Question 80: What best practices do you recommend to improve LCO recovery? Do changes in LCO pump around affect LCO recovery? What are common challenges?

Alec Klinghoffer (Coffeyville Resources)

There has been a lot of work and discussion on LCO maximization at the FCCU and there is plenty of literature on different options for LCO recovery. This will be a general overview of available options to refiners and some challenges recently experienced at Coffeyville. There are four main categories for LCO maximization. They are:

1.Feedstock optimization

2.Catalyst optimization/ changes

3.Operating Conditions

4.Main fractionator optimization/adjustments

Feedstock optimization includes feed hydrotreating optimization, residual feedstock optimization, and removal of diesel range material from the FCC feed. There will be very little discussion about this since Coffeyville runs non-hydrotreated CAT feed and there is very little ability to optimize the feed quality. Catalyst optimization and/or catalyst changes are a longer-term solution and are generally used and effective if the long-term refinery strategy is to maximize LCO in the cat cracker. These optimization strategies include increased bottoms conversion using a higher matrix surface area catalyst, targeting a lower fresh catalyst activity (which includes lower zeolite activity catalyst) and any other catalyst changes that suppress catalyst activity. Again, each catalyst vendor has its own technology for upgrading bottoms conversion without producing more gasoline and LPG. Operating conditions can be adjusted to lower activity and selectively maximize LCO. These include operating at a lower riser temperature, and increasing the feed preheat temperature. Directionally these moves decrease cat to oil and catalyst circulation and tend to shift yields to LCO. In addition, equilibrium catalyst can be lowered to preferentially lower conversion and selective make more LCO. Finally, main fractionator adjustments and optimization are an easy and effective method to increase LCO yield. Coffeyville has experience in these because these moves are also used to mitigate other FCC limits. For example, one can lower the gasoline 90 and push the heavy end of the gasoline range material into the LCO. Additionally, main fractionator bottoms stripping steam and temperature can be increased to push the light end of the slurry into the LCO. LCO pumparound would have an effect in that lowering the pumparound would allow heavier material up the tower and could be captured as increased LCO. Fractionation moves are probably the easiest and can be used to take advantage of short-term opportunities based on favorable LCO economics. Some of the pitfalls are issues of LCO quality. One has to make sure the cloud point and/or LCO endpoint does not significantly increase to cause blending issues. In addition, by adding lighter material to the LCO, one has to watch the flash point on the LCO rundown steam. Bottoms recycle can also be used to increase LCO yield but here is a penalty associated with overlap liquid yield.

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