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:
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.”

Part I: Wood in Architecture

• Introduction
  i. Historical trajectory
Part I: Wood in Architecture

• Introduction

  i. Historical context

    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
Part I: Wood in Architecture

- Material Properties

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

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

Bearing Wall Log Types

Image by MIT OCW.
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

Common timber framing types
Part I: Wood in Architecture

• Structural Morphology
  
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  ii. Timber Frame
  
  • Transparencies

i. Balloon and Platform Framing

ii. Stress-Skin Systems Structural Types
Part I: Wood in Architecture

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Image:

Ishii, Puppet Theater, Seiwa, Japan.
Part I: Wood in Architecture

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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
Part I: Wood in Architecture

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Jourda Perraudin, Architecture School, Lyon, France.
Part I: Wood in Architecture

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Jourda Perraudin, Architecture School, Lyon, France.
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Image:

Jourda Perraudin, Architecture School, Lyon, France.

Cast Steel Detail
Part I: Wood in Architecture

- Structural Morphology
  
  i. Solid Load Bearing Wall
  
  ii. Timber Frame
  Details are designed to capture extreme fibers of timber members
  
  Image:

  Jourda Perraudin, Architecture School, Lyon, France.

  i. Balloon and Platform Framing
  
  ii. Stress-Skin Systems Structural Types
Part I: Wood in Architecture

• Structural Morphology

  i. Solid Load Bearing Wall
  Image:

  ii. Timber Frame
  Baller, Gymnasium, Berlin

  iii. Balloon and Platform Framing

  iv. Stress-Skin Systems Structural Types
Part I: Wood in Architecture

- Structural Morphology
  
i. Solid Load Bearing Wall

ii. Timber Frame

iii. Braced, Balloon and Platform Framing

iv. Stress-Skin Systems Structural Types

Image by MIT OCW.
Part I: Wood in Architecture

- Structural Morphology
  
i. Solid Load Bearing Wall

ii. Timber Frame

iii. Balloon and Platform Framing

iv. Structural Stress-Skin Systems