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**Case Study: Unique
Supply Chain Demands
of Petrochemical Firm**

**Collaboration Sounds
Good—But What Is It?**

**How Is Your Supply
Chain Performing?**



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Low-Margin Products, High-Service Demands Drive Innovene's Supply Chain Choices

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BY JEAN V. MURPHY

Operating in the highly competitive petrochemical market, INEOS subsidiary Innovene needed a supply chain solution that would help it produce at low cost and keep inventories in check while meeting all of its customers' needs.

Even before its acquisition last year by chemical giant INEOS Group, Innovene was one of the world's largest petrochemical companies, primarily producing polyethylene and polypropylene. These versatile polymers are used in a wide range of products that permeate everyday life, from plastic bottles and DVD packaging to carpets, cables, safety belts, protective clothing and high-tech sportswear.

Originally a part of British Petroleum, Innovene was spun off as a separate company in 2004 and in December of last year was acquired by INEOS, a UK-based private chemicals company that has become, through a series of similar acquisitions, the world's third-largest chemical manufacturer. Global in scope, INEOS's production spans 50 manufacturing facilities in 15 countries throughout the world and its 11

business units produce a wide range of specialty and intermediate chemicals.

The Innovene operation also is global, employing more than 8,000 people at sites in Asia, Europe and North America. Its U.S. operation, headquartered in Houston, has three manufacturing plants, two in the Houston area and one near Los Angeles. These plants ship thousands of carloads of polymer granules and pellets to a few hundred manufacturing customers each year. Some product also is bagged and distributed in smaller quantities.

As commodity products, polyethylene and polypropylene are extremely cost sensitive, but the market's customer base, which has significantly consolidated in recent years, also is highly demanding when it comes to service. "We are really focused on what the customer needs because we are trying to be the supplier of

choice in a very competitive marketplace," says Steve Vice, who was global supply chain process manager for Innovene at the time of this project and currently is IT manager for another INEOS business. "At the same time, we need to be a low-cost producer. We don't want to build huge inventories of material, which will push up our cost of manufacturing, so our supply chain planning needs to minimize inventory, while still allowing us to meet customer demand," Vice says.

In addition to the pressure of operating in a customer-driven commodity market, the petrochemical supply chain has other challenging characteristics. "One thing that is different about polymers, compared with some more generic petrochemicals, is that they come in many different grades, all of which are produced on the same, continuously running equipment," says

Vice. Once one grade is in production, a certain amount needs to be produced to maintain cost efficiencies, and when a switch is made it needs to occur in the best sequence. "When you put two products together in the line sequentially there is an optimal mix," he explains. "As an analogy, let's say you were going to produce white, black and gray products during the coming week. You would not want to go from white to black because of the poor interface between those two. Optimal scheduling would be to go from white to gray to black."

With these polymers, following an opti-

mal sequence can get pretty complicated as there may be hundreds of different grades to schedule over many different production lines. Failing to sequence optimally, however, results in excess waste. "There is always some material between grades that is neither one grade nor the other, neither here nor there, but the idea is to minimize that," Vice says. Unanticipated demand can throw a wrench in those plans. "You might have an optimized plan that minimizes any kind of waste and then a customer comes in with a rush order that has to be produced right away," he says. "If you try to squeeze that into the schedule, you could generate

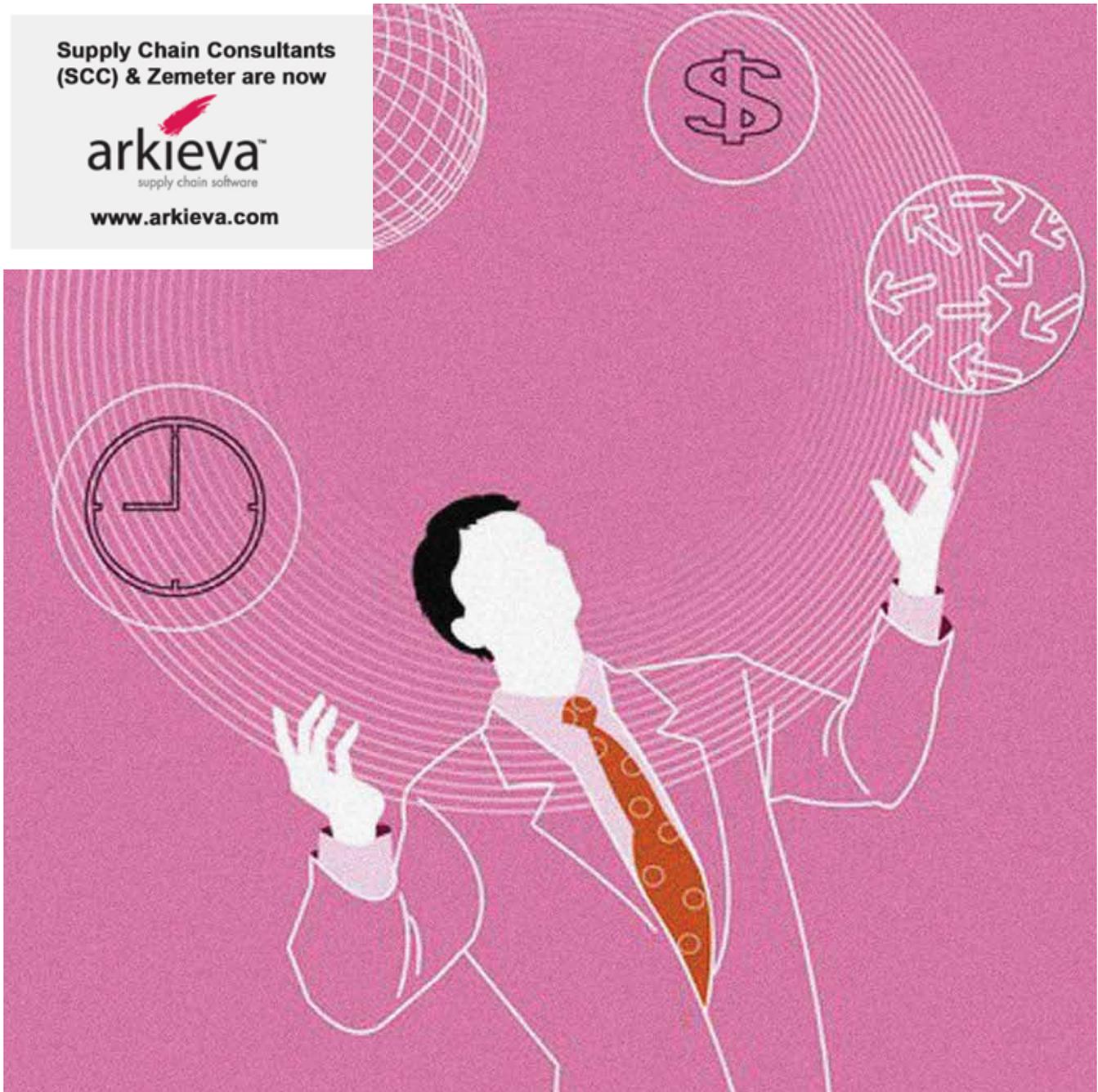
more waste and also delay other shipments. So you can see the importance of scheduling and forecasting to our operations. It is very important for us to try and get our forecasting right and to minimize emergency production. We need to make the right amount of material, in the right order to meet our demand." Since the supply chain also includes terminals that serve as intermediate distribution points, terminal replenishment of the right material in the right amount also is critical, he adds.

A related upstream issue is the fact that each product might need different raw materials. "So when you are planning pro-

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duction, it helps to plan the procurement process as well—what materials to order and when they should arrive at the plant,” says Vice.

These goals need to be achieved while keeping inventories as low as possible, which makes inventory management another key performance indicator for Innovene. “Forecast accuracy and inventory accuracy—those are the two critical areas that we focus on most,” he says.

Flexibility

When Innovene set out to improve these areas, however, it was not just a matter of results—the company’s attention to operations already had generated pretty good supply chain metrics. But its technology solutions lacked flexibility and ease of use. “We had a number of different legacy systems and systems provided by other vendors that just weren’t as efficient as we would have liked,” says Vice. Additionally, the polyethylene and the polypropylene businesses were run separately and had different supply chain models and work processes. The company wanted to

move to a standard, open platform that would unify these businesses and be easy to use and maintain.

After doing research on different systems, Innovene decided to implement the Zementer supply chain suite from Supply Chain Consultants, Wilmington, Del. “From an IT standpoint, the Zementer tool is easier to maintain and a lower cost tool to support than what we had previously,” Vice says. The lower cost is partly due to Zementer’s Microsoft platform, he says. “Some of the Microsoft components that are part of Zementer are a lower cost alternative, but the other thing is the general design of the Zementer tool and its ease of use. A person can go in and modify a report themselves, whereas in our old tool, we would have had to hire consultants to do that.”

Innovene also had previously partnered with SCC for integration and technology support on its vendor-supplied supply-chain software. “We were very happy with their responsiveness to issues,” Vice says. “They were very quick to learn and understand our business and quickly brought value to us whenever we had a problem or

a new initiative. They just brought a lot of knowledge to the table.”

There is a reason for Zementer’s strong domain expertise in the chemical industry—its co-founders and many of its early developers came out of DuPont. “We have a very strong chemical background and the company, since its inception, has been deeply involved with the chemical industry,” says Sujit Singh, vice president of supply chain solutions at SCC. This expertise is important to companies like Innovene, he says, which over time develop very specific business practices around their supply chain. “Just taking software off the shelf and implementing it does not work for these companies, because they want to keep those special practices that they see as giving them a competitive edge,” he says. “Zementer works with these specific processes. And while SCC brings our experience in terms of what other companies have done, it’s our ability to enable whatever it is that gives an individual company a competitive advantage that’s important. Then they can use the software to drive that advantage even further.”



Polymers are manufactured and shipped in pellet form.

Another byproduct of this involvement is a deep understanding and experience with SAP enterprise software, which is used by most chemical companies, including Innovene. “We have many ways of integrating with SAP and we work with SAP all the time, getting data and pushing data back,” says Singh.

Vice underscores this point. “Zemeter interfaces very well with our SAP,” he says. “Every evening the tool gets a complete update from SAP to make sure that it has the most current data available.”

Better Visibility

In line with its key areas of focus, Innovene began its Zemeter implementation with demand planning and scheduling and inventory planning. These modules first were installed at the polyethylene business unit. An immediate result was better visibility to both ends of the supply chain, from incoming demand to how product flows through manufacturing, Vice says. “Our previous system did not do such a good job

try to swallow the whole piece at once. Our ultimate goal with this methodology is to enable companies to make good decisions all of the time as opposed to just making one or two great decisions by chance or by luck some of the time,” he says.

This time line was laid out before the acquisition by INEOS, however. As details on this deal were revealed, “we had a surprise change in our IT schedule that meant we had to complete this project in a time frame that had not been anticipated at the beginning,” says Vice. In the end, when the project actually went live this spring it was a couple of weeks early. “A lot of that was due to SCC’s ability to respond to our needs,” says Vice.

It was important to Innovene to tie the demand forecasting solution, one of the first modules implemented, into its traditional sales and operations planning process. “Our S&OP process is based on a monthly cycle, so we plan around that time frame,” says Vice. “We now use Zemeter to do a monthly statistical fore-

based on profitability and other criteria established by Innovene.

“The next thing is the actual scheduling, which is where we get into sequencing and determining what products to make on which days, making sure that the sequence is optimized,” says Vice.

Innovene currently is using Zemeter to plan across all three of plants for polyethylene. By the end of the year, the polypropylene business also will be included. Additionally, a module for terminal replenishment helps Innovene optimize how and when it re-fills its distribution sites. “We fill orders from both our distribution sites and from our plants directly, so we have to manage both of those streams,” says Vice. Innovene also will soon go live with a Zemeter module for calculating optimal safety stock, he says.

While Vice does not yet have specific numbers, he says forecast accuracy at Innovene “definitely is going up. We are still trying to figure out the right way to measure this and report it regularly, but

“Initial results show a definite improvement, which should cascade into fewer rush shipments, less waste and lower overall inventory. We definitely are operating the supply chain with better efficiency.”

— Steve Vice of INEOS

in that respect,” he notes. “Now we have access to actual numbers vs. planned numbers and, generally, a much better view of how our supply chain is performing.”

At the beginning of the implementation, both Innovene and SCC thought they had plenty of time. “We had scoped out a time line that we thought was manageable,” says Vice. “It gave us about eight months for the first phase of the project. The front end of that eight months was geared toward identifying business processes and making sure we understood the processes and that any proposed changes made sense. We wanted to get everybody on board before we actually started building.”

This time line also was aligned with a six-step methodology that SCC “preaches and practices,” says Singh. “We know that each step has a lot of process involved so we don’t

cast based on history.” This forecast is submitted to sales account managers for their input, which is derived from actual meetings with customers. “Our sales people can override the statistical forecast numbers based on their information, which improves our accuracy,” Vice says. “The tool takes the modified forecast and does a bit of calculations to get lot sizes that are equivalent to rail cars, rather than using a number that doesn’t make sense in the actual plan,” he adds. The forecast typically looks out three months and is refined until production capacity actually has to be committed.

The Zemeter production planning module, “takes the demand forecast and balances it with capacity at the plants and their ability to produce,” Vice says. An optimization engine does this balancing

initial results show a definite improvement, which should cascade into fewer rush shipments, less waste and lower overall inventory,” he says. “Also, we definitely are operating the supply chain with better efficiency and more reliability than we had before.”

Expanded Roll-Outs

The parent company has taken note of this project as well and is in the process of implementing Zemeter, with SCC help, at its polyolefin business in Europe. Additionally, says Vice, “we are starting to have discussions with people in other INEOS units, who are inquiring about what we are doing. We are finding that this solution makes most sense in supply chains where there are multiple grades of projects and scheduling issues as well as multiple distri-



Most of Innovene's products are shipped in bulk via rail car.

bution points. It is not as applicable for some of the less complex bulk commodity chemicals that INEOS manufactures."

Vice points to two lessons learned from this and prior projects. "On this project, we spent a lot of time jointly developing requirements upfront and that is paying off now with fewer requests to change something," he says. "In previous projects, we did not spend enough time defining requirements and we had to rebuild the tool a number of times before we got it right. This time, we did a lot more front-end work and that has made life a lot easier."

The second lesson is around training. "Generally I find that people working in different areas of the supply chain tend to understand their little piece really well and execute on their piece really well. But if they don't have a broad view of how the whole supply chain works, even though each individual does their piece well, things can still fall apart. Communications can get lost or not be understood

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and you can experience all kinds of difficulties and inefficiencies."

To resolve this issue, Innovene created a number of cross-functional teams, whose goal is to make sure that everyone working in the supply chain process has a good understanding of the whole. "In this training, there have been a lot of moments where someone

might say, 'Oh, I didn't know that's what you guys did. If I had known that, I would have done this thing differently,'" says Vice. "So just through this process and people understanding how their jobs affect each other, we have realized a lot of efficiencies and cost reductions, and we also have reduced the potential for error."

All of this, says Vice, is to ensure "that our customers select us first when they want to buy these products. For that to happen, we have to make sure we are the low-cost producer, that we are as efficient as possible and that we are able to meet their demands. That's what this is all about." 

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