

Disposal of HVLC NCG in Existing Boilers

Disposal of High Volume Low Concentration (HVLC) noncondensable gas (NCG) in dedicated incinerators is expensive and can create operating and environmental problems. Furnace injection and rapid oxidation with the use of Jansen High Energy Combustion Air Nozzles has proven to be an efficient and low cost option.

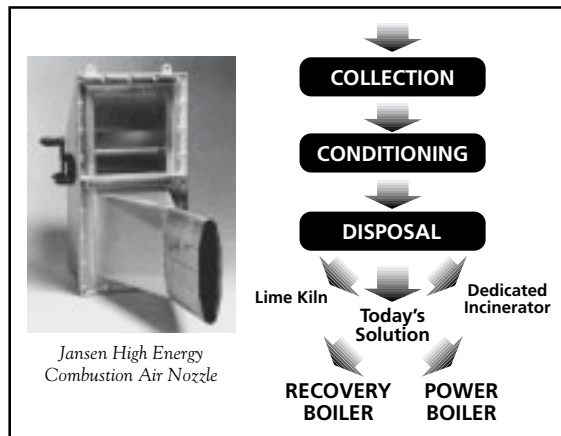
HVLC NCG, referred to as dilute noncondensable gases (DNCG) are collected in a pulp mill from various sources including brownstock washers and deckers, chip bins, digesters, blow tanks and accumulators, filtrate tanks, black liquor tanks, sewers, oxidizers, and many others. DNCG can conveniently be combined into one gas header for treatment. Gas coolers and preheaters can be used to condition the DNCG prior to incineration. DNCG quantities are usually 10,000 to 30,000 acf per ton of pulp (15,000 to 30,000 m³/tonne), with TRS concentrations on the order of 50 to 250 ppm and combustibles, such as methanol, on the order of 2,000 ppm. Moist air makes up over 95% of the DNCG. This is perfectly suited for mixing with boiler combustion air.

Injection of DNCG into boilers with Jansen Air Nozzles

There are several ways of disposing DNCG and the preferred methods vary from mill to mill. One method of DNCG disposal that has proved successful in numerous mills is injecting them into an existing boiler, either separately or pre-mixed with combustion air. Jansen High Energy Combustion Air Nozzles are a

Jansen air nozzles achieve:

1. High air/DNCG mixture jet velocity at nozzle tip
2. Deep jet penetration inside the furnace cavity
3. Turbulent mixing of combustion air with combustibles at high temperature
4. Rapid oxidation of combustible materials including DNCG compounds
5. Clean flue gas conditions at the furnace outlet
6. Low TRS, CO, VOC, and SO₂ emissions
7. Easy shut-off capability of the DNCG without interfering with boiler operation
8. No/low maintenance nozzles. DNCG have been disposed of in this manner for many years. The technology and long-term experience is available today.
9. Air/DNCG flow measuring capability



Cluster rule legislation has been signed into effect, requiring kraft pulp mills to collect and incinerate HVLC NCGs before the year 2006.

proven method for DNCG disposal with minimum disruption to normal operation. Jansen High Energy Combustion Air Nozzles have been used since 1986 on many recovery and power boiler applications to improve the combustion and increase fuel burning capacity. These patented nozzles are characterized by a design that efficiently converts static pressure in the windbox into high air velocity (kinetic energy) leaving the nozzle tip.

Benefits of disposing DNCG in existing boilers

- Low capital cost – no new incinerator equipment to purchase
- Easy to install
- Low operating cost – no additional fossil fuels are needed to oxidize the DNCG
- No detrimental effect on mill production and operating targets
- BLRBAC has developed recommended good practices to burn DNCG in recovery boilers
- Recovery of sulfur if incinerated in recovery boiler

In recent years, Jansen has supplied several bark boiler overfire air system upgrades with the purpose to facilitate HVLC NCG incineration. These projects were at Mead Paper (Chillicothe, OH), Smurfit-Stone (Portage-du-Fort, PQ), Appleton Papers (Roaring Spring, PA), and Westvaco (Silsbee, TX).

For further information please contact Arie Verloop (ext. 111) or John La Fond (ext. 110) at 425.825.0500 (or e-mail: firstname.lastname@jansenboiler.com). Additional information and specific project references can also be found on our website at: www.jansenboiler.com.

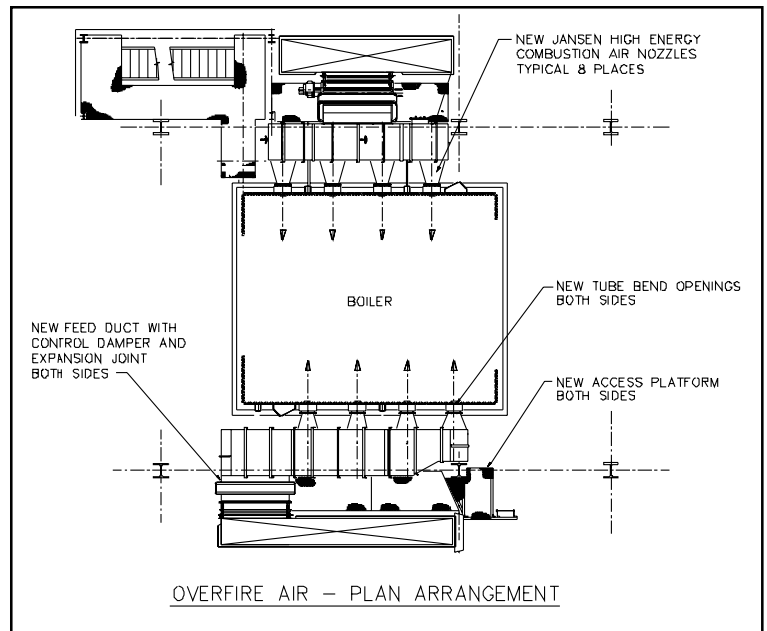
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Texas Bark Boiler Gets Overfire Air System Upgrade

In mid-December, Jansen provided the overfire air (OFA) system upgrade of a large bark boiler in Texas with the purpose to increase the unit's bark burning rate. Upon the client's request, their name and location are not disclosed. The boiler, a two-drum model VU-40, was built by Combustion Engineering in the late 1970s to burn natural gas and bark with an MCR of 775,000 lb/hr steaming rate and final steam temperature of 940°F. Our customer had several objectives with this upgrade:

1. Increase the annual average waste wood burning rate by 360 ton/day.
2. Reduce the carryover of ash and unburned carbon.
3. Provide more stable combustion conditions over the full range of waste wood fuel qualities.
4. Minimize emissions.

In this Engineer, Procure, and Construct (EPC) project, Jansen installed four custom sized High Energy Combustion Air Nozzles™ on each of the left and right side walls. The OFA upgrade was installed in phases to meet customer schedule. The pressure



parts were installed during the regular boiler outage that took six days.

As with most Jansen OFA system upgrades, FD fan modifications/replacements were not needed.

After four weeks of operation, the experience that has been gathered with the new system has been preliminary and limited in nature, however, the results appear to be meeting the expectations.

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). Additional information will be published in our next newsletter.

Problem / Solution

Update: Highly Loaded Recovery Boiler Receives Breath of Fresh Air

In our last newsletter (No. 26, Summer 2001) we wrote about a highly loaded, 'short and stubby' Kraft recovery boiler that was upgraded in June with the installation of 12 new Jansen High Energy Combustion Air Nozzles™ at the level of secondary air.

Prior to the upgrade, the unit could not burn all of the mill's liquor and meet the local TRS limit of 5 ppm. In addition, the unit was water washed frequently, namely every 6 to 7 weeks.

After more than half a year of operation, the boiler has performed very satisfactory and the mill is pleased. All of the mill's liquor is now burned in their recovery boiler ("...the Kraft mill has a hard time keeping up with the recovery boiler...") and TRS is consistently below 3 ppm. The unit's fouling rate has also been slowed down significantly and only one (1) water wash was needed since the June installation. That means that in just over half a year, four (4) water washes have been eliminated.



For further information on how Jansen can assist in improving the performance of your recovery boiler, please contact Arie Verloop (ext. 111) at 425.825.0500, or e-mail: arie.verloop@jansenboiler.com. Information and specific project references can also be found on our website at: www.jansenboiler.com.

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News Briefs

In the past year, Jansen conducted the following process and design engineering projects:

- Bark boiler capacity and performance evaluations
- Chemical recovery boiler capacity upgrade studies
- Chemical recovery boiler circulation studies and/or UFM data collection
- Bark and recovery boiler preliminary engineering for major modifications
- Capacity and performance evaluations for MSW boilers
- CFD modeling of bark, recovery, and bubbling fluidized bed (BFB) boilers
- Chemical recovery boiler air system upgrades
- Bark boiler overfire (OFA) system upgrades
- Incineration of HVLC NCG and LVHC NCG in power boilers
- Design/supply replacement superheater (w/composite tubes)
- Boiler controls process assessment

- Chemical recovery boiler tube failures analyses
- Chemical recovery boiler NOx evaluation
- Chemical recovery boiler outage assistance
- Chemical recovery boiler operations training seminar
- Chemical recovery boiler audit

This work was conducted for the following mills (in alphabetical order unrelated to the above listing):

- Abitibi-Consolidated - St. Félicien, PQ
- Alliance Forest Products - Coosa Pines, AL
- Appleton Papers - Roaring Spring, PA
- Boise Cascade - Wallula, WA
- Carter Holt Harvey - Kinleith mill, New Zealand
- Eurocan - Kitimat, BC
- Georgia-Pacific - Clatskanie, OR
- International Paper Company - Ticonderoga, NY, Mansfield, LA, Prattville, AL, Bastrop, LA, Riegelwood, NC, Courtland, AL, Vicksburg, MS, Texarkana, TX
- Kimberly-Clark - Everett, WA
- Kruger-Wayagamack - Trois Rivières, PQ
- Mead Paper - Rumford, ME, Chillicothe, OH, Phenix City, AL
- Montenay Inc. - Burnaby, BC
- Riverwood International - West Monroe, LA
- Simpson Tacoma Kraft - Tacoma, WA
- Stora Enso - Wisconsin Rapids, WI
- Barlow Projects, Inc. - Harrisburg, PA
- Weldwood of Canada - Hinton, AB
- Western Pulp - Port Alice, BC
- Westvaco - Silsbee, TX, Wickliffe, KY, and Covington, VA.
- Weyerhaeuser Company - Valliant, OK
- Willamette Industries - Campti, LA

Upgrading Boilers May Involve Environmental Permitting

As we have pointed out many times in this newsletter, the fuel burning capacity of existing power and recovery boilers (i.e., wood-waste, sludge, spent chemical liquors) can be increased significantly by optimizing their combustion system, particularly air delivery arrangement and operating parameters. Elements of these upgrades may involve modifying or replacing air system components, such as ducting, windboxes, air nozzles, flow meters, heaters, and/or, occasionally the FD fan.

Actually implementing the boiler upgrade and realizing the increase in production requires that the owner consider the environmental permitting requirements during the initial stages of a project.

Local, state, and federal air pollution control regulations require that changes in a source's potential to emit air pollutants be evaluated. Such an evaluation is best conducted as soon as a project concept is adopted. If a proposed project has the potential for an increase in air emissions, the owner must determine what steps are necessary to insure the project will be properly permitted. Failure to follow permitting requirements has resulted in major U.S. Environmental Protection Agency enforcement initiatives in recent years, targeting, among others, the electric utilities and the pulp and paper industry.

The regulations governing permitting of projects that could directly or indirectly increase air emissions are complex. These regulations are generally referred to as New Source Review and Prevention of Significant Deterioration (NSR/PSD). An owner must consider whether a proposed project is routine maintenance and, therefore, may be exempt from some requirements. If the proposed project is a major modification, the incremental increase in emissions must be compared with permitting thresholds. Ambient air quality modeling may be necessary to determine if ambient air quality increments are exceeded. In addition, recent trends suggest potential hazardous air pollutants must be considered. For example, the heavy metals emitted from the combustion of sludge and wood-waste may have to be considered. Depending upon circumstances, it may be necessary to evaluate whether a project is subject to new source performance standards (NSPS), best available control technology standards (BACT) or maximum achievable control technology standards (MACT).

For a project that involves permitting and/regulatory issues, Jansen teams with experienced environmental engineers to assist our customers. These engineers have more than 25 years experience in both process engineering and environmental management. The benefits and features that are brought to the project are:

- Understanding the natural tension between the desire to achieve the production objectives in a timely manner and the necessity to achieve compliance with construction permitting and operational compliance.
- Skills to evaluate the potential changes in emission characteristics and quantities.
- Perform screening-level air quality modeling for criteria and hazardous air pollutants.
- Assist in specifying and choosing air pollution control equipment, including BACT requirements.
- Prepare or assist the owner in preparing construction permit applications and amendments to air operating permits.

The fundamental approach in these activities is the use of linked databases for production rates and operating conditions and the emission factors for the process. Rapid and accurate evaluations of the impact of different production scenarios will identify limiting conditions. Once the limits are understood, permitting strategies can be adopted that meet the project's intended implementation schedule while avoiding permit conditions that are unrealistic or unachievable over the life of the project.

The key to achieving a project's economic potential is careful project management. Timely completion of the environmental permitting requirements is essential. Jansen can provide the necessary expertise to ensure this critical aspect of a project is managed with the same degree of excellence as our process and design engineering work.

For further information and discussion on how we can assist your mill, please contact Arie Verloop (ext. 111) or Ned Dye (ext. 125) at 425.825.0500 (or e-mail: 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.

Measuring Air Flows; Flow Meters Are Not Always Needed!

Most of us know that measuring boiler combustion air flow quantities can be difficult to accomplish in a manner that is reliable and accurate. Conventional air flow instrumentation is prone to errors, as over our 26 years of boiler testing and evaluation, we have seen flow meter readings in error by more than 50%.

For proper combustion control, operators need to know the air quantities that are supplied to the various air levels on the boiler. This includes undergrate air (UGA), overfire air (OFA), and burner air on biomass fueled

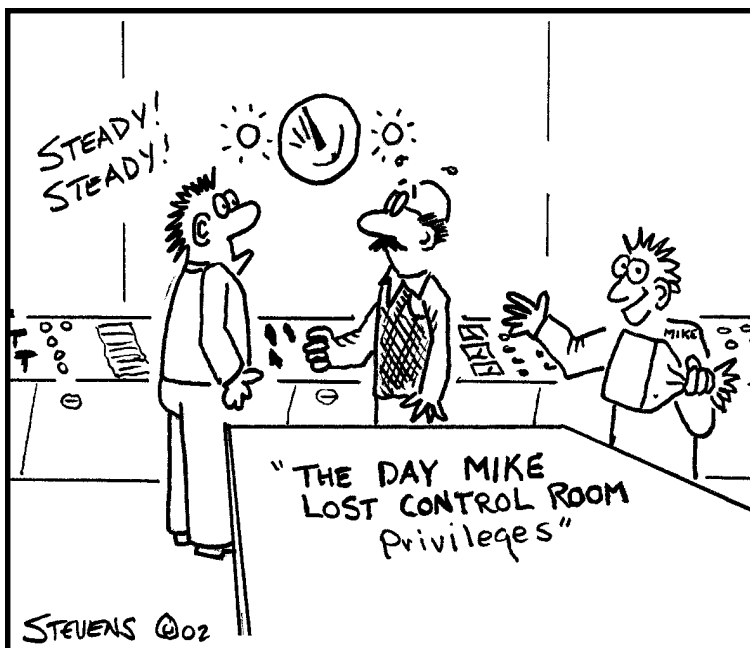
boilers, and primary air (PA), secondary air (SA) and tertiary air (TA) on recovery boilers.

A reliable, new method of air flow metering has been developed by Jansen that has been in use in several boiler applications. This method involves the unique characteristics of the Jansen High Energy Air Nozzle™.

Jansen air nozzles are characterized by a straight convergent section after the flow control damper, thus providing for a constant opening nozzle tip for air jet development. Therefore, for all damper positions, the pressure drop across

the air nozzle is directly proportional to the amount of air flowing through that nozzle. A pressure transmitter allows measurement of the air flow quantity through each nozzle. The individual quantities can be summed to give total air flow for that particular air level, and can also be differentiated between front/rear/left/right wall air flows, etc.

This method of air flow measurement has been in use successfully in several of Jansen's recent recovery and power boiler air system upgrades, including disposal of HVLC NCG.



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Upcoming Bark Boiler Workshops

To repeat last year's success, Jansen is again organizing two Bark Boiler Workshops to share information with our customers about new developments and results of improving the operating performance of biomass fueled power boilers. This winter, two workshops are scheduled at different dates and locations, namely:

- February 21 and 22, Jacksonville, Florida
- March 21 and 22, Bellevue, Washington

The two-day workshop consists of presentations about new technologies and cost effective solutions to improve the operat-

ing performance of bark-fired boilers with the following goals:

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

The workshop is co-sponsored by:

- Jansen Combustion and Boiler Technologies, Inc.
- Orion CEM, Inc.

Participation in the workshop is free of charge. Registration is on a



first come first serve basis and seating is limited. Jansen reserves the right without advance notice to cancel or postpone the workshop at any time without obligation or liability.

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



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