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Lean Manufacturing Wins for Metalworks

How the metal furniture builder cut waste, improved manufacturing processes, and won the Shingo Prize

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Metal furniture builder Metalworks won the Shingo Prize for its implementation of lean manufacturing techniques.



Successful lean manufacturers can usually point to some crisis that led employees to fully embrace the lean manufacturing techniques that helped change the company's culture. For metal-case-goods manufacturer Metalworks Inc./Great Openings (Ludington, MI), that event is perhaps embodied with the realization by management that the company's supervisors' roles would change the greatest as the company shifted toward a more

lean-style operation. The improvements that Metalworks made in reducing waste and increasing operational efficiencies resulted in the company recently winning the prestigious 2008 Shingo Prize for Operational Excellence.

Metalworks manufactures metal furniture components for major office furniture OEMs, such as Steelcase Inc. (Grand Rapids, MI), that it also sells through the company's Great Openings sales division. With more than 220 employees at its main facility, Metalworks builds a line of pedestal and lateral filing components for storage, as well as wardrobe towers, bookcases, and desk products. The company's 120,000 ft² (11,160 m²) main manufacturing facility in Ludington has sheetmetal fabrication, laser cutting, robotic welding, paint, and assembly departments, organized into two Value Streams for pedestal and lateral components, that ensure smooth delivery of products. Metalworks employs 100 people at its Fab-Lite 40,000 ft² (3720 m²) facility in Manistee, MI, that builds lower-volume components, and it has another 15 workers at its Component Services Division in Ludington that produces components for both Metalworks and Fab-Lite.

Continuous improvement, eliminating waste, and working much more efficiently were keys to Metalworks winning the Shingo Prize. Starting in the late 1990s, Metalworks began implementing lean manufacturing techniques with its first efforts focusing on 5S tools. The company started with 5S and other aspects of operational excellence, notes Scott Lakari, Metalworks vice president, operations, and that effort eventually led to the team winning the bronze level award of the Michigan Shingo Prize in 2005.

“We started talking lean manufacturing in the late 1990s, and we had been practicing some aspects of operational excellence, had read some books, and said ‘operational excellence, that’s what we want to be,’” Lakari recalls. “At the time, when we first got into it, I was the manager of manufacturing and I ran the shop. Initially, for me, lean manufacturing was inventory reduction, and I thought if we started reducing inventories, a lot of good things will happen, so that’s what we did. That was the path that we headed down, and we started a 5S improvement program with our supervisors.”



Value Stream Managers Sue Caudill (center left) and Tim Tibbits (center right) go over production problems daily near the CI Matrix and product accountability boards located at the factory entrance.

Prior to winning the state Shingo, Metalworks had not implemented many lean tools beyond its 5S program, leading to inconsistent results, Lakari notes. In the 2004-2005 timeframe, the company began to adopt a much broader range of lean tools by joining a Shingo Prize users group and hiring Deb Liefer, a consultant based near Grand Haven, MI, whose lean expertise was Standard Work.

“What happened is we took off on the Plan, Do, Check, Act [PDCA] part of the continuous improvement circle,” Lakari says. “We took off on the Plan and Do part of it. We would lay out a plan and do something, lay out a plan and do something, and that’s what we did for really a few years. And even on our initial 5S program, we got the supervisors pumped up and they were out there straightening and organizing areas, but after about three or four years, we really were losing control over things, because we weren’t sustaining the gains. It was frustrating, because we would say: ‘We’re doing all this great stuff, but we can’t sustain our gains.’ We just struggled really for a period of a couple of years as we were thinking we were doing the right thing, and just struggling.”

Taking big strides, Metalworks’ lean manufacturing efforts really took off with three major initiatives, Lakari says, including implementation of Standard Work, adopting a problem-solving model, and drawing up a continuous improvement map. With the help of Liefer acting as sensei, Metalworks employees began tackling the task of writing Standard Work for every job in the company. “All of our Standard Work throughout the entire shop has been developed by our hourly people—that was a big part of its success, people writing and developing their own standard work.” Another key was adoption of a company-wide problem-solving model developed by Ron Maynard, Metalworks continuous improvement coordinator, who joined the company in 2006.

“We implemented a very consistent problem-solving model, and that was something that Ron brought with him,” Lakari says. “We took that problem-solving model and trained people in it throughout the entire organization— whether you were engineering, customer service, manufacturing, it didn’t matter, you were going to use the same problem-solving model.

“The cool thing about that was, we could have a person from customer service show up at an operations problem-solving session, and I would say that after five minutes of sitting in on the discussion, they would understand where in the problem-solving process they were, because everyone’s using the same model,” he says. “And the other thing is that we’ve had cross-functional teams get together, where you’ve had customer service, manufacturing, quality, shipping, and receiving. They all come and sit down, and because they’re all familiar with the same model, you can be very effective in walking through your issue.”

Changing the mindset. About four years ago, Metalworks also decided to split its manufacturing organization into the two Pedestal and Lateral File Value Streams, which raised the conundrum of whether the company was leaning too heavily on Tim Tibbits and Sue Caudill, who as Value Stream managers found their roles changing from being involved in daily “firefighting” problems with getting production out the door, to planning-oriented, process-improvement roles geared toward maximizing Metalworks’ manufacturing efficiencies.

“When I look back at that, I remember thinking, ‘When I look at our entire organization, our supervisors’ job and responsibilities are changing faster and more than anyone else at our company,’ and I kept saying, ‘Is that



An automated metal punch press line uses a host CNC to command nine presses that complete finished drawers in about seven seconds.

really fair?’ And every time we talked about it, I said, ‘I don’t know if it’s fair, but it’s unavoidable.’ Because of their role, you can’t work around them—that won’t work.

“We had been transforming their job to be more auditing, follow-up, problem-solving, process improvement, and that was a change from just being part expeditors and firefighters. And I remember one of the supervisors saying to me, ‘Scott, it seems like we just don’t get credit for the things we used to do.’ And I said, ‘You’re absolutely right, you don’t. I don’t give you credit for fire-fighting any more, you’re supposed to be problem-solving your problems and getting yourself past that.’”

Prior to the changes, Metalworks’ supervisors easily spent some 85% of their time fighting fires and expediting, notes Lakari. “We did very well with on-time shipping, we drove our schedule hard, and I remember people saying, ‘Let’s get a supervisor involved.’ Fast-forward 10 years later, and I’m saying, ‘Our supervisors really need be fighting fires and part expediting probably 15% of their time.’ Now I tell Sue and Tim as our Value Stream managers that they need to be involved in problem-solving models, or conducting daily audits to make sure that your departments are where we need them to be at the end of the shift. They need to audit the standard work that’s been written and developed, to ensure that it’s being followed, and to be complete corrective actions that were generated during the last internal audit.”

Out on the shop floor, in a corner near the training room, the third component of the lean puzzle is readily apparent. Several visual tools include two large boards detailing Metalworks’ Continuous Improvement maps, which were recently updated with the Continuous Improvement Matrix 2.0 to outline the company’s current vision and strategy. Other visual aids include the Pedestal and Lateral Accountability Boards, where managers daily post notes on any issues in manufacturing that arise for discussion with Value Stream Managers Tibbits and Caudill, who handle the pedestal and lateral product lines respectively.

At the first station in the factory, an Automatic Drawer Machine (ADM) from BTM Corp. (Marysville, MI), punches holes in painted flat sheetmetal to make drawer components for the pedestal Value Stream. The most automated process in the plant, the ADM workcell consists of nine press machines bolted together that use a roll conveyor. The cell is tended by one worker. “It’s a hard press that actually has seven programmable controllers talking to one host computer,” says Bob Hayes, development process engineering “and the host computer is making sure every other machine is doing what it needs to do. I think right now we’re doing a drawer complete every seven seconds.”

Metalworks also has one Trumpf Trumatic L2530 laser that cuts holes in sheetmetal and does the outside geometry of parts. In the welding department, automatic welding is done with two Fanuc Arc-Mate 100 robots and light MIG welding is done by hand by two nearby operators. Near a workcell labeled QCDSM lateral welding, Maynard explains “that’s Quality, Costs, Delivery, Safety, and Morale, so this is the area where we’re going to attack all that information. This chart here shows what our expectations are, based on how many people are in the cell. So, for instance, this is lateral weld, two people work here and we’re getting about four parts per hour. With three people we should be getting six, and so on.”

On the pedestal welding value stream, Maynard notes the company still has some work-in-progress (WIP) in the system. “In this whole value stream, we just had a bunch of WIP in the system,” he says. “We reduced it from about 40 pieces, at any given time, to six, which means we can address any quality issues a lot faster. People don’t have to walk quite so much to get their product. The reason we want to go down to three is that the project was to get to One-Piece Flow—and when you get down to there, you have to make sure you’re still getting enough product to stay alive. You’ve got to feed the beast.”

At the paint booth, the lateral and pedestal products are first washed to rid the components of any oil and grease then, after drying, the units are either powder-coat or wet painted, depending on the order. A key Metalworks

competitive advantage is the ability to offer customers more than 1000 colors.

“Most of our product is powdercoat, because of the environmental issues,” Maynard notes. “We offer pretty much any color you can think of, so if we can’t get that in powder, we’ll make it ourselves in wet. About 80% of our product is powder-coat.”

In assembly, workers rotate even more often than those in other departments, with team members in final assembly rotating twice a day, every three hours, to help alleviate ergonomic strain; welders rotate once daily, and in the paint shop workers rotate weekly.



Metal case goods are either powder-coat or wet-painted at Metalworks in more than 1000 available colors.

“**One of our core philosophies** is job rotation,” notes Value Stream Manager Tibbits, “and we switched positions at the end of the fiscal year. It’s a bit frightening at first. Everything I’ve ever done has been on the lateral side, and every thing she [Sue Caudill] has done is on the other. It’s a little excitement at first, but it really happens simply and easily because of the way we run our manufacturing. Regardless of whether you’re on the pedestal or the lateral side, we have the same types of systems in place, so the transition went a lot smoother than was expected.”

Leading up to its winning the national Shingo award, Metalworks achieved several milestones, including improving quality with a 75% reduction in customer complaints per million, while achieving a 68% reduction in scrap/rework as a percentage of sales in the past four years. The efforts also resulted in a \$6.27 million cost savings over the past five years, including a 15% reduction in direct labor costs. Metalworks’ deliveries improved with a 33–50% reduction in customer lead times, and the company’s CI (continuous improvement) Suggestion system has realized a 55% success rate (approved and completed), and a 91% closure rate.

Tibbits, who’s been with Metalworks for seven years, says that Maynard has always taken a real systems-based approach to lean. “We had a lot of little islands of excellence,” Tibbits observes of early lean efforts. “We had an area that we’d go into, conduct a kaizen event and 5S it, and that would be our great showcase of workplace organization. Three months later, you’d wander back through there and it’d be a mess.

“It really wasn’t until a few years ago that things really started coming together, and instead of having several kinds of tools, like 5S or other tools of lean like kaizens and poka yoke, we really unified and tied it all together. And it really wasn’t until that connection was made that the real magic started to happen. And now every thing we do now—every decision we make, every process we implement, every part we design and put on the floor—has a system behind it.”

Not to sit on their laurels, Metalworks employees have redoubled their continuous improvement efforts since winning the Shingo Prize with the adoption of the CI Matrix 2.0, as well as setting new goals with a SMART (specific, measurable, achievable, relevant, and time-based) formula. “We try to set SMART goals,” notes Maynard. “If it’s not achievable, we need to reevaluate it and reset the goals.”