

## Case study

# Shapeways builds consumer demand with HP 3D Printing

## Global manufacturing services



### Industry

Consumer manufacturing

### Objective

Deliver quality 3D parts to worldwide consumer marketplace

### Approach

Digital manufacturing—using 3D printing for final part production

### Technology

- HP Multi Jet Fusion



## Summary



While many consumer manufacturers debate when 3D printing will be ready for final-part production, Shapeways is busy proving that it is. The New York-based service bureau combines direct-to-consumer 3D printing with a global online marketplace, enabling designers to not only print, but also sell their 3D printed products. Shapeways has been embraced by independent designers because of its ability to deliver affordable, high-quality, individual 3D parts, and is now scaling up the business across a wider array of consumer applications. The HP Jet Fusion 3D Printing Solution is the newest addition to the Shapeways fleet, and consumer demand is booming.

## Challenge

As a direct-to-consumer 3D printing provider, Shapeways shoulders the weight of high expectations, and topping the list of demands are higher part quality and faster turnaround times. The company offers over 60 materials and finishes, but SLS remains one of its most popular offerings.

“It comes down to being really fast and keeping the quality high,” said Debbie Claxton, a senior 3D printing engineer whose background includes 3D product design. “We live in an e-commerce society. People have an expectation that if they place an order for something online, they are going to get it the next day. In 3D printing that has not been realistic until recently.”

Shapeways brings product designers and consumers together in an online marketplace that features original creations such as jewelry and figurative art alongside custom parts for consumer products, including cameras, remote control cars, and home accessories. Need a nocturnal watch? You can order one designed by T. Shawn Johnson off the Shapeways marketplace.

Shapeways’ ability to meet the turnaround time expectation of its customers is directly related to the efficiency of its 3D printers. “We have more orders than capacity. We pretty much always have an order waiting,” Claxton said.

“The requirements for manufacturing are different than for prototyping,” added Shapeways CEO Peter Weijmarshausen. “The (HP) machine is built for manufacturing. The speed is much, much higher. Which will match the expectations of current consumers.”

## Solution

HP’s Jet Fusion 3D Printing Solution is the latest addition to Shapeways’ arsenal of additive manufacturing technologies.

“I think Shapeways knows what our customers want, and I try to find that for them,”

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—Peter Weijmarshausen, Shapeways CEO

Weijmarshausen said. “When I heard about the new technology, I went like ‘Yes, that’s a great step in the right direction.’”

In fact, when Shapeways announced its pilot program with HP it received more than 2,000 requests in the first 24 hours.

“Everyone knows HP, and the reputation with their other printers is very good. I think people knew it was only a matter of time before HP produced a 3D printer,” Claxton said.

Shapeways brought two HP Jet Fusion 3D Printers online in 2017. Since HP’s 3D High Reusability PA 12 powder<sup>1</sup> has similar properties to the PA2200 that Shapeways uses in its SLS processes, the HP Jet Fusion 3D Printer fit nicely into the company’s existing material portfolio.

“The nylon powder is showing tremendous potential to achieve a very fine level of detail,” Claxton explained. Combined with the high dimensional accuracy of the HP Multi Jet Fusion process, Claxton said Shapeways is pleased with its results. “We’re aiming for high-end products. Not just finish quality, but high levels of accuracy and mechanical properties.”

“We don’t want prints to look like prototypes, we want them to look like finished products,” she said.

Claxton also applauds the collaborative relationship between HP and Shapeways, which influenced the design of the printer’s post-processing station. “I couldn’t reach the back of it. I said, ‘you need to make it smaller, I can’t reach the back of the machine.’ And they did. HP changed it. That’s pretty incredible.”

As part of the HP Jet Fusion 3D Printing Solution, Claxton said Shapeways uses HP’s 3D Software SmartStream 3D Command Center on a daily basis. “I really like the Command Center. It’s a great piece of software you can use to keep an eye on your equipment. It’s nice I don’t have to walk over to the machine and look in the window to see how it’s doing. I’ve got all the data relaying back to me.”



### Footnotes:

<sup>1</sup> HP Jet Fusion 3D printing solutions using HP 3D High Reusability PA 12 provide 80% post-production surplus powder reusability, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for recyclability). Parts are then made from each generation and tested for mechanical properties and accuracy.



Inspecting finished products

## Result

“The key thing that HP Multi Jet Fusion wins on is that it’s not just about a printer, or a technology,” she said. “It’s about the whole package. HP has taken into account our experience with the product from start to finish.”

Aside from the integrated nature of the HP Jet Fusion 3D Printing Solution, Claxton is particularly impressed with its strength<sup>1</sup>, speed and efficiency.

“With HP we are printing about 2 cm per hour,” she said. “It’s actually faster than our SLS printers. I can set a job to print at 9 o’clock in the morning, and have it out at 9 o’clock at night.”<sup>2</sup> She noted that cooling is an area where HP is continuing to focus effort, targeting a 1:1 ratio between printing and cooling.<sup>3</sup>

Shapeways measures the efficiency of the HP Jet Fusion 3D Printing Solution in terms of powder use and labor requirements.

“In the post-processing station they’ve created a closed powder loop, which is great. Not only does it reduce the risk of contamination and loss of powder, but we are now printing with a higher ratio of used powder than new powder.”

In the HP Jet Fusion 3D Printing Solution, the powder is stored and mixed inside the

post-processing station, reducing human error, contamination, labor requirements, and time. By comparison, Claxton said, “With the other printers, we load the powder manually and transport it to the printers, and we use a giant mixer. We actually designate a day to mix the old and new powder. HP has completely removed the entire need to handle powder.”

Claxton said her experience with HP has given her a new perspective on the future of additive manufacturing. “This printer is most definitely not hype. It does perform very well on the mechanical properties<sup>1</sup> and dimensional accuracy<sup>1</sup>. And they have definitely improved on speed.”

For Weijmarshausen, the HP Multi Jet Fusion technology also translates to new business possibilities thanks to the unique properties of the HP 3D Materials. “The HP Multi Jet Fusion technology gives the opportunity not only to use different types of base material, but using the agents to actually influence the properties of the base materials in different ways,” he explained.

Claxton added, “What we’re doing here is a game changer. In time, this is going to change the way we think of design, the products we want, and how and when we can get them.”

### Footnotes:

<sup>1</sup>Based on HP’s unique Multi-Agent printing process. Excellent dimensional accuracy and fine detail within allowable margin of error. Based on dimensional accuracy of  $\pm 0.2$  mm/0.008 inches on XY for hollow parts below 100 mm/3.94 inches and  $\pm 0.2\%$  for hollow parts over 100 mm/3.94 inches, using HP 3D High Reusability PA 12 material, measured after sandblasting. See [hp.com/go/3Dmaterials](http://hp.com/go/3Dmaterials) for more information on materials specifications. Based on the following mechanical properties: Tensile strength at 48 MPa (XYZ), Modulus at 1700–1800 MPa (XYZ). ASTM standard tests with HP 3D High Reusability PA 12 material. See [hp.com/go/3Dmaterials](http://hp.com/go/3Dmaterials) for more information on materials specifications.

<sup>2</sup>Continuous printing requires an additional HP Jet Fusion 3D Build Unit (standard printer configuration includes one HP Jet Fusion 3D Build Unit).

<sup>3</sup>Based on internal testing and simulation, HP Jet Fusion 3D average printing time is up to 10 times faster than average printing time of comparable fused deposition modeling (FDM) and selective laser sintering (SLS) printer solutions from \$100,000 USD to \$300,000 USD on market as of April, 2016. Testing variables for the HP Jet Fusion 4210/4200 Printing Solutions: Part quantity: 1 full build chamber of parts from HP Jet Fusion 3D at 20% of packing density versus same number of parts on above-mentioned competitive devices; Part size: 30 cm<sup>3</sup>; Layer thickness: 0.08 mm/0.003 inches.



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—Debbie Claxton, Senior 3D Printing Engineer

## Customer at a glance

### Application

Digital manufacturing—using 3D printing for final part production

### Hardware

- HP Jet Fusion 3D 4200 Printer

### Accessories

- HP Jet Fusion 3D 4200 Processing Station with Fast Cooling
- HP Jet Fusion 3D Build Unit
- HP Jet Fusion 3D External Tank 5 units Bundle

### Software

- HP SmartStream3D Build Manager
- HP SmartStream3D Command Center
- Autodesk® Netfabb® Engine for HP
- Magics with Materialise Build Processor for HP Multi Jet Fusion
- 3MF

### HP services

- Next-business-day onsite support<sup>1</sup>
- Next-business-day spare parts availability,<sup>1</sup> thanks to HP’s global reach
- 3D printing productivity and professional services

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Footnotes:

<sup>1</sup>Available in most countries, subject to Terms & Conditions of HP Limited Warranty and/or Service Agreement. Please consult your local sales representatives for further details.

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