

Project Description



No. 4 Recovery Boiler Air System Upgrade Simpson Tacoma Kraft Company Tacoma, Washington

Project Scope

In October 1999 JANSEN was awarded the contract to provide engineering, equipment supply, and installation services for an air system upgrade on Simpson Tacoma Kraft Company's (STK) No. 4 Recovery Boiler in Tacoma, Washington. The recovery boiler is a Combustion Engineering unit that was installed in the early 1970s and designed to process 2.6 million lb/day of virgin black liquor dry solids.



Prior to the upgrade, the boiler was typically processing 3.1 million lb/day of virgin black liquor dry solids using a conventional two-level air system: primary air and tangential secondary air above the liquor nozzles.

At this firing rate, the capability of the air system was limited, as further increases in solids throughput could not be sustained while at the same time continuously meeting TRS stack emission limits. JANSEN added ten Jansen High Energy Combustion Air Nozzles™ to the front and rear walls of the existing primary belt duct (five nozzles per wall), approximately seven feet above the primary air ports. The air system was designed to increase the solids throughput to 3.3 million lb/day of virgin black liquor dry solids and maintain TRS emissions well below the permit level of 5 ppm. The air system was also designed to accommodate an increase in virgin black liquor throughput to 3.7 million lb/day in 2002 following the installation of an economizer.

Two unique characteristics of the JANSEN air nozzles provided significant benefits to STK:

1. The low pressure loss nozzles allowed the use of the existing forced draft fan and permitted the installation of the overbed new secondary air level nozzles directly in the existing primary air belt duct, and
2. The convergent nozzles provide a reliable means of measuring air flow by using transmitters to measure the static pressure in each nozzle and the furnace draft. The DCS displays air flows for each nozzle and for the total new secondary air level. Having the ability to read air flow at the nozzles allows the use of a common combustion air supply duct for both the primary and new secondary air levels.

The benefits realized by STK were: (1) relatively low capital cost, and (2) short installation time. The system was installed in only five days (the entire outage was approximately seven days due to maintenance work in other areas of the boiler).

Results

The air system modifications were installed during STK's annual outage in January 2000. During start-up the boiler was brought up to full design load of 3.3 million lb/day of virgin black liquor dry solids as soon as liquor was available from the rest of the mill. After removal of the unit's original Laminar Air Heaters (LAH) and installation of a long flow economizer in January of 2002, the unit has processed up to 4.0 million lb/day as-fired BLDS. The air system has met all of the design objectives for liquor throughput and stack TRS and NO_x release and the owner has been very pleased.