

LOW COST NOx REDUCTION SUCCESS IN VERTICAL HEATERS

SITUATION

Lyondell/Equistar's NOx Reduction Program mandated multiple low emission burner replacements on four vertical fired furnaces. The three goals of the project were NOx reduction, improved operation and reliability, and cost effectiveness.

Equistar sought assurances and guarantees that no harmful flame impingement occurs, and that the new burner system reaches full design heat input with only three of the four burners in operation per heater.

The units are located at Equistar's North Plant in Channelview, Texas, a regulatory region governed by the Texas Commission on Environmental Quality. The EPA designates this area as a severe ozone non-attainment area per the Federal Clean Air Act Amendments of 1990.

Name:	Lyondell/Equistar North Plant	
Location:	Channelview, Texas	
Vertical Furnaces:	Lummus Global, Inc. (4) Vertical Cylindrical Heaters	
Heat Input:	220 MBtu/hr Total	
Burners:	(4) Coen QLG-3.2 per Heater Common Air Plenum	
Fuel:	Refinery Gas (variable Btu)	
Fuel Pressure:	30 psig	
Emissions:	NOx	0.03 lb/MBtu
	CO	0.034 lb/MBtu
	Particulates	0.005 lb/MBtu
	UBHC	0.0026 lb/MBtu

SOLUTION

The straightforward burner-for-burner replacement on each vertical heater included **(4) loose Coen QLG-3.2 refinery gas burners**, precast throat assemblies, and **Coen /scan digital flame scanners**. The new Coen burners fit the existing pitch circle diameters and openings, which help **save on installation cost**.

To improve heater reliability, each Coen burner operates with an automatic air isolation damper to permit burner shutdown to remove and clean refinery gas spuds while the heater remains online firing the three remaining burners.

To keep project costs low, existing forced draft fans, windboxes, combustion controls, burner management systems, fuel piping and instrumentation were ALL REUSED.

Coen engineers employed Computational Fluid Dynamics (CFD) modeling to optimize the distribution of combustion air and flue gas recirculation (FGR) to the windbox.

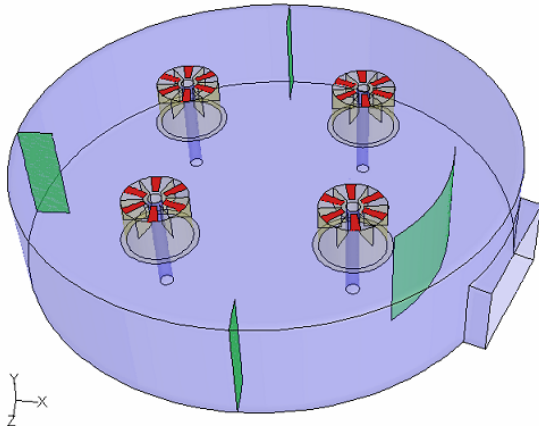


Shipment of First Two Sets of Coen QLG Burners

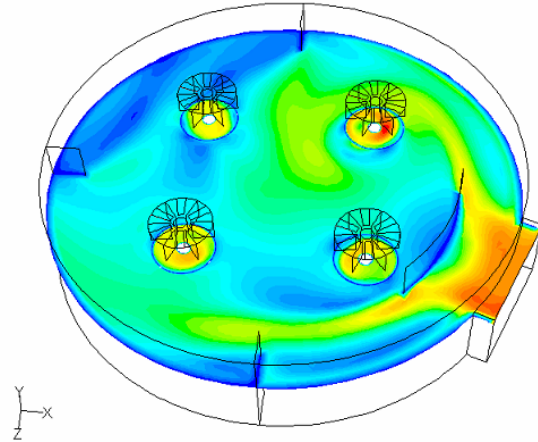
RESULTS

Initial start-up data indicated the Coen QLG burners performed as expected and include:

- LOW NOx** -- NOx measured below 0.03 lb/MBtu
- LOW CO** -- CO remained extremely low, near "zero" CO in all cases
- LOW O₂** -- Stack oxygen measured near 3%



CFD Modeling to Optimize Air + FGR Distribution



Sample Run - Windbox Velocity Contours

CUSTOMER NEEDS

- ✓ Low Cost NOx Reduction
- ✓ Very Low CO Emissions
- ✓ Employ CFD Modeling to Insure No Flame Impingement
- ✓ Improve Operation and Reliability
- ✓ Reuse Equipment & Controls
- ✓ Single Source Responsibility

OPERATIONS

- ✓ Safe Continuous Operation
- ✓ Minimal 6% Bulk Mix FGR
- ✓ Achieve Design Capacity with Only 3 of 4 Burners in Service
- ✓ Individual Burner Air Isolation
- ✓ Remove and Clean Gas Spuds with Heater in Operation

AIR QUALITY

- ✓ < 0.03 lb/MBtu NOx Over Normal Load Range
- ✓ Near "Zero" CO Throughout the Firing Range
- ✓ 3% O₂ in the Stack

Strict Federal air pollution regulations trickling down to the district level are creating great economic challenges to remain competitive in a fierce global environment. It is no longer an option, but a necessity for industry to pursue and implement the latest technology that provides economic and environmental benefits.

Coen Company, engineers and manufacturers of combustion equipment since 1912, understands this trend. Coen Company is committed to providing the latest in combustion and emission control technology to meet the needs of industry. We also offer sole source Turnkey responsibility.



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