

# Ceramic 3D Printing

3DMIX - CERAMAKER - SERVICES



**The leading Ceramics Additive Manufacturer**

# Opening new application fields for advanced ceramics with additive manufacturing



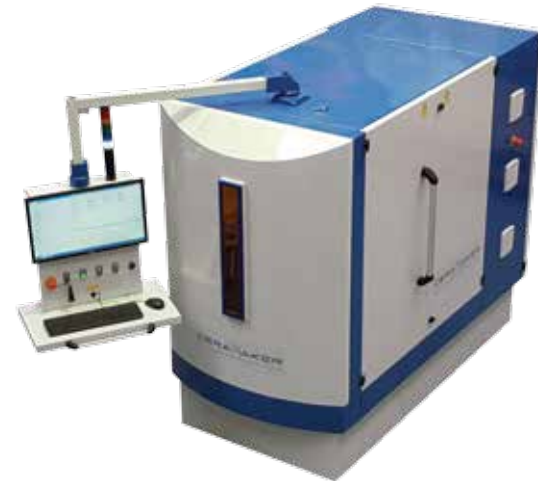
Founded in 2001 in Limoges (France), 3DCeram is directed since 2009 by Christophe Chaput and Richard Gaignon. The company built on the laser stereolithography 3D printing technology (SLA) it developed and expanded to establish ceramics in a wide range of new fields and applications.



In 2017, the arrival of Sinto Group, as a new shareholder, will boost 3DCeram's production and innovation capacity.

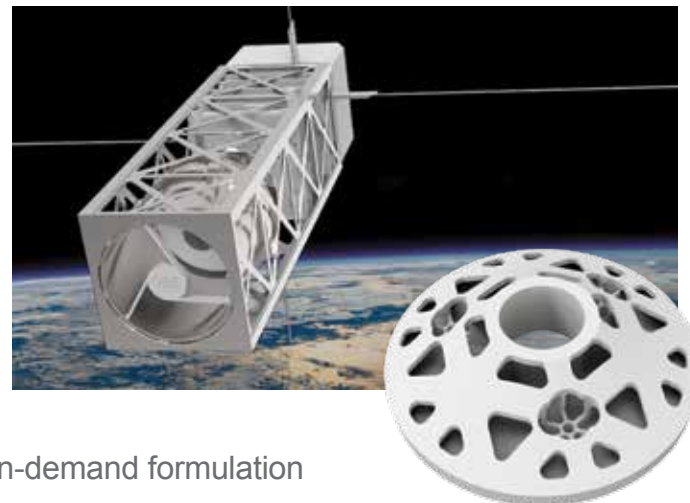
The Sinto Group was founded in 1934 and is the world's leading company in foundry equipment, committed to developing the most innovative technologies with one motto: «Giving Form and Life to Process Materials».

3DCeram provides customers with unique technological expertise in the field of 3D ceramic printing. It has been producing ceramic parts by additive manufacturing since 2005 thanks to a 3D printer that it has developed for its own needs: the CERAMAKER printer.



In 2015, 3DCERAM decided to market the CERAMAKER additive manufacturing line and related consumables, equipment and services.

Putting innovation at the heart of its development 3DCeram offers a unique set of solutions, including the OptiCeram topological optimization service and a new hybrid 3D printing line (multi-materials).



- > **3DMIX**, ceramic pastes and suspensions, on-demand formulation
- > **CERAMAKER**, additive manufacturing line : 3D printers and equipment
- > **SERVICES**, Ceramaker customers' support, topological optimization of parts and on-demand production

## PRINTING WITH QUALITY CONSUMABLES: 3DMIX

A broad selection of ceramic pastes 3DMIX ceramic pastes for 3D printers.



The team at 3DCeram, made up mainly of engineers or doctors in ceramics or organic chemistry, has developed a range of ceramic pastes and suspensions that achieve optimal printing results.

### Pastes dedicated to the CERAMAKER printers

These pastes are used every day in the 3DCeram workshop to guarantee a standard of quality that satisfies even the most demanding manufacturers.

#### Zirconia $ZrO_2$

Material with the very good mechanical properties cold, being able to be colored for applications in jewelry, excellent mechanical properties in the high temperatures, the weak thermal conductivity at room temperature, conductor in  $T > 1000^\circ C$ , great hardness, high wear resistance, low chemical reactivity, good resistance in the attacks of metals.

#### Alumina $Al_2O_3$

Basic material being useful in many applications for technical ceramics, good mechanical behavior in high temperatures, good thermal conductivity, high electric resistivity, hardness, high wear resistance, low chemical reactivity.

#### Hydroxyapatite/TCP

Material used in the biomedical applications for the manufacture of the osseous substitutes, chemical composition close to bone

### On-demand formulation

This service, intended mainly for ceramicists, consists in testing ceramics for specific applications.

- ✓ **Formulation**
- ✓ **Definition of the printing parameters**
- ✓ **Definition of the sintering parameters**

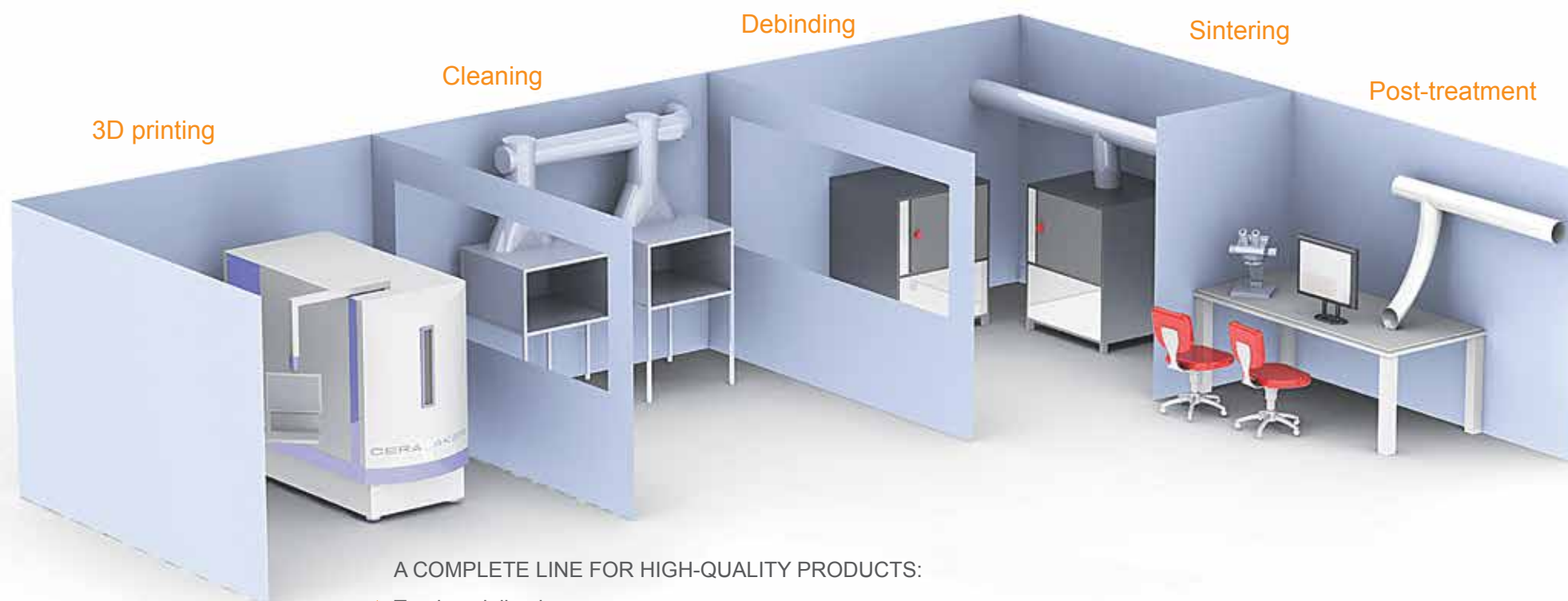




## PRODUCTION: THE CERAMAKER 3D PRINTING PRODUCTION LINE

**The flexibility of 3D printing, combined with the exceptional properties of ceramics**

3DCeram shares its expertise through its made-to-measure engineering and start-up services that will help you to make your first parts as quickly as possible.



A COMPLETE LINE FOR HIGH-QUALITY PRODUCTS:

- > Turnkey deliveries
- > Optional supply of cleaning cabins, kilns for binder removal or sintering, etc.

## 3DCeram uses 3D laser printing (SLA)

The CERAMAKER is especially well suited to the production of unique functional parts or small production runs of parts with the same properties as those made using conventional processes (machining, injection, etc.).

With its large tray, the CERAMAKER printer can produce parts measuring up to 20 cm in length.

- ✓ OPEN SYSTEM
- ✓ 300 MM X 300 MM TRAY
- ✓ 30 µm RESOLUTION, IRRESPECTIVE OF THE SIZE OF THE WORK TRAY
- ✓ LINK FREE SUPPORT TECHNOLOGY FOR SUPPORT MARK-FREE PARTS



CERAMAKER 900

## Producing with the CERAMAKER additive manufacturing line



Creation by CAD    Slicing of the parts before printing    3D printing    Cleaning    Debinding and sintering    Finishing

## Other equipment and software supplied with the printer

- ✓ Software suite selected to make the most of the possibilities offered by ceramic 3D printing. Its composition can be tailored according to the type of software you already have.
- ✓ Cleaning hood specifications and installation plan.
- ✓ Oven and refractory supports (optional).

## Ceramaker 3D printers technical data

CERAMAKER 3D PRINTER	Ceramaker 900	Ceramaker 100
Dimensions	1060 x 2250 x 2040 mm (WxDxH)	1000 x 1500 x 1900 mm (WxDxH)
Tank capacity	300 x 300 x 100 mm	100 x 100 x 100 mm
Weight	About 1450 kg	About 800 kg
Electrical requirements	220-240 VAC / 50 Hz	
Electric power	2kW	
Light source	UV Laser	
Laser spot diameter	~30 µm	
Wavelength UV	355/405 nm	
Layer thickness mm	0.010 – 0.125	
Room operating temperature	20-25 °C	
Room maximum temperature variation	1°C/hour	
Relative humidity	50 %	
Compressed air	6 bars dry	



CERAMAKER 100

## A DEDICATED SERVICE OFFER THAT WILL HELP YOU BOOST YOUR CERAMIC PROJECT

Combining its ceramic and 3D printing expertise, 3DCeram designed a new service offer to help you give a new dimension to your ceramic project: let's leverage 3D printing together!

### Kick-off packs for Ceramaker line customers



#### Training (prior to Ceramaker printing line commissioning)

A training that combines theory and practical session held at the 3DCeram facility in Limoges. The team of operators will first enter the 3<sup>rd</sup> dimension with ceramics and learn about:

- ✓ 3Dceramic pre-processing
- ✓ Ceramaker® operation & maintenance (technical training)
- ✓ Ceramic post-processing – cleaning, debinding and sintering

#### Commissioning and on-site training

After commissioning and acceptance, operators and maintenance related employees will undergo dedicated on-site training:

- ✓ Ceramaker operation technical training
- ✓ Ceramaker maintenance technical training
- ✓ Launch of validation production run (validation samples)

### Service packs for Ceramaker 3D printing line customers

3DCeram designs 3 service packs dedicated to CERAMAKER owners.

#### ✓ Access pack

Equipment related technical support (on line assistance) and spare parts kit.

#### ✓ Serinity pack

Equipment related support (priority on line assistance), spare parts kits and priority delivery service, on-site annual inspection and software update.

#### ✓ Performance pack

On-line process support for user from beginner to confirmed level: CAD file creation, design of 3D print media, manufacturing trouble shooting guide, preparation of the building platform), process audit.



## On-demand services

3DCeram offers a complete range of services to help you design and produce your parts.

### Boost the performance of your ceramics with OPTICERAM

Opticeram is a unique service, offering help and support in the design and optimization of ceramic parts before they are produced by 3D printing (weight reductions, increased mechanical strength, etc.).

- ✓ Co-Engineering
- ✓ Assistance qualifying key aspects of the specifications (performance, costs and time line)
- ✓ Optimized design proposal



OptiCeram brings a set of tools to design innovative products. For this purpose, we propose to implement the most advanced optimization tools (**topological optimization**) as well as means of calculation of mechanical and thermal structure.

### On-demand additive manufacturing service

A service to manufacture your parts and help you develop and fine tune your process



At the start of the 2000s, the biomedical industry chose on-demand additive manufacturing service, 3DCeram's traditional activity, for the production of ceramic implants. Since then, numerous players in the luxury goods industry, and industry in general (the aerospace and automotive industries, etc.), have turned to 3DCeram to make their parts.



✓ Luxury

✓ Biomedical

✓ Industry





**3DCERAM** - 27 rue du Petit Theil - 87280 LIMOGES - Tel. +33 (0) 5 55 04 10 90 - [info@3dceram.com](mailto:info@3dceram.com)

3DCeram is a french company based in Limoges, in the heart of the European Ceramic Pole of competitiveness.

The company has developed a network of partners to be closer to its customers:

- ✓ China
- ✓ France
- ✓ Israel
- ✓ Italy
- ✓ Japan
- ✓ Korea
- ✓ Russia
- ✓ Singapore
- ✓ Spain
- ✓ UK
- ✓ Ukraine
- ✓ United States

and many more to come..  
Connect to [www.3dceram.com](http://www.3dceram.com)



[www.3dceram.com](http://www.3dceram.com)

[www.ceramaker.com](http://www.ceramaker.com)

CERAMAKER, a 3DCERAM's trademark

3DCERAM, simplified joint stock company (SAS) with a capital of €200,000 - Register: RCS Limoges 435 266 598