3D Printing in the Medical Field

3D Printing's ability to personalize treatment has accelerated its adoption in the medical field. Professionals are having anatomically correct educational models made to improve student training and surgical outcomes and printing custom surgical guides, limb prosthetics and body implants. Another popular use for these types of prints allows doctors to convert patient-specific scans to better explain medical issues, upcoming surgeries, and treatment options.

RapidMade has been privileged to work on various medical applications including the design and production of medical and dental devices and anatomical models. The emergence of bio-compatible and sterilize-able materials allows RapidMade to use its additive manufacturing skills to create these revolutionary products. Materials include:

Nylon 12

- Process: SLS
- Method of sterilization: Steam Autoclave, EtO, Plasma, Chemical, Gamma
- Considerations: moisture, absorption, matte surface

ABS M30i

- Process: FDM
- Method of sterilization: Gamma, EtO
- Considerations: Micro-gaps

PC-ISO

- Process: FDM
- Method of sterilization: Gamma, EtO
- Considerations: Micro-gaps

PPSF

- Process: FDM
- Method of sterilization: Steam Autoclave, EtO, Plasma, Chemical, Gamma
- Considerations: Micro-gaps

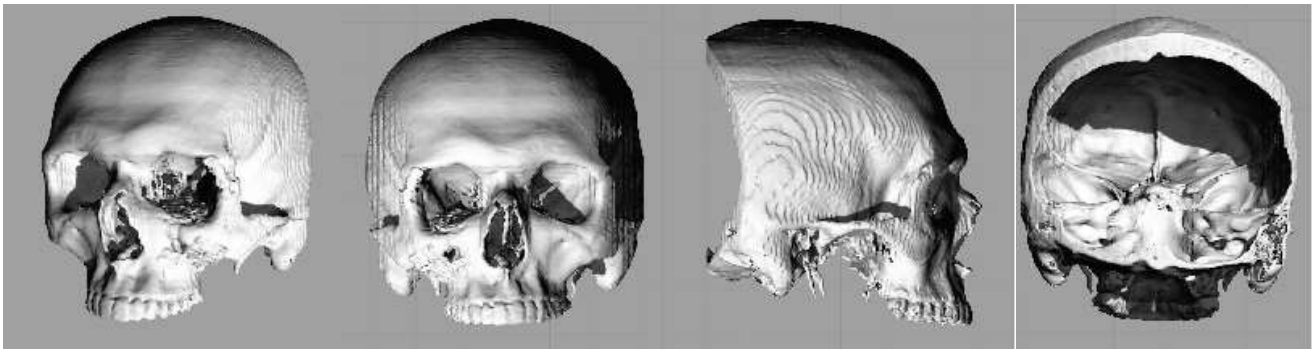
Ultem 1010 and 9085

- Process: FDM
- Method of sterilization: Steam Autoclave
- Considerations: Micro-gaps

17-4PH Stainless Steel

- Process: DMLS
- Method of sterilization: Steam Autoclave, EtO, Plasma, Chemical, Gamma
- Considerations: Matte surface

Recently RapidMade had the opportunity to work with a client that had CT skull scans done pre-and post-surgery. The client then came to RapidMade to have us 3D print the CT scan (DICOM file) to gain a more tangible understanding of the results. Instead of printing an entire skull, we re-modeled the CAD file to print just the main features, reducing the client's cost.



RapidMade printed the scaled and modified skull on its in-house Colorjet printer using a ceramic composite called Gypsum Powder. The high detail of the Colorjet printer could depict every bone, detail, and surgical re-construction for the client to see and feel. And this lower cost, fast turn-around machine enabled finished print delivery to this customer within days.

These medical files can be converted into models quickly and efficiently for a wide variety of uses including surgical reference for patients who need more visual aide of upcoming surgeries. They could lessen operating room time on difficult surgeries by providing a more tangible exact model to plan, take notes and practice on. They could be highly educational by scaling, adding visual aids and printed references onto the object or as in the skulls case serve as a cosmetic before and after "shot" of a surgery.

Like physicians, dentists and chiropractors can also benefit from having the models in their offices to determine treatment plans, visualize patient conditions, and explain proposed procedures.

The advent of sterilize-able medical grade materials has further accelerated the medical field's adoption of additive manufacturing. These advancements produce custom implants that last longer and reject less often in people's bodies, and include organic printed working hearts, printed living skin tissue, stainless-steel vertebrae and skulls, as well as a myriad of medical devices.

Additive manufacturing is helping the medical field grow – in some cases, literally. People may not be able to live forever, but they will likely live better and perhaps longer.