



CASE STUDY
Off Gas Cl Treaters within a UOP CCR, Tennessee Refinery
CLS Custom Systems Mitigate Severe Carryover

This is a Refinery located in Tennessee with a 31 MMSCFH UOP designed CCR. The focus of this study will be the Off Gas Chloride Treaters, of which this refinery has two. The following is based on conditions within the reformer during the summer of 2011 when the main product separator had a faulty demister pad and sent slugs of reformate into the Cl Treaters.

Background

This refinery has a lead/lag arrangement for its Off Gas Cl Treaters. In April of 2011, CLS sent the refinery a new charge of Vari-Zeo, as the cycle length of the existing charge had reached its EOR (End Of Run).

These two treaters are up-flow H₂ Cl treaters.

Problem

After running the Cl treaters for approximately 4 months, the refinery engineers noticed they were having pressure drop issues across the lead treater. Pressure drop occurs when the inlet to the vessel experiences higher pressure than the outlet of the vessel. In this case, something was blocking the H₂ from passing through the bed.

Upon further inspection, the engineers realized that multiple upsets had occurred at the de-mister pads of the upstream product separator. These faulty pads had sent slugs of reformate downstream into the H₂ Cl Treaters. When these liquid slugs entered the bottom of the treater, they lifted the absorbent material and slammed it back down onto the support grid. It is believed that this occurred at least four times. The result of this carryover and violent action within the treater was a crushed bed. The smaller dust-like particles restricted the flow through the treater, thus resulting in significant pressure drop.

Solution

The engineers needed a replacement bed as soon as possible, but knew that they could not immediately fix the source of the problem, the faulty de-mister pads. CLS was now confronted with a problem which need immediate resolution.

In reaction to the situation, CLS developed a “Hybrid” system of material which would allow for a much higher flow rate, dissipate the slugs of reformate through out the bed, and still retain a reasonable cycle length of Total Chloride Removal.

The new system created was done so by changing the size and shape of the overall material, in addition to the changes in size of the pores within the material. These changes affected the flow characteristics of the bed and achieved the desired effects. System 1108-02 remained online for 6 months, during which it achieved total chloride removal, pressure drop mitigation, no channeling, and no formation of byproducts such as Green Oils.

Conclusion

Utilizing CLS' custom production process as well as the extensive technical experience of the company, we were able to quickly solve a client's issues with minimal down time and no risk of downstream corrosion. Had we not provided this unique solution, the refinery would have had to bypass the Cl treaters and passed 100% of all reforming Chlorides downstream to the rest of the refinery. The costs of which are not even calculable.

The customer was thankful and greatly aware of the impact of the solution.

-Christian Ahrens