CAD is not just for engineers anymore. In fact, it never was. By Jean Thilmany, Associate Editor

Architects use CAD software to design the inside and outside of a store. Retailers use the software in order to plan floor layout and merchandise displays.

Downloaded from http://asmedigitalcollection.asme.org/memagazineselect/article-pt/l/12/01/36/6355934/me-2005-jan3.pdf by guest on 07 November 202-CASCO CORP.

Downloaded from http://asmedigitalcollection.asme.org/memagazineselect/article-pdf/127/01/36/6355934/me-2005-jan3.

Trom the time she was knee-high to a grasshopper, as she puts it, Kathy Dickinson knit, sewed, and crocheted clothes for dolls. The hobby stayed with her into adulthood and, eventually, she started a small home-based business selling vintage patterns that had entered the public domain. She'd copy these patterns from the original outfits.

The business grew steadily from her home near Albany, N.Y., helped along by the Internet explosion, which gives doll lovers the world over a means to find each other easily. Then it hit a snag. Dickinson had always suffered from minor seizures, but in recent years they've grown worse. She was loath to give up her favorite hobby and her growing business. But her hands now shake a little, making the work tedious.

"I used to be a really good artist, but now I can't hold a pencil without a problem," Dickinson said. "I can draw basic patterns, but they're always on the shaky side."

Dickinson may be creative, but she's not afraid of computers. They had helped her business grow and she figured they could come to the rescue again. She was right. She discovered that a popular computer-aided design program commonly used by mechanical engineers could be easily tweaked to provide everything needed for her doll-pattern business.

Engineers probably know that the CAD programs they use every day serve a multitude of fields, most notably architecture, but they may be surprised to find just how broadly CAD is implemented. Fashion designers, video game creators, landscapers, and interior designers rely on the software for one purpose or another.

Alfred Kypta had worked years as an electrical engineer, all the while turning in the evenings to a favorite activity: designing and making jewelry. The Lewiston, Maine, resident reckons he was one of the first people to trick out the TurboCAD software he used every day as an engineer to serve him in his evening, jewelry-designing hours.

"I was using it for electrical engineering drawings and for mechanical layouts and stuff, but I figured it could be used for the other," he said.

Some CAD vendors now sell programs specifically for jewelry design, Kypta said. The program he originally adapted and still uses is from International Microcomputer Software Inc., or IMSI, of Novato, Calif.

Kypta has since started a retail jewelry business, where he continues to design custom pieces like rings or brooches, which he makes mainly from gold, silver, or platinum. He first draws the piece—as he envisions it—in two dimensions in the software system to specify exact dimensions. He then creates a three-dimensional model from the 2-D drawing.

KYPTA

ALFRED |

"The 2-D is for when I actually build the piece. It gives me the information, the profile of what I need to build," he said. He handcrafts the piece, closely following the 2-D drawing. "It's like building a house," he added. "You have the 2-D blueprint and you construct the house from those drawings."

The jeweler relies upon his 3-D model to show the customer what the finished piece will look like. After he meets with his clients, determines what they want, and creates the 3-D model from his blueprint, he runs it by the customer to check that he's on target.

"It's amazing how, when people see what they'll be getting, it's so much easier to sell the piece," Kypta said. "A customer says, 'Can you do something for me?' and I say, 'Yes, and I'll make a little drawing to show you what.'"

fashionable computers

Like jewelry making, fashion design could be considered an art form, yet the industry has of late been irrevocably changed by the same technology engineers use daily. Just as in engineering, CAD technology, in the past decade or so, has revolutionized fashion design, according to *Apparel Magazine*, an industry trade journal.

Essentially, designers use the technology to create the

technical sketches of their clothing design, a job they traditionally did by hand. Sound like a use an engineer might find familiar? The designers then illustrate those drawings with a variety of fabrics and colors to decide which ones look the best. They then make the first garment or, to

One Maine jeweler uses TurboCAD software when designing custom jewelry. He creates a 2-D model to specify dimensions and a 3-D one to show clients how the piece will look.



use an engineering word, prototype.

Just as in engineering, fashion designers use their CAD software to make lives easier by automating certain repeatable tasks. That way, they don't recreate again and again the shapes and designs they use all the time.

Although she makes miniaturized dresses, Dickinson found a CAD program that suited her needs perfectly. She runs Halea's Doll Clothes from her home in Averill Park, N.Y.

"I can draw basic things, though on the shaky side, import them into TurboCAD, and hold a mouse to clean them up," she said. "They come out looking very professional."

In fact, Dickinson encourages her buyers to purchase TurboCAD, too, so she can furnish patterns they can easily open and use. She originally found the CAD program by running a Google search for pattern-making software.

"In addition to architectural and engineering purposes it was advertised as an artistic illustration program. And rightly so," she said. "It was listed as a college requirement for fashion design."

Dickinson figured that a program intended for beginning fashion students would suit her well. Creating doll clothes is a form of fashion design, after all. She hooked herself up with a trial version and went to work tailoring it to her vision and needs. To create her designs, she first



cuts it from paper, and drapes it on her intended doll. If it drapes correctly, she imports the design to create the first simple pattern. She then upgrades the pattern on the computer to adjust for the amount of material that will accommodate the seam, called a seam allowance.

"You continue to make changes, which are easy to do in CAD," Dickinson said. "You go back and forth until you get the pattern right. If you're good, it should only take you a couple of tries."

Although she's primarily a clothing designer—albeit on a nonhuman scale—once Dickinson started playing with her new software program, she couldn't stop thinking of potential uses. She plans to use it to arrange furniture in her home, much as an interior designer would.

"You could draw up a blueprint of your room to figure out where to put the piano," she said.

"Or, I've thought of using it to rotate food in the pantry," she added. "You could designate your pantry as a box, then figure out the size of cans, figure out many could fit in there, then make a list of inventory and keep track of how you rotate that inventory as you buy new."

bring in the sea

Dickinson is admittedly creative. But she hasn't thought of many a CAD use that software vendors haven't already claimed.

Beside engineering applications, CAD technology acts as a workhorse, as it were, for those in the architecture business. Engineers and architects alike know Autodesk of San Rafael, Calif., as a major player in the CAD industry.

The software is an essential tool in Dave Sheston's office. He's an architectural consultant and project manager in San Francisco.

"What was once done with pen and paper, we now do with CAD drawings for quicker design and for quicker and better communication with structural, mechanical, and plumbing engineers on the project," Sheston said.

Oftentimes, architects use different flavors of CAD programs on the same project.

Take the recent aquarium project undertaken by design firm Chermayeff, Sollogub, and Poole Inc. of Boston, which thankfully shortens its name to CSP. The firm develops large-scale aquariums of the type you may have visited on a family vacation to, say, Seaworld. Designing such a structure is an extremely complicated task, says Tom Jin, a CSP associate.

The projects necessitate vital input not only from typical building consultants like structural and mechanical engineers, but also from life-support-system engineers, animal-care consultants, and architects.

The firm used Architectural Desktop software from AutoDesk as well as the AutoCAD program more familiar to mechanical engineers to design a 60,000-square-foot expansion to the National Aquarium of Baltimore. The expansion will include a habitat for crocodiles, fish, and birds indigenous to Australia as well as space for retail stores and a restaurant. It's slated for completion this year.

To design the Iowa Rainforest Project in Coralville,

KATHY DICKINSON



The architectural industry is a widespread user of CAD software. Blueprints once drawn with pen and paper can be easily drawn via the software, and the files sent to structural and mechanical engineers.

Iowa, the firm used another Autodesk offering called Autodesk VIZ, which allowed designers to visualize how the final project will look.

The 600-foot-long, greenhouse-style building, planned to open in 2008, will capture a bit of the Amazon rainforest in Iowa by mirroring the climate and housing native plants.

"A project of that size requires an image of equal impact," Jin said. "Visualization was previously a four-step process. Designers and graphic designers constructed wire frames, then traced, scanned, and rendered them. Now, a single designer can generate stunning views."

Like the jewelry designer, Jin's firm uses the visualizaton product to show developers, investors, and politicians exactly how the structure and its surrounding landscape will look when completed. "That's a tremendous advantage to us," he said.

Much like an engineering project, potential architectural designs need to be vetted by a number of individuals before they're approved. Architectural firms are only too familiar with one complication of the job, which engineers don't often face. They need to negotiate a sea of building and zoning codes and often have in hand an environmental impact statement that tells local government officials how a potential building will affect surrounding habitat and air quality.

CAD software helps out in this aspect, as well, because architects can show local government officials exactly how a finished building will look.

An engineering and architectural firm, Casco, in St. Louis says that it uses the Autodesk product Revit to get quick buy-in for projects.

One of the firm's clients had leased a multilevel space in Manhattan, where square footage is at a premium. The client had taken a space that extended well underground, making for some tricky design. The client wanted to locate a lobby on the first level, with retail shops on the three lower levels, said J.C. Alberts, Casco's president.

Casco architects knew that a well-designed lobby would entice customers to the retail space below. They designed the lobby in their CAD software and showed a



model of the plan to the client to get approval before moving forward, Alberts said.

He and fellow architects were able to show the client how elevators, escalators, and other elements of the lobby would fit and function together.

"Conventional design methods like hand drafting or artist rendering would have taken weeks," Alberts said.

Instead, Casco architects produced a preliminary design in two days, refining the design as it evolved, with input from the client. The floor plan and the design information used to produce that preliminary design were called on again and again in the project. Later in the process, the architects used the same CAD software to lay out the retail area.

"We had a client that spent \$10 million to build a building to put a mock-up of their store in," Alberts said. "That kind of investment is unnecessary anymore."

His company built a mock-up of the store completely in the CAD software, much as Dickinson envisioned laying out her pantry. The retail mock-up came complete with lighting, signage, and merchandise. Store executives did a virtual walk-through of their computerized store to see what a customer will eventually see.

All kinds of people will keep coming up with all kinds of new uses for CAD technology. Next time you call up your computerized part assembly, think of the chic fashion designers firing up their CAD systems for a not-sodifferent purpose.