

Profit SensorPro

Powerful Data Analysis and Inferential Modeling



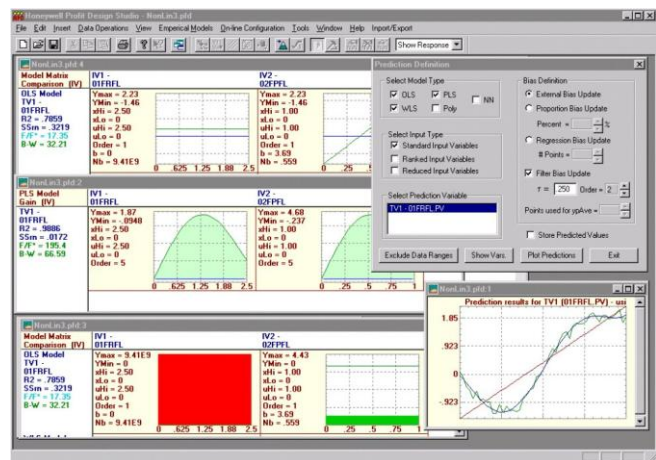
Profit® SensorPro is an innovative data analysis and regression tool used to develop reliable models for online prediction and soft sensor applications. Part of Honeywell's Profit Suite™, Profit SensorPro delivers low-cost process monitoring and improved control and optimization capability with less reliance on lab-based or online analyses.

Profit SensorPro enables the detailed analysis of complex data sets using a suite of advanced mathematical tools, including ordinary least squares (OLS), weighted least squares (WLS) and partial least squares (PLS) regression, dynamic sub-space (DSS) and user-entered structure (UES) models. Variable selection is simplified with principal component analysis (PCA) and statistical variable ranking. Additional capabilities include dynamic compensation and automated variable combination and transformation utilities.

This convenient data analysis and inferential modeling tool simplifies the task of identifying and developing soft sensor relationships among process variables. These relationships provide the user with a better understanding of the process operations with online capability for real-time quality control, and with improved monitoring, advanced control and optimization strategies.

Profit SensorPro capabilities include the development of linear and nonlinear models for offline analysis and online deployment. In an online implementation, Profit SensorPro also ensures that model accuracy is effectively maintained through online model updating with periodic laboratory or online analyzer feedback information. Offline and online models can also be used seamlessly with other Profit Suite products, such as Profit Controller and Profit Optimizer, to improve plant profitability.

Profit SensorPro operates in an intuitive, interactive fashion and is a complementary part of Profit Design Studio, the standard design environment for other Profit Suite components.



Profit SensorPro's offline model development environment allows different models to be easily developed and compared.

Benefits

Profit SensorPro provides the following benefits:

- Low-cost, reliable, online product quality indication
- Less reliance on laboratory and online analyses to continue controlling during a lab service interruption or analyzer failure
- Improved capability for process monitoring, process control and optimization applications

Features

Offline Model Development Tools

Accurate, high-quality, inferred property calculations are key inputs for optimization, multivariable control and advanced regulatory control strategies. Profit SensorPro provides the necessary tools in an integrated design environment to address all of your inferential modeling needs. Furthermore, this product excels at addressing the most challenging issues encountered in the development of accurate inferential models.

Input variable selection is simplified using statistical variable ranking and PCA techniques, which highlight input variables having the most impact on the output variable of interest.

Nonlinear variable relationships are addressed with two sophisticated methods:

- **PLS** regression provides an nth-order polynomial subspace technique to provide powerful modeling capabilities for complex and nonlinear property estimation.
- **UES** equation allows users to enter nonlinear (or linear) equation forms, and perform an SQP search to determine coefficients and bias terms from plant data.

Highly correlated data is handled by two sophisticated statistical techniques. PLS and PCA help the user generate inferential models that are better suited for online use.

Outlier data can be processed using WLS regression that automatically detects and adjusts for the presence of suspect data.

UES allows users to define and generate their own regression structure (linear or nonlinear) for inferential properties. Also allows manual input of regression coefficients or bias as constraints on the SQP solution or complete manual entry of inferential equation form.

Dynamic compensation allows users to define the dynamic relationships between the input and output variables in terms of a Laplace transform matrix.

DSS regression provides a fully automated procedure for development of dynamic inferential properties. All dynamic relationships, regression coefficients and bias terms to define the most accurate inferential are automatically determined and then presented to the user in “real space” terms: dynamics are represented by Laplace transforms and regression in terms of numerical coefficients.

Proper model configuration is aided through configuration defaults and visual displays that compare the effects of model parameters and model types.

Lab and Analyzer Bias Update is automatically configured for all model types and has optional CUSUM statistical rules to provide a more rigorous management of model updates.

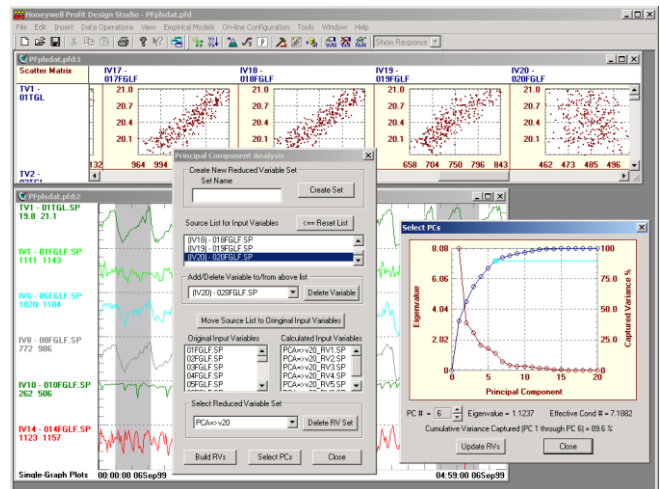
Online Integration

Once a model has been developed, it is automatically integrated into Honeywell’s online execution environment which supports analyzer and/or laboratory update capability, ensuring that the model accuracy and capability is effectively maintained. Use with advanced applications such as Profit Controller, Profit Optimizer or any other Profit Toolkit component.

Broad Application

As a generalized inferential modeling package, Profit SensorPro can be applied to parameter estimation problems in practically any plant in any process industry, including:

- Oil refining
- Chemicals/petrochemicals
- Pulp and paper
- Power generation
- Mining and minerals



Models can be simplified using techniques such as Principal Components Analysis.

Profit SensorPro helps identify complex relationships among large numbers of process variables and then facilitates the use of that information to improve plant operations.

Industrial Applications

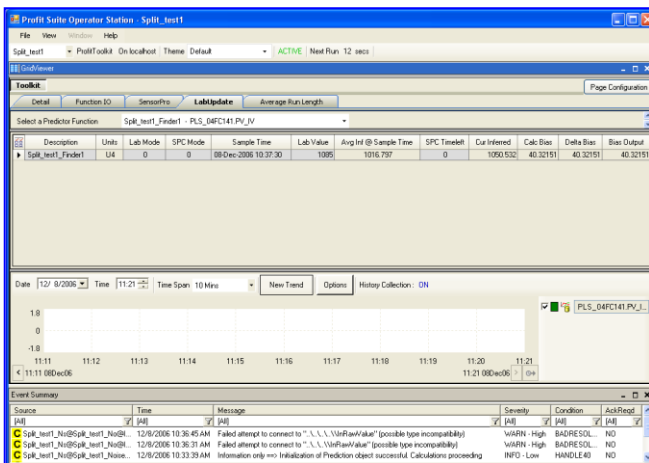
The generic structure of Profit SensorPro supports applying the technology to solve a variety of process-related problems.

Process Analysis

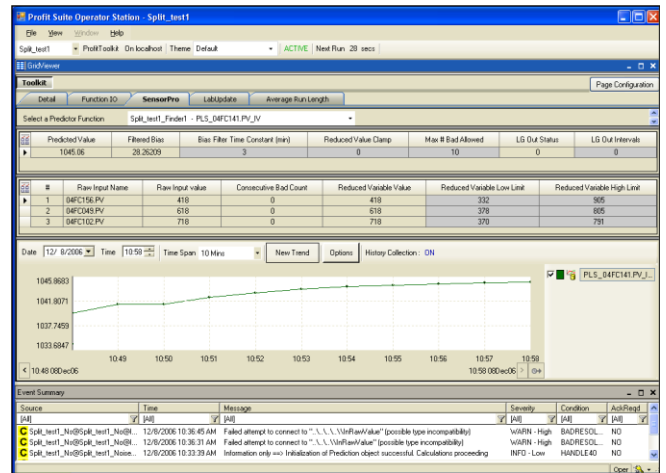
Profit SensorPro can be used to identify underlying process relationships and help answer questions as well as troubleshoot and improve process operations.

Real-time Quality Control

Profit SensorPro models can accurately predict end-product qualities commonly measured by lab testing and online analyzers. This information can then be used to maintain tighter product quality control in real time without the long delays commonly associated with lab analyses and online analyzer results. When new lab analyses or online analyzer results are available, they can be used to update the Profit SensorPro models.



Profit SensorPro's lab and analyzer update user interface is integrated with Profit Suite Operator Station



Operator Station provides ultimate flexibility in layout and accessibility.

On-line Analyzer Alternative

Profit SensorPro models can completely replace the need for some online analyzers, possibly saving purchase, installation and maintenance costs associated with these hardware products.

Profit SensorPro models can also be complementary to online analyzer installations by offering a backup “virtual analyzer” when the online analyzer is down for maintenance.

Advanced Control and Optimization

Although Profit SensorPro results provide valuable information when used offline as an analysis tool or online for open-loop supervisory control, maximum benefits are achieved when the model results are used as online inputs to closed-loop multivariable control and optimization systems. In many cases, these inferential variables are key inputs into higher level control systems, which allow process optimization objectives such as feed maximization or product-value optimization to occur.

System Requirements

Profit SensorPro offline design software runs on Windows XP Professional or Windows 7 Professional operating systems. An Intel Xeon E5506 equivalent or higher microprocessor and 2.0 GB of RAM is recommended due to the computational requirements of this application.

Profit SensorPro online implementation software runs on the Experion® Application Server, Honeywell TPS APP Nodes, and open platform operating systems with Windows XP Professional, Windows 2003 Server, and Windows 2008 Server operating systems. An Intel Xeon X5560 equivalent or higher microprocessor and 3.0 GB of RAM is recommended due to the computation requirements of the application. Open implementation of Profit SensorPro on non-Honeywell distributed control systems through direct OPC connections or Honeywell's PHD software.

Training Services

Training courses covering Profit SensorPro theory, concepts and implementation are available through Honeywell's Automation College, www.automationcollege.com. On-site courses are available on request.

More Information

For more information on Honeywell's advanced control and optimization solutions, www.honeywellprocess.com or contact your Honeywell account manager.

Automation & Control Solutions

Process Solutions

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