

Case Studies (FIS-296)

Hydrogen Heater Capacity Improvement Project

Furnace Improvements Services (FIS) carried out a Hydrogen Heater (77-H-001) revamp project. The Hydrogen Heater is a vertical cylindrical heater, built in 1990. The heater was revamped in 2003 for a heat duty of 12.48 MMBtu/hr. The heater was operating at an efficiency of 78% and an absorbed duty of 11.6 MMBtu/hr. The revamp heater design heat duty is 14.77 MMBtu/hr.



Operating data analysis indicated the following:

- Convection section fins are burned out/fouled, resulting in a higher flue gas temperature leaving the convection section.
- Flue gas temperature leaving the convection section increases continuously with time.

Currently, it is around 100°F higher than the clean conditions flue gas temperature.

The conventional revamp scheme (to preheat the feed in the convection section) resulted in very high fluid pressure drop. Such a high fluid pressure drop was not feasible.

FIS redesigned the convection section with FIS patented “Split Flow Technology”. In this scheme, the feed was heated parallel in the convection and radiant section. The pressure drop across the heater reduced at an even higher capacity due to parallel processing.

Furnace Improvements Services
Clean & Efficient Combustion

Case Studies (FIS-296)

Hydrogen Heater Data Comparison

Item	Units	Design	Operating	After Revamp
Capacity	lb/hr	22,383	16,400	24,560
Absorbed Duty	MMBtu/hr	12.46	11.6	14.77
Heat Release	MMBtu/hr	16.82	14.9	17.17
Stack Temp.	°F	796	790	478
Efficiency	%	74.1	77.8	86

FIS carries out the entire scope of activities from conceptualization to commissioning of this heater revamp. The heater will be commissioned in May 2009. After revamp, the thermal efficiency of this heater will increase from 78% to 86%.