Benesch

3D Printing Half-Year Report 2021

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, 2021 to June 15, 2021.

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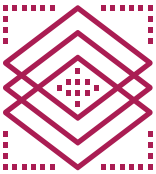
Legal Implications

Is 3D printing the next litigation frontier? (March 18)

Litigation over 3D printing will become increasingly more prevalent as the technology becomes less expensive to build due to rising demand, some lawyers say. A federal court in Fort Lauderdale, Fla., heard arguments in a trademark and trade dress infringement case involving a car product replicated using 3D printer technology. Defendant Jerrit Askvig is accused of manufacturing, distributing, marketing and selling an infringing product. The dispute involves Velossa Tech's BIG MOUTH ram-air intake, which is a product of the fiercely competitive after-market automobile parts and modification industry. Velossa, which is based in Hollywood, Florida, indicated in the complaint that it has two federal trademark registrations for the product and exclusive use of the BIG MOUTH mark and the Velossa Tech Trade Dress.



Materials

Californian researchers develop crack-resistant nickel-based superalloy for 3D printing (Jan 5)

A team of researchers from UC Santa Barbara and Oak Ridge National Laboratory developed a defect-resistant superalloy for metal 3D printing. The Co-Ni superalloy reportedly overcomes the issue of cracking, which can plague parts fabricated via high-temperature powder bed fusion technologies such as SLM and EBM. The scientists believe their material holds "tremendous promise" for the advancement of industrial 3D printing in high-stress applications, including critical aerospace engine components and chemical-contacting nuclear components.

Fraunhofer 3D prints mycelium as sound absorber (Jan 6)

The Fraunhofer Institute for Building Physics (IBP) and Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT are proposing the use of fungus for supplanting mineral fibers or synthetic foams for manufacturing sound-cancelling components. Because traditional materials are not typically sustainable or easily recycled, the team is exploring the use of mycelium as a 3D printing material. Like the root network beneath a tree, mycelium is the underlying body of fungi that can give rise to mushrooms. Made up of a network of filament-like hyphae, mycelium can span over a square kilometer underground.

FAMU-FSU scientists identify ideal parameters for 3D printing conductive graphite composites (Jan 22)

Researchers from the FAMU-FSU College of Engineering developed a parameter set for 3D printing graphene-based structures with optimized conductive qualities. The team found while factors like print pressure and nozzle diameter affected the composite's properties, at specific speeds, its particles could be aligned vertically. Using these parameters as a guide, the scientists produced a material with enhanced strength and conductivity, potentially making it ideal for use within military applications such as 3D printing heat sinks or shielding.

Digital metal launches pure copper powder for 3D printing (Feb 26)

Digital Metal has launched of pure copper powder, DM Cu, for use with its binder jet 3D printing technology. Users of the DM P2500 3D printer will now be able to 3D print 99.9% pure copper components on the shop floor. The company says copper has been high up on their customers' wish list and they have seen rising demand for copper applications in fast growth areas such as e-mobility and heat conductivity.

3D Printing materials market to reach $18B in 2030 (April 26)

Despite setbacks from COVID-19, plenty of market drivers point to a strong future, according to research from IDTechEx. The company forecasts the global market for 3D printing materials will be worth $18.4 billion by 2030. 3D printing for prototypes is a long-standing practice but increasing ability to manufacture goods is on the rise, say researchers. Although there are drawbacks to the 3D printing process, including proportionate cost and scalability, recent improvements in the technology's capabilities resulted in pre-pandemic commentators predicting a bright future.

Printing Techniques & Capabilities

Singapore researchers 3D print sweat evaporating film capable of powering wearable electronics (Jan 5)

A research team from the National University of Singapore used 3D printing to produce a film that can evaporate sweat from human skin, designed for applications such as underarm pads, insoles and shoe linings. The researchers also demonstrated how the moisture absorbed by the film can be harnessed to power wearable electronic devices, including watches and fitness trackers.

Rutgers engineers 3D print octopus-inspired camouflage-ready robots (Jan 5)

Researchers from Rutgers University created light-sensitive 3D printed artificial 'muscles' that are capable of fluctuating their appearance and shape on-demand. The robotic devices are based on a hydrogel, that's inspired by the adaptable cells found in squid, cuttlefish and octopuses. Once exposed to a light stimulus, the stretchy material can contract and change color, potentially providing it with applications in consumer electronics or military camouflage in the future.

Soft, sensitive robotic gripping fingers made with multi-material 3D printing (Jan 12)

According to a team at Ritsumeikan University in Japan, one current main goal in robotics is developing a dexterous robotic gripper with capabilities that are safer and more human-like. The researchers have been working to design 3D printed soft, sensitive robotic fingers that would be a major step in the right direction toward safer robots. Multimaterial 3D printing is what made it possible for the team to easily integrate the stiffness- and sensing-tuning mechanisms into the soft gripper's design, which will make the fingers safer to use when manipulating fragile objects, like they would in the healthcare field.

3DQue rolls out Quinly 3D print manager with variable adhesion build plate for continuous printing (Jan 22)

Quinly combines 3DQue's Print Queue Management software and a series of hardware components that include a tilt frame and part guidance panels and print bed with Variable Adhesion and Automated Part Release (VAAPR) technology. The product is designed to allow unattended, continuous 3D printing and the easy removal of parts from the print bed. The software and hardware will enable users to print a series of parts continuously without an operator having to physically touch the set-up, said 3DQue.

Researchers develop FDM printing process for self-healing TPU (Jan 28)

Scientists from the Delft University of Technology created a process to 3D print room temperature self-healing TPU (SH-TPU) using fused deposition modeling (FDM). The SH-TPU used in the study showed less mechanical dependence on printing conditions compared to a 3D printed commercial TPU, along with the added value of healing damages at room temperature. The findings have potential to open areas in additive manufacturing in terms of soft robotics and consumer electronics.

Scientists develop high-speed printer capable of 2000 layers per minute (Feb 4)

Investigators at Northwestern University's McCormick School of Engineering developed a resin-based 3D printer that combines photopolymerization with a six-axis robotic arm that allows for very fast printing. The system also gives operators the ability to move, rotate and rescale each layer as it is being built. The machine can print the equivalent of around 2,000 layers every minute. The researchers demonstrated the system's power by fabricating several test prints, including an Eiffel Tower, a double helix and a vascular stent.

Sea urchins inspire development of 3D-printed support-free lattices (Feb 18)

A research team from the National Taiwan University of Science and Technology 3D printed lattice structures using fused deposition modeling (FDM) that don't require support structures. The shell-shaped lattice structures are based on the mechanically stable and load-bearing shape of sea urchins. The researchers sought to emulate these properties to eliminate the need for support structures for the lattices, reducing the amount of material, energy and time required during the printing process and post-processing steps. The lattices have specific stiffness and energy absorption properties and could have potential applications within consumer products such as low-cost shoe midsoles and ski boots.

Researchers develop 3D-printed wearable sensors (Feb 19)

Investigators from Korea-based Jeonbuk National University and Chinese material provider Wuhan Chamtop 3D printed novel wearable self-powered sensors based on a unique barium-loaded PVDF polymer. When built into an array, the sensors use the piezoelectric energy generated by human movement to detect pressure inputs and convert them into signals, representing a major advance in the development of high-performance additive wearable electronics.

U.K. researchers create 3D printing process for making microfluidic devices (Feb 21)

Scientists from the University of Bristol developed a low-cost and open-source 3D printing process for producing microfluidic devices the research team says could lower the threshold for microfluidics research. The technology could also enable the rapid prototyping of affordable LOC diagnostic technology possible at the point-of-care, they said. A microfluidic chip is a set of micro-channels etched or molded into a material. These are connected to the outside world by inputs and outputs pierced through the chip through which liquids or gases can be injected and removed by external active or passive systems for biomedical field applications.

Inkbit debuts closed-loop, automated 3D printer with machine vision (Feb 23)

Mass-based startup Inkbit released the Inkbit Vista, a closed-loop 3D printer that includes 3D machine vision. The printer uses an inkjet 3D printing technology like Stratasys' PolyJet printer or the MultiJet from 3D Systems. However, Inkbit's Vision-Controlled Jetting (VCJ) employs machine vision to introduce real-time, in-process, voxel-level closed-loop control with the aim of ensuring reliability and repeatability.

Scientists develop faster means of 3D printing organs (Mar 8)

Scientists at the University at Buffalo developed a technique for 3D printing human organs that's 10 to 50 times faster than standard methods. The approach uses a combination of stereolithography with hydrogels. By precisely guiding photopolymerization, the team could quickly and continuously supply the necessary hydrogel solution and maintain nonstop growth. The output is currently limited to centimeter-sized models, but if scientists can scale the process to full-size organs, hospitals wouldn't have to rely as much on organ donors for transplants.

Researchers use reverse 3D printing to manufacture tiny biomedical implants (May 28)

A research team at Australia-based RMIT University created a 3D printing technique that allows them to create tiny and complex biomedical implants. The approach involves printing glue molds that can then be filled with biomaterial filler. Once the mold is dissolved away, the biomaterial structure remains. The technique uses standard 3D printers and PVA glue as a printing material. The researchers called their technique Negative Embodied Sacrificial Template 3D (NEST3D) printing.

Kongsberg Ferrotech project will test underwater printing for repair of undersea components (June 3)

Kongsberg Ferrotech developed a "Subsea Additive Manufacturing for Lifetime Extension" 3D printing technology it plans to test through an R&D project with SINTEF and other industry players with support from the Research Council of Norway. The project is intended to allow for in-situ repairs of subsea components such as flowlines and conductors by using additive manufacturing techniques, significantly extending the lifetime of the assets. Kongsberg Ferrotech said the technique has the potential to unlock significant opportunities across global markets.

Manufacturing & Construction

L&T Construction completes India's first 3D printed two-storey building in 106 hours (Jan 15)

Following the 3D printing of a one-storey house back in November 2019, India's largest construction company, Larsen & Toubro Construction (L&T), completed the country's first 3D printed two-storey building. With 65m² in floor space, the building was fabricated using a large-format concrete 3D printer supplied by OEM COBOD and is made up of a locally sourced 3D printable concrete mix developed by L&T's own in-house team. Located at the company's Kanchipuram facility near the city of Chennai, the building also integrated reinforcement bars, and is compliant with India's building codes.

RMIT researchers 3D print high-strength concrete structures inspired by lobster shells (Jan 19)

A team of researchers from RMIT University, Australia, made 3D printed concrete structures stronger by drawing inspiration from lobster shell patterns. By emulating the biological spiral patterns with the toolpath of an extrusion-based concrete 3D printer, the team managed to leverage millennia of natural selection, resulting in an increase in strength and durability. Having also experimented with steel fiber reinforcements, the researchers were able to formulate a composite material stronger than even traditionally made concrete.

WASP completes 3D printers -built eco-housing model in Italy (Jan 21)

WASP (World's Advanced Saving Project) completed the printing phase of its sustainable living project, a circular housing model created entirely with reusable and recyclable materials, sourced from natural products adaptable to any climate. Designed by Mario Cucinella Architects and engineered by WASP, the fully 3D printed model was built in northern Italy using Crane WASP, the company's latest innovation in on-site 3D construction.

KIT researchers 3D print polymer objects with design flexibility, nanoscale porosity (Jan 28)

Researchers from the Karlsruhe Institute of Technology (KIT) developed a method that enables the 3D printing of nanoporous polymers with complex geometries that have uses within energy storage, tissue engineering, and biomedical applications. Using a desktop DLP printer, the scientists fabricated four objects displaying different geometrical properties, including a hexagonal mesh box, an intricate crown, a lattice cube, and a gyroid, to demonstrate the capability of their method to produce nanoporous objects with complex geometries.

Palari Group, Mighty Buildings to create 3D printed community (March 12)

Palari Group and Mighty Buildings partnered to 3D-print fifteen zero-net-energy homes that will form the first 3D-printed community in the U.S. The project is both a business proposition as well as a proof of concept toward the next step toward a full-fledged AM building industry. The partnership will pre-fabricate the homes in an industrial setting, increasing the reliability of equipment and materials while reducing construction costs and housing projects' time-to-completion.

Longest 3D printed concrete pedestrian bridge to include 3D printing of concrete (March 30)

'The Bridge Project' is an initiative of Rijkswaterstaat, Michiel van der Kley in collaboration with Eindhoven University of Technology and co-commissioned by Rijkswaterstaat (Dutch Directorate-General for Public Works and Water Management). The project is being built in Nijmegen, Netherlands, and printed in Eindhoven, where the 3D printing facility of BAM and Weber Beamix is located. The project will apply new techniques that include the 3D printing of concrete and investigate new ways to collaborate.

Dutch couple become EU's first inhabitants of a 3D-printed house (April 30)

The home is the first legally habitable property with load-bearing walls made using 3D-printing technology in a development backers believe will open up a world of choice in the shape and style of the homes of the future. Inspired by the shape of a boulder, the dimensions of which would be difficult and expensive to construct using traditional methods, the property is the first of five homes planned by the construction firm Saint-Gobain Weber Beamix for a plot of land in the Eindhoven suburb of Bosrijk.

M&A and Investments

Lumentum buys Coherent, maker of CREATOR Metal 3D Printer for $5.7B (Jan 26)

Lumentum, a manufacturer of optical components and subsystems, will purchase photonics maker Coherent, which manufactures the CREATOR 3D printer. Stockholder rights law firm Bragar Eagel & Squire as well as WeissLaw, are investigating the merger for what they believe may have been an "unfair process and ultimately agreed to an inadequate merger agreement." Coherent joined the 3D printing industry in 2018, when it acquired German company OR Laser. Two years prior, OR Laser had released a comparatively inexpensive, yet rapid powder bed fusion metal 3D printer, the CREATOR. This was followed by a hybrid version that could perform milling every five to 10 layers. The deal is valued at $5.7 billion.

Uniformity Labs raises $38M to expand production capabilities, material development (Feb 2)

Calif.-based software and material producer Uniformity Labs closed a $38.35 million Series B financing round and will use the proceeds to expand its production capabilities and increase the development of additional specialized materials. The firm will also grow its sales and marketing team over the course of this year. Uniformity said its powder, processes, and software have delivered economically viable print solutions for customers across a range of industries.

GE research awarded $14M to 3D print portable device that produces water out of air (Feb 5)

AIR2WATER is a four-year project is part of Defense Advanced Research Projects Agency (DARPA)'s Atmospheric Water Extraction (AWE) program and could provide technology to address water scarcity across the globe. GE Research was awarded $14.3 million by DARPA to transform the transport of potable water to troops in the field through a 3D printed device that produces it out of air. GE Research and scientists and engineers from the University of California at Berkeley, University of Chicago, and University of South Alabama will develop the compact, portable device that could produce enough daily water for 150 troops.

Construction 3D printing Mighty Buildings raises $40M in Series B (Feb 11)

Oakland startup Mighty Buildings makes "beautiful, sustainable and affordable" 3D printed homes and secured $40 million Series B funding from Khosla Ventures and Zeno Ventures, with more than a dozen other investors participating. The company says it builds the homes two times as quickly with 95% less labor hours and 10-times less waste in comparison to traditional construction techniques. Khosla believes that costs and CO2 emissions associated with home building can be reduced by around 50%.

3D printing provider Fathom snaps up injection molding firm Summit (Feb 12)

Fathom's acquisition of injection molding and precision tooling services provider Summit Tooling and Summit Plastics marks its fourth add-on deal since being acquired by Chicago-based private equity firm CORE Industrial Partners in 2018. In addition to specializing in small-to-medium prototype injection molds, Summit offers close-tolerance injection molding, precision mold-making and high-quality plastic injection mold design services. While Summit doesn't offer any 3D printing technologies, injection molding and 3D printing can go hand in hand. Summit is headquartered northwest of Chicago and has a 26,000-square-foot facility that holds more than 30 machines.

Fictiv raises $35M to expand digital manufacturing ecosystem (Feb 18)

Fictiv, a startup that acts as a hub for customers looking to manufacture hardware, secured $35 million in a Series D funding round, bringing its total amount raised to date to $92 million. The round was led by 40 North Ventures, with participation from Honeywell, Sumitomo Mitsui Banking Corp., Adit Ventures and Microsoft's M20 investment arm, as well as previous backers including Accel, G2VP and Bill Gates. Fictiv will use the funds to drive its digital manufacturing platform forward, including its supply chain operations and network infrastructure. The latest investment in Fictiv signals 3D printing services are becoming increasingly popular as the world embraces digital manufacturing as the solution to supply chain disruption.

Stratasys acquires industrial SLA 3D printer maker RP Support (Feb 18)

Roughly a month after completing its acquisition of open stereolithography (SLA) startup Origin, Stratasys snapped up U.K.-based industrial SLA 3D printer and solutions provider RP Support. The addition of RP Support's complementary SLA technology will enable Stratasys to cover the entire product life cycle, from concept modeling to 3D printed end parts. Stratasys will also expand its range of polymer 3D printing solutions with the addition of RP Support's Neo SLA 3D printers, which are open resin systems that rely on laser technology to enable prints with detailed features and low variability. Stratasys will integrate future versions of the Neo SLA 3D printers into its GrabCAD Print workflow software.

AM Ventures forms €100M venture capital fund focused on industrial 3D printing sector (March 5)

AM Ventures and shareholder LANGER Group joined forces with European independent investment and asset management company KGAL to form a €100-million venture capital fund that will invest in hardware, software, materials and applications startups in the industrial 3D printing sector. With this first-of-its-kind fund, AM Ventures hopes to build a portfolio of 20 to 25 early-stage startups. Following an initial closing, the AM Ventures Management fund is nearing half of its target. AM Ventures expects to hold a final close on the fund in the spring of 2022.

PyroGenesis gets green light to trade on NASDAQ (March 11)

Common shares of PyroGenesis are now trading on the NASDAQ under the ticker symbol "PYR" after its listing application was cleared by the Depository Trust Company. The Canadian company, whose patented Plasma Atomization Process can be used to create 3D printing-compatible fine metal powders, expects the NASDAQ listing to further boost its visibility within the financial community and increase awareness of its product offerings among potential clients. As a result of its listing on the NASDAQ, PyroGenesis has delisted from the OTCQB venture market. However, the company plans to continue listing its stock on the Toronto Stock Exchange.

3D printing startup Fortify raises $20M in Series B funding round (March 18)

Fortify, which is transforming the 3D printing industry with its patented Digital Composite Manufacturing platform, secured $20 million in an equity round led by Cota Capital, with participation from Accel Partners, Neotribe Ventures and Prelude Ventures. The Boston-based startup plans to use the Series B funds to scale up its team, accelerate expansion in high-value application spaces and transition to volume manufacturing of its Flux Series 3D printers.

VELO3D to go public via merger with blank-check company (March 23)

3D printer manufacturer VELO3D will be listed on the NYSE under the ticker symbol "VLD" following its merger with special purpose acquisition company JAWS Spitfire Acquisition Corp. The transaction, which is expected to close in H2, is likely to value the combined entity at $1.6 billion. The deal is also expected to provide VELO3D with around $500 million in cash proceeds, $345 million of which will come in the form of proceeds from JAWS Spitfire's cash in trust. The remaining $155 million will come from a private placement led by strategic and institutional investors such as Baron Capital Group and Hedosophia. VELO3D will use additional capital will for technological development, sales, marketing and customer support.

Nikon acquires metal 3D printing startup Morf3D (April 6)

Nikon is building on its small footprint in the 3D printing space by acquiring majority ownership of Morf3D, a metal 3D printing design, engineering and service bureau that has received investments from companies such as Boeing. By combining its knowledge with that of Morf3D's, Nikon could develop automated quality assurance tools for 3D printed parts that make technology safer while lowering the cost of parts. Nikon could also further develop its own printer, extend post-processing and automation solutions or it make parts for the commercial space industry.

BEAMIT buys 3T Additive Manufacturing as part of global expansion efforts (April 12)

The BEAMIT Group, which claims to run the largest 3D printing hub in Europe, is adding value and expertise by acquiring U.K.-based 3D printing service bureau 3T Additive Manufacturing from AM GLOBAL. The deal gives BEAMIT an established footprint in the U.K. and is the first step in its efforts to expand globally. As part of the acquisition, 3T Additive Manufacturing will participate in a joint group R&D program. The project partners operating under BEAMIT will develop 3D printing-related processes in advanced heat treatment, non-destructive testing and post-processing.

3D printing marketplace Shapeways to go public via merger with SPAC (April 28)

Shapeways, which offers 3D printing as a service, is slated to list on the NYSE under the ticker symbol "SHPW" after agreeing to a reverse merger with blank-check company Galileo Acquisition Corp. The deal would value Shapeways at $410 million and provide it with as much as $195 million in proceeds. The company plans to use the money to accelerate its metal additive manufacturing capabilities and expand its material and technology offerings to more markets and industries. The transaction is expected to close this summer.

3D printing company Formlabs valued at $2B after raising $150M (May 19)

Formlabs raised $150 million in a funding round led by SoftBank's Vision Fund 2, bringing its total amount raised to date to more than $250 million. The round gives the 3D printing company a valuation of $2 billion, double the $1-billion valuation it fetched after raising $15 million from New Enterprise Associates in 2018. Formlabs plans to use the fresh funds to grow its product lines, expand into new regions and pursue acquisitions. This marks SoftBank's first bet on 3D printing.

Trilantic to acquire on-demand manufacturing business from 3D Systems (June 1)

Growth-focused middle market private equity firm Trilantic North America agreed to acquire 3D Systems' on-demand manufacturing business in partnership with industry executives including Ziad Abou, who served as SVP and general manager of the business for nearly 10 years. The business provides on-demand 3D printing and custom manufacturing services and has an installed base of roughly 200 in-house 3D printers, as well as a network of manufacturing partners around the world. After the deal closes, the business will operate under the name QuickParts, with Abou taking the lead as CEO.

Partnerships

VELO3D signs agreement with CRP Meccanica (Jan 19)

CRP Meccanica signed an agreement with VELO3D to be an exclusive distributor for VELO3D's metal 3D printing systems in the Italian market. The company is also able to sell the equipment in some other parts of Europe on an account basis, as well as provide after-sales support, service, maintenance and production backup to customers throughout the region.

Nexa3D, Keystone announce partnership to advance dentistry through better 3D printing (Jan 19)

Manufacturer of polymer production 3D printers Nexa3D, and manufacturer of biocompatible photopolymer resins Keystone Industries, are partnering to improve 3D printing to dental markets internationally. All KeyPrint 3D printing dental resins are now available on Nexa3D's NXE 400 3D printers to provide dental customers with 3D printing solutions.

Intelligens, Ansys partner to empower 3D printing with deep learning (Feb 22)

Machine learning solutions company Intellegens is collaborating with engineering simulation company Ansys to develop a reliable and repeatable additive manufacturing (AM) processes. The integration of machine learning methods is expected to accelerate AM workflow, the companies say, adding combining the two companies' technologies will make it quick and easy for AM project teams to analyze data from experiments, simulations, or production generating models that capture vital insights.

3D Systems, Jabil create "high speed fusion" filament 3D printing technology (Feb 24)

3D Systems introduced a fused filament 3D printer, the Roadrunner, which was developed in collaboration with contract manufacturer with Jabil. Roadrunner relies on what the partners call High Speed Fusion and say it features temperature capability and available build areas greater than those of competing systems.

Micro 3D printing startup BMF partners with Materialise (Feb 25)

Materialise and Boston Micro Fabrication (BMF) have created Magics Print for BMF for those deploying the use of microscale 3D printing, which can setup builds and prepare data using Materialise software. The software offers improved support structure generation, with support structure types and styles that can be customized to a user's specific geometries. In turn, the company claims, users can achieve improved build success and accuracy, as well as a cut in preprocessing times.

Olympic winners will receive medals on a 3D printed Olympic podium (June 8)

For the first time in history, the Olympic and Paralympic Games Tokyo 2020 medal ceremonies will be held on 3D printed podiums manufactured using recycled plastic. The material was contributed by the public and recovered from the oceans as part of the Tokyo 2020 Podium Project. Each of the 98 podiums was created with 3D printing technology, using plastic collected from more than 2,000 locations across Japan.

Regulatory

Additive Orthopaedics gains FDA approval for first 3D printed talus implant (Feb 18)

The FDA approved a 3D printed implant called the Patient Specific Talus Spacer from Additive Orthopaedics. The talus is the bone in the ankle that joins the leg and the foot and the implant could be used to treat avascular necrosis (AVN) of the ankle joint, where bone tissue is destroyed by a lack of blood supply to the area. Additive Orthopaedics says now there is a 3D printable implant to treat this problem, it may be used to replace other surgical interventions and spare the joint of people suffering from late-stage AVN.

Desktop Metal's Health business receives FDA clearance for Flexcera resins for 3D printed dentures (May 13)

Desktop Health, the recently launched health business belonging to metal 3D printer manufacturer Desktop Metal, received 510(k) clearance from the US Food and Drug Administration (FDA) for its proprietary Flexcera Base resin used in the 3D printing of dental prosthetics. Developed, tested and chosen from over 200 formulations, Flexcera Base joins Flexcera Smile as Desktop Health's first formulated and optimized dental resins.

Transportation & Automotive

3DNA uses 3D printing to re-engineer parts for Naples' Transport Network (Feb 1)

Neapolitan public transport company Azienda Napoletana Mobilità (ANM) enlisted the help of Italian 3D printing engineering firm 3DnA to re-engineer mechanical components for Naples' bus and tram networks. The 'trolley heads' connect each bus to the network's aerial power supply lines and mechanically guide rods fixed to the buses' roofs. There are no spare trolley heads on the market, and traditional manufacturing offered a lead time of more than a year, 3D printing was chosen to fill the gap. 3DnA reverse engineered the component using 3D scanning, then the firm reconstructed the trolley heads using 3D modeling software to make them suitable for additive manufacturing.

Williams Racing adopts Nexa3D SLA 3D printing tech for wind tunnel testing parts (March 10)

Formula One team Williams Racing will use Nexa3D's NXE400 stereolithography 3D printing system to produce functional wind tunnel parts for aero testing purposes and, in doing so, expects to save time. Typically, the design and manufacture of wind tunnel components is said to take hours, but the company believes it can reduce that to minutes with the NXE400 platform. The NXE400 was selected for its ability to print at speeds of 1Z centimeter per minute, tackle complex geometry and reduce weight, material usage and waste. Combining the hardware's capabilities with the NexaX software, which uses modern computation architecture, the partners expect the file-to-part process to be accelerated.

EOS and Audi expand range of applications for metal 3D printing (March 18)

Carmaker AUDI AG is relying on industrial 3D printing at its Metal 3D Printing Centre in Ingolstadt to produce selected tool segments. Additive manufacturing (AM) with EOS technology is used for 12 segments of four tools for hot forming. Plans call for more segments to be printed this way. Audi uses the tool segments in its press shop to make body panels. The company plans to do the same for future electric vehicles.

Ford and HP reuse spent 3D printed powders and parts (March 26)

Ford teamed up with HP to reuse spent 3D printed powders and parts, thus closing a supply chain loop and turning them into injection-molded vehicle parts. The recycled materials are being used to manufacture injection-molded fuel-line clips installed first on Super Duty F-250 trucks. The parts have better chemical and moisture resistance than conventional versions, are 7% lighter and cost 10% less. The Ford research team identified 10 other fuel-line clips on existing vehicles that could benefit from this use of material and are migrating it to future models. The resulting injection-molded parts are better for the environment with no compromise in the durability and quality standards Ford and its customer's demand.

Ford Motor, ExOne developed process for binder jet 3D printing, sintering (May 13)

A joint venture co-funded by Ford Motor Co. and the ExOne Co. developed a patent-pending process for binder jet 3D printing and sintering of aluminum 6061. The new additive manufacturing (AM) process delivers final parts with 99% density and material properties comparable to traditional manufacturing. Collaborative and individual patents are expected to be filed by Ford and ExOne because of this ongoing project. The process is expected to increase the automaker's efficiency by allowing it to affordably produce complex parts uniquely designed for AM, which enables size and weight reductions, part consolidation and performance improvements.

DAIMLER creates mobile 3D printing center to produce spare parts (May 13)

German automotive maker Daimler AG and its service brand Omniplus created a mobile 3D printing center for the decentralized production of spare parts. The mobile container will be in operation at the BusWorld Home, as it requires only electricity and an internet connection to operate it can be transported by truck to any location. The container spans twelve by three meters. It is equipped with an industrial 3D printer enabling Daimler to produce series-production quality parts. In addition, it contains a CAD workstation and a processing station where powder is prepared, and parts are freed from residue powder in the final stage of the process. In an adjacent room there is a blasting system as well as an air compressor. The container is also equipped with an industrial vacuum cleaner, an air filter and an air conditioning system.

Navy, Military, Aviation & Aerospace

Project MOONRISE scientist's 3D print lunar regolith-based zero gravity structures (Jan 12)

Scientists from the Technical University of Braunschweig and Laser Zentrum Hannover (LZH) 3D printed lunar regolith under zero gravity for the first time. During their experimental MOONRISE project, the team mounted a customized laser to their MIRA3D lunar rover and melted moondust into spherical shapes. With further R&D, the laser's head could form the basis of a flight-ready model, that enables future astronauts to create economical long-term structures on the Moon.

Naval Group 3D printed a one-ton ship propeller for the French Navy (Jan 14)

Defense contractor Naval Group manufactured a 3D printed propeller for a French Navy ship. The company used its DED-based process for the job, which it calls metal wire fusion. Sporting a 2.5-meter span and five individual 200 kg blades, the propeller is reportedly the largest thruster of its kind to be 3D printed, and the first to be manufactured using Naval Group's own process. Having left the Naval Group site of Nantes-Indret back in October, the propeller was mounted onto the intermediate shaft of the *Andromède*, a Tripartite-class minehunter, a month later. December 2020 saw the completion of a series of sea trials with the propeller, cementing its place on all the ship's upcoming operational missions.

Partnership aims to advance 3D printing of aerospace components using AI (Jan 18)

Joined by the University of Sheffield's AMRC and aerospace manufacturer Boeing, Intellegens, a University of Cambridge AI spin-out, will lead an R&D project focused on advancing the 3D printing of aerospace components. Project MEDAL will see the company's machine learning platform, Alchemite, being used to optimize process parameters for the laser powder bed fusion process, ensuring end-use aircraft parts can be printed faster and cheaper with new materials. The partners believe their machine learning approach will reduce the number of experimental cycles required by around 80%, and Intellegens' software platform will be able to suggest which experiments need to be prioritized.

MIT develops 3D printed ion-powered satellite thruster (Jan 25)

Researchers from the Massachusetts Institute of Technology (MIT) designed and tested a novel 3D printed ion-emitting satellite propulsion system. The tiny thruster, which is believed to be the first fully printed device of its kind, fires charged ionic particles from emitter cones along its outer shell, to give it a few micronewtons of propulsion. Within the frictionless environment of space, this power could prove sufficient to make it a low-cost and efficient alternative to conventional CubeSat engines. Using 3D printing, the scientists claim it's possible to "democratize" the tech, shorten the design process and produce small-to-medium sized batches.

Students design 3D printable landing pad for lunar missions (Jan 25)

A team of undergraduate students from 10 U.S. colleges and universities –members of NASA's Artemis Generation –designed a 3D printable, reusable launch and landing pad for future lunar missions. Dubbed the Lunar Plume Alleviation Device, or Lunar PAD, the concept is designed to be 3D printed using lunar regolith material found directly on the surface of the Moon. It aims to stop an engine's exhaust from loosening and kicking up lunar dust during landing burns. The student team presented a research paper on its concept landing pad at the American Institute of Aeronautics and Astronautics' 2021 SciTech Forum. The students printed a subscale prototype at Camp Swift in Texas last year. They used a concrete 3D printer developed by construction firm ICON and a special cement-based material for the project.

Fabrisonic uses 3D printer to create lower cost satellite heat exchangers for NASA (Feb 3)

Solid-state metal 3D printing specialist Fabrisonic used its compact SonicLayer 1200 3D printer to create better value satellite heat exchangers for NASA's Jet Propulsion Lab (JPL). Instead of using its standard SonicLayer 7200 to produce the thermal regulators and their complex internal geometries, Fabrisonic used its smaller, more efficient machine. The resulting components proved not only to be more cost-effective, but their seals passed the JPL's stringent testing, including a simulated Atlas V rocket launch. Fabrisonic was commissioned via Utah State University's (USU) College of Engineering to develop two parts for a thermal satellite system.

Dassault Systèmes adds two 3D software packages targeted for makers, students (Feb 10)

SOLIDWORKS for Makers (available in H2 2021) and SOLIDWORKS for Students (available May 2021) will provide makers and learners cloud-based access to a targeted set of Dassault's digital design and engineering environments. The Makers package is aimed at digital design hobbyists looking to create and share their 3D projects. Granting access to the original SOLIDWORKS Professional program, 3D Creator and 3D Sculptor, the package provides a suite of purpose-built 3D design applications for engineering and artistic enthusiasts alike. Meanwhile, the Students offer is intended to help engineering and design students boost their employability.

Navy Research Lab creates 3D printed lightweight cylindrical arrays (Feb 21)

Engineers at the US Navy Research Laboratory (NRL) used a 3D printer to fabricate optimized antenna components that could be key to advancing the US Navy's radar monitoring capabilities. The engineers were able to create cylindrical arrays at a lower cost and with reduced lead times compared to those incurred using conventional specialized equipment. The resulting parts are significantly lighter than previous iterations, potentially lending them new end-use navigational or defense applications.

Senvol will use Department of Defense funding to advance its ML 3D printing software (March 12)

Senvol enhances capabilities with Senvol ML, machine learning software with 'additional capabilities,' following an additional round of funding from the DoD. Originally launched in Nov. 2019 after being awarded an STTR Phase II seed fund with the U.S. Navy's Office of Naval Research (ONR), Senvol ML latest capital was provided by both the U.S. Navy and the U.S. Air Force, along with ONR, Naval Sea Systems Command, Naval Air Systems Command and the Air Force Research Laboratory (AFRL). The size of the deal and the specifics of the software developments weren't disclosed.

US Air Force to work with BotFactory on next generation of electronics 3D printers (March 30)

U.S. Air Force program AFWERX enlists BotFactory to develop a fully automated desktop machine for on-site, on-demand 3D printing and assembly of printed circuit boards. As part of the $750,000 investment, BotFactory will spend the 15-month term of the project with their partners at the 402nd EMXG/MXDEK/REARM Lab in Robins AFB. BotFactory's proposed system will provide airmen the capability of prototyping designs from scratch, or reverse-engineering legacy devices to sustain assets on the ground and in the sky.

US Army Aims to Build World's Largest Metal 3D Printer for Vehicles (April 13)

The Applied Science & Technology Research Organization, ASTRO America, was selected to manage a U.S. Army initiative to develop and deliver a hull-scale tool using metal additive manufacturing technology. The 'Jointless Hull Project' aims to provide improved production speeds, reduced production costs, reduced vehicle weight, greater vehicle performance and increased survivability. "The mission is to develop a large-scale tool capable of producing single, jointless combat vehicle hulls at a near net size of 30ft x 20ft x 12 ft in size," said Larry Holmes, Principal Investigator at ASTRO America. The Jointless Hull Project is being contracted through LIFT, a DoD-supported national manufacturing innovation institute while the U.S. Army Combat Capabilities Development Command Ground Vehicle Systems Center, Ground Vehicle System Center is directing the technical program. The Army's Rock Island Arsenal - Joint Manufacturing Technology Center is also a partner on will serve as the location for the manufacturing platform.

Essentium and NIAR partner to advance 3D printed aircraft part safety and performance (April 29)

Essentium is partnering with Wichita State University's National Institute for Aviation Research (NIAR) to advance 3D printing within the U.S. aerospace industry. Part of the Kansas Aviation Research and Technology (KART) growth initiative, the partnership will see Essentium's High Speed Extrusion 3D printing platform deployed for tooling, spare parts and flight-worthy end parts for aircraft. The partners will work together in a multi-stage process to advance the extrusion additive manufacturing process and to test 3D printed applications to benefit KART and the aerospace sector generally.

Relativity Space raises $650 million to scale Terran R rocket production (June 8)

Relativity Space closed a $650-million Series E equity funding round led by Fidelity Management & Research Company with participation from investors including Baillie Gifford, funds and accounts managed by BlackRock, Centricus, Coatue, K5 Global, Soroban Capital, Tiger Global, Tribe Capital, XN, Brad Buss, Mark Cuban, Jared Leto and Spencer Rascoff, among others. The round of funding enables the company to scale its Terran R program - a 3D printed reusable rocket – and other long-term infrastructure development.

General Life Sciences

Surgeons use HoloLens and metal 3D printing to implant eye socket (Jan 8)

A team of doctors at Galilee Medical Center for Oral and Maxillofacial Surgery performed a repair of a fracture in the floor of an eye socket using augmented reality and 3D printing. A 31-year-old patient underwent surgery led by Prof. Samer Srouji of Galilee Medical Center's Center for Oral and Maxillofacial Surgery. The patient fractured the left eye socket of his face leaving him impaired with double vision and facial disfiguration. The patient received a 3D printed titanium plate based on a 3D model built from scanned CT data of the left socket area. The scan was an inverted version of the patient's healthy right socket area, projected onto the injured left socket area with 3D software. To position the 3D printed titanium plate, one doctor used Microsoft HoloLens mixed reality glasses to overlay the 3D model of the titanium implant into position under the patient's left eye socket. Overlaying the 3D models of the patient's skull and the 3D model of the 3D printed titanium plate on the patient's facial anatomy, doctors at Galilee Medical Center positioned the implant into the existing bone structure.

Researchers 3D print hollow microneedles for controlled transdermal drug delivery (Jan 20)

Researchers from the University of Kent and the University of Strathclyde developed a novel device that combines 3D printing, microneedles and microelectromechanical systems (MEMS) for controllable transdermal drug delivery. Researchers developed a composite device consisting of a 3D printed microneedle patch, coupled with a MEMS, that enables direct control of drug administration by the user. The device, 3DMNMEMS, was developed with the goal of personalizing clinical treatment.

UNSW scientists 3D print bone-like structures containing living cells (Jan 26)

Scientists from the University of New South Wales (UNSW) developed a technique to 3D print bone-mimicking structures containing living cells, which could have potential uses for bone tissue engineering applications, disease modeling, and drug screening. The method could enable in-situ reconstruction of bone and cartilage defects by extruding the ceramic-based ink directly into the affected area. The technique, ceramic omnidirectional bioprinting in cell-suspensions, uses a 3D printer to deploy a novel ceramic-based ink made up of calcium phosphate to produce bone-like structures that harden in minutes when they are placed in water. When this ink is combined with a collagen substance containing living cells, in-situ fabrication of bone-like tissues is enabled. The process can occur at room temperature, making it unique from other 3D printed bone-mimicking techniques.

3D printed, vascularized lung models push 3D systems into bioprinting (Jan 27)

3D Systems and United Therapeutics Corporation developed a method for the rapid fabrication of hydrogel scaffolds that are then perfused with living cells. The technology has shown such promising results for tissue engineering applications that 3D Systems has decided to invest much more into bioprinting. 3D Systems calls the process “Print to Perfusion.” The company’s Figure 4 system will be expanded to better address bioprinting and regenerative medicine.

Osteopore, UMC+ 3D print leg amputation preventive implant (Feb 2)

3D printed implant developer Osteopore has teamed up with Maastricht University Medical Centre (UMC+) to develop a bioresorbable bone implant that could prevent lower leg amputations, made possible using a 3D printer. The 3D printed cage is designed to aid patients in regenerating new bone cells and has been successfully implanted in its first patient in the Netherlands. The 3D-printed cage was developed with Osteopore’s proprietary 3D printing and materials technology. The structure is customized based upon a CT scan of the patient’s lower leg. It is printed in a biodegradable material to eventually break down into water and carbon dioxide within the body. The personalized cage is then created by a 3D printer based on the patient’s CT scan.

ETH researchers 3D print bioresorbable airway stent by DLP (Feb 6)

An ETH Zurich research team used DLP 3D printing to produce a type of bioresorbable airway stent that could greatly simplify the future treatment of upper airway obstruction. The researchers create a computer tomography image of a specific section of the airways. Based on this, they develop a digital 3D model of the stent. The data is then transferred to the DLP printer, which produces the customized stent layer by layer.

UC Santa Barbara researchers develop first 3D printable "bottlebrush" elastomer (Feb 9)

Researchers from UC Santa Barbara developed a 3D printable "bottlebrush" elastomer with softness and elasticity resembling that of human tissue. Postdoctoral researchers stumbled across the new elastomer by accident while trying to develop a material for a different project. After observing its super-soft and shape-holding properties, they realized they could 3D print the elastomer using direct ink writing (DIW) to create inks, before returning the elastomer to its solid form by applying UV light. Being able to 3D print bottlebrush elastomers makes it possible to harness their unique mechanical properties for applications such as biomimetic tissue and high-sensitivity electronic devices like touch pads, sensors, and actuators, which require close control over an object's dimensions.

Formlabs introduces biocompatible dental resin for 3D printing indirect bonding trays (Feb 16)

Formlabs launched a biocompatible Indirect Bonding Tray (IBT) resin, built specifically for direct printing of IBTs to help orthodontists with accurate, efficient placement of brackets. The translucent IBT resin is Class 1 compliant, with optimized flexibility and tear strength to help with bracket placement, which is one of the most common problems of orthodontic workflows. The IBTs will hold the brackets in place and help ensure a faster installation and decreased costs.

Scientists 3D print dragonfly-inspired 'spiky-joints' for treating wrist injuries (Feb 19)

The spiky-joint features an interlocking mechanism designed to cushion the wrist without impairing free movement. When set to its maximum rigidity, the scientists believe their device could be ideal for treating everyday strains and sprains and preventing common hyperextension injuries in athletes. If constructed out of more resilient alloys, the researchers claim their support could sustain pressures of over 450kg.

Sennheiser developing custom-fit 3D printed AMBEO ear tips (Feb 20)

Sennheiser's AMBEO division is developing a production method that enables customers to affordably and easily customize their earphones to fit their unique ears. The custom-fit, 3D printed AMBEO ear tip prototypes in development further refine the sound experience. Formlabs' automated manufacturing solution provides the capability to bring mass customization to the consumer audio industry. By automating multiple Form 3B printers and processes around an integrated digital workflow, an affordable and simple solution is now available to mass 3D print custom-fit earphones. Customers can use their smartphone to scan their ear, replacing the more traditional and impactable ear impression process.

Ultra-rapid volumetric 3D printer speeds medical research (Feb 22)

Together with several research institutions and companies across Europe, Readily3D will 3D print a living model of the human pancreas in a bid to improve the testing of diabetes medication. Specifically, the company will be signing on as the official bioprinter manufacturer of the European ENLIGHT project, adapting its proprietary contactless tomographic illumination technology to suit the needs of pancreatic tissue structures.

Swiss researchers 3D print high-res x-ray detector (Feb 23)

Scientists at the School of Basic Sciences in Switzerland's École polytechnique fédérale de Lausanne (EPFL) 3D-printed cost-effective, high-resolution X-ray detectors that can be integrated into standard microelectronics to improve performance and reduce radiation exposure in medical imaging scanners. With aerosol jet printing, the researchers 3D-printed perovskite layers on a graphene substrate, with the perovskite acting as the photon detector and electron discharger, while the graphene amplified the outgoing electrical signal. They chose graphene and perovskites due to their versatility and ease of synthetization, and because perovskite has heavy atoms that provide a high scattering cross-section for photons. They also used methylammonium lead iodide perovskite (MAPbI3), which holds optoelectronic properties that pair well with its low fabrication costs. The detectors were found to have record sensitivity and created a four-fold improvement in best-in-class medical imaging devices. They also made it simple to form images.

Scientists create fully automated 3D-printed prosthetic production line (March 9)

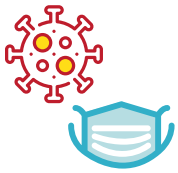
Scientists from the Israel Institute of Technology developed an automated production line for 3D printing low-cost customized prosthetic limbs. Within the team's streamlined design process, amputees' unaffected hands are scanned, tailored using CAD software and converted straight into an STL file ready to print. The resulting parts can then easily be assembled into lifelike extremities with advanced object-gripping capabilities, that provide patients with an enhanced quality of life.

3D Printing used to create engineered flat brain organoid scaffolds (March 17)

A research team from the Autonomous University of Madrid and the Technical University of Denmark (TUD) used 3D printing to create scaffolds for engineered flat brain organoids. The scaffolds allowed the brain organoid size to be significantly increased and, after 20 days, self-generated folding was observed, according to the scientists. Brain organoids are considered a promising in vitro model for the study of the human brain and, despite their various shortcomings, have already been used widely in neurobiological studies.

New additive manufacturing method could allow 3D printing of custom medicine (May 4)

A study by scientists from the University of East Anglia (UEA) analyzed technology to 3D print pills and demonstrated customized medicines could someday be manufactured as per individual requirements of patients. The research group discovered a new additive manufacturing technique to enable the 3D printing of medicine in highly porous structures, which can further be utilized to control the drug release rate from the medicine to the body when it is consumed orally. Researchers analyzed a newly developed 3D printing technique that can produce porous pharmaceutical tablets without using filaments. Findings showed that by altering the pore size, the speed with which a drug is released from the tablet into the body can be controlled.



COVID-19 Support & Medical Personal Protection Equipment

DOD uses 3D-printing to create N95 respirators (Jan 25)

In response to the COVID-19 pandemic, the U.S. Army Medical Materiel Development Activity's Warfighter Expeditionary Medicine and Treatment Project Management Office, as part of the U.S. Army Medical Research and Development Command's Additive Manufacturing Working Group, has played an integral role in the ramped-up effort to produce N95 respirators for health care and frontline workers across the nation. The primary purpose of the N95 working group is to develop N95 respirators to supplement existing supplies of respirators, as well as to develop new manufacturing capabilities within the DOD's organic industrial base. Ensuring the DOD has the capability to independently manufacture protective respiratory devices will help protect frontline workers during the COVID-19 pandemic, and it will also help to maintain military readiness in the face of future pandemics or biothreats.

Silver, copper & tungsten combined to make antiviral "Covid-killing" 3D printing material (Feb 24)

An interdisciplinary team of scientists and bioengineers partnered to develop a 3D printable antiviral material they claim can kill the novel coronavirus, and potentially help lower the disease spread. PhD researcher John Robinson, Dr. Arun Arjunan, and Dr. Ahmad Baroutaji with the Additive Manufacturing Functional Materials (AMFM) research group at the University of Wolverhampton in the U.K. teamed up with the Ángel Serrano-Aroca group from the Catholic University of Valencia's Biomaterials and Bioengineering Lab for rapid material development and anti-COVID viral analysis. The goal is to use the antiviral material in filtration systems and face masks to lower the risk of infection. The team used tungsten, silver, and copper to make their antiviral material. Silver has been found to have antimicrobial properties, but the material is pricey, so it's not a cost-effective option on its own in terms of large-scale implementation, and especially not for single-use products. Copper is much less expensive than silver and has been shown to have anti-COVID-19 properties, and new research also shows that tungsten can help kill viruses. While this research is limited, it does show that tungsten has antimicrobial effects against some common pathogens. like E. coli and Staphylococcus aureus, which is why the researchers decided to combine all three to 3D print their COVID-killing material.

How 3D printed microneedle could facilitate Covid-19 rollout (March 8)

A collaborative effort led by Carnegie Mellon University is developing a COVID-19 vaccine inoculation technique that leverages 3D printed hybrid microneedle arrays (Hybrid-MNA). The innovative approach is both efficient to manufacture and is effective from an immunology standpoint. The Hybrid-MNA technology consists of an intradermal delivery device that provides a small dose of the vaccine to the patient, while still triggering strong and long-lasting immunity against SARS-CoV-2. By delivering a fraction of the dosage, vaccine supplies can be stretched, inoculating more people and helping to mitigate any shortages. At the core of this inoculation solution is a microneedle device based on work pioneered by Burak Ozdoganlar, a professor of mechanical engineering at Carnegie Mellon and the project's principal investigator. The project is also focused on optimizing and automating the production of the Hybrid-MNAs by leveraging 3D printing and robotic automation. Specifically, the research team is using micro-precision 3D printing technology developed by Boston Micro Fabrication. The use of these technologies will enable the microneedles to be made cost efficiently.

Food & Agriculture

Löfberg unveils 3D printed coffee station made from waste (Jan 21)

Swedish coffee group Löfbergs teamed up with 3D print company Sculptur to transform coffee production waste into new coffee stations. The group claims its 3D printed waste-based coffee station is a "world-first," with one already in operation and several others underway. The collaboration, part of Circular Coffee Community (CCC), aims to reach the group's target of zero coffee waste by 2030.

3D-printed steak ushers in new era for pioneers like beyond meat (Feb 21)

Redefine Meat, an Israeli company that developed technology to 3D print meat, raised $29 million from a consortium of global investors to use digital technology to create steaks that look, smell and taste like the real thing. Engineers at Redefine are using plant-based materials similar to nutrients eaten by cows to "ink" printed steaks. This ink contains proteins from grains and legumes to mimic the muscle texture, and fats and other acids to duplicate the juicy flavor, blood structure and color of actual meat.

Novameat 3D prints 'world's biggest' cell-based meat prototype (Feb 21)

Alternative meat startup Novameat unveiled what it calls the world's biggest piece of cell-based, whole-cut meat analog. Since its foundation in 2018, the Barcelona-based startup has been 3D printing plant-based meat substitutes to combat the unsustainable and insufficient global agricultural system and solve the world's food supply problem. Novameat's proprietary technology mimics the texture, taste, appearance, and nutritional properties of animal meat products, including beef steaks.

Environmental Efforts & Energy

U.S. community colleges test ability of 3D printers to produce relief goods in mock disaster (Jan 20)

Five community colleges in Ky. were involved in the exercise dubbed the Rapid Response Additive Manufacturing Initiative. The idea is that during a disaster, the supply of vital manufacturing goods may become disrupted. The initiative will determine if 3D printing machines in a crisis situation can be used to mitigate those shortages. The quality and quantity of disaster relief goods will be tracked, as well as the ability of disparate clusters of printers to coordinate their manufacturing activities.

Italian company builds novel additive habitat with eco-friendly materials (Jan 20)

3D printing company Wasp used several multi-printers to simultaneously deposit the various organic materials that make up the eco-friendly house known as Tecla. The habitats use layers of reusable and recyclable materials, such as clay, to create 60-cubic-foot dome-shaped structures in 200 hours, while using just 6 kW of power. Other firms, such as PERI Group, ICON and Mighty Buildings, have developed systems to construct housing units using 3D-printed materials.

Korean researchers 3D print safety valve to be used in nuclear reactor (Jan 28)

The Korean Atomic Energy Research Institute (KAERI) says the faucet - manufactured by a combination of 3D printing and CNC machining - met the standard for spare parts produced through traditional processes. That means the 3D printed safety valve not only can withstand high hydraulic pressures but also continue functioning under severe radiation exposures. KAERI notes the technology isn't sufficiently advanced to produce the part by 3D printing alone, necessitating five-axis CNC machining to fabricate a replica with the precision required.

Spanish 3D print company recycles footwear to produce flexible TPU filaments (Feb 19)

Recreus developed Reciflex from waste material from the footwear industry and its own manufacturing processes. The result is a flexible filament for any TPU-compatible FFF 3D printer. Recreus adds Reciflex can be used to manufacture products such as RC car wheels and protective covers for phones, GoPros, and drones. Once used, these materials can be recycled once again, the company states.

Hong Kong University develops artificial coral substrate made with 3D printing (March 19)

Researchers at Hong Kong University's School of Biological Sciences developed a process to produce terracotta tiles which can be used by coral polyps as an artificial bed to create new colonies on the sea floor. The waters off Hong Kong are home to 84 species of corals, some of which are under pressure due to warming ocean temperatures. Researchers seeded 430 square feet of tiles on the sea floor in a marine park with coral polyps and report a 90% survival rate. The university notes that because of the tiles' composition, any that are unused dissolve in the sea over time.

DOE-sponsored project involves 3D printed wind turbine blade tips (March 3)

The U.S. Department of Energy (DOE) is funding a 25-month, $6.7-million project being undertaken by GE Research, GE Renewable Energy and LM Wind Power. The partners will develop four full-size wind turbine blade tips, one that'll be tested for structural integrity and three more that'll be installed on turbine for real world testing. GE states the goal is to produce components that can be produced more cheaply and quickly while optimizing the amount of energy produced by wind farms.