

Case Study (FIS-260):

Improvement of Reactor Charge Heater Capacity using Split Flow Technology

Furnace Improvements Services (FIS) was employed to carry out a capacity improvement of the Reactor Charge Heater (080-H-001). The client wanted to increase the process heat duty from 29.95 MMBtu/hr to 37 MMBtu/hr. The maximum firing rate limitation was 54 MMBtu/hr.

This heater was originally built in 1965 as a natural draft all radiant heater. It was modified in 1980 to increase its thermal efficiency from 55% to 89% by adding a convection section for steam generation. The heater was operating at 85% efficiency.

The revamp options to increase the capacity of the heater were:

- Replace existing radiant coil and put in a new convection to preheat the process feed.
- Revamp using FIS Split Flow Technology. In this option, the process feed is split and heated parallel in the radiant and convections sections. The two parallel streams are then combined at the outlet.



FIS revamped the heater, for increasing the processing capacity, using “*Split Flow Technology.*”

Parameter	Units	Design	Operating	Revamp
Total Absorbed Duty	MMBtu/hr	47.63	55.48	42.4

Furnace Improvements Services

Clean & Efficient Combustion

Process Duty (Total)	MMBtu/hr	29.99	37.68	37.01
Process Radiant Duty	MMBtu/hr	29.99	37.68	25.01
Process Convection Duty	MMBtu/hr	-	-	12
Total Fuel Firing Rate	MMBtu/hr	53.47	64.83	49.87
Firebox Temperature	°F	1540	1630	1511
Radiant Average Heat Flux	Btu/hr/ft ²	11,820	14,850	11,480

Advantages of the revamped design based on Split Flow are as follows:

- a) No radiant section modifications – Existing tubes and supports can be used
- b) Steam generation systems can be reused with minimum modifications
- c) Lowest cost
- d) Shortest turn-around time

The heater is now operating successfully after revamp. FIS carried out the entire scope of activities from conceptualization to commissioning of this heater revamp.