GANG-NAIL GUIDELINES No.103

ANOTHER MITEK ADVANTAGE

TRUSS DESIGN LOADS

Today truss fabricators have very powerful and sophisticated software to design, cost and detail roof and floor trusses.

However any software program relies on the operator to input the right information to ensure that appropriate and correct designs are generated.

So what information is required to accurately describe the loads which the truss is to be designed?

First let us look at the types of loads which we need to consider:-

Dead Loads are permanent loads that are supported by the truss throughout the life of the structure.

Live Loads are temporary loads that will arise during the life of the structure. For roof trusses these are typically during construction and later, maintenance type loads.

Wind loads are loads imposed by action of wind and can be in any direction on the structure.

Snow loads may also need to be considered when designing structures in alpine areas.

Many projects require clarification as to the magnitude of each type of load to be applied.

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Dead Load

Even the simple Dead Load case is not always clear.

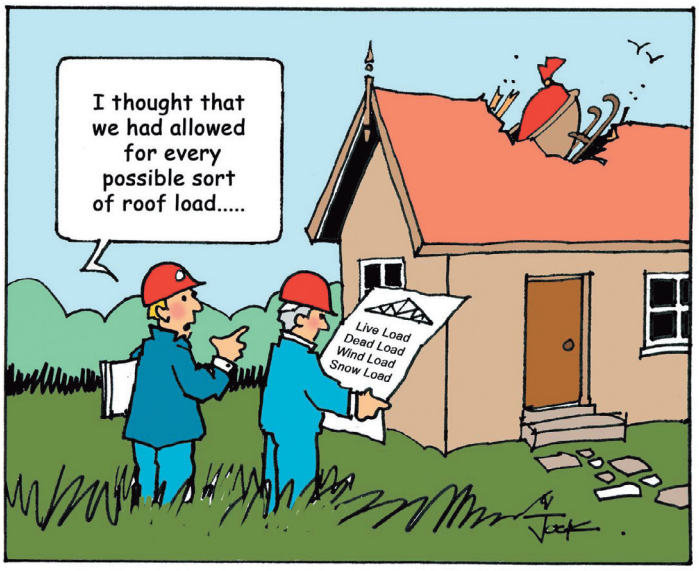
A tile roof for example - is a concrete tile or terracotta tile to be used as the mass of a terracotta tile is significantly more than a concrete tile.

Even within the range of concrete tiles, different brand tiles can have quite different weights. The weight of roof battens will also affect the Dead Load.

Metal battens, which are becoming more common in some parts of Australia, are much lighter than timber battens.

Additional loads from mechanical units such as air conditioners and ductwork, heater units or solar hot water service units also need to be considered. The size, location and weights of the units need to be determined.

With a solar hot water unit for example, the water tank may be located on the roof or could be located on the ground.



Live Load

Live Loads are typically specified by "Australian Standard AS1170.1".

For a floor truss the end use of the floor will need to be known. In residential buildings there are different values of Live Loads for each of general area, balconies and stair landings.

Other structures, such as commercial buildings, can have a wide range of Live Loads applied for each part of the structure.

Wind Loads

The determination of Wind Loads can also be confusing. In residential construction it may be possible to obtain the wind loads from "Australian Standard AS4055 Wind Loads for Housing".

This will give wind classification of N1 to N6 for non cyclonic areas and C1 to C4 for cyclonic areas. For other structures AS1170.2 would be used and the Design Wind Velocity would need to be specified along with external pressure coefficients $C_{p,e}$ and internal pressure coefficients $C_{p,i}$.

Previous GN Guidelines cover Wind Loads and Pressure Coefficients in more detail should you require more information on this subject.

All of the loads above are entered into the design software as basic unfactored loads.

Your truss design software will then combine the loads in various combinations and with varying factors in accordance with the requirements of AS1170.

If you have to manually transfer loads from one software program to another, or from one truss to another, you will also need to input the unfactored loads.

Your truss design software should have the capability to provide reports for unfactored loads (or reactions) and for factored loads.

The factored loads would be used to determine what hold down or truss to truss connection is required and, as mentioned above, the unfactored loads are used for loading other members.

Truss design software will also take into account load durations. Timber is quite unique in that it can carry higher loads for short periods of time.

It is therefore important to take care and add any loads as the correct load type (Dead Load, Live Load, Wind Load etc) as otherwise the incorrect duration factors will be applied.

If you are not clear about what loads are to be applied to your trusses, obtain written confirmation from your client. You can also contact your local nailplate supplier for assistance if there is some doubt about the appropriate loads to be applied. TTN