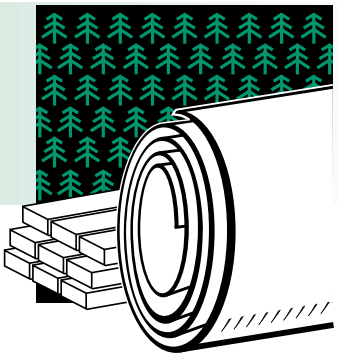
FOREST PRODUCTS

Project Fact Sheet



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

Benefits

- Increases boiler productivity
- Reduces pluggage-related problems such as slag-falls
- Increases boiler capacity
- Enhances environmental compliance
- Prevents pendant tube leaks and their respective safety hazards
- Improves operator confidence

Applications

If successful, this technology will be commercialized by Combustion Specialists, Inc.(Maple Valley, WA), and transferred to the industry within the next 15 years. Widespread use of the technology will increase the production capacity and efficiency of the entire kraft pulping industry.

Immediate Benefits Will Be Derived through the Reduction and Control of Recovery Boiler Pluggage

The chemical recovery boilers used in kraft pulp processing are large and expensive. Since it is not cost-effective to increase their capacity in small increments, their original size may limit the capacity of the entire mill. The effective burning capacity of boilers could be improved, however, by reducing the deposition of particulates on their heat transfer surfaces and the resultant plugging of gas passages. On-line sensing methods that detect and control build-up of these deposits could help extend the intervals between boiler shutdowns and reduce deposit formation.

Researchers are exploring several sensing technologies for monitoring deposition in kraft boilers. These technologies, coupled with computers that conduct multi-point data processing, should be capable of accurately detecting and measuring materials that are deposited on pulp boilers. A successful deposition-monitoring system will decrease boilers downtime and increase boiler capacity by reducing pluggage and its related problems. For a modest capital investment, the pulp and paper industry could achieve substantial economic savings.

Particulate Sensing System For Kraft Boilers

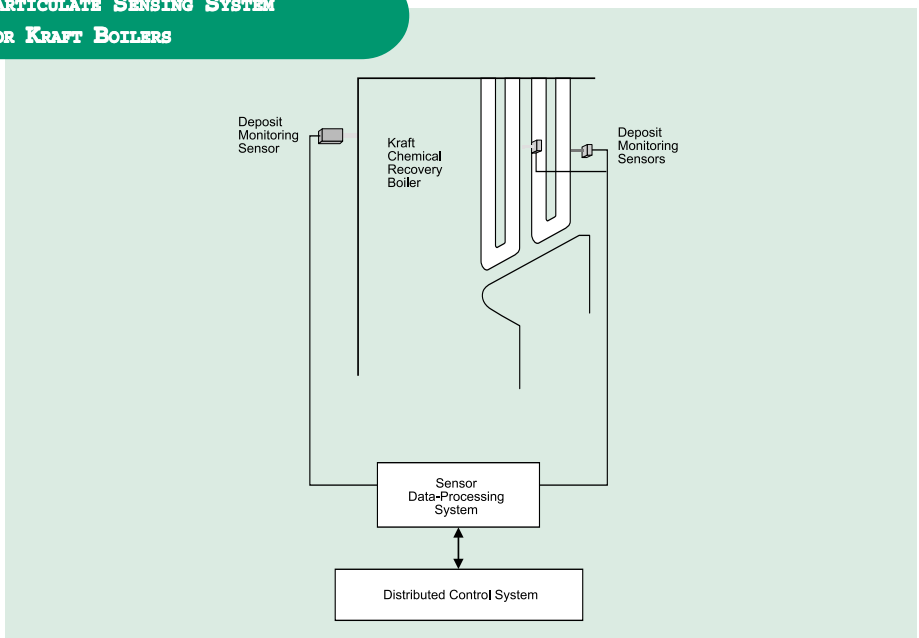


Figure 1. The schematic shows the application of sensing technology to monitor particulate deposition on boiler pendant tubes.

Project Description

Goal: To develop a sensing system for detecting deposits on the pendant tubes of a kraft chemical recovery boiler, and to demonstrate the system's usefulness in extending the time between boiler shutdowns and in ameliorating other deposit-related problems.

Three objectives have been identified for this project: (1) To identify a method of directly monitoring the deposition of fume and carryover particles on recovery boiler pendant tubes; (2) to develop and test the chosen method of directly monitoring the deposition of fume and carryover particles on recovery boiler pendant tubes; and (3) to use the information, in conjunction with simultaneous gas temperature measurements, to develop an effective control scheme for these deposits.

Seven tasks will be performed during this project, which is scheduled to run for nearly three years (through the second quarter of 2001): (1) Electromagnetic properties survey, consisting of a literature review and a simple modeling effort; (2) detection technology survey, to determine the most economic method for detecting deposits; (3) device selection and packaging so it will withstand the recovery boiler environment; (4) boiler data acquisition, using the packaged system in an operational recovery boiler to obtain images of deposit formation; (5) data processing definition/implementation, to obtain a small number of relevant parameters; (6) prototype (proof-of-concept) system assembly, using data collected previously in the field; and (7) pluggage control demonstration, using the proof-of-concept system in conjunction with on-line gas temperature measurements.

Progress & Milestones

- Achieved clear images of sootblower operation in recovery boilers under full load.
- New lens train design offers improved performance at lower light levels, enabling data to be acquired deeper in the convection pass.
- Four field tests were completed: three at Weyerhaeuser, Longview, WA and one at Simpson Kraft, Tacoma, WA.
- First complete prototype and Version 2.02 of the image acquisition software have been completed and tested.
- Long-term demonstration is expected to be complete in mid-2001.

Project Partners

Combustion Specialists, Inc.
Maple Valley, WA

Weyerhaeuser Company
Tacoma, WA

DanzCo
Tenino, WA

Electrophysics Corporation
Fairfield, NJ

Orca Photonic Systems
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