



## PRODUCT DATASHEET

---

# AVEVA™ 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. AVEVA APC is engineered for enhanced usability.

# Summary

## Maximize Your Profits

AVEVA APC is comprehensive, Model Predictive 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.

AVEVA provides unique strategic solutions based on improving economics and process operation. Other vendors may propose partial solutions to optimize a process, but AVEVA 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

AVEVA APC, 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.

## AVEVA APC – Maximizing Economic Performance

- Move the process toward multiple operating constraints to realize maximum profit
- Reduce the standard deviation of key product qualities and parameters resulting in a more stable process operation
- Improve process efficiency, reducing rework/recycling and saving both material and energy
- Deliver faster, more stable grade changes with virtually no overshoot

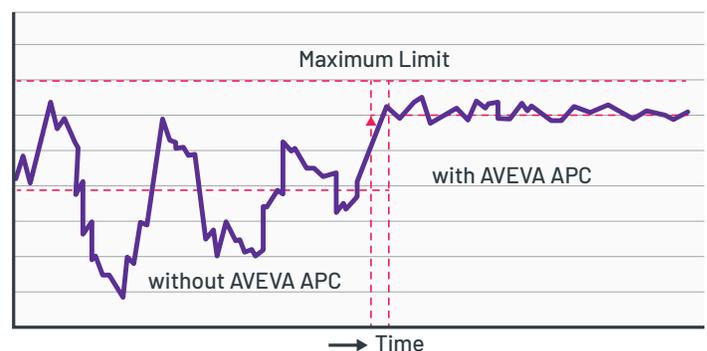
## Reducing Variability for Quality Control

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

## Immediate Quality Improvements Lead to Economic Benefits

Implementing AVEVA APC 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.

AVEVA APC manages 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

AVEVA APC 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.

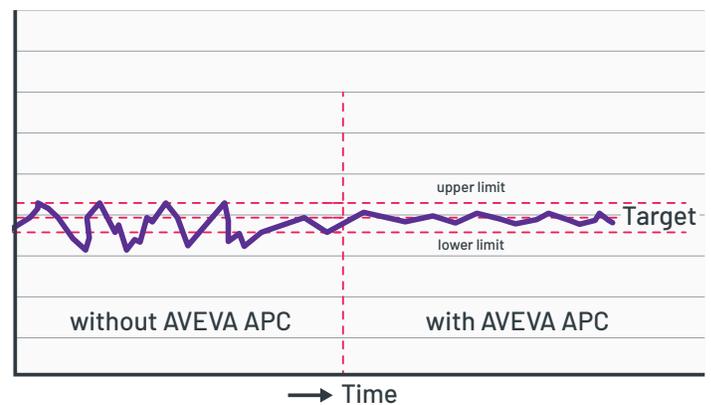
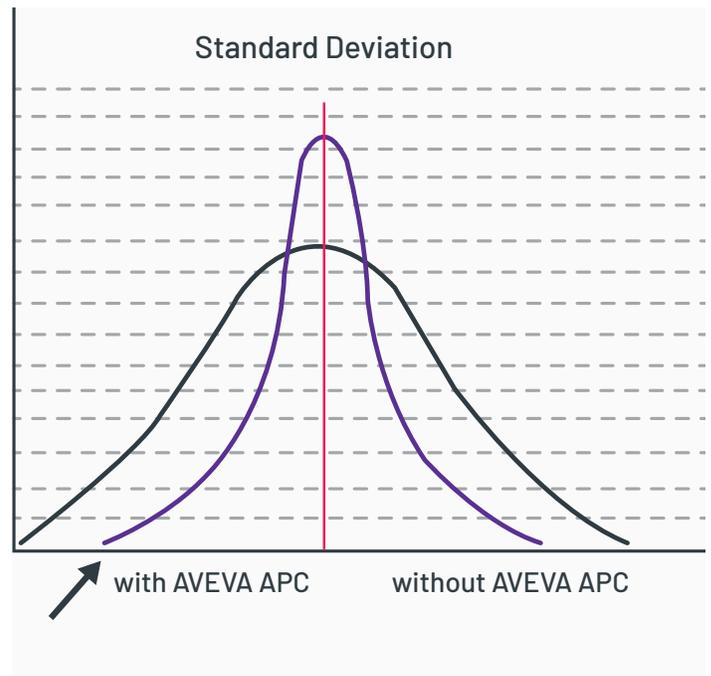
## Integrated Design Environment

- 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 that 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 AVEVA 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

Deliver 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.

Anticipate 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.



Provide a more stable process operation with less disruption and increased process utilization. Every installation of AVEVA 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

## AVEVA 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 through web
- Separation of MPC and LP optimizing functions for more flexibility to address a wide range of application needs
- Composite LP providing global LP for multiple MPCs for better coordination and constraint handling
- 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

## Data Collection and Analysis

AVEVA APC performs a series of process response tests, which collect dynamically-rich data with little or no disruption to normal process operations. 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

AVEVA 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.

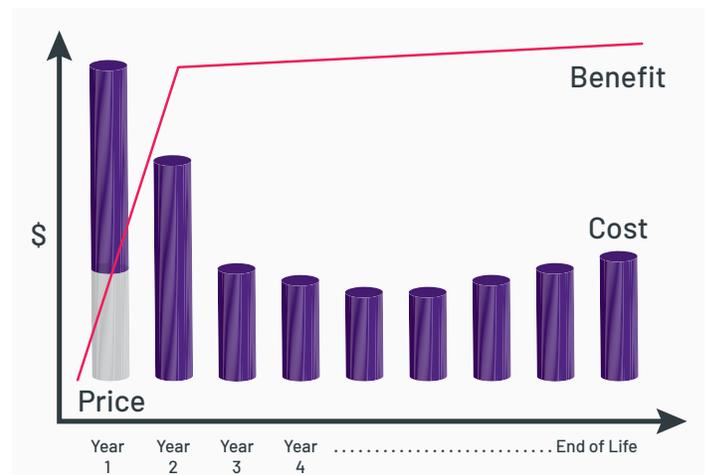
## Multiple Model Sets and Gain Scheduling

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

## Optimize Your Process

AVEVA APC manages process constraints such as absolute limits on valve motion and rate-of-change limits on process variables. AVEVA 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 AVEVA APC to identify the optimum operating point based on maximum throughput, minimum energy consumption, or a balance between these and other performance objectives.



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

## Process Applications

AVEVA 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 Expertize

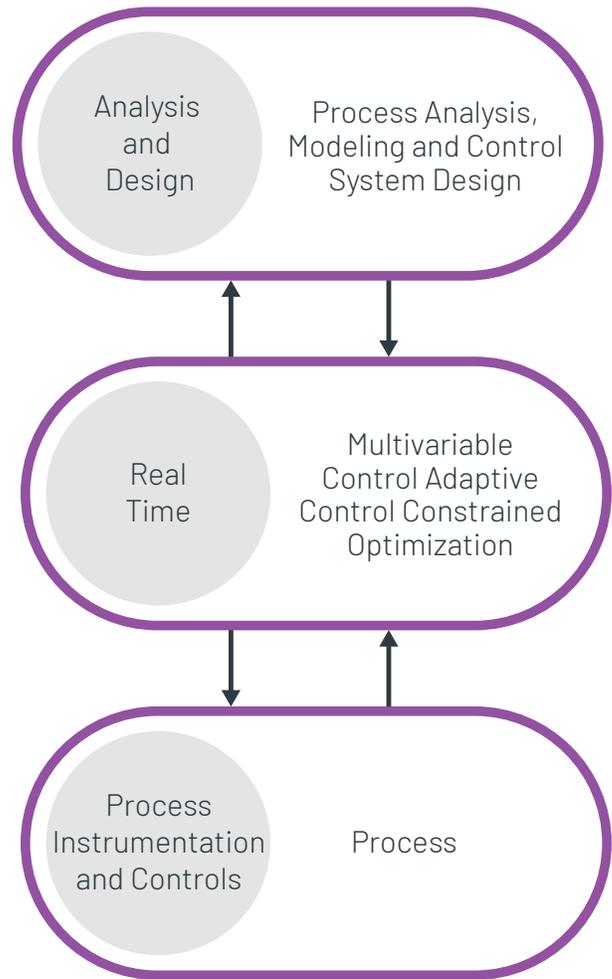
Significant cost and profit improvement from using AVEVA APC are proven in industries such as oil refining, petrochemical, food, metals and mining, power generation, and pulp and paper. AVEVA has a global team of highly experienced AVEVA APC engineers who can work with your team to quickly realize significant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

## Performance Teaming

To be certain that a solution is running at peak performance, AVEVA 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

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



## Performance Monitoring and Support

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

For more information on AVEVA APC, please visit: [aveva.com/advanced-process-control](https://www.aveva.com/advanced-process-control)