

# mechanical engineering

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PUTTING  
THE  
WORLD  
ON  
WHEELS



OUT OF THE DUNGEON: REMOTE CONTROL WAY DOWN IN THE MINE  
CAD FOR KIDS FINDS YOUNG ENGINEERS  
DIESEL SPRAY GOES INTO X-RAY

# CATCHING THEM YOUNGER

## PROBLEM-SOLVING SKILLS

High school teacher Timothy Jump said that youngsters who learn to design on CAD programs and who solve engineering programs in high school are thinking about and solving problems in a way they aren't able to in other classes. And the classes reach them at a vital time in their development.

"It's kind of a 'use it or lose it' thing," Jump said. "If you never use that part of the brain, those skills are gone and you can't go back to relearn them."

Jump teaches the Advanced Competitive Science Program to kids in grades 10, 11, and 12 at Benilde-St. Margaret's School in St. Louis Park, Minn., a suburb of Minneapolis. The six-year-old elective program was meant originally to include elements of biology and chemistry so kids could participate in science fairs, but it turned into a full-fledged engineering program. Now, instead of readying science projects, kids make robots. Students in the program compete in many of the popular national engineering design competitions, including FIRST. The event, "For Inspiration and Recognition of Science and Technology," was founded by ASME member Dean Kamen. It is a competition in which teams of students and engineers build robots that compete against each other in a sports-style event. (FIRST was the subject of an article in the June 2002 issue of *Mechanical Engineering*, starting on page 46.)

As Jump sees it, a program like this focuses on exercising the problem-solving areas of kids' brains. "It's not like we hand the kids a kit and say, 'Build a robot from this,'" he said. "We say, 'We have a goal to build a robot that can put

out a lighted candle; now go and do it.' That's why the momentum of this program has really taken off."

The 65 students in Jump's program use SolidWorks 3-D CAD modeling software, from SolidWorks Corp. of Concord, Mass. New this year is a 3-D printer from Dimension of Minneapolis that creates a prototype part from information sent from the CAD system. Jump prints parts overnight. The new printer has saved him many a late hour. He formerly machined the prototype parts himself in the school's machine shop, where he spent from 12 to 15 hours tooling a part he knew wouldn't work. Not that he ever told the student who had designed the part that it wouldn't work.

"We want to give students the ability to come up with a solution and then follow through from design to prototype to testing the part," he said. "But part of the learning curve is allowing students to fail. When I went to the machine shop knowing I was making something that wouldn't work, there was a real tendency for me to want to say in advance, 'Look, this won't work.' Of course, I didn't do that."

The Dimension 3-D helps students experiment with design because the printer turns out parts overnight; kids have more time to make more prototypes. And they can see clearly why a particular prototype failed, Jump said.

"They made a little box to hold a computer circuit board, but they didn't support it, so when they started screwing it down, it fell apart," Jump said. "Then they went back and looked at the ribbing and the support inside plastic boxes and said, 'Oh, so that's what those are for.' I could see the learning process take off." ■



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