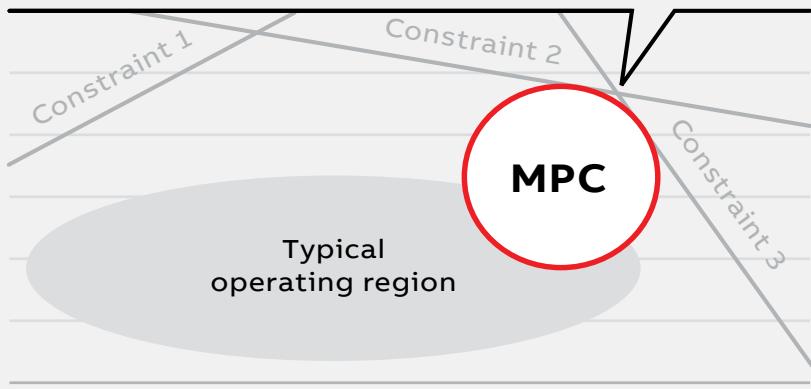


Advanced Process Control Solution

Increase throughput, reduce energy and materials cost

Operate close to multiple constraints limits and economic optimum

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01

01. Model predictive control (MPC) allows plant equipment to operate at constraint limits, leading to increased throughput, and reduced energy and material costs.

ABB optimization engineers, who understand your process, apply and configure the APC controls. This often includes use of ABB's Predict & Control software solution, to perform multi-variable model predictive control (MPC). For processes featuring strong interaction among different units, MPC offers substantial performance improvements compared with traditional single-input, single-output control strategies. A feature of MPC is the ability to effectively manage multiple operational constraints (Fig. 1). Without MPC, variability within the typical operating region does not allow the plant to operate close to constraint limits or economic optimums. With MPC, the variability is significantly reduced, then benefits can be increased by increasing throughput, reducing energy and materials, etc.

Implementation process

- Develop APC design
- Assess and improve existing DCS controls
- Perform plant step/bump tests to gather data and build process models
- Configure APC software and DCS logic for supervisory control
- Commission APC controller
- Monitor APC performance
- Update models and tune APC as needed

Advanced Process Control (APC) is a supervisory control solution that communicates with installed level one distributed control system (DCS) controllers. APC can be implemented within the DCS as level two advanced regulatory controllers or as a software solution running on a dedicated PC and communicating to the DCS through an OPC server.

Typical situations remedied with APC

Process is running “a safe distance” from optimum

Control must be optimized to adjust product quality and maximize benefits

Reduced site staff does not have bandwidth to identify opportunities and optimize system

Existing PID controllers cannot effectively manage interactions between different feedback loops

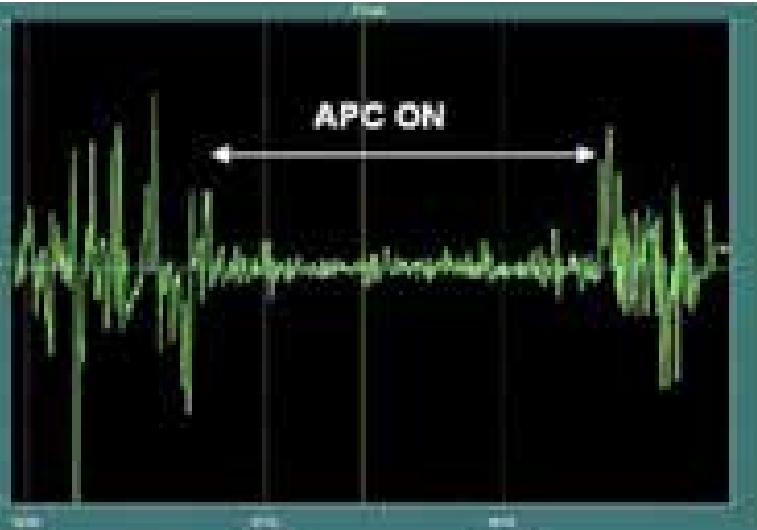
Controls do not include proper constraints

Tuning PID controllers does not improve productivity, energy usage, benefits

Savings opportunities from \$300K to \$2M annually

Scheduled periodic or continuous monitoring services ensure APC continues to deliver the highest value over time and alerts engineers to additional model updates and/or APC tuning that may be required.

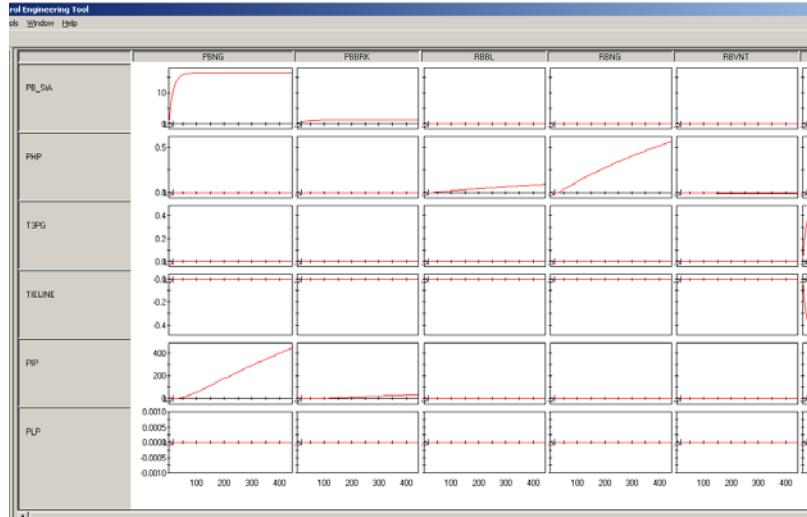
To maximize the benefit of APC, additional corrective activities can ensure the control system and instrumentation are able to take advantage of APC. This may include loop performance optimization, and/or other process specific improvements.



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02

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02. This result is obtained through the use of models (Fig. 3) and multivariable predictive controls that allow the controller to plan its moves taking into account their effects on process dynamics. The future process behavior is predicted and compared to process operating objectives and constraints using an optimization engine that computes future control actions

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03. Matrix of models between the multiple inputs and outputs



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03

Why choose ABB

ABB has worked in the field of advanced process control (APC) and optimization since the 1980s, working with innovative technologies that range from advanced regulatory controls to multi-variable model predictive control to real-time optimization. Our software tools and services deliver the most effective and advanced solutions for any process problem. ABB installations continue to deliver benefits to numerous plants around the world.

Example of APC delivery

A U.S. alumina refinery power plant experienced substantial energy savings and process stability implementing an APC design. An 80% reduction in pressure standard deviation resulted from steam header control optimization, eliminating cascading boiler trips, and reducing outages and production losses. Savings in energy costs alone allowed the plant to recoup their investment within six months.

Additional services from ABB

ABB provides many types of diagnostic fingerprint service activities:

- Control Loop Optimization
- Alarm Management
- Boiler Optimization
- Batch Optimization