Forest&Wood Products Australia

MARKET KNOWLEDGE & DEVELOPMENT

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Timber Beams Instead of Steel Beams in Housing Construction

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Front Cover: Wrightfeldhusen for Dunsborough Residence

Page 2: Toon Architects Group for Dimasi House Alterations & Additions

The Situation / /

Most housing projects involve timber framed construction but in some long span situations steel is used to help support the timber. In many instances, a strategically placed engineered timber beam can do the job just as well. As a result, a 100% timber solution offers less cost, less complexity, better flow and simpler safety management.

The Problem with Steel Beams

- Steel is expensive- especially given recent increases in world steel prices
- It needs a specialist supplier/fabricator
- It needs a specialist subcontractor on site
- It involves greater organisational complexity i.e. steel work has to interrupt the carpentry work, to allow carpentry work to proceed
- Site welding creates safety issues for those undertaking the work onsite
- Steel involves heavy lifting which may include cranes, props and riggers

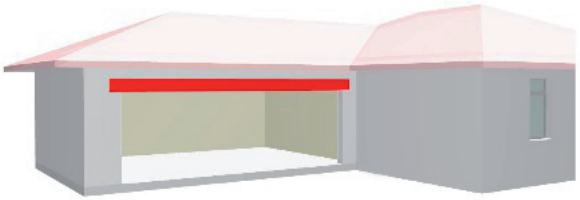
What's Good About Engineered Timber Beams

- Timber is cheaper and less prone to world fluctuations in prices
- One supplier/fabricator for all structural needs
- One subcontractor (a Carpenter) for all onsite needs
- No interruptions to the flow of trades work
- No safety needs over and above normal carpentry needs
- Timber is lighter and involves simpler handling procedures

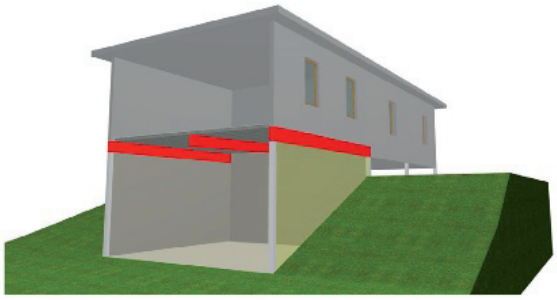
Typical Long Span Beam Situations //

In housing construction, most long span situations fall into the range of 4 to 8 m spans. A number of common scenarios are shown below.

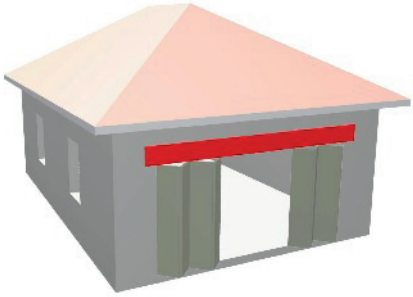
Double garage door openings



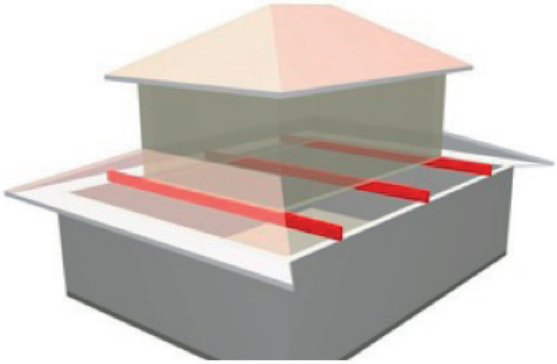
Creating open span rooms within the subfloor of an existing house



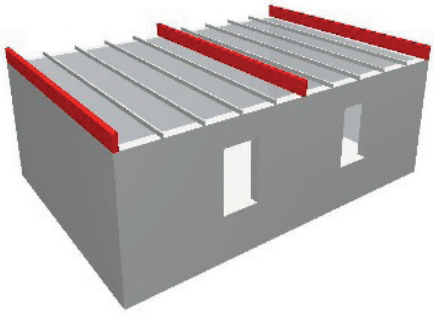
Café door opening



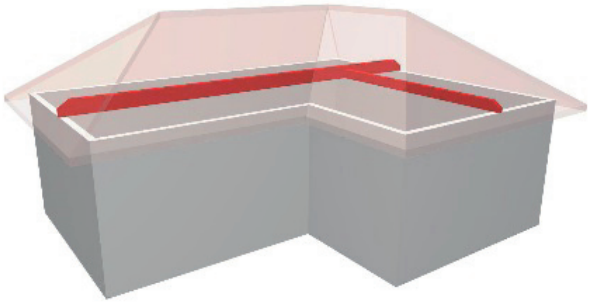
Support for an upper storey set back from the lower storey walls



Support for a new storey above an existing ceiling



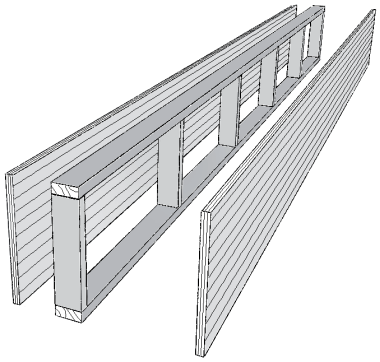
Strutting/counter beams over open plan room layouts



Types of Long Span Timber Beams //

Only a specific range of engineered timber beams are large enough and strong enough to carry the loads involved in long span situations. The main options to suit the typical 4 to 8 m span situations described previously include:

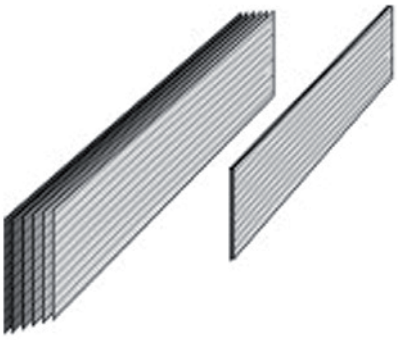
Plywood Box Beams



These beams involve plywood sheets nailed to horizontal flanges and vertical stiffeners. The assembly looks similar to a stud frame. Features include:

- Suitable for medium to long spans
- Lightweight
- Span increases with beam depth
- Beams can be used to double as wall construction (subject to the exclusion of door and similar openings)
- Can be built onsite or prefabricated offsite

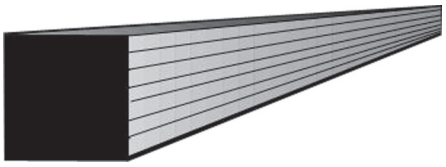
Laminated Veneer Lumber beams (LVL)



These beams involve thin sheets of timber laminated together to form a solid section. The process serves to minimise weaknesses in the timber thus providing higher strength. Features include:

- Deep standard size sections available
- Many applications possible including short to long spans
- Some LVL products are customised to suit specific beam applications e.g. strutting beams

Glue Laminated Timber Beams



These beams involve pieces of sawn timber glued together to form solid timber sections. Like LVL, the process serves to minimise weaknesses in the timber thus providing higher strength. Features include:

- Standard or customised sizes possible
- Suitable for mid to long spans
- Many shape configurations possible
- Well suited to decorative portal frame applications

Other Engineered Beam Options

Companies that specialise in nail plated timber trusses and similar components have a variety of beam options that involve specific design characteristics

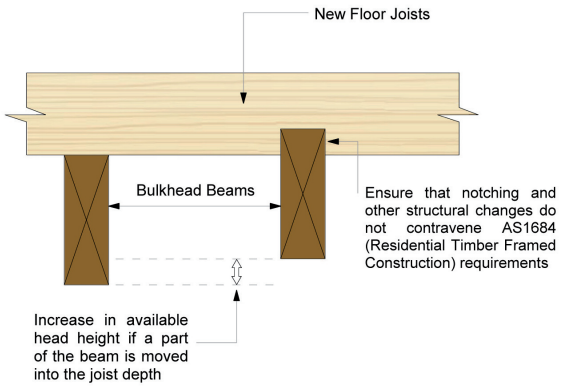
- Usually limited to short to mid span scenarios (e.g. double garage door openings) and limited load width
- Lightweight
- Are designed to be fabricated offsite (e.g. with frames and trusses)

Design Strategies for Fitting the Beam into the Space Available //

Timber beams tend to be deeper than steel beams given the same spanning situation. As a result, strategic positioning of beams is required to ensure they fit in the space available. The main scenarios are described below. For each, the issues that adversely effect timber beams are stated, followed by strategies for solving or avoiding the problem.

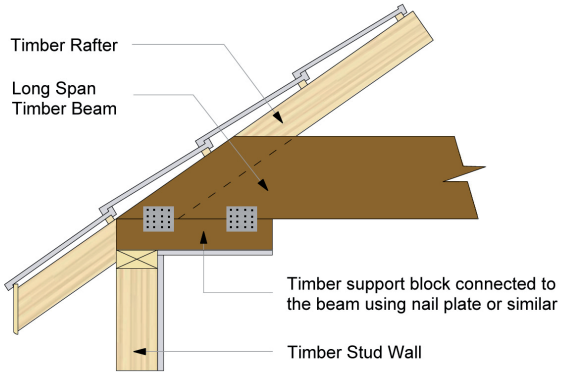
Bulkhead beams

- Issue: The amount of beam projecting downwards into a room is limited by the head height for window, door and other openings.
- Strategy: If beam depth poses a problem then consider moving part of the beam up into the joist plane but in doing so, check there is enough joist depth to provide for shear requirements.



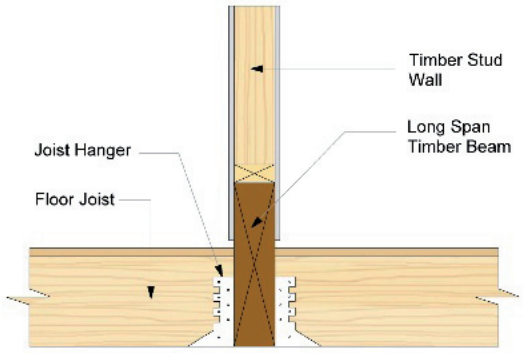
Roof void beams

- Issue: In some instances, the ends of a roof beam (e.g. strutting/hanging/counter beam) may need to be cut on a splay so as not to protrude above the rafter line. This can create problems in terms of the shear and bearing resistance at the ends of the beam.
- Strategy: Specific end detailing can be used to assist this situation – typically blocking connected to the underside of the beam ends. Refer to beam manufacturer for further guidance on this issue.



Beam in the wall above

- Issue: A lack of space to hide a timber beam (e.g. a bearer) in the joist depth, can sometimes be solved by allowing that beam to protrude above the joists it supports.
- Strategy: The beam can be hidden in a wall above, as long as there are no doors or other openings in the wall. External walls often present a strong possibility for this option.

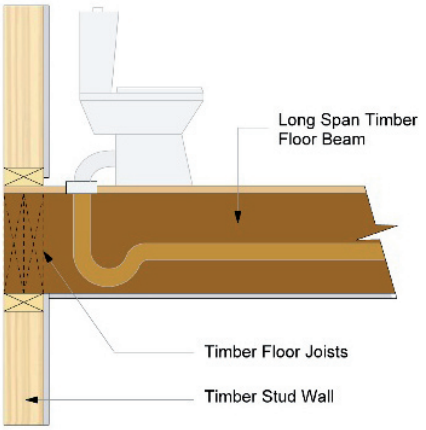


Hidden (in-plane) floor beam

- Issue: For spatial design reasons there is often a need to hide a beam (e.g. a bearer) in the same plane as the floor joists it supports.
- Strategy: Consider the depth to span ratio of the various timber beam options offered in this publication and choose the one with the least impact on depth.

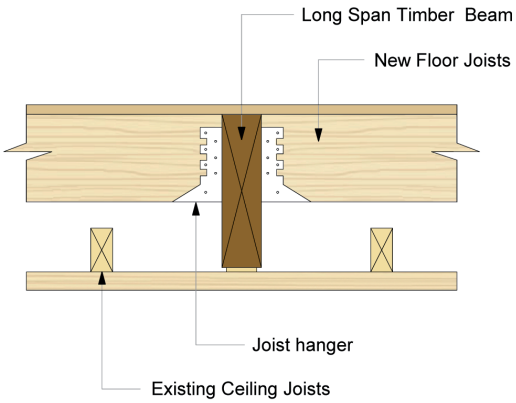
  Check the cost impact of using floor joists deep enough to hide the required bearer depth. In making the calculation bear in mind that deep joists can be used to conceal plumbing stack-work thus saving the cost of constructing a false ceiling for this purpose.

  Consider allowing the beam to rise above the floor level if it can be housed inside a wall above (refer to previous page).



Inter-storey beams (dividing old and new construction)

- Issue: Upper storey extensions often involve using deep beams (e.g. bearers) to lift the new floor construction clear of the old ceiling construction (of the storey below). The beams also serve to simplify the new floor joist setout.
- Strategy: Box beams are potentially useful in this situation as the extra depth can easily be attained without significant changes to fabrication requirements. Careful detailing can also make it possible for the new floor joists to be sound isolated from the existing ceiling joists.



Selecting and Procuring Long Span Timber Beams //

The previous concepts and ideas can be made into reality by using one or more of the links below which are broken up according to beam types.

Plywood Box Beam Span Tables

Box beams can be made onsite or prefabricated using pre-prepared downloadable span tables:

- www.timber.net.au

Laminated Veneer Lumber Manufacturers/Suppliers

LVL beams are manufactured products, with each manufacturer having their own design software, span tables and product distributors. Major manufacturers include:

Carter Holt Harvey

- www.chhfuturebuild.com.au
- Phone: 1800 808131
- Email: futurebuild@au.chh.com.

Hyne timbers

- www.hyne.com.au
- Phone: 1300 304963
- Email: info@hyne.com.au

Tilling Timber

- www.tilling.com.au
- Phone: 03 97250222
- Email: smartdata@tilling.com

Wesbeam

- www.wespine.com.au
- Phone: 1800 018 888

Glue Laminated Timber Manufacturers/Suppliers

Select a supplier of your choice from the Glue Laminated Timber Association of Australia

- www.gltaa.com

Other Engineered Beam Options

Specialist beam products are provided by a supply chain of companies involved in engineered timber fixings and frame or truss manufacture. In this chain, one company supplies the beam technology and another conducts the actual fabrication of the technology. Options include:

Mitek (beam technology)

- www.mitek.com.au
- Fabricators: see web site
- Phone: head office 03 87958888

Pryda (beam technology)

- www.pryda.com.au
- Fabricators: see web site
- Phone: head office 03 95547001

Frame and Truss Manufacturers Association of Australia Miscellaneous (including member fabricators)

- www.ftmaaustralia.com.au

Need More Help?

Speak to your frame and truss fabricator or your structural engineer for assistance on the feasibility of the beams and design solutions in this guide. Also go to www.timber.net.au for an interactive web based version of this guide.