

3D ADEPT MAG

3D PRINTING

**KEY TAKEAWAYS FROM THE YEAR 2020
THE GOOD, THE BAD AND THE UGLY**

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Edited by 3D ADEPT MEDIA

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Hello & Welcome



Meaningful connections

Every year typically has a few defining moments, but 2020 in its whole was unparalleled. This year has contained so many world-changing and paradigm-shifting developments that many will feel relieved that it is almost over.

While many companies have strived for positive financial results, it should be noted that this year was also a good one for a bunch of companies out there. Whether your company is part of the first or the second group, I feel like it is the perfect time to pause, reflect, and create/rethink a vision for ourselves of where we want to go – as a person or as a company – and who we want to be.

At 3D ADEPT Media, this year has given us plenty of opportunities to think, to learn and to share. And one thing we would like to keep in mind is the “importance of meaningful connections”. Depending on where you read it, it can mean anything.

However, for additive manufacturing companies, it is never too late to create and maintain substantial relationships within the working environment, with collaborators, clients, suppliers and even friends. In the end, these relationships will move you to action and will ultimately affect your business, career or life.

Lastly, we cannot let you delve into this last issue of the year without a BIG “THANK YOU”. Thank you for being part of our readership, thank you to our advertisers and thank you to our growing community.



Kety SINDZE

Managing Editor at 3D ADEPT Media

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Season's Greetings from the 3D ADEPT Media Team.

Editorial

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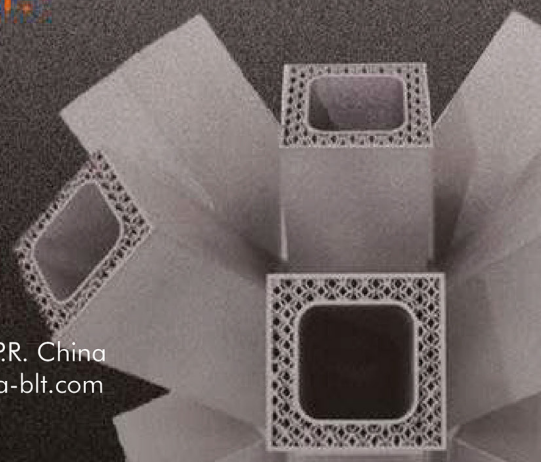
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KEY TAKEAWAYS FROM THE YEAR 2020:

“The good, the bad and the ugly”

We usually start/end the year by asking companies what the ending year meant for them and how they envision the new year. This year, we have done things differently. We have invited key companies and experts to discuss topics that have had a major impact throughout 2020.

1- COVID-19, obviously

There is no debate on the fact that COVID-19 has placed 1st among the topics that fuel this year's conversations. No matter the industry was, this was the main topic – with good reason: it has changed so many aspects of our professional and personal lives.

Let us not come back on what you probably already know: 3D printing has played a key role in the manufacturing of personal and protective equipment. Let's focus instead on what's next for the additive manufacturing industry.

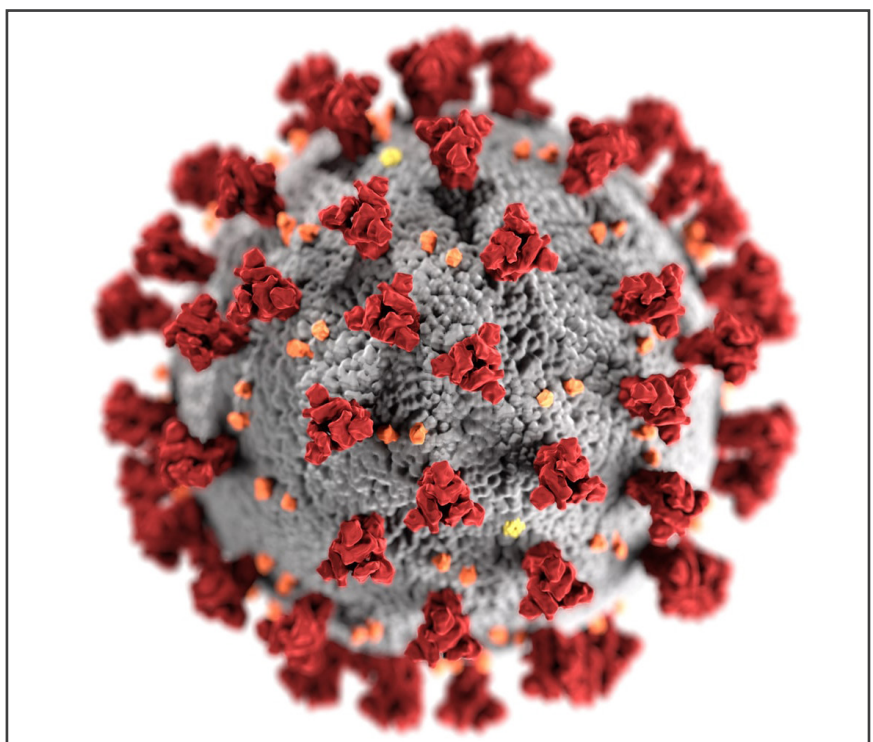
The **Additive Manufacturing Working Group** (AG AM) within the [VDMA](#) (The Mechanical Engineering Industry Association), has conducted two surveys (one during the first half of the year and another one during the second half of the year) to find out how companies have been affected and what will be their next focus despite the current difficult market environment.

In the first half of 2020, many of the 70 companies that took part in the survey

recorded declining sales. 56% of those surveyed, sales declined, in some cases significantly. One fifth had to cope with a decline of more than 20 percent. In contrast, only every fifth company remained on a growth path in the first six months of the year.

“The weak economy resulting from the corona pandemic is also affecting the business situation in Additive Manufacturing,” explains **Dr. Markus Heering**,

Managing Director of the Additive Manufacturing Working Group. According to the survey, consulting firms, AM materials and manufacturing service providers are hit the hardest. The fact that many users of AM processes and users of AM parts also reported declining sales fits the picture. “Many projects are currently being postponed. In addition, foreign business is significantly more difficult due to travel restrictions,” he



explains.

Confidence based on export expectations

However, almost 40 per cent of those surveyed companies expect exports to rise in the next twelve months; a further 46 per cent expect business abroad to remain at least at the same level. Looking 24 months ahead, more than two thirds of the companies even expect exports to grow. Nine out of ten respondents cite **the EU as their most important export market.**

For 40 percent, exports to the USA are also highly relevant – and a fifth of all respondents also name China as an

important target market for their products and services. Heering sees this export orientation **as proof of the increasing maturity of the AM industry.** “At the same time, the large differences between the 12- and 24-month forecasts indicate a certain scepticism about a rapid return to normality without pandemic-related restrictions,” he explains.

AM industry gets ready

Nevertheless, the willingness of companies to invest has increased compared to the last survey in April 2020. Thus, 35 percent now state that they want to expand their investments. In the

April survey this figure was 24 percent. And compared to 32 per cent in April, only 18 per cent of those questioned now state that they are planning with lower investments in the AM sector. “Even after the very difficult first half of the year, our member companies are still looking ahead to their growth opportunities,” says Heering. This is also reflected in the fact that a large proportion of companies say they are using the current rest period for product development and staff training. “They want to be ready when the economy picks up again,” he explains.

2- Sustainability

When 3D ADEPT Media shared that twelve companies join [AMGTA](#), to promote sustainability within the AM industry, [Eliana Fu](#), Senior Engineer at [Relativity Space](#), comments: “If COVID hadn’t been the major topic of conversation in 2020 in the AM industry, it would have been «sustainability» quite frankly.”

We could not agree more with her. Sustainability has been widely addressed throughout the year, by 3D ADEPT Media itself, by our colleagues from other media, and during so many events. So, what’s important for Additive Manufacturing companies then?

The truth is, there is still very little being done to actually drive sustainability initiatives. And these concerns are continuously growing the increasing number of engineering innovations. Part of that problem likely lies with the question **“Who is responsible?”**

In a panel discussion on the [relationship between sustainability and AM](#), [Björn Hannapel](#), Head of Sustainability at EOS, explained that AM companies should keep in mind the **four I** in their sustainability strategy:

- **Innovation** in powders, machine and cost side
- **Information** towards the customers, the



public and non-customers

- Impulse

- And **Inspiration** as we need leadership and proof that it is working.

Usually, “there is a sustainability strategy and there is a company’s strategy but from my perspective, the company’s strategy also needs to be a sustainability strategy”, Hannapel completes. A vision that **Sherry Handel**, Executive Director at AMFGA shares as she concludes: “sustainability is a journey, not a destination” and everyone should feel concerned.

3 - Diversity & Inclusion in the Tech Industry

This long-standing issue has caused much ink to flow throughout this year. For the additive manufacturing industry industry, **Women in 3D Printing** has published a special edition of its 2020 Diversity for Additive Manufacturing Report. The report that Kety Sindze, our Managing Editor, has had the pleasure to lead goes beyond the simple goal of improving gender parity.

As a reminder, the report is based on two main surveys: the first one was designed for recruitment companies, and was meant to determine if the lack of minority groups' representation in the AM

sphere is due to an absence of people or a limited number of candidates in target groups.

AM companies took part in the second survey, that aimed at discovering existing actions implemented by companies in their workplace to enable inclusion, and determine key actionable takeaways that should be considered to create a more diverse and inclusive industry.

According to [a 2018 McKinsey report](#), socially diverse 12 13 companies are 33% more likely to outperform their less diverse counterparts

financially. They mostly make it happen by minimizing unconscious bias, through engagement and by relying on minorities that already work within their industry.

These steps are only a few ones that should be taken to create a more diverse industry. While [the report](#) highlights a very interesting list, it should be noted that it's up to each company to test its own recipe and adapt it accordingly.

In the end, words and means may vary from one place to another, from one language to another, but ultimately the battle remains the same.



4- Fundings

Discussing fundings with a serial investor in Additive Manufacturing

Let us admit that defining “fundings” as a hot topic in 2020 is a bit overstated but the ability to raise money when the market is uncertain and when most AM companies announce negative financial results raises a certain curiosity. 3D ADEPT Media caught up with Arno Held, Chief Venture Officer (CVO) at AM Ventures, to understand this topic.

While big Additive Manufacturing players naturally focus their investments on their business and strategic ways to grow, [AM Ventures Holding GmbH](#) (AM Ventures) has decided to grow the entire industry by investing in forward-thinking AM companies.

At the heart of the company's journey in the additive manufacturing industry, we find **Arno Held**, Chief Venture Officer. Industrial Engineer by training, Held started his career in industrial laser applications and built extensive experience with leading machine manufacturers such as **Trumpf**. Not surprisingly, he got to a tipping point in his career when he discovered AM (which was rapid prototyping at the time).

From the role of an intern in the R&D department to **Dr. Hans J. Langer's** executive assistant at [EOS](#), Held learned a lot about 3D printing but also start-ups. *“I got hooked not only on the 3D printing part but also on the start-up culture”,* he tells 3D ADEPT Media. As part of a project, he got to meet a team of three founders in an incubator at Eindhoven: the founding team of [Shapeways](#).

“I really liked to work with these guys, experienced the start-up dynamic, saw what start-ups can do to 3D printing and what 3D printing can do to start-ups. That was a topic I started to follow quite passionately”, he continued.

Back to EOS, he switched to the business development and strategy department. He did not only want to work with start-ups anymore, he wanted to invest in them. As per his words, he wanted to *“invest in small start-up teams and in early stage technologies in additive manufacturing”*.

With the willingness to make this vision



Arno Held from AM Ventures

a reality, he pitched this project to the Langer family that decided to provide funds to set up a venture capital firm that would focus on investing in additive manufacturing companies. Together with Johann Oberhofer, former Chief Operating Officer at EOS, and long-time companion of Dr. Langer, AM Ventures got underway as an independent firm in the Langer family's group of companies. This means that EOS is not an investor in any companies funded by AM Ventures – and obviously that AM Ventures is not an EOS company.

“In January 2015, AM Ventures officially took off. Our very first investment was DyeMansion. We'd met Felix and Philipp earlier and basically cofounded the company with them. DyeMansion was a success story on its own. In the last five years, AM Ventures has grown very well. Today, we are a team of almost ten people. We have scouted more than 1500 start-ups companies across the world that specialize in AM. We have already funded 17 companies in seven countries, on three continents and we are still very curious and highly-motivated about our little industry”, Held enthuses.

From scouting new start-up companies to the investment management of the portfolio members, AM Ventures has proved out its essential role in accelerating the AM industry. The serial investor in 3D printing is really one-of-a-kind when speaking about investments as it combines an in-depth know-how on AM and business development. They know the ins and outs, the resources and skills required to evolve within the industry.

But how do we manage investments in a pandemic world which sends out alarm signals about economic uncertainty? And most importantly, how should AM companies position themselves to get funded?

We were keen to listen to the thoughts from AM Ventures on these questions.



Amid the chaos

Interestingly, the current socio-economic environment did not slow down AM Ventures' potential investments in AM companies but it did change the way it operates and assesses its investments.

"At the beginning, when we had the very first lockdown, we were naturally a bit confused and unsure about what the future will bring. We dove into our budget and asked all portfolio companies for certain emergency budgets and measures, so that they come out with a plan of what would happen in the near future. After assessing these data and monitoring our portfolio companies closely, we were quite pleasantly surprised that our portfolio all the way through, was in a good state. We saw that companies still conducted their funding rounds whose planning had

started last year or early this year. Investors were still interested in supporting them.

Furthermore, despite the crisis, we have seen that our start-ups recover quite impressively and quickly. Some of these companies are even doing fantastic", Held explains.

We can endorse Held's comments today, as among these start-ups and apart from DyeMansion, who raised \$14M USD in summer, there is [3YOURMIND](#).

Remember the software company recently [secured \\$5.5M USD to expand its market](#). Furthermore, in an Opinion of the Week segment, **Alexandre Donnadieu-Deray**, Head of Sales and Managing Director North America at 3YOURMIND told 3D ADEPT Media [the company gained traction amid the pandemic](#) and thanks to the crisis. For software companies like 3YOURMIND for instance, the crisis has shed light on the importance of their services in a production environment.



Image: 3YOURMIND – Agile-MES Production Workflow

Furthermore, speaking of the funding rounds process, Held outlines: *"In general, there are not necessarily fewer funding rounds and they do not necessarily take longer but there are not so many investors who are active in AM. Of course, the economic outlook of the next 12 to 14 months is probably not as great as it was before the pandemic. The main consequence that results is that the valuations for start-ups has experienced a slight decrease."*

Market dynamics

Securing an investment round is always big news for a business, whether it be a fresh-faced start-up or a more grizzled production operation. Doing so in the mid of economic uncertainty only highlights the uniqueness of a company's products / services and its ability to withstand any hurdles the future would hold.

In addition to 3YOURMIND and [DyeMansion](#) mentioned

earlier, the non-exhaustive list of companies that announced millions in new investment rounds this year includes: [LightForce Orthodontics](#), [Additive Drives GmbH](#), [Additive Industries](#), [Arevo](#), [Azul3D](#), [BCN3D](#), [ICON](#), [Kumovis](#), [VELO3D](#) and [Mighty Buildings](#).

Although **timing** is often crucial, Held's words also shed light on a type of sectors that increasingly gains momentum: the **digital value chain**. This is one of the first examples of forces that affects prices and behaviours of both producers and industrial users.

Besides pandemic-driven applications, AM has officially positioned itself as a solution to disrupted supply chains. Decentralizing production reduces the strain of logistics as digital technologies allow for manufacturing in-situ.

For AM Ventures' representative, *"if you are playing a certain role in*

the digital value chain, it's probably the time to focus on that because everyone is looking at it. It's for sure the right view in my opinion."

Applications are the second key enabler. "Digital issues addressed by AM companies are very eye-catching. However, while a few years ago, fundings were mostly granted to companies that develop hardware products for AM, this year saw a combination of investments in hardware and a trend towards applications made possible using AM. [LightForce Orthodontics for example, secured a \$14 million Series B round of funding to ramping up operations and continue developing its digital platform providing orthodontists with fully customized, 3D printed tooth-moving tools.] This interest in funding "applications" provides evidence of the maturity of AM technologies".



Moving forward...

While we did not focus on key components of the fundraising process such as in-person meetings between executive teams and venture capitalists, fundraising preparation or the importance to “do more with less”, it is worth noting the pivotal part executives have to play to secure fundings. Indeed, despite the fact that the economy is not at its best right now, there is always room for multiple opportunities and **early stage founders need to be savvy.**

“For startups that are raising funds, I would recommend to pick their investors extremely carefully because deep tech and high tech investments require very competent investors who understand the development cycles, the cash requirements for start-ups, and also the volatility which is simply inevitable in this game. If you have an investor that does not understand this, he will certainly be surprised that R&D takes longer and consumes more cash than expected; and an investor who is not well experienced becomes a little bit nervous” the CVO points out.

Furthermore, it is no secret that big players usually enter the AM market through acquisitions of innovative start-ups. Remember how [BASE](#) or [Xerox](#) debut on the AM market? Although this road might seem appealing to founders, Held recommends prioritising **collaborations over acquisitions.**

“My recommendation which is also one lesson we learned over the past years



is to not sell a company too early. Accepting investments from strategic corporate investors can become critical and it's mostly better to first team up with venture capitalists who want to help accelerating a company and investing extra miles for the sake of the start-up and not necessarily for the sake of a big corporation in the background. We've seen a lot of potential dynamic got wasted because start-up entrepreneurs fell for the attractive valuation that big corporations are willing to pay but after that, the dynamic somehow evaporated because the big corporation has boarded them into its ecosystem in very early phases.”

Speaking of the 2021 AM market, he concludes:

“There will be more money available. We are seeing now funds being raised and other funds shifting their focus to watch this industry. I think it should be a little bit easier to get money. This would mean that both the valuations and the volumes of the funding rounds would increase. However, this will obviously depend

on the performance of the economic development. Desktop Metal for instance has recently announced [it will go public](#). It's still an announcement, it is not yet executed. Many are waiting for the outcome of this project. The success or failure of this endeavour will strongly determine how investors will look at AM in the industry in 2021. If Desktop Metal effectively becomes a publicly listed company, this will definitely bring new funds into the industry and attract other investors. But if the project is not a success, investors are very likely to look at this industry as well as other high ambitious projects within the industry quite critically. This crucial point will determine a lot the climate for raising money and for investments in general in AM but I am quite optimistic. When we look at the applications we receive and the plans for AM Ventures in 2021, I remain excited about the upcoming year.”

5 – Climate Change

Climate change is everywhere – in weather patterns, throughout plant and animal habitats. Is it really a critical time for the climate? The answer is “YES”. Scientists have extensively documented the effects of such climate-related shifts, which largely stem from global warming caused by humans and are already affecting daily life. The good news is that global momentum around climate change is building toward a crescendo. However, one question remains: **can Additive Manufacturing help fight climate change?**

Proponents of AM technologies believe so. According to AM Services provider [ProtoCAM](#), the well-acknowledged DfAM method helps reduce the carbon footprint of plastics manufacturers through the use of topology optimization and generative design, not to mention that the method enables to imitate nature so as to better protect nature.

“Because printing can be performed on-site for green energy producers such as wind turbines, additive manufacturing offers a two-for-one hit for sustainability and environmental protection”, the company said.

However, at the European level, to address this global issue, the EU has set itself targets for reducing its greenhouse gas emissions progressively up to 2050. For this reason, the European Commission has invested €1 billion to boost the green and digital transition through the **European Green Deal Call**.

Given the urgency of the challenges it addresses, this program aims for clear, discernible results in the short to medium-term, but with a perspective of long-term change. Participants can deliver results with tangible benefits in ten areas. **AM companies also have their part to play in this fight as they want to achieve**



a zero pollution ambition and a toxic-free environment, transitioning this way to a clean and circular economy by waste prevention and recycling in contrast to traditional subtractive manufacturing.

One company that is currently one to watch in this area is [DyeMansion](#). Selected to play its part, the company that recently raised \$14M to accelerate AM mass production will support this mission with its [Powerfuse S](#).

Capable to run autonomously 24/7 to deliver sealed 3D printed surfaces at injection molding level, DyeMansion’s technology makes the parts pressure-tight and capable of repelling water, oil, and other liquids.

The Powerfuse S integrates a fully automatic loading option, connectivity and batch tracking features. Suitable for a wide range of applications, the machine requires the use of an eco-friendly solvent approved by the EU for food packaging and cosmetic products and is equipped with a recycling process for the solvent to avoid waste.

*“Being selected as one of the very first startups to work at the forefront of Europe’s mission to become the first climate-neutral continent is a great honor for us,” said **Felix Ewald**, CEO and co-founder of DyeMansion.*

“This underlines not only the sustainability potential for 3D printing but also the innovative ‘green’ approach that we bring to the manufacturing industry with our Powerfuse S. We take this job seriously and see sustainability as a key obligation to all our activities.”

Another company with big ambitions for 2025 is Covestro. In order to become “fully circular”, Covestro currently focuses on renewable energy, develops numerous research projects to promote recycling as well as alternative raw materials within the AM industry.

*“We collect raw materials and make new out of them, states Business Development Manager **Lukas Breuers** during an [expert Session moderated](#) by **Niko Palosuo**, Head of External Communications. “Our new materials are based on three pillars”. With a key focus on **recycling**, Breuers explained that new manufactured products [should be] based on **recycled raw materials**, on **CO2-derived raw materials** as well as **bio-content of up to 50%**.*

Even though confidence in 3D printing’s environmental benefits is far from universal, it should be noted that AM companies did not yet really position themselves on the topic. Therefore, next year will probably see a big focus on this matter.

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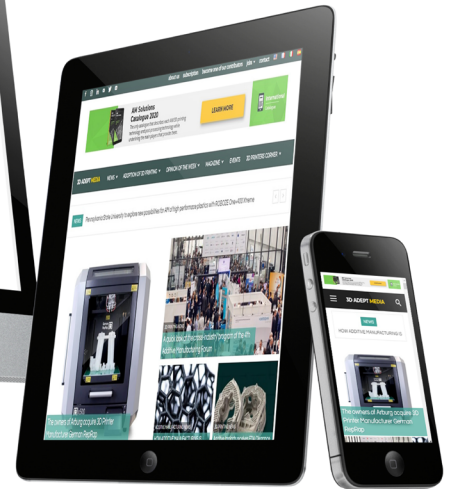
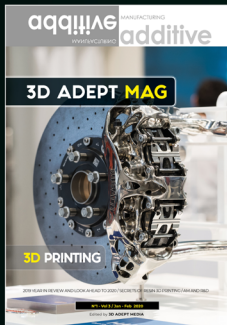


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FORMNEXT CONNECT 2020 : **THE VERDICT?**

When **Petra Haarburger**, President of Formnext, kickstarted Formnext digital edition, [she said](#): “We hope that everyone will experience a little bit of the Formnext magic during these two and half days”.

Although the platform will remain open until December 31st, to enable those who would like to watch some content on demand to do so, the end of officially planned activities was on Thursday, 12th November at 02.00 pm CET.

Recorded figures by Mesago show that “Formnext Connect attracted 203 exhibitors with about 2200 representatives, and showcased 1412 products. 8541 active participants from more than 100 nations (1/3 national, 2/3 international) made great use of the intelligent and modern matchmaking function, which managed to generate more than 450000 recommendations for products and other participants. Further, 23311 new

contacts and 4733 business meetings in the form of video calls were enabled. The 221 lectures and presentations of the high-profile program of stage events and sessions were watched by 45000 spectators”.

But these are just figures, in the end, was “the Formnext magic” there? What are the final impressions of the organizers, exhibitors and attendees?

On November 11th, we reported on a mix of understandable and diverse feelings from [the organizers, the exhibitors and the attendees](#).

Before anything else, let us congratulate the creative team of Formnext for putting together such a massive digital event in just eight weeks. Despite the constraints of the digital format, “Formnext” will remain one of the rare AM events, if not the only AM event to create such euphoria within the industry.

For **Sascha F. Wenzler**, the digital format of



Formnext Connect will also play a role in future trade fair formats. *“Born out of necessity due to the worldwide corona restrictions, Formnext Connect [...] will continue to form an important part of future exhibitions.”* That being said, Wenzler is of the firm belief that it can never make up for the direct contact and personal interaction of a physical event.

As a reminder, what’s interesting about the Grip platform used for Formnext Connect, is that it was based on AI-driven matchmaking. The same platform has already been used [by the Additive Manufacturing Forum in Berlin](#) to plan meetings prior to the

in-person conference – but not in such an extensive way, with a whole set of digital activities.

The matchmaking tool is a very nice aspect if you want to make the most of your digital experience – or your time during a physical attendance at a show, as it matches people that share common interests. But let us not forget that a good deal can often come out from an unexpected conversation, or from the eye-catching product that draws your attention when you are walking down aisle of an exhibition hall.

In this vein, most exhibitors we talked to, told us that

they did not have the same traffic they usually got while attending Formnext, which is quite understandable. Indeed, in addition to “unexpected conversations” that usually occurred during a physical event, and despite the fact that the program aimed at facilitating people from different time zones (USA, Europe, and China) to take part in the event, people were not always gathered at the same time and on the same platform. As mentioned on November 11th, most companies carried out their presentation and product launches on their preferred digital platform – and this was often an external platform to Grip. Not to mention that some expert

and interactive sessions had some limitations in terms of attendance capacity.

As far as attendees are concerned, we believe each attendee will have a different story to share about Formnext Connect. At 3D ADEPT Media for instance, we usually showcase our products as exhibitor and cover the show thanks to a well-thought out media planning combined with a booth-to-booth approach on the ground.

This time, in addition to some major product launches and updates from companies, we focused on some interesting newcomers & rising AM players that we will introduce in a couple of days.

While we've heard some attendees say that they wanted to discover more about a specific topic, for other attendees (that were actually AM companies), the goal was just to "network virtually".

In the end, did you feel a bit of that "Formnext magic"?

Notwithstanding each personal digital experience, it should be noted that Formnext

has maintained its standard in terms of quality content and experts.

Apart from the [start-up challenge](#) and the [purmundus challenge](#), key topics addressed during the event range from sustainability, engineering and aerospace to industrial use cases in automotive, financial services in AM, as well as standardization and certification. In addition to China as a partner country, the event has made a closer look at Israël as an AM hub and explored the possibilities in the mould & die industry.

Lastly, to extraordinary year, extraordinary measures, and thus extraordinary Formnext. From what we saw on social networks, beyond business objectives that have been achieved or not, this Formnext was about **"connecting the fAMily"** in the new Covid-19 world before next year's annual gathering to Frankfurt – and that to me, is the sign that the "Formnext magic" was somehow there.

Formnext 2021 is scheduled to return to Frankfurt am Main from 16 to 19 November 2021. In the meantime, stay healthy & take care of your relatives.

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New comers and rising players in the Additive Manufacturing industry

As announced in our [“verdict” of Formnext](#), Formnext Connect was also the opportunity to discover more about some interesting newcomers and rising AM players that are getting their bearings on this market.

Weber Additive and its Fused Granular Fabrication (FGF)

WEBER brings a century of experience in the manufacturing of plastic extrusion machinery. Two years ago, the company decided to transfer this know-how in plastic extrusion machinery to additive manufacturing and created its AM unit: [Weber Additive](#).

The company therefore specializes in FGF. In such process, melted plastic granules are deposited on a bed layer

by layer to form a 3D component.

So far, Weber Additive was known for the development of a manufacturing cell. Developed with support from [AI Build's software](#), the machine produces large-volume components quickly and cost-effectively from a variety of plastic granules.

This year, during Formnext Connect, Weber Additive introduces its **DX 025 manufacturing system**. With a build volume of 2.5 m³, the system combines the capabilities of a high-precision CNC-controlled system with a WEBER extruder specially developed for additive manufacturing.

Already available for commercialization, it should be noted that the configuration of the additive manufacturing system depends on several factors.

Making Additive Manufacturing “Becker”

Another company that operates in stealth mode within this industry is **Becker**. If you are an operator that works with metal AM machines, then, it is no secret to you that a stable inert gas atmosphere must be ensured within the build chamber of the machine, as well as a specified temperature range. Furthermore, metal splash and smoke created during the melting process must be removed. Achieving that is one of the missions of Becker





Becker, short for [Gebr. Becker GmbH](#), is a global manufacturer of efficient vacuum pumps, compressors and air supply systems, components that are developed for a variety of industries including **AM, printing & paper, electronics and medical industries – to name a few of them.**

Designed for powder-bed fusion systems, the manufacturer's gas-tight blowers allow for effective inert gas recirculation & pneumatic conveying of powders within AM factories. This means that there is no loss of valuable inert gas since there is no oxygenation.

pro-beam goes additive

Aerospace engineer Verena Uhl gave a short introduction of pro-beam additive GmbH at Formnext Connect. pro-beam additive GmbH is a company of the [pro-beam Group](#), a global company acknowledged for its expertise in the electron beam technology segment.

The new subsidiary debuted at Formnext 2020 with the launch of two metal 3D printing processes designed for industrial applications.

By bringing its process know-how,

equipment solution competence and serial-production experience, pro-beam additive aims to enable flexible additive manufacturing of metal parts of all sizes – from a batch size of 1 up to serial production. The company's new systems requires the use of various processes such as wire deposition welding and electron beam melting within a powder bed.

"The powder bed process is designed for components that have detailed structures, while the use of a wire, especially for large components, offers advantages over conventional production methods", the company explains.

Currently, the team of the new AM division works on materials that used to be difficult to process before, as they want to ensure that the need for post-processing is kept as minimal as possible in order to significantly increase production speed.

In the long run, "pro-beam's AM concepts will cover the requirements of the market and various industries in terms of quality, speed, flexibility and reliability".



Xact Metal and its in-depth overview of the XM200C metal 3D printer

US-based manufacturer of metal 3D printing [Xact](#) positions itself as the “accessible” metal AM alternative. Unveiled for the first time in 2018, the metal Powder Bed Fusion (PBF) process has been built to enable universities, labs and SMEs to get an easy access to metal AM.

With a build volume of 2048 cm³ (127 x 127 x 127 mm) / 125 in³ (5 x 5 x 5 in), the machine features a 100W Yb fiber laser and a scanner which fuses at speeds up to 500 mm/sec. Its small footprint simplifies its integration into a lab or a manufacturing plant.



As in most machines, 6 steps needs to be followed to manufacture on the XM200C:

- Print preparation,
- Load printer with powder,
- Installation of build plate and recoater bulb,
- Load print file and purge machine,
- Level build plate and run print,
- And unpack the print and remove the parts from the build plate.

Xact agrees with industry experts that believes pricing must be “meaningfully lower” to drive the adoption of AM hence its efforts to combine the requirements of metal Powder Bed Fusion and technology to establish a new level of price and performance for Additive Manufacturing.

The company’s technology is now accessible across the world through certified distributors.



METAL AM BY EXPERTS

Quality Must Be Calibrated Throughout
the Additive Manufacturing Process



**By Zach Murphree, Vice President
Technical Partnerships, VELO3D**

*Measuring before, during and after a
part build*

Repeatable part quality is the holy grail for the metal additive manufacturing (AM, aka 3D printing) industry. The aim is to match the reliability and performance seen in traditional manufacturing methods like machining or casting.

The continued, successful growth of AM (a market that passed \$10 billion in 2019)—in both series production and direct part replacement—now depends largely on quantitative quality measurement and dependable machine-calibration. Even the improving cost-efficiencies of AM won't advance the process much if component behavior can't be fully understood and trusted in mission-critical applications or across mid-to-high-volume orders.

As they've evolved, every major manufacturing process has gone through challenges in material science and pre-, post- and in-process quality calibration and measurement. Metal additive manufacturing is no different, and is now moving fast to deliver designs of startling complexity and performance. The next step is products that are identical on the first and hundredth build.

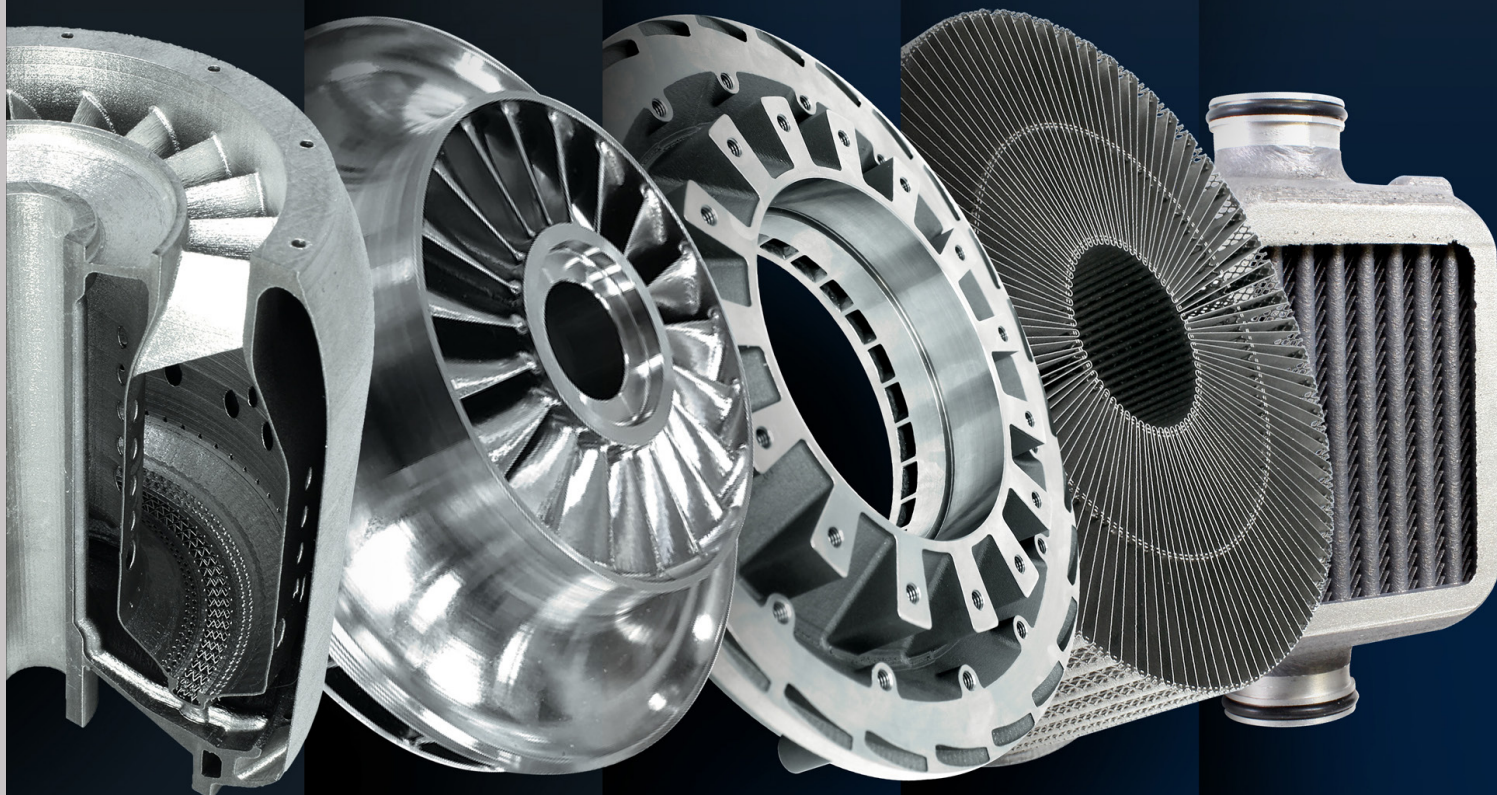


Image 1. A variety of complex industrial parts produced via additive manufacturing. Many features can now be 3D printed in a next-generation AM system with intricate, nearly impossible-to-make zero-degree overhanging surfaces that most current AM machines cannot reproduce without extensive support structures. Image courtesy VELO3D.

Pre-build calibration is evolving

The standards and methods of pre-build calibration for metal AM are evolving. NASA, ASTM, SAE, AWS, and API, among others, continue to refine their requirements to reflect the increasing capabilities of the machines themselves to observe their own build performance. However, NASA guideline MFSC-SPEC-3717 (written in 2017) states that “calibration is effective only when maintained continuously. For pragmatic reasons, confirming calibration is not feasible on a pre-build basis. This time-based calibration interval [at least every 90 days] is set as a compromise between production efficiency and process assurance.”

This compromise is one that needs to be mitigated for AM to be considered mature. As machinists, welders and casters know, many processes must be monitored in as close to real-time as possible. Not in days or weeks; too much is at stake. Yield rates alone will determine whether a bid price is met and if product can ship on-time, profitably, and as a full,

not partial, order. Consistent quality dictates product safety and impacts customer value, brand identity and warranty exposure.

Manufacturers have made efforts to place cameras and sensors inside AM equipment to gain insight into what exactly is going on within the build chamber, but generally the onus is then on the user to establish thresholds and control limits for each specific parameter. These metrics are often not immediately actionable, nor do they help correlate the chamber physics as an interrelated data set. In many current machines, devices have been added onto an existing AM architecture; tradeoffs can abound in their placement and usefulness. While this is an initial step toward greater insight into what makes a quality, repeatable build, AM must make a further leap and marry data science to material science. A modern AM system is capable of burying the user in data, but this has not had a significant effect on the user’s confidence in the part quality at the end of the day.

Material and process considerations

Metal powder feedstock for 3D printing is widely produced and generally very well characterized before reaching the printer. There are a number of ways suppliers create powder. Atomization (generally via gas or plasma methods) provides high-purity, spherical material of predictable size and layering performance. Extracted from wire, bar, or ingot metal stock, many proven and certified metals have been developed for AM, along with custom, super-alloys designed to meet the requirements of a specific application, say for oil & gas or aerospace, with select corrosion or strength characteristics. Keeping a diversified supply chain of reliable suppliers is always a sound idea. Powder suppliers provide a stable element in the AM quality movement that closely resembles traditional manufacturing.

Optics are critical to the metal AM micro-welding process. Most engineers are now familiar with the micron-scale of the powder layers involved, each literally welded onto the next. Systems of one-to-four lasers fuse metals with extreme precision; these must be perfectly aligned, directed to the right place and at the proper speeds to create the precision thickness and consequent metallurgy necessary for a quality part.

Challenging part geometries and wall angles and heights make calibration even more important. Rough surfaces and porosity can be an outcome of poor process-design set-ups for the build, but also of poor optical settings. Again, the standard today is a 90-day calibration of AM machine optics, often done by placing an anodized aluminum plate (or thermal paper) in the build chamber set to a very precise height to provide comparison metrics. Lines are burned into the plate and inspected via an optical Coordinate Measuring Machine (CMM). This is a time-consuming, manual, often-iterative process that can generate its own errors. This extends the scheduled

downtime, something no shop floor or service bureau wants for its most expensive equipment.

As found in other manufacturing-process sectors, the AM industry is moving toward more real-time test solutions—with the most advanced machines available today able to automate the collection of a variety of metrics in the pre-build stage, ranging from beam stability, laser alignment and focus to atmospherics and powder bed statistics. This allows the establishment of control limits that guide each aspect of system performance and part creation. It also provides for the most advanced in-situ, real-time metrology environment in the industry.

Power-bed control is just as integral to part quality as laser-beam accuracy. Thickness and uniformity of the powder bed allow properly calibrated lasers to create melts that avoid porosity, excess vaporization and mechanical properties that are not in spec.

The recoater systems that put down each successive layer of powder need to be calibrated as well. Currently, the industry recommendation for these is every 180 days. If that timeline is followed, much can go wrong in the thousands of layers put down in even the smallest of parts. Incumbent AM systems do not yet have a quantitative means of actively monitoring

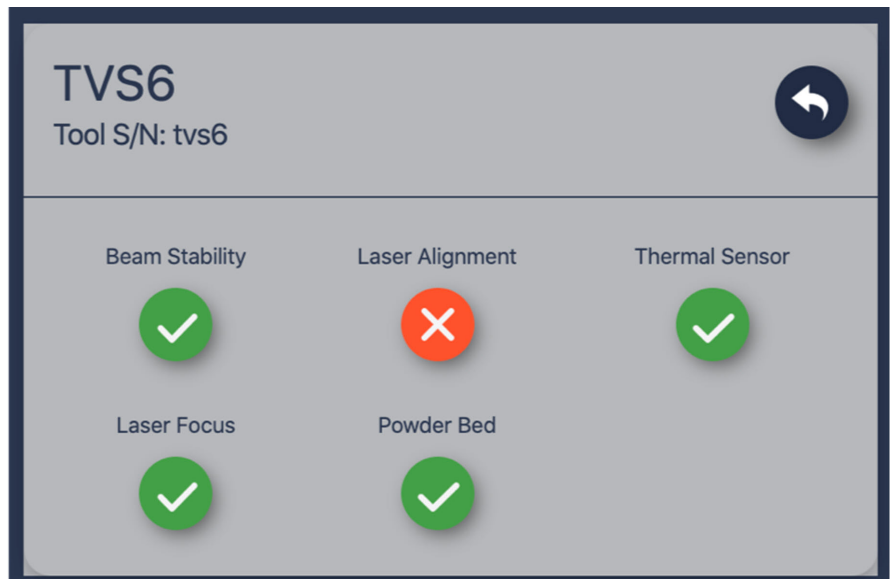


Image 2. Machine health in a VELO3D Sapphire system can be checked via a single click to ensure powder bed quality, sensors, and optics are calibrated and in optimal condition, and will not compromise part quality. Image courtesy VELO3D.

the effects of recoater damage or improper powder dispensing.

Post-build inspection of parts has become more of a priority, either via dye-penetrant testing for potential crack initiation in fatigue-critical applications, CT-scans for porosity and other flaws, or destructive testing. Full inspection is the norm with much of the

current AM equipment, although the desire is to be able to move to batch inspections. The majority of data analysis is used to validate and determine parameter settings for lasers, powder beds, feeds and other operations after the product is made, not during the critical manufacturing process.

The latest systems, however,

include not only melt pool metrology, but also height mapping that surveys each layer of the build in-progress against the position of the bed, as well as in-situ checks of calibrations and performance. All of this data is captured in a comprehensive build report for traceable quality.

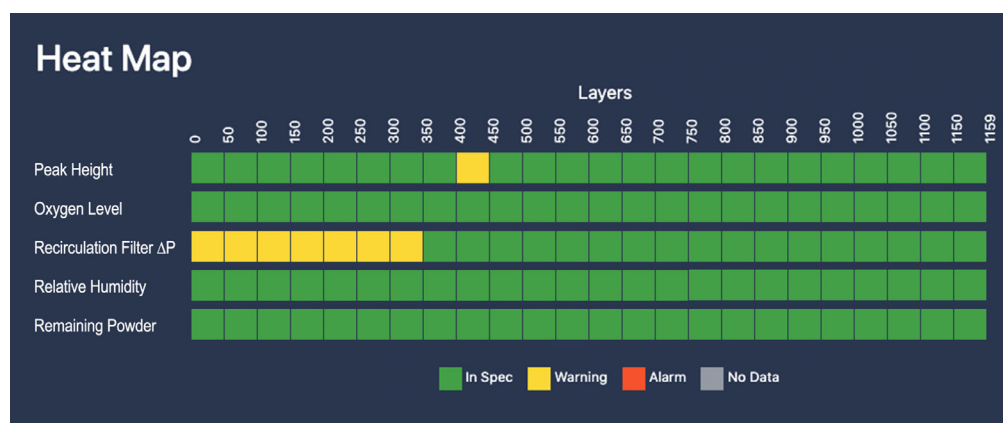
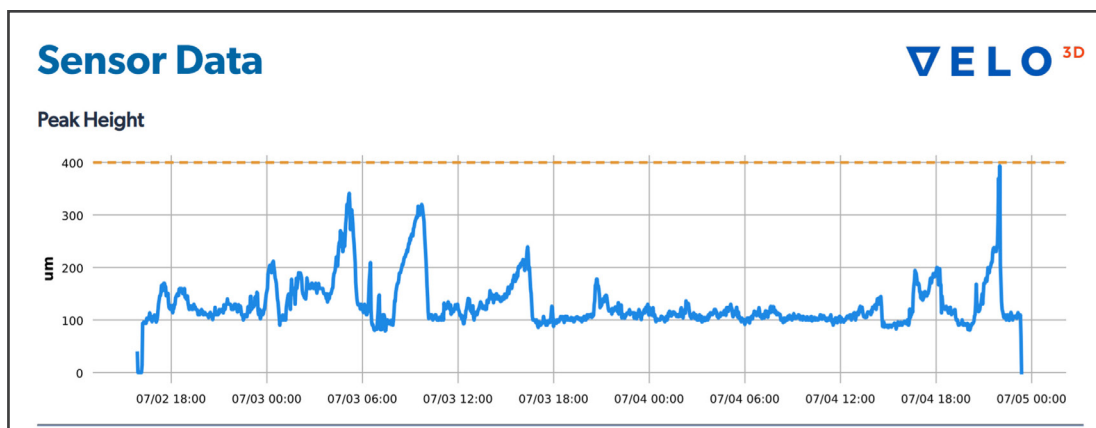


Image 3. Before and during a build, the Assure quality control system validates that critical parameters stay within control limits, ensuring high quality parts. Clicking on individual squares reveals details on the underlying event. Image courtesy VELO3D.

Image 4. The Assure system tracks whether the build is showing any signs of unwanted protrusions; crossing the warning threshold will alert the user. Image courtesy VELO3D.



The relationship between calibration and quality

There are many types of additive or 3D printing systems in the world. They use materials from metal to plastic to composites to concrete. All have performance objectives and tolerance limits that must be satisfied in order to meet quality requirements for safety and/or market acceptance. Advanced metal Laser Powder Bed Fusion (LPBF) machines are arguably one of the most complex and dynamic of these systems due to the nature of the materials involved, the stresses induced by welding, the high operating temperatures and certain metals' sensitivities to environmental factors.

LPBF is becoming key to expanding industrial applications in nearly every market that uses metals—all-important in mission-critical applications such as space, defense and aviation, medical and oil & gas. What's more, on-demand, direct-part replacement in small lots for Maintenance, Repair and Operations (MRO) has the potential to determine the economic health of whole industries, as casting and tooling suffer from

restrictive investment barriers outside of full production. All these industries are dependent on parts of certified quality—which is where opportunity and actuality intersect.

As AM breaks through with new paradigms in innovation and performance, provable quality of individual parts is critical. This can only be achieved through a vigorous combination of data acquisition and applied material science. That is, sensors, cameras and software for capturing, measuring and monitoring quality metrics that can

zero in on any moment and aspect of production, report that data and synthesize the outputs for insights into continuous process improvement.

Derived from lessons learned from the highly exacting semiconductor industry, those calibration benchmarks for AM are now being met and refined by the most advanced 3D-printing systems. In terms of quality, function and volume production, this should be very encouraging news for those seeking certified AM product solutions.

ABOUT THE AUTHOR



Zach Murphree, Ph.D. is [VELO3D](#)'s VP of Technical Partnerships. His background includes engineering roles for energy companies, where he was in charge of introducing metal additive manufacturing technology to a Fortune 500 energy company. He earned Bachelor of Science and Ph.D degrees in Aerospace Engineering from the University of Texas and has been granted more than 35 patents.

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Possible powder for production

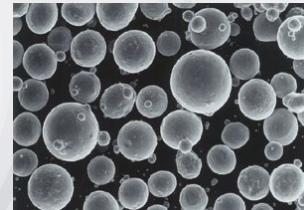
- CP Titanium
- Ti-6Al-4V, Ti-6Al-4V ELI
- Trially produced other alloys (e.g. Ti-Al Alloys, Ti-6Al-7Nb)

Markets & Applications

- Additive Manufacturing (AM)
- Metal powder Injection Molding (MIM)
- Hot Isostatic Pressing (HIP)
- Others



Appearance



OSAKA Titanium technologies Co.,Ltd.

URL <https://www.osaka-ti.co.jp/>

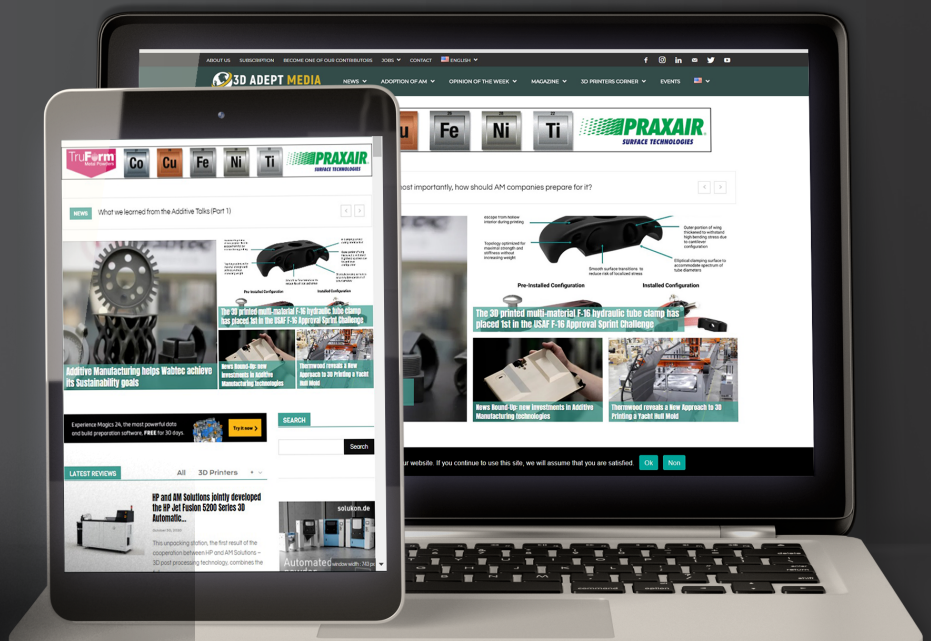
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Throwback to the company's journey in 2020 and outlooks for 2021.

Everyone knows about New Year's resolutions; those objectives we set ourselves and promise ourselves to keep. While for most individuals, the overwhelming odds are that they ditched those resolutions about a month later after the beginning of the year, things are different for companies that do not even talk about "resolutions" but "strategic goals/plans" to grow.

Like every company, [ULT AG](#) set itself strategic goals at the beginning of the year but 2020 had a different plan for the team.

"Just like every year, we had a strategic planning that highlighted key areas where we should focus our expertise. Our planning helps us determine what kind of industry we want to serve more, what kind of branches and where we want to grow. The ultimate goal remains to grow the company further. This year, we wanted to focus our role and position in the additive manufacturing industry as market leaders in the gas cleaning for Selective Laser Melting," **Alexander Jakschik**, Managing Board at ULT AG states from the outset.

"Another pillar of growth was our [network AMP+](#)." [As a reminder, AMP+ was officially launched last year at Formnext 2019. Made up of [Assonic Dorstener Siebtechnik GmbH](#), [Solukon Maschinenbau GmbH](#) and [ULT AG](#), the network helps operators of SLM technology to develop efficient manufacturing practices while addressing issues related to powder processing and handling.]

"Together with Assonic and Solukon, we wanted to push our capabilities forward in order to build a complete end-to-end solution for the depowdering, sieving and cleaning conditions."

Obviously, for our business segment, we wanted to develop new products for extraction and filtration, as well as air drying solutions.

Lastly, another key goal was to optimize and digitize our internal processes. In this vein, we have installed an ERP system – Enterprise Resource Planning – to digitalize our processes. To date, not only has the company's warehouse been digitalized, but there is a wide range of digital processes that our teams needed to master", the Managing Director continues.

It's been two years that digitalization was on the company's roadmap but this year more than ever, it was crucial to accelerate this part of their activities and makes it an integral part



Alexander Jakschik,
Managing Director/CSO at ULT AG

of their enterprise culture. This has facilitated both the work internally but also with customers.

Furthermore, the teams should not only master the new internal digital processes, they should also adapt to a new way of working – remotely. Let's note that this new way of working remotely was valid for various teams except from operators that build the machines.

"Only a few people needed to work remotely. For a company of our size and our field, it's very important to have the teams in-house to ensure real-time production planning and other requirements that cannot be performed from home office", the CSO clarifies.

ULT had therefore a roadmap of well-defined strategic points to achieve throughout this year. Given the unexpected sanitary crisis, some of them have been accelerated while others have been redefined.

"NEVER LET A GOOD CRISIS GO TO WASTE"

Although the full effects of economic and structural damage caused by COVID-19 have yet to be seen, ULT AG is not one to sit back and wait for the storm to pass. As a matter of fact, Jakschik strongly believes that one should *"never*



FOCUS On You Series

let a good crisis go to waste" (Winston Churchill). In this vein, the company's first actions were to look for a way to bring its contribution to flatten the curve of this pandemic.

"Like many companies, we did not operate at 100% during the peak of the pandemic. We used this chance to push the integration of our ERP system within our processes forward. It was an opportune time to launch it, to make amendments and to improve what needed to be improved. We also launched two new product lines. These products aim to ensure safety conditions by cleaning the air from the virus in public areas including schools, fitness centers, big office spaces and more. Named JakAir and SASOO, the new products enable to help fight viruses like Coronavirus by purifying the air", he explains.

As far as additive manufacturing activities are concerned, the company's representative admits that they encountered similar issues faced by other AM technologies providers. In

these times, **exchange with customers and discuss technical issues** can easily become complicated when engineers are working from home.

Nonetheless, this was the right time for the ULT team to focus their efforts on R&D activities and "develop new products that would meet customers' problems of tomorrow" – as per the words of **Jakschik**.

"In our gas cleaning systems designed for Additive Manufacturing for instance, we have further developed features that enhance easiness of use, safety as well as features which make it possible to reuse powders," he outlines.

If it is more than clear now, that ULT did not let this crisis "go to waste", it is worth noting that the company has had to learn the hard way to be flexible, to adapt to changing conditions in a volatile market, to rely on and strengthen its network – in a nutshell, to be more agile.

"It's difficult to share expectations after such an

extraordinary year"

One thing is certain, air technology solutions have proved out their capabilities in AM production environments; capabilities that have been confirmed beyond manufacturing environments – thanks to the Coronavirus pandemic.

However, there is still a long road to go and as of today, it's difficult to share clear expectations of what ULT's plans will be for 2021. Nevertheless, the Managing Director remains optimistic about the developments of the AM market and the way ULT intends to improve it:

"We have been working on the launch of a new dehumidification equipment, a new extraction filtration machine which also focuses on highly flammable particles found in AM production environments and for our OEMs that use SLM process, we have developed new features for their AM processes. We will keep a high focus on AM", he concludes.

A Guide to Metal 3D Printed Surface Finish



Words of Matt Sand, President of 3DEO



The nature of a surface is defined by three characteristics: lay, surface roughness, and waviness. It comprises the small, local deviations of a surface from the perfectly flat ideal, or a true plane.

Recently, additive manufacturers have been addressing surface finishes and have seen remarkable results. Some metal 3D printing companies, like 3DEO, can achieve a surface roughness of sub-10 μin (0.3 μm) Ra with the likes of polishing, black nitriding, bead blasting, and a few other options. Let's dive more into surface finishes with additive manufacturing.

SURFACE ROUGHNESS

Surface roughness is a measure of the variance in a part's surface topology. Roughness can affect part aesthetics (e.g. shiny or matte) and mechanical behavior like crack initiation, wear resistance, fatigue life, marine, sealing, bearing, and fluid dynamics.

The rougher the surfaces in an integrated dynamic machine, the less quietly, efficiently, and safely it will operate.

Reducing roughness, or friction, is critical in mechanical parts like pistons, bearings, and seal surfaces where too much contact between moving surfaces can lead to rapid wear and tear. Specifications may differ by case, but the smoothness required of an

end-use part can be an important factor in costing it. Surface roughness analysis includes the use of parameters to inspect and determine whether the part manufactured meets quality control standards. This helps manufacturers and designers quantify the roughness of the surface finish they select.

MEASURING SURFACE ROUGHNESS

A surface's profile is measured using a profilometer which detects and records a surface's step, curvature, and flatness. This data is then used to calculate the roughness of the surface, typically using one of the parameters below.

Ra - Roughness Average

Ra is the arithmetic average

of surface heights measured across an entire surface. Simply put, it's the average height of the microscopic peaks and valleys on any given surface.

**This is most commonly used in North America.*

Rz - Mean Roughness Depth

Rz is calculated by measuring and averaging the vertical distances from the highest peak to the lowest valley within five sampling lengths.

**This is most commonly used in Europe.*

RMS - Root Mean Square

RMS is calculated as the Root Mean Square of a surface's measured microscopic peaks and valleys.



SURFACE FINISH OPTIONS IN METAL 3D PRINTING

Metal 3D printing is quickly making a name for itself as an up-and-coming manufacturing technology. Rather than manufacturing parts conventionally through MIM or CNC, metal 3D printers build parts layer-by-layer to produce complete objects. Shifting from traditional manufacturing to metal 3D printing brings a variety of advantages, including product development

flexibility, design freedom, and low-supply chain risk. While these are significant advantages, surface finish has historically been a difficult challenge for end use applications, particularly by the finishes yielded in the as-printed state. As such, it makes post-processing a big opportunity for high volume 3D printers in the long run.

While metal 3D printing brings with it a host of

surface finishing options, the “right” finish depends on the part’s application.


Since each case is different, understanding surface finishes helps design and engineering teams grasp the costs and benefits associated with bringing the most suitable finish to the printed parts. 3DEO offers options for almost every use case and has production parts in a wide variety of industries today.

DIFFERENT METAL SURFACE FINISH PROCESSES

There are five main categories of surface finishing processes, each of which deliver different aesthetic, feel, and part properties.

1. Standard finish – Parts are “as sintered” out of the standard 3D printing process
2. Undefined cutting edge finish – Abrasive blasting, vibratory finishing
3. Chemical additive finish – Isotropic superfinishing, vibratory finishing
4. Electric power finish – Electropolishing, metal DryLyte
5. Solidification by plastic deformation – Shot peening

Here are 7 finishing processes expanded on with more details.

Bead Blasting Finish – Finishing process to smooth surface without affecting tolerances. MIM-like surface finish, great for non-reflective applications, 32–64 μin (0.8–1.6 μm) Ra surface roughness.	
Vibratory Finish – Machining process with an undefined cutting edge. The goal is to improve surface quality for small parts. This is done by rounding edges, smoothing processes, and grinding.	
Polished Finish – Mirror finish with a unique production polishing process. Ideal for aesthetic and functional requirements, 10 μin (0.3 μm) Ra surface roughness.	
Polished Finish – Mirror finish with a unique production polishing process. Ideal for aesthetic and functional requirements, 10 μin (0.3 μm) Ra surface roughness.	
Centrifugal Finish – Fully automated surface finishing which deburrs and polishes large metal parts.	
Black Nitride Finish – Chemical hardening of steel that produces a black finish. Harder, more durable surface quality. Ideal for applications requiring a black finish.	
Shot Peening Finish – The goal of shot peening is to strengthen the surface and solidify it through plastic deformation, thus modifying the mechanical properties of the surface.	
As-Printed Finish – Surface finish in the “as printed” state with no secondary ops. Includes a matte finish comparable to investment casting with 100 μin (2.5 μm) Ra surface roughness. The surface can be polished to a glossier finish with some simple carbide tooling.	

3DEO AND SURFACE FINISH

As a metal 3D printing company focused on supplying small, complex stainless steel components to customers in the medical, defense, aerospace, and industrial equipment markets, 3DEO realizes the importance of surface finish. They offer polished finish, bead blasting, black nitride, electroless nickel, cerakote, and matte finish. Utilizing the company’s breakthrough Intelligent Layering® technology, part properties exceed the high industry benchmark MPIF Standard 35 while achieving tight tolerances and a superior surface finish.



Rough surface finish metal 3D printing

3DEO’s 17-4 PH Stainless Steel Material Specifications in the As-Printed State

- Relative Density: 99.5%
- As Printed Surface Roughness: 100–120 μin (2.5–3.1 μm) Ra
- Hardness: 34–42 HRC

CONCLUSION

The reasons for using a surface finish apply both to 3D-printed parts and parts manufactured with traditional methods. Regardless, all aspects of your part, such as the component’s material, shape, thickness, and weight, its planned use, and the environment in which it will be used, must be considered before deciding on the best surface finishing process. Of course, different finishing options come with different costs, but ultimately, the decision on which option to use depends on the part’s application and performance requirement.



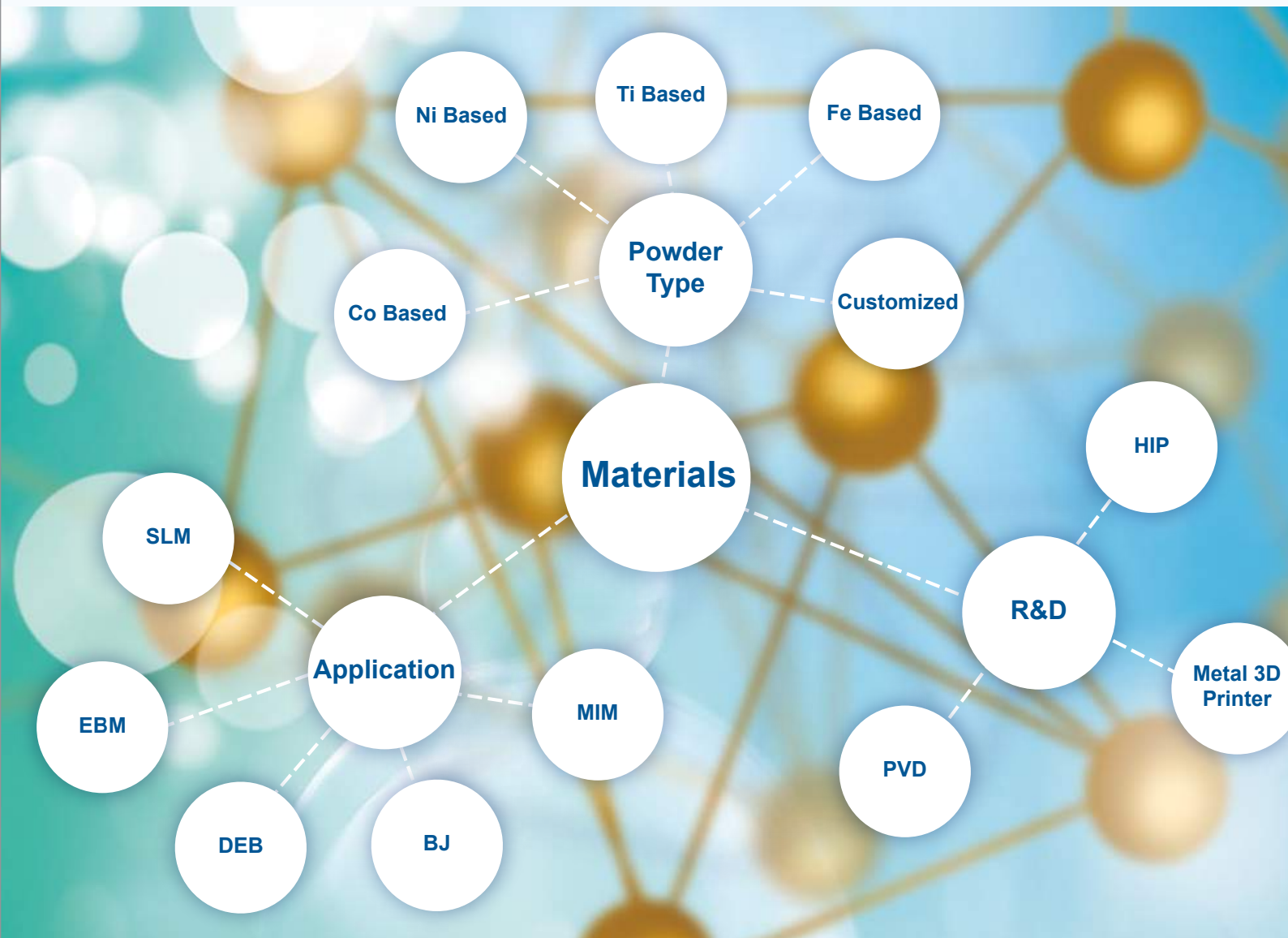
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MEET OSSBERGER GMBH & CO. KG, A COMPANY THAT IS ON A MISSION TO AUTOMATING POST-PROCESSING OPERATIONS

Strengthening conventional cleaning business with post-processing for Additive Manufacturing.

There are several ways to enter the additive manufacturing market: while big players mostly decide to acquire SMEs, others follow all the steps of an entrepreneurial journey and develop their own products.

OSSBERGER GmbH & Co. KG is one of those big players that has a deep footprint in the engineering industry. However, unlike most players that belong to the same league, the company's recent entrance in the AM industry is the result of an in-house experience that outlined the necessity for a reliable post-processing equipment.

Before we delve into this point, let's mention that the family enterprise has built a solid reputation in Hydropower Technology. With over 10 000 turbines installed across the world, it's fair to say the company has been able to improve the quality of life for millions of people with eco-friendly and renewable energy.

Over time, the German machinery maker has also built up extensive expertise in Plastic Technology. Its plastics processing machines have allowed for the reduction of automotive components, saving this way, significant resources in fuel and energy consumption as well as global CO2 emissions.

The third business unit Surface Technology manufactures cleaning systems that work without chemical agents leads to less waste and less environmental impact, thus saving energy and providing a cleaner, eco-friendlier system than conventional installations. This technology, which also uses vibration at its core, has been used worldwide for



Markus Garscha - Business Unit Director

17 years.

Additive manufacturing comes into play into the company's activities in 2019 when Surface Technology developed the OSSBERGER FINISH machine platform.

The company was using a powder-bed technology for tooling and other machine components. They quickly realized the intense work required by post-processing.

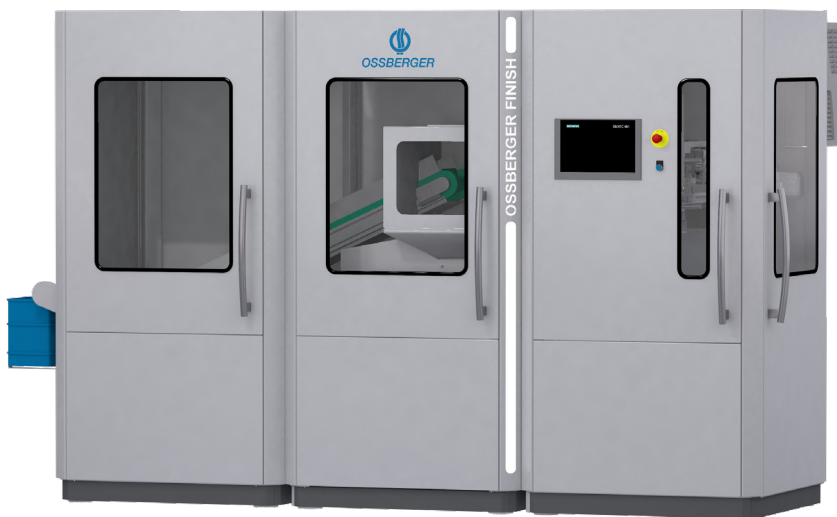
Rather than investing into an external post-processing system, they leveraged their expertise in machinery and surface technology to develop a post-processing solution that marked the debuts of their AM activities.

"We have produced tools with SLS technology. When we came across the issue of post-processing for AM, we've

seen a perfect match of our vibration technology and the dry-cleaning requirements of parts produced in powder bed technology. So, we worked on a solution that we exhibited at

Formnext 2019 for the first time. During the show, we met EOS GmbH and we continue the product development of the machine with them this year. With our OSSBERGER FINISH

Platform, we provide scalable automatable solutions for unpacking, de-powdering and cleaning of powder-bed printed parts”, **Markus Garscha**, Business Unit Director, explained.



The OSSBERGER FINISH Machine Platform

“Unpacking, de-powdering and cleaning”, these are the key bottlenecks in using additive manufacturing (AM) as an industrial process. Adding automation to these tasks is giving the opportunity to operators to enable viable use of AM in their production environment.

The only thing is that, post-processing of 3D printed components can be quite complex. Metal 3D printed parts for instance do not require the same equipment than polymer 3D printed parts which require a more specific equipment, not to mention that some metal 3D printing processes sometimes require various post-processing solutions.

OSSBERGER GmbH has decided to focus on powder-bed based AM technologies to develop its equipment. OSSBERGER FINISH's **patent-pending technology** uses **Modulated Vibrations and Vacuum Airflow**. The Modular machine platform can be used without

compressed air and any blasting material. It has been qualified by EOS and best suits the post-processing of parts with fine details.

“Our machines can be integrated in a fully automated smart factory environment: e.g. an autonomous print container handling system or connected to an automated powder management system” Garscha pointed out.

There are still many things to discover about OSSBERGER GmbH & Co. KG, but it is great to know that the company is already part of the short list of players that can scale and automate post-processing operations.

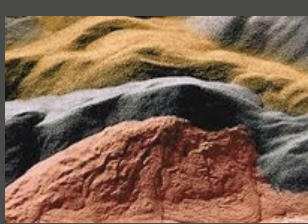
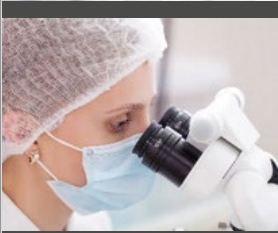
“We would like to bring our many years of experience in the line-integrated and automated cleaning of machined parts into the world of additive manufacturing and hope to offer smart solutions to potential customers”, the business unit director concludes.



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CONTEXT

**CHINA AND DESKTOP 3D PRINTER
MARKETS LEAD THE WAY FOR
LONGER U-SHAPED RECOVERY**

The global 3D printing market saw a +24% second quarter sequential rebound in domestic unit shipments of Industrial-class printers in China, and a global surge of +68% in Personal desktop printer shipments. These trends give hope to an otherwise depressed 3D printer market that saw hardware revenues fall by -27% from a year ago.

Shipments of high-end and mid-range 3D printers (that is, those in the \$100K+ Industrial and \$20K-\$100K Design price classes) stalled significantly as businesses in the West put capital expenditures on hold and large parts of key industries were still paused. However, demand for Professional price-class printers (\$2.5K-\$20K) remained strong as people continued to work from home. Hobby-level Personal printers (<\$2.5K) were also in demand and shipments of these are no longer hampered by supply-chain limitations now that production in China has resumed. Aggregate revenues from new printer shipments rose marginally from Q1 to Q2 (by +5%) but were down -27% from Q2 2019. Industrial printer sales accounted for 62% of global finished-good revenues in the period.

As China came back on-line in Q2 2020, so too did demand for Industrial printers. Many Chinese vendors reported seeing shipments not just rise compared to Q1 but also witnessed even higher shipment rates than a year ago. While overall shipments improved slightly from Q1 to Q2 thanks mostly to a bounce back in China, they remained very low in Western markets resulting in total shipments in the class down -38% from a year ago.

This portion of the market was already facing negative headwinds at the end of 2019, prior to the onset of the pandemic, but vendors are noting accelerated interest following the important role that 3D printing played in the heart of pandemic shutdowns.

Almost all non-Chinese top 20 Industrial printer companies saw sizable year-on-year declines in the number of units shipped – with the notable exception of metal machine producer SLM Solutions. China's UnionTech, Farsoon and HBD saw not only a sequential rise in shipments but also saw shipment totals actually greater than last year. Germany's SLM Solutions has come back nicely from their reset year last year and were shipping against orders placed prior to the onset of the pandemic. While some vendors reported a slight sequential rebound in shipments, most saw a double-digit year-on-year drop in shipments from a year ago.

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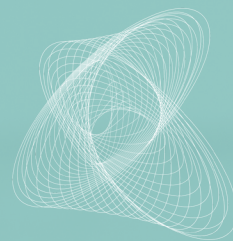
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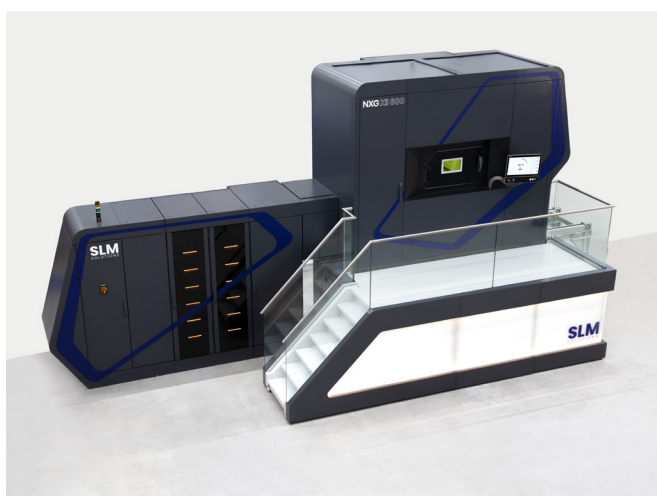
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NEWS

ROUND UP

The past two months have been marked by so many interesting applications, product launches and fundings. We have summarized on these pages some of the announcements that raised the most our online visitors' attention. You just need to click on each title to access the article on the online media!

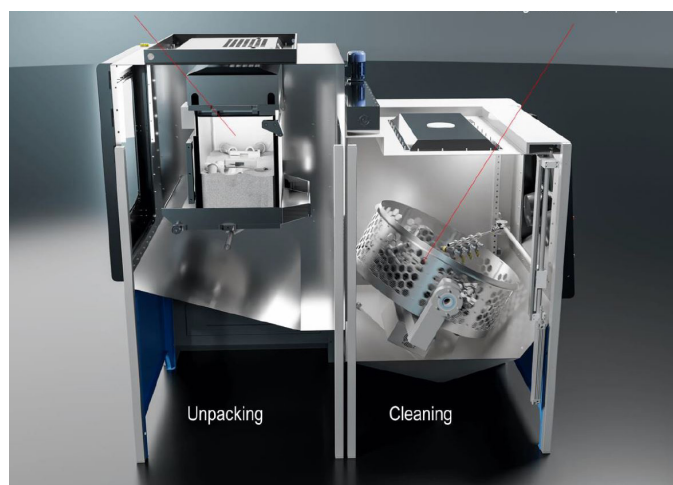


SLM Solutions reaches new heights in industrial AM with newly launched 12-Laser Machine

Quad laser AM systems have long been considered as the standard in Additive Manufacturing. With the launch of the NXG XII 600, SLM Solutions achieves a milestone in the use of advanced manufacturing technologies.

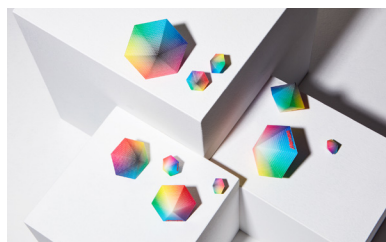
Automated powder removal for polymer 3D printed parts: process and main features of Solukon's system

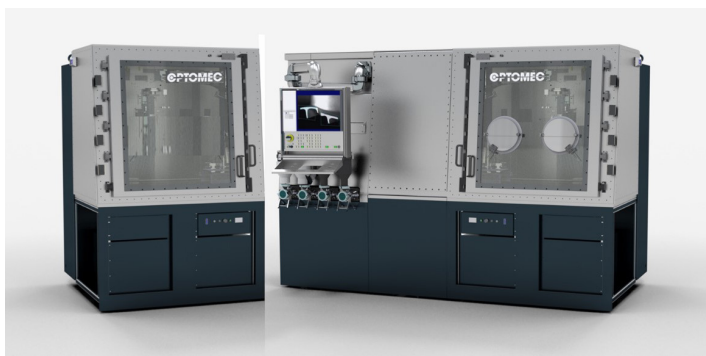
“With the launch of the SFP770, we bring the benefit of years of experience in the depowdering and unpacking of metal AM parts to polymer AM applications”, Andreas Hartmann, Technical Director and Co-Founder of Solukon comments.



Mimaki's New Compact Full Colour UV Inkjet 3D Printer represents a step forward for detailing and post-processing

Named Mimaki 3DUJ-2207, the 3D printer is the second machine brought to the market this year by the colour 3D printing specialist, the other one being its Gel Dispensing Printing technology-based 3D printer.



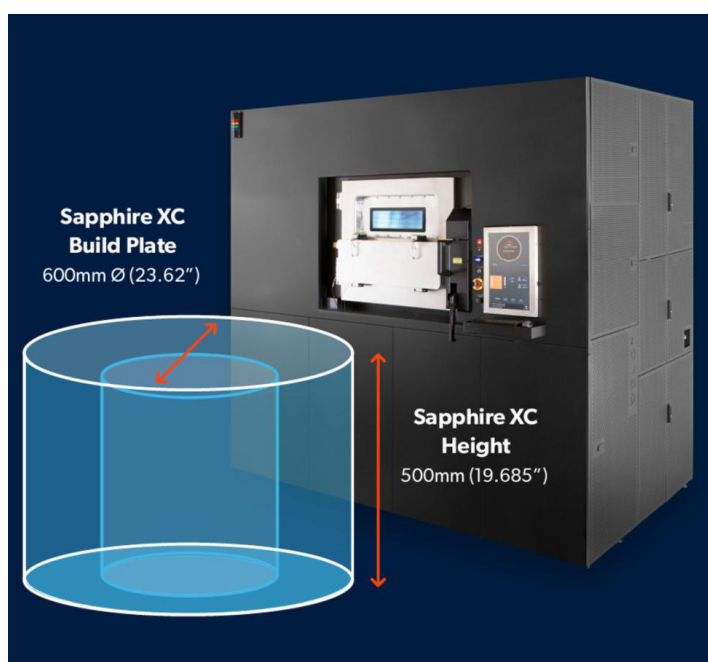


Optomec adds two compact metal 3D printers to its portfolio

The CS250 machine and the HC-TBR machine aim to provide value in terms functionality, performance, flexibility, and pricing.

Interspectral launches a new visualization software for metal additive manufacturing

Named AM Explorer, the new tool is the result of a collaboration with Siemens Energy AB, a collaboration both companies announced last year as a strategic action to accelerate industrialization within Siemens Energy.



New Sapphire® XC 3D Metal Printer features "Extra Capacity" for production

More on VELO3D's new large format metal 3D printer.



PERI builds another 3D printed building in Germany: this time, it is a three-floor apartment building in Bavaria

Last month, we reported on the first 3D-printed residential building in Beckum, North Rhine-Westphalia (Germany). The two-storey detached house with approx. 80 sqm of living space per floor was entirely 3D printed.



Ultimaker 2+ Connect combines the strengths of single extrusion with digital workflow

Ultimaker launches the Ultimaker 2+ Connect, an entire solution that enables to leverage the Ultimaker ecosystem in a solid digital workflow.

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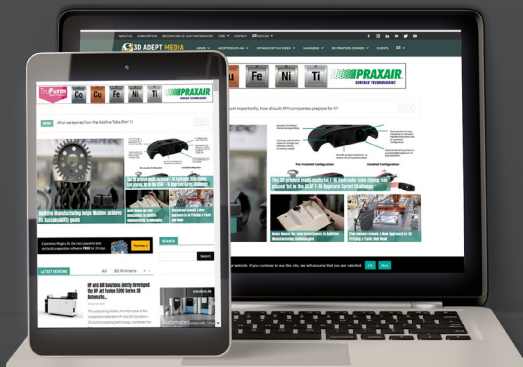
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