



**VAAI UNIVERSITY
OF TECHNOLOGY**

Inspiring thought. Shaping talent.

2023 VUT AM offerings

25/05/2023

www.vut.ac.za

EOS



P100/P110

X - 193mm
Y - 242mm
Z - 300mm



P395

X - 320mm
Y - 320mm
Z - 600mm



P760

X - 677mm
Y - 367mm
Z - 600mm

PA2221 nylon, Alumide®, PA2301 PEBA

Laser sintering





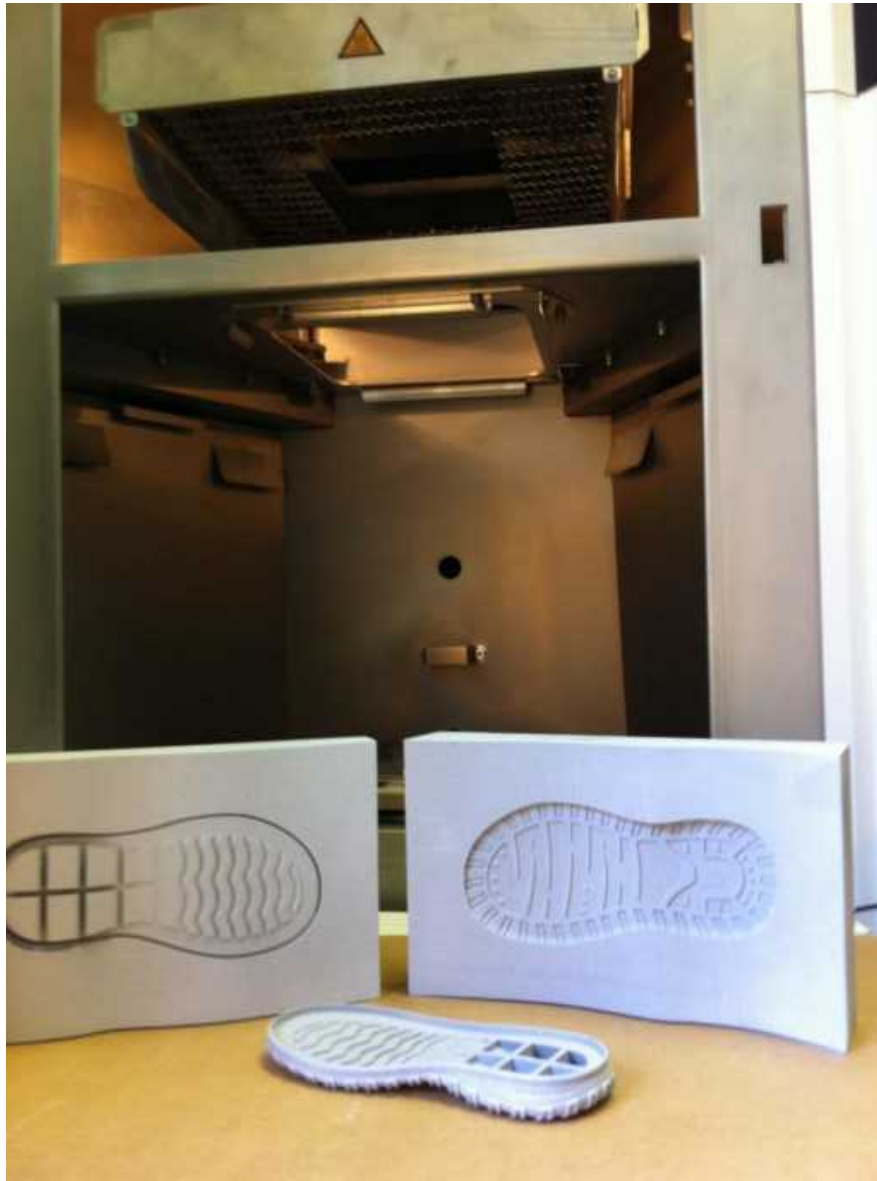


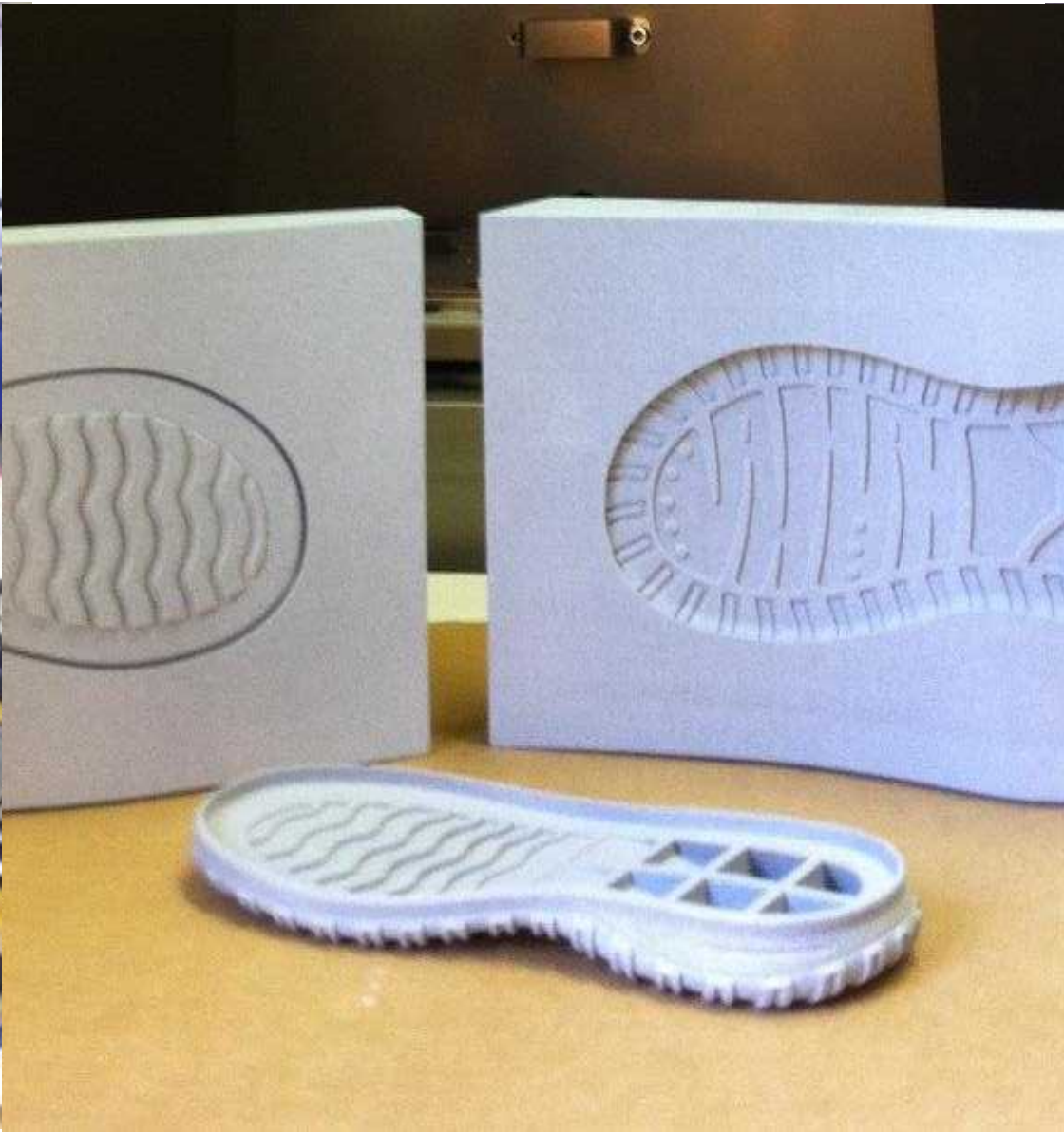


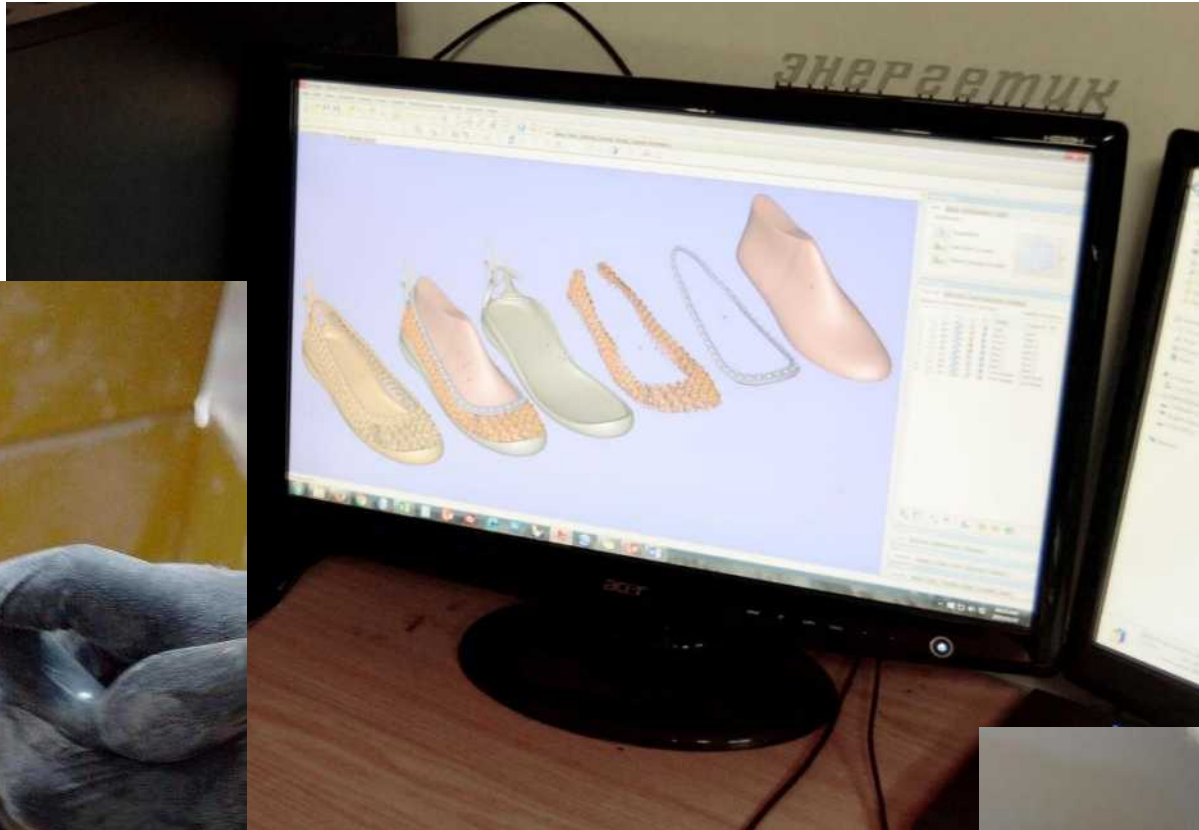














STRATASYS



Fortus 400mc

X – 355mm
Y – 254mm
Z – 254mm



Fortus 900mc

X - 914mm
Y - 610mm
Z - 914mm

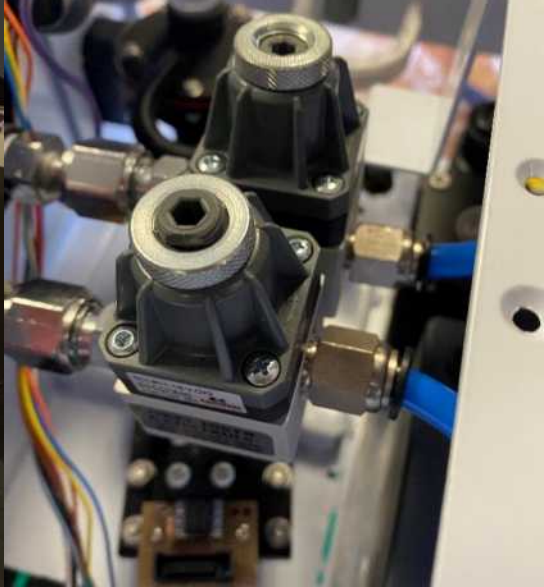
ABS, Polycarbonate, ULTEM 9085





AHRLAC





ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	EVT-0000-A12	Main Ventilator System Box Unit	1
2	VRO-NV-AS-ASM-01-RO-EM2		1
3	EVT0000-A25	Components Unit Door Panel	1
4	S18.6.7M - M3 x 0.5 x 5 Type I Cross Recessed CHMS -5N		12
5	S18.6.7M - M4 x 0.7 x 8 Type I Cross Recessed CHMS -5N		2
6	ISO 5356-1 connector	Oxygen O ₂ connector	1
7	BO1409		1
8	EVT-0000-P26		1
9	PEM CLS-M4-0 -N		2
10	S18.6.7M - M3 x 0.5 x 6.4 Type I Cross Recessed PHMS -16N		2
11	P0350M_8_c60pe		1
12	A5-NZ5 1023 CC-M3 x 5-N		2

COREL INSTR. & CONTROLS
TEL: 016 971 3010
CELL: 083 236 2966

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH: Gloss Powder Coat
COURTESY: LRSR

DESIGN AND
BREAK SHARP
EDGES

SCALE: 1:1

REVISION

NAME: Tin Eokara

SIGNATURE: _____

DATE: _____

DRAWN: Tin Eokara

CHEK: _____

APPROV: _____

MG: _____

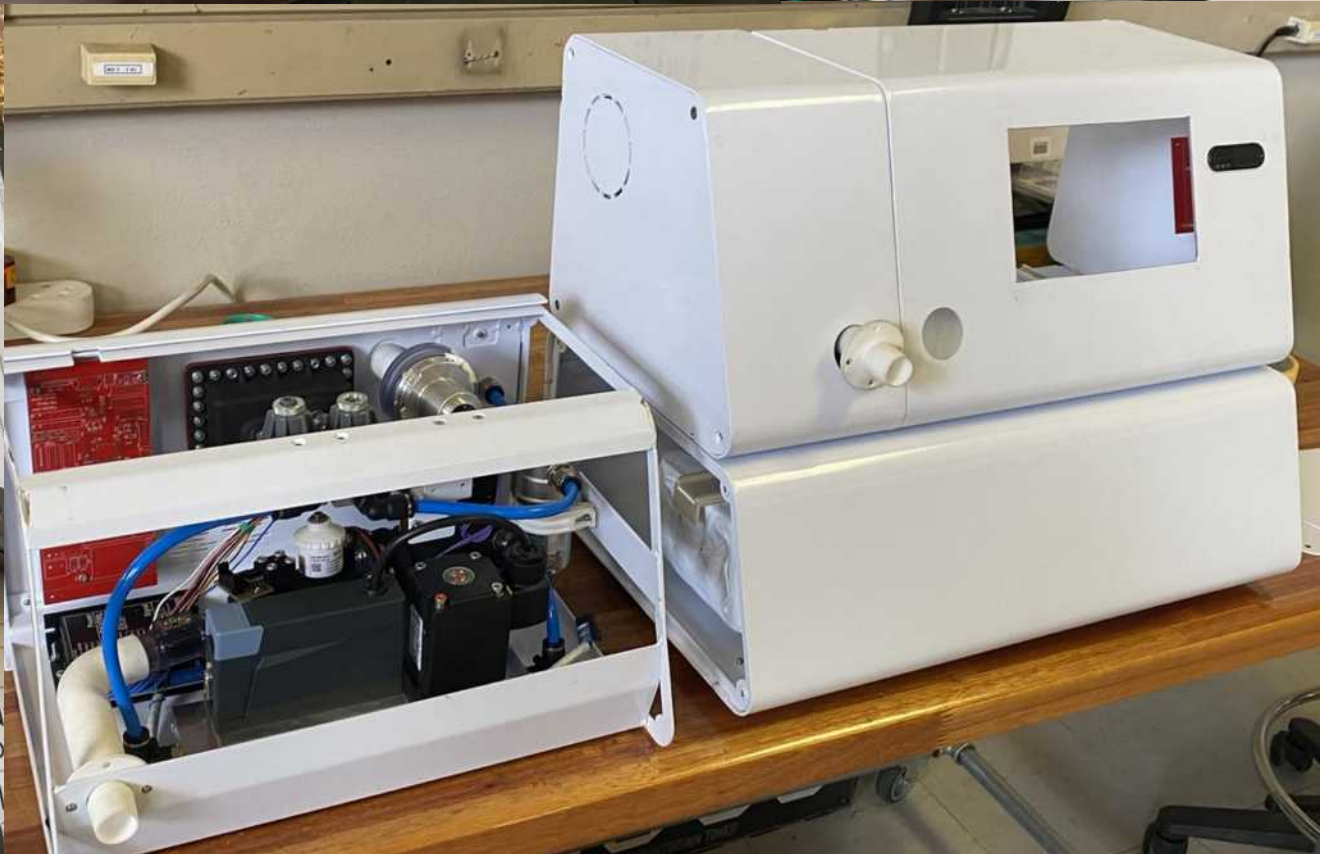
Q.A: _____

MATERIAL: Aluminium

DWG NO: Main System Bo

EVT-00

SCALE: 1:1



VOXELJET



VX500

X – 500mm
Y – 400mm
Z – 300mm
PMMA



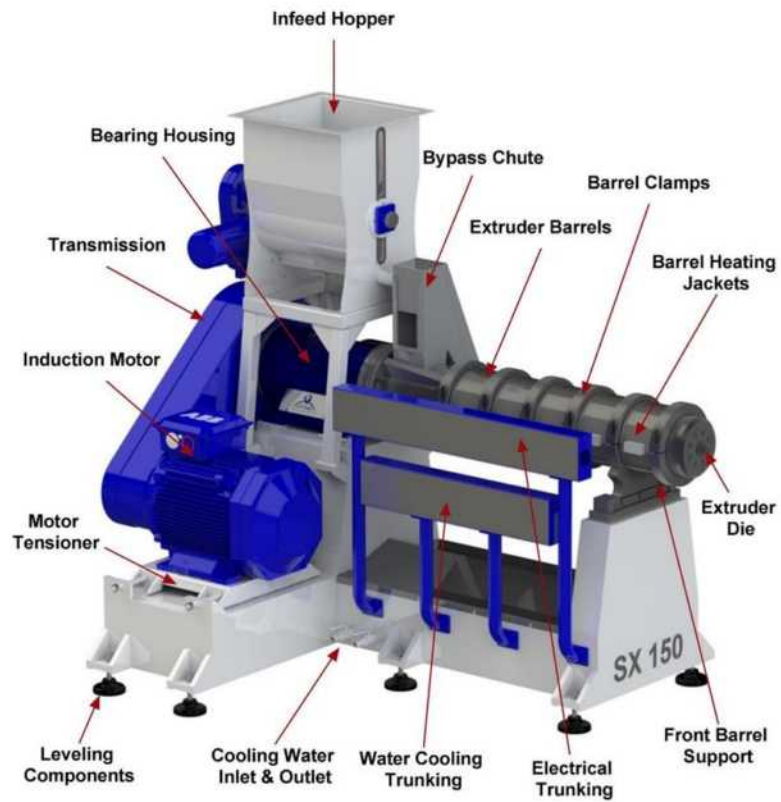
VX1000

X – 600mm
Y – 1080mm
Z – 500mm
Silica sand, Furan process

Extruder prototype



Case study (Extruder development using AM)



FOUNDRY CASE STUDIES

Investment casting patterns- Voxeljet



FOUNDRY CASE STUDIES

Investment casting patterns- Voxeljet



FOUNDRY CASE STUDIES

Extruder component



FOUNDRY CASE STUDIES

Extruder component



Case study (Extruder development using AM)



3 days from CAD data to castable mold !!!

Case study (Extruder development using AM)



Case study (Extruder development using AM)





Aditiv Solutions

Hyrax

Diameter 200mm
Height 300mm



Process reliability

The highest quality German optical systems are employed to ensure build-consistency and accuracy.



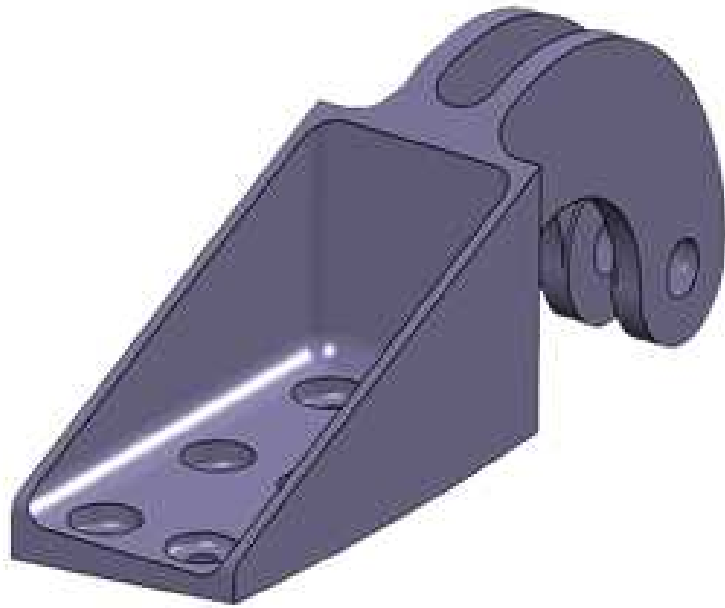
Most common materials:

- Stainless steels
- Tool steels
- Nickel alloys
- Titanium alloys
- Aluminium alloys
- Cobalt Chrome

DESIGN FOR ADDITIVE MANUFACTURING



DESIGN FOR ADDITIVE MANUFACTURING

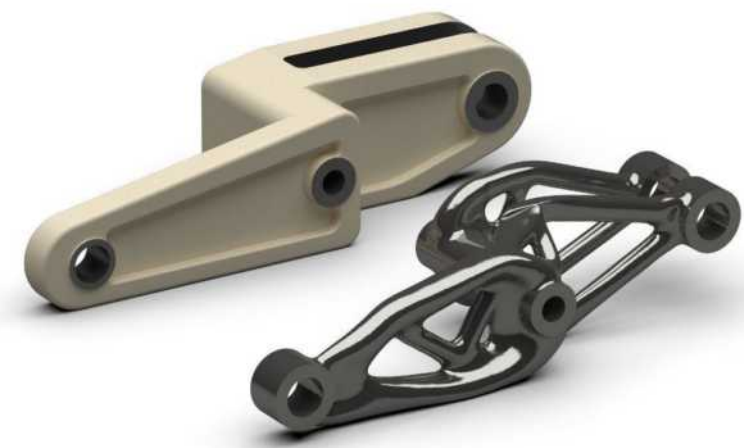
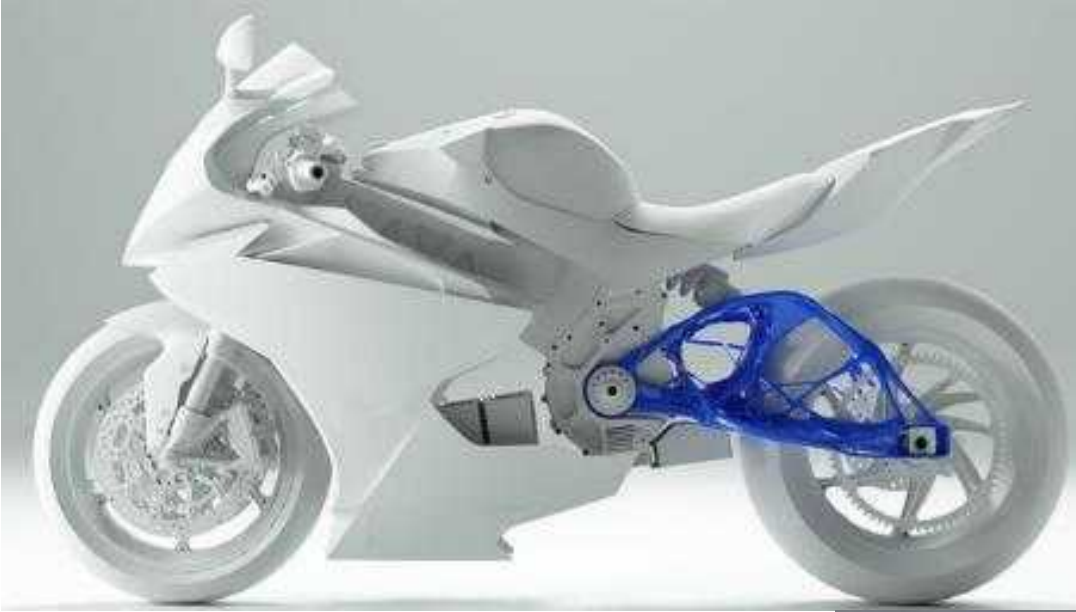


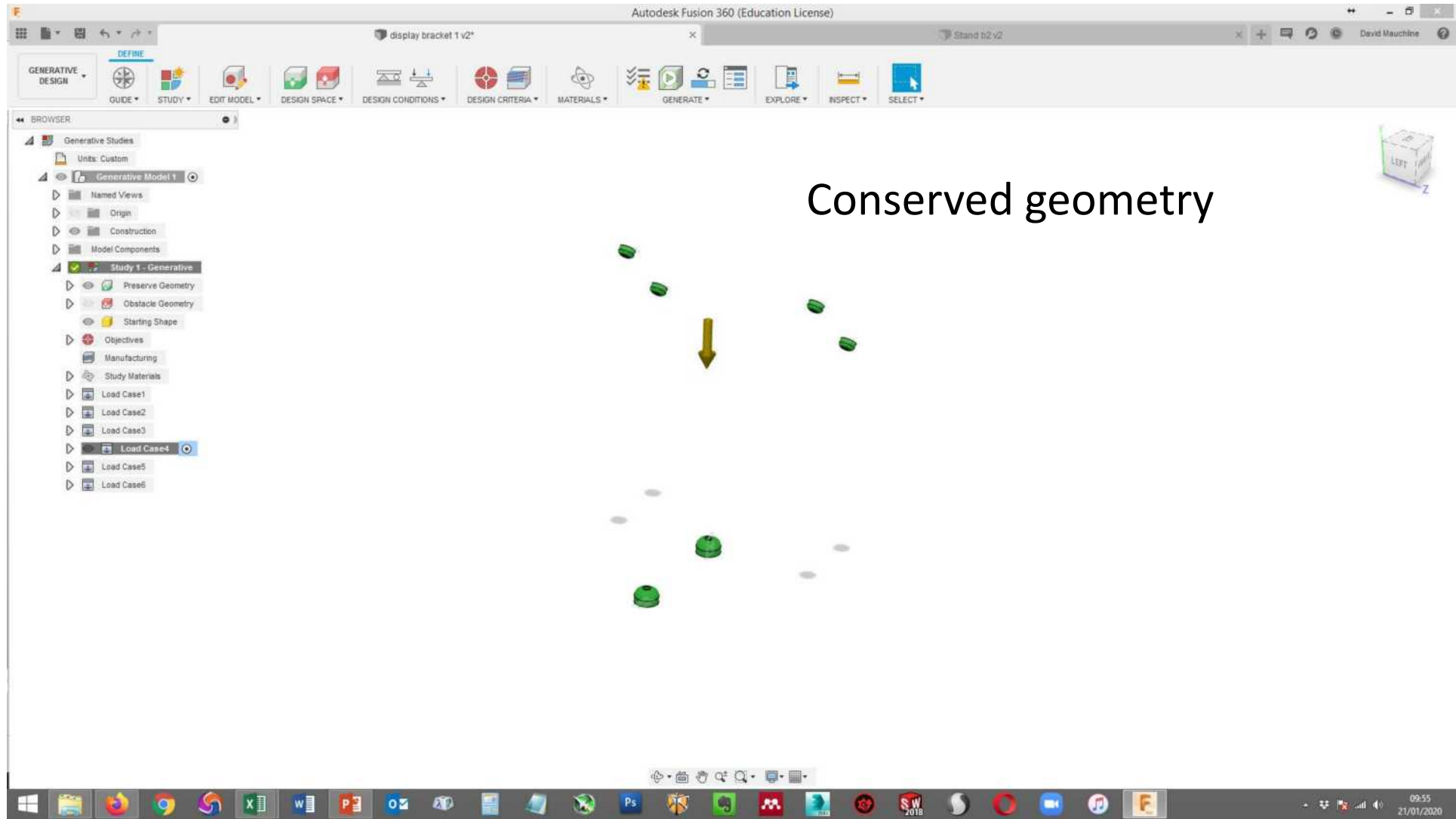
DESIGN FOR ADDITIVE MANUFACTURING



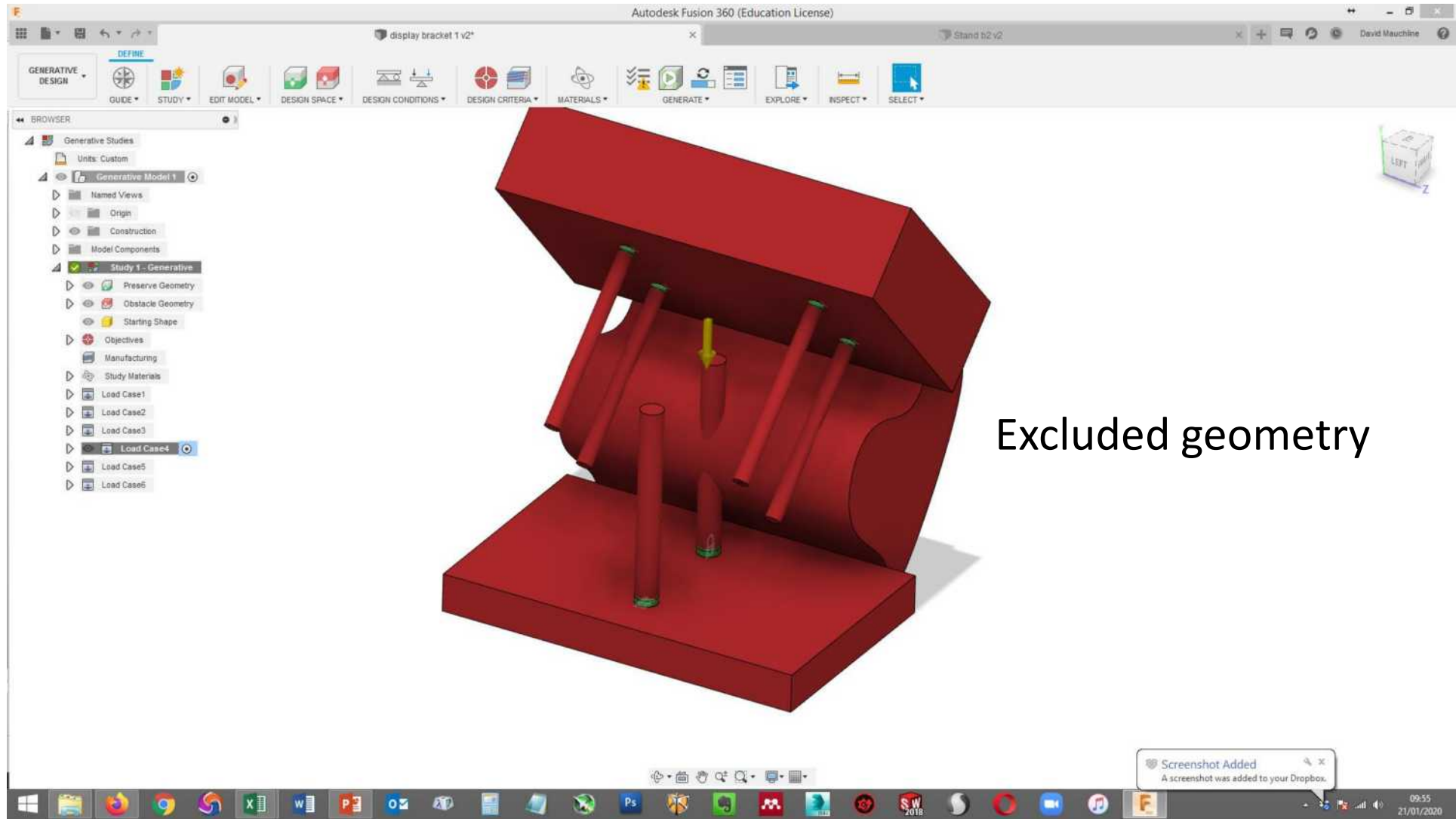


Generative Design



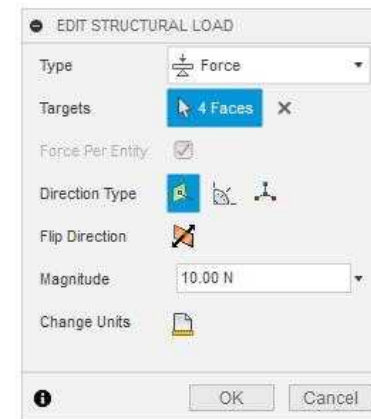
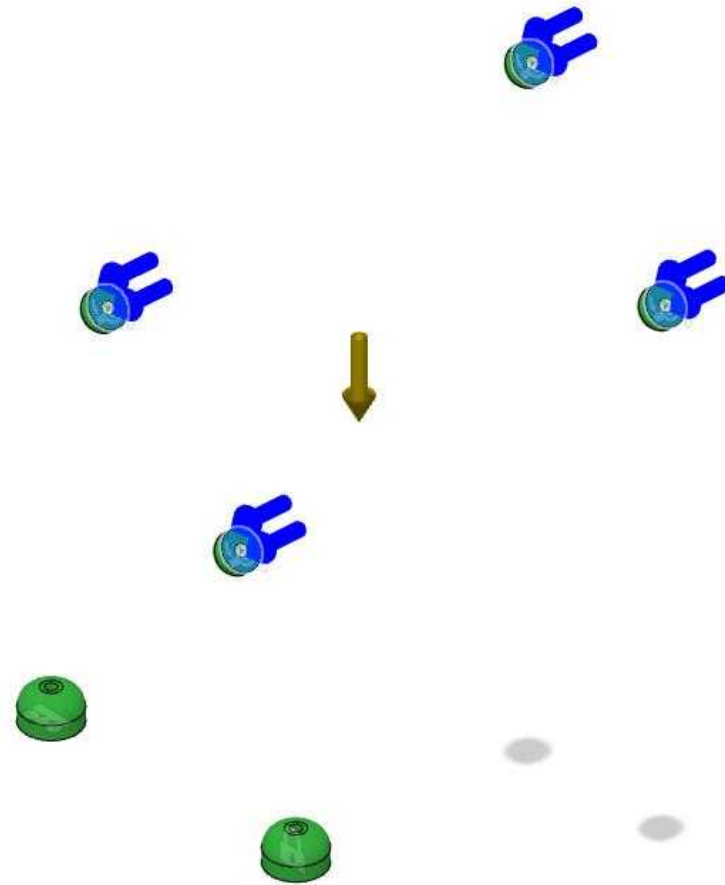


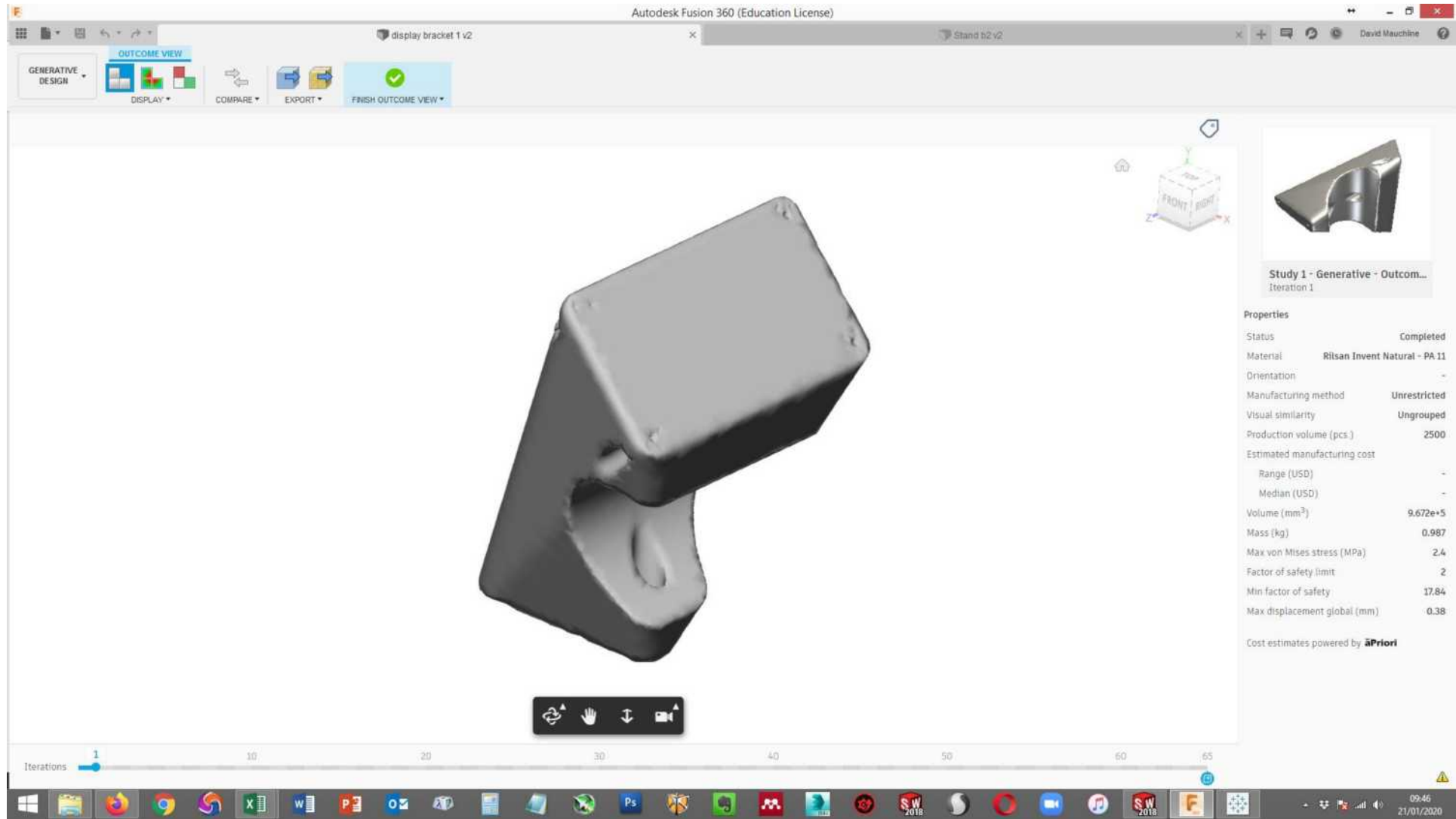
Conserved geometry



Excluded geometry

Loads and constraints





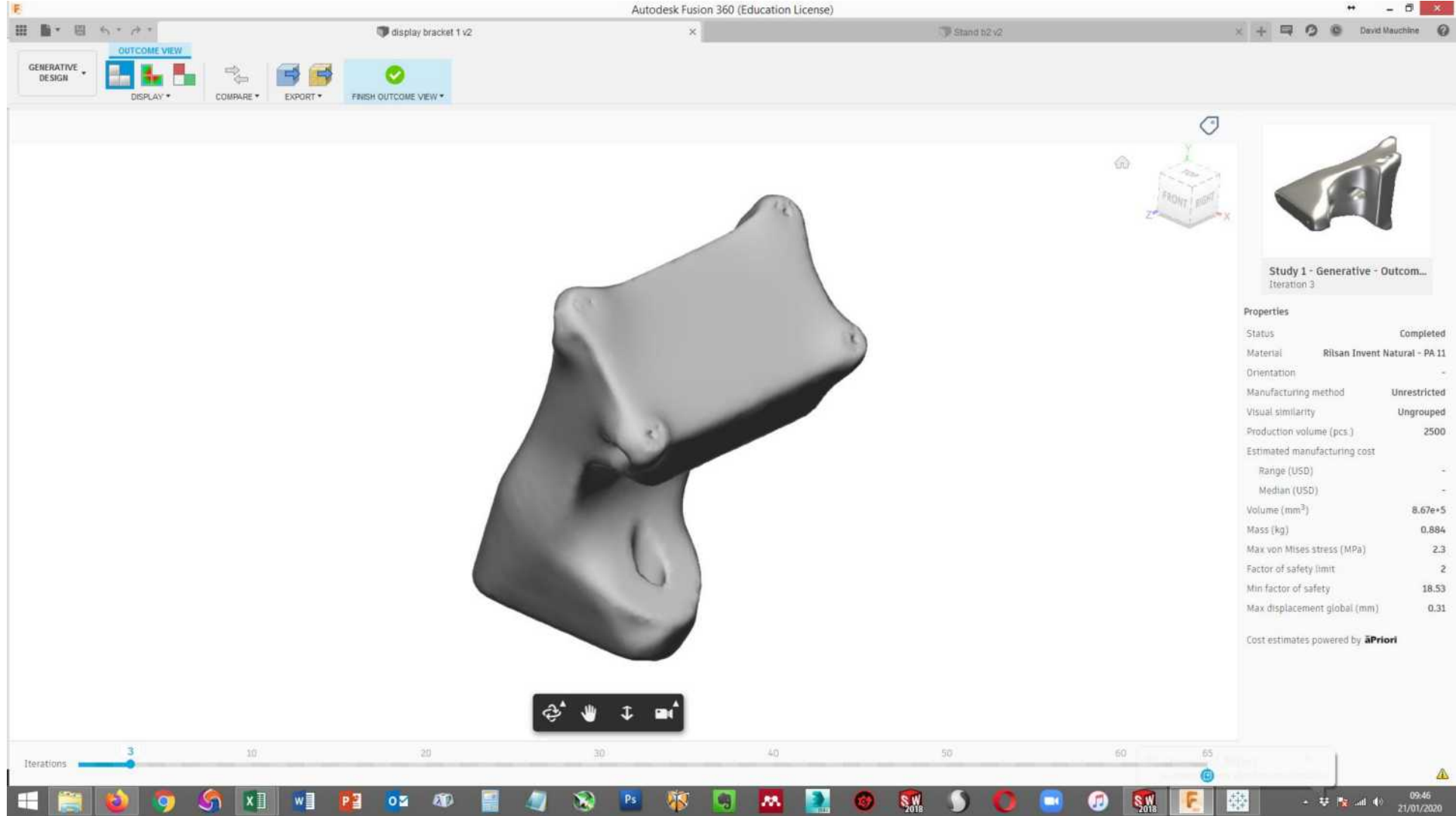
Study 1 - Generative - Outcom...
Iteration 1

Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	9.672e+5
Mass (kg)	0.987
Max von Mises stress (MPa)	2.4
Factor of safety limit	2
Min factor of safety	17.84
Max displacement global (mm)	0.38

Cost estimates powered by **aPriori**

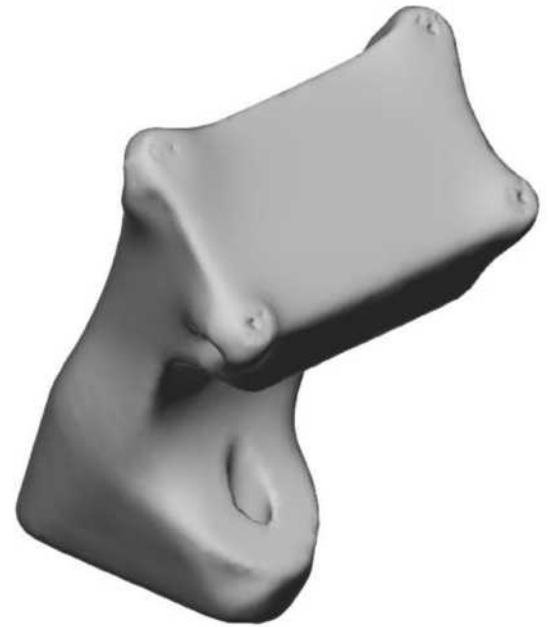
Iterations 1 10 20 30 40 50 60 65



OUTCOME VIEW

GENERATIVE DESIGN

DISPLAY COMPARE EXPORT FINISH OUTCOME VIEW



Study 1 - Generative - Outcom...
Iteration 3

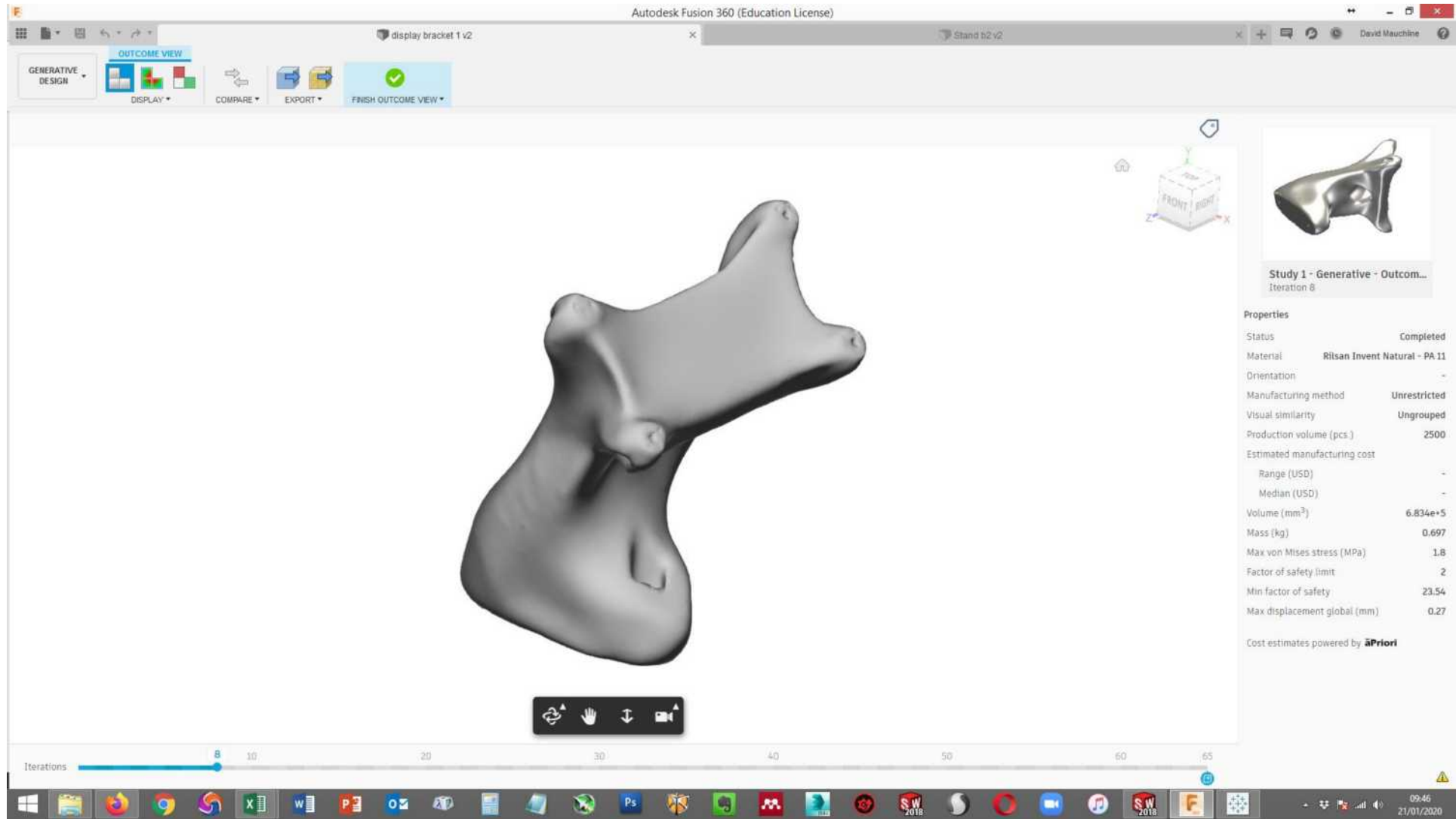
Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	8.67e+5
Mass (kg)	0.884
Max von Mises stress (MPa)	2.3
Factor of safety limit	2
Min factor of safety	18.53
Max displacement global (mm)	0.31

Cost estimates powered by **aPriori**



Iterations 3 10 20 30 40 50 60 65



OUTCOME VIEW

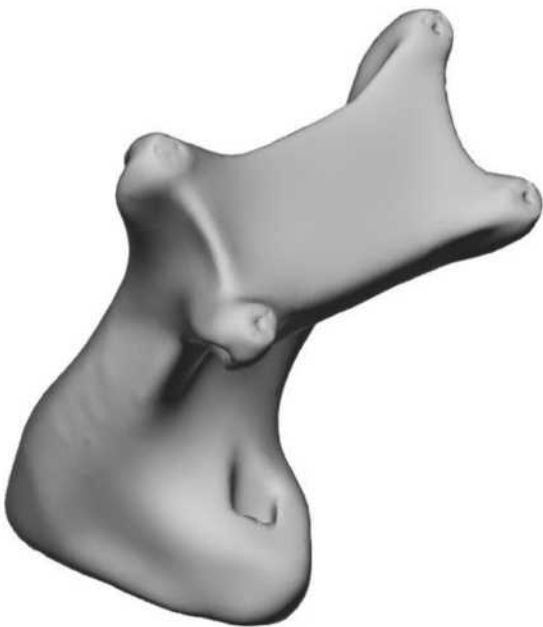
GENERATIVE DESIGN

DISPLAY

COMPARE

EXPORT

FINISH OUTCOME VIEW



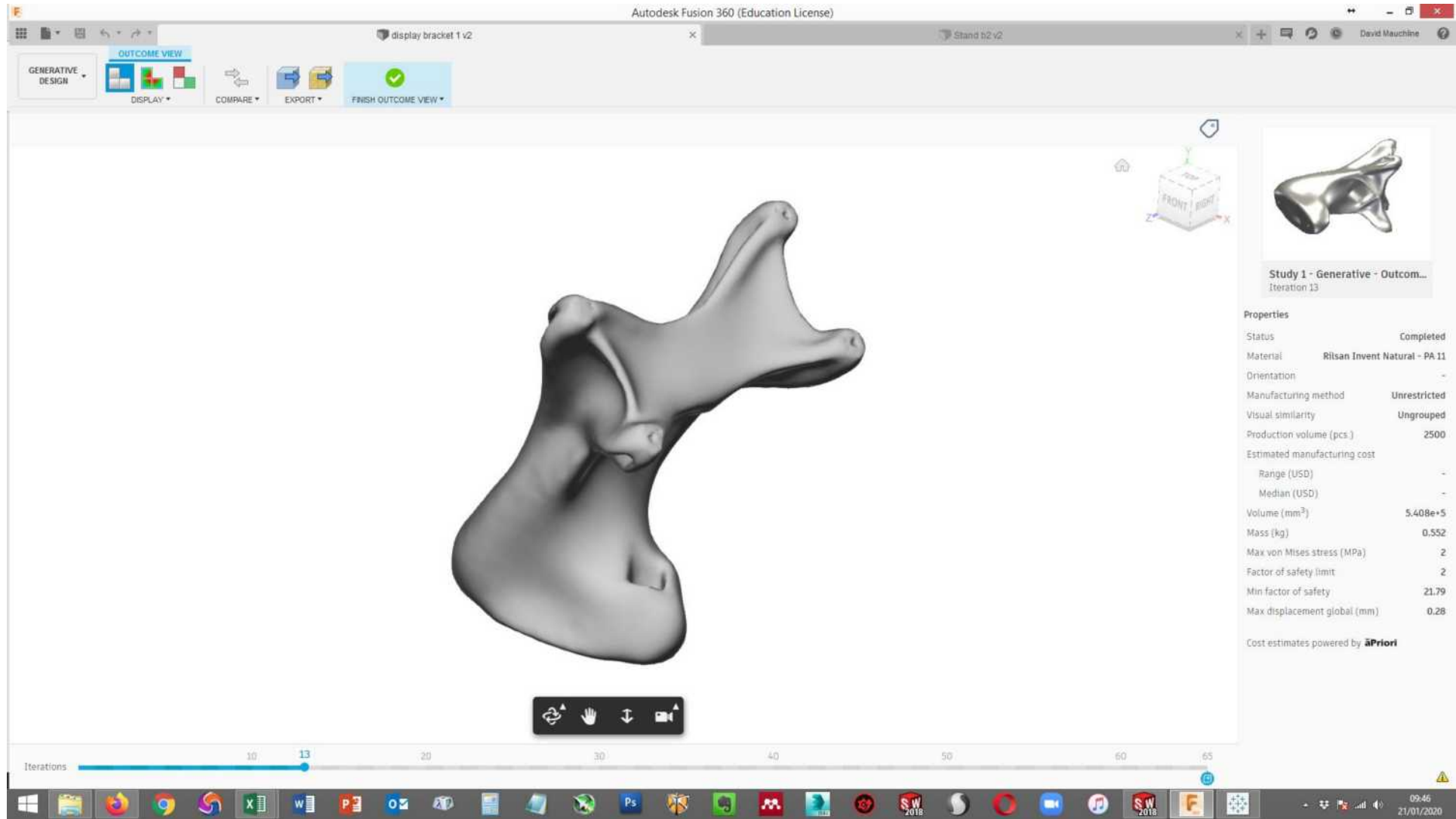
Study 1 - Generative - Outcom...
Iteration 8

Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	6.834e+5
Mass (kg)	0.697
Max von Mises stress (MPa)	1.8
Factor of safety limit	2
Min factor of safety	23.54
Max displacement global (mm)	0.27

Cost estimates powered by **aPriori**





OUTCOME VIEW

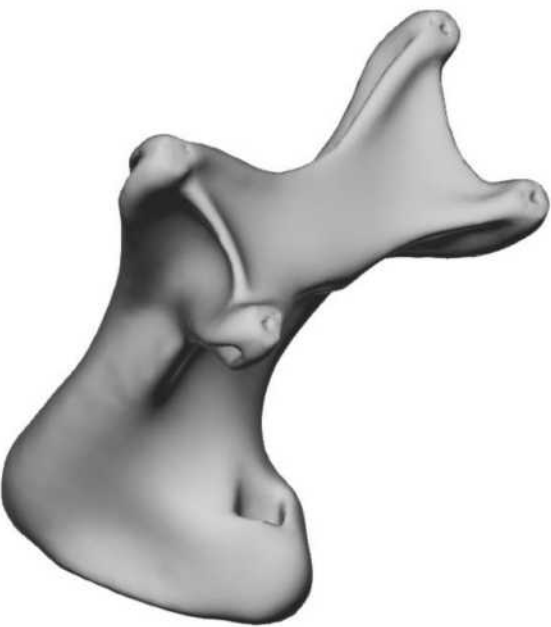
GENERATIVE DESIGN

DISPLAY

COMPARE

EXPORT

FINISH OUTCOME VIEW



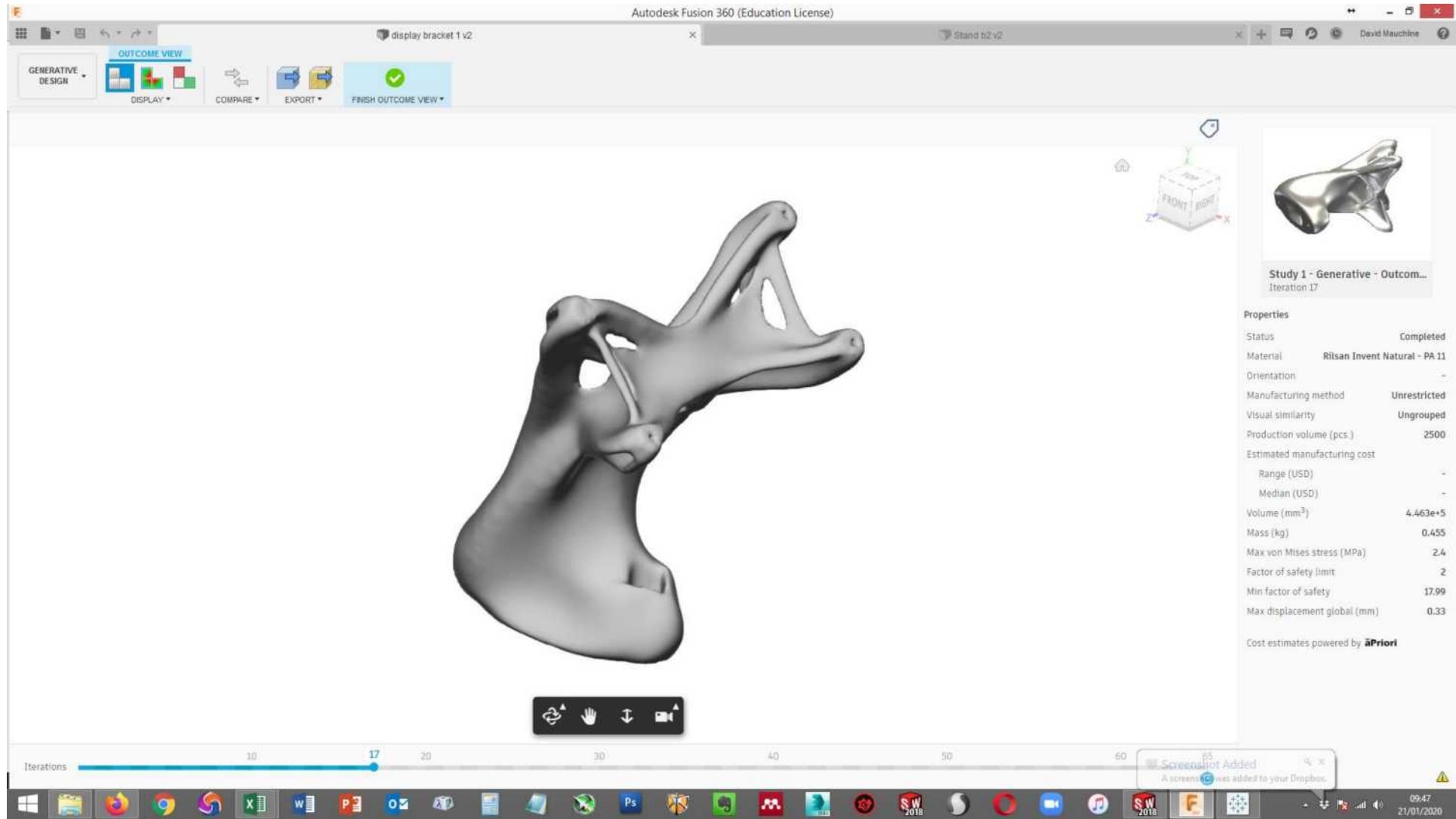
Study 1 - Generative - Outcom...
Iteration 13

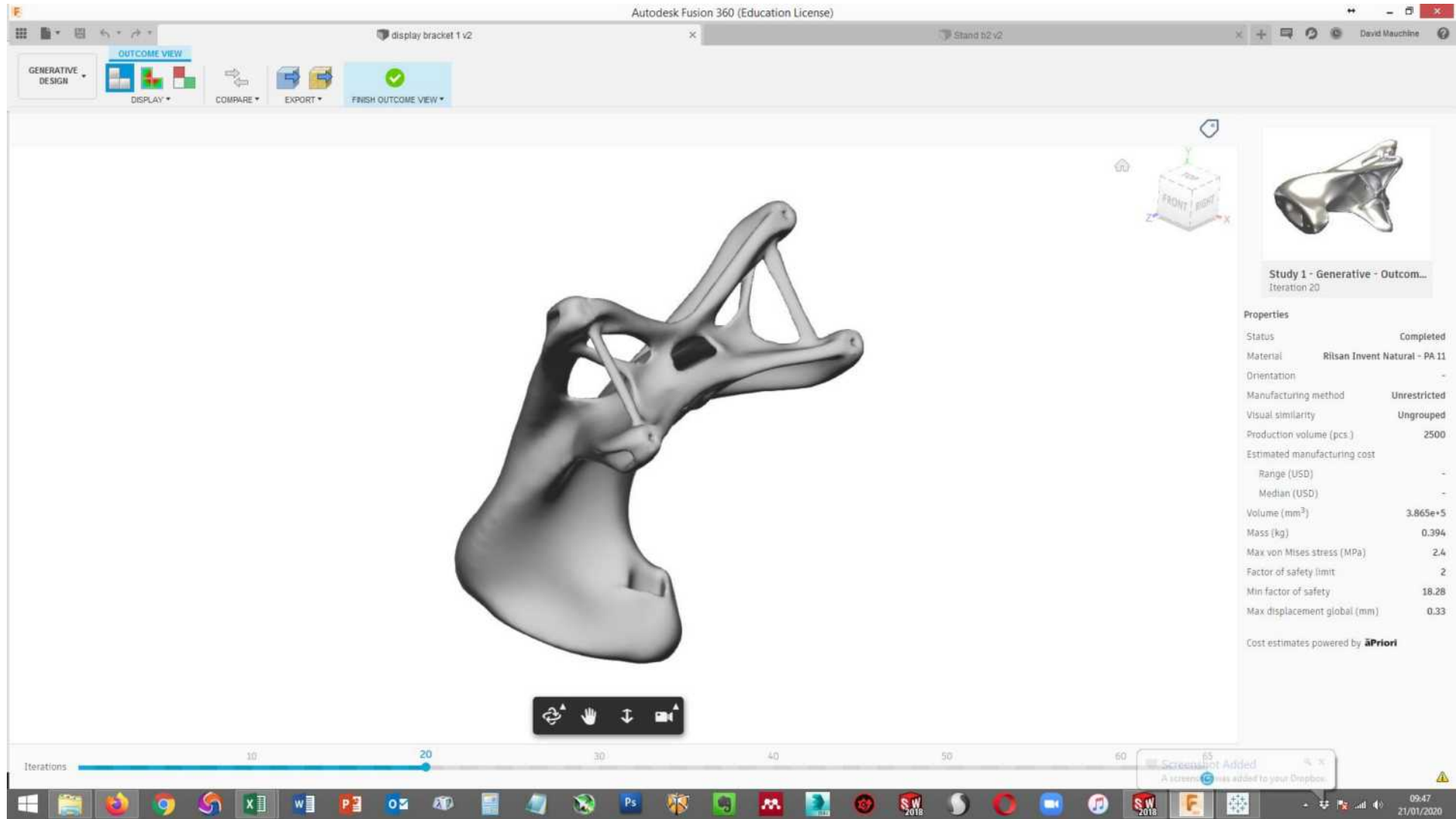
Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	5.408e+5
Mass (kg)	0.552
Max von Mises stress (MPa)	2
Factor of safety limit	2
Min factor of safety	21.79
Max displacement global (mm)	0.28

Cost estimates powered by **aPriori**



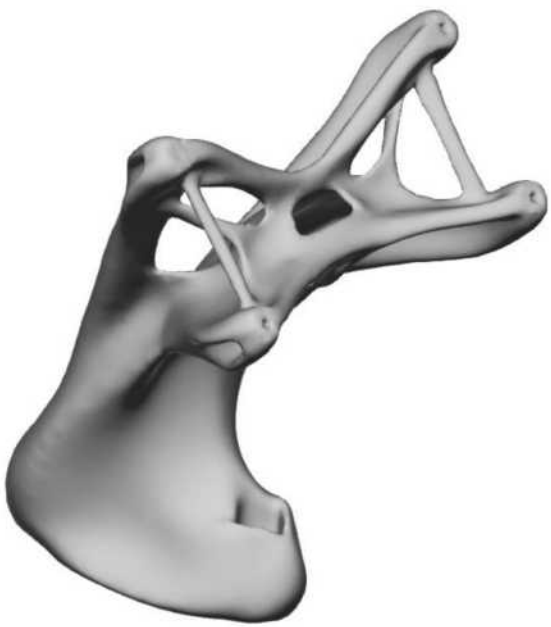




OUTCOME VIEW

GENERATIVE DESIGN

DISPLAY COMPARE EXPORT FINISH OUTCOME VIEW



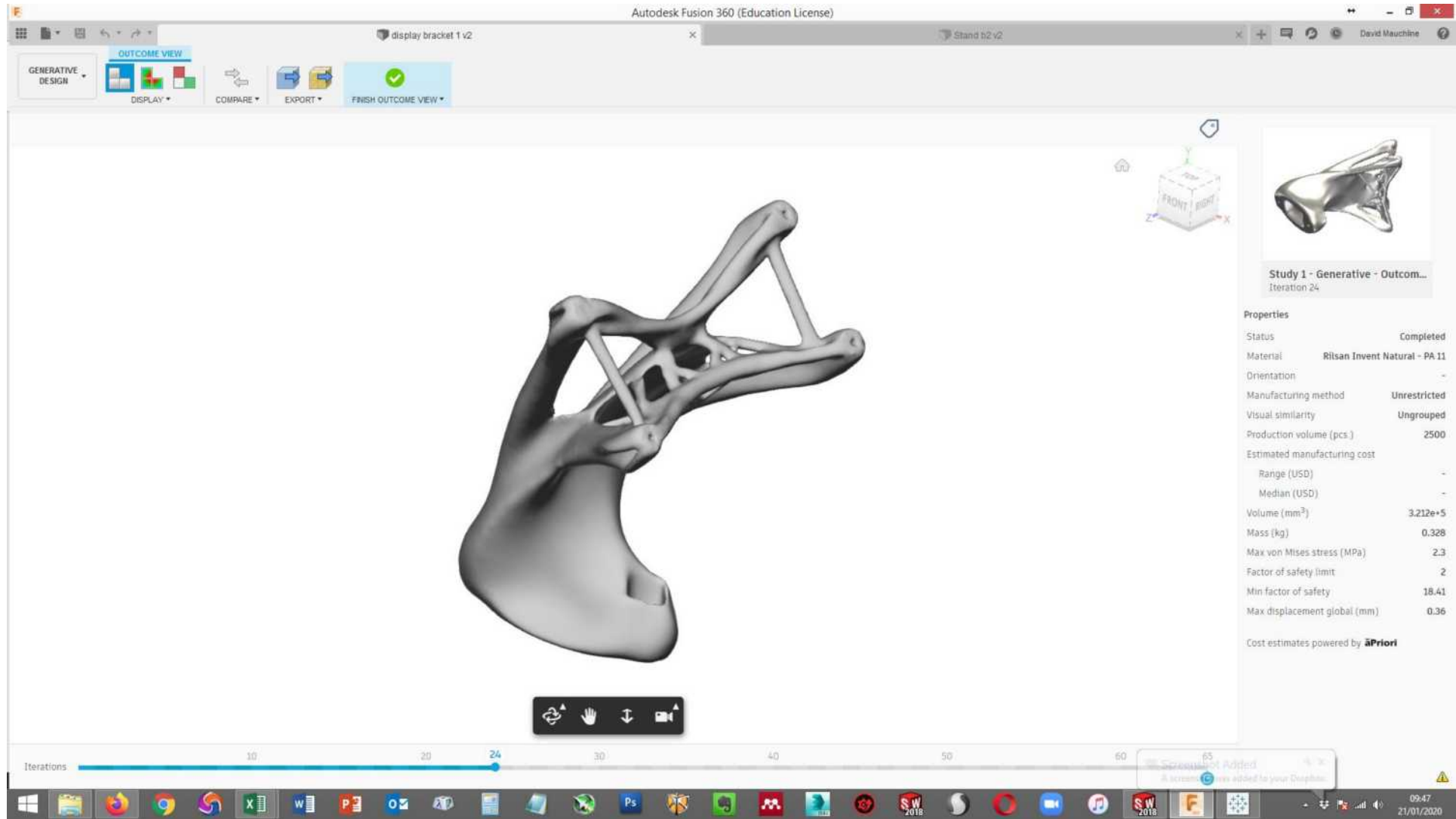
Study 1 - Generative - Outcom...
Iteration 20

Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	3.865e+5
Mass (kg)	0.394
Max von Mises stress (MPa)	2.4
Factor of safety limit	2
Min factor of safety	18.28
Max displacement global (mm)	0.33

Cost estimates powered by **aPriori**

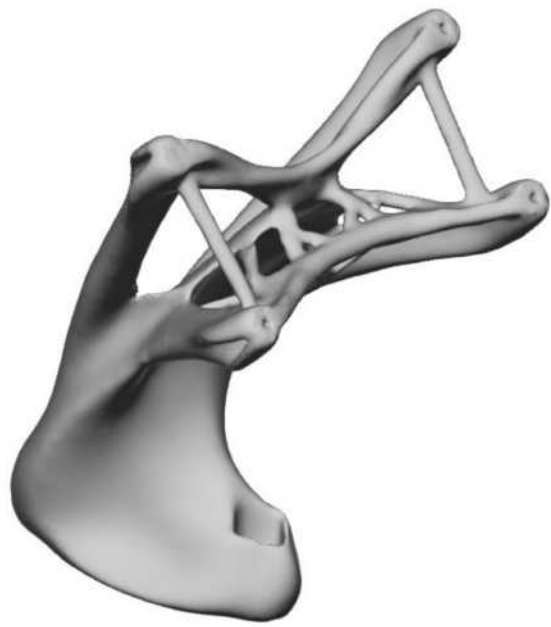




OUTCOME VIEW

GENERATIVE DESIGN

DISPLAY COMPARE EXPORT FINISH OUTCOME VIEW



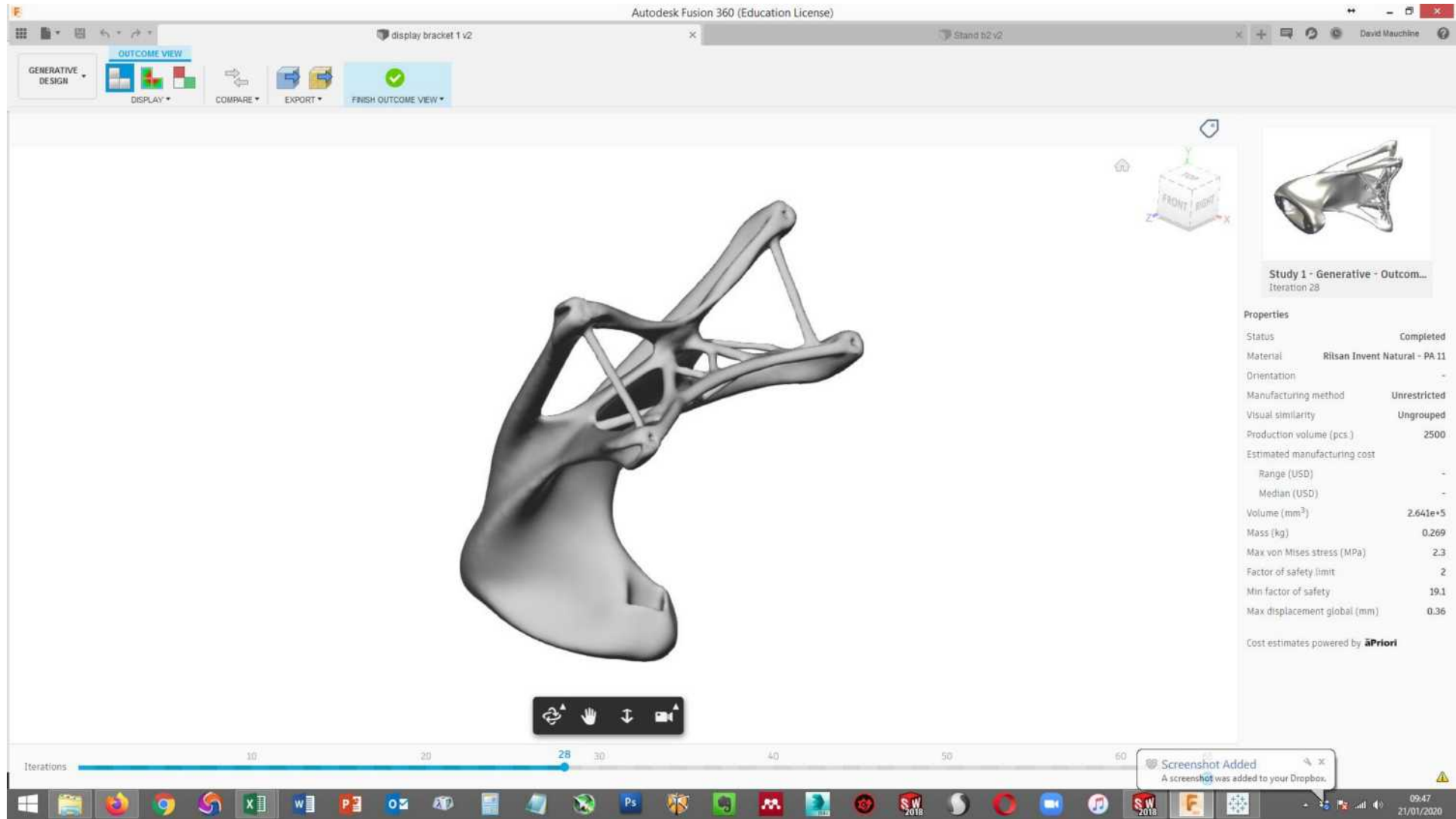
Study 1 - Generative - Outcom...
Iteration 24

Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	3.212e+5
Mass (kg)	0.328
Max von Mises stress (MPa)	2.3
Factor of safety limit	2
Min factor of safety	18.41
Max displacement global (mm)	0.36

Cost estimates powered by **aPriori**

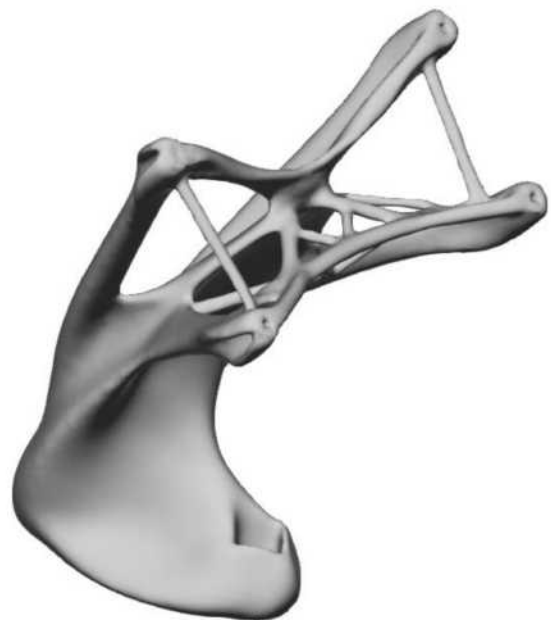




GENERATIVE DESIGN

OUTCOME VIEW

DISPLAY COMPARE EXPORT FINISH OUTCOME VIEW



Study 1 - Generative - Outcom...
Iteration 28

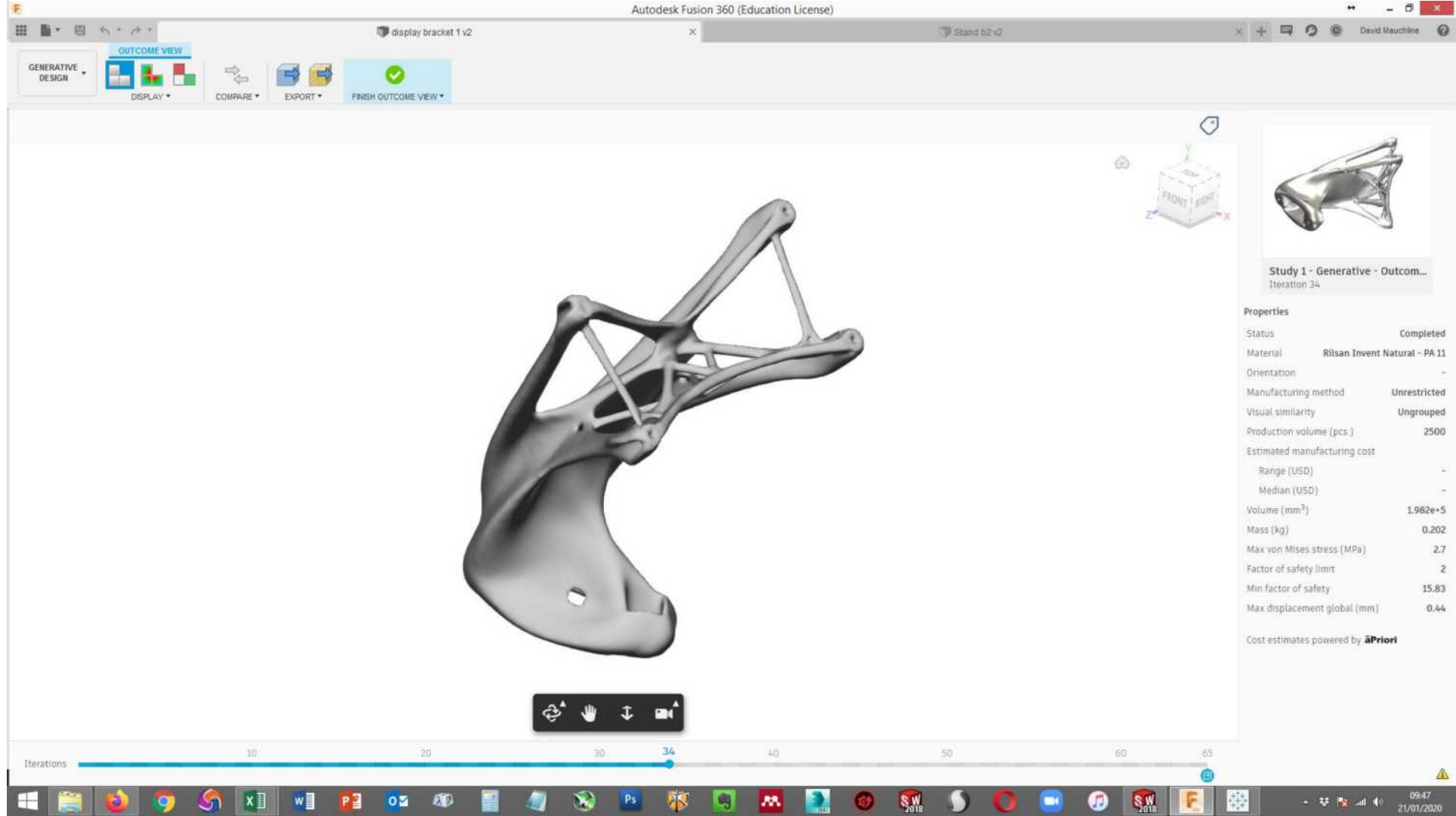
Properties

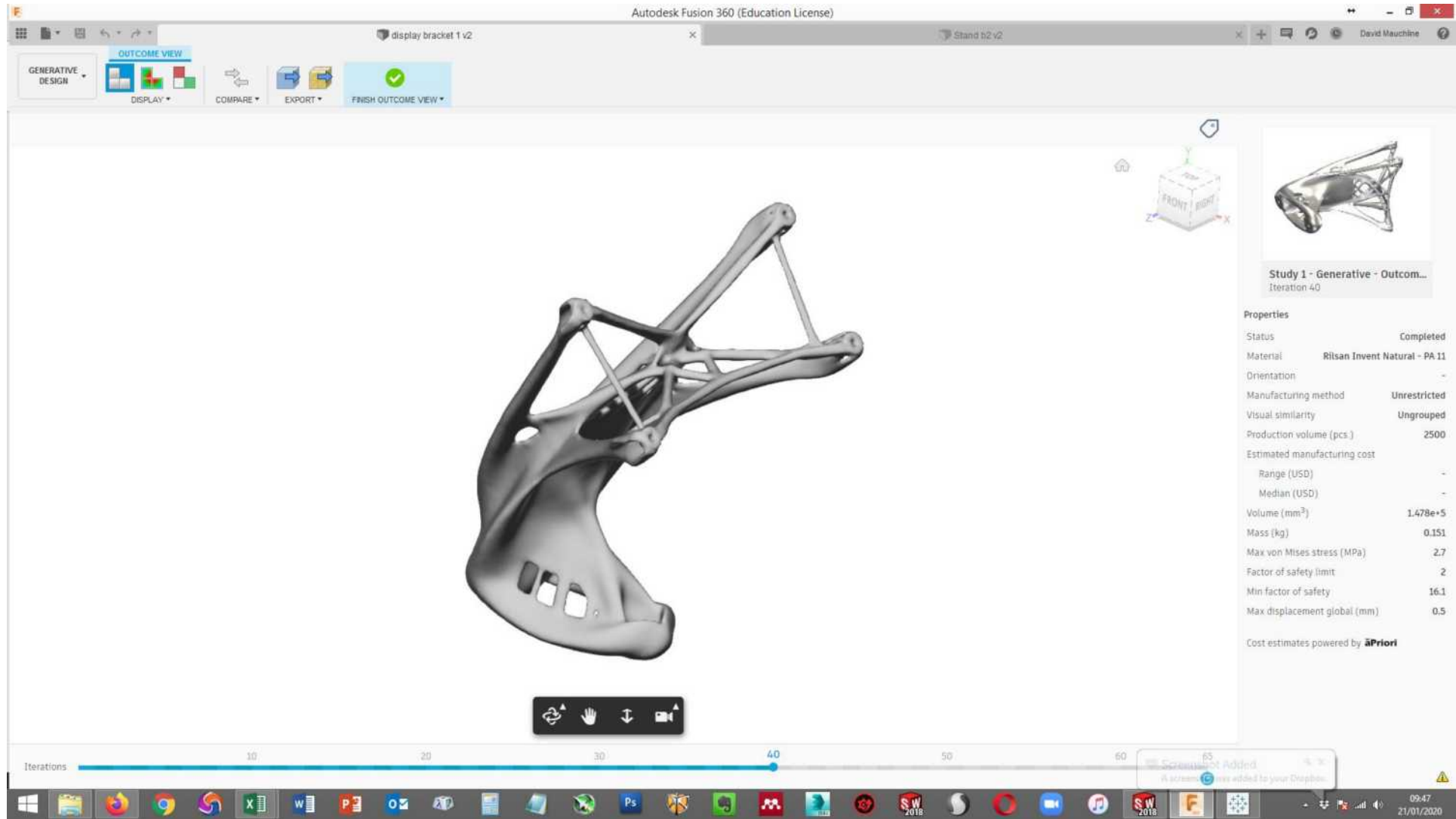
Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	2.641e+5
Mass (kg)	0.269
Max von Mises stress (MPa)	2.3
Factor of safety limit	2
Min factor of safety	19.1
Max displacement global (mm)	0.36

Cost estimates powered by **aPriori**



Screenshot Added
A screenshot was added to your Dropbox.





OUTCOME VIEW

GENERATIVE DESIGN

DISPLAY

COMPARE

EXPORT

FINISH OUTCOME VIEW



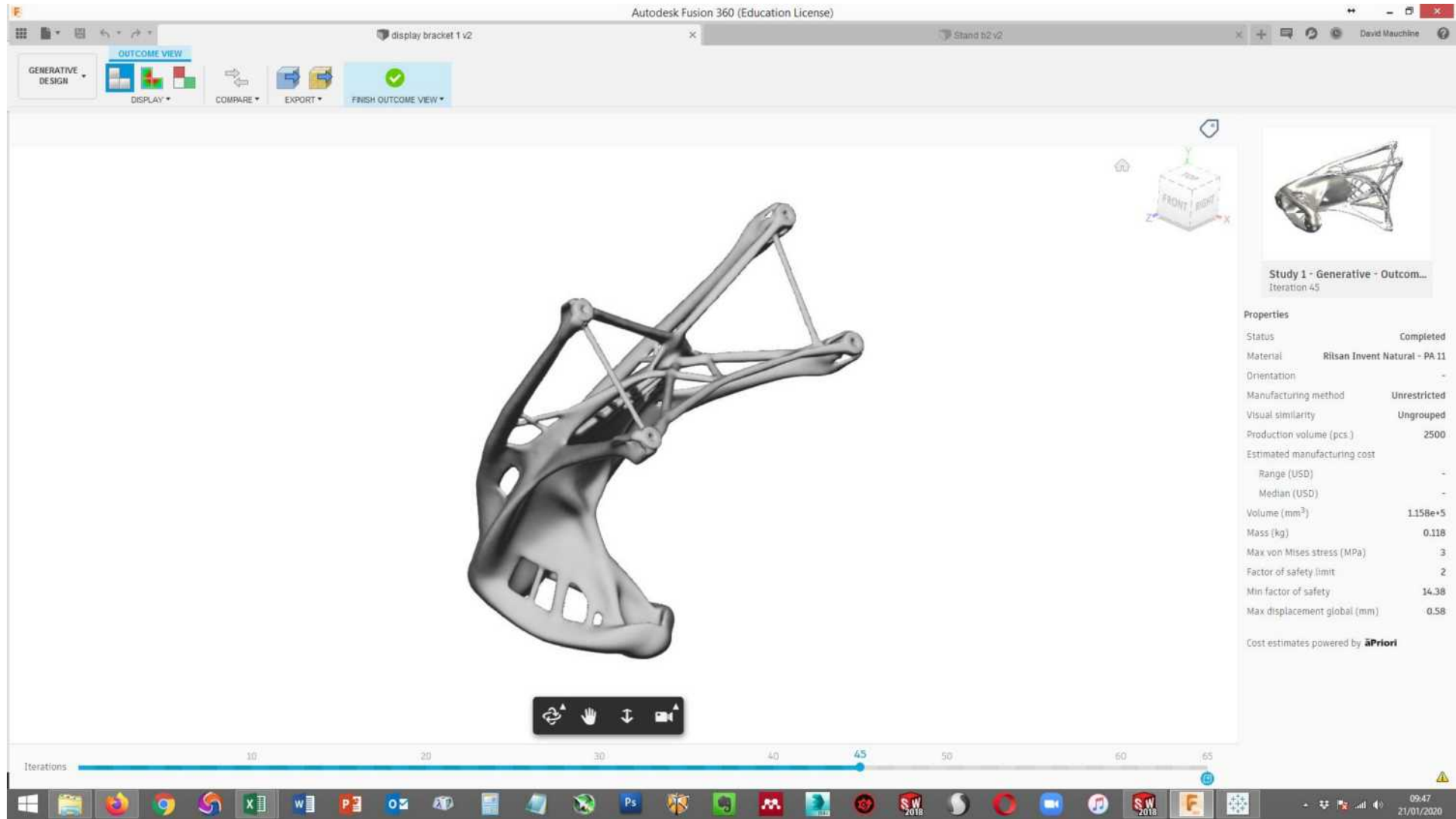
Study 1 - Generative - Outcom...
Iteration 40

Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	1.478e+5
Mass (kg)	0.151
Max von Mises stress (MPa)	2.7
Factor of safety limit	2
Min factor of safety	16.1
Max displacement global (mm)	0.5

Cost estimates powered by **aPriori**





OUTCOME VIEW

GENERATIVE DESIGN

DISPLAY ▾ COMPARE ▾ EXPORT ▾ FINISH OUTCOME VIEW ▾



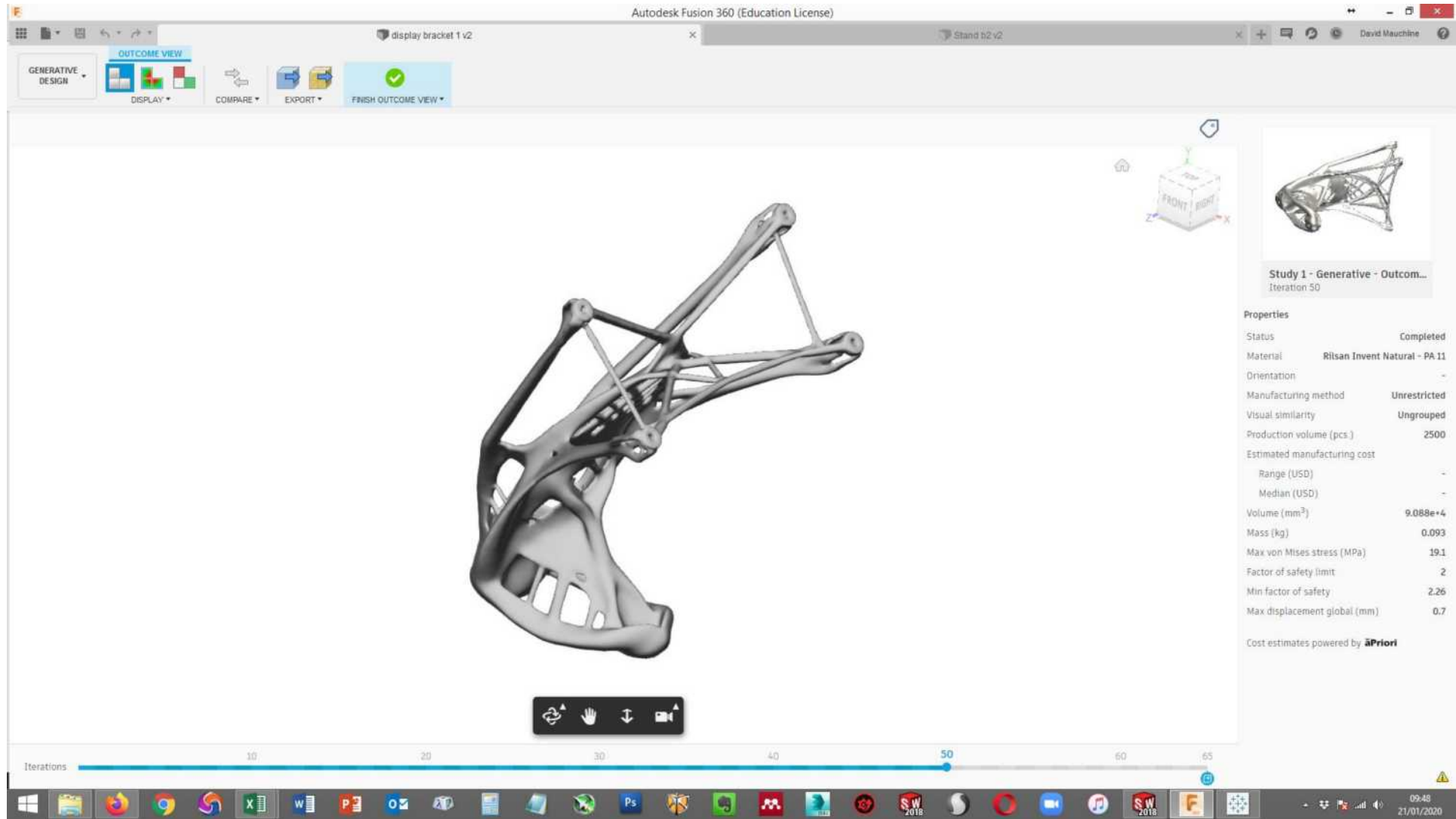
Study 1 - Generative - Outcom...
Iteration 45

Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	1.158e+5
Mass (kg)	0.118
Max von Mises stress (MPa)	3
Factor of safety limit	2
Min factor of safety	14.38
Max displacement global (mm)	0.58

Cost estimates powered by **aPriori**





OUTCOME VIEW

GENERATIVE DESIGN

DISPLAY

COMPARE

EXPORT

FINISH OUTCOME VIEW



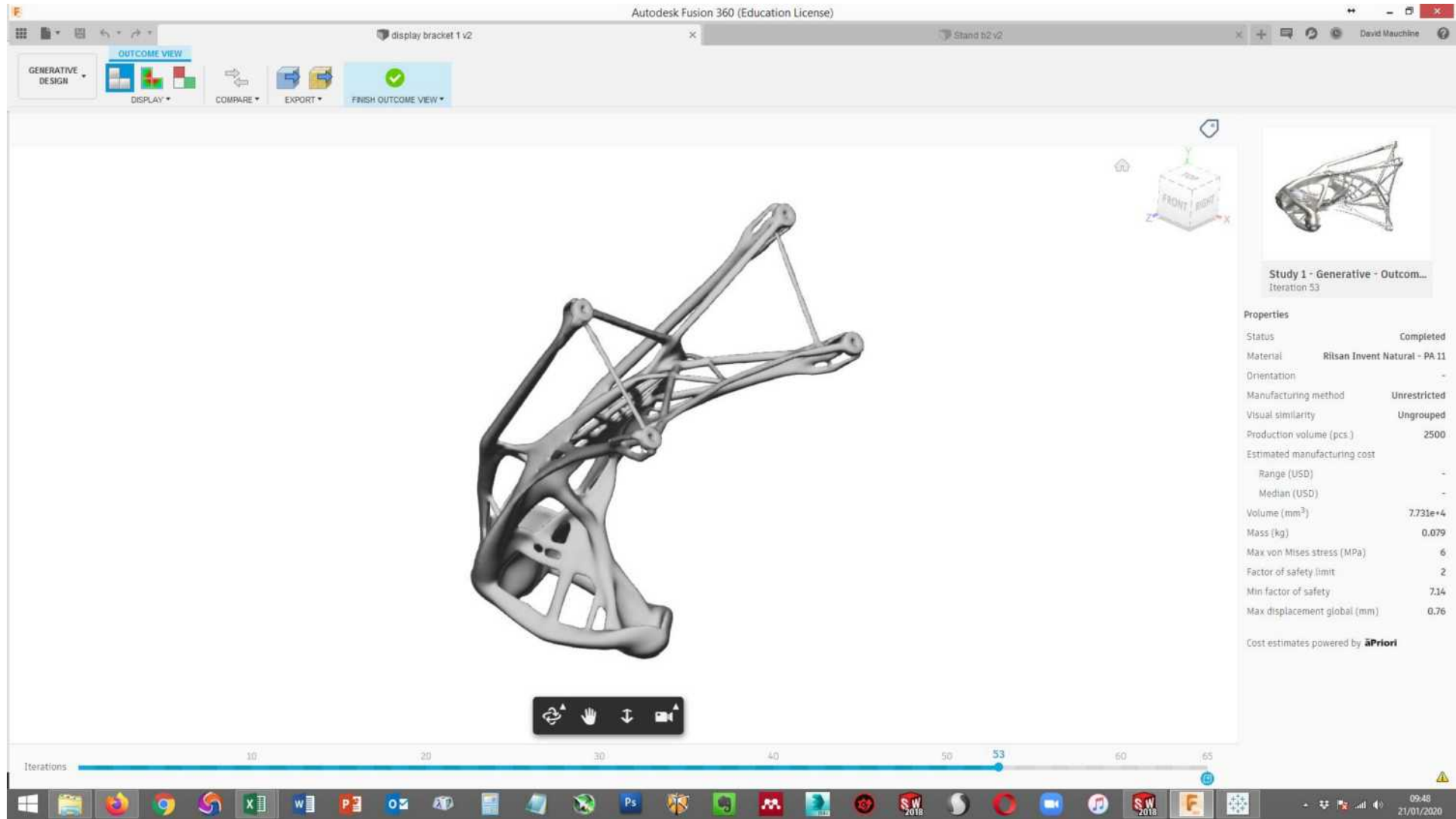
Study 1 - Generative - Outcom...
Iteration 50

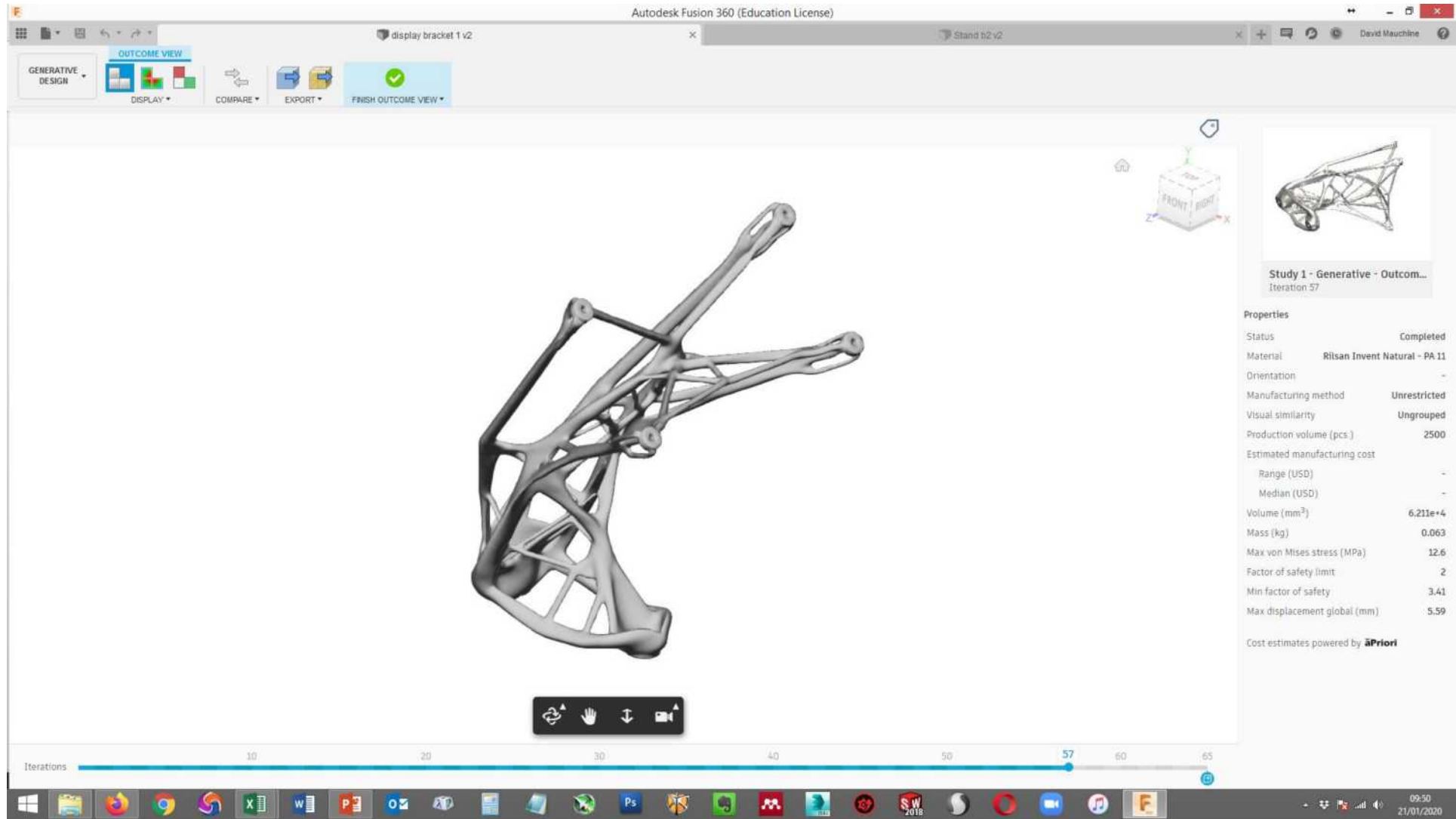
Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	9.088e+4
Mass (kg)	0.093
Max von Mises stress (MPa)	19.1
Factor of safety limit	2
Min factor of safety	2.26
Max displacement global (mm)	0.7

Cost estimates powered by **aPriori**







OUTCOME VIEW

GENERATIVE DESIGN

DISPLAY COMPARE EXPORT FINISH OUTCOME VIEW



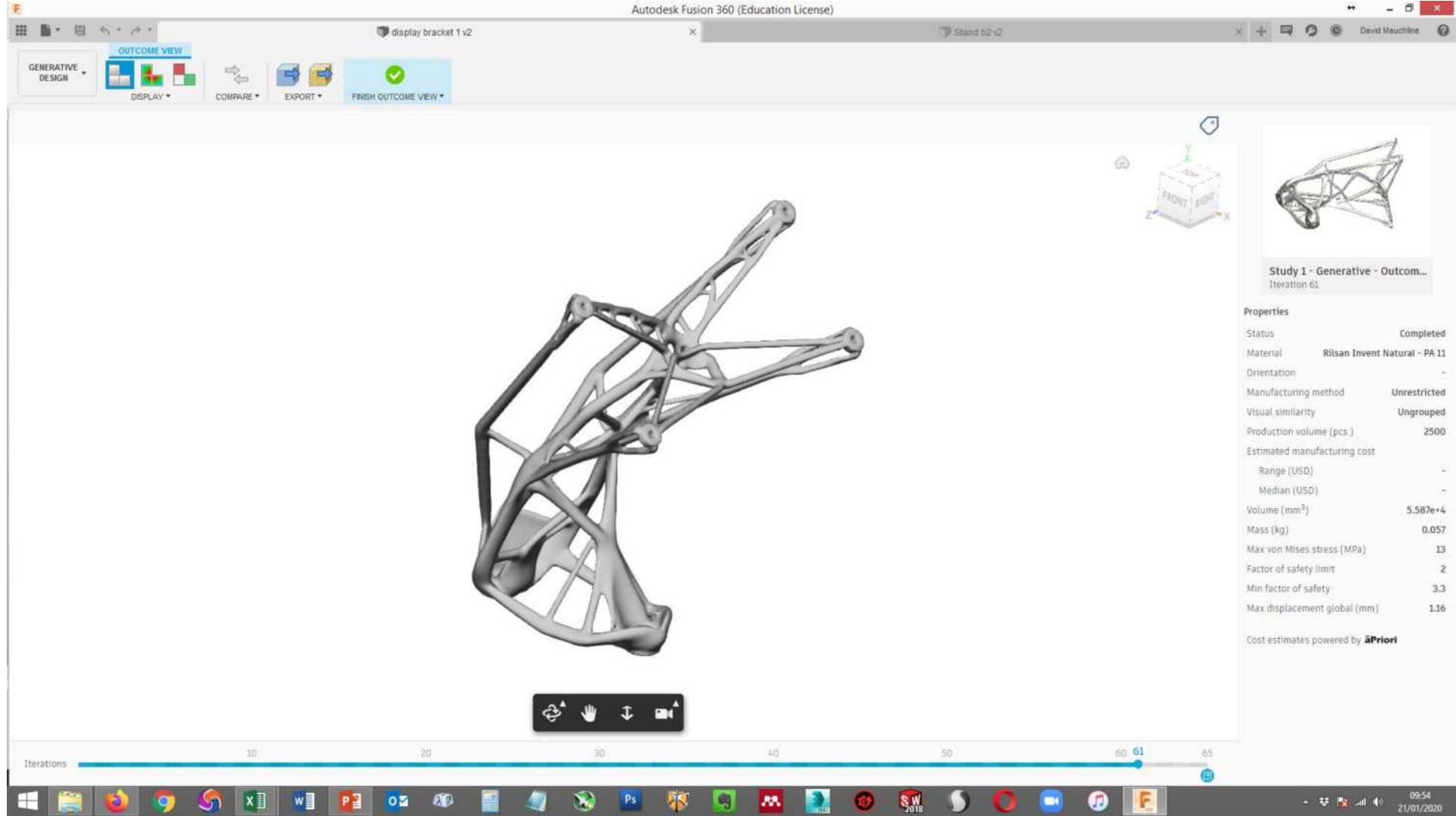
Study 1 - Generative - Outcom...
Iteration 57

Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	6.211e+4
Mass (kg)	0.063
Max von Mises stress (MPa)	12.6
Factor of safety limit	2
Min factor of safety	3.41
Max displacement global (mm)	5.59

Cost estimates powered by **aPriori**

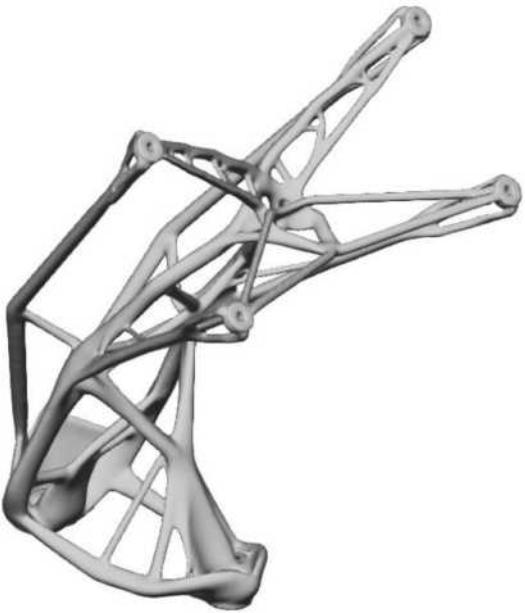




GENERATIVE DESIGN

OUTCOME VIEW

DISPLAY COMPARE EXPORT FINISH OUTCOME VIEW



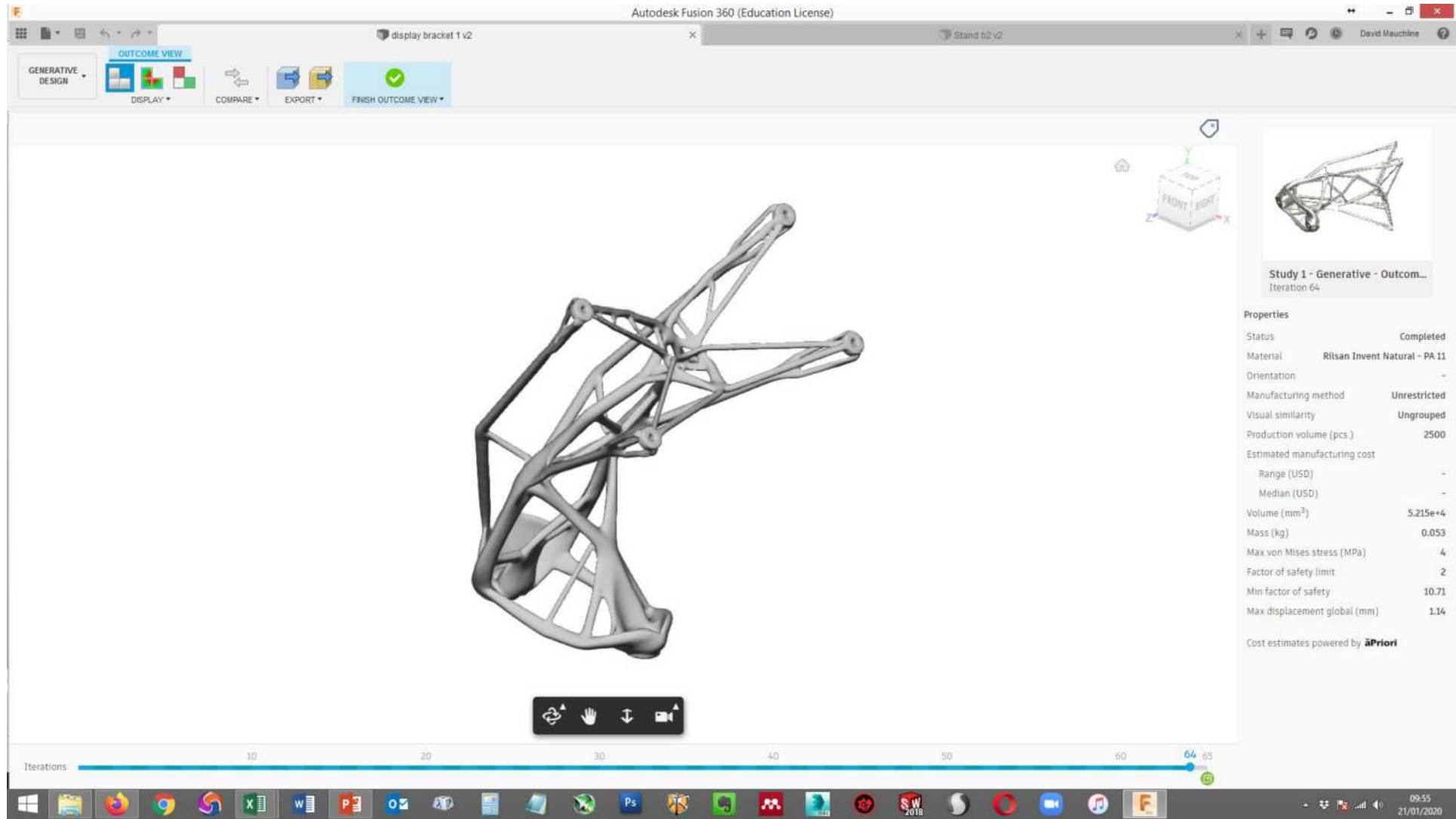
Study 1 - Generative - Outcom...
Iteration 61

Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	5.587e+4
Mass (kg)	0.057
Max von Mises stress (MPa)	13
Factor of safety limit	2
Min factor of safety	3.3
Max displacement global (mm)	1.16

Cost estimates powered by **aPriori**





display bracket 1 v2

Stand b2 v2

David Mauchline

GENERATIVE DESIGN

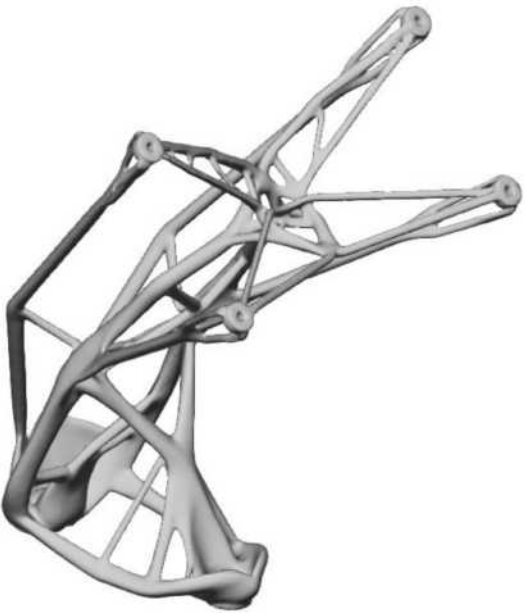
OUTCOME VIEW

DISPLAY

COMPARE

EXPORT

FINISH OUTCOME VIEW



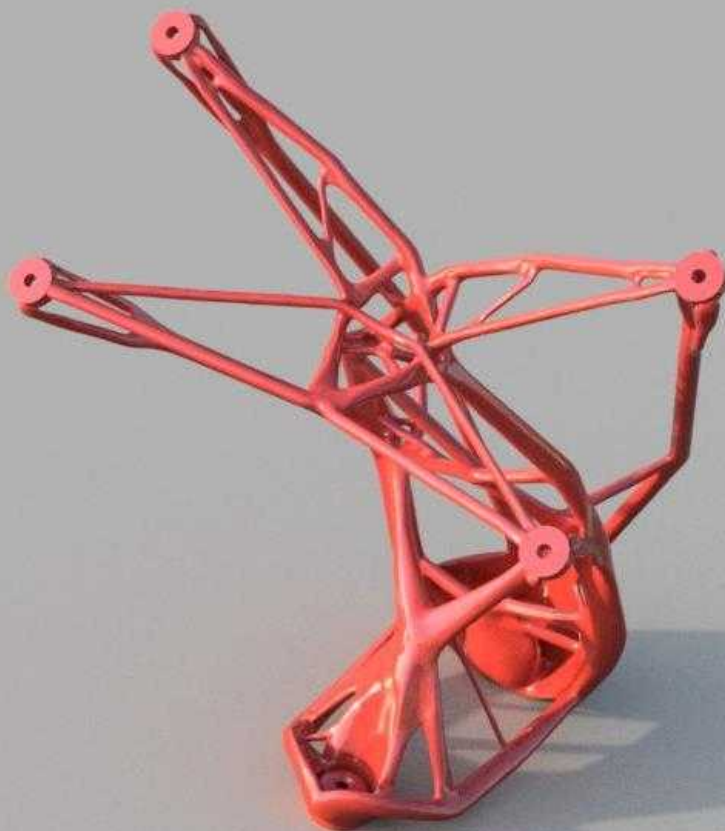
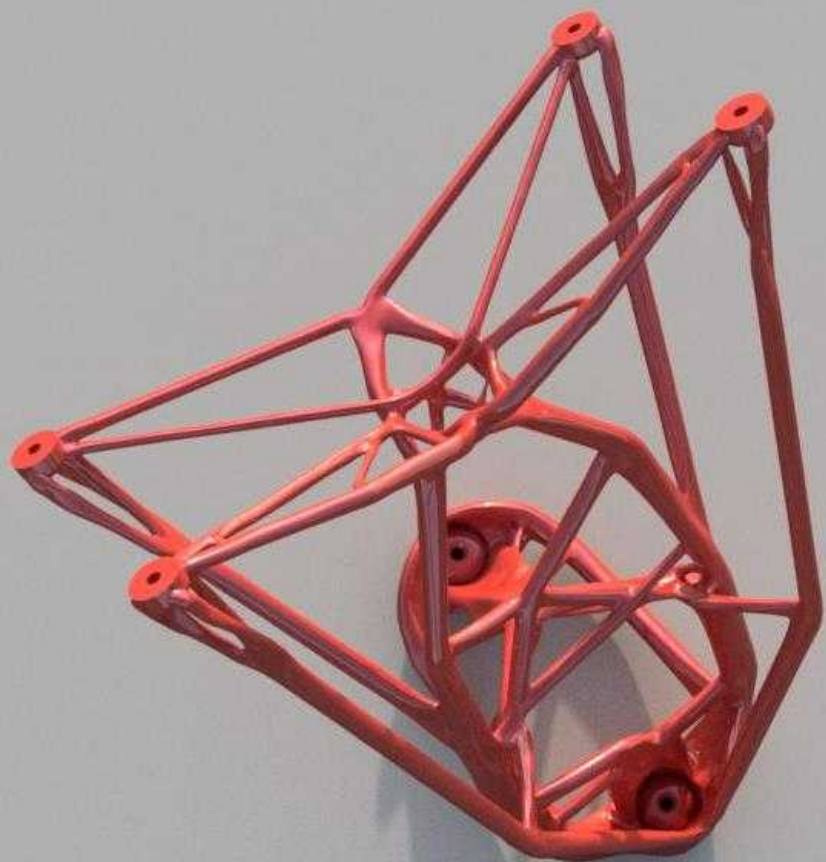
Study 1 - Generative - Outcom...
Iteration 64

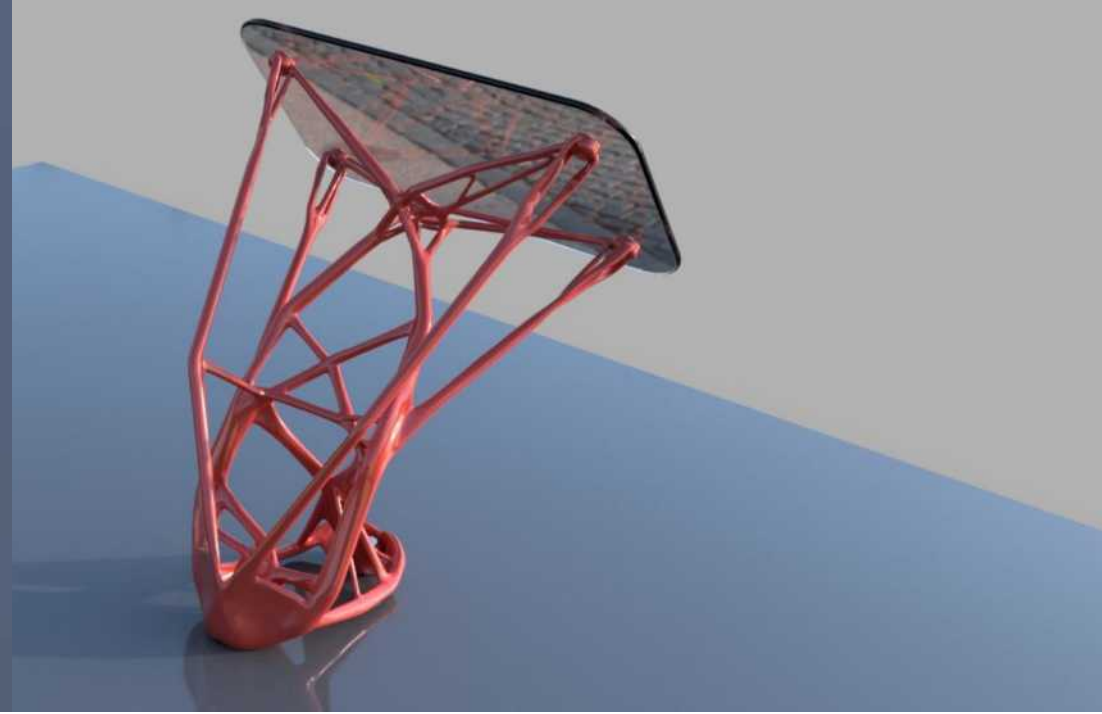
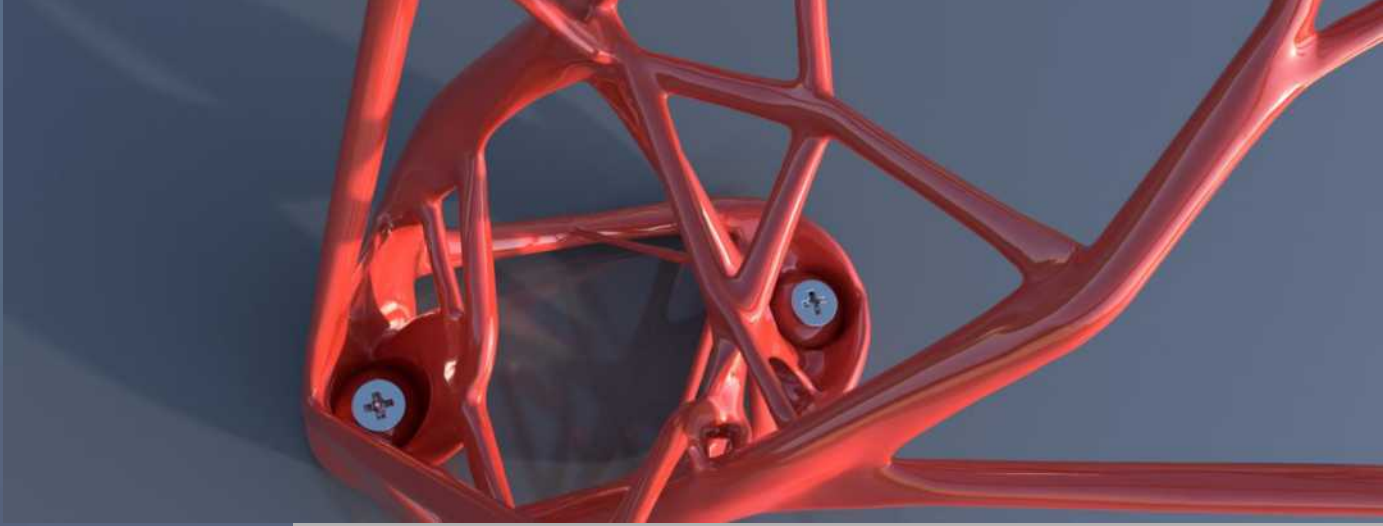
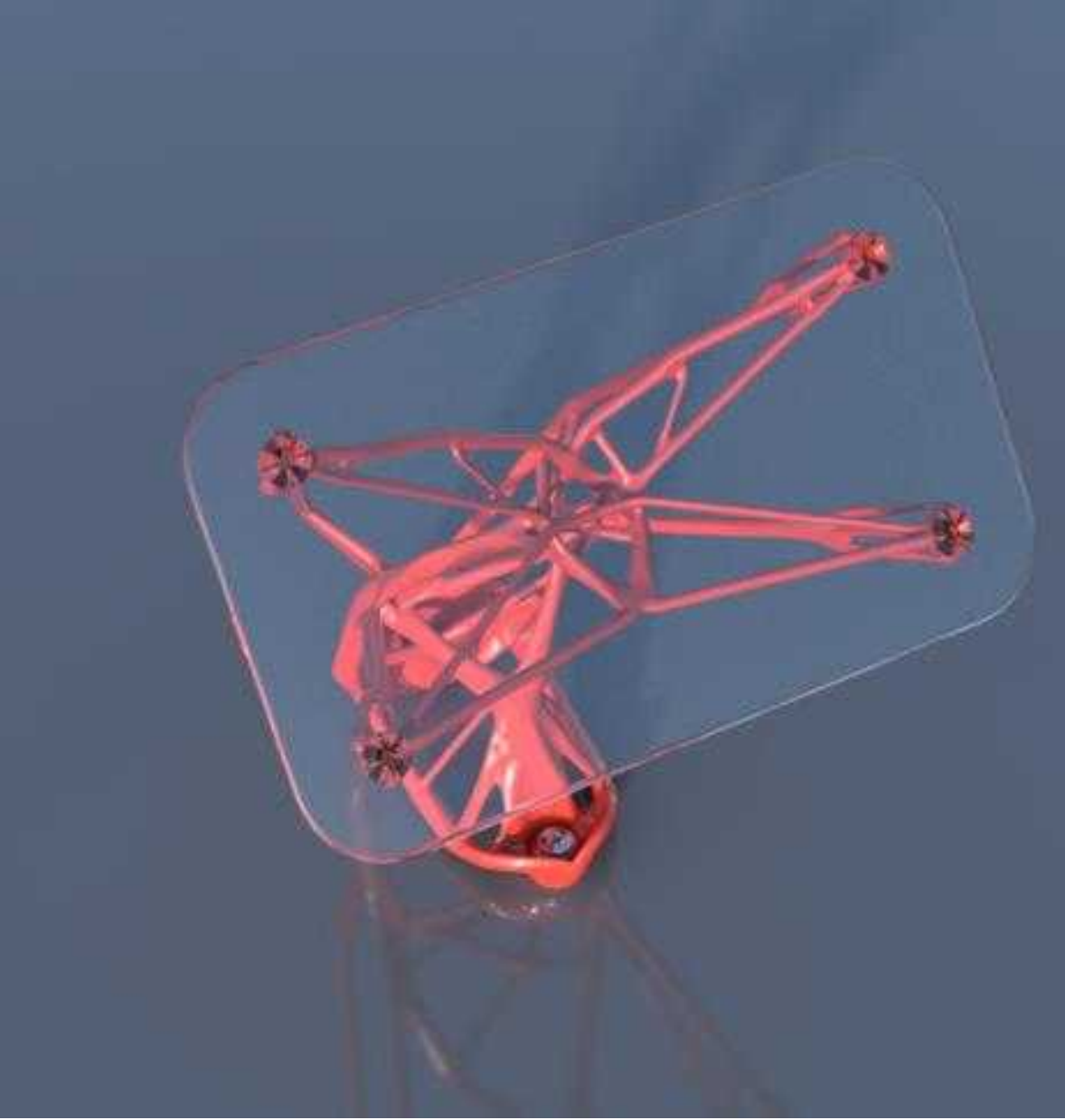
Properties

Status	Completed
Material	Risan Invent Natural - PA 11
Orientation	-
Manufacturing method	Unrestricted
Visual similarity	Ungrouped
Production volume (pcs.)	2500
Estimated manufacturing cost	-
Range (USD)	-
Median (USD)	-
Volume (mm ³)	5.215e+4
Mass (kg)	0.053
Max von Mises stress (MPa)	4
Factor of safety limit	2
Min factor of safety	10.71
Max displacement global (mm)	1.14

Cost estimates powered by **aPriori**









**VAAAL UNIVERSITY
OF TECHNOLOGY**

Inspiring thought. Shaping talent.

Thank you!

davidma@vut.ac.za

www.vut.ac.za