

Forum's Desalter Upgrade Enhances Operational Benefits for Heavy Feeds in the Refining Process

The Challenge

Removing brine-water and water-soluble salts (inorganic contaminants) from crude oil in desalter equipment is a challenge in the refining industry. Because of inconsistent global crude quality, refineries can see varying levels of feedstock, which often translates into significantly higher operating and maintenance costs. Processing large quantities of heavier feeds or crudes with high salt content can increase corrosion rates and decrease the desalter's life expectancy. Choosing the appropriate desalter design for a specific crude-water mixture and capacity is essential to minimizing these challenges, as well as reducing downtime, salt carryover, chemical injection, and oil in effluent water.

A Gulf Coast refiner wanted to optimize productivity, increase capacity, and change its crude diet from light to heavier feeds at two refineries. They contacted Forum Process Technologies—known for providing efficient solutions to treat heavy crudes—to manufacture and install a two-train, two-stage desalter system with inlet salt content of 50 PTB and inlet BS&W of 0.15-0.44 % v/v to also improve their operating performance (i.e. desalting efficiency, oil in brine, and dehydration efficiency) and save operations and maintenance expenses.

The Solution

After a technical review with the client, the Forum process team recommended adding the EDGE™ II technology to an existing desalter in the refinery. This solution was chosen because of its ability to treat heavy feedstock or emulsion sensitive crudes. The EDGE II feed distribution system could also help increase residence time for the interface emulsion and effluent water; provide flexibility to handle upsets; yield decreased chemical consumption; and offer low oil-carry under in the effluent water.

The EDGE II offering, particularly the crude distribution and electrode design, provided the best option to treat the emulsion sensitive crude. After installation, it was proven that the desalters with new heavy feedstock capabilities met/exceeded their target desalting, oil in brine and dehydration efficiency. The dual, horizontal-flow distribution provided quick, complete coalescence of water droplets; thereby, ensuring larger droplets and faster settling. The high-level distribution, between the grids, allowed for two to three times the volume of water / oil emulsion, compared to vertical flow desalters. The distribution also improved the control of the interface (rag) emulsion and minimized the oil carry-under for improved effluent water quality. The independently energized electrode grid design gave flexibility to handle upsets that are seen with heavy or emulsion sensitive crudes, and reduced chemical injection rate. The desalter's solid carbon steel rod electrodes proved to be more durable than alternate designs.



Crude inlet distributor in the EDGE II desalter was designed to increase residence time for interface emulsion

The Benefit

Forum's EDGE II solution helped improve the operating performance of the desalting process at the Gulf Coast refinery. The desalter reduced operating and maintenance costs, as well as several other benefits:

- Reduced downtime caused by potential downstream corrosion—the lowered salt and water carryover in the desalted crude protected downstream equipment.
- Facilitated long-run cycles because the desalter could better handle upsets.
- Improved unit lifecycle by increasing the life expectancy of electrical components (electrodes and bushings)
 - The typical life expectancy for electrodes is greater than 20 years, and bushings is up to three-times longer than the alternate design, based on customer history.
 - By increasing the longevity of these parts, long-term costs and downtime were also minimized
- Reduced chemical injection from the greater residence time for resolution of interface emulsion.
- Decreased produced water treatment costs by lowering the amount of oil in the effluent water.

The results exceeded the client's expectations, and now Forum's EDGE II is the technology of choice for heavy crude oil treatment applications.