

A sampling of benefits:

In recent wood-waste fired OFA projects, the following benefits were achieved by the Jansen OFA system upgrade:

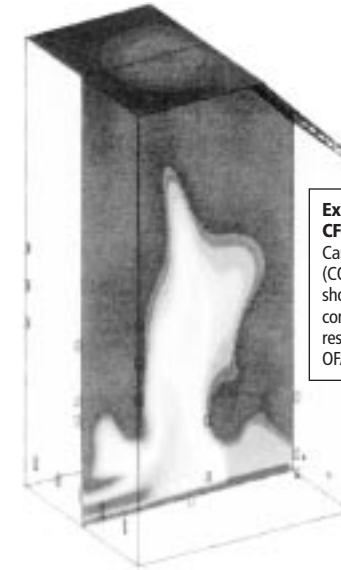
- Reduction in CO stack emissions from 1500 ppm to below 250 ppm
- Reduction in VOC/hydrocarbons stack emissions from 500 ppm to below 25 ppm
- Reduction in amount of fly ash carryover by 30%
- Elimination of fly ash re-injection system due to low carbon content
- Reduction by 75% or more in fuel oil consumption
- Rapid and complete incineration of HVLC NCG without causing odor problems in the boiler house
- Increase in bark firing rate by 50%
- Follow load swings on bark alone (no gas/oil) in steaming range of 50,000 to 300,000 lb/hr
- Elimination of puffing and combustion instabilities
- Elimination of delayed combustion and superheater temperature excursions
- Project payback time within six months



Would you like to burn
more wood-waste

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Would you like to burn more wood-waste?



**Example
CFD Modeling;**
Carbon monoxide
(CO) profile
showing high
concentrations
resulting from poor
OFA delivery

Can your boiler handle it?

**Are emissions
limiting operations?**

**Are high oil/gas
prices hurting your
bottom line?**

**Problem
Solution**

JANSEN

Problem

Solution

Does your wood-waste fired boiler experience any of the following problems?

- High emissions of CO and VOC
- High ash carryover from the furnace
- High unburned carbon content in the fly ash
- Combustion stability problems, furnace puffing
- Delayed combustion into superheater, high gas temperatures and steam temperature excursions
- Need for high excess air usage
- Tube erosion from carryover
- High stack opacity
- High auxiliary fuel firing rates and associated costs
- Inability to burn more biomass fuel (wood-waste, sludge)
- All of the above

You are not alone!

Many wood-waste fired boilers experience the kind of operating challenges listed above. Typically, the problems are symptoms of poor combustion that is caused by inefficient overfire air (OFA) delivery.

In some boilers, poor OFA system design is characterized by numerous small air ports that are located at different elevations on the boiler's front and rear walls. Small air jets do not penetrate deep into the furnace and do not provide uniform cross-sectional coverage of combustion air. In other boilers, tangential or cyclonic OFA is delivered, resulting in insufficient mixing of air with combustibles prior to the furnace outlet.

Poor air delivery leads to weak combustion, which is often the root cause of the wood-waste fired boiler problems listed above.

Jansen OFA System Upgrade Using High Energy Combustion Air Nozzle

Jansen OFA nozzles achieve:



- High air jet velocity at nozzle tip
- Deep jet penetration inside furnace cavity
- Turbulent mixing of combustion air with combustibles
- Dampers on each nozzle for trimming air flow
- Air flow measurement capability at each nozzle
- Capability to inject HVLC NCG; without leakage
- Low pressure loss; new FD fan typically not needed
- No/low maintenance

Contact us:

For information please contact Ned Dye (ext. 125) or Arie Verloop (ext. 111) at 425.825.0500.

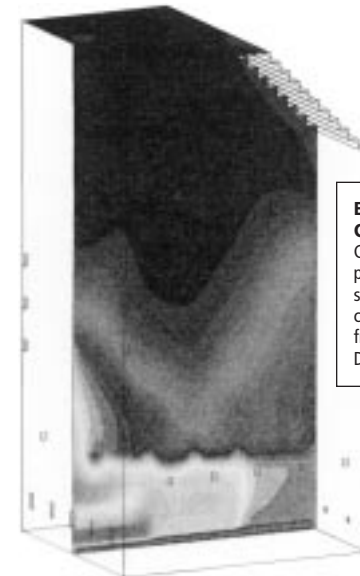
Visit our new website:

www.jansenboiler.com

Project Scope:

The Jansen scope of supply on your wood-waste fired boiler OFA system upgrade may include any or all of the following aspects:

- Detailed process engineering evaluation
- Computational Fluid Dynamics (CFD) modeling
- OFA delivery system with High Energy Combustion Air Nozzles
- Bark handling and feed system
- Instrumentations and controls; firing strategy
- Grate replacement
- Pressure part replacements (i.e., wall panels)
- Disposal of HVLC NCG using new OFA system
- Engineer-Procure-Construct (EPC) project responsibility



Example CFD Modeling: Carbon monoxide (CO) profile showing significantly reduced concentrations resulting from Jansen OFA Delivery Upgrade

PROJECT CAPABILITIES

BIOMASS BOILER COMBUSTION SYSTEM UPGRADES



Many biomass fuel-fired boilers experience challenges that prevent higher biomass (i.e., wood waste or sludge) fuel burning rates at significant lower operating cost. For example, the unit may experience high CO and VOC emissions and excessive carryover of fly ash, and/or may experience combustion instabilities with the need for continuous co-firing of auxiliary fossil fuel to sustain combustion.

All these problems are symptoms of poor combustion that is caused by ineffective overfire air (OFA) delivery. JANSEN's modern, sidewall, high capacity OFA system has proven that these problems can be solved. Our sidewall OFA system creates a zone of turbulent mixing across the full furnace cross section in which fines and volatiles are rapidly burned.

A limited number of relatively large OFA nozzles are used. Because the patented JANSEN air nozzles have very low internal pressure losses, our OFA system can typically be installed without the need for new or modified forced draft (FD) fan(s). Installation time is during a five day outage.

Operational benefits (and associated economic impact) that are normally achieved are:

- Reduced reliance on auxiliary fuel to maintain combustion (lower auxiliary fuel cost).
- Ability to burn additional biomass fuel (lower auxiliary fuel cost).
- Reduced carryover of fly ash (lower landfill cost).
- Reduced carbon content in fly ash (improved thermal efficiency).
- Reduced excess air usage (improved thermal efficiency).
- Reduced CO, NO_x, and VOC emissions (higher efficiency and better emissions compliance).
- Reduced flue gas temperature into the superheater (less erosion/tube wastage).
- Improved combustion stability and reduced furnace puffing (this may be a safety issue).
- Efficient incineration of HVLC NCG.

Selected References (see next page)

Selected References

Alabama River Pulp Company - Perdue Hill, AL
Appleton Papers, Inc. - Roaring Spring, PA
Boise Cascade Corporation - Steilacoom, WA
Boise Paper - Wallula, WA
Cariboo Pulp & Paper - Quesnel, BC (in progress)
Consolidated Papers, Inc. - Wisconsin Rapids, WI (2 units)
Daishowa America - Port Angeles, WA
Domtar Industries - Ashdown, AR
Domtar Industries - Rothschild, WI
Domtar Industries - Windsor, PQ (in progress)
Great River Energy - Elk River, MN
International Paper Company - Augusta, GA
International Paper Company - Bastrop, LA
International Paper Company - Courtland, AL
International Paper Company - Franklin, VA
International Paper Company - Georgetown, SC (2 units)
International Paper Company - Jay, ME
International Paper Company - Mansfield, LA (2 units)
International Paper Company - Pensacola, FL
International Paper Company - Pine Bluff, AR
International Paper Company - Pineville, LA
International Paper Company - Prattville, AL
International Paper Company - Riegelwood, NC
International Paper Company - Saillat, France
International Paper Company - Selma, AL
International Paper Company - Texarkana, TX
International Paper Company - Ticonderoga, NY
Koch Cellulose - Brunswick, GA
Mead Coated Board Inc. - Phenix City, AL (2 units)
Mead Paper - Chillicothe, OH
MeadWestvaco Corporation - Covington, VA (2 units)
Minnesota Power - Duluth, MN
NewPage Corporation - Escanaba, MI (in progress)
NewPage Corporation - Wickliffe, KY
Packaging Corporation of America - Counce, TN
Packaging Corporation of America - Valdosta, GA (2 units)
Rayonier, Inc. - Jesup, GA
Riverside/Tolko - Armstrong, BC
SAPPI Fine Paper North America - Skowhegan, ME (2 units)
Simpson Tacoma Kraft - Tacoma, WA
Smurfit-Stone Container Corporation - Hodge, LA
Smurfit-Stone Container Corporation - Missoula, MT
Smurfit-Stone Container Corporation - Portage du Fort, PQ
Smurfit-Stone Container Corporation - West Point, VA
Tolko Manitoba - The Pas, MB
Westvaco Corporation - Silsbee, TX
Willamette Industries, Inc. - Campti, LA
Weyerhaeuser Company - Bennettsville, SC
Weyerhaeuser Company - Columbus, MS
Weyerhaeuser Company - Longview, WA
Weyerhaeuser Company - Valliant, OK