This PEP report is designed to help clients better understand the technology changes that are being incorporated in modern, state of the art naphtha steam crackers, and also assist operators of existing steam crackers in providing incremental upgrades to improve performance and profitability.

For grass roots naphtha steam crackers, we provide an engineering process design and corresponding production economics for a 1.2 MM tpy naphtha steam cracking unit that incorporates state of the art technology. These new developments include: mercury and arsenic pre-treatment of feedstock, DMSO addition to naphtha very low in sulfur content, furnace operation for both maximum ethylene and maximum propylene business objectives, front end depropanizer fractionation trains, dual depropanizer tower optimization, front end hydrogenation of di-olefins with dilute hydrogen, mixed refrigerant cryogenics, and low pressure (20 bar) process compression. For this configuration, we have also provided material balances for light and full range naphtha operated for both maximum ethylene and propylene yields.

We have also prepared a comparison of the licensed process offerings currently made by KBR, Lummus, S&W, Technip and Linde.

We also explore typical debottlenecking strategies to incrementally increase production capacity. These include cracked gas and refrigeration compressor upgrades, major driver modifications, quench oil and water wash tower modifications, and fractionation train tray and packing modifications.

To extend major turnaround frequency to 5 year intervals, we identify the major equipment that needs to be upgraded and/or made redundant. These include heavy service reboilers, compressor inter-stage coolers, TLE operation, upgraded furnace tube metallurgy, and quench cooler upgrades.

Given the emphasis currently applied to on-line, real time economic optimizers, we review the vendor offerings, and describe the sources of economic credits that justify this type of SCADA investment.

Lastly, we explore unit operating strategies to improve conversion and selectivity, reduce the volume of coke production and frequency of steam air decoking, and keeping the unit running clean. We examine on-line washing of the cracked gas compressor, naphtha additives to reduce furnace tube coking and extend tube life, current hydrogenation catalyst availability, green oil management, intermediate draw-off trays on the primary fractionator for kerosene and diesel recovery, and improved process computer control offerings made by Honeywell and Foxboro.
ADVANCES IN NAPHTHA
STEAM CRACKING

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