

CASE STUDY

ACHIEVING >365 DAYS OF REBOILER RUN TIME

Customer: SABIC Affiliate

Location: Jubail Industrial City
Kingdom of Saudi Arabia

Process System: Quench Water Loop
Olefins Plant



APPLICATION: Treatment of Quench Water in a Closed Loop System for Ethane, Propane and Mixture Crackers

OBJECTIVES OF THE TREATMENT

- To maintain low oil loading in quench water by managing high loading upset conditions and heavy emulsions
- To maintain on-spec wastewater for the quench water system, achieving RCER 2015 standards
- To reduce waste generation by minimizing blowdown rates from the quench water loop
- To increase capacity utilization of the quench water system by eliminating unscheduled maintenance activities on the quench water reboilers

OIL LOADING DATA

- Average inlet oil concentrations of 2,100 ppm with upset conditions as high as 184,000 ppm
- Design effluent concentration is 20 – 100 ppm, with up to 150 ppm maximum allowable concentration
- MYCELX average oil discharge concentration is 75 ppm

FLOW RATE:

- Design for Average of 100 m³/hr, Maximum 140 m³/hr

CONTACT / REFERENCE: Upon request

MYCELX DELIVERED:

Improved On-Stream Factor
Reduced DSG Blowdown
Reduced DSG Oil Loading
Higher Quality Steam
Improved Capacity Utilisation

CHALLENGE

The petrochemical facility deployed a Dispersed Oil Extraction (DOX) process to remove oil from the closed loop quench water system to prevent fouling of the Dilution Steam Generator (DSG) system. This oil-free water is used to generate high-quality steam for use in the cracking furnaces. During upset oil loading conditions or in the presence of strong emulsions the quench water system struggled to achieve the required balance with the downstream DOX unit, resulting in poor oil removal efficiencies. Ultimately the customer saw significant negative impacts to their capacity utilization as frequent reboiler maintenance reduced on-stream factors and compromised production rates. Major increases in water usage and wastewater generation from high DSG blowdown rates were preventing energy and water efficiency goals from being met.

In order to address the above issues and meet increasing production demands for oil-free water and high-quality steam, the plant sought to replace the existing DOX process. This alternative process needed to be a robust system capable of removing high oil loading and handling upset conditions of strong emulsions. Key performance parameters included discharging oil concentrations of <150 ppm in the system effluent, reducing reboiler maintenance to every 180 days, and improving flow rates and oil loading in the DSG blowdown such that wastewater pond discharge would meet Royal Commission Environmental Regulations (RCER).

SOLUTION

MYCELX designed, engineered and delivered a customized multi-stage treatment solution driven by patented technologies for an optimized solution.

The primary MYCELX Advanced Coalescer (MAC) system removes bulk oil and recovers high purity skim oil and settles out large solids. The secondary MYCELX RE-GEN system uses a media depth bed to remove remaining bulk and dispersed oils and captures 98% of suspended solids >5 microns. Periodic regeneration of the media bed is performed to maintain high efficiency. The MYCELX Polisher system removes emulsified oils and fine solids to meet effluent requirements.

Daily analysis of outlet water samples by a third party lab is used to generate reports to the customer. Water characterization expertise is used to troubleshoot unique quench water upset conditions such as high concentrations of green oil and heavy emulsions.

The MYCELX solution provided a robust and continuously operating system capable of handling major upset conditions with inlet concentrations as high as 184,000 ppm. The MYCELX system is continuously optimized for varying feed compositions and oil loading.

IMPACT

The MYCELX oil removal solution delivered enormous benefits by drastically improving DSG and reboiler performance. Successful handling of upset oil conditions resulted in significant reductions in wastewater generation:

Improved on-stream factor:

- DSG reboiler on-stream factor significantly improved with run lengths increased from the previous average of 25 days to **over 365 days**

Reduced Blowdown:

- DSG blowdown wastewater flowrate **reduced by 56%**

Reduced Oil Loading:

- Oil loading in DSG blowdown wastewater reduced from average of 1,308ppm to an average of **84 ppm** from MYCELX system

Reduced Coke Waste:

- Reboiler coke waste generation **reduced by 88%** in DSG reboilers, contributing to improved S.H.E. Metrics

Improved Capacity Utilization:

- Improvements to reboiler run time and DSG blowdown resulted in quench water system meeting or exceeding goals for **capacity utilization**

High-quality steam provided to furnace crackers