Industrial Energy Solution Description

Application: Multi-Fuel Power Boiler
Product: SmartProcess® Boiler

Background

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, refinery off-gases, 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

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 stream volume 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 fluxuate, sometimes suddenly

Specific Objectives

Best in class multi-fuel power boilers are run with the following performance parameters. Operation at this level is the objective of Emerson's process control and optimization efforts:

- Burn all available alternate fuel streams, flare only when steam load is reduced
- Follow steam load changes while maximizing waste alternate use
- Hold Excess Oxygen at 3.0 to 3.5% to maximize unit efficiency
- Produce steam at MCR while maintaining emissions within permitted levels
- Operate boiler in Full Automatic control over 95% of time

Emerson Holistic Solution

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 the solution turnkey 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.

SmartProcess® Boiler provides full-automatic boiler control, real-time compensation for the changing fuel Btu, alternate fuel maximization, unit efficiency optimization, and header pressure control with minimal deviation.

Process Mechanical Improvements

Working with boiler and process equipment partners, Emerson installs mechanical improvements to multi-fuel boiler processes when shortcomings are identified. This could include fuel train changes, burner modifications, air system upgrades, fan modifications, or damper improvements. Process expertise allows Emerson to deliver true 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 alternate fuels such as 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 control techniques that improve on traditional methods of alternate fuel firing. The system provides operators with greatly simplified interface to the boiler process and automates many functions that are often done manually. SmartProcess® Boiler makes automatic adjustments to the boiler process to compensate for changing alternate fuel supply and varying fuel Btu.

SmartProcess® Boiler functionality includes:

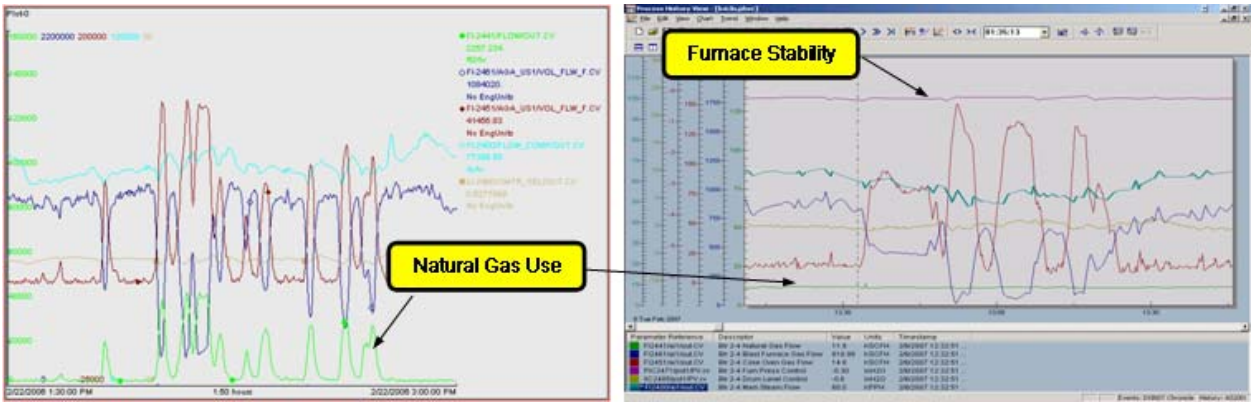
- Full automatic boiler control
- Separate control masters for each fuel in boiler
- Btu based firing with real-time adjustment for alternate fuel quality
- Enhanced operator interface
- Only typical boiler instrumentation is used by the system

This functionality is used to accomplish the following:

- Maintain header pressure with minimal deviation while maximizing alternative fuel use
- Optimize efficiency by reducing excess air
- Meet all emissions constraints
- Eliminate need for continuing operator manual intervention

Results

The bottom line is that SmartProcess® Boiler makes money for a process business. Typical payback from an investment in a SmartProcess® Boiler implementation is 3 to 6 Months. The picture below shows before and after SmartProcess performance and typical reduced Natural Gas use.



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