

Fon Mag⁺

EXPO EDITION

Featuring plenty of world premieres
set for Formnext 2022

Looking for
more productivity
page 16

Making
colors tangible
page 28

Implants, robots,
and micro 3D Printing
page 34

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EDITORIAL

The only constant in life is change. That applies to our private lives and to our business.

If we are to master current and future challenges, we need to adapt to new conditions, develop ideas and explore new avenues.

Our business environment has also seen a number of changes, and not all of them have been positive: The dominant issues facing us at the moment are disruptions to the supply chain, inflation, energy prices, staff shortages as well as the war in Ukraine and its global impact. And of course the pandemic (especially the difficulties in China) and the climate crisis are still with us, albeit more or less overshadowed by present events.

But these crises also provide opportunities for AM. More and more industrial nations are relocating their production and making changes to their energy provision and supply chains. Enormous cost increases are forcing companies to invest in new technologies and innovative manufacturing methods while also keeping an eye on sustainability.

This opens up enormous opportunities for Additive Manufacturing to display its strengths. You can experience this wide range of benefits at Formnext, the world's most comprehensive platform for generative manufacturing methods and the entire AM process chain. Come to Formnext

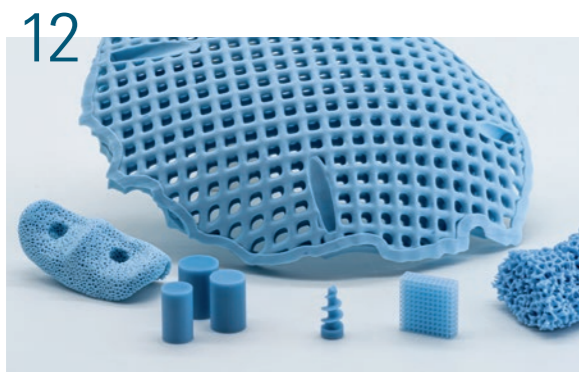
2022 and experience even smarter, more connected AM at an even higher industrial level.

AM itself won't be able to solve all the major problems of our time, but it will have a part to play. More information is available in this trade show edition and of course at Formnext 2022 in Frankfurt am Main. Incidentally, apropos change – we have redesigned the layout of our magazine. I hope you like it.

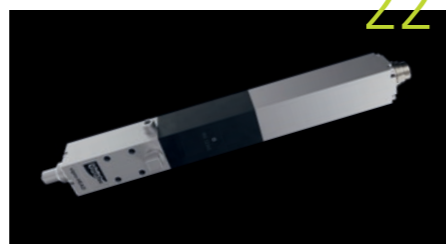
Sincerely, Sascha F. Wenzler
Vice President Formnext



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FORMNEXT NEWS



CLAY, AVIATION AND FOOD

Formnext 2022 will also be setting new standards in content. The supporting program of events is set to be more extensive than ever before, showcasing the latest topics and developments in additive manufacturing from such diverse sectors as the construction industry, aerospace, ceramic applications, and investments.

Among other things, Formnext has significantly expanded its AM4U offering to include subjects such as: Start-Ups and Investments (Tuesday, 15 November 2022), Construction and Architecture, Decentralized Manufacturing, and the partner country France (Wednesday, 16 November), AM in Education and Careers (17 November) and, for the first time, a Deep Thought Aerospace presented by ACAM, Formnext and VDMA AG AM, where AM topics will be examined in more detail with a focus on answering important questions from the industry. On Friday, 18 November 2022, a new panel will discuss the use of AM in ceramic applications.

Back by popular demand are the Discover3Dprinting seminars, which are especially useful to those new to AM and will take place on the AM4U stage on each day of the exhibition

(daily at 11:20 a.m.; Tuesday and Thursday in German; Wednesday and Friday in English). On the Thursday, visitors will also have an opportunity to learn more about the wide range of careers in the AM industry and sit for a professional photographer for job application photos.

All content from the AM4U stage as well as impressions, voices, and more will be streamed live on Formnext.TV, which will also be available to Formnext visitors after the exhibition to enable them to catch up on anything they might have missed during the in-person event. This also gives anyone unable to attend the event in Frankfurt an opportunity to participate in Formnext virtually.

CONFERENCE, SPECIAL SHOWS, AND MORE

In addition to the extensive program on the AM4U Stage, Formnext 2022 will also see the return and expansion of various other established events as well as an array of new program elements. The Start-Up Challenge, which recognizes innovative and viable business ideas from young companies, will take place for the eighth time, for example. The exhibitors in the Start-Up Area will present themselves in brief introductory rounds on the AM4U stage. There will also be interesting contributions on the topic of investment and funding. The purmundus challenge ideas competition will this year celebrate its 10th anniversary with a showcase entitled

»Best of 10 Years«.

In addition, the high-quality conference program organized by Formnext's content partner, TCT, will once again address current trends and developments in additive manufacturing in 2022, High-ranking representatives from Honda, GE Healthcare, PepsiCo, among others, will discuss current developments in the medical technology, aerospace, automotive, and food industries, while the VDMA will have a showcase, exhibiting industrial AM applications and business cases from the world of mechanical engineering, and provide further insights with presentations on the AM4U stage. Using real applications, the BE-AM showcase will demonstrate advanced developments in 3D printing in the construction industry, a topic that is growing in importance. At the same time, the BE-AM Symposium will provide a wealth of background information on this subject and present future developments in the field.

THE EVENT HIGHLIGHTS AT FORMNEXT:

- AM4U Area** 11.0, D70+72
- Start-up Area** 12.0, B81
- purmundus challenge** 12.1, C01
- TCT Conference Portalhaus,** room Transparenz 1+2
- TCT Introducing Stage** 12.0, E38
- VDMA Showcase Additive4Industry** 11.1, D69
- BE-AM Showcase** 11.0 B59

EXHIBITOR NEWS

FFF PRINTING WITH UP TO 7 NOZZLES



With the introduction of its latest 3D printer with multi-nozzle technology Liqtra GmbH is creating a new way to increase the productivity of the FFF printing process without increasing speeds or nozzle diameters. The Liqtra FX-7 Pro's patent-pending multi-nozzle technology achieves up to a 300 percent increase in productivity, the company said. At the same time, it says, the standard of mapping geometric details remains high and part strengths are increased by as much as 37 percent. The 3D printer uses up to seven nozzles in a print head simultaneously, each of which can be individually controlled during the printing process. The process can be used for part production with Liqtra planning software, a slicer specially developed for multi-nozzle applications. Artificial intelligence and numerical optimization are used in the software to find the optimal part orientation, determine the best process parameters and plan the individual

control of each nozzle. Liqtra multi-nozzle technology uses parallel extrusion from multiple nozzles throughout the entire printing process. In each process step, the active nozzles and their respective extrusion rates are suitably selected for this purpose. Liqtra multi-nozzle technology is particularly suitable when medium to large components need to be produced quickly. Fields of application include 3D printing of customized manufacturing aids and patient-specific medical aids.

Liqtra at Formnext 2022:
Hall 12.1, Booth G89

MANNEQUINS AND FACADES USING DLP

Fiberneering will introduce their machines to the market at Formnext 2022. The young Dutch company has been building machines and formulating materials since 2017. Now the machine and materials have reached a level of maturity that allows for the next step. DLP technology is well known in the industry for its high level of detail and fast production rates. However, until now the majority of applications has been in small products, like dental applications. »Our machines have unique build volumes, starting with 1m x 0.5m x 0.4m for the XD2 machine,« says Peter Cocu, commercial manager of Fiberneering. »This build volume enables production of previously impossible prints: very large products with high visual requirements like mannequins, signage and art pieces. But also more technical parts like molds, prototypes and even complete facades.« According to Fiberneering, the build volume of the XD2 machine is

more than 3 times larger than the largest currently commercially available DLP machine. The company also offers two even larger systems built on the same technology platform: XD4 (1 x 0.8 x 0.5m) and XD8 (1 x 1 x 0.8m). In combination with the proprietary resin systems offered by Fiberneering, it is possible to complete a full meter long print run in 24 hours, Fiberneering reports. This high productivity, in combination with resin costs significantly under current industry benchmarks, makes the technology extremely well suited for production companies involved in arts, visual marketing, prototyping and polymer processing. Fiberneering's history started in 2015 with development of DLP based printers for certain applications in composite processing, for which the company holds several patents.

Fiberneering at Formnext 2022:
Hall 12.1, Booth F50



Photos: Liqtra, Fiberneering, 3D Systems, Rivelin

EXHIBITOR NEWS

FROM IMPLANTS TO HISTORICAL VASES



At Formnext 2022, 3D Systems will showcase its unique solutions portfolio designed to address a variety of advanced applications in healthcare and industrial markets. The company will also showcase its industry-leading hardware and materials, as well as Oqton's software portfolio. At the booth, 3D Systems will showcase the mechanical performance and stability of its materials through numerous components and applications. The company will present the latest additions to its hardware portfolio. These include the large-format, high-speed 3D printers for thermoplastic extrusion that 3D Systems can offer through its acquisition of Titan Robotics. The technology offers a combination of pellet extrusion, filament extrusion, and spindle subtractive

tooling. One example is the replication of a historic vase (see image). 3D Systems will also showcase Kumovis' extrusion technology, which was developed for precision printing of medical-grade, high-performance polymers such as PEEK (polyether ether ketone). These materials are often preferred for human implants and surgical instrumentation applications. The U.S. company's portfolio also includes Allevi's bioprinters, used in the research community to help develop breakthrough innovations in regenerative medicine.

3D Systems at Formnext 2022:
Hall 11.1, Booth D11

AUTOMATED SUPPORT REMOVAL

With the development of its NetShape robots, Rivelin aims to provide a rapid solution for the post-processing of additive-fabricated metal parts and components. After all, in many metal AM applications, post-processing accounts for more than 30% of the unit cost per part and often requires manual intervention that leads to variations in quality from part to part, according to Rivelin. At Formnext, the company is making its first appearance in front of the international AM world, showcasing its NetShape robot, an automated solution for metal support removal and targeted finishing. Driven by its proprietary NetShape control software, both machine learning and traditional deterministic control theory are used. With the NetShape robot, Rivelin promises a 90% reduction in errors and a 10-fold reduction in operating costs. The company is also showcasing its electrochemical jet machining technology with co-exhibitor TextureJet (see image).

Rivelin at Formnext 2022: Hall 12.0, Booth B41



Cover image
The ability to industrially produce components with virtually no geometric restrictions has long been one of the major advantages of additive manufacturing. This trump card can also be played with new materials and manufacturing processes. At the Leichtbau BW booth, Karl Späh GmbH & Co. KG (Hall 12.0, D.21) will be showing solutions made of polyamide 12 (PA12), for example, as well as from the combination of the multi-jet fusion manufacturing process with polypropylene.

EXHIBITOR NEWS

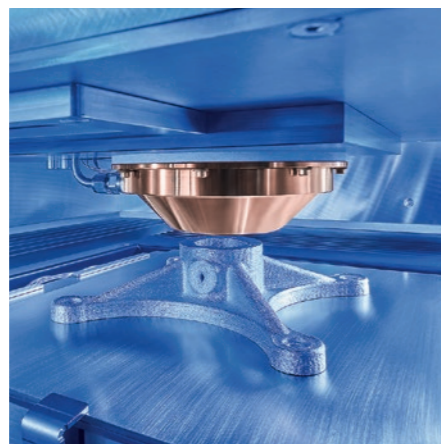
FASTER THAN PBF, MORE ACCURATE THAN DED

With the GMP300, Grob is presenting its Liquid Metal Printing (LMP) for the production of near-net-shape components for the first time. According to the manufacturer, the machine offers reliable, efficient and cost-conscious system technology with maximum production flexibility for one-off and small-batch production. GMP stands for Grob Metal Printing and the 300 for the size of the work area 300x300x300 mm³. The GMP300 is equipped with 3-axis kinematics and offers a maximum axis speed of 30 m/min. The inert atmosphere serves to protect the component from oxidation and thus guar-

antees consistently good material properties. According to Grob, the company has developed Liquid Metal Printing (LMP), a forward-looking, economical and at the same time flexible additive manufacturing process that eliminates the disadvantages of traditional, metalworking additive manufacturing processes. The development was sparked by increasing market demand for customized and near-net-shape products. In the LMP process developed by Grob, the starting material is wire. The LMP process produces a homogeneous microstructure at yield strengths that are equal to or, in some cases, even higher than

the values of the starting material. The droplet diameter can be adjusted between 380 µm and 700 µm by using different nozzles. In addition, the print head including nozzle can be changed quickly during the build-up process, as can the build plates between print jobs. At a maximum drop frequency of 500 Hz and a drop diameter of 700 µm, the build rate is up to 320 cm³/h, according to Grob. As advantages in comparison to previous AM processes, Grob mentions the higher build-up rate compared to PBF systems as well as a better component resolution compared to current DED processes. Another advantage is simpler operation. »With no powder handling and no need for any beam sources, the systems can be integrated into an existing production line without increased safety precautions,« said Dr.-Ing. Johannes Glasschröder, team leader responsible for additive manufacturing at Grob.

Grob at Formnext 2022:
Hall 11.0, Booth C51



FURTHER EXPANDING APPLICATION FIELDS FOR METAL 3D PRINTING

With its new XM300G series, U.S.-based Xact Metal aims to make metal 3D printing more cost-effective while also decentralizing the process. According to the manufacturer, the XM300G family comes with one, two or four independent lasers with 100% overlapping print zones, offering industrial speed and performance at an affordable price (starting at \$200,000). In doing so, the company hopes to convince small and medium-sized companies in particular to adopt powder-bed fusion technology for metal and

further expand metal 3D printing in a variety of industries, including aerospace, automotive and general manufacturing. The system offers build volumes of 300x300x350 mm, which can be upgraded to 300x300x450 mm, a choice of 400 W or 700 W fiber lasers, and an interchangeable build platform that can reduce print cycle time. Shipments are scheduled to start in Q3 2023.

Xact Metal at Formnext 2022:
Hall 12.0, Booth D98



Photos: Grob-Werke, Xact Metal, One Click Metal

EXHIBITOR NEWS

ADDITIONAL MODULES FOR LPBF PRINTER

One Click Metal is offering two additional modules to expand the application possibilities of its LPBF printer. According to the company, the new Lab module enables the flexible use of different powder materials without the need for a time-consuming material change of the entire system. This is particularly suitable for small powder quantities, research purposes and the qualification of materials. The second expansion module is the heating module, with which the temperature of the build plate can be adapted to the conditions of different materials and components, and residual stresses in the component can be reduced. This is espe-

cially suitable for improving component quality when using tool steels. Both modules can be used to expand the Boldseries from One Click Metal. This offers an easy entry into metal 3D printing and consists of a metal 3D printer, the associated unpacking and screening station, software for data preparation, and a remote monitoring application for observation and control of the print job from any location on a smartphone.

One Click Metal at Formnext 2022:
Hall 12.0, Booth E102



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Frankfurt, Germany,
15 – 18 November 2022

Booth 12.0 B21

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EXHIBITOR NEWS

POROSITY SIGNIFICANTLY REDUCED

Cold Spray Additive Manufacturing technology is particularly attractive for the manufacturing of large parts, which are challenging for today's powder bed fusion-based 3D printing, especially when depositing reactive materials such as Ti-6-4. Up to now



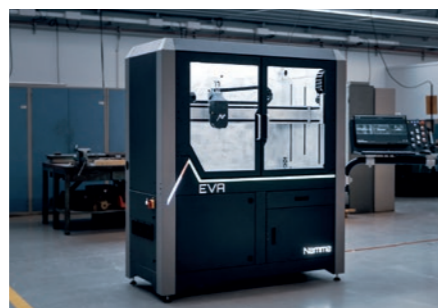
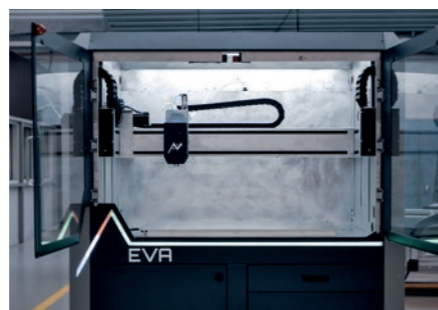
Ti-6Al-4V has been considered one of the most challenging materials in Cold Spray Additive Manufacturing (CSAM) due to the high critical velocities of the materials that have to be overcome during the deposition process. This resulted in porosities in the cold spray deposits of 3% and higher, Impact Innovations GmbH reports. The company has recently developed the CSAM process utilizing the unique combination of cold spray hardware, process parameters & post treatment procedure, thereby achieving porosity levels <0.5% and final mechanical properties exceeding the requirements set out in the ASTM F3001, ISO 5832-3 and AMS 4930 standards. Impact Innovations GmbH has demonstrated its new CSAM process by building a Ti-6Al-4V free-standing turbojet aircraft engine fan shaft. The fan shaft is 380 mm long and 223 mm in diameter at its widest point. It was deposited in about 2 h at deposition rate of 2.7 kg/h. The net weight of the fan shaft after final machin-

ing is 3.2kg. The fan shaft was deposited onto a pre-machined Al alloy mandrel, which was removed after Ti-6Al-4V deposition by chemical dissolution. Subsequently the fan shaft demonstrator underwent dedicated post-treatment processes to achieve the desired mechanical properties, followed by turning to the final outer design and creating the additional features by other conventional subtractive manufacturing processes. The Ti-6Al-4V alloy is typically used in marine and defense applications, for manufacturing aerospace structural parts, gas turbine components and biomedical implants and prostheses.

Impact Innovations at Formnext 2022:
Hall 11.0, Booth C49

THREE-IN-ONE

Namma, a French startup, develops and sells 3-in-1 hybrid machines that combine 3D printing, machining and laser engraving for professionals. At Formnext, the company will showcase its hybrid printer Eva along with a number of new features. In its hybrid machine, Namma combines three manufacturing processes for three application areas (prototypes, tools and finished parts). Thanks to N-Play control software, Eva is easy to operate, the company says. The system can produce parts using 3D FFF printing, offers 3-axis CNC machining as well as laser engraving and laser cutting capabilities. Materials available include polymers, composites, non-ferrous metals and others. At the same time, Namma is developing new tool heads that can be integrated into the Eva machine. In addition to the five existing tool heads (3DF02, CNC11, CNC22, LUV06 and



LUV15), the company launched the 3DF09 this year. With this die head, the startup promises an extrusion throughput of nearly 1 kg per hour.

Namma at Formnext 2022:
Hall 12.0, Booth C39

Photos: Impact Innovations, Namma, Intamsys

EXHIBITOR NEWS

FOR A HIGHER FFF PRINT QUALITY

Intamsys will be introducing its new Funmat Pro 310 desktop printer at this year's Formnext. The printer features a variety of state-of-the-art technologies and completes the existing portfolio by providing the market with new features and applications. As the company reports, Intamsys has developed the printer to quickly respond to the growing demands from professional engineers for higher-quality FFF printed parts and the growing production needs for these parts. The two top-rated features of the Funmat Pro 310 are its thermostatic chamber and its full-size printing capability. The printer's overall sealed thermal insulation design reduces heat loss. The thermostatic chamber can reach up

to 90 °C to realize real engineering plastics in large-scale printing (305*260*260mm). Among other features is an independent sealed drying filament box, combined with the reusable molecular sieve. This ensures long-term low humidity and there is no need to dry the filaments repeatedly. It guarantees the printing quality of easily hygroscopic materials such as nylon (PA). The Funmat Pro 310 has a 7-inch full-color touch screen with a brand-new interface. Premiered at Formnext 2022, availability is currently restricted to a limited number of pre-orders, with the system expected to be made widely available by end of H1 2023.

Intamsys at Formnext 2022:
Hall 11.1, Booth B29



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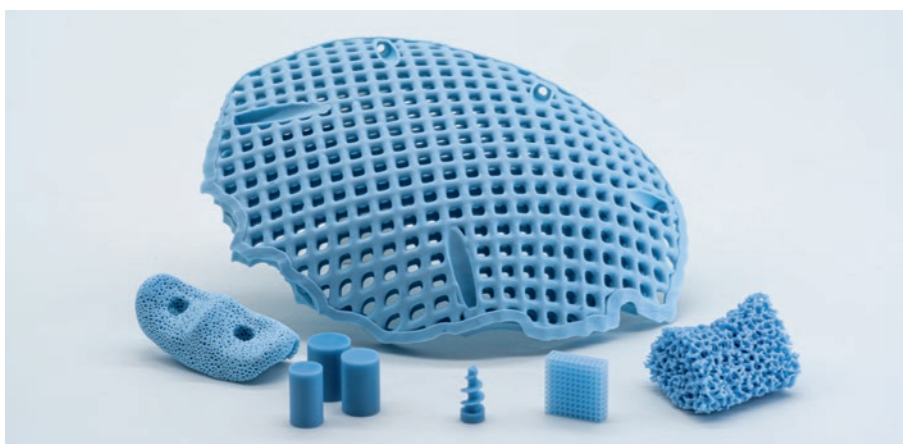
FORMNEXT '22
HALL 11.1
BOOTH C39

EXHIBITOR NEWS

LIS TECHNOLOGY FOR THE »QUEEN OF CERAMICS«

At this year's Formnext, Lithoz GmbH is presenting concrete answers to how 3D printing will disruptively change the ceramic industry. Among other things, the Austrian company, which has around 125 employees, will be showing a bioresorbable ceramic material for patient-specific bone implants for the first time. The CeraFab System S65 ceramic 3D printer is specially designed for productivity-focused industrial requirements. Thanks to intelligent software and precise resolution, even multiple coupled printers reproduce identical parts at all points on their platforms, Lithoz said. At Formnext,

the company will showcase the complex structures and fine details produced by Lithoz LCM System printers. Making its Formnext debut is the CeraMax Vario V900 with LIS (Laser-Induced Slipcasting) technology, which was first presented to the global public in June 2022. This additive process for advanced ceramics was specially developed for the production of large, fully dense parts with high wall thickness and is particularly suited to the additively processing of dark ceramic materials, such as silicon carbide - also dubbed »The Queen of Ceramics« thanks to its properties. LithaBone HA 480 (see picture),



a bioresorbable ceramic for use in patient-specific bone implants in surgery, will celebrate its world premiere at Formnext. The hydroxyapatite-based material degrades completely after use in the human body, saving patients from risky second procedures to remove an implant and thus representing a significant advance in patient safety.

Lithoz at Formnext 2022:
Hall 11.0, Booth B29
Hall 11.1, Booth D39

AUTOMATED CERAMIC PRINTING

With its new C1000 Flexmatic 3D printer, manufacturer 3DCeram has complemented its Smart Ceramic Factory and created the conditions for printing ceramic parts in a semi-automated line. The new development has a build volume of 320 x 320 x 200 mm and can process a dozen different materials such as Si₃N₄, zirconia and aluminum oxide. An optional two-laser version is also available. The French company has put 15 years of experience in ceramic 3D printing into the development with the aim of achieving

automation of the process. This concerns, among other things, the recycling phase of the uncured material as well as the parts cleaning phase. At the same time, 3DCeram promises that parts printed on the C1000 Flexmatic will require little or no support structures.

3DCeram at Formnext 2022:
Hall 11.1, Booth C33



Photos: Lithoz, 3DCeram

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More information www.trumpf.com/s/additivemanufacturing

EXHIBITOR NEWS

HYBRID MACHINE FOR LARGE COMPONENTS

Reichenbacher Hamuel will be presenting its newly developed HybriDX-LT and AMS 400 machines for the first time and demonstrating the functionality of both systems live at Formnext. The HybriDX-LT, developed jointly with Hans Weber Maschinenfabrik, offers a combination of large-format 3D printing and milling post-processing. Reichenbacher Hamuel cites the large print volume and the use of engineering plastics and high-performance thermoplastics as special features. Direct extrusion or FGF (fused granular fabrication) is used as an additive manufacturing technology. In this process, plastic granulate is melted and the component is built up layer by layer. Thanks to the integrated milling unit, the parts can be machined on the same machine. With the AMS 400 equipped with L-PBF technology, Reichenbacher Hamuel

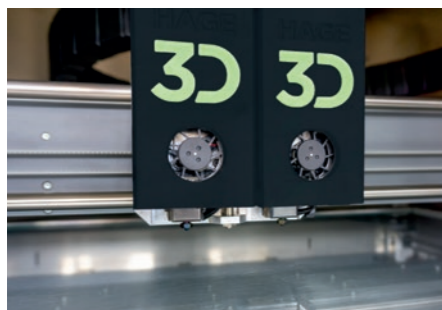
is targeting large build volumes that cannot be realized in a conventional way. With the modular system, a choice can be made between a laser melting system for metal powder and a laser sintering system. The system has an integrated powder preparation and inert gas system (nitrogen N₂). Handling of the compo-

nents takes place outside the installation space, and transfer between the machining processes is fully automatic.

Reichenbacher Hamuel at Formnext 2022:
Hall 11.1, Booth C49



ALSO SUITABLE FOR LARGE FLEXIBLE COMPONENTS



DieHage 3D GmbH has specialized in additive material extrusion for many years. With the new Precise One, the company is presenting a large-volume printer for high-performance materials at this year's Formnext. A core component of the new Hage 3D machine generation is the compact and lightweight DSD (Direct Synchronized Drive) filament print head, for which a patent application has been filed. The system can also process thermoplastic elastomers on an industrial scale - with high printing speed (up to 100 gr / hour) and low shore hardness (up to 65A). This also includes larger components over 400 mm. This is made possible by a number of special features on the print head and in the machine: among other things, the water-cooled filament feed area and the feed or contact pressure of the filament, which can be adjusted at two points. Hage 3D cites com-

ponents with integrated seals or the production of large, flexible elastomer components as possible applications.

Hage 3D at Formnext 2022:
Hall 12.1, Booth E99



Photos: Reichenbacher Hamuel, Hage 3D, Multec

EXHIBITOR NEWS

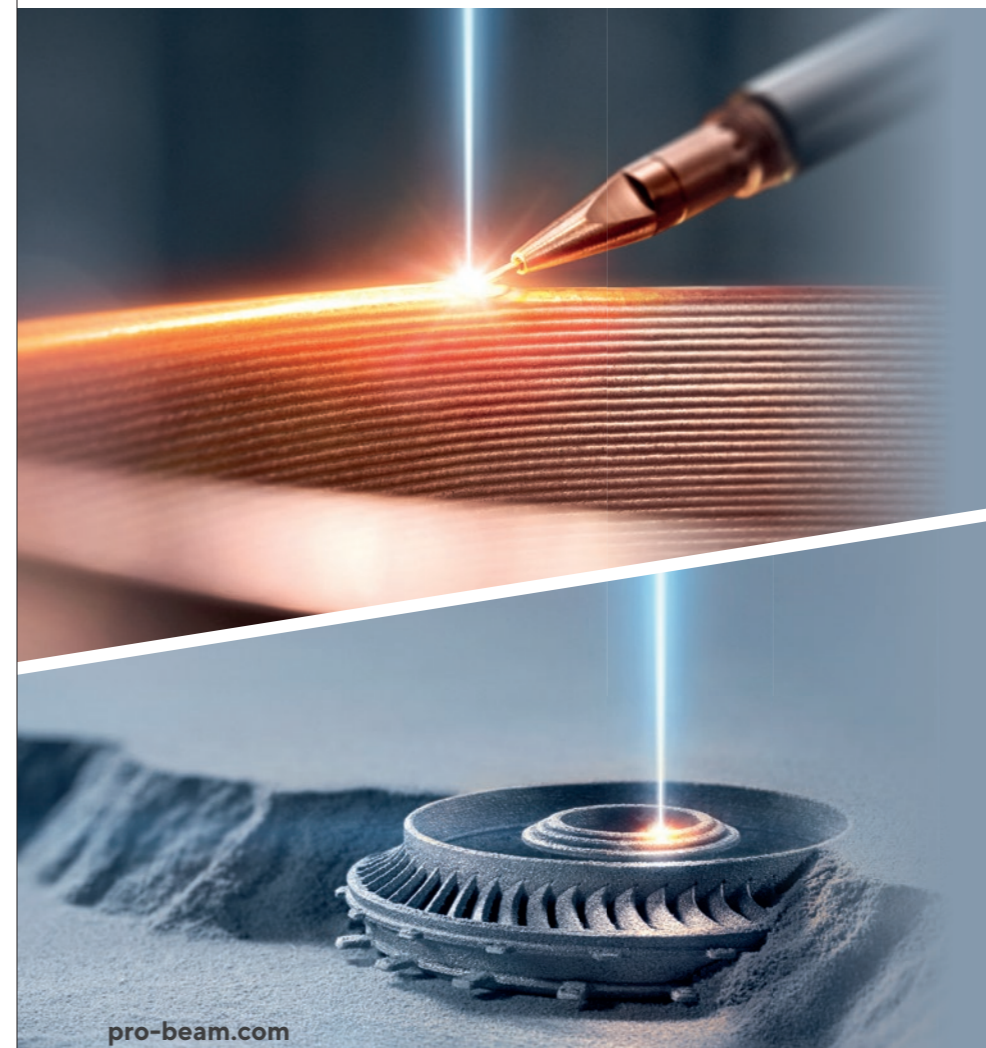
MORE MATERIAL AND MORE APPLICATIONS

With the combination of Siemens control technology and the patented HexaMove 6-fold printhead, Multec aims to set new standards in industrial additive production. In addition to multi-material 3D printing, the new M800S FFF printer scores with deep process control and quality assurance, faster printing and a wide range of applications, the manufacturer says. Multec large-capacity 3D printers have already been used in industry for 11 years, and Multec's patented multiple printhead has been on the market for six years. The advancement to a 6-nozzle printhead reduces ancillary costs and setup times such as nozzle changes and filament loading. Each nozzle is quickly ready for

use and can be combined with other materials or nozzle sizes. Thus, up to 6 materials, 6 nozzle sizes or colors are possible in one printing process. This allows printing of multi-material printed parts and support materials, plus the nozzle combinations reduce production times, according to Multec: large nozzles fill the infill effectively, while small nozzles perfect the outer surfaces. In addition, the continuous printing function allows automatic filament spool changes during the printing process. The Siemens Sinumerik MC in the M800S controls the process while monitoring and regulating the volume flow in real time, resulting in a huge improvement in quality, according to Multec.



Multec at Formnext 2022:
Hall 12.1, Booth E119



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Hall 12.0 / E59

LOOKING FOR MORE PRODUCTIVITY



Whether it is worthwhile to start automating depends fundamentally on what is meant by automation in the first place (see article below) as well as on numerous factors such as the capacities of the company, the standards required, and the complexity, size and number of components. Another decisive point is the company's business case. »Our specialty is the qualification of new industrial applications made from special and new materials. And we have already qualified more than 40 materials in-house,« says Philipp Schwarz, Business Development Manager at Rosswag. »So, we don't have automatic depowdering devices, but we do try to automate the little time-consuming steps because we change the material very often.«

Rosswag's AM division, Rosswag Engineering, was founded in 2014 as part of a century-old supplier of industrial forgings (founded in 1911). It currently operates three SLM 280 from SLM Solutions, one AL3D machine from Alpha Laser and a small-batch gas atomizer from BluePower, plus several CNC machines as well as a fully equipped material laboratory. When asked what exactly the »little time-consuming steps« are, Schwarz responded that they include powder transport, quality assurance in serial production and data preparation.

FORMULA 1 AND OTHER INDUSTRIES

The degree of automation in additive manufacturing is significantly higher at Sauber Technologies (Hinwil, Switzerland), a

We've heard it many times: Automation is part of the future of additive manufacturing. In the metal sector too, manufacturers of AM hardware offer equipment and systems designed for automated production - in some cases there are even concepts for entire factory halls. From a marketing point of view, a lot is possible - but what does reality look like on the shopfloor? We investigated this question and asked leading manufacturers and service providers.

medium-sized service provider that produces components for the Alfa Romeo Orlen F1 team as well as for several clients from various industries. By partnering with Additive Industries, a machine maker that in recent years has been channeling efforts toward automated systems such as the newest MetalFAB2, Sauber Technologies decided to go all-in on automation. Their initial reason was a rather pragmatic one. »Productivity and efficiency are a must to reduce the cost per part and guarantee repeatable quality at an absolutely top level,« Christoph Hansen, COO, told us. »So, we were always looking to have the highest degree of automation available on the market.«

Sauber Technologies operates more than 20 machines and offers a variety of services

Text: Luca van der Heide

Photos (5): Sauber Technologies



Looking for the highest level of automation: In 24/7 operation, Sauber Technologies can produce series parts with annual quantities of 10,000 and more.

around additive manufacturing. Processes and even laser parameters are tailored to meet the highest standards. According to a company statement, the combination of this approach and the infrastructure – including hot isostatic pressing (HIP), a team of AM design experts and the latest infrastructure for post-manufacturing – is making Sauber »a power user of additive manufacturing«. The production machines run autonomously with automatic job handling: The build plates are placed and removed by a robot, and the next job starts automatically. The machines themselves remove the powder and recycle it under inert gas without any manual labor involved. Even fully automated heat treatments are executed in the system. Multiple independent build chambers and a movable optical unit equipped with 4 lasers enable 24/7 operation. This

allows Sauber to manufacture serial production parts with annual quantities upward of 10,000.

»Our strategy is to focus on regular industry, like packaging and other machine manufacturing companies,« said Hansen when asked about the demand for serial production in AM. This is possible when we're dealing with smaller, less complex components. It's a different story, however, when it comes to the larger components in more demanding industries.

LARGE, COMPLEX PARTS AS A CHALLENGE

Production companies with large machine parks – such as Beamit, which counts approximately sixty machines spread between their seven plants in Italy and the UK – need to have a very varied assortment of machines, »





A specialized team of AM design experts and the latest infrastructure for post-processing make Sauber, according to its own statements to be a »power user of additive manufacturing«.



each with their specialties and strong points, each serving different needs. »The real challenge is big, complex parts,« said Andrea Scanavini, General Manager at Beamit. »In its current state of development, automation is not yet advanced enough for extremely demanding applications – sometimes involving large sizes – in which the printing phase represents only a small percentage of the overall process.«

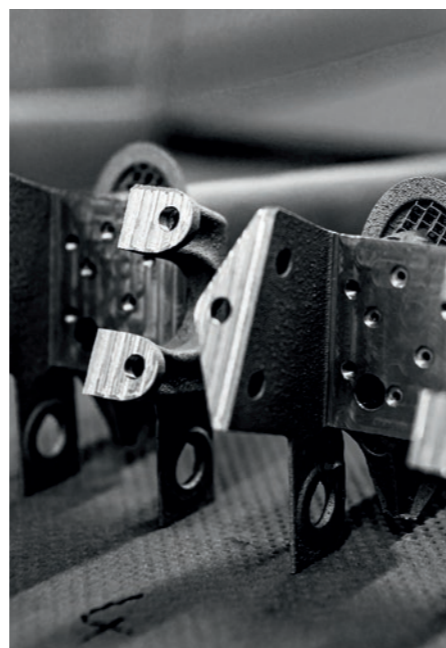
The situation is particularly tricky in aerospace, which was the first market to approach metal AM and remains to this day one of the larger – if not the largest – sectors for a big metal AM provider like Beamit. This is where the really complex projects come in, with big parts that might take ages to print and, more significantly, have incredibly strict quality

standards. Standards, in fact, are a huge hurdle: Only a few big service providers today have the NADCAP certification necessary to produce parts for aerospace.

THESE COMPANIES AT FORMNEXT 2022:

- Rosswag: Hall 12.0, Booth D21
- Beamit (Sandvik): Hall 11.0, Booth D21
- Additive Industries: Hall 11.0, Booth D11

+ FURTHER INFORMATION:
» formnext.com/fonmag



Text: Luca van der Heide

Technical range of automation in metal printing

When we use the term automation, we are not referring to end-to-end, swift automated workflow without any human input. This is merely a much heralded vision that still remains an ambitious goal. What we are really talking about is automating certain steps: we can therefore speak of different degrees of automation, or semi-automation.

To realize this vision, big providers like Beamit are investing in machines that are designed to fit within a vision of end-to-end automation. At the same time machine makers like EOS, GE Additive and Additive Industries, among others, are developing modular printers. The idea behind these machines is that, instead of replacing old machines with new, more productive ones every time a company decides to scale up, the systems are built in »modules«. Modules can be added to and removed from a pre-existing production chain, making it possible to implement new modules with increasingly automated technologies with the goal of growing an automated production chain incrementally and scaling production.

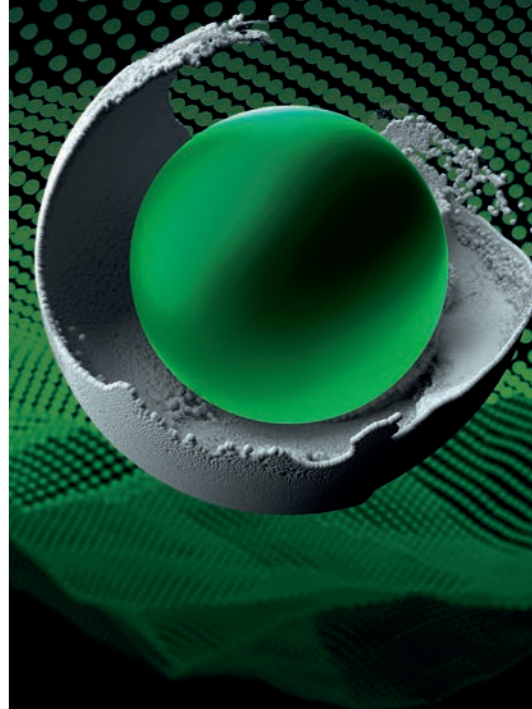
Today, most of the printers themselves are considered semi-automated. This means they can run autonomously until job completion. Powder handling can be automated in varying degrees by having machines for automatic unpacking and sieving. Closed loop powder handling is a popular solution whereby the powder is contained entirely within the machine at inert gas conditions and is then fed automatically into the printer. This is useful and safer because the operator doesn't need to be in contact with the powder.

Automatic depowdering or unpacking is another feature that is often included within semi-automated printers. From there, a company can then decide whether to opt for robot handling for exchanging build plates along with automatic transport between stations using AGVs - although most production companies still have operators moving the parts themselves.



Photo: Rosswag

The AM department at Rosswag wants to automate »the small, time-consuming steps«. The machinery includes three SLM 280s from SLM Solutions, an AL3D from Alpha Laser and a small-batch gas atomizer from BluePower, as well as CNC machines and a materials lab.



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EXHIBITOR NEWS

FAST AND PRECISE COATING

With the Dynamic Material Deposition process developed by Ponticon, alloys of any elemental composition can be deposited on metallic and ceramic components. In contrast to conventional laser deposition methods, in the DMD process the metallic powder is already molten when it reaches the surface of the substrate upon which it is deposited in successive layers. Ponticon will introduce its new pE3D system for Dynamic Material Deposition (DMD), a process developed for additive manufacturing, coating and repairing complex-shaped metallic workpieces. According to Ponticon, the new system combines high process speed with utmost precision and flexibility in terms of the choice of alloying elements. At Formnext, Ponticon will showcase a pE3D system of five-axis design. Its high-speed parallel kinematic system is equipped with an additional turning and tilting device to be able to deal with the most complex of geometries. In its standard design, the machine can handle component weights of up to 500 kg. When the system is used for pinpoint repairs of components damaged as a result of broken-off

metal or worn metallic surfaces, the sensors initially capture the as-is component geometry. Based on these data, the CAM software plans the path for the repair process, which requires the nozzle and the workpiece carrier to be precisely aligned to one another. Once in the aligned position, the system starts to apply the new material onto the workpiece. As the heat transfer into the base material is minimal, the material properties of the repaired components are not affected during the process. »Our pE3D



machines have passed the acid test in various near-industry-scale projects performed by several renowned research institutions. 2023 will see the first machines go into operation in industry,« says Tobias Stittgen, Managing Director of Ponticon GmbH.

Ponticon at Formnext 2022:
Hall 12.0, Booth D39

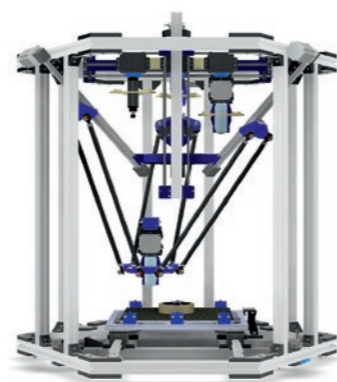


HYBRID WITH NINE TOOLS

The Ukrainian-German startup SmartZavod has developed the first prototype of its fully automated hybrid 3D printer CEH1 and is presenting it at Formnext at the Bayern Innovative booth. In the next step, the young company plans to further develop the prototype into a hybrid manufacturing cell and to build up a service model based on HaaS (Hardware-as-a-Service). SmartZavod is a technology startup founded in 2020 by Oleksii Solntsev (CEO) and Anton Yakhno (CTO) with the stated aim of launching the world's first fully automated hybrid 3D printer. The startup, which is currently raising investor funds, now has seven employees - all students or graduates of the Igor Sikorsky Kyiv Polytechnic Institute

(Ukraine). According to SmartZavod, what sets the CEH1 apart from existing printers is an automatic tool changing system with up to nine tools for different tasks (precision printing, high-performance printing, 3D printing & automatic post-processing, among others). The printer is equipped with an automatic material changing system and holds up to 15 kg of raw material. In addition, SmartZavod is developing an automatic printing system for continuous printing and automatic surface cleaning.

SmartZavod at Formnext 2022:
Hall 12.1, Booth C71



Photos: Ponticon, SmartZavod, Q.big 3D, Rapid Shape, Lynxter

EXHIBITOR NEWS

QUEEN 1
CREATES BIG THINGS

Q.big 3D GmbH, a developer of large-format granular 3D printers for industrial applications, will present the Queen 1 printer at Formnext 2022. The VFGF (Variable Fused Granular Fabrication) process developed by Q.big 3D uses high-resolution printing only where necessary. Inner structures are filled with a higher material throughput. This allows even large-volume prints to be made up to 100 times faster, the company says. According to Q.big 3D, this enables the use of additive manufacturing technologies in entirely new fields of application and lowers costs through the use of inexpensive plastic granules. In particular, the manufacturer sees potential applications for the Queen 1 granulate 3D printer in plant and mechanical engineering, in the automotive sector for commercial vehicles and agricultural machinery, and



in the field of ergonomic and medical technology products.

Q.big 3D at Formnext 2022:
Hall 11.1, Booth C69

7-METER-LONG ADDITIVE PRODUCTION LINE



Rapid Shape demonstrates up to five units connected in series with its new »RS inline« production line. The 7-meter-long modern production line can continuously 3D print thousands of individual parts using Digital Light Processing (DLP) and continue to process them gently and in a time-saving manner until they are removed. Rapid Shape's patented force feedback technology makes it possible to measure the forces acting on the part and provide real-time data for the control system. At Formnext, the company will use it to print industrial parts for the automotive industry in a live demonstration. In addition, Rapid Shape will show the fully automated »I50+« 3D printer.

Rapid Shape at Formnext 2022:
Hall 12.1, Booth C41

PRINTING COMPLEX
FILAMENTS EFFICIENTLY

The French company Lynxter presents its new FIL21 Direct Drive printhead. This technology is a 3D printing configuration where the extruder motor is placed directly above the heater block. Decreasing friction, reducing filament clutter, and increasing throughput results in faster, more efficient, and more reliable printing. The toolhead completes Lynxter's FIL arsenal (FIL11 and FIL33) for its modular S600D 3D printer and opens up opportunities for new material families. According to Lynxter, this new tool enables easy printing of complex filaments such as metal/ceramic filaments (alumina, zirconia, 316L) as well as flexible filaments such as TPU, TPE, TPC. The FIL21 can print wider and denser layers, which leads to a reduction in the number of printing layers and thus to additional time savings. 3D printing is precise, fast, and easy. Offered with preconfigured print settings for plug & play use, FIL21 stays true to the Lynxter ecosystem as it can be easily configured. The new toolhead can handle technical ceramics such as Alumina and Zirconia quickly and cleanly. These materials are used by major sectors of industry (aeronautics, space, automotive, health, etc.) for their properties and technical performance: resistance to high temperatures, resistance to abrasion, chemical inertness, or electrical insulation.

Lynxter at Formnext 2022:
Hall 11.1, Booth E02



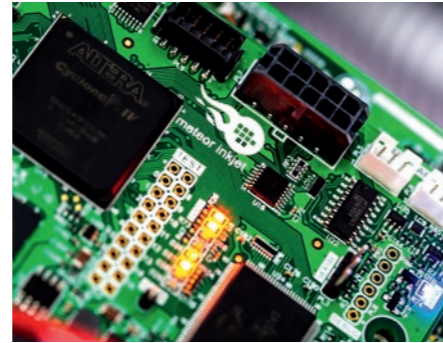
EXHIBITOR NEWS

LARGEST SELECTION OF DRIVE ELECTRONICS

Meteor Inkjet Ltd will be exhibiting a comprehensive range of solutions for additive manufacturing printing systems at Formnext 2022, including the world's largest selection of drive electronics for all major industrial inkjet printheads. Also on display will be turnkey digital front ends that integrate with off-the-shelf 3D build tools, software development kits that can be used to build custom printers, and a full range

of tools and services for print system development and optimization.

Meteor Inkjet at Formnext 2022:
Hall 12.0, Booth B12



3D PRINTING WITH A CLEAN ATMOSPHERE

Bofa will be showcasing its latest innovations in 3D printing filtration and atmosphere management at Formnext 2022, including an enhanced capacity 3D PrintPro 4 and its new 3D PrintPro HT (high temperature) alongside the established 3D PrintPro range. The AM 400 system will also appear in the line-up, featuring Bofa's revolutionary Intelligent Operating System (iQ). 3D PrintPro 4 has been enhanced to support fused deposition modelling, stereolithography, digital light processing, and material jetting. It can manage multi-unit operations thanks to a high capacity filtration system while delivering

optimal temperature control. Effective airflow management contributes to an odorless workplace environment. The new 3D PrintPro HT uses advanced electronics components, thermal insulation and innovative air management to deliver high levels of filtration in high temperature chambers. The AM 400 system features patented technology enabling the safe removal and exchange of filters exposed to potentially harmful gases and particulate resulting from metal additive manufacturing processes, which could otherwise risk a thermal event. Bofa International launched in 1987 as a small family business and has developed

into a multi-award-winning global leader in portable fume extraction and filtration. It now employs over 260 people at its headquarters in Poole, Dorset, and in offices in Germany and the USA, and exports to 120 countries around the world.

Bofa at Formnext 2022:
Hall 12.0, Booth E18

IN FUTURE ALSO WITH SERVO

ViscoTec Pumpen- u. Dosiertechnik GmbH has upgraded its 1k-vipro-HEAD in the 3/3 and 5/5 versions. The engineers took their cue from the established 2k-vipro-HEAD pressure heads and adapted the design and drive technology. As a result, the 1k-vipro-HEAD also offers a controlled system and a more modern design. In addition, after the upgrade, a servo motor will replace the stepper motor previously used for



the 1k-vipro-Head printheads. Furthermore, a heatable printhead variant is also available as an option.

ViscoTec at Formnext 2022:
Hall 12.0, Booth B78

Photos: Meteor Inkjet, ViscoTec, DMG Mori, ULT

EXHIBITOR NEWS

HYBRID MANUFACTURING WITH BLUE LASER

With a newly developed blue laser for Lasertec DED hybrid machines and improved features for the AM Assistant, DMG Mori will be showing innovative solutions for additive manufacturing at this year's Formnext. The blue laser newly developed by DMG Mori for Lasertec DED hybrid models has a wavelength of 450 nm and is characterized by optimal absorption behavior. This is an advantage especially with reflective materials such as copper. The absorption rate in this case is 44 percent – compared to two percent for infrared light. In additive manufacturing it is crucial to continuously monitor and control the important process variables in order to achieve optimal and, above all, verifiable workpiece quality. The AM Assistant, a combination of hardware and software for

Lasertec DED and Lasertec DED hybrid machines, monitors process variables such as laser power, powder mass flow, shielding gas, and melt pool temperature.

DMG Mori at Formnext 2022:
Hall 12.0, Booth D139



CONTAMINATION-FREE FILTER HANDLING

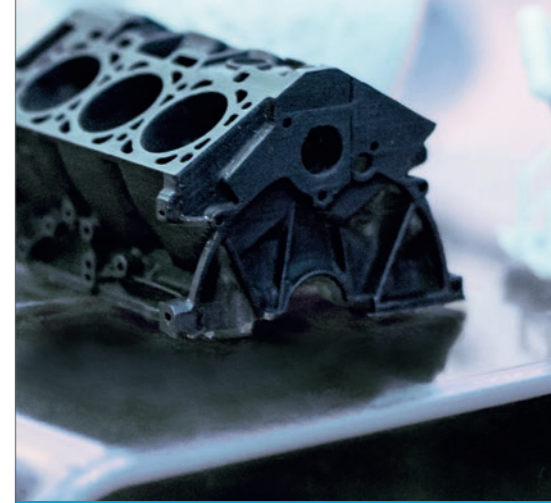
ULT has developed a solution for flexible process gas cleaning as well as concepts for dust removal in post-processing and is presenting them at Formnext. The brand-new AFM 200 system concept for process gas cleaning has a small installation space and is based on a modular concept.

According to ULT, this can be adapted to almost all technical requirements in metallic LPBF 3D printing and provides scalable air volumes. ULT cites contamination-free filter and powder handling as an important advantage of the AFM 200. As an option, the system can be delivered with a newly developed system control. In addition, the company, which has been involved in extraction and filtration for industrial 3D printing for more than 20 years, will be showing solutions for efficient dust and particle extraction during post-processing. The focus is on capturing all airborne pollutants, including fine dusts.

ULT at Formnext 2022:
Hall 11.0, Booth B18



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EXHIBITOR NEWS

ONE EXPOSURE FOR ENTIRE PRINT LAYER

Direct Image Sintering, DIS, is Visitech's new DLP-based polymer powder bed fusion concept. At Formnext, the company will demonstrate how the build area, speed, and mechanical strength of printed parts are increased by use of the LRS-MCx WX NIR Light Engines, comprising an integrated laser diode with multiple benefits. The integrated NIR laser diode light source is all-new. The integrated, pre-aligned, and calibrated IngnitIR diode module yields maximum control in throughput while safeguarding essential system components such as the DMD. Visitech's new DIS concept uses DLP and powerful IR laser diode arrays to substantially increase print speed, resolution, and build area com-

pared to traditional polymer PBF methods. Exposing the entire print layer in one shot is the critical driver when it comes to build speed. Visitech will also introduce two other new subsystems for additive manufacturing at Formnext. The first is the LRS MCx 4K, a light engine with native 4K resolution for UV-AM applications. In addition, Visitech will demonstrate the LRS 8KA, the world's first 8K projector supported by a conceptual actuator.

Visitech at Formnext 2022:
Hall 11.1, Booth D68



FROM SHOE MODEL TO FASHION SHOW

At DWS, the launch of the new Invicta Sketch and Flexa Digital TPU materials is associated with the »introduction of a new way of thinking about the industrial process«. By this, the Italian supplier of 3D printing systems, materials and software means taking into account all the production requirements of 3D printing, from design to final product. According to DWS, Invicta Sketch is particularly suitable for low-cost and fast designs - for example, of shoe models. With Flexa Digital TPU, the company is responding to the increased need for flexibility, especially in the fashion world. Here, trends are constantly changing, and production must meet exacting demands when new products are launched. According to DWS, Flexa Digital TPU is a functional material that is suitable for fitting trials, fashion shows and pre-series through to complete production runs. In addition, the material could find applications in the automotive, racing, defense and aerospace industries, the company says.



DWS at Formnext 2022:
Hall 12.1, Booth C20

Photos: Visitech, DWS, Indutherm, Xioneer

EXHIBITOR NEWS

FINEST PLATINUM POWDER AT 2,100 °C

Blue Power has now launched new high temperature gas atomization systems for platinum and other high melting alloys. The gas atomizers of the AUG series now being presented bear the suffix HTC+ in their names. Their induction melting system reaches a maximum temperature of 2100° C. Oxidation-free processing in the closed-chamber machine by means of degassing, vacuum and protective gas features guarantees maximum purity of the produced powder, Indutherm says. The AUG HTC+ produces fine powders <20 µm from high melting special alloys, e.g. based on platinum or chrome for a wide range of powder applications such as LPBF, LAM, MIM, Binder Jetting and more. Three different AUG versions are available in the HTC+ specification, offering capacities from ≈ max. 6 kg Pt (AUG 500 HTC+) to ≈ max. 70 kg Pt (AUG 3000 HTC+). The final atomization tests with up to 20 kg of 950 PtCu, 950 PtRu, 900 PtRh and with pure platinum showed high process stability and excellent results in terms of particle size distribution, purity and flowability. This opens



numerous new application possibilities in watch and jewelry production, medical technology, aerospace and many other fields.

Indutherm at Formnext 2022:
Hall 12.0, Booth D18

EFFECTIVE ADHESION TO PLA

Xioneer is expanding its product range with the new water-soluble FFF support materials Xioneer PVA and BVOH. Xioneer will offer these materials as 1.75 mm filaments wound on 500 g spools. According to the manufacturer, Xioneer's PVA and BVOH offer particularly effective adhesion to PLA. They will be showcased for the first time at this year's Formnext. According to Xioneer, the materials can be dissolved in water, allowing them to be disposed of down the household drain. PVA and BVOH can be used on most FFF dual-print desktop 3D printers. Xioneer will also introduce the new FX65 removal station within the Vortex Pro series. The Vortex Pro series, with its technology for faster support removal

using a patent-pending rotating drum, was introduced last year. The FX65 is an automated industrial support removal device for larger production volumes than its predecessor, the FX29. It features stainless steel construction, a variety of new features and a graphic display. Xioneer also has its online store for B2B and B2C customers on display at Formnext. The new store has been designed with a new look and intuitive navigation.

Xioneer at Formnext 2022:
Hall 12.1, Booth E121



EXHIBITOR NEWS

MORE EXPERTISE FOR MEDICAL DEVICE INNOVATIONS

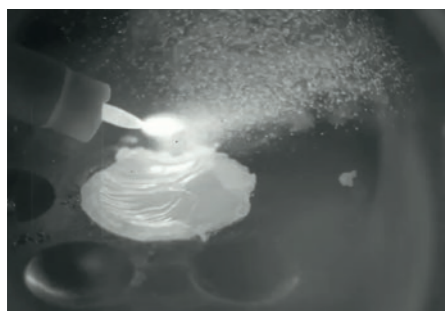


To support companies in their adoption of 4Degra, 4D Biomaterials will launch their new support services and 4D Design facility based in Nottingham UK. »We found that most of our early customers wanted to exploit the advantages of 4Degra in exciting new medical device innovations, but they didn't know how,« explains CEO Phil Smith. »The combination of our material's unique properties and the freedom of design enabled by AM presents a new world of opportunities in medical device innovation but requires specialist knowledge and technology access to realise«. The 4D Design facility brings together a dedicated team of mechanical, design and bioengineering experts with access to cutting edge 3D CAD, simulation, and analysis software, alongside macro and micro scale 3D printing hardware. The facility has extensive post-processing

and mechanical testing capabilities enabling implantable devices to go from ideation to prototyping within a matter of weeks. One recent example of 4D Design is a project undertaken by 4D Biomaterials to develop a resorbable ACL interference screw used to fixate ligament grafts in the knee. Examples of the ACL interference screw along with a range of other bioresorbable medical devices will be on display at Formnext 2022.

4D Biomaterials at Formnext 2022:
Hall 11.1, Booth A39

FINEST POWDERS THANKS TO ULTRASOUND



The Polish company Amazemet is coming to Formnext with an improved version of the Repowder ultrasonic atomizer. Unlike other atomizers, Repowder enables the production of metal powders in batches ranging from a few grams to several kilograms, the company says. Various starting materials such as failed prints, rods, wires and others can also be used. »So far, Repowder has allowed us to apply for over 30 scientific projects, and the goal of our work is for this number to rise constantly,« says Łukasz Źrodowski, inventor and CEO of Amazemet. The new features include an automated wire feeder, a powered rod feeder, a new HMI with enhanced capabilities, and a redesign of the suction casting module. An additional 60 kHz ultrasonic frequency for even finer powder particles is currently being developed. The new ultrasonic atomizer can be operated with three heat sources (induction, arc and plasma) and allows atomization of any alloy with a melting point between 200 and 3500 degrees Celsius.

The particle size distribution is adjustable in the range of 30-120 µm by changing the ultrasonic frequency. Furthermore, Amazemet offers additional modules e.g. for alloying or casting. Amazemet is a spin-off company of Warsaw University of Technology and focusses on solutions for metal 3D printing research and industry. Apart from Repowder, the current product range includes SafeEtch, a device for automated support removal from metal printouts, and Infurner, a compact high vacuum furnace.

Amazemet at Formnext 2022:
Hall 12.0, Booth E21

Photos: 4D Biomaterials, Amazemet, Smart Materials 3D

EXHIBITOR NEWS

OLIVE PITS MAKE PLASTICS MORE STABLE AND DURABLE

With its »Olive« project, Spanish company Smart Materials 3D has focused on developing plastics in the form of environmentally friendly pellets and filaments for 3D printing. These materials integrate organic waste from olive cultivation into biodegradable polymer matrices. Compounding is about improving various material properties by modifying the polymer components. Industrial or agricultural waste is used in the process. According to the Spanish company, biopolymers currently account for 1 percent of plastics produced worldwide, but show annual growth rates of 20 to 30 percent. In the long term, this could make them a real alternative to the usual plastic made from petroleum derivatives. As a raw material for its olive filaments, Smart Materials 3D uses polylactic acid (PLA), which is obtained by fermenting sugars of plant origin. The waste comes from olive production in the province of Jaén, which is the largest olive producer in the entire region of Andalusia (Spain), with more than 630,000 hectares under cultivation. In the production of olive oil, the by-product is the olive pit, which is usually thrown away, burned or used as fuel for heating. Due to the



enormous amount of olive pits in the province of Jaén alone, Smart Materials 3D sees great potential in this resource for the production of filaments and pellets. In this context, the kernels provide more dimensional stability and improve mechanical properties, durability and biodegradability. In addition to olive pits, the Spanish company, which says it is one of the largest filament manufacturers in Spain, also uses other organic by-products such as oysters, wood, cork, coffee or rice to develop customized materials for 3D printing. Carbon fibers, graphite, ceramic fibers, glass as well

as metallic fillers and polymer fibers can also be integrated to make the material more durable and processable.

Smart Materials 3D at Formnext 2022:
Hall 12.1, Booth G19

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FORMNEXT PURMUNDUS CHALLENGE

Making colors tangible

The purmundus challenge ideas competition has been honoring creative concepts and product ideas for ten years. This anniversary will be celebrated at Formnext with a festive reception and a special show entitled »Best of 10 Years«. This will show a selection of the winners of the past years and also provide insights into how good product ideas can be successful beyond that. One example is the tactile color compass with 3D printed surfaces, which opens up a wide range of applications in education and inclusion. Blind and visually impaired people often experience a lack of diversity and depth in inclusion. Sylvia Goldbach and Eric Bahr consider the current state of haptic education and inclusion to be in need of improvement - and as designers and developers under the Taktilen brand, they see themselves in a position to bring about a decisive change. With the necessary know-how as well as access to appropriate 3D and digital printing technologies, they are developing their tactile color compass. One aspect of their mission: to make colors tangible. Sylvia Goldbach is Taktilendes-

sign GmbH's CEO and designer. In her work, she has built up extensive expertise in additive manufacturing and surface textures. After winning the Special Mention award at the purmundus challenge 2020 (under the auspices of cirp), the Taktilen team continues to work on the practical use of its navigation system. Ms Goldbach explained that advances in the development of 3D printing technologies software and materials coupled with intensive networking had led to a steady, positive development. As part of the »Amazons of Pop!« special exhibition at the Kunsthalle von Kiel and in the permanent exhibition at the »Museumsberg Flensburg« museum, Taktilen not only brings blind and visually impaired people closer to the works of art. The haptic experience can also be a valuable addition to visual perception for sighted people, says Sylvia Goldbach.

Also on display will be the patented pointe shoe that Act'ble developed with leading dance physicians and research institutes. The 3D-printed recyclable sole lasts an average of 5 times longer than conventional shoes and

drastically reduces health risks. In the coming years, the products will be developed both sustainably and circularly based on the growing global dancer database.

purmundus challenge at Formnext 2022:
Hall 12.1, Booth C01



PROGRAMMING THE POST-PROCESSING



Open Mind's trade show appearance at Formnext will focus on the Hypermill Additive Manufacturing CAD/CAM solution and use of the digital twin with Hypermill Best Fit. The solutions will be demonstrated with examples from medical technology, aerospace and others. Hypermill Additive Manufacturing enables highly complex 5-axis simultaneous machining for DED and WAAM. Material application can be programmed with the software and automatically simulated for collision avoidance, according to Open Mind. In the PBF process, for example, Hypermill can be used in post-processing to program the removal of support structures in the 5-axis machining

process. Hypermill Best Fit is also used in post-processing. When a part with a small dimension is aligned in the machine tool, the CAM system automatically aligns the NC program to the part position. The corrected NC code is then simulated in the virtual machine on the actual fixturing situation and automatically optimized.

Open Mind at Formnext 2022:
Hall 12.0, Booth A39

EXHIBITOR NEWS

Photos: Taktilendesign, Open Mind, 1A Technologies, Arburg

EXHIBITOR NEWS

3D PRINTING AND MILLING IN A SHIPPING CONTAINER

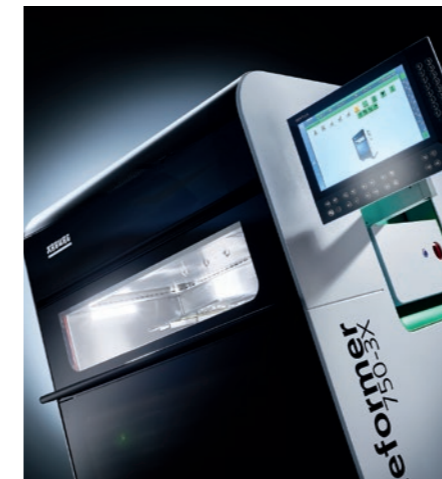
Location-independent use and flexible manufacturing: The Mobile Smart Factory wants to write a special story in the field of hybrid manufacturing. And the developers promise the simplest possible operation - hybrid manufacturing at the push of a button, so to speak. This push of a button is delivered by 1A Technologies in cooperation with Moduleworks GmbH. Using the HY5CAM software, components are to be manufactured and repaired both additively and subtractively, regardless of the kinematics and technology used. The cooperation started with a customer project with Bionic Production GmbH: The »Mobile Smart Factory« is a production environment in a container. This allows components to be manufactured at the customer's site or on the way there (by ship or rail), regardless of outside conditions, using only an external power supply of 63 amps. The WAAM

process or Wire-DED is used in combination with milling including automatic tool change. 1A Technologies sees applications for the Mobile Smart Factory primarily in the rapid delivery of small quantities of individual components. One example is the housing of a windshield wiper motor of an ocean-going vessel, which had to be replaced due to corrosion in order to be able to guarantee the safe continuation of the journey. After a CAD model of the component had been created in the container, additive and subtractive programming followed using HY5CAM. Manufacturing took place at the heart of the Mobile Smart Factory: a hybrid parallel kinematic 6-axis machine tool of the type P700 from Metrom Mechatronische Maschinen GmbH. The WAAM process was followed by mechanical milling and drilling tool machining on the same machine.



Moduleworks: Hall 11.0, Booth A29
Bionic Production: Hall 11.0, Booth B48

PART CARRIER 2.5 TIMES LARGER



printer. The large build envelope of the Freeformer 750-3X is particularly suitable for rapid series production of large components or several articles per build job.

The principle of material preparation remains the same, but the entire system - preparation and discharge units - has been optimized so that the new unit could be designed more compactly. From a strictly external point of view, the freeformer 750-3X cannot be distinguished from the 300-3X, as it has the same external dimensions. However, the part carrier is around 2.5 times larger at around 750 square centimeters. The significantly enlarged build chamber measuring 330 millimeters x 230 millimeters x 230 millimeters, in which, incidentally, the temperatures are kept stable without any special air flow or circulation, is the result of several technical innovations. These include optimized melt pressure generators for dosing and injecting.

This allows the three discharge units to be positioned more closely to each other and in a more compact way. Due to advanced software features of the control system, it was possible to increase the printing speed considerably. In addition, the Freeformer 200-3X »soft« is particularly suitable for processing soft materials such as TPE in a wide range of shore hardnesses. Also represented at the Formnext booth is Arburg family member Innovatiq. Its systems process FFF filaments (Fused Filament Fabrication) or LSR (Liquid Silicone Rubber) using a patented process. The new TiQ2 filament printer for industrial applications will be presented at the trade show.

Arburg at Formnext 2022:
Hall 12.1, Booth D61

Arburg is coming to Formnext with the new Freeformer 750-3X. Its build chamber is around 2.5 times larger than that of the Freeformer 300-3X. The company will also be presenting the new Innovatiq TiQ2

EXHIBITOR NEWS

NEW STEELS FOR COLDMETALFUSION

Headmade Materials GmbH qualifies two new materials for ColdMetalFusion. The new materials 17/4PH stainless steel and M2 tool steel will be exhibited for the very first time during this year's Formnext. Headmade's newly developed M2 tool steel exhibits an ultra-high wear resistance and hardness, which makes it the perfect material for the production of high-wear tools, molds and a wide variety of other applications. According to the company, the main use of tool steels continues to be in the manufacture of various cutting tools. Typical applications for M2 high-speed steel are twist drills, reamers, broaches, taps, milling tools and metal saws. M2 is suitable for cold forming tools

such as extrusion punches and dies, which are also widely used in all kinds of cutting tools, knife and punching tools as well as die applications, plastic molds with increased wear resistance and screws. The second newly qualified material is 17/4PH stainless steel. It provides high strength combined with good wear resistance thanks to its main alloying elements chromium (~17%) and nickel (~4%). 17/4PH stainless steel achieves tensile strengths of 1,320 MPa and elongation of up to 12.9% in the ColdMetalFusion standard after heat treatment. 17/4PH has magnetic properties. Stainless steel 17/4PH is therefore ideally suited for use in many industries, such as medical technology, (e-)mobility,

mechanical engineering or maritime applications, where corrosion resistance combined with good mechanical properties plays a significant role. In October, Headmade Materials announced its move to join the ColdMetalFusion alliance together with other major industry players.

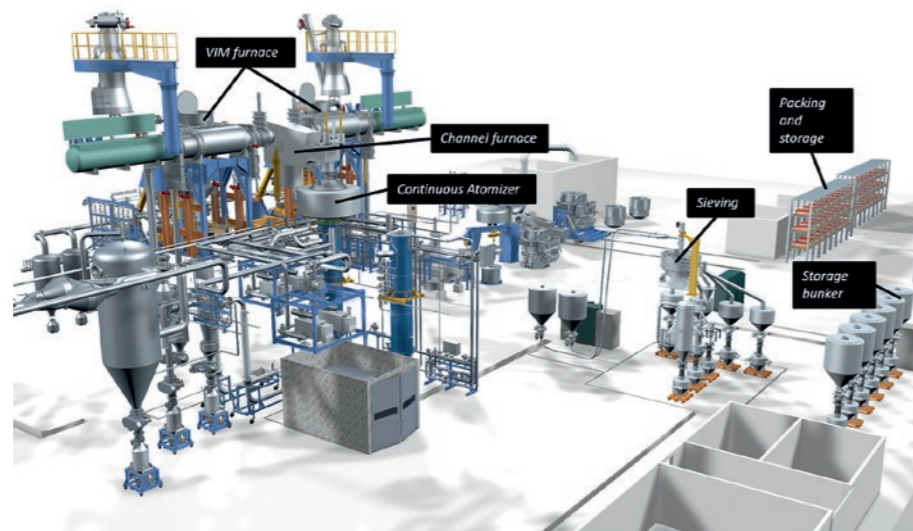
Headmade Materials at Formnext 2022:
Hall 11.1, Booth D48

CONTINUOUSLY INSTEAD OF BATCH-WISE

In addition to conventional gas atomization plants, the SMS group, together with a customer, has developed another highly innovative powder production process. The conventional batch-wise process is transformed into a continuous process. The Continuous Powder Production Plant enables cost-effective and large-scale production of up to 4,000 tons per year, thus more than doubling capacity compared to the traditional gas atomization process. The integrated plant was developed to meet the rapidly growing demand for metal powders and the growing cost expectations in the market. According to SMS group, production costs for spherical, high-quality metal powders are significantly reduced. The system will be presented to the AM world for the first time at Formnext 2022. In the new process developed by SMS group, two large Vacuum Induction Melting (VIM) furnaces continuously hold liquid melt, which is atomized successively through the nozzle. The nozzle can be exchanged during operation. Melting is done under vacuum to guarantee highest quality levels like in the conventional process. In addition to the VIM route, where pure scrap is used as feedstock, the new

process can also work with an existing liquid material supply. A metallurgical route with basic scrap as feedstock is also possible. The new process is backed up by an intelligent powder handling and storage system as well as an automatic packaging solution. A scrap warehouse and a packaging area complete the integrated factory solution.

SMS group at Formnext 2022:
Hall 12.0, Booth A118



Photos: SMS group, Flow Science

EXHIBITOR NEWS

CUSTOMIZED AM POWDERS

The PometonPlus AM division of the Italian metal powder manufacturer Pometon will present the production of customized AM powders with VIGA and EIGA technology at this year's Formnext. The company has developed an electrode inert gas atomization (EIGA) process - a crucible-free technology used for reactive metals. The powders produced by the EIGA process are characterized by excellent chemistry and flowability, and have a very round morphology and a very high bulk density.

Thanks to the EIGA process, the content of oxygen, nitrogen and hydrogen is low, which improves the mechanical properties of the components. Thus, PometonPlus delivers high quality Ti23, Ti64 and Titanium Beta 21S, the latest material developed for biomedical applications. Pometon has more than eighty years of experience in metal powders, a modern research and development center and offers various powders: Copper, Copper Alloys, Steel and Stainless Steel and Alloys, Cobalt-Chro-

mium and Alloys, Nickel-Chromium and Alloys, Titanium and Titanium Alloys. These are optimized for the requirements of different AM manufacturing technologies such as DED, LPBF and EB-PBF.

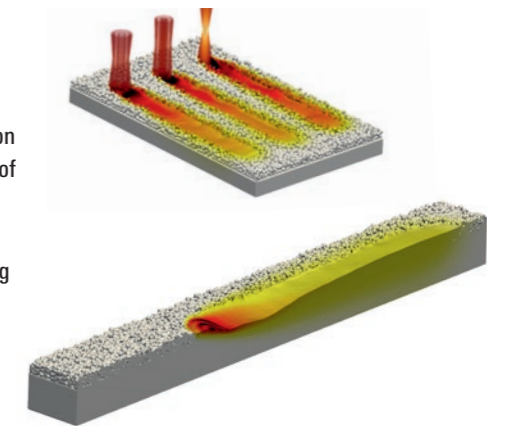
Pometon at Formnext 2022:
Hall 12.0, Booth B62

CALCULATING LASER-MATERIAL INTERACTIONS

Flow-3D AM brings high-fidelity numerical modeling of laser-material interactions into a CFD software that scientists and engineers can easily adapt to their workflow in process parameter development, material characterization, and optimization studies. At Formnext 2022, Flow-3D AM will be sharing the latest developments in computational fluid dynamics (CFD) for AM technology focusing specifically on accurately modeling fluid flow, heat transfer, phase change, and Marangoni

effects for laser powder bed fusion (LPBF), directed energy deposition (DED), and extrusion processes. Flow Science Inc. is the developer of FLOW-3D, a software for computational fluid dynamics. The company has over 40 years of experience and has been a pioneer in modeling free surface flows.

Flow Science at Formnext 2022:
Hall 12.0, Booth B75



ENORMOUS SAVINGS BY CHOOSING THE RIGHT MANUFACTURING PROCESS

Supply bottlenecks for components are a major challenge for industry. The startup 3D Spark wants to remedy this situation and provides producing OEMs and manufacturing service providers with a transparent decision-making basis for selecting the cheapest, fastest, technically most suitable, and most sustainable manufacturing process for each of their components. One option, industrial 3D printing, enables full supply chain security through local, on-demand printing. According to 3D-Spark, Alstom, a global leader in mobility

solutions, is an early adopter of the 3D Spark software, which enabled their 3D printing experts to identify and leverage validated cost savings of more than €1.8 million and about 20,000 days of lead time with 3D printed jigs, spares, and end-use parts. For this achievement, 3D Sparks was awarded the Start-up Prize Digital Innovations of the German Federal Ministry of Economics and Climate Protection. »We will make the platform available to all Alstom employees in the next deployment phase and plan to triple the number of parts analyzed by

the end of 2023, targeting cost savings of more than €5 million,« says Aurelien Fussel, 3D Printing Program Manager at Alstom. 3D Spark GmbH was founded in September 2021. The team currently consists of eight members and is expected to grow further after completion of an upcoming seed funding round.

3D Spark at Formnext 2022:
Hall 12.0, Booth B101A

EXHIBITOR NEWS

MOBILE REPAIR

Metrom presents the world's first mobile repair factory in collaboration with BTU Cottbus. A combination of 3D printing and mechanical processing in a mobile design can be quickly deployed on site at any time for power plants, mining facilities, chemical plants or shipbuilding. The mobile repair factory (More) is a cooperation project with the Brandenburg University of Technology Cottbus-Senftenberg and will be presented for the first time at Formnext. Specifically, it involves two sea containers, one of which contains a Pentapod CNC machine with a milling process from Metrom accurate to 20 µm and a WAAM system based on the Fronius

CMT process. The second container contains a dynamic rotary table with a water-cooled clamping platen, an advanced laser welding head from Oscar PLT and a newly developed TIG multi-wire system from Kjellberg Finsterwalde. The equipment represents a variety of technology components for the additive manufacturing of metallic workpieces in combination with mechanical processing. The setup is supplemented by digitizing and monitoring systems, which can be used individually or in combination with the corresponding technology modules, depending on requirements. With the mobile repair factory, Metrom aims to produce parts quickly on site, thus greatly reducing the

need for inventories and lead and delivery times for spare parts. The developed repair processes are also expected to extend the service life of components.

Metrom at Formnext 2022:
Hall 11.0, Booth C41

FINDING THE RIGHT PARTS FOR AM

Cognitive Design Systems, a French tech start-up providing design to manufacturing software solutions using AI, is releasing the new version 2.5 of its »Cognitive Additive« software to help the industry find the »right« AM parts. Fully automated, this new solution identifies the best part for AM in just a few clicks and also helps to adapt designs for 3D printing. Cognitive Additive is an industrialization software, analysing 3D models for different metal and polymer processes, such as PBF, SLS, MJF, FFF, Binder Jetting. This software computes cost and manufacturability for machines, materials and parameter combinations to determine which is the most suitable. The newer version allows users to calculate part production cost to a very fine degree of detail, which also includes certification related cost (AS 9100) and post-process cost.

Cognitive Design Systems at Formnext 2022:
Hall 12.0, Booth E52

STREAMLINED AM PROCESS

Software company Oqton aims to help companies produce more efficiently and eliminate waste with its end-to-end manufacturing solutions. To do so, Oqton is showcasing its full range of industrial manufacturing software solutions at Formnext. Based on artificial intelligence, Oqton automates manufacturing with its machine-independent platform Manufacturing OS, which combines specialized applications for design, CAM, 3D printing, reverse engineering and inspection. Its all-in-one 3DXpert software for industrial additive manufacturing streamlines the workflow from design to print, including preparation, optimization and printing. The portfolio also includes Amphyon, which provides a »first-time-right« process for metal additive manufacturing; Geomagic Design X reverse engineering software; Geomagic Control X 3D quality control and dimensional inspection software; and Geomagic Freeform hybrid design software. Using a variety of parts, Oqton will demonstrate the capabilities of its software solutions at Formnext - including an additively manufactured heat

exchanger, a transparent conformal cooling demonstrator and generatively designed aerospace brackets.

Oqton at Formnext 2022:
Hall 11.1, Booth F41



Photos: Oqton, IAM3DHUB

EXHIBITOR NEWS

A MELODIOUS SUCCESS STORY

After taking second place in the 2021 purmundus challenge, the Travel Sax is returning to Formnext - and it has a real success story under its belt. The musical instrument is the world's smallest and lightest electronic saxophone. Designed in Barcelona and manufactured using the latest 3D printing technologies, the saxophone has already sold over 1,300 units in more than 46 countries around the world. It was created in response to two main problems we all face: not being able to take the saxophone with us when we travel as it is a large, fragile and delicate instrument. And secondly, not disturbing the peace of our neighbors. The result is the Travel Sax, a small, easy-to-carry saxophone compatible with head-

phones, designed by the startup Odisei Music. The final design and prototype of the Travel Sax was created in cooperation with the AM/3DP team from Leitat and IAM3DHUB. The Travel Sax was printed at the International Advanced Manufacturing 3D HUB using a HP MultiJet Fusion 8100 as the machine and HP 3D SF12 as the material. It was then processed in the same facilities using Abrast sandblasting and graphite blasting systems.

IAM3DHUB at Formnext 2022:
Hall 12.1, Booth B41



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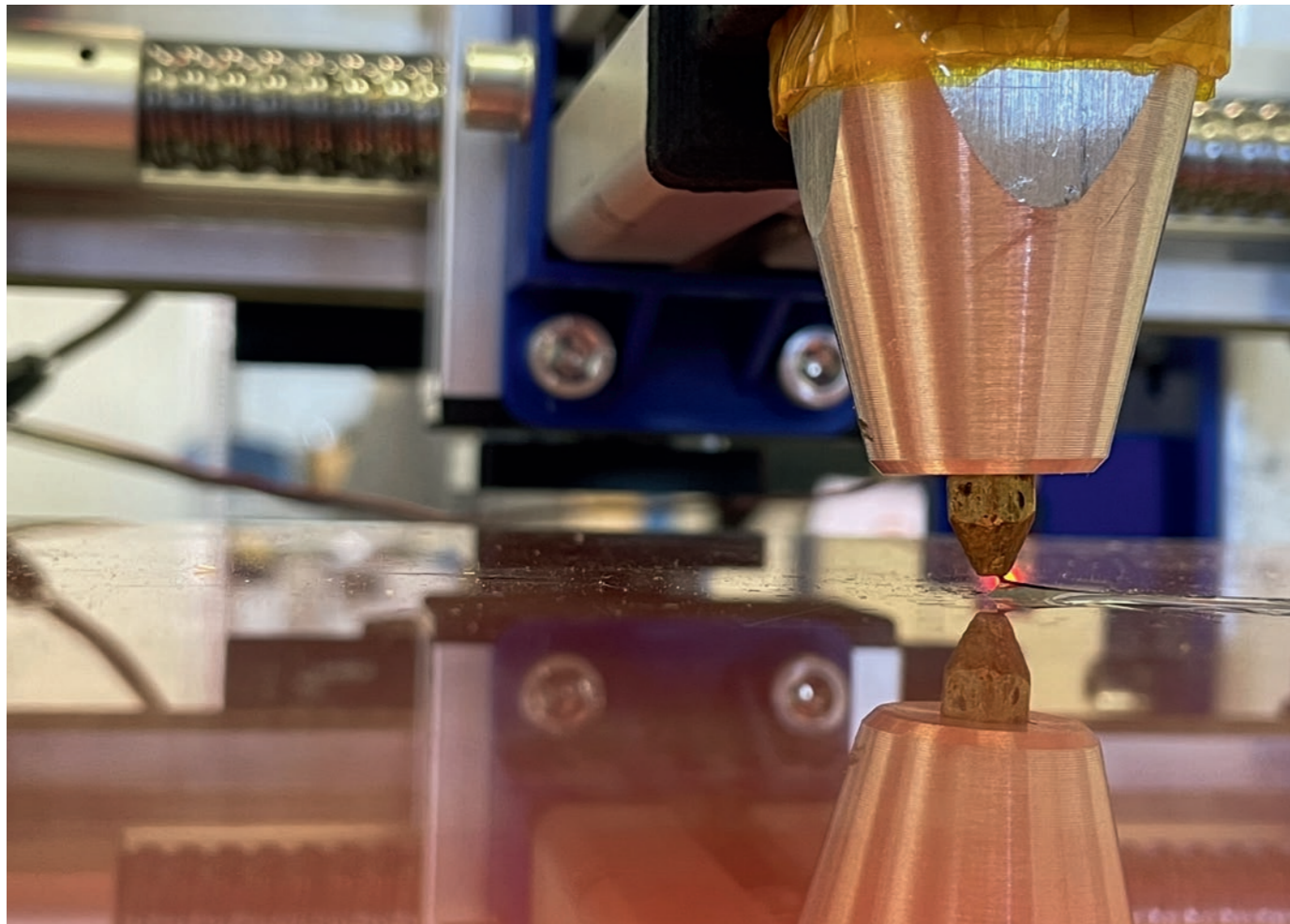


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FORMNEXT START-UP CHALLENGE

Bioabsorbable breast implants and robotic post-processing

Winners of the Formnext Start-up Challenge demonstrate the high innovative power of 3D printing



For the eighth time, the international Formnext Start-up Challenge has recognized young companies from the world of additive manufacturing for their innovative business ideas and technical developments. From the on-demand production of AM powders through degradable implants and efficient robotic post-processing: The award-winning innovations are shining examples of the high innovative power of 3D printing and the AM market. The

international winners, who will all present themselves to the AM world at Formnext 2022, are Photosynthetic (Netherlands), Lattice Medical (France), Rivelin Robotics (UK), SphereCube (Italy) and Alpha Powders (Poland). The AM Ventures Impact Award also went to Lattice Medical.

The innovations of these start-ups were selected both for the high level of creativity demonstrated in product development as well as

the viability of the business models. The start-ups were able to provide proof of existing patents or patents pending and also demonstrated extremely promising applications.

Sascha F. Wenzler, Vice President of Formnext at organizer Mesago Messe Frankfurt GmbH: »Once again, these companies have showcased the great potential of this industry, highlighting the fact that the sector produces significant developments that, in the future, will

Photos: Alpha Powders, Lattice Medical, SphereCube



influence our industry, medicine, and other areas of life.«

The Formnext Start-up Challenge 2022 recognizes inventive, viable business ideas from companies founded within the last five years. The distinguished judging panel consists of prominent representatives from the realms of industry, science, media, and investment. The winners will each have a dedicated exhibition booth and will also present themselves at the Formnext Pitchnext event on Tuesday 15 November 2022.

ON-DEMAND SLS POWDER MODIFICATION

Warsaw-based start-up Alpha Powders has developed and patented a technology for the pulverization, spheroidization and on-demand modification of polymer powders. The company's current focus is the development of a compact device specifically for R&D laboratories working on new SLS powders. The prototype has been tested with a variety of materials, including polyamides, TPU, or polyolefin powders, and has been proven to reliably produce spherical SLS powders by dry process. The company continues to develop this technology and aims to offer pilot and production scale solutions in the coming years.

3D-PRINTED BIOABSORBABLE IMPLANTS TO IMPROVE HEALING


Lattice Medical is a biomedical start-up that was founded in October 2017. The French company has developed a patented 3D technology in cooperation with CHU Lille-France that enables the natural regeneration of adipose tissue, bringing enormous improvements in breast implant procedures, for example. The Mat(t)isse bioprosthesis is made of 3D-printed biomaterials, is fully bioabsorbable, and is adapted to the individual morphology of the patient. Breasts are thus entirely reconstructed from the patient's own tissue, and no foreign bodies are introduced.



FAST MICRO 3D PRINTING

Photosynthetic specializes in fast and cost-effective micro 3D printing. 3D microstructures are generally fabricated using conventional


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Booth #D11, Hall 11.1



3D SYSTEMS

methods such as two-photon lithography (TPL), stereolithography (SLA), and optical grayscale lithography (OGL). The Dutch start-up's patented technology, on the other hand, uses an optical hardware system, resins based on single-photon polymerization, and computer algorithms to control the printing process. Photosynthetic's new micro 3D printer enables fast microfabrication (50 mm³/hour) in high-resolution mode (<1 micron).

IMPROVED AM COMPOSITE BONDING

Italian start-up SphereCube (booth 12.0-B81A) has developed 3D printing technology that is able to process polymer-based composite materials or a thermosetting matrix with continuous fiber reinforcement, thus enabling the automated manufacture of products from



high-performance composites in any desired shape. According to the company, its technology differs from the processes currently available by curing the plastic under heat, which improves wetting and bonding of the fiber reinforcements, matrix, and the 3D-printed layers.

SEE THE WINNERS OF THE FORMNEXT START-UP CHALLENGE IN HALL 12.0:

Alpha Powders Stand B81G
Lattice Medical Stand B81B
Photosynthetic Stand B81H
Rivelin Robotics Stand B41
SphereCube Stand B81A

+ FURTHER INFORMATION:

- » formnext.com/fonmag
- » Rivelin Robotics see page 07

EXHIBITOR NEWS

INTEGRATED SOFTWARE AND CONTROL SOLUTION FOR L-PBF



For the first time, Siemens is presenting a complete and integrated software and hardware solution for the control and operation of a laser powder bed fusion (L-PBF) system. This solution provides machine builders with a comprehensive starting point for commissioning and operating the machine. Implementation of the solution will be demonstrated at Formnext at the Reichenbacher Hamuel GmbH booth (see page XX). Reichenbacher Hamuel implemented this solution as a pilot user for the first time in the new AMS 400 L-PBF system along with Siemens and Siemens partner AixPath GmbH from Aachen. In addition to the print preparation

module in Siemens NX AM, Siemens is presenting its own Build Processor Module for the first time. The build processor configured in NX AM handles slicing and hatching and generates the machine-specific build job.

Siemens at Formnext 2022:
Hall 12.1, Booth D119
Hall 11.1, Booth C49

A PROTOTYPE IN 2 DAYS

The rapid delivery of prototypes and small series made of plastic using injection molding and additive manufacturing is the specialty of Priomold GmbH. As a result, the company, which was founded in 2015, is on a successful growth path and now has 60 employees. »Overall, the number of rush projects in 2022 has already doubled compared to 2021, partly due to global supply chain issues,« says Managing Director Thomas Schönbacher. To further reduce the days between ordering and delivering injection-molded parts, Priomold is increasingly turning to additive manufacturing: In September, the company purchased an EOS Formiga P110 Velocis SLS system, promising to create prototypes from thermoplastics within 2 working days.

Priomold at Formnext 2022:
Hall 11.0, Booth A39

»INJECTION MOLDING FEEL« FOR PRINTED PARTS

Better feel and better look with unchanged material properties: This is what Elkamet Kunststofftechnik promises with its new AMT SF 50 system for surface finishing. At Formnext, the long-established company from central Hesse will be exhibiting, among other things, sample parts and prototypes that have an »injection-molded feel« after chemical surface treatment: smooth, colorable, yet water and dirt-repellent, and with no change in material properties, according to the company. The AMT SF 50 system has been in use at Elkamet since



the end of August 2022, and »the results are outstanding,« reports Mathias Sturma, head of additive manufacturing at Elkamet. The company will also showcase its extensive machinery including FDM and polyjet plastic printing, direct metal laser sintering, selective laser sintering and various post-processing methods.

Elkamet Kunststofftechnik GmbH
at Formnext 2022: Hall 12.1, Booth E79

Photos: Ossberger, Scanningspray Vertriebs GmbH, Elkamet, Siemens

EXHIBITOR NEWS

TAKES THE SHINE, NOT THE COLOR

Aesub transparent is a new scan spray that temporarily mattes glossy surfaces with a transparent film. It will be presented for the first time at Formnext 2022. The new spray allows optical scanners to capture not only the surface contours but also the color values of the measured object at the same time. As traditional scanning sprays produce a white coating, capturing color information has not been possible when using previous spray variants, says the producer Scanningspray Vertriebs GmbH. Aesub transparent spray creates a layer thickness of approximately 8 to 15 µm. The coating evaporates after approximately four hours with no cleaning required. Similar to the other sublimating AESUB scanning sprays, AESUB transparent can be applied directly at the scanning site. According to the producer, Aesub transparent is used in 3D scanning when - besides dimension and contour - the color information



of an object also needs to be captured. Especially in reverse engineering of complex parts with extensive color information, Aesub transparent significantly simplifies and accelerates the scanning process.

Aesub Scanningspray at Formnext 2022:
Hall 12.1, Booth D40

CIRCULAR ECONOMY FOR POWDER BED 3D PRINTING

To make powder-bed-based 3D printing even more economical, Ossberger GmbH has developed automatic solutions for unpacking, de-powdering and the ready-to-use preparation of powder. At Formnext, the company will show the semi and fully-automatic unpacking solutions FS Basic and FS Automatic, as well as a complete solution for recycling management for a 3D printing production site. The company will also present the newly developed FS Powder powder management system. The powder recycled during unpacking is extracted, sieved and weighed, and the degraded powder is separated. Depending on the stored refresh rate, new powder is sucked in, dosed, mixed with the recycled powder and homogenized. Finally, the ready-to-use powder is automatically conveyed to the printer or into a powder container. In addition, the company offers the FS

Spinner unpacking solution for small sinter printing systems for entry into powder bed-based processes.

Ossberger at Formnext 2022:
Hall 11.1, Booth E45



EXHIBITOR NEWS

METAL EXTRUSION WITHOUT LOOSE POWDER OR SOLVENTS

Rapidia has announced a new sintering furnace to complement its metal AM system. The F2 vacuum furnace offers partial pressure, argon atmosphere sintering capabilities for improved metallurgical control and low gas consumption. Using advanced materials allows Rapidia to offer a large hot zone and high atmospheric purity in a compact furnace. Rapidia's two-step system (printer and vacuum furnace) is now in production. Rapidia says it is offering the only metal extrusion system with no loose powder, no solvents, no chemical debind, and inert-atmos-

phere sintering. The feedstock enables water-bonding, allowing users to assemble multiple prints and fuse them together during sintering. The F2 furnace is available in single-phase and 3-phase power configurations. Rapidia's system prints with third-party qualified 316L and 17-4 PH stainless steels that exceed metal injection molding material standards as well as an evaporative support material to enable internal part geometry of unlimited complexity. Several other materials are in development.

Rapidia at Formnext 2022:
Hall, 12.0, Booth E122



AUTOMATION FOR VERTICAL FARMING

Prexels GmbH has developed an automated loading and moistening system for vertical farming. The system automatically loads flower pots with the appropriate amount of rockwool and moistens them. The company, which specializes in the development and production of prototypes, series parts, tools and fixtures, implemented the project in just two months. Agile project tools such as Scrum were also used. In the project, the company used standard purchased parts

as well as 3D-printed components. For example, certain profiles for the rails were purchased and special connections were realized using 3D printing. The 3D-printed connections made the entire system much more compact than when using standard components and resulted in an optimized lightweight design. In addition, 3D printing enabled functional integration to be realized for individual components.

Prexels at Formnext 2022:
Hall 12.1, Booth C71



NORMS, STANDARDS AND EXCLUSIVE INDUSTRY INSIGHTS

The extensive supporting program of Formnext 2022 also includes two renowned events, which will take place in Frankfurt one day before the start of the trade show on Monday, Nov. 14, 2022. On November 14, 2022, one day before the exhibition commences, the renowned ASTM Standards Forum will once again bring together international experts and decision-makers from the AM industry to discuss the extremely important

topic of standards. New to this year's exhibition will be Wohlers Report LIVE at Formnext 2022 on November 14, a supporting event following the Standards Forum that will give attendees an overview of the AM industry and many valuable insights into materials and component production, the future of AM, and much more. Anyone who wants to get in the mood for the topic of standards will have the opportunity to do so at the ASTM International Conference on

Additive Manufacturing (ASTM ICAM 2022). This will take place from October 31 to November 4, 2022 in Orlando, Florida. It is ASTM International's seventh annual flagship event covering standardization, qualification and certification, with a focus on industry-specific requirements that affect the entire AM process chain. Further information: formnext.com/ASTM.

Photos: Joke Technology, Rapidia, Prexels, Fraunhofer-Verbund Produktion

EXHIBITOR NEWS

LARGER AND MORE ERGONOMIC

Many 3D-printed parts are getting larger and larger thanks to modern processes. To ensure that even large parts can be safely reworked, Joke Technology is launching an enhanced version of its fully enclosed Eneskapostprocess workstation: the new Eneskapostprocess XL offers a larger usable space, is even more ergonomic, and will be presented for the first time at Formnext 2022. With this equipment system, all post-processing steps are carried out in an enclosed workspace. This means that the user does not have any contact with the air from the reworking process, with the residual powders it still contains or with the dusts generated during reworking. Access to the component is via sealed, manual inlets that lead into the interior of the housing. The station can be equipped with a variety of electrical and pneumatic tools. Accumulating respirable powders and dusts are extracted and safely collected throughout the machining process. This also prevents potentially life-threatening explosions and deflagrations, which can occur with certain materials. However, the size of the

parts to be processed was previously limited at the workstation. The Eneskapostprocess XL has a 150-liter larger installation space and offers room for significantly larger components. Joke Technology will also be exhibiting a special suction unit that can be used in a variety of ways - for example to suck in chips, dust or powder residues.

Joke Technology at Formnext 2022:
Hall 12.0, Booth C42



SOLUTIONS FOR THE AM SUPPLY CHAIN

Various solutions along the AM supply chain will be presented by the Fraunhofer Group for Production at this year's Formnext. A virtual factory layout represents various process components. The company's presentation will also include the performance fields of digitization and networking of molds and AM machines, hybrid manufacturing chains, product engineering, quality assurance, qualification, and AM material flow. Innovative solutions for post-processing (machining, vibratory grinding and blasting as well as cleaning), plant networking, digital twin, etc. will also feature among the exhibits.



Fraunhofer-Verbund Produktion
at Formnext 2022: Hall 11, Booth D51

EXHIBITOR NEWS

TRADING PROCESS PARAMETERS

Improved technologies, new materials and digital services are needed to fully exploit the potential of industrial 3D printing. Numerous innovations will be presented at the »Lightweight Construction from Baden-Württemberg« joint booth - from trading in process parameters to 5D lens printing and blue PA12 for the food industry. Rosswag GmbH will present the AddiMap online platform for metal 3D printing, focusing on the often time-consuming and cost-intensive optimization and validation of process parameters for the LPBF process. AddiMap enables uncomplicated trading and validation of process parameters via a digital marketplace. The InnovationCampus Mobility of the Future (ICM) of the University of Stuttgart and the Karlsruhe Institute of Technology will show the experimental vehicle »eVee«, a single-seater electric light vehicle with an individual fiber mesh body. The latest research results and novel electric motors from additive-subtractive manufacturing will be on display here. A 5D lens printing process for

the rapid and customizable production of optical lenses will also be presented. These then enable, for example, near and far vision functions for autonomous driving with just a single sensor. Murtfeldt Additive Solutions GmbH from Tübingen, Germany, will showcase a new material for food-safe 3D printing with its MurSint PA12 blue material. The material is based on PA12 and has been specially developed for applications in the food and pharmaceutical industries as sintering blue-colored components enables visual detectability. The joint stand is being organized for the second time by Leichtbau BW GmbH in cooperation

with Hessen Trade & Invest GmbH and Bremen Economic Development Corporation.

Leichtbau BW at Formnext 2022:
Hall 12.0, Booth D21



Photos: Murtfeldt Additive Solutions GmbH, InnovationsCampus Mobilität der Zukunft (ICM), Universität Bayreuth, Ampower

EXHIBITOR NEWS

QUALITY CLASS SYSTEM FOR COMPONENT QUALITY

Material extrusion is the most widely used AM process. Although its industrialization continues to advance, experts see the lack of quality assurance in the additive process chain, among other things, as an obstacle to further development. For this reason, the Fraunhofer Institute for Manufacturing Engineering and Automation IPA and the Chair of Environmentally Compatible Production Technology at the University of Bayreuth have written the user guide »Quality Assurance in Additive Material Extrusion« and are presenting it at Formnext. It contains recommendations for determining the quality of an AM component for planning, production and control in the additive process chain. To ensure the comparability of components, the experts have developed a quality class system that enables the quantification of component quality. The core is the evaluation

of quality characteristics and their test methods. The focus is on tensile strength, surface condition and dimensional stability. This process-related approach is a prerequisite, especially in safety-relevant areas such as the aerospace industry, medical technology or vehicle construction, in order to obtain certification and thus production orders.

University of Bayreuth at Formnext 2022:
Hall 12.1, Booth C71 (Bayern Innovativ)



NEW AM ACADEMY AND CO2 CALCULATOR

The consulting company Ampower, publisher of the Ampower Report, will present two more online solutions at Formnext 2022: Ampower Academy and Ampower Tools. The Ampower Academy is an independent online training solution aimed at engineers, management and quality assurance. The training concept is based on a cooperation with AM expert Benjamin Haller, who has already supported numerous companies in various functions during the introduction of additive manufacturing and developed the forerunner of the Ampower Academy with Amadde. Through the cooperation with Ampower, the scope of training can be expanded to include numerous technologies and topics. Through its global consulting activities and numerous projects, Ampower has internally developed powerful tools that the team now makes available to its customers. Ampower Tools creates a homepage with two calculation tools - one is an AM compo-

nent cost calculator for metal, and the second is the Sustainability Calculator. According to Ampower, this is the world's first tool that calculates the energy consumption and CO₂ footprint for 3D-printed components. Furthermore, the calculation results can also be compared with conventional technologies. Initially,

both tools will only be available for metal materials, but in the near future they will be expanded to include plastic materials.

Ampower at Formnext 2022:
Hall 12.0, Booth D122



EXHIBITOR NEWS

GOING DIGITAL FROM MATERIAL TO MANUFACTURING

CDP Venture Capital, Mimete and Punch Torino have agreed a strategic partnership for the AM market worth €19.4 million. The new company, MadelnAdd, offers a digital model for the design and production of 3D-printed components, targeting manufacturing companies. Participating in the joint initiative are Boost Innovation Fund, the corporate venture builder of CDP Venture Capital that creates new startups together with large Italian companies, Mimete, a manufacturer of

AM metal powders, and Punch Torino, which specializes in the development of innovative drive systems and is already active in the field of additive manufacturing. MadelnAdd creates a digital platform to guide customers, especially SMEs, in the development of components. This platform defines the most suitable features and materials for 3D printing and offers the possibility of completing the manufacturing process by placing an order with a printing service provider. An established sup-

plier selection process is available for this purpose. MadelnAdd will be headquartered in Turin and will serve both the Italian and European markets.

Mimete at Formnext 2022:
Hall 12.0, Booth A02

AM MEETS FORGING

In the publicly funded research project SAMT64, Otto Fuchs has expanded its expertise in the development of a hybrid process route for titanium structural components. The process combines forging and additive manufacturing. In order to manufacture safety-relevant components with a high degree of complexity in different variants, the two processes of forging and arc-wire buildup welding were consistently digitized and seamlessly documented. As typical use cases for

the application of these two technologies, Otto Fuchs cites complex forged parts, where special geometry elements are additively manufactured as well as components with property profiles that differ from location to location. Component repairs and different variants of a component can also be realized. Otto Fuchs's exhibits at Formnext will include a test component, which was created as part of the SAMT64 research project as well as other additively manufactured components for the

aerospace and automotive industries. In the coming months, Otto Fuchs intends to expand and deepen the knowledge gained in various follow-up projects to SAMT64. One of the central development goals is to increase resource efficiency.

Otto Fuchs at Formnext 2022:
Hall 12.0, Booth E121

NETWORKING UNDER 3D-PRINTED DOME

The Netherlands-Flanders is one of the most powerful regions in the field of additive manufacturing. To illustrate this, Flam3D is presenting itself at Formnext with a 3D-printed booth: »The AMbigram« serves as proof of both the potential of additive manufacturing and the strength of the local ecosystem. AMbigram and its 24m² dome structure will showcase more than 130 3D printed parts, both polymer and metal, and fifteen different 3D printing technologies. With the demonstrator, the initiators primarily

want to raise awareness of 3D printing. »3D printing is already considered a full-fledged manufacturing technology, but it remains a challenge for many companies to deploy the technology where it is useful and relevant,« explains Kris Binon, director of the organization. After its premiere at the Formnext fair, the AMbigram will travel around to trade fairs and events at home and abroad for several years. Represented at the Flam3D-Booth: AdditiveLab, AMNOVIS, AMPC solutions, AMR, ChemStream, Dotx Control Solutions,

Guaranteed, Hybrid software, Leuven.AM, Metal Technics 3D, Sculpsman, Seido Solutions and Windesheim.

Flam3D at Formnext 2022:
Hall 12.1, Booth D21

AM4U

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