Question 64: Please discuss the latest tray and packing technologies for improved fractionation efficiency in existing crude and vacuum units. In particular, what is the effectiveness in terms of fouling/plugging and resulting run length?

Eric Thraen (Flint Hills Resources)

Well designed and installed fractionator tray, packing and liquid/vapor distributor equipment are one important tool in ensuring the crude/vacuum unit is able to reach its targeted runlength. A good understanding of operating parameters along with measures and systems to ensure that operation stays within those parameters are the other tools necessary to meet that targeted runlength. The best equipment designs can be defeated if either steady state or transient operations result in salt deposition or coke formation that clogs and degrades the equipment performance.

In conjunction with programs for managing desalter performance, crude overhead neutralizer injection, and crude tower water dewpoint - fixed valve distillation trays are a valuable tool to sustain good fractionation in the upper section of crude towers. The crude tower top section is vulnerable to salt deposition and corrosion from salts and the presence of free water. The fixed valve design ensures that tray valves do not stick closed. The programs to control tower operating parameters limit the corrosion potential in the first place.

Well-defined targets, for wash section vapor velocity, wash bed packing minimum net wetting rate, and gas oil and slop wax quality are essential to the reliable operation of the vacuum tower wash bed section. Systems to routinely monitor, sample and provide feedback to Operations for staying within these parameters are also essential to staying within these targets. The vacuum tower wash bed is vulnerable to coking due to elevated temperatures along with the potential for wash bed dryout if wash liquid is not uniformly maintained above minimum wetting rates. Good vapor distribution below the wash bed works in conjunction with good wash liquid distribution and good packing design to ensure uniform packing wetting and prevent localized packing dryout. Recent developments in flash zone vapor distribution include the radial design inlet distributor. Good vapor distribution, along with the right combination of wash bed packings, including both grid and the correct style of structured packing, contribute to meeting the targeted runlength on the vacuum unit.

Flint Hills Resources has considerable operating experience with distillation equipment internals designed by Koch Engineering. The fixed valve tray design, radial inlet distributor, grid and structured packing designs mentioned above are shown in more detail in the PowerPoint presentation provided here.

Year

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