How Manufacturing Software Should Adapt to Support Lean Principles

Over the years, manufacturing production strategies have come and gone. One tussle between manufacturing strategies remains: debate between MRP software advocates and lean manufacturing advocates. On one side is the philosophy that manufacturing resource planning (MRP) software is required to adequately plan production. On the other side is the lean philosophy, which argues that these planning tools are too rigid to reflect actual production environments and ultimately impede effective production.

Despite the popularity of both approaches, the debate persists. Some manufacturers rely on sophisticated software systems to plan and execute production, while others rely on simple Excel spreadsheets and lean principles. Still others use a hybrid of manufacturing software and lean methods.

The conflict between these two philosophies got me wondering: Why is there a rift in the first place? And, more importantly, what can be done about it? In this article, I'll look at a few ways that manufacturing software can evolve to accommodate lean manufacturing principles.

A Brief Look at Lean Manufacturing Principles

Lean manufacturing is a production philosophy that focuses on waste reduction via improvements in the flow between manufacturing processes. In a lean manufacturing environment, waste is broadly defined as spending resources (labor, materials, etc.) on any activity that does not add value to the end customer, or detracts from profits. This means limiting inventory, labor and machine use to only what's needed to meet production requirements. In an ideal world, a lean manufacturer would have the right supplies arrive at the right place and time to create only the products that are necessary to meet demand. In this way, lean manufacturing is said to "pull" orders into production as consumer demand is generated.

The Conflict Between MRP and Lean

The concept of "pulling" production to meet demand is a key area of contention between lean advocates and manufacturing software advocates. Lean advocates argue that manufacturing software is built on an outdated model of manufacturing and distribution, in which it is best to "push" production ahead of demand and promote products to sell them. But it's more than a conflict between "pulling" and "pushing" production. Many lean advocates view MRP software as an overly complicated, transaction-intensive system. They argue that relying on these systems is inefficient and leaves manufacturers unable to adjust to demand fluctuations.

In contrast, manufacturing software advocates believe that today's manufacturing challenges require planning tools to get an accurate picture of production requirements. This side argues that the lean model does not plan ahead to deal with the complexity and volatility of today's planning and supply chain scenarios, which can result in inventory shortages.

Finding Common Ground Between MRP and Lean Advocates

While the conflict may appear to position these two parties on opposite ends of the spectrum, some common ground exists. As Chad Smith and Carol Ptak, managing partners at the Demand Driven Institute, noted in a recent whitepaper, both sides share a quest for flow in manufacturing operations. Flow in this context can be defined as the efficient movement of materials and information through every part of the manufacturing process. According to Smith and Ptak, MRP software advocates seek flow because materials and processes that flow are the easiest to plan and manage. Meanwhile, lean advocates promote flow because it helps reduce inventory held at the manufacturing facility. The two approaches to production share two additional goals:

- Pace production as close to actual demand as possible, and
- Improve visibility into the supply chain.

With these shared goals, proponents of manufacturing software can find common ground with lean manufacturing advocates. Before that can happen, however, there are a few ways that manufacturing software needs to change.

Four Ways Manufacturing Software Should Evolve to Support Lean Processes

Building on this common ground, manufacturing software can learn a few things from the lean approach to production. I recently caught up with Bill Waddell, a leading lean manufacturing consultant, and Chad Smith**,** co-author of the third edition of Orlicky's Material Requirements Planning (with link), to discuss some of the ways they could see manufacturing software evolving to better support the lean manufacturing philosophy. I'd like to share a few of the ideas we discussed.

1. ***Incorporate support for value stream mapping*.**
   Value stream mapping is a lean manufacturing technique that maps the flow of information and materials through the shop floor. Waddell believes that software should make this a more integral part of the production process to help manufacturers identify key constraints and bottlenecks in the flow of production. These value stream maps would allow manufacturers to identify areas where flow is compromised to indicate which areas in the value stream need improvement. There are some manufacturing systems that support value stream mapping but it is usually secondary to batch processing functionality, forecasting, etc.
2. ***Continuously track cycle times, capacity availability and production status.***
   These are the critical metrics of improvement under the lean manufacturing philosophy. Of these, the cycle time--the time it takes from when material arrives at the receiving dock until it leaves as part of a product--is the most important efficiency metric. Knowing capacity availability and the production status throughout helps inform manufacturers of how they can reduce cycle times.

3. ***Identify where in the plant and supply chain to add or subtract inventory.***
   Smith noted that a key capability the software needs is the ability to give you a clear picture of *where* to stock inventory in your manufacturing plant. Most all systems provide methods to help companies determine when to supply and how much to stock but, according to Smith, the primary question around inventory and materials should be where within the product, plant, supply and distribution structures to place these stock buffers. According to Smith, a system that can indicate where to hold inventory would help manufacturers create buffers to dampen variability, compress lead times and minimize working capital. These buffers would be set to the way the market pulls in quantity and volatility--instead of according to forecasts--to align production more closely to actual consumption levels.

If manufacturing software can evolve to better accommodate the needs of lean manufacturing, we can move one step closer to closing the rift between manufacturing software advocates and lean proponents.

What are your thoughts? How else do you think manufacturing software can change to closer align with the lean vision? Please leave your thoughts in the comments section below.

A special thanks to Bill Waddell, Chad Smith and Carol Ptak for lending their expertise to this article.