SPARTAN CONTROLS

INDUSTRIAL ENERGY MANAGEMENT SYSTEM (EMS)

Operational Challenges

Managing the industrial powerhouse to minimize the costs of electricity and steam requires constant attention and a great deal of information management. Typically, significant manual intervention occurs as operations personnel are continuously multi-tasking, making critical process control decisions that include:

- Adjusting of steam supply to meet process demands
- Selecting of various possible fuels based on cost and availability
- Loading of available boilers based on cost and constraints
- Determining the amount of electricity to purchase versus generate
- Loading of turbines based on cost, steam availability, and constraints
- Responding to disruptions and equipment breakdowns

Spartan Controls Process Solutions energy management optimization system is used to reduce the total cost of energy in a mill/plant by automating critical decision-making and process adjustment.

The energy management system (EMS) employs facility-specific models and rule sets to continually determine the optimum setpoints for all powerhouse process units.

Robust Functionality

Past energy management functions had limited scope, robustness and maintainability. Spartan's EMS solution has unique capabilities that provide the end user with superior value:

- Process unit modeling is included to allow the highest degree of accuracy in calculations and decision-making.
- Model predictive and expert system logic for decision-making provides flexibility and the ability to respond effectively to the widest possible variety of real-time conditions.
- The EMS solution is developed using standard real-time open architecture hardware and software components so that the system is stable and maintainable.

- The EMS solution is designed to perform full automatic control, but can operate in either advisory or direct control mode. This flexibility allows operators to make system-suggested changes or the system can make setpoint changes itself in conjunction with the unit process control systems.

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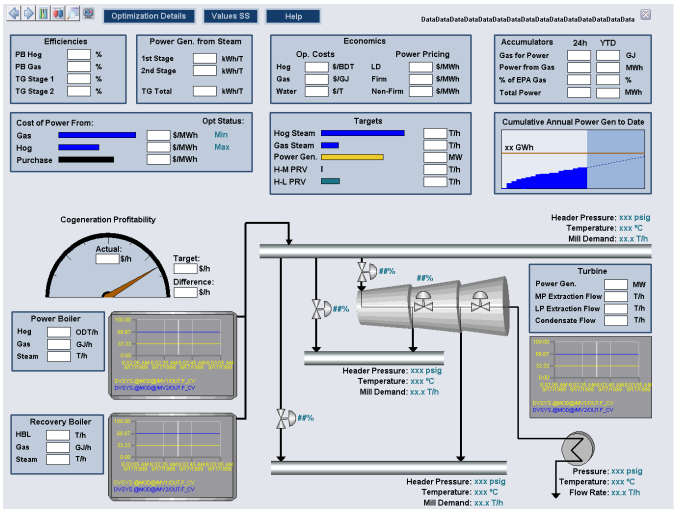
Application Overview

The energy management system (EMS) coordinates the steam headers, steam turbine generator (STG), and boiler combustion controls to maximize overall power generation and improve the robustness of the various steam headers through upset conditions. The following control and optimization functionality is provided:



- **Header Pressure Management** – maintains steam header pressures within specific limits during upset conditions and, when necessary, slides certain "low-priority" header pressure setpoints to maintain "high-priority" header pressures
- **Boiler Load Allocation** – determines the optimal steam load allocation between the various multi-fuel boilers based upon boiler availability, efficiency, and constraints, thereby maximizing steam production from the most efficient boiler
- **Steam Turbine Power Generation Optimization** – determines the optimal steam load allocation and maximizes STG power generation based upon available steam and mill constraints
- **Contract Base Load / Generator Base Load Tracking** – continuously tracks power usage and generation against the contract baselines
- **Energy Cost Calculations** – determine the cost of producing steam and generating power on a per unit basis
- **Real-time Power Contract Calculations** – determine incremental price for generated power at any time of the day and year
- **Data Validation and Error Handling** – ensures all process data used for control and economic decision-making is "good" data
- **Decision logic** – Business models and Integrated expert system
- **Enhanced Operator Interface Displays** – description needed

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