INDUSTRY SOLUTION

AVEVA™ APC for Power

Combustion optimization

AVEVA APC offers a unique approach to Combustion optimization that captures more benefits than Neural Networks alone while offering improved control. It affords the ability to optimize over the entire controllable load range and during both steady state and load-following generation. This allows for dynamic optimization during transient operations of NOx emissions while minimizing adverse impacts to opacity, heat rate, unburned carbon, and CO. AVEVA APC is a single software product, which provides dynamic steam temperature control, ramp rate enhancements, intelligent soot blowing and coal mill optimization as well as NOx and heat rate improvements with mercury reduction.

Summary

AVEVA APC has the ability to adapt to changing conditions ensuring that the application stays running at peak efficiency, maximizing service factor, and reducing maintenance costs.

AVEVA APC leads to:

- Enhanced generation efficiency
- Increased availability
- Regulatory compliance
- Reduced emissions
- Increased safety
- Reduced outages
- Maximized profit

Reasons to choose AVEVA APC:

- Unparalleled global application capability
- Award-winning industry expertise with proven record
- Regional implementation teams
- Short implementation time
- Typically provide ROI in less than a year

"The system provides tighter regulation of the critical load ramping variables thus allowing the reduction of "operator margin" for heat rate improvements approaching 1% – with an estimated annual value of $1M and NOx reductions of more than 15%."

- Entergy

Unique capabilities

- The highest life cycle ROI – as a result of comprehensive licensing and ease of maintenance. This combination provides low initial cost with a longer and greater benefit stream.

- Decades of experience with a large installed base, which covers a wide variety of processes and consequently has yielded a controller that is more stable and provides better constraint control than any other on the market.

- Real-time, online model adaptation for the most flexibility.

- An approach that grows out of our controls experience, not academic curiosity, allowing for solutions that are more tightly coupled with the existing controls and operator interface to ensure the widest usability and operator acceptance.

- Regardless of whether the control optimization objective is to improve load response, heat rate, NOx, MW production, LOI, and/or soot blowing, AVEVA can solve the problem with a single software license.

- Integrated Neural Net and Model Predictive Control provide faster, more accurate dynamic response. Consequently, Power generation owners can enjoy the benefits of Multivariable Control (MVC) regardless of how their units are dispatched and will enjoy greater benefit due to more continuous operation on MVC, particularly during transient operation.

- One complete package Model Predictive Controller, Neural Network, fuzzy logic, heuristics, calculations, Linear Programming and Nonlinear Programming optimizer provides the most flexible solver for any optimization problem.

- Data Archiving Trending and Analysis features for both analysis within our environment and for data export providing the highest level of analytics for engineering and business purposes.

- Open and transparent application for which the user has access to tools to view, change and maintain models ensuring ease of maintenance and confidence in the control strategy.

- Automated Step Testing – Pseudo Random Binary Step testing for faster implementation and less process disruption gaining results faster and at a lower cost.
- Burner Zone Virtual Sensors yielding a higher fidelity, near first principles approach to combustion thereby optimizing NOx, LOI, and heat rate while allowing for prediction of slagging and fouling.
- Wider range of model usability and load response reducing the need for re-training and model maintenance.

"Heat rate benefits of greater than 0.5% and NOx reductions of greater than 10% were obtained through coal pulverizer optimization, reduced air preheating and lower excess air. Fuel and SCR ammonia consumption savings are worth $330,000 per year."

- Dayton Power and Light

Application

The NOx reduction and heat rate improvement application solution utilizes the control and modeling benefits of AVEVA APC for continuous closed loop control of any boiler manufacturer type. AVEVA control engineers will implement the best possible control strategy, reviewing the base level of control and applying advanced model predictive control algorithms and neural networks. AVEVA APC runs on industry standard computing platforms and connects to the process via existing process control equipment, such as Distributed Control Systems or Plant.

Benefits

- Reduced capital requirement for NOx reduction
- NOx reduction levels from 10% to 30% while maintaining CO, opacity and loss on ignition
- Heat rate improvements up to 1.5%
- Better control of Opacity
- Improved Loss of Ignitions (LOI)
- Built-in on-line adaptation features for sustainability and maintainability

- Inherent simulation facilities to assist with design, analysis, and training
- Flexibility to address future hardware/control modifications, such as mill temperature controls achieved easily by adding variables to the controller and optimizer
- Ease of control and equipment trouble-shooting through the use of a suite of analysis tools
- State-of-the-art, standard AVEVA commercial products with a multi-industry user base supporting future enhancements and product development
- Best in class domestic engineering personnel skilled in thermal performance, LOI and NOx emissions optimization, multivariable boiler control and DCS modifications

Enhanced generation efficiency

Generation efficiency is an important metric for a power plant. Increasing and sustaining unit heat rate is measured is often used to determine the success of a power generation plant. It is also important for power plant to be able to ramp up and down to adapt to changing load requirements. While load ramping is a necessity for profitable operation, load ramping can lead to dramatic fluctuations in the steam temperature. High steam temperature spikes can cause excessive stress on the boiler and steam turbine – reducing their equipment life. Alternatively, the low steam temperatures spikes can decrease the steam cycle efficiency or counteract the effort to ramp down.

Since steam temperature is frequently a limitation to ramping, improving steam temperature control through AVEVA APC can lead to a significant improvements in ramp rates. AVEVA APC is unique in its ability to control stream temperature, allowing for enhanced ramp up and ramp down rates while staying in the operational envelope. This allows the power plant to meet current load demands without wasting money producing too much electricity or not being able to capitalize on an increased electricity demand.

Value

Industry expertise

Significant cost and profit improvement from using AVEVA APC has been proven time and time again in the power industry. AVEVA's highly experienced regional teams augmented with a global team of APC engineers who can work with your team to quickly realise significant improvements to your bottom line.

Training and support

AVEVA 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 AVEVA APC.

Technical features

- Easier, non-linear identification
- Controller design and simulation
- Real-time adaptive control
- Constrained linear economic optimization
- Non-linear optimization control
- Fully automated PRBS Testing

- RBF Neural nets, can be mixed with step test derived models
- Automatically detects and supervises controller mode changes for changing process states through scripts
- ARx model option for superior load rejection performance
- Online performance monitoring and controller performance reporting
- Ability to seamlessly integrate into our award winning Operator Training Simulators offering with full support for freeze, backup and reset functions commonly required in a training environment
- Seamless integration into our award winning ROMeo Process optimization to realise a plant wide formal optimization by receiving new targets and constraint information from this global environment

To learn how your power industry peers use AVEVA's digital solutions, visit: aveva.com/en/industries/power-utilities/power-generation

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