

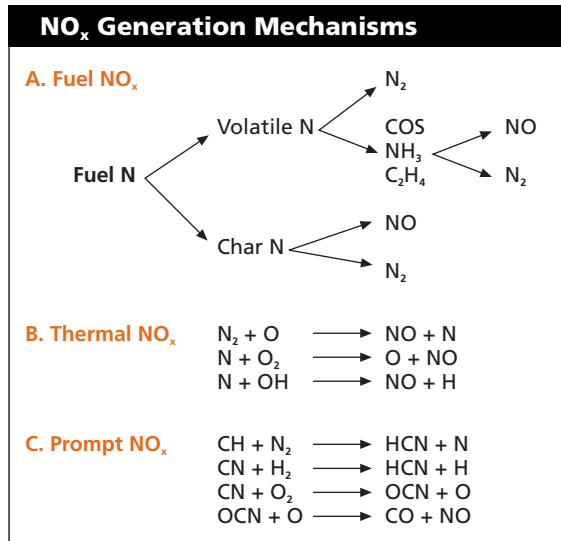
# NO<sub>x</sub> Emissions Reduction

Many utilities, co-generation and manufacturing plants are facing stricter NO<sub>x</sub> emission limits to be effective in the near future. Often, NO<sub>x</sub> emissions must be reduced by more than 50% from current levels. Jansen has worked with several plants to evaluate complex NO<sub>x</sub> issues with biomass-, fossil fuel-fired, and chemical recovery boilers. Jansen has also supplied boiler combustion system modifications designed to reduce NO<sub>x</sub> emissions.

## Jansen's Approach to Solving NO<sub>x</sub> Issues

NO<sub>x</sub> can be generated through various reaction paths depending on the type of fuel and boiler configuration. There are different approaches to lowering NO<sub>x</sub> levels in stack gases. Successful NO<sub>x</sub> abatement starts with understanding the specific NO<sub>x</sub> generation mechanism(s) that are prevalent in a specific combustion system burning a particular mix of fuels. This understanding provides the opportunity to choose the most cost effective NO<sub>x</sub> reduction solution, and define a path forward. The following steps are key elements in Jansen's approach to solving boiler NO<sub>x</sub> issues.

1. Understand the customer's goals.
2. Understand the local environmental permitting constraints.
3. Evaluate current boiler operation to:
  - a. Determine current NO<sub>x</sub> generation mechanism(s)
  - b. Analyze the physical arrangement of the combustion system; size of furnace, location of existing burners and air supply



- c. Determine operating strategy/control, fuel splits, load variability
- d. Establish fuel properties
4. Perform Computational Fluid Dynamics (CFD) modeling to predict effectiveness of types of solutions.
5. Evaluate NO<sub>x</sub> reduction methods for most viable and cost effective solution. Determine capital cost and operating costs as well as "side effects" of proposed solutions.
6. Provide operating recommendations and hardware alterations that best meet the customers' goals.

*(continued on page 5)*

## Projects in Municipal Waste-to-Energy Industry

Since first reporting in previous newsletters, Jansen was recently awarded several new contracts in the *Municipal Solids Waste (MSW) -to-Energy Industry*.

### New Superheaters for Montenay, Inc. at Burnaby Facility, British Columbia

Montenay incinerates MSW that is generated by the greater Vancouver region in three boilers in Burnaby, British Columbia, Canada. Montenay is planning the upgrade of these units to produce superheated steam for a new steam turbine generator. This past spring, Jansen was awarded the

contract for the design of the new superheaters for these MSW boilers.

The Jansen scope of work consists of the following major elements:

- Sizing of heat transfer surfaces,
- Preparing ASME code calculations,
- Preparing general arrangement and fabrication assembly drawings for the new primary and secondary superheaters and associate piping,
- Preparing fabrication specifications for the new superheaters and all associated equipment,

*(continued on page 2)*



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## Update: Bark Boiler Overfire Air System Upgrade in Texas

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In mid-December, Jansen provided the overfire air (OFA) system upgrade of a large bark boiler in Texas (MCR steaming capacity of 775,000 lb/hr) with the purpose to increase the unit's bark burning rate. A full description of this project can be found in our previous Newsletter (issue No. 27, on page 2).

As a final step of the project, contract performance testing at two separate bark burning rates took place in May of 2002. All performance goals were surpassed. Performance requirements had been specified by the mill for increased bark flow as well as reduction in stack emissions of NO<sub>x</sub> and particulate matter.

The upgraded OFA system on the No. 2 Power Boiler resulted in:

- Up to 20 tons per hour more bark burning than before.
- Reduced levels of NO<sub>x</sub> and particulate matter.
- Reduced grate temperatures (by approximately 100°F).
- Improved burning of wet bark.

*For further information on this project, please contact Ned Dye (ext. 125) or John La Fond (ext. 110) at 425.825.0500 (or e-mail: [firstname.lastname@jansenboiler.com](mailto:firstname.lastname@jansenboiler.com)).*

### Projects in Municipal Waste-to-Energy Industry

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*(continued from page 1)*

- Preparing general arrangement and fabrication assembly drawings for other associated modifications (roof, water walls, screen tubes, drum internals, seals, casing, etc.),
- Preparing drawings for structural modifications, including hangers and supports,
- Preparing installation detail drawings and specifications for contractors.

Fabrication and installation of the new superheater elements for the first unit at the Burnaby facility is planned for early next year.

#### **Air Control Strategy Review for Montenay Power at Dade County Facility, Florida**

At the Dade County Facility, Montenay Power Corporation operates four boilers that incinerate RDF generated by the city of Miami and surrounding county in Florida. In an effort to optimize combustion air delivery to these units, Jansen was contracted to review the current air system and controls logic, and comment on air system modifications that were under considerations. The purpose of Jansen's work was to verify that

certain planned air delivery modifications would be expected to provide Montenay with the benefits it was seeking.

*For further information and discussion on how we can assist your facility, please contact Arie Verloop (ext. 111) or Ned Dye (ext. 125) at 425.825.0500 (or e-mail: [firstname.lastname@jansenboiler.com](mailto:firstname.lastname@jansenboiler.com)).*

## Problem / Solution

# Need More Black Liquor Throughput?

*Is Your Recovery Boiler Limiting Your Operations?*

**Oxygen Enrichment of Combustion Air (OEA) Can Solve Your Problem.**

## PROMO<sub>2</sub>X™

Oxygen enriched air (OEA) has been used for years to improve combustion processes in the glass and metal refinery industries. OEA has proven to be a safe, cost effective method of improving product quality and quantity. Now, Jansen and Air Liquide have a patented process for applying OEA to kraft recovery boilers.

**Our OEA process, trademarked PROMO<sub>2</sub>X™, provides:**

- An increase in black liquor solids throughput
- A reduction in TRS and SO<sub>2</sub> emissions
- An increase in chemical reduction efficiency
- More stabilized combustion in the lower furnace for better bed control and eliminating blackouts or the need for auxiliary fuels

PROMO<sub>2</sub>X™ works by increasing the oxygen content in the combustion air at the secondary and/or tertiary air levels. With combustion air oxygen levels of 25% (increased from the normal 21%), a significant reduction in dead load nitrogen is supplied to the furnace, resulting in a reduction by 15% in the amount of flue gas that is generated. This allows:

- An increase in the amount of black liquor burned, nominally by 15%, or
- A reduction in furnace outlet flue gas velocities to reduce pluggage, and
- A reduction in carryover of liquor, char, and smelt.

### Unique Alliance

Jansen's expertise in recovery boilers and combustion air delivery systems, combined with Air Liquide's expertise in oxygen production, handling, and delivery, provides a unique alliance for the safe and effective application of OEA in recovery boilers.

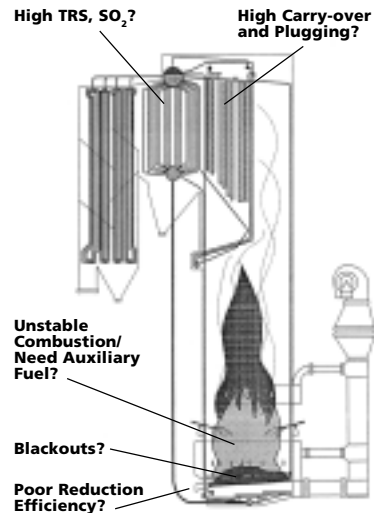
### Low Capital Cost

A PROMO<sub>2</sub>X™ system can be provided in an "over-the-fence" financial arrangement which allows the end user to "pay-as-you-go" with minimal upfront capital expenditures.

### Overall Benefits

Increased black liquor throughput leads to:

- Recovery boiler no longer bottleneck
- Stop shipping liquor
- Increased pulp production rates
- Significant improvement in mill profitability



### The Time has Come...

The concept of enriching recovery boiler combustion air with oxygen is not new. Recent technological developments now provide safe, efficient and economical application through the Jansen/Air Liquide patented process.

*For further information and discussion on how we can significantly increase the solids burning capacity of your plant, please contact Arie Verloop (ext. 111) at 425.825.0500 (or e-mail: [arie.verloop@jansenboiler.com](mailto:arie.verloop@jansenboiler.com)).*

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## Overfire Air System Upgrade for Power Boiler in Louisiana

Jansen provided Engineering and Materials Supply to a confidential customer in the southern US for the Overfire Air (OFA) System Upgrade on their No. 3 Power Boiler. The unit is a Foster Wheeler combination fuel-fired boiler built in 1982. The MCR steaming rate of the unit is 550,000 lb/hr at an operating pressure of 1,250 psig and final steam temperature of 925°F. The typical steaming rate prior to the upgrade was between 425,000 and 550,000 lb/hr from the burning of a combination of waste wood, TDF, sludge, pulverized coal and/or natural gas.

The old OFA system consisted of numerous small air ports located at three different elevations on the front and rear walls. Due to limited capacity of the OFA system, and the resulting high undergrate air flows, the unit experienced heavy carryover of fly ash with a high content of unburned carbon (ashes were disposed to landfill). As a result, the multiclone dust collector and ID fan were severely eroded and in need of replacement. Under these operating conditions, the unit had reached its upper limit for bark throughput and this limitation increased the need to burn more costly fossil fuels.

The mill had the following goals for the OFA system upgrade of the No. 3 Power Boiler:

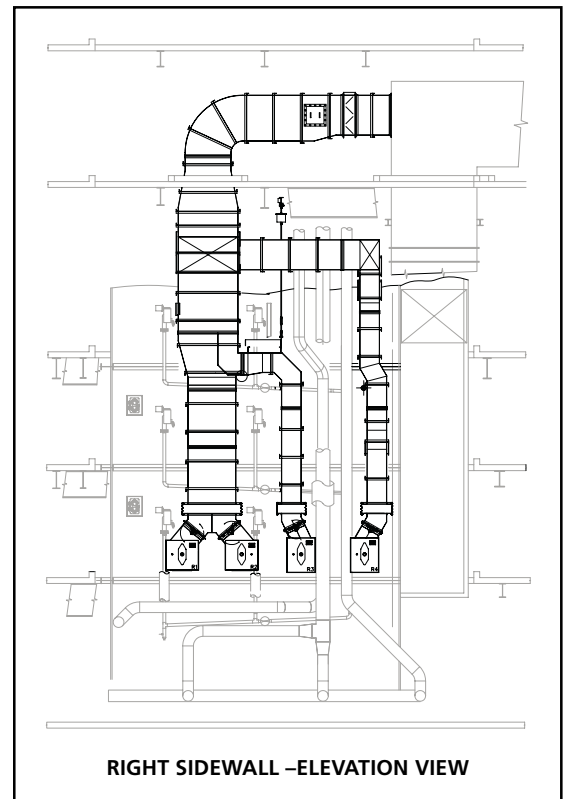
- Reduce the quantity of landfill ash by reducing the carryover and amount of unburned carbon in the fly ash.
- Increase the boiler's capability to burn waste fuels (bark, TDF, and sludge), thereby reducing the reliance on burning coal or natural gas.
- Improve the ability to handle load swings on bark firing.
- Maintain or improve the boiler's current emission performance (particulate, NO<sub>x</sub>, CO, and SO<sub>2</sub>).

In May of 2002, the new OFA system was installed utilizing four custom sized High Energy Combustion Air Nozzles™ on each of the side walls. As with most Jansen OFA system upgrades, FD fan modifications/replacements were not needed. The pressure parts and air system modifications were installed during the regular boiler outage that took five days.

After start-up of the No. 3 Power Boiler and initial operation with the upgraded OFA system, the boiler has demonstrated the following capabilities:

- Grate heat release rates from bark, TDF, and sludge has increased by more than 17%. The boiler can operate at full MCR on grate fuels only, without requiring fossil fuel co-firing.
- Need for auxiliary fuel firing has been virtually eliminated.
- CO emissions have been kept to less than 100 ppm.
- Total carryover from the furnace has been significantly reduced.
- Unburned carbon in the ash has been reduced by more than 50%.

*For further information on this project, please contact Ned Dye (ext. 125) or John La Fond (ext. 110) at 425.825.0500 (or e-mail: [firstname.lastname@jansenboiler.com](mailto:firstname.lastname@jansenboiler.com))*



Our Company provides combustion and boiler technology, products, and services.

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 flexible approach to problem solving.
- Developing creative and innovative solutions.
- Working with clients to implement these solutions.

Our team of talented and experienced individuals is committed to the highest standards of professional ethics.

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

## Bark Boiler Workshops Great Success

Jansen organized two Bark Boiler Workshops early in 2002 that took place in Jacksonville, Florida and Bellevue, Washington, respectively. The workshops were attended by a total of 52 participants, representing 22 companies from 33 different plant/office locations. The workshops were co-sponsored by Orion CEM, Inc. and Bradford Conrad Crow Engineering Co.

Both two-day workshops consisted of presentations about new technological developments and cost effective solutions to improve the operating performance of existing bark-fired boilers, such as:

1. Increase biomass (wood-waste and sludge) burning capacity
2. Increase efficiency and reduce reliance on auxiliary fuel firing
3. Reduce carryover of ash and char
4. Improve emissions performance
5. Facilitate efficient and safe incineration of HVLC NCG

Future bark boiler workshops are planned for early in 2003.

For registration and additional information, please call Cathy Thomas at 425.825.0500, ext. 108, or e-mail: [cathy.thomas@jansenboiler.com](mailto:cathy.thomas@jansenboiler.com).

### NO<sub>x</sub> Emissions Reduction

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Where appropriate, possible solutions may include:

- Staged combustion/overfire air
  - Flue gas recirculation (FGR)
  - Low excess air
  - Low NO<sub>x</sub> burners
  - Fuel rich secondary combustion
  - Automatic combustion controls
  - Urea/ammonia injection (SNCR)
  - Selective catalytic reduction (SCR)
  - Reburning
  - Oxidation/adsorption
7. Design and supply specific NO<sub>x</sub> reduction technology and equipment.

Customers for whom Jansen has helped define or implement a NO<sub>x</sub> reduction strategy include Boise, International Paper, MeadWestvaco, Stora Enso, and Weyerhaeuser.

For further information on how we can assist your plant in reducing NO<sub>x</sub> emissions, please contact John La Fond (ext. 110) or Arie Verloop (ext. 111) at 425.825.0500 (or e-mail: [firstname.lastname@jansenboiler.com](mailto:firstname.lastname@jansenboiler.com)).



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## Jansen in Mobile, Alabama

Jansen has strengthened its presence in the Southeastern portion of the US with the appointment of Jerry P. Drott as an operations specialist. Jerry lives in Mobile, Alabama, and will call upon plants located, roughly, between Virginia and east Texas.

Jerry has a long career working around industrial boilers and his past duties include corporate boiler projects manager and 'troubleshooter' for a large manufacturer, as well as powerhouse superintendent in several mills. Through his experience, Jerry is uniquely qualified to be part of the Jansen team working on projects or to discuss future projects for your wood-waste, sludge, fossil fuel, and/or chemical recovery boiler.

*Please feel free to contact Jerry by phone at 251.633.0696, or e-mail: [jerry.drott@jansenboiler.com](mailto:jerry.drott@jansenboiler.com)*

## Receive This Newsletter by E-mail

This Newsletter, No. 28 Summer 2002, is the second Newsletter that is sent by e-mail to a selected group of people. It will also be sent via regular postal service.

We are continually expanding the electronic distribution list for our bi-annual newsletter. To receive our newsletter, you are given the following choices:

- Prefer receipt by e-mail (no regular mail)
- Prefer receipt by regular mail (no e-mail)

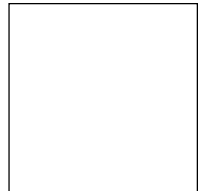
- Prefer both mailings (e-mail and regular mail)

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

*To receive this and upcoming Newsletters electronically, please send your e-mail address to [editor@jansenboiler.com](mailto:editor@jansenboiler.com) and you will be included on the list.*



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Recovery  
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