In-Line System

MC Pro 2500

USER MANUAL

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SYSTEM HARDWARE GUIDE

System Description

The MC-PRO 2500 is for lineal moisture sensing of wood. It is a non-contact moisture meter that differs from conventional meters in several ways, not the least of which is the method of taking readings. While other systems use a form of analog tank capacitive sensing, the MC-PRO 2500 triggers a stream of high speed digital pulses through the wood. This method allows us to take faster readings thereby detecting sudden changes in moisture content at high speeds. The system also incorporates distance and temperature compensation to optimize the accuracy of our measurements. Due to the unique manner in which the lumber is sensed, the system needs little or no calibration.

The MC-PRO 2500 also incorporates an embedded processor and does not require the use of a dedicated PC. Through the use of our remote Windows based monitoring program, the user can monitor production, access historical data, and generate user defined reports. These user defined reports look at moisture content over time as well as single load reports, which graphically display the end cross section of a load of lumber with the moisture content of each piece displayed on the load. The program generates a report every time the stock or shift is changed. It is also possible to set up automatic shift reporting to take reports at the end of each shift.

Our superior moisture meter combined with versatile data collection and monitoring software provide you with a system that is unique and delivers extremely accurate and stable readings.

The In-Line – MC Pro 2500 system consists of 3 main components: In-Line sensor(s), the main control unit (MCU), and a Windows software package.

Sensor(s)

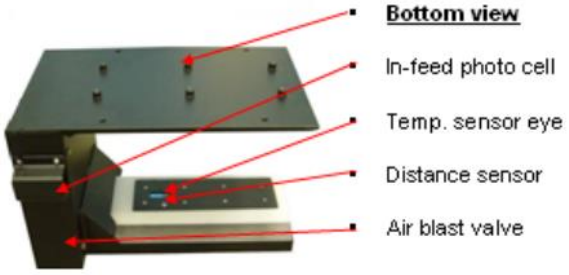

Figure 1: Planer System (View 1)

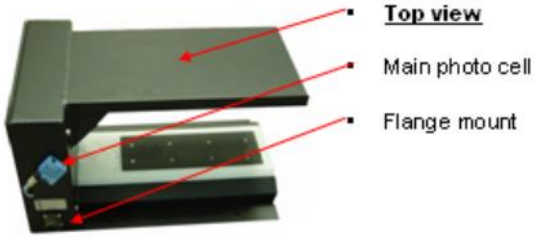

Figure 2: Planer System (View 2)

The in-line sensor is usually mounted at the out-feed of the planer or automatic grading machine. It consists of two plates which the lumber travels through and an upright section where most of the electronic components are located (see Figure 1). The sensor reads the moisture, height, and temperature of the lumber and sends the readings back to the MCU.

A laser distance sensor is mounted in the upper arm (See figure 2) and measures the height of the lumber. From this measurement and the thickness of the lumber (entered at time of install) a location of the

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lumber in the sensing field is derived. This location makes it possible to compensate for changes in the lumber height as it leaves the planer. The inline unit also includes a temperature sensor which is located in the upper arm of the frame (see Figure 2). The temperature sensor relays the temperature of the lumber to the MCU where it is used in the moisture content calculations.

The unit also employs two photo eyes (see Figure 1 and 2). These are both transceiver type and the first is used to detect the presence of the lumber while the second is a high speed sensor and is intended to catch the gaps between boards. This transceiver is mounted on an angle in order to compensate for various thickness and widths of lumber. The first photoeye is a horizontal mount on the in-feed side of the sensor and is used in conjunction with the first to detect the presence of lumber.

Main Control Unit (MCU)

The system uses a network compatible embedded microprocessor (located in the MCU, Figure 3) as the main processing and control unit. The embedded microprocessor uses the readings from the sensor(s) to determine the moisture content of the lumber using proven oven dry formulas. It also performs tasks such as sensor calibration, controlling the IO for communication and painters, and tallying the data from the sensor(s). Histograms and tally data can be viewed using the Windows software package.

Figure 3: Main Control Unit (MCU)

Included in the MCU are the system wiring, system power, and I/O. The power supply provides +12Vdc, -12Vdc, +5Vdc, and +24Vdc to power the various components of the system. +12Vdc provides power for the main sensor(s) and all photoeyes. +24Vdc is an optional output power that can be used to operate painters. The I/O carrier board acts as an interface to the system and is used to drive the painter and/or outputs to your PLC or auto grader, as well as interface with the photo

A liquid crystal display (LCD), and two small buttons are located on the door panel of the MCU. The LCD and buttons are used in conjunction to view system parameters, status, and to configure the system.

System Power-up

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The MCU power supply must be connected to a 120VAC or 240VAC source. This provides power for the sensor as well as the embedded processor unit. Upon powering up, the LCD Screen should become backlit and instruction text will appear on the screen.

MCU LCD Display

The MCU display has a number of functions to assist with the operation, and diagnostics of the system without requiring the user to use the windows software package to access the system. The functions in the MCU screen are accessed by using the "Mode" and "Select" buttons on the front of the MCU. The "Mode" Button advances the user through the menus and the "Select" Button allows the user to make a selection or change a value.

The menu functions on the MCU display are as follows:

Board Monitor

The BOARD MONITOR screen allows the user to view the information of the board that was just run through the system. If the system is not running the screen will show "Waiting for Board." until a board is run through the system. After a board is run through, the screen will appear as shown below.

BOARD MONITOR
MC=XX.X Pk=XX #R=XX
Dist= X.XX
T=XXX.X AT=XXX.X

The information shown on the screen is as follows:

MC The average moisture content read while the board was in the system.

Pk The peak moisture content sensed while the board was in the system.

Dist The average gap from the bottom of the board to the bottom sensor plate while the board was in the system.

T The temperature of the board.

AT The average temperature taken over the last 30 boards.

Distance Cal

The distance cal selection will allow a user to perform the distance calibration for all of the sensors. Pressing select will begin the calibration. Simply follow the on screen prompts.

Static Mode

STATIC MODE allows the user to monitor the status of all transducers on the sensor.
The STATIC MODE screen is shown below.

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STATIC MODE (Sel=BG)
D = xxx P = xxx M = xxx
Dn = xxx T = xxx
MP = X IP = X PI=X

D The raw reading taken from the moisture sensor above the reference.

P The Pre-Temperature moisture content of the sample in the system (before temperature effects are considered)

M The actual moisture content of the sample.

Dn The distance sensor reading, using the current stock's thickness to calculate the distance the sample is off the bottom sensor plate.

T The temperature of the sample.

Pressing 'SELECT' on this screen will force background values.
This means the D will be forced to 0.

In the following cases X can either be [B] indicating blocked, or [U] indicating unblocked.

MP MP describes the state of the main (Out-feed) Photoeye.

IP IP describes the start of the In-feed Photoeye.

PI PI describes the state of the Planer In-feed as taken from the mill I/O.

View Errors

The VIEW ERRORS displays to the user the number of certain errors that took place in the system. The screen will appear as shown below.

VIEW ERRORS (Sel=CLR)
RD = X RF = X EL = X
DD = X AL = X DS = X
TS = X

The information on the screen is as follows:

RD Read errors occur when the controller does not get a response from the sensor board. It will only alarm if the number of errors exceeds the alarm limit setting.

RF Reference errors occur when the controller does not get a response from the sensor board. It will only alarm if the number of errors exceeds the alarm limit setting.

EL Excessive Low Readings Errors occur when more than 10 boards in a row have very low readings, resulting in a 6 average. It will only alarm if the number of errors exceeds the alarm limit setting.

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DD Excessive Default Distance Errors occur when more than 20 boards use a default distance based on an add/subtract algorithm. If a board uses a DD then a counter is incremented (and decremented if not DD). If the counter goes past 20 the error is triggered. It will only alarm if the number of errors exceeds the alarm limit setting.

AL Algorithm Errors occur when the total number of readings minus all the deleted readings is to zero or less for more than 10 boards. It will only alarm if the number of errors exceeds the alarm limit setting.

DS Distance Sensor errors occur when the controller does not get a response from the distance sensor board. It will only alarm if the number of errors exceeds the alarm limit setting.

TS Temperature Sensor errors occur when the controller does not get a response from the Temperature sensor board. It will only alarm if the number of errors exceeds the alarm limit setting.

*Pressing Select will clear all errors

View Net Info

The NET INFO displays the network configuration to the user. The screen will appear as shown below.

NET INFO (Sel=Set)
Nm: xxxxxxxxxxxxxxx
IP: xxx.xxx.xxx.xxx
SM: xxx.xxx.xxx.xxx

The information on the screen is as follows:

Nm The NetBIOS name of the system.
IP The current IP of the system on the local network.
SM The subnet mask of the local network.

Pressing Select on this screen will allow the user to change the IP address of the system. This should only be done when instructed by an SCS Forest Products Technician.

Change Stock

The CHANGE STOCK allows the user to change the current stock passing through the system. The screen will appear as shown below.

CHANGE STOCK
-> XXX
-> XXX
Mode-Acpt Sel-Next

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The first line with indicate the dimensions of the stock (e.g. 2x4), and the second line will indicate the type of the stock (e.g. SYP). Pressing 'Select' will scan though all the stocks in system memory, and pressing 'Mode' will accept the displayed stock as the current stock.

Photo eyes

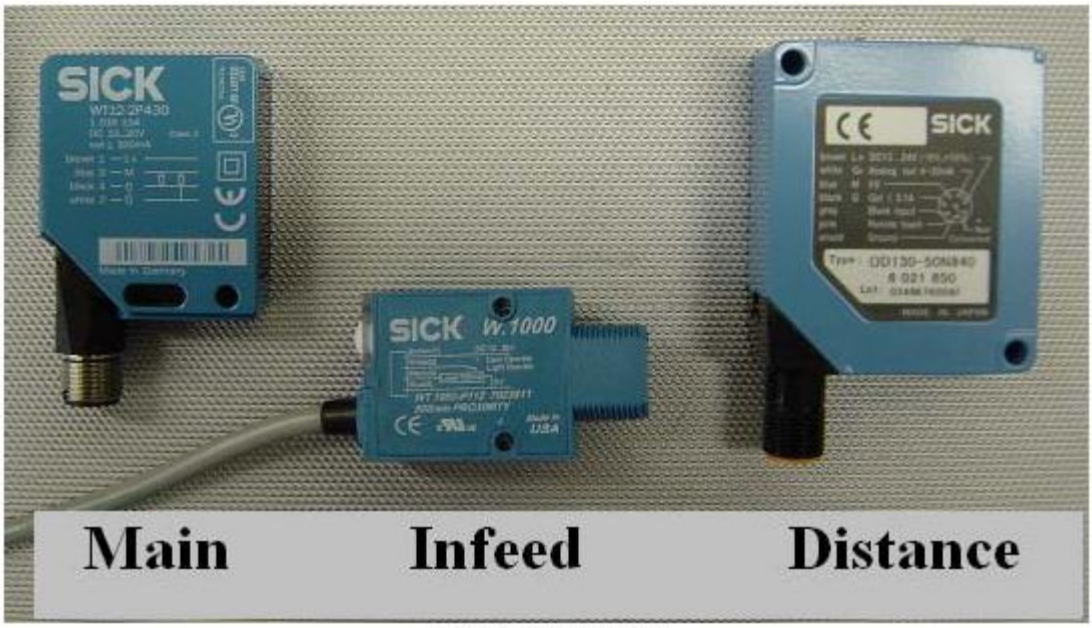

Figure 5: Photocells

The first and second photoeyes are used to indicate the presence of the piece. These photoeyes are located on either side of the sensor. To test a photoeye, block the path of the light (as a board would) and make sure the light on the sensor changes state. If this does not happen then clean the lens of the photoeye and retest. If there is still no operation, make sure that the photoeye is getting proper power. Power can be tested by examining the voltage between the terminals labeled BRN +12 and BLK PE (a brown and a blue wire, respectively, should be run from these terminals to the photoeye cable) on the terminal strip in the upright section, the voltage should be +12V.

If a photoeye must be replaced, use the following procedure: Using a #2 Robertson head screwdriver remove the bolts connecting the photoeye to the upright sensor; Remove the cable running from the sensor into the upright section from the photoeye.
The third photoeye is a distance sensor which is located in the upper arm (See Figure 3 and Figure 4). If this photoeye is working a small red light should appear on the lower sensor plate directly below it.

*MCU must be disconnected from power source before replacing photoeyes.

Temperature Sensor

The In Line Non-Contact system has one temperature sensor that measures the temperature of the wood for compensating the measurements due to temperature variations.

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WINDOWS SOFTWARE GUIDE

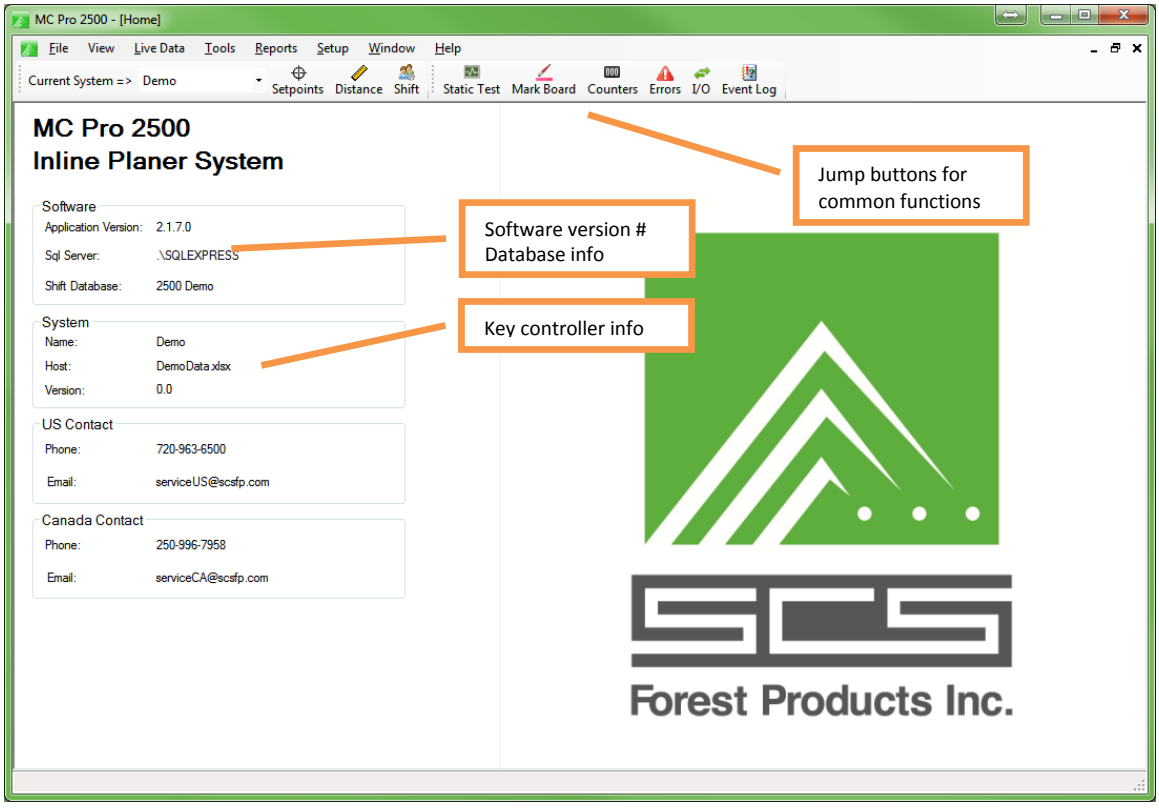
- Note: This guide was prepared using software version 2.4.0.0
  Your software may look different.

Starting the Program

The program is started in the programs section of the start menu of windows. It should be listed under the "SCS Forest Products" group. There may also be a shortcut on the desktop.

Home Screen

When the software is started the Home screen will be the first screen that is displayed. Information such as the system version, IP address, windows application version and key contact information, is located on the home page for easy reference.



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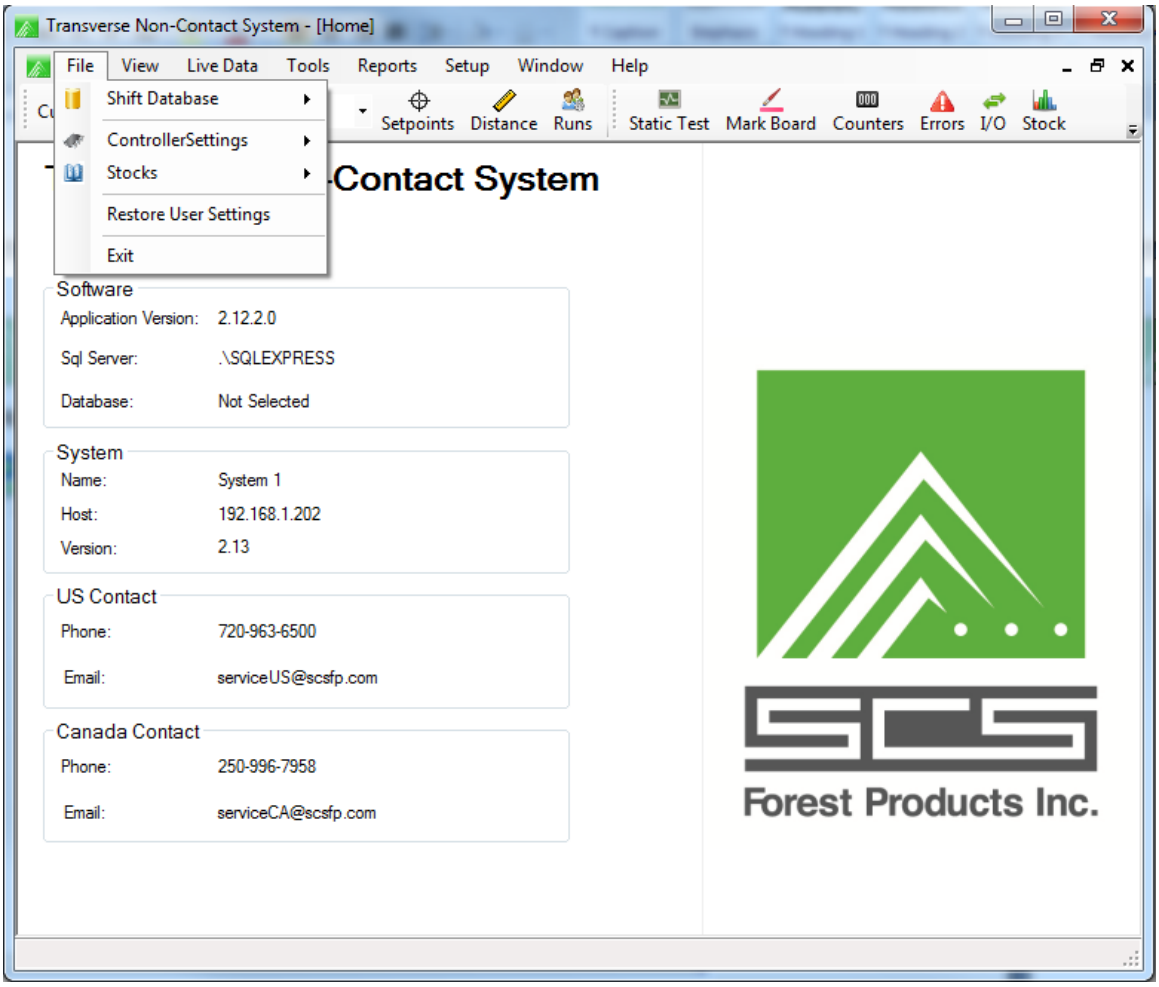
FILE



Shift Database:	User can create a new shift database or select an existing database to store all shift data. Also able to select scan database.
Controller Settings:	Settings can be imported and downloaded to the controller or exported from the controller to a file on the local computer.
Stocks:	Stocks can be imported and downloaded to the controller or exported from the controller to a file on the local computer.
Restore User settings	These are the settings that can be restored when updating from one version to a newer version.
Exit:	Close the program.

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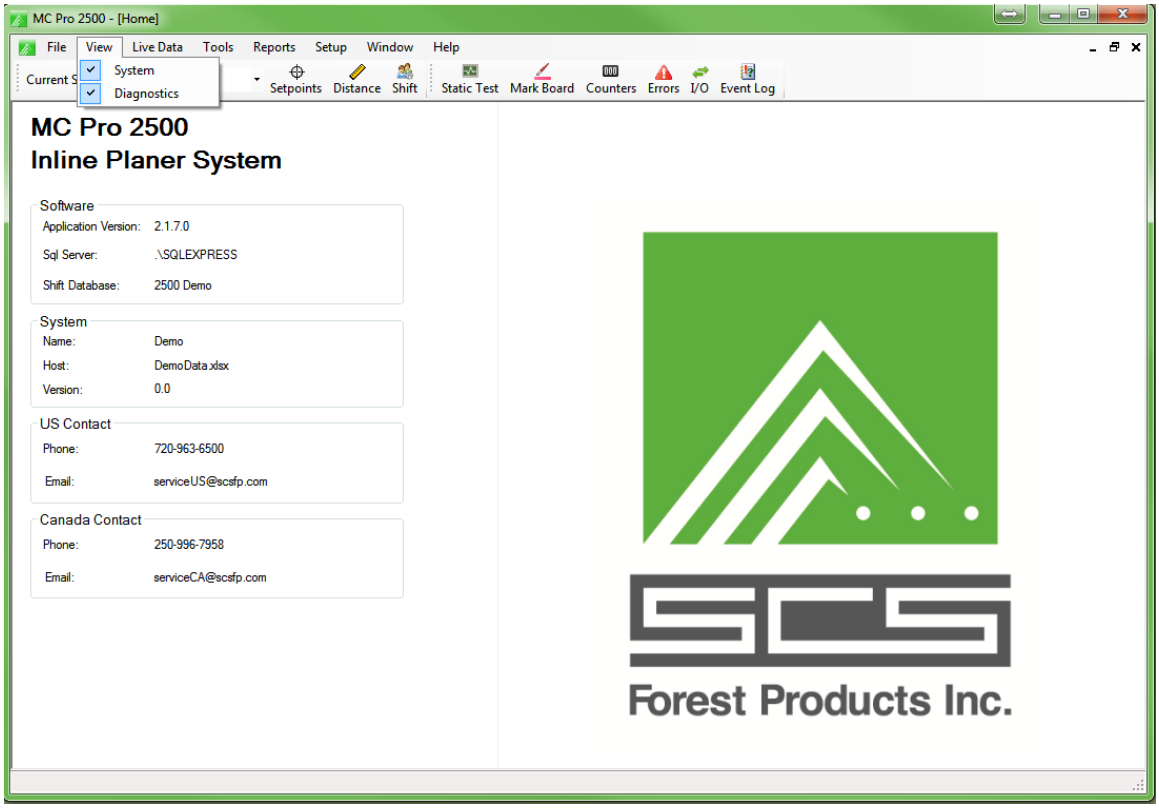
VIEW

Toggles on/off the toolbar displayed below.



LIVE DATA

The Live data Monitor displays current operating selections and conditions.

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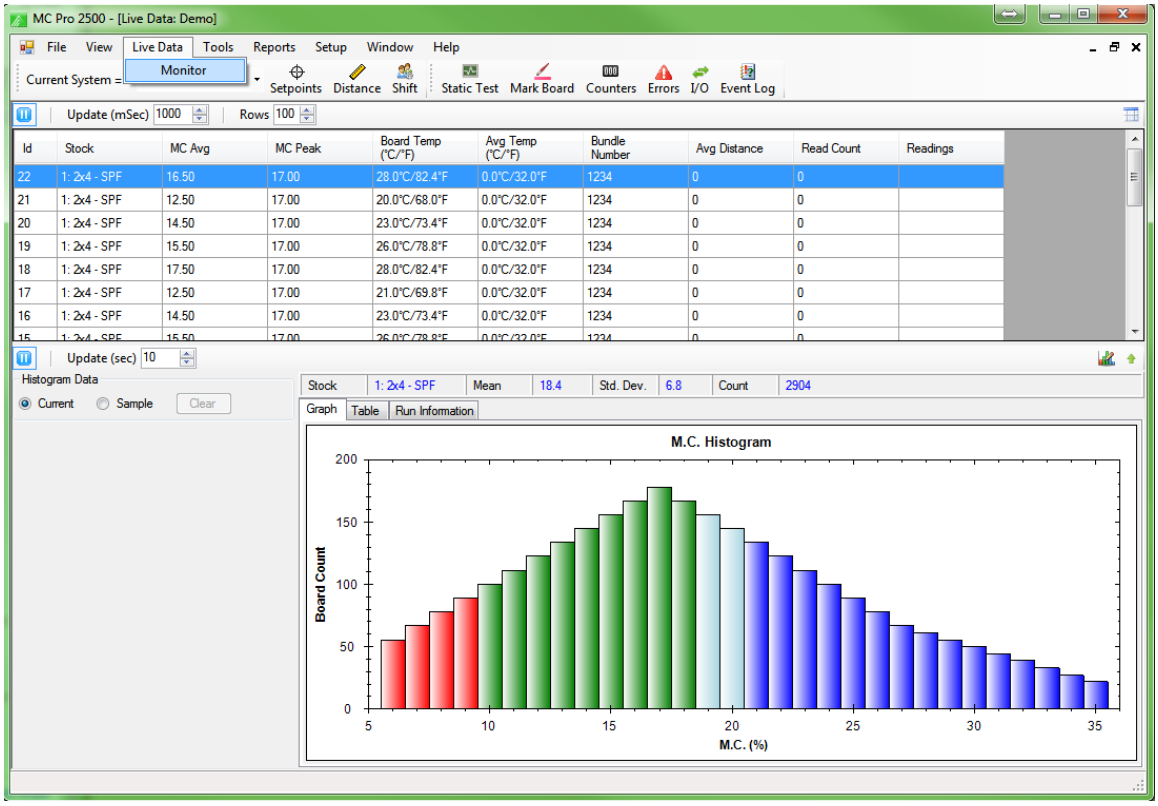

The Information included on the screen is as follows:

Scroll Data:

ID	Board count number.
Stock	Stock of specified board.
MC Avg	Average moisture content of the board
MC Peak	Peak reading recorded
Board Temp	Average temperature reading of the board
Avg Temp	Running average of board temperatures
Bundle Number	Package ID as entered into the system at the tilt hoist
DD Count	Number of distance readings for the specified board
Avg Distance	Average distance reading for the specified board
Read Count	Number of individual readings captured for the board
Readings	Each individual reading is displayed down the length of the board

Stock Selection:

Current stock as well as the marker status.

Histogram/Table:

Update (sec)	How often (interval = seconds) the system will ping the controller to update the histogram. Low intervals can cause network issues.

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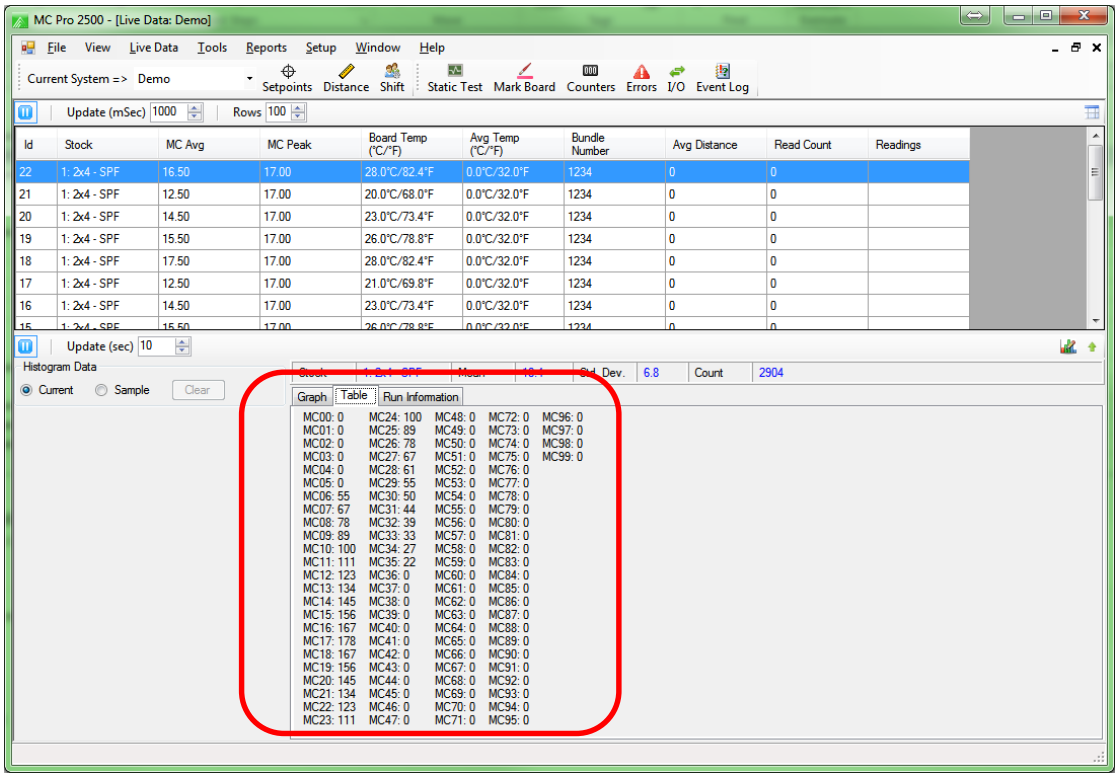
Current	Toggle to show the current run
Sample	Toggle to show any sample runs
Stock	Current stock running through the system
Mean	Average moisture content of the current run
Std Dev	Moisture content standard deviation
Count	Number of pieces in the current run

Default is to show Graph data. Users can also select the tab for Table or Run Information

Table



Complete board count per moisture content value is displayed. This information is also available on run reports.

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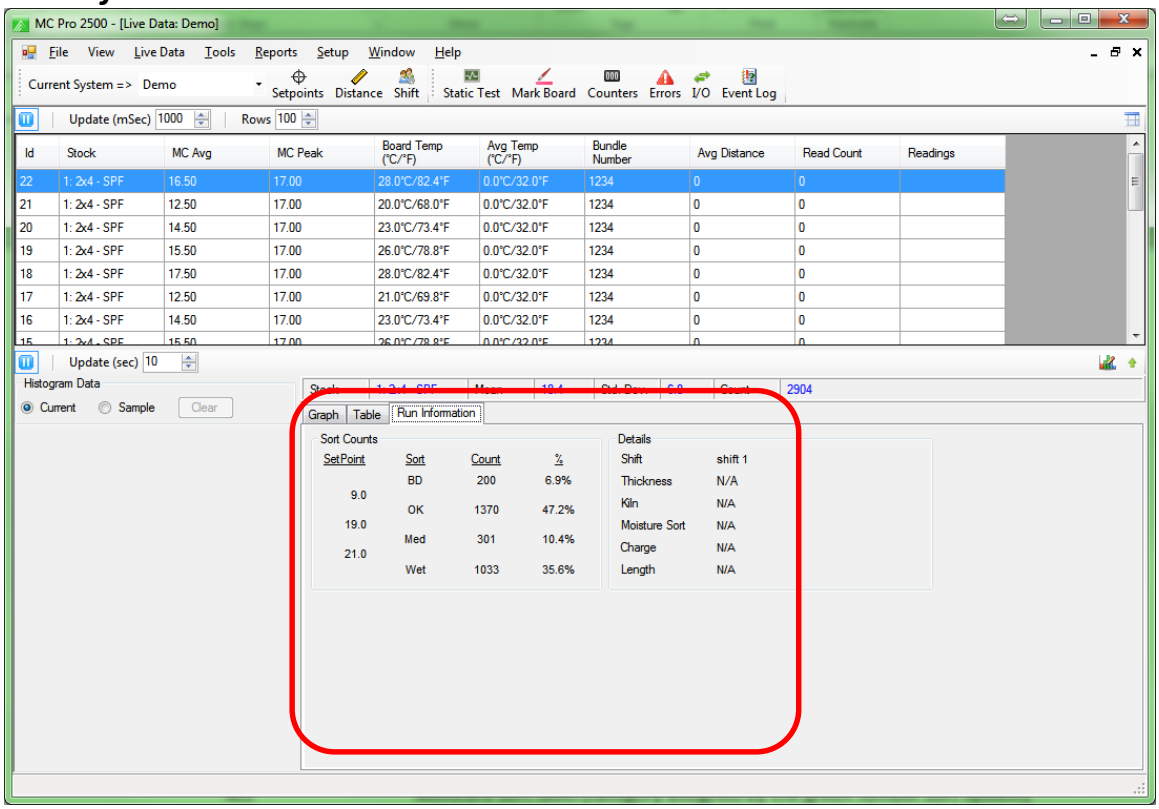
Run Information:



Sort Counts

SP	Set-point percentages
Sort	Set-point labels
Count	Number of pieces
%	Percent of boards in each setpoint

Details

Shift	Shift label
Thickness	Stock setting for thickness of the board
Kiln	Kiln label
Moisture Sort	Moisture sort label
Charge	Current charge number
Length	Lumber length label

Configure Columns (icon)

User can choose which items to display in the Scroll Data. Default items are reviewed here

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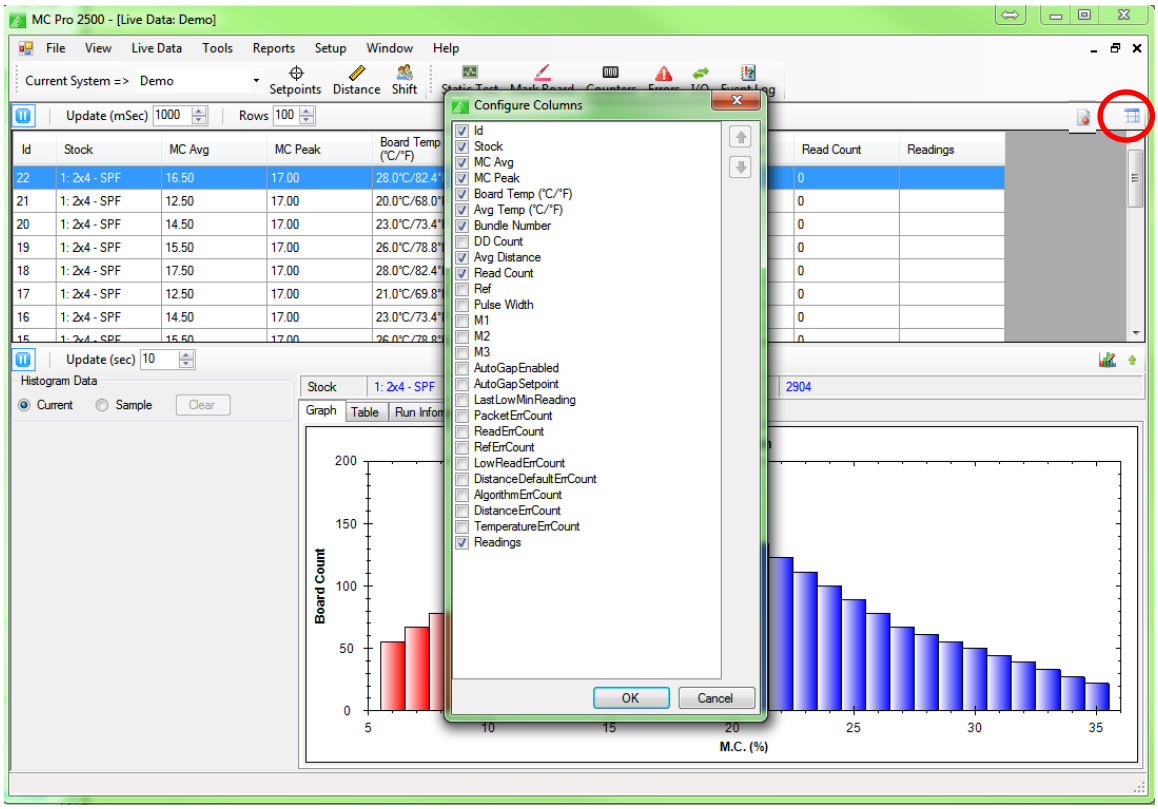

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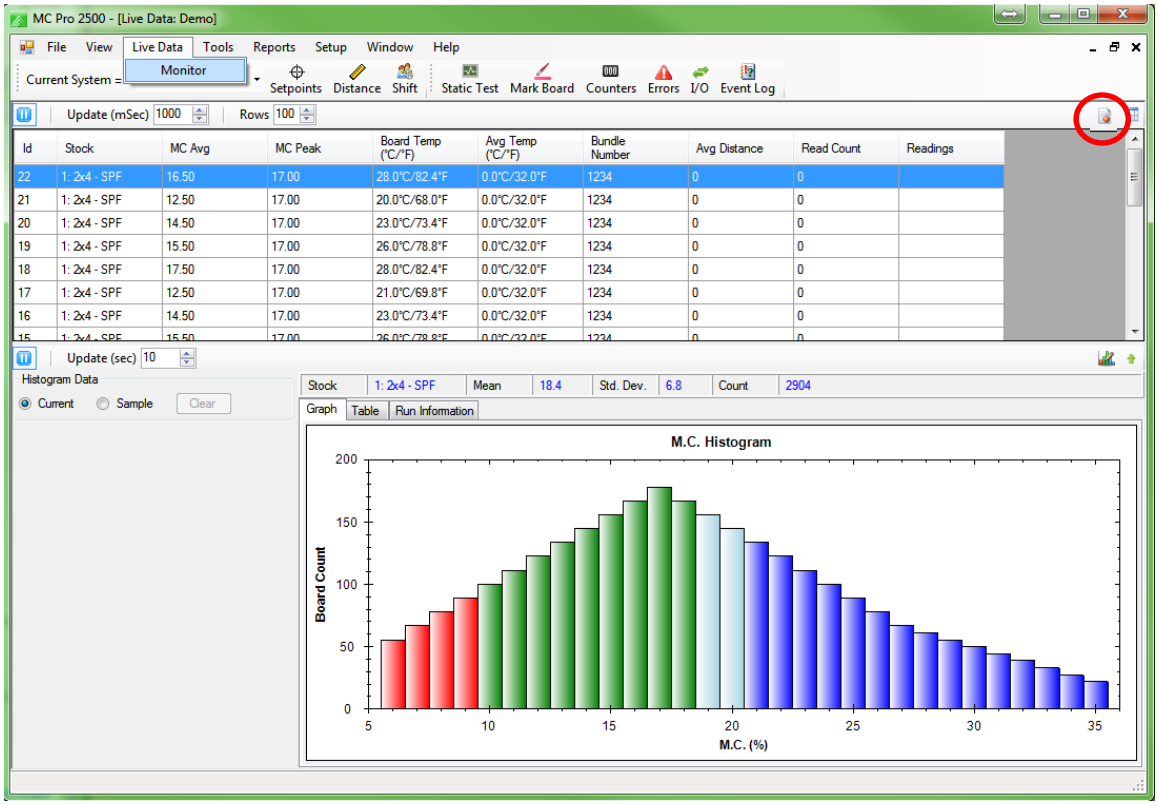
Record Data (icon)

This icon allows a user or technician to record the board data into a log file for troubleshooting.



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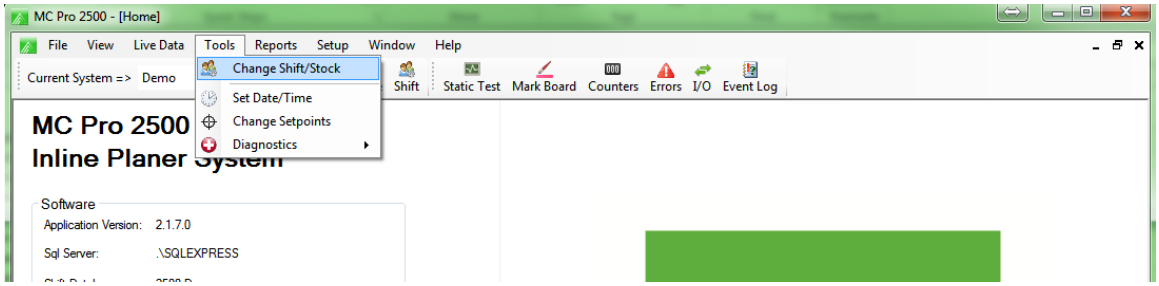
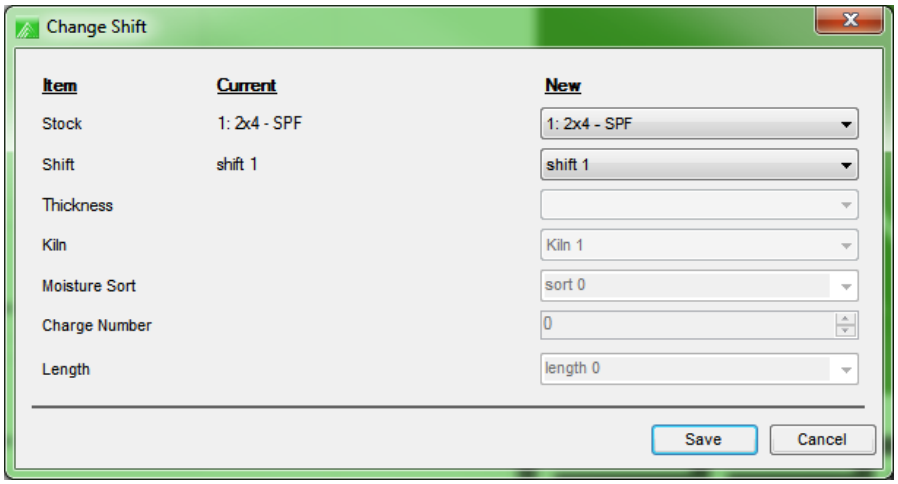
TOOLS

This section allows users to configure the system for their specific needs. Users can set the Date/Time for the controller, change set-points, and check diagnostics of the system.



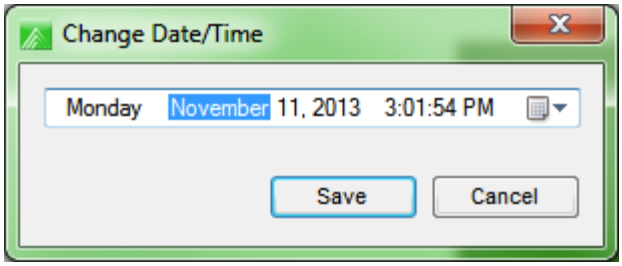
Change Shift/Stock

This screen allows the operator to change Run parameters such as stock, and shift. Changing an option in the menu will cause a report to be taken, and the tally will be cleared.



Set Date / Time

The 'Change Date and Time' screen allows the user to change the date/time on the controller. This will not change the local computer's clock.



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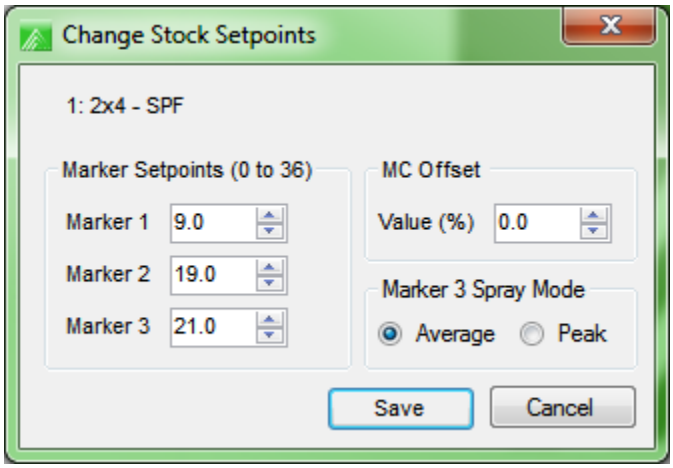
Change Set-points

It allows the user to modify three marker set-points of the current stock. It also allows the user to toggle between average and peak spray mode for marker 3. The MC Offset is a bias to either increase or decrease moisture content results of the selected stock.



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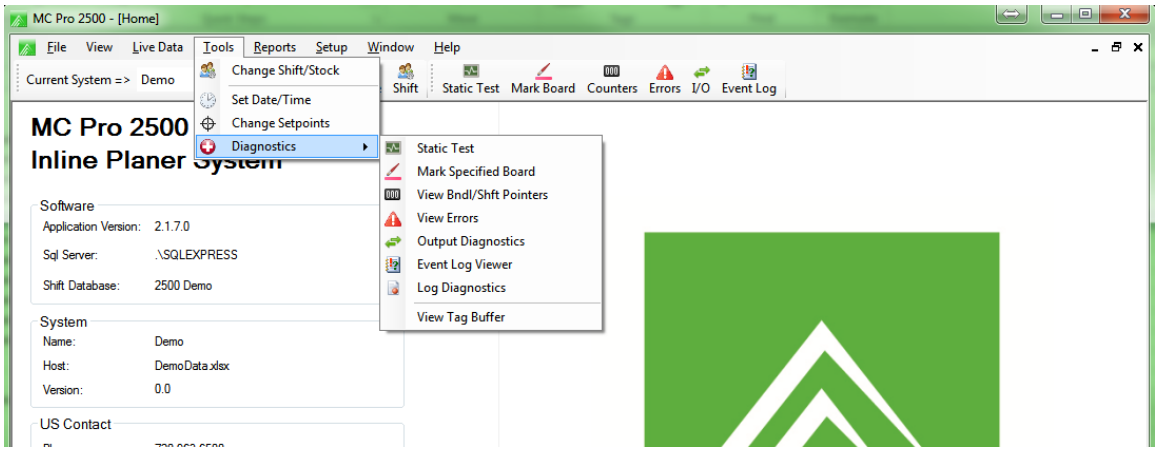
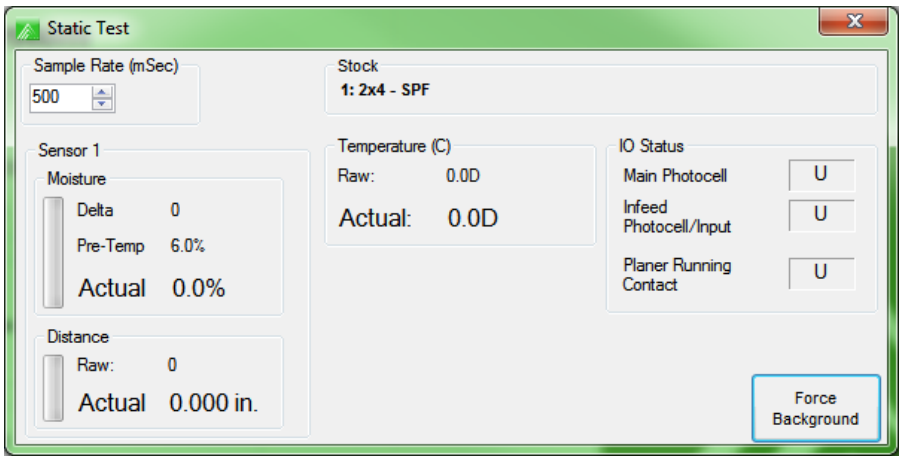
Diagnostics

The diagnostics section allows the user to check the status of the system; Static test, Mark specified board, view counters, view errors, out diagnostics, stock histogram, event log viewer and log diagnostics.



Static Test

The Static Test form allows the user to view the status of the sensor/s. (Caution: this test will stop the sensor from calculating and outputting) The Force Background button causes the system to take a reference.



The information shown on this screen is as follows:

<u>Moisture</u>

Delta	Difference between the background reading and the current reading
Pre-Temp	Moisture content before adjusting for temperature
Actual	Moisture content after adjusting for temperature

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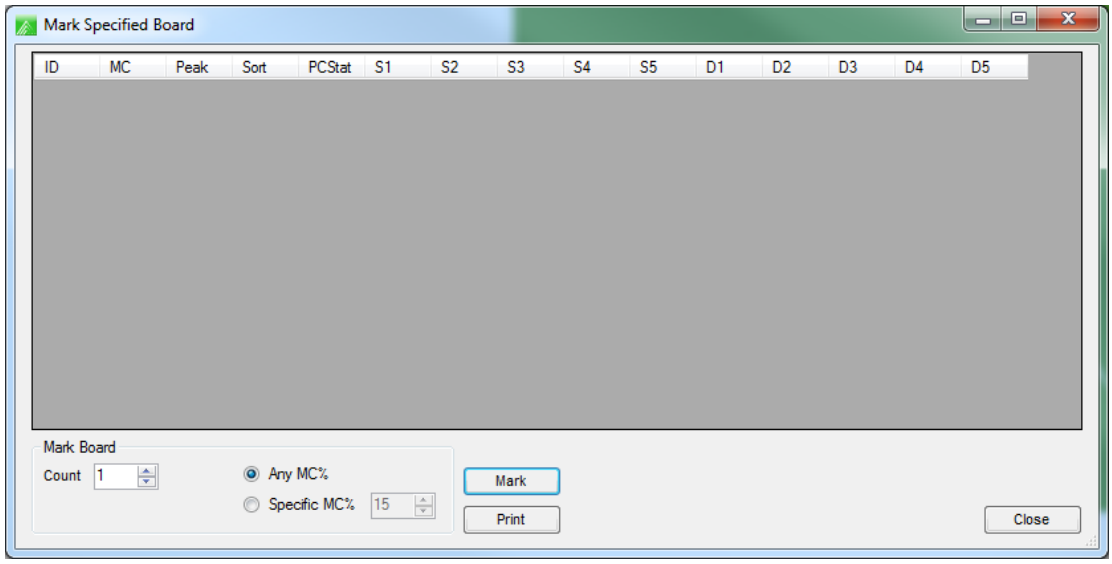
<u>Distance</u>	
Raw	Raw, uncalibrated number reported by the sensor
Actual	Calculated distance reported in inches
<u>Temperature</u>	
Raw	Raw number reported by sensor
Actual	Calculated temperature reported in degrees C
<u>I/O Status</u>	
Main Photo eye	Indicates whether it is (B)locked or (U)nblocked
Infeed Photo eye	Indicates whether it is (B)locked or (U)nblocked
Planer Contact	Input from planer infeed rolls.

Mark Specified Board

This is only used in systems that have a paint system connected. Screen provides two functions. The first is to mark "Any MC" to adjust spray nozzles and check that the delay counter is correct to mark a board in a desired location. Selecting, "Specified MC", helps the operator verify the moisture model.

Mark Board Count:	Marks the next specified number of boards
Print:	Prints this screen to ease MC calibration.



View Bundle/Shift Pointers

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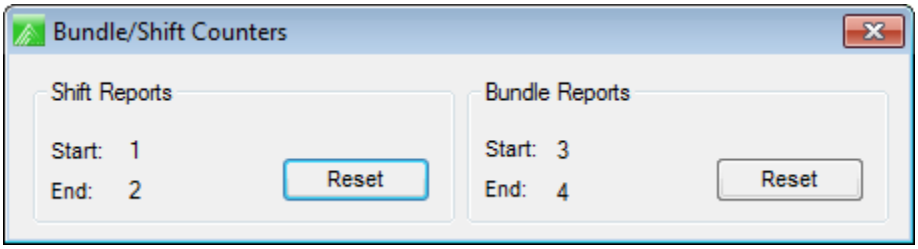
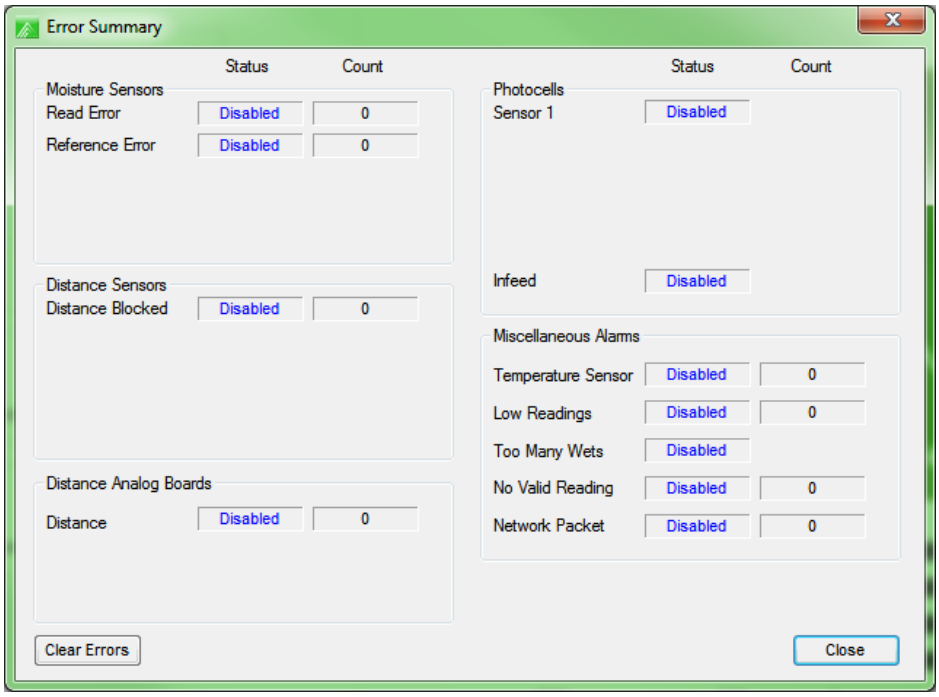
This screen allows the user to reset bundle and shift pointers. Pressing the reset button clears the data in the controller. These values do not need to be cleared unless direct by an SCS technician.



View Errors

This will display the status of the system and notify the user of any errors.



Output Diagnostics

This screen allows the user to force the various IO bits on or off to ensure that they are operating correctly. This feature is mainly used when initially configuring the system.

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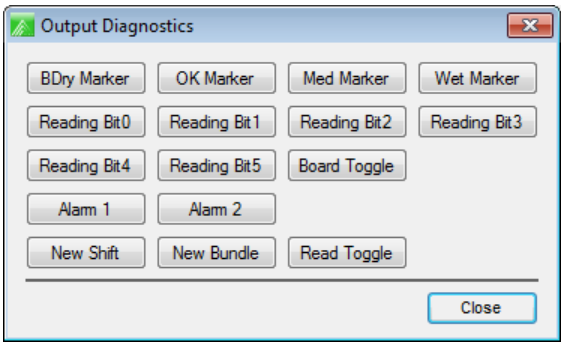


Event Log Viewer

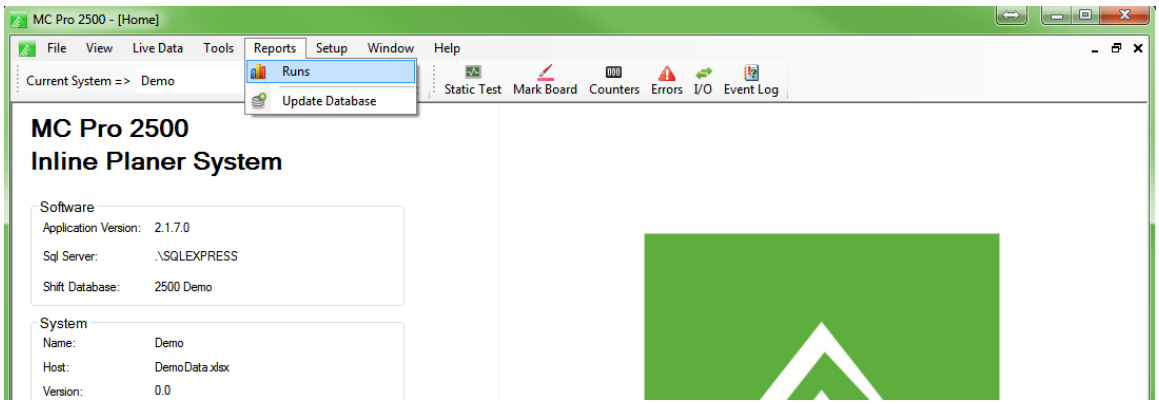
A display for PC related errors or events

Log Diagnostics

A recorder for internal system communications.

REPORTS

A list of all available shift reports in the database. Users can view or delete records. Data can be sorted by selecting a column header at the top. Multiple selections can be made.



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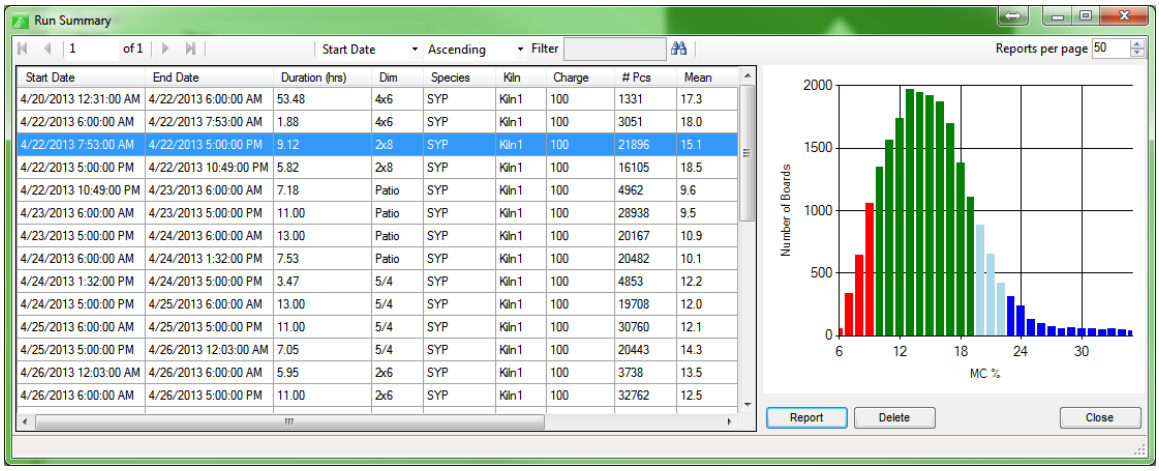

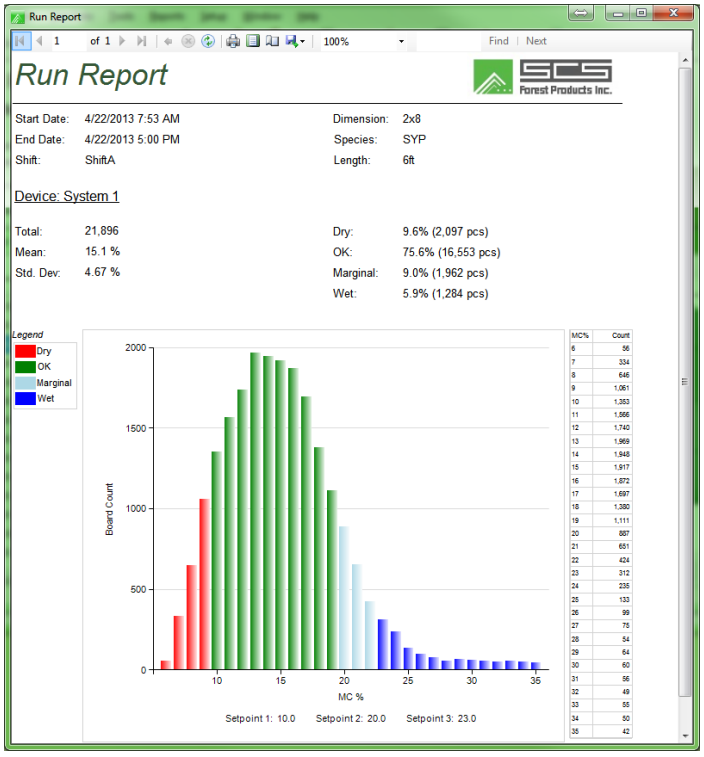

Sample run report.

SETUP

Allows the operator to configure general system settings.

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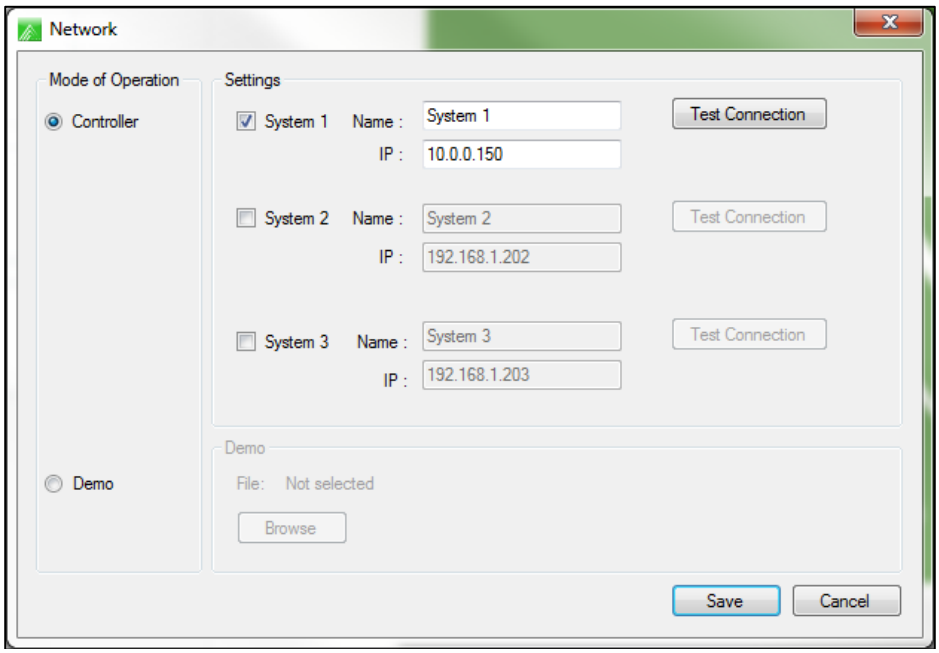
Network

Up to 3 systems can be controlled from the software. To setup a system, simply select the checkbox in an available system. Next, provide a system name. Finally, input the MCU IP address.



Test Connections: Confirm network connection to the controller.

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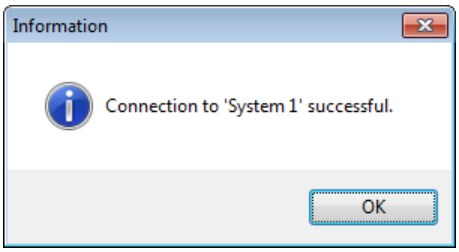
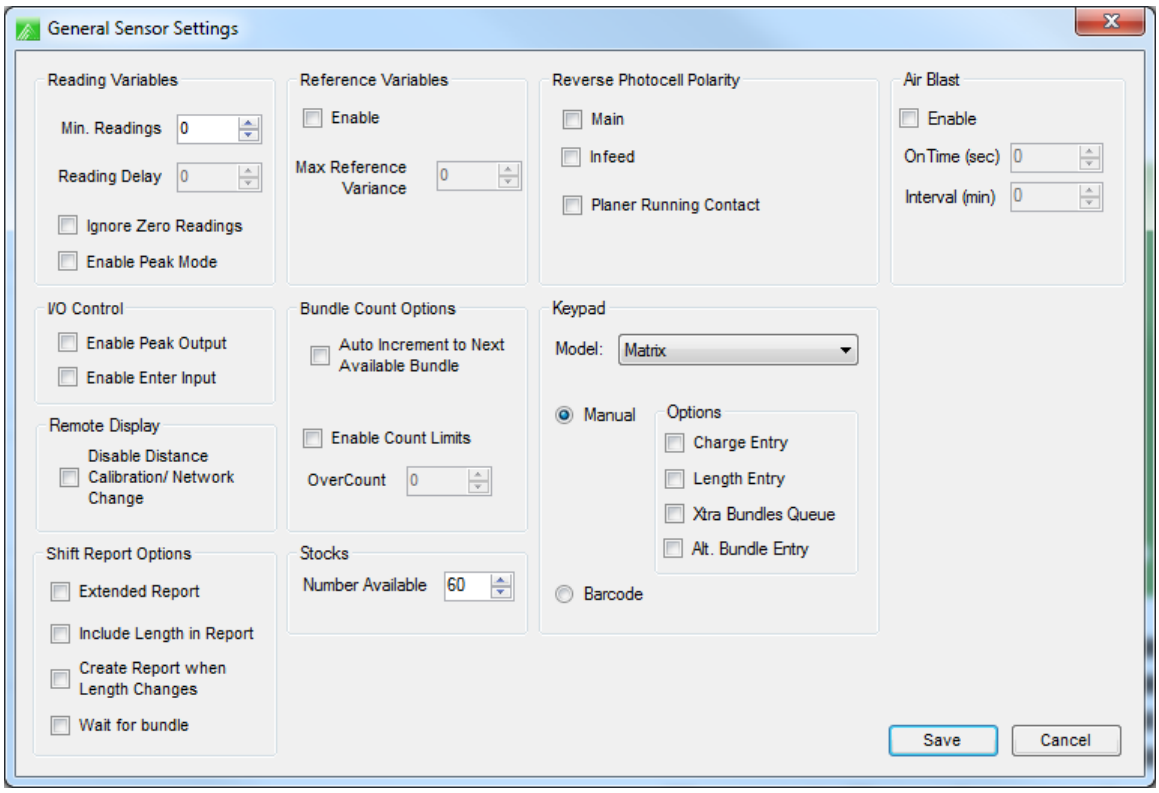


General Sensor Settings



Reading Variables

Min. Readings	Minimum number of readings required per board. If fewer readings are recorded, then the system assumes there was no board.
Reading Delay	This feature should only be used with slower planers to set a delay between readings, thereby reducing the total number of readings recorded per board to a maximum of 90. The range is 1-4. The default is 1 and this sets the readings at 16ms. Increasing to 2, reduces readings to every 32ms (3=48ms, etc).
Ignore Zero Readings	Control whether the zero reading error is enabled or not.

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Enable Peak Mode	Changes the MC output from Average to Peak reading
Reference Variables	
Reference Enable	Turns on/off background readings.
Max Reference Variance	The maximum tolerance between the old reference value and the new zero reading. If the difference exceeds this value, the system will store the new reference number.
Reverse Photo eye Polarity	
Polarity Selects:	The polarity for each detector is: unselected = active low, selected = active high.
Air Blast	
On Time (sec)	Duration (in seconds) of air blast
Interval (min)	How frequently (in minutes) the air is blasted
I/O Control	
Enable Peak Output	Only the peak reading is output through discreet I/O.
Enable Enter Input	Explanation required. Allows the customer to install a remote enter button near the operator who will be tracking bundles.
Bundle Count Options	
Auto Increment	Changes parameters related to bundle tracking. Consult an SCS Tech for assistance.
Keypad	
Model	Allows user to select model of keypad.
Manual/Barcode	Indicates which method the mill will use to enter in package information. Additionally, users can key in charge, length and enable a bundles queue function
Remote Display	Configuration screen for a remote information display. Used when mills want to display data on an overhead screen.
Shift Report Options	
Extended Report	Allows the user to edit Kiln, Moisture Sort, and Charge. If enabled, they can be accessed via View/Change Shifts.

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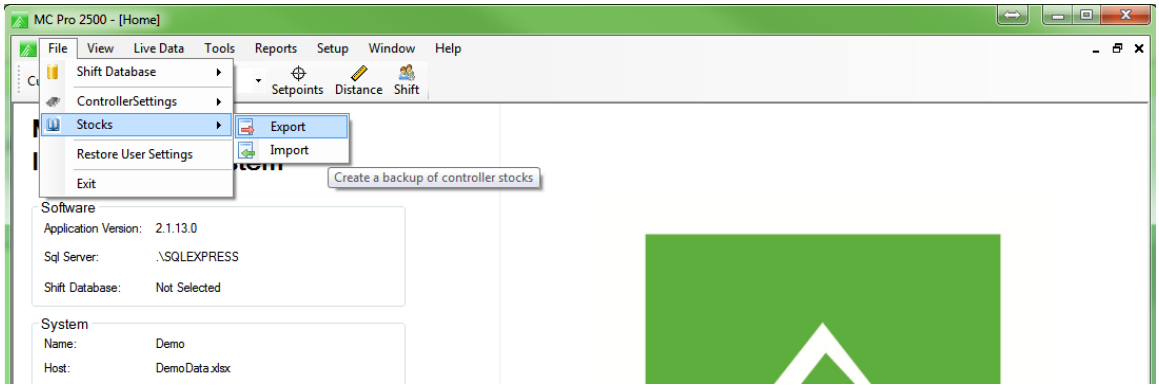
Include Length In Report	Allows the user to change the length of the lumber. The lengths are then used for shift reporting.
Create Report when Length Changes	If a length change is made on the keypad, a shift report will be taken, and the tally will clear.
Wait for Bundle	

Stocks

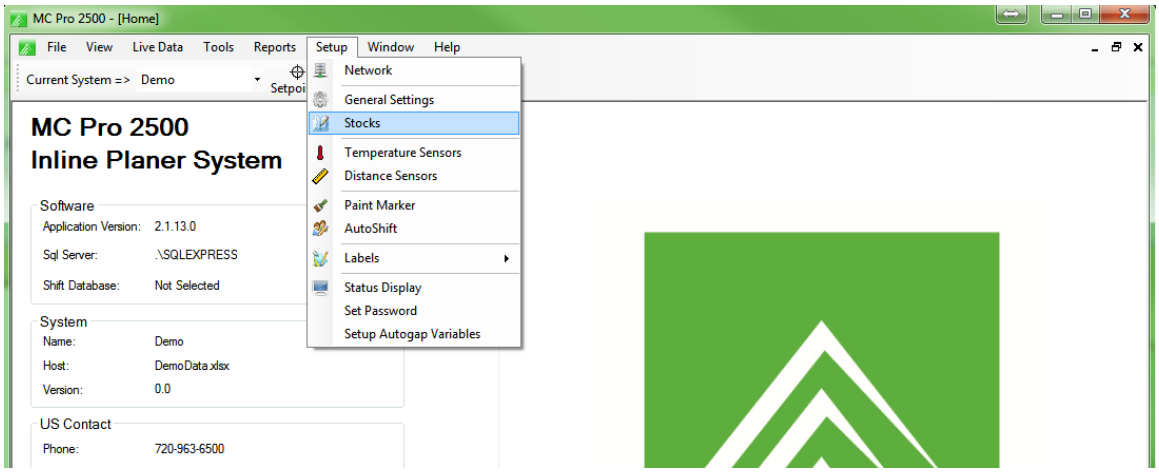
Number Available	Use this field to enter in the number of potential stocks

Setup Stocks

A backup of this list can be imported or exported by selecting "File" → "Stocks" → "Import"/"Export" option.



To edit stocks, select Setup -> Stocks



This form allows the user to configure the stock information on the system. The user can add, edit, and delete stocks. Current stocks are shown in the list.

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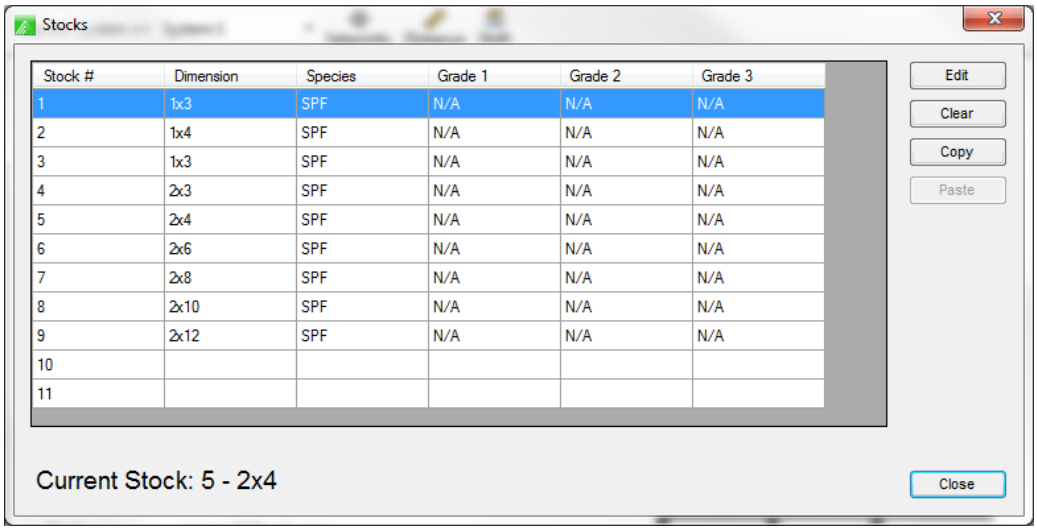
When adding, inserting or editing a stock, the following screen opens. To select a stock, simply highlight the row.



Edit a Stock

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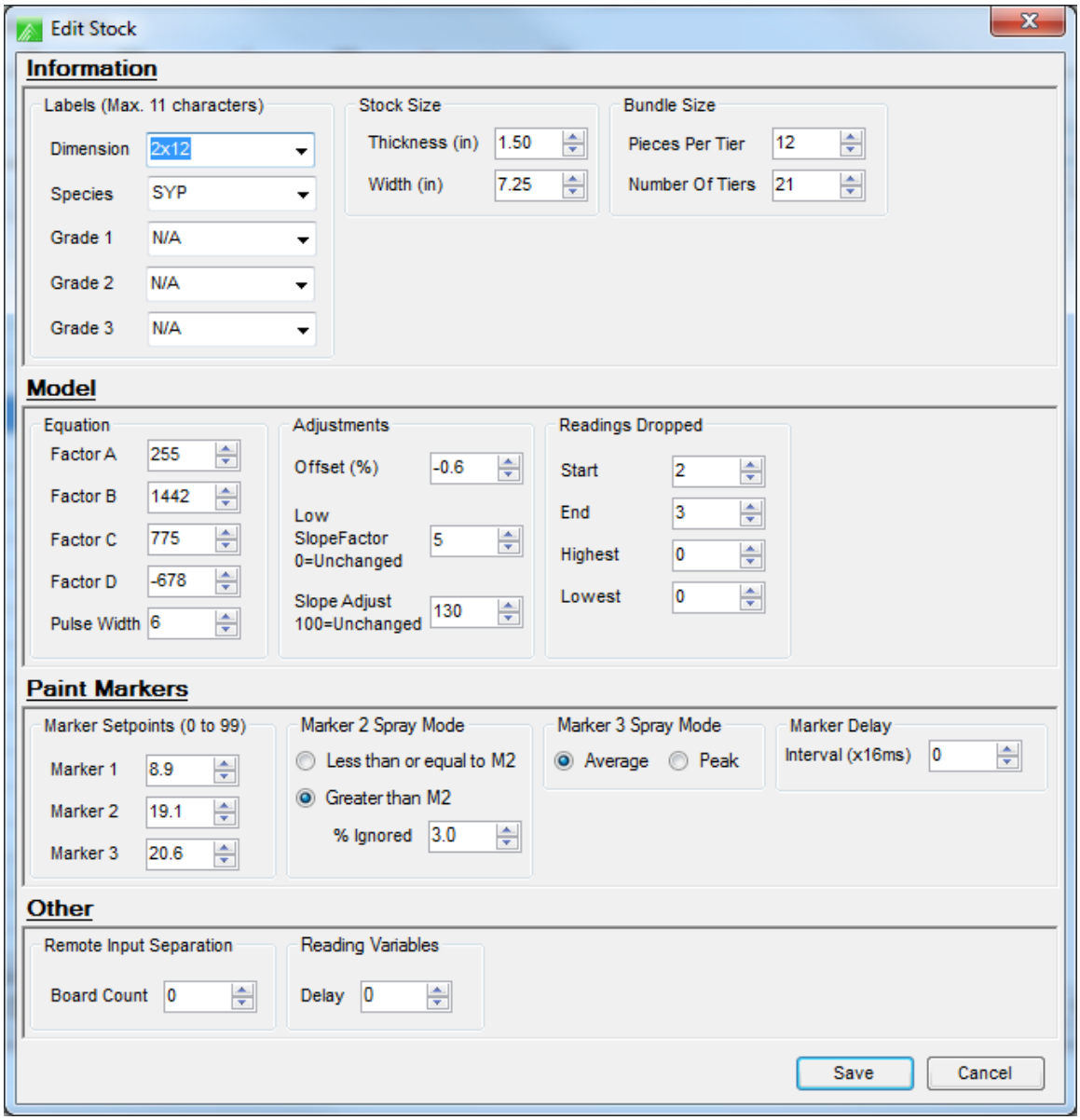

The settings are as follows:

Information

Labels

Dimension	Dimension label
Species	Species label
Grade 1/2/3	Three grades labels

Stock Size

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Thickness	Thickness (in)
Width	Width (in)
Bundle Size	
Pieces Per Tier	Number of pieces in the width of a tier
Number of Tiers	Number of pieces in the height of a load.
Model	
Equation Factors	
Factor A - Factor D	This variable should only be changed by an SCS technician.
Pulse Width	This variable should only be changed by an SCS technician.
Adjustments	
Offset	Offsets the calculated moisture content.
Low Slope Factor	This adjusts the slope of the formula used to calculate the MC of pieces 10% and lower. This should not be adjusted without contacting an SCS technician.
Slope Adjust	Adds a multiplier to the sensor reading so the higher readings are affected differently than the lower readings. (eg. sensor reading is 15. Slope is 100: reading is 15. Slope is 110: reading is 11.5). This number can make a large change on how your system reads and should not be adjusted without consulting an SCS technician.
Readings Dropped	
Start	Number of readings taken at the start of the board to disregard.
End	Number of readings taken at the end of the board to disregard.
Highest	Number of highest readings to disregard.
Lowest	Number of lowest readings to disregard.
Paint Markers	
Marker Setpoints	Thresholds at which various markers will start to spray boards.
Marker 2 Spray Mode	

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Less Than, Equal M2	If the user selects less than M2, then boards will be sprayed that fall below the M2 setting. A mill would select this if it uses 3 markers and desires to track 'marginally wets'.
Greater Than M2	If the user selects greater than M2, boards will be sprayed wet that exceed the M2 value
% Ignored	Users can ignore a certain percentage of wet boards. These wets will not be sprayed until the % exceeds the setting.

Marker 3 Spray Mode

Average	Sprays based on the average of the board
Peak	Sprays based on the peak reading of the board.

Marker Delay

Interval (x16ms)	Time delay for spray to turn on (in 16ms intervals)

Other

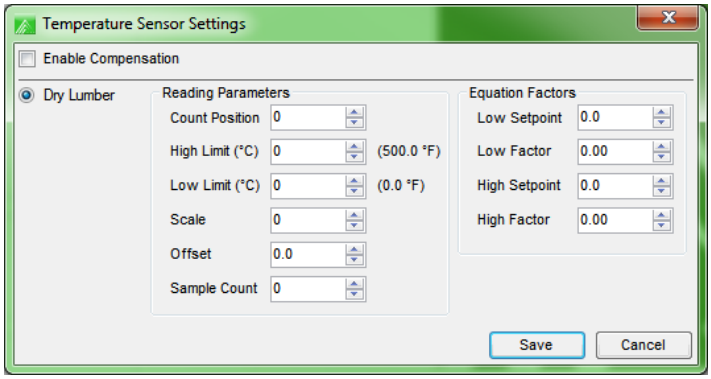
Remote Input Separation

Board Count	Number of boards that are read before next package automatically increments

Reading Variables

Temperature Sensors

Not all systems have temperature sensors installed. Please talk to your technical advisor to determine if you have purchased this option.



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Note: these variables should not be changed without consulting an SCS employee.

Enable Compensation	Enables temperature compensation which offsets the moisture readings by a factor, depending on the temperature of the board.

Reading Parameters

Count Position	Number of sensor readings taken before temperature is read.
High Limit	Maximum acceptable temperature reading
Low Limit	Minimum acceptable temperature reading
Scale	This factor should be adjusted until the temperature displayed on the sensor and the temperature displayed in the Static Test screen match each other.
Offset	A bias to increase or decrease the temperature sensor reading.
Sample Count	The sample count is the number of pieces that the temperature average is based on. Default: 50.

Equation Factors

Low Set-point	Variable for the adjustment of the temperature compensation formula. Do not adjust.
Low Factor	Variable for the adjustment of the temperature compensation formula. Do not adjust.
High Set-point	Variable for the adjustment of the temperature compensation formula. Do not adjust.
High Factor	Variable for the adjustment of the temperature compensation formula. Do not adjust.

Distance Sensors

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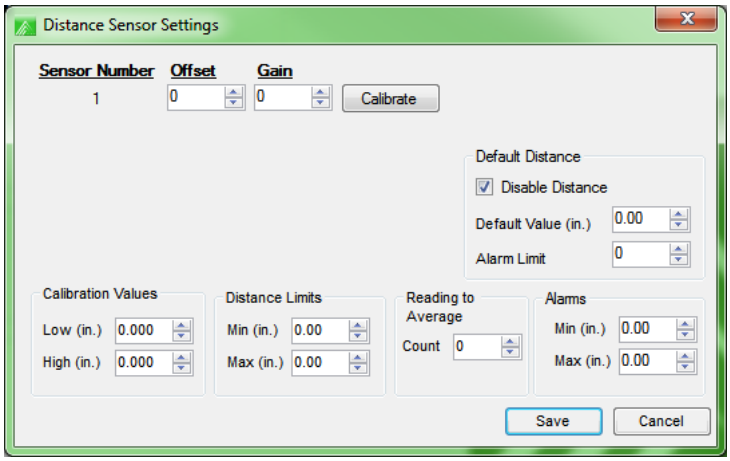

Offset — Used to calculate true distance from the sensor readings. This variable is determined in the distance calibration process and should not be manually adjusted.

Gain — A variable used to calculate true distance from the sensor readings. This variable is calculated in the distance calibration process and should not be manually adjusted.

Calibration Values

Low — Lower distance (in inches) used when running the distance calibration process (usually 0”).

Note: Do not change unless immediately calibrating with new calibration piece.

High — Upper distance (in inches) used when running the distance calibration process (usually 1.250”).

Note: Do not change unless immediately calibrating with new calibration piece.

Distance Limits

Min — Lowest reading allowed before the distance will not be considered valid. If the distance is not valid, moisture content for that reading will not be generated.

Max — Highest reading allowed before the distance will not be considered valid. If the distance is not valid, moisture content for that reading will not be generated.

Miscellaneous Distance Settings

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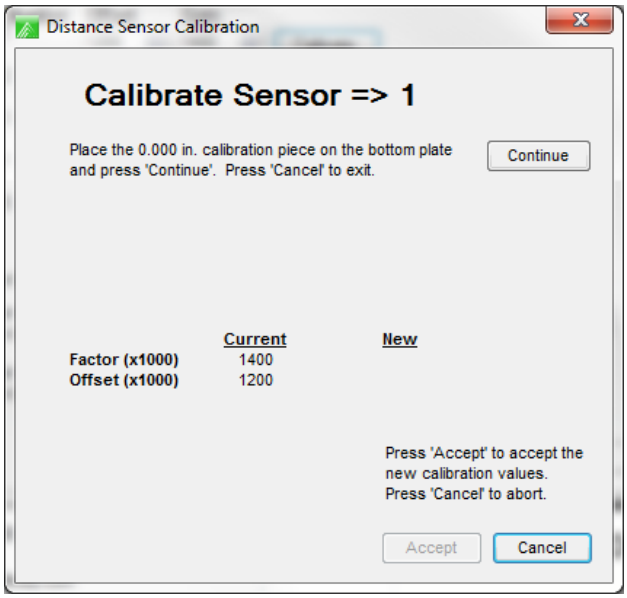
Readings to Average	Number of sensor readings taken before the readings are averaged and the display is refreshed in the 'Static Test' mode.

Calibrate



A step by step procedure for calibrating the distance sensor is shown on the screen beside the continue button. The procedure is as follows:

1. Ensure the distance sensors are clean before calibration.
2. Place the calibration piece on the lower arm of the system so the 0.000" side is blocking the distance sensor. The hole for the distance sensor should be completely covered.
3. Press the "Continue" button.
4. Rotate the calibration piece so that the 1.250" section is straddling the distance sensor hole.
5. Press the "Finish" button. New factor and offset values will appear and should be around 1200 and 1400 +/- 200.
6. Compare the old values to the new values. They should not change by much (+/-10 %).
7. If OK, then press Accept.
8. Calibration can be tested by placing a piece over the sensor and viewing distance in static test mode.

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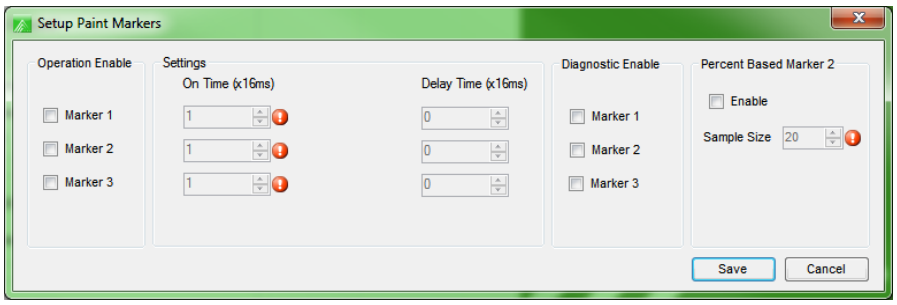
Paint Markers

This form allows the user to setup the paint markers. Users can enable a paint marker by checking the appropriate marker label.



Marker 1	Activates when an MC value below set-point 1 is measured.
Marker 2	Activates when an MC value above set-point 1 and below set-point 2 is measured.
Marker 3	Activates when an MC value above set-point 2 and below set-point 3 is measured.
Settings	On Time – Indicates marker spray duration (16 mS increments). Delay time – Marker delay time (16 mS increments).
Diagnostic Enable	Controls which marker sprays when using the Mark Specified Board function.
Percent Based Marker 2	If disabled, marker 2 will mark boards less than or equal to set-point 2 and above set-point 1. If this is enabled, a percentage of pieces above set-point 2 will be allowed into the drier sort. (See Edit Stocks)

Setup Auto Shift Reporting

Screen is used to setup shift reporting. The system will automatically assign a shift to a run based on the time of the run. Users can edit the various shifts as required.

*User must set up both Rotation #1 and Rotation #2.

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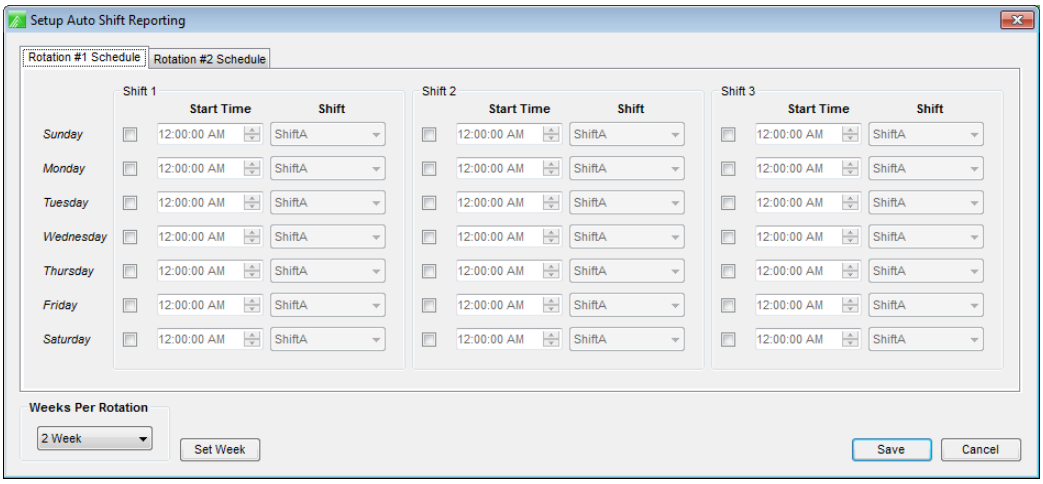
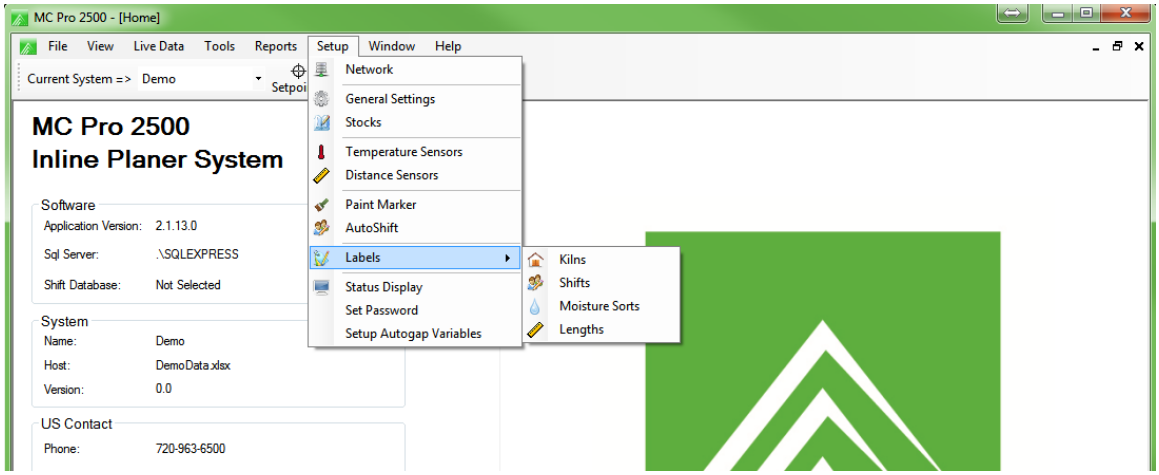


Labels



Kilns

Create kiln labels and set the charge number format.

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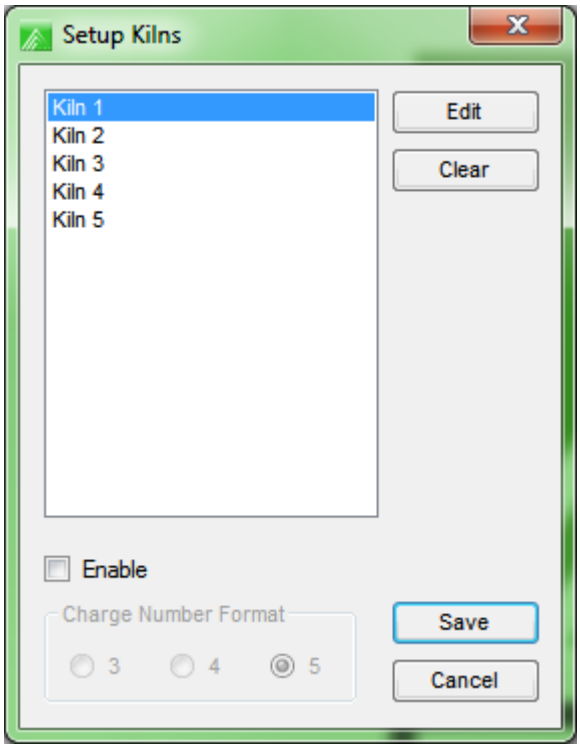
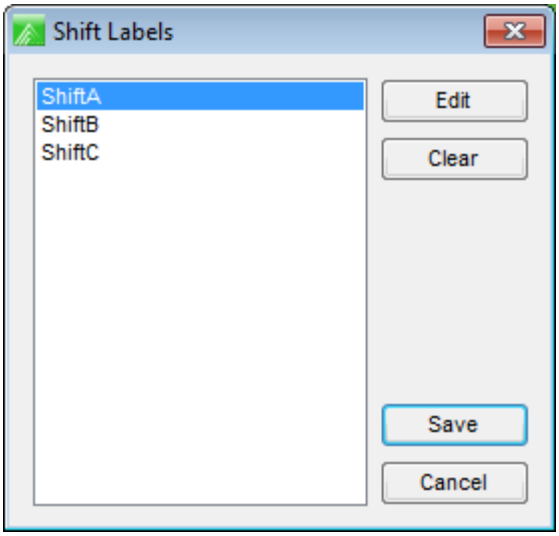


Shifts

You must have at least one shift name in the system.



Create shift labels for future reporting.

Moisture Sorts

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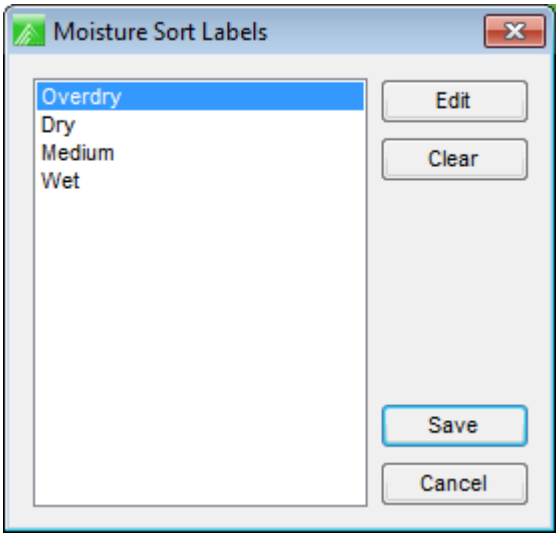
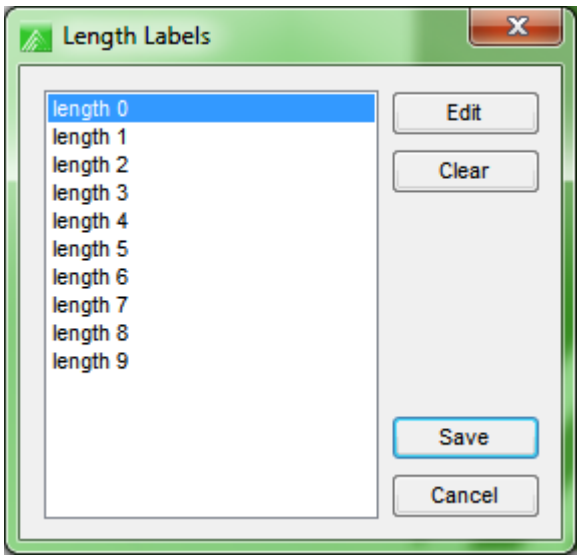
Create custom moisture sort labels for future reporting.



Lengths

Create lumber length labels for future reporting.



AutoGap

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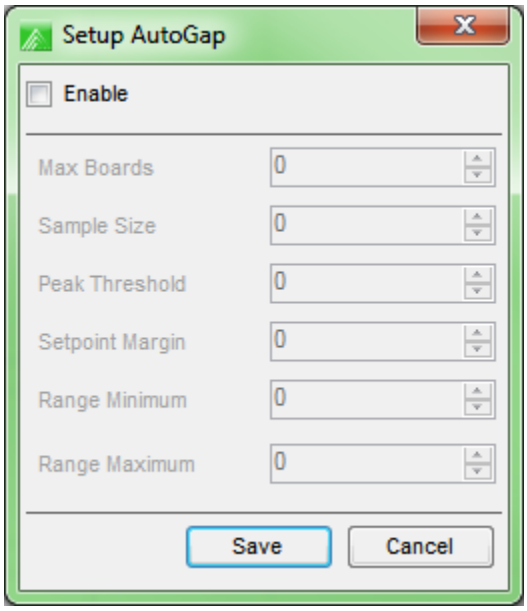
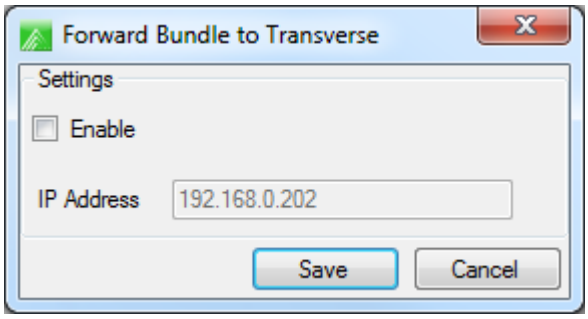


Forward Bundle Info

Allows the user to forward the bundle info to an SCS Transverse system.
Check enable and type in the IP address of the Transverse controller.



Set Password

Allows the user to create a password to prevent unauthorized changes to the software.

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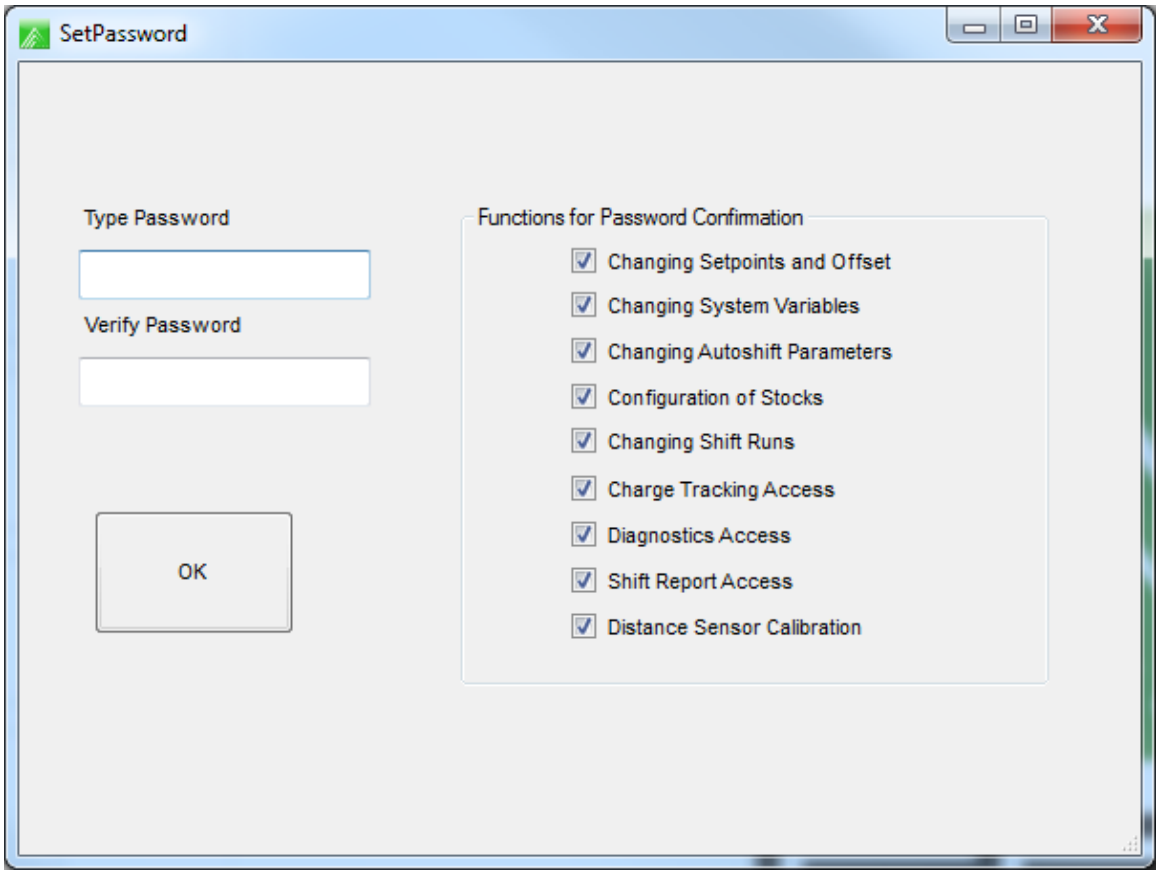
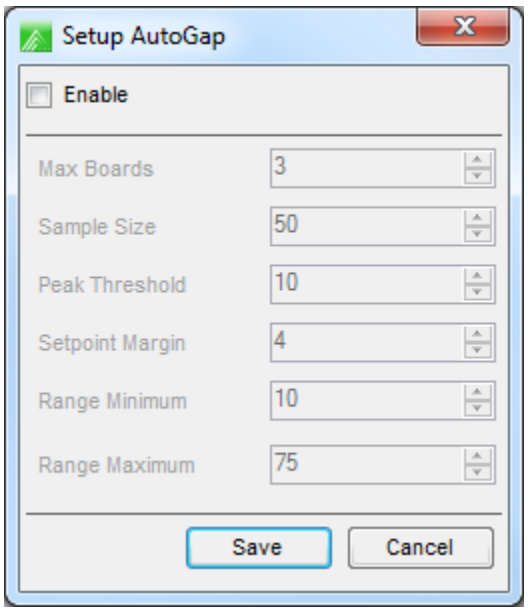


Setup AutoGap Variables



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Window

Select the active window.

Help

Return to the Home page containing important software and hardware information.

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System Calibration and Maintenance

Frequency	Activity
Daily	With clean air, blow down the sensors as well as all related photo eyes, distance sensors, and temperature sensors if applicable.
Weekly	Update shift report database by entering shifts and clicking "yes" when prompted to update the shift database. This pulls all of the reports off of the controller and stores them on the database on your local PC or network. Once the shifts are stored on the database, they can then be viewed in the shift report viewer. Updating the database can be more frequent than weekly if the user wants to have up to data information in the shift viewer.
Bi-weekly	With clean air, blow down the sensors as well as all related photo eyes, distance sensors, and temperature sensors if applicable. Take a moist rag (with alcohol or a similar cleaning fluid) and clean all of the system photo eyes. Also, clean the distance sensors and temperature sensor if the system is equipped with one. Perform a distance calibration. (See calibration procedure in this manual) Visually inspect all components of the system including photo eyes and distance sensors.

Keypad Bundle Entry Description

This will cover the function and setup of the remote keypad.

Keypad Bundle Entry Description

The keypad system is used to re-create the loads as there were placed in the kiln. This will allow the user to maximize drying times, and troubleshoot any problems they may have with the kilns. The keypad system is utilized by having the user mark each load from the kiln with a code. This code consists partly of the mill's charge number that was labeled to that kiln charge. The other part of the code is a number corresponding to the position of the load in the kiln. This system also allows the 2500T to cooperate with the user's SCS In-Kiln moisture meter, to monitor, verify, and fine tune the in-kiln system's operation.

Keypad Setup

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There are a few options to consider when setting up the keypad. The first is what information is desired. If all that is desired is the charge number and the position of the bundle in the kiln, then NMI's default settings will be alright. If the charge and the kiln number are all that is desired, the "Enable New Keypad Entry" must be enabled. If it is desired to track the kiln number, charge number and bundle position, you need to check "Enable New Keypad Entry", as well as "Report after Bundle"

Keypad Operation

Using NMI's default settings (no checks enabled section 4.7.3.6) there will be a single number labeled on the bundles as they leave the kiln. This number will represent both the charge number and the bundle position. The charge number is the first digits in the number. The charge number could be between 3-5 digits (set in section 4.7.5). If "Enable New Keypad Entry" is checked, keypad operation is as follows. Current kiln and charge will always be displayed on the top line of the keypad's display. Press F1 button to commence bundle tracking. A "K:" will pop up on the bottom line of the keypad display. Enter the kiln number and press enter. A "C:" will popup. Enter the bundle's charge number and press enter. If only the kiln or the charge needs changing, leave the other variable blank and press enter. If "Report after Bundle" is also checked the above procedure is followed. After the charge number has been entered the bottom line of the keypad display will go blank. This is when the bundle position number is to be entered. If all that is desired is to track bundles by their charge number, "Extended Report Enable", as well as "Enable Keypad Charge Entry" must be enabled. In this case, the user will press the F2 key. They will see "CC:". This is where they enter the charge number and hit enter. If the user wishes to track the lumber by length, and wishes to use the keypad to change that length, "Enable Length in Reports" must be enabled as well as "Enable Keypad Length Entry". In this case the user will press the F3 key, until they see the desired length. They will then press enter.

Keypad Options

In order to track bundles with complete accuracy, the user must press the enter key when the first board of the next bundle is the next piece to enter the 2500T. If the keypad operator has a good view of the planer infeed they can press the enter button when the first board enters the planer.
If the keypad operator is too far away from the planer infeed to accurately judge when the first board is about to enter the planer, there are two options. If the user knows the number of boards lying on the infeed deck, that can be entered in the configure stocks screen (Section 4.7.2). The "Enter Input Board Delay Count" will be the variable to be set. This variable must be set for each stock. Another solution to this problem is to install a remote button for the planer feeder to press when that first board is about to enter the planer. See MCU wiring diagram for remote button wiring. This remote enter button is enabled in the "General System Variables" "IO control" (Section 4.7.3.6). This remote button can be replaced with a color photo eye that will recognize a mark that the tilt hoist operator could paint on the first board. In either of these cases, the keypad operator is still to enter the bundle number, but not press the enter button.

Distance Calibration

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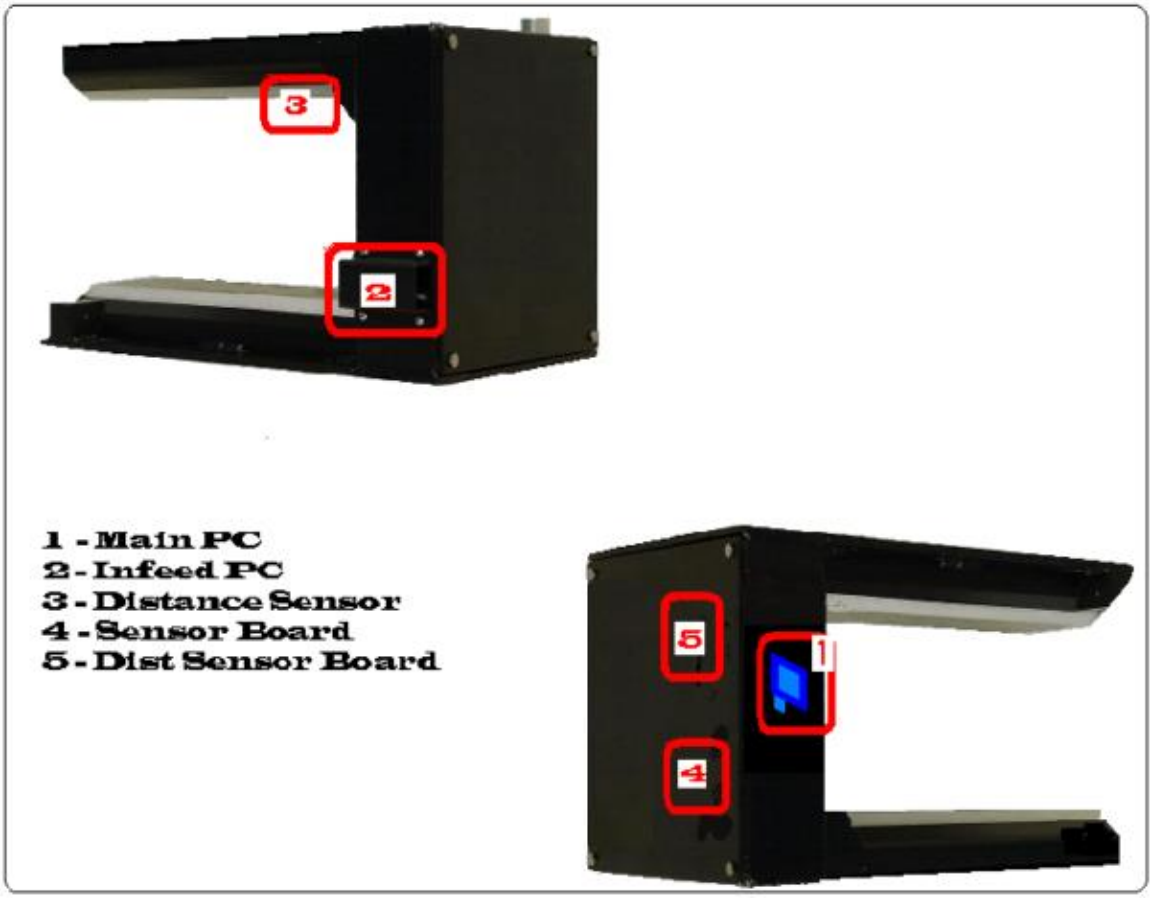

This maintenance is recommended to be done every two weeks.
1) If you have an air hose nearby spray off the system.
2) Take a moist rag (with alcohol or a similar cleaning fluid) and wipe off the photo eyes on either side of the system, as well as the distance sensor and the temperature sensor, located on the underside of the upper portion of the sensor.

Now to calibrate the Distance sensor
1) Get the aluminum calibration block ready.
2) You can do the calibration on the software computer, or on the Controller Box.

You can do it one of two ways. On the controller box press the mode button until it says “Distance Cal” then press select

3) Whichever way you got into the calibration mode it should now say “place the 1.875” calibration block under the distance laser”. Now place the shorter, painted side of the aluminum calibration piece under the distance laser.

4) Now Click continue, or press the select button.
5) After a very short time it should now say “Place the 2.625” piece under the distance laser”. Now put the tall, painted side of the calibration block under the distance laser.
6) Now Click Finish, press the select button, to finish the calibration.

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However you did the calibration it should now tell you the old distance numbers and the new numbers. If the new numbers are close to the old numbers then accept the changes. These numbers should be somewhere around -1400, and -5400 (+/- 1000).

Information Handoff to Automatic Grader Specifications

The specification will use the Average port in the main JB. This function will use the output on connection 23 of the main JB to toggle between readings and each readings of the board by NMI will be put on the average bus. Connection 24 will toggle between boards. When connection 24 (board toggle) toggles the average reading that NMI has read will be put on the bus and will be valid until the next toggle of connection 23 (reading toggle). The connection map is as follows:

Function	Main JB Connection
MC Average/Reading Bit 0	17
MC Average/Reading Bit 1	18
MC Average/Reading Bit 2	19
MC Average/Reading Bit 3	20
MC Average/Reading Bit 4	21
MC Average/Reading Bit 5	22
Reading Toggle Bit	23
Board Toggle Bit	24

Serial Specification

This specification will describe the serial specification for the planer program in order that a inline grader can receive the board by board data from the planer sensor via a serial channel. The serial connection will be a three wire connection with GND, TX and RX. The sensor can operate in three modes; Full Mode, peak/average only and peak/average/Bundle. In full mode all of the readings are output and. at the end of the board, a packet with overall info is sent. In peak/average only mode only the peak and average are sent every board. In peak/average/bundle mode the peak, average and bundle number are sent. The modes are selected in the Sensor Setup/Setup System Variables/Setup General System Variables form.

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Full Mode

The sensor will send packets to the grader which are framed by start Tx (02H) and End Tx (03H) bytes. Byte two of the packet indicates what type of packet it is (30H- End of Board, 31H-reading, etc.). When a board leaves the moisture sensor the sensor will transmit a package to the grader with the following format:

Byte	Description
0	02H (Start Transmit)
1	30H (New board indication)
2-11	ASCII string (10 char) with the bundle number
12-16	ASCII string (5 char) with the Average reading
17-21	ASCII string (5 char) with the peak reading
22	ASCII Char (0-9) - # of First readings deleted
23	ASCII Char (0-9) - # of Last readings deleted
24	ASCII Char (0-9) - # of highest readings deleted
25	ASCII Char (0-9) - # of lowest readings deleted
26	03H (End Transmit)

All ASCII strings will use the null character (00H) to mark the end of the string. The average reading will be sent with a decimal in the string (ex. 28.5).

The sensor will send every reading that it takes on boards. This will include readings that we have excluded from the algorithm (i.e. delete highest, etc). The packet format for these readings is as follows:

Byte	Description
0	02H (Start Transmit)
1	31H (New reading indication)
2	ASCII first character of reading (Ten's Digit)
3	ASCII second character of reading (One's Digit)
4	03H (End Transmit)

The grader can send the character 30H to the sensor and the sensor will respond with a package of the following format:

Byte	Description
0	02H (Start Transmit)
1	32H (Presence detect response)
2-6	ASCII string (5 char) with the sensor version number
7	03H (End Transmit)

Again the ASCII string will be null terminated and contain a decimal point (ex 4.11). The sensor will ignore any other character sent. This function could be used as a presence detect.

The serial communication will be 19200, 8 bit, 1 stop, no parity.

The board data takes approx. 12 ms to transmit and will be transmitted as soon as the board leaves the sensor. It is up to the grader program to match this data to the board.

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Peak/Average mode

The sensor will send a packet every board with the following format;

Byte	Description
0, 1	ASCII Peak value – 2 digits
2	20H (space)
3, 4	ASCII Average value – 2 digits
4	0DH (CR)
5	0AH (LF)

The grader can send the character 30H to the sensor and the sensor will respond with a package of the following format:

Byte	Description
0	02H (Start Transmit)
1	32H (Presence detect response)
2-6	ASCII string (5 char) with the sensor version number
7	03H (End Transmit)

The ASCII string will be null terminated and contain a decimal point (ex 4.11). The sensor will ignore any other character sent. This function could be used as a presence detect.

The serial communication will be 9600, 8 bit, 1 stop, no parity.

Peak/Average/Bundle Mode

The sensor will send packets to the grader which are framed by start Tx (02H) and End Tx (03H) bytes.

When a board leaves the moisture sensor the sensor will transmit a package to the grader with the following format:

Byte	Description
0	02H (Start Transmit)
1-10	ASCII string (10 char) with the bundle number
11-15	ASCII string (5 char) with the Average reading
16-20	ASCII string (5 char) with the peak reading
21	03H (End Transmit)

All ASCII strings will use the null character (00H) to mark the end of the string. The average reading will be sent with a decimal in the string (ex. 28.5).

The grader can send the character 30H to the sensor and the sensor will respond with a package of the following format:

Byte	Description
0	02H (Start Transmit)

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1	32H (Presence detect response)
2-6	ASCII string (5 char) with the sensor version number
7	03H (End Transmit)

Again the ASCII string will be null terminated and contain a decimal point (ex 4.11). The sensor will ignore any other character sent. This function could be used as a presence detect.

The serial communication will be 19200, 8 bit, 1 stop, no parity.

The board data takes approx. 12 ms to transmit and will be transmitted as soon as the board leaves the sensor. It is up to the grader program to match this data to the board.

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