

Time Based Monitoring Demonstration

Using KEEL[®] Technology



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Objective:

Demonstrate the use of KEEL[®] Technology to address time-based monitoring functions.

Time-based monitoring functions are intended to address situations where there is a time delay between an event and a reaction.

For example, in a medical case, it might be that a drug was administered and a reaction might be expected in approximately four hours.

In a mechanical system, a particular sensor might indicate some event that has a time constant associated with it. In this case, there may be a need to validate that the system is performing correctly; and if not, react accordingly.

Time based monitoring activity can be applied to a wide variety of markets and applications. Since many of these monitoring activities can be drawn as curves showing

expectations plotted against time, they are easily addressed with KEEL Technology. [Additional information on KEEL Technology can be found on Compsim's web site: <http://www.compsim.com>.]

Installation:

Contact Compsim by email and we will return an InstallShield **setup.exe** file that will install the Time Based Monitoring application on your computer.

[mailto:info@compsim.com?subject=Time Based Monitoring Demo Request](mailto:info@compsim.com?subject=Time%20Based%20Monitoring%20Demo%20Request)

NOTE: This file will be sent to you as an attachment: TimeBasedMonitoring.zip (5,118 KB). Your email system must allow files of this size to be received.

By default, it will install to C:\Program Files\Compsim\Time Based Monitoring directory. The application will be TimeBasedMonitoring.exe. Shortcuts will be placed on your desktop and in the Program Files list under Compsim.

NOTE: We recommend printing this document so you can refer to it while running the application.

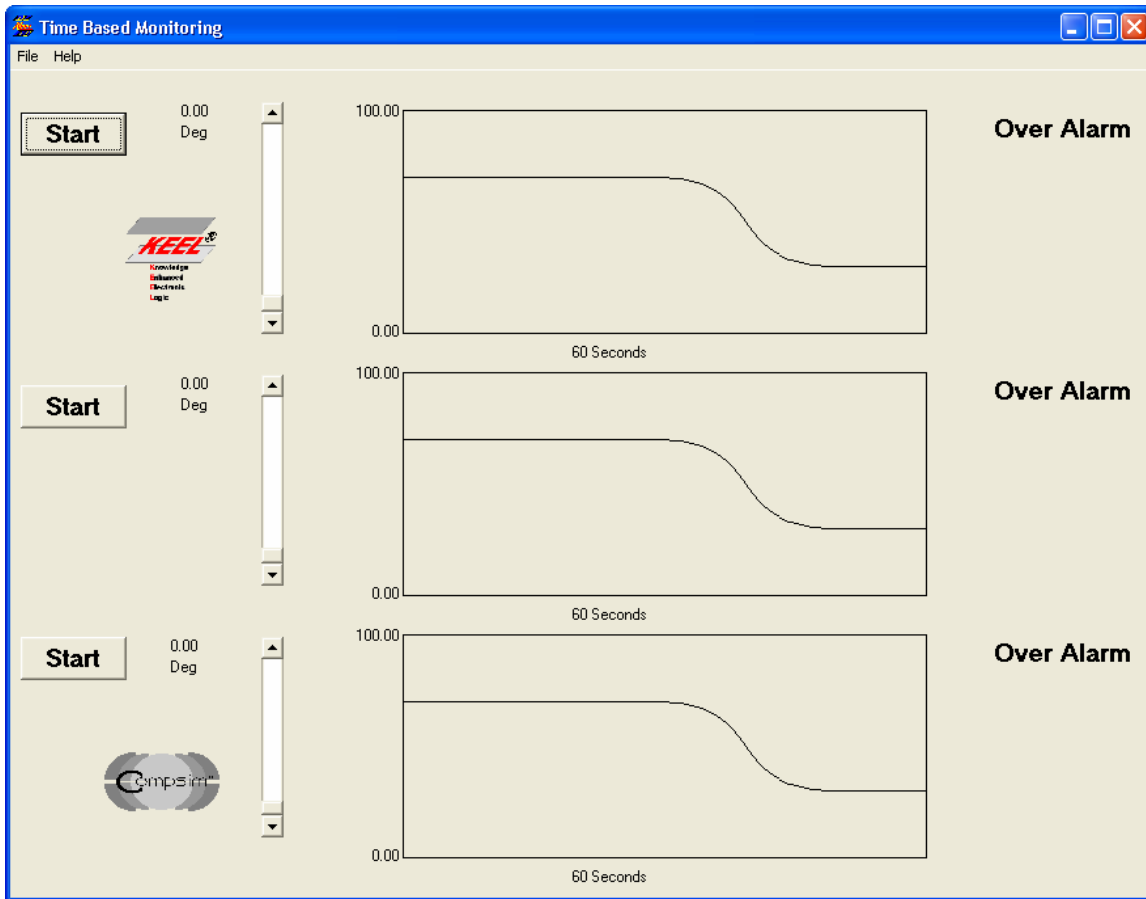
Removal:

When you want to remove the application, use the Windows Control Panel, Add or Remove Programs function where it will be called "Time Based Monitoring".

Setup Instructions

In this demonstration, a window is provided to the user that can monitor three variables. The user can assign the type of curve and the time span over which the monitoring will occur.

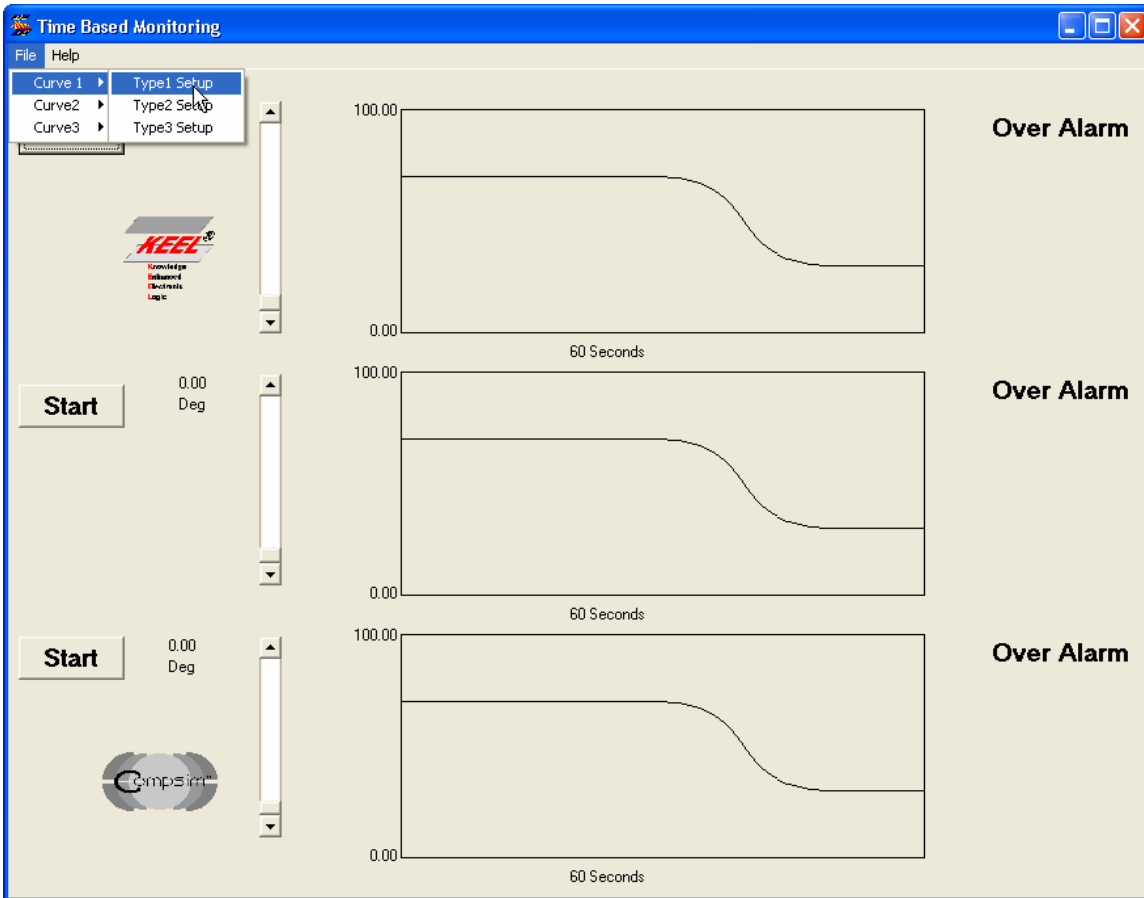
The figure below shows the opening screen.



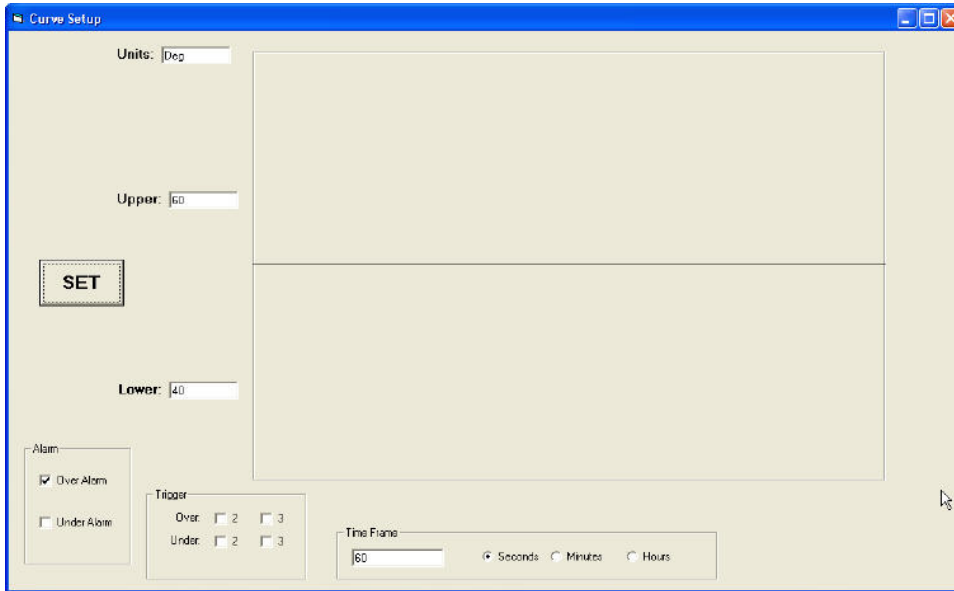
The system defaults to three similar curves. The three vertical scroll bars are used to simulate external signals. The system starts with the full vertical ranges for each of the graphs - from 0 to 100 Degrees.

Before starting to monitor the individual values, the user may want to specifically select the type and configuration for each graph. The figure below shows the menu option which allows configuration of the top graph (Chart 1) to be a Type 1 graph.

NOTE: This demonstration has only three "types" of graphs. While each of these graphs can be individually configured, a production system could have any number of different graphs. The "engines" that control the drawing of the graphs and the monitoring function were created with the KEEL Toolkit. In this case, the KEEL Engines were created for a Visual Basic application. A productized version might use C, Java, Microsoft C#, Macromedia Flash, or PLC Structured Text.



By selecting the menu option File | Chart 1 | Type 1 Setup, the system opens the Type 1 graph setup screen shown below.



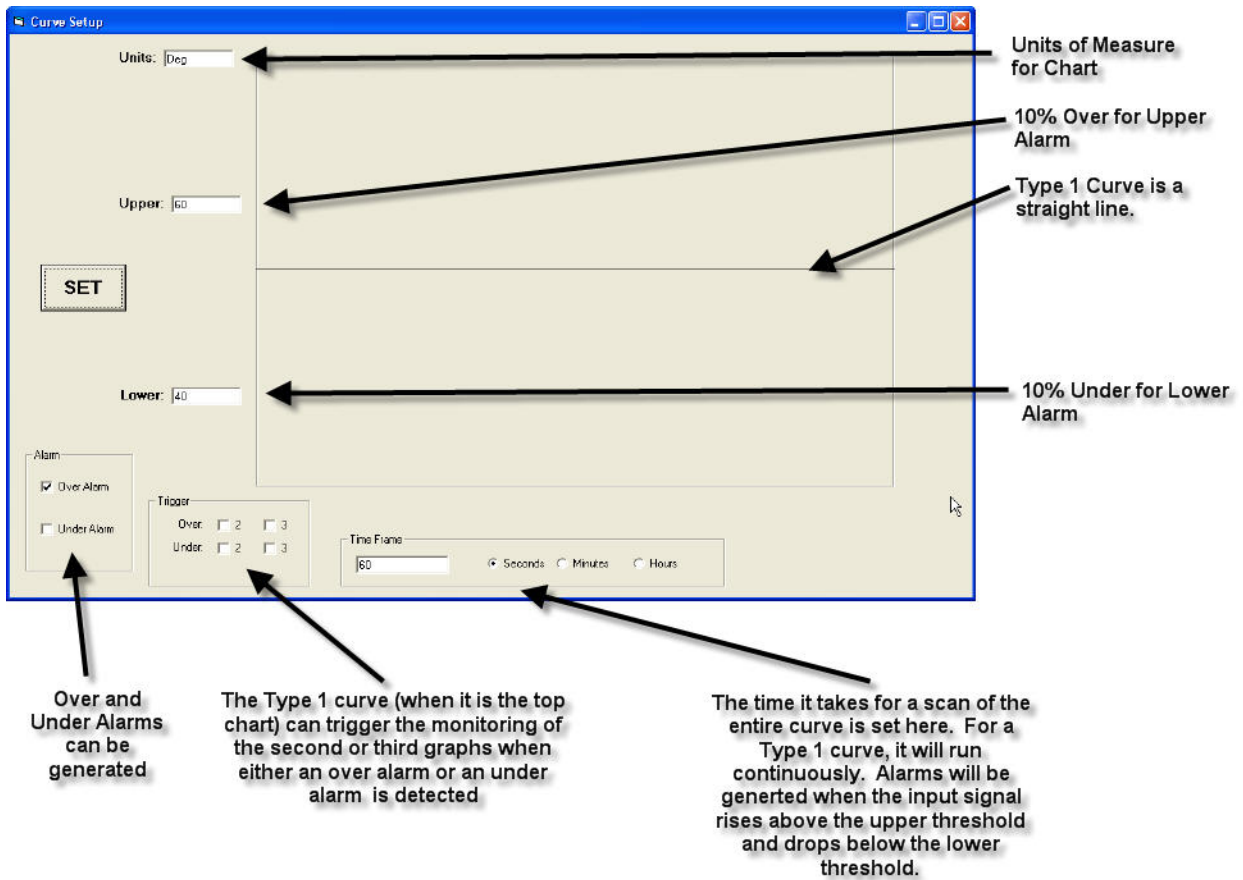
The setup screen for each type of curve, while similar, can be different depending on the functionality to be achieved. In this case, the Type 1 curve is very simple. It is just a horizontal line that will be monitored for “Over” or “Under” alarms. In this case, the curve was designed to trigger an alarm if the input signal is 10% above the line or 10% below the line. The upper limit is set in the Upper field and the lower limit is set in the Lower field. The setup function will calculate the maximums and minimums for the graph.

The user can select units of measure that will be displayed on the chart.

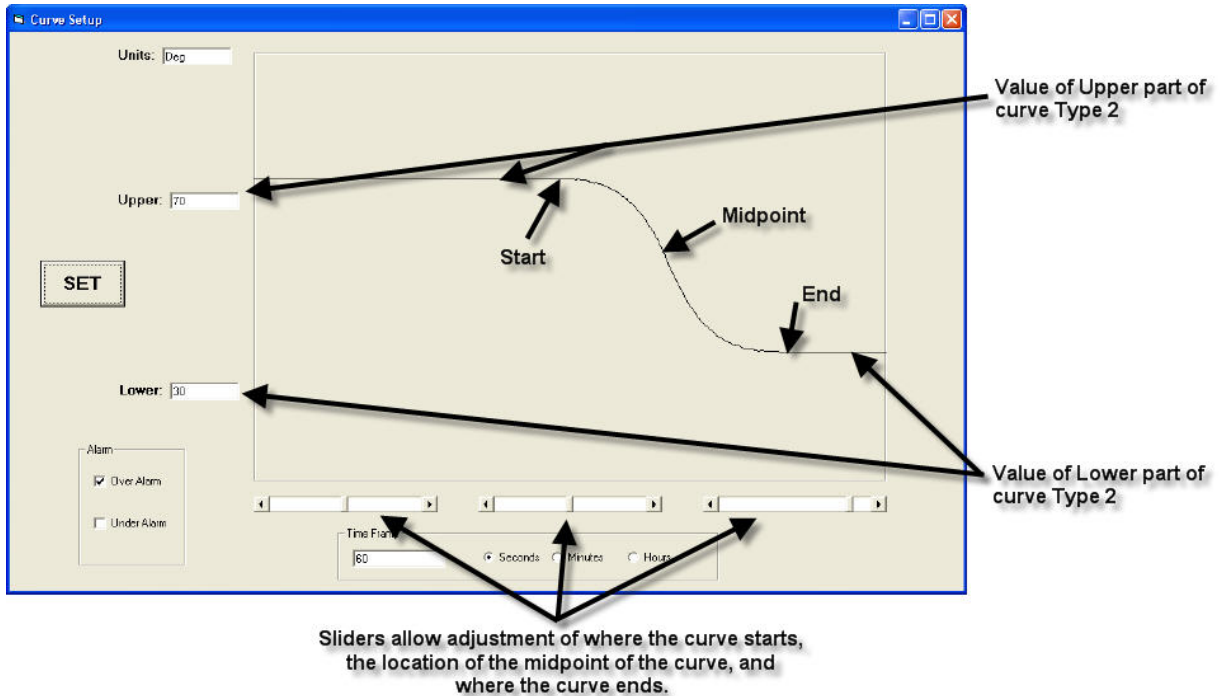
The user can select whether to create an alarm with either the Over Alarm or the Under Alarm conditions, or both, by checking the appropriate Alarm check boxes.

The user can set the time frame for the scan of the graph. The text box allows the entry of a number. The option buttons identify whether the number indicates seconds, minutes, or hours.

NOTE: If you select seconds as the timeframe, then during the operation, the system will evaluate the input values every second, once the scan has started.



When the Type 1 graph is used as the top chart it has one additional feature that is not available when it is used as the second or third graph. When used in the top chart, it has the ability to trigger the initiation of the other graphs when an Over or Under alarm is detected here.

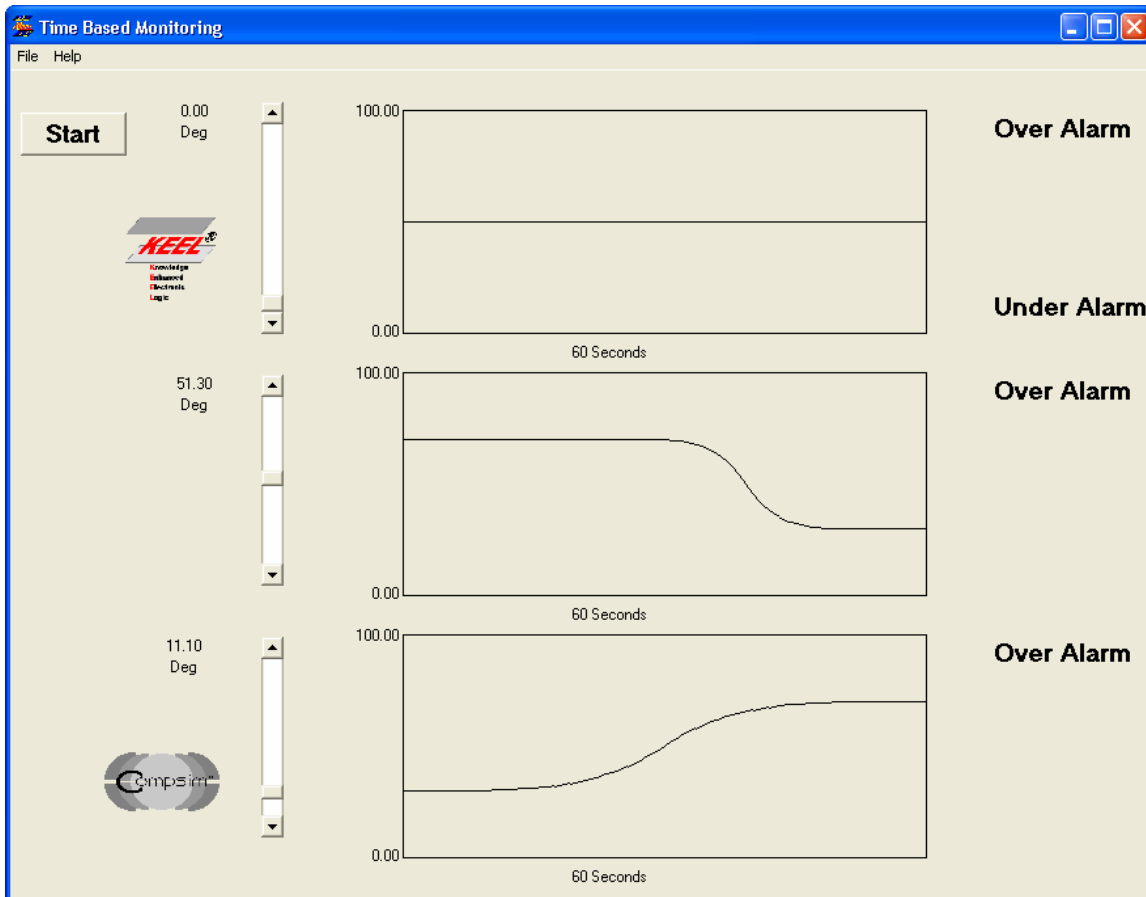


The Type 2 and Type 3 charts look similar to the image above. With these graphs, the user can select whether an alarm will be triggered when the input signal goes above the Upper value or below the Lower value.

With the Type 2 and Type 3 charts, the user has a sigmoid curve to deal with. With either of these curves, the user sets the upper value and the lower value numerically. The system will calculate the min and max values automatically. The user also has the ability to shape the curve by adjusting the sliders.

The user clicks on the SET button on these configuration screens to save the settings for the selected chart.

The image below shows the selection of a Type 1 graph for the top, a Type 2 graph for the middle chart and a Type 3 graph for the lower chart. There are no real limits to the number or types of curves that could be available for use.



Running the Demo

The vertical scroll bars next to each curve are provided to allow you to simulate real time inputs to the system. To start the demo, you might want to set these values to non-alarming conditions. With our example setup, this would mean that you set the vertical scroll bar for the first curve to the near midpoint value. Since Curve 2 is looking for an over alarm to trigger, you would set this value to midpoint (which would not trigger Curve 2 over alarm). With Curve 3, you would want to set the input to near the bottom, since a midpoint value would immediately trigger an over alarm, when it was started.

When initial values are set appropriately, depress the Start button for Curve 1. This will begin its scan. Adjust the Curve 1 input value up or down to trigger Curve 2 and 3 to begin monitoring. Adjust the inputs to Curve 2 and 3 to simulate changes to their input values.

The image below shows the result of manually starting Chart 1, which first triggers Chart 2 with an Under Alarm. Then Chart 3 was triggered by an Over Alarm from Chart 1. This shows that Chart 2 is not in alarm condition, but Chart 3 has detected an Over Alarm.

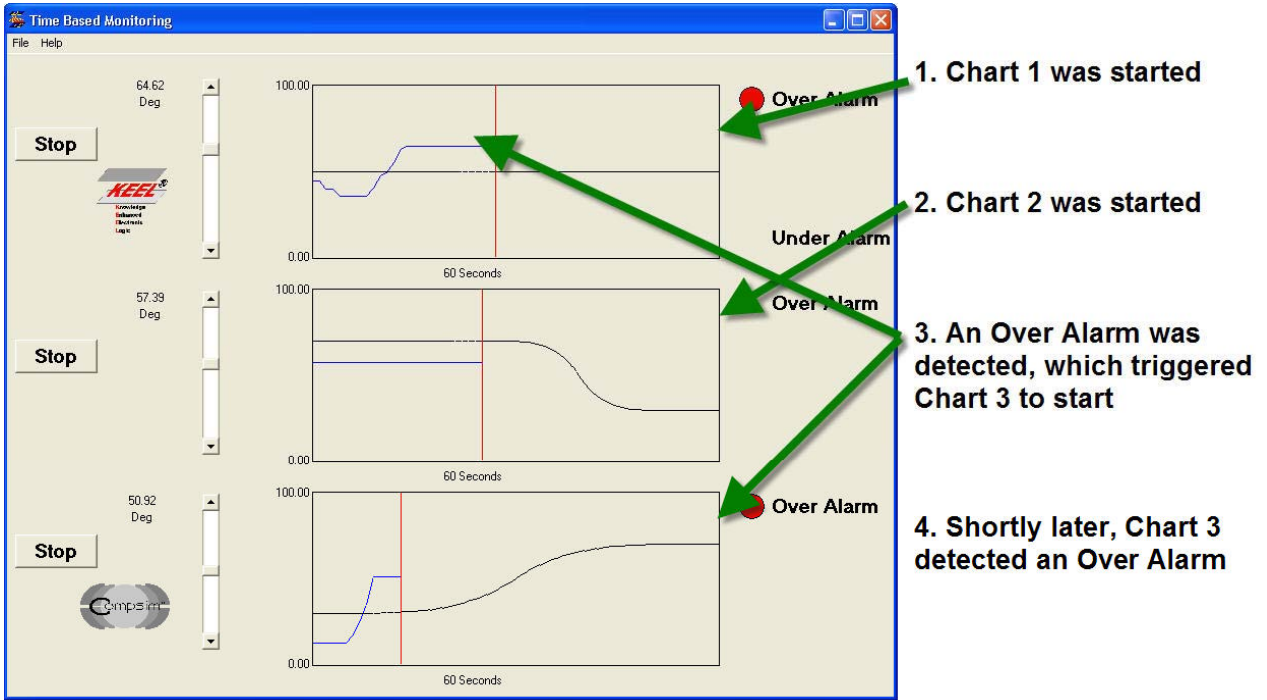
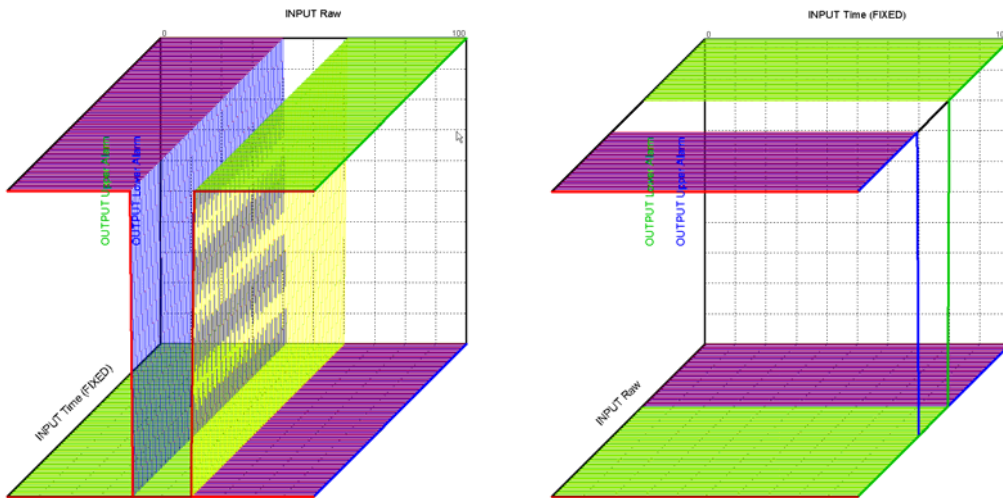


Chart 2 and 3 will run until completion or to when the user hits his Stop button). Chart 1 will continue independently (refreshing each time it completes a scan). If Chart 3 completes its scan, it can be re-triggered again by Chart 1.

KEEL Configuration of the Curves

In this demonstration, three curves were developed with the KEEL Toolkit. The first curve is just a horizontal line where alarms are to be generated 10% above and 10% below a line drawn through the 50% gradient of the graph. Using the KEEL Toolkit graphing capability the alarm conditions are shown below.

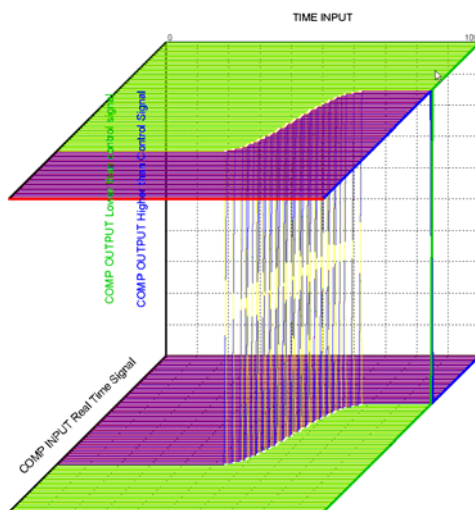
Curve type 1



The images above show the same data rotated for different views.

In this demonstration, the system is either IN the alarm state or NOT IN the alarm state.

Curve type 2



The graph to the right shows the type 2 curve graphed from within the KEEL toolkit. Control signals that allow the curve to be tuned by the user are exposed in the design.

The type 3 curve is developed using similar techniques. Both type 2 and type 3 curve characteristics are derived from a library of curve designs provided with the KEEL toolkit.

This is a demonstration of KEEL technology

A production system focused on time based monitoring would likely contain a library of curves suited for different needs. The user interface to the curves is intended to introduce the user to the capabilities of a KEEL based solution. It would also be possible to package a complete time based monitoring function inside a device without a user interface. By integrating the time based monitoring function with other KEEL Engines focused on problem analysis, a complete diagnostic / prognostic solution with response tactics could be delivered.



Compsim LLC is a provider of next generation cognitive technology for application in automotive, industrial automation, medical, military, governmental, enterprise software and electronic gaming markets. The company is headquartered in Brookfield, Wisconsin.

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