

Project Description



*No. 2 Hog Fuel Boiler Overfire Air Delivery System Upgrade
SAPPI Fine Paper North America
Skowhegan, ME*

Project Scope

The No. 2 Hog Fuel Boiler is a CE VU-40 unit installed in 1990 that was originally designed to generate 450,000 lb/hr of steam at 855°F and 900 psig from waste wood alone and a Maximum Continuous Rating (MCR) of 685,000 lb/hr when firing waste wood and auxiliary fuel oil. On the grate, the unit fires a combination of waste wood and mill sludge. Auxiliary fuel oil is also fired to satisfy the steam demand of approximately 640,000 lb/hr.

The old overfire air (OFA) system consisted of several air registers in the corners of the furnace that introduced OFA into the unit in a tangential pattern. Due to the elevation of this OFA delivery and a fundamental design limitation that prevented adequate penetration and mixing of the OFA with the in-flight fuel particles, the unit was limited in achieving higher grate fuel firing rates. The unit was typically operated with an indicated grate fuel firing rate of around 63 tons per hour.

The mill had a desire to improve the combustion performance of the No. 2 Hog Fuel Boiler by upgrading the OFA system. The goals of the upgrade project were:

- Reliably increase grate fuel firing rates to an indicated value of 72 tons per hour.
- Reduce auxiliary fuel oil firing.
- Maintain adequate combustion conditions 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 June 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 forced draft (FD) fan was retained to supply combustion air to the new OFA nozzles without needing an additional booster fan to supply high pressure OFA.

Results

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

- Indicated grate fuel firing rates in excess of 72 tons per hour were achieved.
- Reduced fuel oil firing in the unit.
- CO and NO_x emission compliance at the increased grate fuel firing rates.

