[dEk] WPM 11 Digital : Analog

Pascal Nünninghoff

WPM 11 Digital : Analog [dEk]
School of Architecture | Frankfurt University of Applied Sciences
Master | Summer 2021
Pascal, Nünninghoff

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Introdution

This booklet documents the journey, that has partaken as part of the WPM Digital: Analog at the Frankfurt University of Applied Sciences, which study's the interface of Digital and Parametric Designs with the "real" Analog world. As this is WP is part of the Architecture Master, the viewpoint of the subject is from that of an Architect. The course was taught in the SoSe2021, amidst the COVID 19 Pandemic and the course took place almost entirely Digitally. A fact that highlights the poignancy of its subject matter and how evermore important the interface between the physical and the Digital is. A particular emphasis in the course was placed on the teaching of the parametric tool Grasshopper in Rhino 3D.

There are two major conclusions from the course.
In general, as architects, we produce images/ an idea which, through the medium of Drawing, we communicate to the craftsman and manufacturers. The ideal end product for an architect is always a Building. In some ways, the Parametric and digital Design, which then is immediately followed by Digital production, shortens the journey between idealized idea and the finished product. The Designers knowledge base, therefore, has to encompass a wider range, but tighter control and environmental parameters are more easily combined into the building components. The computational parts of the design which would be tedious or outright impossible by hand are not to be forgotten. This brings us to the second conclusion.

Once a Designer has learned about these digital tools that make Computation and the combination with other mostly environment data easier, the temptation is to make building components that are extremely optimize using this data.
The outcomes of such endeavours are usually Questionable. A more nuanced approach is usually more appropriate. That is the case because as architects our task is to have a general overview over a given design that encompasses far more parameters than just those that are computable. Aesthetic sensibilities are far harder to quantify, as they are a function of the human condition and are an important part of Design.

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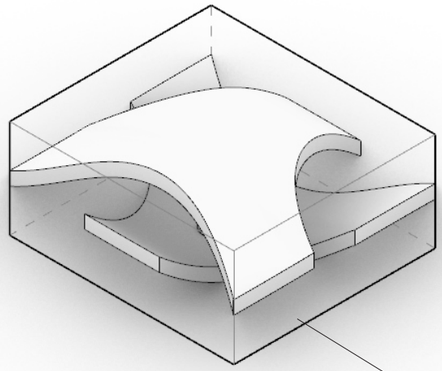
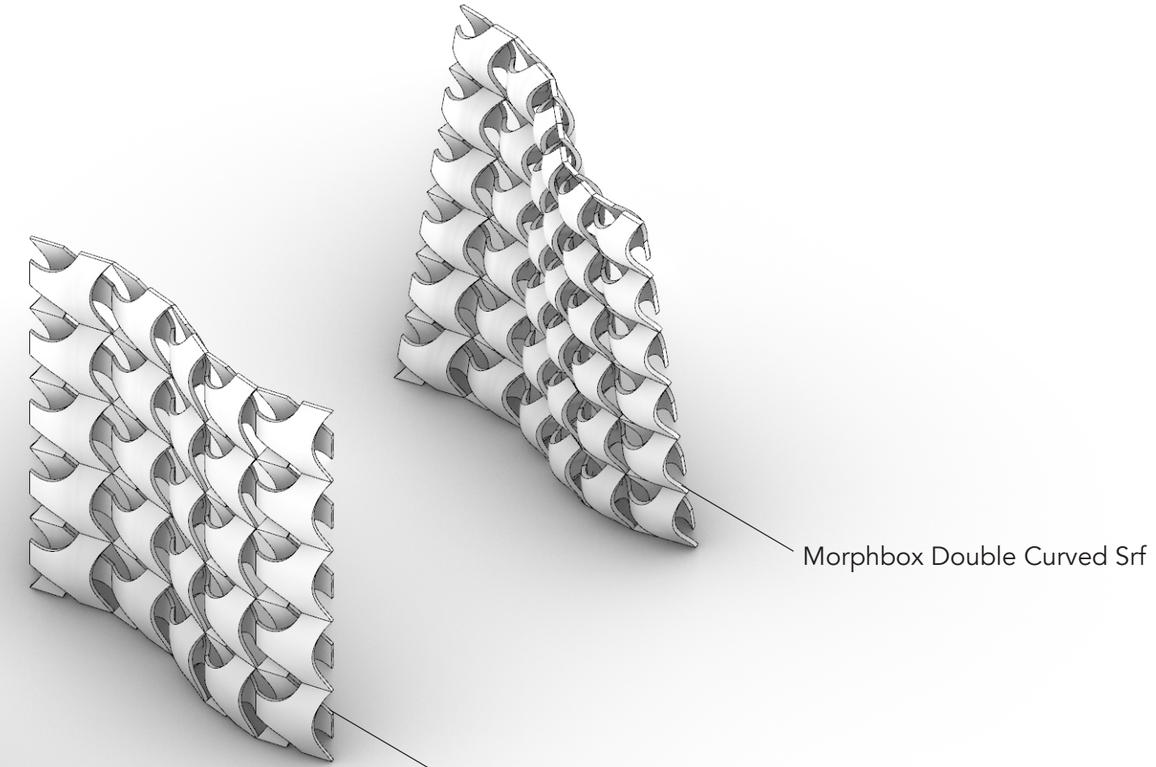
Aggregate 1 : Morphbox

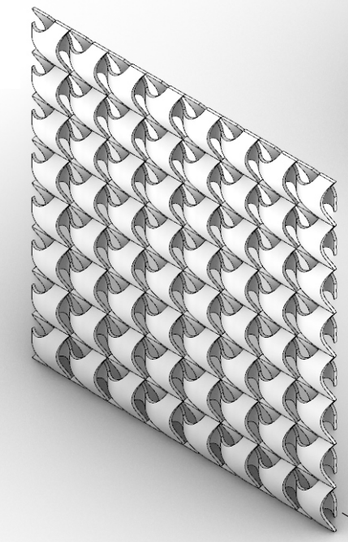


Base Module

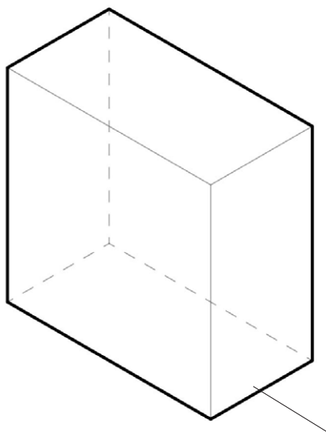


Morphbox Double Curved Srf

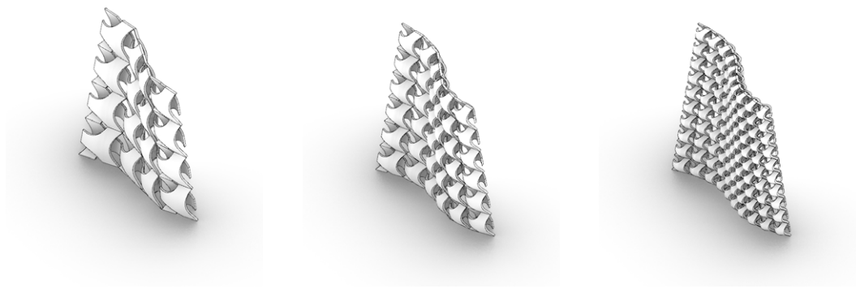
Morphbox Single Curved Srf



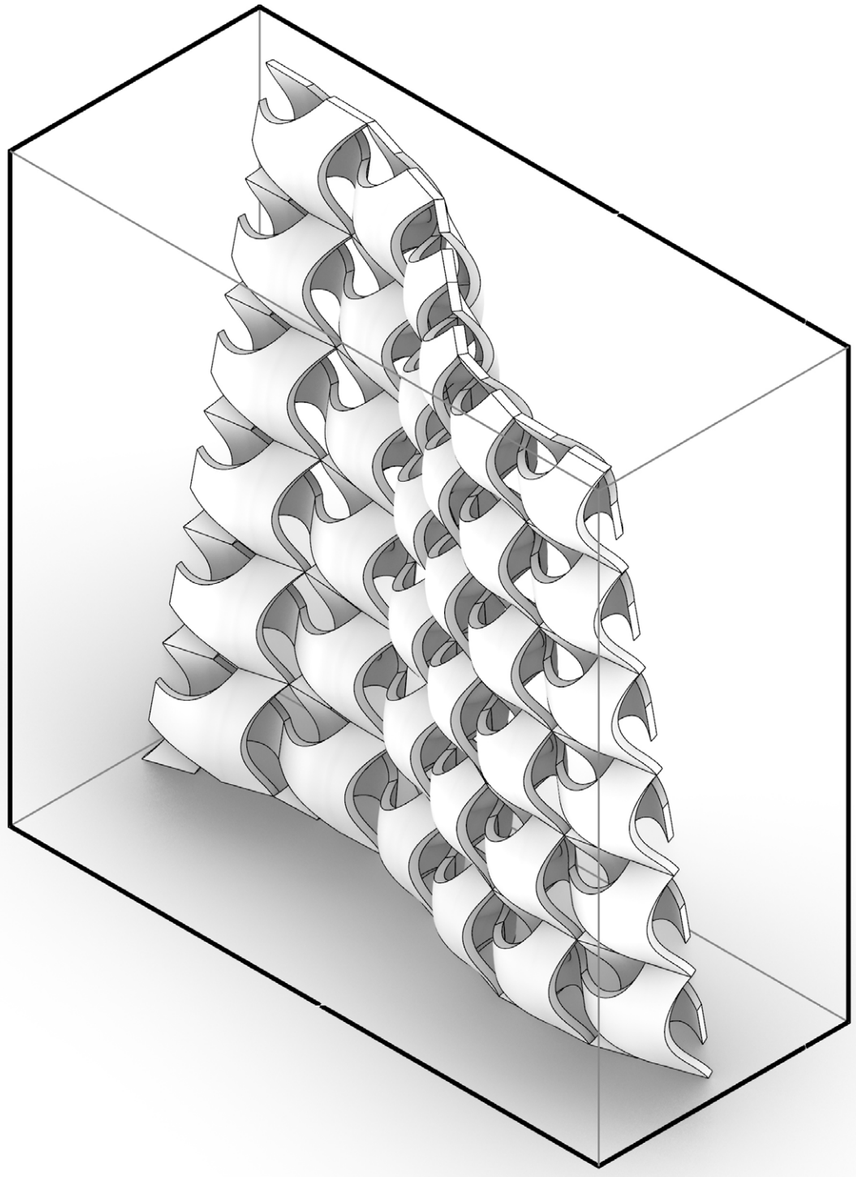
Morphbox Planar Srf

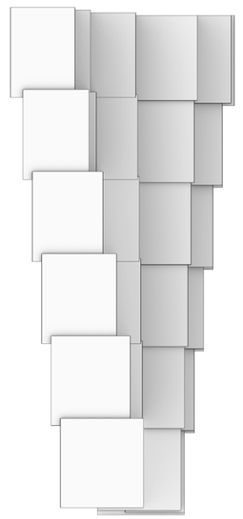


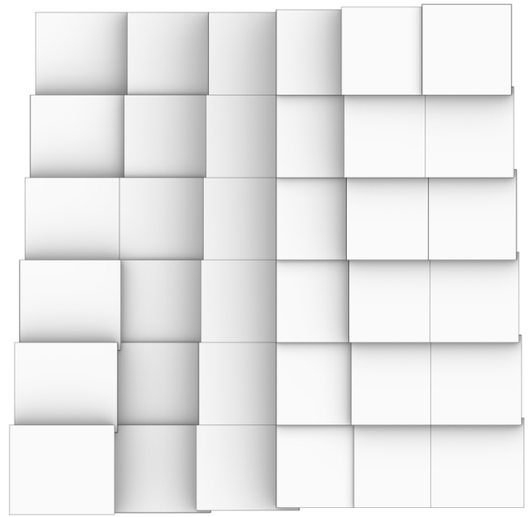
Base 100x100x6m



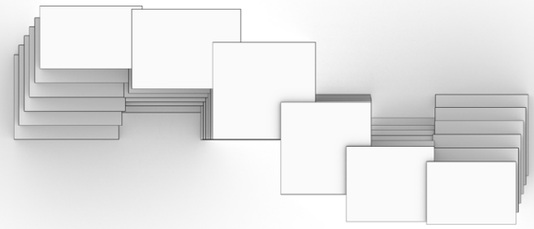
Varianten UV-Werte

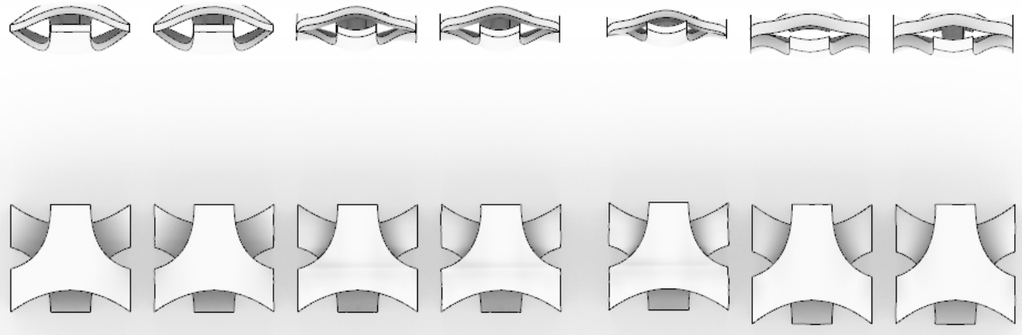






Domain

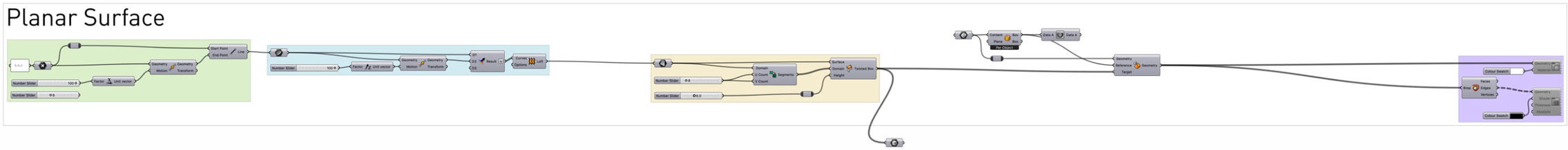




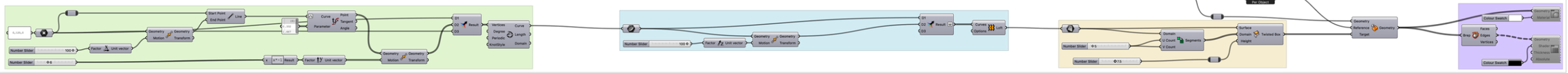
Grasshopper Definition

All Rhino data is either internalised or the geometry is purely Prametricly generated. The Plugin Human is needed for some Display purposes.

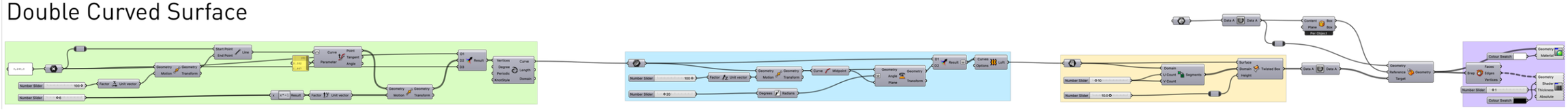
Planar Surface



Single Curved Surface



Double Curved Surface



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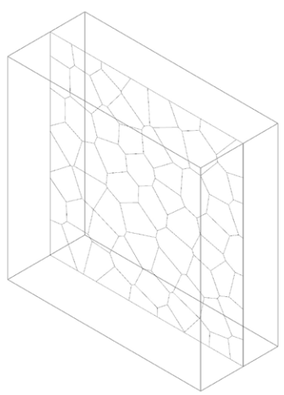
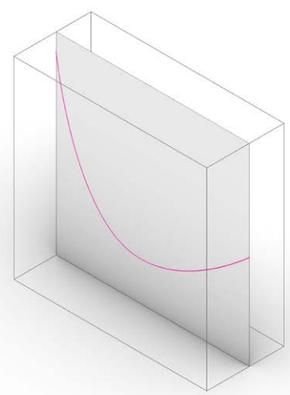
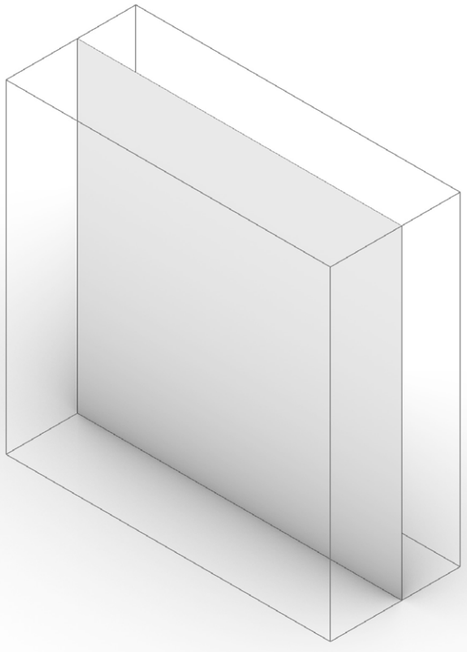
Aggregate 2: Attraction



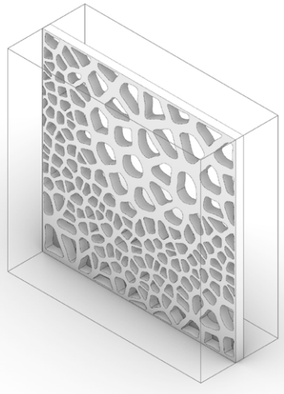
Voronoi



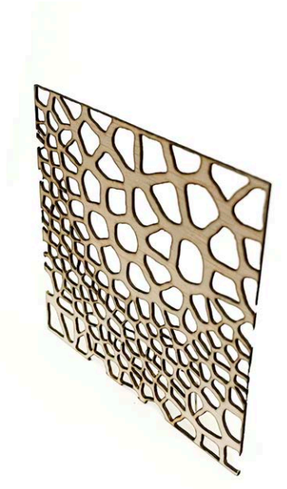
Attractor



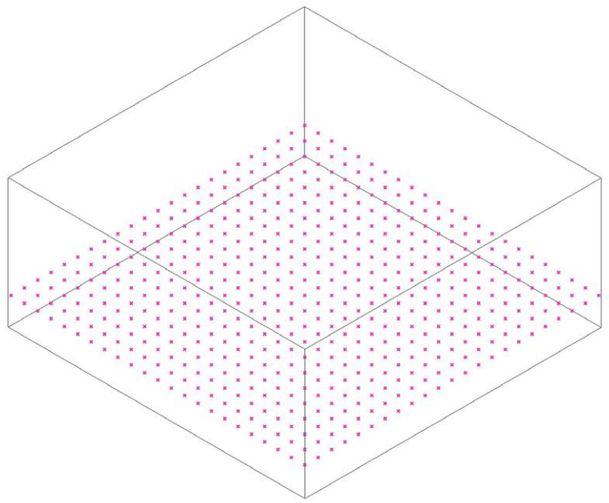
Base Surface



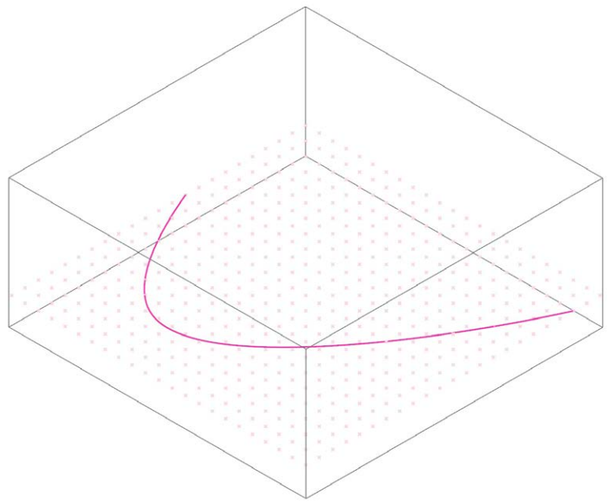
Final Model



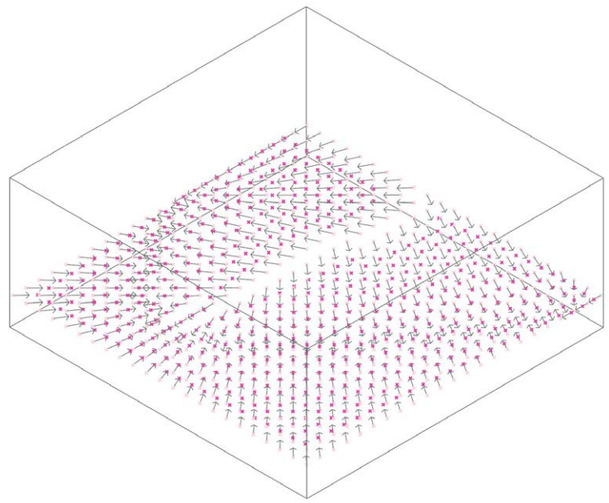
Physical model



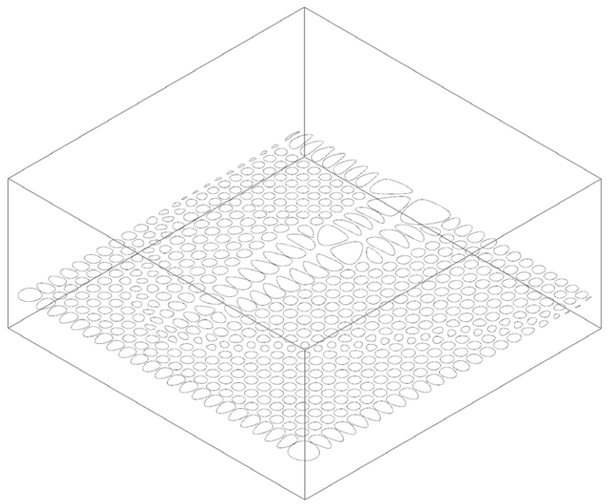
Base Grid



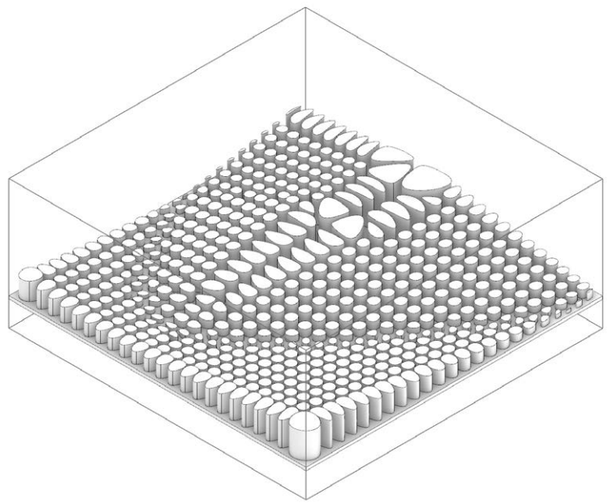
Attractor



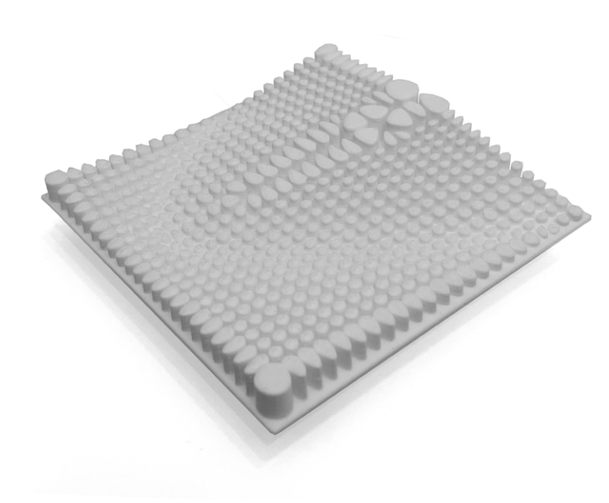
Vector Direction



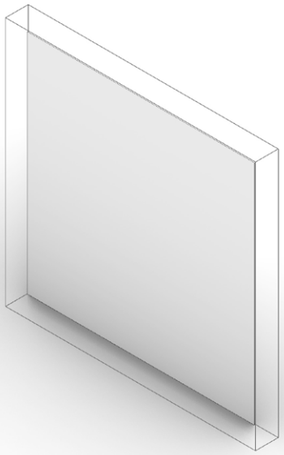
Moduled mapped on Grid



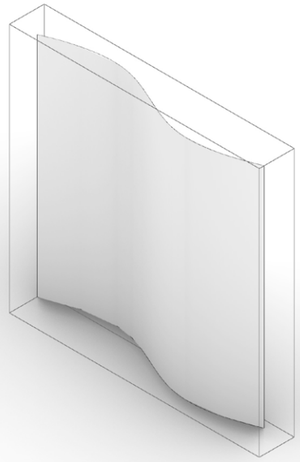
Model Modul



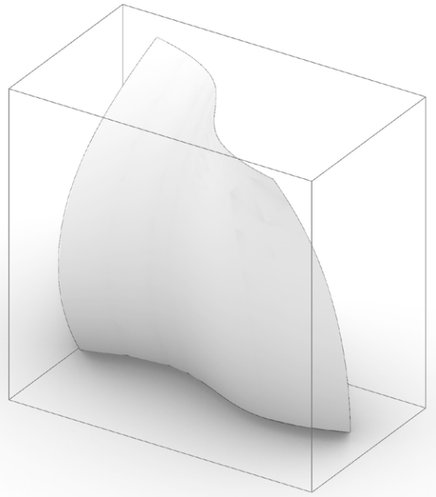
Physical model



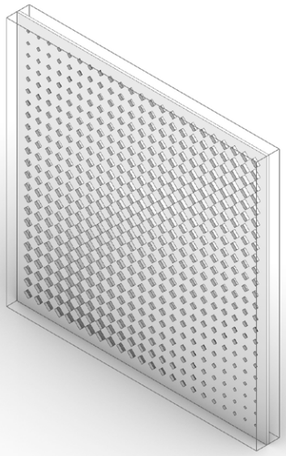
Planar Surface

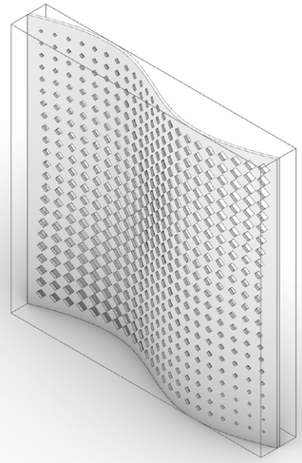


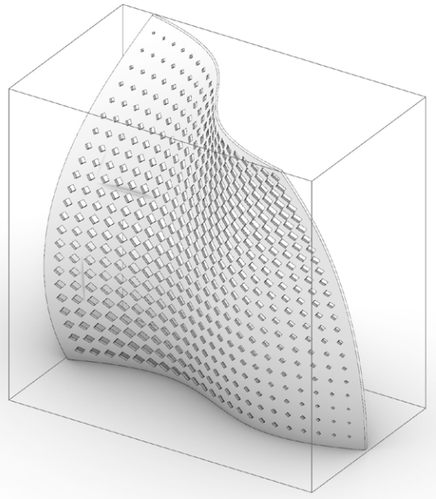
Single Curved Surface



Double Curved Surface







Grasshopper Definition

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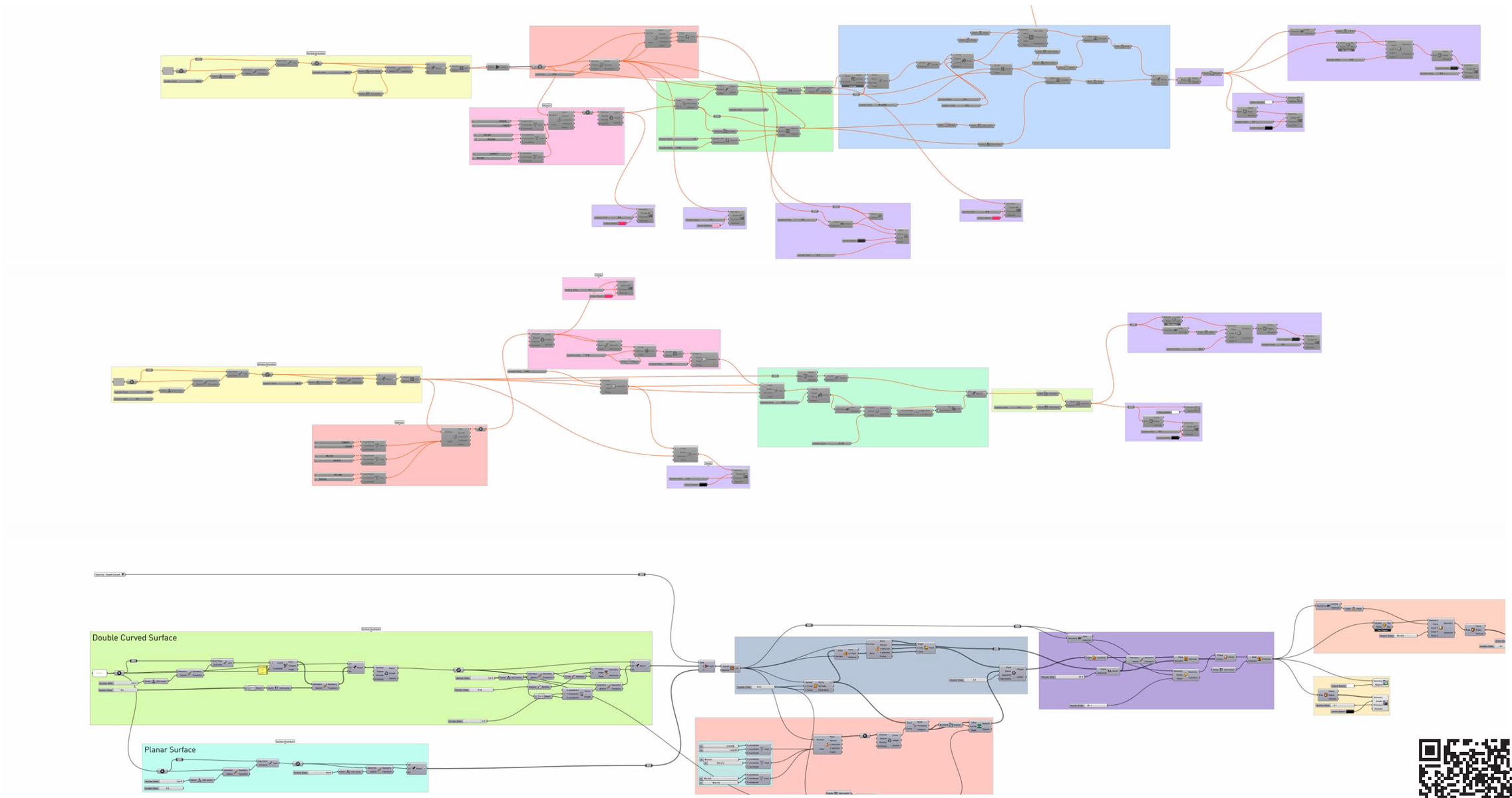

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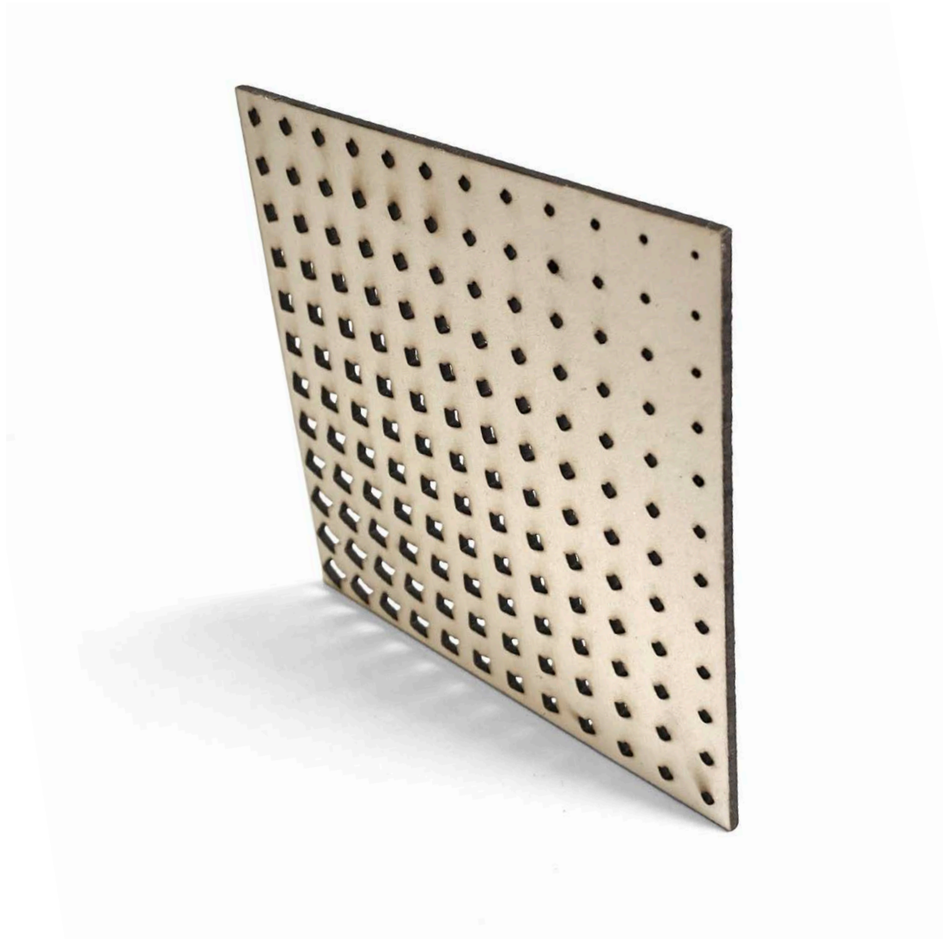
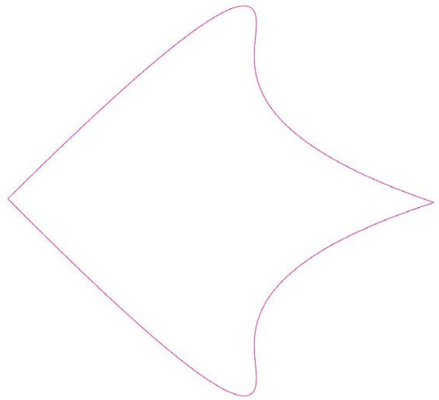
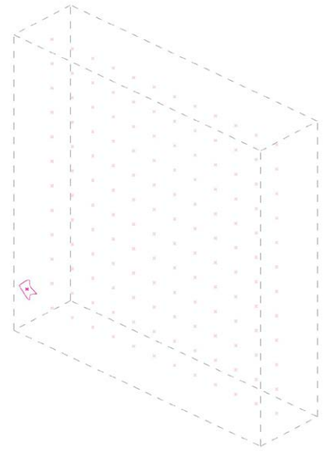
Aggregate 3: Vector 2Point



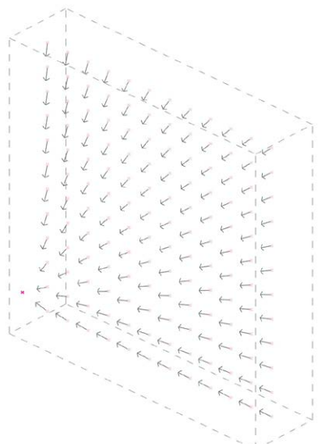
Physical model



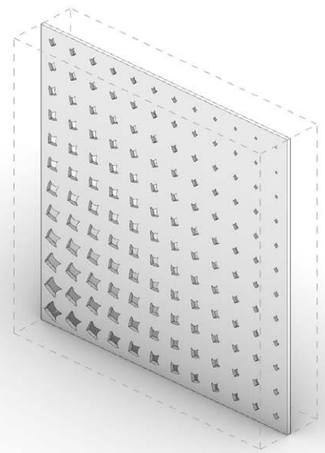
Modul Pattern



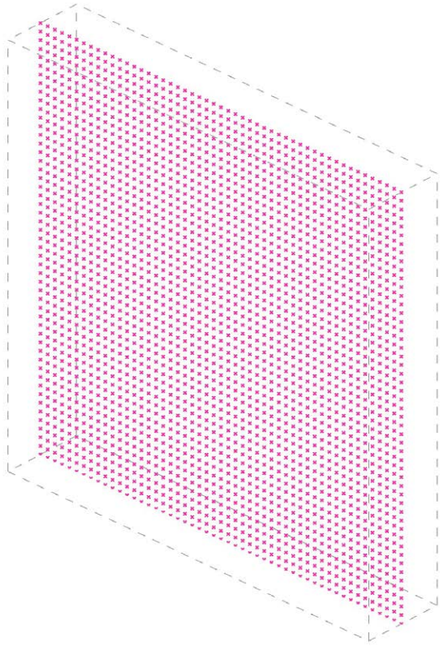
Grid and Atractor



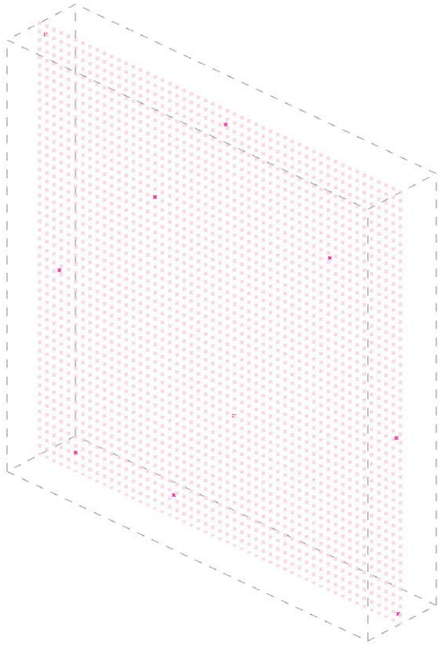
Vector Direction



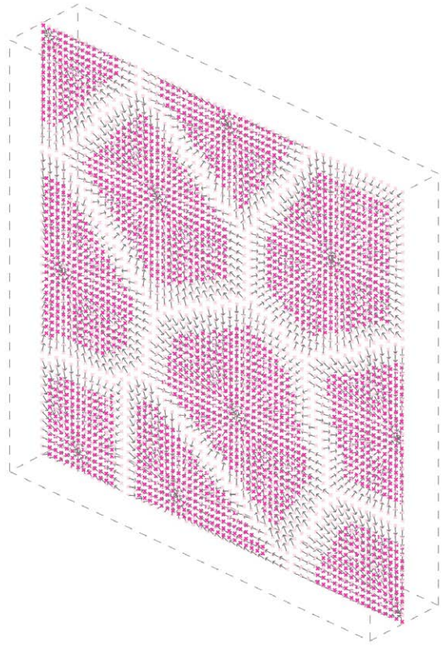
Final Render



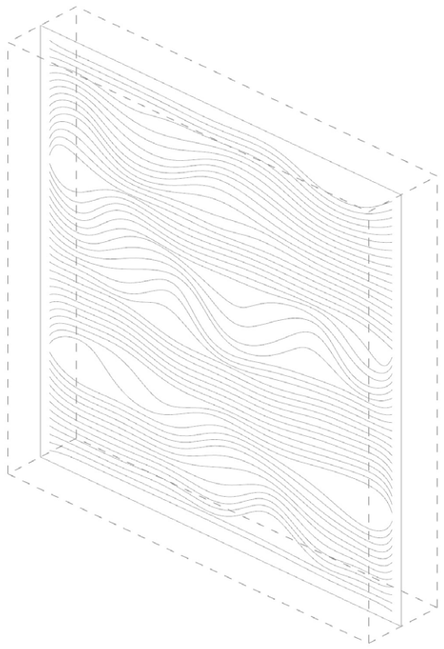
Base Grid 50 x 50



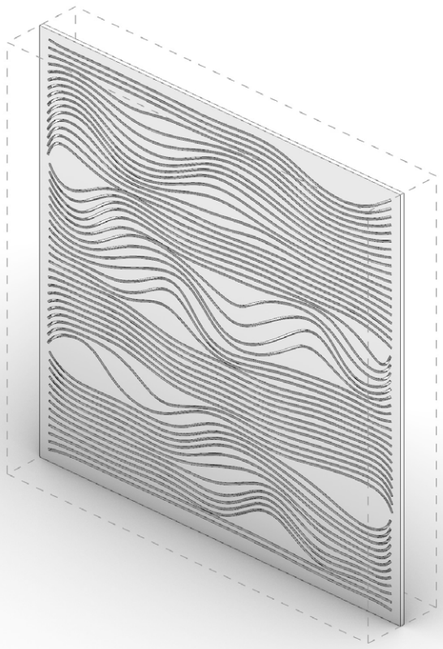
Attractors



Vector Direction

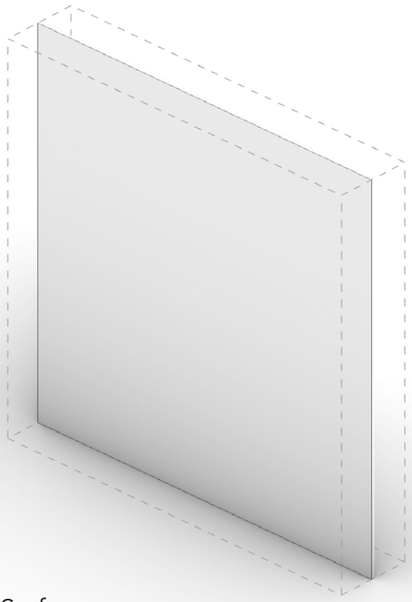


Curves mapped to Grid

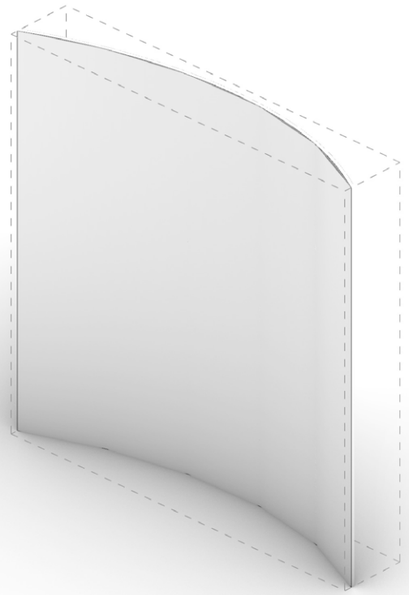


As a Solid Object

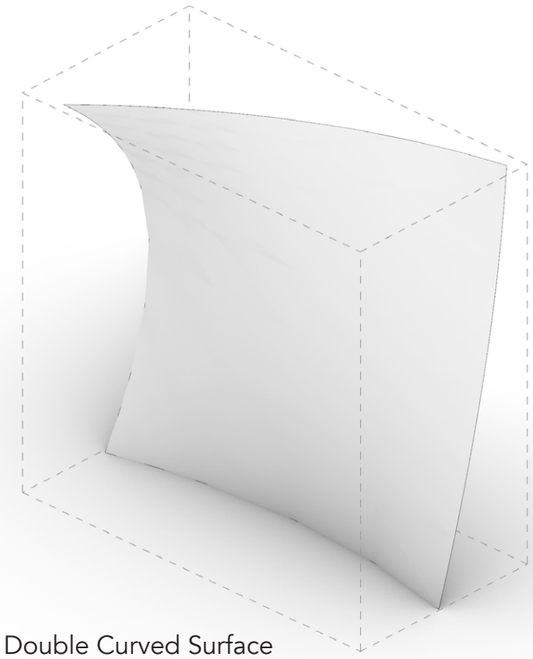
Physical model



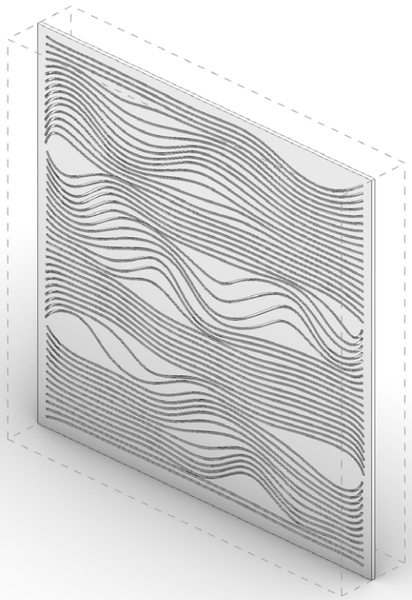
Planar Surface

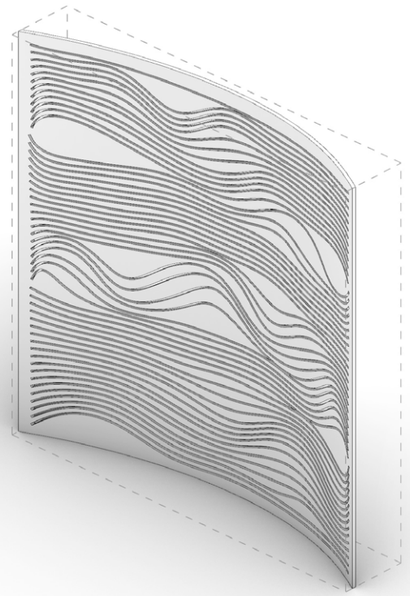


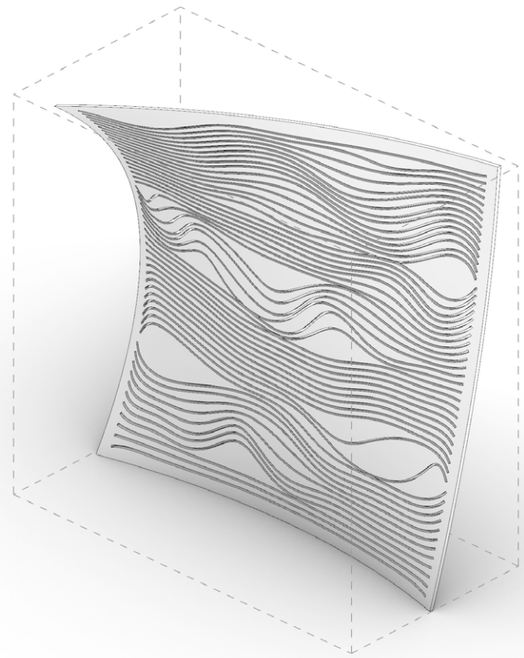
Single Curved Surface



Double Curved Surface







Grasshopper Definition

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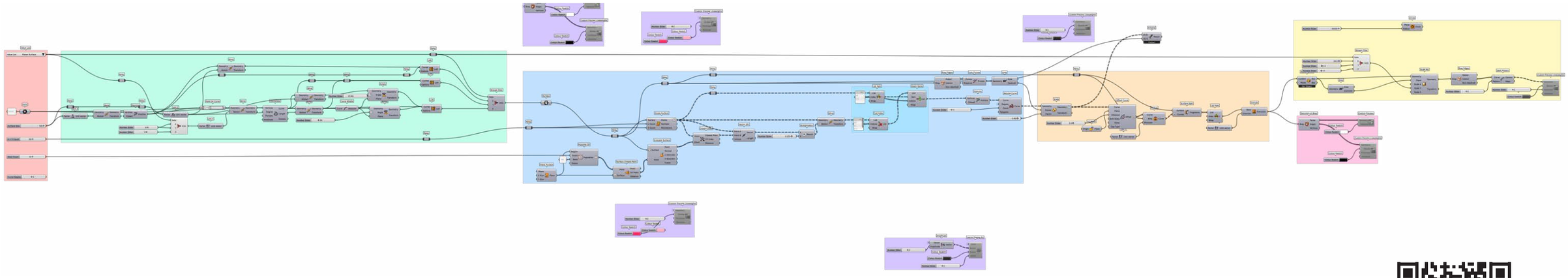
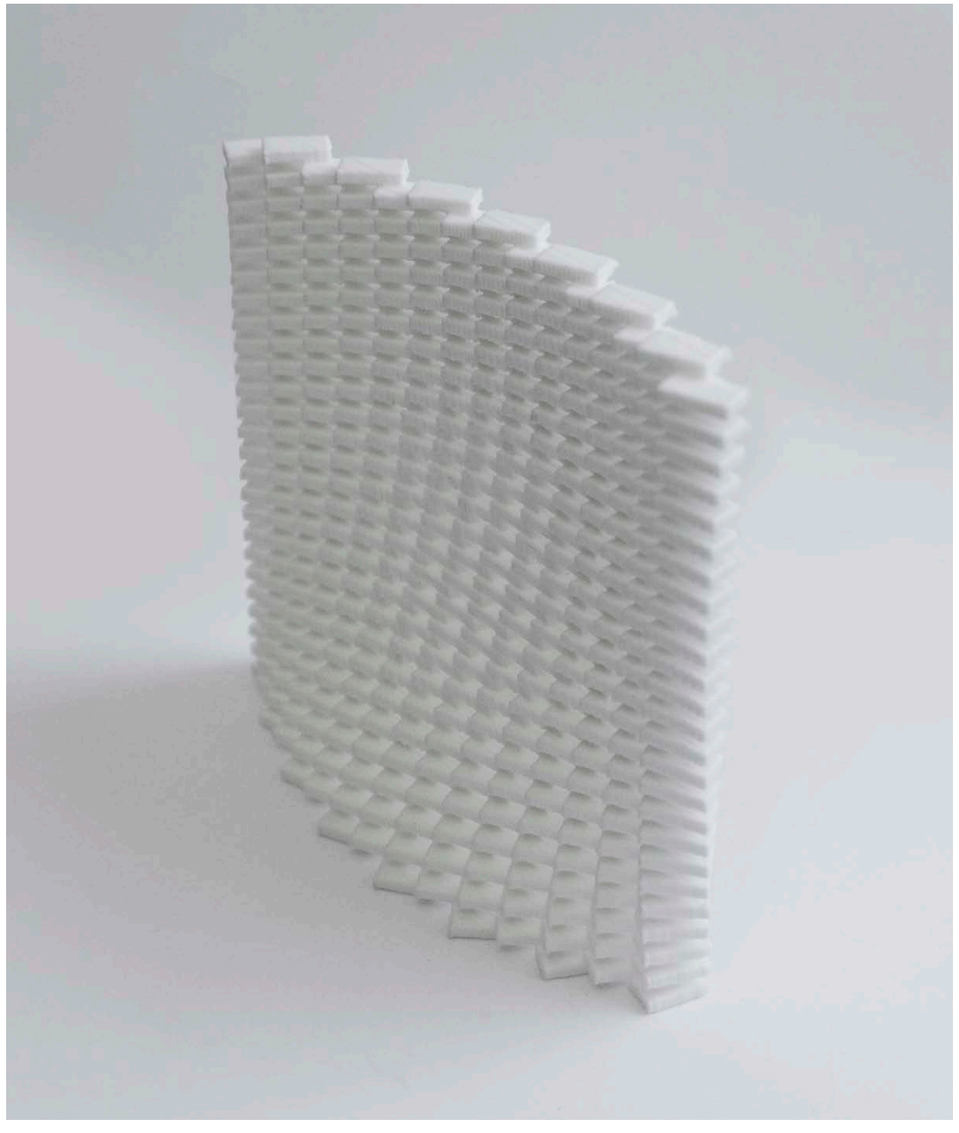
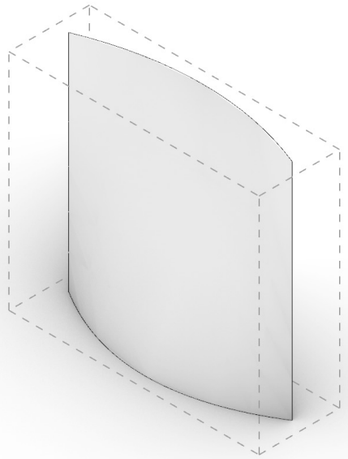


https://pascalnun.com/share/Digital-Analog/GH/[dEk]_WPM_11_-_3_(PN).gh

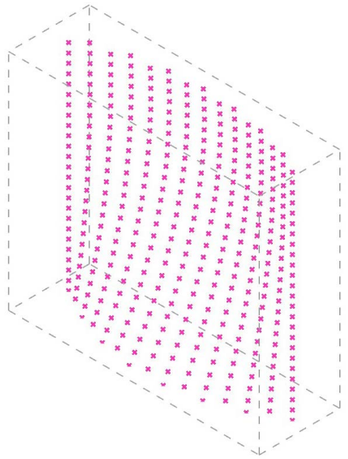
Aggregate 4: Brick Wall



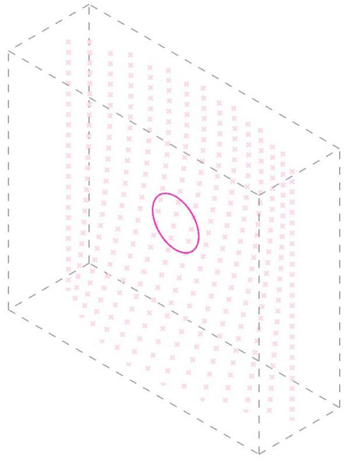
Physical Model



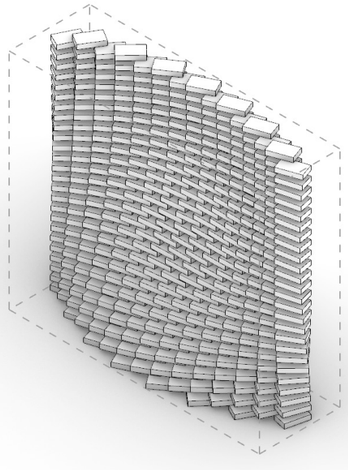
Base Surface



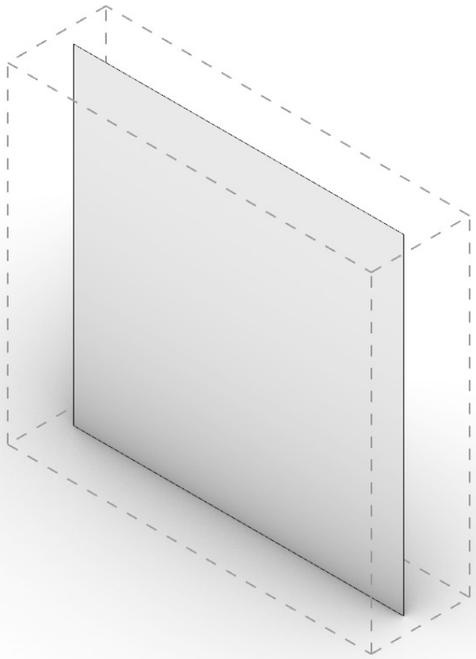
Base Grid



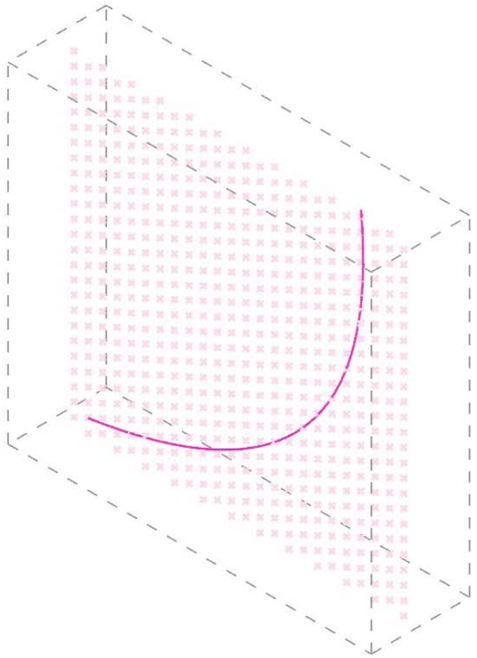
Attractor



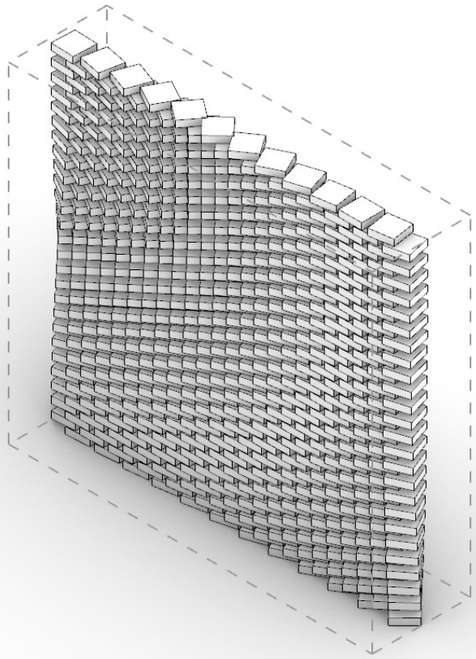
Model



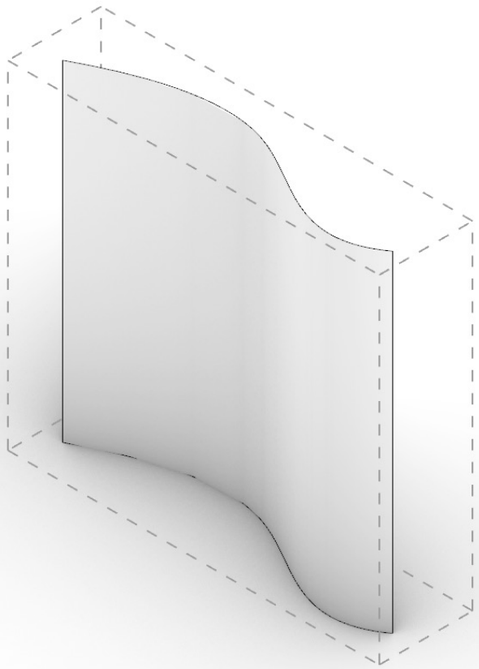
Planar Base Surface



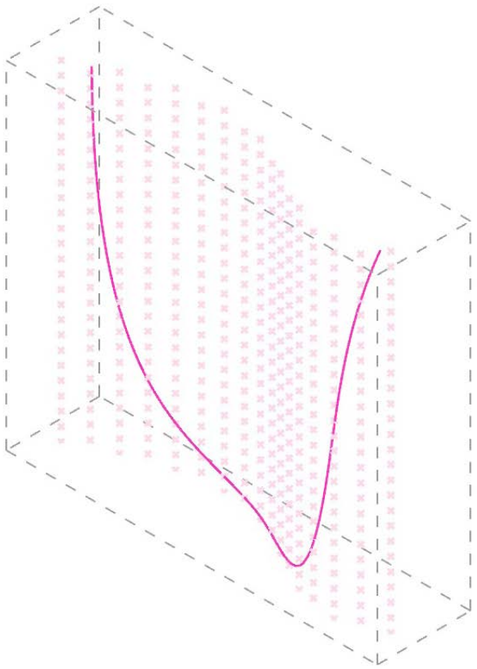
Grid and Attractor



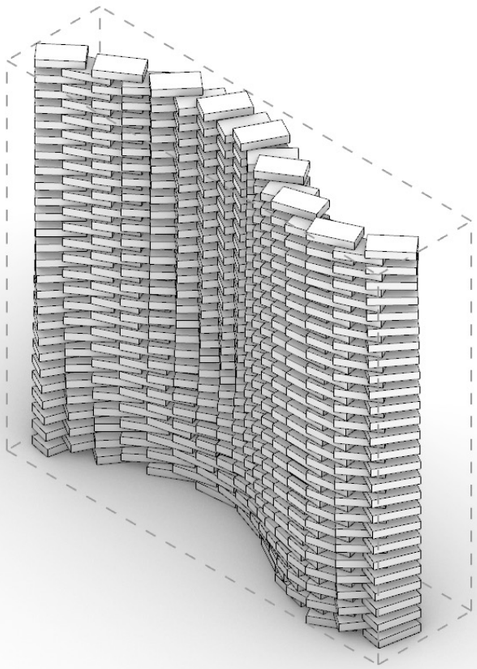
Model



Single Curved Base Surface



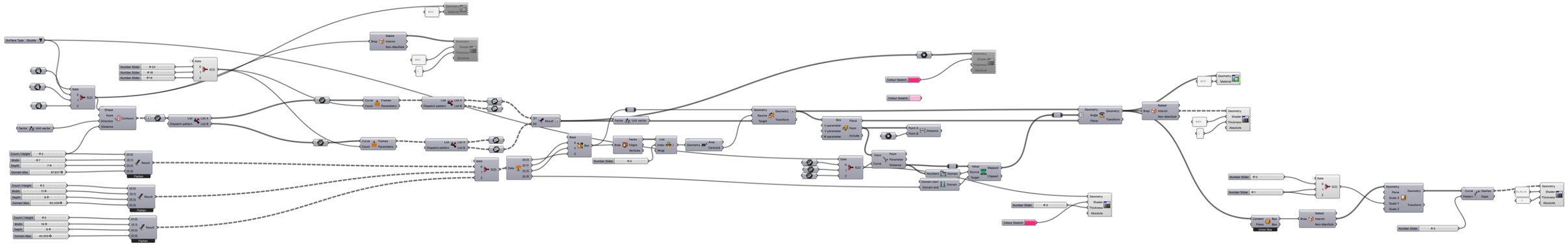
Grid and Attractor



Model

Grasshopper Definition

All Rhino data is either internalised or the geometry is purely Prametricly generated. The Plugin Human is needed for some Display purposes.



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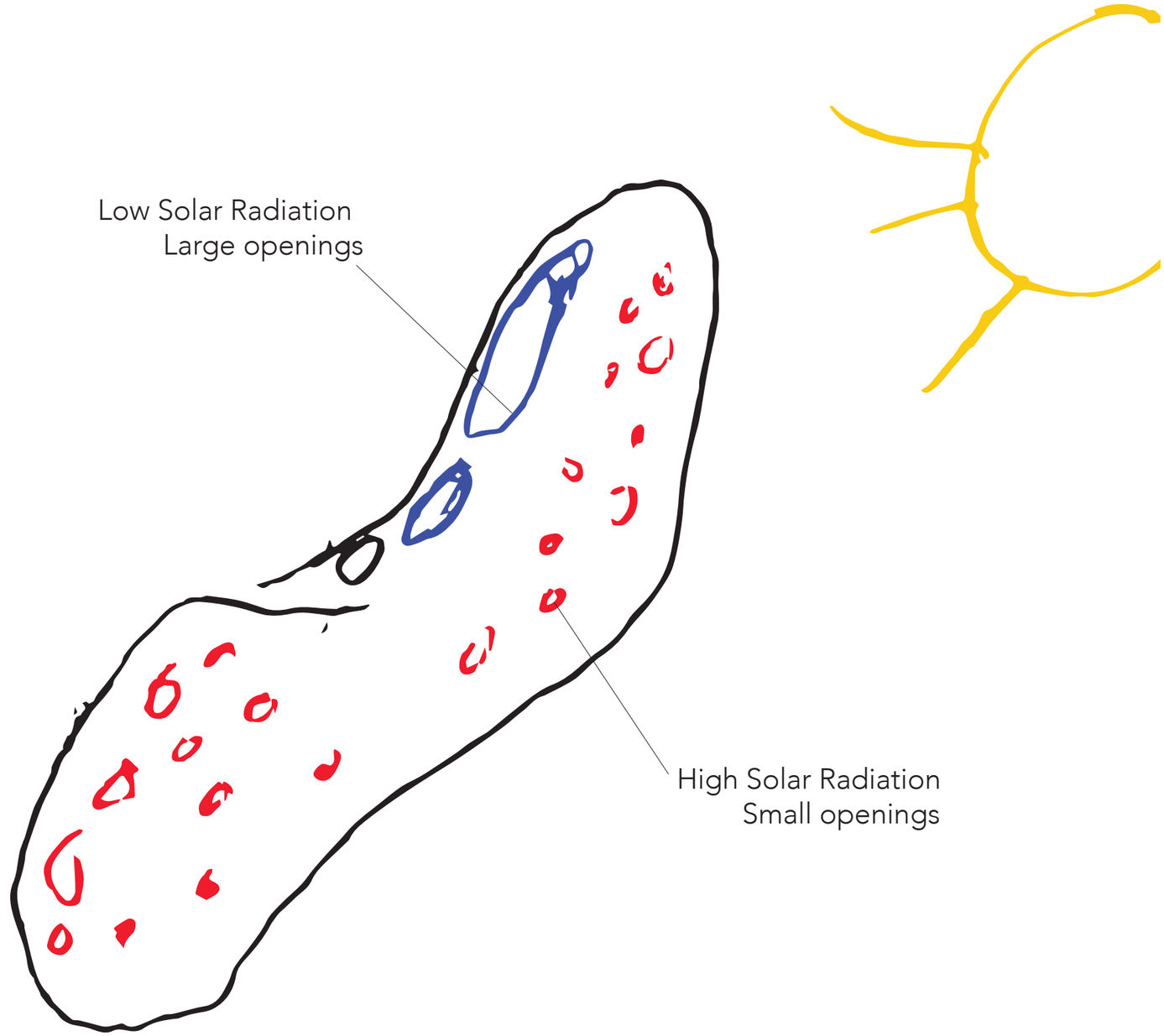
Final Model: Idea

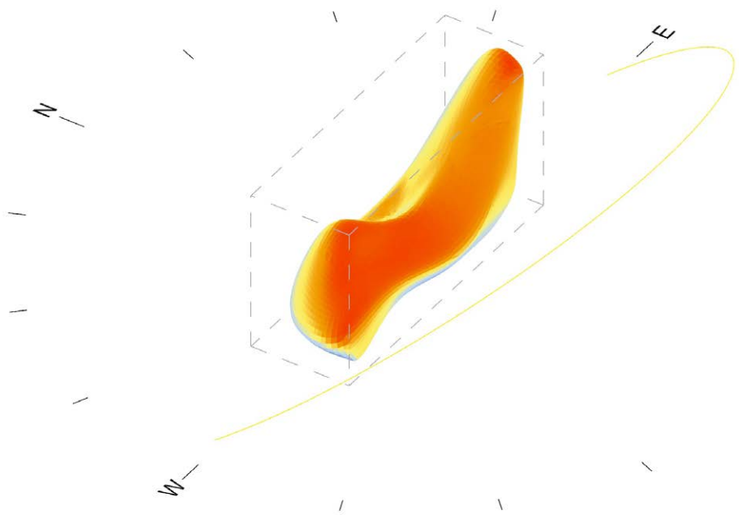


The basic idea behind mein Final model is to populate a Freeform surface with openings that are Scaled inverse to the solar radiation they receive.

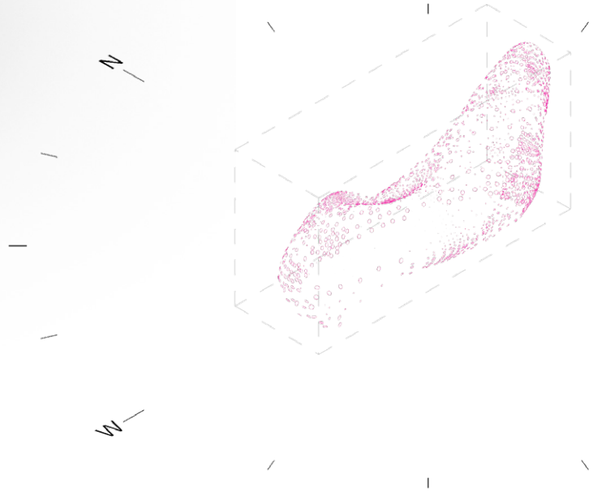
Aggregate 5: Ladybug

Base Surface

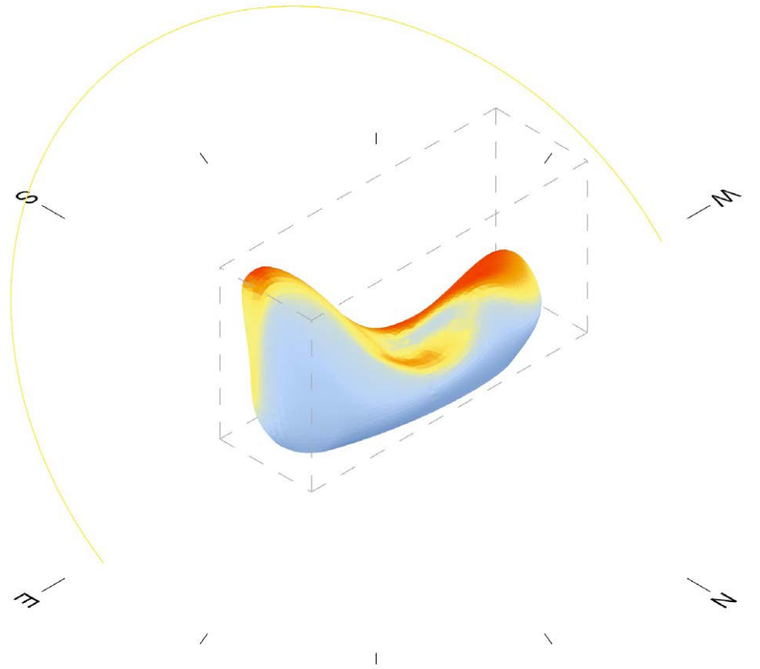
In this first attempt Ladybug is used to generate Circeles on a relativ fine Mesh. The circles are then subtakted from the Base Surafce

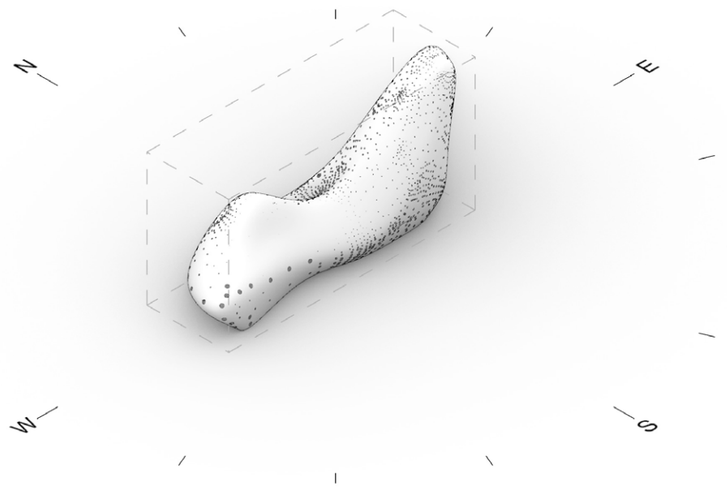


Sun Analysis

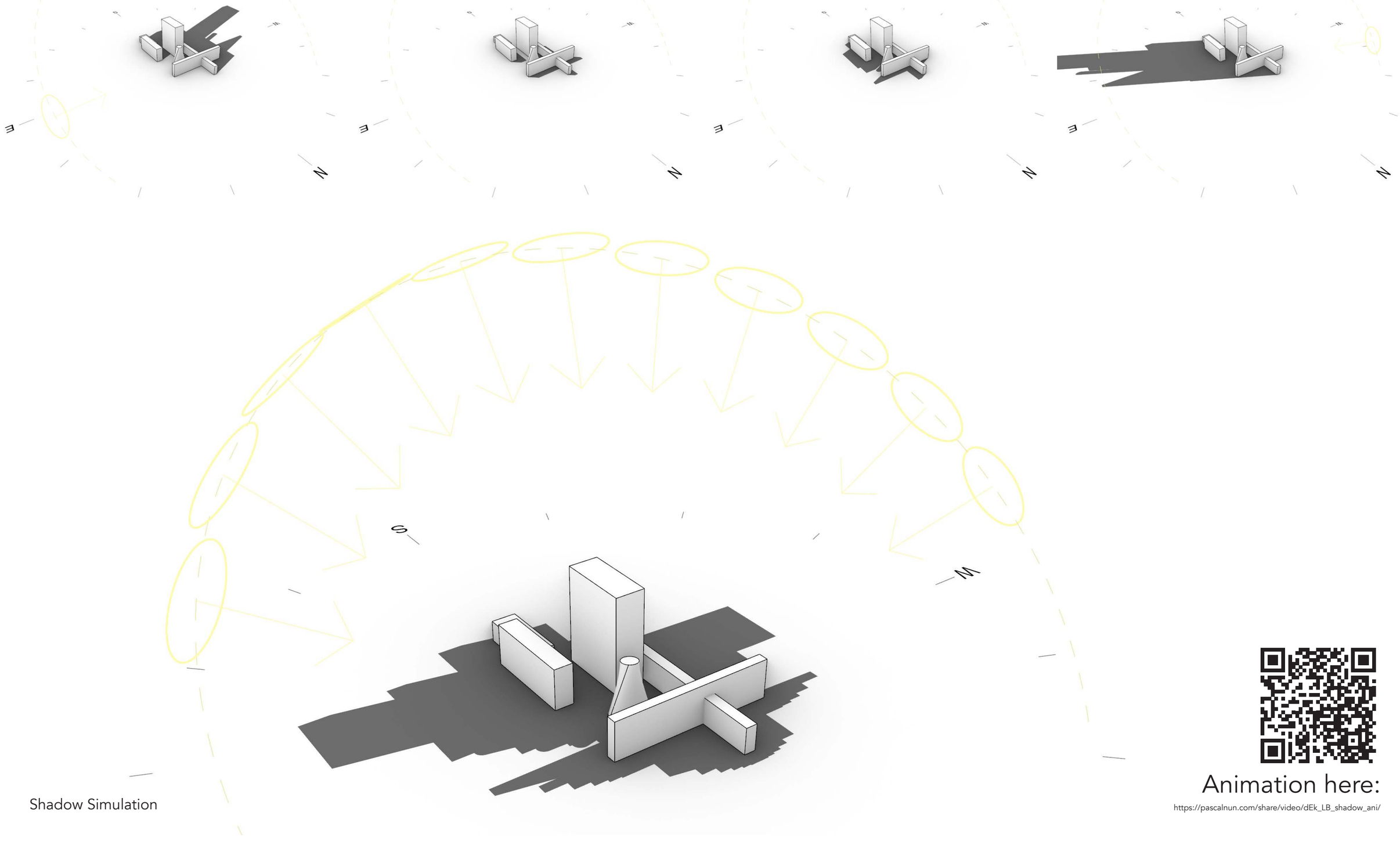


Shade Optimized Arcs





Model



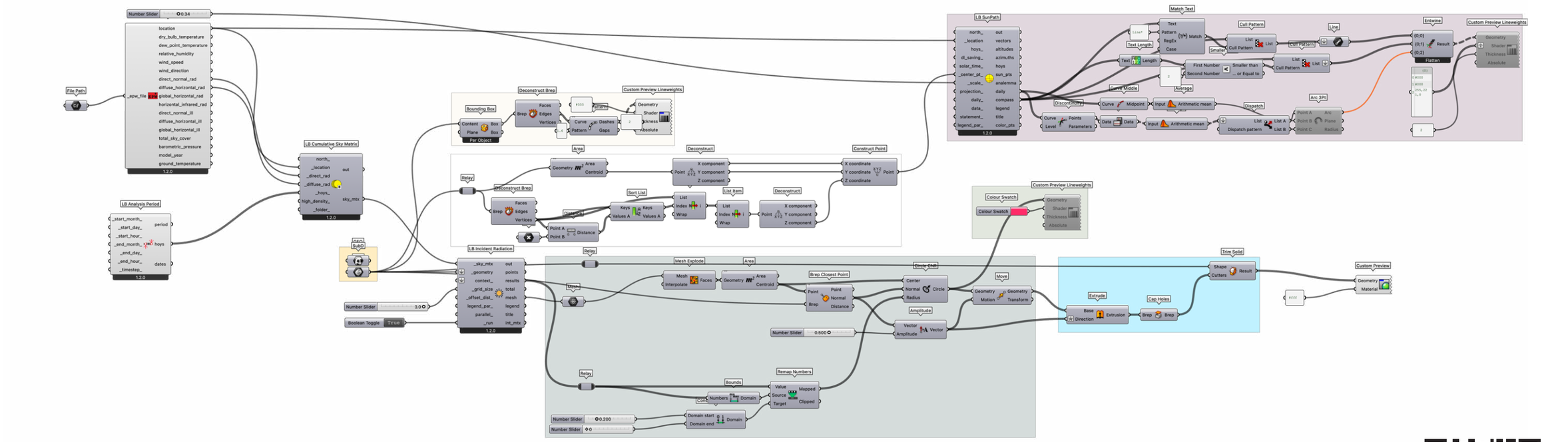
Shadow Simulation

Animation here:

https://pascalnun.com/share/video/dEk_LB_shadow_ani/

Grasshopper Definition

All Rhino data is either internalised or the geometry is purely Prametricly generated. The Plugin Human is needed for some Display purposes.



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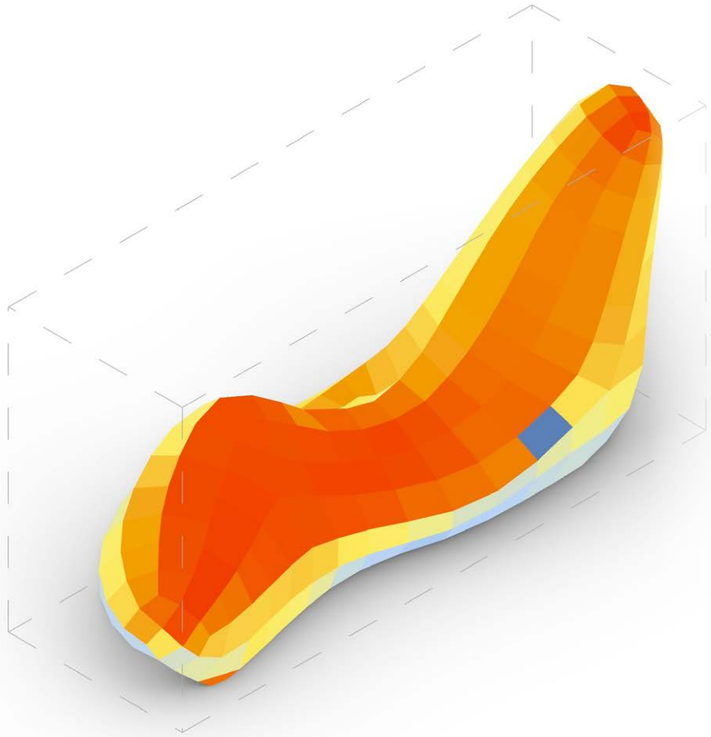
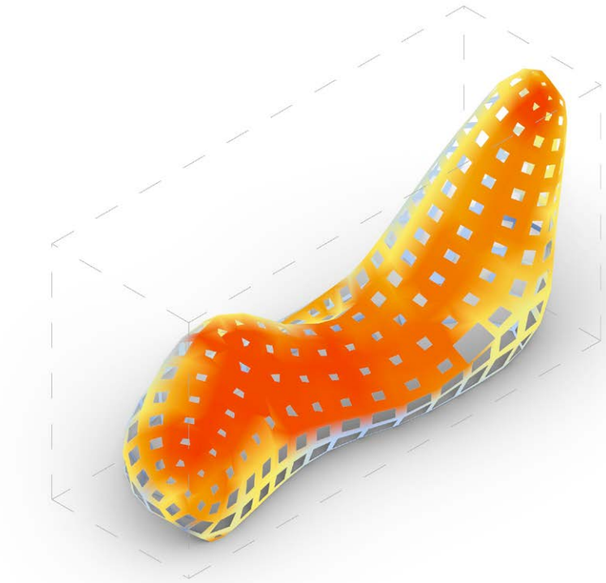
Aggregate 6: Ladybug

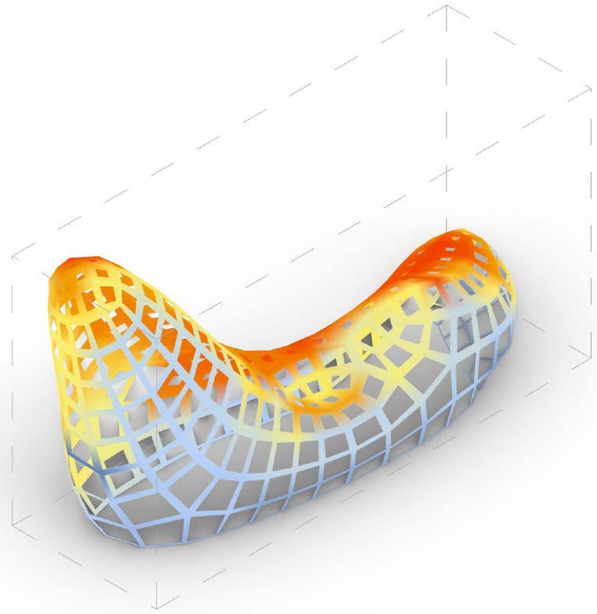


Base Mesh and Solar radiation

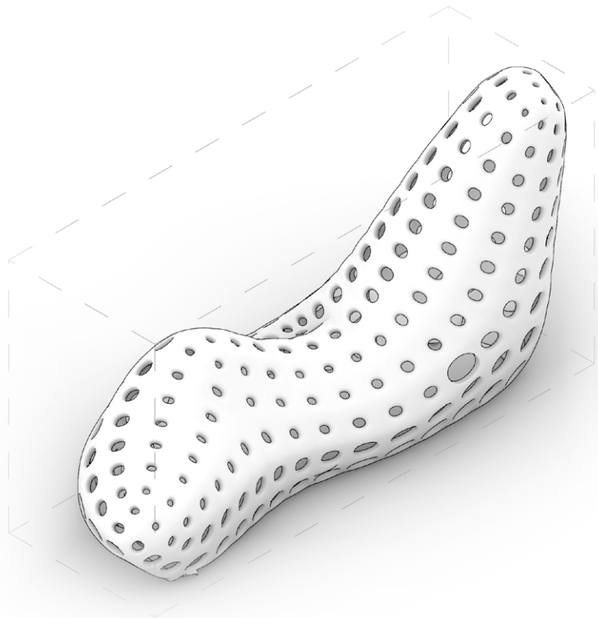
Using the insights of the first attempt in this attempted the base mesh is more coarse and distribute more evenly. The Mesh is then offset based on the Radiation.



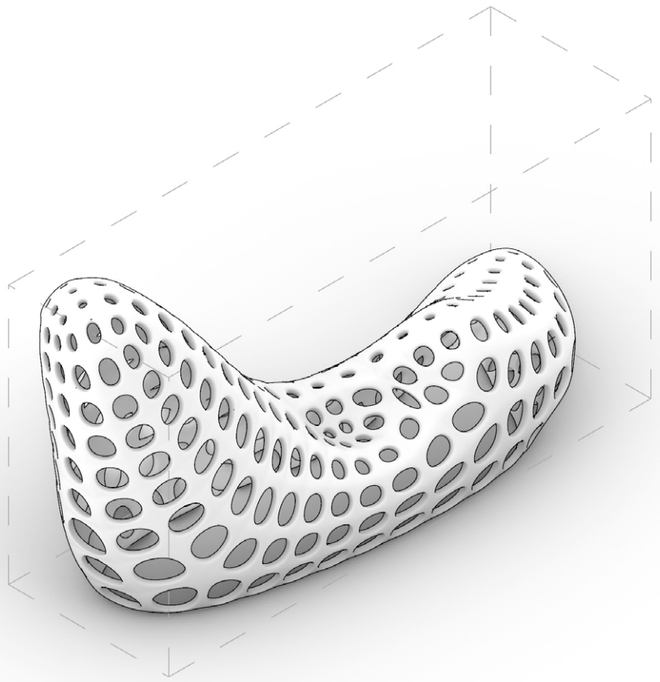
Offset Mesh



Offset Mesh



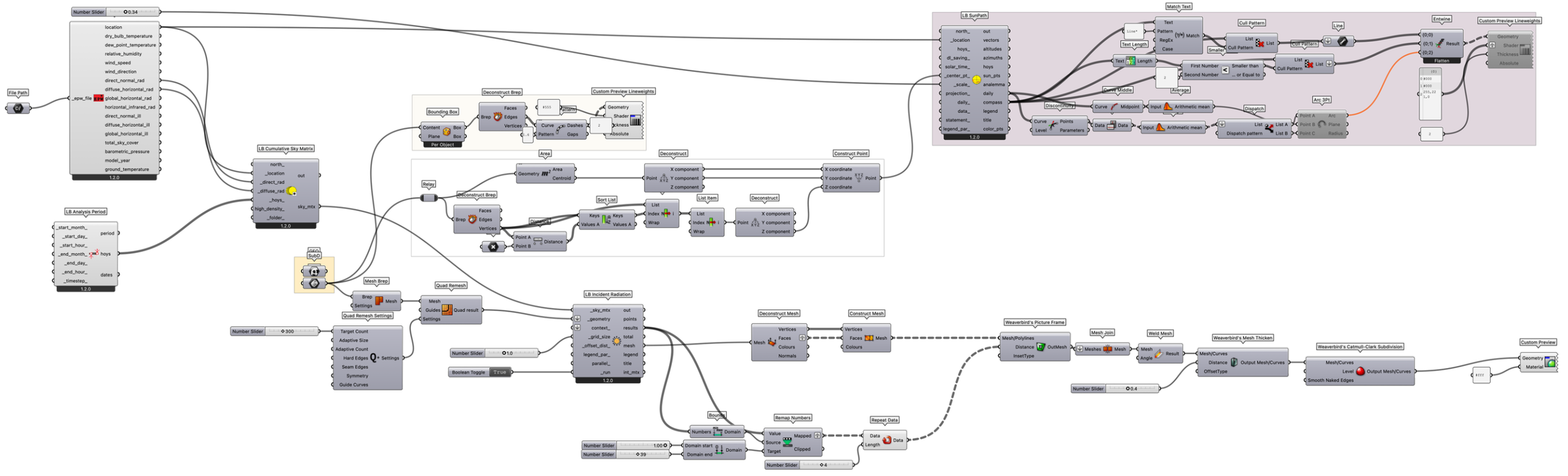
Isometric view



Isometric view

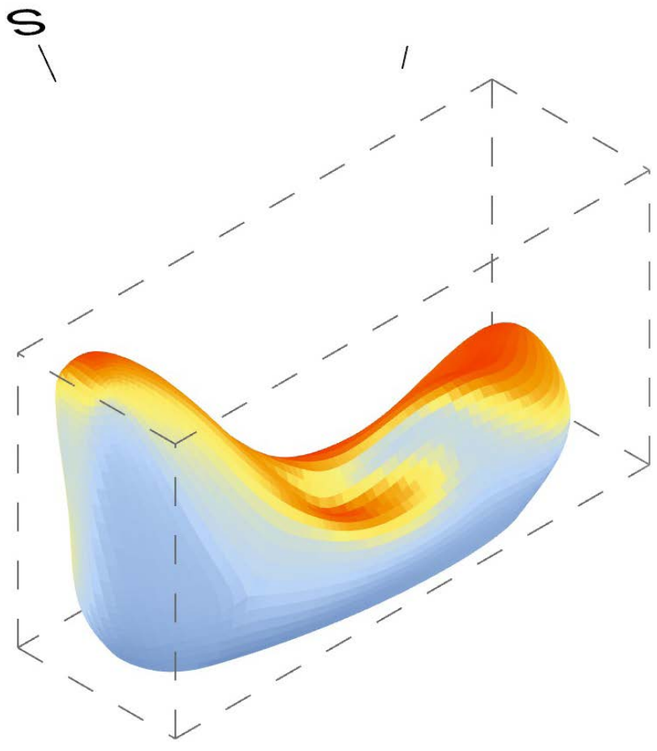
Grasshopper Definition

All Rhino data is either internalised or the geometry is purely Prametricly generated. The Plugin Human is needed for some Display purposes. Weverbird is needed for dis definition.

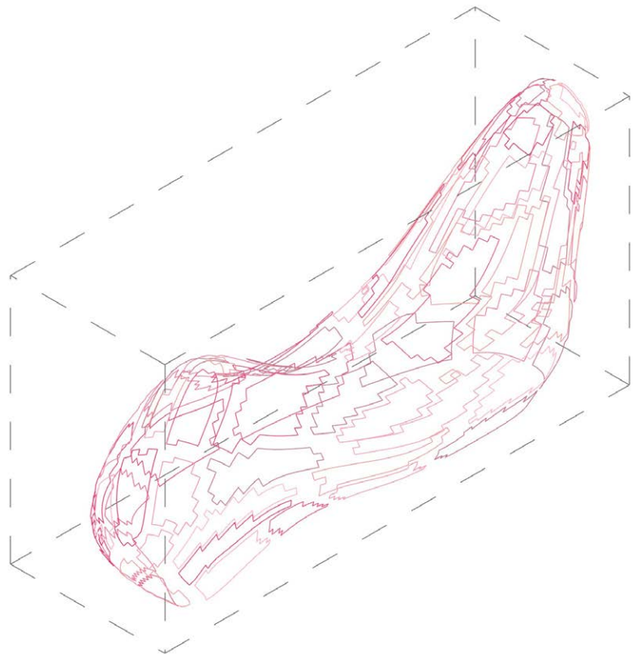


https://pascalnun.com/share/Digital-Analog/GH/[dEk]_WPM_11_-_6_(PN).gh

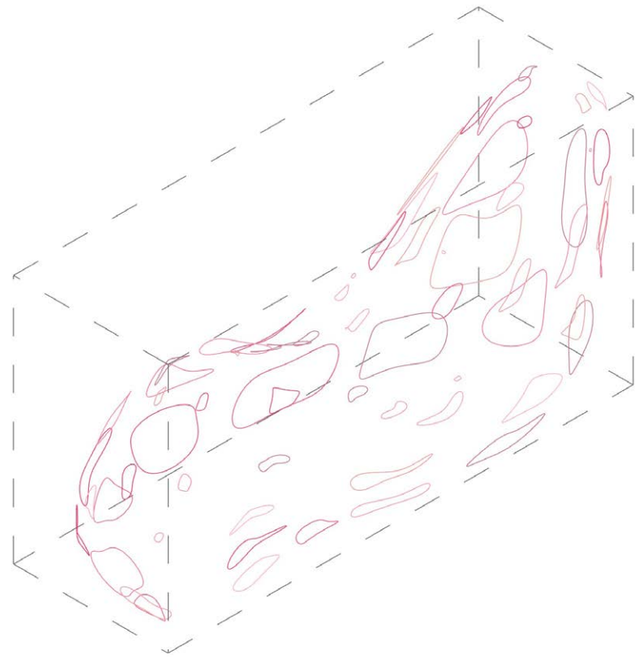
Aggregate 7: Clusterring



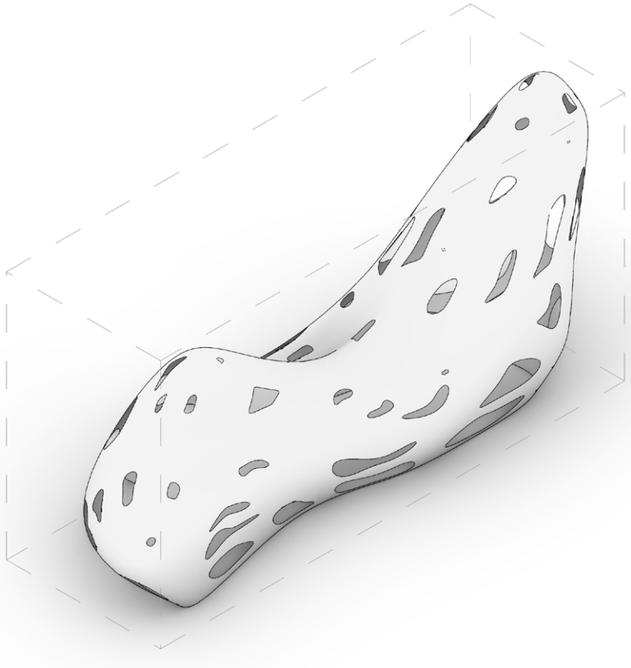
In this final version, a gaussian Cluster method is used to not only offset the individual Mesh Faces but to cluster a finer mesh Based on radiation and Position. So that not only the individual openings are scale. But also the area of the window is determent by it beforehand.



Mesh Face Culster

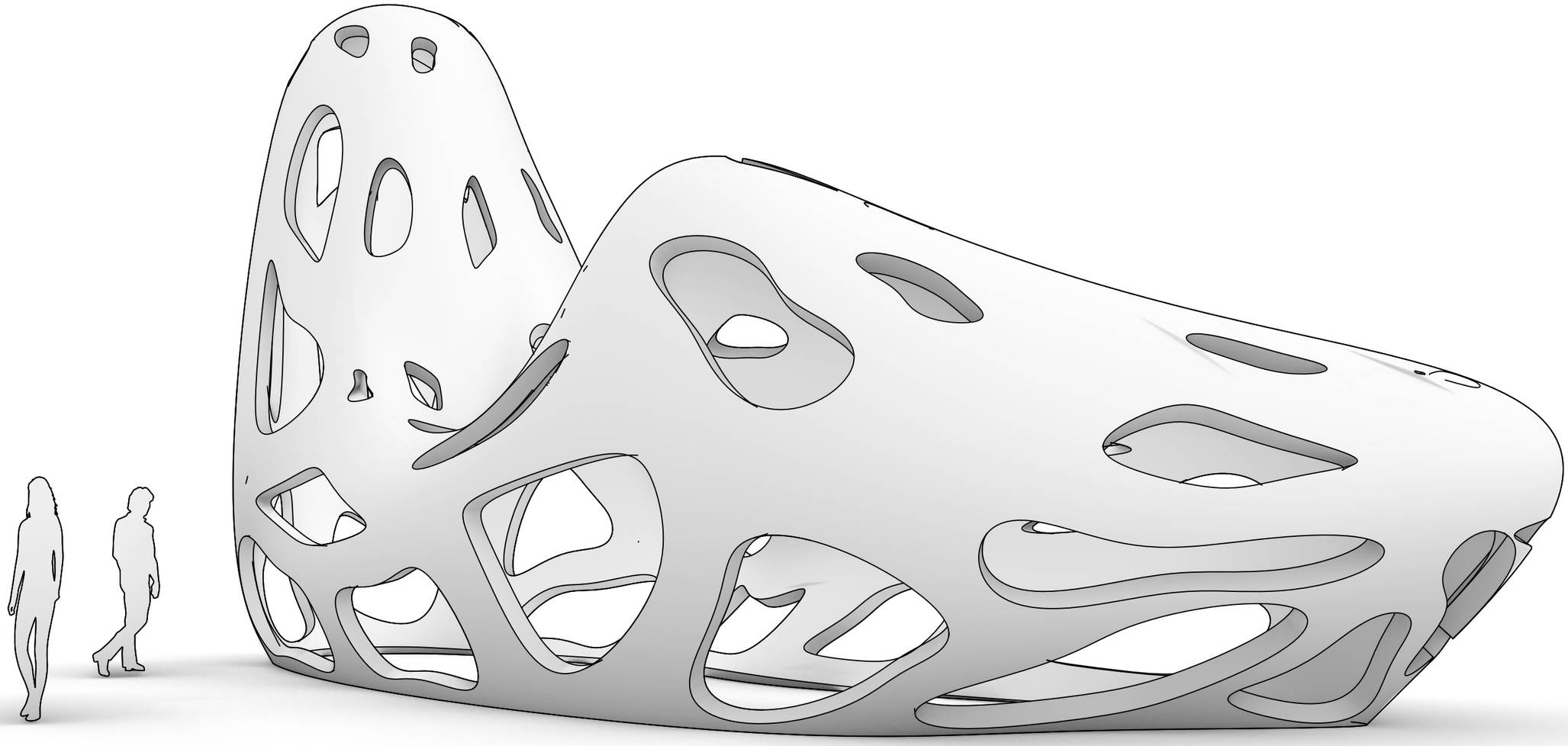


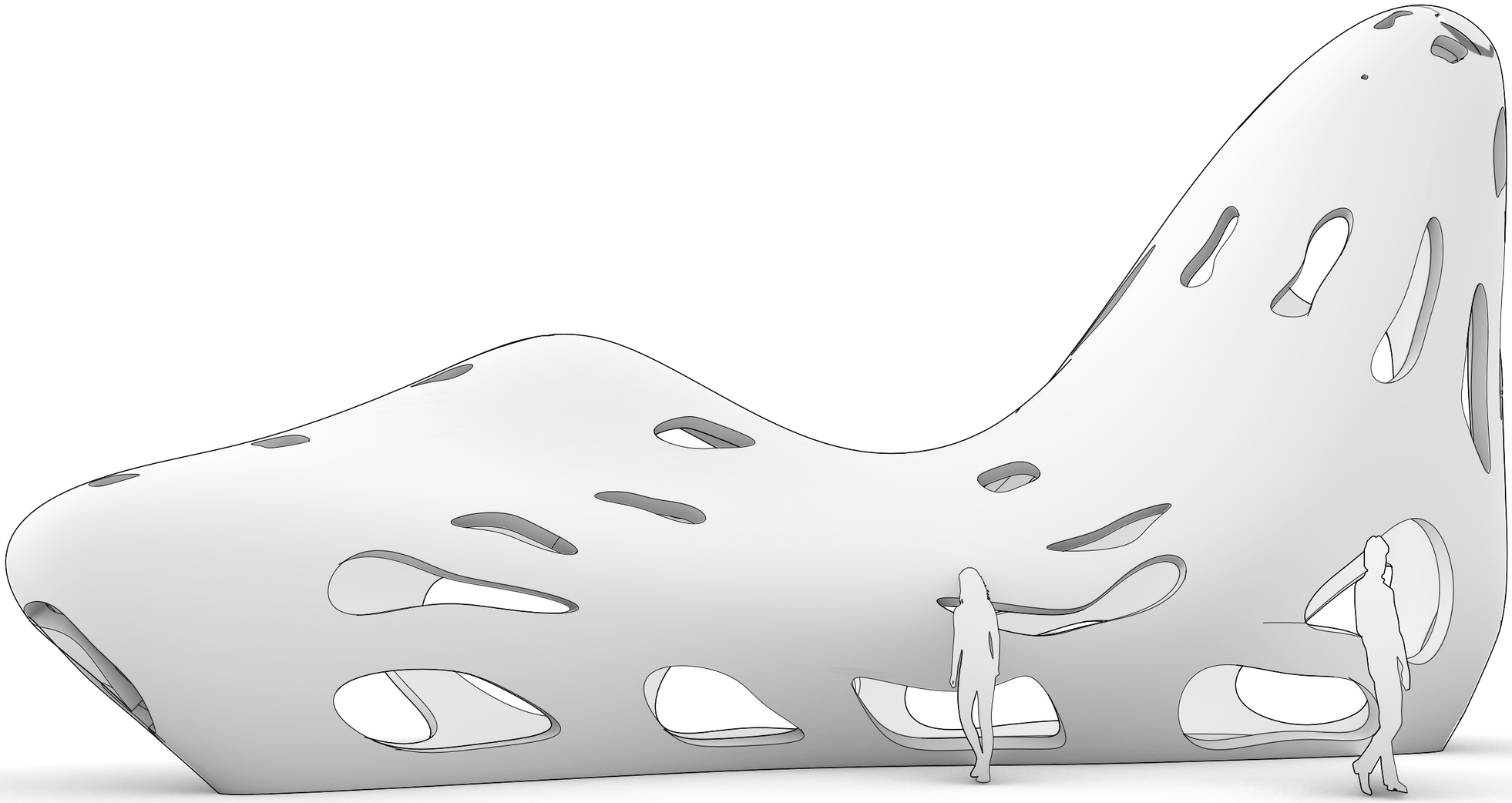
Rebuild Cluster edge

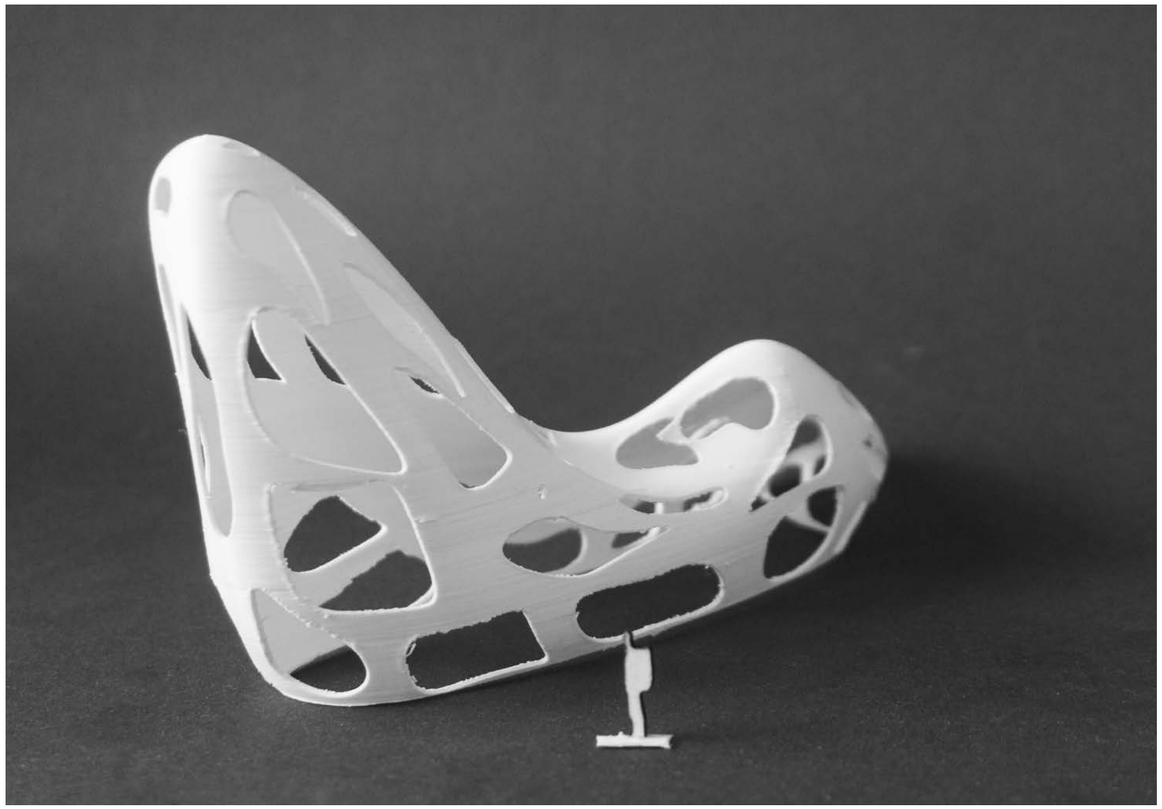


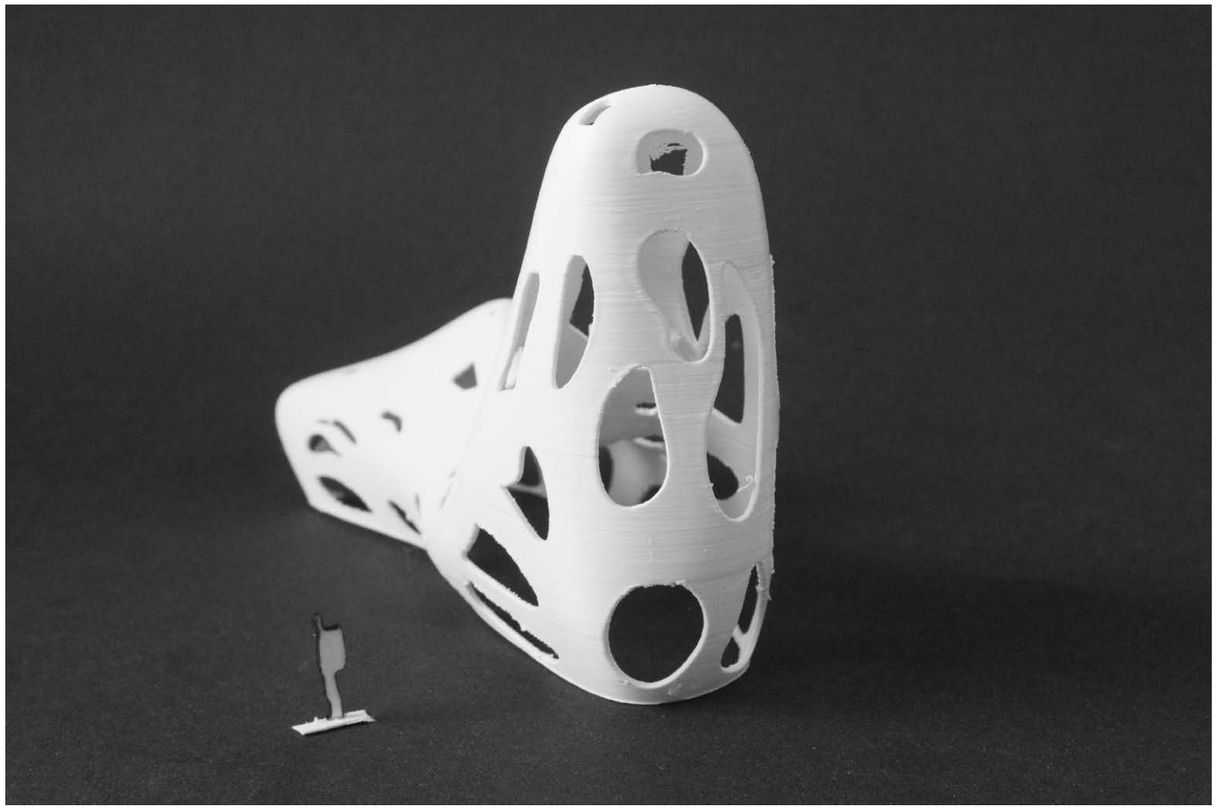
Isometric view

Isometric view



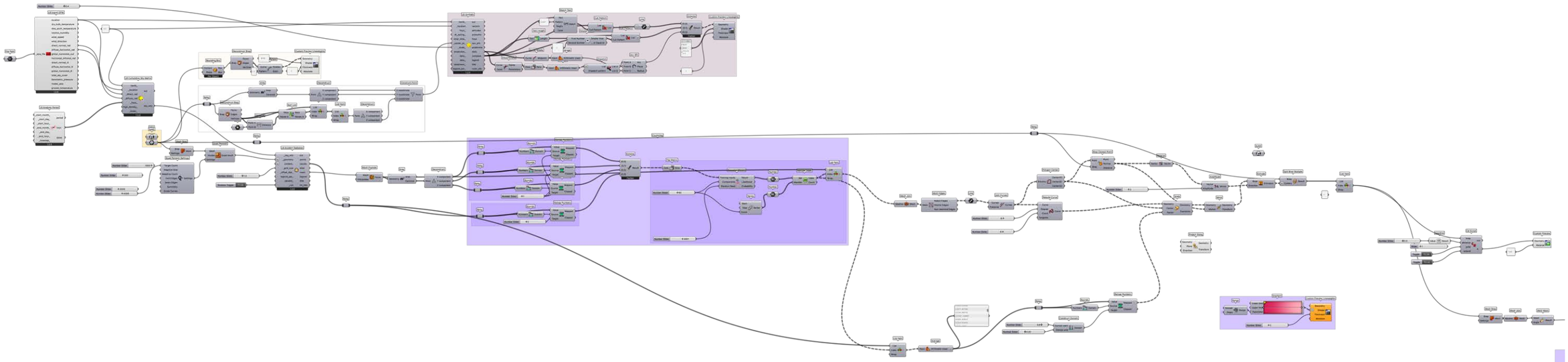






Grasshopper Definition

All Rhino data is either internalised or the geometry is purely Prametricly generated. The Plugin Human is needed for some Display purposes. Lunchbox is needed for dis definition.



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