Light hydrocarbon fractionation - Mega splitter towers

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With an abundance of affordable natural gas and continued growth in the utilization of poly-ethylene and poly-propylene several very large olefin plants were built in the recent past. To handle the capacity of these mega plants, large diameter splitter towers had to be designed and built. The diameters of these large towers challenged the state-of-the-art tray designs and tray support mechanisms. There was also uncertainty about whether high tray efficiency values could be obtained in these large towers. There were reports in the literature of such splitter towers not meeting efficiency targets, which led to capacity shortfalls in these plants. It was also reported that some of splitter towers had to be designed with a larger number of trays due to the inherently lower efficiency of the type of trays that were chosen. This impacted the capital and operating cost of these units.

Koch-Glitsch developed a number of innovative solutions to deal with the challenges of these mega towers. New support mechanisms make it possible to install trays in large diameter towers without the need to use large, heavy, conventional beams that negatively impact the hydraulic performance of the trays. Tray configurations were developed to maximize the capacity and efficiency of the trays. This is achieved by optimizing the number of flow passes, tray spacing, valve choices, layout of the tray, incorporating the new support mechanisms and using new downcomer configurations.

Two case studies where these design methodologies were applied to mega splitter towers are being presented. In both cases it was possible to achieve the desired capacity, product purity and recovery with tray efficiencies that exceeded 90%. This allowed the plant owners to minimize their capital and operating costs.