Pharmaceutical MANUFACTURING

At Freiburg, Germany, Pfizer aims to take flexibility to new levels.

Tailoring Production to Demand

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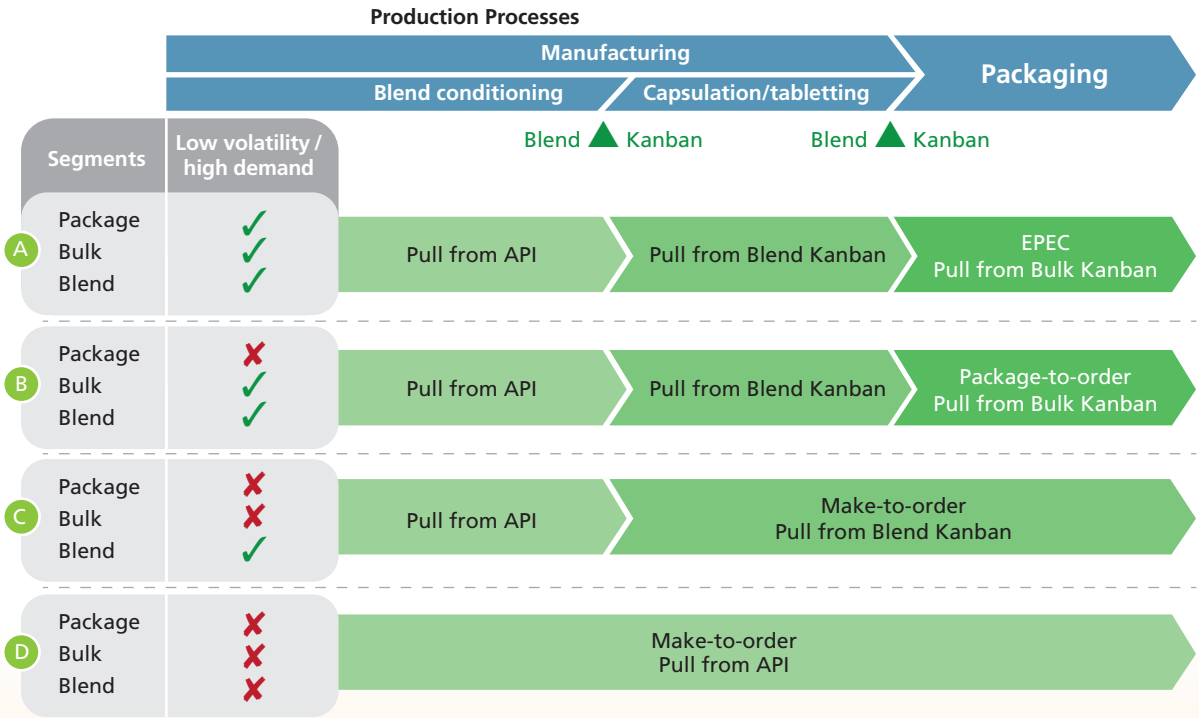
THE PARAMETERS of the global pharmaceutical industry— and the highly competitive business arena in which it operates — continue to evolve. Pricing pressures are increasing, generics are moving to the forefront as blockbuster patents expire, and regulatory demands are rising. Driven by an increasing focus on new markets and the development of more targeted medicines, the sheer number of product variants that are being manufactured continues to increase. Although these "nichebusters" are being produced in lower volumes than blockbusters were, market-by-market demand is more highly volatile and increasingly variable.

Against this backdrop, Pfizer has laid out a new framework to align supply operations with the volatile reality of market demand. Working with the Boston Consulting Group (BCG), Pfizer has developed and implemented a new production strategy at its manufacturing site in Freiburg, Germany. It leverages different supply chain and inventory strategies for different Pfizer products, based on their demand and volatility patterns. This segmentation approach — built on a highly flexible pull system (Figure, p. 31) with the ability to drive both fixed schedule and fixed volume (Chart) — tailors Freiburg site production to customer demand in the 180 countries where it sells medicine.

This approach reduces the need to maintain high inventory levels. The result: a flexible, cost-effective system that addresses the challenges of an increasingly complex environment to enable lower inventories and ensure a high level of service.

The first phase of implementation, focused on the

4 DIFFERENT PRODUCTION STRATEGIES ALONG VALUE STREAM DEFINED



portfolio of one major product, was carried out over six months, and improved the site's performance on the production costs of these products by approximately 10 percent. The consequently shortened lead times resulted in lower required inventory levels. This initial phase of the new production strategy reduced the total number of changeovers and generally lessened complexity within the production and planning processes.

Additional benefits are indicated in the areas of employee satisfaction and engagement levels. Monthly "pulse checks," surveys conducted at the Freiburg site, for example, show increased employee engagement and willingness to facilitate continued implementation efforts.

PFIZER FREIBURG

Part of the PGS network since 2000, Pfizer's 800-person Freiburg was already a high-performing site with a long history of driving operational improvement, when the new production strategy was implemented. While Freiburg's various departments showed marked improvement, the end-to-end processes and the interfaces among departments indicated opportunities for improvement. Furthermore, the site needed to prepare to deal with an expected leap in manufacturing complexity. The number of stock keeping units (SKUs) produced at Freiburg—currently approximately 2,500—is forecast to jump by 50 percent over the next five years.

The site's previous production planning process treated all products with a common, central approach that didn't take different demand patterns into account. Market forecasts triggered production for all products. Because a large number of products shared the same manufacturing equipment, thus necessitating lengthy changeovers, this approach resulted in long lead times. The high inventory levels needed to accommodate delivery times raised carrying costs. Moreover, this production schedule was highly inflexible; unforeseen issues in manufacturing required changing downstream schedules in packaging, adding to changeover costs. Workers at times scrambled to "put out fires" caused by urgent supply needs and unplanned events.

PLANNING THE NEW STRATEGY

It is no secret that maintaining high levels of warehouse inventory makes it easier to deliver high levels of customer service. Pfizer was challenged to gain competitive advantage in a dynamic and increasingly complex business arena by maintaining high service levels and lowering production and inventory costs.

In November 2010, PGS and BCG began work on a joint project designed to address this challenge. This collaborative process focused on rethinking how manufacturing complexity was managed and developing more highly efficient Lean production methods; for example, producing a competitive product while at the same time controlling expense and working capital (inventories) as much as possible.

The team analyzed Freiburg's high-volume product families, which account for approximately 30 percent of total sales (more than 700 SKUs). Additionally, for each of these products, the team analyzed sales volume and demand volatility and dissected its three main production steps—blending, encapsulation or tableting, and packaging.

This analysis yielded vital data. The same common-form tablet or capsule end product can have vastly different packaging requirements. It is not unusual, for example, for the site to produce a small number of the same common-form capsules for distribution to various markets around the world. However, because each market requires a different package (distinguished by language and often by tablet/capsule count as well), it is not in the manufacturing of the common-form tablet or capsule that the complexity arises, but in its packaging.

Analysis identified four different product segments, based on sales volume and demand volatility levels for those different processes. The results (Figure) show that 15 percent of the finished goods SKUs, accounting for 75 percent of sales volume, can be identified as low-demand-volatility, high-volume products. The remaining SKUs have either smaller volumes or higher demand volatility—and are mainly products with special dosages or for smaller countries.

The team applied two general strategies at different points to determine the optimum production strategy for each of these segments. One of these, the "make-to-forecast" or "push" strategy, says that manufacturing is driven by forecasted demand. According to the "make-to-order" or "pull" strategy, however, manufacturing is triggered by consumption. The different production strategies were aligned into four product segments.

A. Products with High Volume and Stable Demand at All Process Steps

Products in this segment have highly predictable sales (for example, when sales are predictable enough to support forecasting the production of 1,000 packages every three weeks) and thus do not require a fully flexible system based solely on market pull. Instead of a pure pull system, a stable, predictable production using a pre-defined cycle based on the expected demand is more efficient for this product segment.

For packaging, the team applied a common lean tool known as "EPEC" (Every Product Every Cycle). Applied to help determine the best production batch size and sequence, EPEC in turn reduces changeover times. EPEC studies workers that follow the same sequence of production for all products. Teams of workers who repeat a known sequence tend to find an optimal way to do things, leading to continuous improvement and faster cycles. Dedicated high-speed packaging lines optimize efficiency.

For manufacturing, analysis recommended a pure pull system based on kanbans to ensure that the material required for packaging is available. Kanban is an inventory control system that triggers production when defined thresholds are reached. Because packaging pulls the required material from the kanbans when there is no waiting time or ad hoc production schedule changes if a breakdown occurs in the manufacturing process, this decoupling of manufacturing from packaging reduces lead times, resulting in lower inventory levels.

B. Products with Highly Variable Packaging

This applies to product families whose sales are stable in total, yet may include SKUs sold in low volumes with high volatility in certain countries due to the market specific packaging requirements. The identical commonly used 75-milligram pain product, for example, may be marketed in Germany as well as a smaller country such as Kazakhstan. In this instance, month-to-month sales in Kazakhstan may often be more volatile, with relatively low overall sales volume. In this situation, Pfizer utilizes a pull system called "packaged-to-order," meaning that package production is triggered by an inventory replenishment threshold.

C. Common Blend Products with Unstable or Low Demand for Packaging and Bulk

These seldom-used products are based on common blends, but that are produced in rarely prescribed dosages, such as a 300 milligram pain product, for example. Products in this category are manufactured and packaged only after a replenishment stock level is reached; blend is pulled from a Blend-Kanban.

D. Exotic Products

These are rarely used drugs based on seldom-used blends. The products, from beginning to end, are made-to-order from stocked APIs (Active Pharmaceutical Ingredients).

IMPLEMENTATION

In Freiburg, adopting the new production model required significant effort. On the technical side, implementing EPEC and kanban drove major changes to planning and scheduling processes. Information technology needed to be heavily involved. Lead times in documentation and quality release processes had to be reduced significantly and variability of processing time also had to be reduced to align with an end-to-end value stream approach in the plant. This approach of designing the supply chain performance from first step through delivery to the country of destination was another new design step for the site.

To get buy-in from the Freiburg staff, site employees from all departments were part of the project team, with a high share of capacity — some up to 100% — allocated to the effort. Additionally, the team set up a highly detailed change-management process. A cascading communication model was employed in which the production changes were discussed clearly and in detail from one level to the others. This activity was critical as the new system impacted employees' daily work across production, packaging, planning, and quality.

Various tools, such as dashboards for production and logistics planning, were used to engage line operators in the day-to-day operations. Employee satisfaction rose as fewer extra shifts were required to put out fires. Management assumed a visible role, taking daily Gemba walks to follow production flow and encourage teams to make changes to the new system if necessary. Regular (and anonymous) pulse checks provided insightful colleague feedback on the change effort.

The early success of the new production model prepares Freiburg for the coming years and the challenges of even higher product complexity across more markets. Pfizer plans to roll out the model at other sites, and more broadly at Freiburg—anticipating an increase in performance and efficiency, a reduction in inventory levels across the site and within markets' distribution centers, and improved service level improvements.

ABOUT THE AUTHORS

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