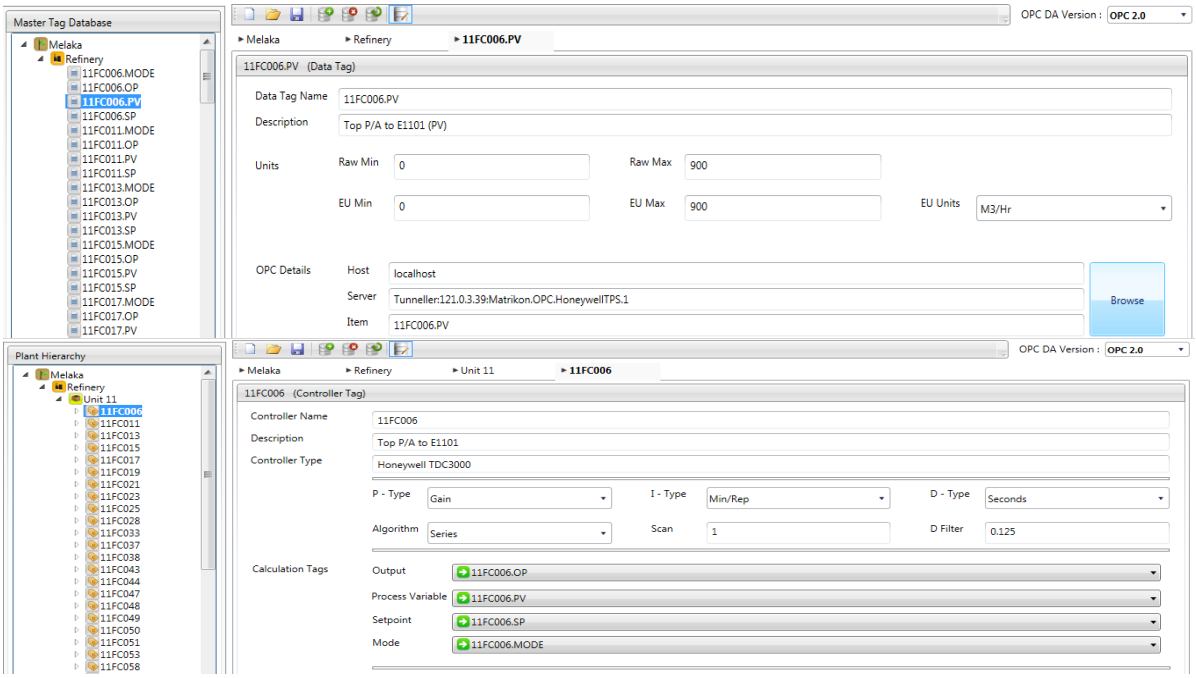
TECHMATION

ProtunerPlus™

The ProtunerPlus™ is suite of programmes designed to test and optimise the operation of regulatory control systems. Dynamic test data on operating control systems can be collected in real time utilising OPC or static data imported from a .CSV formatted file. The dynamic test results are analysed using the powerful routines to troubleshoot and optimally tune the system being tested.

Master Tag Database (MTD)



The Master Tag Database allows the user to create, edit and save all details relevant to a unique data tag or a complete controller.

- The database stores information in a three tier hierarchy, namely Location, Plant and Unit with the main MTD being assigned to a Plant and Controllers assigned to a Unit.
- The Master Tag Database holds information to create the Configuration files that are used in the Data Acquisition Suite and the Controller Database holds required information needed in the Analyzer and ProMonitor™.
- The Master Tag and Controller Databases can be created manually or imported from files stored in a CSV format.
- When MTD edit form has a handy OPC Browser that enables the user to quickly and accurately fill in the details of the OPC server

TECHMATION

Data Acquisition (DAQ)

The Data Acquisition suite is an intuitive software programme which is easy to configure and use. Features include:

- Direct or network connection to your system using a control system specific OPC server and the ProtunerPlus™ generic OPC client driver
- All configuration files are saved for ready deployment at a later time
- High speed real time trending of control system variables
- Zooming and full cursor control of real time trend data
- User selected data window time and total sample time with on the fly total sample time changes
- Automatic scaling and storage of data with selectable Moving Average Filtering.

File Conversion Features:

- Protuner™ 32 PSA format to ProtunerPlus™ PSAX format
- Protuner™ 32 PSA data files to CSV format and vice versa
- ProtunerPlus™ PSAX format to CSV format and vice versa
- Automatic conversion of percent to EU or EU to percent

TECHMATION

ProtunerPlus™ Analyzer

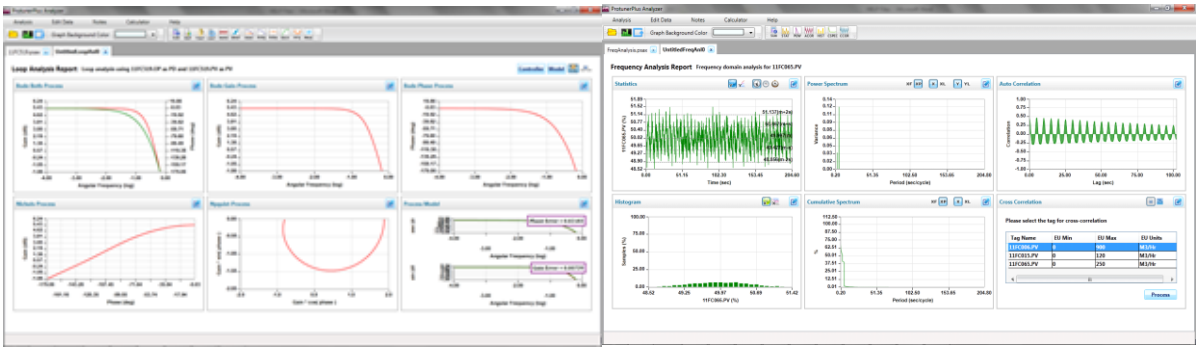
The ProtunerPlus™ Analyzer is a powerful programme specifically designed with all the tools to effectively analyse, interpret, and document the dynamic characteristics of an installed control system. The System Analysis software documents the controllability of a system, problems with valves, quality of measurement signals, installed linearity, and the optimum tuning parameters for individual loops and dynamic de-couplers between loops.

Data Editing Features:

- Edit and overwrite raw data using Filter Data and Graphic Edit functions
- Tab to display all data or individual data traces
- Window and zooming functions
- Text notes – Attaches notes to file for documentation
- All values displayed with cursor showing position of time.

Loop Analysis Data Preparation Features

- Select data representing the process demand (PD) and process variable (PV) of controller being tuned
- Window and zoom step test data to identify best test data representing true loop dynamic response
- Graphic editing feature to remove excessive noise from recorded data and saves edit data as part of tuning Record without overwriting original data.
- Lag and averaging filter constants are graphically added to real process variable data to graphically determine optimum controller filter tuning constant. The filter constant chosen is then used in calculation of tuning parameters.
- Calculation and documentation of valve hysteresis and dead band and signal noise on unfiltered and unedited test data
- Tuning procedure determines loop transfer function utilising Techmation Inc. exclusive point to point digital Laplace transformation of test data from time zero to time infinity and table of tuning parameters utilising pole cancellation and gain margin, phase margin and damping factor criteria based on user specified controller algorithm.



TECHMATION

Loop Analysis Report

- Tab to display complete Loop Analysis Tuning Report Data
- Report tab displays complete tuning report summary including: table of tuning parameters, loop data documentation, loop signature report, and controller setting used in the analysis
- Test Data tab displays the test data used in the analysis
- Loop Data tab displays the step test data used in the analysis of the process transfer function including raw data, edited data, and filtered data.
- Noise tab displays the steady state data used in the calculation of the signal noise and features include the ability to recalculate the signal noise
- Hysteresis tab displays the test data used in the analysis of the valve hysteresis and features include the ability to recalculate the hysteresis
- The Bode Both, Bode Gain, Bode Phase, Nichols, and Nyquist tabs display the plots representing the solutions for the open loop process transfer function at hundreds of frequencies. The plots can be displayed combined with the controller tuning parameters from the Loop Analysis Report tab or with user entered tuning parameters.
- Model tab displays the Bode gain and phase plots of the actual process transfer function overlapped with Bode plots of the Model transfer function calculated for use in the Simulator. The modeling feature allows you to modify the model parameters to achieve a better fit to the real Bode plots of the process transfer function to improve the accuracy of the simulation.
- Text notes can be added to the Loop Analysis Report Record
- The Loop Analysis Report can be saved as a Record quickly retrieved
- The Loop Analysis Report can be exported to a Microsoft Word file

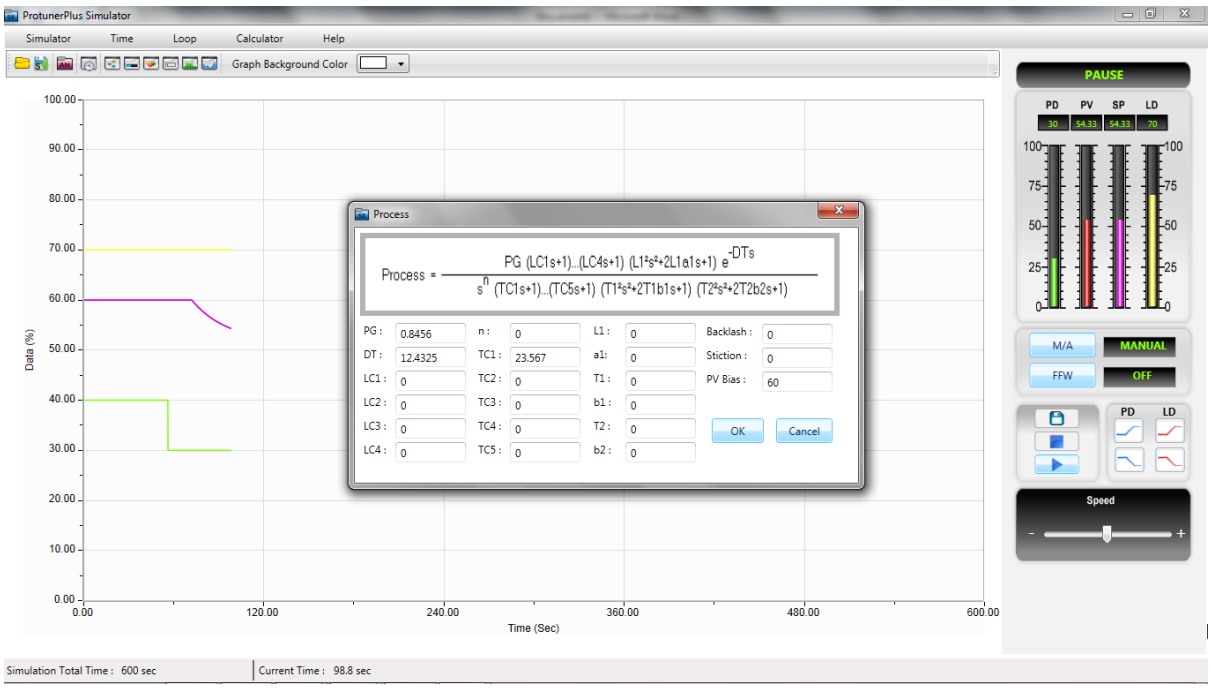
Frequency Analysis Functions

- Test Data tab displays the raw test data originally chosen for the Frequency Analysis and allows the user to window a new section of data for analysis. The new data selection automatically updates all analysis functions
- Synopsis tab displays the Statistic, Histogram, Power Spectrum, and Cumulative Spectrum plots on a single page
- Statistics tab displays statistical analysis report on data being analysed
- Histogram plot is a plot of the percentage of the data values that are within a range of process values (a cell). Together all the cells span the range of the data. The value of the mean plus and minus two standard deviations is printed at the bottom of the plot.
- Power Spectrum plot shows the mean square intensities of the cycles (harmonics) plotted against frequency (or period).
- Cumulative Spectrum plot of the integrated normalised intensities from the power spectrum calculation which shows, for a given frequency, the relative contribution of it and all lower frequencies to the variance of the time series data.
- Auto Correlation plot shows the correlation amplitude as the Y-axis and the time as the X-axis. The span of the X-axis is based on the number of lags
- Cross Correlation shows the correlation amplitude as the Y-axis and the lag time as the X-axis. The variable selected for the analysis is cross correlated against second variable. A significant positive lag time means the variable selected is behind (lags) variable 1.

Loop Simulator

The full function dynamic Loop Simulator allows you to test the open and closed loop operation of control loops to user defined load upsets and setpoint changes offline. The transfer function constants can be directly entered, or downloaded from the ProtunerPlus™ Plus Loop Analysis records, to describe the simulated process. Controllers can be accurately defined to duplicate any of the PID algorithms implemented by the various system manufacturers. Among the Simulator features are:

- Feedforward decoupling
- Variety of specialty nonlinear PID algorithms
- Recorded simulation can be ran as a data file
- Simulation setup can be saved as a file
- Load and/or Input variables can be configured as a Step, Function, Ramp or data from an external file



ProMonitor™

The ProMonitor™ generates useful indices showing the health of single or multiple controllers and/or the performance of selected controllers within an operating Unit.

ProMonitor™ features are:

- All data normalised as a percentage allowing for direct comparison between controllers irrespective of their engineering units.
- Special algorithms that normalise values which are sample rate dependent such as IAE, ISE and the respective Travel indices. This allows for direct comparison between controllers irrespective of their data sample rates

Calculator

The user can select the standard Windows calculator or the ProtunerPlus™ Calculator which is a full featured programmable calculator with algebraic notation and 24 callable functions.