

# what do you know?

Employers hire engineers based on the CAD package they know. Or, they don't.

by Jean Thilmany,  
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**W**hen it comes time for mechanical engineering students to look for their first professional jobs, how much does it count which computer-aided design system they learned in college? Maybe an employer uses a particular type of system and wants new engineers to know that system inside out.

Do employers make their hiring decisions based on the CAD system the job seeker knows best?

## The Answer: It Depends

"Years ago, knowing a particular CAD system was more critical than it is today," said Bill Wright, who has owned CAD/CAM Recruiters of Charlotte, N.C., since 1981. "I can't really say what's changed. Systems are more similar today, so it might not really matter what you know. But that's some conjecture on my part."

In the 1980s, when most engineering organizations were newly acquainted with CAD and computer-aided manufacturing technologies, employers emphasized their need for engineers with very specific knowledge of a particular computer-aided engineering system, Wright said.

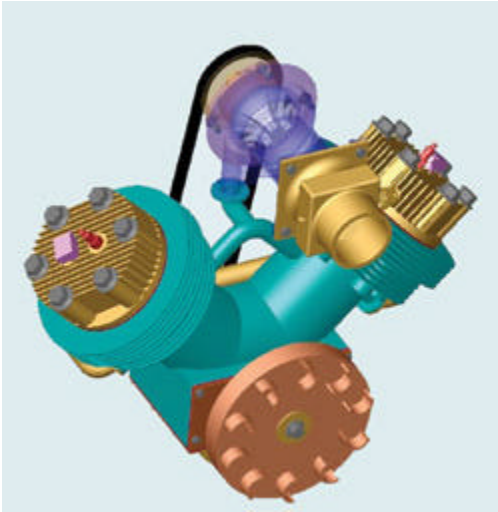
"A lot of times, a corporate-wide CAE strategy wasn't in place yet, and they wanted a person who could drive or champion implementation of that software," Wright said. "But now, the software is already in place and employers tend to seek a person who knows an application. In other words, they want a mechanical engineer who knows about propulsion or pumps or actuators or aircraft engines, and it sure would be nice if they knew UGS, too, but it's not necessary."

Certainly, most employers would prefer novice mechanical engineers to be up and running on company technology from their first day, but if those engineers bring the turbomachinery or actuator knowledge the company wants, most employers are willing to jump-start a new employee's technology training, Wright said.

So does knowing a certain CAD system ever get your foot in the door? Much depends on the particular company, said Michael Keefe, associate chairman for undergraduate education in the mechanical engineering department at the University of Delaware in Newark, Del.

He's found that most local companies don't mind which CAD package students know, as long as they've been exposed to one in college. But smaller consulting companies prefer that new hires be skilled on the CAD package already in place at their firm because they have limited

funds and time for training. Still, the university can't teach every CAD system that exists and small companies acknowledge that reality, Keefe said.



*Professors want students to acquire the basics of a solid-modeling program.*

Yes, it's important for students to learn an up-to-date CAD program, said Blaine Lilly, assistant professor of design and manufacturing at Ohio State University in Columbus. Still, the program they learn isn't as important as the fact that it include solid modeling capabilities, he said.

"We think they need to know a solid modeling program. It doesn't matter which one because they're all structured the same way," Lilly said. "But we don't want to do their training. We want them to understand how the programs are structured and how models are built, because that will carry them through any design and manufacturing process."

Ohio State engineering majors learn a solid modeling program in their freshman year and draw on that experience for the rest of their undergraduate careers. A good, basic understanding of solid modeling sets the foundation students need later, when they'll analyze the models using finite element analysis, computational fluid dynamics, or other methods, Lilly said. Analysis is just as important in today's workplace as design, he said.

For CAD, his students use UGS and Solid Edge from EDS of Plano, Texas. Freshmen also learn Inventor or AutoCAD, both from Autodesk of San Rafael, Calif.

Mechanical engineering majors should understand the methods behind solid modeling, such as the principle of orthographic projection, said Wayne Zemke, an associate professor of mechanical engineering at California State Polytechnic University in Pomona. The method of representing objects doesn't include the viewer's perspective and can take a bit of practice to pick up, he said.

Because of the growing popularity of solid modeling, Zemke now sees students who've used CAD in high school, which gives them a nice head start. Still, students need to learn CAD skills more than the ins and outs of a particular system, he said.

"That way, even if you might not know the package your company wants you to know, learning a new package is ho-hum," he said. "But certainly, as you're coming out of college, to know a CAD package of a company's choice is something the company will look at."

Software vendors offer universities discounts to get their software on campus, Zemke said. His students train on the SolidWorks application because an alumnus who owns an area engineering company paid for the seats and teaches a class about the system, including its built-in analysis capabilities. SolidWorks is from the company of the same name in Concord, Mass. California Poly Pomona also teaches wireframe modeling with AutoCAD. Many small and long-established companies use wireframe, so it's useful for students to know it, Zemke said.

## You Can't Know Them All

Lilly and his fellow Ohio State professors try not to get too hung up on pleasing future employers. You can't predict their needs, he said.

"Individual companies ask for different programs," he said. "We can't accommodate everyone."

The situation is much the same at the University of Delaware, where students use AutoCAD. Keefe is clear: Students don't learn AutoCAD, they're exposed to it. That means they're familiar with the software, but not formally trained. Professors use the software to demonstrate the engineering theories discussed in class. Students, in turn, prove via the software that they understand those theories. They're not drawing with any kind of depth or skill, Keefe said.

"They can't call themselves a skilled AutoCAD user," he said. "They've been exposed to it, but to be a user you pay your money and do your short course and get your certificate. They aren't registered users."

Nothing stops students from becoming registered users while they're undergraduates or graduates, he said. Many students tinker with the system enough on their own to demonstrate at job interviews that they know most of the package's ins and outs, he said.

The university brought the AutoCAD software on board about eight years ago to complement a change in curriculum, Keefe said. At that time, the engineering department was mulling SolidWorks and a competing application, Pro/Engineer from PTC of Needham, Mass. The department ultimately went with AutoCAD because the solid modeling feature can be used by mechanical engineering students and the surveying feature by civil engineering students.



*Engineering students used CAD to design this micro-film projector.*

Before settling on AutoCAD, however, Keefe checked with local employers to ascertain the technology they preferred a newly graduated student to know. He sent surveys to the employers who visited the campus for career or job fairs and who generally hired University of Delaware engineering students.

you?" Keefe said. About 60 percent of respondents went with AutoCAD.

"Many said they don't use AutoCAD internally, but it was the most common CAD package that their vendors and customers and people that sent them drawings use," Keefe said. "They felt that, though they may not use it internally, their vendors, customers, and everyone else understood that package, and if you're going to go with something, go with that."

Richard Hecker hires mechanical engineers regularly. Does he take an applicant's CAD knowledge into consideration? Yes and no. An engineer's skill on a particular program may count in his favor, if Hecker has a seat open for a particular system that he really wants to fill.

Mostly, however, he's willing to train. Like others, he feels that if engineers know CAD software in general, they can quickly pick up the particulars of a specific system.

Hecker owns Eifel Mold and Engineering Inc. in Fraser, Mich. The tooling and design company develops products and makes the tooling for original equipment manufacturers of automotive parts, such as steering wheel assemblies. He's president and owner now. In 1989, as his father's employee, Hecker brought CAD and CAM into the shop.

The technology is simply a tool, he said. It helps good designers create the products they envision.

"It's like if you were an accountant and I gave you a calculator," Hecker said. "The calculator is another tool. You'd already have the knowledge, but I'd give you the tool. I could have a sharp engineer with no CAD background, but it wouldn't take me long to get him to where he could have that knowledge," he added.

### **The Right CAD for the Job**

Eifel maintains the CAD programs UGS and I-deas from EDS, and Catia from Dassault Systèmes of Paris. Engineers use ICEM Surf from ICEM Ltd. of Southampton, England, for surface design, and Powermill from Delcam Plc of Birmingham, England, for CAM.

Hecker is interested now in making sure his employees know analysis. If they understand analysis concepts, he's willing to train them on any particular system he brings on board.

Now a college professor, Zemke worked 20 years for Hughes Aircraft, 15 of those at Raytheon, the defense and aerospace system supplier. Some of those years he spent as CAD manager. While his employers sometimes specifically sought engineers who knew Pro/Engineer software, Raytheon also commonly trained new employees who weren't familiar with the CAD system the company used.

"It's just like in the old days when you sat at a drawing board and learned the practices for your company," Zemke said.

He found that engineers continued to discover their software's useful idiosyncrasies even after their formal training ended. Mostly, they continued their training by picking their fellow engineers' brains. They'd rather talk to engineers and learn as they go.

That preference, coupled with a flexibility about the technology they use, is key for engineers as they progress through their careers, he said. As they move from job to job, even from department to department within large companies like Raytheon, they'll work on different CAD packages along the way. And at smaller companies that don't have a budget for training, engineers must acquire the technology on the fly, as it were.

One thing that engineers, like everyone else, can count on, after all, is change. And software development never stands still.

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