

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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A Message from the President

Jansen is excited to use this newsletter as an opportunity to introduce our new logo and updated branding appearance. Since 1976, Jansen has been a leader in combustion, boiler, and energy technologies, assisting our customers with getting the most out of their boiler and combustion processes. Over the past couple of years, there has been a lot of change at Jansen and in many of your organizations in large part due to events going on in the world around us. We felt like now was a good time to re-energize our brand and show a newer, more modern look to our customers.

One thing that will not change is our commitment to helping you achieve your operational and production goals through innovative, custom engineering solutions that optimize your existing boiler processes and equipment. You will see a new look to our website, newsletter, paperwork, and branded goods, but we will still provide you the same excellent service that you have come to expect from Jansen.

Thanks to all of you for partnering with Jansen over the years, and we look forward to being of service for many more years to come!



Doug Giarde

Jansen Designs New Recovery Boiler Superheater

In a welcome sign that the pulp and paper industry's health continues to improve following the pandemic, a mill in the northeastern United States has contracted Jansen to design a replacement two-stage superheater for their recovery boiler. The existing superheater was nearing the end of its serviceable life and had experienced damage due to thermal shock from the boiler's sootblowers. The mill was interested in achieving higher steam temperatures for power generation, increasing black liquor throughput, and changing the source of the steam supply to the sootblowers.

The boiler was designed for a virgin black liquor solids throughput rate of 3.1 million lb/day and a maximum steam flow of 515,000 lb/hr. Jansen knows the boiler well,



Jansen Superheater Modules Awaiting Installation

having conducted several capacity and circulation evaluations over the years. In spring 2022, Jansen performed an evaluation of the boiler focusing on superheater design and performance. The evaluation results showed that the mill's target steam temperature could be reached by adding a radiant tertiary superheater in front of the existing primary and secondary sections.

After consideration, the mill elected to proceed with a new primary and secondary superheater designed by Jansen and forgo a tertiary section. The revised design of the primary and secondary superheater incorporates upgraded tube metallurgy and thickness as compared to the existing arrangement. In addition, the new design also reduces the superheater steam side pressure drop. A new connection for the sootblower steam supply was provided so that sootblowing steam is drawn from the primary superheater outlet rather than from the steam drum. This change will reduce the moisture content in the sootblower steam, thus reducing thermal shock in the superheater tubes.

Jansen's scope of work includes the engineering and design of new primary and secondary superheater pendants, the new primary and secondary inlet and outlet headers, as well as construction observation during the outage. The project has a tight schedule which has required flexibility to meet the planned outage date in August 2023. As of this writing, the pressure part materials have been ordered by the customer with fabrication scheduled to begin in October of 2022.

Further Studies on Replacing Coal with Biomass

Jansen's spring 2022 newsletter noted that coal is facing an uncertain future. While US coal production is projected to increase through 2022 and 2023, coal consumption is projected to decline due to a variety of factors, including energy market volatility and environmental regulations. Earlier this year, Jansen completed a study for a paper mill in the Pacific Northwest that sought to remove stoker coal from the solid fuel mixture fired in their power boiler. Since then, Jansen has performed two similar evaluations on power boilers located in the midwestern United States.

The first study focused on reducing sulfur dioxide emissions associated with co-firing coal with hogged wood and mill sludge. The boiler has a design steam capacity of 100,000 lb/hr and in current operations receives roughly 60% of its heat input from coal. Jansen was contracted to evaluate and provide cost estimates for equipment upgrades required to achieve maximum steam production from wood and sludge.

The study results showed that the FD fan, ID fan, and pollution control equipment were adequate for maximized wood and sludge firing. Recommended upgrades included an upgraded overfire air system with a booster fan and new fuel



Combustion on a Coal-Heavy Grate

distributors. The boiler lacks a steam attemperator, so a new attemperator was recommended to guard against steam temperature excursions. With these upgrades and the elimination of coal, the boiler was projected to generate nearly all of its designed steam flow on hog fuel and sludge, and sulfur dioxide levels were predicted to be greatly reduced.

In a second study, the mill was interested in steam generation from firing manufactured fuel pellets. The boiler was originally designed to burn stoker coal for a maximum steam load of 275,000 lb/hr. In recent years, the mill had added biomass and pellets to the mixture, but coal still provided most of the fuel heat input. The mill approached Jansen to evaluate the feasibility of operating the boiler at maximum load on 100% pellet firing.

Jansen's evaluation showed that the design steam load of 275,000 lb/hr could indeed be generated on 100% pellet firing. The boiler's FD fan, ID fan, and pollution control equipment were adequately sized, requiring no upgrades. Given the pellets' high volatile content, however, the existing overfire air system lacked sufficient capacity. A larger, overfire air system including a booster fan would be recommended, along with new fuel distributors. In addition, the mill is facing tighter NO_x limits, so an SNCR system was recommended. As in the first evaluation described above, the mill is consulting with a materials handling firm to determine needed capacity upgrades for the boiler's fuel and ash handling systems.

Given today's changing energy and environmental landscape, boiler owners need flexibility when facing major operational decisions. Jansen provides a go-to source of accurate and unbiased engineering evaluations to help mills and plants meet these challenges.

Improving Recovery Boiler Performance Through Tuning

Ensuring that a mill's recovery boiler(s) operate at high performance is critical to maximizing overall pulp production rates and meeting state and federal permit limits. Benefits range from peak chemical reduction efficiencies, reduced carryover and fouling, and acceptable stack emissions. In addition to process and capacity evaluations, Jansen provides operational tuning support for clients experiencing recovery boiler challenges. Jansen has recently tuned three recovery boilers located at mills in the southeastern United States.

Boiler A was designed to fire 5.5 million lb/day of as-fired black liquor dry solids with a solids content of 65%. An initial survey of the liquor delivery and combustion air systems revealed an irregularly shaped bed and imbalanced combustion air delivery. Tuning efforts focused on optimizing the distribution and quantity of air delivered to each of the three combustion air levels. Improved air delivery dropped carbon monoxide emission to near zero, while reduction of total excess air lowered NO_x levels without increasing TRS. In addition, the bed shape became more stable and uniform, and camera images showed a brighter bed, indicting a hotter lower furnace and increased sodium fume generation.

Boiler B was designed to fire 6.4 million lb/day of liquor solids with a solids content of 68%. One issue with Boiler B was a fouled liquor gun that was spraying directly onto the bed and creating a “cool” mound. Additionally, the tertiary air delivery was imbalanced leading to elevated and stratified carbon monoxide emissions. Correcting the faulty liquor spray improved the bed structure, and balancing the tertiary air nearly eliminated carbon monoxide. Adjustments to primary air delivery improved the bed and promoted hotter conditions in the lower furnace.

Boiler C was designed to fire 3.6 million lb/day of liquor solids. Jansen upgraded the boiler’s secondary and tertiary air systems in 2007 to support a liquor throughput increase to 5 million lb/day. The mill’s interest in tuning had less to do with combustion or emissions and more to do with optimization of air system operation. Jansen had provided an air system control scheme with the 2007 upgrade, but this scheme had never been implemented. The boiler’s liquor flow meter was also found to read high, meaning that combustion air delivery to the furnace would be excessive if the air system was operated in cascade mode. To improve operations, Jansen provided a controls scheme updated to reflect current instrumentation as well as recommended air system settings for current boiler loads.

Due to the complexity of recovery boiler operations, engineers and operators must be mindful of an array of parameters. Changes in liquor chemistry, liquor spray pattern, combustion air delivery, and smelt runoff require constant attention. Periodic tuning is recommended to ensure optimal performance and availability, and Jansen has the knowledge and experience to keep recovery boilers running in top shape.



Poor Bed Shape in a Recovery Boiler Prior to Tuning

Jansen Welcomes...



Morgan Silverman

Process Engineer

Morgan Silverman graduated from UCLA in June with a bachelor’s degree in chemical engineering; her degree path concentrated on pursuing environmentalism within the energy industry. Her research group focused on the technological development of luminescent solar concentrators (LSCs), an energy alternative to traditional solar cells. Morgan also worked on several engineering projects during her undergraduate years, including the design of an ethylene production plant. During this project, she oversaw the development of technical specifications for the ethylene cracking furnaces and quench units.

In her free time, Morgan enjoys relaxing in the great outdoors. As a former Alaskan resident, she is an avid hiker, ice climber, and mountain biker, and she can often be found camping on weekends. Morgan also enjoys reading classic literature and nonfiction on ecology and botany.



Pat Romberg
Senior Designer

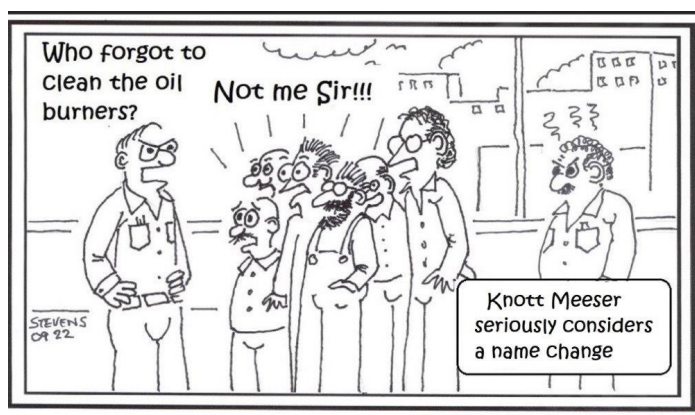
Patrick Romberg brings over 25 years of mechanical design and drafting experience to Jansen. Patrick received his bachelor's degree in mechanical engineering from the South Dakota School of Mines and Technology. His work experience includes permanent building maintenance equipment and conveying equipment for a variety of industries including pulp and paper mills. He's proficient with AutoCAD software and has utilized it as well as other computer-aided design software packages since the late '80s.

Patrick and his wife have been residents of the Seattle area since 2000. He enjoys exploring coastal towns and beaches of the northwest and all things baseball.

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.



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

For further information on Jansen's projects and capabilities, contact Mark McCabe at 425.736.9758. Additional information and specific project references can be found on our website at www.jansenboiler.com.

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Jansen at TAPPI PEERS

The annual TAPPI PEERS meeting is returning to an in-person format this year, and Jansen will have a booth at the meeting, to be held October 30 through November 2 in Providence, Rhode Island. Come see us at booth 111 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 Providence!



Fall 2022 Biomass Boiler Workshop

Panama City Beach, Florida | November 9-10, 2022

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 of upgrades 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.

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:

