



Printer brings projects to life

Device lets Milford drafting students see 3-D versions of their computer creations.

MILFORD -- It's not always easy for Dan Diachenko, 17, to understand whether a project he created with the help of a computer-aided drafting program will work in real life.

But the senior at Milford High School now has the help of a high-tech 3-D printer, which actually details and builds the exterior of the project, to know if his designs will work.

"It makes a lot more sense to see it in 3-D than seeing it on a piece of paper," he said. "When we print these out, we can see the weak parts of the structure and see how it all is put together and works," he said.

In fact, while he was building a vise, Dan realized a couple of pieces didn't fit quite right. He had to change the dimensions to make the parts work.

In the same way that conventional desktop printers provide computer users with a paper output of their documents, 3-D printers provide 3-D CAD users with a physical prototype of real-world objects, said Lois Davis, Milford High School teacher and former engineer. She wanted to provide cutting-edge technology experiences and real-world applications for her engineering and architectural students. They can create the exterior of a mobile phone, an engine manifold or a camera.

After learning about the 3-D printer -- also known as the ZPrinter 310 System, an entry-level rapid prototyping system -- she worked for three years to get one for her students. Now she is working on getting one for Lakeland High School.

In addition to designing and printing the vise parts, her engineering students also have designed and printed several other parts that are being used as educational tools in the introduction to drafting classes. As students prepare and print their designed parts, they gain practical knowledge and experience in such areas as prototyping and assembling.

"They can see the manufacturing end of how a piece is going to be built; when it's on paper it always looks like it would work, but when those pieces are being put together they realize it might not work," Davis said. "They are not just drawing it -- it has to be built eventually."

With the 3-D prototype, "They can manipulate it with their hands," she said. "A lot of kids are hands-on learners so it clicks a lot quicker and they figure out how to draw it."

Her students have been using the \$30,000 printer since September. She said it beats having students try to create 3-D images out of cardboard or balsa wood.

"A lot of companies out there are using this to build prototypes and using it to sell products," Davis said. "The companies are using it. So the kids are able to be right at the front end of something being used in the industry."



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"It seems more like the real world when you draw an actual part and you can actually assemble a piece when you are done with it," says Milford High School senior Ryan Brennan, right, watching Dan Diachenko use the 3-D printer for their engineering class.

John Shirkey, the CAD and drafting instructor at Southfield High School, said he has been familiar with the 3-D printer for about a year now.

"I was amazed at how far rapid prototyping has come since I left the industry about 11 years ago," he said.

Recently he checked out Milford High School's new printer.

"It convinced me that this could be a valuable teaching tool that I would like to incorporate into my advanced CAD curriculum here at Southfield High School," he said.

When Troy Athens High School drafting instructor Larry Wolosiewicz was looking for a way to help students, he jumped at the chance to get one of these printers in his classroom.

Last school year, about 25 students started working with it.

Though no students are working this semester with the printer, Wolosiewicz said in January his advanced students will be ready to fire up the printer.

"To be able to actually hold something in your hand is a world of difference than seeing it on the computer," he said. "In manufacturing, you need to see it and hold it, not just look at it on the computer."

And when the parts don't work together, the lesson changes -- students learn about down time and how mistakes can be costly.

"They get an idea of what the real world is in manufacturing," he said.

It's important to get students who are mature enough to realize the significance of what they are learning, he said.

Adam Curl, 2004 Athens graduate, said using the printer made an impact on his understanding of drafting concepts.

"It really made a difference because when you are looking at a screen it is only 2-D, and with the machine we could construct the object that we draw on the screen and we could see it at any angle with all of its dimensions."

Ryan Brennan, a senior at Milford High School, said, "It's neat to see what you draw become an actual object. It seems more like the real world when you draw an actual part and you can actually assemble a piece when you are done with it."

Janet Sugameli is a Metro Detroit freelance writer.



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The exteriors of gargoyle and engine blocks were detailed and built by the 3-D printer used by drafting students in Milford High School's engineering class.

About the technology

- Students are able to create parts from the design concept that they can hold in their hands with the help of the prototyping 3-D printer. They produce the prototype from digital data, and then they can evaluate their designs in three dimensions. Through the process, they understand the pros and cons of design concepts and see and understand the tolerance of parts, as well as the importance of the fit of individual parts.
- The students must also learn the importance of accuracy in drawing and determining dimensions.