



InnoCell, the first high-rise building that adopted MiC in Hong Kong

INNOCELL

A co-living residential project located at Hong Kong Science Park, InnoCell comprises shared working spaces and ancillary facilities, such as gymnasium, games room, bars, function rooms and kitchens to bring people together to create a more holistic lifestyle.

Its design seeks to promote a self-sufficient community where the residents could enjoy living in their modular units whilst being closely connected with one another through the diverse programmes.

EQUIPPING TECHNOLOGY USE

The InnoCell design process saw the prototyping of Modular Integrated Construction (MiC) components using 3D printing, along with the use of virtual reality and Building Information Modeling (BIM).

BIM was used in the the design stage to enhance safety, quality and productivity during the process. All coordination footpaths and spatial geometries were well recorded in the BIM model towards the construction stage, upholding a single source of project information for all involved. To minimise the noise nuisance caused by module transportation, drones, photogrammetry and BIM animation were utilised to simulate the optimal swept path and transportation route with the minimum sound levels. Furthermore, since BIM was fully utilised in project design and construction stages, it also improved building quality and facilitated coordination, allowing conflicts to be foreseen and resolved, avoiding wastage on site.



Modular Integrated Construction on-site installation

The 3D printing techniques allowed workers to understand better the details that were important for site installation quality, especially this construction method is still new in Hong Kong. Besides, the visualisation of the working environment through virtual reality (VR) and augmented reality (AR) allowed workers to simulate the actual working environment beforehand, which effectively avoided abortive works, reduced material wastage and enhanced safety.

The process merged BIM and cloud inspection platforms to pursue IoT, which allowed big data transfer and analysis among project team members despite geographical barriers. This advantage had a profound positive impact on the project amidst the pandemic.

PIONEERING MiC IN HONG KONG

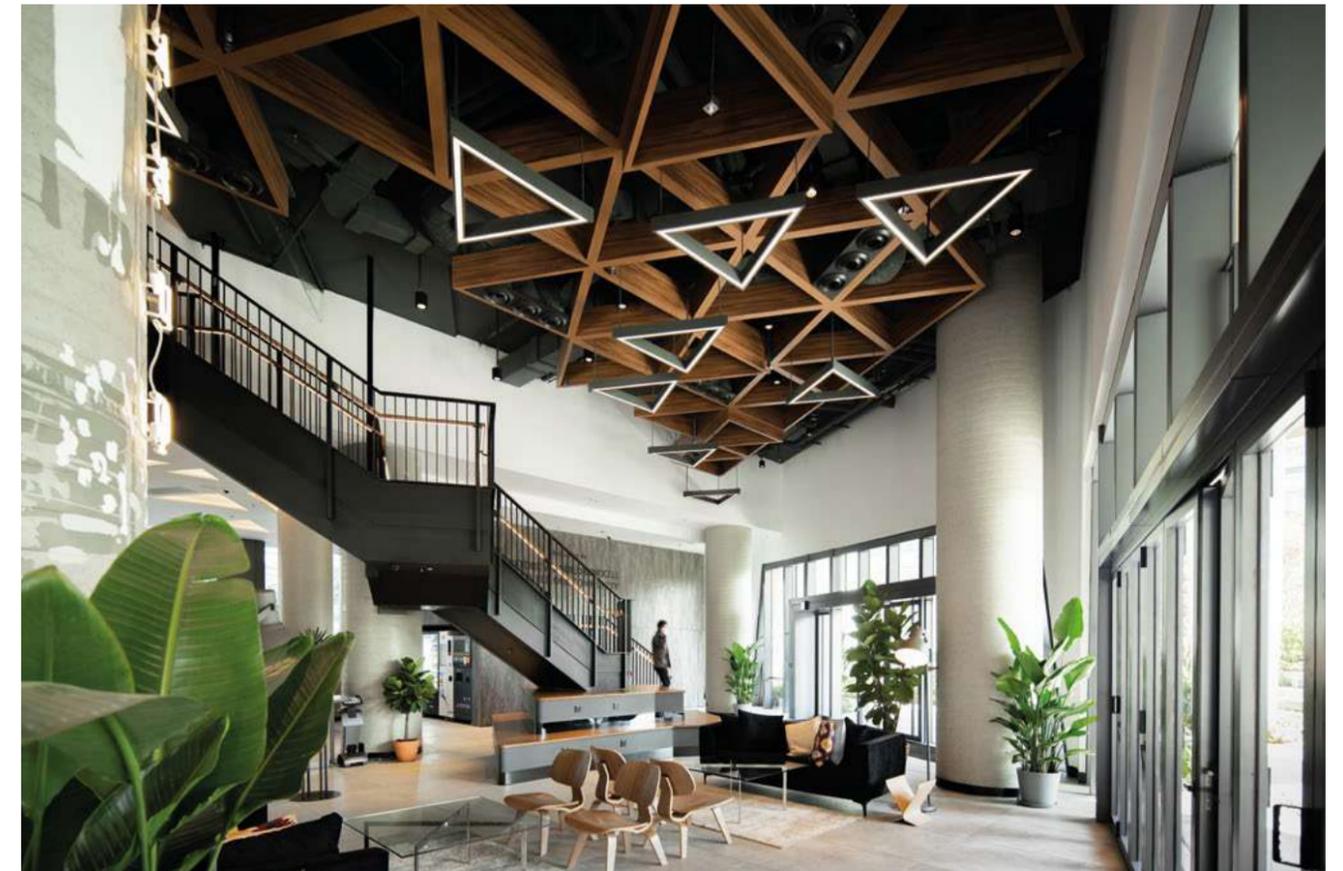
InnoCell is a pilot project adopting high-rise steel MiC in a high-rise building scenario in Hong Kong. With the application of MiC, the project has proven to shorten the construction programme by five months; improve the quality of the final fit-out; reduce reworking and wastage; and resolve traditional construction problems in advance. One of the key advantages from MiC adoption is

sustainability. The project has overcome some challenges by shortening standard construction duration while mitigating the amount of labour required; reducing on-site pollution; enhancing site safety; and ultimately improving the overall quality of the completed construction project. In addition, it has also improved design coordination and work planning while optimising construction safety resulting in zero accidents recorded during the entire construction period.

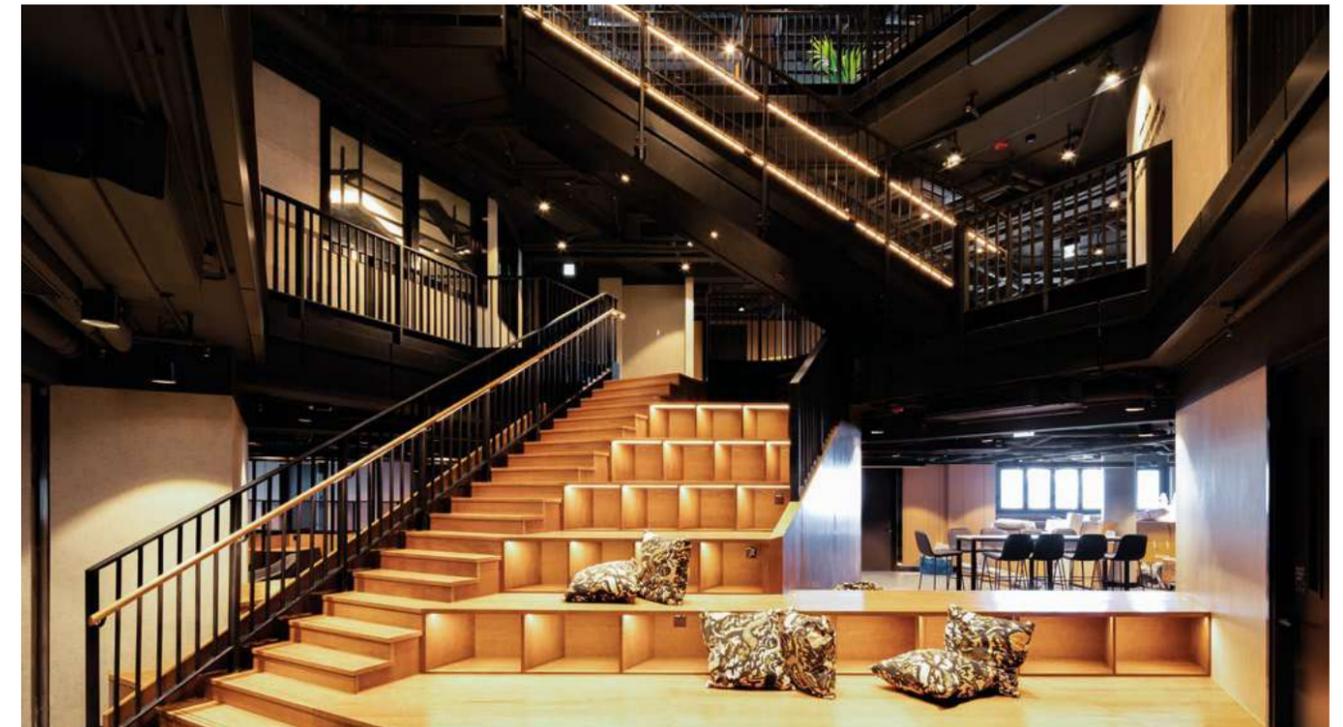
TECHNICAL CHALLENGES

Given the dense nature of Hong Kong's landscape and the prevailing building regulations, the adoption of MiC has faced enormous challenges both technically and statutorily. This is also the case for every stakeholder in the industry, including architects, engineers, surveyors and contractors. Consequently, early and close engagement with contractors and specialists was necessary to develop the method, even at a factory level.

Another critical feature was to optimise the amount of daylight filtering into the interior spaces by carefully positioning and orientating the building on the site. Therefore, the communal area has been designed in the building core, surrounded by the units in a triangular



Communal working space



Library area



Skylight draws natural light deep into the building

form, inspired by the windmill concept, for efficiency and environmental considerations.

InnoCell incorporated both passive and active building designs. The skylight brings at least 300 lux of solar illumination to more than 80 per cent of the communal space across 16 floors, which is well above LEED and WELL standards. Operable windows provided in the communal area on each floor allow for cross ventilation too. Eco-balconies facing prevailing wind directions enable air to cool down before reaching the communal area, while also mitigating the urban heat island effect.

The use of environmentally friendly materials and finishes enhances the life cycle of the building and bodes well for future maintenance, with 50 per cent of timber and composite timber products being FSC-certified and 10 per cent of building materials coming from recycled sources.

Producing a high-quality building in 15 months is a challenge. Still, implementing new technology such as MiC requires successful collaboration among all industry stakeholders and an open exchange of ideas. As a result, the project has achieved various awards. One of them is BEAM Plus-NB [v1.2] Platinum, the highest rating certified by Hong Kong Green Building Council. 

PROJECT DATA

Project Name
InnoCell

Location
1 Chong San Road, Tai Po, New Territories, Hong Kong

Completion Date
Q4 2020

Site Area
Approx. 3,000 square metres

Gross Floor Area
15,300 square metres

Building Height
17 storeys

Number of Units
392 units

Client/Owner/Developer
Hong Kong Science and Technology Parks Corporation

Architecture Firm
Leigh & Orange Limited

Principal Architect
Ivy Lee

Interior Design Firm
Leigh & Orange Limited

Civil & Structural Engineer
WSP (HK) Limited

Mechanical & Electrical Engineer
Ove Arup & Partners (HK) Limited

Quantity Surveyor
Currie & Brown Limited

Landscape Architect
Adrian L. Norman Limited

BEAM+, Environmental, Acoustic & Sustainability Consultant
Allied Environmental Consultant Limited

Main Contractor
Hip Hing Engineering Company Limited

Traffic Engineer
MVA Hong Kong Limited

Panning Engineering
Kenneth To & Associates Limited

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