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10 Years of Lithoz: Manufacturing the Future

Lithoz was founded in 2011 as spin-off of Vienna University of Technology/AT and specialises in the development and production of materials and Additive Manufacturing (AM) systems for 3D-printing high-performance ceramics. With interdisciplinary collaboration between specialists from mechanical engineering, process engineering and chemistry, Lithoz has established a manufacturing system with which ceramics can be manufactured industrially. The Lithoz 3D-printers, which are based on Lithography-based Ceramic Manufacturing (LCM) technology, enable reliable series production of additive-manufactured ceramics.

Dr Johannes Homa (JH), CEO at Lithoz GmbH, gave us an insight into the progress made in this digital technology after ten years.

CA: How have you managed in these “Corona times” to further establish the LCM process on the market?

JH: In Austria, we have had to struggle with two lockdowns. But with a segregated shift system and strict hygiene measures, we have managed to maintain production and customer service without interruption. Naturally, we are availing ourselves of virtual tools for customer and market communications. We have done a lot of webinars, which are now available on our website. During the first lockdown, we learned a great deal. Corona has, however, influenced market needs, too.

CA: What changes have you noticed in recent months here?

JH: On the one hand, projects have been shelved. Large groups of companies in particular have provisionally postponed R&D projects or investments. But there have been other, certainly very positive effects.

Especially in SMEs, there have been efforts to find new approaches. Tasks like adapting component concepts to 3D-printing have been taken in hand. Insofar, the “seeds” that we have previously sown with our consulting services have germinated. At university level, we are exceptionally well represented today. Here, investment is still made according to the set project budgets.

As travel is very limited, the time is used in the companies for “introspection” and to question established routines. That is fruitful ground to get innovations up and running. We can profit from this.



Fig. 1
Dr Johannes Homa, CEO Lithoz GmbH

CA: Digital manufacturing processes are on the rise. What does that mean for Additive Manufacturing (AM) in ceramics?



Fig. 2
CeraFab Multi 2M30

JH: Corona is certainly accelerating the digitalization of process chains. 3D-printing has arrived in industrial manufacturing. Already today, lot sizes of 5000–20 000 units per year are additive-manufactured in ceramics. That is no longer just prototyping. The downstream processes must, of course, harmoniously be adapted to this.



Fig. 3
AM multi-material component made of ZTA and alumina

For the mechanical engineering from our company it also means that it must have proven itself as being precisely reproducible in respect of dimensional tolerance and generally the quality in series manufacturing. Sometimes, the term machine capability is used for industrial processes. We can guarantee that with the further development of our systems and have proven this.

The advantage of 3D-printing is that the component design and accordingly the “tool” are digital. Accordingly, it is possible to react at low cost, quickly and in an uncomplicated way to the geometric adjustments that are often necessary over the lifecycle of a ceramic component.

CA: You have steadily expanded the range of products in respect of the materials to be processed in LCM technology. What were the “drivers”? Where will it be difficult to apply these processes?

JH: Our approach has always been to adjust the technology to the powders, because they have a crucial influence on the component properties. With this approach, we do, of course, reach our limits. For this reason, we are in the process of developing complementary processes for stereolithography with which large components can be built and coarse powders processed. We want to address industries like the semiconductors, sanitaryware, and aerospace industries, which are looking for solutions for the innovation of products, design and production chains.

CA: Can you adapt to customer-specific powder mixes?

JH: Of course, they are ultimately an essential part of the know-how of a ceramics manufacturer. In 2020, we completed almost 100 batch developments. On the one hand, to respond to such enquiries, but also to expand the range of materials for the LCM process. Our goal is to be able to process as many powders as possible.

CA: Does that apply to metal powders, too?

JH: Yes, from our research groups, Incus was spun off as an independent company in 2019. Incus specialises in processing metal powders in the LMM process (Lithography-based Metal Manufacturing).

CA: In specialist fields of application, are you working with partners that have manufacturing and market know-how?

JH: That’s essential although we have assigned product managers and developers to specialist aspects like, for example, dental or casting cores. We not only need the feedback from our customers, but through them we also need input in respect of the entire manufacturing chain as well as market requirements which in turn are seen by their customers.

CA: What advantages do those companies that engaged early with AM technologies in ceramics have today?

JH: They are not only the experts for the entire process chain, but also have the experience with regard to how and where in the market 3D-printed components can best be placed. Moreover, they have already trained their customers about how best a component should be designed to be able to utilise all the advantages of 3D-printing. Here, the companies are, of course, now well ahead of their competition because they have already primed the market and have a good command of the technology.

CA: What opportunities do you see for multi-material printing?

JH: Here I have learned something myself because I initially underestimated the tricky nature of the topic and classed it as an academic project.

It can't be resolved with the printing process on its own. It is necessary to work intensively on preparation of the powders and co-sintering to produce high-quality components. In 2020, we introduced the CeraFab Multi 2M30. Multi-material 3D-printing opens the door to numerous applications in areas that range from electronics (e.g. LTCC, HTCC) and embedded sensors to biomedical implants and devices, but also in aerospace, automotive and energy storage systems. FGK Glas/Keramik GmbH in Höhr-Grenzhausen/DE has also opted for this machine. It will be used in the newly created research centre for additive manufacturing, Lithoz Inc./US, too, has very good feedback from the market for this.

CA: How are you looking forward to 2021?

JH: With optimism. After the first lockdown in 2020, we started recruiting staff again. We have enquiries from com-

panies that want to get into ceramics because they want to make themselves independent of the contract manufacturing with ceramic manufacturers. That is exciting because these companies want to approach the topic from different perspectives than ceramics experts with long experience.

The topic of 3D-printing has now arrived in the mainstream and is in demand as a manufacturing method.

In addition, there are also ideas about pushing 3D-printing in replacement parts (digital storage). That could even go so far that the printer is installed in the company that needs the parts and then get the necessary files from the Cloud.

CIM and 3D-printing are interesting partners, for example, for product development and market introduction based on additive manufacturing, and then the transition to CIM for mass production. But the other way around, too, that is when series parts have to be modified quickly. Digital manufacturing technologies are on the rise, we shall be able to profit from this.

CA: Thank you for talking to us.

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