

SootOpt Benefits

- Improves heat rate by minimizing attemperation sprays and exit gas temperatures, and better controlling reheat and superheat steam temperatures.
- Improves reliability by avoiding soot cleaning activities that cause tube erosion and excessive thermal shocking, and by avoiding plugging and fouling events.
- Reduces NO_x by correctly proportioning heat transfer and reducing “hot spots” that result from ineffective cleaning.
- Reduces opacity violations by better managing the time between cleaning events and consistently applying rules for cleaning zones associated with opacity events.

Real-Time Global Sootblowing Management

Why SootOpt?

Sootblowing sequence control has traditionally been managed either manually at the operator’s discretion, or by using simple time-based logic. Recently, locally-intelligent sootblowing systems emerged that maintain a preset level of cleanliness in each boiler zone. However, these systems do not take overall boiler performance targets — such as heat rate and emissions — into account when determining cleanliness set points or initiating sootblowing operations.

SootOpt closes this gap by dynamically determining the boiler cleaning actions that optimally balance the unit’s heat rate, reliability, and NO_x objectives. A closed-loop optimization software application, SootOpt directs existing sootblowing control systems to take action in real-time to best meet the unit’s overall heat rate, reliability, and emissions goals.

How it Works

SootOpt is a global Optimizer that works in conjunction with existing sootblowing controls and instrumentation — from simple PLC-based controls to advanced ISB systems. SootOpt

uses adaptive modeling and expert rules or heuristics to optimize the activity of these systems with respect to their effect on multiple simultaneous global performance objectives. The expert rules also ensure that all applicable unit-specific constraints are considered. Within the boundaries defined by these rules, SootOpt’s adaptive neural network models identify the equipment and actions most effective for achieving the plant’s efficiency, reliability, and emissions objectives, and biases control activity toward those objectives. The neural models constantly learn from and adapt to changes in boiler operations, so that model quality remains high as conditions change.

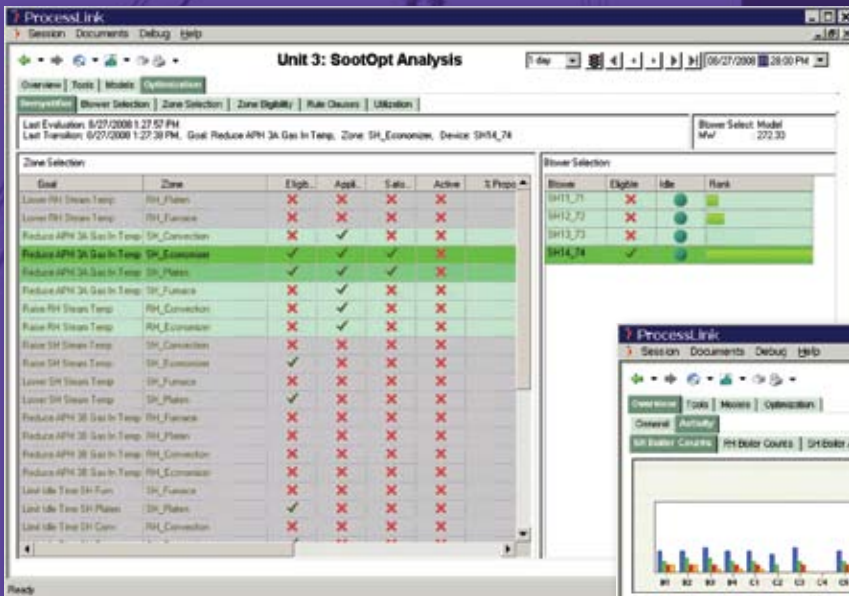
Like an operator, SootOpt looks at current conditions represented by whatever data is available for temperatures, pressures, sprays, and the time since last cleaning. Based on these conditions, SootOpt proposes a set

of necessary and useful actions. The proposed actions are then narrowed down using a sense of priority and effectiveness with respect to addressing the current conditions.

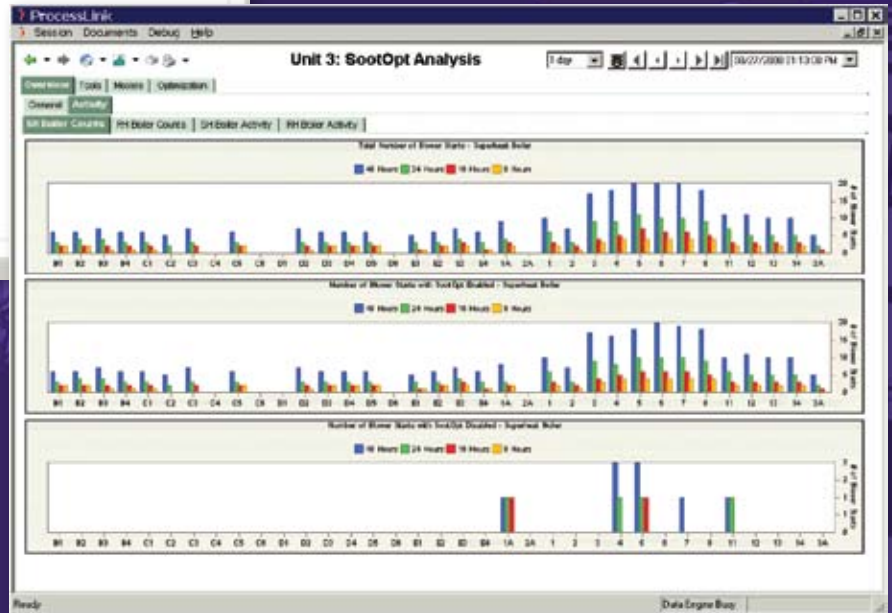
The information that can be used to represent current conditions and build rules for determining actions is unlimited. Information can include data found in almost all plants, such as



SootOpt’s homepage explains the recent moves by the Optimizer, offers actionable advice for improving performance, and provides real-time performance benchmarks.



SootOpt makes the decision machinery transparent to staff by displaying real-time and historical data, as well as statistical analysis of its decision machinery.



One of many analysis tools provided by SootOpt, the Counts tab bar charts show actuation statistics over different time periods for each sootblowing device in the selected boiler area. This information helps build an understanding of baseline activity and identify changing cleaning patterns.

steam and exit gas temps, spray-flows, combustion control settings, load, etc. It can also include data from more advanced instrumentation such as strain-gauges, ash-loading measurements, flux instruments, PerformanceOpt® cleanliness-factors, fuel analysis, operator entered data recording clinker buildup severity, and indications taken from SootOpt's neural network-based scenario mill.

Insight and Analysis

SootOpt is also a powerful analysis tool, providing key process insights that support improved situational awareness and better decision making. SootOpt makes the decision machinery transparent to staff by displaying real-time and historical data, as well as statistical analysis. For example, SootOpt provides information about how effectively your sootblowing equipment is operating and provides alerts when it notices an issue that needs attention. SootOpt also displays analysis related to changes in sootblowing patterns, equipment

that may need maintenance, and performance differences between operator shifts.

SootOpt & the ProcessLink® Suite

As a stand-alone application, SootOpt directs sootblowing activity to achieve the optimal balance between heat rate, reliability, and emissions goals. Integrated with other Optimizers in the ProcessLink suite, SootOpt provides even greater value. For example, used together, SootOpt and CombustionOpt® let the end user view and manage interactions between combustion processes and sootblowing systems, thereby minimizing conflicts between complex goals such as low NO_x and heat rate. SootOpt can also leverage PerformanceOpt's® comprehensive mass-and- energy balance and CombustionOpt's adaptive models to help identify and control fuel-related slagging. When used with MaintenanceOpt®, users benefit from incorporating process or control issues detected by SootOpt into MaintenanceOpt's action-centric diagnostics workflow.

