



A 3D Printing Adventure
From Zero
to Perfect Bone Implants

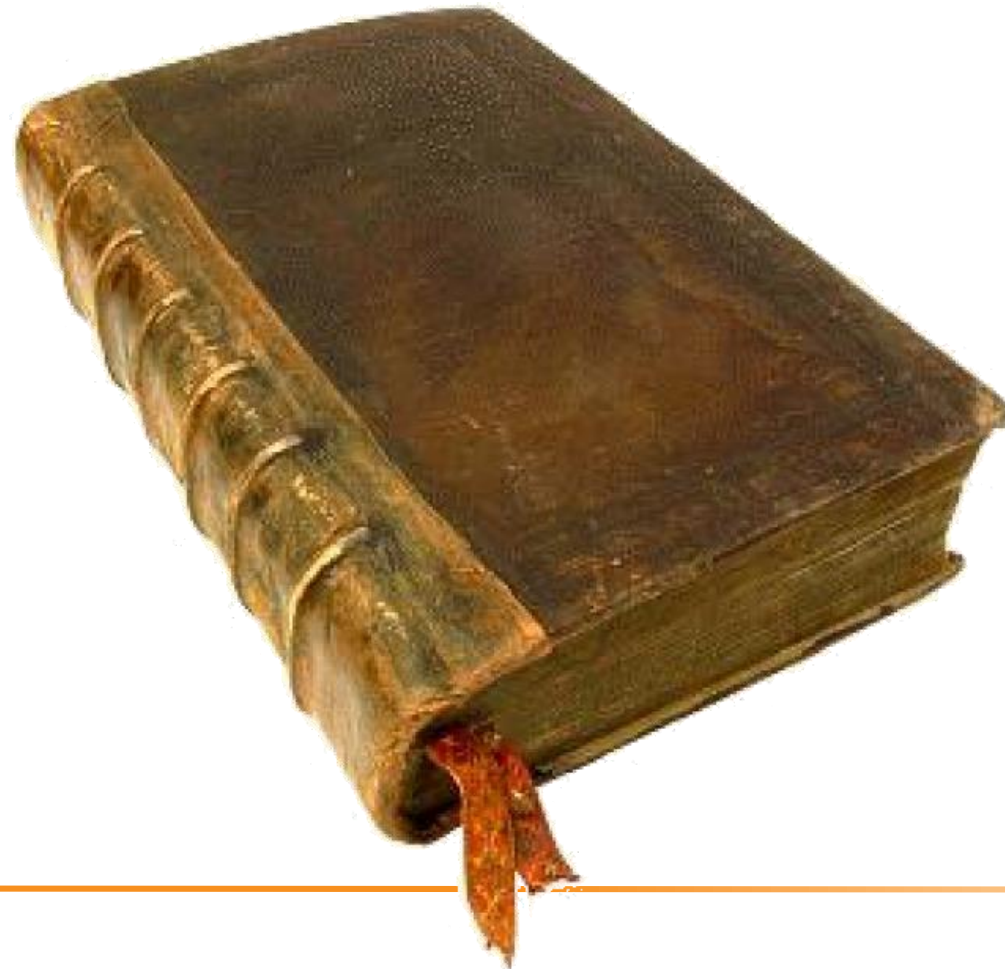
Maikel Beerens CEO Xilloc



How it all started ...



My story



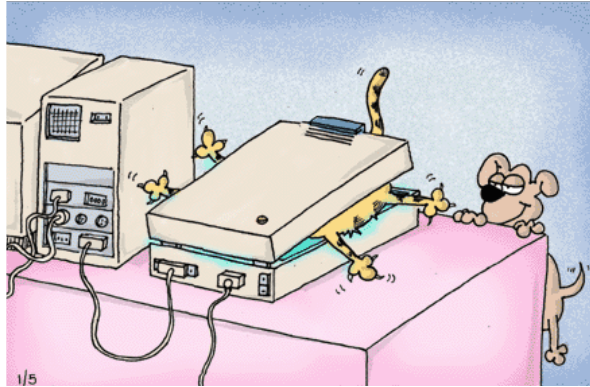
I share a dream and vision



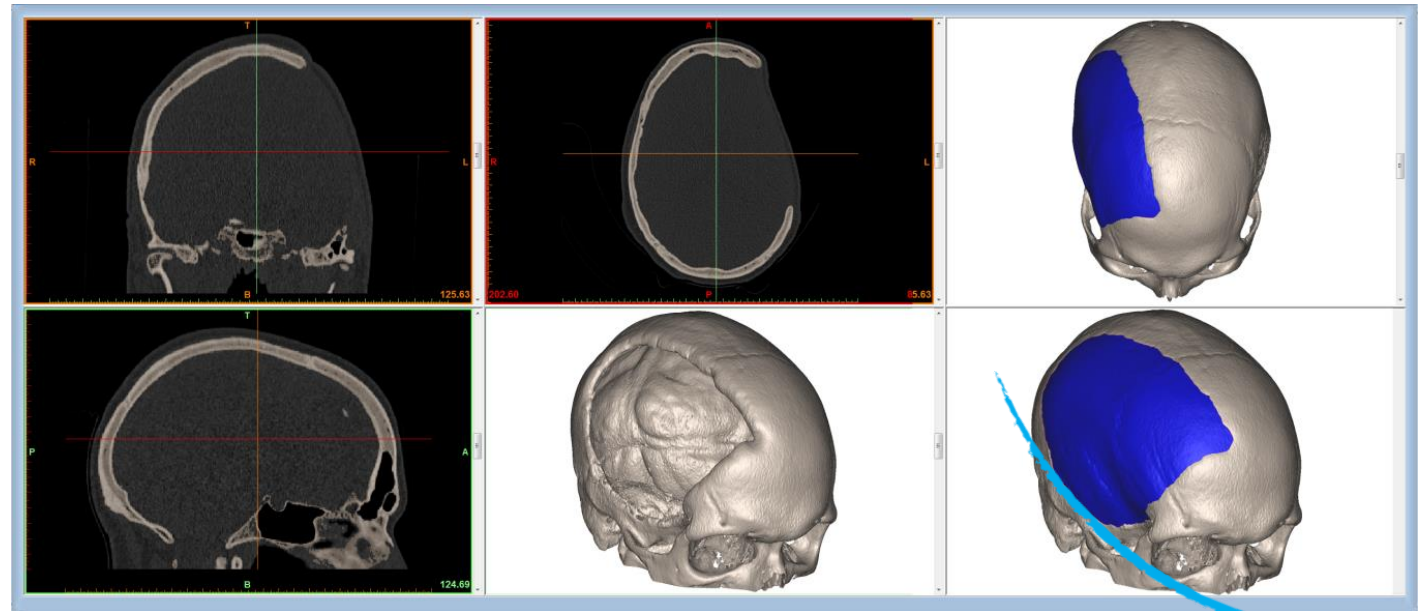
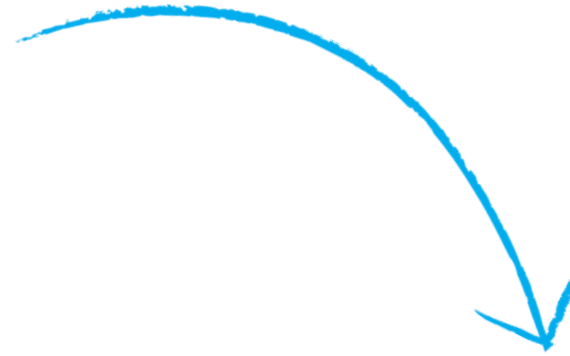
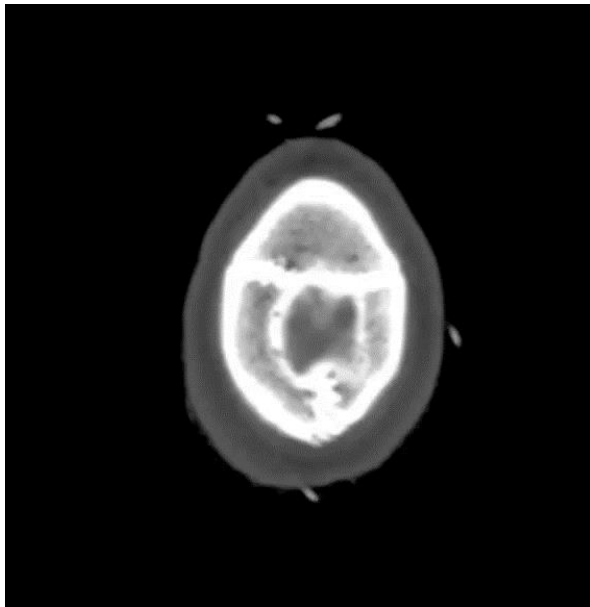
Future: 3D printing body replacements parts

Click Me: The Fifth Element by Luc Besson

During my thesis



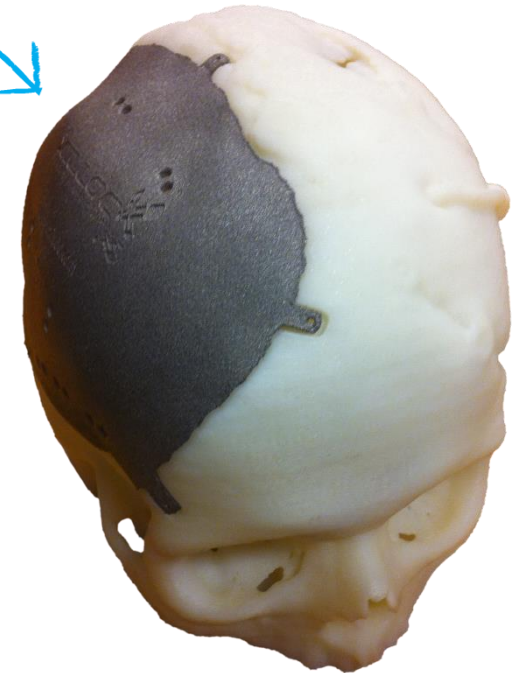
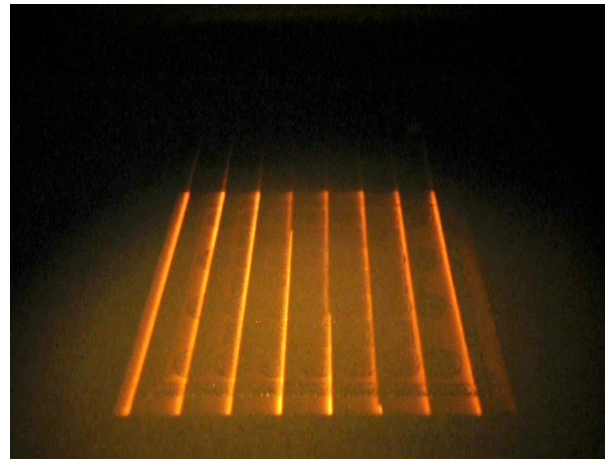
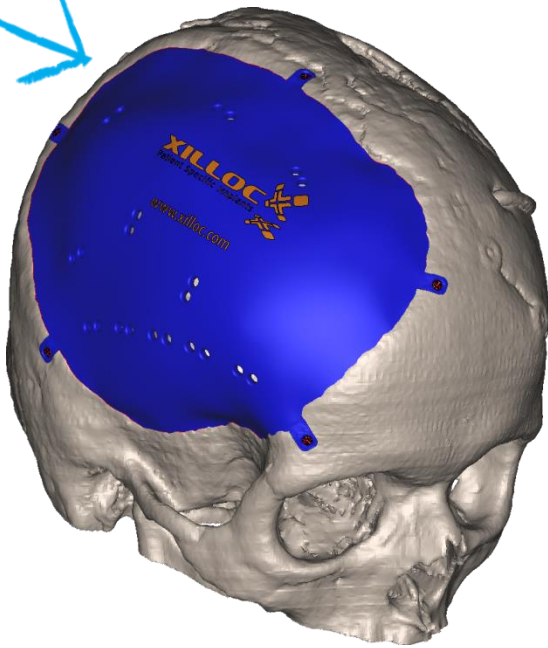
"Cat Scan"



My thesis

✦ Patient-Specific Implant method

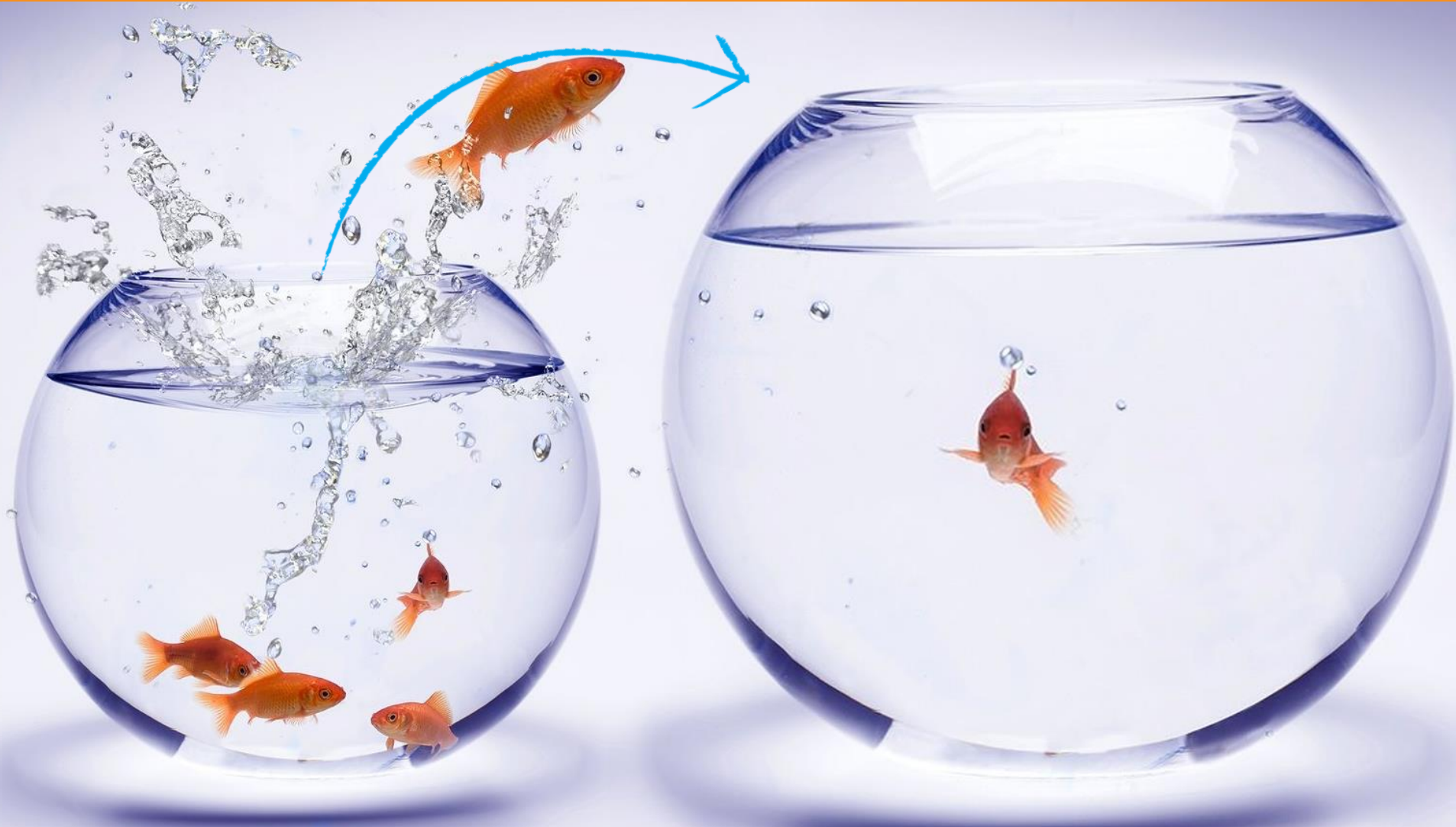
- ◆ First EBM printed skull implant in the world (2006)



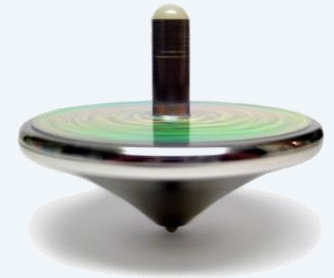
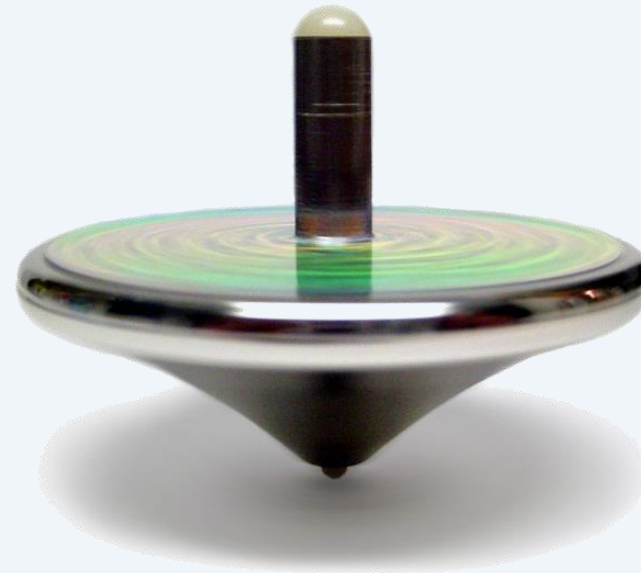
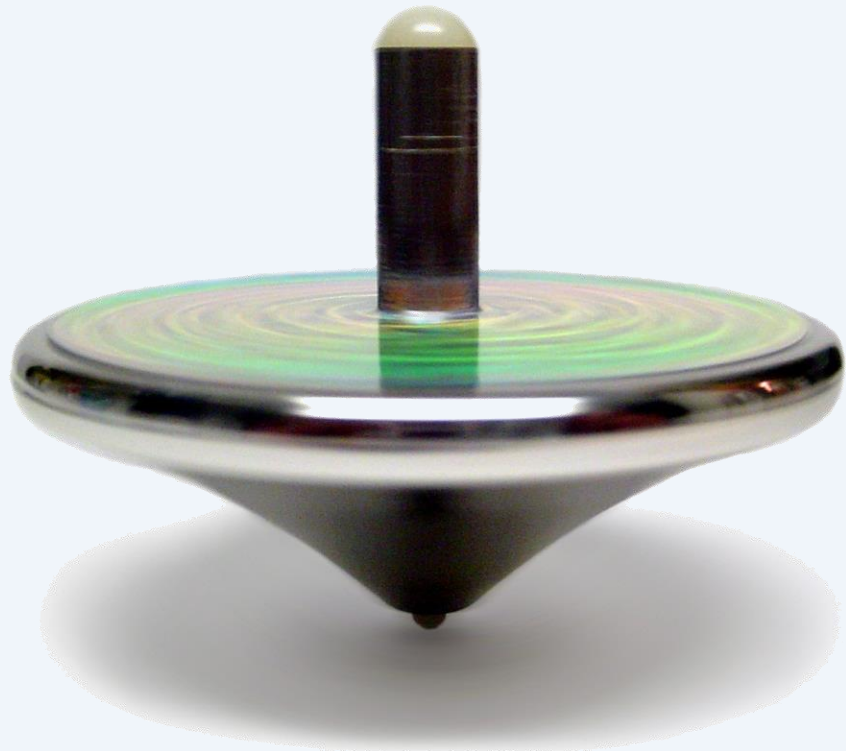
Case by: Prof Dr Poukens, Prof Dr van der Hulst – MUMC+, Maastricht, The Netherlands



What happened then ...



Spin-off: University of Maastricht



Founded Xilloc Medical B.V.

XILLOC

Patient Specific Implants



About us

About us

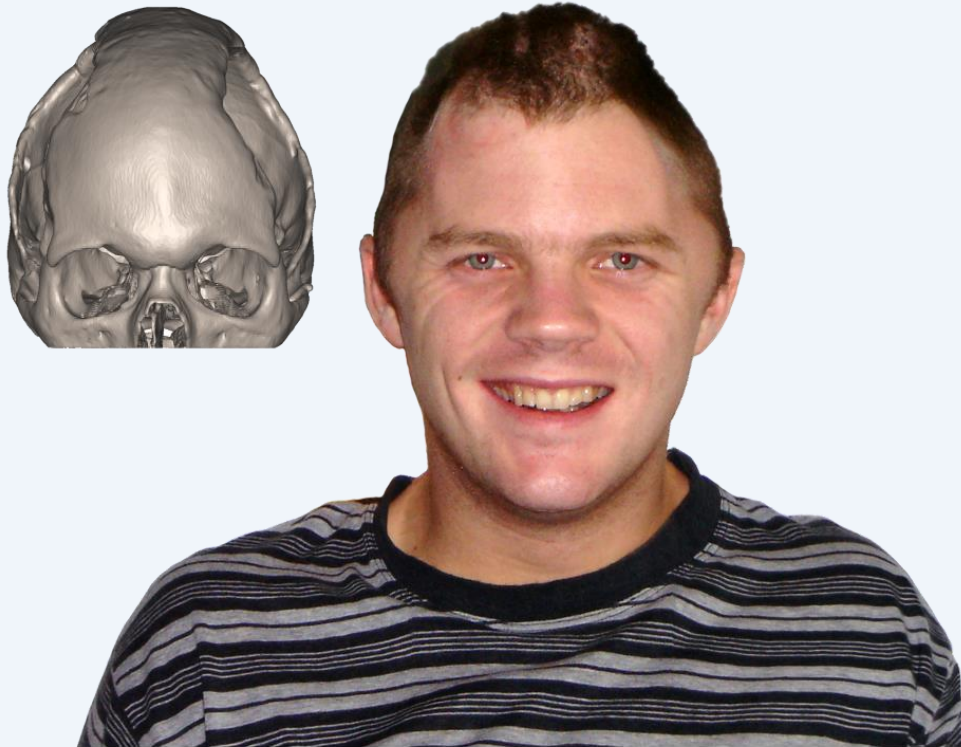
To meet the market demand outside the MUMC+, the new company [Xilloc Medical BV](#) has been founded on the premises of [Maastricht Instruments BV](#). The company will set out to revolutionize the implant industry with the fast and reliable production of patient-specific implants to fix bone defects in the human skeleton. Xilloc Medical will bridge the gap between surgeons and their patient-specific solutions through its innovative online ordering system and experienced team of medical and technical specialists. The company's approach of a total implant solution will save hospitals and insurers large amounts of money, and because this procedure ensures that the implant fits all the time, every time, patients will have to undergo fewer operations. Prominent players in the field of cranio-maxillofacial reconstruction have already claimed that having patient-specific implants at their fingertips will herald a revolution.

Brief history

The [Maastricht University Medical Centre+](#) (MUMC+) has over seven years of experience in the design, manufacture and implantation of highly specialized, low-volume, patient-specific implants. Back in 2003, the Department of Cranio-Maxillofacial and Plastic Surgery of the former Maastricht University Hospital needed a product to repair large skull defects easily during surgery that not only fit the defect perfectly, but also gave an aesthetically pleasing result. Until that time, repairing large skull defects had been truly complicated by manually shaping, modeling and placing the implant. This resulted in long and complex operations with poor aesthetic results.

In cooperation with the department of Cranio-Maxillofacial and Plastic Surgery, IDEE (the engineering department for high-tech medical instruments at the MUMC+) developed a method to preoperatively design and print 3D, patient-specific implants, based on a computer tomography scan of the patient. These have been implanted very successfully ever since.

...A life changed

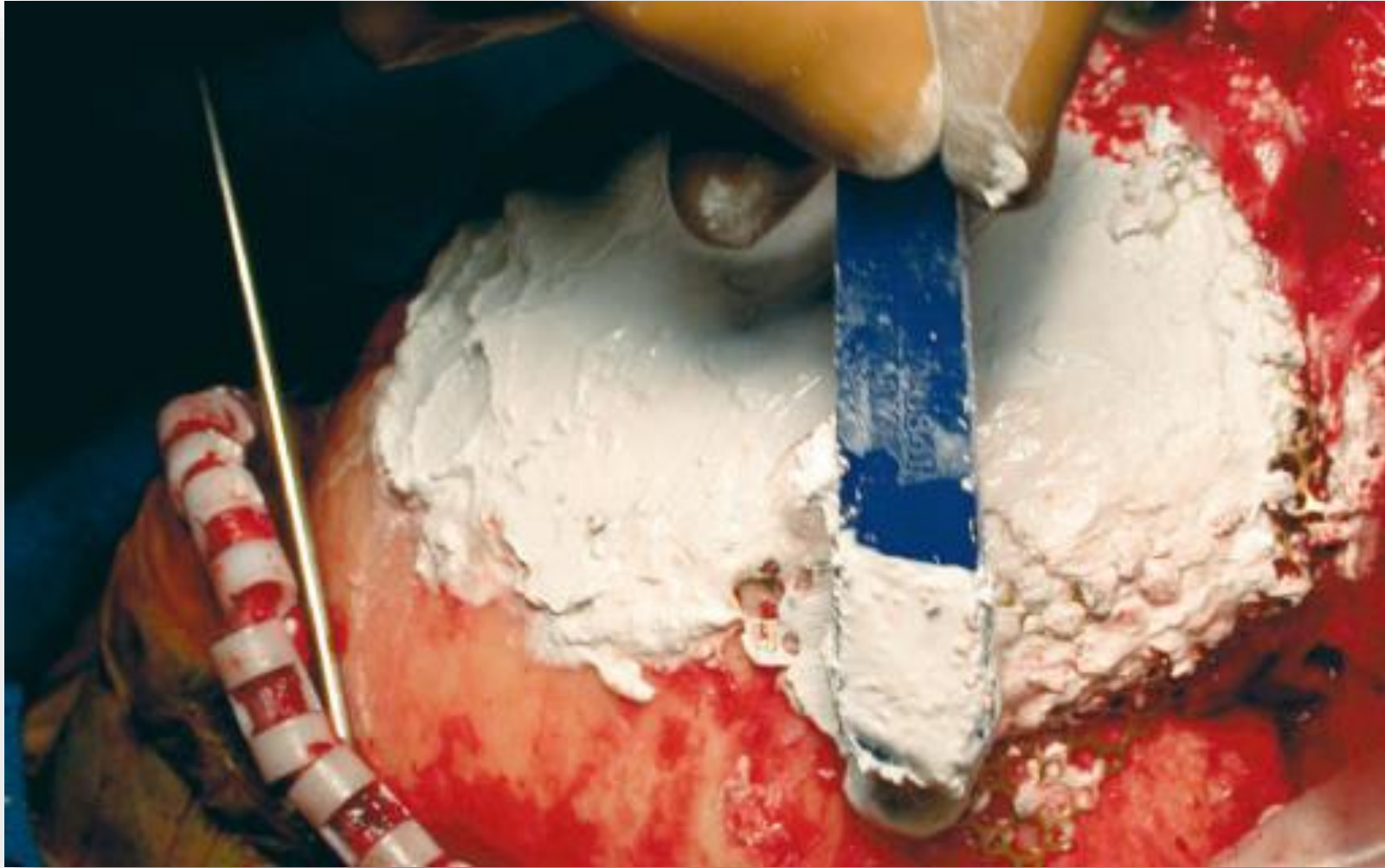


- ✦ Bike accident 2004
- ✦ Bone plates removed 2004
- ✦ Bone plates reimplanted 2004
- ✦ Bone resorption right side 2006
- ✦ Alternative reconstruction right side 2006
- ✦ Bone resorption left side 2010
- ✦ Reconstruction with our total patient-specific implant solution in 2010
- ✦ 4 surgeries in 6 years, could have been 2 surgeries in 3 months when chosen for 2 patient specific implants of Xilloc during primary reconstruction.

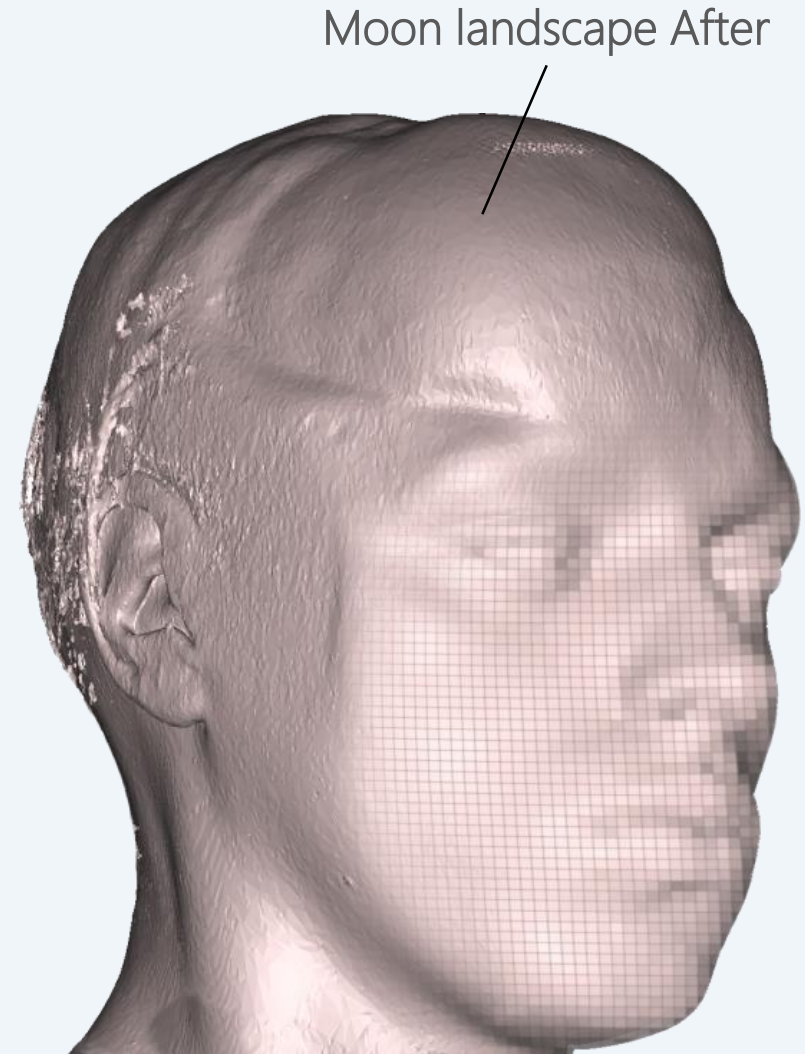
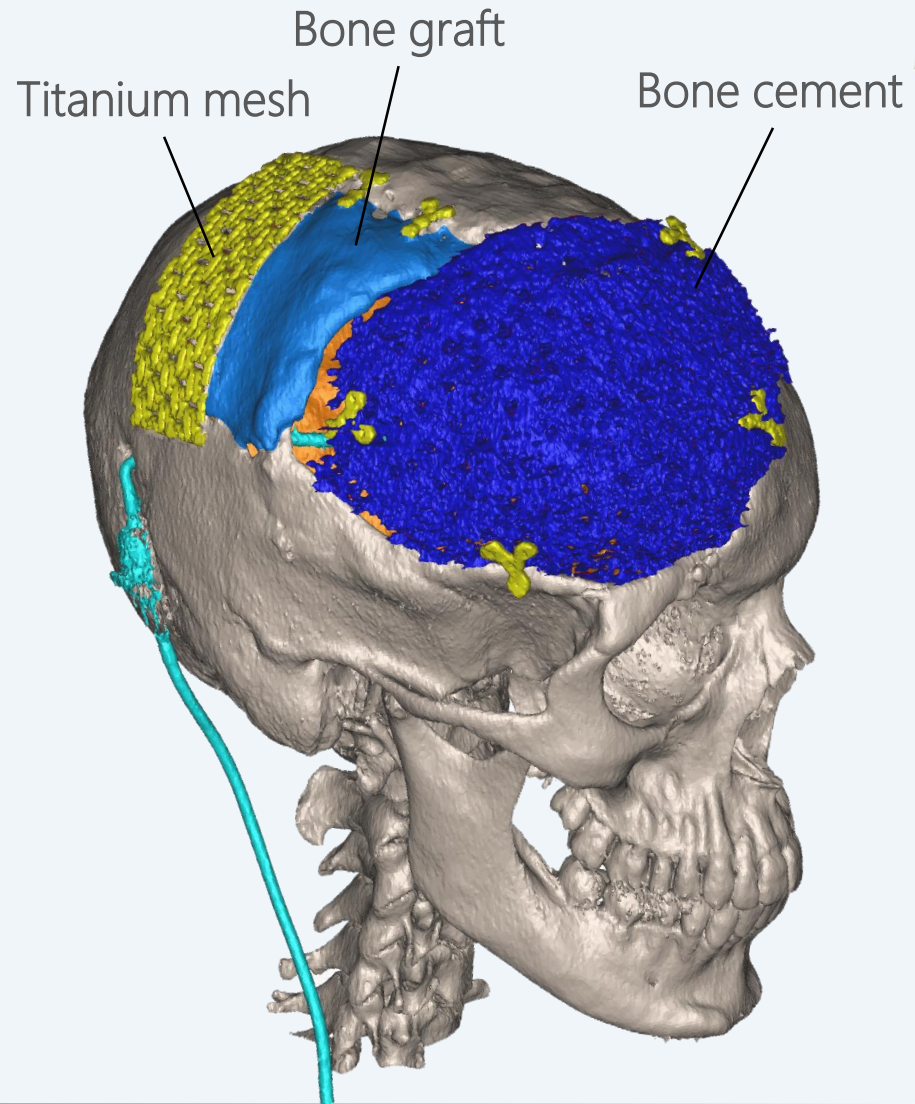
2000 fellow patients annually in EU



Bone cement after bone flap



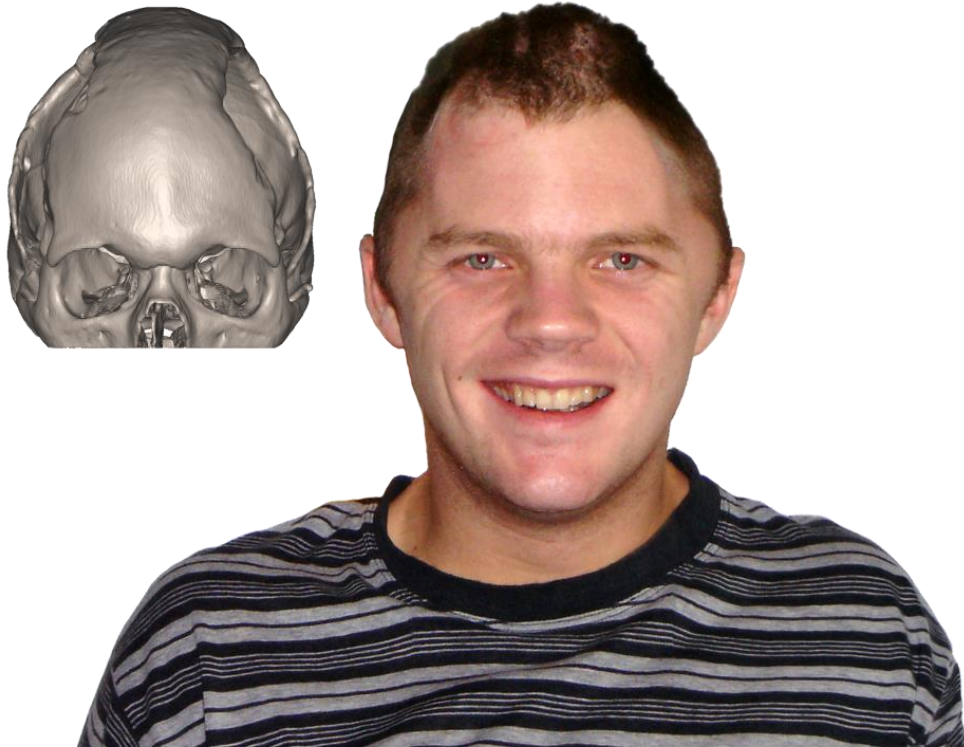
Alternatives for reconstruction



Imagine how that feels...

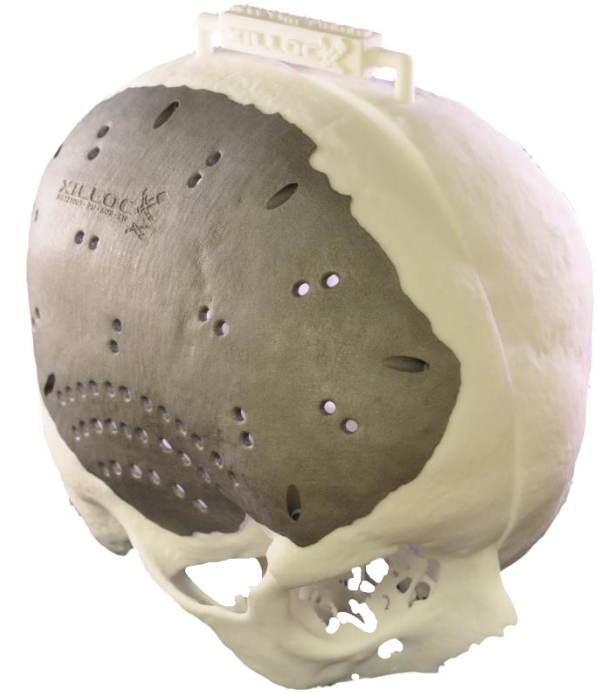
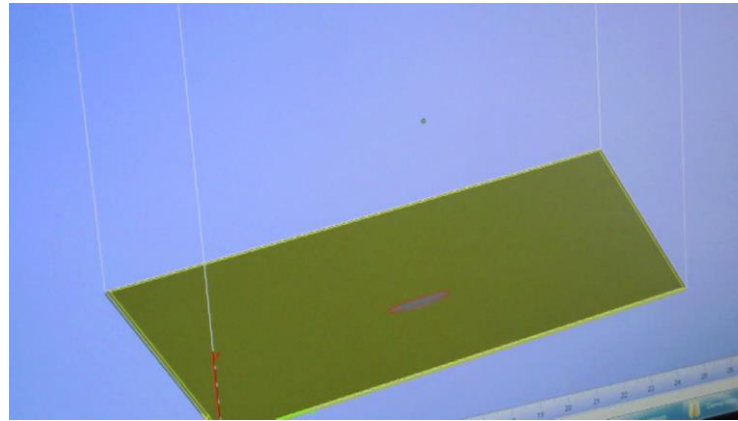
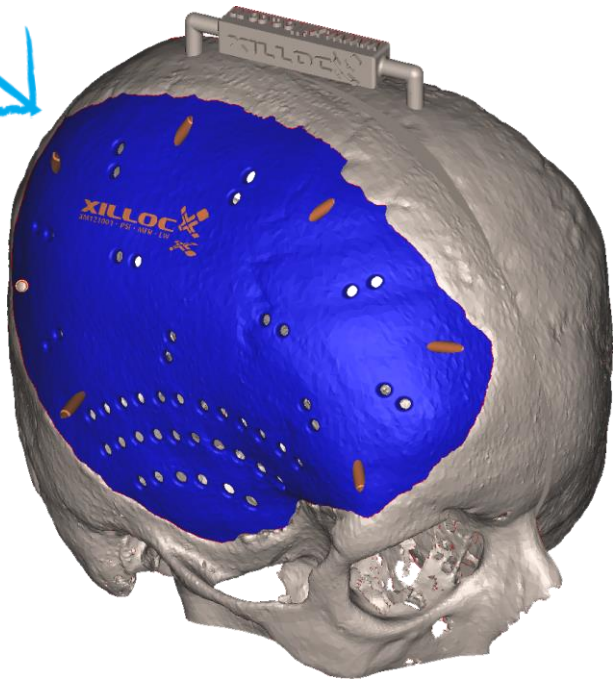


...A life changed

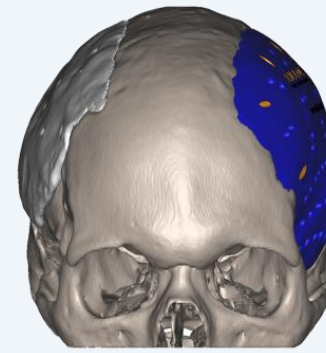
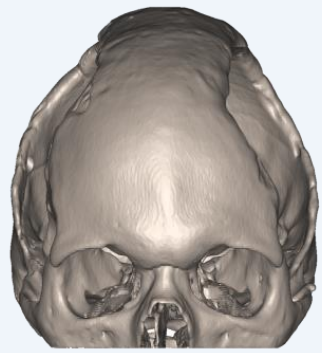


Production

✂ 3D Printed or CNC Milled



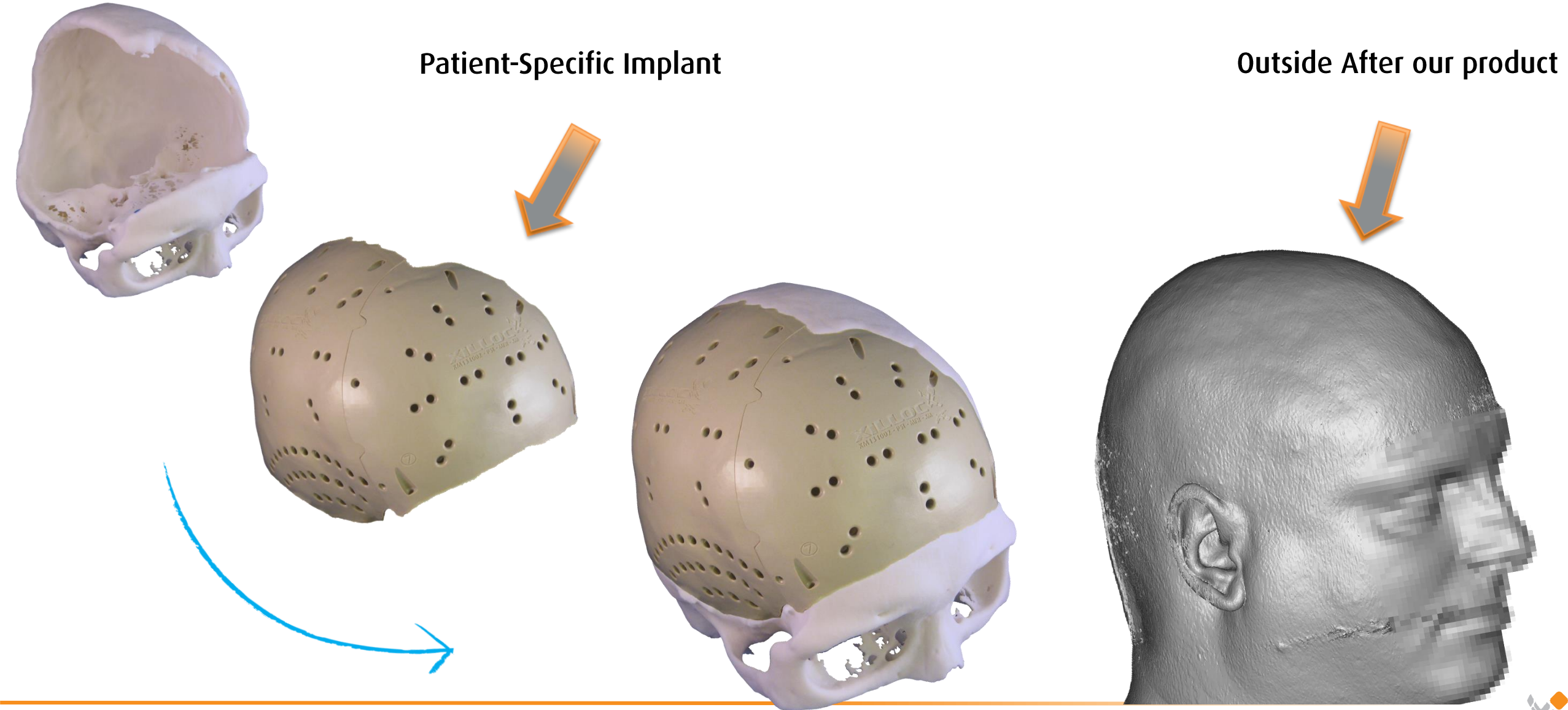
...A life changed



Case by: Prof Dr Dr Kessler MUMC+, Maastricht, The Netherlands

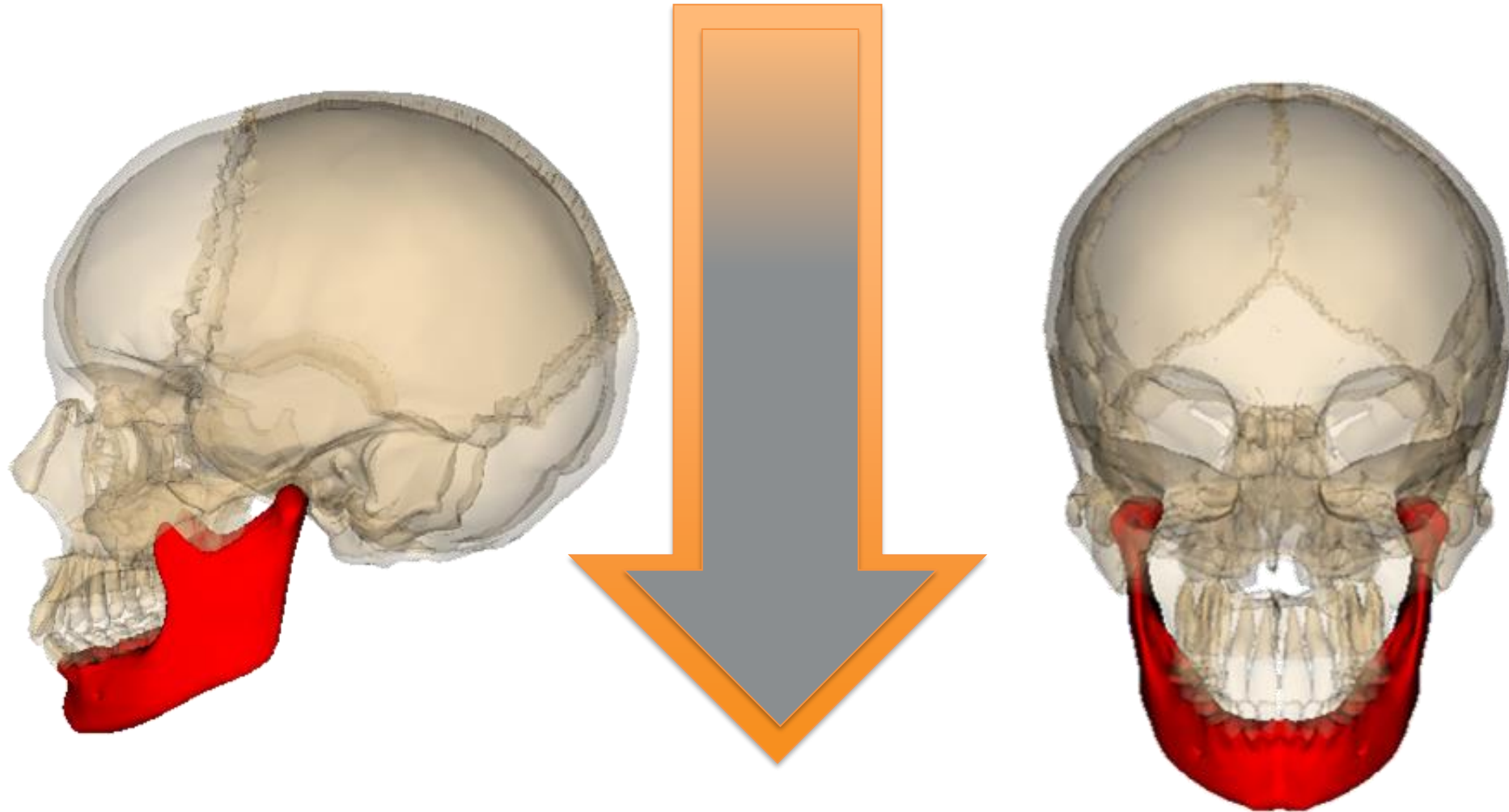
Patient-Specific Implant

Outside After our product

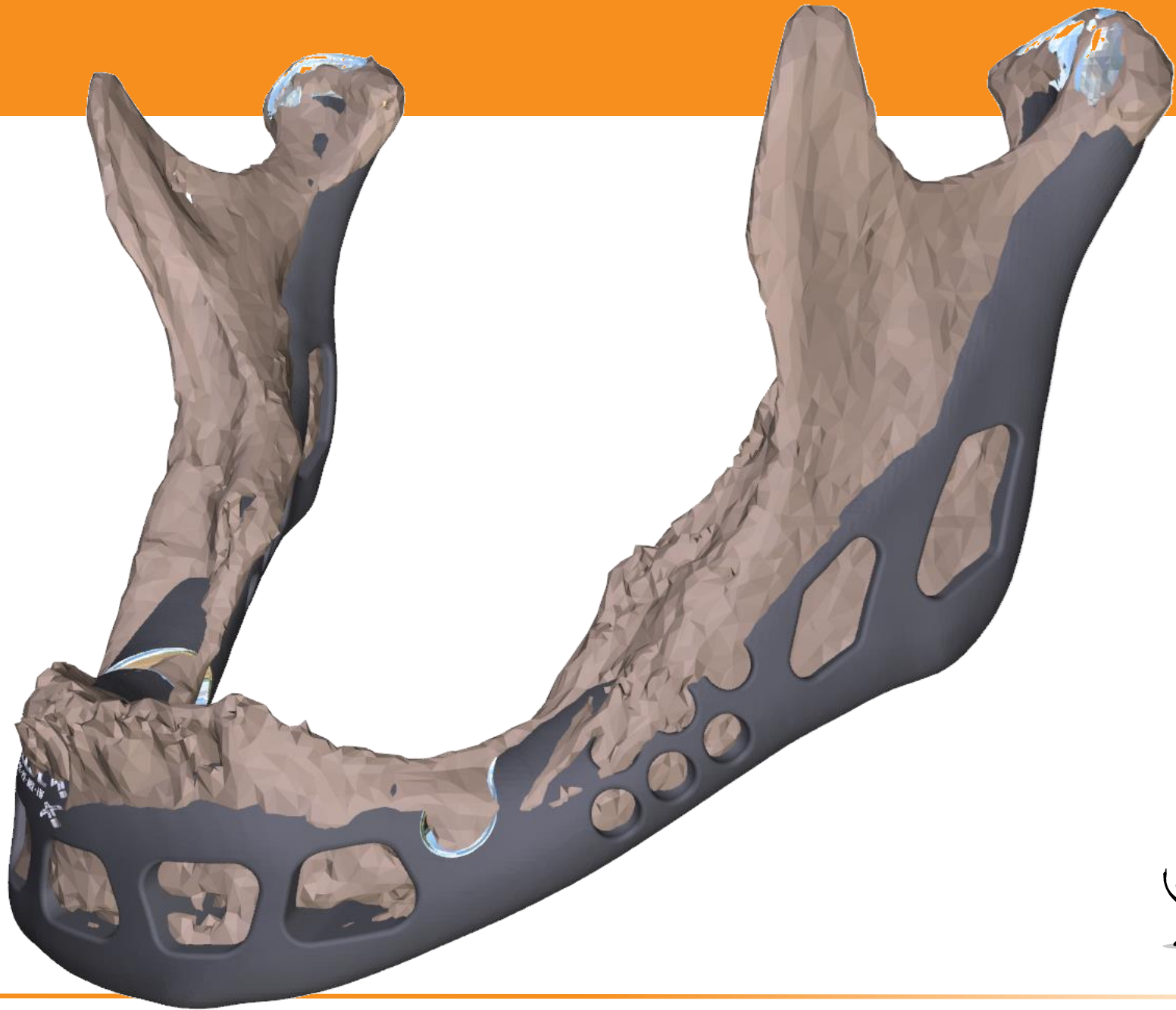


World premiere - Worlds^{1st} Full AMT Mandibula Implant

Case by: Prof Dr Poukens, Orbis Medical Centre, Sittard, The Netherlands








 Patented [®]

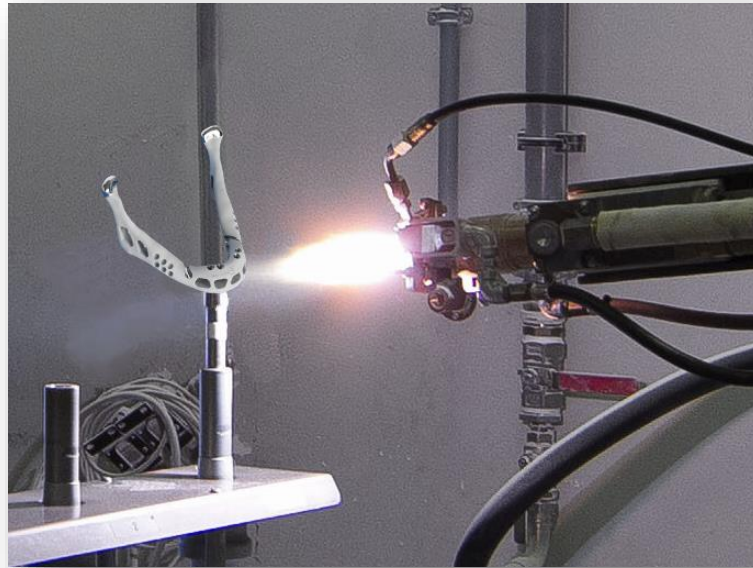


 Patented [®]

AMT – Selective Laser Melting

[Click Me: Xilloc Selective Laser Melting](#)

AMT and Plasma process



Patient specific mandibula



Nerve protection & Dental slot preparation



X-Ray

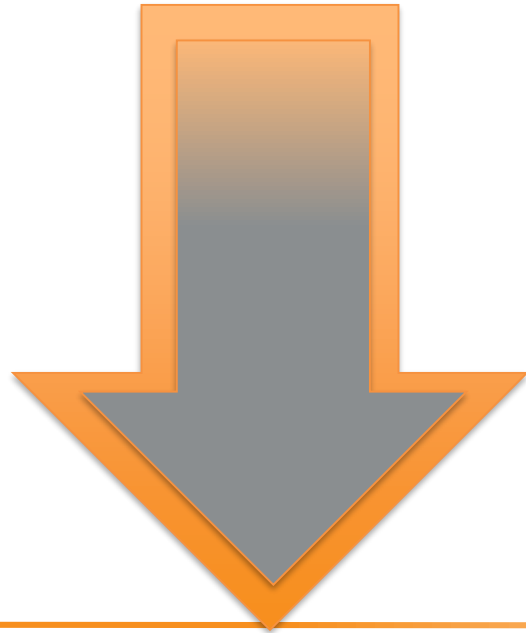


Finish with a smile 😊



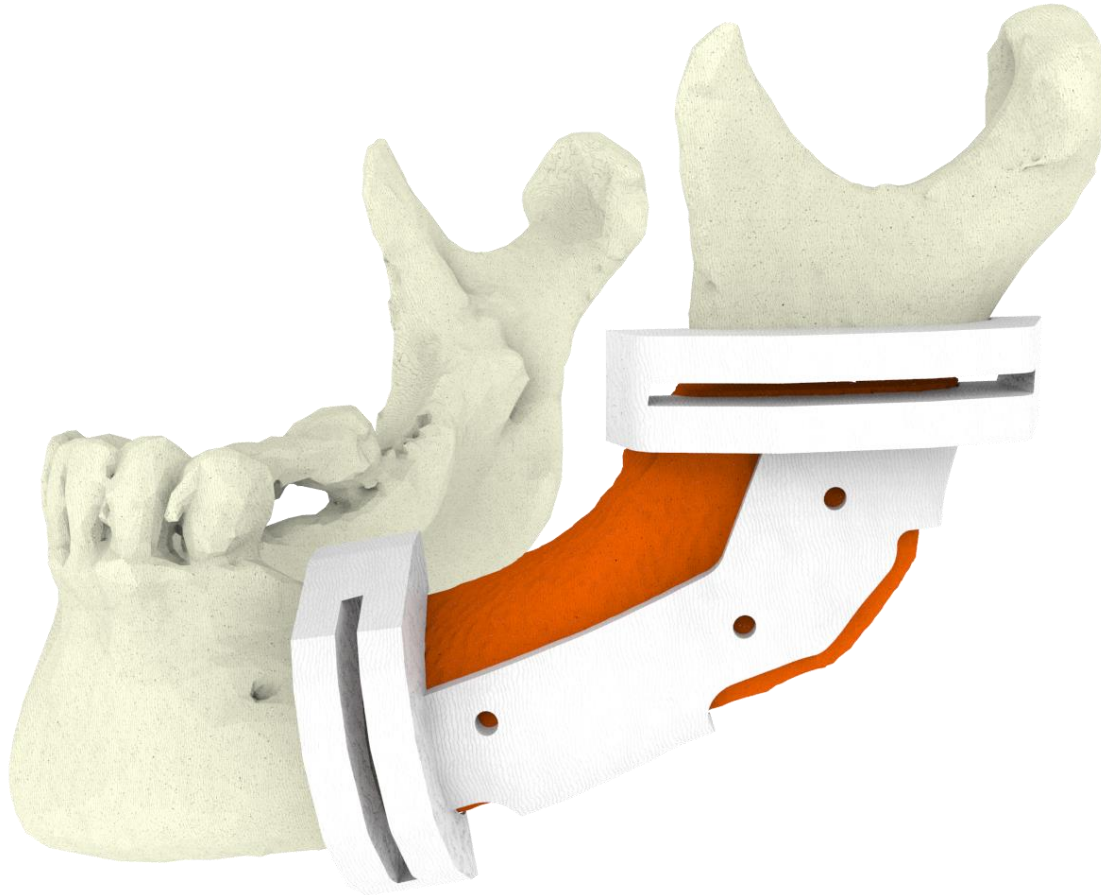
More Xilloc products

Anatomical Models & Surgical Guides



Patient Specific Implants from Xilloc Medical

Surgical cutting guides

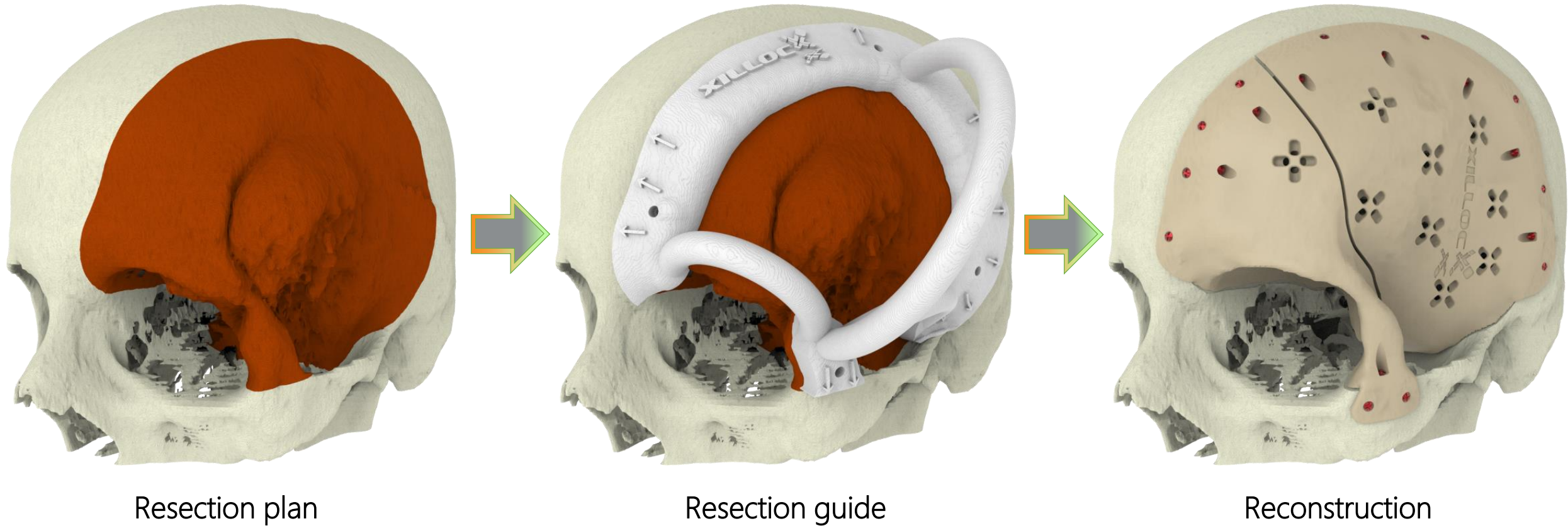


“
Your guides are so
much better than the
ones we used before
”

CMF Surgeon

Patient Specific Implants from Xilloc Medical

✂ 1-step meningioma resection





Our vision
2025

Our brand ...



AM Award 2012



Award: "The most promising European Medtech start-up"

Award: ""The Greater Region Business Days Luxembourg – Product Innovation Award"



Award: "Most innovative product of the Netherlands"

Award: "Best 3D Printing and Additive Manufacturing Application of 2015"







DMU 60 evo linear.

PH 15018

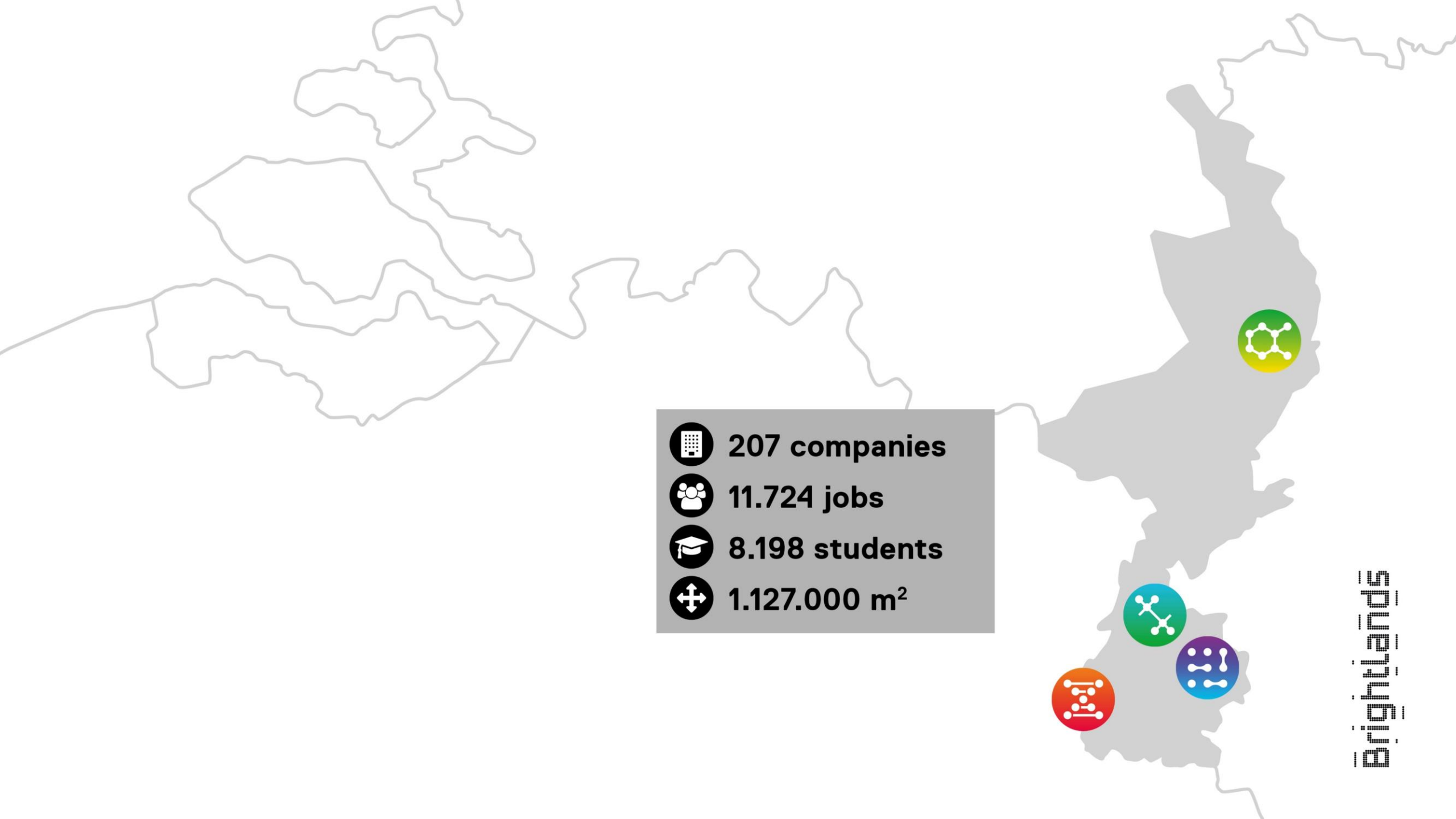
DMU MORI SYSTEMS

DMU MORI

MITRA-TEX

A few of the BAMC machines





207 companies



11.724 jobs



8.198 students



1.127.000 m²

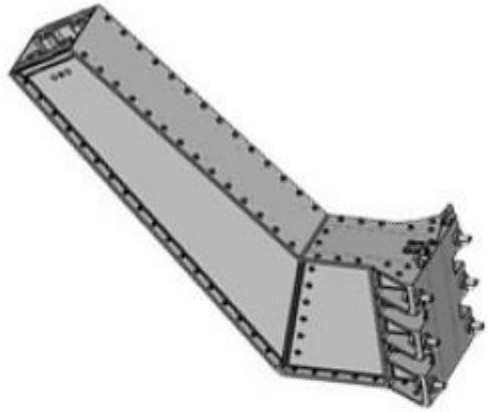
Brightlands

BAMC



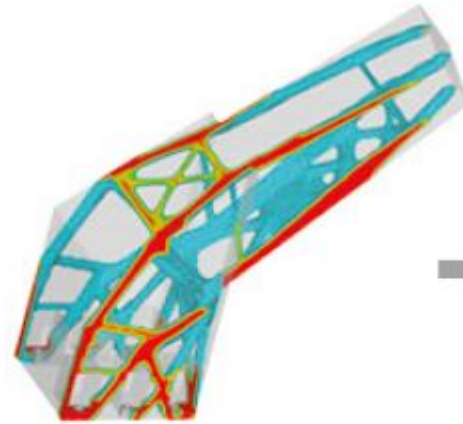
Brightlands
Knowledge crossing borders

Antenna Bracket Design Optimisation



Original
design

1400 Gram



Optimized
topology



Redesigned
antenna bracket

800 Gram

1kg = 50.000 euros

20 x Clamp system is 12 Kg reduction ~ 600.000 euro



The machines

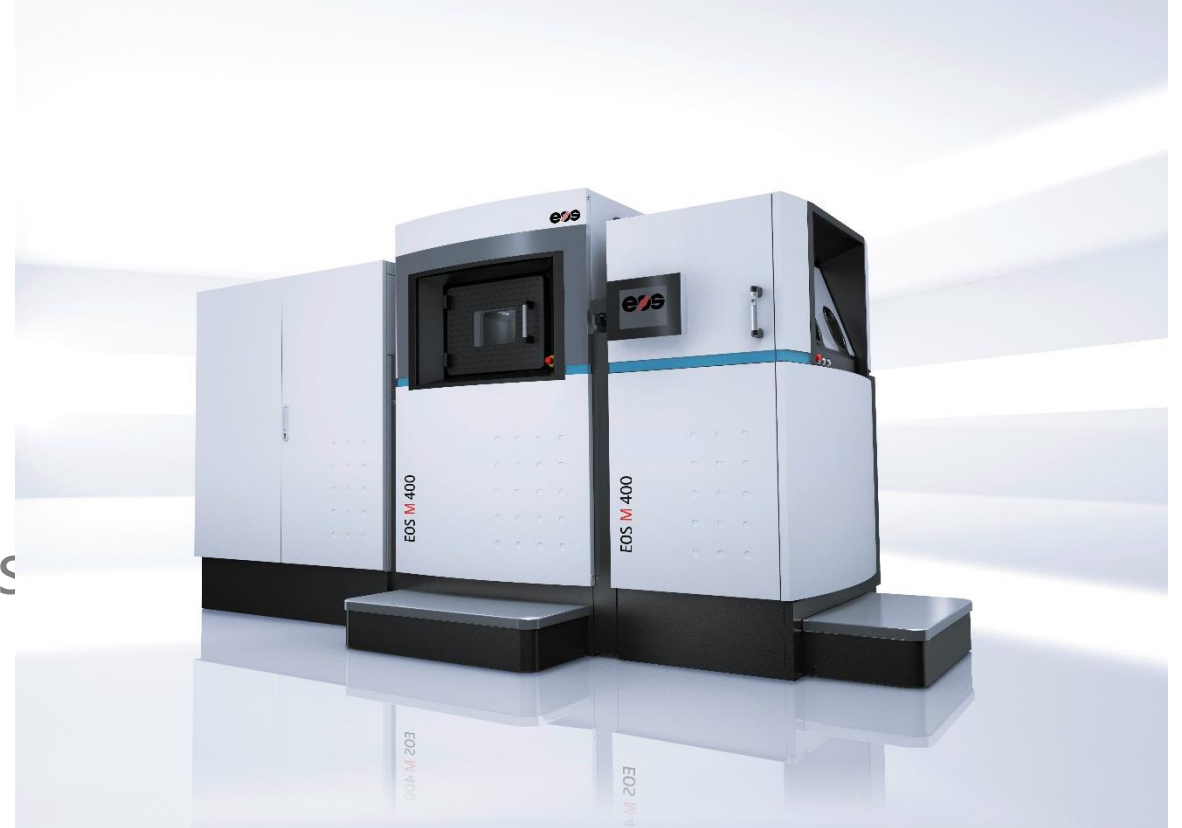
Technologies

- ✦ EOS M290 – Dedicated for production
- ✦ 250x250x325 mm³
- ✦ 400W Laser
- ✦ 40-200°C
- ✦ 20-120 µm layers
- ✦ Heat camera & QMS
- ✦ Materials:
 - ◆ Ti-alloys



Technologies

- ✦ EOS M400 – Production & R&D
- ✦ 400x400x400 mm³
- ✦ 1kW Laser
- ✦ 40-200°C
- ✦ 20-120 µm layers
- ✦ Heat camera & QMS
- ✦ Extendable automated module (s)
- ✦ Materials:
 - ◆ Al-alloys
 - ◆ Steel-alloys
 - ◆ Others on request



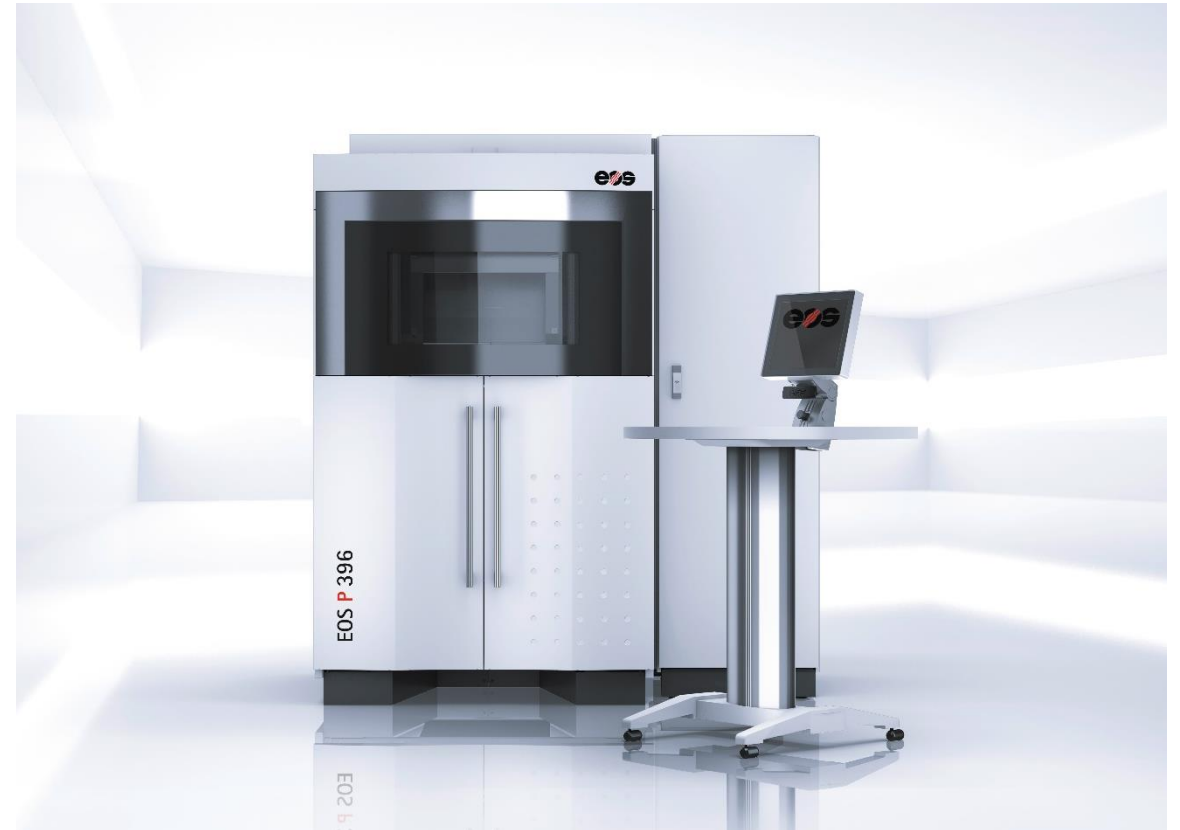
Technologies

- ✦ EOS P110 – Dedicated to research
- ✦ 200x250x330 mm³
- ✦ CO2 30W Laser
- ✦ 5-200 µm layers
- ✦ Integrated QMS
- ✦ Materials:
 - ◆ New polymer materials (medical research)
 - ◆ PA families



Technologies

- ✦ EOS P396 – Dedicated to production
- ✦ 340x340x600 mm³
- ✦ CO2 70W Laser
- ✦ 5-200 µm layers
- ✦ Integrated QMS
- ✦ Materials:
 - ◆ PA families



Technologies

- ✦ 3D ink-jet printer: Ceramics & bone
- ✦ Zcorp Plaster powder– Ceramics production and R&D
- ✦ 254x356x203 mm³
- ✦ Composites & colors
- ✦ 24bit colors and 600x540 DPI
- ✦ 80-100 micron layers
- ✦ Materials:
 - ◆ Ceramics
 - ◆ Synthetic bone
 - ◆ Others



Technologies

- ✦ 3D ink-jet printer for models in plaster:
- ✦ ProJet 460 Plaster powder– Production and Prototyping
- ✦ 254x356x203 mm³
- ✦ Composites & colors
- ✦ 24bit colors and 600x540 DPI
- ✦ 80-100 micron layers
- ✦ Materials:
 - ◆ Plaster



DMG Mori 6:

- High-end 5-axes simultaneous machining
- 10 pallet automation loader

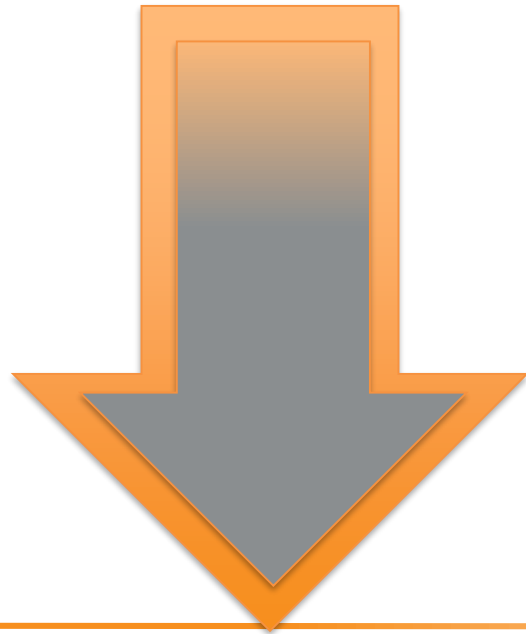


Technologies

- ✂ 3D Scanner device:
- ✂ GOM ATOS Core 200 – Service
- ✂ Measuring area: 200x150mm²
- ✂ Working distance: 250mm
- ✂ Point spacing: 0.08mm
- ✂ Sensor dimensions: 206x205x64 mm



Entrepreneurs & Inspiration



Entrepreneurs & Inspiration video

Click me for the video

About me...

- ✦ 32 years young
- ✦ Living in Maastricht
- ✦ Love to travel & to salsa dance



Thank you Q&A



Maikel Beerens



MaikelBeerens



Xiloc

www.xiloc.com

Winner of:



New Venture
van idee naar BV!



AM Award 2012

Contact us: info@xilloc.com

