



CeraFab  
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—  
**DRIVING  
INNOVATION IN  
HEALTHCARE**  
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**3D PRINTER FOR  
MEDICAL AND DENTAL  
APPLICATIONS**

# DRIVING INNOVATION WITH THE MOST RELIABLE TECHNOLOGY

## PROCESS

With a wealth of experience in 3D printing and ceramics, Lithoz strives to provide the highest quality technology and services to the medical and dental industry. Lithoz's technology facilitates the production of 3D-printed ceramic parts with unlimited design potential, opening the door to innovative metal-free applications in a digitally driven process.

### 3D PRINTING DEBIND AND SINTER PROCESS

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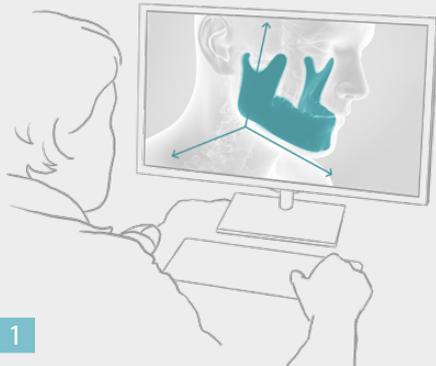
#### The technology

The lithography-based ceramic manufacturing (LCM) offers the most reliable ceramic 3D printing solution on the market. This technology is capable of fulfilling even the highest requirements of high-performance ceramics, in terms of mechanical strength, tailored surface roughness and dimensional accuracy – all while allowing you to maintain high levels of efficiency and productivity.



#### Patient-centric outcomes

While conventional manufacturing processes require individual molds and tools for every component, the tool-free LCM technology allows you to easily modify the CAD data to match the customer's needs. The result is a batch-oriented process for producing custom-made products, with the additional possibility of mass customization.



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### 3D CAD MODEL

#### CeraDoc4Med

This innovative software facilitates the easy and automated creation of reports for the technical documentation of medical device fabrication, as well as data analysis and a bar code for thorough traceability.



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### FINAL COMPONENT

## THE LCM FACTOR

The LCM technology starts with a CAD model. Information for the run is digitally transferred to the 3D printer directly from your computer and ceramic-loaded liquid is automatically dispensed in the rotating vat. The movable build platform is dipped into the material, which is then selectively exposed to visible light to generate a 3D green part. Following thermal treatment, the green parts are sintered, resulting in fully dense ceramic parts with outstanding biocompatible properties and near limitless geometries.

# APPLICATIONS – FROM PATIENT-SPECIFIC IMPLANTS TO SURGICAL INSTRUMENTS



## CMF for implants

**Critically sized bone defects** can be the result of severe trauma or tumors. The body alone will not be able to heal the bone defect. A dual approach is therefore presented here, with a shell of high-strength zirconia giving mechanical support during the healing phase. The inner volume of the implant is made of **bioresorbable beta-tricalcium phosphate (LithaBone TCP 300)** or **hydroxy apatite (LithaBone HA 400)**, which will be resorbed and replaced by newly formed bone allowing for **complete bone healing**.



## Spinal cages

Spinal cages are used for treating vertebral disc diseases. These implants are the same height as the **removed disc**, allowing bone to grow through it and eventually become a part of your spine and therefore resulting in **anatomically correct posture**. **High mechanical strength, biocompatibility and osseointegration** are required for this application. Silicon nitride, used in Lithoz's **LithaNit 770**, meets these requirements while also possessing **antibacterial** properties.



## Dental implants and restorations

Dental implants are used as a base for replacing teeth. Using LCM technology, it is possible to manufacture even the most complex of implants in **large numbers with high accuracy** while still keeping costs low due to the **highly efficient material usage**. Zirconia or lithium disilicate are the materials of choice for crowns, bridges and veneers. Both can be processed using LCM to achieve perfect results with **unprecedented fissure quality, feather edges** down to **100 µm** and significantly **minimized manual postprocessing**.



## Cranial implant

This implant is based on beta-tricalcium phosphate ( $\beta$ -TCP) and is used for replacing parts of the human cranium. The combination of resorbability and defined macro porosity in this material allows for the ingrowth of bone cells and vascularization. 3D printing facilitates **patient-specific designs** based on diagnostic imaging, therefore ensuring the **perfect fit** of the implant and a **fast surgery**. Features as fine as **50 µm** are feasible due to high accuracy and optimized high-performance materials.

### Reference

**KLS Martin** has been working with Lithoz for 5 years. Since 2015, we have had a CeraFab 7500 3D printer and have used it to produce jaw implants (CMF implants) for human use. These have been met with great success in numerous patients and we have had optimal results in terms of the accuracy of fit, tolerance and healing success. Additive manufacturing holds immense potential in the medical field. Lithoz supports us with our certification of the products and we look forward to further cooperation with Lithoz in the future.

**Frank Reinauer** | Head of Innovation at KLS Martin

# LITHOZ

## YOUR TECHNOLOGY PROVIDER OF CERAMIC 3D PRINTERS

### MATERIALS

Bioceramic materials are perfect for medical and dental applications due to their outstanding properties including high mechanical strength, wear resistance, non-corrosivity, low thermal and electrical conductivity and anti-allergenic materials.

- **Aluminium oxide: LithaLox 350 and HP500**
- **Hydroxyapatite: LithaBone HA 400**
- **Silicon nitride: LithaNit 770**
- **Tricalcium phosphate: LithaBone TCP 300**
- **Zirconium oxide: LithaCon 3Y 230**
- **Contact us about Lithium disilicate, ATZ, ZTA and Bioglass**

### CONTACT



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### CUSTOMIZED

### DEVELOPMENT

**Application:** Lithoz supports their customers throughout the entire process, of integrating additive manufacturing into each step of their production chain, all the way from design to the finished product.

**Material:** Lithoz offers material developments to allow their customers to adapt LCM technology for specific powders and materials.

### HIGH QUALITY

The production of medical devices requires materials and equipment of the highest quality, as well as reliable supply chains. Lithoz conducts thorough assurance control throughout the entire production process and supports its customers with consultations, personalized hands-on training and the qualification of production lines. Lithoz devotes their full efforts to ensuring the fastest establishment of serial production for their customers.

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