sinto 3DCERAM

New Harmony >> New Solutions™

www.3DCeram.com

Ceramic Additive Manufacturing

From lab to mass production

CERAMIC ADDITIVE MANUFACTURING

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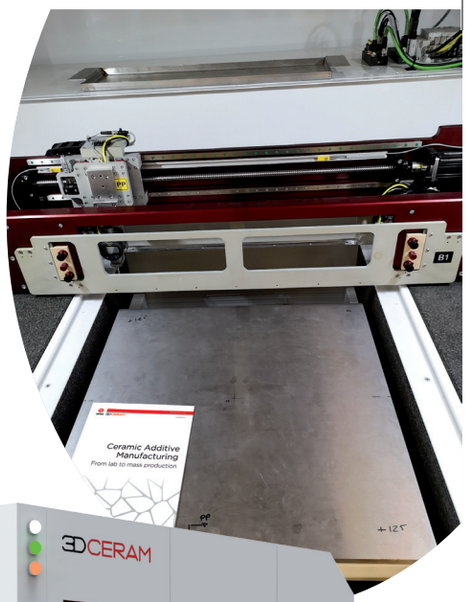


As a major player in ceramic additive manufacturing, it is time to expand our horizons. Since 15 years, we have been working on the development of the SLA technology to make ceramic parts printable in 3D. Since we have developed the technology and tested its reliability and proved it with major industrial partners.

We are now ready to get into customized production thanks to our printer the **C3600 ULTIMATE !** Follow us into our ranges of products and services...

C3600 ULTIMATE

3DCeram IN DATES:

- **2001:** Creation of Cerampilot in Limoges (France) to test 3D printing with technical ceramics with Christophe Chaput
- **2005:** 3DCeram begun to print parts with technical ceramics
- **2009:** 3DCeram is bought in partnership by Richard Gaignon and Christophe Chaput
- **2010:** 3D printer C900 is launched
- **2017:** The Japanese group Sintokogio acquired 3D Ceram to diversify its portfolio into new and innovative technologies
- **2019:** The C100 EASY and C3600 ULTIMATE printers are launched to scale-up from lab to mass production.


SAM

NOVELTIES:

SAM (Small Amount of Material)**:** The 3D printer for ceramics C900 FLEX has been augmented with SAM, an extrusion system, which consists in a nozzle and a 200 ml cartridge, to be installed and fixed on the blade. It allows a small amount of material to be deposited on the building platform, the quantity needed to print the part. For C900 FLEX owners, it is the opportunity to upgrade their printer with this new option, to optimize accuracy when deposit the material. The possibility to start a printing run with a small amount of material allows to develop your own mix faster.

C100 EASY: A new printer, which has a small building platform of 100x100x150 mm. Dedicated to labs and research centers, for prototyping and printing small parts. This printer goes fast in production.

C900 HYBRID: Equipped with 3 nozzles in addition to its original tank. This optimization allows to associate 3 additional materials. With the C900 HYBRID it is possible to print parts composed of 4 different materials, including ceramic from the tank, on the same production.

C3600 ULTIMATE: The biggest one with a building platform 600x600x300 mm, this new printer allows mass production and printing big parts.

AlN: Aluminium nitride has an excellent thermal conductivity. Therefore its excellent electrical and mechanical properties, close to those of alumina, fit the needs for electronics market.

Silicore: Developed for foundry cores, the Silicore is a porous ceramic with a high mechanical resistance, it keeps very stable at high temperature and can be used with all alloys except cobalt. Easily leachable and compatible with complex shapes.

PRINTER RANGE

Our range goes from lab to mass production

3DCeram has developed its printers' to answer specific needs of the large range of customers.

C100 EASY

- Easy use for research
- Smaller printing platform (100x100x150mm)
- 20-30 minutes in order to launch printing run (fill the formulation tank, software procedure,...)
- Minimum quantity of material to print
- Easy cleaning
- Labs & research centers, universities
- Open system

C100 EASY

C900 FLEX

C900 FLEX

The original printer of 3DCeram – the one on which experiments and developments were set and make the C900 FLEX the most polyvalent of our printers:

- Building platform: 300x300x100 mm, for printing small production runs
- SAM option: to optimize the prototyping process by distributing a small amount of material, 100 mL from a cartridge which contains 200 mL refillable. *(see p.2/3)*
- Hybrid option: the ability to print with multi-materials applied to ceramics. Combine up 3 additional materials (polymers, ceramics...) or to print parts composed of several ceramics with different densities to reinforce the point of intense stress *(see p.2/3)*

C3600 ULTIMATE

- For mass production or for printing large parts
- The biggest building platform on the market 600x600x300 mm
- Developped for printing big series or big parts
- Reduce printing time with its 4 lasers
- Brings added value to build and optimize specific parts

C3600 ULTIMATE

3D MIX BY 3D CERAM

AlN
> Thermal conductor
> Chemical resistant
> Electrical insulator

Zirconia 3Y ZrO_2
> Excellent mechanical properties
> Chemical inertness
> Great hardness

Zirconia 8Y ZrO_2
> 8 mol% yttria-stabilized zirconia is mainly used for fuel cell.

Silicon nitride Si_3N_4
> Very resistant, low density
> Excellent resistance to thermal shocks, wear and corrosion resistance
> Good electrical insulation

Alumina Toughened Zirconia ATZ
> Resistance to wear and thermal shock
> Biocompatibility

Silica SiO_2
> For foundry cores and also optical applications.

Alumina Al_2O_3
> Good mechanical behavior
> Good thermal conductivity

Hydroxyapatite/Tricalcium phosphate
> Chemical composition close to bone
> Biomedical application

Cordierite
> Low CTE and thermal conductivity
> Wear resistant
> Good for vacuum application

Silicore (Silica based ceramic)
> High mechanical resistance
> Porous ceramic, easily dissolvable
> Very stable at high temperature
> Compatible with complex shapes like cores
> Used with all alloys except cobalt

« On-demand »

We support you by developing the right ceramic for your project and application in 3D Printing process. It goes in 3 steps:

> Formulation
> Definition of printing parameters
> Definition of sintering parameters (option)

Boost your ceramic project

Combining its ceramic and 3D printing expertise, 3DCeram Sinto designed new service offers to help you give a new dimension to your ceramic project from lab to mass production.

> Training - prior to Ceramaker printer commissioning

We organize a training that combines theory and practical session held at the 3DCeram Sinto facility in Limoges.

The team of operators (4 people max) will first enter the 3rd 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 be trained on-site for:

- Operation technical
- Maintenance technical
- Launch of validation production run (validation samples)

> On-demand additive manufacturing service

A service to manufacture your parts and help you to develop and fine tune your process.
Numerous players in the luxury goods industry, and industry in general (the aerospace and automotive industries, etc.), have turned to 3DCeram Sinto to make their parts for more than 15 years thanks to our know-how and expertise.

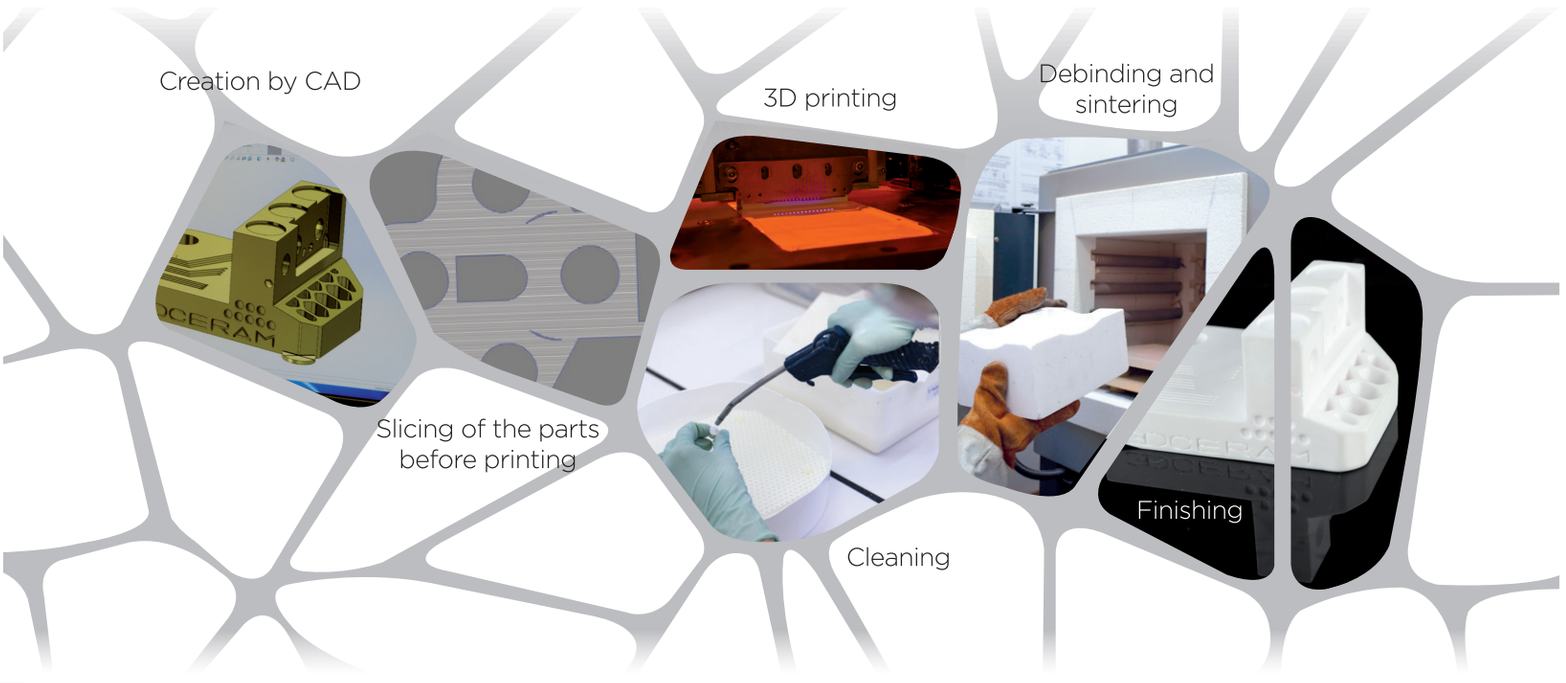
- Co-Engineering
- Assistance qualifying key aspects of the specifications (performance, costs and time line)
- Optimized design proposal
- Parts manufacturing by 3D printing

> 3D Printing process

Full offer :

From printing to sintering ceramics, we provide programs and equipment for the full process:

- Software suite selected to make the most of the possibilities offered by ceramic 3D printing.
- Cleaning hood specifications and installation plan.
- Kiln and refractory supports (optional).



> Services and packs for Ceramaker 3D printers

We support our customers with services of maintenance, process optimization and developments of know-how adapted to each printers and its specificities:

C100 EASY	C900 FLEX	C900 HYBRID	C3600 ULTIMATE
4 hrs/year	8 hrs/year	11 hrs/year	11 hrs/year

PACK ESSENTIAL

- Phone assistance
- 1 blade set renewal (blades and plastic sliders)
- Laser module: fast shipping (72h max) instead of the 2 required months to avoid interruption in your production chain.
- Yearly renewal (exept for C100 EASY)

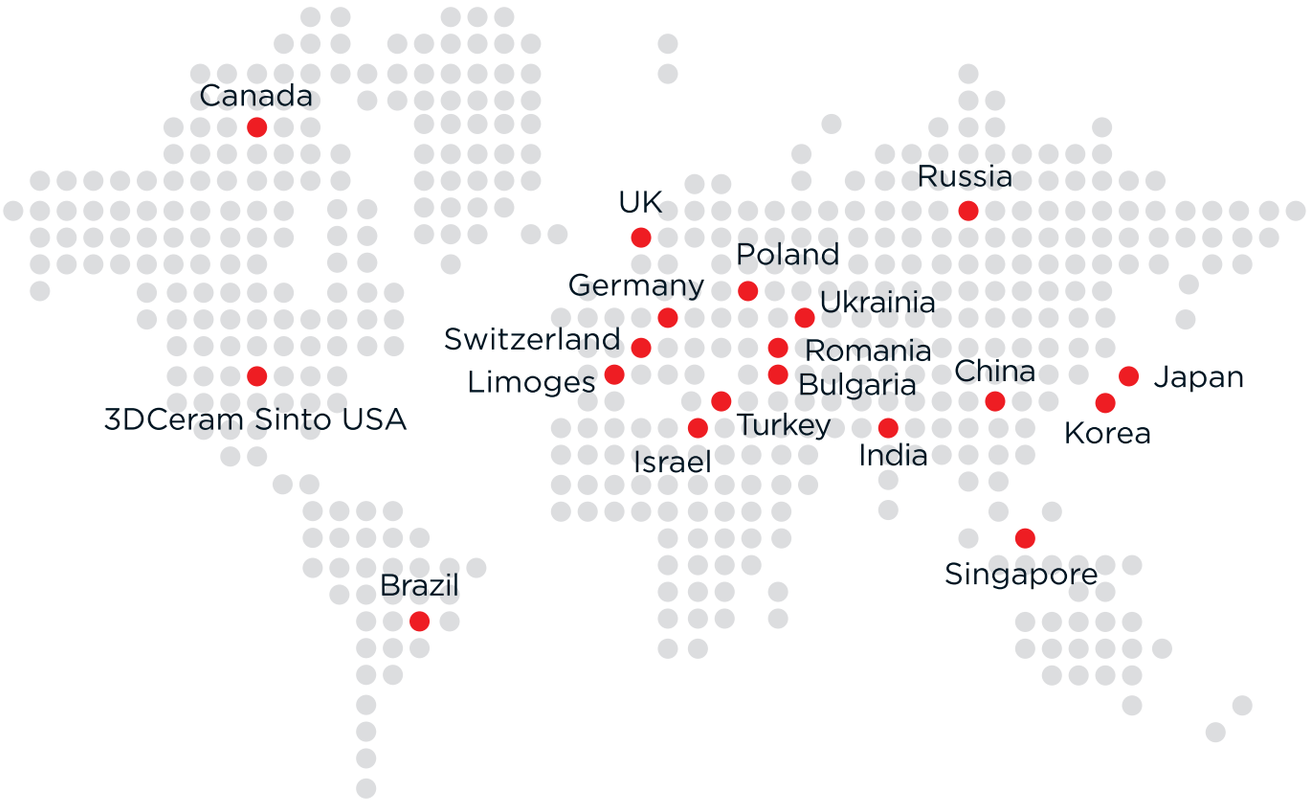
C100 EASY	C900 FLEX	C900 HYBRID	C3600 ULTIMATE
On site annual support (1 day of preventive maintenance) • Software upgrade Phone assistance: 16 hrs/year 1 blade set renewal (blades and plastic sliders) Laser module: fast shipping (48h max)	On site annual support (1,5 days of preventive maintenance) • Software upgrade • One year of warranty extension Phone assistance: 16 hrs/year 1 blade set renewal (blades and plastic sliders) Laser module: fast shipping (48h max)	On site annual support (2 days of preventive maintenance) • Software upgrade • One year of warranty extension Phone assistance: 22 hrs/year 1 blade set renewal (blades and plastic sliders) Laser module: fast shipping (48h max)	On site annual support (3 days of preventive maintenance) • Software upgrade • One year of warranty extension Phone assistance: 22 hrs/year 1 blade set renewal (blades and plastic sliders) Laser module: fast shipping (48h max) instead of the 2 required months to avoid interruption in your production chain.

PACK SERENITY

C900 FLEX & C900 HYBRID	C3600 ULTIMATE
From lab to fab: • Prototyping process • Design support to increase expertise • Stripping • Multi-materials 3D printing *(for C900 HYBRID only)* • Process audit on site *Customized training Price on demand*	**Mass production:** • Tank optimization • Stripping support • Process audit on site *Customized training Price on demand*

PERFORMANCE OFFER

3DCeram has developed a network partners to be closer to its customers :



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