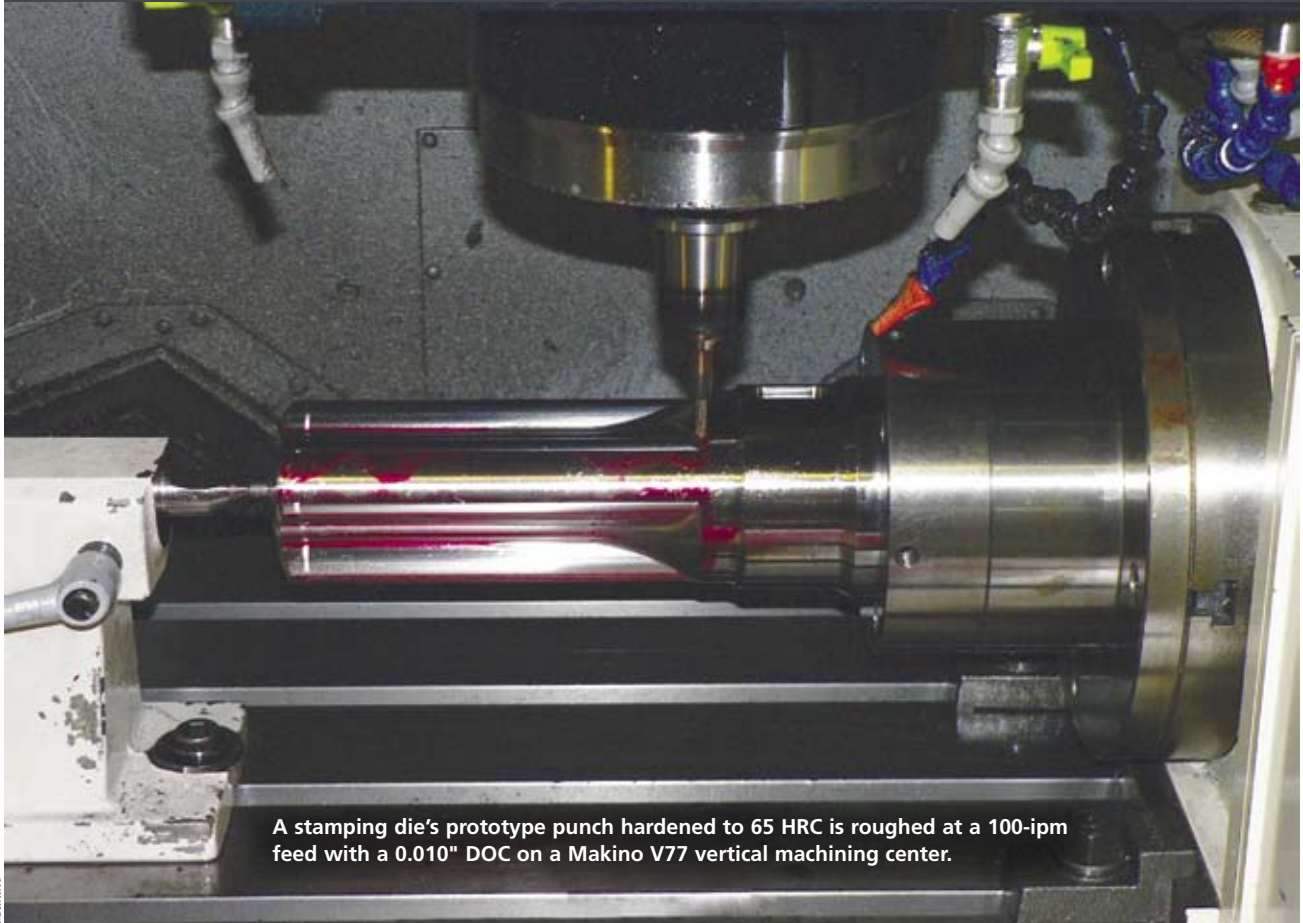


► BY ALAN RICHTER, EDITOR



A stamping die's prototype punch hardened to 65 HRC is roughed at a 100-ipm feed with a 0.010" DOC on a Makino V77 vertical machining center.

Makino

The 'Hard' Way

Die and mold shop carves a niche by focusing on contour and hard milling.

When business conditions are difficult, most people focus on the problems. Others see opportunity. Clarence Meltzer Jr. started CAMmand Machining LLC in February 2002—when the U.S. moldmaking industry was bottoming out—and targeted 3-axis contour milling to distinguish his business. Since then, CAMmand has grown and employs 10 to 15 workers, depending on work fluctuations.

"Anybody can do 2-D work," said Meltzer, president of the Romeo,

Mich.-based die and mold "service" shop. "Drilling, tapping, reaming and stuff like that is generally pretty easy, but to be able to contour mill and get it right isn't."

Getting it right requires putting the exact shape of the part to be molded, including intricate details, into a block of metal, holding tight tolerances and frequently cutting a mold to "zero." This means molds lack significant spotting stock, which customers would otherwise need to spend considerable time removing via grinding and other

bench work in order to fit a mold's components together.

"We cut parts to zero whenever possible," Meltzer said. "As long as you know what you're doing and have a machine that can handle it, we don't see why you need the plus stock allowance. We save our customers time and money once the parts get to their shops. They don't have to worry about getting a part that was cut off-spec or one that requires lots of testing or bench work."

CAMmand will often leave 0.010"

of stock. "Nothing is perfect, so you can't theoretically cut 100 percent to zero stock allowance," Meltzer said. "There's always going to be some stock unless you keep going over it again and again."

He added that based on customer feedback, CAMmand has been able to reduce its customers' spotting and bench work time by 40 to 80 percent.

A Hard Niche

Hard milling is another market niche that Meltzer said CAMmand has always tried to go after because it complements the shop's focus on contour machining. After a couple years in business, CAMmand was presented with the chance to hard mill when it landed a job to produce punches for a stamping knuckle, which were prototype test pieces. The workpiece material was hardened to 65 HRC. "The final piece looks like a huge silver bullet," Meltzer said. "This is the kind of part that most shops wouldn't even think about trying."

To produce punches and be able to handle future hard milling work,

Meltzer contacted Single Source Technologies, an Auburn Hills, Mich.-based Makino distributor, and ended up buying a V77 vertical machining center with a 20,000-rpm spindle and an S56 VMC with a 13,000-rpm spindle.

The 5"-dia. workpiece was about 12" long, so CAMmand machined it on the V77, which has a 30"x55" bed.

CAMmand also acquired a 4-axis rotary table to machine the workpiece using shorter-length 8mm and 10mm cutting tools while roughing at 100 ipm with a 0.010" DOC. "Because these molds are so tall and there's detail down the side, it would have been impossible to have a long cutter hang out and cut it," Meltzer said. "With this table, we can rotate the part 360° and cut all the contours with stubby cutters, which allows hard milling at high feed rates and a quick turnaround time."

Hard milling saves time and eliminates potential errors partly because it doesn't involve the handling time of roughing, then hardening and then finishing. Hard milling roughs, semifinishes and finishes in a single setup. The method avoids the risk of a machinist improperly fixturing the workpiece once it returns from heat treatment. "It's a raw block, so the chances of a machinist picking it up wrong are virtually none," Meltzer said.

Nonetheless, all workpieces require a reference point before machining, and CAMmand created a small pickup pocket in the round punch stock for machinists to use as a reference point. That enables additional work to be performed on the finished part if needed.

Post-Treatment Milling

Most hard milling applications don't



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A Makino S56 vertical machining center is one of two Makino VMCs CAMmand uses for hard milling.

require roughing hardened materials. For example, CAMmand produced a cavity insert for an automotive manufacturer by first roughing the workpiece to a +0.02" allowance on the S56 VMC using a 3/16"-dia. cutter and adding holes to stress relieve the block. The shop then sent the workpiece to be hardened to 48 to 50 HRC. When the cavity insert returned, CAMmand finished it on the S56, imparting a 3- to 4-micron surface finish.

Because its molds have fine finishes and high levels of accuracy, CAMmand's products are highly sought after by some manufacturers, according to Meltzer. "We've had customers tell us that when their spotting and bench departments get our jobs in, their guys are fighting to get our parts instead of finishing the ones that are in front of them," Meltzer said. "They know how easy ours are to work on and how quickly they'll go together."

Regardless of whether the workpiece material was heat treated before or after roughing, Meltzer explained

that hard milling involves taking a small DOC, such as 0.010", but having 75 percent of the cutting tool's diameter in the cut. "Not any more and not any less around the cutter at all times," he said. "That's what increases the life of the cutter, keeping it from breaking."

It's important the tool doesn't "walk into a corner," Meltzer added. "Then you hear the squeaking and squawking. The cutter finds itself surrounded on all sides and just lends itself to vibration." He noted that those hard milling techniques enable running at feeds up to 200 ipm or more.

Training Requirements

To learn effective hard milling techniques, Meltzer sent his top machinists to Makino's Die/Mold Technology Center at its headquarters in Auburn Hills, Mich. He noted that such training is important for well-established machinists to generate new productivity-enhancing ideas.

"All you have to do is look around you," Meltzer said. "Computers change every day. Machines change every day. Cutters change every day. It only makes sense that machining techniques change too."

One technique is toolpath generation to achieve a smooth radius by automatically adjusting the step-down for each cut. "The way I was trained, you cut things up and down—lathe cuts—and you cut at the greatest angle," he said. "Today, you want to be able to cut as fast as possible, so machining lends itself more to some kind of Z-level cutting, where you start at the top and work your way down."

That method isn't always the most effective, but training enables a machinist to determine the fastest way depending on the application. "Somebody who is just learning is going to think 'OK, on the last job I did this, this and this,'" Meltzer said, "so I'm

just automatically going to do this, this and this again.' That may not be the best approach."

And Meltzer's approach to growing his business isn't based on following what worked in the past. Although about 95 percent of CAMmand's work is for the automotive industry,

the shop strives to diversify. "We've gotten into aerospace a bit," he said. "We're trying to increase that market because that's a good market to be in right now." Δ

For more information about CAMmand Machining LLC, call (586) 752-0366.

New machine equals new facility

Before taking delivery of a Model IA 5 TLF 5-axis gundrill from Ixion Auerbach Inc., Clarence Meltzer Jr., president of CAMmand Machining LLC, knew his former 7,000-sq.-ft. facility wouldn't be large enough to house the massive machine, so he moved to a building with double the manufacturing space and the capacity to add 8,000 sq. ft.

Ten months after ordering the specialized gundrill, he took delivery in June 2006.

Most gundrilling applications require compound setups, which involve setting up angle plates and step blocks for 3-axis machines. "We don't have to do that," he noted. "Mine is a true 5-

axis gundrill, which allows us to work quicker."

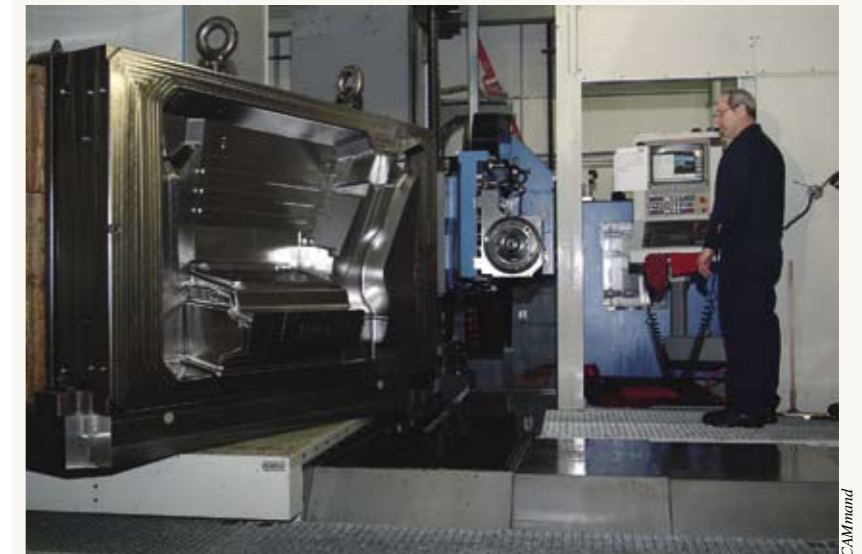
The German-made machine boasts a 125" X-axis stroke, a 63" Y-axis stroke, a 83" Z-axis stroke, a 51" W-axis stroke, a +25°/-15° NC swiveling axis and a 16-ton weight capacity.

Meltzer also knew that he'd need a skilled operator to run the machine and was able to find someone and bring him onboard shortly after the machine was up and running. But CAMmand runs two 12-hour shifts, and Meltzer wasn't as fortunate finding an operator for the second shift. "I don't know how many ads I've run looking for a gundrill operator and I've come up empty handed every time," he said. —A. Richter



A. Richter

Clarence Meltzer Jr., president of CAMmand Machining LLC, founded his company in 2002 after working in the mold and die industry for nearly 20 years.



CAMmand

To house its Model IA 5 TLF 5-axis gundrill from Ixion Auerbach Inc., CAMmand needed to move from its previous 7,000-sq.-ft. facility.