Boiler performance degradation through fouling and slagging represents a significant operational challenge. Use of sootblowing as well as using energy disturbs combustion equilibrium. SentientBoilerClean intelligent sootblowing technology successfully addresses these challenges mitigating combustion disturbances and optimizing the energy usage required to maintain boiler performance. Investing in this technology can provide payback in 3-9 months in increased unit performance, decreased membrane wall tube failures and associated maintenance costs.

Intelligent Sootblowing

Intelligent sootblowing is the generic term used by the Electrical Power Research Institution (EPRI) to describe a range of systems that control sootblower operation instead of an operator or scheduled time-controlled system.

EPRI has been evaluating Intelligent Sootblowing systems installed in power plants since 2002. In a large number of these studies, Intelligent Sootblowing significantly improved power plant operation and efficiency.

SentientBoilerClean is one of the successful technologies to have been assessed in EPRI-sponsored intelligent sootblowing demonstrations. SentientBoilerClean is a component of SentientSystem®, an integrated suite of modules specifically designed to address boiler, boiler cleaning, turbine cycle and unit optimization.

Traditional Intelligent Sootblowing systems:

- Require a large range of additional instrumentation
- Require a period of several sootblowing cycles for training
- Cannot respond adequately if:
  - A boiler undergoes a different operation profile
  - There is a change of coal type
  - Sootblowers are not available for an extended period

Sootblowing Impacts

Sootblowing has a large impact on boiler operation and can influence:

- **Reliability** through slagging, fouling, tube failures (erosion, creep, fatigue, quench) and process stability.
- **Capacity** through load reduction to deslag, steam set points and emissions.
- **Performance** through economizer exit gas temperature, boiler heat transfer, sootblower operations and super heat steam and reheat temperature

SentientBoilerClean

SentientBoilerClean is an industrial software solution focused on “intelligent, dynamic” sootblowing.

Project experience has demonstrated that the keys to success are customizing the solution to the particular unit. A holistic view is taken by quantifying all the sootblowing impacts and managing each sootblower individually.

The Benefits of SentientBoilerClean

These benefits, unique to the SentientBoilerClean solution, are:

- Reduces costs because additional instruments is very rarely required
- Increases flexibility as it adapts to variable coal quality
- Allows for individual sootblower control, increasing optimization effectiveness
- Reduces downtime, because no outage is required during the commissioning process
SentientBoilerClean Control Architecture

SentientBoilerClean implements the following 10-stage control architecture:

1. **Boiler modeling**: Precisely created and operated in real time using existing instrumentation.

2. **Sootblower characterization**: Sootblower impact on the thermal conductance of the boiler elements is analyzed and self learned.

3. **Mode selection**: Each sootblower is individually optimized and placed in one of four modes: manual, cycle, schedule or optimize mode.

4. **Optimization**: Sootblower scheduling is optimized based on objectives that can be a combination of any or all elements: efficiency, asset life, and/or emissions.

5. **Schedule recommendation**: A recommended sootblowing schedule to meet long-term requirements is created.

6. **Constraints**: The system checks the current status of the unit taking into account the short-term requirements and applies appropriate constraints. These constraints are codified operator and engineer knowledge of the impact of the boiler operation. The unit then has a constraints adjusted schedule.

7. **Minimum/maximum rules**: Sootblower scheduling is checked and adjusted to prevent excessive or infrequent operation.

8. **Operator priority**: Operators retain the capacity to recommend sootblower operation when required.

9. **Demand balance**: Scheduling may be further adjusted to ensure sootblowing resources are not exceeded or for the completion of warm cycles.

10. **Sootblow initiation**: Final scheduling implemented by integration with sootblower controls.

Instrumentation and Control

Apart from the SentientBoilerClean server itself, no additional instrumentation or hardware is usually required. This has the benefits of:

- No plant outage is required
- Very high resolution of furnace cleanliness is available without further instrumentation
- Any increased risk from boilers modification is avoided

SentientBoilerClean validates plant instrument sensor readings and has the ability to self-sense, thereby reducing concern about plant instrumentation and not-in-service conditions.

SentientBoilerClean works with the existing sootblowing control system. This allows the conventional sootblowing system to be maintained and also allows for the full manual operation of the sootblowing system in the event that it is required. Existing protective logic is untouched.

User Interface

The user interface for SentientBoilerClean can be:

- Provided through the existing digitals control system
- Provided through the sootblower control human machine interface
- A web based septem

Commissioning

Commissioning of SentientBoilerClean is greatly enhanced because no additional instrumentation is required and no plant outage is necessary. An installation window can be coordinated around major plant outages.

The SentientBoilerClean operation may also be initiated in stages over several weeks
More Information

For more information on SentientBoilerClean, visit [www.honeywell.com/ps](http://www.honeywell.com/ps) or contact your Honeywell account manager.

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