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GN GUIDELINES NO.238

ANOTHER MITEK ADVANTAGE – MAY 2017

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Geometric limitations of hangers and hold downs

"Nails, bolts and screws have minimum edge distance, end distance and spacing requirements for any fastener to achieve their full design capacity," explained Tim Rossiter in GN Guidelines 210. Engineered building products (EBPs) have the same requirements, and that's why they must be installed in accordance with their manufacturer's recommendations in order to achieve their full potential. It also highlights why certified EBPs should be used for structural applications instead of inferior generic products which leave the user to make their own determinations (guesswork).

Sometimes the timber member an EBP is connected to has to be of a minimum size to accommodate these fastener distances. In Figure 1, for example, this bolted universal girder bracket requires a bottom chord of at least 130mm depth, which precludes 90mm or 120mm members from being compatible with the bracket. (To make it easy for fabrication plants, reputable truss design software takes these geometry requirements into consideration and prevents the use of a hanger when it's not compatible with the timber backing.)

Truss hold downs have similar geometric limitations. The hold downs specified in AS 4440, AS 1684 and other similar references generally assume that roof trusses are held down to top plates. However, it may not always be possible to wrap a cyclone tie under the top plate as shown in Figure 2, if a lintel (or steel beam) is located directly underneath it, which necessitates an alternative method of hold down, or fixing to the lintel, to be found.

At other times, a truss web layout may need to be revised in order to suit the hold down cleat. As an example, the bolted cleat in Figure 3 requires a vertical web in the truss to provide a base for fixing.

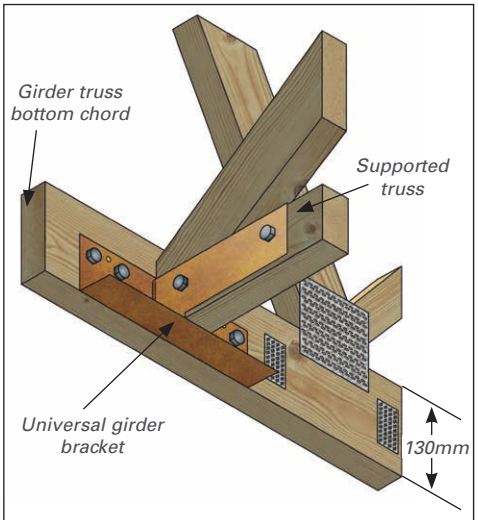

Figure 1

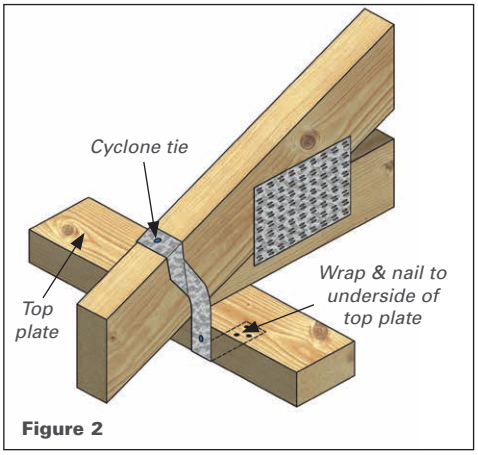

Figure 2

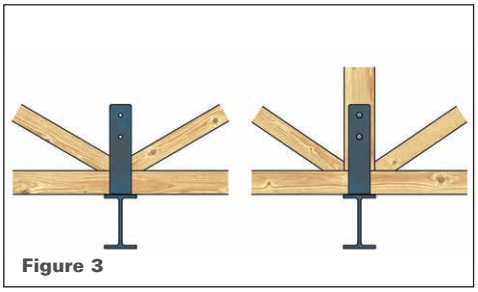

Figure 3

Even the hold down of the supporting structure needs similar consideration. If the truss designer is different to the wall frame designer, or if the wall frames are stick built on site, the required hold down requirements have to be clearly communicated. I have seen cases where a girder truss is held down to the top plate with double cyclone ties, but with the top plate only nominally nailed into the end of the stud. Critical studs and jamb studs need specific connections to ensure that all load paths flow through to the foundations.

This includes the bottom plate, which in turn needs to be held down to the structure below. Where it is a concrete slab, there are a range of concrete anchors available. Just like timber fasteners, these anchors also have minimum concrete edge distance and spacing limitations to meet. Too close, and the anchor capacity will be compromised.

It is important to be fully aware of the complete structural model, and any geometric limitations that may govern. All assumptions and requirements which may affect other stakeholders' details must be clearly communicated. Your nail plate supplier's engineers are always available to clarify any specific applications. T

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