Ted's News

October 2016

Coconut Lumber

Last month I spoke about the logging moratorium in the Philippines, a land once heavily forested. What has taken the place of these hardwoods in the marketplace is cocowood. The image above is from a cocowood wholesaler outside of Manilla. The timber wholesales at 15 pesos per super foot ($A200 per m3) and retails at about 22-25 pesos per super foot ($A290 -330 per m3). There is only one length, 12 ft (3.6 m). Most is cut with a chainsaw and some with a Lucas style portable mill. If you dried this wood and run this material through a planer, it would look a very classy product. As this material is already entering the Australian market the question arises, "is it any good?". Simple question with a not so simple answer.

Strictly, coconut palm “wood” cannot be classified as wood. Cocowood is a blend of two different fibres: put simplistically, it is more like parallel cables embedded in foam. The outside is covered with a cortex that acts like bark. Coconut palms have neither heartwood nor annual growth rings and lack branches and therefore contain no knots in processed material.

It is estimated that there are 120,000 hectares of over mature coconut plantations in the Asia-Pacific region that no longer produce enough coconuts to be profitable. The livelihood of millions of farmers are affected. The palms themselves are typically 25 metres high with a breast height diameter of between 25 and 35 cm. If these palms can be economically converted into sawn timber or veneer it provides a financial incentive for the farmers to remove these low productivity trees and replace them with either new coconut trees or other agricultural alternatives.

The outer portion of the palm is very dense (often between 800 to 1,170 kg/m3) with properties similar to many hardwoods. Unfortunately the inner section transitions between 400 to 600 kg/m3 in the intermediate zone down to 100-400 kg/m3 in the core. From the image above it is easy to identify the material with the highest property. High density cocowood can be used for flooring, furniture, joinery, panelling, pallets, plywood and veneers, utility poles (preservative-treated) and feature posts. Lower density material can be used for turnery, insulation, handicrafts and charcoal, firewood and a potting substrate for plants.

Links

The Queensland Department of of Agriculture and Fisheries have published a number of excellent guides to cocowood and cocoveneer and are worth reading.

Technical information from Cocowood and cocoveneer projects by Qld Dept of Agriculture and Fisheries

Only dinosaurs like me know what a super foot is. It is a volume of 12 inch x 12 inch by 1 inch and is how timber used to be sold in Australia. It is not as bad as a hoppus cubic foot which I also used to use also.

New WoodSolutions Design Guide for Mid-rise Developments

On May 1st 2016, The National Construction Code (NCC) was changed to allow the use of timber construction systems under the Deemed-to-Satisfy (DTS) Provisions for Class 2, 3 and 5 buildings up to 25 metres in effective height, known as ‘mid-rise construction’. A new technical guide on the Wood Solutions website has been Created To help industry professionals realise the full benefits of the recent changes The new technical design guide, “Mid-rise Timber Buildings – Class 2, 3, and 5 Buildings” explains how to achieve the targeted fire and sound Performance Requirements. It is available for free download at http://bit.ly/MidRiseTimber.

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Lui the Wood Turner is a Fan of Tanacoat

(Not a paid commercial)

Over the years I have made good friendships with people I have never met. Not Facebook friends but customers I only have had contact with by phone or email. One of these is Lui Greco of Lui's Wood Turning. Over the years Lui has

been ringing me for advice and to purchase Tanacoat but was one of these people I had never met. Recently I decided to rectify that and directly above is a pic of Lui with one of his copy lathes. When I had to have some turned bollards made (top two images) I naturally turned to him (no pun intended) to make my square pieces round. I organised the copper caps and fitted them and the result is amazing I think. If you need wood turning Lui is a good man to know - see link below.

Lui particularly wanted to show me the timber awning over his entrance. It is five years old 20x20 spotted gum and gets a coat of Tanacoat every 9 months and it is in excellent shape. Incidentally that is tanacoat on the bollards also. Have you discovered Tanacoat yet? It was made by Arch, the timber treatment experts initially for Outdoor Structures Australia and that understanding of the properties of timber makes all the difference.

Turned posts look far better than natural rounds. This shelter used posts that were almost 4 metres long, 300 mm (finished starting at roughly 350mm) in diameter and tapered. They are too big for Lui's equipment (max 4.2 and starting at 300mm) but we were able to have them made locally here in Gatton on a large metal lathe. Hardwood turns beautifully and in my opinion is underutilised as a landscaping element..

Links

Lui's wood turning

Tanacoat (available at Wilson Timbers (07) 3171 2898)

Full Day Timber Seminar at Broncos League Club

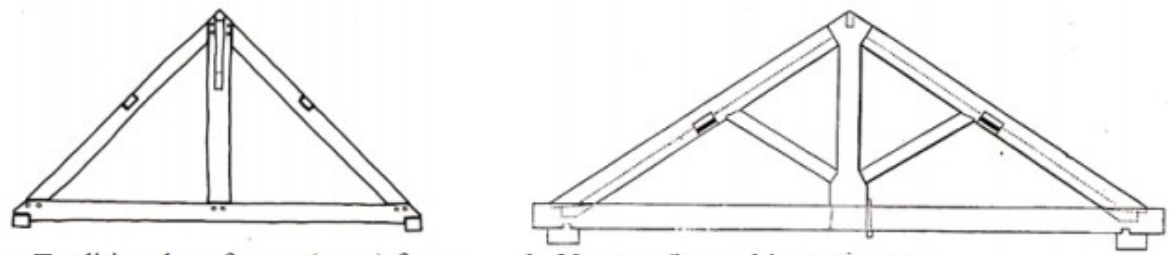
On the 6th of October, Timber Queensland held a full day induction workshop entitled *Designing, specifying and building timber structures.* Colin Mckenzie, a legend in the timber industry, took one session and I delivered the other five. From the feedback it went well and Timber Queensland is considering holding more of these in the future.

If you are part of a council, government department or large professional office you should seriously consider holding one of these seminars in house. Contact Clarissa Brant, Communications Manager at Timber Queensland to organise a date. Her phone number is 07 3358 7906 and her email is clarissa@timberqueensland.com.au.

Trusses - A Brief History

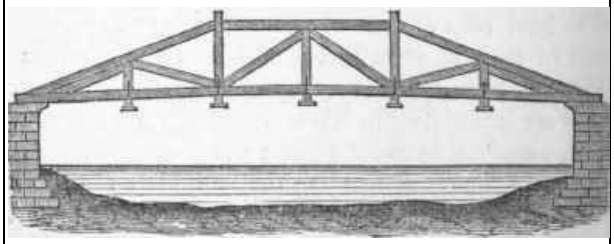
(Extract from my upcoming book on timber joints)

Trusses have been with us since antiquity, possibly as early as the sixth century B.C. but certainly by the third century B.C. The tie beam truss is just a simple triangle with the rafters in compression and the tie beam in tension making a coherent system. This may well have originated in the Greek shrines in Sicily where the builders used larger unsupported spans than those used on the Greek mainland. While there is little evidence that the Greeks capitalised on the trusses ability to deliver large open spaces, the Romans certainly did utilise them. They were able to span over 30 metres by the time of Augustus. Unfortunately we no longer have evidence available about how these joints were constructed. One researcher commented “There is no question, however, that the timber truss was extremely strong and for this reason is still a fundamental component of modern timber framing.” For all their innovation, there is little or no evidence of any engineering theory being employed and, as floor frames were generally heavier than needed, the same is likely to have applied to the trusses.

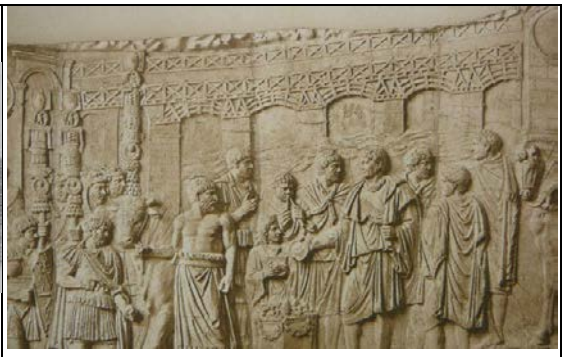


Transition of king post truss.

In these early trusses, the ceiling beam had to carry the full load of the roof with their own bearing capacity. Some scholars think that the tie beam (bottom cord) in some of these trusses from antiquity could have been as deep as 500 mm! While these timbers may well have been available in a world that still had large almost virgin forests, it was not sustainable. We see over the intervening years the timber sizes decreasing and now modern builders who wish to take advantage of a truss's obvious strength must do so with much smaller sizes and improved truss designs and connections. This improvement was started with the development of the king post truss. Initially in ancient Greece this was a compression member where the post was attached to the ceiling beam and supported the weight of the rafters, being fitted under or into them where they met at the apex. In this arrangement the load on the ceiling beam was increased. But the king post design transitioned whereby the post extended to the top of the apex and the rafters fitted into the post, in effect hanging the post from the rafters which could then be used to support what is now a tie beam. Members that were subject to bending were now primarily axially loaded which transferred much greater loads into the base of the rafter where it joined the ceiling beam. This loading allowed for smaller sizes which are needed for larger spans. To this in time were added different diagonal and post arrangements but the approach to the design of trusses was still empirical.



Palladio's 36 m bridge over the Cismon River.



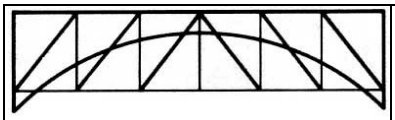
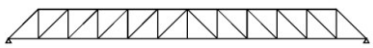
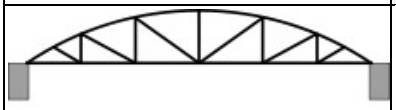
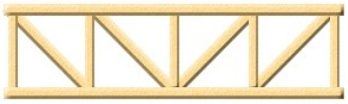
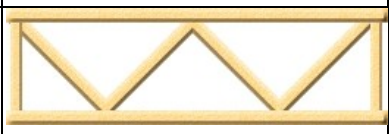
Trajan's 33 m bridge over the Danube (from Trajan's column).

The start of the transition from empirical design to a scientific approach is often attributed to Andrea Palladio and his widely disseminated 1570 treatise *i quattro libri dell'Architettura* where he describes a number of timber bridges without intermediate supports. Palladio claims them as "inventions" as he believed them to be different to anything seen previously. His book contains the oldest detailed designs for bridge trusses including that of the Cismon river which spanned 36 metres. The Romans were able to achieve bridge spans of 33 metres but these were not simply supported structures but gained the benefit of continuity from the adjacent truss (refer Trajan's bridge above). The joints he designed would not be improved upon for at least 200 years but their very labour intensive nature highlight the difficulty of making effective connections for large span trusses. Another contribution was the development of modularity with standard sized members (for Cismon bridge 360 mm high and 270 mm wide) and components that could be prefabricated and quickly assembled.

Trajan's bridge was essentially an arch built of timber instead of stone and at the beginning of the 19th century "arch structures were considered the most suitable structural system for large span [timber] bridges". In the arch there were, in effect, no joints compared to the multiplicity of joints and greater deflection in the truss. But the rapid expansion of

railways in North America bought a new approach. The profit driven and highly competitive environment forced builders to seek solutions that required a minimum amount of time and effort to achieve the desired outcome. Wood and labour were relatively inexpensive and steel was expensive so these solutions were frequently wooden. This would lead to a rush of new truss types, many bearing the names of their inventors. Some of these are:

- Burr arch truss (Thomas Burr, patented 1817)
- Town truss (Ithiel Town, patented 1820)
- Howe truss (William Howe, patented 1840)
- Bowstring arch truss (Squire Whipple, patented 1841)
- Pratt truss (Thomas and Caleb Pratt, invented 1844)
- Warren truss (James Warren, patented 1848).

		
Burr arch truss	Town truss	Howe truss
		
Bowstring arch truss	Pratt truss	Warren truss
Illustrations of different truss types.		

It should be noted that these trusses predate the first scientific publications on the theory of trusses which were not released until 1851 and then were in German.

(Note - images of truss types are taken from wikipedia. Refer to https://en.wikipedia.org/wiki/Truss_bridge#Warren_

truss for credits on images)

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Here is a link to my CV.