Roof Vaults and National Styles

Early 20th Century

The German approach: analysis and geometry
The Italian approach: ribs, coffers, and buttresses
The "Spanish" approach: double curvature and thinness
Concrete shells and stiffness
Economy of labor vs. efficiency of materials
Complexity of analysis vs. complexity of form
German Tradition

Firm of Dycherhoff and Widmann
F. Dischinger (1887-1953)
U. Finsterwalder (1897-1988)
A. Tedesco (1903-1994)

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Describe the method used by the German school for finding forms for roof structures.

Why would such an approach be justified for structural engineering?

Why might it be limiting for structural art?
2D ribs = Stiffness  
1D rib = Strength

Nervi

Tedesko
Little Sports Palace
1957
Describe the differences in the ribbing in these two Nervi structures. What are the differences in the way domes and barrels carry loads?
failures in translation

structure, not structural art
What makes Nervi’s solution so much more elegant?
What are the scientific reasons, if any, for his aesthetic choices?
Spanish Tradition

Catalan influence

A. Gaudi (1852-1926)
E. Torroja (1899-1961)
F. Candela (1910-1997)
E. Dieste (1917-2000)
Church of the Sagrada Familia  
Gaudi, 1882 - present
Zarzuella Hippodrome (1935), Eduardo Torroja

Torroja

Nervi

double curvature = stiffness
Locate the double curvature in this shell
Comment on the aesthetics

Algeciras market hall
Describe the different approaches Gaudi (left) and Candela (right) took to form-finding? Did material choice have any effect on their choices?

who needs tradition?

Kresge Auditorium (MIT)
Sails without breaking the bank...

German tradition

Italian tradition

Spanish tradition
Exam 1 Next Tuesday

1. Study IDs from online index website > exam review (can be printed) (also linked from UMass moodle page)
2. Study Tower and the Bridge. This is the core material for questions
3. Study each lecture theme. Practice writing and answering questions based on them
4. No calculation, but quantitative questions and axial force / moment diagrams are fair game

Format: IDs; multiple choice/matching/blanks