



ANSYS® + AG Furnace

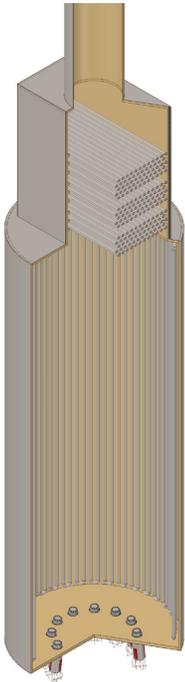
“ANSYS Fluent simulation analysis helped in optimizing the design recommendations for improving heater performance. Revamped heater field observations were in line with CFD simulation results.”

Amarvir G. Chilka

Head-CFD Modeling Group

AG Furnace Improvements Pvt. Ltd.

Simulation of Crude Heater's Flame Greatly Improves Efficiency



Heater Geometry

The crude heater is the largest heater and the most important piece of equipment in a refinery. It's used for crude oil processing, which can be inhibited by coke formation. Many factors contribute to coke formation, including flame impingement, overfiring and low flow inside the tubes. When heaters operate under these conditions, high tube metal temperatures and frequent shutdowns occur.

Challenges

Our primary challenge was to increase the crude capacity of the heater, while maintaining tube metal temperatures below the design values. We also needed to increase the run length of the heater, and validate the simulation predictions with the experimental test data.

Technology Used

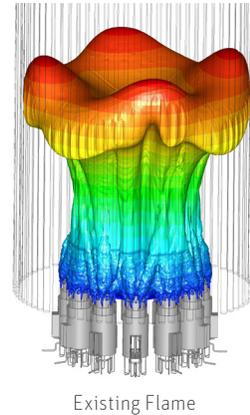
ANSYS® Workbench™
ANSYS® Fluent®

Engineering Solution

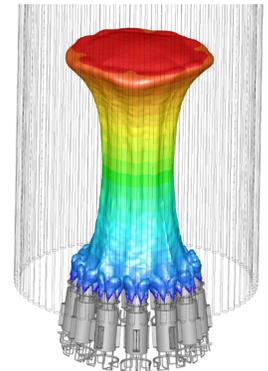
We performed a combustion analysis using ANSYS Fluent to simulate the flame characteristics and temperature distribution in the heater. To replicate the field observations, we accounted for the non-uniform distribution of air flowing to the burners. Based on the results, we evaluated possible options to meet the design objectives.

Benefits

- Proposed burner configuration substantially improved the heater's flame characteristics.
- Proposed case showed no flame impingement on the radiant tubes.
 - Maximum radiant tube metal temperatures were reduced, increasing the heater run length.
 - Deviation in airflow was reduced from ± 20 percent to ± 3 percent.
 - Heater was commissioned with proposed modifications and is now running with increased capacity and efficiency.
 - CFD modeling helped to optimize the proposed options.



Existing Flame



Modified Flame

Company Description

For over 21 years, AG Furnace Improvements has been providing end users and manufacturers with design and engineering services to improve the performance and efficiency of their fired heaters and boilers. The company also helps refineries reduce NOx emissions, and holds several patents for performance-enhancing technologies. AG Furnace Improvements offers customers:

- Turnkey services for design, engineering and supply of new, fired heaters.
- Revamping of all types of fired heaters.
- CFD modeling.
- Troubleshooting.

ANSYS, Inc.

www.ansys.com
ansysinfo@ansys.com
866.267.9724