Reducing NOx Emissions Through Air Jet Combustion

Air nozzles are shown on pallets ready for shipment to customers worldwide.

The nozzle designs are optimized to meet the requirements of each application, ensuring efficient combustion and minimal emissions. For further information or inquiries, please contact:

Jansen Combustion and Boiler Technologies, Inc.
12025 158th Avenue NE, Suite 250
Kirkland, WA 98084-3043
Phone: (425) 825-0500
Fax: (425) 825-1131
E-mail: editor@jansenboiler.com

For more information, visit our website at:
www.jansenboiler.com
UPDATE ON

Biomass Boiler OFA System Upgrades

In the past ten years, Jansen has been awarded contracts to design/ supervise overfire air (OFA) system upgrades on forty-five (45) biomass boilers in the Forest Products Industries. With these upgrades (of which several are under contract for installation in the remainder of 2007), Jansen continues to supply the most biomass boiler OFA system upgrades to the industry.

The rising cost of fossil fuels and stricter regulatory emissions performance requirements (MACT) have been the common motivation behind these projects. Consistent improvements in boiler performance and fuel economy have provided confidence to many of Jansen’s customers to have them come back for repeat business.

Further-detailed information of the Jansen approach and experience in upgrading the combustion system of biomass-fired boilers, including OFA upgrades, can be found in our prior newsletter (No. 81) and our website (www.jansenboiler.com). Two workshops are again scheduled for this year (see related article on page 4).

For further information and specific project information contact Arne Verloop at 425.952.2825 or by e-mail at Arne.Verloop@jansenboiler.com.

In the past ten years, Jansen has upgraded the performance of 45 biomass fueled power boilers in our industries. Typically, the goals of these upgrades are:

• To significantly increase the biomass burning capacity and reduce fossil fuel firing.
• To improve emissions performance (CO, VOC, NOx, particulate matter).
• To reduce carryover and reduce unburned carbon losses.
• To reduce erosion from higher biomass.
• To reduce excess air and increase thermal efficiency.
• To help meet Boiler MACT regulations and improve performance.
• To facilitate efficient and trouble-free incineration of Dioxide Non-Condensable Gas (DNCG).

The workshops are co-sponsored by:

• To help meet Boiler MACT regulations and improve performance.
• To facilitate efficient and trouble-free incineration of Dioxide Non-Condensable Gas (DNCG).

For sign-up to receive a detailed program of the technical presentations, workshop locations, and ticket, etc., please contact Pat Ankrum or Cathy Thomas by phone at 425.952.2825 or by e-mail at Firstname.Lastname@jansenboiler.com.

NEWS Briefs

Since our last newsletter (Winter of 2006), Jansen conducted the following process and design engineering projects in the Forest Products and Waste-to-Energy industries:

• Biomass and waste fuel boiler engineering evaluations (Bark, MSW, RDF).
• Chemical recovery boiler capacity evaluations.
• Boiler circulation studies and UFM data collection.
• CFD modeling of biomass and chemical recovery boilers.
• Biomass boiler OFA system upgrades, design, supply, and installation.
• Biomass boiler superheater design and supply.
• Boiler fuel conversion feasibility studies.
• Chemical recovery boiler air system upgrades.
• Specification for new recovery boiler purchase.
• Waste boiler fuel mix alkaline combustion calculations.
• Evaluation and implementation of HVNC NOx disposal in existing boilers.

This work was conducted (or is currently underway) for the following companies:

• Boise
• Borum Forest Products
• Catalyst Paper
• Domtar Inc.
• EnergyRecovery Corporation
• Epcor
• Encon Inc.
• Eurosun Pulp & Paper Company
• Genco Pacific/Port Callaway
• Great River Energy
• Green Island Energy Limited
• International Paper Company
• McMillan
• NewPage Corporation
• Porteous
• Primary Power International
• SAPPI North America
• Smith-Storey Container Corporation
• Southern Forest Products
• Tembec,
Inc.
• Vaner Paper
• Timber, Inc.
• Weyerhaeuser Company

For further information on this type of work, please contact Arne Verloop at 425.952.2825 or by e-mail at Arne.Verloop@jansenboiler.com.

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

CUSTOMIZED ENGINEERED SOLUTIONS

Jansen Supplies Four Recovery Boiler Air System Upgrade Projects

• Reduce carryover and flue gas temperatures in the superheater.
• Reallocation of the heating surfaces therefore reducing the boiler’s drawing frequencies.

General concepts and key elements of Jansen’s recovery boiler air system upgrades are:

1. No or efficient level of overfire/secondary air. Installation of new or improved overfire/secondary air in-bed size and shape. Overfire/secondary air is typically installed on two opposing walls in an interlaced pattern.

2. Efficient overfire/secondary air nozzles. One of the key aspects of the new or improved overfire/secondary air level is the need for effective air jets that provide good coverage of the furnace cross-section, thus promoting rapid mixing and burns large quantities of pyrolysis gases. This will result in improved energy and air utilization.

3. High angle or “low tertiary air”. When firing BLDS at dry solid levels in excess of 70%, large quantities of pyrolysis gases will be released from the liquor drop shortly after leaving the liquor guns. To complete combustion of these pyrolysis gases particularly on larger units, when burning liquor at high velocities, effective air will need to be supplied, in increasing quantities, just above the liquor gun levels.

4. High tertiary air. On older Combustion Engineering units with 2-level air supply, computational fluid dynamics (CFD) modeling has shown, and actual installations have demonstrated that, the “old” tangential secondary air does not always need to be replaced by new interlaced air. Most often, only small benefits were seen from the replacement and were not cost-effective. With this approach, the upper tangential air supply can remain in service, unmodified, in conjunction with Jansen-supplied overfire/secondary and liquor air gun levels, as is the case in several Jansen upgraded units.

5. Additional FD fan capacity may not be needed to achieve sufficient air flow quantity and pressure at different air levels. The need for new FD fan blower is reviewed for each boiler individually, however, often has been found not necessary.

6. No new air flow meters needed. Due to the fixed opening and size of the Jansen air nozzles, the device is used to provide accurate and reliable air flow measurement. No new duct or flow meters will be needed.

CFD Modeling. Prior to an upgrade, as part of the boiler process evaluation or design phase, Jansen conducts CFD modeling of the boiler and after upgrade configuration of the combustion air supply and boiler operation. The outcome of the CFD modeling provides the confidence that a particular design approach will be successful.

At Jansen, CFD modeling is carried out in-house by Jansen engineers.

Including the upcoming four new installations, Jansen will have upgraded air delivery systems of 24 chemical recovery boilers in the pulp and paper industry, some of which are among the highest loaded boilers in North America, both on the basis of cross-sectional area and boiler input rates.

For further information and specific inquiries, please contact Arne Verloop at 425.952.2825 or by e-mail at Arne.Verloop@jansenboiler.com. Additional information and specific project information can be found on our website at www.jansenboiler.com.
Jansen Supplies Four Recovery Boiler Air System Upgrade Projects

- Reduce carryover and flux gas temperatures into the superheater.
- Realizing the heating of the superheating therefore reducing the boiler’s heating frequency.

**General concepts and key elements of Jansen’s recovery boiler air system upgrades are:**

1. New or efficient level of overbed/secondary air. Installation of new or improved overbed/secondary air to control bed size and shape. Overbed/secondary air is typically installed on two opposing walls in an interlaced pattern.

2. Efficient overbed/secondary air nozzles. One key aspect of the new or improved overbed/secondary air at least is the need for effective air jets that provide good coverage of the furnace cross-section, thus promoting rapid mixing and burning and achieving an acceptable flame pattern. This subtle change in overbed/secondary air nozzles is controlled in two opposing walls.

3. New “low tertiary air”. When firing BLDs at dry solid levels in excess of 70%, large quantities of pyrolysis gases will be released from the liquor short of leaving the liquor guns. To complete combustion of these pyrolysis gases particularly on larger units, when burning liquor at high solids, effective air will need to be supplied, in increasing quantities, just above the liquor gun level.

4. High tertiary air. On older Combustion Engineering units with 2-level air supply, computational fluid dynamics (CFD) modeling has shown, and actual data have demonstrated that, the “old” tangential secondary air does not always need to be replaced by new interlaced air. Most often, only small benefits were seen from the replacement and were not cost-effective. With this approach, the upper tangential air supply can remain in service, unmodified, in combination with Jansen-supplied overbed/secondary and liquor gun level air, as is the case in several Jansen upgraded units.

5. Additional FD fan capacity may not be needed to achieve sufficient air flow quantity and pressure at all the different levels. The need for new FD fan reliability is increased for each boiler individually, however, often has been found not necessary.

6. No new air flow meters needed. Due to the fixed opening and size of the Jansen air nozzles, the design is used to provide accurate and reliable air flow measurement. No new air duct or flow meters will be needed.

**CFD Modeling:** Prior to an upgrade, as part of the boiler’s process evaluation or design phase, Jansen conducts CFD modeling of the boiler and after upgraded configuration of the combustion air system and boiler operation. The outcome of the CFD modeling provides the confidence that a particular design approach will be successful. At Jansen, CFD modeling is carried out in-house by Jansen engineers.

Including the upcoming four new installations, Jansen will have upgraded air delivery systems of 24 chemical recovery boilers in the pulp and paper industry, some of which are among the highest loaded boilers in North America, both on the basis of cross-sectional and bottom load input rates.

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

Announcing Our 2007 Biomass Boiler Workshops

- Nashville, Tennessee, June 14-15, 2007
- Raleigh, North Carolina, September 13-14, 2007

Since 2000, these workshops have been attended by some 350 representatives of numerous plants in the Pulp/Forest Products industries and independent power producers. The workshops consist of presentations about new technological developments and results to improve the operating performance, waste fuel burning capacity, efficiency, and fuel economy of biomass-fired boilers (mostly stoker-fired). In addition, the program will include troubleshooting and problem solving discussions of challenges that attendees bring to the workshop. Participants will benefit by: learning about the current retrofit technology for biomass boilers and associated equipment; seeing how other mill owners solve their biomass boiler area problems; and receiving information and solutions to their mill specific problems.

In the past ten years, Jansen has upgraded the performance of 45 biomass fueled power boilers in our industries. Typically, the results of these upgrades are:

- To significantly increase the biomass burning capacity and reduce fossil fuel firing.
- To improve emissions performance (CO, VOC, NOx, particulate matter).
- To reduce carryover and reduce unburned carbon losses.
- To reduce emissions from high volume and low volume.
- To reduce excess air increase thermal efficiency.
- To help meet Boiler MACT regulated environmental performance.
- To facilitate efficient and trouble-free operation of Dlute Non-Condensable Gas (DNC).

The workshops are co-sponsored by:

- EnergyAnswers Corporation
- MeadWestvaco
- Verso Paper
- Weyerhaeuser Company

For sign-up and to receive a detailed program of the technical presentations, workshop locations, and hotel, etc., please contact Pat Austin or Cathy Thomas at phone at 425.952.2820 or by e-mail at Pat.Austin@jansenboiler.com.

Participants take notes during a past Biomass Boiler workshop.

**UPDATE ON**

**Biomass Boiler OFAC System Upgrades**

In the past ten years, Jansen has been awarded contracts to design/supply overfire air (OFA) system upgrades on forty-five (45) biomass boilers in the Forest Products Industries. With these upgrades (of which several are under contract for installation in the remainder of 2007), Jansen continues to supply the most biomass boiler OFAC system upgrades in the industry.

The rising cost of fossil fuels and strict regulatory emissions performance requirements (MACT) have been the common motivation behind these projects. Consistent improvements in boiler performance and fuel economy have provided confidence to many of Jansen’s customers to have them come back for repeat business.

Further detailed information of the Jansen approach and experience in upgrading the combustion system of biomass-fired boilers, including OFAC upgrades, can be found in our prior newsletter (Nov. 2006) and our website (www.jansenboiler.com). Two workshops are again scheduled for this year (see related article on page 4).

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

**Since our last newsletter (Winter of 2006), Jansen conducted the following process and design engineering projects in the Forest Products and Waste-to-Energy industries:**

- Biomass and waste fuel boiler engineering evaluations (Ark, MWK, RDP).
- Chemical recovery boiler capacity evaluations.
- Boiler circulation studies and UFM data collection.
- CFD modeling of biomass and chemical recovery boilers.
- Biomass boiler OFAC system upgrades, design, supply, and installation.
- Biomass boiler superheater design and supply.
- Boiler fuel conversion feasibility studies.
- Chemical recovery boiler air system upgrades.
- Specification for new recovery boiler purchase.
- Waste boiler fuel-mix ash elutriation combustion calculations.
- Evaluation and implementation of HVGC NCG disposal in existing boilers.

This work was conducted (or is currently underway) for the following companies:

- Boise
- Borregaard et al.
- Catalyst Paper
- Domtar Inc.
- EnergySources Corporation
- Epco
- Evergreen Ely
- Evergreen pulp & Paper Company
- Georgia Pacific/Rock Cellulose
- Great River Energy
- Green Island Energy Limited
- International Power Company
- MeadWestvaco
- NewPage Corporation
- Portland Tissue
- Primary Power International
- SAPP/South America
- Smurfit-Stone Container Corporation
- Stora-Enso North America
- Verso Paper
- Weyerhaeuser Company
- Weyerhaeuser

For further information on this type of work, please contact Art Verloop at 425.952.2825 or by e-mail at Art.Verloop@jansenboiler.com.

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

**NEWS Briefs**

Since our last newsletter (Winter of 2006), Jansen conducted the following process and design engineering projects in the Forest Products and Waste-to-Energy industries:

- Chemical recovery boiler capacity evaluations.
- Boiler circulation studies and UFM data collection.
- CFD modeling of biomass and chemical recovery boilers.
- Biomass boiler OFAC system upgrades, design, supply, and installation.
- Biomass boiler superheater design and supply.
- Boiler fuel conversion feasibility studies.
- Chemical recovery boiler air system upgrades.
- Specification for new recovery boiler purchase.
- Waste boiler fuel-mix ash elutriation combustion calculations.
- Evaluation and implementation of HVGC NCG disposal in existing boilers.

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

**Biomass Boiler OFAC System Upgrades**
Since our last newsletter (Winter of 2006), Jansen conducted the following process and design engineering projects in the Forest Products and Waste-To-Energy industries:

- Biomass and waste fuel boiler engineering evaluations (Bark, MSW, RDF).
- Chemical recovery boiler capacity evaluations.
- Boiler circulation studies and UFM data collection.
- CFD modeling of biomass and chemical recovery boilers.
- Biomass boiler OFA system upgrades, design, supply, and installation.
- Biomass superheater design and supply.
- Boiler fuel conversion feasibility studies.
- Chemical recovery boiler air system upgrades.
- Specification for new recovery boiler purchase.
- Waste boiler fuel mix ashleak combustion calculations.
- Evaluation and implementation of HVCN NGC disposal in existing boilers.

This work was conducted (or is currently underway) for the following companies:
- Boise
- Barney Forest Products
- Catalyst Paper
- Domtar Inc.
- EnergyPlus Corporation
- Epoxy
- Evergreen Eko
- Eurtox PulP & Paper Company
- Georgia Pacific/NovCello
- Great River Energy
- Green Island Energy Limited
- International Paper Company
- MeadWestvaco
- NewPage Corporation
- Portucel
- Primary Power International
- SAPPI North America
- Smurfit-Stone Container Corporation
- Tissue North America
- Veen Paper
- Tembec Inc.
- Weyerhaeuser Company

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

Announcing Our 2007 Biomass Boiler Workshops

- Nashville, Tennessee, June 14-15, 2007
- Raleigh, North Carolina, September 13-14, 2007

Since 2000, these workshops have been attended by some 350 representatives of numerous plants in the Pulp/Forest Products Industries and Independent Power Producers.

The workshops consist of presentations about new technological developments and results to improve the operating performance, waste fuel burning capacity, efficiency, and fuel economy of biomass fuel-fired boilers (mostly stoker-fed). In addition, the program will include troubleshooting and problem solving discussions of challenges that attendees bring to the workshop. Participants will benefit by: learning about the current retrofit technology for biomass boilers and associated equipment; 2) seeing how other mill operations solve their biomass boiler area problems; and 3) receiving information and solutions to their mill specific problems.

In the past ten years, JANSEN has upgraded the performance of 45 biomass fueled power boilers in our industries. Typically, the benefits of these upgrades are:

- To significantly increase the biomass burning capacity and reduce fossil fuel firing.
- To improve emissions performance (CO, VOC, NOx, particulate matter).
- To reduce carryover and reduce unburned carbon losses.
- To reduce emissions from high lime boiler fuels.
- To reduce excess air and increase thermal efficiency.
- To help meet Boiler MACT regulation and emissions performance.
- To facilitate efficient and trouble-free incineration of Dize Non-Consamable Gas (DNCG).

The workshops are co-sponsored by:

- International Paper Company
- MeadWestvaco
- Tembec, Inc.
- Weyerhaeuser Company

For sign-up and to review a detailed program of the technical presentations, workshop locations, and hotel, etc., please contact Pat Annetor or Cathy Thomas by phone at 425.952.2826 / 2827 or by email at Festville.Lettman@jansenboiler.com.

Jansen Supplies Four Recovery Boiler Air System Upgrade Projects

- Reduce carryover and flux gas temperatures into the superheater.
- Reallocation of the heating surfaces therefore reducing the boiler’s cleaning frequency.

General concepts and key elements of Jansen’s recovery boiler air system upgrades are:

1. New or efficient level of overbed/secondary air, installation of new or improved overbed/secondary air to control bed size and shape. Overbed/secondary air is typically installed on two opposing walls in an interlaced pattern.

2. Efficient overbed/secondary air nozzles. One key aspect of the new or improved overbed/secondary air level is the need for effective air jets that provide good coverage of the furnace cross-section, thus promoting rapid mixing and burnout of combustible material. This results in the “High Energy Combustion Air Nozzle” (described in detail elsewhere in this newsletter).

Typically, four or five overbed/secondary air nozzles are installed on two opposing walls.

3. New “turbine air”. When firing BLDS at dry solid levels in excess of 70%, large quantities of Ryzen gas will be released from the liquor drum shortly after leaving the liquor gun. To complete combustion of these Ryzen gases particularly on larger units, when burning liquor at high viscosities, effective air will need to be supplied, in increasing quantities, just above the liquor gun level.

4. High thermal air. On older Combustion Engineering units with 2-level air supply, computational fluid dynamic (CFD) modeling has shown, and actual installations have demonstrated that, the “old” tangential secondary air does not always need to be replaced by new interlaced air. Most often, only small benefits were seen from this replacement and were not cost-effective. With this approach the upper tangential air supply can remain in service, unmodified, in conjunction with Jansen-supplied overbed/secondary and liquor gun level air, as is the case in several Jansen upgraded units.

5. Additional FD fan capacity may not be needed to achieve sufficient air flow quantity and pressures at all different air levels. The need for new FD fan capacity is relieved for each boiler individually, however, often has been found not necessary.

6. No new air flow meters needed. Due to the fixed opening and size of the Jansen air nozzles, the design is used to provide accurate and reliable air flow measurement. No new duct or air meters will be needed.

CFD Modeling. Prior to an upgrade, as part of the boiler replacement process evaluation or design phase, Jansen conducts CFD modeling of the boiler and after appropriate configuration of the combustion air supply and boiler operation. The outcome of the CFD modeling provides the confidence that a particular design approach will be successful. At Jansen, CFD modeling is carried out in-house by Jansen engineers.

Including the upcoming four new installations, Jansen will have upgraded air delivery systems of 26 chemical recovery boilers in the pulp and paper industry, some of which are among the highest loaded boilers in North America, both on the basis of cross-sectional area and boilers heat input rates.

For further information and specific inquiries, please contact Ante Verlovi at 425.952.2825 or by email at AVerlovi@jansenboiler.com. Additional information and specific project references can be found on our website at: www.jansenboiler.com.

Customized Engineering Solutions

www.jansenboiler.com
PRESENTING Superheater UPGRADES

Did you know that...

• The nozzles are individually designed and built for each particular boiler and fuel application. See the photo collage of peat nozzle tips on page 5. Tip areas have varied in size from 8 to 150 square inches.

• The nozzles are used where high air velocity, momentum, and furnace penetration is necessary, namely at the secondary, tertiary, and/or quaternary air areas on a recovery boiler for a supply on a biomass/waste fuel-fired boiler.

• The nozzle's air inlet and convergent section exhibit minimal pressure losses (less than 1 in. wg). Relatively low air pressures (typically 8 to 12 in. wg) are needed from the air supply during to achieve excellent air characteristics. For this reason, combustion air delivery system upgrades by Jansen often do not require new air supply fans.

• The nozzles, designed to handle air temperatures from ambient to 60°F. High temperature nozzles are of dual wall construction with insulation between walls.

• New furnace bent tube openings are supplied with the nozzles. Depending on nozzle size, wall construction, and tube dimensions, typically between one and four bent tube sections are provided for each nozzle opening; large nozzle tips require more.

Jansen High Energy Combustion Air Nozzles™ Installed in 70 Waste Fuel-Fired Boilers

Since 1986, Jansen High Energy Combustion Air Nozzles™ have been installed for efficient combustion air supply in more than 70 waste fuel-fired boilers, totaling more than 750 nozzles. At press time of this article, an additional nine projects are underway in various stages for installation between May and December of this year. These nine current projects include four chemical recovery boiler air delivery system upgrades and five biomass boiler overfire air (OFA) system upgrades.

Our mission

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

We accomplish this by:

• Listening and understanding
• Providing a focused and innovative solution
• Working with clients to implement these solutions

Our team of talented and experienced individuals is committed to the highest standards of professional ethics. We remain committed to creating a challenging and supportive work environment that fosters opportunity for professional growth, fulfillment, and rewards.

Continued from page 1

Jansen High Energy Combustion Air Nozzles™ Installed in 70 Waste Fuel-Fired Boilers

• When equipped with a pressure gauge, each individual air nozzle can act as an air flow metering device.

• New duct or flow meters are not needed with the application of Jansen's air nozzles.

• High volume low concentration nozzleless gas (HVLC NGC) can be mixed with balance of combustion air prior to or mixed at the nozzle and centred into the furnace for efficient destruction of the NEC compounds. With 19 installed systems, this has proven to be an effective and economic method of HVLC NEC destruction in recovery and limehe boilers.

• Internally, the nozzles are equipped with a flow control damper that is not exposed to “hobble” furnace conditions (such as high temperature, aggressive flows, high ash, gas, slag, and/or sticky ashes, etc.) These dampers do not warp, break, corrode, or get stuck.

Continued on page 4

Jansen Supplies Four (4) Recovery Boiler Air System Upgrade Projects

Since our previous newsletter last year, Jansen has been awarded on the design and supply of combustion air delivery system upgrades on four recovery boilers in the US.

All four units had been built by Combustion Engineering in the period 1967 to 1976 and these are operating with their original two-level air system. The upgrades will be installed in the summer months that are scheduled between May and November of this year.

As is typically seen, the purpose for these upgrades is to achieve a particular or any combination of the following improvements:

• Increase the black liquor burning capacity, sometimes significantly and over and above original MCR throughput.

• Reduce TS in the furnace to well below 5 ppm.

• Increase temperatures in the lower furnace to improve reduction efficiency and lower SO2 concentrations in the flue gas.

Continued on page 5

Installed in 70 Waste Fuel-Fired Boilers

Installed in 70 Waste Fuel-Fired Boilers

Presently, many mills are critically reviewing the performance of their boilers’ superheaters with the purpose of uncovering opportunities to increase steam temperature and/or keeping the heating surfaces cleaner for longer periods of time.

The name-of-the-game is to make waste fuel-fired boilers more fuel efficient and increase the steam temperature to the turbine generator(s). The obvious incentive for these efforts are to avoid the cost of both purchased fossil fuels and purchased electrical power.

Jansen has assisted several mills with evaluating both purchased fossil fuels and purchased electrical energy. The scope of work may include the following elements:

• Process studies to determine potential benefits and provide budgetary costs.

• Design and supply of additional heating surface including heat exchanger systems. This includes selection of tube materials and dimensions, designing panel bending details, headers, and support structure.

• Design modifications in steam flow path to minimize pressure loss across the superheater.

Several new history of Jansen superheater upgrade designs are described in a detailed article in Newsletter No. 33 (can be viewed from our website). Watch for more coverage on this topic in our next newsletter.

For further information and specific inquiries, please contact

Anu Veragop at 425.852.2625, or Mike Akku at 425.852.2629 or by e-mail at info@jansenboiler.com.

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For further information and specific inquiries, please contact

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Presently, many mills are critically reviewing the performance of their boiler's superheaters with the purpose of uncovering opportunities to increase final steam temperature and/or keeping the heating surfaces cleaner for longer periods of time.

The name-of-the-game is to make waste fuel-fired boilers more fuel-efficient and increase the steam temperature to the furnace burner(s). The obvious incentive for these interests are to avoid the cost of both purchased fossil fuels and purchased electrical power.

Jansen has assisted several mills with evaluating and implementing superheater installations and/or upgrades. The scope of work may include the following elements:

- Process studies to determine potential benefits and provide budgetary costs.
- Design and supply of additional heating surface including attainment heat system. This includes selection of tube materials and dimensions, designing panel bending details, headers, and support structure.
- Design modifications in steam flow pattern to minimize pressure loss across the superheater.

Several case histories of Jansen superheater upgrade designs are described in a detailed article in Newsletter No. 33 (can be viewed from our website). Watch for more coverage on this topic in our next newsletter.

For further information and specific inquiries, please contact Arie Verloop at 425.952.2825, or Mike Britt at 425.952.2829 or by e-mail at Office@Jansenboiler.com.

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This Newsletter, No. 34, Spring 2007, is again being sent by e-mail to our contacts for whom we have an e-mail address, it will also be sent via regular postal service. If you would like to receive the direct-mail distribution list for our bi-annual newsletter. To receive future newsletters, you are given the following choices:

- Prefer receipt by e-mail (no regular mail)
- Prefer receipt by regular mail (no e-mail)
- Prefer both mailing (e-mail and regular mail)

If we do not hear from you, we will assume the third choice.

To receive this and any ensuing Newsletter electronically, please send your e-mail address to editor@jansenboiler.com and you will be included on the list.

Commendations & Support Steel	Modifications

Superheater Inside and Support Steel Mod-Bolts

Inside this Issue

- Jansen High Energy Combustion Air Nozzles™ Installed in 70 Waste Fuel-Fired Boilers
- Jansen Supplies Four (4) Recovery Air Boiler System Upgrade Projects
- The name-of-the-game is to make waste fuel-fired boilers more fuel-efficient and increase the steam temperature to the furnace burner(s).
- Several case histories of Jansen superheater upgrade designs are described in a detailed article in Newsletter No. 33 (can be viewed from our website). Watch for more coverage on this topic in our next newsletter.

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Jansen High Energy Combustion Air Nozzles™ Installed in 70 Waste Fuel-Fired Boilers
Since 1996, Jansen High Energy Combustion Air Nozzles™ have been installed for efficient combustion air supply in over 70 waste fuel-fired boilers, totaling more than 750 nozzles. At press time of this article, an additional nine projects are underway in various stages for installation between May and December of this year. These nine current projects include four chemical recovery boiler air delivery system upgrades and five biomass boiler overfire air (OFA) system upgrades.

Did you know that...

- The nozzles are individually designed and built for each particular boiler and fuel application. See the photo collage of past nozzle tips on page 5. Tip areas have varied in size from 8 to 1750 square inches.
- The nozzles are used where high air velocity, momentum, and furnace penetration is necessary, namely at the secondary, tertiary, and/or quaternary air levels on a recovery boiler air supply on a biomass/waste fuel-fired boiler.
- The nozzle’s air inlet and convergent section exhibit minimal pressure losses (less than 1 in. wg). Relatively low air pressures typically 8 to 12 in. wg are needed from the air supply ducting to achieve excellent air particle characteristics. For this reason, combustion air delivery system upgrades by Jansen often do not require new air supply fans.
- The nozzles are designed to handle air temperatures from ambient to 600°F. High temperature nozzles are of dual wall construction with insulation between walls. These harness bent tube openings are supplied with the nozzles. Depending on nozzle size, wall construction, and tube dimensions, typically between one and four bent tube sections are provided in each nozzle opening; large nozzle tips require more.

The individual design of the Jansen air nozzles is an example of how Jansen develops and applies innovative solutions.

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Jansen Supplies Four Recovery Air Boiler System Upgrade Projects
Since our previous newsletter last year, Jansen has been awarded contracts for the design and supply of combustion air delivery system upgrades on four recovery boilers in the US.

All four units had been built by Combustion Engineering in the period 1967 to 1976 and are operating with their original two-level air-system. The upgrades will be installed during the outages that are scheduled between May and November of this year.

As is typically seen, the purpose for these upgrades is to achieve a particular or any combination of the following improvements:

- Increase the block liner burning capacity, sometimes significantly over and above original MCR throughput.
- Reduce TRS release from the furnace to well below 5 ppm.
- Increase temperatures in the lower furnace to improve reduction efficiency and lower SO2 concentrations in the flue gas.

Jansen High Energy Combustion Air Nozzles™ Installed in 70 Waste Fuel-Fired Boilers

The photo collage of past nozzle tips on page 5. Tip areas have varied in size from 8 to 1750 square inches.

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The name-of-the-game is to make waste fuel-fired boilers more fuel-efficient and increase the steam temperature to the furnace burner(s).

Several case histories of Jansen superheater upgrade designs are described in a detailed article in Newsletter No. 33 (can be viewed from our website). Watch for more coverage on this topic in our next newsletter.