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FACTSHEET ON PRODUCTIVE TECHNOLOGIES

Cross Laminated Timber (CLT)

About Cross Laminated Timber (CLT)

CLT is manufactured from wood harvested from sustainably managed forests and fabricated by binding layers of timber at 90 degrees with structural adhesives to produce a solid timber panel. Unlike sawn timber, CLT can support heavier loads and be applied for structural and non-structural components in buildings. Also, as it is flexible and light (about 500 kg/m³, compared to 2,400 kg/m³ for reinforced concrete), it is usually used for the construction of walls, lift shafts and floors.

Depending on the dimensions of the building elements, the CLT panels can comprise more than three layers of timber and be manufactured in varying sizes, with a maximum length of 18 metres and thickness of 0.5 metres. The CLT panels are also cut in factories for window and door openings before they are assembled on-site.



Installation of CLT on site

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CLT Overseas



The Forte (designed and built by Lend Lease in Melbourne, Australia) is 10 storeys high and is currently the tallest residential timber building in the world (for more information: www.forteliving.com.au)

Besides residential and hotel projects, CLT construction has also been used in other development types overseas, such as healthcare, sports halls and other institutional projects.



Sports hall

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Healthcare



Institutional

Benefits of using CLT for construction

- Reduction of waste on site and positive impact on the surrounding community (via reduced construction noise, truck movements and reduced concrete / general dust emission).
- Faster construction and fewer labour needed on site, compared to conventional construction methods
- Sustainability benefits throughout a building's lifecycle: timber has the lowest energy and water consumption of any building material and it is a renewable structural building material. Even at time of demolition, CLT is recyclable and can be reused.
- CLT also provides a higher level of thermal performance, reducing heating and cooling costs for occupiers.

CLT in Singapore

In terms of regulatory clearance, CLT has already obtained In-Principle Acceptance from all the technical agencies for use in Singapore. However, its use is subject to certain conditions, such as the building height (generally up to 24 metres, or up to 12 metres for healthcare projects) and

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fire safety design requirements (building to be fully protected by an automatic sprinkler system in accordance to the Code of Practice for automatic fire sprinkler system requirements).

There are currently two builders who can use CLT (one evaluated and one pending approval from the Building Innovation Panel) and we understand that there are other builders such as Woh Hup and JV Zheng Keng-Santarli who may be keen to use CLT.

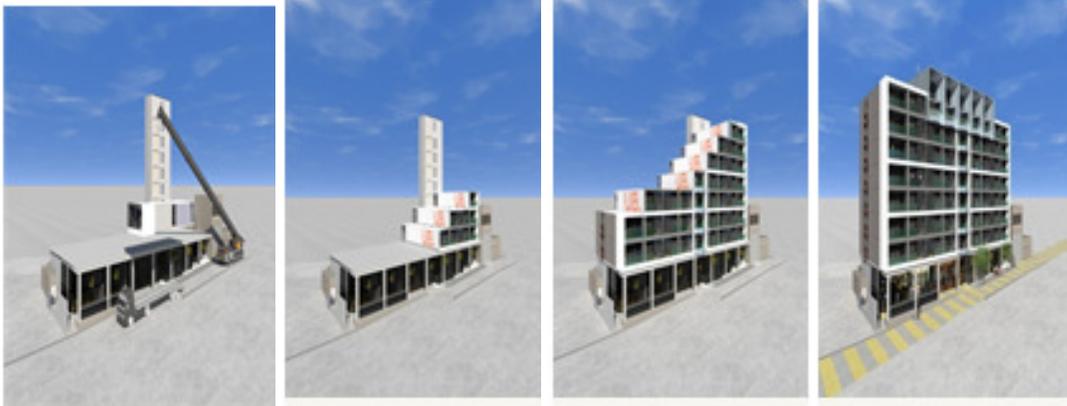
With benefits such as a reduction in construction duration, developers can consider the adoption of CLT for their upcoming projects. In Singapore, the Nanyang Technological University (NTU) has committed to adopt CLT for their upcoming sports hall.

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Prefabricated Prefinished Volumetric Construction

About Prefabricated Prefinished Volumetric Construction

For Prefabricated Prefinished Volumetric Construction (PPVC), complete flats or modules made of multiple units complete with internal finishes, fixtures and fittings are manufactured in factories, and are then transported to site for installation in a lego-like manner.



PPVC Overseas

PPVC is more suited for projects which have a regular layout, such as residential projects, hotels, nursing homes, schools etc. For buildings that have a large span, such as a shopping centres or factories, this technology might not be suitable as the modules would be too big to be transported to the construction site.

PPVC can be used for high-rise construction. A 32-storey development is currently being constructed in New York and will be the world's tallest PPVC building when completed. This project takes only 20 months to build as compared to 30 months using the conventional construction method.



Benefits of PPVC

- PPVC can help to significantly speed up construction. It can potentially achieve a productivity improvement of 30-50% in terms of manpower and time savings, depending on the complexity of the projects.
- Furthermore, dust and noise pollution can be minimised as more activities are done off-site.

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- With the bulk of the installation activities and manpower moved off-site to a factory controlled environment, site safety will also improve.

PPVC in Singapore

In terms of regulatory clearance, PPVC has already obtained In-Principle Acceptance from all the technical agencies for use in Singapore.

There are currently four suppliers (Sw ee Hong/UB Australia, Moderna Homes, Sembcorp EOSM and UB RUSH) for PPVC in Singapore which have been assessed by the Building Innovation Panel.

Also, Nanyang Technological University had called a tender to construct their upcoming student hostel project using PPVC. The tender submissions are currently being evaluated by NTU. MOH, on the other hand is looking to PPVC in a nursing home project to improve construction productivity in health care projects

One-stop Building Innovation Panel (BIP)

New construction technologies or methods often take a longer time to obtain approvals by the various regulatory agencies. Such a process might deter potential innovative products or methods which help to boost construction productivity to be introduced in Singapore. In May 2011, the inter-agency BIP was established to facilitate expedient multiple agency evaluation and approval of innovative construction products and methods that help improve construction productivity by at least 20%.

Led by MND and BCA, the panel includes other agencies such as HDB, JTC, NEA, LTA, URA, SCDF, PUB and MOM.

For applications that have been approved by the Panel, the regulatory agencies issue an in-principle acceptance (IPA) letter for the innovative product or method. For subsequent project submission involving the products or methods issued with IPA, the submission will be accorded fast-track status. Through the BIP, new productive technologies such as PPVC and CLT can now be used in Singapore.