Four strategies to help move beyond lean and build a competitive advantage

For companies that make complex, configurable products, lean manufacturing principles have become an integral part of their day-to-day operations. No surprise there. Over the past 30 years, lean has helped these companies streamline manufacturing and supply chain processes to eliminate waste and create important business benefits.

But there's now statistical evidence showing that in discrete manufacturing, the presumed benefits from lean have not yielded the competitive advantage that manufacturers had hoped for. There are two reasons for this. First, while early adopters received advantage for their lean investments, lean is now pervasive at nearly all major discrete manufacturers, so the advantage has been substantially reduced. Second, while the productivity improvement attributable to lean inside manufacturing operations is high, at the corporate level, total productivity has only marginally improved because of the high capital cost of investment in productivity programs.

For discrete manufacturing executives, this begs the question: What can my company do to achieve the real competitive advantage I thought I was getting from lean?

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There are four strategies that manufacturers of complex, configurable products can incorporate to go beyond the benefits they and their competitors are getting from lean. Two of these strategies—dynamically generating bills of materials and routings, and automating production of shop floor drawings—are, in effect, better ways to implement lean. The final two are breakthrough strategies that can dramatically improve efficiency and performance. These strategies stretch through the lean concept into sales by changing what product features are available based on manufacturing constraints, and into master scheduling by using quote data from reps and dealers to improve forecasting.

Manufacturers that enhance their lean manufacturing environments are reaping strategic competitive advantages by aligning sales processes with manufacturing capabilities, reducing order errors, scrap and rework, and better aligning customer expectations in the selling process to delivery.

Lean manufacturing: The benefits aren't what you think

There's no doubt that lean has contributed to major improvements in discrete manufacturing processes over the past 30 years. But a close look at statistics published by the US Department of Labor reveals that multifactor manufacturing productivity in the US increased by only an average of 1.3 % per year between 1987 and 2011. Unlike measuring output per hour worked, which is a common metric in assessing gains from lean, multifactor productivity gives a more comprehensive and accurate picture of performance. It takes into account the influence of technological advances, efficiency improvements, the cost of capital and labor, and other factors like energy and materials.[1]

By taking a broader view of manufacturing costs, it's easy to see that while lean methodologies have helped improve productivity significantly, much of the gain has been offset by other drags on productivity. Manufacturers seeking breakthrough productivity improvements need not only master lean principles, but also need to find other ways to outperform their competitors.

Two strategies to get more from lean right now

To increase the competitive advantage from your lean manufacturing program, consider inserting two strategies that are readily available but that haven't been widely adopted.

Strategy 1: Dynamically generate bills of materials and routings. Most companies that produce configured products currently manage their bill of materials (BOM) process by creating a star part BOM for every possible combination of product attributes. When they receive an order, they search their catalog of star parts and choose the exact match for attributes like dimension, features, and color. This approach has three inherent inefficiencies. First, it's wasteful to set up a star parts system involving thousands or even millions of possible product combinations.

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for customized products.

Second, it can take a long time to search the catalog for the exact star part required to fulfill an order. And third, updating the catalog every time a product attribute is added or deleted is typically a costly and time-consuming manual process.

Instead of creating thousands or even millions of star parts, discrete manufacturers can use existing solutions to create a rules-based BOM process. By creating rules to determine how unique BOMs and routings are generated, manufacturers can dynamically respond to orders for customized products and avoid the heavy investment required to create a star part catalog. They'll also be able to save time creating the BOM and routing for each customized order and be able to update a product line with new features and other innovations much faster because they'll only have to update a few rules, not an entire catalog.

Strategy 2: Automate the production of shop floor drawings. Discrete manufacturers can also take a rules-based approach to creating shop floor drawings to save time and eliminate manufacturing errors.

Capabilities exist today to automatically combine customer order specifications with CAD models to generate unique drawings for each order. This can eliminate human errors in shop floor drawings, which can occur when a CAD designer or engineer fails to accurately create a shop floor drawing to match unique customer specifications. Should the order error make its way into production, the situation is compounded by the product being produced to the exact—but flawed—specifications, shipped to the customer, and installed. The rework repercussions can be significant.

To correct the mistake, new shop floor drawings have to be created and new products have to be manufactured and shipped, all because of a human error in the instructions sent to the shop floor. Manufacturers often attempt to solve the problem by adding a quality assurance step to the shop floor drawing process, but drawing errors are inherently hard to detect. Adding a product inspection step after manufacturing also takes time and is inconsistent with the lean principle of avoiding errors, rather than detecting them after the fact.

By generating rules to govern how customer order specifications are combined with CAD models, the manual steps in the shop floor drawing process can be eliminated. If an error does occur, it can be corrected more easily by revising the rules.

Two breakthrough strategies to extend lean

Discrete manufacturers also can apply existing lean concepts in innovative new ways to achieve breakthrough improvements in productivity. These strategies require more than simply modifying a current lean implementation, but offer a much greater potential payback in cost reductions and competitive positioning.

Consider extending the lean concept into other areas using these strategies:

Manual steps in the shop floor

drawing process

can be eliminated

Strategy 3: Feed quote data to forecasting for a better master schedule. Discrete manufacturers, for the most part, have well developed processes for using order data in their material planning processes. Master schedulers at these companies are accomplished at forecasting factory requirements by looking at order history, orders in backlog, sales volume, and special marketing promotions. But there's another data set—existing open quotes—that schedulers can use to make their material forecasts more accurate.

Manufacturers should be asking the question: Since my configurable products typically have a quote-to-order sales cycle that is longer than my material lead time, why am I using sales history for forecasting? The use of quote data from dealers and distributors can give schedulers more comprehensive and accurate picture of future material needs.

Why is this a lean concept? Because it eliminates waste. Significant shifts in customer demand will not be forecasted by using sales history, but will be completely evident using quotes. Much less wasted material will be ordered.

Strategy 4: Change the products and features you offer for sale dynamically. Manufacturers of customizable products should consider implementing breakthrough processes that extend lean concepts into their sales processes. While lean has helped manufacturing operations become more efficient and agile, sales processes haven't made the same improvements. Nearly all discrete manufacturers today lack the ability to systematically incorporate planned and unplanned supply and manufacturing constraints into what products and features their sales reps offer to customers.

Just as outdated as the preprinted paper catalogs, which locked in product lines until the next catalog printing, are manufacturer's available-to -promise schemes to push out promised dates.

For example, a stainless component is in very limited supply because of a supply problem or because of unplanned manufacturing maintenance. If you are the sole supplier, you can by all means push the promised date out when the customer orders a stainless option.

If you want to be known for fast lead times, then consider temporarily swapping the stainless option and leave only a titanium option. You could also switch manufacturing cells, switch plants, raise prices, offer a substitute product, or eliminate the product altogether.

The point is that manufacturers can now automatically change what their quoting systems are offering based on their supply and manufacturing constraints. Their choices can be aligned with how they want to be perceived by their customers.

The real benefits

By implementing comprehensive lean manufacturing programs, discrete manufacturers have effectively kept pace with their competitors. With the strategic initiatives outlined here, discrete manufacturers can create substantial competitive advantages. They can:

Increase sales:

- Launch product changes faster by eliminating wasted effort changing hundreds of thousands of bills of materials.
- Improve repeat sales by removing the last remaining manual processes, which introduce errors that result in customer returns and rework.

Reduce costs

- Eliminate effort and manufacturing delays, while a unique bill of material is set up each time a new feature combo is ordered.
- Reduce order scrap caused by manually drawing shop floor CAD drawings.
- Eliminate wasted materials by master scheduling based on open quote data.

Differentiate your brand

- Better set customer expectations by changing what products and features are offered for sale dynamically, to account for unplanned supply and manufacturing constraints.

Tips for implementing lean manufacturing

If your company has successfully implemented elements of lean, you've already created a culture of change where employees understand the value of systematically identifying and eliminating unprofitable manufacturing activity. At a high level, going beyond your current implementation of lean is a straightforward process of applying lean principles to new areas of your business. The following are some suggested steps for getting started:

- **Pick the lean strategies you want to consider.**
- **Document the current situation**. All four strategies involve unique key benefits. Assess your current situation and estimate how much improvement is possible.
- **Identify gaps in your IT infrastructure**. Just as information technology is essential to successful lean implementation, using the right advanced IT tools, like configure-price-quote (CPQ) software, is essential for any lean improvement strategy. The technology exists to support each of the strategies described in this white paper. Even if your company doesn't already have all the capabilities in place, there is a good chance you'll be to make an incremental change in your IT infrastructure to achieve breakthrough business advantage.
- **Start small and get a win**. Consider, for example, dynamically generating bills of materials and shop drawings for less complex products to try it out. Use 90% order history and 10% quote data when you forecast to see how quote data impacts the result. Consider testing and changing your product offerings on the fly in a low-profile, safe market segment. Learn and expand.
- **Teach your colleagues how to think lean**. Keep in mind that as you move beyond your core manufacturing processes, you will be enlisting the participation of new players in your company and a partner network who may not have the same experience with lean that you do.
- **Move on to the next opportunity.**

To learn more, visit our blog Manufacturing Matters.

1. “Multifactor Productivity Trends in Manufacturing, 2011,” United States Department of Labor, Bureau of Labor Statistics.

2. June 19, 2013, http://www.bls.gov/news.release/prod5.nr0.htm.

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