



Timber Buildings

Presented by Ali Habibi





Presentation Outline

- Introduction to engineered timber
- Timber projects around the world
- Timber projects in Australia
- Why timber?
- Types of timber buildings
- Fire
- Challenges

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What is engineered timber?



Glulam

Glued Laminated Timber



LVL

Laminated Veneer Lumber



NLT

Nail Laminated Timber



CLT

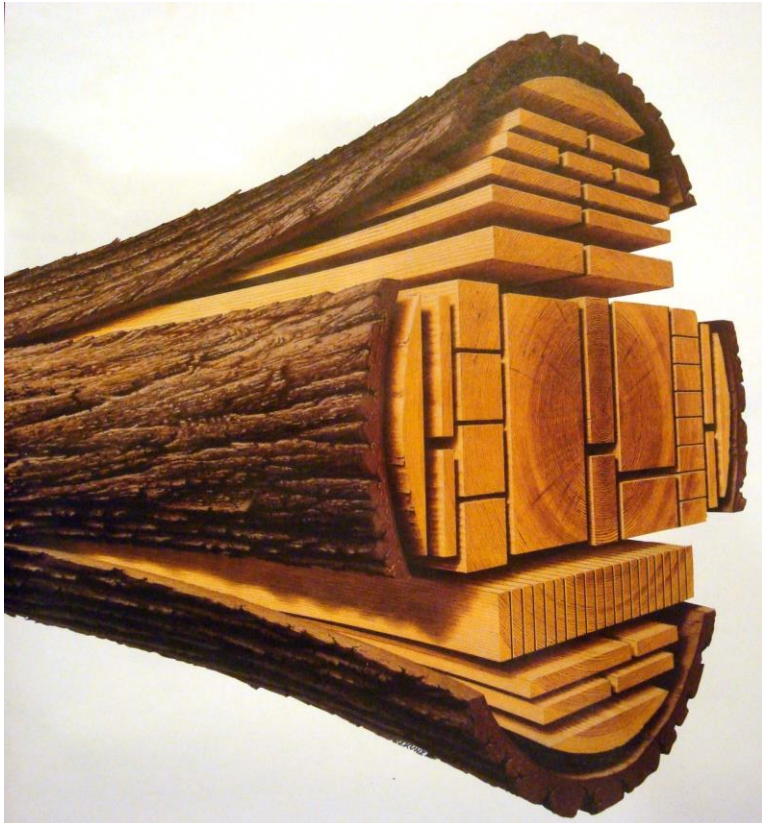
Cross Laminated Timber



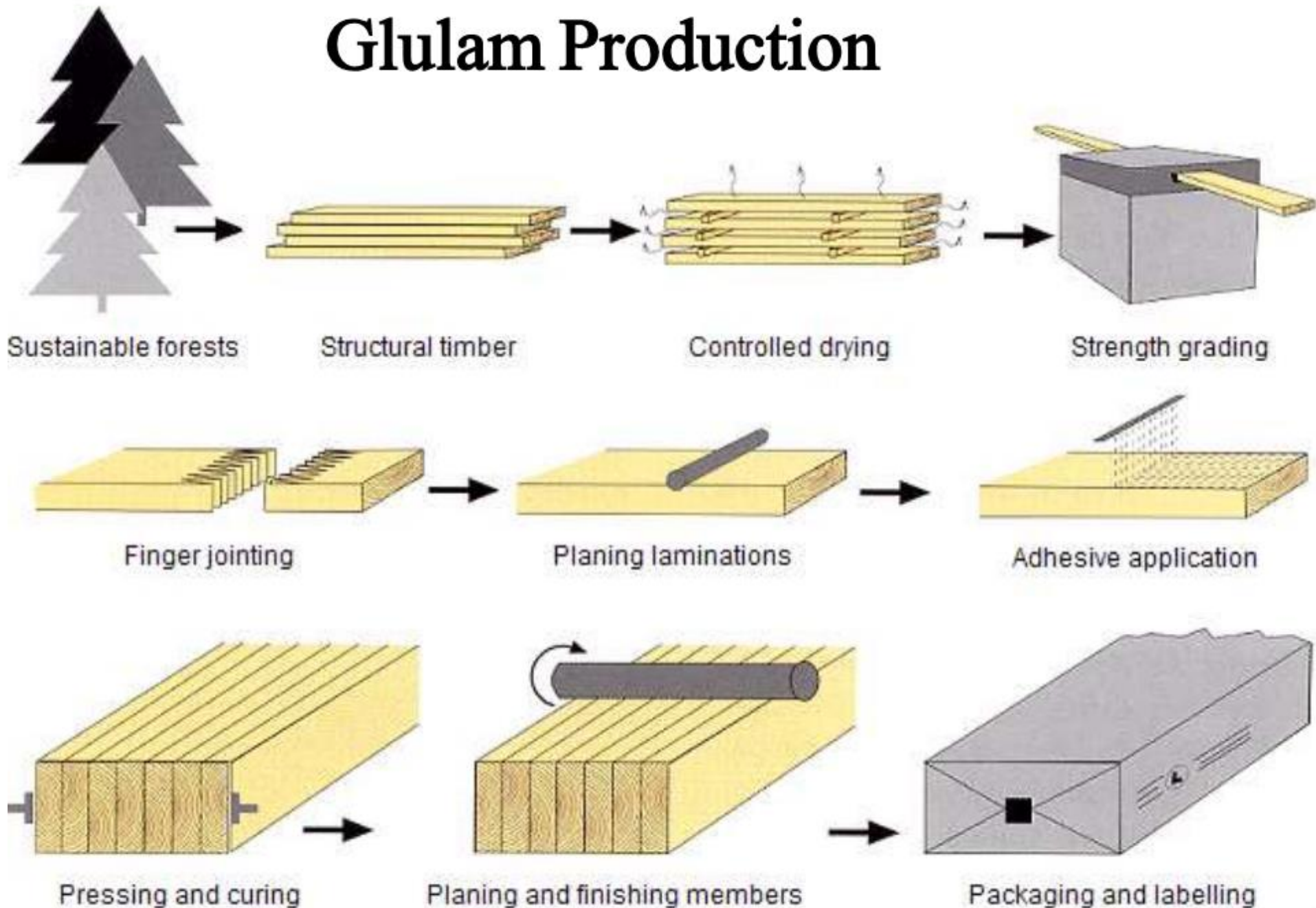
Plywood

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Sawing trunks into timber

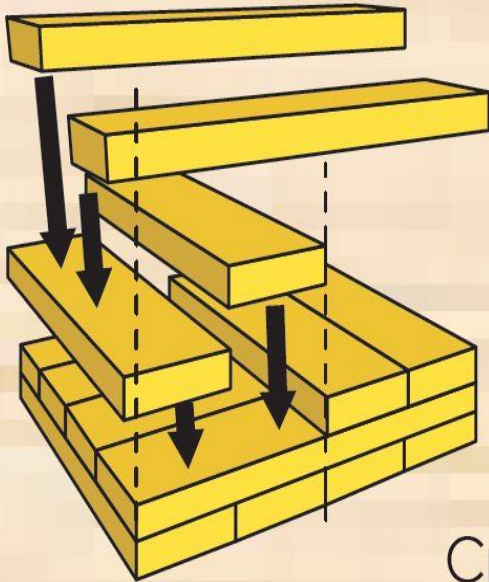


Glulam Production

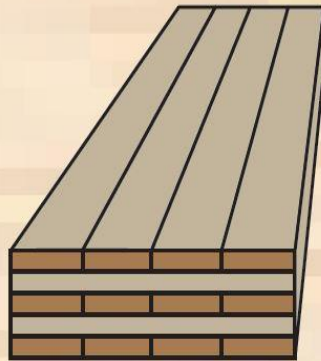


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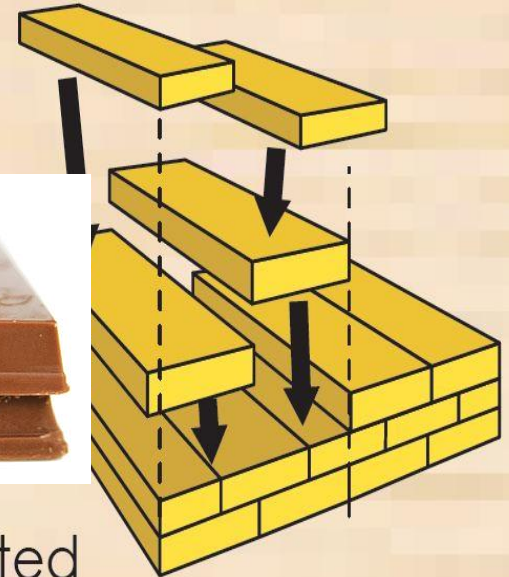
CLT vs Glulam



Cross Laminated
Timber (CLT)

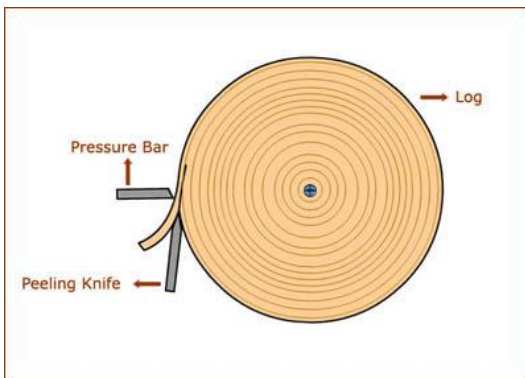


Glued Laminated
Timber (Glulam)

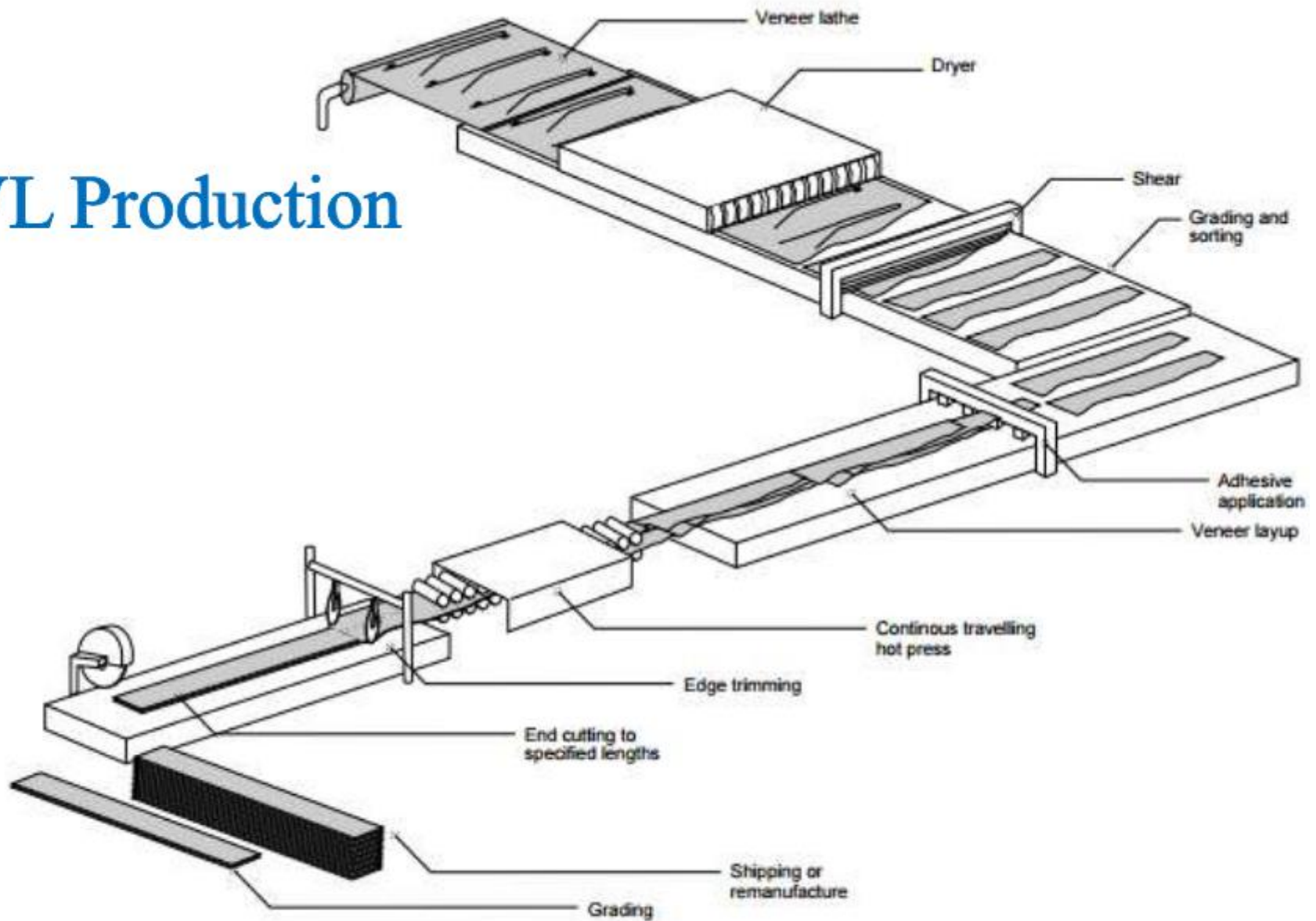


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Producing timber veneer



LVL Production



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Timber projects around the world



Federal Bank/Bozeman, MT-USA



Pedestrian Bridge in Bahrain



TIMBER PROJECTS

Timber projects around the world

Richmond Olympic Oval, Canada



RENDERING BY CANNON DESIGN

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Timber projects around the world

Zurich Zoo, Switzerland



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Timber projects around the world

Pyramidenkogel, Austria

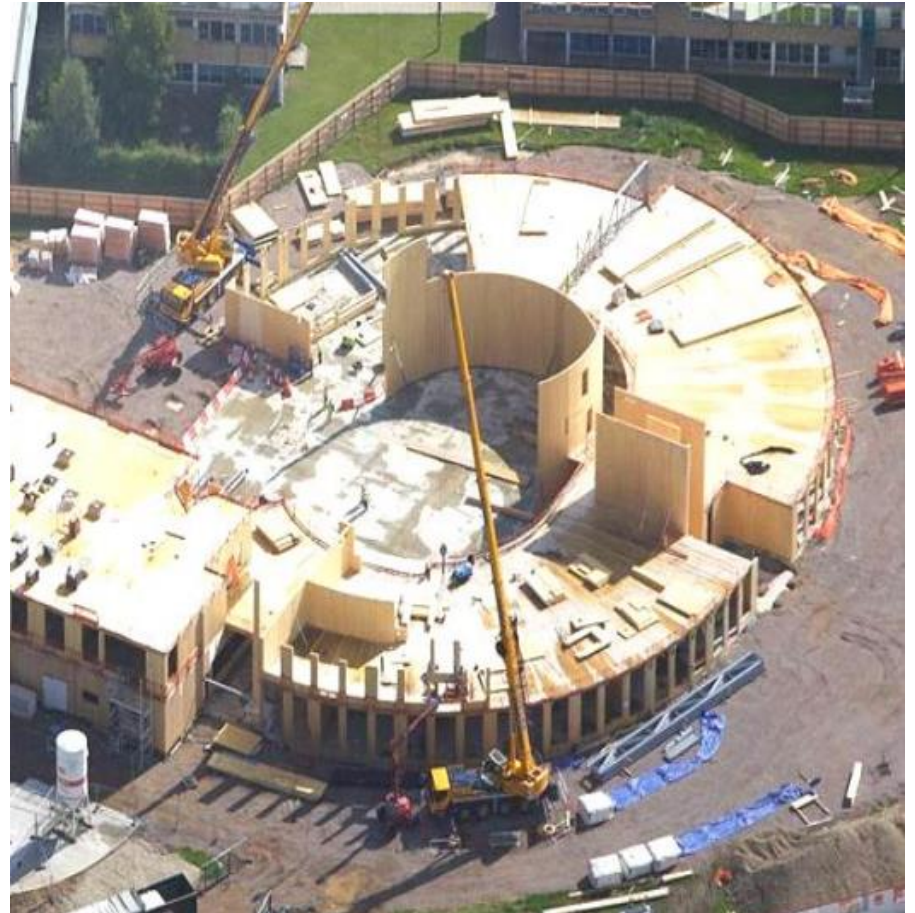


**24 Storey
2019**



Timber Projects around the world:

9 storey-Hackney London (left)
School in UK (Right)



Timber Projects around the world:

Believe in Better Building, West London



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Timber Projects around the world:

Treet, Norway (Tallest Residential building – 14 storey)



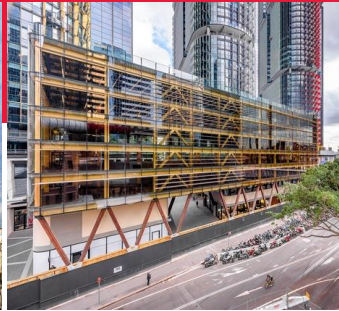
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Timber Projects around the world:

Brock Commons, UBC, Canada (World tallest timber building-18 storey)



Projects in Australia



Why timber?

- Benefit of building in timber
 - More sustainable
 - Lightweight
 - Less trades and labourers
 - Safer worksite
 - Less complex
 - Faster
 - Marketable

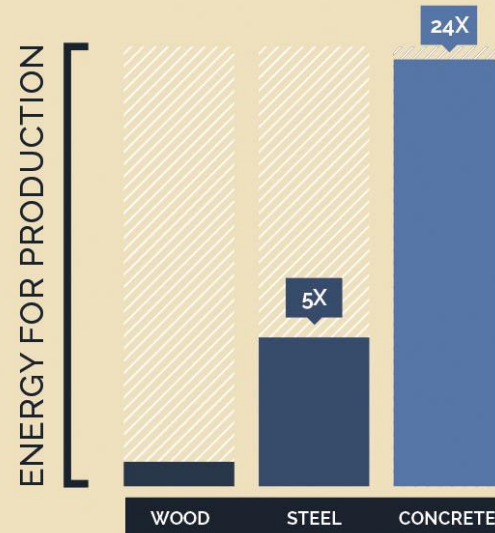
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Why timber?

More sustainable

BENEFITS OF BUILDING WITH **WOOD**

Wood and wood products need the least amount of energy to manufacture and has the lowest impact on air and water quality.



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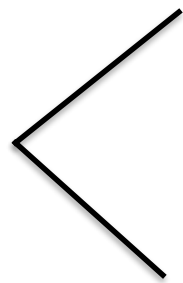
Why timber?

Less trades and labour = Safer worksite



Types of timber buildings

Mass timber



- Light timber framing
 - Low rise residential buildings
- CLT floors and loadbearing walls
 - Low-medium rise residential buildings
- Heavy timber framing
 - Office buildings
- Hybrid structures
 - Tall buildings (>10 stories)

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Light timber framing in Australia The Green (Melbourne)



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Types of timber buildings



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CLT floors and walls in Australia
Forte (Melbourne)





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CLT floors and walls in Australia Campbelltown affordable housing (Sydney)



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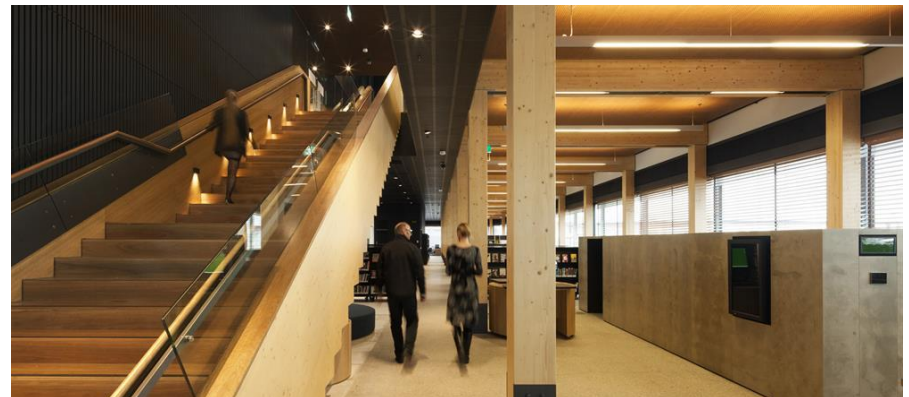
Types of timber buildings

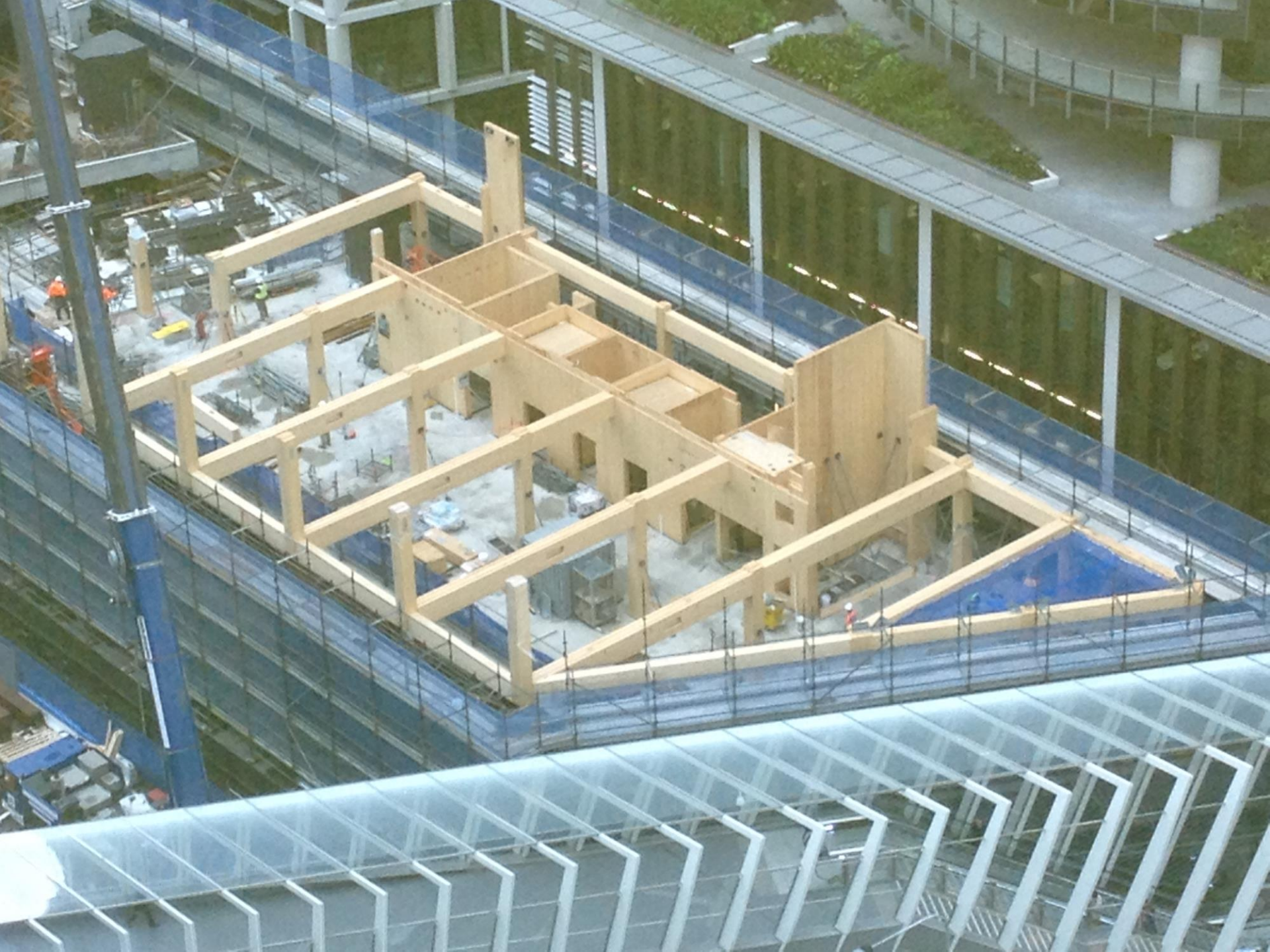


- Light timber framing
 - Low rise residential buildings
- CLT floors and loadbearing walls
 - Low-medium rise residential buildings
- **Heavy timber framing**
 - Office buildings
- Hybrid structures
 - Tall buildings (>10 stories)

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Heavy timber framing in Australia Library at the Dock (Melbourne)





Types of timber buildings



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Fire



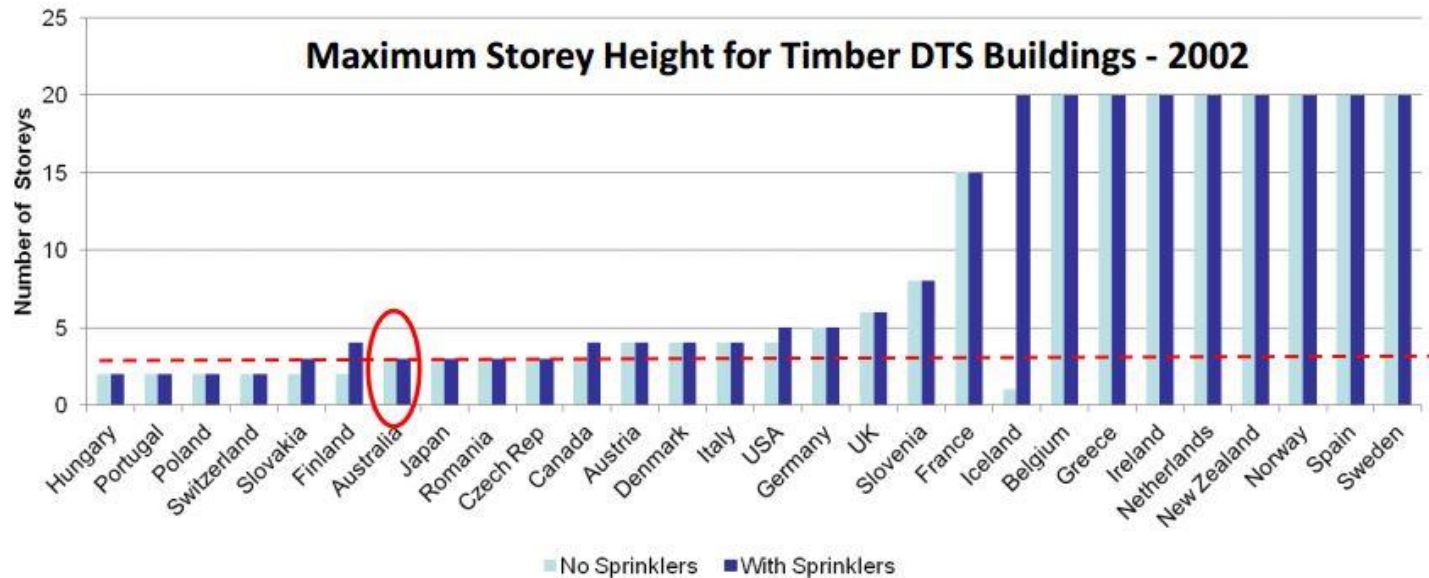
- **Option 1 – Deemed-to-Satisfy**
 - Recent Changes in BCA



- **Option 2 – Alternative Solution**

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Code compliance worldwide



Source: FWPA

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Code compliance worldwide



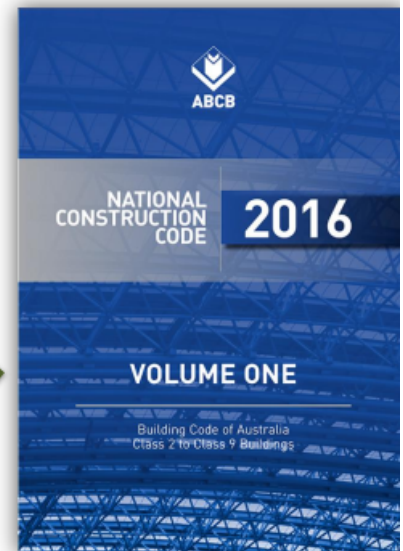
Source: FWPA

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BCA Changes in May 2016

- If, the building or building part is Class 2, 3 or 5.
- the building has an *effective height of not more than 25m*;
- and utilises:
 - *fire-protected timber*
 - *automatic sprinkler systems*
 - *non-combustible insulation*
 - *cavity barriers (if applicable)*

Then it meets the DtS Solution for
Mid-rise Timber Buildings

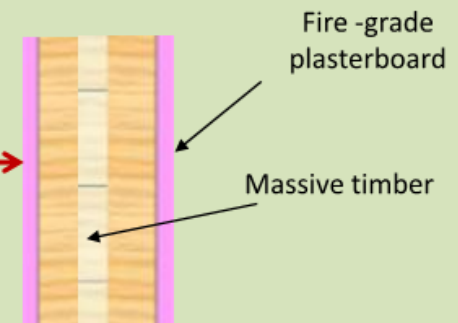


BCA Changes in May 2016

Massive Timber *(Lower level of protection to timber)*

- **Minimum 75mm thickness** of massive timber element, with required FRL, with no concealed spaces between plasterboard coverings and timber
e.g. CLT, Glulam, LVL

- Fire protective covering required:
 - Element with appropriate layers of fire protective covering, generally 1 layer of **16mm** fire-grade plasterboard for walls and ceilings



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Alternative Solutions

- Practically all buildings will require some “alternative” components
- A ‘fire engineered’ solution with input from the structural engineer



Holmes Fire



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Supply chain in Australia / Fire



Austria



Italy



Austria



XLam

Australia & NZ

RUBNER

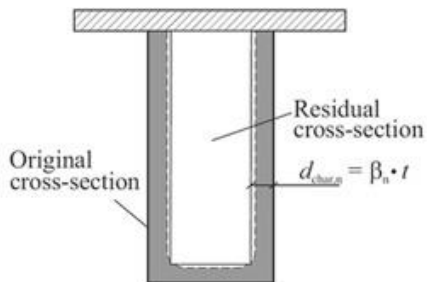
Italy

Distributors/fabricators

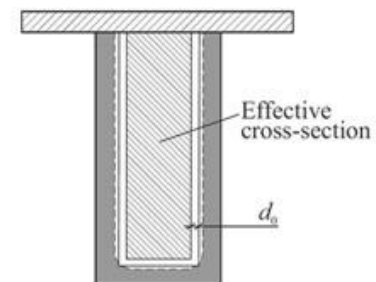


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Fire and Glulam (Charring Rate)



Step 1: Calculation of residual cross-section using the notional charring rate β_a and the time of fire exposure t

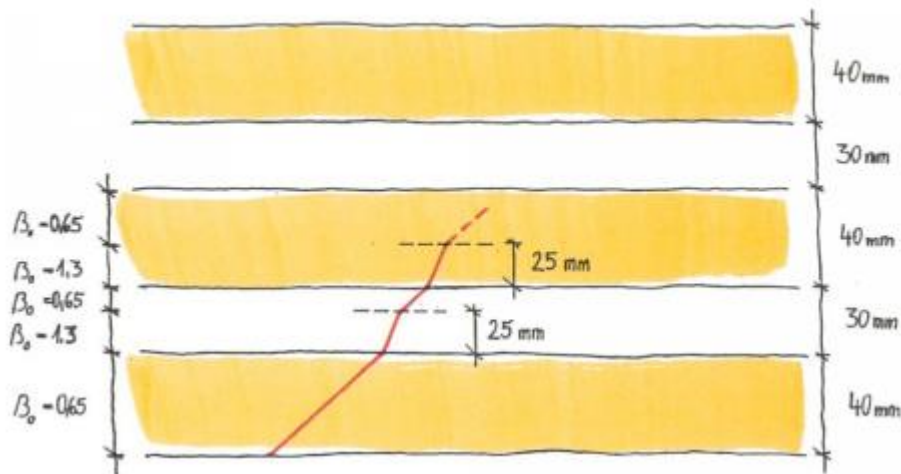


Step 2: Calculation of effective cross-section using the zero-strength layer d_0

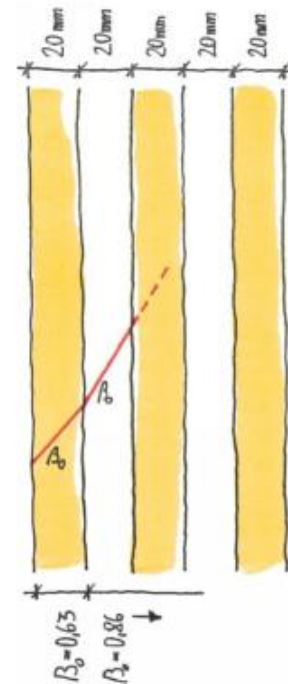
CLT Wall

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Fire and CLT (Charring Rate)



CLT Slab



CLT Wall

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Fire in beam with large penetration

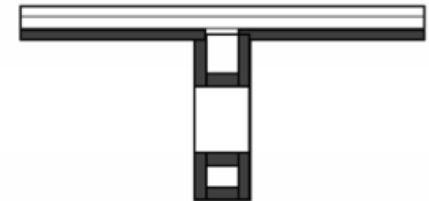


Diagram showing residual section after char around a penetrated primary beam.

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Fire & Connections

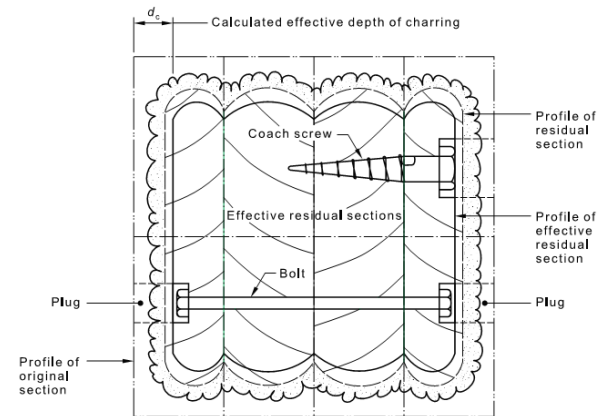


FIGURE 3.1 A METHOD OF PROTECTING METAL CONNECTORS



Structural Engineers Challenges

- Early involvement on the job
- Higher portion of the work upfront
- Services coordination
- Fire engineers with timber experience
- Fire authorities vs Fire engineers
- Neighbouring property
- Fit-out
- Progressive collapse solution
- Selection of supplier/builder

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Q&A?