- Internal Temp: Indicates the current internal temperature of the M.O.L.E. Profiler.
- RF Status: Signal strength indicator with 5 bars indicating relative strength of the RF signal.

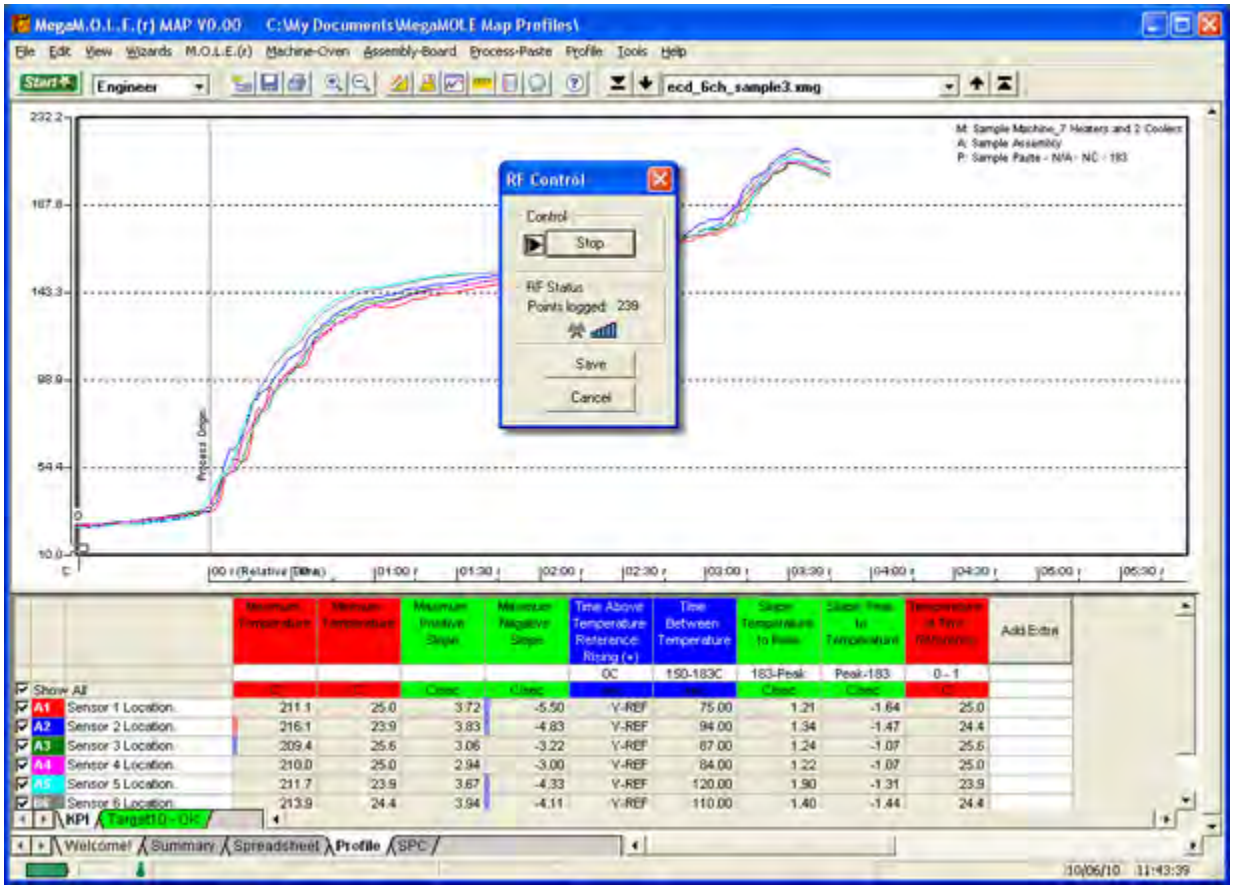
Save:

- Stops the M.O.L.E. Profiler logging real-time data and allows the user to save that data. If there is not enough data recorded, the software displays a “Not enough data to profile” message, and it will cancel the data run.

When real-time data is logging using the MEGAM.O.L.E.® or SuperM.O.L.E.® Gold 2 Profiler, some of the transmitted data may not get logged on the Data Graph. While transmitting the real-time data the M.O.L.E. Profiler also records the data run. The software prompts the user to either decide to connect the M.O.L.E. Profiler to the computer and replace the real-time data with the data run stored in the M.O.L.E. Profiler, or retain the real-time data and have the software substitute the gaps with a straight line between missing points.

Cancel:

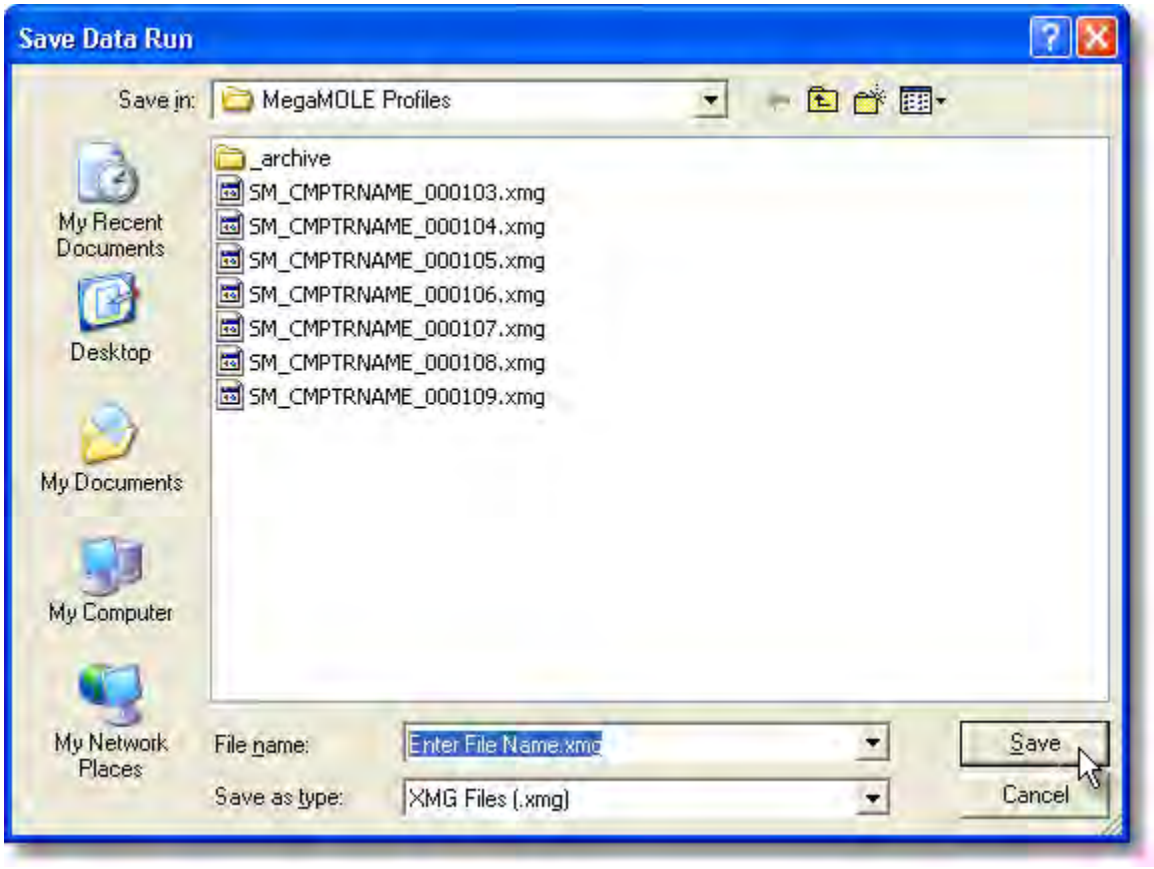
- Stops the M.O.L.E. Profiler logging real-time data discarding any recorded real-time RF data.



When real-time data logging has stopped, the software automatically processes the data. Depending on how long the data run is, it may take a few moments to complete.

7) Click the ***Save*** command to save the data run. The software prompts the user to specify a file name (*.XMG).

When saving a data run (***.XMG**) to a different file directory other than the current Working directory, the software automatically sets the new file directory as the current Working Directory. This process does not delete any data run files in the previously set Working directory and can be quickly accessed using the ***Recent Working Directory*** command on the ***File*** menu.



8) When finished, click the ***Save*** command button to complete the process.

When using the PTP® VP-8, the PTP® TX power must be turned OFF after saving the data run by removing the On/Off Male Plug connector from the Female On/Off Power connector.

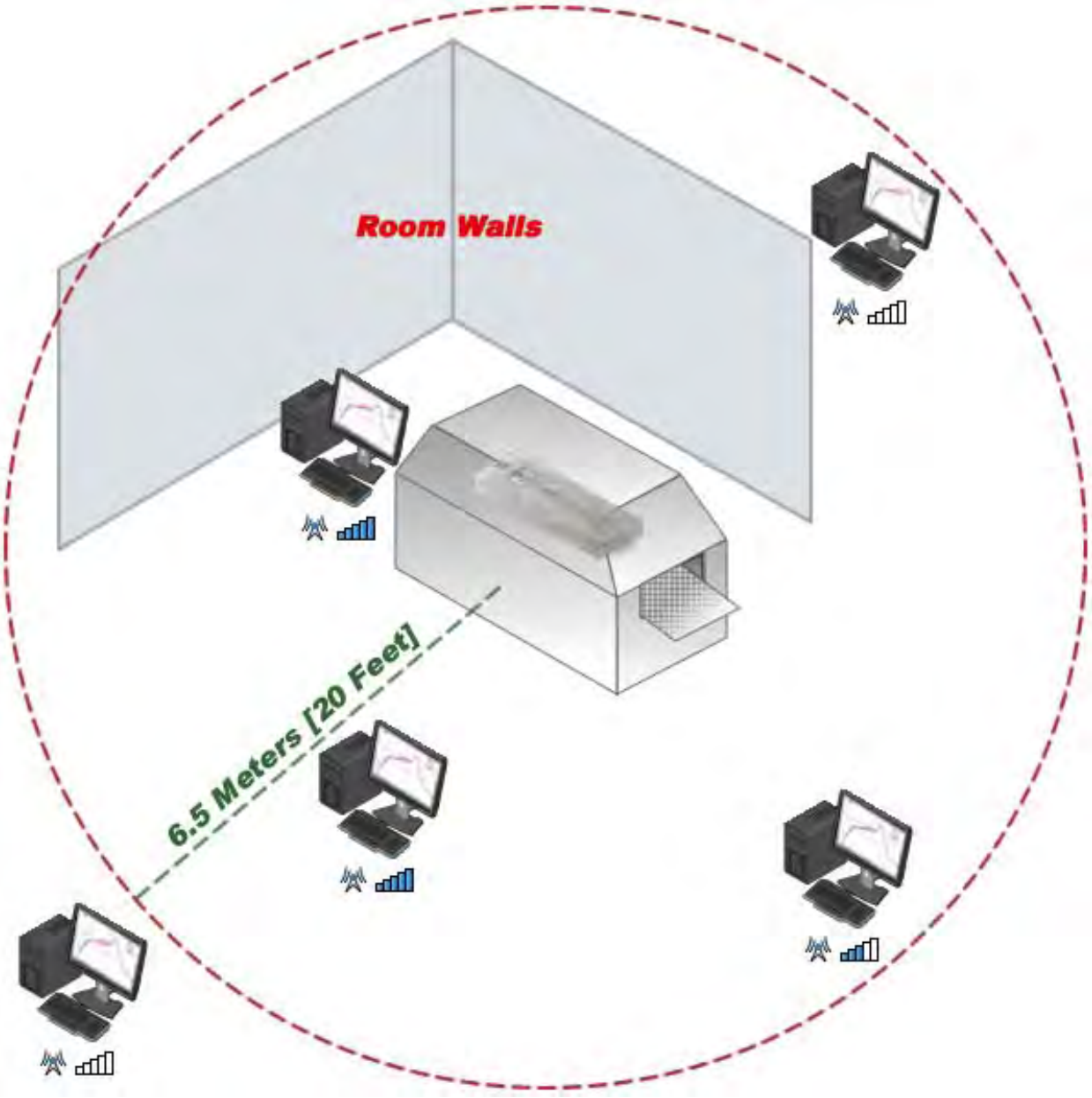
Wireless RF communication tips (MEGAM.O.L.E.® & SuperM.O.L.E.® Gold 2):

RF signals come and go as either the M.O.L.E. Profiler moves through the oven or the Transceiver is moved around like FM radio static as you drive in your car. Moving a few inches in any direction can turn a low signal strength to high signal strength. This gets worse as the Transceiver gets further from the M.O.L.E. Profiler, to a point where no position works.

When setting up the Wireless RF system, the transceiver should be placed as close to the machine as practical. A standard USB extension cable can be used to move the Transceiver closer to the machine or up and away from metal or other interference objects.

Typically if the Transceiver is 3 meters [10 feet] away from the M.O.L.E. Profiler in a machine any location in the room, reception should be fine. Reception is also often a bit better when the Transceiver is perpendicular to the direction of travel through the machine. Metal objects such as carts, walls, or other equipment in the room will impede transmission.

The transmitting Antenna and its proximity to metal can have a big affect. Care should be taken to make sure the Antenna is not laying on metal parts in the machine or barrier box. Keeping the Antenna straight is best.



Wireless RF Range

5.5.5.4. Set Recording Parameters

The Set Recording Parameters command configures how the M.O.L.E. profiler records data during a data run.

This is available when in Engineer Mode.

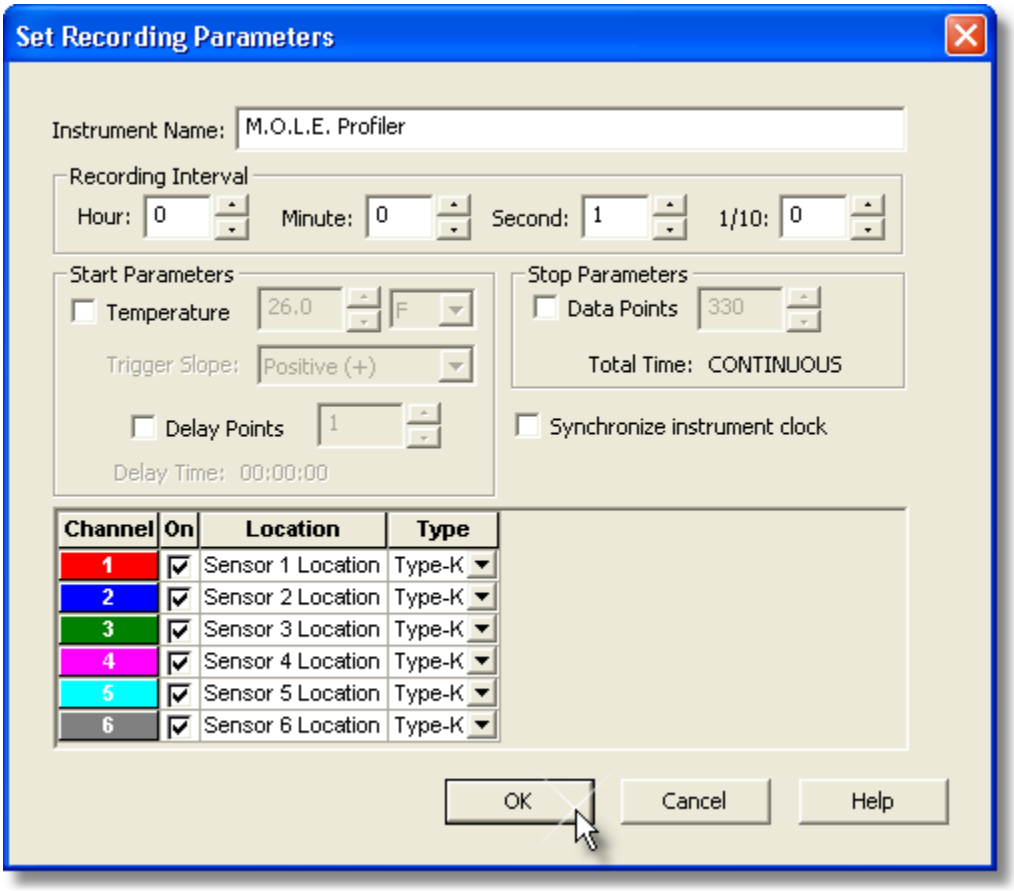
To set recording parameters:

1) Connect the M.O.L.E. Profiler to the computer. Refer to ***Basics>Setup>Communications Setup*** for more information.

> If an instrument is not currently connected to the computer, the default Demonstration MEGAM.O.L.E.® profiler will be displayed.

2) On the ***M.O.L.E.*** menu, click ***Set Recording Parameters***.

> The Start and Stop Parameters are optional settings and do not require configuration.



3) In the ***Instrument Name*** text box, type a company, operator, or M.O.L.E. Profiler name.

4) Enter the Recording interval at which the M.O.L.E. profiler records data points.

> The maximum interval for a SuperM.O.L.E.® Gold Profiler is 24 hours (one data point per day) and the minimum interval is 0.3 second (one data point every three-tenths of a second). When using a SuperM.O.L.E.® Gold Profiler with the RF Option the minimum interval is 0.5 (one data point every five-tenths of a second).

5) If desired, configure a Start Parameter such as a threshold temperature or Delay Points by selecting the associated check box and entering the proper values.

Specifying a threshold temperature “triggers” the recording process when any active channel reaches the specified temperature and Data Points “trigger” the M.O.L.E. profiler to start recording when the specified data point is reached in the process. The actual delay is equal to the ***Interval*** times the ***Pts Dly***.

6) If desired, configure a Stop Parameter by selecting the associated check box and entering the proper value. This parameter is a number of data points the M.O.L.E. profiler will record during the data run. The maximum number is dependent on the number of channels turned on. The maximum points the M.O.L.E. Profiler can log at any recording interval is 5460.

If a no stop parameter is specified, the M.O.L.E. Profiler will log continuously and will require the user to manually stop the recording process.

7) Configure sensor information by turning the amount of channels **ON** or **OFF**, set the sensor location description and sensor type.
8) Click the ***OK*** command button to send the data to the instrument or ***Cancel*** to quit the command.

If the currently selected M.O.L.E. Profiler is a SuperM.O.L.E. Gold, the sending of data will erase the data currently stored in the M.O.L.E. Profiler.

5.5.5.5. Setup Instrument

This Wizard guides the user through a typical process on how to set a M.O.L.E. Profiler up for performing a data run.

This is available when in Engineer Mode.

To set an instrument up:

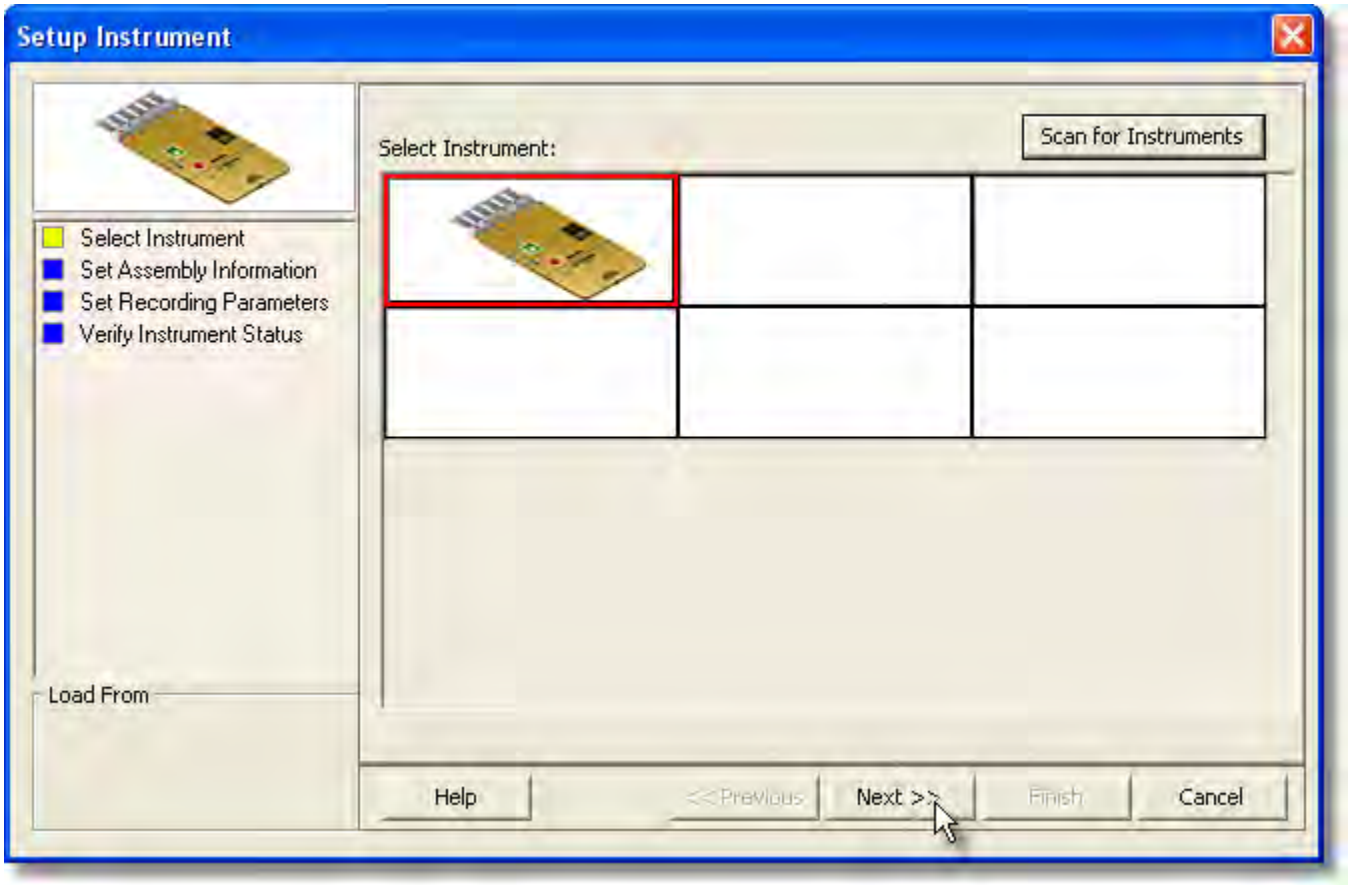
1) Connect the M.O.L.E. Profiler to the computer. Refer to ***Basics>Setup>Communications Setup*** for more information.
2) On the M.O.L.E. menu, click ***Setup Instrument*** and the workflow wizard appears.

When navigating through the wizard, the step list on the left uses a color key to inform the user of the current step, steps that have been completed and remaining steps.

Current Completed Remaining

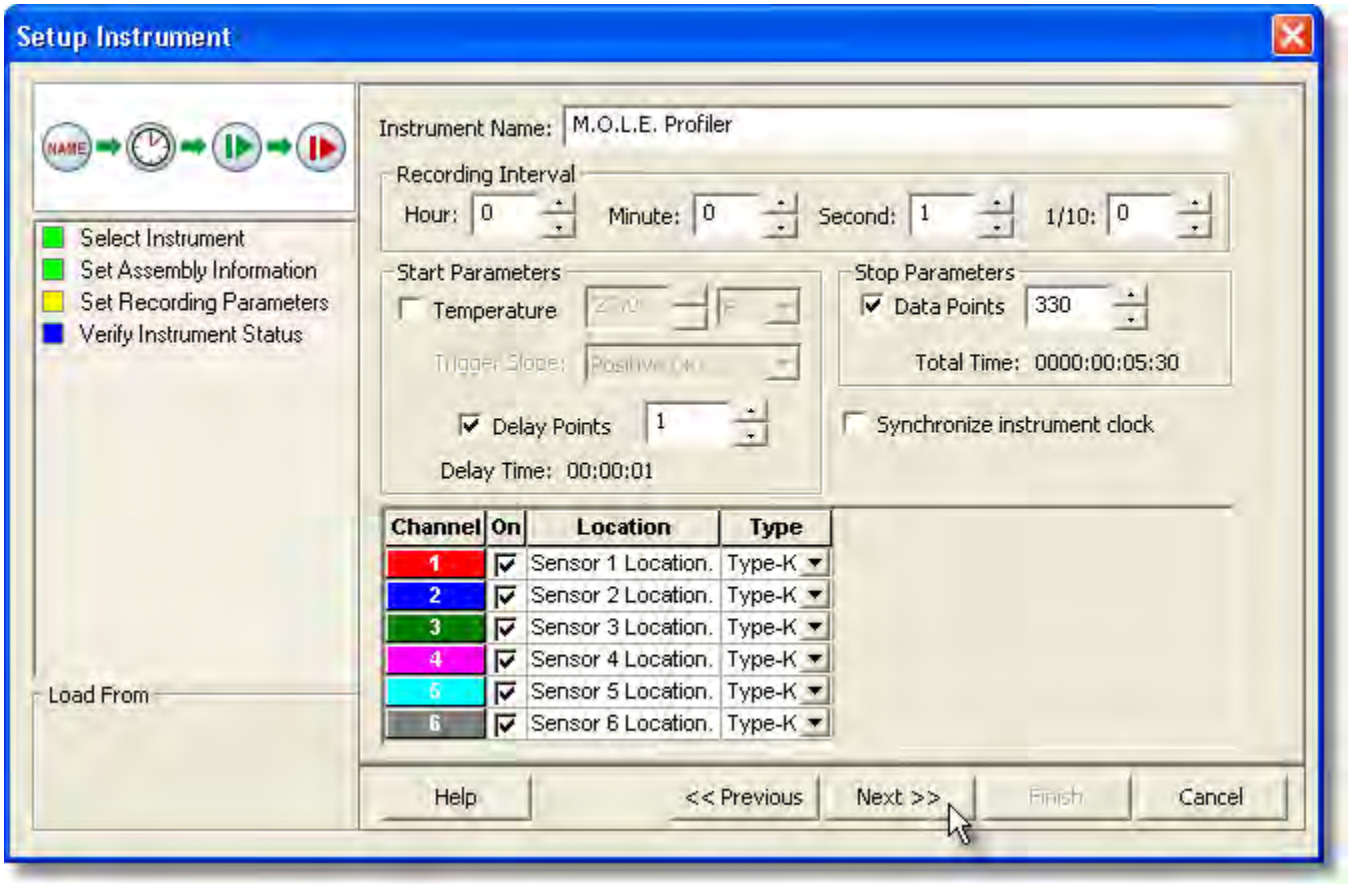
3) Select the desired instrument from the dialog box. If there is none displayed, select the ***Scan for Instruments*** command button to detect all connected instruments.

If the software does not detect a M.O.L.E. Profiler, using the communication cable connect it to the computer and click the ***Scan for Instruments*** command button to search again. M.O.L.E.® MAP software allows multiple instruments to be connected to a computer at one time. Selecting the ***Scan for Instruments*** command button will detect all instruments and display them in the dialog box. If no instrument is detected the software displays all of the Demonstration thermal profilers to select from.



4) Select the ***Next*** command button.

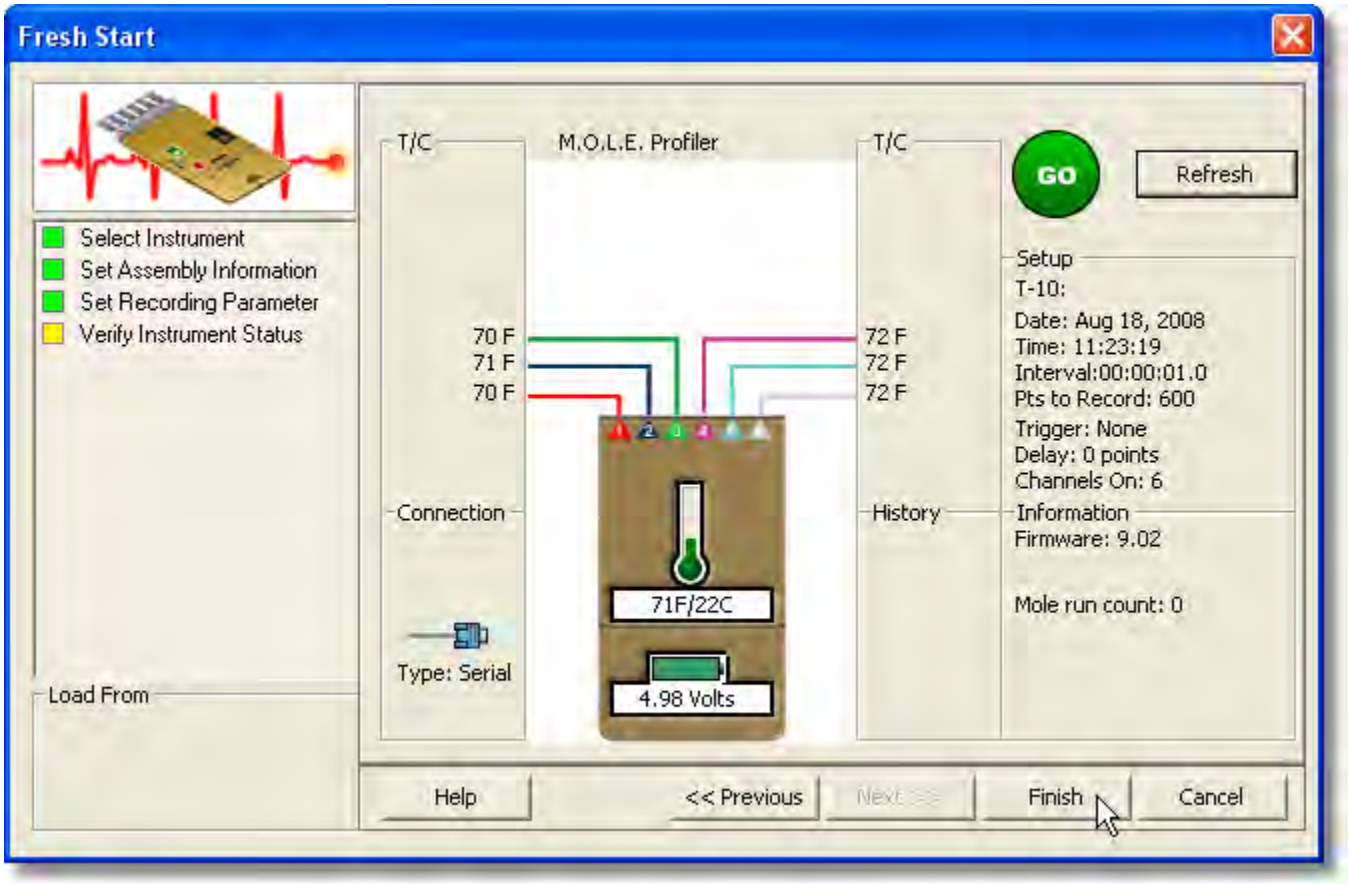
7) Set Recording Parameters such as the instrument name, recording interval, start parameters and stop parameters. This step is where the user can also turn a sensor channel ON or OFF, set the sensor location description and sensor type. Refer to section ***Software>Menus>MOLE>Set Recording Parameters*** for detailed information for each setting.



8) Select the ***Next*** command button to send the data listed in the dialog box to the instrument.

If the currently selected M.O.L.E. Profiler is a SuperM.O.L.E. Gold, the sending of data will erase the data currently stored in the M.O.L.E. Profiler.

9) Verify the instrument status. This dialog box displays the health of the M.O.L.E. Profiler such as battery charge, internal temperature, thermocouple temperatures. If the user selects the ***Show Critical*** command button the dialog box will only display items that will prevent the user from completing a successful data run.



10) Select the ***Finish*** command button to complete the Setup Instrument wizard.

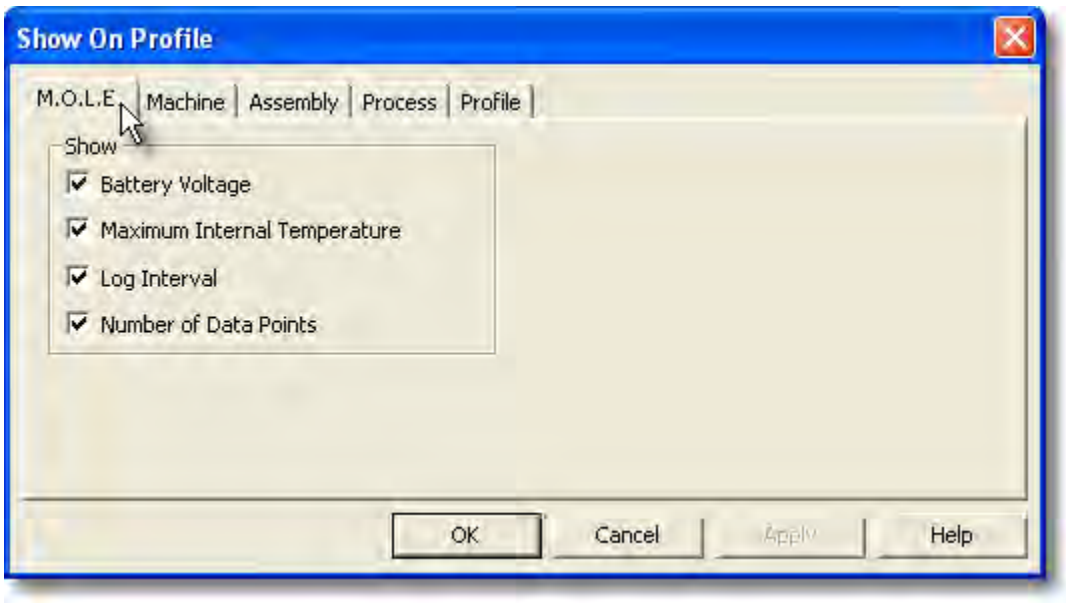
5.5.5.6. Show on Profile

M.O.L.E. status information can be displayed or hidden on the Data Graph.

This is available when in Engineer Mode.

To show machine information on the Data Graph:

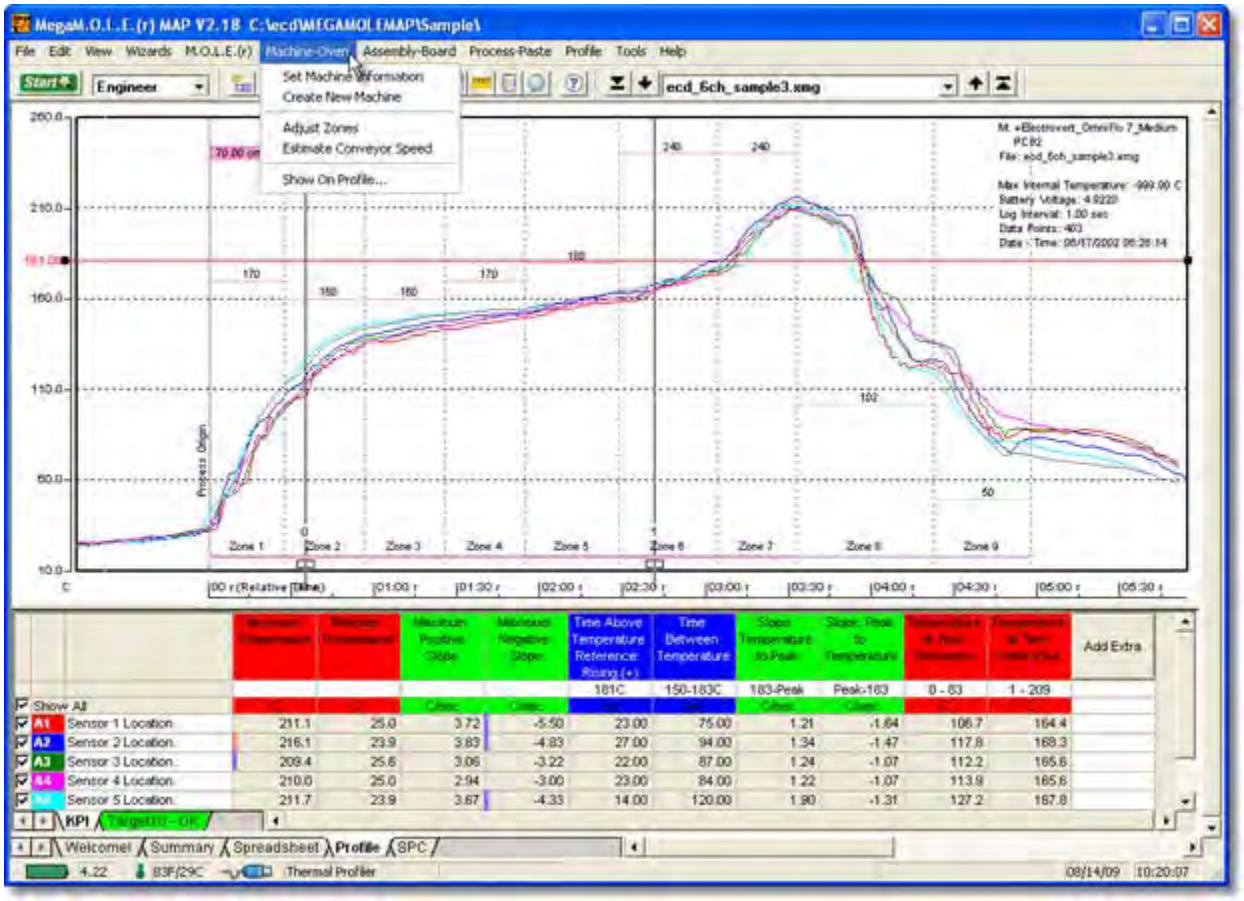
1) On the ***M.O.L.E.*** menu, click ***Show on Profile***.
2) Select or clear the associated machine characteristics to display or hide on the Data Graph.



3) Click the ***OK*** command button to accept, or ***Cancel*** to quit the command.

5.5.6. Machine-Oven Menu

The Machine-Oven menu include options to design specific machine models. Creating an machine model allows the user to visualize it on the Data Graph along with the associated data run profile.



5.5.6.1. Set Machine Information

This command allows the user to set machine information and display it on the Data Graph so the user can visually see how the data run profile lines up with the machine.

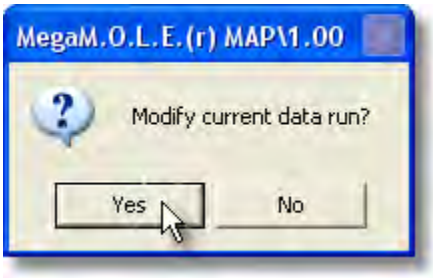
> This is available when in Engineer Mode.

<u>To set machine information:</u>

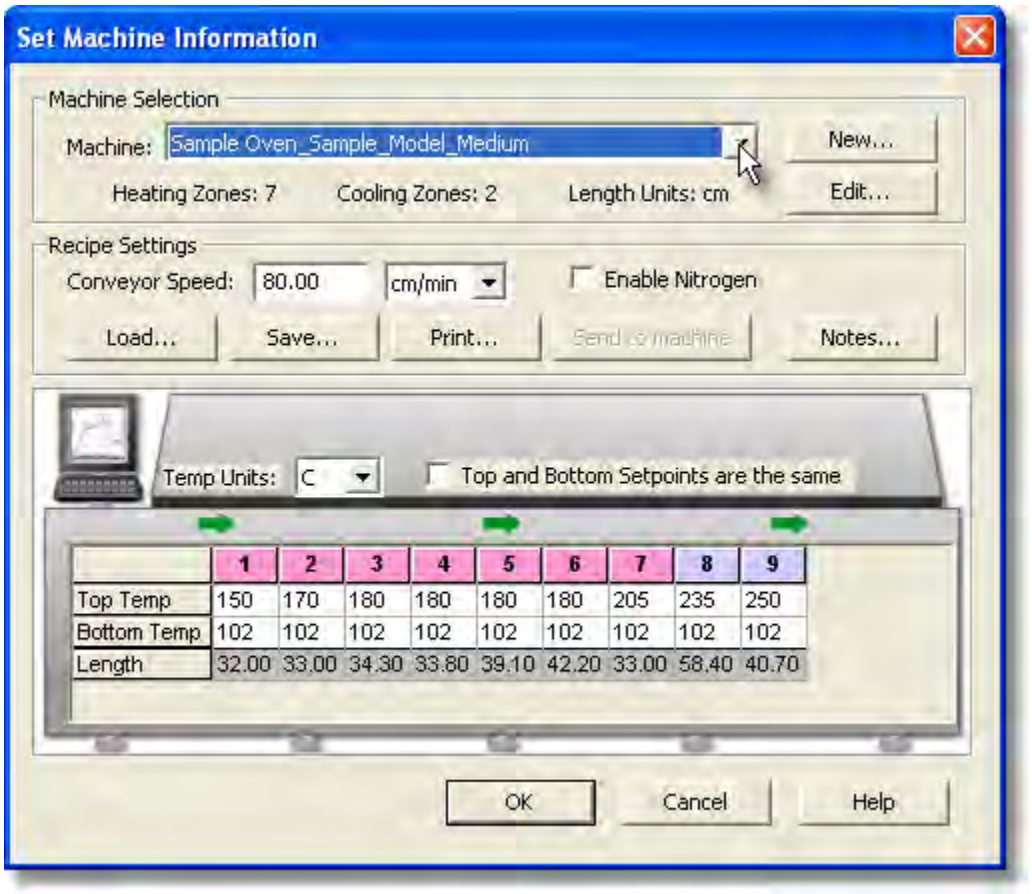
> When setting machine information, this data will be applied to the currently selected data run only. Existing defined machine models may not accurately reflect your machine and are used as a starting template.

1) On the ***Machine-Oven*** menu, click ***Set Machine Information***.

> If a setting is already selected for a data run, the software prompts the user to decide if they wish to modify the current data run. Click the ***Yes*** command button to continue or ***No*** to quit the command.



2) Select your machine from the ***Machine*** drop down list. If it does not appear in the list click the ***New*** command button to create a new one. Refer to topic ***Software>Menus>Machine>Create new Machine*** for more information.

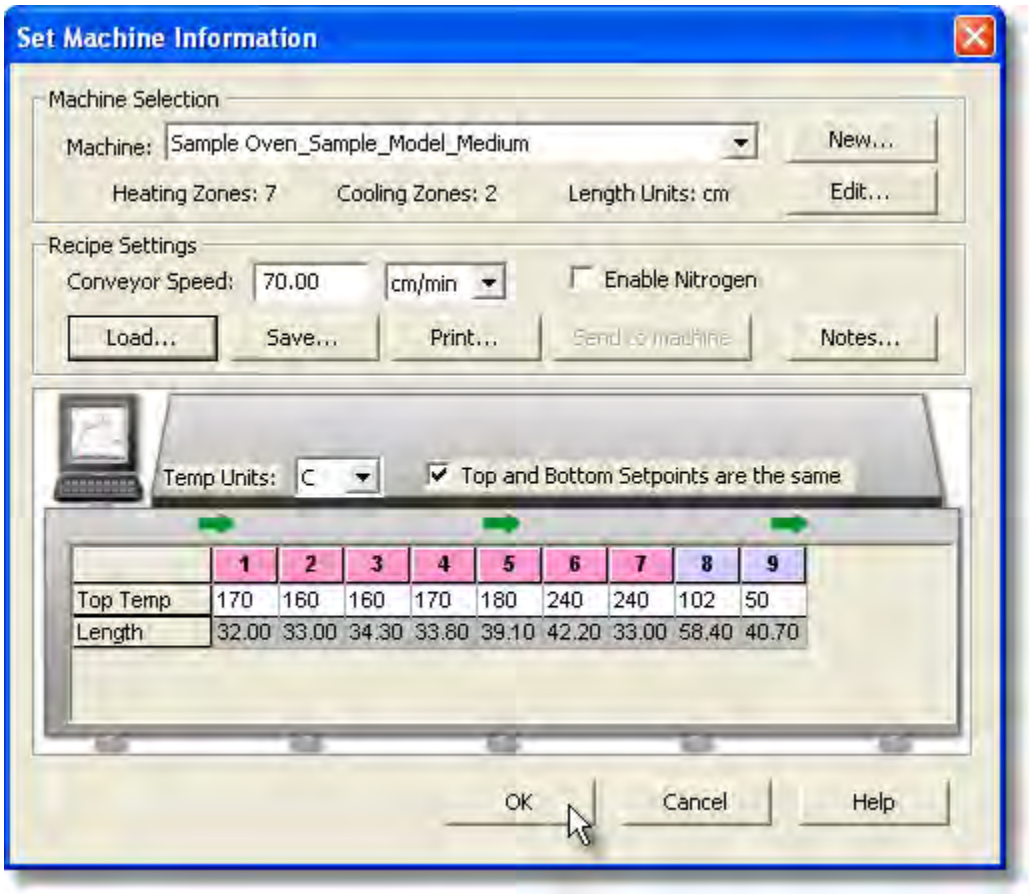


3) Set the machine conveyor speed. The software uses this value to calculate the Time (X) Scale values when ***Distance*** units are displayed. This number is also used as the actual conveyor speed when prediction data lines are added. Refer to topic ***Software>Menus>Tools>Prediction Tool*** for more information.

To properly display a machine model on the Data Graph, a conveyor speed must be set. If you do not know what the conveyor speed is, the software allows you to estimate it based on the machine information and the data run profile. Refer to topic ***Software>Menus>Machine>Estimate Conveyor Speed*** for more information.

4) Set the machine temperature units.

5) Set the Zone Temperatures in the zone matrix. These temperatures could be the upper and lower thresholds of acceptable temperatures to meet process standards or temperature settings of upper and lower heat sources. Upper zone temperatures appear as solid lines and lower zones appear as dotted lines on the Data Graph.



6) Click the ***OK*** command button to set the machine information, or ***Cancel*** to quit the command.

To view the machine information on the Data Graph, the ***Show on Profile*** settings must be enabled. Refer to topic ***Software>Menus>Machine>Show on Profile*** for more information.

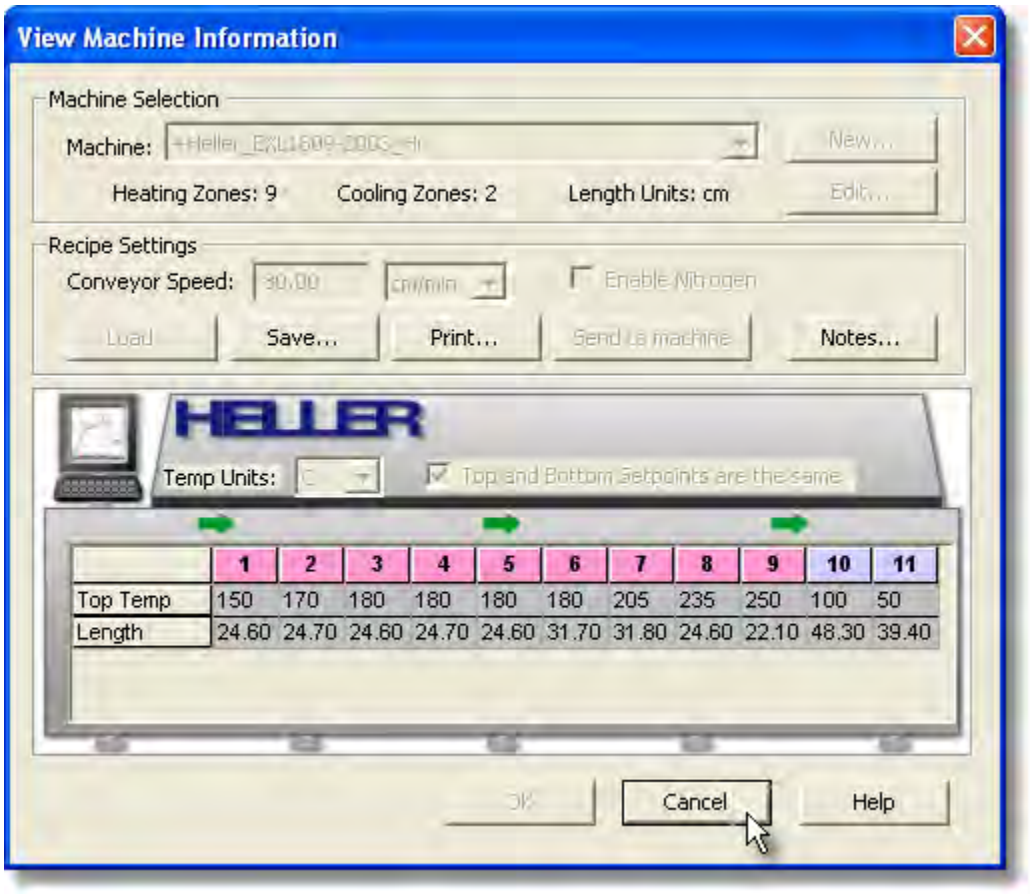
5.5.6.2. View Machine Oven

This command allows the user to view machine information displayed on the Data Graph so the user can visually see how the data run profile lines up with the machine.

This is available when in Verify Mode.

To view machine information:

1) On the ***Machine-Oven*** menu, click ***View Machine Information***.



2) Select the ***Cancel*** command button to quit the command.

5.5.6.3. Create New Machine

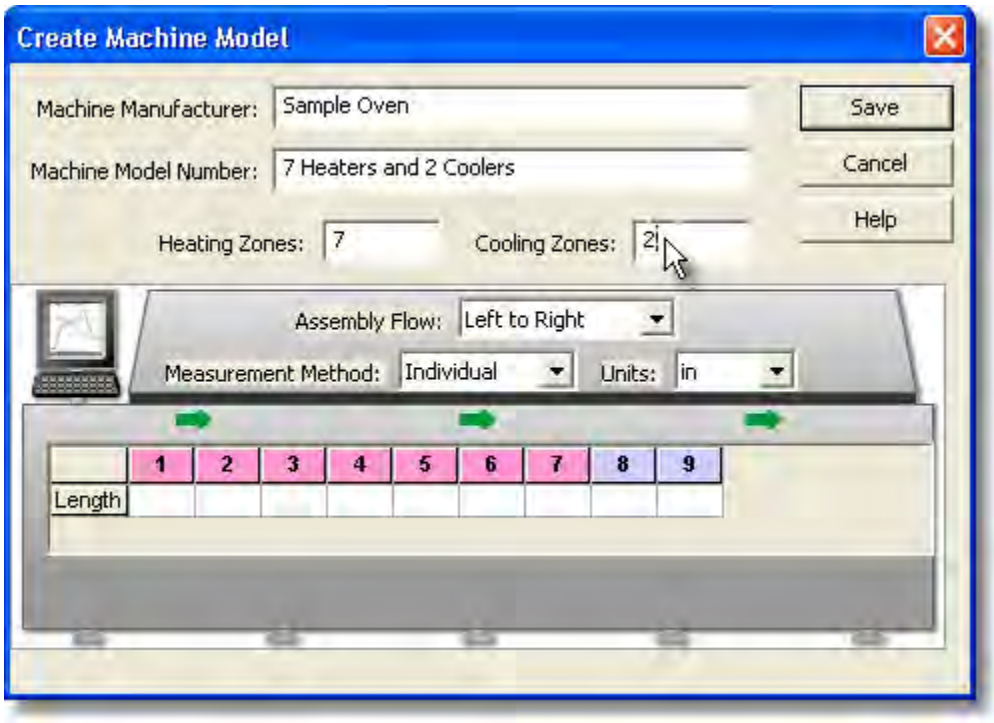
When setting machine information, the user is required to select a machine. The software includes basic machine models for the user to select from. If your machine model does not appear in the list the software has the ability for you to create a new machine model.

This is available when in Engineer Mode.

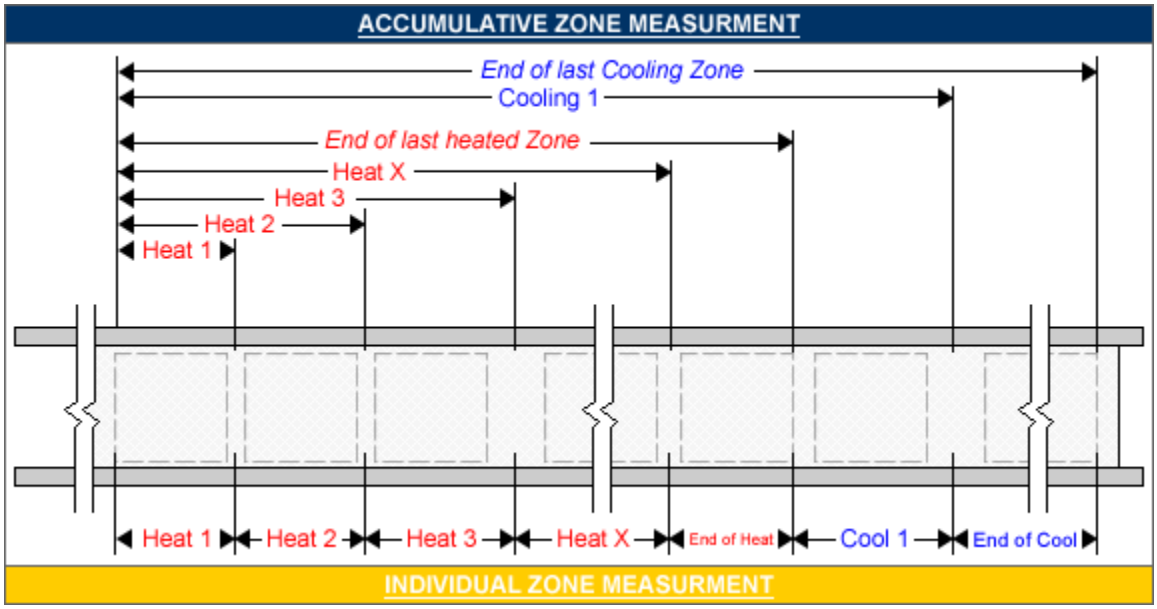
To create a new machine:

1) On the ***Machine-Oven*** menu, click ***Create New Machine***.
2) Enter the machine manufacturer and model number.

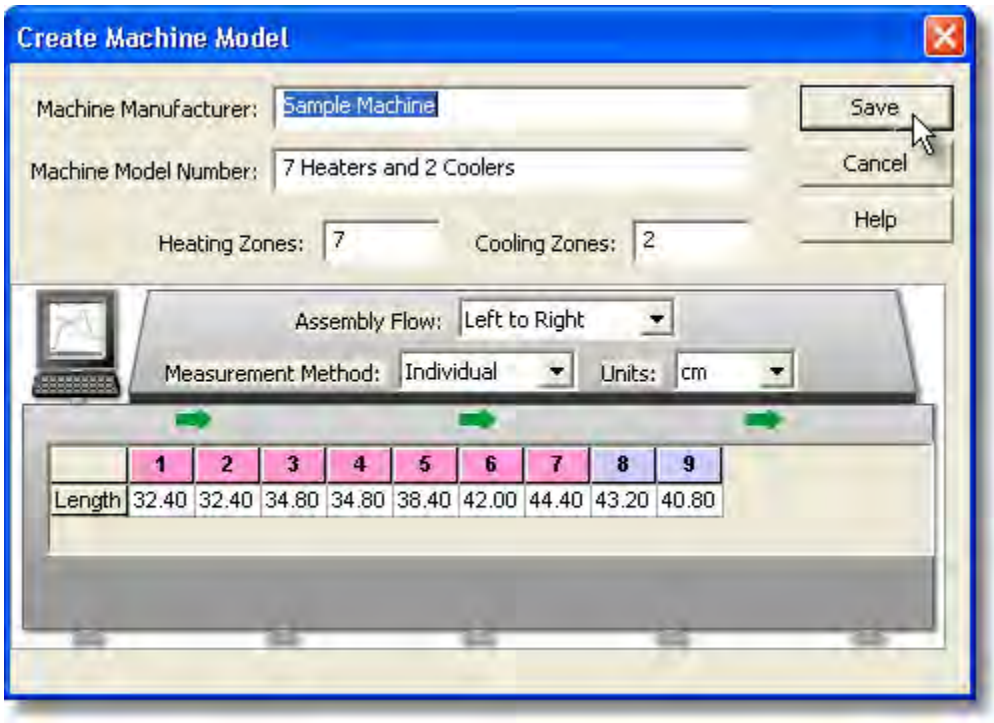
3) Enter the amount of heating and cooling zones. As zones are specified the zone matrix will automatically grow to allow you to enter zone measurements.



4) Select the assembly flow (left to right or right to left), zone measurement method (individual or accumulative) and units of measurement. Refer to the illustration below for proper measurement methods.



5) Enter the zone measurements in the zone matrix.



6-) Click the ***Save*** command button to save the new machine, or ***Cancel*** to quit the command.

The new machine will now appear in the Machine drop-down list on the ***Set Machine Information*** dialog box. Refer to topic ***Software>Menus>Machine>Set Machine Information*** for more information.

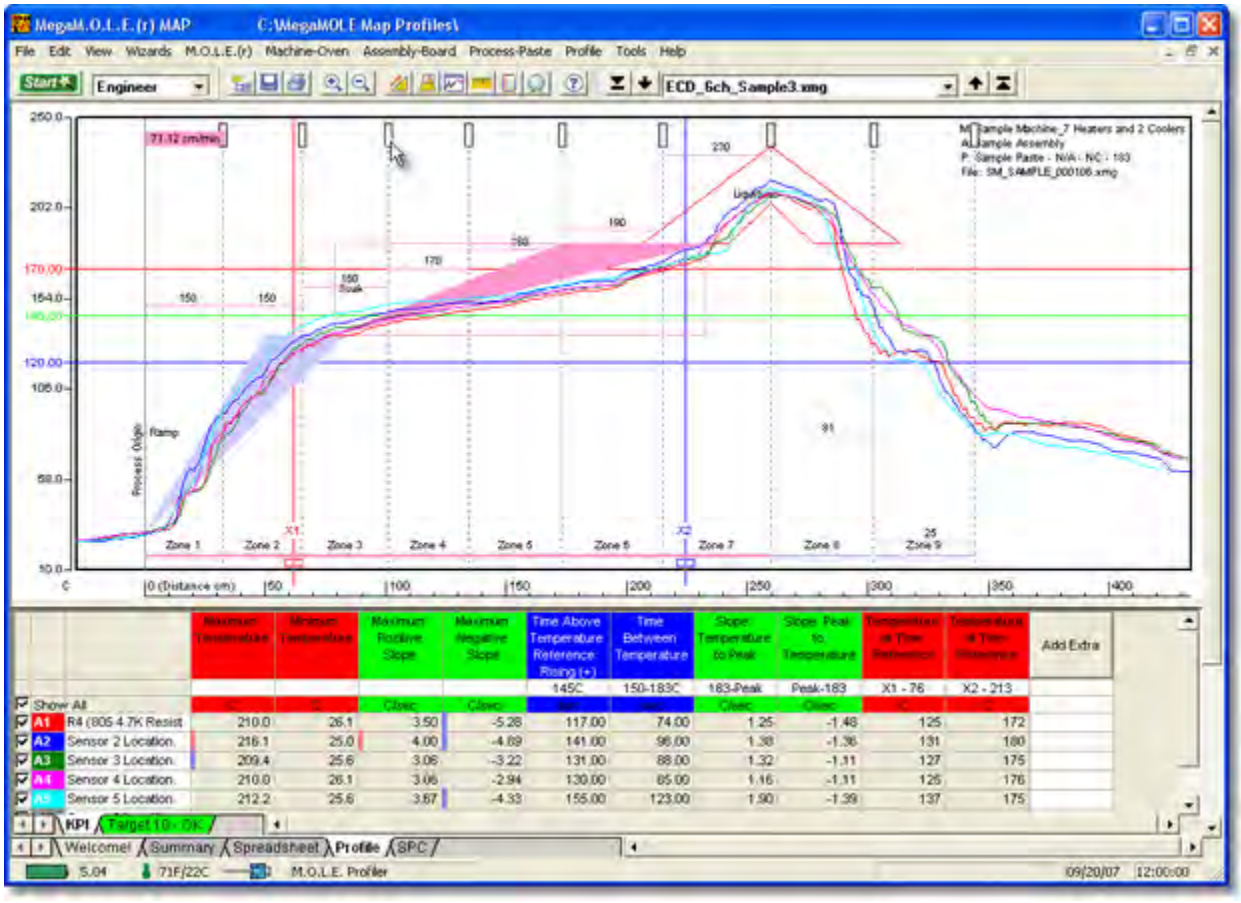
5.5.6.4. Adjust Zones

This command allows the user to manually adjust the displayed machine zones on the Data Graph. To use this command a machine must be selected and displayed. Refer to topic ***Software>Menus>Machine>Set Machine Information***.

This is available in both Engineer & Verify Modes.

To adjust zones:

1) One the ***Machine-Oven*** menu, click ***Adjust Zones*** to activate. A check mark appears to the left of the command indicating the software is in Adjust Zones mode.
2) Position the mouse pointer over a desired machine zone line.
3) Click and hold the left mouse button to drag it left or right releasing the mouse button when the machine zone line is at the desired location.



4) Lock the settings by selecting the ***Adjust Zones*** command again. This removes the check mark next to the command indicating the software is not in Adjust Zones mode.

5.5.6.5. Estimate Conveyor Speed

To properly display a machine model on the Data Graph, a conveyor speed must be set. If you do not know what the conveyor speed is when setting machine information, the software allows you to estimate it based on the machine information and the data run profile.

> This is available when in Engineer Mode.

To estimate conveyor speed:

1) On the ***Machine-Oven*** menu, click ***Estimate Conveyor Speed***. and the estimated conveyor speed automatically is displayed in the text box.

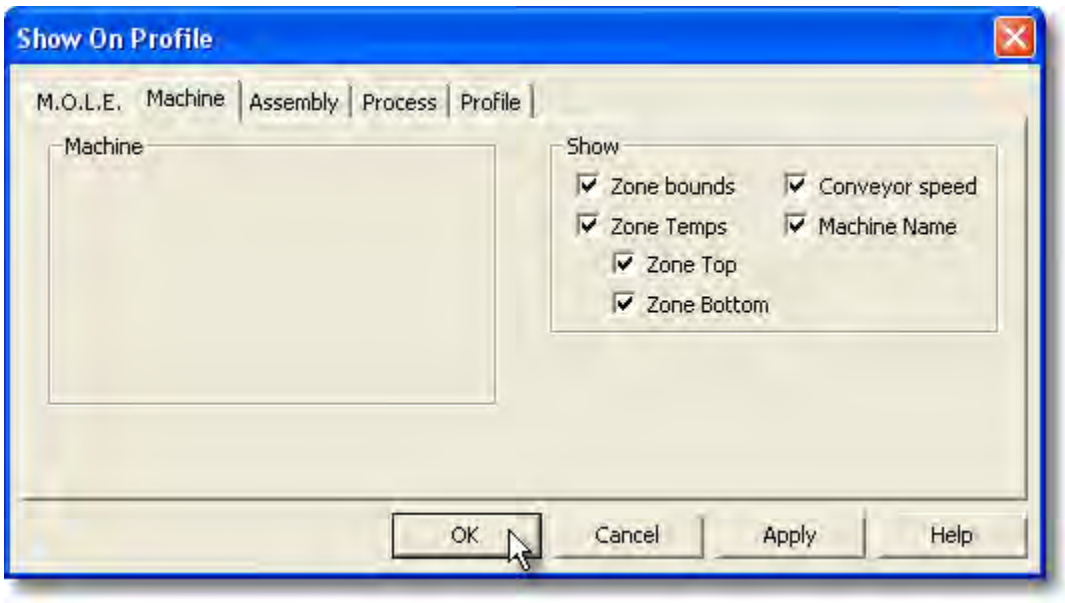
2) Click the ***OK*** command button to accept the estimated conveyor speed, or ***Cancel*** to quit the command.

5.5.6.6. Show on Profile

Machine information can be displayed or hidden on the Data Graph.

To show machine information on the Data Graph:

1) On the ***Machine-Oven*** menu, click ***Show on Profile***.
2) Select or clear the associated machine characteristics to display or hide on the Data Graph.



3) Click the ***OK*** command button to accept, or ***Cancel*** to quit the command.

5.5.7. Assembly-Board Menu

The Assembly-Board menu include commands that enable the user to set and edit experimental assembly documentation.

5.5.7.1. Set Assembly Information

This command allows the user to set assembly information associated with the selected data run profile.

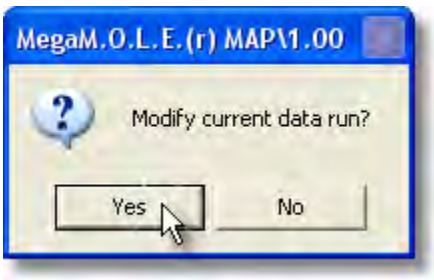
> This is available when in Engineer Mode.

To enter assembly information:

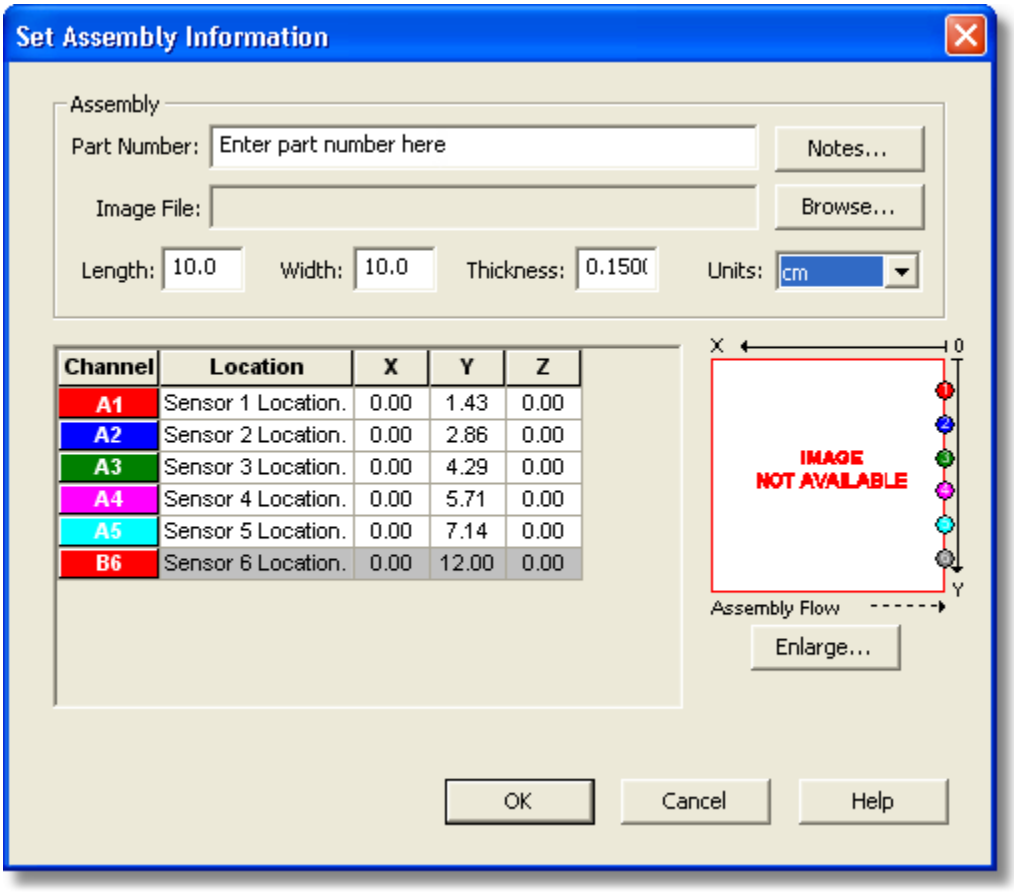
> When setting assembly information, this data will be applied to the currently selected data run only.

1) On the ***Assembly-Board*** menu, click ***Set Assembly Information***.

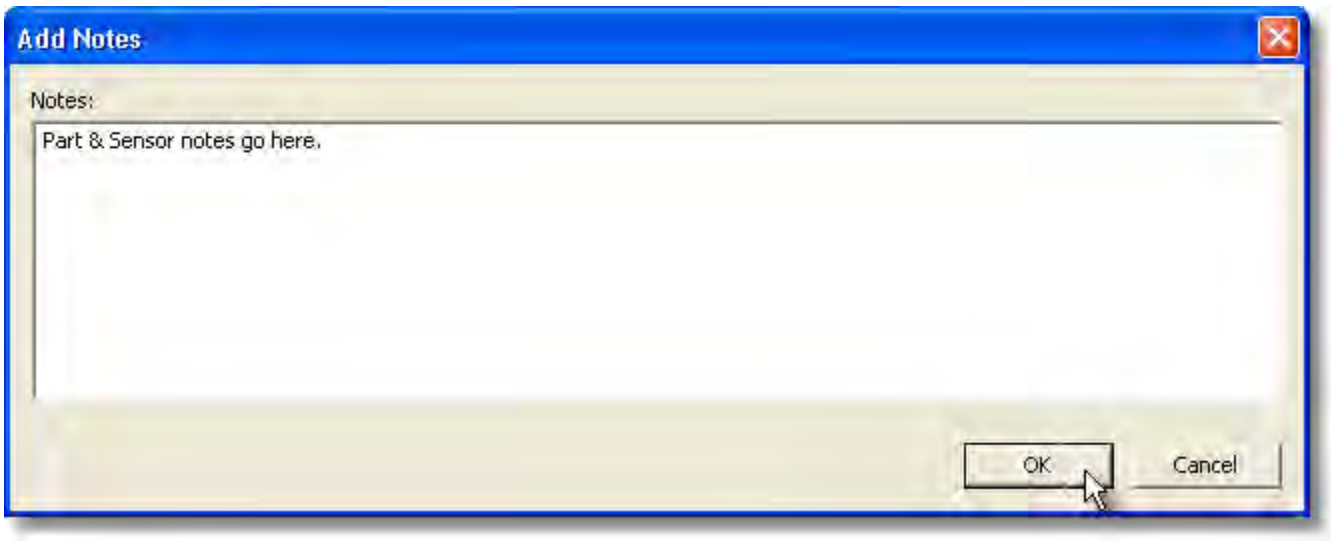
> If a setting is already selected for a data run, the software prompts the user to decide if they wish to modify the current data run. Click the ***Yes*** command button to continue or ***No*** to quit the command.



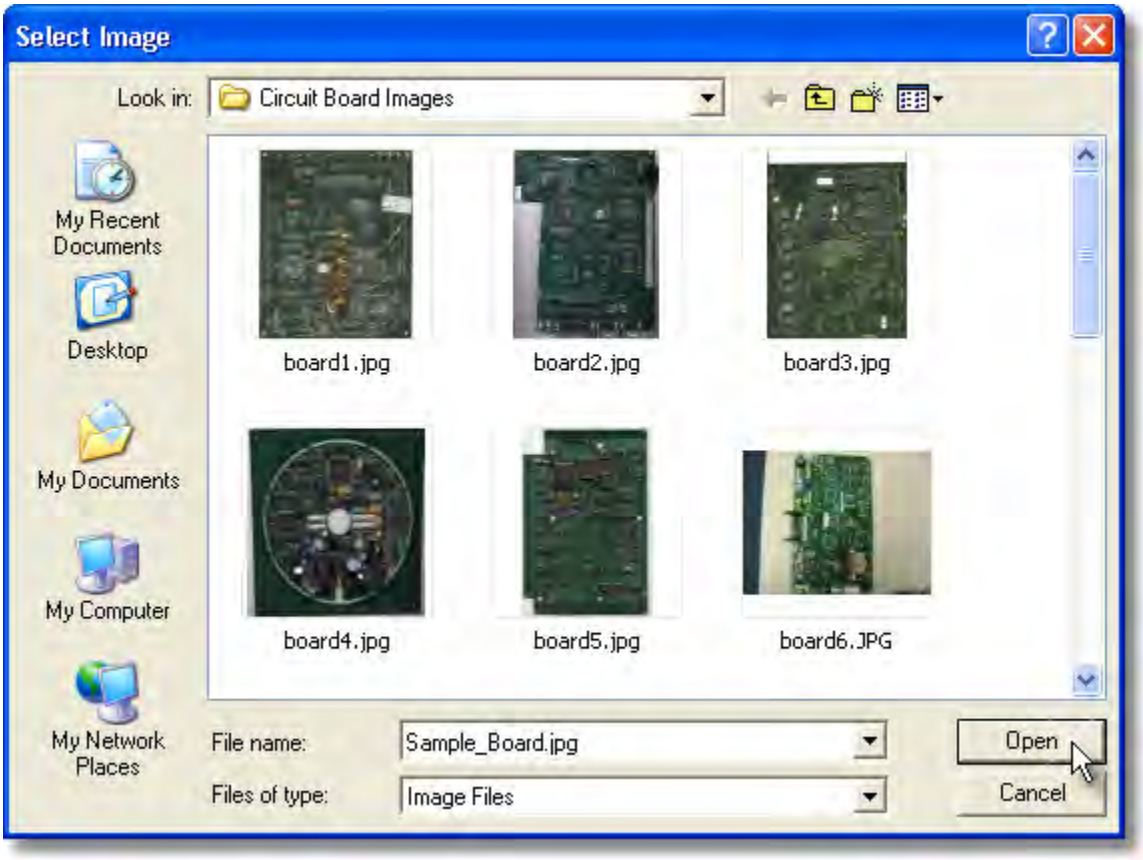
2) Enter an assembly part number.



3) Click the ***Notes*** command button if you would like to enter part documentation about the test assembly being profiled.



4) Click the image file ***Browse*** command button to select a product image. Image files supported by the software are Jpeg (.jpg), Bitmap (.bmp), and Tiff (.tif).

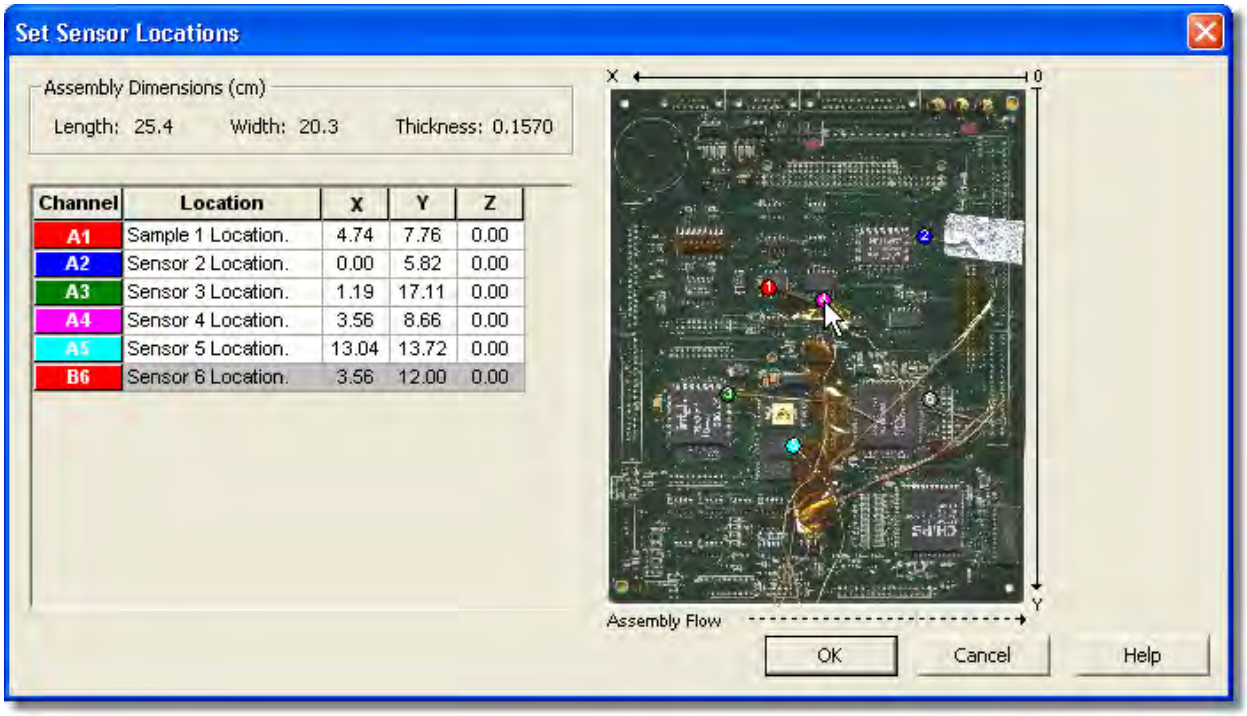


5) Enter the test assembly board length, width and thickness.
6) Enter the sensor location descriptions. These descriptions can be the location where each sensor is connected to the test product. The channel color associated with the description indicates which Data Plot on the Data Graph it represents.

Thermocouple placement information entered in the sensor location matrix are also displayed as the ***Sensor Locations*** in the Data Table.

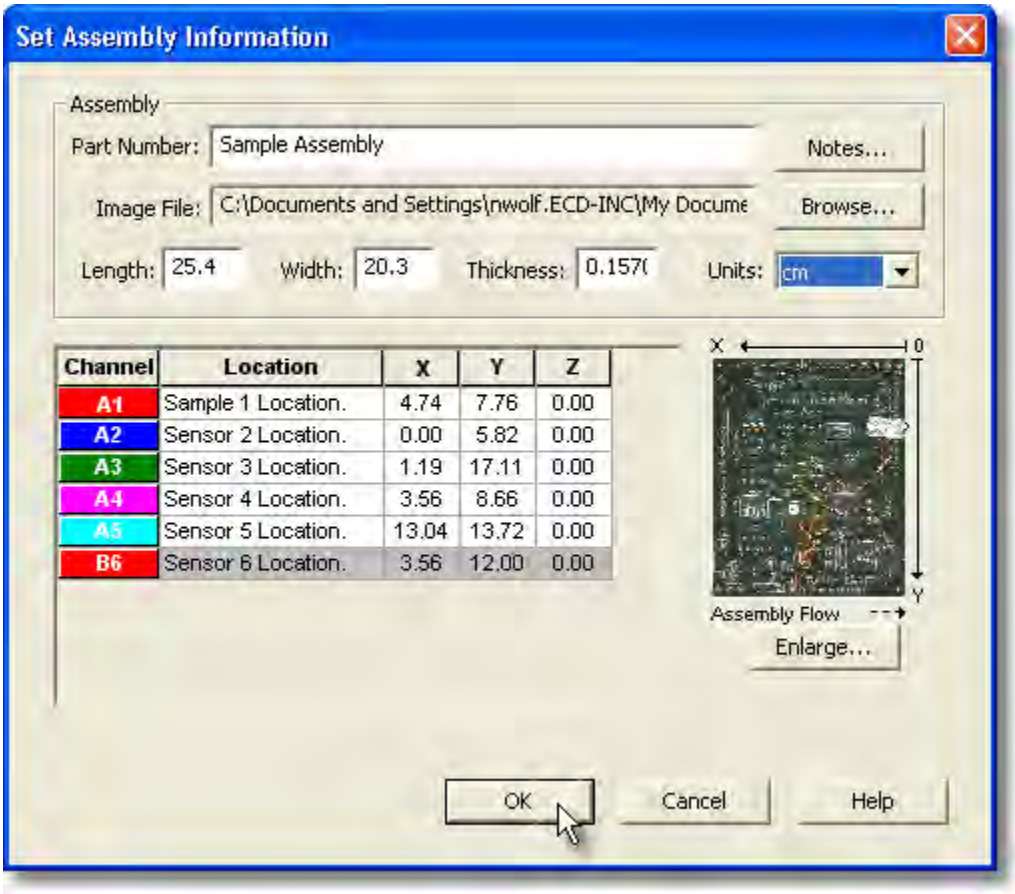
7) Enter sensor location dimensions. Sensor Locations can also be set by dragging sensor location markers on the selected image. To move the markers, click the ***Enlarge*** command button below the assembly image and the ***Set Sensor Locations*** dialog box appears.

Specified X-dimensions may be altered when using the ***Align Profile Peaks*** command to align the data run profile lines. Refer to topic ***Software>Menus>Profile>Align Profile Peaks*** for more information.



X-dimensions are measured from the leading (right) edge or the first edge to enter the process, and Y dimensions are from the top down.

8) Select which sensor channels to display in the Data Table. Excluding a sensor channel does not delete channel data and can be turned back on at any time. This is helpful when data has been collected and it may not be beneficial to the data run profile.



9) Click the ***OK*** command button accept or ***Cancel*** to quit the command.

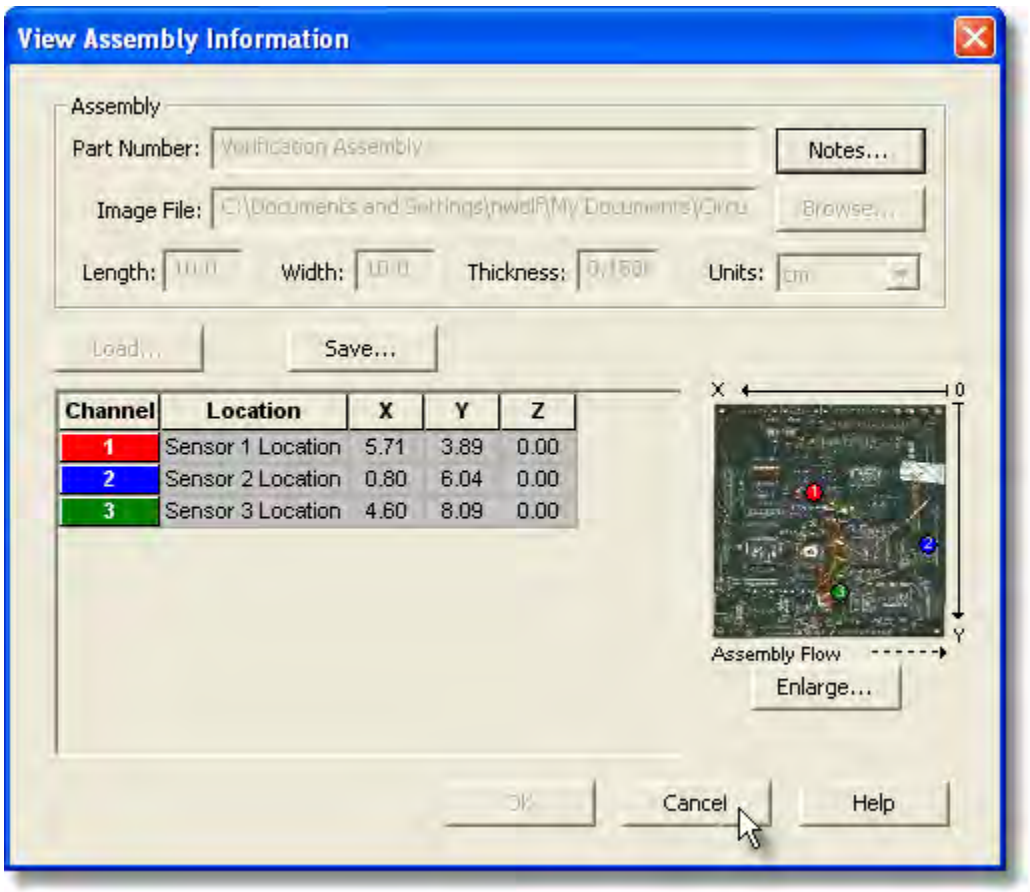
5.5.7.2. View Assembly Information

This command allows the user to view assembly information associated with the selected data run profile.

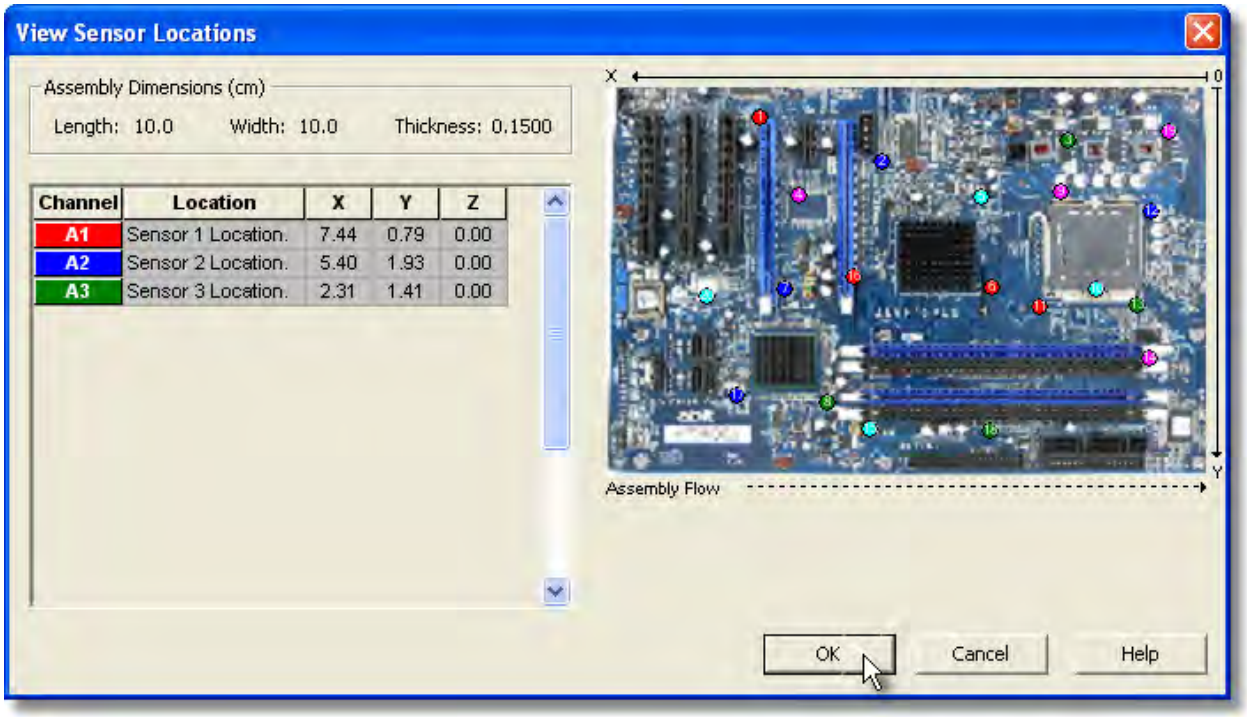
This is available when in Verify Mode.

<u>To view assembly information:</u>

1) On the ***Assembly-Board*** menu, click ***View Assembly Information***.



2) For a larger view of the assembly image and sensor locations, click the ***Enlarge*** command and the ***View Sensor Locations*** dialog box appears.



3) Select the ***OK*** or ***Cancel*** command button to close the dialog box.

4) Select the ***Cancel*** command button to quit the command.

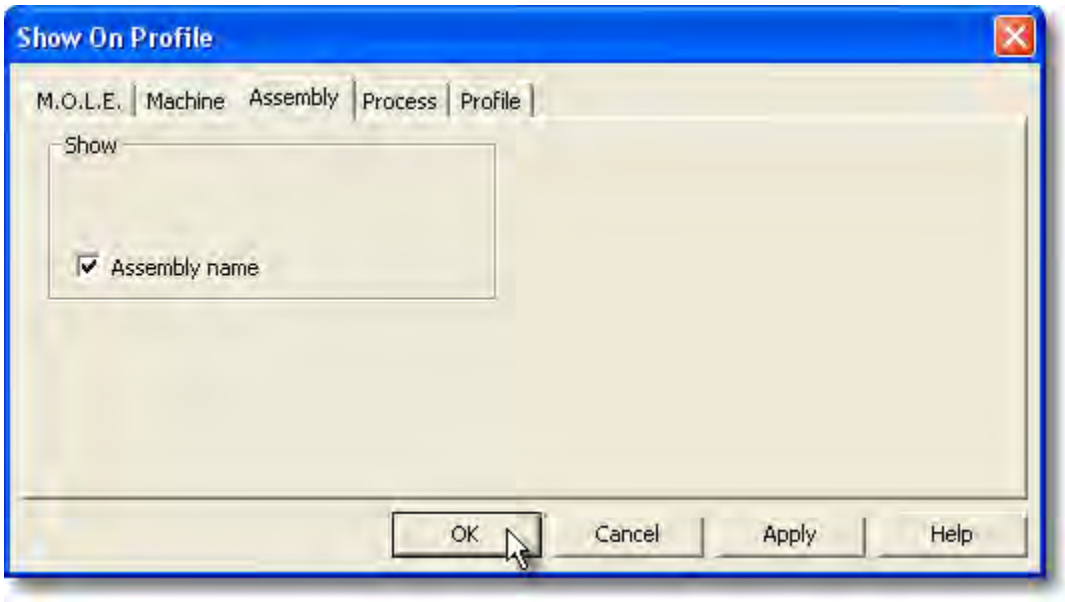
5.5.7.3. Show on Profile

Assembly name can be displayed or hidden on the MAP data section of the Data Graph.

> This is available when in Engineer Mode.

To show assembly information on the Data Graph:

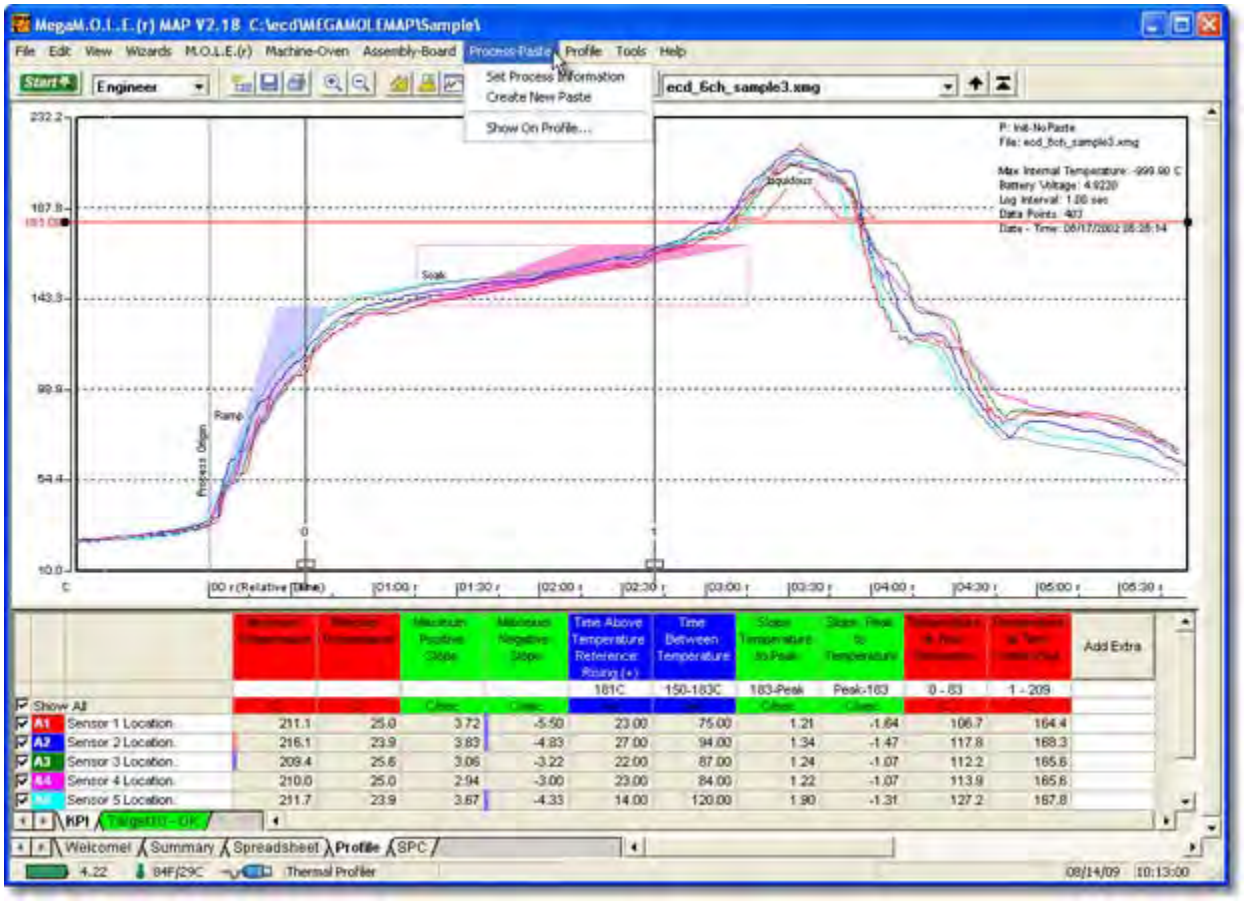
1) On the ***Assembly-Board*** menu, click ***Show on Profile***.
2) Select or clear the ***Assembly name*** check box to display or hide it on the Data Graph.



3) Click the ***OK*** command button to accept, or ***Cancel*** to quit the command.

5.5.8. Process-Paste Menu

The Process-Paste menu include options to select or design a process paste. Creating an process paste allows the user to visualize it on the Data Graph along with the associated data run profile.



5.5.8.1. Set Process Information

This command allows the user to set a process paste and display it on the Data Graph so the user can visually see how the data run profile lines up with the process specification.

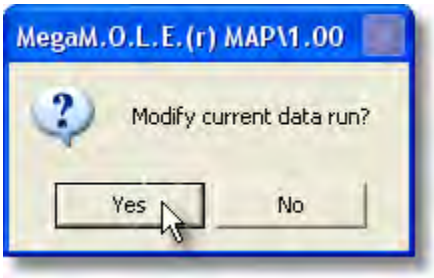
This is available when in Engineer Mode.

To set a process:

When setting a process, this data will be applied to the currently selected data run only. Existing defined machine models may not accurately reflect your machine and are used as a starting template.

1) On the ***Process-Paste*** menu, click ***Set Process***.

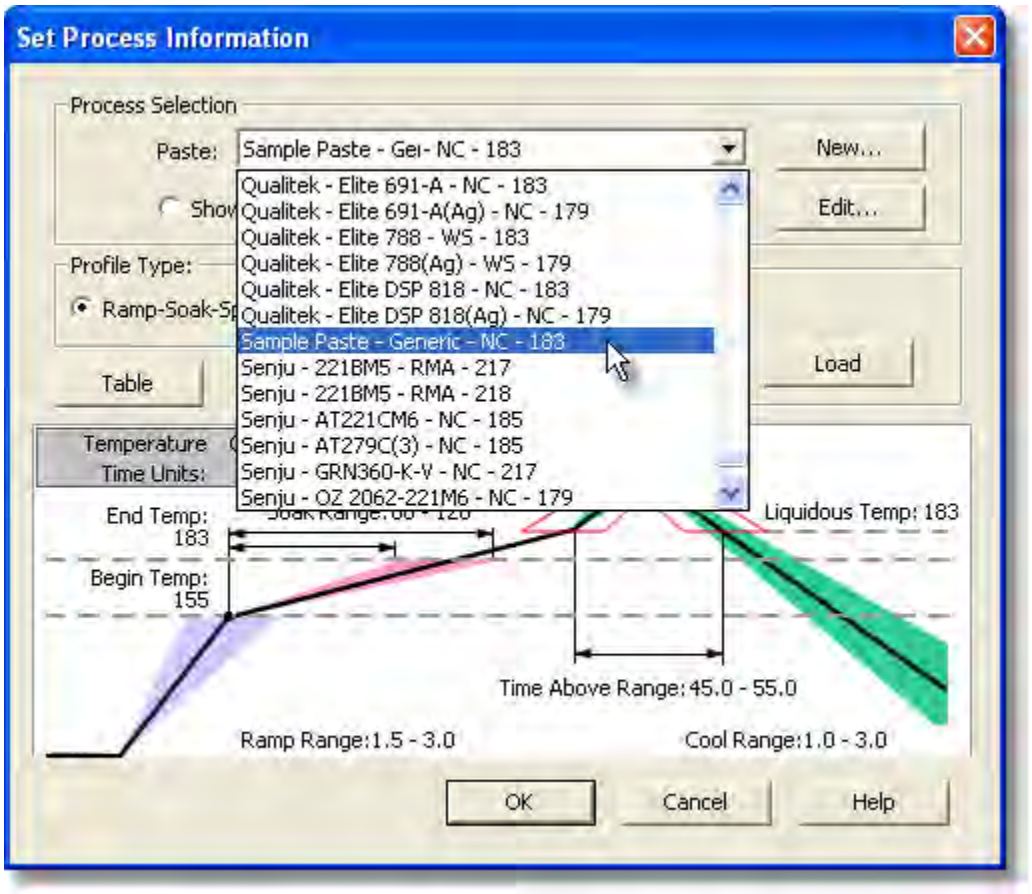
If a setting is already selected for a data run, the software prompts the user to decide if they wish to modify the current data run. Click the ***Yes*** command button to continue or ***No*** to quit the command.



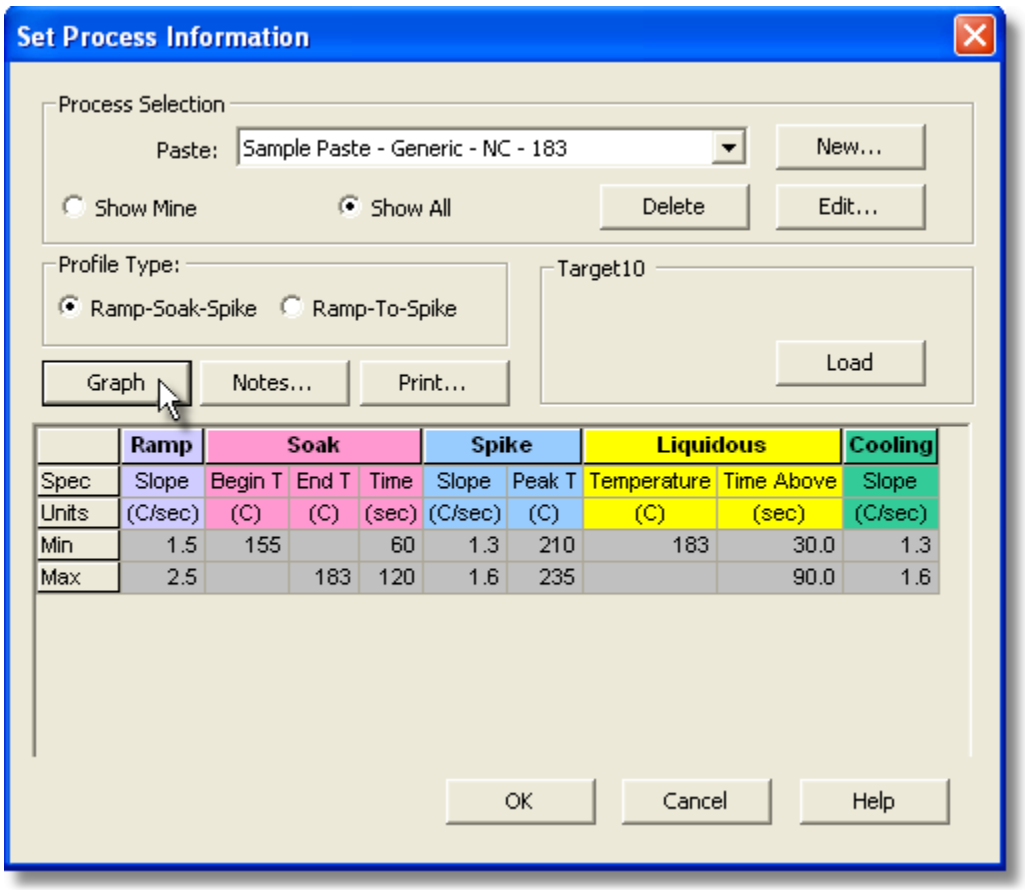
2) Select your process specification. Select a ***Paste*** from the database or previously created ***Target 10 Specification***. If your Paste does not appear in the database list click the ***New*** command button to create a new one. Refer to topic ***Software>Menus>Process>Create new Paste*** for more information.

When the user selects a paste from the database, they can use the radio buttons below the drop down box to filter and display only the user created pastes from paste database.

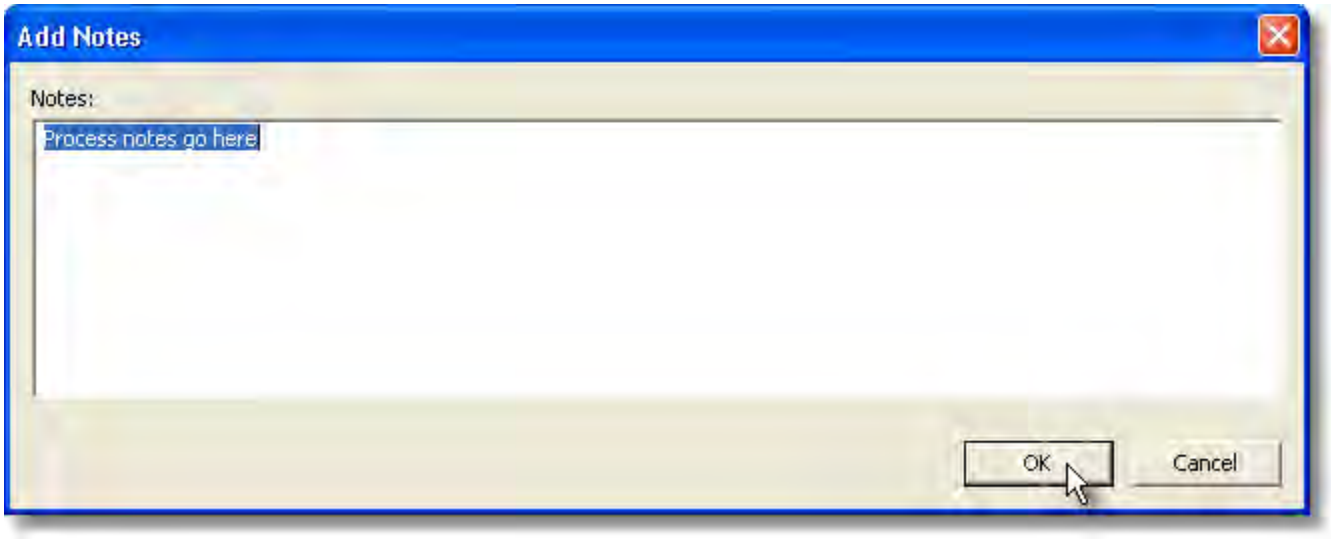
3) Choose the ***Profile Type*** (Ramp-Soak-Spike or Ramp-to-Spike). Ramp-Soak-Spike profile types are the only type allowed to be edited.



Once a process is selected, the specifications are displayed on the graph. The software also allows paste specification data to be viewed in a table view by clicking the ***Table*** command button.



4) Click the ***Notes*** command button if you would like to enter process paste documentation.



5) Click the ***OK*** command button to set the process, or ***Cancel*** to quit the command.

To view the process on the Data Graph, the ***Show on Profile*** settings must be enabled. Refer to topic ***Software>Menus>Process>Show on Profile*** for more information.

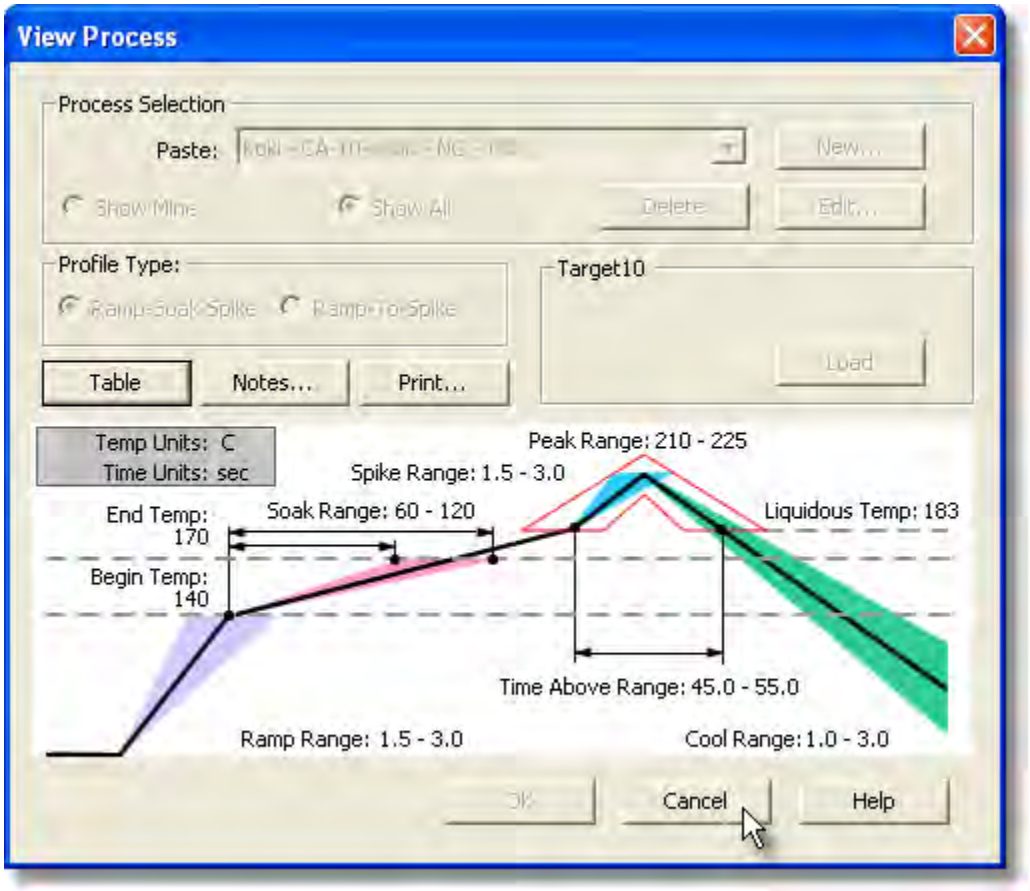
5.5.8.2. View Process

This command allows the user to view process information associated with the selected data run profile.

> This is available when in Verify Mode.

To view a process:

1) On the ***Process-Paste*** menu, click ***View Process***.



2) Select the ***Cancel*** command button to quit the command.

5.5.8.3. Create New Paste

When setting machine information, the user is required to select a machine. The software includes basic machine models for the user to select from. If your machine model does not appear in the list the software has the ability for you to create a new machine model.

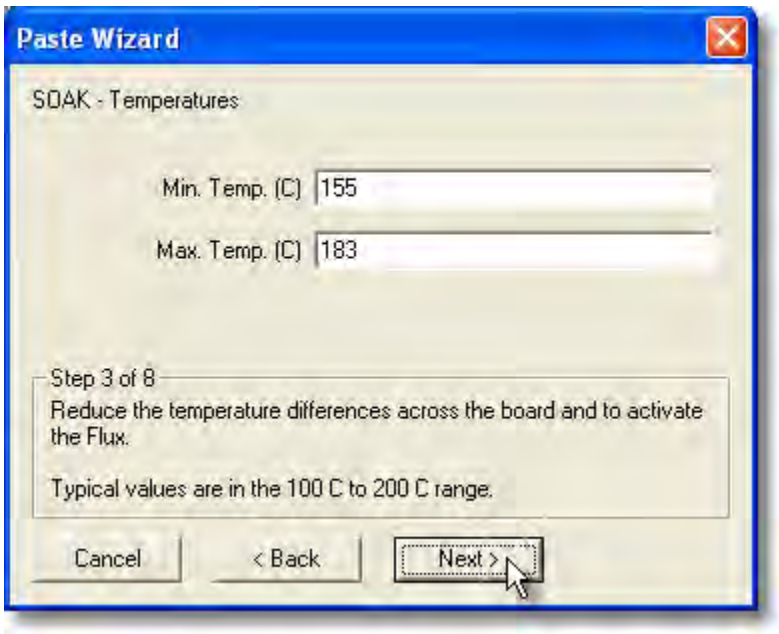
This is available when in Engineer Mode.

To create a new paste:

1) On the ***Process-Paste*** menu, click ***Create New Paste***.
2) Enter the required information and select the ***Next*** button.

3) Enter the RAMP – Slope information and select the ***Next*** button.

4) Enter the SOAK –Temperatures information and select the ***Next*** button.



5) Enter the SOAK –Time information and select the ***Next*** button.

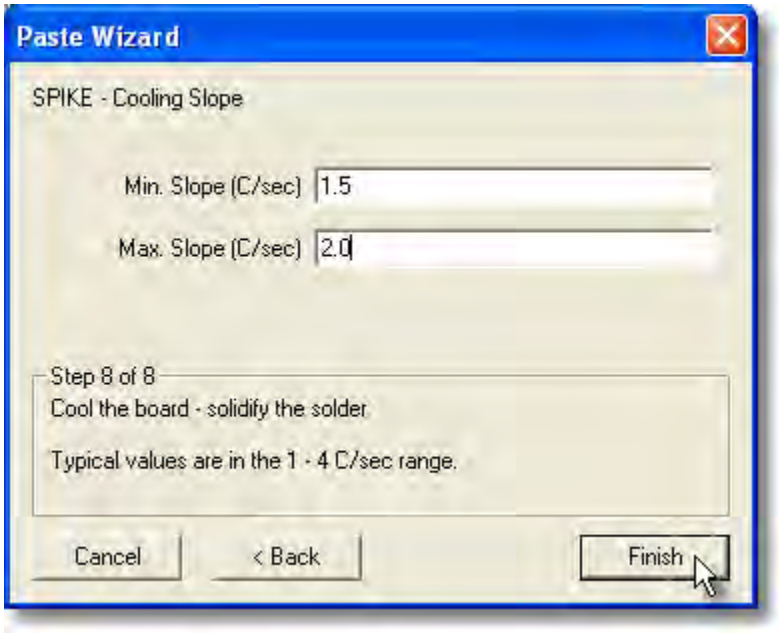
6) Enter the SPIKE – Ramp Slope information and select the ***Next*** button.

7) Enter the SPIKE – Time Above information and select the ***Next*** button.

8) Enter the SPIKE – Peak Temperature information and select the ***Next*** button.

9) Enter the SPIKE – Cooling Slope information and select the ***Finish*** button to create the new paste and return to the Paste Specification database dialog box.

Once the user proceeds to each Step, the Back button can be selected to confirm or modify previously entered information.



10) Click the ***Finish*** command button to accept, or ***Cancel*** to quit the command.

The new process paste will now appear in the Paste drop-down list on the ***Set Paste*** dialog box. Refer to topic ***Software>Menus>Process>Set Paste*** for more information.

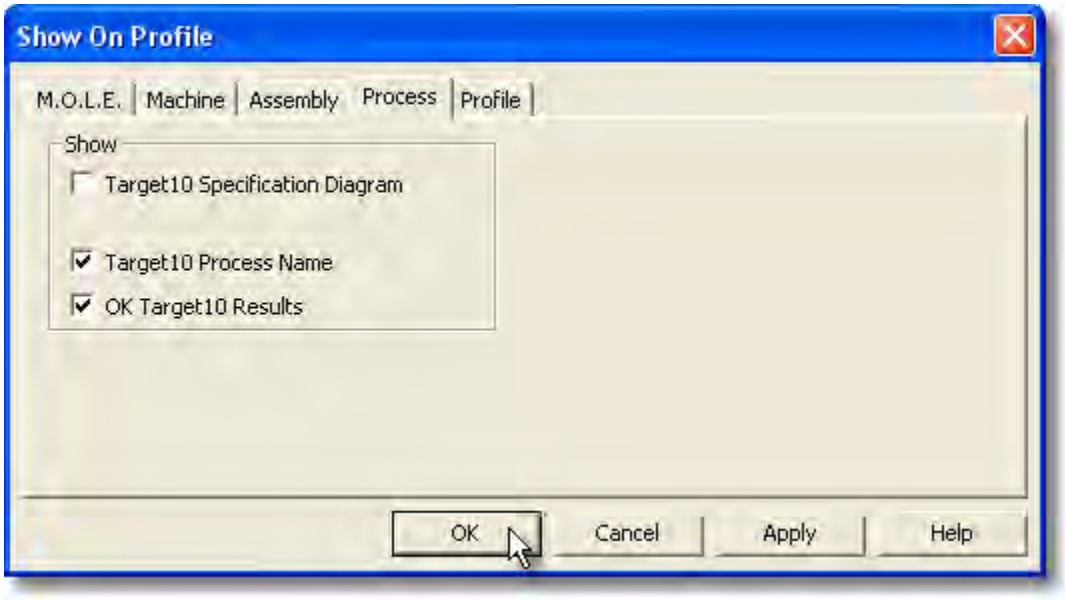
5.5.8.4. Show on Profile

Process Paste specification can be displayed or hidden on the Data Graph.

This is available when in Engineer Mode.

To show the process paste specification on the Data Graph:

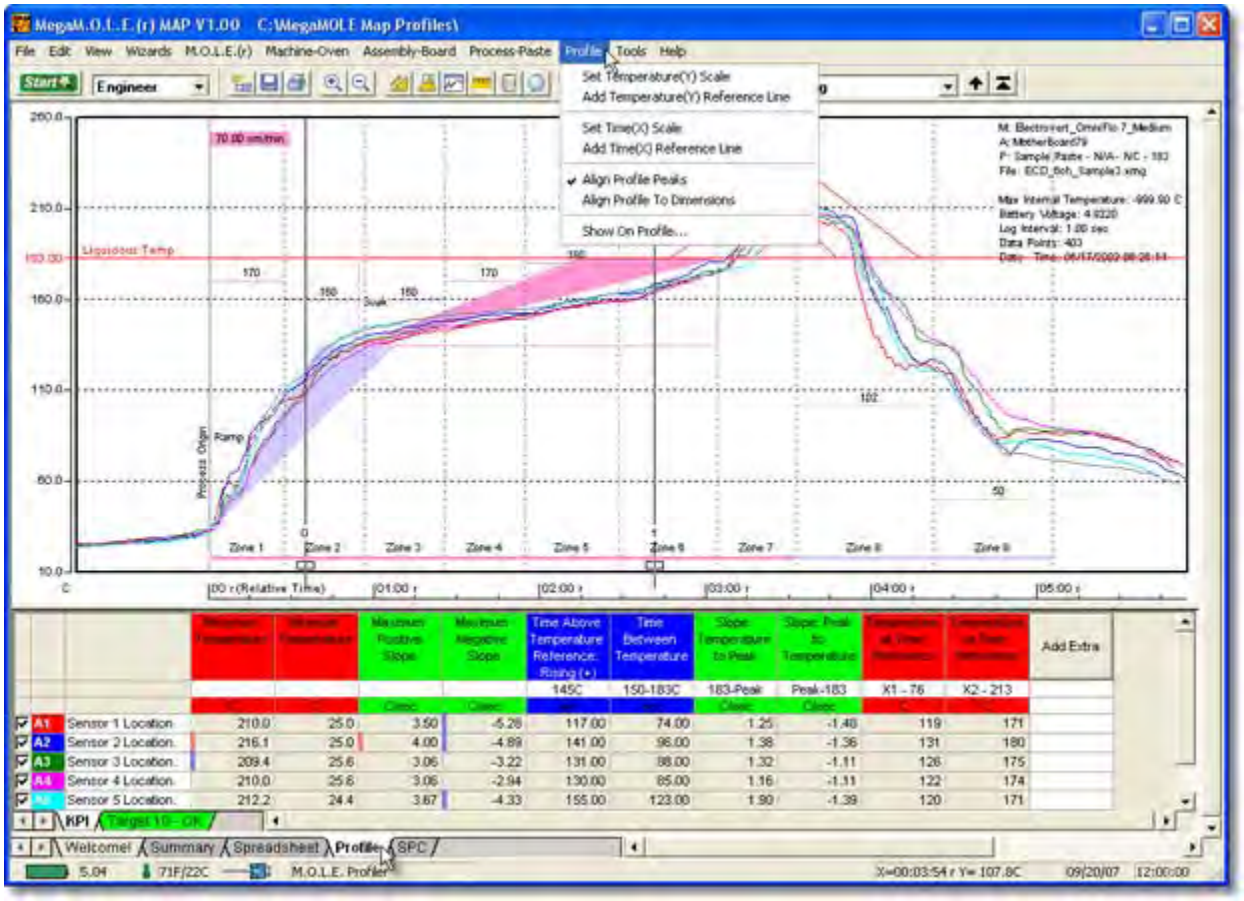
1) On the ***Process-Paste*** menu, click ***Show on Profile***.
2) Select or clear the associated process paste options to display or hide on the Data Graph.



3) Click the ***OK*** command button to accept, or ***Cancel*** to quit the command.

5.5.9. Profile Menu

The Profile menu includes special commands specifically used on the Profile worksheet. Commands in this menu enable the user to view and edit data run documentation, change the appearance of the Data Graph and design experiments.



5.5.9.1. Set Temperature (Y) Scale

This command controls the scale of the Temperature (Y) axis on the Data Graph.

This is available in both Engineer & Verify Modes.

To use the scaling command:

1) On the ***Profile*** menu, click ***Set Temperature (Y) Scale***. This dialog box identifies the current settings of the displayed units and the maximum and minimum values.
2) Select between ***Auto*** or ***Manual*** mode. In Auto mode, the software selects the scale of the Y-Axis to ensure all Data Point values and the highest Zone

temperature settings are visible in the Data Graph. In Manual mode, the range of values must be manually set.

3) Click the ***OK*** command button to use the settings or ***Cancel*** to quit the command.

The software allows the ability to include recipe values when using the Autoscale feature. Instead of automatically scaling the Data Graph to the data run profile, it scales it to include the recipe values along with profile so the data will always be visible and easy to work with.

This command can also be accessed by double-clicking the scale on the Data Graph.

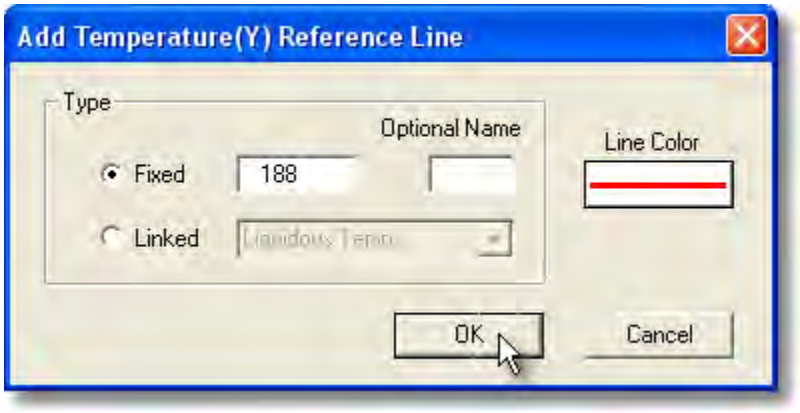
5.5.9.2. Add Temperature (Y) Reference Lines

Temperature Reference Lines are colored horizontal lines and can be positioned anywhere within the range of Y-values in the graph.
They are used for analysis when the Temperature (Y) parameter calculations are displayed in the Data Table.

This is available when in Engineer Mode.

To add Temperature Reference Lines to the Data Graph:

1) On the ***Profile*** menu, click ***Add Temperature (Y) Reference Line***.
2) Choose the reference line Type (Fixed and Linked). If ***Fixed*** is selected, enter a fixed Temperature value. If ***Linked*** is selected, select a portion of the profile to link it to.



3) Select the line color by clicking the line button below the label.

When an reference line is displayed on the Data Graph, the default label is the specified temperature. The software allows the user to rename the line by using the ***Optional Name*** text box.

4) Click the ***OK*** command to accept the new settings or ***Cancel*** to quit the command.

This command can also be accessed by right-clicking the scale on the Data Graph and select ***Add Temperature (Y) Scale*** from the shortcut menu.

To move an Temperature (Y) Reference Line:

1) Position the mouse pointer over the desired reference line.
2) Double-click the reference line and the ***Add Temperature (Y) Reference*** line dialog box appears.
3) Edit the reference line settings and click the ***OK*** command to accept the new settings or ***Cancel*** to quit the command.

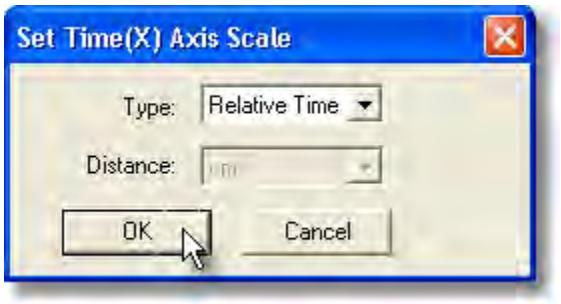
5.5.9.3. Set Time (X) Scale

This command controls the scale of the Time (X) axis on the Data Graph.

This is available when in Engineer Mode.

To select a Time (X) scale:

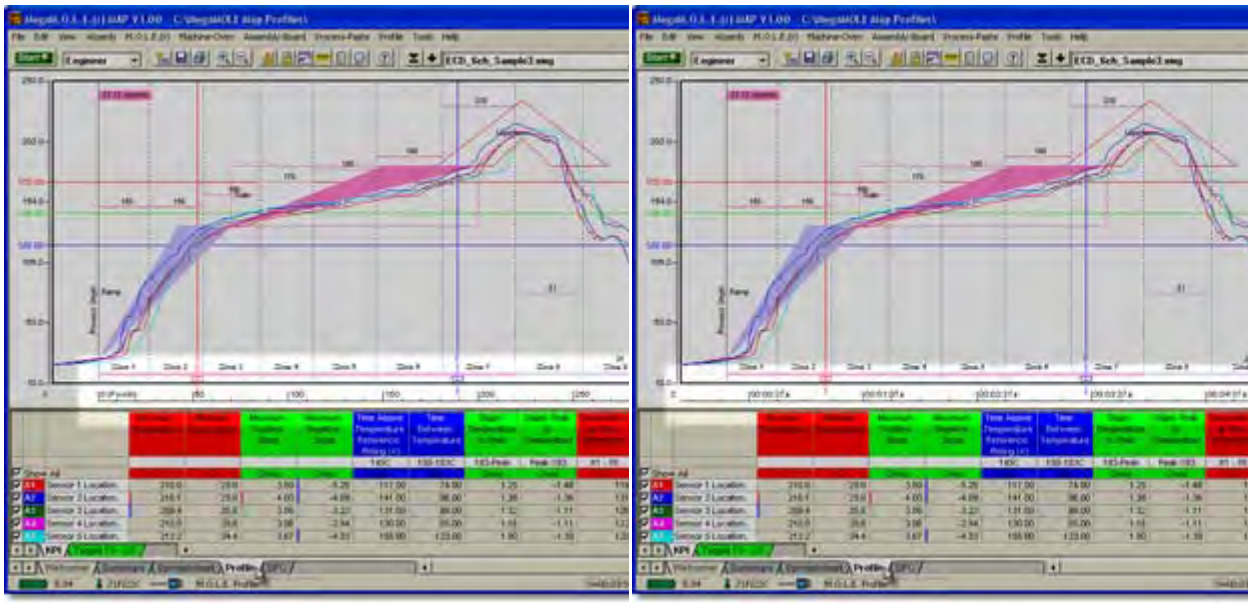
1) On the ***Profile*** menu, click ***Set Time (X) Scale***.



2) Select the scale ***Type*** and ***Distance units***.
3) Click the ***OK*** command button to accept the changes, or ***Cancel*** to discard any changes.

Relative Time Scale

Distance Scale



Points Scale ***Absolute Time Scale***

This command can also be accessed by right-clicking the scale on the Data Graph and select ***Set Time (X) Scale*** from the shortcut menu.

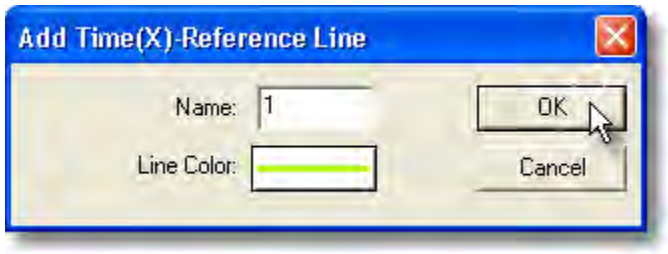
5.5.9.4. Add Time (X) Reference Lines

Time Reference Lines are colored vertical lines that can be positioned anywhere within the range of X-values on the Data Graph.
These reference lines indicate the temperature values at the intersection of a Data Plot with each displayed reference line.

This is available when in Engineer Mode.

To add Time Reference Lines to the Data Graph:

1) On the ***Profile*** menu, click ***Add Time (X) Reference Line***.

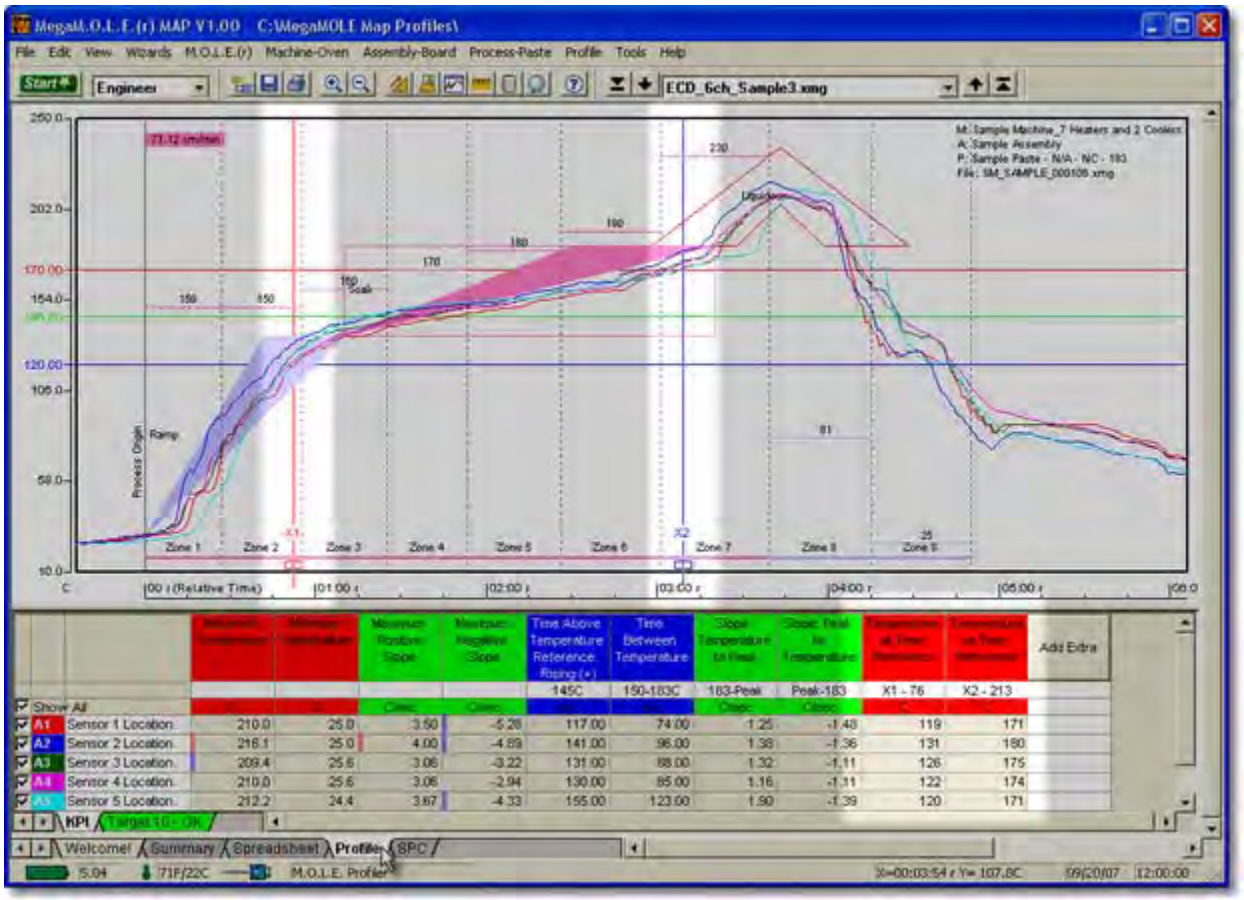


2) Select the line color by clicking the line button below the label.

When a reference line is displayed on the Data Graph, the default label is the next number of reference line. For example if there is two reference lines displayed, the next default label will be 3. The software allows the user to rename the line by using the ***Name*** text box.

3) Click the ***OK*** command to accept the new settings or ***Cancel*** to quit the command.

If a reference line is used in a Data Table calculation, the name of the reference appears in the header along with the parameter value.



This command can also be accessed by right-clicking the scale on the Data Graph and select ***Add Time (X) Reference*** from the shortcut menu.

To move an Time (X) Reference Line:

1) Position the mouse pointer over the a Time (X) Reference line.
2) When the mouse pointer becomes a ⇿, click and hold the left mouse button to drag it left or right releasing the mouse button when the Time (X) Reference line is at the desired location.

When moving the selected Time (X) Reference line, it can be moved past other cursors to any location on the Data Graph.

When a Time (X) Reference line is moved to a new position, it snaps to the closest real Time (X) value. Notice on highly magnified graphs that the line jumps from point to point. The values in the Data Table are automatically updated to reflect the new position.

5.5.9.5. Align Profile Peaks

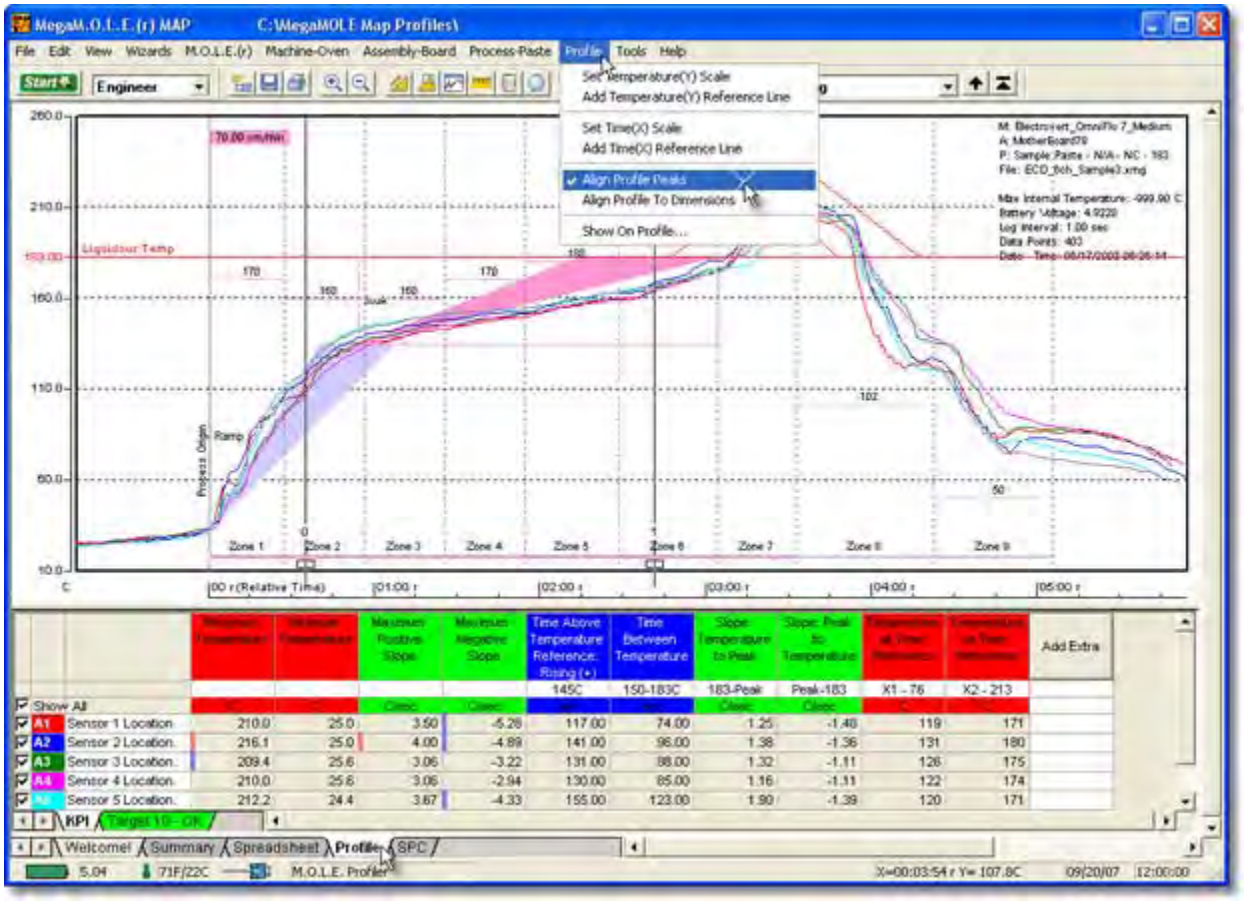
If sensors are placed so they enter and exit machine zones at different times, the resulting Data Plots lag behind one another. The Align Profile Peaks command automatically aligns the Time (X) axis maximum peak values for each Data Plot so the results can be easily compared during analysis.

This is available in both Engineer & Verify Modes.

To align profile peaks:

A conveyor speed must be set to properly use this command. Refer to topic ***Software>Menus>Machine>Set Machine Information*** or ***Software>Page Tabs>Profile>Data Graph>Conveyor Speed Indicator*** for more details.

1) On the ***Profile*** menu, click ***Align Profile Peaks*** the channel lag values are automatically calculated, and the Data Plots adjust to reflect them. A check mark appears to the left of the command indicating the software is in Align Profile Peaks mode. Repeat this step to disable the command.



When downloading a data run from the M.O.L.E. Profiler, the default sensor alignment can be specified in the Profile tab of the Preferences dialog box. Refer to topic ***Software>Menus>File>Preferences>Profile*** for more information.

5.5.9.6. Align Profile to Dimensions

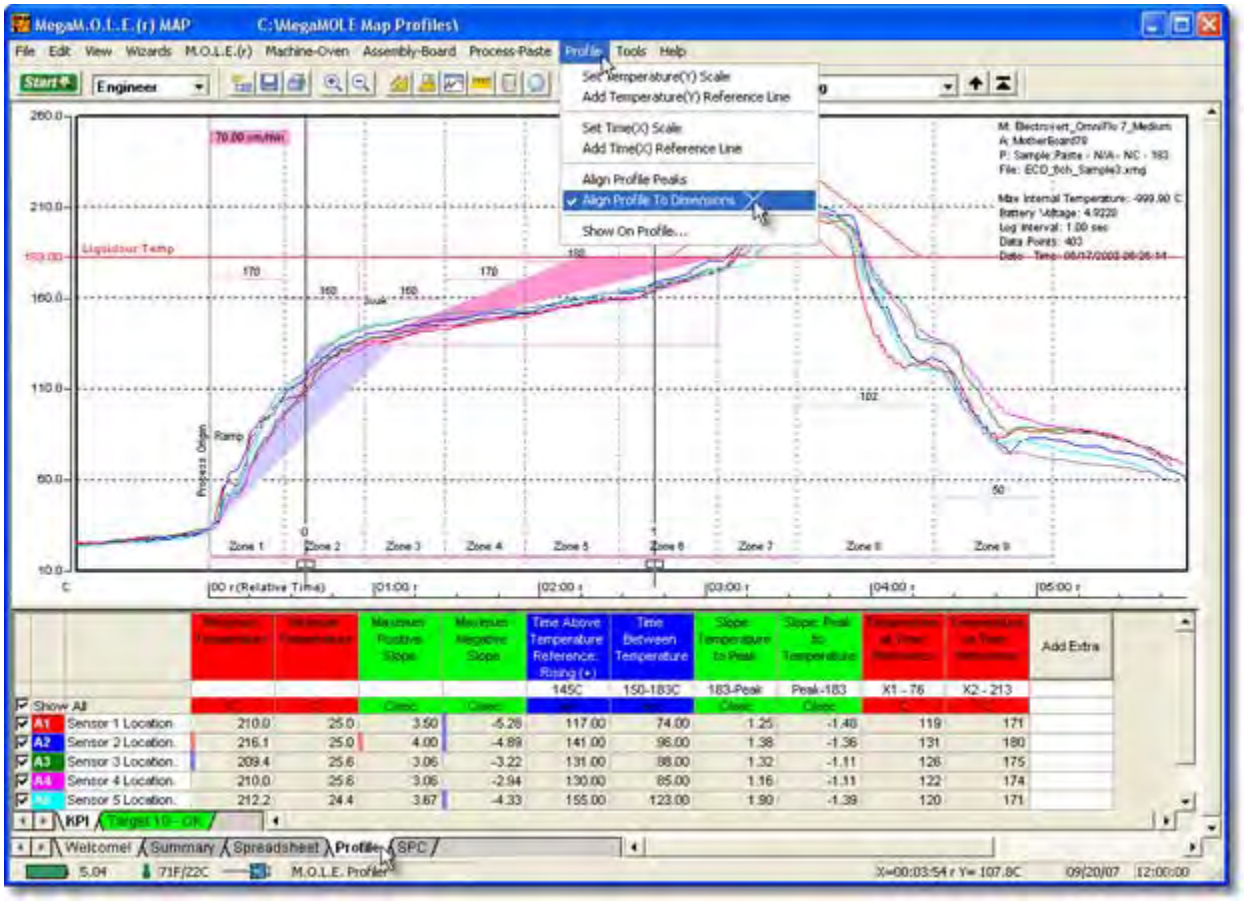
If sensors are placed so they enter and exit machine zones at different times, the resulting Data Plots lag behind one another. The Align Profile To Dimensions command automatically aligns the (X) values specified in the ***Set Assembly Information*** command for each Data Plot so they are aligned in time so they can be easily compared during analysis.

This is available in both Engineer & Verify Modes.

To align profile to dimensions:

A conveyor speed and sensor locations must be set to properly use this command. Refer to topic ***Software>Menus>Machine>Set Machine Information*** and/or ***Software>Page Tabs>Profile>Data Graph>Conveyor Speed Indicator*** for more details.

1) On the ***Profile*** menu, click ***Align Profile To Dimensions*** the channel lag values are automatically calculated, and the Data Plots adjust to reflect them. A check mark appears to the left of the command indicating the software is in Align Profile To Dimensions mode. Repeat this step to disable the command.



When downloading a data run from the M.O.L.E. Profiler, the default sensor alignment can be specified in the Profile tab of the Preferences dialog box. Refer to topic ***Software>Menus>File>Preferences>Profile*** for more information.

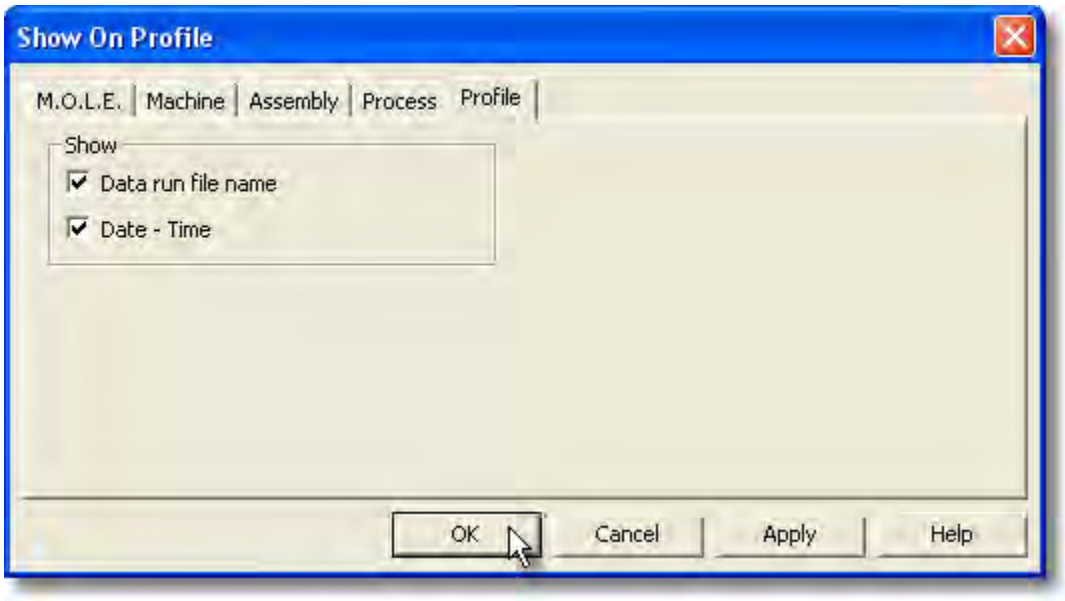
5.5.9.7. Show on Profile

The data run file name can be displayed or hidden on the MAP data section of the Data Graph.

This is available when in Engineer Mode.

To show profile information on the Data Graph:

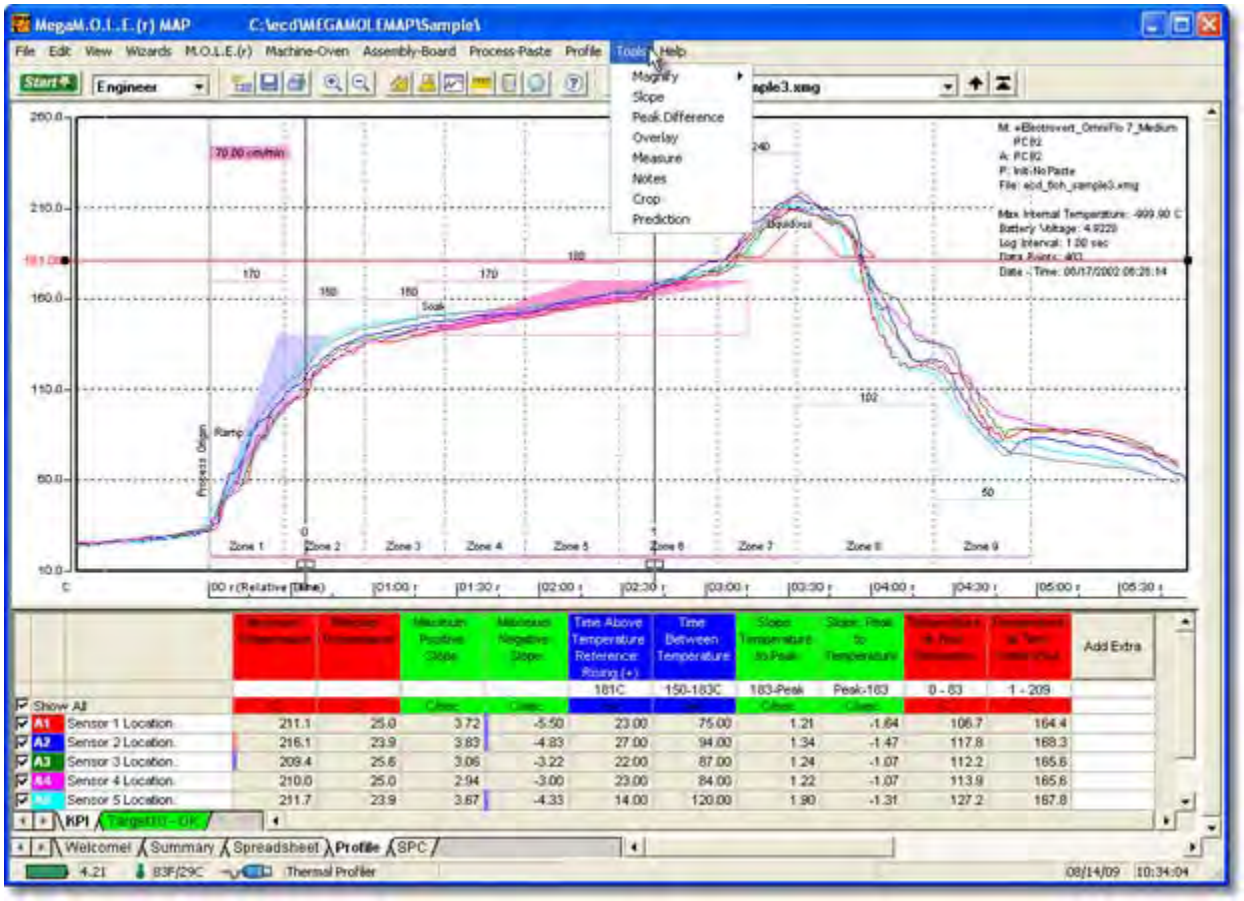
1) On the ***Profile*** menu, click ***Show on Profile***.
2) Select or clear the ***File Name*** check box to display or hide it on the Data Graph.



3) Click the ***OK*** command button to accept, or ***Cancel*** to quit the command.

5.5.10. Tools Menu

Options in this menu help the user manipulate and analyze the data run profile displayed on the Data Graph.



5.5.10.1. Magnify

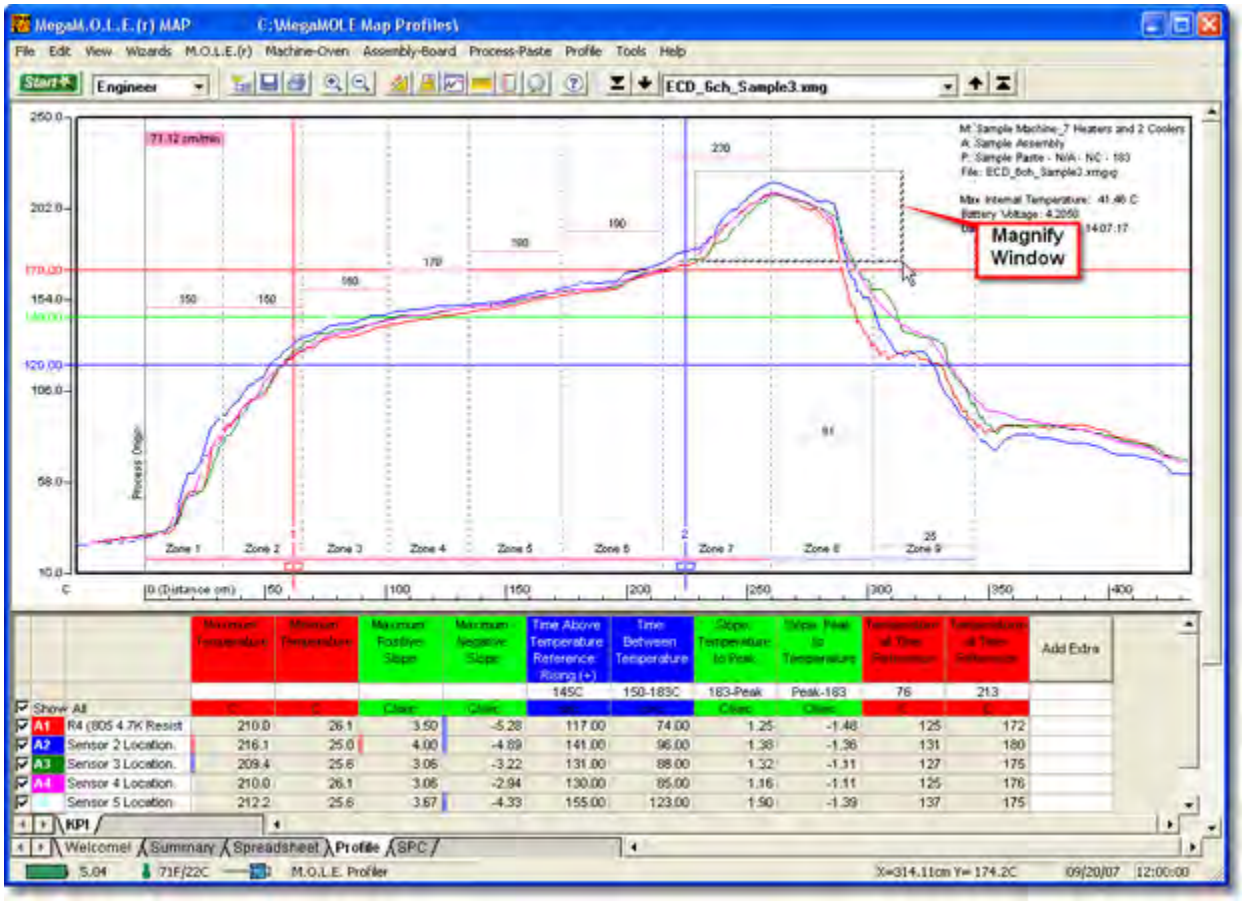
The Magnify tool enlarges any selected area of the data graph for easy visual examination.

> This is available when in Engineer Mode.

To magnify a portion of the Data Graph:

> When a Magnified Window constraint is applied to a parameter in the Data Table, the Magnify tool is used to enlarge a portion of the Data Graph, and the values within the magnified area are displayed in the Data Table.

1) On the ***Tools*** menu, point to ***Magnify*** then select ***Select Area***.
2) Position the mouse pointer on a corner of the area to enlarge.
3) Press the left mouse button and drag the pointer diagonally to the opposite corner to form a box around the area to be magnified. An outline of the box appears as you drag.



4) Release the left mouse button when the outline of the area to be magnified is visible. The area inside the box is then magnified to fill the entire Data Graph.

To show even more detail in the Data Graph, Magnify can be performed multiple times. If the Magnify tool reaches the maximum zoom capability the software will display a message box informing that the user has “Zoomed to Tight”.

This command can be accessed on the Toolbar when the Profile Tab is active.

Magnify Button

5.5.10.2. Slope

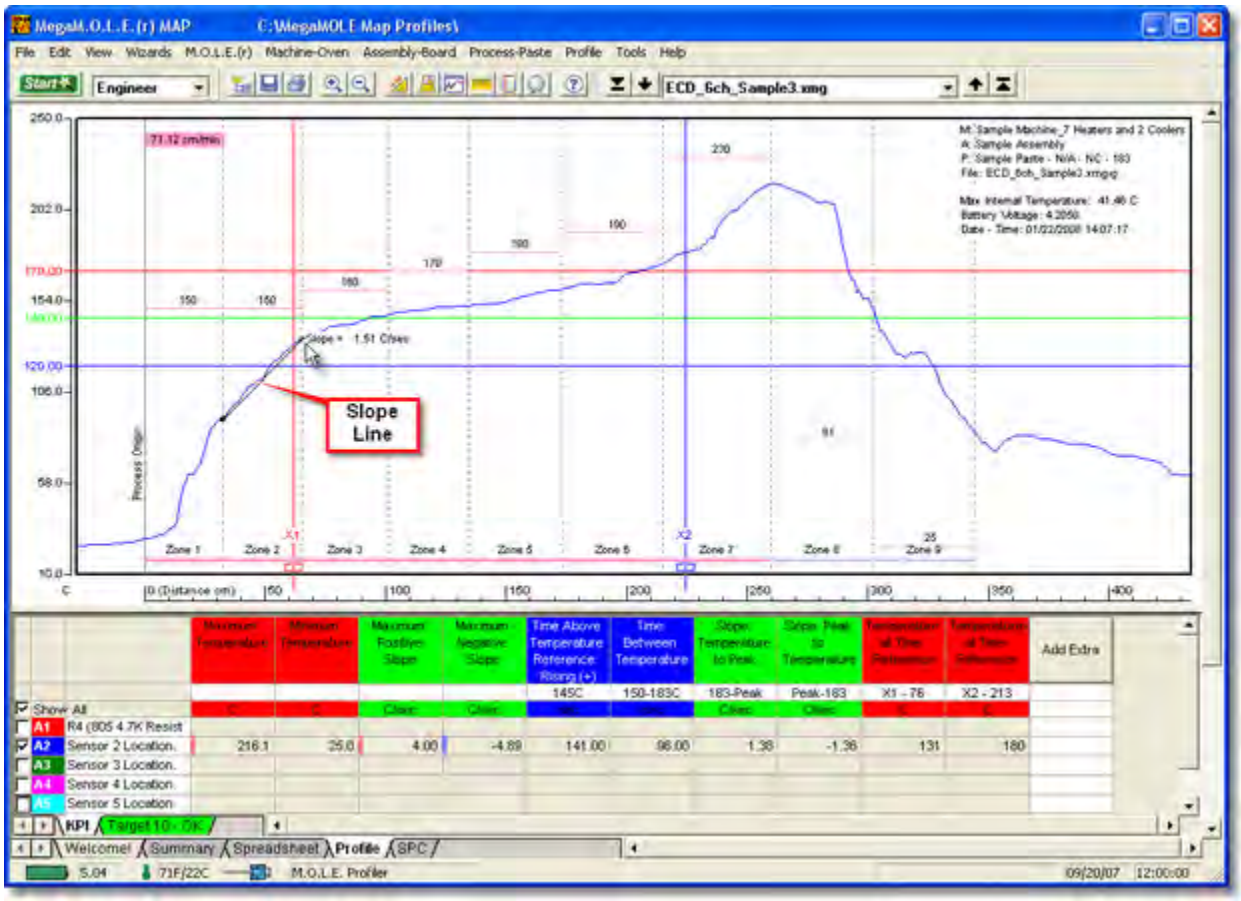
The Slope tool finds the average slope between any two points in the Data Graph.

This is available when in Engineer Mode.

<u>To find the average slope of a line:</u>

1) On the ***Tools*** menu, click ***Slope***.

2) Position the mouse pointer at a point on the curve.
3) Press and hold the left mouse button.
4) Drag the pointer to the end of the desired slope line.
5) Release the left mouse button when the pointer is at the desired location. The software will draw a slope line on the Data Graph, and label the slope value.



To obtain more accurate slopes:

1) On the Tools menu, click Magnify to magnify a portion of the Data Graph
2) Repeat the Slope command.

To remove a slope line from the Data Graph:

1) Using the mouse pointer, select the object on the Data Graph by clicking it once. The object trackers will then become bold indicating that it has been selected.
2) Press the [Delete] key on the keyboard to remove the object.

Slope Applications

- Use the Slope tool to find the average slope between any two points on the graph. Longer slope lines tend to produce more accurate slope calculations.
- The Slope tool can be used to compare actual data with ideal conditions by drawing a line with a known slope (to represent the ideal condition) beside a portion of a Data Plot.

Slope Limitations

- Slope calculations are based on logged points connected by the slope line. Points occur only at the exact time intervals used to record data.
- The Slope tool cannot measure slopes when the line is vertical.

This command can be accessed on the Toolbar when the Profile Tab is active.

	Slope Button

5.5.10.3. Peak Difference

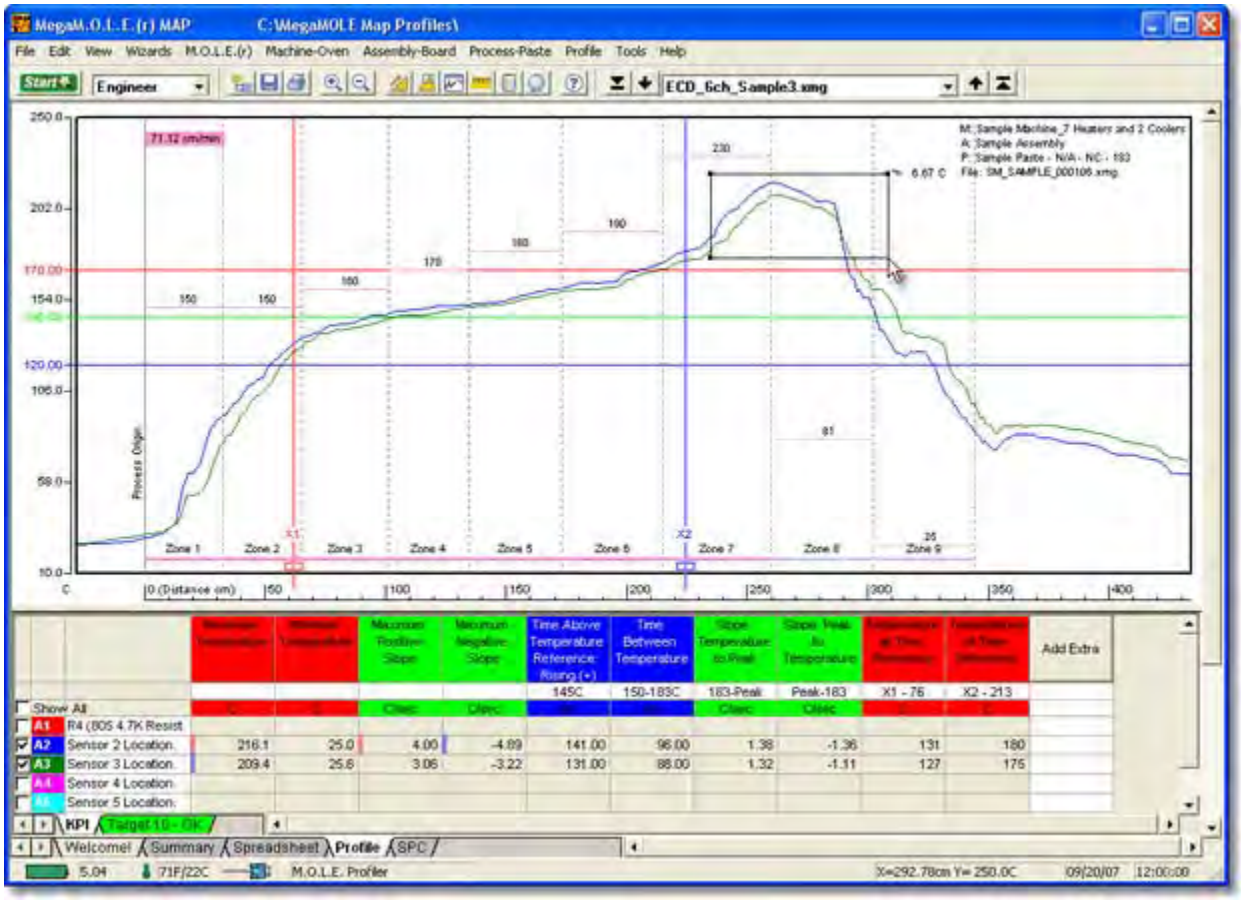
This command displays the difference in value between the peak of the maximum Data Plot and the peak of the minimum Data Plot in any location of the Data Graph. This command is especially useful for measuring side-to-side heating differences in a machine (oven).

This is available when in Engineer Mode.

To display the peak difference between Data Plots:

The peak difference is calculated as the maximum difference between the highest peak and the lowest peak within the rectangle.

1) On the ***Tools*** menu, click ***Peak Difference***.
2) Position the mouse pointer on a corner of the area you want to analyze.
3) Press the left mouse button and drag the pointer diagonally to the opposite corner to form a Peak difference box. An outline of the box appears as you drag.



To remove the peak difference:

1) Using the mouse pointer, select the object on the Data Graph by clicking it once. The object trackers will then become bold indicating that it has been selected.
2) Press the [Delete] key on the keyboard to remove the object.

This command can be accessed on the Toolbar when the Profile Tab is active.

	Peak Difference Button

5.5.10.4. Overlay

The Overlay tool displays a second data run profile over the currently displayed profile on the Data Graph for comparison.

	This is available when in Engineer Mode.

<u>To overlay two Profiles:</u>

1) On the ***Tools*** menu, click ***Overlay***. A list box of data run files (.XMG) in the currently open working directory appears.

2) Select a data run file (.XMG) to overlay on the original.

The profile will be inserted at the same process origin and automatically scaled to the same Temperature (Y) axis. The original Data plots remain as solid lines while those added for comparison are dashed.

The dashed “Overlay” Data Plots are the same color as the original Data Plots.

To remove the overlaid Data Graph:

1) Select the Overlay command again.

Overlay Applications

- The Overlay and Magnify tools can be used together to overlay and compare ideal reference profiles and magnified portions of the two data files. They can have different but overlapping Time (X) values (times, point numbers, logging intervals) or temperatures.

Overlay Limitations

- If the Data Plots are too numerous to clearly see the information of interest, they can be suppressed by turning the desired channel in one or both files "OFF". This

must be done to the overlaid data run file prior to using the Overlay tool. Save that data run file and use the Overlay tool again.

This command can be accessed on the Toolbar when the Profile Tab is active.

 Overlay Button

5.5.10.5. Measure

The Measure tool is similar to the Slope tool except it measures the distance between any two points on the Profile worksheet Data Graph. This tool adds a line labeled with the distance values to the graph, and notes the change in X and change in Y (Delta X and Delta Y) instead of the slope. »

 This is available when in Engineer Mode.

To find the distance between two points:

1) On the ***Tools*** menu, click ***Measure***.
2) Position the mouse pointer at a point on the curve.
3) Press and hold the left mouse button.
4) Drag the pointer to the end of the desired point on the curve.
5) Release the left mouse button when the pointer is at the desired location and a slope line labeled with the change in X and Y appears on the Data Graph.

To obtain more accurate distances:

1) Magnify a portion of the Data Graph using the Magnify tool and repeat this procedure.

To remove the annotated distance:

1) Using the mouse pointer, select the object on the Data Graph by clicking it once. The object trackers will then become bold indicating that it has been selected.
2) Press the [Delete] key on the keyboard to remove the object.

This command can be accessed on the Toolbar when the Profile Tab is active.

	Measure Button

5.5.10.6. Notes

The Notes tool adds a leader with text to any portion on the Data Graph to label special points of interest.

This is available in both Engineer & Verify Modes.

To add notes to the Data Graph:

1) On the ***Tools*** menu, click ***Notes***.
2) Position the mouse pointer at the desired location to start the note leader, click and drag the mouse pointer to the desired location for the note text and release the mouse button.

3) A dialog box appears allowing the user to enter a note by typing it in the text box. There also are options to customize the color and font size.

4) Click the ***OK*** command button or ***Cancel*** to quit the command.

To move notes:

1) Select a note leader, click and drag the mouse pointer to the desired location for the note and release the mouse button.

To remove notes:

1) Using the mouse pointer, select the object on the Data Graph by clicking it once. The object trackers will then become bold indicating that it has been selected.
2) Press the [Delete] key on the keyboard to remove the object.

This command can be accessed on the Toolbar when the Profile Tab is active.

	Notes Button

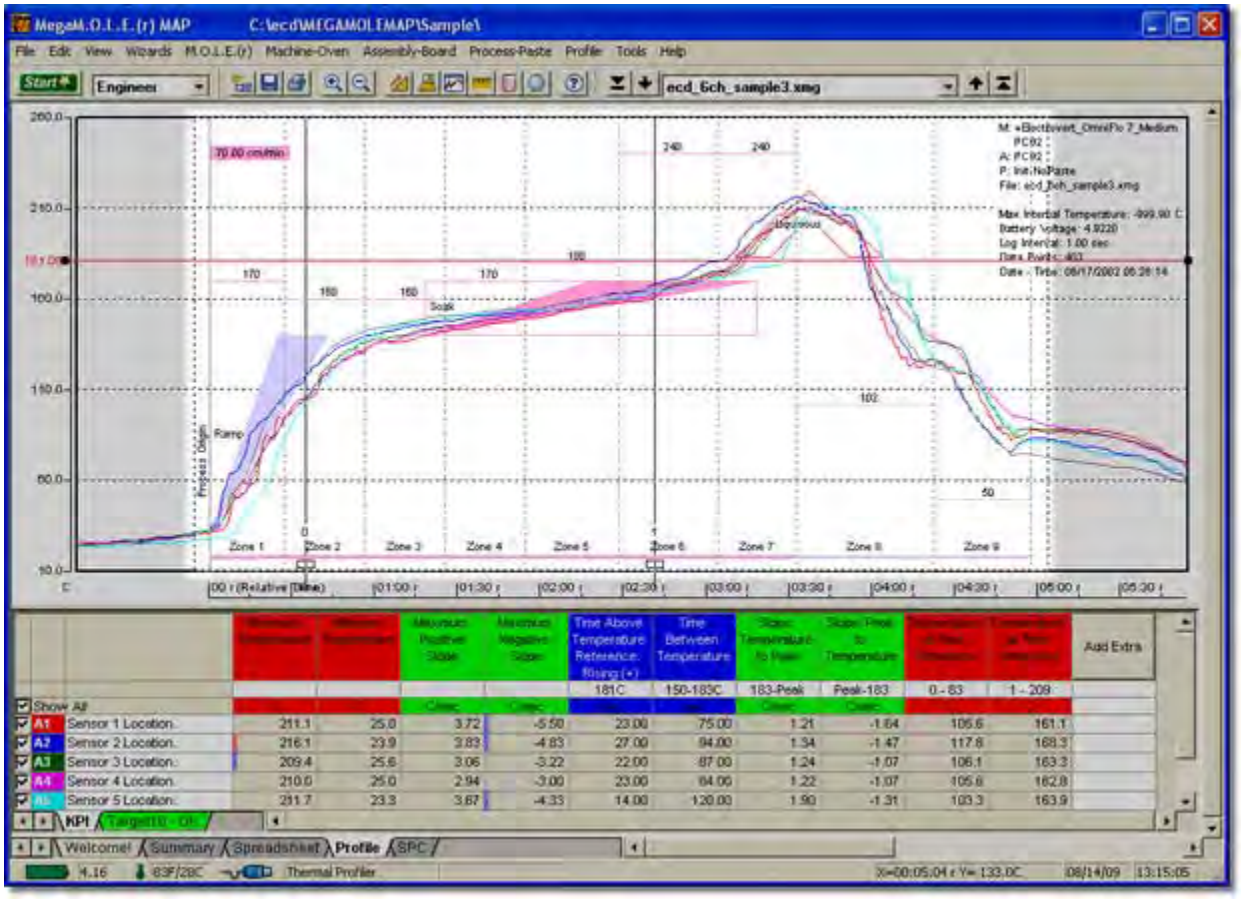
5.5.10.7. Crop

The Crop tool allows the user to save a portion of the data run profile that eliminates unwanted portions from it. This crop tool only works for the Time (X) Scale which allows the user the ability to remove portions from the front and back of the data run profile.

This is available when in Engineer Mode.

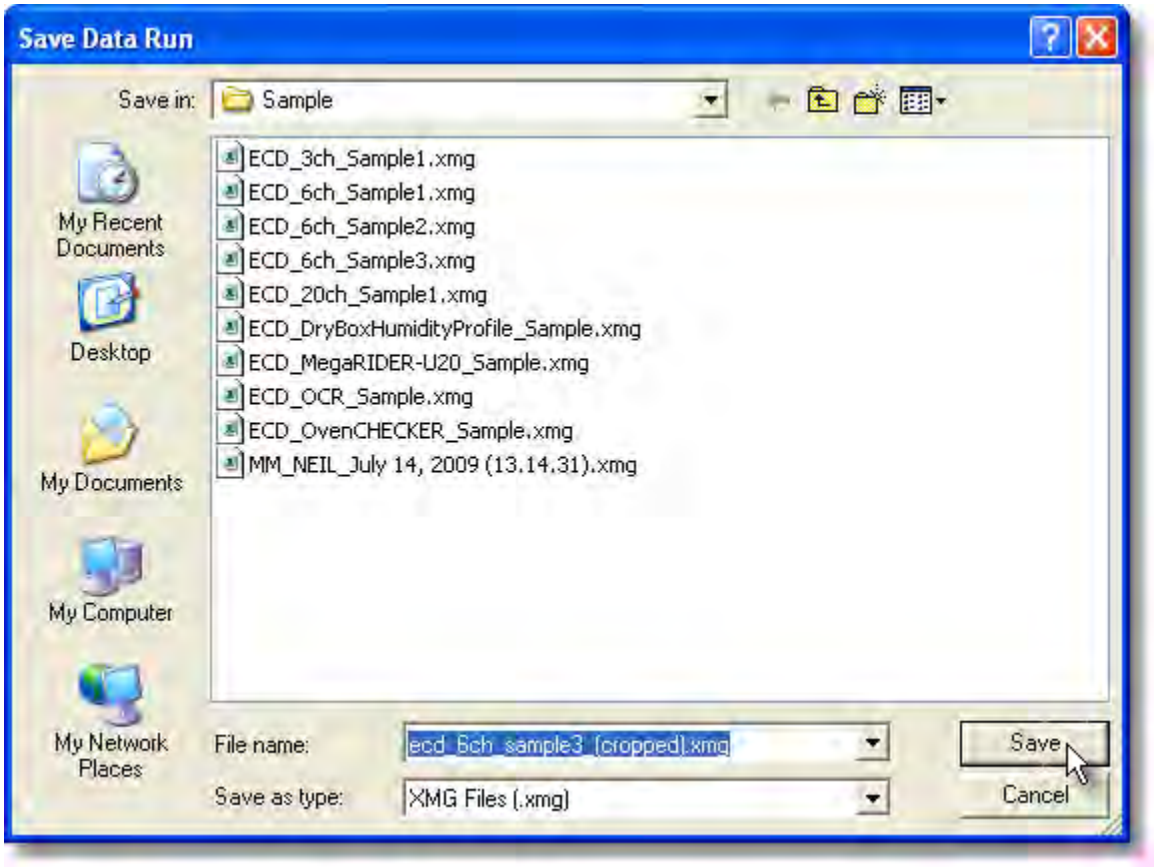
To crop a data run profile:

1) On the ***Tools*** menu, click ***Crop***.
2) Position the mouse pointer on any area of the Data Graph you want to start the crop.
3) Press and hold the left mouse button down, then drag the pointer horizontally to the left or right. An outline of the box appears as you drag indicated by dashed line that appears at the start point.

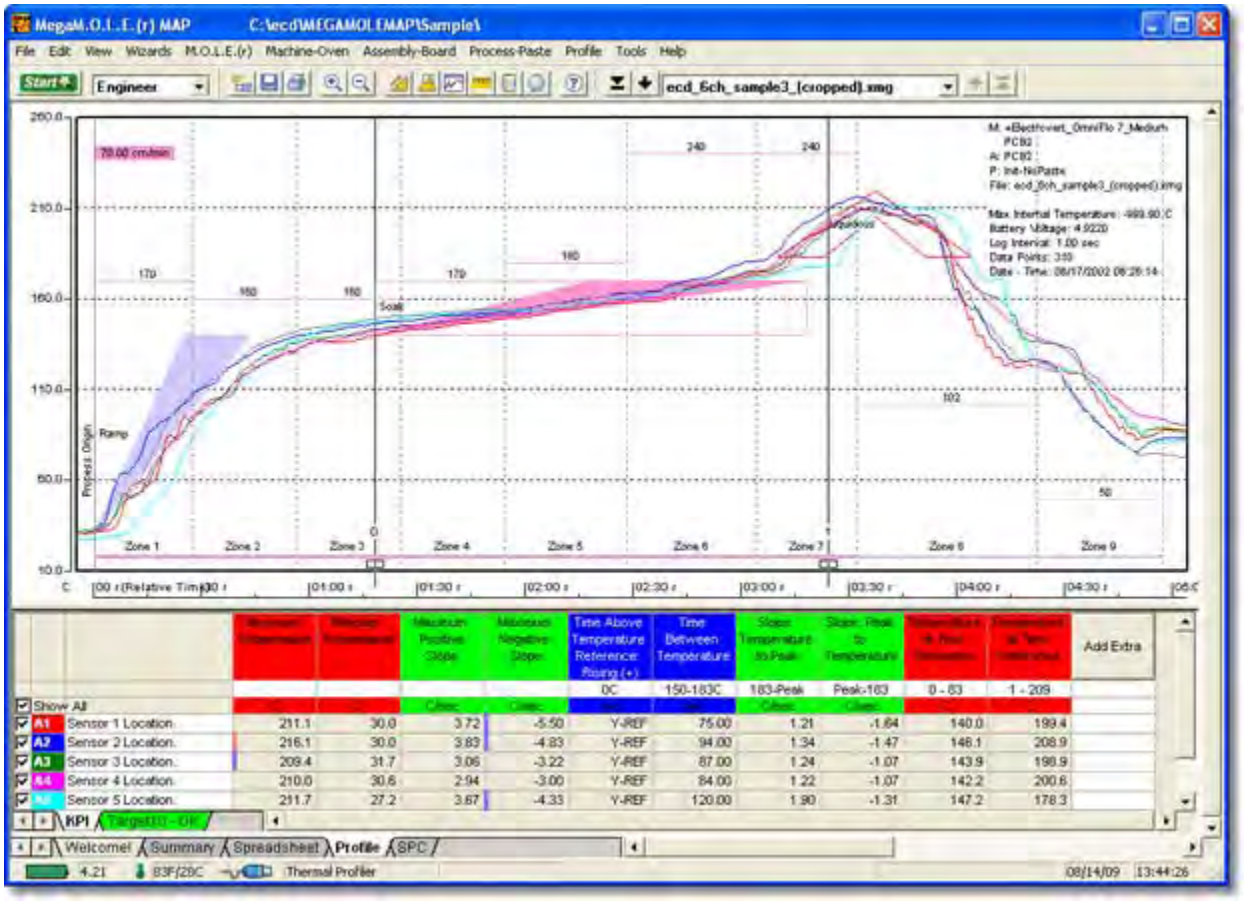


4) Release the left mouse button when the pointer is at the desired location. The software prompts the user to save the cropped data run file (.XMG).

When saving a cropped data run file, the software allows the user to save as the existing file name or give it a different one. This helps preserve the original data run.



Once the cropped data run has been saved, it Autoscales to properly appear in the Data Graph.



5.5.10.8. Prediction

One of the most impressive software features is the Prediction tool. This tool enables the user to change a zone temperature value or the conveyor speed and predict the outcome of that change. Prediction is easy to use and a valuable command that quickly defines process parameters.

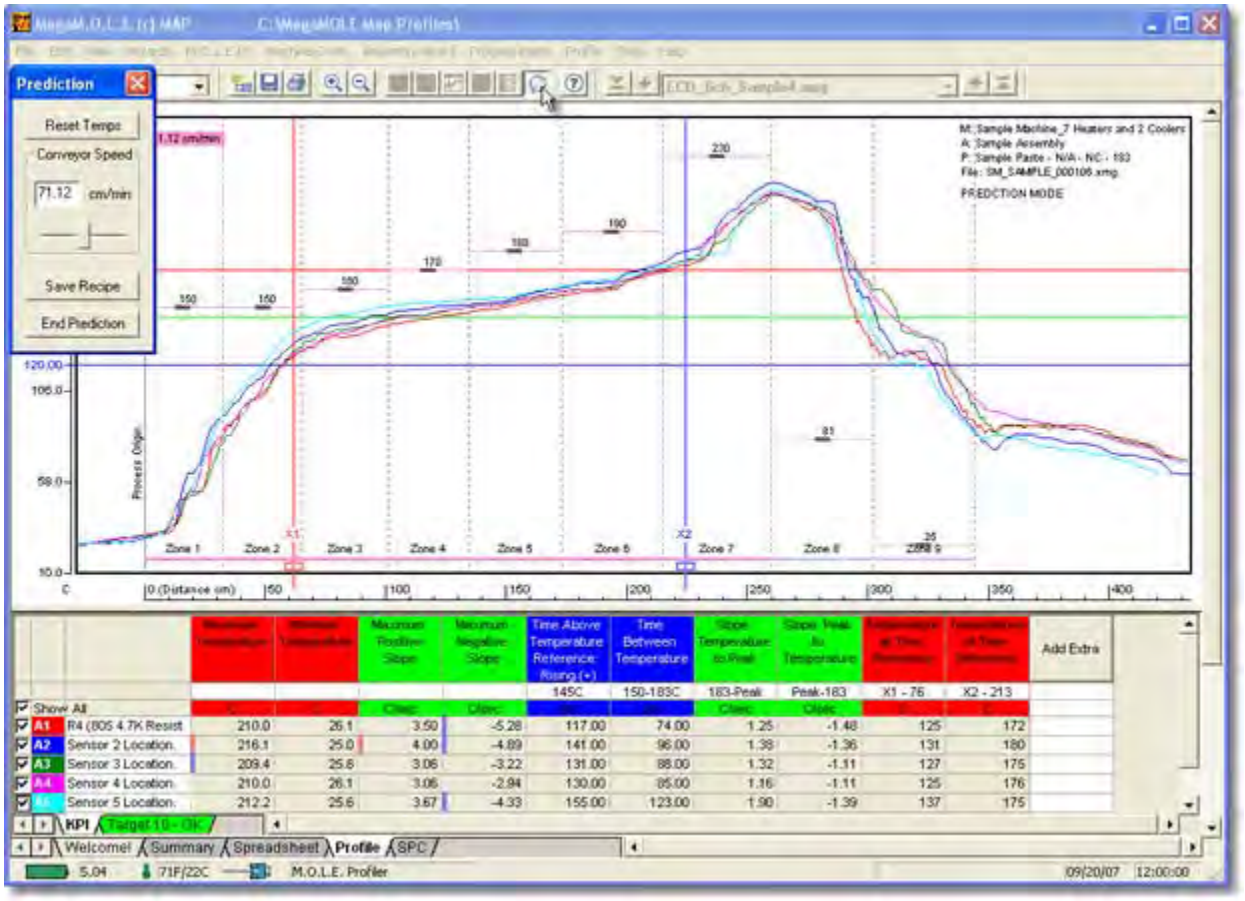
To use the Prediction Tool machine information must first be set to build an accurate "model" of an machine (oven) environment. As experience with modeling grows, the first values selected may need to be modified accurately reflect the process. Refer to topic ***Software>Menus>Machine>Set Machine Information***.

This is available when in Engineer Mode.

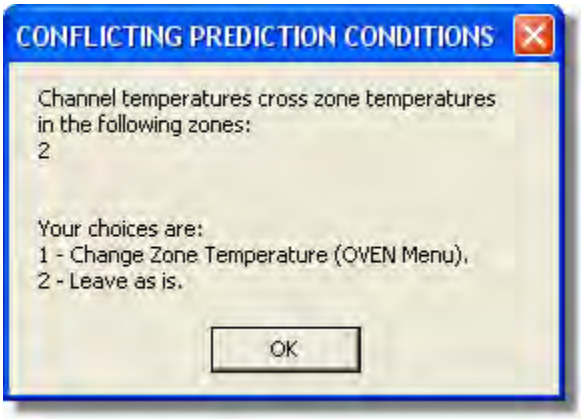
To predict results:

If Zone temperatures are not set, the Prediction tool will not work.

1) On the ***Tools*** menu, click ***Prediction*** and the Prediction pallet appears.

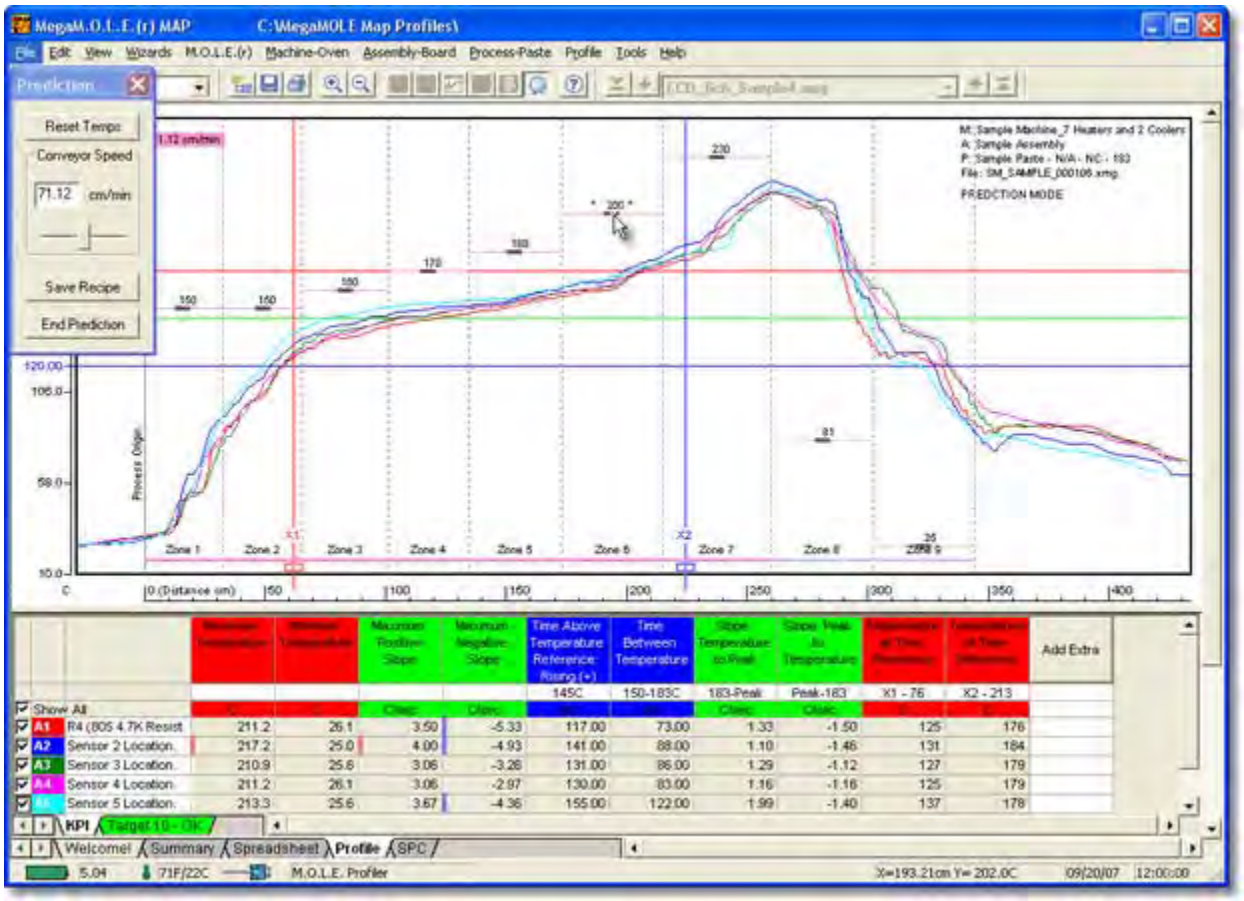


If sensor temperatures are inconsistent with zone temperature settings, a message box with an explanation appears. The explanation appears only once for all zones, each time Prediction is used. After that, the software assumes the user is aware of the potential problem.

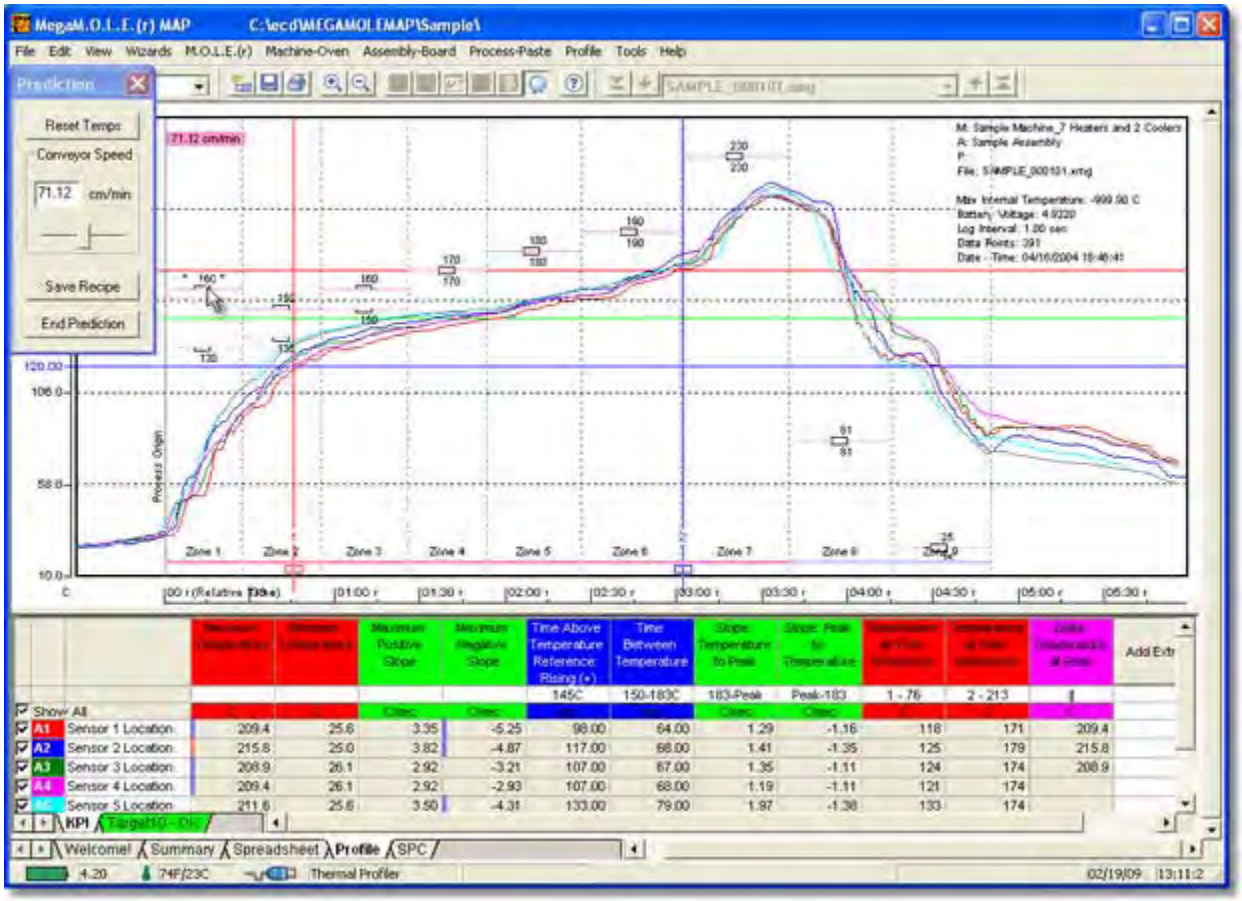


The inconsistent setting does not prevent the software from making a prediction. It makes a rational assumption about what is happening. In addition to the explanation, several logical ways are displayed to correct the conflicting conditions at the bottom of the dialog box.

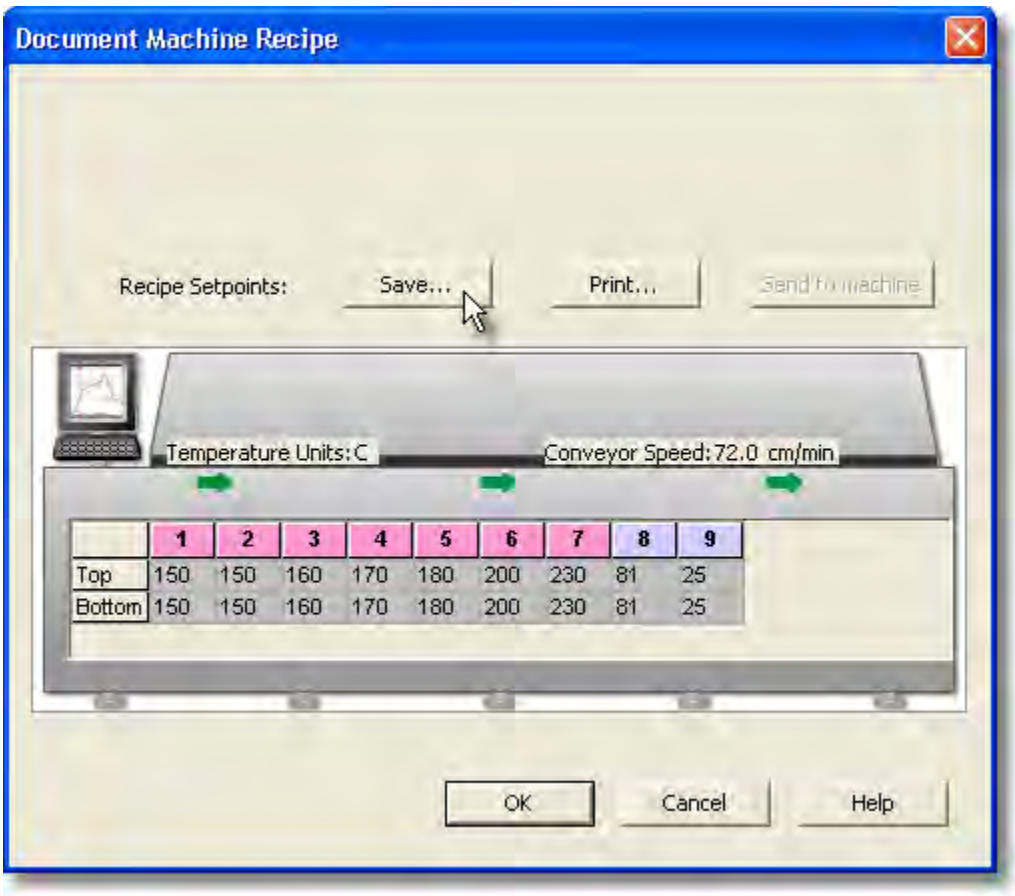
2) Experiment by making “what if” changes to the conveyor speed and sliding Zone Temperature Prediction Handles up or down to the preferred prediction temperature.



If the Top and Bottom zone temperature setpoints are different, the software allows the user to perform predictions by adjusting them independently. Refer to topic ***Set Machine Information***.



3) Once the predicted machine recipe is at the desired settings, the user can save them to a recipe file (.XMR) or print them by selecting the ***Save Recipe*** command button.



4) Once the machine recipe is saved, set the machine to the final prediction values, let it stabilize and then perform another data run to check if the process has been optimized.

This command can be accessed on the Toolbar when the Profile Page Tab is active.

	Prediction Button

5.5.11. Help Menu

The Help menu commands are useful when information is needed quickly or when this Users guide is not available.

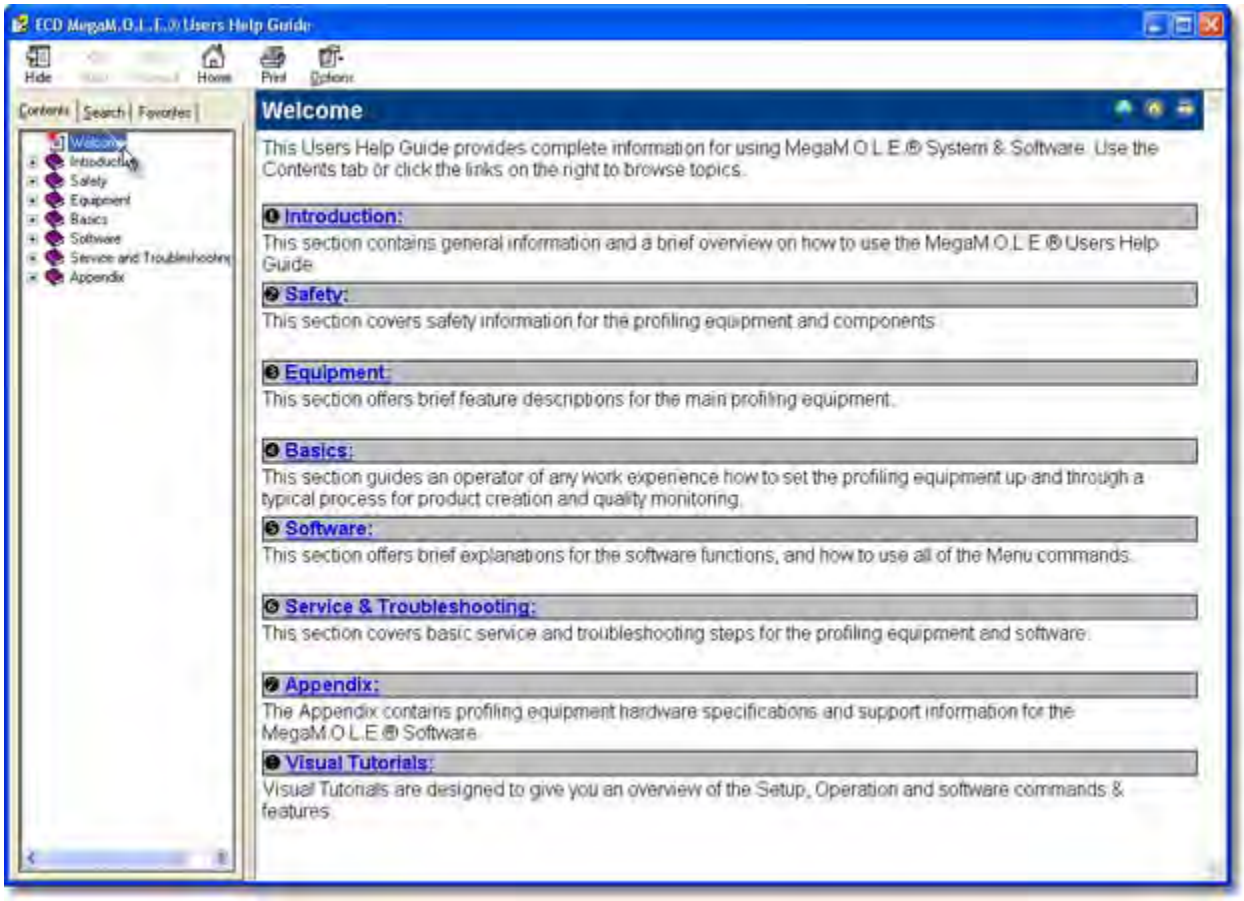
5.5.11.1. Help

The Help Index is a complete reference tool that can be used at any time.

> This is available in both Engineer & Verify Modes.

<u>To launch the help system:</u>

1) On the ***Help*** menu, click ***Help*** to launch the user's help guide. You may now search for the help topic of your choice.



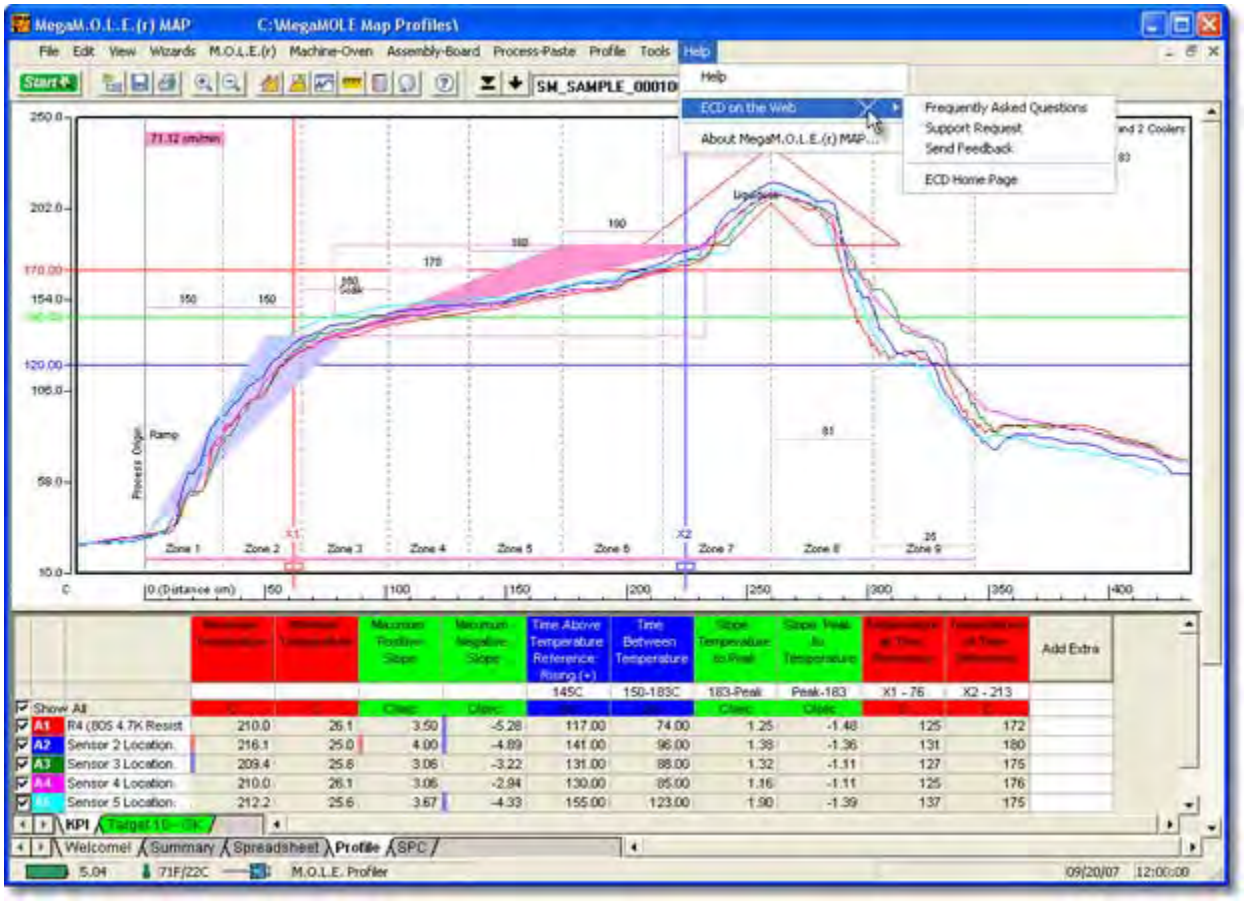
This command can be accessed on the Toolbar and can also be used by pressing the shortcut key [**F1**].

	Help Button

5.5.11.2. ECD on the Web

You can access more help by using ECD web commands. Let us help you by using the linked commands to the ECD Web site.

	This is available when in Engineer Mode.



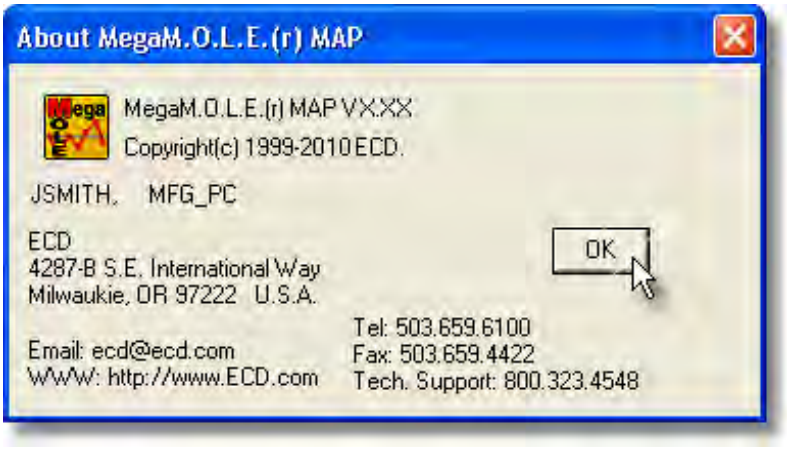
5.5.11.3. About MEGAM.O.L.E.® M.O.L.E.® MAP

The About command displays the software version, release date and company information.

This is available in both Engineer & Verify Modes.

To view About information:

1) On the ***Help*** menu, click ***About M.O.L.E.® MAP.***



6. Optional Accessories

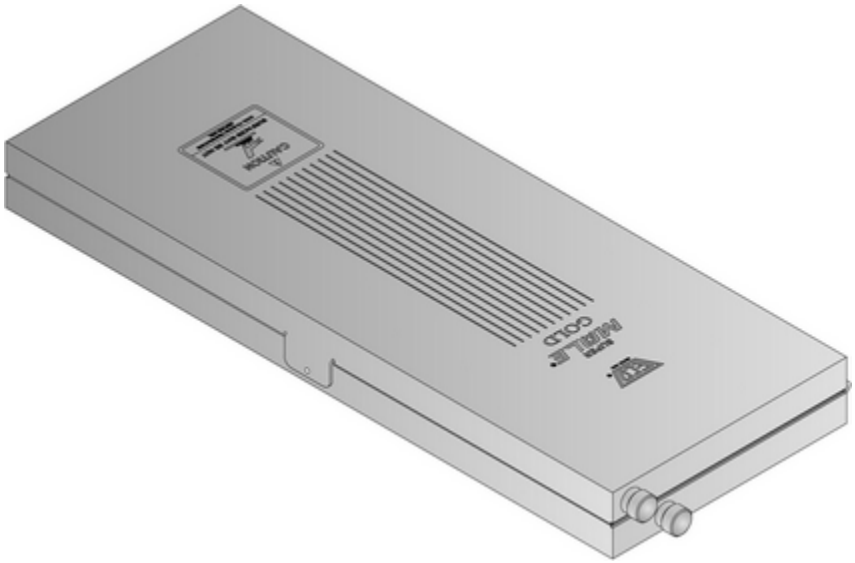
This section covers optional accessories that ECD offers to enhance the use of the M.O.L.E. Profiler. Contact ECD for complete ordering options and current pricing. You can also visit the ECD web site for additional information.

Here is how to contact ECD:

Telephone: (800) 323-4548
(503) 659-6100
FAX: (503) 654-4422
Email: ecd@ecd.com
Internet: http://www.ecd.com

6.1. Thermal Barriers:

The Lead-Free process barriers provide different protection features for the M.O.L.E. Profiler. Refer to the ***Armor Chart*** at the end of this section to determine which is best for your process.



1.0” Uni-barrier

Part Number: E42-0901-80

Dimensions, Inches: 1.0” 4.1” x 10.62”

Dimensions, Millimeters: 25.4 x 104 x 269.7mm

Weight: 1lb 15oz (0.88kg)

1.0" Uni-Barrier w/Yellow Jacket

Part Number: E44-0944-80

Dimensions, Inches: 1.28” x 4.53” x 11.28”

Dimensions, Millimeters: 32.5 x 115 x 286.5 mm

Weight: 2.1lbs (0.95kg)

BB-45 Hinged Hot Box

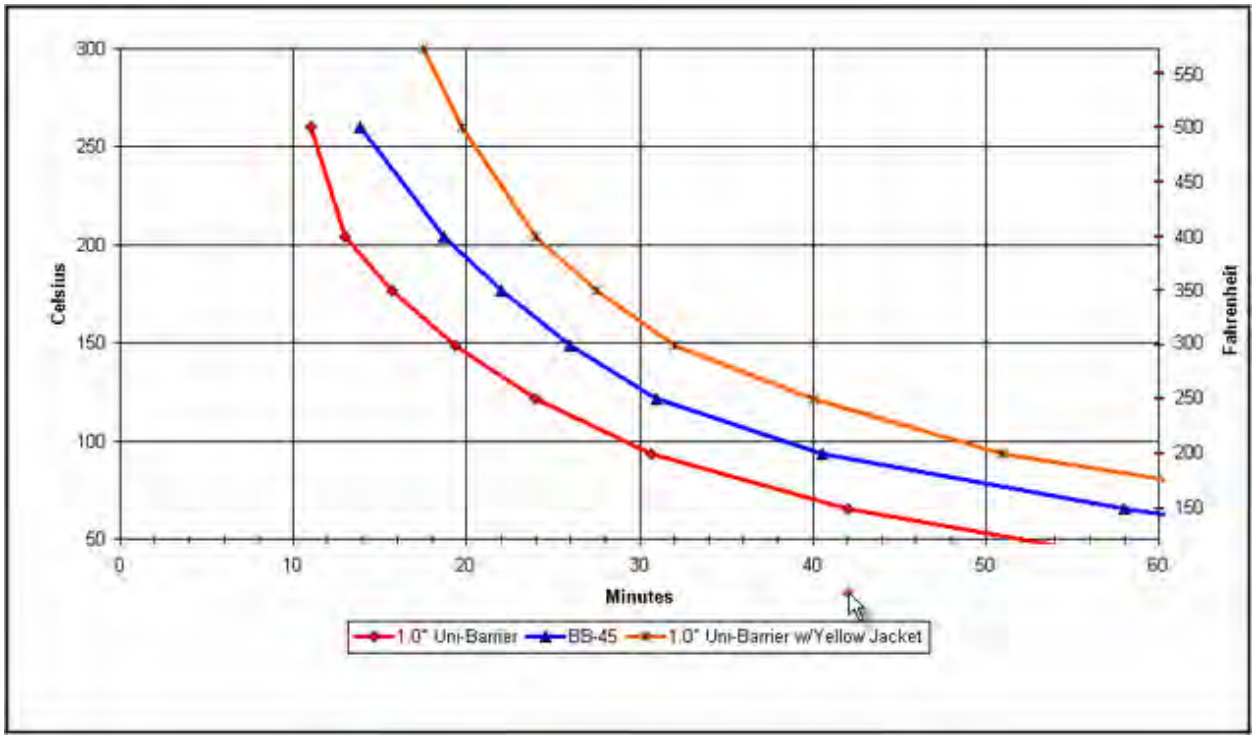
Part Number: E44-4245-80

Dimensions, Inches: 1.75” x 4.6” x 9.9”

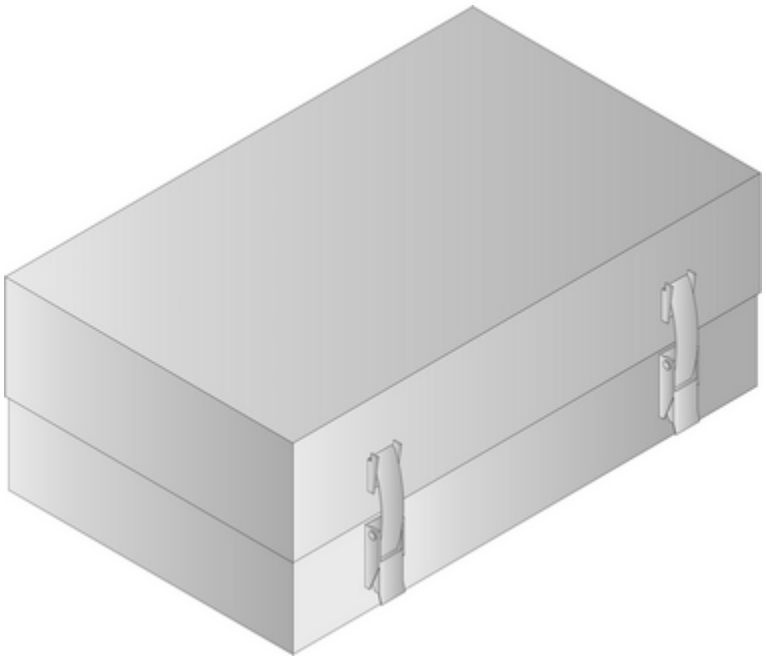
Dimensions, Millimeters: 44.5 x 116.8 x 251.5mm

Weight: 3lbs 9oz (1.62kg)

Lead-Free Process Thermal Barriers - Armor Chart



6.2. Alternate Thermal Barriers:



Super HOT BOX (For 450°F 40 minute oven profiling)

Part Number: E29-2686-90

Dimensions, Inches: 5.25” x 7.9” x 13.0”

Dimensions, Millimeters: 133.4 x 200.7 x 330.2mm

Weight: 11lbs 11oz (5.30kg)

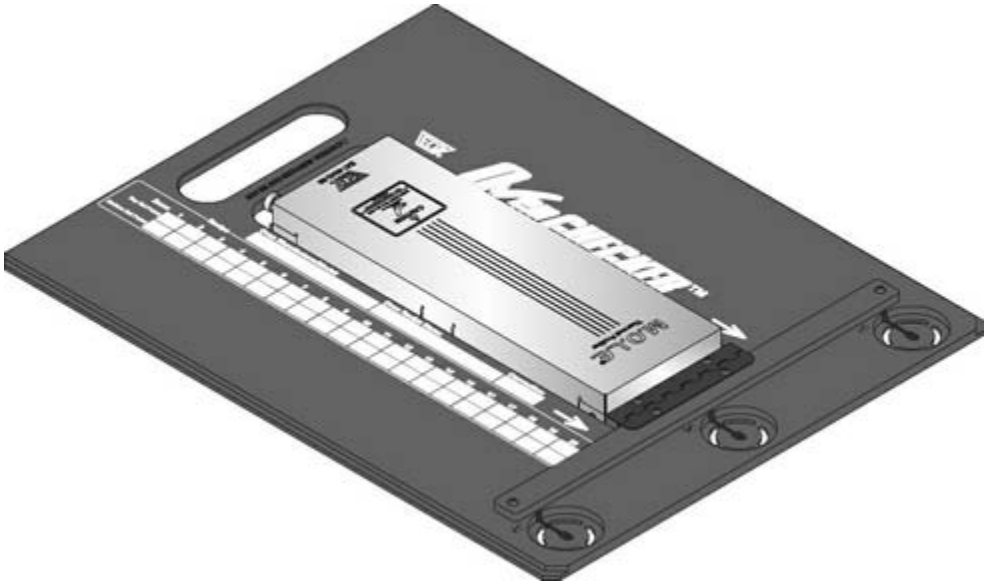
6.3. Products

ECD offers optional products that enable the M.O.L.E. profiler ability to monitor Temperature and Reflow Analysis. This platform approach ensures the longevity of your initial investment giving you great flexibility while minimizing training time. The following section briefly describes the products that can be used in conjunction with the M.O.L.E. Profiler to monitor and document manufacturing processes. Refer to the beginning of this topic for contact information.

OvenCHECKER™ Oven Verification System

More Information

The OvenCHECKER™ Option is exclusively used with the V-M.O.L.E.® profiler and it becomes an oven verification system which is the easiest way known to “Verify” a reflow oven profile. This system allows Engineers-to-Operators “Checking” oven performance immediately.



The long-life pallet is designed for more than 1,000 reflow runs which includes 3 sensors and Thermal Barrier.

ECD-exclusive “OK Button” on the V-M.O.L.E.® makes for quick work of assessing profile to be IN or OUT of specification.

If you…

- Need to verify your oven profile,
- Need to train multiple production operators to profile,
- Need to delegate Go/No-Go decisions to increase your own productivity

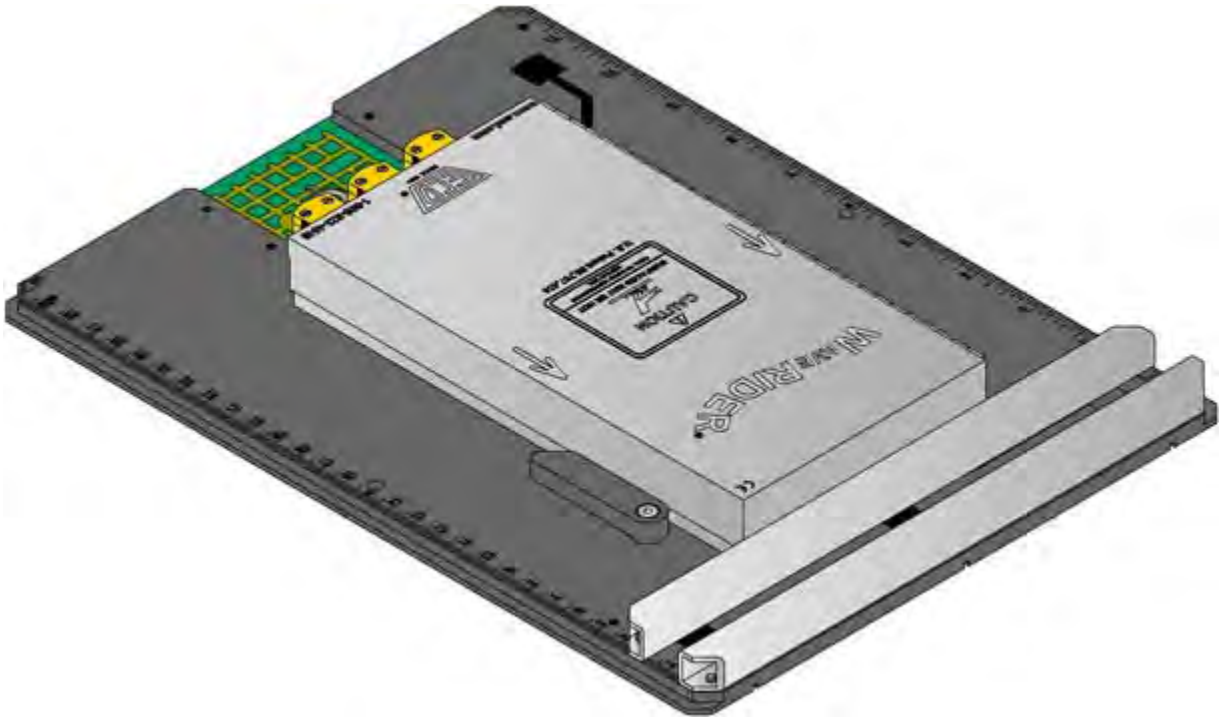
… you need OvenCHECKER™

For use with: V-M.O.L.E.® Thermal Profiler

WaveRIDER® NL 2

More Information

The WaveRIDER® NL 2 is a self-contained system designed to give the user critical data on Wave Solder Machine setup and performance parameters. The WaveRIDER® comes in several standard sizes and is available in custom widths.



Comprehensive SPC software is included featuring:

- X-bar-bar and R SPC Charting
- Measure and track conveyor speed
- Parallelism of the Solder Wave(s)
- Preheat Slopes and Solder depth

For use with: SuperM.O.L.E.® Gold Thermal Profiler

OvenRIDER® NL 2

More Information

The OvenRIDER® NL 2 is designed exclusively for Reflow solder ovens and provides the most accurate, easy-to-use monitoring available. Perform diagnostic checks on an oven process in just minutes with the OvenRIDER®. Reduce scrap and maximize yields through improved process control. The OvenRIDER® comes in several standard sizes and is available in custom widths.

Comprehensive SPC software is included featuring:

- X-bar-bar and R SPC Charting
- Measure and track conveyor speed
- Side to Side thermal evenness and heat flow per zone

For use with: SuperM.O.L.E.® Gold Thermal Profiler

AutoM.O.L.E.® Xpert3

More Information

The AutoM.O.L.E.® Xpert3 saves you from the laborious, time consuming iterations of reflow process development that deprive the oven from manufacturing. Instead, work right at your desk to create a robust lead-free process and oven recipe before actually running a profile. New, flexible oven Signature creation makes Xpert3 compatible with virtually any oven, freeing the program from the confines of machine, PC and software compatibility.

For use with: SuperM.O.L.E.® Gold Thermal Profiler

6.4. Thermocouples & Other

Thermocouples for SuperM.O.L.E.® Gold: (Micro Connector, Type K):

More Information

Insulation	Qty	Color	Wire AWG	Length	Max. Temp.	Part Number
Glass	6	Color-Indexed	36 [.005”/.127mm]	3ft/915mm	900F/482C	E44-0944-85
Glass	6	Color-Indexed	30 [.010”/.254mm]	3ft/915mm	900F/482C	E44-0944-81
Glass	6	Brown	36 [.005”/.127mm]	3ft/915mm	900F/482C	E43-0900-85
Glass	6	Brown	30 [.010”/.254mm]	3ft/915mm	900F/482C	E43-0900-89
Glass	6	Brown	40 [.003”/.076mm]	3ft/915mm	900F/482C	E47-0900-83
PFA	6	Color-Indexed	36 [.005”/.127mm]	3ft/915mm	500F/260C	E43-0900-65
PFA	6	Color-Indexed	30 [.010”/.254mm]	3ft/915mm	500F/260C	E43-0900-61
PFA	6	Color-Indexed	30 [.010”/.254mm]	12ft/3658mm	500F/260C	E44-2253-71
PFA	6	Transparent	36 [.005”/.127mm]	3ft/915mm	500F/260C	E31-0900-65
PFA	6	Transparent	30 [.010”/.254mm]	3ft/915mm	500F/260C	E31-0900-61

PFA	6	Transparent	30 [.010”/.254mm]	6ft/1829mm	500F/260C	E31-0900-62
PFA	6	Transparent	36 [.005”/.127mm]	7ft/2134mm	500F/260C	E31-0900-66
PFA	6	Transparent	30 [.010”/.254mm]	7ft/2134mm	500F/260C	E31-0900-71
SSOB	6	-	24 [.021”/ .533mm]	3ft/915mm	900F/482C	E31-0900-86
SSOB	6	-	24 [.021”/ .533mm]	6ft/1829mm	900F/482C	E31-0900-87

Thermocouple Adaptors & Extension Cables:

	Part Number
Glass 6-Channel Thermocouple Adapter Set [Mini-Micro] 900F/482C	E44-0944-64
PFA 6-Channel Thermocouple Adapter Set [Mini-Micro] 500F/260C	E31-0900-64
Glass 6-Channel K-Type Extension [Mini-Mini], 15ft/ 4572mm 900F/482C	E42-6672-64
Glass 6-Channel K-Type Extension [Mini-Mini], 20ft/ 6096mm 900F/482C	E42-6672-74

Thermocouples for V-M.O.L.E. ® (Miniature Connector, Type K):

More Information

Insulation	Qty	Color	Wire AWG	Length	Max. Temp.	Part Number
Glass	6	Color-Indexed	36 [.005”/.127mm]	3ft/915mm	900F/482C	E47-0248-65
Glass	6	Color-Indexed	30 [.010”/.254mm]	3ft/915mm	900F/482C	E47-0248-61
PFA	6	Color-Indexed	36 [.005”/.127mm]	3ft/915mm	500F/260C	E43-0216-65
PFA	6	Color-Indexed	30 [.010”/.254mm]	3ft/915mm	500F/260C	E43-0216-61
PFA	5	Transparent	36 [.005”/.127mm]	3ft/915mm	500F/260C	Y15-0216-05
PFA	5	Transparent	30 [.010”/.254mm]	3ft/915mm	500F/260C	Y15-0216-10
PFA	5	Transparent	36 [.005”/.127mm]	7ft/2134mm	500F/260C	E29-0180-65
Glass	3	Brown	36 [.005”/.127mm]	3ft/915mm	900F/482C	E48-0509-63
Glass	3	Brown	30 [.010”/.254mm]	3ft/915mm	900F/482C	E48-0509-61
Glass	3	Red/Green/Blue	36 [.005”/.127mm]	3ft/915mm	900F/482C	E48-0509-73
Glass	3	Red/Green/Blue	30 [.010”/.254mm]	3ft/915mm	900F/482C	E48-0509-71
PFA	3	Red/Green/Blue	36 [.005”/.127mm]	3ft/915mm	500F/260C	E48-0509-83
PFA	3	Red/Green/Blue	30 [.010”/.254mm	3ft/915mm	500F/260C	E48-0509-81
Glass	1	Brown	30 [.010”/.254mm]	3ft/915mm	900F/482C	Y15-0224-20
Glass	1	Brown	30 [.010”/.254mm]	15ft/ 4572mm	900F/482C	Y15-0224-30
Glass	1	Brown	30 [.010”/.254mm]	20ft/ 6096mm	900F/482C	Y15-0224-40

Thermocouples for MEGAM.O.L.E.® (Nano Connector, Type K):

	Part Number
*MEGA*M.O.L.E.® 20 Thermocouple Kit	E47-6342-34

Includes: 4 Sets of 5 Glass Color-Indexed 36-gauge [.005”/.127mm], 3ft 900F/482C, Aluminum and Kapton Tape Strips, High Temp Solder & Organizer Sleeves

Insulation	Qty	Color	Wire AWG	Length	Max. Temp.	Part Number
Glass	5	Color-Indexed	36 [.005”/.127mm]	3ft/915mm	900F/482C	E47-6342-85
[For channel banks A & C]						
Glass	5	Color-Indexed	36 [.005”/.127mm]	3ft/915mm	900F/482C	E47-6342-75

[For channel banks B & D]						
Glass	1	Red	36 [.005"/.127mm	3ft/915mm	900F/482C	Y15-6342-15
Glass	1	Blue	36 [.005"/.127mm	3ft/915mm	900F/482C	Y15-6342-25
Glass	1	Green	36 [.005"/.127mm	3ft/915mm	900F/482C	Y15-6342-35
Glass	1	Violet	36 [.005"/.127mm	3ft/915mm	900F/482C	Y15-6342-45
Glass	1	Light Blue	36 [.005"/.127mm	3ft/915mm	900F/482C	Y15-6342-55

Thermal Protective Enclosures for SuperM.O.L.E.® Gold, SuperM.O.L.E.® Gold 2 & RF Option:

	Dimensions	Part Number
1" Uni-Barrier	1.0 x 4.2 x 10.5"	E42-0901-80
Yellow Jacket [for Uni-Barrier or 1" Super Survivor]	1.28 x 4.52 x 11.27"	E44-7435-80
1" Uni-Barrier with Yellow Jacket	1.28 x 4.52 x 11.27"	E44-0944-80
SuperM.O.L.E. Boot	1.3 x 5.2 x 9.7"	M30-0200-70
BB-45	1.75 x 4.6 x 9.9"	E44-4245-80
Super Hot Box	5.25 x 7.9 x 13.0"	E29-2686-90

Thermal Protective Enclosures for MEGAM.O.L.E.® & V-M.O.L.E.®:

	Dimensions	Part Number
M.O.L.E. Thermal Barrier (stainless steel)		E47-6342-80
M.O.L.E. Yellow Jacket Thermal Barrier Cover		E47-6342-70

Accessories and Value Added Options SuperM.O.L.E.® Gold, SuperM.O.L.E.® Gold 2:

	Part Number
Lead-Free Upgrade Kit-Hardware that makes your Gold Lead-Free Compatible	E44-0944-05
For those with an older version of the SuperM.O.L.E. Gold profiling kit.	
Includes: 1" Uni-Barrier, Yellow Jacket and 5 & 10-mil sets of color indexed glass thermocouples	
Xpert Desktop Download/Charging Station	E40-2875-52
Power Pack Charger, 110V	E31-0900-25
Power Pack Charger, 220V	E31-0900-21
SuperM.O.L.E. Gold Rechargeable Power Pack - RoHS Compliant	E45-7647-30
SuperM.O.L.E. Gold Calendar/Clock Battery	F30-0041-00
SuperM.O.L.E. Gold Pogo Pin [for RF and Xpert dock charging use]	J01-6016-00
SuperM.O.L.E. Gold to PC Interface Cable	Y20-2848-04
USB/RS-232 Serial Adapter	Y23-7782-10
VaporWATCH Humidity Sensor	E44-7423-00
*MEGA*M.O.L.E. MAP Software (includes CD & Quick Ref Guide)	E47-6342-32
Extended M.O.L.E. warranty; 1 year, includes 1 calibration	A10-0900-00

Accessories and Value Added Options MEGAM.O.L.E.® & V-M.O.L.E.®:

	Part Number
*MEGA*M.O.L.E. Rechargeable Power Pack Battery	E47-6342-30
*MEGA*M.O.L.E. 20 nano-mini 20-channel adapter	E47-6342-74
*MEGA*M.O.L.E./V-M.O.L.E. PC USB 2.0 Cable	E47-6342-10
*MEGA*M.O.L.E./V-M.O.L.E. Battery Charger	E47-6342-20
*MEGA*M.O.L.E. MAP Software (includes CD & Quick Ref Guide)	E47-6342-32
Extended M.O.L.E. warranty; 1 year, includes 1 calibration	A10-0900-00

Miscellaneous Accessories:

Micro Connector Thermocouple Organizer w/screw lock	M45-0900-60
Micro Thermocouple Connector Set (6 connectors)	E31-0900-60

Micro Thermocouple Connector each (1 connector)	E31-0900-68
Micro Connector Socket, green pin	J31-0252-10
Micro Connector Socket, white pin	J31-0252-15
Micro Thermocouple Connector Crimping Tool	Y25-0312-10
Nano Thermocouple Connector Kit (2 connectors)	E47-6342-68
Nano Thermocouple #0 Phillips Head Screwdriver	G10-0128-10
1 inch Aluminum Tape Roll, 15 feet	G10-7594-18
Aluminum Tape Strips, .50 inch x 1 inch, 10 pieces total	M30-2686-74
Hi Temp Solder, SN10, 6 feet	G10-0041-00
Polyimide Film Tape, 108 feet, 5/8" Kapton	G10-0021-00
Polyimide Tape Strips, 20 pieces total	M30-2686-64
Adhesive Spray Accelerator	G10-0108-00
Clear Instant Adhesive	G10-0107-00

7. Service and Troubleshooting

7.1. General Service Information

This section covers maintaining and troubleshooting a M.O.L.E., Thermocouples, Power Pack, Software, Wiring, and other parts of the system.

The following service and calibration instructions are for use by qualified personnel only. Refer to the ***Safety>Operators Safety Information*** prior to performing any service.

Service Troubleshooting:

Decide if the problem is with the M.O.L.E. Profiler Hardware, Communications, or Software.

- If the problem occurs while attempting to log data, the Hardware may be faulty.
- If the problem occurs while attempting to communicate between M.O.L.E. Profiler and the computer, the Communications links may be faulty.
- If the problem occurs while attempting to use a software function, the software may be faulty.

Once it has been determined what item is causing the problem, refer to the appropriate service section. Start at the top of the list and work your way down. If the problem is still unresolved go to ***Service>How to Get Additional Help***.

7.2. SuperM.O.L.E.® Gold

This section describes problems that can occur with M.O.L.E. Profiler hardware.

Hardware Problems:

Wrong or erratic temperature readings:

- **Open or intermittent thermocouple, cable, or connector:** Individual channels being detected as “Open” on the profile plot will indicate this. Check thermocouple wires and insulation. Also, check the connectors visually for damage or loose connections. Tighten all the connections and check with an ohmmeter or millivolt meter if available or substitute a thermocouple that you know works properly.
- **Shorted thermocouple, cable, or connector:** This is harder to find. A shorted thermocouple connector or cable creates a new thermocouple junction at the location of the short; therefore, actual temperatures are recorded, but not the ones desired. If the short is intermittent, the recorded temperatures may jump between that of the thermocouple and that of the shorted location. Visually check for shorts inside of connectors and for damaged insulation on the wires. Repair or replace any suspicious components.
- **Wrong type thermocouple, connector, or wire:** Wrong thermocouple types will give consistently wrong readings, either always high or always low. Wrong connectors or wrong wire types (used as an extension) create extra thermocouple junctions and uncontrolled temperature offsets. Use only Type K thermocouple wires, and connectors.
- **Thermocouple connector wired backwards:** Typically causes high temperatures to read as negative (e.g., -150°F.). Should be Yellow=Ch, Red=Al.
- **Low Power Pack charge:** Charge the Power Pack.
- **Conductive contamination inside the M.O.L.E. Profiler or I/O Module:** Although unlikely, this is known to cause “spikes” (abrupt jumps in value) in the recorded temperatures. Other kinds of errors are also possible.
- **Incorrect calibration:** If the recorded temperatures for all of the active channels are wrong in the same direction (e.g., all too high), then possibly the M.O.L.E. Profiler has incorrect calibration. Refer to Calibration Information for cautions and procedures, or return the M.O.L.E. Profiler to ECD for re-calibration.
- **Internal temperature effects:** If the M.O.L.E. Profiler and it's components has been subjected to an internal temperature in excess of the published specifications. Temperatures outside the specified operating range may cause incorrect readings and shorten Power Pack battery life. **Internal temperatures in excess of the absolute maximum warranteed internal temperature may cause permanent, irreparable damage to your M.O.L.E. Profiler.**
- **M.O.L.E. Profiler never turns on, but the software can read and write the hardware configuration:** The start button is possibly defective, return to ECD for service.
- **SuperM.O.L.E.® Gold LED stays on steady (no flashing) when power pack is replaced:**

1) Try a fully charged Power Pack.
2) For MEGAM.O.L.E.® and SuperM.O.L.E.® Gold try removing the Power Pack waiting a minute before plugging it in again. If the problem is still there, the start switch is probably damaged. Contact ECD to request an RMA (Return Merchandise Authorization) to return the M.O.L.E. Profiler for service. Refer to Service>How to Get Additional Help for contact information.

- **The SuperM.O.L.E.® Gold Profiler clock resets itself: Calendar/clock battery discharged:** Replace the calendar/clock battery.

7.2.1. Communications Problems

“SuperM.O.L.E.® Gold not responding” error message:

- Try triggering the M.O.L.E. Profiler with the switch. (Doing this will erase the data in memory so do this as a last resort). If you cannot get the light to flash, you have a hardware problem with the M.O.L.E. Profiler itself.

If you can activate the SuperM.O.L.E.® Gold with the switch, check for the following:

- **Wrong computer port:** Cable must be connected to which is selected using the Configuration command in the M.O.L.E.® MAP Software.
- **Conflicting use of COM port:** Perhaps some other software, such as a mouse driver, communications programs, or PDA is trying to use the COM Port.
- **Computer Interface cable defective:** Order spare or replacement cables from ECD, refer to ***Service>How to Get Additional Help*** for contact information.

7.2.2. Calibration Information

Because the SuperM.O.L.E.® Gold Profiler is made with precision components with high temperature stability and tight tolerances; the analog-to-digital converter remains stable for years. High quality components together with software algorithms based on the IPTS-68* standard for Type K thermocouples have been provided to yield specified accuracy and long-term stability. Each unit has been tested at the factory before it is shipped.

ECD recommends the M.O.L.E. profiler is factory re-calibrated every 6 months when it is being used constantly. If the use is occasional, a period of no greater than 12 months between calibrations is recommended.

Depending on use, however, temperature accuracy should be periodically verified using a suitable temperature standard. Any observed inaccuracies are probably not caused by calibration error but by any one of a number of other sources, primarily the following:

1) Poor thermocouple connectors or open thermocouples.
2) Using a temperature standard that is inaccurate or is not traceable to the National Institute of Standards and Technology (NIST, formerly the Nation Bureau of Standards).

- Check the accuracy of your temperature standard and that it is traceable to NIST. Be sure that you’re using Type K wire connected to the standard. Be sure that your temperature standard is cold-junction compensated, or use an ice point reference.

3) Extremely low Power Pack charge.

- Recharge the Power Pack. Refer to topic ***Basics>Setup>Charging the Power Pack Battery***.

4) Sudden changes or excessive ambient temperatures.

- Allow M.O.L.E. profiler temperature to stabilize for 1/2 hour before calibration.

If after checking these possible sources of inaccuracy the M.O.L.E. profiler still needs to be calibrated, there are two calibration methods: Using a thermocouple simulator and another using a voltage reference and an ice point.

> Do not attempt to calibrate the M.O.L.E. profiler if you have never used a thermocouple simulator, or you are unsure of the accuracy of your thermocouple simulator. (Contact ECD for the proper calibration procedure P/N A31-0900-05).

If you need to return the M.O.L.E. profiler for re-calibration, contact ECD and request an RMA (Return Merchandise Authorization). Refer to topic ***Service>How to Get Additional Help*** for contact information.

IPTS-68 (International Practical Temperature Scale of 1968)

7.2.3. Changing the Calendar/Clock Battery

If the clock is resetting itself, it may be necessary to replace the calendar/clock battery. (Note that changing this battery resets the hardware configuration parameters stored in the M.O.L.E. Profiler)

Change the battery as follows:

1) Remove the Power Pack battery by separating the unit. This exposes the clock battery.

2) Pull the tab to remove the old battery.
3) Insert a new 3V Lithium battery (ECD P/N F30-0041-00), making sure it is oriented as pictured on the M.O.L.E. Profiler and making sure the tab is tucked in behind the battery.
4) To help prolong clock battery life, the Power Pack should be replaced so power is not drawing off the Calendar/Clock battery. The Activity LED blinks rapidly for two seconds when the Power Pack is first reconnected indicating complete reset has occurred.
5) Start and then stop the M.O.L.E. Profiler to clear the memory.
6) Reconfigure the M.O.L.E. Profiler Refer to ***Basics>Setup>Communications Setup*** for more information).

7.2.4. Constructing a Thermocouple

The following procedures describe how to construct a thermocouple and a shorting plug.

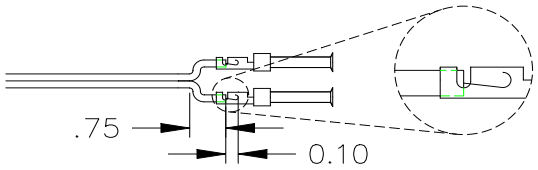
Thermocouple construction:

The following items will be needed to construct a Thermocouple:

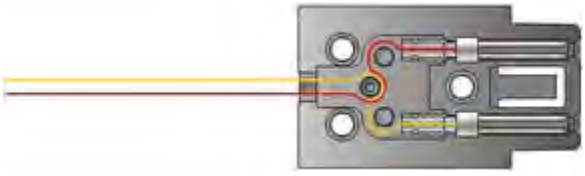
- Thermocouple assembly which includes: 1 Thermocouple housing, 3 Hardware Screws and 2 female pins (one marked with a green dot and one marked with a white dot).
- A Thermocouple consisting of one yellow and one red wire. (Maximum T/C wire size 24 gauge).
- Thermocouple crimping tool
- Phillips (Crosshead) Screwdriver

Construct a thermocouple as follows:

1) Disassemble the Thermocouple housing by unscrewing the 3 Hardware screws.
2) Separate the wires on the stripped lead end (opposite junction end) about ¾".
3) Prep the Red (-) T/C wire stripping the wire casing about 0.10" and curling the bare wire into a U-shape. Place it into the T/C pin with the green dot and crimp with the T/C crimping tool. Make sure that the wire covering is clear through the first set of shoulders and crimped by them. Also, be sure that only wire is crimped by the second shoulders.



4) Repeat Step 3 for the Yellow (+) wire by placing it into the T/C pin with the white dot.
5) Place the female pins in the bottom (smaller) half of the Thermocouple housing. Be careful to place the pins in the proper pin location.



6) Wrap the red and yellow wires around the strain relief posts as shown in the Figure above.

7) Carefully place the two halves of the Thermocouple housing together. Verify that the wires are not pinched and that the pin and wire positions are correct.

8) Replace the 3 Hardware screws.

Shorting plug construction

If fewer than six sensors are used in your application, a shorting plug may be used for each of the unused M.O.L.E. Profiler channels.

The following items will be needed to construct a Thermocouple:

- Thermocouple assembly, which includes: Thermocouple housing, 3 Hardware Screws and 2 female pins (one marked with a green dot and one marked with a white dot).
- A 1" bare copper buss wire. (Maximum wire size 24 gauge).
- Thermocouple crimping tool.
- Phillips (Crosshead) Screwdriver

Construct a shorting plug as follows:

1) Disassemble the Thermocouple housing by unscrewing the 3 Hardware screws.
2) Place one end of the copper wire into the T/C pin with the green dot and the other end into the T/C pin with the white dot. Now crimp both pins with the T/C crimping tool
3) Place the female pins in the bottom (smaller) half of the Thermocouple housing. Be careful to place the pins in the proper pin locations as shown in the Figure below.
4) Carefully place the two halves of the Thermocouple housing together. Verify that the wire is not pinched and that the pin positions are correct.

5) Replace the 3 Hardware screws.

7.3. SuperM.O.L.E.® Gold 2

This section describes problems that can occur with M.O.L.E. Profiler hardware.

Hardware Problems:

Wrong or erratic temperature readings:

- **Open or intermittent thermocouple, cable, or connector:** Individual channels being detected as “Open” on the profile plot will indicate this. Check thermocouple wires and insulation. Also, check the connectors visually for damage or loose connections. Tighten all the connections and check with an ohmmeter or millivolt meter if available or substitute a thermocouple that you know works properly.
- **Shorted thermocouple, cable, or connector:** This is harder to find. A shorted thermocouple connector or cable creates a new thermocouple junction at the location of the short; therefore, actual temperatures are recorded, but not the ones desired. If the short is intermittent, the recorded temperatures may jump between that of the thermocouple and that of the shorted location. Visually check for shorts inside of connectors and for damaged insulation on the wires. Repair or replace any suspicious components.
- **Wrong type thermocouple, connector, or wire:** Wrong thermocouple types will give consistently wrong readings, either always high or always low. Wrong connectors or wrong wire types (used as an extension) create extra thermocouple junctions and uncontrolled temperature offsets. Use only Type K thermocouple wires, and connectors.
- **Thermocouple connector wired backwards:** Typically causes high temperatures to read as negative (e.g., -150°F.). Should be Yellow=Ch, Red=Al.
- **Low Power Pack charge:** Charge the Power Pack.
- **Conductive contamination inside the M.O.L.E. Profiler or I/O Module:** Although unlikely, this is known to cause “spikes” (abrupt jumps in value) in the recorded temperatures. Other kinds of errors are also possible.

- **Incorrect calibration:** If the recorded temperatures for all of the active channels are wrong in the same direction (e.g., all too high), then possibly the M.O.L.E. Profiler has incorrect calibration. Refer to Calibration Information for cautions and procedures, or return the M.O.L.E. Profiler to ECD for re-calibration.
- **Internal temperature effects:** If the M.O.L.E. Profiler and it's components has been subjected to an internal temperature in excess of the published specifications. Temperatures outside the specified operating range may cause incorrect readings and shorten Power Pack battery life. **Internal temperatures in excess of the absolute maximum warranteed internal temperature may cause permanent, irreparable damage to your M.O.L.E. Profiler.**
- **M.O.L.E. Profiler never turns on, but the software can read and write the hardware configuration:** The start button is possibly defective, return to ECD for service.
- **SuperM.O.L.E.® Gold LED stays on steady (no flashing) when power pack is replaced:**

1) Try a fully charged Power Pack.
2) For MEGAM.O.L.E.® and SuperM.O.L.E.® Gold try removing the Power Pack waiting a minute before plugging it in again. If the problem is still there, the start switch is probably damaged. Contact ECD to request an RMA (Return Merchandise Authorization) to return the M.O.L.E. Profiler for service. Refer to Service>How to Get Additional Help for contact information.

- **The SuperM.O.L.E.® Gold Profiler clock resets itself: Calendar/clock battery discharged:** Replace the calendar/clock battery.

7.3.1. Communications Problems

"Instrument not responding" error message:

- Try triggering the M.O.L.E. Profiler with the switch. If you cannot get the light to flash, you have a hardware problem with the M.O.L.E. Profiler itself.

If you can activate the M.O.L.E. profiler with the switch, check for the following:

- **Wrong computer Communication Port:** Cable must be connected to which is selected using the ***Select Instruments*** command in the software.
- **Conflicting use of COM Port:** Perhaps some other software, such as a mouse driver, communications programs, or PDA is trying to use the same COM Port.
- **Computer Interface cable defective:** Order spare or replacement cables from ECD, refer to ***Service>How to Get Additional Help*** for contact information.

The software appears to be locked up when trying to communicate with the M.O.L.E. Profiler:

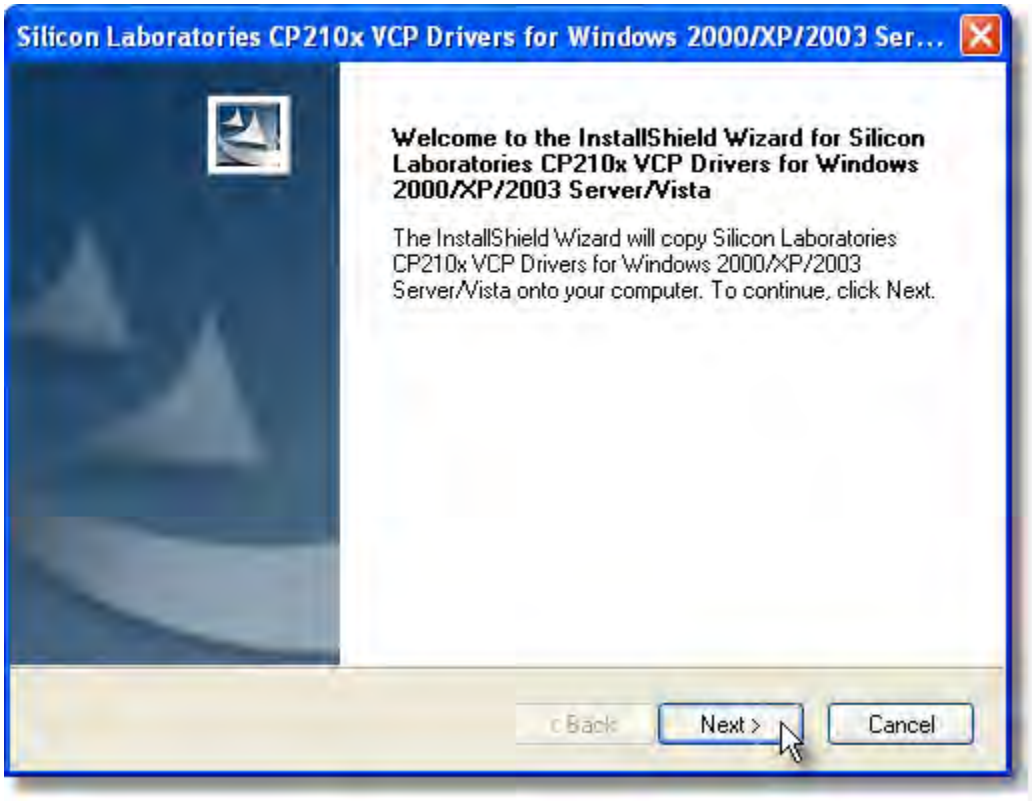
- The USB driver may be faulty. Refer to USB Driver information for your M.O.L.E. Profiler.
-
-
- ***USB Driver - SuperM.O.L.E.® Gold 2***

7.3.1.1. USB Driver

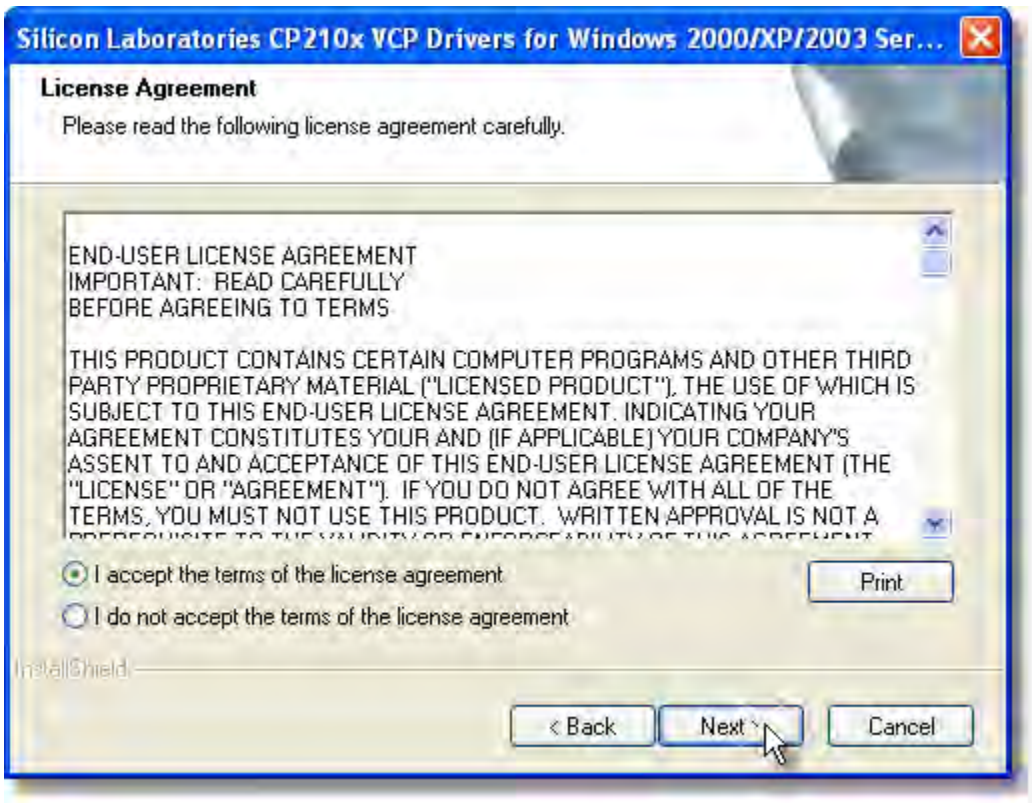
If the installed USB driver for the M.O.L.E.® Profiler is lower than version 5.3.0, it is recommended that it is updated using the following procedure.

Update USB drivers:

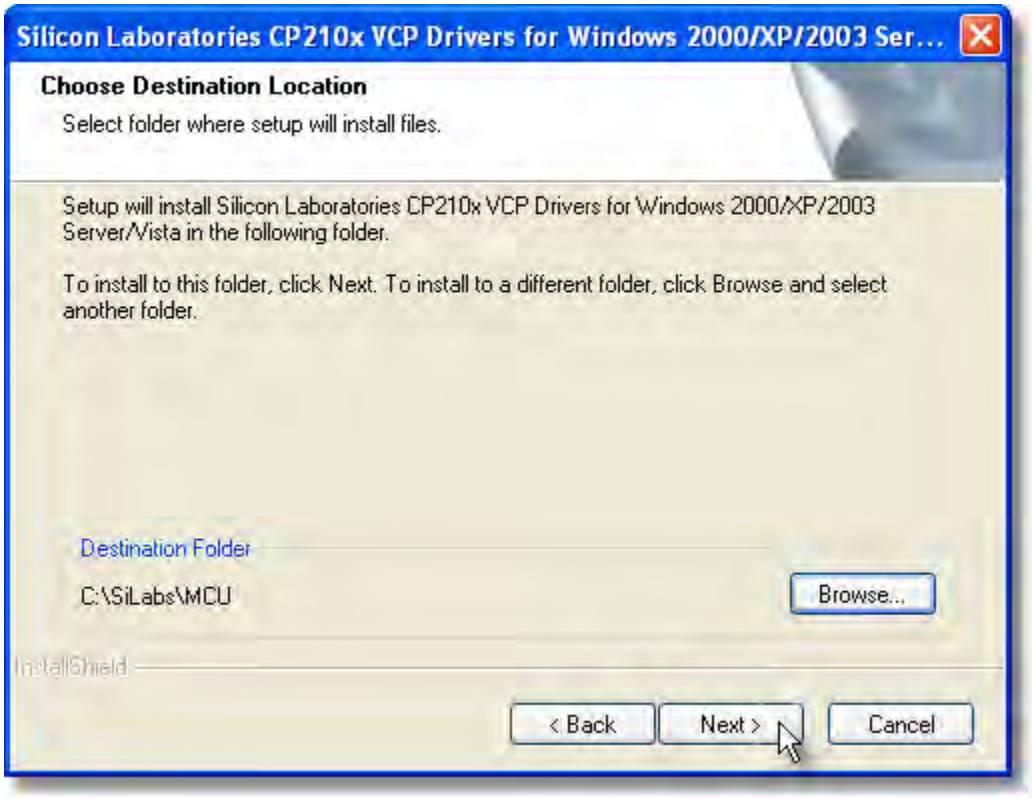
1) Run the driver installation file ***"CP210x_VCP_Win2K_XP_S2K3.exe"*** located in folder: ***\ECD\MegaMoleMAP\utility***.
2) Follow the InstallShield wizard steps.



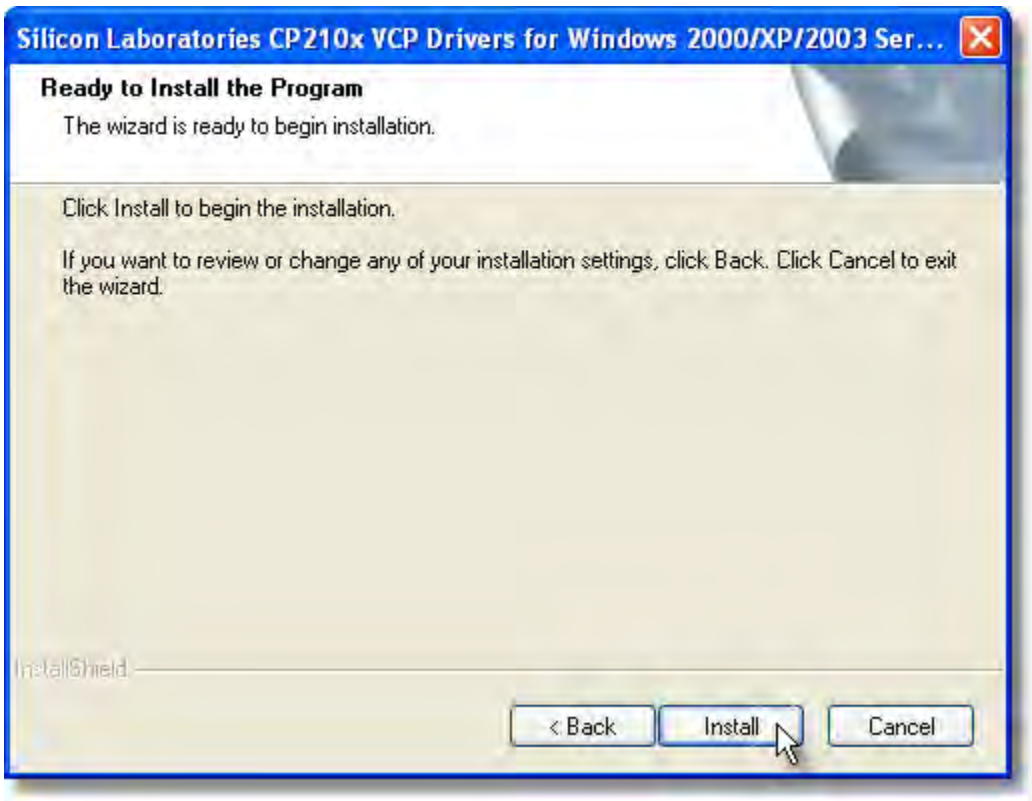
3) Click the ***Next*** command button.



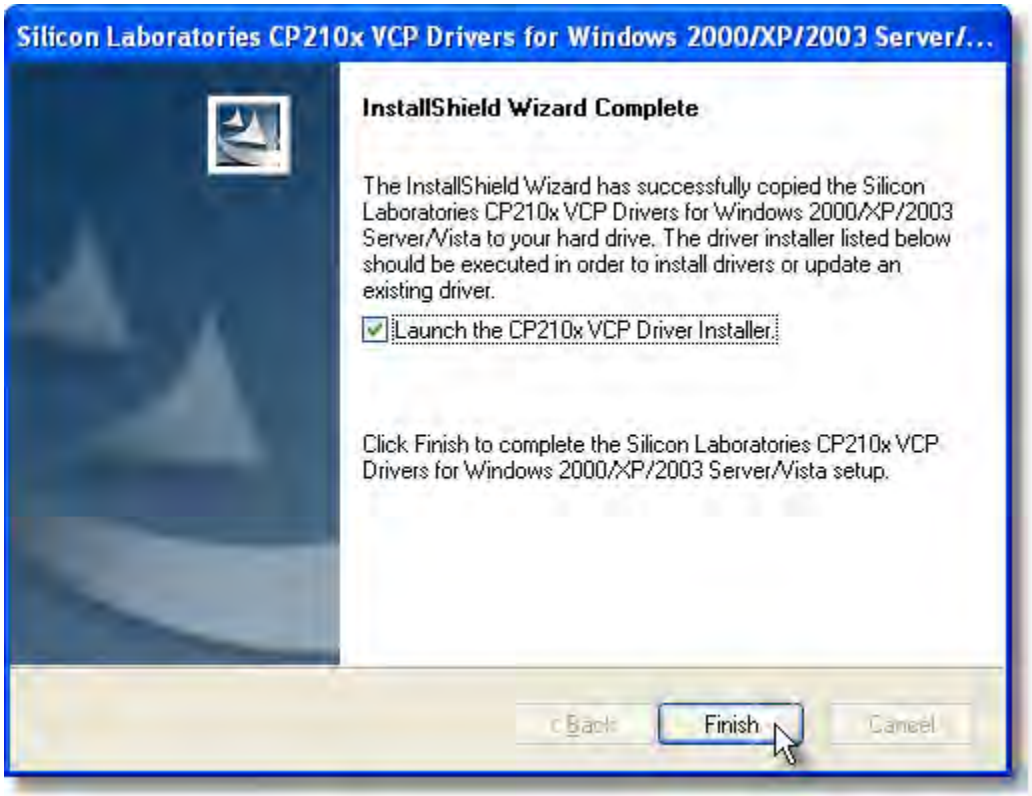
4) Select the ***Accept*** radio button then click the ***Next*** command button.



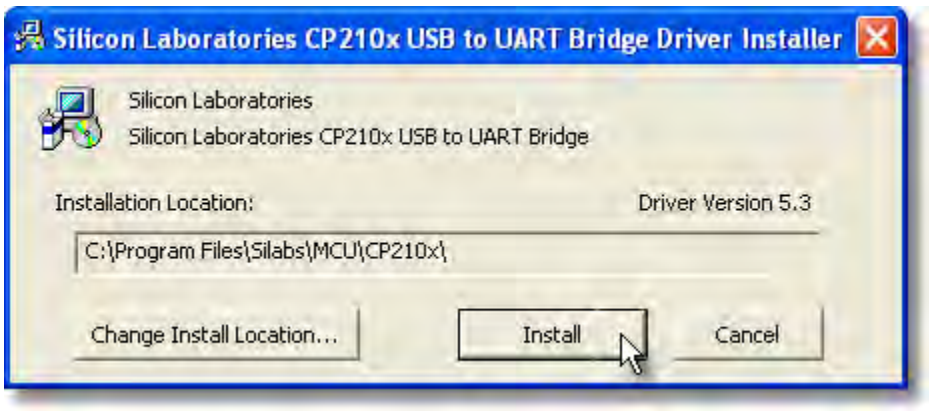
5) Click the ***Next*** command button to accept the installation folder.



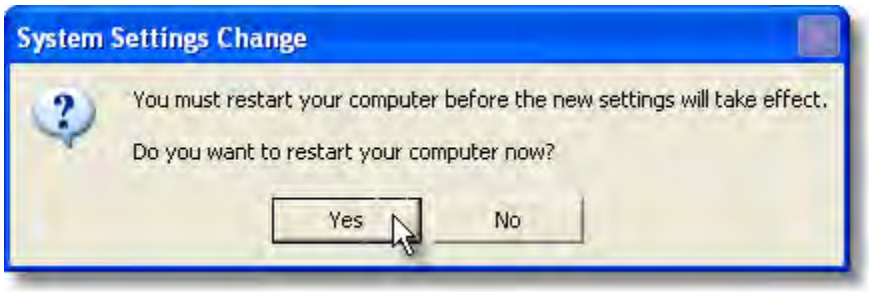
6) Click the ***Install*** command button to start the installation.



7) Select the ***Launch*** checkbox and then click the ***Finish*** command button.



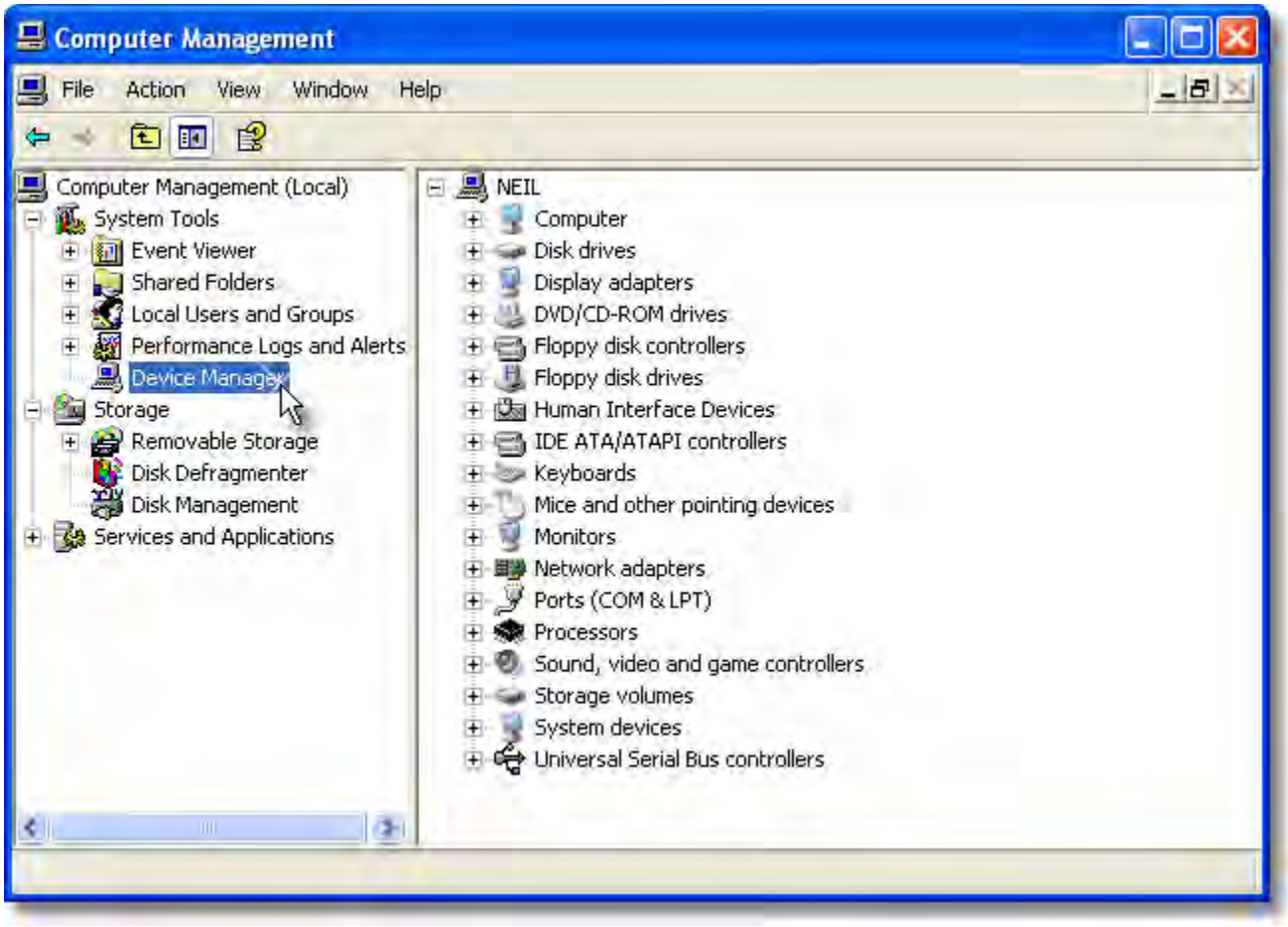
8) Click the ***Install*** command button.



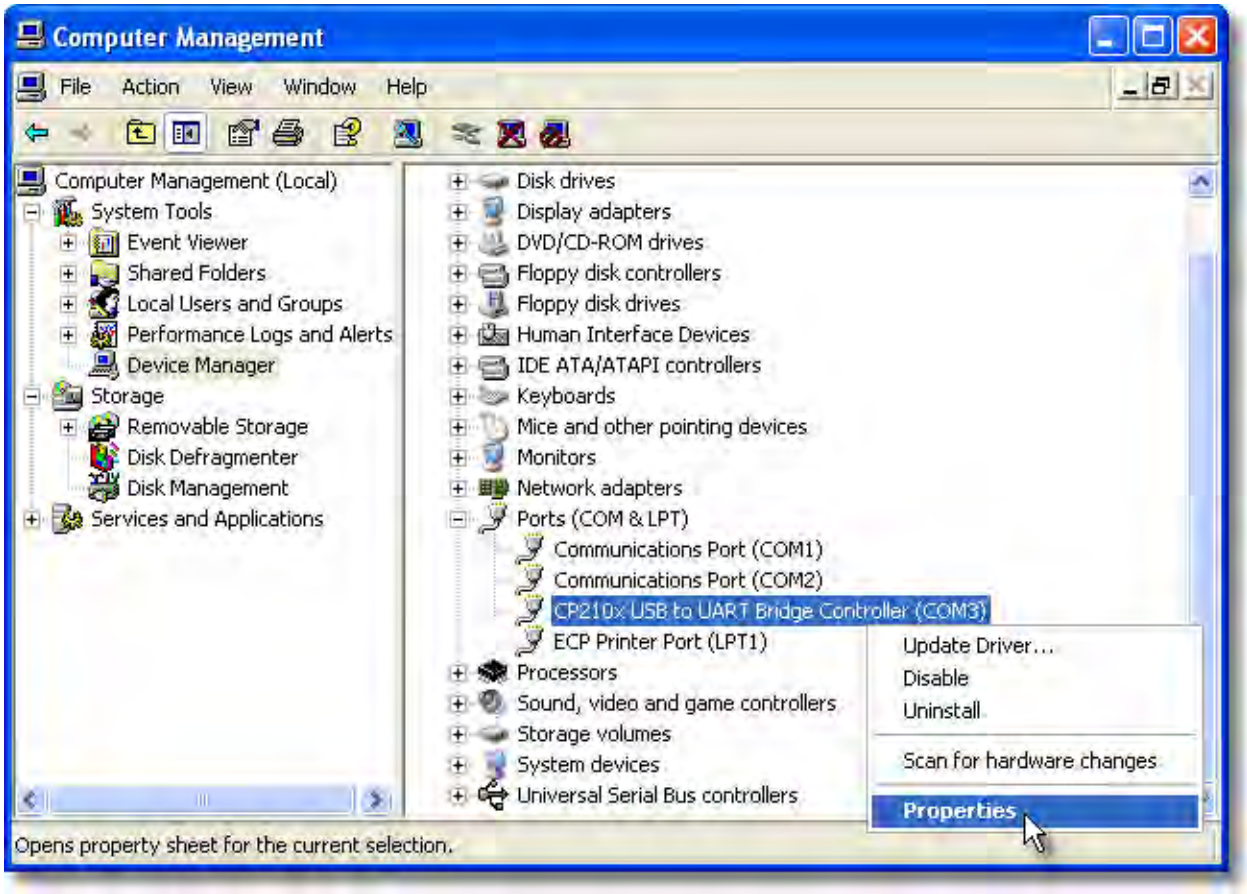
9) Restart the computer.

10) Once the computer has restarted, insert the USB computer interface cable into the Data/Charging Port.

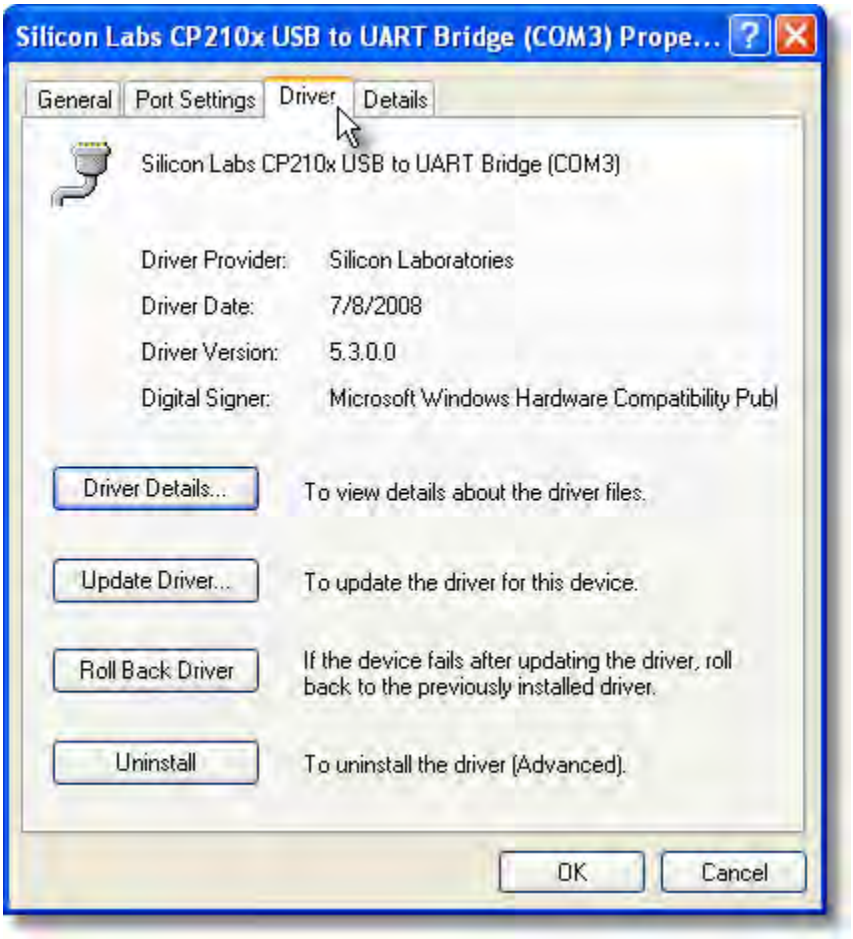
11) Launch the ***Device Manager***. To access, right-click ***My Computer***, click ***Manage***, and then click ***Device Manager***.



12) Check the driver version by selecting ***Ports***, right-click ***CP210x USB to UART Bridge Controller*** then ***Properties***.



13) Once the driver property manager is displayed, select the ***Driver*** tab. If the driver version is **5.3.0** or greater, the USB driver has been properly updated.



7.3.2. MEGAM.O.L.E.® Series Thermal Profilers

*MEGA*M.O.L.E.® Series Thermal Profilers

Calibration Procedure

For *MEGA*M.O.L.E.® 20, V-M.O.L.E.® & SuperM.O.L.E.® Gold 2

SINCE 1964

ECD, Inc.
4287-B S.E. International Way
Milwaukie, Oregon 97222-8825
Telephone: (800) 323-4548
FAX: (503) 659-4422
Technical Support: (800) 323-4548
Email: ecd@ecd.com
Internet: http://www.ecd.com

7.3.3. Calibration Information

Because the M.O.L.E.® Thermal Profiler is made with precision components with high temperature stability and tight tolerances, the analog-to-digital converter remains stable for years. High quality components together with software algorithms based on the **IPTS-90*** standard for **Type K** thermocouples have been provided to yield the specified accuracy and long-term stability. Each unit has been tested at the factory before it is shipped.

ECD recommends the M.O.L.E.® Thermal Profiler is factory re-calibrated every 6 months when it is being used constantly. If the use is occasional, a period of no greater than 12 months between calibrations is recommended.

Good thermal quality programs require periodic calibration to show the Thermal Profiler continues to remain in calibration using a temperature standard. Any observed inaccuracies are probably not caused by calibration error but by any one of a number of other sources, primarily the following:

1. Poor thermocouple connections or open thermocouples.
2. Using a standard that is inaccurate or one not traceable to the National Institute of Standards and Technology.
   - Check the accuracy of your standard and that it is traceable to NIST. Be sure that you're using **Type K** special limits of error wire connected to the standard. Be sure that your standard is cold-junction compensated, or use an ice-point reference.
   - Make sure that IPTS-90 tables are being used.
3. Extremely low Power Pack charge.
   - Recharge the Power Pack. Refer to M.O.L.E.® MAP User Help System for details.
4. Sudden changes in ambient temperature.

- Allow the M.O.L.E.® Thermal Profiler to stabilize for 1/2 hour before calibration.

If after checking these possible sources of inaccuracy and the M.O.L.E.® Thermal Profiler still needs to be calibrated, proceed as directed.

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* **IPTS-90 - International Practical Temperature Scale of 1990**

7.3.3.1. Equipment Required

Equipment Required:

1. Voltage reference and an ice point reference.
    - Resolution: 1µV or better
    - Accuracy: 5µV or better
    - Output Imp: =10ohms

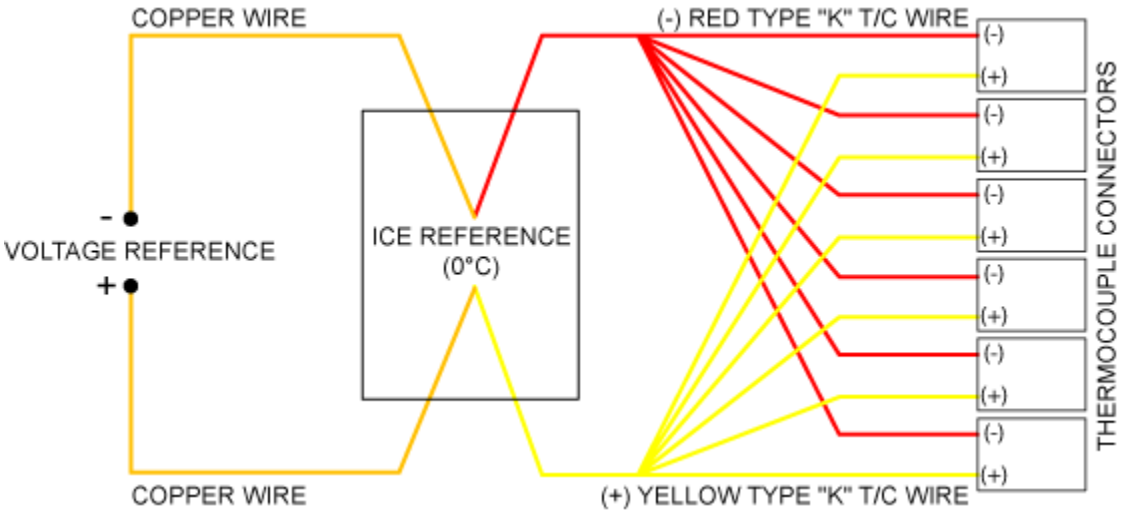
    ---------- ***OR*** ----------

    Thermocouple Simulator
    - Resolution: 0.1°C
    - Accuracy: 0.25°C
    - Output Imp: =10ohms
2. Thermocouple harness (special limits of error)
3. Thermal Isolation Box (Thermal Barrier)
4. Thermocouple Simulator software program
    - Hyperterminal (Windows)
5. USB computer interface cable

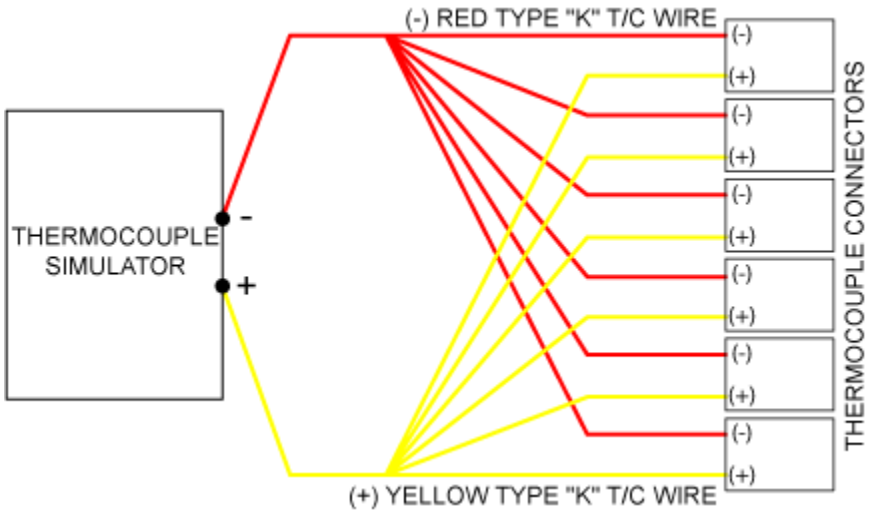
7.3.3.2. Setup

The equipment you use for the calibration determines the setup procedure. The number of thermocouples vary depending on the M.O.L.E.® Thermal Profiler. These examples display the use of 6 channels.

Voltage reference and ice point reference:



Thermocouple Simulator:



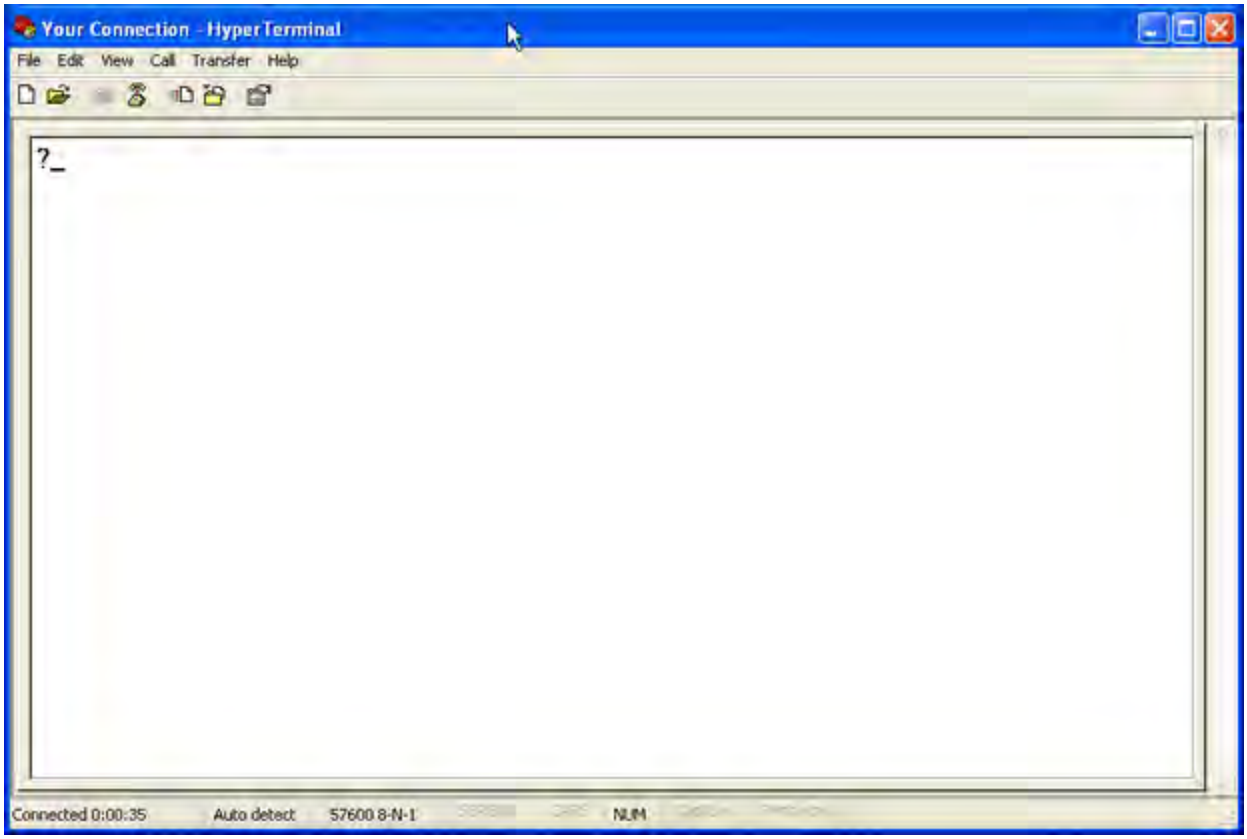
7.3.3.3. Procedure

1. Connect the M.O.L.E.® Thermal Profiler to calibration standard.
2. Connect the M.O.L.E.® to a USB port with the USB computer interface cable.
3. Insert the M.O.L.E.® into the Thermal Isolation Box.
4. Start Hyperterminal.
5. Enter any ***Name*** for the Connection Description.

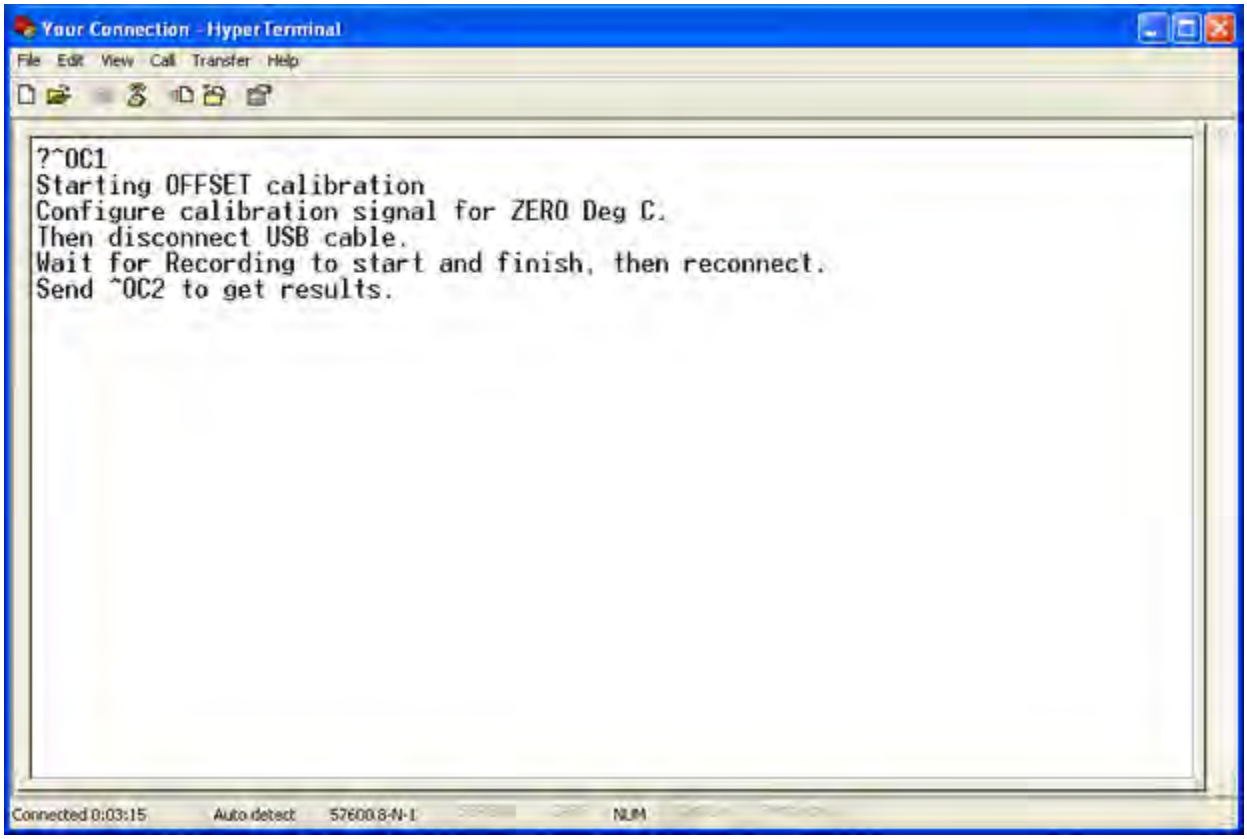
6. Select the COM port number that the operating system assigned to the USB port that the M.O.L.E.® is connected to. The ***Connect Using*** drop down list displays all of the available COM ports so it may require a few attempts to determine the correct port.

7. Enter the COM Port Properties as shown.

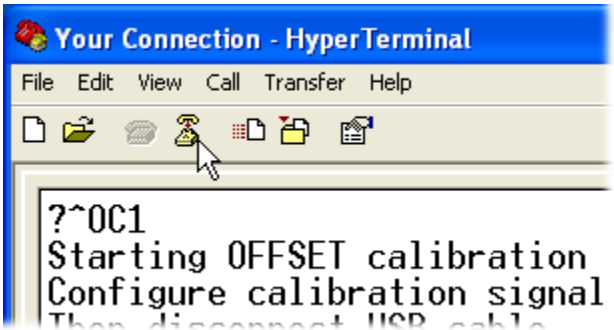
8. When finished select the ***OK*** command button and Hyperterminal displays a blank screen to enter commands directly to the M.O.L.E.®.
9. Hit ***Enter*** to display a "***?***_". If Hyperterminal does not display a "***?***_", that means the correct COM Port was not selected in Step 7.



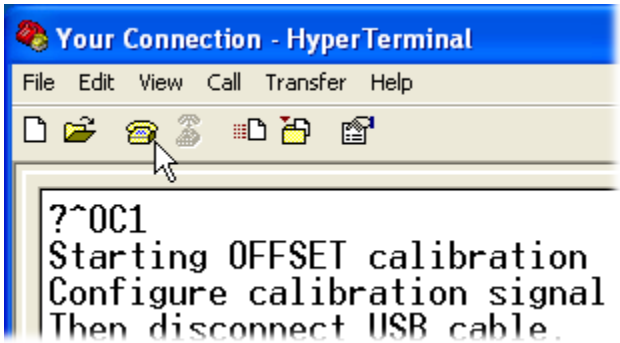
10. Enter: **^OC1.** This starts the calibration and the M.O.L.E.® replies with instructions:



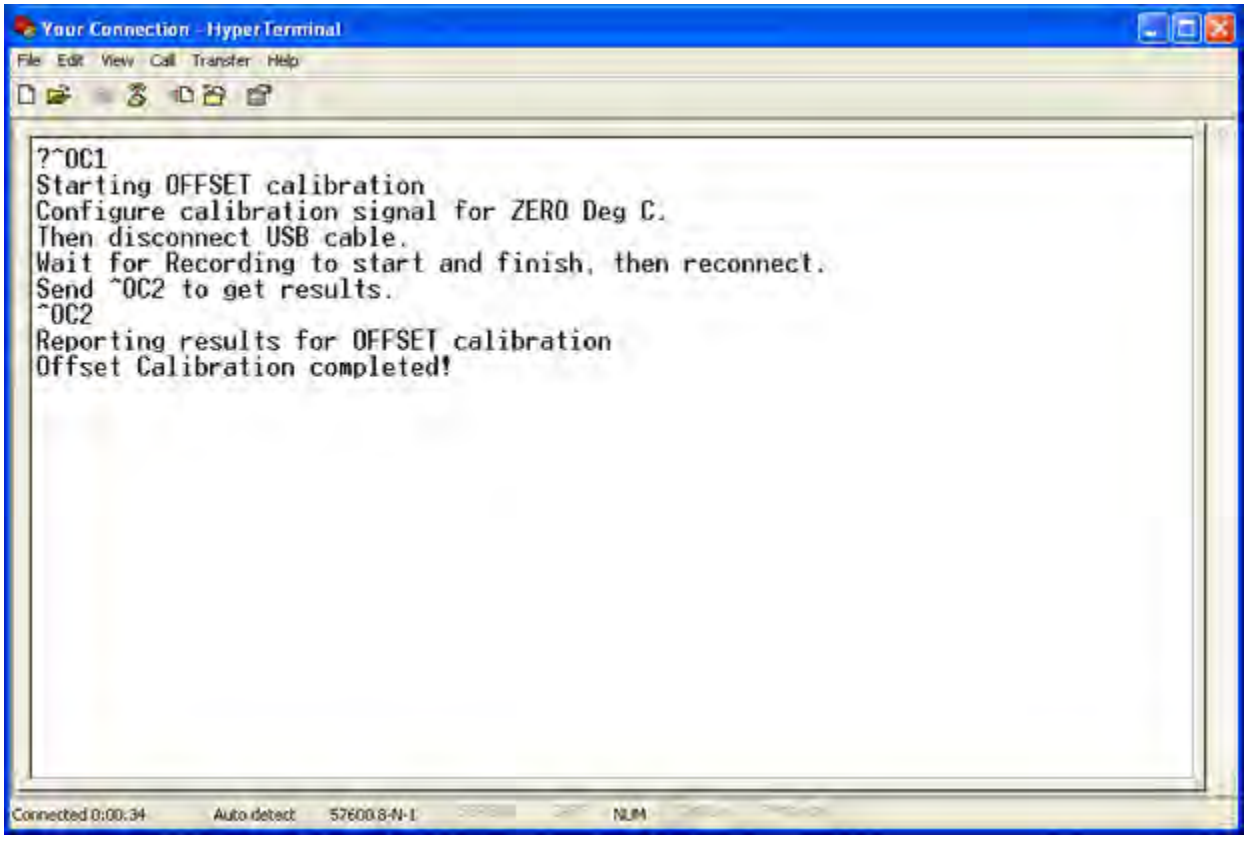
11. Set the standard to 0.0°C, disconnect the M.O.L.E.® from the computer and then select ***Disconnect*** on the Hyperterminal Toolbar. The M.O.L.E.® records for about 20 seconds and stops.



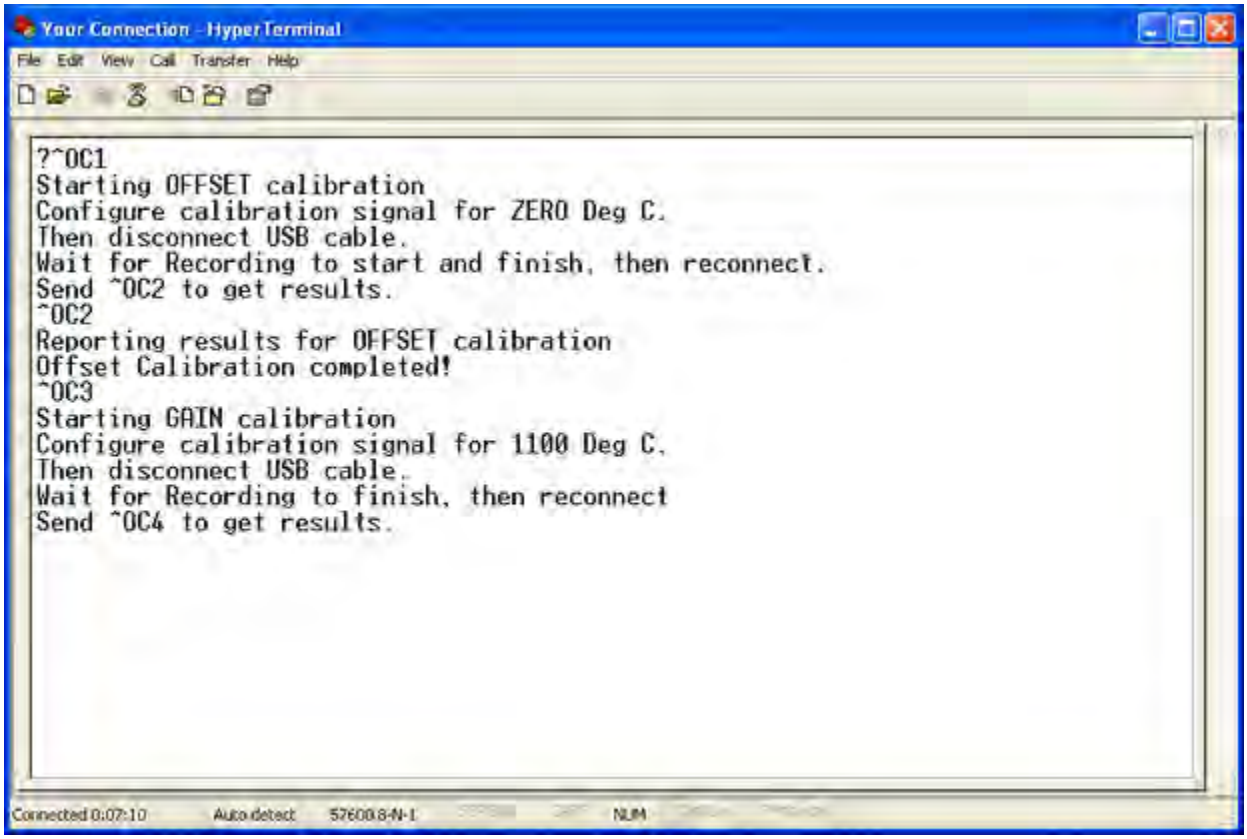
12. Connect the M.O.L.E.® to the computer again and select ***Call*** on the Hyperterminal Toolbar.



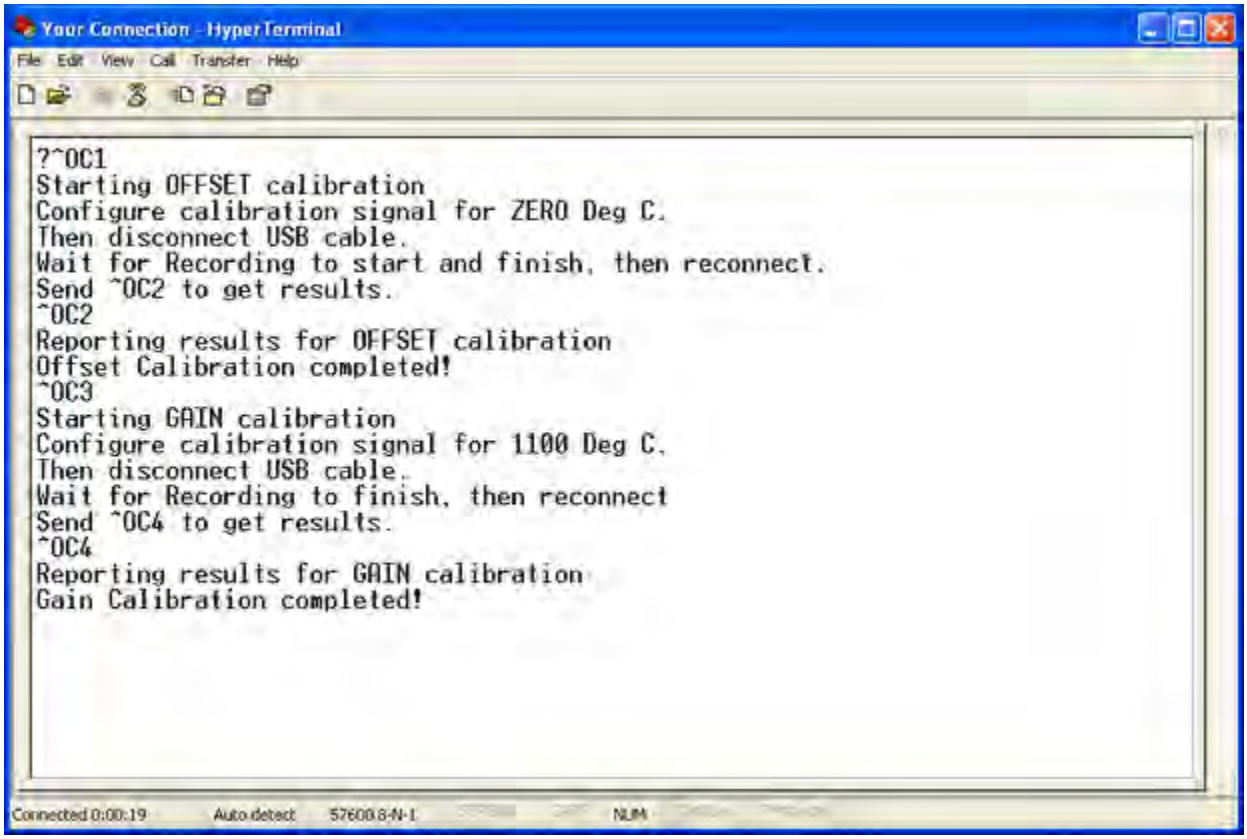
13. Enter: **^OC2**.



14. The M.O.L.E.® reports success or failure. If successful, Hyperterminal dispays: ***Offset Calibration completed!*** then enter: **^OC3.** If **failure**, repeat **^OC1** as directed in Step 10.
15. The M.O.L.E.® replies with instructions:



16. Set the standard to 1100.0°C, disconnect the M.O.L.E.® from the computer and then select ***Disconnect*** on the Hyperterminal Toolbar. The M.O.L.E.® records for about 20 seconds and stops.
17. Connect the M.O.L.E.® to the computer again and select ***Call*** on the Hyperterminal Toolbar.
18. Enter: **^OC4**.



19. The M.O.L.E.® reports success or failure. If successful, Hyperterminal dispays: ***Gain Calibration completed!*** then hit the **Enter** key which displays the "***?***_". If **failure**, repeat **^OC3** as directed in Step 14.
20. Now perform a calibration confirmation. Select ***Disconnect*** on the Hyperterminal Toolbar, disconnect the M.O.L.E.® from the computer and record several temperature values downloading them into M.O.L.E.® MAP software to see if they are within the ECD specification. If acceptable, connect the M.O.L.E.® to the computer again and select ***Call*** on the Hyperterminal Toolbar. Enter: **^OCD** then **^OCA**.

    Manufacturer Specification: +/- 1ºC of reading

    Those commands set the calibration date and stores the calibration constants as archive values:

Your M.O.L.E.® Thermal Profiler is now calibrated.

7.3.4. Constructing a Thermocouple

The following procedures describe how to construct a thermocouple and a shorting plug.

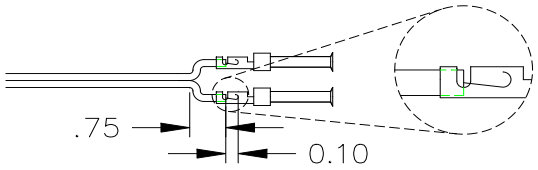
Thermocouple construction:

The following items will be needed to construct a Thermocouple:

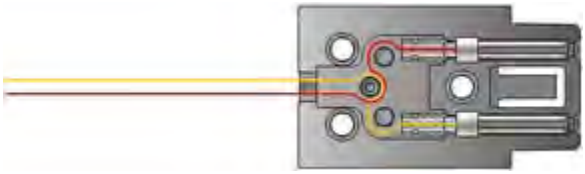
- Thermocouple assembly which includes: 1 Thermocouple housing, 3 Hardware Screws and 2 female pins (one marked with a green dot and one marked with a white dot).
- A Thermocouple consisting of one yellow and one red wire. (Maximum T/C wire size 24 gauge).
- Thermocouple crimping tool
- Phillips (Crosshead) Screwdriver

Construct a thermocouple as follows:

1) Disassemble the Thermocouple housing by unscrewing the 3 Hardware screws.
2) Separate the wires on the stripped lead end (opposite junction end) about ¾".
3) Prep the Red (-) T/C wire stripping the wire casing about 0.10" and curling the bare wire into a U-shape. Place it into the T/C pin with the green dot and crimp with the T/C crimping tool. Make sure that the wire covering is clear through the first set of shoulders and crimped by them. Also, be sure that only wire is crimped by the second shoulders.



4) Repeat Step 3 for the Yellow (+) wire by placing it into the T/C pin with the white dot.
5) Place the female pins in the bottom (smaller) half of the Thermocouple housing. Be careful to place the pins in the proper pin location.



6) Wrap the red and yellow wires around the strain relief posts as shown in the Figure above.
7) Carefully place the two halves of the Thermocouple housing together. Verify that the wires are not pinched and that the pin and wire positions are correct.

8) Replace the 3 Hardware screws.

Shorting plug construction

If fewer than six sensors are used in your application, a shorting plug may be used for each of the unused M.O.L.E. Profiler channels.

The following items will be needed to construct a Thermocouple:

- Thermocouple assembly, which includes: Thermocouple housing, 3 Hardware Screws and 2 female pins (one marked with a green dot and one marked with a white dot).
- A 1" bare copper buss wire. (Maximum wire size 24 gauge).
- Thermocouple crimping tool.
- Phillips (Crosshead) Screwdriver

Construct a shorting plug as follows:

1) Disassemble the Thermocouple housing by unscrewing the 3 Hardware screws.
2) Place one end of the copper wire into the T/C pin with the green dot and the other end into the T/C pin with the white dot. Now crimp both pins with the T/C crimping tool
3) Place the female pins in the bottom (smaller) half of the Thermocouple housing. Be careful to place the pins in the proper pin locations as shown in the Figure below.
4) Carefully place the two halves of the Thermocouple housing together. Verify that the wire is not pinched and that the pin positions are correct.

5) Replace the 3 Hardware screws.

7.4. How to Get Additional Help

If you still have problems, let us help you. We offer many ways to service your problems. You can call our Service/Test technicians, visit our web site to view our FAQ section (Frequently asked Questions) or send us e-mail explaining your problem in detail.

When calling our Service/Test technicians or sending us e-mail, please include the following information:

- Product Description (i.e. SuperM.O.L.E.® Gold 2)
- Product Serial Number
- Software Version

Here is how to contact ECD:

Telephone: +(1) 800.323.4548
+(1) 503.659.6100
FAX: +(1) 503.659.4422
Email: ecd@ecd.com
Internet: http://www.ecd.com

8. Appendix

8.1. A: Specifications

SuperM.O.L.E.® Gold Profiler:

INPUTS:	Up to 6 type K ECD Micro-Thermocouples
PHYSICAL DIMENSIONS:	3.5" x 6" x 0.37"

TEMPERATURE MEASUREMENT RANGE:	-129°C to +1250°C (200°F to +2282°F)
INTERNAL OPERATING TEMPERATURE RANGE:	0°C to 65°C (32°F to 150°F)
Absolute Maximum Warranteed Internal Temperature:	82°C (180°F)* SuperM.O.L.E.® Gold automatically stops monitoring when the internal temperature exceeds 80°C (176°F)
	***WARNING: Exceeding this temperature may permanently damage the equipment!**
ACCURACY:	Within ± 0.1%+1°C. at –73, 100, 250 and 1000°C. Channel to channel compliance within 1°C.
PROGRAMMABLE SAMPLING PERIOD:	0.1 seconds to 24 hours
HARDWARE REAL-TIME CLOCK/CALENDER:	±1 minute/month at 25°C
OPEN THERMOCOUPLE DETECTION.	All six channels
NUMBER OF SAMPLES PER CHANNEL	5460 total for six channels

Power Pack:

POWER PACK CHARGE:	Typical 50 ten-minute profiles.
CHARGE TIME:	14 hours.
EXPECTED POWER PACK LIFE:	300-400 charging cycles.
OPERATING RANGE:	5.1V to 4.9V (the unit may become unreliable below 4.5V).

Power Pack Charger Model Specifications:

NORTH AMERICA:	ECD Part No. E31-0900-25 Input: 120 V, AC, 50/60 Hz, 2.8 VA Output: 9V DC, 120-200mA, 1.08VA
CONTINENTAL EUROPE:	ECD Part No. E31-0900-21 Input: 230 V, AC, 50/60 Hz, 2.8 VA Output: 9V DC, 120-200mA, 1.08VA

Thermocouple Specifications:

Thermocouples: Type K, Micro-Connector, Glass insulated. (Other insulation types available)

THERMOCOUPLE RESPONSE TIME

Wire Size	Still Air 800/100°F	60 Ft./Sec. Air 800/100°F	Still H2O 200/100°F
.001 in. .005 in. .015 in.	0.05 sec. 1.0 sec. 10.0 sec.	0.004 sec. 0.08 sec. 0.80 sec.	0.002 sec. 0.04 sec. 0.40 sec.

Environmental Limitation Specifications:

- Altitude up to 2000 meters
- Maximum relative humidity 80% RH from 0°C to 31°C, decreasing linearly to 17% RH at 50°C.
- Pollution Degree 2 (Normally only dry pollution, but with temporary conductivity caused by condensation)

Power Pack Charger Only:

- Mains Voltage Fluctuations + 10%

• Mains Transient Overvoltage Installation Category II (Per IEC 664) • Pollution Degree 2 (Normally only dry pollution, but with temporary conductivity caused by condensation)
NOTE:Tests have shown that because of the sensitive nature of the measurement and logic circuits, the following precautions must be observed:
• **Minimize exposure to ESD Events.** If the M.O.L.E. Profiler or one of the thermocouples receives an 8kV electrostatic discharge during the data collection sequence, the M.O.L.E. Profiler may switch itself "OFF". To retrieve the data, simply upload the data that was recorded prior to the event. If a new data collection sequence is started without uploading first, the existing data stored in the M.O.L.E. Profiler will be lost.
• **Keep strong electromagnetic fields away.** The thermocouple wires serve as an antenna for electromagnetic radiation. If field strength of 3 volts per meter is present (usually due to close proximity of radio transmitters) while the M.O.L.E. Profiler is collecting data, the accuracy of the data may be compromised. This interference is compounded by using long thermocouple wires, as well as the effect of the thermocouple wires acting as a "tuned" antenna.

SuperM.O.L.E.® Gold 2 Profiler

INPUTS:	Up to 6 type K ECD Micro-Thermocouples
PHYSICAL DIMENSIONS:	9.41mm x 89mm x 152.4mm (0.37in. x 3.5in. x 6in.)
TEMPERATURE MEASUREMENT RANGE:	-200°C to +1271°C (-328°F to +2322°F)
INTERNAL OPERATING TEMPERATURE RANGE:	-40°C to 85°C (-40°F to 185°F)
Absolute Maximum Warranteed Internal Temperature:	87°C (188.6°F)* SuperM.O.L.E.® Gold 2 Profiler automatically stops operating when the internal temperature exceeds 85°C (185°F)
	***WARNING: Exceeding this temperature may permanently damage the equipment!**
ACCURACY:	±1°C. Channel to channel compliance within 1°C.
PROGRAMMABLE SAMPLING PERIOD:	0.1 seconds to 24 hours
HARDWARE REAL-TIME CLOCK/CALENDAR:	±1 minute/month at 25°C
OPEN THERMOCOUPLE DETECTION.	All 6 channels
NUMBER OF SAMPLES PER CHANNEL	250,000 total for 6 channels

Internal Power Pack:

POWER PACK CHARGE:	Typical 50 ten-minute profiles.
CHARGE TIME:	8 hours (a 15 min. charge allows one 10min. data run)
EXPECTED POWER PACK LIFE:	300-400 charging cycles.
OPERATING RANGE:	4.2V to 3.0V

Internal Power Pack Charger:

INPUT:	Voltage Rating: 100 to 240 VAC Current: 200mA(RMS) max. @ 115VAC 80mA(RMS) max. @ 230VAC Frequency: 50/60Hz
OUTPUT:	5V DC, Load 0A MIN. 1A MAX.
Mains Voltage Fluctuations:	+ 10%

Wireless RF Option:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

SuperM.O.L.E.® Gold 2 Radio:	
Type:	IEEE 802.15.4 ZigBee™ two way
Frequency:	2.45 gHz
Power:	1mW (0dbm)
Range:	6.5 meters (20ft)*
Wireless Antenna:	
Temperature:	250ºC (500ºF)
Exposed Material:	Teflon insulation
Connector:	MMCX Right Angle
USB Transceiver:	
Type:	IEEE 802.15.4 ZigBee™ two way
Antenna:	Internal fractal chip

* The range of the SuperM.O.L.E.® Gold 2 RF system varies with the RF environment. Under ideal conditions, the range may be 6.5 meters [20 feet] and in some situations it may only be a few meters. Refer to topic ***Basics>Wireless RF Option Setup***

Thermocouple Specifications:

Thermocouples: Type K, Mini-Connector, Glass insulated. (Other insulation types available.)

THERMOCOUPLE RESPONSE TIME

Wire Size	Still Air 800/100°F	60 Ft./Sec. Air 800/100°F	Still H2O 200/100°F
.005 in.	1.0 sec.	0.08 sec.	0.04 sec.

Environmental Limitation Specifications:

SuperM.O.L.E.® Gold 2 Profiler:

- Maximum relative humidity 80% RH from 0°C to 31°C, decreasing linearly to 17% RH at 50°C.
- Pollution Degree 2 (Normally only dry pollution, but with temporary conductivity caused by condensation)

Power Pack Charger:

- Temperature: (Operation) 0 to +45°C (32 to 113°F)
- Temperature: (Non-Operation) -20 to +75°C (-4 to 167°F)
- Humidity: (Operation) 20 to 90%

NOTE:Tests have shown that because of the sensitive nature of the measurement and logic circuits, the

following precautions must be observed:
• **Minimize exposure to ESD Events.** If the M.O.L.E. Profiler or one of the thermocouples receives an 8kV electrostatic discharge during the data collection sequence, the M.O.L.E. Profiler may switch itself “OFF”. To retrieve the data, simply upload the data that was recorded prior to the event. If a new data collection sequence is started without uploading first, the existing data stored in the M.O.L.E. Profiler will be lost.
• **Keep strong electromagnetic fields away.** The thermocouple wires serve as an antenna for electromagnetic radiation. If field strength of 3 volts per meter is present (usually due to close proximity of radio transmitters) while the M.O.L.E. Profiler is collecting data, the accuracy of the data may be compromised. This interference is compounded by using long thermocouple wires, as well as the effect of the thermocouple wires acting as a “tuned” antenna.

8.2. B: Statistical Process Control (SPC) Background Information

This appendix deals with the subset of SPC that is incorporated into M.O.L.E.® MAP Software. It does not address general SPC principals. A working knowledge of general statistical principals and SPC terms is assumed and is not addressed here. There are many good basic SPC books where this information may be obtained.

Reflow and Wave Solder operators, engineers and production managers are expected to understand their soldering process so as to deliver quality products cost effectively. This is a continuous process.

First, the machine must be checked for consistency. A standard or typical set up should be routinely checked prior to any process set point determinations, or actual production run machine checks. Only after the machine has been determined to be operating correctly and not experiencing abnormal variation, should data from the machine be utilized. SPC is all about identifying common or normal variation from abnormal variation.

Second, the correct process set points must be determined for a particular product. Utilizing the M.O.L.E. Profiler, the correct set points for a particular product may be determined. These set points, if selected correctly and followed, should deliver the maximum throughput of quality product.

Third, the machine must consistently deliver the correctly determined set points. SPC will help identify common or normal variation from abnormal variation. Checking the machine using your M.O.L.E. Profiler and the M.O.L.E.® MAP Software with its SPC capability will help ensure that the machine is consistently performing to its set points and your expectations.

Fourth, repeat the above three steps. Continuous improvement is a never-ending cycle. Check the long-term variation of the machine by graphing typical set point samples. Using the M.O.L.E. Profiler, recheck/adjust part number specific set points to maximize your quality throughput. Check the machine during a part number run to control the machine variation from that part number’s actual ideal set points.
While SPC had its start in high volume repetitive operations, SPC is applicable to many other types of operations as well. However, SPC can be difficult to apply to short runs.

Short runs may be runs that take a long time to process, runs in which multiple samples are difficult to collect, and runs where samples are difficult to place into subgroups or runs where small quantities are run.

The M.O.L.E.® MAP Software charts will be more meaningful to the user if SPC charts are generated based on data sets that have the same set points each time.

There are several basic short run SPC techniques:

1. Nominals Charts
2. Individuals/Moving Range Charts
3. Moving Average/Moving Range Charts
4. Standardized Formula Charts

The Moving Average/Moving Range Chart technique is particularly well suited for situations where control information is desired as soon as possible and there is a relatively long time between sample collections. After considering the nature of solder operations and the machine sampling process, the Moving Average/Moving Range Chart technique was incorporated into M.O.L.E.® MAP Software.

Moving Average/Moving Range Chart Technique:

M.O.L.E.® MAP Software utilizes the standard Moving Average/Moving Range Charting technique with a subgroup size of 2-6 that is selected by the user. The following steps and figure illustrates the Moving Average/Moving Range calculations (using a group size of two) that are used to construct the SPC chart.

Steps for Creating a Moving Average Moving Range Control Chart:

1. Select the key variable to monitor.
2. Select the moving average group size. (We will use two in our example.)
3. Obtain your first sample and record it as sample 1 (X1).
4. Obtain your second sample and record it as sample 2 (X2).
5. Determine the x-bar and R values.

Moving Average formulas:

$$\overline{X} = \frac{X_1 + X_2}{2} \qquad (\text{Range}) R = X_H - X_L$$

6. Plot this value on the chart as subgroup 1.
7. Carry forward sample 2 into subgroup 2's calculation. Obtain your third sample and record it as sample 3. The averages of sample 2 and sample 3 form subgroup 2.
8. Plot this value on the chart as subgroup 2.
9. Repeat for all the samples.
10. Calculate control limits using standard x-bar and R formulas for the appropriate sample sizes. M.O.L.E.® MAP Software uses range-based calculations for LCL and UCL.

11. Continue monitoring the process.

SAMPLE #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SAMPLE MEASUREMENTS	3	4	5	3	2	9	5	2	6	8	4	8	5	6	3	3
SUBGROUP VALUE	x	3.5	4.5	4	2.5	5.5	7	3.5	4	7	6	6	6.5	5.5	4.5	3
	R	1	1	2	1	7	4	3	4	2	4	4	3	1	3	0

Moving Average/Moving Range Subgroup Size 2 Calculations Chart

Process Capability

A process capability index is a standard measure of how a process compares with its specification limits—how a process **is** performing relative to how **it is supposed** to perform. As opposed to the control chart, which shows detailed information about how the data compares with control limits, a capability index is a summary of how the data compares with the specification limits.

Two common capability indicators are Cp and Cpk. These values are shown in the Statistics Box on the SPC Page Tab.

Samples Per Sub-Group = 2

Channel 1	
Time Above:	Sec
N:	9
Min:	22.0
Max:	50.0
X-2Bar:	37.6
Std-Dev:	8.61
Cp:	0.97
Cpk:	0.87

For both of the index values, the data used to determine them is dictated by the subgroup size (N) chosen by the user. In the case where N=1, individual data is used—for N>1, average data is used (x bar).

The charts on the next page give a graphical representation of the concept of Cp and Cpk. Notice that in each graph, the same upper and lower specification limits (USL, LSL) are used. The values of Cp and Cpk will differ according to the data that is compared with those specifications.

Depending on the particular process being monitored, the desired value for Cp and Cpk may differ. In general, however, a Cp and Cpk of 1.33 or above is desired. This assures that the process is not only capable of meeting the required specification limits, but also has a built-in margin for error that may be needed in special circumstances. In addition to targeting a certain minimum Cp and Cpk, it is also desirable to have these two values equal one another. This indicates that the process is well-centered between the specification limits.

	**Cp ≥ 1.33**: Data tightly distributed.

	Cpk ≥ 1.33: Data well inside spec limits.
	Cp = 1.00: Data fills entire spec range. **Cpk = 1.00**: Data fills entire spec range.
	Cp > 1.00: Data tightly distributed. If it were centered between the spec limits, no data would lie beyond those limits. **Cpk < 1.00**: Some data is outside the spec limits.
	Cp < 1.00: Data not tightly distributed. If it were centered between the spec limits, some data would still lie outside those limits. **Cpk < 1.00**: Some data is outside the spec limits.

The equations used to calculate the index values are as follows:

$$Cp = \frac{USL - LSL}{6 * (Std.Dev.)}$$

$$Cpk = \frac{USL - \bar{\bar{x}}}{3 * (Std.Dev.)} \quad \text{OR} \quad Cpk = \frac{\bar{\bar{x}} - LSL}{3 * (Std.Dev.)}$$, whichever is less

As can be interpreted from the above equations, Cp gives an indication of how narrow the data distribution is relative to the width of the specification limits. Essentially, it indicates how well the process would be able to stay within the specified limits if the data were perfectly centered between those limits.

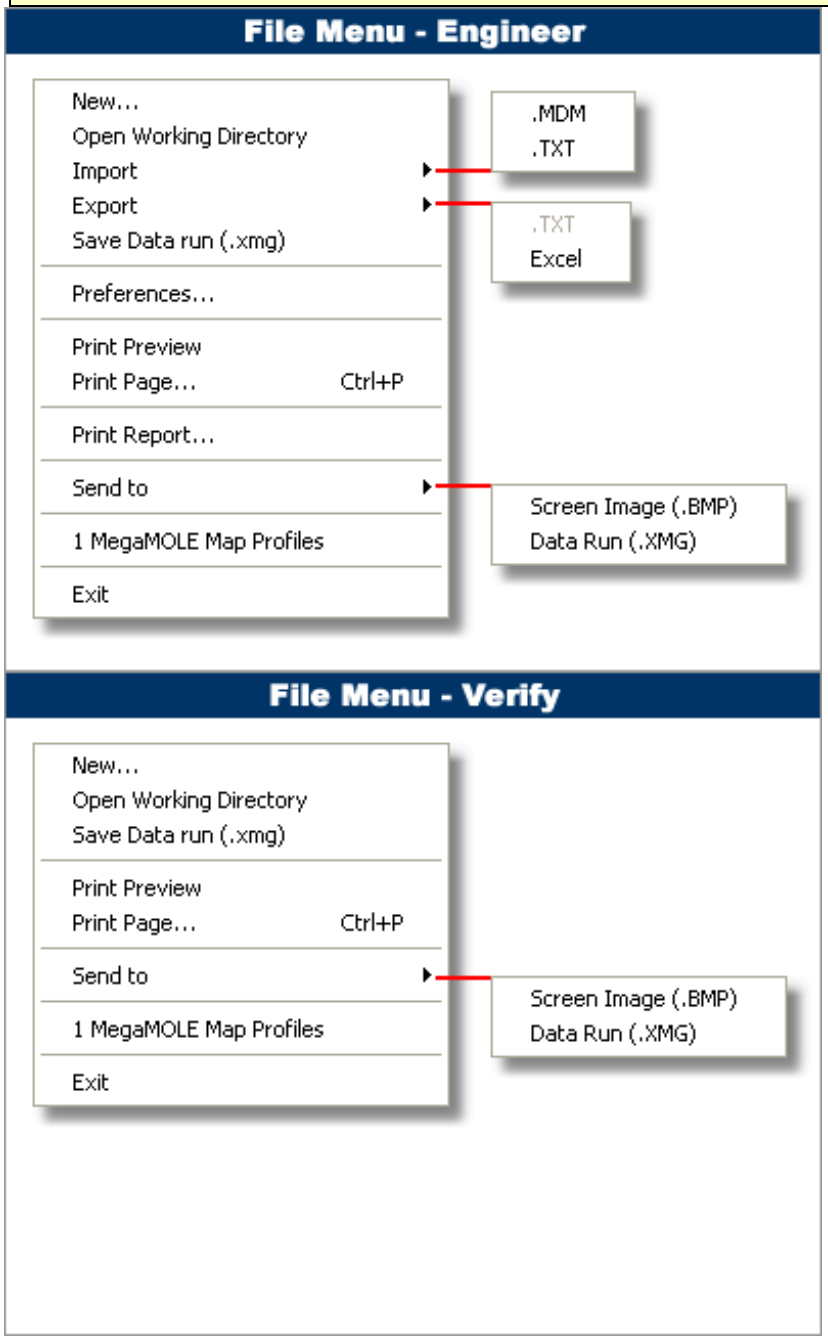
Cpk compares the widest half of the data distribution to the appropriate specification limit. It indicates whether the process is capable of meeting the specification as indicated by

the “worst half” of the measurements. Unlike Cp, the Cpk index measures process capability without assuming the data is well-centered.

8.3. C: Pull Down Menus & Toolbar Buttons

Menus:

The dimmed menu commands are used in other Page Tabs.



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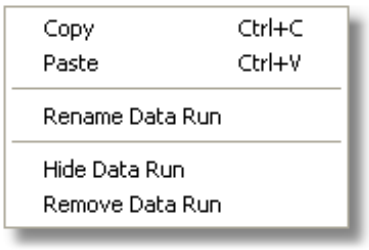
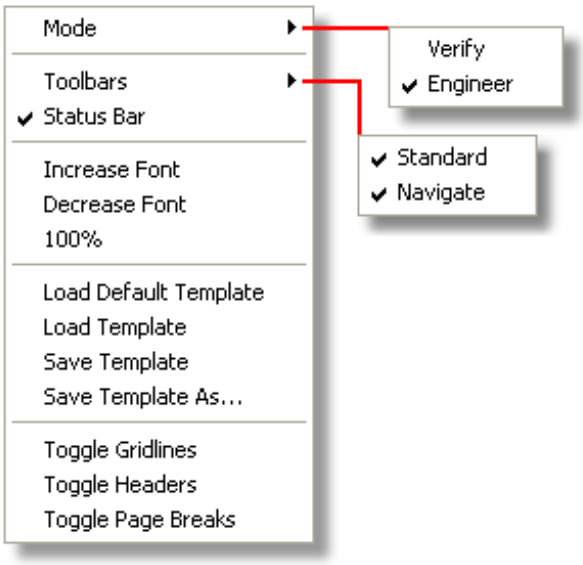
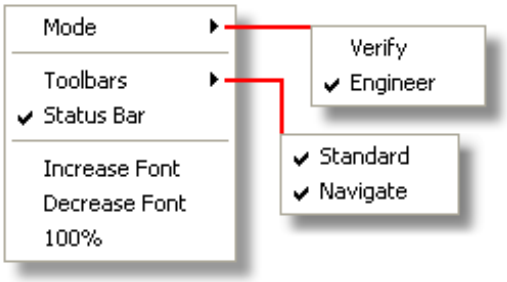


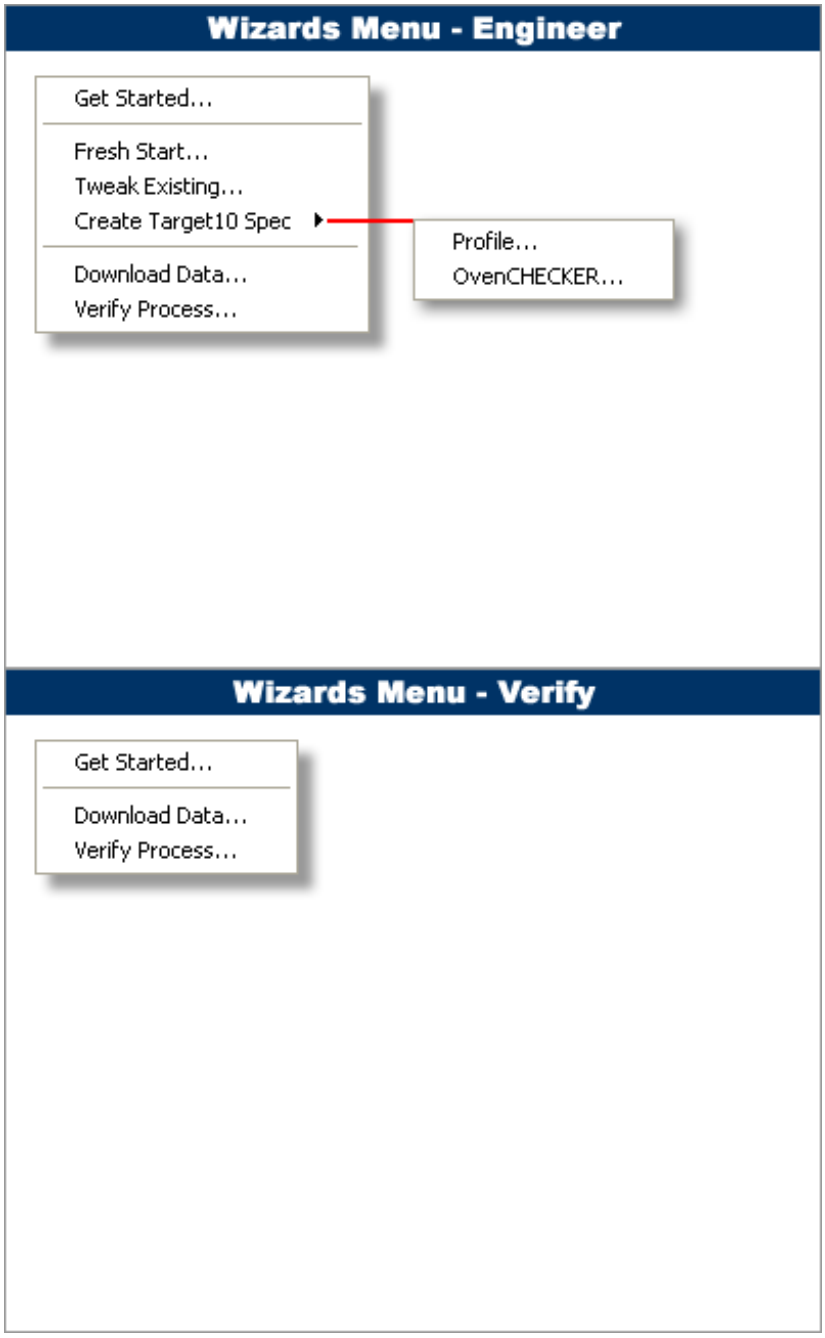
Edit Menu - Verify

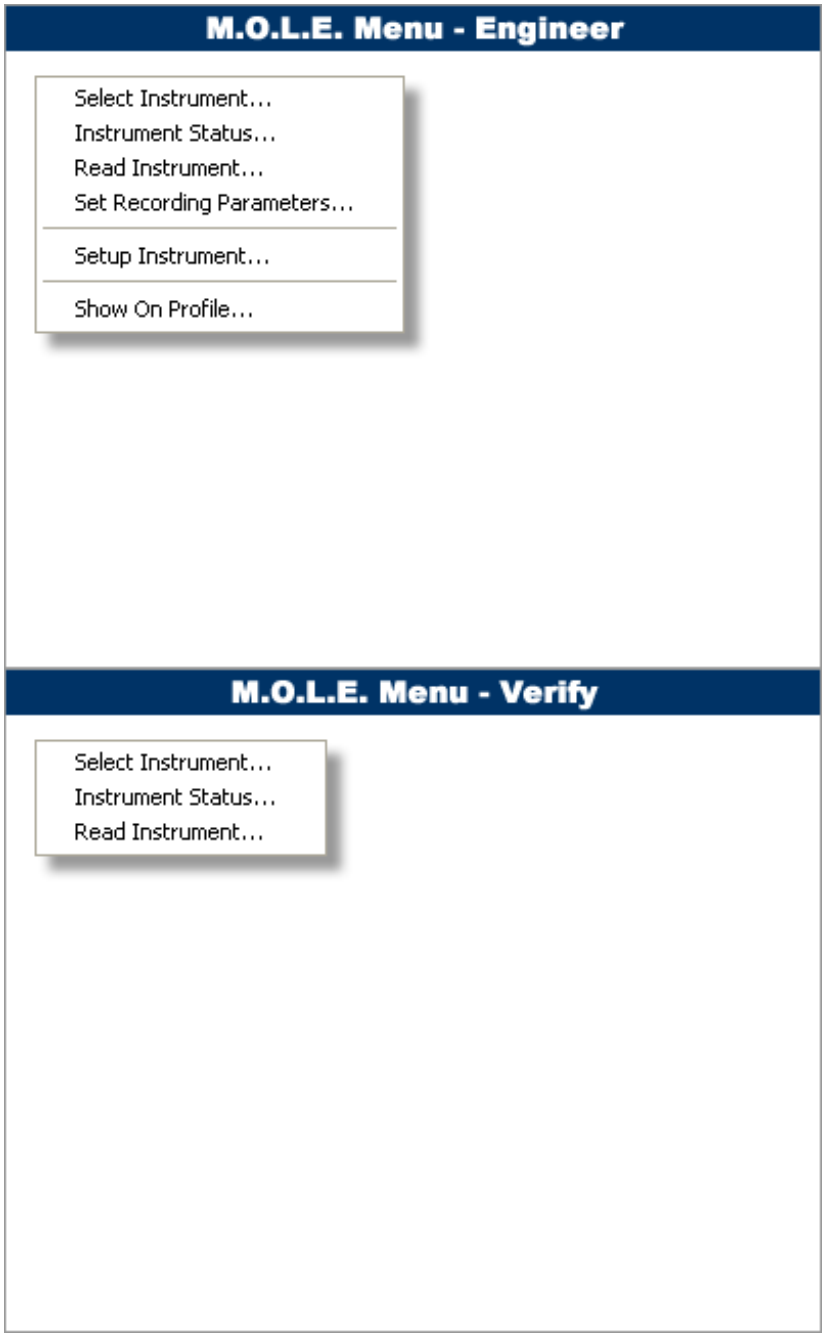
View Menu - Engineer

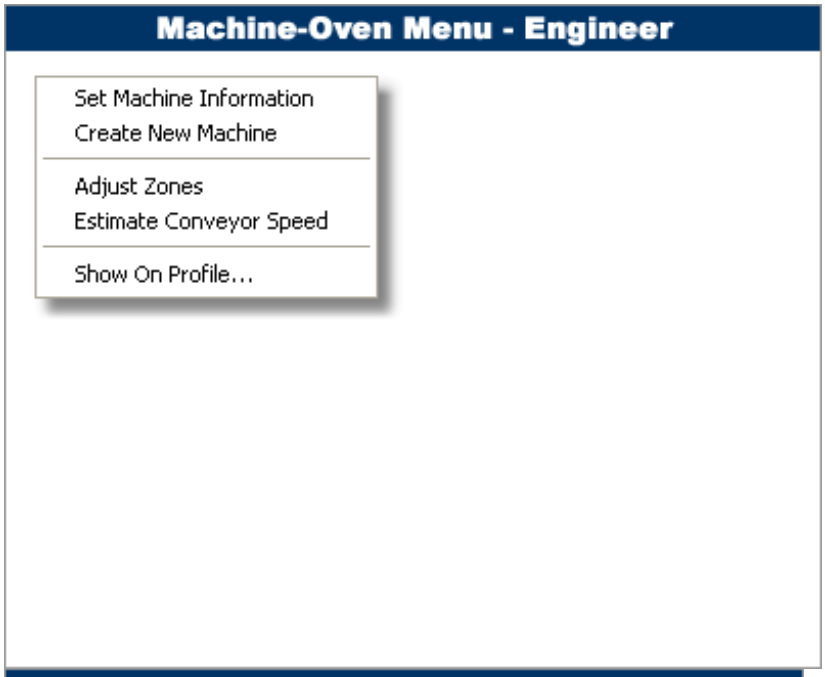


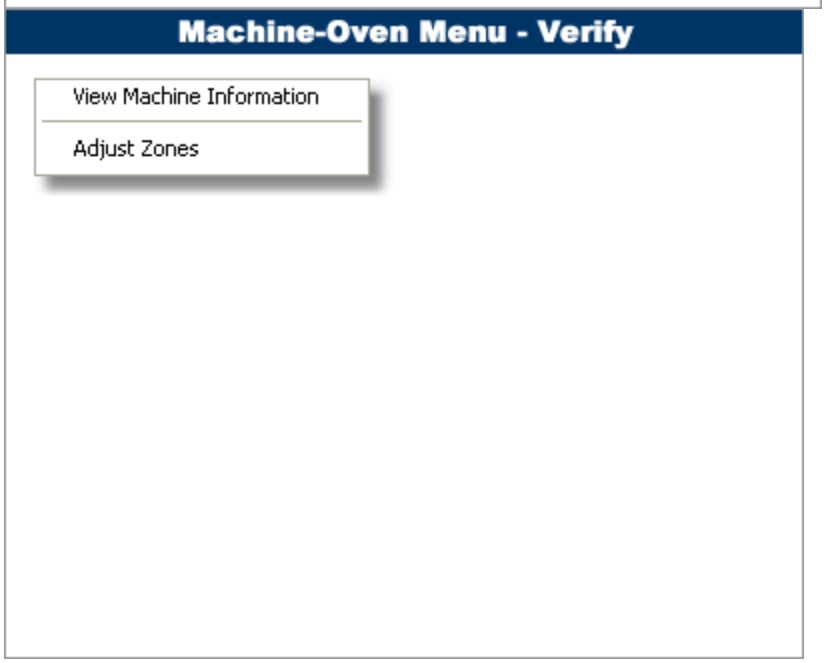
View Menu - Verify

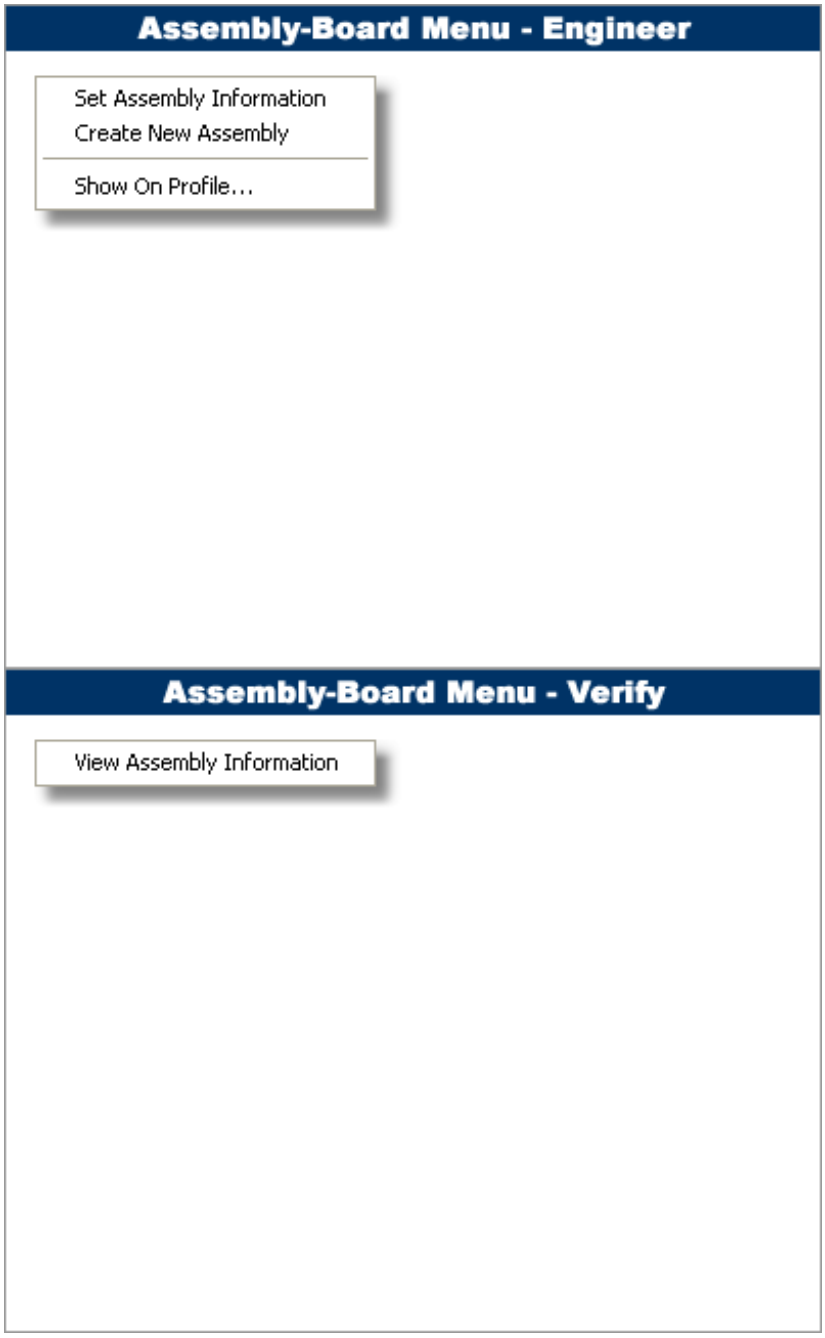



Wizards Menu - Engineer
Get Started...
Fresh Start...
Tweak Existing...
Create Target10 Spec
Download Data...
Verify Process...
Profile...
OvenCHECKER...
Wizards Menu - Verify
Get Started...
Download Data...
Verify Process...

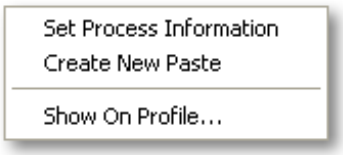

M.O.L.E. Menu - Engineer
Select Instrument...
Instrument Status...
Read Instrument...
Set Recording Parameters...
Setup Instrument...
Show On Profile...
M.O.L.E. Menu - Verify
Select Instrument...
Instrument Status...
Read Instrument...


Machine-Oven Menu - Engineer
Set Machine Information
Create New Machine
Adjust Zones
Estimate Conveyor Speed
Show On Profile...


Machine-Oven Menu - Verify
View Machine Information
Adjust Zones

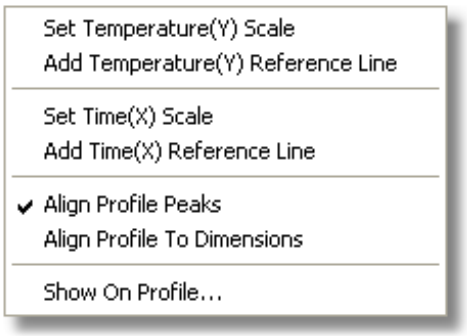

Assembly-Board Menu - Engineer
Set Assembly Information
Create New Assembly
Show On Profile...
Assembly-Board Menu - Verify
View Assembly Information

Process-Paste Menu - Engineer



Process-Paste Menu - Verify

Profile Menu - Engineer



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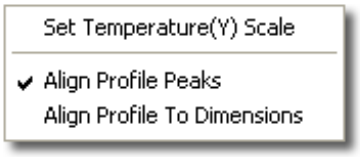
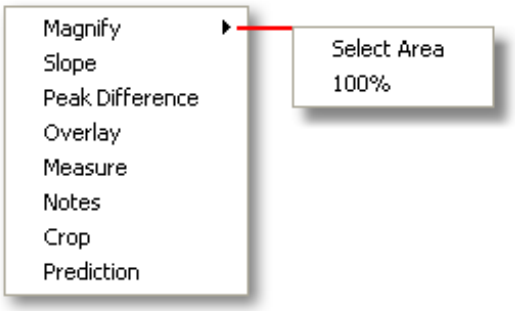
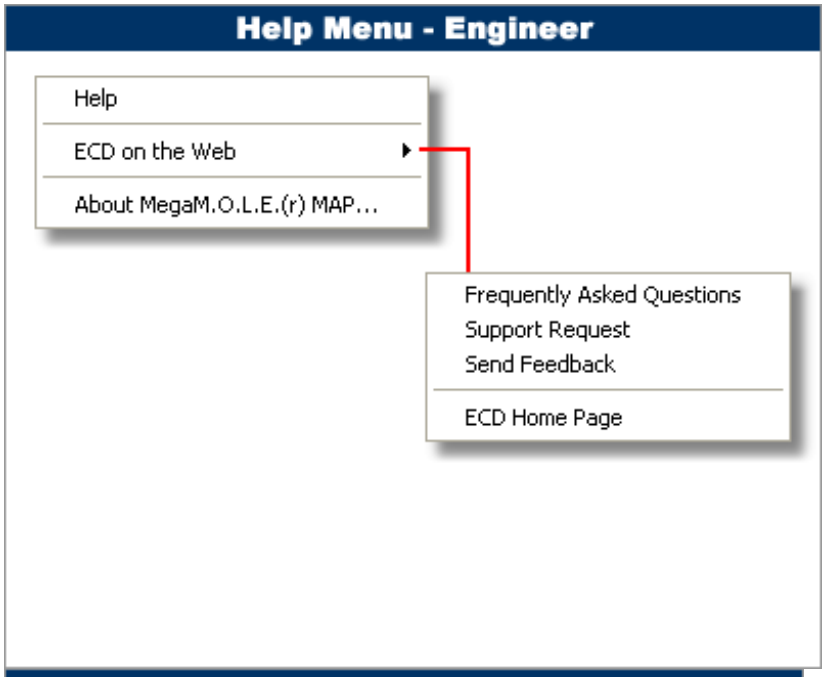
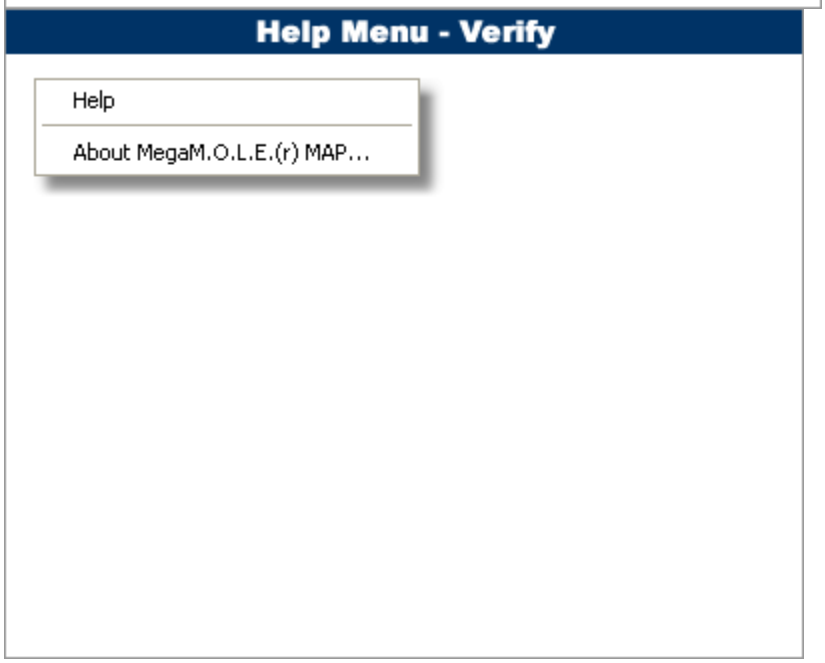


Tools Menu - Engineer



Tools Menu - Verify





Menus (Verify Mode):

Toolbar buttons:

	Engineer Mode		**Verify Mode**
Button	Command	Button	Command
	Back (To Previous Data Run)		
	First (Data Run)		

	Help		Help
	Last (Data Run)		
	Magnify Window		
	Magnify 100%		
	Measure		
	Next (Data Run)		
	Notes		Notes
	Open Working Directory		Open Working Directory
	Overlay		
	Peak Difference		
	Print Page Tab		Print Page Tab
	Prediction		
	Save Data Run		Save Data Run
	Slope		
	Start/New		Start/New

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