

Ted's News

December 2016

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Last month I ran Part One on the importance of understanding ductility when considering decking fasteners with a very good article by Herb Kuhn, Managing Director of Simpson Strong-Tie Australia. [Here is the link to Part 1.](#) Herb has more to say this month but before we hear from him, I will provide some extra background to the problem below.

CHOOSING THE CORRECT DECKING FASTENERS

Part 2 of 2 - Screws with steel decking



Steel joist used on verandah badly corroding.
Image courtesy Contrast Constructions.



Broken screws in C section steel joists



Blackbutt with high acidity (pH 3.6) used on steel joists - not something I would advise.
(The image of the broken screw above is from this deck.)

When we were writing our LifePlus Decking Guide (only \$22.00 a real bargain), we wanted to include information about how to attach our 88x21 decking to steel joists. It is not as easy as it seems as you can easily be swapping well known and easily "sortable" issues for ones that are not as well known and not as easy to sort. So we wrote to Lysaghts asking for how we detail to avoid the four issues we saw which were:-

- Increased acidity of new treatments
- Lipped profiles of C and Z sections holding moisture
- Decreased torsional stiffness
- Screw manufacturers not certifying their screws when going from timber to steel

These days I would now add a fifth issue - the acidity of the timber.

After a very long time (two years) we got a verbal reply that they did not approve of their steel joists being used with timber. Later a technical bulletin was issued CTB-13 *Contact with Timber* which basically says, if not CCA treated, they advise against its use [CLICK HERE FOR THE LINK](#). That would be the end of the matter except that a Lysaght publication *Construction of a Lysaght QuikkaFloor* outlines how to make a verandah floor with their product and does not appear to mention that you are not to use timber decking. A phone call indicated that decking would have to be screwed or nailed with a hardened twisted shank nail as with the internal floor sheeting instructions. A publication I found more helpful was the *Duragal Flooring System* published by Onesteel. Their guide gives design solutions for all the issues I sought guidance on, which includes the use of a joist sealing tape between the decking and the joist. From here it gets complicated...

The Duragal guide prohibits the use of solvent based decking oils (page 9) as that may damage the sealing tape - and, in our opinion, the best domestic decking oil, Tanacoat, is solvent based and your decking should be oiled all around and then done thereafter as needed - with Tanacoat of course! (Tanacoat is now low in aromatics which is generally what attacks the strip so it should be fine but your builder may substitute the good oil for something of lower cost which may cause issues). Norton Flashtac which is specified for sealing the ends of the joist could be used over the whole joist and it won't be attacked by the solvents in cheap decking oils but, last time I priced Flashtac, it was \$4.00 per metre so it is not going to happen due to its cost. The Duragal guide then advises against using decking screws to fasten the decking to the joist but recommends hardened nails. However in my opinion people are going to continue to use screws. Over to you Herb (not a paid advertisement).

"In our experience areas like North East Victoria and the High Country are the most extreme and as you get further from the coast the humidity variation is most extreme. West of the Great Divide is the other area that is a real challenge for us, again due to the hot and dry summer and then if there is large amounts of rain in the winter or wet seasons, this creates the challenging environment that we need to deal with.



It is also worth mentioning that when fixing Hardwood decking to steel joists, in bushfire prone areas, that Bi-Metal screws are the ONLY solution, again due to the ductility of stainless steel. Bi-metal screws have a carbon steel drill point, wings and the first 4 threads and the remainder of the fastener is 316 stainless for optimum ductility." Herb added later that his screws have a zinc coating to minimise the potential for corrosion due to dissimilar metals. Image courtesy of Simpson Strong-Tie [Here is a link to the Simpson Strong-Tie website](#)

Tube Nuts - An Old Bridge Revisited



Last Month I commented on an old bridge I supplied the Brisbane City Council and the lessons it showed about the importance of correct width to thickness ratio. [Here is the link.](#)



The bridge makes extensive use of tube nuts we call Man-O-War nuts. They are M12, have a mushroom head with a Hex drive and are made from stainless steel. The tube measured 300mm long and is 16 mm on the outside. But why add the extra cost when a nut would have sufficed?

When I first started manufacturing timber landscaping such as barbecue tables I learnt of a case where a young child severely disfigured her face on a protruding bolt when she fell against it - similar to the one illustrated. The personal pain and anguish for the child and the family and on the supplier, even if he was a heartless so and so, would have felt the pain of the litigation that followed. I thought, "It is not worth going down that path for the few dollars saved".

We made it a policy to use tube nuts where we had to use bolts and try as much as possible to use coachscrews and batten screws. [Here is a link to a DWG drawing of the nut.](#)



They also look a lot neater than countersunk bolts. Compare the two bollards above, one by us on the left and the other by the lower priced supplier. Undoubtedly ours looks better. Do you want to know how to achieve this finish? [Here is the link to the December 2015 Newsletter that explains how.](#) Man-O-War nuts can be purchased from Outdoor Structures Australia. Call Tammy on 0403 601 041

Largest Timber Gable Truss in Australia

Excerpt from my new book "timber Joints"



A 39.6m hardwood truss using shearplates under construction at Tocumwal, NSW during World War 2. Image Courtesy Associate Professor Gregory Nolan

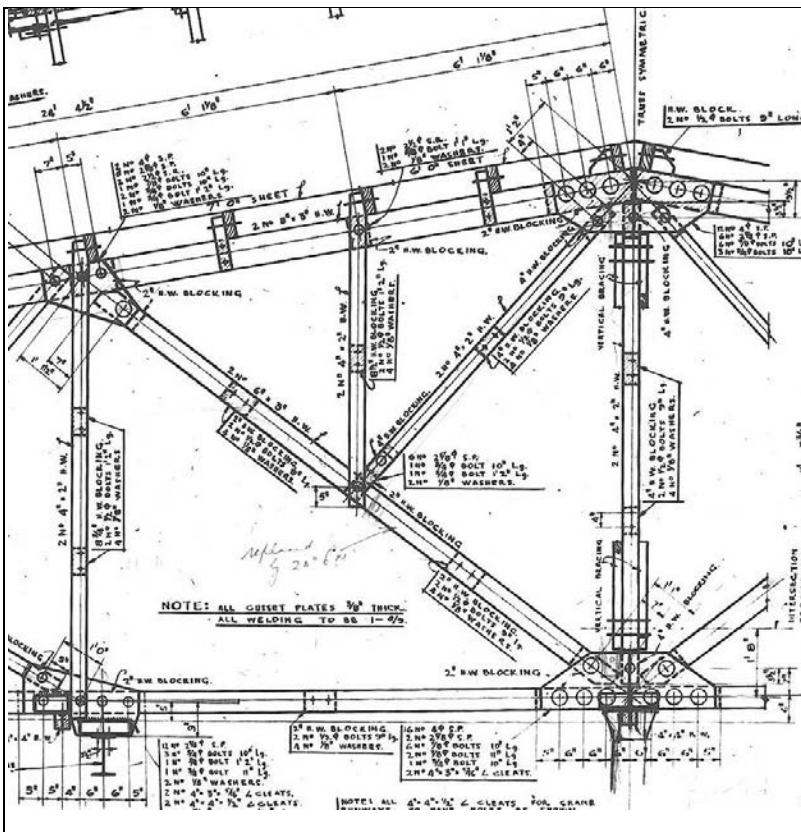


Truss made with shearplate connectors at Werribee aerodrome. Image courtesy of Owen Peake

An example of the use of shear plate construction is the heritage listed Werribee aerodrome hangars constructed during World War Two. These are an American design, re-engineered from pine to Australian Hardwood with clear spans reaching 130 ft (39.6 m). Like the Igloo, timber framing was again used as steel was in short supply. One author wrote, "Architecturally these structures are unique as they are the first long span trusses recorded that use timber as tension web members. They [were in 1996 and still believed to be so] the longest clear span gable shaped timber truss buildings known in Australia." Similar trusses were built elsewhere including Tocumwal.

The 96 ft (29.3 m) hangar used a double 8x3 inch (200x75 mm) for the top cord a double 6x3 inch (150x75 mm) for the bottom cord. The main

diagonals reduced from double 6x3 inch (150x75 mm) at the centre to 4x3 inch (100x75 mm) and ancillary bracing is single 4x2 inch (100x50 mm). These trusses were, in a sense, experimental as up till then timber in major projects had been seasoned but there was no longer time for this. Unseasoned timber had to be used and the engineers had to learn how to overcome the difficulties that caused.



Detail of truss in 29.3 m Werribee Hangar. Drawing courtesy of Owen Peake.

While no problems were reported with the shorter 96 ft spans, the 130 ft truss initially had considerable problems.

The 130ft (39.6 m) span trusses were constructed with a straight-line camber of 8 inches (200 mm) at the centre of the span but when measured 9 months after construction, deflections from the cambered position ranged from 184 mm to 238 mm. Deflection, roughly the quarter points of the span were the lowest, giving a double festooned appearance. This required the trusses to be propped and re-cambered. Gregory Nolan speculated that, "It is probable that the stresses allowed were just too great for satisfactory performance with green hardwood." With the seasoning of the timber no further problems were reported and those of both length that were inspected in 1992 were performing satisfactorily.

Further Reading

[Werribee Satellite Aerodrome Hangars](#) – Nomination for Heritage Recognition. Hankins, Alan, Thanh Ho. (Engineering Heritage Victoria, 2005)
[The Forgotten Long Span timber structures of Australia](#). Nolan, Gregory.

[Newsletters 2014 to 2016](#)

In the next couple of months I will be finalising a book containing all the newsletters over the last three years. That is six years now that I have been producing the newsletter month by month without fail. I thought I would run out of things to say after six months! Pre-order a copy for \$33 by emailing me.

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[Here is a link to my CV.](#)