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The future in 3D printing: New innovations harness older technology

Artist Emmett Moore with a couple of his works made with 3D printing at Gallery Diet in Wynwood on May 22, 2015.
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Remember when the Jetsons wanted to eat? All they had to do was select a menu, push a few buttons on the machine and their meals would magically appear.

Well, the future is here through the magic of 3D printing. Producing piping hot pizza, fish and chips, and even heart-shaped chocolates is one of the more novel approaches to a technology that has been taking the world by storm over the past few years. Today 3D printers assist not only the culinary-challenged but also provide more practical uses for medicine, the arts and everyday business. With the right software and printer, it is now possible to send an image through a computer and create anything from a hammer, a gun, an earring, or a precision tool for airplane maintenance or even delicate life-saving surgery.

Even NASA has been experimenting with 3D printing — not to create Space Age food — but to provide members of the International Space Station with the ability to create their own tools. In a test last December, an astronaut created a ratchet wrench from a computer image transmitted from NASA. The experiment

demonstrated that a mission could continue even if a critical tool broke or was missing. After all, it would have been rather costly and time-consuming to return to Earth for the tool.

Today, 3D printing affords artists the opportunity to envision what Venus de Milo might look like with arms and scientists the ability to actually customize mechanical arms for amputees and people with birth defects. Doctors can now hold a life-size model of an individual patient's heart in their hands so they can clearly see where they have to operate. Even a Boeing 737-800 can be scanned in 3D so that a local business in Doral can retrofit passenger jets into cargo carriers.

Although 3D printing has been around for nearly three decades, only in recent years has the technology caught the imagination of the masses, in part because a rudimentary 3D printer can cost less than some iPads. In the past year, there has been a spike in 3D printing use. One trend tracker, the Wohlers Report 2014, noted a 21 percent increase in the 3D print service provider sector over the previous year. The worldwide demand for 3D printing has increased so dizzily in the past year that Wohlers increased its original projections. Just two years ago, Wohlers predicted the worldwide market would grow from $3.07 billion in revenues in 2013 to $10.8 billion by 2021. They doubled that projection last year, now stating the market should exceed $21 billion by 2020.

The publicly traded 3D Systems (NYSE: DDD), founded by Charles Hull, credited with inventing the process that made 3D printing possible, saw a 27 percent year-to-year increase in its sales into design and manufacturing from 2013 to 2014, growing $609.8 million in sales. The company portfolio shows sales into healthcare increased 80 percent, from $71.7 million in 2013 to $129.3 million in 2014. There was also a big jump in consumer sales, with a growth of 26 percent, from $34.8 million in 2013 to $43.8 million in 2014, according to 3D Systems investor Presentation, Manufacturing the Future.

Pundits have speculated on how 3D printing may signal a reversal of the Industrial Revolution, as the evolving technology will make it possible for businesses to shift from mass production to individualized manufacturing on demand. Dartmouth professor Richard A. D'Aveni addressed this issue in the Harvard Business Review, pointing out that China will likely have to cede its position as the "world's manufacturing powerhouse." While the U.S. and other countries lost jobs by outsourcing to China, whose massive workforce could produce products for pennies on the dollar, 3D printing will be a game changer, D'Aveni predicts.

"No workforce can be paid little enough to make up for the cost of shipping across oceans," D'Aveni wrote. While the Chinese market won't entirely implode, the change in production that 3D printing affords will be significant. "China won't be a loser in the new era; like every nation, it will have a domestic market to serve on a local basis, and its domestic market is huge. And not all products lend themselves to 3D printing. But China will have to give up on being the mass-manufacturing powerhouse of the world. The strategy that has given it such political heft won't serve it in the future."

When local artist Emmett Moore started experimenting with 3D printing at the Rhode Island School of Design in 2009, most of his colleagues didn't know what to make of the technology.

"People using it in this playful way — people were scanning and printing their bodies," Moore told the Miami Herald. "It's fun and cute. And that's how people are starting to think about 3D printing — things that you could buy or you could just print it, and it's kind of like novelty — but the direction that it's going in is pretty wild. It's going to be integrated into everything."

Initially, most of Moore's fellow designers used the technology to design the same furniture that they could make by hand. Moore saw greater possibilities. While it was next to impossible to create an 80-sided object by hand, especially if you wanted the sides to be symmetrical, Moore figured he would let the 3D printer handle that aspect and he would complete the design with other elements added on by hand. The process not only has changed how he produces his work, but also his creative vision.

"A lot of my work is about the intersection of digital and handmade," says Moore, who to date is the only local artist to exhibit at the prestigious Design Miami fair during Art Basel Miami Beach. "When you start thinking in this way, you look at physical objects differently. They kind of appear more malleable, and you kind of see things without scale or their physical sensibilities as you would if you were working with physical material every day."

In mid-May, Moore exhibited his latest creations at the Patrick Parrish gallery. His tables, desk lamps and pendant lights all were created using computer-designed images that include hammer heads and wrenches, Ferrari rims and revolver cylinders, mechanical gears, forks, springs and paper clips. Created in plastic or steel through the miracle of 3D printing, Moore was also able to design strategically-placed holes in the objects so that they could fit together seamlessly. He says some of those holes would have been impossible to do by hand, given their location and trajectory.

“That’s what my show is all about in New York — not only conceiving unimaginable things, but things that would not be possible without some kind of printer,” Moore says.

Usually, it takes a month or so to make each of his sculptural designs through the 3D printing process, Moore says, explaining that the computer-assisted design (CAD) takes about a week. Then the images are sent to New York, where a company called Shapeways prints out the images as three-dimensional sculptures. A week later, he has the sculptures in hand. Sometimes when in a rush, Moore says, he will have a Miami company handle the work. That only takes a couple of days, he says, but the price is usually double because the New York company has so much volume that it can reduce its costs.

While some people foresee every household having a 3D printer, much the way computers have become an everyday fixture, Moore predicts the technology will become universal — so much so that people won’t need their own printers to get their work done.

“The technology is advancing so much that for me,” he says, “there’s no way that it can be more cost-effective to buy a printer.”

Instead, Moore says, he will continue to use the services of various 3D printing companies in New York and Miami.