.168.16.180
- Subnet Mask: 255.255.255.0
- TCP Port: 31000

Serial Settings
- Com Port: COM1
- Baud Rate: 9600

To determine if communications have been established between SlimWare and the tonnage monitor, start SlimWare by either double-clicking the shortcut on the desktop (installed during setup) or by the following:

Start >> All Programs >> Toledo Integrated Systems >> SlimWare 7

SlimWare will load. If there is no communication, the LEDs in the upper right-hand corner of the SlimWare window will not be flashing and a communications error will appear near the top of the screen as well as in the historical data box. See figure 3-1 and 3-2 for examples of a communications error.

Communication Error

Figure 3-1 Communication Error Alert

9/15/2021 4:43:20 PM SlimWare is starting...
9/15/2021 4:43:21 PM Data Dir: C:\ProgramData\Toledo Integrated Systems\SlimWare 7
9/15/2021 4:43:22 PM Serial port open: COM1 at 9600 baud
9/15/2021 4:44:32 PM Communications Error - Bytes To Read: 834   Bytes In Buffer: 0
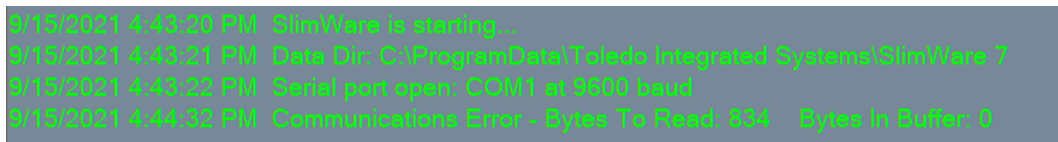
Figure 3-2 Communication Error (Historical Data Box)

Continue reading for instructions on establishing communication. Both Ethernet and Serial setup instructions are covered on the following pages.

I. Setting up Ethernet Communications (ZT-SLIM)

By default, the ZT-SLIM ships with an IP address of 192.168.16.180 with a subnet mask of 255.255.255.0 and a TCP Port of 31000.

Hardware connections:

Connect one end an Ethernet cable to the Ethernet TCP/IP port on the bottom of the ZT-SLIM. Connect the other end of the cable to the press's Ethernet switch or see the preferred method below.

Preferred method:

To establish initial communications, you may choose to install SlimWare on a laptop and configure the laptop's network interface to a compatible static IP address. Then use an Ethernet cable to connect directly to the ZT-SLIM.

1) **Start SlimWare.**
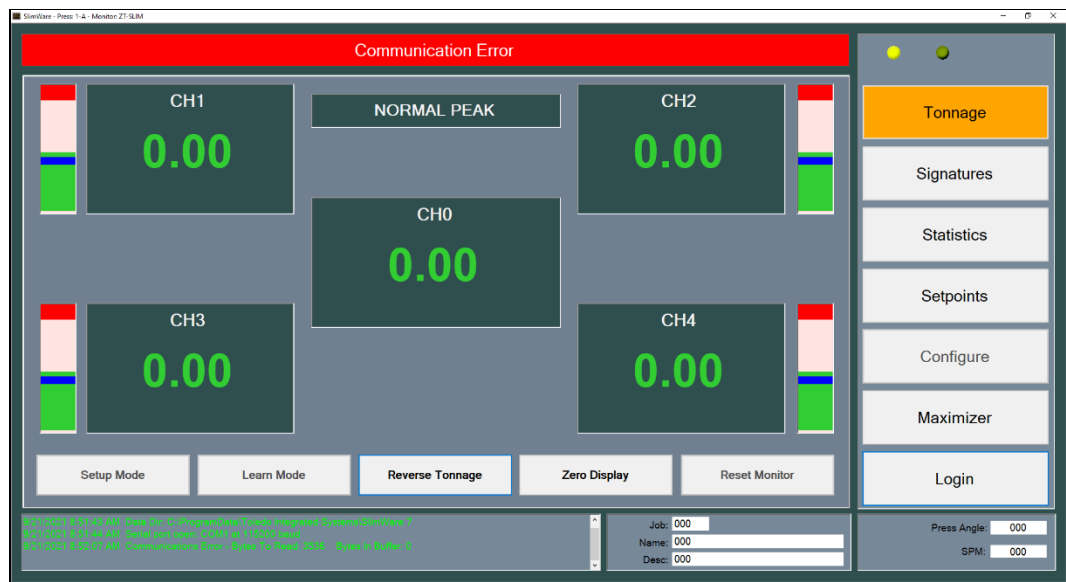
When you first start SlimWare, you will notice that the communication lights in the top right-hand corner are not flashing, and you get the following message in the status window at the bottom. This indicates that communication is not yet established.
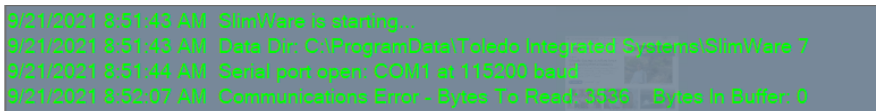
2) Login.
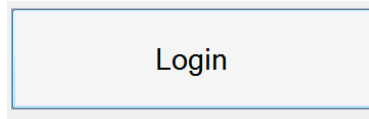
Login

Click the **Login** button on the right and enter the master password (default is "m").

3) Go to the Hardware / Trigger configuration page.

Configure

Hardware / Trigger

Click the **Configure** button on the right, then click the **Hardware / Trigger** button at the bottom.

4) Set the Monitor Model.

Monitor Model
ZT-SLIM

On the Hardware Configuration tab, check the Monitor Model selection to verify that it is set to ZT-SLIM. If not, select ZT-SLIM. SlimWare will need to close. Restart SlimWare, log in, and continue with step 5.

5) Go to the Comms / Network configuration page.

Configure

Comms / Network

Click the **Configure** button on the right, then click the **Comms / Network** button at the bottom.

6) Set the Communication Mode to Ethernet.
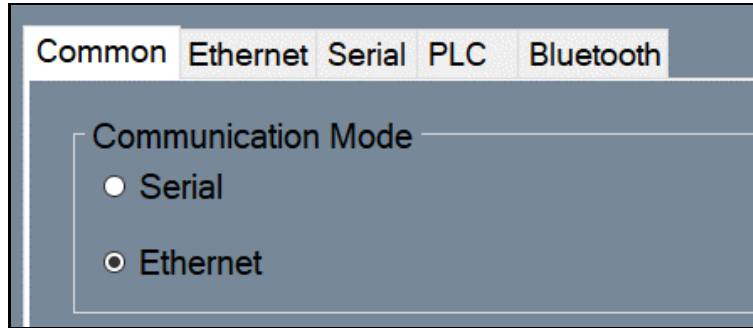
On the Common tab, verify that the communication mode is set to Ethernet. If not, select it.

7) **Go to the Ethernet tab.**
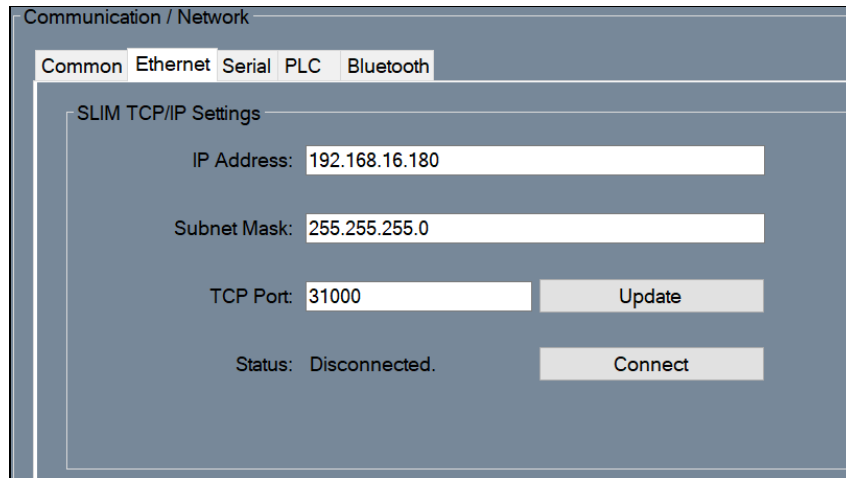
While still on the Comms / Network page, click the Ethernet tab to display its settings.

8) Enter the ZT-SLIM's default IP address.
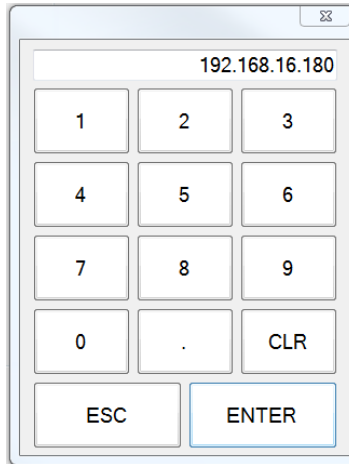
Click anywhere in the **Remote IP** field to bring up the entry keypad. Enter the default IP address "192.168.16.180" and click **Enter**.

9) Confirm the settings.
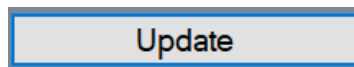
Keep all other settings the same and click the **Update** button. After a brief pause, you should notice that the communication lights on the top right-hand corner will begin flashing and the status window at the bottom will verify that the TCP connection is established.

9/21/2021 9:09:42 AM   TCP connection established: 192.168.16.180 on port 31000
9/21/2021 9:09:44 AM   Firmware #: 1141
9/21/2021 9:09:44 AM   Current Job Not Found ...

10) Save SlimWare settings and exit.
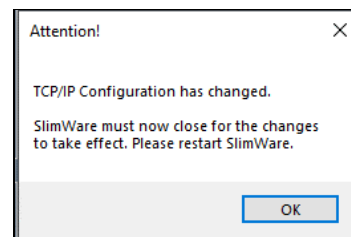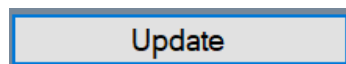
Click the **Update** button one more time. SlimWare will confirm that the configuration has changed. Click OK to save the settings and close SlimWare.

11) Restart SlimWare.

Open SlimWare from the desktop shortcut or start menu. Communications should start normally.

12) Configure the ZT-SLIM for the press network.

Repeat steps 2-7, except this time enter the desired IP address, subnet mask, and TCP port for the press network. Once you click **Update**, the ZT-SLIM will apply the new settings and reboot. If you chose to use a laptop and direct Ethernet connection to establish communications (the preferred method) continue with step 13 below.

13) Connect the ZT-SLIM to the press Ethernet network. Reboot the ZT-SLIM.

14) Connect the HMI PC to the press Ethernet network.

15) Start SlimWare on the HMI PC.

16) Repeat steps 2-11, using the IP address, subnet mask, and TCP port that were configured in step 12.

II. Setting up Serial Communications

Most models of tonnage monitors communicate via a Serial connection. This method requires either a 3-wire serial cable (if the SlimWare PC has a built-in RS232 port) or a USB-to-Serial adapter. Contact Toledo Integrated Systems for more information on adapter and cable requirements.

By default, SlimWare is configured to use com port COM1 at 9600 baud.

Hardware connections (RS232):
If the computer has a built-in RS232 serial port, prepare a 3-wire cable like the diagram below. Note that the terminal locations for the tonnage monitor may vary by model. Refer to the user's manual for your specific tonnage monitor. If a cable length of more than 10 feet is required, it is recommended to use a USB-to-Serial adapter capable of RS422 connection.
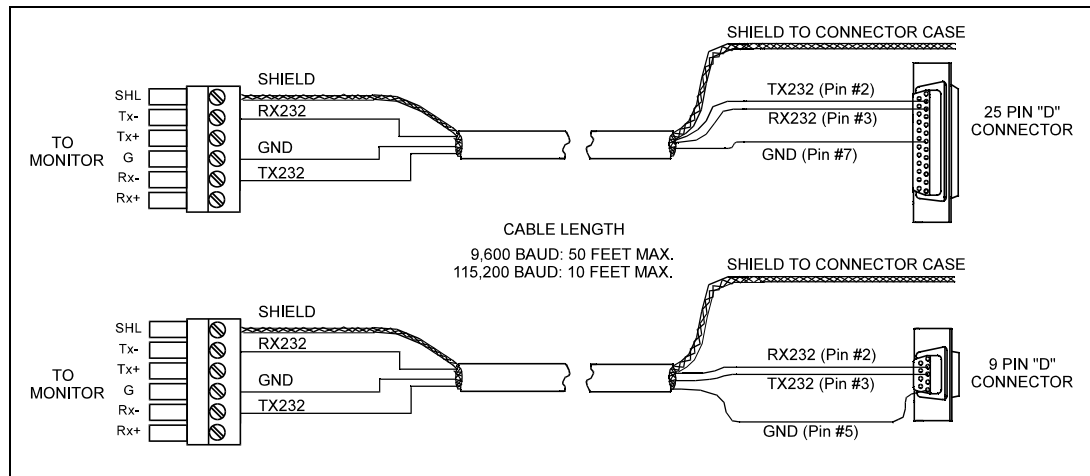
Hardware connections (USB-to-Serial Adapter):

Connect the serial adapter's USB plug to the SlimWare PC. Use a shielded, twisted-pair cable (Belden 8103, or equivalent) to connect the USB-to-Serial adapter to the tonnage monitor's serial port. Refer to the diagram below for wiring connections.
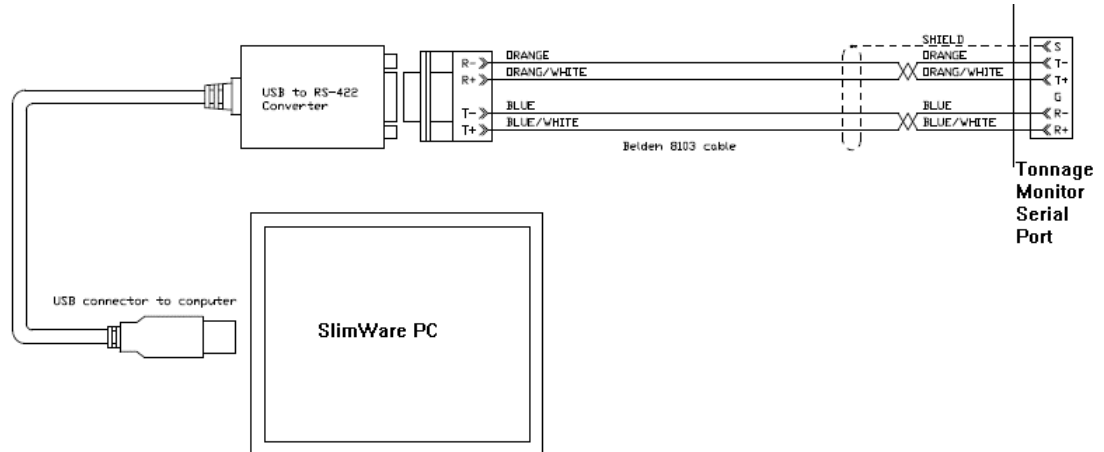
17) **Take note of the COM port.**

On the SlimWare PC, open Device Manager and expand the Ports section. Locate the COM port on which the USB Serial adapter is installed (COM4 in the example below), or the COM number of the built-in RS232 port.
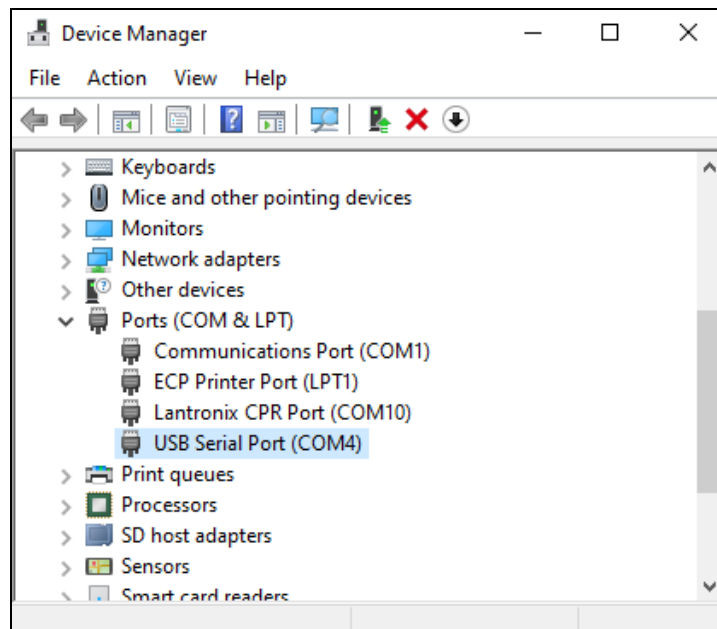
18) Start SlimWare.
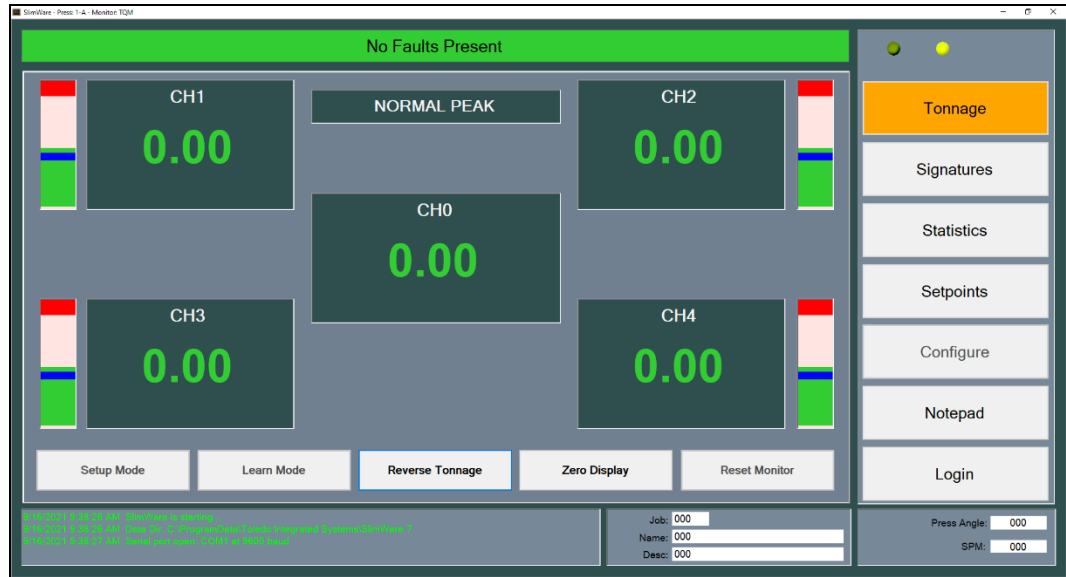
When you first start SlimWare, you will notice that the communication lights in the top right-hand corner are not flashing.

This indicates that communication is not yet established.

19) Login.
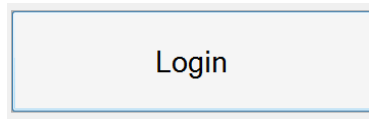
Click the **Login** button on the right and enter the master password (default is "m").

20) Go to the Hardware / Trigger configuration page.

Click the **Configure** button on the right, then click the **Hardware / Trigger** button at the bottom.

21) Set the Monitor Model.

Monitor Model

PWi

On the Hardware Configuration tab, check the Monitor Model selection to verify that it is set to the correct model of tonnage monitor. If not, select the correct model. SlimWare will need to close. Restart SlimWare, log in, and continue with step 6.

22) Go to the Comms / Network configuration page.

Configure → Comms / Network

Click the **Configure** button on the right, then click the **Comms / Network** button at the bottom.

23) Verify that the Communication Mode is set to Serial.

Communication / Network

Common Serial PLC

Communication Mode
◉ Serial
● Ethernet
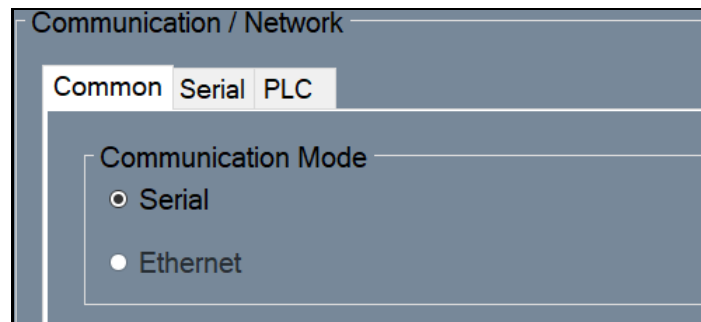
On the Common tab, change the communication mode to Serial if it is not already.

24) Go to the Serial tab.
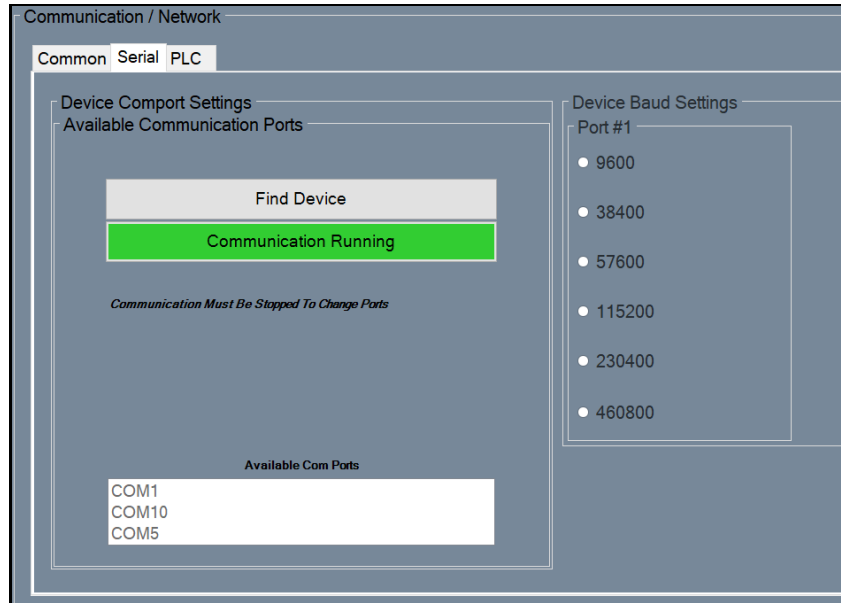
While still on the Comms / Network page, click the Serial tab to display its settings.

25) Select the correct Com Port.
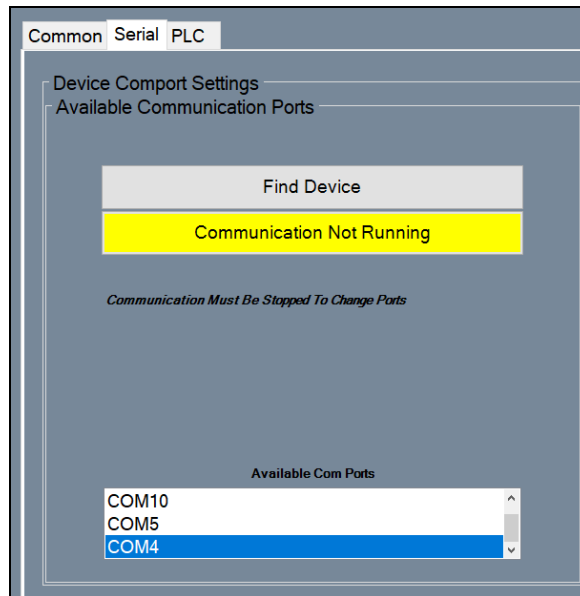
You will see two buttons on the left. Verify that the bottom button is yellow and reads "Communication Not Running." If it is green, click it to stop the communication.

In the list of available com ports, select the com port that you noted from step 1.

26) Enable Communications.

Click the yellow "Communication Not Running" button to start the communication.
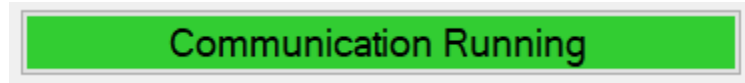
After a brief pause, you should notice that the communication lights on the top right-hand corner will begin flashing and the status window at the bottom will verify that the communications have started.

9/16/2021 10:02:55 AM Communications Recovered
9/16/2021 10:02:55 AM Firmware #: 8042

If communications do not start, continue to step 11.

27) Search for the tonnage monitor.

Click the **Find Device** button and wait while SlimWare searches for the connected tonnage monitor.
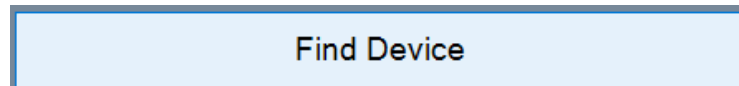
After a brief search, you should get the following message and communication should start.
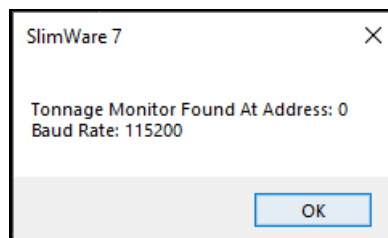
If the search ends with no device found, check the communication cable, and verify that the correct com port is selected in SlimWare.

4. Main Window
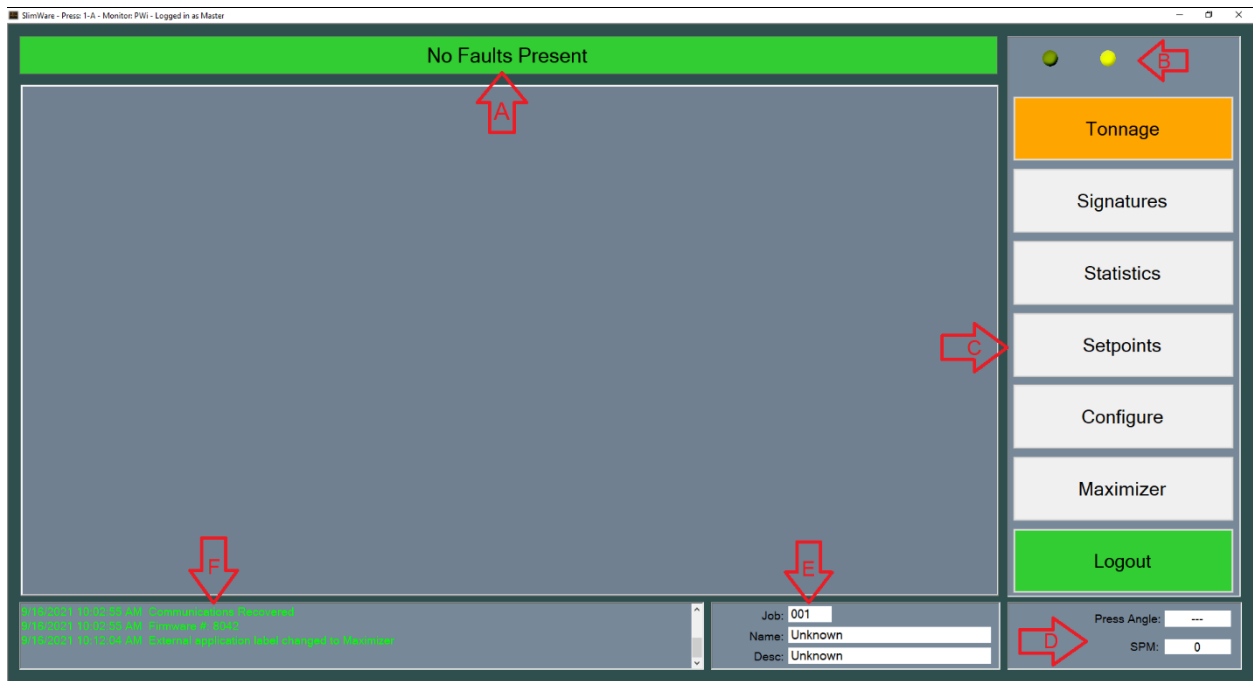
Figure 4-1 – SlimWare Main Window

The main window is always displayed regardless of what page a user is on. The main window includes all the navigation buttons, press angle, strokes per minute, job number, name and description, status bar and the historical data log. Also displayed in the top left-hand corner of the main window is the Press Name (configurable), model of tonnage monitor, and user permission level if logged in.

- **Status Bar (A)** – Displays the current status of the tonnage monitor. If an alarm is detected, the status bar will flash red and white and display the highest level alarm. To reset an alarm, a user can simply click on this bar while alarmed.
- **Indicator Lights (B)** – In the top right-hand of the SlimWare windows are two (2) yellow LEDs. These represent the transmit and receive status of the communication with the tonnage monitor. If these LEDs are idle, this is due to a communication error.
- **Navigation (C)** – These buttons allow the user to navigate to the various pages throughout SlimWare.
  - **Tonnage** – Pressing this button will load the tonnage page. From the tonnage page, the current peak or reverse tonnage can be viewed easily. Personnel with a setup or master password can also enable setup or learn modes from this page.
  - **Signatures** – This button will load the signature page. From the signature page, users can recall current signatures from an online tonnage monitor or recall previously saved signatures.

- o **Statistics** – Pressing this button will load the statistics page. This page displays information such as the highest load, number of high alarms and last alarm. Personnel logged in with a setup or master password can clear the alarm history from this page.
- o **Setpoints** – Clicking the setpoints button will load the setpoints page. If the user is not logged in with a setup or master password, this page is read only and no setpoints can be changed. If a user is logged in with a setup or master password, setpoints such as high and low alarms and reverse tonnage setpoints can be modified.
- o **Configure** – Only the master password can access the configure page. From this configure page, all personnel and hardware settings can be modified, alarms can be disabled and a tonnage calibration can be performed.
- o **External Application**– This button will call an external program (such as a SCADA program). This program is declared on the configuration page. In figure 4-1, the configured external program is the "Maximizer", Toledo Integrated Systems' proprietary automation program.
- o **Login/Logout** – Pressing this button will load the login keypad if no user is currently logged in. Enter the correct password and the button will change to a green background indicating that a user is logged in. While logged in, if the user selects this button again, the current user will be logged out. The Login/Logout pushbutton will be hidden if SlimWare is configured to use external data management.

- **Press Angle (D)** – Displays the current angle of the press if a resolver, encoder, or gray code input is used.
- **SPM – Strokes Per Minute (D)** – Displays the speed at which the press is running.
- **Job Number (E)** – Displays the current job number loaded. If enabled, a user can click on the job number box and load or create a new job.
- **Job Name (E)** – Displays the current job name loaded. If enabled, a user can click on the job name box and load or create a new job.
- **Job Description (E)** – Displays the current job description loaded. If enabled, a user can click on the job name box and load or create a new job.
- **Historical Data Log (F)** – This displays all pertinent information regarding the tonnage monitor and any changes or alarms that occur. This log can be saved to a log file located in the user's storage folder if "Data and Alarm Logging" is enabled from the configure page.

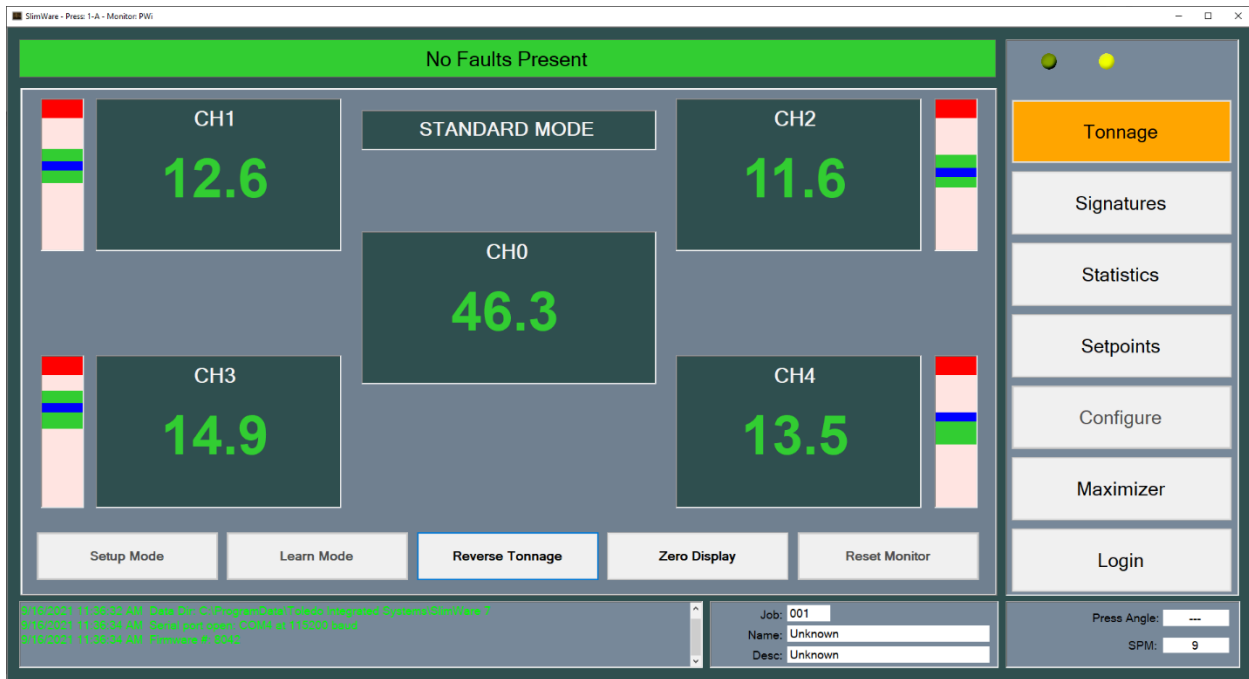![Toledo Integrated Systems - Toledo Transducers, Inc.]

5. Tonnage

Figure 5-1 – Tonnage Screen (4 Channel)

The tonnage page displays all relevant tonnage information. This information includes current tonnage, alarm status of each channel, the monitor mode (setup, learn or normal) and a graphical representation of each corner's high/low setpoint windows with regards to current tonnage.

Figure 5-1 shows a typical four (4) channel monitor. Each corner displays the current tonnage and will turn red if an alarm is flagged for that channel.

I. Setup Mode

- *[Requires Operator, Setup, or Master password]*
- Press the "Setup Mode" button in the bottom left-hand corner to place the monitor into setup mode. While in setup mode, the press will be able to run and the following alarms will be bypassed
    - High and Low Envelope Alarms
    - High and Low Setpoint Alarms
    - Reverse Alarms

The setup mode button is only available when a user is logged in. The monitor should only be placed in setup for the beginning or end of runs. Setup mode is not recommended for normal production use, as several alarm modes are bypassed.

II. Learn Mode

- *[Requires Operator, Setup, or Master password]*
- Press the "Learn Mode" button in the bottom left-hand corner to place the tonnage monitor into learn mode. Learn mode will run for eight (8) strokes. During these eight strokes, the monitor will calculate new high and low setpoints, as well as a new benchmark for each channel.
- When the learn mode button is pressed, a dialogue box will appear prompting the user to confirm that learn mode is desired. This is to prevent users from accidently entering learn mode and learning new benchmarks.
- The monitor will come out of learn mode automatically after eight (8) strokes.
- The learn mode button is only available when a user is logged in.

III. Reverse Tonnage

- Press the "Reverse Tonnage" button to display the reverse tonnage for each channel.
- Even with reverse tonnage displayed, the monitor will function as in normal mode; all alarms will be monitored. This button is available for all users.
- To return to normal mode, simply press the "Reverse Tonnage" button and the normal tonnage will be displayed.

IV. Zero Display

- Press the "Zero Display" button to clear the displayed tonnage.
- This is mostly used in the initial setup of the monitor and SlimWare to make sure communications are correct and the tonnage values are updating properly.

V. Reset Monitor

- *[Requires Setup or Master password, Operator option available]*
- Press the "Reset Monitor" to reset any alarms.
- The "Reset Monitor" button by default is only available to setup or higher level passwords, however it can be enabled for Operators if "Operator Personnel Reset Alarms" is enabled on the configure page (See Section 9).
- Alarms can also be reset by pressing the channel which is alarmed or pressing the flashing status bar at the top of the screen (subject to password authorization).

VI. Bar Graphs

- The bar graphs next to each channel display the relationship between the current tonnage and the high and low setpoint window.
- This graph can be changed to display either the current tonnage with regards to the high and low setpoint window, or the benchmark with regards to the percentage variation of each hit. The display is determined by which autoset mode (Capacity or Benchmark) is selected in the configuration page.

VII. Mode Display

- Just above the total tonnage is the mode display box. This displays what type of mode the monitor is in. These modes can be any of the following:
    - Standard (Shown in figure 5-1)
    - First Level
    - STI
    - TFP
    - Pendulum
    - Multi-Strike
- The tonnage modes can only be changed from the configuration page. (To learn more about each type of mode, refer to the configuration section.)

VIII. Alarms

- If the tonnage monitor detects an alarm, the status bar will begin flashing red and white and the alarmed channel will turn red. To reset any of these alarms, first find the cause for the alarm. Once the cause has been corrected, press either the alarmed corner, the status box or the "reset monitor" pushbutton in the bottom right-hand corner of the tonnage page (subject to password authorization).

6. Signatures
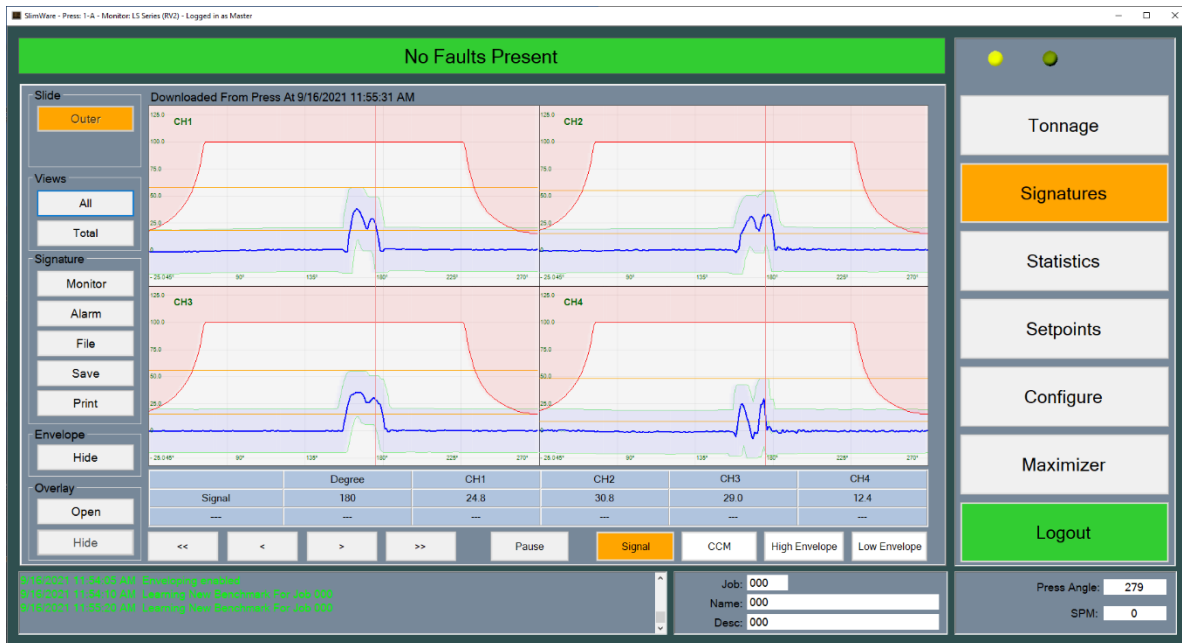
Figure 6-1 – Signature Screen (4 Channel)

The signature page is used to display historical or live signatures from the tonnage monitor. To navigate to the signature page, simply press the "Signatures" button on the right side of the main screen.

Figure 6-1 shows a typical four (4) channel signature with enveloping. Operators can analyze the signatures from each stroke and determine if there are problems such as excessive tonnage early or late in the stroke.

I. Slide

- The slide is to determine whether to poll the monitor for the inner or outside slide. If the number of channels is set to 2 or 4, the inner slide option is not shown.
  - o Outer – Polls the monitor for the outer slide signature (Channels 0-4)
  - o Inner – Polls the monitor for the inner slide signature (Channels 5-9)

II. Views

- The default view of the signatures page is all corners shown in normal viewing mode. Clicking on one of the corner signature windows will display an enlarged view of the corner. Click the enlarged view to return to the multi-corner view. In addition, the following buttons may be used to provide other viewing options.

o All – This view will overlay all corners into one window. This is best used to view differences between channels. Click the signature window to return to the multi-corner view.

o Total – This view shows the total for the selected slide(s). Click the signature window to return to the multi-corner view.

III. Signature

- The signature group box contains the controls for polling, retrieving from file or saving to file, a signature.
  - o Monitor – Select this button to poll the monitor for the most recent signature. Certain tonnage monitors support viewing for the most recent 25 signatures.
  - o Alarm – Select this button to poll the last alarmed signature.
  - o File – Selecting this button will load a file dialogue box. From here, select a .SIG, .SWS, or .SWSX file to open and view in the signature viewing window. When a signature is loaded, the file path will be shown above the viewing window.
  - o Save – Select this control to save the loaded signature to a file.
  - o Print - Use the print function to print out any signatures or overlays shown in the viewing window. The default print setting is landscape mode. When printing a signature, the current signature view will be printed.

IV. Envelope

- This option enables an operator to hide or display envelope and benchmark signatures. This option is only available if enveloping is enabled. Enveloping is only available for resolver-based tonnage monitors.

V. Overlay

- Once a signature is loaded, the overlay controls will become enabled. Use overlays to compared previous "good" signatures to current signatures.
  - o Open – Selecting this control will load a file dialogue box. From here, select a .SIG, .SWS, or .SWSX file to load as an overlay. The overlay will be a light gray color in each channel.
  - o Hide – Once an overlay is loaded, select the "Hide" control to hide the overlay.

VI. Detail and Scan

- While viewing live signatures the signature will continually update. To examine a signature more closely press the Pause button to stop the screen from updating. SlimWare will continue to update all critical data in the background.

- To view the details of each signature (peak, CCM, envelope and capacity at each degree), use the four (4) buttons in the bottom left-hand corner of the signature window. A red line will appear through the signature viewing area. To change the degree, use the four (4) navigation buttons mentioned above. For time-based signatures (non-resolver), the navigation buttons increase or decrease the time.
- The details display is updated if the view or angle is changed. When all four corners are displayed, the displayed details include:
    - Degree or Time
    - Channel 1 Signal Value
    - Channel 2 Signal Value
    - Channel 3 Signal Value
    - Channel 4 Signal Value
  If the total or any corner is displayed, the values include:
    - Degree or Time
    - Load Value
    - CCM Value
    - High Envelope Value
    - Low Envelope Value
- The current loaded signature filename or timestamp is shown above the signature window. If the signature has been downloaded from the press, this path will include the timestamp of when the signature was downloaded. If the signature has been recalled from a file, the file path will be shown.
- All signatures and overlays are saved as .SWSX files.

7. Statistics

The statistics page is used to detail the number and types of alarms that have been recorded by the tonnage monitor. From this page, any user can view the various alarms for each channel.

Figure 7-1 – Statistics Screen (4 Channel)

Figure 7-1 shows a typical four (4) channel unit's historical statistics. If the user is not logged in with a setup or master password, these statistics are "read only". If logged in with a setup or master password, these values can be cleared by pressing the "C" button for the corresponding alarm row.

- **Highest Load** – Displays the highest recorded tonnage per channel
- **Lowest Load** – Displays the lowest recorded tonnage per channel
- **Last Alarm** – The last recorded alarm (any type) per channel
- **Last High Alarm** – The last recorded high alarm per channel
- **Last Low Alarm** – the last recorded low alarm per channel
- **# Capacity Alarms** – The number of capacity alarms recorded per channel
- **# CCM Alarms** – The number of CCM alarms recorded per channel
- **# High Alarms** – The number of high alarms recorded per channel
- **# Low Alarms** – The number of low alarms recorded per channel
- **# Reverse Alarms** – The number of reverse alarms recorded per channel

Figure 8-1 – Setpoints Screen (4 Channel)

The setpoints page displays and configures the tonnage monitor's alarm setpoint values. From this page, setpoints such as high and low setpoints, high and low benchmark percentages and reverse setpoints can be altered. Capacity settings are "read only" on this page and can only be changed from the configure screen.

Figure 8-1 shows a typical four (4) channel unit setpoint screen. If the user is not logged in with a setup or master level password, these setpoints are "read only". If a user is logged in with a setup or master password, these values can be changed.

I. Standard Setpoints

A.   High Setpoint

- The high setpoint value will stop the press when peak tonnage is above this value.
- The high setpoint value is stored with each job, so each job can have a different high setpoint value.
- A high setpoint alarm can be configured for an immediate stop or top stop (See section 9).

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B.   Peak Tonnage

- Peak tonnage is current tonnage that the monitor has recorded. This value is specific to the monitor mode (Standard, First Level, Etc…).
- Peak tonnage is read only and cannot be changed.

C.   Benchmark

- The benchmark value is desired peak tonnage per corner. The benchmark value is created by putting the monitor into learn mode.
- The benchmark tonnage is read only and can only be changed by putting the monitor into learn mode.
- The benchmark tonnage is stored with each job, so each job can have a different benchmark tonnage.

D.   Low Setpoint

- The low setpoint value will stop the press when peak tonnage is below this value.
- The low setpoint value is stored with each job, so each job can have a different low setpoint value.
- A low setpoint alarm is always top stop.

E.   High Percentage

- The high percentage value is used in conjunction with learn mode. This value is used to determine the new high setpoint value.
- While in learn mode, the monitor will multiply either the capacity or new benchmark value (configurable) by the high percentage value. The difference is then added to the benchmark value and the high setpoint value is established.
- The high percentage value is stored with each job, so each job can have a different high percentage value.

F.   Low Percentage

- The low percentage value is used in conjunction with learn mode. This value is used to determine the new low setpoint value.
- While in learn mode, the monitor will multiply either the capacity or new benchmark value (configurable) by the low percentage value. The difference is then deducted from the benchmark value and low setpoint value is established.

- The low percentage value is stored with each job, so each job can have a different low percentage value.
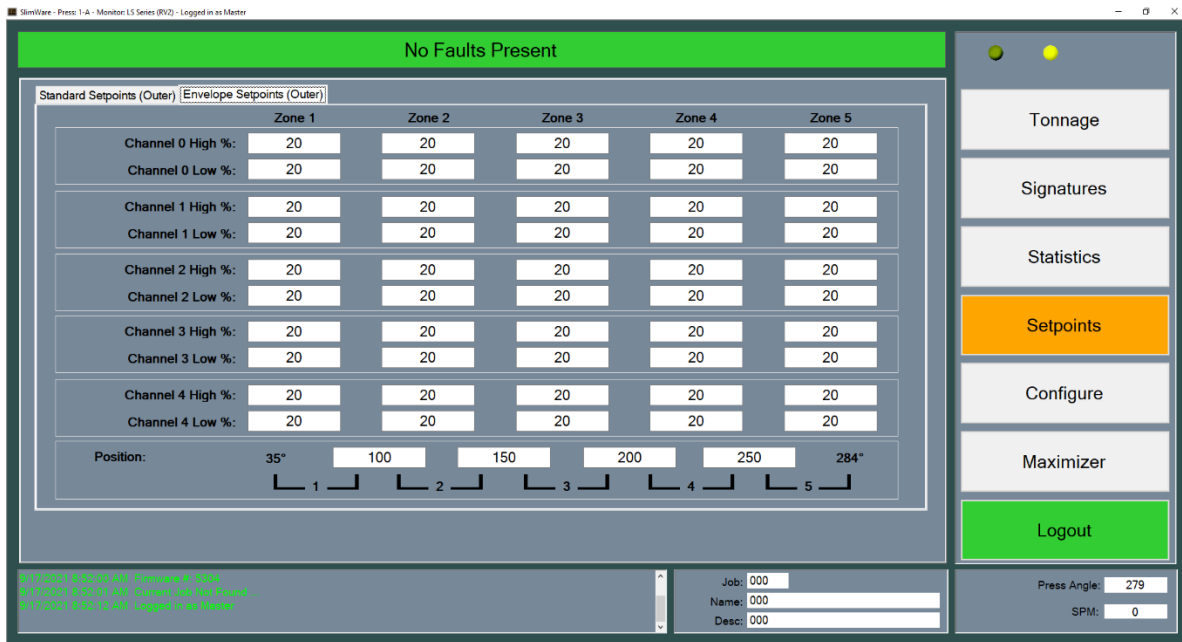
## G.	Reverse Tonnage

- Reverse tonnage is current reverse tonnage that the monitor has recorded.
- Also called "Snap Thru" tonnage, this is tonnage that is applied to the press once the punch stamps through the part.
- Reverse tonnage is read only and cannot be changed.

## H.	Reverse Setpoint

- The reverse setpoint value will stop the press when reverse tonnage is beyond this value.
- The reverse setpoint value is stored with each job, so each job can have a different reverse setpoint value.
- A reverse setpoint alarm can be configured for an immediate or top stop. (This setting is available from the configure screen.)

II. Envelope Setpoints

Figure 8-2 Envelope Setpoints (4 Channel)

Enveloping allows for a form-fitting curve through the entire press stroke. Enveloping goes above and beyond a simple high and low setpoint by calculating different high and low limits throughout each degree of the press stroke.

With supported tonnage monitors (SLIM-RV2, LS-Series, and ZT-SLIM), five (5) envelope zones can be calculated allowing for different high and low tolerances throughout certain windows. As seen in figure 8-2, the enveloping setpoints for each zone are set by a degree-based value. Each window can be configured by entering the desired degrees. To bypass a zone, simply enter the same value as the previous zone.

A.   Channel High and Low %

- These are the percentage values above and below the benchmark used to calculate the high and low enveloping limits in each specified zone. These values are used during learn mode.

B.   Position

- Up to five (5) zones can be calculated throughout the press stroke. Enter the desired windows in these textboxes.

9. Configure
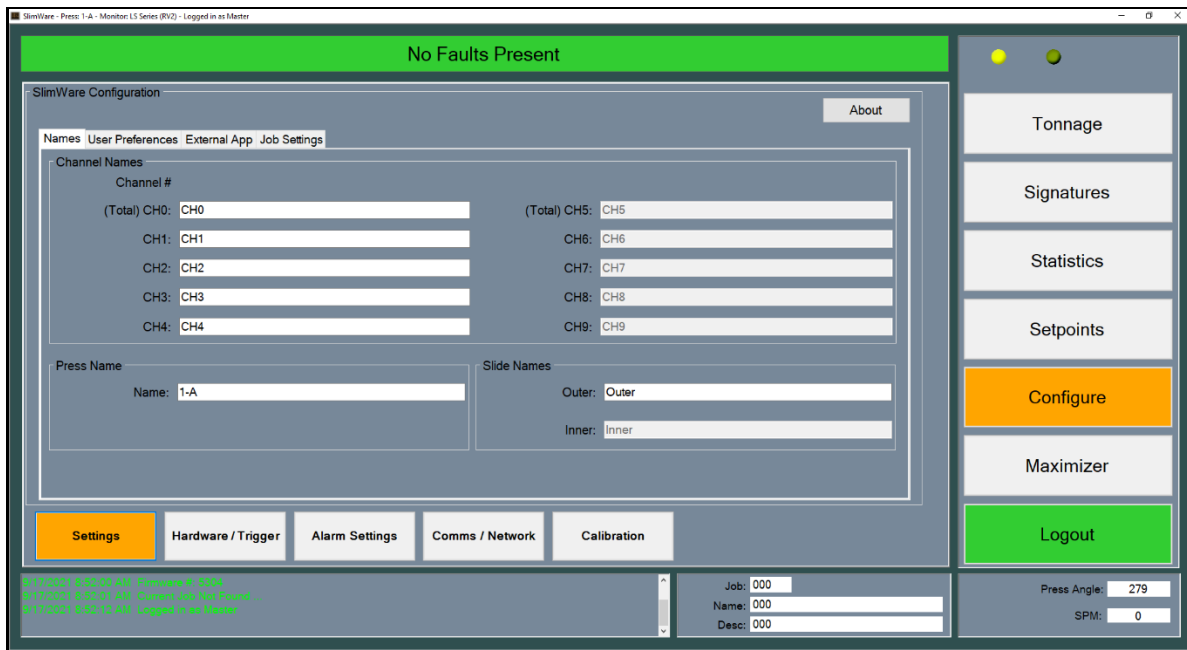
Figure 9-1 –Configuration Settings Screen

I. Settings

There are 5 total configuration pages. From these pages, a user logged in with a master password can access such features as tonnage calibration, user settings, communication settings, capacity values and alarm bypass settings.

Figure 9-1 shows the initial configure page (settings). The Settings screen is split up into four different tabs (Names, User Preferences, External App, and Job Settings). Use the buttons near the bottom of the configuration window to navigate to the different configuration menus.

- **Names**
  - **Channel Names** – Each channel can be configured for a specific name. Type in the desired name and press "Enter" to save the name to the desired corner. The default names are shown in figure 9-1.
  - **Press Name** – Enter the name of the press on which the tonnage monitor is installed. This name will be displayed in the SlimWare title bar. You may need to restart SlimWare after the press name is changed.
  - **Slide Names** – Each slide can be configured for a specific name. Type in the desired name and press "Enter" to save the name to the desired corner.

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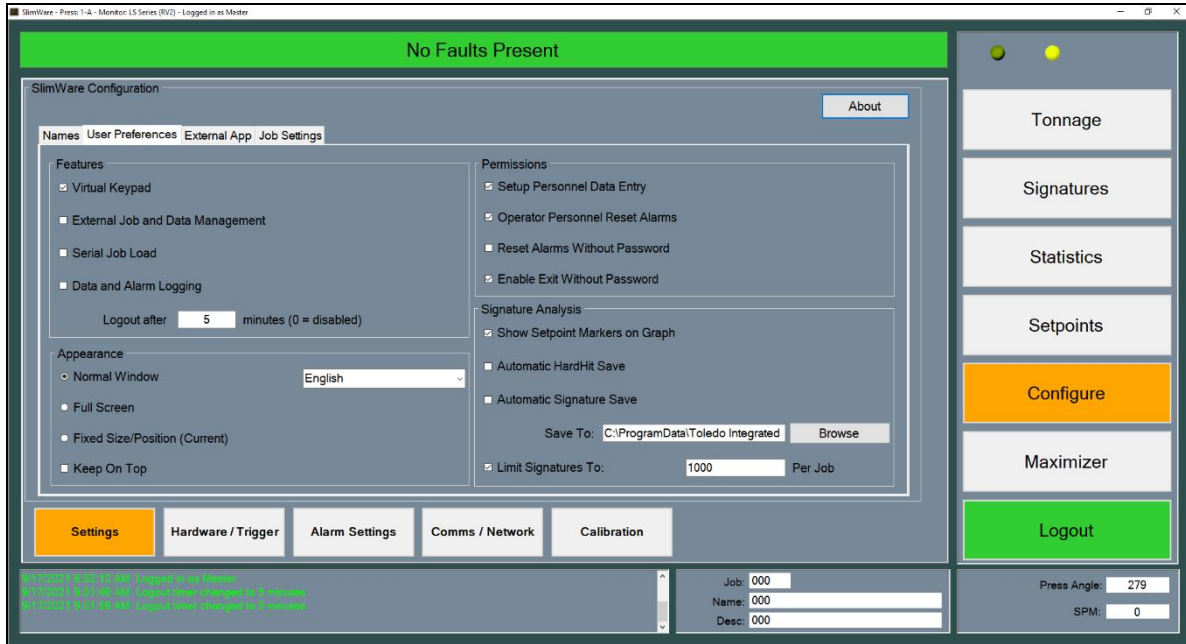
Figure 9-2 –User Preferences Screen
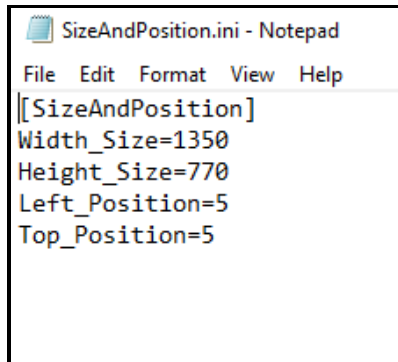
- **User Preferences**
  - o **Features**
    - **Virtual Keypad** – Enabled by default, this calls a keypad to the foreground when an alpha or numeric entry is required. This is to be used when a mouse and keyboard is not available (touch-screen applications). If a keypad is not desired, uncheck this option.
    - **External Job Data and Management** – This allows for a third-party program to be used with SlimWare. For example, if using a SCADA program, this option would be checked. By checking this option, the Login/Logout button becomes invisible, and the external application button becomes visible. Users must now login/logout with INI files (see section 12 for INI descriptions and instructions).
    Checking this option will also enable the Live Data Output and Job Data Output features. See sections 13 and 14 for more information.
    - **Serial Job Load** – Checking this option allows a job to be loaded using a serial command from another device such as a PLC.
    - **Data And Alarm Logging** – Checking this option will log all events from the event viewer window to a text file. This file is stored in the program installation folder (default location: C:\ProgramData\Toledo Integrated Systems\SlimWare 7\). If this log file becomes larger than 2GB, the oldest record will be deleted, and the most current records will be added.

- **Logout Time** – The number of minutes of inactivity that SlimWare will wait before automatically logging out the current user. Setting this to 0 will disable the auto-logout feature.

- **Appearance**
  - **Normal Window** – Selecting this option will allow the user to change the size and position of SlimWare like any other window (click-and-drag, etc.). It is recommended to restart SlimWare after this option is changed.
  - **Full Screen** – Selecting this option will cause SlimWare to take up the entire screen, including the taskbar. It is recommended to restart SlimWare after this option is changed.
  - **Fixed Size/Position (Current)** – Selecting this option will cause SlimWare to open at the current size and position every time it starts. Before selecting this option, set the appearance to Normal Window, adjust SlimWare to the desired location and size, then select Fixed Size/Position. It is recommended to restart SlimWare after this option is changed.

    Note: In this mode, the size and position are saved to the SizeAndPosition.ini configuration file, located in SlimWare's data directory (default is **C:\ProgramData\Toledo Integrated Systems\SlimWare 7**).

    If preferred, you may set the size and position manually. Set the appearance to Fixed Size/Position, exit SlimWare, then edit the SizeAndPosition.ini file.

    Width_Size is the width of the SlimWare window, in pixels.
    Height_Size is the height of the SlimWare window, in pixels.
    Left_Position is the distance in pixels from the left edge of the screen.
    Top_Position is the distance in pixels from the top edge of the screen.
    The top, left corner of the screen is considered position (0, 0).

- **Keep On Top** – When enabled, SlimWare will always be the top-most window. Disable this if you would like SlimWare to be able to go to the background.
- **Language** – SlimWare has the capability of running in three different languages (English, Spanish and Simplified Chinese). Note that SlimWare will need to be restarted after this option is changed.

o **Permissions**

- **Setup Personnel Data Entry** – By checking this, setup personnel is allowed to enter data including:
  - High and Low Setpoints
  - Hight % and Low %
  - Enveloping Setpoints
  - Reverse Setpoints
- **Operator Personnel Reset Alarms** – This option allows users logged in as an operator to reset alarms. If operators should not be allowed to reset alarms, uncheck this option.
- **Reset Alarms Without Password** – Checking this option will allow alarms to be reset regardless of the level of user logged in or when no one is logged in. Setting this option will override the operator personnel reset alarm option.
- **Enable Exit Without Password** – Checking this option allows SlimWare to be closed, regardless of the login status. When unchecked, the user must be logged in with the master password before SlimWare can be closed.

o **Signature Analysis**

- **Show Setpoint Markers on Graph** – Checking this option will display the high and low setpoint markers on the signature(s). These markers are designated by yellow horizontal lines on the graph.
- **Automatic HardHit Save** – When checked, SlimWare will automatically save the incoming alarm signatures to the HardHit directory.
- **Automatic Signature Save** – This option allows for SlimWare to automatically request and save a signature every 1 second. See section 11 for more details.
- **Limit Signatures To** – Limits the number of signatures that will stored while using the Automatic Signature Save feature. See section 11 for more details.
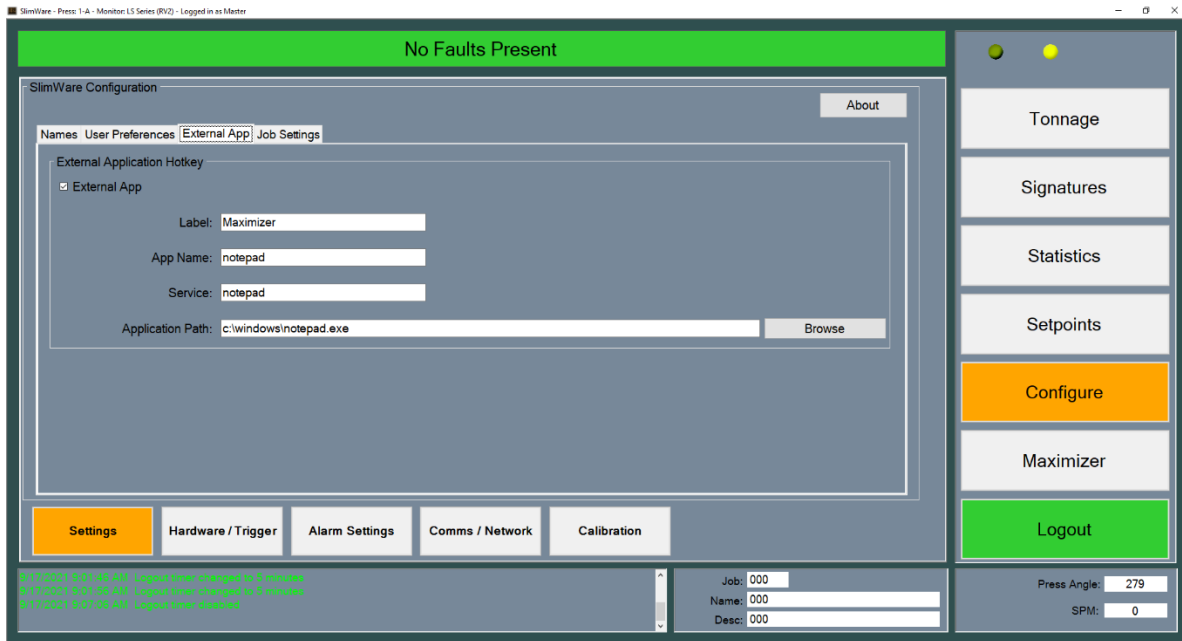
Figure 9-3 –External App Screen

- **External Application Hotkey**
    - **External App** – Checking this option will enable the external application button above the Login/Logout button. This button is used to call a third-party program to the front.
    - **Label** – Input the name to be shown on the external application button.
    - **App Name** – The name of the external application. This name can be seen in the taskbar when the program is running.
    - **Service** – This is the external applications service name. *The service name can be seen by right clicking on the taskbar and selecting "Task Manager". On the services tab of the task manager, find the external applications service name.*
    - **Application Path** – This is the path to the .exe of the external application. Use the browse button to open a dialogue box to browse to the external program executable.

If SlimWare is not able to be brought to front, follow the instructions below:

Certain settings within your PC may prohibit applications being brought to front. These settings can be changed by modifying the following registry key.

HKCU >> Control Panel >> Desktop >> ForegroundLockTimeout

If the default value for this key is 20000 (Hex), this will prohibit programs from coming to the foreground. Change this value to 0 (Decimal) and select "OK". Restart the PC and this will allow the application to come to front.

** Using Registry Editor incorrectly can cause serious, system-wide problems that may require you to re-install Windows to correct them. Toledo Integrated Systems cannot guarantee that any problems resulting from the misuse of Registry Editor can be solved.
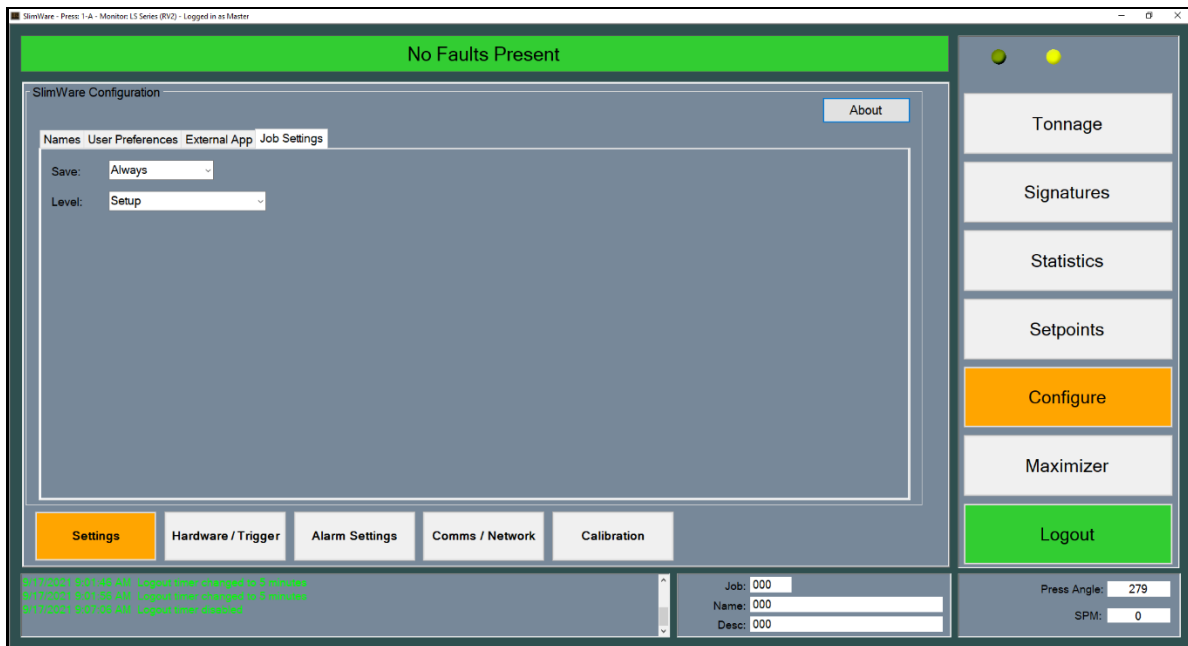
Figure 9-4 –Job Settings Screen

- **Job Settings**
  - **Save Changed Setpoints to Job**– When changing setpoints (standard or enveloping) to a loaded job, the changes can be:
    - Always saved
    - Prompted before saving
    - Never saved (dismissed)
  - **Minimum Login Level Required for Job Changes** – As an extra level of security, a login level can be required to perform job changes. Select the lowest level of user desired for job changes from this list. All levels above the selected level will also be allowed to perform job changes.

II. Hardware / Trigger

The hardware/trigger page contains the basic tonnage monitor features such as the monitor type, number of channels, corner capacity, type of position instrument, decimal place precision and enveloping mode. The hardware/trigger page is split up into three different tabs (Hardware Configuration, Capacity, and Trigger).

NOTE: The features shown will vary widely depending on the model of tonnage monitor selected.
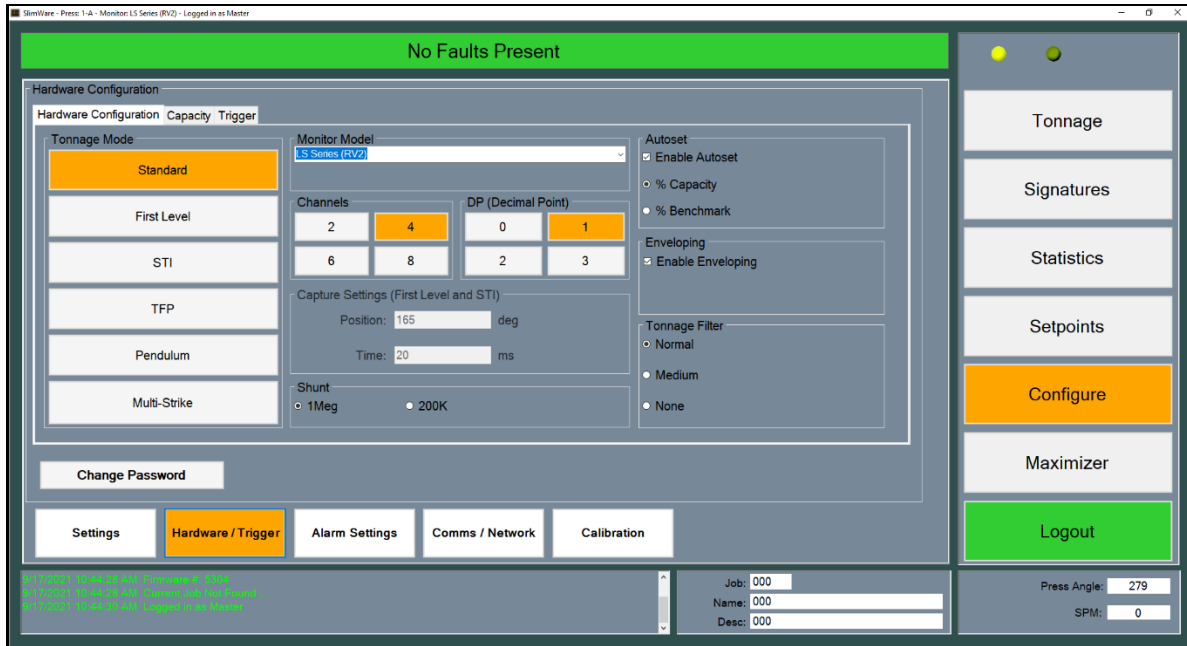
Figure 9-5 –Hardware/Trigger Hardware Configuration Screen

- **Hardware Configuration**
    - **Tonnage mode**
        - **Standard** – The normal mode of operation. For most applications, this is the desired mode. Unless otherwise noted, use this tonnage mode.
        - **First Level** – In first level mode, the load is the peak loading which occurs during the portion of the stroke from the initial threshold crossing until the time point is reached.
        - **STI** – Designed for double-action stamping presses. This mode allows for the inner and outer slide tonnage to be monitored with only mounting four (4) sensors.
        - **TFP** – Designed for a specific type of transfer press system with six (6) columns, where center columns are shared by the two slides.

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- **Pendulum** – Used by servo presses. This mode allows tonnage gathering for the non-cyclical, forward-backward, short stroke motion of servo presses. Each short stroke produces a part.
- **Multi-Strike** – Used by servo presses. Similar to Pendulum mode, but several strikes are used to produce a single part.

- **Channels**
  - The number of channels the unit is to monitor, normally four (4) channels.
- **DP (Decimal Point)**
  - Sets the digits to the right of the decimal point to be displayed.
- **Shunt (SLIM RV2 and LS-Series RV2 only)**
  - **1 Meg** – Standard shunt value used in most calibrations.
  - **200K** – Used only in certain calibration situations where the Gain number is less than 15% of the channel capacity.
- **Autoset**
  - **Enable Autoset (Capacity)** – When enabled, the monitor will calculate all percentages based on press capacity. (The percentages can be configured from the setpoints page).
  - **Enable Autoset (Benchmark)** – When enabled, the monitor will calculate all percentages based on the obtained benchmark value calculated during learn mode. (The percentages can be configured from the setpoints page).
- **Capture Settings**
  - **Position** – Used with first level and STI tonnage modes, this is the position (resolver, encoder, or gray code triggering) at which the load will be captured.
  - **Time** – Used with first level and STI tonnage modes, this is the amount of time the peak hold circuit is monitored once the threshold tonnage has been crossed (threshold triggering) or the probe input signal is read (probe triggering).
- **Enveloping**
  - **Enable Enveloping** – Check this to enable enveloping mode. Enveloping provides a window throughout the press stroke that monitors tonnage from 35 to 284 degrees. Applies to resolver, encoder, or gray code triggering only.
- **Tonnage Filter (ZT-SLIM only)**
  - **Normal** – Analyzes incoming signal from the tonnage sensors and filters out noise from electrical interference.
  - **Medium** – More aggressive noise filtering. Should only be used in situations where high electrical noise is suspected.
  - **None** – The incoming tonnage sensor signal is not filtered.
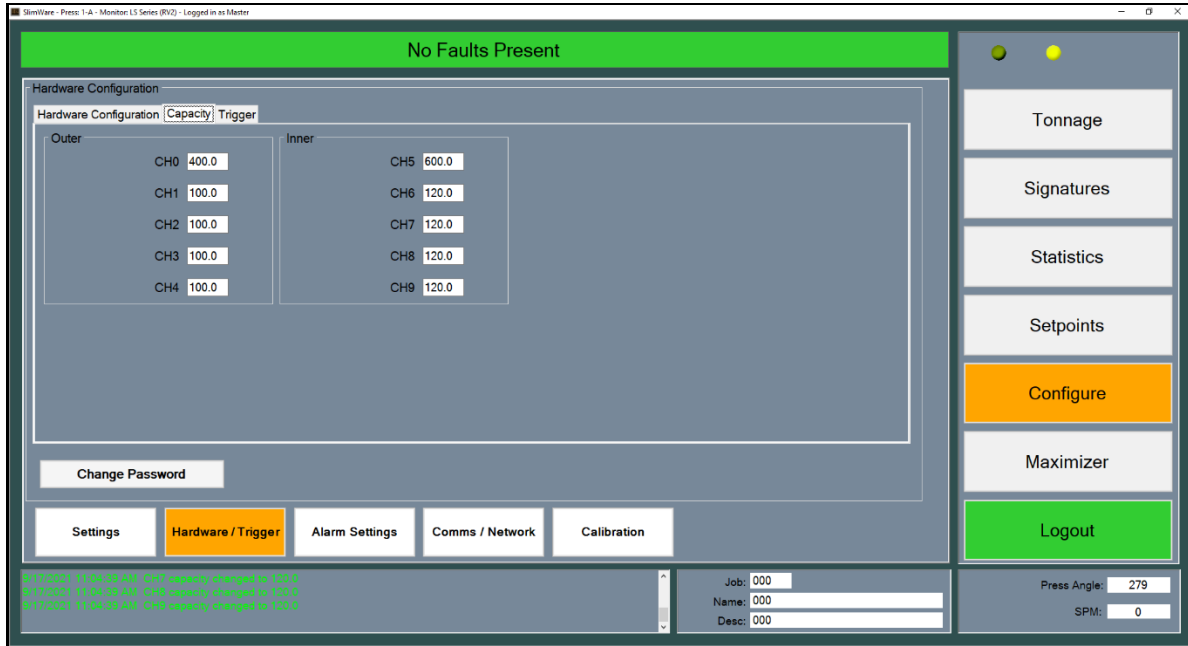
Figure 9-6 – Capacity Screen

The capacity settings for the unit should be set during initial startup and should not be changed thereafter. Changing the capacity will affect all other setpoints.

- **Capacity**
  - o **Outer** – The rated maximum tonnage for the outer slide's total and each corner.
    - For standard single-action presses, this is where the press's rated capacity is entered.
    - For double-action presses, this is where press's rated capacity for the outer slide is entered.
    - Each corner's capacity is typically the slide's total divided by the number of channels for that slide. When the total capacity is entered, SlimWare will automatically calculate the capacities for the individual corners.
    - Each corner can have a different capacity assigned if required (not standard).
  - o **Inner** – The rated maximum tonnage for the inner slide's total and each corner.
    - For double-action presses, this is where the press's rated capacity for the inner slide is entered. Not used for single-action presses.
    - Each corner's capacity is typically the slide's total divided by the number of channels for that slide. When the total capacity is entered, SlimWare will automatically calculate the capacities for the individual corners.
    - Each corner can have a different capacity assigned if required (not standard).

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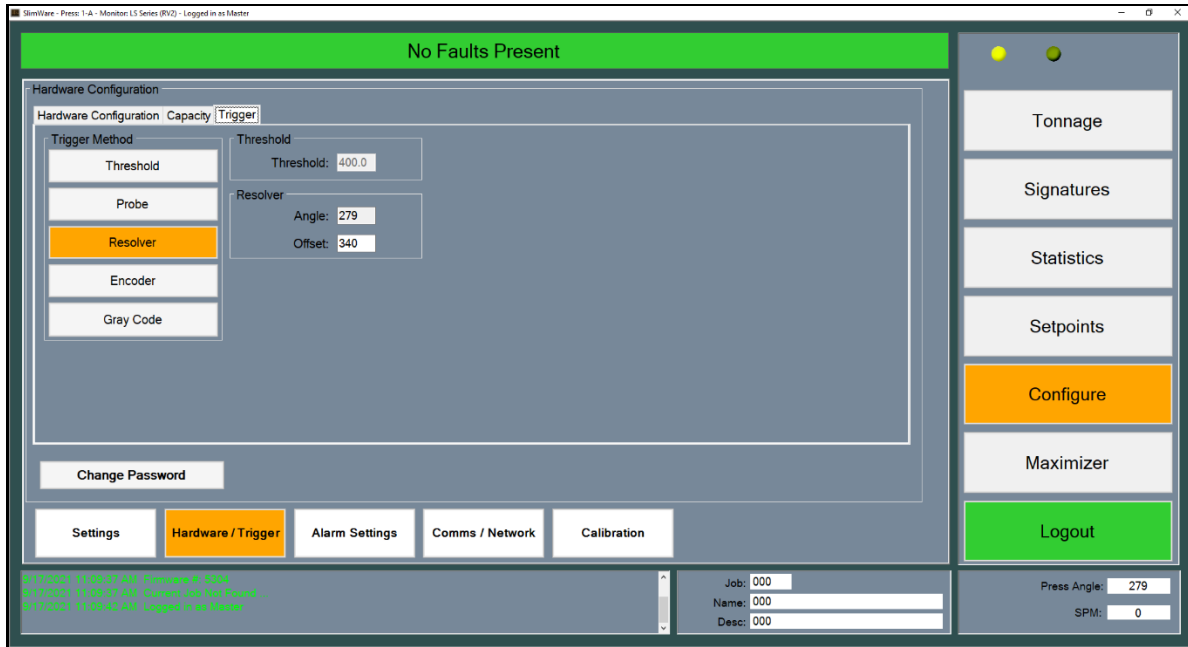
Figure 9-7 – Trigger Screen

- **Trigger**
  - **Trigger Method**
    - **Threshold** – Setting the trigger to threshold will allow a user to enter a desired total tonnage value at which the monitor should start monitoring. For example, if 100 tons is entered, the monitor will not begin its peak hold circuit until 100 total tons has been obtained.
      - The maximum press speed is 400 spm with a threshold trigger.
      - Signatures are not available for some tonnage monitors when using a threshold trigger.
      - The threshold entry field is the total tonnage value (CH0) at which the unit will start to monitor. If the threshold method is not selected, this field is not editable.
    - **Resolver** – Use this method when the tonnage monitor supports a resolver and one is wired into the resolver input.
      - The angle field is read-only and displays the current resolver/encoder/gray code position.
      - The maximum press speed with a resolver trigger is 900 spm.
      - The offset entry field allows users to enter the desired offset value to obtain the correct angle. Valid offset values range from 0-359.

- **Probe** – The probe method can be wired so that an input signal can trigger the monitor to start and stop monitoring.
  - The maximum press speed with a probe trigger is 2000 spm.
  - Signatures are not available for some tonnage monitors when using a probe trigger.
- **Encoder** – Similar to resolver method. Use this method when the tonnage monitor supports an incremental encoder and one is wired into the encoder input.
  - The angle field is read-only and displays the current resolver/encoder/gray code position.
  - The maximum press speed with an encoder trigger is 900 spm.
  - The offset entry field allows users to enter the desired offset value to obtain the correct angle. Valid offset values range from 0-359.
- **Gray Code** – Accepts a gray code logic signal. Use this method when the tonnage monitor supports gray code and a gray code signal is wired into the IN(x) inputs.
  - The angle field is read-only and displays the current resolver/encoder/gray code position.
  - The maximum press speed with a gray code trigger is 900 spm.
  - Gray code is the absolute position of the press. Therefore, no offset value is needed.

- **Change Password** – Press the button to change the passwords for master, setup or operator users. Select the desired type of user from the top radio buttons and select "Enter" once a new password has been entered.
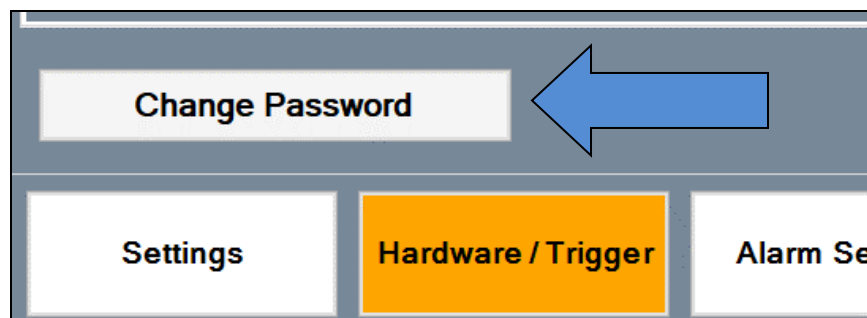
III. Alarm Settings

Alarm settings can be configured from the alarm setup page. Below is a sample screen of the alarm settings page. For certain tonnage monitors, each type of alarm can be configured for a specific type of stop including top or immediate stop. Alarms can also be bypassed on a channel-by-channel basis. For some legacy monitors, these settings are read only.

Figure 9-8 Configuration Bypass Screen (4 Channel)

For example, in the above screen shot, the high setpoint and reverse alarms are bypassed, while Capacity, CCM, Low setpoint, High and Low enveloping alarms are active. Immediate stops are declared for Capacity and CCM alarms, while top stops are declared for the remaining alarms.

To bypass and/or change the alarm type, click on the button to toggle through the available options. When any type of alarm or stop is changed, an Apply and Cancel button will appear in the bottom right-hand corner of the configuration screen. To save the alarm setting changes, press the "Apply" button.

For an eight (8) channel unit, toggle between the slides by using the two tabs near the top of the screen. As with the four (4) channel unit, each slide and channel number can be configured independently.

IV. Comms / Network

The comms (communication) / network page contains all the settings pertaining to the communication between SlimWare and the tonnage monitor, hard-hit software connections and opc server and client tag definitions. Once configured during setup, the communication and network settings should not be adjusted unless communications have been terminated. The communication/network page is split up into five different tabs: Common, Ethernet, Serial, PLC, and Bluetooth.

NOTE: Not all tabs and options are available for all monitors.
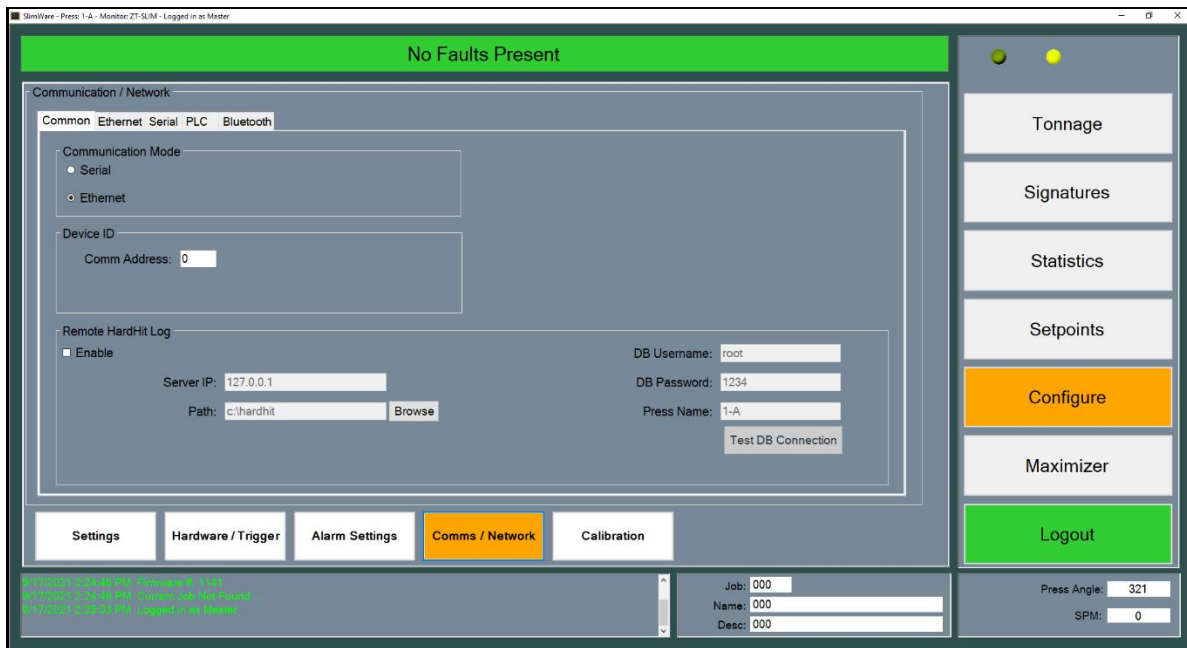
Figure 9-9 Configuration Communication/Network Common Screen

- **Common**
  - This tab contains settings that are common to Ethernet, Serial, and PLC communication.
  - **SlimWare Communication Mode –** Specifies how SlimWare will communicate with the tonnage monitor. Choose between Serial or Ethernet, depending on the connection. Only tonnage monitors that support Ethernet communication will have the option to select both. See the Initial Setup section for more information.
  - **Device ID**
    - **Comm Address –** The Comm Address is a unique number (0-31) assigned to each individual tonnage monitor when multiple units are installed on a PressNet plant-wide network. If not part of a PressNet network, leave this at 0.

- o **Remote HardHit Log –** This group contains the network settings for saving hard hits (over-tonnage) to a location on the network.
  - ▪ **Enable** – If checked, SlimWare will attempt to write any alarm values to the remote MySQL database and save hard-hit signatures (alarms) to the remote PC. If the remote PC is unavailable, SlimWare will attempt to store the alarm information in a local database. Once the remote PC becomes available, the alarm data stored in the local PC will be transferred to the remote PC database.
  - ▪ **Server IP** – The IP address of the remote PC.
  - ▪ **Path** – The location on the remote PC where signatures will be stored.
  - ▪ **DB Username** – The MySQL database username (Default: "root").
  - ▪ **DB Password** – The MySQL database password (Default; "1234").
  - ▪ **Press Name** – The name of the press. This is stored in the remote database and used for reporting purposes.
  - ▪ **Test DB Connection** – This button can be used to verify the connection between SlimWare and the remote database. By clicking this button, SlimWare will attempt to connect to the remote database. A message box will appear indicating the connection status.
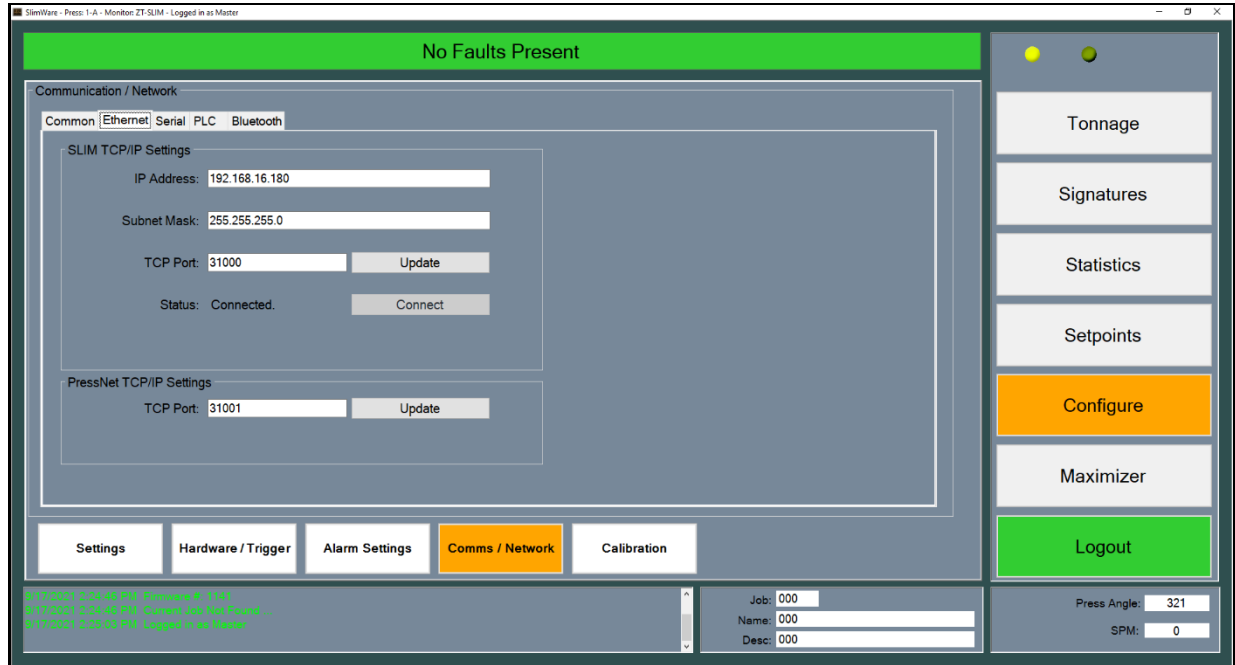
Figure 9-10 Configuration Communication/Network Ethernet Screen

- **Ethernet**
  - This tab contains Ethernet-related communication settings. These settings are only changeable when the SlimWare Communication Mode is set to Ethernet.
  - **TCP/IP Settings**
    - **Remote IP –** The IP Address of the monitor. Default is 192.168.16.180
    - **Subnet Mask** – The subnet mask of the local network on which the SlimWare PC and the monitor are connected. Default is 255.255.255.0
    - **TCP Port** – The unique port number of the TCP connection that the monitor and SlimWare will share. Default is 31000.
    - **Status** – The current state of the TCP connection between SlimWare and the monitor. Will be either "Connected" or "Disconnected".
    - **Update –** Pressing this button will send the Remote IP Address, Subnet Mask, and TCP Port settings to the monitor. Press the Update button after changing any of the above settings. After the settings are sent, the tonnage monitor will reboot and SlimWare will display a message that it will need to restart to apply the settings. Wait for the monitor to finish rebooting, then reopen SlimWare.
  - **PressNet TCP/IP Settings**
    - **TCP Port** – The unique port number of the TCP connection that the monitor and PressNet will share. This must be different than the TCP port number for the SlimWare connection. Default is 31001.

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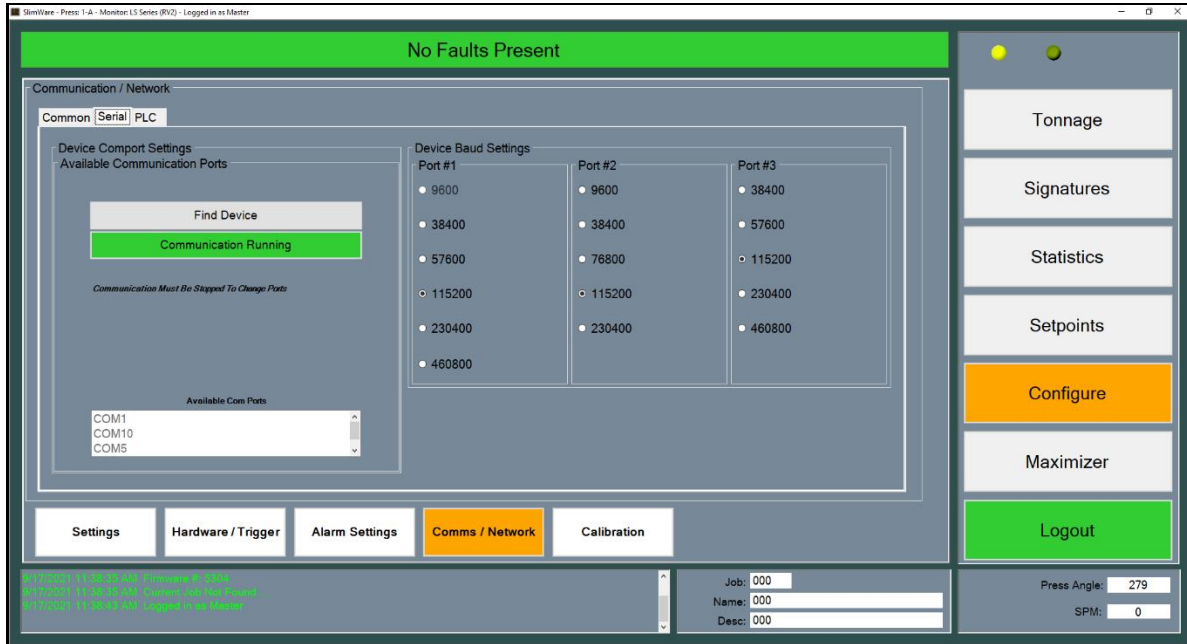
Figure 9-11 Configuration Communication/Network Serial Screen

- **Serial**
    - This tab contains Serial-related communication settings. These settings are only changeable when the SlimWare Communication Mode is set to Serial.
    - **Device Comport Settings**
        - **Find Device –** Select this button if the com port, baud rate or address have been changed. *See more about this in the initial communication setup later in this section.*
        - **Available Com Ports** – Lists the available com ports on the PC.
        - **Communication Running / Idle** – Indicates whether communications have been established and whether communications are running. If the com port is open, this button will be green. If no com port is open, this button is yellow.
    - **Device Baud Settings** – This is the main communication port between the PC (SlimWare) and the tonnage monitor. Select the desired baud rate for the monitor. Additional ports will be shown if the tonnage monitor supports them.

If serial communication has been lost or SlimWare is being installed on a new PC, follow these steps to establish communication with the tonnage monitor.

- **Communication Setup**
    - If communications are currently running, press the green "Communications Running" button. The button should turn yellow and the text will change to "Communication Not Running".

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- From the Available Com Ports list box, select the desired PC com port, then press the yellow "Communication Not Running" button. SlimWare will try to connect to the desired com port.
- If needed, change the baud rate and comm address (located on Common tab) to the desired values.
- If the baud rate and/or comm address is not known, press the Find Device button and wait while SlimWare searches for the proper settings.
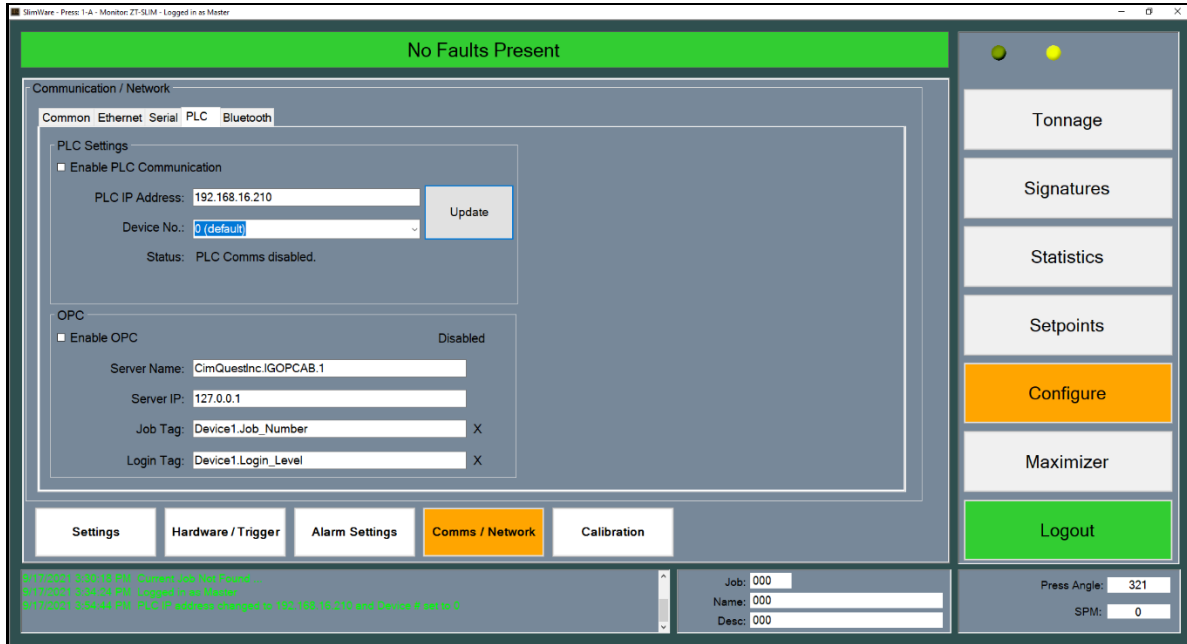
Figure 9-12 Configuration Communication/Network PLC Screen

- **PLC**
  - This tab contains PLC-related communication settings. Configure these settings when the monitor will communicate directly to a PLC.
  - **PLC Settings**
    - **Enable PLC Communication** – Check this box to enable communications between the monitor and the PLC located at the IP Address listed in the PLC IP Address field.
    - **PLC IP Address** – The IP address of the PLC with which the monitor will communicate. The Enable PLC Communication checkbox must be unchecked before you can edit this.
    - **Device No.** – If multiple tonnage monitors will be communicating to the same PLC, you must assign a unique device number to each. Keep this set to 0 if only one monitor will communicate with the PLC.
    - **Update** – Press this button to send the PLC IP Address to the monitor. The Enable PLC Communication checkbox must be unchecked before you can send the PLC IP Address to the monitor.
    - **Status** – The current state of the PLC connection.
  - **OPC**
    - This group box contains the OPC server address and OPC client tag names used for job changes, bolster ID, etc.
    - **Enable OPC** – If checked, SlimWare will attempt to read the OPC tags defined from the tag names and server address.

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- **Server Name** – This is the OPC server name. By default, this is *CimQuestInc.IGOPCAB.1*
- **Server IP** – The IP address of the PC where the OPC server is located.
- **Job Tag** – The OPC client tag name. This value is defined by the job name/number tag in the PLC.
- **Login Tag** – The OPC client tag name. This value is defined by the login level tag in the PLC.
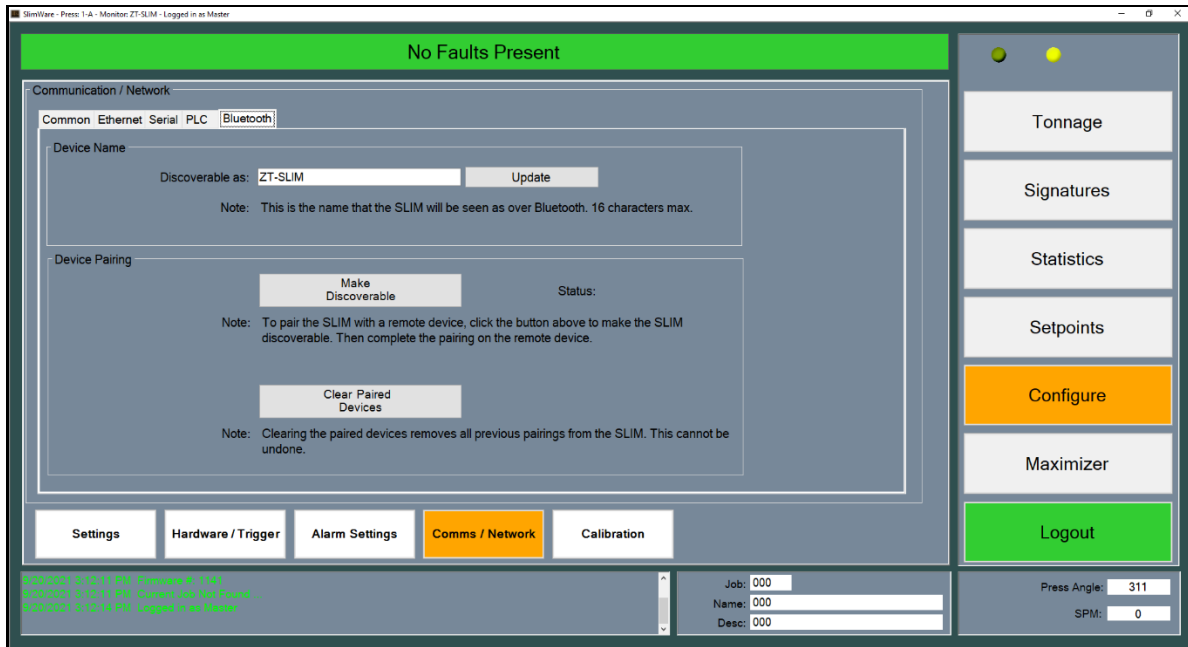
Figure 9-13 Configuration Communication/Network Bluetooth Screen

- **Bluetooth**
  - This tab contains Bluetooth-related settings that allow the ZT-SLIM tonnage monitor to communicate with the ForceView app for Android smart phones.
  - **Device Name**
    - **Discoverable As** – This is the name that the ZT-SLIM will be seen as over Bluetooth. The name can be up to 16 characters long. After changing the name, click the Update button.
  - **Device Pairing**
    - **Make Discoverable** – Click this button to make the ZT-SLIM discoverable to a remote device, such as a smart phone. After making the ZT-SLIM discoverable, complete the pairing on the remote device.
    - **Clear Paired Devices** – Multiple remote devices can be paired with the ZT-SLIM. Clicking this button will clear the list of paired devices from the ZT-SLIM's memory.

V. Calibration

Calibration should only be done by a trained Toledo Integrated Systems technician or someone else with tonnage monitor calibration knowledge. Depending on the model of tonnage monitor being calibrated, the functionality of the Calibration page will vary. Some monitors require the calibration to be performed manually, therefore the Calibration page will be read only.

Refer to the Calibration Procedure of this manual for further details.

**Warning: Improper calibration of the monitor can result in physical damage to the press. Please contact Toledo Integrated Systems if you have any questions about the tonnage calibration procedure.
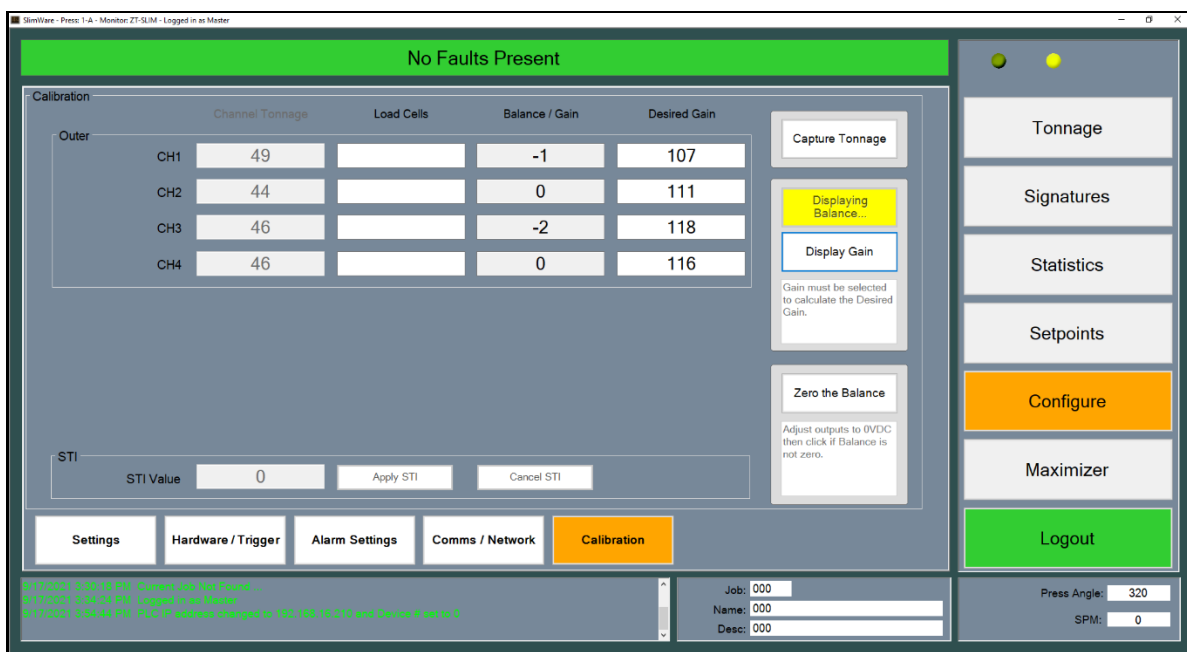
Figure 9-14 Configuration Tonnage Calibration Screen (4 Channel) – ZT-SLIM

- **Channel Tonnage** – Displays the current peak tonnage from the tonnage monitor.
- **Load Cells** – User input of the displayed tonnage from the calibration load cells (AutoCells). Available when displaying Gain values. Entering a Load Cell value will cause SlimWare to calculate a new Desired Gain value based on the current channel tonnage.
- **Balance/Gain** – Depending on the mode and stage of calibration, the monitor's balance (zero) or gain (shunt).
- **Desired Gain** – User input of the new desired gain values. Available when displaying Gain values. These are automatically calculated by entering load cell values.
- **Capture/Capturing Tonnage** – When the monitor is ready to capture peak load tonnage values, this button will turn yellow and display the "Capturing Tonnage" message.

When the balance or gain values are being displayed, pressing this button will exit calibration mode and the monitor will be ready to capture peak load tonnage again.

- **Display/Displaying Balance** – Press this button to display the current sensor balance for each channel. After pressing this button, the values in the "Balance/Gain" fields show the sensor balance. This mode is used for calibration purposes. The monitor will not update its peak tonnage while it is displaying the balance.

- **Display/Displaying Gain** – Press this button to display the current gain for each channel. After pressing this button, the values in the "Balance/Gain" fields show the sensor gain. This mode is used for calibration purposes. The monitor will not update its peak tonnage while it is displaying the gain.

- **Zero the Balance** – When displaying the balance, this button zeroes the balance of the tonnage monitor's channels. The balance should only be zeroed when the press is in the top position without any load on the sensors. ***This button does not balance the actual signal output voltage by the tonnage monitor.*** You should always adjust the balance pot of each channel on the monitor to read close to zero volts output. After this is done, you can use the Zero the Balance button to correct minor differences between the actual balance voltage and the balance readings as shown in SlimWare.

- **STI**
  - **STI Value** – User input for the desired STI value so that the monitor can calculate the Inner Slide tonnage. Only available when in STI mode.
  - **Apply STI** – When entering the STI Value this button will send the desired value to the monitor.
  - **Cancel STI** – When entering the STI Value this button will cancel the value the user has entered and return to the original value.
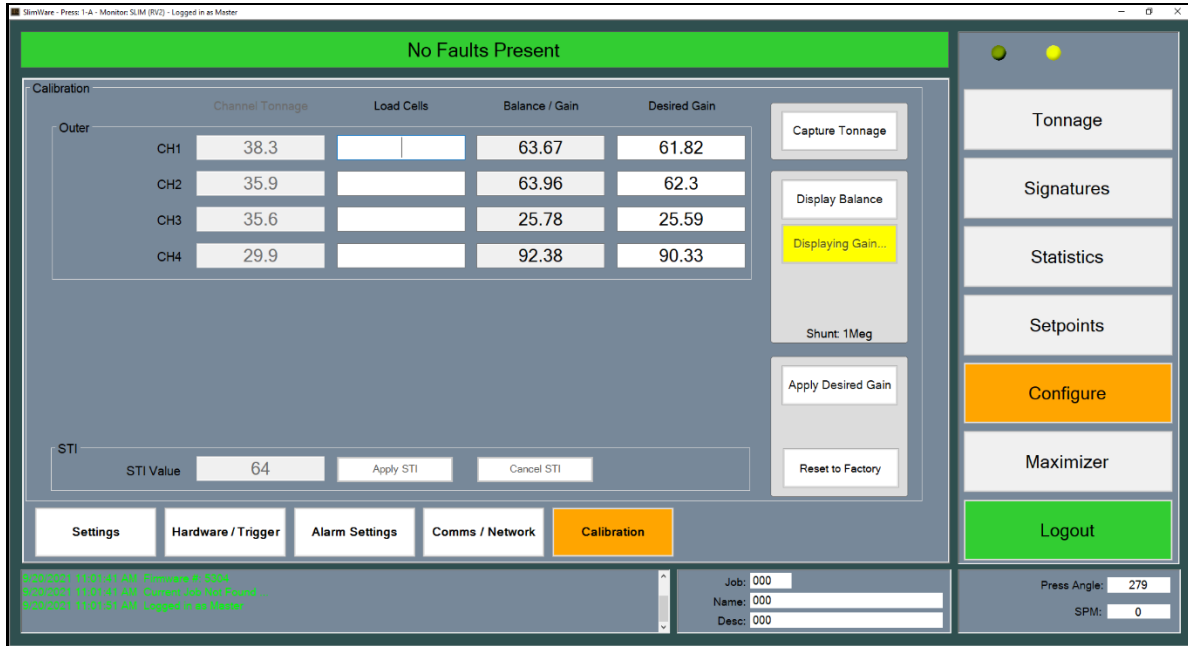
Figure 9-15 Configuration Tonnage Calibration Screen (4 Channel) – SLIM/LS-Series

For the SLIM and LS-Series tonnage monitors, many of the previously discussed features of the ZT-SLIM **Channel Tonnage**, **Load Cells**, **Balance/Gain**, **Desired Gain**, **Capture Tonnage**, **Display Balance**, and **Display Gain**) still apply. The differences are discussed below.

- **Zero the Balance** – When displaying the balance, this button zeroes the balance of the tonnage monitor's channels. The balance should only be zeroed when the press is in the top position without any load on the sensors.
- **Apply Desired Gain** – When displaying the gain, this button will send the desired gain values to the monitor.
- **Reset to Factory Default** – Pressing this button will reset the monitor's balance/gain values back to their factory default settings. This should only be done if the unit's tonnage readings become unresponsive during the calibration process, or if instructed to do so by a Toledo Integrated Systems technician.

10. Job Settings

The job settings can be controlled through SlimWare itself or externally through INI (configuration) files. From SlimWare, users can add, edit, or delete job setpoints. To access the job settings page, click anywhere in the job group box near the bottom of the screen (see figure 4-1, point E). If the password is at or above the required level to access the job settings page, the screen in figure 10-1 will load.

NOTE: Not all tonnage monitors support jobs.
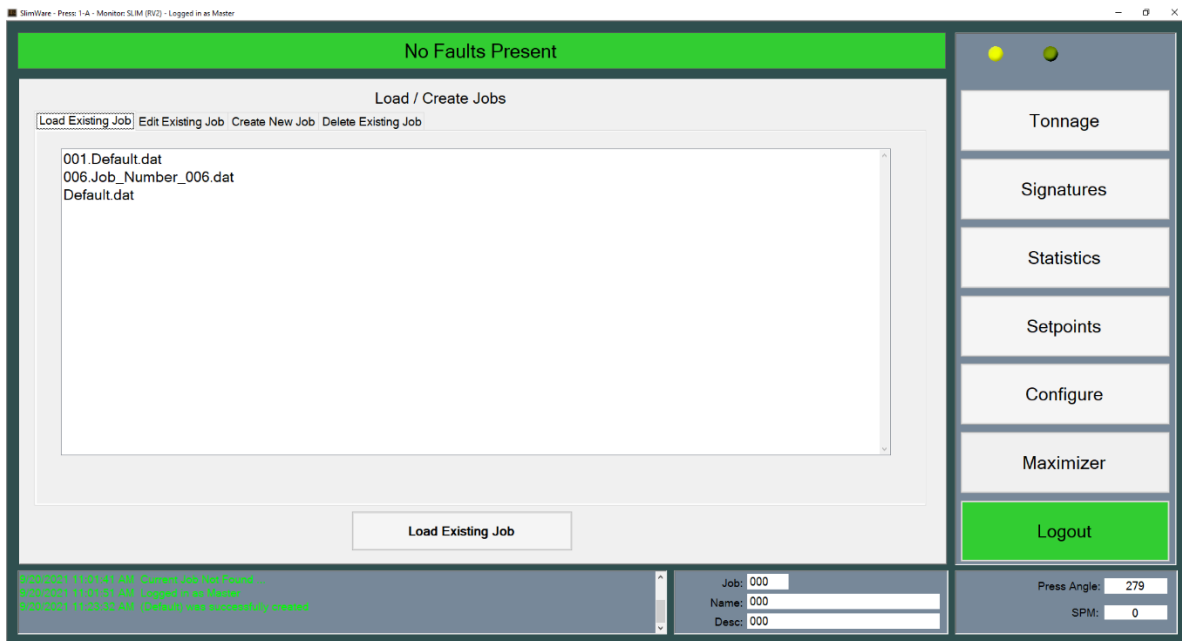
Figure 10-1 Load Existing Job Screen

I. Load Existing Job

- As mentioned above, SlimWare can manually or externally load a new job. If "External Job Data and Management" is checked on the configuration page, third party programs need to create an INI file in SlimWare's external file directory and a new job will load.

- To load a new job manually, click on the desired job (the new job will become highlighted in the list), and select "Load Existing Job". Notice the job number, name and description will update along with the historical text box.

- If the loaded job is new or has not yet been "learned", a message will appear notifying the user that no available signature is available. Once the job has been successfully "learned", a saved signature and folder will be created for the job.

(To learn a job, simply select "Learn" from the tonnage page once the new job is loaded. This will automatically calculate setpoints based on 8 strokes.)
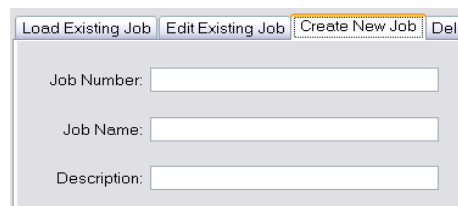
- The external job folder is located in the SlimWare data directory. Normally, this path is: C:\ProgramData\Toledo Integrated Systems\SlimWare 7\ExtData. If the installation path is changed during installation, the above path should be modified to reflect that change.

- To view the INI file structure type, view section 12 for all external file type structures.

II. Edit Existing Job

- SlimWare allows for users to edit job parameters while the job is not loaded. By selected the "Edit Existing Job" tab, a list of all previously saved jobs (excluding the currently loaded job) will appear. Click on the desired job and the setpoints (standard and enveloping) will load.

- Edit any of the job parameters and select "Save Job Settings". This will save the setpoints to the desired job. The changes will be reflected next time the job loads.

III. Create New Job

- To create a new job, select the "Create New Job" tab. The window below will load.

Figure 10-2 Create New Job

- Enter the desired job number, job name and description for the new job and select "Create New Job". Note: The job number can be a max of three digits and the job name must start with a non-numeric value.

- The newly created job is not loaded, just created. It is created with the current setpoints that are stored in the monitor (the current job loaded). To load the new job, select the "Load Existing Job" tab. The recently created job will be listed. Click on the new job and select "Load Existing Job". The new job will be loaded.

- If the setpoints of the currently loaded job are not suitable, once created, follow the steps in section II above for editing an existing job.

IV. Delete Existing Job

- To remove an existing job, select the "Delete Existing Job" tab and highlight the job that is to be removed. Once highlighted, select "Delete Job". A message box will appear asking for confirmation; select "Yes" to permanently remove the job from SlimWare.

11. Automatic Signature Save Feature

SlimWare can automatically download and save signatures for later analysis. This section will discuss this feature and its options.

The Automatic Signature Save feature can be found on the **User Preferences** tab of the **Configure→Settings** page.
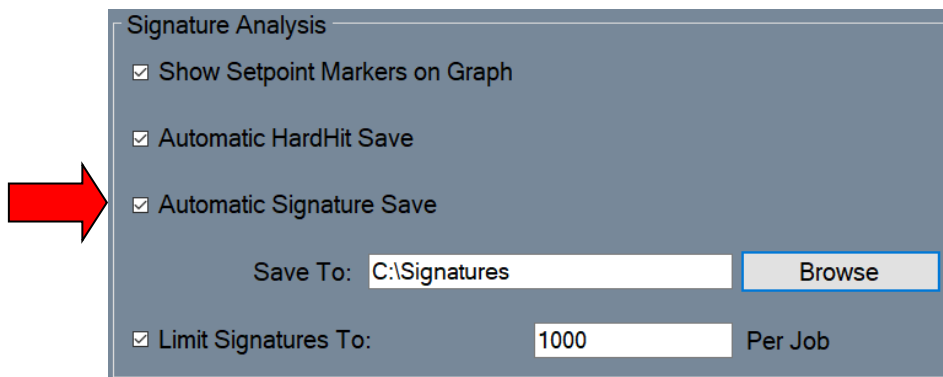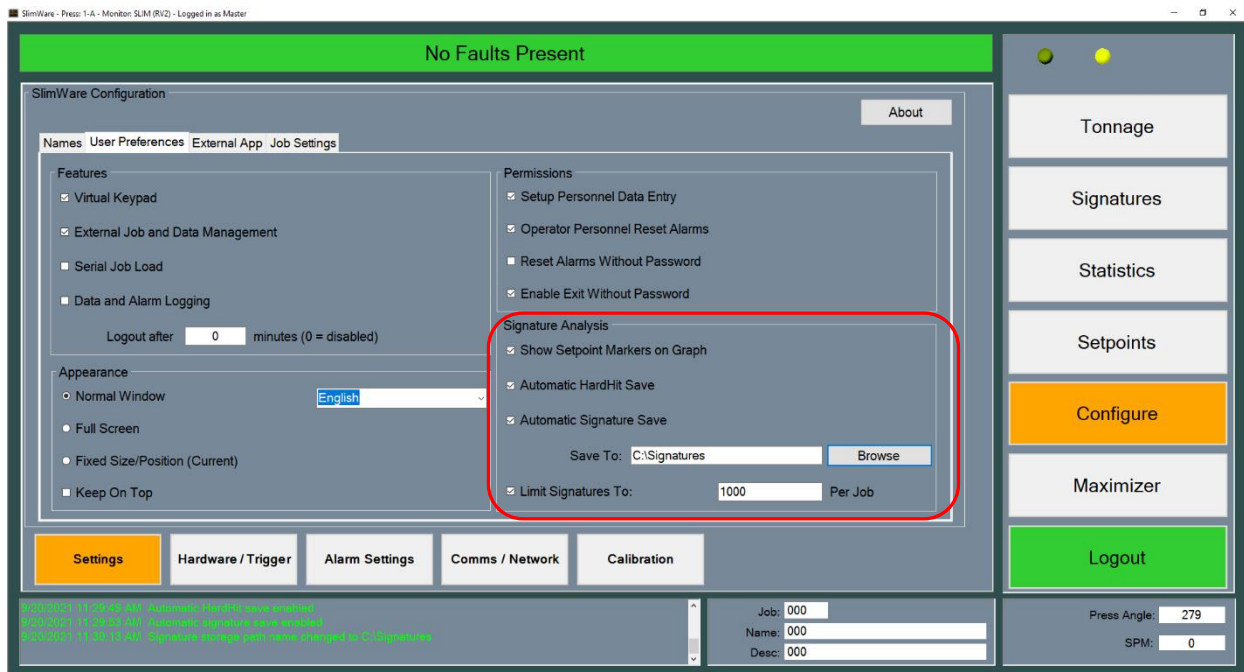
Check the **Automatic Signature Save** box to begin gathering signatures during runtime.

- Please note the following:

  - Signatures are saved in both .swsx and .csv file formats. SlimWare can only open and analyze the .swsx file format. See section 15 for details of the comma-separated-value (.csv) files.

  - Automatic saving does not occur while the tonnage monitor is in Learn Mode. If learn mode is active, automatic saving will resume once the new benchmark is learned.

  - Signature saving occurs no more often than every 1 second. Therefore, presses cycling faster than 60 SPM will not be able to capture and save every stroke.

  - Automatic signature saving is only recommended for tonnage monitors that communicate at 38400 baud or above. Using this feature at low baud rates will result in slower performance.

  - Signatures are named in the following format:

YYYY_MM_DD_hh_mm_ss.swsx   where   **YYYY** is the year in 4-digit format
                                                                MM is the month (01-12)
                                                                DD is the day of the month (01-31)
                                                                hh is the hour in 24-hour format (00-23)
                                                                mm is the minute (00-59)
                                                                ss is the second (00-59)

I. Automatic Signature Storage

By default, SlimWare saves its signatures to the **C:\ProgramData\Toledo Integrated Systems\SlimWare\DataLog\Signature** directory. This location can be changed to suit your requirements. For example, you can choose a different directory on the local hard drive, a network drive, or a USB flash drive.
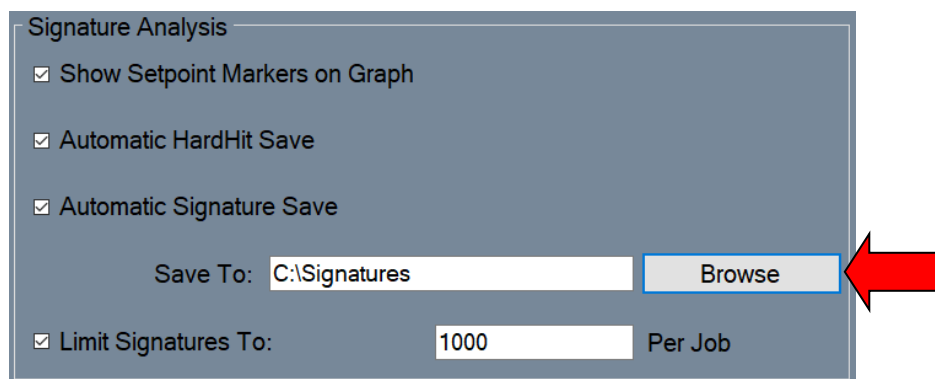
- To select a customized storage location, click the **Browse** button next to the **Save To** path. In the resulting dialog box, browse to the directory that you would like to use for storage and click **OK**.

- Once a **Save To** directory is selected, SlimWare will create a directory structure in which to store the signatures. In this example, the **Save To** directory is **C:\Signatures**.
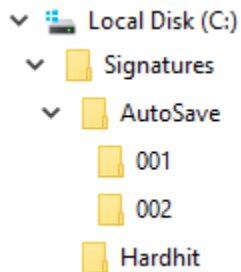
Inside the Save To directory, SlimWare creates a directory named **AutoSave** where all automatically saved signatures are stored. The signatures are further sorted into numeric subdirectories that correspond to the currently loaded job. For example, while Job #2 is loaded all saved signatures will be stored in the **C:\Signatures\AutoSave\002** directory.

Also, inside of the **Save To** directory, if the **Automatic Hardhit Save** feature is enabled, SlimWare creates a Hardhit subdirectory where all alarm signatures are stored.

II. Signature Storage Maintenance

To manage the number of signatures that are automatically saved, you can apply a limit. Once the limit is exceeded, SlimWare will delete the oldest signatures in a first-in-first-out (FIFO) manner to make room for new ones.
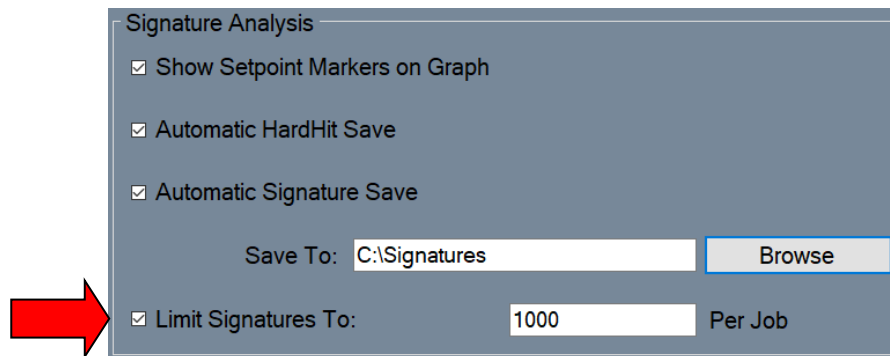
- To enable signature limits, check the **Limit Signatures To** box, then enter a value for the maximum number of signatures that should be stored. You may set the limit from 1 to 25,000 signatures per job.

- Signature limits apply only to the **AutoSave** directory and its subdirectories. The limit does not apply to the Hardhit directory.

- The signature limit is enforced for each type of signature file. Therefore, setting a limit of 25,000 will allow SlimWare to save up to 25,000 .csv signature files **AND** 25,000 .swsx signature files.

- When choosing a limit, keep in mind the size of the signature files. An 8-channel .swsx file takes approximately 11KB of storage, but each .csv file can vary in size, potentially taking 30KB or more. If you have 120 jobs with 25,000 signatures each, there could be 3,000,000 signatures in total. Therefore, saving 3,000,000 signatures can require up to 123GB of storage.

- If you choose not to impose a signature limit, SlimWare will still protect the storage drive from overfilling. In this case, the number of saved signatures is limited only by the storage space available. SlimWare continuously checks the amount of storage space remaining and warns the user when the amount of storage is low. When the amount of available storage falls below 1GB remaining, SlimWare will present the following warning.

This is simply a warning. All signature storage will continue, but the user should make more storage space available soon to avoid losing signatures. Click **Later** to close the warning or click **View** to open the storage directory.

When the amount of available storage falls below 500MB remaining, SlimWare will present the following warning.
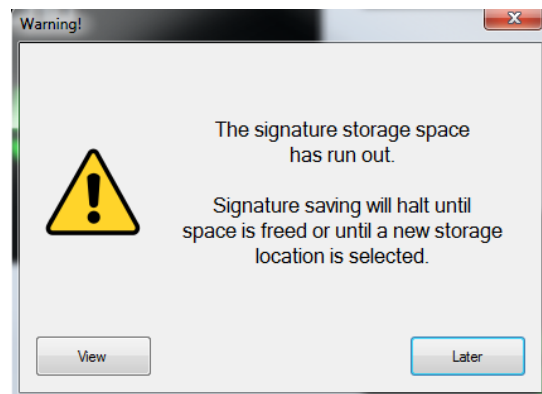
When this happens, no further signatures will be stored until more space is made available. Click **Later** to close the warning or click **View** to open the storage directory.

REMEMBER: It is the responsibility of the user to maintain the signature storage to avoid loss of data.

12. External Configuration Files

There are two (2) configuration files that control job, login and setpoint features. These two configuration files are named **Ext_Job.ini** and **Slimware_Stat.ini**. These files are to be written to the following location:

C:\ProgramData\Toledo Integrated Systems\SlimWare 7\ExtData

The above path reflects the default installation path. If this path was changed during SlimWare installation, the path will reflect these changes.

I. Ext_Job.ini

- Ext_Job.ini applies only to tonnage monitors that support external job changes.
- Ext_Job.ini controls all features related to job changes. A sample Ext _Job.ini is shown below in figure 12-1.
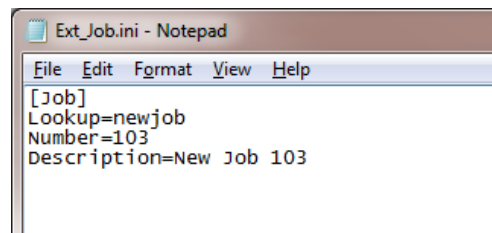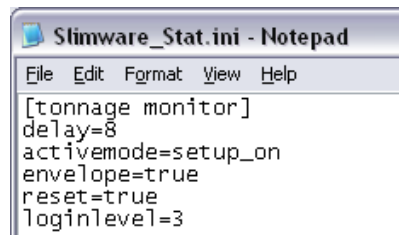
Figure 12-1 Ext_Job.ini

- **[Job]** – This is a static value and cannot be changed. When writing the Ext_Job.ini, this value must be included.
- **Lookup** – This is the value that SlimWare will use to lookup or create the job. The Lookup value is the Job Name and must start with a non-numeric value.
- **Number** – SlimWare will also use this value to lookup or create the job. The Number value is the Job Number. This must be a numeric value and a max of three digits.
- **Description** – This value is only used to give a better description of the job and is not used to lookup or create a job.
- In Figure 12-1, SlimWare is searching for the job with the name of "newjob" and a number of "103". If this job can be found, the job and corresponding setpoints will be loaded. If "103.newjob" is not found, the job will be created with the current setpoints and the user will be alerted that the job could not be found (in the historical data window).

II. Slimware_Stat.ini

- Slimware_Stat.ini controls all features related to setpoints, login and other functions with the tonnage monitor.

Figure 12-2 Slimware_Stat.ini

For all items defined below, only one variable is required when writing the Slimware_Stat.ini. For example, to reset the monitor, only the reset command needs to be sent. The delay, activemode, envelope and loginlevel are not required to be written along with the reset command. Not all commands are compatible with all tonnage monitors.

- **[tonnage monitor]** - This is a static value and cannot be changed. When writing the Slimware_Stat.ini, this value must be included.
- **Delay** – This value is used in conjunction with the activemode feature (described below). When the delay value is set, the monitor will remain in setup mode for the declared number of cycles before switching to learn mode. In figure 12-2, the monitor will remain in setup mode of eight (8) cycles before automatically moving to learn mode.
- **Activemode** – There are four possible declarations for this variable:
  - setup_on: This will place the monitor in setup mode.
  - setup_off: This will take the monitor out of the setup mode.
  - learn_on: This will place the monitor into learn mode.
  - learn_off: This will take the monitor out of the learn mode.

  Activemode is optional and is only required when the delay value is declared.
- **Envelope** – By setting this value to "true", the monitor will enable enveloping mode. Enveloping is disabled by writing a "false" to this variable.
- **Reset** – The only value that can be written to this variable is "true". By writing "true", the monitor will issue the reset command to reset any alarms.
- **Loginlevel** – By writing a "3", "2", "1" or "0", users can be logged in or out. Below are the login levels and equivalent values:
  - Master: "3"
  - Setup: "2"
  - Operator: "1"
  - Log Out: "0"

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13. Live Data Output Feature

The Live Data Output feature provides a means for SlimWare to communicate the current peak load values and alarm status to external applications. This is accomplished via a Comma-Separated-Value (CSV) file, named "livedata.csv" that can be opened and read at any time. The file is written to the following location:

C:\ProgramData\Toledo Integrated Systems\SlimWare 7\ExtData

To enable this feature, check the External Job and Data Management option on the Configure>>Settings>>User Preferences screen.

I. File format of the "livedata.csv" file

- The "livedata.csv" file contains the most current peak load values for each channel as well as their corresponding alarm status. A sample file is shown below in figure 13-1.
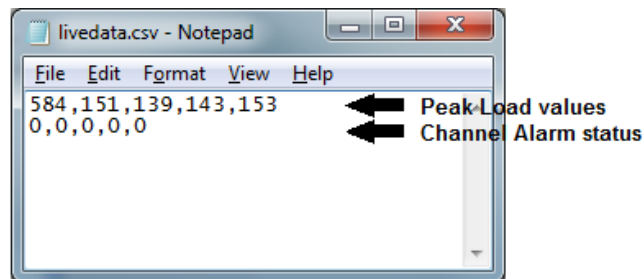
Figure 13-1 livedata.csv

- The file format for a 4-channel tonnage monitor is as follows:

	CH0 Load	CH1 Load	CH2 Load	CH3 Load	CH4 Load
Line 1					
Line 2	CH0 Status	CH1 Status	CH2 Status	CH3 Status	CH4 Status

where CH0 corresponds to the total, CH1 corresponds to channel 1, etc.
- Each peak load value is separated by a comma.
  Each channel alarm status is separated by a comma.
  The new-line characters (ASCII <CR> <LF>) separate the peak load values and the channel alarm statuses.
- The peak load values are stored in standard ASCII format, including decimal points (when applicable).

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- The channel alarm status values are stored in standard ASCII format. The status is represented by a decimal number (0-7), which equates to the following alarm types:
    - 0 = No alarm
    - 1 = Capacity alarm
    - 2 = CCM alarm
    - 3 = High Setpoint alarm
    - 4 = Low Setpoint alarm
    - 5 = Reverse alarm
    - 6 = High Enveloping alarm
    - 7 = Low Enveloping alarm

- Note that only enabled channels are written to the file.
  2-channel units will only include CH0, CH1, and CH2 load values and statuses.
  8-channel units will include CH0, CH1, CH2, CH3, CH4, CH5, CH6, CH7, CH8, and CH9 load values and statuses.

II. Reading the "livedata.csv" file

- Any application that accesses the "livedata.csv" file must follow this sequence:
    - Open the file.
    - Read the contents.
    - Close the file.
- SlimWare will not be able to update the file if it remains opened.
- SlimWare updates the "livedata.csv" every 1 second. Any application that reads this file should not attempt to read it more frequently than this interval.
- The "livedata.csv" was designed to be read a line at a time.
  The first line read will return the load values, starting at CH0 (the total) and ending with the highest configured channel, with a comma separating each value.
  The second line read will return the channel alarm statuses, starting at CH0 (the total) and ending with the highest configured channel, with a comma separating each value.

14. Job Data Output Feature

The Job Data Output feature provides a means for SlimWare to communicate the settings (setpoints, benchmark tonnages, etc.) of the currently loaded job to external applications. This is accomplished via a Comma-Separated-Value (CSV) file, named "jobdata.csv" that can be opened and read at any time. The file is written to the following location:

C:\ProgramData\Toledo Integrated Systems\SlimWare\ExtData

To enable this feature, check the External Job and Data Management option on the Configure>>Settings>>User Preferences screen.

I. File format of the "jobdata.csv" file

- The "jobdata.csv" file contains the settings for the currently loaded job, as well as other data such as the job number and name, and the press capacity. A sample file is shown below in figure 14-1.
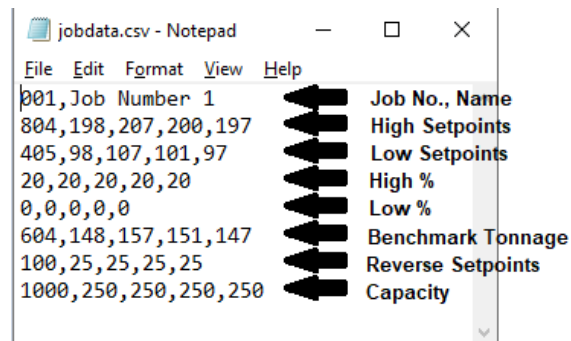
Figure 14-1 jobdata.csv

- The file format for a 4-channel unit is as follows:

Line 1	Job Number	Job Name			
Line 2	CH0 Hi Setpoint	CH1 Hi Setpoint	CH2 Hi Setpoint	CH3 Hi Setpoint	CH4 Hi Setpoint
Line 3	CH0 Lo Setpoint	CH1 Lo Setpoint	CH2 Lo Setpoint	CH3 Lo Setpoint	CH4 Lo Setpoint
Line 4	CH0 Hi %	CH1 Hi %	CH2 Hi %	CH3 Hi %	CH4 Hi %
Line 5	CH0 Lo %	CH1 Lo %	CH2 Lo %	CH3 Lo %	CH4 Lo %
Line 6	CH0 Benchmark	CH1 Benchmark	CH2 Benchmark	CH3 Benchmark	CH4 Benchmark
Line 7	CH0 Rev Setpoint	CH1 Rev Setpoint	CH2 Rev Setpoint	CH3 Rev Setpoint	CH4 Rev Setpoint
Line 8	CH0 Capacity	CH1 Capacity	CH2 Capacity	CH3 Capacity	CH4 Capacity

where CH0 corresponds to the total, CH1 corresponds to channel 1, etc.
- Each row's value is separated by a comma.
  The new-line characters (ASCII <CR> <LF>) separate each of the rows.
- All values are stored in standard ASCII format, including decimal points (when applicable).
- Note that only enabled channels are written to the file.
  2-channel units will only include CH0, CH1, and CH2 load values and statuses.
  8-channel units will include CH0, CH1, CH2, CH3, CH4, CH5, CH6, CH7, CH8, and CH9 load values and statuses.

II. Reading the "jobdata.csv" file

- Any application that accesses the "jobdata.csv" file must follow this sequence:
  - Open the file.
  - Read the contents.
  - Close the file.
- SlimWare will not be able to update the file if it remains opened.
- SlimWare updates the "jobdata.csv" every 1 second. Any application that reads this file should not attempt to read it more frequently than this interval.
- The "jobdata.csv" was designed to be read a line at a time.
  The first line read will return the job number and job name, with a comma separating the values. Note: Job names must not contain commas.
  The second line read will return the high setpoint values, starting at CH0 (the total) and ending with the highest configured channel, with a comma separating each value.
  Similarly, lines 3-8 will return the low setpoint, high %, low %, benchmark, reverse setpoint, and capacity values.

15. Signature CSV File Format

While SlimWare continues to save signatures in its proprietary .swsx file format, it will also save signatures in comma-separated-value (.csv) format when using the Automatic Signature Save feature. The .csv files contain all the information required to analyze the signature including press angle, load data per press angle, CCM (Critical Curve Monitoring) data per press angle, peak load for the stroke, job number loaded, and date/time of stroke. Additional tonnage monitor configuration data is also included.

> Note: In the following documentation, "Outer slide" refers to channels 0-4 and "Inner slide" refers to channels 5-9.

> Note: For time-based signatures, time in milliseconds is used rather than the press angle.

- The first 250 lines of the .csv signature file contains load and CCM data for 250 press degrees   (35° – 284°) or time samples. The structure of each line is detailed below.

Press Angle or Time	Load Data										CCM Data – Outer		CCM Data – Inner	
	CH0	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	Total (CH0)	Corner (CH1-4)	Total (CH5)	Corner (CH6-9)

Each line for an 8-channel signature will contain 15 values, each separated by a comma and terminated with a line feed. Note that the number of values per line depends on the total number of load channels. For a 4-channel load monitor, the load data for CH5-CH9 and the CCM data for CH5-9 are not included. Therefore, a 4-channel signature will contain 8 values per line.

- Line #251 in the .csv file contains the peak load data for each channel, as detailed below.

Peak Load Data									
CH0	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9

This line for an 8-channel load monitor will contain 10 values, each separated by a comma and terminated with a line feed. For a 4-channel load monitor, the peak data for CH5-CH9 are not included, so this line will contain only 5 values.

- Line #252 in the .csv file contains the capacity value for each channel, as detailed below.

Capacity									
CH0	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9

This line for an 8-channel load monitor will contain 10 values, each separated by a comma and terminated with a line feed. For a 4-channel load monitor, the capacity values for CH5-CH9 are not included, so this line will contain only 5 values.

- The final line (#253) in the .csv file contains the following information.

Job Number	Number of Channels	Decimal Point	Date/ Time

This line includes the job number loaded, the number of channels (4 for a 4-channel load monitor [CH0-4], or 9 for an 8-channel load monitor [CH0-9]), the configured number of decimal points (0-3), and the date/time that the signature was saved (in YYYY-MM-DD hh:mm:ss format). This line will always contain 4 values, each separated by a comma and terminated with a line feed.

- The completed structure of the .csv signature file is illustrated below.

Line #	Angle/ Time	CH0	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CCM Data – Outer Total (CH0)	Corner (CH1-4)	CCM Data – Inner Total (CH5)	Corner (CH6-9)
1	35														
2	36														
3	37														
4	38														
.															
.															
.															
247	281														
248	282														
249	283														
250	284														
251	CH0 Peak	CH1 Peak	CH2 Peak	CH3 Peak	CH4 Peak	CH5 Peak	CH6 Peak	CH7 Peak	CH8 Peak	CH9 Peak					
252	CH0 Cap	CH1 Cap	CH2 Cap	CH3 Cap	CH4 Cap	CH5 Cap	CH6 Cap	CH7 Cap	CH8 Cap	CH9 Cap					
253	Job #	Max CH	Dec Pt	Date/ Time											

- The following example details a .csv signature from an 8-channel load monitor.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	35	-1.5	-0.8	-0.4	-0.2	-0.1	-1.9	-1.3	-0.2	-0.1	0.3	8.1	2	34.7	8.7
2	36	-1	-0.8	-0.3	-0.2	0	-2.2	-1.3	-0.5	-0.3	0	8.1	2	34.7	8.7
3	37	-0.6	-0.8	-0.2	-0.2	0.1	-1.8	-1.3	-0.4	-0.3	0.1	8.1	2	34.7	8.7
4	38	-0.9	-0.6	-0.3	0	0.1	-1.6	-1.1	-0.5	-0.1	0.1	8.1	2	34.7	8.7
5	39	-1.6	-0.8	-0.4	-0.2	0	-1.9	-1.2	-0.5	-0.2	0	8.1	2	34.7	8.7
6	40	-1	-0.8	-0.2	-0.2	0	-1.5	-1.3	-0.4	-0.4	0.1	8.1	2	34.7	8.7
143	177	27	7.7	9	4	6.3	41.1	11.8	13.5	6.2	9.8	80	20	120	30
144	178	23.8	8	7.7	1.4	6.5	32.8	12.4	8.7	0.2	11.2	80	20	120	30
145	179	20.9	8.1	5.6	0	7.1	31.6	12.4	8.3	0	10.9	80	20	120	30
146	180	19.4	8	3.6	0	7.6	29.5	12.3	5.3	0.1	11.8	80	20	120	30
147	181	21.3	7.4	3.6	2.6	7.8	33.2	11.3	5.5	4	12.1	80	20	120	30
148	182	22.9	7.1	3.8	4.1	7.9	35.4	10.4	6	7.6	12.8	80	20	120	30
149	183	24	6.7	3.8	4.9	8.1	35.7	10.3	5.4	9	12.5	80	20	120	30
247	281	0.3	0.3	0.1	0.1	0.1	0.6	0.4	0.1	0.2	0.1	8.1	2	34.7	8.7
248	282	0.2	0.2	0.1	0.1	0	1.2	0.2	0.3	0.1	0.2	8.1	2	34.7	8.7
249	283	0.5	0.3	0.1	0.2	0	0.7	0.3	0.2	0.2	0	8.1	2	34.7	8.7
250	284	0.4	0.2	0.1	0.1	0	1.2	0.2	0.3	0.1	0	8.1	2	34.7	8.7
251	31.7	8.1	9.3	8.9	8.3	48.5	12.4	13.8	13.5	12.8					
252	80	20	20	20	20	120	30	30	30	30					
253	1	9	1	######## 2019-12-11 10:39:23											
254															

Rows 1-250 contain the signature data. Column A is the press angle, columns B-K are the load values, and columns L-O are the CCM values. Performing a scatter plot of A1-A250 vs B1-B250 yields the following graph.
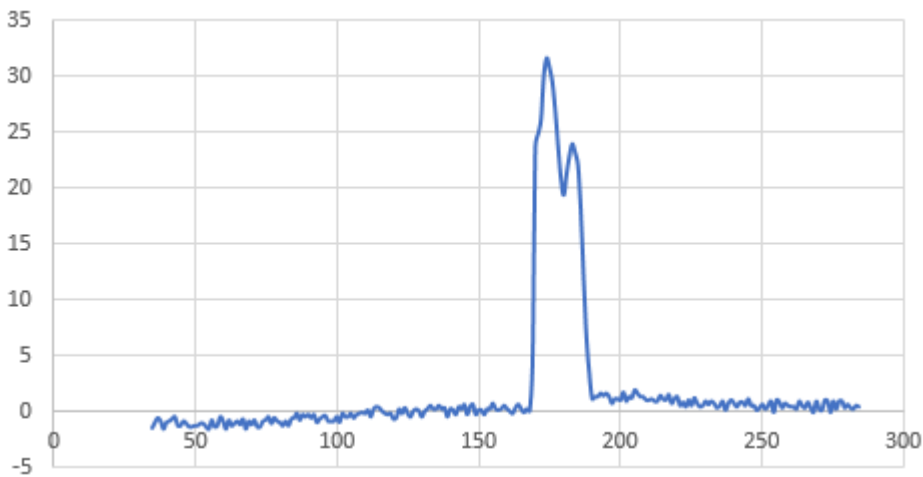
This is the signature for the outer slide's total (CH0).

To plot the corresponding CCM curve for the outer slide, you can perform a scatter plot of A1-A250 vs L1-L250.
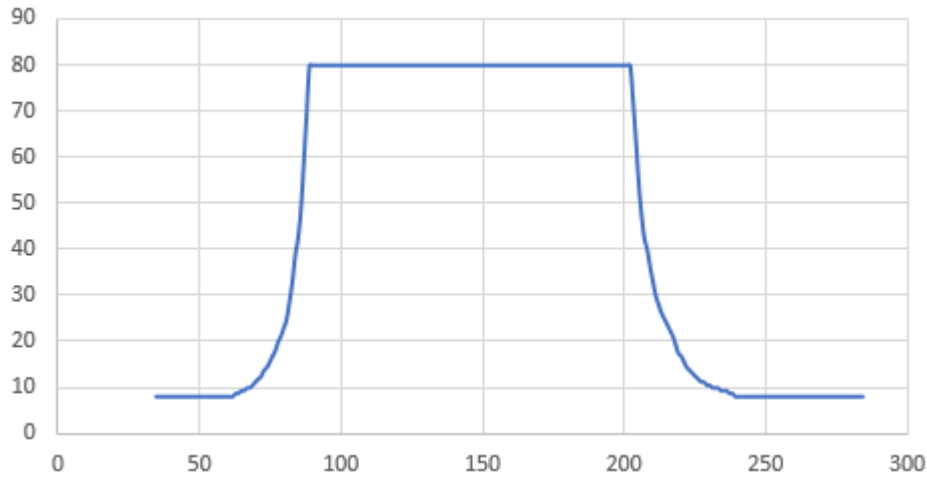
In addition to the signature data, the .csv file contains other useful information.

251	31.7	8.1	9.3	8.9	8.3	48.5	12.4	13.8	13.5	12.8
252	80	20	20	20	20	120	30	30	30	30
253	1	9	1	########						
254				2019-12-11 10:39:23						

Row #251 shows the outer slide's total peak load (A251) for the stroke was 31.7 tons. The outer slide's corner peak loads (B251-E251) are shown as well. The inner slide's total peak load (F251) was 48.5 tons. The inner slide's corner peak loads (G251-J251) are shown as well.

Row #252 tells us that the outer slide's capacity (A252) is set to 80 tons and the inner slide's capacity (F252) is set to 120 tons. The outer slide's corner capacities (B252-E252) are each set to 20 tons, while the inner slide's corner capacities (G252-J252) are each set to 30 tons.

Analyzing row #253, we can see that job #1 was loaded (A253), the maximum channel number is 9 (B253), the load monitor is configured to display 1 decimal point (C253), and the stroke occurred on December 11, 2019 at 10:39:23 (D253).

16. Calibration Procedure – ZT-SLIM

ZT-SLIM   ZT-4
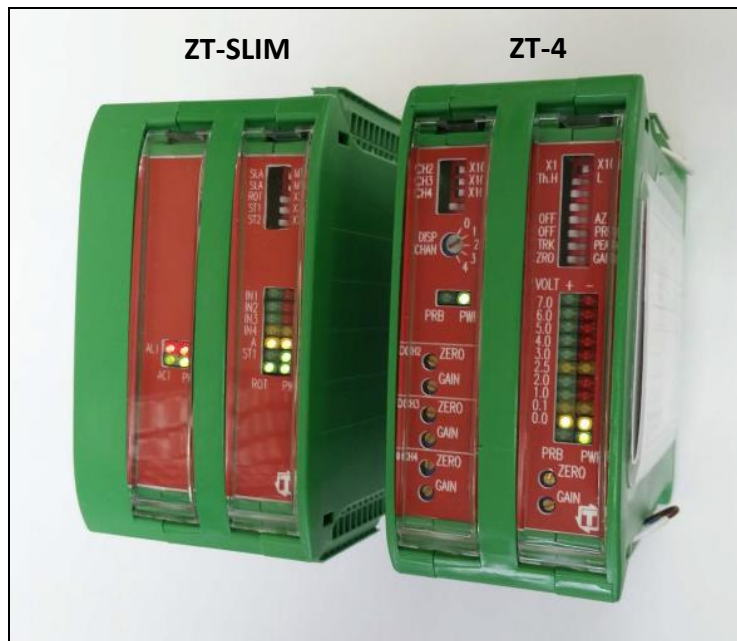
For the ZT-SLIM to display accurate tonnage information, the unit must be properly calibrated. Calibration is performed by using SlimWare and the ZT-4 module (see above).

1) **Login to SlimWare. Default password is "m".**

2) **Go to the Configure → Hardware/Trigger page.**

   a)   Select options like the figure below.
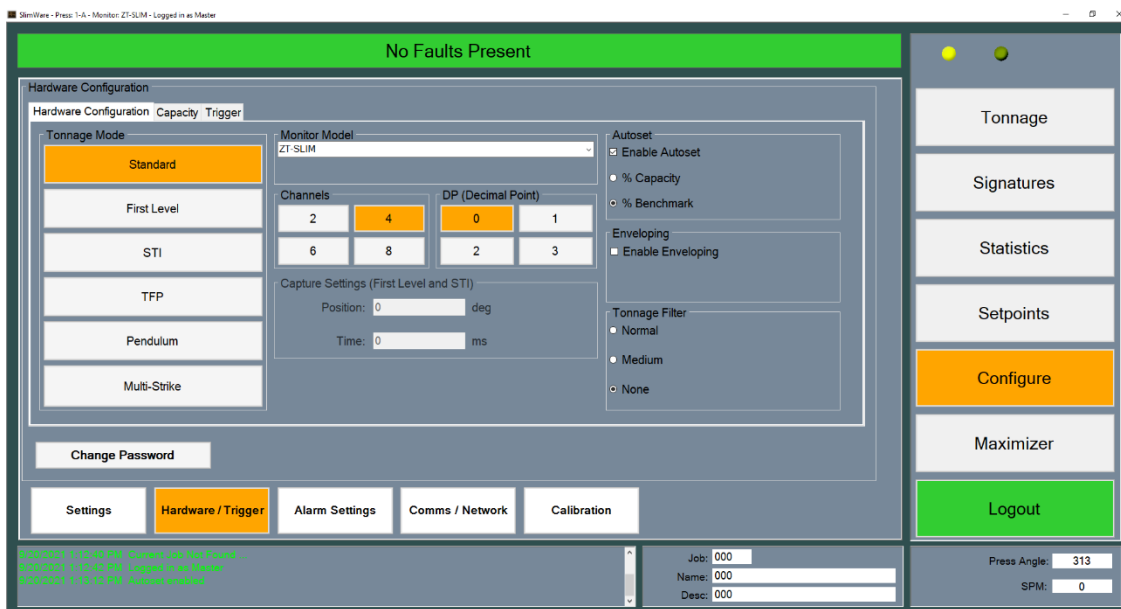
b) Enter the press capacity on the Capacity tab.

c) Choose the appropriate trigger method on the Trigger tab. If using resolver or encoder for triggering, set the offset so that the resolver angle matches the press angle.

3) Enable "Setup Mode" to bypass the high and low limits.
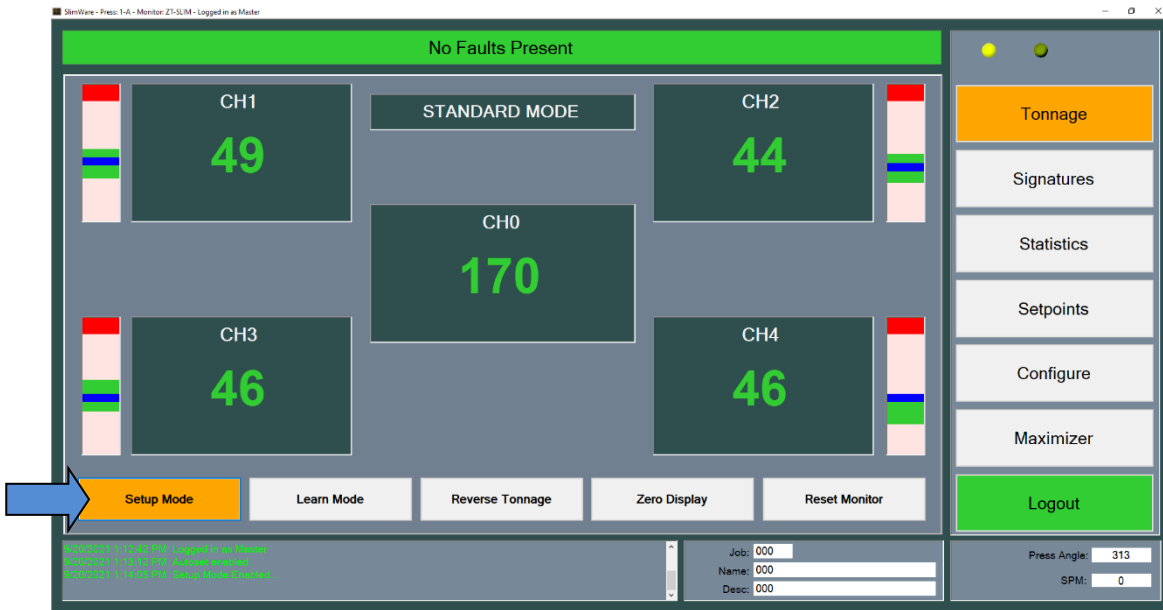
4) Find the shut height of the press.

a) Jog the press until the ram is at bottom dead center (BDC) or 180° without any load cells or die in the press.

b) Determine the number of spacers needed with your load cells. Cycle the press without load cells to ensure correct height.

5) Place the load cells in the correct position in the press.

a) All load cells should be equal distance from the sides and front and rear. For example, 12" from the sides, 10" from the front and rear. Load cells are typically placed at each corner of the press's bed.

b) Cycle the press without hitting the load cells first.

c) Place cardboard on the top and bottom of the load cells.

6) Balance the tonnage sensors.

a) Make sure the press is under no load.

b) Set the ZT-4 dip switches as shown. Set all gain pots to fully clockwise, then dial each gain pot about 12 turns counterclockwise to start.

```
CH2 [ ▯●] X10            X1  [ ▯●] X10
CH3 [ ▯●] X10          Th.H  [●▯ ] L
CH4 [ ▯●] X10                [●▯ ]
    [●▯ ]                    [●▯ ]
                       OFF   [●▯ ] AZ
                       OFF   [●▯ ] PRB
                       TRK   [●▯ ] PEAK
                       ZRO   [●▯ ] GAIN
```
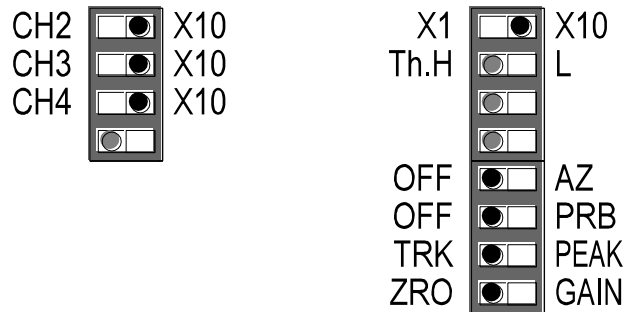
c) On the ZT-4, set the Display channel selector to **1** for Channel 1. The Bar-graph voltmeter now shows the balance of Channel 1.

d) Adjust the Channel 1 ZERO pot until the bar-graph has only the 2 yellow **0.0V** LEDs lit. This indicates a balanced or zeroed state.

```
VOLT +   –
 7.0  ●  ●
 6.0  ●  ●
 5.0  ●  ●
 4.0  ●  ●
 3.0  ●  ●
 2.5  ●  ●
 2.0  ●  ●
 1.0  ●  ●
 0.1  ●  ●
 0.0  ○  ○
      ●  ●
     PRB  PWR
```
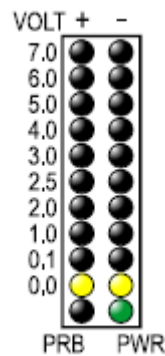
e) Repeat steps c) and d) for Channels 2, 3, and 4.

f) Go to SlimWare's Configure → Calibration page (see figure below).

g) Push the "Display Balance" button.

h) The Balance/Gain fields should be close to zero. If not, push the "Zero the Balance" button. The "Balance/Gain" column should become all zeroes.

7) **Cycle the press.**

a) Press the "Capture Tonnage" button in SlimWare.

b) Further adjust the shut height so that the press impacts the load cells and generates a load at 100% of press capacity. See the following warning.

WARNING:

Depending on the press capacity and the size of the load cells being used, loading the press at capacity with load cells could indent the ram or bolster. To prevent this situation from happening, do one of the following:

- Calibrate the press only up to 80% of capacity, or
- Use larger load cells to increase the loading surface. For instance, to calibrate a 400 Ton press at capacity, use (4) 250 Ton load cells instead of (4) 100 Ton load cells.

8) Adjust the gain.

a) Cycle the press a few times.

b) The peak tonnage is shown in the "Channel Tonnage" column.

c) Push the "Display Balance/Gain" button. The gain values are shown in the "Balance/Gain" column.

d) Enter the load cell values in the "Load Cells" column.

e) If the values in the "Load Cells" column match the values in the "Channel Tonnage" column, the ZT-SLIM is already set to the correct gain. You can now skip to Step 9.

f) Adjust the Gain pot for each channel until its Gain value matches the value in the "Desired Gain" column. If less gain is needed, change the channel's Gain switch to X1.

g) Press the "Capture Tonnage" button.

h) Cycle the press. The values in the "Channel Tonnage" column should match the values on the load cells. If not, repeat from step 8 a).

9) Record Gain Numbers.

a) The values in the "Desired Gain" column are the Gain Numbers. Record these gain numbers (instead of, or in addition to, the DC voltage gain) on the calibration card located on the side of the ZT-4. Refer to the figure below.

10) Document the ZT-SLIM Settings.

a) On the ZT-SLIM Settings Card, fill out all applicable settings including Press No., resolver dip switch configuration, capacities, and trigger method. See the example below.

Model ZTSLM		Serial No. _A1502_
Setup By: _John Doe_		Date: _1-1-2015_

Press No. _3-2_	**Resolver Switch** (Fill In Switch Position)
IP Addr. _192.168.16.180_	

Capacities	SLA ☐ MTR
CH0: _400_ CH5:	SLA ☐ MTR
	ROT ☐ X2
	ST1 ☐ X2
	ST2 ☐ X2

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● Master
○ Slave

Trigger Method (Mark only one)				
○ Threshold	● Resolver	○ Encoder	○ Probe	○ Gray Code
Value: _____	Offset: _158_			

Notes:

11) Make linearity check.

a) Go to the Tonnage page (see figure below).

b) Raise the shut height in .020 to .030 inch increments to decrease tonnage.

c) Cycle the press and impact the load cells.

d) Compare the tonnage applied to the load cells to the tonnage displayed in SlimWare. Record these data on the Calibration Sheet (Form #1224) provided at the end of this procedure.

12) Calibration complete.

The calibration procedure is now complete. Contact Toledo Integrated Systems' Service Department for assistance if needed. Our Service Department can be reached at 419-867-4170, Monday through Friday, 8:00AM to 5:00PM.

17. Calibration Procedure – SLIM / LS-Series

For the tonnage monitor to display accurate tonnage information, the unit must be properly calibrated.

1) **Login to SlimWare. Default password is "m".**

2) **Go to the Configure → Hardware/Trigger page.**

   a) Select options like the figure below.
   b) Enter the press capacity on the Capacity tab.
   c) Choose the appropriate trigger method on the Trigger tab. If using resolver for triggering, set the offset so that the resolver angle matches the press angle.
   d) The standard 1 Meg shunt should be able to cover most press calibrations. In cases where the gain number is less than 15% of the channel capacity, and a very accurate calibration is required, then the 200K shunt should be used.
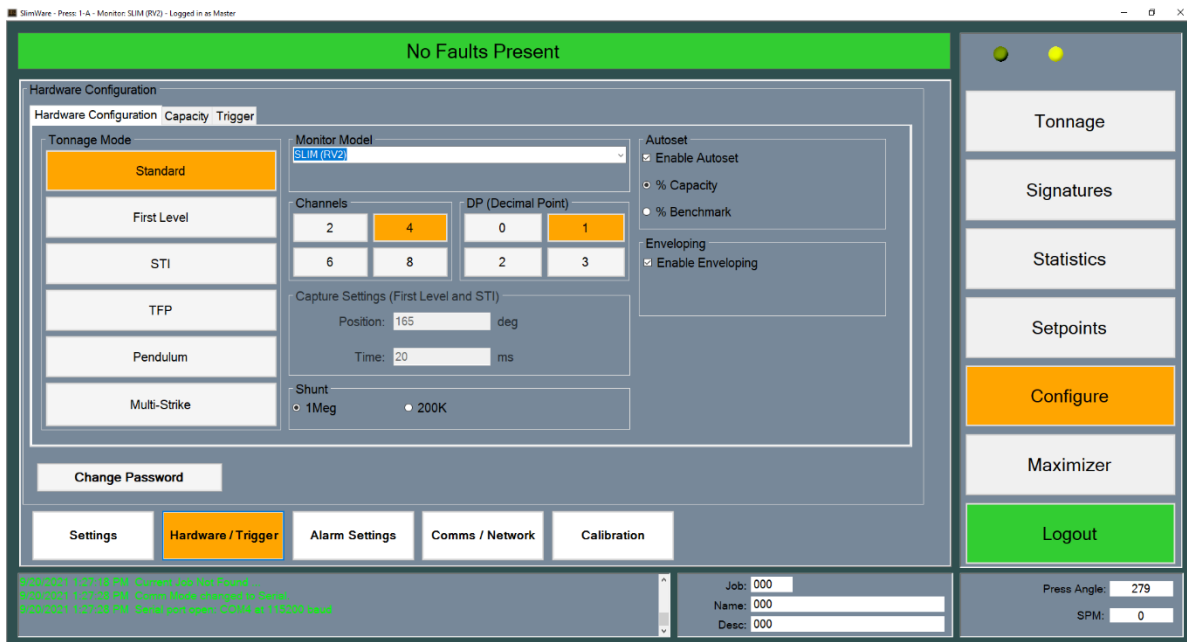
3) **Enable "Setup Mode" to bypass the high and low limits.**
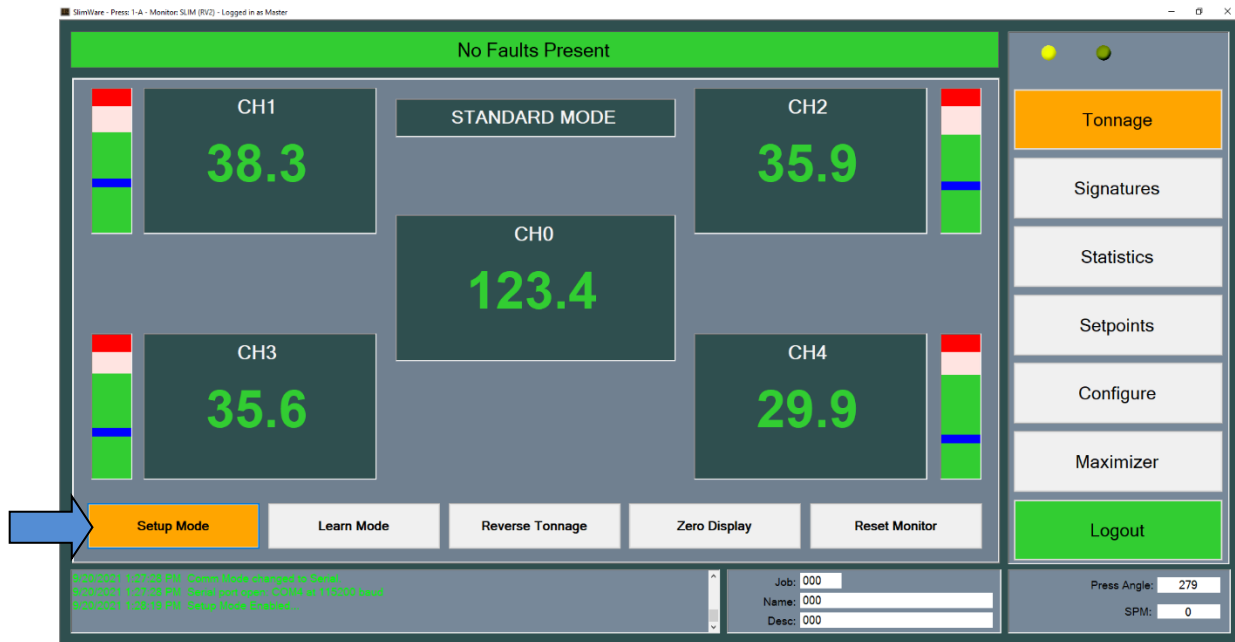
4) **Find the shut height of the press.**

a) Jog the press until the ram is at bottom dead center (BDC) or 180° without any load cells or die in the press.

b) Determine the number of spacers needed with your load cells. Cycle the press without load cells to insure correct height.

5) **Place the load cells in the correct position in the press.**

a) All load cells should be equal distance from the sides and front and rear. For example, 12" from the sides, 10" from the front and rear. Load cells are typically placed at each corner of the press's bed.

b) Cycle the press without hitting the load cells first.

c) Place cardboard on the top and bottom of the load cells.

d) Further adjust the shut height so that the press impacts the load cells and generates a load at 100% of press capacity. See the following warning.

WARNING:

Depending on the press capacity and the size of the load cells being used, loading the press at capacity with load cells could indent the ram or bolster. To prevent this situation from happening, do one of the following:

- Calibrate the press only up to 80% of capacity, or

- Use larger load cells to increase the loading surface. For instance, to calibrate a 400 Ton press at capacity, use (4) 250 Ton load cells instead of (4) 100 Ton load cells.

6) Balance the tonnage sensors.

a) Make sure the press is under no load.

b) Go to the Configure → Calibration page (see figure below).

c) Push the "Display Balance" button.

d) Push the "Zero the Balance" button. The "Balance" column should become all zeroes. Push this button again if the values are not close to zero.

7) **Find the calibration numbers.**

a) Push the "Capture Tonnage" button.

b) Cycle the press a few times.

c) The peak tonnage is shown in the "Channel Tonnage" column.

d) Push the "Display Gain" button.

e) Enter the load cell values in the "Load Cells" column.

f) If the values in the "Load Cells" column match the values in the "Tonnage" column, the monitor is already set to the correct gain. You can now skip to Step 8.

g) Push the "Apply Desired Gain" button to set the monitor to these Desired Gain numbers.

h) The values in the "Gain" and "Desired Gain" columns should be now closely matched.

i) Push the "Capture Tonnage" button and cycle the press. The values in the "Channel Tonnage" column should match the load cells. If not, repeat from Step 7d.

8) Record Gain Numbers.

a) The values in the "Desired Gain" column are the Gain Numbers. Record these numbers on the calibration card located on the side of the SLIM or inside the LS-Series tonnage monitor. Refer to the figure below.

Model: SLIM	Serial No. _____
Cal. By _____	Date _____
Press No. _____	Addr. _____

CAPACITIES	
CH0	CH5

CALIBRATION NUMBERS	
CH1	CH6
CH2	CH7
CH3	CH8
CH4	CH9

RESOLVER   ○STI No.   ○TFP No.

1
2   ○Master   STI   Lo   Hi
3   CH5
4   ○Slave
5   TFP
6   CH2
7   CH4
8
9   CH6
Offset _____   CH8

TIME: Mode _____ Value _____

Thres. _____   Pos. _____

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9) Make linearity check.

a) Go to the Tonnage page (see figure below).

b) Raise the shut height in .020 to .030 inch increments to decrease tonnage.

c) Cycle the press and impact the load cells.

d) Compare the tonnage applied to the load cells to the tonnage displayed in SlimWare. Record these data on the Calibration Sheet (Form #1224) provided at the end of this procedure.

10) Calibration complete.

The calibration procedure is now complete. Contact Toledo Integrated Systems' Service Department for assistance if needed. Our Service Department can be reached at 419-867-4170, Monday through Friday, 8:00AM to 5:00PM.