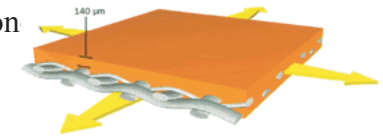
Familiar example of light weight structures include fabric and tensile structures

LIGHT-WEIGHT STRUCTURES

A structure's function is to support "live loads." The dead loads of the structure itself are a necessary evil. The smaller the ratio between a structure's dead load and the supported live loads, the "lighter" the structure.

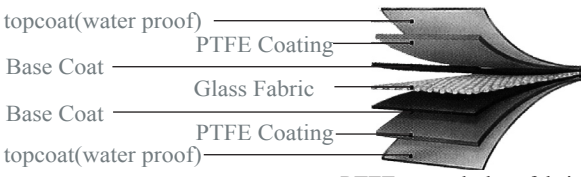
MATERIAL

PVC coated fabrics are mostly made out of high tenacity polyester yarn covered on both sides with a protective plasticized PVC coating, or covered with PES (polyether sulfon



PTEF has chemical resistance, high thermal stability and a wide service temperature rage.

Glass Fibres have high temp. resistantance, and are UV and weather resistant. The tensile strength of glass is comparable with that of steal but it is 65% Lighter.

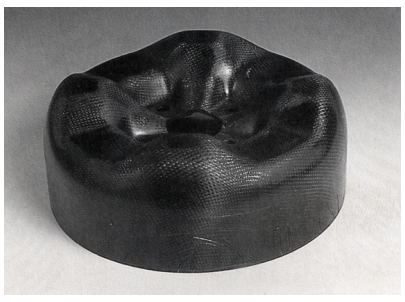


PTFE-coated glass fabric

Coated Steel Cord Textiles

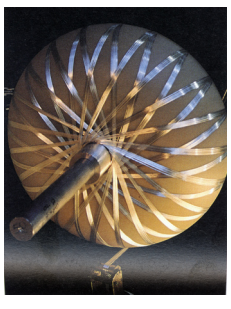
Meshes of woven fine cords can be coated with different types of thermoplastic coatings, such as PVC, Polyurethane, PTFE….. Longer spans and/or less pre-stress and curvature become possible due to the higher tensile strength and tear resistance and/or possible reduction in safety factors. Lower deflections do occur due to the increased stiffness.

Resin Transfer Moulding



uses composite carbon fabrics to create structurally resilient forms that are durable, Lightweight, and easy to repair

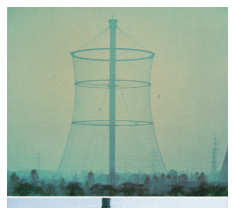
Composites

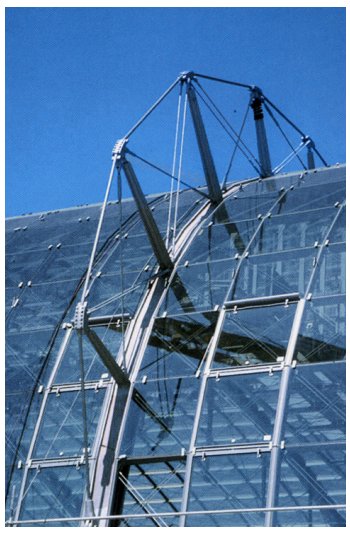


This baloon becomes extremely strong when wound with glass or carbon fiber. Once reinforced, the baloon can function similar to a hydrolic jack, lifting large loads.

Galerie des Machines

Cooling Tower
This complex cable structure uses tension and a compresive rings to cope with forces usually reserved for concrete





Hauptbahnhofs Berlin
This truss seperates compression and tension into more efficient materialities

King Fahd Stadium
Based on the principle of double curvature, tensile structures function solely with tensile forces

Eden Project
an ultra lightweight shell is made using pressurized cells giving the dome structural integrity.

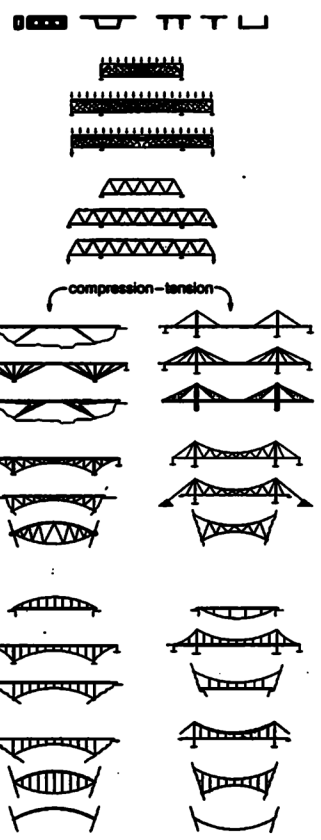


Figure 2: The evolution of bridges.

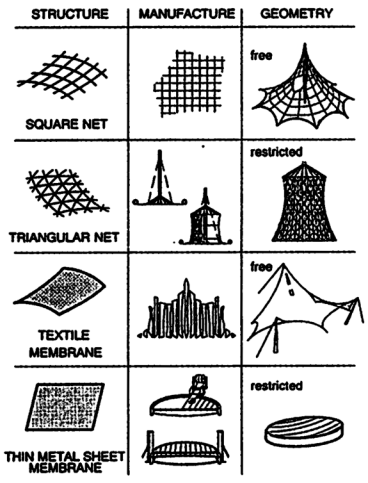


Figure 5: The geometry and manufacture of typical double-curved lightweight structures.

weight spatial structures. Expensive formwork and complicated cutting patterns are

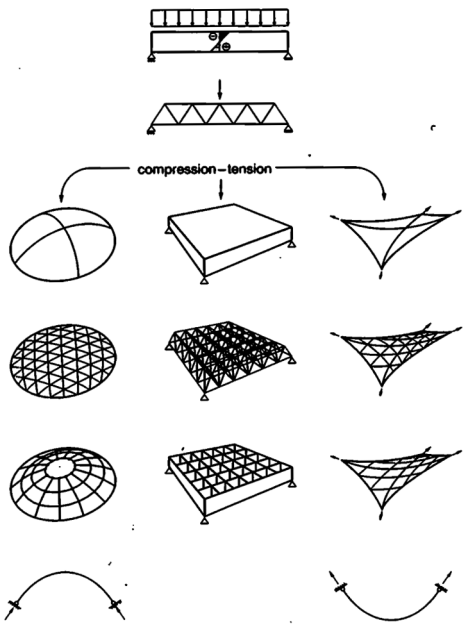
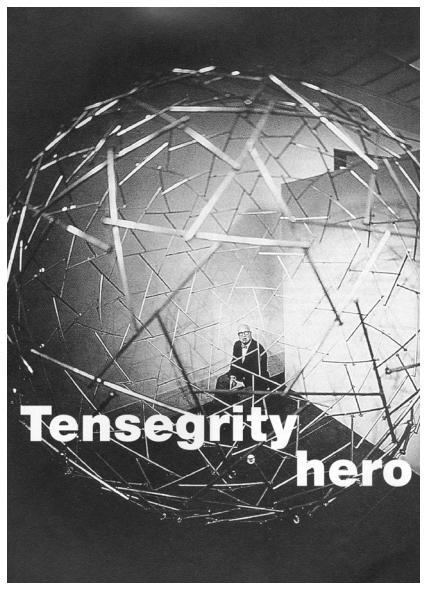


Figure 4: The evolution of lightweight spatial structures.



Sources - Lightness: Adriaan Beukers, Ed van Hinte / Light Structures: Jorg Schlaich, Rudolf Bergermann / The Design of Membrane and Lightweight Structures: Marijke Mollaert