

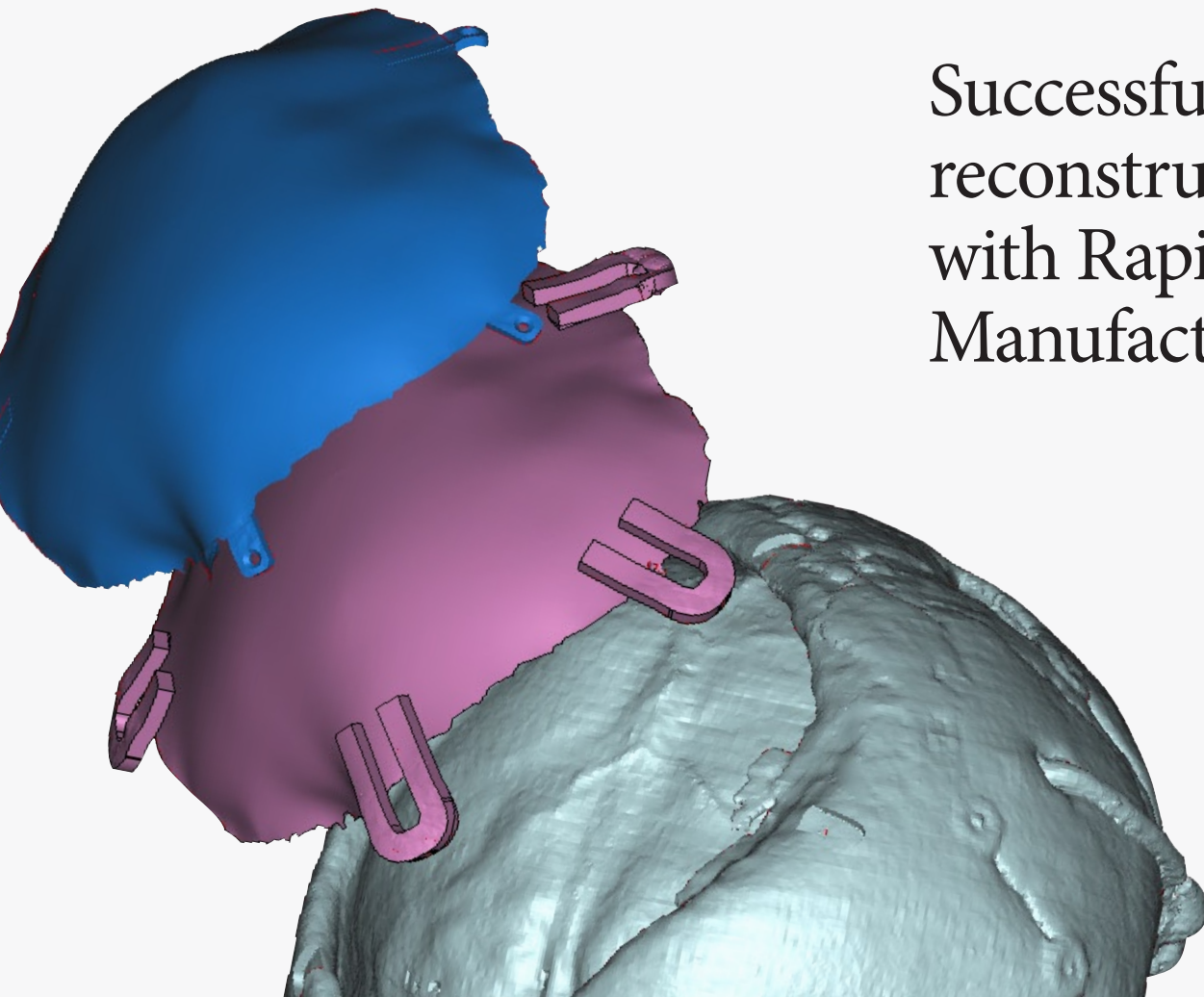
Rapid News.

GET THE LATEST REAL LIFE STORIES FROM THE WORLDWIDE USAGE OF ARCAM DIRECT MANUFACTURING MACHINES

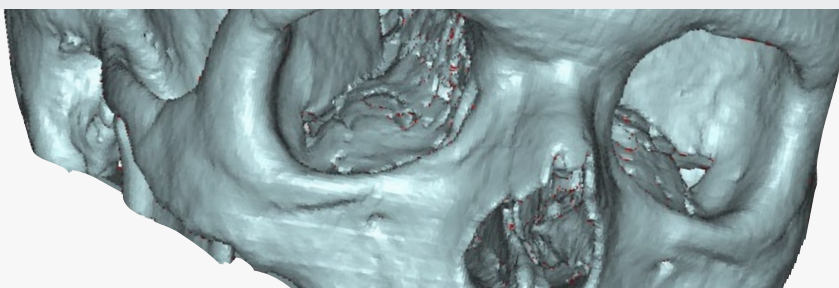
Arcam provides **Free Form Fabrication** machines for **Direct Manufacturing** of metal parts. The technology offers ultimate geometric freedom combined with first class material properties. Arcam is guided by our vision to revolutionize the art of manufacturing.



Successful skull reconstruction with Rapid Manufacturing.



www.arcam.com



A young girl suffers a tragedy in a car accident. An implant manufactured with Arcam EBM was used to reconstruct her skull.



Dr. Jules Poukens.
Vice Chairman at the Department of Cranio-Maxillofacial Surgery at the University Hospital in Maastricht. Dr Poukens is the pioneer that designed and performed the successful insertion of the titanium skull implant. The implant was manufactured in the titanium alloy Ti6Al4V using an Arcam EBM S12

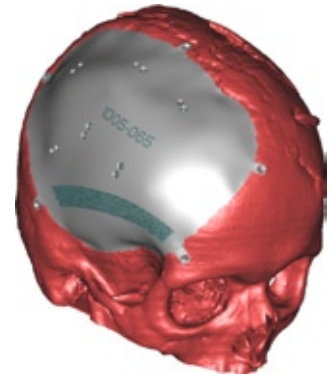


A young girl suffers a tragedy in a car accident. A large part of her skull bone had to be removed the by neurosurgeon in order to relieve the pressure on the brain. The extent of the implant can be seen in the CAD image to the right.

Reconstruction was done by using Rapid Manufacturing to fabricate an implant. The design of the implant was done by using 3-Matic software (from Materialise). Since the cranial plate needs to fit perfectly on the patient's skull you need to incorporate scanned anatomical data into the design.

This is usually a rather complex and time-consuming task but 3Matic works directly on the data generated by the image processing software, which results in considerable time-savings. The software provides the necessary tools for easily designing even the most complex prostheses such as this large skull plate.

The implant size is 180 x 130 x 5 mm, and the implant was designed by the engineers Maikel Beerens and Paul Laeven at



Instrument Development Engineering & Evaluation (IDEE) at Maastricht University.

The implant was manufactured in the titanium alloy Ti6Al4V using an Arcam EBM S12 machine at Fruth Innovative Technologien in Germany. The implant was built to net shape in 12 hours and finished with moderate manual polishing.

The mechanical properties are excellent with 100% density of the material.

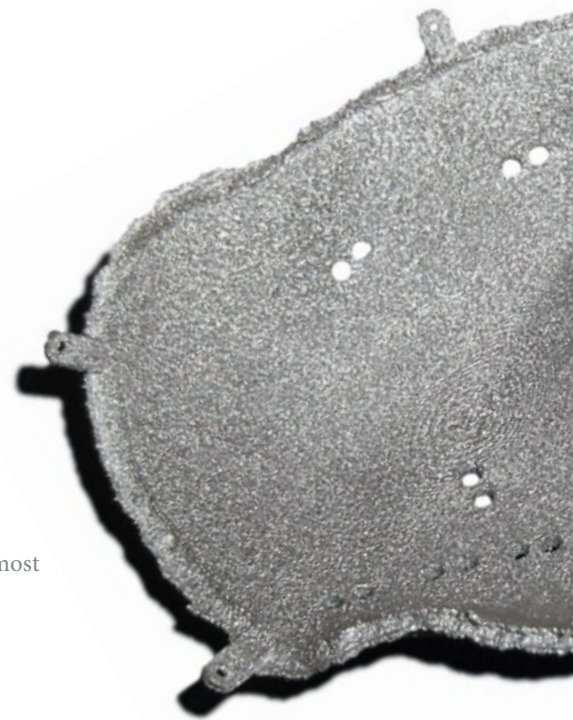
“The surface finish is almost ideal for implants”

Arcam's EBM technology manufactured the implant by melting thin layers of titanium powder. The energy source is an Electron Beam Gun and the process takes place in a vacuum chamber. The vacuum ensures very high purity of the material which is of great importance in implant manufacture. The combination of vacuum and a high power energy source yields high strength properties of the material. Implants produced with Electron Beam Melting feature a chemical composition within stipulated standards, fully solid material with fine microstructure, high ductility and good fatigue characteristics.





“The Arcam EBM technology has been very successful”



During the surgery a drill indicator built in a Stratasys FDM Titan machine was first used to indicate the fixation lips of the implants. The fixation lips need to be at bone level and not above. The implant was then fitted for seating and fixated with titanium screws.

The implant had a perfect fit during the operation and the implant healed in without any complications. The entire operation took less than 2 hours, and the procedure made it possible to get normal aesthetics, normal brain function and protection of the inner tissue.

EBM implants are faster and cheaper to manufacture compared to a CNC machine. The design aspect is smoother and less complicated with an EBM manufactured part and the surface is almost perfect for implants.

For more information, contact:

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ARCAM EBM MACHINE TECHNICAL DATA

| | |
|--------------------------|------------------------------|
| Build envelope | 200 x 200 x 200 mm (WxDxH) |
| Build speed | Up to 60 cm ³ /hr |
| Layer thickness | 0.05–0.20 mm |
| Vacuum pressure | <5 x 10 ⁻⁴ mBar |
| Electron Beam power | Up to 4000 W |
| Electron Beam accuracy | ±0.05 mm |
| Electron Beam scan speed | ~1000 m/s |
| Electrical connection: | 3 x 400 V, 32 A |
| Certification | CE |





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