Benesch

3D Printing Half-Year Report 2022

3D PRINTING–A FAST-MOVING MARKET

Developments in 3D Printing

A Sector by Sector Overview

This report explores developments in 3D printing across several sectors and categories for the half-year period of January 1, 2022–June 15, 2022.

For more information, please contact:

Mark E. Avsec
(216) 363-4151
mavsec@beneschlaw.com

www.beneschlaw.com

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Industry

3D Printing is Nearly a $15B Industry, Continues to Grow, McKinsey Says (March 22)

McKinsey estimates that 3D printing is now a $14.7 billion industry, with a 22% annual growth rate. The firm notes that after 40 years of development, the sector is "extremely dynamic, with more than 200 players competing to develop new hardware, software, and materials." McKinsey identifies four sources of value created by 3D printing:

1. It can generate any 3D component, and it will perform better and cost less than with conventional manufacturing methods.
2. Simplicity of fabrication reduces the time to market.
3. There is no need for molds or fixed tooling, allowing for mass-scale customization.
4. It reduces the need for spare-parts inventories by enabling on-demand production of items from digital files, in the field.

One of the key drivers of 3D printing growth, according to McKinsey, will be increasing labor costs in China.

Survey Says More Users Plan on Investing in 3D Printing Hardware, Materials, and Accessories (February 15)

A survey from MakerBot on the 3D printing usage habits and investment plans of professionals from around the world found there is continued strong adoption of 3D printing, with 77% of respondents saying they made 3D printing investments in 2021, and 69% expecting to do so this year. Seventy-four percent of respondents said they planned new 3D printing investments in 2021, showing growing optimism in the segment. Moreover, in this year's study, 84% of respondents who invested last year said they plan to purchase more equipment, materials, and accessories in 2022 in order to address new applications, whether that's prototyping, tooling, or even expanding to mass production - something new for respondents.

Construction

Chinese Engineers Plan to Fully Automate the Construction of a Dam Using 3D Printing (May 10)

Using the ideas of research paper, Chinese engineers are planning to use 3D printing to fully automate the construction of a 590-foot-tall dam on the Tibetan Plateau to build the Yangqu hydropower plant. The engineers believe they can build the dam within two years while eliminating the need for human laborers at the dam site by using artificial intelligence to control unmanned machinery to construct the overall structure.

Alquist 3D Plans to Build 200 Homes in Virginia (April 27)

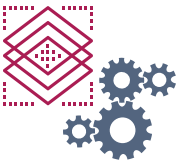
Having finished building the "first owner-occupied 3D printed home" earlier in 2022, construction 3D printing firm Alquist 3D is planning to build 200 homes across the state of Virginia. Given the region's rapidly growing workforce, it's expected to serve as an ideal test bed for showcasing 3D printing's efficacy in creating accessible new homes. Unlike its previous builds, which were carried out using a COBOD machine, Alquist 3D's new homes are expected to be realized with the help of Black Buffalo 3D's "NEXCON," a gantry system capable of creating three-story structures.

GE Renewable Energy Opens R&D Facility Focused on 3D Printing Wind Turbine Bases (April 25)

GE Renewable Energy opened a new research and development facility dedicated to 3D printing the concrete base of wind turbine towers. The facility, located in Bergen, New York, will see GE conduct research into additively manufacturing these wind turbine bases on-site at various wind farms as the firm looks to lower transportation costs and create additional employment opportunities. GE believes 3D printing has the potential to "bring a step-change in cost and performance competitiveness" in the wind energy sector, as the industry continues to grow. The research is partially supported by a grant from the U.S. Department of Energy and will see a team of 20 people work to optimize the 3D printing technology. The first applications of the technology within the field are anticipated within the next five years.

Habitat for Humanity 3D-Prints Its First Home in the U.S. (December 27)

Habitat for Humanity Peninsula and Greater Williamsburg in Virginia partnered with 3D printing company Alquist to 3D print a 1,200-square-foot home built out of concrete. The technology allowed the home to be built in just 12 hours, which saves about four weeks of construction time for a typical home. The concrete used in the house's 3D construction has many long-term benefits, such as the ability to retain temperature and withstand natural disasters, like tornadoes and hurricanes. Habitat for Humanity hopes to continue partnering and developing the technology used with the printing of this home, and sees the technology as a way to help alleviate the increased demand for low-cost housing.



Materials & Manufacturing

Chevron is Solving Supply Chain Issues with 3D Printing (May 3)

Oil company Chevron turned to 3D printing to solve its supply chain problems. To do so, the U.S. company enlisted the services of Lincoln Electric, a firm that specializes in manufacturing production tools. In addition to offering welding and plasma cutting solutions, Lincoln Electric has one of the largest 3D metal printing facilities in the world. Together, the two companies were able to meet Chevron's on-demand production needs. According to the company, a delay in the supply chain put one of the company's refineries at risk. But thanks to 3D printing, the company was responsive and flexible enough to quickly design replacement parts.

Scientists Develop Fast New Methodology of 3D Printing Glass Into Components with "The Thickness of Hair" (April 22)

Researchers at the University of Freiburg collaborated with colleagues at the University of California, Berkeley to introduce a novel technique of quickly 3D printing complicated glass components at a microscopic scale. Known as "Microscale Computed Axial Lithography," this method entails exposing resin to 2D mild photographs of a desired form from a number of angles, which once they overlap, set off polymerization. When used to print materials, layer-free material has the potential to unlock units with new microfluidic or micro-optical performance.

Researchers Develop New Abrasion-Based Technique of Manufacturing 3D Printing Powders (April 14)

Researchers from the Indian Institute of Science (IISc) developed an abrasion-based technique of manufacturing metallic powders for 3D printing. The strategy is designed to offer an alternative choice to atomization, the method by which most metallic powders are currently produced. However, atomization-based powder manufacturing can produce poor yield, be cost-inefficient, and is restricted to only some metals. The IISc aims to deal with these shortcomings. Priti Ranjan Panda, a Ph.D. pupil at IISc's Centre for Product Design and Manufacturing, stated, "We have an alternative, more economical and inherently scalable route for making metal powders, and the quality of the final powders appear to be very competitive when compared with conventional gas atomized powders."

3D Printing Brings Customization to the Supply Chain (February 22)

An MHI and Deloitte survey of more than 1,000 supply chain professionals found 21% of companies currently use 3D printing and additive manufacturing, while 32% plan to invest in the technology in the next five years. The rising popularity of 3D printing is driving innovation and change in the way businesses use the technology within their supply chains. The rapid adoption of additive manufacturing is being driven by improvements in just about every aspect of 3D printing. Machines are faster, more precise and can handle more volume. There are also more options as to what can be made, with ways to 3D print things like high temperature plastics and metals.

Research Paves the Way for Stronger Composite 3D Printing Filaments
(February 14)

Researchers from the Iran Polymer and Petrochemical Institute are taking a deeper dive into the mechanical properties of glass fiber-reinforced 3D printing filaments in a bid to enable stronger composites. The team prepared several ABS-based composite filaments with varying amounts of ABS, conducting tensile, flexural, and short beam tests to evaluate the mechanical behavior of the resulting 3D printed parts. According to the research paper, this is the first study showing the effects of ABS weight percentage on the mechanical properties of 3D printed continuous fiber-reinforced composite parts, paving the way for improved material formulations.

Research Improves Resin 3D Printing Using Novel Metal Polarizer Technology
(February 8)

Researchers from the University of Texas at Austin and Lawrence Livermore National Laboratory are investigating the use of metal wired grid polarizing filters in resin-based 3D printers. The wired grid polarizers are designed to replace the conventional PVA film polarizers used in monochrome LCD screens, the component which generates the patterns for printing individual layers. Early testing has shown that the new wired grid polarizers offer a significantly higher light transmission efficiency when compared to their film counterparts.

Azure Printed Homes Opens New Facility to 3D Print Homes from Recycled Plastic
(February 2)

Azure Printed Homes announced the opening of a 15,000 square foot factory in California to house its custom-built construction 3D printer, which is capable of producing backyard studios, accessory dwelling units (ADUs) and, eventually, full-sized homes. The company's technology combines its large-scale robotic 3D printers with recycled plastic polymers as feedstock in order to prefabricate studios, offices, ADUs and homes 70% faster and 20-30% cheaper than existing construction methods, the firm claims. More than 60% of the firm's print material comes from recycled plastic, specifically a plastic polymer that is most commonly used in the production of plastic bottles and food packaging.

German-Canadian Project Set to Automate 3D Printing Part Repair Using AI Technology (January 31)

A collection of organizations from Germany and Canada have set up a new consortium to automate the process of repairing parts using 3D printing and artificial intelligence. The project, named Artificial Intelligence Enhancement of Process Sensing for Adaptive Laser Additive Manufacturing (AI-SLAM), aims to develop advanced AI-based software to automatically run Directed Energy Deposition (DED) 3D printers. Used in conjunction with Fraunhofer's LMD technology (a form of DED), the software will algorithmically manage the printing process to more effectively repair irregular surfaces on damaged components – all without the need for human input. The consortium includes the Fraunhofer Institute for Laser Technology (ILT) and software developer BCT from Germany, while in Canada, the work will be overseen by the National Research Council of Canada, McGill University will coordinate the research, and machine learning firm Braintoy will help program the AI models. Alberta-based manufacturing service bureau Apollo Machine and Welding will also be providing additional 3D printing services to aid the research.

3D Printing Gets Faster and More Reliable with New Carbon Models (January 26)

3D printer maker Carbon announced two new models, the M3 and M3 Max, designed to make the novel manufacturing method more practical. The systems are better able to detect and compensate for manufacturing stress problems, resulting in stronger products that often can be printed faster, the company said. Most 3D printers lay down plastics from the top, fusing a supply of powder or filament layer by layer into a solid object. Carbon has a different approach, zapping a liquid with carefully directed ultraviolet laser light from the bottom. 3D printing has been transforming manufacturing, letting companies build products that wouldn't be economical or even feasible with earlier methods like molding or machining.

3D Printing's Next Act: Big Metal Objects (January 23)

A new method of 3D printing from a startup called Seurat Technologies could revolutionize how industrial products like planes and cars are made while reducing the cost and carbon footprint of mass manufacturing. The technology from Seurat speeds things up by splitting a single, high-powered laser beam into as many as 2.3 million beams of light. Seurat, based in Wilmington, Massachusetts, says it has deals with seven of the world's largest automotive, aerospace, energy and industrial companies to begin commercializing the technology this year.

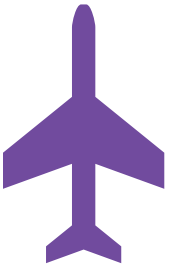
Automotive

Bentley Invests in 3D Printing to Produce New Components (February 18)

Bentley will invest £3 million in its 3D printing facility in Crewe, England. The additive manufacturing facility has been applied in a range of uses and produced over 15,000 components in 2021 alone. Bentley says the expansion will enable it to utilize the advanced technology to create 3D printed vehicle components and level up personalization in customer cars. The automaker has stated this is a long-term sustainable business model.

Ford Releases Open-Source CAD Files for 3D Printing Truck Accessories (February 15)

Ford released a set of CAD files enabling customers to 3D print their own accessories for their Maverick pickup truck. The files are for the pickup's Ford Integrated Tether System (FITS) which is a series of slots at the rear of the center console and the under-seat storage bins that can be customized with a wide variety of accessories, such as cup holders and phone mounts. Ford had planned to release the files since before the Maverick entered production, and now that the truck has started hitting driveways the car manufacturer has made good on its promise.



Aerospace

NASA Develops 3D Printing Alloy for High-Performance Aerospace Systems (April 19)

NASA developed a metal 3D printing alloy specially designed for use in high-performance aerospace systems. The GRX-810 is an example of an oxide dispersion strengthened (ODS) alloy: a metal containing nanoscale oxide particles. The material can reportedly withstand temperatures of over 1090°C (2000°F), all while being more malleable than existing aerospace alloys. NASA intends to use the technology to 3D print high-temperature components for systems such as rocket engines, claiming it can ultimately improve fuel efficiency and lower maintenance costs. The agency has already used the alloy to 3D print a turbine engine combustor, a monolithic part designed to mix fuel and air.

Boeing Unveils a New High-Throughput Small Satellite Production Facility (April 3)

Boeing's new high-throughput small satellite production facility will be powered by Boeing subsidiary Millennium Space Systems and will be housed in the world's largest satellite production facility, Boeing's 1-million-square-foot El Segundo facilities. Millennium's team will staff the small satellite production facility, bringing processes and infrastructure from the subsidiary, as well as environmental testing capabilities tailored to small satellites. Boeing will also provide access to extensive environmental and specialty testing capabilities that have qualified some of the most iconic spacecraft.

Boeing Increases Use of 3D Printing to Speed Up Production of WGS Military Satellite (March 1)

Boeing is manufacturing components with 3D printing as a way to shorten the production cycle of the U.S. military's Wideband Global Satcom (WGS) communications satellite. By 3D printing parts, Boeing is able to make a WGS satellite in five years compared to the typical seven-to-10-year production schedule. The parts that are being 3D printed for WGS include structures and mechanisms, thermal control subsystems, dynamic isolation systems and passive microwave devices. Materials used include aluminum alloy, titanium alloy and high-performance polymer. Boeing said it is also qualifying other materials.

NMIS-Led Consortium Set to Develop New Hybrid DED 3D Printing (February 10)

An additive manufacturing consortium together with Airbus, Safran Landing Systems, and the National Manufacturing Institute Scotland (NMIS) has engaged on a new hybrid directed vitality deposition (DED) 3D printing course for the aerospace sector. The "Hybrid Direct Energy Deposition Sprint" undertaking aims to supply an extra sustainable path to aerospace manufacturing by means of 3D printing. Aiming to beat the challenges that standard manufacturing companies face, the Hybrid DED course will reportedly tackle a variety of points associated to manufacturing prices and lead occasions. Funded by the Aerospace Technology Institute and supported by the High Value Manufacturing Catapult, the joint undertaking additionally consists of Cranfield University, the Northern Ireland Technology Centre, and an trade steering group of 13 corporations.

Relativity is 3D Printing Rockets and Raising Billions. Will its Technology Work? (February 7)

Relativity Space, the rocket startup Tim Ellis co-founded in 2015 after he left Jeff Bezos' space company, plans to build fairly small rockets that can blast satellites into orbit cheaply and quickly. The company raised about $1.2 billion in just eight months. Relativity plans to 3D print almost every component of its 200-foot-tall orbital rockets, called Terran 1. Ellis says investors are drawn in by the promises that Relativity's methods will allow them to build a rocket in less than a month, while labor-driven rocket manufacturing can take more than a year. Using robots will also allow Relativity to quickly integrate small changes into its rockets' design, potentially allowing the company to develop a far better product in less time, according to Ellis.

Cornell, HP and NASA Efficiently Check 3D Modeling Software Program Aboard ISS (February 3)

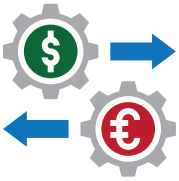
An experiment carried out with NASA saw a superior modeling software program developed by Cornell University and examined on the International Space Station. The experiment saw the ISS US National Laboratory and HP, Cornell's modeling software program, built-in into HP's Spaceborne Computer-2 to simulate how 3D printing processes would play out in house for a desired part, and predict half high quality.

Tait to 3D Print 6 Meter-Long Aerostructures with the "World's Largest" Electron Beam Machine From Sciaky (January 26)

Metal 3D printing specialist Sciaky plans to ship the "world's largest" electron beam directed energy deposition system to aircraft manufacturer Turkish Aerospace Industries. The partnership will see TAI install a custom Sciaky 300" x 108" x 132" build volume 300 Series Electron Beam Additive Manufacturing (EBAM) 3D printer. The system will be used to create titanium aerostructures of up to 6 meters in length, in the course of several pilot projects that are expected to help TAI master its deployment of the technology.

Honeywell Aerospace Embraces Additive Manufacturing to Reshape Industry (January 6)

Honeywell Aerospace is openly embracing additive manufacturing technology and thinks it can reshape the way the aerospace industry works. The company is implementing additive manufacturing to enhance part design freedom and to accelerate development. Honeywell established a dedicated additive manufacturing design team and three high-tech labs with expert process engineers and well-trained operations staff to work on rapid prototyping. Honeywell is also utilizing additive manufacturing to create supply chain flexibility, an issue that became even more pressing after the global COVID outbreak caused supply-chain constraints. These can come from tooling or casting quality issues or simply from general spikes in demand. Additive manufacturing is now providing the surge capacity to respond quickly to produce parts. To enhance this capability, Honeywell has begun a campaign to qualify an additive-produced alternative to part numbers with the most significant constraints.



Transactions

Czinger Hypercar Builder Divergent Technologies Raises $160M to Industrialize "Revolutionary" 3D Printing Platform (April 26)

Divergent Technologies closed a $160 million Series C funding round. Divergent has already committed to build the 1,233 bhp 21C hypercar for sister firm Czinger, which ships next year. According to the company, its newly-raised funding should now allow it to industrialize DAPS, while "expanding its operations," to meet "growing demand among automotive OEMs." Over the last eight years, Divergent has managed to hone its DAPS system, and turn it into a complete, end-to-end modular car-building platform. Designed to serve as a fully-fledged alternative to traditional automotive production processes, the software-hardware solution has allowed the firm to become a Tier 1 automotive supplier.

Siemens and Roboze Team Up to Accelerate Industrialization of 3D Printing (March 30)

Siemens and 3D printing manufacturer Roboze entered into a partnership to develop complete workflows for the industrialization of 3D printing. Under the partnership, the two firms will combine their respective expertise to increase the production opportunities for companies operating within the energy, mobility, and aerospace sectors through a raft of digitalization and automation projects. Roboze's high-performance FFF machine is specifically geared for the production of high-end finished 3D printed parts for the industrial, aerospace, and automotive sectors.

3D Systems Buying Into Advanced FFF 3D Printing with Kumovis and Titan Robotics Acquisition (February 24)

U.S. 3D manufacturer 3D Systems acquired medical-grade 3D printing specialist Kumovis and Titan Robotics. The Titan acquisition sees the company move into pellet extrusion for the first time, which could allow it to better meet the needs of consumer, automotive, aerospace, defense and service bureau clientele. "As the leading additive manufacturing solutions partner across industrial and healthcare markets, 3D Systems is committed to meeting the widest possible range of our customers' AM production needs," said Dr. Jeffrey Graves, President and CEO of 3D Systems.

ICON Raises $185M in Tiger-Led Round to Build More Homes with its 3D Printing Tech, Now Approaching $2B Valuation (February 18)

ICON raised an additional $185 million in a round led by Tiger Global Management. The financing is an extension of ICON's $207 million 2021 Series B. The company didn't provide details on the raise, but previous backers include Norwest Venture Partners, 8VC, Bjarke Ingels Group, BOND, Citi Crosstimbers, Ensemble, Fifth Wall, LENx, Moderne Ventures and Oakhouse Partners, among others. It is not clear which of those investors also participated in this extension. With the latest financing, ICON has now raised a total of $451 million in equity. ICON was founded in late 2017 and launched during SXSW in March 2018 with the first permitted 3D-printed home in the U.S. That 350-square-foot house took about 48 hours (at 25% speed) to print. ICON purposely chose concrete as a material because, as co-founder and CEO Jason Ballard put it, "It's one of the most resilient materials on Earth."

Nano Dimension Acquires Global Inkjet Systems in Deal Worth Up To $28.8M (January 6)

Nano Dimension, an Israeli 3D printing manufacturer acquired inkjet software, drive electronics and delivery system developer Global Inkjet Systems. Nano Dimension paid an initial $18.1 million to GIS' shareholders, and committed to pay up to $10.7 million more, provided it reaches pre-agreed financial performance milestones. Based in Cambridge, U.K., GIS develops the technologies behind the printheads used in industrial single-pass, XY scanning and 3D printing systems. The firm has established a 130 client-strong user base, with adopters applying its products in biomedical, packaging and electronic printing applications. Through acquiring GIS, Nano Dimension therefore anticipates being able to accelerate its product development, as it considers the firm's technologies to be essential to any ink deposition methodology within its AME and AM solutions.

Fathom Goes Public on the NYSE After Wrapping Up $1.5B SPAC Merger (January 4)

Fathom Digital Manufacturing completed its merger with SPAC Altimar Acquisition Corp. II in a deal that will see CORE Industrial Partners remain the largest shareholder in the newly-combined company. Fathom markets rapid prototyping and low-volume production services via its extensive in-house manufacturing capacity.

Environmental / Sustainability

Israeli Scientists Reform Coral Reefs with New 3D Printing Method (April 27)

Scientists from four leading universities in Israel developed an innovative way to combine technology and science to help preserve coral reefs. In a joint research project, the researchers from Technion – Israel Institute of Technology, Bar Ilan University, Tel Aviv University, and the University of Haifa have developed a new 3D printing method based on the natural structure of coral reefs off the southern coastal city of Eilat. The process combines 3D scanning algorithms, with environmental DNA sampling, and a 3D printing algorithm that allows in-depth and accurate examination of the data from each reef as well as tailoring the printed model to a specific reef environment. In addition, data can be re-fed into the algorithm to check the level of effectiveness and efficiency of the design after it has been implemented, based on information collected in the process.

Scientists Use Recycled Glass Waste as Sand Replacement in 3D Printing (April 26)

Researchers from Nanyang Technological University, Singapore developed the capability to use recycled glass in 3D printing. The development opens the door to more environmentally sustainable ways of building and construction. Glass is one material that can be 100% recycled with no reduction in quality, yet it is one of the least recycled waste types. Glass is made up of silicon dioxide, or silica, which is a major component of sand, and therefore it offers significant untapped potential to be recycled into other products.

Texas A&M Engineer Develops 3D Printed Models that Uncover the Secrets Behind Optimal Fracking (January 7)

A researcher from Texas A&M has developed a novel 3D printing-based approach to accurately stimulate the hydraulic fracturing or "fracking" oil and natural gas mining process. Engineer Gabriel Tatman worked with local research university Colorado School of Mines to develop clear printed models, which reveal the impact of flow materials used during fracking. It is believed the models could uncover previously-unseen fracking behaviors and enable firms to optimize their recovery efforts.

Military

Defense Department, ICON Partner to Develop 3D Printed Barracks (April 7)

In a partnership with construction technology company ICON, the Defense Department is 3D-printing the largest structures in the Western Hemisphere, to serve as transient housing for service members. Made out of ICON's proprietary "Lavacrete," this printable high-strength concrete has a compressive strength of 2,000 to 3,500 pounds per square inch and can reportedly withstand extreme weather.

3D Printing Speeds Up Production of Missiles in China (March 21)

China Aerospace Science and Industry Corp. is leveraging 3D printing to accelerated the design and production of crise missiles. A technician at CASIC said it takes about one or two months for dozens of technicians and workers to manufacture a gas rudder used on a cruise missile with traditional machining methods. With 3D printing, a handful of workers can make the small part within a week, saving a great deal of labor, time, cost and producing less waste. The technology also has huge potential in the academy's production of unmanned aircraft, he said. Wu Peixin, a defense industry observer in Beijing, said it is likely that in the future, 3D printers will be taken to the battlefield to allow soldiers to print and assemble missiles on the spot based on their needs.

Senvol ML Software Helps U.S. Air Force Fast-Track the Qualifications of New 3D Printing Materials (February 21)

Senvol, an additive manufacturing data specialist, showcased how its machine learning technology can be used to accelerate the qualifications of new aerospace 3D printing materials. Under a contracted awarded by America Makes and funded by the U.S. Air Force, the firm deployed its Senvol ML software to rapidly and cost-effectively identify property allowables during material R&D. The projects findings could be a key to producing a new generation of durable lightweight parts for both aerospace and commercial applications.

U.S. Navy Eyes 3D Printing for Submarine Parts to Ease Burden on Strained Industrial Base (February 4)

The U.S. Navy is planning to pair suppliers who can't keep up with demand with additive manufacturing companies who can print parts around the clock to boost the supply. The effort aims to avert risks to the Columbia-class ballistic missile submarine program. The most fragile parts of the submarine-industrial base are companies that do castings, forgings and fittings would be targeted in the effort. While today, the Navy certifies individual parts to go on submarines. That part-by-part qualification won't work going forward, according to an official who is advocating for the Navy to instead qualify materials and processes used for additive manufacturing rather than the parts that result from it.

Academic

UMaine Leverages 3D Printing to Return Cultural Artifacts to Alaska Tribe (May 5)

The University of Maine is using 3D printing to return culturally-sensitive artifacts back to an Alaska tribe. The team from the university is 3D printing a replica of a helmet that will be displayed at a museum while the original is sent back to the Tlingit tribe in Alaska. If the replica helmet is successful, UMaine will use the technology to fabricate around half a dozen replicas of other Tinglit tribe artifacts.

Researchers Develop Watermarking Technology to Protect 3D Printing IP (April 25)

Researchers from the University of Exeter Law School patented a watermarking technology for use with 3D printing which they claim will "revolutionize" how 3D printed objects can be distributed, traced, and searched for. The team is now working to link their watermarking technology with blockchain to allow companies to license 3D printed objects while protecting their intellectual property. The technology will reportedly help companies to license their products for 3D printing "properly" for the first time.

New Volumetric 3D Printing Method Relies on Light-Converting Nanoparticles (April 21)

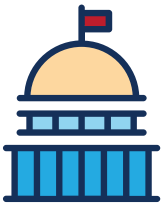
Researchers developed a new method of volumetric 3D printing that is capable for fabricating resin parts without the need for any support structures. The approach, developed by researchers from Stanford University and Harvard University, relies on a nanoparticle-laden resin material that only hardens when it's blasted with a very focused laser spot.

FAMU-FSU researchers Use Machine Learning to Improve 3D (April 5)

Researchers at the FAMU-FSU College of Engineering are working to improve 3D printing technology by teaching machines to learn from each other. In a new study published in the IEEE (Institute of Electrical and Electronics Engineers) Transactions on Automation Science and Engineering, researchers showed how data from one printer can be used by other machines to improve efficiency and quality. The researchers connected different printers on a cloud platform, and then had the machines share data about accurate processing, which decreased the time needed to prepare and calibrate them. The researchers also developed a mathematical model to better understand the printing process.

3D Printing the Key to Inclusive Learning for Students (March 26)

NSW public school students who are blind or have low vision are benefiting from access to 3D printers to create 3D models to help their learning. The Department of Education spent two and a half years researching and developing the program that offers schools access to a growing library of 3D files that are aligned to the curriculum. Education and Early Learning Minister Sarah Mitchell said the resources are world-leading examples of inclusive education.



Government

U.S. suspends exports by manufacturers that leaked data to China (June 9)

The U.S. Department of Commerce suspended the export licenses of three firms after they allegedly leaked confidential defense data to 3D printing service providers in China. Rapid Cut, Quicksilver Manufacturing and U.S. Prototype are believed to have asked Chinese manufacturers to 3D print satellite, rocket and other defense-related prototypes. However, in the process of placing these orders, the firms shared sensitive technical drawings and blueprints without authorization. They have been banned from exporting for 180 days.

Biden Launches Program to Promote, Fund 3D Printing (May 6)

President Biden declared his administration's plan to promote 3D printing as a way to deal with rising prices and sinking competitiveness of America's small and medium-sized manufacturers. The President introduced an initiative called Additive Manufacturing Forward (AM Forward) that will see large manufacturing companies in the America pledge to purchase 3D-printed parts from small-to mid-size U.S.-based suppliers and reduce their dependence on overseas factories. Several companies have already joined this voluntary compact, including GE Aviation, Honeywell, Lockheed Martin, Raytheon, and Siemens Energy.

Sports

German Olympic Team Gets a 3D Printing Push at the Winter Games (February 12)

The German Olympic bobsleigh, skeleton and luge teams at the Winter Games in Beijing used shoe spikes 3D printed with the help of BMW. For the new 3D printed metal spikes, a digital image of the real shoe tip geometry was first produced and analyzed. This allowed many different shapes to be tested to eventually identify maximum traction on the ice. The 3D printer created a filigree and stable structure that made the shoe lighter on the one hand and also gave it optimal grip distributed over the entire forefoot area. In addition, the individual wishes of the athletes could be taken into account, since the process allows for a variety of cost-effective variations.

Health

U.K. Researchers Develop Technique to 3D Print Medicine Tablets in Seven Seconds (March 25)

Research from University College London found that medicines can be 3D printed in seven seconds using a vat polymerisation technique that prints the entire object all at once, reducing the printing speed from multiple minutes to just seven to 17 seconds (depending on the resin composition selected). For the current study, the researchers loaded printlets (printed tablets) with paracetamol, which is one of many medicines that can be produced with a 3D printer. For printing medicines, the vat polymerisation technique uses a resin formulation, constituting the required drug dissolved in a solution of a photoreactive chemical, activated by light to solidify the resin into a printed tablet.

Singapore, Japan-Based Researchers Develop Okara-Based 3D Printing Ink That Could Reduce Food Waste and Tackle Obesity (March 23)

Researchers from Nanyang Technological University Singapore and Waseda University have trialed the use of soybean waste to reduce obesity in rats. The study found that fermented soybean waste, or okara, has the potential to improve fat metabolism and mitigate the effects of diet-induced obesity, while also addressing issues of food waste. Alongside the trial, the team successfully formulated okara into an eco-friendly 3D printable ink, which they say could pave the way for food 3D printing to improve food sustainability. The researchers are currently reaching out to industry partners to produce healthy snacks with their okara-based 3D printing ink, and explore how okara can be integrated into other food products.

MIT Spinoff Creates 3D Printed Nasal Swab, Plans to Ramp Up Production (March 1)

MIT spinoff OPT Industries has developed a 3D printed nasal swab. InstaSwab has a complex geometrical build constructed from ultra-thin polymer fibers measuring less than the width of a human hair. OPT's 3D printing system was seven years in the making and the company says the swab is "up to 20 times more effective in bacterial sample elution." Having just raised $15 million in a Series A, the company says the InstaSwab will remain an integral part of the company's offering for now, with the firm planning to ramp up production on the cotton swab alternative.

Trestle Biotherapeutic Licenses Kidney Tissue 3D Printing Technology Developed by Harvard University (February 9)

San Diego-based bioengineering startup Trestle Biotherapeutics gained a license for a 3D bioprinting technology that enables the fabrication of functional human kidney tissues. Developed at Harvard University, the approach is said to combine stem cell and biofabrication technologies in a way that yields viable renal tissues. Trestle Biotherapeutics intends to use it to create kidney cell transplants that help get people off dialysis.

Research Develop "Cryo-Bioprinting" Process to Print Live Human Tendon (February 7)

Researchers at Harvard Medical School and Sichuan University have developed a novel way of 3D bioprinting live human muscle-tendon tissues. As opposed to normal extrusion bioprinting, which involves depositing cells along X and Y axes, the team's "cryo-bioprinting" process sees them frozen and stacked vertically, in a way that allows for the creation of freestanding, mixed-cell tissues. The scientists said their technique also yields tissues that are more robust and versatile than those produced via conventional bioprinting and that it could have regenerative medicine, drug discovery, or personalized therapeutic applications.

Hong Kong Scientists 3D Printing Antiviral Material (January 17)

Scientists at Hong Kong Polytechnic University have developed a 3D printable antiviral material that would be able to effectively fight against COVID-19, regardless of the variant, as well as against other bacteria. In the experimental phase, the scientists made toilet door handle guards as well as Braille elevator buttons to test the effectiveness of the material. After a year of use in public places, no traces of the coronavirus or other bacteria were detected on these parts. To design the material, the researchers added antiviral agents to resin. In the coming months, the team of scientists will manufacture door handle covers for more than 100 buildings in Hong Kong and hopes to eventually equip schools, public transportation, and healthcare facilities.

U.K. Researchers Develop 3D Bioprinting Technique to Treat Wounds (January 6)

Researchers from the University of Birmingham and the University of Huddersfield in the U.K. have developed a 3D bioprinting technique called Suspended Layer Additive Manufacturing (SLAM). The technique enables the printing of a biomaterial that accurately simulates the structure of mammalian skin and can be used to treat chronic wounds. According to the researchers, the biomaterial is the first of its kind to simulate all three of the major layers found in skin – the hypodermis, the dermis, and the epidermis – making it a unique tri-layered skin equivalent. Early experiments suggest that the 3D bioprinted skin can be placed at the site of a wound to induce healing, reducing scar tissue in the process.