BPTrends ARTICLE

3D Printing Is Hot…And It's Only Going to Get Hotter

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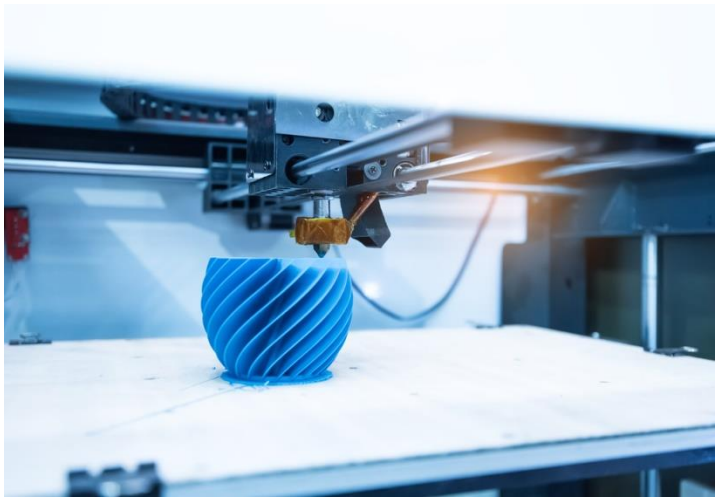
We often think of 3D printing as a new technology with futuristic implications, but we rarely stop to consider how far it's come or where it could be in another few years.

3D printing was invented by Charles Hull in 1984, and in the ensuing 34 years we have developed ways to scan and 3D print objects in real time and have even begun one of the most science-fiction endeavors yet–3D printing human organs.

Still, 3D printing has yet to reach its full potential, and that's a good thing. With everything we've achieved and all the breakthroughs still being made, it's only a matter of time before niche achievements carried out under perfect laboratory conditions become repeatable (and affordable) options for 3D printing hubs across the globe.

3D printers offer us a look at how computer and software technology can create meaningful changes in hardware by revolutionizing the design and physical creation processes. Here's a look at where 3D printing is in 2018 and where it's headed in the future.

Printing Organs, Saving Lives



For a while, the talk of 3D printed body parts was nothing more than theoretical science fiction. Sure, some researchers had figured out how to use a semi-organic material in a 3D printer and had even activated some living cells that replicated on the formed compound to create something like a real liver in a petri dish.

But in the last few years, things have progressed dramatically. In recent years, scientists have 3D printed a replacement foot for a duck, a new jaw for an elderly woman with a bone infection, and a few early clinical trials have shown success using the next-generation of 3D printing to replace people's own failing organs using CAT scans for shape and their own cells as a source of DNA to bring the organs to life.

This process is referred to as 3D bioprinting by industry insiders, and it is enjoying widespread adoption and funding that promises to further accelerate progress towards fully-functioning bioprinted organs that can be used instead of transplants from organ donors.

Research labs have already begun to use 3D bioprinted organs to conduct medical tests, which both reduces the need for animal testing and legitimizes bioprinted organs as more successful clinical studies show that the organs are a suitable replacement for naturally-sourced human organs.

A medical device company recently created a 3D printed bionic ear that combines the external structure and an internally-wound hearing aid that offers both a lifelike prosthesis and advanced hearing aid technology that is aided by its integration into the silicon-based external ear.

This sort of integrated manufacturing promises to change and improve all prosthetic-style devices by making more lifelike prosthetics more capable than ever before.

All of today's 3D-printed implants and prosthetics are more like fully-customized inorganic prosthetics than living and breathing organs, but the line is quickly blurring as more firms make more progress towards printing exact replicas of human organs and activating the tissues using grafts or samples from patients.

Today, 3D printing delivers extremely customized synthetic implants like new mandibles, duck feet, and components of external prosthetics that used to require intensive shaping by hand that was more art than science.

The ability to work with multiple materials and use highly-accurate measurements means that 3D printers will be welcomed in virtually every medical field as materials science catches up to the software and hardware behind 3D scanning and printing.

Construction

Just as with creating body parts, the only limit to 3D printing is how sophisticated the materials science is and how large of a 3D printer you have access to. 3D printers are increasingly utilized in art installations and one-off niche problem-solving applications, as they allow manufacturers to create highly specific or esoteric components without requiring customized tooling in a traditional manufacturing setting.

At this year's South by Southwest festival in Austin, Texas, a 3D printing and construction startup called ICON upped the ante on 3D printing by 3D printing a complete home in real-time on the grounds of an event.

The home is made of a concrete compound and can be 3D printed in under 24 hours for $4,000. Even with such nascent and proprietary technology for large-scale 3D printing, the results are impressive.

The company aims to use this technology to transform affordable housing options, and its first endeavor is building a neighborhood of 100 3D printed homes in El Salvador. As time passes, ICON and other large-scale firms will continue to perfect 3D printing at the commercial scale, and it's only a matter of time before we see the booming prefabricated housing field and the 3D printing field intersect to further drive down construction costs while bringing high-design architecture to every lot and budget size.

And when it comes to complex architectural designs or engineering challenges, 3D printing will push the envelope far beyond today's formed and reinforced concrete. These materials triumphs will lead to changes in both high-design flagship projects and repeatable, affordable construction in developing nations and expensive urban areas alike.

It will also transform the imbalance of skill and labor demand in many areas, thus reducing development barriers from recently-growing urban areas that typically see dramatic increases in construction costs as the labor pool becomes occupied by the largest and highest-bidding contracts.

Micro Manufacturing

Just as tooling costs for certain components can make architectural sketches cost prohibitive, if not impossible, to bring to reality, remanufacturing small parts for out-of-production devices is often impossible once the assembly lines are shut down and the tooling is lost forever.

For fans of niche hobbies or uncommon objects, 3D printing has brought life back to countless thousands of previously 'obsolete' items that were likely missing one part that kept them from being usable.

From brake cable housings on vintage bicycles to ink cartridge clips on antique typewriters to brackets on classic cars, 3D printing can enable serious archivists and amateur hobbyists to complete their projects and reduce manufacturing waste and functional product obsolescence.

Similarly, micro manufacturing enables a new generation of consumer goods to be produced on-demand, allowing for both increased customization and reduced inventory or resource waste.

One of the simplest and most ubiquitous examples of 3D printing in the mainstream micro manufacturing world is custom phone cases that allow you to order a case for virtually any modern cell phone with any color combination or design that you choose.

Cell phone and other small tech device cases are an ideal candidate for 3D printing, because they typically employ easy-to-print materials like silicon or plastic, are in high demand thanks to a booming global consumer technology industry, and are not a good candidate for large inventory due to the rapidly-evolving nature of the smartphone, tablet, and laptop industries.

3D printing helps to reduce waste and keep pace with ever-changing trends and consumer demands in this and many similar fields.

The Future of 3D Printing

The 3D printing industry is projected to nearly double from a 2018 total of $12.8 billion to over $21 billion in 2020, which indicates that its adoption and applications are still spreading rapidly.

Many major conventional manufacturers have already partially or completely transitioned from conventional manufacturing and inventory to 3D printing and 'digital inventory' models which allow them to create products on-demand while virtually eliminating tooling and prototyping costs.

The potential of this manufacturing model allows for far faster design and testing phases, ongoing product updates, and increased product 'lifespan' thanks to the ability to create replacement or updated parts without maintaining a physical inventory or active assembly line.

As commercial demand for 3D printing technology increases, it will continue to drive further improvements in available technology while making devices more affordable to a wider range of industries and businesses. Much of the technology for creating futuristic-sounding 3D printed products exists today but requires affordability and widespread adoption to become viable.

Alongside this progress in the commercial and consumer-facing 3D printed product realm, the medical field will continue to make advances towards transplant-ready 3D-printed organs, which many consider to be the ultimate realization of this technology.

The intersection of computer software that model and design given goods, printing hardware that can turn these models into reality, and materials science that will continue to push the envelope of what's possible in 3D printing will move us towards a future where 3D printing is less of a novelty and more of a given across manufacturing and medical realms.

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