Enabling Prefabricated Timber Building Systems for Class 2-9 Buildings

Prepared for Forest Wood Products Australia (FWPA) by the Centre For Sustainable Architecture with Wood (CSAW).

Presented by Dr. David Bylund
15 March 2017
Webinar Overview

• Executive Summary & Introduction
• Construction & the Matrix of Prefabrication
• Prefabrication in Class 2-9 Building in Australia
• Current Prefabricated Timber Supply Chain
• Drivers Enabling Prefabricated Timber Building Systems
• Barriers to Enabling Prefabricated Timber Building Systems
• Case Studies
• Recommendations
• **Drivers for** and **barriers to** the increased use of **Prefabricated Timber Building (PTB)** systems
• Increasing number of innovative PTB systems – suggests ongoing growth potential
• **NCC 2016** allows Fire Protected Timber in mid-rise construction
• Growing awareness - Several tier one and two builders now build using PTB systems
• Market-ready PTB systems remain in formative stages
• Opportunity to leveraged of timber’s well established benefits:
  • **Strength to weight ratio**
  • **Design and construction flexibility**
  • **Environmental benefits**
  • **Prefabricated timber construction suits:**
    • **Brownfield suburban & inner city sites**
    • **Restricted access sites**
    • **Sloping sites**

Project Introduction
Design:
‘Prefabrication is not just about the making, both the architectural and engineering design intent and processes are paramount and must be considered’

Location:
‘Manufacturing or the act of making pre-determined elements must be away from the final destination/position in a building or structure. This could be on the same site or at another location off site’

Purpose:
‘Prefabrication is not the manufacture of ‘blanks’ but rather specific pieces intended for a specific task or series of tasks in a particular building or structure’

Singular Item or Entire Assembly:
‘The item being prefabricated can be a single component or an entire assembly of component’

Simple to Complex:
‘Components or assemblies of components can vary in their complexity relative to the entire structure. They can form part of a structure or the entire structure’

The design and off-site manufacture of a project specific component, assembly or system that is utilised, in part or as a whole, to build a structure.

Prefabrication in Construction
Prefabrication Matrix
Prefabrication in Class 2-9 Buildings

Forte` Living - Docklands

The Green - Parkerville
Prefabricated Timber Supply Chain
D1 – Cost & efficiency advantages over traditional alternative construction methods

D2 – Inherent quality manufacturing & site impact advantages of prefabricated timber construction systems

D3 – Increases in medium density dwelling construction in urban infill areas

D4 – 2016 NCC ‘Fire Protected Timber’ Deemed-to-Satisfy provisions for Class 2, 3 & 5 buildings

D5 – Timber’s inherent structural, fire, thermal and acoustic properties

D6 – Interest in environmentally friendly materials and wood encouragement policies

D7 – Increased interest in using low-grade wood resource in higher strength engineered wood products

D8 – Governments encouraging innovation and off-site manufacturing and prefabrication

D9 – Building Information Modelling (BIM) and digital manufacturing

D10 – Increased training & education opportunities in prefabricated systems design, manufacture and supply

D11 – Established heavy lifting and transport logistics industry

Drivers to Enabling Prefabricated Timber
B1 – Risk to existing businesses
B2 – Financial models
B3 - Timber industry’s interest and capacity to supply
B4 - Industry fragmentation and lack of coordination
B5 – Competition with other materials
B6 - Establishing a culture of prefabrication
B7 – Perceptions of timber and prefabricated systems
B8 – Costs in establishing prefabrication facilities
B9 – Australia’s geography and isolated populations
B10 - Research and knowledge sharing

**Barriers** to Enabling Prefabricated Timber
Case Study-
NRAS Inveresk – UTas Student Accommodation

Production/Installation:
• Approximately 9 months

Unique features:
• Fully finished timber framed prefabricated modules
• CLT corridors and flooring in all upper level public areas
• Nail plate roof trusses assembled with roof cover on ground
Case Study - NRAS Inveresk – UTas Student Accommodation
Case Study - NRAS Inveresk – UTas Student Accommodation
Case Study - Caulfield Grammar – The Learning Project

**Unique features:**
- Bespoke prefabricated modular buildings with a focus on design quality
- Timber and steel framed volume modules
- Potential to be demounted and relocated
Case Study - The Green

Unique features:

- Five storey building with 57, 1, 2 & 3 bedroom apartments
- ‘Hybrid’ construction utilising Tecbeam timber cassette floors, prefabricated wall frames and SIPS external cladding
- Overall project cost was 25% lower than traditional construction
- Largest floor cassette – 2.7m x 8m
- Most prefabricated wall frames were 3.6m long
- Sub-contractors sourced from residential sector
- Appears as a traditional rendered multi-storey building
R1 - Class 2-9 Prefabricated Timber Systems Market Implementation Group
R2 - Network and leverage technical support and promotion with other system component suppliers
R3 - Assist Truss and Frame manufacturers to expand
R4 - Urban densification developer
R5 - Increase technical support for design professionals, builders and prefabricators
R6 - Develop a database of current timber-wise design professionals
R7 - Regular industry site visits to new Class 2-9 buildings
R8 - Develop detailed case studies of all significant new Class 2-9 projects constructed
R9 - Encourage the use of Building Information Modelling (BIM)
R10 - Support value-adding research into out-of-grade softwood and plantation hardwood resource
R11 - Actively support the off-site and prefabrication sector
R12 - Encourage R&D and University Centres of Excellence
R13 - Expansion of NCC DtS Provisions to other commercial building classes and taller builders

13 Recommendations
Dr. David Bylund
Architect & Program Development Manager
Mid-Rise Advisory Program

W: woodsolutions.com.au
E: david.bylund@woodsolutions.com.au
M: 0488 035 825
T: +61 3 9927 3200
Level 11, 10-16 Queen St, Melbourne Vic 3000