Question 13: What are your experiences with alternate procedures or additives to speed up the time to hydrocarbon-free a hydrotreater during cool down? What are potential downsides? Qualitatively, did the time savings justify the expense?

Martin Gonzalez (BP)

We have used a terpene-based product to help free hydrotreater reactor circuits of hydrocarbon in preparation for catalyst change-out. The product was effective for achieving a low level of combustibles in the reactor and in all vessels of the reactor circuit. However, in one instance, the test for entry indicated high benzene levels, and further nitrogen purging was required. As a result, the benefit of a quicker shut-down was not fully realized. In our trials, the greatest gains in shut-down duration resulted from the review and optimization of cool-down procedure that took place in preparation for the injection, rather than from injection of the chemical itself. Also, note that chemical may heat up the catalyst upon application, due to a relatively high heat of adsorption. Such a warmup may extend cool-down time beyond what was anticipated.

Tim Lewer (Shell)

Some plants have used additives during the hydrotreater reactor cool down period in order to remove hydrocarbon, especially benzene. These additives have been used with varied degrees of success. To this date, data has been inconclusive as to whether or not the chemical additive speeds up reactor decontamination versus conducting a proper hot hydrogen strip.

Injection of chemical additive requires several extra considerations in addition to the expense of the chemical:

• Waste disposal – Chemical suppliers may claim that their product is safe for refinery re-run systems, but most plants will be hesitant to re-run through the crude unit due to concerns, for example crude column overhead corrosion.

• Piping for injection – Temporary piping needs to be installed in order to inject chemical to the desired locations. This creates additional expense and maintenance workload during unit shutdown. Also, many plants may not allow connection to the process until the unit is down to a low enough pressure.

• Hold points – Many chemical additives need hold times at certain temperatures per the manufacturer to guarantee hydrocarbon removal. This will add time to your cool down.

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