

Avoiding Opacity Events

CASE STUDY

Problem

A large eastern United States utility located near a population center is required to operate within very tight opacity and emission limits.

The plant frequently experiences opacity excursions that require the plant to derate up to 40 MW while the plant engineering team determines the cause of the excursion. Poorly performing burners (or in some cases a single burner) are often determined to be the primary cause of these opacity events. Frequent changes in fuel due to spot market coal purchases contribute to the frequency of these events. However, identifying which specific burner(s) were causing the problems was difficult and time consuming.

Troubleshooting was limited to measuring imbalances in economizer O_2 , CO in the stack, or worst of all, stack opacity. None of these techniques pointed to specific detuned burners, so each burner had to be adjusted manually and individually. During this iterative process, the plant remained derated and experienced significant lost revenue opportunities.

Solution

In August 2007, the plant installed a seven path ZoloBOSS™ system on unit #2, a 685 MW B&W wallfired boiler.

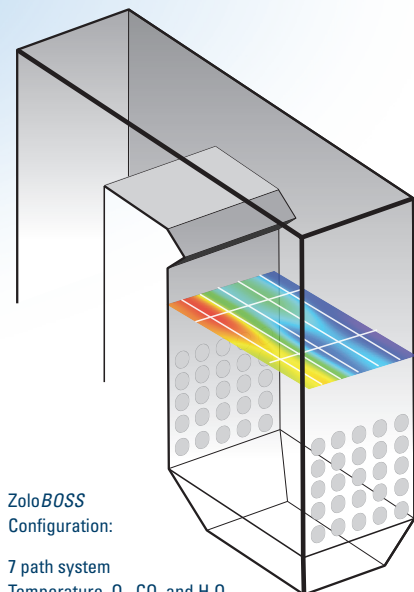
They selected a five by two path grid installed on elevation 498. Five east-west paths intersect with two north-south paths, each directly above the burner columns. Together, they create a concentration map for O_2 , CO, H_2O , and temperature directly in the combustion zone, that provides plant engineers with an indication of boiler and burner performance in real-time.

By observing the ZoloBOSS generated combustion tomography, particularly for CO, plant engineers can now narrow the search for poorly tuned burners to a specific column of five. This reduces adjustment time up to 80%, quickly returns the plant to full capacity, and saves hours of engineering time.



PLANT DATA

Boiler Manufacturer	B&W
Burner Config	Opposed wall-fired
Capacity	685 MW
Coal type	Various, Bituminous



ZoloBOSS Configuration:

7 path system
Temperature, O_2 , CO, and H_2O

OPC Data connection



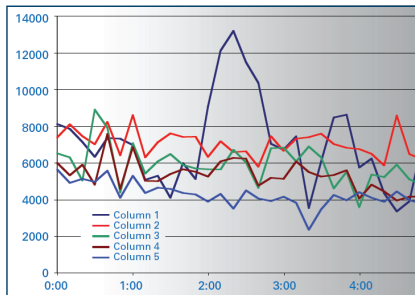
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Benefits

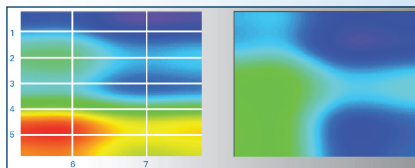
During an opacity event, a 40 MW plant de-rate averages \$25,000 in lost power sales per event and can exceed \$100,000 per event.

Costs will vary depending how long it takes to identify the cause and rectify the situation, and power prices at the time of the derate. Over the last year, the plant had over seven such opacity events totaling in excess of \$140,000 in lost power sales. If these events had occurred during peak power days the cost to the plant would have been over \$500,000.



HIGH CO₂ EVENT CAPTURED ON PATH 5

The ZoloBOSS captures a high CO event which occurred on path 5, above one column of burners. Targeted information reduces time require to find and repair problems.



Before and after - burner CO MAPS

Burner imbalance was detected in column five along the south wall. After tuning, combustion zone mapping of CO shows significant improvement.

Going Forward

The ZoloBOSS system can act as an early warning system for localized poor combustion when CO increases to unacceptable levels. This information can help to eliminate opacity events entirely.

Future plans include linking ZoloBOSS data with the OSI plant historian to allow control room operators to see changes and correct them without the need for engineering intervention. With the help of the ZoloBOSS, neural networks will be able to adjust burners based on CO readings several times per hour. The plant has installed additional paths on their unit #1 and will expand the use of the system on both units in the future.

"The ZoloBOSS allows us to adjust just the bad-acting burners, reducing stack opacity and the associated costly de-ratings"



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