

Project Description



No. 3 Power Boiler Overfire Air System Upgrade Incineration of HVLC NCG Appleton Papers, Roaring Spring, Pennsylvania

Project Scope

The boiler is a two-drum Stirling type unit, supplied by Foster Wheeler in 1977 to burn wood waste, sludge, and coal. The MCR steaming rate of the unit is 110,000 lb/hr at an operating pressure of 600 psig and final steam temperature of 725° F. The typical steaming rate of the unit is between 40,000 to 150,000 lb/hr from burning bark, dewatered waste water treatment solids (sludge), and coal on a traveling grate.

The old overfire air (OFA) system consisted of an OFA booster air fan and numerous small OFA ports located at several elevations on the rear and front walls. The size and location of the existing OFA ports made them ineffective.



The mill installed a dilute non-condensable gas (DNCG) collection system, also called high volume low concentration (HVLC) NCG, and had identified the No. 3 Power Boiler for disposal of these gases through the boiler's upgraded OFA system. With the OFA system upgrade, the mill had several objectives:

- Inject DNCG into the hot combustion zone, provide for thorough mixing with combustion air, and provide sufficient residence time and temperatures to assure rapid and complete thermal oxidation of the NCG.
- Provide a DNCG disposal system that avoids leakage of foul gases in the boiler building.
- Improve general combustion characteristics of waste wood and sludge.

In the fall of 2001, the new JANSEN OFA system was installed utilizing three custom sized Jansen High Energy Combustion Air Nozzles™ on each of the side walls for the injection of the DNCG as OFA. Computational Fluid Dynamics (CFD) modeling conducted by JANSEN for this boiler had demonstrated that the new OFA nozzles would provide excellent burnout of the DNCG stream. As with most JANSEN OFA system upgrades, FD fan modifications/replacements were not needed.

Results

In summary, the following project goals were achieved:

- Full incineration of DNCG and CNCG gases (TRS is below 0.5 ppm).
- There has been no evidence of odorous gas leakage in the boiler building.
- The boiler is able to operate in automatic control over the normal operating range.