

CUTTING TOOL ENGINEERING®

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Big Parts Propel Wind

Machining wind turbine parts
can help machine shops
diversify and grow



Plus:

Turning technology for orthopedic implants

Grinding: a pictorial odyssey

Error detection and prevention for CAM

Grooving miniature parts



■ V as in versatile

Ask shop owner Larry Hager what's essential for business success, and you'll soon learn that all roads lead to one trait: "You want to be a versatile job shop in the medical field."

"Most of the [products other manufacturers] make are for one particular size; they're not versatile at all," he explained. "We're trying to come up with [a pole clamp] that's versatile and will work in several applications."

It's been 18 years since Hager opened the doors to his L&L Machine & Tool Co., Jackson, Mich. For nearly 15 of those years, the company focused on job shop work—mostly specialty machines, jigs, fixtures and other tooling—for auto suppliers.

Then, about 3 years ago, Hager's brother Kip, a biotechnician at a local hospital, stopped by to discuss a problem at work. Patient carts had no place where nurses and technicians could attach thermometers. Consequently, the instruments were continually misplaced or damaged.

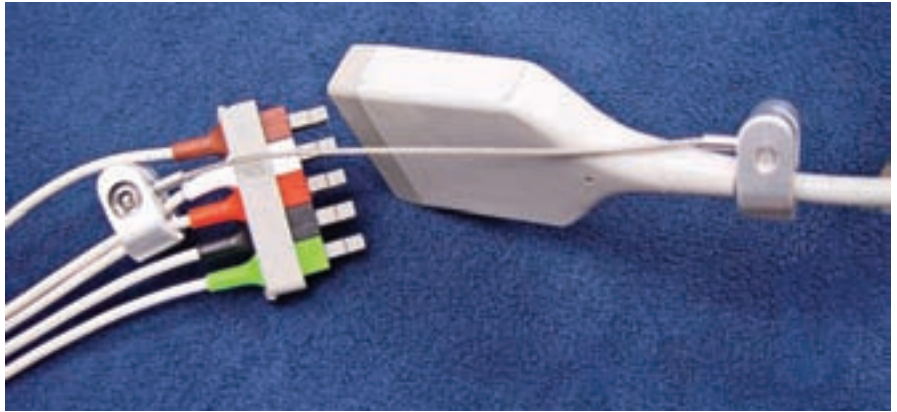
Could L&L devise something to secure the devices? After some work, Hager produced an aluminum thermometer bracket that attaches to the cart.

Similar problems centering on mounting or securing hospital devices soon made their way to L&L's doorstep. "We'd listen to people's problems and then see what we could do for them," said Hager.

During the ensuing 3 years, Hager and his seven-man crew developed a product line that includes wall mounts for thermometers and nurse call phones, clamps to secure baskets and other devices and an array of wire clamps, plates and tethers that comprise the company's cord containment systems.

Along the way, Hager also created a new company division focused solely on hospital devices, called SecureMount. "We have about 40 different devices we're making for hospitals," said Hager. "It's like an erector set; we keep adding to it."

Moreover, hospitals across the country that learned of SecureMount's products have often called to ask whether the company could slightly modify devices



SecureMount

Prime among SecureMount's products is its tether mount, which secures hospital cables.

to fit their needs. Now, making adjustable (read versatile) products has become a major thrust at SecureMount.

Hager gave the example of a pole clamp that can hold baskets containing medical supplies. "It's nothing more than a V block," he said. "But we have developed one that can attach to poles ranging from 7/8" to 2" in diameter." Among SecureMount's more popular products is its patented tether for securing cables. "Some of these pieces of [hospital] equipment have \$150 cords that often attach to extension cords," said Hager. But because the two cables are not always plugged together they can easily separate widely, making it difficult for hospital workers to find the proper ends.

The tether itself looks similar to a small cord, one end of which locks on

to the equipment cable and the other to the extension cord. "The two can still be unplugged, but the tether makes sure they're kept close together," said Hager.

While demand for mounting and securing products has increased, the automotive side of Hager's business has dwindled. He estimated that the company's workload today is split evenly between auto and health care. Because the health-related business has posted such healthy gains—with potential for continued growth—the company may be looking for a larger facility within the next year or so, said Bob Miller, SecureMount president.

One recent boost for SecureMount has been partnering with Curbell Electronics, Buffalo, N.Y., a distributor of nurse calls, pillow speakers and other medical products and accessories. Curbell is marketing SecureMount devices alongside its own.

The big push now, said Hager, is to spread the word about SecureMount products, "to more people—somehow, someday."

And, as always, to remain versatile.

survey says

MIXED '09 BUSINESS

PROSPECTS. Visitors to CTE's Web site were asked their thoughts on business prospects for their companies in 2009. Eighteen percent said things looked great and sales should be up; 41 percent said the outlook was OK, with business probably at the same level as last year; 18 percent expect some decline in sales; and 23 thought they'd be lucky to stay in business.

A NEW QUESTION APPEARS

MONTHLY. Log on at www.ctemag.com and cast your vote.

■ Study: tuning machines improves accuracy

A study conducted at Independent Quality Laboratory, Rockville, R.I., showed that via a process known as SuperTuning, the volumetric positioning accuracy of a moderately priced machine tool can be improved twofold vs. the same machine that was purchased and installed to the manufacturer's

standard specifications. (SuperTuning is IQL's proprietary methodology that involves using instruments traceable to NIST to characterize and adjust errors that impact a CNC machine's positioning accuracy.) Researchers concluded that the findings make it unnecessary to use CAM software to compensate

for dimensional variability within the machine's measuring envelope.

Michael Mariani, IQL vice president, explained why chasing part variability with CAM software might not be prudent. "Over time, by trial and error, the good machinist will often arrive at a magic combination of offsets that

allow all features on all the parts in the setup to be manufactured within spec. Sometimes this strategy works in the short run, only to have out-of-spec dimensions reappear a day or two later. Sometimes parts close to the center of the machine come out fine, but others, farther away from the volumetric center of the work envelope, vary in and out of spec."

In the study, IQL measured test pieces manufactured on a Haas vertical machining center before and after the equipment was SuperTuned. The ASME B5.54 test part was created as a solid model in SolidWorks and imported into Mastercam CAD/CAM software for efficient toolpath generation. These were chosen because they are widely used by CNC manufacturing shops worldwide. The Mastercam-generated part program created a test piece that consisted of 36 sets of bores and counterbores, half of which were manufactured with the tool approaching the part in one direction and half with the tool approaching from the opposite direction. This approach made it possible to observe the effects of reversal errors due to axis backlash.

The before-and-after parts were taken to Hexagon Metrology Precision Center, North Kingstown, R.I., and measured with PC-DMIS measurement software on a Leitz PMM Infinity ultraprecision coordinate measuring machine with a measuring accuracy of less than a micron. The measurements showed that SuperTuning not only improved positioning accuracy of the Haas VMC by a factor of two but also minimized the disparity of positioning accuracy for parts manufactured in different locations (positions one and two) within the machine's work envelope.

■ From Midvale to Mars

When NASA's Mars Science Laboratory launches from Cape Canaveral in 2011, it will include some exacting technology from Dean Jorgensen's Optimization Burr-Free Micro-Hole Div. LLC, Midvale, Utah.

"We received the order in August 2007 from [NASA's] Jet Propulsion

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Laboratory,” recalled Jorgensen, Optimization’s president. The job called for microEDMing a precisely tapered and angled tungsten aperture that would be incorporated on the vehicle’s spectrograph, a device used to analyze soil gathered on the planet.

According to NASA, “the robotic laboratory will carry the most advanced payload of scientific gear ever used on



NASA/Jet Propulsion Laboratory-Caltech

NASA’s Mars Science Laboratory, a mobile robot for investigating the planet’s past or present ability to sustain life.

Mars’ surface, a payload more than 10 times as massive as those of earlier Mars rovers. Its mission: investigate the past or present potential of Mars to support microbial life.”

The spectrograph will analyze elements in collected soil by bombarding it with X-rays, which are projected through the aperture. The aperture, Jorgensen said, “features a 4° full-included angle that tapers down to precisely 700µm.

“In the drawing they gave us,” he continued, “they wanted a particular centering on the aperture, but they had a very loose OD. They had it in the thousandths and we tightened up the tolerance on the OD in the millionths. Also, we used our Opti Rev 2 software that we developed specifically for micro-machining to touch off on the OD and go into the center.”

The Opti Rev 2 software was pivotal for the project’s success. “We came up with our own source code over the years and just started adding on and adding on,” said Jorgensen. “Now we have a very interesting bit of software specifically made for micromachining to

do some of the things we thought were important. For instance, we have true simultaneous servo vector control on the X, Y and Z. Also, I’ve found that one of the most critical parts of micromachining any part is the backlash. When you’re looking at something that’s in the micron range and you’ve got a back-

lash of a micron, you’ve got problems. So what we did with help from the University of Utah was to develop our own piezo X-Y stage that’s 4”x8” with a 50-nanometer resolution. And there’s no backlash because it’s a piezo with no lead screw. That’s key to what we do.”

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