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Case Study: Engineering Study

Background

An oil refinery in Canada was facing the prospect of having to meet BLIERS and MSAPR regulations for reduced NOx emissions in the near future on a 290kpph T-Fired, superheated, CE "MU" boiler that fires a blend of natural gas and various refinery gas streams. The boilers at the plant all being of an older vintage, none of them have any existing NOx mitigation measures. Unsure of how to approach this problem and reduce NOx emissions, STEP was contracted to support in an **engineering study** to evaluate the system and identify potential NOx reduction strategies.

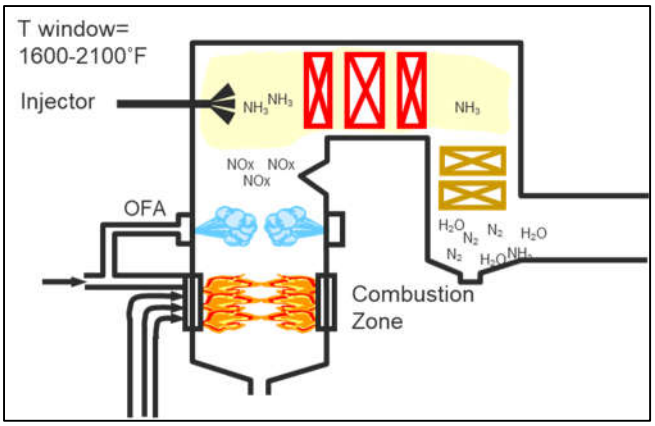

Figure 1: NOx Options: LNBs, OFA, SNCR, etc.

Solution

STEP took an **engineering first approach** to evaluate the system as a whole to identify key areas to target. The analysis began with a site walk down to understand the operation and limitations of the existing unit. Operators and site engineers were interviewed, drawings and datasheets were reviewed to understand the system. As the existing unit was a field erected T-Fired boiler, it makes it a prime candidate for OFA and SNCR. These tried-and-true methods are staples of boilers of this type. However, with the NOx reduction required (80%), SCR and FGR were not out of the question. Also, given the age of the unit, it is a prime candidate for Low-NOx burner upgrades. With so many options available, STEP analyzed various combinations from a technical and economical aspect to narrow down the options.

Furthermore, STEP conducted preliminary **CFD modeling** to better understand the consequences of each proposed solution.

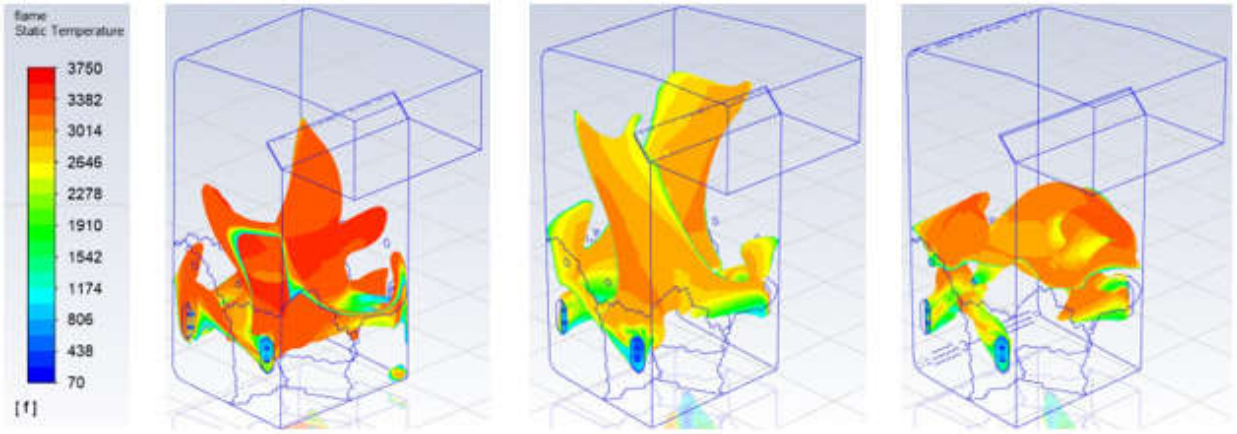

Figure 2: CFD model contours. ISO surfaces of 2,000ppm CO, colored by temperature to represent flame shape.

Conclusion

With a comprehensive engineering report in hand, the client was able to make an informed decision on which options to explore further in a Front-End Engineering and Design (FEED) study.