03/2025 | EN

FonMag

READ AM I Application stories, interviews, news and insights about Additive Manufacturing

VERSATILE
How the automotive industry uses AM for an array of purposes
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UN PARTNER ESPECIAL
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mesago

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Messe Frankfurt Group

A río revuelto, ganancia de pescadores.

»When the river's rough, fishermen get rich.«

Spanish proverb emphasizing opportunities in difficult times.

Cover: Reinforce3D

Our preparations for this year's partner country took me to – where else? – Spain! Along with some very fine food and a cosmopolitan culture, I was looking forward to research institutes, innovative users of AM, and some highly impressive AM manufacturers, as well. One encounter has stuck with me to this day: with an entrepreneur that has developed an efficient, cost-effective LPBF machine, along with a corresponding ecosystem and software – practically as a side job. I was particularly struck by how he has viewed the industry's global struggles and accompanying price pressure not as a challenge, but a source of motivation.

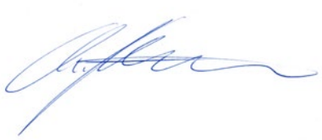
One current development in our industry relates to how desktop printers seem to be turning the world of AM on its head. New applications, can now keep pace with industrial systems. Instead of large, robot-driven factory floors with extensive AM systems, however, those looking for additive mass production have so far found rather unspectacular print farms with dozens (or sometimes hundreds) of desktop printers churning out things like shoes, toys, or models for medical purposes.

This trend is also reflected in the figures in various market reports: While turnover is on the decline in the sale of AM systems, it continues to rise in the field of materials. This means existing systems are being utilized with increasing efficiency, and on average, less money is being spent on new AM units. It's also an indication that the industry continues to evolve.

Of course, this development (and the growing intensity of competition that sometimes comes along with it) isn't producing only winners. While users are profiting from systems that are getting more affordable all the time, the situation and market are growing more challenging for many manufacturers. This is where Spain is positioning itself as an attractive location for manufacturers and users alike. The wage level (and thus also prices in many cases) is lower than in places like Germany, and at the same time, Spain offers the same European standards in terms of legal stability and data protection.

With hopes and challenges both vying for the upper hand, Formnext has a unique role to play. It continues to serve as the central platform for Additive Manufacturing – a place for innovation, strategic course-setting, and the sharing of ideas. Here, we don't just talk about the future of industrial production; we shape it.

We're looking forward to a Formnext that will show AM is ready to take the next step. In spite of all the challenges it faces – or perhaps because of them.



Sincerely, Christoph Stüker
Vice President Formnext

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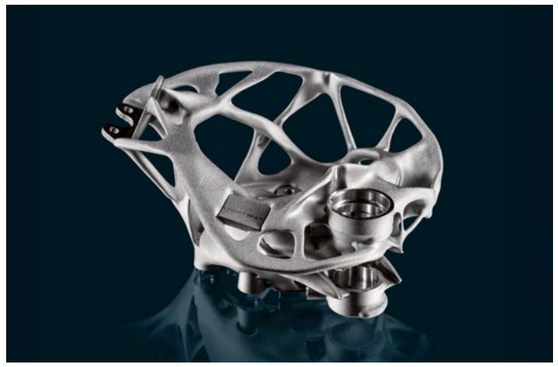

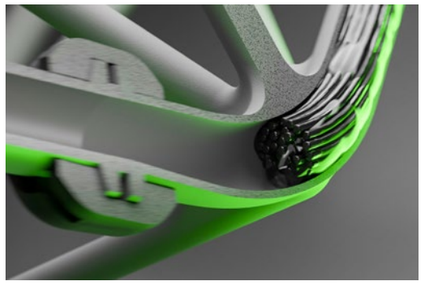

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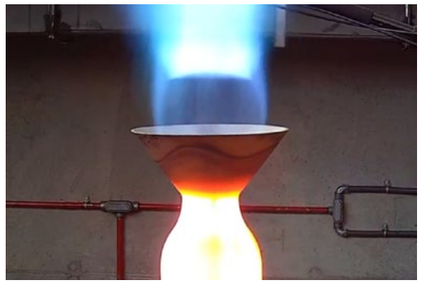

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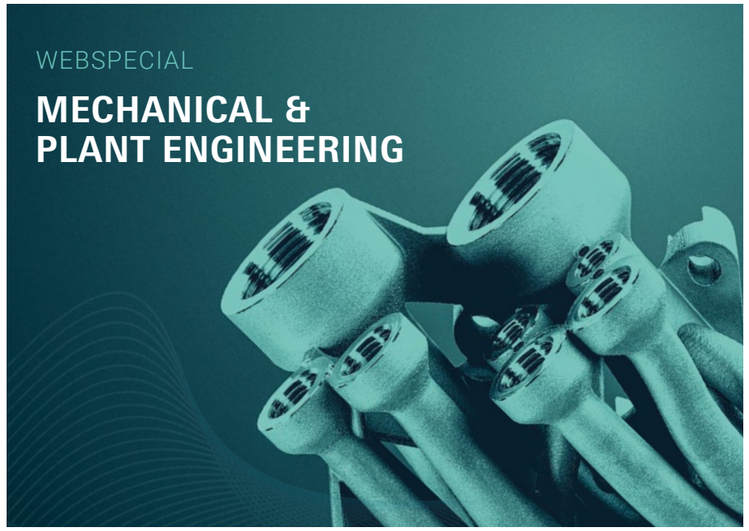
INDUSTRIAL APPLICATIONS IN FOCUS



Industrial applications are both an important indicator and an essential basis for the further progress of Additive Manufacturing. That's why Formnext continuously highlights exciting and promising user industries at various levels, from Formnext Magazine, white-papers, and webinars to lectures and special shows at its flagship trade fair. This gives visitors every opportunity to prepare during the run-up to the event so they can make the most of what Formnext has to offer. One of the key topics at Formnext 2025 will be mechanical and plant engineering.

FOCUS TOPIC: MECHANICAL AND PLANT ENGINEERING

Seeking to drive the ongoing industrialization of AM, Formnext has launched the topic special »Additive Manufacturing in Mechanical and Plant Engineering«. In addition to articles on this subject,- there is also a comprehensive white paper, sponsored by toolcraft, that covers challenges, opportunities, and business possibilities related to AM in this sector. Another of this year's highlights will be the Technology Talk scheduled for 4:00–5:00 pm on 18 September, sponsored by Xometry and moderated by Davide Sher (VoxelMatters).

Mechanical and plant engineering will also play an important role on the Formnext trade fair floor: Numerous presentations and industry talks are planned as part of the stage program, where renowned experts will discuss current trends, technological developments, and business opportunities.

In addition, the VDMA's working group on Additive Manufacturing (AG AM), which is also the conceptual sponsor of Formnext, will once again be presenting promising and concrete user examples from its member companies in its special showcase – this time under the motto »Profitable Industrial Solutions.«

Anyone who wants to get a taste of this can find successful practical examples from the mechanical engineering sector in the new, constantly growing compendium maintained by AG AM. This collection illustrates how AM technologies contribute to solving key challenges – such as resource efficiency, functional integration, and the development of new components.

+ FURTHER INFORMATION:
» formnext.com/expo

The topic special »Additive Manufacturing in Mechanical and Plant Engineering« is available here:

» formnext.com/engineering

ACCESS TO THE JAPANESE AM MARKET

For decades, Japan has been one of the leading industrialized countries in high-quality manufacturing technologies – and it also plays an important role in AM. Many Japanese companies (e.g. Matsuura, DMG Mori, Nikon, Ricoh, Yamaha, Mazak) develop their own AM systems or hybrid machines. Additive Manufacturing is also used in many high-tech sectors in Japan, including automotive engineering, medical technology, aerospace, and electronics. Large Japanese companies in particular are constantly investing in new innovations.

The Formnext Asia Tokyo Forum 2025, which will take place on 25–26 September 2025 at Hamamatsucho-kan in the heart of the Japanese capital, will provide an excellent point of entry into the country's exciting and demanding market. A combination of trade exhibition and conference program, the Formnext Asia Tokyo Forum has positioned itself as the central industry meeting for AM in Japan and focuses not only on Additive Manufacturing, but related technologies, as well.

In addition to solutions from local and international AM technology providers, the spotlight will be on topics such as material innovations, standards and norms, industrial applications, and trends in research. Special sessions will highlight the Japanese AM market and opportunities to cooperate with players from China and South Korea. For companies outside Japan, the forum is an ideal opportunity to gain market insights and network efficiently with potential partners and customers.

+ FURTHER INFORMATION:
» formnext.com/worldwide

formnext
ASIA TOKYO forum

MULTIMATERIAL AM FOR DENTAL TECHNOLOGY

The double crown technique is used to anchor removable dental prostheses. With its Additive Manufacturing process, the Munich-based start-up Fidentis aims to reduce manual labor, production time, and material costs in this area. According to the company, it has now succeeded for the first time in producing secondary crowns digitally using a multimaterial AM technology (PBF-LB/MM) developed at Fraunhofer IGCV. Secondary crowns, or friction telescopes, consist of a combination of precious and non-precious metals. At the core of the solution is an industrial, robot-assisted powder bed process based on a modified EOS M290 system from AMCM. Two metal alloys commonly used in dentistry – for example, CoCrMo and a gold-based alloy – are automatically combined within a single build process. The geometry is digitally designed by the dental lab, and the friction surfaces are subsequently machined to specification. High-quality friction telescopes are typically produced manually in leading dental laboratories today. Following a successful proof of concept, Fidentis – supported by Professor Christian Seidel of the Munich University of Applied Sciences as part of the Exist program – plans to launch its digital multimaterial solution on the market in 2026.

NEW GENERAL-PURPOSE SILICONE

The new material P3 Silicone 25A, developed by Stratasys in collaboration with Shin-Etsu, offers the chemical resistance, thermal stability, and mechanical properties of conventional silicones according to the manufacturer. Designed exclusively for the Stratasys Origin DLP platform, this general-purpose silicone has been validated in thermal aging tests up to 1,000 hours at 150°C and passed biocompatibility and flame retardancy certification. Typical silicone applications include seals, gaskets, vibration dampers, wearables, and soft-touch components. »The proliferation of Additive Manufacturing in production environments depends on specialty materials that perform to the standards of traditional methods,« said Rich Garrity, chief business unit officer at Stratasys. The launch marks the first in a planned portfolio of silicone materials co-developed by Stratasys and Shin-Etsu, with additional hardness levels and application-specific variants expected in the future.

Images: Fidentis, Stratsys

3D SCANNING WITH HYBRID LIGHT TECHNOLOGY

Shining 3D has introduced the EinScan Rigil, a new 3D scanning system specifically designed for professional users in the automotive aftermarket and related industrial sectors. The device uses hybrid lighting technology combined with integrated data processing and wireless communication. The scanner offers three flexible scanning modes, two of which are based on blue laser technology: One mode uses 19+19 crossed lines for fast capture of larger volumes, while a second mode with seven parallel lines is designed for high detail accuracy. In addition, an infrared mode with VCSEL technology is available, which enables markerless scanning, especially of large objects. According to the manufacturer, the EinScan Rigil delivers volumetric precision of up to 0.04 + 0.06 mm/m and a resolution of up to 0.05 mm. In autonomous mode, the system performs all computing processes independently. For this purpose, the scanner is equipped with an eight-core processor, 32 GB of RAM, a 1 TB SSD, and a 6.4-inch Amoled touch display. It can also connect to other devices via Wi-Fi 6 or a wired interface. The EXScan Rigil software is used for post-processing and further use of scanning data. It offers functions for data preparation, format conversion, and the creation of closed 3D models. According to the manufacturer, the system is also suitable for challenging surfaces such as dark, shiny, or metallic materials.

AI AGENT TAKES OVER PRINT PREPARATION

Synera and Materialise have announced a collaboration that brings together Magics SDK and Synera's agent-based AI platform. The aim is to enable the use of Additive Manufacturing agents that autonomously take on tasks from design to printing. Synera's platform enables the creation of collaborative AI agents that act as technical experts and independently take on tasks in product development. The first Magics SDK Connector for Synera offers automated file repair and preparation directly from Synera, support structure generation and customization, and advanced file editing and modification. »Our customers are already transforming their engineering operations with Synera by handing over repetitive work that all engineers dread to AI agents that autonomously optimize and prepare complex designs with less human intervention,« said Andrew Sartorelli, partner and product management lead at Synera. The integration of Magics now makes it possible to create comprehensive AM workflows that »prevent build failures due to file preparation issues while standardizing and digitizing their processes«.

Images: Shining 3D, Synera

A TURNAROUND IN A TRADITIONAL INDUSTRY

There is hardly any other sector where AM has been used for as long as in the automotive industry. Even though the last few years have not been easy, this is still one of the three most important user industries for Additive Manufacturing. Meanwhile, a turnaround appears highly likely for the coming years, due in part to new applications in series production, motorsports, and trucks and buses.

Text: Thomas Masuch

In the automotive industry, there are probably few AM service providers with as much experience as Cirp (based near Stuttgart, Germany). »At Cirp, we have grown and matured with this industry for 31 years. Today, we sense a great deal of uncertainty in it,« explains Thomas Lück, head of sales and innovation at the company. Nevertheless, Lück continues to see potential, particularly in Additive Manufacturing: »AM and rapid tooling remain in demand. This applies to all stages of the supply chain and to the various drive concepts.«

According to the Wohlers Report 2025, the automotive sector is one of the most important user industries: Last year, the global AM industry generated 10.3 percent of its revenue here. This puts the automotive industry close behind medical (11.1%) and aerospace (10.6%). However, the automotive industry, which in this article also includes motorsports, trucks, and buses, is currently going through challenging times. While sales figures are stagnating, production costs remain high – especially in Germany, where building a car costs around 5.5 times as much as in China (see chart). It is therefore not surprising that VW, for example, has opted for an extensive cost-cutting program: Among other things, a quarter of the 130,000 jobs in Germany are to be cut by 2030.

COST-CUTTING PROGRAMS NOTICEABLE

The AM industry has also been affected by cost-cutting programs like these in recent years. According to the Ampower Report 2025, sales of AM equipment in the automotive sector declined significantly between 2022 and 2024 – from €260 million to €190 million, a drop of around 27 percent. These figures are also consistent with Thomas Lück's experience: »Demand and predictability have suffered. The uncertainty is also affecting small projects, and decisions are being postponed unexpectedly.« According to Lück, this means that »flexibility and capacity planning are now more challenging at Cirp,« although the company is »able to respond with a healthy structure and equipment.«

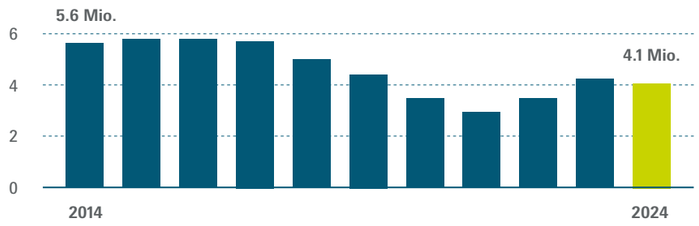
Ampower's experts, however, are predicting a significant trend reversal in the coming years. By 2029, AM sales in the automotive sector are expected to grow significantly again, by 13 percent annually to €360 million in 2029.

TREND REVERSAL IN AM APPLICATIONS

The reasons for this positive turnaround vary depending on which automotive sub-sector you consider. In the area of passenger car series production, »much potential remains untapped,« explains Mathias Schmidt-Lehr, founder and CEO of Ampower. Thomas Lück has also noticed that »many customers are now recognizing the advantages of AM and rapid tooling in particular in implementing short-term decisions quickly and with little investment while accelerating development and gaining the ability to deliver on short notice.« The AM experts at Wohlers Associates are also seeing a rising number of applications in the automotive sector. »Binder jetting remains a very good technology and, in the right hands, can deliver significant added value. Unfortunately, in recent years, exaggerated marketing promises have created unrealistic expectations that have not been fulfilled as quickly as hoped,« explains Mahdi Jamshid, director of market intelligence.

In addition, the motorsport sector is proving to be a stable growth market for AM. Here, more and more 3D-printed components are finding their way into Formula 1 cars and super sports cars. The trucks and buses segment also offers great potential for Additive Manufacturing, especially in the area of spare parts. One example of this is the development of the AM division at Daimler Buses. »

Passenger vehicle production in Germany



Source: Handelsblatt, Oliver Wyman, companies, GlobalData, VDA, Liepin

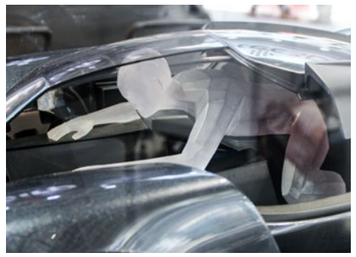
Images: Cirp, Lightway, Daimler Buses

Labor costs per vehicle, 2024
In select countries (USD)

Germany	**3.307**
United Kingdom	2.333
Italy	2.067
France	1.569
USA	1.341
Spain	955
Slovakia	830
South Korea	789
Japan	769
China	597

Source: Handelsblatt, Oliver Wyman, companies, GlobalData, VDA, Liepin

Above:
Thomas Lück
Below:
Back in 2018, Cirp presented a show car featuring a prone driver at Formnext



Examples from Cirp's prototyping and product development: an instrument screen and mount *(above)*, a small-series ambulance light *(middle)*, and an electric vehicle design model built and finished using stereolithography *(below)*

CAR SERIES PRODUCTION

The fact that the automotive industry remains one of the most important user industries for Additive Manufacturing »is also due to the fact that it was one of the first industries to draw its designs with 3D CAD – because of its complex products, among other things,« explains Lück. »This design data also created the basis for the Additive Manufacturing of components. Overall, AM therefore remains a very important development tool,« says Lück.

Despite many advances in virtual reality, haptic models continue to play an important role in design approvals. »Sure, managers may occasionally wear VR glasses, but designs are often still decided on the basis of real models,« Lück reveals. These are traditionally molded or milled from clay at a one-to-one scale and supplemented with plastic components (e.g. radiator grilles or exterior mirrors). And even when the so-called prototypes are later tested in camouflage on roads in real traffic, numerous additive components are integrated depending on the stage of development – to install and maintain the hard camouflage, for instance.

Prototyping in the automotive sector is a very complex topic and covers all phases of automotive development for series vehicles. This ranges from components for internal models to design approval, where high demands are placed on surface quality (which requires post-processing of 3D-printed components), to cars that are tested in wind tunnels or later on the road.

Various technologies are used, such as stereolithography for optically demanding parts and laser sintering for test parts. Cirp uses injection molding, for example, when components have to be manufactured in the original material and require a very high degree of precision. Think of the interior trim in front of an airbag, where a precise predetermined breaking point must be implemented. The quantities for testable parts like these are often between 100 and 5,000. Cirp uses the experience it has gained from these orders to produce corresponding finished parts series for niche markets in the automotive sector (e.g. trucks or sports cars), as well. These are then sometimes delivered directly to the OEMs' assembly lines in just-in-time arrangements.

When it comes to access to the automotive industry, Cirp, which has more than 60 employees at its headquarters in Heimsheim, benefits from its location in the Stuttgart area with several large German OEMs in the immediate vicinity.

POTENTIAL IN PRODUCTION TOOLS

In addition to prototypes, Additive Manufacturing plays an important role in car series production, especially in production tools. In a recent study, however, experts at Ampower have found that there is still a lot of potential for more use of AM in this area: While AM is already used very efficiently in the early design phase, only a small portion of its potential is being exploited in areas such as robot grippers or injection molding tools. »Around 80 percent of the market for production tools in the automotive industry is still untapped,« explains Matthias Schmidt-Lehr. »This offers OEMs an enormous opportunity to increase their productivity and uptime while reducing the cost of production equipment. This is facilitated by the increasing availability of inexpensive, user-friendly printers.«

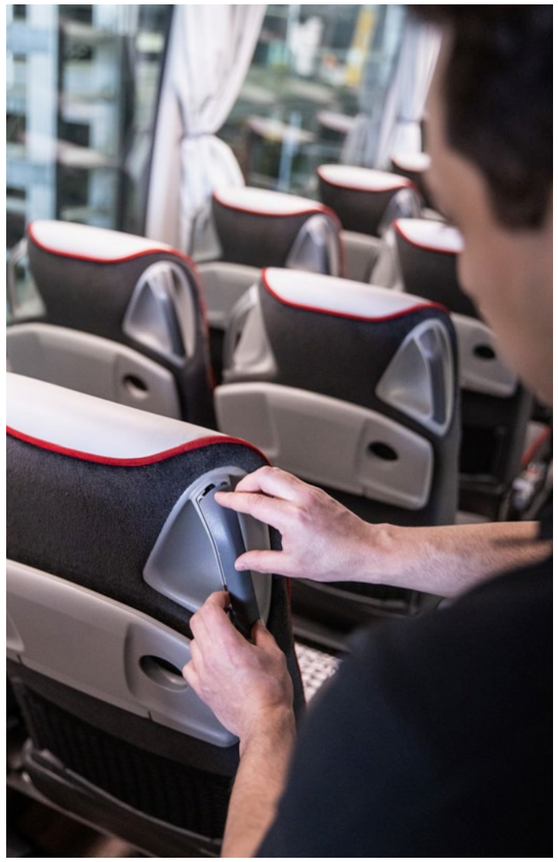
MOTORSPORT AND HYPERCARS

The Additive Manufacturing of metal components has been established in Formula 1 for around 10 years. »A few years ago, many racing teams began to increasingly build up these technologies in-house,« recalls Jan-Steffen Hötter, director of global business development at Lightway. »However, it quickly became clear that it's not enough to just have a printer. You also need milling machines, automation, quality assurance – and the relevant expertise in the processes and design of the components. You have to have the entire process chain under control, right up to the ready-to-install part.«

Founded in 2016 and based at the former Formula 1 race track at Nürburgring in Rhineland-Palatinate, Lightway's workforce is now 18 employees strong. The company supplies directly to F1 teams, GT3 racing teams, and hypercar manufacturers, as well as through tier-one suppliers. The company produces distributor-like geometries, tubes, heat exchangers with internal channels, and safety-critical components and structural parts such as wheel carriers and roll hubs. The latter are made of titanium and offer the driver vital protection in the event of a rollover. All these components benefit from real functional added value thanks to AM – for example, through flow-optimized channels, topology-optimized lightweight structures, or customized wall thicknesses. Sophisticated materials such as AlSi10Mg, Scalmalloy, titanium, Inconel, stainless steel, or CuCrZr are used – all with specific advantages, such as extreme strength or high density (e.g. in hydrogen applications).

»Although the number of F1 cars manufactured each year remains constant, the number of additively manufactured components is growing steadily,« explains Hötter. The regulations of the FIA, the sport's world governing body, have also supported this trend – for example, by approving 3D metal printing for structurally loaded components like wheel carriers from 2026 onwards. For AM service providers, this means high requirements for documentation, material data, verification, and testing procedures – but also a competitive advantage after successful qualification. Components that have been successfully introduced in Formula 1 often find their way into other racing series or the supercar sector later on. »

Top:
A 3D-printed wheel bearing
Middle:
Jan-Steffen Hötter, director of global business development at Lightway
Directly above:
Lightway's headquarters in Niederzissen



At left:
A 3D-printed handle insert for Setra coaches from Daimler Buses. The insert displayed above in front of a bus is custom variant, which is being applied to a seat below

TRUCKS AND BUSES

For Daimler Buses, supplying spare parts is a challenging issue due in part to the high quality of its own buses. These are often in service for up to 25 years or more and travel more than a million kilometers. Daimler Buses therefore continues to supply spare parts even 15 years after the end of production, and in some cases even longer for critical parts. And because a single bus consists of up to 70,000 individual parts depending on the model, numerous components and the necessary tools must be kept in stock.

Since the quantities required are relatively small compared to the passenger car market, Daimler Buses began systematically validating spare parts and manufacturing them in series using industrial 3D Printing back in 2016. Three years ago, Ralf Anderhofstadt, head of the Center of Competence Additive Manufacturing at Daimler Buses, and his team began to establish and roll out a global partner network for the decentralized Additive Manufacturing of original spare parts.

Omniplus 3D Printing has now deemed a total of over 20 percent of all spare parts printable, with over 500 different spare parts already validated and approved for industrial 3D Printing.

In order to establish and expand Daimler Buses' network of AM partners, Anderhofstadt first spoke to the obvious candidates: Daimler Buses' own external organizations and the workshops of existing partners. The second step was to approach AM service providers and logistics companies, where Anderhofstadt encountered a surprisingly positive response for the most part. »Some of the companies see 3D Printing and decentralized manufacturing as a ›disruption‹ to their existing business model and want to use 3D Printing as an opportunity themselves.«

Above:
Preparing a 3D-printing job at Daimler Buses
Below:
Ralf Anderhofstadt, head of the Center of Competence Additive Manufacturing at Daimler Buses

The industrial 3D Printing of spare parts for buses is often quite demanding from a technological standpoint – and a desktop printer is usually not sufficient. »On the one hand, many spare parts are too large, and on the other, high quality standards and requirements must be met,« explains Anderhofstadt. Such AM systems often require a correspondingly large investment: Here, amounts in the higher six-figure range can be expected for the industrial 3D printer alone. When you factor in the necessary peripherals, process certification, and employee training, the required investment can exceed €1 million.

To further improve profitability, Anderhofstadt has another concrete idea in mind: The process of licensed spare-part production that his company has developed should not be limited to its own buses. The AM expert is already in talks with manufacturers of caravans and special vehicles, and even with the maritime industry. »Our decentralized licensing model is suitable wherever complex spare parts and products are needed quickly and globally in manageable quantities,« he points out. And the greater the number of industries enthusiastic about it grows, the more successful the partners' business will certainly be.

+ FURTHER INFORMATION:
» formnext.com/fonmag

Here, you'll find further information and exclusive in-depth articles on **Daimler Buses**, **Cirp**, and **Lightway**.

DRIVING THE INDUSTRIALIZING OF AM?

Text: James Woodcock

Intuitive Machines printed this rocket nozzle component for the IM-1 mission to the moon

Directed Energy Deposition (DED) is one of the seven major classes of Additive Manufacturing (AM) technologies that ASTM has categorized. It has garnered less of the limelight than some other processes, notably powder bed fusion, but DED has found its niche in heavy industrial applications where large-format parts, functional repairs and adaptive material use are the priorities. Combining a high-energy power source (laser or electron beam) and a fed or jetted material (typically wire or powder), DED additively constructs parts on a substrate, either for repair or the creation of new parts.

OUTGROWING THE COMPETITION

DED's standout improvements are part size and throughput. Sciaky's electron beam DED (EBAM) systems have deposition rates of over 18 kg/hour for titanium, with part sizes at close to six meters in length. Wire-arc systems (WAAM) generally offer 2–10 kg/hour with cheaper welding wire, outstripping powder bed fusion by an order of magnitude in raw throughput. Hybrid systems like FormAlloy's X5R employ powder and wire feeds, offering greater flexibility at these large sizes.

SMARTER PROCESS CONTROL

The key to DED's development has been in process control. Consistency is managed by real-time monitoring and adaptive control, adjusting beam parameters layer-by-layer to stabilize geometry, melt pool temperature and reduce porosity. While DED is improving, it continues to struggle with meeting stringent specifications in industries like nuclear or aerospace where the original parts are wrought or cast. To address this, new systems are being developed that incorporate interlayer mechanical deformation — i.e., rolling or peening — to refine microstructures and achieve near-wrought mechanical properties.

BUILDING MATERIAL CAPABILITIES

DED material portfolio has expanded rapidly. Crack-prone, high-strength alloys like Al 6061 and 7075 are now available in nanoparticle-reinforced versions (e.g., NASA and Elementum 3D's A6061-RAM2), where they have been successfully tested in hot-fire rocket engine tests. Copper, tool steels, and superalloys are increasingly compatible owing to beam shaping and thermal management.

Multi-material capability is also on the rise and is one of the most encouraging potential directions for DED. Dual-wire or dual-powder systems now create bimetallic parts (stainless-to-nickel transitions or copper heat sinks in steel). Researchers have even demonstrated ceramic-metal gradients and functionally graded ceramic composites in the lab as well.

To process reflective metals like aluminum and copper, laser DED systems are integrating blue lasers (i.e., with a wavelength of ~450 nm) for improved energy absorption.

Images: Sciaky

SURFACE FINISH, QUALITY AND PERFORMANCE

DED now attains 99%+ dense parts in alloys like Ti-6Al-4V and 316L. Beam oscillation, improved scan strategies, and thermal control optimization reduce grain anisotropy and improve elongation, yield strength and fatigue life. While DED still falls behind powder bed fusion in terms of surface finish (Ra ~10–30 µm), hybrid machines with interlayer milling are narrowing the difference. Fine-mode settings and smaller nozzles are enabling higher resolution.

DED is industrializing fast. Turnkey robotic cells now come packaged with safety systems, slicers, training, and support. DMG Mori's Scan3D-enabled hybrids support fully automated repair workflow whereby the system can scan, generate a toolpath and deposit in one pass. Sensor-driven QA and digital thread integration are enabling aerospace-grade traceability, with blockchain-based layer certification under investigation.

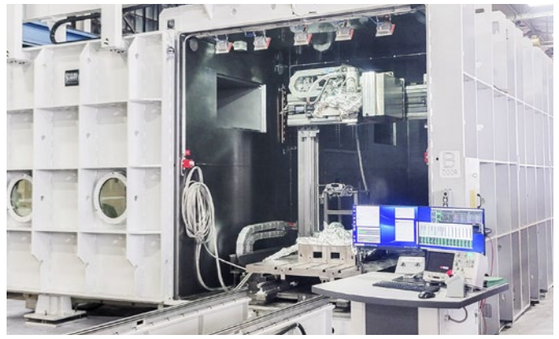
Field-deployable DED systems are being developed for use in remote defense operations and on-site industrial repairs, enabling rapid part restoration without the need for traditional infrastructure. On the factory floor, DED is increasingly used to add near-net-shape features to forged or cast components, offering the potential to significantly cut down on machining time and material waste.

POLYMERS AND CERAMICS ARE THE NEXT FRONTIER

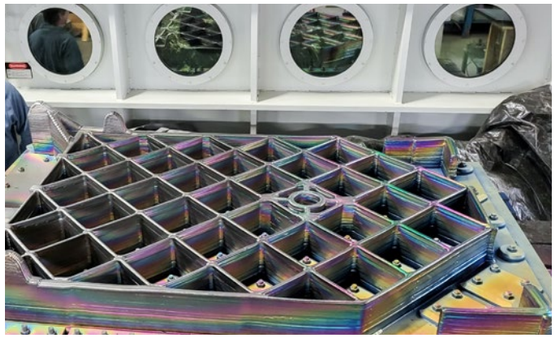
Though metal is the dominant material, DED is moving into polymer and ceramic deposition as well. Laser DED of polymers like PA12 has attained <1% porosity and injection-molded-like properties through melt pool real-time control. Ceramic deposition is challenging due to melting temperatures in excess of 2000°C, but researchers have created graded and eutectic structures in alumina and zirconia via innovative melt dynamics and thermal control.

DED is no longer a niche or ancillary process. Its ability to deliver large components, short lead times and complex, multi-material structures with increasingly sophisticated control positions it as one of the key drivers of AM industrialization. DED will see broader adoption in key verticals with difficult metal and alloy components, while new polymer and ceramic uses indicate where the technology is headed next.

+ FURTHER INFORMATION:
» formnext.com/fonmag



At left:
A standard Sciaky EBAM 300 machine
At right:
This grid fin was built for the Indian company Ankit Aerospace and the Indian Space Research Organisation (ISRO)



Directed Energy Deposition: For further information on this procedure, check out the AM Field Guide at
» formnext.com/amfieldguide

STRONG GROWTH AND A BRIDGE TO SOUTH AMERICA

Spain, Formnext's partner country for 2025, will be presenting itself at the world's leading trade fair for AM technologies and next-generation manufacturing with numerous innovative exhibitors and providing important impetus in the event's supporting program. The country not only has a very dynamic and rapidly growing AM industry, but also acts as a bridge between Europe and Latin America due to its geopolitical and cultural positioning.

Spain combines attractive business opportunities with a high quality of life in many regions. Here's a view of San Sebastian.

Image: iStock/bloodua

The AM industry in Spain employs more than 1,000 people and is experiencing double-digit growth every year. According to the Wohlers Report 2025, 1.6% of the world's installed industrial 3D printers are located in Spain. »Although the market is still small, the forecasts for the coming years are promising,« explains Naiara Zubizarreta, director of ADDIMAT, the Additive Manufacturing Technologies Association of Spain. The Spanish AM industry is very diverse and includes many internationally renowned machine manufacturers (HP, Etxetar, Indart3D, Meltio, Reinforce3D, Samylabs, Supernova, etc.) and numerous suppliers of AM printed parts (such as Madit, Aenium, Rovalma, and Izadi), materials, and software, as well as a large number of research institutes.

The strength of the Iberian AM industry is also evident at Formnext, where Spain has been one of the strongest exhibiting countries for years: In 2024, more than 30 Spanish exhibitors presented themselves in Frankfurt. »Spain is the best example of how AM can drive growth and new developments even in challenging times and inspire the entire manufacturing industry,« says Sascha F. Wenzler, Vice President of Formnext at event organizer Mesago Messe Frankfurt GmbH.

STRONG PARTNERS

ADDIMAT and the AM network IAM3DHUB are two of Formnext's more prominent partners. »These two highly committed organizations play a crucial role in the Spanish AM industry and will showcase the remarkable potential of the Spanish AM landscape at Formnext 2025 together with their member companies and cooperation partners,« adds Christoph Stüker, Vice President of Formnext at Mesago Messe Frankfurt GmbH.

Spain has built up a very strong and highly coordinated network to support technological transformation. ADDIMAT was founded in 2014 to promote the use of Additive Manufacturing in Spanish industry. Based in San Sebastian, the association brings together more than 100 companies representing the entire AM value chain, including machine manufacturers, 3D Printing service providers, technology centers, material suppliers, and end users.

DOUBLE-DIGIT GROWTH

The Spanish AM industry has recently shown strong growth. According to the survey conducted by ADDIMAT in 2025, AM machine sales have grown by 24.5% and AM services by 36.2%. The key user industries include aerospace, defense, automotive, and healthcare, with the more significant industrial applications including press brake cladding, the repair of wind shafts, and complex motor parts for aerospace.

The solid development of the Spanish AM industry is also based on the country's strong manufacturing industry. According to Eurostat, industrial production in Spain has grown by 7.3% since 2014, while other major European industrial countries such as France (+0.1%) have stagnated or, like Germany, recorded a significant decline (-5.2%). AFM, the Spanish machine tool association, was also able to report record sales of €2.3 billion in the machine tool sector for 2024. »Spain has a long tradition of manufacturing, with strong supply chains, distributed capacities, and a well-established culture of innovation,« explains Zubizarreta. »AM companies in Spain benefit from being part of a strong, competitive, and export-oriented industrial ecosystem.«

A PRECISION ROBOT FOR HEAVY PARTS

The machine tool and production systems company Danobat has actually been at home in traditional manufacturing for decades. Now, this long-established firm has also discovered Additive Manufacturing as an interesting sales market and developed a solution with its new dBOT robot system, which can be used to manufacture and finish large metal and composite parts for various industries using both additive and subtractive processes.

At its headquarters in Elgoibar (Basque Country, Spain), Danobat manufactures machine tools primarily for demanding industries such as aerospace, automotive, rail transport, and energy. In order to further diversify within the industry, Danobat ventured into CNC precision robotics this year. »dBOT is not just another robot; it combines machine tool technology in terms of rigidity and precision with the agility of a robot system,« explains Xabier Alzaga, CEO at Danobat. dBOT's strengths therefore lie particularly in the areas of precision, repeatability, and stiffness.

The company currently offers two models of the robot: dBOT S2, with a payload of 220 kg and a reach of up to 2,900 mm; and dBOT S7, with a payload of up to 700 kg and a reach of up to 3,315 mm. The robot has an open architecture, which, according to Danobat, allows for fully configurable solutions. The possible applications include nozzles for aerospace manufacturing and the repair of turbine parts for power generation. Alzaga also cites the defense industry and heavy machinery manufacturing – industries in which large, complex, and powerful parts are indispensable – as important areas of application.

Danobat was founded in 1954 and employs around 650 people, around 40% of whom work internationally. In addition to its headquarters in Elgoibar, the company has production facilities in Germany and the Netherlands, as well as sales and technical service offices in the US, Mexico, China, the UK, Italy, and other countries.

FROM DATE SEEDS TO EMISSION-FREE AVIATION

Smart Materials 3D says it is playing an important role in the two Spanish R&D initiatives Doze and Fauno in the field of Additive Manufacturing for emission-free aviation.

The Doze project (which involves advanced manufacturing of multifunctional aero-structures for zero-emission aircraft) aims to advance aerospace design through lightweight composite structures made of multiple materials, combining thermoplastics and thermosets with functional additives such as graphene and its derivatives, ensuring optimal performance in terms of heat management and mechanical strength. The project's other partners include Aerotecnic, Idaero, Nasika, and the Aimen Technology Center.

The Fauno project is also dedicated to the further development of mold and tool design using multi-material Additive Manufacturing. It focuses on OoA (out-of-autoclave) composite processes – in particular liquid resin infusion (LRI) – for the production of sustainable, high-performance composite parts. In this project, Smart Materials 3D is responsible for developing the materials used. Specifically, PPS and PA matrices have been developed that are reinforced with carbon fiber and contain additives to ensure thermal conductivity and heat resistance.

EVER-EXPANDING PRODUCT RANGE

Smart Materials 3D is also continuously expanding its product range. Building on its PLA filaments with organic reinforcements, the company now uses recycled PET-G and recycled polypropylene (rPP) as new base polymers. These base polymers are combined with natural fillers such as spirulina, olive pits, pine, coffee, date seeds, and rice husks and are manufactured entirely in Spain.

In addition, Smart Materials 3D has developed five materials designed for industrial robotic printing: carbon-fiber- and glass-fiber-reinforced ABS and ASA, as well as a low-density PLA formula that is ideal for printing large pieces of furniture. According to the company, this PLA variant reduces the weight of furniture by up to 65% without compromising mechanical integrity.

Smart Materials 3D was founded in 2014 and specializes in the development, manufacture, and marketing of materials for 3D Printing. It currently has 42 employees and offers a portfolio of over 59 products, exporting to more than 50 countries in EMEA and LATAM. At its headquarters in Alcalá la Real (near Granada in southern Spain), the company has six extrusion lines with an annual production capacity of 480 tons of filaments for 3D Printing. In addition, two compounding lines have a capacity of 850 tons per year. Smart Materials 3D's waste treatment plant can also process up to 495 tons annually.

To read the full article, please visit **formnext.com/fonmag**

FILAMENTS FOR ROBOTICS, SHOES, AND MORE

Thanks primarily to its international growth and the increasing use of technical filaments in industrial 3D Printing applications, filament supplier Recreus has been able to increase its production by more than 60 percent over the past five years. Based in Elda (Alicante), Spain, the company specializes in the development and manufacture of flexible filaments for FDM 3D Printing. These are used in industries such as shoe production, orthopedics, robotics, automotive, and fashion. Founded in 2013 by Ignacio García, Recreus currently produces over 35 tons of flexible filaments per year. Alongside García, the energy company Repsol has held around 17 percent of the shares in the company since 2019. Over the past five years, the company has steadily expanded its material portfolio and is now leveraging a strategic network of distributors and partners specializing in high-quality applications to drive its international growth.

Image: Smart Materials 3D

RECYCLING APPLE POMACE AND NATURAL LEATHER

The technology center Aimplas is currently working on the development of new AM materials as part of various research projects. The focus is on new material properties in combination with sustainability. The MAT3D-XL project focuses on developing new thermoplastic materials that are either recycled or bio-based and reinforced with carbon, glass, or natural fibers. These composites enhance the strength and rigidity of printed parts while also promoting circular economy. The aim of the Magaya project, meanwhile, is to convert apple pomace, a by-product of natural cider production, into a biopolymer suitable for use in a new Additive Manufacturing process.

Finally, the Ecofap project aims to develop a new 3D Printing material based on recycled natural leather that can be used in various components for fashion, textiles, and footwear. Specifically, the project is focusing on valorizing tanned leather waste from the footwear sector to create new materials for manufacturing soles and heels using FDM. Most of this scrap is usually disposed of in landfills. Based in Paterna (near Valencia), Aimplas has been offering solutions along the entire value chain for more than 35 years and has more than 35 pilot plants for plastic processing. These facilities are used for research, the development of new materials, and the improvement of existing processes.

THE PELLET PIONEERS

Tumaker was one of the first manufacturers to focus on pellet 3D Printing, and the company continues to build on this experience today. In addition, its location in northern Spain and a rather unusual ownership structure have played an important role in the development of the company, which now operates under the name Indart3D. When the company first participated as an exhibitor at Formnext in 2019, »we were almost the only company at the entire trade fair presenting pellet technology,« recalls Iván Sardón, CEO and co-founder of Indart3D. Competition in pellet 3D Printing has become much more intense in the meantime, but Indart3D still sees itself having a technical advantage. »Because we clearly focus on pellet extrusion technology as the core of our offering,« Sardón adds. The company was founded in 2013 under the name Tumaker and reorganized itself in 2020 as the Indart3D cooperative while continuing to offer 3D printers under the Tumaker brand. Indart3D has already sold more than a thousand units, particularly to research centers, universities, and the automotive, textile, and defense industries. Indart3D is headquartered near the French border in the northern Spanish city of Irun, where it employs 10 people. Support is provided by an international network of distribution partners and strategic partners. Sardón sees the location as very advantageous for »combining strong engineering talent with an agile and creative approach to industrial design. Our location in the Basque Country gives us access to a dynamic industrial ecosystem as well as leading research centers and universities.« The company's cooperative structure has also brought it a number of advantages in recent years. »It allows us to make decisions in a more horizontal and participative way, which strengthens the commitment of the team and encourages long-term thinking,« explains Sardón. »It also fosters a culture of shared responsibility and transparency, helping us align individual contributions with our collective goals of innovation and customer service.« Despite its focus on pellet 3D Printing, Indart3D remains as technically flexible as possible and, since 2020, has been pursuing a modular approach to integrating filament and pellet heads on a single platform. »In 2024, we launched the new Tumaker series, which allows tool heads to be changed in less than five minutes,« says Sardón. This makes it possible to process a wide range of materials, from various metals and plastics to wood and ceramics. According to Indart3D, over 500 materials have already been successfully tested.

Images: Aimplas, Indart3D

BIOLOGICAL INTELLIGENCE MEETS 3D PRINTING

The Spanish technology center Aimen is combining Additive Manufacturing with principles of biological intelligence in two innovative Horizon Europe projects, Organic and Biogemse. The aim is to develop sustainable, adaptable, and high-performance products for the wind energy and construction industries.

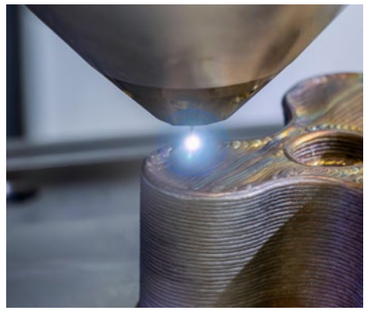
As part of the Organic project, Aimen is coordinating the development of an autonomous, bio-intelligent Additive Manufacturing system based on fused granulate fabrication (FGF). The project integrates bio-inspired lattice structures, bio-based materials, and a cognitive control architecture capable of self-monitoring, self-optimization, and self-healing. A generative AI system called gentelligence will ensure the continuous evolution of the printing process, enabling each generation of components to improve based on its experience – much like a living organism. Aimen is responsible for coordinating the project, designing the FGF printhead, developing generative design tools, and implementing reinforcement learning models that guide the system's learning and adaptation. The technology will be validated through the production of large, bio-inspired blade cores for offshore wind turbines, which should ensure structural efficiency and sustainability from the first print.

As part of the Biogemse project, Aimen is helping to transform the construction sector by developing bio-intelligent, sustainable and circular modular building systems. The project combines bio-based and recyclable materials with flexible, robotized 3D Printing technologies. A generative AI tool will enable the design of biomimetic structures optimized for functionality and environmental performance. Aimen is leading the development of sustainable construction mortars with tailored functionalities, the implementation of a robotic Additive Manufacturing system for large and complex geometries, and the simulation of acoustic behavior to optimize product performance. The solutions will be validated in three Smart Living Labs targeting diverse climates and use cases.

To read the full article, please visit **formnext.com/fonmag**

STRONG GROWTH WITH WIRE DED SYSTEMS

Meltio, a Spanish manufacturer of DED systems, is reporting an increasing number of applications for the laser-based Additive Manufacturing of metal parts from wire. The technology has a wide range of uses in industries such as automotive, defense, mining, aerospace, and oil and gas. One example is a turbo intake manifold developed by ERM for the motorsport sector. Printed from two materials using the Meltio M600, the manifold can withstand temperatures of over 800° C. Meanwhile, Meltio says the manufacturing costs and times involved have been reduced by 70 percent compared to conventional processes. Meltio cites Iveco as another company in the automotive sector, which uses the Meltio Robot Cell solution at its Bourbon-Lancy plant in France to shorten production lead times and increase flexibility in the design and manufacture of parts. In addition, Hirud was able to achieve a 62-percent weight reduction and start delivering 33 percent faster using Meltio technology on steering knuckles. The increasing number of applications is also reflected in the company's financial results: The Linares-based company reported revenue growth of over 50 percent for the 2024 fiscal year. According to Meltio, over 500 systems have already been delivered worldwide.



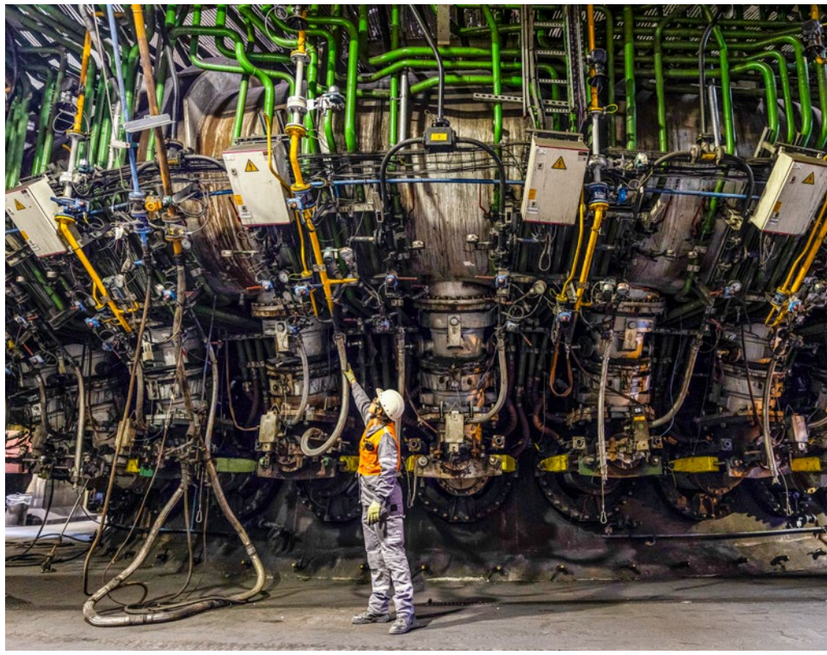
Images: Aimen, Meltio

AM AND HEAVY INDUSTRY

ArcelorMittal has been involved in Additive Manufacturing since 2016. In 2019, a joint venture with Frankstahl established TheSteelPrinters in an effort to transform heavy industry through the adoption of metal 3D Printing for spare part production. Since then, 2,500 engineering projects and parts have been completed in materials such as 316L stainless steel, maraging steel, and nickel base IN718. The total production has accounted for more than 30 tons of components for ArcelorMittal's operations across Europe.

The parts in question help optimize fluid management and heat transfer, consolidate assemblies, or functionalize captors or camera sets. This way, ArcelorMittal can better understand and anticipate the needs of heavy industries. Plus, its approach to AM makes a perfect complement to the steel powder manufacturing capacity the company built up in northern Spain just a few years ago.

»Thanks to Additive Manufacturing, reliability teams across ArcelorMittal plants are more efficient and resilient,« explains Aubin Defer, Chief Marketing Officer at ArcelorMittal. »AM allows for fast maintenance of critical operations, reduces unplanned downtime, and helps fix weak part designs thanks to rapid iteration and improvement.« Other advantages include longer component service life and higher performance, improved operational efficiency, and greater safety in operational processes.



In addition to the Additive Manufacturing of components for internal use, TheSteelPrinters now offers its services to customers from other industries, such as aerospace, defense, oil and gas, and energy. The angle ArcelorMittal is taking now relates more to improving the reliability and availability of its assets than to rationalizing its supply chain.

To read the full article, please visit **formnext.com/fonmag**

Image: ArcelorMittal

CONNECTING EUROPEAN AM HUBS

IAM3DHUB, based in Barcelona and managed by Leitat, is a leading industry-driven center for AM adoption, with over 25 tech partners supporting companies in implementing and scaling AM technologies. After nearly a decade accelerating industrial and medical uptake, IAM3DHUB (together with many other AM entities) impulsed Addliance – The European AM Hubs Alliance, a pan-European framework that connects AM hubs across regions and sectors to foster strategic collaboration and unified action. Thanks to the shared vision of many AM entities across Europe, Addliance is becoming a key platform to accelerate adoption, strengthen the AM industry, and support public and private stakeholders in shaping stronger policies, strategies, and funding tools. The official launch will take place at the Global AM Hubs Summit, on September 16–18, 2025, at DFactory Barcelona, gathering over 20 AM hubs, companies, and institutions. Backed by Formnext, a key partner since its inception, this summit marks a major step toward a more connected and resilient European AM ecosystem.

FROM ROBOT ARMS TO BICYCLE SADDLES

Text: Thomas Masuch

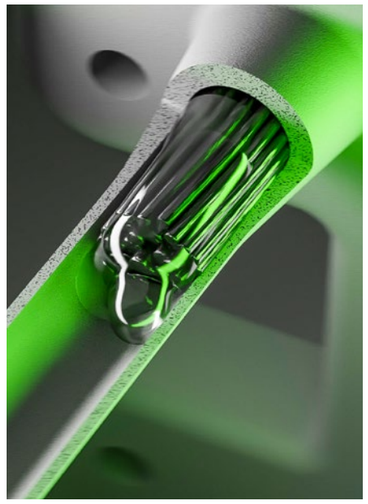
Blanca Garro encounters new products and innovations almost every day. However, she is not allowed to talk about them publicly – as a rule, the managing director of Spain's Reinforce3D signs an NDA with every new partner. Garro operates in a world shaped by innovation because of her start-up's CFIP technology. »This technology enables progress even in areas where innovation once seemed impossible, as everything was thought to be already perfected,« she explains. Examples include new saddles and handlebars in cycling, as well as mounts for robots in mechanical engineering. »We don't just make these products lighter; in many cases, we also deliver significant cost advantages over traditional additive processes.« At the same time, components made of different materials can also be joined together – for example, plastic and aluminum.

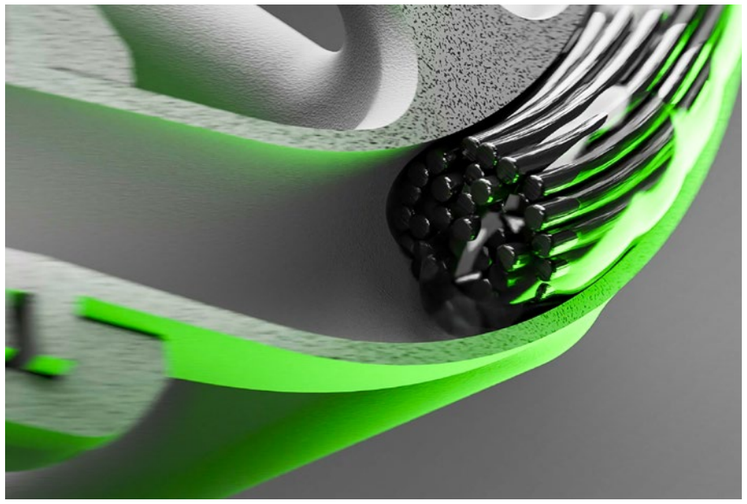
The CFIP technology Reinforce3D has developed and commercialized enables the automatic insertion of continuous fibers into prefabricated parts, improving their mechanical properties. The beauty of this patented technology – namely that it enables many new applications and innovations, especially in the field of lightweight construction – also poses a challenge for Reinforce3D: »Because the best technology is worthless if no one knows how to use it,« Garro points out. Today, the team focuses on developing and demonstrating sample applications across key industrial sectors, showcasing CFIP's versatility and scalability while supporting partners in integrating it into their workflows. »We're growing step by step, building strong collaborations, and expanding into more industries, with the clear goal of making CFIP a standard in advanced manufacturing,« Garro states.

COMPLEX AND ROBUST LIGHTWEIGHT COMPONENTS

The technology was researched around 10 years ago at the Catalan technology center Eurecat in Barcelona, where a mixture of resin and continuous carbon fibers was injected into a 3D-printed casing. According to Garro, this has several advantages, including the fact that the casing can be produced using fairly simple desktop printers. The filling process allows for the creation of complex, robust, and lightweight parts – efficiently and at a competitive cost.

Reinforce3D company was founded in 2022 as a spin-off from Eurecat and former Eurecat researcher Marc Crescenti, who now serves as the company's CTO. Garro, who studied chemical engineering, has been CEO of the company since 2023, having previously worked at Materialise for several years and earned her MBA on the side. The company now has 12 employees at its site in Amposta on the Ebro Delta, halfway between Barcelona and Valencia. One third of the team operates the machines at the company, one third are engineers, and the remaining third is responsible for marketing and administration. To finance growth and technology development, Reinforce3D has investors on board, including the Spanish fund BeAble Capital, which specializes in technology start-ups and was the company's largest VC investor in an earlier phase. In 2022, BeAble officially invested €650,000 in the company, supporting the industrialization of CFIP. The start-up is also supported by Spanish public institutions, particularly the region of Catalonia.





POTENTIAL IN VARIOUS INDUSTRIES

Since presenting its Delta machine at Formnext in 2023, Reinforce3D has earned international recognition, and its technology is already used in various sectors. The use of the Delta machine varies considerably: Garro estimates that about half of the customers use it to manufacture prototypes and short runs, while the other half use it to manufacture final products. The applications range from the aforementioned bicycle saddles and handlebars to replacement parts for trains, machine components, and components for robot arms. Important fields include sports (especially bicycle and sporting goods manufacturing) and drone manufacturing, as well as motorsports, mechanical engineering, and healthcare. Garro sees particular potential in the latter, as CFIP technology »may allow certain internal reinforcements without altering external designs or contact surfaces – potentially simplifying the regulatory pathway. However, all modifications still require case-by-case evaluation in line with medical device regulations.«

This area of application is set to grow even further in the future. Firstly, Garro and her team want to offer other materials (such as glass fiber and Kevlar) in addition to the carbon fiber embedded in resin that they currently use. Secondly, another machine is already in development that will automate the mixing of the material components and the injection of the material. First, however, comes the Robotic Injection Automation that will be showcased at this year's Formnext. »This is how we'll take our technology to the next level of industrialization,« declares a confident Blanca Garro.

Images: Reinforce3D

+ FURTHER INFORMATION:

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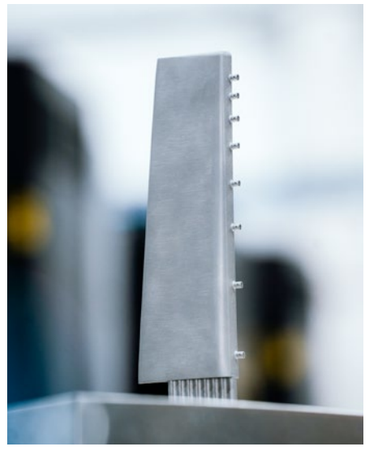
» reinforce3d.com/

GROWTH THANKS TO SPEED AND EFFICIENCY



Images: Madit

With the move to its new headquarters, Madit (northern Spain) has continued its impressive development: A service office specializing in the Additive Manufacturing of metal parts was founded just five years ago and has already made an international name for itself as a service provider.

Text: Thomas Masuch

At its new location in the Zamudio industrial park near Bilbao Airport, the company's production area has increased from 200 square meters to 2,000. With significantly more space, Madit has also been able to invest in new equipment: In just one year, its machine park has grown from five to 11 laser melting systems (PBF) – all from Renishaw. The size of the team has also grown considerably, practically doubling to 25 employees in the past 12 months. »This makes us the largest service office for additive metal manufacturing in Spain,« emphasizes Asier Domínguez, founder and project manager at Madit.

The reason for this growth is an increase in orders – while Madit has mainly grown with prototypes and unitary parts in recent years, more and more series projects are being added. »This enables us to plan for the long term and significantly expand our capacities, both technically and in terms of personnel,« says Domínguez. The company also has various in-house post-processing facilities, including sandblasting, polishing, machining, welding, and heat treatment. Quality assurance is handled by a specialized colleague who takes care of checking the powder as well as measuring the finished components (to cite just two examples). »Our aim is to guarantee consistent quality, especially in series production – even if the components are printed on demand at intervals of several days,« Domínguez continues.

HUNDREDS OF BIKE FRAMES

Customers come not only from Spain, but from all over Europe. The components printed in Zamudio are supplied to general industry (e.g. mechanical engineering), the automotive industry, and bicycle manufacturers, among others. Among other things, Madit manufactures series of 50 to 100 titanium bicycle frames in various sizes every year. Domínguez and his team also bring a current model to Formnext in Frankfurt every year.

To remain competitive internationally, Madit has focused heavily on its clear strengths: In the area of prototyping, this is primarily speed. »We respond to inquiries within one day,« Domínguez promises. And in series production, the company makes a compelling argument with a combination of experience in AM design, a high degree of flexibility thanks to its relatively large machine park, and cost-efficient production. »By focusing on less regulated industries, we have been able to grow and gain knowledge in order to take on now more complex projects in sectors such as aeronautics and space. This growth strategy has allowed us to keep costs low for our customers,« Domínguez points out. Efficient production also means that the machines are permanently filled with the same material: Inconel 718 is processed on four systems, aluminum on three, and stainless steel (316 and 17-4PH), maraging steel, and titanium on the rest.

LEAN ORGANIZATION

Overall, Madit has a very lean structure. »We don't have a sales team,« explains Domínguez. Advertising is done almost exclusively via LinkedIn or Instagram – the latter generates high traffic, especially in the bicycle sector. The only investments in marketing go toward trade fair appearances, with Formnext being the only event outside Spain in which Madit participates as an exhibitor. »Formnext is a great window to European and international clients from the AM world and many other industries. There is no event like this in Spain; in Frankfurt, we're able to promote our capacities and services, which is very important« Domínguez says.

Despite its relatively rapid growth, the company is still owned by its three founders (Asier Domínguez Olabe, CEO Javier Díaz Gutiérrez, and engineering director Pablo Rojo Bilbao), who launched Madit in 2020 after quitting their jobs at an aircraft turbine manufacturer in northern Spain. The three engineers have driven all this growth themselves, aided in part by their excellent partnership with Renishaw. »In the future, we would like to be one of the major players in European metal 3D Printing and enable the industry to take full advantage of this technology,« Domínguez declares.

+ FURTHER INFORMATION:

» formnext.com/fonmag
» maditmetal.com

BANANAS, CRYPTO, AND LOTS OF TECHNOLOGY

Text: Thomas Masuch

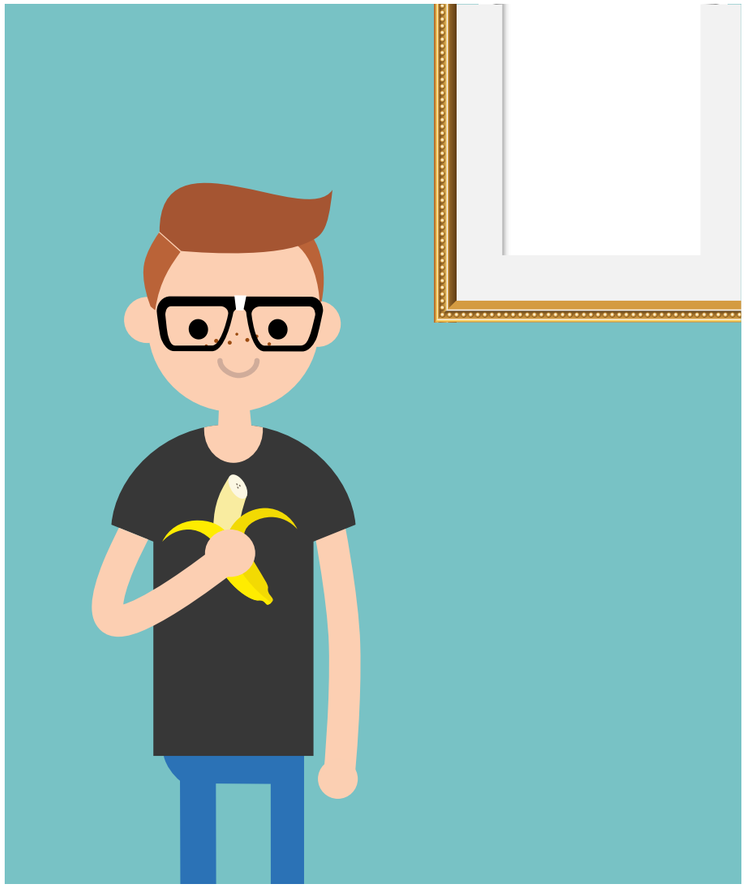


Illustration: feedbackmedia.de, iStock / nadia_bormotova, amtitus

We all know that fruit is healthy, but when Justin Sun ate a banana during a press conference a few months ago, it still made headlines around the world. That's because it was probably the most expensive banana in the world: The founder of Tron and notorious crypto billionaire had previously bought the Maurizio Cattelan artwork Comedian at a Sotheby's auction in New York for more than US$6 million. For the uninitiated, this rather infamous »installation« consists of a banana stuck to a white wall with duct tape.

The 35-year-old Sun justified the act by pointing out the parallels between modern art and crypto: The value isn't necessarily in the material, but in the concept. As for whether it was this or just a desire for PR that prompted his rather expensive snack, that will remain Sun's secret. Critics, on the other hand, saw Sun's behavior as an arrogant way of burning money. Strictly speaking, though, no money was actually burned; Sun's millions were still there – just somewhere else.

A similar discussion recently arose around the insolvency of Desktop Metal. After initially emerging as a celebrated star in Additive Manufacturing, the company has burned through a lot of venture capital in its own right. Imagine what that money could have done elsewhere... Support hundreds of start-ups, buy thousands of cheap desktop printers – or maybe even millions of bananas!

Despite all the criticism, however, there's no question that Desktop Metal has left its mark. At its headquarters in Burlington, Massachusetts, it was possible to see the high level at which the company developed its AM technologies further. There are also two sides to its much-derided acquisition of numerous start-ups and other companies: Nobody was forced to sell their firm, after all, and thanks to Desktop Metal's deep pockets, they were compensated handsomely.

In other words, it was just another case where money wasn't burned, just...redistributed. But does this help the AM industry? I think so, because the real damage only occurs when technologies, innovations, and expertise go unused and simply disappear. That is indeed a waste. Or, to stick with our current theme – it's bananas!

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CONTACT:
» Hotline: +49 711 61946-810
» formnext@mesago.com
» formnext.com/fonmag

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mesago.com

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PROJECT COORDINATION
Nina Schwarzer
Phone +49 711 61946-566
Nina.Schwarzer@mesago.com

EDITED BY
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thomas.masuch@zikomm.de

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Stefan.Rapp@mesago.com

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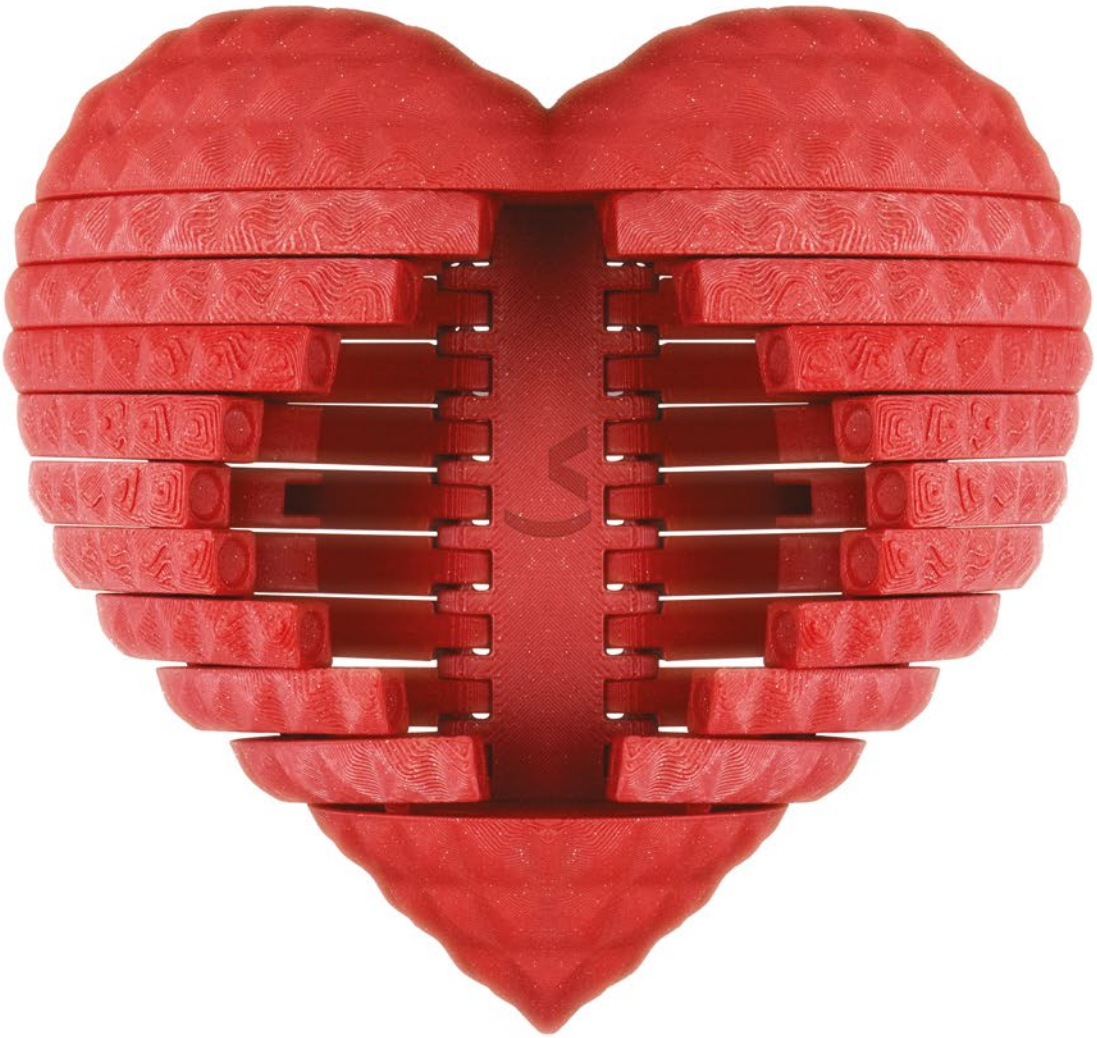

The heart of your 3D printing

3D PRINTING FILAMENT

WINKLE