

Project Description



Bark Boiler Overfire Air Delivery System Upgrade
NewPage Corporation
Wickliffe, Kentucky

Project Scope

The Bark Boiler, supplied by Foster Wheeler in the mid-1970's, was originally designed to burn waste wood and auxiliary natural gas and has a Maximum Continuous Rating (MCR) of 450,000 lb/hr of steam at 635 psig and 750°F. The boiler fired a combination of waste wood and Tire Derived Fuel (TDF) on the grate and has the ability to fire auxiliary natural gas through rear wall burners. The boiler is the mill's swing boiler and experiences large variations in its steam demand of 200,000 lb/hr in the summer months to more than 400,000 lb/hr in the winter.



The old overfire air (OFA) system consisted of several small circular ports arranged in three levels on the rear wall and front walls. Due to fundamental design limitations, there was insufficient flow and penetration of the OFA into the furnace, leading to lower volatiles burnout, higher CO emissions and increased carryover of unburned char and ash. This OFA system deficiency limited the boiler to generating no more than 300,000 lb/hr of steam from grate fuels.

The mill had a desire to improve the combustion performance of the Bark Boiler by upgrading the OFA system and fuel delivery. The goals of the upgrade project were:

- Reliably increase steam generation from waste wood and TDF firing.
- Reduce the reliance on burning natural gas, specifically during the winter months of increased steam demand.
- Maintain adequate combustion conditions when firing increased waste wood and TDF.
- Optimize boiler operation during the summer months of reduced steam demand and lower grate fuel firing.

The new OFA system was installed in October of 2008. Four custom designed dual-range Jansen High Energy Combustion Air Nozzles™ were placed on each side wall, arranged in an interlaced pattern. The low pressure drop design of the JANSEN nozzles allowed increased OFA flow capacity while retaining the existing OFA booster fan. A separate low capacity ambient air fan was installed to deliver combustion air to new wind-swept wood distributors. The dual-range design of the OFA nozzles allows the OFA flow to be optimized for both the summer (low load) and winter (high load) months as well as during the transition periods between these seasonal demands.

Results

Operation with the new OFA system demonstrated the following performance improvements:

- Boiler steaming rates of up to 400,000 lb/hr achieved from grate fuel firing alone.
- Reduced need for natural gas co-firing to maintain the steam demand.
- Optimized OFA operation over a large range of grate fuel firing and steaming rates.