MICOL PUCCIARELLI
MIRADOURO

M A S T E R _ P A R A M E T R I C _ D E S I G N
XIV Edition. Final Project. Part I
November - January 2021

MIRADOURO
(Belvedere)

How to enhance a spectacular view?
Here starts the exploration and research of the best shape,
in order to give the location a viewpoint where to apreciate
the surroundings.

INDEX

INTRODUCTION

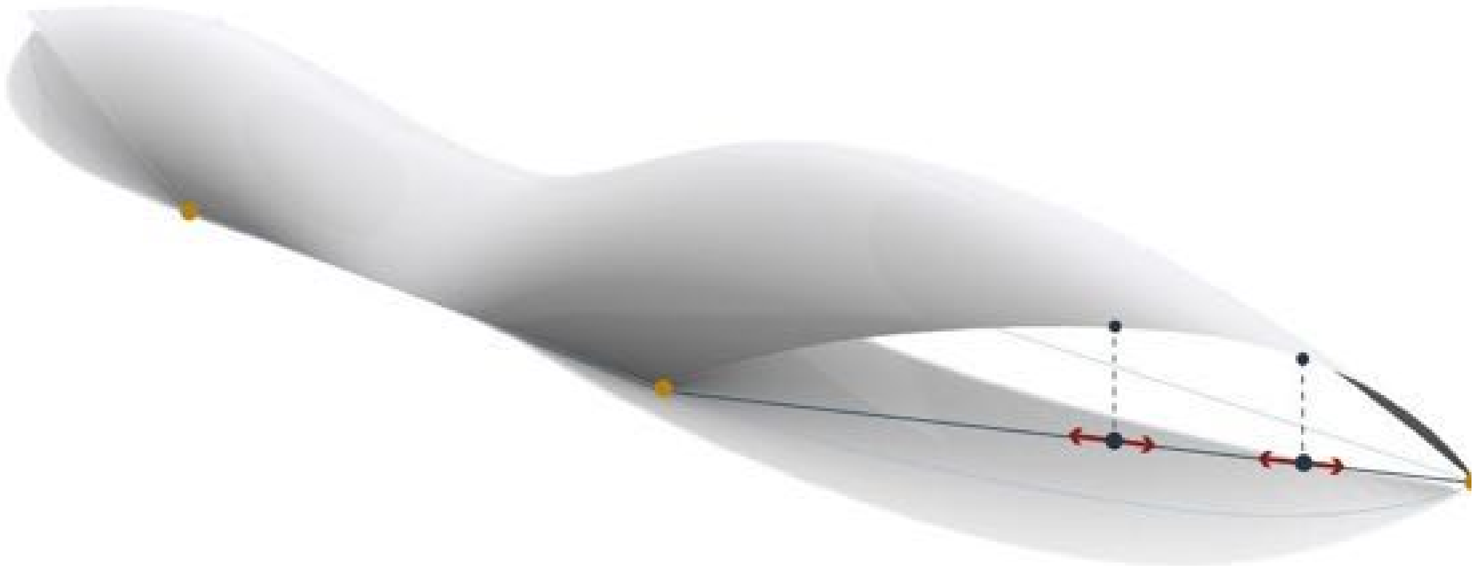
The main purpose of this thesis is to study a pavillon to be used as a viewpoint.
The idea was to analyze first the shape itself and its responsive skin according to the orientation of the Sun.
Then a structural analysis was necessary, in order to have a final structure that could support the shell.
We could, therefore, start the design investigation of the responsive skin, searching for the best solution to merge a good covering to the Sun heat, a feasable structure, and an organic shape that could blend with the landscape.

1.1

Selection of Variable Points

4 Anchor Points
3 Curves
2 Points movable in z direction
7 t parameters

Control Points Inputs:
Those points are variables and will move in the direction shown in order to find the best shape. with the minumum area.

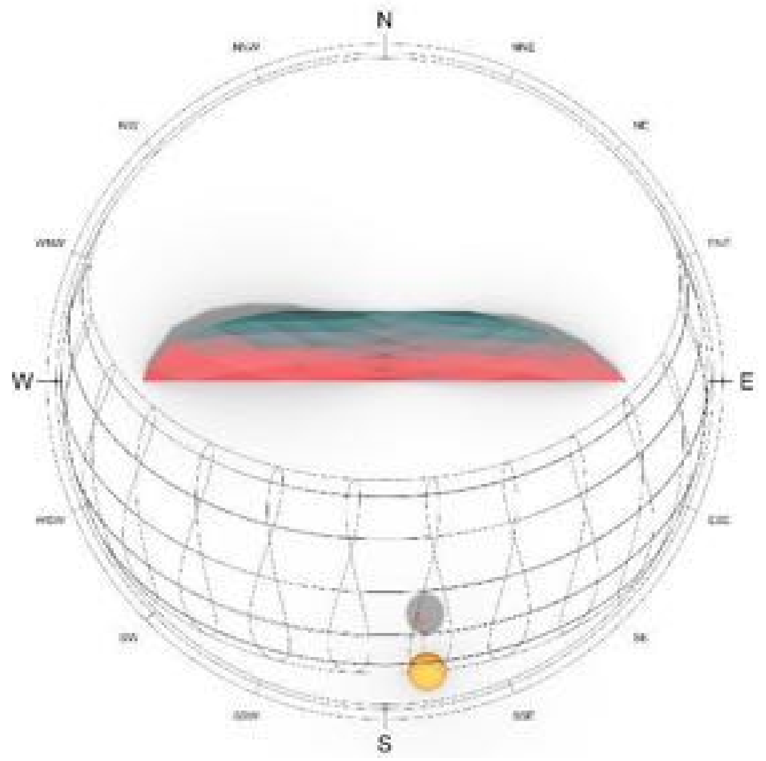


2.

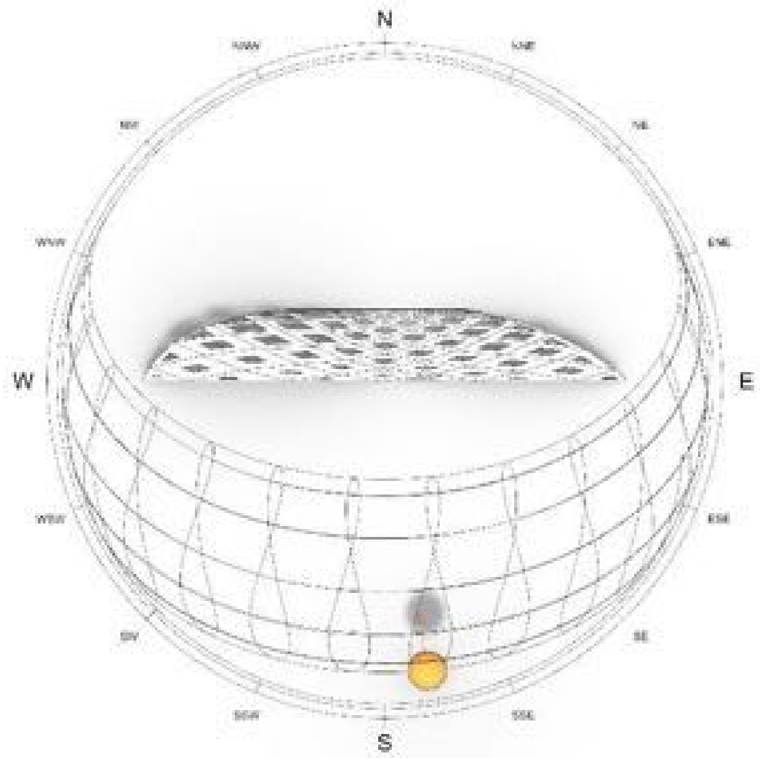
Solar Analysis

With Ladybug we can generate a solar map based on the location data and the exact date and time.

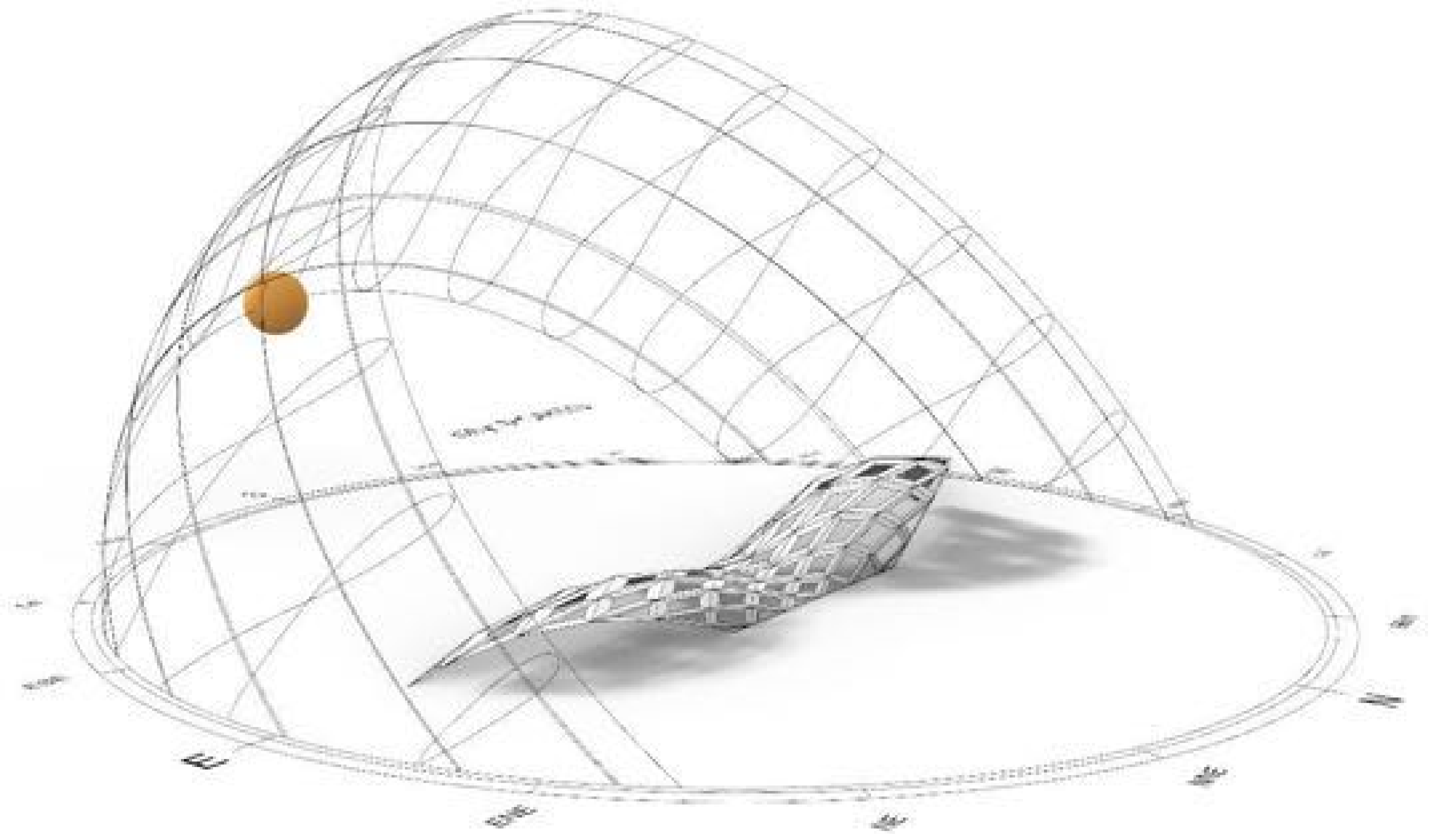
Location: Porto, Portugal
Day: 21 December h.12.00



Solar radiation applied on our shell



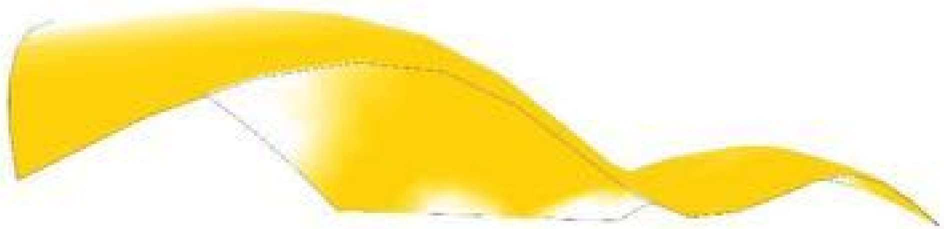
Hypothetical responsive skin based on the sun radiation

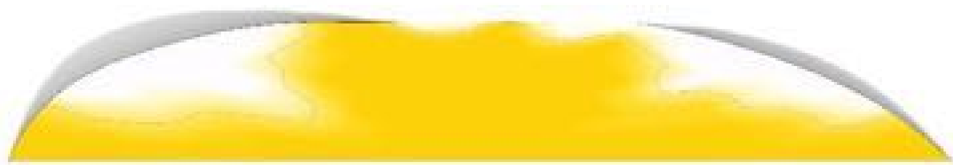


3.1

BESO for Shell - Thickness

Bidirectional Evolutionary Structural Optimization method. Beso is a topology optimization method where inefficient material is removed from the shell. In this way the structure is allowed to grow into the optimum design.





☐ Highest stress - Thicker structure

■ Lowest stress - Thinner structure

— Isocurve Result - Thickness value of 6cm

3.2

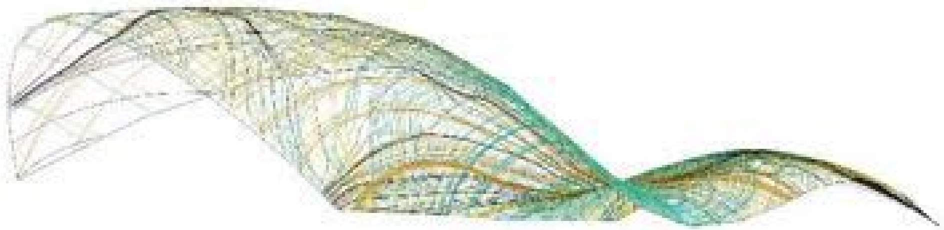
Shell Forces

Thanks to those lines outputs we can see the flow of moment and stress forces through the shell

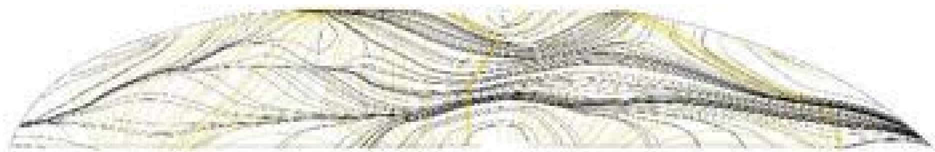
Line 1 - Tangent to the first principal direction

Line 2 - Tangent to the second principal direction

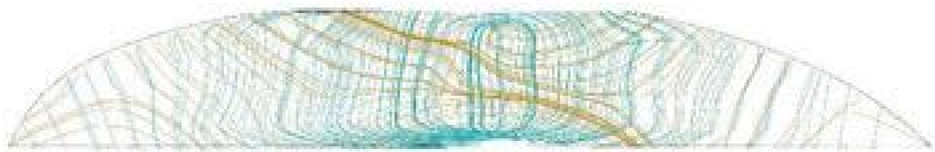
- Line1 - Principal Stress
- Line 2 - Principal Stress
- Line 1 - Principal Moment
- Line 2 - Principal Moment



Principal Stress + Principal Moment



Principal Stress



Principal Moment

3.3

Column Optimization

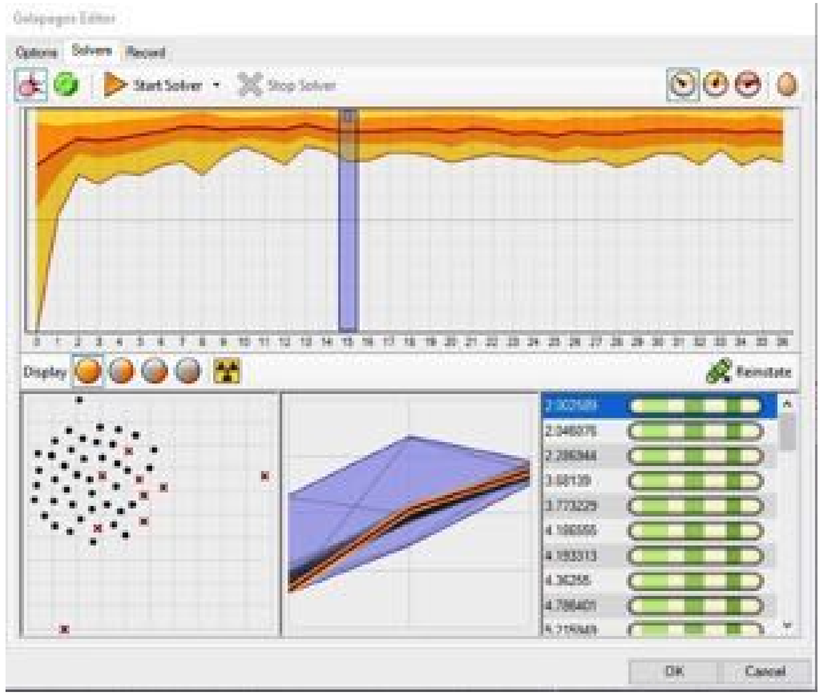
Thanks to the **Galapagos** plug in we can search for the best location of the columns in order to have a less stressed shell.

In this case we gave set up the number of columns as 3 and with a panel we let the software calculate the best response shifting those values.

Max Displacement (cm): 2.04

Galapagos uses an evolutionary-based algorithmic solver similar to Biomorpher (see Chapter 1). The goal here is to optimize to position of columns according to the shell structure.

Genome Input -
Number of columns: 3
Random values: position of co-lumns under the shell

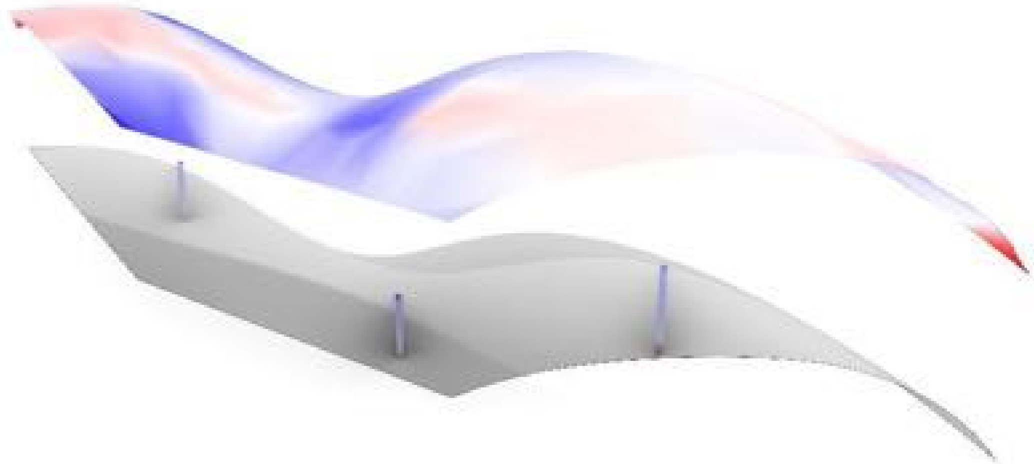


Best solution highlighted in blue

In the images we can see the choosen solution of columns and how the shell reacts to the loads of gravity with those three supports added to the analysis.

Below we can see the outputs of the **utilization** legend for the columns and for the shell.

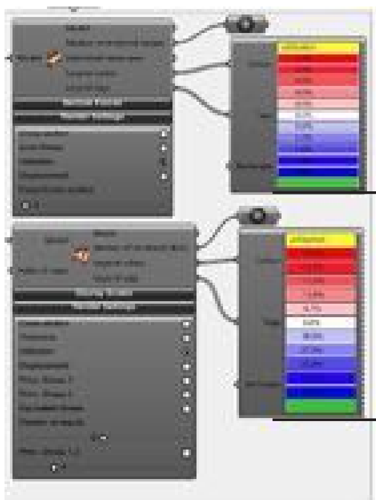
Here we get the level of utilization for each element, from compression (red) to tension (blue)
When the numeric value goes higher that 100% this means a point of break in the material.



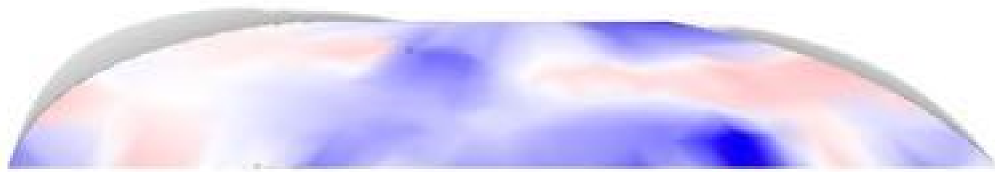
Red
Maximum
material utilization

Blue
Minimum
material utilization

Utilization Outputs
Column
Max 8.0%



Shell
Min -28.6%
Max 93.2%



3.4

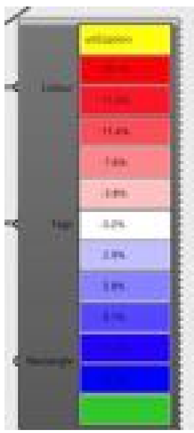
Beams Optimization

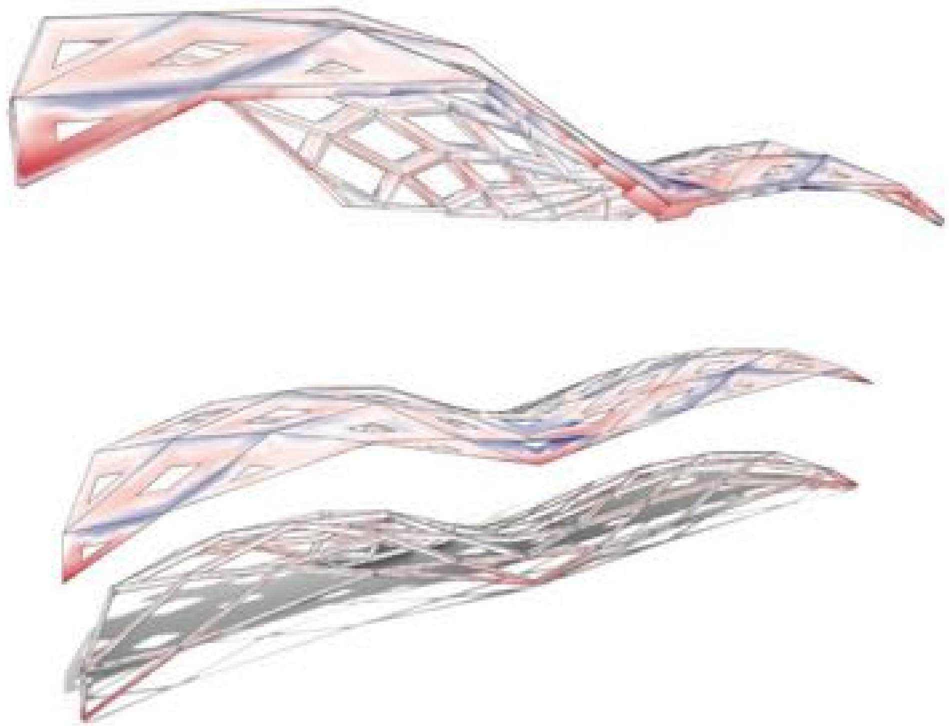
Always with the use of the plug in **Karamba 3D** we analysed the dimension of the beams and an hypothetical shell.

Material:
Hardwood
D18(Parallel)

Dimensions:
Width: 20cm
Height: 50 to 210cm

Max **Displacement** (cm): 1.77
Buckling: 0 to 0.95





Utilization Output

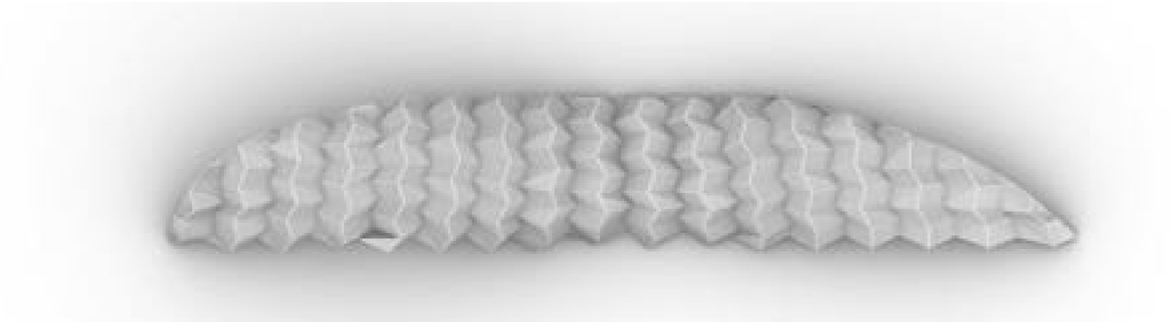
Displacement output

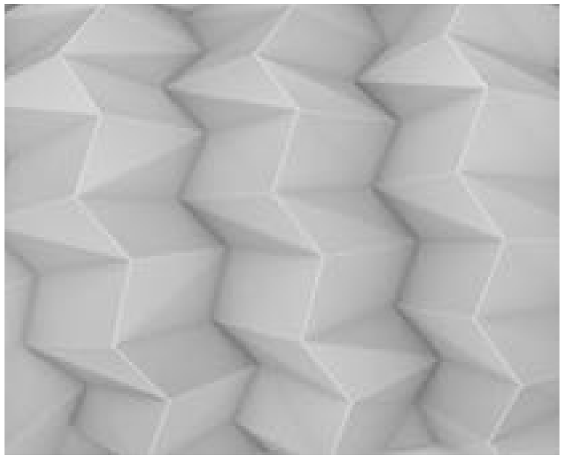
FOLDED PATTERN

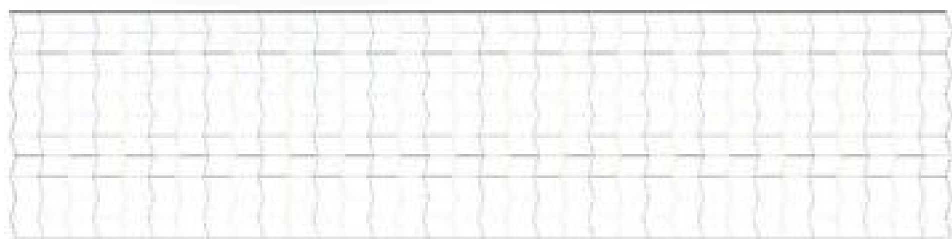
4.1

Folded Pattern

Miura-ori folding method.
The origami starts from a flat surface, folded following a quadrilateral mesh drawing.





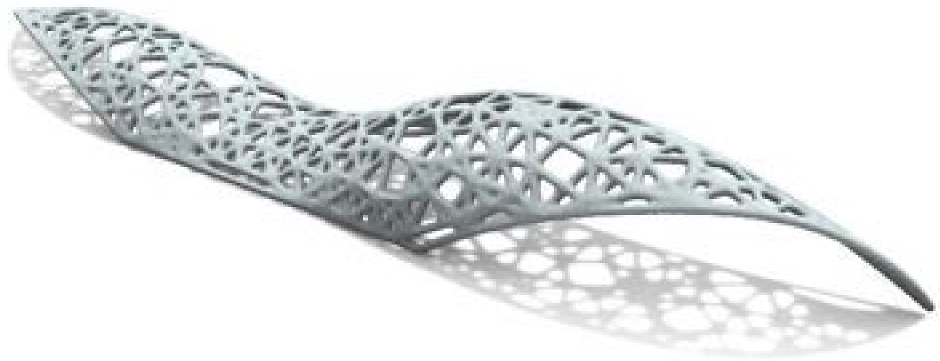


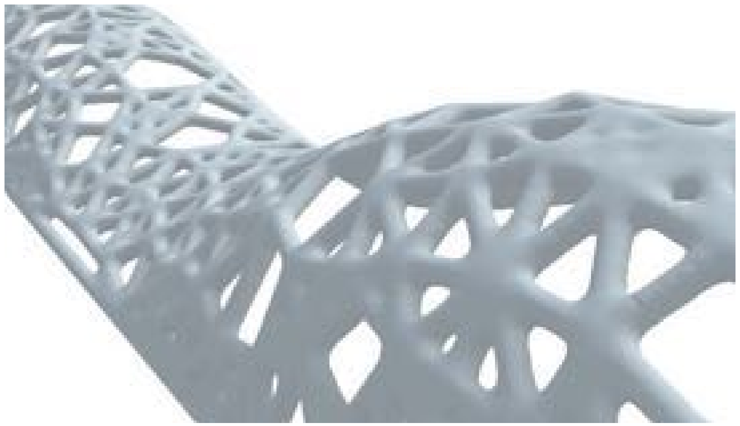
ORGANIC PATTERN

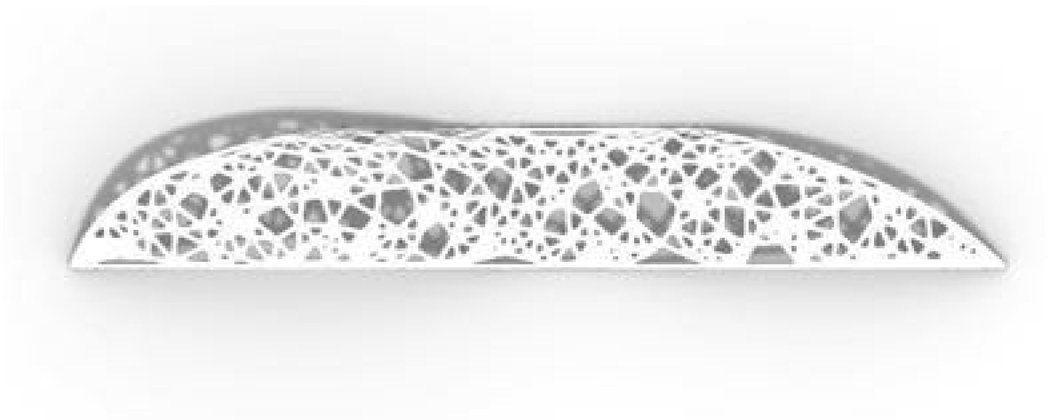
4.2

Organic Patterns

Starting from a population of the mesh with random points we analysed two ways of creating a net structure, one with a fattener component (on the following page) and the other with a voxelization method with Dendro plug in (on the right) .
Same inputs, different solutions.





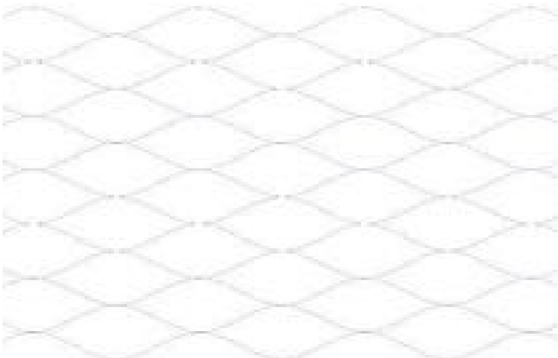


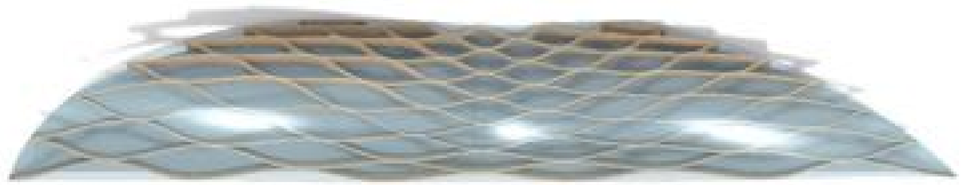
WAVE PATTERN

4.3

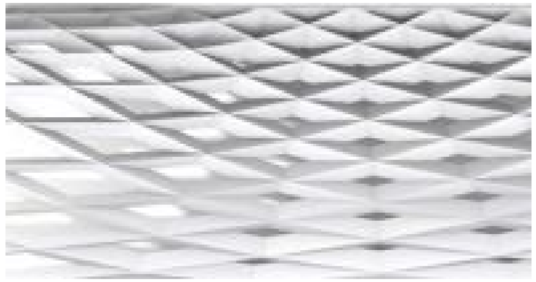
Wave Pattern

Generated from the sin function and applyed to our shell to create a possible structure.





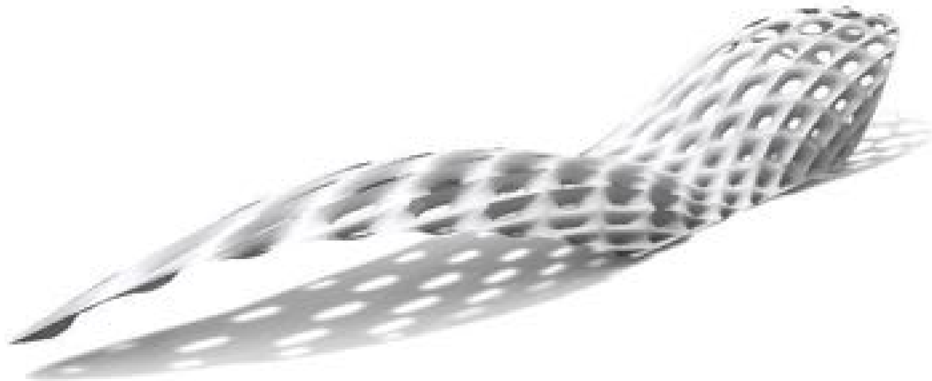
DIAMOND PATTERN



4.4

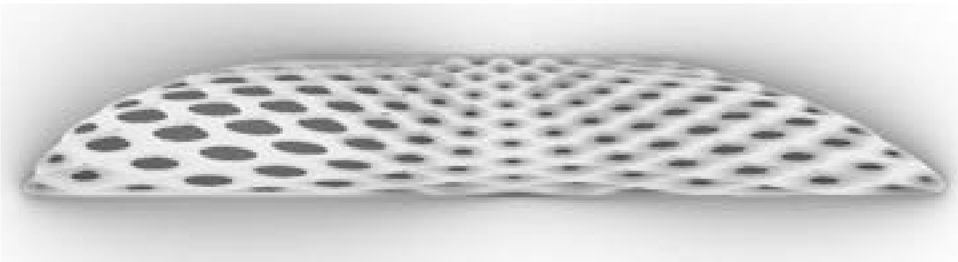
Diamond Pattern

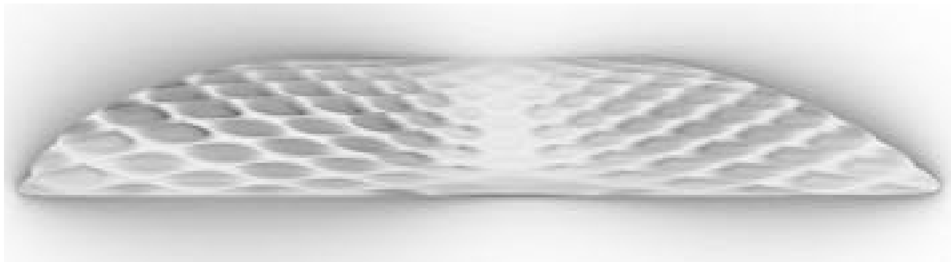
Generated from a diamond pattern and applyed to the shell.
In both example of apertures are driven by the height of the shell.



Skin with openings

Closed skin



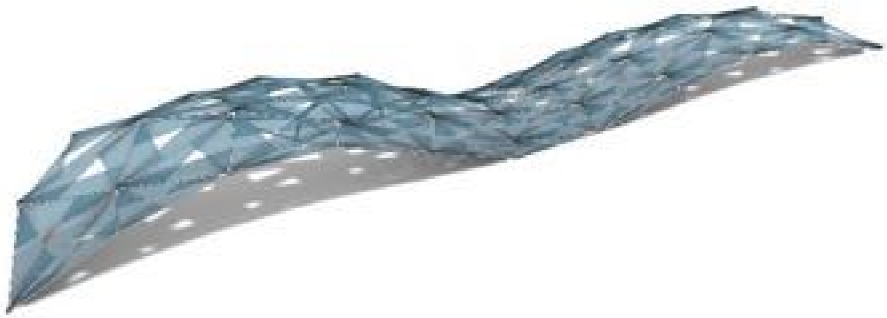


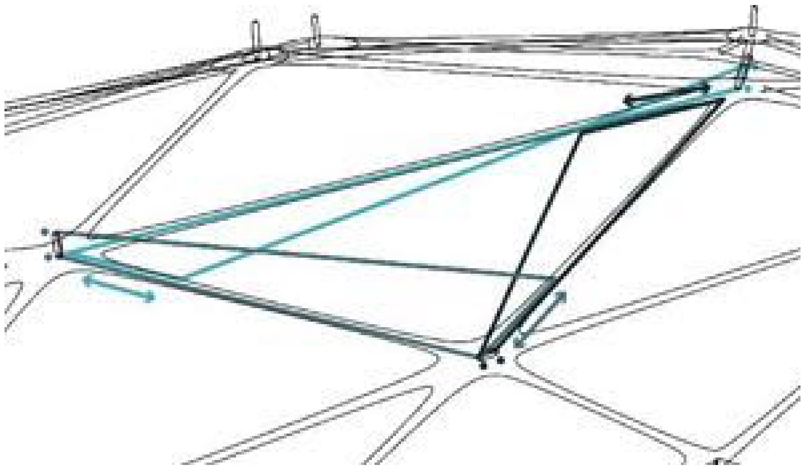
ELASTIC PATTERN

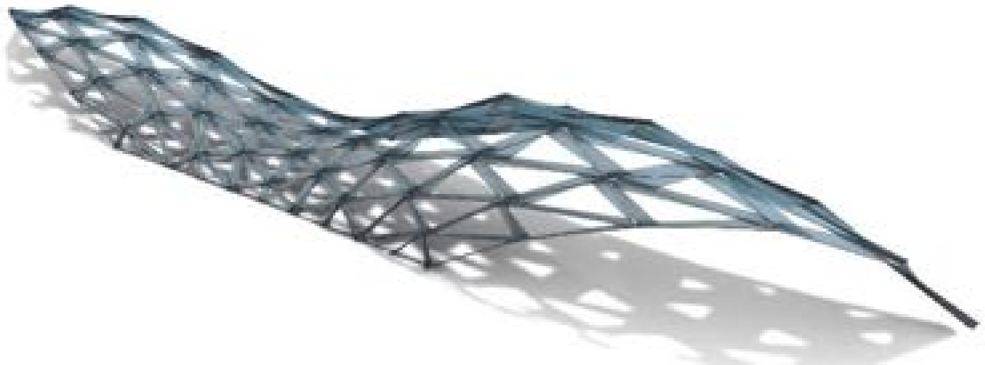
4.5

Elastic Pattern

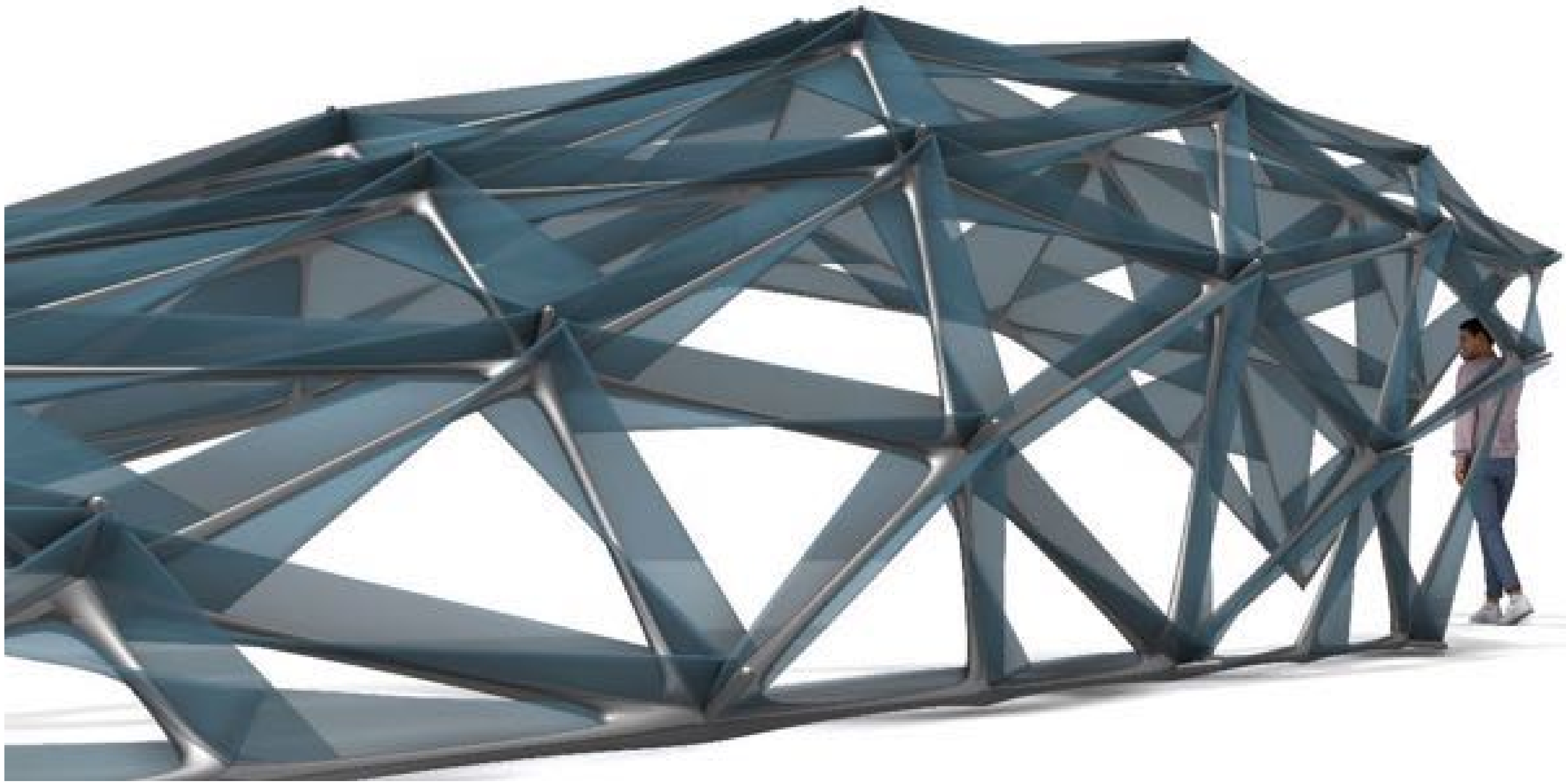
Responsive skin based on a triangular pattern.
The transparent blue elastic material expands itself in order create a shelter or retract to give more light.







Movement of the elastic material.

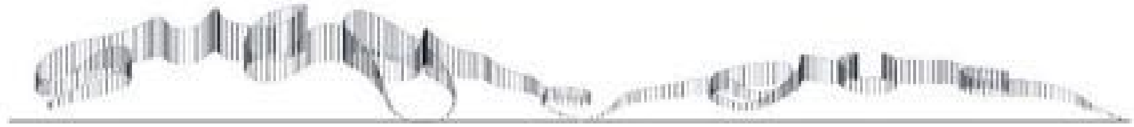


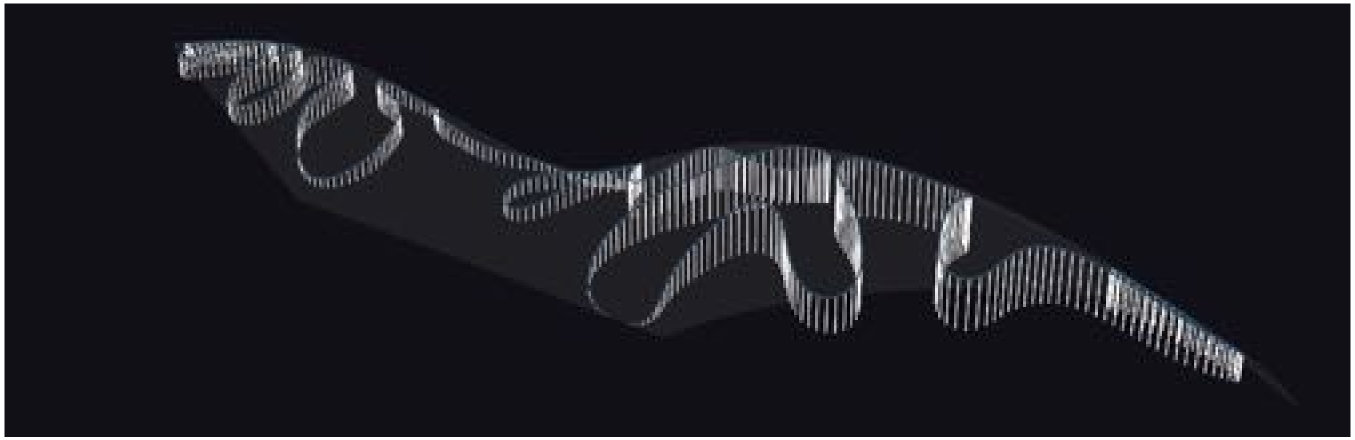
LIGHTING STUDY

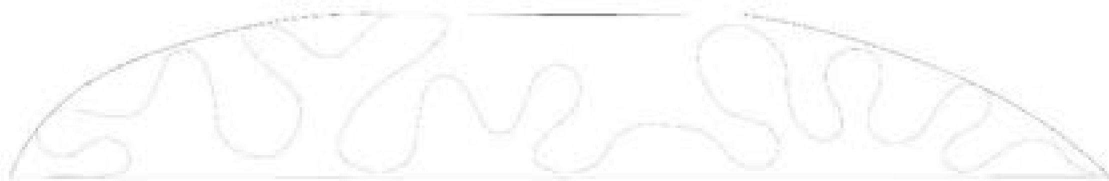
5.2

Lighting Study -
Pendant Spline Design

Lights are hanged on a curved spline structure following the shape of the shell.
The lenght of the pendants variates according to the height of the shell.







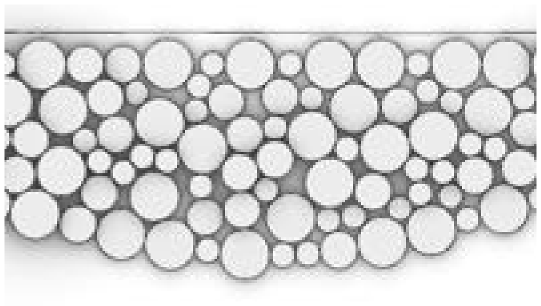
SEATINGS

6.

Seatings

The design of the seatings is generated by a series of circles pushed toghether. The vertical extrusion of the cylinders variates according to the height of the shell.

Cylinders:
3 Heights
3 Diameters



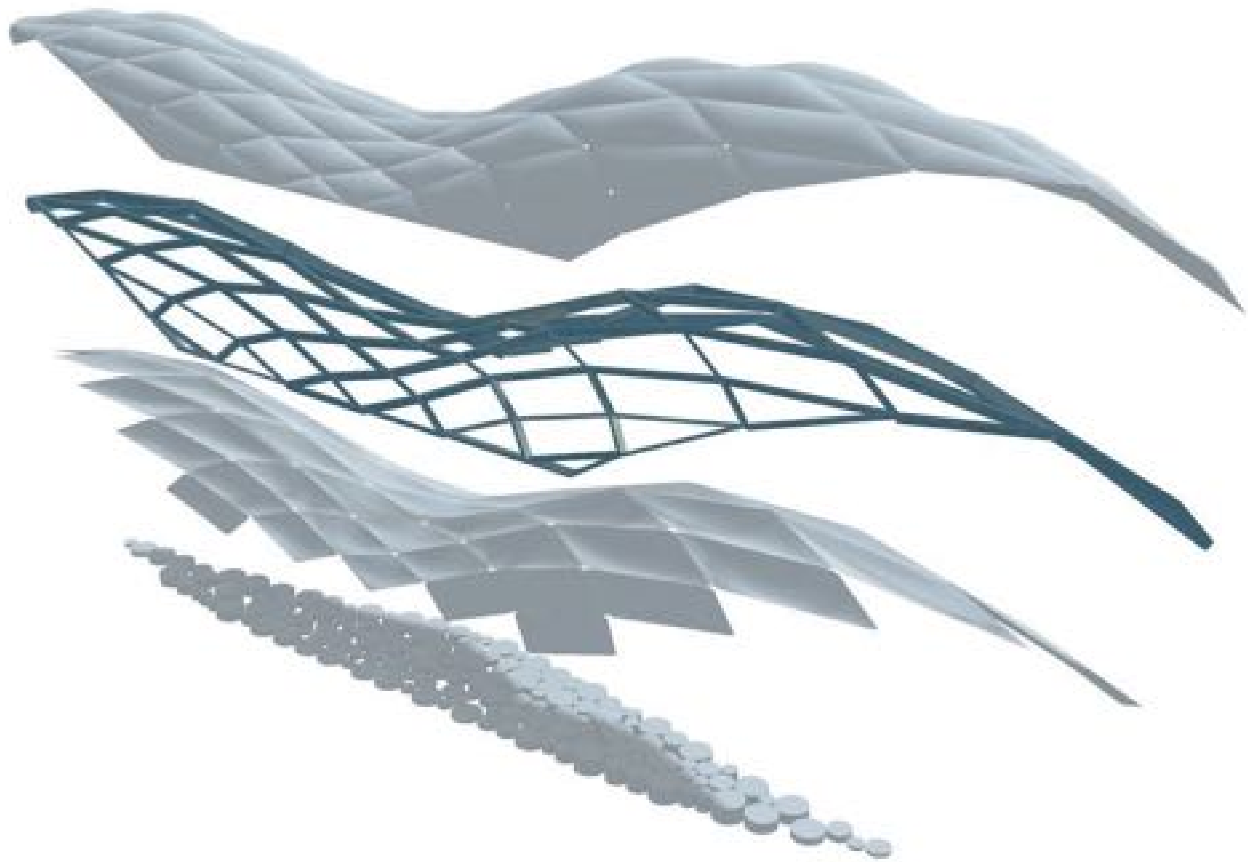
INFLATED SOLUTION

7.

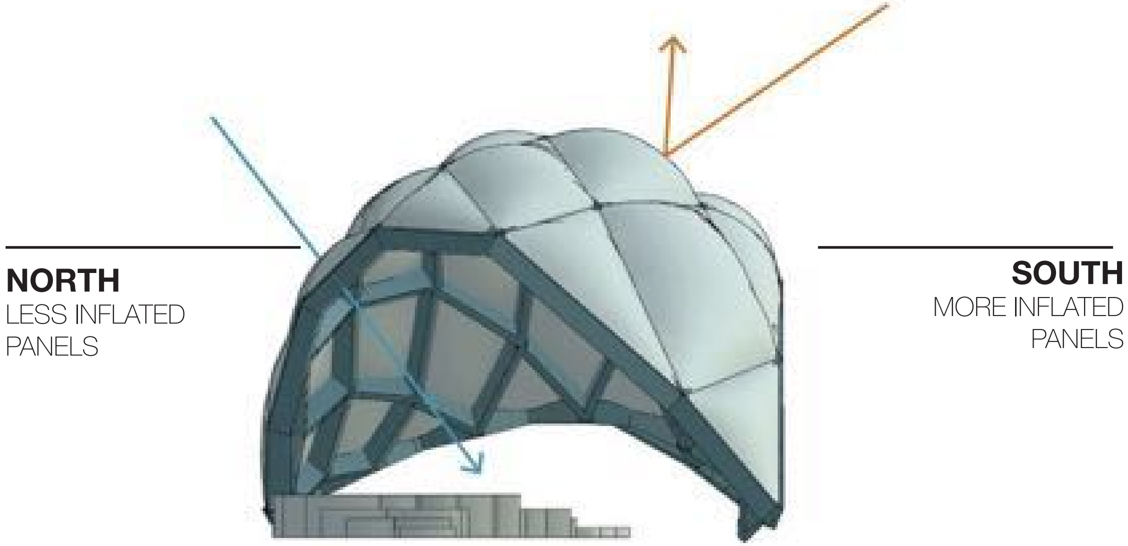
Inflated Solution

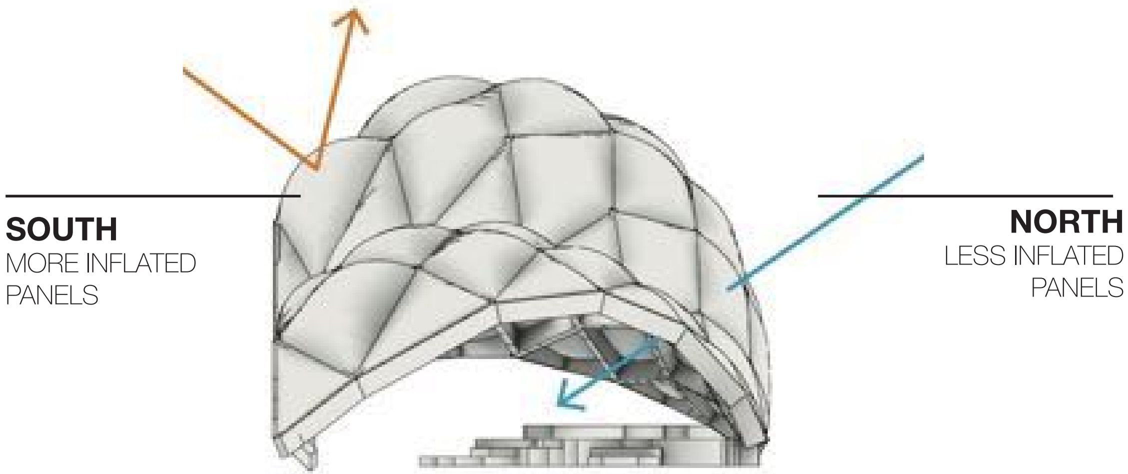
As last we explored the possibility of having an inflatable skin mounted over the wooden structure previously studied (see chapter 3.4).

The design comes from the diamond's pattern already developed. In this case we imagined to apply an elastic membrane (ETFE for example) and to inflate the cushions with a nitrogen mix of gas in order to increase the shading of the skin.



Thanks to the solar analysis made at the beginning (see chapter 2) we could inflate more the panels oriented to the south, choosing when and where to provide more solar radiation.





ANA_ASCIC
RESPONSIVE SKIN

M A S T E R _ P A R A M E T R I C _ D E S I G N
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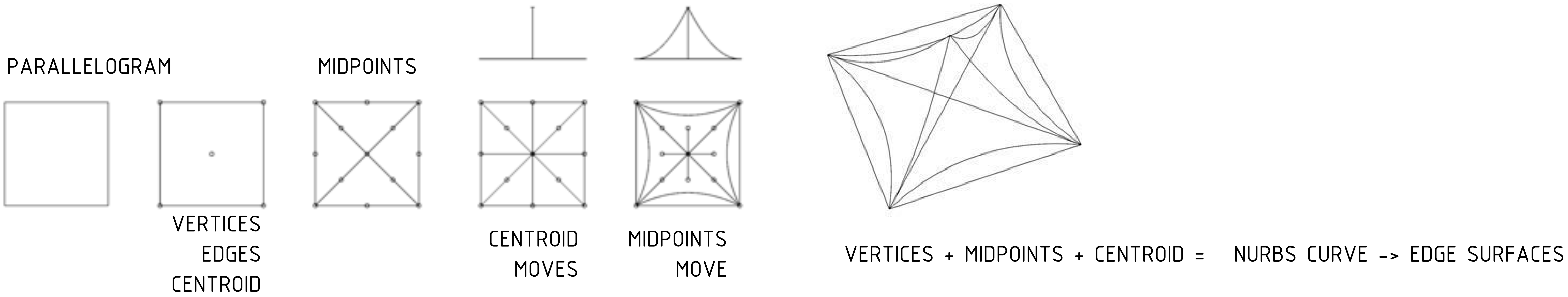
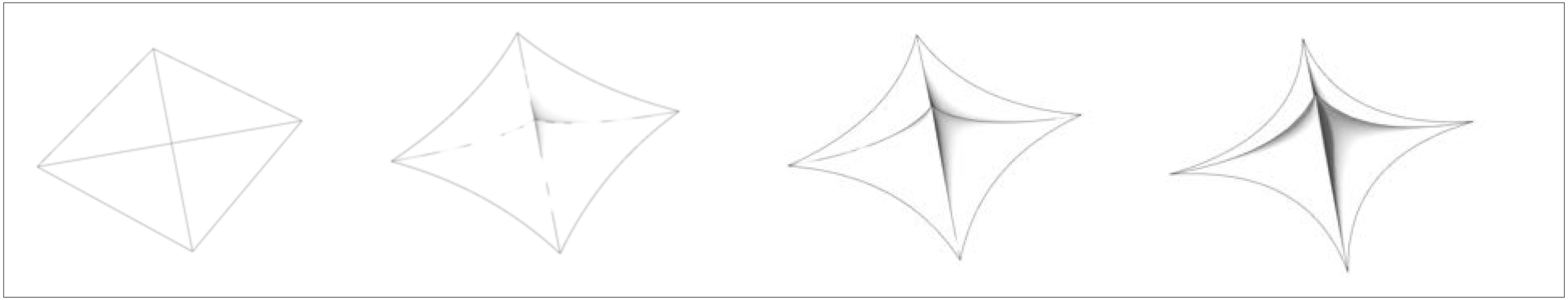
1. INTRODUCTION

Last decade has shown a growing interest in responsive facade technologies to counter overheating problems and well-being concerns in smart and high-performance buildings. On the other hand computational design tools and technologies offer architects opportunities to explore the possibilities of creating dynamic and responsive surfaces and to optimize them according to the environmental data or to some other demands. The aim of this research is to propose a concept of a responsive architectural skin that could be applied to surfaces of different sizes and shapes.





3. RESPONSIVE SKIN

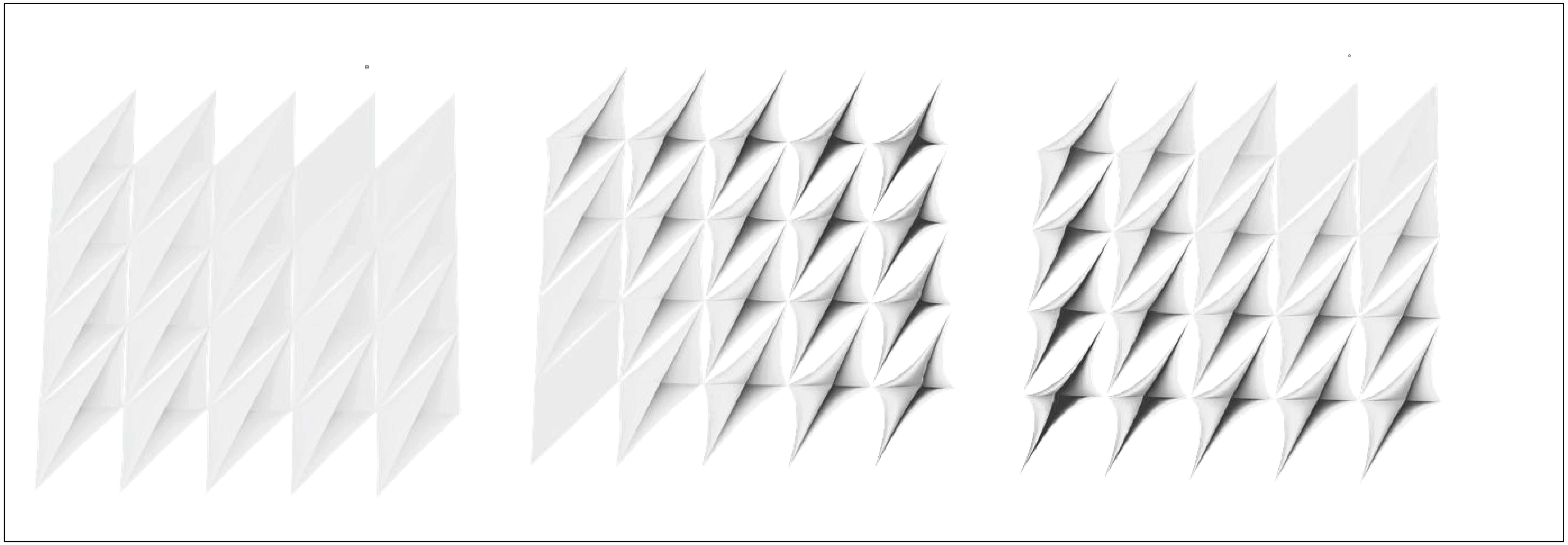
SINGLE MODULE CONSTRUCTION

Departing from the initial idea of a single unit that when multiplied forms larger structures, a single module was formed. The aim of the design was to generate a module that is geometrically transformed by the movement of the centroid point of the base in normal direction simulating the transformation that might occur if the module were made from an elastic material (fabric, polymer, etc.). This geometrical transformation of the module offers us an opportunity for further research of more complex geometries.

3. RESPONSIVE SKIN

SINGLE MODULE DEFINITION

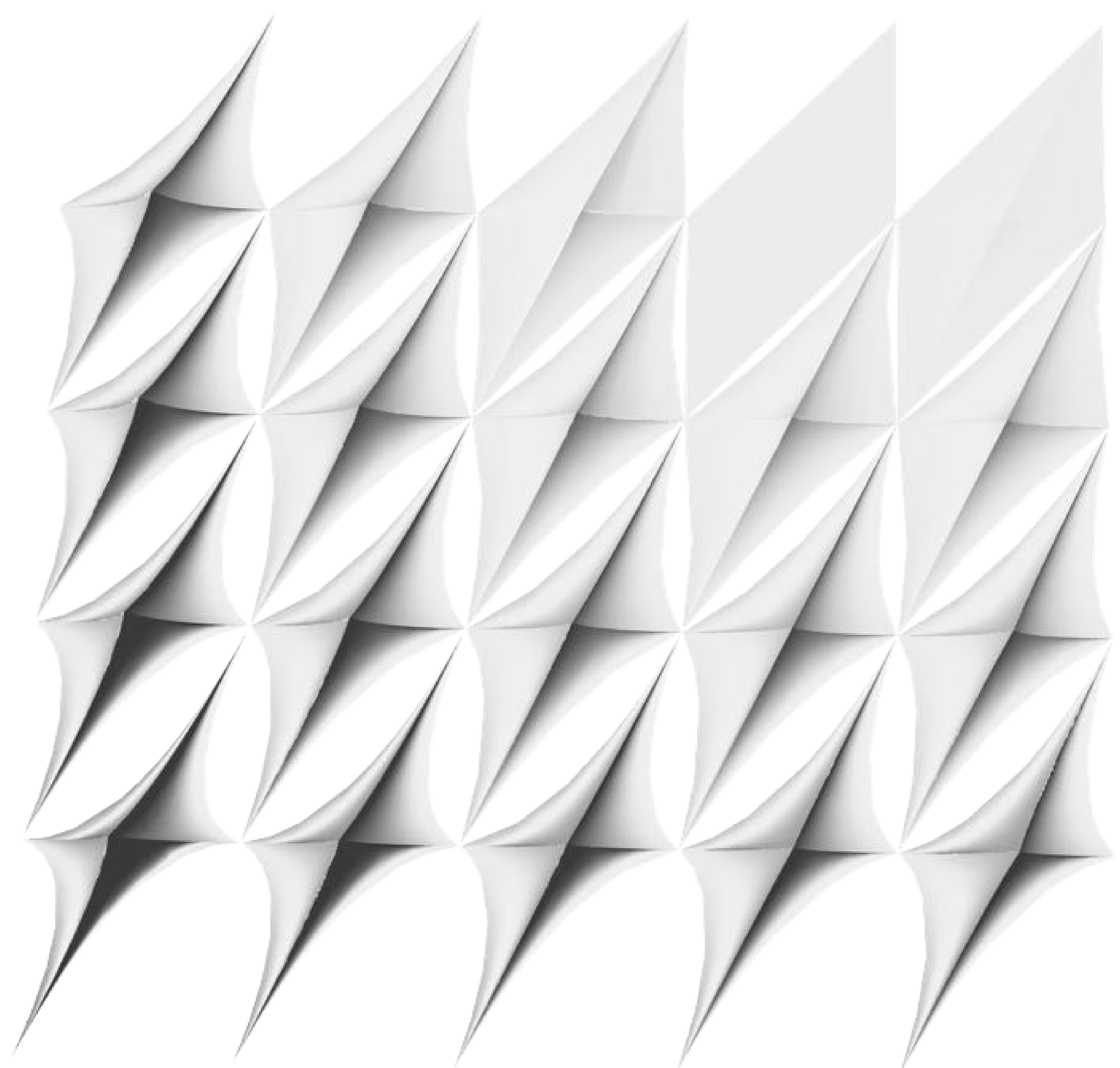
Grasshopper definition was made in which both the movement of centroid and the consequential transformation of the edges are controlled with a single slider. It is clear that the slider bar could be replaced by a movement of an attractor, and the attractor condition could be connected with some numerical values from the environment (like sunlight, insolation, pollution, wind, sound, etc.)



3. RESPONSIVE SKIN

SIMPLE SURFACE + ATTRACTOR

Next step for the research was to apply the module on a simple surface and connect the movement of the centroid and the consequential transformation of the edges to an attractor. The attractor is a single point that when moved away from the module generated a larger movement of the centroid and thus a larger transformation of the module.



3. RESPONSIVE SKIN

SIMPLE SURFACE + ATTRACTOR DEFINITION

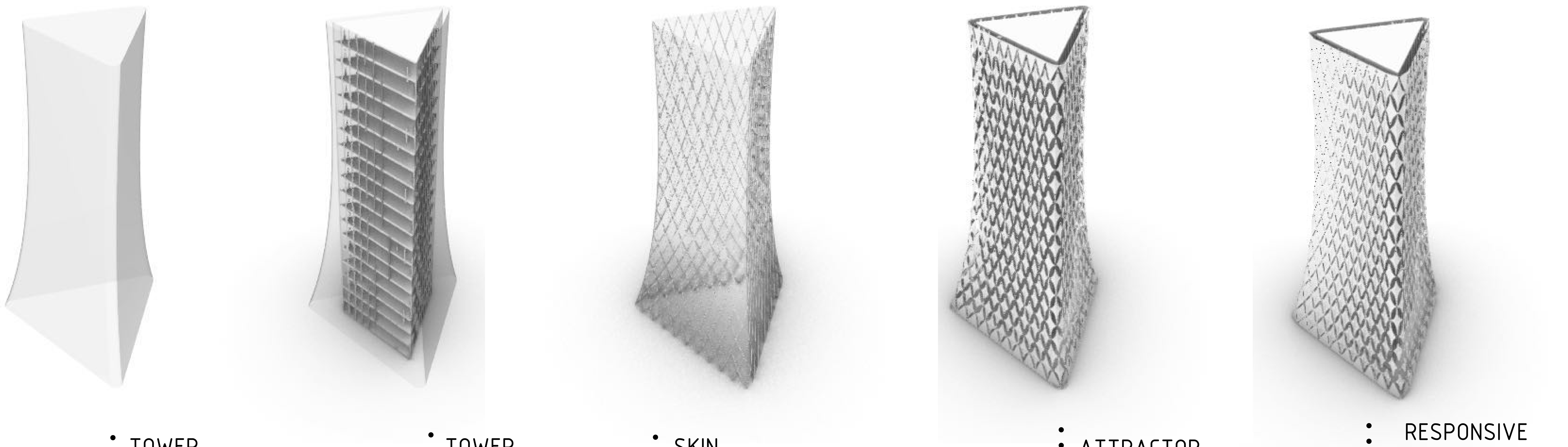
3. RESPONSIVE SKIN

SIMPLE SURFACE + ATTRACTOR

The images above illustrate how the system might be applied to an architectural skin if the attractor were replaced by environmental data like insolation, as the facade warms the attractor is closer to the surface and the modules close, as the facade cools the attractor moves away and the modules open.

3. RESPONSIVE SKIN

RESPONSIVE TOWER - CONSTRUCTION



TOWER SKIN

TOWER STRUCTURE

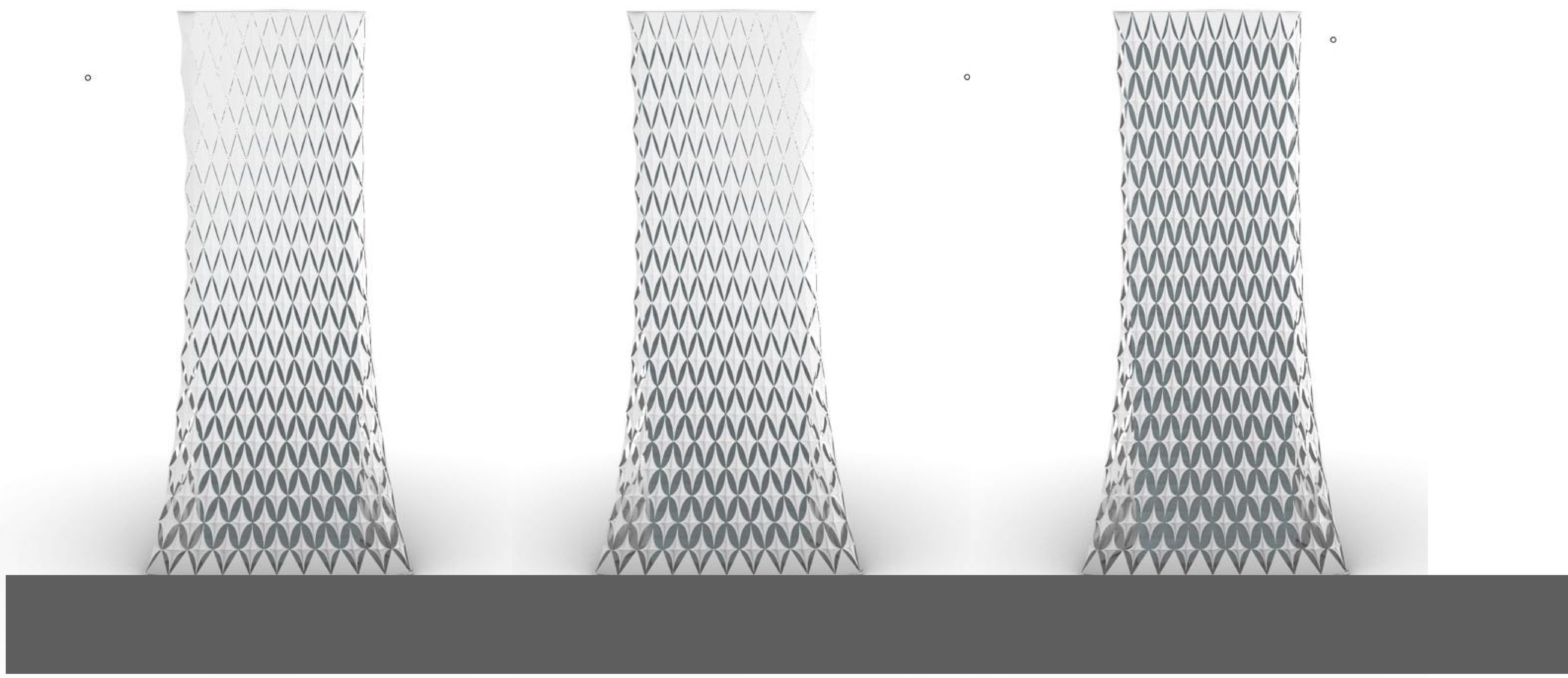
SKIN PANELIZATION

ATTRACTOR

RESPONSIVE SKIN

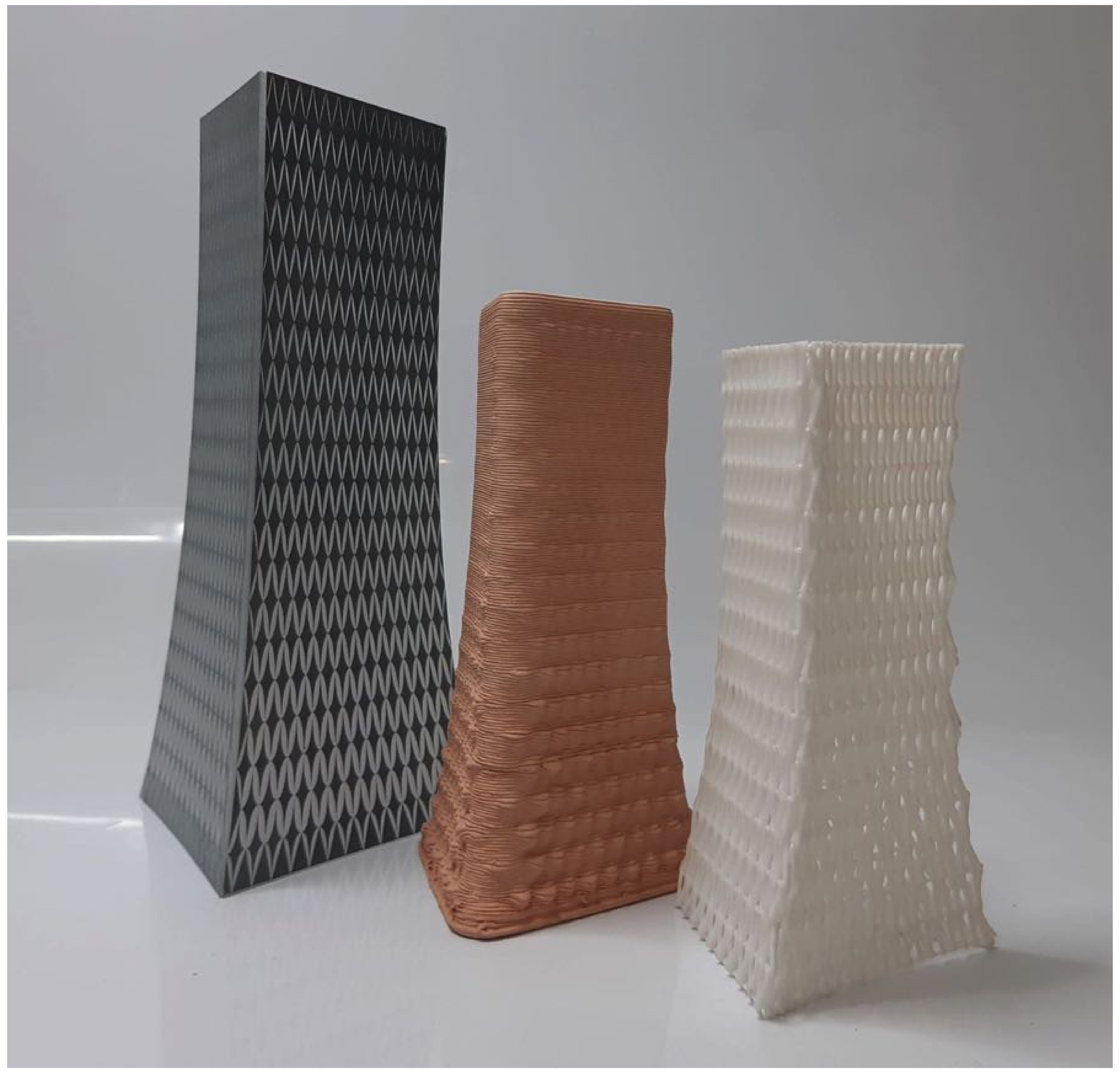
3. RESPONSIVE SKIN

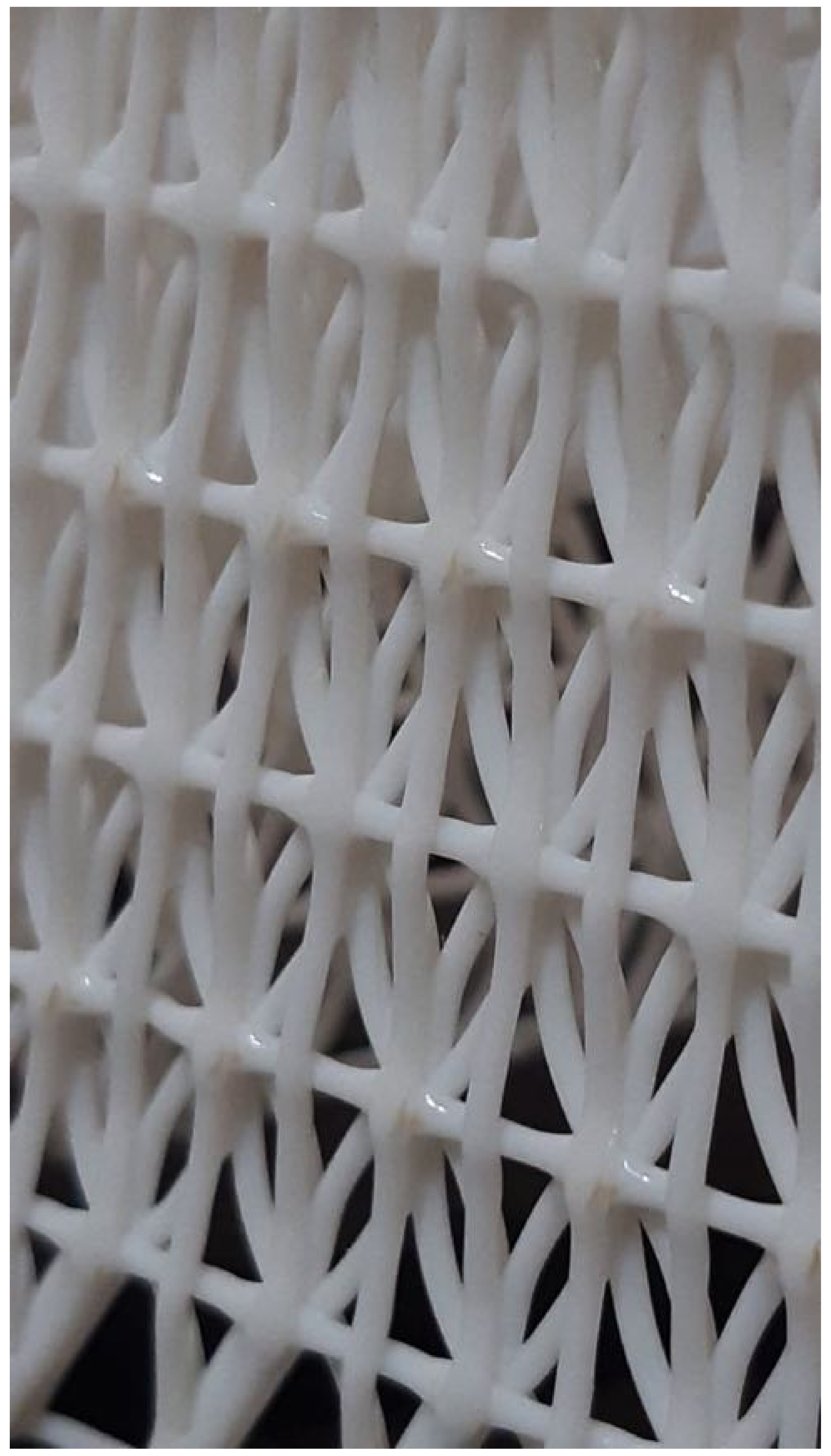
RESPONSIVE TOWER - FACADES



3. RESPONSIVE SKIN

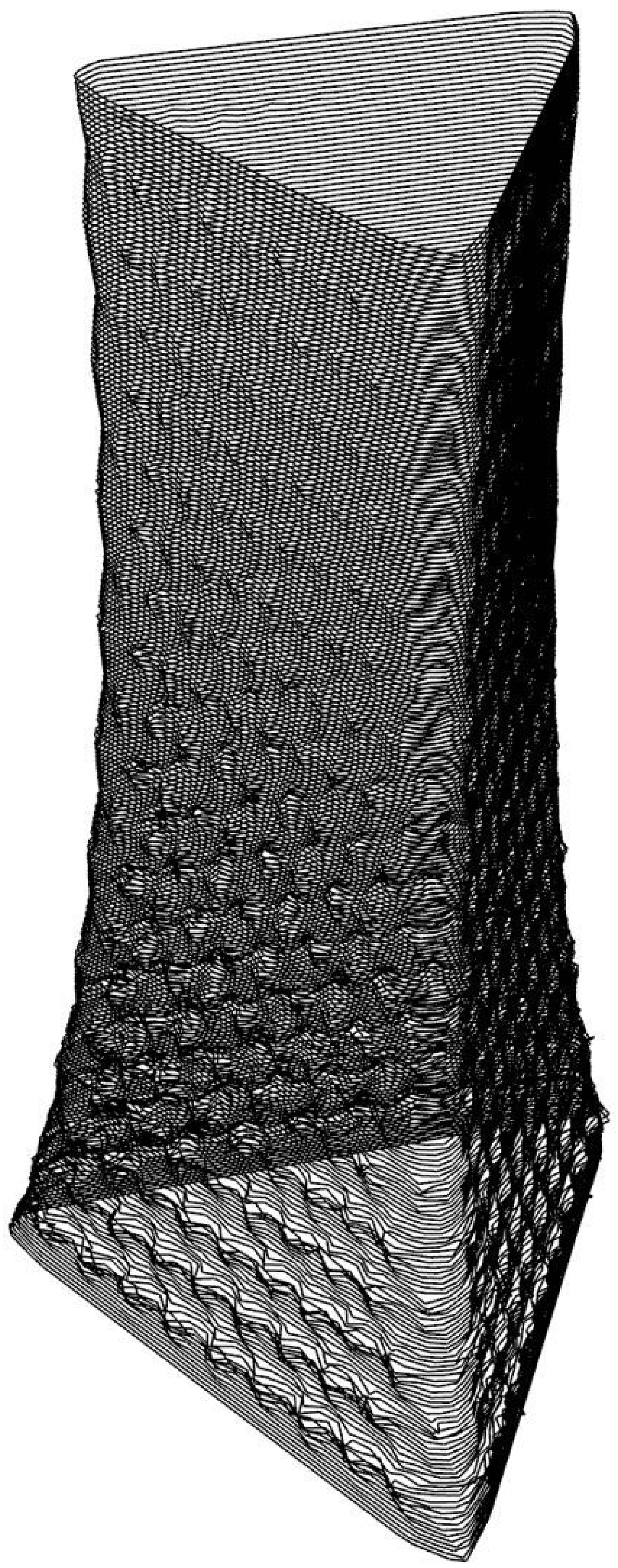
TOWER SECTION AND PLAN

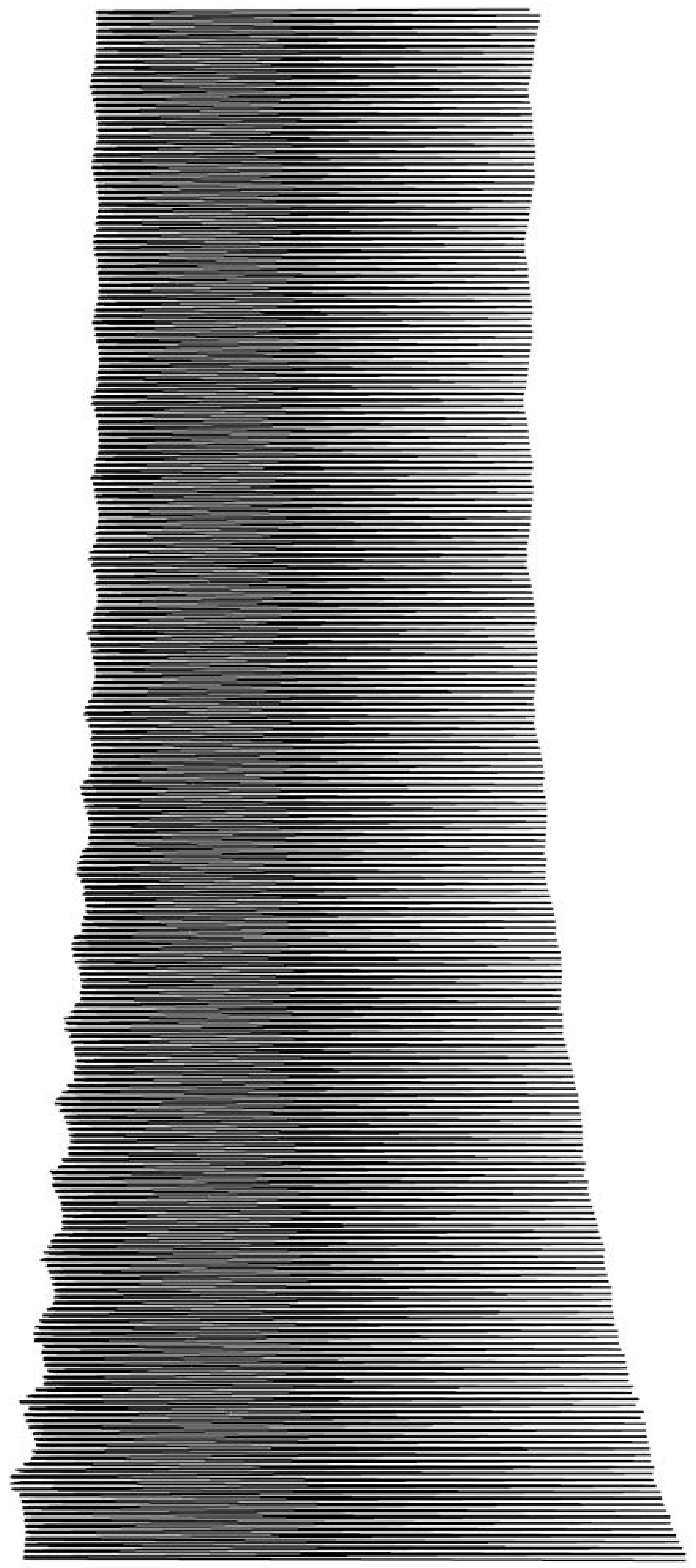




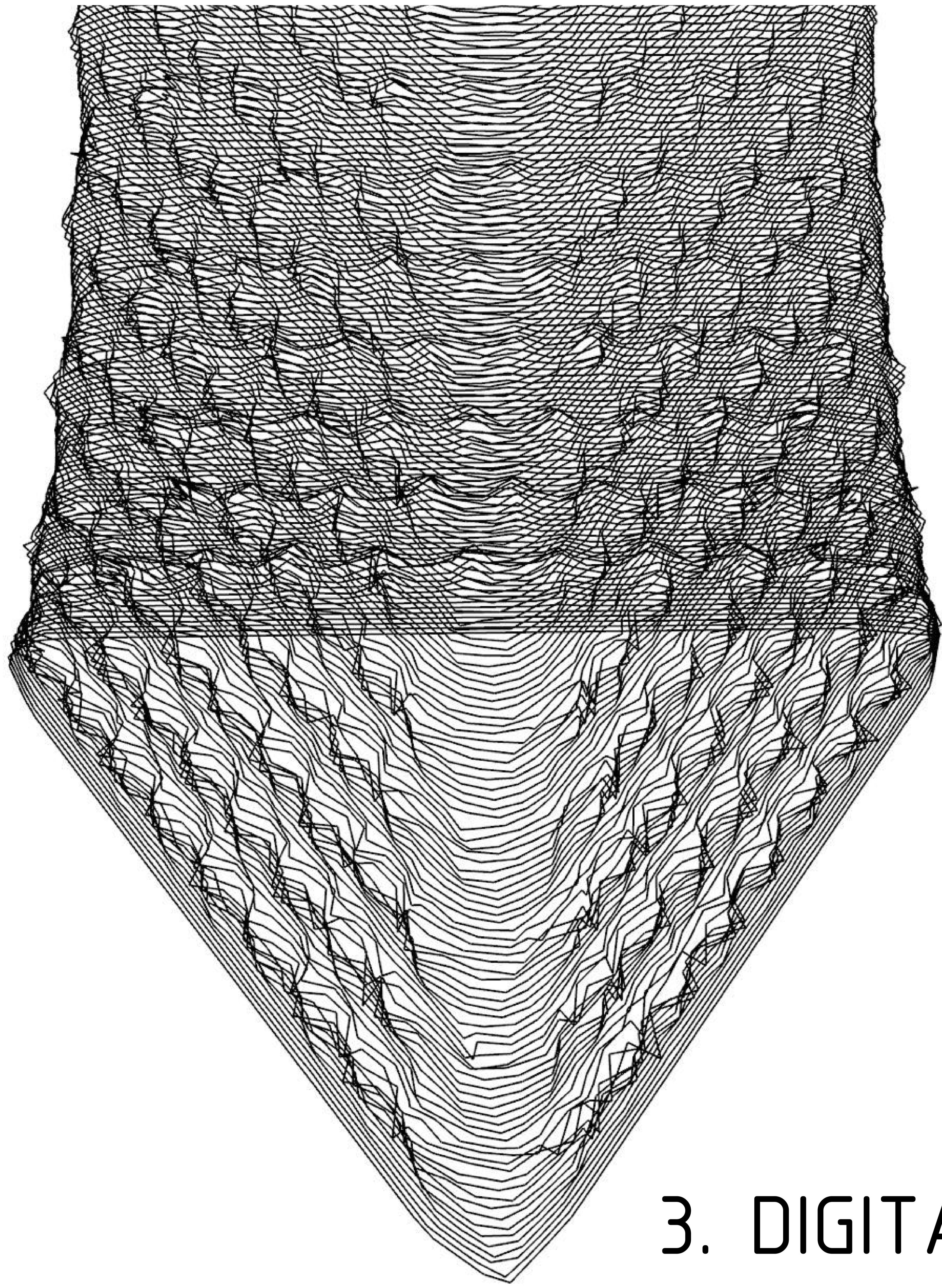
3. EXPERIMENTS IN DIGITAL FABRICATION

The first technique used to materialise the tower and the skin pattern was 3D printing with clay. The tower skin model was used to first create contours of the object and then to create a path - a list of point's coordinates - for the extruder described in a g-code script. The structure of the pattern proved to be too complex to translate into a continuous spiral and the shape of the pattern was getting lost, so a more simple method was used instead.





SPIRAL EXTRUDER PATH
ELEVATION AND PERSPETIVE

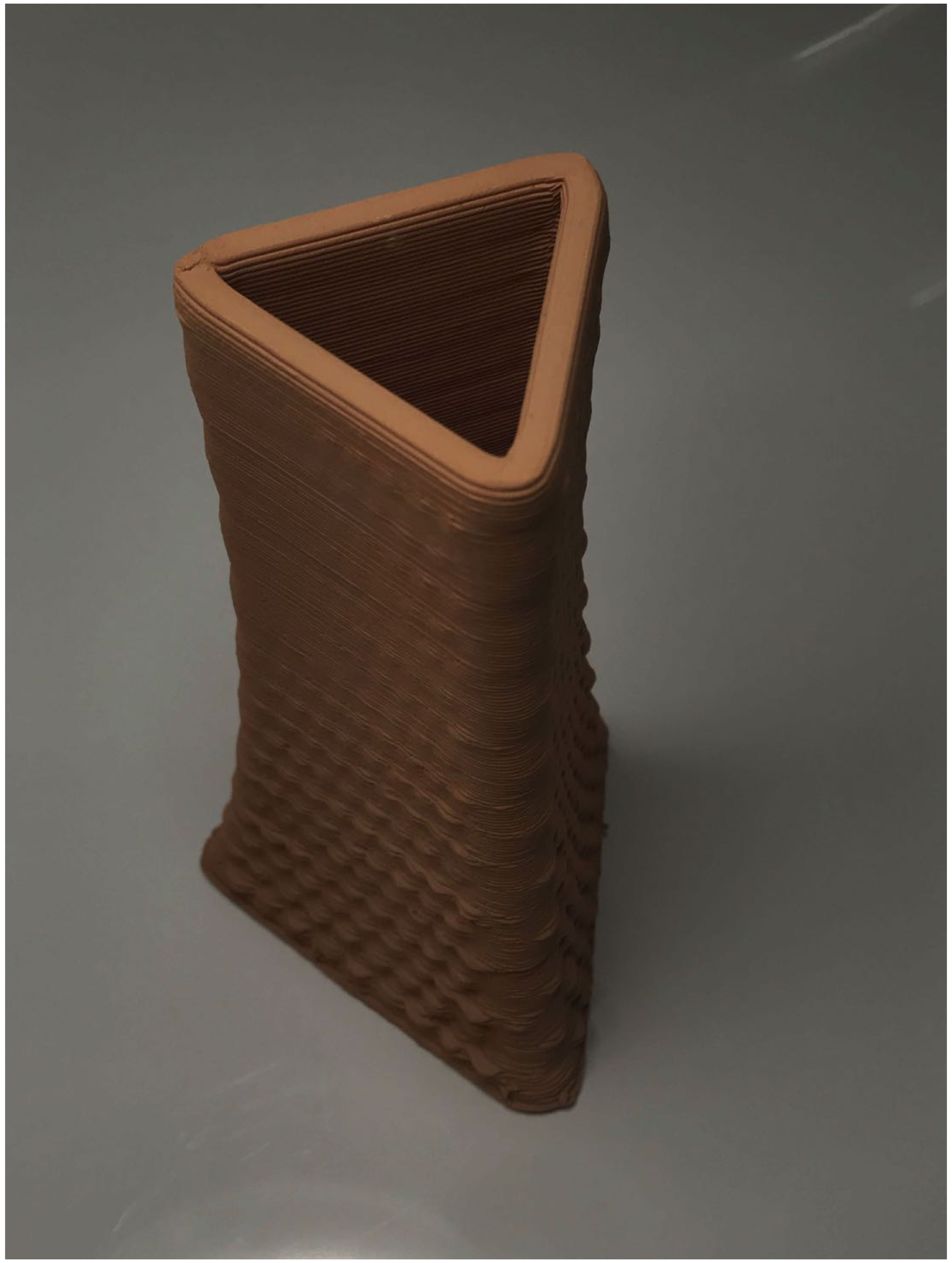


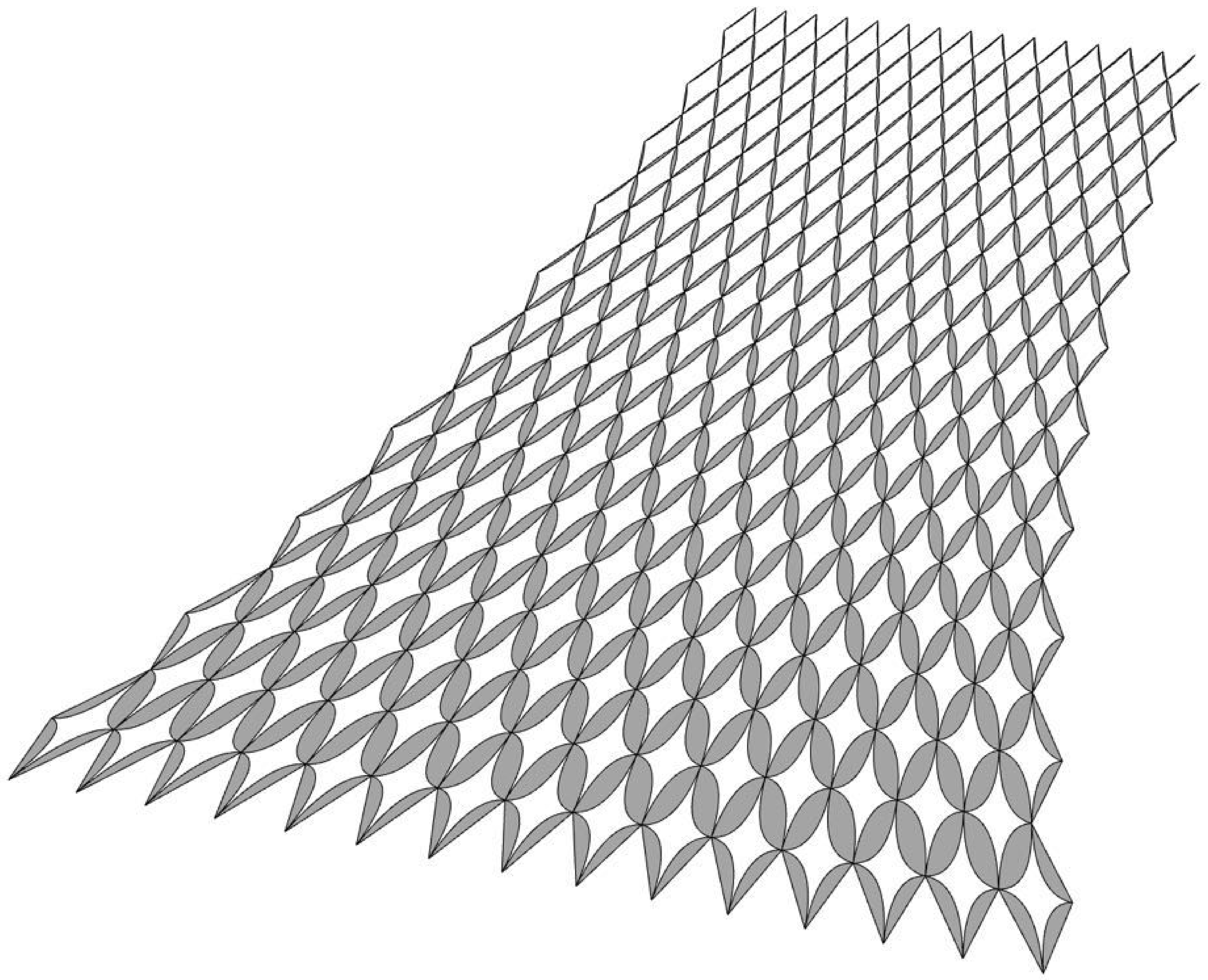
DETAIL
SHOWING PROBLEMS WITH
TRANSLATING PATTERN GEOMETRY
TO A SPIRAL

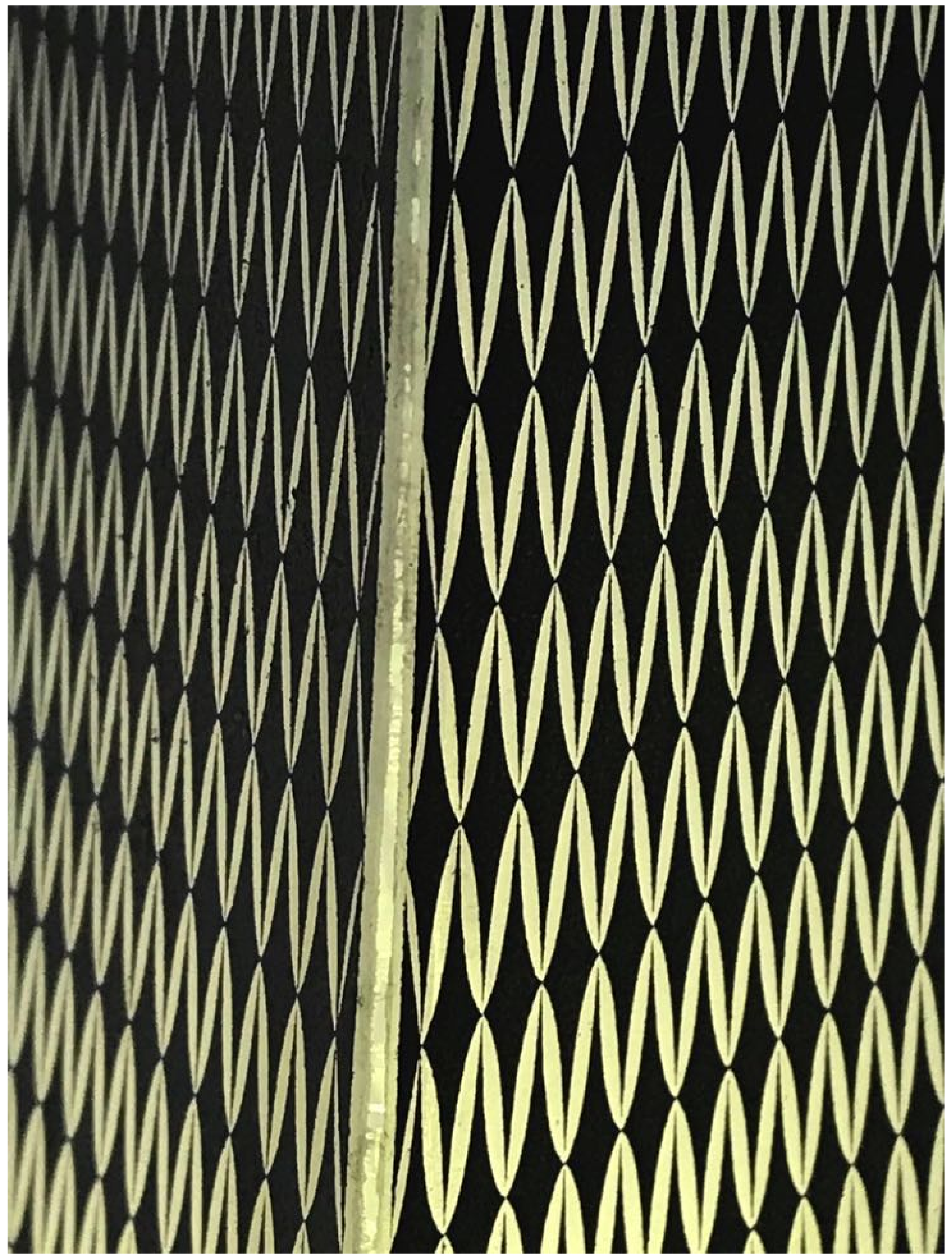
3. DIGITAL FABRICATION

UNIT A - 3D PRINTING - CLAY

The first technique used to materialise the tower and the skin pattern was 3D printing with clay. The tower skin model was used to first create contours of the object and then to create a path - a list of point's coordinates - for the extruder described in a g-code script. The structure of the pattern proved to be too complex to translate into a continuous spiral and the shape of the pattern was getting lost, so a more simple method was used instead.



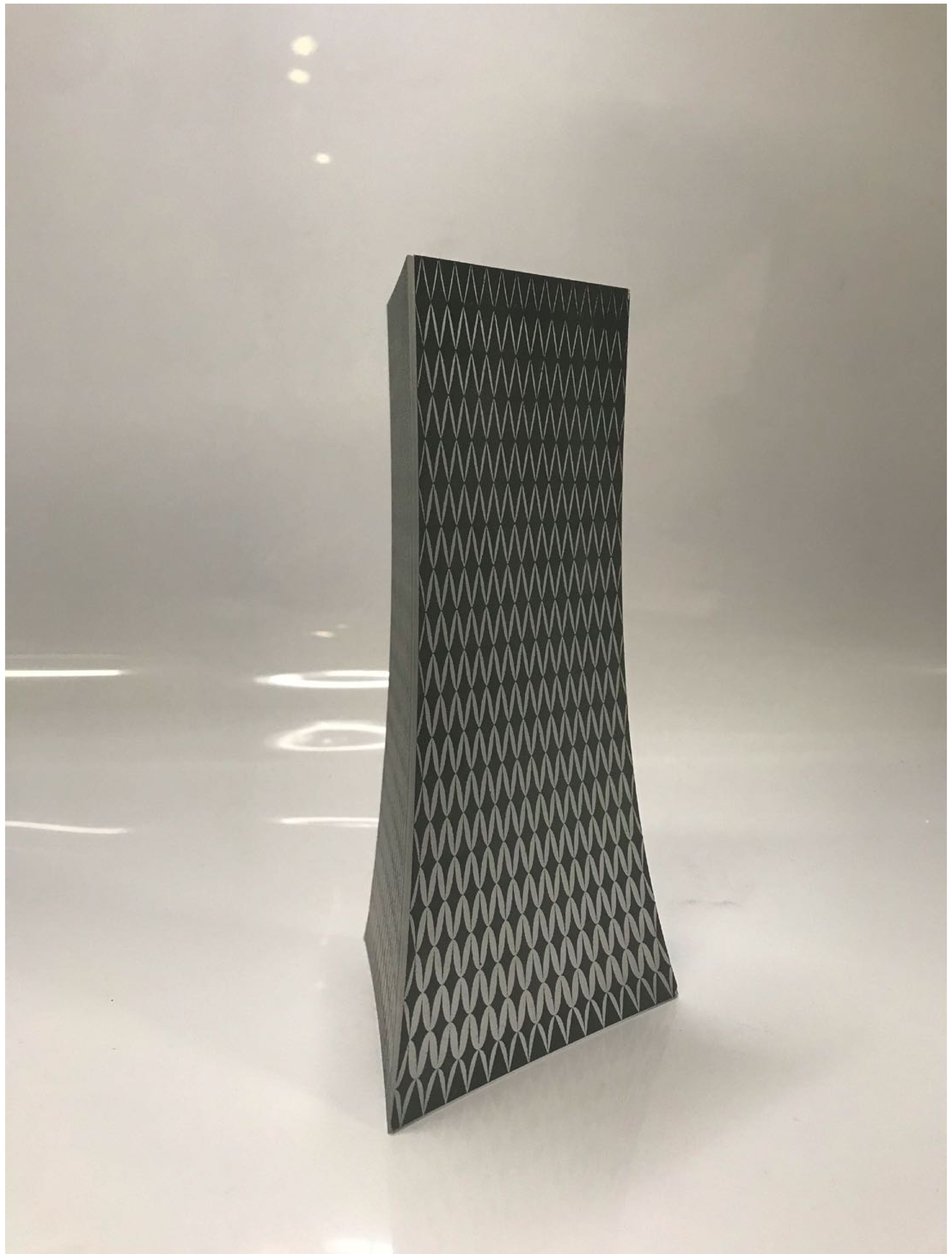


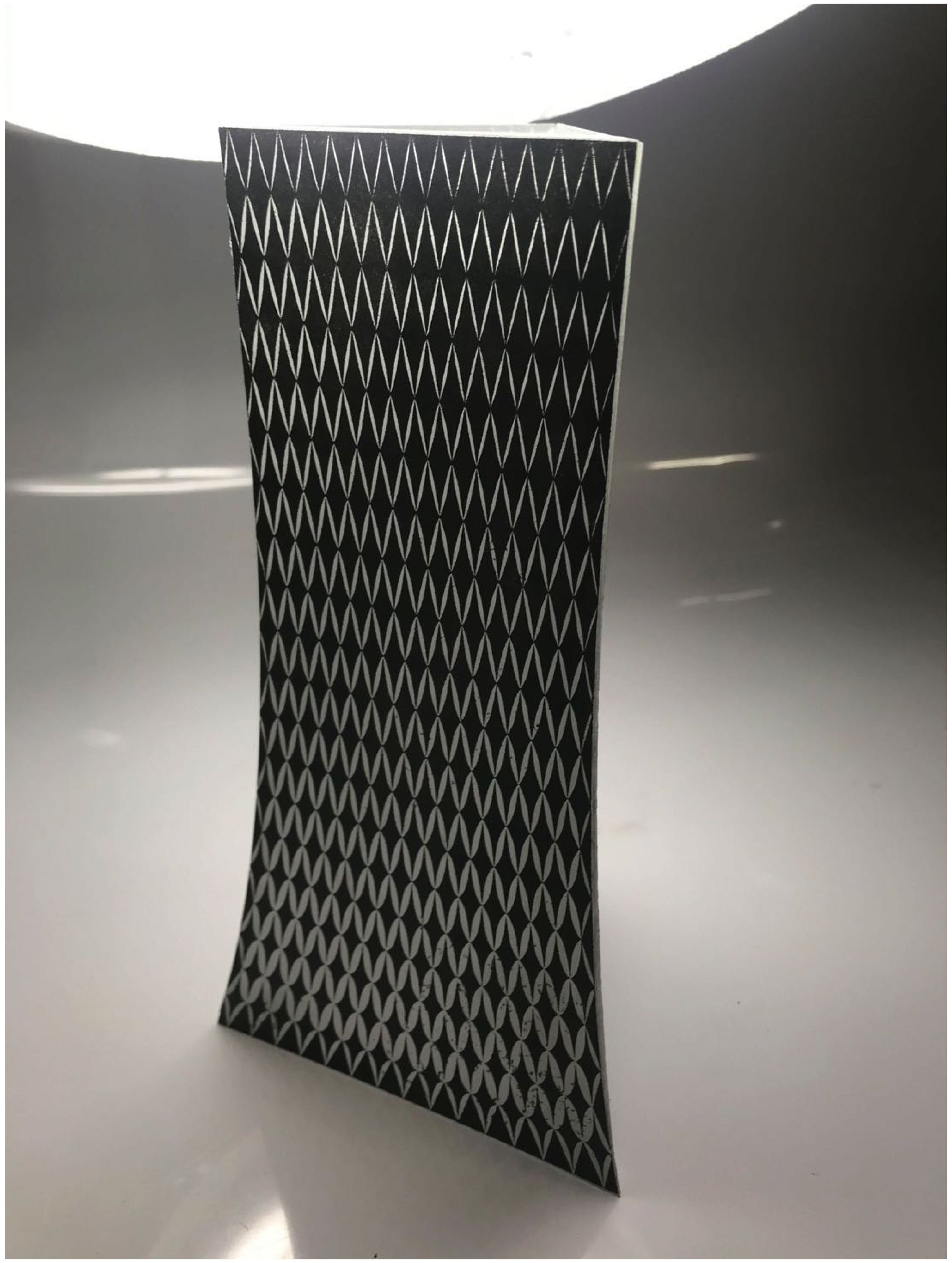


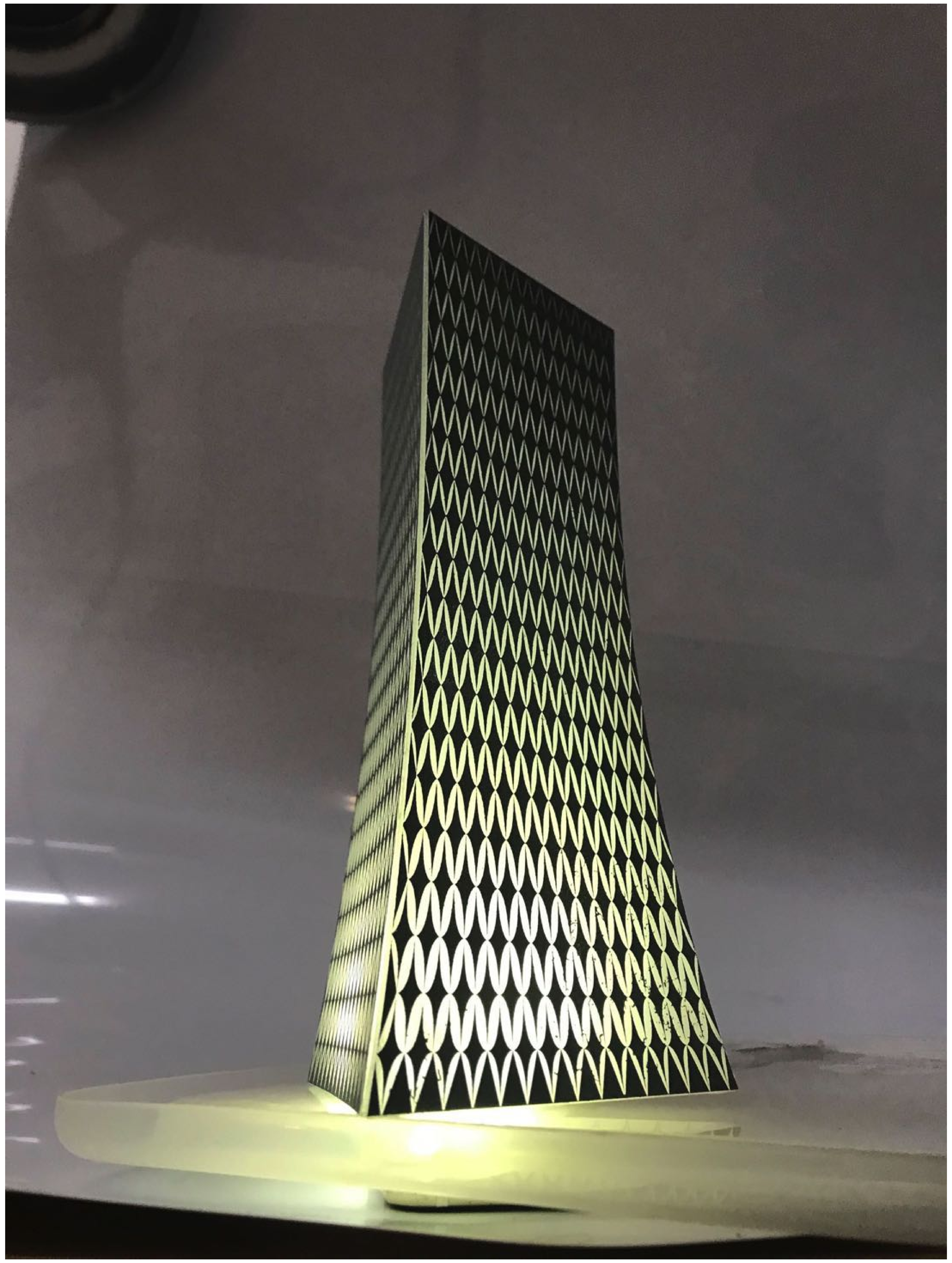
3. DIGITAL FABRICATION

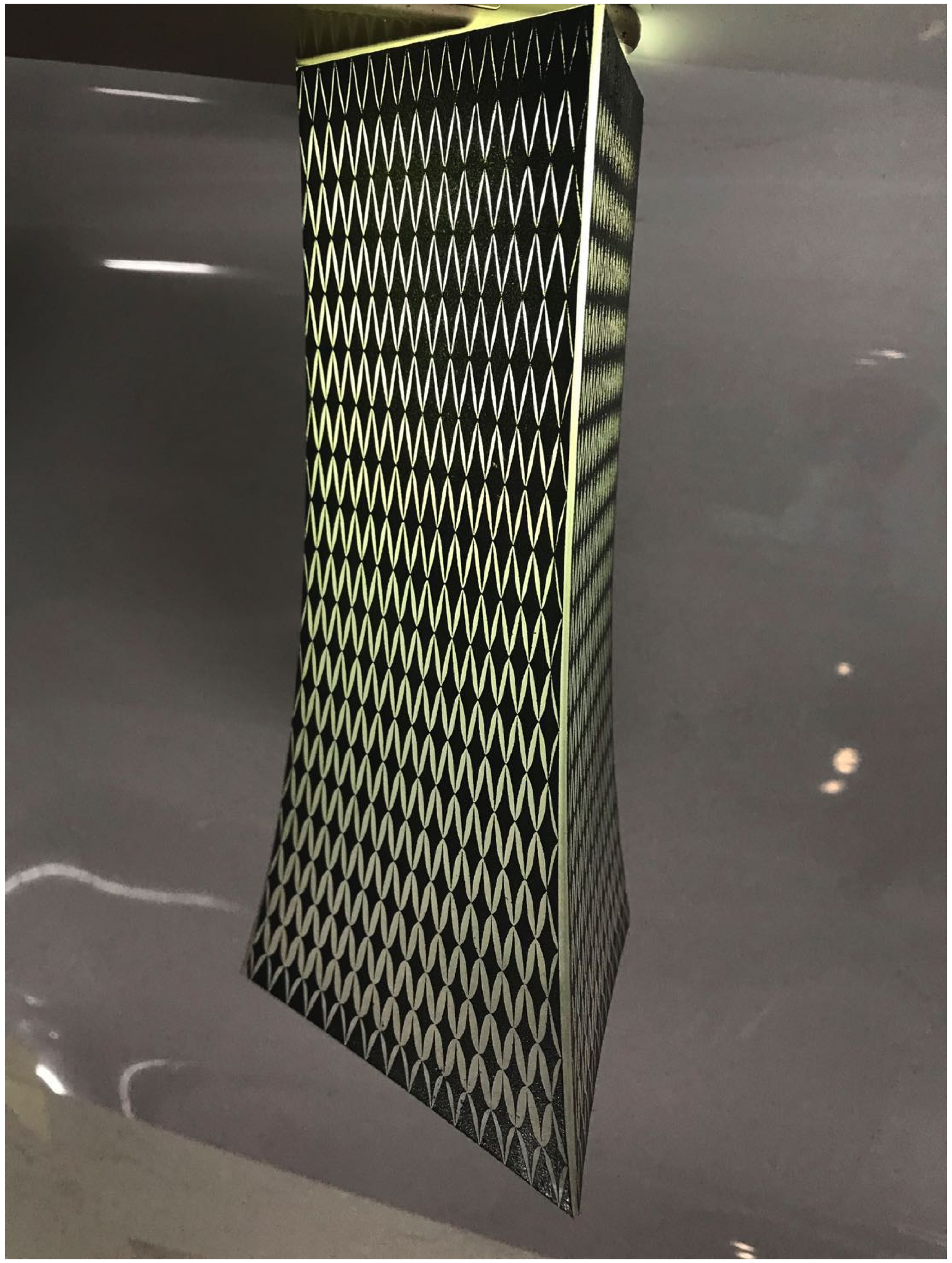
UNIT B - LASER CUTTING AND ENGRAVING ON ACRYL

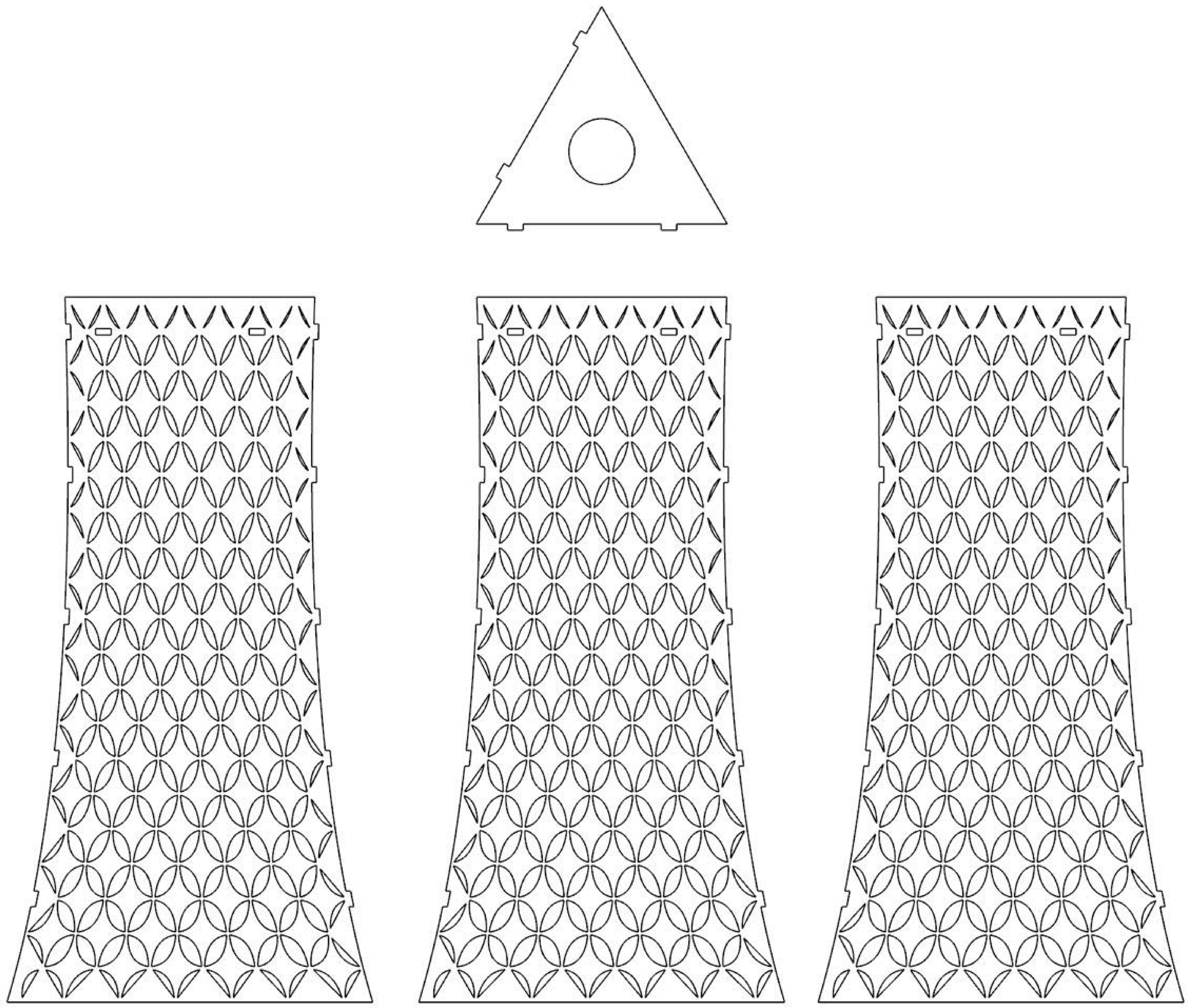
The second technique used to show the pattern of open and closed facade panels related to an attractor was laser cutting and engraving. The form of the tower was unrolled in Grasshopper 3D and the pattern was mapped on them, a hatch was used to determine parts of the pattern that are open and that were going to be engraved in a painted acrylic plate in that way removing color from the surface and leaving the areas transparent. Three pieces of the tower were made separately and then joined and glued together. The final impression is that of translucency of the engraved areas.

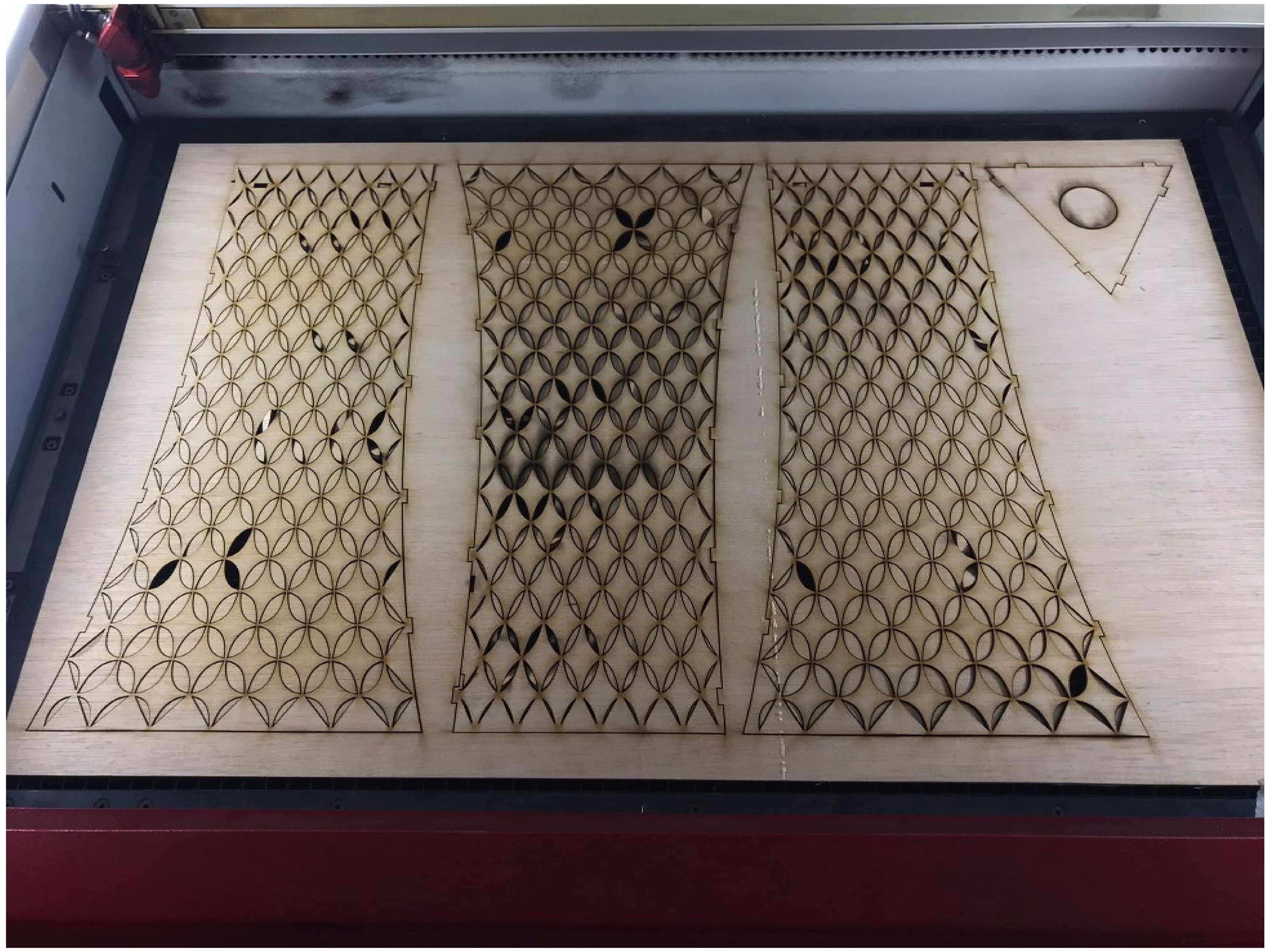






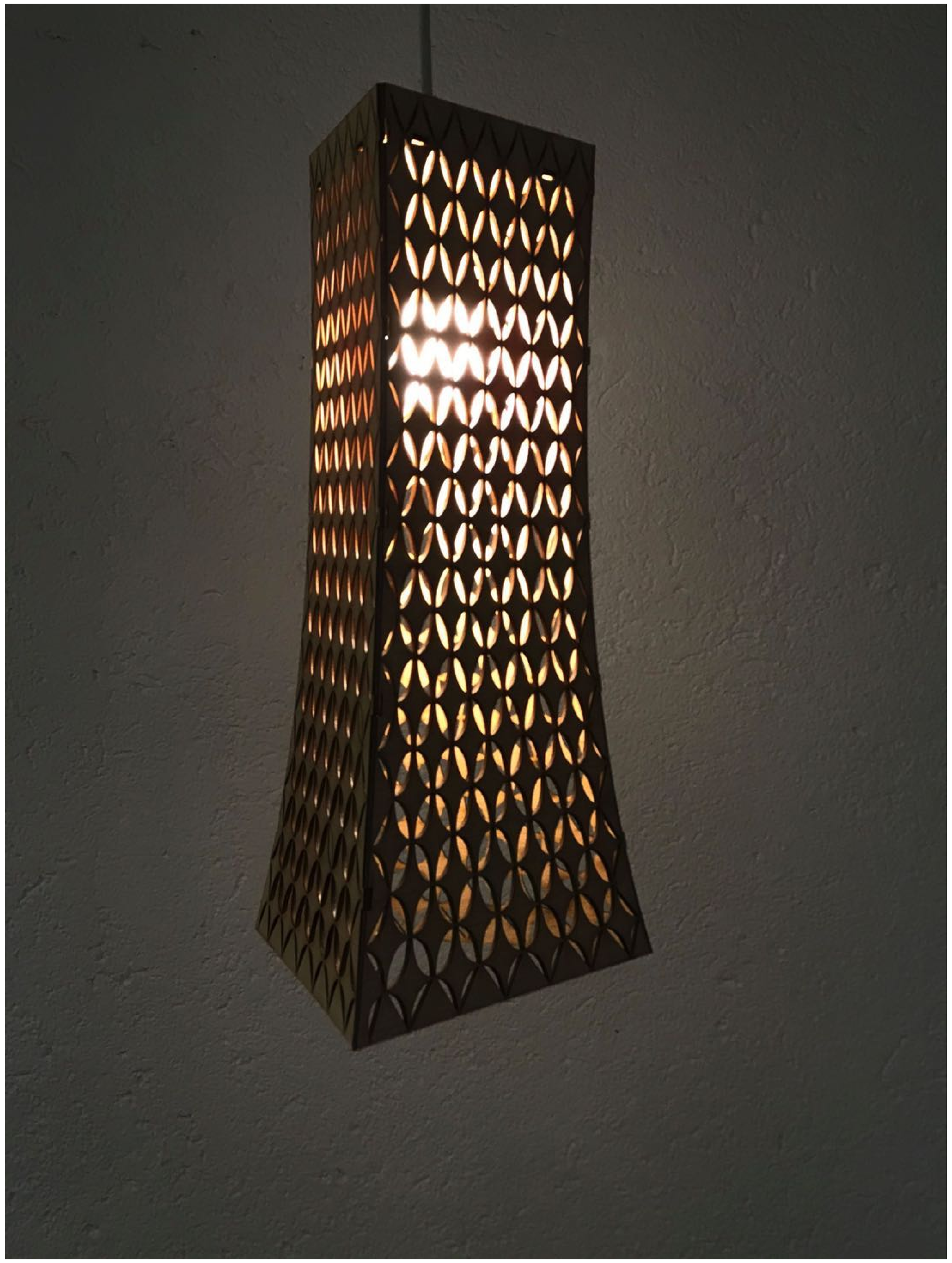


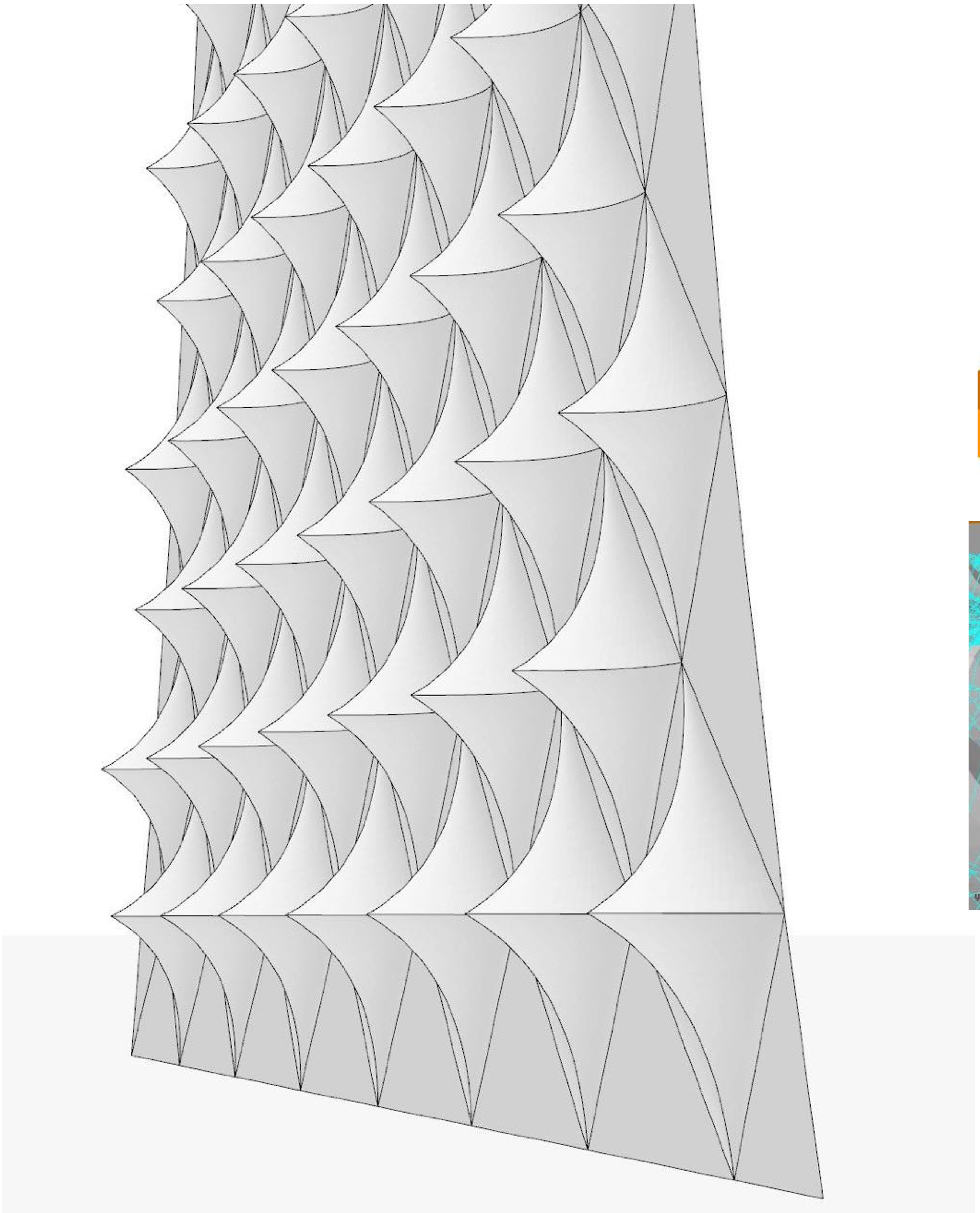


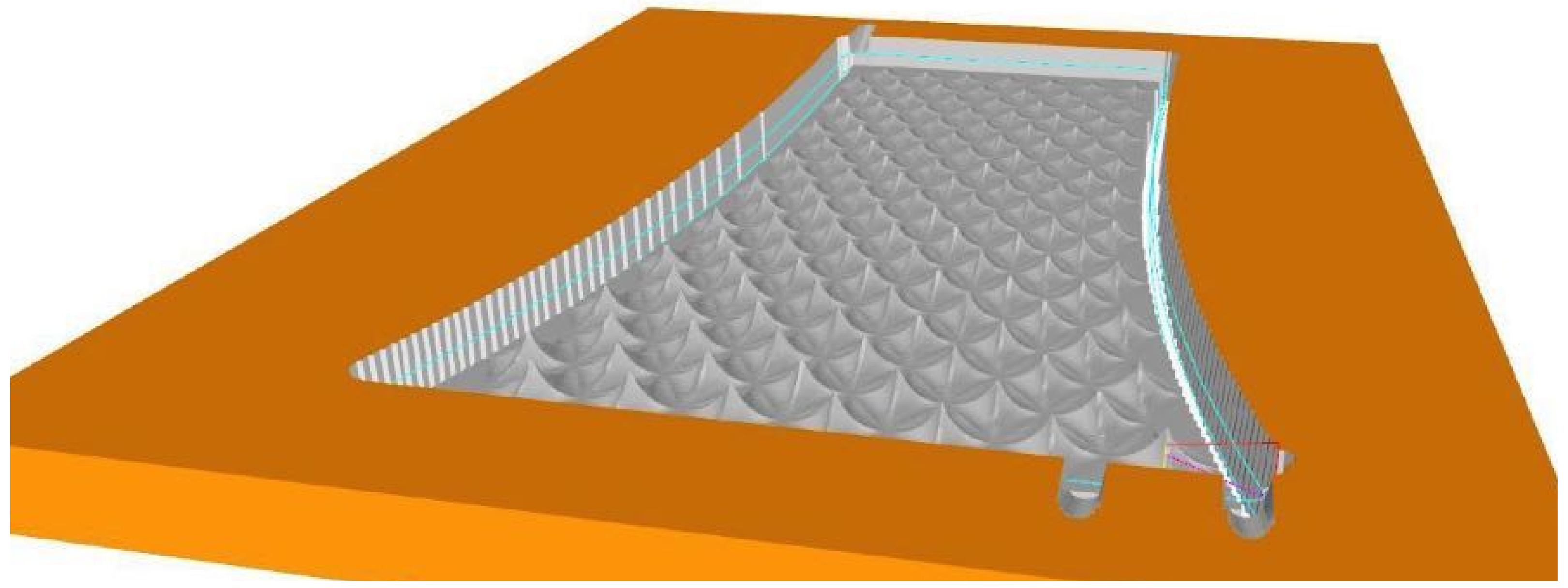


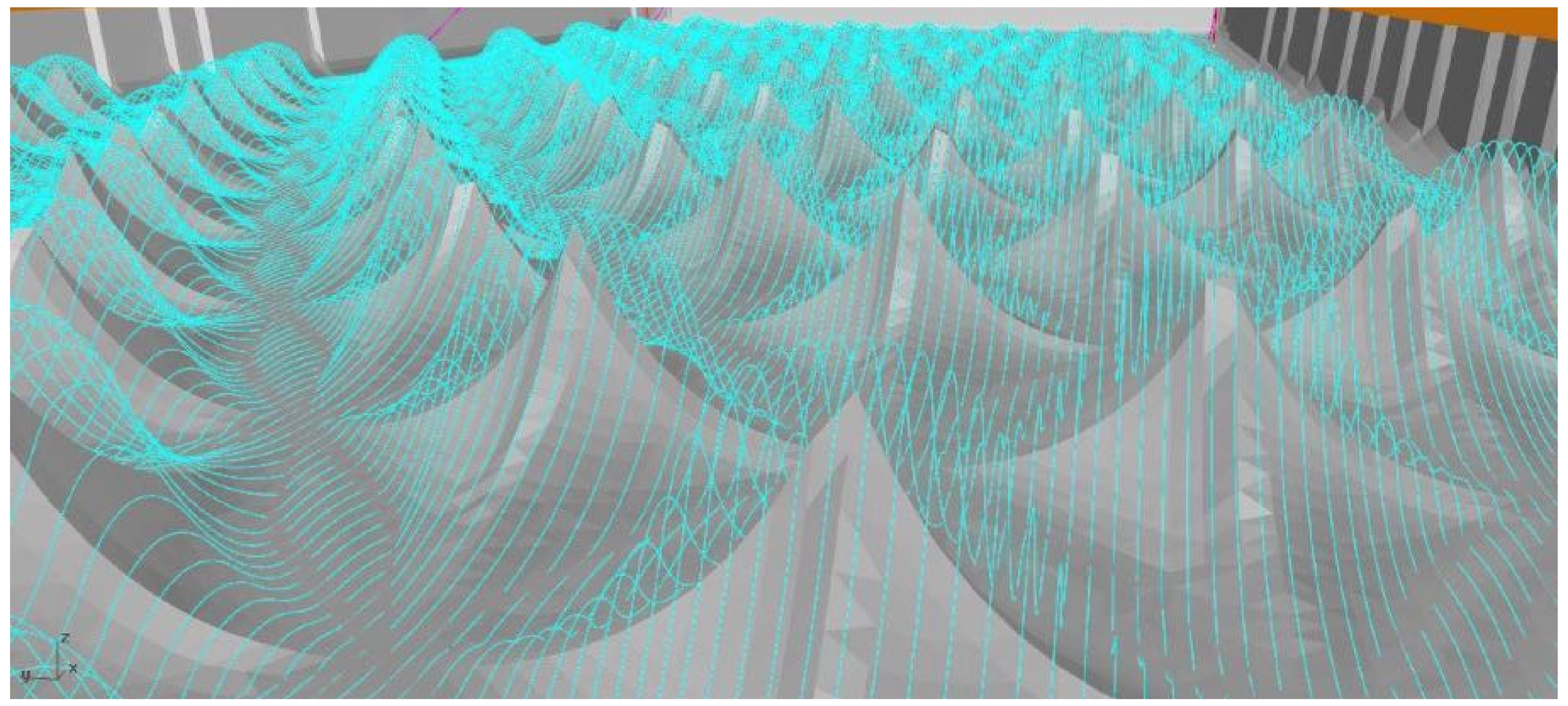
3. DIGITAL FABRICATION

UNIT B - LASER CUTTING A LAMP SHADE





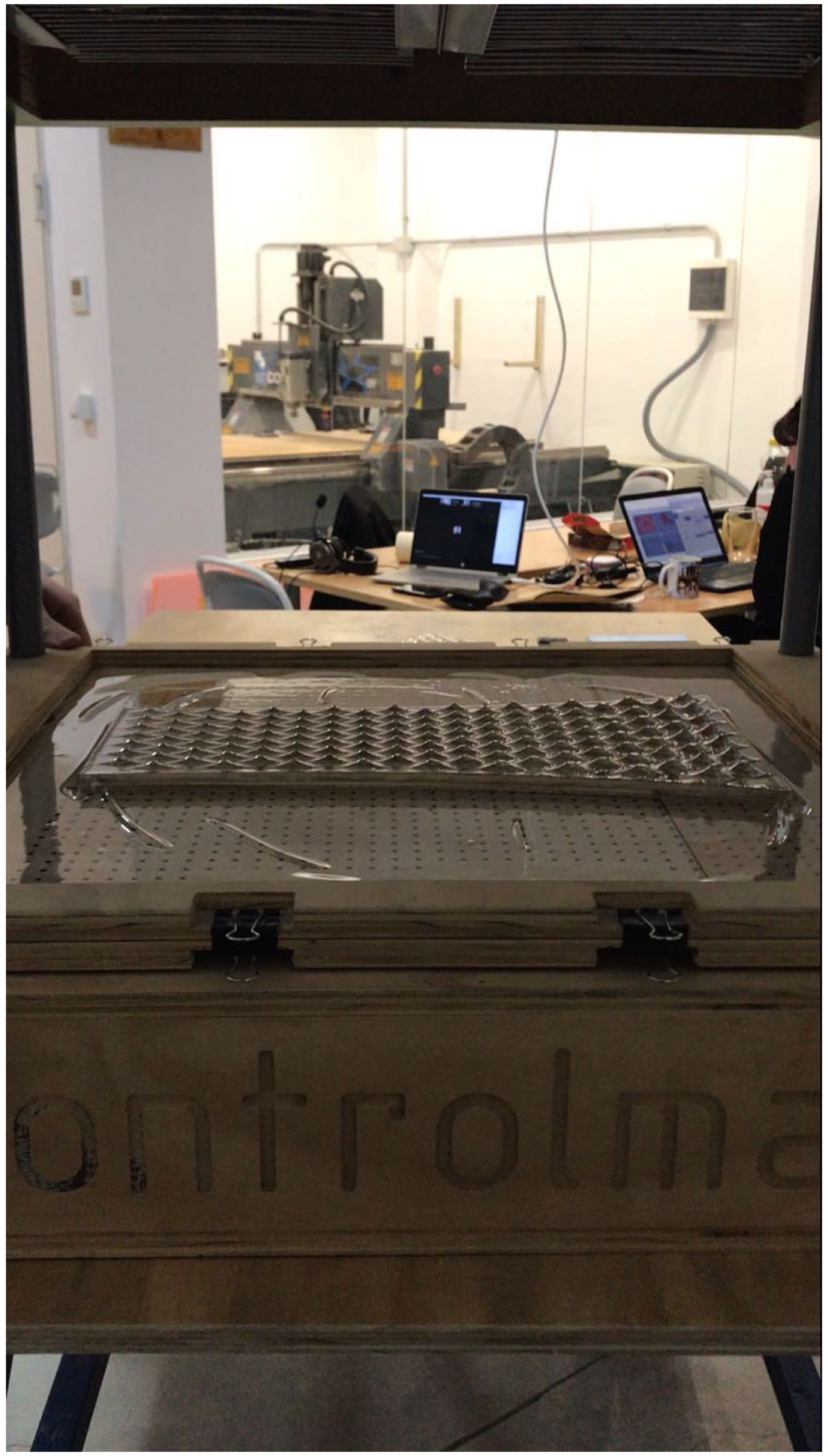




3. DIGITAL FABRICATION

UNIT C - CNC MILLING AND THERMOFORMING

The third technique used to show the geometry of the skin was a combination of CNC milling and terraforming. The 3D model of the facade was opened in Rhino Cam software where G-code for the milling machine was made. The facade was then milled in wood and the resulting relief was used as a mould to make a plastic skin with the technique of thermoforming.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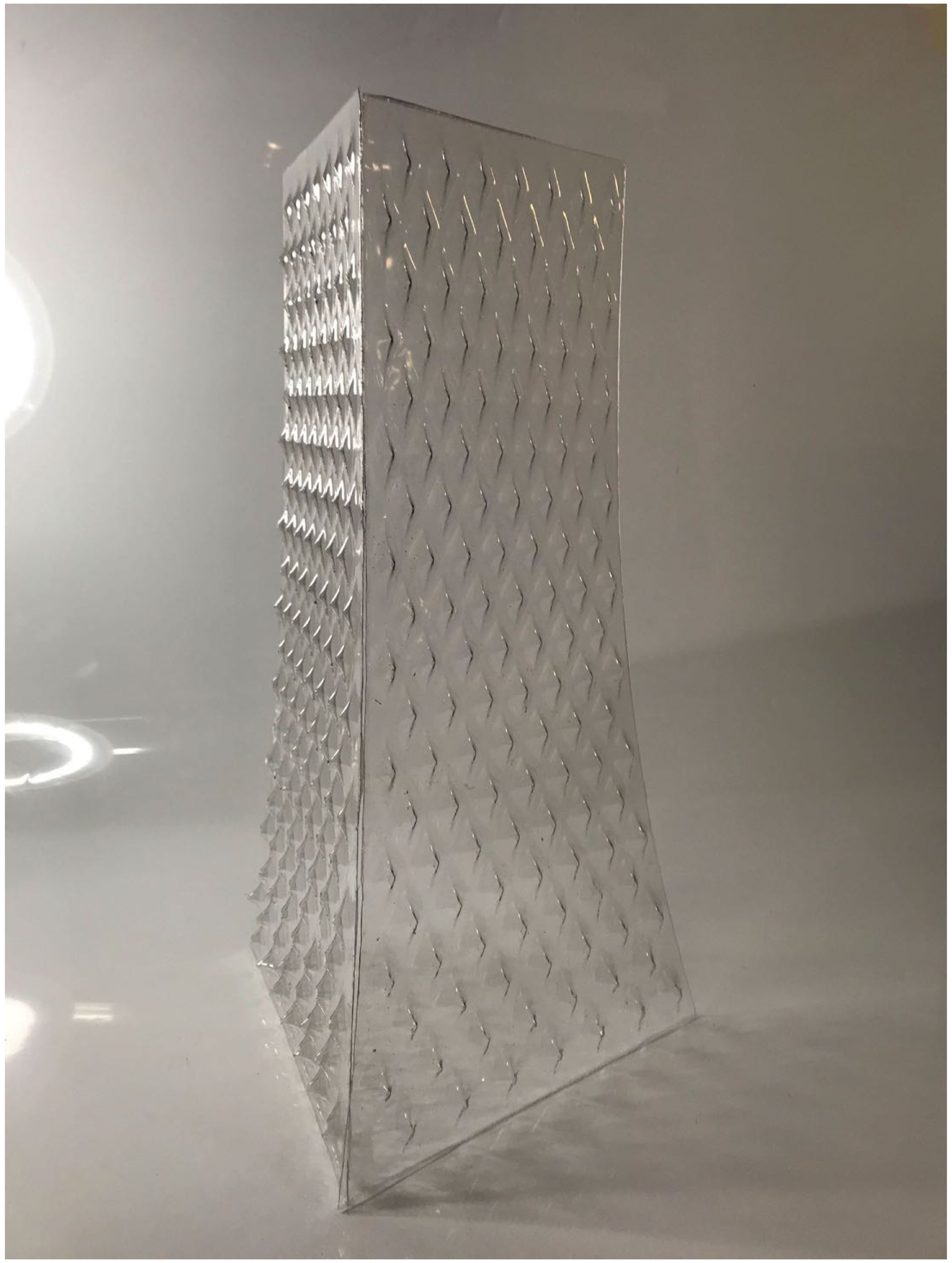
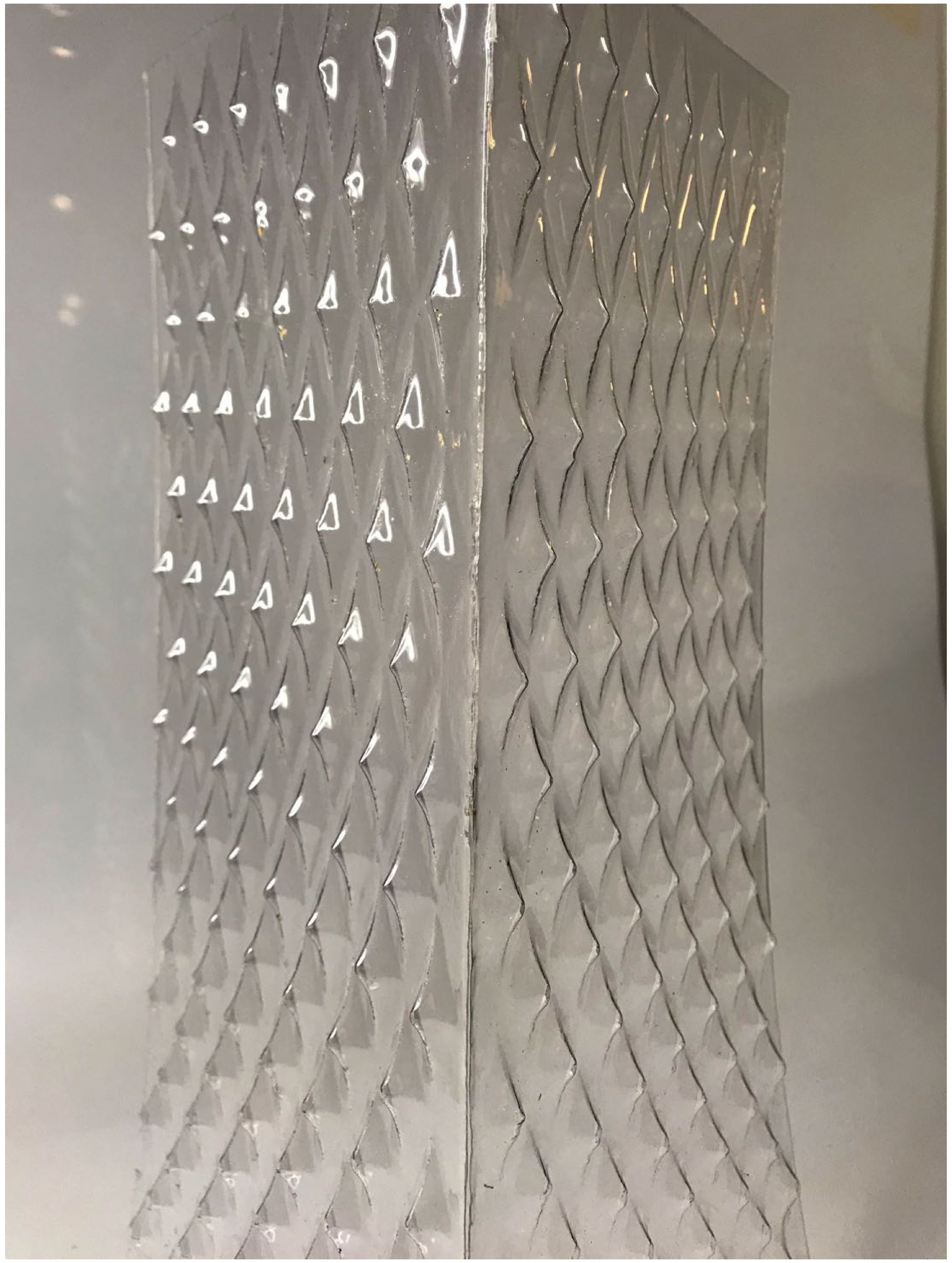
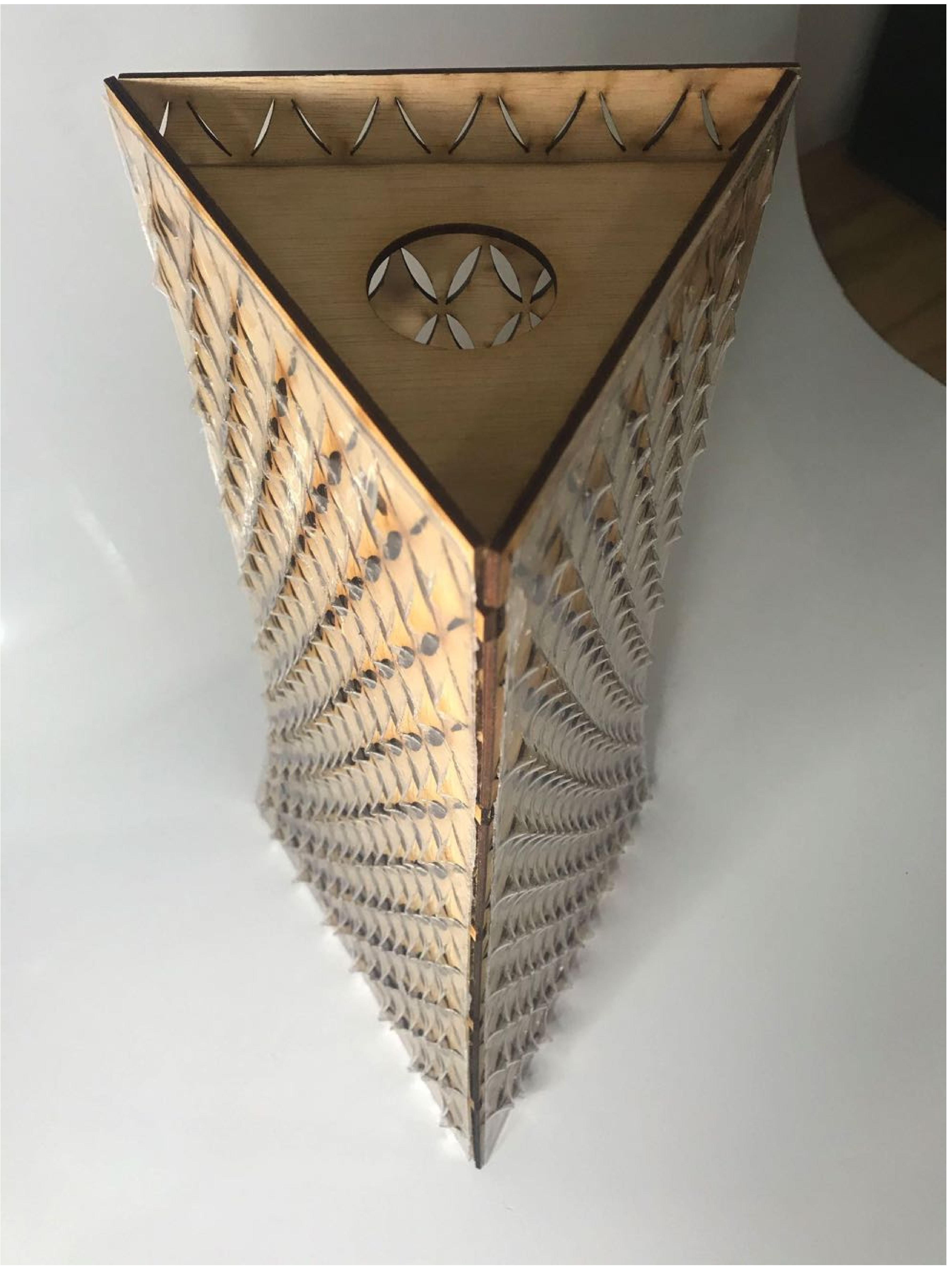
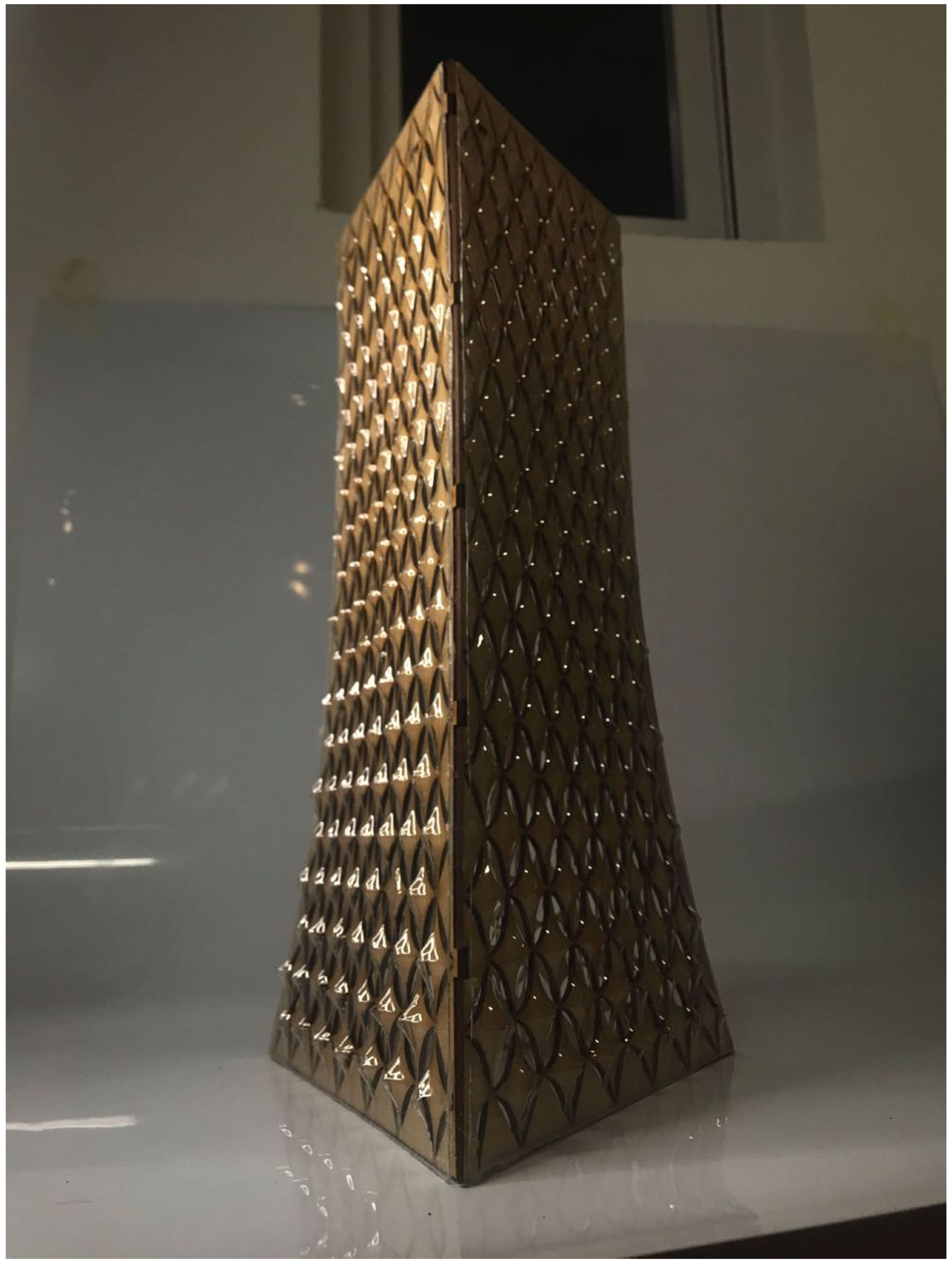


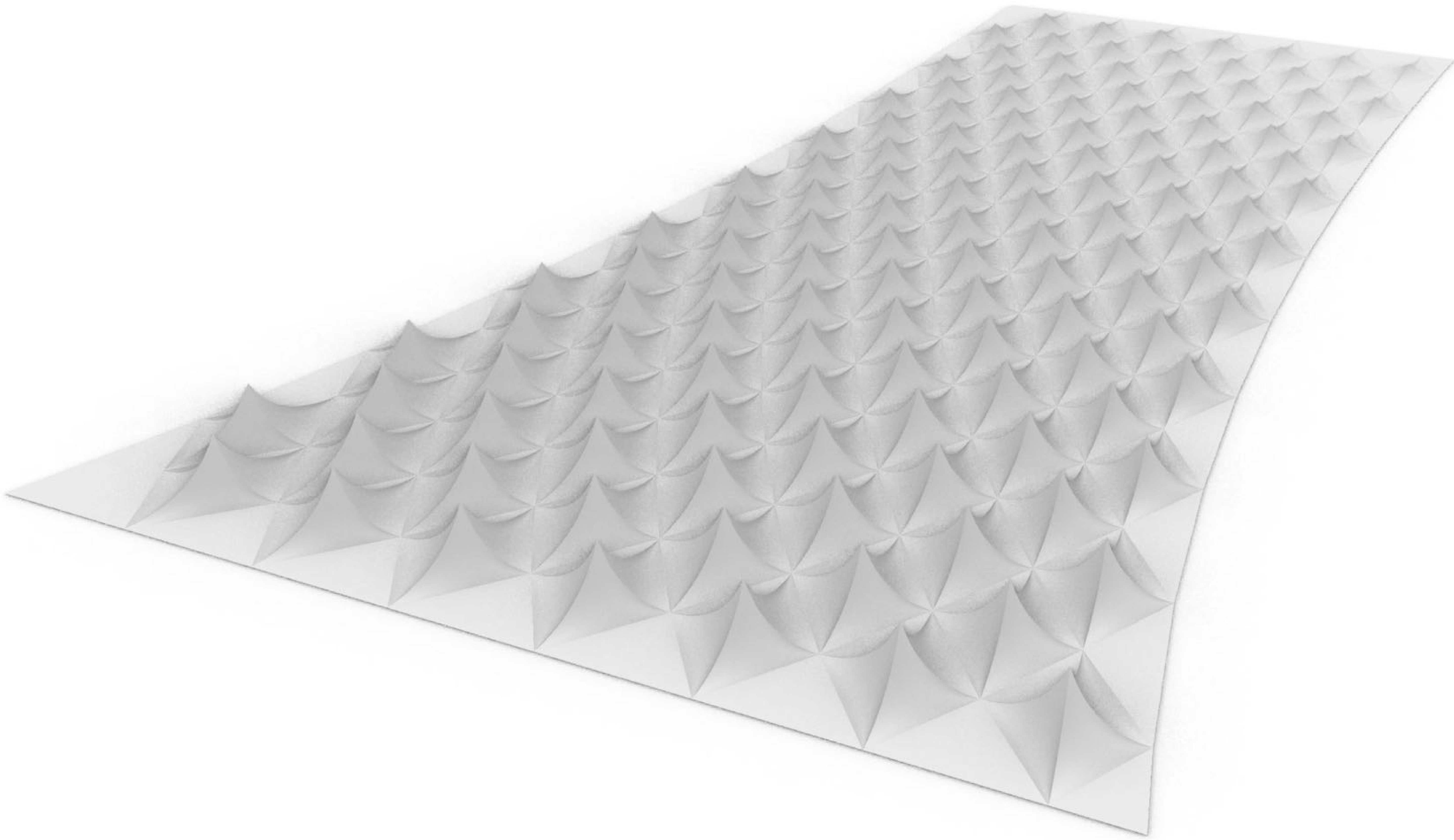


3. DIGITAL FABRICATION

EXPERIMENT - CNC MILLING, THERMOFORMING AND LASER CUTTING



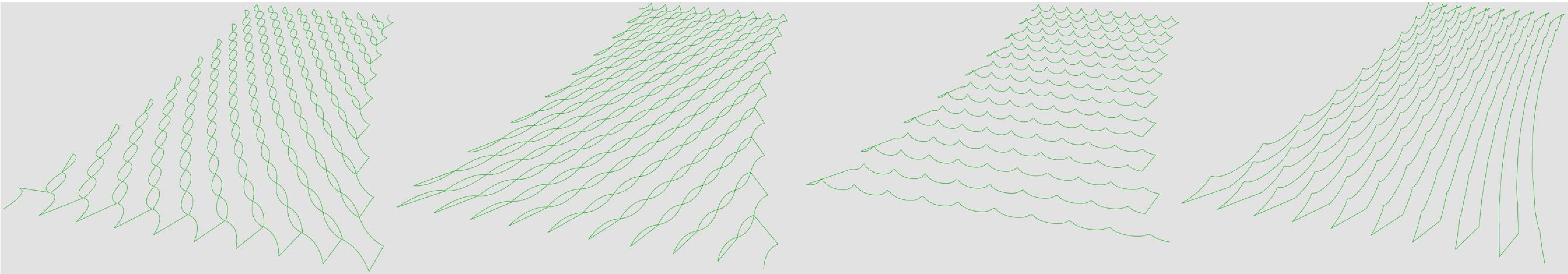


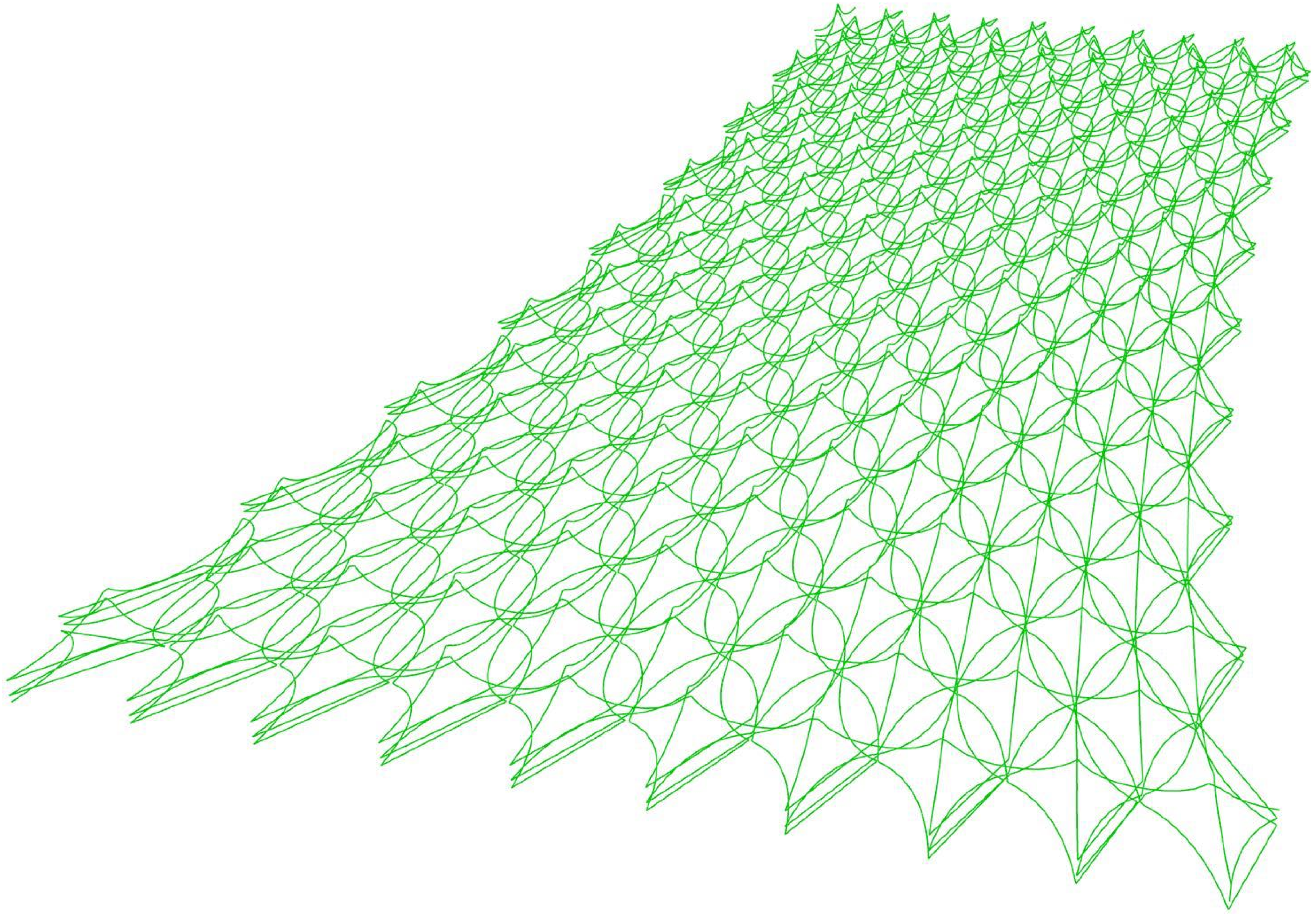


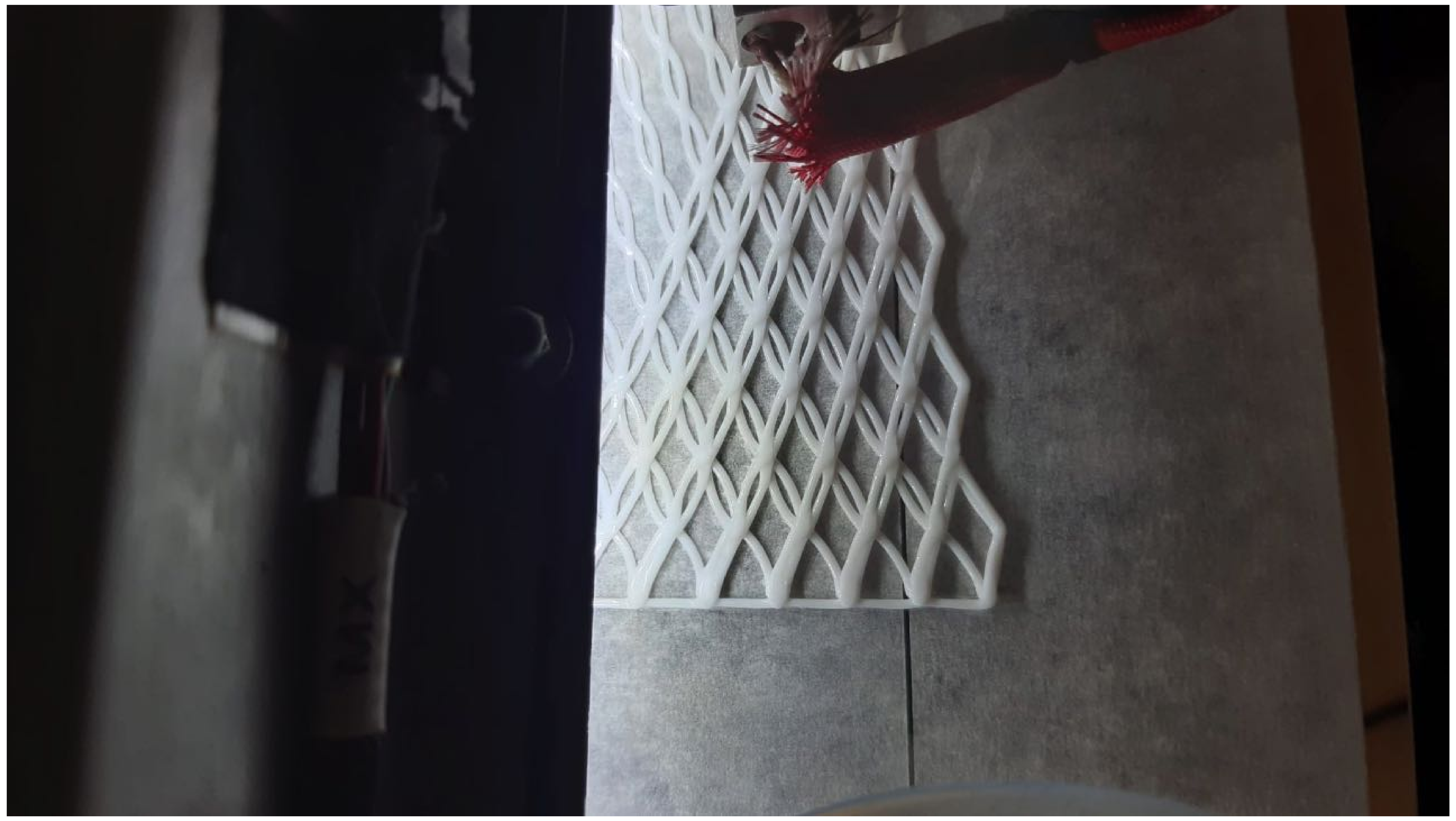
3. DIGITAL FABRICATION

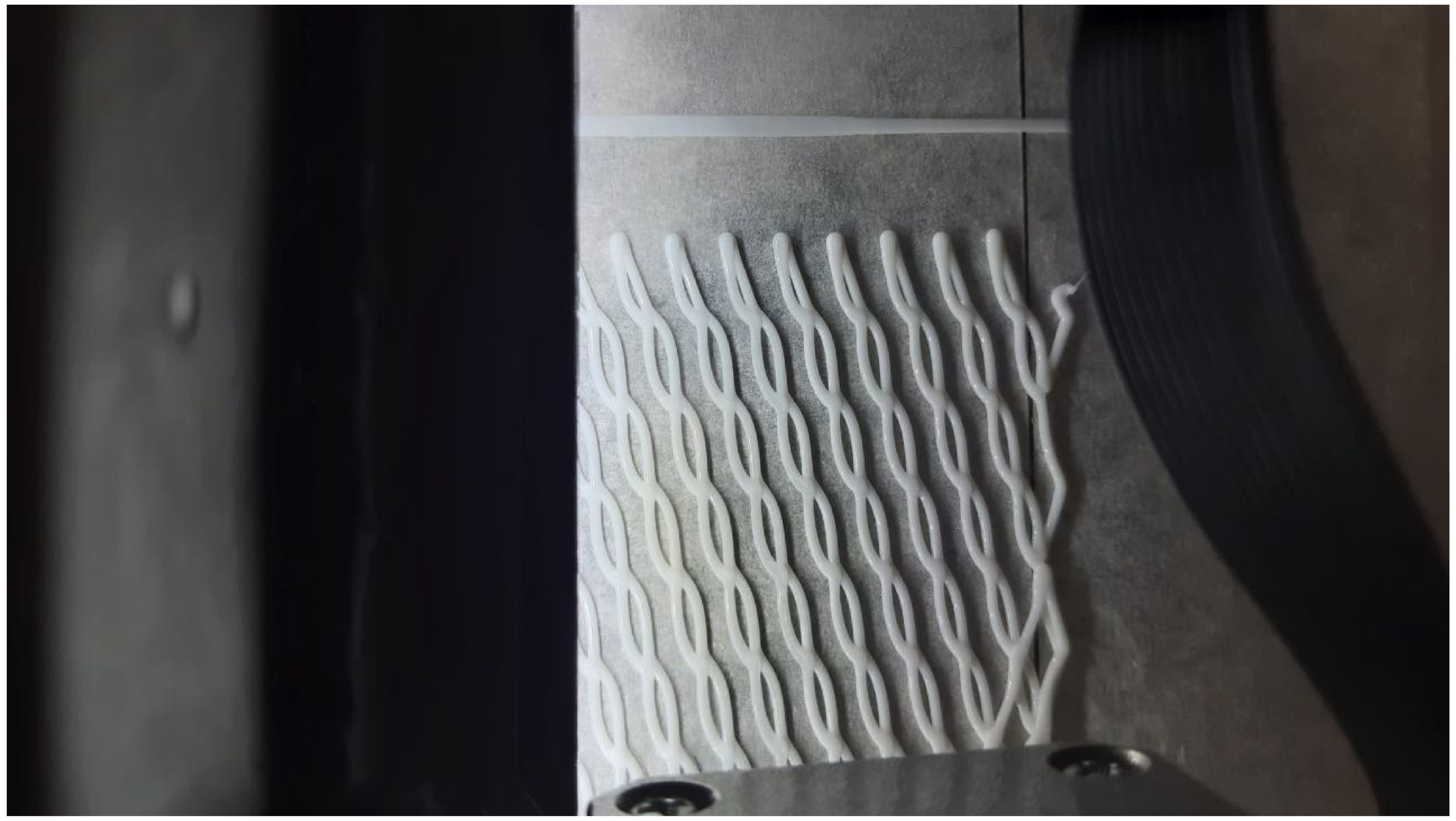
UNIT D - PERSONAL PROJECT - 3D PRINTING - plastic

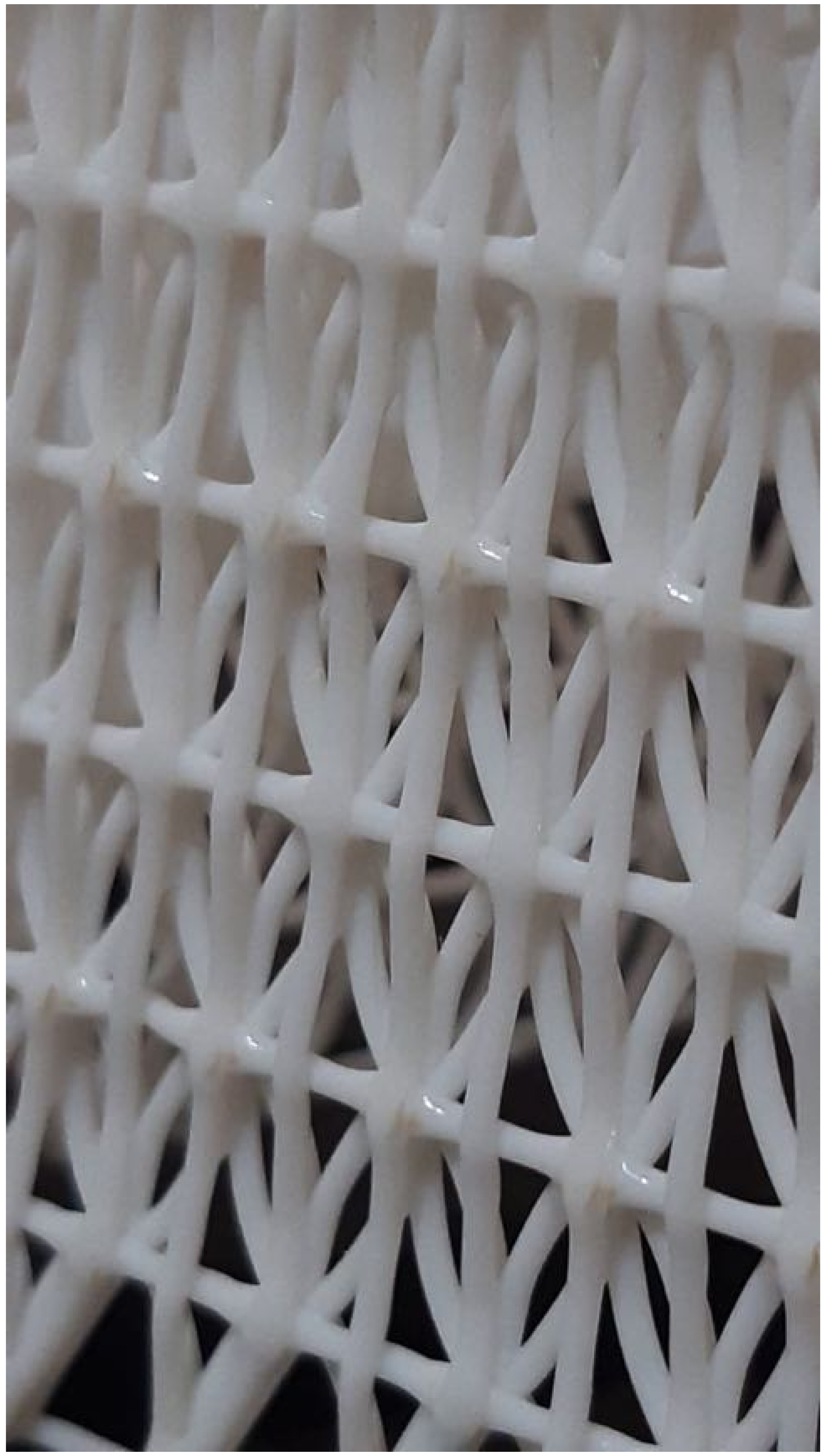
For the final model, 3D printing of a wireframe model in plastic was chosen. This strategy was chosen to create a model that would show the transparency of the structure. All curves that define the geometry were extracted from the polysurface and a strategy was deployed to connect the segments in such a way that they are all connected in one single poly line from which points were extracted for the G-code.

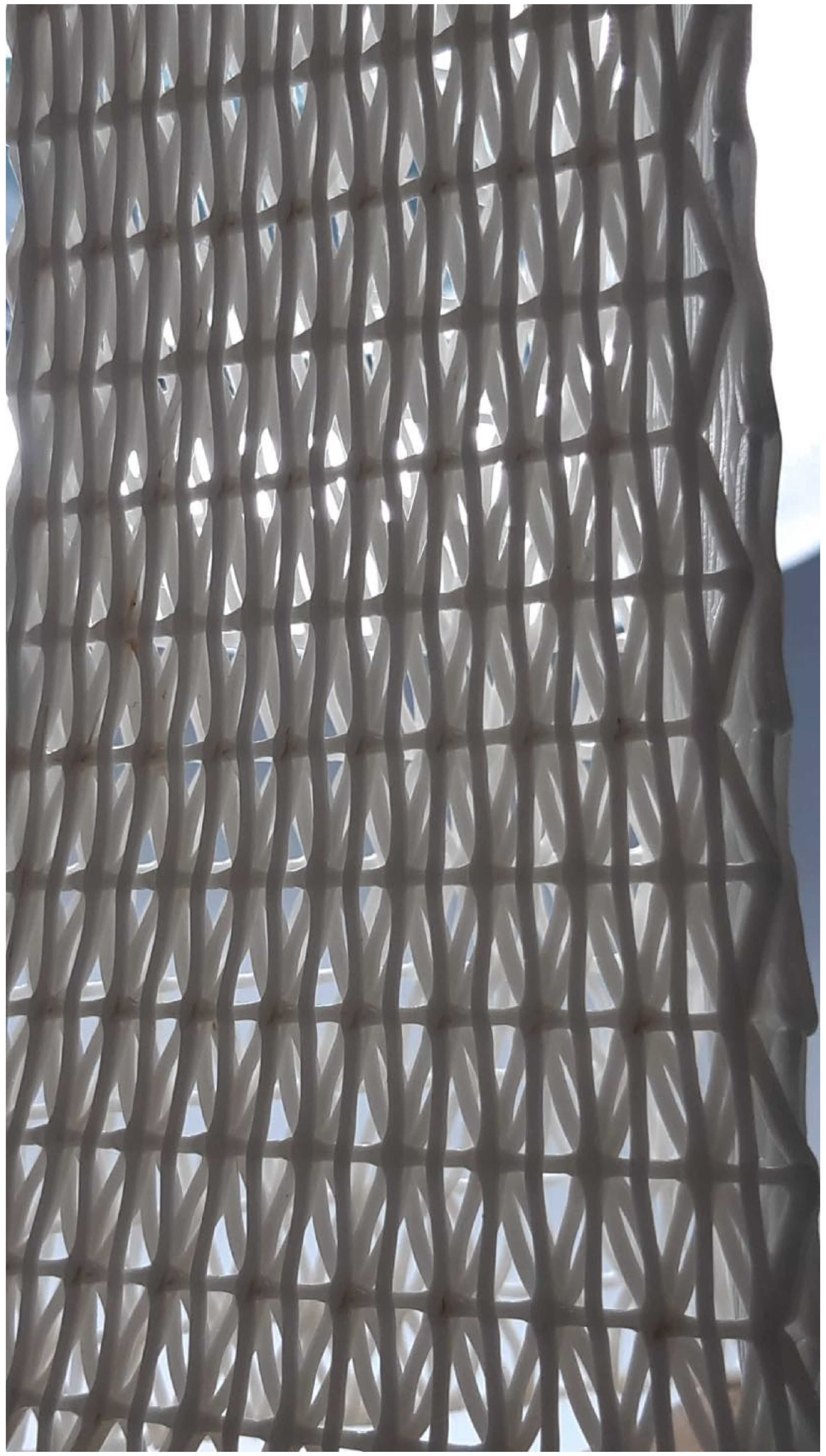


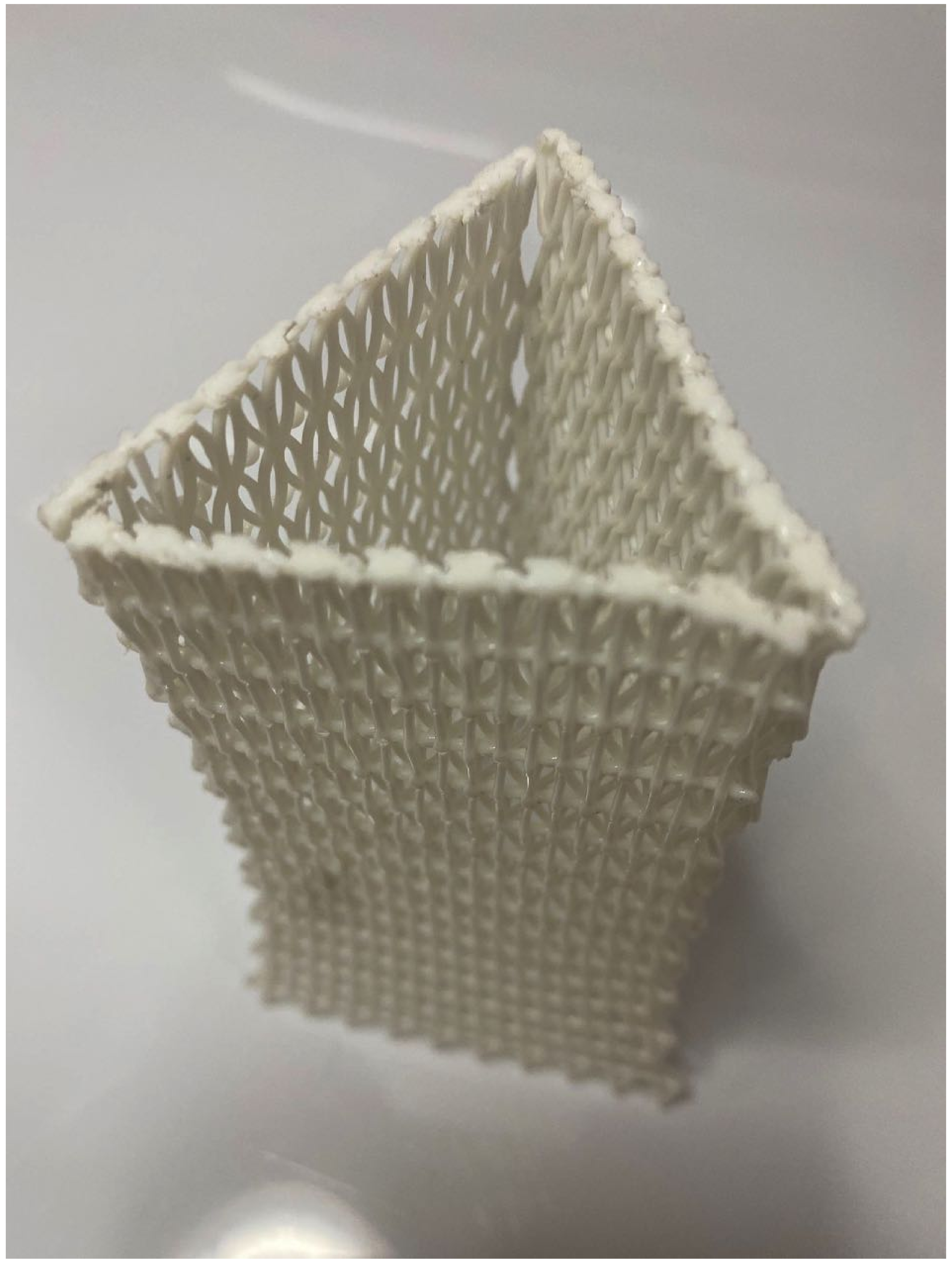


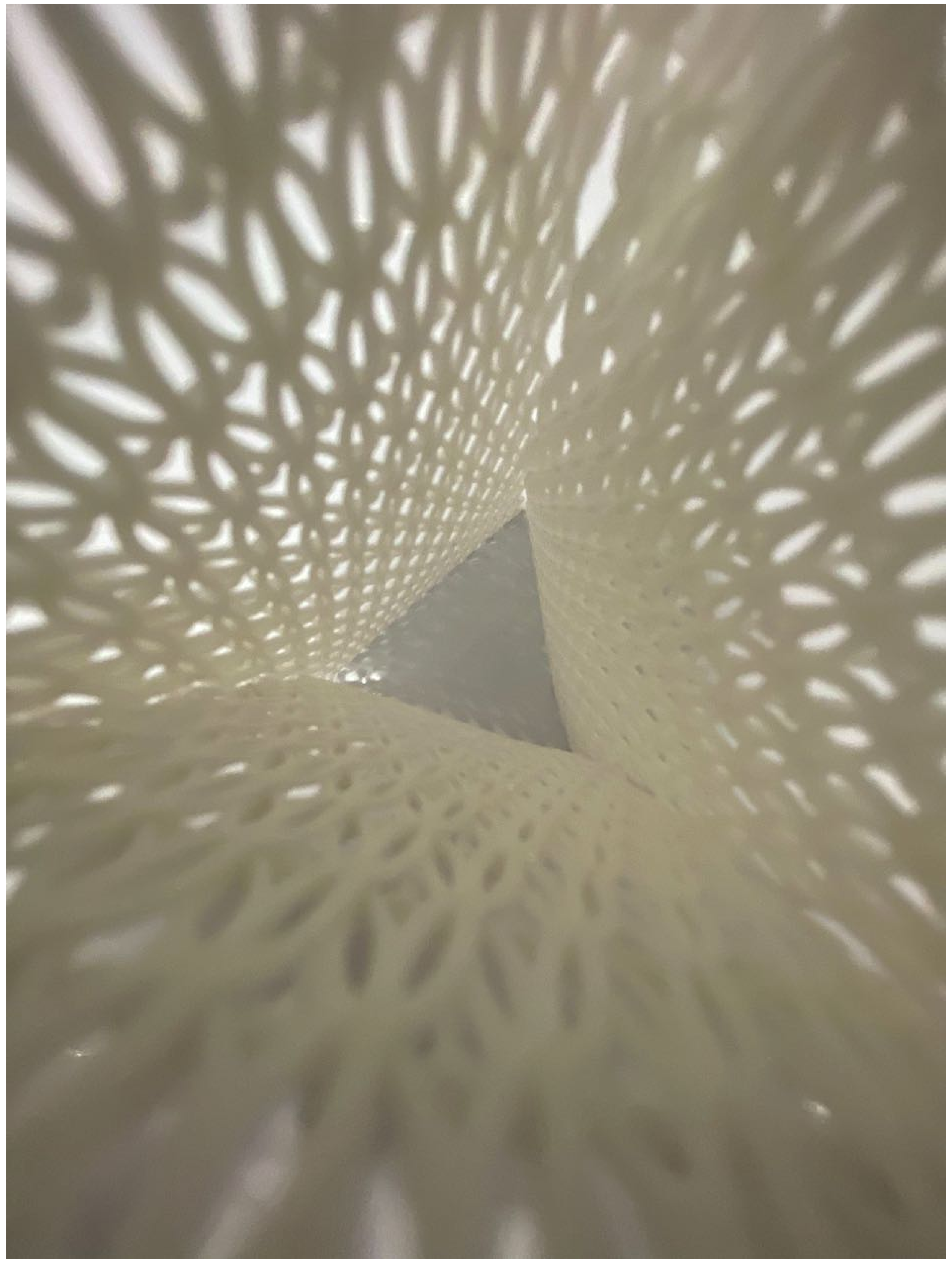












CARLOS LÓPEZ CRESPI

MONOLITH - OPTIMIZED GEOMETRY FOR 3D PRINTING

M A S T E R _ P A R A M E T R I C _ D E S I G N

XIV Edition. Final Project. Part I

November - January 2021

INSPIRATION

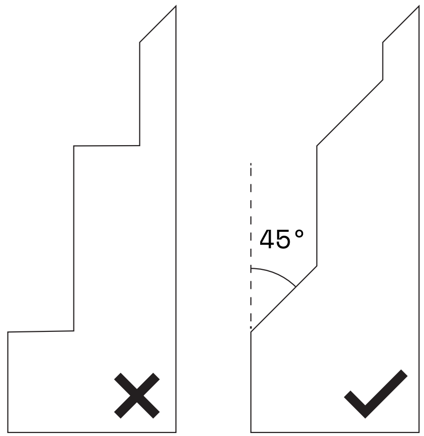
- Distopic
- Suprematism
- Verticality
- Cyberpunk

REQUIREMENTS

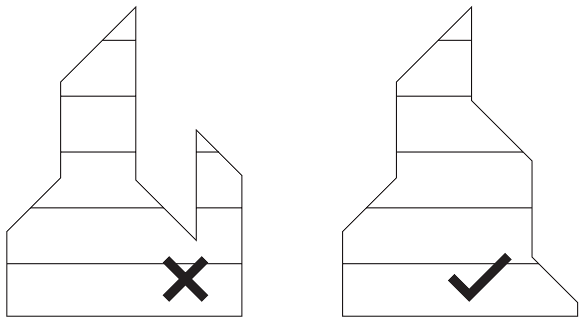
Since Monolith is a product designed to be 3D printed, the geometric requirements of the 3D model must abide to the restrictions given by the technology.

In order to save as much material as possible and achieve an optimal surface finish, we must avoid surfaces with angles larger than 45° with respect to the z axis and define an ever-increasing topology to avoid creating more than one contour.

This way the model can be printed using a single helical path without support material and no traveling between sections.

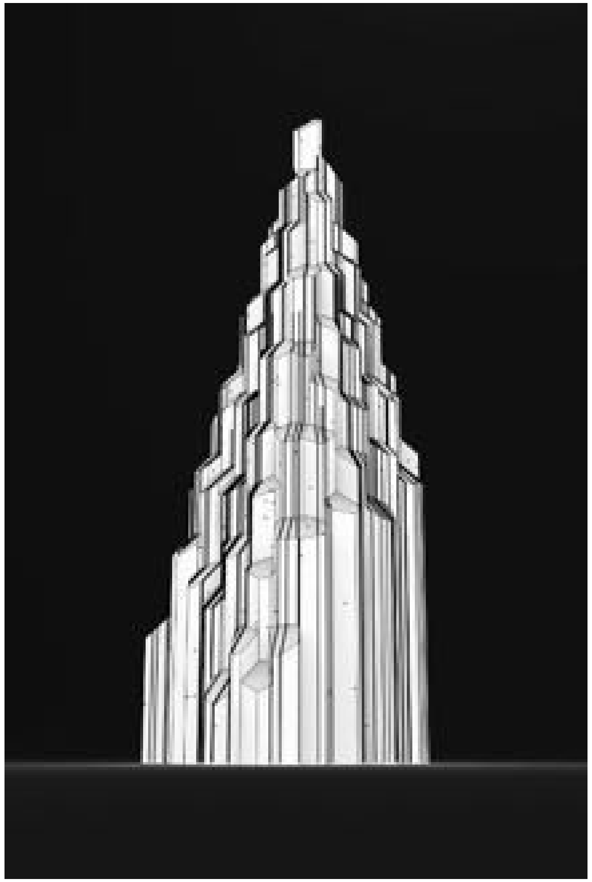


Maximum angle



One single contour

RENDERING



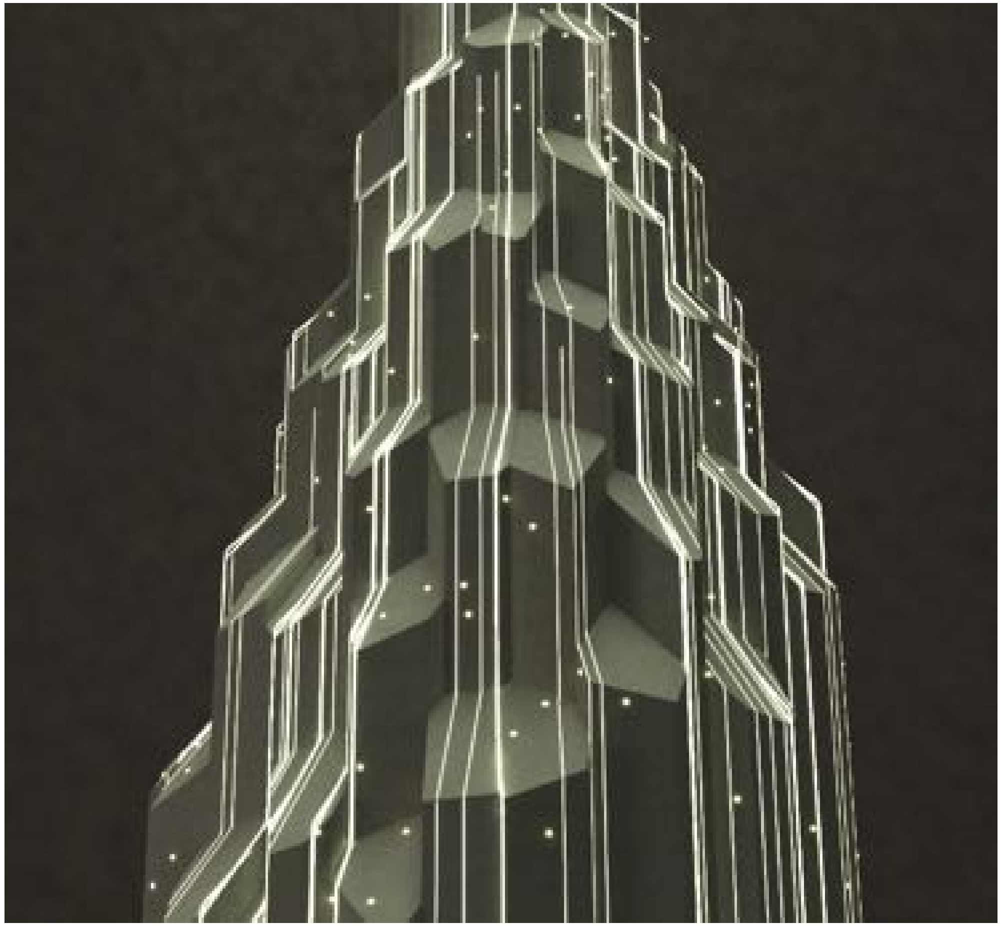
Camera angle

Lights

Material

RENDERING

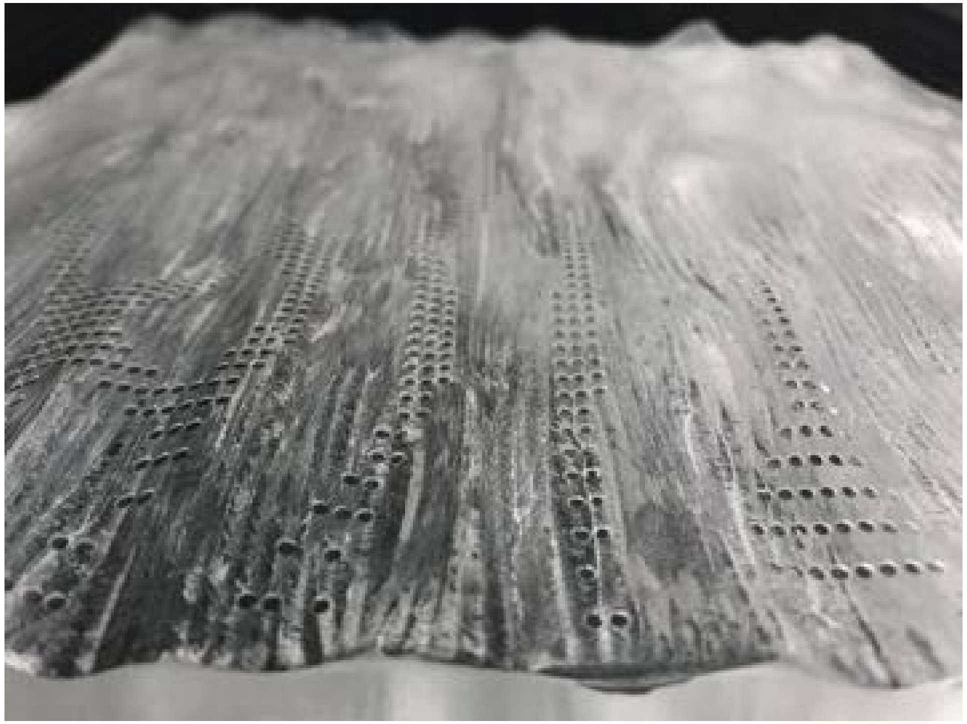
Emissive materials and fog effect



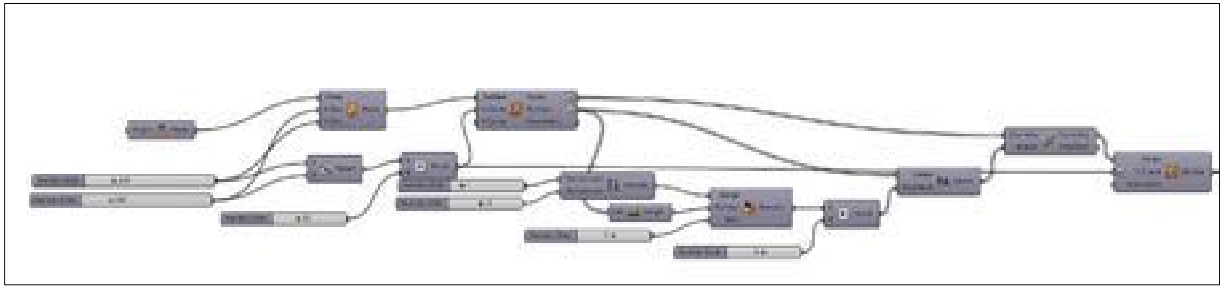
CNC MILLING + LASER CUTTING

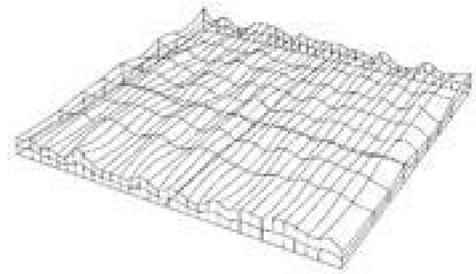
The inspiration for this exercise was to emulate the surface of liquid using a CNC milling machine to create the wavy surface and over it a laser cutting machine to emulate the reflection of the light on that surface.

For that, the material used is a acrilyc polymer because of the easy milling properties, transparency and, as it is a thermoplastic, it will partially melt using the laser to define the caustic shape.

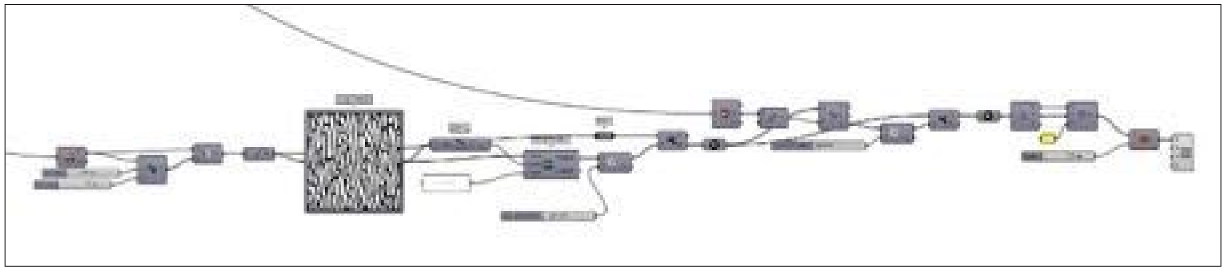


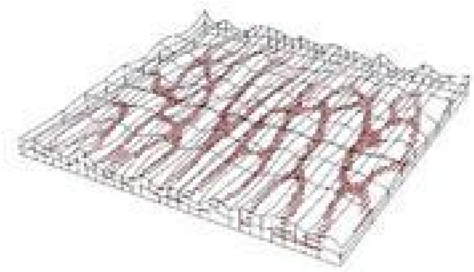
Wavy surface





Reflection pattern

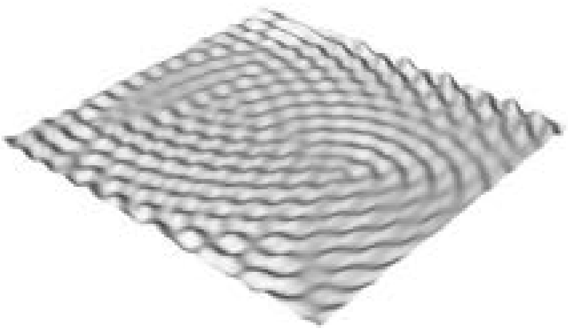




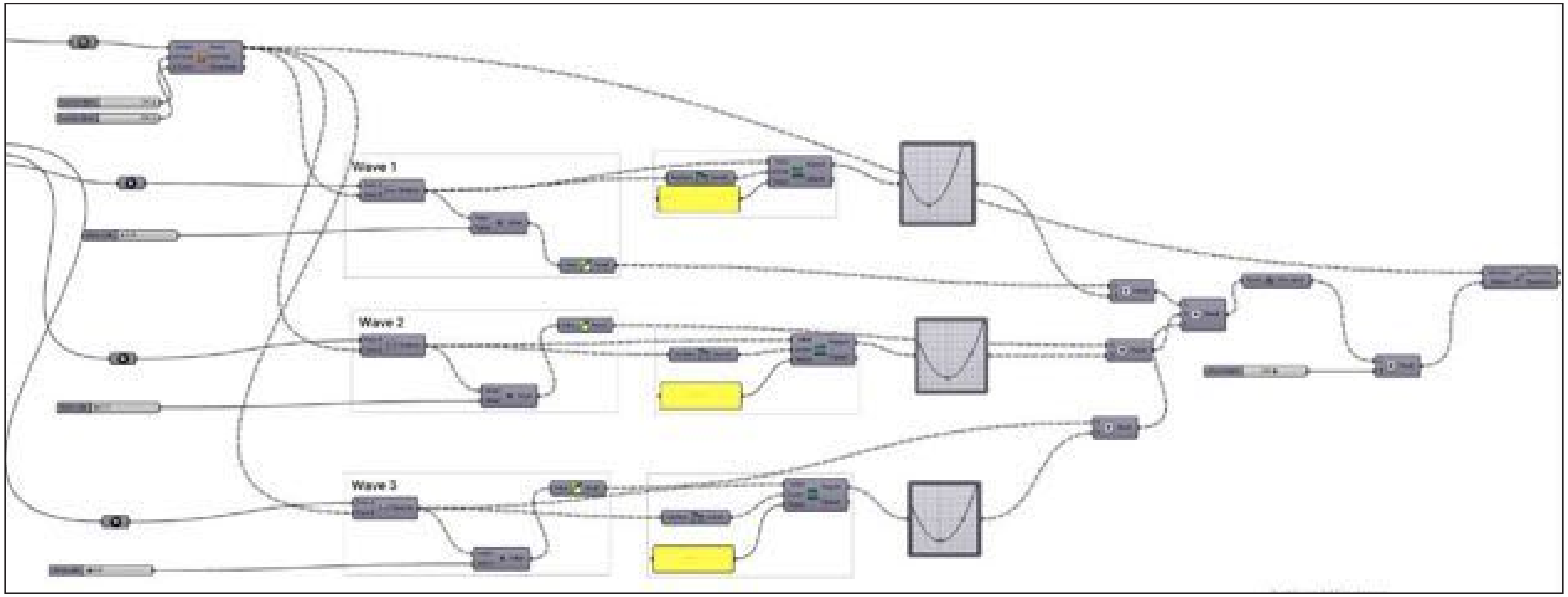
CNC MILLING

The grasshopper definition for this cnc milling example shows 3 sin waves colliding and the resulting interference pattern.

In order to highlight this pattern, the material used for this task is plywood. The horizontal layers of the plywood define the contour shapes when it is milled.



Sin wave collision pattern



3D PRINTING - FDM

Using a single perimeter we can achieve translucent properties using common white PLA. This is the perfect technique to design lamp shades with geometries that interact with direct light.

One of those examples is the monolith lamp. Using as a reference the previous project done in the first part of this master course and designing an organic base to contrast to contrast with the monolith shape.

MASTER PARAMETRIC DESIGN
FINAL PROJECT

LIGHTWEIGHT PAVILION
INSPIRED BY SUBAQUATIC WATER SPIDER NESTS

JOHANNES RYBAKOWSKI

COMPONENTS / FUNCTIONS

ETFE FILM

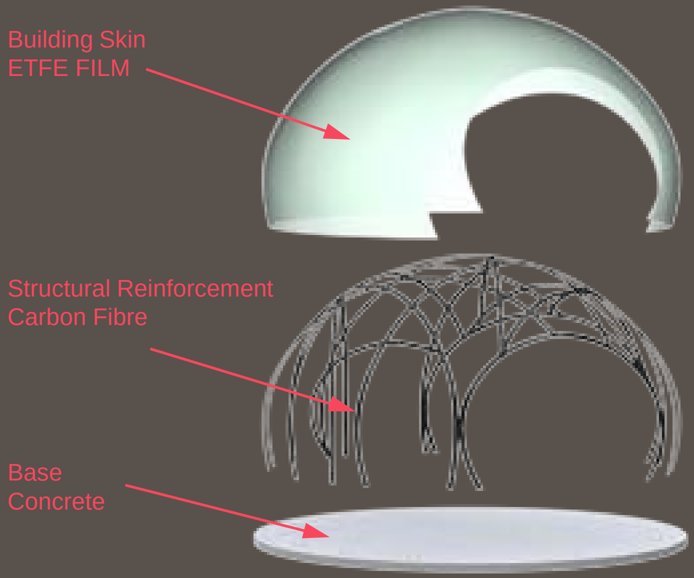
- Inspiration → air bubble under water
- Function → watertight building skin
- Structure → membrane (tensile forces / prestress)
- Fabrication → pneumatic formwork

CARBON FIBRE

- Inspiration → spider webs under water
- Structure → reinforcement of compression shell

BASE

- Function → foundation / base
- Structure → support of pavilion

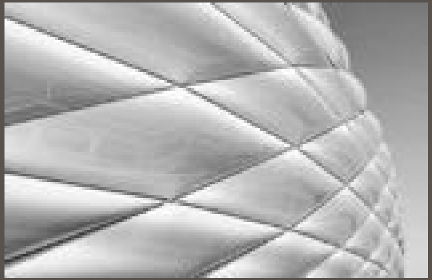


Exploded view of the Lightweight Pavilion

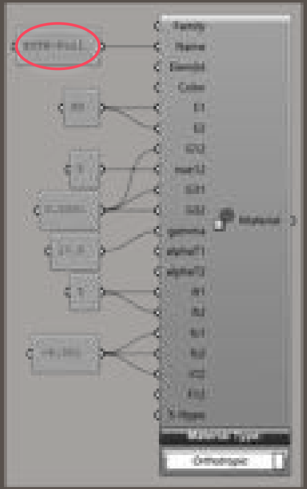
MATERIALS

ETFE FILM

ETFE Film [4]

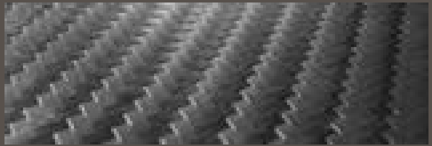


Air-inflated ETFE Cushion Facade [5]

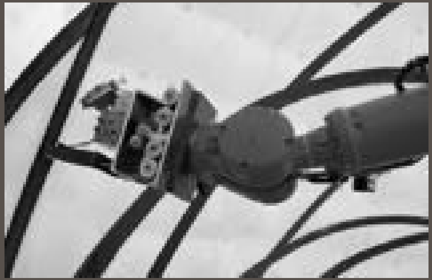


Material properties ETFE Foil [8]

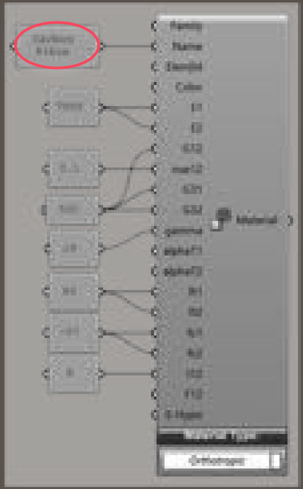
CARBON FIBRE



Carbon Fibre pattern [6]

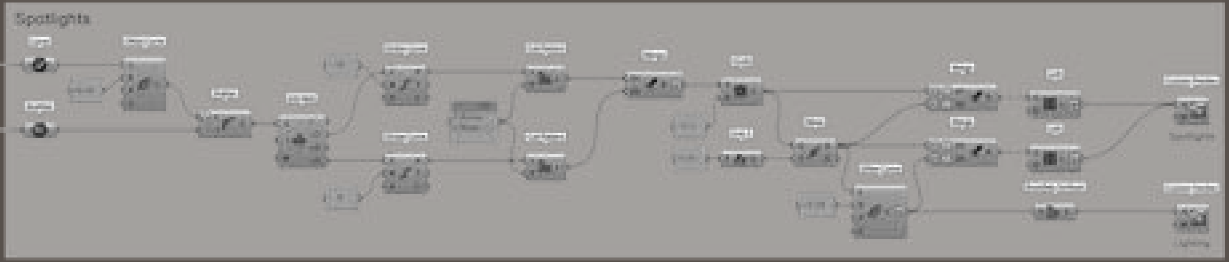


On-site robotic fibre placement [7]



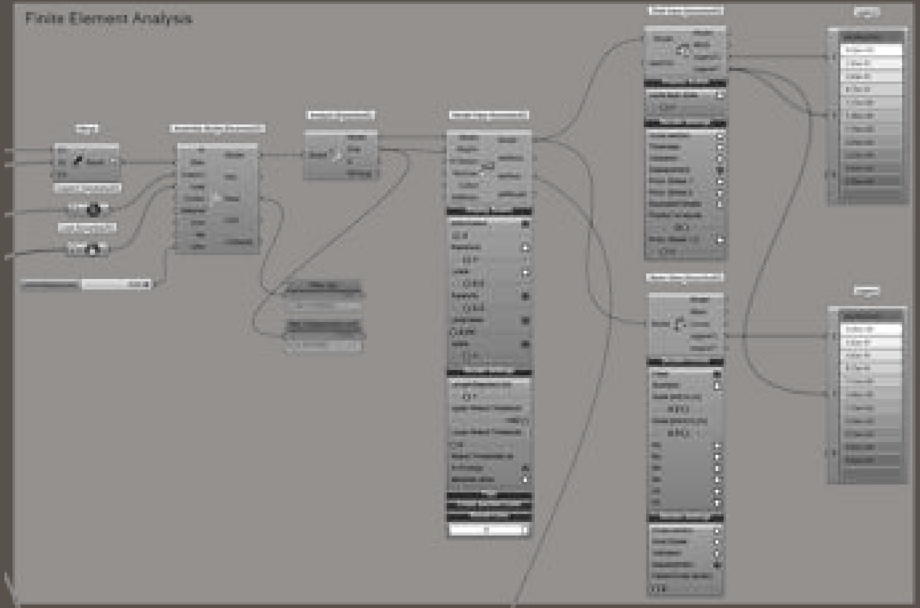
Material properties Carbon Fibre [9]

GEOMETRY / FORMFINDING



Grasshopper Definition

STRUCTURAL ANALYSIS / OPTIMIZATION



Grasshopper Definition

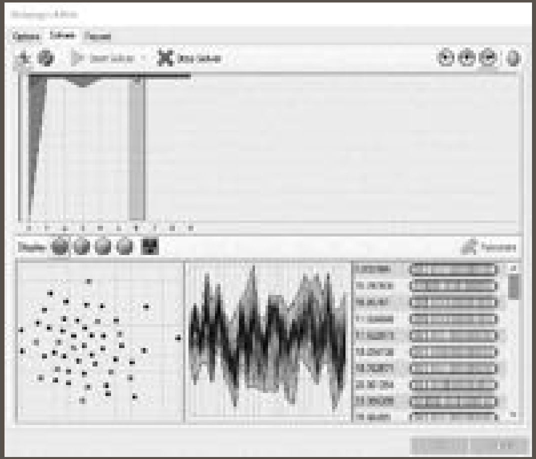
Displacements Loadcase 0: Dead Loads

Utilization Loadcase 0: Dead Loads

STRUCTURAL ANALYSIS / OPTIMIZATION

Points and lines, that are defining the
path of the Carbon Fibre Reinforcement

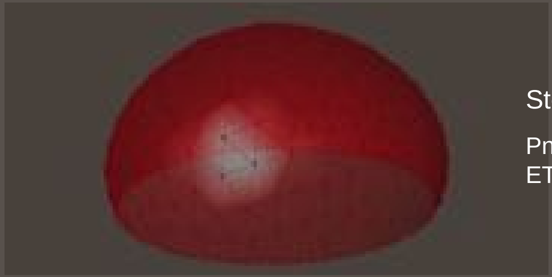
Grasshopper Definition



Generative Optimization with Galapagos Solver

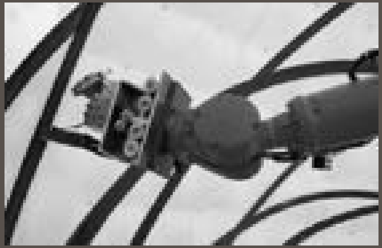
FABRICATION

A high degree of functional integration is achieved through the use of the ETFE film as **pneumatic formwork** and building envelope. This saves the material consumption of conventional formwork techniques as well as an additional façade installation. A composite adhesive provides a proper bond between the ETFE film and the carbon fibres [10]. During the production and **printing process**, nine pre-impregnated carbon fibre rovings are placed in parallel [10]. This additive process allows the stress-oriented placement of the fibre composite material.



Step 1:

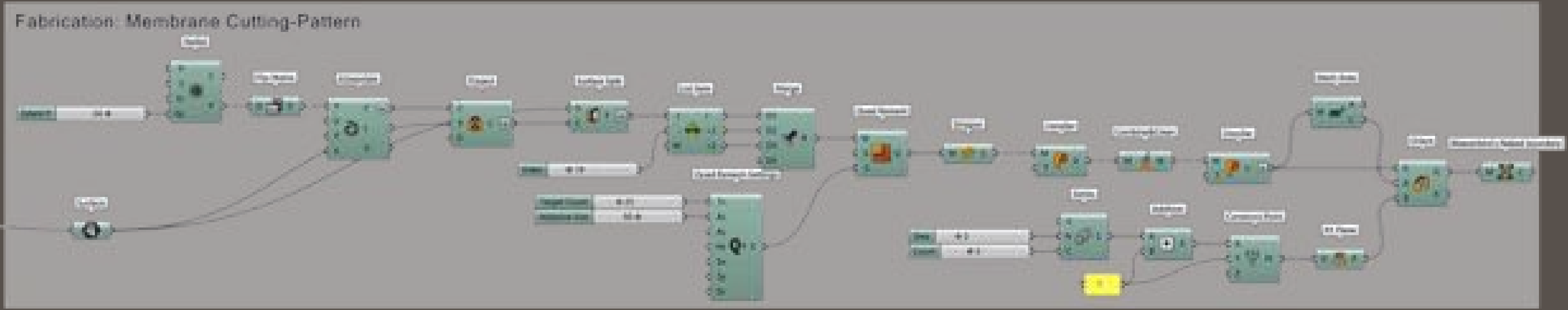
Pneumatic inflation of ETFE membrane



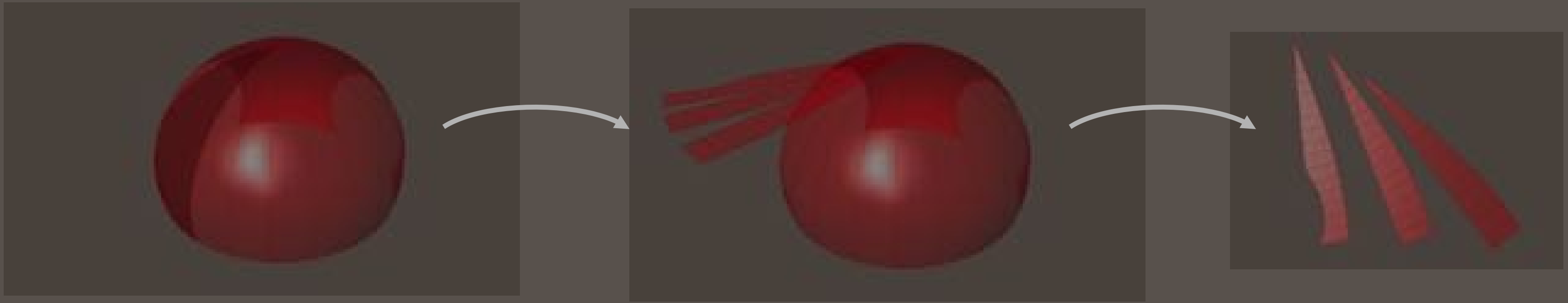
Step 2:

On-site robotic fibre placement [7]

FABRICATION



Grasshopper Definition



CONCLUSION

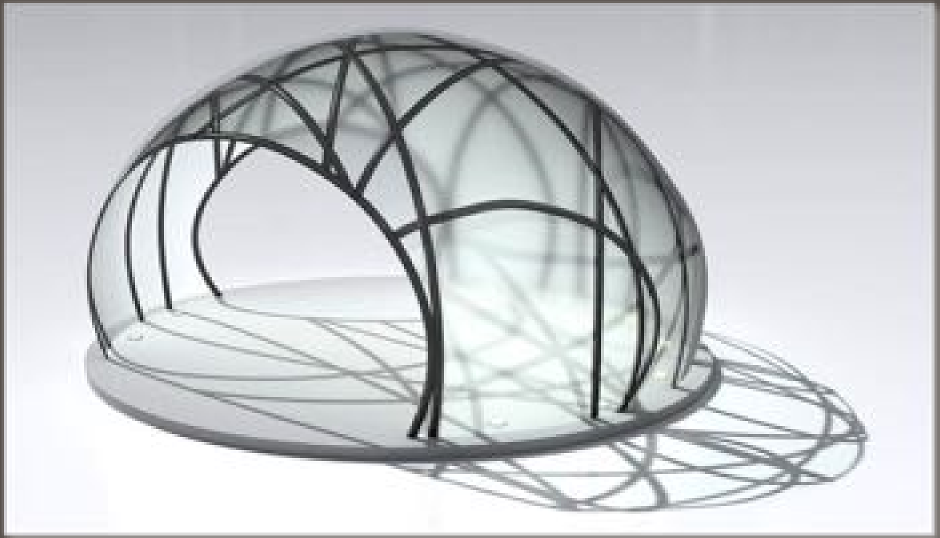
The design of the biomimetic Pavilion explored in this project showcases the potential of using computational methods and novel fabrication strategies.

With a total weight of only 630kg the whole construction is highly material-efficient compared to conventional building techniques.

Its highly articulated skin integrates the composite structure of a fibre-reinforced ETFE surface and a weatherproof membrane in one system, while also enabling increased structural performance for a thin shell spanning more than 8 metres.

Perspective view of the Lightweight Pavilion inspired by subaquatic water spider nests

CONCLUSION



Lightweight Pavilion: Perspective view with shades

Lightweight Pavilion: Top view with shades

Marco Gesualdo
Algorithmic Reinterpretation of the Eames' DCW

MASTER_PARAMETRIC_DESIGN
XIV Edition. Final Project. Part I
November - January 2022

1. “Colorado” | 3d Printing with Clay

Process

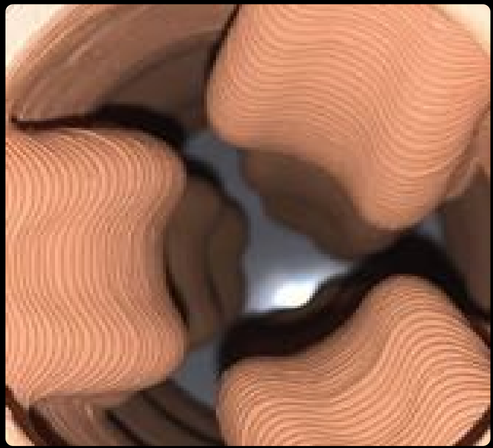
As the above pictures shows, the process of 3d printing with clay has different variables to consider.

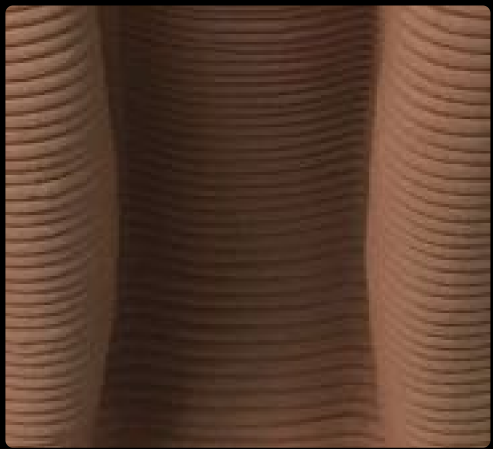
In this case, the main points to control where the wall thickness and its path (to avoid co-llapsing), the layer quality (depending on the pressure applied and the homogeneity of the clay) and the flow of extrusion (as the layers were non-planar).

Considerations

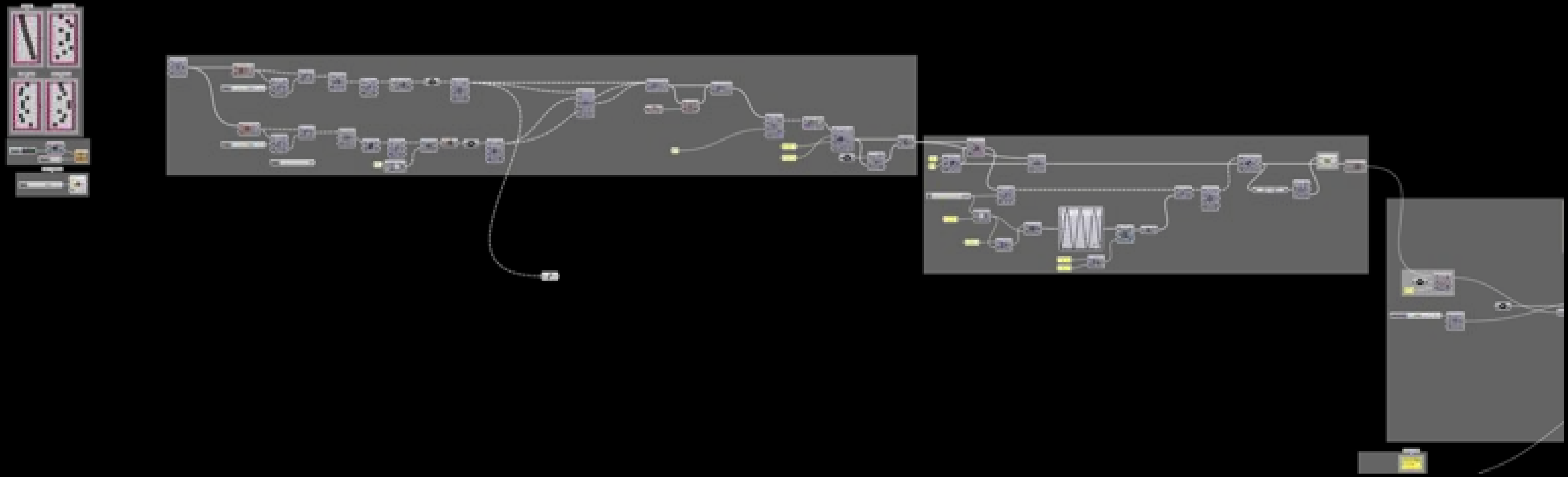
During the printing process, the fact of working with organic and tall shapes involved some issues to avoid the piece collapse. As shown in the previous images, the thinest section was the layer where the object started collapsing... In order to avoid that situation, drying the piece with a heating-gun was the strategy followed.

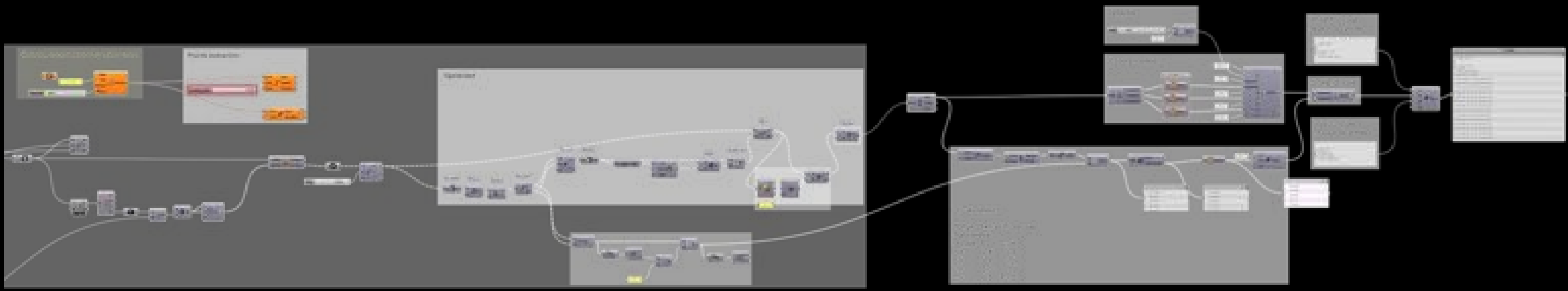
Result

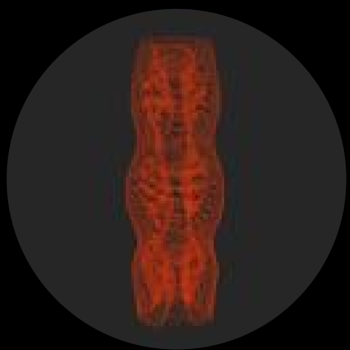




Algorithmic Development





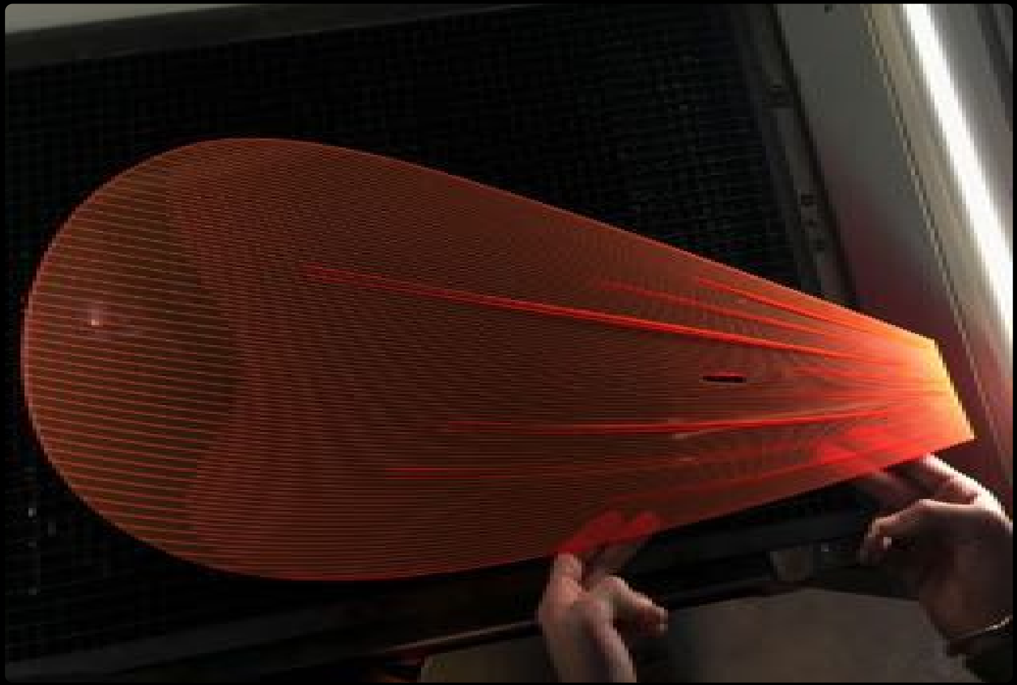


2. “Edges” | Laser Cutting

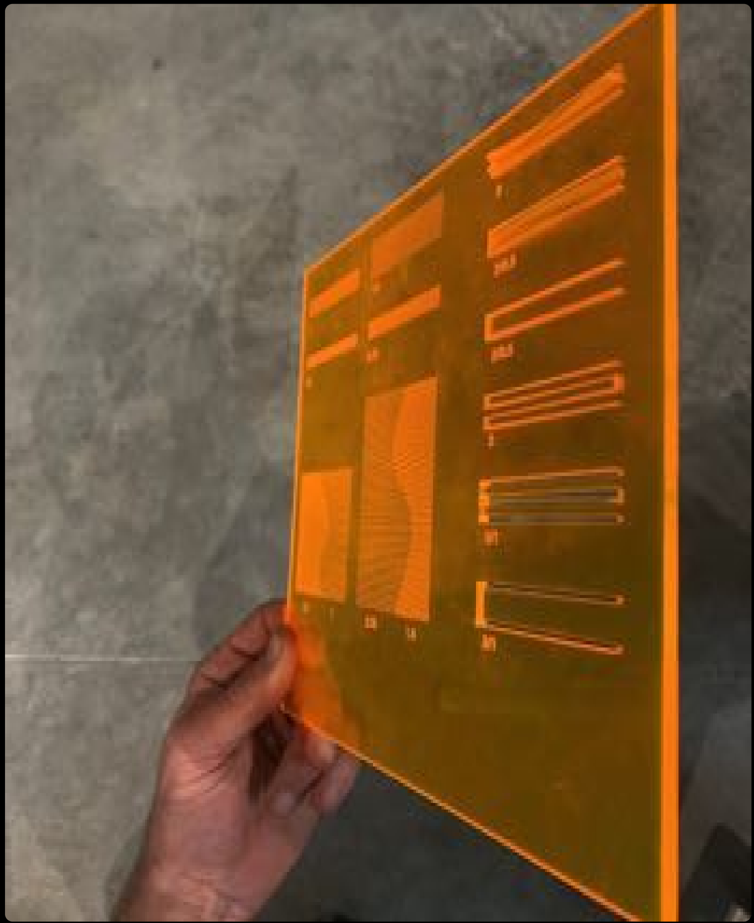
Process

Laser cutting, by it’s high accuracy in terms of rastering, has been used to simulate the pattern of a flower petal, which thanks to the material (fluorescent PMMA) gives a shiny effect to the edges.

In line with the petal inspiration, the PMMA sheet has been deformed using a heating-gun in order to adapt the shape to be used as a lamp hung from the ceiling.



Considerations

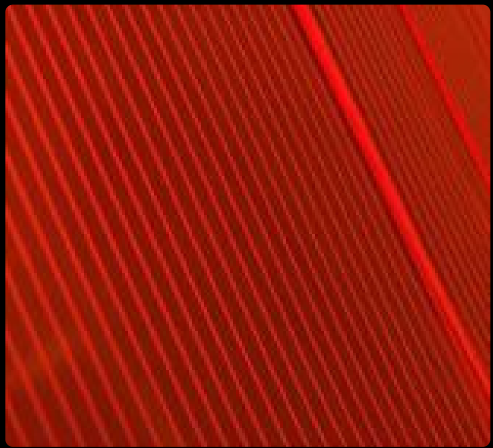


The main point to consider, was the scale of the rastering & cutting pattern, as the light passed through the material with different reflections.

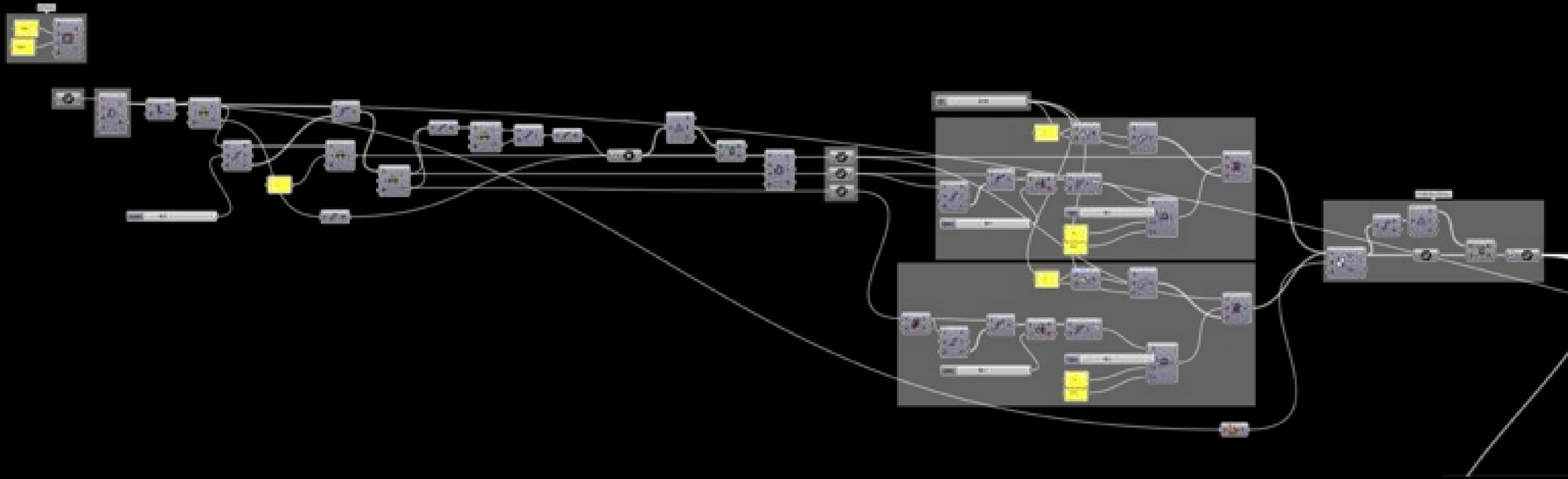
Secondly, as the heating system used was focal, some tensors were required to deform the plastic sheet.

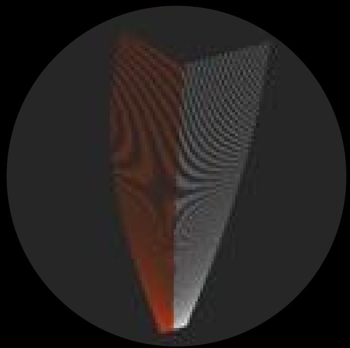
Result

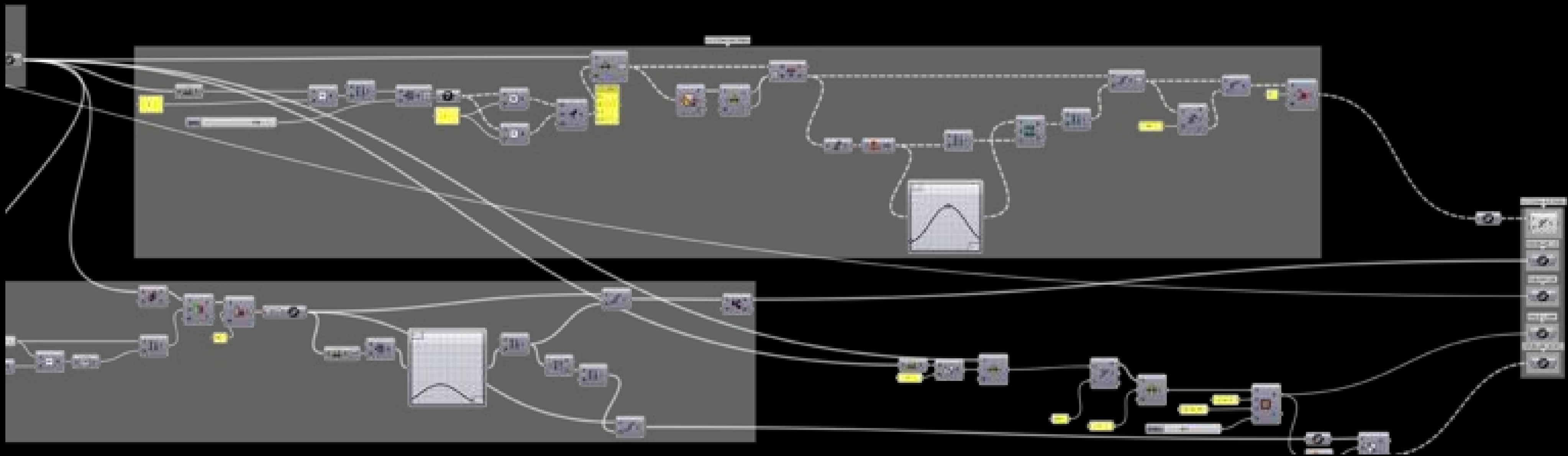


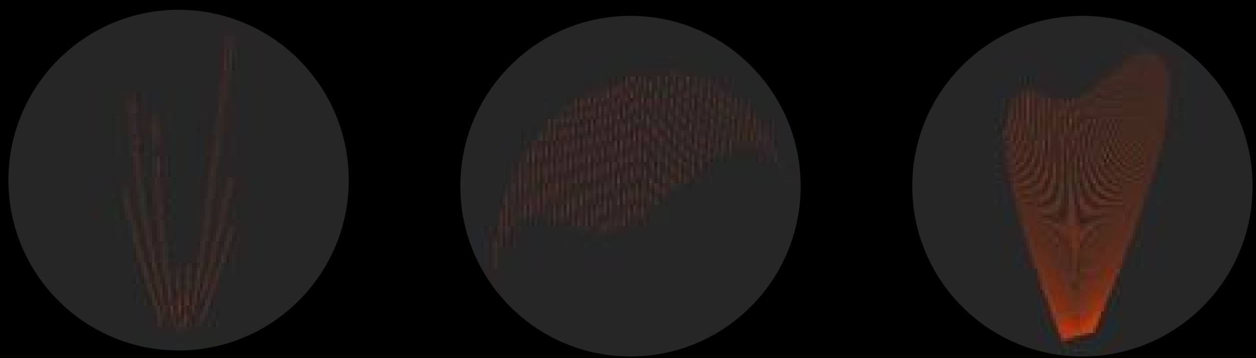



Algorithmic Development









3. “Human” | CNC Milling

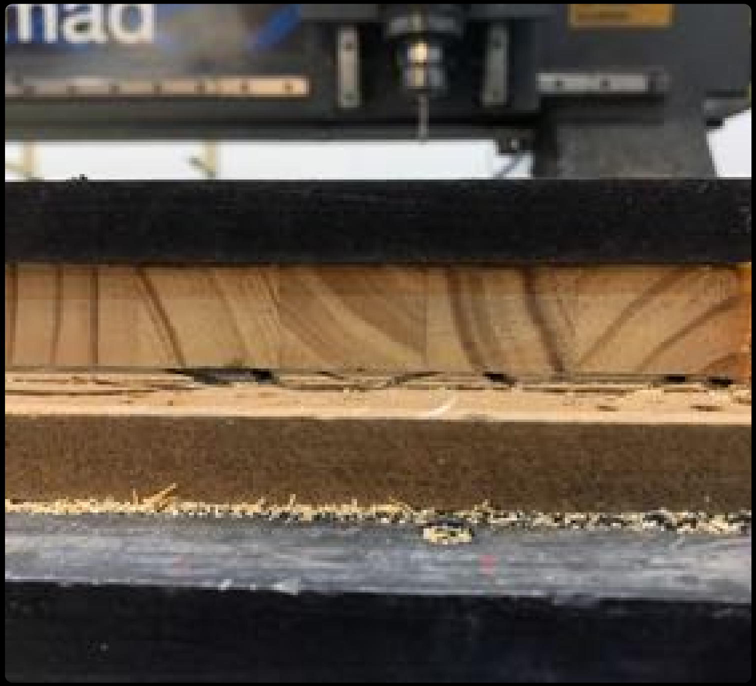
Process

To obtain the expected result, two strategies have been followed during the milling process.

Firslty, a roughing removed the material depending on the layer height. Afterwards, the paralel finishing smoothed the surface.

Secondly, an engraving was done to draw the proportions of a human face on the surface.

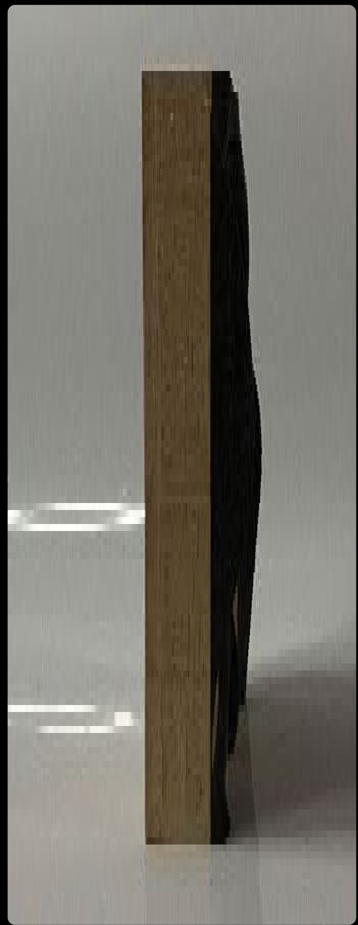
Considerations

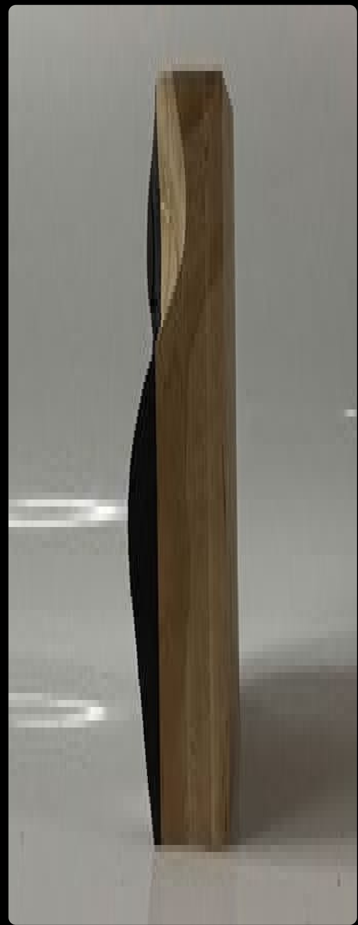


Working with a two-layered material gived the chance to differentiate some zones depending on the dressing depth. Neverthe-less, to obtain the expected result, the gluing must be accurate.

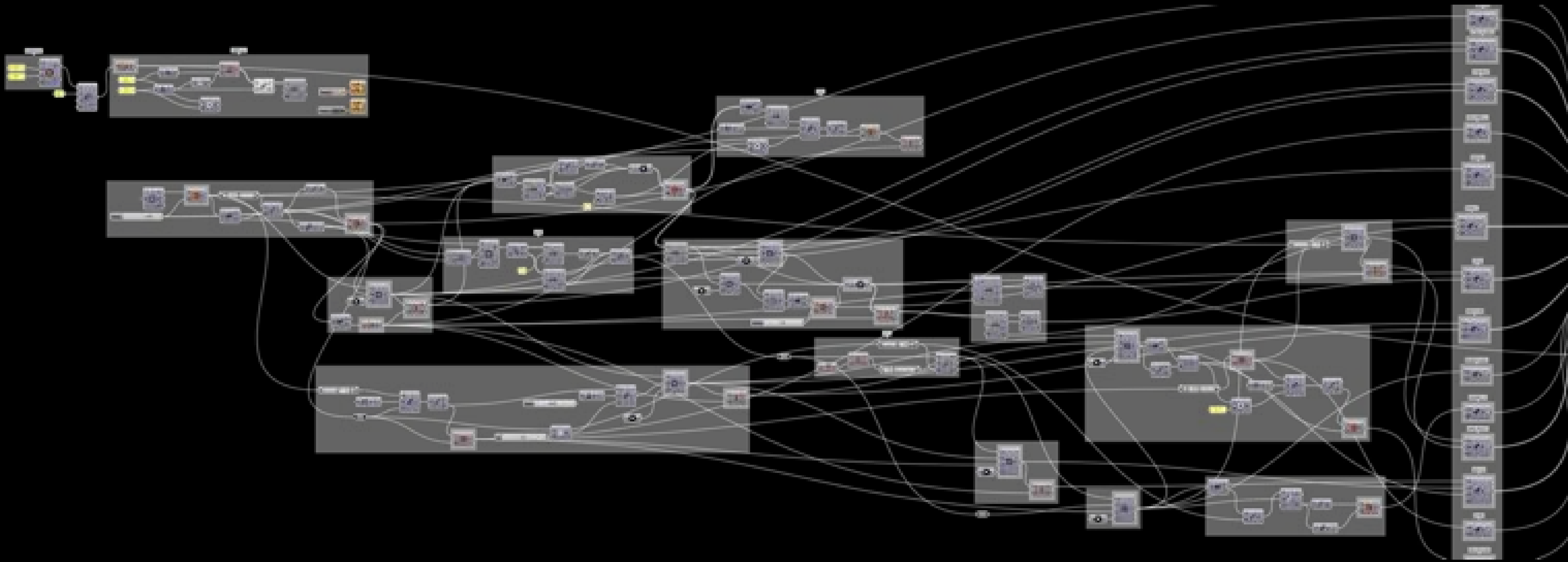
Something to consider during the materials selection, was it's similarity; as both were wood based, the milling process could be done with the same tool and parameters.

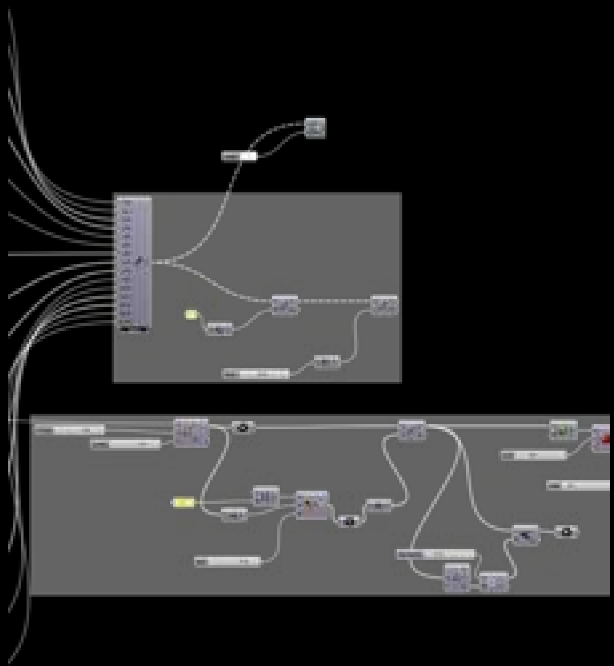
Result





Algorithmic Development





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Student´s works
XIII Edition. Final Project. Part II
January - February 2022

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SOFIA ALEDO CARMONA

DIGITAL FABRICATION TECNOLOGIES

MASTER_PARAMETRIC_DESIGN XIV Edition. Final Project. Part II

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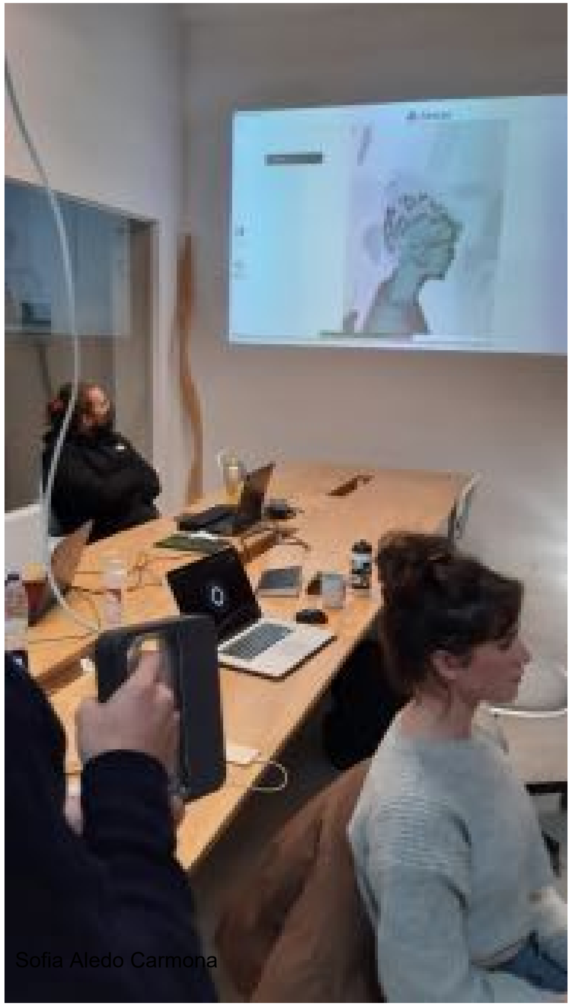
3D SCANNING

Bee 3D printer



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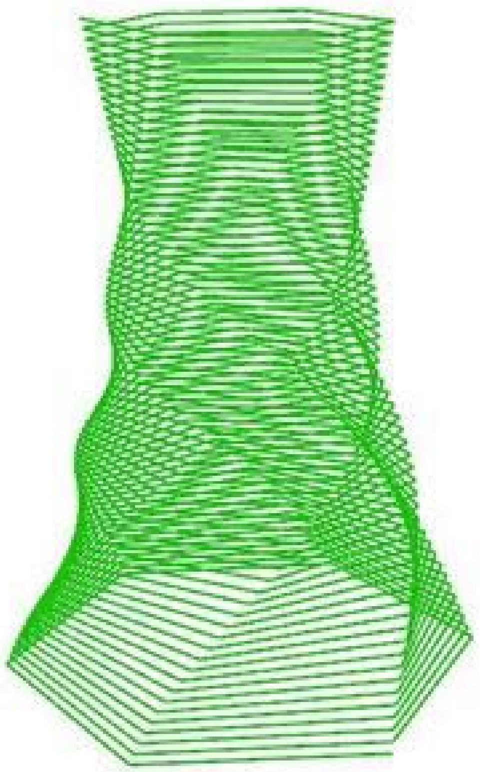
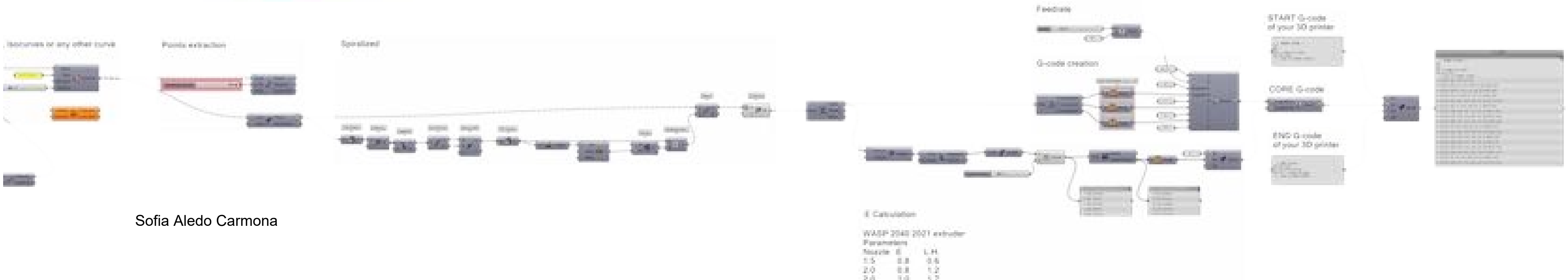
3D PRINTING WITH CLAY

Twisted Tower



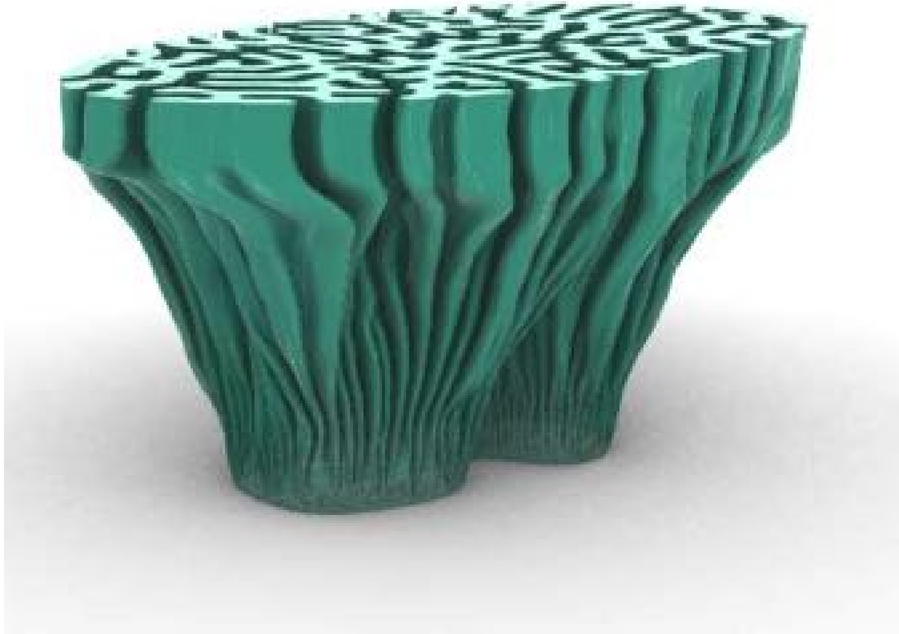


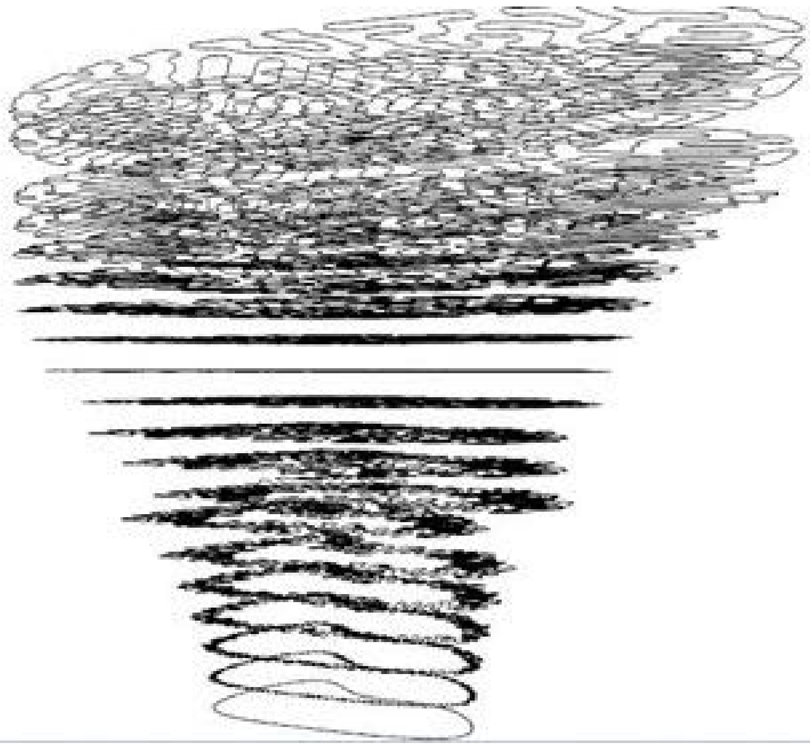
Sofia Aledo Carmona

3D PRINTING WITH CLAY

Differential Growth Loft

Rhino 3D model





Differential Growth Loft

Print 2

2mm diameter nossal with WASP printer

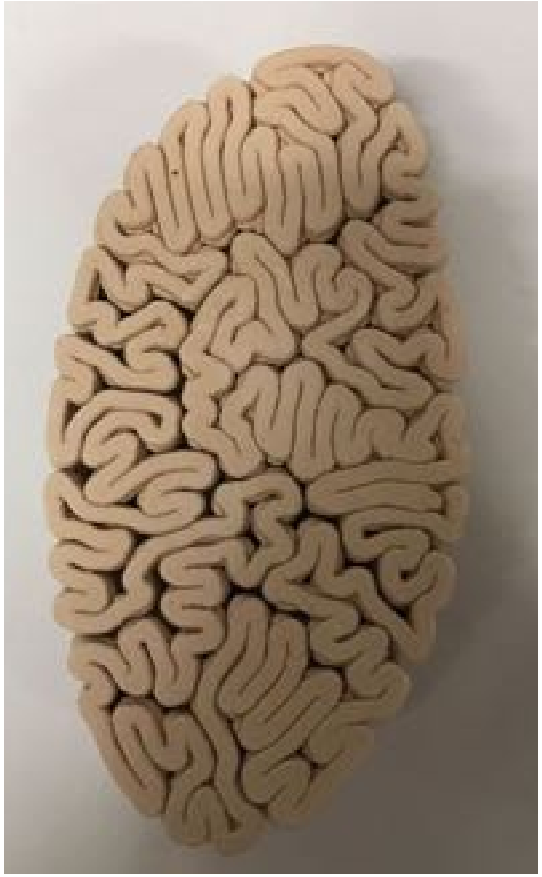
Problems:

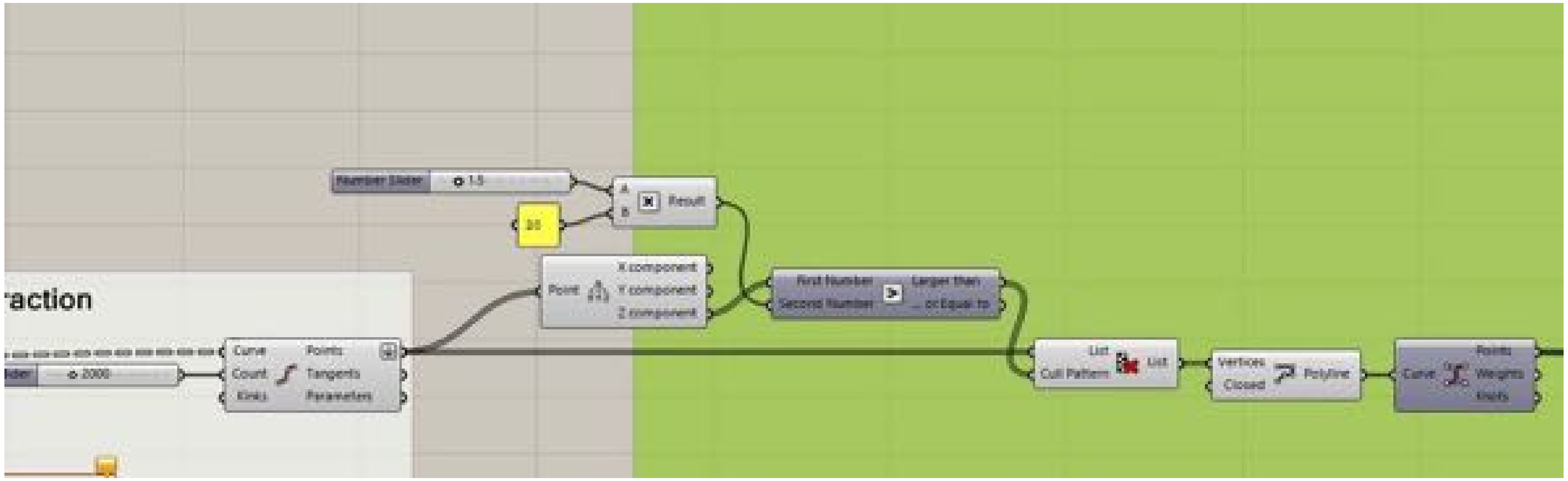
-Liquid clay clump in layer 20

-Printing stopped

-Gcode modification to start over at the point it left off

-Model was not finished due to lack of clay



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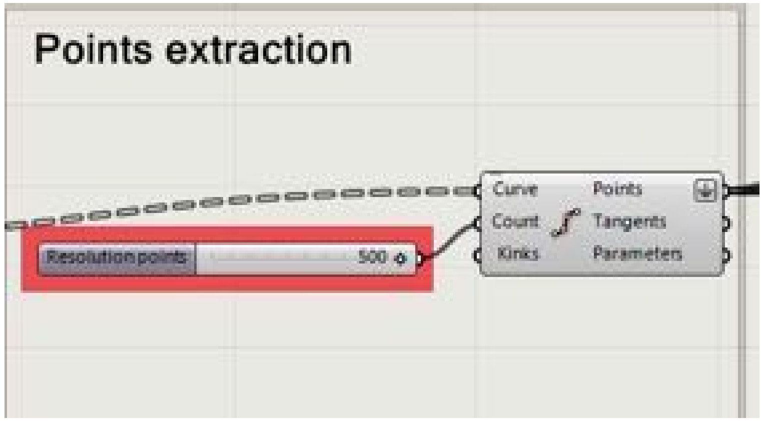
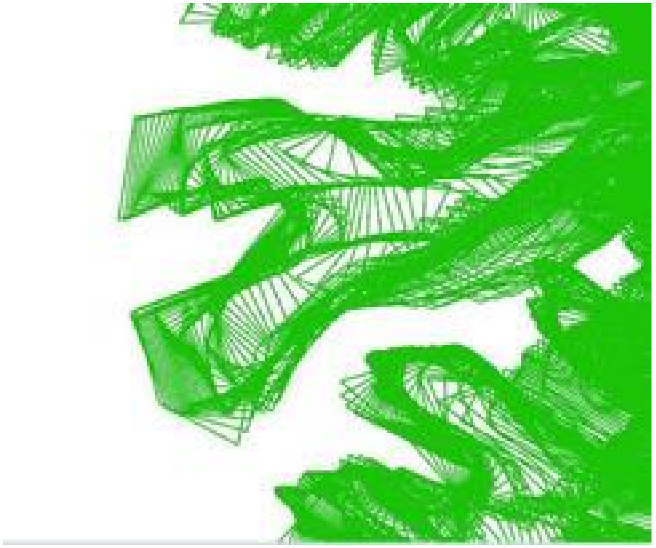
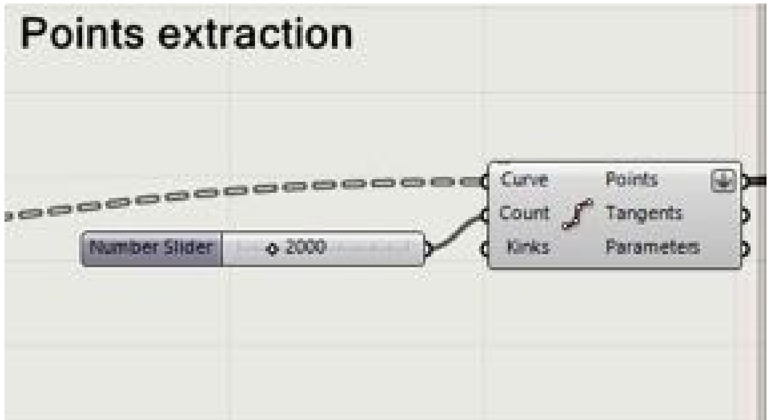
3D PRINTING IN PLASTIC

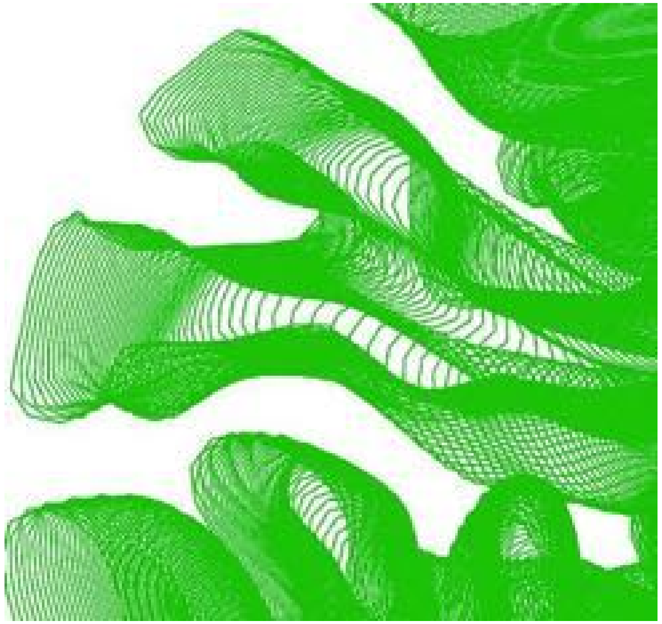
Differential Growth Loft

500 vs. 2000 points per layer









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Differential Growth Loft

The Growth sctructure was succesfully set to print at 2000 points per layer, making it widly time restricting. The model was stopped at layer 59/134.

CNC MILLING

Perlin noise 20x20

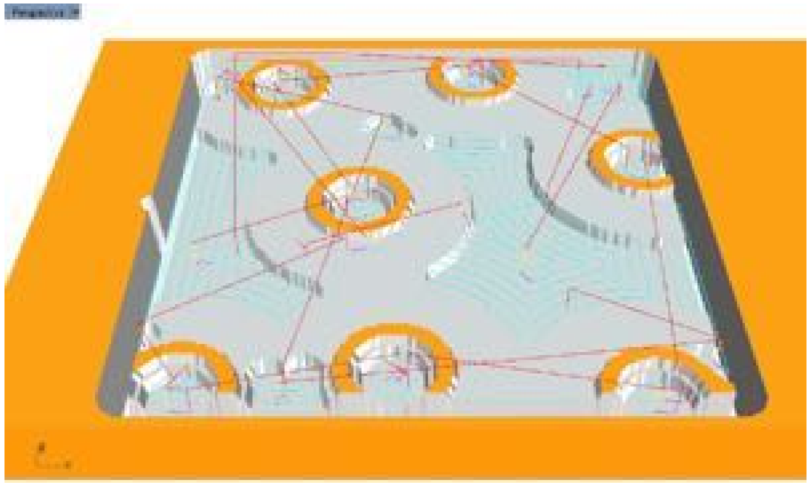
12 mm diameter

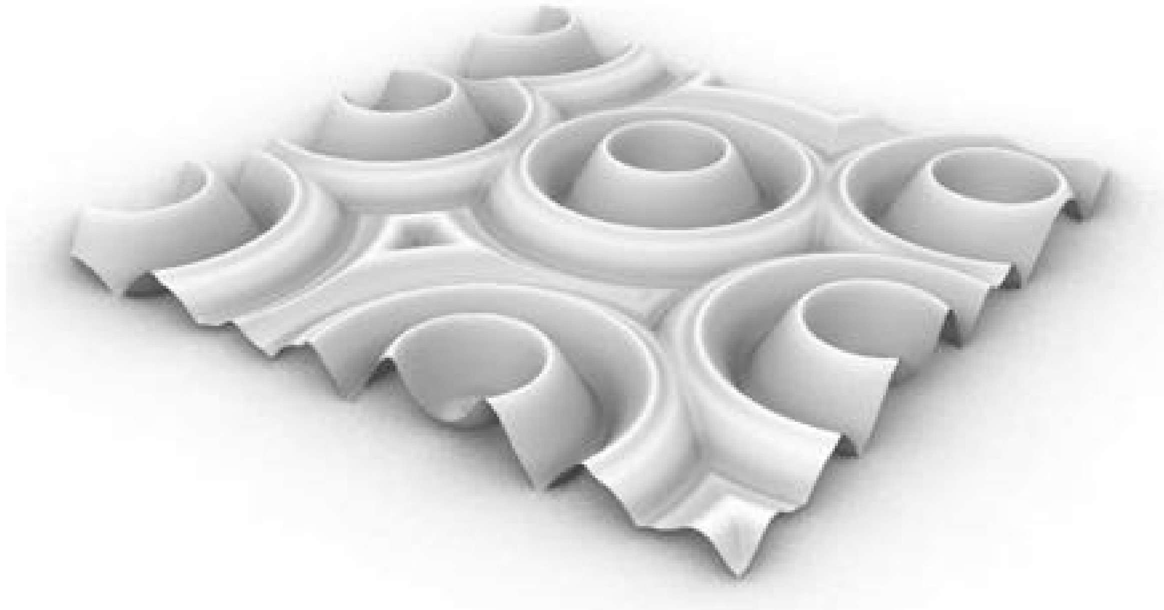
10 mm diameter

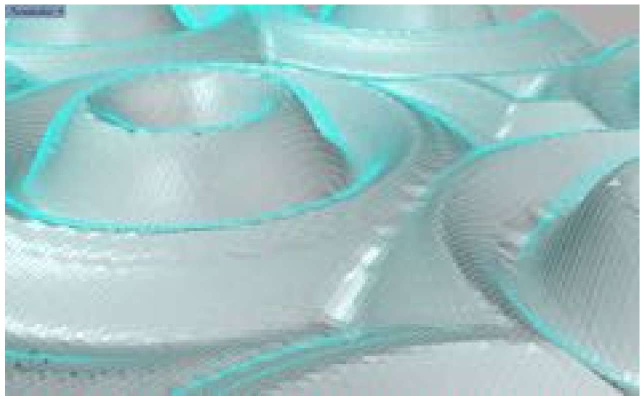
Wood dye and Barnish

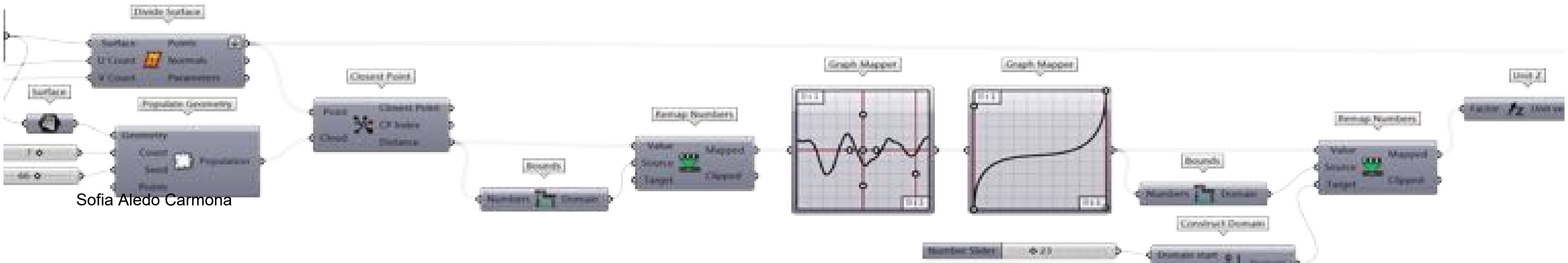
Digital Fabrication Presentation

Perlin noise 20x20









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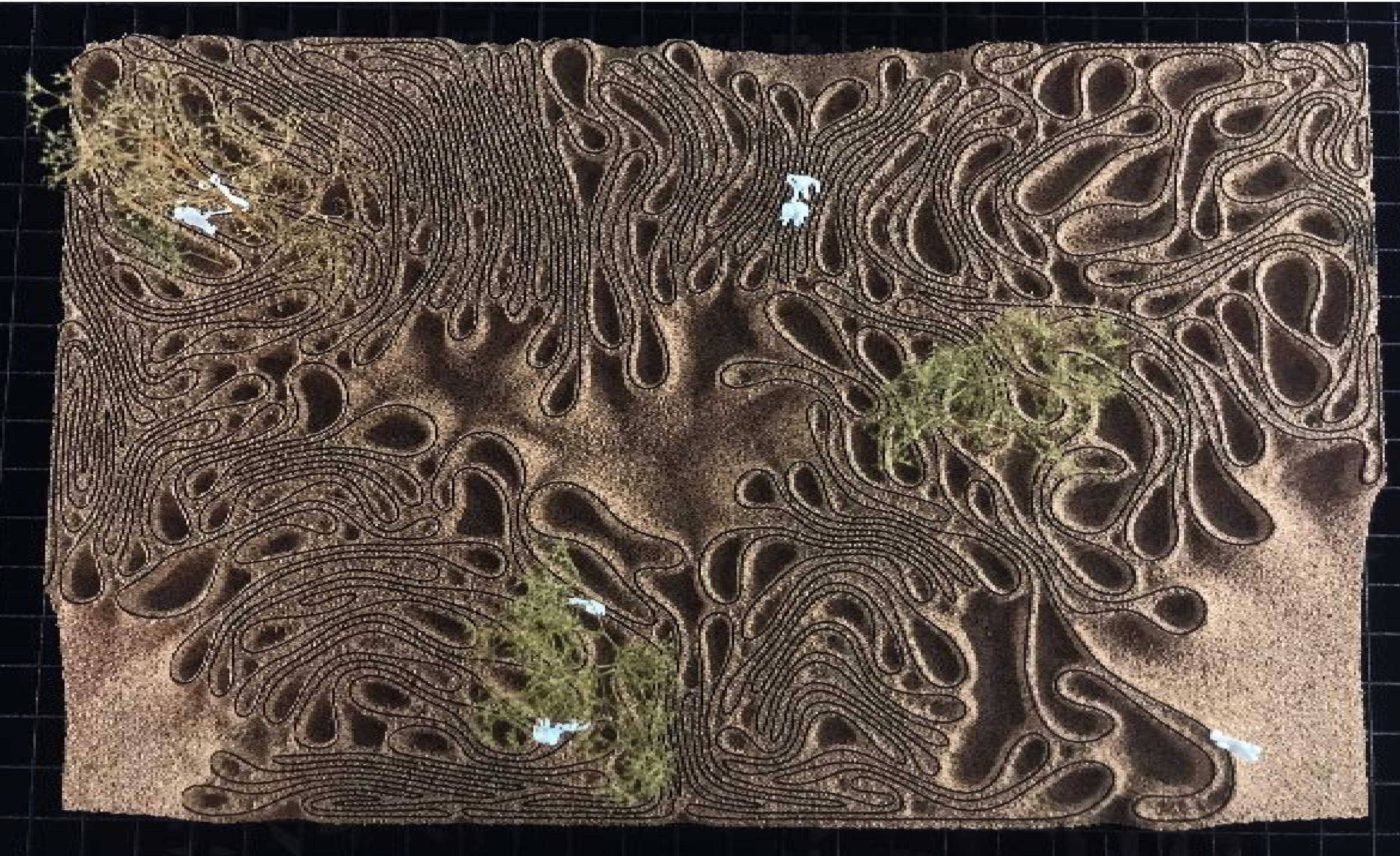
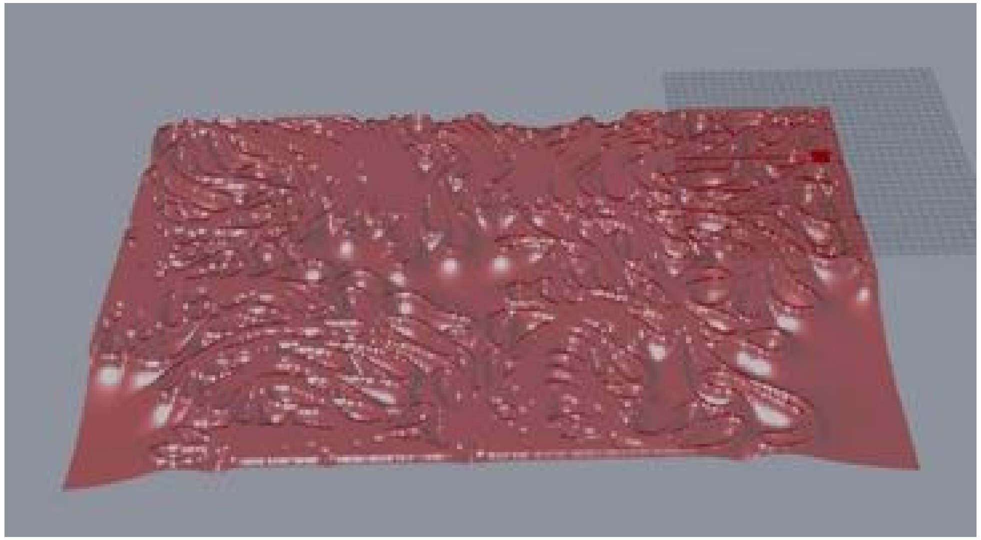
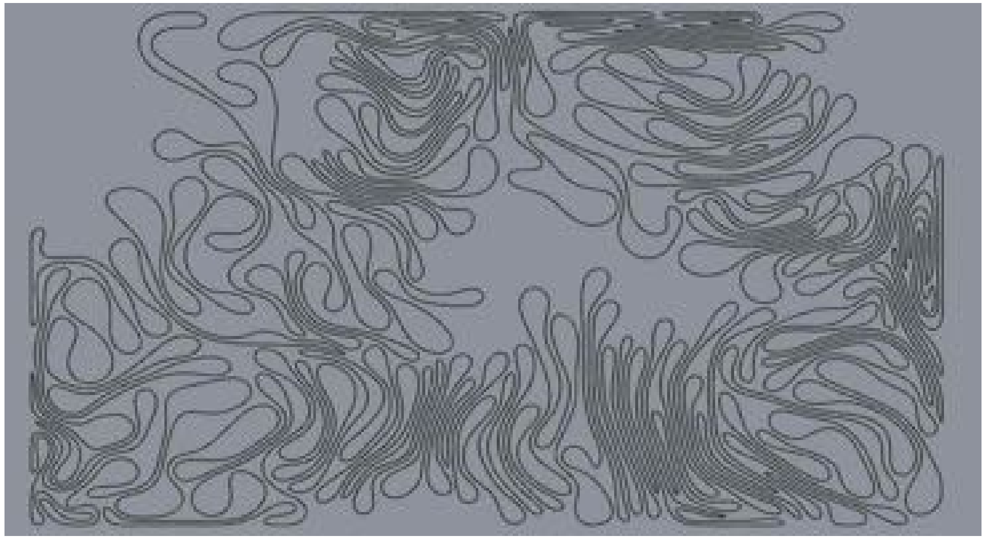
LASER CUT

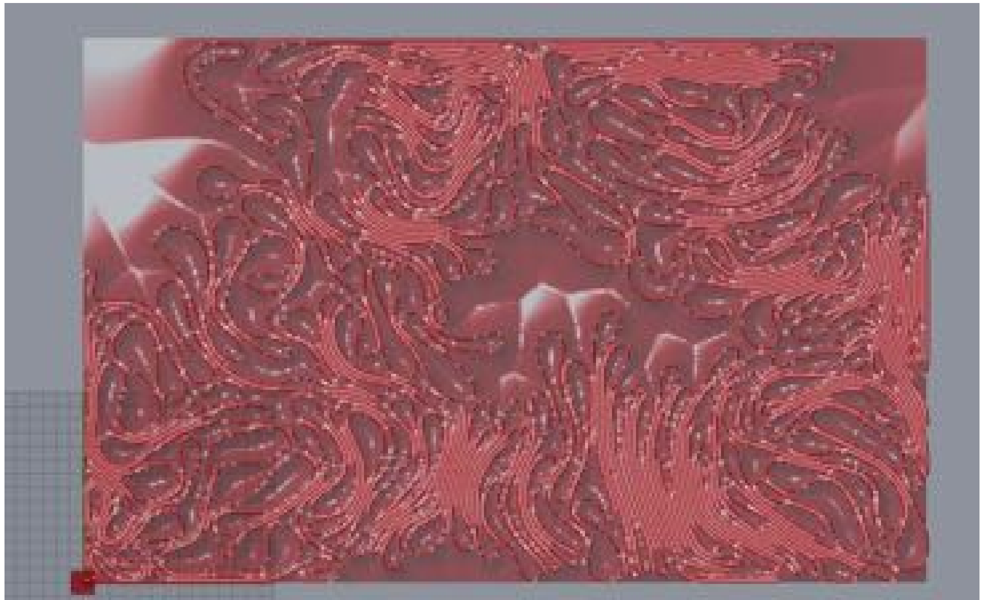


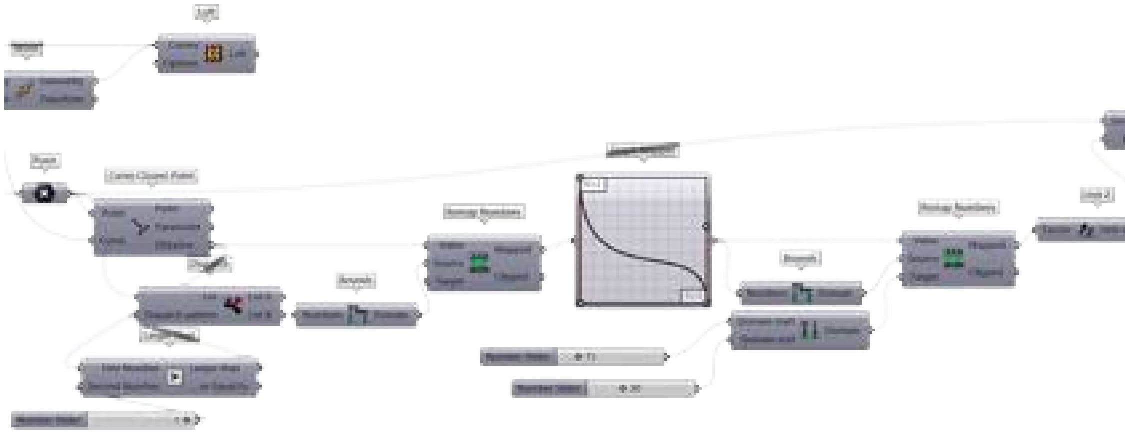
Land art: Growth trail. CNC + Laser Cut

Grasshopper surface creation and laser path definition









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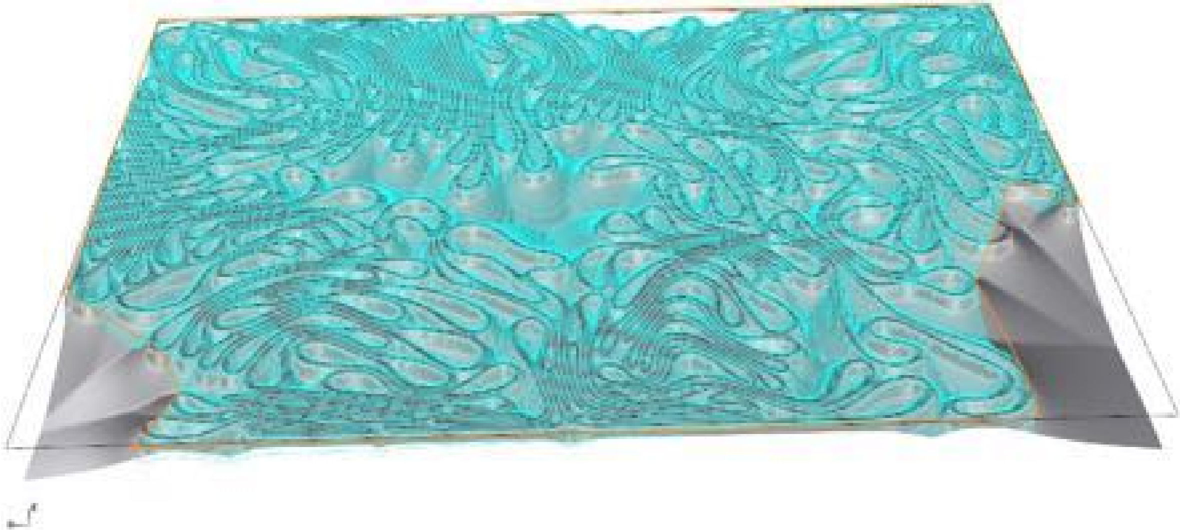
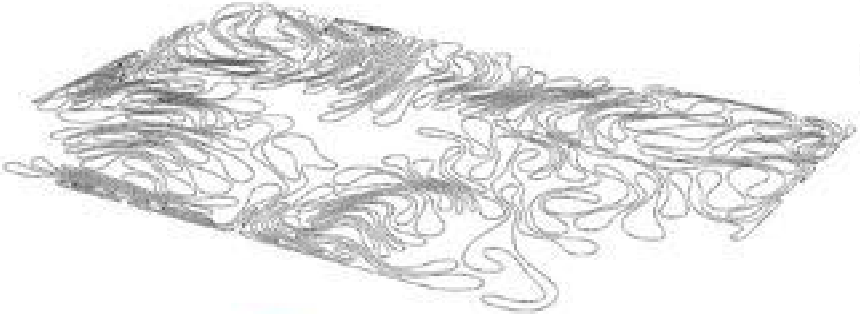
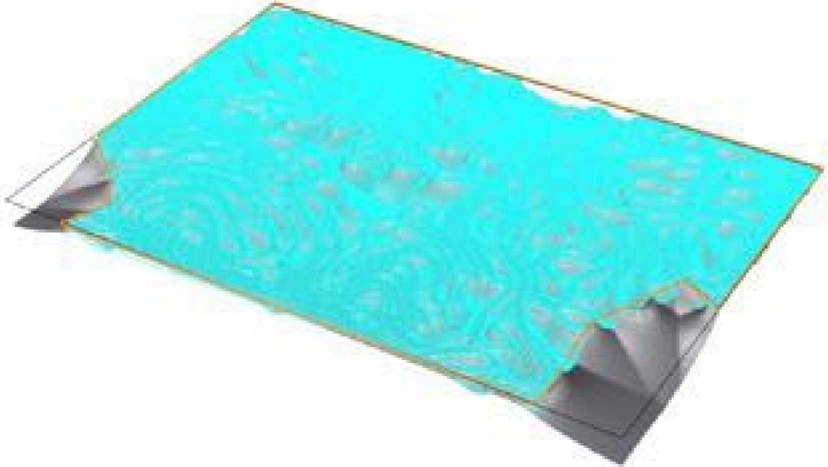
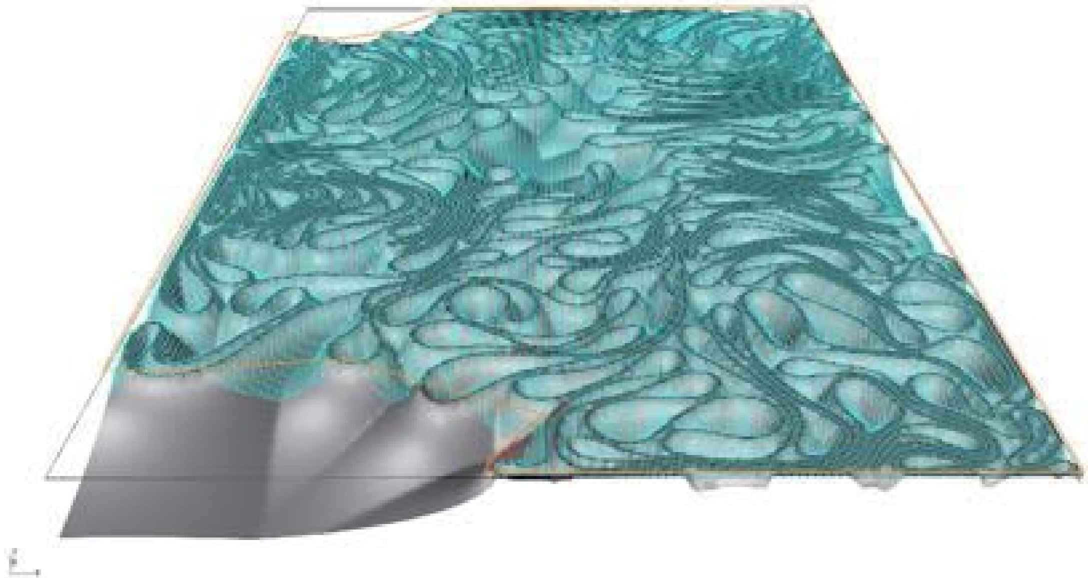
Land art: Growth trail

CNC and Laser working paths









Sofia Aledo Carmona

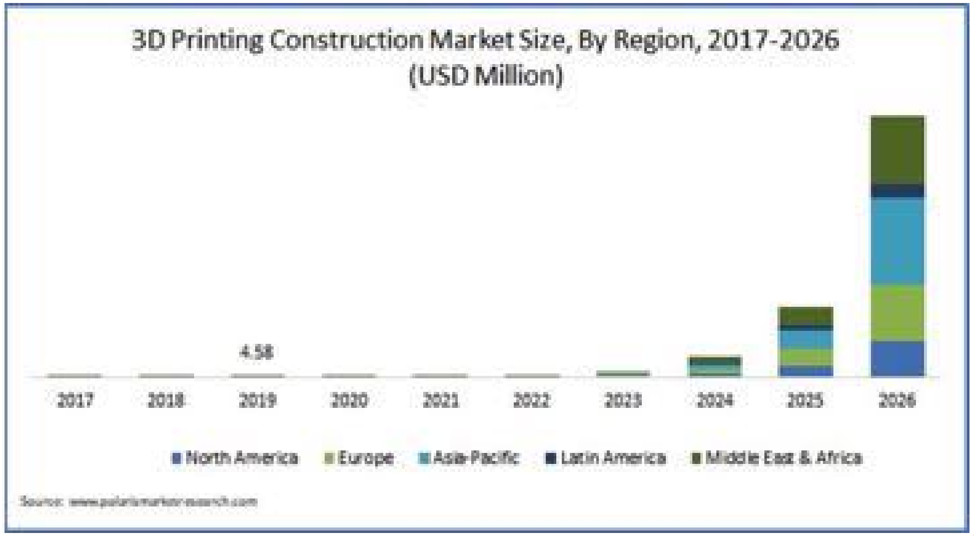
Land art: Growth trail

Digital Fabrication

CNC 6mm + 4mm

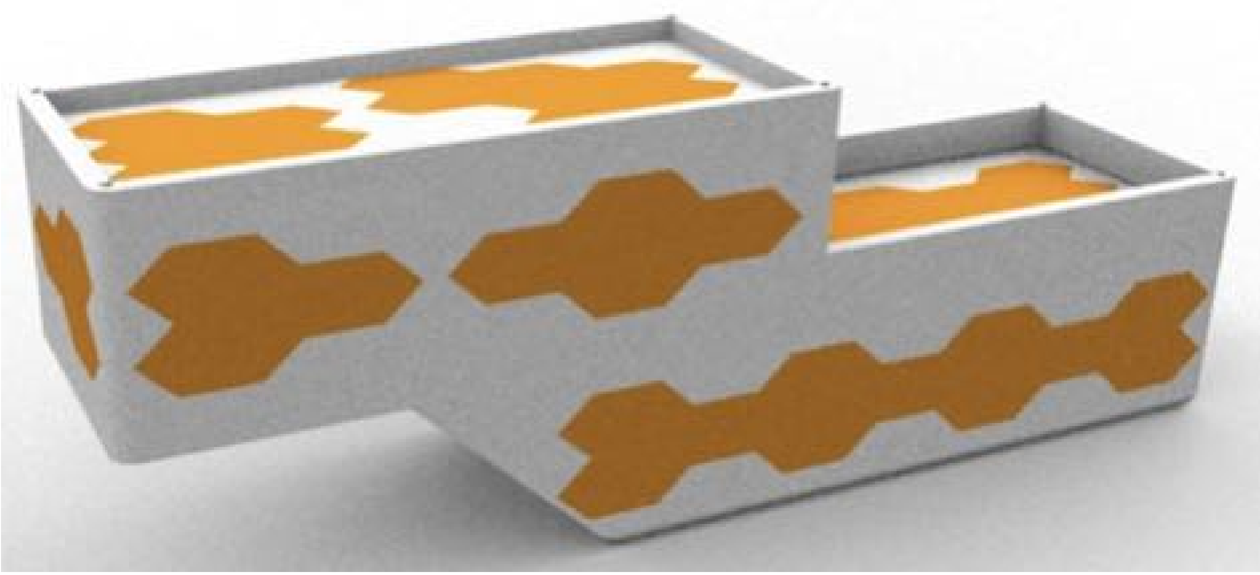
Laser Cut

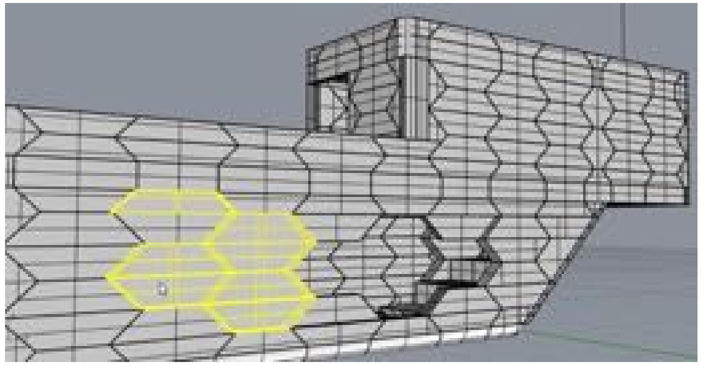
Proposed model

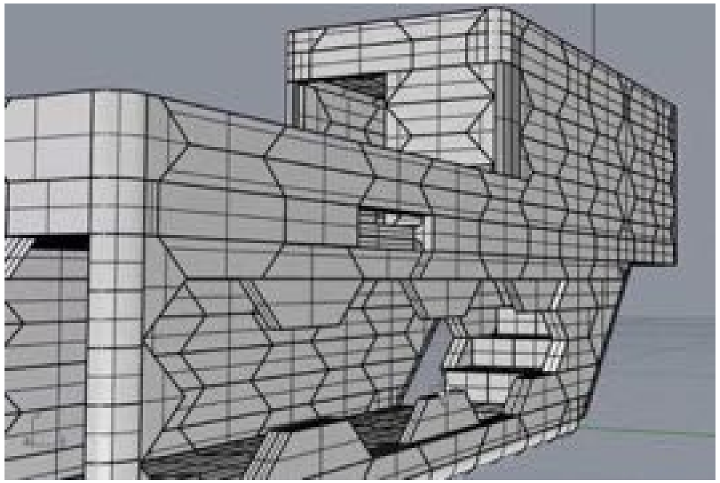


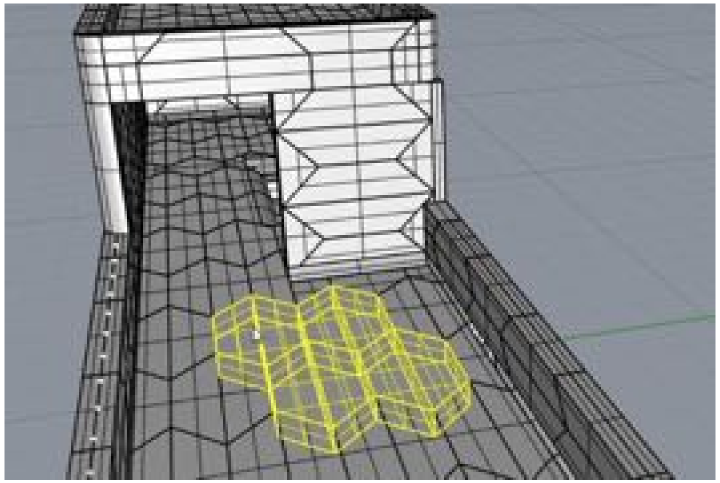
Cabibihan et al.
Taxonomy of Robotic 3D Printing,
(in preparation)

Honeycomb 3D Printed Home

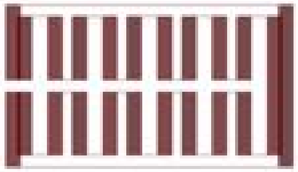




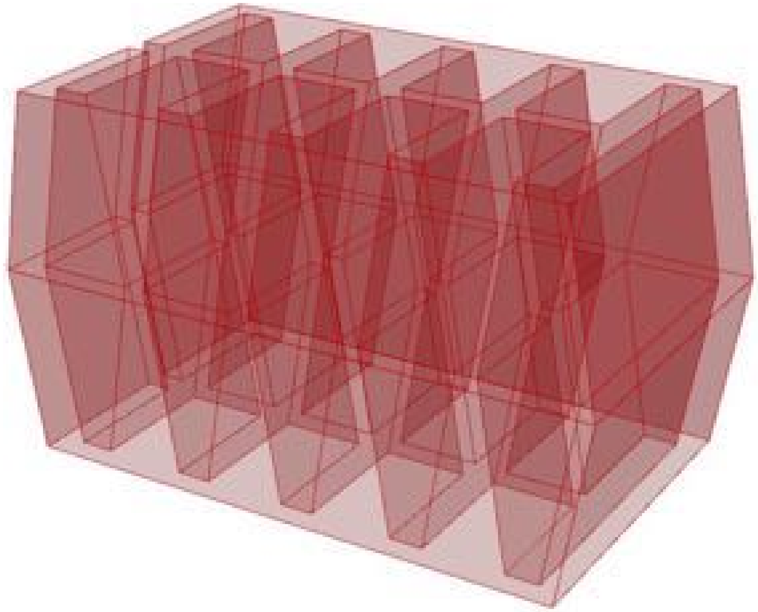


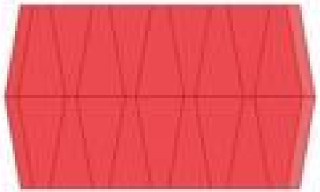


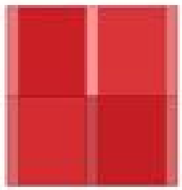
Fully Parametric Honeycomb Module

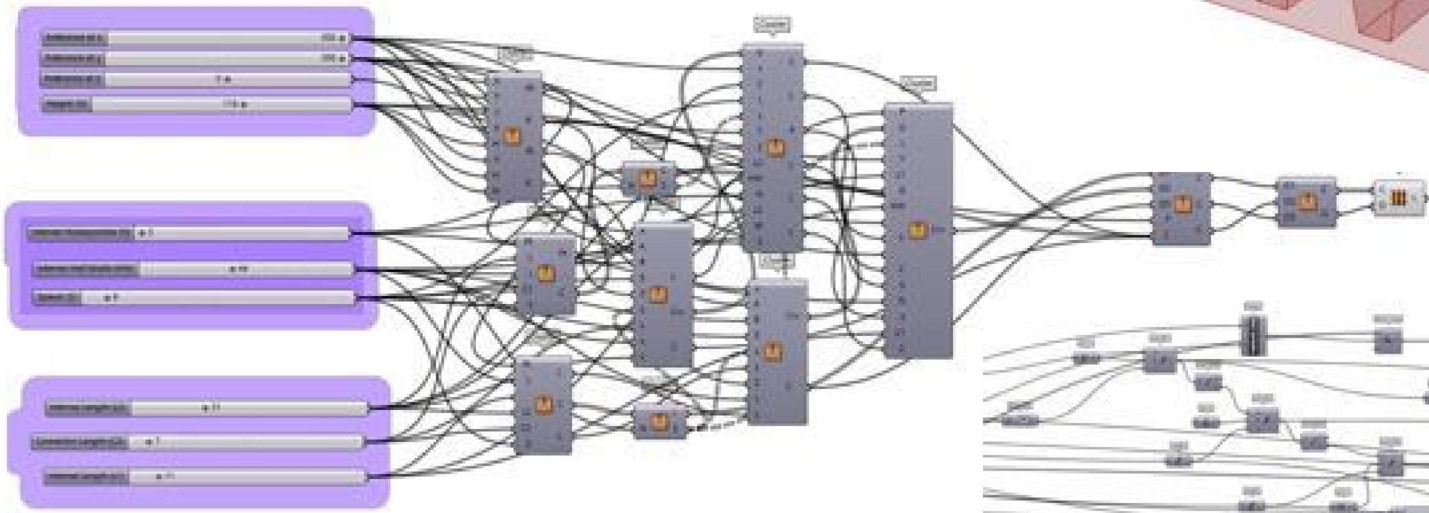


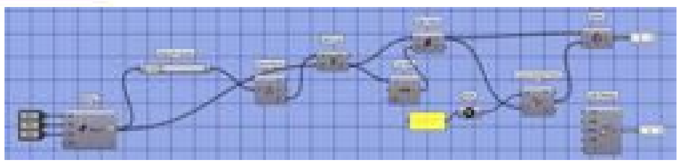
1. Full parametric model
2. Single pass path for 3D printing
3. G-code ready

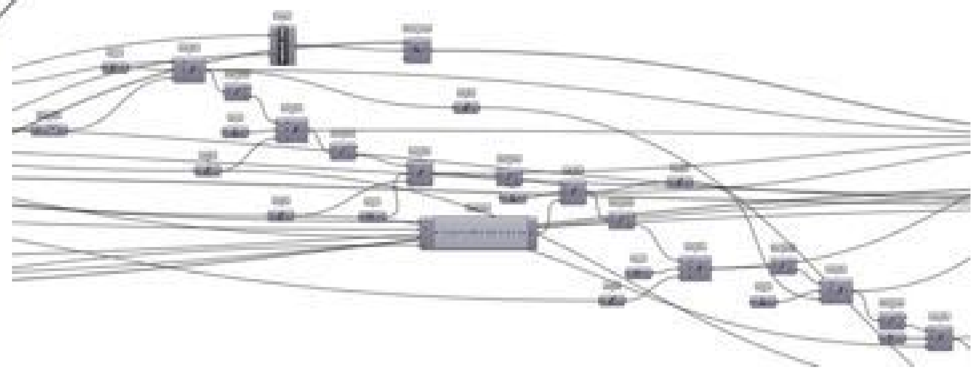




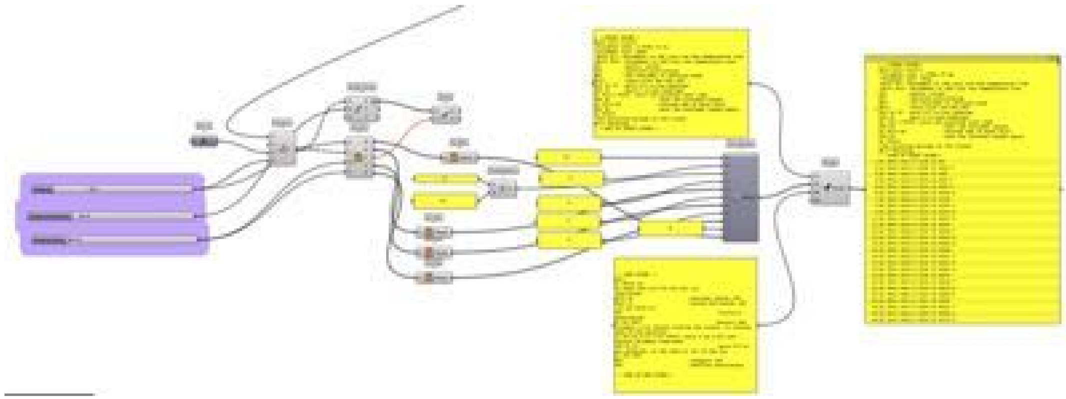


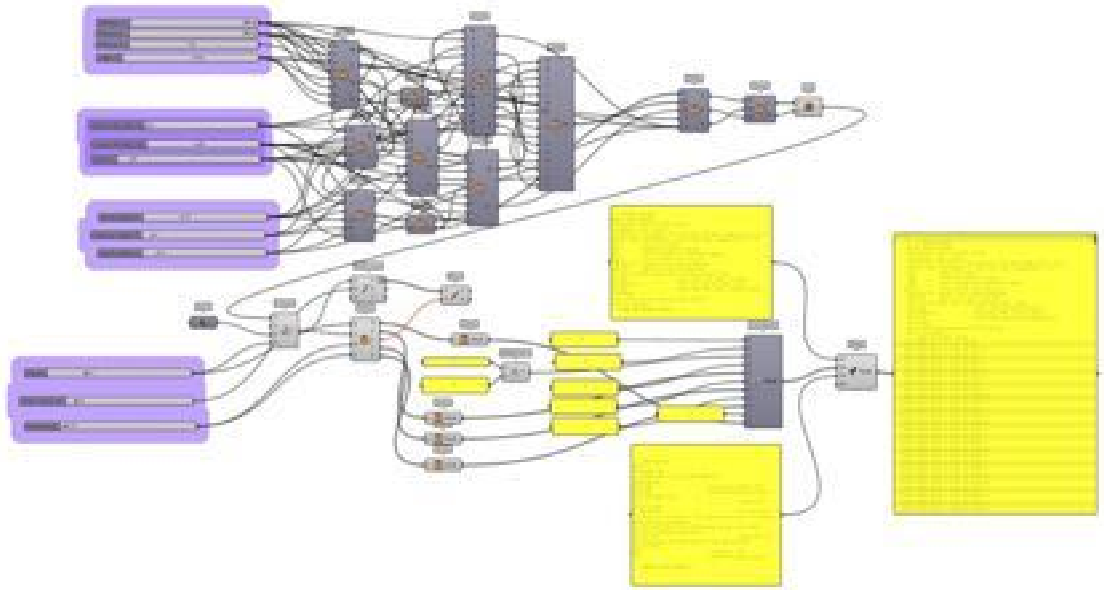


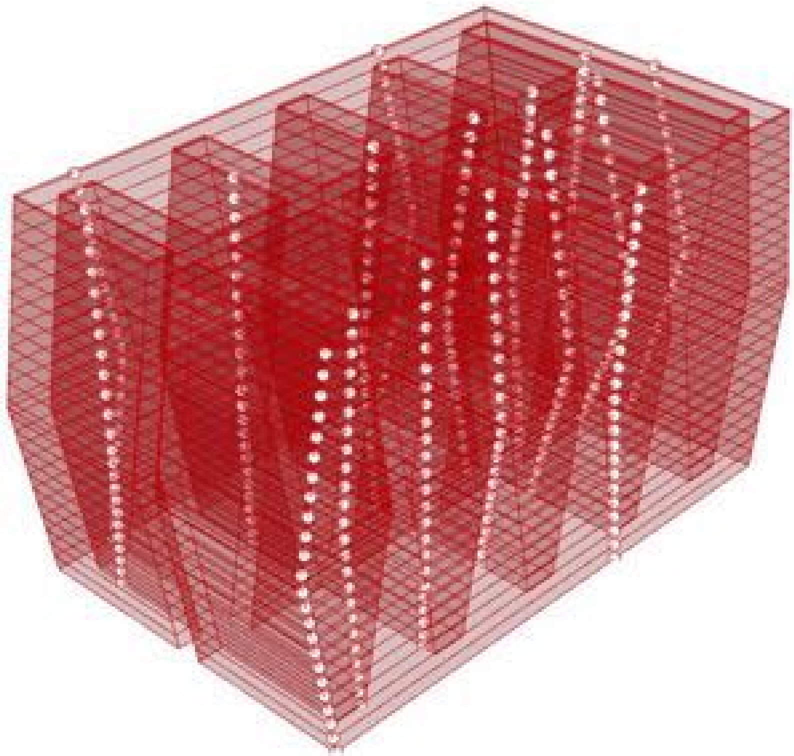


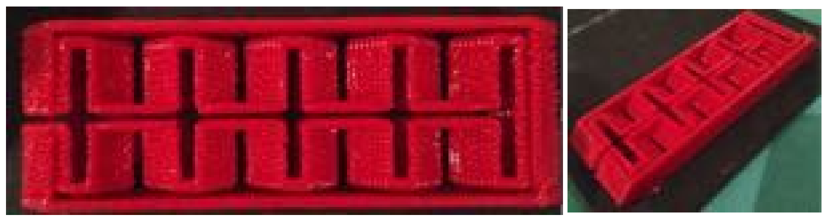


Fully Parametric Honeycomb Module









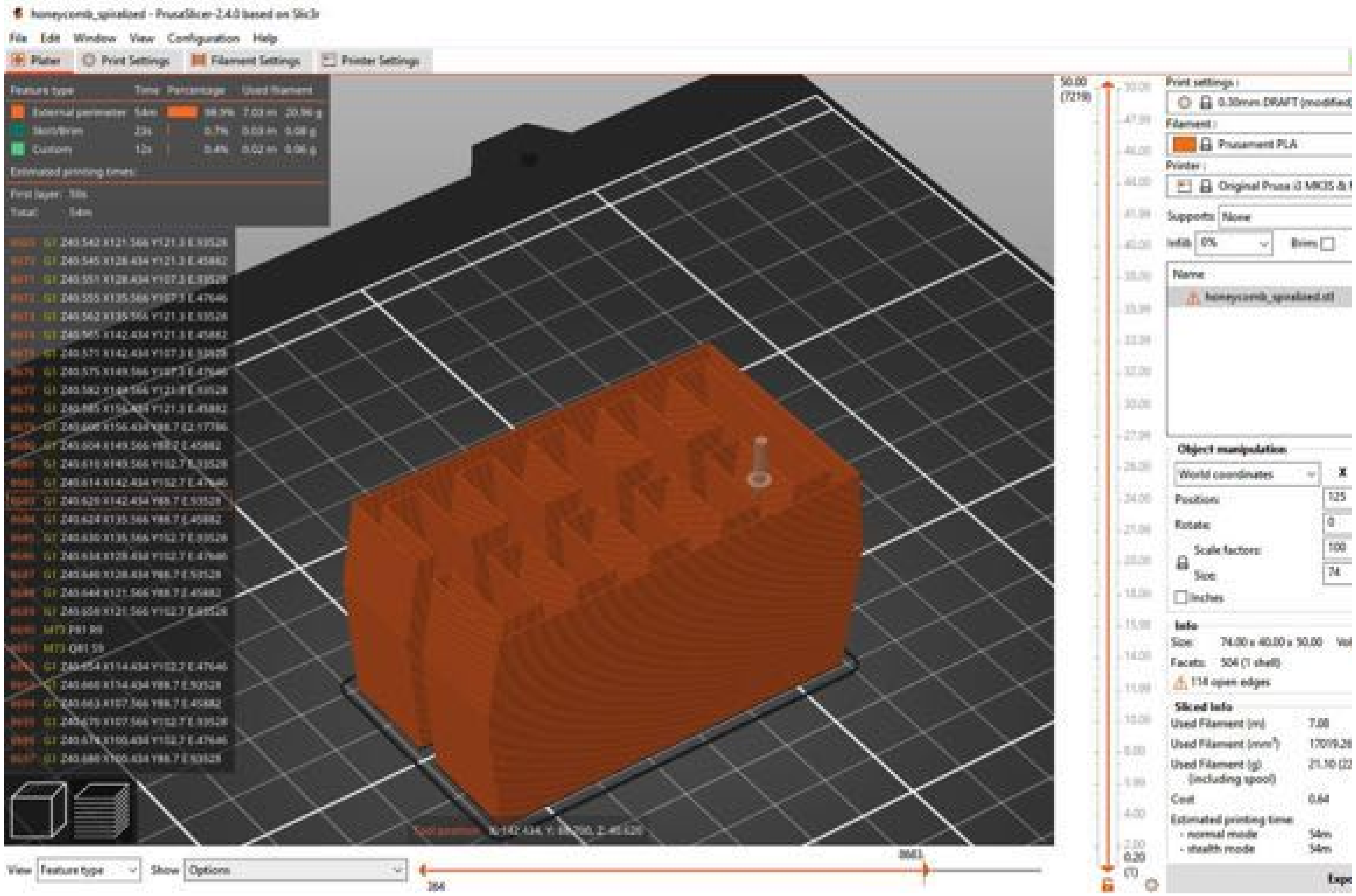
Scaled-down trial prints on a desktop 3D printer

3D Printing Experiments

Prusa Slicer (v.2.4.0)
Nozzle diameter: 0.4 mm
Layer height:
- Min: 0.07 mm
- Max: 0.25 mm

Trial 1
Infill: 0%
Spiral vase: ON
Solid layers:
- Top: 4
- Bottom: 3

Trial 2
Infill: 0%
Spiral vase: ON
Solid layers:
- Top: 0
- Bottom: 0

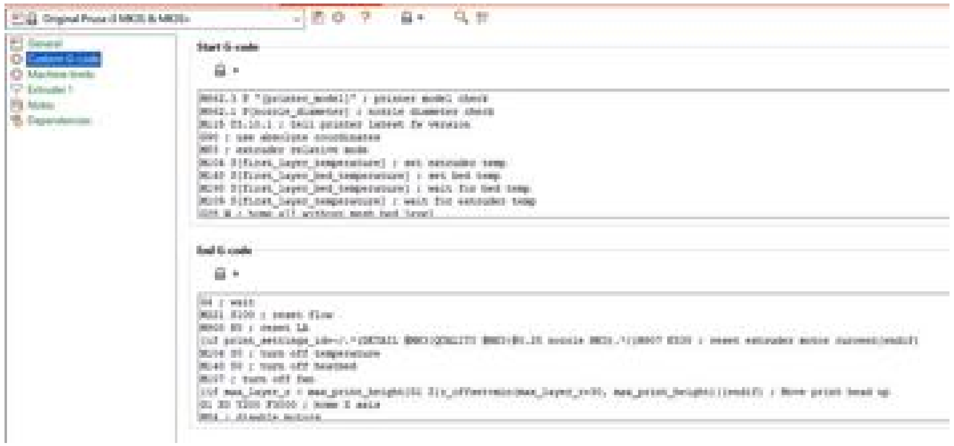


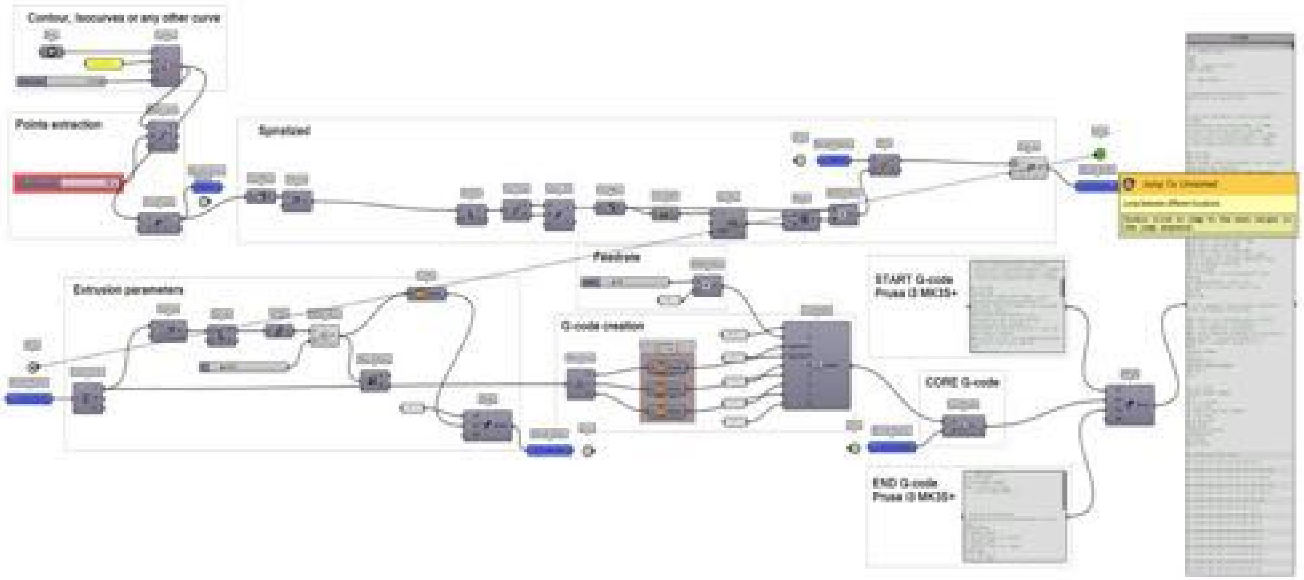
3D Printing Experiments

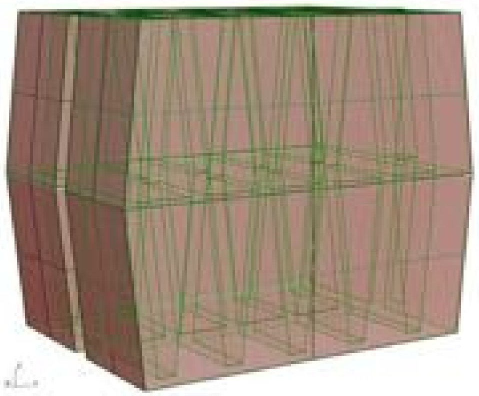
Diegο Spiralizer on Prusa i3 MK3S+
Nozzle diameter: 0.4 mm

Nozzle diameter recommendation:
Layer height should not exceed
80% of nozzle diameter
(80% of 0.4 mm = 0.32 mm)

Trial 3
Layer height used: 0.25 mm
Include Custom G-code settings
Prusa settings uses M83
(i.e. Relative Extruder Mode)
Disable Mass Addition in Spiralizer

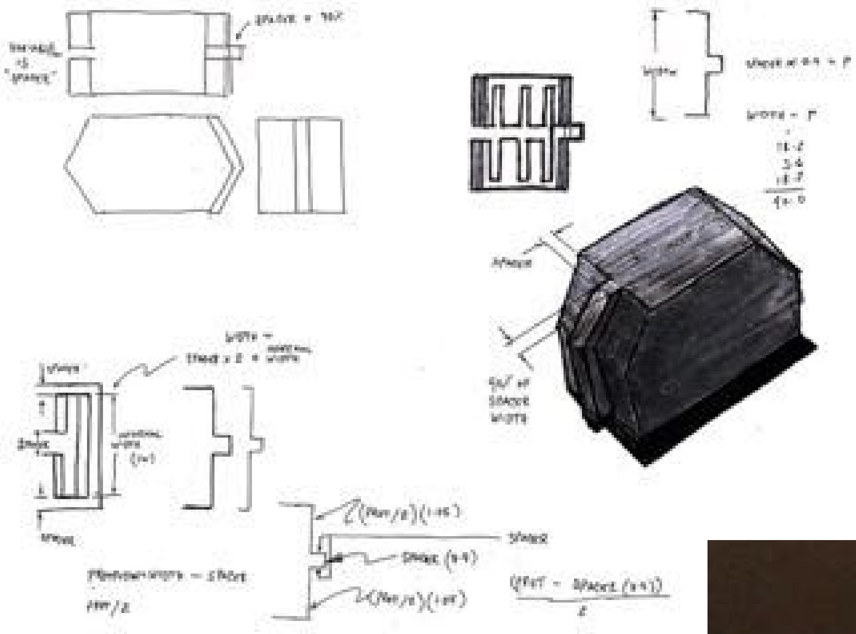


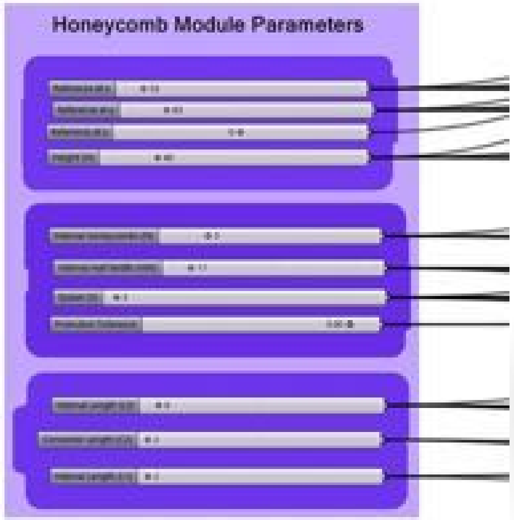


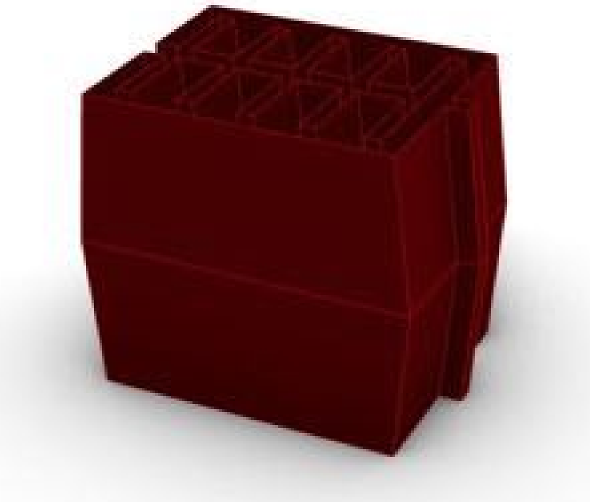


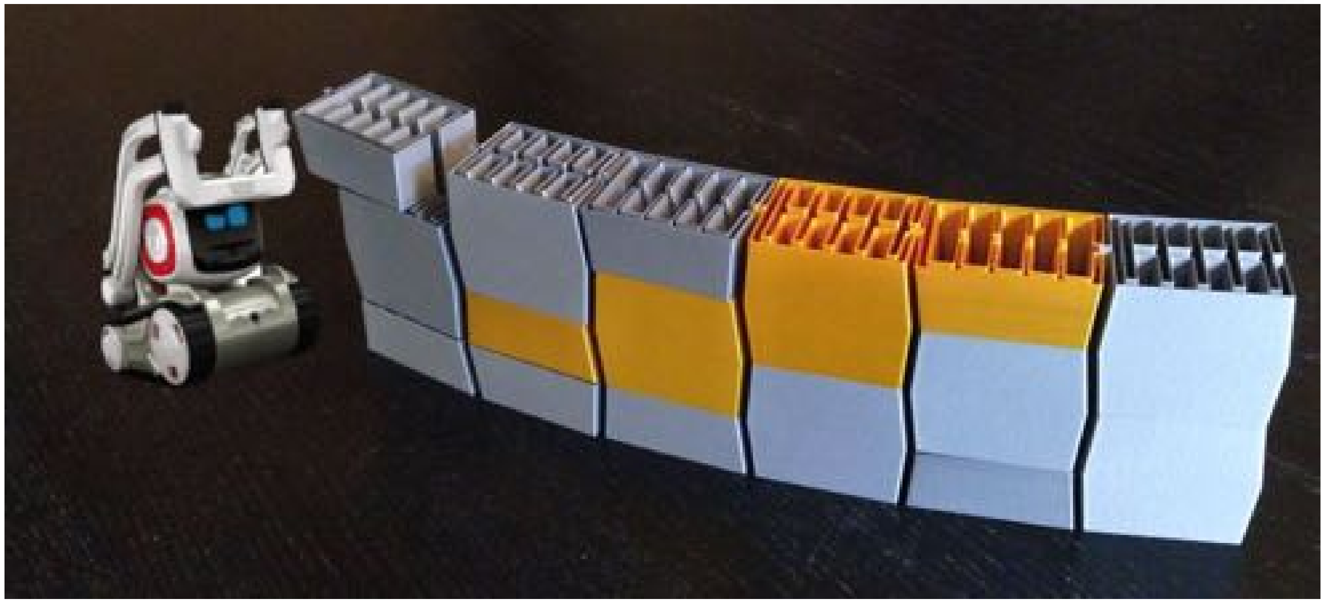
3D Printing Experiments

Revised Honeycomb Module Design









"TO BE DEFINITION"

EDWARD BROWN

M A S T E R _ P A R A M E T R I C _ D E S I G N
XIV Edition. Final Project. Part I
November - January 2021

"TO BE DEFINITION"

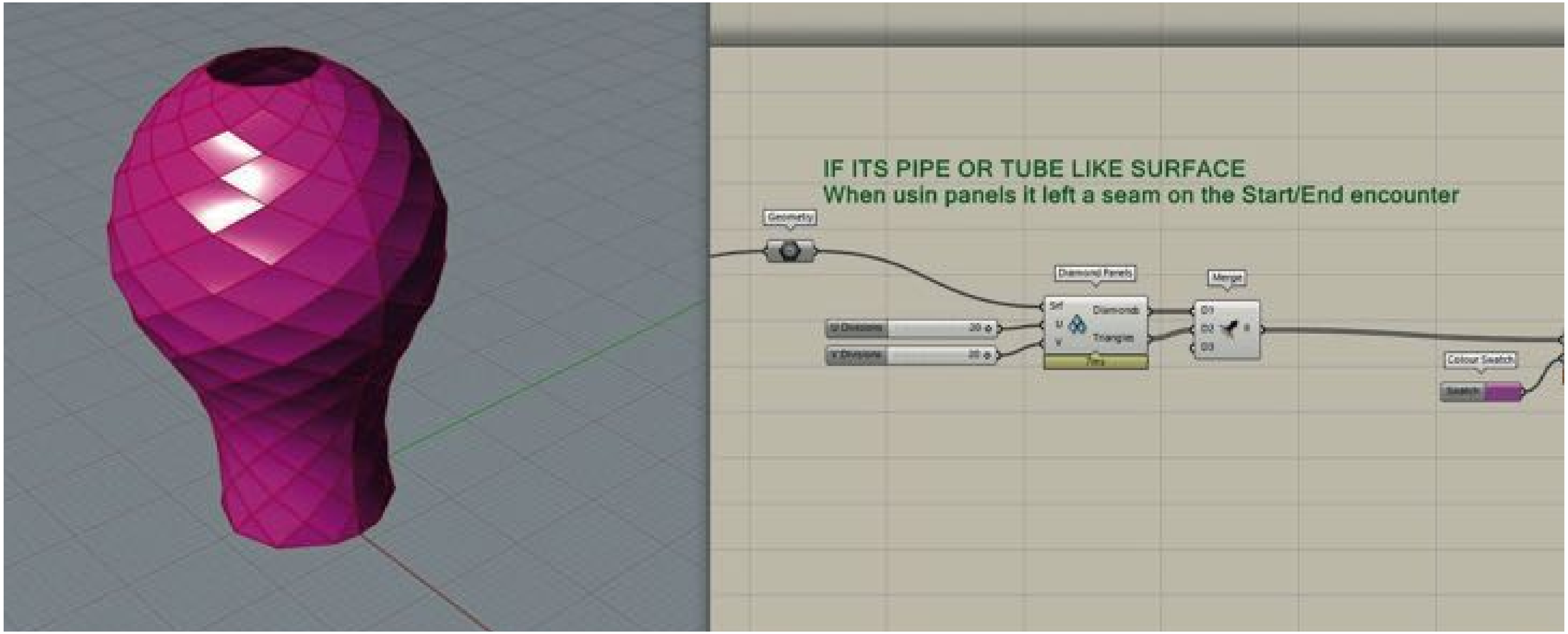
Research about using 3d truss parametric definition/script as part of an organic estetics of a Lamp shade and a parametric definitions open to be used as facades, skins, walls , and in all sort of Visual/ Light permeability situations.

Itroducción

En este ejercicio se busca la utilizacion de las herramientas aprendidas y manejo edl workflow al interior de grasshopper para lograr de forma progresiva y un producto de foramas diferenciadoras con el uso de las herramientas paramétricas como parte de la estética orgánica de una pantalla de lámpara y en miras de dejarla como una definiciones paramétricas abiertas para ser utilizadas como fachadas, skins, muros, y en todo tipo de situaciones de permeabilidad visual/ lumínica.

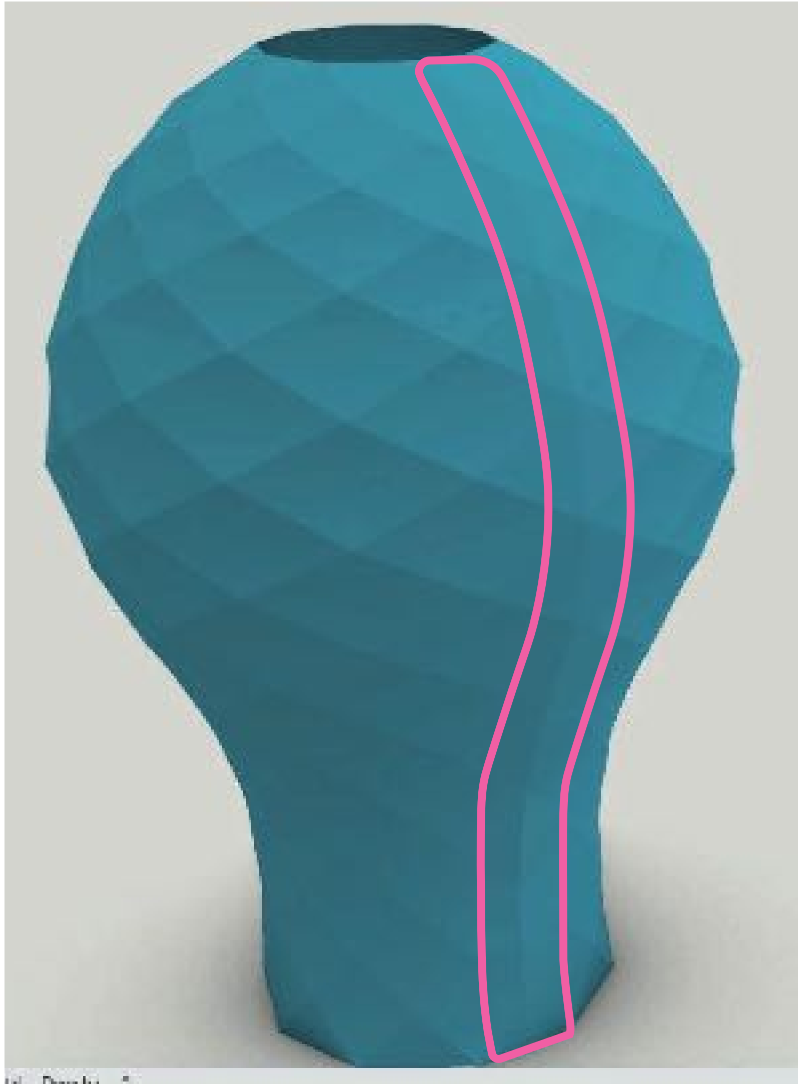
The Process

En inicio se busco el uso de Paneles de Launchbox para genera runa doble piel con estructuras internas.
La idea de usar patrones tipo diamante favorese el uso de diagonales que pueden generar estructuras imprimibles en 3d sin necesidad de soporte



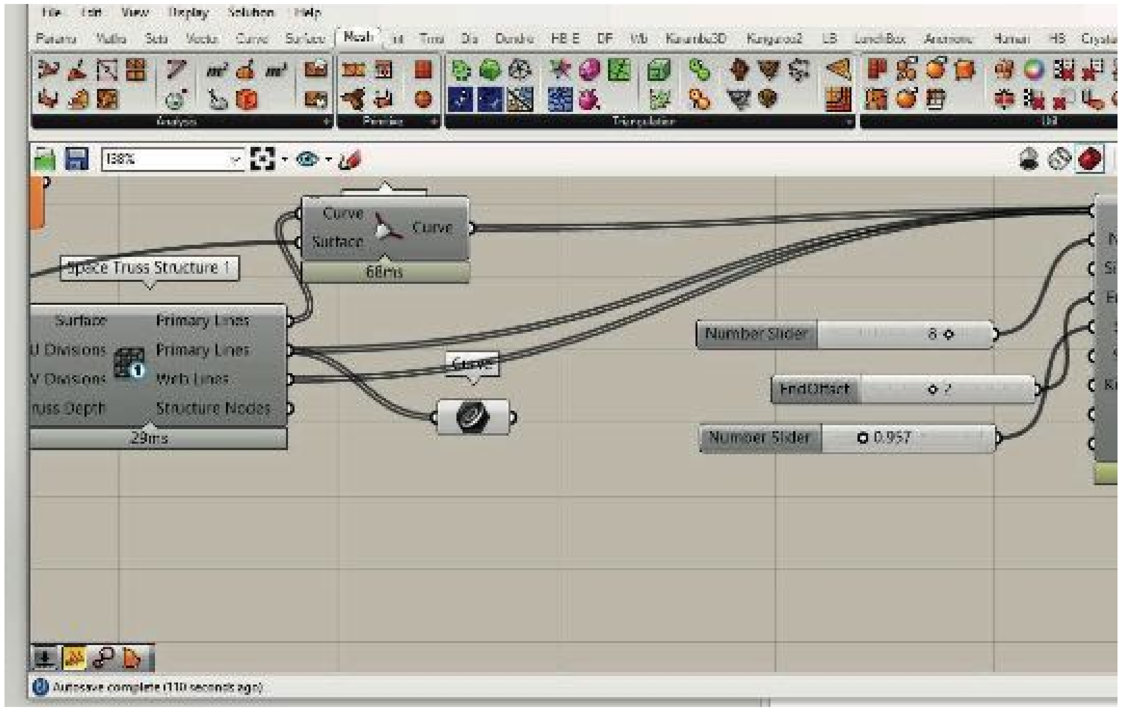
The Process

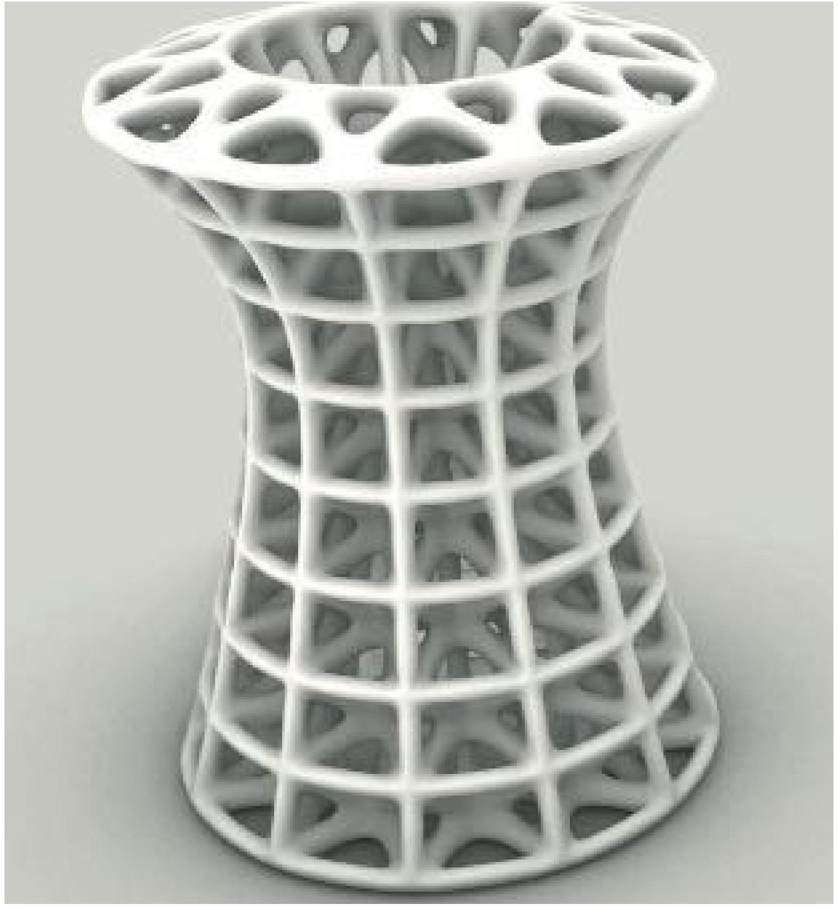
El Uso del componente Panels Diamantes en Launchobox en superficies tipo tubo deja una costura en el inicio y fin de la superficie, restandole la posibilida de uso de patrones y texturas en es zona de la superficie.



The Process

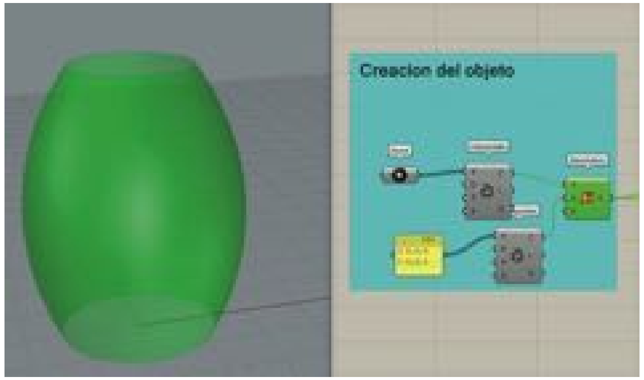
Primer aproach a fue la implementacion de Space truss structue como estructura base para generar las lineas del modelo, lo que dejo en evidencia que la herramienta deja poca capacidad de manipular los datos internos desde los puntos para generar la estructura deseada con uso de diagonales y sin costura en el inicio /fin de la superficie.



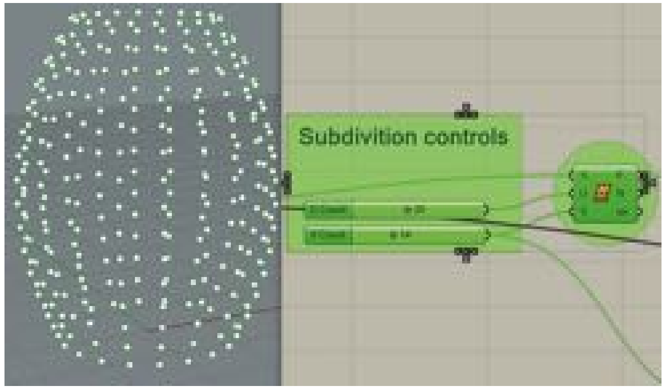


Workflow

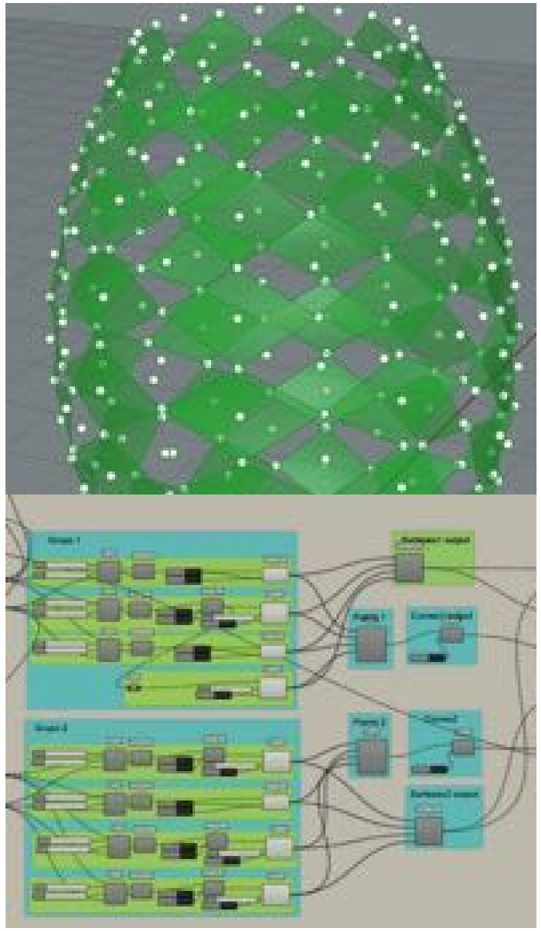
1_ Creacion de la superficie base en Gh para mejor manipulacion del modelo



2_ Subdivición de puntos en la superficie



3_ Generar Grupos de puntos "Quads" Para generar rombos alternados.



Workflow