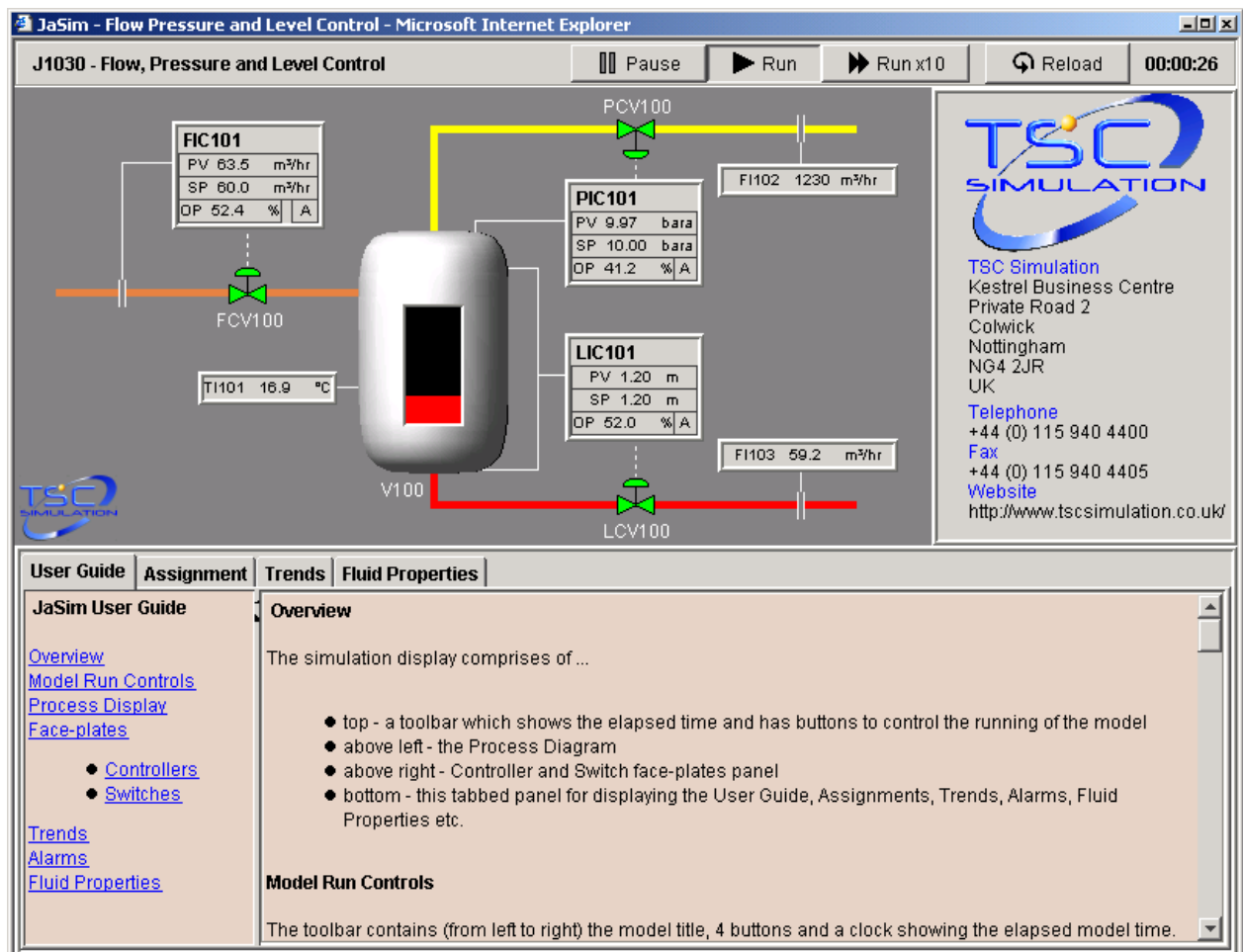


INTRODUCING JaSim®

JaSim® is a brand-new range of web-enabled Dynamic Process Simulations written in Java Software, for training in process and control, using engineering level mathematical algorithms.

- Complete with User Guides and Training Assignments, the Models are suitable for both individual and class training. They may be run on most modern computers and systems, including Microsoft Windows PC's, Mac, Sun, and Linux.
- The system is based on TSC's 25 years experience of providing dynamic process training models to clients such as BP, Shell, ExxonMobil, and many others.
- The system is introduced with a range of Models that will be expanded rapidly.

Each JaSim® model may be installed from a website download or from CD ROM. The start up display for the model J1030 Flow, Pressure and Level Control, for example, is:



JaSim - Flow Pressure and Level Control - Microsoft Internet Explorer

J1030 - Flow, Pressure and Level Control Pause Run Run x10 Reload 00:00:26

Process Diagram Data:

- FIC101:** PV 63.5 m³/hr, SP 60.0 m³/hr, OP 52.4 %
- PIC101:** PV 9.97 bara, SP 10.00 bara, OP 41.2 %
- LIC101:** PV 1.20 m, SP 1.20 m, OP 52.0 %
- TI101:** 16.9 °C
- Flow Rates:** FI102 (1230 m³/hr), FI103 (59.2 m³/hr)

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User Guide Overview:

The simulation display comprises of ...

- top - a toolbar which shows the elapsed time and has buttons to control the running of the model
- above left - the Process Diagram
- above right - Controller and Switch face-plates panel
- bottom - this tabbed panel for displaying the User Guide, Assignments, Trends, Alarms, Fluid Properties etc.

Model Run Controls:

The toolbar contains (from left to right) the model title, 4 buttons and a clock showing the elapsed model time.

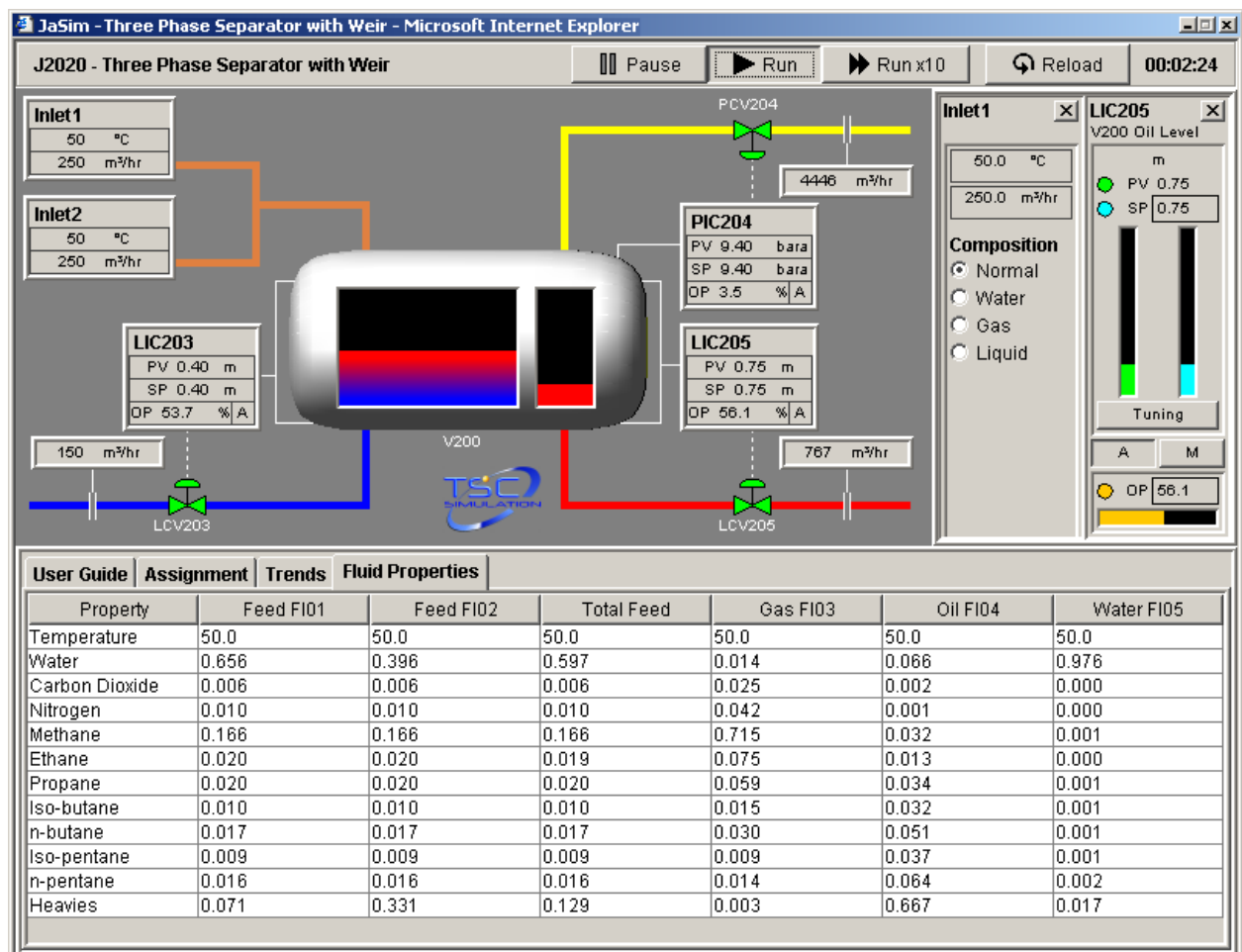
Range of Models

JaSim[®] is introduced with a range of Models, which will be expanded rapidly over the coming period. These include:

- *J1010 Three Term Control Loop*
- *J1030 Flow, Pressure and Level Control*
- *J2010 Direct and Cascade Control*
- *J2020 Three Phase Separator with Weir*
- *J2100 Basic Pump Operations*
- *J3010 Basic Centrifugal Compressor*
- *J3020 Basic Distillation Column*
- *J3070 Basic Refrigeration System*

Training Features

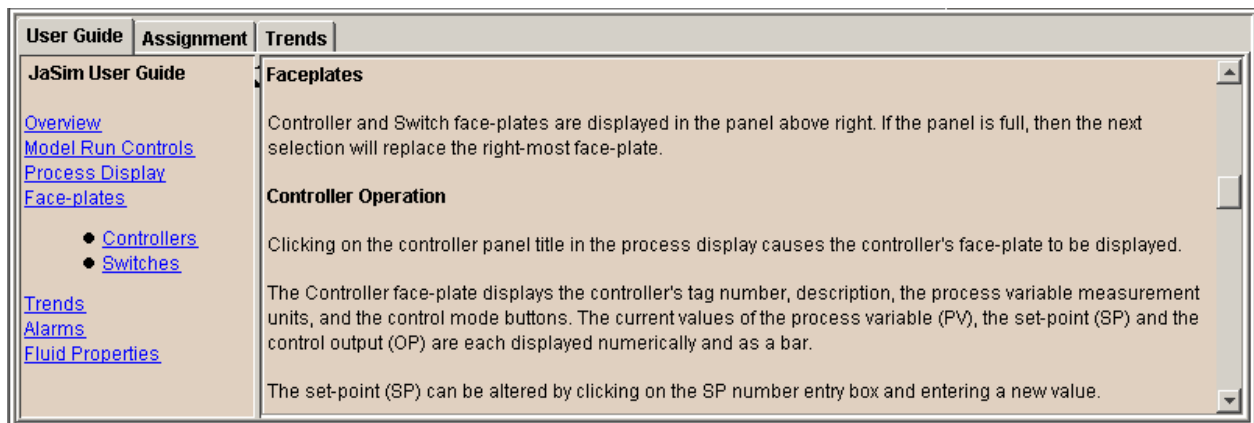
Where appropriate, the model displays are enhanced by dynamic coloured graphics, fluid properties and other display information. An example of a more complex model is provided by J2020 Three Phase Separator with Weir. The display for this is shown below:



The **JaSim** graphical display comprises:

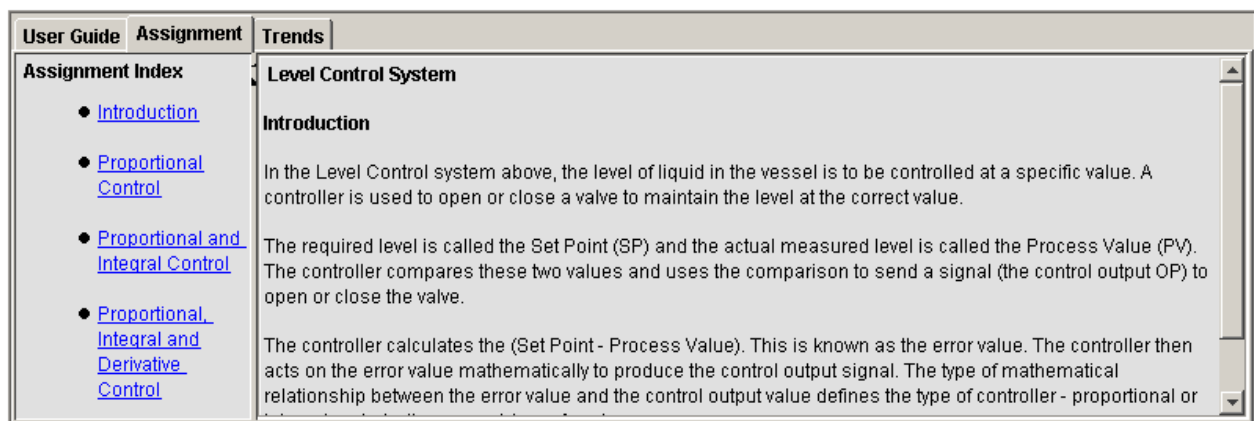
- Top - a toolbar which shows the elapsed time and has buttons to control the model to run at real time, or at a higher speed, and to pause. The start-up conditions may also be reloaded from this toolbar.
- Above left - the Process Display, laid out as a modern DCS Graphic Screen.
- Above right - Controller and Switch scratch-panel (Shows the TSC logo on start-up)
- Bottom - a tabbed panel for displaying the User Guide, Assignments, and Trend Charts. More advanced models include tabs for Alarms, ESD systems, Fluid Properties etc.

The **JaSim** User Guide includes a hotlink index, for example clicking on the “Controllers” index will scroll the Guide to the correct heading:



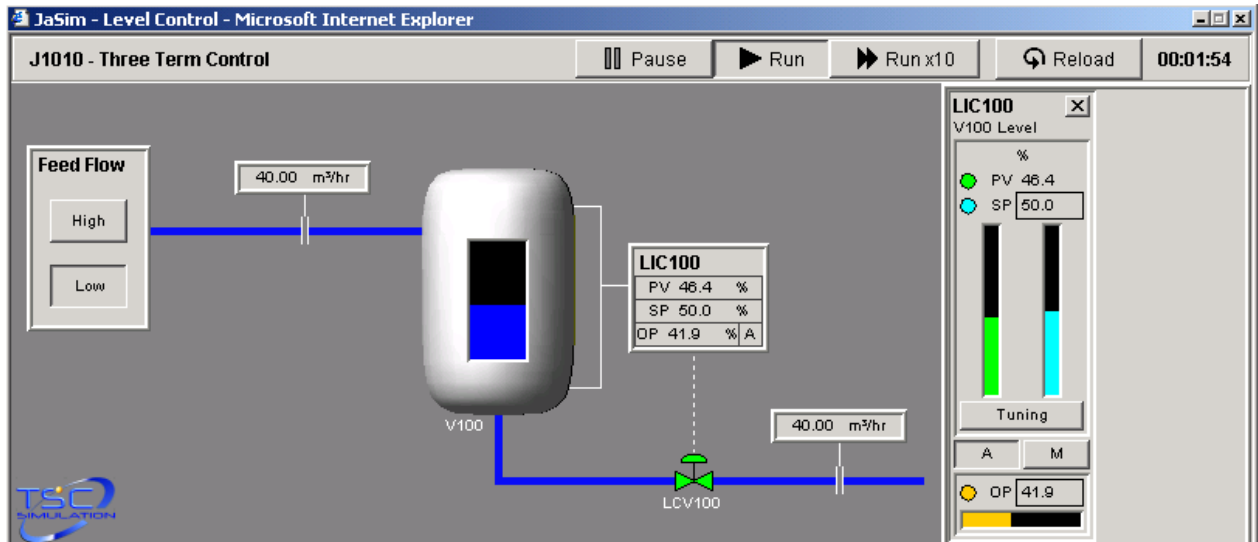
Suggested **Assignments** are also supplied:

In the example below of J1010 Three Term Control, these guide the Trainee to determine the Ultimate Gain and Ultimate Period, and to calculate the optimum P I and D settings using the Zeigler Nichols formulae. This Assignments page is selected by a tab, scrolls down in the lower half of the display screen, and also includes a hotlink index.

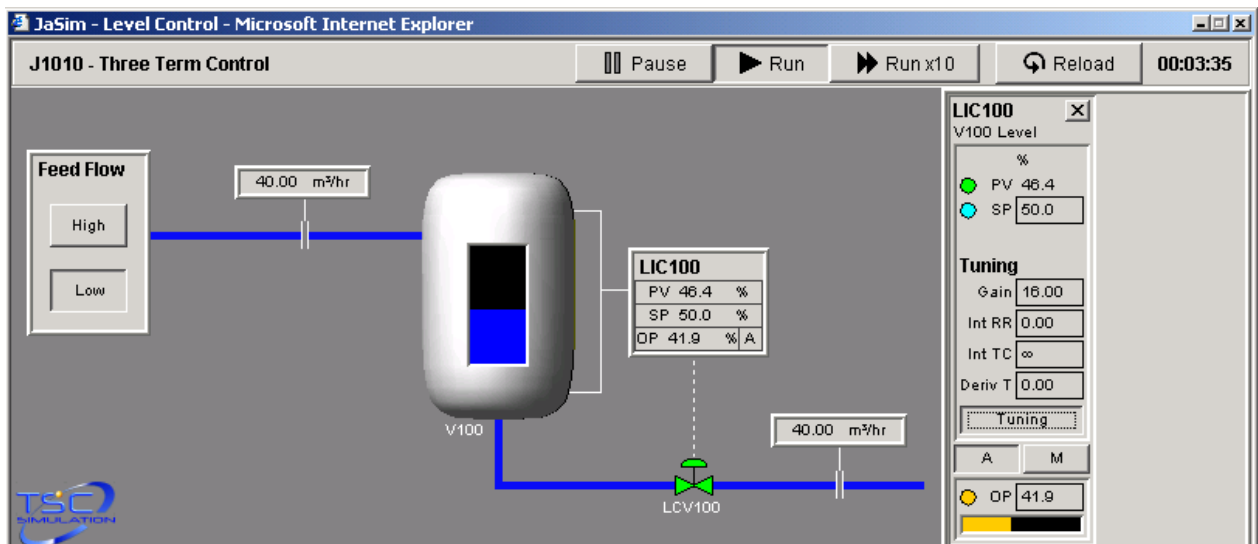


The JaSim® Controller

Clicking on a **Controller** label brings up a generic style controller on the scratchpad faceplate area to the right. The controller Set Point and Output are adjusted by selecting and replacing the value shown. The faceplate also allows Manual or Auto selection, and a visual bar graph of the three variables:



Within the controller faceplate, clicking on the **Tuning** button allows the P I and D values to be displayed and changed:

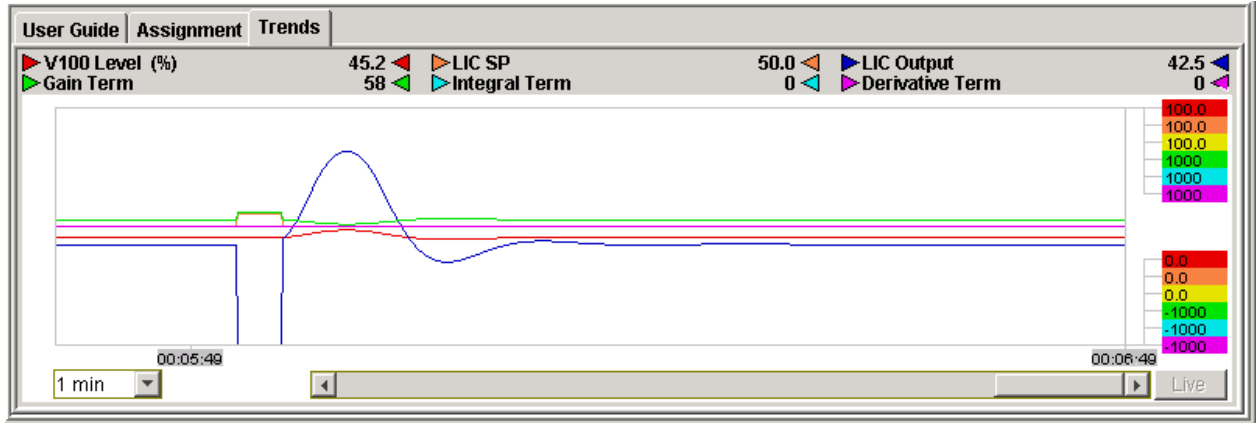


For example, the J1010 Three Term Control model uses the Controller features for tuning exercises. Measurement of ultimate period and critical gain values from the Trend Chart are used to enter values from standard PID calculations, to show the effect on the control loop.

This model can also be used to demonstrate other aspects, including the effect of liquid head on flow, and the limiting effect on the available Set Point range of the valve C_v at different flows.

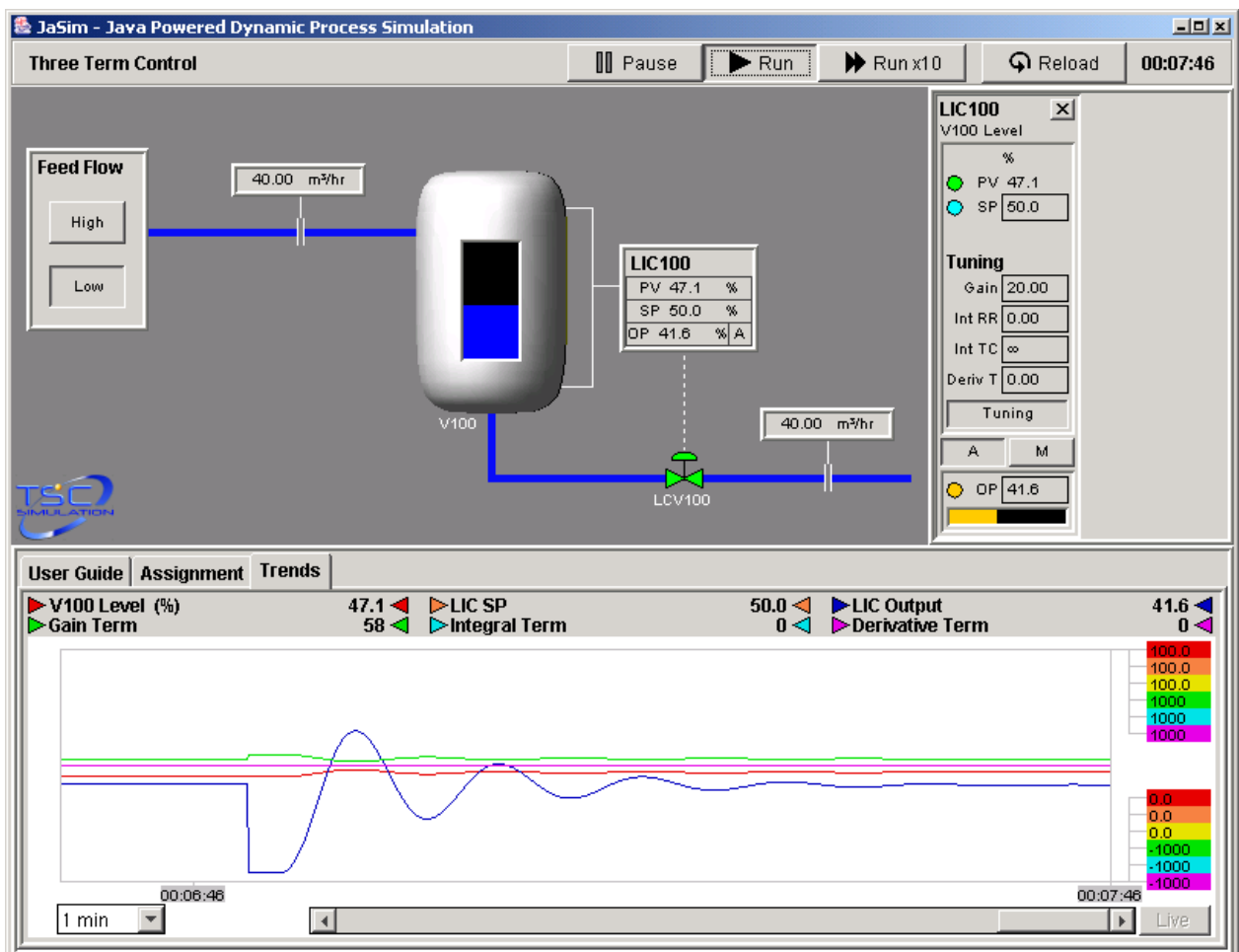
Example from JaSim[®] model J1010 Three Term Control

As an example, for a Proportional Gain only system, if the gain is reduced to 12, a disturbance is made, and the system is allowed to settle, the response will be shown on the Trend Chart:



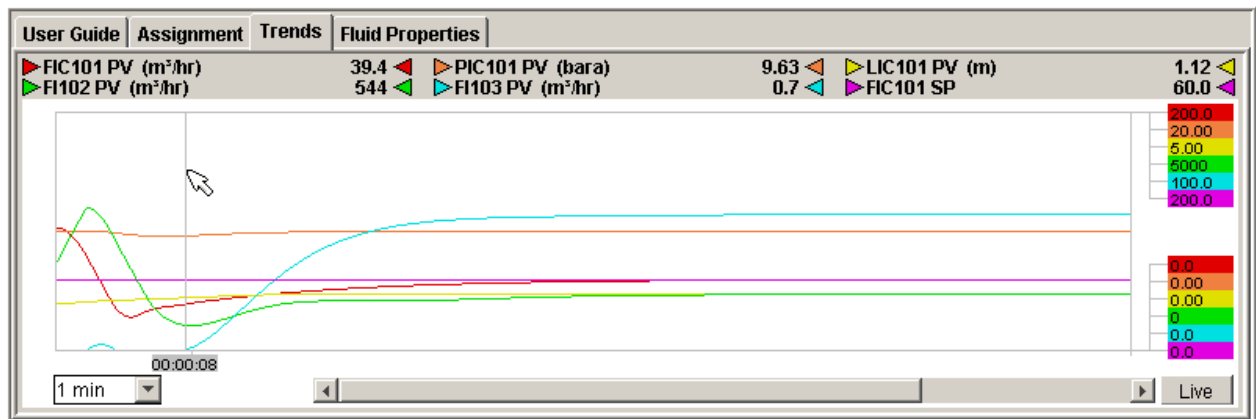
When the gain is increased to 20, the Trend Chart shows a reduction in the steady state error at the expense of stability of response.

Each Trend Chart also includes the ability to read the time and trend values at any point simply by clicking the cursor at that point within the chart area.



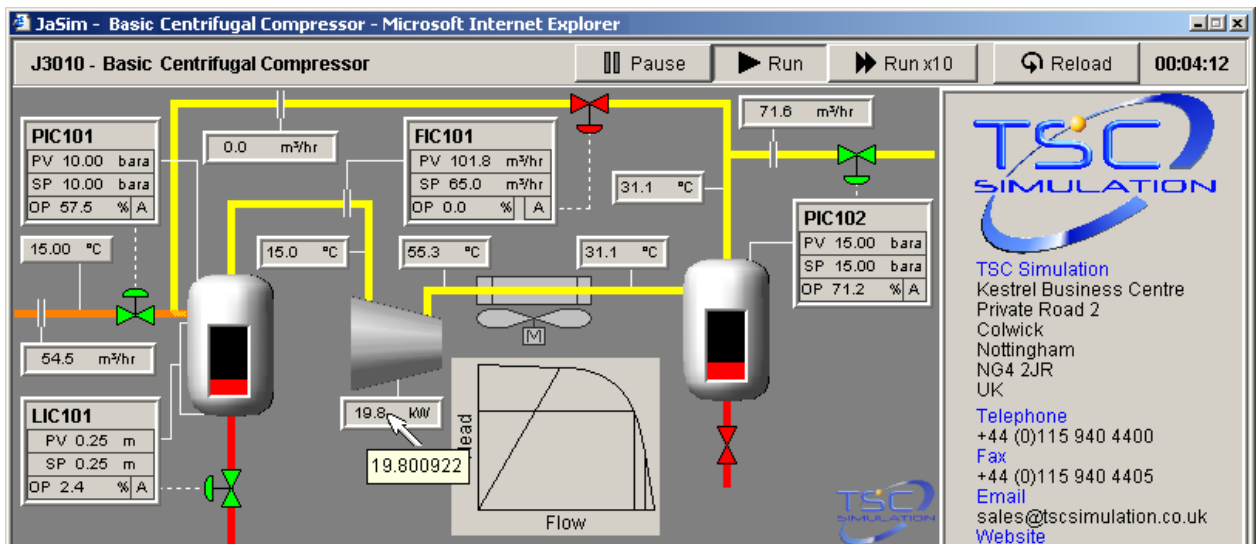
The JaSim® Trends Display

The comprehensive Trends Display which is available in the lower half of the page, allows 6 Channel and time base selection, Channel ranging, and full historical value recording. The display below gives an example showing the settling of the J1030 model during the first few minutes of running. In this example, the cursor has been clicked at the point where the FI 103 measurement has started to rise, showing the time and values at that point:



The models use **Full Engineering Level Mathematical Analysis**.

In addition to allowing a basic understanding of each process, the models may also be used to explore other aspects of the particular subject. To use the full mathematical capability, increased fidelity displays may be selected simply by holding the cursor on a variable value for a couple of seconds. This automatically brings up a greater precision display of the value, as shown on power display for the J3010 Basic Centrifugal Compressor model below:



The models include multiple component fluid stream data where appropriate, for example in separation (as shown on Page 2), compression, and distillation models, together with high fidelity process modelling.