

Project Description



*Combination Boiler Overfire Air Delivery System Upgrade
Weyerhaeuser Corporation
Columbus, Mississippi*

Project Scope

The Combination Boiler, supplied by Foster Wheeler in the mid 1980's, was originally designed to generate 490,000 lb/hr of steam at 925°F and 1,550 psig from waste wood alone and a Maximum Continuous Rating (MCR) of 600,000 lb/hr when firing waste wood and auxiliary fuel oil or pulverized coal. On the grate, the unit fires a combination of waste wood, mill sludge and wetted char pieces separated from the fly ash classifiers. The unit, required to generate 500,000 lb/hr of steam, was limited in grate fuel firing due to high ash and char carryover. This high char and ash carryover led to fires and damage to the particulate control equipment and maintenance issues. Due to the inability to maximize the grate fuel firing rate, the unit was periodically required to fire costly auxiliary fuels such as natural gas and fuel oil to achieve the steam demand.



The old overfire air (OFA) system consisted of multiple rows of small OFA ports located on the front and rear walls. A fundamental design limitation that caused insufficient OFA flow capacity and less than optimal mixing of the OFA with the in-flight fuel particles was identified during an in-depth evaluation of the boiler's operation.

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

- Improve combustion conditions to sustain the generation of 500,000 lb/hr of steam from grate fuels alone.
- Reduce/eliminate auxiliary fuel oil and/or natural gas firing.
- Maintain adequate combustion conditions and limit fly and char carryover when firing increased grate fuels.
- Maintain flue gas Carbon Monoxide (CO) and Nitrogen Oxides (NO_x) emissions below permit levels.

The new OFA system was installed in February of 2005. Four custom designed 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 and penetration. The existing primary air fan was retained to supply combustion air to the new OFA nozzles without requiring a fan upgrade.

Results

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

- Steam generation rate of 500,000 lb/hr achieved while firing grate fuels alone.
- Reduced fuel oil and natural gas firing.
- Carryover and ash and char have been maintained to acceptable levels without compromising the performance, operation and integrity of the pollution control equipment.
- CO and NO_x emission compliance at the increased grate fuel firing rates.