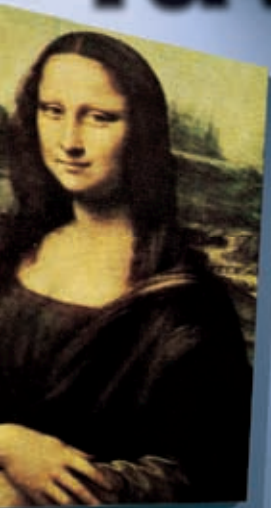


# The Grinding Journal™

Bringing **Solutions** to the Art of Grinding

## A few of my favorite things



**Man looks for mirror finish and sees a Studer**

**A long way to grind**

**Huge hit for little inserts**



*Man & machine: Two trustworthy friends. Trust is crucial in Mark Roman's business, especially on one-off or short production runs, because grinding is usually one of the final steps in the manufacturing process.*

## “My new favorit...”

### Economical new Studer proves itself in a demanding job shop

“We’re a job shop, and we’ll grind anything, essentially,” said Mark Roman, owner of G&R Precision Grinding in Brampton, Ontario. G&R opened in 1979, providing grinding services to moldmakers. It is now more diversified, grinding parts for tool and die makers and other machine shops, but it maintains a significant focus on mold component work. Mark bought the shop in 1999; including himself and his wife Sheralyn, it employs six.

The shop grinds a variety of tool steels and other materials, including carbide and beryllium. Part tolerances routinely are 0.000,2” – 0.000,5”; “if we get 0.001”, we’re pretty happy, that’s pretty easy for us,” Mark said. Many of the mold parts G&R Precision handles are polished after grinding, and the typical 16  $\mu\text{m}$ .  $R_a$  finish the shop produces minimizes the amount of polishing required. Part volumes range from single digits to over a thousand; “right now we have a job in here with 1,200 rotors, that’s fairly big for us,” Mark said.

Mark said his business is based on “quick turnaround and trust.” Trust is crucial, especially on one-off or short production runs, because grinding is usually one of the final steps in the manufacturing process. “When they get to us with their product, there is so much work in it that it would be very expensive if we were to make a mistake,” he said.

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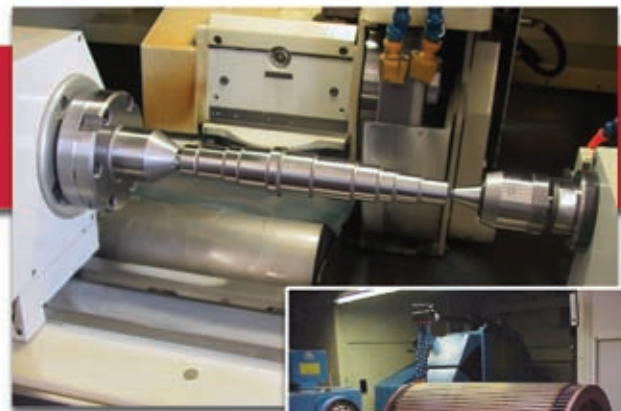
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**LMC** Workholding

## Staying price competitive

Beyond providing error-free parts, Mark said his greatest challenge is keeping his pricing competitive. He controls costs by maximizing utilization of equipment and labor. G&R Precision's equipment includes 13 grinders, seven of which are manual universal (ID/OD) machines. Two of the grinders are CNC machines from Fritz Studer AG, purchased from United Grinding (represented locally by Machine Tool Systems Inc.)

Mark bought the shop's first CNC, a Studer Eco 650 OD grinder, five years ago. "If we hadn't gone into CNC," he said, "we couldn't be competitive. It wouldn't work. You can't do stuff fast enough manually."

Although the Eco grinder gave the shop a competitive boost, it was configured for OD grinding only. Mark saw a growing need for CNC ID grinding capability. In late 2007, he thought the strength of the Canadian dollar might provide an economic opportunity. We just finished paying off our first machine, and although I wasn't looking to buy a machine, I called John Manley at Machine Tool Systems to see what was going on."

## New Studer adds ID capability

After consulting with John Manley, Mark purchased a Studer favorite CNC grinder, a newly-introduced machine engineered to provide accurate and reliable CNC grinding performance at an economical price. The fully-enclosed machine features a center distance of 25.6", center height of 6.9" and maximum workpiece weight capacity of 176 lbs. Its 1,500 RPM MT5 workhead and rigid MT4 tailstock provide 16 millionths (0.000,016") run out, chucked or between centers. The wheelhead indexes from -15° to +195° in 2 1/2° increments. A 12 HP OD spindle is standard, and Mark's machine has an optional 4.2 HP ID spindle. Studer's intuitive Pictogramming programming system operates on the grinder's Fanuc 0 Series CNC.

Comparing the favorite CNC to top-end Studers with features Mark would use rarely if at all, John said, "I told him you can buy a machine that costs 50 or 100 percent more, or you can buy a machine that can still do what you want it to do 90 percent of the time and



*Mark Roman says it is an easy process to switch back and forth between OD and ID grinding. "The ID wheel is behind the OD wheel, and you can lift up the wheelhead and manually swing it around to the ID position."*

your capital cost per part will be half the amount. Because 90 percent of the parts that go out his door are done on a very economical CNC machine, it keeps him competitive."

Mark said he wouldn't have bought another OD-only machine: "I wanted to get the ID grinding. It's an easy process to switch it back and forth. The ID wheel is behind the OD wheel, and you can lift up the wheelhead and manually swing it around to the ID position."

"For bang for the buck I really got a great deal," Mark said, "The price was good, and the dollar was good, so why not go for it?"

A job shop like G&R Precision handles a continually changing selection of parts. Mark said Studer's Pictogramming package enables him to "program on the machine and it's a quick setup." He added, "We do repeats, sure. We keep our programs on the machine and utilize them again." He said the machine provides accurate and reliable dressing of the vitrified aluminum oxide, borazon and diamond wheels the shop employs.



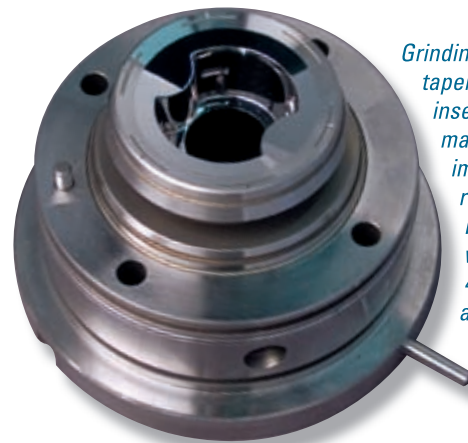
*The speed and accuracy of G & R Precision's favoritCNC grinder enabled it to win a new customer, grinding 200 - 600 piece lots of these carbide-tipped beryllium mold nozzles*

## Speed & repeatability capture new customers

Mark described how the speed and repeatability of CNC grinding helped G&R Precision win a new customer. The job involves grinding the taper and overall height on nozzles used in an injection molding system. The 0.500"- diameter, 2"-long parts are made of beryllium with a small conical carbide tip, and job lots are 200 - 600 pieces at a time. Before approaching G&R Precision, the customer's grinding provider "wasn't working out; time-wise he wasn't getting his parts fast enough, so he came over here and so far he seems pretty happy," Mark said.

In another case, the favoritCNC's ID capabilities helped G&R quickly complete a job that would have been much more time-consuming on a manual machine. A 5.0"- diameter, 4"- tall tool steel mold cavity insert required ground ID and OD tapers. Grinding the part's 30-degree ID taper on a manual machine was "not impossible, but just a real challenge," Mark said, "On the manual machine it would take 30 or 45 minutes to rough and finish each ID. Once the CNC machine was set up, it probably took ten minutes. It doesn't matter how tricky it is, it does the same motion time and time again. The trickier the job gets, the better the CNC is," Mark said.

Mark said that setup on a CNC machine requires more caution than a manual grinder because the CNC's unerring repeatability means, "If you make a mistake on the first part, all the rest of the parts in the series have a mistake on them." When grinding complex parts that represent a significant investment in prior machining, "first we will run the machine with the part off, to make sure it all makes sense," Mark said. Machining the first piece also is done conservatively. "You don't just write the program and push the button," he said, "You control the machine for each individual step to make sure nothing is going to make contact or not make sense. That's why it takes a while to set them up."



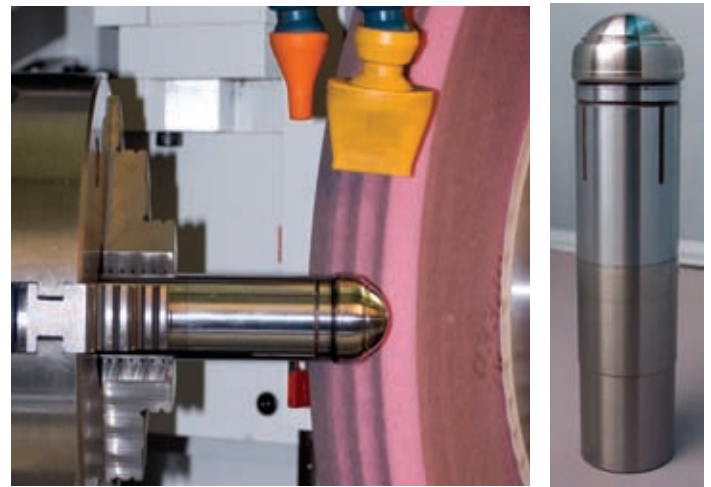
*Grinding the 30-degree ID taper of this mold cavity insert on a manual machine was "not impossible, but just a real challenge," Mark Roman said, and would consume 30 or 45 minutes to rough and finish manually, as opposed to just ten minutes (after setup) on the favoritCNC*



*The favoritCNC's ID capabilities helped G&R quickly complete a job that would have been much more time-consuming on a manual machine*

## 20 different shapes and contours on one part? CNC is the answer

Some parts simply can't be done on a manual grinder. Mark gave the example of a 6"-long, 1"-dia. inner mold core featuring perhaps 20 different shapes and contours including tapers, radii, and angles. The order was for twenty cores, but on a manual machine, "You couldn't even do one piece because of the way the part was designed," Mark said, "You have a 0.020" radius into a 0.040" radius into a 0.100" radius, and that continuous shape is free flowing." Because the core is a repeat job, he said, "we saved the program and when it came back it was much easier to set up. The first time to write it and get the wheels ready took six hours. When it came back it was just over an hour or so to get the wheels back on and dress them." The part required two wheels; "Most of it was a one-wheel plunge to do the very top with the large radii. Then we used a second wheel to blend that top portion into the main body," Mark said. The shop dressed the wheels specifically for that part and keeps them aside for when the job returns.



*According to Mark Roman, this inner mold core, featuring perhaps 20 different shapes and contours including tapers, radii, and angles, simply couldn't be done on a manual grinder.*

For some jobs, Mark said, manual grinders are still the answer. "There is definitely a use for them." However, for very complex jobs and when G&R Precision must produce multiple parts quickly, accurately, and economically, CNC "really helps, I got to tell you," he said, "the higher-number jobs are unbeatable on the CNCs." ■



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