Flame Doctor® Burner Diagnostic System for Individual Burner Optimization

Do you have combustion problems? Are you experiencing high NO_x, CO or LOI? Is it difficult to control combustion performance or to sustain performance over time? If so, then take a look at a Flame Doctor® burner diagnostic system from Babcock & Wilcox (B&W).

Cutting edge technology

The Flame Doctor burner diagnostic system provides real time analysis for each burner on your boiler. It analyzes

A typical Flame Doctor system installation analyzes individual burner performance for optimum combustion.

individual burner performance, identifies poorly performing burners, and provides a root cause diagnosis to help guide adjustments.

Sponsored by the Electric Power Research Institute (EPRI) and developed jointly by B&W and Oak Ridge National Laboratory, a decade of research and development has allowed Flame Doctor to evolve as the premier tool for assessing individual burner performance. The Flame Doctor system utilizes signals from existing optical flame scanners to diagnose poor operation in individual burners that contributes to excessive emissions or reduced efficiency. The heart of the system is a set of highly sophisticated, proprietary mathematical tools for identifying flame performance.

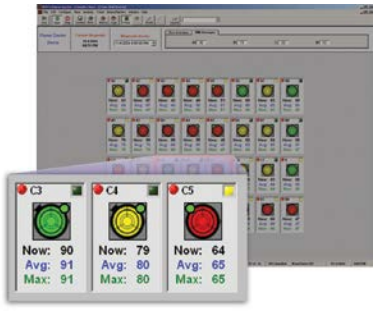
In addition to providing highly accurate discrimination of different flame conditions, the Flame Doctor system incorporates B&W's many years of practical experience in the design and operation of coal-fired burners.

Unique and innovative analysis

Flame Doctor uses a new, more effective approach for discriminating flame patterns. Specifically, mathematics derived from chaos theory is used to detect characteristic shifts in flame performance that measure the degree to which that flame has deviated from optimal. Tests performed during the development phase of the Flame Doctor system at B&W's Research Center have shown that this new non-linear approach to pattern recognition is more discriminating than traditional Fourier-transform-based methods. In addition, the new mathematics are combined with a more complete understanding of burner physics stemming from B&W's many years of combustion research to give Flame Doctor unprecedented diagnostic capabilities.

Benefits and features

The Flame Doctor system enables optimization of individual burners based on real-time data. Overall combustion performance can be improved beyond the limits of



Flame Doctor's user-friendly graphical interface makes the system easy to use.

traditional burner tuning, which relies mostly on the experience and knowledge of the combustion engineer.

Some of the potential benefits include:

- Higher boiler efficiency through better combustion – improved CO, LOI, etc.
- Better distribution of combustion air
- Reduced excess air and better balanced O_2
- Improved control of CO emissions
- Improved NO_x emissions

Specific features include:

- Quick, straightforward installation
- Easy-to-use, intuitive Windows-based user interface
- Client/server architecture
- OPC Client for communications with other systems

Overcoming challenges

Tests with the Flame Doctor system have confirmed that just a few poorly performing burners can adversely affect overall boiler performance. Overfire air (OFA) systems can mask the effect of poorly performing burners resulting in less than optimal combustion that may go undetected. The inability to pinpoint the root cause of combustion problems can lead to time consuming tuning programs or a sacrifice in day-to-day boiler performance.

A gas measurement grid on the back end of the unit often helps to indicate an area of the furnace that might be causing problems. However, even gas grids have limits in pinpointing specific burner problems, especially

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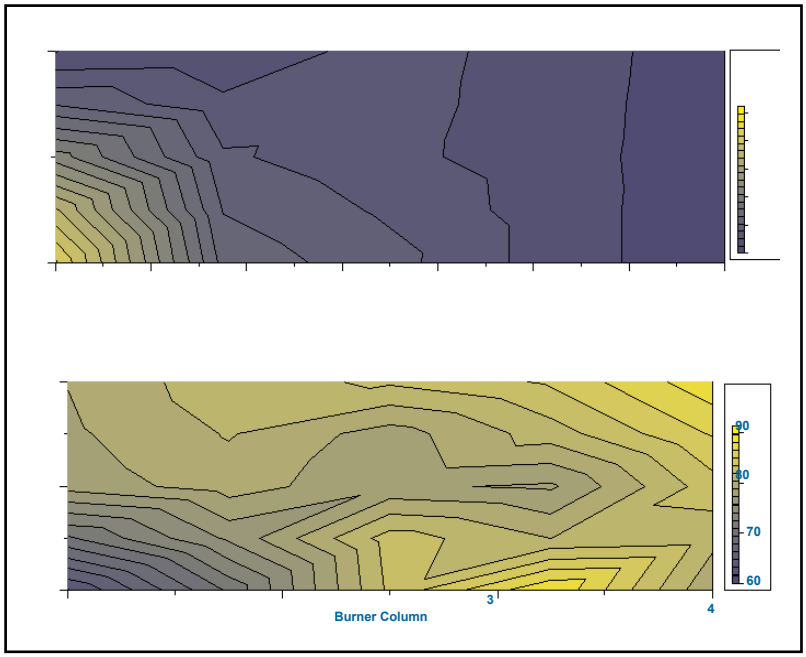
if the unit has OFA ports. The Flame Doctor system helps to overcome these shortcomings by identifying specific problem burners or by directing tuning efforts to the OFA system. The Flame Doctor technology complements back end measurements in any tuning program. A permanent Flame Doctor installation provides continuous monitoring of burner performance to quickly alert engineers and operators when a burner problem first occurs.

Permanent installation or tuning service

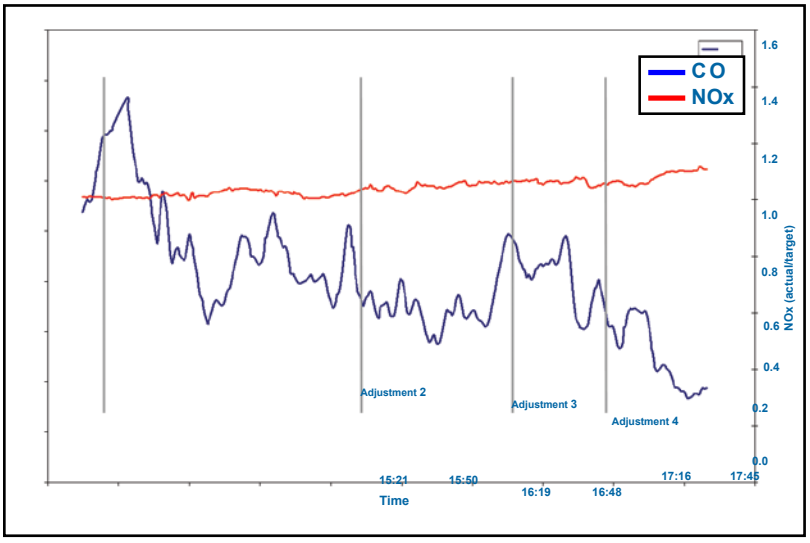
A permanent Flame Doctor installation permits continuous tracking and diagnosing of combustion performance through load changes, fuel variations and equipment deterioration. If burner performance problems arise they can be quickly diagnosed and addressed. The Flame Doctor system ensures optimized long-term combustion performance.

The Flame Doctor system is also offered by B&W as a tuning service. Whether you are troubleshooting a specific problem or undertaking a comprehensive tuning program, B&W's engineers can deliver this leading edge technology for more effective combustion tuning programs.

For more information about the Flame Doctor system, contact your regional B&W Field Engineering Services office, or visit our website at babcock.com.



Flame Doctor's analysis agrees with back-end emissions grid results.



Flame Doctor's use leads to successive adjustments for improved emissions.

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