

SmartProcess® Improves Boiler Operation and Temperature Control at WFEC's Hugo Plant

RESULTS

- 84% reduction in average occurrences of exceeding reheat temperature
- 9°F decrease in boiler exit gas temperature
- 100% reduction in fan stalls
- Consistent and efficient air heater cleaning

APPLICATION

475-megawatt coal-fired generating unit with a Babcock and Wilcox (B&W) boiler

CUSTOMER

Western Farmers Electric Cooperative (WFEC), Hugo Power Plant located near Fort Towson, Oklahoma

CHALLENGE

Endless days of 100-plus degree temperatures has created record electric generation demands in the Midwest United States. As Western Farmer's most cost effective producer, it is essential that the Hugo plant operates reliably with minimal downtime during the peak season to satisfy the need for increased power.

Use of Powder River Basin coal has caused the Hugo station to experience high levels of slagging, which in turn can reduce heat transfer to the boiler tubes and increase differential across the furnace. WFEC sought to capture best practices in a strategic sootblowing advisory system to reduce the increased slagging, as well as achieve the following goals:

- Provide consistent blowing
- Avoid fan stalls
- Maintain constant reheat temperature control



“The results of our SmartProcess project were outstanding. Before installation, cleaning the reheater while maintaining temperature was a challenge. Now, the optimizer automatically performs the cleaning while preserving the reheat temperature. Our operators can fully concentrate on improving other operational aspects of the Hugo plant instead of worrying about sootblowing issues.”

Torry R. Wise
Production Services
Controls Coordinator
Western Farmers Electric Cooperative



SOLUTION

A collaborative effort between Emerson and WFEC Hugo plant personnel produced a customized SmartProcess® Sootblower Optimizer that provides consistency in the unit’s sootblowing schedule, avoids fan stalls, and stabilizes reheat temperatures.

The Sootblower Optimizer uses an intelligent modeling tool to develop strategic sootblowing sequences that ensures the Hugo plant blows soot when needed and only in necessary locations. Implementing these sequences reduces opacity and thermal NOx while improving overall heat rate and boiler efficiency. The optimizer has the ability to dynamically calculate the cleanliness factors of the process at all times, even while the plant is moving through load ranges. WFEC’s Hugo station operates the SmartProcess module in either the advisory mode that displays blowing recommendations to the operator for consideration or control mode that automatically performs the recommended actions.

An expert system module within the optimizer draws inferences based on a set of unit specific rules. These rules capture the dependencies between plant components involved in the sootblowing process. Rule priorities vary depending upon the current working mode of the optimizer. Rules established for the Hugo site include setting slag zone targets, performing consistent air heater blowing, and maintaining reheat temperature within the desirable range of 1010°F to 1020°F.

The Sootblower Optimizer was installed at Hugo in late 2006, with the first two full months of automatic operation at full load in January and February of 2007. Reheat temperature samples were collected in ten-minute intervals at loads exceeding 200-MW gross capacity. Results showed that the SmartProcess optimizer not only reduced the average reheat temperature, but also decreased the occurrences of operating above the reheat temperature by 84%. Economizer temperatures were recorded in ten-minute intervals at loads exceeding 450-MW gross capacity which yielded a reduction in the boiler exit gas temperature of 9°F. A decrease in the boiler exit gas temperature reduces the likelihood of ID fan stalls.

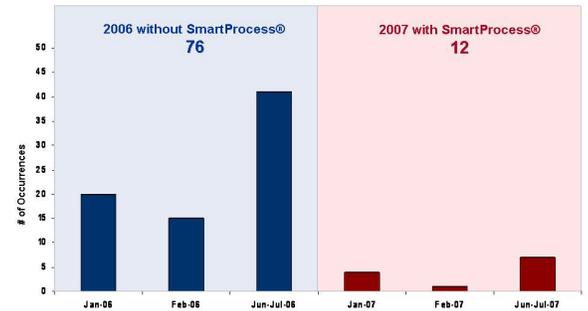
Information taken from Hugo station monthly reports showed a 100% reduction in ID fan stalls, which in part can be credited to the Sootblower Optimizer. Eliminating fan stalls helps to avoid the temporary loss of megawatts often incurred when an operator lowers the firing rate.

Prior to SmartProcess, Hugo’s three air heaters were not cleaned on a consistent schedule for fear of increased slagging in the main furnace. Hugo site personnel and the Emerson SmartProcess team incorporated rules to efficiently “short blow” each air heater during idle times to ensure automatic daily cleaning.

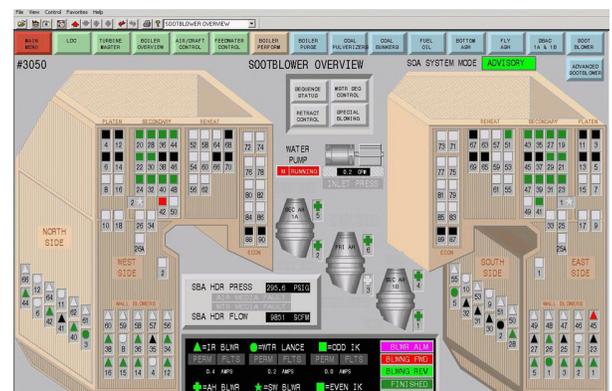


For more information:
www.EmersonProcess-PowerWater.com

Number of Occurrences Exceeding Reheat Temperature

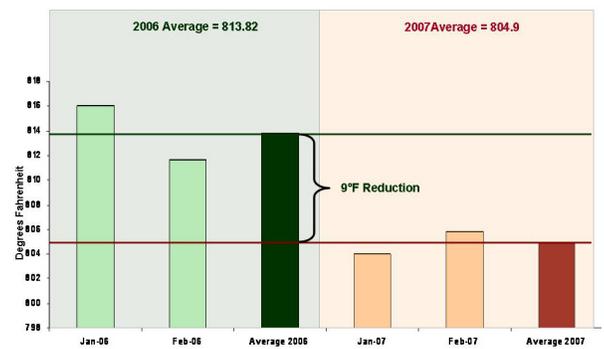


The number of occurrences of exceeding the reheat temperature at Hugo was reduced by 84%.



WFEC helped design the optimizer overview graphic to show all areas active in the sootblowing process.

Average Economizer Temperature



Hugo’s average economizer temperature decreased by 9°F with the Sootblower Optimizer.

