

Project Description

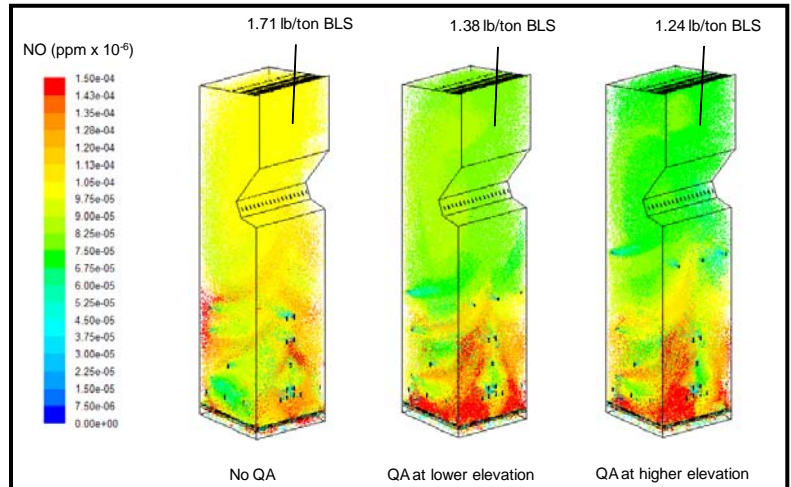


Recovery Boiler Combustion Air System Upgrade & NO_x Control Confidential Client

Project Scope

This Recovery Boiler was supplied by Babcock and Wilcox (B&W) in early 1970. The unit was rated to burn 3.30 million lb/day of virgin BLDS at 63% virgin solids content and generate 549,000 lb/hr of steam at 760°F and 650 psig. The original three level combustion air system was modified in 2008 to two-level stacked air arrangements at the secondary and tertiary air levels.

Prior to the project, the boiler was operating at heat input rates up to the original design while green liquor reduction efficiencies were lower than desired. The client was planning for a major change in pulping operations, which was expected to increase the black liquor heating value, the BLDS firing rate, and the unit's NO_x emissions.



The project goals included the following:

- Increase the firing rate to 3.5 million lb/day of virgin BLDS.
- Maintain flue gas NO_x emissions below 1.37 lb per ton of as-fired BLDS.
- Increase the green liquor reduction efficiency to at least 91%.
- Decrease carryover and operate for 12-month periods between water-washes.

As part of the initial design, JANSEN conducted extensive CFD modeling to find the best distribution and locations for the upgraded air levels to best meet the mill's goals, particularly lowering NO_x emissions.

Combustion system modifications were installed in March of 2012. Six new quaternary air (QA) Jansen High Energy Combustion Air Nozzles™ were placed on each side wall, arranged in an interlaced pattern about 30 ft above the lower tertiary air level, for deep staging to reduce NO_x emissions. The old upper tertiary air stacked air ports were removed. A new ambient air fan was installed to supply QA. In addition, automatic port rodders were installed at the primary and QA levels.

Results

Operation with the upgraded combustion air system demonstrated the following performance improvements:

1. The target firing rates were achieved with the black liquor from the changed pulping operations.
2. NO_x emissions are 40% lower than guaranteed and all other emission guarantees were also met.
3. The green liquor reduction efficiency averaged 94% during an 8 hour performance test.
4. Twelve month continuous operation between water washes has been achieved.

This was a highly successful upgrade project for this boiler and all performance guarantees were met. A second unit in this mill was similarly upgraded a year later.