Beijing District Heating Group
A Case Study: December, 2015

Synopsis
NTFB solved a challenging low NOx boiler retrofit project in Beijing, China in early 2016 for the Beijing District Heating Facility. Keeping with the original side by side burner arrangement on their radically shaped 77,000 PPH watertube boiler, NTFB successfully replaced the outdated gas fired register burners with two independent gas fired NTFB low NOx burner systems.

As a result, Client's objectives were met by providing a flexible burner solution which allowed for improved overall boiler performance and readily meeting upcoming strict air emission standards in Beijing.

Technical Challenge
Client's request to keep with a two burner approach while working with existing boiler furnace limitations provided technical challenges. The 77,000 PPH field erected watertube boiler has an unusually short 13.3 ft. deep furnace combined with a furnace width of 12.2 ft. Two existing independent gas fired register burners were mounted side by side in the boiler furnace and could not meet newly required low NOx emission requirements of <30 PPM NOx on natural gas fuel.

Solution
NTFB retained their GS Low NOx two burner arrangement in order to handle the higher thermal NOx levels generated by a two burner side by side configuration paired with an unusually short furnace. By employing induced flue gas recirculation through the NTFB burners and by modifying the forced draft combustion air fans with air/FGR mix boxes, low NOx levels were attained while providing efficient operation with minimal excess air requirements.

The use of two burner systems on this boiler, each with its independent windbox, isolation/control damper, and independent fuel gas piping train helps assure continuous boiler operation at a somewhat reduced boiler capacity when one burner is taken out of service for routine maintenance.

Hidden Benefits
NTFB meets client's requirement of <30 PPM NOx when firing natural gas in this unusual watertube boiler. While not yet a requirement in most areas of China, Beijing Heating District continues with the foresight and civic responsibility to minimize NOx emission levels well below most current standards. It would be an unusually tough standard for any area of China to meet, let alone complete in a highly populated and congested Beijing.

NTFB's expertise helps their client set industry standards for other industrial and commercial facilities to meet the ever tightening NOx emission standards in Beijing and soon in other populated areas of China.

One other key benefit for the future:

These newly installed NTFB low NOx burners are capable of meeting even drastically lower NOx levels with minor changes if/when lower emission are mandated by the Beijing air quality standards in the future.

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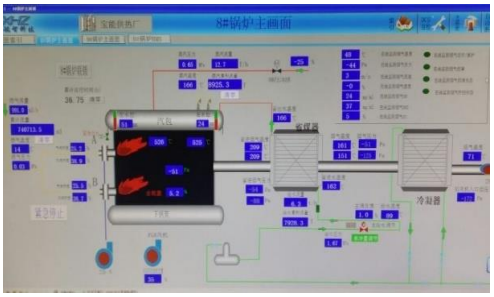
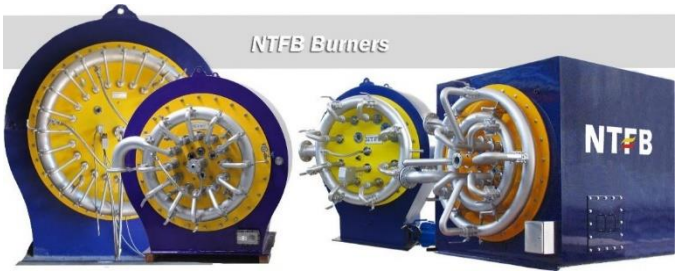
Boiler and Burner Performance at Maximum Boiler Load (MCR)

Boiler capacity at MCR – 77,000 PPH Steam
Heat Release Rate – 85.7 MM Btu
Boiler Operating Pressure - 230 PSIG
Feedwater Temperature - 220 Deg F
Steam Temperature. - 398 Deg F
Combustion Air Temp - 68 Deg F
Induced FGR Temp - 280 Deg F
NOx at MCR - < 30 PPM
CO at MCR - < 25 ppm
O2 Level at MCR - <3%
Gas Supply Pressure - 15 PSIG
Gas Heating Value - 1000 BTU/CU FT

Burners, Combustion Controls, Burner Management, Gas Piping

Low NOx Burners – NTFB Type GS
Burner Windboxes – NTFB Type AO1
Fuel Piping – NTFB & Existing Piping
Controls (CCS) – Full Metering / O2 Trim
Controls Designer – NTFB / Siemens 315/2DP
Burner Management – NTFB / Fireye Scanners





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