Museo Soumaya

Institute for advanced architecture of Catalonia

Jorge Mauricio Casian Espejel

MUSEO SOUMAYA

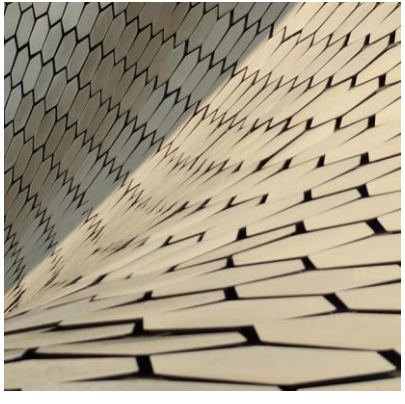
Fernando Romero FR-EE

Type: Cultural
Location: Mexico City, Mexico
Year: 2010

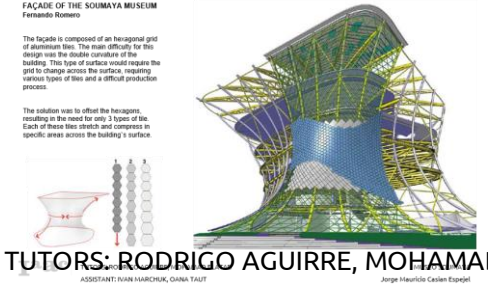
Museo Soumaya is home to a private art collection of nearly 70,000 works, ranging from the 15th to mid-20th Century.

Rising 150 feet (46 mts) at the heart of a new cultural and commercial district, the building's form is clad in a skin of 16,000 hexagonal mirrored-steel elements, refering the traditional, colonial ceramic-tiled building façades in Mexico City.







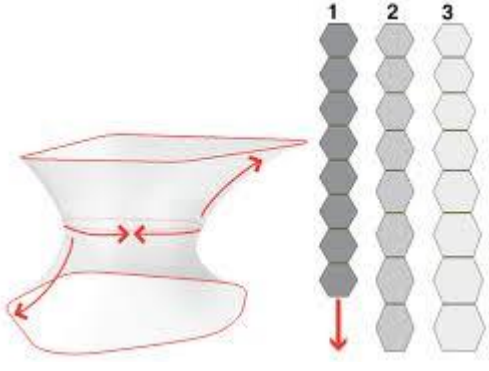


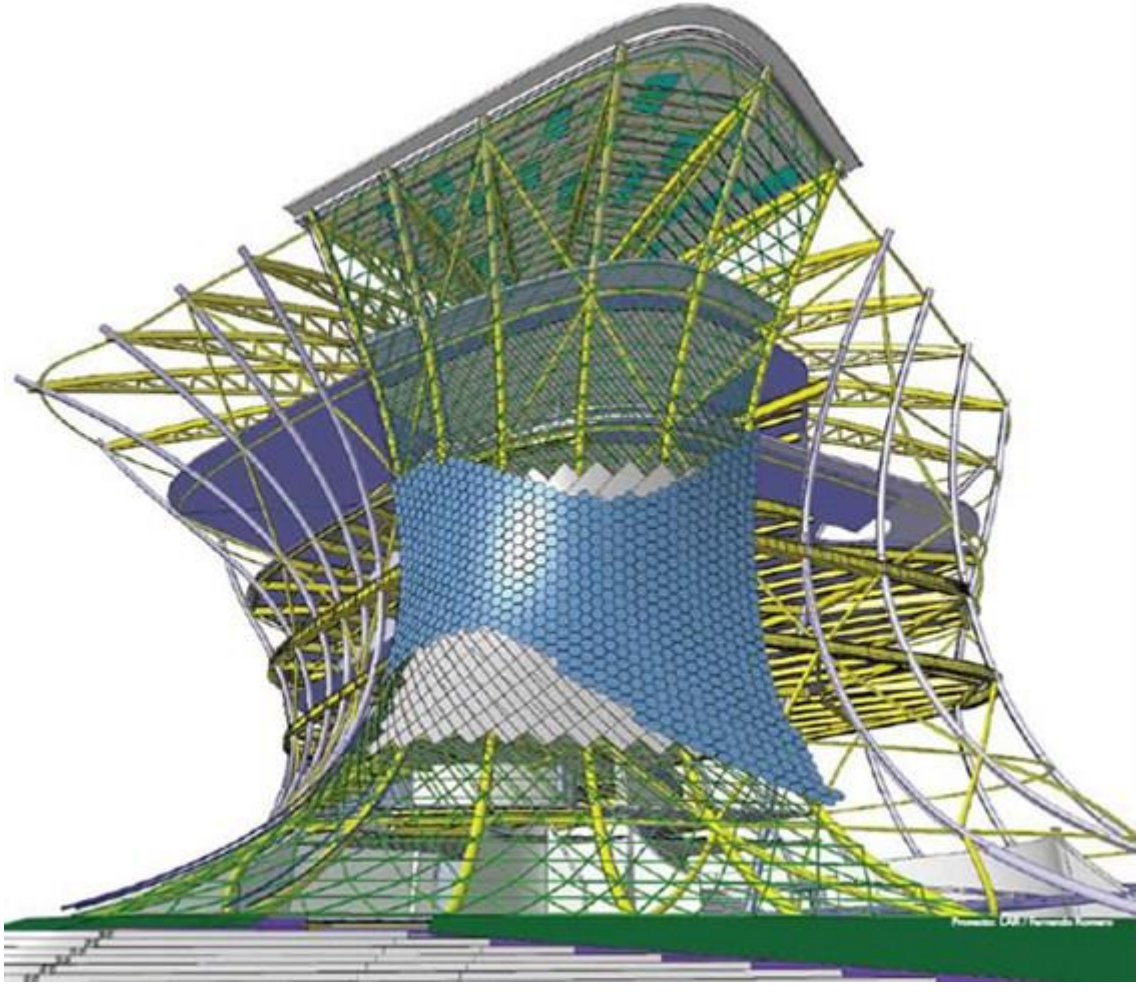
FAÇADE OF THE SOUMAYA MUSEUM

Fernando Romero

The façade is composed of an hexagonal grid of aluminium tiles. The main difficulty for this design was the double curvature of the building. This type of surface would require the grid to change across the surface, requiring various types of tiles and a difficult production process.

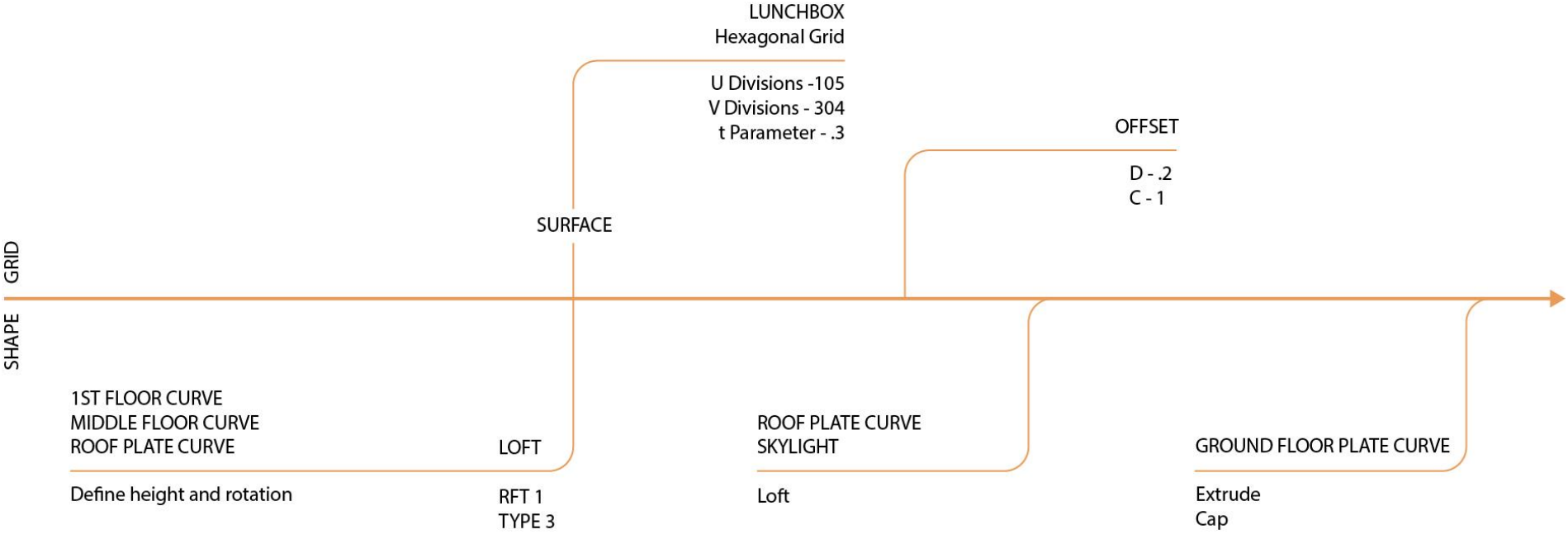
The solution was to offset the hexagons, resulting in the need for only 3 types of tile. Each of these tiles stretch and compress in specific areas across the building`s surface.



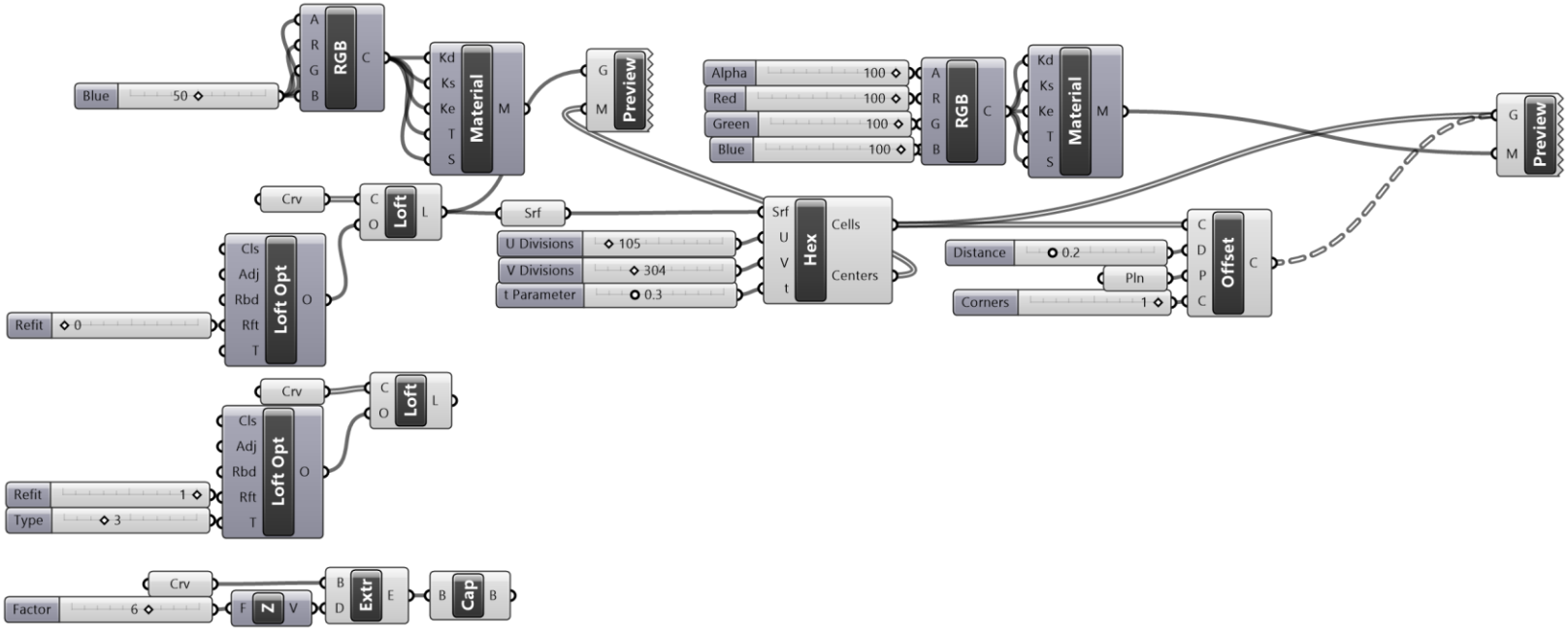




Pseudo Code

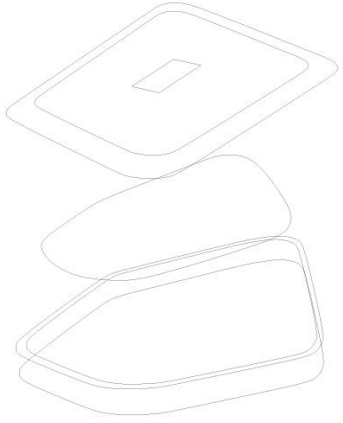

LUNCHBOX
Hexagonal Grid
U Divisions -105
V Divisions - 304
t Parameter - .3
OFFSET
D - .2
C - 1
SURFACE
GRID
SHAPE
1ST FLOOR CURVE
MIDDLE FLOOR CURVE
ROOF PLATE CURVE
LOFT
Define height and rotation
RFT 1
TYPE 3
ROOF PLATE CURVE
SKYLIGHT
Loft
GROUND FLOOR PLATE CURVE
Extrude
Cap

Pseudo Code


Blue
50
RGB
Material
Preview
Alpha
Red
Green
Blue
100
Crv
Loft
Srf
Cls
Adj
Rbd
Rft
T
Loft Opt
Refit
0
U Divisions
105
V Divisions
304
t Parameter
0.3
Hex
Cells
Centers
Distance
0.2
Pln
Corners
1
Offset
Refit
1
Type
3
Factor
6
Z
Extr
Cap

Code Development

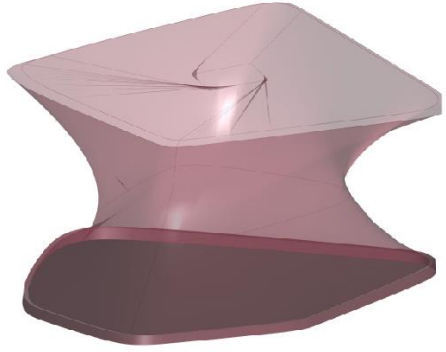
NOTE: As a curvilinear object. The Soumaya Museum has no defined facades, and for the purpose of this excerse, the whole perimeter of the museum was considered as a single facade.



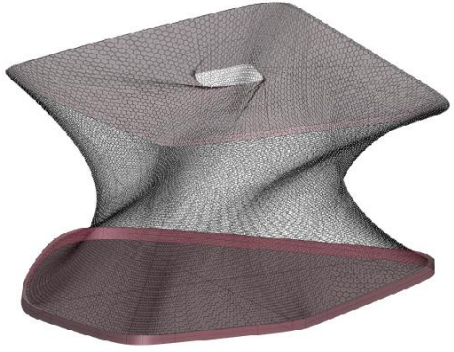
1 - Create a set of curves that will form the facade of the building.



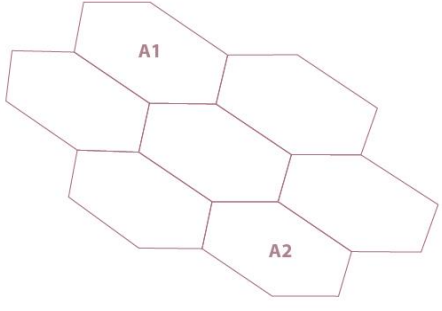
2 - Extrude the floor plate curve and Loft the Roof Plane curves to form the ceiling



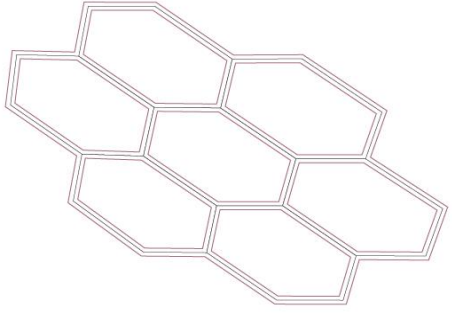
3 - Loft the floor plate Curves and adjust the heights and curvatures of the facade.
(LOFT OPTIONS > REFIT >1)



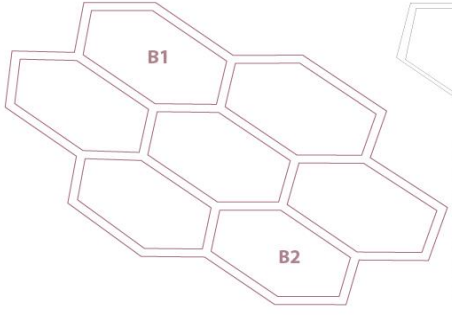
4 - Use LUNCHBOX to create an hexagonal grid to wrap around the facade.
5 - Adjust the grid for more defined hexagons that are close in proportion to the ones in the building.
(U-DIVISIONS 732)
(V- DIVISIONS 658)
(t PARAMETER .8)

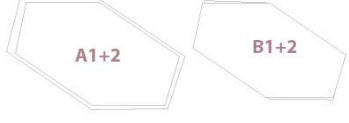


6 - Offset the hexagonal grid by scaling up the Lofted surface (3) and setting this as the extrude direction.



6 - Offset the hexagonal grid to mimic in scale an d proportion the tiles in the Building **(DISTANCE .2)**





NOTE: 1 and 2 are close in proximity. They should have a simmilar size and shape.

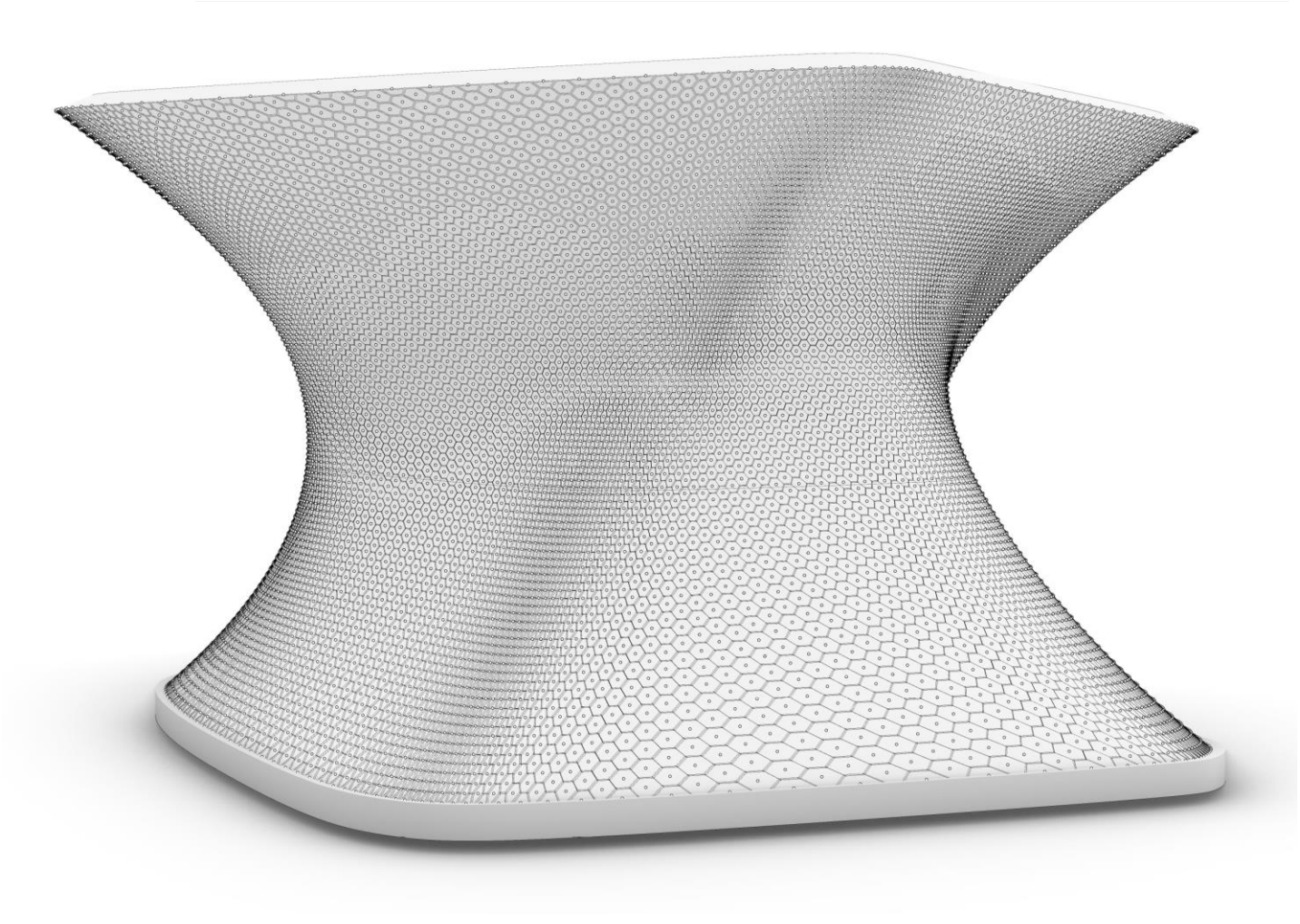
A represents the geometry before offsetting. Tiles A1+2 are more varied than B1+2.

Facade main element

For the modeling of this façade, 2 factors were considered:

The curvatures of the walls needed to form loose concave profiles. There were areas in the model where the curvature of the floor plates created tight folds that had to be readjusted by changing the parameters.

The hexagonal skin should mimic in scale and form the Building`s real finish. In this model, the hexagons stretch toward the top and bottom surfaces.

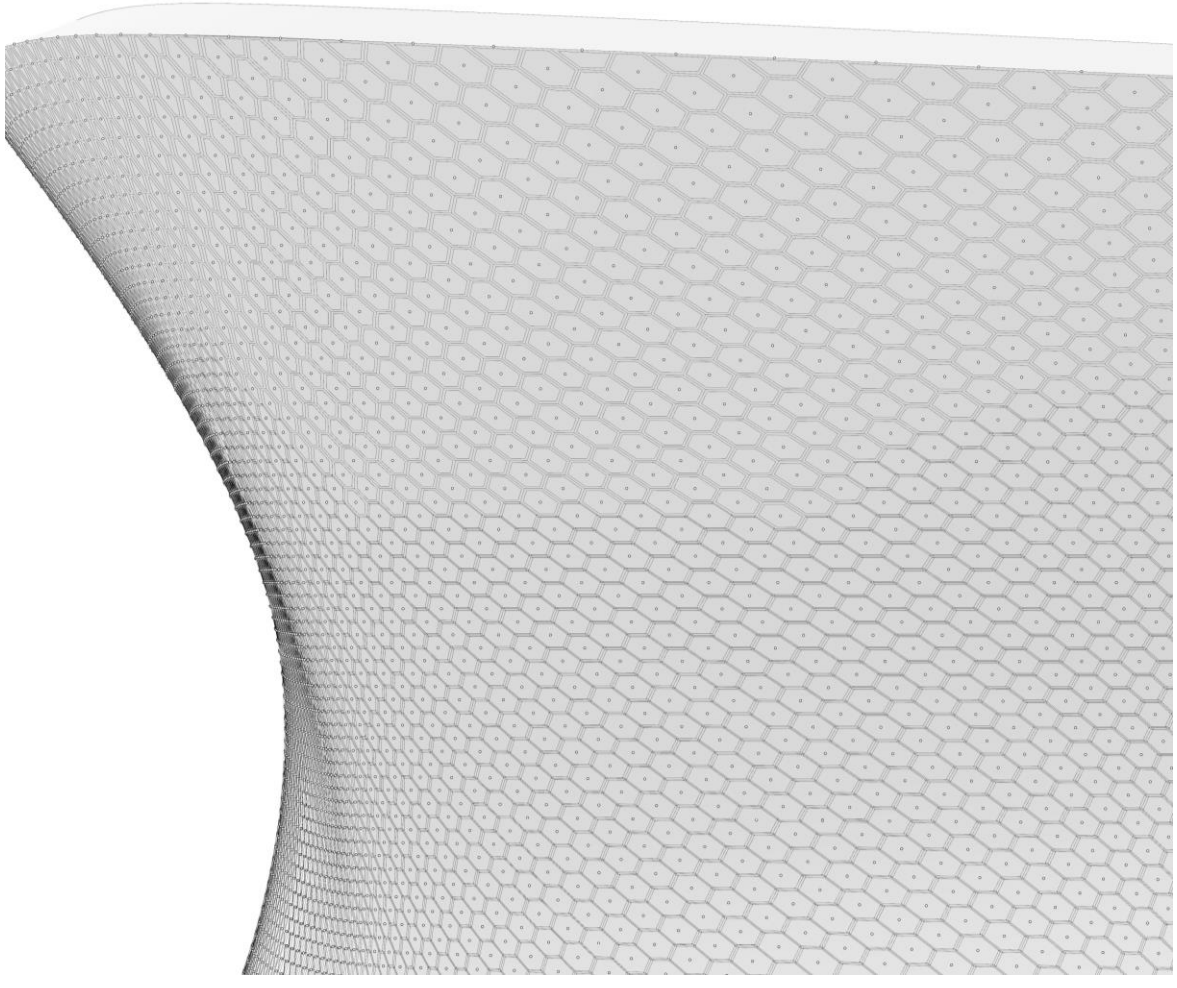


Facade array

HEXAGONAL GRID

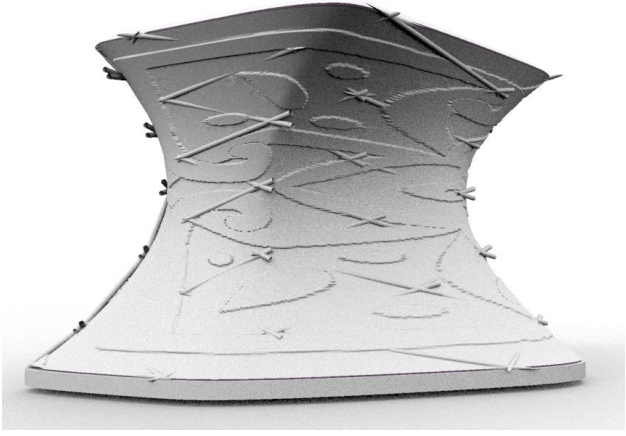
The hexagonal tiles that cover the facade were offset to model the gaps that are in the building.

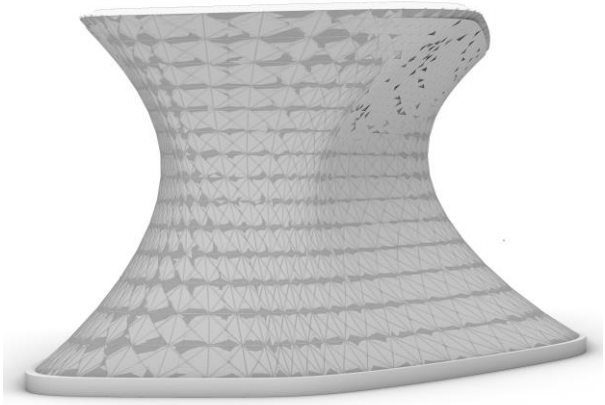
This allows the hexagonal grid to have mor eunifirmity as there is a need for les types of hexagons. Various parameters were altered in the modelling process to create a proportionate grid.



Facade iterations

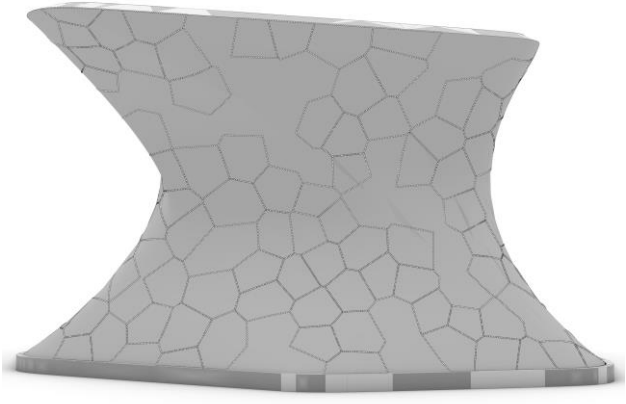
ITERATION 1
Traditional tile as an image imput for the creation of a surface





ITERATION 3
Triangulated grid layers with removed elements

ITERATION 2
Voronoi pattern pipe and random reduction





ITERATION 4
Offset pattern, random removal and perforation

