

FRANCE

3DCERAM Sinto: Process Provider for Ceramic Additive Manufacturing Opened a New Site

In October 2021, the company inaugurated a new building in Bonnac La Côte near Limoges. With 3000 m² for manufacturing machines and mixes as well as R&D work for materials and lasers plus office space and meeting rooms, the new facility sets a milestone in the history of the company. Richard Gaignon (RG), CEO and co-founder with Christophe Chaput, explained to us the advantages of this new industrial facility to provide a dedicated service for industry and universities.

CA: With your background in plant engineering, operating globally for more than 15 years, you have always stated that 3D printing has to be fit for industrial processes, not only for prototyping and research. The target was to get from lab to fab. What confirmation is there today that 3DCERAM Sinto has now achieved the level of a process provider?

RG: The motto of our strategy is and was industrialization of 3D printing. We are not only using the word, like others do, we have designed dedicated printers for this purpose – the C100 FAB for fabrication and the big C3600 ULTIMATE, which was presented at formnext 2019.

I'm not saying that we don't address the R&D market. With C100 LAB, we have a dedicated machine for laboratory and research. We have also the hybrid machine with which we can print several materials at the same time using different sizes and types of containers for the materials.

In a nutshell, it is a simple formula that counts for industry: R.o.I. With the C3600 ULTIMATE, we cannot only produce big parts. It is also a quite efficient machine to cut down cost and increase productivity. And those criteria are the most important expectations from many industrial customers: reducing the production costs per piece and increasing productivity. With the large building platform 600 mm × 600 mm × 300 mm for the 3600 ULTIMATE, we can get incredibly low costs per part and a high production rate. This substantially lowers the entry barrier for 3D printing as a production method. As a matter of fact, we are seeing so many customers who have bought machines from our competitors and become so frustrated by the small printing surface of these machines that they decide to buy our machines as soon as they have business for production.



Fig. 1
New facility in Bonnac La Côte near Limoges

We have to see what our customers have to deliver to their customers: Cost-effective prices plus short development and short delivery times. This package can be provided by 3DCERAM Sinto machines today.

It was important to develop all the services an industrial customer expects. Especially if the industrial customer is looking to scale up to mass production and has decided to integrate our technology. We do everything we can to make it easier for them. Therefore, we have established a department for after-sales service, but also developed a software program named Build-It. Meanwhile, our on-line service includes not only live demos but also the possibility to install machines with the support of augmented reality headsets.



Fig. 2
Range of 3DCERAM Sinto's printers

In this development, COVID-19 gave us a push. We sold machines to e.g. Russia and China, but we had no chance to send experts when the restrictions for travelling were imposed. This new situation stopped all internal discussions by 3DCERAM Sinto on the pros and cons of augmented reality headsets as it became our only chance to provide customer service on time. Abroad, we now have a strong and extended network of resellers worldwide who can also provide technical services with our support from France using these tools.

This period therefore presented an opportunity to meet the needs, which we know well, of manufacturers who wish to adopt 3D printing. Industrial customers mainly want to use their own ceramic materials, and for that they need support to adapt those materials for 3D printing. So we have also developed dedicated training programmes for industry.

This makes sense when we refer to our positioning, which is to be a partner involved in the entire process, we provide the machines, the mixes, the software and all the services needed for 3D printing.

This is why 3DCERAM Sinto is now the privileged partner of major industrial groups, world-famous players in the chemicals, telecommunications, electronics and aerospace industries, among others, as well as research laboratories.

CA: But you also offer mixes for printing to customers.

RG: Correct. We have a selection of mixes based on oxide and non-oxide ceramics for sale. But our approach is much wider. 3DCERAM Sinto develops on demand slurries based on customer's ceramic formulas, drawing on several years of R&D in ceramics for 3D printing. Our R&D team is not only quite strong in ceramics but also includes several experts in organic chemistry to develop the optimum rheological behaviour of the materials, as this can optimize various properties e.g. green and sintered density, but also reduce time for cleaning of the parts.

CA: You have mentioned industrial customers several times, do you mean technical ceramic manufacturers?

RG: Yes and no. We do have more and more key players in the ceramic field as customers and we have also industrial customers who need ceramics but don't have the competences to make them. For them, we have created 3D-AIM which consists of three steps:



Fig. 3
CERAMAKER units in workshop

1. Analysis of the feasibility together with the customer of their requirements, definition of a risk analysis and a de-risking plan to mitigate the risk of the application in our 3D printing process.
2. Design to manufacturing based on several iteration steps to define the proper conditions for printing/debinding and sintering the parts
3. Transfer to a production partner.

3D-AIM has been developed primarily to support aerospace companies that are willing to switch to additive manufacturing for their future projects. For instance, 3DCERAM Sinto has helped companies such as Anywaves or Thrust-Me to develop their ceramic application from scratch to the part production. These parts are flying in space now – in just 18 months, the first parts ever made by 3D printing in space.

Even though 3D-AIM was developed first for aerospace application, this flexible approach can be adapted to different market segments. The project can start from a blank page to end in the production of parts, or can just target modifications to existing ceramic parts. 3D-AIM is really a tool to boost the adoption of AM in the ceramic field.

CA: Please give us some more details on the new software program.

RG: Our CERAMAKER machines were equipped from the beginning with very efficient software: CPS. But we were not quite happy with the software that can be found on the market to prepare the virtual platform. We wanted software that is very user friendly.

Therefore, 3DCERAM Sinto launched the "Build-It" software, which can also create our free-link supports with one click, or take into consideration, for instance, the shrinkage x-y-z with one click, to create a shell if you want to avoid deformation during the printing with one click. It is something that someone can do even if they aren't a CAD-software specialist.

CA: Which industry segments are adapting 3D printing as an additional shaping technology?

RG: The aerospace industry is one of them as this market is constantly seeking to optimize the performance of its equipment (satellites, measurement tools, optical instrumentation, etc.) by exploiting the properties of ceramics and imposing new challenges with a high performance/cost compromise. In this context, the products need to push

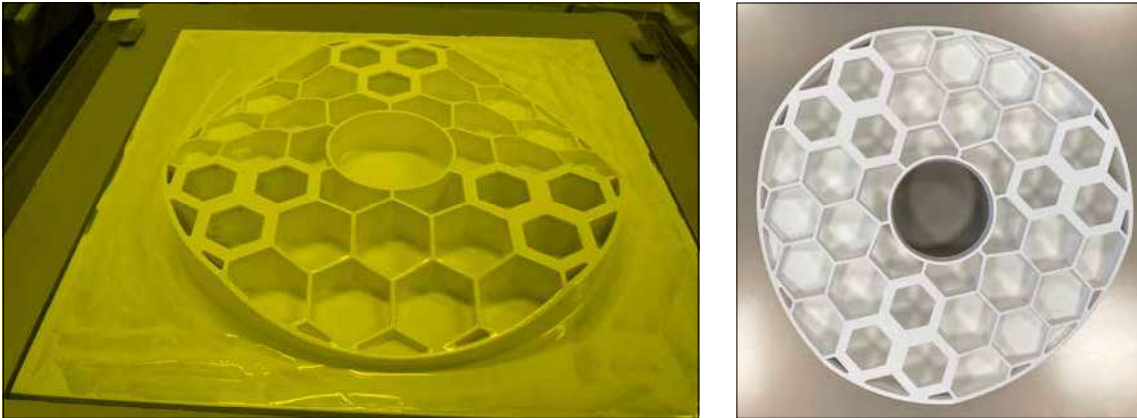


Fig. 4
Mirror of 550 mm: printed (l.) and sintered (r.)

technical boundaries and reduce development times. Therefore, we have developed 3D-AIM to complete our toolbox as a process provider.

Our printers (C100 EASY FAB, C3600 ULTIMATE), depending on production capacity requirements, are used for biomedical devices or dental applications, knowing that 3DCERAM Sinto has been a pioneer in printing parts for biomedical applications since 2005. Since that time, we have developed specific formulations for osteointegration and biocompatibility, like HAP (Hydroxyapatite) or TCP (Tricalcium Phosphate) or Alumina-Toughened Zirconia (ATZ) for medical applications.

We have had patients living with 3DCERAM Sinto implants for years. It sounds so funny when some competitor claims to be the first ... 16 years after us. To integrate 3D printing in the medical supply chain, certification is essential. Therefore, 3DCERAM Sinto has established a partnership with Gregory Nolens, expert in advanced manufacturing, management, and medical regulatory affairs, to support customers in the biomedical field to get CE or FDA approval. Again, this process provides philosophy!

A wide range of industrial applications can be added: e.g. filtering of fluids and gases, high-temperature applications, electronic insulation – and for sure plenty that we don't see today.

To give a really good service, we also need experts on board, experts who know the industrial production process and product design of ceramic parts in detail. Therefore, we are very pleased that we were able to establish a partnership for the investment casting industry with Avignon Ceramics as they are the ideal "twin" to operate as a solution provider with us in this industry segment. Avignon Ceramic has investigated and tried out different machines from competitors and they have chosen 3DCERAM Sinto as a partner! There is no better way to be recognised as a partner for industrial customers.

CA: Which additional know-how can your customers expect with this partnership?

RG: With this partnership, we are promoting a new service whose name is United 3D-Cores (U3DC) for cores. Launch-

ing U3DC, is the answer to the expectations of the players in investment casting for a partner capable of proposing a turnkey solution. Today, designs of foundry cores are becoming more and more complex.

Avignon Ceramic, supplier of investment casting for the largest aviation engine manufacturers as well as the world's leading precision foundries for over 30 years, is joining forces with us. Our aim is to provide the investment casting industry with proven solutions in both the production of 3D printed ceramic cores and to offer a complete printing solution (machine, materials and process). This new service ranges from the definition of raw materials, depending on the alloy chosen and the casting mode, to the realisation of test cores to validate the process at the foundry. 3DCERAM Sinto and Avignon Ceramic, with their respective experi-

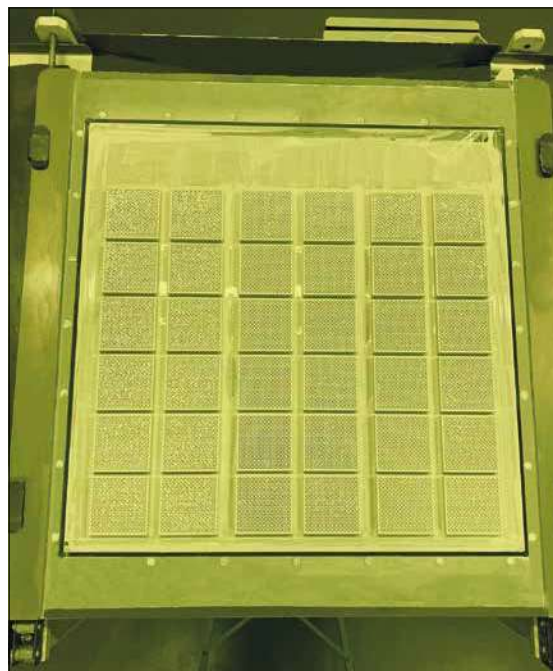


Fig. 5
Mass customisation on C3600 ULTIMATE



Fig. 6
3DCERAM Sinto at formnext 2021 (Figs.: 3DCERAM Sinto)

ence and expertise, will support customers wishing to integrate 3D printing into the various stages of the process. And they will carry out tests to integrate this new printing technology.

CA: *What is, in your view, the real added value that the new industrial site is providing?*

RG: The space for manufacture has three main advantages for our customers:

1. We can tailor the equipment to customer needs, design the right optic solution with the support of the experts in Limoges (Pole XLIM), calibrate and qualify all lasers in-house.
2. More space in-house for more R&D. I am very pleased to announce the creation of our scientific advisory board (e.g. Prof. Thierry Chartier from IRCER/FR, Prof. Jens Günster from BAM/DE), which will be a real advantage.

3. More space to organise training for our customers' employees and to step up production in line with market needs.

We have also a comfortable reserve of land for further expansion. We are ready to step into the future, get connected to the future and participate in the growth of the market.

3D printing is not only a technology but also a magnet which fits super well with mentality of the young generation. We have not only prepared the company technically to deliver turnkey solutions, we also have enlarged our team in terms of numbers and competences (link 3DCERAM Sinto inside video) and provided special training for the new personnel.

In our sales team, we have e. g. with Maxence young "talent", who has additionally taken over the responsibility for the new after-sales department. We have pinned our hopes on him to grow our business, amongst the younger generation, too. He is a ceramic engineer who has been working over eight years with us and has meanwhile absorbed 3D printing into his blood.

In short, 3DCERAM Sinto is not only based on the sole persons of Christophe Chaput and myself. It consists of a committed and dynamic team, all sharing the DNA of 3DCERAM Sinto. This gives us more strength, more reactivity and dynamism in our dealings with customers.

CA: *What role will the Sinto Group play in this future scenario?*

RG: The more the business is rolling out into the industrial world, the more important Sinto's role becomes. From the beginning, Sinto has had the credibility of an international group, with more than USD 1 billion in revenue! Sinto's reputation in different fields such as the medical, foundry, aircraft industry is excellent and helps to make the 3D technology a reality and a commodity for industrial customers. But the influence of Sinto is not only important for the business. It gives a boost to our team, which is proud to be part of a group with values and taking action to reduce waste, as well as its CO₂ impact. Being part of Sinto gives us a long-term view, which is again an asset for our customers.

CA: *Thank you for talking to us.* KS

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