

Trends in prefabricated timber building

Welcome and introduction

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Learning Objectives



- Participants completing this activity will be able to understand:
 - The scope for prefabrication in design and construction and factors that influence it.
 - Trends in timber prefabrication locally and internationally.
- For architects - AACA Competencies:
 - Design
 - Documentation



Seminar content

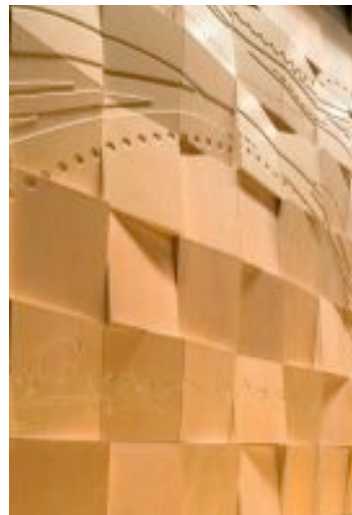


- An introduction to prefabrication.
– *Greg Nolan, CSAW*
 - Structural prefabrication trends in Australia
– *Phil Ladson, MultiNail*
- Tea and coffee break*
- Prefabrication trends internationally
– *Jon Shanks, CSAW*
– *Karl Zankl, Wuerzburg University of Applied Sciences*

This presentation



- Definition of prefabrication
- Scales of prefabrication
- Prefabrication's key aspects
- Types of fabricators in Australia.



Vertical board cladding

Definition: prefabrication



- To manufacture sections or components of a building, usually in a factory or workshop, so that they can be easily transported to and rapidly assembled on site.

Scale of prefabricated sections



Scale	Description	Example
Buildings	A discrete enclosure.	Classroom
Components	Major sections of a building with common or similar performance requirements.	Floor, roof, wall façade.
Elements	The pieces assembled to make up a component.	Trusses in a roof, joists in a floor.
Detail	The pieces assembled to make up an element.	A window sash.

- There is often overlap, especially at the element and detail scale.
- A piece of sawn timber can be:
 - a joist in a floor (an element in a component) or
 - a part of a nail plate truss (a detail in an element).

Component types



Component	Description
Superstructure	The primary load-bearing frame found in most buildings.
Roof	The roof and roof structure.
Upper floors	The upper floor surfaces and support structure.
Ground floor	The base floor and ground support structure.
External walls	The wall structure and associated cladding and external joinery such as doors and windows.
Internal fabric	Internal non load-bearing walls, linings, architectural surfaces, and internal joinery.
External elements	Verandas, decks and associated landscape structures.

- Components can be structural, architectural or envelope items.

Timber is a good base for prefabrication



Timber systems offer solutions that:

- Are lighter, more adaptable and easier to handle than mass materials.
- Are a safer construction method
 - without the hardness, weight and danger of high mass materials.
- Are cleaner and create less site noise and waste.
- Offer savings in other areas of the structure and the foundations.
- Provide builders with an alternative to steel and concrete.

Courtesy of Herman Kaufman

Key aspects of prefabrication

Key aspects of prefabrication

Prefabrication moves work from:

- uncontrolled site conditions
- to controlled workshop conditions.

This can offer:

- Reduced exposure to risk:
 - adverse site conditions and
 - the demands of maintaining a skilled site workforce.
- Potential increases in building quality.
- Significant reduction in site construction times.

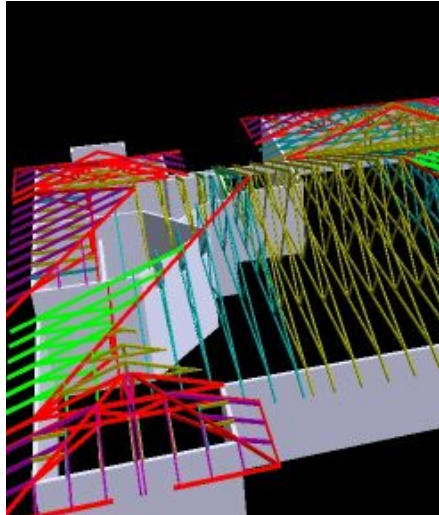


Key aspects of prefabrication



Moves detailed decision-making from construction to the design documentation stage.

- This can
 - Increase the volume, cost and criticality of documentation.
 - Decrease acceptable tolerances while increasing their importance.
 - Increase demand for skilled labour and efficient equipment in the workshop.



Key aspects of prefabrication



- It increases transportation costs.
 - Commodity products first have to be delivered to the workshop.
 - The items being transported to site are generally larger, more valuable and less robust than its constituent commodity products.

Prefabrication and site construction



Prefabrication *thrives* if:

- The savings from:
 - Lower risk.
 - More consistent quality (fewer costly mistakes).
 - Quicker building.
- Outweigh the costs of:
 - Additional documentation.
 - Workshop infrastructure and equipment.
 - More expensive transport.

Viable levels of prefabrication



A relationship exists between the viable prefabrication level and the project.

This is governed by:

- The conditions on the site.
 - The costs penalties incurred by access, climate, proximity of labour, etc.
- The regularity and volume of construction.



Viabile levels of prefabrication



- The prefabrication company's skill and equipment base.
- The potential to channel design information directly to production equipment.
 - This limits the additional cost of documentation and associated management.



High-level production capacity



Courtesy of Herman Kaufman

Types of fabricators in Australia

In Australia, there are three general types of timber product fabricators.


Timber construction 1 prefabrication

Types of fabricators

- Frame and truss manufacturers (F&T)
- Specialist structural fabricators
- Joiners
 - General
 - Window and door joinery



Timber construction 1
prefabrication

Scope for prefabrication		
		
Element type	Australian	International
Superstructure elements	◀	◀
Envelope / fabric systems		
<i>Wall frames</i>	◀	◀
<i>Roof and floor trusses and modules</i>	◀	◀
<i>Flooring modules, such as cassette floors</i>		▶
<i>Structural insulated panels</i>		▶
<i>Cross laminated timber panels.</i>		▶
Envelope elements & components		
<i>Window and door joinery</i>	◀	◀
<i>Envelope systems</i>		▶
Appearance elements		
<i>Stairs and general joinery items</i>	◀	◀
<i>Specialist joinery</i>	◀	◀

Timber construction 1 prefabrication

More Information	
	
	

Questions?



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