

Project Description



*RDF Boiler Overfire Air Delivery System Upgrades (3 Units)
Connecticut Resource Recovery Authority (CRRRA)
Hartford, Connecticut*

Project Scope

The Hartford energy-from-waste plant operates three identical refuse derived fuel (RDF)-fired boilers that were supplied by Combustion Engineering (CE) in 1987. The model VU-40 boilers were designed for RDF burning on a traveling grate to generate 231,000 lb/hr of steam at 880 psig and 825°F. The units were originally equipped with a water cooled screen upstream of a two-stage superheater.

The original overfire air (OFA) system consisted of tangential ports located in each corner arranged in three elevations, and a total of three rows of small front and rear wall ports located 2 to 7 ft above the grate. The old OFA system had shortcomings that led to operation at lower than desired steam generation rates in order to meet the carbon monoxide (CO) emission limit.



Since the water cooled furnace screens were approaching the end of their service life, CRRRA was considering their options. While removing of the screen was preferred, CRRRA was concerned that this would shorten the life of the superheater. An engineering evaluation by JANSEN confirmed the potential for increased superheater corrosion, but also found that upgrading the OFA system would provide lower and more uniform furnace exit flue gas temperatures, which would partially offset the increase in superheater metal temperatures when removing the screens.

A new OFA system was installed on the first boiler in early 2011, on the second boiler in early 2012, and on the third boiler in early 2013. Four custom designed Jansen High Energy Combustion Air Nozzles™ were placed on each side wall, arranged in an interlaced pattern. The low pressure drop design of the JANSEN nozzles allowed increased OFA flow capacity and more heated combustion air from the tubular air heater while the existing OFA booster fan for the old front and rear wall ports was removed from service.

Results

Operation with the new OFA system has demonstrated the following performance improvements:

- Lower CO emissions with fewer spikes have allowed higher average steaming rates close to 231,000 lb/hr.
- The screen section was removed from the first unit in early 2012 and from the second unit in early 2013.
- There has been no noticeable change in superheater life *after* removing the furnace screen.
- Operating crews report that the new OFA systems on the first two boilers are “...making a difference between night and day...” as the boilers run a lot better now without the OFA booster fan on new OFA.