

Manage Complexity for Better Decision Making

Oil refinery managers need to assess the entire petroleum supply chain in order to make better operational decisions and improve profitability, says *Henry Lau*.

There was a time, not too long ago, when refinery margins were high and operating costs reduction was less important than maximizing throughput. Times have changed. The recent economic downturn and weak product demand in the market have forced refiners to give more attention to optimizing the efficiency of operations to reduce costs and improve on lower margins.

Standards for success in the industry are also being redefined. The downstream sector is facing new challenges and refineries have to adapt quickly to meet the dynamic changes occurring in the marketplace. Streamlined business operations will make the difference for refineries as they need to be able to visualize the performance of all areas of their plants to optimise output in the face of new challenges, such as clean fuels, compliance to industry standards and also remain competitive.

Overall, complexity is perhaps the biggest challenge in running a refinery. Oil refineries are complex operations and hundreds of decisions are made every day. For plant directors and technical managers, it is not only the short-term day-to-day operational decisions that will affect the performance of their plants, but also their judgment on the long-term investment in technology.

Companies that focus on reliability, flexibility, know-how and having a good pipeline of engineering talent are best placed to succeed. However, it is imperative that refinery management see the whole integrated picture in order to perform the appropriate action across the supply chain.

Challenging times

The key challenges range from process problems through to operational and personnel issues. Those challenges that resonate



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today cover collaboration across the entire supply chain and improving reliability in executing the plan to achieve the best production margins (i.e. dollars per barrel). These are coupled with the ability and agility to make the necessary decisions quickly and more easily based upon better visibility of plant disruptions and constraints.

The need to evaluate and select the most appropriate crude feedstock from both a cost and operations aspect is increasingly important. In addition, the lack of visibility to respond to volatile market demands, unplanned events and plant upsets is a major threat to profitability and will also impact on inventory and supply chain costs.

With skills shortages being an increasingly urgent issue across the process industries and veteran engineers retiring in their thousands, companies across the sector are waking up to the need for knowledge sharing, collaborative working and providing ease of access to data in order to address and, ultimately, plug the growing knowledge gap.

Businesses are currently looking at how they can ensure that knowledge is not just captured, but is also accessible, searchable and usable. Here, there are key approaches: collaborative working, standardization, and data liberation.

The ability to “liberate” data from engineers’ laptops and from the process control network for business and for environmental reasons to enable process companies to leverage data more effectively will become increasingly critical in years to come. Liberated data can potentially be sent to the cloud and used for collaborative applications, helping to promote the use of collaborative networking concepts and knowledge sharing.

Real-time business collaboration plays an increasingly important role in process industry projects, with social networking techniques driving interaction between groups of users across the world. Simply sending an e-mail is not always an effective method of communicating with colleagues. A single engineer, for example, could be working on an operational problem related to a crude distillation unit (CDU), whereby he can identify other people in the organization with relevant experience and filter down to those people who worked on a similar problem or unit based elsewhere across multiple, international locations.

Taken together, these approaches offer process industries the chance to pool resources, preserve key data, make this information more accessible and ensure that vital expertise and experience is not lost.

Another issue often seen is when traders and sales teams struggle to get accurate and timely information across the supply chain. Sales demand is invariably fragmented and refinery blends often are not optimal. Consequently, transportation costs are high and safety stocks inflated.

Refineries need accurate demand forecasts to maintain customer service levels and efficiently manage production assets. Traditional demand management solutions rely solely on statistical forecasts. Unfortunately, this method of forecasting does not support today's more dynamic business environment nor does it consider the complexities of the process industry value chain.

Generating demand forecasts without systematic collaboration with marketing and sales creates inaccurate projections resulting in increased stock-outs, excess inventories and flawed purchasing decisions.

Technology to tackle complexity

Technology can serve as a powerful tool for downstream companies that are searching for new channels to improve business. Refineries are constantly looking to innovative solutions, sustainable changes and reliable partners to help meet commercial goals and achieve maximum profits. Crude oil cost, for example, is the largest cost for any refinery, so the ability to determine crude choices quickly and accurately supports the planning process and enhances profitability. The deployment of technology is a fundamental decision to help reduce costs and optimise throughput.

Process industry software tools help refineries to achieve full visibility of operational performance and make the necessary business decisions to optimise their processes quickly and easily to remain competitive. Software tools enable standardized work processes and real-time decisions based on common data, models and assumptions. By integrating the overall business processes, companies can achieve significant improvements in performance with payback in months instead of years. Also, by making the software more intuitive, younger, more inexperienced engineers, planners and schedulers are able to utilize these tools quickly and effectively.

Refiners, marketers and distributors can look to providers of process industry software to help maximize profitability by integrating and optimizing process engineering, plant operations and supply and distribution.

For instance, the aspenONE for Refining & Marketing suite from AspenTech expands visibility across the entire petroleum supply chain to reduce inventory carrying costs, whilst increasing speed and accuracy of response in decision-making to enable higher refinery margins. The benefits of using this software extends to helping operators to optimise selection and scheduling of feedstock, driving collaboration across engineering, refinery operations and the entire petroleum supply chain.

Consultation with the refinery planners and schedulers combined



Appropriate software tools can help refineries achieve full visibility of operational performance and make the necessary business decisions to optimise processes quickly.

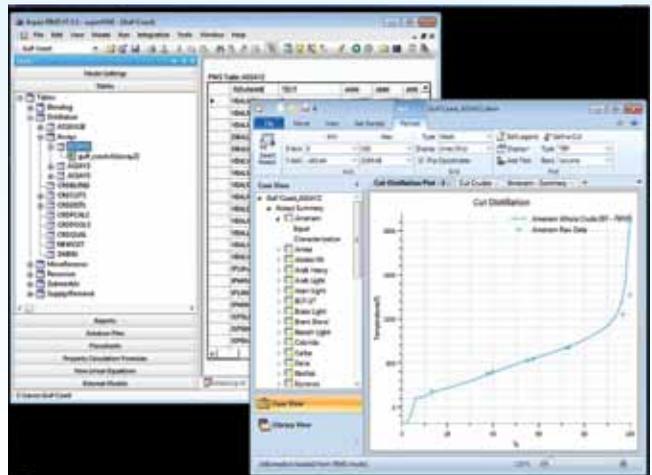
with understanding the function of the supply chain is essential for refinery operational optimization. Aspen PIMS and Aspen Petroleum Scheduler, for example, facilitate collaboration between refining planners and schedulers. Through tighter petroleum supply chain integration, refiners can increase their profitability by optimizing the accuracy and productivity of planners and schedulers.

In addition, enhanced analytics provide planners and

schedulers with better decision support tools enabling them to rapidly respond to changing market conditions or operational upsets. These software solutions optimise end-to-end refinery operations by integrating key processes.

Software tools also improve collaboration by sharing operating targets between planning and scheduling functions for closer alignment of plan and actual. This enables sharing of critical data, such as production targets, model assays and blend models to enhance profitability and reduce margin loss.

Other features include powerful analytics, such as Spider Charts and Microsoft-based Excel PowerPivots, which help refiners visualize alternative feedstock selections. By quickly comparing many simultaneous scenarios, easily sharing information across the organization, refiners are better able to pick the optimal crude slate.



Integrating and optimizing process engineering, plant operations and supply and distribution is the road to greater efficiency for refiners.

Uplift in profitability

An economic downturn does not need to be a reason to “down tools”. There are clear challenges ahead from expectations to meet customer product demands whilst complying with more stringent safety and environmental regulations, through to internal pressures to reduce operating costs, improve supply chain distribution efficiency and increase margins. However, although operations may be complex, the key to success rests with making the best decisions across the entire operation.

It is essential for plant directors and technical managers to assess the entire supply chain to make better operational decisions, rather than simply focus on individual areas of the operation. Integrating and optimizing process engineering, plant operations and supply and distribution for refiners will achieve greater efficiency. The new collaboration capabilities that software solutions provide enables refiners to better respond to market volatility and run their schedules closer to plan. Ultimately, software applications help to solve the simplest to the most complex supply chain optimization challenges.

Decisions are made every day in business. One of the most important decisions that plant directors and technical managers can take today to add commercial value is to make the appropriate investment in process industry software tools to accurately tighten petroleum supply chain integration, optimise productivity and increase refinery profitability.

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