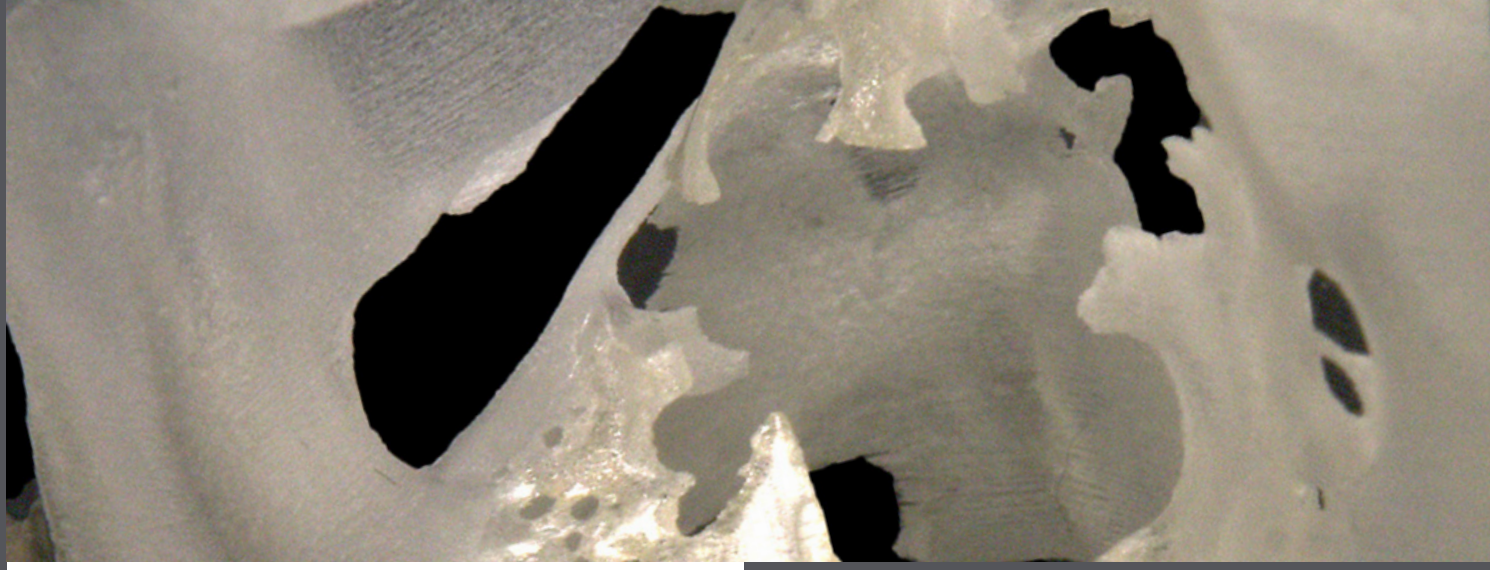


Better Care, Lower Cost

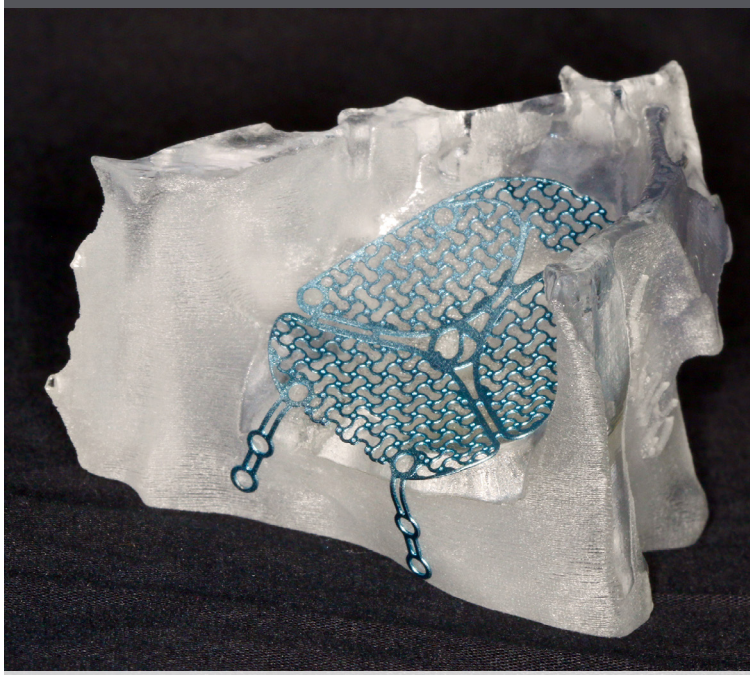
University Hospital Basel Uses 3D Printing for Advanced Cranio-Maxillofacial Surgery

The University Hospital Basel is an internationally recognized center of research and excellence, located in North-West Switzerland. The hospital provides expert patient care in areas such as cardiac and thoracic diagnostics, abdominal and oncological conditions, and oral and maxillofacial surgery.

In the Department of Surgery, physicians often treat patients with complex and life-altering illnesses that need expert, detailed surgical attention. Surgeons are constantly seeking ways to ensure successful clinical outcomes while simultaneously improving patient care and reducing costs for the patient and the hospital.

> “The impact on our patients is significant, and due to the reduced time under anesthesia, the risks of associated complications is substantially decreased.”

Dr. Florian M. Thieringer
MD, DDS, MHBA, CMF-Surgery, University Hospital Basel



Patient-specific 3D printed models enable preparation of hybrid titanium mesh implants prior to surgery, reducing operating time.

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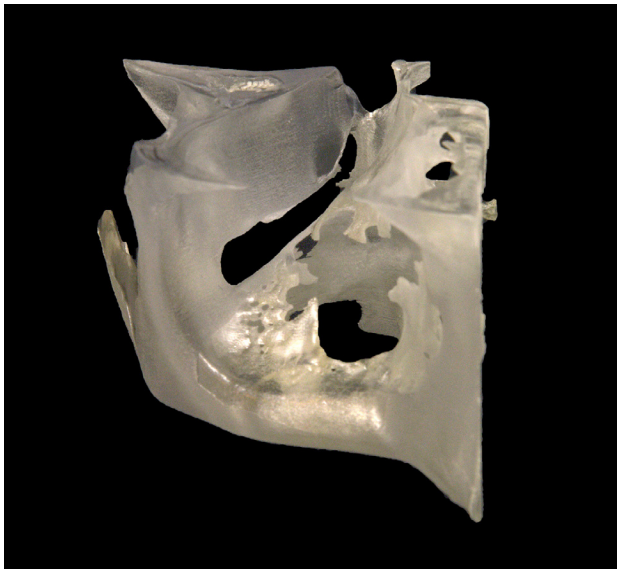
Reducing the Impact of Complex Orbital Reconstructive Surgery



An anatomically accurate, patient-specific 3D printed surgical guide and 3D model of the right orbit.

For Dr. Philipp Brantner and Dr. Dr. Florian M. Thieringer, patient-specific 3D printed surgical models represented a solution to these challenges and the hospital began outsourcing 3D printed models. However, the high costs and lengthy lead time posed a problem. To overcome these obstacles, Dr. Brantner and Dr. Dr. Thieringer co-founded the university hospital's in-house 3D Print Lab.

Now armed with access to high-resolution, accurate 3D printing technology that fits perfectly into a hospital environment, an interdisciplinary team of surgeons and radiologists is now working to make ultra-precise 3D models accessible to all surgical disciplines within the hospital.

Surgery for orbital floor fractures is complex due to extremely limited visibility and the risk of error can be high. Standard solutions involved hand-made, non-customized titanium meshes. But they required adjustment to ensure an exact fit, increasing operating time and cost, and potentially negatively impacting the patient.

Outsourced patient-specific 3D printed models or implants offered a potential solution, but the long lead time and high costs negated this option.

As a solution, the Department of Cranio and Maxillofacial Surgery used the hospital's in-house 3D printer to create patient-specific models. Doctors make a viable reconstruction plan by creating a 3D digital rendering of the healthy side of the skull using the patient's CT scan. The university hospital's in-house 3D Print Lab then makes an accurate surgical planning guide with biocompatible material. Within a few hours the model is with the surgical team, enabling them to prepare hybrid, patient-specific titanium implants prior to surgery. This technique has reduced operating time and eliminated the wait for outsourced patient-specific implants.

With regular access to customized, patient-specific models, the surgical team can plan, practice and prepare for complex surgeries ahead of time. The team is also using the 3D printed models to explain the surgeries to patients, which helps put them at ease prior to undergoing the actual procedure, and enables informed consent to be obtained quicker and more easily.

To make these models, the 3D Print Lab relies on an Objet30 Prime™ 3D Printer, using biocompatible MED610™ material. "Having access to an in-house 3D printer has simply revolutionized the way we treat many kinds of cranio-maxillofacial injuries," Dr. Dr. Thieringer explains. "MED610 is ideal, as the transparent models allow us to visualize parts of the anatomy otherwise obscured ahead of surgery. This is essential in cases where the orbital floor or several walls are fractured, and these bio models enable us to eliminate time-consuming elements of the treatment process."

Dr. Dr. Thieringer continued, “The use of Stratasys 3D models for the planning of interventions and implants has decreased surgery time by a staggering 33 percent. Now, a surgery which, on average, saw our patients under anesthesia for over an hour-and-a-half has been cut by a third to just one hour, additionally minimizing the risk of complications. Also, as the models are anatomically correct, we are decreasing the need for patients to return to us for revision operations.”

Beyond substantial time-savings and reduced complications, Dr. Dr. Thieringer’s team has also reported remarkable cost-savings associated with the surgeries. On average, when surgery time is reduced by 33 percent, the result is a significant savings of 70 Swiss Francs per minute or around 2,000[1] Swiss francs per operation.[2]

“The Stratasys Objet30 Prime fits effortlessly into our 3D Print Lab, and we are now harnessing it for the benefit of many of the patients that enter the Oral and Cranio-Maxillofacial clinic. Without 3D printing and the biocompatible, transparent material MED610, we wouldn’t be able to visualize these complex surgeries ahead of time, bring the model into the operating theatre, and ultimately improve the care for our patients,” he concludes.

> “The use of Stratasys 3D models for the planning of interventions and implants has decreased surgery time by a staggering 33 percent...”
>
> Dr. Dr. Florian M. Thieringer
> **MD, DDS, MHBA, CMF-Surgery,**
> **University Hospital Basel**

Outside the clinic for Oral and Cranio-Maxillofacial Surgery, the University Hospital Basel continues to integrate Stratasys 3D printing into the pre-surgical planning of other departments to improve not only patient outcomes, but also capitalize on the time and cost savings across the hospital.

[1] 1 CHF equivalent to €0.855; 2000 CHF = €1,710 (January 2018)

[2] This is only an exemplary cost estimation. The amount mentioned here assumes that one operating minute corresponds to approximately 70 Swiss Francs. Depending on the surgical procedure and the time saved, the total amount can be significantly higher or lower.

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