GANG-NAIL GUIDELINES No.164

ANOTHER MITEK ADVANTAGE

LAMINATED TIMBER MEMBERS

Laminated members are small timber sections layered together to form a larger, stronger member. They are normally attached with nails, screws, bolts, nailplates or glue.

I am often asked if a laminated member is equivalent to a solid member of the combined size.

With the exception of nailplated ConstructaBeam and glued-laminated timber (which, being engineered wood products, are a topic unto themselves), the short answer is "No".

The performance of a nail (or screw) laminated member depends on the orientation and number of layers, how they are fixed together and how the external loads are applied and shared between layers.

One governing factor is whether the layers are oriented vertically or horizontally.

For example, beams laminated vertically (Fig 1) act altogether differently to wall plates laminated horizontally (Fig 2).

This can be illustrated by holding two plastic rulers back to back.

When the rulers are bent on their flat faces (as wall plates are), the rulers easily slide past each other (Fig 3).

When the rulers are stuck together with Blu-Tack, they become stiffer and stronger than before.

If the rulers were to be bent on their edges (as beams are), their combined stiffness does not improve with the application of Blu-Tack.

But at higher loads, the Blu-Tacked rulers are less likely to twist sideways because it has improved the rulers' "lateral stiffness" and that increases its effective strength.

The same effect will be observed when the rulers are compressed at the ends (similar to laminated jamb studs).

The "slenderness ratio" improves with increasing bond between the layers. It requires an adhesive much stronger than blue tack before the two rulers behave as a solid piece.

Likewise, laminated timber members fixed with nails are only partially and not fully bonded into a solid member.

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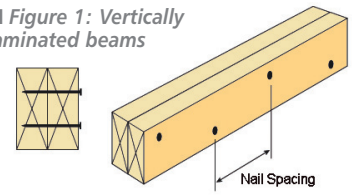
The next consideration is how the layers are loaded. In a wall frame, each layer of a laminated beam is equally loaded via the top plate or jack studs.

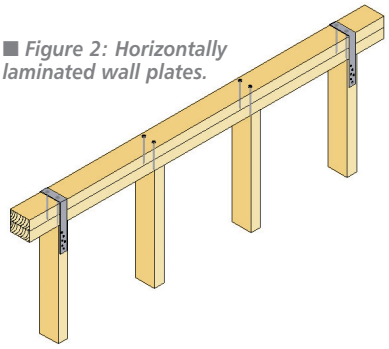
Hence, the required fixing between them is nominal.

But the nature of girder trusses supporting other roof trusses from one

■ *Figure 1: Vertically laminated beams*



■ *Figure 2: Horizontally laminated wall plates.*



side (Fig 4) means that the load (which is primarily applied to the outer layer) has to be mechanically transferred to the other layers.

The manner in which laminated trusses are fixed is therefore more critical.

This usually means driving nails or screws at regular spacing along chords, fixing additional bolts at joints and using longer fasteners in girder brackets.

Details on fixing together laminated wall framing components (e.g. wall plates, studs, lintels, etc.) may be found in the Australian Standard *"AS1684 Residential Timber Framed Construction".*

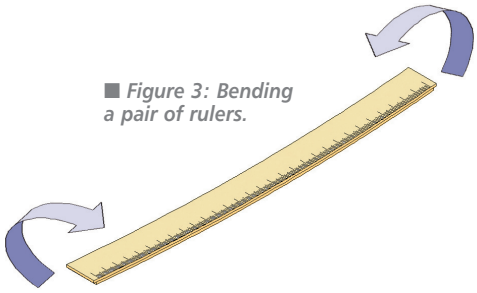
Information on joining laminated trusses may be found in "*Fixing and Bracing Guidelines*" available from your truss supplier or nailplate manufacturer.

Finally, solid members are not necessarily always stronger than laminated ones.

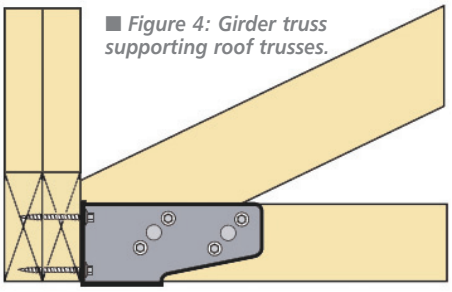
One benefit laminated timber members have over solid members is that any defects or blemishes tend to be staggered along its length.

A knot right through a solid member

■ *Figure 3: Bending a pair of rulers.*



■ *Figure 4: Girder truss supporting roof trusses.*



defines its weakest point and governs the strength of the entire piece.

Laminated members rarely have their defects coinciding at the same location and that improves its basic strength.

The more layers there are, the more evenly distributed the defects and therefore the more reliable and stronger the member becomes.

That is why plywood and LVL, because of their large number of layers, have much better properties than solid members of the same timber species.

For more information, please contact your truss supplier or nailplate manufacturer. TTN