

OUR MISSION

Our Company provides combustion, boiler, and energy technologies, products, and services.

We are dedicated to working with our clients to help define and achieve their productivity, reliability, efficiency, safety, and environmental goals.

We accomplish this by:

- *Listening and understanding.*
- *Providing a flexible approach to problem solving.*
- *Developing creative and innovative solutions.*
- *Partnering with clients to implement these solutions.*

We commit ourselves to creating a challenging and supportive work environment that fosters opportunity for professional growth and fulfillment.

Our team is dedicated to the highest standards of professional ethics and integrity.

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Jansen Performs Recovery Boiler Evaluation Focused on Floor Tube Thinning

Recently Jansen completed a project on a recovery boiler that combined several areas of our expertise into a single boiler evaluation. The subject boiler is experiencing accelerated material loss in the boiler floor tubes. The location of the loss is at a weld-line that transitions from carbon steel to composite alloy wall tubes. Initially discovered several years ago, the thinning has continued at a constant rate.

The client initiated a root cause analysis project to identify potential thinning mechanisms and contracted Jansen to provide services in support of their efforts. The overall scope of Jansen's involvement was to evaluate the boiler for potential factors related to operations or natural circulation that could promote these losses. In addition, Jansen was to conduct boiler tuning to identify and correct any operational shortcomings that may be contributing to the material loss.

During a visit to the facility, Jansen performed a survey of operating parameters pertaining to the combustion air system, liquor delivery, bed conditions, and equipment settings. Combustion air splits were deemed to be appropriate, air flow to each wall was balanced, and liquor delivery was uniform. Overall, this survey revealed that the equipment was well maintained and functioning properly, and operating practices were consistent with industry standards for good recovery boiler operations.

Additional data collection activities included water velocity measurements in the boiler's downcomers using ultrasonic flow metering technology to



Water Flow Measuring Equipment on Boiler Downcomer

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support the natural circulation portion of the evaluation. Field measurements were made in the flue gas and combustion air systems along with the collection and analysis of black liquor, saltcake, and smelt samples to model the boiler at current conditions and at increased liquor throughput.

The results of the evaluation indicated that the boiler natural circulation was sufficient for the liquor throughput cases Jansen was asked to consider. From a heat loading perspective, the boiler was determined to be heavily but not excessively loaded. Even at projections with increased liquor throughput, natural circulation was determined to be adequate, although the cross-sectional heat input rate exceeded recommended limits.

Overall, Jansen's evaluation constituted a vital part of the larger root cause analysis. The evaluation results will allow the client to focus on other potential causes of tube thinning.

Recent Boiler Tuning Projects

Modern boilers have increasingly complex control systems, governing everything from drum level to grate speed. The result in general is that boilers are able to operate at high efficiency with minimal operator intervention. Even with these modern tools, problems often arise that require another set of hands at the controls and on the boiler. This is where operational tuning and combustion optimization comes in. Jansen has recently completed tuning projects on several projects that took us from North America to South America.

Boiler A is located in Brazil and burns biomass for a maximum steaming rate of 70,000 lb/hr. The boiler had recently experienced elevated grate temperatures, often to the point of grate malfunction. Jansen did a boiler evaluation in 2022 that attributed grate overheating to poor distribution of fuel and primary air. In subsequent tuning, Jansen optimized settings in grate movement, primary air distribution, and overall combustion air delivery. The result was improved spread of combustion on the grate, lower grate temperatures, and reduced carbon monoxide emissions.

Boiler B is a black liquor recovery boiler in the southeastern United States with a maximum steaming rate of 549,000 lb/hr and equipped with a four-level air system. Since a recent lower furnace rebuild, boiler operations had been plagued by high total reduced Sulfur (TRS) emissions and poor bed stability. Jansen's tuning approach involved adjusting the air flows to all four air levels, particularly the underused quaternary level. The results showed that increasing air flow to the secondary level helped improve bed coverage on the furnace floor. Although raising the quaternary air flow led to an increase in opacity, CO emissions dropped by 90%, and TRS fell by more than half.

Boiler C is a biomass boiler in western Canada, converted from a recovery boiler, and with a maximum steam flow of 250,000 lb/hr. Achievable steam generation from biomass had recently been limited to around 150,000 lb/hr due to poor grate combustion conditions. Through adjustments to the fuel screw speeds and grate speed, fuel distribution on the grate was made more uniform, and adjustments to the undergrate air and overfire air systems helped bias combustion air to the rear half of the grate. These tuning steps led to a 40% increase in steam generation from biomass.

An important point here is that, although Jansen's combustion expertise drives the tuning efforts, we strive to work with the boiler operators and plant staff so that everyone involved will understand optimal settings and best practices. In this way, peak boiler performance can be sustained long after the tuning period has ended.



Pre-Tuning (top) and Post-Tuning (bottom) Images Showing Improved Bed Coverage in a Recovery Boiler

It's the Little Things

Mills and plants place high importance on the design, capacity, and functionality of boilers and associated equipment. This makes sense, as proper engineering of these items determines whether the boiler can effectively burn fuel and generate the required steam flow at high efficiency and with low emissions. Sometimes, however, the key to good operation is far more mundane.

Consider the cleanout ports on biomass fuel chutes. A boiler operator charged with routinely rodding out the chutes might want to leave these ports open at all times, particularly if the chutes are prone to pluggage. But open ports allow air to be drafted into the furnace, which can negatively impact boiler operation. Jansen observed this during recent tuning of a biomass boiler. After improved combustion and reduced carbon monoxide (CO) emissions had been achieved through careful, methodical adjustments to the combustion air system settings, the fuel chute ports were found to have been open the whole time. Closing the ports led to reduced boiler excess air and hence a further, significant drop in CO.

In another case, the boiler operators had been dealing with excessive fuel and ash carryover. The boiler's undergrate air damper and damper controller were in working order, but the undergrate air flow sensor was non-functional, so changes in air flow could not be discerned from changes in damper controller output. During a walkdown of the boiler, Jansen noticed that the damper actuator controller had been placed to an open setting instead of automatic. So although the operators thought they were manipulating the damper, in reality it was always fixed open. Once the damper was switched back to automatic control, the damper moved to a more closed setting as required by the controller. This caused a reduction in undergrate air flow and with it a reduction in carryover.

A third example is removing deposits from the liquor guns in a recovery boiler. In a recent recovery boiler tuning trip, heavily fouled guns sometimes produced a fine liquor spray that deposited asymmetrically on the furnace walls, creating a thin, uneven smelt bed. At other instances, plugged guns caused liquor spray directly onto the bed. Cleaning the guns had the effect of generating a more uniform droplet size and injection patterns that resulted in better bed coverage and shape. The enhanced combustion of liquor and a stable bed also raised bed temperatures, which contributed to a reduction in sulfur dioxide emissions.

Besides in-depth boiler evaluations and well-designed equipment upgrades, Jansen provides decades of experience in diagnosing operational issues and improving boiler performance. This "extra set of eyes" can help identify the little, sometimes forgotten things that make the difference between suboptimal and optimal performance.



Control Dampers Should Be Set to Automatic Mode

Jansen at TAPPI PEERS

The annual TAPPI PEERS meeting will be held in Atlanta, November 5-8, and Jansen will have a booth at the meeting. Come see us at booth 303 in the exposition area and find out what we're up to these days. Rumor has it that Jansen personnel will also put on their running shoes for the TAPPI PEERS PaperChase 5k run. We hope to see you in Atlanta!

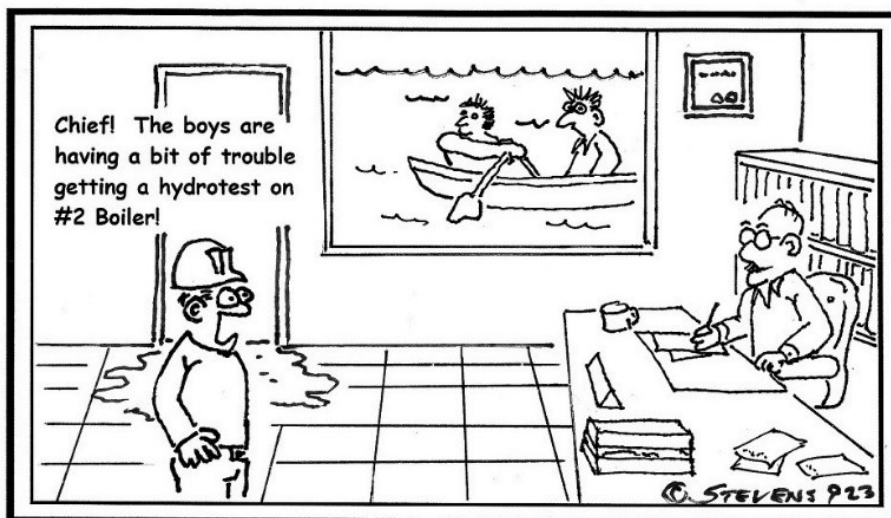


News Briefs

Jansen's experience in the pulp & paper, forest products, agricultural, and waste-to-energy industries and with independent power producers is extensive. Services recently provided to our customers include the following, many of which are in progress:

- Engineering evaluations of biomass, chemical recovery, waste-to-energy, and coal-fired boilers.
- Chemical recovery boiler capacity and condition assessments.
- Combustion air system upgrades.
- Economizer and superheater upgrades.
- Boiler steam/water-side circulation studies.
- CFD modeling of biomass, chemical recovery, and waste-to-energy boilers.
- Emissions control evaluations (CO, NO_x, TRS, and PM).
- Boiler operational tuning and optimization support.
- Boiler MACT compliance review and operational tuning.

For further information on Jansen's projects and capabilities, contact Mark McCabe at 425.736.9758 or by e-mail at mark.mccabe@jansenboiler.com. Additional information and specific project references can be found on our website at www.jansenboiler.com.



A collection of boiler house cartoons by Gordon Stevens shown previously in our newsletter can be viewed on our website: www.jansenboiler.com.

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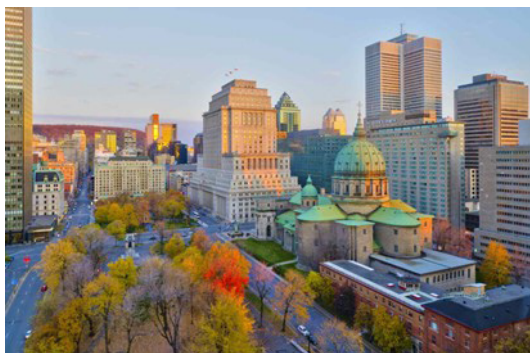
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Fall 2023 Biomass Boiler Workshop

Montréal, Québec | November 1-2, 2023

Since Jansen's workshops began in 2000, they have been attended by over 1,000 engineers, operators, and managers from numerous plants in the pulp & paper, forest products, energy-from-waste, independent power, and food processing industries.

The workshop consists of presentations about new technological developments and results of upgrades to improve the operating performance, burning capacity, thermal efficiency, and fuel economy of biomass- and other solid fuel-fired boilers. In addition, the program will include opportunities for troubleshooting and problem-solving discussions. Participants will benefit by:



- ✦ Learning from experts in the industry about current retrofit technology for biomass boilers and associated equipment.
- ✦ Seeing how other boiler owners solve their boiler problems.
- ✦ Discussing potential solutions for their specific issues.

Attendance to the workshop is free of charge, but space is limited.

For sign-up and to receive a detailed program of the technical presentations, workshop location, and hotel information, please contact Cathy Thomas by phone at 425.952.2835 or by e-mail at cathy.thomas@jansenboiler.com.

The Biomass Boiler Workshop is presented and co-sponsored by:

