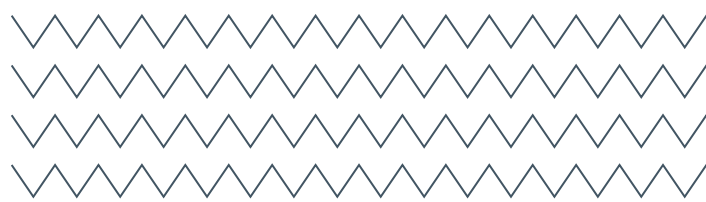


Ultimaker



Instant surgical planning with low-cost 3D printed bone models



Dr. Boyd Goldie, an orthopedic surgeon in London, uses 3D printing to make invaluable visualization aids for surgeries, saving time and money in the process. The technology offers numerous benefits, including better surgical preparation, significant reduction of surgical costs and more opportunities for better patient education.

Company

The Holly Private Hospital



Industry

Medical

Challenge

Make surgical procedures more efficient and improve communication between the patient and doctor.

Solution

Use 3D printing to easily recreate models of the bone in question at minimal cost, while reducing surgery preparation time.

Results

- Reduced time and costs involved with bone model preparation
- Better communication with patients
- Scalability allows for more precise results

Dr. Boyd Goldie – Introduction

Dr. Boyd Goldie, Consultant Orthopedic Surgeon - The Holly Private Hospital, London, treats patients with conditions associated with the upper limbs including: the shoulder, elbow, wrist and arm. He carries out a range of emergency and elective

procedures and provides several different upper limb treatments for his patients.

Dr. Goldie is a pioneer in the use of 3D printers in orthopedics and has lectured extensively on the topic. He uses the technology regularly in his practice. 3D printing helps him educate patients and facilitates the planning of complex surgeries by using 3D printed models as a guide during the operation.

Challenge

3D printing is commonly used in complex surgery, but most surgeons order externally-made 3D prints. Dr. Goldie wasn't content with this arrangement. It was very expensive (hundreds of pounds per print) and took weeks for the 3D prints to be delivered.

As Dr. Goldie says: "This is no good if you have a guy with a broken wrist and you're going to operate tomorrow."

Solution

Dr. Goldie purchased an Ultimaker 2+ 3D printer. When used in combination with open-source software (slicer.org), he can 3D print accurate fracture replicas in a matter of hours; depending on the size of the area. Dr. Goldie explains how it works. "I ask

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the radiographers to put the CT onto a disk. You can then extract the files and import them into the software to make the finals for the 3D printer.” The Ultimaker has also saved Dr. Goldie money. Medical software is costly (thousands of pounds) and takes time to use. With his 3D printer, Dr. Goldie can create models in minutes, at a fraction of the price.

Results

This process benefits Dr. Goldie and his patient. The patient gains a deeper understanding of the problem and how the doctor will address the issue. Dr. Goldie is better prepared and careful surgical preparation reduces surgery times. This makes 3D printing a cost-effective innovation for all procedures. It’s less expensive and faster than using conventional surgical equipment.

Other benefits include:

- Simplified communication with patients through tangible models
- Optimized surgical planning with reduced operation times
- Low-cost, effective visualization aids
- Customized parts tailored to fit any unique requirement

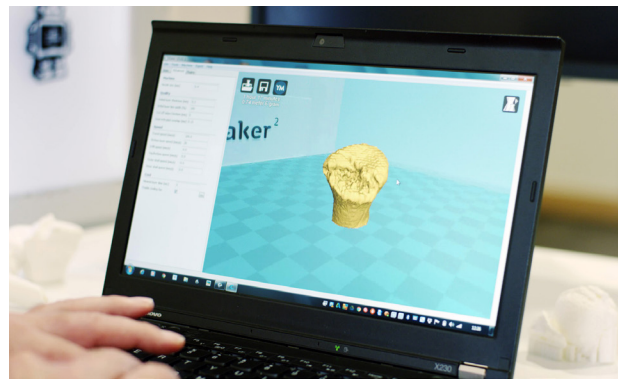


In preparation for surgery, the radiographs take a CT scan and save the data for Dr. Goldie to review

Costs

3D printing costs depend on both model size and degree of complexity. On average, a wrist-bone print requires 1.5 m of PLA and an upper arm bone needs 7.3 m. With Ultimaker 2+ in the office, surgical planning time was reduced from weeks to just a few hours and costs were lowered by 100 times.

	External suppliers	Ultimaker 3D printers + proprietary software	Ultimaker 3D printers + open-source software
Cost	\$850 per model	\$345 per model	\$345 per model
Time	2 weeks per model	5 hours per model	2.5 hours per model



Dr. Goldie converts the medical scan to a printable model using free, open-source software.



With his Ultimaker 2+, Dr. Goldie can print the bone model in a matter of hours.

Disclaimer: Ultimaker 3D printers are designed and built for Fused Filament Fabrication with Ultimaker engineering thermoplastics within a commercial/business environment. The mixture of precision and speed makes the Ultimaker 3D printers the perfect machine for concept models, functional prototypes and the production of small series. Although we achieved a very high standard in the reproduction of 3D models with the usage of Ultimaker Cura, the user remains responsible to qualify and validate the application of the printed object for its intended use, especially critical for applications in strictly regulated areas like medical devices and aeronautics.

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