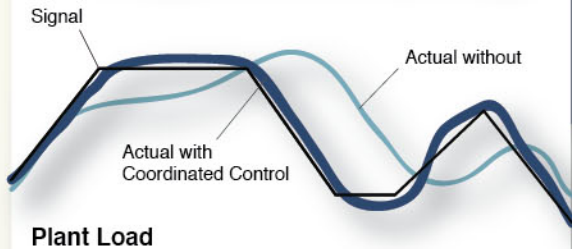# COMBINED CYCLE COORDINATED CONTROL

Respond quickly and safely to the demands of your power market, while continuously maximizing efficiency at the new load ranges.

Accelerate response to load changes while maintaining stability.

Eliminate upsets to the HRSG drum levels and steam temperatures ensuring smooth HRSG performance.

Enhance Revenue in Power Market

Setpoint

$

Actual without

Actual with Coordinated Control

Plant Load

Improve AGC and ADS Throughout Entire Load Range

Signal

Actual without

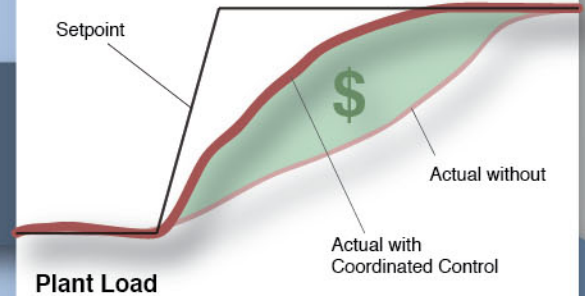Actual with Coordinated Control

Plant Load

Smoothly **modulate** plant load in response to ADS and AGC dispatch signal requests.

**Participate** more effectively in the power merchant market.

Continuous Heat Rate Minimization

Combustion Turbine Control

Heat Rate

Duct Burner Control

Optimize the overall efficiency over the full MW range and operational modes.

**Minimize** MW losses due to ambient temperature changes throughout the day or week, while automatically minimizing the heat rate.
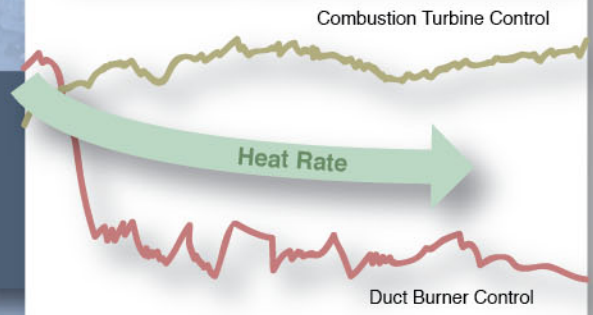
Proven Technology

A California power generator entered a new phase of operation by supplying energy into the power merchant market through ISO dispatching, which rewards a generator's ramping flexibility and generation response. To meet the demand of greater production flexibility, the operator implemented ControlSoft's Combine Cycle Coordinated Control, which proved very effective in allowing the operator to attain the ISO's dispatch regulation for AGC and ADS signals throughout the entire MW operating range for a 2xl 575 MW plant.

When the duct burners are fired, the operator can now demonstrate a greater range of operating flexibility over its various plant configurations with more consistent heat rates while maintaining a constant unit ramp rate at MW transitions.

CONTROLSOFT
ADVANCED PROCESS CONTROL MADE EASY
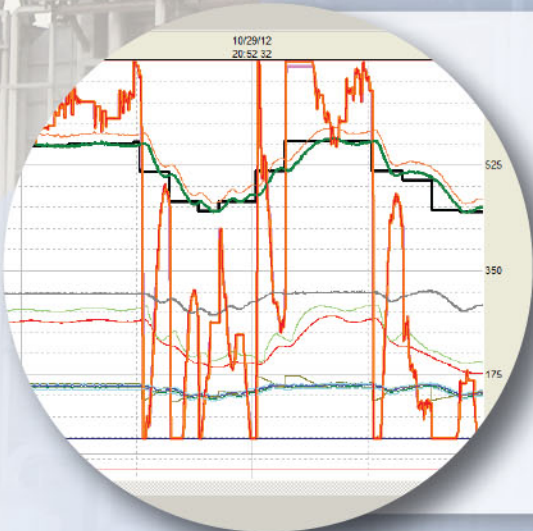
COMBINED CYCLE COORDINATED CONTROL

Combines ControlSoft's **MANTRA** software, a proprietary and patented advanced model-based control software, and ControlSoft's **INTUNE+** tuning and performance monitoring software.

Enables greater flexibility for combined cycle power plants with supplemental duct burners to respond to AGC and ADS signal demand changes.

Whenever duct burner operation is needed for supporting the plant MW load, **coordinates** the firing of duct burners with the combustion turbines to provide a stable and robust ramp rate.

Automatically initiates heat rate minimization under steady operation.

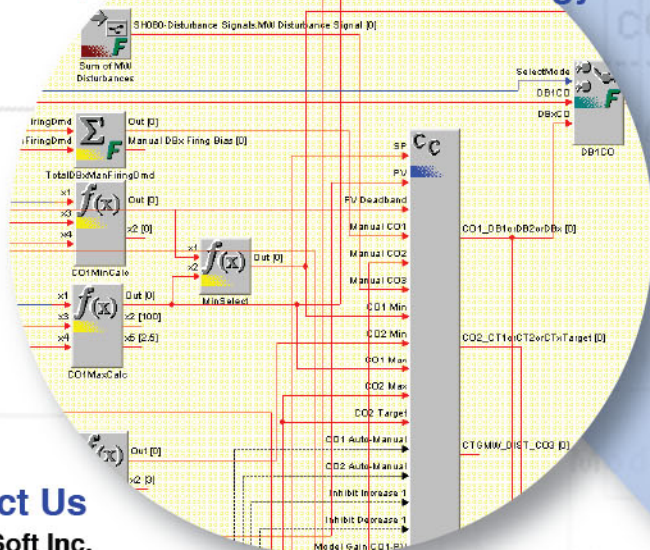**Interfaces** to existing DCS or turbine controller through OPC communication standards.

Supports various plant configurations (1x1, 2x1, 3x1, 4x1) with different load ranges.

Supports safety interlocks.

OTHER ADVANCED CONTROL SOLUTIONS FOR POWER GENERATION

Back End Emissions Control	Stabilize chemical injection for NOX, SOX, etc. during load changes to reduce violations and chemical use.
Superheat and Reheat Temperatures	Coordinate the control of Superheat and Reheat Temperatures during load changes, eliminating excursions.
Chlorination/ De-chlorination	Reduce fluctuations in water chemistry and chemical usage
pH Control	Handles the non-linear characterizations to provide tight pH control.

MANTRA
Patented Control Technology

About ControlSoft

ControlSoft has helped improve the efficiency, stability, and reliability of power plants worldwide since 1985. Founded by distinguished professors from Case Western Reserve University, our unique consulting team is associated with outstanding research institutions and includes noted global experts in process control automation.

We provide the highest quality consulting and technology services to our customers and the power generation industry. We are honored by our strategic alliances with companies like Emerson Power and Water Solutions, Westinghouse, Bailey Controls, and Rockwell Automation, and have been recognized by readers of Control Magazine and our customers for our exceptional customer service and support.

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CONTROLSOFT
ADVANCED PROCESS CONTROL MADE EASY