

Project Description



*No. 9 Power Boiler Overfire Air System Upgrade
Harmac Pacific
Location: Nanaimo, British Columbia*

Project Scope

The No. 9 Power Boiler was supplied by Combustion Engineering in the mid-1960s. It was originally designed for steam generation rates of up to 450,000 lb/hr on fuel oil or 250,000 lb/hr burning hog fuel on a stationary pinhole grate. The boiler was converted from oil firing to natural gas firing in the early 1990s. In current operations, the fuel fired on the grate consists of hog fuel, sludge, and unburned char separated from the air heater and dust collector discharge sluice by a skimming system.



The boiler's original overfire air (OFA) system consisted of ports on all four boiler walls. Although the OFA ports could deliver substantial amounts of air, their location below the fuel distributor openings contributed to a strong updraft that tended to lift fuel particles into the upper furnace. This effect, combined with fuel moisture often above 60% in the winter months, led to sharp reductions in steam generation from hog fuel, high CO emissions (frequently over 1,000 ppm and spiking to over 2,000 ppm), and large amounts of char carryover.

The mill desired to upgrade the boiler to achieve steaming at 275,000 lb/hr on hog fuel at 56% moisture, and to reduce char carryover. To meet these goals, the mill installed a new JANSEN OFA system consisting of six multi-range OFA nozzles installed on the side walls above the elevation of the fuel distributor openings. Various upgrades to air system instrumentation and control dampers were installed along with the new OFA system.

Results

The new JANSEN OFA system was installed in May 2016, and JANSEN tuned the boiler during start-up in June and again in December. Fuel moisture was slightly below 50% in June, but was around 62% in December. The upgraded boiler showed improved performance under both fuel conditions:

- The boiler was easily able to maintain steam loads as high as 280,000 lb/hr on grate fuels at lower fuel moisture and 230,000 lb/hr at higher fuel moisture.
- Mill data showed that char carryover was cut by more than half in the first month following the start-up compared to a seven-month period in 2014.
- Levels of flue gas CO were low during both tuning visits, averaging less than 300 ppm.