WOOD	FALL TERM 2004 SCHOOL OF ARCHITECTURE AND PLANNING: MIT

Part I: Wood in Architecture

- Introduction
- Material Properties and Structural Morphology
  i. Wood
  ii. Masonry
  iii. Steel
  iv. Fabric
  v. Composites

Part II: Wood Systems and Architecture

- Transparencies

Part III: New Materials and Systems

- Engineered woods
- Panelized systems

Part IV: Resource Efficiency

- Rating councils
- Sustainable practice

Images:

Piano, Renzo. Building Workshop, Genoa, Italy, 1995.

Thompson and Rose, Altantic Center for the Arts, New Smyrna, FL, 1997.

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Part I: Wood in Architecture

- Introduction

The use of wood extends back in time longer than any other material. In fact, wood represents both the original material of building as well as the earliest source of energy. Once abundant it is now, for the most part a managed resource.

"whether to use the wood to build a small shelter or as firewood for a bonfire. An entire theory of architecture is encapsulated in this simple question."

Fernandez-Galiano, Luis, *Fire and Memory: On Architecture and Energy, page 7.*

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Part I: Wood in Architecture

- Introduction
  - i. Historical trajectory

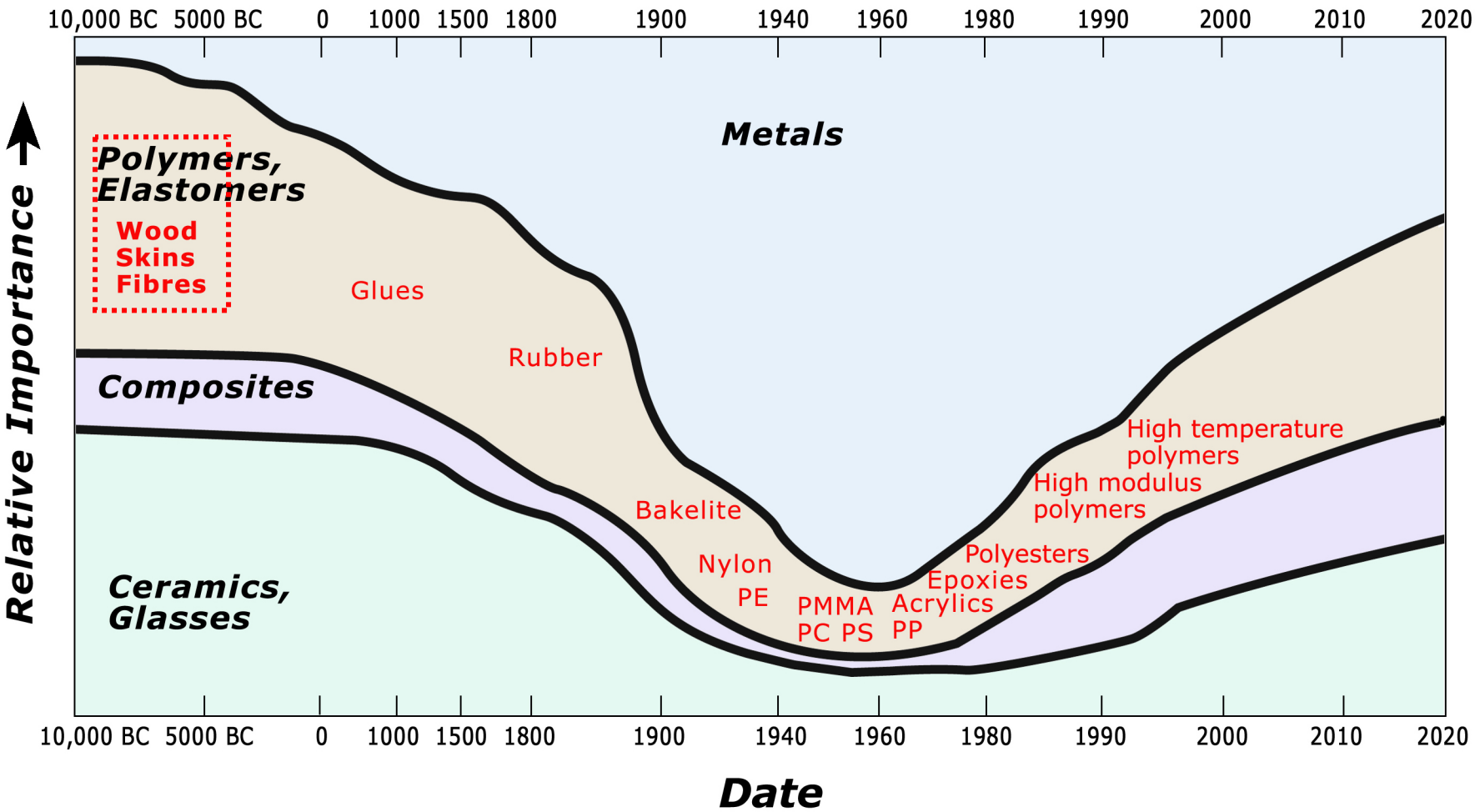

Image by MIT OCW.

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Part I: Wood in Architecture

- Introduction

i. Historical context

Landmark developments

1666	Great Fire of London
1760s	Powered mills on the rise (water or wind driven)
1773	Rhode Island completely depletes its forests
1777	Circular saw patented in Britain
1810	Timber replaces furs as largest Canadian export
1832	Balloon framing introduced in Chicago
c.1850	Circular saw first used in the US for processing wood
1860s	The Great Lakes becomes center of lumber production in the US
1870s	The eastern US, having substantially reduced its forests, becomes a net importer of wood from the west
1883	Completion of railroad to Puget Sound opens forests of the Northwest
1884	Production of three-ply chair seats in Estonia
1890s	“Hot ponds”, heated with heat recovery from sawmills’ boilers, make year round operation possible for sawmills in North America
1890s	Large scale band saws invented
1900	Resawing introduced
1905	Softwood plywood displayed at Lewis and Clark Expedition Centennial
1906	Synthetic resin glues produced in Germany

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Part I: Wood in Architecture

- Material Properties

  i. Molecular components
  - Cellulose
  - Hemicellulose
  - Lignin
  - Pectin

  ii. Macroscopic structure
  - Annular rings
  - Heartwood
  - Sapwood
  - Bark

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Part I: Wood in Architecture

- Structural Morphology
  - i. Solid Load Bearing Wall
  - ii. Timber Frame
  - iii. Balloon and Platform Framing
  - iv. Stress-Skin Systems Structural Types

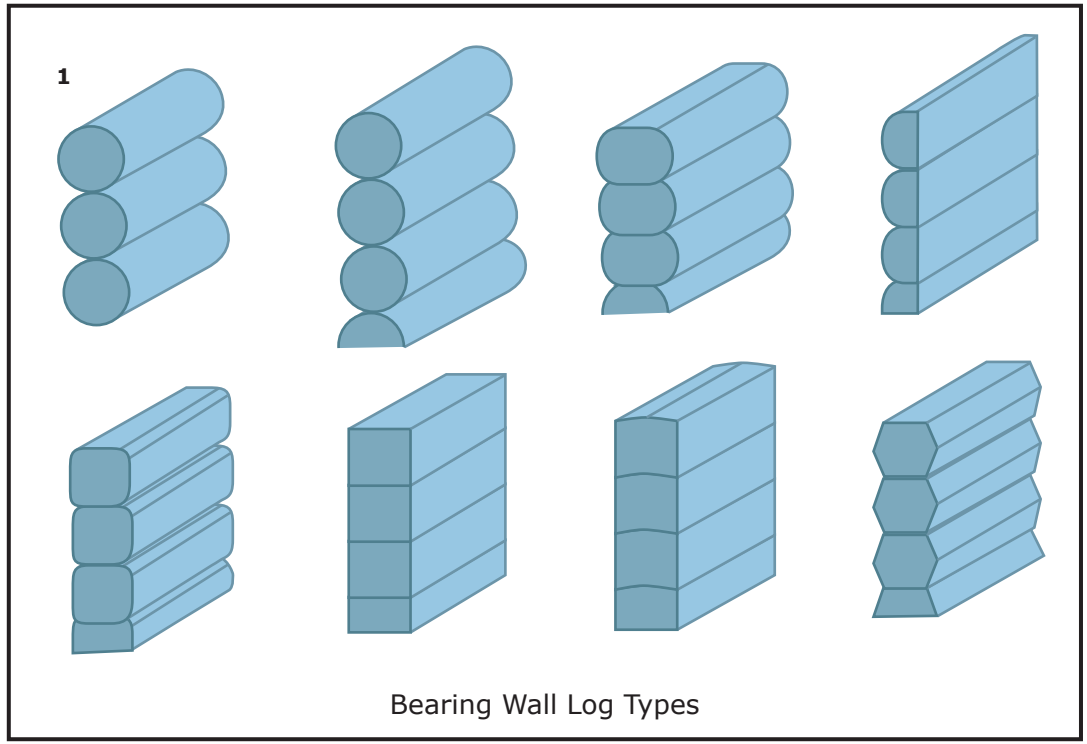

Image by MIT OCW.

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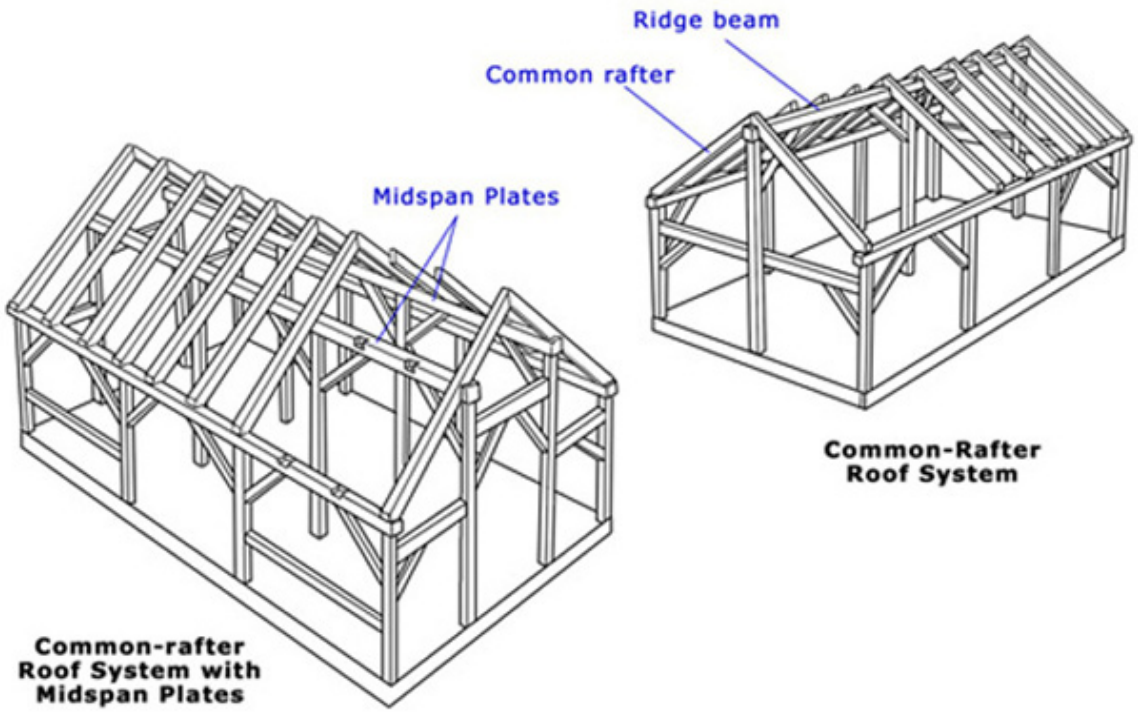

Image by MIT OCW.

Common timber framing types

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WOOD

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Image:

Ishii, Puppet Theater, Seiwa, Japan.

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Image:

Ishii, Puppet Theater, Seiwa, Japan.

Ishii, Puppet Theater, Seiwa, Japan.

1. Roof construction: clay tiles, thermal insulation and radial purlins
2. Rafters 40/90mm
3. Rafter-supporting purlin, 90/90mm
4. Wood beams, 180/330mm

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Image:

Jourda Perraudin, Architecture $chool, Lyon, France.

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Image:

Jourda Perraudin, Architecture School, Lyon, France.

Cast Steel Detail

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  i. Solid Load Bearing Wall

  ii. Timber Frame

  Details are designed to capture extreme fibers of timber members

  i. Balloon and Platform Framing

  ii. Stress-Skin Systems Structural Types

Image:

Jourda Perraudin, Architecture $school, Lyon, France.

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  ii. Timber Frame

  iii. Balloon and Platform Framing

  iv. Stress-Skin Systems Structural Types

Image:

Baller, Gymnasium, Berlin

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Part I: Wood in Architecture

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  i. Solid Load Bearing Wall

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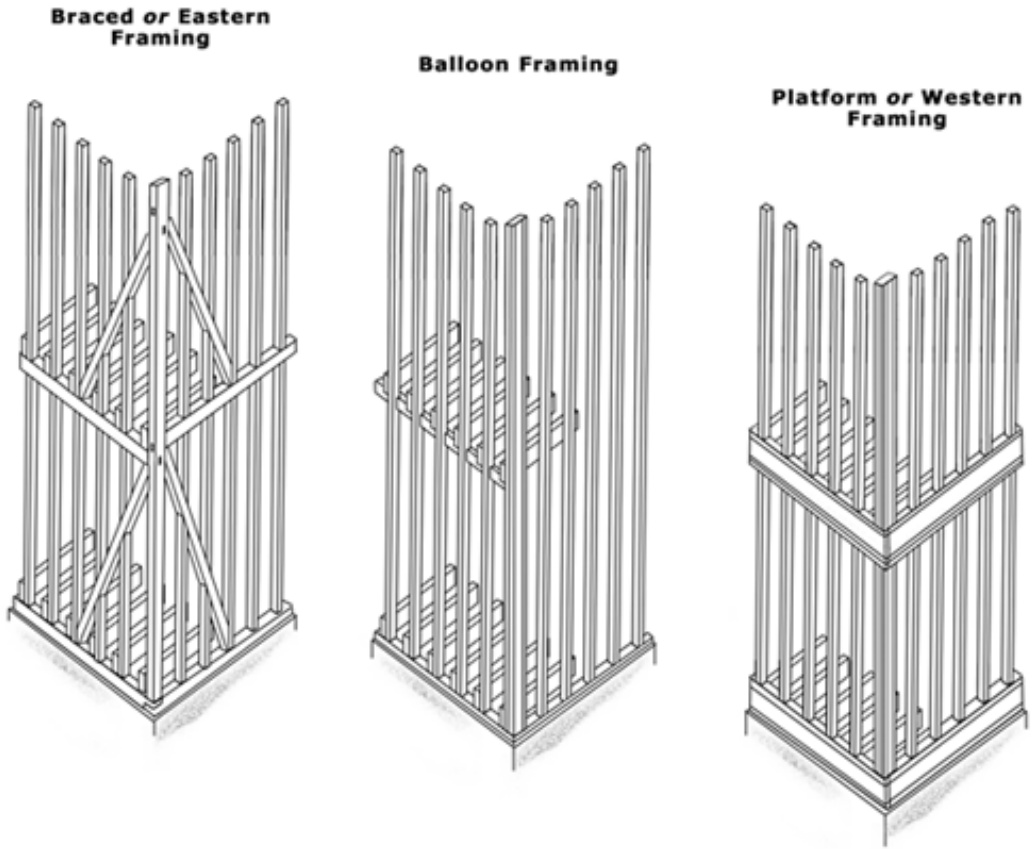
  iii. Braced, Balloon and Platform Framing

  iv. Stress-Skin Systems Structural Types



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