

form follows force

**INTERDISCIPLINARY PROJECT BASED DESIGN
2019 FALL**

Department of Mechanics, Materials and Structures and
Department of Industrial and Agricultural Building Design

Structures under pure tension and/or compression are often very efficient:

Cables:



Arches:



Shells:



Tents:



2004/12/08 17:04:31

But you have to pay a price for this:

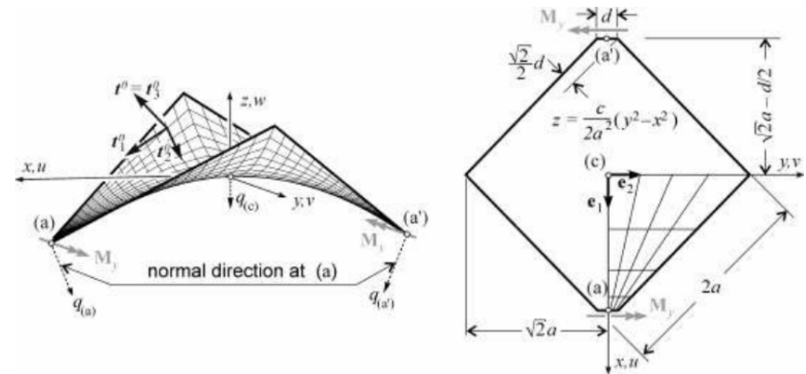
The shapes of these structures are determined by forces that they have to carry!



You cannot design them without attention to structural mechanics

How to design the shape?

- Find the most important load
- search for a shape that can efficiently carry this load („structural form finding“)
- How?
 1. By calculation
 2. by physical experiment
 3. By computer algorithms



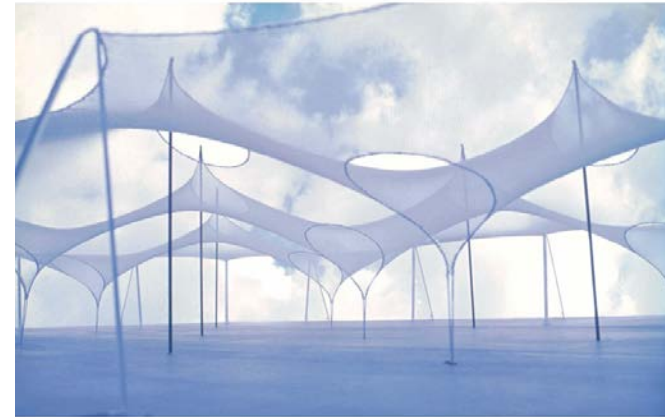
simple shapes like
catenary curves,
parabolic arches,
spherical domes,
saddle roofs



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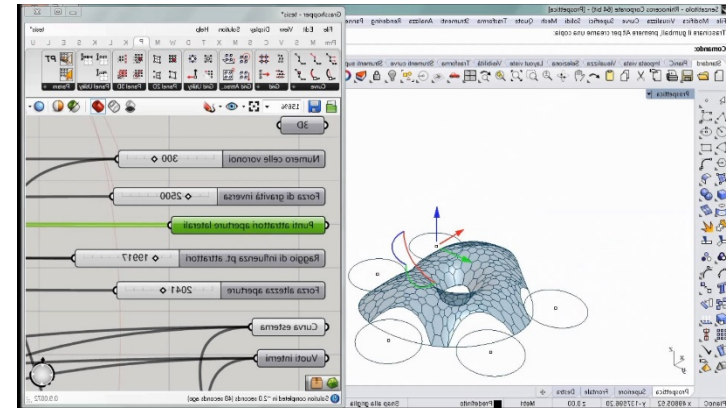
Complex shapes
are possible



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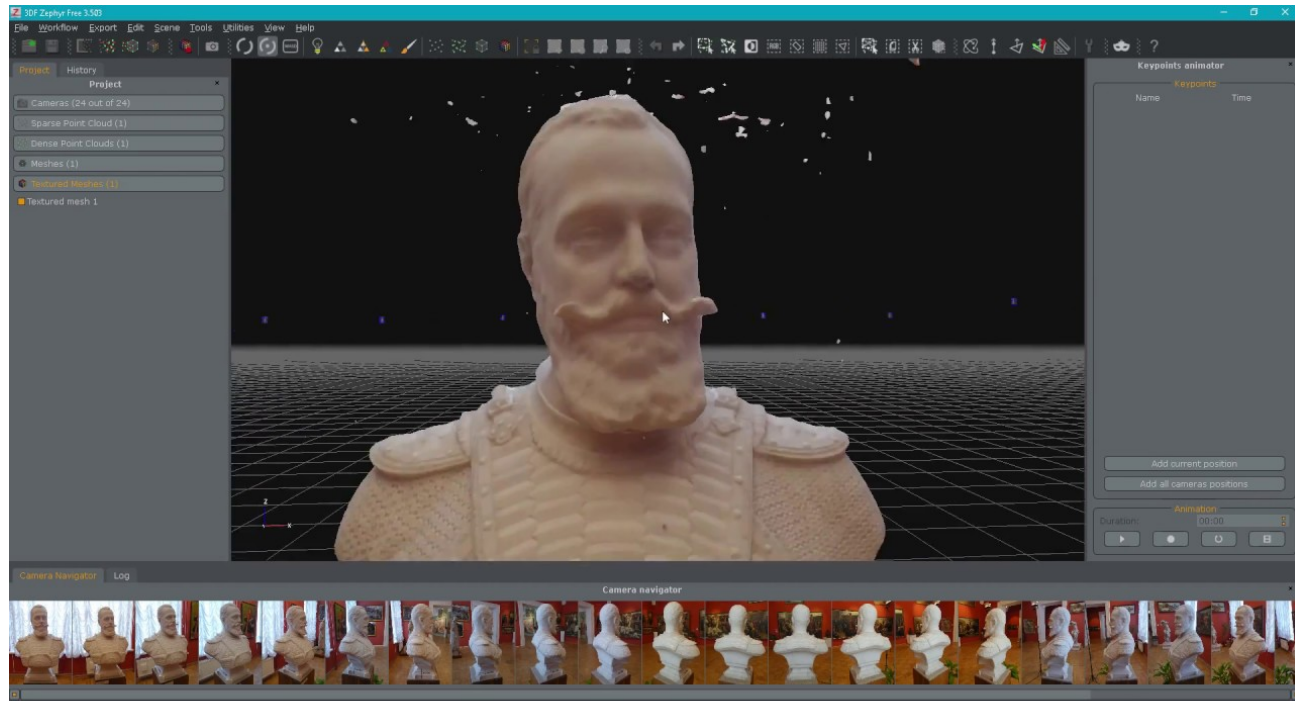
We invite you to design a building with a shell structure

Use your imagination to figure out roughly what you would like to see (material, positions and types of supports,...)

Find the shape of your shell(s) by building physical model that *mimics the dominant load of the real structure*. Play with the models!

Import the shape of your model into your CAD software by using a photogrammetry software (e.g. zephyr 3D)

Finalize your design!



What kind of model?

- soap film
- elastic membrane
- textile and plaster
SEE WORKSHOP NEXT WEDNESDAY
- anything else
- (computer-based form finding
is also allowed)



What kind of shell?

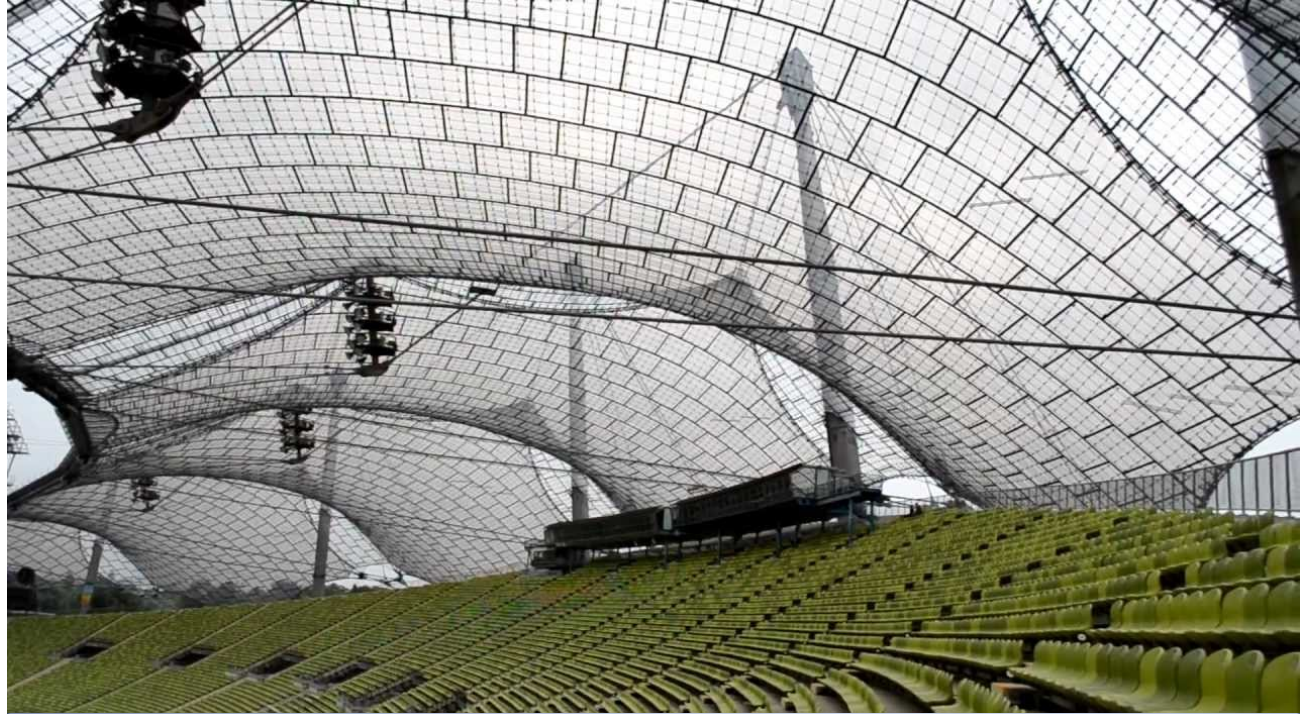
-reinforced concrete shell

-timber or steel gridshell



What kind of shell?

- reinforced concrete shell
- timber or steel gridshell
- cable grid
- tent



What kind of shell?

- reinforced concrete shell
- timber or steel gridshell
- cable grid
- tent
- or anything else



week	MONDAY	WEDNESDAY
8. 22. and 24. Oct.	Day off	11:15 INTRODUCTION, SITE VISIT Students' short introduction Introductory lectures by instructors. Setting up the teams with 2-3 students and topics of preliminary study.
9. 29. and 31. Oct.	12:15 STUDENT PRESENTATION of preliminary study of site analysis and motivating examples consultation with both departments	11:15 STRUCTURAL DESIGN WORKSHOP + FORM FINDING LECTURE organized by T. Ther & O. Gáspár
10. 05. and 07. Nov.	12:15 CONSULTATION with both departments	11:15 STUDENT PRESENTATION of concept design
11. 12. and 14. Nov.	12:15 REFERENCES lecture consultation with both departments	Day off
12. 19. and 21. Nov.	12:15 CONSULTATION with both departments	11:15 STUDENT PRESENTATION of structural form finding
13. 26. and 28. Nov.	12:15 CONSULTATION with both departments	11:15 CHECKPOINT consultation with both departments
14. 03. and 05. Dec.	12:15 CONSULTATION with both departments (please show us work-in-progress state of your final presentation materials)	10:15 FINAL STUDENT PRESENTATION of completed projects