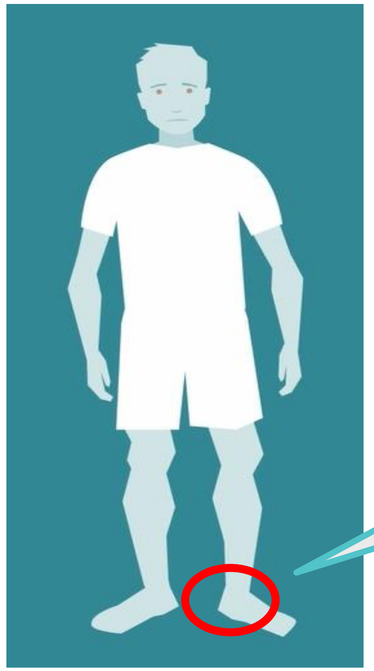
Objectify Technologies Pvt. Ltd.

Ideate | Design | Create

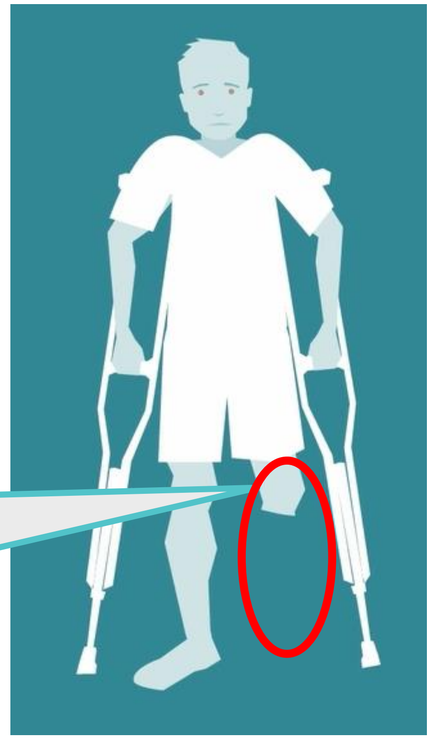
Case Study : DMLS Titanium Calcaneus Implant

Office Address : Plot no. 456, Patparganj Industrial Area, Delhi-110092

The Problem



Doctors from **Maulana Azad Medical College** (New Delhi) had an immediate requirement of a **heel bone implant** for a patient suffering from bone cancer.



The requirement needed to be met as soon as possible as the cancer was spreading, effecting more bone tissues. Current Bone Grafting techniques are inadequate to meet the demand of cancer ridden cells. This would have led to **Amputation**.

The Requirements

The Challenge was to **Avoid the need for Amputation.**

➢ The Heel Bone Implant had the requirement of the following properties:

Customize shape
- for perfect replacement

Accuracy
- for ease in movement.

Strength
- for Durability

Desired Surfaces
- for ease in joining

Pores
- For Osseo integration

Light weight
- for Mobility

All this was required in a **timeline of just one week.**

The Solution

- With the help **of CAD file of the ankle obtained through CT scan** OBJECTIFY started working on providing a solution.
- **Metal Additive manufacturing** was the only tool that could address the requirements and that too in such a **short timeframe**.

Customize shape

- Metal AM allows complex shapes to be manufactured using CAD as input.

Accuracy

- Metal AM allows near net shapes to be build with an accuracy of around 50 microns.

Strength

- Titanium alloy Ti64 provides robust strength.

Desired Surfaces

- Using Metal AM desired surfaces were achieves and areas where highly smooth surfaces were need polishing was done post build.

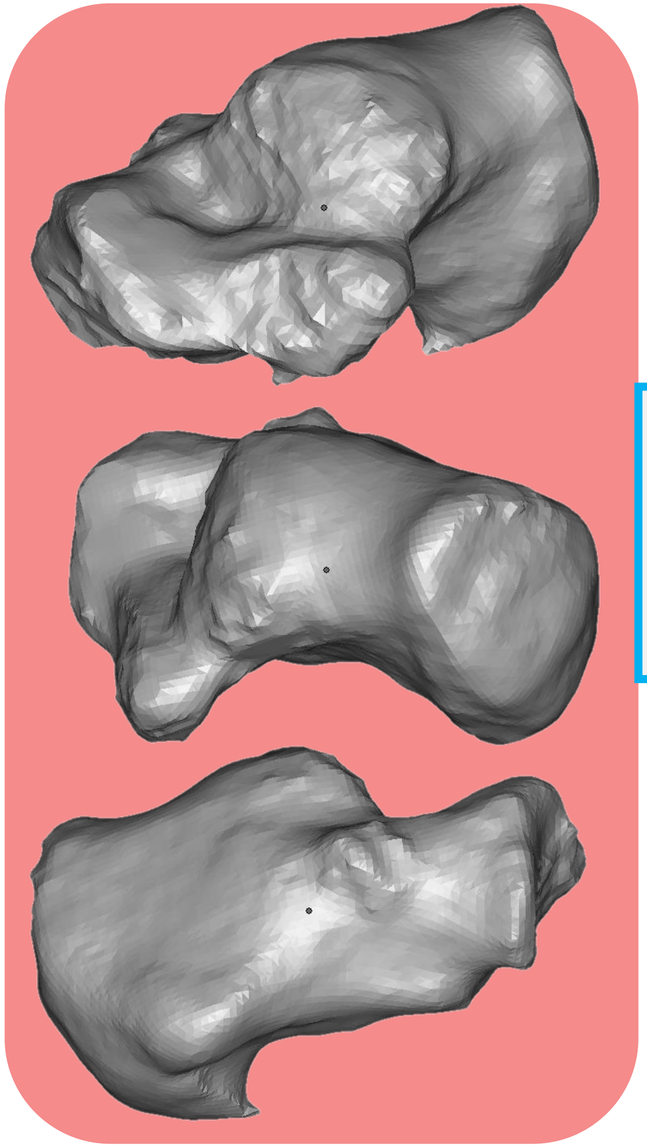
Pores

- For Osseo integration Metal AM allowed freedom to make pores.

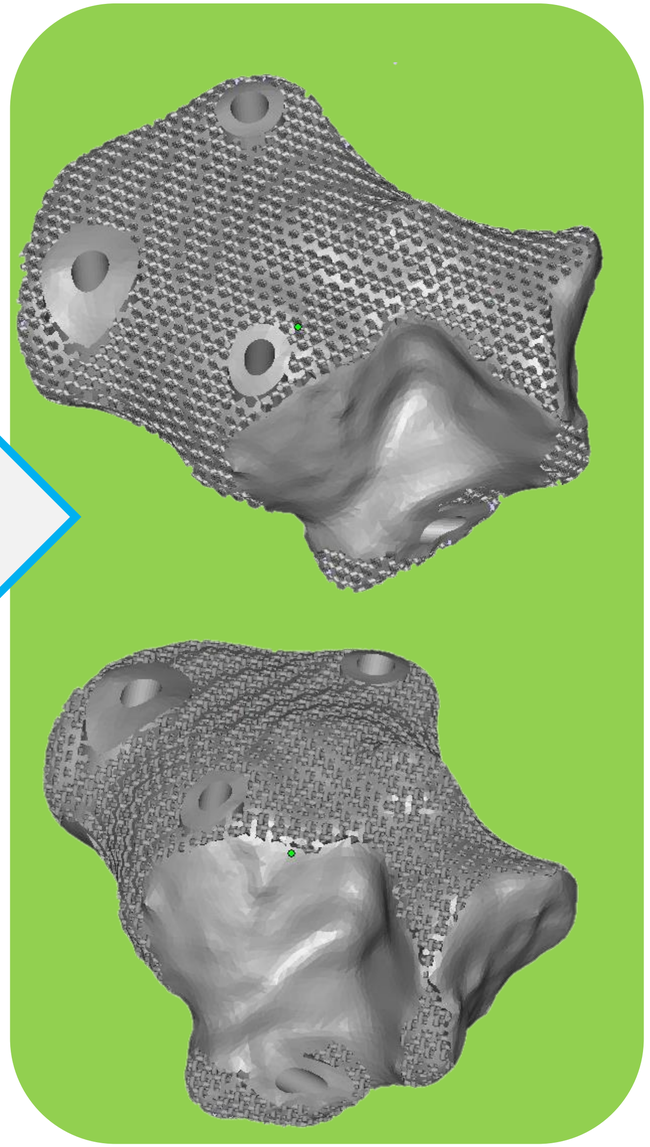
Light weight

- Lattice structure was incorporated in the design and light Titanium alloy was used.

The Designing



Designers at OBJECTIFY converted **raw CAD input from CT scan** was converted into the actual implant model with the valuable inputs of the doctors.

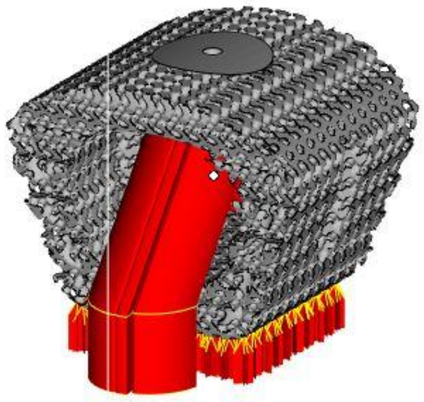


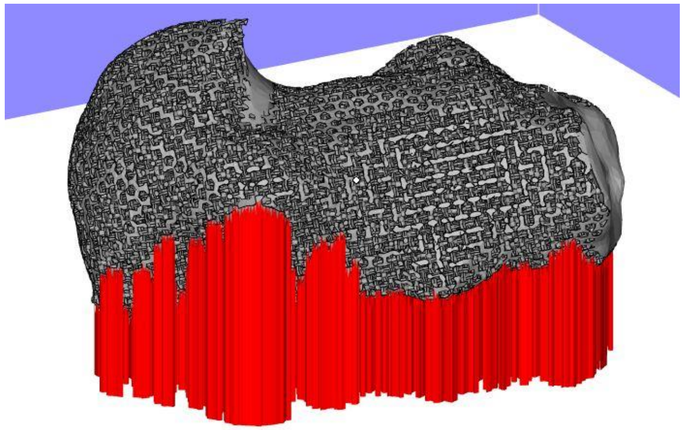
Design Validation

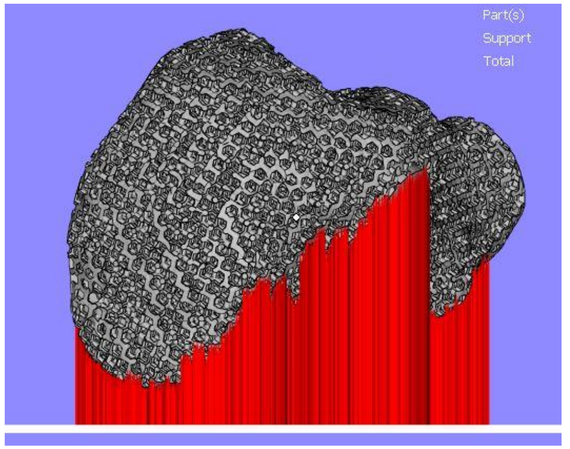
- Using Polymer based 3D printing technology (SLS – Selective laser Sintering) the team created a mock-up for the final end implant.
- This gave us two big upper hands
  - The team was able to get a feel of the size and orientation of the implant.
  - And, check for dimensional accuracy.

Data Preparation

- Using Magics the team prepared the data which was validated through the Plastic mock-up built earlier.
- This made the data preparation easier and more fluid. Reducing time and making more room for improvements (if any).

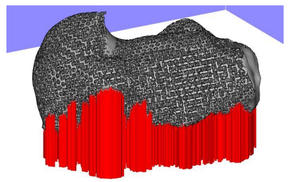






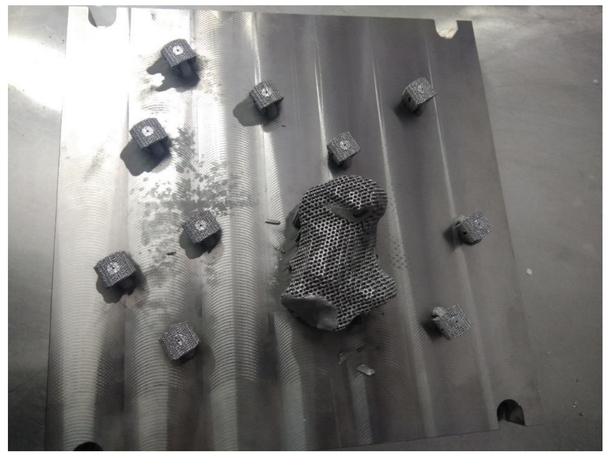
Production

- With all variables and needs in set it was the time for manufacturing the component in Titanium.
- Using Metal 3D printing capabilities (DMLS – Direct Metal Laser Sintering), the process was initiated.



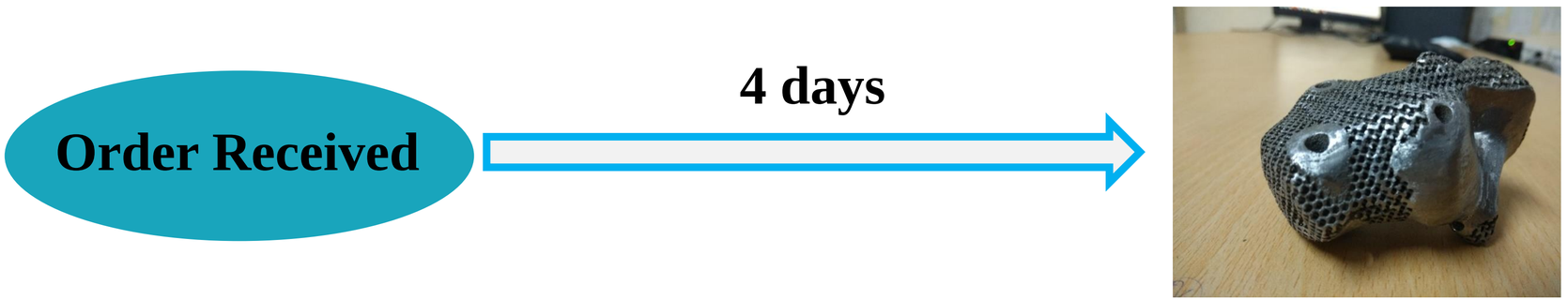
Data is fed in the machine

The final Outcome



Finishing

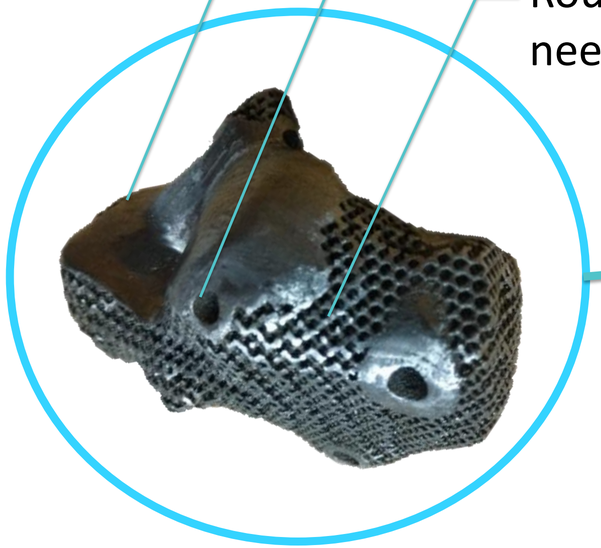
- With the completion of the production procedure, the part needed to be refined with precision for final implementation.
- The following constitute the finishing/post production procedures
  - Wire cutting of the base plate.
  - Making holes in the desired locations.
  - Hand polishing of the implant.
  - Dimensions were verified.
- Finally the implant was sterilised and dispatched.

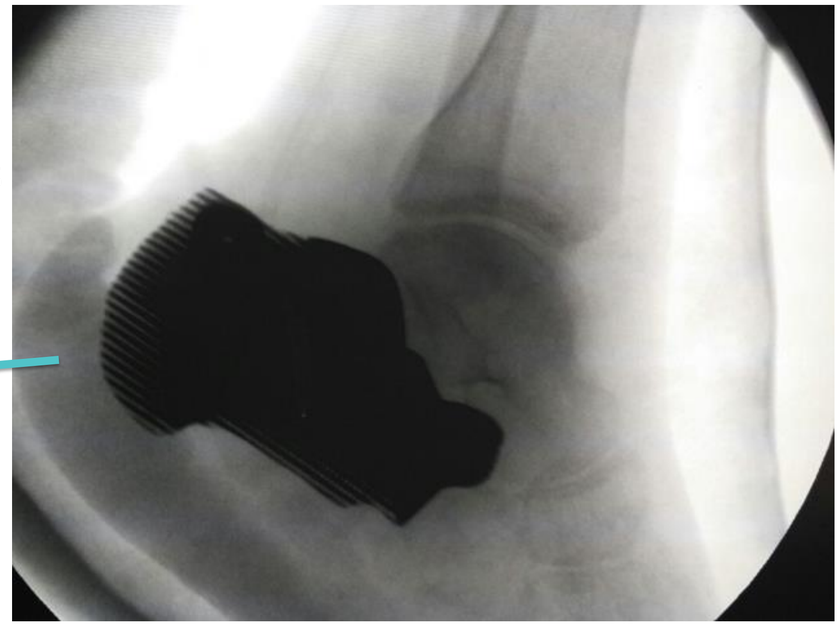


- The built process took 9hrs and 30minutes and the whole process took 4 days.

Result

- The implant was done and the patient could walk again evading the need for amputation.





Thank You!

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