Shui On Construction Company Limited

Project:
The Innovation Tower, The School of Design Development for The Hong Kong Polytechnic University

Location:
The Hong Kong Polytechnic University, Hung Hom, Kowloon

Type:
Academic Building

Scheduled Time of Completion:
2012

BIM Vital for Freeform Building

In a corner of the Hong Kong Polytechnic University campus, Kowloon, work is underway on creating Hong Kong's first major freeform building, the aptly named Innovation Tower, which will house the School of Design.

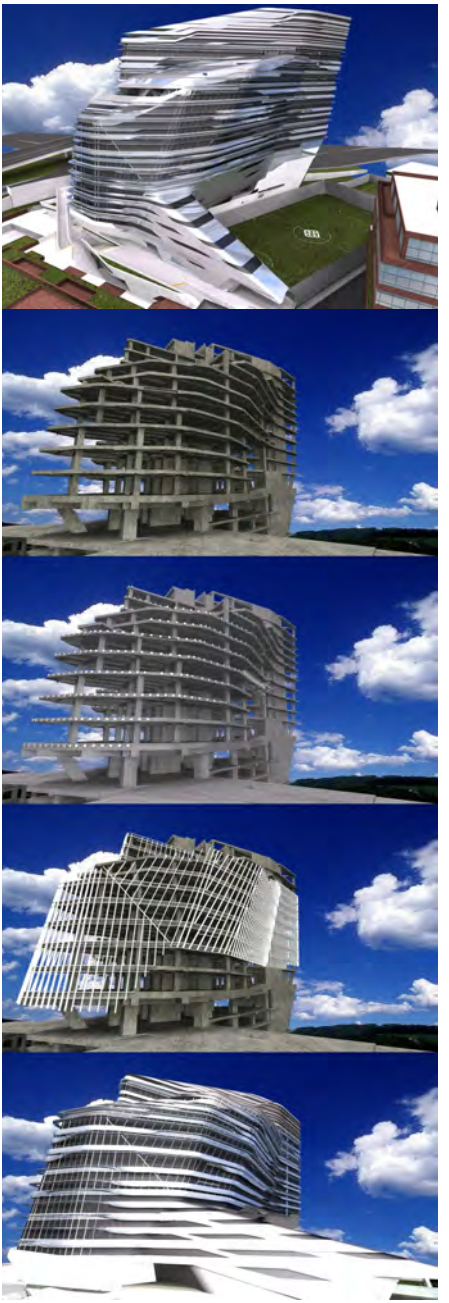
There is little to see but a construction site at present, yet 3D computer models show a futuristic 16-storey tower, with a base like the bow of a ship, on which sits a structure more like a sculpture than a regular building, with a glass façade that wraps around, its surface restlessly curving in here, curving out there.

"The information in the architect's model was insufficient for the construction works," says Chan Tsang Shing, Senior Engineer of the contractor, Shui On Construction (SOC). "The main problem was that we could not easily identify the setting out points, including relationships between the façade and superstructure, based on traditional 2D drawings. We decided to use BIM, which could help us with setting out and coordination work, so we asked isBIM to put all the building systems in a single model." With this model, correlations between various disciplines would be far clearer than with 2D drawings and sections, and Shui On could construct Innovation Tower as envisaged by the architect.

"The façade is unique, and very hard to visualise using 2D CAD," says Anthony Lam, Project Manager, isBIM. The isBIM team developed the BIM model in Revit, using another 3D model, plus layout plans and sections, from the architect and consultants.

Coordination in construction details

The initial BIM model combined architecture and structure – and revealed a great many clashes. The majority arose because of the complexity of the façade and the curving floor edges: in places, there was too much space between floor structure and façade, and in others the plans would result in the floor protruding through the façade. The project team resolved these clashes, chiefly through revising the structural plans – and so eliminated a host of potential issues that would have been very hard to discover with 2D plans, so would otherwise have arisen during



building construction. These changes in turn led to revisions to the architect's 3D model.

The clash analyses cannot be done without BIM. Mr Lam shows a sample view from the early BIM model: it's a cross section of just one, typical floor, with nine red ovals around nine sites where there were clashes between floor and façade.

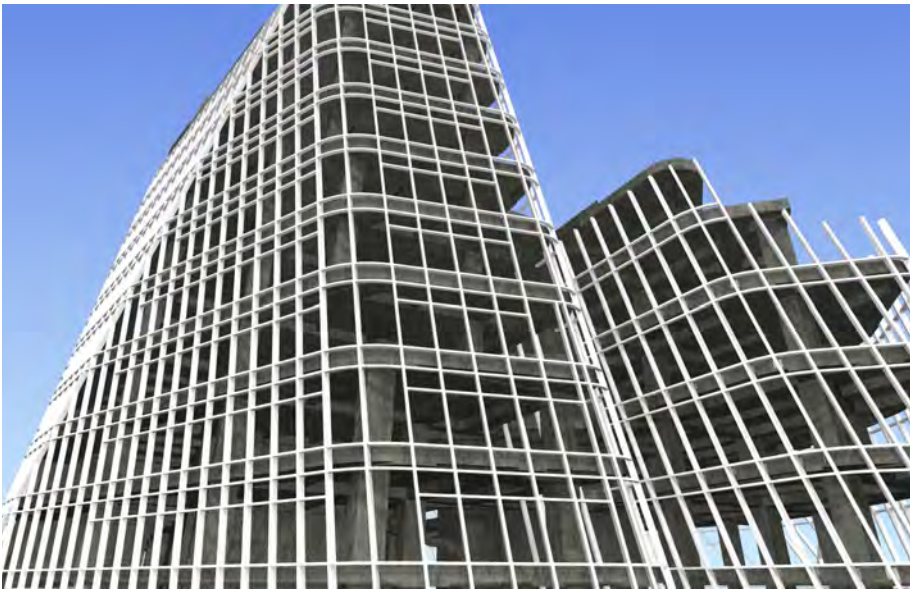
Making complex designs practical

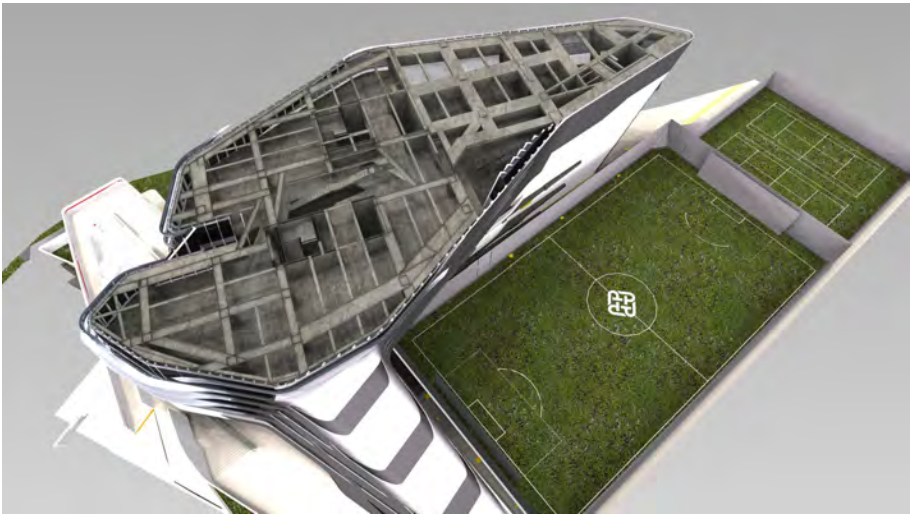
The mullions and transoms – vertical and horizontal structural members – would also be very hard to check using 2D plans. This is particularly the case for the mullions, which tend to be set at angles, and are not arrayed throughout the building in a neatly ordered pattern. In some cases, the BIM model showed where a planned mullion was not quite as long as was actually required.

The BIM model is also proving a great help in planning construction of the base of the tower, which will have a fair face concrete wall extending from the ground floor to the third floor. The wall will lean outward, and will be curved – viewing the BIM model from one end of the building, it looks like the bow of a ship. The Shui On team will rely on BIM to help ensure they have data for exact setting out and the arrangement of plywood.

More effective meetings

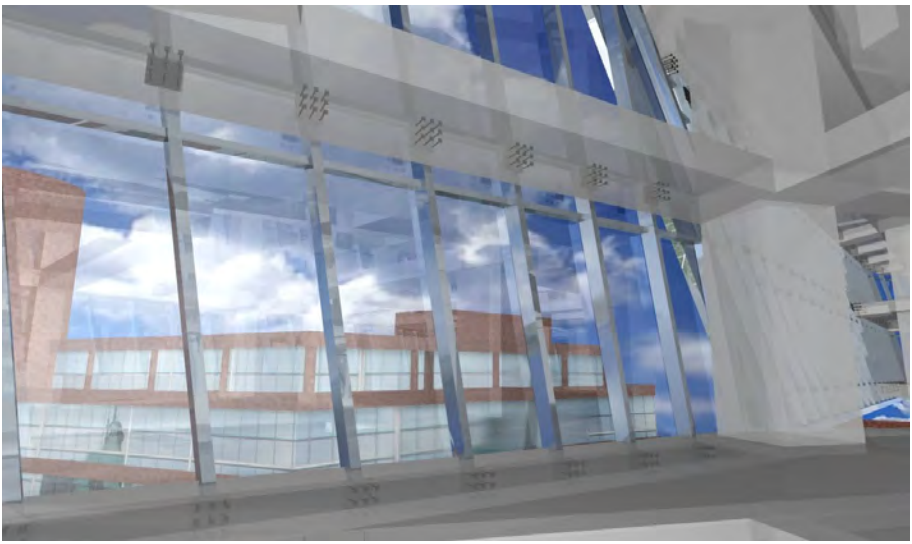
Project team members are making great use of the BIM model in coordination meetings. The computer output is projected on a screen, and team members request that the model of the building exterior is rotated to show a view from a certain angle, or zoomed in – even to the extent of showing views inside the building. Elements such as concrete, glass





and mullions are clearly distinguishable, each with its own colour. This makes meetings more effective and efficient than if massive 2D drawings were being used.

Later, Mr Lam and his colleagues in isBIM will add architectural fixtures and selected building services, to make the model more comprehensive. This will further help with



detecting clashes before construction work, reducing costs and time for corrections.

As well as significantly helping to shorten the time spent on design coordination and drawings vetting – and resolving potential problems at an early stage – the BIM model was used for calculating the volumes of concrete for each floor.

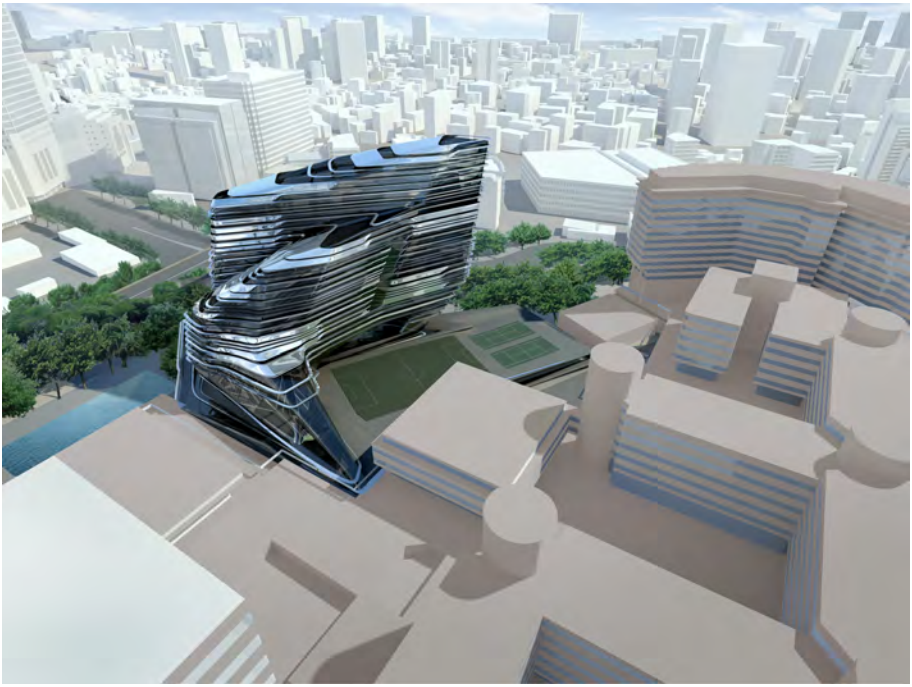
This helps with planning on floor construction cycles, based on the concrete volumes for each zone. "When the design of the MEP systems and interior layouts are in place, we will include them in the BIM model, so that the whole building will be coordinated before it is built,' said Mr Chan.

Helping shape future buildings

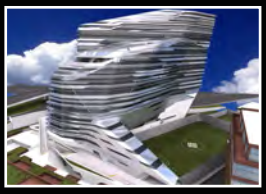
Mr Chan says Shui On is now training staff to use BIM, and they find that Revit helps them easily visualise construction projects in 3D. "Most colleagues find it very useful, and know there's a trend to use BIM," he adds.

"It seems that every day there's a new technique for using BIM – and sometimes when you use it in real life, it's quite amazing," says Mr Lam. "You can see that architects' designs are more and more complex compared to 30 years ago. I think buildings in future will look different because of BIM."

** All images in this article provided by Shui On Construction Co. Ltd.*



瑞 安 建 築 有 限 公 司
SHUI ON CONSTRUCTION COMPANY LIMITED



ABOUT SHUI ON CONSTRUCTION COMPANY LIMITED

Shui On has extensive experience in the construction of commercial and institutional projects for the Government, major institutions and private developers, with many well known developments to its credit. These range from major luxury hotels, office buildings and shopping centres to sports and arts facilities, hospitals, schools, universities and recreational parks.

With its wide range of experience and professional project management capabilities, Shui On has also been highly successful in carrying out design-and-build contracts. Major completed projects include Customs Headquarters Building, ICAC Headquarters Building, North Point Government Offices, Shui On Centre, Manulife Tower and "Private Sector Participation Scheme" of the Government of the HKSAR at Bauhinia Garden, Richland Gardens, Hong Sing Garden and Tai Po Plaza in Hong Kong.

Over the years Shui On has won many prestigious awards in recognition of its outstanding achievements in construction quality and project progress. As a key player in Hong Kong's construction industry, Shui On always gives priority to and also prides itself on winning awards for its performance in safety, occupational health and environment campaigns every year.