



SMARTPROCESS[®] BOILER OPTIMIZATION

Maximize Alternate/Waste Fuel Use and Stabilize Boiler Operation

Alternate/waste fuel use for low cost steam

Multi-fuel power boilers are used in many industries to provide cost effective steam for process use and on-site electrical generation. In addition to fossil fuels (gas, oil, and coal) it is common that these units be fed with alternate fuel streams such as biomass, waste wood, waste liquids, refinery off-gases, biogas, excess Hydrogen, Coke Oven Gas (COG), or Blast Furnace Gas (BFG). In today's competitive business environment, it is critical that multi-fuel boiler operation be optimized such that steam is produced for the least cost possible.

Issues with utilizing alternate/waste fuel

Operation of a multi-fuel Boiler is more difficult by several orders of magnitude when compared to running a unit fired with only fossil fuels. Operating issues vary from site to site, but there are a number of problems that are seen in many places:

- Alternate fuel availability is variable and subject to frequent interruption
- Btu content per volume of alternate fuel varies significantly and quickly

- Boiler emissions performance limits operation
- Process steam loads normally fluctuate, sometimes suddenly

Performance objectives

Best in class multi-fuel power boilers are run with the following performance parameters, and these are the objectives of Emerson's process control and optimization efforts:

- Burn all available waste, and maximize alternate fuel streams
- Follow steam load changes while maximizing waste or alternate fuel use
- Hold Excess Oxygen at 3.0 to 3.5% to maximize efficiency
- Produce steam at MCR while maintaining emissions within permitted levels
- Operate boiler in automatic control over 95% of time

Using a holistic approach

Emerson optimizes multi-fuel boiler unit operation by addressing the physical limitations of the process and then installing the Emerson SmartProcess[®] Boiler optimized control solution. The Emerson approach is a holistic one.

Optimized control solutions cannot work effectively if mechanical issues are too limiting, and the best process equipment will not perform ideally if an optimized control strategy is not implemented.

Emerson works with both and delivers a turnkey solution including design, installation, commissioning, and start-up. Emerson also trains operating personnel to run the boiler using the newly optimized equipment, firing methods, and control tools.

Process mechanical improvements

Working with boiler and process equipment partners, Emerson installs mechanical improvements to multi-fuel boiler processes when shortcomings that restrict operation are identified. This could include fuel train changes, burner modifications, air system upgrades, fan modifications, or damper improvements. True process expertise allows Emerson to deliver lasting improvement results.

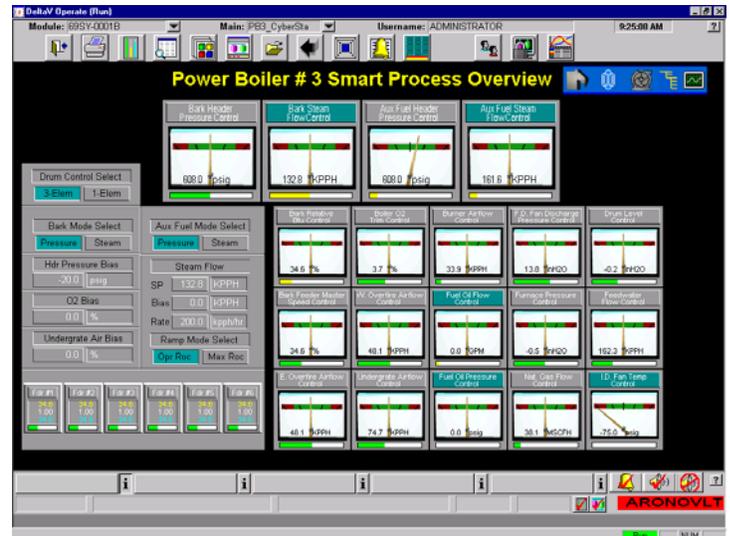
SmartProcess® Boiler Solution

Emerson's SmartProcess Boiler is a product used to optimize multi-fuel power boiler processes by increasing the efficiency of the boiler and maximizing the amount of steam produced through burning of least cost fuel (typically waste/alternate fuels such as biomass or off-gases).

SmartProcess Boiler provides complete automatic control of the boiler at all times including start-up, and the system allows a multi-fuel boiler to be used as a swing boiler while burning least cost fuel.

SmartProcess Boiler incorporates combustion control techniques that improve on traditional methods of alternate fuel firing. For example, SmartProcess Boiler makes automatic adjustments to the boiler process to compensate for changing alternate fuel availability and varying fuel Btu per volume. The system provides operators with greatly simplified interface to the boiler process and automates many functions that are often done manually.

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Functionality

- Full automatic boiler control
- Separate control masters for each fuel in boiler
- Btu based firing with real-time adjustment for alternate fuel quality
- Enhanced operator interface

SmartProcess® Boiler achieves

- Maintaining header pressure with minimal deviation while maximizing alternative fuel use
- Optimizing efficiency by reducing excess air
- Meeting all emissions constraints

- Eliminating need for continuing operator manual intervention
- Only typical boiler instrumentation is used by the solution

Business results

The bottom line is that SmartProcess Boiler makes money for a boiler owner. Typical results from an implementation are:

- 5-15% additional steam generation from alternate fuel
- 2-4% thermal efficiency increase
- Minimized emission constraint excursions

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