

Tower Technical Bulletin

4 Simple Ways to Convert Turnarounds Into Profitable Tower Upgrade Opportunities

Background

With planned outages commonly occurring at intervals of 2-5 years, a refinery turnaround is a prime opportunity to replace column and separator internals with the newest available technology. Planning for an outage with a “replacement-in-kind” strategy will address lost performance from refinery equipment due to normal wear and tear. However, most column internals can be upgraded for higher capacity, more flexibility, or greater efficiency at close to the same cost as an in-kind equipment replacement.

#1 – Upgrade Performance of Existing Packing or Trays

Adding column capacity to debottleneck existing operations or to create “room” for future capacity creep can often be accomplished with a simple modification to the existing design. High performance tray decks, like Sulzer MVG™ trays, can achieve up to a 15% capacity increase in entrainment-limited applications. MVG trays can fit within existing column weld-ins and ring supports for a similar cost to replacement-in-kind moveable valve trays. If increased liquid handling is required, the use of Z-bars can adapt the existing weld-ins for larger downcomers without the need for costly welding to the vessel wall. Similarly, standard structured packing can easily be replaced with high performance packings such as MellapakPlus™ and Mellagrid™, providing capacity increases of up to 40% at a cost that is comparable to the existing equipment without requiring other column modifications.



#2 – Optimize Stripping Tray Open Area

Column bottom, side column, or Hydrotreater Product stripping trays are often of a single design in order to simplify equipment layout and production. In operation, however, the bottom tray has a far lower vapor rate than the top tray due to the stripping effect. Since the design will have to accommodate the highest loads, the bottom trays' performance will likely suffer due to weeping. Because of this, stripping trays can often have an

efficiency of 25% or less. By making a simple change to the design – reducing the open area on the lower trays appropriate to the predicted vapor rate, the refiner can see a large impact on stripping efficiency or can take advantage of the improved stripping by reducing energy / steam usage.

#3 – Upgrade Separator Internals

Separators, accumulators, receivers, and knockouts are often the forgotten vessels that can consume downstream capacity when operating with poor performance. Since entrainment generation is typically exponential, a small shortfall in separator capacity can result in a very large increase in liquid losses. Upgrading an existing standard mesh or demister pad with a higher capacity Sulzer KnitMesh™ Mist Eliminator or Mellachevron™ can reduce carryover of liquid or free water to downstream processes from existing separators that are forced to operate with a higher superficial velocity.

#4 – Improve Tray Fouling Resistance

Adding anti-fouling features to a replacement tray can be a simple fix to increase run length between cleanings or turnarounds in heavy fouling services. Adjusting downcomer design and incorporating push valves on the active decks can improve the washing effect of the tray liquid traffic to prevent fouling build-up. These features can typically be incorporated into the trays without the need to weld on the column wall.

Other Considerations

Making tower and vessel upgrades rather than in-kind replacements takes some extra planning and strategy but the payout is often extremely high. You have to start early so you have time to evaluate, not only the tower internals in question, but also the feeds, draws, nozzles, and auxiliary equipment as well. Sulzer's process applications team can help evaluate all your possible options.

The Sulzer Chemtech Applications Group

Sulzer Chemtech has over 50 years of providing equipment and services for optimal turnarounds. Our goal is to meet your requirements and challenges while providing the most cost effective solutions with the least amount of downtime, in any situation.

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