



a whole new
groove

**For General Industrial Diamond,
it pays to be on the cutting edge
of design automation**

a user profile

According to the old saw, it's easy to sculpt an elephant—you just start with a big piece of marble and chip away everything that doesn't look like an elephant.

If you think it would be hard to sculpt an elephant out of marble, imagine what it would be like to try to grind the spiral flutes on a tiny drill bit—to be used, say, for root canal surgery—to a tolerance of four-thousandths of an inch.

Now imagine trying to operate the machine that grinds the wheel that's used to shape the drill bit.

Welcome to the world of General Industrial Diamond Company Inc., a leader in superabrasion technology. Headquartered in Whippany, New Jersey, GIDCO makes a wide range of industrial diamond and CBN (Cubic Boron Nitride) tools and grinding wheels. Among its products is a machine, the E226V, which its customers use to generate radii, angles, and forms on diamond and CBN wheels, a process known as “dressing.” The other part of the process—balancing and leveling the wheel—is called “trueing.” Thus, in industry parlance, the E226V is a trueing and dressing machine. It is used to shape the grinding wheels that in turn are used to remove material to create a variety of drill bits, reamers, and similar devices composed of carbon, steel, ceramics, or diamond.

In the past year, GIDCO has made a quantum leap in the technology of wheel trueing and dressing. It has integrated design automation into its E226V machine using an OEM version of AutoCAD created by Advanced Micro Systems, Inc. (AMS), a registered Autodesk Developer.

Low Technology

To understand how far the technology has come, it helps to understand how wheel grinding used to be done. If you're of a certain age, you may remember “Winky Dink and You,” a Saturday morning cartoon of the 1950s that featured a star-haired little boy who led

a life of adventure and danger. The show's claim to fame was that its young viewers could send away for a special kit consisting of a plastic sheet and a handful of “magic” crayons. When the show came on, kids fastened the sheet to the TV set. Then when Winky got into a jam, he would pause while viewers used the crayons to draw whatever he needed—a bridge, a rope, a ladder—to get out of trouble.

In an odd coincidence, this low-tech version of interactive television is a lot like the former method used to dress a wheel. A stock wheel was mounted on an optical comparator, a machine that's not unlike a combination TV set and microscope. “Customers would use AutoCAD to generate a drawing of the shape they wanted,” explains Rich Umbrino, quality design specialist at GIDCO. “Then they'd scale it up to 10 power, 20 power, 30 power, and print it out on a transparency. Then they'd tape the transparency to the screen of the optical comparator.”

Here's where it got tricky. “On the screen, you would see a plain white background and the black silhouette of the wheel mounted on the machine,” Umbrino says. “Then you'd manually operate the machine to grind the form to match the one on the transparency.”

The main problem with this approach is that the limited resolution of the wheel's on-screen image often resulted in a lack of precision in the final product. “A lot of times they couldn't get their tolerances to match up, or if they did, it would take a long time,” Umbrino says. To test the process, GIDCO customers would grind a template using a box-cutter razor blade as a stand-in for the stock wheel. “They would put the razor blade into a standalone optical comparator, and they would see the blade on-screen. At that point they would make a transparency, put it on the machine, and make sure it matched the razor blade template. If it didn't, they had to go back to the machine and redress it. This process could go on all day to do just one wheel.”

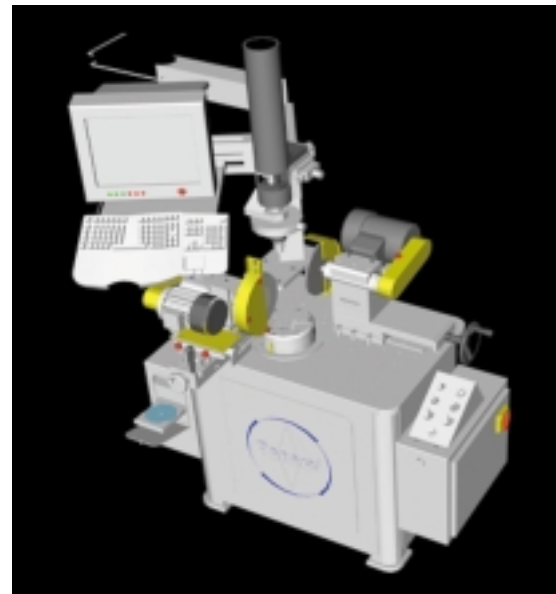
Obviously, the process had room for improvement. “We decided to make it a computer-interfaced system,” Umbrino

notes. “I thought AutoCAD would be fantastic for generating the shapes and making customized menus and all that good stuff.”

But GIDCO's expertise was in superabrasive technology, not computers. That's why they called on AMS (www.amsystems.com), an authorized Autodesk value-added reseller and a part of the registered Autodesk Developer Network (ADN), based in Fairfield, New Jersey.

Knowledgeable and Nice

AMS specializes in creating turnkey CADD productivity solutions with clients ranging from Johnson & Johnson



GIDCO's E228V video trueing and dressing machine can cut dressing time in half

to TyCom to the City of New York. “Our focus is design automation,” says Dan Lorenz, AMS technical director. “We find out how customers are using CADD and how we can extend it to automate tasks, share design data, or process information to make AutoCAD more valuable to them.”

AMS president Brad Whittemore and his technical team presented an AutoCAD demo at the GIDCO facility two years ago, persuading the company to take a look at customizing AutoCAD to automate the tasks of the shape design process. “They were very knowledgeable and they were nice people,” GIDCO's Umbrino says. “So we decided to stick

a whole new groove

with them.”

AMS faced two problems. The first was technical: how to program AutoCAD to generate the wheel shape automatically. The second was what Umbrino describes as the only drawback to making the change—the machine operators didn't know how to

operate computers, didn't know Windows, and didn't know drafting.

The AMS AutoCAD development team had their work cut out for them.

Easy If You Don't Know How

The solution AMS created was GenCAD, a customized build of

AutoCAD tailor-made for use with the GIDCO machine. The software works within a machine environment similar to the one the operators were familiar with. The stock wheel is mounted on the machine, a camera lens is focused on it, and operators manually grind the wheel to match the projected shape.

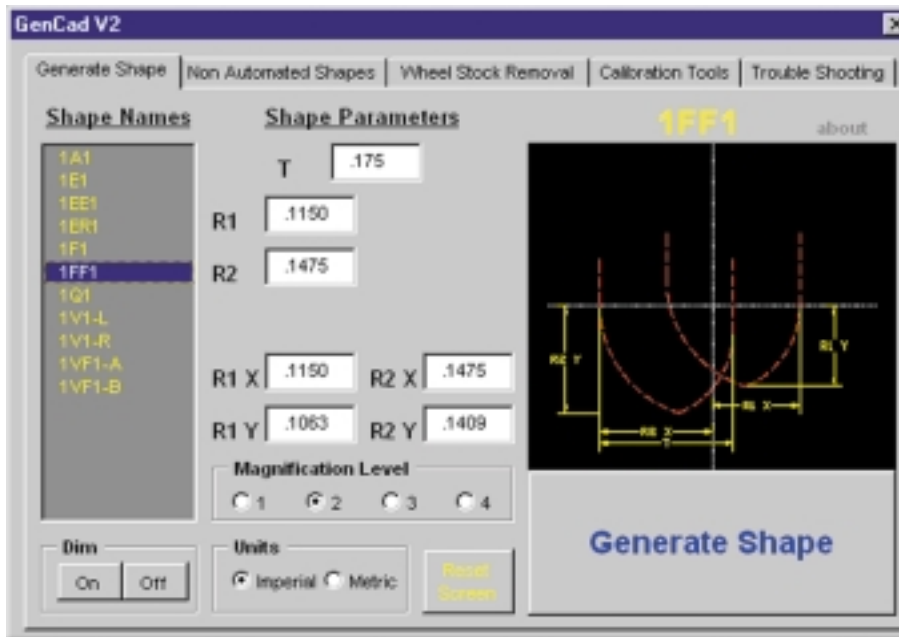
What's different is how the shape is generated. “The flute that's in the drill bit—the little valley—is a combination of three radii, and they form the shape that's going to be ground on the edge of the wheel,” Umbrino explains. “Operators take those numbers from the customer's printout and use them in the GenCAD software—type them in, R1, R2—and it generates the exact shape that's going to be ground in the drill bit.”

In other words, instead of drawing the shape and printing it on a transparency, the operator feeds GenCAD the design data through intuitive dialogue boxes and it generates the desired shape on-screen.

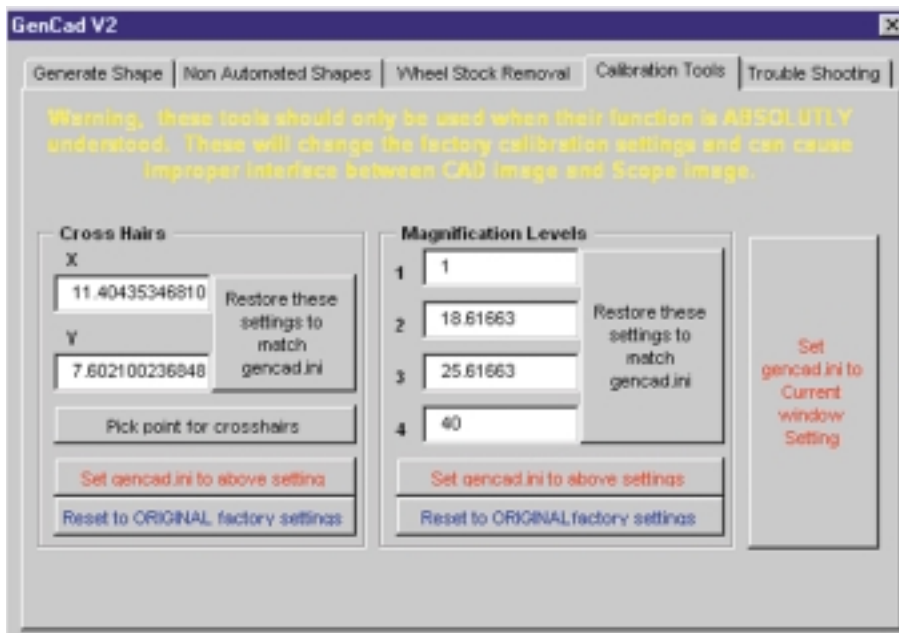
Not only is this system faster than the former method, but it also results in greater precision. That in turn saves time and improves wheel life. “Quality is dramatically improved for every customer we've sold it to,” says Umbrino, “and production time is reduced by half in most cases.” One customer reports an 84 percent reduction in dressing time and another says that wheel life has doubled.

GIDCO addresses the concern of operator inexperience by sending a service technician to install and configure the machine and train the operators. “The lack of drafting knowledge was taken out of the equation by using AMS and their customization techniques—making menus that are easily understood by operators without having any drafting knowledge,” Umbrino says. “The GenCAD system is relatively self-explanatory. After about 10 minutes of training, it's usually understood.”

If the proof is in the pudding, GIDCO itself gives the best testimony to the



The main GenCAD interface of the E228V machine. Users choose from eight standard profiles and enter the desired shape parameters; the machine generates the shape of the wheel to be ground.



The calibration tools in the E228V machine reduce calibration time from hours to minutes.

benefits of the new approach—it uses the E226V to produce the stock wheels it sells to customers.

The Next Step

For GIDCO, business in the new machines has been brisk. “Just this year we built a new wing for the assembly area for this machine,” Umbrino says. “So that goes to show you.” Having automated the design of the grinding wheels, GIDCO is now researching what would seem the next logical step: adding computer control of the dressing process itself. “It seems that our customers are interested in that integration,” Umbrino says.

AMS is currently consulting for several clients who want to extend AutoCAD to be more productive and

automate their design process. “Some companies don’t yet realize the potential power and competitive edge that custom developed programming solutions can offer,” says AMS Director of Design Automation Gene Marchetto. “The companies that have this vision are working more productively and efficiently. By drastically reducing design time and errors, they are able to provide their customers quicker design drawings and final product, positioning themselves ahead of their competition and therefore becoming more profitable and outstanding.”

About the author: Betsy Hardinger (bh@pond.net) is a freelance writer specializing in technical and business issues.

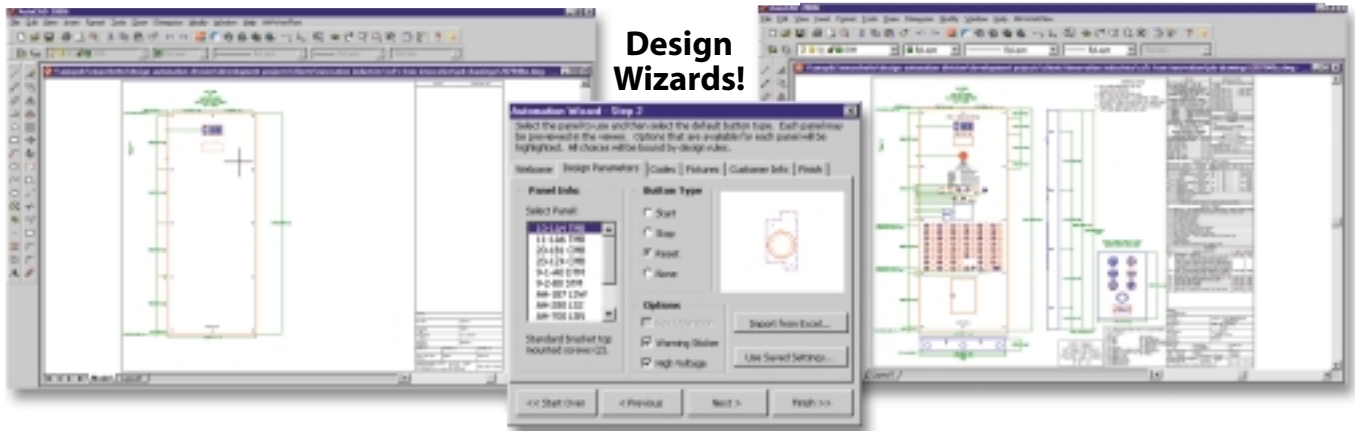


GIDCO's truing and dressing machine in action.

Where does 15 minutes of design get you?

Without Design Automation...

With Design Automation!



Reduce Design Time, Eliminate Design Errors, Increase Productivity

Design Automation is essentially custom software created to run inside or together with AutoCAD® that automates tasks or processes of a design. It allows sharing of important data to other departments that need it while enforcing rules and standards that virtually eliminate design errors.

Want to know more? Visit us at: www.amsystems.com

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