

**WHITE PAPER**

**ON**

**3D PRINTED MODELS**

**FOR SURGICAL PLANNING**

## BRIEF INTRODUCTION

Surgical planning is a pre-operative method of visualizing surgical intervention to pre-define surgical steps. Visualizing patient's anatomy on a 2D computer screen provides an insufficient and non-realistic representation of spatial relationships at times. Use of 3D printed anatomical models for preoperative planning can assist the surgeons better. The DICOM images produced in radiographic imaging techniques like CT scan and MRI are used to create a 3D design, from which we can create models using 3D printing. These 3D printed models are a great help in surgical pre-planning, by providing anatomical information that is invaluable for an accurate diagnosis, to determine the line of treatment and to perform mock surgery.

## ADVANTAGES OF 3D PRINTED MODELS FOR SURGICAL PLANNING

### TRADITIONAL PLANNING

### WITH 3D PRINTING

❖ Interpretation of 2D data is difficult

❖ Interpretation of 3D data is lot easier

❖ Anatomical structure of the patient when viewed during surgery might not match the visualized structure

❖ 3D Printed models used for mock surgery are accurate and patient specific as those are based on DICOM images of patients.

❖ More time is consumed in analysing each and every step

❖ Less time consuming surgical procedure with adequate aesthetic result.

❖ Orientation and approach of the intervention might not be accurate

❖ Can predetermine approach and orientation of the surgical tools

- ❖ Drilling and sawing operations can't be performed in pre-surgical planning
- ❖ Drilling, sawing, bending plates, screwing etc. can be performed easily.

## **APPLICATIONS OF SURGICAL PLANNING**

- ❖ The implants can be molded or shaped prior to the surgery in Cranioplasty by using a patient specific 3D printed skull.
- ❖ 3D printed models can be used by Orthodontists to print Crowns, bridges and many more Orthodontic objects for better fit on the teeth. Preoperational procedures help the orthodontist arrive at the right orientation and access of the tools to be used in the procedure.
- ❖ Maxillofacial surgeons can use 3D printed models of the affected part for preoperative planning as the procedure needs to be minimally invasive and the outcome should be aesthetic.
- ❖ Osteoarthritis has the risk of unequal leg length. The risk can be minimized by pre operating on the 3D printed model.
- ❖ Oral, Orthognathic, Vascular surgeons etc., can also use 3D models for surgical preplanning.

## **PROCESS TO MANUFACTURE CUSTOM 3D MODELS**

- ❖ CT scan or MRI images (DICOM images ) of the affected part are studied.
- ❖ The Images are converted into .stl format.
- ❖ The 3D virtual model is prepared by slicing and designing software.

- ❖ The virtual model is printed using additive manufacturing technique.
- ❖ This 3D printed model is used for patient counseling.
- ❖ Pre-operative techniques can also be applied on the model.

## **HOW TO GET THESE ANATOMICAL MODELS**

- ❖ Send the patient specific dicom images, instructions and the contact details to [info@think3d.in](mailto:info@think3d.in) or upload the images at [www.think3d.in/dicom-3d-models](http://www.think3d.in/dicom-3d-models)
- ❖ We will go through them and have a teleconference with doctor to confirm requirements and choice of material.
- ❖ 3D Views of the custom implant are shared along with measurements and fitment for feedback.
- ❖ 3D Printed custom implant is shipped to your site.

## **CONTACT US**

Drop an email to [info@think3d.in](mailto:info@think3d.in) / callus @ 040-30191007. You can chat with us by logging to [www.think3d.in](http://www.think3d.in)

## **ABOUT THINK3D**

think3D is India's leading 3D printing platform with sales & support offices in Hyderabad, Mumbai, Delhi, Bangalore, Chennai, Ahmedabad, Coimbatore and Visakhapatnam. We provide 3D Printers, Scanners, and also offer 3D Printing/ Designing/ prototyping services for multiple sectors.

## **REFERENCES**

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- ❖ 3.3D Printout Models vs. 3D-Rendered Images: Which Is Better for Preoperative Planning? Zheng YX; Yu DF; Zhao JG; Wu YL; Zheng B

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