



Planning and scheduling

Reliance expects financial benefits from greater crude flexibility

Approximately 80% of a refinery's costs are for the purchase of crude oil. Buying and scheduling of crude oil and managing the total crude oil supply chain are major profit drivers, particularly at Reliance Industries' Jamnagar refinery, India – the world's third-largest refinery.

The 660,000-barrels-per-day refinery is fed with a blend of crude oils. Having a blend that lies within a narrow quality window while selecting crudes from the widest possible range is crucial for maximising margins.

With the help of Shell Global Solutions, Reliance Industries has improved its crude supply-chain business process so that crude oil planners and schedulers can work together and increase the range of crude oils that can be selected for processing.

The refinery's linear programming (LP) system is key to the planning process and is used to select the right crude oils to buy and process. Having outgrown its original LP system, Jamnagar needed a very accurate system to reflect the expansion and its constraints and to facilitate good planning.

Planners in Mumbai, 815 km from the refinery, run the LP system to value and rank the refinery's crude oils to help select the optimal refinery feed. They try to keep feed costs down and ensure that the schedulers in Jamnagar have the right crude slate at the right time. If not, a crude has to be acquired at short notice and high cost, and then blended with other crudes to achieve the required slate.

Shell Global Solutions was asked to review the LP system and found the refinery could be better represented in feed-system and processing constraints. Recommendations were made for their improvement.

Shell Global Solutions then led the initiative to upgrade the LP system, which helped to improve the structure and accuracy of the refinery unit models and to enhance the quality of the basic data generated.

The major secondary refinery units each had a complex non-linear process model. These were used to provide data to develop new base

and delta models for many of the units, particularly for those secondary conversion units that process the lower end of the barrel.

The new models provide a simplified linear representation of the secondary units, and data from them are used in the upgraded LP system. A crude cutting tool that closely represents the actual operation of the crude distillers generates data for the crude unit.

A new crude scheduling tool, the generic crude oil scheduling system, helps the planners to sequence the purchase of crude oils. They can take into consideration the constraints at the refinery for receiving, storing, blending and processing crude mixes to capacity and the quality targets at the distillers; this facilitates smooth and optimum secondary unit operation.

"A close match between the plan and the reality is being achieved," says Ajay Marathe, assistant vice president, petroleum business, Reliance Industries. "The new scheduling system has improved business practices by sharing our schedulers' and planners' perspectives, which increases overall transparency in the crude oil sequencing-scheduling process."

After three months of running the old and new LP systems in parallel for a rigorous quality-assurance process, the old system was phased out. Integration of business processes around planning, scheduling and data generation has decreased the gap between the crude mix planned and that actually processed, and thereby helped to reduce the erosion of actual margins.

"We are impressed by the increased range of feedstocks that can be processed at Jamnagar through the enhanced modelling and simulation tools developed with Shell Global Solutions. We can now try the new crude oils that have been selected. We expect to benefit financially from this flexibility to utilise opportunity crude oils," concludes Partha Maitra, senior vice president, petroleum business, Reliance Industries.

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