

Merck adopts lean manufacturing to slim down its supply chain costs and get closer to the customer.

Overview

■ **Business Challenge**

Globalization is forcing pharmaceutical companies to look to new sources of differentiation – the most fertile ground being their own operations. For Merck, establishing a global business platform was necessary, but not sufficient. Equally essential was the need to transform its supply chain processes to adapt to an increasingly competitive and dynamic marketplace.

■ **Solution**

Merck worked with IBM Global Business Services to implement a program of lean manufacturing, and to build these process improvements into its future global ERP system. From end to end, rigid production practices have been replaced with flexible, demand-driven processes.

■ **Key Benefits**

- *Up to 30 percent reduction in production-related inventory costs*
- *Up to 20 percent reduction in overall operating expenses at plant level*



Based in Whitehouse Station, NJ, Merck & Co., Inc. is a global research-driven pharmaceutical company dedicated to putting patients first. Established in 1891, Merck discovers, develops, manufactures and markets vaccines and medicines to address unmet medical needs, while also publishing unbiased health information through the Merck Manuals. Merck employs 61,000.

If you ask most people how the business side of the pharmaceutical industry works, there's a good chance they'll point to long, expensive R&D efforts, the breakthrough products that periodically come out of these efforts, and the high profit margins that compensate for the industry's risk-taking and innovation. While true in part, the reality is more complex. To be sure, R&D is and always will be the industry's lifeblood, and new products the key to its growth.

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– Martin Khun, global leader, Merck Production System, Merck

Business Benefits

- Up to 30 percent reduction in production-related inventory costs
- Up to 20 percent reduction in overall operating expenses at plant level
- 50 percent reduction in changeover time on some production lines

“By implementing [lean manufacturing principles], we will completely transform how we manage production, view our work, organize our business, and ultimately, we will change our culture to a ‘lean-thinking and performing’ one.”

– Sue Capps Morris, senior vice president, Manufacturing Operations–Americas, and Executive Sponsor of the MPS initiative, Merck

What has changed is the nature of the competitive environment in which these activities occur, with globalization a key underlying factor. For a time, major product successes bought pharmaceutical companies a degree of breathing room—a buffer—from competitive forces that enabled them to sustain high margins, which in turn could subsidize research for the next generation of products. This contrasts with today’s market, in which factors such as increasing global competition, shortened new drug exclusivity periods and a number of other factors have begun to erode margins across the industry. Indeed, for even the most innovative drugs making it to market, there’s a high likelihood that one or more competing drugs are already in the development pipeline. The point is *not* that breakthrough products are no longer a valid means of differentiation. Rather, it is a question of sustainability, with globalization forcing pharmaceutical companies to look to new sources of differentiation—the most fertile ground being their own operations.

Competition prescribes flexibility

While it’s true that pharmaceutical companies have long followed practices designed to improve or optimize the efficiency of their production runs, they’ve done so under a set of business rules that are less and less in synch with today’s more competitive marketplace. Under traditional batch-based pharmaceutical manufacturing, the most important production decisions—what to produce when, and in what quantity—are driven by internal operational factors, a key one being the fixed cost of changing over a piece of equipment to make another product. The basic idea of this approach, known as “campaigning,” is to determine an optimal production run length for each product that minimizes the fixed costs of each batch, and then execute it without interruption. While alluring in its simplicity, the fact that campaign-based manufacturing pays little or no heed to the customer side of the equation almost always leads to costly inventory build-up in the supply chain. Compounding this is an inherent inflexibility that makes it nearly impossible to shift production as demand patterns change.

As a practitioner of this approach, Merck (www.merck.com) saw the transformation of its supply chain and manufacturing processes as a way to strengthen its margins. The main thrust of Merck’s vision was to make these processes more flexible, responsive and efficient. To achieve this, the company planned to deploy a common ERP framework (SAP R/3) across its global operations and create standard business processes based on lean principles. IBM Global Business Services first came into the picture in the role of consultant for the implementation and brought lean expertise into the strategy implementation

based on work it had previously done for Johnson & Johnson. In contrast to the inwardly directed supply chain processes that Merck had previously employed, lean called for a continuous, just-in-time production flow that was triggered by external demand signals. In conjunction with IBM, the transformational intent was to create a whole new way of optimizing the supply chain around lean principles at the site level and enterprise level. Embraced by Merck, these principles eventually became the foundation of a broader supply chain initiative known as the Merck Production System, or MPS.

Given the level of process and organizational transformation the MPS initiative called for, Merck knew that gaining buy-in early on would be critical to the project's success. To advance this aim, IBM facilitated the development of an iterative, plant-by-plant deployment methodology whose key tool was a diagnostic analysis of processes used to build a concrete business case for the adoption of lean manufacturing processes. The premise of IBM's approach was simple: The more executive sponsors knew up front about the benefits of the MPS, the more likely they would be to actively embrace it and make it successful. It soon faced its first test.

A whole new way of optimizing

Merck chose its plant in Arecibo, Puerto Rico, as the pilot site for the MPS rollout, its diverse base of processes seen as being most representative of the company as a whole. Having completed the upfront assessment phase, the IBM team facilitated the process transformation efforts through a series of parallel work streams staffed by Merck and IBM subject matter experts. Overall project leadership was a partnership with IBM and Merck site and corporate leadership. The demand and supply planning stream examined both internal and external process links, while the procurement stream looked at strategic supplier relationships. In terms of intensity, however, the production work stream—scrutinizing all aspects of line design—was the true focal point of the transformation effort. The team's work around the issues of changeover times and optimal production mix exemplifies this. Using a lean technique known as value stream mapping, the team tracked the changeover process and found that most of the waste resulted from the long, campaign-based production practices it was following, as well as a lack of standardized quick-changeover processes. Using algorithms that minimized the overall effects of the changeovers, the IBM team identified the ideal manufacturing cycle, or “rhythm sequence,” resulting in a 50 percent reduction in changeover time on some production lines.

Key Components

Software

- SAP R/3

Services

- IBM Global Business Services—Lean Practice

Time frame

- Planning stage: four months
- Pilot implementation: six months
- Phase two implementation: three months
- Global rollout: in progress

Why it matters

Operating in an industry where rigid, top-down production planning predominates, Merck put in place flexible supply chain processes that are driven by customer demand. By focusing on customer value, continuous production flow and continuous improvement—and basing its production on actual customer demand—Merck's Arecibo plant has reduced waste and cost on an enormous scale, all while improving quality.

Another key point of Merck's transformation was the adoption of demand-pull signaling as the main trigger for production scheduling, which in many ways is the core attribute of lean manufacturing. By relying on "top-down" production triggers, as well as the desire to minimize changeovers, Merck's campaign-based approach to production had made inventory buildup in the supply chain endemic. In its place, a network of automated pull signals was created using a variety of inventory tracking measurements—from the warehouse to the shop floor—as triggers for sending replenishment requests to its production planning system. By moving from a rigid monthly production schedule to a flexible one driven solely by customer demand, Merck's Arcibo plant reduced inventory in the supply chain by as much as 30 percent, and overall operating expenses have been significantly reduced for the plant.

Creating a beachhead for change

Having succeeded in Arcibo, the team turned their transformation efforts to the Merck plant in Wilson, North Carolina, (one of the company's most efficient), thus posing an implicit challenge—Could these efforts produce similar levels of operating improvements? The fact that they *did* showed the company as a whole that MPS was for real, explains Martin Khun, Merck's global leader for MPS. "What we did created a beachhead for change, a concrete example of what we could achieve through transformation," says Khun. "The successes we achieved collaborating with IBM made everyone realize that this [global transformation] *had* to happen."

The next step in Merck's plan, now underway, is to take the new processes that came out of the lean transformation efforts in Arcibo and Wilson and incorporate them into the standard ERP solution being rolled out globally, with SAP R/3's Business Blueprint the enabling capability. Khun points out that it's not just the risk of locking in sub-par business processes with a new tool—or "paving the cow path"—that drove Merck to lead with process transformation. Khun also saw it as an opportunity to create a more fertile environment for change, for making employees "hungry" for improving the way things are done. With that goal, the implementation approach developed with IBM succeeded. "By showing the value of transformation from the very start, the approach laid the groundwork for a successful SAP rollout across the supply chain," says Khun. "Instead of resistance to change, we see our people 'pulling in' new tools like SAP to change the way they work. We consider IBM's flexibility and partnership, while focusing on delivering real business value, as essential to our success."

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4-07
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