

5: Nature of Materials

Introduction:

The materials or construction are an architect's palette. An understanding of their properties and characteristics allows the architect to design effectively and with control. Though the range of materials available is nearly limitless they fall into several broad categories. We will work with materials that have strength, flexibility and ductility, that can be shaped and formed and that have degrees of transparency. Each material's nature affects its suitability for a given task. By working with these materials you will develop an understanding of their capabilities and limitations.

Objectives:

- To be able to precisely construct forms using specified materials
- To create a work that responds to a set of design constraints and goals.
- To be able to work in different scales while developing a design concept
- To be able to research a specific architectural work and analyze its conceptual structure
- To be able to develop an abstract expression of architectural concepts
- To understand the nature of several different materials
- To be able to fabricate a model using a variety of materials
- To be able to develop a design that responds to the nature of the materials
- To be able to communicate the results of your research concisely and clearly

Phase I: Research and Analysis

There are many ways to develop designs. Last quarter one project was a two-dimensional abstraction of the Barcelona Pavilion. In this project we will follow a similar path to develop a three-dimensional expression of an architectural project.

Each student will independently study a specific work. Your research should be both deep and broad. It must include the architect's other works as well as the works that they were influenced by, contemporary and historical, architectural and artistic movements.

As you research your project you will record your findings in your sketchbook and/or study models of the form. Your notes may be narrative, diagrammatic, pictorial or any other form.

Each student will choose three works from the list below as possible research topics. Or any other late-nineteenth, twentieth or twenty-first century work approved by the instructor. I will review the choices and determine which of the three you will research. Each student will research a different project. **It is imperative that you investigate each of your choices before submitting them to me**, make sure you are truly interested in and excited by all of your choices and that you are able to find sufficient information on them to complete your research.

Project Selection

Project	Architect	Year
Vanna Venturi House	Robert Venturi	1963
Kimbell Art Museum	Louis Kahn	1966-72
Exeter Library	Louis Kahn	
New Reichstag	Norman Foster & Partners	1992-99
Vienna Postal Savings Bank	Otto Wagner	1904-06
Yale Art & Architecture Building	Paul Rudolph	1958-62
Lovell House	Rudolph Schindler	1923-26
Workers Housing, Hook, Holland	J.P. Oud	1924
Karl-Marx-Hof	Karl Ehn	1927
Notre Dame, Le Raincy	Auguste Perret	1922-23
Villa Mairea	Alvar Aalto	1938-41
Church of St Francis Assisi	Oscar Niemeyer	1943
Kaufman House	Richard Neutra	1946
Eames House	Charles Eames	1945-49
Town Hall, Saynatsalo	Alvar Aalto	1949-52
Egerstrom Residence, "San Cristóbal"	Luis Barragan	1968
Olympic Gymnasium	Kenzo Tange	1961-64
Neue Staatsgalerie	James Stirling	1977-84
Palais D'Abraxas	Ricardo Bofill	1978-83
Casa Rotonda	Mario Botta	1980-81
Koshino House	Tadao Ando	1979-81
Menil Collection	Renzo Piano	181-86
Lloyds Building	Richard Rogers	1978-86
Hong Kong & Shanghai Bank	Norman Foster & Partners	1979-85
Wexner Center	Peter Eisenman	1983-89
Gamble House	Green & Greene	1907-08
Dodge House	Irving Gill	1915-16
St Mary's Cathedral, San Francisco	Pier Luigi Nervi & Pietro Belluschi	1971
The Atheneum, New Harmony, Indiana	Richard Meier	1975-1979
Rosenthal Center for Contemporary Arts	Zaha Hadid	2003
Museum of Modern Art, Frankfurt, Germany	Hans Hollein	
Walt Disney Concert Hall	Frank Gehry	2003
Guest House, Wayzata Minnesota	Frank Gehry	1983
Teatro del Mondo	Also Rossi	1979
Central Public Library, Seattle, Washington	Rem Koolhaas	
City of Arts and Sciences, Valencia, Spain	Santiago Calatrava	1991-2004
Berlin Philharmonie	Hans Scharoun	1956-63
Church-On-The-Water	Tadao Ando	1985-88
Unite d'Habitation, Marseilles	Le Corbusier	1946-1952
Eishin School, Tokyo, Japan,	Christopher Alexander	1985
Harvard Graduate School of Design, Cambridge	Walter Gropius	1950
Stockholm Library	Erik Gunnar Apslund	1918-1927
Commodities Exchange, Amsterdam	Hendrik Petrus Berlage	1897-1909
Whitney Museum, NYC	Marcel Breuer	1966
Kanchanjunga Apartments, Bombay, India	Charles Correa	1970-1983
Chapel of Saint Peter	Paula Mendes da Rocha	1987
London City Hall	Norman Foster & Partners	1998-2003
Kresge College	Moore and Turnbull	1972-1974
Banco Popolare di Verona	Carlo Scarpa	1973

Phase I Architectural Study:

Each student will prepare a 10 min power point presentation of their project. The presentation will identify the important concepts that you expect to develop in your construction. To be meaningful it should place your project within the movements of the last 2 centuries and within the body of work of your architect. You can assume that your audience has a fundamental understanding of the time period through their own research.

Students will hand in an **outline** of their presentation for grading and post their power point presentation in the shared folders on MyCOD. The outline should include the following topics:

- Building Data: architect, date, location and style
- Characteristics of style
- Roots of style
- Specific expressions of the style in your building
- A building image
- Bibliography
 - Bibliography should include at least 2 books, look for books that cover the period or style of your building as well as books exclusively on your architect or building. Use MLA format.

Outlines will be bound into a book for jurors to use as a review of the projects. *It will be their first impression of your work-make sure it is a good one!*

Final Submittal Phase I

	7:Architectural Study	Excellent 10	Very Good 9	Good 8	Average 7	Fair 6	Poor 5	Incomplete 2.5
Research 40	Research of building is accurate and complete							
	Research of style and period is accurate and complete							
	Outline is in correct format and is complete							
	Bibliography-sources are appropriate and properly cited							
Analysis & Understanding 50	Understanding of architectural influences on project and architect							
	Contextual placement of movement within architectural spectrum							
	Identification of major concepts of architect and project							
	Evaluation of incorporation of concepts in structure							
	Recognition of primary goals of architect							
Presentation 30	Completeness							
	Clarity							
	Visual aids							
	TOTAL							

Models:

Problem:

The problem is to develop an abstract expression of your project that reflects and responds to the nature of the materials employed in the construction of the model-**do not look to your building for its use of your materials as inspiration.** Each construction must use metal, wood, transparent material (glass or plexiglass) and a formable material (plaster or concrete). The design does not need to express all of the concepts of the project but can focus on particular ideas that interest you. It must use all of the materials in a way that has a meaningful association to the nature of the material. Develop your concept and then judge which material is appropriate for each component. The scale of this model requires you to address issues of weight and transportation. These requirements will influence your final design decisions. All models must be able to fit through the door of the classroom unless specific permission is granted by the instructor. Final presentation will include the small scale model and a large, 11"x17" minimum at appropriate resolution, mounted image of your structure

Use the following approximate values to calculate your project's total weight

- Concrete=150 pounds per cubic foot (pcf)
- 2" thick Wood=4.5 pounds per square foot (psf)
- 1/2" Plywood=1.5 pounds per square foot (psf)
- Metal=165 pounds per cubic foot for aluminum to 500 pounds per cubic foot for steel.
- Plaster=100 pounds per cubic foot (pcf)
- Glass=3 pounds per square foot (psf)

Model Maximum weight =200#

Design Goals:

- The construction will abstractly represent the project as a physical object and/or an ideological exploration
- The construction will develop a dialogue about the nature of materials used in it's construction
- The construction will create a cohesive and unified composition
- The construction will show a strong relationship between the parts and the whole
- The construction will show a hierarchical relationship with both major and minor elements.
- The construction will be effective when viewed from any natural position
- The construction will be structurally sound and stabile
- The construction may be static or dynamic
- The construction will be of sufficient size that the strength of materials and connections must be considered

Constraints:

- The construction will use at least one element made of a metal
- The construction will use at least one element made of wood
- The construction will use at least one element made of glass or plexiglass
- The construction will use at least one element made of plaster or concrete. If this is the base it must be an integral part of the design, not simply a rectangular platform
- The construction will fit into the classroom
- The structure will be transportable

Process:

- The research and analysis will be conducted simultaneously with other assignments during the first 7 weeks of the quarter
- A small scale model, approximately the size of a shoebox, will be developed as a preliminary exploration
- Perform a rough calculation of the **weight of your final structure**
- Plan how to develop your model so it can be transported to and from school
- The first model will be presented
- The final model at a larger scale, approximately 64 cubic feet, will be developed
- The final model will be a reiteration of the original design based on feedback and further development
- The final model will be crafted to the highest level

Final Submittal Phase II

		Excellent 10	Very Good 9	Good 8	Average 7	Fair 6	Poor 5	Incomplete 2.5
7:Small Scale Model								
Craft 30	Quality of, cutting, straightness and crispness of cuts							
	Quality of assembly, neatness of gluing, soundness of construction							
	Cutting and assembly techniques appropriate to the materials							
Requirement 70	Design includes at least one wood element							
	Design includes at least one metal element							
	Design includes at least one element of a transparent material							
	Design includes at least one element of a moldable material							
	Rough calculation of weight is included							
	Presentation includes an explanation of how model will develop at full scale and be transported							
	Model is sufficiently detailed and crafted for viewer to understand concepts and identify critical issues							
	20	18	16	14	12	10	5	
Understanding 100	Model is an abstract representation of the ideas of the building							
	Model explores ideas fundamental to the building							
	Construction reveals the nature of the materials used							
	Construction is successful from all natural viewing positions							
	Creativity and aesthetic quality of the overall design							
TOTAL								

Final Submittal Phase III

		Excellent 20	Very Good 18	Good 16	Fair 14	Poor 12	Incomplete 5
7: Final Model							
Craft 100	Metal is well crafted						
	Wood is well crafted						
	Concrete is well crafted						
	Glass is well crafted						
	Connections between materials and pieces are well crafted						
Requirements 200	Small Scale model is brought to presentation						
	Image is correct size and adequate resolution						
	Design includes at least one element of metal						
	Design includes one element of wood						
	Design includes one element of concrete						
	Design Includes one element of glass						
	Connections are responsive to the characteristics of the materials						
	Design is correct size						
	Construction is successful from all natural viewing positions						
	Model responds shows development from small scale to large scale						
Understanding 160	Model is an abstract representation of the ideas of the building						
	Model explores ideas fundamental to the building						
	Metal is used in a way expressive of the material						
	Wood is used in a way expressive of the material						
	Concrete is used in a way expressive of the material						
	Glass is used in a way expressive of the material						
	Connections enhance the design						
	Creativity and aesthetic quality of the overall design						
Presentation 80	Model is assembled and ready present at start of class						
	Model is removed in time						
	Presentation clearly articulates ideas						
	Presenter responds to jurors comments						
TOTAL							

