

Profit Controller Multivariable Control and Optimization Technology



Honeywell's Profit[®] Controller application allows easy implementation of multivariable control and optimization strategies. Profit Controller's economical and robust algorithm provides safe control of complex and highly interactive industrial processes. It has the unique ability to maintain superior process control even with significant model mismatches resulting from underlying process changes.

Honeywell's patented Profit Controller application includes the necessary tools to design, implement and maintain multiple-input/multiple-output (MIMO) applications.

Benefits

Maximum Process Efficiency – The advanced multivariable control algorithm balances performance and robustness objectives against process economics to minimize costly process movement.

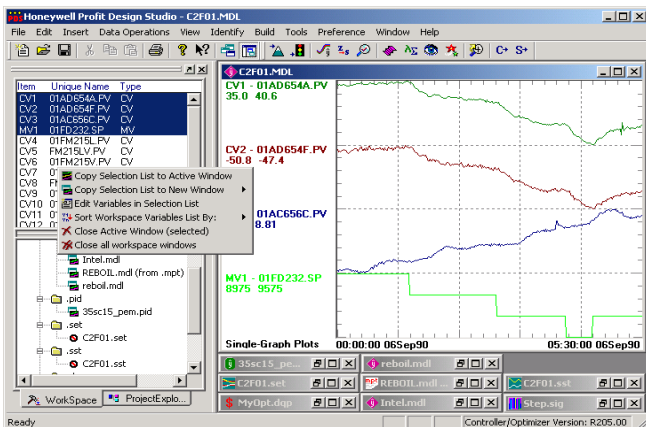
Flexibility to Meet Process Needs – A configurable control response path allows tailoring of control performance to meet process objectives.

Optimum Control Performance - Independent feed-forward and feedback control tuning provides optimum control performance for changes in both control targets and process disturbances.

Enhanced Robustness – The configurable funnel-based approach to range control delivers enhanced robustness versus target-only approaches, while providing flexibility in control performance.

Best-in-Class Operator Interface – Profit Controller provides unmatched man-machine interface capabilities by offering both Profit Suite[™] Operator Station (a .net-based environment compatible with all modern DCS) and the HMIWeb APC Shape Library (for use with Experion[®] R300 and later). Both environments provide maximum flexibility in the design of the user environment, workflow integration with existing operator work processes, and diagnostic tools to promote increased understanding of the APC applications controlling their plant. The end result is a net increase in operator effectiveness, higher application uptimes and more appropriate utilization of your plant's APC investment.

Easy Maintenance - Range control design enables easier tuning and enhanced performance. Robust control design reduces tuning needs.



Typical Profit Design Studio session for Profit Controller design, simulation and deployment

Profit Controller utilizes a dynamic process model to drive maximum value through the following steps:

- Predict future process behavior
- Control the process using the minimum manipulated variable movement necessary to bring all process variables within limits or to set points
- Optimize the process with the remaining degrees of freedom to drive the process to optimum operation

Features

Range Control Algorithm Minimizes Model Uncertainty

Profit Controller uses the Honeywell patented Range Control Algorithm (RCA). RCA minimizes the effects of model uncertainty while determining the smallest process moves required to simultaneously meet control and optimization objectives. Its innovative handling of control through funnels rather than specified trajectories provides the controller with additional degrees of freedom to enhance dynamic process optimization.

Hard and soft limits allow the user to control optimization limits separately from control limits to effectively manage the extent to which optimization is imposed on the process. In addition, the optimization speed is configured independently from desired control performance tuning to allow users to balance control objectives with economic objectives.

Product Value Optimization

Profit Controller's engine employs both a linear and a quadratic objective function to provide the user with maximum flexibility in implementing the optimization strategy that best fits the needs of the application. All application variables can be maximized, minimized or specified as desired targets that will be honored under optimization conditions.

The most powerful optimization scenario occurs when true process economics are directly entered into the controller (in either the independent or dependent variables). This technique, commonly known as Product Value Optimization (PVO), allows the overall economics of the process to be optimized by allowing the controller to dynamically determine the best economic operating condition of the unit based on input variables such as product prices, feed prices and utility costs. This technique has also been successfully applied in optimizing product yields within quality constraints to generate the best mix of on-spec products.

One-Knob Tuning Simplifies Engineering Effort

With Profit Controller, a single performance ratio is available for each controlled variable to adjust the desired control response independently from the other controlled variables. This approach is more intuitive than setting interactive weighting factors on application variables as is typically necessary in competing multivariable control products.

Feed-forward Inputs Optimize Control Performance

In addition to simplified controller tuning for general operation, Profit Controller employs a patented technique that allows the controlled response of feed-forward inputs to be tuned

independently from the controlled response of feedback inputs. This allows aggressive feed-forward disturbance rejection without introducing instabilities in controller feedback.

Easy Implementation of Advanced Control Strategies

Profit Controller provides model flexibility in the overall controller structure, allowing control parameters to be adjusted while the controller is online. This powerful functionality simplifies the deployment and commissioning of advanced control strategies to optimally solve difficult control problems such as feed quality changes, process nonlinearities and the incorporation of rigorous models.

Industrial Applications

Maximize Production Rates

Many times, process constraints can be better managed to result in higher production rates. A tray flooding constraint in a fractionation tower is a good example. Operators typically do not have time to closely monitor the symptoms leading up to a flooding event. Profit Controller adjusts the appropriate application variables to mitigate this situation when it is predicted to occur rather than as it occurs. The end result is operation at the processes' true maximum potential.

Profit Controller Improves Product Quality

Multivariable control typically results in a 50 percent reduction in the standard deviation of lab-measured product quality values. This improvement in product quality is derived from improved process stability, fewer process upsets and more consistent control across operator shifts.

Honeywell's Layered Optimization Solution

Profit Optimizer and Profit Bridge provide additional benefits for unit- or site-wide rigorous process optimization. Profit Controller provides a perfect framework for implementing high-level optimization objectives. It links seamlessly with Profit Optimizer to provide dynamic unit-wide, multi-unit or site-wide optimization for most industrial applications. When significant nonlinearities exist, Profit Bridge can be used to integrate a rigorous process model to calculate the desired target conditions of the process in the controller objective function. In either case, Profit Controller provides the base level control to bring the process to its optimal resting conditions while still controlling the process within the specified constraints.



Integrated Windows graphical user interface



Experion HMIWeb graphical User Interface

System Requirements

Profit Controller offline design software runs on Windows NT and Windows 2000. Windows XP compatibility is available with Profit Design Studio R240 and above. A Pentium III equivalent or higher microprocessor is recommended due to the computational requirements of this application. Profit Controller online software runs on the Experion Application Server, Honeywell TPS Application Module (AM) and APP Nodes, and open platform DCS running Windows 2000, Windows XP, Windows 2000 Server and Windows 2003 operating systems.

Windows XP, Windows 2000 Server and Windows 2003 are supported for Profit Controller R205.1 and later. The native TPS version of Profit Suite software supports direct implementation on AM, AxM and APP Node platforms. Native Experion implementation is supported in Profit Suite R210 and beyond. Open system implementations are supported through direct OPC connections or with Honeywell's Uniformance® PHD software.

Training Services

Training courses covering Profit Controller theory, concepts and implementation are available through Honeywell's Automation College. On-site courses are available upon request. Visit www.automationcollege.com for more information.

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More Information

For more information on Profit Controller, visit www.honeywell.com/ps or contact your Honeywell account manager.

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March 2007
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