



# FTMA TECH TALK

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## IMPLEMENTATION OF LVL INTO ENGINEERING SOFTWARE FOR ROOF TRUSSES

The last few years have seen the increasing use of LVL in the Australian construction industry. It is widely used for beams, lintels, rafters, general framing and in roof trusses predominantly into the domestic timber framing market.

Supply constraints due to COVID and the difficulty in sourcing of timber from conflict regions has led to an influx of alternative suppliers with the introduction of new LVL products while existing LVL products were also subject to varying degrees of stock or recipe changes.

For designing roof trusses, this often represents a challenge as the Engineering software programs that design timber roof trusses in Australia require a fairly rigorous testing and compliance regime to be adhered to, in order for LVL species to be adopted in the timber databases that we use for design. It is also strongly recommended that apart from the important engineering characteristic properties that is commonly supplied, there should also be manufacturing specifications, veneer profiles, joint group (for fasteners) and tooth group (for nailplates) details which are all required for Engineering software implementation.

It's important to understand that not all LVL's are created equal – each species has its own characteristic design values which is currently derived solely from testing, since our current timber engineering code AS1720.1 does not include minimum characteristic properties for LVL unlike MGP machine graded pine, F-Graded softwoods/hardwoods and other EWP products like plywood and Glulam.

Each LVL supplier is responsible for their published capacities and must arrive at these design values in accordance with testing to AS/NZS 4357 series of Australian Standards.

This creates potential variations in design values, even for LVL's within the same branding group (e.g., LVL14).

They may indeed have different design properties and therefore substitution is typically not allowed between LVL species.

The only method to ensure compliance would be to redesign the job or specific element(s) with the new LVL species.

Another layer of complexity is added since the nailplate suppliers require each new LVL species to be tested in accordance with AS1649 under Category C. The veneer composition, orientations and the species of timber used on the outside laminates of the LVL can substantially affect the teeth holding capacities. Hence the importance of testing to determine these values prior to LVL being added or implemented in our timber databases.

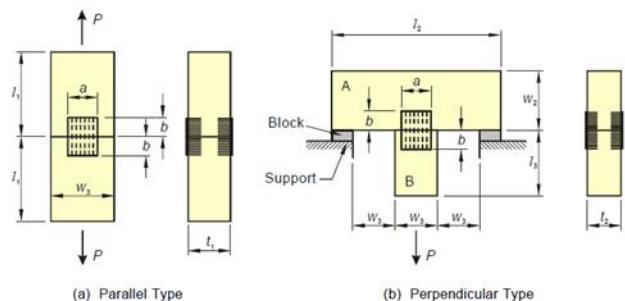


FIGURE 2.4 ASSEMBLIES FOR TESTING CATEGORY C FASTENERS

Source: Figure 2.4 from AS1649

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In order to supply compliant LVL into the Australian market, each supplier is also required to adhere to the NCC and its 'Evidence of Suitability' criteria listed for material and products supplied to the building construction industry.

The NCC requires that these products should be either:

- Code-marked by an accredited organization.
- Tested in accordance with the required Australian Standards by a NATA accredited laboratory.
- Certified by a registered Professional Engineer.

Even with this documentation, this may not be enough to gain access to Engineering software's timber databases, as LVL is often tested with the intended use for rafters and beams and so the testing is often done to the minimum requirements of bending stiffness, shear and bending strength.



**Pryda nailplate testing (load & plate orientation parallel to grain) for LVL**

If there are any changes with the supply chain, manufacturing process or general improvements with the LVL product, it is imperative that the relevant party must inform the nailplate software provider as soon as possible, since these changes will require re-validation or re-testing of nailplate for its tooth group classification.

The Engineering properties required by the nailplate suppliers are much more rigorous than those required for use as rafters and beams and not all LVL suppliers have achieved compliance for access to these Engineering software & databases.

So, when manufacturing roof and floor trusses, always ensure that you use the specific LVL that has been designed with the software.

**Do not substitute other LVL species thinking that will be OK.**

If the LVL species is not listed in your database or timber inventory, there is likely a very good reason why not!



**Source: Instron's bend test fixtures (3-point bending)**

However, to be used in truss production the LVL must also undergo tension, compression, joint shear, perpendicular to the grain testing as well as mandatory nailplate testing.



This FTMA Tech Talk was written by Han Hong Tan, Structural Engineer - Software & Testing ANZ of our Principal Partner, Pryda.

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