



LUNGOMARE. Re-Imagined

DESIGN & PARAMETRIC FABRICATION

VII Edition Summer Workshop

3th July - 28 July 2023

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CONCLUSION

Controlmad's hybrid Summer course took place from the 3th to 28th July 2023.

After three weeks of online training in 2D en 3D modelling using Rhinoceros, Grasshopper and several of its plugins, we made a digital design for the final project in order to fabricate them on site.

For the final project we chose to create our own iteration on the design of Escofet called 'Lungo Mare' (1997).

We made two prototypes of this iteration on-site. One in Madrid and one in Dundalk Ireland using digital fabrication tools like a CNC-milling machine, laser cutters and a robot arm.

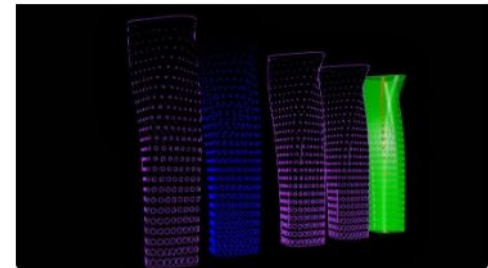
Summer Workshop - PART II - Digital Fabrication Systems

[See Overview](#)[Start Course](#)

Summer Workshop - PART I - Unit 3

[See Overview](#)[Start Course](#)

Summer Workshop - PART I - Units 1 & 2

[See Overview](#)[Resume Course](#)

01. team



Students

- Carl Mc Ateer
- Miguel Santos
- Oscar Diaz
- Henry Welch
- Claudia Garcia San Millán
- Jelica Vukasinovic
- Sumaya Ben Saad
- Jorge Lopes
- Tim Rossi
- Marina van der Lecq

Instructors:

- *Diego García Cuevas*
CEO - Founding Partner | Projects
Manager
- *Sergio Alonso del Campo*
CEO - Founding Partner | Training
Manager
- *Aman Agrawal*
Grasshopper/ Kangaroo Instructor



HENRY WELSH



DIEGO GARCIA CUEVAS
CEO - Founding Partner



ASSAAD AWAD
Guest Examiner- Fashion Designer



CLAUDIA GARCIAS SAN MILLAN



JELICA VUKASINOVIC



SUMAYA BEN SAAD



MARINA VAN DER LEEQ

JORGE LOPEZ



-controlmad



Ag



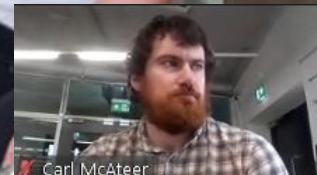
Tim Rossi



Oscar Diaz



Miguel Santos



Carl McAteer



Gonçalo Loureiro

$$f_X(x) = \int_0^1 f_{X,Y}(x, y) dy = K(s) \exp\left(\frac{s}{\log(x)}\right)$$

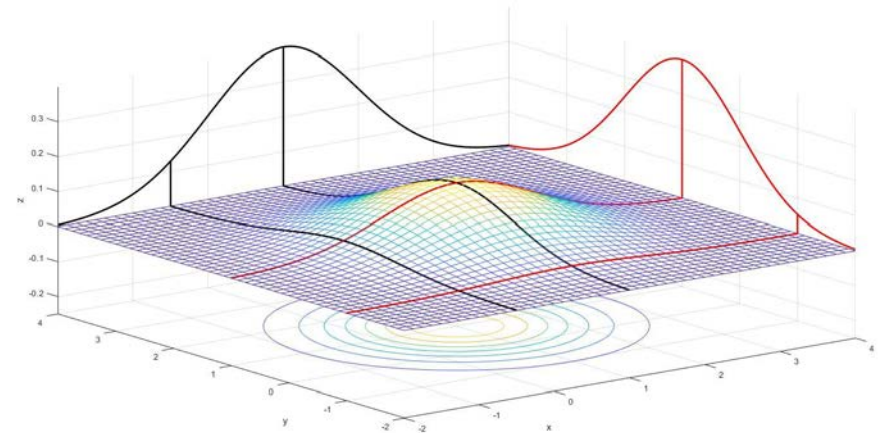
$$f_Y(y) = \int_0^1 f_{X,Y}(x, y) dx = K(s) \exp\left(\frac{s}{\log(y)}\right)$$

-BENCH

What do certain economic models actually tell us? **What parameters are used in graphs such as PPP Purchasing Power Parity, Gini-index and the Lorenz curve?** How do we measure wealth? What is meant by a gap between rich and poor? What does it mean to live below the minimum or just way above it?

Let's talk about it on this **bench, that will be placed in public space**. Perhaps we can make sense of the absurdity of these economic models or learn about income inequality. **Take a seat on the spot that represents your economic position. Are you comfortable?**

This bench state a data visualization of the PPP-graph. Our hope is to start a good conversation about the gap between rich and poor. Just as Lungomare has multiple benches. **So we would like multiple benches that stand for the different countries in the world.**



Source: *analytic multivariate Lorenz surfaces*. (n.d.). Mathematics Stack Exchange.

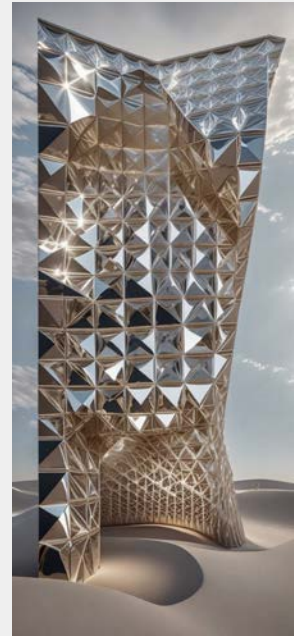
<https://math.stackexchange.com/questions/4264242/analytic-multivariate-lorenz-surfaces>

A SCULPTURAL DESERT HARMONY PAVILION - Mirage Oasis

Nestled amidst the vast expanse of the arid desert, the "Oasis of Reflection" stands tall as an awe-inspiring sculptural pavilion, radiating an aura of wonder and harmony. As visitors approach, they are drawn to the mesmerizing interplay of light and form, beckoning them to step into a realm where the stark desert and the luminous pavilion coexist in perfect harmony.

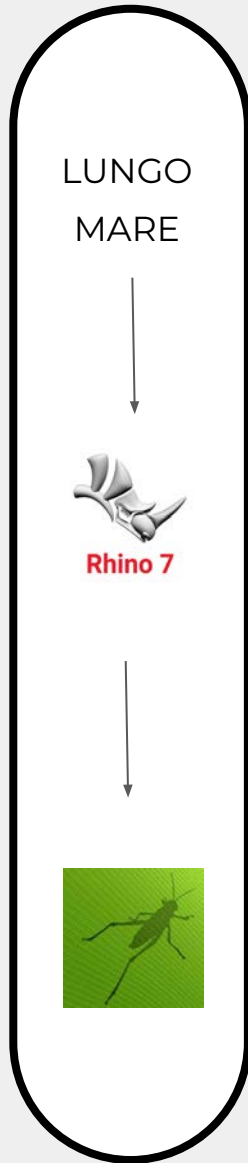
Form and Function: The pavilion's design is an ingenious play on triangular geometry, where each facet interacts with the other, forming a unified whole that symbolizes the interconnectedness of all life forms in the desert ecosystem. The triangulated mirrors, strategically positioned, capture the sunlight at various angles, creating a striking visual dance of light and shadow throughout the day. These reflective surfaces serve a multiple purpose: to mirror the awe-inspiring natural landscape, to collect solar energy, and provide cooling shade within the pavilion.

A Symbol of Untouched Nature: The Oasis of Reflection serves as a powerful symbol of untouched nature amidst an ever-changing world.



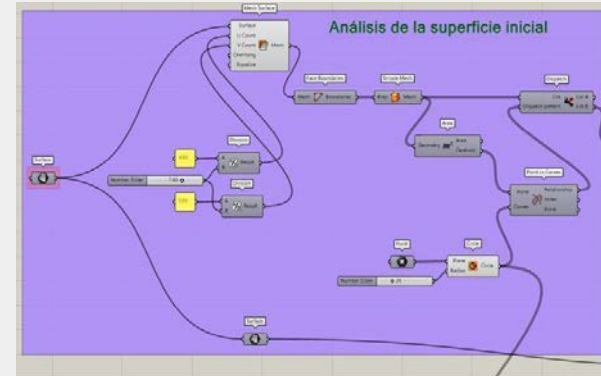
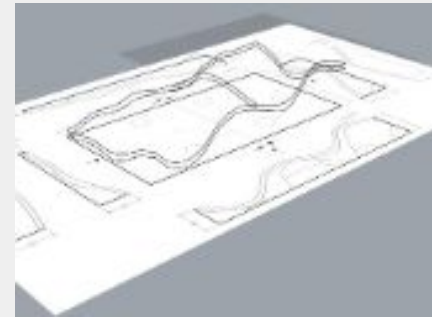
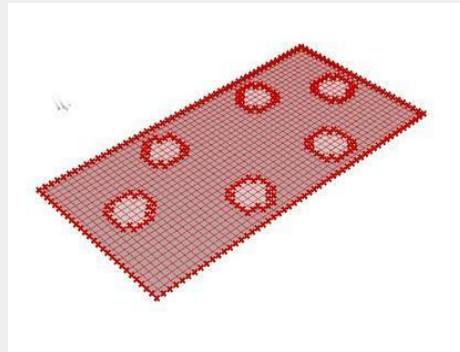
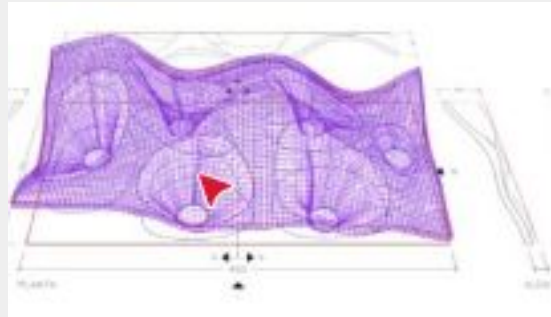
FORM-FINDING Ai GENERATED - DEEP DREAM GENERATOR

03. process: 3D-modeling



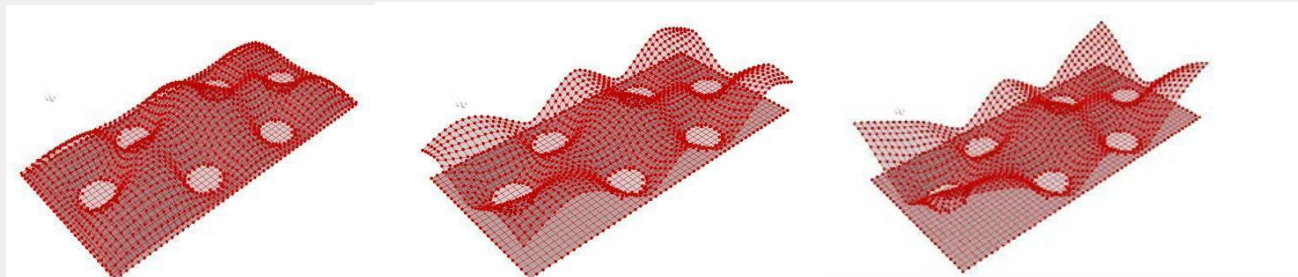
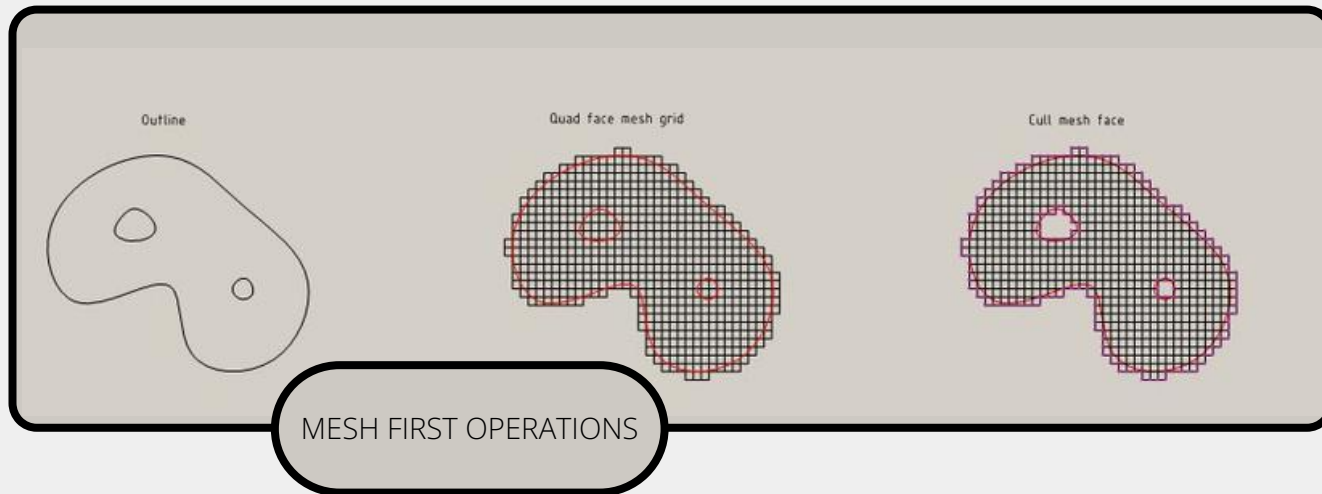
FROM NON PARAMETRIC TO PARAMETRIC

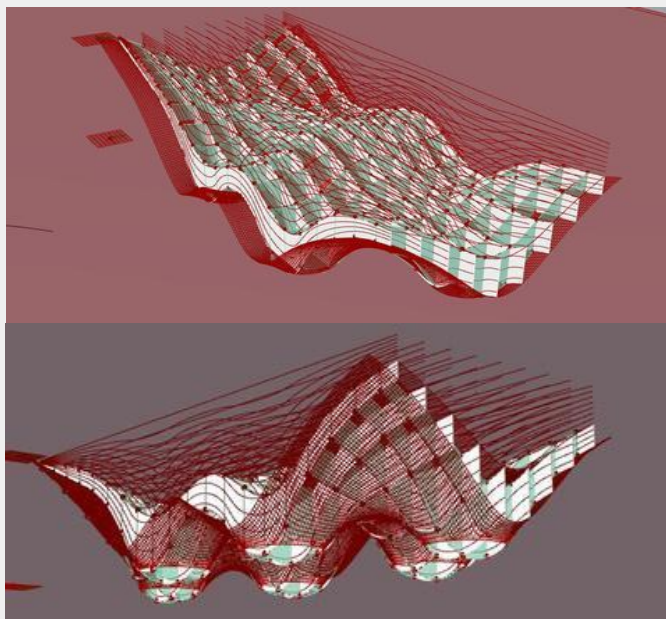
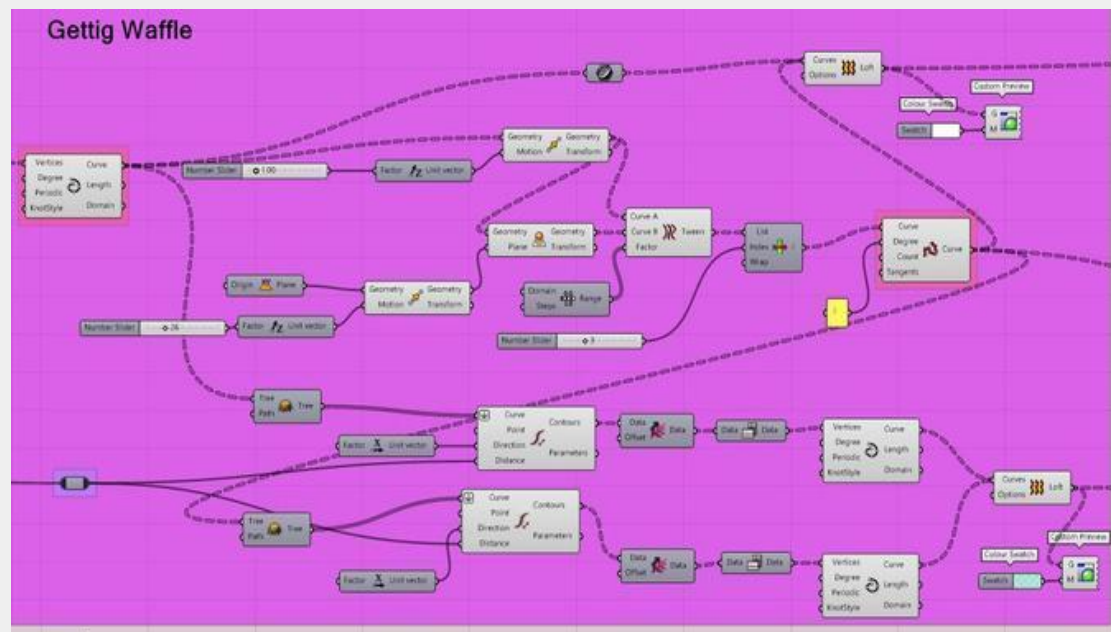
A 2D-drawing of one of the Lungomare's bench converted into a 3D model using Rhinoceros. To parametrize the model, the bench was re-created using Grasshopper.



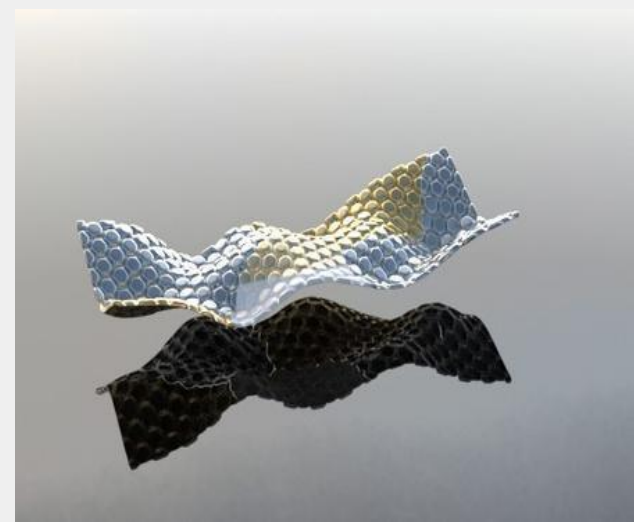
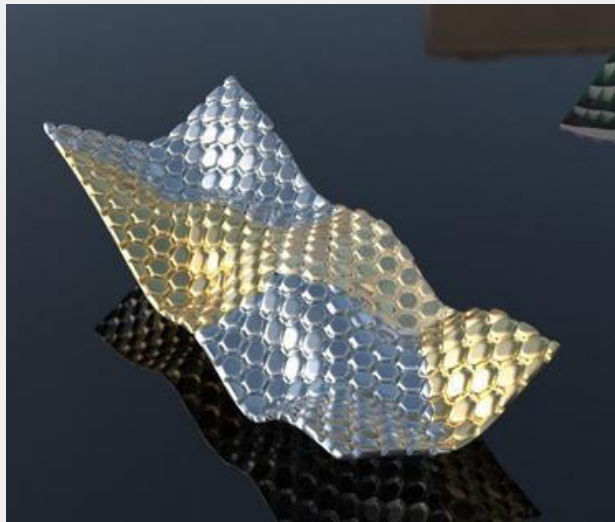
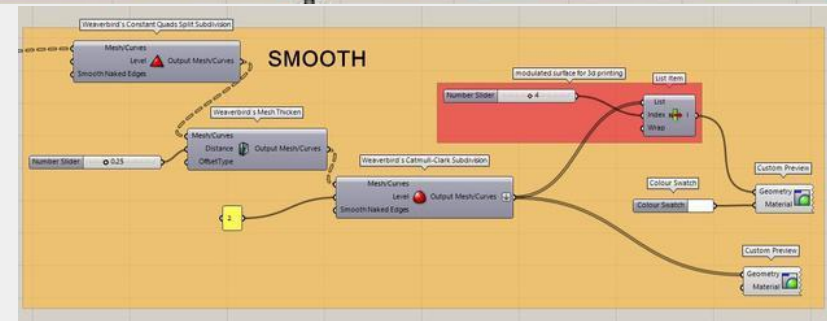
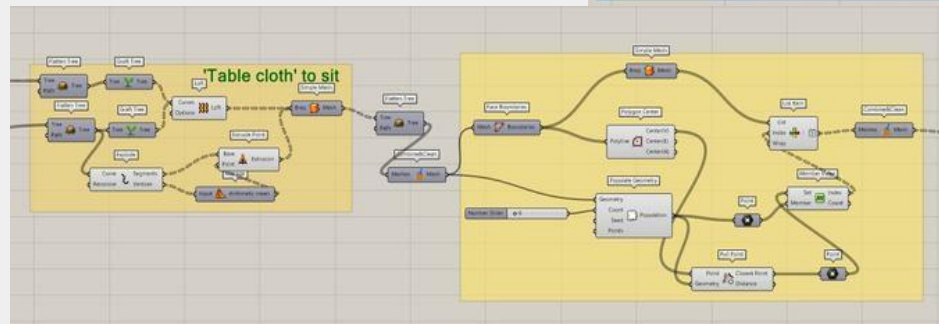
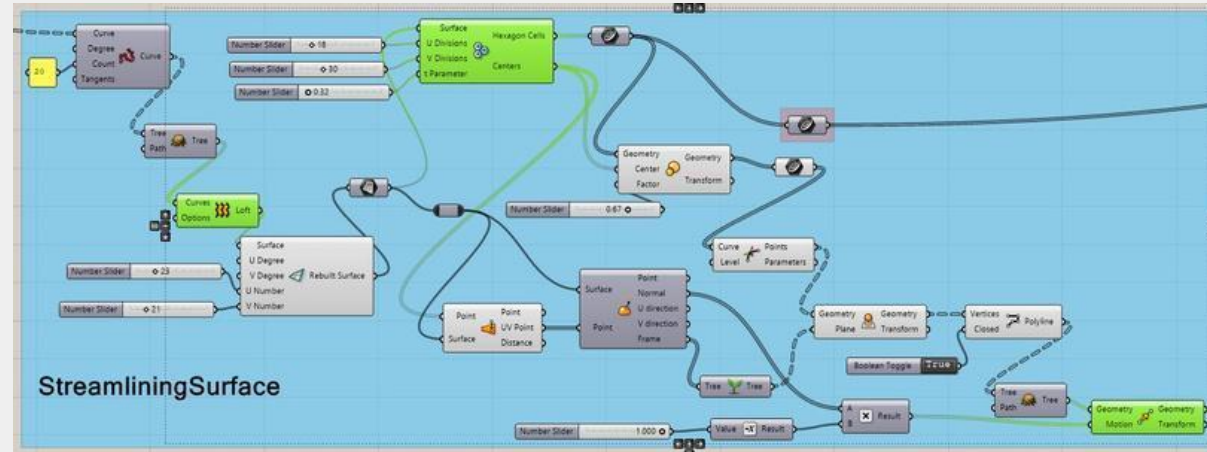
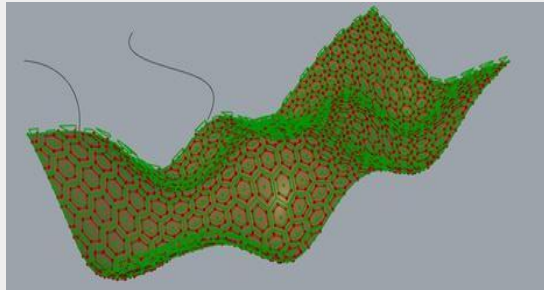
LUNGO MARE'S INTERPRETATION SIMULATED BY GRASSHOPPER'S PLUGIN: 'KANGAROO'.

Form Finding: the Kangaroo plug-in is a live physics engine for Grasshopper. The Kangaroo solver library and set of components are used for shape finding, physics simulation and geometric constraint solving.



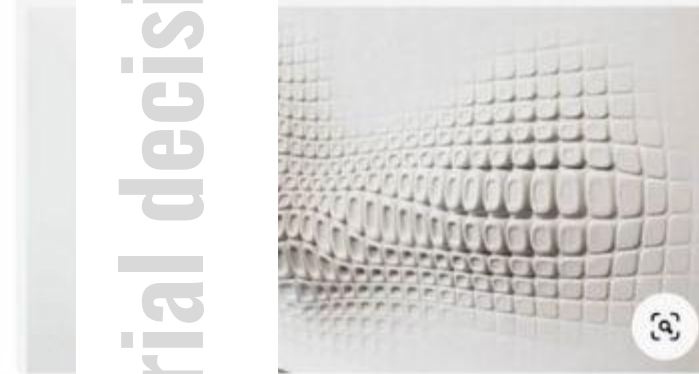
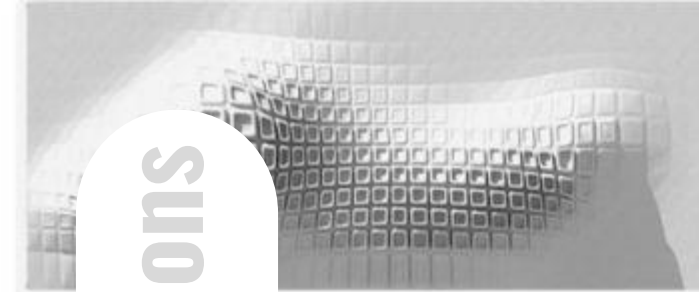
[illegible]

DEFINING THE INITIAL SKIN

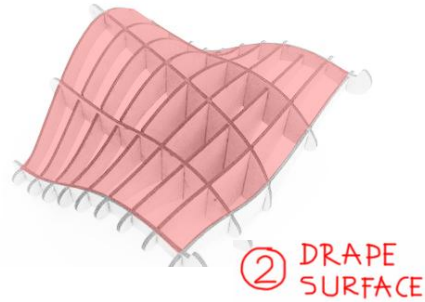


03. process: material decisions

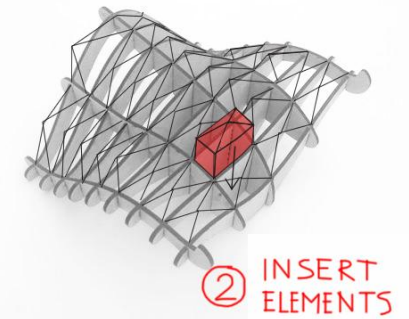
INSPIRATION FOR CONSTRUCTION
AND SKIN



FURTHER STUDIES OF SECOND LAYER ON TOP
OF PLYWOOD WAFFLE STRUCTURE



OR



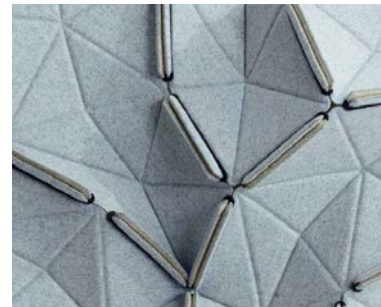
SECONDARY SKIN INITIAL PROPOSALS



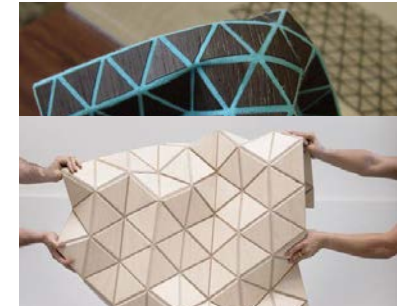
1. TRIANGULATED ORIGAMI
FOLDABLE SURFACE



2. STRETCHED FABRIC +
POLYURETHANE



3. FOLDABLE FELT
TRIANGULATES



4. WOOD TRIANGLES ON A
FABRIC BASE



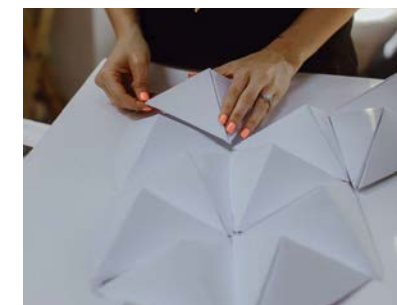
5. PLANTING FLOWERS
-WAFLE AS A PLANTER



6. CORK ZIP TIES

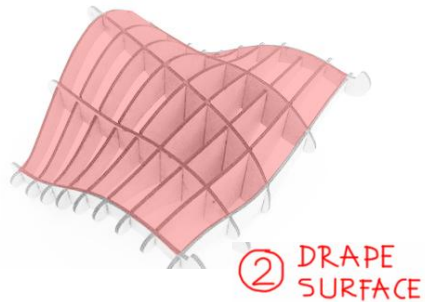


7. INSERTED POLYSTYRENE
FOAM PYRAMIDES
CUT BY ROBOT

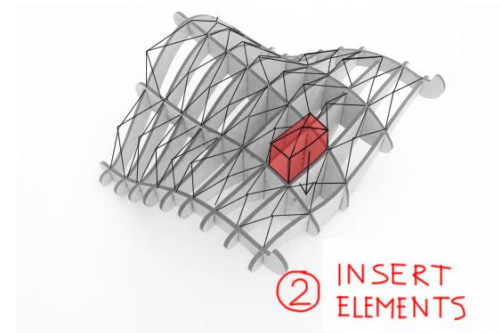


8. INDIVIDUAL INSERTED
PAPER FOLDED PYRAMIDES

SELECTED & TESTED SKIN PROPOSALS



IRELAND TEAM

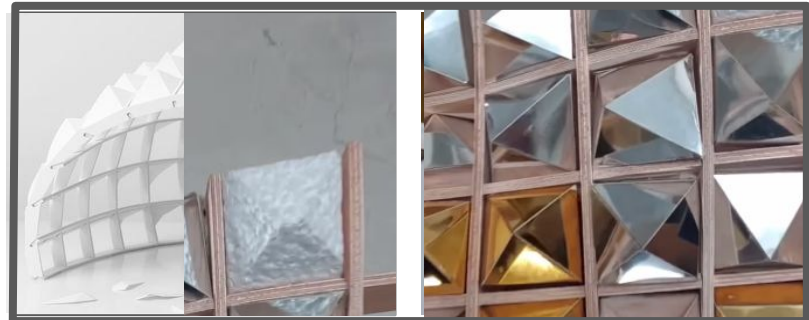


SPAIN TEAM



STRETCHED FABRIC

WEAVED GSM PAPER

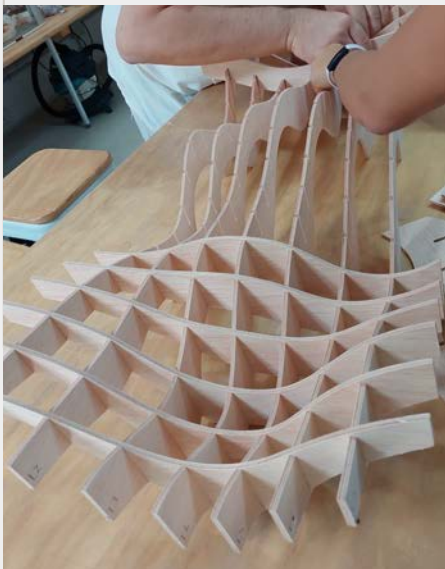


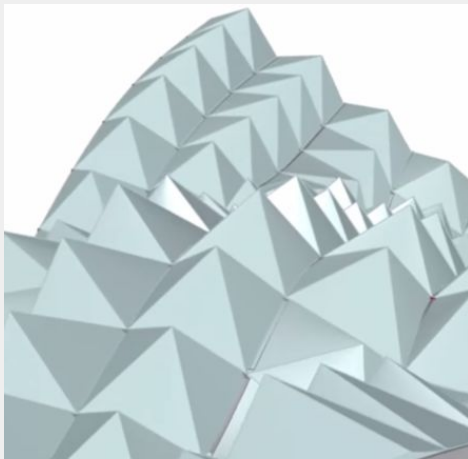
7. INSERTED POLYSTYRENE
FOAM PYRAMIDES
CUT BY ROBOT

8. INDIVIDUAL INSERTED
PAPER FOLDED PYRAMIDES

03. Process: fabrication milling

CNC MILLING & ASSEMBLING THE PLYWOOD WAFFLE STRUCTURE

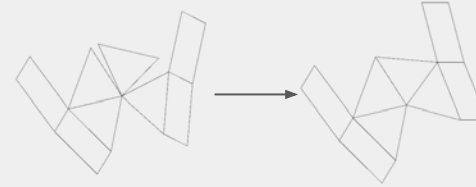




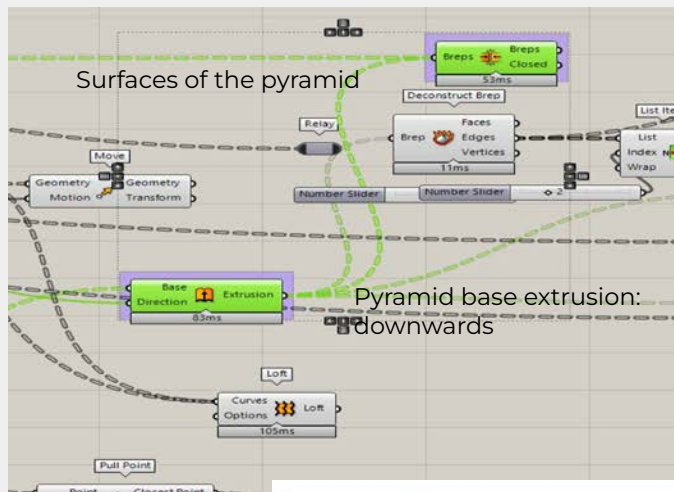
DEFINING THE PYRAMID DESIGN

Defining a planar base instead of curved to ease the process of assembly

Doubly net:
difficult to
construct



Planar net:
Relatively easier as
there are less disjointed
edges



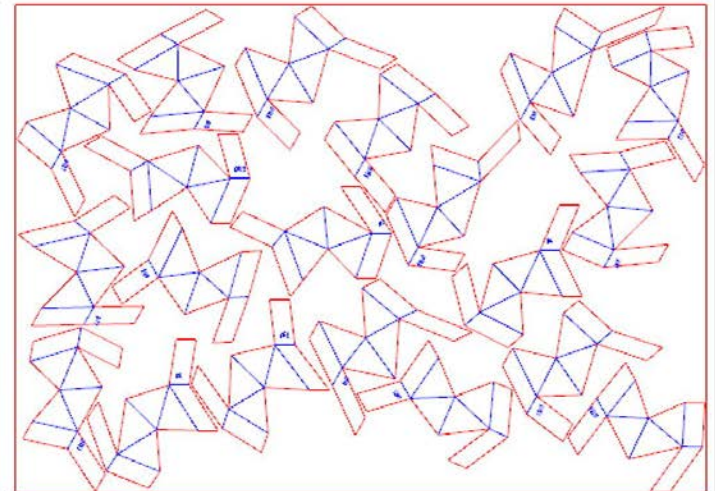
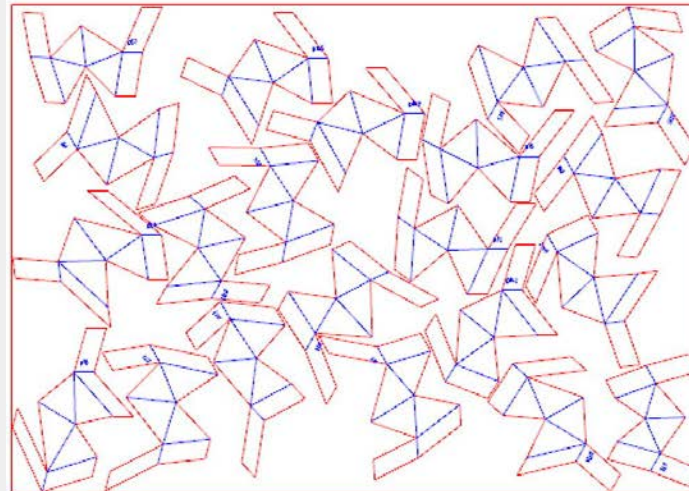
Laser instructions:



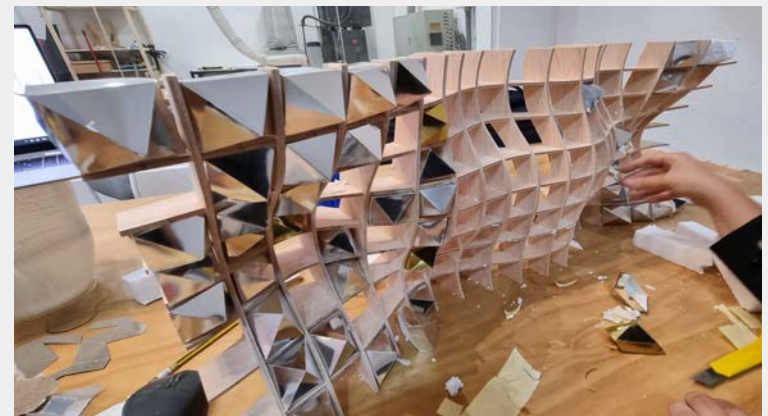
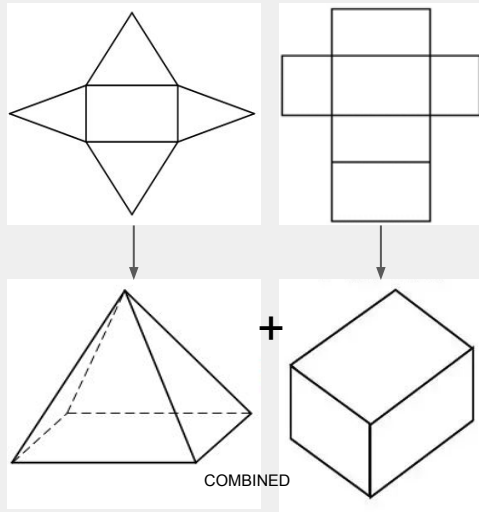
Red: cut



Blue: engrave

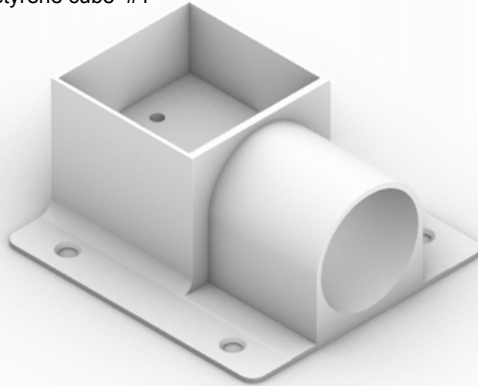


NESTING, LASER CUTTING & PYRAMIDES ASSEMBLY

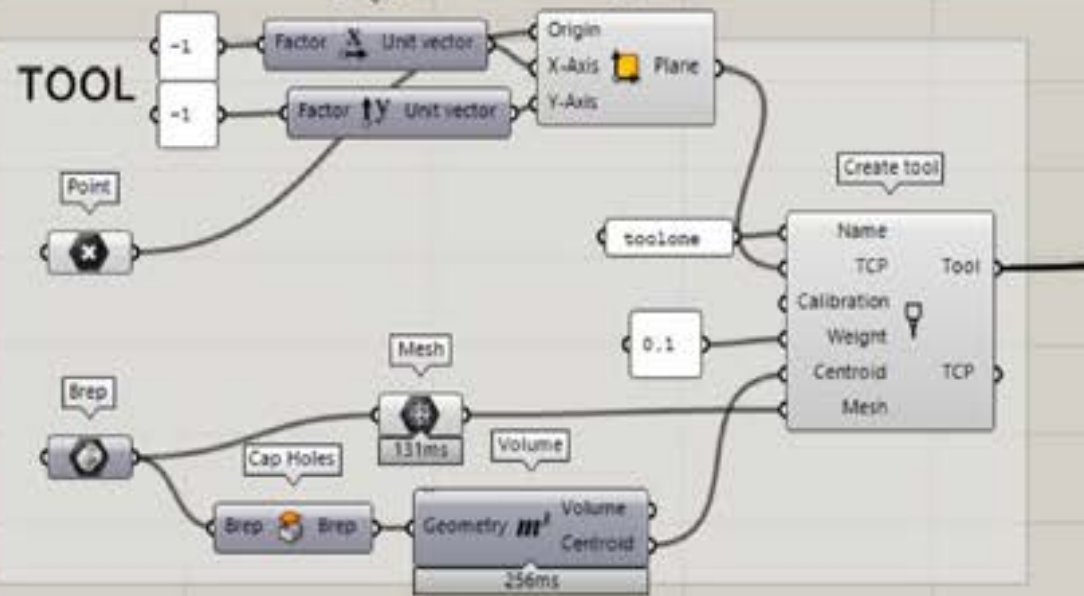
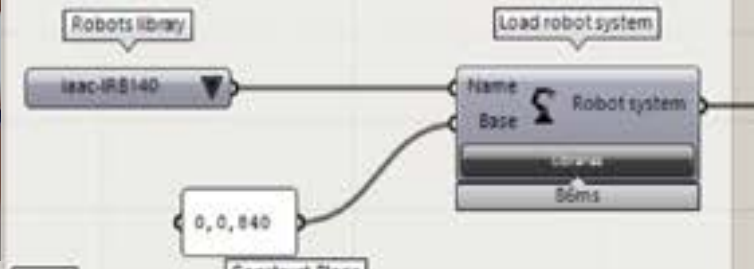


3D-PRINTING THE HOLDERS FOR POLYSTYRENE CUTTING

3D printed holder for the polystyrene cube #1



ROBOT: ABB IRB-140

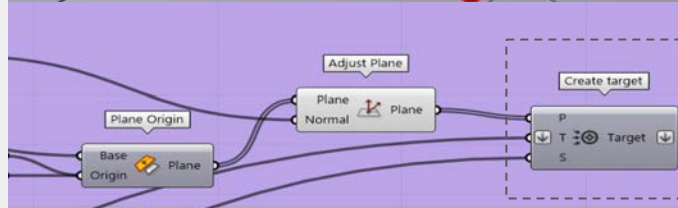
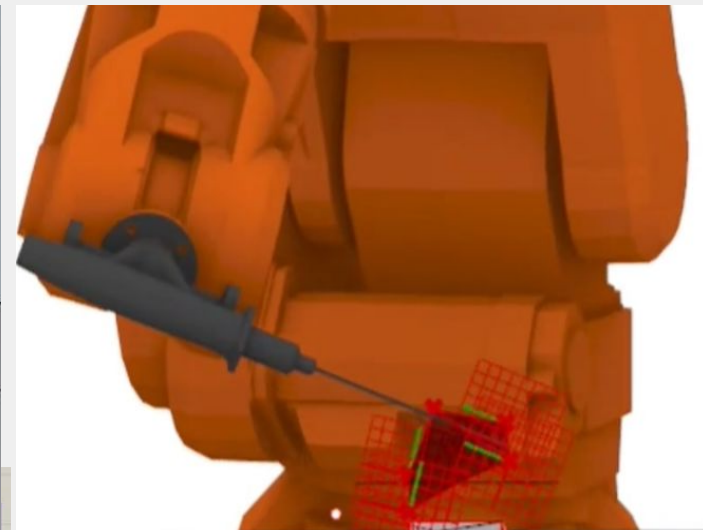
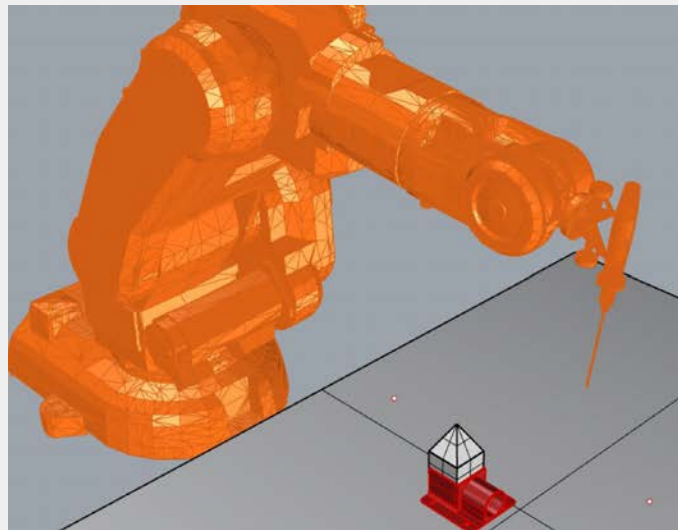
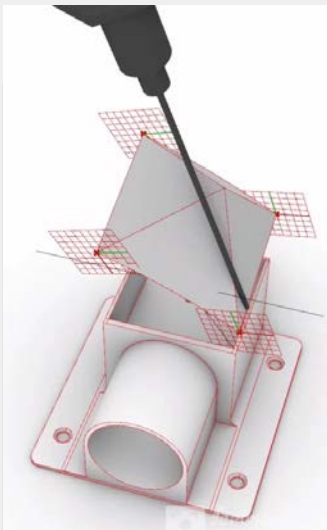


3D-printed Holder for the polystyrene cutter #2



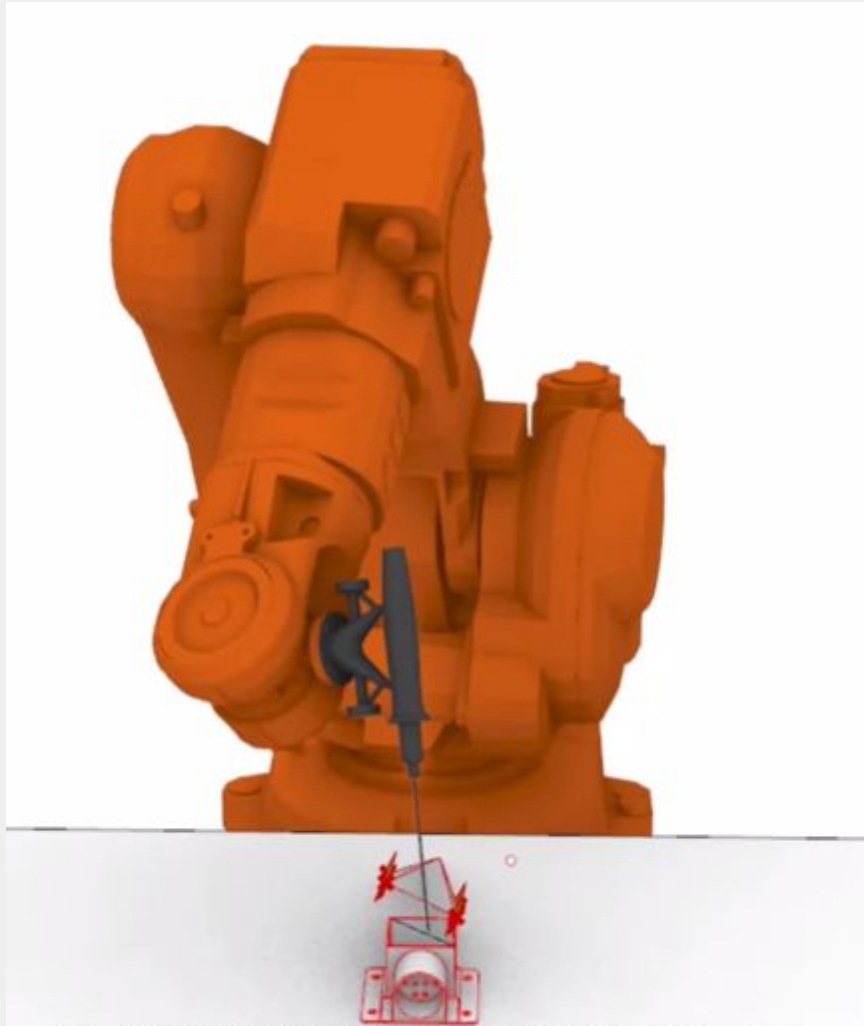
DEFINING THE ROBOT TARGET PLANES

04. fabrication. robot

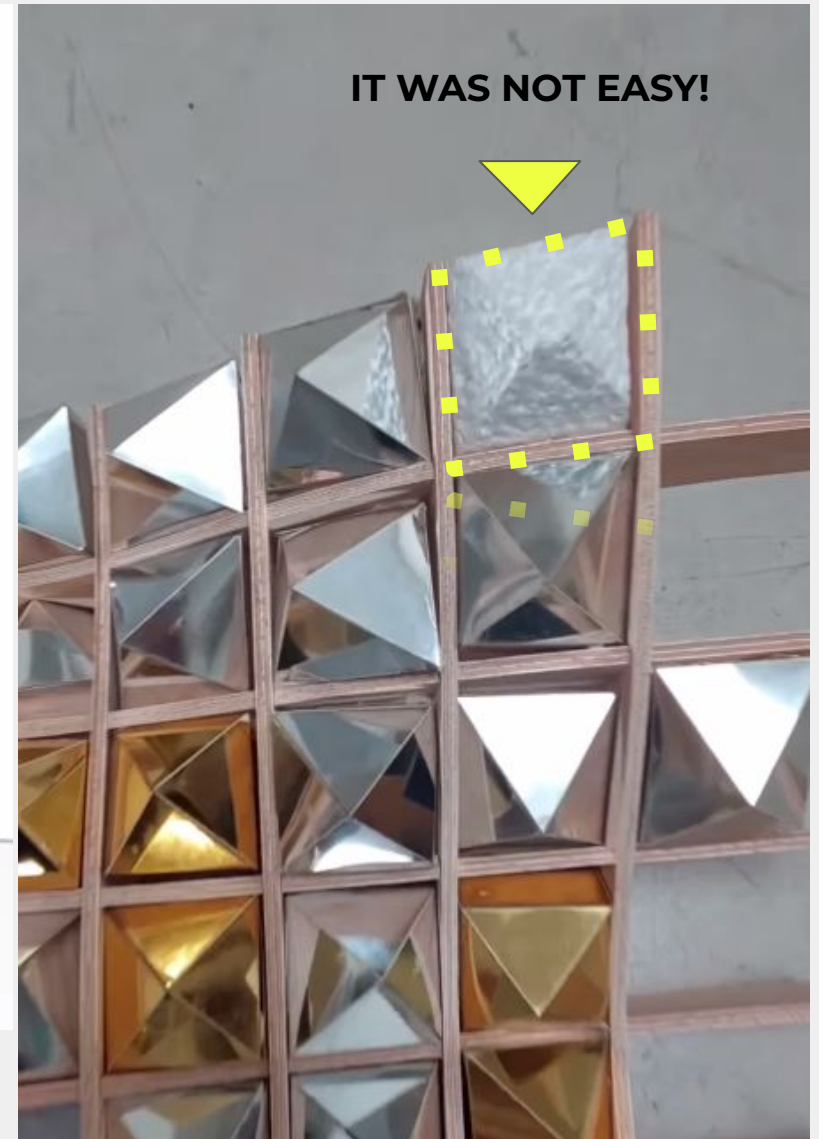


CUTTING POLYSTYRENE PYRAMIDES

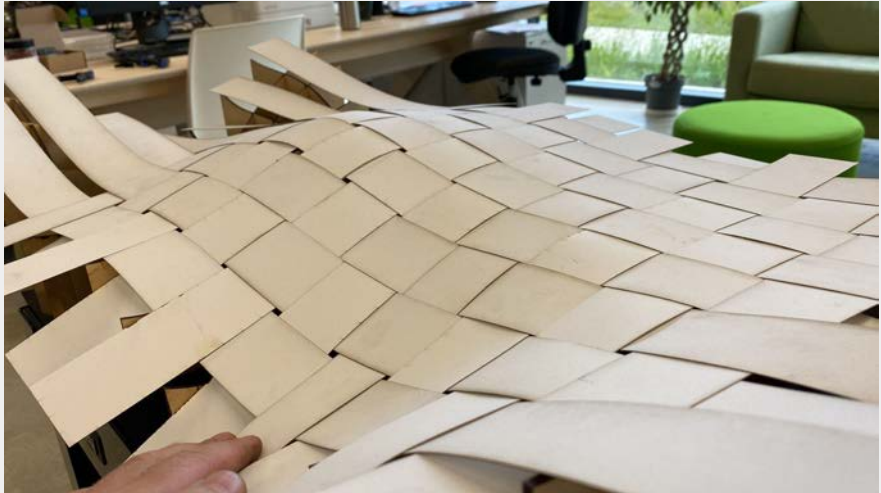
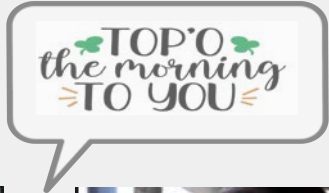
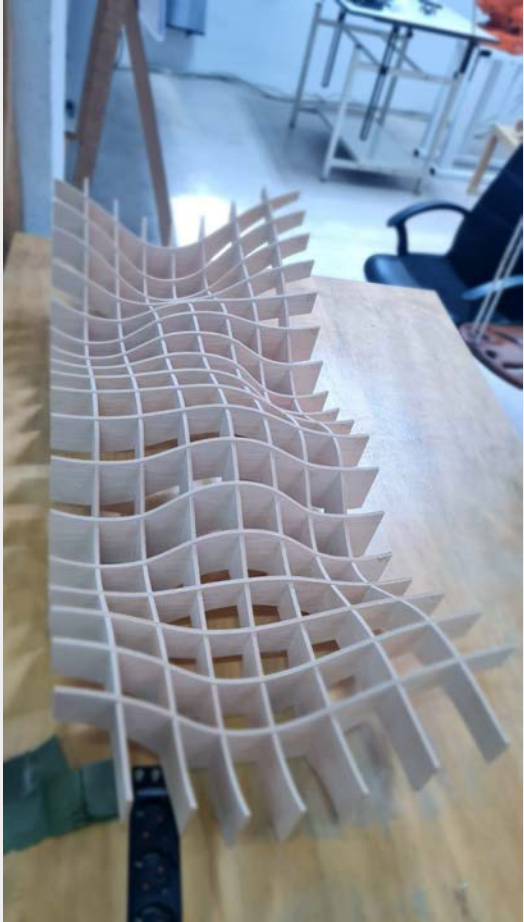
04. fabrication. robot



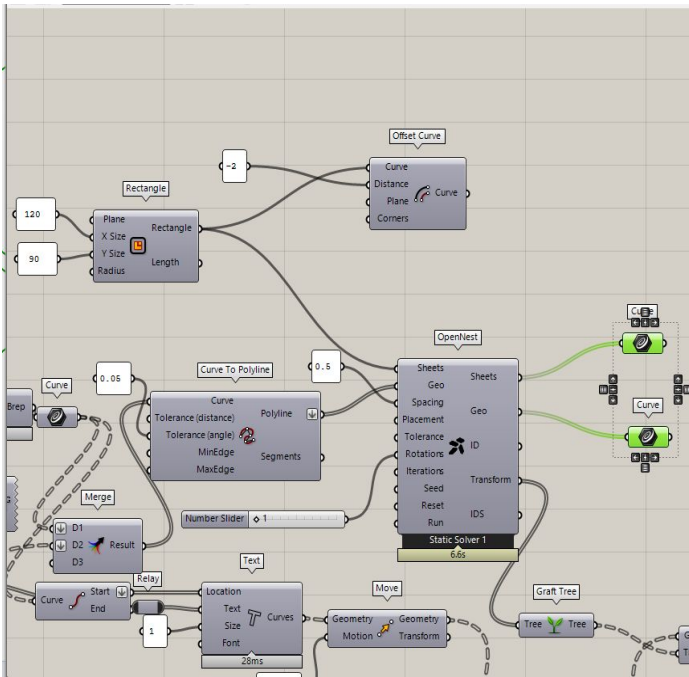
WHY DID WE PRODUCE ONLY ONE
POLYSTYRENE PYRAMID?



05. irish counterpart



IRELAND TEAM FABRICATION - WAFFLE



1. Nesting the original design
to fit 1200x900mm

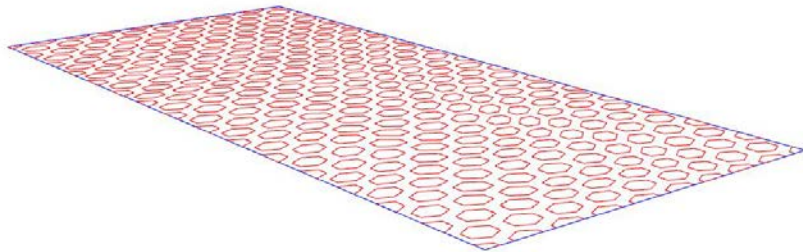
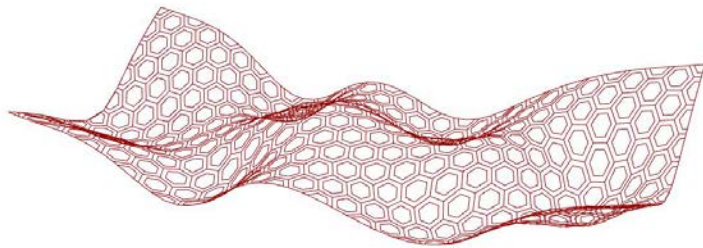


2. Laser cut waffle
with CO2 laser in
3mm MDF



3. Laser cut waffle with
CO2 laser

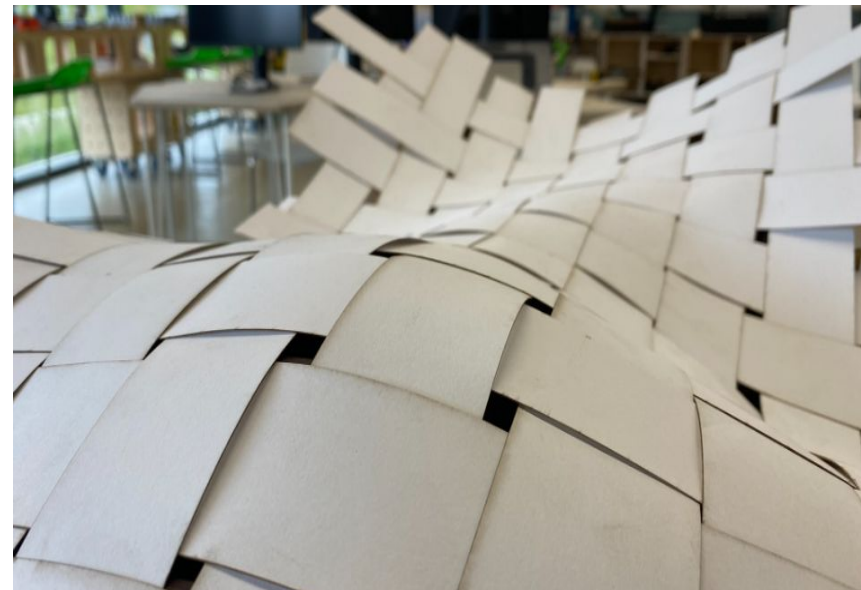
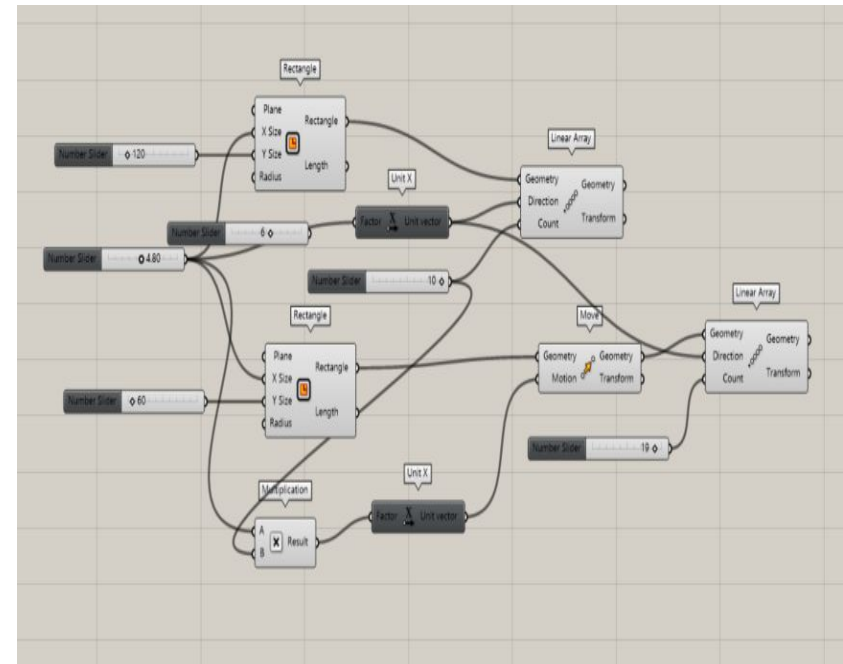
IRELAND TEAM FABRICATION - DEFINING THE SKIN



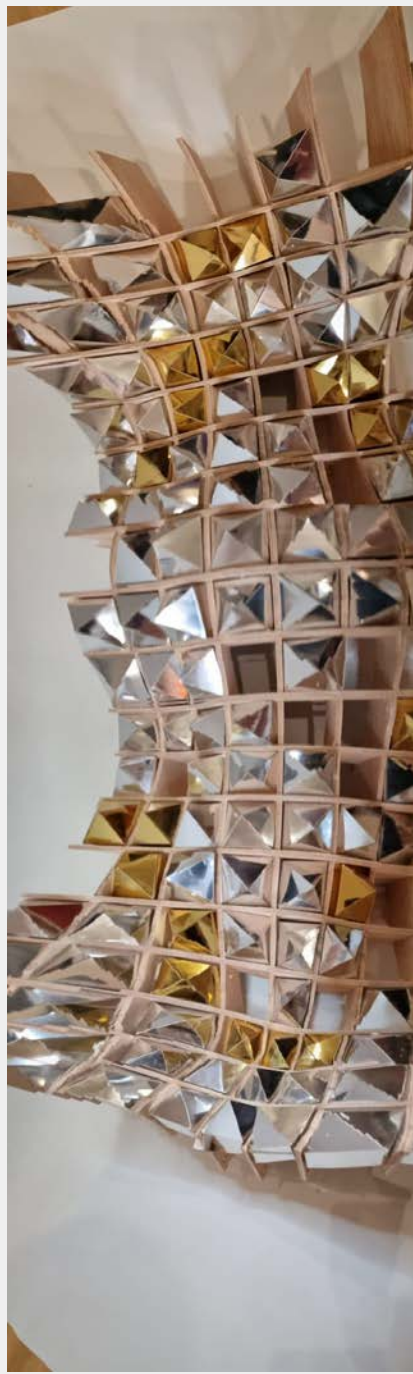
IRELAND TEAM FABRICATION - WEAVED SKIN

For the skin of the structure we chose to use a weave. This way we were able to accommodate the double curvature of the surface.

The strips were cut on the laser with using heavy GSM paper.



06. final result



LOOKING BACK...

CNC PROCESS

- Double checking material thickness and Initial Test fit to ensure adequate tolerances is essential to get the model assembly right.
- The design of the joints can be tricky and requires trial and error.



LASER PROCESS

- Assembly process is time consuming
- Origami implies manual work



ROBOT PROCESS

- Programming robot was needs a lot of expertise, however it is rewarding
- Selection of material for heat cutting is tricky to ensure final product looks great
- Robot is not easy to control as other more used machines, it needs more expertise



CONCLUSION THINGS TO LEARN

- To spend more time on preparation and ensure fully resolved parametric model, prepared for digital fabrication to save time in the final assembly
- To have a strong concept to connect the design
- To stay together as a team and organise ourselves better
- To use design as means to inspire us more meaningfully





VII Edition Summer Workshop

DESIGN & PARAMETRIC FABRICATION

3TH JULY - 28 JULY 2023



MUCHAS GRACIAS!!

