Design of Australian Cross Laminated Timber (CLT) Buildings

(A ‘sustainable technology’ project for 3 “structures” oriented students in EBDA/EBAE and/or EBDC/EBCC)

Cross Laminated Timber (CLT) is the engineered wood of the future and is making the construction of entire buildings from timber a reality. First developed in Switzerland in the 1970s, CLT is an extension of the technology that began with plywood and may be best described as a ‘jumbo thickness plywood’.

Having gained popularity in Europe, CLT - also referred to as ‘tilt up timber’ or ‘pre-cast timber panels’ - is slowly being adopted more widely as a viable and sustainable alternative to traditional building practices.

Layers of timber, known as ‘lamellas’, are glued together with the grain alternating at 90 degree angles for each layer. The exterior layers’ grains run lengthways, giving optimum strength. CLT is manufactured in a similar way to glulaminated timber beams, except that glulam is layered with the grain.

Cross-laminating layers of wood veneer improves the structural properties of wood by distributing the along-the-grain strength of wood in both directions, and this means that CLT panels can be used to form complete floors, walls and roofs.

CLT is a timber panel product that actually has similar characteristics to that of a pre-cast concrete panel. The advantages this offers new buildings is quite exciting - timber panels are much lighter than concrete, more easily worked and easier to erect.

The potential of CLT as a sustainable building material is only just being realised around the globe.

CLT manufacture is available in Europe and has recently entered the North American market. It is not currently available as a manufacturing technology in Australia, however increasing local interest means this new building technology should soon enter the Australian market.

The Project

This project is to work with a leading Melbourne Consulting Engineering practice which has already designed 1 significant Melbourne building using CLT in the Docklands area. The project includes the examination of ‘how to’ design CLT buildings from first principles and European practice and also consideration of design in the Australian environment where at present we lack a suitable Australian Standard.

2 of the existing Melbourne CLT buildings will also be studied and perhaps visited as a part of this project.

From this project students considering a career in structural design will gain a portfolio covering a new / emerging technology for future ‘practise’ here and overseas. Skills gained will be relevant and transferrable to concrete panel equivalent structures.

Supervised by 1) Ian Campbell, Honorary Fellow – College of Engineering and Science, and 2) Bien (Dustin) Lam – Associate & Senior Structural Engineer, Robert Bird Group, Melbourne.

Example Building - Melbourne (See pictures that follows)

“Forte Living” is a 10 storey apartment building made from cross laminated timber (CLT). Standing at 32.2m it is the world tallest modern timber apartment building made from CLT. It is also the first Australian building to be made from CLT. The building comprises 759 CLT panels of European spruce (picea abies), weighing a total of 485 tonnes. The spruce for the CLT panels was grown and harvested in Austria, the panels were manufactured then shipped to Australia in 25 shipping containers.
“Forte Living” - Melbourne