

SPECIAL LOADING FOR ROOF TRUSSES



by **ADAM DENNAOUI**
State Engineer,
MiTek Australia Limited

With the advent of more powerful and flexible computers running even more powerful and flexible truss engineering programs to accommodate the variety of truss shapes now being designed it appears that the sky is the limit. This is all perfectly fine, as long as sound engineering principles are adhered to.

Whilst variety is the spice of life, we have to be mindful of the intended application (and category) of the roof truss within the structure.

The loads may vary from basic dead, live and wind loads, as required for residential purposes to specific dead, live and wind loads for commercial and industrial buildings.

Loads for commercial and industrial buildings can be vague and confusing, and must always be referred to the project engineer. The users of truss design programs must be careful not to overstep the mark if applying non-standard loads to their truss designs.

Examples of such cases that come to mind relate to live loads. The dead and live load code, AS1170.1 - 1989, provides provisions for occasional live

load on roof trusses, which are sometimes overlooked, misunderstood or incorrectly applied.

The first 'occasional load' applies to roof trusses in **industrial and commercial** buildings, which do not have a full ceiling below the bottom chord.

This occasional load allows for the possibility that objects may be supported off the exposed bottom chords of trusses in such buildings. A concentrated downward load of 4.5kN must be applied at each bottom chord panel point, taken **one at a time**.

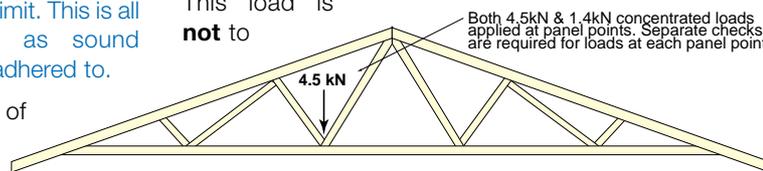
This occasional load must also be applied **in addition** to the other roof live loads.

The second "occasional load" applies to exposed roof trusses in **other than industrial and commercial** buildings (such as residential).

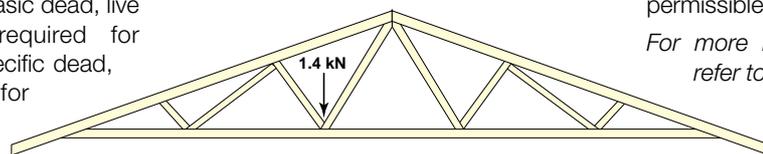
The same principle (as above) also **applies in addition** to the other roof live loads except the load is reduced to 1.4kN.

The third "occasional load" applies to **all exposed roof trusses** where the distance between the top and bottom chords exceeds 1.2m.

This load is **not to**



Occasional Load to trusses in Commercial and Industrial buildings
EXPOSED TIMBER TRUSSES



Occasional Load to trusses other than Commercial and Industrial buildings

be applied simultaneously with other "occasional loads" but consists of a 1.4kN point load to the truss bottom chord between panel points.

This load ensures that the bottom chord has adequate strength to support a person standing on the bottom chord between panel points without local overstressing of the bottom chord.

Trusses are also sometimes required, by

either the architect or the engineer, to support a platform or a walkway for ease of access. This requirement may come in the form of a general note on the architectural and/or structural drawings as, "... trusses to be designed for platform live load of 2.5kPa".

The design of roof trusses to support platform or walkway live loads is covered by AS1657 - 1992 'Fixed platforms, walkways, stairways and ladders - design, construction and installation'.

Roof trusses that support a platform or a walkway should be designed for the dead load of the structure plus a superimposed live load of not less than 2.5kPa uniformly distributed, or a concentrated loading of not less than 1.0kN at any point, whichever produces the most adverse effect.

This uniformly distributed load must also be applied over a length of not less than 600mm.

WIND LOAD

This topic was covered in a previous Gang-Nail Guidelines (No.19) titled "Wind Load For Housing".

The Australian Standards, AS1170.2 - 1989 and AS4055 - 1992, are still the same and are thus applicable. The only difference, however, is the method in which we now use them.

In other words, for Limit State design principles, we have to adopt the ultimate wind speed, not the permissible wind speed.

For more information on this change, refer to Gang-Nail Guidelines No.30.

The above roof loads are by no means the only loads that may be applicable to your structure. Well-documented structural and architectural documentation should clearly state the intended use and loads of the structure, at hand. If not, then it must be provided by the builder or the client.

Other loads worth considering are snow loads and earthquake loads. For further references to these loads, refer to the project engineer or AS1170.3 - 1990 "Snow Loads" and AS1170.4 - 1990 "Earthquake Loads".