

# Project Description



*Foster Wheeler Power Boiler Combustion System Upgrade*  
*Daishowa-Marubeni International Ltd.*  
*Location: Peace River, Alberta*

## Project Scope

The Foster Wheeler Power Boiler was installed in the late 1980s and was originally designed to generate up to 287,000 lb/hr of superheated steam on hog fuel and up to 397,000 lb/hr on natural gas or oil. In recent years the boiler fired a mixture of hog fuel and primary sludge on the grate with natural gas co-firing.

Furnace combustion issues limited the unit's typical steam generation to less than 231,000 lb/hr and forced natural gas co-firing most of the time. The boiler's overfire air (OFA) system consisted of two rows of ports on the rear wall and two rows on the front wall (three other OFA levels had been completely or partially removed from service). JANSEN's evaluation of the boiler determined that the existing OFA system would be unable to support increased steam generation from grate fuels.



The mill pursued a boiler upgrade with the following goals:

- Optimize the boiler's grate fuel combustion to improve the thermal efficiency.
- Increase the annual fraction of boiler steam generation from grate fuel combustion to more than 90%.
- Increase the boiler's turndown ratio to greater than 2.5:1.
- Maintain unburned carbon in the fly ash to less than 0.6% by mass of the as-received grate fuel firing rate.

JANSEN designed and supplied an OFA system to meet these goals. The new OFA system was installed in May 2016.

## Results

The new OFA system performed well during start-up and tuning in June, providing significantly more flow capacity than with the old air system. The benefits of the new OFA system were immediate. Before the upgrade, deficiencies in the OFA system forced higher air flow through the grate, which led to the near absence of an ash bed. With the upgrade, the increased OFA flow allowed a reduction in grate air flow. This in turn helped create and sustain an ash bed on the grate and substantially reduced the amount of ash and char blown off the grate and out of the furnace. Achievable steam generation from hog fuel was also greatly increased compared to the pre-upgrade boiler.