

Chapter 3

Treating of geometric organization and the flexibility of space.

Far-eastern international competition award, 2005

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探討幾何式的組織與空間的變動性

2005遠東數位國際競圖入圍作品

本研究 是從生活中熟之的材料的發想，到人對於一般建築物的既有觀念。試圖想尋找 一種更親切的介質 改變一般人所依賴的固定的空間。
如我們身上穿的衣服，因為質料有彈性，剪裁合適，才能使穿者 舒服。所以過程中，我們用了皮層，在構造和材料上來回的實驗了幾種可能性。
希望能藉此探索空間構築更多的發展性。



The main idea for this project is coming from material of familiar daily life. We attempt to break the preconceived ideas of fixed architecture space therefore try to find out yet more friendly and intimate material. Consequently in this research, we study about the construction of soft skin material, and then we create a flexible landscape with geometric rhythm. By this way, we explore more and more possible about relationships between humanity and space construction.



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Trigger:

Surface & note point

面與節點

1. 節點位移拉展出不同大小的開口
兩個面向的節點產生不同類型的單元空間

皮層分析

延展過程

2. 2D展開 3D展開
3. 分割向度
4. 延展的面



MODEL1

Material : Rapit Prototype



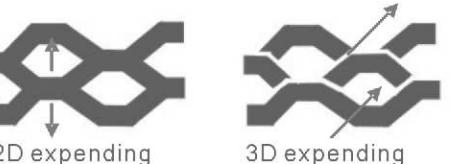
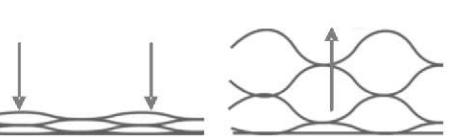
1. From the multiple-dimension surface
Control the nodes with two sides to create
Different unit prototypes.

平面的皮層，經由切割的動作，
將面分割為線，再由連續的線展
開成三度網狀的形式。

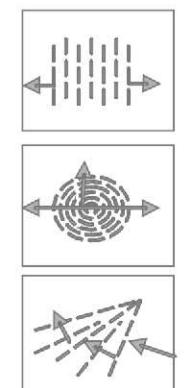
同一個形狀的皮，經不同的切割
方式(密度方向)，從"面"轉化至"網"
的過程中，產生了新的組織方
式，最後因材料施予不同外力，
改變了原先的形式，成為多重面
向有彈性的展演形式。

任何位置或方向的外力(扭曲/拉
扯/延伸)，作用在網狀的系統
中，必然產生力的連鎖傳遞效
應，亦是一種動態演繹的展演過
程。

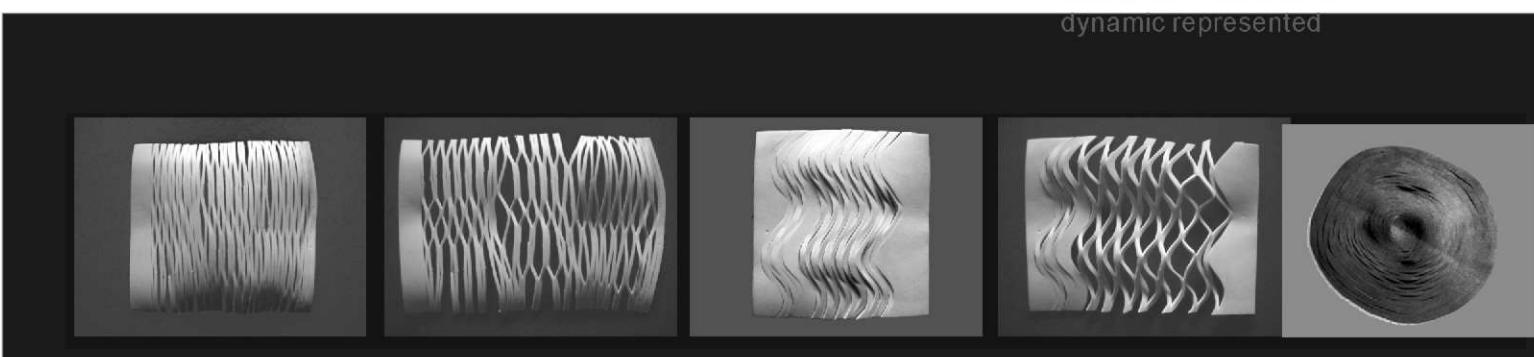
將活動(program)比喻為外力，
在不同時間，不斷改變、介入此
三度的網狀系統。



2. Expending surface



3. direction of cutting



4. forms and cutting action

Flat surface : The cutting action can split the surface into line . Then, by connecting the continuous lines , they can spread into 3 dimensional

The surface which has the same shape is sliced by different densities and different directions. In the process transforming the surface to the net, it will become new organization way. Finally , because of the material character , the outside force transform the original form into multiple Program is also one possibility of outside force. It constantly interacts the 3-d net system all the time.

Outside force in any location or any direction (such as twist , stretch, extend), will change the net system, then raise the chain reaction about force . This is also one kind of dynamic represented



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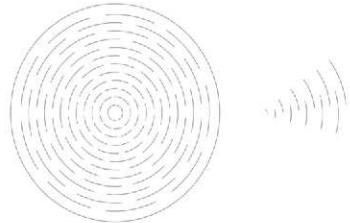
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Operation the skin in plan

MODEL1

Material: sponge / flexible material

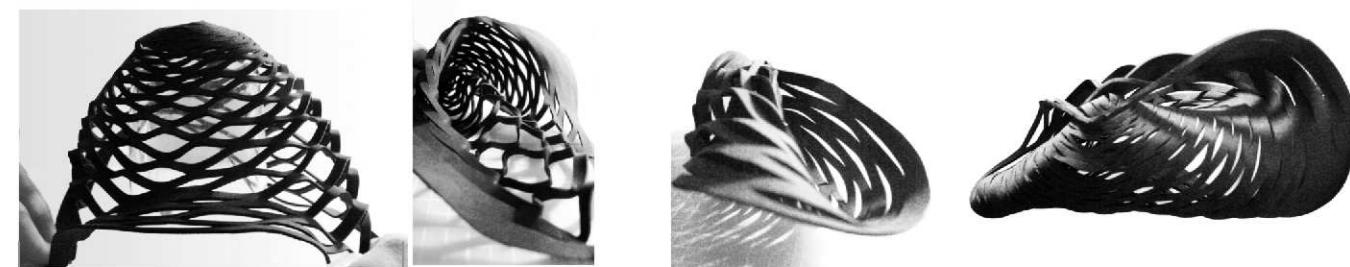


FORCE2 : the structure fixed itself



力1:自我制衡的力

彈性材料
向心狀線的密度
2D-3D 外力影響展開方式



Density of line with centrality

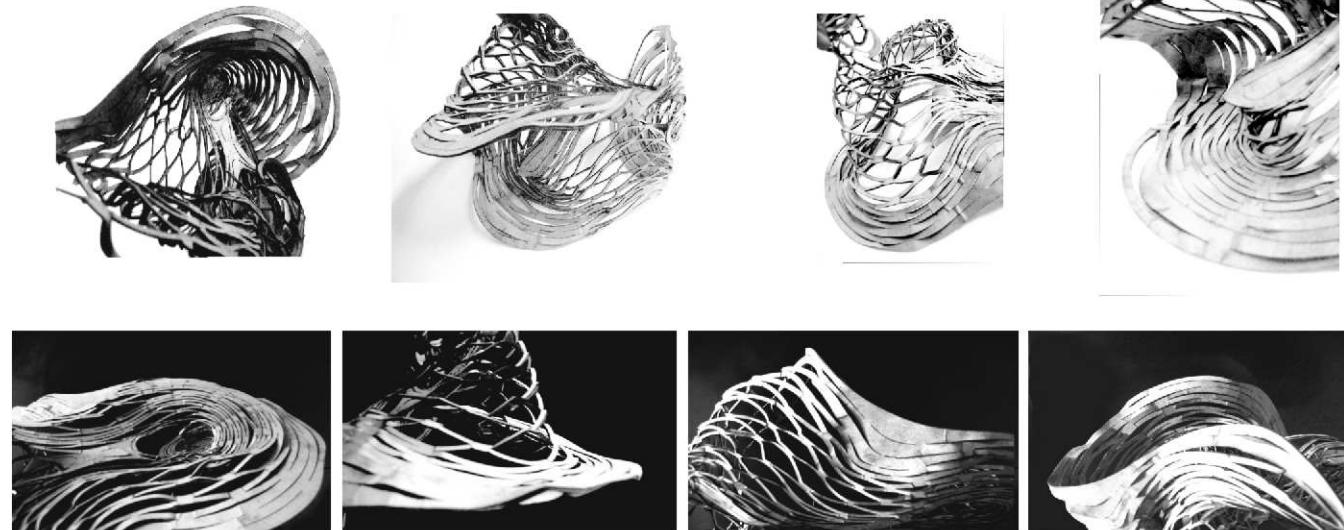
Line :skin cutting and regeneration

Transform 2D to 3D

External force effects the expending way

MODEL1

Material: paper mold /shaped by glue



The process of transform 2D to 3D



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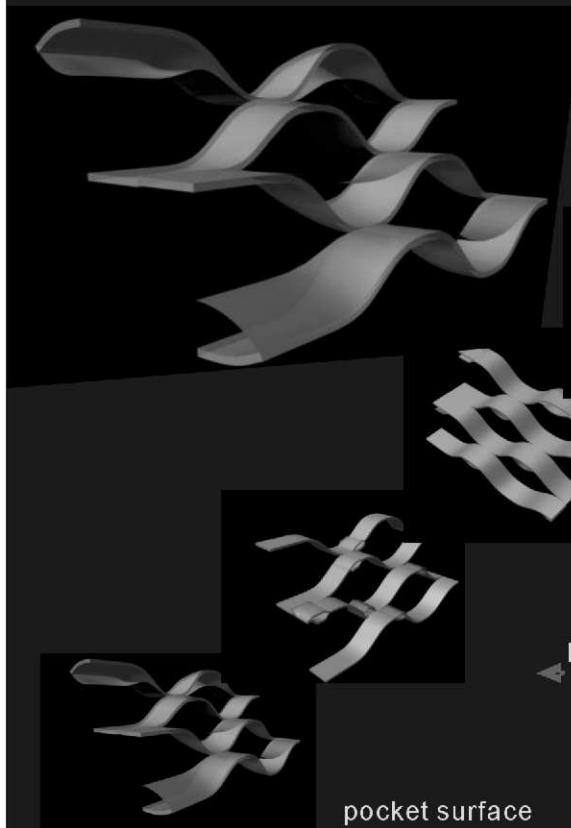
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Analysis: material character/
Organization

Material character



皮層分析

材料特性/組織方式密度

Tube space

管狀式

resplit surface

皮層分裂

central node (space)

中心分裂

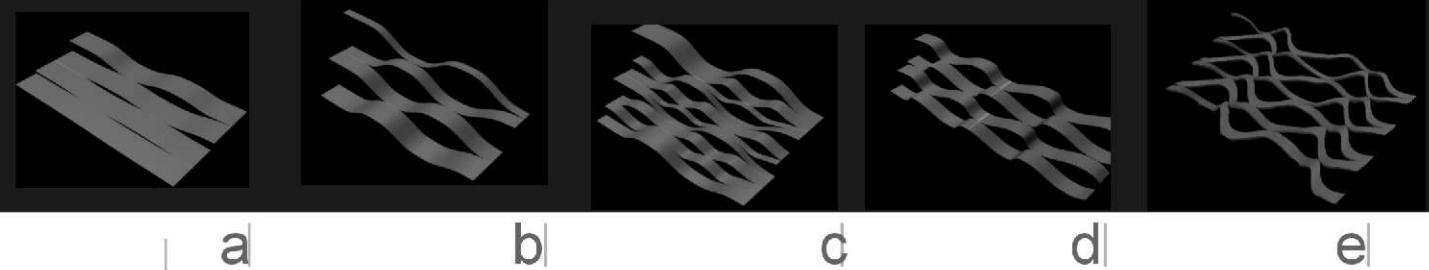
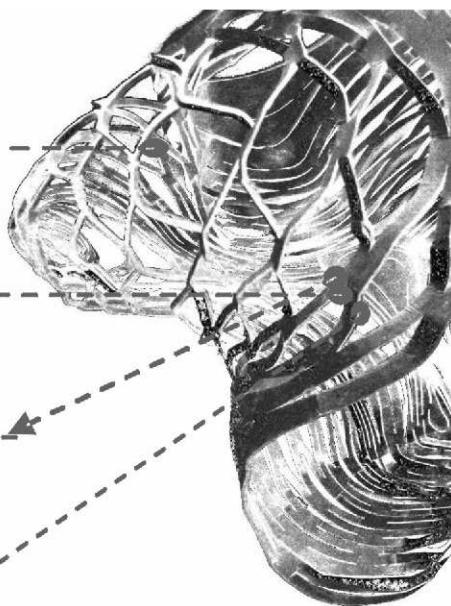
Interlock node

交錯的節點

pocket surface

袋狀

Organization/ density



| a

b

c

d

e



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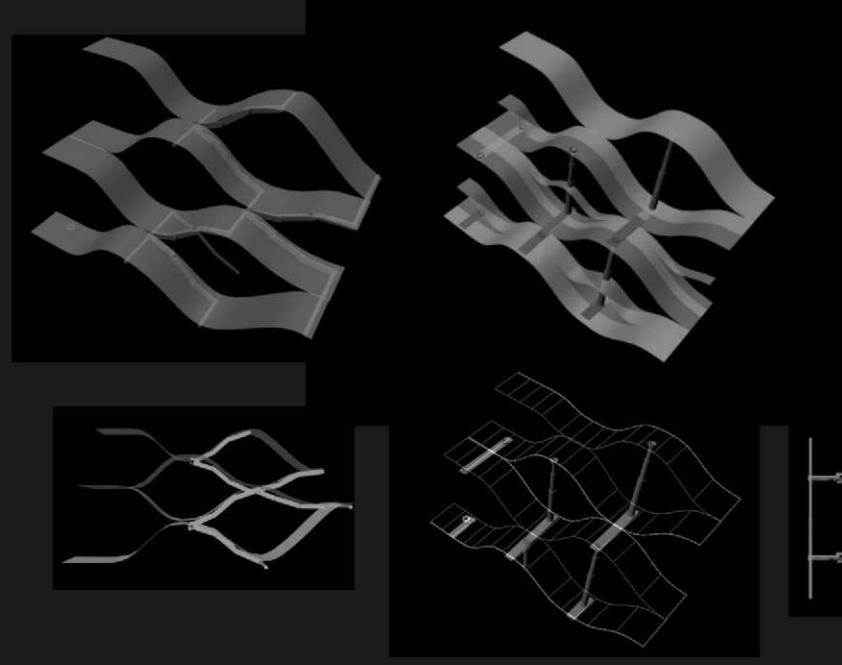
Operation the skin in plan
Manufacture frame structure

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MODEL4

Material: sponge /flexible material / gasbag structure

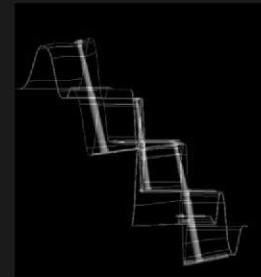


FORCE2 : outside hard structure

桿件結構 力2 外來的硬性結構

材料: 氣囊 泡棉 桿件

將單元化的桿件結構串聯出幾種路徑，因為不同路徑的配置而會有不同空間，在桿結構連結的支撑下，使原有的平面皮層，展開為暫時的可變空間。

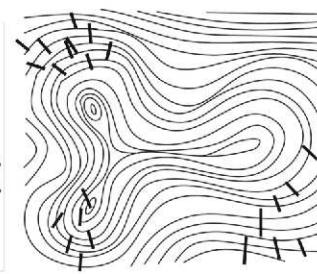


FORCE2 : outside hard structure

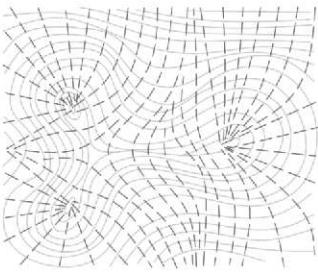
Connecting the stick units
Will create **several paths**
Then we arrange the path in different way to create different space. By this stick structure system, By this stick structure system, 2D plan surface will expand into **temporary flexible space**.



structure point



cutting line



expanding direction of surface



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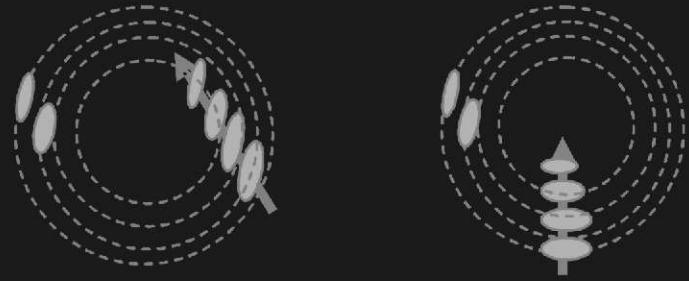
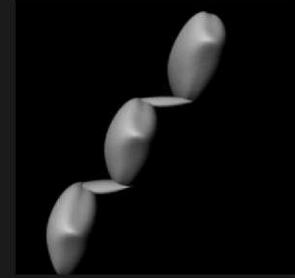
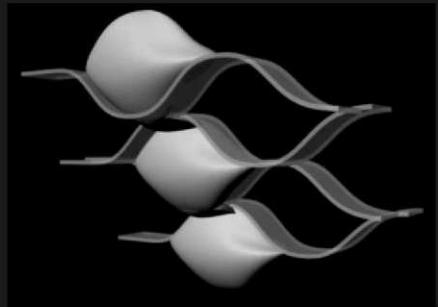
Operation the skin in plan
Manufacture frame structure

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MODEL4

Material: sponge flexible material / gasbag structure



1. Structure point / cutting line

FORCE2 : outside soft structure

力2：外來的軟性結構

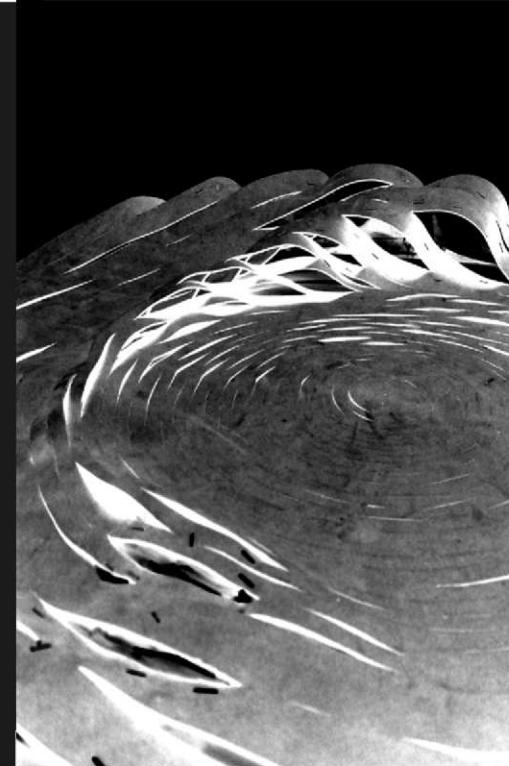
材料：氣囊 泡棉 槀件

將單元化的桿件結構中聯出幾種路徑，因為不同路徑的配置而會有不同空間，在桿結構連鎖的支撐下，使原有的平面皮層，展開為暫時的可變空間。

1. 切割線 / 氣囊配置路徑
2. 直徑90 cm 模型



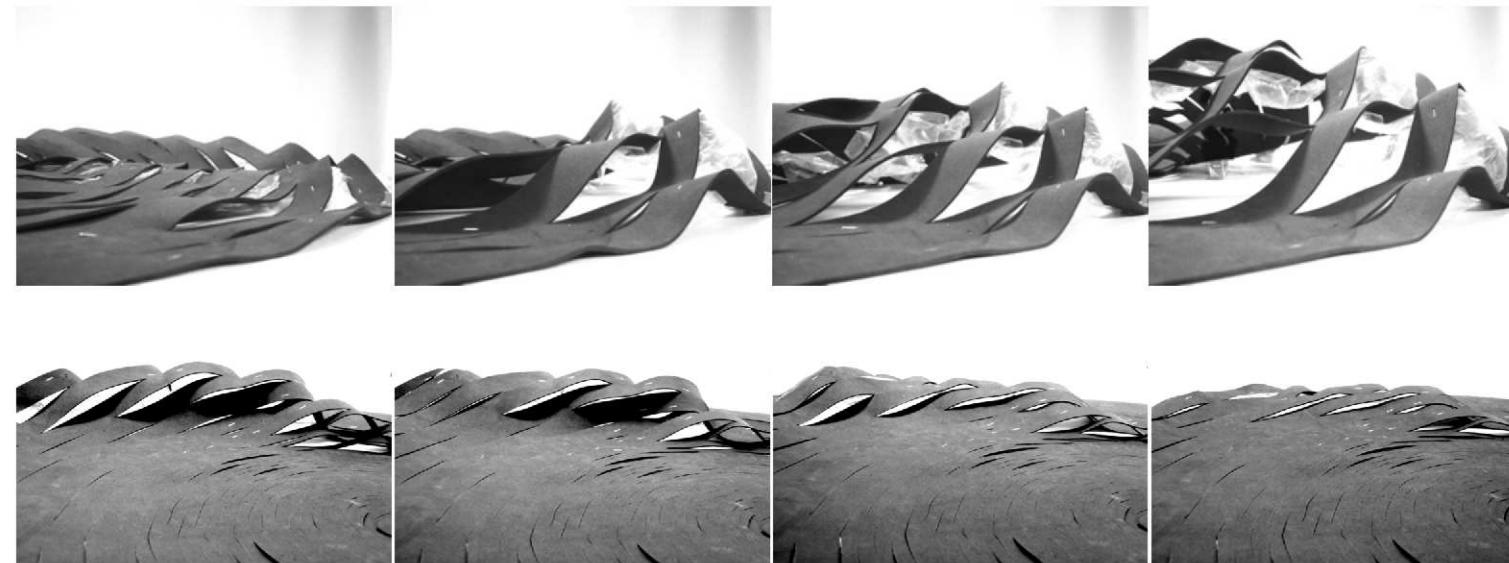
2



FORCE2 : outside soft structure

Material: sponge flexible material / gasbag structure

Connecting gasbag structure units will create several path. Then we arrange the path in different way to create different space. By this gasbag structure system, 2D plan surface will expand into temporary flexible space.



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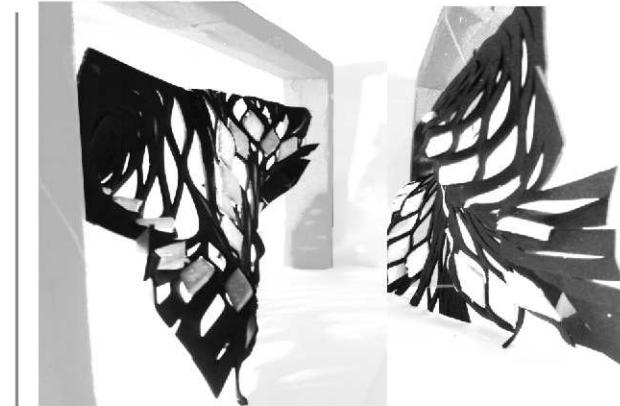
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Operation the skin in elevation

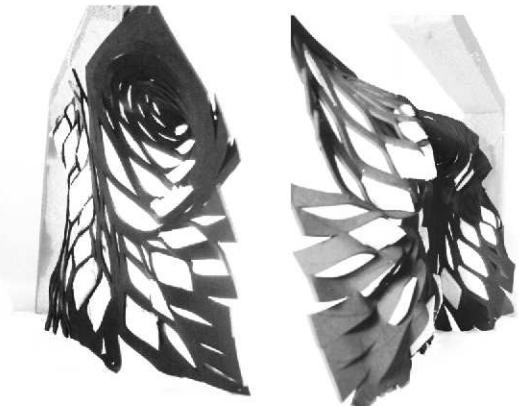
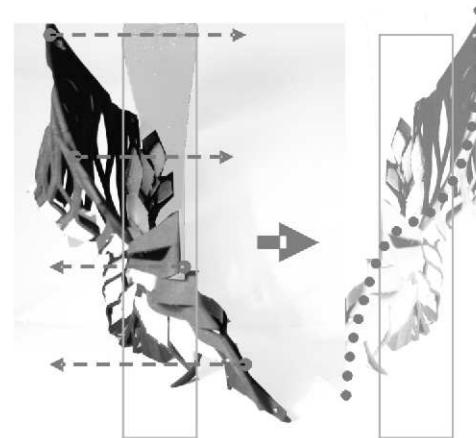
MODEL5 Material: sponge /flexible material / gasbag structure

立面操作皮層

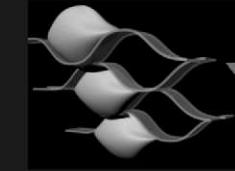
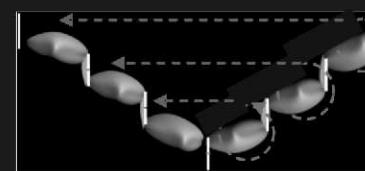
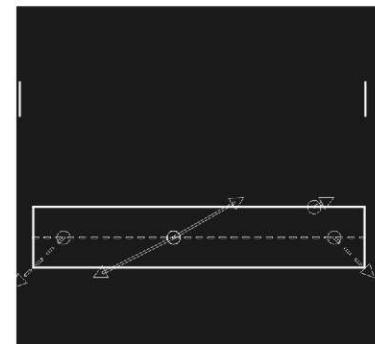
連續的氣囊可以反轉方向 雙向延展皮層



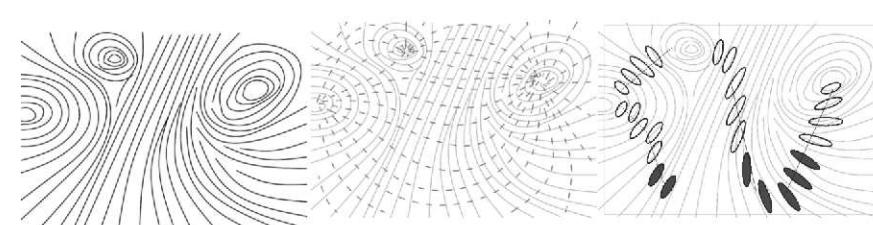
Direction 1



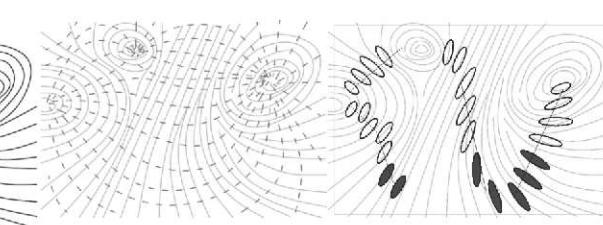
Direction 2



1. The continual gasbag can reverse the direction of shape.



2. Cutting line



3. Expanding direction of Surface



4. Cutting line / Connecting gasbag



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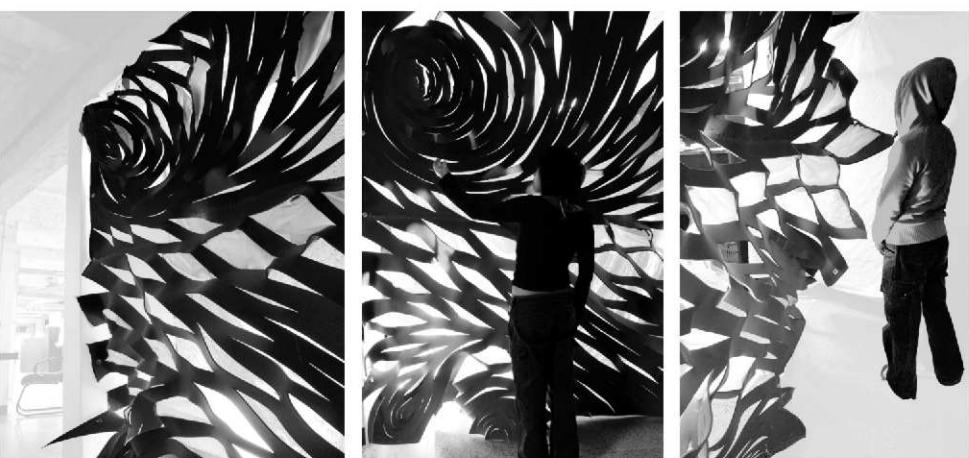
Operation the skin in elevation

MODEL6

Material: sponge /flexible material / gasbag structure

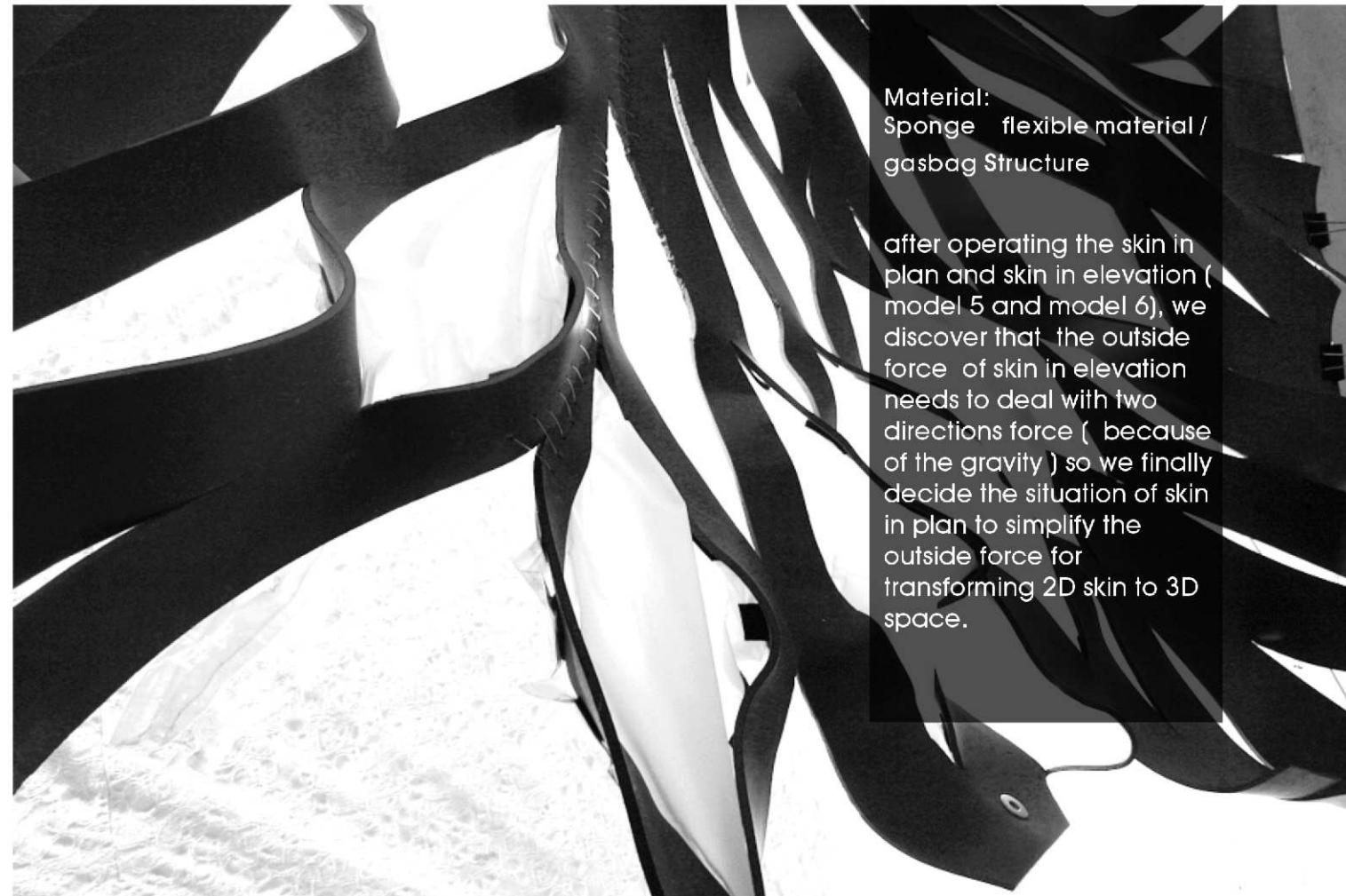


1:1 scale model



材料：泡棉 彈性材料 充氣結構

從不同向度操作皮層後 發現 立面系統必須抗衡兩種方向以上的外力model 5 and model 6(重力斜撐力)，而平面系統的施力方向與正好與重力平衡，較容易將皮層從2D展開成3D，最後以平面系統再續發展。



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Operation the skin by triangle line system

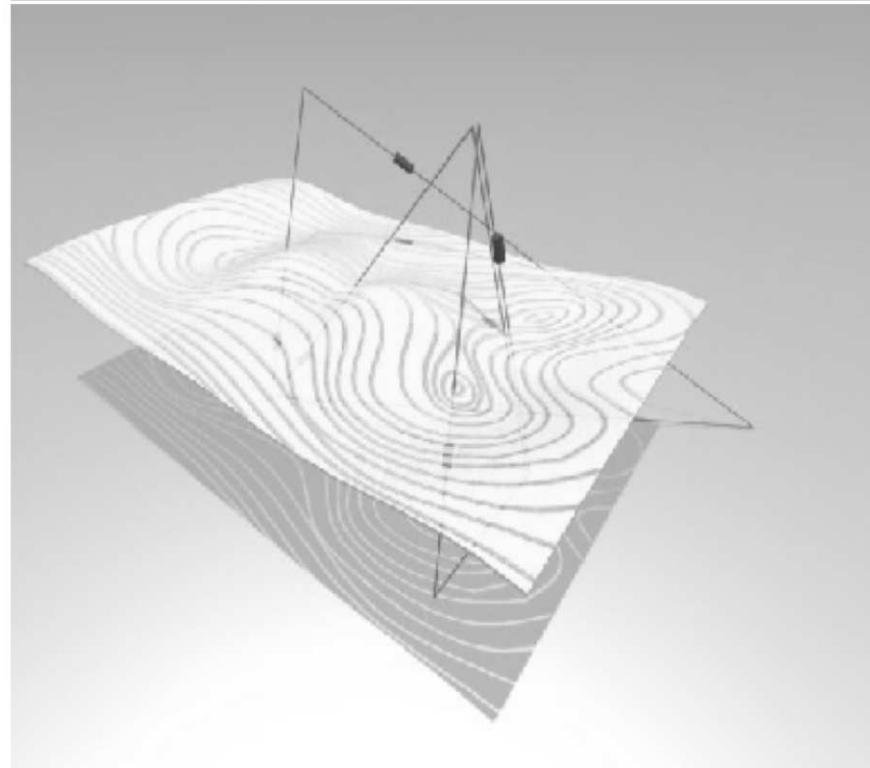
自動化控制的三角系統

從之前的討論，我們將重點放在影響皮膚展開的外在作用力上，最後假設馬達可以控制移動的線，然後以三角形的線系統去改變皮膚的形狀。

三角式的線系統是以三組系統連結，控制線的滑動，產生連鎖式的動態效應。

1. 三角線狀控制系統

2. 動態系統序列圖



1. Triangle line system



2. Images of animation

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Follow the research before, we keep concentrating on how to give an outside force to split the 2D surface and create net form space.

So we suppose that motors can control the movement of the lines. Then we create a very simple triangle line system which will influence surface shape. Left diagram is the line system and the fixed points which are jointed with the surface. This diagram show how the triangle line system works.

Right animation is the movement sequence of



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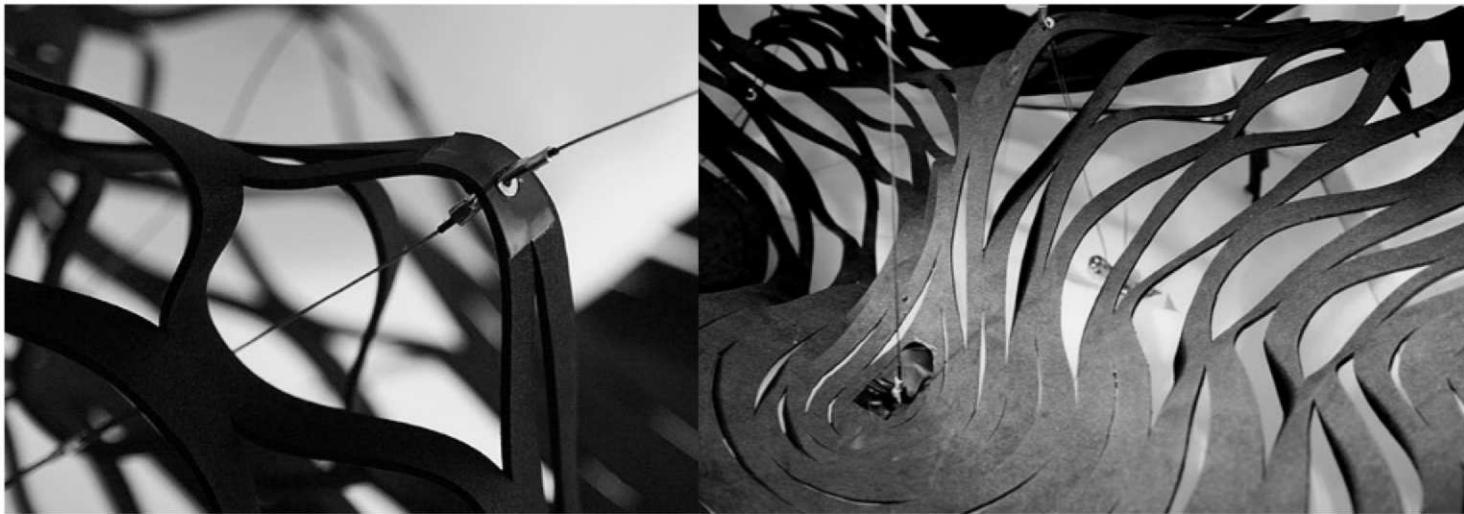
Operation the skin by triangle line system

3. 線系統 / 固定在皮層上
的作用點

4. 動態式的皮層產生即時
性的戲劇空間

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3. The point of structure standing on the surface



4. The surface create the flexibility

