

New technologies boost construction efficiency

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Factory-made beams cut building time and boost safety

Specially engineered timber and lightweight steel beams are holding their own against traditional concrete structures.

These productivity-boosting technologies are being used to build three industrial blocks in the second phase of start-up space JTC LaunchPad @ one-north.

One block, for instance, has an internal structure made mainly of wood which has been specially engineered for strength. Two other blocks rely on structural steel.

These methods bring considerable benefits to productivity, worksite safety and construction quality.

As the materials are factory-manufactured, they are less susceptible to defects. Easy onsite assembly means manpower savings of 10 to 15 per cent, compared with conventional concrete construction.

Some assembly required

Wooden or steel columns and beams are cut to the required size in factories, and then just pieced together at the construction site. These efficient and safety-boosting construction methods are being used for three three-storey blocks in the second phase of start-up space JTC LaunchPad @ one-north.

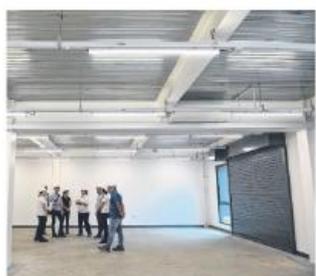
Structural steel

Blocks 75 and 77 are built using structural steel, coated with special paint for fire protection.



Locking it in

Steel beams and columns are shaped to requirements under factory conditions. On site, only bolts and nuts are needed. This eliminates the need for welding, which is potentially more dangerous.



Industrial chic

The unadorned steel columns can simply be retained as part of the interior design.

Engineered wood

The new Block 81 is natural to the core. Glue-laminated timber or glulam is used for its structural beams and columns, and cross-laminated timber for floor slabs.



Fitting it together

Beams and columns are joined in slots, and are secured by nails and screws. Workers have to handle only simple tools such as hammers and electric screwdrivers, making for a safer construction environment.



Natural style

Exposed wood beams and columns inside the building add a stylish touch.

Keeping dry

To protect the wood from Singapore's humid and rainy climate, the exterior of the building is covered with dryboard and metal cladding.

Factory-made

Tailored to the project's exact specifications, the special timber pieces are made under factory conditions in Austria and shipped over here.

How are they made?

Lengths of timber are cut to size and glued end-to-end, forming sheets called laminates. These are glued together along their flat surfaces, and pressure is applied. The resulting glulam beam can then be cut to the required shape.



These methods are...



Lighter

Both engineered timber and structural steel are much lighter than concrete beams, and can be lifted using manual hoisting or small mobile cranes. This saves manpower and makes for safer construction.



Faster

With quick assembly methods used, the JTC LaunchPad blocks will take about one month less to build, compared to the 11 months it would take with conventional methods.



Less disruptive

With little dust or noise generated, these methods are particularly suitable for construction taking place near existing buildings.



Efficient

These techniques require about 10 to 15 per cent less manpower than conventional concrete casting.



But... costlier

Despite the productivity gains, both engineered timber and structural steel work out to be more expensive than concrete, due partly to the cost of importing the components. However, this could change if there are economies of scale.

Source: JTC CORPORATION. PHOTOS: JAMIE KOH, STRAITS TIMES GRAPHICS

Instead of having to be welded onsite, the engineered timber components are joined manually by galvanised nails and screws, while nuts and bolts keep the galvanised steel parts together.

These techniques also shave off about a month in construction time - making it possible for all three new blocks to be completed by the end of this year. In addition, less heavy equipment and no temporary structures such as scaffolds are needed, meaning less dust, less noise and a safer worksite.

Such techniques are also less disruptive to the existing tenants, said Mr Png Giok Hua, JTC Corporation's engineering and operation group's group director (infrastructure development) and director (innovative space division).

"In a way, we have a community here now," he said, referring to the tenants of the LaunchPad's first phase. "They would be quite affected if it was a dirty worksite with a lot of noise and so on," he added.

But such productive techniques have their limitations. For one thing, they are more expensive than concrete, partly due to import costs.

Still, Mr Png is optimistic that such construction techniques will eventually become more widespread.

"JTC, being one of the big developers, generates sizeable demand," he said. "Being an early adopter of these new technologies and methods, we hope that we can act as a good role model."

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