



## Show and tell

I've been accused of a lot of things, but being reserved isn't one of them. Particularly when it comes to communicating a mission to employees.

Some years back, when the clerks at the local sign shop received my purchase order for six gigantic, silk-screened vinyl banners bearing all manner of inspirational slogans, they, understandably, wondered if I was setting up a locker room for a high school football team. I told them being a Steelers fan doesn't make me qualified to coach a team, and that the 5'x7' color banners were for the walls of my nifty new machine shop.

My thinking was then, and is now, that nothing beats a visual aid when communicating crucial information. In the case of my vinyl signs, that information included sayings such as, "We demand perfection, Excellence will be tolerated," "American Pride, American Craftsmanship" and "On Time, In Tolerance," among other pithy slogans that every machinist, programmer and support staffer would readily understand.

### What visual representation does your shop floor contain that tells your team in 5 seconds or less how they're doing in key areas?

Did the banners make a difference? I think so, although, like most such visuals, they eventually became invisible to longtime employees. But to new workers and, especially, visiting customers, the huge banners sent a clear signal about the seriousness with which we took our work.

Although billed to operations, you could argue that my expenditure should have been billed to marketing. But, I viewed the investment—about 600 bucks—as part of a larger strategy that I use to this day. It's one that reflects my firm belief that employees remember 25 percent of what they hear and 50 percent of what they see—especially when it's in front of their faces every workday.

Take a long look around your shop floor. I'll bet you've got all kinds of stuff at individual workstations and tool benches—drawings, maybe even PCs and bar-code readers—to help your team produce, measure, package and ship parts and assemblies. And, of course, you have the obligatory bulletin board chock-full of mandated federal, state and local notices.

But what visual representation does your shop floor contain that tells your team in 5 seconds or less how they're doing in key areas? No, complex, color-coded, MIT-inspired charts listing every measurable activity in the plant do not qualify. Such charts usually are overly complex, take too long to update and, by comparison, make the aforementioned federal, state and local notices seem like beach reading.

What I'm talking about is a straightforward visual presentation of the metrics your production team members really need to care about: quality ratings, output relative to estimated times, ship date vs. customer-requested date, and revenue and profitability. These metrics should be expressed in aggregate (i.e., overall for the shop floor and not by customer, P.O. number, part number or any other detailed—and potentially confidential—category).

These four metrics, boiled down to their simplest possible form, tell your most important employees—the skilled craftsmen who actually crank handles, program and set up jobs, test for quality, and carefully pack and ship your products—exactly how the whole team is progressing toward the company's goals. No engineering degree or background in cryptography required.

Naturally, the boss needs to actually set the goals for these four vital metrics. If that hasn't been done, well, odds are your shop has problems that a Times Square billboard wouldn't solve. But if your shop does have achievable goals in these four areas, by all means, display them proudly for all to see, including customers. My guess is that if you've read this far, you're already thinking, "Hell yeah, we're kicking butt. Why shouldn't a visiting customer know that?"

Creating this dynamic display can be as old-school effective as a conference room-sized erasable whiteboard with the metrics handwritten into columns or as "technogeeky" as a large flat-screen monitor tied to a Microsoft PowerPoint digital file into which you or your designee keyboard in daily updates.

With due respect to my old media professors, in this case it most assuredly ain't the medium that matters, it's the message that counts.

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## Bar feeders

To eliminate the manual loading of slugs, a bar feeder automatically positions raw material into a lathe. The bars can be round-, hex-, square- or even odd-shaped. Depending on the type of bar feeder, typically the bar measures from 0.040" to 4¾" in diameter. For feeding sliding-headstock, or Swiss-style, machines, the diameter of round bar stock is up to about 1¼".

Of course, bar feeders can be customized for specific applications, such as grinders and other nonturning machines, for example, but that represents only a small percentage of the market.

Three basic versions of bar feeders are available: a single-bar loader, a 12' magazine-style bar loader and a magazine short loader. With a single-bar feeder, one bar at a time is loaded manually. This is the low-cost option, typically used for producing complex parts where cycle times are 5 minutes or more. When there isn't enough material on the bar to machine another part, an end-of-bar signal indicates to the CNC to stop the production cycle and a red light turns on, indicating to the operator that a new bar needs to be loaded.

A magazine bar loader automates the bar-loading process, enabling unmanned production and usually allowing an operator to work a multiple-machine cell. The most common bar length is 12', and, depending on bar diameter, a standard magazine holds 20 to 25 bars.

With a short loader, bars need to be cut to the length of the headstock, but the equipment consumes less room on the shop floor than a 12' magazine bar loader. A short loader also automatically loads stock into the machine.

In addition to loading bar stock, a bar feeder needs to support long bars at a high rotational speed without generating any

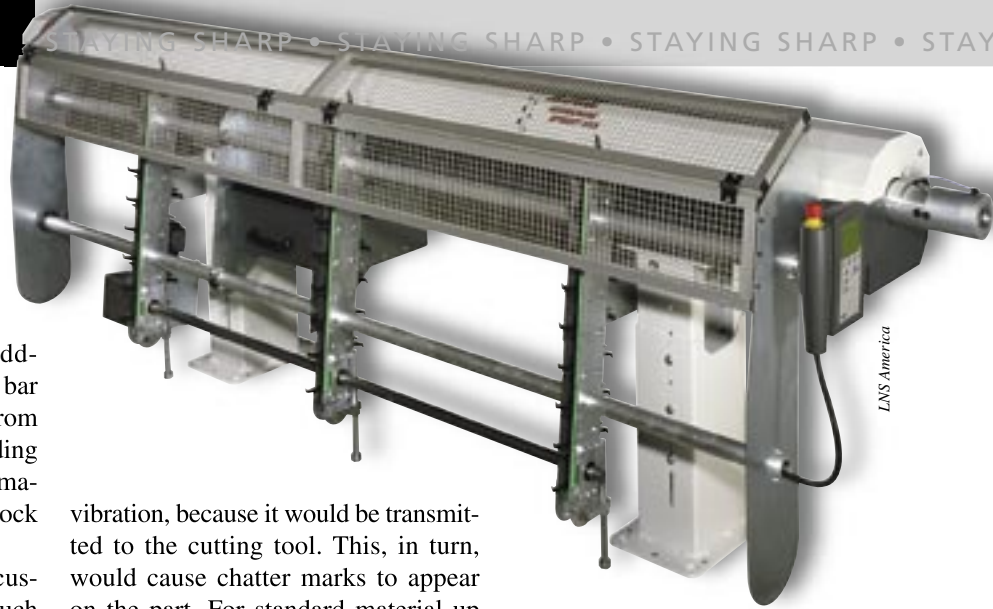
vibration, because it would be transmitted to the cutting tool. This, in turn, would cause chatter marks to appear on the part. For standard material up to ¾" in diameter, the bar is rotated at up to 15,000 rpm. For stock from ¾" to 2", the speed is about 6,000 rpm, and, larger stock is rotated from 3,000 to 4,000 rpm at constant cutting speeds.

The main components of a bar feeder are the magazine, the guiding mechanism and the pusher drive. The magazine is where the raw material is loaded. The guiding mechanism, or guiding channel, is what supports the bar in rotation. The majority of bar feeders produced during the past 5 years have a guiding mechanism that operates hydrodynamically, using oil. The other technology employed is hydrostatic, which is appropriate for high-speed rotation and long production runs.

The pusher drive is the rod that moves the bar automatically into a lathe. On a Swiss-style lathe, it is necessary to coordinate the bar feeder's pusher and the movement of the bar, because the bar moves back and forth during machining. For this purpose, some bar feeders have electronic synchronization, where the PLC logs the bar's movement the first time a part is processed. After that, the PLC matches the bar's movement with the pusher.

Several optional features are available. One is an automatic front rest, which is located on the front of a bar feeder and prevents residual bar vibra-

**A magazine bar feeder, such as LNS America's Hydrobar Sprint 555, automates high-production parts making.**



tions from transferring to machine's cutting area. (Some manufacturers offer it as standard.) This troublesome vibration can occur because of the small, unsupported gap between the lathe and bar feeder. Another is a Z- or X-axis retraction. This allows the bar feeder to be moved away from the machine so maintenance personnel can work on it more easily or when changing spindle filler tubes. The most popular option is a magazine-capacity extension to allow longer production runs.

When specifying a bar feeder, manufacturers often provide a reference chart to help end users select the best bar-feed model for their application. Such a chart usually takes into account considerations such as the type of headstock, whether auto or manual load is needed, bar length, floor space, range of the bar size, changeover and magazine capacity.

*Special thanks to Damien Wenisch, director of technology for LNS America Inc., Cincinnati. For information about the company's bar feeders, call (513) 528-5674 or visit [www.lnsamerica.com](http://www.lnsamerica.com).*

# Learning old tricks

BY JAMES A. HARVEY

One of the advantages of learning the machining trade is that much of what you learn is cumulative and enduring. Many of the techniques were validated decades ago and will still be useful decades from now. The following tips cover common and not-so-common shop practices.

Some of these suggestions may seem obvious, but I've found that "obvious" hardly ever is. Ask 10 different people a simple question, like, "What is a cone-shaped edge finder used for?" You'll be amazed at the variety of responses.

**■ Use hydraulics to remove bushings or dowel pins pressed into blind-holes.**

It can be difficult to extract pressed-in bushings or dowel pins from blind-holes unless some provision was made beforehand for extracting them. One technique is to use hydraulics.

This technique can only be used when there is a hole all the way through the axis of the bushing or dowel pin before pressing it into the blind-hole. The way to use hydraulics to extract a bushing or dowel pin from a blind-hole is to first fill the ID of the dowel pin or bushing with oil or grease. Any oil will do, but thicker oil tends to work better because it doesn't run or splatter so easily.

Then, insert a dowel pin without a hole in it, which is slightly smaller in diameter than the bushing's or dowel pin's hole, into the ID of the bushing or dowel pin. When you rap the end of the pin with a hammer, you force oil around the end of the bushing or dowel pin and cause the holeless dowel pin to act as a "piston" that drives the oil or grease forward. This exerts the backward pressure needed to extract the pressed-in bushing or dowel pin.

The only time hydraulics won't work is if the bushing or dowel pin you want to extract has a flat bottom and the hole that it is pressed into has a flat bottom. These surfaces mate, creating a seal that prevents the grease from getting behind the dowel pin or bushing to provide the force needed

for extraction.

**■ Apply a milling cutter with a diameter slightly greater than the width of the workpiece.**

In a milling machine, it is not good practice to use a cutter that is much greater in diameter than the width of the surface being machined. A large-diameter cutter moving across a narrow workpiece has a tendency to "hammer" the workpiece, which can shorten tool life. The hammering is caused by the cutter entering the workpiece at, or near, its maximum chip load.

On the other hand, a cutter that is only slightly larger than the workpiece enters the workpiece "early," gradually increasing the chip load as it rotates into the workpiece and then gradually decreasing the chip load as it exits.

The first half of the chip is thicker because of the lateral movement, or feed, of the table, which makes the first half of the chip curl more than the last half.

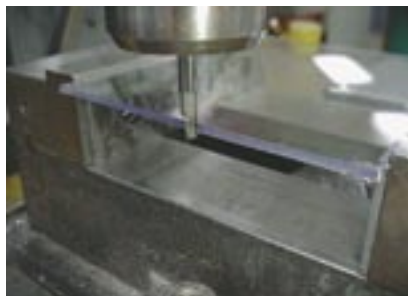
The gradual increase and decrease in chip load on a cutter that just covers the workpiece makes for a smoother, more efficient cut.

**■ Use cutting oil when machining plastics.**

Plastics have a tendency to spring away from cutting tools. The tendency is sometimes quite noticeable, especially when tapping. The friction and clamping action of plastics usually require increasingly more torque to wind in a tap the deeper it goes.

Cutting oil reduces friction and significantly improves the machining characteristics of plastics.

**■ Use single-flute cutters in a milling machine to avoid "lifting" parts.**



**Apply a single-flute endmill to side mill flimsy plates. This eliminates the lifting forces generated by helical endmills.**



**Using hydraulics to remove a bushing from a blind-hole.**

Helical endmills have a tendency to lift parts. When cutting thin, flimsy parts, the lifting action can be detrimental. Keep parts from lifting by applying single-flute cutters.

**■ Construct work stops with minimal surface contact area.**

Work stops are something machinists often use to accurately and repeatedly locate parts in machine tools. Stops should be constructed, or set up, in such a way that there is minimal surface contact between the stop and workpiece. By doing so, there is less opportunity to trap chips between the stop and workpiece.

Spherical shapes work well as stops because they don't trap chips and have little tendency to dent parts.

Construct stops rigidly so they don't move if bumped a little hard.

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All images: J. Harvey

# A second wind

INTERVIEWED BY ALAN RICHTER, EDITOR

*E. Mike Bruhwiler is president of Bruwiler Precise Sales Co., Los Angeles, a company he formed in 1962. He is also co-founder of Micro 100 Tool Corp. Although Bruhwiler is no longer formally part of the Meridian, Idaho-based Micro 100, his company serves as a local dealer for its tools. Bruhwiler spoke about his start in the manufacturing industry, the changes that have occurred and his current endeavors.*

**CUTTING TOOL ENGINEERING:** How did you get involved in the manufacturing industry?

**E. Mike Bruhwiler:** I emigrated from Switzerland to the United States in 1953. My intentions, at that time, were to come here for 2 years, learn the language and the American way of business and go back. After 4 years, the sales manager of a machine tool company I worked for decided to quit and go work for S&S Machinery, which is still in business.



**E. Mike Bruhwiler**

Its headquarters are in Brooklyn, N.Y. They opened a branch office in Los Angeles and the sales manager asked me to come along and run the office. This was in 1957. I happened to like it here.

**CTE:** How did you become co-founder of Micro 100?

**Bruhwiler:** In 1969, Jack Newberry had a great idea for carbide cutting tools, which he called Hi-Micro. I still remember

the day he came to see me. I never met the fellow before. He came to the building, where we are still today, and said, “Hey, Mike, I want to show you something.” So we went to the warehouse, where there’s this concrete floor and he had this brazed carbide tool that he slammed into the ground and the damn thing didn’t break. I was shocked. I thought either he’s nuts or I’m nuts, but if this is the way it is, he’s got something very special. So Bruwiler Precise Sales took on the line, which Jack produced in the garage of his home

in Gardena, [Calif.], and we started to sell these tools locally. Then we formed a separate company, Micro 100 Inc., because the thing really took off.

**CTE:** What significant changes have you seen in the industry?

**Bruhwiler:** Everything has to run faster, run smoother and last longer. The big changes have to do with the quality of the tools, which is much better than it was 50 years ago. There’s no question about it.

**CTE:** What hasn’t changed?

**Bruhwiler:** People still look for the highest quality at the best possible price.

**CTE:** Is it important to have the best end-user price and still serve the dealer?

**Bruhwiler:** I’m trying to do this now, one more time, with Bruwiler Precise Sales, so you can say I’ve got a second wind. We’re taking it to the next level to make Bruwiler a wholesale organization strictly for our own brand of cutting tools. They’re called BPS carbide cutting tools.

**CTE:** I understand you were involved in community service. What did you do?

**Bruhwiler:** For over 20 years, I was involved with youth soccer. When soccer started here on the West Coast, you could say I was a pioneer in youth soccer. I spent a lot of time at it, several days a week. That was my community service. I coached for many, many years. I’m still a fan, of course, but I’m not active anymore. For the World Cup in 1994, I was honored as the ambassador of soccer representing Switzerland in the United States as having done more for youth soccer than any other person from Switzerland. This was how MasterCard honored all the people who had a lot to do with the growth of soccer in the United States.

**CTE:** Lastly, why is the “h” in your name missing from the spelling of your company’s name?

**Bruhwiler:** I had a friend who was the publisher of *Industrial News*. I told him I was starting my own corporation and he asked me what I was going to call it. I said, “I’d like to call it Bruhwiler Precise Sales.” He said, “Yep, that sounds pretty good, but if I were you I would take the h out, because Bruhwiler with an h just doesn’t go very well with the English language.” I agreed with him.





# The value of an employee

A true sign of the worth of a company is the value it places on its employees. It took me quite a few years to realize that.

When I started my career, I worked for a company with over 2,000 employees. Management put me in various positions during that time. I loaded trucks, pulled stock, inspected, programmed and worked on saws, lathes, mills, NCs and CNCs. I saw opportunity for overtime dollars and job diversity.

In my youth, however, I didn't realize what was going on behind the scenes. I couldn't see that corporate managers were grooming me to join the management team. They were putting me in these positions so I would know everything about the business. (Sneaky devils they were.) Unfortunately, being young and impatient, I eventually left to work as an applications engineer for a turning-center builder. The only reason I left was for slightly higher wages.

**Companies looking for an employee who wants a career provide benefits above and beyond what's normal for their industry.**

What I should have seen was my previous company valued its employees. Initially, new hires were placed in positions the company needed to fill. Typically, these jobs were at the lower end of the skill and pay spectrum, because the better positions had little turnover. There was, literally, a waiting list to get a job there, and you had to know someone to get interviewed.

As time progressed, company managers studied and evaluated their employees. They offered training and then placed employees in positions to which they were better suited and showed interest.

Each position had a wage-level range. If someone became proficient in his job, he could achieve the highest wage level for that position. There was no secret about the wage range for a given position, either. If an employee wanted to earn more, he could check the wage

rates for other positions and strive for a higher-paying position.

As I became older and more experienced, I realized a higher wage is not the only thing that makes a company attractive. Don't get me wrong, a good income enables us to get the things we desire, but a nice benefits package can be just as important. Companies that value an employee provide more benefits than companies just looking for someone to fill a position.

Companies looking for an employee who wants a career provide benefits above and beyond what's normal for their industry. I'm not just talking about vacation days and paid holidays, but true benefits such as high-quality health care. These companies typically provide better health care plans, ones in which employee contributions are relatively low, as well as dental and vision plans.

What about retirement plans? Some companies don't even have a retirement plan. If they do, it's up to the employee to make his own contribution. A company that offers a retirement plan and makes matching contributions to its employees is a rare commodity these days.

Let's not forget life insurance and short-term and long-term disability. At the last company I worked for, I had to pay for these. The life insurance policy would have covered my burial costs ... maybe! Better companies provide these at no cost to the employee.

What about bonuses? I can't tell you how many years it's been since I've heard about a company that gives bonuses.

Other benefits include tuition reimbursement, use of a company vehicle and company luncheons. Even seemingly insignificant benefits, like an occasional free lunch, add up—and add to a company's appeal. A good benefits package tells employees that they're valued. That, in turn, will make them less likely to take a job at the shop down the street for a few bucks more a week. △

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