PORTFOLIO

Fabrication & Experimental Design

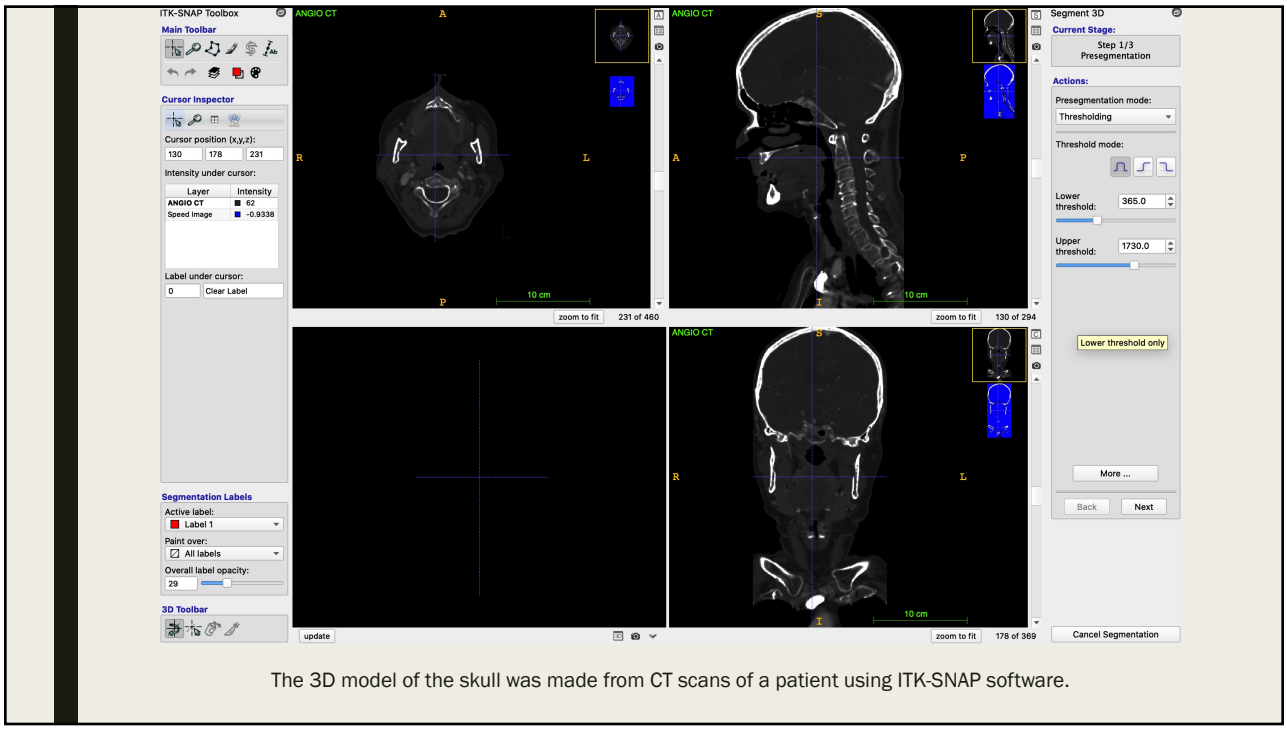
SIMBISO MAPHOSA

1

BODY PART EXTRACTION (SKULL)

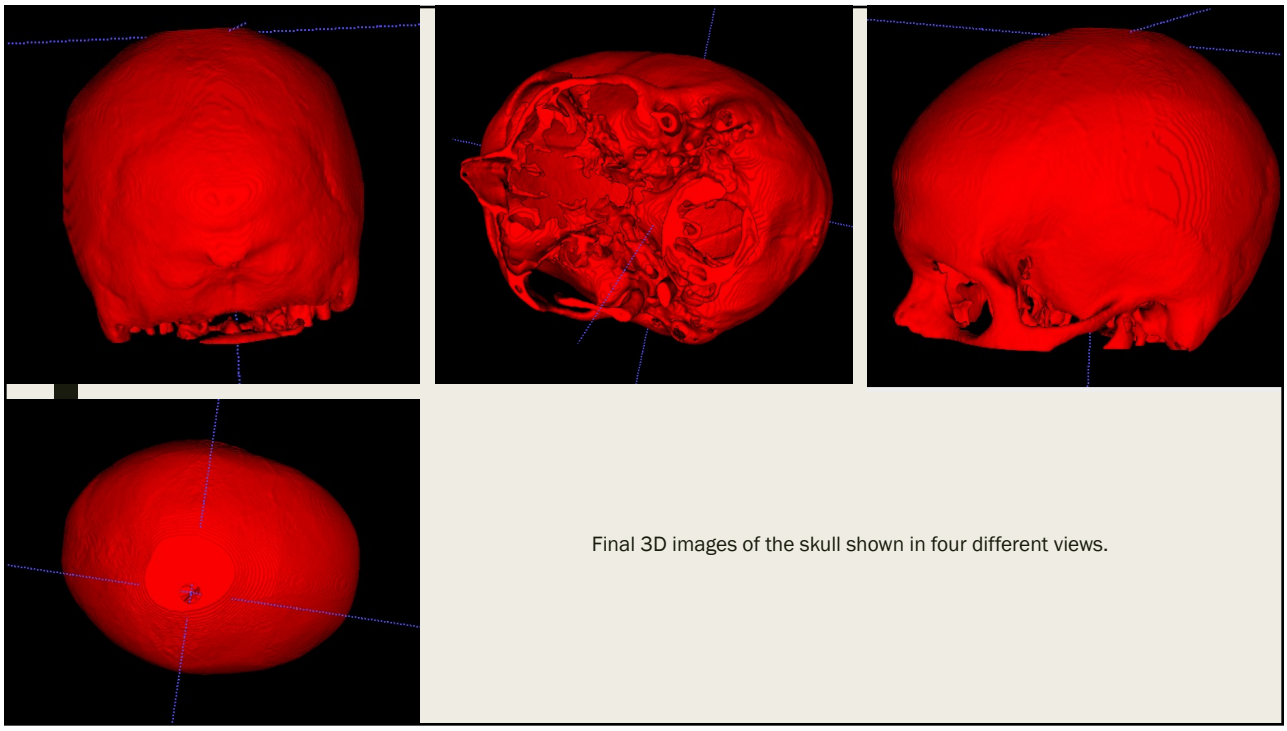
3D PRINTING

2



The 3D model of the skull was made from CT scans of a patient using ITK-SNAP software.

3



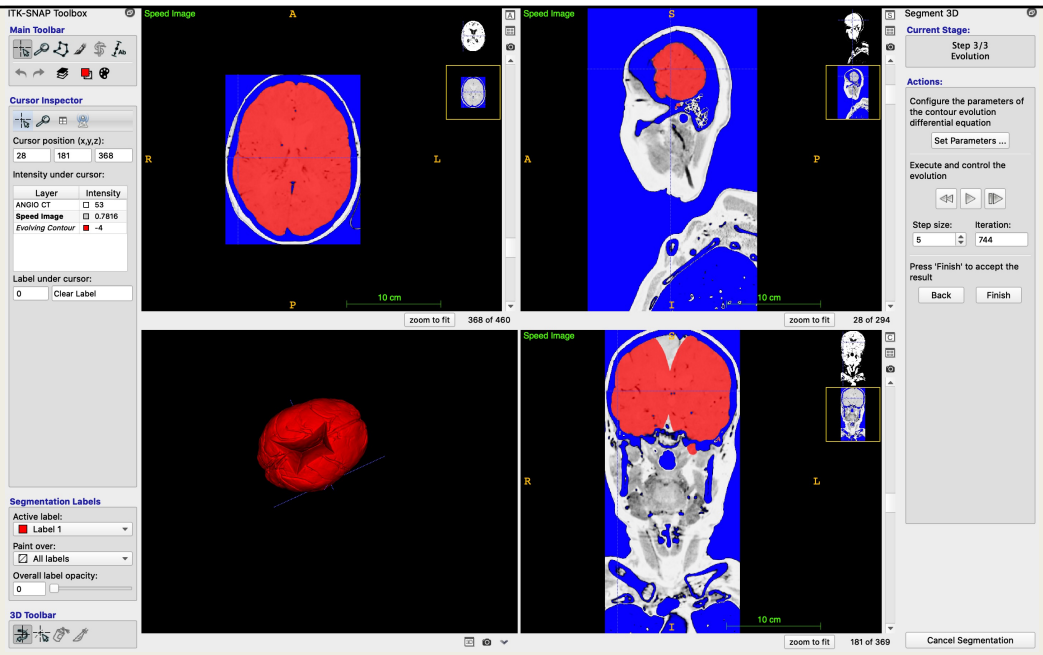
Final 3D images of the skull shown in four different views.

4

BODY PART EXTRACTION (BRAIN)

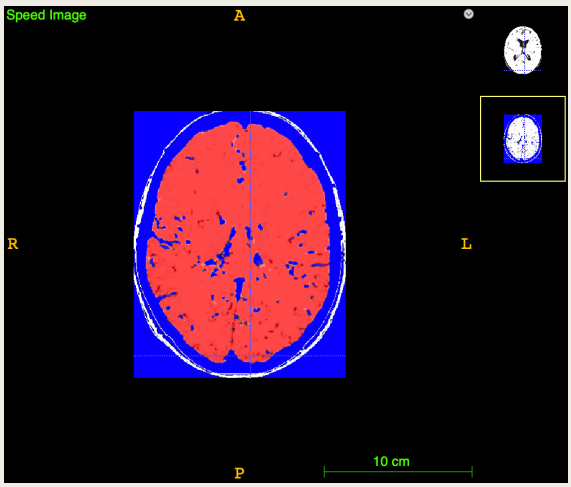
3D PRINTING

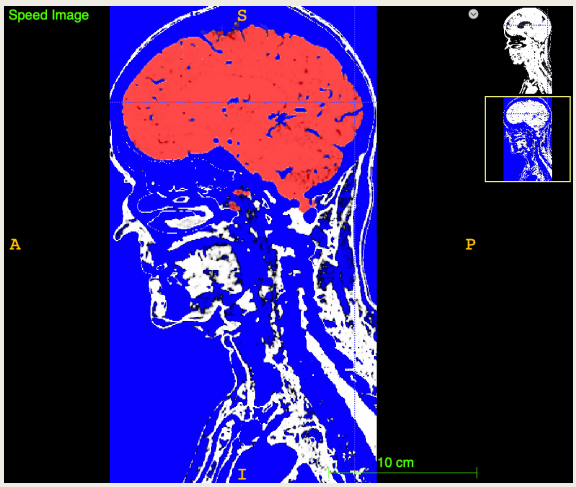
5



The image shows the propagation of segments of the brain to create a 3D image. The 3D model of the brain was made using ITK-SNAP software from CT scan images of the head and neck.

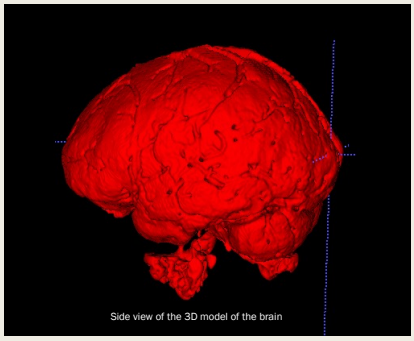
6

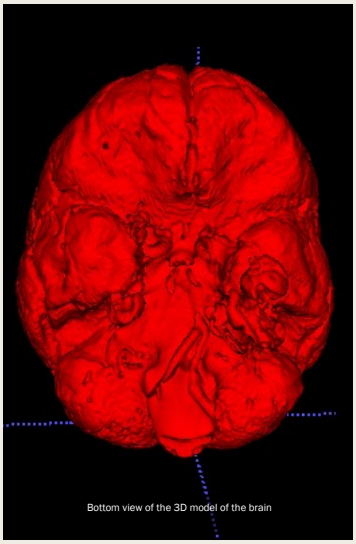


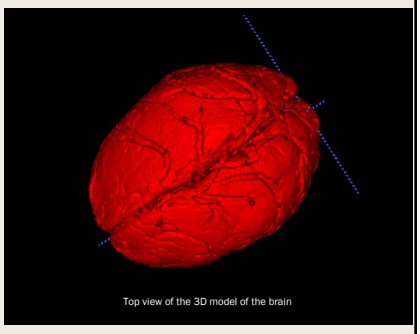


The brain segments were separated for other body parts by adjusting the contrast and the threshold.

7







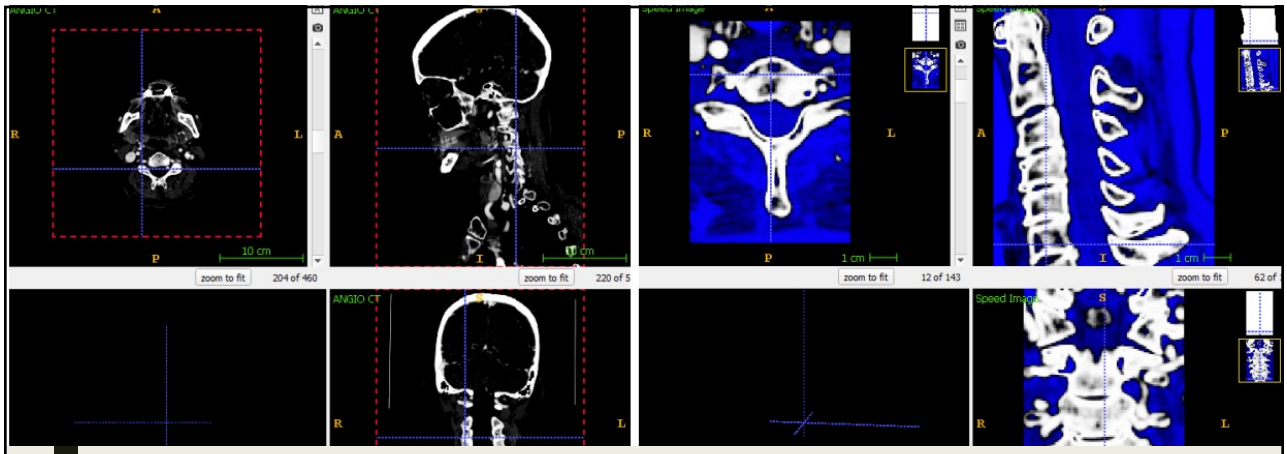
The 3D model of the brain was exported as a .stl file when the propagation process was complete. The images above show the final 3D model of the brain.

8

BODY PART EXTRACTION (CERVICAL SPINE)

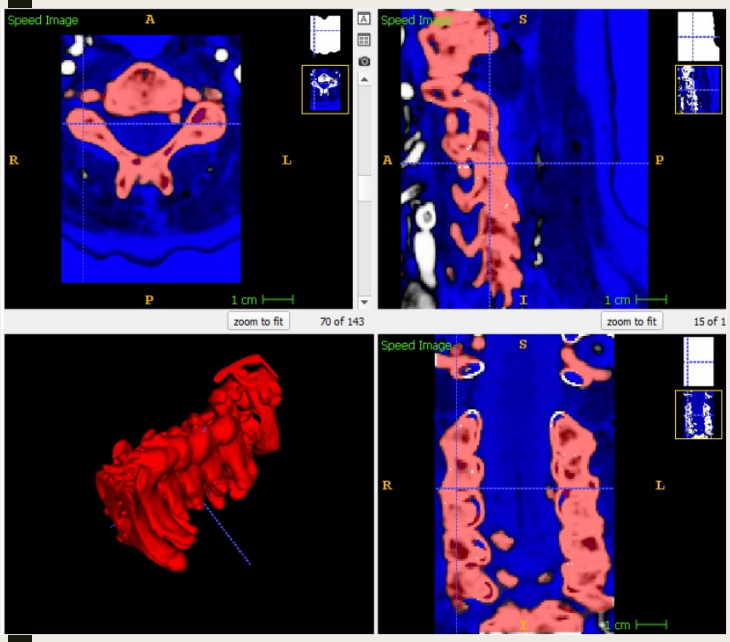
3D PRINTING

9



Segmentation of the cervical spine

10



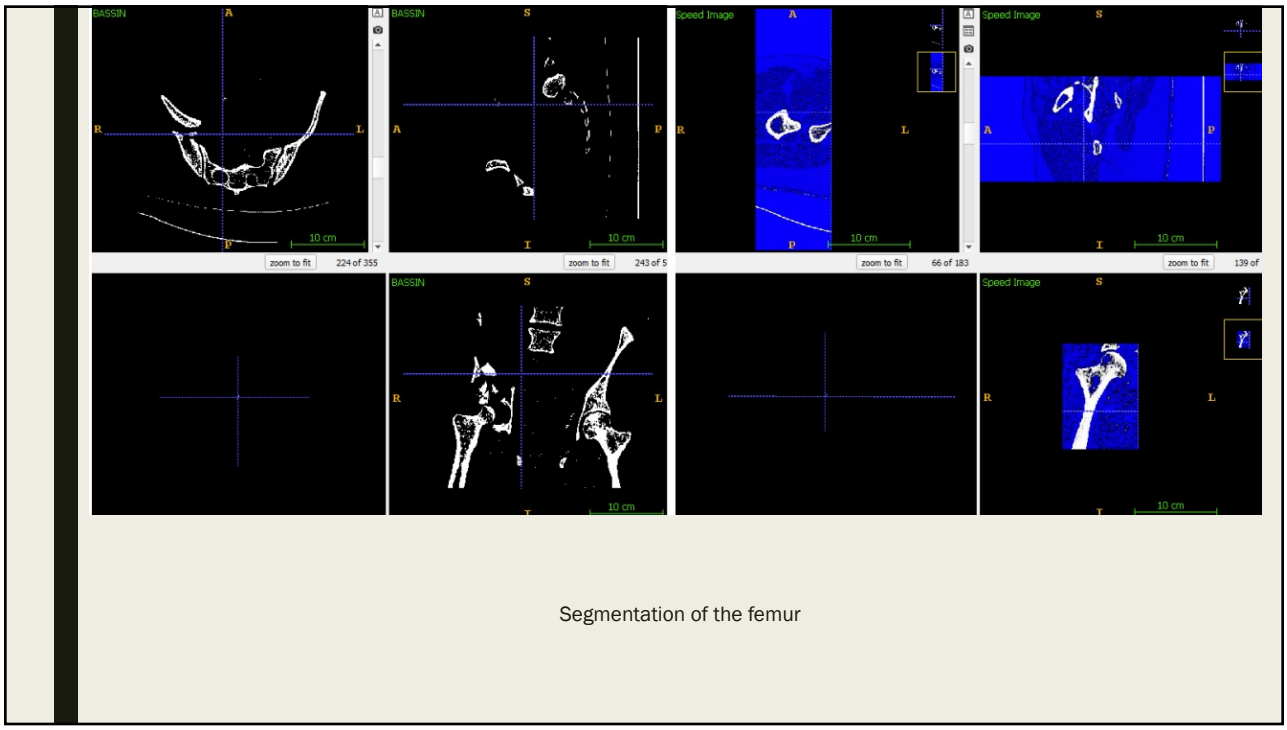
3D rendering of the cervical spine

11

BODY PART EXTRACTION (FEMUR)

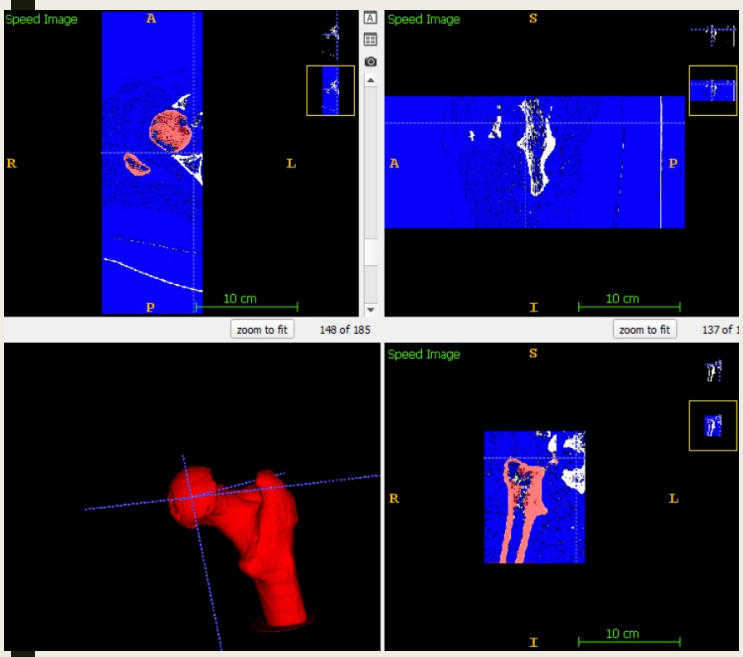
3D PRINTING

12



Segmentation of the femur

13

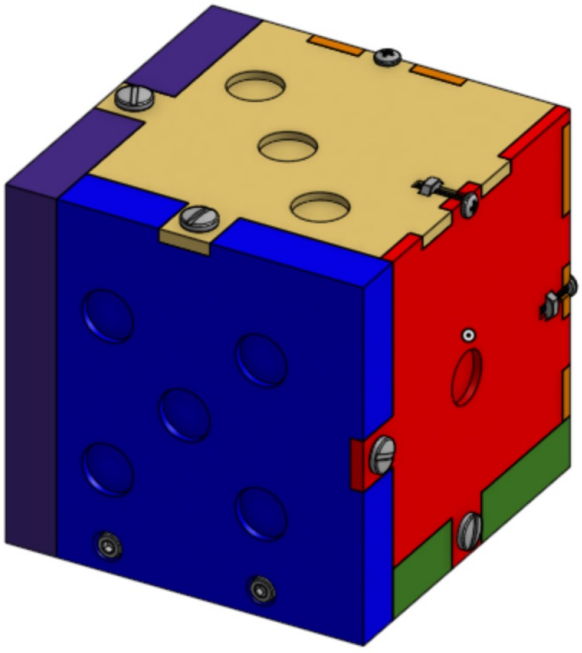


3D rendering of the femur

14

CUBE OF KNOWLEDGE

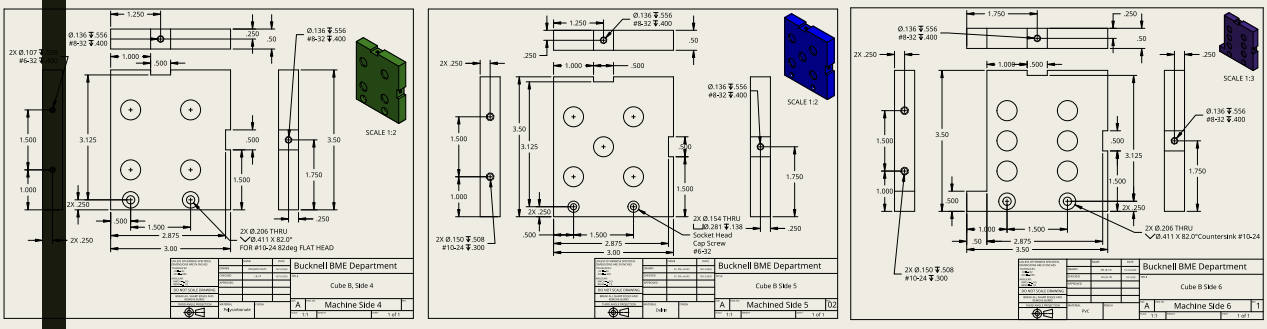
15



Three teams with three students on each team worked together to manufacture the cube of knowledge on the right.

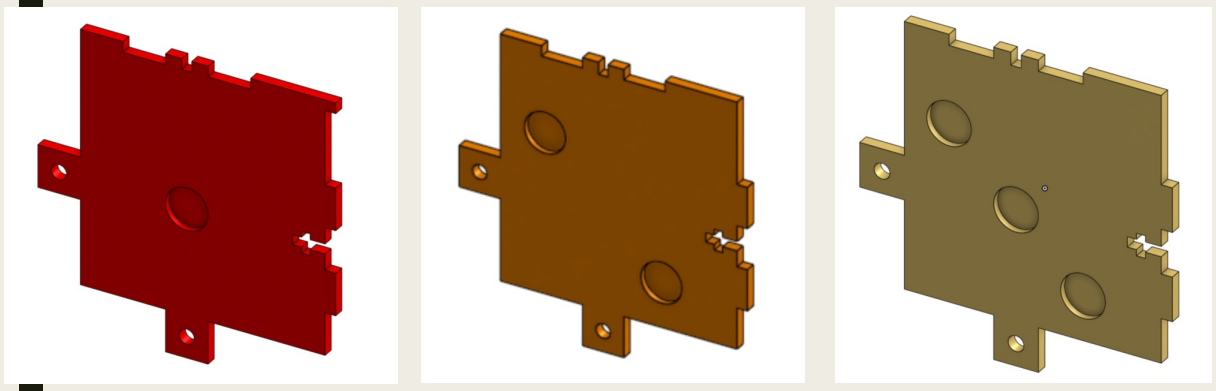
The cube consists of three machined sides and three laser cut sides.

16



Each team designed and manufactured one machined side. Assembly drawing of each machined side are shown above.

17

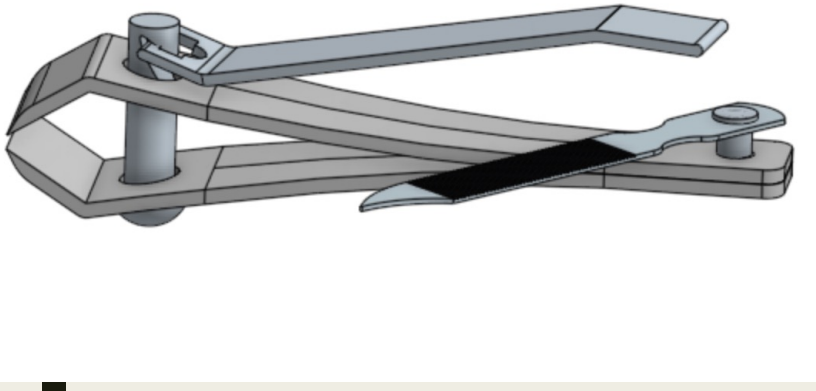


Each team also made a laser cut side.

18

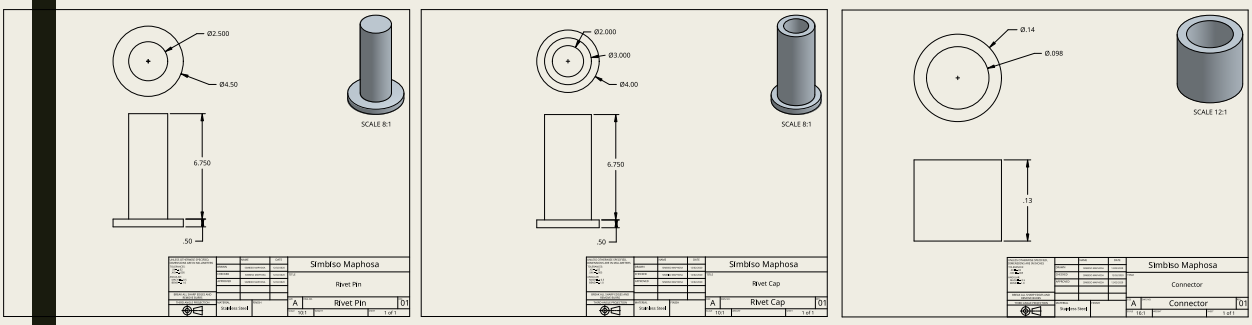
NAIL CLIPPERS

19



The nail clippers on the left were designed in Onshape.

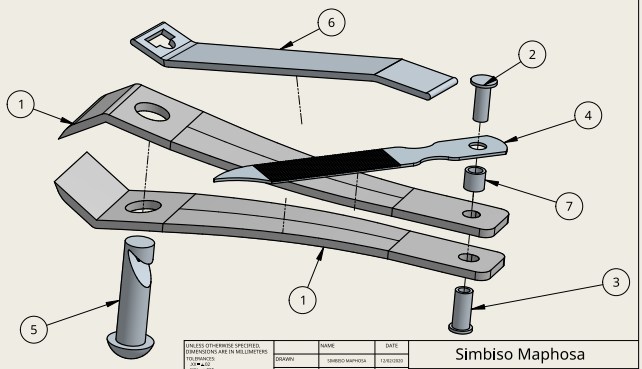
20



Engineering drawings of the rivet pin, rivet cap and connector.

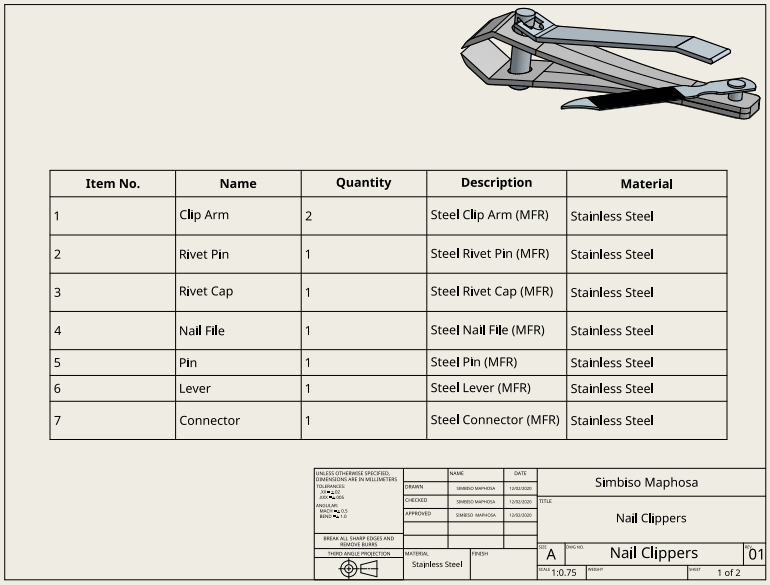
21

1. Place items 1 together and the bottom sides facing each other. Make sure the holes on each item align.
2. Place item 7 on top of item 1, making sure it aligns with the hole at the back of item 1.
3. Place item 4 on top of item 7.
4. Place item 2 on top of item 4 and make sure it goes through item 4, 7, and 1.
5. Place item 3 at the bottom of item 1 and make sure it goes throught the holes in items 1, 7, and 4.
6. Put item 5 through the holes in item 1.
7. Connect item 6 to the top of item 5.



Assembly drawing of the nail clippers with step by step instructions of how to assemble the parts.

22



Item No.	Name	Quantity	Description	Material
1	Clip Arm	2	Steel Clip Arm (MFR)	Stainless Steel
2	Rivet Pin	1	Steel Rivet Pin (MFR)	Stainless Steel
3	Rivet Cap	1	Steel Rivet Cap (MFR)	Stainless Steel
4	Nail File	1	Steel Nail File (MFR)	Stainless Steel
5	Pin	1	Steel Pin (MFR)	Stainless Steel
6	Lever	1	Steel Lever (MFR)	Stainless Steel
7	Connector	1	Steel Connector (MFR)	Stainless Steel

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS
TOLERANCES:
LINEAR
.XXX ±0.005
ANGULAR:
MACH ±0.5
BEND ±1.0
BREAK ALL SHARP EDGES AND REMOVE BURRS
THIRD ANGLE PROJECTION

	NAME	DATE
DRAWN	SIMBISO MAPHOSA	12/02/2020
CHECKED	SIMBISO MAPHOSA	12/02/2020
APPROVED	SIMBISO MAPHOSA	12/02/2020

MATERIAL: Stainless Steel
FINISH

Simbiso Maphosa

TITLE: Nail Clippers

SIZE: A | DWG NO.: Nail Clippers | REV: 01

SCALE: 1:0.75 | WEIGHT | SHEET: 1 of 2

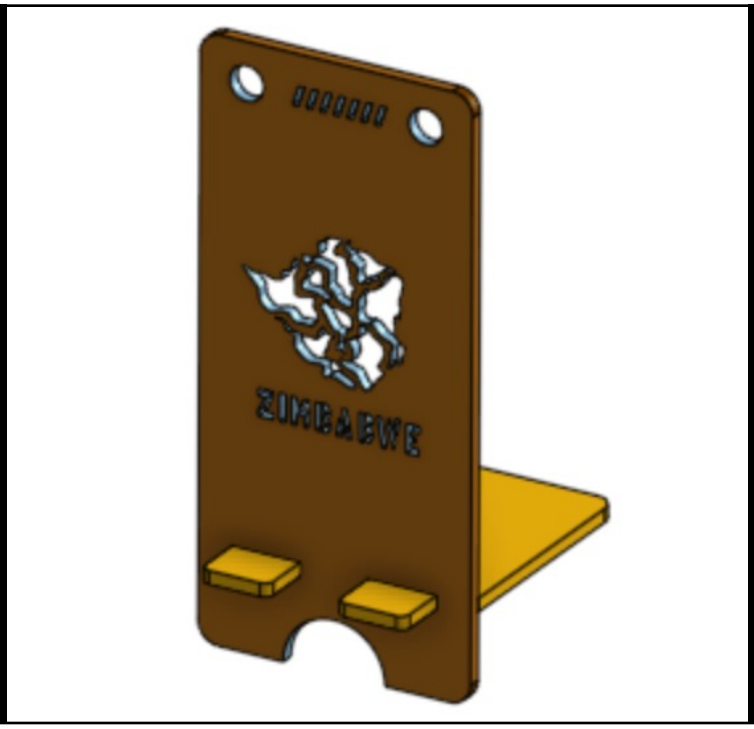
Assembly drawing of the nail clippers displaying the bill of materials.

23

PHONE STAND

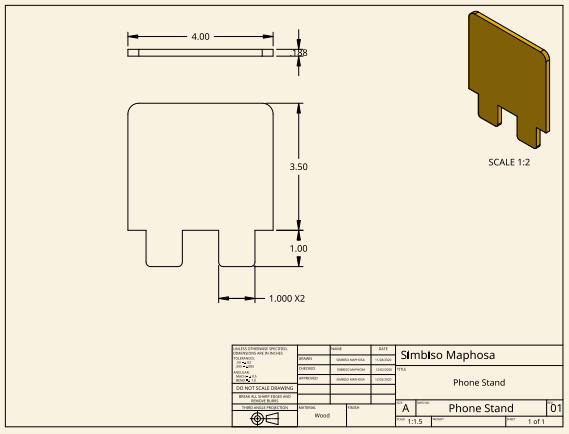
LASER CUTTING

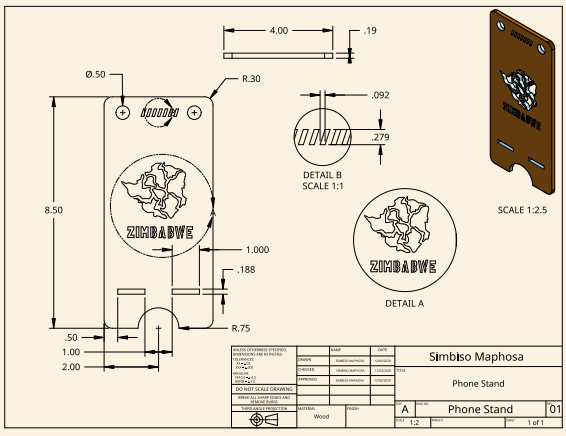
24



The image on the left is a phone stand that was designed using various OnShape features.

25



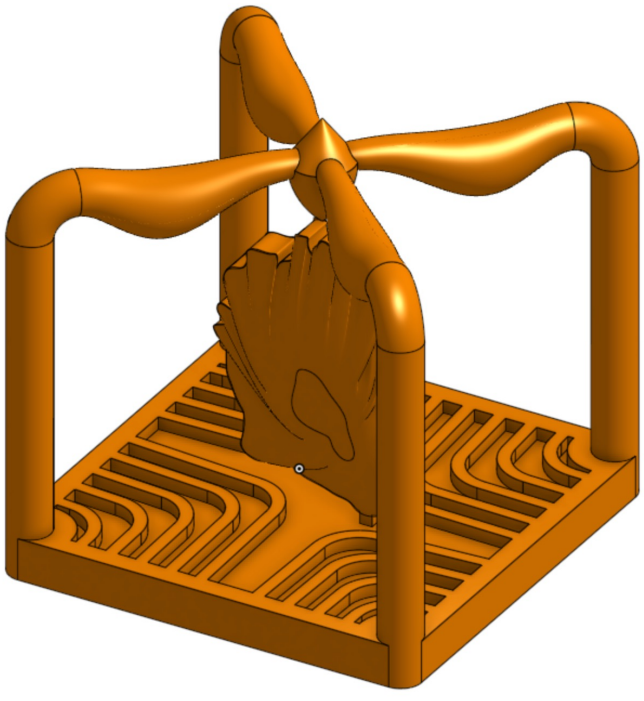


Engineering drawings of the phone stand are shown above. The phone stand consists of two part, a vertical bar and a horizontal bar.

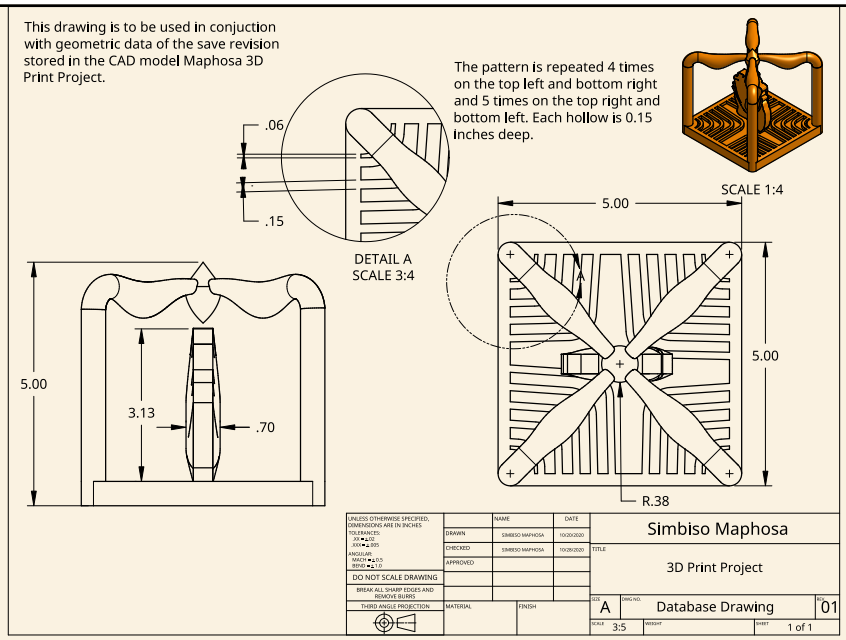
26

HEART
3D PRINTING

27



28



Database drawing of the 3D print project.

29

Final PLA print.

30