The Modern Swedish Timber Construction Industry

An Australian Perspective

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AUSTRALIAN MAP MAGE: SWEDISH AUSTRALIAN CHAMBER OF COMMERCE - http://www.swedelink.com.au

Sweden is leading the world in innovative low and mid rise prefabricated timber construction methodologies.

In the last 20 years, you have developed a domestic off-site timber building sector with a range of advances that are unique and worthy of consideration by others wishing to explore timber as a reliable modern construction material. As an outsider looking in, I am envious of the new approach to timber construction that you have adopted for both one and two storey free standing houses and for mid rise multistorey buildings.

The Byggma Groups's Masonite Beam construction, Martinson's planar CLT construction, Moelven's TRÄ8 and the Volume Module Construction as practiced by Lindbäcks are just a few examples of Sweden's highly resolved and diverse range of engineered timber construction methodologies.

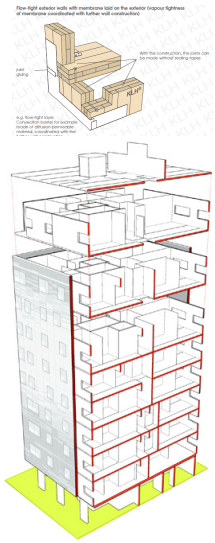
Images: D.Bylund, martinsons.se and moelven.se

From my observations, the modern Swedish timber construction is equal to or in some respects better than those seen in other leading timber focused countries such as Germany and Austria. You easily out perform North America, Australia and New Zealand in terms of innovation and rationalisation in the prefabrication procurement process for low and mid rise buildings.

This being said, I feel Sweden is yet to fully explore and embrace this role of world leader by promoting your advances internationally to their full potential.

Why do I say this?

With a few exceptions, your industry had remained focused on the domestic production of timber houses without exploring the opportunity to share your knowledge and advances with other countries. While your sawn timber and pulp is exported throughout the world, the intellectual property that underpins your modern timber construction methodologies has remained largely at home. Unlike, the Germans, Austrians and Canadians, you have kept your advances hidden, while they have begun to actively promote their advances beyond their borders. Examples of this are KLH's nine storey Stadhaus Murray Grove in Hackney, London by Waugh Thistleton Architects, built in 2009.

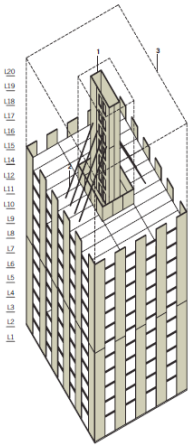


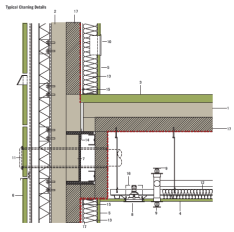
Images: klhuk.com

More recently the ten storey Forte' building in Melbourne is the result of a collaborative partnership between Lend Lease and KLH by exchanging both cross laminated panels and more importantly local knowledge that has set a new standard in cross continental

intellectual property transfer in modern timber construction.

In addition to these examples, the Canadian Architect Michael Green's Tall Wood system is a highly resolved conceptual proposal for a 30 storey high rise tower and has also had much international publicity.





Images: Tall Wood - Michael Green Architecture

Before I discuss this further, let me take a step back and explain a little about who I am and why I am here, speaking to you today. Just a week ago, I submitted my PhD at the University of Western Australia at the Faculty of Architecture, Landscape and Visual Arts.

My PhD is entitled:

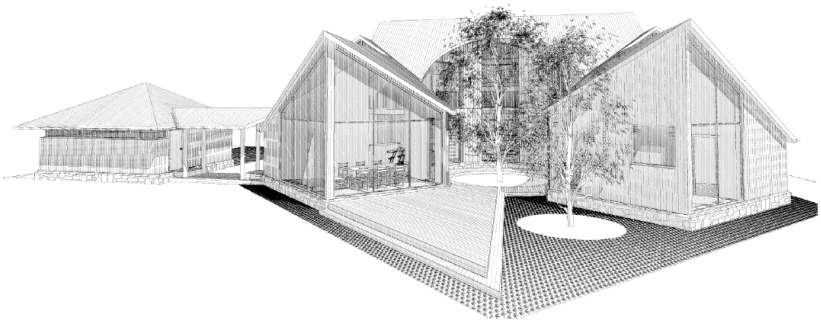
Engineered Timber Construction in Australia

An investigation into modern Swedish timber construction methodologies and their potential Australian application

Image: David Bylund Architect

Why did I undertake a PhD on this topic?

Prior to commencing my post graduate studies four years ago, I had been in private practice as an architect designing residential, commercial, recreational and educational buildings. I had not been involved with any particularity innovative projects nor had I many opportunities to design any large scale structures with timber.



Images: David Bylund Architect

This was a problem for me because innovation and timber construction was an area that fascinated me. I had designed some feature timber decks, renovated old timber houses, and had used timber as a feature material in a commercial foyer or as part of a retail fit-out, but I had come to the realisation that if I was asked to, or even wished to design a significant structure with wood, I did not have the knowledge to do it...and this troubled me. This was a result of a combination of a number of factors such as, limited undergraduate architectural education in timber, conservative clients and

developers, and a lack of detailed knowledge and experience in how to design and build with wood. Couple these issues with conservative government building regulations and a construction industry geared to approve and build with concrete, steel and brick, very few opportunities would present themselves to to me or the majority of Australian architects wishing to explore and design with innovative timber construction methods. I suspect that this is similar for many architects here in Sweden too.

So I set out to do something about it. I started a PhD investigating innovative Swedish timber construction. I did this because at the time, there was no post graduate opportunities to explore timber in the ways that interested me in Australia and I had family connections with Sweden that had given me an appreciation of the your affinity for wood.

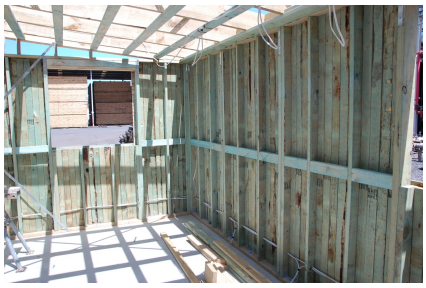
So, my Ph.D asked the question:

> Can advances in the modern Swedish prefabricated engineered timber construction industry be adapted for use in Australia?

My research explored this question through an investigation into a number of established and emerging Swedish prefabrication and engineered timber building methodologies currently being used here. I also looked to see if there were any similar developments in Australia.

I considered some of the cultural, economic and environmental influences that had shaped and continue to inform your timber building industry, both past and present. Both my Swedish and Australian findings were then used to design a simple yet robust, prefabricated engineered timber solution that could be manufactured in an Australian context.




In doing this, I attempted to incorporate some of the main elements I had observed in Sweden's approach to modern timber construction. I addressed core principles issues such as ease of prefabrication, lean construction, value adding to lower grade wood and the potential for sawmills to vertically integrate into construction. I did this to demonstrate that Australian timber construction could benefit from the new approaches that have been developed in this field.

For my Swedish ideas and observations to be credible, I had to consider what might be acceptable in Australia's environmental, cultural, economic and regulatory structures. I attempted to find a solution that introducing a new method of building with timber to Australia that would point toward the benefits now being realised here.

To do this, I wanted to understand, not just Swedish timber construction from an

architects, engineers, carpenters or builder's point of view, but the influences that had helped shaped your new, timber based innovative construction methodologies. I then considered if lessons could be learnt from your journey that could inform Australia's own explorations with wood.

As part of my field research, I spent 8 months in Stockholm at KTH's School of Architecture, studying your approach to modern timber construction. I toured sawmills, factories, building sites and interviewed architects, engineers and academics specialising in this area. I developed an understanding of timber in your history and which factors influenced the development and reinvigoration of it as a reliable, modern building material, suitable for large scale construction.

So what did I found?

I found that Sweden and Australia are certainly not the same. This means that it is really not possible to simply lift your highly resolved solutions as a block and transplant them elsewhere.

Australia has its own cultural understanding of wood and the way we expect our buildings to perform. We have different forest ownership structures and many different climates, from alpine regions to tropical forests to vast deserts. Australia has different tree varieties, both native and introduced with different structural properties. We have different regulatory and governance frame works and a far less altruistic approach to the provision of public housing, especially using alternative or new technologies involving wood.


Images: David Bylund

But this does not mean that we can't learn from both your successes and failures. I believe that there is scope for both your experience and knowledge in the form of your intellectual property could be exported to places like Australia and for that matter, other developed and developing countries.

You, like us, are an advanced, highly mechanised economy with a strong, solutions based approach to problem solving. Your energized, interdisciplinary timber building culture, rationalised approach to construction and expanding market share have resulted in a unique set of very Swedish attributes, influences and drivers.

These factors have contributed to, and continue to inform, a growing broad cultural

acceptance of timber as a capable structural material and more importantly, as a viable alternative to steel and concrete. The proof of this is the increasing number of mid rise apartment buildings being built here that are prefabricated - and that are made of wood. Further to this, the dominance that off-site, prefabricated timber construction now has in your low rise residential, free-standing housing sector is almost without comparison.

So why is this?

Over the centuries, you have enjoyed a lengthy, rich and certain at times, a troubled association with timber. As an abundant natural resource, timber has existed in almost all aspects of your life and culture through the good periods and the bad. Timber is one of the Scandinavian regions most recognisable materials and it has helped define the very essence of your built environment. As a country and as an internationally recognised representative of the nordic region, you are renowned for producing high quality timbers that feature prominently in areas such as construction, boat building, furniture manufacture and handicrafts.

The long affiliation that you have with your immediate neighbours and their strong association with wood has resulted in a recognisable commonality in all things timber that is often perceived from the outside as simply ‘Scandinavian’ or ‘Nordic’. These terms will

conjure up a range of images for the rest of the world. In terms of the built environment, timber will almost always be present and it is beginning to sit along side the impression of Swedish and Scandinavian products as strong, dependable, stylish and well engineered. This is a valuable commodity that has the potential to be leveraged by your industry as an exportable commodity.

This is important as, following the onset of the industrial age and a century of prescriptive building regulations, successive steel and concrete based architectural movements and styles have dominated, not just Scandinavian cities, but much of European, North American and Australian architecture. The dominance of steel and concrete has resulted in timber being considered, up until relatively recent times, as a second class building material. The 'modern' construction methods championed in the 20th century have all but excluded wood.

Images: David Bylund

Until recent times, timber as an identifiable structural material in public buildings was conspicuously absent apart from its use as roof and wall timbers, flooring or wall cladding but over the last 15 to 20 years, your timber construction industry has been reborn. You have again re embraced wood as a material to be celebrated and relied upon. Wood is once again seen as a significant structural and aesthetic material that should be expressed prominently in almost all aspects of life.

Once your performance based codes were enacted in the mid 90s, intense research activity in the field of timber construction fast tracked technical developments in low and mid rise timber building. An increasing number of architects, academics, engineers and developers have now begun to utilise and rapidly progress the new wave of

engineered timber construction techniques that we are now seeing in increasing numbers of Sweden's contemporary multi-storey buildings.


Image: David Bylund

While your multi-storey timber construction industry could still be considered to be in its formative phase as it strives to compete with concrete and steel, it is experiencing unparalleled opportunities as cities such as Växjö in the south and here in Skellefteå encourage new developments in timber focused construction. During the last 15 years, you have established a number of highly resolved timber building technologies that utilise industrialised production to produce all-timber buildings up to eight storeys high.

This focus on mid rise construction is one of your strongest assets. While other countries aspire to explore timber's theoretical potential to build taller and taller structures, such as the Canadian architect Michael Green's 30 storey *Tall Wood* scheme, you have focused on developing and commercialising constructional systems that are fast, affordable and reliable in the mid rise sector. This type of construction is well suited for use in the new urban infill programs introduced by many local governments as populations increase and pressure is placed on existing housing stock.

Your residential construction is now considered to be of such high quality it is often described as a 'manufactured product' rather than just 'construction'. According to Shipper, Meyers and Kelly, your approach to the procurement of both free standing cottages and mid rise multi-residential apartments represents a new standard in economic and construction rationalism that has been tempered by a craftsman's approach to industrial production.

By its very nature, prefabricated timber buildings require a high degree of industrialised production and rely on an economy of scale model to be profitable. As high production volumes are one of the key elements of prefabricated construction, the Swedish timber prefabrication industry must continually strive towards larger production outputs and new opportunities to grow. This is needed to offset the high capital costs associated with the development and maintenance of the type of technically advanced facilities required for this type of construction. Exploring opportunities beyond your borders could be part of this expansion.

Images: David Bylund

Your strengths lie in your ability to adopt, develop and explore increasingly technical structural solutions by partnering with the timber milling industry, government regulators and developers to continue optimising your timber resources. Australian and New Zealand sawmills are yet to experience the level of vertical integration into the constructions sector that has occurred here. Our sawmills remain committed to the efficient production of sawn lumber but they have little understanding of the uses that its timber is put to once it leaves

the mill. If Australia and New Zealand's timber processing sector wishes to grow it will have to learn from places like Sweden, Germany and Austria and be prepared to accept that value adding through vertical integration is critical to expansion. Australian and New Zealand mill profits are continually being reduced as cheap imported timber flood our markets. The dominance of a traditional conservative mindset continues to be ignorant of the hard fought successes your timber and construction industry is now experiencing.

Both countries enjoy a high standard of living and feature highly developed urban environments, but Sweden's increasing level of dependance on timber relative to its available resource demonstrates the widening gulf that exists between the two countries in this aspect.

While you increases your reliance on your timber resources as you make improvements to timber processing technologies, furthering your ability to compete with steel and concrete, such initiatives in Australia remain, with some notable exceptions, on the periphery of the building industry. Unfortunately, it would appear that Australia is perpetuating its reliance on steel and concrete as the number of timber processors diminish and research initiatives are reduced.

For Swedish timber construction, I believe a committed focus on the needs of the client must remain paramount and technical solutions must continue to be developed that respect the importance of the client by ensuring maximum design flexibility within the context of prefabricated construction.

The future:

Sweden's domestic timber construction industry, while being a world leader in adopting technology and providing highly resolved design solutions, is yet to embrace the role of leading the world. Your developments in this field, while admirable, are yet to be translated beyond your borders to real change in other countries. If outsiders wish to learn about

Swedish construction, they must come to Sweden. I think it is time that Sweden also went to them.

I believe the world wide recognition of iconic Swedish companies such as Volvo, Saab, SKF and of course IKEA demonstrate that Swedish innovation is highly marketable and that it has the potential to be emulated by your timber construction sector. The value of your intellectual property in this area is significant and is worthy of exporting globally.

The next phase of your growth should include a shift from a purely domestic focus to the exporting of the intellectual property gained through your experience and insight into advanced timber construction methodologies. The key to this will be to establish and develop strategic partners in other countries to ensure new Swedish timber construction methods are optimised within the culture, climate and context of other locations. This will be the key to its success and is paramount as you consider how to create international affiliations and partnerships. Australia, New Zealand, Canada, America and Japan are all places that value Swedish ingenuity and design and we can all be beneficiaries from your experience.