

A photograph of an industrial refinery or chemical plant at dusk. The scene is filled with tall distillation columns, complex piping, and metal walkways. The sky is a deep blue, and the facility is illuminated by warm lights, creating a contrast with the cool tones of the twilight. The overall atmosphere is one of industrial scale and complexity.

Life Is On

SimSci™

by Schneider Electric

SimSci APC

Model Predictive Control to Improve Your Process Economics

In today's economic environment, capital budgets and overhead are constantly being cut. Companies are faced with rising manufacturing costs, global competition, and soaring energy costs. To meet these challenges, companies are forced to optimize manufacturing operations and make performance improvements that will positively affect their bottom line. SimSci® APC is new advanced process control software engineered for enhanced usability.

software.schneider-electric.com/simsci

SimSci APC –

Model Predictive Control to Improve Your Process Economics

Summary

Maximize Your Profits

SimSci® APC Model Predictive Control is comprehensive, advanced process control software that improves process profitability by enhancing quality, increasing throughput, and reducing energy usage. It uses modern, state-of-the-art technology to provide automatic control systems that are capable of releasing process potential.

Predictive control helps process operations realize their full potential by moving the process closer to active constraints — resulting in reduced process variability and increased profits.

Schneider Electric provides unique strategic solutions based on improving economics and process operation. Other vendors may propose partial solutions to optimize a process, but Schneider Electric teams with its clients to execute an integrated solution that employs sophisticated control strategies to reduce costs, streamline operations, and ultimately, increase shareholder value.

Process Control and Optimization

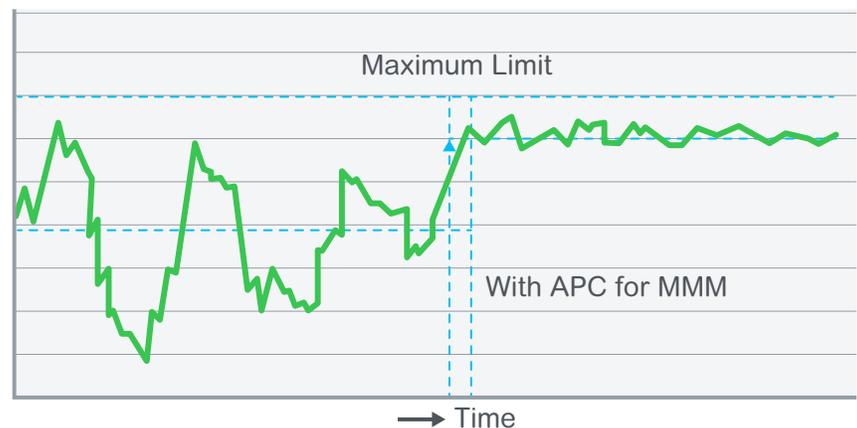
SimSci APC, new advanced process control software from SimSci, connects directly to a wide variety of automation systems and uses both real-time and historical data to analyze, identify, and model the significant cause-and-effect relationships in a process. Identification and verification of cause-and-effect relationships are powerful analytical tools that provide an engineer with valuable insight into process behavior and understanding of process characteristics.

Simsci APC – Maximizing Economic Performance

- SimSci APC moves the process toward multiple operating constraints to realize maximum profit
- SimSci APC reduces the standard deviation of key product qualities and parameters resulting in a more stable process operation
- SimSci APC leads to improvements in process efficiency, reducing rework/recycling and saving both material and energy
- SimSci APC delivers faster, more stable grade changes with virtually no overshoot

Reducing Variability for Quality Control

SimSci APC simultaneously controls a number of process parameters that maintain the product within specification. Taking into account process dynamics, interactions, constraints, and economics, SimSci APC predicts future process behavior and takes control actions before product measurements are out of specification.



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Immediate Quality Improvements Lead to Economic Benefits

Implementing SimSci APC control results in immediate quality improvements. This is confirmed by a significant reduction in the standard deviation of key product parameters from target specification, which leads to increases in throughput and significant reductions in material and/or energy consumption. The end result is measurable economic performance improvement.

SimSci APC controls a number of process parameters and orchestrates them to maintain the product within precise specifications and reduces standard deviations in product quality by a factor of two or more.

Increase Your Throughput

SimSci APC control enables the process to be driven closer to active constraints. It provides a more stable process operation with less disruption and down-time. With tighter quality control, there is less recirculation and material going to waste. These benefits contribute to increasing process yields. Typical increases range from 1-5%, however, some applications have increased yields by 10% or more.

SimSci APC Integrated Design Environment

- Identifies and quantifies integral cause-and-effect relationships, offering insight into process characteristics
- Incorporates a dynamic process model to provide tighter quality control
- Enables real-time, adaptive control to manage changing process conditions online
- Operates within physical constraints
- Maximizes process economic performance
- Includes an executive supervisory program called Director which enables almost any special process condition to be accounted for to maintain the highest possible on stream factor
- Includes a highly unique option for ARx models which are proven to have superior performance to unmeasured dynamic load changes. Since these are the primary type of disturbance found in operating plants, then SimSci APC will consistently deliver the highest possible performance of any available technology as measured by the IAE, Integrated Absolute Error, method.

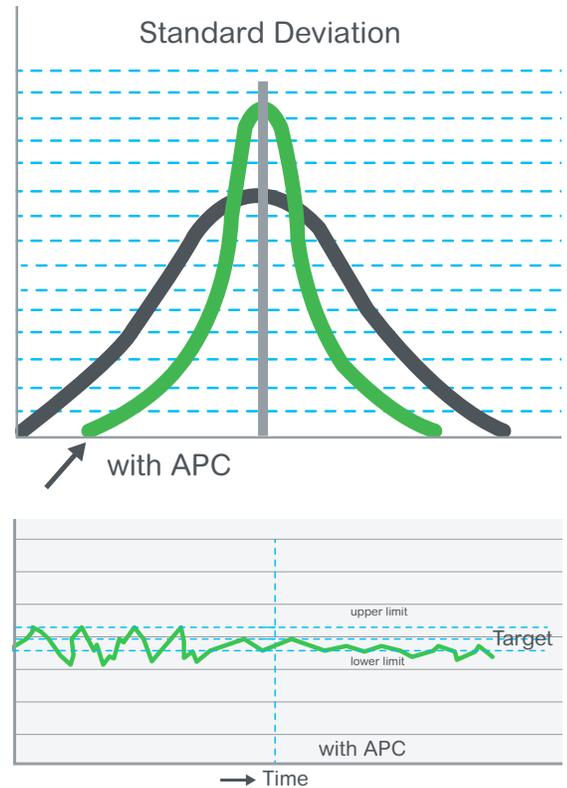
Improve Your Economic Performance

SimSci APC control also delivers significant savings with reductions in energy consumption. For example, by reducing the standard deviation and moving the process closer to constraints most processes will deliver a significant reduction in energy usage per unit of feed.

SimSci APC anticipates the consequences of both disturbances and control actions to maintain a superior quality product. Supplementing the benefits of improved quality, are increases in process yield and savings in waste and energy consumption.

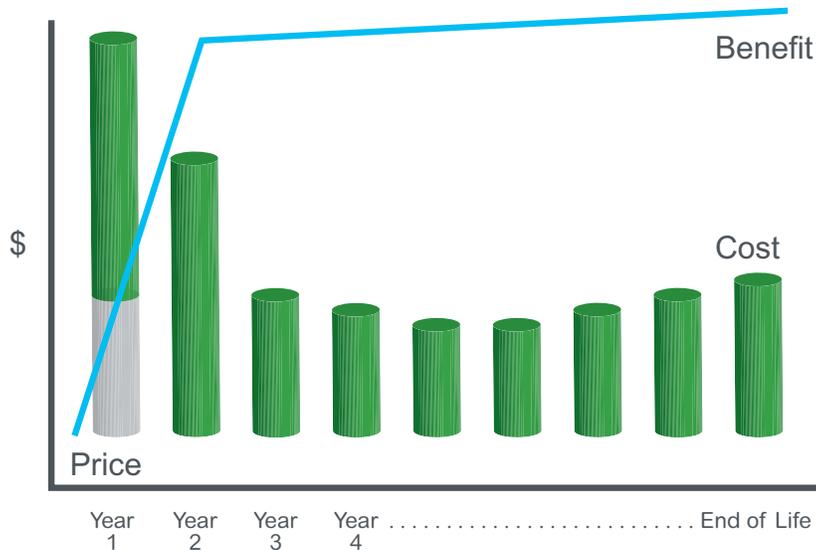
SimSci APC provides a more stable process operation with less disruption and increased process utilization. Every installation of SimSci APC pays for itself quickly. Pay back periods vary by industry, but typically range from a short 3-6 months.

- Reduce standard deviation, usually by a factor of two or greater
- Increase throughput by as much as 5%
- Increase process yields from 2-10%
- Reduce specific energy consumption by 3-10%
- Reduce waste, reworking, and recycling costs



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Simsci APC Features

- Intuitive and efficient user interface minimizes project execution effort
- Easier, case-based model identification
- Variable drag and drop for model building
- Multivariable Predictive Controller (MPC) design and simulation
- Real-time adaptive control (Coming Soon)
- Constrained linear economic optimization
- Director, supported by Python programming interface for implementation of application scripting and special-purpose control functions
- Integrated OPC Client data interface
- Data historization and trending capability
- Fully automated PRBS Testing
- ARX model option for superior unmeasured disturbance rejection performance
- Online performance monitoring and controller performance reporting
- Separation of MPC and LP optimizing functions for more flexibility to address a wide range of application needs
- MPC supported by a QP algorithm
- Ability to be seamlessly integrated into our award-winning OTS offering
- Tablet-friendly display formats
- All configuration and process data consolidated into a single project file

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Data Collection and Analysis

SimSci APC performs a series of process response tests, which collect dynamically-rich data with little or no disruption to normal process operations. SimSci APC's statistical tools, including cross correlation and power spectrum density, allow an engineer to analyze signals for cause-and-effect interactions. These tools, coupled with operational experience, identify significant relationships that characterize process behavior.

Dynamically Model Your Process

SimSci APC provides tighter control of key process variables, which are based on a dynamic model. This effectively de-couples interactions that would occur if the same loops were controlled independently by single loop controllers. The result means a more economically-advantageous operating point.

Multiple Model Sets and Gain Scheduling

A unique feature permits the application of model predictive control to processes that require multiple models. For example, in blending applications or seasonal production, SimSci APC uses online gain scheduling and can switch automatically between multiple model sets without turning the controller off.

Optimize Your Process

SimSci APC manages process constraints such as absolute limits on valve motion and rate-of-change limits on process variables. SimSci APC's capability in this area includes the use of modern techniques such as quadratic programming.

A linear programming technique, together with a steady-state model and an economic performance objective function, enables SimSci APC to identify the optimum operating point based on maximum throughput, minimum energy consumption, or a balance between these and other performance objectives.

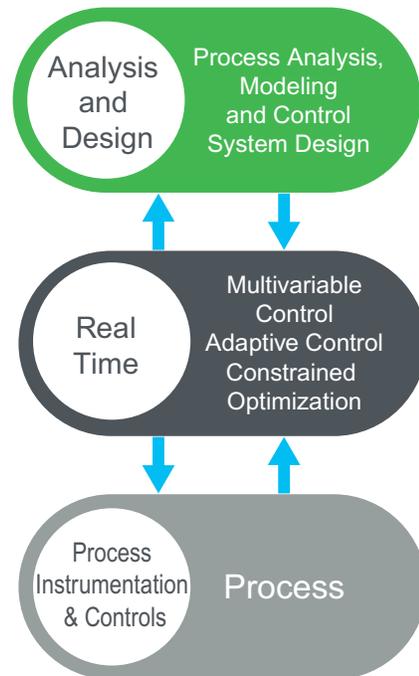
SimSci APC easily integrates with DCS and PLC-based control systems and plant information system databases from all major suppliers. SimSci APC is compliant with the latest industry standards for data connectivity, such as OPC, allowing direct and efficient access to process data.

Process Applications

SimSci APC can be used in any size process problem including those which exhibit significant time delays between the measured and controlled variables, interactions between process variables, or unmeasured variables which affect process operations.

Industry Expertise

Significant cost and profit improvement from using SimSci APC are proven in industries such as oil refining, petrochemical, food, metals and mining, power generation, and pulp and paper. Schneider Electric has a global team of highly experienced APC engineers who can work with your team to quickly realize significant improvements to your bottom line.



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Performance Teaming

To be certain that a solution is running at peak performance, Schneider Electric teams with its clients to improve control schemes as process needs evolve. Through advanced modeling and simulation, continuous process and equipment performance improvements are realized time and again.

Training and Support

SimSci provides an unbeatable combination of high-level technical and business expertise for optimizing plant performance. A complete training, support, and teaming system is available on the beneficial use and application of SimSci APC.

Performance Monitoring and Support

Besides providing personalized on-site assistance to operators/engineers, Schneider Electric can establish automatic remote monitoring of a process, accompanied by individual telephone, online, and/or email support.