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Lean manufacturing and ERP: How to leverage ERP to get lean

A manufacturing firm adopting the principles of lean manufacturing can effectively leverage the company's ERP system during its transition to lean. This E-Book explains what part of the plant you should start with; the importance of simplifying the ERP system; how to balance the ERP system with lean principles; and what pitfalls to avoid.

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For the lean manufacturer, ERP plays a vital role

By Jean Thilmany, SearchManufacturingERP.com Contributor

In order to simplify manufacturing and reduce inventory levels, some proponents of the lean manufacturing enterprise recommend the elimination of the ERP system.

However, at most, a manufacturer's ERP system should be simplified.

"There's a huge part of your business that has to go on, whether you're lean or not," says Jim Shepherd, senior vice president of research at AMR Research. "You still have to do general ledger and accounts payable, and you have to purchase and receive things and take customer orders."

According to Shepherd, "The reality is, unless you're running a fairly small or simple organization without a complex product, it's not practical to run a manufacturing company without a dedicated business application. I could be running the leanest place around, but I'll still need an ERP system, even if I don't use it out on the shop floor."

Introducing the principles of lean manufacturing principles to an organization means training employees as well as laying out production lines anew. And ERP has no role in these types of changes.

But ERP does have a vital role to play in analyzing existing business practices and potentially restructuring them to operate in a lean manufacturing environment. After all, according to Shepherd, the only way to find areas that need improvement and then make those improvements is by tracking and analyzing current manufacturing processes—which can be done in ERP.

The good news is that, beyond day-to-day business operations, lean principles such as continuous process improvement are also supported by ERP. "ERP organizes the information you need about products, production, facilities, resources and demand," Shepherd says. "You need this [information] to implement lean, so having it organized in a single place of reference is very valuable."

Manufacturers will find the best payoff from implementing lean manufacturing principles by combining the predictive capabilities of ERP with the streamlined productivity and enhanced customer service principles of lean, says F. Frank Chen, director of the Center for Advanced Manufacturing and Lean Systems at the University of Texas at San Antonio.

Today, it's not hard to find an ERP system that supports lean manufacturing principles. According to Chen, nearly all major ERP vendors have extended their applications to support the core lean principles of value definition and specification, value stream mapping, uninterrupted flow, customer pull and the pursuit of perfection.

In most cases, no customization of the ERP system is required, since lean applications are part of the standard manufacturing modules.

But that doesn't mean these systems actually help implement lean, Chen says. In other words, they support lean but they don't necessarily drive it. A manufacturing firm will need to spend time studying business processes and implementing a lean environment before programming the ERP system and selecting modules to support a lean initiative.

Or, as Chen puts it, "If you merely automate a process that is poor in the first place, ERP is not a magic tool that will fix this dilemma."

Here's where a good IT department can help. Whether bringing in a new ERP system or retooling the existing system, the IT department needs to work with manufacturing engineers and consultants in selecting the ERP functions and features to be implemented for the lean environment, Chen says.

When reconfiguring or implementing a new ERP system to run lean, it would behoove manufacturers to follow the time-honored KISS (keep it simple, stupid) philosophy, says Drew Locher, managing director for Change Management Associates, which offers manufacturing consulting services.

"But a lot of people overcomplicate ERP by doing management tasks within the system," says Locher. "They're trying to have some sort of shop floor control module to tell people what to make and to control the flow on a shop floor."

Manufacturers are also guilty of using ERP in a manner for which the system is unintended, such as collecting data against work orders. "What do you do with this data?" asks Locher. "You find out that it doesn't give you much of an answer and that you don't do much with the data."

There are simpler ways of doing those things and lean manufacturing principles address them without the need for an information management system, he says. For instance, lean principles call for a visual management technique to control flow on the shop floor. But Locher says, "I don't need a computer to say where product should go. Visual management is fine."

However, some experts say it's impractical for large organizations to call upon visual management techniques to track product flow.

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How running ERP in a lean manufacturing environment can improve the bottom line

By Jean Thilmany, SearchManufacturingERP.com Contributor

Any manufacturing plant can implement lean manufacturing principles, and nearly every manufacturer can see improvement to their bottom line by running ERP in a lean environment.

For a process manufacturing plant that does not need a wide variety of supplied inventory because it makes the same product or slight variants of the same product, lean techniques of cellular manufacturing, called kanban, should be employed, says Salvatore Ganino, president of the manufacturing consulting firm ManufacturingETC.

Ganino likens the concept of cellular manufacturing to a special-purpose factory within a factory. Kanban dedicates equipment and machinery to a particular product or family of products and groups them into a cell. In Ganino's analogy, the cell becomes the special-purpose factory.

"No matter how many individual operations are within the cell, product moves only when the last operation is completed," Ganino says. "Thus, the flow is one piece at a time with no work-in-process inventory between operations."

As in Henry Ford's assembly line, inventory is delivered to each operation within the cell in small quantities at regular intervals several times a shift.

However, not every supplier will be able to supply inventory in small quantities several times a shift. That's where ERP comes into play.

According to Ganino, a manufacturer's ERP systems can provide the information needed about inventories for a lean manufacturing environment, including quantity required, the time at which inventory is required and lead-time to supplier delivery.

Like other manufacturing technology consultants, Ganino often is called upon to program a manufacturer's ERP system to help advance lean principles. He also on occasion studies the way the ERP system could be used to drive lean throughout the organization, as well as the way the existing ERP system itself could be made to run leaner.

For instance, Ganino advises manufacturers that are embracing lean principles to reduce the amount of time they spend changing out their materials on their product lines. "Reducing the setup time reduces the lot size, and product will flow through an operation much faster," he says. "Smaller lots reduce the amount of inventory on the floor."

Because setup time is tracked within the ERP system, in this instance, the ERP system manages the lean implementation, he says.

Another example of ERP being integrated with lean manufacturing occurs when a bill of materials is analyzed within

the ERP system. This would allow manufacturers to coordinate the lot sizing of components, which would in turn help them avoid producing more goods than needed to satisfy the order.

Reducing setup time and coordinating lot sizes will reduce inventory, which Ganino calls “a major element of waste.”

Managers at firms incorporating lean manufacturing principles should simplify the ERP system by reducing the number of transactions on the system, according to Drew Locher, managing director for manufacturing consultancy Change Management Associates.

“Say I had a product that went through multiple work centers and, bringing in lean, I physically bring those centers those together in a cell,” Locher says. “Then I’ll need one cell in the ERP system to denote the operation. I won’t need five workstations within the system.”

Historically, these multiple work centers might encompass different machine processes or assembly processes. “So instead of defining those multiple work centers within ERP, I’d define them within one cell,” Locher says. “So we’re turning five or six workstation entities into one entity within the system.”

The goal, according to Locher, is to bring all of a manufacturer’s operations to this cellular system and to simplify ERP transactions accordingly.

In a traditional manufacturing environment, work orders flow between each work center, which are individually defined in the ERP system. In an ERP system set up to run in a lean manufacturing environment, no more than one work order should be brought into a cell. Such steps, says Locher, will reduce the number of transactions in the ERP system.

In simplifying the ERP system in order to accommodate lean principles, a manufacturer can reduce by up to 75 percent the number of transactions run on the system, Locher adds. This will lead to the system returning more meaningful information, Locher says.

“We’ll find that a manufacturer will be tracking work orders every step of the way. Why put all these transactions in there in the first place?” he says. “The belief is that they’ll have more control, but the reality is the more data, the lower the quality of that data... and the more the opportunity for error to be introduced and for a vital transaction to be missed.”

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When using ERP to go lean, experts advise starting small

By Jean Thilmany, SearchManufacturingERP.com Contributor

You're committed to using your ERP system to help you go lean. But where do you start?

According to F. Frank Chen, director of the Center for Advanced Manufacturing and Lean Systems at the University of Texas at San Antonio, you should begin by considering how quickly you'll be able to respond to supply and demand while improving customer service and reducing inventory levels. Chen suggests that manufacturers take a look at how they'll bring new products to market faster while collaborating downstream and upstream with customers and suppliers.

That is the bedrock of a lean manufacturing deployment, Chen says.

According to Chen, ERP bridges the manufacturing organization's supply chain, scheduling and accounting activities. He suggests that a manufacturer study those business processes—and all business processes across the entire supply chain—before implementing or re-architecting their ERP system.

Chen also recommends implementing the pull—or Kanban—scheduling process at your plant before programming the ERP system to enable that process.

To ensure that the ERP system is running as efficiently as possible, you'll want to streamline the system by cleaning up part numbers, inventory balances, part locations, bills of materials and routings, says Chen.

And while you cannot leave any department out of the picture—they're all interrelated—you will need to decide which business processes you'll be tracking, says Jim Shepherd, senior vice president of research at AMR Research.

"You could use ERP to manage key data like cost accounting and other processes not addressed by lean," Shepherd says. "Management at most companies really wants to know what it costs to produce and develop products, so you'll capture all the costs associated with making those products like material issues, labor expended and machines used."

Although an ERP system can track these costs, lean principles don't necessarily take cost accounting into account, as it were. The question is, should you?

"The purists in lean would say I don't need to track that stuff," Shepherd says. "That may be true if you focus on throughput—which is the main focus of lean—but that can lead to managers who don't know the cost of individual products" (i.e., because they're not tracking costs in a dedicated and automated system).

Savvy companies advise striking a balance between lean principles and ERP functionality. "They take advantage of the things lean is good at, but they don't give up the things ERP is good at," says Shepherd.

Whether bringing in a new ERP system to support lean or re-architecting an existing system, you'll need to start on the small side, says Andrew Beck, vice president of global operations at Metaformers Inc., a provider of ERP consulting services.

You'll want to begin your lean pilot by studying the manufacturing plant to isolate the line or area that would benefit most from a lean implementation. Next, you'll want to bring lean principles to bear on this line. Finally, you'll need to deploy the ERP system to track and analyze business processes on this line.

"We recommend you evaluate all production areas of the factory and select one for a pilot based on attributes of the line being produced rather than look at software and say what parts of business fits into the software," Beck says. "We want to take on visible problems with the pilot, like inventory sitting idle or high number of reworks.

"You'll want to see how you can do that with ERP on a small scale first, with lean in mind," he adds.

You'll also want to measure key performance indicators (KPIs) so you can compare those numbers before and after implementation. This way, you'll be able to measure the improvements ERP makes to the line. You can then extrapolate those numbers to the entire factory, Beck says.

In the case of a lean implementation, those KPIs will reflect lean principles. For instance, say you reduce lot sizes for overall efficiency. "If you're spending time on set-up for those reduced lot sizes, you can get bottlenecks in the system," Beck says. "There's a fine balancing act you need to play when looking for those efficiencies. But ERP can be used to track these processes—including set-up time—for continuous improvement, which is a lean goal."

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Avoiding the pitfalls of configuring your ERP system for a lean environment

By Jean Thilmany, SearchManufacturingERP.com Contributor

It may sound strange, but as you merge ERP and lean manufacturing, you need not agonize over the bottom line integrity of your lean implementation, says Jim Shepherd, senior vice president of research at AMR Research.

"A lot of lean activities—and the Kanban pull signals are a classic example—are traditionally done with [signal] cards and visual signals," he says. "There's a certain purity to that, but a lot of times it's just more efficient to have an automated system in place to track goods."

Many companies accept the tradeoffs of pre-configured ERP software templates in the hopes of deploying the ERP system faster and meeting their budget goals, says Salvatore Ganino, president of the manufacturing consultancy ManufacturingETC.

Here are a handful of tips from Ganino and Shepherd to help manufacturers configure their ERP system for a lean environment.

- Wherever possible, couple two or more operations so that work does not accumulate between work stations. By using this pull technique, work will flow one piece at a time through the cell. Never make more product than you need to satisfy the current demand for the product.
- See if your vendors will deliver smaller quantities in more frequent deliveries. This will enable you to reduce the re-order lot size to your suppliers, as well as the amount of inventory you carry.
- Enable the lot-for-lot sizing function in your ERP system. When you do this, lots will not be generated in sizes greater than the quantity actually needed to satisfy requirements, resulting in a zero base inventory. At the finished goods level, this would result in either a zero-based or safer stock-based inventory.
- Schedule machine maintenance. Don't wait for the equipment to fail. Planning for repair and maintenance gives the maintenance department time to receive any repair parts and materials needed. It also allows the planning department time to work around the problem of not having that piece of equipment.
- Review your bills of materials, work center files and routings. Your ERP system requires accurate data. If a bill of materials has the wrong quantity of parts needed to make a certain item, that will guarantee an assembly problem, which will lead to inventory problems.
- Spend one production cycle physically counting your inventory. This provides fresh data regarding inventory errors. Annual physical inventories are never accurate and provide no information as to when, where and how inventory errors occurred.
- Figure out why non-productive time dedicated to queue, wait, and move times is happening. Reduce those times, and you'll see a reduction in lead-times and inventory levels.

Should you be searching for a new ERP system as part of your lean initiative, Eric Kimberling president of the Panorama Consulting Group LLC, suggests you define your business process inefficiencies upfront with lean in mind.

"Think lean as you're looking," he says. "A lot of times a company will say, 'Here's what we know and how we'd like to do it and evaluate software against that.'" But, says Kimberling, they need to go a step further and ask themselves if they change their requirements to go leaner, could the vendor adjust to that change?

As always, a manufacturer should quantify and measure all business operations before and after employing lean and implementing ERP. "If you think you're inefficient now, quantify and measure and find targets for improvement, because that will drive what does or doesn't get implemented, such as additional modules," Kimberling says.

According to Kimberling, running the numbers you find will help you run a cost/benefit analysis to determine whether you need a particular ERP module.

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