Project Description

JANSEN Combustion and Boiler Technologies, Inc.

Recovery Boiler Combustion Air System Upgrade & NO_x Control
Confidential Client

Project Scope

This Recovery Boiler was supplied by Combustion Engineering in early 1980s. The unit was rated to burn 4.90 million lb/day of virgin BLDS at 63% virgin solids content and generate 810,000 lb/hr of steam at 900°F and 1325 psig. The steam rating was subsequently uprated by the OEM. The original two level combustion air system was modified by another vendor to add a secondary level and two tertiary air levels in 2010.

Prior to the project, the boiler was operating at heat input rates above 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 6.0 million lb/day of virgin BLDS.
- Maintain flue gas NO_x emissions below 1.47 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 May of 2013. Six new quaternary air (QA) Jansen High Energy Combustion Air Nozzles™ were placed on each side wall, arranged in an interlaced pattern about 34 ft above the lower tertiary air level, for deep staging to reduce NO_x emissions. The secondary air ports were replaced with Jansen nozzles. The existing upper tertiary 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 has been in excess of 93%.
4. Carryover has been low and excessive deposits warranting an unscheduled water wash have not been seen. 12-month continuous operation between water washes has been achieved.

This was a highly successful upgrade project for this boiler after which all performance guarantees were met.

Phone: 425.825.0500
Fax: 425.825.1131
www.jansenboiler.com

Confidentiality agreements preclude further disclosure on this project.