Project.

THE TENSION

"Lightweight structure for our future generation "

I think **"Efficiency"** is the most important message to put in my design for the future generations.
I pursued the efficiency in this project, and that guided me to Lightweight Structure.

Lightweight Structure which is made by less materials and also use the materials in a technically better and more beautiful way is containing the message called efficiency.

Project "The Tension" is a message for our future generations, talking about "The Efficiency" through the lightweight structure, for their better world.

Problems.

Limited Resources & Unlimited Needs

We are living in the era of "limited resources and unlimited needs". It is a issue against humanity.

We are facing many universal crises such as the lack of resources and the environmental pollution, driven by over production and indiscriminate consumptions.

With these kinds of problems in our generation, it's getting more important than ever to ask ourselves what "Message" do we have to put in our design.

Early tensegrity structure model for the tension shelf

Solution.

Advantages of the Lightweight Strucutre

Less	More
-	-
Material	Lightness
Energy	Volume
Emission	Stability
	Aesthetic
	Sustainability

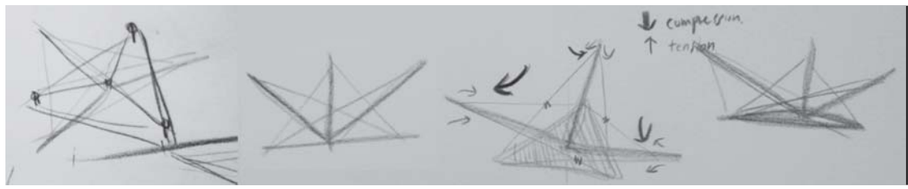
Benefit.

The Lightweight Structure makes the world more "Sustainable"

Project The Tension is the message for our future generations, talking about "the Efficiency".

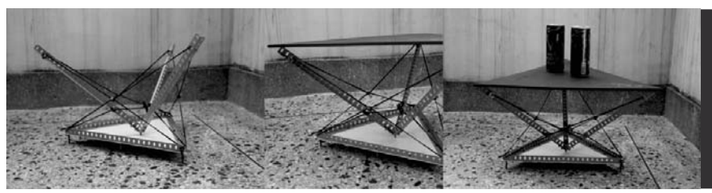
"Limited resources and unlimited needs." This is the reality that we are facing now. However through the efficiency, we can make our world more sustainable. The Lightweight structure that I sought through this project creates new efficient way of integrating, structuring and unique aesthetic.

I hope that users will appreciate the efficiency of my design, with these messages are widespread, and that there is a more livable world for our future generations.



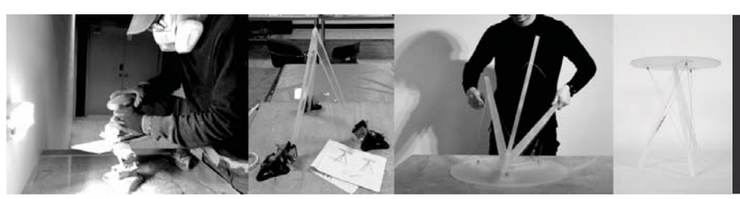
Structure Sketch

By drawing the flow of stresses on a structure, developing the structure.



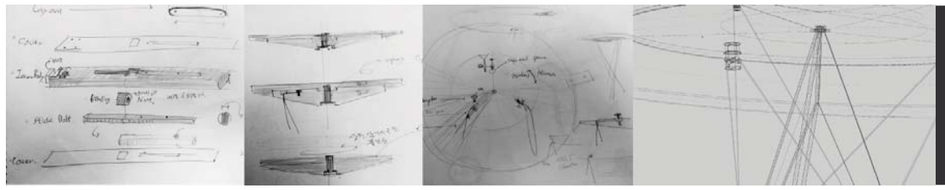
Physical Model Simulation

Analysing the tension and compression added to an object through physical model simulations.



1:1 Scale Model

I made the human-scale lightweight structure through a physical model stress analysis. I had used that model for a certain time to find out problems and insights from real life usage.



Developing the Detail

Solving real life problems with clever and delicate details, that give the object its life.

Making the prototype

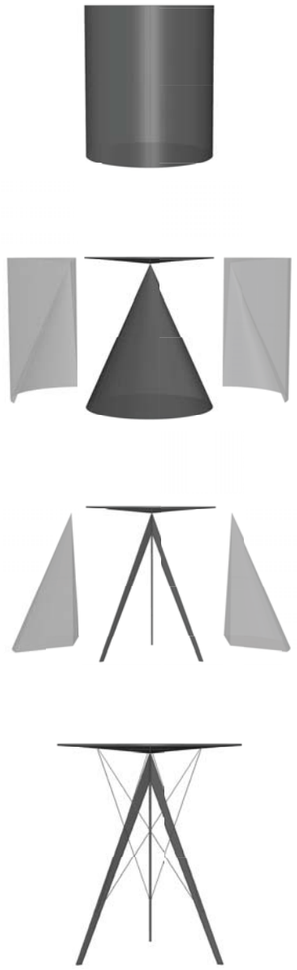
Fabricating the design with maintaining an every single detail.

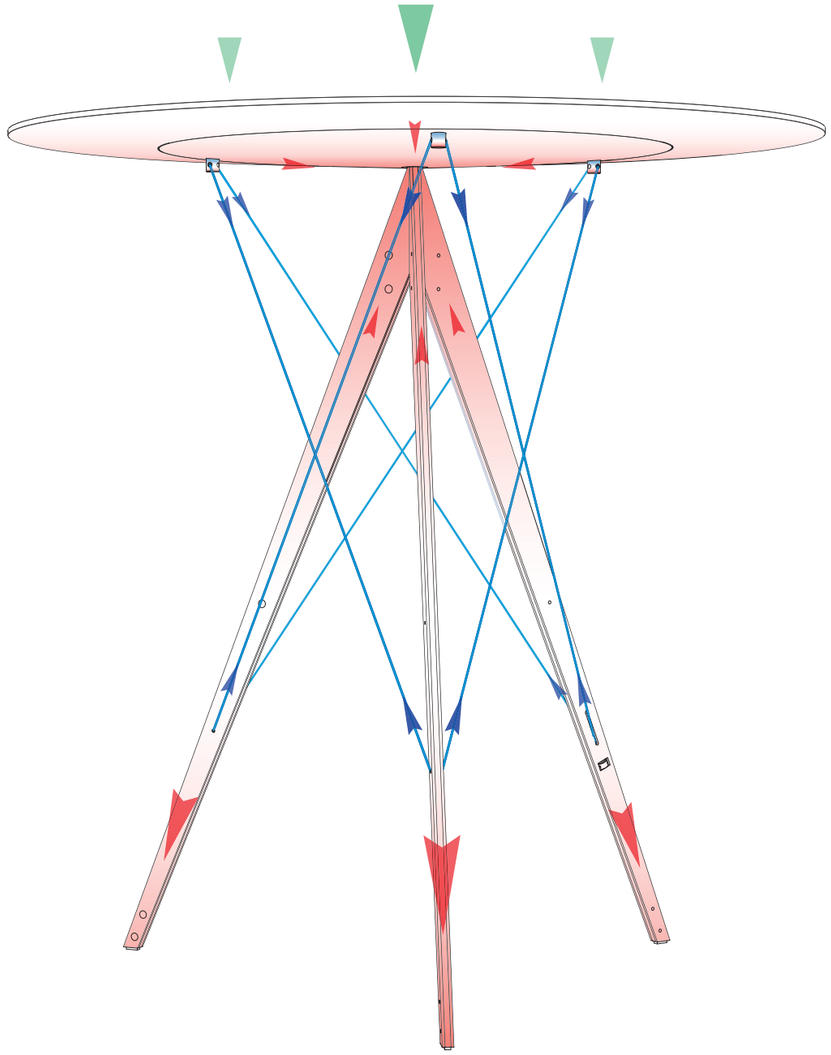
Process to find “The Optimal Structure”

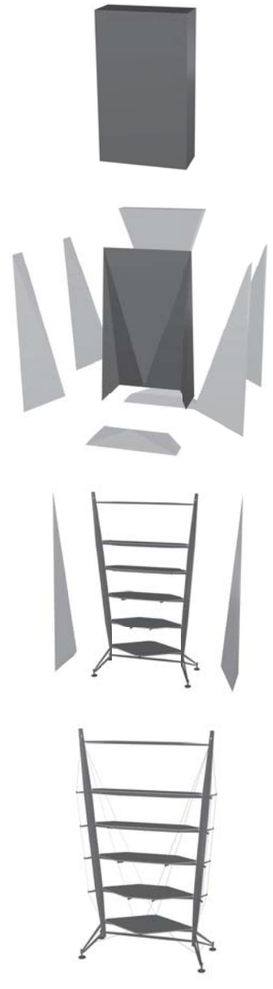
To find the optimal structure I've done a parallel process between CAD and Physical Model Experiment. Analysing the tension and compression added to an object through CAD and physical model simulations. Through this simulation, I found the suitable structure and materials countering to compression and tension, resulting the best tensile and compressive structure that is optimized for the lightweight structure.

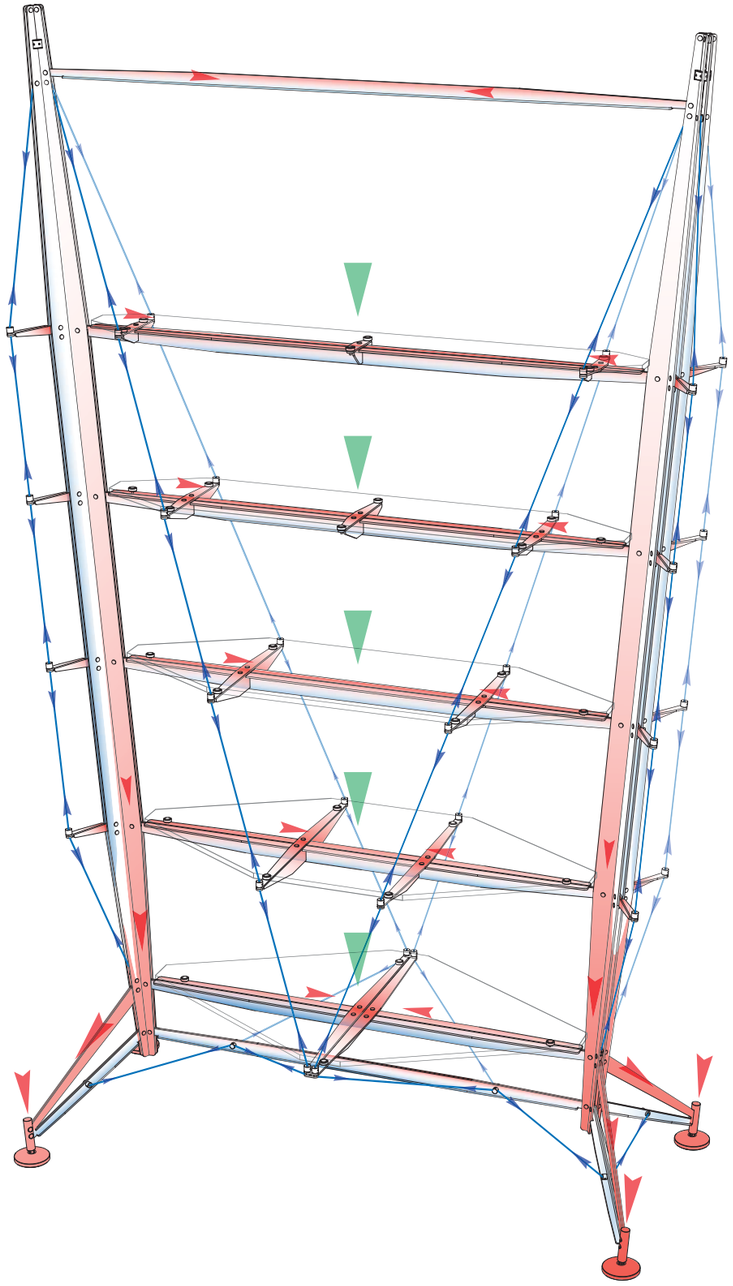
The Structure Stress Maps

* Load * Tension * Compression









The Tension Table_acryl ver

Arcly
L600*H650_mm

By tensioning the wire seperated elements be a one stiff table.

The Tension Table_metal ver | Stainless Steel & Aluminum
Table_L600*H650_mm

Tapered top and edged legs are emphasizing the structural feature, designed by minimalistic optimization.

The Tension Stool_metal ver | Stainless Steel & Aluminum
Stool_L350*H450_mm

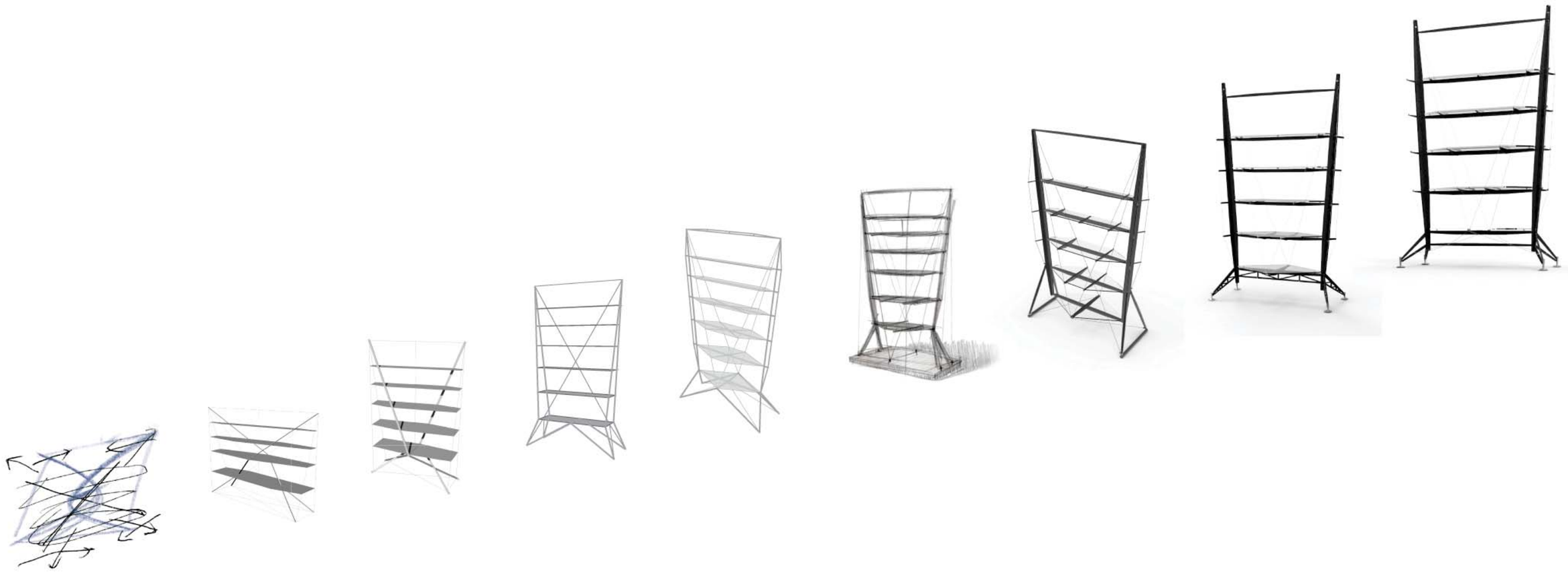
The Tension Table_metal ver | Stainless Steel & Aluminum
Table_L600*H650_mm

The Tension Stool_metal ver | Stainless Steel & Aluminum
Stool_L350*H450_mm

The Tension Table & Stool

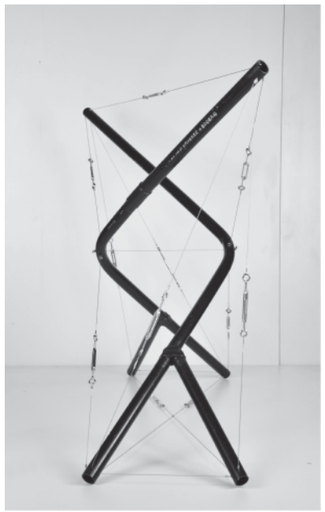
The Tension Table and Stool are **“the Prestressed Structures”** whose integrity and stability primarily depend on prestressing. Structurally minimized tabletop and legs can be stiffly integrated without a thick joint, it works by tensioning the cable. Each three anchors on the top and legs are connected by a cable which connects an anchor to two opposite anchors that creates the crossing equal prestress in the structure.

The table and stool can be weight lightened and have a unique pointed joint by this special way of integrating. The pointed joint makes the top look as if it is magically floating on the legs. The Tension Table and Stool are mostly made up of stainless steel and aluminum, also they can be customized with other materials. The structural principle can be variously applied to other objects.

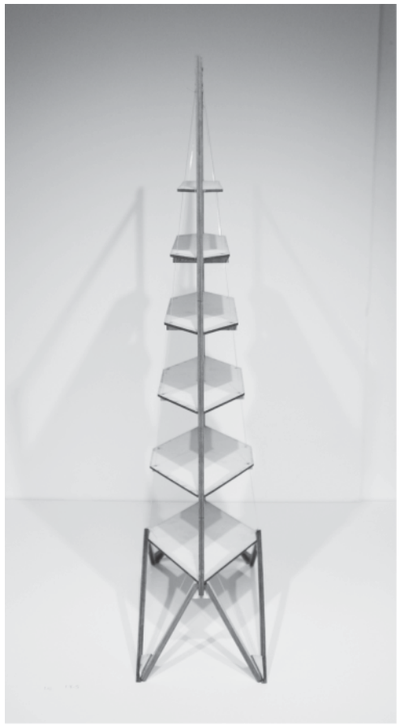


An Unexpected Encounter

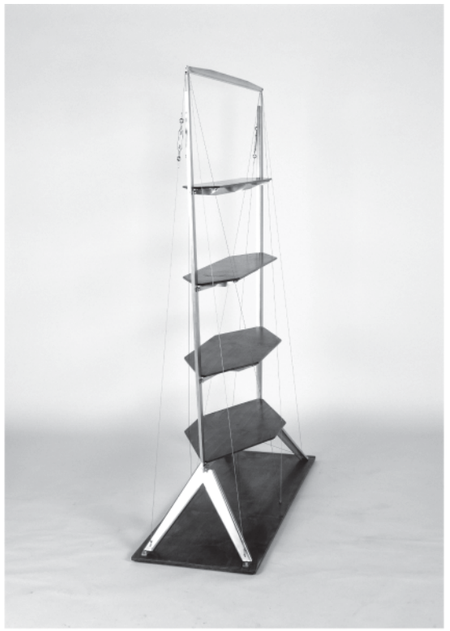
The task of joining together the essential components with a minimal addition undertook much research and investigation. Extensive fabrication and sketch work revealed the best way to combine the components with tensegrity making maintaining stiffness possible. And through this journey designer encounter unexpected object.

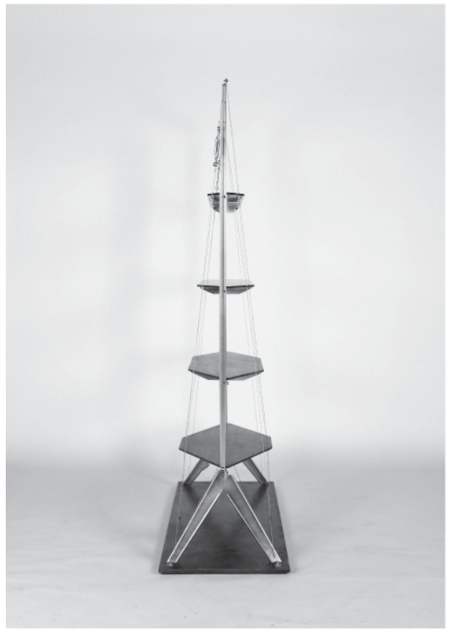


Early Tensegrity Structure | PVC Pipe & Stainless Wire
L1200*D400*H900_mm



Developed Shelf Model | Paper Board & Nylon
L300*D120*H540_mm





The Tension Shelf_J | Stainless Steel & Plywood
L1200*D450*H1780_mm

The Tension Shelf_L | Stainless Steel & Tempered Glass
L1200*D500*H2100_mm

The Tension Shelf | Stainless Steel & Tempered Glass
L1200*D500*H2100_mm

The Tension Shelf

The tension shelf is **“the Cable Stayed Mast Structure”**. The structure consists of iconic twin masts, cross beams, legs and tension cables which are formed by analysis of the stress in the structure. The masts which are anchored to the cross beams are stiffly integrated by the connection between the top of masts and both edges of the cross beams, resulting in a tetrahedron shape which is a minimum but rigid geometry. And the cable connection between masts and struts works as a tension truss which prevents the deflection of the mast caused from a load on the shelf. **The tension shelf, integrated by prestressed cables in clever way results loss of material and unique lightweight structure piece.** The tension shelf is made up of stainless steel and tempered glass. The object can be customized in various sizes and colors.1