3-D printing coming in reach of consumers

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It may sound like a prop from a sci-fi movie, or some garage inventor's holy grail: a device that converts a computer file into a three-dimensional physical object.

But the technology known as 3-D printing is already widely used in industry, and it's been catching on with hobbyists and do-it-yourselfers around the world.

There are online businesses that will take your digital design and create three-dimensional objects by extruding metal or plastic to form unique toys, jewelry, tableware or favorite characters from sword-and-sorcery computer games. Thousands of people have joined an online community for sharing ideas and design tips on the Web site of Shapeways, a Dutch company that does custom 3-D printing for consumers.

And there are open-source enthusiasts in Brooklyn who will sell you a $750 kit to make your own 3-D printer, putting a modest version of advanced manufacturing technology within reach of everyday users.

"A lot of people who buy them are just ordinary people who have a vision," said Bre Pettis, a co-founder of MakerBot Industries, which sells the kits.

Much like a traditional printer sprays ink onto paper, a typical 3-D printer squeezes out thin lines of plastic or other material, one on top of another, until the accumulated layers form a physical object. Today, most 3-D printing equipment and design programs are aimed at the

commercial market -- and cost thousands of dollars -- but hobbyists are discovering lower-cost, open-source versions like the MakerBot printer and Blender software.

MakerBot aficionados include young techies, artists and amateur mechanics who have used their printers to make everything from customized gears and machine parts to Lego-style toys -- and even an engagement ring (made of plastic) that one cash-strapped fellow gave his fiancee. Many show their work at www.thingiverse.com.

A former Seattle schoolteacher and lifelong tinkerer, the 37-year-old Pettis is the kind of person who says in earnest: "My life has been dedicated to developing infrastructure for people to be creative and make things." Then he follows up by joking, "Our biggest customers are actually people coming back from the future in time machines, who want to buy our early models and sell them later as antiques."

Still, 3-D printing is no joke. Tech giant Hewlett-Packard recently announced it is partnering with a smaller company, Minneapolis-based Stratasys, to sell commercial 3-D printers under the HP brand.

Aircraft manufacturers, automakers and other big companies use industrial versions of 3-D printers to fabricate mechanical parts and detailed models of new product designs. Other companies use the same technology to make topographic maps, medical prosthetics and even personalized crematory urns.

Industrial printers can cost hundreds of thousands of dollars, but Stratasys and others have introduced printers that sell for under $15,000.

"When you have products in that price range, it becomes very attractive to a wider audience," said Pete Basiliere, a printing industry analyst for the Gartner research firm who believes the devices will find their way

into college engineering labs and even high schools, along with a variety of small businesses. Architects and city planning departments, he added, could use them to quickly create models of proposed buildings.

"We believe the time is right for 3-D printing to become mainstream," Stratasys CEO Scott Crump said in a statement announcing the HP deal on Jan. 19. The statement also quoted Santiago Morera, an executive with HP's commercial printing division, who said HP sees a huge potential customer base of commercial and industrial designers who are already creating 3-D models on their computers.

HP, well-known for its home PCs and ink printers, declined to comment on whether it sees any consumer market for 3-D printing.

"Our focus is just on this deal for now. We're really just looking at this as going into a technical design market," said an HP spokeswoman.

Basiliere doesn't foresee sophisticated devices for home use in the near future, but he said the idea is "not that far down the road." Others agreed that HP will bring new marketing and distribution strength to the 3-D printing industry.

"They will drive this market forward and eventually machines will become better and cheaper," declared Joris Peels, the "community manager" at Shapeways.

Shapeways uses advanced 3-D printing equipment made by Z Corp., a Massachusetts company that Basiliere credits with developing composite printing materials that offer a full range of colors and a hard, smooth finish. (The home-brew guys at Makerbot sell three kinds of plastic printing media, including a biodegradable material made from Nebraska corn.)

For now, businesses like Shapeways operate on the assumption that many customers won't have access to or expertise in the most sophisticated design software or equipment. So they take customers' designs, refine them, print the item, then clean and finish it before shipping it to the customer. Shapeways also lets you buy some items designed by other customers.

But many 3-D printing enthusiasts would be thrilled to one day own their own replicating device, much like the computer-driven appliances that sci-fi characters use to create physical items on command. Their mantra could be the beverage that Capt. Jean-Luc Picard of "Star Trek: The Next Generation" routinely summoned from one such device.

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