



Alberta

WoodWORKS!

Alberta Biomaterial Development Centre

Feb 12, 2013



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Wood WORKS! is an industry led, federally and provincially supported project of the Canadian Wood Council, here to promote and educate the economic and environmental benefits of wood construction.

* Canadian Program Impact

- Mature Program - 15 years experience
- 1.03 billion bf lumber
- 471 million sq. ft. (3/8") panels
- \$8.5 billion of commercial projects
- \$558 million - wood sales
- 180,000 + continuing education hours delivered
- Catalyst to innovative solutions



WoodWORKS! Activities:



Lunch & Learns
Seminars
Workshops
Case Studies



WoodWORKS! Video:

<http://www.redtheagency.com/video/>

Benefits of Using Wood

- 18,000 Albertans work in the forest products industry
- The industry generates \$4 billion for our economy
- Relative to other materials, wood is cost-effective
 - A 6-story mid-rise in BC cost 14% less than a similar building of other materials
- Environmentally friendly





* Challenges

- Building Codes
- Green Standards
- Perceptions



* We Have the Solutions

New products with enhanced properties

- Build quicker
- Meet and exceed structural and fire requirements
- Cost Competitive
- Taller Buildings (6-10 stories)



Mid-Rise Buildings



Mid-Rise Buildings



Mid-Rise Buildings



Economical, Sustainable, Safe

*Innovation in Wood

- * Glulam
- * Laminated Strand Lumber
- * Cross Laminated Lumber

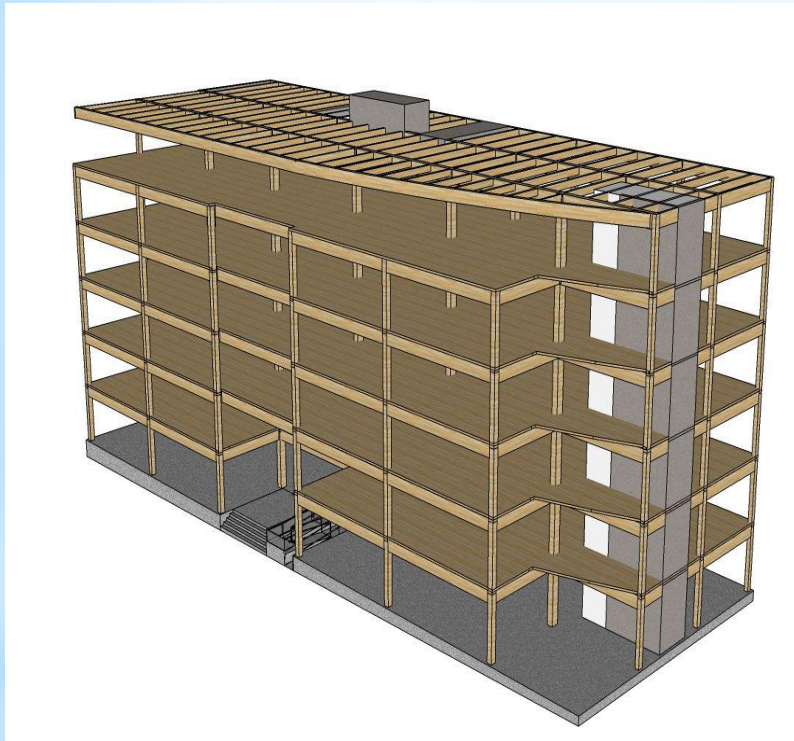
* Innovation in Wood

* **Glulam**

* Laminated Strand Lumber

* Cross Laminated Lumber

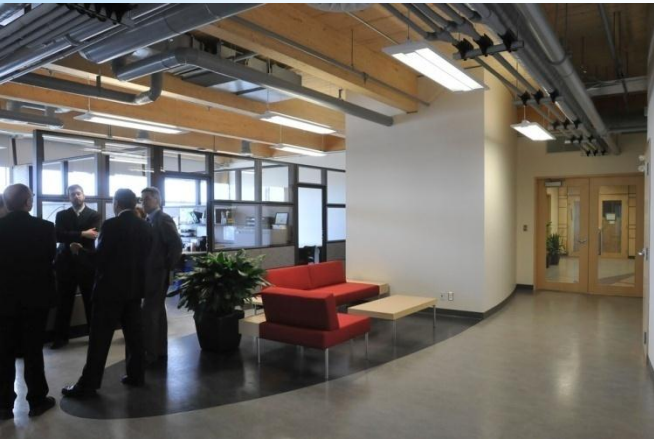
North America's first Six Storey Bldg goes to...? Quebec City!



6-storey glulam post-and-beam structure with reinforced concrete cores (CSN FondAction)

Credit: FP Innovations





Credit: Cecobois





* Innovation in Wood

* Glulam

* **Laminated Strand Lumber**

* Cross Laminated Lumber

*Innovation in Wood



* Innovation in Wood



*Innovation in Wood



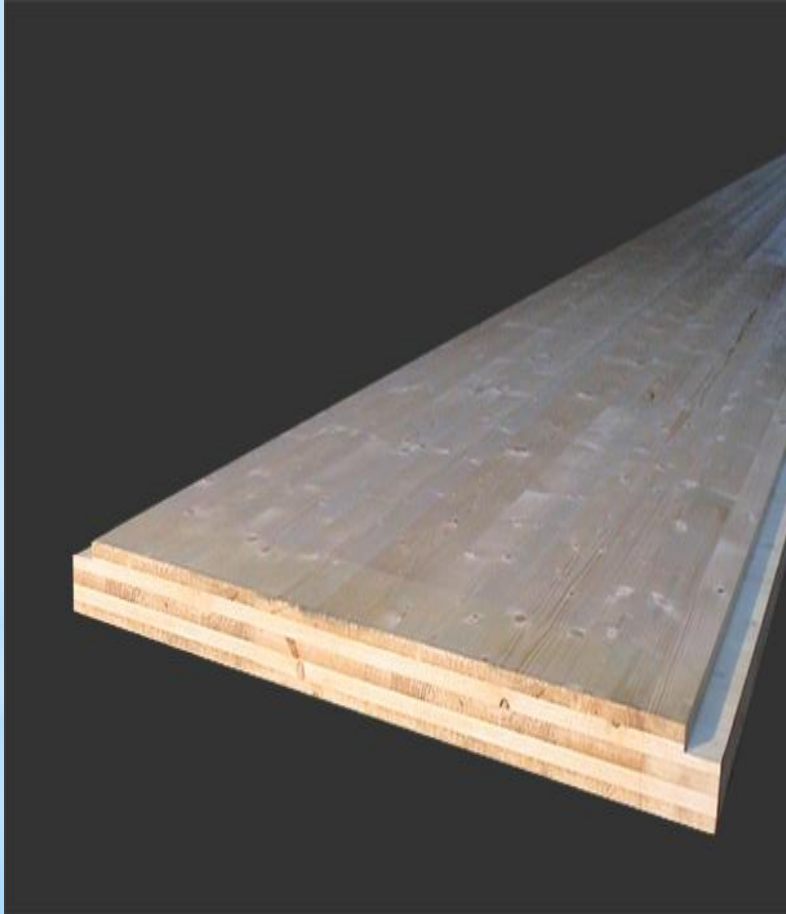
*Innovation in Wood

* Glulam

* Laminated Strand Lumber

* **Cross Laminated Lumber**

*Innovation in Wood



*Typical Panels



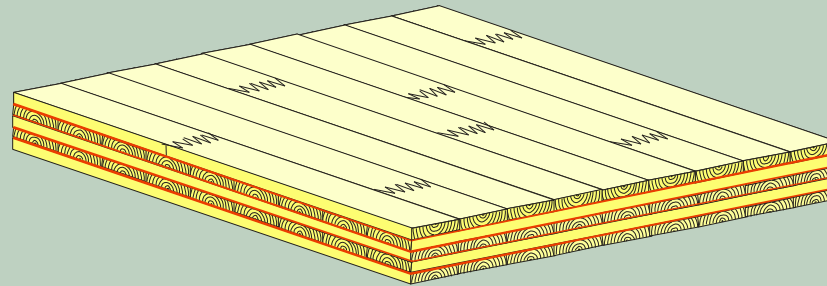
CLT – technology (Europe only)

production process of Cross Laminated Timber (CLT) elements

step

intermediate product | intermediate production process

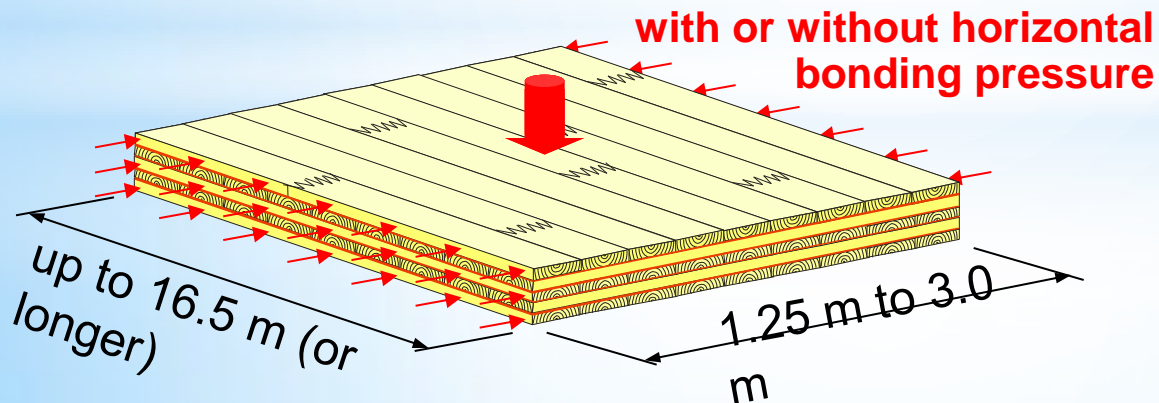
**STEP IV:
Cross
Laminated
Timber
(CLT)**



face gluing

bonding pressure vertical:

- approx. **0.6 N/mm²** with **hydraulic equipment**
- **< 0.1 N/mm²** with **vacuum**
- approx. **0.1 N/mm²** with **clip connection**





Cross-Laminated Timber Mid-rise Buildings

Limnologen Project: 2006 start

Construction of four-
8 Storey buildings

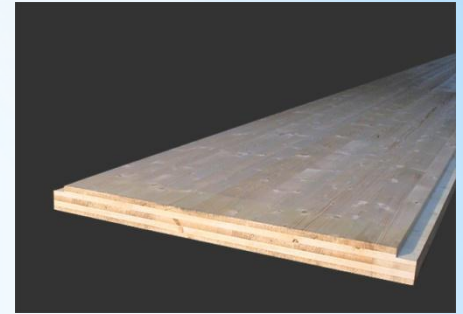
First storey concrete
and 7 storeys wood

Växjö, Sweden



Source: Växjö University

Limnologen Project:



- The connection between the composite panels was achieved by a plywood strip screwed to the wooden panels.
- The number of screws was optimized following the calculation of shear stress all along the panel.



Limnologen Project:



- To connect walls together, SFS screws were used.



* Viken Skog Office Bldg, Norway



- 4 storey office bldg
- CLT floor slab supported on GLB beams
- CLT walls, interior and exterior



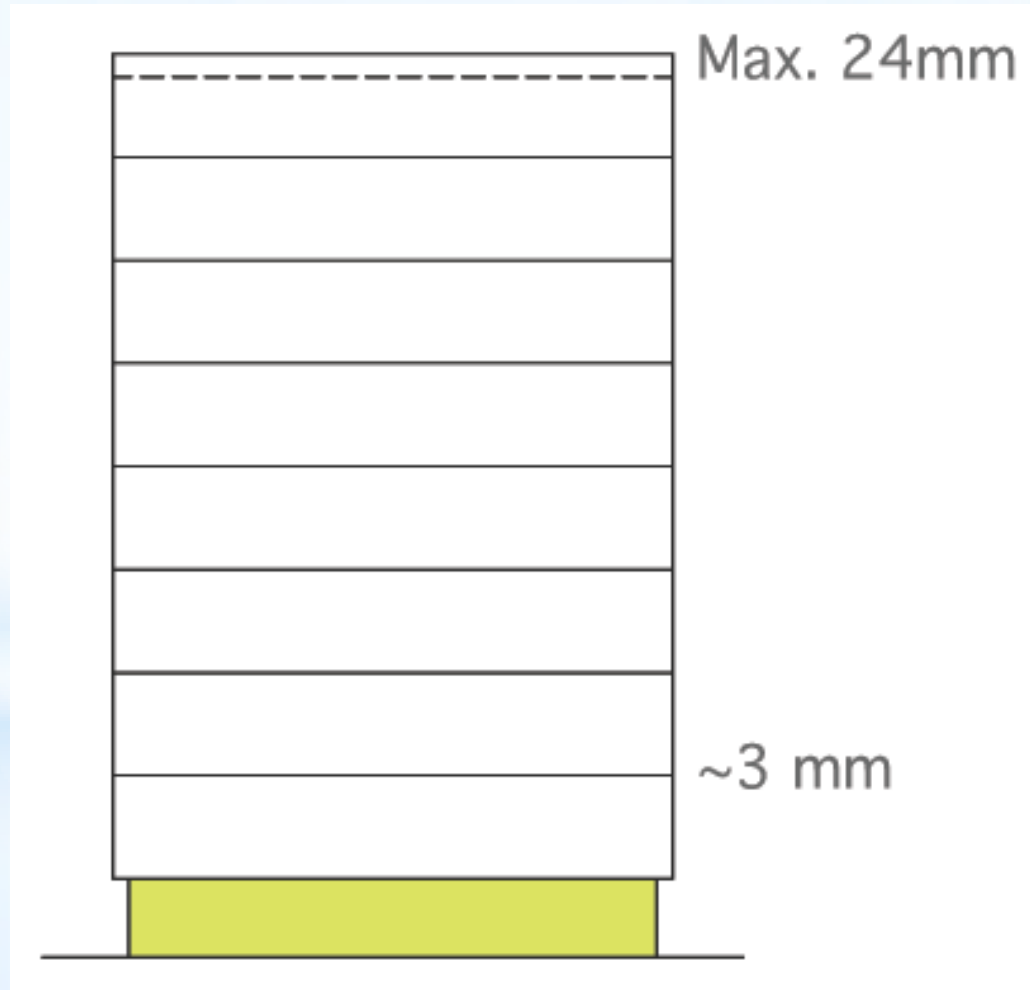
* Murray Grove, London, England

Waugh Thistleton Architects



- 9 Storey Wood Building
- 29 apartments
- Cross Laminated Wall and Floor Panels
- Prefabricated with cutouts for doors and windows

* Murray Grove, London, England Shrinkage









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13

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29

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MANS

UNIT 1

UNIT 2

UNIT 3

UNIT 4

UNIT 5

UNIT 6

UNIT 7

UNIT 8

UNIT 9

UNIT 10

UNIT 11





10











Panel height
13'3"

9" deep CLT-25' span

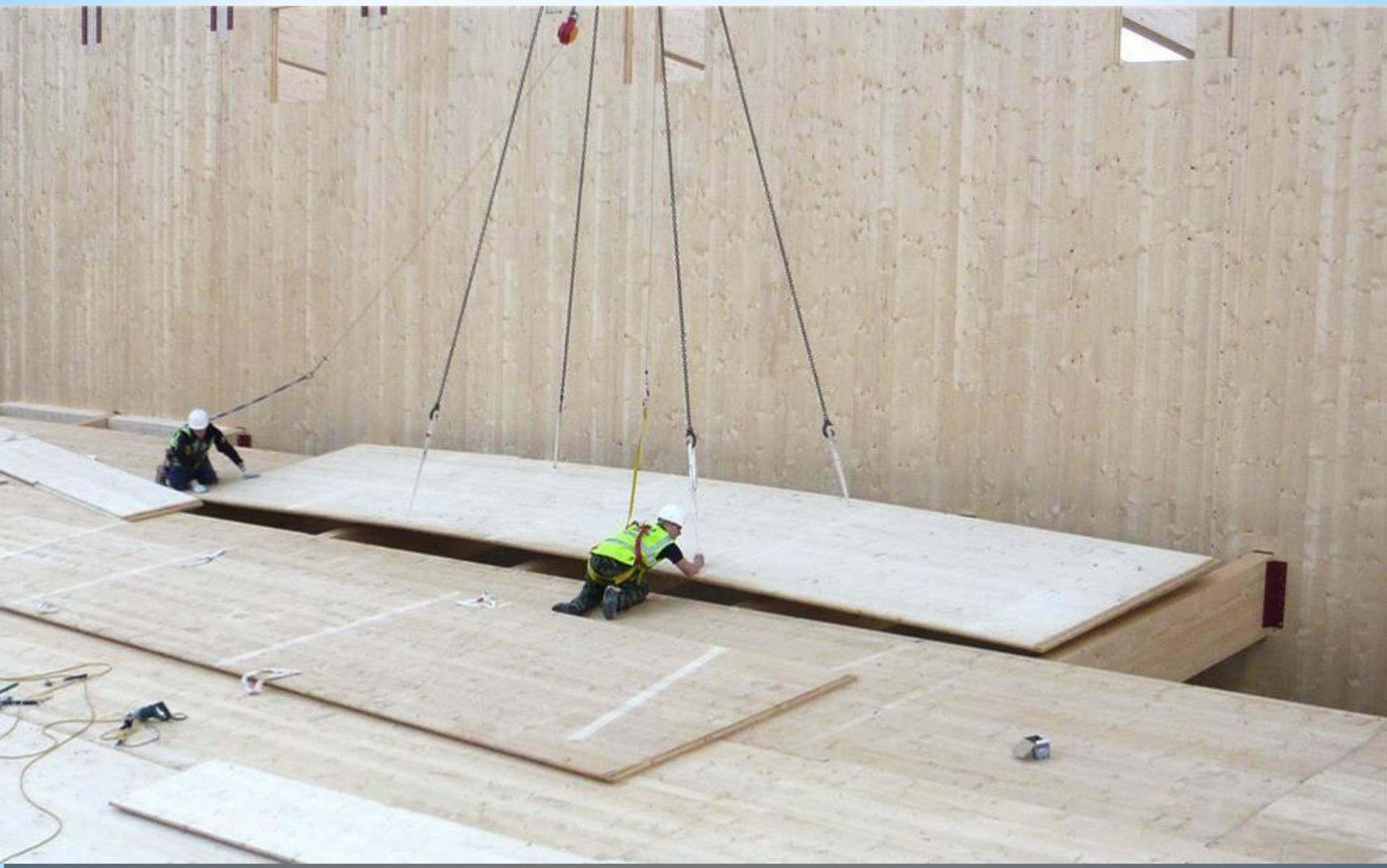
27"

13' 3"

8' 2"







Proposed Tall Wood Structures and Systems



NEXT CITY SOLUTIONS

Hail, Timber

In Hainan, Japan, a 122-foot-tall wooden pagoda has stood for more than 1,300 years. Very few modern structures like it exist, largely due to fire safety concerns and building codes that limit the height of timber structures. Canadian architect Michael Green aims to change that with a proposed wooden skyscraper up to 30 stories high in Vancouver. He explains that giant panels of laminated wood known as mass timber are more fire-resistant than typical two-by-fours, just as logs are harder to ignite than kindling.

The bigger advantage? The production of concrete and steel emits high levels of carbon dioxide, whereas wooden buildings store carbon that would otherwise be released when trees decay or burn. London already has a nine-story mass-timber apartment building, and a 16-story wooden skyscraper is slated for Kibera, Kenya. Green's ultimate ambition for timber towers is even loftier: provide affordable housing for people living in slums. —Alex Noy

Mass Timber
Instead of traditional lumber, mass timber boards and plywood made of sustainably grown wood—such as fast-growing birch—would normally be suitable for concrete.

Fire Protection
Additional layers of wood create a "char layer" that protects structural beams during a blaze. In early tests, mass timber withstood fire as well as other building materials.

Carbon Sequestration
Mass timber stores CO₂ instead of emitting it, as concrete construction does. The net carbon footprint is negative.

CO₂ Impact of a 20-story wood building in 2015

Tons of CO ₂ stored by mass timber	3,141
Net CO ₂ effect	4,356 tons
Tons of CO ₂ generated by construction	1,215

Source: Green Building Institute

Examples of Tall Wooden Structures



Source: Research, Green and The Urban Village

Fort McMurray Airport

Largest CLT in North
America

170,000 square foot

Prefabricated Roof System

Glulam + CLT Roof Panels



Benefits

- *Can be used to form roof, wall and floor elements*
- *Can complement light frame construction bldg - shear walls or lower 1st/ 2nd floor of a midrise bldg?*
- *Taller than 6 storey residential buildings - potential (up to 10 storeys)*
- *Shallow floor construction- a solution for an over height bldg?*
- *Provide a “wood” alternate solution to precast concrete construction, masonry and steel structures (Non Res bldgs)*
- *building accuracy, system predictability, carbon sequestering and emission reduction benefits*

QUESTIONS?

- * Alberta Biomaterial Development Centre
- * Feb 12, 2013