

Detection and Control of Deposition on Pendant Tubes in Kraft Chemical Recovery Boilers

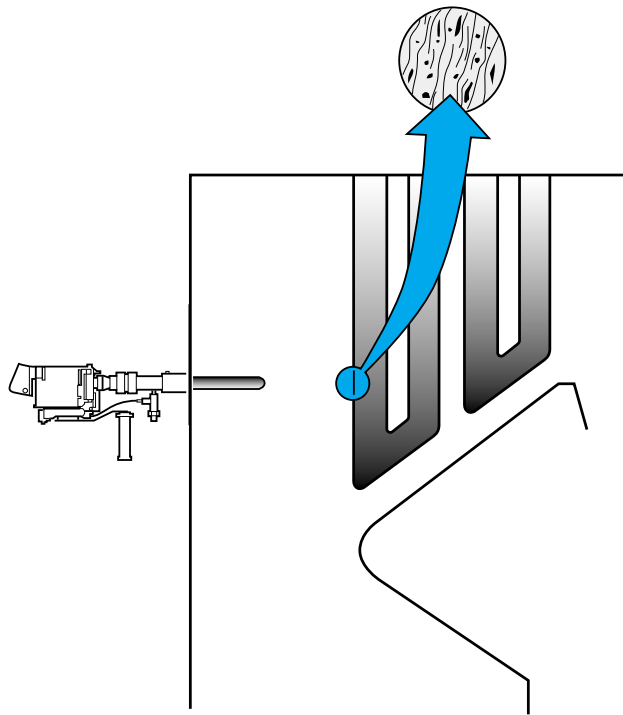


Advanced Imaging System Improves Boiler Efficiency, Reduces Sootblowing Costs, and Improves Operational Safety

The kraft chemical recovery boilers used for pulp processing are large and expensive and can be the limiting factor for mill capacity. Improvements in boiler efficiency with better control of deposits on heat transfer surfaces (e.g. pendant tubes) and reductions in boiler downtime (due to pluggage or slag impact) can improve boiler capacity and reduce operating costs.

With assistance from DOE's Inventions and Innovation Program, Enertechnix, Inc., has developed a hand-held infrared inspection system. Using the inspection system technology, they have also established the feasibility of and are developing a continuous integrated monitoring sootblower control system to detect and control buildup of deposits. The early detection of deposits can extend the intervals between boiler shutdowns. The resulting improved boiler operation and reduced maintenance provide energy savings and productivity improvements to the pulp processing industry.

The hand-held inspection system has demonstrated reductions in sootblower steam use of up to 20%. This steam improvement is achieved because the frequency of sootblower operation is reduced, sootblowers can be repositioned based on data obtained from the inspection, and sootblower malfunction can be detected. Reduced pluggage and deposition in the boiler have also led to improved heat transfer rates. The integrated observation camera and sootblower control system (under development) are expected to reduce sootblower steam usage by 30-35% and improve heat transfer efficiency by 20%.



Hand-held Inspection System on a Kraft Recovery Boiler

Overview

- ◆ Developed by Enertechnix, Inc.
- ◆ Commercialized a hand-held device in 2002
- ◆ 8 units in use in 2003

Energy Savings

(Trillion Btu)

Cumulative through 2003	2003
0.176	0.132

Emissions Reductions

(Thousand Tons, 2003)

Particulates	SO _x	NO _x	Carbon
0.001	0.077	0.020	2.87

Applications

Kraft recovery boilers in the pulp and paper industry and in the coal, cement, steel, and glass manufacturing industries

Capabilities

- ◆ Produces clear images and videos of boiler interiors despite highly particle-laden environments.
- ◆ Produces images at distances up to 100 feet, enabling inspection anywhere in the combustion chamber including the convection pass and economizer.

Benefits

Productivity

The hand-held inspection system reduces boiler downtime through early detection of defective fixtures (tube leaks or damaged sootblower). Without shutting down the boiler, the system also detects slag formation at an early stage, preventing impact damage and enabling cleaning before deposits harden.

Safety

The impact of sizable slag deposits on boiler internals can lead to severe damage and potential injury. The hand-held inspection system has enabled early detection and elimination of such deposits.