

Optimising supply chain functions for success in speciality chemicals

Despite the downturn and its impact on the industry across the world, chemical companies need to make prudent investments in the right technologies to become resilient to dramatic changes in a dynamic market. The economic picture, particularly for chemical companies operating in the developed western world, remains mixed while bullish trends generally prevail in the developing countries. Hence, it is imperative that companies continue to invest in their supply chains despite the economic uncertainty, in order to emerge stronger and to be better positioned for a global recovery.

According to a report on chemicals dated Spring 2012 by global management consulting firm, McKinsey & Company Inc. the compound annual growth rate (CAGR) for speciality chemicals is projected to be between 13-17% and the total available market is estimated to be between \$80-100-bn for India by 2020. The same report also highlighted the penetration rate



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of speciality chemicals as being relatively low in countries such as India, China, compared to the developed nations such as US and Europe. McKinsey also advocates that companies should aim to grow by 20-25% per year in order to capitalise on the expected fivefold market expansion in the Indian speciality chemicals sector by 2020.

Companies aiming to be a leading

‘player’ in the industry today need to overcome numerous challenges to remain competitive and ensure that the

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About the company

AspenTech [www.aspentech.com] supplies of software that optimises process manufacturing – including energy, chemicals, pharmaceuticals, engineering & construction, and other industries that manufacture and produce products from a chemical process. With integrated ‘aspensONE’ solutions, process manufacturers can implement best practices for optimizing their engineering, manufacturing and supply chain operations. As a result, AspenTech customers are better able to increase capacity, improve margins, reduce costs and become more energy efficient.





entire supply chain is optimised. This is because the speciality chemicals sector remains a particularly complex arena with challenges that threaten to ‘slay’ the business of speciality chemicals operators on a daily basis. For many companies in this sector, expanding product portfolios has caused the number of products to grow significantly over recent years, thereby making the operational challenges they face still more complex. The responsiveness of manufacturing plants has, therefore, needed to increase to accommodate this commercial change.

There are numerous other challenges that chemical companies need to overcome across different levels of the operation and over varying time frames, some of which threaten their very existence. This article highlights some of these challenges that have to be addressed by supply chain leaders.

The ‘slayers’ of profit margins

Supply chain leaders need to evaluate issues affecting their business and make adjustments to ensure operational ‘slayers’ do not kill profitability and keep the operation sustainable and able to successfully respond to customer demands. It is important to identify some of the main challenges that harm the business in order to put in place appropriate measures that will safeguard their commercial targets.

Regulation through the chain

Government regulation and end customer requirements result in strict

controls being implemented to assure precise batch and lot traceability, as well as stringent quality control and testing procedures. In many other industries, contamination is not a critical issue. In the specialty chemicals sector, major and minor cleaning is required to ensure no contamination exists between batches. The quality control effect is further exacerbated because stringent control procedures are not only required on finished products as is the case in many industries, but also for raw materials and packaging materials. Compliance is essential in the industry. As the market evolves and changes occur within the sector, regulation is an ever-present fact of life for speciality chemical companies to manage.

Uncertain demand patterns

Some characteristics of speciality chemicals products result in uncertain and unpredictable demand patterns. In many industries, historic sales can be a good indicator of future demand. However, this is probably less true of speciality chemicals, where globalisation and changing economic climate make it difficult to derive the demand of a product in a specific future time period based on past patterns. This issue is compounded by the typical uncertainties associated with forecasting, including the perceptions of buyers relative to competitive products or the introduction of “next generation” products. The availability of equivalent competitive products means that product unavailability, in many cases, results in a lost sale rather than just a deferred ship-

ment. Customers generally need the product immediately and cannot usually wait even for a few additional days.

Lack of decision support tools: manual planning and scheduling

Many organisations primarily utilise manual methods to complete planning and scheduling functions. Significant levels of automation normally exist in transaction support systems (sales, production tracking, purchasing, etc.) and in the control or execution area (e.g. automatic recipe based on mixing systems, equipment monitoring and control, etc.). The intermediate area of decision support has not traditionally received the same level of attention.

An overwhelming amount of chemical producers still use ‘Microsoft Excel’ or ‘Access’ to manage aspects of their supply chain, rather than supply chain modelling software specifically designed for these tasks. This results in an environment where planners are saddled with manual data gathering and data manipulation tasks, which can increase the risk of manual errors.

Without a sales and operations planning (S&OP) process in place, chemical companies have limited ability to profitably align supply with demand. They lack the business agility to evaluate scenarios and respond quickly to unplanned events, spending more time managing data and fire-fighting instead of performing meaningful analysis. For example, in the event of an unplanned shutdown or raw material shortage, how do you predict the best business response? Would one approach allow you to fulfil additional demand at higher margin? The short answer is that there is no way of knowing without the proper processes and technologies in place to provide appropriate visibility into the supply chain’s dynamics. In the absence of integrated enablement technologies, planners protect against

disruptions in demand fulfilment by building inventory, using this as a buffer against the unexpected.

Although predominantly manual, the use of spreadsheets for tracking data, performing data manipulation or assisting with analysis through the use of reports and graphs has been extensive. By utilising spreadsheets or other types of localised support systems, a phenomenon of “islands of automation” has been created where decision support tools have been created to address a specific set of issues. However, these tools are often “stand-alone” with data either entered manually or entered through a spreadsheet front end. A significant weakness is that these tools are often only well understood by the primary user or developer. The resulting “silos of automation” often fall short, when evaluated from the viewpoint of meeting the needs of the overall planning and scheduling function. This is primarily due to the complexity of integrating these stand-alone, often spreadsheet-based applications, with the organisation’s primary systems or databases.

Seeing the bigger picture

The inability to see the whole picture of what the operation is doing, results in ambiguity for setting a consistent strategy. In many cases, an imprecise view of the future occurs from the inability to plan for or identify potential problems. Even in cases where tools have been used to simulate future events, it is rare that such tools have incorporated the intelligence needed to plough through large amounts of data and extract problem situations to the norm. The resulting uncertainty often leads to directions being set and decisions being based only on the hot issues of the present. As hot issues change direction and associated decisions are altered, the consequence adds confusion and frustration to the planning organi-



sation’s function. One of the major difficulties with justifying better decision support tools is that costs of the current practices are not always apparent and are very difficult to quantify.

Hedging behaviour with inventory and capacity

Hedging is possibly the most damaging and costly part of current planning and scheduling practices. This involves the build-up of safety stocks due to the uncertainty of future demand, the lack of understating of capacity or a lack of ability to provide catch-up capability if an equipment failure occurs. Planners and schedulers have developed a culture to avoid risk and always aim to be prepared for the worst case scenario. For example, if there were not enough products to meet an important customer order, a planner might boost safety stock on the item to prevent a future recurrence. If the plant did not meet a budgeted production target, the planner could withhold capacity on a machine or decrease production rates. This creates “slack” that can be used at times of need. The downside of this strategy is that it can result in both under-production of product required and, potentially, over-production of unwanted product.

Forecasting uncertainties

Major shifts in demand patterns are often caused by major events. This might include launches of new products, the expiration of patents, the ap-

pearance of generic or substitutions on the market and announcements by regulatory boards. Most of these events are known well in advance by all players in the market. Pricing can also create major swings in both short and long-term demands of a product.

In many cases, an adversarial relationship could then exist between manufacturers and distributors – the distributors may order maximum quantities prior to a price increase or producers may attempt to use their knowledge of the distributor’s inventory levels to time price increases at the precise point when distributors have maximum inventories, leaving the latter little room to stockpile products at the original price.

Overcoming the ‘slayers’: Investing in technology

The best tools available on the market today offer speciality chemicals companies the opportunity to carry out the full spectrum of ‘what if’ analysis. These capabilities, in turn, help them to streamline workflows, reduce costs and reach faster and more informed decisions.

Operational planning models can have a significant impact on sourcing transportation and inventory policy decisions. In every supply chain, there are activities that must be initiated in anticipation of future demand. The specific activities vary with the business, but generally include finished goods



production, semi-finished goods production or raw materials purchasing. To maximise performance, these activities must be planned with the best available information. Improvements in forecasting and demand planning can reduce the need to carry excess safety stock or have spare capacity sit idle. In a fully integrated supply chain, production operations should be closely linked with demand management, so a company's operational plan can adapt quickly as demand changes.

Demand management encompasses a number of different time frames. At one end of the spectrum are new product planning, marketing, product positioning, product consolidation and other activities that create demand in the marketplace. At a more operational level is the challenge of predicting short-term requirements and using assets to effectively satisfy demand.

The process of developing accurate and consistent projections of market demand and continuously updating these projections as circumstances change is known as operational demand management. This encompasses many kinds of activities:

- Consolidating the shipment data for various market segments.
- Generating forecasts.
- Reconciling forecasts with firm orders.
- Processing customer orders.
- Moving material from plant to plant.
- Other processes that are essential for developing a sound business plan.

Companies deploying software tools can typically realise significant margin improvement of 4%-20% by increasing capacity 3%-5%, improving customer service 5%-10%, improving first quality production 5% and reducing costs 4%-6%.

Driving operational excellence

Many leading speciality chemical companies have adopted AspenTech's 'aspenONE Supply Chain' to drive operational excellence by addressing inefficiencies in end-to-end processes to drive first quality production, minimise inventory and allow rapid innovation to meet customer requirements. These tools enable companies to optimise trade-offs between customer service, inventory levels and manufacturing costs, accelerate process innovation and time-to-market for new products

through improved collaboration between process development and manufacturing, as well as maximise revenue by enabling 100% customer delivery performance without excessive inventory. Another key advantage of using these software tools is the ability to monitor and document procedural and regulatory compliance, which is a key issue in the industry today.

'AspenONE' provides companies with a single, unified solution that can help significantly to improve operational performance and profitability. The model-based approach can build an integrated system that helps leverage collaboration between process development, planning and scheduling, chemicals production, formulation and packaging. This critical collaboration delivers control and optimises operations, end to end. In addition, 'aspenONE' can be implemented in stages, using individual business process applications to address the most pressing challenges. 'aspenONE' uses ISA-S95 standards to automate manufacturing workflow, driving true plant-to-enterprise business process interoperability. Through its integration infrastructure and common real-time data model, the solution set helps align people, information and business processes across organisational and technological boundaries.

Advanced process control enables manufacturers to optimise production operations, providing greater agility in responding to market demands. The solution set facilitates process and product consistency by minimising variability and facilitating consistent manufacturing execution with a solution that features both commercial and technical scalability. Companies deploying 'aspenONE Advanced Process Control' can increase throughput, improve product quality, reduce energy and raw material usage and increase

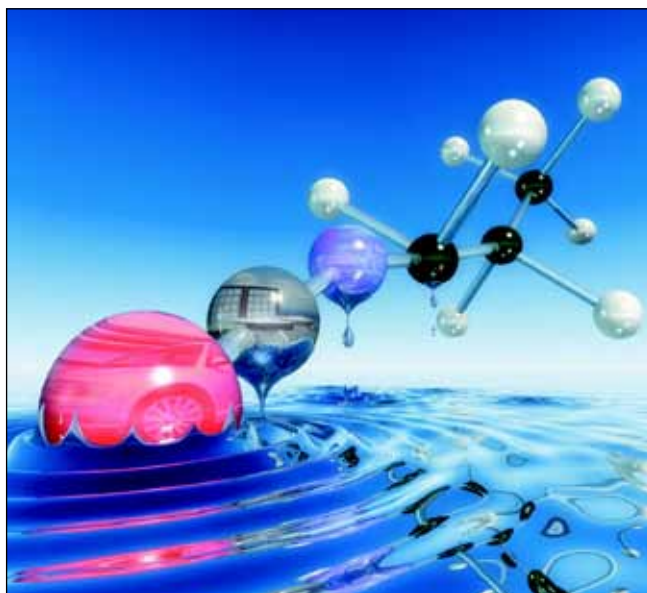
overall operational efficiency while keeping the process between safe limits of reliable operation. Optimising return on production assets is a primary objective of balancing supply with demand in the chemical and process industries. Freight economics, incremental production margins and inventory planning is becoming more integrated with production and distribution planning. Leading edge software technology providers offer flexible and configurable supply planning and modelling to overcome constraints for the chemical operation and supply network.

Using better supply planning strategies and tools will overcome the limitations of commercial demand visibility and help to develop staff talent with easy-to-use tools giving advanced optimisation analytics. Crucially, supply planning must integrate with scheduling at the operating level and the key 'player' in the game ensures that the final supply plan flows through to the formation of a principal schedule that enables detailed execution plans.

Better sales & operations planning

Software tools provide the most optimal plan taking into account labour and equipment, raw materials or feedstock, inbound/outbound transportation, storage capacity and other variables. An easy-to-use interface with streamlined workflows helps quickly navigate through supply chain complexity and respond faster to unexpected market conditions to profitably meet production and management goals.

The role of an effective supply chain planning tool in the sales and operations planning (S&OP) process is to focus on business-wide supply and inventory planning, specifically determining "where to make what." It involves allocating production across various plants while minimising transportation and operating costs. By con-



sidering both the production and distribution, 'Aspen Supply Chain Planner', for example, provides a globally optimal solution while respecting capacity and other constraints. The key issues addressed include where to procure raw or intermediate materials, sourcing of production, tools, contract production and managing movements of intermediates between manufacturing sites.

As volatility increases in the market and lead times shrink, chemical manufacturers must increase their focus on the value of supply planning and support the sales and operations planning decisions. The best tools provide web-based Supply and Sales & Operations Planning (S&OP) analytics for enterprise-wide reporting and access to data and analysis during the planning process. These capabilities allow users to attain visibility into their current situation by combining data from their ERP and production systems, as well as results from their planning and scheduling tools, for a complete picture of their supply chain.

Carefully defined processes and capable talent are a foundation, but advanced supply chain management

customer demand.

Players maximising profit

In today's speciality chemicals industry, business challenges are enormous. To be a successful player, companies need to be more agile and responsive to fluctuations within the market, as well as react quickly to disruptions within their own operations. Get the business model right and you will achieve targets and make significant profit – get it wrong and you stand to lose money and miss the opportunity to achieve full commercial potential.

Today, the economic climate remains difficult with market volatility and tight margins. Commercial challenges are wide ranging. Investing in the right solutions is vital if process industry companies want to capitalise on the opportunities in the marketplace. Companies battle with operational issues on a daily basis and to meet customer demand. Whilst the speciality chemicals industry is complex, the opportunity is simple. Through leading-edge software technology, the players can combat operational 'slayers' to optimise performance, align processes, maximise profit and achieve competitive advantage.