

Fon Mag⁺

EXPO EDITION

Featuring plenty of world premieres
set for Formnext 2024

INCREASINGLY EFFICIENT

Many innovations are seeking
to optimize AM and make even
more applications possible

Page 06–38

A MIXED, BUT POSITIVE PICTURE

Five industry experts offer
their assessments of the
current AM market

Page 12

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Blue Diode Lasers are Revolutionizing Copper Processing – Even in Cladding and Additive Manufacturing

Copper is one of the most important materials in industrial manufacturing today. This applies especially to powder-based applications, such as the coating of printed circuit boards or additive manufacturing of entire components. The demands on production technologies are therefore high: They must produce robust coatings or components with the highest possible density. Laser-based processes are becoming increasingly popular in this area, as they allow very precise and controlled processes. However, as industrial lasers mainly operate in the near infrared range (NIR), a spectral range that is 95% reflected by copper, these processes are often difficult to implement. For example, melting the surface of a component during coating required such high energy inputs that a controlled process was impossible.

Laserline LDFblue and LDMblue: High Absorption Rate and Output Power up to 6 kW

However, with the help of blue diode lasers, not only is melting the surface achieved effortlessly, but the output power can be lower than with NIR lasers. This results in significantly improved energy efficiency. Laserline's LDFblue and LDMblue diode lasers, available with CW output powers from 400W to 6kW, are at the forefront of this technology. They operate at a wavelength of 445 nm, which is absorbed by copper alloys ten times better than NIR wavelengths, resulting in exceptionally stable melt pools without pore or spatter formation. Additionally, powder efficiencies of over 80% can be achieved during the process. After the cladding process, the workpiece and coating material are metallurgically bonded after a short cooling time, resulting in extremely durable coatings. Moreover, the process causes very little distortion of components due to the low heat input.



Particularly High Beam Quality

In addition to laser systems with output powers in the multi-kilowatt range, the extensive product portfolio of the German diode laser specialist now also includes models with particularly high beam qualities of 4 mm mrad and better thanks to the acquisition of a majority stake in US-based laser specialist WBC Photonics. The high beam quality is of great importance for additive manufacturing processes – especially powder bed processes benefit significantly from this: The laser's high focusability enables fine details and complex geometries to be produced with high precision. This is particularly important for applications that require the highest levels of precision and surface quality, such as aerospace or medical technology.

Incredible Development Potential

Blue diode lasers are not only suitable for processing copper but also achieve excellent results with steel or nickel. Furthermore, they are no longer used exclusively in traditional industrial materials processing such as cladding, welding, and additive manufacturing: For example, blue lasers have been discovered as a tool to combat biofouling on ship hulls. In this process, the growth is lethally damaged by irradiation by laser light, so it is easily washed away by the shear forces of the water on the next voyage. The fact that blue diode lasers have revolutionized non-ferrous metal processing and have also found applications outside the metal sector is further proof of the incredible potential of this technology — and there is still no end in sight.



Visit us at Formnext - Hall 12.0, Booth C122 - and discover our latest innovations in cladding and additive manufacturing!

Laserline GmbH
Fraunhofer Straße 5
56218 Mülheim-Kärlich, Germany
Phone: +49 2630 964 4000

www.laserline.com

Cover: Feramic/cross-ING

Recent social media reports on the state of the AM world might easily give the impression that industrial 3D Printing is on the brink of collapse. The reports tend to use the share prices of listed AM companies as an indication of the situation in the sector as a whole. And because the share prices of most listed AM companies have been falling for some time, so the reasoning of these so-called analysts goes, the sector must be doing badly.

However, gaining a realistic picture of the AM world is not so straightforward. And genuine industry experts are far more optimistic about the situation, as our market report shows (from page 12). What's more, it reveals that the fall in share prices is largely the result of too high expectations.

While the situation in the AM sector may no longer be quite so euphoric, it is still positive, as can be seen from the anticipated attendance figures for the upcoming Formnext alone. By the end of September, 844 exhibitors had registered from around the world, more than half from outside of Germany, again making Frankfurt the global powerhouse of Additive Manufacturing from 19-22 November. It is already clear that many of the innovations are aimed at enabling specific new applications and making production more efficient and less costly. My impression is that the industry is combining an increased focus on cost efficiency for customers with the

creative spirit that is part of its DNA. These two factors are key to becoming established as a still young technology in industrial production.

Sustainability is also playing an increasingly important role and ranges from recycling filament spools to the use of sustainable materials such as coffee grounds and olive pits. Above all, sustainability is about taking a holistic approach throughout the life cycle of a product and not just focusing on taking action in one area and leaving it at that. Here too, Formnext's supporting program of events offers valuable knowledge for numerous industries from medical technology to plant engineering and the construction industry.

This magazine offers a foretaste of the innovations and product premieres that await you at Formnext. More will be revealed at Formnext. I hope you will find it inspiring and look forward to meeting you in person in Frankfurt.



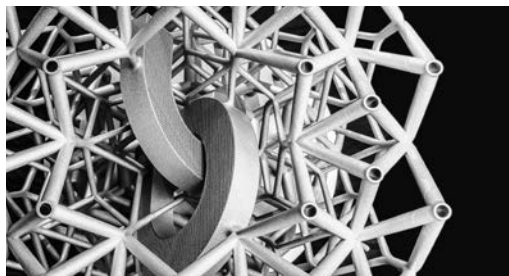
Sincerely, Sascha F. Wenzler
Vice President Formnext



12



06



18

23



05 FORMNEXT NEWS

AM's global elite set to meet once again in Frankfurt

06 INNOVATIONS | AM SYSTEMS

- » 06 DMG Mori · Aconity3D · Multiax CNC and Rev3RD · 3D Systems · Lithoz · BLT · Prima Additive
- » 15 Sharebot · Optris · Fronius · Grob-Werke · Boston Micro Fabrication
- » 20 3Deus Dynamics · New Infrared Technologies (NIT) · Anima · Schaeffler · WAAM3D · Ruwac

12 AM FACTS | TAKING STOCK OF THE INDUSTRY

Five experts assess the current situation in the AM market

18 AM PERSPECTIVES | AI IN AM

What opportunities does AI present in Additive Manufacturing? An overview

23 INNOVATIONS | APPLICATIONS

LZH · Fraunhofer IFAM · Fraunhofer ILT · KSB · CADdent

26 INNOVATIONS | MATERIALS

3D Lab · 3devo · Altana · Plansee and Ceratizit · Alpaplastic · AzureFilm · Feramic · Smart Materials 3D · Kexcelled · Müller DrumTec

31 INNOVATIONS | SOFTWARE

VoxelDance · Fehrmann Materials · Advanced Additive · Aibuild · Polyga · CIMsystem

34 INNOVATIONS | ANCILLARY PROCESS SYSTEMS

Solukon · Nabertherm · Xioneer · Joke Technology · Thies · AMbitious powered by Toolcraft

37 INNOVATIONS | QUALITY MANAGEMENT

Anton Paar · SmarAct

38 INNOVATIONS | SERVICES

Ampower · Additive Marking and TÜV Nord

AM'S GLOBAL ELITE HEADED BACK TO FRANKFURT

In spite of the global challenges being faced at the moment, the Formnext success story is set to continue in 2024: As of October, 844 companies (61 percent of them from outside of Germany) have registered for this year's event in a bid to once again make Frankfurt the world's leading hotspot in AM on 19–22 November.

FORMNEXT AWARDS

To put even more of the spotlight on extraordinary talents and their groundbreaking ideas, Formnext has evolved its previous award concept into the brand-new Formnext Awards. All the compelling submissions we received this year made it all the more difficult to choose the following finalists:

- **Ambassador Award:** 3D Printing Nerd, University of Stuttgart
- **Design Award:** Siemens AG, Quorum Orthopedics, Inc., ILEK Institute, ISW Institute, University of Stuttgart
- **Rookie Award:** Enki Interdentalis, Fidentis, Oryx Medicals
- **Start-up Award:** AM Craft Group Inc., amsight GmbH, Axolotl Biosciences, micro factory 3DSolutions GmbH, Supernova Additive SLU
- **(R)Evolution Award:** AMsystems B.V., Fraunhofer Institute for Casting, Composite and Processing Technology IGCV, toolcraft AG
- **Sustainability Award:** Baker Hughes, Ceratizit S.A., Stratasys Ltd

In addition to having their own special showcase at Formnext, these finalists' ideas will be presented on our website starting in mid-October. For the first time, you can vote for the winners!

Online voting and presentation of finalists
formnext.com/awards

Formnext Awards special showcase
 Hall 11.0, Booth F62

Announcement of winners and award ceremony

Thu, 21 Nov. at 4:20 pm on the Industry Stage (Hall 12.0, D72)

The Formnext team and all the participants in the Formnext Awards would like to thank AM Ventures, Renishaw, 3D Printing Industry, Cirp, Trumpf, Voxeljet, Sutosuto, and all the members of the jury for their support!

MULTISTAGE PROGRAM

To promote an open exchange of ideas, Formnext will once again feature an extensive lineup of presentations that all visitors are welcome to attend. That means 2024 is sure to be another year of in-depth discussions of current and future applications, technologies, and overarching trends in the AM and production industry. The key topics of focus on the Application, Industry, and Technology Stages will include artificial intelligence in AM, medical and dental technology, robotics, and automation.

For more details on this year's supporting program, please visit:
formnext.com/eventcalendar

FOR START-UPS AND NEWCOMERS TO AM

This year's Service Provider Marketplace (Hall 12.1, Booth E61) will be all about the medical technology, dentistry, and packaging industries. Meanwhile, the Start-up Area (Hall 11.0, Booth D62) and Pitchnext event (Tue. 19 Nov. at 2:15 pm on the Industry Stage) will give young, innovative companies the chance to present themselves to an audience of experts. On 21 November, Career Day will then offer all kinds of information on professional opportunities in the AM industry. For companies looking to get into the industry, our well-known Discover-3DPrinting seminars will provide excellent insights and advice on every day of the event in cooperation with ACAM. And finally, Formnext will also be working with ACAM on four deep-dive seminars on the industrialization of AM, designing for AM, surface finishing, and materials.

To check out the schedule and get registered, please visit:
formnext.com/discover

MECHANICAL ENGINEERING, ARCHITECTURE, AND DESIGN

In a joint booth at the Additive4Industry showcase (Hall 12.0, Booth B01), the AM workgroup of the German industry association VDMA will be presenting valuable AM applications from the world of mechanical engineering. In addition, the BE-AM Symposium and its own showcase (Hall 11.0, Booth F49) will cover recent developments in an area that's only growing more important: 3D Printing in the construction industry. The day before Formnext 2024 event begins, the AM Innovation and Standards Summit at Formnext will take place in the Illusion room at Messe Frankfurt's Congress Center in cooperation with ASTM International. The finalists in the running for this year's Hessian State Award for Universal Design will also be presented at a showcase in Hall 11.0 (Booth D69), and the resulting winners will be recognized at an award ceremony on 19 November (5:00 pm on the Industry Stage).

To access the full program, please visit:
formnext.com/program

PARTNER COUNTRY: AUSTRALIA

Formnext is thrilled to have Australia on board as its partner country in 2024! For years, this multifaceted continent has impressed the world with its vibrant AM community, globally successful system manufacturers and service providers, and AM companies that are highly specialized in various areas of AM. Part of the foundation making all this possible is a series of outstanding universities, along with a one-of-a-kind setting that draws talented people Down Under from all over the world. Stop by and meet our Australian guests at their joint booth (C02) in Hall 12.0!

+ FURTHER INFORMATION:

Tickets and all information about Formnext, please visit:
 » [Formnext.com/visitors](https://formnext.com/visitors)

Download our app as the perfect companion for your Formnext visit:
 » [Formnext.com/app](https://formnext.com/app)

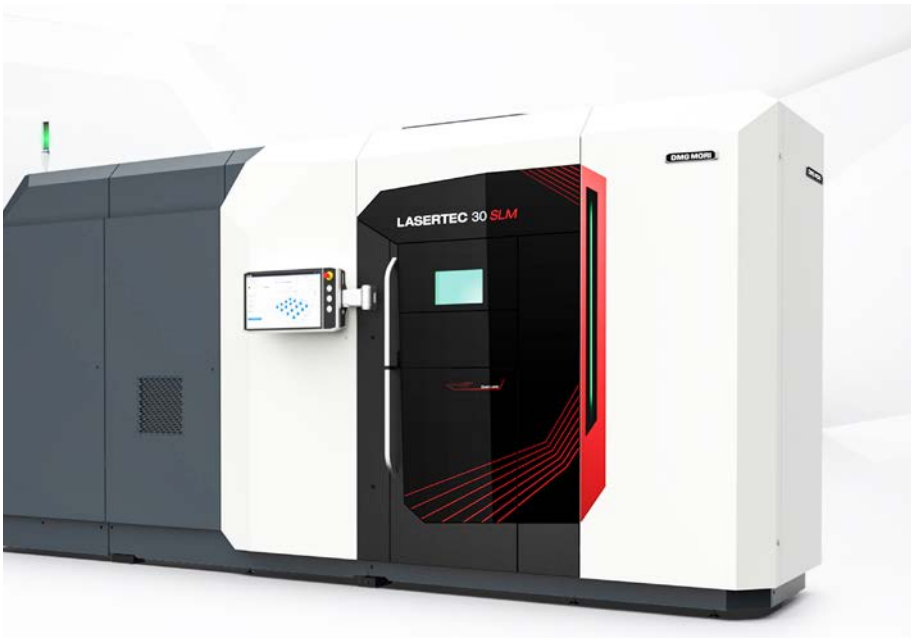
KNOW-HOW FROM MACHINE TOOL CONSTRUCTION

DMG Mori will be showing off its new Lasertec 30 SLM 3rd Generation, whose design is entirely based on many years of experience in the construction of stable machine tools. The company has also completed the process chain in Additive Manufacturing with the DMU 60 eVo. Thanks to its PH Cell 300 pallet handling system, components printed on the powder bed are finished with a high degree of precision. In the Lasertec 30 SLM 3rd Generation, a new quad laser offers complete overlap of the scan fields in a build space measuring 325 x 325 x 400 mm. Similar to milling and turning machines, cast parts are used for the frame. This design guarantees maximum rigidity and optimal manufacturing conditions, enabling the new machine to redefine robustness and repeatability. The potential of a continuous process chain can also be seen in the example of the Lasertec 65 DED hybrid. This hybrid machine combines Additive Manufacturing using powder deposition welding and high-precision, five-axis simultaneous milling in one workspace. Featuring a fully integrated and automated DMG Mori scan3D laser scanner for repair applications, it represents the concept of machi-

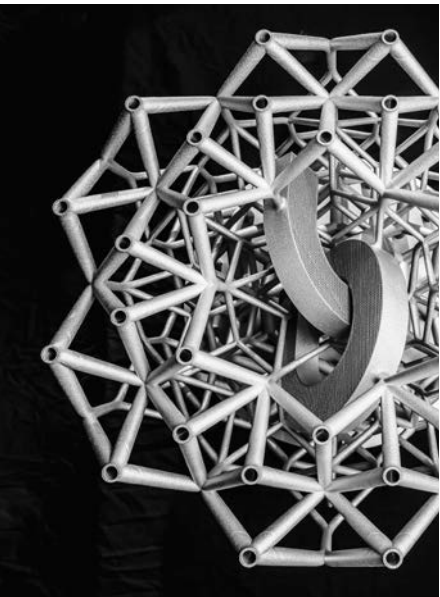
ning transformation (MX): the integration of AM and CNC machining in the same operating environment. In order to leverage the far-reaching possibilities of AM in a targeted manner, DMG Mori founded Additive Intelligence. As the consulting unit of the DMG MORI Academy, it has set

its sights on sustainably optimizing processes related to the manufacture of complex products.

DMG Mori at Formnext 2024:
Hall 12.0, Booth D139



LASERS WITH BOTH POWER AND FLEXIBILITY



Aconity3D's brand new AconityX system offers up to 6 x 4 kW laser power, flexible beam profiles, and interchangeable process chambers. In addition, AconityX features the new version of AconityStudio, as well as an Infinity Filter and Ultrafast Purging, which is designed to minimize set-up times and enable uninterrupted production. »With the AconityX, we have developed a machine that is actively shaping the future of Additive Manufacturing,« promises Yves Hagedorn, CEO of Aconity3D. »Our focus was on creating a solution that not only offers maximum flexibility, but also meets the most demanding production requirements.«

Aconity3D at Formnext 2024:
Hall 12.0, Booth D02



Images: DMG Mori, Aconity3D

CARBON EMPOWERS BUSINESSES THROUGH VERTICAL INTEGRATION

Empowering Businesses Through Vertical Integration and Collaboration



Carbon is a leader in additive manufacturing, thanks to its vertical integration of software, materials, and hardware. This approach enables seamless collaboration across disciplines, helping companies solve complex manufacturing challenges and bring innovative products to market.

EPX MATERIALS: ENGINEERED FOR PERFORMANCE

The EPX family of materials is designed for high-performance automotive, industrial, and medtech applications. From the popular EPX 82 to the new EPX 150, Carbon's photopolymers offer strength, durability, and thermal resistance. EPX 150 excels in demanding environments, passing GMW3191 standards for automotive connectors, withstanding over 400 steam autoclave cycles in medtech, and meeting outgassing tests for space applications. These materials result from Carbon's cross-disciplinary collaboration, integrating feedback from software, hardware, and materials teams to optimize every step of the production process.

COLLABORATIVE PROBLEM SOLVING: THE FIZIK SUCCESS STORY

Carbon's partnership with Fizik, the Italian saddle manufacturer, is a prime example of its approach. Fizik needed lightweight, custom saddles for every rider. Using Carbon's Design Engine and L1 printers, Fizik

was able to produce custom saddles efficiently, combining complex design and high-performance materials at scale.

VERTICAL INTEGRATION: THE FUTURE OF ADDITIVE MANUFACTURING

Carbon's vertical integration sets it apart, streamlining the journey from prototype to production. Its experience helps customers overcome unexpected challenges, offering best-in-class materials and a proven track record, as seen in the Fizik One-to-One project. Carbon pushes the boundaries of additive manufacturing, helping customers lead in their markets.

THE BOTTOM LINE

Carbon's innovative approach and deep expertise make it a go-to partner for companies seeking to create radically better products. From custom saddles to industrial components, Carbon leads the way in scalable, high-performance products.

Visit Carbon at Formnext 2024, Hall 11.1, Stand D22, to learn how our unique approach can transform your manufacturing process.

Carbon Technologies DE GmbH
Dornhofstrasse 38A
63263 Neu-Isenburg
+07082 792670
www.carbon3d.com

LOW VIBRATION, HIGH PRECISION

Multi-ax CNC and Rev3RD have combined their expertise to jointly develop a brand-new project: a complete line of Cartesian 3D printers and a series of hybrid CNC machines that enable both 3D Printing and milling. These solutions will be presented at Formnext. Among other things, a CNC machining center from the Multi-ax P-Series will be showcased live in action. This monolithic cell structure is designed for high performance, with a gantry driven

by two motors ensuring optimal parallel movement. This reduces vibrations and achieves high precision, particularly in the high-speed machining of aluminum or composite materials. The main application areas of the Multi-ax machines range from rapid prototyping, cutting tools, jigs, low-temperature master models, and casting patterns to various molds, spare parts, and design items. Thanks to their broad extrusion capacity, their additive functions can be integrated into several other Multi-ax CNC machines.

Multi-ax CNC and Rev3RD at Formnext 2024: Hall 12.1, Booth F81 and D51



IMPLEMENTING CHALLENGING APPLICATIONS

With its latest innovations, 3D Systems wants to demonstrate how challenging AM applications can be implemented even more productively. Of special note are the PSLA 270 and the EXT 800 Titan Pellet. The PSLA 270 is a high-speed, projector-based SLA AM solution designed for the time-sensitive production of large volumes of parts. According to 3D Systems, this compact, mid-frame 3D printer can deliver batch-level, truly production-grade parts in a fraction of the time it would take for conventional SLA. The PSLA 270 comes with 3D Systems' 3D Sprint software, which enables manufacturers to efficiently go from design to high-quality, true-to-CAD parts without needing additional third-party software. 3D Systems also reports that vat-based printing with the PSLA 270 delivers excellent first-article success rates, as well as simple support structures with minimal material usage and touch points. The PSLA 270 utilizes 3D Systems' extensive and expanding Figure 4 family of engineering-grade

materials. These address a wide range of applications for direct production, end-use parts, functional prototyping, aesthetic modeling, and molding and casting. The EXT 800 Titan Pellet, meanwhile, has a build volume of 800x600x800 mm and is made to fabricate more modestly sized functional prototypes, tooling, fixtures, sand casting patterns, thermoforming molds, and end-use parts. The printer also features a single extrusion

tool head and a refined industrial design. 3D Systems promises print speeds that are up to 10 times faster and material costs that are 10 times lower than traditional filament-based systems.

3D Systems at Formnext 2024: Hall 11.1, Booth D11



Images: Multi-ax CNC, 3D Systems, Lithoz

A MUCH LARGER BUILD PLATFORM

Lithoz will premiere the latest and biggest addition to its range of ceramic 3D printers – the CeraFab System S320. This machine has a build platform and volume that are five times larger than the industry-proven CeraFab System S65, making it suited to the series production of mid-size parts, as Lithoz points out. Also on display will be the newest innovations printed on the S320, including atomic layer deposition ring segments for semiconductor manufacturing, casting cores, and filtration devices. In addition, Lithoz will showcase fascinating new medical and dental applications in ceramic 3D Printing through the exclusive launch of its brand-new LithaBite material for orthodontic brackets and the first-ever successful implantation of a 3D printed ceramic subperiosteal jaw implant. The CeraFab System S320

offers the largest build platform of any Lithoz LCM printer, along with a resolution of 60 µm and a 4K projection system. Lithoz is also promising reduced operating costs thanks to the system's efficient material usage. Meanwhile, Formnext visitors will be able to examine a showcase of LCM-printed ceramic parts, including segments of an alumina gas distribution ring 15 inches (380 mm) in diameter from Alumina Systems. The ring performs more effectively than those produced via conventional methods thanks to the design freedom afforded by LCM technology, which enables its exceptionally lightweight and thin-walled structure.

Lithoz at Formnext 2024: Hall 11.1, Booth C49



A NEW TITAN 1500S SPM-AT



- 2,100 kg
- 600 x 600 x 1500 mm
- 820 x 820 x 1300 mm



Maximum capacity
Minimal footprint

Ready for
SPR-PATHFINDER®

LOWER ARGON CONSUMPTION, IMPROVED COST EFFICIENCY

Bright Laser Technologies (BLT) will present the latest version of its metal laser powder bed fusion (LPBF) system, the BLT-S450. This model features a build volume of 400 mm × 450 mm × 500 mm (W × D × H) and a four-laser configuration. It can also be configured with six or eight lasers. According to the manufacturer, the BLT-S450 offers several features that make it a game-changer in metal Additive Manufacturing. These include excellent cost efficiency, which it achieves by consuming very little argon. At the same time, the system is equipped with an automated powder circulation system that enables closed-loop powder recycling under inert gas protection. This feature automates the recycling, sieving, and powder supply processes. For enhanced safety, redundant oxygen sensors are located in the forming

chamber, filter chamber, and retrieval compartment. Furthermore, the system includes automatic shutdown and fault alarms for high oxygen levels, temperatures, and pressures to meet strict safety protocols. The BLT-S450 has already received CE and FDA certification and passed an ATEX explosion-proof assessment.

ved CE and FDA certification and passed an ATEX explosion-proof assessment.

BLT at Formnext 2024:
Hall 12.0, Booth D41



FULLY AUTOMATED COATING



Prima Additive and Comau have developed a fully automated system for coating brake discs for Stellantis. The first in a series of robotic Rapid Coating Process cells was unveiled at Stellantis Factory Booster Day in Turin (Italy) in mid-September. By hard-coating raw brake discs with resistant steel and composite materials, Stellantis will be able to significantly increase the durability of its discs and reduce emission pollution by up to 80%. At the same time, cycle times will

remain minimal, enabling the car manufacturer to fully comply with the Euro 7 standard, which requires a 27% reduction in particulate emissions from brake discs by the end of 2026. The robotic cell includes advanced laser systems, high-speed robotic arms, Additive Manufacturing processes, and safe powder management. By integrating Comau's robotic arms with Sinumerik Run MyRobot from Siemens, the arms can be controlled directly without the need for external or embedded

robot controllers. The cells are also equipped with adjustable grippers that can handle windows of different sizes in cars and trucks. The system is due to be installed at the Septfonds plant in France by the end of 2024.

Prima Additive at Formnext 2024:
Hall 12.0, Booth E81



Images: BLT, Prima Additive

GENUINE LARGE-SCALE PRODUCTION MEETS DESIGN FREEDOM

Exentis is breaking new ground in Additive Manufacturing. The unique and extensively patented Exentis additive screen printing technology enables the mass production of millions of components with complex geometries. With this development, the Swiss company is opening up new applications to production companies in industry, the pharmaceutical sector, and other sectors.



Exentis 3D Mass Customization Technology is a sustainable AM cold printing process. The material is efficiently applied layer by layer as a paste through screens. Geometry changes can be made quickly and flexibly using new screens. The Swiss company's production systems are modular and can be flexibly configured for industrial and cleanroom applications. They can produce very small components with ultra-fine structures of up to 125 µm channel width, as well as larger components with a diameter of up to 400 mm.

HIGH BUILDING RATE AND SURFACE QUALITY

For industrial applications, additional features such as cooling structures or integrated channels can be processed in a single step. If structures of this complexity could be produced using conventional manufacturing methods, several individual steps would be required. A wide range of materials can be used in the process. All available powdered materials such as ceramics, metals, polymers, active pharmaceutical ingredients, and biomaterials are processed into a printable paste, which is then used to manufacture the components.

In contrast to other AM processes, the Exentis technology's building rate of up to 10,000 cm³/h and a production volume of more than 5 million components per system per year enables »genuine large-scale production«. This is combined with Exentis technology's great design freedom and a surface quality of Ra 2 micrometers, which is exceptional for Additive Manufacturing.

UP TO FOUR DIFFERENT ACTIVE INGREDIENTS IN ONE TABLET

The pharmaceutical industry is another important area of application for Exentis technology. An Exentis production system can manufacture over 200 million tablets per year. Thanks to the EX434 iflex GMP production system's four printing towers, several different active pharmaceutical ingredients can be individually processed in a single step. Production can also be converted to handle other active ingredients within a very short time, as there is no powder dust contamination, when using pastes.

Exentis's innovative systems are already being used successfully in numerous countries around the world. The up-and-coming high-tech company with headquarters in Stetten, Switzerland, employs 130 people and offers a comprehensive all-in-one service, including production systems, component development projects, materials and services, as well as contract manufacturing.

Exentis at Formnext 2024:
Hall 11, Booth C62



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exentis-group.com

A MIXED PICTURE – BUT POSITIVE ON THE WHOLE

Taking a look at the current market from the perspectives of five experts

The market is growing, yet share prices are on the decline: For most of us, the recent developments in the world of Additive Manufacturing are difficult to understand. And then there are the very different signals AM companies have been sending. Some are letting 15 percent of their workforce go or only staving off bankruptcy by selling their precious intellectual property; others, meanwhile, are reporting 30-percent increases in revenue, and some start-ups continue to rake in more than €20 million in a single round of financing.

The sense of euphoria has subsided somewhat, but the AM market definitely has plenty of things going for it. In any case, it's miles away from the gloomy assessments of so-called analysts who focus almost exclusively on the stock prices of publicly traded AM firms. Consider how well things are trending for Formnext in the run-up to this year's big event, for example (see page 5). To paint as realistic picture as possible of the current world of AM, we spoke with five of the industry's leading minds and asked them to give us their views on the following:

- The current situation in the market and at their particular company
- Whether they think the pessimism that has taken hold in some circles is justified
- What the causes of this might be
- AM's chances for continued success in the future

As you might expect, their responses varied a great deal – and yet most of them seem to agree on a few core sentiments:

- The present circumstances depend on the industry and application in question.
- Competition is getting tougher.
- AM's future prospects remain highly positive; both the number of applications and the overall market will continue to grow.

But why not get these insights straight from the experts themselves? Please note that we had to abridge these interviews due to the limited space available in our print edition;

for the full versions, please visit fon-mag.de.

Arno Held, managing partner at AM Ventures



ARNO HELD: »IT IS POSITIVE THAT DUBIOUS PARTICIPANTS HAVE LEFT THE TABLE«

The current situation on the market appears to be somewhat better than in the first half of this year. The first board meetings have indicated a latent recovery. Customers are ordering again, financing rounds are being carried out, and company sales are also taking place again. While the level is still modest compared to previous years, it is starting to feel like a slight trend reversal so far in 2024.

Is the widespread pessimism in AM justified? In my view, no. The pessimism stems primarily from the financial markets and is due to the fact that between 2020 and 2022, completely exaggerated expectations were created that have now been missed by a wide margin (as expected by industry insiders). If you look at the specific applications and the customer structures of these firms, it is rather positive to see that dubious participants have left the table.

Of course, the number of bold experiments increased massively in the »boom« years. Not all the applications that have been hyped in recent years are really worthwhile, and not all promises that were made have been kept.

The competitive situation is getting tougher. There are currently around eight to ten times as many hardware manufacturers on the market as would be necessary. The level of competition will increase massively over the next 18 months, especially with rising cost pressure from very low-cost and highly innovative competitors from China, and that will lead to a market shakeout.

Text: Thomas Masuch

Images: AM Ventures, HZG Group, Renishaw

The industry is only now learning not to live on hype and advance payments for the future, and to think in terms of concrete, short-term business opportunities instead. The problem with AM technology, which can theoretically print anything, is that hardly any providers want to specialize in individual applications. However, it is precisely this specialization that is the key to success.

Frank Carsten Herzog, Founder and Managing Partner, HZG Group



FRANK CARSTEN HERZOG: »THERE IS NO REASON FOR PESSIMISM«

It has become more difficult for many start-ups in the 3D Printing industry to find capital in new financing rounds. As investors, we no longer encounter exaggerated valuations as often as we did three years ago. The self-assessment of start-ups is becoming more realistic. The start-ups in which we're involved at the HZG Group are at different stages of development. When I look at our portfolio companies, I'm very optimistic overall.

There is no reason for pessimism. Overall, the market for 3D Printing is growing. We are on our way to achieving a decent market penetration in both spare parts production and tool manufacturing. Additionally, an increasing number of companies are beginning to explore 3D Printing as a viable option for series production.

Not all forecasts have come true, but much of that was also due to hype. Anyone who thought that 3D Printing would prevail in every area may now be somewhat disillusioned. There are natural limits. For example, 3D Printing will not be an option in the future for quantities in the millions. Overall, a differentiated view is needed to identify growth opportunities. There is no single AM market.

I advise every entrepreneur to be courageous when using new technologies. Europe is strong in basic research; when »

Rainer Lotz, EMEA president at Renishaw



RAINER LOTZ: »THE GOOD LONG-TERM PROSPECTS ARE NOT AT RISK«

We're all navigating a complex market situation right now. Geopolitical uncertainty, economic policy instability, and inadequate long-term investment incentives are some of the factors leading to market stagnation, which is reflected in declining demand. This is particularly evident in sectors like automotive, mechanical, and plant engineering. However, at

Renishaw, we've managed to achieve record sales in recent years by expanding our portfolio (as of June 2024). We're also seeing steady demand in the Additive Manufacturing sector.

The industry experienced a »gold rush« period, and some companies overextended themselves. In today's challenging economic climate, this is catching up with them. It is now clear that the industry needs more staying power. However, I don't believe this undermines the industry's long-term prospects. Additive Manufacturing has established its place in modern production, and the key now is to better understand and meet customer needs. Doing so will lead to stronger demand in the future.

Caution around capital goods is widespread, and this affects more than just the AM market. It's understandable given the current economic climate. We're also seeing heightened competition from manufacturers in the Far East. The real opportunity for companies lies in driving innovation.

it comes to implementation, companies from the USA often lead the way. We need to look at the opportunities offered by new technologies.

I expect the use of artificial intelligence in particular to give the industry new impetus for innovation. We are also continuing to see great innovations in production processes themselves! However, I see our strong training system as the greatest opportunity. This is where we as a society should continue to invest.



Jurgen Laudus, Vice President and General Manager of Materialise Manufacturing

JURGEN LAUDUS: BIG DIFFERENCE BETWEEN PROTOTYPING AND SERIES PRODUCTION

In the current landscape of the 3D Printing industry, it's crucial to differentiate between the prototyping market and serial manufacturing. The prototyping sector is experiencing a decline, driven by three key factors.

- Firstly, the challenging economic climate has led to reduced investments, particularly impacting industries like automotive, which plays a vital role in European manufacturing.

- Secondly, there is a growing trend of companies insourcing their prototyping services, acquiring 3D Printing systems, and managing these operations internally.
- Finally, China's technological advancements and ability to maintain cost efficiency have resulted in a significant shift, with more prototyping business being outsourced to China.

When we turn to serial manufacturing, there is continued growth, with double-digit increases. This expansion is driven by the medtech sector, which focuses on the development of medical devices for healthcare, as well as the aerospace industry.

One major hurdle is the need for re-design. Components that have traditionally been produced using conventional manufacturing methods must be redesigned for Additive Manufacturing, which is both costly and complex. Although this redesign is a non-recurring cost, it often limits the adoption of 3D Printing, especially for upgrade-designs in industries like aerospace. However, when entirely new airplane designs emerge, we believe 3D Printing will play a more significant role.

The second barrier is the need for process optimization. Achieving the required quality standards involves fine-tuning and optimizing the 3D Printing production processes, which takes time but is essential for success.

Rainer Gebhardt, Additive Manufacturing Consultant, VDMA e.V.



RAINER GEBHARDT: »MORE CONFIDENT THAN THE AVERAGE«

Within the VDMA, Additive Manufacturing is naturally tied to the mechanical engineering sector, which is currently facing significant challenges – AM included. However, we are seeing positive signals from our member companies in the additive sector. AM is being used where flexibility is required: printing on demand and printing on site are proving to be an advantage in tough times. AM is experiencing growth in industries like medical technology, chip production, energy, and defence, where its relevance is increasingly being recognized.

What we once saw as a challenge – that AM hadn't yet gained widespread adoption, including in the automotive industry – now means that the AM sector is showing more resilience and confidence compared to the wider mechanical engineering industry.

Access to international markets is also becoming increasingly important. Renewed optimism in the U.S. market, for example, highlights a growing interest in advanced manufacturing, with additive technologies playing a key role.

There's no single AM technology; rather, solutions are often customized to meet specific quality and process requirements.

FURTHER INFORMATION:
» formnext.com/fonmag

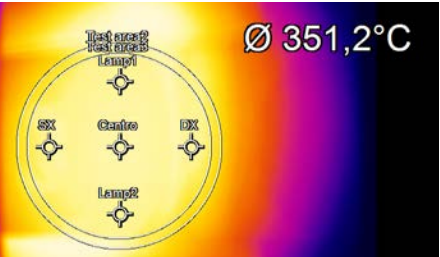
Images: VDMA, Materialise

SPECIALLY DESIGNED FOR MATERIAL RESEARCH

At this year's Formnext, the Italian company Sharebot is presenting the SnowWhite2 HT, the latest version of an SLS printer that is specially tailored to material research on high-performance thermoplastics. The 3D printer offers a heated powder chamber that can reach temperatures of over 350°C,

as well as optimized thermal management and advanced software controls.

Sharebot at Formnext 2024:
Hall 12.1, Booth E10



MONITOR PROCESSES BETWEEN -20°C AND 900°C

The Berlin-based manufacturer Optris is poised to present the Xi 640 infrared camera, a new member of its Compact Line that is said to enable safe, affordable, non-contact temperature measurement in VGA resolution. With a high optical resolution of 640 x 480 pixels and a frame rate of 32 Hz in the spectral range of 8–14 µm, this VGA infrared camera can be used to monitor fast thermal processes at temperatures between -20°C and 900°C. Optris has equipped the Xi 640 with an »Auto spot finder« function, which can also be used to measure the temperature of moving objects without having to readjust the camera. Image processing is carried out using the free PIX Connect software with line scan functionality.

Optris at Formnext 2024:
Hall 11.1, Booth A61

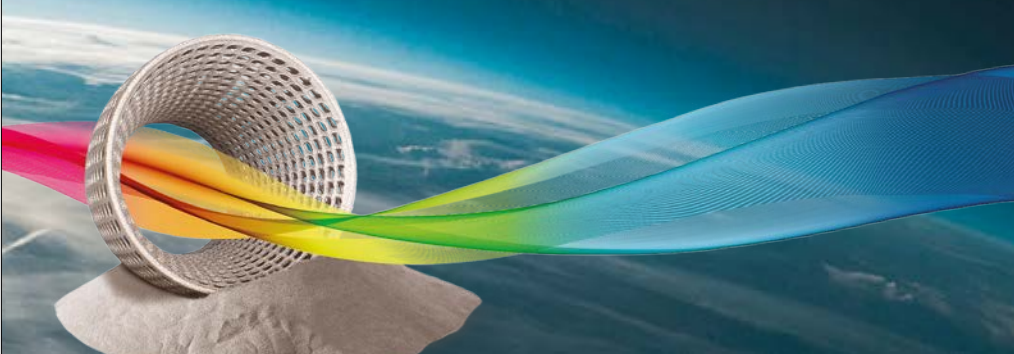


Images: Sharebot, Optris

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Linde AMT and NASA have announced a licensing agreement for the GRX-810 ODS Alloy. This innovative oxide dispersion strengthened alloy, developed by Linde AMT and tested by NASA, exhibits exceptional properties at high temperatures (1093°C), making it ideal for aerospace applications.

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STACKING IDENTICAL WELD SEAMS LAYER BY LAYER

Fronius is set to unveil CMT Additive Pro, a 3D-optimized welding process that promises consistent layer buildup, high quality, and stability. In the new iWave Multiprocess Pro and the specially tailored CMT Additive Pro waveform for 3D metal printing, the company offers a high-performance welding system compatible with common robotic systems used in Additive Manufacturing. For decades, Fronius has utilized cold metal transfer (CMT), a stable, controllable, and relatively low-heat welding process. This technology is already used worldwide for 3D Printing, and Fronius has now optimized it specifically for metal 3D Printing. Fronius' CMT Additive Pro features an integrated melt-rate stabilizer that ensures a constant wire feed, which in turn produces a consistent and predictable layer buildup. According to the company, this significantly improves the overall stability of the manufacturing process. »Another innovation is the adjustable heat input, which keeps the height-to-width ratio of the weld bead consistent, regardless of the temperature of the base material or the previously welded layer.«

explains Philipp Roithinger, an expert in Additive Manufacturing at Fronius International. »Typically, a weld bead becomes wider and flatter as the part heats up. Our power correction counteracts this, allowing identical weld seams to be stacked one on top of the other, layer by layer.« In addition to this, Fronius supports its customers with welding expertise at its 900-m² prototype center in

Wels, Austria. The facility houses multiple isolated robotic cells and systems, offering a full range of services that includes offline programming and simulations, metallurgical analysis, 3D part measurement, comprehensive data documentation, and much more.

Fronius at Formnext 2024:
Hall 12.0, Booth C99



DROPLETS NOW MONITORED IN REAL TIME

At Formnext, Grob will present the next generation of its GMP300, which is based on liquid metal printing (LMP) and molten metal printing (MMP) technology. The GMP300 utilizes aluminum wire that is melted and printed onto a heated build plate measuring 300 x 300 mm, similar to an inkjet printer. According to Grob, this allows for a maximum build volume of 200 cm³ per hour. The new generation of the GMP300 features a variety of enhanced functions, including an improved sealing concept for the build chamber. A movable camera system monitors the droplets in real time, while a second camera system within the build chamber detects and reports any droplet misalignment. In addition, the implementation of a second wire feed unit facilitates even faster material changes.

Extra sensors for temperature and process monitoring enhance control and quality assurance during the printing process. Meanwhile, improvements have also been made with regard to the GMP300's maintenance and accessibility.

Grob at Formnext 2024:
Hall 11.0, Booth C51



Images: Fronius, Grob-Werke

THE RIGHT RESOLUTION FOR EVERY APPLICATION

With its next generation of industrial 3D printers for micro-scale components, Boston Micro Fabrication (BMF) is promising a flexible resolution of 10µm or 25µm to facilitate higher speeds and efficiency. The company is set to present the first 3D printer in its new series, the MicroArch D1025, at Formnext. The hybrid MicroArch D1025 accurately produces tiny components and complex features at 10µm, while the 25µm mode enables higher printing speeds for small parts that don't require ultra-high resolution. Both resolutions can be flexibly combined in the same print layer. In hybrid mode, the MicroArch D1025 also automatically recognizes and adjusts to areas that require 10µm resolution. This means that tiny features are reproduced precisely while the overall build is still faster. The microArch D1025 is based on

projection micro-stereolithography (PµSL), which enables rapid photopolymerization of liquid polymer layers using flashes of UV light. DLP projection offers two resolutions with larger projection zones to speed up the printing of high-precision components. The speed and efficiency of the microArch D1025, which features a build volume of 100 x 100 x 50 millimeters, has been improved in many other areas, as well. For example, an automatic calibration system aligns the platform, roller, and membrane, thereby reducing change-over times. The print settings for roller frequency and delay times can also be automatically adjusted to the printing area and material viscosity at hand.

Boston Micro Fabrication at Formnext 2024:
Hall 11.1, Booth C19



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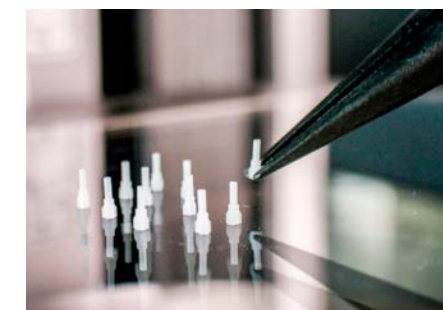
EFFICIENT PRODUCTION OF INTRICATE CERAMICS

As a contract manufacturer, Bosch Advanced Ceramics specializes in the innovative field of the Additive Manufacturing (AM) of ceramics and produces high-performance, innovative components for various industries worldwide. One of its most recent projects, the production of a very small, intricate sleeve for a medical technology company, showcased the company's highly specialized expertise. The sleeve electrically insulates a 0.5 mm wire in a laparoscopic instrument (used to carry out procedures such as laparoscopies). With an outer diameter of just 3.5 mm, the compact dimensions of the instrument mean that the wall thickness at the top of the sleeve is only 90 µm. This delicate structure, which is almost impossible to produce using subtractive manufacturing methods, requires exceptional precision throughout the entire process, including the cleaning of components. This level of detail can only be achieved with the right material and

the perfect process parameters. This compensates for over-polymerization and ensures accurate reproduction of the most intricate features. During a 5-month development phase, the Bosch Advanced Ceramics team determined the ideal balance of wall thickness and electrical insulation. Producing the sleeve using Additive Manufacturing is also highly efficient. Up to 1,400 parts can be produced in one printing process, meeting the annual requirement of up to 50,000 parts. Thanks to innovations such as the sleeve,

laparoscopic instruments are continually decreasing in size, enabling smaller incisions during operations and faster healing. Bosch Advanced Ceramics is one of the few companies in the world with the necessary expertise to successfully execute AM ceramic manufacturing projects of this nature.

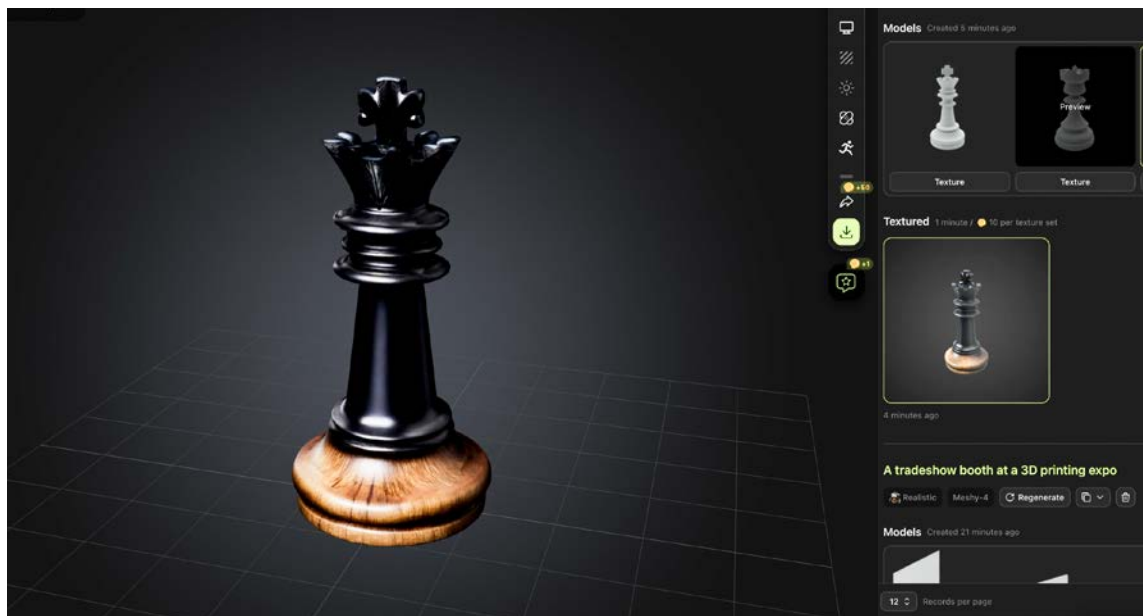
Bosch Advanced Ceramics
at Formnext 2024: Hall 11.1, Booth B21



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Phone +49 711 81113891
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THE NEXT HYPE CYCLE?

An overview of the current state of artificial intelligence in Additive Manufacturing



In addition to design, AI offers support in further process steps in Additive Manufacturing

Text: James Woodcock

AI, as you may have noticed, is everywhere. Whether it is a discussion about political elections, the implications for recruitment, education or for manufacturing, AI is seemingly always a key part of the conversation. Applications of AI models are nascent across all use cases, including within AM. In this area, the National Institute of Standards and Technology (NIST) is currently running the Advanced Informatics and Artificial Intelligence for Additive Manufacturing (AI2AM) project to develop the methods, models, standards, and best practices to leverage AI and related technologies to move AM towards »born qualified« and »first part correct« outcomes.

Despite the fledgling nature of much of the technology, in the world of AM, different types of AI do, will or could find use across the process chain.

IDEATION AND DESIGN

AI can play a significant role in the DfAM space, with generative AI able to create complex designs that make full use of the benefits of AM. As well as being embedded in major CAD software like Autodesk Fusion 360 and Siemens NX, standalone products like Meshy AI allows users to create 3D models — exportable as .stl files — from either text prompts or photographs. Deploying deep learning and generative design in this way drastically reduces the design time while allowing more solutions to be trialed in a reduced timeframe.

Once part files have been generated, several AI processes including machine learning, predictive analytics and physics-informed AI software can then be used to analyze and fix files prior to printing. By analyzing the parts and mining known datasets about how different AM systems

build, solutions like 1000 Kelvin's AMAIZE, can predict issues with individual builds based on the part geometry, machine parameters and materials choice, reducing the number of failed builds.

Here is a concrete example: The Citrine Platform was used in collaboration with the Alliance for the Development of Additive Processing Technologies (ADAPT) Consortium to optimize the design and production of hinges for Mine-Resistant Ambush Protected (MRAP) light tactical vehicles. AI-driven optimization led to a 50% increase in strength, 38% reduction in weight, and consolidated the original six parts down to one.

DEFINING THE BUILD

Machine learning (ML) models can analyze huge material datasets and combine that information with data from previous builds to predict how a given

Image: James Woodcock

Machine Learning

A subset of AI focused on building systems that learn from data to make predictions or decisions without being explicitly programmed for each task.

Deep Learning

A subset of machine learning that uses neural networks to model complex patterns in data. Deep learning is particularly effective for tasks like image and speech recognition.

Generative Models

AI models designed to generate new data samples that resemble the training data. These models can create new text, images, music, or other content.

Neural Networks

A set of algorithms modelled loosely after the human brain, designed to recognize patterns.

material will behave during the printing process. This allows engineers to make informed decisions about which materials to use for an application based on real-world data.

Predictive analytics AI ensures that schedules are optimized for maximum efficiency, helping manufacturers reduce downtime by planning and scheduling optimal times to run certain print jobs, based on machine availability, material stocks, and job priorities.

AI AS QA

AM processes, especially in metals, require the complex choreography of chemistry and physics. Things can and do go wrong. AI-based computer vision systems use deep learning to track each layer of a print as it is being produced, flagging defects such as layer shifts, warping, or other inconsistencies in real-time. Where fixes can be implemented, feedback loops can action corrections, at the very least part builds can be stopped at the point of failure instead of letting the process run.

Once the parts are built, inspection is still required — a time-consuming process open to human error. AI-driven automated inspection systems solve this by using computer vision and deep learning to analyze parts post-production. Companies like EOS have integrated computer vision into their platforms to provide real-time process monitoring (EOSCONNECT), ensuring that defects are identified early in the process. Oqton's Build Quality combines build simulation, monitoring, and part inspection to ensure parts are built to specification without human interference.

Perennial bugbear, post-processing, can also be automated with AI-driven robotic systems, further optimizing the production workflow, and ensuring consistent results by handling support removal and surface finishing.

FUTURE FAILURE ALERT

Predictive maintenance — i.e., fixing a system before it breaks — is one of the most significant areas where AI adds value to users of AM systems. By using machine learning and IoT/IIoT-enabled sensors, AI can monitor the health of AM machines and predict when maintenance is required before a breakdown occurs. This proactive approach minimizes unplanned downtime, reduces repair costs, and extends machine lifespan. By integrating predictive maintenance solutions, manufacturers can achieve 20% efficiency gains and increase machine utilization, significantly enhancing profitability.

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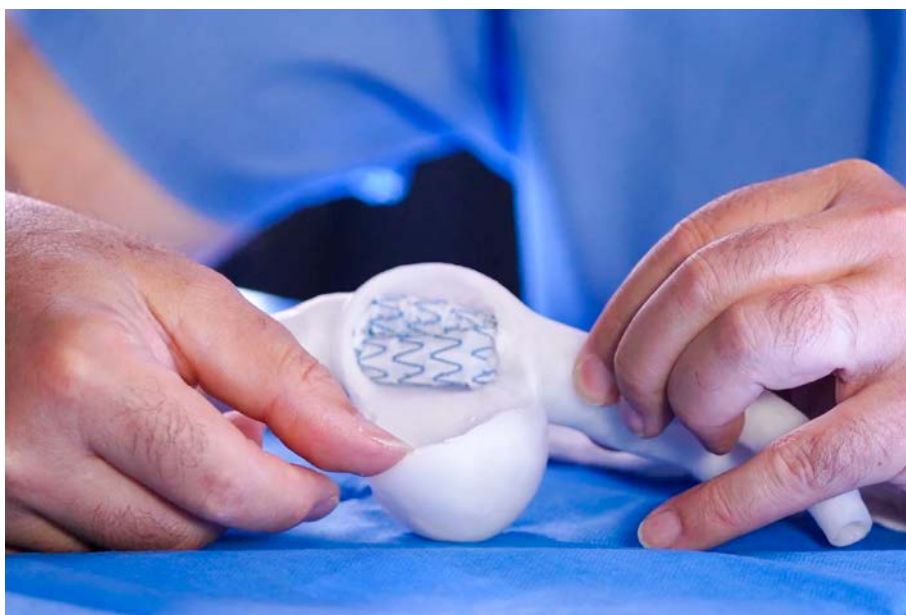
PRECISELY REPLICATING THE MECHANICAL PROPERTIES OF TISSUE

French company 3Deus Dynamics is poised to present 3D printed aortic models specifically designed to improve surgical training and pre-operative planning. According to the company, the innovation in these models is that they accurately replicate the mechanical properties of human tissue, providing surgeons with a realistic hands-on training experience.

The models are made of silicone, which offers better flexibility and tactile feedback compared to traditional hard plastic or resin models. 3Deus Dynamics offers its own patented silicone 3D Printing process for the production of complex and realistic anatomical models. For surgical training, complex procedures such as endovascular aortic

repair (EVAR) can be simulated in an environment that mimics real operating room conditions. Thanks to the accuracy of the models, physicians can practice important skills such as wire handling, stent placement, and cannulation. According to recent studies, the use of simulations with 3D printed models significantly reduces procedure time and radiation exposure and improves surgeon performance by up to 40 percent. Another important innovation of these models is patient-specific customization. Using medical imaging data such as CT scans, 3Deus Dynamics can produce anatomically accurate aortic models tailored to each patient's condition. This allows surgeons to practice and fine-tune their approach before the actual procedure to ensure they are prepared for any difficulties that may arise.

3Deus Dynamics at Formnext 2024:
Hall 11.1, Booth B03



MONITORING THE COATING OF BRAKE DISKS

To address the health risks posed by particulate matter, the EU has included brake dust in the new Euro 7 vehicle emission standard for the first time. This standard treats each vehicle as a whole and requires a significant reduction in particulate emissions from braking systems. Euro 7 aims to cut these emissions by 27%, limiting them to a maximum of 7 mg per kilometre by 2035. A key method of reducing these particles and increasing the lifespan of brake discs involves applying a hard coating that combines stainless steel and carbides on the surface of the discs. To ensure accurate, real-time monitoring of the coating process, NIT has developed the Discover

IR Suite. This solution ensures quality control using an uncooled IR camera integrated with specialized software. The Discover IR Suite functions as an in-process quality assurance tool for evaluating brake disc coatings applied via high-speed laser metal deposition (HS-LMD). The system's assessments are based on analysis of the geometry and dynamics of the melt pool as captured by a specialized MWIR infrared camera. This analysis is further refined by mathematically evaluating over 40 features through continuous monitoring and measurement.

New Infrared Technologies (NIT)
at Formnext 2024: Hall 12.0, Booth B48



Images: 3Deus Dynamics, New Infrared Technologies (NIT)

SAVE MATERIAL WHEN DEVELOPING NEW POWDERS

Anima, the official European distributor of ZRapid Technologies, will be presenting the Build Volume Reducer (BVR) for SLM machines at Formnext 2024. This additional tool can be easily attached to an existing build plate and feed hopper to reduce the build area to a 50 x 50 mm plate. The BVR, which is designed for the development of new powders and printing parameters, makes it possible to carry out tests with minimal material use. The BVR can currently be used with ZRapid Technologies' iSLM160 machine, and there are plans to make it compatible with the iSLM280. The BVR can thus be used in both research and larger industrial environments. According to Anima, the BVR module is particularly impressive thanks to its simplicity. It can be installed and removed in five minutes and is also easy to clean, which minimizes downtime between tests.

Anima was founded in 1991 and offers selective laser melting (SLM) and stereolithography (SLA) machines as part of its partnership with ZRapid Technologies.

Anima at Formnext 2024:
Hall 11.1, Booth B28

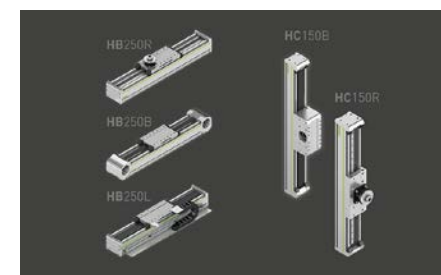


GREATER RIGIDITY FOR HEAVIER LOADS

Rigid positioning axles with closed aluminum profile for the most demanding dynamics and precision requirements. Hiwin presents its new bridge axles featuring toothed belt drive, linear motor drive, and now with rack and pinion drive. The movement technology specialist is also enlarging its HC cantilever axles with a new, wider profile. Hiwin's new bridge axles are primarily used for material loading and palletizing in larger workspaces. Thanks to the closed aluminum profile, HB bridge axles are particularly torsionally and flexurally

rigid and designed for maximum moment loads. The Hiwin CG series external double guide in an O arrangement also guarantees high load-bearing capacities. Depending on the application requirements, the 250 mm wide axles are available with a toothed belt drive, linear motor drive, and now also with a rack and pinion drive. With speeds of up to 5 m/s and load capacities of 350 kg workpiece weight, the bridge axles achieve repeat accuracies of up to ± 0.005 mm. Hiwin has enlarged its HC cantilever axles with a new wider profile of 150 mm. Thanks to the high rigidity of the cantilever and the low moving mass, the linear axles are particularly suitable for dynamic applications with high loads in vertical applications.

Hiwin at Formnext 2024:
Hall 11.0, Booth C59



Images: Anima, Hiwin

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APPLYING METAL POWDER WITH AIR PRESSURE

With its new OmniFusion 3D system, Schaeffler is targeting the additive processing of metal multi-materials. The system is based on a »recoater«, which is essentially a sled that carries three rollers. These rollers are equipped with a fine grid structure onto which the material powder trickles from above. Since this takes place in a vacuum, the fine particles adhere to the rotating surface of the rollers. The recoater then moves across the build platform at a speed of 15 cm/s and places the powder precisely where it is needed in the component. This is made possible by compressed air bars installed inside the rollers. Each of these bars is equipped with 832 tiny nozzles, which have a diameter of just 300 µm and create a powder landscape of 0.3 mm pixels. The material is then solidified using up to four lasers, each of which can



achieve an output of up to 3 kW. The wavelengths and power of the individual lasers are precisely matched to the different powder fractions in the powder bed, and the layer thickness can be set between 40 µm and 200 µm. The maximum application rate is currently 15 cm³/h when using steel.

Schaeffler at Formnext 2024:
Hall 11.0, Booth C28

BUILD RATE OF OVER 10 KG/H

As a provider of wire arc Additive Manufacturing, WAAM3D combines modern research with practical and efficient solutions. The company's latest innovation is based on the patented CWMIG process and is designed to enable the construction and processing of multi-ton components. The British company, a spin-out from Cranfield University, promises a build rate of over 10 kg/h. This should enable players in the oil and gas or marine industries in

particular to significantly increase their productivity. WAAM3D is set to present its latest development at Formnext.

WAAM3D at Formnext 2024:
Hall 11.0, Booth C99

REDUCING THE RISK OF EXPLOSION

At Formnext, Ruwac will be presenting a further development in wet separators and a new product whose operating principle differs significantly from the process used to date. The company will also be unveiling its newly founded Additive Manufacturing competence center for the first time. Leading manufacturers of SLM systems have included wet separators from Ruwac, which have been explicitly adapted to the requirements of Additive Manufacturing. With Ruwac wet sepa-

rators, the powder is first separated in a suitable liquid to render it non-explosive.

Ruwac at Formnext 2024:
Hall 11.0, Booth F11



Images: Schaeffler, Ruwac, LZH

PROCESS DEVELOPMENT OF SPECIAL MATERIALS

At this year's Formnext, Laser Zentrum Hannover e. V. (LZH) will present its latest research findings in the Additive Manufacturing of metals, polymers, and glass. In the field of powder-bed-based AM using metallic materials, LZH focuses on process development for special materials such as magnesium and its alloys, brass, and niobium, and will also showcase corresponding components. Another highlight of the company's exhibition will be wire-based Additive Manufacturing, particularly for the cost-effective production of large-scale components. With a specially developed laser processing head for coaxial wire deposition, it is possible to fabricate components with precision in complex geometries independently of the direction at hand. This technique enables the creation of large-format components and the

processing of micro-wire for more intricate structures. In the area of polymers, LZH will also unveil a seeder integrated with a cyclone separator. This device, which enables the targeted placement of seeds in soil, cannot be manufactured conventionally.

LZH at Formnext 2024:
Hall 11.0, Booth F51



PLANSEE

Refractory metal production

Refractory metal production

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GGW FILTERS VIA 3D SCREEN PRINTING

Modern communication systems such as satellites or mobile networks require higher data rates and capacities. As a result, higher frequency bands in the millimeter-wave range are increasingly being used. However, as frequency increases, wavelength decreases, which means that the components of such systems must become



smaller. This ongoing trend of miniaturization demands technologies capable of realizing components like filters, antennas, or diplexers. According to the Fraunhofer Institute for Manufacturing Technology and Advanced Materials (IFAM), 3D screen printing has proven to be an ideal method for manufacturing these components. In a joint project with the European Space Agency (ESA) and the University of Kiel, excellent results were achieved using groove-gap-waveguide (GGW) technology. This technology has proven to be highly suitable for creating components in the millimeter-wave range. The quality of the components produced in this project is comparable to conventionally milled parts. However, 3D screen printing offers greater flexibility and cost-effectiveness, especially for high-volume production. Screen printing

is a well-established process widely used in the solar and electronics industries. 3D screen printing takes this technology a step further by adding a third dimension, as layers are printed on top of one another. This process enables structural precision down to fewer than 100 µm with extremely high surface quality. Not only can complex internal geometries be realized, but the process can also be scaled to produce several million units for future applications. Thanks to its powder-metallurgical approach, the process allows near-net-shape production of components from a wide range of industrially relevant materials.

Fraunhofer IFAM at Formnext 2024:
Hall 11.0, Booth D31

NEW IMPETUS FOR EUROPEAN SPACE TRAVEL

To enhance the competitiveness of European space transportation systems, the Fraunhofer Institute for Laser Technology (ILT) is developing groundbreaking manufacturing technologies for rocket components as part of the Enlighten project. One major boost for European space travel comes from a rocket engine nozzle manufactured using laser material deposition (LMD). »The wide range of possibilities offered by LMD technology drastically improve our speed and cost-effectiveness in manufacturing new generations of rocket nozzles. Apart from its large build envelope, the design being investigated has exceptionally fine, thin-walled cooling channels that require great effort to implement in conventional production routines,« explains sub-project coordinator Min-Uh Ko. »What's exciting about LMD technology is that the process principle can be transferred to almost any kind of kinematic system. And that means the size is also easy to scale.« The nozzle being developed at Fraunhofer ILT is designed for use as a component in the next generation of

rockets to emerge from the Ariane program. ArianeGroup is the overall coordinator in charge of the Enlighten project. While the rocket nozzle can already be produced using conventional methods, the process currently involves many individual sequential steps, which presents challenges in terms of time and costs. Since no provider can carry out all the steps at a single production site, the components have to be moved around to multiple locations. This creates a process chain that significantly extends production and delivery times. Meanwhile, Fraunhofer ILT also focuses on process monitoring and quality assurance. The aim is to optimize the reliability and robustness of technologies developed at ILT to the point that they can be handed over to industry for future mass production. »With our results, we can make it possible for industry entities to produce structures that are just as large, complex, and intricate using LMD at their own facilities to supply the aerospace industry,« says a confident Min-Uh Ko.

Fraunhofer ILT at Formnext 2024:
Hall 11.0, Booth D31



Images: Fraunhofer IFAM, Fraunhofer ILT

CHANNEL-INFUSED DESIGN

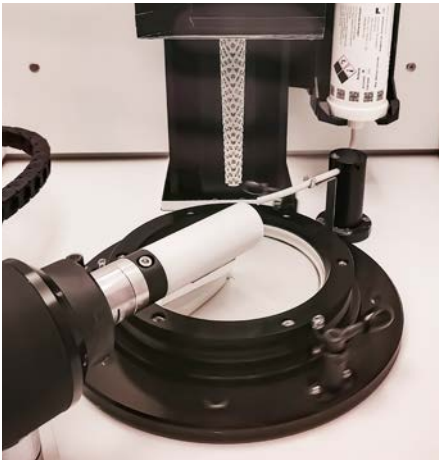
KSB SE & Co. KGaA will be showcasing a new, 3D printed split housing for magnetically coupled pumps at Formnext 2024. The component, named MagnoProtect, offers the safety of a double-walled split housing without the drawbacks of significant heating and high eddy current losses. Compared to conventional split-tube motor pumps, the new magnetically coupled versions demonstrate significantly better overall efficiency while maintaining comparable safety levels. With its completely channel-infused design, KSB's the new split housing provides a second redundant static safety feature against leakage of the conveyed medium. Due to its construction, the pump manufacturer reports that MagnoProtect exhibits high mechanical strength and excellent wear resistance. Its design is also optimized to minimize heat loss and eddy currents. Over the past 10 years, KSB has developed extensive expertise in metal-based Additive Manufacturing using powder bed fusion at its facility in Pegnitz, Germany, where it operates four PBF systems within its Additive Manufacturing Center.

KSB at Formnext 2024:
Hall 12.0, Booth B01M



Images: KSB, CADdent

BONE REPLACEMENT FOR A CAT



Veterinary medicine is another area that really benefits from the quick implementation and adaptability of AM. Unlike in human medicine, where complex and expensive certification processes are required, materials that have just appeared on the market or have been optimized for a particular area of application can be introduced and tested more quickly. This enables veterinarians to offer the most modern and effective treatment methods without compromising on safety or quality. For an impressive example of this, consider the recent case of a cat that was suffering from a severe bone defect on its left lower leg after being bitten by a dog. Thanks to modern imaging techniques such as CT scanning, the Austrian veterinarian Danilo Borak was able to identify and measure the defect, which enabled CADdent to construct a bone replacement structure. This was then manufactured from hydroxyapatite using lithography-based ceramic manufacturing (LCM). Borak implanted the bone replacement structure in the area of the defect and affixed it using two angle-stable osteosynthesis plates. The cat was then able to put its full weight on the leg just three days after the operation. A check-up six months after the operation showed that overall, everything had gone smoothly.

CADdent at Formnext 2024:
Hall 12.1, Booth E79

WANT TO LEARN
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ENHANCED
PRECISION
AND SPEED
FOR ADDITIVE
MANUFACTURING
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SOLUTIONS?

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Nov. 19 - 22

FORMNEXT
HALL 12.0
BOOTH C53



FULL CONTROL OVER
POWDER PRODUCTION

Met atomization technology company 3D Lab will be presenting its patented ultrasonic metal atomization solutions. This fully integrated suite, which includes ATO Lab Plus, ATO Noble, ATO Induction Melting System, ATO Sieve, ATO Cast, and ATO Clean – is designed to give customers

complete control over their metal powder production processes. Developed for companies active in material engineering and Additive Manufacturing, these systems enable such firms to produce metal powder from their own alloys. This is meant to make innovations faster and more effective. At Formnext 2024, 3D

Lab will also demonstrate how its compact, easy-to-use ATO suite can help companies and research institutions control the production of metal powders.

3D Lab at Formnext 2024:
Hall 11.0, Booth B21



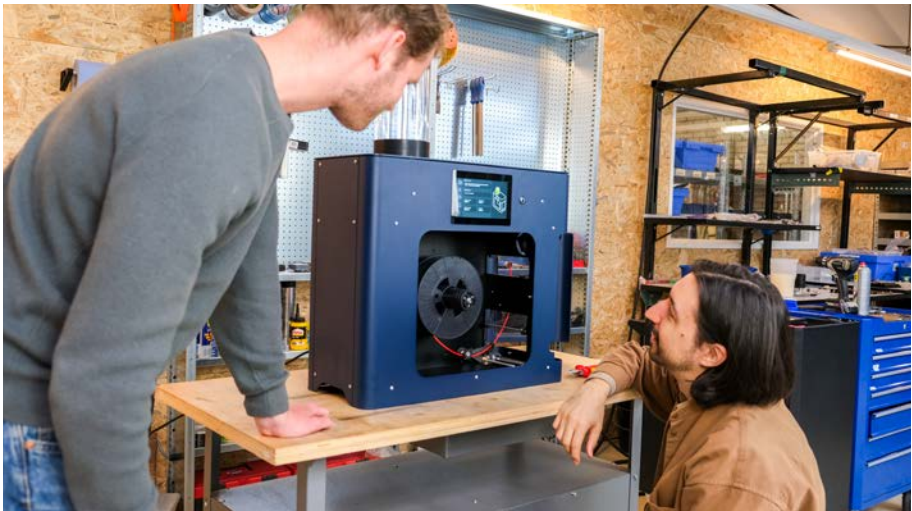
HIGH-QUALITY FILAMENT FROM PLASTIC WASTE

The new Filament Maker 2 from 3devo is set to debut with new sensor integration and improved functionality. The Dutch company also offers the possibility of recycling plastic materials – whether from 3D Printing processes or general plastic waste – into high-quality filament. The new and improved features of the Filament Maker 2 include a fully integrated sensor system which optimizes extrusion control and ensures precision throughout the process. »At last year's Formnext, we showcased the prototype of the Filament Maker 2, and the response was really positive,« says Timo van der Laak, lead materials specialist at 3devo. »Now, with a market-ready version that includes new integrated sensors, we can show how it truly enables users to reduce waste and create their own custom filament, whether by repurposing materials from produc-

tion lines or experimenting with new compounds.« Founded in 2016, 3devo provides both the tools and the expertise for developing sustainable, customized solutions for FDM filament production.

Its products range from the Filament Maker to the GP20 Shredder & Granulator.

3devo at Formnext 2024:
Hall 12.1, Booth F139



Images: 3D Lab, 3devo, Altana

FOR ONE-SHOT MOLDS AND LIGHT PIPES

The 3D Printing resins and inks from Cubic Ink, a product line from Altana New Technologies GmbH, cover nearly everything from functional prototyping to all-round technical capabilities and special applications. At Formnext 2024, the Cubic Ink team will be presenting a number of material enhancements and new developments. Cubic Ink Mold materials are used to produce one-shot molds for classic injection molding, but can also be used as cast material for applications like vacuum casting processes at low temperatures and pressures. They are suitable for 2K silicones, polyurethanes, epoxies, and other filled 2K systems. Altana believes this opens the door to significant cost reductions in classic injection molding by enabling the testing of new object designs, which can be produced and tested quickly

and inexpensively in the original material compared to conventional injection molds. Meanwhile, Cubic Ink High Performance 4-2800 VP ESD resin, which is suitable for electrostatically dissipative objects at moderate temperatures, has now been joined by Cubic Ink High Temperature 303 VP ESD. Thanks to its moderate viscosity, this resin is easy to print on all common DLP, LCD, and SLA machines. Objects made from it exhibit a heat deflection temperature of over 220°C. Improved versions of the impact-resistant, yet heat-stable materials around Cubic Ink High Performance 4-2100 VP will also be shown at this year's Formnext. Another new offering from Cubic Ink is the highly transparent, rigid material Cubic Ink Clear 1600 VP. Its refractive index of 1.58 results in a very clear material that is well suited to the production of light pipes, for example.

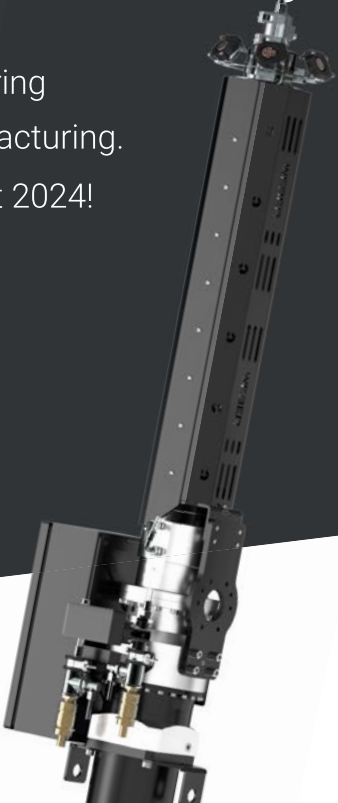
Altana at Formnext 2024:
Hall 12.1, Booth F12.1-F99



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Hall 11.1 | Stand C41



CRACK-FREE AND DUCTILE AT HIGH TEMPERATURES

Research and development have played an important role at Plansee for 100 years. At Formnext, the manufacturer of molybdenum and tungsten components is presenting MoC0.4, its new molybdenum alloy for Additive Manufacturing. MoC0.4 consists of more than 99.5% molybdenum. According to Plansee, this patented alloy exhibits high strength at both room and elevated temperatures, and also remains crack-free and ductile at high temperatures. MoC0.4 has similar properties to conventionally produced TZM (titanium-zirconium-molybdenum). Plansee will be exhibiting at Formnext together with Ceratizit, which is also part of the Austrian Plansee Group.

Together, the two companies will be showcasing a wide range of Additive Manufacturing solutions using the refractory metals molybdenum and tungsten, as well as carbide. Ceratizit offers 3D Printing of all the conventional carbide grades from its portfolio without the need for separate powder development. This includes the more sustainable carbide grades from the Upgrade range, which are made of 50- to 99-percent recycled carbide powder. In line with the Plansee Group's commitment to sustainability, 100 percent of all the metal residue and waste generated during 3D Printing are returned to the production cycle.

Plansee and Ceratizit at Formnext 2024:
Hall 11.1, Booth F19



FOR AUTOMATIC MATERIAL LOADING SYSTEMS



Focusing on the trends of innovation and sustainability, the Italian company Alpaplastic has two newly developed empty reels in its portfolio. The RS 200 RB spool has been specially developed for users who prefer automatic material loading systems and refillable cartridges. With a capacity of 1 kg for 3D Printing filament, it features a compact and stackable design that can

be used with or without a cardboard tube. The RS 300/20 spool, meanwhile, offers a capacity of 3 kg. Alpaplastic promises »unprecedented aesthetics and guaranteed technical efficiency and innovation.«

Alpaplastic at Formnext 2024:
Hall 12.1, Booth E48

AESTHETIC MATTE FINISH

Having launched the Prime, Matte HS, and Refill material collections in 2024, AzureFilm is poised to present them to an international specialist audience at Formnext 2024. One of the special features of the Prime collection is its heat resistance. These filaments are designed for high temperatures and suitable for applications such as electronic housings and automotive components. In addition to heat resistance, AzureFilm reports that Prime filaments are characterized by their high impact resistance. PLA Matte HS, meanwhile, was developed to offer an aesthetically pleasing

matte finish. It is suitable for a wide range of applications, from decorative objects to functional prototypes. According to AzureFilm, the material is easy to use and enables even beginners to achieve

excellent printing results due to its improved aesthetic properties.

AzureFilm at Formnext 2024:
Hall 12.1, Booth B19



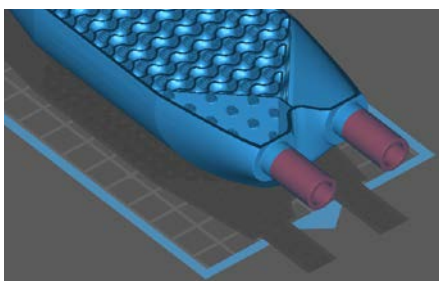
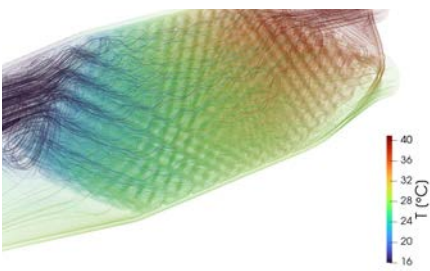
Images: Alpaplastic, AzureFilm, Plansee, cross-ING

CONDUCTIVE, STRONG, AND WELDABLE

At Formnext 2024, Feramic will showcase the industrial application of Ahead CP1 aluminum, also known as Aluminum 320 (Feramic's own designation). According to Feramic, this new aluminum surpasses conventional alloys like AISi10Mg in several key aspects. Its notable properties include excellent electrical and thermal conductivity, high strength, corrosion resistance, and the ability to be anodized.

Ahead CP1 is also highly weldable, which is a feature that sets it apart. Over the past 18 months, Feramic has worked diligently to optimize the material's production parameters, ensuring that components made from CP1 can be produced with an ideal balance of cost and performance.

Feramic at Formnext 2024:
Hall 12.1, Booth E19 (Swiss Pavilion)



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MADE FROM OYSTER SHELLS, COFFEE GROUNDS, AND OLIVE PITS



In collaboration with Nagami Design, Smart Materials 3D has designed the first fully 3D printed booth made from sustainable materials, which it now plans to present at Formnext 2024. The booth is more than just a product exhibition: every element, from the walls to the tables and chairs, was produced using large-format Additive Manufacturing (LFAM) technology, which uses robotic arms. The ecologically sustainable materials used for production included organic components such as oyster shells, coffee grounds, pine wood, olive pits, and cork. These materials also reflect Smart Materials 3D's commitment to circular economy and responsible waste management. More than 2,000 kilograms of pellets from the new PelletSmart brand were used for this project. Most of these

pellets (around 1,000 kg) were made from oyster waste, with the aforementioned materials accounting for the rest. These pellets illustrate the versatility of such materials and allow visitors to see, touch, and experience their physical properties.

Smart Materials 3D at Formnext 2024:
Hall 12.1, Booth F39



REDUCING PLASTIC WASTE

The Chinese company Kexcelled will be presenting its Reusable Filament Spool (RFS), which is meant to help reduce plastic waste in the 3D Printing industry. »We were shocked to learn that two-thirds of plastic filament spools end up in landfills,« says Wilson Mao, founder and CEO of Kexcelled. According to the company, the RFS seamlessly integrates with most FDM/FFF 3D printers, is designed for long-term use, and is compatible with automated material systems.



Kexcelled at Formnext 2024:
Hall 12.1, Booth G19

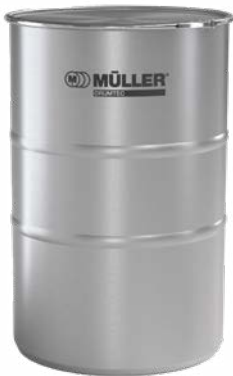


AVOIDING MATERIAL LOSS

At Formnext, Müller DrumTec will showcase stainless steel drums and customized process solutions, particularly for powder handling in Additive Manufacturing. The company underscores the importance of the quality of these containers with an example: Handling 1,000 kilograms of metal powder in non-specialized containers can lead to up to 5% material loss due to leaks, contamination, or spillage – equating to 50 kilo-

grams of powder per batch. With Müller DrumTec containers, this loss can be reduced to less than 0.5%.

Müller DrumTec at Formnext 2024:
Hall 12.0, Booth B22



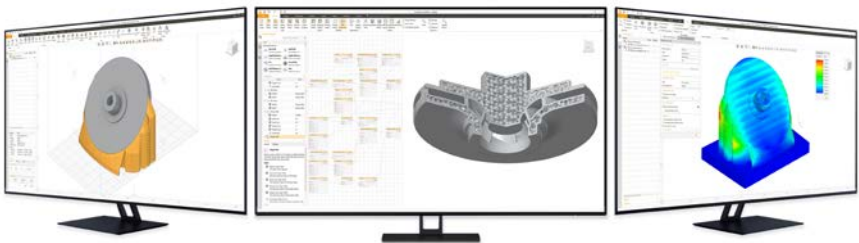
Images: Smart Materials 3D, Kexcelled, Müller DrumTec

DESIGN AND MANUFACTURE WITH ONE PLATFORM

At Formnext, Chinese software provider VoxelDance is presenting VoxelDance Additive 5, a comprehensive software solution that makes it easier to switch between different model formats and, according to the manufacturer, helps to exploit the full potential of 3D Printing. »Engineers often face delays and extra costs because of the back-and-forth between design and production stages,« says Zhang Chaoxin, CEO of VoxelDance. »Transferring data from CAD to CAM, for example, can take forever and often results in errors. If model compensation is performed separately in CAM and CAE, it can cause inaccuracies in data preparation.« VoxelDance Additive 5 solves this problem by combining design, manufacturing, and engineering

tools in one platform. The new software also offers implicit modeling, which simplifies complex designs and reduces file sizes. This makes it possible to design lattice structures in real time. Thanks to its GPU-based architecture, VoxelDance Additive 5 also significantly speeds up simulation compared to conventional CAE solutions according to the provider. The platform focuses on the laser powder bed fusion (L-PBF) process, and it also enables precise simulations that can predict and resolve production problems. The software can easily compensate for the original model based on simulation results, thus eliminating data transfer issues.

VoxelDance at Formnext 2024:
Hall 12.0, Booth C22



AI SOLUTION FOR INTERNAL DATA SETS

Fehrmann MaterialsX is planning to present its latest development, MatGPT Enterprise, at Formnext 2024. This advanced AI solution combines the proven functions of MatGPT Pro with the ability to build and use company-specific knowledge databases – all in a secure private cloud environment hosted in Europe. Following the successful launch of MatGPT Pro, a browser-based AI platform that leverages expert knowledge in specialized fields such as aluminum and magnesium, MatGPT Enterprise now offers companies the opportunity to

integrate and use internal data sets and specific information in their own secure knowledge database. Like MatGPT Pro, it will be accessible through individual licenses. This allows for flexible use of the platform, which can be tailored to the specific requirements and size of each company.

Fehrmann Materials at Formnext 2024:
Hall 12.0, Booth C81

Image: VoxelDance

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19. – 22. November 2024
Hall 12.0 | Booth C129

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BETTER COMPONENTS THANKS TO AN OPTIMIZED FILLING STRATEGY

With a strong focus on AI and digital simulations, Advanced Additive says it wants to help shape the future of AM. At Formnext 2024, the company will be presenting its latest innovations in its production software for 3D Printing. Advanced Additive is working on AI-for-FLM path planning that makes component-related optimizations in filling strategies, which should enable faster and more reliable production. According to the company, its specially developed AI architecture can be integrated into existing software. It features a digital twin that functions without intervening in production or data collec-



tion, enables process optimization, and creates the flexibility needed for tailor-made customer solutions. Advanced Additive is presenting the current range of Project Path functions with a special showcase. Its prototype demonstrates the ability to fill component areas 100-percent evenly, resulting in consistent and homogeneous component quality. Among other benefits, this prevents over-extrusion and reduces process times.

Advanced Additive at Formnext with Bayern Innovativ: Hall 12.1, Booth C71

NEW FEATURES FOR AUTOMATED HYBRID MANUFACTURING

Aibuild has updated its software platform to version 3.0, offering a wide range of new features for the automation of additive and subtractive manufacturing processes on one platform. The software is suitable for both metal and plastic processing and makes it possible to plan, execute, monitor, and optimize toolpaths. Aibuild 3.0 includes scanning, damaged part repair, molding, milling, WAAM, DED, and more. At Formnext, the British company



will also be presenting an optional add-on to its base software. This will enable live monitoring of printing and automatic thermal optimization for each machine in real time.

Aibuild at Formnext 2024: Hall 11.1, Booth F39

PROCESSING POINT CLOUDS AND MESHES

Polyga is presenting its new software platform, PointKit – the US company's latest effort to optimize workflows for industrial 3D data acquisition, automation, analysis, and reverse engineering. The PointKit platform includes two software tools, PointKit Scan and PointKit View, and further tools are planned. PointKit Scan offers new alignment and 3D data processing algorithms for applications such as general point cloud and mesh processing. Its advanced features include the ability to integrate with existing manufacturing lines to automate

3D capture and inspection, to reconfigure for reverse engineering to ease the mesh-to-CAD process, and to create views to convey measurement information. PointKit View, meanwhile, works seamlessly with PointKit Scan to provide cloud storage and sharing capabilities for easy collaboration from any desktop or mobile device. This allows users to conveniently review and iterate on data at any time without needing to install additional software.

Polyga at Formnext 2024: Hall 12.1, Booth G10



Images: Advanced Additive, Aibuild, Polyga

PRECISE PRINTING AND MILLING

The production of parts using the SLM process is becoming increasingly popular among dental companies. However, the printed restorations must undergo finishing to ensure that they are precise and comfortable. This was why CIMsystem developed Make&Mill, a hybrid solution that combines the advantages of both additive and subtractive technologies in a single application. »The 3D Printing market is increasingly moving towards the purchase and use of desktop printers. Although these smaller printers are more compact and less expensive than their industrial counterparts, they can still produce high-quality results for many different types of restorations,« says Luigi Fanin, co-founder of CIMsystem. With Make&Mill, the company aims to make certain refinement operations possible regardless of the machine size

or job complexity at hand. Equipped with a user-friendly interface and versatile capabilities, Make&Mill is available in several configurations and compatible with all major CAD and 3D Printing solutions, including Pyramis, CIMsystem's comprehensive slicing software. It can also be used with many open 3D printers and milling machines and combined with other software solutions, such as MillBox, CIMsystem's flagship CAM solution for the dental sector.

CIMsystem at Formnext 2024: Hall 12.0, Booth B63



HEYGEARS GMBH | ADVERTISEMENT

INNOVATING THE FUTURE



At Formnext 2024, HeyGears is showcasing its advanced 3D Printing hardware, software, and materials with a focus on consumer and dental applications. By highlighting practical solutions, HeyGears will emphasize its breakthroughs in automated features and high-performance materials at booth C09 (Hall 12.1). The centerpiece of the company's event presence will be the UltraCraft Reflex Series, which is designed for professional-grade results. HeyGears' newest printer, the UltraCraft Reflex RS,

integrates a C5 Z-axis module, full-field screen calibration, and dynamic motion algorithms to deliver precision and speed for tasks such as model creation and small-batch production. In addition, the UltraCraft Pulsing Release Module further enhances the printing process by reducing peeling force. There will also be plenty of industry use cases to learn about – including in tabletop gaming, where GCT is able to output 1,800 models per week using six printers at a 96% yield rate. For the hearables industry, meanwhile, HeyGears provides a batch production solution with mixable multi-color materials like PAM10 and rapid prototyping to produce hearables with ±0.05mm accuracy. Another HeyGears offering, Blueprint Studio, simplifies workflows with one-click pre-processing and auto model repair to make 3D Printing more accessible, while resins like the water-washable UltraPrint PAWW10 and PAS10 (for standard modeling) cater to both hobbyists and profes-

sionals. For dentistry, the UltraCraft A3D printer automates resin refills and part removal while enabling large-scale, high-precision production for dental labs. This ensures consistent, high-quality results. HeyGears' booth will have six sections showcasing 3D-printed hearables, miniatures, wearables, engineering solutions, and dental applications. Visitors can look forward to exploring high-performance materials like PAU20, PAT10, and PAE20, which offer durability, transparency, and elasticity for various uses. To see how HeyGears is innovating 3D Printing, empowering creativity, and improving efficiency across industries, be sure to stop by!

HeyGears at Formnext 2024: Hall 12.1, Booth C09

Images: CIMsystem

DE-POWDERING TWO-TON COMPONENTS

Solukon's new de-powdering system for beam-melted metal parts can handle components weighing more than two tons. The SFM-AT1500-S, which will be on display live for the first time at Formnext, is Solukon's largest metal de-powdering system to date. It can accommodate components measuring 600x600x1500 mm or 820x820x1300 mm with a maximum weight of 2,100 kg (including the build plate). To allow powder to flow, the solid component at hand must be subjected to strong vibrations. Solukon has developed a new decoupling concept to ensure that these vibrations are not transmitted to the rest of the system. In addition, it has come up with a new, robust drive technology for use in the SFM-AT1500-S. The chamber of the

SFM-AT1500-S is made entirely of stainless steel, and the turntable has four separately controllable compressed air lines for different constellations of vibrators, beaters, or blowing connections. The SFM-AT1500-S is compatible with the SPR-Pathfinder software, which, according to Solukon, automatically calculates the ideal motion sequence based on the CAD file of each component. When removing powder from solid components, considerable quantities of powder are produced for which standard containers are no longer sufficient for collection. With the compatible SFM-PCU powder collection station, the powder can be safely discharged through sensor monitoring and collected in a large container.



Solukon at Formnext 2024:
Hall 12.0, Booth D71

UP TO 1,400 °C

Nabertherm will be presenting the new LH..DB product series for the thermal treatment of ceramic parts and additively manufactured components at Formnext 2024. These compact furnaces are designed for debinding and sintering conventionally manufactured ceramic parts on a laboratory scale while also meeting the requirements of thermal post-processing in connection with additively manufactured components. The furnaces can be converted from air atmosphere to operation with

inert gas. During the debinding phase, the DB debinding package is designed to guarantee the highest safety standards. Material outgassing is diluted by preheated fresh air and reduced to a non-flammable level in the furnace atmosphere. Nabertherm's new furnaces will be available in two sizes with volumes of 120 or 216 liters and maximum furnace temperatures of 1,300 or 1,400 °C. When using the optional gas box, processes can be performed at up to 1,100 °C.



Nabertherm at Formnext 2024:
Hall 11.0, Booth A31

SOLUBLE SOLUTIONS



Xioneer focuses on soluble support materials and post-processing solutions for granulate and filament 3D Printing. At Formnext, the company is presenting its new VXL 150 support material, which has been specially developed for high-temperature printing, as well as the new Vortex XL tank. This tank is available in three different versions, each with a nearly doubled capacity

of 60 liters. Xioneer will also be presenting the new Vortex EZ Dental dissolving station, a heatable desktop device for quick and easy removal of support materials in a water bath.

Xioneer at Formnext 2024:
Hall 12.1, Booth E121

Images: Solukon, Nabertherm, Xioneer, Joke Technology

POST-PROCESSING COMPONENTS WEIGHING UP TO 250 KG



Joke Technology will be showcasing its enhanced Eneskapostprocess 5.0 workstation for the safe post-processing of 3D printed products at Formnext. This new generation offers a larger workspace, as well as optimized, efficient, and ergonomic handling. In the Eneskapostprocess, Joke Technology launched a workstation in 2019 that made it possible

to safely post-process 3D printed products in a closed workspace. With the new Eneskapostprocess 5.0, Joke is responding to the trend toward larger and more complex 3D printed components by offering a 50-percent-larger workspace (a 560-liter volume for components weighing up to 250 kilograms). Just 10 centimeters longer and wider than the original model, the workstation can be loaded manually or by forklift truck or crane. One of the most striking new features of the Eneskapostprocess 5.0 is its fully glazed front main flap, which can only be opened if the interior is sufficiently dust-free thanks to electromagnetic locks. Cleaning and disposal has also been optimized, including by a pull-out drawer for collecting support residue and coarse removal chips.



Joke Technology at Formnext 2024:
Hall 12, Booth D121



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COLORING SERIES PARTS AND PROTOTYPES

The MiniColor, a dyeing system Thies has specifically designed for additively manufactured polymer parts, will be showcased at Formnext. According to the company, the system is suitable for coloring series components, spare parts, and functional prototypes efficiently and consistently. The new T390 control system monitors every process step to ensure reliability, while the new Smart Color Inject function eliminates the need for manual dye preparation by the machine operator. The system also enables automated liquid dye handling and precise dye feeding, which guarantees color reproducibility. The MiniColor's »open system« allows for free program design and is not tied to specific chemical or dye manufacturers. The system is capable with Industry 4.0 and IoT applica-

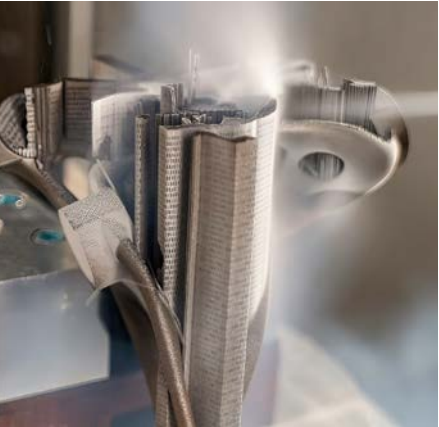
tions and supports an individual number of connected dyes. The new Multicolor feature also accelerates color development.

Thies at Formnext 2024:
Hall 12.1, Booth B02

REMOVING SUPPORT STRUCTURES WITH DRY ICE

AMbitious powered by Toolcraft will be presenting the use of dry ice blasting to remove support structures at Formnext. Until now, this process was often time-consuming and manually burdensome for metal 3D printed components. The dry ice blasting system offers an efficient solution by semi-automating the process and improving ergonomic working conditions. The throughput time per component can be reduced by up to 15 minutes, as AMbitious reports. In addition, working conditions are improved through the minimization of physically strenuous activities. This technology is already being used successfully in production at Toolcraft AG. At Formnext, the system will be presented virtually as part of the AMbitious platform along with insights into VR training for AM. AMbitious will be represented at the Siemens booth as a Siemens NX AM Expert Partner.

AMbitious powered by Toolcraft at
Formnext 2024: Hall 12.1, Booth D101



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Images: Thies, AMbitious powered by Toolcraft, Anton Paar, SmarAct

MEASURING THE ENVELOPE DENSITY OF SOLIDS

The latest innovation from Anton Paar is an accessory set for MCR rheometers, which enables companies to use the rheometer platform to measure the envelope density of solids. The modular design of the MCR Evolution rheometer also allows mechanical tests, tribological measurements, dynamic mechanical analyses (DMA), and all common standard rheological tests to be carried out. This makes it possible to determine the envelope density of solids in the sample size range of 0.3 cm³ to 25 cm³ using a reusable, free-flowing displacement powder. The RheoCompass software complies with 21 CFR Part 11, ensuring

correct data storage and maximum transparency for pharmaceutical customers. The Toolmaster automatically detects the measuring geometry and adjusts settings accordingly in the RheoCompass software, which saves time and eliminates errors arising through manual configuration. Combined with our Ultrapyc series gas pycnometers, the MCR rheometers and envelope density set now provide the density values required to determine the porosity of your sample.

Anton Paar at Formnext 2024:
Hall 12.1, Booth G118



FOR MICROELECTRONICS AND NANOTECHNOLOGY

The SmarAct Group from Oldenburg, Germany, is presenting its new SOM-MS-180150M microscopy stage at Formnext. The stage features electromagnetic direct drives and has been specially developed for applications in microscopy, nanotechnology, and industrial manufacturing. It has a travel range of 180 x 150 mm² and a movement accuracy in the sub-micrometer range. The SOM-MS-180150M

can also be used in material science, microelectronics, and optics manufacturing. According to SmarAct, the SmarShift technology used in the SOM-MS-180150M offers impressive dynamics and precise motion control. This also makes the stage ideal for rapid prototyping, particularly with high-resolution printing technologies such as two-photon polymerization (2PP).

SmarAct at Formnext 2024:
Hall 12.1, Booth A85



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ADVANCING AM TRAINING IN ALL INDUSTRIES

Ampower has just announced the launch of AM Academy GmbH, which represents the strategy consultancy's aim to advance AM education across all industries. AM Academy will offer a comprehensive suite of services, including self-paced online courses, live training sessions, and guided programs, each of which will be designed to meet the needs of professionals at all levels. While maintaining a strong industrial focus, AM Academy will independently address every major AM technology and sector. Building on the successful

educational services Ampower has established in recent years, AM Academy is a strategic expansion of the company's offerings to meet the growing demand from international clients. Headquartered in Hamburg, Germany, the company is led by Benjamin Haller and operates across the globe.

Ampower at Formnext 2024:
Hall 12.0, Booth B61



CERTIFICATION OF AM PRODUCTION FACILITIES

Providing easy access to AM-specific certifications and testing services, ensuring reliable traceability – Additive Marking and TÜV Nord are presenting solutions and methods that are designed to build trust in AM technology. The focus of the two companies' presentation will be on the certification of AM production facilities in accordance with the new international standard DIN EN ISO/ASTM 52920:2023. This standard specifies strict requirements for the structural and process organization of AM production facilities and defines framework conditions for reproducible, high-quality series production. »Certification to this standard brings benefits for all stakeholders. It improves transparency along the supply chain, differentiates industrial manufacturing operations from pure prototyping companies, and strengthens confidence in manufactured products,« explains Ulrich Jahnke, managing director of Additive Marking GmbH. Through their iam-approved.com platform, Additive Marking and TÜV Nord now provide simple digital access to accredited testing services from TÜV Nord. This online hub offers a wide range of test methods, which is particularly interesting for manufacturing service providers that don't have their own laboratories. Standard-compliant test specimens are provided in the form of clearly marked printable files and created as production samples along with the respective component. Additive Marking's solutions enable reliable traceability and automated serialization of industrial components in both Additive Manufacturing and conventional manufacturing processes. Each part is provided with an individual, non-manipulable code that makes it possible to trace the origin and the complete process chain back to the corresponding material batch.

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Additive Marking and TÜV Nord at
Formnext 2024: Hall 11.1, Booth D28



Images: Ampower, Additive Marking

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