GANG-NAIL GUIDELINES No.106

ANOTHER MITEK ADVANTAGE

UNACHIEVABLE PRE-CAMBER

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One of the major benefits of roof trusses is that they can generally be pre-cambered during fabrication to achieve a level ceiling after the application of roof loading.

Nevertheless, circumstances do exist when the designed camber cannot be achieved and the result will be a truss that deflects below level. But with proper management, this does not necessarily pose an insurmountable problem.

The programs used by fabricators to design trusses predict the truss deflection expected based on applied load and timber properties.

This deflection value is reproduced in a fabrication sheet that is recognised in the truss plant as the camber that has to be set into the jig to form the truss shape.

It is well known that trusses can only be cambered at panel points, which are held by webs.

Any camber set at mid-panel or at the end of an overhang will only spring back after it is released from the jig because there are no web panel points to restrain it.

The key mechanism whereby trusses are able to retain their cambered shape at web panel points is known as "Triangulation".

If there is a break in triangulation, the truss will have a reduced ability to hold its pre-cambered shape after it is released from the jig, even at panel points.

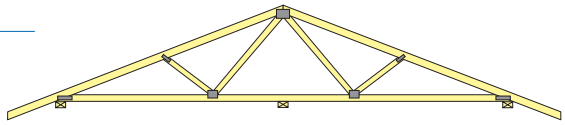
Some common situations where a lapse in triangulation occurs are as follows:

- Where the webs do not form triangular shapes with the truss chords, e.g. attic trusses, or trusses that have normal webs removed to fit large mechanical services;
- Where supports are not located at a heel or web panel point, e.g. trusses that are not supported at the heel but at the end of an overhang, or trusses that are supported by an internal wall at mid-panel;
- Where there is a sharp break in the pitch of the top or bottom chord that is not adequately webbed; e.g. trusses with vertically vaulted ceilings, or trusses with internal gutter formation.

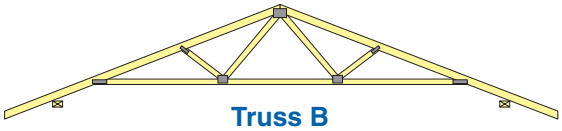
Of all the trusses shown in the spot quiz, only one is adequately triangulated and able to achieve full camber. The others will all spring back to an uncambered shape after release from the jigs.

QUIZ

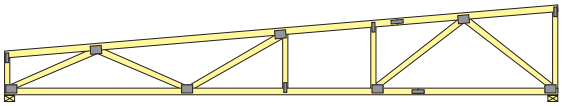
Which truss is adequately triangulated?



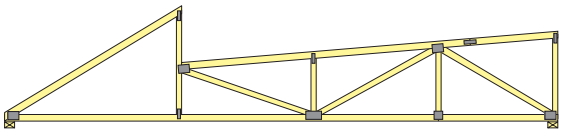
Truss A



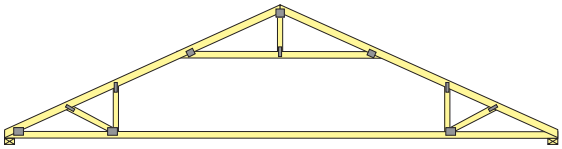
Truss B



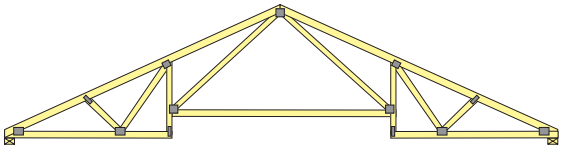
Truss C



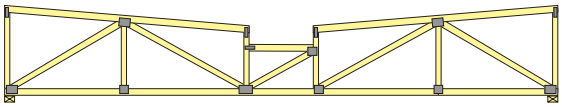
Truss D



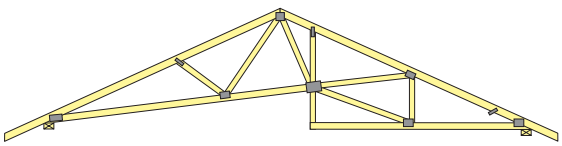
Truss E



Truss F



Truss G



Truss H

Answer: Truss 'H' is the only fully triangulated truss and is therefore able to retain full pre-camber

Principles of Good Truss Designs

1. The first rule is to do everything possible to achieve triangulation in the first place. Non-triangulation should be avoided as much as you can. Using scabs or supplementary members to strengthen non-triangulated trusses is a poor second choice.

2. Where there are sharp breaks in the chords, insert additional webs to pick up the axial load from the discontinuous chord. Try not to rely on a vertical web to act in bending to resist the chord force.

3. If a non-triangulated truss in unavoidable, strengthen the truss in the critical areas to reduce the overall deflection to a manageable value. It is advisable to consult with your customers when trusses will not hold pre-camber and to seek agreement on the allowable deflections. You can also use higher timber grades in the chords for greater reliability in performance.

Finally, consult your local truss engineer for further guidance and information in circum-stances where trusses cannot be fully triangulated. TTN