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High Olefins Fluid Catalytic Cracking Processes

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Abstract

Fluid catalytic cracking (FCC) has been a major refinery conversion process for more than seven decades. The technology is mature, but it continues to evolve in the areas of mechanical reliability, feedstock and operational flexibility, and meeting regulatory requirements. While FCC units have traditionally been operated to maximize gasoline or distillate production, interest in maximizing light olefins, particularly propylene, has gained traction in recent decades. FCC catalyst formulation and process technology improvements now give refiners the flexibility to boost propylene yields from traditional levels of 4–6 wt% to beyond 20 wt%. Slowing propylene supply growth from steam cracking—the principal source for propylene production—opens up potential opportunities for FCC to help fill the mounting propylene supply-demand gap.

This report provides an overview of fluid catalytic cracking developments in catalyst, process, and hardware technologies with a focus on high olefins processes. A general review of the technical field and recent process developments is included for several primary licensors in the space. Detailed technical and economic evaluations are presented for three high olefins FCC technologies from leading licensors from a market share perspective. Specific assessments are provided for the following technologies:

- KBR MAXOFIN™
- UOP PetroFCC™
- CB&I/Lummus Selected Component Cracking (SCC)

The analysis and technoeconomic design results that follow are based on an FCC unit that processes 40,000 barrel per day of vacuum gas oil feed. Alternative investment and production cost estimates are also provided for plant capacities that are half and double the base case. While the capital and production cost results herein are presented on a US Gulf Coast basis, the accompanying iPEP Navigator Excel-based data module (available with the electronic version of this report) allows for viewing results for other major regions along with conversion between English and metric units.

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