GOOD NEWS AND BAD NEWS

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The subject of this article is about a site inspection that I did some months ago.

It demonstrates a couple of problems developing in the timber roof truss industry and illustrates some good news about the way timber performs.

As usual it all started from that dreaded phone call - "I have a problem on site I need you to look at. The builder says that a girder truss has 'failed'" - or something along those lines.

Pardon my cynicism, but 'failed' can mean many different things to different people. This is problem number one - the tendency for any crack, ceiling deviation, etc to be labelled as a 'failed' truss.

In a lot of cases, further investigation shows that the problem is not actually caused by the truss (See GN Guidelines No. 6). So I politely asked what evidence there was that the truss had actually failed.

The customer faxed me a number of pages showing the layout of the roof structure and a picture that showed the webs at the apex of the girder had pulled away from the plate.

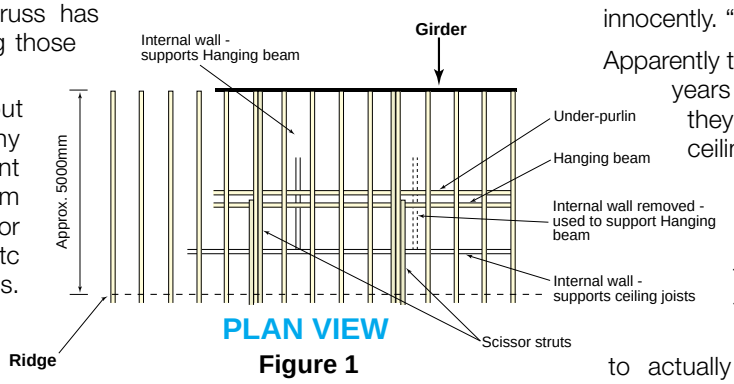
OK - I'm convinced - the girder has failed. Time to crawl around inside the roof to find out why.

An examination of the plans showed that a family room had been added to the side of a house. Basically a gable to gable conventionally framed roof had been turned into an L-shape by adding a girder and valleys and a run of standard trusses.

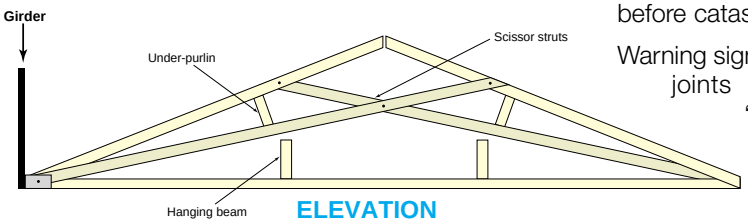
The fabricator pointed out that a couple of walls had been removed - "maybe they were load bearing". The girder was designed to carry 3000mm of roof and ceiling - presumably the distance to the under-purlins and hanging beams.

When I arrived I was shown the family room, where a rather unattractive prop was positioned beneath a dramatic crack in the ceiling that extended to the now deformed cornices at either end, seemingly due to an overload from the truss above - hmm!

Crawling into the roof I found that - yes - this was a conventional roof and - yes - the webs had separated from the apex joint. In fact I was quite glad that the girder was propped.



PLAN VIEW
Figure 1



ELEVATION
Figure 2

I also found that the under-purlins and hanging beams were approximately 2400 mm away from the girder truss, so where was the problem? Further investigation of the roof revealed the problem (number two) - a misconception of how the conventional timber roof construction worked.

Figure 1 shows a sketch of the plan view of the problem area and Figure 2 shows elevation of the real culprit - scissor struts!

In this case the rafters were supported on the under-purlins, and the under-purlins were supported on the scissor struts, which in turn were supported by the now failed girder truss.

To make matters worse, the internal wall shown was removed and the hanging beam was then 'hung' from the rafters above. So the girder truss was really supporting approximately 10m of roof applied as two large point loads, plus the extra ceiling load from the hanging beam support.

I promised you some good news; when I discussed the situation with the owner I asked how long the extension had been built - "about six to six and a half" I was told. "Weeks?" I asked innocently. "No - years".

Apparently the extension was done six years previous but at Easter they noticed a bulge in the ceiling, which was probably when the apex joint had given way causing cracking of the cornices.

The good news is that timber truss construction usually takes a long time to actually fail even when grossly overloaded. Large deflections and other signs of distress are obvious well before catastrophic failure.

Warning signs to look out for on plated joints are nailplates that are 'peeling' out of the timber. Nailplates seldom fail by the plate itself breaking.

There is one last warning though - just because it is holding fine when the job is first done - if the loading is too high it will eventually cause problems, sometimes years later!

For the record the solution in this case was to insert another truss beside the existing girder creating a double truss strong enough to carry the entire 10m of roof load.

In summary - be very careful when interacting trusses with conventional timber roof construction. Be sure the loads are identified correctly. If you are unsure, then check with a roof truss engineer, as problems with incorrect assumptions may surface years down the track.