GANG-NAIL GUIDELINES No.89

ANOTHER MITEK ADVANTAGE

Continuous Spans - Pitfalls To Avoid (Part 2)

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In Guidelines No. 83, I described the inappropriate nature of locating internal supports too close to other supports.

Now in Part 2, I want to highlight the importance of ensuring that any design assumptions concerning internal supports are actually implemented in the truss plant and during installation.

Problems occur when a truss that has been designed to be internally supported, does not sit evenly on all supports when installed.

This happens when the supports are not level, or when the truss has incorrectly been cambered at a bearing point so it is does not rest on the support.

Normally, an ordinary truss with two bearing points is less sensitive to variation in the support levels. The truss would merely slant one way or the other if the supports are uneven. Nonetheless, each wall would still carry the designed load.

However, if any one or more of the supports in a multiple support truss are not level (i.e. if they are not in a straight line), then the truss would not be bearing on all supports at the same time.

Since the lowest support does not carry its designed share of the load, the other supports have to carry a greater proportion. Furthermore, some members in the truss may also become overstressed.

Figure 1 shows an example of a truss failure I investigated earlier this year. The beam support on the right hand side was deliberately propped higher by about 12mm to allow brick columns to be built underneath at a later date.

Figure 1.

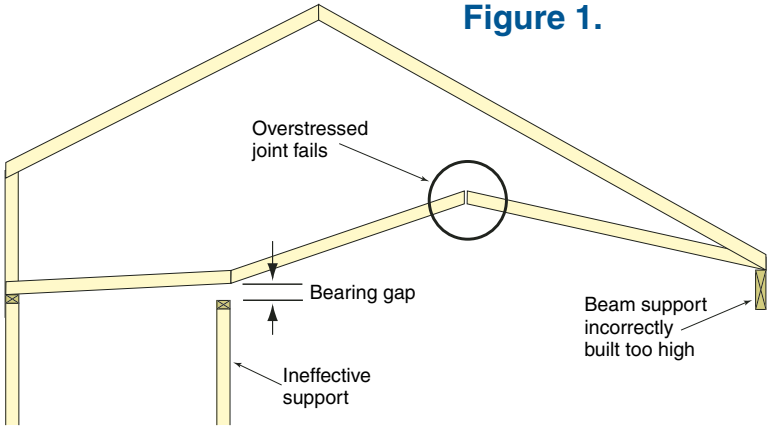
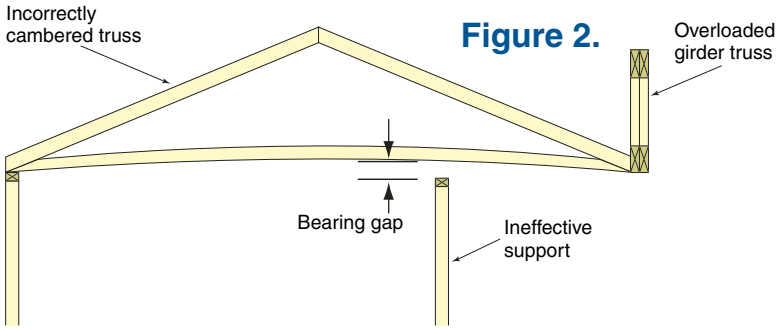
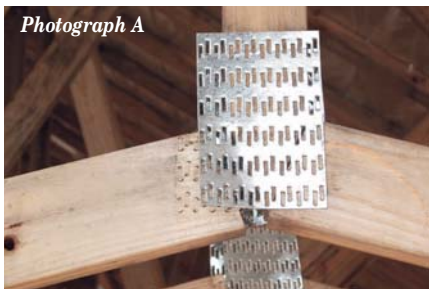


Figure 2.



Consequently, even though the other two supports were near level, the truss could not bear on the centre support when installed.

When the heavy slate roof was laid, the truss sagged until it reached the internal support. By then, the tension stress on the bottom chord had become much higher than predicted in design.



Eventually, this led to all of the bottom chord splice plates in this run of trusses failing at the apex of the cathedral ceiling. See Photograph A.

In another example demonstrated by Figure 2, the truss plant operator failed to read the fabrication plans properly and mistakenly manufactured the trusses with natural camber between the external bearing points.

To make matters worse, the internal wall on site also happened to be marginally low compounding the gap to the bottom chord. As a result, a truncated girder truss on the right supporting a run of these trusses became overloaded and deflected far more than expected.

On investigation, some bottom chord splice plates were also starting to come apart in the overloaded girder.

Recommendations:

1. The truss detailer must communicate design assumptions to factory staff and their clients so that all concerned appreciate what needs to be done.

   The staff in the truss plant must be trained on the importance of carefully reading and following the cambers in the fabrication sheets.
2. When internally supported trusses are required, drawing notes stressing the importance of level supports beneath them should be added to the truss layout.

In both of the above cases, the use of 'Support Here' stickers would assist to remind both fabricator staff and installers that trusses have been designed with internal supports.