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OVERVIEW

What does "Lean Manufacturing" mean? What does it take to implement Lean Manufacturing? And is "Lean Manufacturing" necessarily "mean manufacturing" as critics of this zero waste approach to making things have suggested? In this article, *InSights* talks with Joachim Fischer, a life-long practitioner of the art of Lean Manufacturing, to explore the answers to these questions.

Upon graduating with an Engineering degree from the University of Applied Science in Rosenheim, Germany, Fischer joined Gruber+Schlager furniture company where he first experienced how Lean Manufacturing comes to life. Mr. Schlager and his partner started their company in Austria shortly after WWII and he quickly realized that, like those who developed the much-envied Toyota Production System (TPS), "They just didn't have anything to waste. Subsequently, they had to make the most out of whatever they had."

As Operations Manager, Fischer also realized that Schlager's concept of making the most out of every resource extended far beyond material inventories and machine capacities. While Schlager had only a modest education, he was shrewd enough to realize that the workers' minds, their time, and their energy were of equal importance to the manufacturer as the materials and machines they handled. Making furniture under this inspired mentor taught Fischer, "Lean Manufacturing is something that is core to everything a business does. It is not just a program or the latest management fad. It is not just for the factory. It is a way of living."

The rest of this article explores Fischer's approach to applying the principles of Lean Manufacturing, implementing them, and checking to see that they are working properly.

WHAT ARE THE PRINCIPLES OF LEAN MANUFACTURING?

Fischer thinks hard when asked to enumerate the principles of Lean Manufacturing. Over the years, he has helped more companies than he can remember adopt the Lean Manufacturing approach. While each company has different processes, there is one principle that transcends all others. The essence of Lean Manufacturing can be summarized in two words: *waste free*.

Fischer says, "The shop floor is just half or two-thirds of the activity of a manufacturing organization. If you are an R&D intensive organization, maybe only ten percent of your activities are in the factory. But regardless of the percentage, if you only focus on the shop floor, your efforts to implement Lean Manufacturing are going to fail. You have to work on all of the processes in a company at the same time."

Fischer asserts that the principle of "waste free" extends from the Chairman's office to the broom closet. Waste free must inform everything people think about, and everything they do in the organization. Waste free is not so much about fastidiousness as it is about the message management conveys to employees. When managerial directives contradict management's actions, employees notice the discrepancies.

Fischer explains, "Your back office also entails processes. Marketing, human resources, purchasing, finance, executive management, all of these are processes, and the shop floor is just one of the places where you need to make changes. You call in an expert to improve your machine changeover time, but reducing that time will be in vain if you still drown in inventory, and you have to fix that too."

Message: You cannot expect manufacturing to work clean and Lean, while allowing other departments to work messy and fat. You need to transform the entire system! Fischer provides some additional thoughts on what it means to adopt a Lean Manufacturing mindset.

Design Human-Oriented Workplaces

The craftsman-run carpentry shop of yesterday may have become a highly mechanized furniture factory today, but human beings remain essential to the efficient use of tools. Ironically, many of today's "factories" require intense human effort to direct the work of machines. Consider the global bank, emergency room, retail chain, movie studio, restaurant, or university. The factory is far from a thing of the past. If you want to see a modern, labor-intense "factory", visit a Starbucks.

Fischer asserts that the principles he learned from his mentor 25 years ago still apply to the 21st century workplace. "Mr. Schlager observed that people spend their lives in the factory. He realized that if you take care of them, they will take care of you." Taking care of people begins by making sure they can get their work done effectively, efficiently, and safely. Taking care of people also extends to creating a healthy work environment, providing appropriate compensation, training, and giving appreciation when it is merited.

Accordingly, Lean workplace design needs to accommodate a range of basic human needs. Certainly there is a design that maximizes machine output. There is also a design that maximizes human output. Those two designs need to interact in ways that optimize what humans and machines can do together.

Fischer summarizes, "It's easy to agree on a new layout for the shop floor, but Lean extends far beyond just that. Senior Management and all the support functions, such as HR, need to emphasize their clear commitment to the workforce. This commitment, whether it is manifested through professional development, visual management or simply a safe workplace, needs to be visible to the people in all departments. I think there is a huge message here."

Think First, Measure Twice, Cut Once

Fischer explains that "measure twice, cut once" is an old cabinet making principle. He adds the "think first" to make the point that modern work is seldom rote. The cabinetmaker worked with a precious few, irregularly hewn boards. He had to decide how to cut each board so that he could make the pieces he needed to finish the work and sell it. A cutting mistake might mean either a delay in delivery, or the loss of a sale. Nobody pays top price for an almost finished cabinet.

The scarce resources in today's factories are not only planks or parts, but also time. Not only is time scarce, it is expensive. When people waste time by performing unnecessary steps, duplicating efforts, or in other ways wasting time, they are essentially cutting twice. Time lost can never be recovered. Both the clock and the calendar are unforgiving.

Clear, Clean, and Orderly

The absence of debris is one of the hallmarks of a Lean factory. Fischer says that the ability to "eat off the floor" serves a profoundly simple and functional purpose. He expands the analogy by explaining; "The ability to 'eat off the floor' is also the ability to detect problems such as a screw lying on the floor. A screw on the floor might not seem like a big deal, but this screw is either missing on your product, which customers do not appreciate, or it is missing on a machine which can lead to major issues with the manufacturing process. Either way, unless we can detect the screw on the floor, we won't know that something is wrong." Keeping the floor and all other places in the factory debris-free serves as an early warning device for spotting defects and preventing breakdowns.

Fix Things Immediately

With regard to breakdowns of any kind, Fischer insists, "Get things fixed immediately. You stop. You finish the repair. Then you start again."

Fischer makes the point that when a worker continues to use a machine that is not performing to spec, or uses components that are not 100% to spec, errors tend to compound. While pressure to get things done on time may tempt workers and managers to apply bandages and take shortcuts, the results will never meet the quality standards needed to distinguish the business over time. Slightly flawed products may pass out of the factory unnoticed, but customers inevitably have a knack for discovering such flaws. Companies that tolerate taking shortcuts routinely find themselves in trouble.

Commit to People

Fischer reflects on his experience as a newbie Operations Manager. He says, "You know, coming out of school the whole concept of Continuous Improvement was very mechanical. Basically it was the Deming principles around the stopwatch. But then working in the factory, I realized that the crux of efficient manufacturing is not necessarily improvement by measuring, but by working with people and drawing them into recognizing that they know the solutions. Unless people are motivated to become part of the solution rather than just part of the problem, you will not achieve much change."

Fischer describes his experience with two organizations that fully embraced the principles of Lean Manufacturing to achieve dramatic and lasting change. Each organization was so successful at ingraining Lean Manufacturing that they no longer needed Fischer's services. Like a proud parent seeing his children take charge of their own lives, Fischer points to two factors that differentiated how these companies approached the Lean transformation. The first factor was trust and the second factor was time.

Fischer identifies trust as an essential factor on multiple levels. He says, "You first have to trust that Lean Manufacturing is the solution. You have to believe that if you do it, it is the means to make a difference, not just a means to get out of trouble with a particular machine or change a process."

He further emphasizes that trust means involving those who will be affected by the changes. A transformation is not something you do to people. It is a process that must be done *with* people. Also, solutions to highly embedded problems may not be apparent at the outset. Managers need to trust that the people involved can find solutions for the most intractable problems.

Finding solutions to intractable problems evokes the second factor: time. Once management conveys the need to change

the way things are done, they also need to convey the message, "We trust you to help us figure out how to get it right. "Management must back up their messages with persistence and patience, both of which rely on trust.

Fischer acknowledges that getting things right generally takes a little longer than just applying bandages. It requires getting into the weeds, and can sometimes be frustrating. But once done, the changes that result will fundamentally eliminate inefficiency from the shop floor. His point is that when management provides the trust and time for people to learn how to do things differently, it will no longer matter which machine is giving problems. The Lean Manufacturing team will have gained the ability to deal with such problems in the most effective way.

Management's Job is Coaching and Mentoring

Management's initial role in the transformation to Lean Manufacturing is to realize that the process is irreversible. If a company takes on Lean Manufacturing as a way of life, it means life thereafter will be different. Fischer says that the most successful transformations are led by managers who insist, "I'm not interested, per se, in just shaving a couple of seconds off some processes. I'm committed to transforming my organization into something that is truly exceptional. "

Fischer again points to Mr. Schlager as a role model for coaching and mentoring. He observed Schlager constantly helping his people do their jobs better at all levels. Fischer says, "For me as a young individual coming fresh out of school and being in a leadership position running the shop floor, this was eye-opening. He would take care to teach you everything there is to know. His commitment was to individuals and to his staff. There is something in that approach to teaching people that you cannot necessarily take for granted today."

HOW DO YOU IMPLEMENT LEAN MANUFACTURING?

The mechanics of implementing Lean Manufacturing processes are straightforward. According to Fischer, a company that has never engaged in a comprehensive Lean review may expect to improve outcomes by 30% or more. In fact, Fischer says, "Getting 30% improvement is a kind of given. And if you don't get that, then you know something is wrong."

For companies such as Toyota, that practice Lean Manufacturing almost as a religion, "getting 3% improvement is a big deal because they have already been doing it for so long." He adds, "The beauty is that the tools and techniques are exactly the same. Once you learn them, you can continue to apply them."

The process of implementing Lean Manufacturing begins by developing what Fischer calls a "Value Stream Map." The Value Stream Map captures in detail the current situation.

Fischer says, "A Value Stream Map is a visual depiction of what the processes are in their current state. It showcases anyone who touches it, any piece of information that's required in the flow from start to finish. It also depicts resources required, like how many people are involved, how many widgets are required, how many transportation devices, how much inventory."

A Value Stream Map is not a general depiction of what goes on in the company. It is a highly specific, detailed record of exactly what goes on in the company. Fischer makes the point that in order to arrive at the details, you have to measure and count. This is essentially the "base lining" exercise that is familiar to those who have participated in process improvement initiatives.

After the Value Stream Map is completed and verified, the next major step is to generate an "Ideal State" Value Stream Map. The Ideal State represents the company's most ambitious vision of outcomes. The Ideal State focuses on stretch goals and not so much on specific processes.

Fischer says, "Say you learn that lead time is four weeks. You basically just ask yourself, why can't I do that in 30 minutes? That would be the Ideal State." Describing the Ideal State taps into the company's collective imagination. The prompts that lead to the Ideal State are "What if?" and "Why not?" Fischer recognizes that, "The Ideal State might require many things that are not possible today." Complete feasibility of the Ideal State is not essential.

The third step in implementing Lean Manufacturing is to develop the "Future State" Value Stream Map. The question here is, "Which changes are possible?" How might making those changes move the company closer to the Ideal State?

Fischer provides a simple example from a recent visit to a pharmaceutical company. Imagine there is a production line that involves two individuals counting tablets. The first person counts each batch as it passes her station and the second person intermittently checks the first person's work. They then compare counts to confirm accuracy of total throughput.

An Ideal State might be to eliminate the need to count tablets manually altogether. "What if we didn't have anyone counting and the machine weighs and counts the product automatically?"
As this ideal solution might require significant capital which might not be an option at the time, how might this Ideal State be realized? Imagine that tablets are counted in groups of ten using a simple scoop with ten little cavities in it. The counter

only needs to check that the scoop is full, and counting moves from one at a time to ten at a time. Or imagine that the scoop could hold 20 tablets, and that the scoop passes over an optical scanner to register the number of scoops that have passed that point. How close could the company get to the Ideal State by changing parts of the Value Stream Map while not spending significant amounts of money?

According to Fischer, the Value Stream Mapping process is a dynamic process. As we bring the Future State Map to life and closer to the Ideal State, the organization has to periodically revisit the process and update both the current and Future State Value Stream Maps.

The most important activity however is the implementation work itself. Fischer notes that successfully implementing the Future Value Stream Map depends on a number of factors. He includes all of the principles of Lean Manufacturing articulated previously. In addition, Fischer notes that other factors, such as company resources, available technology and policy directives also influence the speed and extent to which the Ideal State can be achieved.

WHERE'S THE STOPWATCH?

Is Fischer's version of Lean Manufacturing softer than the Deming version? Is person-centric Lean less effective than counting seconds?

Not at all. In fact, applying Lean Manufacturing as a way of life may well guide the knife deeper than the mechanistic application of numerical quality control, including all of its latest fads and flavors. It is the focus on helping people become efficient, and not the focus on helping machines become efficient, that makes the difference.

Fischer states emphatically, "I'm very keen on the personal aspects of this job. It's not a source of pride for me that I go into a factory with 500 people and at the end of the day, 200 of those people have to leave. I mean, that's not what excites me. But what does excite me is that the 300 people who are left will be more knowledgeable about what they do, will have participated in the changes, will be more capable of replicating those new principles, and will be more motivated to continue making improvements with or without the help of consultants."

He continues, "You still need the stopwatch. You are going to get the dollars and cents out of the process. But the stopwatch is only used at the end to quantify how much you save. For me, the stopwatch is not necessarily a tool for improvement by itself. You use it to prove the obvious."

Fischer cites the example of a fraud detection company he recently served. He says, "Fraud detection has no moving parts. There is nothing being produced in the traditional sense. All they have is data files. Those files are shuffled around from one individual to another. And based on that information, decisions are made. Whether this risk is covered, whether that risk is not covered, whether this transaction is disputed, whether that bill is paid. It's all just data files jumping from one desk to another. And for them, material obviously is zero."

In this example, Fischer focused the company on the idea that the time between information input and decision-making was an area of waste. He says, "It may not seem like much, but reducing the time to make decisions by 30% would be a big deal. You still don't want to accumulate risk by making the wrong decisions, but you want to make decisions as quickly as possible. How do you do that?"

Fischer's answer? "You start with the Value Stream Map."

WHAT GOES WRONG IN LEAN-ING A COMPANY?

Asked about the apparent ubiquity of Lean Manufacturing pundits, Fischer says, "I'm happy and I'm frustrated by the proliferation of Lean. What I mean by that is that I find a huge proliferation of the buzzwords, and people running training classes and handing out colored belts. And yet you have done very little to truly transform this environment."

Fischer provides the following cautions on the road to becoming Lean.

First, management must commit to change. Lean Manufacturing is not a quick fix. On the contrary, it's a long haul. Lean transformations must be viewed as irreversible.

Second, the Lean approach involves the whole company in thinking Lean. If exceptions are made, those exceptions will eventually dilute, or even undermine, the entire effort.

Third, you need to generate some early wins. Take on a manageable amount of work in the beginning, a pilot area rather than "bet the whole company". The trick in changing the way people think is pacing. Succeed in one area first, then extend the success to the next.

Fourth, management needs to attend the training, get involved in the learning, and act on the ideas people have about making things work better. Management has to learn how to ride the bicycle, not just tell others they need to learn.

Fifth is training. The Lean approach is one of constant learning.

What can we achieve? What did we try? What happened? What could we do differently? People need to be trained to think in ways that lead to Lean.

Sixth is hiring and retaining people who want to think and work Lean. Those who stay with the company and those who come into the company after the Lean transformation are both critical to maintaining the Lean mindset.

Seventh, forget what you know you can't do or don't do. Institutional knowledge about "the way we do things around here" gets in the way of thinking about new ways those things could be done. Or asking whether those things need to be done.

And finally, once the process is well embedded, management needs to look for opportunities to step away from leading the change. Avoid over leading from the front in order to let those most involved in the change process carry it forward on their own. Be involved, but let others own the process and be recognized for their leadership.

Fischer closes the discussion on the meaning of Lean Manufacturing with the following thought:

"Getting Lean Manufacturing right means you have to actually do things differently. This as opposed to saying, 'Yeah, yeah I understand it.' Understanding does not mean anything. I understand how to exercise, but it doesn't make me a fit person."

Lean Manufacturing means taking on the hard work to become as fit as possible.

ARTICLE CONTRIBUTORS

BENNETT MCCLELLAN has over 30 years of corporate and consulting experience. Most recently, he was a Managing Director in PricewaterhouseCoopers' Media & Entertainment practice. Bennett has also held management positions with leading entertainment companies, and has worked as a consultant for McKinsey & Company and Arthur D. Little, Inc. He also serves as a freelance journalist, and has had over 100 articles and editorials published. Bennett holds a PhD from Claremont Graduate University, an MBA from Harvard Business School and a BA from University of California-San Diego.

JOACHIM FISCHER has led numerous operational and cultural improvement and transformation initiatives for clients across a range of industries. His consulting practice is focused on Lean process design, change management and capability building. Fischer previously spent seven years at McKinsey & Company as a Lean Manufacturing and Operations expert, and began his career at Gruber+Schlager GmbH, an Austrian furniture maker, where he served as Plant Manager. Joachim holds a BS from University of Applied Science in Rosenheim, Germany and an MBA from University of China Europe International Business School (CEIBS).

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