



Measuring the Success of Lean

Selecting the best mileposts for the never-ending journey

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By Steve Minter

As manufacturers adopt lean principles the process inevitably involves developing metrics for measuring their progress. If our company is on a lean journey, where are we on that road? How well are we doing? What should we measure? Are we measuring too little or too much? The data that can be collected in a manufacturing plant are almost endless, and the systems that companies use to assess where they stand run a wide and sometimes bewildering gamut.

"It is important that you keep a focus on strategy deployment and that measurements are linked throughout the organization, not just on the manufacturing floor but in accounts payable or other back-office processes, to the objectives of the company so that everybody is pulling in the same direction," says David Strothmann, director, Manufacturing Customer Value Network, SAP Americas.

Underlying the old truism that what gets measured gets done is the fact that measurements are used to influence behavior. Strothmann and other lean experts warn that it is all too easy to deploy metrics in a company that have the unintended consequence of driving anti-lean behavior. For example, says Strothmann, if a plant falls behind on overhead absorption for a quarter, "as a manager there is only one action you can take to improve that measurement, and that is to build more inventory, whether it is needed or not. The traditional measurements that manufacturing has been held to by finance tend to actively hurt their lean initiatives." This disconnect is helping to fuel the interest in lean accounting, says Strothmann, where companies look at value stream performance in a way that supports and promotes lean behavior.

Lonnie Wilson, a lean manufacturing consultant and author of "How to Implement Lean Manufacturing," says it is difficult, if not impossible, to assign a general lean score to companies because their operations and competitive situations differ markedly. He urges companies to adopt two primary yardsticks -- track their own efforts to see if they are making progress and compare their efforts to their competition. He notes, "In the end, the way you measure lean is the ways you changed your behavior to make your fundamental business a better money-making machine and a more secure place for your people to work."

Larry Anderson, co-chair of SME's Lean Certification Committee and a Shingo Prize examiner, agrees. "You can measure inventory turns and those kinds of things, but everything is relative. It is really the long-term sustainability of the business that tells you whether it is lean or not." When judging a facility, for example, Anderson looks through a variety of metrics such as revenue per employee or defects to determine if it is moving in the right direction. But, he adds, he also relies on shop-floor observations. "It is as much feel as anything. Is material flowing or are there points where the flow of material stops? Is there a sense that employees are engaged and that they have standard work that you can base improvements on, or is it helter-skelter?"

Lean experts say one metric companies frequently underestimate is the amount of time needed to implement a lasting lean culture. Wilson says company managers too often treat lean like a fad diet. They find some lean tools, implement them, and track the improvements. But he cautions,

"Two years later, they're right back where they started because they didn't incorporate it into their whole culture."

Favorite Measures

Industrial Scientific Corp., a manufacturer of portable gas detection instruments and related services based in Pittsburgh, has been working on lean for nearly five years. Marc Pagano, the company's manufacturing engineering and operational excellence manager, says one high-level measure the company uses is dollar of output per employee. When the company began its lean journey, the Pittsburgh facility had more than 100 people on the manufacturing floor. Today, it has 64 people but puts out 30% more product. "You can have various lean assessment scores but putting out more product with less people is what it is really about and what people want to see," he observes.

Bill Smith, ISC's Americas manufacturing manager, says that in keeping with the company's "employee first" philosophy, it trains employees thoroughly in lean concepts and encourages employees to take a lead role in continuous improvement. "We have empowered employees on the floor to go make changes to their processes, implement that change and report it to the production manager to get credit for it. We have 125 kaizen improvements per month." Pagano adds that while the company doesn't try to quantify the financial impact of these suggestions, "We know by doing this every day we're seeing improvements."

One of the metrics Industrial Scientific carefully monitors is on-time delivery. Smith recalls that when he was in sales with the company, two-week lead times for orders were typical. When employees studied the situation, they found that 80% of the products being sold represented 20% of the inventory. "We started building up that inventory and setting it up in kanbans," he says. "Now we have one to three-day lead times."

Watlow Electric Manufacturing Co., headquartered in St. Louis, is a custom designer and manufacturer of industrial electric heaters, sensors, controllers and software. Because the company primarily engineers products to meet customer specifications, there is considerable upfront development to generate the product design and produce it. Before 2004, the company had a 20- to 30-day manufacturing cycle, with half of that spent in design and administrative processing and the other half in actually producing the product. The company divided each plant into value streams and carefully analyzed each to understand current performance and how it compared to stakeholders' expectations.

"We focused on moving the work that is common to a product closer together, processing parts one by one, defect-free, so that we can produce them quickly and get them off our manufacturing floor to the customer," said Tom Lyons, continuous-improvement manager at Watlow's Hannibal and St. Louis manufacturing sites. The lean efforts have paid off in reducing the typical manufacturing process for a product to three to five days, compared to the previous 15 days.

Throughout the Hannibal site, both in the manufacturing and administrative areas, are boards that measure four principal metrics -- safety, quality, delivery and cost. Once a kaizen event occurs, the boards are used to measure team results on a daily basis and identify where gaps are occurring against goals. Then the team is allocated time each day to discuss the chief gaps for each category and work on solutions. Thus, the kaizen events and the ensuing attention to these key metrics drive sustainable activity and improvements.

The daily cell reviews are rolled up into a weekly review that looks at operational and financial performance of the facility. These results are provided to the corporate level. The company employs hoshin planning, or policy deployment, to ensure that tactical execution is linked to the strategic direction of the company.

Another metric used at Watlow is engagement of the employee population in rapid-improvement events. The Hannibal plant averages about 30 events a year. Of its 300 employees, 90% have been involved in at least one

event ,and 60% have participated in two events. Bruce Smith, a senior consultant with Simpler Consulting who has been working with Watlow, said, "The more the population is engaged, the more they are going to understand and the better the improvement results are."

Randy Fry, president and CEO of Photo Etch, an aerospace manufacturing company based in Fort Worth, Texas, is such a strong proponent of lean that he joined the board of the Supplier Excellence Alliance (SEA), a non-profit group dedicated to promoting lean enterprises, and speaks around the country on the topic. Fry said SEA provided the guidance and system that helped him implement lean in a comprehensive fashion in his company.

Fry says adoption of lean is a business necessity in the competitive aerospace market. "Aerospace is demanding you get on-time and go to zero defects or get out," he says.

Last summer, Fry's team reconfigured its manufacturing operations into three cells that produce integrally lit display and control panels, flight simulation and training components, and black boxes. The changes have helped the company reduce manufacturing time for its basic panels from 12 to 18 weeks to six to eight weeks, and Fry plans to halve that time this year. Defects have also plummeted.

These changes have reduced the manufacturing footprint from 50,000 square feet to 35,000. As a result, Fry is exploring several new business opportunities, such as building a simulated cockpit.

Two primary metrics Fry monitors are inventory turns and sales per employee. "SEA says the normal aerospace business has less than two turns of inventory. We're at 7.5 and want to go to 15. That frees up a lot of cash," he notes. Meanwhile, sales per employee have climbed from \$49,000 when he bought the company to approximately \$125,000.



Photo courtesy Photo Etch

Implementation of single-flow work cells is one of the lean steps Photo Etch has taken to reduce manufacturing time and floor space, enabling the firm to pursue new business lines.

Fry readily admits the company has much more to do in lean, but he likes what he sees so far. "My metrics have picked up, my company is running better, I make more money and I'm out of debt."