Case Study

Boiler Energy Savings with Fuel/Air Ratio Controls

Company Profile

This customer is the world's third-largest pharmaceutical medical device manufacturer specializing in cardiac and vascular technologies, restorative therapies and services, and advanced diabetes management solutions.

Challenge

This customer used multiple boilers to supply building heat, hot water, autoclave steam, and process heating steam. The cost of running and maintaining these boilers was considered overhead, so any reduction in cost would directly improve profits.

The boiler controls made use of a traditional, mechanical jack-shaft system, forcing a linear fuel-to-air ratio throughout the demand curve. Peak boiler efficiency, however, is not a linear relationship. Therefore, the boiler runs either too "rich" or too "lean," which results in wasting valuable energy. Because the boilers can be fueled by either natural gas or by oil, the customer is faced with a very time-consuming process to adjust the mechanical system when changing between fuels.

Solution

Rawson/Industrial Controls provided a Honeywell Control Links parallel positioning system, which replaced the mechanical linkage system and allowed for modeling a fuel-to-air ratio curve to match the peak boiler efficiency curve. The mechanical linkages were replaced by individual servo actuators for each of the fuel valves and air damper. The electronic touch screen controller was programmed to control each of the servo actuators independently at every point in the demand curve, allowing the fuel-to-air ratio to be optimized during any steam demand condition. The system adjusts automatically when a change in fuel occurs.

Additional benefits derived from this solution:

- Reduced fuel usage (6%-8% of annual fuel used).
- "One-touch" fuel changeover procedure, reducing operations personnel time required to adjust the system when change from gas to oil is required.
- Reduced exhaust stack temperature, an environmental benefit.
- Reduced emissions stemming from efficient combustion, an environmental benefit.

Results

The total investment in this project was $45,000 and it took eight weeks to complete all three boilers. Annual energy savings is estimated at $18,000 per year, and additional savings in labor were reported for the several hours that were required for adjusting the traditional jack shafts when a change in fuel occurred.