Article

3D Printing's Role In Digitally Manufacturing Consumer Products

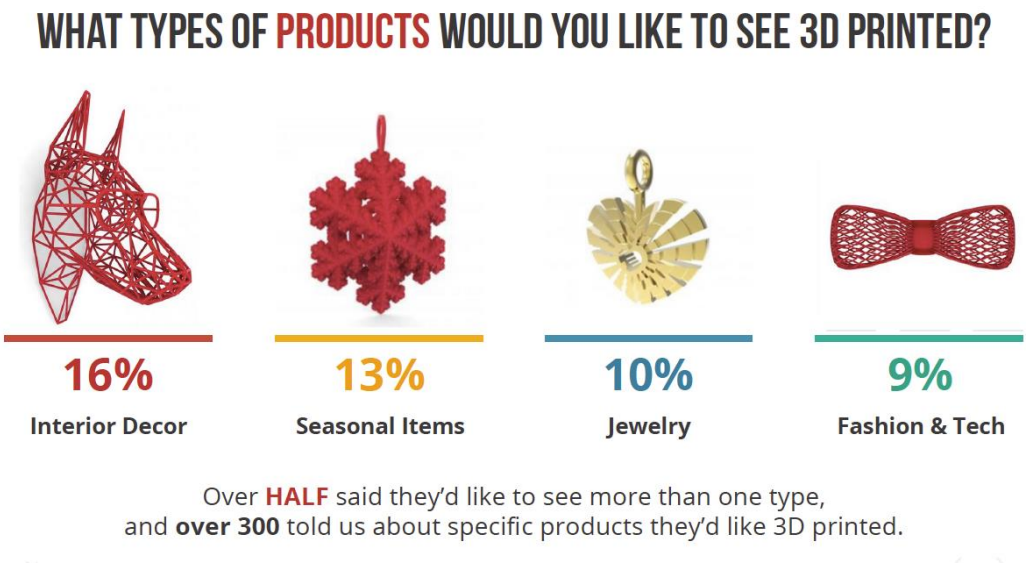
According to McKinsey, 3D printing's economic impact could reach $500 billion annually by 2025, but technology, infrastructure and "killer applications" are needed to make it happen.

In May of 2013 McKinsey & Company published their now famous report which outlined twelve disruptive technologies that would have a big impact by 2025. 3D printing was one of them and consumer products were a driving force.

In the report, they noted that, “3D printing could have meaningful impact on certain consumer product categories, including toys, accessories, jewelry, footwear, ceramics, and simple apparel.” They predicted that “global sales of products in these categories could grow to $4 trillion a year (at retail prices) by 2025.”

McKinsey isn’t alone in gravitating towards those product categories. Several retailers have conducted their own research and consumers frequently express interest in things like tech accessories, jewelry, and toys. In fact when my previous company, 3DLT launched with Amazon back in 2014, they asked us to “supply products in four key categories – jewelry, home decor, toys, and fashion accessories (including tech accessories).”

Later we conducted research with Sears where over 4,600 consumers responded to a survey asking what types of products they’d like to see 3D printed. Interior decor, seasonal items, jewelry and tech accessories were the top selections.



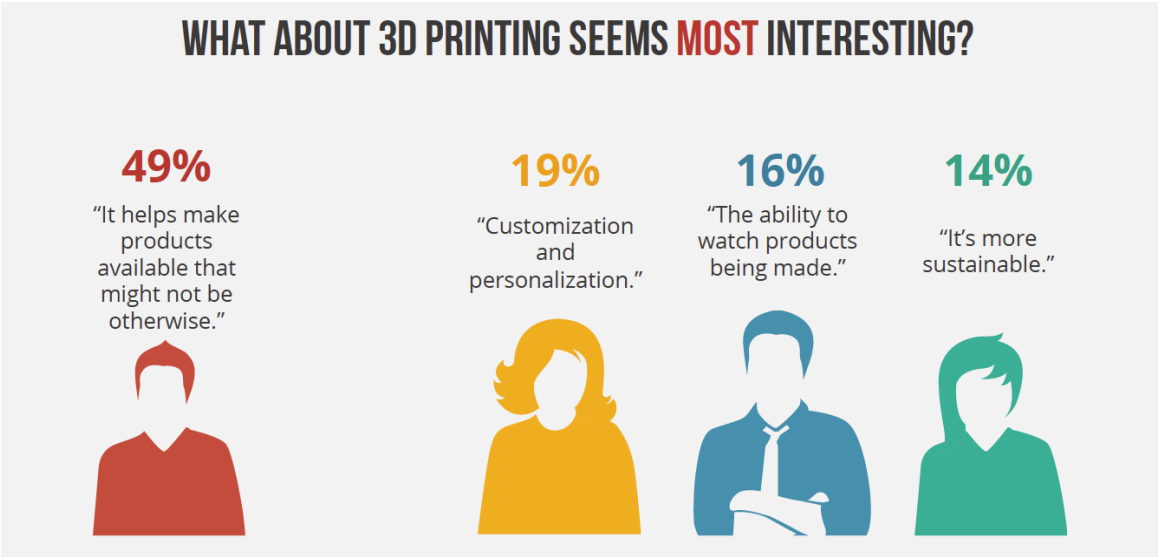
*Source: Get3DSmart

How Big Could It Be?

McKinsey wrote then that 3D printing could have an economic impact of over $500 billion annually by 2025. They predicted that almost all of it would come from “consumer use of 3D printing” and “direct product manufacturing.”

How did McKinsey arrive at such a staggering number? They backed into it by estimating that, “consumers might 3D print 5 to 10 percent of these products by 2025, based on the products’ material composition, complexity, cost, and the potential convenience and enjoyment of printing compared with buying for consumers.” They also forecasted that, “customization might be worth 10 percent or even more of the value for some 3D-printed consumer products.”

I’ll stack some more wood on the fire. During the Sears research, we asked the respondents, “What about 3D printing seems most interesting.” 19% of the respondents said customization and personalization. Unforeseen by anyone though, an overwhelming 49% answered that it would allow access to products they couldn’t get otherwise. Another 17% told us it was the ability to watch the product being made online or in-store, and 14% told us it was about sustainability.



In their report, McKinsey expressed a belief that a significant portion would come from desktop 3D printing. But they also saw other opportunities. They wrote then, that, "It is possible that most, if not all, consumers of these products could have access to 3D printing by 2025, whether by owning a 3D printer, using a 3D printer in a local store, or ordering 3D-printed products online."

Getting There

Later, in January of 2014, McKinsey & Company outlined five disruptions that would drive use of 3D printing.

1. Accelerated product development lifecycles - They saw this happening in part because the lines between digital and conventional manufacturing were (and still are) blurring.

2. New manufacturing strategies and footprints - They noted that in 2011, only 25% of 3D printing was for end-use products, but that portion of the market was growing fastest (60% per year). They assumed that only some products would be good candidates for transformation, and saw the primary drivers as cost reduction, performance improvement (or both).

3. Shifting sources of profit - They predicted a shift from low-cost to high value, and named several opportunities including customization and personalization, new design possibilities, and access to products that aren't otherwise available.

4. New capabilities - They pointed out that while the capabilities and limitations of traditional manufacturing are well known, there is a lot of unknowns in design for digital manufacturing. Uncovering these would lead to new opportunity.

5. Disruptive competitors - They also commented on how the relatively low cost of entry and lack of institutional "baggage" could beget players who would originally carve out niches but could eventually transform entire industries.

One of the challenges to meeting the kind of volume McKinsey predicted lies in infrastructure. To reach that kind of scale you've got to have significant throughput - not just in production, but also design, order entry, finishing, packaging and distribution. Getting there will require a ton of effort and a big upfront investment in people, processes and technology.

Software

Digital manufacturing requires digital input. Designs have to come from somewhere. Some will come from consumer products companies who want to sell their products in a new channel. Others will come from communities of designers who take advantage of an easier pathway to product development. More will come from new technologies like augmented and virtual reality. Many may also come from 3D scanning.

But, it's not only a matter of what is created, exported or scanned. The existing file format doesn't provide enough information to be useful to a new set of capabilities. The goal of 3MF is to package more of the needed information with the file. Also, a significant amount of work needs to go into cataloging all those files - turning them into products that can be sold like physical products are today. Ask anyone in eCommerce and they'll tell you it's not as easy as it looks. Every time a product is added, photos must be taken, copy must be written and a bunch of other things must be done before a product gets sold online.

Equipment

For a moment assume McKinsey is right and that by 2025, most if not all people have access to 3D printing. That alone would require a massive increase in capacity.

It's hard to see how desktop printers will make much of an impact. By some estimates the worldwide installed population of 2D desktop printers is about 500 million, yet they generate less than 10% of all printed pages. The vast majority of pages are printed commercially.

If 3D printing follows suit, a large percentage of products will be made on high-volume, commercial 3D printing machines. But to meet the demand, they'll have to be bigger, better, faster, and much cheaper to operate.

New capabilities

Conventional manufacturing techniques offer high quality and many choices of materials and finishing. 3D printing has some serious catching up to do if it wants to account for a significant portion of consumer products in any category.

Think about it for a moment. How many of the products in your house or office are a single color? If so, what color? Even something as simple as a set of measuring spoons is offered in multiple colors. Why? Because color helps us identify and differentiate between the various sizes.

Being able to quickly, reliably and inexpensively print in color was a big driver for the 2D printing industry. It's likely to have a similar impact for 3D printing.

Materials

Manufacturers can choose from a vast number of different materials when producing a product conventionally. Within plastics alone there are thousands of choices. From thermoplastics like nylon and polycarbonate, to thermosets like polyurethane and silicone, and engineering grade plastics like ABS to plastic fibers like polyester, rayon, acrylic and even kevlar, the number of choices is staggering. Then there are myriad other materials like ceramics, glass and metals, among others.

The Senvol database currently lists over 800 materials that are considered 3D printable today. But many of these are dedicated to specific types of commercial equipment. The options for consumer products are still pretty limited.

Killer applications

Bill Gates once famously said about the Internet in the 1990's that "the more users it gets, the more content it gets. And the more content it gets, the more users it gets." To some extent the same is true of 3D printing.

The better the technology gets, the more people will want to print. And the more people want to print, the better the technology will get.

There are already many examples of low-volume consumer applications. Consider 3D printed footwear. Big name footwear companies like Nike have announced special edition shoes with 3D printed components. iMcustom is 3D printing custom insoles in select Sam's Club locations and most recently Feetz, a startup maker of 3D printed footwear, announced a strategic partnership with shoe retailer DSW.

It's not only happening in footwear. 3D printed products have been sold in many retail categories from seasonal items and interior decor, to tech accessories and jewelry. Big name retailers like Amazon, Walmart, Target and Lowe's and many others have all experimented with selling products manufactured using the technology.

Infrastructure

So what's holding it back? As mentioned above, in large part the technology hasn't been good enough. But it's also a matter of infrastructure. Retailers and their suppliers will have to adapt to support digital manufacturing.

But from a competitive standpoint, can you think of any other technology in the last 10 years that was a benefit for brick-and-mortar? The Internet, eCommerce and mobile have arguably helped create disruptive competitors more than they've helped retailers with physical stores. Many omnichannel retailers are now leveraging the technologies to their benefit, but in many cases it was because they faced a new competitive threat. They invested millions or even billions to catch up.

To some extent they will have to do it again with 3D printing. But the leaders who develop the infrastructure will reap big rewards. The laggards will once again be playing "catch-up."

To learn more about HP 3D printers and printing solutions, please click HERE.

John Hauer is the Founder and CEO of Get3DSmart, a consulting practice which helps large companies understand and capitalize on opportunities with 3D printing. Prior to that, John co-Founded and served as the CEO of 3DLT. The company worked with retailers and their suppliers, helping them sell 3D printable products, online and in-store.

John's original content has been featured on TechCrunch, QZ.com, Techfaster.com, 3DPrint.com and Inside3DP.com, among others. Follow him on Twitter at @Get3DJohn