

## Praxair's OxyFuel Solutions for Petrochemical Process Heaters

### CIRCUMSTANCES

Refinery was preparing for crude slate change where a process heater needed additional output, lower NOx, and efficiency increase.

Refinery relied on Praxair to not only meet performance objectives, but to provide an all-inclusive turnkey retrofit package that emphasized safety, and operational continuity.

### Background:

Name: Refinery  
Location: Texas City, TX  
Heater: vertical cylindrical  
Unit Duty: 10,000 bpd  
Fuel: Refinery Gas  
Heat Release: 70 MM Btu/hr  
Burners: (2) 7" Praxair Aspiration (A)

### APPROACH

The successful turnkey project was executed in three steps. First, Praxair's combustion team provided computer modeling of the heater. Next, Praxair engineered and manufactured the oxygen supply system, (A) Burners and associated control skids. Finally, the OxyFuel Solution system was installed and started up in three weeks with *no heater down time*.



'A' burner fired in heater.



'A' Burner mounted under heater. Note size compared to air burners.

# Case History

www.Praxair.com  
1-800-PRAXAIR

## RESULTS

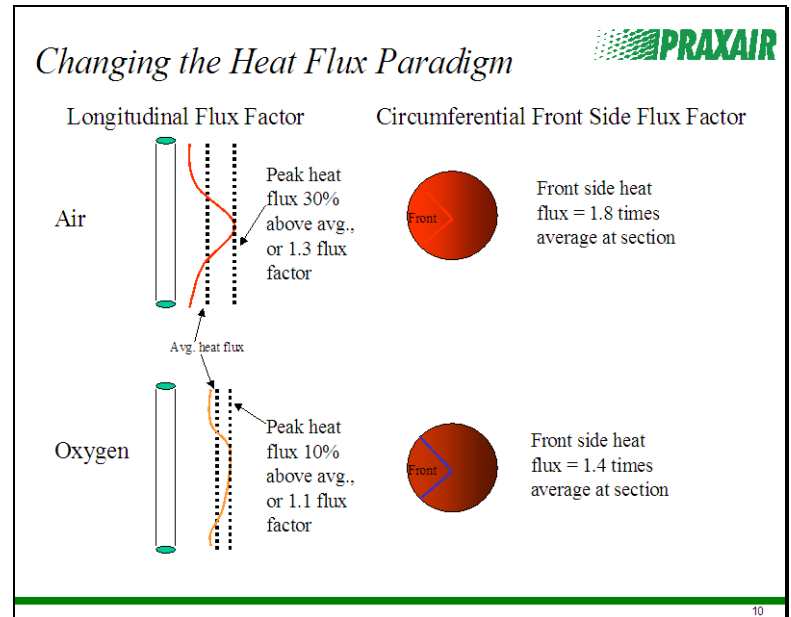
Aspiration burners were installed into an operating heater with zero downtime.

Heater output can be increased by up to 16 %, and eliminate it as the process bottleneck. As the aspiration burner creates a more uniform heat distribution firing requirements are reduced, or the better heat distribution can be translated to increases in throughput for systems that were previously heat flux or heat input limited.

NOx performance (lb/MMBtu) was 50% of baseline operation with no CO increase. NOx results can be further optimized for oxygen based combustion to achieve unparalleled NOx performance compared to air-fuel burners.

Fuel usage per unit output drops as heater efficiency improved. Overall fuel usage is lower by 10-15%. This represents fuel savings of approximately \$500,000 per year for a 100 MM Btu/hr heater.

Praxair managed the project from concept to start-up including customer pre-installation requirements, safety procedures, pre-start up checks, and initial light off.



Praxair's A Burner creates more uniform heat transfer inside heater. This translates to lower heat flux peaks, lower tube temperatures, and more output.

Customer Requirements	Praxair Results
<ul style="list-style-type: none"><li>▪ Turnkey Installation-minimize downtime</li><li>▪ Increased Output-NOW!</li><li>▪ NOx abatement</li><li>▪ Increased efficiency-fuel savings</li><li>▪ Flexible operations including turndown</li><li>▪ Reduce maintenance costs and outages</li><li>▪ Eliminate flame impingement on tubes</li></ul>	<ul style="list-style-type: none"><li>▪ Turnkey installation with <i>zero</i> downtime</li><li>▪ Throughput increases 15-20 % possible</li><li>▪ NOx performance of 0.01 lb/MMBtu</li><li>▪ Fuel savings of 10-15%</li><li>▪ Flexible operations with 20:1 turndown</li><li>▪ No need for burner cleaning, less coking</li><li>▪ Smaller burner w/flame shaping capability</li></ul>