SULZER

Sulzer Chemtech

Tower Technical Bulletin

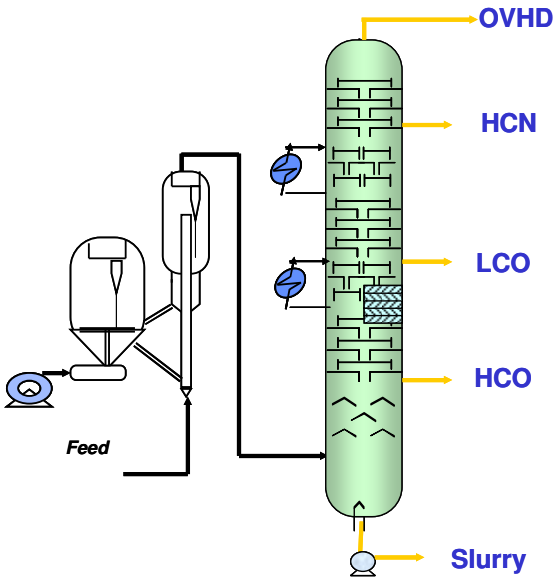
Maximizing Light Cycle Oil Recovery in the FCC Main Fractionator

Background

Refiners operating FCCU's have adjusted their operating strategies to maximize light cycle oil production to meet the increased demand for automotive diesel. Catalyst formulations and reactor conditions can alter yields, but the refinery cannot take full advantage of the increased LCO recovery without an optimized Main Fractionator operation and design. Sulzer offers several methods of optimizing the separation between light cycle oil and less valuable HCO or slurry with little or no investment.

The Driving Force

Product overlaps between light and heavy cycle oil or light cycle oil and slurry can contribute to a significant portion of refinery gas oil volumes. Shrinking these overlaps can be very profitable for refinery operations and increase the overall refinery diesel pool.



First, Optimize Your Base Case

Before considering design changes in the Main Fractionator, it is important to begin with an optimized base case. LCO can be downgraded to HCO or slurry product by the redistribution of the pumparound and reflux duties. The cooling duty to the bottom pumparound is often provided by reboiling the Gas Con Stripper or Debutanizer column. Sometimes the demands of the gas plant columns necessitate high bottom pumparound duties, resulting in low LCO product endpoints. In these cases, the most beneficial investment may be a supplemental reboiler to the Gas Con. This allows the Main Fractionator pumparound duty to be reduced, which then allows more diesel-ranged material to travel up the column to be pulled as LCO.

Many refineries also employ external jumpovers from the pumparound directly to the LCO product stripper, in order to "spike" the endpoint. This method can increase the overall distillate product rate, but it provides relatively poor direct endpoint control.

Now, Consider Design Improvements

The balance of heat and pumparound duties in the column required to achieve maximum LCO endpoint may require higher hydraulic capacity and / or improved stage fractionation efficiency.

Increasing hydraulic capacity in the column is possible with the installation of high performance mass transfer internals, such as Sulzer VGPlus™ High Capacity Trays. With a combination of fixed valves, high open area, and advanced downcomers, these high capacity designs can accommodate high liquid and vapor rates. The higher capacity allows more trays to be installed with reduced tray spacings to increase the number of theoretical stages in the LCO-HCO fractionation section. This improves separation efficiency and reduces the losses of LCO into HCO or slurry product.

Another very effective solution is to replace trays with Sulzer Mellapak™ or MellapakPlus™ Structured Packing. Structured packing can allow for increased stages of separation within a fixed column height with the added side benefit of having a much lower pressure drop. With this design, the refinery can not only recover more LCO for the diesel pool, but potentially debottleneck the unit by taking advantage of the lower DP to free capacity in the Main Air Blower or Wet Gas Compressor.

The Sulzer Refinery Applications Group

Sulzer Chemtech has over 50 years of operating and design experience in refinery applications. We understand your process and your economic drivers. Sulzer has the know-how and the technology to provide an internals design with reliable, high performance.

Sulzer Chemtech, USA, Inc.
8505 E. North Belt Drive | Humble, TX 77396
Phone: (281) 604-4100 | Fax: (281) 540-2777
TowerTech.CTUS@sulzer.com
www.sulzerchemtech.com