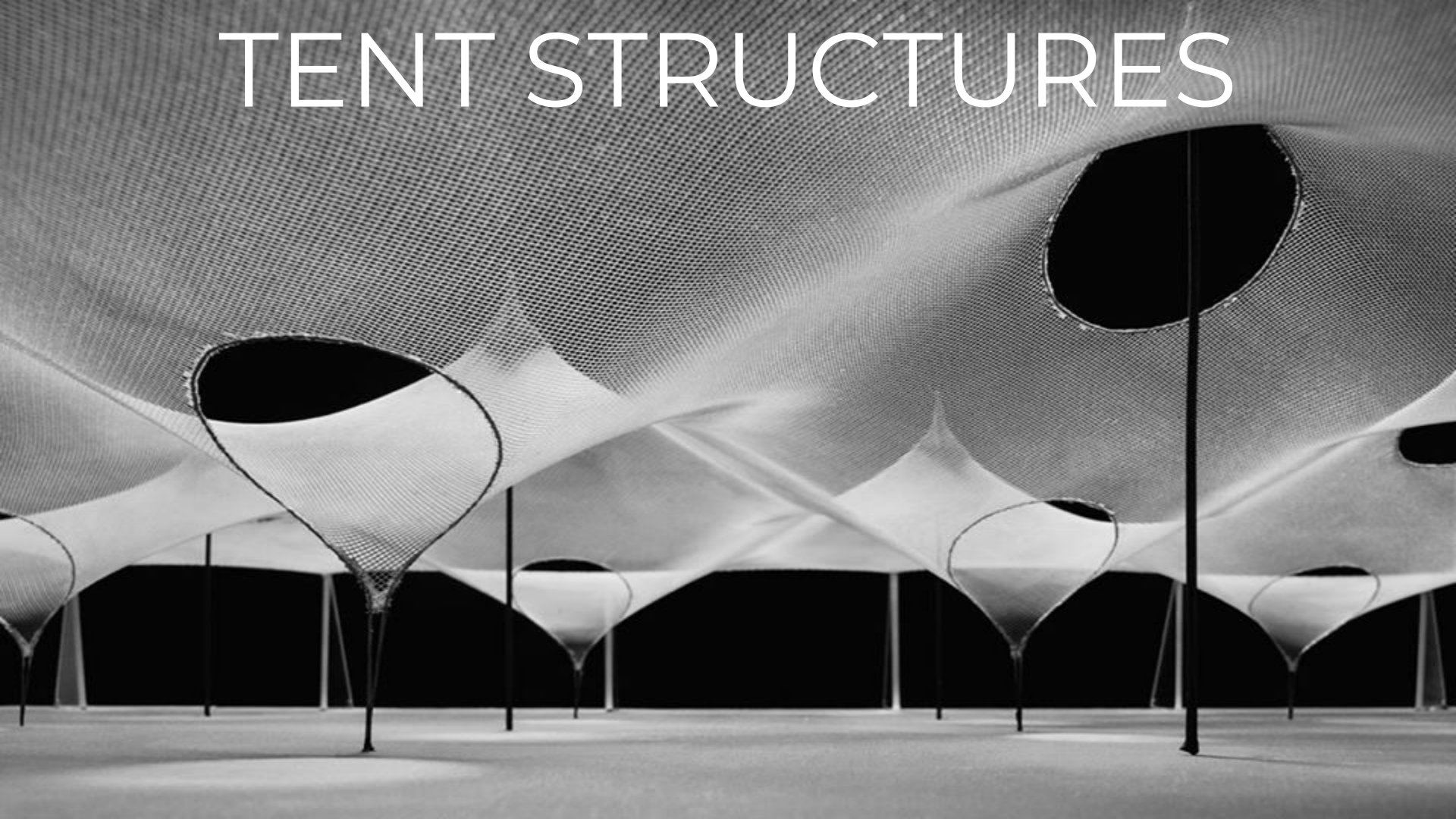


TENT STRUCTURES



HISTORY

Tepee



It is a conical tent, originally made of animal skins such as bison, and wooden poles. The tepee was used e.g. by the nomadic indigenous peoples of from the Great Plains of the United States.

Coliseum

Rome, Italy



At its highest point, the Colosseum had the "Velarium", a large tent made of textile that protected the spectators from the sun and was managed by sailors from the Naples fleet.

Materials:

- natural textiles (animals, plants)
- synthetic textiles (woven)
- PVC / polyester fibre (sensitive to sunshine)
- ETFE (Ethylene tetrafluoroethylene)
- teflon & glass fibre (PTFE)

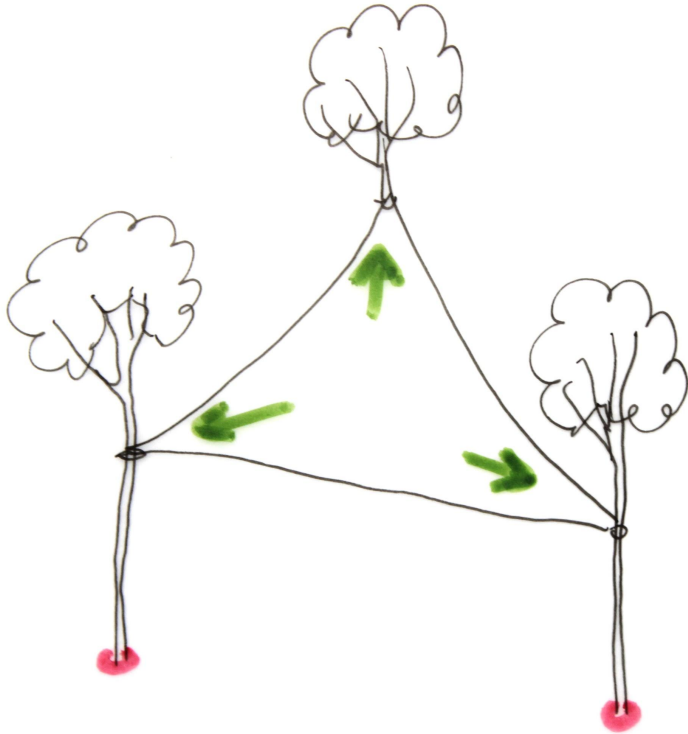


example: Eden Project, Cornwall, UK
constructed with ETFE cushions



BASIC STRENGTHS

The easiest way to build a roof



You need:

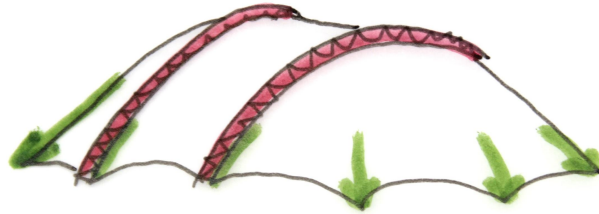
- at least 3 trees
- a piece of textile (tensible)
- tension

> strengths inside the membrane:
just TENSIONS, but you need a
solid structure...

solid structure + membrane + tension = tent structure



pillar + membrane

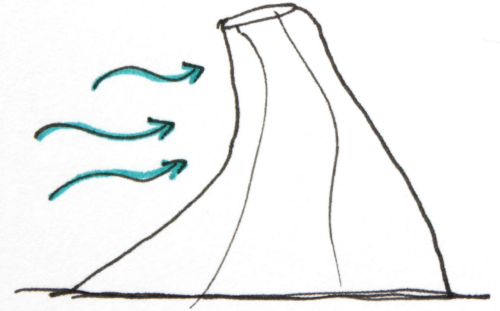
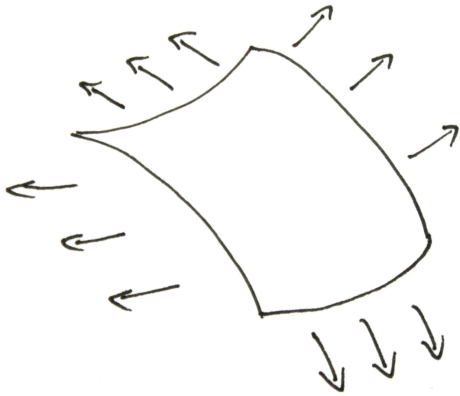


arch + membrane



mast supported

- structural loads: strengths inside the structure
- live loads: water, snow, ice, wind



ADVANTAGES

- light
- flexible
- versatile
- long-life cycles of materials
- portable
- shapeful
- potential of re-use and recycle of the materials

LIMITATIONS

- non-loadbearing
- textile needs the right form and tension
- you need a good solid structure

different types of tent structures

tensioned structures



cushion structures



pneumatic tents...



Famous Tent Structures

Millenium dome, London, O2 Arena
(Richard Rogers (RSHP))





O2 Arena has a tensioned membrane structure with a diameter of 320 metres. Originally created for the major exhibition celebrating the beginning of the third millennium. It is the eighth-largest building in the world by usable volume. Thanks to the great degree of flexibility in its design, the dome has been successfully adapted for multiple uses since the closure of the Millennium Experience. Number of festivals, events and even as the shelter for the homeless during the Christmas period.



Denver International Airport





Denver International Airport was completed in 1994 and is the World's third largest airport. The terminal building is roofed by a white membrane stretched from steel masts. The Teflon coated fibreglass roof of the airport is designed to resemble the peaks of the Rocky Mountains in winter, capped with snow. The tensile structure has stood the test of time and the structure hasn't failed under the extreme weather conditions that it experiences.

Expiration Christ's Bridge

Seville, Spain (1991)



Steel structure, with two reduced arches of 130 meters of light and without support under water, which supports a 223 m board. x 30 m and 30.5m wide.

Pedestrian crossings along the bridge are covered in white sailcloth that hang from masts and relieve heat.

Wanda Metropolitan Stadium

Madrid, Spain (Cruz y Ortiz, 2018)



Its structure is formed by an outer and an inner ring, joined by steel cables.

Basically it's like a double-sided bicycle wheel in which tensioned cables that connect the outer rings with the inner ones make the function of the spokes, which supports the cover made out of teflon.

Olympiapark Munich Germany (1972)

prestressed tensile structure

Behnisch & Partner, Jürgen Joedicke, Heinz Iseler, Jörg Schlaich & Frei Otto



Foto: Diego Delso

Olympiapark Munich, Germany
prestressed tensile structure
inspired by Frei Otto's Expo Pavillion Montreal

