fon

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Presently we are using only a fraction of the potential which process and materials technologies offer.

[Prof. Christoph Leyens, Head of Center for Additive Manufacturing Dresden, AMCD]

EDITORIAL

Have you ever come across the names Antonio Meucci or Josef Ressel? Both were brilliant inventors in their day, but success and the fame that comes with it were, unfortunately, not to be. Upon unveiling his device for long-distance voice communication in New York in 1860, the Italian-born Meucci found himself too strapped for cash to apply for a patent. A certain Alexander Graham Bell was thus free to secure his own patent on the telephone 16 years later.

Meanwhile, fortune didn't smile much brighter on Josef Ressel's innovative career. A forester born in Bohemia (in what is now the Czech Republic), Ressel spent his free time building a ship propeller that was much more efficient than the paddle-wheel systems commonly used at the time. During the propeller's much-heralded trial run, however, the steam engine powering it broke down. When Ressel went on to showcase his invention in France, he also failed to protect it against copycats, which opened the door for others to filch his fortune and fame. Ressel sought legal recourse in numerous cases, but these only ended up costing him the wealth he did have; he then died essentially penniless 160 years ago.

These days, companies typically keep their (often highly cost-intensive) developments and innovations under lock and key. At the same time, the way in which we deal with innovations has also evolved, particularly in the world of Additive Manufacturing and intelligent production. After all, those looking to achieve long-term success have to do more than just imitate others. The industry is much too vibrant – its latest developments, too fleeting.

Unlike in the case of the tragic stories above, most companies in our industry have also realized that they can accomplish their goals through collaboration. In today's additive sector, Meucci and Ressel would have remained in demand as experts even after losing control of their inventions. Both would surely be highly respected innovators working in promising positions at one of the industry's up-and-coming firms.

The salaries specialists like these can currently earn is, by the way, another topic covered in this issue. You can also learn a great deal about the industry's latest innovations – those coming out of Audi's metal 3D printing center in Ingolstadt, for instance, which we recently toured to bring you an exclusive behind-the-scenes report.

I hope you find plenty of inspiration in this edition of »fon«-magazine.

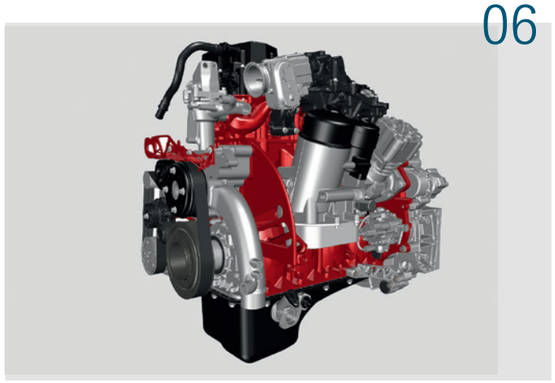
Enjoy the read!

Sincerely,
Sascha F. Wenzler
Vice President formnext

Cover: Klerx

CONTENTS

14



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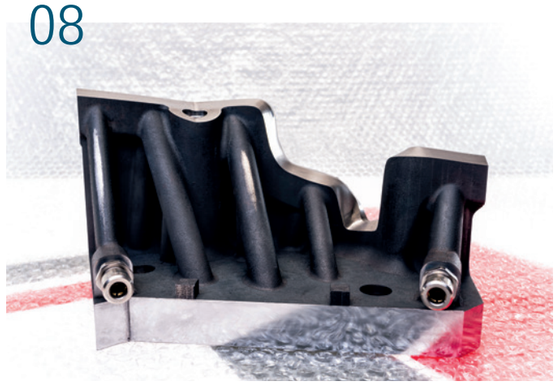

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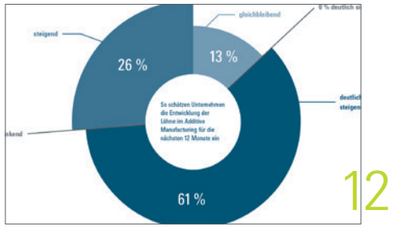


12

FORMNEXT NEWS

FROM APPLE TO ZF: ALREADY SET TO EXPAND INTO HALL LEVEL 3.0 IN 2017, FORMNEXT DEMONSTRATES ITS HUGE INFLUENCE ON INDUSTRY INVESTMENTS

An event packed with innovations, unparalleled technical quality, and highly satisfied visitors and exhibitors: By focusing on these three factors, formnext powered by tct 2016 laid a foundation for continued success in the years ahead.

For evidence of the chemistry that has already made this exhibition so successful, look no further than OR Laser. This Hessian company used formnext as an opportunity to unveil the 3D metal printer Orlas Creator to the expert public for the first time. The response was remarkable: OR Laser received 43 pre-orders and connected with 20 companies from all over the globe that were interested in becoming Orlas Creator resellers.

This is a perfect example of how formnext combines innovation and business. Leading decision-makers from virtually every user industry attend to learn about the latest breakthroughs relevant to them and, in some cases, put together deals right on the spot. The list of visitors reads like a who's-who of international innovation. The automotive industry, for instance, was represented by Audi, BMW, Delphi, Ferrari, Ford, Mercedes-Benz, Porsche, and Volkswagen. Luminaries from other sectors were also in attendance, including Apple, Hankook, Honeywell, Kuka, MTU, Samsung, Siemens, and ZF. Meanwhile, representatives from Adidas, Bulgari, Johnson & Johnson, Nike, Procter & Gamble, and Rolex underscored formnext's prominence in the clothing, accessories, and consumer products industries.

The latest results of a survey conducted among the exhibitors and visitors at formnext 2016 provide further proof of the event's successful concept: More than three-fourths of the 307 exhibitors were satisfied or highly satisfied with the number of new contacts they acquired. The same can be said of a full 98% of formnext's 13,384 attendees with regard to the event as a whole.

In addition, formnext boasts a highly international audience, with 43% of the professionals in attendance last year hailing from outside of Germany. Thanks to the very high share of executives and decision-makers on hand, formnext 2016 also demonstrated the enormous significance it has with regard to future investments throughout the industry. High-level managers accounted for around a third of last year's visitors, and nearly three in every four attendees reported being involved in investment decisions at their company.

This outstanding track record has resulted in big plans for the future, as well. »We're going to be growing significantly in terms of both space and exhibitors at formnext 2017,« affirms Sascha F. Wenzler, Head of Division for formnext at event organizer Mesago Messe Frankfurt GmbH. »In fact, we're planning to expand from hall level 3.1 into level 3.0.«

Photos: Klerx *Excerpt from visiting companies

Visitors to formnext 2016:
Number of visitors: 13,384
Internationality: 44%
Exhibition goals achieved: 97%

INDUSTRY NEWS

RENAULT TRUCKS DESIGNS ENGINE FOR 3D PRINTING: TESTS ALREADY COMPLETE ON ADDITIVE-MANUFACTURED COMPONENTS

When it comes to future engine production, the design division of Renault Trucks is looking to Additive Manufacturing. Its creative minds in Lyon have already developed a prototype variant of the company's four-cylinder DTI 5 engine that is specifically designed for 3D printing.

Meanwhile, the division has also spent 600 hours putting a series of additive-manufactured components (including four-bar linkages and corresponding mounts) through their paces on a Euro 6 engine at its in-house testing facility. »The goal of this project was to document the positive effects additive metal production can have on the size and weight of an engine,« explains Damien Lemasson, project lead at Renault Trucks. »These techniques enabled us to reduce the weight of a four-cylinder engine by 25%.« Lemasson reports that the completed trials have also proven the durability of 3D printed engines.

In addition, Renault Trucks managed to reduce the number of components that go into a DTI 5 engine by 25% (corresponding to around 200 of a typical engine's 841 parts). According to Renault, the lighter engines made possible by 3D printing open the door to heavier loads and lower fuel consumption. Among other benefits, this should translate into lower fleet operating costs for transport companies.

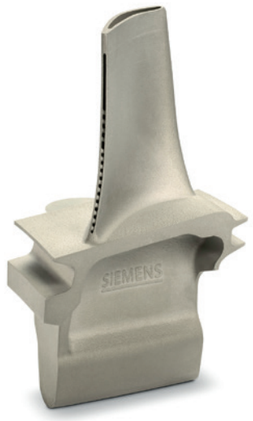
Left: A DTI 5 (Euro 6) engine consisting of 841 components. Right: The variant optimized for Additive Manufacturing, which weighs less and requires fewer parts.

RUNNING HOT AND FAST: SIEMENS TRIALS 3D PRINTED GAS TURBINE BLADES

In a breakthrough for the company, Siemens has produced gas turbine blades using only additive methods and successfully tested them under maximum operational conditions. It reports that the blades were subjected to up to 13,000 revolutions per minute and temperatures higher than 1,250 degrees (Celsius). Siemens used both conventional blades and variants featuring a new design and internal cooling geometry that has been completely overhauled. According to the company, this design further improves the efficiency of its gas turbines.

»Additive Manufacturing is a pillar of our digitalization strategy,« says Willi Meixner, CEO of the Siemens Power and Gas Division. The blades were installed in a SGT-400 industrial gas turbine rated at 13 megawatts.

Manufactured by the recently acquired Siemens subsidiary Materials Solutions using a highly resistant superalloy based on polycrystalline nickel, the turbine blades are capable of withstanding extreme temperatures, levels of pressure, and centrifugal force. At maximum speed, each blade spins at over 1,600 km/h and bears a load of around 11 tons.



Photos: Renault, Siemens

INDUSTRY NEWS

A SERIOUS PASSION

Stratasys and McLaren Racing have entered into a four-year partnership in which the former company will officially supply its 3D printing solutions to the McLaren-Honda Formula 1 team. The two partners also revealed that the team is seeking to expand its rapid manufacturing capacity in Woking, England.

As part of this collaboration, the solutions Stratasys will be providing to McLaren Racing will include innovations that leverage FDM and PolyJet technology, as well as composite material instruments and production tools and components. Besides speeding up related supply channels, the companies believe this will lead to greater productivity in design and manufacturing.

»The ability to design, build, and analyze models of new components in no time is invaluable to any dynamic racing team,« points out Eric Boullier, racing director at McLaren Racing. For Stratasys EMEA president Andy Middleton, both organizations share »a serious passion and drive to test the limits of technology.«

PRINTING SKIN

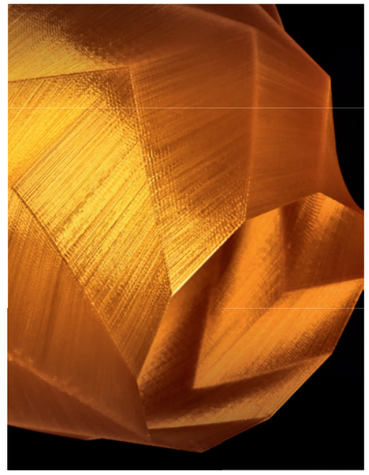
Researchers in Spain have developed a biological 3D printer that produces skin suitable for human transplant. This innovation is the result of a collaboration between Universidad Carlos III de Madrid, Hospital General Universitario Gregorio Marañón, and CIEMAT (which researches energy, technology, and the environment). Those familiar with the project say the "printed skin" can also be used to test pharmaceutical and cosmetic products.

According to the university, this artificially produced skin has the same cellular composition as natural skin, and the patented and standardized procedure that creates it is more cost-effective than previous manual techniques. Meanwhile, the information available thus far indicates that skin can be produced both industrially (from a collection of generic cells) or using the cells of individual patients. This would offer another means of treating severe burns, for example. Those involved also report that the right combination of biological components, environmental conditions, and proper bioink application is essential to successful production.

SODICK UNVEILS ITS OWN ALL-ROUNDER

In the OPM350L, Sodick now offers a machine that combines milling and Additive Manufacturing in one. In addition to its 500-watt fiber laser for additive applications, the OPM350L houses a high-performance spindle capable of 45,000 rpm, a linear motor, an automatic tool changer, and an automatic tool-length measurement function for milling activities. The unit can manufacture workpieces measuring up to 350 x 350 x 350 mm and weighing up to 300 kg.

One area where the OPM250L could see use is in the production of injection-molding tools: Here, the machine is capable of 3D printing cooling channels of an optimized form and geometry and then proceeding directly to milling.



Photos: Sodick, Klerx

Whether in art or in nature, beauty is often thought of as the ideal. Those who attended formnext 2016 had the chance to experience how aesthetic considerations have their place in connection with design and technology, as well. Here, the latest technical developments and versatile innovations in materials continue to offer new possibilities.

ON THE CUTTING EDGE

Audi and EOS are developing reliable additive techniques in manufacturing cutting edges for press tools

Text: Thomas Masuch

At Audi Toolmaking in Ingolstadt, Germany, traditional manufacturing mingles with the future of additive production. Row upon row of press machines weighing up to 40 tons of gray iron and steel can be seen from the windows of the division's 3D metal printing center, which opened just a few short months ago. Located right in the middle of an Audi plant that employs over 43,000 people, the center's couch and beanbag chairs exude a startup atmosphere rather at odds with the rest of the company.

»We've been so busy that the furniture hasn't seen much use,« Lars Reichelt admits with a smile. A trained mechanical engineer and tool technician, Reichelt has been in charge of establishing this center since he began working as a project lead in Additive Manufacturing at Audi Toolmaking in April 2016.

At the heart of Audi's 3D printing center are three metal laser sintering machines. The brightly colored walls of this air-conditioned and dehumidified space still offer room for a great deal more equipment, however. The surrounding project is a high priority for Audi, with production board member Dr. Hubert Waltl having taken a personal interest in the swift assembly of this forward-thinking department in central Bavaria. While the 3D printing center is physically located within Audi Toolmaking, its team often reports directly to the board on its latest developments.

One groundbreaking endeavor Reichelt and his colleagues recently carried out also involved the »additive minds« (see box) from one of the leading AM technology provider EOS. This project's stated technical objective was to »use additive methods to create reproducible cutting and hot forming tools that offer enhanced functionality and technical design«. The resulting additive operations included internally cooled cutting components for Audi's press tools.

Here, Audi had already been using a smaller EOS M 290 unit to manufacture parts in the necessary level of quality. »We then wanted to achieve the same quality and increased layer thickness with the EOS M 400,« Reichelt explains. The components Audi is now producing in this unit's 400 x 400 x 400 mm modeling area include cutting tools designed to remove the edges of autobody sheet metal as part of the company's heavy press machines. When machining aluminum, a press of this type produces tiny particles (also known as flitter) that eventually coat its cutting edge, along with the machine itself. This used to require regular cleaning of the cutting edge, which meant idle time for every machine affected.

In the design engineering department of Audi Toolmaking, the idea was thus born to use cooling and suction to improve the process and reduce the corresponding downtime. Channels »

EOS and Additive Minds
Since late 2016, EOS and its new Additive Minds department have been offering a significantly broader range of services. This department is based on three pillars: consulting, EOS's innovation center, and the Additive Minds Academy. EOS (founded 1898) is using this young consulting division to assemble a team of interdisciplinary experts. »Through our Additive Minds services, we now have the entire life cycle covered for our customers,« explains Güngör Kara, director of global applications and consulting at EOS. »That includes everything from getting started in additive production and choosing the right components and applications to design processes, application development, industrial production planning, qualification, and validation.«

Audi has now developed a stable process for 3D printing cutting tools for press machines.

Fotos: Audi

The real challenge in this effort involved »printing« cutting edges with the necessary rigidity and material quality as efficiently as possible using 1.2709 tool steel.

Audi's 3D printing center in Ingolstadt is equipped with three metal laser sintering systems.

Audi's 3D Metal Printing Center
Working with five engineers and three application technicians who operate the equipment, project lead Lars Reichelt produces around 400 components a year at Audi's 3D metal printing center in Ingolstadt. Each part is made of some 400 kilos of 3D printed steel and aluminum. For Reichelt and his colleagues, the main goal is to »build up expertise in additive production right here at Audi«. To that end, they also use the company's three metal printing machines to manufacture components for prototypes, which takes up around 30-40% of the center's capacity. »We don't yet have what it takes to be a profit center for the company,« Reichelt admits. »That said, we're definitely already capable of competing with external service providers in this field.«

In his role as project lead in Additive Manufacturing, Lars Reichelt has been responsible for establishing the 3D metal printing center within Audi Toolmaking since April 2016.

positioned directly below the cutting edge now provide the cooling effect, which is meant to minimize flitter buildup. Meanwhile, Audi's engineers also developed another tool variant in which similarly positioned suction channels reduce the amount of flitter that develops.

The real challenge in this effort involved »printing« cutting edges with the necessary rigidity and material quality as efficiently as possible using 1.2709 tool steel. During a test phase that ran from June to November 2016, more than 800 steel test cubes were 3D printed, grinding patterns evaluated, and material densities measured at EOS's facilities in nearby Krailling. Parameters including layer thickness, laser output, speed, and track spacing were continually fine-tuned in cooperation with EOS employees until a reliable procedure was established.

Manufacturing these cutting edges using additive techniques also makes it possible to combine different material properties in the same component. The edge itself needs to be hard and rigid, for example, while the main body material has to be a bit more ductile in order to absorb vibrations. Audi's engineers achieved both characteristics by increasing the laser speed and incorporating more porous segments.

Reichelt is also proud of the fact that his team and the »additive minds« from EOS managed to design a process 240% more productive than the technique previously followed on the EOS M 290.

In addition to making sure Audi's laser sintering equipment continues to run efficiently, Reichelt keeps a constant eye on the entire process chain in Additive Manufacturing. Here, direct access to computer tomography, x-ray imaging, tensile tests, and grinding patterns gives him and others at the 3D printing center a number of valuable resources in quality assurance.

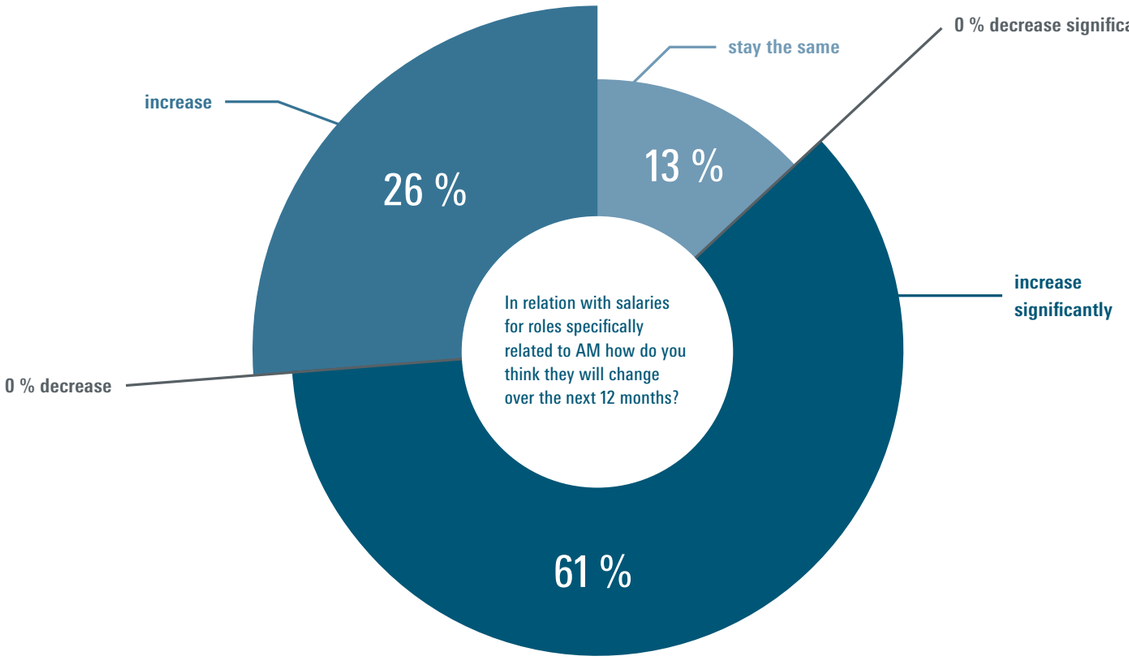
Meanwhile, Reichelt still sees plenty of potential in the ongoing development of Additive Manufacturing, particularly in post-processing. Additive production covers more than just 3D printing, after all; it also involves activities such as eliminating powder, separating components from the modeling platform, removing support elements, and polishing or blasting the surface of printed parts.

Reichelt estimates that follow-up efforts like these account for around half of the cost of many components. »We're slowly coming up against the machine's physical limits in this process, but intelligent solutions should definitely make it possible to reduce post-processing costs by around 10%,« he surmises.

In Reichelt's view, Audi's methods in post-processing represent the current state of the art – the »benchmark in the automotive sector«, as he puts it. The company is not one to rest on its laurels, however: Right now, Reichelt and his team are working through a list of 56 topics involving further optimizations of its Additive Manufacturing process.

FOR EXPERTS, THE FUTURE LOOKS BRIGHT

Text: Thomas Masuch



With the expanding AM industry essentially hiring everyone it can find, employees are in an ideal position to find interesting jobs at rising wages. For the industry itself, however, the shortage of qualified workers represents a real challenge.

Alexander Daniels Global
Founded in 2015, this personnel recruiting agency now employs seven people: three in Great Britain, three in Spain, and one in the United States. Its clients include HP, EOS, and SLM. According to company director Nick Pearce (see picture), Alexander Daniels Global helped the AM industry hire 40 employees in 2016 at salaries between €45,000 and €250,000 per year.

While technological innovations have dominated the agendas of many companies in the additive industry in recent years, the focus has since shifted to include another subject: attracting qualified employees. Any organization looking to grow needs to bring the right people on board, which is why such efforts continue to gain importance throughout the sector.

»Meanwhile, the unemployment rate in Additive Manufacturing is basically zero,« reports Nick Pearce, director of Alexander Daniels Global, an employee recruiting company that specializes in the industry. This might sound like a utopian jobs report from some socialist regime, but it is indeed the reality material providers and manufacturers of laser sintering machines currently face.

Universities and companies alike have already begun responding to this shortage in specialized personnel. Additive Manufacturing is now being integrated into traditional study programs in engineering, for example and some firms have established their own training academies in this field. In addition, certified advance training programs have emerged in Germany at institutions like LZH Laser Akademie (Hanover) or the Schmalkalden University of Applied Sciences. According to Pearce, however, these developments are not enough to meet the rampant demand for qualified hires in an industry witnessing exponential growth.

»THE BATTLE FOR TALENT IN ADDITIVE MANUFACTURING«

In a sweeping study of the AM industry, Alexander Daniels Global recently examined the current trends and challenges companies face in vying for talented employees. The firm surveyed more than 100 such organizations and examined over 4,000 positions across the entire spectrum of additive industries, including machine and material manufacturers, software providers, and users. All of the companies surveyed indicated that they were planning to expand their workforce in 2017.

Meanwhile, the study identified the strongest demand in sales, application technology, and service. »The core issues in the industry are costs, speed, repeatability, and the availability of materials,« Pearce reveals. That said, qualified personnel with the necessary knowledge and experience is the area where he has noticed a significant gap between supply and demand.

This is why Pearce believes offering better conditions or higher salaries than the competition is key in the battle for talent. At the same time, retaining employees and enabling them to advance their skills is also becoming more important. Pearce thus maintains that the challenge for companies lies in »training employees or imparting the required expertise to personnel from other industries in the next five to 10 years«.

INTERNATIONAL GROUPS TURNING UP THE HEAT IN THE LABOR MARKET

The recent forays of corporations like GE, HP, and BASF have had a considerable impact on the global market for AM specialists. While the market was dictated by Stratasys, 3D Systems, EOS, and other industry staples up until 2015, the involvement of HP and GE in particular has changed the landscape. »HP and GE have the brand profile and the resources to attract the industry's best minds,« Pearce explains. As a result, he expects that startups and previous players will find it increasingly difficult to acquire the personnel they need to fulfill their plans for further business expansion.

The realm of politics has also taken note of the labor shortage issues in Additive Manufacturing and their potential to hinder the industry's continued growth. Along with the latest technical advancements, the subject of personnel was a prominent one at Additive Manufacturing European Forum 2016, an event supported by the European Union.

»WAGES EXPECTED TO RISE FOR THE NEXT FIVE YEARS«

From an AM employee's perspective, on the other hand, the future looks bright indeed. In addition to intriguing opportunities for advancement, this is particularly apparent in the salaries on offer in the industry. Most of the companies surveyed by Alexander Daniels Global predicted that wages will trend upward in the coming 12 months. Pearce even believes that »salaries will continue to rise for the next five years, while the number of available trainees will remain limited«.

Although the industry is now highly interconnected around the world, there are still stark differences in income among individual regions. According to the study, a service manager with five to 10 years of experience in Europe earns around €65,000 per year. Corresponding salaries in the Asia-Pacific region are only slightly below that level, but experienced service managers in the United States can expect to take home €83,000 on average – a difference of nearly 30%. The disparity is even greater in sales, where U.S. wages can outstrip those paid in Europe by 50% or more.

Fotos: Pearce

TALKING ABOUT

»ON ITS WAY TO THE MASSES«

Interview: Thomas Masuch

How much progress has Additive Manufacturing made toward serial applications? Carl Fruth offers some answers in this interview with »fon«-magazine. As the founder and CEO of FIT AG, Fruth is known as both a key player and thought leader in his field. His company commenced operations at the first factory specifically designed for Additive Manufacturing in early 2016.

Mr. Fruth, what can you tell us about the latest developments at FIT?

FRUTH Right now, we're continuing to fine-tune our FIT factory. You don't just build something like this; it has to keep evolving. As soon as we've reached a certain level of sophistication, the next step will be to duplicate the facility. The essential part of industrialization is achieving scalability, after all.

Is this your response to the ongoing rise in demand?

FRUTH That's always a chicken-and-egg type of question. We're a prominent company in industrial Additive Manufacturing, which gives us an important position. It's our job to lead the way, not oversee the industry.

Your new facility is capable of industrial mass production using additive techniques, which definitely puts you among the industry's pioneers. What are some of the special features of a digital additive factory?

FRUTH First of all, a factory like ours produces a lot of different parts. In essence, it's not really a factory at all, but something like a department store that offers configurable components. Our factory has a highly streamlined structure and operates on a pull system – that is, based on what customers need.

Photos: FIT AG

And what about in terms of technology?

FRUTH In contrast to the concepts you often see from other manufacturers, I don't see the future of industrial additive production in a factory that has a lot of machines all lined up in a row. It's not really about the technology at all; the key aspect is the structure. It's also not important to have machines that all come from the same manufacturer. In industrial production, companies always look for the provider that offers the cheapest solution for a given application.

What are some areas where you still see obstacles to mass additive production?

FRUTH The technology and market are still at odds in a number of different ways. We often don't have products that were designed for Additive Manufacturing, for instance, and additive techniques usually don't make sense for existing products that were developed for another type of production technology.

Where do the differences still lie between additive and conventional industrial production?

FRUTH Industrial production means producing a high level of quality at a low cost. At the moment, Additive Manufacturing is still tremendously expensive. That's why designing products with added value is always key. In metals, for example, we're currently looking at a product price of around three euros per gram. Even if we reduce that price by 10%, mass-producing entire products will still be much too costly in most cases. In other words, it's not a question of price, but how to make money.

Still, price plays an important role, just as it does in every industry. When it comes down to it, people want to generate revenue through their business. How has the introduction of digital production affected the cost of components at FIT, and what's your opinion of the current trends in the industry?

FRUTH It has made things cheaper to make – around twice as cheap, in fact. When I look at the developments in the industry, I see quite a few manufacturers that keep showing off more and more robots and extra features. What I'm not seeing is someone who can demonstrate a way to run production operations at 10% of the current costs within five years, for instance. For manufacturers like us, things are trending in the wrong direction. The challenge we focus on in the years ahead needs to be making things more cost-effective across the board.

As a "manufacturer for hire", the only way you'll come up with products that offer more added value and are designed for Additive Manufacturing is in collaboration with your customers.

FRUTH We definitely do work closely with our clients in that regard. The main challenge lies in the fact that they aren't tinkerers; they're mostly corporations that usually think in terms of specified standards.

The challenge we focus on in the years ahead needs to be making things more cost-effective across the board.

Let's get back to FIT. Around 40% of your company's workforce is female. How have you managed to get so many women excited about Additive Manufacturing?

FRUTH Having well-structured processes makes it relatively easy for us to hire employees from other industries and integrate them into our company. We have quite a few on staff who have switched careers and started acquiring the necessary expertise with us. Meanwhile, we're very young company with a mean employee age of around 30 years. We also have a very high proportion of women involved in our training program for model design, for example, which is a really creative area.

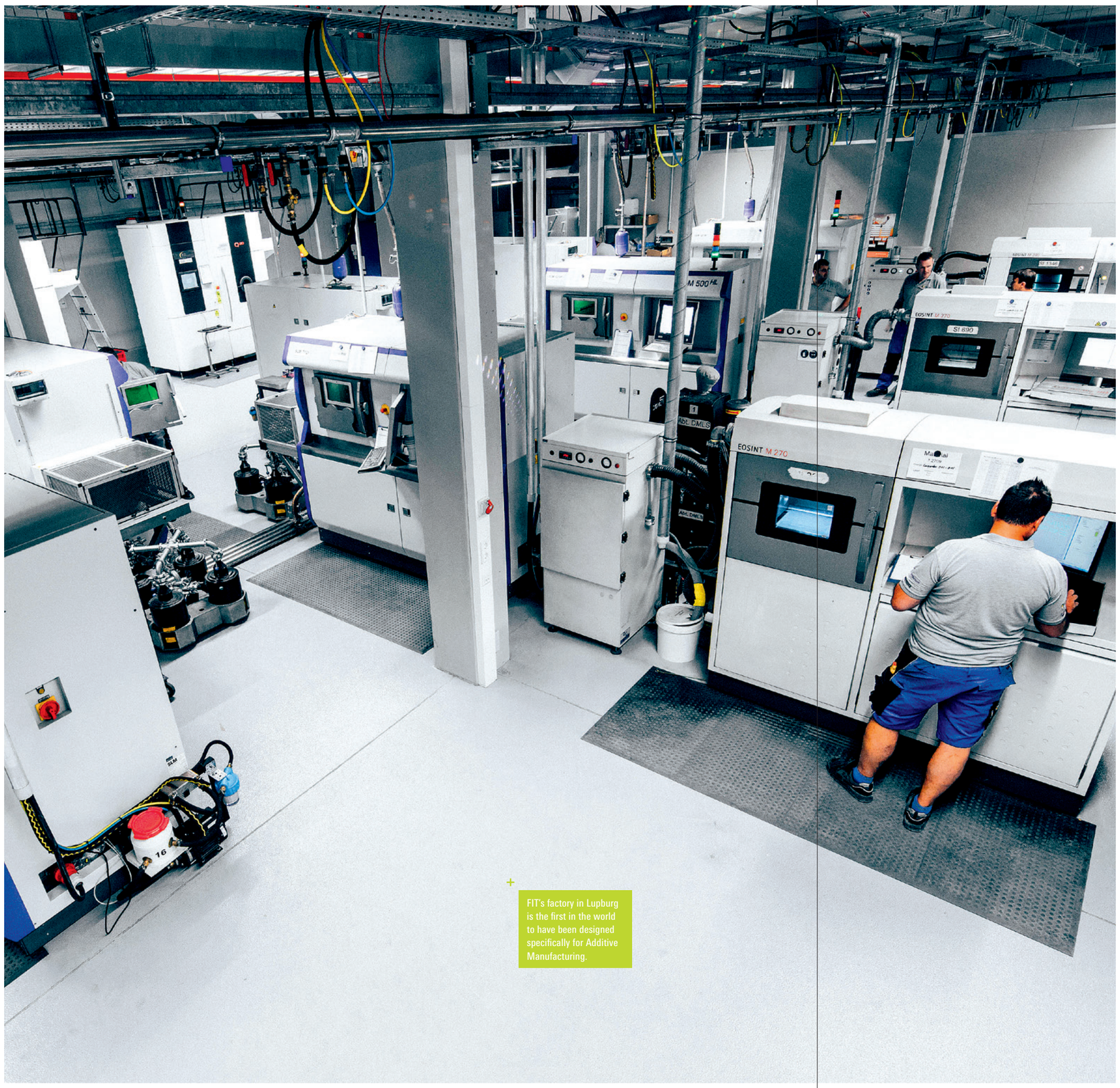
In 2016, you and your 250 employees generated €24 million in revenue. That comes to less than €100,000 per employee. For a well-structured company, that seems like a relatively small figure

FRUTH Well, along with Additive Manufacturing, our company spends a good share of its time on model design, which requires a lot of personnel. Plus, our 250 employees include 40 trainees. You also have to keep in mind that we're currently in a phase of dynamic growth. It's impossible to grow when you're always operating at full capacity; you have to keep some resources free.

Just recently, you acquired a stake in Sinterit, a Polish manufacturer of desktop SLS printers. What is FIT hoping to accomplish through this move?

FRUTH Sinterit builds systems that might not be the fastest, but they're affordable and precise. We're hoping this will strengthen our effort to bring additive technology to schools and engineering firms and further propagate the additive mindset. We want to help show people the benefits of taking Additive Manufacturing into account early on in the product development process. After all, we need more products and components that have been developed for additive techniques.

Mr. Fruth, thank you for taking the time to talk with us. »



FIT's factory in Lupburg is the first in the world to have been designed specifically for Additive Manufacturing.

Process efficiency means optimizing components for both production and serial manufacturing. This makes it possible to fit 15 of these motor mounting plates for prototypes on a single building board.

FIT AG
Founded by Carl Fruth in the southeast German city of Lupburg in 1995, FIT AG considers itself a leader in Additive Manufacturing technology. The products it manufactures include prototypes, limited series, software and hardware solutions, and both serial and custom mass-produced items based on additive methods. FIT's serial production division goes by the name Additive Design and Manufacturing, or simply ADM. According to Fruth himself, this area currently accounts for around 20% of his company's revenues; in metals, it manufactures batches involving anywhere between one and a thousand units.

»OUTSIDE THE BOX«

»The sound of business«

20 + 60 + 75 + 1 + 42 + 4

Text: Thomas Masuch

»Money makes the world go round«, as they say, and that certainly applies to the world of AM, as well. A look at the related business news from February 2017 reveals some of the players at the core of this industry*:

»Divergent (an US company that 3D prints vehicle chassis) collected over €20 million in venture capital.«

»Oerlikon (Switzerland) announced its plans to spend around €60 million on a new Additive Manufacturing center in North Carolina (USA).«

»The AM Center Dresden (Germany), an investment involving some €75 million, was officially opened.«

»Desktop Metal received €42 million in financial support from Google Ventures, BMW i Ventures, and Lowe's Ventures.«

»FIT (Germany) invested €1 million in the Polish start-up Sinterit.«

»Wiivv Wearables (a Canadian company specializing in 3D printed shoe insoles) secured just under €4 million in venture capital.«

In this random sample of AM news, all but €5 million (for Sinterit and Wiivv, which deal in plastics) of the €197 million in question was invested in metals. This makes metals the predominant material with regard to investments. The acquisition of a majority share in Realizer by DMG Mori confirms this trend.

When it comes to current ventures in metal 3D printing, euros and dollars are evidently burning as many holes in investors' pockets as they were around 20 years ago in the Internet industry. Some of the start-ups that were part of the hype back then are longer around, of course, but the likes of Google, Amazon, and Facebook represent some of the most valuable publicly traded companies in the world. It will be interesting to see how high today's 3D start-ups are trading on the stock market in 20 years' time.

While it may not yet be nearly so advanced as other industries in commercial terms, the additive industry is always good for announcements that capture the imagination in other ways. Asier Marzo from the University of Bristol (UK), for example, has developed a tractor beam that can levitate and draw in objects like something out of a Star Trek movie. The young inventor also published instructions online for those interested in building their own tractor beam from electronic components and 3D printed plastic parts. It's comforting to see that the additive industry we've grown to appreciate still makes sci-fi applications like these accessible to everyone – even those without venture capital to spare.

*Selected at random; not an exhaustive review

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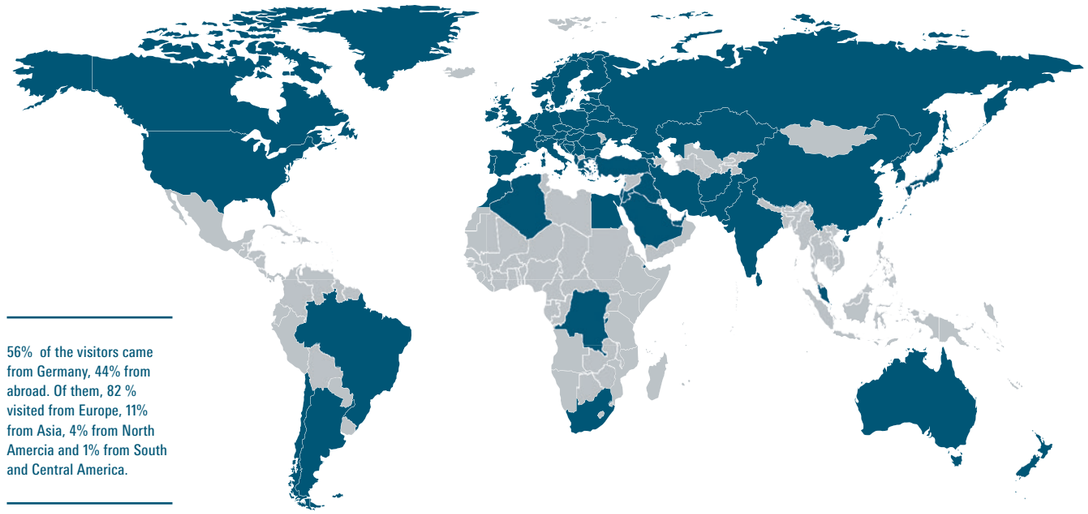
VISITORS OF FORMNEXT 2016 CAME FROM THE COUNTRIES SHOWN ON THE MAP



56% of the visitors came from Germany, 44% from abroad. Of them, 82 % visited from Europe, 11% from Asia, 4% from North Amercia and 1% from South and Central America.

IMPORTANT FACTS:

» 14 – 17 November 2017

» Messe Frankfurt, Hall 3

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