

CAD/CAM Can/Do

September 1, 2003 by ANTHONY DEMARCO



Would Sara Grinnell be in business without CAD/CAM?

Grinnell and partner Lorraine Lowe own Studio C Designs, which designs jewelry and sells it directly to consumers, and C&L Gems, a fledgling business that designs jewelry for retailers. They run their operation from a small studio in Minneapolis, Minn.

Grinnell says CAD/CAM technology was the key to making her business a reality. "Basically, we wanted to have a company where we can create custom designs and our own designs very quickly, without a lot of employees. CAD does this for us," she explains. "I probably could have done it [without CAD/CAM], but not just with a two-person start-up."

Saying that CAD (computer-aided design) and CAM (computer-aided manufacturing) is transforming the way jewelry designers, retailers, and manufacturers work may be an overstatement. But its impact on the industry is undeniable, and it cuts across all sectors. Mom-and-pop stores, prestigious handcrafted-jewelry businesses, and some of the largest jewelry manufacturers in the world are using the technology to enhance the process of jewelry design and manufacturing.

Applying the technology. CAD refers to software used to create three-dimensional (3-D) models on a computer. CAM refers to software that programs a machine—such as a computer numeric control (CNC) machine or a rapid prototype machine—to automatically make models based on the 3-D designs.

"I think it's an important distinction," says Jeff High, president of GemVision Corp., Davenport, Iowa, which creates Matrix 3-D CAD/CAM software and other automated design products. "They really are two separate disciplines—designing and manufacturing. You really have to get the design aspect done before actually creating it."

Stanley Lechtzin, a professor and head of the Metals/Jewelry/CAD-CAM section of Temple University's Tyler School of Art in Philadelphia, notes that the way in which the technology is applied varies based on an individual's computer savvy, design skills, and creativity. But many of the benefits of CAD/CAM are equal.

"The most obvious change among those who have adopted CAD is that they are no longer sitting at the bench fabricating and carving models. They are sitting at a computer," Lechtzin says. "You can do your model-making anywhere you happen to be. You are no longer tied to a shop and your tools."

"It lends itself to much greater precision than traditional hand methods, and the complexities of design are no longer time consuming," he continues. "Models are developed much more quickly



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in the CAD environment. And once the solid models are created, [the design] resides in your computer where you can create as many copies as you wish and send them anywhere in the world. That opens up efficiencies.

"Finally, a CAD model can be easily changed, which is a great advantage in a production environment. It can easily be made larger or smaller and multiples can be made with greater ease than with conventional approaches. As far as the artist and designer is concerned, it opens up many new avenues to be explored."

Some firms use the technology in highly specialized ways, while others use it in every aspect of the jewelry-making process. Grinnell, for example, has a fully automated operation, with no need for hand carvings, and does her own prototyping.

"We just like to do things custom," she explains. "And everything that we retail we manufacture ourselves. I haven't done any wax carvings by hand. I have one person who can do that, but we haven't been able to utilize it."

Another tool in the box. Most users of CAD/CAM technology, however, use it as another design tool to enhance and augment a workshop.

"This whole technology is one more tool in the toolbox," High says. "Some people are threatened by it, believing that they will never be able to carve a wax again. And they have different views on whether it helps or hurts them. It enhances your skills."

Bill Underwood of Underwood Fine Jewelers, Fayetteville, Ark., uses the Matrix product. He says CAD's convenience and flexibility has led to a significant increase in the number of original pieces made and sold at his store—without an increase in staff.

"In the past, of course, we had to carve our pieces by hand," he says. "If there were any problems, you'd have to start over. In essence, you'd have to reinvent the wheel. In a CAD environment, once you save the job, you can then retrieve it and expand it. It has an amazing amount of flexibility."

Underwood says that with CAD, about 30% of his business now comes from jewelry he and others at the store design. About half of the work consists of custom-designed pieces for his clients; the other half is produced in larger quantities for sale in his store.

"And we're moving more and more in that direction," he adds. "I do a lot of it myself, and we have a couple of designers on staff. We pretty much make use of the people we have."

Larger design and manufacturing operations that specialize in distinctive jewelry also are incorporating CAD. For example, Philadelphia-based Lagos uses CAD to create about 30% of the company's models, says company co-owner and designer Steven Lagos. "We determine how we will make it based on what will be the best product in the end," Lagos says. "We like to use the best technique to make the best jewelry. CAD/CAM is really about points, angles, and geometric



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terms. If you want to carve something that is free form, it is easier to carve it by hand."

But one of Lagos's two CAD model-makers, Cate Minich (who uses Rhinoceros CAD software), notes that it's becoming much easier to use the technology as a sculpting tool. "There are software developments now that allow for free-form sculpting," she says. "It can be used for smoothing and pulling and basically treating the virtual object just like clay."

Lagos, whose company produces about 60 to 70 CAD-driven waxes per year, uses CAD exclusively for designing, preferring to outsource the CAM portion of the work. "In the end, those machines are best when they're running 24 hours a day," he explains. "It's cost effective for us to outsource."

CAD designers who outsource manufacturing turn to companies like Acropolis Studios, Providence, R.I., which uses CAD/CAM technology to create prototypes from computer-driven models.

Acropolis Studios president Jill Kenik says that while her company offers design, process engineering, and other consulting services, about 80% of her business involves making prototypes for small jewelry operations and large manufacturers. "I'm a little bit unusual in that I'm doing this on a freelance basis," she says. "My customers range from corporate America to Main Street U.S.A."

The company uses a design and modeling software package called ArtCAM, which creates 3-D designs and the specs to allow a CNC machine to automatically create prototypes. Model Maker, Woodstock, Ga., sells the software and milling machine as an integrated system. Acropolis runs three milling machines, which can produce models in wax, brass, pewter, sterling silver, gold, or a fast-cutting plastic that can withstand the temperature and pressure of vulcanized rubber molds.

"It's a very good tool for our shop," Kenik says. "A lot of the work still gets some bench refinement."

Grinnell, who does everything in-house, uses a number of CAD/CAM systems including Matrix, ArtCAM, and a ModelMaker II machine from Solidscape, Merrimack, N.H., a rapid-prototyping machine that builds 3-D wax parts.

The learning curve. According to most people interviewed, there is no way to determine whether a designer will be successful with CAD/CAM. Each software program has its own unique features and tools that make it better suited for some applications than others, and the learning curve is different for each individual. Knowing how to design jewelry is a plus. Knowing your way around a computer certainly helps. But there is no formula for an application that is relatively new and constantly changing.

"It took me two weeks to learn [CAD/CAM] and a year to perfect it," Grinnell says. "But I'm always learning."



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"I would estimate that to be a truly competent CAD modeler takes about three years," Temple University's Lechtzin says. "But purchasing a computer and CAD program doesn't make you a designer, and it may never make you a designer."



"Is CAD easy? It is totally dependent on the individual," says High of GemVision. "It's not a casual effort. It's not something you're going to practice 15 minutes a day. You're going to spend time doing it, just like being on the bench."



"One thing I will say is that it is such a powerful technology, it's worth it, no matter where you are in your design career."

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