

Case Studies (FIS-266C)

Alky Heater (H-2) NO_x Reduction and Efficiency Improvement Project

Furnace Improvements Services (FIS) was hired to perform a turnkey NO_x Reduction revamp on its Alky Unit Heater (H-2). The target NO_x emission rate was 0.035 lb/MMBtu (HHV). The Alky Heater is a vertical cylindrical heater with a design heat duty of 55 MMBtu/hr. The heater efficiency was very low.

Excess oxygen in the firebox was very high. The heater floor was in bad shape. The heater did not have any stack damper for draft control.

FIS' scope included finalization of thermal design and engineering, procurement of material, fabrication, supply and field installation of the heater.



FIS scope of services included:

- **Modification of Existing Floor:**
The existing floor was in bad shape, as it was warped and needed to be replaced. The burners were fitted on a smaller burner circle diameter to increase the reliability of the heater by minimizing the flame impingement.
- **Install Eight New Ultra Low NO_x Burners (ULNB):**
FIS rerated the heater using ULNB to reduce NO_x emissions. The burners are fired vertically upwards and the NO_x emissions are 0.018 lbs/MMBtu. The burners were housed in a common air plenum with a central air intake. The air intake was provided with a manual damper.

Furnace Improvements Services Clean & Efficient Combustion

Case Studies (FIS-266C)

- Installation of New Convection Module:**
 Existing convection section efficiency was very low due to a high flue gas temperature leaving the section. The flue gas temperature was brought down to 520°F from 680°F by replacing the convection section. FIS supplied and installed an upgraded convection section. This increased the efficiency from 66% to 86%.
- Installation of New Stack and Damper:**
 FIS replaced the existing stack and installed O₂ and temperature indicators for better control of the Oxygen levels and the temperatures exiting the stack. The new stack was provided with connected ladders and platforms. The existing stack did not have a damper for draft control. The stack damper is pneumatically operated. Minimum limit stop has been provided on the linkage side of damper frame in order to prevent it from being fully closed. A position transmitter has been provided so that the damper opening position is known. The stack damper is provided to ensure that the draft at the arch is maintained at the design level of (-) 0.1” WC under all operating conditions.

	Before Revamp	After Revamp
Duty (MMBtu/hr)	41.37	41.37
Efficiency (%)	66	86.2
Firing Rate (MMBtu/hr)	62.68	48
Energy savings (\$/year)		782,093
Payback Period (Years)		1.72

The energy savings after the revamp were between \$780,000 - \$1,070,000 per year. The total cost of the project for the design services, engineering services, fabrication and installation was \$2,500,000. The project payout was estimated to be less than 2 years. This heater was successfully commissioned in March 2008.