

3D PRINTING - A FAST MOVING MARKET



Developments in 3D Printing

A Sector by Sector Overview

Overview

This report explores recent developments across 12 sectors as it relates to 3D printing and its impact on each sector. We've limited our scan to the last three months to demonstrate the pace and scope of activity in the market.



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General

Study offers plan to make Northeast Ohio region the Silicon Valley of 3D printing

A report from the Youngstown Business Incubator and America Makes in Youngstown and Team NEO and Magnet in Cleveland offers a plan to make the Northeast Ohio region a 3D printing hub. The report describes itself as an “asset map” and offers a detailed look at existing AM efforts and resulting benefits in the region. Team NEO says the location is a “no brainer” due to its connection with automotive and aerospace industries while already being home to America Makes, the National Additive Manufacturing Innovation Institute. The study also highlights opportunities in direct products and tooling as well as barriers to adoption related to production and cost margins. The study’s seven-year plan outlines five main goals to accomplish its objective, including:

1. Forming a regional innovation cluster;
2. Expanding the use of additive manufacturing through investments in technical support, capital equipment, workforce development, and industry-based educational programs;
3. Education and workforce training initiatives;
4. Building out of supply chains in automotive, biomedical and aerospace industries; and
5. The development of a maker/entrepreneur framework.

This study was supported by a \$98,000 grant from the Fund for our Economic Future, awarded in November.

Insider Picks: MOD-t 3D printer designed “for the rest of us”

Insider Picks, a division of Business Insider, chose the [MOD-t 3D printer](#) as a favored device for its customers. The printer is consumer-grade and, according to the article, “impressive.” [New Matter](#), the company behind the printer, has released [tutorial videos](#) for the successful Kickstarter project. The article’s author describes set up and operation of the printer as easy and interesting.

MakerBot Launches New 3D Printing Solutions for Professionals and Educators

MakerBot launched [MakerBot Print](#) and [Mobile](#) applications to allow professionals to integrate workflows and help educators introduce students to 3D printing. The applications streamline the print preparation process and produce higher quality prints. [MakerBot Replicator+](#) and [Replicator Mini+](#) have been re-engineered to provide faster, easier, and more reliable printing with a bigger build volume. The company’s [Slate Gray Tough PLA Filament Bundle](#) allows engineers to make more durable, high-impact strength prototypes and fixtures. Educators can use [Thingiverse Education](#) to discover 3D printing classroom content created by other educators.

3Doodler Targets Architects and Designers with a New Professional 3D Printing Pen

New England's [WobbleWorks](#) has a line of 3D printing pens considered to be both affordable and for an all-ages market. However, its latest offering has gone in the direction of a \$249 prosumer device marketed at creative professionals such as architects and industrial designers. The device's high heat generating level allows it to use materials such as wood, copper, bronze, nylon and polycarbonate materials. It's available at the [MoMA Design Store](#).

XYZPrinting Releases a \$50 3D Printing Pen

Taiwan's XYZprinting released the [da Vinci 3D Pen](#). It features push-button in-air drawing, using PLA plastic filament available in 11 colors. A wired extrusion device, it's available through Amazon for \$50, roughly half the price of their initial offering. The company is also adding another product to its already robust printing portfolio. The [da Vinci Jr. 1.0 3-in-1](#) brings laser scanning and optional engraving to XYZ's line of entry-level 3D printers. Of note, the scanning functionality is able to capture resolutions down to 0.25mm which comes with the device's \$550 starting price. Engraving will run an additional \$200.

Pirate Party founder says U.K. copyright extension on designed objects bad for 3D Printing

An extension of U.K. copyright for industrially manufactured artistic works represents "a direct assault on the 3D printing revolution," says Pirate Party founder Rick Falkvinge. The decision could limit how items are photographed or scanned. The extension applies to items such as office chair designs and extends the copyright for up to 70 years. The Pirate Party founder says the extension will have an impact on makers in the U.K. and EU as they could be prohibited from using 3D printing to manufacture such objects for as long as a 100 years. He adds that "moving furniture design from a [design right] to copyright law means that people can and will indeed be prosecuted for manufacturing their own furniture using their own tools."

Chinese all-in-one 3D printing, casting technique jumps biggest obstacle facing 3D printing industry

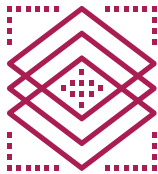
Chinese scientists have developed "smart micro casting & forging" which combines 3D printing and forging. It uses metal wire one-tenth the cost of AM powders, and could be used in the aerospace, automotive, and molding industries. The Micro Forging & Casting Sync Composite Device offers an alternative to metal 3D printing methods like selective laser melting and sintering, combining 3D printing, casting, and forging in one.

3M's 3D printing PTFE polymer tech alternative, cost-effective solution to traditional processing

3M's new polymer tech allows users to 3D print complex PTFE polymer structures in one single process. It provides an alternative to expensive traditional processing techniques. The company's subsidiary Dyneon will introduce this new technology at the K show in Dusseldorf this month. The development also allows users to 3D print spare parts and customized designs on demand without the need for expensive traditional processing techniques. The technology may also help in providing a sustainable manufacturing solution due to potential material savings and a reduction in waste.

SAP, UPS launch early adopter 3D printing program

[SAP SE](#) and [UPS](#) co-launched a website to expand early testing and validation of their early adopter program. It includes partners such as [Airbus APWorks](#), Fast Radius, HP, Krones, Linear AMS, Moog, Sealed Air Corporation and [Stratasys](#). It follows a previous move to develop a distributed manufacturing collaboration to "connect the manufacturing floor to the customer door." Registration for the early adopters program is now open globally through January 2017, including Asia and Greater China, which are now served by the [expansion of the UPS 3D printing network](#).



Materials

LLNL Researchers claim to devise programmable 3D smart ink

Researchers from the Lawrence Livermore National Laboratory (LLNL) in California have learned how to "program" a "smart ink" made from soybean oil along with polymers and carbon nanofibers into a temporary shape at an engineered temperature predetermined by its chemical composition. An example of its use includes as a biomedical splint to correct medical conditions, which is able to change shape as the child grows. LLNL researchers note their version of "4D printing" is the first to combine the process of 3D printing and subsequent folding, via origami methods with conductive smart materials to build complex structures.

Continuous Composites say functional 3D prints with circuits now possible

[Continuous Composites](#) is developing a technology which may pave the way for the 3D printing of objects with electronics also embedded. The company has already worked with carbon fiber, Kevlar, fiberglass, fiber optics, and continuous copper wire materials using a 3D printing setup with up to 16 different material extruders. As curing takes place continuously, they are already reaching speeds of up to 90 inches a minute while creating freeform and functional components complete with circuits and wires. The company says it is past the prototyping and proof-of-concept stage and adds their tech is ready to be developed for market. They believe their process will be useful in the creation of wearable IoT devices, aviation components and even ballistics armor.

Ultimaker releases four professional 3D printing materials

[Ultimaker](#) has released four new materials meant to complement their Ultimaker 2 lineup for professional work. They include:

1. [Ultimaker CPE+](#) (co-polyester) which is tolerant to temperatures as high as 100 °C, offers chemical resistance, toughness and dimensionally stability;
2. [Ultimaker PC](#) (polycarbonate) high print quality, heat resistance up to 110 °C, mechanical strength and toughness;
3. [Ultimaker Nylon](#) (polyamide), which offers strength and abrasion-resistance, is durable and engineered to offer low moisture sensitivity; and
4. [Ultimaker TPU 95A](#) (thermoplastic polyurethane), a TPU that features a Shore-A hardness of 95 and an elongation of up to 580% at break. The material is suited for applications requiring slight flexibility, wear and tear, and chemical resistance.

Evonik Partners with HP to Develop Powder 3D Printing Materials for HP Open Platform

German specialty chemicals maker [Evonik](#) partnered with HP to produce powder 3D printing materials for the HP Jet Fusion 3D printer. The deal is part of HP's Open Platform materials development program, launched in tandem with their Jet Fusion 3D printer. Evonik will focus on the development of materials suitable for the large-scale production of automotive and aerospace components. Other materials developers contributing 3D printing powders through the HP Open Platform include [Arkema](#), BASF and Lehmann & Voss.

3D Printing Meta-Materials: Combining Multi-Materials at the Print Head to Produce Almost Any Properties

In this article, the author predicts the rise of new AM printing materials due to the combinations of varying polymers per layer of 3D printed material. He cites the director of the Creative Machines Lab at Columbia University, saying expansion of the technology will allow for the “combining (of) very different materials together, to create infinite ‘shades’ of materials, and create a whole range of meta-materials.” He uses the example of a working loud speaker with all the wires and magnets 3D printed.

3DomFuel using beer, coffee, hemp in AM

3DomFuel is recycling products such as beer, coffee and hemp for use in AM. The company's co-founder says their push to use alternative materials came from a desire to build a niche market. Their “Wound up” coffee filament, according to the company, offers more texture than plain white and off white alternatives. The company hopes the recycled filaments may be used by medical or aerospace applications.

Researchers able to scale up 3D printed nanostructures

Virginia Tech researchers have discovered how to successfully scale up nanostructure materials with a 3D printer. In their paper, [Multiscale metallic metamaterials](#), they describe

their method for creating metallic nanostructures which they say are lightweight, strong and highly elastic. The 3D printing method can be significantly scaled up through a full seven orders of magnitude control reaching multiple centimeters in size. The multiscale metallic materials, consisting of hierarchical 3D architectural arrangements and nanoscale hollow tubes, are more than 400% more elastic than conventional lightweight metals or ceramic foams. The structures also feature an optimal surface area of nanomaterials, amplifying optical and electrical properties and enabling photon energy to be collected everywhere, not just on the top surface like a photovoltaic panel, but inside the lattice structure too. The team is focused on producing multi-functional inorganic materials (such as metals and ceramics) for very harsh environments.

New Approach to Develop Ultra-Strong, Lightweight Materials

Masdar Institute is using AM to design strong, ultra-lightweight ‘architected foam’ structures. They claim the foam may have the potential of producing lighter and stronger vehicle bodies, as well as improve water production and oil and gas operations. The foams can be 3D printed with various plastics, metals, ceramics, and composite materials. The process is claimed to enhance the thermal, electrical and mechanical properties of various engineering systems, including aerospace and automotive structural components and can be used anywhere there is a need for very strong, lightweight and conductive materials, such as in the aerospace and defense industries. Also, the foams can be used in applications that require highly conductive or porous materials, such as the energy, water and medical industries.

Henkel sees success in providing adhesive solutions for 3D printing industries

German international product developer [Henkel](#) has begun developing adhesives for 3D printing applications. The company aims to develop adhesives that can be used for 3D printed components made for construction, furniture and automotive industries and have partnered with a number of startups in related fields. Several of the company’s adhesive solutions are already being used in construction projects using AM such as the ‘[Europe Building](#)’ in [Amsterdam](#), a mobile conference building 3D printed for the occasion of the Dutch EU Council Presidency.



Military and Government

CTO of Airbus says 3D printing will happen in space

In this article, the deputy CTO of Airbus says aerospace industries are moving towards 3D printing satellites in outer space. It also mentions a company called Made In Space, which installed the first ever manufacturing facility on the International Space Station using 3D printing. While the tech is available, the Airbus CTO says cost-effective methods still need to be proven.

BAE's Chemputer wants to “grow” military aircraft via chemical, 3D printing combination

BAE Systems claims its “Chemputer,” which marries 3D printing and chemical processes, may be able to “grow” aircraft and some of their complex electronic systems from as small as the molecular level. The company has been developing means to digitize synthetic and materials chemistry with the aim of assembling complex machines inside other machines, from the bottom up, with little human assistance. BAE is focused on producing small, customized and incredibly fast unmanned aerial vehicles with the tech, which the company says would also use environmentally sustainable materials.

UIMC drone can be built in one day using AM

Russia's United Instrument Manufacturing Corporation (UIMC) has 3D manufactured a drone for monitoring and reconnaissance. The 4-pound UAV can be printed in one day while spare parts can be fabricated in 15-20 minutes. The 2.4-meter-wingspan drone is also equipped with an onboard video camera and has a flying radius of 50 kilometers. According to the company, the UAV has a distinct advantage of being able to fabricate spare parts quickly and even in the field.

ExOne given \$1.5M to 3D print silicon carbide components for U.S. Missile Defense Agency

Industrial 3D printer and materials manufacturer [ExOne](#) was awarded a \$1.5 million contract with the U.S. Missile Defense Agency. The three-year contract will see the company applying its 3D printing techniques to develop silicon carbide components. Of note, the company's binder jetting printing tech is ideally suited for developing silicon carbide materials for missile component support structures. The 3D printed components will allow the MDA to improve its ballistic missile defense system performance and reduce weight through unique designs and materials, key benefits of binder jetting 3D printing for this and many other industries.

V-22 Osprey completes successful demo flight with 3D-printed, safety critical parts

U.S. NAVAIR officials have completed a demonstration flight of a MV-22B Osprey aircraft featuring critical components created via AM. The plane was outfitted with a titanium, 3D printed link and fitting assembly for the engine nacelle securing the engine to the primary wing structure. The 3D printed equipment will remain on the aircraft for continued evaluation. The flight went smoothly. NAVAIR's Integrated Product team lead says the flight was a “great first step,” adding “it will revolutionize how we repair our aircraft and develop and field new capabilities.” However, NAVAIR officials caution more work is needed before deploying aircraft with AM safety-critical parts.

USMC wants to use 3D printing to quickly, cheaply restore out-of-action aircraft

The U.S. Marine Corps (USMC) wants to use AM to restore old or obsolete aircraft to provide pilots with additional planes for improved essential training. The USMC aims to implement more 3D printing workstations such as those provided to the 1st Maintenance Battalion, Combat Logistics Regiment 15, 1st Marine Logistics Group, in order to produce replacement parts at high speed. By printing parts themselves, middlemen can be removed from the supply chain allowing for lower cost maintenance and speed in repair.

USMC looking at AM to replace “steel mountain” logistics model for supplying soldiers on the battlefield

The Marine Corps’ logistics community says AM could replace the previous battlefield supply method involving the transportation of a massive amount of fuel, water, ammunition and more from ship to shore and then putting it on trucks for distribution. They believe this style could effectively be replaced by unmanned vehicles, revolutionizing how Marines move food, ammunition, medicines and even vehicles into and throughout the battlefield. However, deployment and repair of AAVs and some aircraft are taking much longer than originally intended as the service finds itself needing components from manufacturers long out of business. 3D printing is already being used in the aviation community to address this challenge and could be used on AAVs as well according to one official, pending the Marines’ ability to secure the data rights to the designs.



Money and Investments

HP expands foothold in 3D printing industry, acquires assets, team from David

HP announced it will acquire the 3D hardware and software assets of German-based David Vision Systems GmbH and David 3D solutions. The assets are expected to help HP further expand its [Sprout](#) offerings – the company’s fully integrated desktop 3D scanning solution. Although the deal terms were not announced, it is known that HP will welcome David’s team on board. HP continues to integrate Sprout into a number of industries, including R&D, education and healthcare.

3D printing online marketplace nabs \$7M in Series B funding

Amsterdam-based 3D Hubs, an online marketplace for 3D printing services, closed a \$7 million Series B funding round, led by EQT Ventures, with participation from Balderton Capital. The marketplace connects users requiring 3D printing with local 3D printers, and allows them to order jobs online. 3D Hubs counts approximately 33,000 printers worldwide within its network, offering different kinds of 3D printing and materials.

Startup Carbon scores \$88M in funding, brings total funding to \$222M

The Silicon Valley-based startup, which develops 3D printers to produce medical devices and car parts on demand, saw this most recent funding round led by heavyweights like BMW Group, GE, Nikon and chemical manufacturer JSR Corp. Google Ventures and venture capital firm Sequoia are also among the company's early investors. The company claims it's first commercial 3D printer can print up to 100 times faster than rival printing companies. It plans to use the new funds for international expansion and to develop its technology further.

First 3D Printing ETF launches in the U.S.

The first exchange-traded fund (ETF) focused solely on the 3D printing ecosystem launched on July 19. The ETF, issued by Ark Investment Management, aims to closely follow the performance of the Total 3D-Printing Index, which tracks the price movements of stocks of 3D printing companies. The fund launched with 40 holdings; its top three holdings at the time of launch were Organovo Holdings, Groupe George and HP.

NVBOTS secures Series A funding, names new CEO

NVBOTs, a provider of Built to Share automated 3D printing solutions, secured Series A financing led by Woodman Asset Management. The funds will be used to fuel sales of its NVPro plastics printers and to further develop its new multi-metal printers. Along with the funding announcements, the company added Duncan McCallum as its CEO, with founding CEO AJ Perez elevating to Chairman. Duncan, who co-founded, built and sold two companies – Click Arts and VeloBit – was also previously a venture capitalist at Bessemer Ventures Partners.

GE spends \$1.4B on two European firms as its moves further into 3D printing space

GE launched tender offers to buy Sweden's Arcam AB and Germany's SLM Solutions Group as it aims to build upon its additive manufacturing capabilities. The deals are part of the company's "[3D Vision of the Future](#)," as Bloomberg puts it. The two targets allow the company to expand into an attractive niche within the broader 3D printing market – metal-based additive manufacturing, rather than plastics or composites. Meanwhile, GE Ventures continues to make investments in 3D printing companies, [including](#) Massachusetts-based Desktop Metal, which is working to develop an affordable and efficient desktop 3D printer capable of high quality metal prints.

Formlabs raises another \$35M, brings total funding to \$55M

The Somerville-based 3D printing manufacturer has been raising funds since 2011, with its "efforts over the years in introducing new materials and capabilities hav(ing) defined the category of professional desktop 3D printing," according to the company's CEO. The newly raised funds will be used to hire additional personnel and scale worldwide. It plans to expand its stereolithography business and bring additional tools to market.



Transportation and Logistics

UPS launches 3D printing services in Asia, has plans for Europe

UPS is expanding its 3D printing services to Asia with a new facility in Singapore. The facility, set to open by the end of 2016, will be run by Fast Radius. This arrangement is similar to the service rolled out by UPS in May in the U.S. The package delivering company owns an undisclosed stake in Fast Radius, which runs a 3D printing factory in at UPS' 3D printing hub in Louisville. The company also plans to launch a 3D printing hub in Europe. Recognizing that 3D printing poses a threat to its warehousing business, the company has actively embraced the new technology, incorporating it into its business model in response.



Healthcare

Biomodex turns to realistic 3D printed organs to better train surgeons

According to the company's founder and CEO, Thomas Marchand, medical errors are the third leading cause of death in the U.S. The French startup aims to lower the instances of medical errors by helping doctors perform pre-surgical simulations on 3D printed ultra-realistic replicas of patient's organs. Marchand, and his co-founder, Sidaarth Radju, also believe the technology can be used in medical training practices, where traditionally cadavers or animals have been used. The company is currently producing models for cardiac, orthopedic and Ear Nose and Throat (ENT) procedures using MRI data, but hopes to expand its services to all medical disciplines as it scales up.

U.K. doctor uses 3D scanning technology to develop ear implants for children

Dr. Ken Stewart of the Royal Hospital for Sick Children in Edinburgh, Scotland, is using an Artec Spider 3D scanner to design "hyper-accurate" ear implants for children suffering from microtia. Using a 3D scanner allows the child to avoid general anesthetic or having to undergo an MRI scan. It captures the geometry of the child's other, healthy ear, and then creates a model for the ear implant. The results are much more accurate than previous processes used. Currently, the models are only replicas crafted out of plastic, but according to Dr. Stewart, as bio-printing technology continues to advance, they "may not stay that way for long."

FDA research touts potential of 3D printing in personalized medicine

The FDA, which released draft guidance on 3D printed devices in May, released regulatory science research on devices cleared and approved by the agency, touting the potential of 3D printed drugs and devices. In particular, the agency highlighted the potential the technology presents in personalized medicine. As of July, the FDA has already cleared 85 3D printed medical devices and one 3D printed drug.

Dubai Health Authority develops strategy for 3D printed medical devices

The strategy, which has a deadline of 2030, has two functions: one, to deal with Dubai's general 3D printing strategy; and two, to deal with Dubai's healthcare sector. The latter part

of the strategy has an earlier deadline of 2021, and aims to offer patients more affordable and timely treatments, including 3D printed prosthetic limbs at a ballpark price of US\$109. Dubai is using a number of innovative cities as its benchmark for its strategy, including Stockholm, Boston and Singapore, which it considers to be advanced in innovation.

Doctors use 3D printing for the first time to plan for tongue surgery

In India, which is the oral surgery capital of the world, doctors have used 3D printing for the time to plan tongue cancer surgery on a Bangalore patient. Rather than cutting out the patient's tongue completely, the team of doctors made a 3D print out of the tongue and tumor, featuring a color demarcation to help the team plan the surgery. Thanks to the model, doctors were given exactly the right amount of data needed to plan the tumor's extraction, while maintaining a satisfactory cosmetic and functional outcome for the patient.



Manufacturing and Construction

Dubai sets out plans to 3D print 25% of the city's future buildings by 2030

Dubai, which is home to the world's first 3D printed office, has announced plans to 3D print a quarter of the city's buildings by 2030. In order to accommodate this deadline, the city is currently drawing up legislations and codes for the use of 3D printing in the construction of future buildings. Dubai hope that through its plan it can position itself as a global hub of 3D printing by its target date of 2030.

Saudi Arabia plans to 3D print 1.5M houses within next five years

Taking a page from Dubai's plan, Saudi Arabia has set a target for itself whereby it plans to print 1.5 million homes within the next three years. The technology to meet this target is being supplied by Shanghai-based WinSun, which in 2014 built ten 3D printed houses in less than 24 hours. The company has been invited to set up a construction 3D printing factory in Saudi Arabia.

WASP hosts workshops, invites makers to print ecofriendly 3D printed adobe houses

The WASP Technological Village in Italy – home of the 12-meter-tall Big Delta WASP 3D printer, one of the world's largest 3D printers – is inviting markets to build their first ever 3D printed adobe buildings using ecofriendly local materials during a series of weekend workshops.

Game of Throne's Winterfell gets the 3D printed treatment

Two trends have collided – 3D printing and Game of Thrones. A Russian cement company is using its industrial 3D printer to build a life-size version of Winterfell, the traditional home of House Stark.

China unveils first 3D printed house in its 3D printed park plans

A 3D printed house in Binzhou City, China, has been unveiled. Built with concrete over the span of two months, the builder claims the house is more cost-effective and

more environmentally friendly as well. The house is move-in ready and features regular amenities such as air conditioning. The house marks the first part of a bigger 3D printing construction project, which is being referred to as an ongoing park project, where a series of similar houses will be constructed. The cost of the 3D printed house works out to be roughly 5,000 yuan per square meter.



Wearables

Nike Used 3D Printing and Olympic Sprinters to Design its New Track Shoe

Jamaican Olympian Shelly-Ann Fraser-Pryce, who competed in the women's 100m and 4x100m relay at the Rio Olympics, wore Nike track and field shoes that were developed with the help of 3D printing. Among other experiments, Nike test-3D-printed prototypes of the spikes, which were tailor-made based on captured data that measured her speed on the track and off the blocks. Nike used 3D printing to make a set of different spike plates, each with a different amount of stiffness to meld perfectly with the sprinter's sole. The company's innovation design director, Shane Kohatsu, believes 3D printing technology is a tool that can help make better products. "For us right now, 3D printing is all about accelerating the project, the innovation process," he said, adding that the "3D printing industry isn't at a place where it can replace mass production techniques."

Nano Dimension Paves Way for Wearables by 3D Printing Conductive Patterns Onto Fabric

Nano Dimension Technologies has successfully 3D printed conductive patterns made from silver nanoparticles onto specially treated fabric, paving the way for sensors and electronics to be blended into clothing. The company works with a 3D printer that uses advanced 3D inkjet deposition technology and accompanying insulating and conductive nano-inks to create printed circuit boards (PCBs). Using this 3D printer and its AgCite Silver Nanoparticle conductive ink, Nano Dimension was able to embed electronics and sensors into the fabric itself. Tests demonstrated that the silver conductive particles had enough elasticity to match the fabric's properties and perfectly blend in. This development comes as the textile industry is trying to adapt to the demand for customization. There's a strong demand for smart textiles that link up with smartphones, smartwatches, smart bandages, health monitoring wearables, VR gloves and safety equipment. The smart textile market is valued at \$800 million today but is expected to spike to \$4.72 billion by 2020.



Auto Industry

Daimler Trucks to Use 3D Printing in Spare Parts Production

Daimler will use 3D printing to produce spare parts. The company, which owns the Mercedes-Benz brand, has more than 100,000 printed prototype parts, and said it will expand production using 3D printing methods. Daimler printed spare parts are created with 3D printers based on what is known as a selective laser sintering (SLS) printing process. The company also said that starting September, it will use 3D printing processes for plastic spare parts including spring caps, air and cable ducts, clamps, mountings and control elements. Daimler rival Audi announced that it will launch a 3D competence center at its factory in Ingolstadt, Germany, by year end, which will produce components made from steel and aluminium.

Peugeot Inks 3D Printing Deal Aimed at Cutting Car Costs

French carmaker PSA's partnership with a U.S. 3D printing startup Divergent 3D would lead to cheaper production of whole vehicle structures as well as parts for its models. Divergent 3D claims it has developed "a software-hardware platform enabled by 3D printing that radically transforms the economics and environmental impact of designing and manufacturing complex structures such as cars." PSA, the maker of Peugeot, Citroen and DS cars, said the partnership would start by manufacturing prototypes before moving to making car parts for assembly lines and eventually overall vehicle structures.

3D Printing Takes Car Customization to New Heights

Daihatsu, which operates as a member of the Toyota Group, is rolling out a project to give car buyers the ability to personalize their vehicle by using 3D printing. Leveraging the technology, the company's Copen roadster will offer from-the-factory customization at a level previously unavailable in a mass market car. Designers have developed a library of 15 different textured components called "skins" that fit within the body shell on the nose and rear end of the car. The necessary parts will be 3D-printed using Stratasys' Fortus additive printers and the customer-personalized car will be delivered within two weeks. Since the skins are entirely external and not part of any structural or safety-cage system, the main concern is whether the skins' color will fade with time and whether they'll be able to withstand the bumps and scrapes of normal automotive use.

Series Components Made by 3D Printers: BMW Group Expands Use of Additive Manufacturing Processes

The BMW Group has been using components from 3D printers in series production since 2012, but is steadily pursuing the evolution and use of advanced additive-manufacturing methods. The new, planar printing technologies used by BMW has enabled considerably faster production times than conventional point-to-point 3D printing methods. Beamers or infrared sources are used to expose the full surface, rather than point-to-point, high-priced light sources, such as CO₂ or UV lasers. BMW also achieved a breakthrough in the area of planar 3D printing last year with the introduction of so-called CLIP technology (Continuous Liquid Interface Production). The company used the process for the first time to produce individualized side indicators for the "DriveNow" car-sharing fleet.



Energy

Department of Energy nabs Guinness Book World Record

The Department of Energy's Oak Ridge National Laboratory achieved a Guinness Book World Record by producing the world's largest solid 3D printed solid object – a “trim-and-drill” tool that Boeing uses to build the wings on its passenger aircraft. The laboratory is also [experimenting](#) with 3D printed molds for wind turbine blades, which would cut down manufacturing time for turbine blades and make it easier to test newer designs.

Russia tests 3D printing for nuclear power components

Russia's nuclear energy corporation, Rosatom, is planning to usher in its recently developed advanced metal additive manufacturing technology to produce 3D printed parts for the country's nuclear industry. The company will focus on reliability and safety of the nuclear power components, ensuring they will be able to withstand neutron fluxes. The nuclear energy industry is [reportedly](#) on par to match the increased use of 3D printing tech as can be seen in leading industries like aerospace, automotive and aviation.

MIT, SUTD researchers 3D print structure that shape shifts when exposed to different temperatures

Engineers at MIT and Singapore University of Technology and Design (SUTD) believe 3D printing technology will open up new opportunities for solar tracking technology. The researchers 3D printed a structure that can shift its shape when exposed to different temperatures. If the material can be combined with solar cells, it could create a new type of solar technology that captures more sunlight, harnessing more energy. The technology could also have implications for the pharma industry, where it only releases required medication to a patient should their temperature hit a certain level.



Aviation

Stratasys Debuts New 3D Printing Tech, Partnerships with Ford and Boeing

Stratasys announced a pair of technologies aimed largely at the aerospace and automotive industries. Along with the new technologies the company announced new partnerships with Boeing and Ford. Both of the new technologies are in the proof of concept stage, with the company demonstrating them to the public for the first time at a trade show in the coming weeks. The bigger of the two technologies is the Stratasys' Infinite-Build system which features a new approach to FDM extrusion that increases throughput and repeatability. It turns the 3D printer concept on its side to produce an “infinite-build” approach that prints on a vertical plane using gravitational supports and bonding techniques. The technology is of great interest to Boeing for the creation of light-weight customized parts at low volumes.

Airbus APWorks, SAP to Accelerate 3D Printing Supply Chain for Aerospace

Airbus APWorks signed a co-innovation agreement with application software developer SAP aimed at accelerating the adoption and standardization of industrial 3D printing initiatives for the aerospace and defense industry. APWorks will use the on-demand 3D printing services recently announced by SAP to operate a bionics network that connects 3D printing experts and end users. These services will allow APWorks to manufacture 3D printed components such as armrests and brackets while improving fuel efficiency and reducing CO2 emissions. “The ability to 3D print all the possible components of an A350 aircraft could reduce the weight of it by nearly a ton,” said Joachim Zettler, CEO of APWorks.

Russian Company Uses 3D Printing Technology to Manufacture First UAV

The United Instrument-Manufacturing Corporation, part of Russia’s state hi-tech corporation, Rostec, manufactured the first 3D printed unmanned aerial vehicle (UAV). According to a spokesperson, it takes about 24 hours to manufacture an unmanned aerial vehicle (UAV) of this type, while spare parts for it could be created in 15-20 minutes. Weighing less than four kilograms with a wing span of 2.4 meters, the UAV is designed to conduct reconnaissance and monitoring missions.

GE, Textron Aviation Announce Next Generation Cessna Denali, Featuring 3D printed Engine

During the EAA AirVentures Airshow in OshKosh, Wis., GE Aviation and Textron Aviation unveiled a next-generation plane that features an engine – the Cessna Denali – with numerous 3D printed parts. The engine offers several complex parts 3D printed in metal with titanium and steel. According to GE Aviation, these new parts will replace what in a traditional engine would have amounted to “hundreds of individual parts.” The machine is expected to generate \$40 billion in revenue for GE within 25 years, according to GE chairman and CEO Jeff Immelt.

Airbus Tests High-Tech Concepts with an Innovative 3D-Printed Mini Aircraft

The mini aircraft project – known as THOR (Testing High-tech Objectives in Reality) – is being used by Airbus as a testbed for futuristic aircraft technologies: from 3D-printed structural parts to advanced aerodynamics and even artificial intelligence. The initial THOR version weighs about 21 kg and can fit in a four-meter-by-four-meter square. It is powered by two 1.5 kW electrically-driven propellers, and 90% of its structural components were 3D-printed from plastic polyamide powder. An important advantage for THOR is the short lead time of 3D-printing compared to traditional manufacturing methods. From an existing design concept, it took about seven weeks to print the 60 structural segments of the aircraft and an additional week and half to assemble and fine-tune its electrical systems before it was ready to take flight.



Food

Dinner in 3D

Led by engineering professor Hod Lipson, a research team at Columbia University in New York City have been developing a 3D food printer that can fabricate edible items through computer-guided software and the actual cooking of edible pastes, gels, powders and liquid ingredients. Lipson and his team have been collaborating with New York City-based International Culinary Center (ICC). Lipson, who also leads the Creative Machines Labs (CML), has held several workshops to bring together ICC's culinary creativity with the CML's technical knowledge to create new kinds of foods – novel textures, combinations and spatial arrangements of basic ingredients that chefs cannot currently put together. Unlike conventional oven cooking, their 3D printer will be able to cook various ingredients at different temperatures and different durations, all controlled by a software being developed by computer science professor Eitan Grinspun. The software can predict what a 3D-printed shape will look like after it has been cooked for a specific time at a set temperature.

Food Ink. is the World's First 3D Printing Restaurant

The result of a collaboration between architects, artists, chefs, designers and engineers, pop-up restaurant Food Ink., the world's first 3D-printing restaurant, uses 3D printers produced by Dutch company byFlow to create dishes out of hummus, chocolate mousse, smashed peas, goat cheese or pizza dough – essentially anything that can take the form of a paste. The paste can then be fed through the extruder to create culinary sculptures. Food Ink. hopes to trigger a conversation about the future of sustainable food, nutrition and health as well as demonstrate how emerging technologies may be changing our dietary and cultural habits.

3D Printing at CIA could be the Future of Food

Using an experimental 3D printer and a previously unexplored technique for constructing designs, Liam MacLeod at the Culinary Institute of America's (CIA) 3D Printing Lab is examining possibilities that may revolutionize how 3D technology is used in the food industry. The intricate creations are designed through a process that uses cheap, powdered carbohydrates and does not produce food waste. The technology has drawn the attention of food companies McCormick & Company and Ghiraldi Chocolate Company. The CIA lab has retrofitted its 3D printers to enable powder-based printing and started to branch out with its experiments from sugar to more complex ingredients like maple syrup, cinnamon, guava and even wasabi-based powder.

BeeHex 3D Printing Announces Collaboration with Neapolitan Pizzeria Ribalta

3D pizza printing company BeeHex is collaborating with Pasquale Cozzolino, executive chef and owner of Ribalta, the Neapolitan restaurant in New York City and Atlanta. Cozzolino will serve as an advisor to BeeHex, overseeing the dough, sauce and cheese recipes used in the 3D printer. The company's developmental prototype can print an oven-ready pizza in practically any shape within four minutes while its 3D printing kiosks print and bake a pizza every sixty seconds. The Texas-based company is also [planning](#) to sell 3D printed slices at sporting events and theme parks, repurposing an advanced food-printing machine originally built for NASA astronauts. The company said customers will be able to order pizza via a smartphone app, pay online, and collect the printed pizza when it's done.