Metcam cleans house

Georgia fabricator jumps into cellular manufacturing

By Tim Heston, Senior Editor

Carl Bernstein had a messy desk. So did Andy Rooney. There's something about desktop chaos that breeds a stereotype of the person sitting behind it all. These hard-nosed workers (or in the case of Rooney, curmudgeons) usually don't have an assistant, don't care for long meetings, and probably don't attend many either. People with cleaner desks usually get paid more, maybe have longer job titles. But they don't do the real work, right?

Look at that mess. Work is all around. Just pull a piece off the pile and start working, and don't stop until you're finished—usually late, but that's no surprise. There's just too much … work. Then one day, that's it. Something has to change. The desk is piled with work, but nothing gets done. You're spending more time *finding* and *starting* than actually *finishing* anything. It is time to clean house.

This is just what Bill Freeman and Jerry Ward went through, but it wasn't about their desks. It was the entire manufacturing operation they oversaw. Ward, vice president of Metcam Inc.—a contract fabricator and assembler of trays, electrical boxes, and various other enclosures—appeared at Freeman's office door. He was about to give his plant manager some good news. Another big customer just came onboard. This was fantastic. 2011 was shaping up to be a record year for sales growth.

There was only one problem. Metcam had 100,000 square feet of manufacturing space in Alpharetta, Ga., just north of Atlanta, and every square inch seemed to be in use. The company ran two nine-hour shifts and a shift on the weekend. The shop was running full-tilt. How on earth was Metcam going to fit one more job on the floor?

Both looked around. Parts were staged everywhere, albeit with good intentions. Workers never had to walk far to fetch parts for the next job. Parts were all ready to go, all sitting in nearby racks. In fact, racks were everywhere. Many thought this minimized worker motion, at least in most cases. Yes, a fork truck sometimes had to move a few pallets of parts to make a path to the paint booth. But for the most part, these racks ensured workers had parts they needed to keep machines producing. They would finish a batch, and then put another pile on another rack for the next operation. Yes—*another rack*.

After Freeman and Ward talked, the two paused. Freeman had a thought. By early January, the shop floor looked entirely different. Metcam began to clean house.

The Inventory Drawdown

A funny thing happened during the last four weeks of 2011. Over a typical 18-hour day (again, two nine-hour shifts), the punches ran no more than eight hours, but saleswise it was one of Metcam's best Decembers ever.

That's because the punches had already produced plenty. The shop was drawing down its work-in-process (WIP), clearing out stack upon stack of cut blanks, forming them on the brake, inserting hardware, and then sending them to welding and finishing. In January the job shop had about $100,000 of WIP in front of its painting operations—and that was about it. This was down from the monthly $500,000 in WIP held previously in the entire organization. Beyond this, only a smattering of work remained on a few racks. This left a vast, clean aisle (see **Figure 1**).

FIGURE 1 *In a matter of weeks, Metcam eliminated most of its work-in-process and cut its raw stock inventory by more than two-thirds. Last year this aisle was cluttered with WIP.*

The company's raw stock inventory also plummeted. "Instead of bringing in metal here two or three weeks ahead of time, we'll bring in metal one week and run it the next week," Ward said. "So we cut about two weeks' worth of metal inventory that wasn't going anywhere."

Cells for the Job Shop

These are progressive steps, but not unheard of these days. What's unusual—especially for a high-mix, low-volume fab shop—is what now surrounds each of the shop's lasers and punch presses. On one end of the floor is a laser cutting system with an automated offload table a few feet away from the flat-part deburring machine. Next to this sit two press brakes and a hardware-insertion press (see **Figures 2** and **3**).

It's a manufacturing cell, and Metcam has six more like it. Because enclosures remain Metcam's bread and butter, punch presses abound. But there is no punching department, laser cutting area, or a separate hardware-insertion or bending department. Parts flow from the cutting machine to the press brake, then on to hardware insertion, all within the same fabrication cell.

FIGURE 2 *The company's laser cell includes a nearby deburring machine and (out of shot) a hardware-insertion press.*

Figure 3 *This cell has two press brakes, a hardware-insertion press (on the right), and a punch press (out of shot). The parts shown here have been punched and bent.*

Figure 4 *In this cell, two workers handle a panel for hardware insertion. Several minutes before, one worker at the hardware-insertion press was finishing a job at the press brake.*

It takes longer to bend and insert hardware than it does to cut, which is why most cells have only one cutting machine but several press brakes and hardware-insertion presses. One cutting machine has enough capacity to feed several machines downstream and then some.

Still, it's the "and then some"—the excess capacity of a cutting center—that can run a job shop operation like this into trouble. Freeman recalled one job, prior to the company's cellular transformation, in which the punch press would punch all 2,000 parts for a job in one day. The next day the parts would move to the bending department. Unfortunately, the press brake crew could process only 500 a day, which meant the rest of the parts remained on the rack for another day or two. Then the parts would wait days for riveting and other processes downstream. Those days added up to weeks.

Now the punch press cuts only 500 parts a day, the brakes bend the 500, and then they go on to the riveting machine—all in one shift. "We have room to do even more," Freeman said. "If we staff that cell at night, we can do another 500 at night. So we've doubled our capacity but cut our lead-time by two or three weeks."

Cross-training

To make this all work requires comprehensive cross-training. Metcam had regularly cross-trained many workers for years. Press brake personnel might move to a laser machine; a punch press operator might spend a shift inserting hardware. But arranging machines in cells has made cross-training more critical, because every day an operator may need to run *any* machine in the cell.

As sources described, the nature of the cell promotes cross-training. A new operator receives basic training, but he also works in a cell with skilled technicians who have been with the company for years. Their goal is to bring a set of jobs through all the processes of the cell as efficiently as possible. They don't stand by one machine all day and produce part after part. Instead, they talk with each other and discuss how they'll manage flow.

If one worker needs help holding a large panel in the hardware press, another worker in the manufacturing cell walks over to assist (see **Figure 4**). Sure, he may be in the middle of a batch of parts at the press brake, but if work stops at hardware, forming more parts on the brake just builds up excess WIP. The same thinking goes for a new employee standing at a press brake. If that employee has trouble with a certain workpiece, an experienced employee is there to offer guidance. The goal is to maximize the cell's throughput, not the throughput of a particular machine.

54 Hours

It used to take weeks for a purchase order to make it through manufacturing. As Ward recalled, "We used to plan three or four weeks out. We had to allow for the order to be punched, then during the next week it would be formed, and the next week it would be painted, and the next week it would finally ship."

Now the shop schedule works on a 54-hour cycle—that's two nine-hour shifts over three days. When a purchase order comes in, scheduling managers look at setup sheets and estimate how many hours it will take. They then send it to the shop only if the floor has less than 54 hours' worth of work during a three-day cycle. If it has more than 54 hours, the job is slated for the next 54-hour cycle.

The three-day cycle has simplified shop floor operations. Under the previous system, Freeman marched to the shop floor with a hot order and attempted to shoehorn it into a shop floor environment flooded with work. It wasn't pretty. Now, with only so much work on the floor, if a hot job must be run immediately, schedulers can insert it into the part flow of a cell.

Previously an expeditor would attempt to squeeze a hot order between literally dozens of jobs that could be in process in various departments. Now there's no more checking with the cutting, bending, and hardware-insertion departments. If the hot order forces another order to be pulled back, it's reinserted into the schedule as soon as possible. But it's now about juggling that *one* order in *one* cell.

"There is no firefighting anymore. It eliminated the confusion," Freeman said, adding that "we no longer need a person to expedite those jobs through the shop."

Building the shop schedule starts with the operations management team, which communicates with the assembly and shipping personnel who, being the last people to touch a product, dictate the shop's capacity. The company has hired a few more people during the past few months, mainly to ensure cells are adequately staffed. Metcam now employs a little more than 160. Still, even with a higher head count, workers have become so much more productive that Freeman has been able to eliminate the entire weekend shift and move those workers to the night shift.

"And overtime is nonexistent," Freeman said.

Transformation Without a Shutdown

When Freeman and Ward initially discussed this transformation to cellular manufacturing, the two thought Metcam could shut down for two weeks in December. Racks needed to be taken down and machines moved. "But we had no shutdown at all. We didn't lose any production, and we had one of the busiest Decembers on record," Freeman said.

Metcam managers tackled the massive undertaking the same way someone would eat an elephant: one bite at a time. Fortunately, the company's punching and laser cutting centers stayed where they were. Only the press brakes, hardware-insertion, and resistance spot welding machines needed to be moved. One day a single press brake would be shut down and moved (one bite); the next day several hardware-insertion presses were moved to another cell (another bite).

"We had some people come in on Saturday to help move and set up some of the machines," Freeman said, "but we did not stop production whatsoever."

High-mix Lean

Freeman pointed to an assembly and shipping area that's now dedicated to one of Metcam's largest customers. Parts for this customer used to flow all over the building. Now, once components are fabricated, welded, and painted, they all end up in one corner of the building.

At the far wall, he showed where the company hopes to bring in a gravity-fed conveyor, so components can flow from a staging area, where assemblers attach glass to fabricated sheet metal enclosures. Immediately after final assembly and inspection, the product will head to the shrink-wrap machine and then toward the loading dock.

"We're aiming for single-piece part flow here," Freeman said.

Ward showed where the fabricator hopes to install video screens that show workers' current work status and instructions. Most important, he pointed to where other conveyors will go. Today workers wheel cartloads between different processes. Later this year managers hope to have conveyors facilitating part flow between various fabrication centers within each cell.

> "Instead of bringing in metal here two or three weeks ahead of time, we'll bring in metal one week and run it the next week."—Bill Freeman, Metcam

Both Ward and Freeman emphasized that this isn't Toyota. The company processes a variety of products requiring myriad operations. They hope to move certain machines, including a portable tapping arm, between cells as necessary as demand dictates. Two cells are also designed so that one worker processes parts for both. Some of the time he may be inserting hardware on a press, while other times he may turn around and spot weld parts for an adjacent cell.

Traditionally, shops dedicate lean manufacturing cells to specific product lines, such as that assembly and shipping cell. But Metcam took a different approach. Managers knew it wasn't practical to "cellularize" everything, of course, such as the company's paint and screen printing operations. They also decided to maintain a welding department, because of the specialized skill workers need and the infrastructure welding booths require, such as ventilation and safety curtains.

But as managers saw it, *all* parts are cut and *most* require secondary processes, such as bending and hardware insertion. These processes affect each other closely too. Bend deductions in forming influence blank sizes in cutting; access issues can arise in hardware insertion and spot welding because of various forms bent on a part. Why wouldn't a cell with cutting, bending, hardware insertion, and (sometimes) spot welding work?

Perhaps most important, the quality process has improved. Years ago Freeman initiated a quality initiative that essentially trained all shop floor workers to act as quality assurance technicians. If everyone inspected parts throughout the process, quality would improve, right? As it turned out, personnel did indeed catch part defects, but they caught them too late to make a significant difference. A press brake operator would inspect a part and notice a burr, then walk to the punch department, which had already processed hundreds of defective pieces.

In early January a press brake operator caught a similar quality problem on a component, punched just minutes before. He informed the technician operating the punch press in his manufacturing cell. The punch press operator removed a punch from the turret and replaced it with a freshly sharpened one.

The problem was solved and production continued, virtually unhindered. FAB

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