WOOD II

Part II: Wood Systems and Architecture

transparencies

Images:

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

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

WOOD

Part III: New Materials and Systems

- Engineered woods
- Panelized and board systems
- Wood/Cement composites

WOOD	

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- Engineered woods
  - trusses
  - joists
  - composite sections

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and Systems

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  - composite sections (flitch beams)
  - LVLs, Glulams

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Part III: New Materials and Systems

- Panelized systems and board systems

  - SIPs

    see sips.org

  - oriented strand boards

EPS Core Thickness	3 5/8”	5 5/8”	7 3/8”	9 3/8”	12 3/8”
R-value @ 75 F	16	24	30	38	46
R-value @ 40 F	17	25	33	33	49
R-value @ 25 F	18	26	34	38	51

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- Panelized systems and board systems
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- Wood/Cement composites
  composition: treated waste wood chips and cement 15%

Images:

Cement lumber

Plastic lumber

Faswall cement/wood block

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Part IV: Resource Efficiency and other sustainable issues

Issues

1. Harvesting
   - Deforestation: in the US, rate of forest growth far exceeds rate of harvest
   - Habitat destruction: primary national forest issue
   - Fragmentation of natural habitats: lately identified as major contributor to large floral and fauna population swings
   - Biodiversity: also important in the national forests

2. Indoor environmental issues
   - Off-gassing from formaldehyde composites. Architects should specify products that meet ANSI/HPVA HP-1 or comply with US HUD formaldehyde requirement. (see the American Institute of Architects: *Environmental Resource Guide).* All glulams use adhesives that contain formaldehyde, although resorcinol-formaldehyde and phenol-resorcinol formaldehyde are considered safe. Urea formaldehyde is not.
   - Preservatives, while not proven to cause health hazards, should be completely isolated from the interior spaces of buildings. Try to avoid using preservatives altogether. Good detailing can mitigate most weathering issues.
   - Trapped moisture from green wood can promote mold growth within an exterior envelope assembly. Good exterior wall analysis will prevent many moisture problems.

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Part IV: Resource Efficiency and other sustainable issues

Issues

3. Energy
   - Energy comparisons (in the US) between various materials shows that wood is very resource efficient (units omitted, only relative energy costs shown). For example, aluminum requires 126 % more energy than wood.

Type of Wall	Energy
Plywood siding, no sheathing, 2 x 4s	1.988
MDF siding, plywood sheathing, 2 x 4s	2.541
Aluminum siding, plywood sheathing, 2 x 4s	4.953
MDF siding, plywood sheathing, steel studs	5.106
Concrete building block (cmu), no insulation	17.087
Brick veneer over sheathing	17.887

   - In addition, using fast growing trees (reaching maturation within 20 years; southern pine, poplar) it is possible to remove more carbon from the environment than one has released in the amount of energy used to harvest and produce lumber
   - However, there is a great deal of material waste in the production of standardized sections for construction. The production of 2 x 4s from a single log will result in about 35% waste wood, in the form of shavings, unusable sections, sawdust and chips.

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Issues

4. Production - Rating Councils: Certification is rare and not particularly reliable outside of the United States
   - ISO 14001 (ISO)
   - Sustainable Forestry Initiative Standard (SFI)
   - Canada's National Sustainable Forest Management System (CSA)
   - The American Tree Farm Program (ATF)
   - The Forest Stewardship Council (FSC)

   However:
   - Only about 1% of the world's wood resources are certified (US is net importer of wood)
   - Enforcement of foreign sources of wood is close to impossible
   - Tagging certification strategies are problematic on many fronts

5. Sustainable Practices
   - See article
   - Simply do not specify "exotic" woods (mahogany, teak, ebony, anigre)
   - Seek out sources of recovered, "reclaimed" wood (James Cutler, Gates house)
   - Specify glulams, lvls, osb, non-formaldehyde plywood (more resource efficient production), mdf and engineered sections and structural composite

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Part IV: Resource Efficiency and other sustainable issues

More Sources of information

Precede 2-9 with www.

1. Environmental Resource Guide, American Institute of Architects (Rotch Library)
2. Engineered wood products: advanced buildings.org/main_t_building_engineered_wood.htm
3. Formaldehyde-free mdf: advanced buildings.org/main_t_finishes_formaldehyde.htm
4. Sustainable and uncommon wood species: sustainablebusiness.com/html/insider/jan00/wood.cfm
5. National Resources Defense Council: nrdc.org/cities/building/rwoodus.asp
6. Forest Protection and wood-efficient design: rca-info.org/bldg.html
7. Building reuse: smartgrowth.org/casestudies/Presidio.html
8. Mid-Atlantic consortium of recycling and economic development: libertynet.org/macredo/crrprj.htm
9. Sustainable materials source; engineered sheet materials (OSB etc.): greenbuilder.com/sourcebook/EngSheet.html