Become a Lean Thinker

COLUMN BY NATHAN UNGER

There have been a number of rebuilder's conventions recently which promoted the theme of lean remanufacturing. I couldn't get out to any of those so I checked out our library's Web site. This idea comes from Rob Buksar who, in one of his articles called the library "one of the least used (taxpayer funded) resources."

I discovered a book entitled "Lean Thinking," by James P. Womack and Daniel T. Jones, published by Simon and Schuster, 1996.

Fascinating. It was not only informative, it was also entertaining. I recommend it not only for businesses with many employees, but even for the small shop like mine.

The first thing Womack discusses is the identification of "muda." This is a Japanese word for waste. Muda, he says, must be defined from the customer's perspective because that's who the money comes from. It includes wasted effort, space, or time.

There are at least six different kinds of muda: defects; producing goods and services not needed by the customer; unnecessary movement of goods or people including shipping; unnecessary handling or processing of product; waiting between processing steps; and too much inventory. You might think of more. (Also check out the book "The Toyota Production System: Beyond Large Scale Production," Portland, Oregon, Productivity Press, 1988.)

Then Womack discusses the five principles of lean thinking:

Determine value from the customer's point of view.

For my customers that would be a starter or alternator that is reliable, looks good at the time of purchase, and is ready within a reasonable turnaround time at a reasonable price. This does not necessarily mean the fastest or the cheapest. I found when I raised my prices, I attracted some high profile dealerships who didn't come when the prices were low! I guess they figured that if the prices are too low, then the quality isn't there either.

Determine the steps of the value stream.

This principle is going to take a lot of work, but you have to do it in order to uncover muda. The customer comes into the shop, bringing a unit for rebuild. I enter his information into the computer work order, and make arrangements with him to quote a price, book a time to do it, and so on. Then the job goes into a numbered bin on a numbered shelf rack so I can easily find it when I am ready to do the estimate.

At this time, I completely disassemble it and test the parts. Then I call the customer, receive the OK, and order or gather up the parts and put it back on the shelf. When all the parts are in and the scheduled time has arrived, then and only then do I begin work on it. I try to stick with that job until it is finished, because each trip back to the numbered shelf is the muda of unnecessary handling, not to mention the breakup of orderly thought flow.

Then I take the bin to the parts cleaning machines and paint or varnish the parts that need it. Next, I bring all the parts back to the assembly bench and complete the job. Then I stamp the job with my work order number, paint it, box it, invoice it, and put it out for pickup at the front. Then I phone the customer. When he comes, I close off the work order.

You get the idea.

The more detail I put into this analysis, the more waste I will uncover. I did not go into a lot of detail on what is involved in completing the job. This would vary from one unit to another. As it is, you can see some waste going on here already: waiting for my scheduled time, waiting to hear back from the customer, and waiting for parts. There may be things I can do to reduce or eliminate even these wastes. If I hired an employee for example, then possibly he could look after the customer right away, and give him the estimate on the spot. This would eliminate those first two waits right there.

Flow; make sure that all activity produces value as defined by customer.

Every step in this process should be focused on getting the reliability, final appearance, and timeliness of that job. Things like trying to combine parts orders in an attempt to save freight money may end up producing the muda of wasted time. A cheap price is actually not the customer's top priority. If it is, you may want to consider targeting another market, because you will create more defects that way.

Pull; make nothing until ordered by customer.

If I started producing stuff in order to keep myself busy, thinking, "Oh well, it can just be for stock," that is the muda of overproduction. Perhaps I should be calling on customers during the slow times instead. The idea here is to be doing stuff for which I will get paid. I find that if I am not working on an actual order, I tend to work slower. This concept is very strange to the typical "batch and queue" thinker, but it was conceived by no less than Taiichi Ohno, then president of Toyota, and has been studied and adopted by firms worldwide.

Perfection; no scrap, rework, or comebacks.

This principle is something that will require continual input. The Japanese word for it is "kaizen." Have the mindset of continually improving your process and equipment. Any time there is a problem, do the homework to find out what went wrong, and eliminate it.

Ohno uses the "five whys." Ask why there is a problem, then ask why that situation arose, and then what led up to that, and so on, to a depth of five layers of "why." Don't put up with it as a cost of doing business. Some things that go wrong may be problems on the vehicle, like one customer who complained that my rebuilt alternator was not working. I asked him a number of questions and finally had to go look under his hood. As I stood and watched, we heard the belt squeak. He reached in with a can of lubricant, and sprayed some on the belt! I recommended he replace the belt and clean off his pulleys with a good spray-on cleaner.

That situation went into my list of things that I ask customers about if they are having problems. If I am doing a job and see a heat-discolored pulley, then I note that right on the invoice as a problem he needs to deal with. This step eliminates a lot of frustration because I can now trace the customer's history. Thus I can sometimes prevent a comeback before it happens.

More Time-Saving Terms

Takt Time. The word "takt" is actually a German word, but adopted by the Japanese to describe the time a product spends in each step of the process. It should be the same for each step so that neither the parts nor the workers ever have to wait. One example of this is when I put the parts into the vibratory cleaner, that gives me just enough time to machine the slip rings, clean the stator and rotor and paint quick-dry varnish on them. Then while they are drying, I take the parts out of the cleaner, blow dry them, and glass bead them. By that time, the varnish is dry so I can move on to assembling them. This eliminates those wait times.

Standardized Procedure. You want to eliminate creative rebuilding for commonplace procedures. Have the right tools for each job. Spend time to figure out a good way to do that job the next time it comes around, and then make a note of it so you do it the same reliable way each and every time. This is also helpful for training employees because they can go by the book instead of guessing what you might have done in a given situation.

Visually Intuitive Controls. By having one bin for each job, with smaller bins within that, I can see at a glance what parts I replaced, and whether I forgot anything when I put the unit together. Another example of this principle is to have go, no-go lights and buzzers on your testers. So that if a part is out of acceptable limits, it will give a warning, not just a meter reading that an employee has to interpret. Dick Vensel also sells various sizing gauges. You could also make gauges to compare rotor lengths, slip ring tolerances, and so on.

Poka-yoke; mistake (proofing device). For example, electronic sensors to make sure you picked up a certain part. Another example would be flags to mark bins that need restocking.

U-Shaped Work Cells. We saw these at the Transit Authority tour at the Electrical Rebuilder's Association Trade Show in April. One or two workers will overhaul one engine. This eliminates the waste of moving parts down a line and also gets rid of the problems that creep in when no one person is responsible for the whole job, and nobody knows what the previous guys did, nor what the downstream guys are supposed to do.

Quick Change Tooling. Instead of having a big machine that can do its functions extremely fast but takes a long time to change over, thus justifying large batches, work toward getting a quick change procedure so that you don't lose flow. In the lean method, you are striving toward single piece flow, as requested by the customer, and not just more efficient batches. It's a whole different way of thinking. Since our ever changing market is moving toward more variety in the product lines, it is getting more and more difficult to do things in batch mode.

One thing that paradoxically does not create efficiency in many cases is the batch and queue method. Often, it is preferable to have a smaller, quick changeover machine in the production line, even if it is slower than a huge machine. Although the big machine does things very quickly, it requires a large inventory (and accompanying storage area) on each side of the machine.

A machine which requires a queue to operate is called a "monument" and must be eliminated either immediately, or as part of a more gradual process. For instance, why have a huge shot blaster, when you could have several small ones. They do each unit just as fast, and do not require a batch to operate. You still have to take each alternator apart and handle each housing, so why make that part wait for a big batch?

If the same person who took the alternator apart cleans those same parts, and reassembles the unit later, he will catch many errors that will get lost in the batch and queue method. For example, if an alternator has failed because the brushes and slip rings are worn out, and there are serious signs of arcing, it is advisable to replace the regulator, even it if might still test good. (We learned this from one of Joe Davis's classes.) But if the parts have all gotten separated, that weakened regulator would never be eliminated because it still tests good by most testers.

One thing I have learned, is that if I do custom work instead of working to refill my own inventory, I can see by the failure mode of the unit I am working on whether the customer will need to make corrections on his machine or vehicle. For example, if the brushes are fouled by antifreeze or oil, then I inform him he has a leaking gasket somewhere. He is grateful for the tip, and it prevents a comeback, or at very least, prevents it being at my expense, and it makes me look more professional.

Also, I never have problems with units that don't fit right. I never need to mess with shims, special brackets, or harness adapters. I don't have to stock the completed unit at my own expense, and I don't have to hunt for cores. My costs are way down. I work on a cost-plus basis and can usually still beat the competitors' prices on industrial/agricultural units if I want to.

Often, when I try to rebuild items for stock and use purchased or returned cores, the cores I end up with are worse for wear—broken insulators or housings, rust and corrosion damage. Also I may encounter minor but irritating problems with incorrectly swapped units. Things like threaded or non-threaded holes, length, width or exact orientation of housings and mounting ears can easily be overlooked, and interrupt flow. Using the customer's core, I merely mark or inscribe the parts for correct assembly later, and proceed.

The business must think about each step in the whole process of making the product and position the equipment and processes so that it flows, and can respond quickly to orders from customers. Don't have machines grouped in one area by type, but rather position them according to the value stream.

For example, I put my compressors, vibratory parts cleaner, glass bead machine and paint booth all in the back shed because those functions were noisy, smelly, or dirty. But in thinking about it, I realized that it would be better to have the paint booth nearer the front (vented properly), right by the area where I tested, packaged and invoiced my units. This would save me two round trips back to the paint booth after final testing—one to take it there, paint it and leave it to dry, and then another round trip to get it. And if things were extremely busy, I might have forgotten whether I had painted it already, and so I might make yet another trip back there to look for it, discover that it wasn't there yet, and then have to go and find it, all while the customer was waiting for it. Pure muda.

And that's what lean thinking is all about: eliminate waste in all its forms.

Nathan Unger is owner of ASI Rebuilders, Abottsford, B.C.