



SAP White Paper



THE LEAN ADVANTAGE FOR COMPLEX EQUIPMENT MANUFACTURERS

THE BEST-RUN BUSINESSES RUN SAP™



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EXECUTIVE SUMMARY

An increasing number of manufacturers are implementing lean initiatives to create competitive advantage. Such initiatives can help manufacturers achieve on-time delivery, operational excellence, and continuous improvement as well as shorten order cycles, reduce costs, and increase revenue. However, despite the obvious benefits, many manufacturers of complex equipment have not yet begun or are only just beginning lean initiatives and programs.

This white paper is for those complex equipment manufacturers new to lean strategies, practices, and techniques, or for manufacturers who feel they are not fully achieving their lean goals. It explores the lean areas of focus in play by complex equipment manufacturers determined to differentiate themselves from the competition. The intent of the paper is to help you set the right overall lean direction for your company.

As more manufacturers take lean seriously and the industry swing to lean continues, you cannot stand still. The first question to answer in deciding your company's lean direction is this: can your company afford not to go lean?

Answering that question can be a difficult process and the first of many obstacles to successful lean-manufacturing initiatives. What are the other obstacles to watch out for on the road to lean? This white paper identifies the common barriers to adopting and executing a lean strategy. For example, some companies take a shortsighted view of lean, engaging in sporadic lean projects and fixes with no long-term lean strategy to follow. Others have difficulty gaining executive sponsorship or commitment, leading to compromised lean results. Managing cultural change and engaging employee participation are also challenges, but the ultimate goal is to move beyond lean methodology into practical, actionable control.

However, before a manufacturer can reach that goal, it first needs to master the basics of lean. It can then execute its lean strategy and take specific actions to ensure its success. This white paper outlines some of these key actions. Such actions cannot substitute, however, for the need to partner with a solution provider that has extensive experience in lean manufacturing. Such a partner can provide the enabling technology to give you actionable control over your lean-manufacturing processes. For this purpose, SAP® software from the SAP for Industrial Machinery & Components solution portfolio can help manufacturers of complex products and equipment on their lean journey. This software offers full solution coverage of all the processes needed to support lean manufacturing in your organization.

LEAN INITIATIVES IN THE COMPLEX EQUIPMENT INDUSTRY

As customer demand increases, complex product and equipment manufacturers continue to improve operational performance by adopting lean practices and strategies. Impressive strides are being made, such as increased growth with no increase in workforce and reduced work in process to speed time to market.

A March 2006 AberdeenGroup report¹ focuses on these strides. The report includes a survey of manufacturing companies that reveals those companies taking a best-in-class approach to lean deployment are already reaping benefits from lean initiatives.

A number of competitive threats drive companies to these initiatives, leading with on-time delivery. The report says 75% of manufacturers surveyed ranked meeting customer delivery dates as a key competitive differentiator. Many of these companies are already able to correlate their current success directly to their lean strategy.

For some manufacturers whose expected delivery times have dropped dramatically – from weeks to just days or hours – lean manufacturing is emerging as a requirement of doing business. These manufacturers rank the need to improve operational performance – that is, reduce costs and increase revenue – as their top driver for adopting a lean strategy.

Another important lean driver for manufacturers is customer-driven demand for a shorter order cycle. To meet this demand, a finished goods manufacturer, for example, may start a just-in-time lean initiative requiring process redesign, consolidated supply-chain information, and the implementation of advanced planning and optimization software.

Finally, competitive advantage in price and service is fueling lean initiatives for manufacturers. As lean manufacturing becomes more commonplace in the industry, some manufacturers caught in the price and service squeeze find themselves at a disadvantage by not implementing lean operations, especially where lean processes can lead to double and triple gains in workforce productivity.



1. "Enhancing Lean Practices: Lean Adoption in the Industrial Machinery and Components Industry," AberdeenGroup, March 2006.

OVERCOMING COMMON OBSTACLES TO LEAN

In setting and then executing the lean direction for your company, you can expect to face the following challenges and obstacles.

Organizational Structure

When looking at the success of the overall fulfillment process versus only the manufacturing portion of that process, organizational structure can often get in the way. For example, in numerous instances, a vice president or director of operations drives lean improvements within a company. When defining the road map of the lean journey the organization is about to undertake, this person tends to maintain direct control of the resulting changes, thinking, “By changing what is under my control, I can effect immediate change.” This shortsighted view often leads to an organization committing what JCIT International (JCIT)² calls random acts of lean; companies focus on the wrong piece of the value stream, as the following examples, drawn from JCIT’s experience, drive home:

- A hospital took 4.2 days to process a new patient and wanted to get that number down to less than 4. To the operations director of the hospital, this sounded like a good idea. To the CEO who had profit-and-loss responsibility for the business, the 4.2 days spent on patient processing was not the problem. In the CEO’s view, the real issue was the 62 days it took to process paperwork to receive payment for a patient’s procedures. While random acts of lean, such as reducing 4.2 days to less than 4, can lead to new efficiencies, their value to the overall business is questionable if they don’t tie back to the bottom line.

- A pharmaceutical company took less than 10 days to manufacture and fill millions of bottles of pills for a drug campaign. It used fill and pack machines that ran so fast you could barely see the bottles coming out. However, to reduce the number of production days still further, the company wanted to create a stretch goal to reduce 10 days to less than 10. Again, to the operations director, this made sense. The CFO had a different view. Although the CFO saw advantages to reducing the 10-day process, there was a more urgent issue – the 240 calendar days it took to process the paperwork for that one drug. By applying lean tools and principles against a very large quality-documentation problem, the company would slash more than 200 days of paperwork processing.
- A construction equipment manufacturer took 3 days to build a massive piece of construction equipment that required a bill of materials containing more than 10,000 items. A lean improvement team wanted to get 3 days down to less than 3. Upper management had a different view: it saw the company’s 437-calendar-day order-to-cash cycle. Instead of worrying about reducing 3 days of production to 2.8 days, the company decided to focus on reducing 437 order-to-cash days to less than 100.

The lesson learned is that to make a real quantum leap in speed to market, you need to consider overall fulfillment, not just the factory. Other departments in the company, including sales and marketing, procurement, finance, and distribution and logistics, must be involved in the transformation. Although crossing into these other functional areas of the company is sometimes politically and organizationally taxing, it needs to happen if you want to achieve a fully agile and flexible manufacturing environment.

2. JCIT International is the innovator of Demand Flow® technology. SAP AG and JCIT work on projects that bring think-tank knowledge to ERP software solutions.

Still, to make the change to a lean environment, a company must focus on the factory first, because virtually everything revolves around the factory and its response time. Your people, your engineering, your IT systems, your customers, and your suppliers all depend on the speed and response of your factory. This focus can help you determine if the factory should be more responsive, if lead times are excessive, if you can reduce response times to meet customer demands and expectations, and how to accomplish it all.

Culture Change

Another obstacle to lean concerns the cultural change that occurs when manufacturing companies move from a make-to-stock operating model to a make-to-order or an assemble-to-order environment. This switch from a push to a pull environment based on customer orders can postpone work processes until you receive the customer order. This deviates from traditional manufacturing mentality, where the focus was on utilization and efficiency even at the cost of building products that were not going to be quickly converted to cash.

In a lean environment, managers and workers have to understand that preventing the waste of overproduction outweighs the need to keep workers busy. This can have a cultural impact on experienced personnel who may resist the new and unfamiliar environment. In the survey of manufacturing companies cited in the Aberdeen report,³ 85% of the respondents named significant culture change as their top lean-adoption challenge.

To overcome this transitional situation, you can employ the lean practice of kaizen – engaging employees to accept responsibility for continuous improvement by looking for opportunities and submitting their ideas for consideration. For example, when not all of the line workers are required to meet the day’s production requirements, you can deploy these resources for other value-added activities such as kaizen “blitzes” to investigate improvement possibilities.

Management Support

Top management support is critical to the success of lean initiatives. Workers and managers must understand that the adoption of lean practices is a long-term business strategy and not simply an improvement “flavor of the week.” This can be difficult if the lean initiative begins as a grassroots improvement project in manufacturing rather than being driven as an enterprise-wide strategy from the top down.

When top management drives lean initiatives, improvement projects tend to be more successful and sustainable. One key to obtaining the desired results is to have clear objectives in place and to create performance measurements for the organization that promote behaviors that are desired in a lean environment. This is often a barrier because executives need to be educated on lean principles to understand what new metrics to deploy to the organization.

Enterprise Resource Planning and the Factory Floor

One of the most prevalent challenges facing best-in-class manufacturers is the gap between their enterprise resource planning (ERP) system and the factory floor. Although many companies have worked hard to reduce lead times from months or weeks to just days or even hours or minutes, they still need to integrate the new requirements of the lean factory floor with their ERP system. That is why companies like SAP AG and JCIT International are working together to bring think-tank knowledge of factory conversion to ERP software.

As part of their lean strategy, it is also the objective of best-in-class manufacturing companies to build flexibility into manufacturing supply-chain processes. This is essential to meeting increasing customer demands, especially shorter and shorter lead times.

3. “Enhancing Lean Practices: Lean Adoption in the Industrial Machinery and Components Industry,” AberdeenGroup, March 2006.

Measuring Lean Success

As some manufacturing companies continue to tackle the beginning phase of going lean, other best-in-class companies have already overcome these barriers. These companies are moving beyond methodology toward lean results, and they are diligent about measuring their success with key performance indicators (KPIs). It can be challenging for a business to monitor KPIs on a daily and routine basis. However, by monitoring performance and measuring the impact of lean, a manufacturer can quantify opportunities for success.



LEAN SOLUTIONS FOR COMPLEX EQUIPMENT MANUFACTURERS

The dividing line between those companies succeeding with lean and those that are not is commitment to the lean initiative, and this starts with the basics.

Mastering the Basics of Lean

Lean methodologies begin with education. To accomplish this, many manufacturers institute “train-the-trainer” programs or bring in consultants and trainers to host workshops. Some companies create their own formal lean methodology courses.

Another basic is kaizen. In looking for ways to continuously improve processes and techniques, you should focus on evaluating visible product flow, inventory, and quality. Your line and work-cell structure should align with your lean strategy.

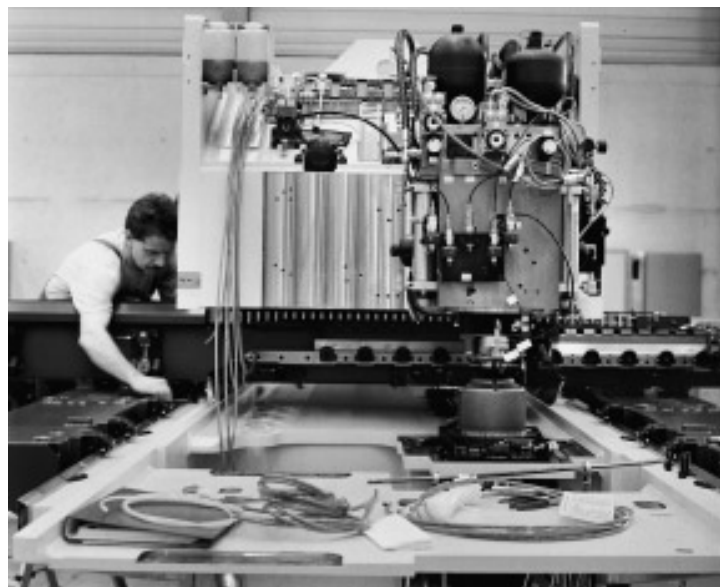
Basic lean methodologies like 5S (sort, set in order, shine, standardize, and sustain) are used by manufacturers to establish and maintain productive work environments. A thorough evaluation of current work processes can result in more organized and effective work areas. Kanban is also common in the manufacturing industry, because kanban pull chains lend themselves to discrete manufacturing. In addition, value-stream mapping is a popular basic lean technique used to evaluate operations and eliminate activities that do not add value.

Finally, monitoring advancing technology and its impact on lean processes is a basic lean practice that never ends. Because of the unique products they produce, complex equipment manufacturers in particular should consider how advances in technology, such as Web-based solutions, analytical tools, and real-time production data, play a role in their lean initiatives.

Putting Lean into Action

The whole point of going lean is to produce measurable and accelerated results. Once you master the lean basics, the following actions can help ensure a successful lean outcome to your lean initiatives and overall lean strategy:

- **Measure KPIs frequently.** Meeting on-time delivery and customer demand by striving for operational excellence requires you to meet strict standards for success based on frequent measurement of critical objectives. Many best-in-class companies measure throughput hourly or by shift, so any production issues are highly visible and quickly resolved.
- **Unite the plant and supply chain.** As customers demand shorter order cycles and on-time delivery, they expect manufacturers to adopt lean, customer-focused processes to meet their requests. The scaling of lean processes throughout the supply chain is required to meet these requests. To enhance visibility and agility, the technology used to unite the plant with the supply chain can be a crucial component of success.
- **Build responsive processes.** Traditional, make-to-forecast methods often lead to inventory backlogs. However, “to order” environments that pull demand from customers rely on processes that accommodate and are responsive to customer requirements.
- **Monitor continuous improvement.** Kaizen workshops focus on continuous improvement by quickly isolating critical issues. Therefore, organize your kaizen improvement programs around the value stream and focus them on your most valuable business areas.
- **Think lean production.** When possible, postpone manufacturing processes until you receive the customer order. Strive to make the cash-to-cash cycle as short as possible by not building ahead and hoping for the right orders to come in. Instead, focus on building products that will be converted to cash quickly.
- **Be ready.** Document your value-stream processes and formalize your kanban sizing methods. As new products are introduced or order volumes change significantly, you can quickly reconfigure your production line and material replenishment plan to maintain the flow of products through your fulfillment processes.
- **Use lean consultants and experts.** While many lean concepts seem simple and logical, there are nuances in every company that have to be addressed. Leverage the experience of skilled consultants who have implemented lean processes with companies in your industry to avoid common pitfalls and mistakes.



Lean Solutions from SAP

When it comes to the enabling technology that complex equipment manufacturers need to make quantum leaps in lean, no one delivers better than SAP. The SAP for Industrial Machinery & Components (SAP for IM&C) solution portfolio offers end-to-end solutions that cover virtually all of the processes required to implement and sustain state-of-the-art lean order-to-cash, supply-chain, and fulfillment processes.

SAP for IM&C supports lean manufacturing in your organization with solutions that enable you to achieve the following:

- Customer collaboration, including responsive replenishment methods for optimizing inventory at customer locations
 - Supplier collaboration, including methods to share, synchronize, and collaborate on inventory and order information
 - Demand planning and forecasting, including tools for collaborative planning, phase-in and phase-out profiles, “like” modeling, and characteristics-based forecasting
 - New-product development and introduction and product life-cycle management, including automated approval workflow to manage engineering changes
 - Global available to promise (ATP), including rules-based ATP
 - Integrated production planning and execution
 - Heijunka sequencing
 - Line design, including sequence of events, takt-time calculations, total product cycle time, critical-path analysis, and features that highlight work imbalances
 - Quality control by linking operational method sheets to bills of material
 - Kanban sizing and execution, including kanban calculation, kanban control, and external procurement using Internet kanban
 - Backflushing at the final operation, at pay points, and even through multiple levels of the bill of material
 - Actionable intelligence for line operators, production managers, and operations executives via role-based dashboards
- Support for individualized reporting with simplified transactions accessible through easily tailored user interfaces that can be quickly developed and deployed
 - Integration of manufacturing systems to an ERP backbone to provide coordinated and consistent information across the enterprise
 - Lean warehouse and logistics with features like cross-docking, task interleaving, wave picking, and slotting
 - Profit-center accounting where cost centers, cost objects, and revenue can be associated to value streams

Solutions You Can Trust – from a Company You Can Trust

Founded in 1972, SAP is the recognized leader in providing collaborative business solutions for all types of industries and for every major market.

Serving more than 38,000 customers worldwide, SAP is the world’s largest business software company* and the world’s third-largest independent software provider overall. SAP has a rich history of innovation and growth that has made it a true industry leader. Today, SAP employs more than 39,300 people in more than 50 countries. SAP professionals are dedicated to providing the highest level of customer service and support.

To learn more about the advantages of using SAP® solutions for lean manufacturing, visit the SAP Web site at www.sapmanufacturing.com.

*SAP defines business software as comprising enterprise resource planning and related applications such as supply chain management, customer relationship management, product life-cycle management, and supplier relationship management.

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