



BOILER NEWS

Number 46, Fall 2019

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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Power Boiler Upgrade Helps Mill Achieve Energy Efficiency and Reliability Goals

At a pulp mill in the eastern United States, a large portion of the mill's steam demand has been supplied by two biomass-fired power boilers (Boiler A and Boiler B). As part of an overall mill energy consolidation, and performance and reliability improvement effort, the mill sought to decommission Boiler A and upgrade Boiler B.

Boiler B was originally designed for a steaming capacity of 500,000 lb/hr from pulverized coal firing or 400,000 lb/hr from biomass firing on a traveling grate.

Natural gas replaced pulverized coal about ten years ago. Prior to the upgrade, natural gas co-firing was common due to biomass combustion system deficiencies. At best, Boiler B could achieve only about 300,000 lb/hr of steam generation from biomass firing alone.

To become the mill's sole power boiler, the B unit would need to sustain steam loads around 400,000 lb/hr during peak demand periods. A boiler evaluation performed by Jansen, including Computational Fluid Dynamics (CFD) modeling, identified inadequate fuel distributor and overfire air (OFA) system capacities as major bottlenecks to increased steam generation. Other limitations included excessive flue gas and combustion air temperatures leaving the tubular air heater, insufficient sweetwater condenser capacity, and high flue gas pressure drops across the unit's granular bed scrubbers.

Jansen designed and supplied major elements of the boiler upgrade in fall 2018, including new fuel distributors, new OFA system (including Jansen Multi-Range High Energy Combustion Air Nozzles™ equipped with automatic nozzle flow control dampers), and a new, larger economizer to replace the old unit. In addition, the feedwater piping was modified to improve sweetwater condenser performance, and the boiler controls were upgraded with a modern load-following strategy by Enero Solutions (www.enerosolutions.com). Separately, the granular bed scrubbers were replaced by a dry electrostatic precipitator.

Following the upgrade, the mill reports several major benefits. Fuel burnout is improved and char and ash carryover from the furnace is reduced. Flue gas and combustion air temperatures are greatly decreased (by 136°F and 102°F, respectively, at the same steaming rate). And fuel firing rates are reported to be down 10% compared to the pre-upgrade condition when operating at the same steaming rate. Most importantly, with the demonstrated ability to generate 400,000 lb/hr of steam when firing only biomass, the mill can now decommission Boiler A, which will produce substantial savings in operating and maintenance costs.

Overall, the Boiler B upgrade has been a key component to achieving the mill's energy consolidation, efficiency, and reliability goals. 



New Economizer Being Lowered into Boiler B Building

A Message from Our President

I am excited to be joining the team at Jansen. Throughout my career in the pulp and paper industry I have been aware of Jansen and the excellent reputation that they have earned. The Jansen Mission Statement shown on the first page of this newsletter fits very well with my own values and principles. Listening to the customer, developing innovative solutions to meet their needs, and implementing projects to their complete satisfaction are the cornerstone of Jansen's mission, and these will be the same ideals we promote as we move forward. You can expect the same level of technical excellence and outstanding customer service that you have come to expect from Jansen. You will continue to be served by the same teams of engineers led by our management team of John La Fond, Marcel Berz, and Matt Henderson.



I look forward to meeting many of you in the months to come, either through visits to your locations, or your participation in our semi-annual Biomass Boiler Workshops. Please don't hesitate to contact me at 425.952.2825 or doug.giarde@jansenboiler.com if Jansen can ever be of service to you. 

- Doug Giarde

Jansen Expands International Presence

Jansen engineers have historically been well traveled, with projects throughout North and South America, as well as several locations in Europe and Asia-Pacific. This year, we added South Africa to the list, along with two more facilities in Brazil.

For a client in South Africa, Jansen engineers performed a major capacity upgrade study on a kraft recovery boiler. The boiler, originally supplied by Götaverken (now Valmet), can currently sustain a black liquor dry solids throughput rate of 2,400 tons/day. The mill is targeting a production increase of up to 21%, which would greatly increase the load on the recovery boiler and its auxiliary equipment.

Jansen's evaluation began with a site visit for data collection and included Computational Fluid Dynamics (CFD) modeling and natural circulation analysis. The results showed that increased liquor firing rates would require expanding the lower furnace and possibly installing a redesigned superheater, plus air system and fan upgrades. In addition, the mill's goal of converting the boiler from a conventional two-drum unit to a single drum and replacing the sloped furnace floor with a decanting design would require extensive pressure part modifications.

Jansen engineers visited a plant in Brazil to begin a troubleshooting evaluation. The subject boiler is a D-type unit,

modified in 2015 to receive flue gas from an external refractory brick-lined furnace that fired eucalyptus chips. Furnace overheating was a major issue, with temperatures in excess of 1,270°C leading to damage to the brick in the furnace and to the refractory in the duct connecting to the boiler.

Jansen identified limited fan capacity, poor fuel distribution, and refractory temperature rating as the main issues. Jansen recommended that the plant upgrade the fire bricks and duct refractory to a material with a higher temperature rating, replace the fuel bin, and install additional fan capacity, together with safety features to prevent overheating.

Also in Brazil, Jansen completed a study of erosion/corrosion in a bubbling fluidized bed (BFB) boiler.

The boiler burns biomass and has suffered tube failures and thinning in the rear tube bends of the horizontal superheaters and the hanger tubes. High flue gas velocities and particulate loadings were identified as the culprits for the rear bend thinning, aided by a oversized primary superheater. While a complete redesign of the superheater to place the rear tube bends outside the flue gas stream would provide the best long-term solution, lower cost mitigating actions were identified to reduce the damage. 

Jansen Welcomes

Doug Giarde. Doug was born and raised in Washington State. He attended the University of Washington and received a B.S. degree in Chemical Engineering. After graduation he began working with A. H. Lundberg Associates, Inc. and was with Lundberg for 34 years. Doug also holds an MBA from Seattle University. During his time at Lundberg he held various positions ranging from Process Engineer to CEO. His areas of focus throughout his career have included process design, project management, construction management, corporate leadership, strategic planning and business development.

Doug will serve as Jansen's new President. Outside of work, Doug is an avid cyclist, and also enjoys golf, snow skiing, water skiing, hiking, and travel. He and his wife Joyce live in Woodinville. 

Spotlight on Recovery Boiler Performance Evaluations

Chemical recovery boilers have been a focal point for Jansen since the early days of the company's existence. Johan Jansen was a recovery boiler expert when he founded the company, and one of his early contracts was authoring/editing the three volume Recovery Boiler Reference Manual for the American Paper Institute. To date, Jansen has carried out performance evaluations of over 100 kraft and sulfite liquor recovery boilers worldwide, many of which have led to upgrades.



Recovery boilers have unique design features, with different fuel characteristics and operating practices. In order to determine the feasibility of modernizing existing units for increased capacity, improved efficiency, extended service life, reduction in emissions of air pollutants, or other purposes, detailed knowledge is required about the boiler's specific arrangement and operational limitations. A performance

evaluation determines baseline conditions and provides a prediction of the expected results following a change in operation or upgrade of equipment.

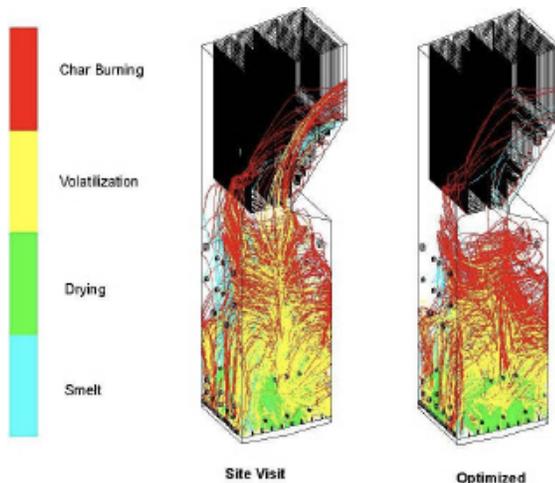
Scope of Services

The Jansen performance evaluation is adapted to each boiler and the specific requirements of each assignment, and will normally include several of the following services:

- Site visit for field data collection and to establish present performance and baseline conditions.
- Performance calculations under site visit conditions and projected future operation.
- Evaluation of critical design and operating parameters affecting the proposed changes.
- Computational Fluid Dynamics (CFD) modeling and analysis of combustion, heat transfer, and emissions.
- Steam/water circulation study, including field measurement of downcomer/feeder water flow using Ultrasonic Flow Monitoring (UFM) technology.
- Determination of necessary boiler modifications to accomplish the desired objective.
- Budget cost and project time schedule estimates.

Recent Trends

Recent trends in the industry that have caused owners to consider recovery boiler evaluations include: increases in capacity, changes in black liquor properties (higher solids content, lignin removal, higher sulfidity, increased non-process elements, etc.), extended run time between outages (increased from 12 months to 15 or 18 months), improved thermal efficiency and power generation (economizer design, excess air control, superheater design for increased steam temperature, etc.), and emissions control (TRS and NO_x in particular). 



RECEIVE OUR Newsletter by E-mail

This newsletter (No. 46, Fall 2019) is again being sent by e-mail to our contacts for whom we have an e-mail address. We are continually expanding the electronic distribution list for our newsletter.

To receive this and upcoming newsletters electronically, you may directly sign-up through the link on our website (<http://jansenboiler.com/publications/newsletters/>) or alternatively, send your e-mail address to jansen@jansenboiler.com to be added to the list.

Additional information and specific project references can be found on our website at www.jansenboiler.com. 



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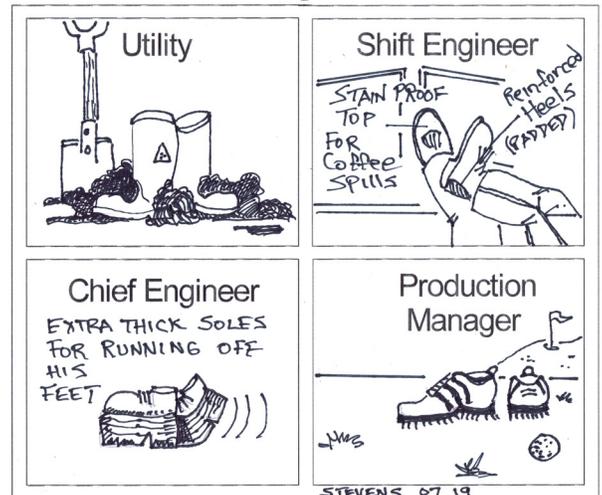
NEWS Briefs

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 these types of projects, contact **John La Fond** at 425.952.2832 or by e-mail at john.lafond@jansenboiler.com, or **Marcel Berz** at 425.952.2836 or by e-mail at marcel.berz@jansenboiler.com. Specific project references can be found on our website at www.jansenboiler.com

Power Engineer Boots



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

Attend Our Fall 2019 Biomass Boiler Workshop

Portland, Maine | November 7 and 8, 2019

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 workshops consist of presentations about new technological developments and results to improve the operating performance, burning capacity, thermal efficiency, and fuel economy of biomass- and waste fuel-fired boilers. In addition, the program will include opportunities for troubleshooting and problem solving discussions of challenges that attendees bring to the workshop. Participants will benefit by: 1) learning from experts in the industry about current retrofit technology for biomass boilers and associated equipment; 2) seeing how other mill operations solve their biomass boiler area problems; and 3) discussing potential solutions for their specific problems. Attendance to the workshop is free of charge, but space is limited.



Stay tuned at www.jansenboiler.com/biomass-boiler-workshops for information on future workshops!

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 workshops are presented and co-sponsored by:

