Problems worthy of attack

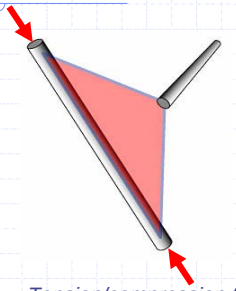
prove their worth by hitting back.

Tensegrity Structures

Weave Tetrahedron

Tensegrity Tetrahedron
Total Triangulation

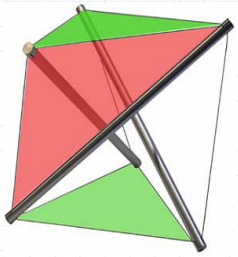
Triangulated Tension Networks



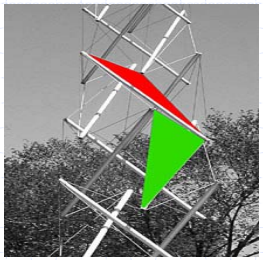
Tension/compression triangle

Tension-only triangle

Triangulated Tension Networks



A three-strut prism showing type 1, red and type 2 green triangles

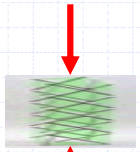


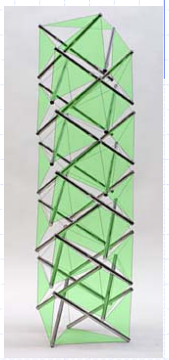
Needle Tower at the Hirshhorn Museum and Sculpture Garden in Washington, D.C.

Triangulated Tension Networks

All tension lines -- edges, slings, draws -- are of equal length so that all type 2 triangles, colored green in the picture, are equilateral.

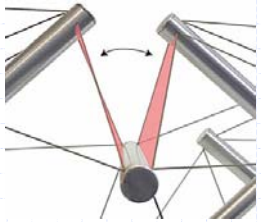
When pressed down on and released the column responds like a coiled spring.





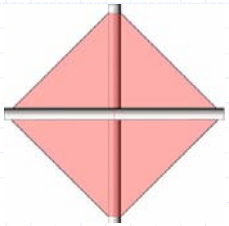
Model of "Equilateral Quivering Tower"

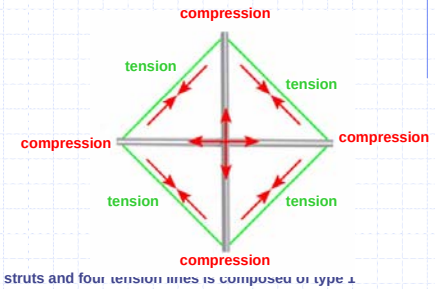
Triangulated Tension Networks



Fold lines of type 1 triangles. The springiness of tensegrity structures occurs in the hinging along the fold lines.
Type 1 triangles occur always in pairs. The fold line of each wing-pair of triangles is similar to a crease in the folded-paper column to the right.

Triangulated Tension Networks



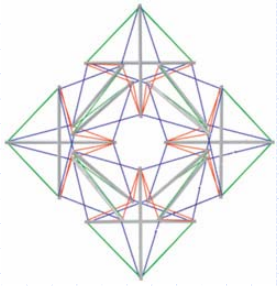


Kite frame structure with its two struts and four tension lines is composed of type 1 triangles.

Type 1 triangles occur here also in pairs making a diamond form. In the kite frame, two face-to-face diamonds share the tension lines on opposite faces of the kite.

Note that this most economical of structures is actually a flattened tetrahedron.

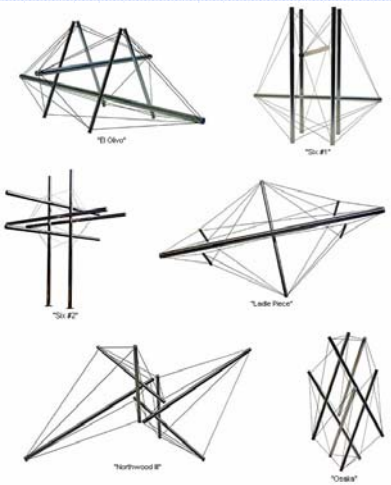
Triangulated Tension Networks



Green = edge lines
Red = sling lines
Blue = draw lines

***SuperStar*, aluminum and stainless steel**

Sculptures



each sculpture is composed of six struts

Sculptures

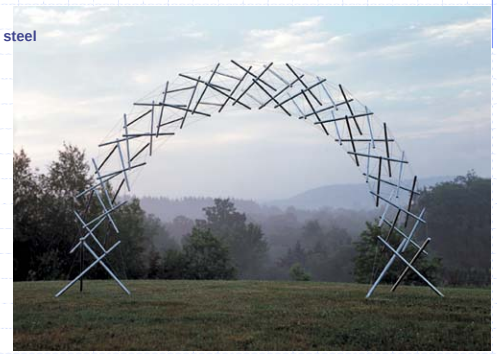
***Dragon*, 2000-03**
stainless steel
30.5 x 31 x 12 feet
9.3 x 9.5 x 3.65m

Sculptures

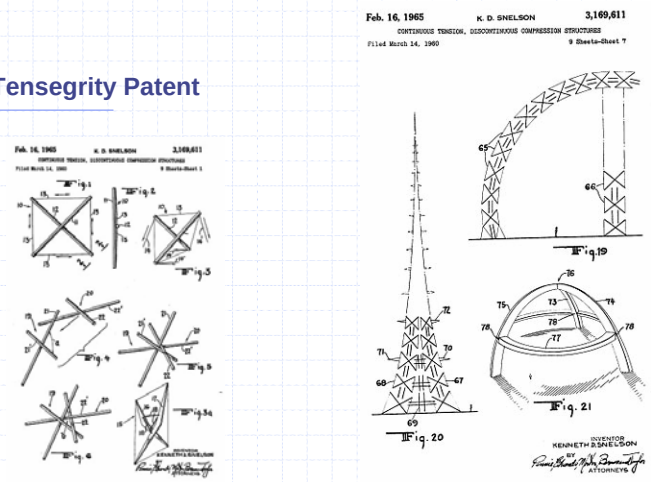
***Needle Tower*,**
aluminum & stainless steel
60 x 20 x 20 feet
18.2 x 6 x 6m
Collection: Hirshhorn Museum & Sculpture Garden, Washington, D.C.

Sculptures

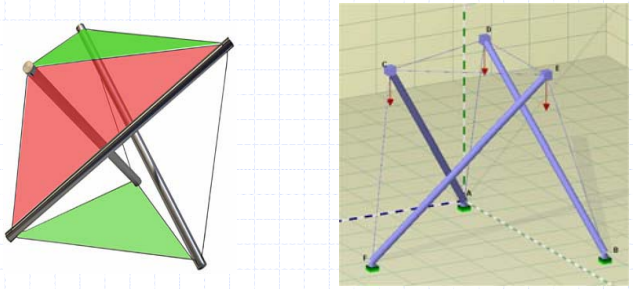
***Rainbow Arch*, 2001**
aluminum & stainless steel
7 x 12.6 x 2.6 feet
2.1 x 3.8 x 1m



Tensegrity Patent



Tensegrity Analysis



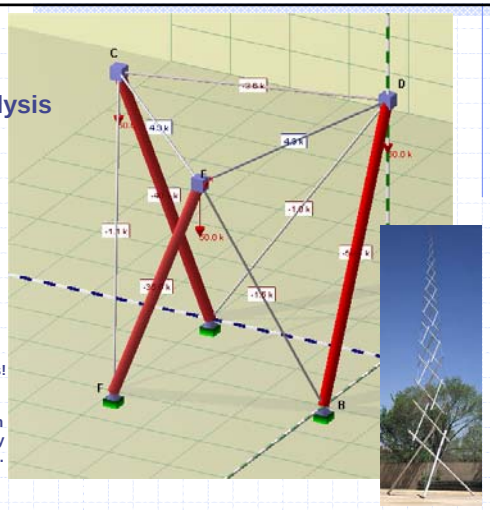
Tensegrity Analysis

Tutorial Make-up Problem:

How many storeys of identical members of 5 m steel pipes of 10" diameter and cross sectional area = 0.25 in^2 can be supported?

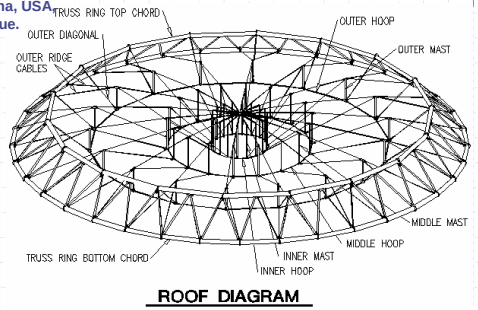
The inclination of the struts is 7/2 (vert / hor). Watch that your cables carry only tensile forces!

Solution to be handed in as PPT file electronically by e-mail before Mar. 26.



Tensegrity Roofs

Cabledome structure with rigid roof built for the Crown Coliseum, Fayetteville, North Carolina, USA, a 13,000 seat athletic venue.

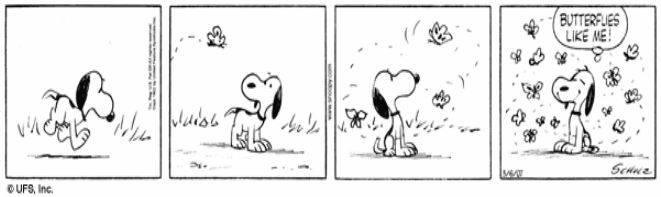


ROOF DIAGRAM

Tensegrity Roofs

This project demonstrates the utility of tensegrity-type domes in structures where tensile membrane roofs may not be appropriate or economical.

Arrgggh, it's over!



Life is too short to sail a slow boat.