JOHN ZINK HAMWORTHY COMBUSTION®

Converting Oil Fired, T-Fired Utility Furnaces to Fire Gas and Oil

Case Study

The Situation

Puerto Rico Electric Power Authority's (PREPA) South Coast Generating Station wanted to convert two 410 MWe tangentially fired (T-fired) boilers (unit #5 & #6) that fired heavy fuel oil only, to fire natural gas and combinations of natural gas and fuel oil. One of the key drivers for the project was to reduce fuel costs. PREPA's cost for fuel oil had more than tripled between 2004 and 2011. Adding natural gas firing capabilities would allow the station to select gas or oil fuel in any combination to help control costs.

+ Unit 5: Six burner elevations per corner (24 burners total)
+ Unit 6: Four burner elevations per corner (16 burners total)

The Solution

Aware of our successful conversions of more than 20 T-Fired units, PREPA contracted us to supply necessary engineering services, equipment and commissioning for the gas conversion. Several up-front studies were conducted including CFD modeling to optimize air-flow distribution and predict flame patterns in the furnace as well as a thermodynamic study to evaluate the boiler heat absorption impact due to the gas conversion. We utilized proprietary computer models to predict fuel and air flows to all corners and elevation zones. We also performed an audit of the BMS and controls to evaluate compliance with the current Boiler and Combustion Systems Hazards Code (NFPA 85).

Equipment supplied for the conversion included gas burners, local burner safety shut-off valves, boiler header skids, local control panels and a main gas pressure regulating skid. We designed a main gas pressure regulating skid to handle compressed natural gas (CNG) that was supplied from an offshore barge with pressure from 450 to 650 psig (31 – 45 bar) and at temperatures from 0 to 40˚F (–17 to 4˚C).

Flexible fuel options to reduce costs and emissions. ***That's smart. That's JZHC.***

Our Proven Solution Process:

1. *Site visit to establish work scope and obtain basic design information.*

2. *Computer modeling of flows, gas injection location, sizing and piping.*

3. *Air flow CFD to determine pressure drops and flow distribution.*

4. *Furnace combustion CFD modeling and thermodynamic impact study of Super Heat (SH) and Reheat (RH), Furnace Exit Gas Temperature (FEGT) and tube temperatures.*

5. *Audit of BMS and controls.*

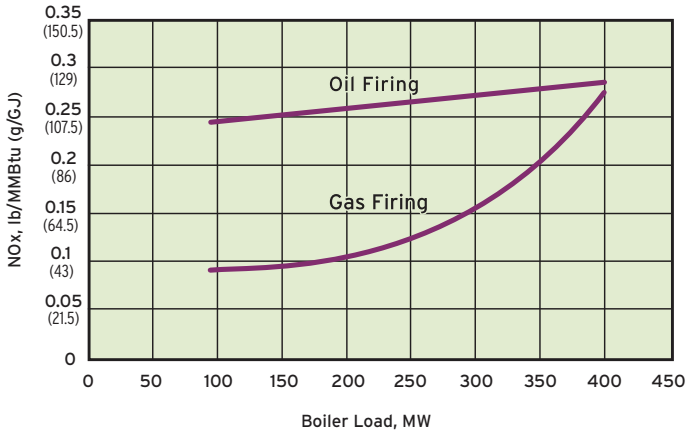
6. *Final equipment design and manufacturing to meet specifications.*

7. *Installation supervision and commissioning.*

The Results

We successfully converted the two utility boilers to fire gas while preserving the existing oil-firing capability. The new dual-fuel system allows PREPA to select fuel (gas or oil) on a per burner basis, permitting co-firing of oil and gas in any combination between 100% gas and 100% oil.

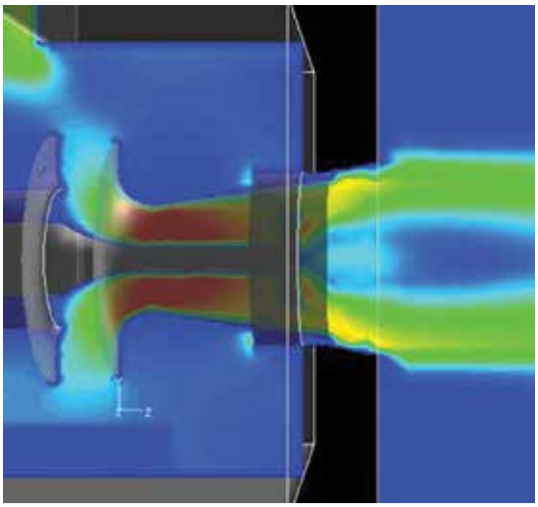
FUEL COMPARTMENT AFTER RETROFIT



EMISSIONS AFTER RETROFIT

Predictive Technology

Our progressive design engineering and product development includes leading-edge burner testing, simulation and modeling techniques, offering an in-depth analysis of current combustion systems as well as engineered solutions to maximize performance. Using state-of-the-art computational fluid dynamics (CFD) modeling techniques, we can maximize your facility's operating performance and achieve your emission requirements. With CFD analysis, we can predict and improve: air distribution, flame characteristics and pollutant formation for optimal combustion.



CFD MODELING

GLOBAL REACH

JZHC has locations all over the map, with thousands of employees worldwide.

JOHN ZINK HAMWORTHY COMBUSTION®

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