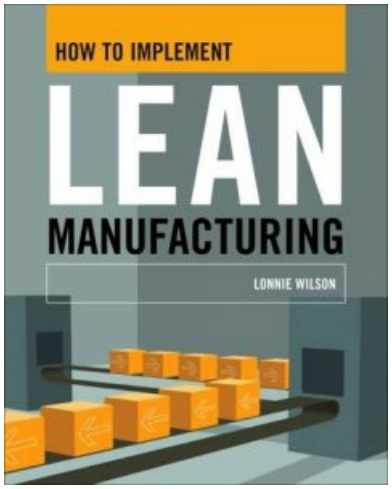

Book How to Implement Lean Manufacturing

Lonnie Wilson
McGraw-Hill, 2009

Recommendation

Lonnie Wilson brings decades of experience to this practical guide. He shows you how to put lean manufacturing to work in the real world without the usual windbag textbook theories and with plentiful examples. *BooksInShort* finds that he provides solid information about what you need to do (and don't need to do) to maximize lean's benefits for your company. Wilson is clear and strikingly passionate. His manual is not difficult to understand, but it is somewhat technical. He directs his lessons – and his informed opinions – toward those who already know a good bit about manufacturing processes. He explains how Toyota uses lean within its Toyota Production System, but he also discusses how you can put lean into practice. Wilson describes how important corporate culture is to implementing lean manufacturing and notes which aspects of your organization must align with its approach. The book is full of checklists, assessments and charts to help you get to its core principles easily and grasp them quickly without ever getting lost in a fog of philosophy.

Take-Aways

- Your company can implement aspects of lean manufacturing quickly and begin realizing its benefits right away.
- Variation in your processes is your enemy. Strive to remove all of it.
- Toyota's Production System is a business philosophy. Lean is only one segment of it.
- The "two pillars" of lean manufacturing are "just in time" production and "*jidoka.*"
- *Jidoka* is a process for identifying substandard parts and preventing their progress through your system.
- To implement lean, you need committed managers, stable processes, superior products, quality control and quantity control.
- Lean also requires solid goals, management audits and motivated workers. Having in-house problem-solving talent helps, too.
- Rolling out lean in multiple stages works better than a "clean-sweep" approach.
- Organize your manufacturing into cells – based on families of products that use particular parts – for easier management and more efficient use of machinery.
- Use lean to measure and eliminate rework from your manufacturing processes.

Summary

Is Toyota's Production System a Synonym for Lean?

The Toyota Production System (TPS) flows from the company's corporate culture. It is an overall way of doing business, not just a manufacturing system, like lean. Trying to remake your culture might yield positive results, but it would be an expensive, long-term project. However, you can realize definite gains in a relatively short time by implementing lean manufacturing, especially if you focus on process engineering. Using lean manufacturing mostly involves taking practical steps that you can measure, analyze and adjust. You will see the business results of your efforts quickly in terms of efficiency and profitability. TPS is Toyota's philosophical and practical overarching system for controlling product quality. It incorporates a lean manufacturing system, but implementing lean does not require using TPS.

> "At the heart of Lean is...a long-term philosophy of growth by generating value for the customer, society and the economy with the objectives of reducing costs, improving delivery times and improving quality through the total elimination of waste."

Toyota's corporate pioneers – Taiichi Ohno, Shigeo Shingo and members of the Toyoda family – developed the Toyota Production System. This system is based on "just in time" (JIT) manufacturing, which ensures the production of goods exactly when your customers want them, and on "*jidoka*," a manufacturing improvement system. Jidoka makes high quality intrinsic to your production processes by preventing bad material from advancing through your system, thus ensuring that you never ship below-standard goods. Quantity control measures are core constituents of quality control, which includes applying jidoka to detect substandard items and knock

them out of your processes.

The Link Between Variation and Inventory

Inventory can be composed of either finished goods or "work in progress" (WIP) materials. A company's volume of work in progress often reflects its cycle time and the variations in its production pacing. "Cycle stock" is inventory that you coordinate with the size and frequency of planned product shipments. Variations in supply, delivery or customer demand can create the need to stock "buffer" inventory.

> "Although manufacturing is the focus, the Lean principles, once understood, have a very broad application."

While you cannot avoid variation completely, regard it with hostility and try to get rid of it. Toyota identifies and removes every scrap of variation in its system because its managers see variation as waste. They use kanban, an incremental "pull-demand system" to manage and reduce inventory.

A Straightforward Approach to Lean

Lean manufacturing insures less waste, lower costs, shorter time to delivery and higher quality. Implementing lean begins with hiring great people, but that is not enough. You must invest in their development and empower them to reduce variation. They must enthusiastically embrace the goal of building stable, flexible, constantly improvable processes. Lack of managerial commitment is just one reason that a lean initiative can fail. Others include lack of understanding, lack of willingness to do the required work, poor suppliers, mismanagement of ancillary programs, and low comprehension of variation and the need to cure it.

> "Standardization is an attempt to get all the parties who perform some activity to perform it using the same skills and actions. It is an attempt to eliminate the variation that exists in any activity."

To succeed with lean manufacturing, your organization needs stable, high-quality products and processes. It also requires reliable machines that are consistently available, real talent for problem solving, a demonstrated ability to develop and maintain standardization, and a proven commitment to incremental, ongoing progress. You should have strong, mature and documented processes that follow a smooth-flowing routine. You also must know your inventory demand and how your processing operations affect quality, since you are about to engage in constantly improving those processes. Once you master these precursors to lean success, you can begin the journey to improved efficiency, profitability and competitiveness.

> "Short lead times and lead-time reduction is such a basic tool in Lean that you will find it to be a strong measure of Leanness."

Culture resides in the way people think, work and talk together about their jobs, and in the things they hold dear. Look for traits your organization has that are so familiar and expected that no one even discusses them. These invisible assumptions matter a great deal, especially if they conflict with your lean manufacturing goals. If you need to adjust your culture to implement lean, turn to strong leaders who can generate powerful motivation companywide. Find the problems you need to alter in your culture and identify or recruit talented problem solvers.

> "Every process has a bottleneck, a constraint that limits its ability to produce."

Jidoka is tough to implement, but it will enable you to find waste to eliminate in every process. Cut transportation by limiting trips. Reduce downtime by refining production lines. Kill all "non-valued added activities," such as "extra processing." You will find that capturing errors and refusing to let them grow within your system makes a strong cultural statement.

Key Steps to Lean

Take four fundamental steps to build your strategic approach to lean:

1. **"Synchronize supply with external customers"** – Set up contracts with your suppliers addressing all matters affecting quality, cycle time and "safety stock" to cover variability.
2. **"Synchronize internal production"** – Use time studies to determine how effective your equipment is and how to make each workstation as efficient as possible in the context of a balanced production line. Strive to eliminate variation in your cycle time.
3. **"Create flow" –** Your overall flow is based on the lead time needed to produce a part. You want to cut that lead time, but several problems can impede manufacturing flow, including defects, inventory, transportation and changeover time.
4. **"Establish pull-demand systems" –** You must know the volume of your stock (that is, cycle, buffer and safety stocks) to create a fixed volume of inventory for your processes to draw against. As production pulls items from your inventory, your signaling system (like Toyota's kanban) tells earlier processes to add stock to replenish it.

   > "The constraint can be a specific step that has the longest cycle time, or if the steps have large variations in cycle time, the constraint can be a moving one."

To reduce your lead time, pay attention to seven pivotal improvement goals:

1. **"Reducing production time"** – Redesign processes for fewer steps and defects.
2. **"Reducing piece wait time"** – Coordinate and harmonize flow.
3. **"Reducing lot wait time"** – Make lot sizes smaller. Shorten "first piece" times.
4. **"Reducing process delays"** – Decrease waiting time by matching capacities and batch size more accurately. Create level production demands throughout your facility.
5. **"Managing the process to absorb deviations and solve problems"** – All deviations from stated processes cause longer lead times and demand extra inventory, so focus on eliminating deviation.

6. **"Reducing transportation delays"** – Consider both physical and data transport and try to eliminate unnecessary trips and transmissions.
7. **"Reducing changeover times"** – Cut your lead time and increase your productivity by eliminating delays at every step of the process.

Paths to Implementation

Decide if you are going to roll out lean in a logical, stepped manner or go for a "clean sweep" of change. Doing it all at once has a certain appeal, but it creates complexity and lowers your chances of success. The focused, segmented approach works better. Each step in a partial rollout will teach you lessons you can use to improve subsequent steps. In an overall rollout, you end up handling many issues after implementation, thus adding cost and difficulty. Designate or hire someone to evaluate your organization's present condition, so you understand your starting point. Document your capabilities. Set the goal of creating a future in which you produce your present level of value or more, but with less waste. Document that design. What objectives help you achieve that future? How can you use *kaizen* ("continual improvement") and jidoka?

> "To install a Lean manufacturing system for all value streams in a large complex plant simultaneously is very difficult. Although this 'clean sweep' approach is surprisingly popular, it usually is an inferior technique to one-value-stream-at-a-time implementation."

Once you implement the system, run stress tests to make sure it meets its goals. Clarifying your targets focuses your company's actions and creates a way to measure its achievements. The Hoshin Kanri planning, "policy deployment" and goal-setting model focuses on time frames, reviews, audits and communications. It works well with lean's methods and purposes. Write specific, measurable objectives that stretch your abilities within a certain level of believable difficulty. Track your progress toward these goals. Include deadlines.

How to Manage Constraints

If you sense that something in your process is impeding your manufacturing speed and efficiency, how can you diagnose that "bottleneck" or constraint? Investigate stations where inventory or WIP builds up; something in that step is holding you back. Maybe it has a longer cycle time or such high variation that it yields fewer quality parts. Sometimes a constraint will manifest at one station under certain conditions and at another under other circumstances. Once you identify the constraint and its cause, adjust the process to clear the choke point.

Breaking Processes into Manufacturing Cells

To improve your production rate without adding cost, organize your manufacturing work into cells that focus on flow by creating single processes to deal with small batches of goods. Each cell uses machines that are appropriate to its volume to create output for defined families of products. Pay attention to the physical layout of each cell so that its supervisors can see the work under way and the materials coming in and out. For this reason, many companies use "C" or "U" patterns when they design their cells' layout.

Fundamental Rules of Variation

Every workstation's capacity varies, a lot or a little, from moment to moment. If you reduce the amount of variation in each workstation, you also will reduce its WIP inventory needs. Conversely, if variation increases, inventory and lead time will also grow. This relationship implies that:

- Any system variation will require having more inventory on hand to maintain continuous production in a smooth flow.
- The more variation in your system increases, the more inventory you will need incrementally to maintain your desired level of production.

> "Process maturity goes beyond the measure of 'good enough' so that a product is not only good, but is produced with a minimum amount of waste."

Train your employees to work on multiple machines so they can cover for each other and still produce high quality-low variance output.

Lessons from the Front

Alpha Line is the main manufacturing line at Bueno Electronics, a European-owned auto supply company in Mexico. Faced with the need to rework its statistical techniques and much of its manufacturing processes, Alpha's executives began by training each department's management team about the firm's production issues. They spent nearly a week teaching the basics of statistical process control, including charting and other management systems. They explained the leaders' roles in increasing quality. To gauge the need for improvements, they measured how much rework Alpha's products needed with a metric called "first time yield" (FTY). It captured how many pieces got through the system the first time, without rework. By training, measuring and focusing on reducing variation, Alpha raised its FTY and kept it higher than 90%. Managers changed its culture by changing themselves and the way they managed their teams.

Holding the Ground You've Won

To ensure that improvements remain stable, monitor their progress. New methods are bound to hit some difficulties, so document problems, address them and be sure customers receive the help they need. Train people to use lean procedures and standards; retrain them as needed. Organize their jobs so you can see quickly if everything is working. Hold frequent audits. Teach managers how to check the system and hold them accountable for its performance. No matter how much progress you make by switching to lean, never assume you have arrived or that your achievements are "good enough." You can and will drive even more waste out of your system.

About the Author

Lonnie Wilson has many years of experience with lean. He founded Quality Consultants, which helps small and large companies implement lean's principles and

techniques.