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HD **Bringing 3-D Power to the People**

BY By STEVEN KURUTZ
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The first thing Duann Scott does when he arrives at the Shapeways factory in Long **Island** City, Queens, is check the bins. They are yellow and stacked in an all-white room that resembles the interior of a spaceship, and they contain the latest prints to come out of the machines, which can really stack up.

Shapeways, a 3-D printing service and online marketplace, has been described as the Amazon of 3-D printing for its on-demand model, if not its outsize volume: The machines spit out about 120,000 objects a month, a tidal flow of design that runs from the mundane to the astonishing.

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On a recent day, a quick search through the bins revealed a pair of pliable black-frame eyeglasses, a scale model of a biplane, an intricately detailed brass ring, enough plastic train cars to form a miniature railroad and a figurine of two tiny purple women on tiny purple trapezes. To what use any of these things will be put, Mr. Scott usually has not a clue. But that doesn't diminish the Christmas-morning grin he gets while he is fishing through them.

Mr. Scott, a tall, bearded man of 39 who was born in Australia, holds the title of designer evangelist at Shapeways. He judges 3-D design competitions, gives talks at schools and businesses, and attends events like South by Southwest Interactive, in Austin, Tex., where earlier this month he and his co-workers took a 3-D scanner to parties. (Willing guests were scanned and could order a figurine of themselves printed by Shapeways.)

Mr. Scott also spends a good portion of his day searching not just the bins, but all the designs uploaded to the Shapeways website, for the 3-D-modeled equivalent of a **gold** nugget. Impressed by a designer's work, he will call and offer the use of **company** resources, or feature the designer on the Shapeways blog, or extend an invitation to a party -- or, as he did with Bradley Rothenberg, a Manhattan-based architect and designer, recommend the person in question to brands with an interest in 3-D printing.

After seeing Mr. Rothenberg give a talk about a year ago, Mr. Scott suggested him to representatives from Victoria's Secret. The designer modeled snowflake angel wings and other pieces based on sketches by the Victoria's Secret design team, which were then worn by the models in the Victoria's Secret fashion show late last year, garnering attention for Shapeways, which printed the nylon plastic pieces, and for Mr. Rothenberg.

"I keep my eye on talent," Mr. Scott said. "I've always got this **group** of amazing designers in the back of my mind if someone needs to connect with them."

Other 3-D printing services exist, including Sculpteo and Materialise, but most of them are based in Europe. Kraftwurx, a Houston **company**, provides on-demand printing and a venue for designers to sell their work, but it doesn't yet have the robust public presence of Shapeways, which sponsors design contests, courts talented designers and partners with museums.

In his role as a Pied Piper for on-demand 3-D printing, Mr. Scott has been instrumental in developing that relationship with the design community. Some designers, like Mr. Rothenberg, use the **company**'s sophisticated, highly accurate printers to make prototypes or produce their work. Others, though, are treating the **company** as an everything-in-one platform: manufacturer, e-retailer and venue for propelling their careers.

Susan Taing, who started a 3-D design studio called bhold, is one of those who has developed a close partnership with Shapeways. Ms. Taing, 33, first experimented with 3-D printing and modeling as a hobby, designing simple things like an earbud cord winder. Last year, she used Shapeways to print the device, which she called the bsnug wrap, and began selling the tool through the Shapeways website.

"Every few days I got more ideas as to what I could do with 3-D printing," said Ms. Taing, whose offerings now include the bholdable espresso tumbler ($69) and the bheard sound pod ($39.50), an acoustic amplifier for smartphones. "I'd been thinking about starting a **company**, and once the concept came, it felt right."

It was the Shapeways "lower risk, lower barrier" model, Ms. Taing said, that made it possible for her to start her own business. Because Shapeways prints on demand, there were no discouraging upfront manufacturing costs; Shapeways also handled time-consuming back-end processes like billing, shipping and customer service. Ms. Taing simply uploaded a printable design, set a price above the cost Shapeways charged her to print and paid the 3.5 percent processing fee out of her profit. And she was assured that supply would exactly meet demand. "You don't have to manage inventory for something that may or may not be needed," she said. "It's much less wasteful."

Evan Gant, an industrial designer in Massachusetts, said if not for Shapeways, many of the ideas he comes up with in his spare time would never make it out of his notebook. "To develop a product takes a tremendous amount of time," he said. "There's not only initial conception and design, but beyond that there's a massive amount of funding, you have to find the right manufacturer, you have to understand retail."

It's unlikely that Mr. Gant or any outside investors would have devoted significant resources to manufacturing Button 2.0, a shirt button with a clip that he designed to secure an earbud cord. (Stray earbud cords, it seems, are one of the trials of modern life.) But after uploading a computer-aided design (CAD) model to Shapeways, he received an instant production quote and ordered a few to test. And once he refined his design, he **sold** them. Total R&D: about $15.

"I think Shapeways charged $2.50 to make that button, and I added $1.50," Mr. Gant said, for his own profit.

With Shapeways handling the manufacturing and back end, "what you're left with is conceptualizing the design," he said. "And documenting it to get your story out there."

Although Shapeways promotes designers and tries to "surface," from the tens of thousands of items for **sale** on its **site**, what it thinks are the best goods, marketing is largely left to the designers, as are patent issues. Mr. Scott's favorite designers to work with, he said, are the ones who grasp form and 3-D printing technology, but can also produce a good video or photography.

"Once we see someone can do that well, we'll promote them and help them to improve as much as we can," he said. "Because the more successful they are, the more successful we are."

And users like Mr. Gant have accepted and even embraced those self-promotional duties. Mr. Gant currently offers eight products for **sale** in his Shapeways shop (not including Button 2.0, which he stopped selling after someone claimed an existing patent). They range from a modular flower-planter system ($75) to a liquid-siphoning toy for children ($12). To promote them, he posts professional-looking photos or videos, and often reaches out to design blogs.

A calm female voice narrates all the videos. Could that be Mr. Gant's wife?

"Yes," he said, laughing. "It gets very low-budget."

Still, that sense of play and experimentation, in both the design and the marketing, is part of the appeal. "With Shapeways, the risk is so little," Mr. Gant said. "It's not like I'**m** going to **China** and producing 10,000 of them."

The other big attraction for designers is the **company**'s printers. Boxy, refrigerator-size machines that glow orange when working, they can print objects of greater size and complexity than desktop 3-D printers can. And through partners, Shapeways offers access to materials like **gold**-plated and polished

brass, stainless steel and ceramics. The objects have the professional-looking finish that the marketplace or the art gallery demands.

Ashley Zelinskie, 26, a sculptor who works with 3-D printing, tried using a desktop machine to print a full-size chair whose structure was embedded with hexadecimal code readable by a computer. Influenced by "One and Three Chairs," a conceptual art piece by Joseph Kosuth, the project was an exercise in high-tech frustration.

"It took me two years of printing every day, and then I lost my mind," Ms. Zelinskie said. She bought a nanny cam to keep tabs on the glitchy machine in her studio and later moved it to her **apartment**. "I got to the point where I could be asleep and hear it messing up," she said.

Last December, Ms. Zelinskie contacted Shapeways to print her chair. When the nylon plastic pieces arrived at her house a few days later, she said, "the chair was built within minutes. The parts snapped together easily. It was clean, professional. It looked like it belonged in a gallery."

Ms. Zelinskie's "One and One Chair" now sits on the second floor of the Museum of Art and Design in Manhattan. Shapeways has an interactive space there as part of "Out of Hand: Materializing the Postdigital," an exhibition on computer-assisted methods of production. It was Mr. Scott, in his evangelist role, who invited Ms. Zelinskie to become a Shapeways artist-in-residence at the museum.

"Shapeways has really backed me," Ms. Zelinskie said. "They point me in the direction of new materials. They did a blog post on me. If you're with them, you're in."

Dhemerae Ford, half of a design duo called the Laser Girls, has been similarly fostered by the **company**. She and her partner, Sarah C. Awad, worked at the 3-D printing lab at New York University, where they began making fake fingernails in wild designs. They used N.Y.U.'s printers for prototypes, but as Ms. Awad said, "Shapeways has printers that N.Y.U. doesn't have," offering materials like nylon and metal. And "we could more easily produce and send out nails to buyers."

Around the same time, Mr. Scott noticed that an acrylic that Shapeways makes is similar to the material used for fake nails, and he looked for designers willing to experiment. "I'd been contacting women on Instagram who are into nails," he said, adding with a laugh, "I know that sounds bad."

The Laser Girls met representatives from Shapeways at a tech event last fall, and have since begun selling their nails through the **company**'s **site**, printing them in standard materials like nylon plastic, but also bronze-infused stainless steel. "They've helped us a lot from a business sense," Ms. Ford said. "In terms of design, they've given us ideas for ways we can push the technology."

Of the Laser Girls, who are in their early 20s, Mr. Scott said: "It's not always established designers who are doing some of the best work. It's kids coming out of school and really kicking it." And that, he said, is part of the joy of discovery.

For New York designers, Shapeways also offers the advantage of proximity. Ms. Taing, for instance, runs her design studio from a tiny office in Long **Island** City, where on a recent afternoon a MakerBot desktop printer was humming away in a corner, producing a prototype that may eventually be sent to Shapeways, if it proved functional. The office is just one block from the factory, and Ms. Taing has visited several times, to resolve production issues and to speed the delivery by picking up finished prints.

One of the few complaints about Shapeways, it seems, is its turnaround time. It can take a week or longer, depending on the material, to fulfill an order. ("The two weeks is rough," Ms. Ford said.) And the **company** doesn't ship partial orders.

Also, as Ms. Taing pointed out, Sculpteo, a rival on-demand printing service in France, has much wider color options, while Materialise, a **firm** in Belgium, offers titanium, a material Ms. Ford wants to try.

Nevertheless, Ms. Taing and Ms. Ford said they use Shapeways for much of their printing because the **company** is local and consistent in its quality, and it supports the 3-D design community.

Ms. Ford said: "I've been to their factory. It's very homey. I was welcomed less as a customer than as someone who is interested in the technology. We all geeked-out over the printers for 30 minutes."

The manufacturing process for nylon plastic, the most common material, could be described as a blend of high-tech and high-school art class. Engineers approve the uploaded design files and assign them to a "build," in which as many objects as possible, perhaps 1,000, are virtually fitted together, as if in a game of 3-D Tetris. The build comes out of the 3-D printers in a square cake of nylon powder. The

cakes are cooled and the powder brushed off to reveal the objects inside, a process Raheel Valiani, the director of **operations** for the Queens factory, likened to an archaeological dig.

Young, hip-looking factory workers then sort the objects, hand-color some of them using boiled fabric dyes (white is the default shade for nylon plastic) and package and place them in the yellow bins to be shipped out.

Shapeways, which started in the Netherlands in 2007, as part of an incubator run by Philips, the electronics maker, initially outsourced its 3-D printing. Now there are two factories, one in Queens and the other in Eindhoven in the Netherlands; the one here is adding four printers to its fleet of 12, at a cost of $500,000 or more each. The hope is that the new machines will increase capacity, speed up work flow and bring Shapeways closer to its long-term goal of overnight fulfillment.

Of the thousands of objects printed each week, iPhone accessories and hobbyist parts like model railroad cars are the most common, Mr. Scott said, as is jewelry. "Drone parts are currently very popular, too," he added.

Still, despite the production volume, and a few breakout objects that have **sold** in the thousands of units, most designers aren't getting rich selling their products through Shapeways. The **company** declined to disclose combined earnings for its 15,000 shop owners.

Mr. Gant estimates that he has made about $800 so far through his Shapeways shop, but has spent about $300 on prototypes and printing his designs. As Mr. Scott noted, however, once a product has been designed and uploaded, there is potential for its designer to earn royalty-driven passive income, something Mr. Gant has experienced. "I will still, weekly, get a couple sales," he said. "It still slowly trickles in. As I do more products, the trickle gets a little bigger."

Mr. Scott said he is looking forward to the first Shapeways **millionaire**. Perhaps it will be him. In addition to promoting all the designers who use Shapeways, he is a designer himself. Bits to Atoms, a digital fabrication studio and consultancy he founded, has a Shapeways shop where you can **buy** the bronze skull ring that he wears on his right hand.

That ring was the second design Mr. Scott uploaded, and it inspired his first act of evangelism. He photographed it and sent the photos to jewelry blogs. He earned a few thousand dollars from sales.

"For months afterwards, I would sell a few more rings and make more money," Mr. Scott said. "I started documenting what I did and shouting to the world: 'This is the future of design.' "

ART Duann Scott, "design evangelist" for Shape- ways, with one of the **company**'s 3-D printers. (D1); Clockwise from top left: the Shapeways factory in Long **Island** City, Queens; winning entries from a **company**-sponsored contest to design 3-D printed restroom signs; objects produced there are sometimes whimsical, like a miniature bust printed in sandstone, a Möbius shaped like bacon and an origami-inspired elephant; or practical, like this metal cuttlefish bottle opener; or simply artful, like a stag sculpture.; Below, Susan Taing in her office a block from the Shapeways factory. Products she offers through the **company** website include, top right, an earbud cord winder; a cord organizer and hook combo tool, bottom left, and an acoustic amplifier. (PHOTOGRAPHS BY RANDY HARRIS FOR THE NEW YORK TIMES) (D5)

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