

DIGITAL CONSTRUCTION IN CHINA

A parametric moldering for double curvature façade with constrains
in construction

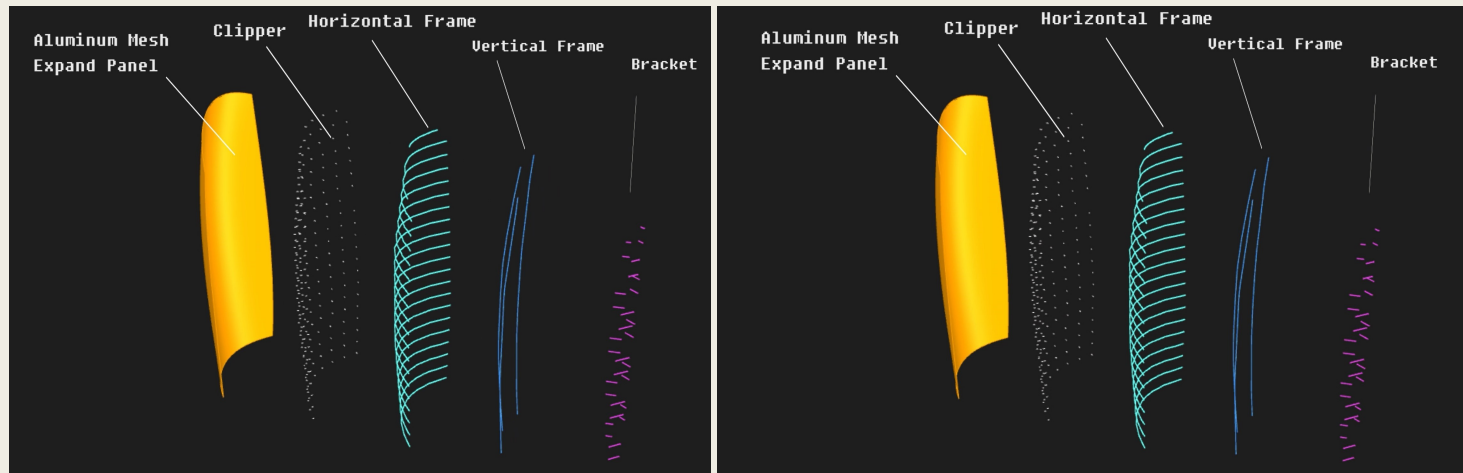
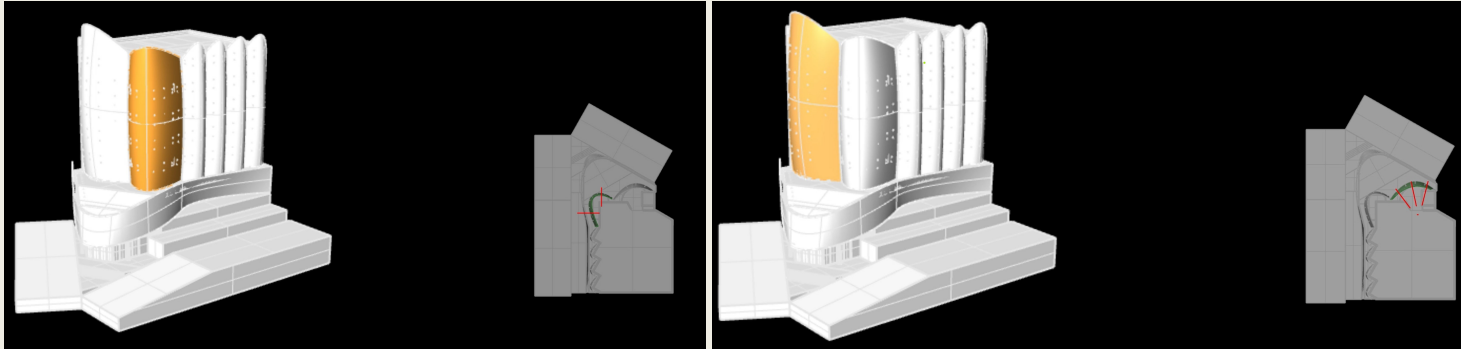
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Background



This project is an exterior renovation project which about setting curve panel to a hospital in Dalian, China. By parametric designing mothed, to solve problems like the developability of curve and fitting existing shape of hospital and to design suitable curve surface.

Previous Outcome

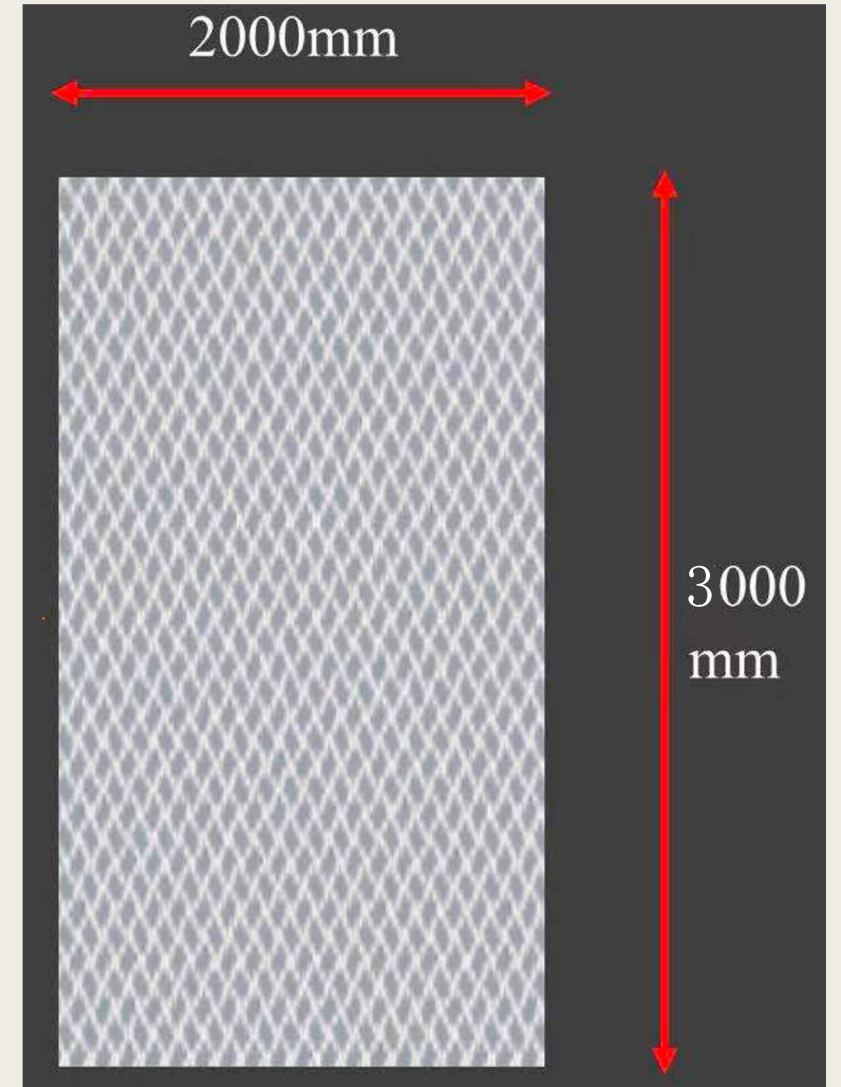


After communicating with manufacturer, we make sure which type of material would be used for façade construction and design a structure for support this façade. We try to segment façade into constructing pieces directly based design model and referring constructing pieces to construct clipper, horizontal frame, vertical frame and supporter.

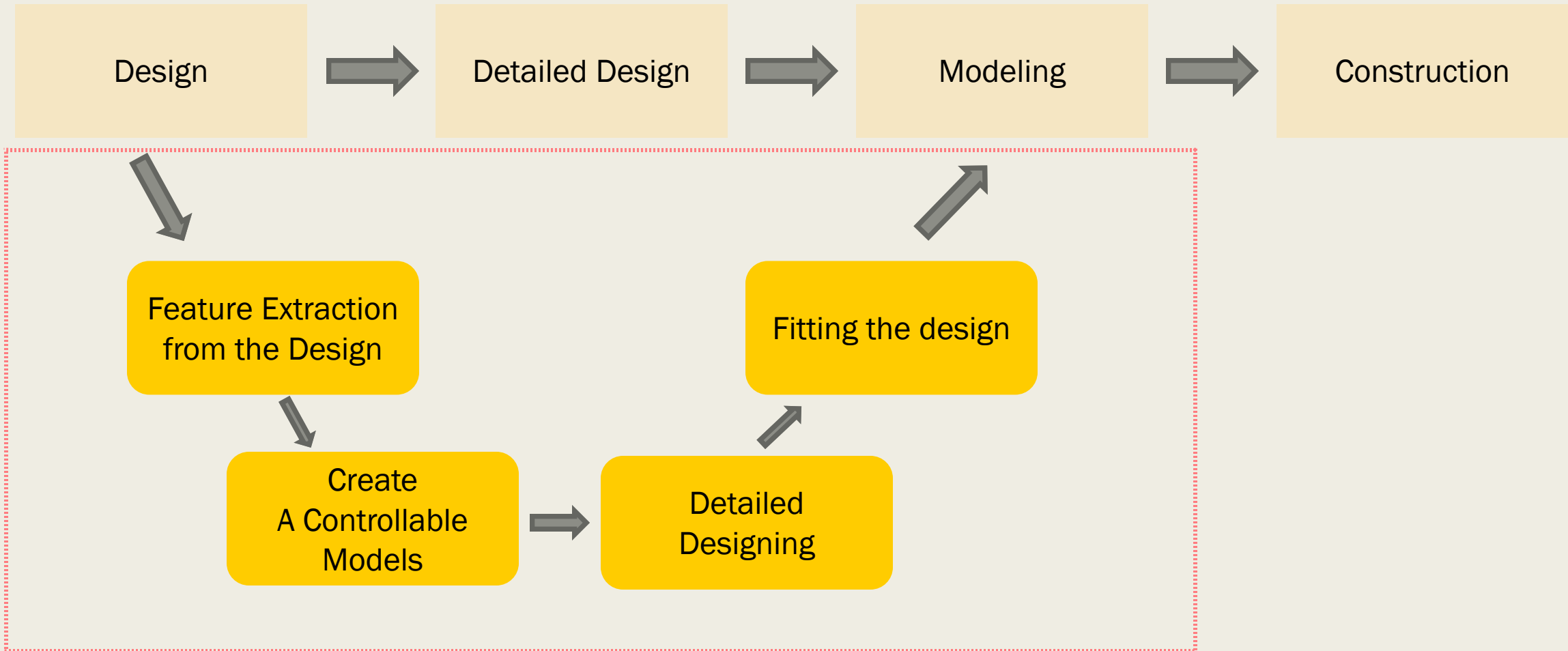
Based on this idea, we try to create detail model based on concept design façade and solve problems in this process.

Material and limits

- 2000mm*3000mm rectangle shape material
- May shift to parallelogram in reality
- Material type: expanded metal panel



Flow Chart



Basic Shape

Goal:

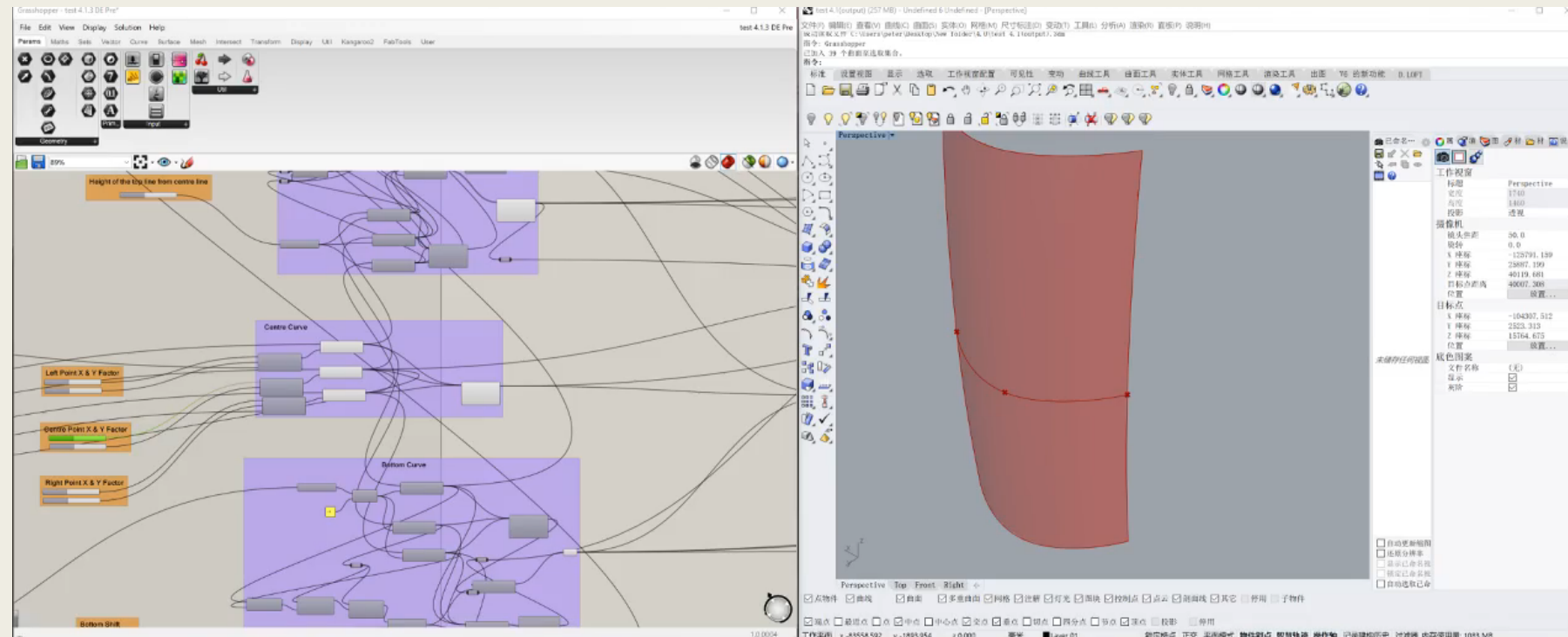
Control basic shape of façade

Parameter:

X & Y factor of three points which consist of base curve;

Z factor of top line and bottom line;

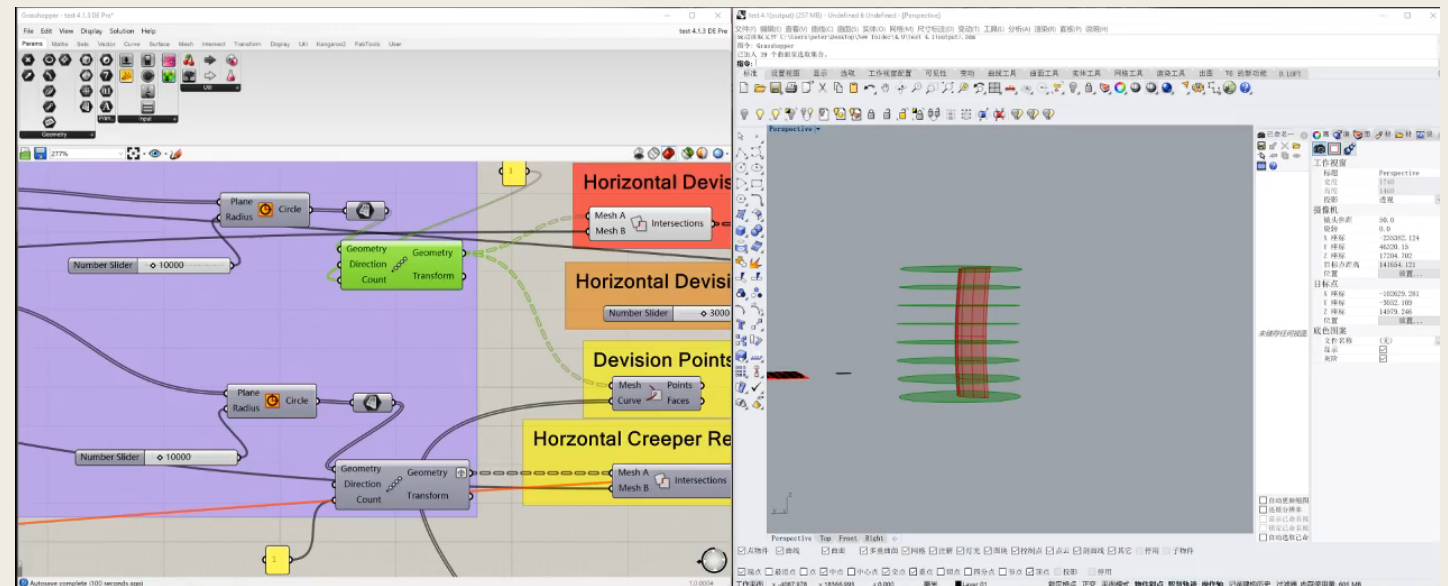
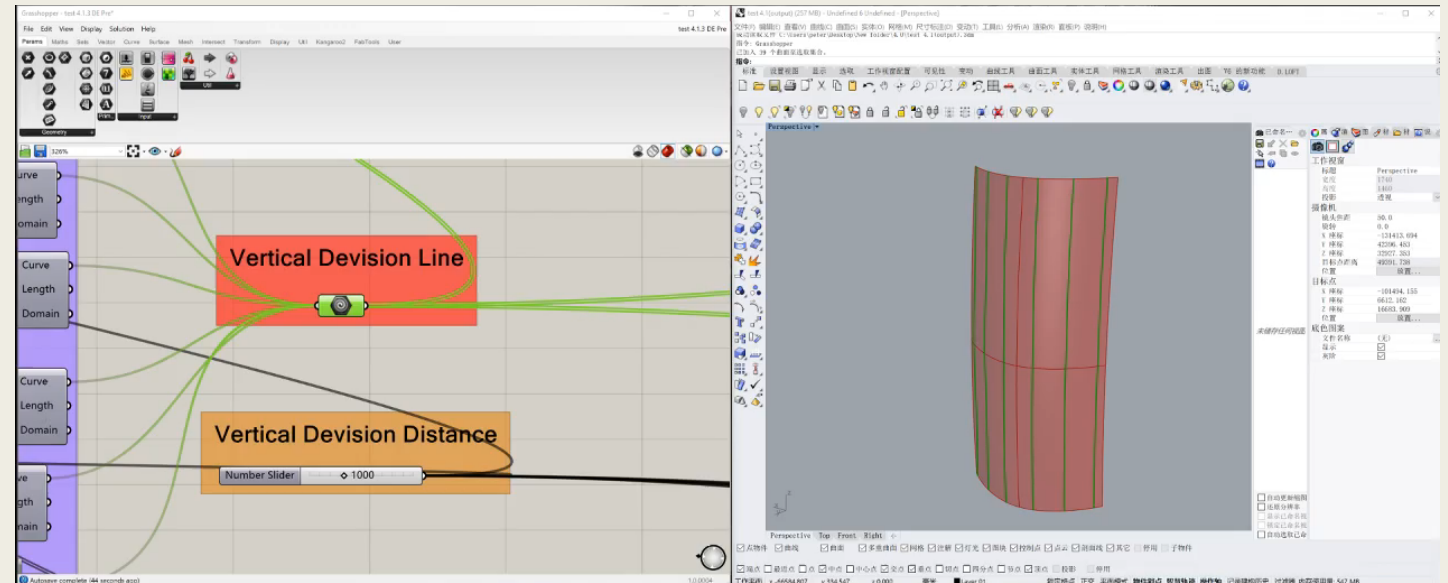
Shift distance of top line and bottom line



Division

Goal:
Control height and
width of segment
pieces

Parameter:
Vertical Division
Distance;
Horizontal Division
Distance



Fixed Clipper Position

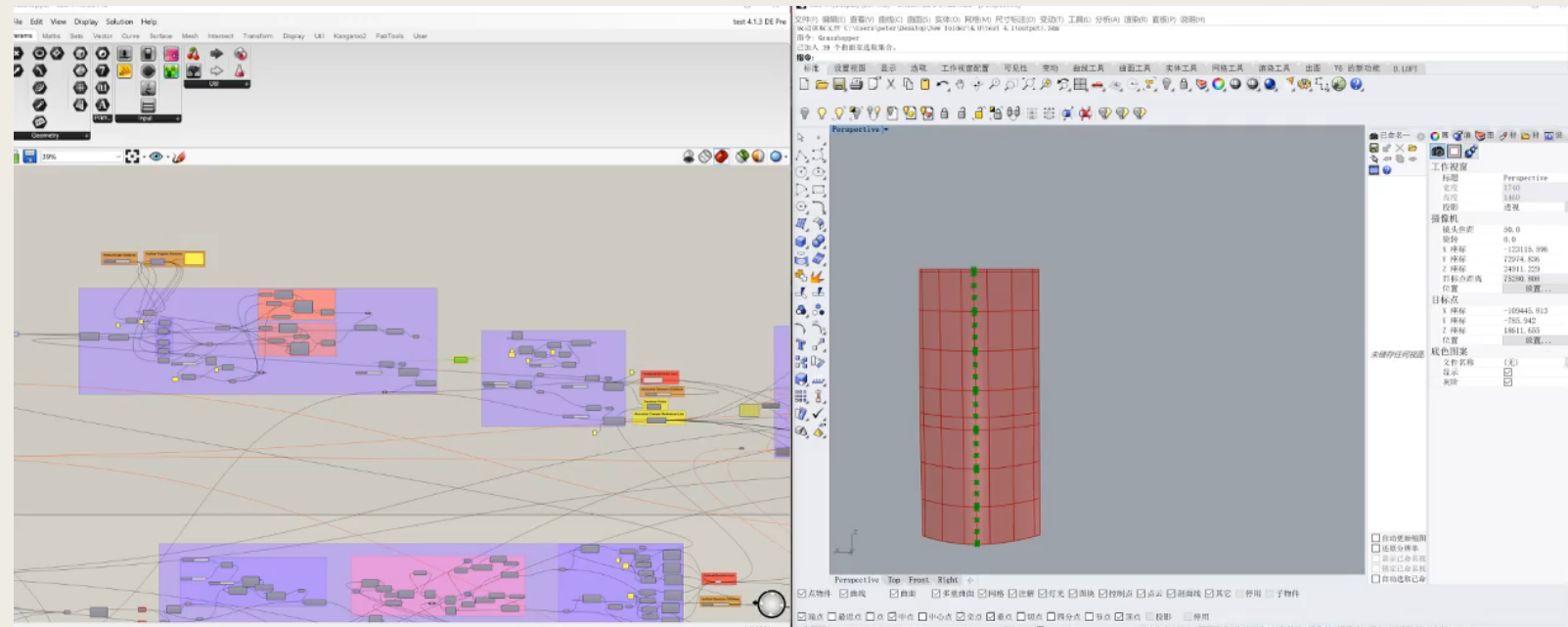
After communicating with manufacturer, we decide to fix clipper with a $2a+3b=3000$ on height and use grasshopper to help to create a model with every given a-value, a b-value come out.

Goal:

Fix and find horizontal clipper reference line.

Parameter:

a-value



Fixed Clipper Position

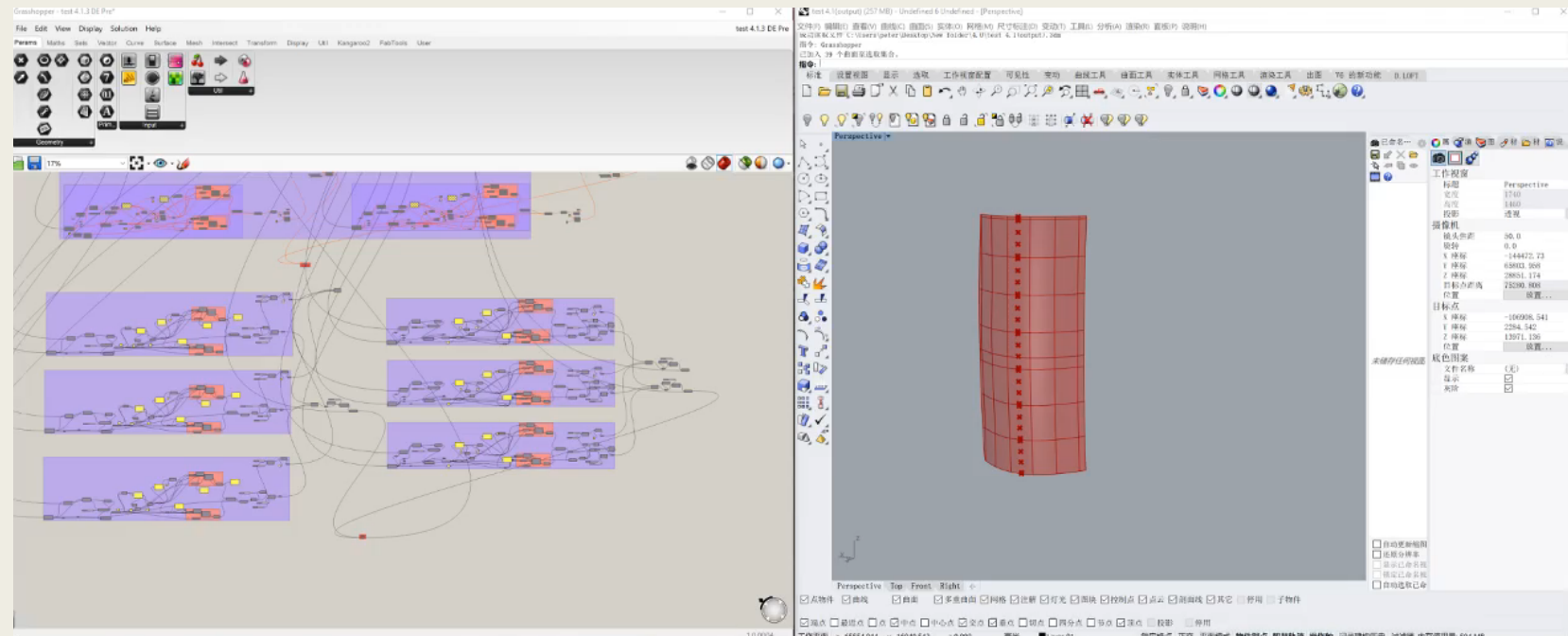
The position of clipper in vertical axis is not as complicated as horizontal axis. It basically equal divides.

Goal:

fixed and find vertical clipper reference surface

Parameter:

distance between clipper



Fitting Façade

Using three controllable surface trimmed with base shape to make new-modeling surface similar with original design façade as much as possible.

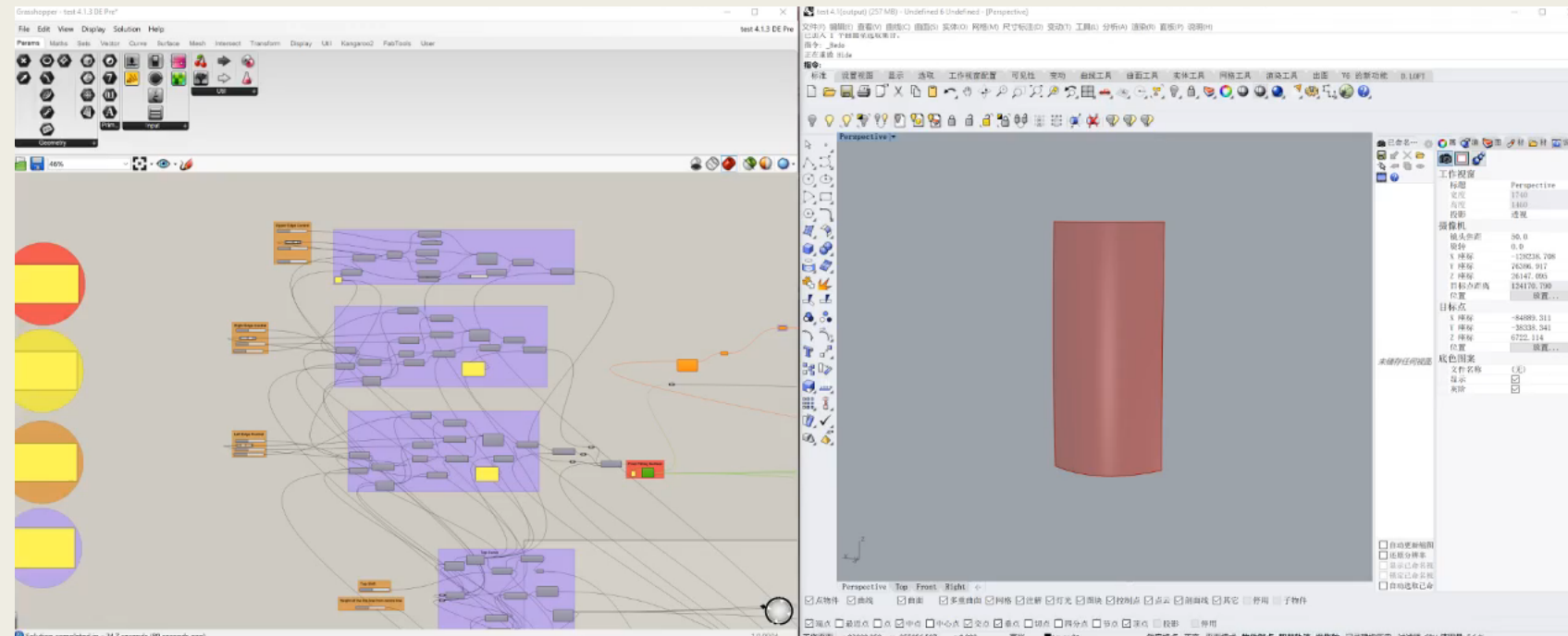
Goal:

trim surface

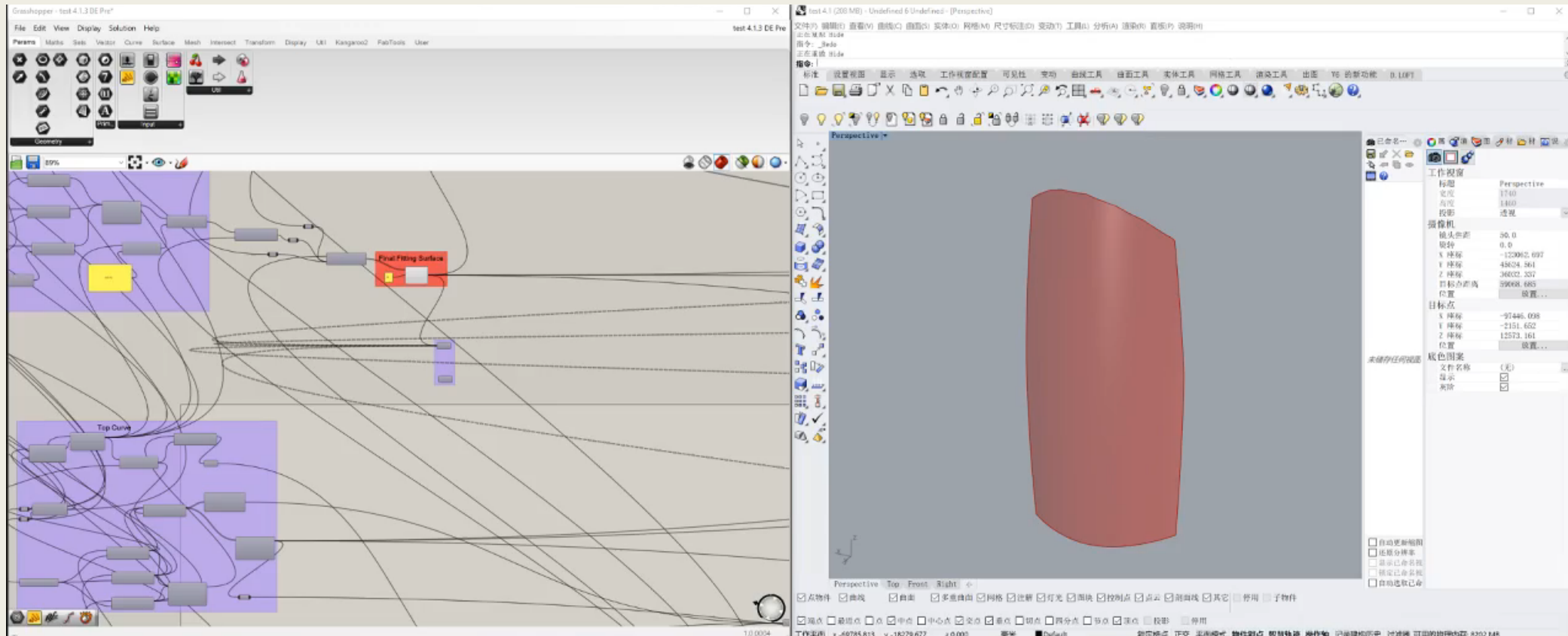
Parameter:

vector of points which consist of curve extruding surface;

Position ratio of middle point of every curve.



Phase Achievement

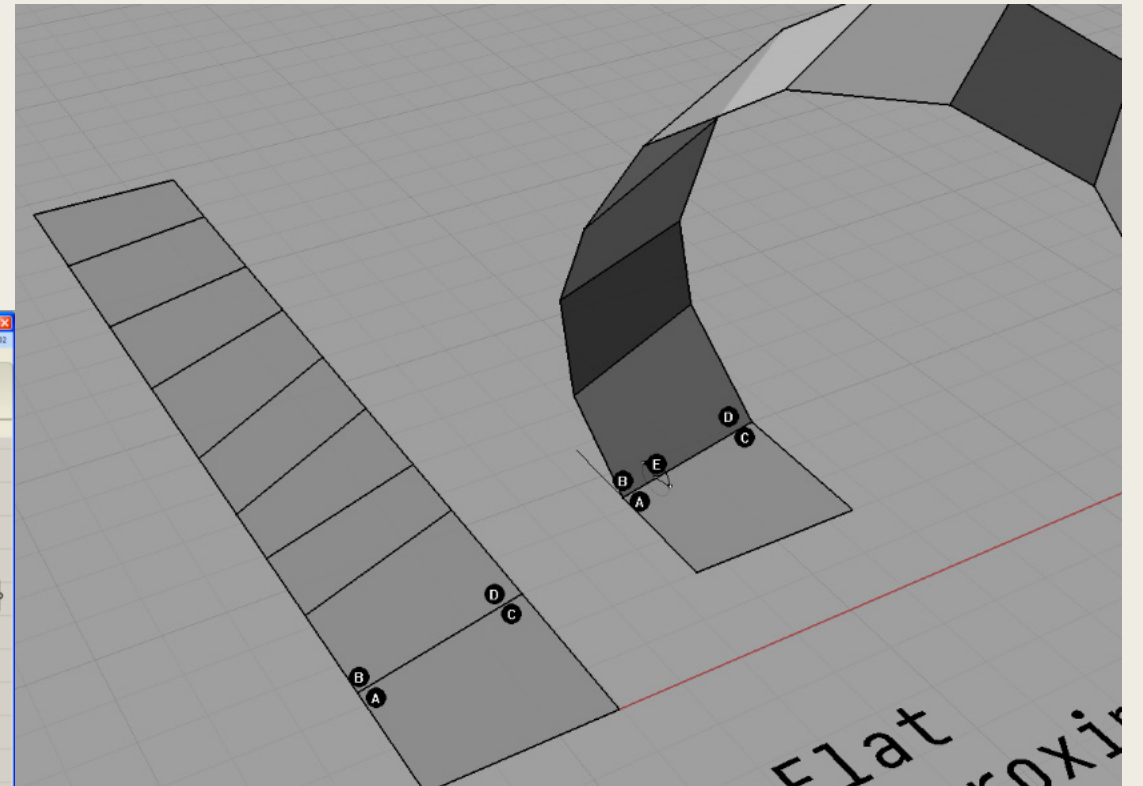
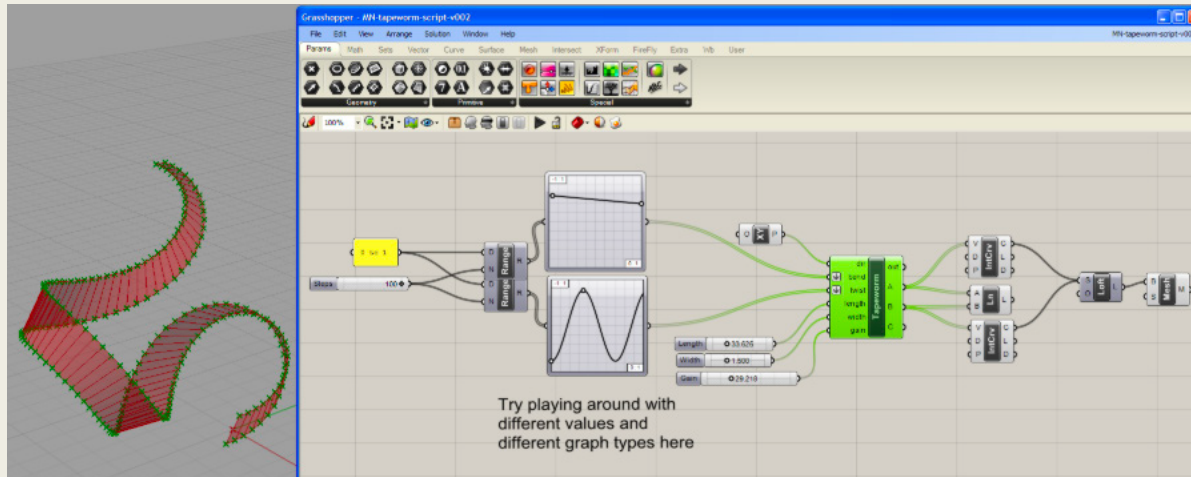


PS: Because constructing in Dalian is still in process, detailed design in this video is not final version. With completing this controllable grasshopper model, changing and fixing in future would be easier and faster.

モデリング方法

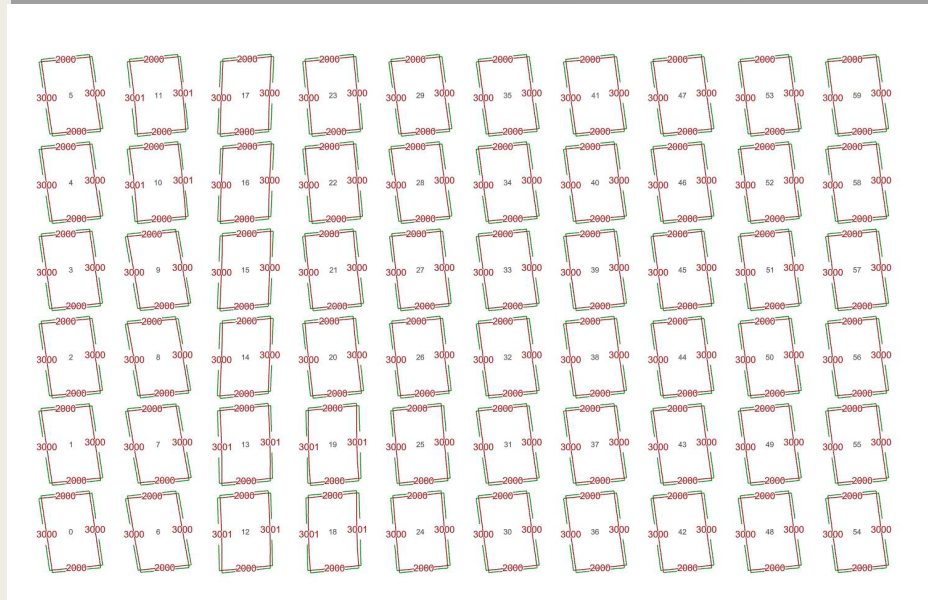
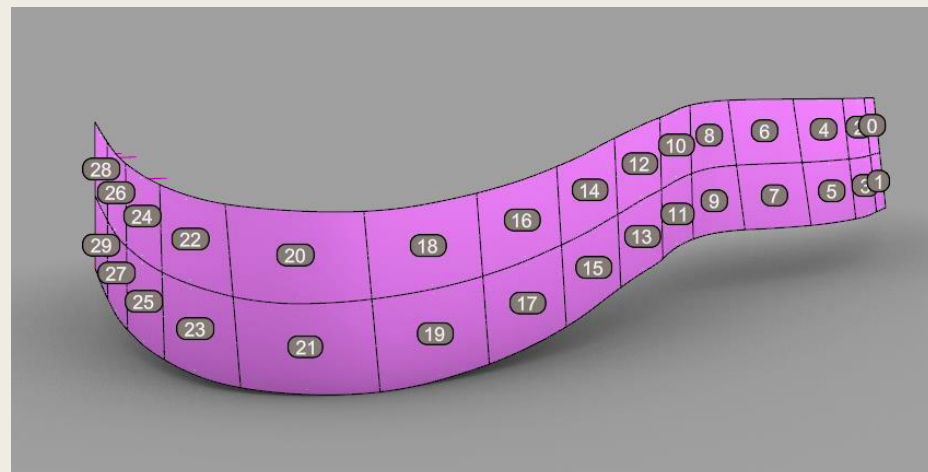
- モデリングツールはgrasshopperのtapeworm(bend,twist)

(二次曲面を可展面とするために、複数の平面パネルで目標の曲面の形に近似させる。)



結果

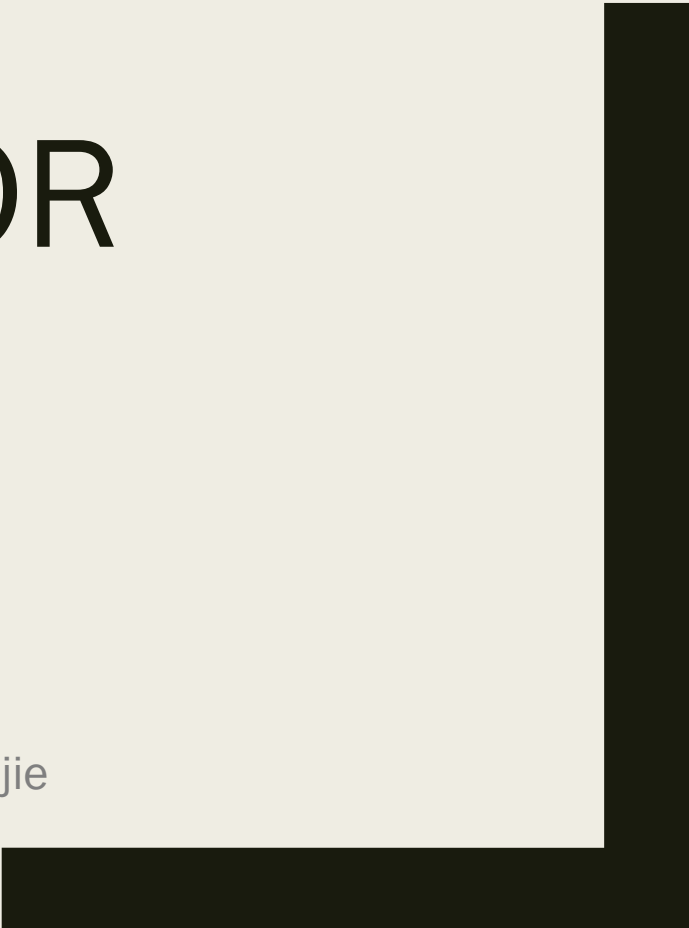
製造上の制限をクリアした平面パネルの組み合わせで、目標とする二次曲面の形に近似した二次曲面建築要素のモデリングが完成した。





THANK YOU FOR
LISTENING

Team Member: Liu Pichen, Chen Sen, He Weijie



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