

build
AUSTRALIA

TENSILE ON THE WORLD STAGE
WITH ONE CENTRAL PARK

MASTERING THE ART OF BIMPLEMENTATION

THE GREEN BUILDING REVOLUTION



PREFABRICATED BUILDINGS: an industrial revolution

Now we have a new industrial revolution reaching deep into the way we create buildings. It's bringing together the new digital technology skills like Building Information Modelling (BIM) from design to operation. It's creating new technologies for industrial construction through prefabrication. Together they open up new possibilities for creating more sustainable buildings.

In 2012, output from the prefabricated building industry globally was considered to be more than US\$90 billion, up from US\$60 billion in 2011. Australia's share of this is still comparatively small, representing just 3% of the global number. Prefabricated buildings in Australia also represent 3% of the domestic residential housing market. In Scandinavian countries they use substantially more, with 50% of residential housing in Finland and 74% in Sweden being prefabricated.

But the Australian industry is growing, with an ambition to achieve 10% of the residential market by 2020.

Many of the Australian modular builders are focused on single and two storey dwellings like BGC Modular in Perth with its new factory producing houses that can be built in a matter of weeks. Others are going for multi-storey dwellings, for example, CIMC have created new ways of using containers to achieve creative designs that can produce much cheaper housing with reduced waste.

Hickory has established a modular factory which now employs more than 150 people and is producing more than 500 apartments every year. Many of the employees are drawn from the depleted Victorian automotive manufacturing sector. Since inception, the factory has produced multi-storey modular residential and hotel projects across the country, and engineered a system that can achieve architecturally diverse high-rise buildings.

Prefabricated building factories resemble an auto manufacturing plant. They use lean construction techniques, building multiple parts of a building in parallel; as well as digital design (BIM), and Enterprise Resource Planning (ERP). In doing so, they halve construction times compared against conventional building methods in Australia. The product is also much more sustainable in terms of energy, carbon and building waste like the Stella Building in Perth which was built in 11 days and the key performance indicators showed:

Buildings have mostly been constructed in Australia by hand, one brick at a time. This is not very different to how the Egyptians did it and indeed how buildings were constructed in medieval Europe. 200 years ago we had an industrial revolution that has impacted on how we productively create most parts of our world: energy, water, food, but not buildings.

- Thermal performance is 30% better.
- Waste was 50% less.
- Inconvenience was vastly better.
- Construction costs were 10-12% less.
- Aggregate funding costs were 35-40% less.
- Improved return on equity for investors and higher dwelling yield.
- Strong market acceptance for modular product.

It's not just the numbers that look good for manufactured buildings; the aesthetics are looking good too. Modular construction needs more design not less and so beautiful buildings are popping up all over the country. Melbourne has the world's tallest wood building, with Lend Lease's Forte apartments. In 2013, a modular peak industry body was established in Australia: PrefabAUS already has over 50 industry members.





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The workforce for modular building requires skills that are usually associated with auto manufacturing, rather than traditional building skills. This includes factors such as design upfront, proactive rather than reactive thinking, procuring materials upfront and warehousing components. There is a clear opportunity to up-skill the auto manufacturing industry to building manufacturing.

Similar factories are operating and popping up in other parts of the world including China, Thailand, Malaysia. Does this mean the end for manufactured buildings here in Australia? Maybe not. Although labour costs in China are much lower than those in Australia, there are other factors which impact the savings perceived in buying modular products offshore.

One advantage that Australian factories have over their foreign competitors is that the modules can get to

site quicker and transportation costs are less. Post project defect rectification and complying with builders warranty regulations becomes much more complicated when purchasing imported products from offshore suppliers. Having an Australian manufacturer and installer allows for greater certainty of any potential issues being resolved promptly and properly.

So while the construction costs, due to labour, may make overall costs more expensive, when compared against lesser transport costs, and potentially escalated costs to rectify defects and quality, these labour gains may be less relevant.

Modular will never completely replace conventional building approaches, but it will take a much greater share in the market, particularly for multi-storey buildings. This 21st century innovation offers a much more sustainable option for the construction sector.