Steady flow, steady profits

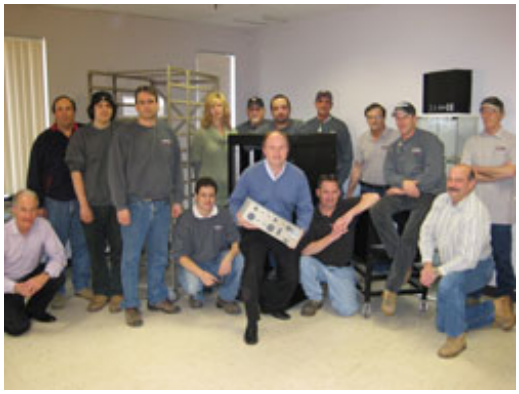
New England contract fabricator keeps quality parts moving

By Tim Heston

May 1, 2012

ETM Manufacturing invests in continuous improvement training. Since initiating these efforts in 2007, the company has less than doubled its headcount, but tripled annual sales.

Figure 1
A portion of ETM Manufacturing's team, with Rob Olney in the center, poses with some of the company's handiwork. Most employees are cross-trained on multiple machines.



Rob Olney entered the contract metal fabrication business with unusual, if not unique, job experience. He spent years in other manufacturing sectors before joining Staples as the retail giant's director of sourcing and product development. He was responsible for sourcing more than $460 million worth of work annually, and much of that work went to Asia.

He toured factory after factory: pen-makers, desk accessory factories, ink processors. Some were great, and some weren't. Olney got the Staples job in part because of his manufacturing experience. Ironically, though, that experience was in the kind of work that dominates stateside—high-mix, low-volume operations. These weren't the kind of factories he was touring.

Throughout his travels he noted several trends. First, if a factory manager in Asia had to solve a problem, he usually just hired more people. Second, Olney saw few factories that produced metal assemblies for export to the states. Unlike pens, metal parts don't ship cheaply, and this guided his next career move.

After his stint at Staples, Olney purchased ETM Manufacturing, a Massachusetts contract metal fabricator that in December of last year moved to a 43,000-square-foot facility in Littleton, northwest of Boston. Within six months after he started in 2006, he rolled out an open-book management program; soon after he initiated a bonus program. Then over the next several years he spent more than $70,000 on lean manufacturing training—quite a chunk of change for a shop that in 2006 had only 14 employees.

Today the company employs 23 (see **Figures 1** and **2**). That's not a tremendous jump, but here's the rub: As Olney put it, "We've tripled our annual sales and less than doubled our personnel. And that is all from lean manufacturing."

Figure 2

ETM Manufacturing's management team includes, from left, Rich Dapp, business development; Rob Olney, president; Mike Jancosko, vice president; Kevin Foskitt, manager; Greg Fowler, vice president; Mike Moore, business development; and Steve Buitkus, manager.

Employee Buy-in

When he started at ETM, he saw a small fabricator that had succeeded for decades using the traditional job shop model. Parts flowed from the cutting area to the bending department, then to welding and grinding. It was batch-style manufacturing. Employees retrieved orders from a stack of work-in-process. Their goal was optimal machine uptime. This was one reason that they often chose easier setups over more difficult ones, even if it made overall part flow suffer.

In lean jargon, they strived for local efficiency, not global efficiency. Even though workers punched, bent, and welded almost continuously during a shift, jobs weren't shipping to customers in a reliable fashion. No one could accurately predict how long an order would take. If business was slow, a job took only a few days; if the shop was jammed, an order took weeks.

Olney chose open-book management for good reason. He wanted everyone to understand how the shop made money. After this he rolled out an informal profit-sharing program. Employees received a quarterly bonus depending on how profitable the company was. He structured the program with bonuses measured not as a percentage of somebody's salary, but instead in a certain number of days. If business hit a minimum profit goal for the quarter, each employee received a monetary bonus equivalent to a certain number of days' pay. Some of that money went into boosting the employees' retirement funds, while the remaining was handed to them in a check.

In 2008 employees received a small payout; in 2009—a challenging year—the payout was essentially nonexistent. But in 2010, employees received the equivalent of 44 extra days of pay. That significant reward was the result of meeting increased customer demand, but it wasn't just because more work happened to be for the taking. After all, the overall economy in 2010 was tenuous at best. Instead, that financial reward came in large part because ETM's operations had changed. The bonus proved to employees that something was going right.

Concentrating on Flow

Lean implementation wasn't quick or easy. After all, the big employee payouts weren't made for several years.

"We struggled during the first few years because we were trying to force the traditional lean approach into our production processes," Olney explained. "That approach included classifying our products as families and then setting up cells around those families. And in a job shop environment, it's hard to tell what a part family is, because the product mix is changing, especially with our customer base.

"We've since backed off of that, and we're still learning. Now we work on lean philosophies. Once we started to understand those lean philosophies deeply, then we started to adapt them to our shop."

To that end, the shop invested heavily in lean manufacturing training tailored for the job shop. The company worked with the Massachusetts Manufacturing Extension Partnership (www.massmep.org). It also reached out to Gary Conner's Lean Enterprise Training (www.worldclassmfg.com) in Newport, Ore., as well as Shahrukh Irani's Job Shop Lean program at The Ohio State University (ise.osu.edu). Most recently ETM has worked with the Greater Boston Manufacturing Partnership (www.gbmp.org). "I've hired a coach through [the GBMP] who is a 20-year veteran at Toyota. Her role at Toyota was to coach Toyota managers."

Olney and his lean consultants know that ETM isn't anything like Toyota. The shop's product mix comes from customers in telecom and computing, energy production, a bit of solar, and various industrial equipment builders. Order sizes vary from one-offs to thousands. Some customers want certain parts delivered at predictable intervals—say, a delivery every other week; others order at sporadic intervals. Some may want a large batch of parts every few months; others may want small batches delivered every few weeks. In essence, it's the classic job shop.

Figure 3

In the middle apex of ETM Manufacturing's W-shaped prototype cell, work flows from the laser (foreground) to the flat-part deburring machine, then to bending and hardware insertion. Machines are positioned for optimal flow, so that an operator need only walk a few paces to retrieve the next job and pass completed parts to the next station.

Like other job shops adapting lean manufacturing, ETM employees have pursued 5S and standard work instructions. They standardized setup sheets to speed changeovers at the press brakes and punch presses. Some press brake setup sheets have actual photos of tooling setups. The shop also has standardized turret punch tooling layout, with standard tools on the inner ring and the variable tools on the outside ring. And managers communicate with suppliers to ensure quick turnaround time. For painting and plating services, ETM works with several suppliers that can turn

around products in two to three days. The trick, Olney said, is communication.

“It’s all about steady flow,” he said. “Our suppliers are managing job shops too.”

He explained that all of ETM’s suppliers offer competitive pricing. The most important factor, though, is how busy those shops are. “If you give a lot of work to a busy shop, they choke on it. The shop’s deliveries become questionable, and they’re not as productive. But if you give a slower shop work, it evens the flow, and you help them become more profitable and have smoother production.”

Figure 4
Within the production cell, work flows from the turret punch press directly to bending and hardware insertion.

Going Cellular

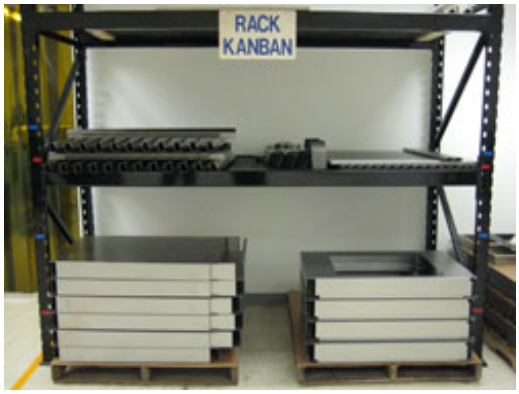
Organizing tools, standardizing setups and work instructions, 5S, even working to smooth part flow among suppliers—all of it can be implemented in a high-mix environment because none of it is product-specific. Those product-centric attributes of lean manufacturing, though, aren’t as easily adapted to the job shop. At least that’s the conventional wisdom.

But ETM doesn’t follow that conventional wisdom entirely. The company no longer has a cutting, bending, or hardware-insertion department. Instead, these processes are grouped into one of three cells, each dedicated not to specific products, but to a range of product volumes (see **Figures 3** and **4**). A prototype cell handles anything from one-piece to about150-piece jobs. A production cell handles jobs (including many repeating orders) calling for more than 1,000 piece parts or more. A third cell handles those jobs between 150 and 1,000 pieces.

The shop carefully arranges machines to minimize worker movement, and nowhere is this more important than the prototype cell, where workers continually transport extremely small batches from one machine to the next. The prototype cell isn’t arranged in a traditional C or U shape but instead resembles a cursive W. Cut parts emerge from the 2.5-kW laser and are fed into a 42-in.-wide wet deburring machine just a few feet away from the press brake. That press brake creates the middle apex of the cursive W. Its operator need only turn around and walk a few steps to find his next batch of parts. He then turns around again and hands off bent parts to the hardware-insertion press operator.

These cells aren’t rigid, and they’re obviously not part-specific. Machines are sometimes shared and even moved for specific jobs. Employees fabricated small platforms for a few hardware-insertion presses as well as the company’s smallest press brake. So if needed for a specific high-volume order, they can use a fork truck or hand jack to move equipment into new positions.

Figure 5



The company's internal kanban allows partly finished components to be stored, so workers can fill repeat orders quickly. As parts are pulled and the stack drops below the red line, a replenishment order is triggered to fill the stacks to the blue line.

Kanban in the Job Shop

In traditional lean manufacturing, operators downstream retrieve parts from a kanban, which in turn triggers upstream to replenish it. But this kanban system is part-specific and designed for steady customer demand. How can this be adapted for the job shop?

Here, ETM managers again used consistent part flow as a guide. In any job shop, it's nearly impossible to balance the load among all workstations. Sometimes the shop is busy, sometimes it isn't. That's just a fact of life in contract manufacturing. "The significant focus of lean is to eliminate waste," Olney said. "But if you dig further, the next level is about steadying flow through the shop."

To that end, ETM uses a kanban-like system in its production cell to steady that flow and improve response times. The kanban is full of partially completed parts that customers repeatedly order. When the shop is slow, workers spend a few hours replenishing the kanban. This way, when those customers pull the trigger on one of those repeat orders, the shop can respond quickly by pulling thehalf-completed parts from the kanban and completing the fabrication in short order (see **Figure 5**).

Still, why use a kanban for repeat orders? Why not just keep some level of finished goods inventory? As Olney explained, it again comes back to steadying the part flow. Tying up all machines on work that isn't immediately needed would wreak havoc on a production schedule designed to produce already ordered products. The kanban, or parts supermarket, allows workers "to fit in the refill runs in and around other work, so we don't disrupt the other jobs that are already scheduled."

Flexible Workers, Steady Flow

Cross-training has become central to ETM's success with lean manufacturing in such a high-product-mix environment, which by its nature can't be perfectly balanced. Workers move to where the work is, steadying flow.

Steady flow equates to steady deliveries, which in turn equates to steady payments into ETM's coffers. In recent years this has led to steady profit, a portion of which has flowed into workers' bank accounts. That's a kind of steady flow employees do not take for granted.

The Value of Prototyping Experience

For years Gary Pittman would work with engineers on CAD files; convert those drawings into a flat-pattern layout; set up the laser, punch press, and press brake for the job; and insert the hardware. Every job was different.

This wasn't at ETM Manufacturing, though. Before joining the job shop three years ago, Pittman worked 25 years in Digital Equipment Corp.'s prototype shop, starting as a teenager and working up through the ranks. "It was great, because you weren't just working one piece of equipment," he said. "We would look at each project and make recommendations to improve manufacturability."

Pittman does something similar as manufacturing engineer for ETM. After looking at a drawing, he immediately can tell if, say, a flange is too short for a spot weld or a hole is too close to a bend line, and works with customers to improve a part's manufacturability.

In fact, his experience makes him a valuable asset for a job shop initiating lean manufacturing, and this includes cross-training. During slow periods at ETM, workers move to other machines to broaden their skill sets. As managers see it, the more versatile employees become, the better the company becomes at high-product-mix manufacturing.

The operation doesn't mirror a prototype shop entirely. ETM employs a few specialists, including lead bending and welding personnel. They may be cross-trained in multiple processes, but their true specialty remains in one process. Those employees aren't tied to one machine or cell, either. For instance, the lead press brake operator may work in the high-volume cell one day and in the low-volume cell the next. As Pittman explained, "The press brake lead is the guy everyone goes to if they have a [bending] question, to keep things flowing."