STAYING SHARP
manager's desk

By Keith Jennings

Your shop's working people

Recently, I happened to catch a CNN interview with Ohio Gov. Ted Strickland. I didn't know much about him, but his comments about the needs of "working people" made me listen carefully. The governor lamented about the condition of Ohio's economy and made a case for his preferred presidential candidate. He kept mentioning the working people of Ohio and how they needed to elect Sen. Hillary Clinton as president if they wanted a better future.

While contemplating Gov. Strickland's position, I wondered if he considers shop owners and managers who somehow succeed and annually earn $60,000, $85,000 or $150,000 as working people. Is there an income cutoff that the governor and many of his fellow politicians consider as disqualifying someone as a working person? Normally, the group he describes includes blue-collar workers, who generally lack college degrees, with machine shop employees among them. Of course, this groups works. Do shop owners and managers work? Of course, they do as well. Well, then, aren't owners and managers also working people? After all, many shop owners and managers were once shop employees, who had the discipline and risk tolerance to be promoted up through the ranks or decided to start their own companies, sacrificing untold amounts of time and money to make their businesses work and employing others who themselves may attempt to start their own shops one day.

When I think about all the people I've interviewed, hired and fired over the years, with their multitude of stories and issues, I wonder if politicians have any clue who real working people are. This political characterization of constituents attempts to drive a wedge between shop owners and managers who acquire new business and manage the operation and the workers who provide the needed labor to complete those jobs. The reality is that owners, for example, who excel and increase their income are role models. They pay insurance and taxes and are responsible for the working conditions in their shops. Ultimately, everything is their responsibility.

However, if they earn $150,000 annually, politicians undoubtedly classify them as "wealthy" and no longer part of the group they claim needs government assistance because they're rich and without problems. But a higher salary doesn't automatically exclude someone from being a working person.

Let's look at plant managers, too. Plant managers are commonly promoted from within after proving their worth through years of sacrifice and effective machine operation. Many spent the majority of their working lives receiving hourly wages, working hard so they can advance up through a company's ranks and hopefully increase their income. Who would dare tell them they aren't working?

> *Working people are those who work, including ambitious, self-reliant shop employees who become successful shop owners in spite of politicians.*

Shop managers know working people. They employ them, work with them, train them, listen to their stories, encourage them, console them and sometimes fire them. It's the entry-level deburring guy, the 60-year-old manual machinist, the CNC operator, the successful sales manager who sometimes receives more compensation than the owner and the general manager who probably started at the bottom. And it's most certainly the owner, who risked everything to get into a business, manufacturing, that politicians said was dying.

Working people are those who work, including ambitious, self-reliant shop employees who become successful shop owners in spite of politicians. CTE

About the Author: *Keith Jennings is president of Crow Corp., Tomball, Texas, a family-owned company focusing on machining, laser cutting, metal fabrication and metal stamping. He can be e-mailed at kjennings@jwr.com.*

Ringmaster

By Bill Kennedy,
Contributing Editor

John Copello is a third-generation machinist at Larry Copello Inc., his family's job shop in Sonora, Calif. The shop does milling, turning and grinding to make components for medical equipment and parts to test airport X-ray machines.

As a side business, Copello designs and machines replacement parts and tools for classic Volkswagens and Porsches. He said VWs and early Porsches are "kissin' cousins in design and body style," so he makes parts for both, including headrest kits, aluminum knobs, stainless steel seat adjustment levers and clip-on vent window deflectors. His most popular Porsche-related products are tools.

One sought-after tool removes and installs the chrome bezels, or rings, that secure dash switches on 356-series Porsches. The round-shouldered rings have four radial holes spaced at 90° intervals. The curved shoulder can't be gripped with a regular pair of pliers, and the holes are not parallel to the dash but sit on an angle on the shoulder. The original Porsche installation tool was a hook-like spanner wrench with a pin to fit one of the holes on the ring.

B. Kennedy

John Copello designed and machined these tools to remove and install round-shouldered dashboard switch bezels, or rings, on vintage Porsches without any risk of a tool slipping and damaging the car's painted dashboard.

However, the last 356 was built more than 40 years ago, so the remaining 356s have holes that are worn and rings that have become hard to turn. Consequently, when a simple spanner tool slips out of a worn hole, it can scratch the car's painted dashboard. Copello said, "Every car show I went to, people asked, 'can you make something that will take these stinking rings off?'" He said he first thought to copy the spanner but realized the aged rings required extra grip. So he decided to combine two spanner

wrenches into a tool resembling a pair of pliers. Each half of the tool is made up of two parts: a handle and a welded-on contoured tip that grips the ring.

Copello machines the tool handles from 303 or 304 stainless steel flat stock, which is 7" long × ¼" thick × ¾" or 1" wide, "depending on what's on sale." He roughs the handle on a Bridgeport mill, stacking up multiple pieces of stock and milling 4" of the handle to a ⅜" width, using a 1"-dia., 5-flute, solid-carbide endmill run at 900 rpm. The shop's Bridgeport features ProtoTrak CNC, but Copello feeds the cutting tools manually; "If I was making a million of them, I would use CNC," he said. Also, he employs light cuts to extend tool life.

At this point, about 3" of the handle remains the width of the original stock, looking "like a little spatula," Copello said.

He next mills a beveled angle on the handle's end where the tip will eventually be welded, turning the vise on the table to generate the angle and tipping the mill's head to create the bevel.

Copello then mills the tool's center, where the two handles will join, to a thickness of ⅛", so the assembled tool will be ¼" thick.

In that milled area, he drills a ½"-dia. hole for the pivot pin with a screw-length HSS drill and then reams the hole to a diameter of ⅝". The reamed hole has a tolerance of ±0.001", and all other tolerances are ±0.005".

The tool's distinguishing feature is dual tips that exactly conform to the ring's shape and also engage two holes with pins.

Copello employs an imaginative process to make the tips from 5"-dia., 4"-long stainless round bar stock. First, on a Webb engine lathe, he drills an axial hole in the stock's center. The hole diameter depends on the ID of the ring the tool is designed to turn, and Copello makes two different versions of the tool. One size matches the ring on the wiper and headlight switches, and the other is for the ignition switch and hand throttle control. For the headlight switch bezel, the hole is 0.708" in diameter.

Copello faces the stock with a turning tool and then machines a pocket with a radius around the hole with a tool that matches the ring's OD. In the headlight switch bezel's case, that is 25mm in diameter. "You could actually take that chrome ring and put it right in there flush," he said. The same facing and pocketing operations are performed on both sides of the stock.

Then the bar is clamped on the mill with the hole facing vertically. A ¼"-dia., 5-flute, solid-carbide endmill makes four cuts across the hole, ¼" deep and ¾" apart, in a pattern resembling a tick-tack-toe board. The stock is turned over, and the cuts are repeated. Next, the

bar goes back to the lathe, and with a ⅛"-wide parting insert, Copello parts the bar's end to the depth he's just milled. The result is four ¼"-thick segments, or tool tips, shaped to exactly match the ring's profile, "and four little pizza slices that I throw away," Copello said.

One bar produces four tips per end, enough to make four dual-tipped tools. Depending on the number of tools he's making at the time, Copello will repeat the sequence of facing, creating a radius, milling and parting off on the bar stock to make as many tips as needed. "The process is the only way I could figure out how to make a perfect tip that would grab that ring and hold it," Copello said. "It took me forever to figure out how to do that!"

Each tip features a pin to fit a hole on the ring. With an abrasive saw, Copello cuts the ⅜"-long pins from ⅛"-dia. hardened steel drill rod. Then he puts each tip in a vise on the mill table, uses an ⅛"-dia. endmill to spot the hole location and drills a ¼"-deep hole with a ⅛"-dia. HSS drill. Copello press fits the pins into the holes and secures them with Loctite adhesive. He then mills a 45° bevel on one side of each tip to prepare it for welding.

The pivot pins that hold the tool's two sides together are turned from ⅝"-dia. brass rod on a Hardinge chucker lathe. "It looks nice if I make the pivot pin fit flush with the handle," Copello said. He machines a taper on the rod from ⅝" in diameter to ½", then parts the ¼" long pin. He assembles the pin and two handles, but at this point doesn't peen the ½"-dia. end of the pin to lock the handles together.

For welding, Copello supports the assembly with a number of small fixture blocks and sets the handles' tips, aligning them around a chrome ring. After spot TIG welding the tips in place, he completes the welds on the tip front, back and sides.

The handles are then bent on a bending machine to the point where they are straight when the tips are gripping a ring. After peening the pivot pin to lock the tool together, Copello polishes it, cleans it with acetone and dips the handles in Plasti-Dip plastic coating.

Copello said it takes about an hour to complete a tool. He has considered ways to automate the process, but believes that the time savings would be minimal. Copello makes about 25 sets (50 tools) a year, "depending on how many people nag me for them." CTE

Contact Larry Copello at (209) 536-1449.

contact us

If you have manufactured a part that would make a good candidate for a Part Time article, contact Contributing Editor Bill Kennedy at (724) 537-6182 or billk@jwr.com.

Automation: What's it for?

By George Weimer

What is automation supposed to do for the machine tool industry and its end users in general? Seems like a simple question, until you try an answer it. Most blue-collar folks probably believe management sees automation as primarily a way to get rid of labor. In other words, workers think their bosses want to kick them off the factory floor and out the door. Automation is what labor might call management's labor-killing weapon.

What do managers think automation is for? Do they agree that it's a tool to remove workers? I think some industrial managers believe that it is even though they use terms like "labor-saving devices," "increasing labor productivity" and "modernizing."

And, to add evidence to belief, there's no question the increasing sophistication of industrial automation has meant fewer people per square foot in many plants.

The auto industry in Europe and in some ways in the U.S. negotiated special "job saving" measures in labor contracts so no one was laid off when lines were built or modernized with the latest, state-of-the-art machinery—even though there was nothing for them to do.

So is it true that automation is a weapon to get rid of manufacturing workers? I don't think so and here's why.

Automation is what I call the wave front of an industrial revolution. It is, in effect, the modern phase of the history of machine tools. As new techniques and technologies are invented and brought into the manufacturing process, worker productivity, and hopefully the productivity of the rest of us, rises dramatically while new jobs are created. That has been happening for generations.

The point is modern machine tools, more automatic than what they replace, disrupt labor and eliminate jobs. In other words, they cause pain for some people. Yet, that is only one part of the automation story because it actually creates more—and more interesting—jobs.

In reality, machine tool automation ups the productivity of both blue-collar and white-collar people. Automation allows all manufacturers to compete in the global economy and bring prosperity to millions.

Modern manufacturing and its core, the machine tool industry, is the central

factor in the rising living standards of people throughout the world. Contrary to what some politicians, social activists and critics from various causes say about industry, it's the most important show in town. Modern manufacturing is the golden goose. Without it, it's dirt floors and a bleak life indeed.

Those newly created jobs? It's a long and growing list. When 2,000 worked in a large machine tool factory 50 years ago, how many others worked as industrial software engineers, systems integrators, CNC programmers, Web site administrators or CAM researchers?

It is a great misconception in both the labor and management ranks to see automation as a weapon to use against the rank and file. Seeing automation as something that eliminates jobs seems upside down to me. Instead, automation is a way to up quality and productivity and create new jobs.

And there's more—much more—automation coming to the machine tool world and manufacturing in general. In a previous column, I noted the MTConnect effort led by AMT—The Association For Manufacturing Technology. This is an attempt to develop a new standard for all machines via a common dictionary of terms and commands. MTConnect uses the Internet to tie a company's many machines in different plants together into a productivity boosting system. Other systems like Haas Automation's M-Net, which enhances the discovery function, means you can know where any machine is by searching the Web.

Further machine tool developments will include increasing functionality as well as achieving higher speeds and feeds. The ability to machine harder and more difficult-to-cut materials will continue to impact the industry. In addition, more and more intelligence will be embedded in the machines, and remote control will become increasingly common. This is all part of the continuing wave front of automation.

These technologies and ideas, and other automation-enhanced machinery, will be demonstrated at IMTS, which takes places Sept. 8-13 in Chicago. They will make the point clear. Automation is only going to increase in sophistication and productivity-enhancing power. Management in particular needs to make sure that both they and their employees are ready for it. **CTE**

About the Author: *George Weimer, a freelance writer based in Lakewood, Ohio, has an extensive background in the metalworking industry's business press. Contact him by e-mail at gweimer@jwr.com.*

Mastercam in SolidWorks coming soon

By Ben Mund,
CNC Software Inc.

A new CNC Software Inc. product, Mastercam in SolidWorks, is scheduled for release this summer, bringing together two leading developers in the CAD/CAM industry. Users of SolidWorks, from SolidWorks Corp., Concord, Mass., will soon be able to design parts in the CAD program they prefer and seamlessly generate the CNC toolpaths to machine those parts. For shops already using both programs independently, the integrated package avoids constantly switching between the two interfaces. Mastercam will be an option clearly visible on the SolidWorks toolbar.

Mastercam in SolidWorks includes Mastercam's most popular cutting strategies, such as high-speed machining, feed rate optimization and FBM (feature-based machining). Even complex 3-D components can be programmed. If design changes are made, Mastercam will automatically identify the affected toolpaths for regeneration. The 3-D part model will have already been created in SolidWorks, providing Mastercam with the necessary data to generate the toolpaths quickly and easily—all in a single interface.

The HSM functionality combines high feed rates and high spindle speeds along with specific tools and motion, which can deliver faster turnaround times and finer part finishes. The goal of high-speed toolpaths is to create a smooth motion with few or no sharp angular moves, allowing for fast, shallow cuts. Keeping the cutter in the material longer and allowing climb cutting is another advantage of HSM.

A few examples of Mastercam's high-speed toolpaths are core roughing, area clearance and waterline.

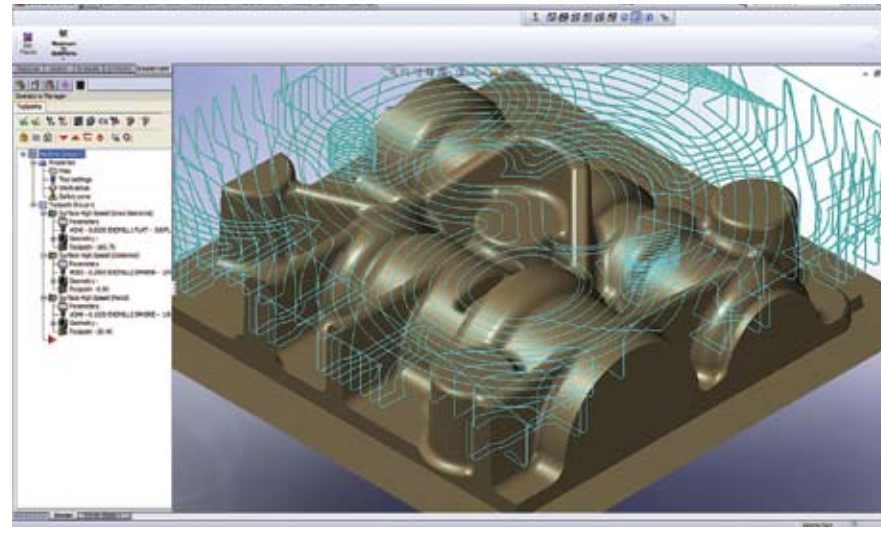
Core roughing is a strategy in which the toolpath intelligently cuts the part from the outside in, and always climb cuts, reducing the risk of damaging special insert cutters.

Area clearance is a technique for cavity machining. It uses Z-axis slices through the model at different depths and clears a large amount of material, starting from the center and working its way out.

Waterline is an automatic smooth entry/exit calculation. It provides smooth transitions from one Z level to the next.

Even if a shop doesn't have a high-speed machine, applying some of these high-speed techniques can improve output and extend tool and machine life.

get with the program



CNC Software

With Mastercam in SolidWorks, users of SolidWorks will be able to design parts in the CAD program they prefer and seamlessly generate the CNC toolpaths to machine those parts.

Another helpful feature, particularly when combined with high-speed machining, is feed rate optimization, which enables a programmer to build feed rate adjustments into the CNC program. It analyzes the toolpaths and divides the motion into smaller segments. Based on the volume of material removed in each segment, the software calculates the optimal feed rate for the cutting condition. The software then provides a new toolpath identical to the original, except with new feed rates.

A series of dialog boxes query the programmer, asking for information that defines the stock being removed. This definition is then associated with the machine tool's performance dynamics and the cutting requirements, such as workpiece material and cutting tool capability. These parameters indicate the metal-removal rate, entry feed rate and other factors to calculate the optimal feed rate for each section of the cut.

For example, feed rates are increased to maintain a full chip load but are decreased to negotiate direction changes without overshooting or undershooting the geometry, given the responsiveness of the machine tool's servos. Likewise, rapid moves are applied to passes where the tool is not in contact with the workpiece to reduce air cutting. The results are machining routines that shorten cycle times.

Another integral aspect of Mastercam in SolidWorks is FBM drill. FBM drill automates the tedious tasks of identifying holes, selecting strategies and tooling, and drilling, reaming, tapping or counterboring holes. FBM drill can find features itself or use those identified with the SolidWorks Hole Wizard.

Mastercam in SolidWorks also delivers a set of automated cleanup toolpaths, allowing programmers to get parts off the machine faster and with little or no handwork. Beta testers felt at ease with the Mastercam "Operations Manager" within SolidWorks, which allows quick access to any point in the machining process.

With the product release, SolidWorks-based companies that are recruiting trained programmers will be able to tap into the Mastercam user community. Companies will also be able to draw upon the knowledge of Mastercam resellers for support and application tips and expertise to boost productivity when programming the software and during subsequent machining operations. **CTE**

About the Author: *Ben Mund is marketing manager for CNC Software Inc., Tolland, Conn. For more information about the company's Mastercam CAM software, call (800) 228-2877 or visit www.mastercam.com.*

Employee selection and training

By Edward F. Rossman, Ph.D.

You spend a lot of your life at work so you should have fun with your job.

Employers should foster a work environment, atmosphere and attitude in their factories that helps all employees have fun with their jobs. That might help machine shops during the lean times.

There is strong competition from other shops and from other countries. Progress in technology, manufacturing techniques and employee involvement are proceeding quickly. Many machine shops, however, are not as up-to-date as they need to be. Training in all facets of the operation can help solve this problem.

These facets include leadership and employee involvement, management selection and attitudes, employee training, programming and lean studies.

Leadership and employee involvement. In my definition of world-class operations, workers are carefully selected, fairly treated and well trained. They are customer oriented and fit well with the rest of the team. Training helps to achieve such a workforce.

Management selection and attitudes. Here, you might want to contact a manager or two from shops that seem well run to have them share their ideas on employee selection and training. One machine shop president I interviewed makes a strong effort to hire and place staff members based on his assessment of how well they will fit in with the team. The focus is on "fit" and "teamwork" and not necessarily on the greatest intellect or highest-skilled person available. This philosophy seems to produce great results for the company and helps minimize turnover. Training of management on how to treat employees as individuals and in being tuned into their requests and needs is the theme here. To achieve that, I strongly recommend teaching listening skills.

Employee training. All personnel—not just machine operators—are part of meeting customer needs. Therefore, some companies establish training programs that include both machine operators and staff. This is a great practice that breaks down communication barriers and reduces boundaries between labor and management. Training is sometimes linked to a community college, and the link becomes a conduit for recruiting. In some companies, the

in-house NC training equipment and machines are exchanged on a regular basis, such as every 3 years, to keep abreast of the latest technology. Training must be ongoing—not just a one-time event—to keep pace with rapid advances in technology and refresh workers' skills.

■ **Efficient programming.** An array of software is available for part programming. First, a part might be created in CATIA, for example, and then converted to Vericut to obtain the G codes. Then Vericut simulation software verifies each program. This eliminates a lot of programming error, and the program is expected to be error free when it goes to the shop floor. In the most successful shops, even slight changes in NC programs are subjected to a full electronic confirmation using software like Vericut.

In great shops, the NC programmers add the elements of machine spindles and part fixturing to computer models of parts to look for interferences and crashes beyond just the cutter's tip. The industry is close to eliminating the need to machine a first part to confirm new NC programs.

However, inefficiencies caused by programming remain, and programmers need to be challenged to wring out that last drop of efficiency. To do that requires finding the shortest toolpaths between cuts. Cutting in both directions when appropriate also reduces inefficiency. Shops stopped conventional milling decades ago and generally only climb mill, but with proper equipment and conditions, a shop can eliminate the return air cut by milling in both directions: climb and conventional. A good test of an inefficient program is when the cutter's feed rate doesn't slow until the tool is about 0.005" from the part and the operator begins to panic and reaches for the stop button. Of course, this boldness can only be successful if the programmer is sure where the surface terrain of the metal starts.

■ **Lean studies.** Lean manufacturing is the rage today and for good reason. It cuts costs and flow time and can improve part quality. Besides fundamental lean studies, a shop should include training on maintaining processing paperwork, maintaining accurate cost-of-job records and scheduling preventive maintenance based on skilled operators' observations. **CTE**

About the Author: *The late Edward F. Rossman, Ph.D., was an associate technical fellow in manufacturing R&D with Boeing Integrated Defense Systems, Seattle. Rossman's Shop Operations column is adapted from information in his book, "Creating and Maintaining a World-Class Machine Shop: A Guide to General and Titanium Machine Shop Practices," published by Industrial Press Inc., New York. The publisher can be reached by calling (212) 889-6330 or visiting www.industrialpress.com.*

Training for a new generation

Interviewed By Alan Rooks,
Editorial Director

Kurt Nordlund was named president of Seco Tools Inc., Warren, Mich., in 2007. He has been with Seco for nearly 30 years, serving in Europe and North America. Prior to his current post, Nordlund was senior vice president of group marketing for Seco Tools AB, Sweden. In the following interview, he discusses the recruiting and training challenges faced by the metalworking industry and Seco Tools' approach to training.

Kurt Nordlund

All images: Seco Tools

Artist's rendering of new Seco Tools headquarters being built in Troy, Mich.

Cutting Tool Engineering: What do you see as the main challenges faced by the metalworking industry in recruiting, training and retaining skilled workers?

Kurt Nordlund: Everyone is aware of the problems the industry faces. Companies are being challenged to develop key competencies, grow their workforces and grow their knowledge bases to compete more effectively. Also, we all have to promote the idea that manufacturing is good for the country, that it provides jobs that are meaningful, interesting and enjoyable. To stay competitive, U.S. manufacturers have to make complex, value-added parts, and that is a challenge we don't talk enough about. We need to let people and the media know that manufacturing still matters in the U.S.

CTE: How has Seco made its training and development programs more effective?

Nordlund: We have restructured our training program, which we call STEP, an acronym for Seco technical education program. We've developed new

training materials, are using new media and are able to customize the programs depending on the audience. In addition to using it for in-house product training, we're taking STEP on the road to our customers and distributors, and we're also partnering with machine tool builders on joint training programs.

The first level of STEP training is a bit beyond basic; you need some metalcutting background to understand it. If people aren't at that level, we provide a basic online course through Tooling U. We've also made STEP training more hands-on. In one STEP course, we divide the class into three groups and provide each group with a workpiece, cutting tools and access to a parts programmer. Each group has to come up with a machining strategy. They review the others groups' work, pointing out where they might have vibration problems, where they might not get chips out of the cavity, etc. This type of training is mandatory for our distributors; they can achieve higher status, a gold star, by completing it. This program covers the basics of turning, milling, threading, holemaking and in some cases reaming. We can customize the training by using different modules.

We also have support tools, such as software that analyzes a customer's machining process. Using this tool, we can propose alternatives that improve productivity and lower costs. The software verifies the new process, which can be changed if the customer doesn't see the expected results.

CTE: Is it the supplier's responsibility to take the lead with this type of education?

Nordlund: Yes, I think it is. As I said before, if you are machining in the developed world, you have to know how to design and produce sophisticated, complex parts in the best possible way. That is what we have to strive for on a daily basis.

CTE: Who are the participants in Seco's education programs? Are they larger machine shops and manufacturers, or do smaller shops participate as well?

Nordlund: It's a mixture. A lot of people from smaller shops attend our scheduled STEP sessions. For larger shops, we may do classes at their sites. In some cases, where a customer is converting to a high-productivity or high-performance tool or material, we come in and train the operators on the floor about the new tool and how to apply it.

CTE: You've had the STEP program in place for about 2 years. What has been the reaction from the market

so far?

Nordlund: It's been very positive. I think more people in the industry are interested in these kinds of programs. Four to 5 years back, the interest from the industry wasn't as high, but companies now are looking for ways to improve their operations and the skills of their operators. We verify that the training works by testing people at the end of their sessions. We've found that to be effective, the training must be interactive. A couple of days of listening to someone lecture is not going to work anymore. To learn, people must have a specific outcome or goal in mind, and they need to participate in their education.

CTE: How can the delivery of applied technology be improved?

Nordlund: Seco uses what we call component engineered tooling groups to develop new applied technology. Our CET groups have access to specialists in CAM, CAD, tool design and other disciplines. In many cases, we design tools around the component to be produced rather than sending customers an off-the-shelf tool. We provide an application solution. We test the application in-house and send them the finished component. When we introduce them to the application, we often use new media, such as CAM simulations, where they can see the solution being applied in real time. They have all the cutting data—speeds, feeds, cutting times and costs—in the presentation.

CTE: How is Seco recruiting new workers?

Nordlund: One of our approaches is to work closely with schools and universities by making parts of our training program available to them. By connecting with students in engineering programs and other disciplines, we hope to recruit and train them.

CTE: What changes are being made to Seco Tools' training center?

Nordlund: In July, we will be moving out of our current building into a greenfield facility in Troy, Mich. The architecture will be very open. Employees and visitors will be able to see what we are working on from everywhere in the building. The new building will be our NAFTA headquarters, distribution center and training center. We will have state-of-the-art machine tools on-site, including multitasking machines and high-speed machines. We've been able to attract a lot of interest from machine tool builders; in fact, we've had to turn down some builders because we don't have any more room! CTE

By Michael Deren

It's show time

As you read this column, WESTEC took place early last month and EASTEC is fast approaching. These are the U.S. metalworking industry's largest annual trade shows, with only the biennial IMTS event drawing more exhibitors and attendees. Both annual events are sponsored by the Society of Manufacturing Engineers. Typically, I attend the EASTEC show, which takes place May 20-22 this year in West Springfield, Mass., because of its proximity to my workplace. Both shows offer extensive educational programs that metalcutting professionals can and should take advantage of.

At WESTEC, held in Los Angeles, various educational sessions were provided daily free of charge. These included sessions on lean principles, conventional and nonconventional machining technologies, robotics, machining composites, coolant and cutting tool materials. Granted, some are video sessions, but others are live presentations.

Something new to WESTEC this year was the free Back-to-Basics Workforce Development Program.

Show attendees had the opportunity to tour a "manufacturing facility" at the show and watch the entire process of creating a hammer from design to finished product. Equipment used included CNC mills and lathes and conventional mills and lathes. Attendees were also able to meet with trainers and educational providers from various community colleges and vocational schools. Attendees could discuss setting up training programs at their facilities as well.

At WESTEC, there also was a Gallery of Manufacturing and Technology, where attendees could see various manufacturing breakthroughs achieved by the very equipment on the show floor.

EASTEC also offers significant education opportunities, including five "Resource Centers," some with multiple presentations. The Resource Centers are Lean and Green, Machining-Tooling-Materials, Medical Manufacturing, Energy and Business Improvement.

Also, EASTEC has made things easier for show attendees. In the past, one of my biggest complaints about EASTEC was that the technologies were placed helter skelter throughout the various buildings. I was glad to see that starting in 2006, the show refined product placement into the five technology-focused buildings. If you want to see manufacturing equipment, visit Buildings 1 and 2. If you're looking for tooling or workholding, go to Building 5. This setup is similar to the pavilions at IMTS. The advantage is attendees save time while at the show by quickly finding tooling and equipment of particular interest.

I am pleased that EASTEC will offer the Careers in Technology Student Program and the Model Mania Competition, where students can create a 3-D model in a design competition.

I am pleased that EASTEC will offer the Careers in Technology Student Program and the Model Mania Competition, where students can create a 3-D model in a design competition, with software support provided by SolidWorks Corp.

Also, congratulations to Haas Automation for letting students see their parts processed on a Haas machine tool and making scholarships available to students who partake in the student program. Other companies should follow suit and create scholarship funds as well. CTE

About the Author: *Mike Deren is a manufacturing engineer/project manager and a regular CTE contributor. He can be e-mailed at mderen1@roadrunner.com.*