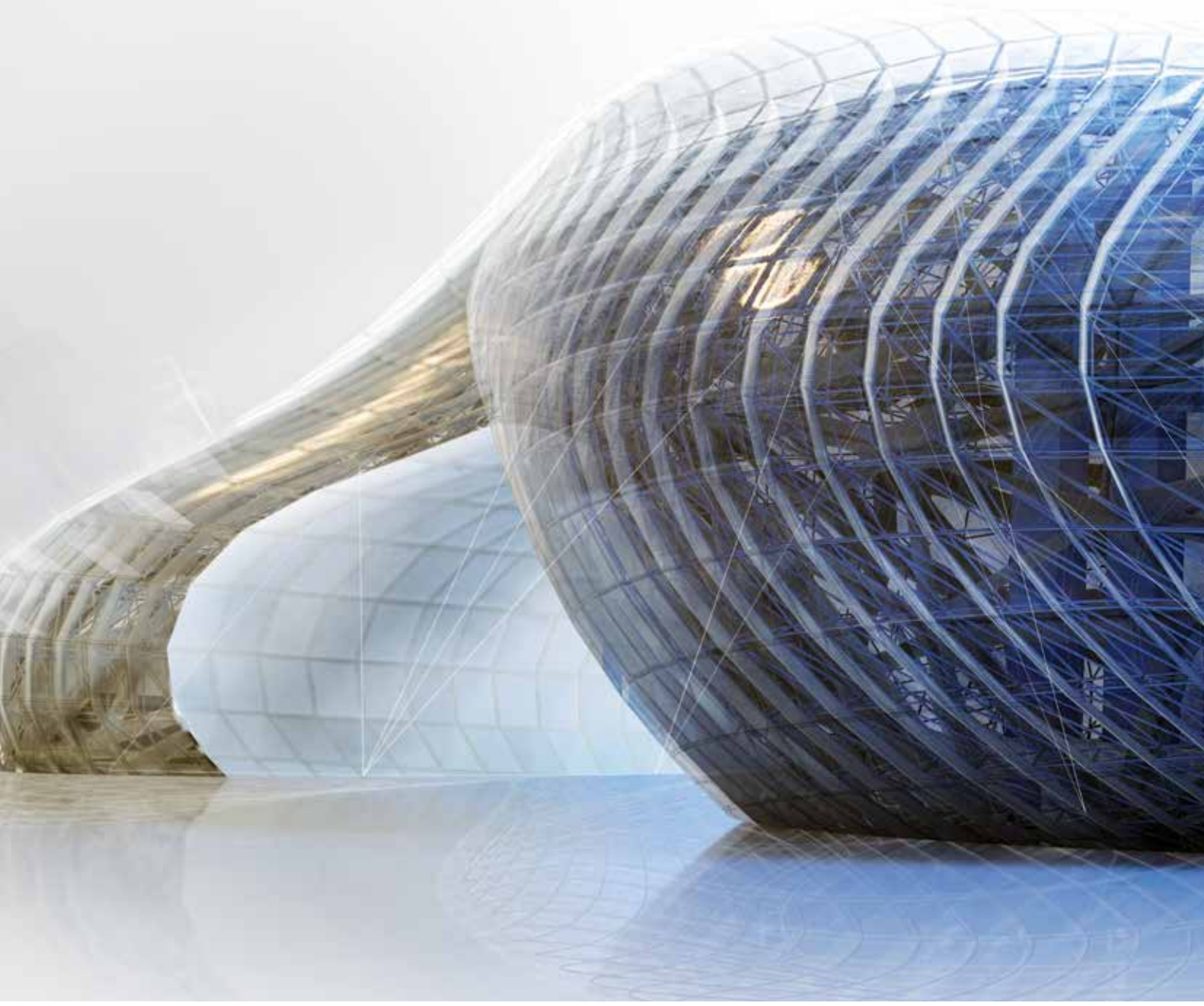
Autodesk Hong Kong BIM Awards 2017



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ACKNOWLEDGEMENT

Sincere thanks to the awarded organizations - CLP Power Hong Kong Limited, Drainage Services Department of HKSAR Government & Summit Technology (Hong Kong) Limited, Hong Kong Housing Authority of HKSAR Government, Sun Hung Kai Properties Limited, Urban Renewal Authority, Water Supplies Department of HKSAR Government and the honorable mention - Architectural Services Department of HKSAR Government, Chun Wo Construction & Engineering Company Limited, Civil Engineering and Development Department of HKSAR Government & AECOM Asia Company Limited, Sun Hung Kai Properties Limited, in providing such valuable information and pictures of their projects. Besides, we are extremely grateful for the contributions of the AIAB committee and members, Dr. Jack C.P. Cheng, Mr. Froky Y.H. Wong, Mr. Hanson Chan, Mr. David Fung, Mr. Michael Soong, Mr. Marcin Klocek, Mr. Ken Mao and Ir Dr George C.K. Wong who are profiled in this booklet.

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BIM's Role in the Future of Making Things

The future of making things is here, and is disrupting every industry, including architecture, engineering, and construction. With the right knowledge and tools, this disruption is your opportunity to power into a future in which successful businesses will approach the ideas and practices of design-make-use in a new, dynamic way.

The process of creation - whether of a loudspeaker, or a skyscraper - is no longer simple and linear, but now involves integrated cycles of input and feedback, made possible by today's technology trends – cloud computing, mobile technology, social connection, and collaboration. Businesses can benefit from profoundly different ways to design, make, and use things.

For the architecture, engineering and construction industries, the seeds of the current transformation were sown in the 1980s, when Autodesk's disruptive CAD technology moved 2D drawings to the computer. During the 2000s, 3D modeling brought simulation and analysis into the design process. BIM was developed, and soon began evolving to encompass far more than basic design.

Today, our cloud-based design ecosystem is leading a new era of agile development, with the computing power to support integrated processes and connect people and things. Design and construction businesses can boost performance, creativity, and profitability through BIM, which is helping to improve decision making and performance across the building and infrastructure lifecycle.

Hong Kong places is among the places spearheading the application of BIM, in projects including winners of this year's Autodesk BIM Awards. On behalf of the Autodesk APAC and Emerging Markets team, I would like to congratulate all this year's award winners, and thank the project teams for sharing their experience and insights, which will in turn inspire others who are eager to learn how BIM can help them deliver outstanding projects.

Patrick Williams
Senior Vice President, Asia Pacific
Autodesk

Building One Belt, One Road with BIM

As this year's BIM Awards show, BIM is becoming increasingly adopted in Hong Kong, with a wide range of successful applications. Its importance is set to rise further, in tandem with two other major trends that are transforming our world: the advent of manufacturing 4.0, and China's "One Belt, One Road" initiative.

Manufacturing 4.0 is shorthand for "Fourth Industrial Revolution", as technological innovation again transforms manufacturing industries, particularly through a combination of automation and data exchange. The architecture, engineering and construction (AEC) industries are being transformed in similar ways, notably through the advent of BIM.

BIM and other technologies are set to play important roles in the One Belt, One Road initiative, which is an ambitious plan to revitalise the ancient Silk Road - creating both land and sea routes to Europe and beyond. This will bring unprecedented opportunities for countries along the routes, and for AEC companies that can help create the extensive new infrastructure, new buildings and even new towns and cities envisaged in One Belt, One Road.

Autodesk aims to be at the forefront of such developments, and we have taken initiatives like introducing the first government BIM standard promotion international seminar in China, which was strongly supported by many domestic and foreign government departments. In Hong Kong, too, the potential of the "One Belt, One Road" initiative is widely recognised by the AEC industries, along with the possibilities for exporting expertise in BIM to design and build projects efficiently and swiftly.

In this booklet, you can read summaries of this year's Autodesk BIM award winning projects. I hope these success stories will help spur other companies and organisations to even greater achievements as they deploy BIM.

On behalf of the Autodesk Greater China team, I would like to congratulate all this year's awardees, and thank them for sharing their stories.

Richard Li
Managing Director, Greater China Region
Autodesk

BIM Helps Create a Smart Region

Smart City has become a hot topic in Hong Kong – spanning smart, green, sustainable technologies that can be applied across the city, helping with management, and helping make it a sustainable place to live.

Our neighbouring cities are likewise aiming for "smart" development, particularly after China's National Development and Reform Council called for the development of the Guanghong-Hong Kong-Macau Greater Bay Area - a region that's home to almost 70 million people. At Autodesk, we aim to help with this exciting development, by fostering further deployment of our market leading, cutting edge software, including our suite of BIM products.

These fast evolving BIM solution are helping companies throughout the region to create buildings with innovative designs, advanced functionality, and with unprecedented scope for management and maintenance throughout the building lifecycle. We will provide customers with new options with greater value, such as updates to core products, cloud services and more, along with improved support, and simplified administration.

Hong Kong is at the forefront of BIM use, with several pioneering projects serving as role models, and helping building not only a smart city, but a smart region.

In November last year, the global Autodesk AEC Excellence Awards were unveiled at Autodesk University 2016 in Las Vegas - and I am especially proud that there was a Hong Kong project among the winners: the Water Supplies Department earned an Honorable Mention with its "Improvement of water supply to Sheung Shui and Fanling" project under the "Small Projects" category.

The department is also among the six recipients of this year's Autodesk BIM Awards, which together demonstrate the multi-faceted benefits of BIM, and reflect its ever more widespread application in Hong Kong. We applaud all winning projects for their outstanding use of BIM. Congratulations!

Dr Wendy Lee
Country Sales Manager
Hong Kong and Macau
Autodesk

Autodesk Hong Kong BIM Awards 2017

Congratulations to the award winners, honorable mentions and outstanding students!

AWARD WINNERS

CLP 中電

渠務署 Drainage Services Department

雪峰 Summit

香港房屋委員會 Hong Kong Housing Authority

新鴻基地產 Sun Hung Kai Properties

市區重建局 URBAN RENEWAL AUTHORITY

水務署 Water Supplies Department

HONORABLE MENTIONS

建築署 Architectural Services Department

俊和發展集團 CHUN WO DEVELOPMENT HOLDINGS LIMITED (亞洲聯合基建控股有限公司集團成員) (Member of Asia Allied Infrastructure Holdings Limited)

CEDD AECOM

新鴻基地產 Sun Hung Kai Properties

OUTSTANDING STUDENTS

Deng Min, Gan Jielong, Tsang Wing Sum, Wong Long Yee - Mary, Yip Shing

The Hong Kong University of Science and Technology

AWARD WINNERS

ORGANIZATION

CLP Power Hong Kong Limited

PROJECT

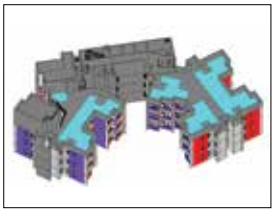
BIM Life Vitality • Power of Kai Tak Cable Tunnel

ORGANIZATION

Drainage Services Department, HKSAR Government
Summit Technology (Hong Kong) Limited

PROJECT

Advance Works for Shek Wu Hui Sewage Treatment Works - Further Expansion Phase 1A and Sewerage Works at Ping Che Road



ORGANIZATION

Hong Kong Housing Authority, HKSAR Government

PROJECT

1. BIM enabled Semi-automated Foundation Design (BIM-SAFD)
2. BIM enabled Residential Thermal Transfer Value Calculation (BIM-RTTV)

ORGANIZATION

Sun Hung Kai Properties Limited

PROJECT

Proposed Residential Development at Inland Lot No. 8963, Stubbs Road

ORGANIZATION

Urban Renewal Authority

PROJECT

Revitalization of Shophouses at 600-626 Shanghai Street, Mong Kok

ORGANIZATION

Water Supplies Department, HKSAR Government

PROJECT

Chlorine generation at Tai Po Water Treatment Works (TPWTW). The chlorine generation is part of the Works under the overall expansion of TPWTW from 400 Million Liters per Day (MLD) to 800 MLD

COMPANY
CLP Power Hong Kong Limited

PROJECT
BIM Life Vitality • Power of Kai Tak Cable Tunnel

LOCATION
Kai Tak

TYPE
Underground Cable Tunnel

SCHEDULED TIME OF COMPLETION
2017

Unique Cable Tunnel Design Helps Power Kai Tak

"Using BIM, we found the construction could be managed more easily compared with that of using traditional 2D site plans only - engineers could visualise the project in 3D model during the planning and design stage, making the design easier and better."

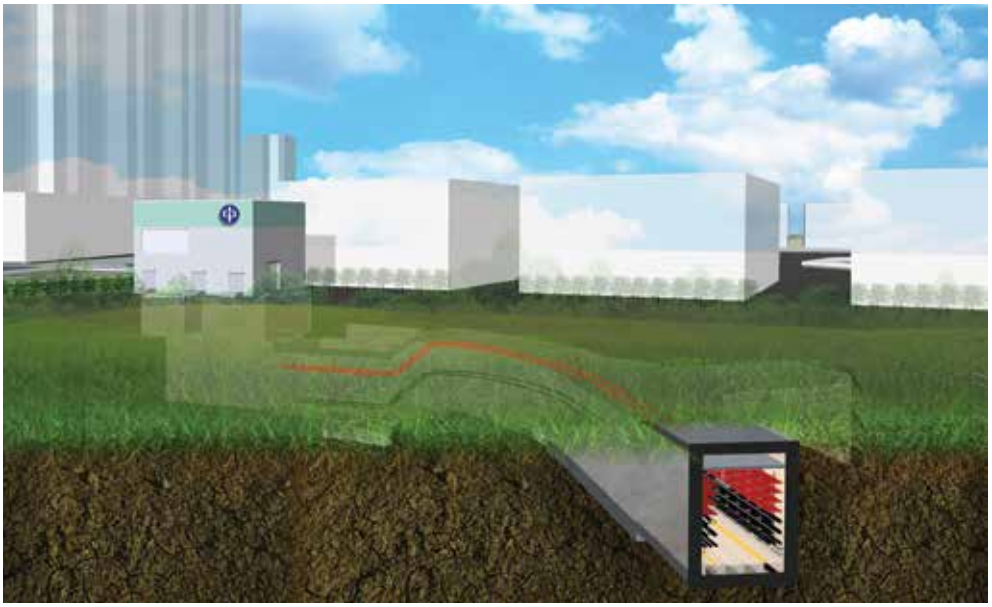
—Ir Anthony Ip
Senior Project Engineer,
CLP Power Hong Kong Limited

BIM PARTNERS
Atkins China Limited

Beria Consulants Limited

Hip Hing Construction Company Limited

isBIM Limited



Visualisation of Underground Kai Tak Cable Tunnel helps the stakeholders to understand the surrounding development and build environment
Image courtesy of CLP Power Hong Kong Limited

The Government of Hong Kong is set to redevelop the former airport area at Kai Tak, in eastern Kowloon, and CLP Power is preparing to supply electricity to the area, through building the Kai Tak Cable Tunnel which will connect to five new substations in the area. "In future, this cable tunnel will minimise the need for future road opening works during the power supply connection," says Ir Anthony Ip Wai-leung, Senior Project Engineer, CLP Power. "Plus, it's an innovative way of leaving a strip of land around a kilometre long for other community development."

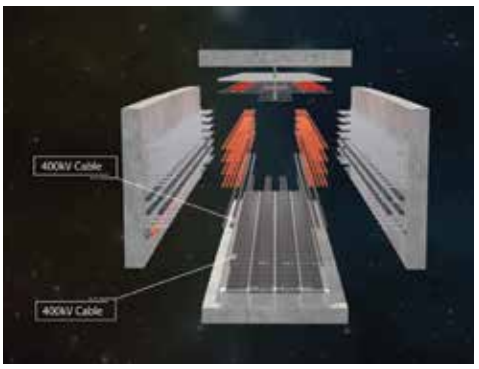
While the cable tunnel made the construction of other developments above ground easier, its route planning involved making many adjustments to ensure the tunnel would not affect other utilities or future road work. Furthermore, an innovative design was developed, to minimise impacts on the environment and the local community – with higher headroom, multiple cable racks on opposite walls, an underground cable chamber and a mobile working platform.

For previous tunnels, designs employed 2D drawings, which required experienced engineers to check for issues such as cable and building services clashing and air quality, with investigations and design revisions taking considerable time and efforts. This new tunnel would be even more complex, affecting multi-disciplinary project stakeholders in various project phases, with many challenges anticipated during collaboration between them. To help tackle the challenges, the project team decided to use BIM.

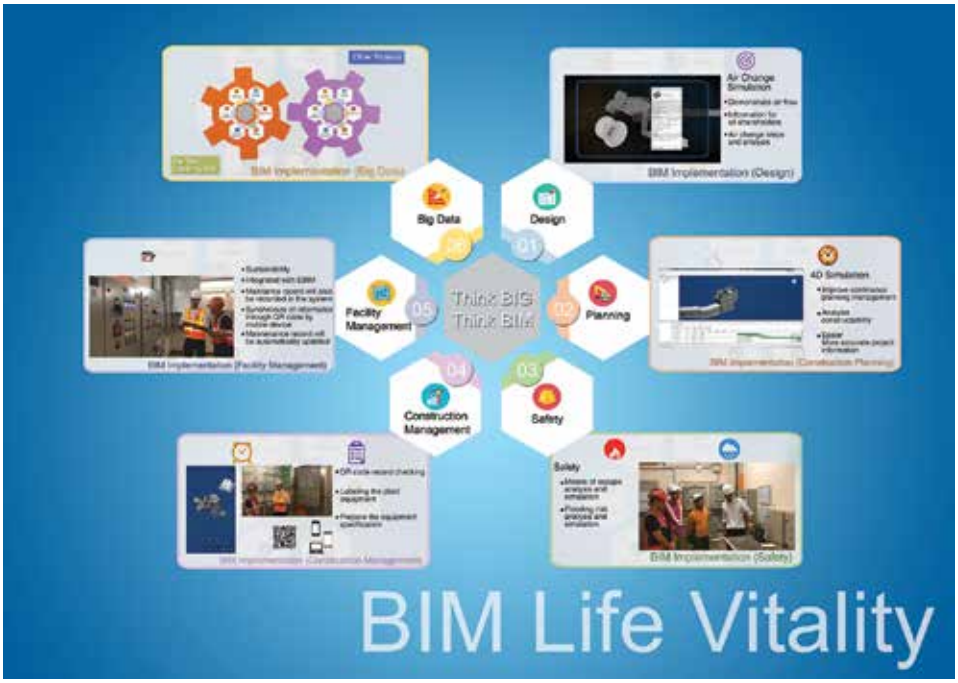
Route planning and ensuring safety

When planning the tunnel route, the project team checked old drawings, and created a relatively simple BIM model.

Then, with the route established, the team



BIM enhances the multidiscipline design collaboration. The tunnel configuration is optimized for installation of high voltage cables.
Image courtesy of CLP Power Hong Kong Limited



BIM Life Vitality for Delivery of CLP Kai Tak Cable Tunnel Project through *Design, Planning, Safety, Construction Management, Facility Management and Big Data aspects*
Image courtesy of CLP Power Hong Kong Limited

members began more detailed work, emphasising safety.

For example, they reviewed the ventilation of the tunnel, aiming to ensure provision of sufficient air supply for engineers and frontline workers during inspection and maintenance work. "We used BIM together with computational fluid dynamics (CFD) technique, and performed some reviews," says Ir Ip. "We found some areas in the tunnel were with poor ventilation originally in some localized corner areas, and therefore made further improvements to the design."

Visualising in 3D helps evaluate scenarios

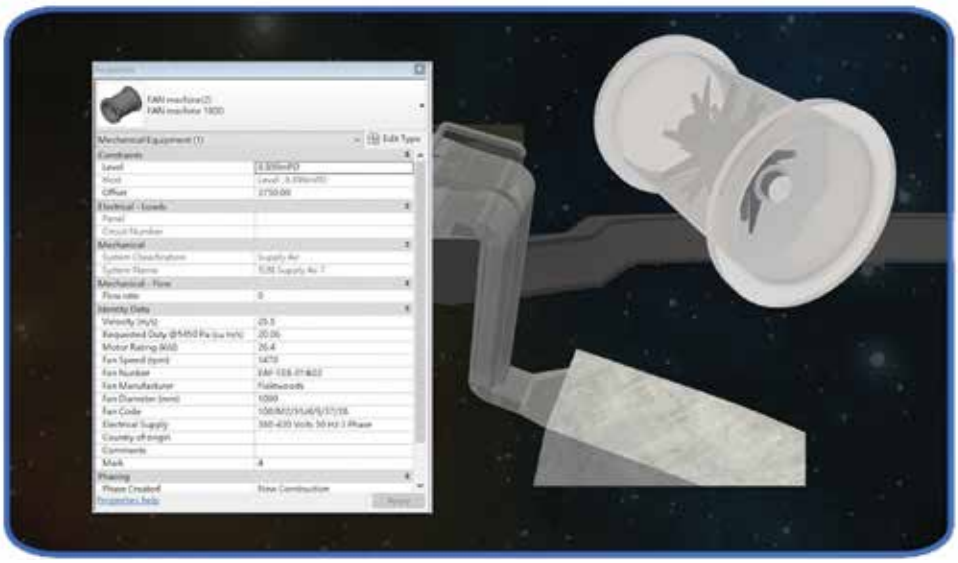
The cable tunnel will be seven metres high and five metres wide, and though relatively large there were still severe space constraints. These included the need for sufficient headroom during operational stages. "Using BIM, we found the construction could be managed more easily compared with that of using traditional 2D site plans only - engineers could visualise the project in 3D model during the planning and design stage, making the design easier and better," says Ir Ip. "We held regular design meetings between the BIM team and engineers, to review the design on screen together."

In addition, BIM was adopted to build virtual digital images for evaluating different scenarios, such as the lighting layout inside the tunnel. The team simulated the effects of different arrangement of lights inside the tunnel, ensuring sufficient illumination and no lights being blocked by cable racks.

The BIM model helped the project team to plan escape routes in the cable tunnel. "This showed the beauty of the BIM process," says Ir Ip. "We could visualise how long it would take from the furthest point in the tunnel to an exit, as well as the obstructions of the routes, so that we could plan ahead and inform the team about the escape routes for any unexpected events and emergencies.

The Kai Tai Cable Tunnel can accommodate up to 50 cable circuits including four 400kV, six 132kV and forty 11kV cable circuits, and the cables are heavy, each perhaps with the diameter

BIM Model provided an accurate sense of presence inside the tunnel that is yet to be built. Improvement to the design can be identified easily prior to the construction.
Image courtesy of CLP Power Hong Kong Limited



Accurate information of the building facility can be retrieved quickly in the BIM model for the facility management team.
Image courtesy of CLP Power Hong Kong Limited

as large as an arm. With the BIM virtual 3D models, the engineers and designers optimised the cable alignment, enhancing cost effectiveness and minimising spatial conflicts. “When turning a corner, we had to make sure there would be enough radius for the thick cables,” says Ir Ip. “As the cables are quite heavy, we also used BIM to help us install them in a safer way.”

Future and BIM - with Big Data

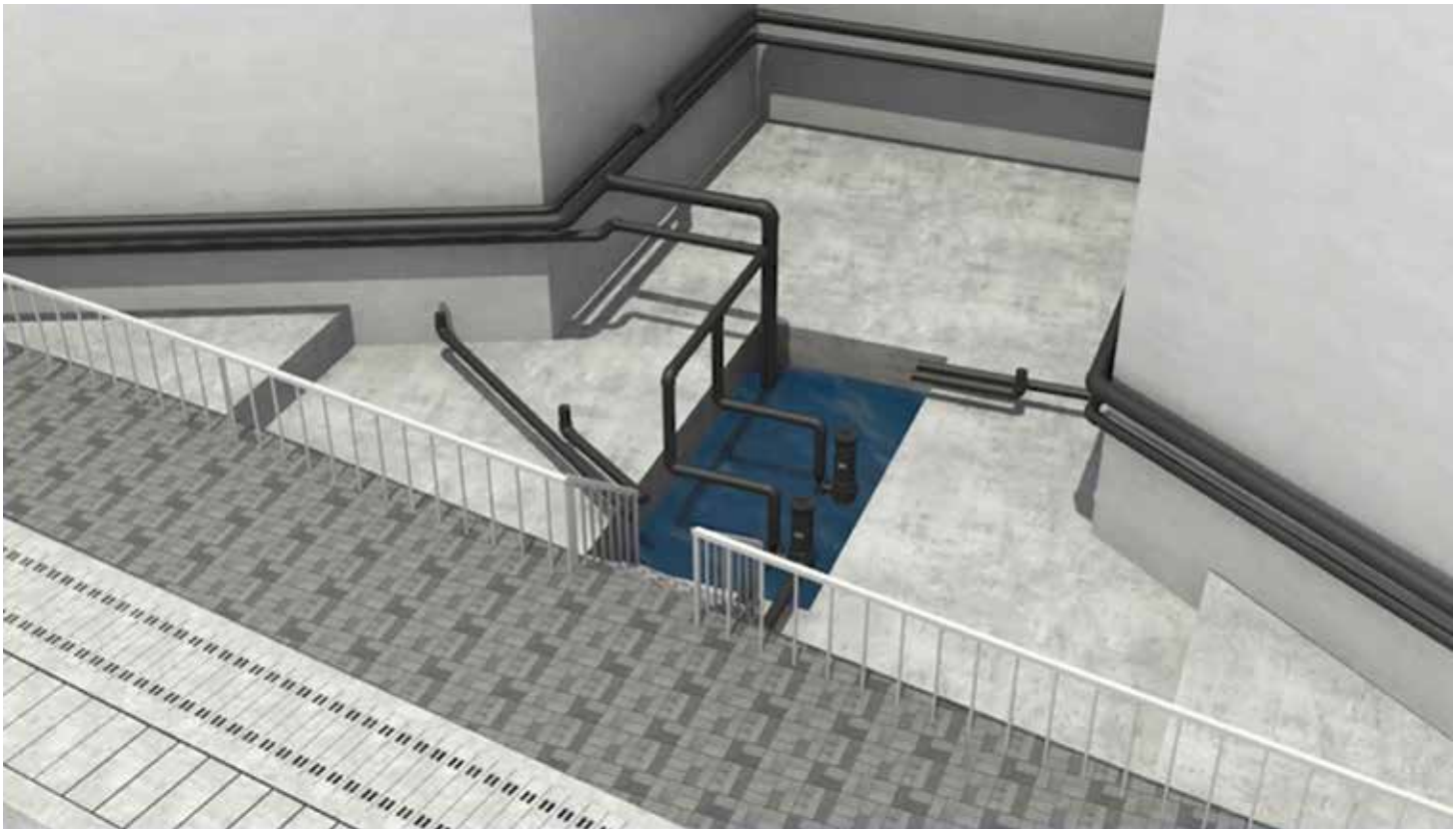
By employing the BIM model, the project team has optimized the tunnel design in cost, construction programme, quality and operational efficiency as well.

“Now, we are planning for using BIM for long term facility management – so our maintenance colleagues can open BIM files, tap the cursor, and see information on screen,” says Ir Ip. “For instance, for a ventilation fan, they can see the installation and inspection time, as well as the information on maintenance.” Moreover, QR code labels on the facility and equipment can make the information retrieval more convenient by using a smartphone.

“We are planning to apply BIM to facility management more widely at both our existing and new substations in the future,” says Ir Ip.

CLP Power also hopes to utilise Big Data for future continuous improvements on the design and management of power facilities, based on previous experience that BIM can have many applications, not only for civil construction, but also for electrical plant installation and overhead line towers.

“CLP Power has been serving Hong Kong for 116 years and supplies highly reliable electricity to over 80% of Hong Kong’s population. We plan to transform the information of our existing power facilities into BIM models so as to facilitate the operation and maintenance,” says Ir Ip. “Our senior management is supportive to the initiative.”



BIM model is an effective communication tool to convey design intentions to the project stakeholders. Arrangement of working platform and drainage sump is clearly shown.
Image courtesy of CLP Power Hong Kong Limited

About CLP Power Hong Kong Limited

CLP Power Hong Kong Limited ("CLP Power") is a Hong Kong utility subsidiary wholly owned by CLP Holdings Limited, a company listed on the Hong Kong Stock Exchange and one of the largest investor owned power businesses in Asia. CLP Power operates a vertically integrated electricity supply business in Hong Kong, and provides a highly reliable supply of electricity and excellent customer services to 6 million people in its supply area.

COMPANY
Drainage Services Department, HKSAR Government
Summit Technology (Hong Kong) Limited

PROJECT
Advance Works for Shek Wu Hui Sewage Treatment Works – Further Expansion Phase 1A and Sewerage Works at Ping Che Road

LOCATION
Shek Wu Hui, Hong Kong

TYPE
Sewage Treatment Works

SCHEDULED TIME OF COMPLETION
March 2018

"From the civil, and the electrical and mechanical teams, we had two sets of drawings and found many clashes – so we wondered: could BIM help?"

"The BIM model was efficient and accurate in identifying clashes. From hands-on experience, it was observed that for clash analysis carried out manually, usually only 30% of the clashes were spotted."

— Ir Michael Leung
Engineer, Hong Kong Drainage Services Department

BIM PARTNERS
The Jardine Engineering Corporation, Limited

Tsun Yip Waterworks Construction Company Limited

BIM Success in Construction of Sewage Treatment Works Project, with lasting benefits

General view of the sewage treatment works with new and existing facilities
Image courtesy of Drainage Services Department, HKSAR Government and Summit Technology (Hong Kong) Limited

The Shek Wu Hui Sewage Treatment Works, in northern Hong Kong, commenced operation in 1984, and is now nearing its design capacity, leading to plans for an on-site reprovisioning of the aging sewage treatment works. This would involve demolishing two of the ten final sedimentation tanks – which will be replaced by a new Membrane Facilities Building and Membrane Filtration Tanks – together with further upgrading works, including a new Chemical Storage Room and a modified Bioreactor to achieve higher effluent quality.

The upgrading project began in July 2015, the site is now ready for the new Membrane Facilities Building and Membrane Tanks, and the Drainage Services Department aims to have the upgraded system functioning during 2019. "It's challenging to keep the treatment works functioning while we implement the construction works, which requires flow diversions," says Michael Leung Ho-kwun, Engineer in the Sewerage Projects Division of Hong Kong's Drainage Services Department.

Refining Design in 3D and Developing DSD's BIM Practices

At the beginning of the contract, the team did not plan to utilize BIM, but as work began, and the challenges of fitting equipment within the buildings became apparent; they began exploring how to deploy BIM as a solution. "From the civil, and the electrical and mechanical teams, we had two sets of drawings and found many clashes – so we wondered: could BIM help?" says Ir Leung. Use of BIM was also encouraged by the Hong Kong Government, for helping with project design, construction planning and operation, and this was a perfect opportunity to continue developing BIM implementation in the Drainage Services Department.

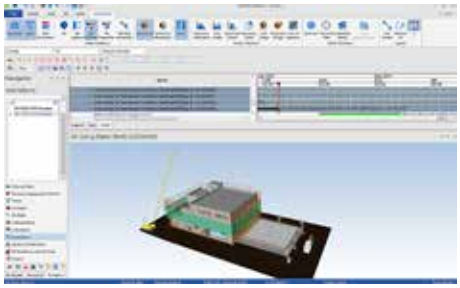
This would be one of DSD's first BIM implementations on sewage treatment works projects. Soon, the benefits were apparent, including working time reduction as the team switched from working with purely 2D drawings to being assisted by 3D BIM models.

"With 3D, the design is more obvious, while with 2D, you require some imagination," says Tom Lee, Senior BIM Engineer, Summit Technology (HK) Ltd. "BIM can

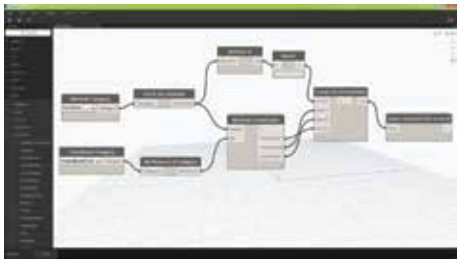
solve problems, such as with stairs, beams, building shapes - which may not be apparent in drawings, but become glaring with BIM. Also, you can walk through the model and come to a better understanding on how the project is supposed to function when completed."

While the initial meetings followed the traditional approach of using 2D drawings, latter coordination meetings expanded on the use of 3D walkthrough and proved far more fruitful by revealing issues such as the equipment access path not being wide enough. "We had our civil engineers, along with electrical and mechanical engineers, and both contractors, looking at models in which they could easily identify and resolve these issues, with the models redrawn in a short time to reflect the resolutions." says Ir Leung.

Design coordination is the basic of BIM application; this project was about doing more, about paving the road for future BIM implementation, and fittingly, the DSD staff asked and cooperated with the BIM team to explore further BIM applications, including 4D construction sequence, equipment maintenance procedures and commissioning procedures. Ir Leung has these words to say, "We held coordination meetings with future operators, so they could visualise the facilities – they were so pleased to do this."



4D method statement to demonstrate construction activities of the Membrane Facilities Building and Membrane Tanks
Image courtesy of Drainage Services Department, HKSAR Government and Summit Technology (Hong Kong) Limited



Screen capture of Dynamo for extracting relevant data from the BIM models
Image courtesy of Drainage Services Department, HKSAR Government and Summit Technology (Hong Kong) Limited

Internal view of the Membrane Facilities Building where the treated water exits from the membrane filters
Image courtesy of Drainage Services Department, HKSAR Government and Summit Technology (Hong Kong) Limited

Helping Staff Prepare for Operation & Maintenance and Commissioning

"We also used 4D BIM [with time as the fourth dimension], to look at installation and maintenance of equipment - ensuring there won't be any obstacles, so maintenance staff can work effectively in the future," says Mr Lee.

The team produced 4D simulations showing ways to lift and remove equipment from buildings for maintenance, along with details such as nails and screws; for critical parts, they even showed how to unscrew an item, where to lift it and lower it, along with other aspects of operations such as how a railing or beam is supposed to be removed. Simulations focusing on maintenance revealed "soft clashes", where elements do not clash when stationary, but would clash when moved during regular operation and maintenance.

Ir Leung said that the adoption of BIM technology greatly reduced the working time and enhanced the effectiveness for identification of clashes, the BIM models were efficient and accurate in identifying clashes. From hands-on experience, it was observed that for clash analysis carried out manually, usually only 30% of the clashes were spotted, he commented, and with more clashes identified and resolved at an early stage, it means that there would be less defects and less remedial work, hence resulting in substantial time and cost savings.

With the BIM models performing well, the team opted to simulate the commissioning procedures well ahead of schedule. The commissioning procedures are challenging in that any slight error can hamper the plant's capacity and impair sewerage treatment services for the Sheung Shui and Fanling residents. Additionally, the reprovisioning works include one of the first implementation of membrane technology in sewerage treatment in Hong Kong, which further adds to the complexity of the commissioning procedures. This is the part when BIM comes for the rescue. Although the project is still in progress, the BIM models already contained majority of the completed and future works, so engineer from DSD suggested simulating the commissioning procedures. The produced animation can help shorten a process that would otherwise require weeks to prepare for, as well as serving as basis for future public relations and educational purposes.

Training, and much to explore in BIM

Based on its successful application in the project so far, the team believes BIM has been proven as viable for large scale design-build infrastructure project in Hong Kong. The project has given rise to new ideas on BIM application, including knowledge transfer.

From the outset, the project involved on-job training for Drainage Services Department staff, initially using a simple BIM model with no mechanical systems, which evolved to a complete BIM model with asset data by joint effort from the DSD staff and the BIM consultant. The team progressed to different kinds of

Existing Bioreactor No.1 renovated to accommodate the new membrane treatment process
Image courtesy of Drainage Services Department, HKSAR Government and Summit Technology (Hong Kong) Limited

training for staff at different levels. "For top level management, we especially focused on how to access and criticize BIM models," says Mr Lee. "While we are training technical staff on how to operate and maintain BIM models - the ultimate goal is for them to be able to handle the project model afterwards." Essentially, the trainings were designed to transfer skills and techniques applied during this project to the DSD staff.

The plant will be upgraded day by day, so it will be important for the technical staff to know how to revise the model, and to use it with a new asset management system. The team has applied Dynamo, a visual programming tool for Revit; the visual programming script could be easily written to integrate the information of BIM and equipment for future usage in asset and facility management.

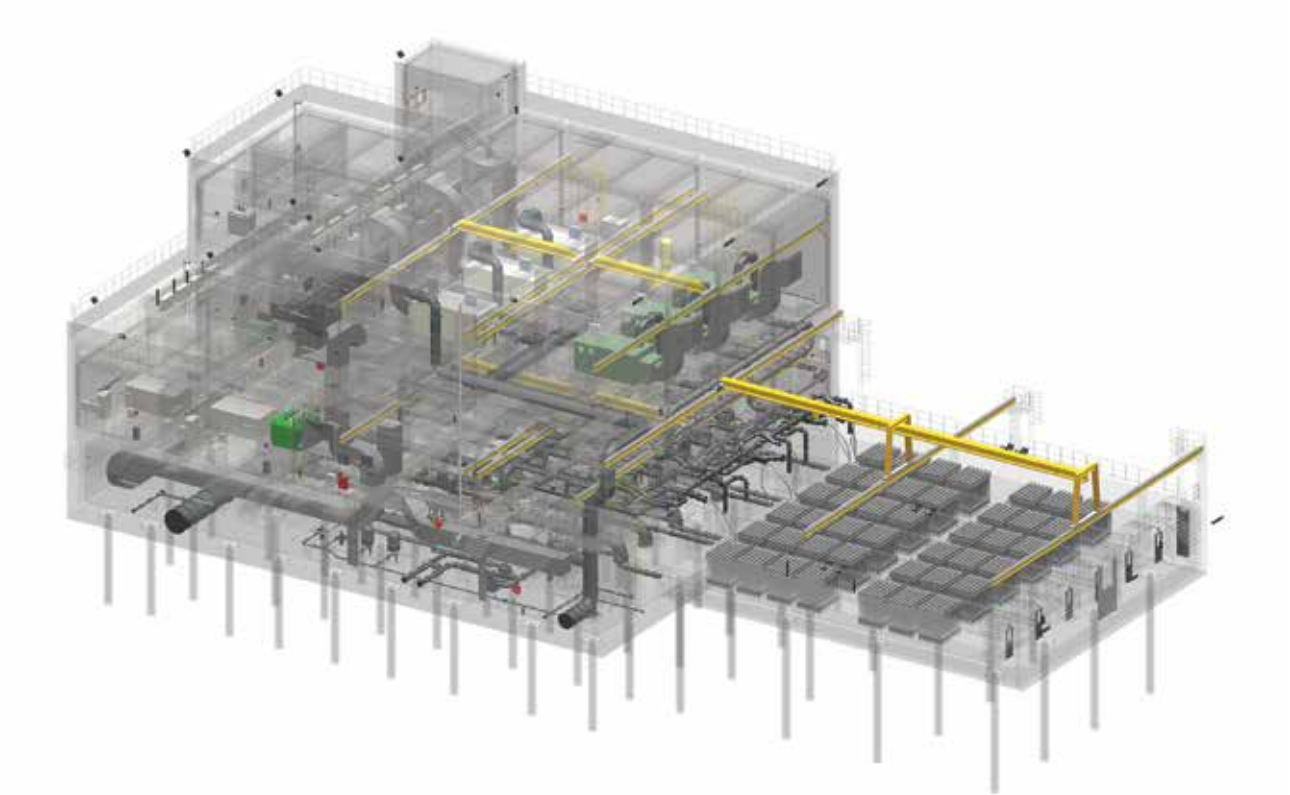
The department has found there are many other areas to explore regarding BIM in the future. "One is to establish a delivery standard, and common practice, for building and upgrading more sewerage and drainage facilities," says Ir Leung. "Also, we want to incentivise and promote wider use of BIM in construction and preliminary planning. With asset management, we have many things in the library, and want to integrate that with BIM, so in the future, staff can click in the model and locate relevant information – such as by using virtual reality on a tablet."

While this advance works project may be coming to a close in the near future, DSD is stimulated by the success of BIM in this project and will persist with its expansion in BIM applications, including refining its BIM standards and encouraging wider BIM literacy in the department. Above all else, BIM aligns with the department's commitment of achieving greater success in drainage and sewerage works, and DSD will continue to work internally and externally with the industry to develop BIM applications for drainage and sewerage works.

Internal view of the Membrane Facilities Building with Air Scouring Blower and Aeration Blower for backwash
Image courtesy of Drainage Services Department, HKSAR Government and Summit Technology (Hong Kong) Limited

渠務署
Drainage Services Department

雲峰 Summit



Transparent view of the Membrane Facilities Building and Membrane Tanks showcasing the latest sewage treatment process in Hong Kong
Image courtesy of Drainage Services Department, HKSAR Government and Summit Technology (Hong Kong) Limited

About Drainage Services Department, HKSAR Government

The Drainage Services Department (DSD) is a department of the Government of the Hong Kong Special Administrative Region and is responsible for drainage and sewerage. DSD was established in September 1989 with a clear vision: to provide world-class wastewater and stormwater drainage services, enabling the sustainable development of Hong Kong. DSD has made good progress in both sewage treatment and flood prevention in five major areas: first, to design and construct green architectural features of the sewage treatment plant, sewage pumping stations, drainage & flood control facilities; second, to operate and maintain sewage-related equipment, use renewable energy, and energy-efficient equipment; third, to clean channels, remove plants impeding the flow of the river and clean up the sludge; fourth, to implement strategic replacement and rehabilitation plans of underground drains, sewers, rising mains, manholes and the like widely spread over the whole territory; and fifth, to implement strategic plans to relocate sewage treatment plants into caverns.

About Summit Technology (Hong Kong) Limited

Summit Technology (Hong Kong) Limited is a Hong Kong-based private limited company dedicated to actively working with the local architectural, engineering and construction industry in providing BIM product and project solution, while also having an internal R&D team to continue supporting the enhancement of the building lifecycle process using BIM as the centric platform. Summit has been aware of BIM's untapped potential as early as 2003. The set philosophy of Summit has always been our commitment on offering BIM Total Solution to our clients from Planning, Design, Construction to Facility Management. Summit strongly believes that BIM will be the next generation of design and management tool in building and construction projects and will enhance the traditional 2D way of information communication. Through BIM, Summit aims to help the local industry achieve better design coordination, more accessible documentations, more comprehensive understanding of projects, smoother transition between project stages, and many more.

Above all else, Summit advocates for a shift to the traditional working culture and embraces BIM culture, which requires changes to the stakeholders, the technology and work process. Summit will continue to work with the public and private sector and promotes this new cultural development.

COMPANY
Hong Kong Housing Authority, HKSAR Government

PROJECT
1. BIM enabled Semi-automated Foundation Design (BIM-SAFD)
2. BIM enabled Residential Thermal Transfer Value Calculation (BIM-RTTV)

LOCATION
Hong Kong

TYPE
Public Housing Development

Housing Authority's Odyssey in Capitalizing BIM - Scaling a New Height in Integrating Designs with Revit Models

"BIM changes the whole industry practice by pooling professional knowledge throughout the project life cycle, from project planning to construction and utility management."

"Paint" External Façade and Roof
Image courtesy of Hong Kong Housing Authority, HKSAR Government

BIM Development of the Company

HA develops and implements a public housing programme which spans all development stages from planning to design, construction, facility operation and maintenance. Among the prevailing IT systems that are currently used in the construction industry, BIM is the most versatile tool that enhances the efficiency of information exchange, and in particular connects the intelligence of different disciplines to the project.

BIM was first introduced to the HA in 2006 and has since been used in some projects on a trial basis to enhance design quality, site safety and improve construction coordination. In 2007, HA established a BIM Project Steering Committee and a BIM Working Group to strategically plan the implementation of BIM, and formed the BIM Service Team as central support to the implementation of BIM in HA projects.

BIM changes the whole industry practice by pooling professional knowledge throughout the project life cycle, from project planning to construction and utility management. The two innovations this year underscore the significance of HA's odyssey in BIM. With advances in BIM technologies, there will be stronger participation by various building stakeholders in using BIM in Hong Kong, while the HA will continue to play an active role in advocating the use of BIM.

The Award-winning BIM Project

(1) BIM-enabled Semi-automated Foundation Design (BIM-SAFD)

In conventional foundation design, Structural Engineers use various discrete software tools to perform structural analysis and design. Even though there is a proliferation of design tools, there has never been a platform available for data interoperability through which different software tools effectively work together for instant information exchange.

HA therefore developed more responsive solutions, with one-stop integrated foundation design with **BIM**, to provide designers with a platform for data interoperability; and devised a set of Standard Approach to Modeling and measurement method to create a **BIM**-based method for estimation that is compatible with the standard and practices of measurement in the industry. **SAFD** was devised using Surfer, with integration of **BIM** to bring about a revolution in the way

foundations are designed, drawings are produced and quantities are measured – to achieve design and drawing production optimisation and, most importantly, enhance design accuracy and efficiency.

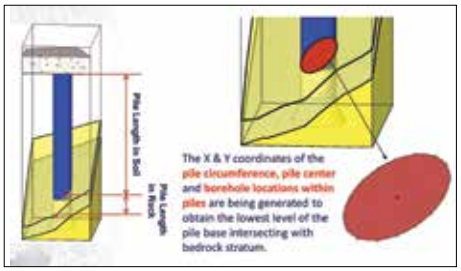


FIGURE 1 - Automatic Determination of Rockhead Level using "Grid Residual" Function of Surfer
Image courtesy of Hong Kong Housing Authority, HKSAR Government

SAFD comprises Surfer - a 3D visualisation, contour modeling software; and an Add-on Programme of MS Excel workbook for correlating the design output from Surfer. It enables the determination of rockhead level of each pile and automatically identifies the coordinates/levels of the intersection of the piles with the rockhead (Figure 1). **SAFD** provides a platform through which the results output from analytical software can be shared and interact with **BIM** to enable engineers to make prompt, systematic and precise decisions.

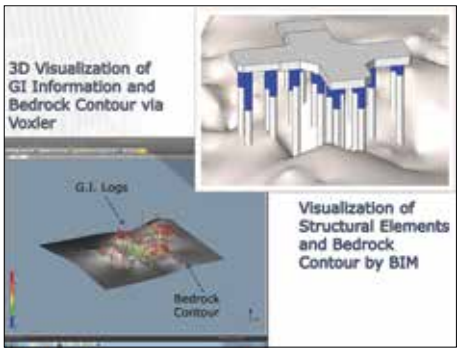


FIGURE 2 - BIM Revit Model Containing Foundation Elements, GI Logs and Bedrock Contour ready for 2D Drop-off
Image courtesy of Hong Kong Housing Authority, HKSAR Government

Upon completion of the foundation design, GI logs and contour information will be exported through Voxler to the Revit model for 2D Drop-off (Figure 2). As a result, the 2D drop-off with combination of structural elements, rockhead contours and GI data will be merged into a single 3D model, which will then be used for foundation plan submission (Figure 3).

FIGURE 3 - Workflow of BIM-SAFD for BIM Submission
Image courtesy of Hong Kong Housing Authority, HKSAR Government

Through **BIM-SAFD** upon completion of the foundation design, the Revit model will be passed to Quantity Surveyors for cost planning and estimation for tendering preparation. With **BIM-SAFD** based QTO, the information in the Revit model can also be shared and exchanged across disciplines. Any changes in geological information or block disposition can be automatically assessed and extracted for verification, whereby updated cost variation can be easily quantified (Figure 4).

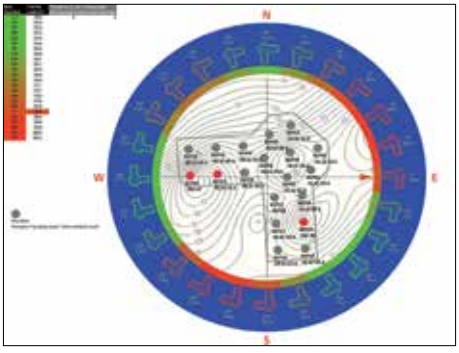


FIGURE 4 - Different Block Disposition for Achieving Optimum Pile Layout
Image courtesy of Hong Kong Housing Authority, HKSAR Government

Integrating **SAFD** and **BIM** brought about a breakthrough in design solution, in terms of data interoperability. It effectively streamlines the workflow from manual computations by individual disciplines, through design automation to multi-disciplinary collaboration via fully interchangeable information database. The introduction of **BIM**, a 3D interface, allows visualisation of the spatial arrangement of pilings, drillholes and rockhead surface, and enables the designers to proceed with the foundation design more efficiently. Also, the design workflow becomes more traceable and minimises the risk of human errors, while ensuring the finalised **BIM** model containing the required quality and quantity of information is sufficient for quantity measurement.

(2) BIM-enabled Residential Thermal Transfer Value Calculation (BIM-RTTV)

To maximise the potential of land to fulfill the strong demand for flats, calculation of **RTTV** is necessary for concession of GFA. To use the formulae in the guidelines on "Design and Construction Requirements for Energy Efficiency of Residential Buildings", the extraction of relevant building parameters is necessary. For conventional CAD designs which rely on 2D drawings, the process is laborious and manual, with a high margin for error.

HA sees opportunities in integrating **BIM** in the calculation of **RTTV**. It can save manpower and also achieve better accuracy. We had an innovative venture in retrieving building parameters and the required shading coefficient factors to facilitate the **RTTV** calculation from **BIM** models, saving manual effort which is prone to errors.

There was, however, no direct application in Revit to retrieve the orientation and area of façade at each orientation from **BIM** model. Therefore, we innovatively integrated the built-in function of Revit, a free plug-in to identify orientations and a QTO plug-in, a plug-in commonly used in taking quantity from Revit models, to retrieve the required data.

Multiple architectural and structural models are combined into a single model (Figure 5) to enable all external facades and internal walls to be identified without error.

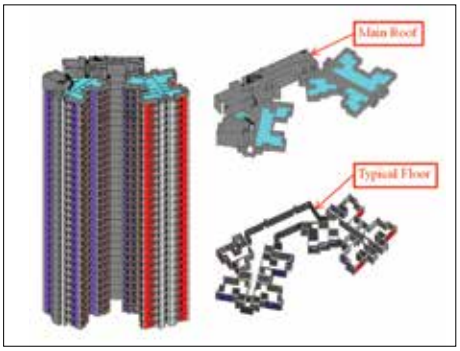


FIGURE 5 – Combined Model
Image courtesy of Hong Kong Housing Authority, HKSAR Government

HA successfully tested a free plug-in, “Case”, which can be used to automatically identify the external wall orientation. The eight directions (N, E, W, S, NE, NW, SE & SW) are indicated as the properties of the wall. The orientation of a window can therefore be identified with reference to the orientation of the wall to which it is attached. The orientation is assigned as a “material” property. Nine different “materials” are assigned to represent the eight directions of the external wall and roof. (Figure 6)

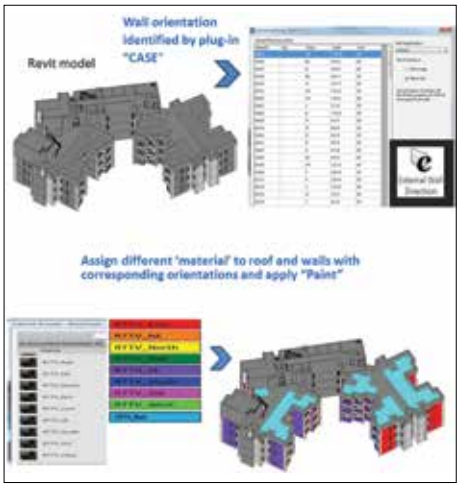


FIGURE 6 –“Paint” External Façade and Roof
Image courtesy of Hong Kong Housing Authority, HKSAR Government

Through applying REVIT “Paint” function to external wall and roof, according to the “material” assigned for each direction and roof, which is originally used for assigning materials to different building components, areas of external façade can be obtained. The Overhang Projection Factor (OPF) and Side Projection Factor (SPF) can also be calculated by using the information contained in the window property (Figure 7).

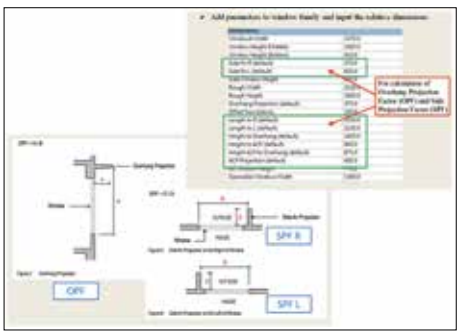


FIGURE 7 – Data in Window Properties
Image courtesy of Hong Kong Housing Authority, HKSAR Government

By using the “Auto-coding” function of the QTO plug-in “EqBQ” (Figure 8) to assign a code for each painted element, the sum of areas of facades of different orientations can be automatically retrieved and exported for further operations. The data retrieved, including the required external shading coefficients, can be used to perform detailed calculations.

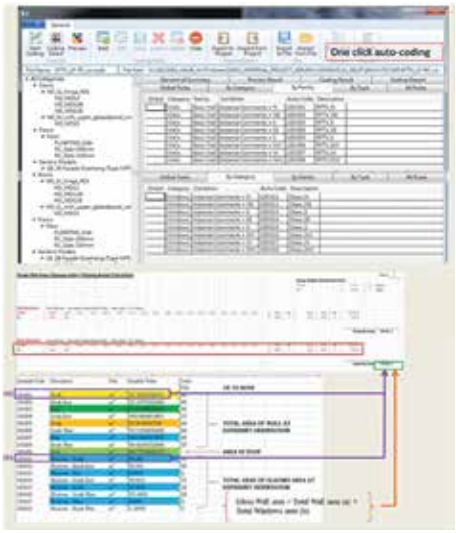


FIGURE 8 – Extracted Data can be used in RTTV Calculation Sheets
Image courtesy of Hong Kong Housing Authority, HKSAR Government

A successful trial of retrieving building parameters from **BIM** model to facilitate **RTTV** calculation resulted in the following benefits -

(i) Speed, traceability and accuracy of **RTTV** calculation can be enhanced;
(ii) Manpower needed to perform the calculation can be reduced;
(iii) Building envelope can achieve better energy efficiency and human comfort through design optimisation.

香港房屋委員會
Hong Kong Housing Authority

Image courtesy of Hong Kong Housing Authority, HKSAR Government

About Hong Kong Housing Authority, HKSAR Government

Hong Kong Housing Authority (HA) is a statutory body established to provide subsidized public rental housing to low-income families, and to help low to middle-income families gain access to subsidised home ownership. Approximately 30% of the Hong Kong population is now living in public rental housing units. The Housing Department is the executive arm of the HA to help the Government achieve its policy objective on public housing.

BIM Smooths the Way on Tough Terrain

COMPANY
Sun Hung Kai Properties Limited

PROJECT
Proposed Residential Development at Inland Lot No. 8963, Stubbs Road

LOCATION
Stubbs Road, Hong Kong

TYPE
Residential Development

SCHEDULED TIME OF COMPLETION
2019

"The BIM model helped a lot with assessing headroom and check for clashes. If we can spot issues before construction, it will improve safety, there will be less abortive work, and we can ensure adequate headroom for future buyers."

—**Charles C. L. Lam**
Project Manager, Sun Hung Kai Properties

BIM PARTNERS
Sun Hung Kai Architects and Engineers Limited

Ronald Lu & Partners (Hong Kong) Limited

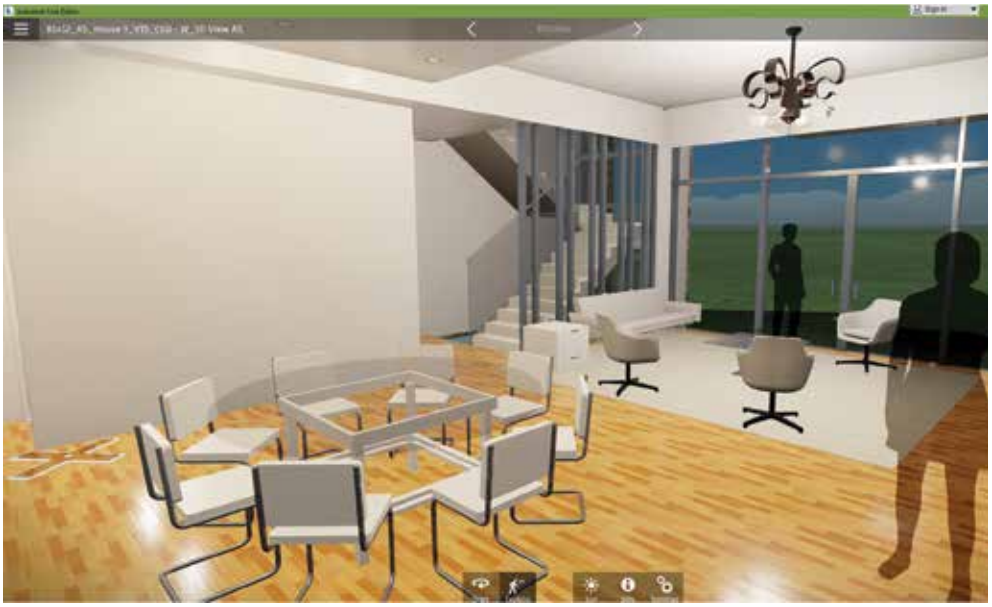
Ove Arup & Partners Hong Kong Limited

J. Roger Preston Limited

CHHADA SIEMBIEDA & Associates Limited

Sanfield Building Contractors Limited

Forida Limited



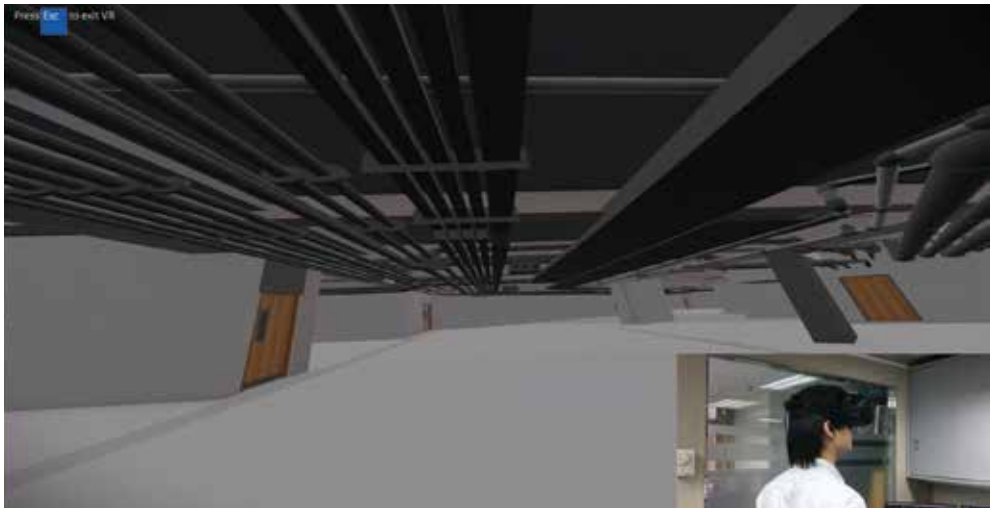
Visualization using VR experience
Image courtesy of Sun Hung Kai Properties Limited

Sun Hung Kai Properties finds BIM model helps overcome challenges of building luxury housing on challenging hillside site

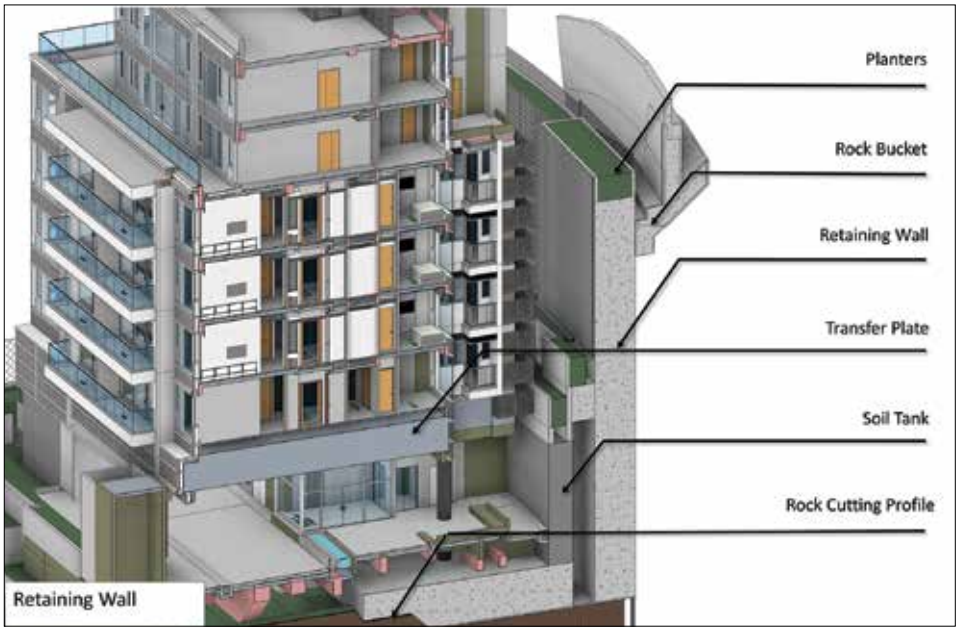
Sun Hung Kai Properties is creating a residential development project that includes five seven-storey residential and nineteen three-storey individual houses, along with two basement car parks and a private clubhouse with swimming pool. This may seem straightforward on flat land, but the project site is a steep Hong Kong hillside.

"It's very difficult terrain," says Ir C. K. Hui, Senior Construction Manager, Sun Hung Kai Properties. "This is a hilly site, with the back of the site about 40 metres higher than the entrance. We need a road to meander up, and are cutting away the slope to build. After completely cutting away the rock, in several steps, we'll have a retaining wall that's about 20 metres high."

The challenging site was one key reason for using BIM. Also, the design process was set to be fast tracked, with a need to allow



Visualization using VR experience
Image courtesy of Sun Hung Kai Properties Limited



3D Section View of Retaining Wall along Hillside
Image courtesy of Sun Hung Kai Properties Limited

other parties such as Structure, Building Services, Interior Design, and Landscape to efficiently keep up-to-date with the design.

Planning and explaining site formation

The BIM consultant, Forida Limited, prepared a BIM Execution Plan spanning identification of BIM work scopes; setting up the BIM roles of different parties; identification of BIM tasks at different stages: setting up BIM Milestones in accordance with main project activities; and proposed workflows for BIM and information exchanges.

"We started with a preliminary design study, with a BIM model that helped us optimise how to cut the slope more efficiently," says Lam Chi Kai, BIM Manager, Sun Hung Kai Properties. "The model helped us to understand the site formation process. Engineers gave us information, and we could appreciate why the retaining wall was in the place they advised."

There was a time element in the model, with a sequence for where to cut, and at which levels. When presented to senior management, this helped explain why site formation would take a relatively long time, along with details of which areas would be cut, which would be level – making the approval process easier.

Tracking and resolving issues on site

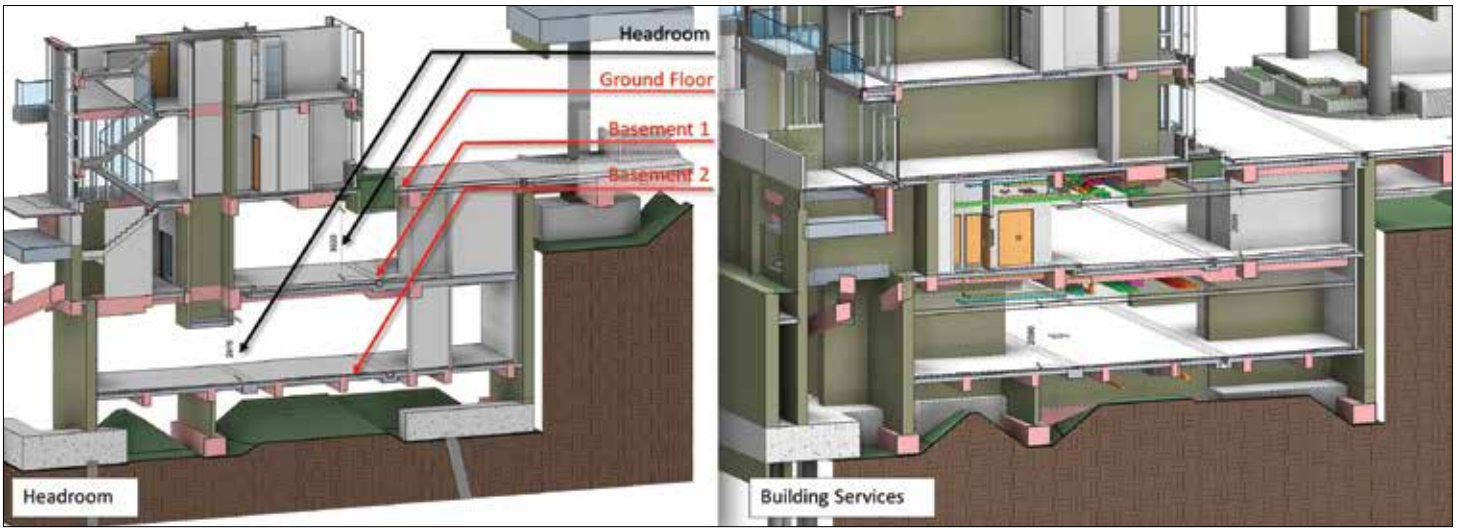
"Half the buildings would be sunk into the ground, and the site has multiple levels, making it challenging to plan the electrical and mechanical aspects," says Charles C. L. Lam, Project Manager, Sun Hung Kai Properties. "The BIM model helped a lot with assessing headroom and check for clashes. If we can spot issues before construction, it will improve safety, there will be less abortive work, and we can ensure adequate headroom for future buyers."

During the design stage, architects made changes through viewing the model, which was especially useful for aspects that are very difficult to see on 2D drawings, such as levels, and ramps. Consultants and engineers assessing the model found over 500 issues before construction began. They were also helped by a BIM team working on site, who generated combined services drawings for drainage, and combined builders' work drawings.

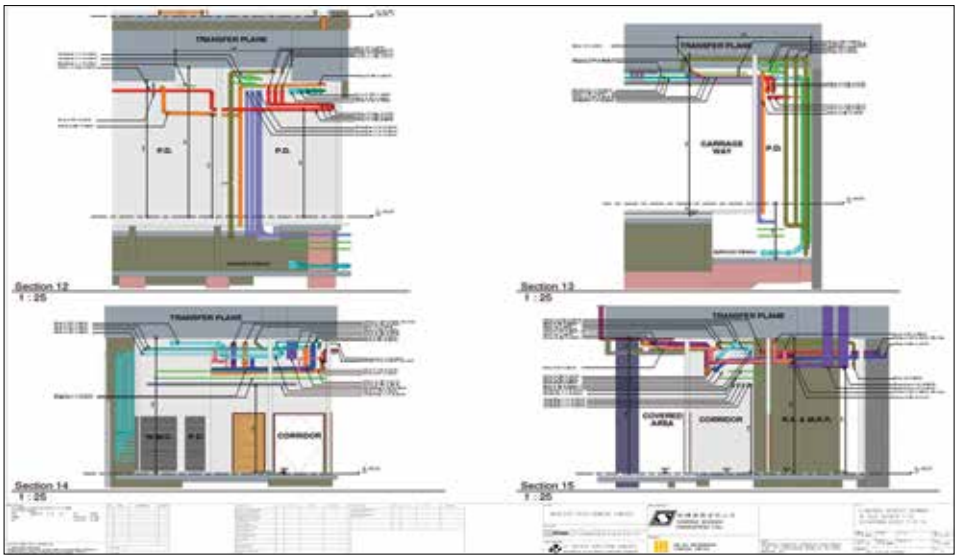
"We had issue management within Revit software – tracking and resolving issues on site, or requesting more information," says Kenneth S. K. Lau, of Forida. "The team could visualise changes, and give feedback."

The BIM model was also used for showing how the luxury apartment interiors might look with different materials. This helped narrow down the choices for materials, which would be finally assessed in a walk in, mock up apartment room based on the BIM model.

The BIM model has also been used to simulate the real views of CCTV, to ensure



Headroom and Building Services Spaces Coordination and Clash Detection in Model
Image courtesy of Sun Hung Kai Properties Limited



Combined Building Services Drawing Production directly from Model
Image courtesy of Sun Hung Kai Properties Limited

that all CCTV cameras are optimally located, minimising possible blind spots.

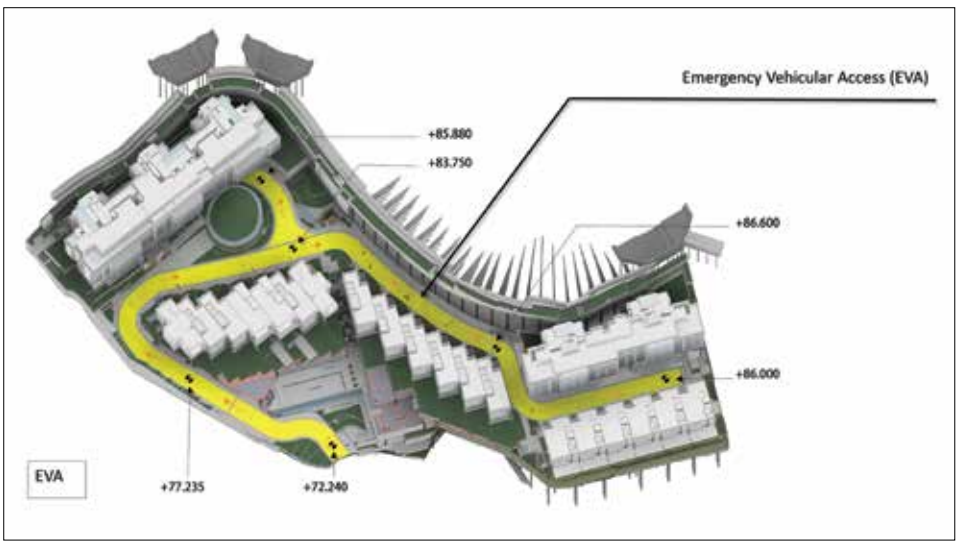
Benefits beyond anticipation

Looking at the benefits of BIM for this project, Mr Lam considers the improvement in safety is most precious.

Sun Hung Kai Properties has been utilising BIM since 2011, and while it is integrated in several projects, from planning to construction and handover, 2D design remains important, partly as the industry has not fully switched to BIM.

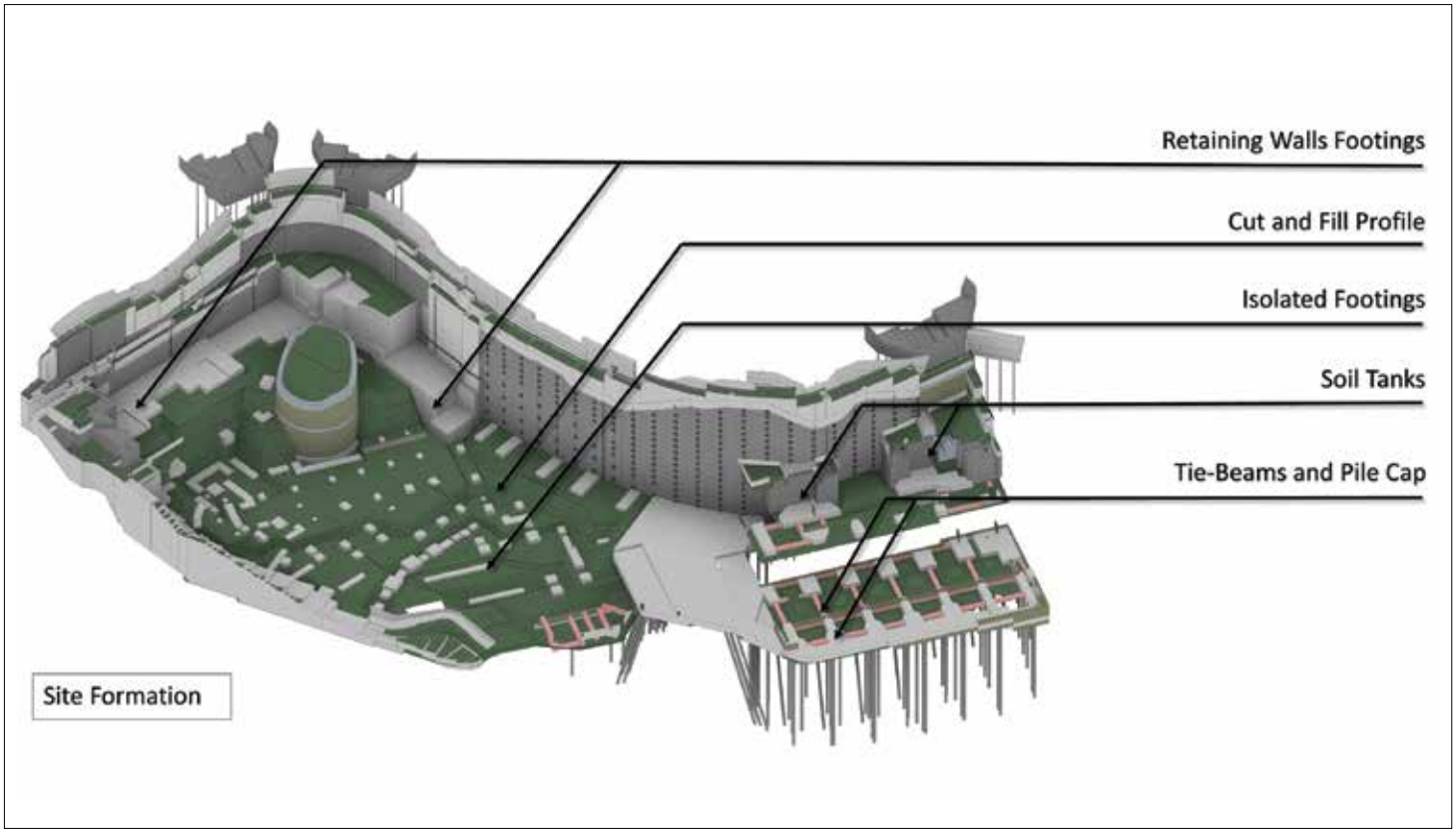
"In the past five or six years, we have been transitioning from 2D based to more focus on 3D – the role of BIM is growing," says Mr Lam. "More consultants and contractors are thinking in terms of 3D. BIM helps coordination, we can cut sections through models, check headroom and clashes."

While BIM seems favoured for projects with unusual aspects like the hillside site, or complex designs, Mr Lam remarks, "There are no easy projects. For more conventional projects, BIM can show a completed building before construction commences. The benefit is far more than we first anticipated."



EVA Design with BIM Assistance
Image courtesy of Sun Hung Kai Properties Limited

新鴻基地產
Sun Hung Kai Properties



Foundation Elements Coordination with BIM
Image courtesy of Sun Hung Kai Properties Limited

About Sun Hung Kai Properties Limited

Sun Hung Kai Properties Limited ("SHKP") was publicly listed in 1972 and is now one of the largest property companies in Hong Kong. It specializes in developing premium-quality residential projects, offices and shopping centres. The Group employs more than 37,000 people.

Sun Hung Kai Properties puts its long-standing belief in 'Building Homes with Heart' into practice, on the one hand by developing residences of the finest quality and offering first-class service to its customers, and also by contributing to the good of the community to make Hong Kong a better home for everyone.

The Group understands that buying a home is one of the biggest decisions people make in their lives, and so it spares no effort to deliver the very best. Vertical integration from planning, material sourcing and construction through to project monitoring and property management ensures high standards in every aspect of a development.

The Group's seasoned management team follows prudent strategies for long-term business development and the company's philosophy includes a strong sense of corporate social responsibility, both to its customers and to the public. The Group works for the benefit of the community with wide-ranging initiatives to protect the environment, care for the less fortunate and foster educational development.

Sun Hung Kai Properties – We're 'Building Homes with Heart'.

COMPANY
Urban Renewal Authority

PROJECT
Revitalization of Shophouses at 600-626 Shanghai Street, Mong Kok

LOCATION
Mong Kok, Hong Kong

TYPE
Revitalization and Preservation

SCHEDULED TIME OF COMPLETION
2018/2019

REVITalisation of Shophouses at Shanghai Street

"BIM is a tool to assist URA to enhance our design coordination and avoid crashes in construction, and hence improve the quality of our buildings. To work with the GIS, it facilitates our studies on townscape, environmental performance and assessment for our re-planning of urban areas. Whereas, the as-built models could also improve the operational efficiency of our facilities management for all buildings."

—**Anderson Leung**
General Manager,
Urban Renewal Authority

BIM PARTNERS
Chau Lam Architects & Associates Architects & Engineers (Hong Kong) Limited
Ben Tse & Associates Limited
Far East Consulting Engineers Limited
China Point Consultants Limited
Beria Consultants Limited
Team 73 HK Limited
Vircon Limited
Wan Chung Construction Company Limited

Enabling a more efficient building life cycle through the use of Building Information Modelling
Image courtesy of Urban Renewal Authority

Hong Kong is heading its development towards smart city by enhancing innovation and technology in our living and business environment

One of the Smart Government's initiatives is to adopt the use of BIM in the building life cycle: Design, Build and Operate.

The Urban Renewal Authority, being a public body, begins to use BIM in its development projects.

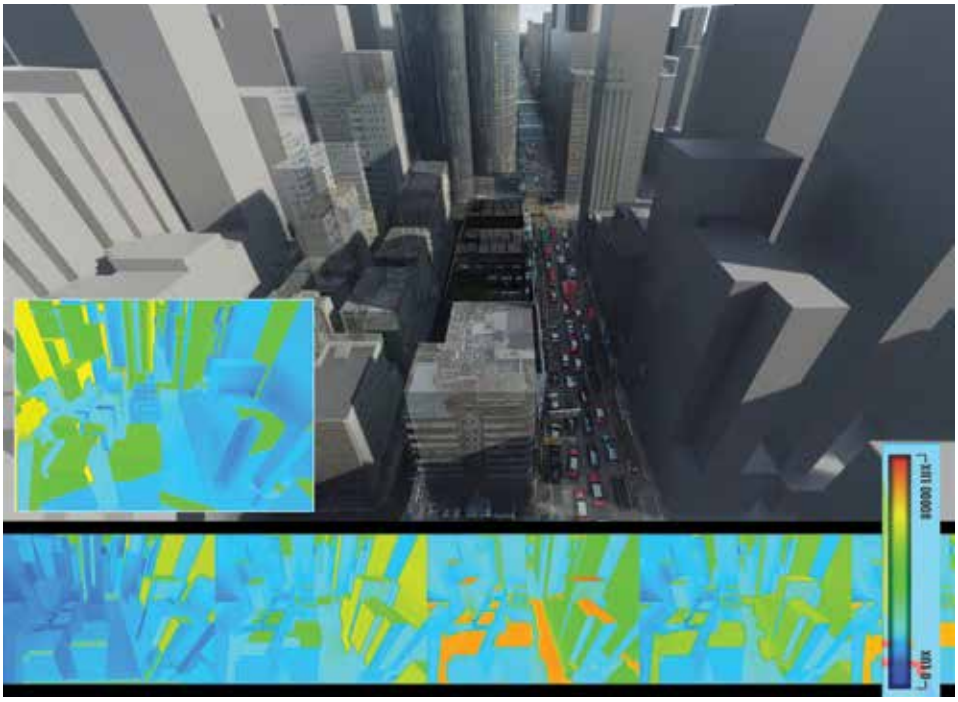
Revitalization at Shanghai Street

The Shanghai Street project is a conservation cum revitalization project to cover a cluster of Grade 2 pre-war shop houses at 600 - 626 Shanghai Street, Mong Kok.

To adopt the use of BIM in the building life cycle: Design, Build and Operate
Image courtesy of Urban Renewal Authority

"The application of BIM technology enables a smooth planning and design process in this project. We could see the whole district virtually, with light and shade, and hence to evaluate the setting of entrances, street facilities and even townscapes."

—**Catherine Lau**
Manager,
Urban Renewal Authority



Virtual 3D simulated platform for interactive visualisations and performance analysis
Image courtesy of Urban Renewal Authority

Reality Capture with laser scanning, photogrammetry and point cloud technologies
Image courtesy of Urban Renewal Authority

Streamline the photographic surveys
Image courtesy of Urban Renewal Authority

"Balancing between redevelopment and conservation of old buildings is always a challenging issue," says Anderson. "The aim is not only to conserve the historic elements but also the streetscape for adaptive re-use."

Modelling the District, and Compact Interiors

The use of BIM can help to visualize the buildings environmental by simulating and analysing it in a virtual 3D platform. "We could see the whole district virtually, with light and shade, and hence to evaluate the setting of entrances, street facilities and even townscapes." says Catherine. With a click, the solar light on any elevation or interior wall at any time can be displayed instantly for detailed design of shading screen, wall finish, even light and shade, etc.

Review of Building Design

"BIM can enable the management and other stakeholders to understand the building design and its relationship with the historic elements in a 3D model or walkthrough, and make more informed decisions," says Catherine.

"We could review the position of all the building services installation in the BIM model and avoid crashes in construction, which is very useful for this conservation project with headroom constraint."

Reality Capture and Digitized Historic Elements

With laser scanning, photogrammetry and 3D modelling technologies, capturing reality for digital record is much easier, unlike the traditional on onsite measurements and photographic record taking. "We have a wish to allow

Enable different stakeholders to understand more and make more informed decisions, especially on the surrounding built environment
Image courtesy of Urban Renewal Authority

Interface of the entrance, covered cloister, finishes of old and new façade can be evaluated easily
Image courtesy of Urban Renewal Authority

the future users and visitors to view the historic elements by using mobile devices, and to appreciate the historic ambience and Tong Lau way of life," says Catherine.

Facility Management

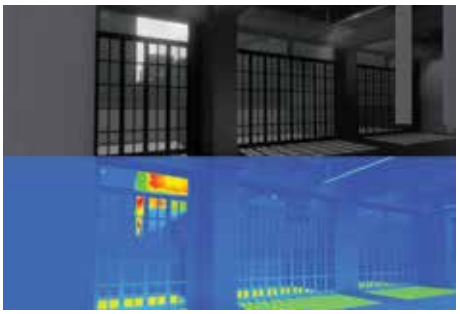
While BIM benefits in design and construction, the URA also regards the facility management as the major part of building life cycle. The employment of BIM at different building stages will generate continuous data.

"With the accumulation of BIM-related knowledge, we are aiming to use the as-built BIM models in our assets management," says Catherine.

Integrating data from BIM and the building management system will provide digital information for the efficient operation and maintenance of the building.

Enhanced Design Communication, Closer Collaboration and quality of the buildings
Image courtesy of Urban Renewal Authority

3D digital representation of building data
Image courtesy of Urban Renewal Authority



Solar studies on any elevation, or any wall, at any time can be analyzed instantly
Image courtesy of Urban Renewal Authority

Interface between historic elements and added facilities of modern buildings
Image courtesy of Urban Renewal Authority

"We are glad that the use of BIM will bring tangible benefits to the project, the team, users and the community as a whole," says Anderson, "URA will further adopt BIM in development projects to improve the buildability and constructability of the development works."

Visualize the built environment by simulating and analysing it in a virtual 3D platform
Image courtesy of Urban Renewal Authority

市區重建局
URBAN RENEWAL AUTHORITY

To work with the GIS, it facilitates our studies on townscape, streetscape and street facilities
Image courtesy of Urban Renewal Authority

About Urban Renewal Authority

The Urban renewal Authority was established in May 2001 under the Urban Renewal Authority Ordinance enacted in July 2000, having the responsibility of improving the standard of housing and the built environment of Hong Kong by undertaking, encouraging, promoting and facilitating urban renewal. A comprehensive and holistic approach should be adopted to rejuvenate older urban areas by way of redevelopment, rehabilitation, revitalisation and heritage preservation (the 4R business strategy).

COMPANY
Water Supplies Department, HKSAR Government

PROJECT
Chlorine generation at Tai Po Water Treatment Works (TPWTW). The chlorine generation is part of the Works under the overall expansion of TPWTW from 400 Million Liters per Day (MLD) to 800 MLD

LOCATION
Tai Po, New Territories

TYPE
Water Treatment Works

SCHEDULED TIME OF COMPLETION
2018

Water Treatment Works Expansion Fast-tracked with BIM

"We could see that with changes made on a continual basis, the model really, really helped" & "Changes could be made over night, and appeared on all drawings - it was quite amazing."

—**Kelvin Leung Siu-kau**
Senior Engineer/Consultants Management, Water Supplies Department

BIM PARTNERS
Black & Veatch Hong Kong Limited
China State / ATAL Joint-Venture
Electrolytic Technologies

Chlorine Store at Entrance of Tai Po Water Treatment Works
Image courtesy of Water Supplies Department, HKSAR Government

3D model helps design and build Hong Kong's largest on-site chlorine generation plant

In 2013, Hong Kong's Water Supplies Department (WSD) has launched a project to expand Tai Po Water Treatment Works, which will supply 30% of the fresh water supply to Tai Po, West and Central Kowloon, and Central and Western Districts of Hong Kong Island. The plant uses chlorine for disinfection of drinking water. The treated water meets the Guidelines for Drinking-water Quality recommended by the World Health Organisation. Since there are no chlorine gas suppliers in Hong Kong, WSD has been importing liquid chlorine from Guangdong Province, which is transported to the water treatment works for storage and use.

With advancement of technology, chlorine generation facilities have become more mature and reliable. The ever-improving membrane technology in recent years has rendered a chlorine generation plant to be accommodated in more compact space. WSD revealed in 2016 that the chlorine generation facilities are suitable to be installed in the major water treatment works of Hong Kong to do away with transportation and storage arising from importation of liquid chlorine, and thus eliminating the risk of chlorine gas leakage associated with the transportation and storage of liquid chlorine, resulting in enhancement of the safety of the disinfection operation.

The chlorine genreation process produces chlorine gas by electrolysing brine (saturated salt water) through electrodes that are separated by membranes. The production process is safe and reliable. Chlorine gas will be generated according to the demand and consumed immediately upon production. These are the first large scale chlorine generation facilities to be installed at the major water treatment works in Hong Kong.

On-site Chlorine Generation Skids with Walkways for Operation and Maintenance Access Fitted within Chlorine Store using BIM Model to Optimize Space Utilization
Image courtesy of Water Supplies Department, HKSAR Government

Need for speed and safety

The WSD adopted a strategy for using BIM in 2014, and after some pilot projects they decided to employ BIM for the Tai Po Water Treatment Works expansion as there is a tight time frame - aiming to commence operation in mid 2018. The project is complex, involving safety concerns, tight space constraints, and a need to quickly provide engineering solutions, so instructions can be sent to equipment manufacturers on time.

"The BIM model was developed by and for all stakeholders," says Stephen Ting, Senior Resident Engineer (Process), Black & Veatch. "They added tanks, pipelines, and details into the BIM models - including sub-models from critical equipment suppliers."

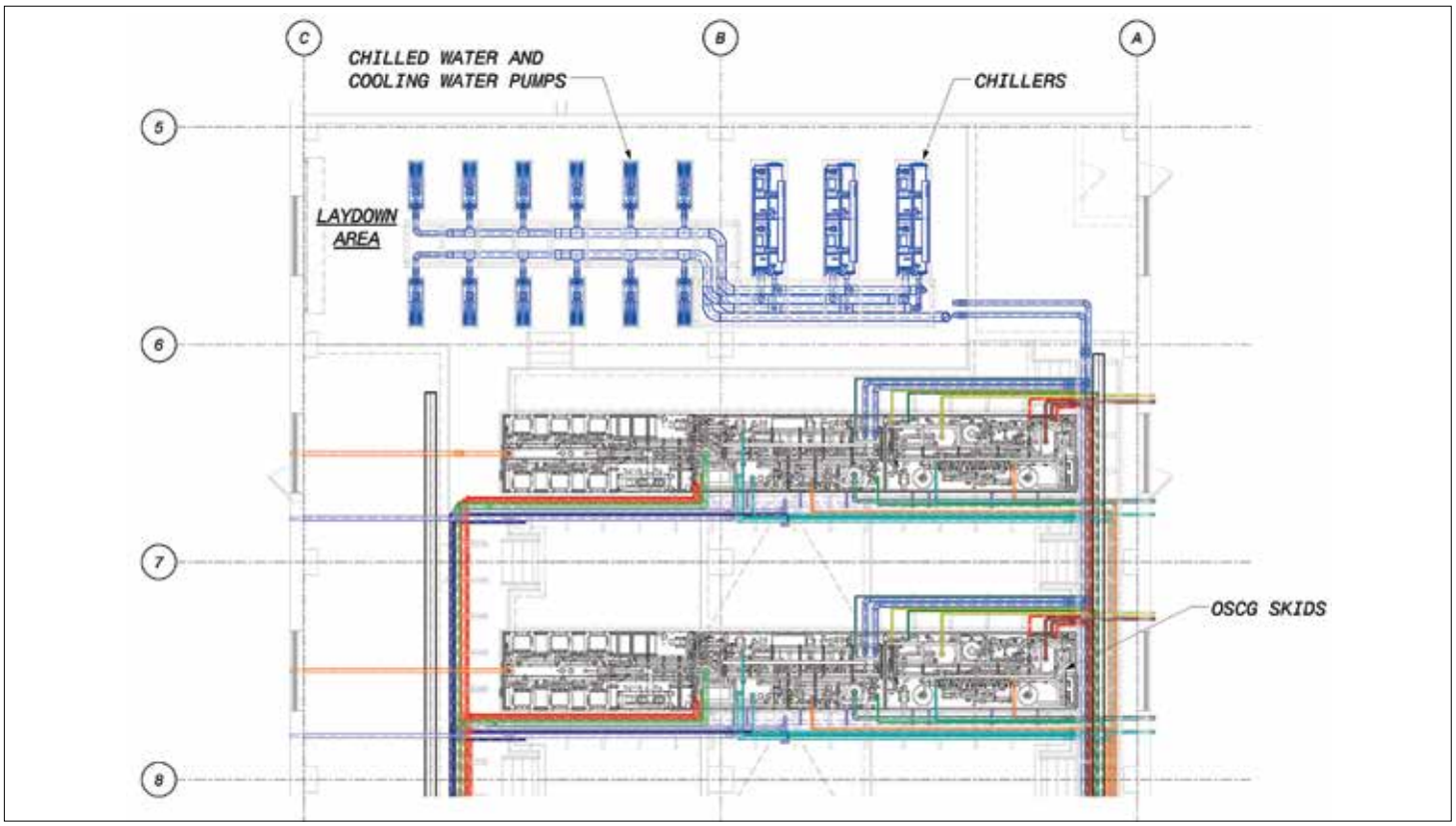
There were initial doubts within the team over whether the BIM model would work; but there were also champions, saying this was the way forward to milestones and key decisions. Soon, BIM was proving its worth.

BIM Facilitated Interdisciplinary Coordination involving Mechanical and Electrical Equipment, Piping, Utilities for Building Services, Civil and Structural Design
Image courtesy of Water Supplies Department, HKSAR Government

Enhanced hazard review

The team had to perform a Hazard and Operability (HAZOP) assessment for the chlorine generation facilities, to review the design and help identify any issues. "All stakeholders discuss these issues in a round table meeting room, traditionally using 2D layouts to look at potential hazards," says Ir. Ting. The required detailed drawings would take considerable time and effort to produce - which would be especially challenging in this fast-tracked project.

But for the first time, a BIM model was used to carry out the HAZOP. This proved far more effective than the 2D plans for visualising the equipment and space around the equipment, and simulating abnormal conditions. There was less guess work and more focuses on solutions. All parties had an overall better experience and time savings. "The



Two Dimensional Layout Plan of Equipment and Piping inside Chlorine Store (Automatically updated with changes from the BIM model)
Image courtesy of Water Supplies Department, HKSAR Government

Visualization of the Access Provided for Operation and Maintenance of Salt Loading Facilities and Brine Tanks
Image courtesy of Water Supplies Department, HKSAR Government

BIM model really speed up the HAZOP considerably," says Ir. Ting.

The BIM model also helped with more typical aspects of design, such as checking for clashes. A change in the location of a pump could have a major impact on piping, leading to not just clashes but also issues such as operation and maintenance, and could take a long time to assess using a traditional 2D layout. The BIM model slashed the time required from over a week to a few man-hours.

"We could see that with changes made on a continual basis, the model really, really helped," says Kelvin Leung Siu-kau, Senior Engineer/Consultants Management, Water Supplies Department. "Changes could be made over night, and appeared on all drawings

Visualization of the Elevated Maintenance Access of Hypochlorite Storage Tanks and Dosing facilities
Image courtesy of Water Supplies Department, HKSAR Government

- it was quite amazing."

David Jackson, Resident Engineer (Process), Black & Veatch, says the model was a great help in coordination meetings: "Some who attended are not familiar with the new plant, but said, 'Oh, I actually know what this looks like!'"

This in turn enabled maintenance and operation staff to more readily participate in the design process, and find issues such as adding an access ladder that would impede the access to another piece of equipment. Similarly, staff from the Environmental Protection Department was given a walkthrough of the model, visualising how the new plant would operate. While for Fire Services Department staff who was less familiar to assessing 3D images, the model was used to produce 2D drawings. The flexibility of the BIM model assisted the project team in obtaining permits from government departments.

The project team has also used the model for planning how to install major items such as membrane electrolysis equipment that will be delivered on skid mounts - ensuring there will be sufficient space.

Towards BIM for asset management

The BIM model has helped project team members from various disciplines come together, and deliver the fast-tracked project on schedule for commissioning early next year. The team estimated that using the BIM model reduced the time needed by at least two months.

"Another benefit was the seamless transition from design to construction. The process/mechanical BIM model was handed over to the Contractor for fitting out the balance of plant auxiliaries such as ventilation, lighting, etc." says Ir. Ting. "The model helps us make prompt decisions on construction in the tight space."

Now, thoughts are turning towards asset management, and the WSD is paving the way by building up the as-constructed BIM model and COBie data worksheets with essential operation and maintenance information following completion of the project.

"We're moving in a direction of using BIM for asset management," says Ir. Leung. "In the long term, it would be critical for us, as the water treatment industry is very asset-intensive. BIM would be very contributive for the design and construction of new water treatment works."

水務署
Water Supplies Department

Tai Po Water Treatment Works Located on a Hilltop Overlooking Tai Po Urban and Rural Developments
Image courtesy of Water Supplies Department, HKSAR Government

About Water Supplies Department, HKSAR Government

Water Supplies Department (WSD) is responsible for supplying fresh water and seawater (for flushing) for consumption by Hong Kong's population of 7.3 million for domestic and non-domestic use. In 2015/16, the WSD supplied 982 million cubic metres (Mm^3) of fresh water. In the same year, WSD supplied 268 Mm^3 of seawater for flushing. As of 1 April 2016, WSD administered 2.91 million water accounts.

HONORABLE MENTIONS

ORGANIZATION

Architectural Services Department, HKSAR Government

PROJECT

Refuse Collection Point at Kai Tak Development, Kowloon

ORGANIZATION

Chun Wo Construction & Engineering Company Limited

PROJECT

The Hong Kong Breast Cancer Foundation Kowloon Centre

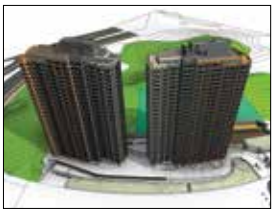
ORGANIZATION

Civil Engineering and Development Department, HKSAR Government

AECOM Asia Company Limited

PROJECT

Widening of Tai Po Road (Sha Tin Section) – Design and Construction



ORGANIZATION

Sun Hung Kai Properties Limited

PROJECT

Proposed Residential Development at T.M.T.L No.515, King Sau Lane, Tuen Mun

COMPANY
Architectural Services Department, HKSAR Government

PROJECT
Refuse Collection Point at Kai Tak Development, Kowloon

LOCATION
Kai Tak District, Kowloon City

TYPE
Government Refuse Collection Point

SCHEDULED TIME OF COMPLETION
2018 Q2

Virtual Assembly Enhances Real World Buildability

建築署
Architectural Services Department

About Architectural Services Department, HKSAR Government

The Architectural Services Department is a department of Hong Kong Special Administrative Region Government, which performs functions in relation to Government-owned and Government-funded facilities in the areas of development, upkeep, monitoring and advisory services.

Project Description

The project is to design and construct a refuse collection point (RCP) for FEHD in Kai Tak Development, Kowloon. It is located on the eastern corner of the existing pumping station, between Kai Tak Second Lane and Shing Kai Road. The overall site area is 687 sq.m and the total CFA is 507 sq.m. The RCP is provided with basic facilities such as refuse storage, loading and unloading space, office, toilet and changing facilities for staff. Unlike the usual RCP, this building was constructed mainly with a steel structure and designed with glass, masonry blocks and vertical greenery as external façade.

Project Challenges

The project is a minor works project carried by a small-scale contractor. The budget and programme are tight. Careful logistics planning and close project coordination are required to ensure smooth and safe project delivery. The project team faces several constraints: a pre-determined cost ceiling, shortage of resources for the contractor and the required design coordination with various outside parties. These constraints turn into the driving force to improve buildability of the design.

Solutions for challenges

Prefabrication and standardisation of various building elements were examined and adopted.

The BIM workflow enables virtual assembly of precast concrete blocks, structural steel members and modular façade elements. It allows dimensional coordination across multi-disciplines. This virtual reality allows the project team members to visualise the impact of buildability upon various building components from a more holistic perspective, making steps to no frills design and achieving cost effectiveness and LEAN construction.

During the construction stage, the buildability studies conducted through the BIM workflow provides data and insight to the contractor to enhance quality, reduce abortive work, minimise wastage and improve the project's constructability.

How does BIM benefit the project?

Using BIM Technology to achieve LEAN CONSTRUCTION - Reduce Waste & Save Money

BIM was used to achieve a LEAN construction throughout project delivery, in order to minimise wastage, and save money and time for the organisation. Benefits reaped from the BIM model include:

1. Design from small to large scale minimises wastage and enhances site efficiency;
2. Advanced multi-disciplinary coordination reduces contractors' burden during construction stage; and
3. Improved contractor understanding saved time in project delivery and minimised abortive works.

The project used more time than the traditional model in the design stage, but it provides all stakeholders with an in-depth understanding of the proposed design.

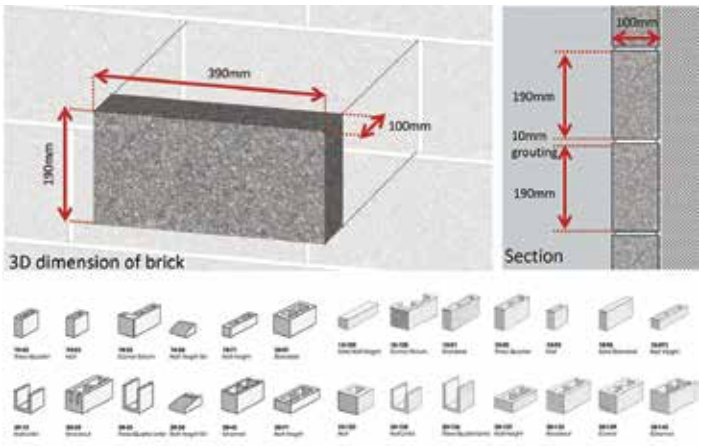
Besides, BIM allows the presentation of isometric views in 3D and can enhance the presentation of different elements. It makes the communication with contractors efficient and helps to reduce errors and abortive works on site. Also, 3D images and animations allow client to have a better understanding of the design. Logistical and operational concerns can be raised in the early design stage to improve the final product.

Better with BIM

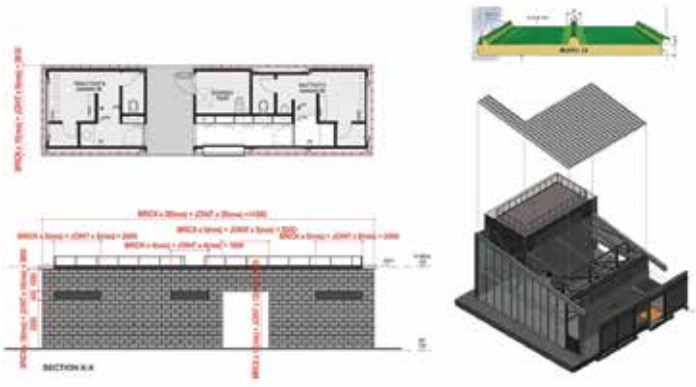
The BIM model is found to be an effective tool in enhancing communication with stakeholders, e.g. presentations to the client and for statutory submissions. The BIM model is also the clue to the collaboration among project team members. The long adopted linear and sequential information flow among project team members – i.e, Arch → SE → BS→ QS – does not accord with the interactive nature of information generation. In this project, in which the BIM model links up all disciplines. Design changes made by one party can be shared instantly. Clashing of structural members with the large air duct is easily spotted, saved the pain in tackling the shortfall in the 2D regime.

BIM benefits extend to the post-construction stage. RFID will be adopted on steel work in this project to allow the possible reuse on other sites, prolonging the life-cycle of structural members. Integration of RFID technology with BIM facilitates easy element selection and improves a facility manager's information retrieval efficiency during the O&M phase.

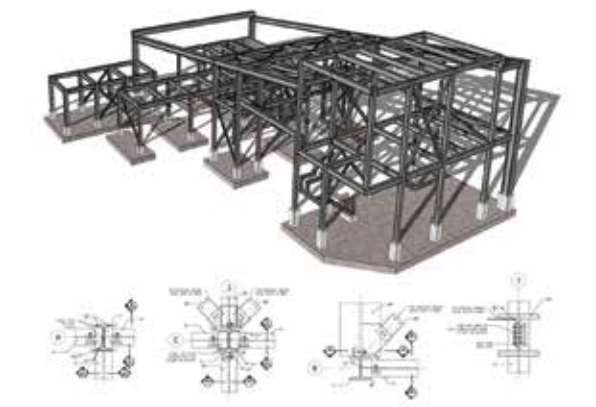
The Kai Tak RCP is constructed mainly by steel structure and designed with glass, masonry block and vertical green as external façade.
Image courtesy of Architectural Services Department, HKSAR Government



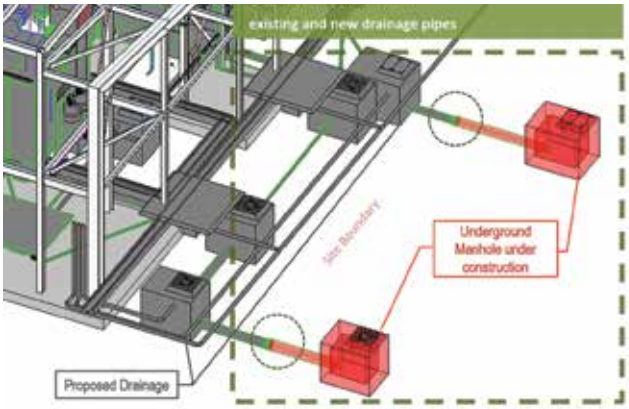
Prefabrication and standardization of various building elements are examined and adopted.
Image courtesy of Architectural Services Department, HKSAR Government



Design from small to big scale minimizes wastage and enhances site efficiency.
Image courtesy of Architectural Services Department, HKSAR Government



BIM was used to achieve a LEAN construction throughout
project delivery to minimize wastage, save money and time for the organization.
Image courtesy of Architectural Services Department, HKSAR Government



Advanced multi-disciplinary coordination reduces contractor
burden during construction stage and minimized abortive works.
Image courtesy of Architectural Services Department, HKSAR Government

Combined Building Services, Air Ducts, Water Pipes, Fire Services (From left to right)
Image courtesy of Architectural Services Department, HKSAR Government

COMPANY
Chun Wo Construction & Engineering Company Limited

PROJECT
The Hong Kong Breast Cancer Foundation Kowloon Centre

LOCATION
Lung Cheung Road, Ngau Chi Wan, Kowloon

TYPE
Government, Clinic

SCHEDULED TIME OF COMPLETION
Mid August, 2017

BIM Key for Eliminating Clashes, Estimating Quantities, and set to Empower Facilities Management

俊和發展集團
CHUN WO DEVELOPMENT HOLDINGS LIMITED
(亞洲聯合基建控股有限公司集團成員)
(Member of Asia Allied Infrastructure Holdings Limited)

Project Description

The Hong Kong Breast Cancer Foundation Kowloon Centre project adopted full BIM in the whole building life cycle from conceptual design stage to Operation and Maintenance stage. Different project stakeholders including the client, consultants, project manager, engineers, survey team, QS department, and foreman are involved in the BIM workflow, and are BIM ready with certificated training. The project success demonstrates that the increased BIM capability of project team members (**全民皆BIM**) can maximise the value of BIM.

Project Challenges

This project BIM delivery is driven by sub-contractor and monitored by main contractor. Different parties need to build /modify the model and do coordination work on the same BIM platform. Secondly, the site is congested and near a crowded road (Lung Cheung Road), and surrounded by many trees. We need to preserve the trees and replant them in other locations. Thirdly, bulky prefabricated facade and slabs need to be designed with a high safety factor, loading and weight should be accurately calculated before production, transport, lifting and installation within a short period of time.

Solutions for challenges

The central BIM model is stored on a VDS (Virtual Design System) and different consultants are authorised to log into the system with non-BIM ready computers. The survey team used a point cloud solution; the laser scanner, and the drone can easily scan the surrounding conditions, which helped logistics planning and recording information on trees. Precast facade and detailed slab design in BIM model include rebar, void formers, and embed. Manufacturers can use detailed design drawing from the model to form the moulds and rebar offsite. Meanwhile, a quantity surveyor extracts useful data from the model and combines this with the construction master schedule for the cashflow forecast.

How does BIM benefit the project?

The overall rework due to poor coordination was reduced by around 80% compared to a non-BIM project. The significant changes mainly involved reducing coring work and rerouting of E&M services. Major clashes have been eliminated as a result of the CDE (common data environment). The most updated BIM model is stored in the VDS, so that everyone shares the same model version. This prevents inconsistencies in the coordination platform. Apart from that, the QS team can accurately quantify the materials usage. It can reduce the materials wastage and prevent unwanted materials storage at the congested site area.

Better with BIM

The Building Information Model acts as a centralised database and contains information related to building and installation components. It helps the facility managers to find information more easily, analyse the system efficiency and avoid any loss of data. After the completion of the building model, all the information can be generated by users for fabricating, analysing, project scheduling (4D BIM), cost estimation (5D BIM), and eventually, for facilities management during the operation phase.

BIM requires enhanced integration of project teams and collaboration between all parties. Hence, regarding delivery methods, collaborative approaches such as IPD are more able to optimise BIM-based projects than linear methods.

About Chun Wo Construction & Engineering Company Limited

Chun Wo was founded in 1968, and initially primarily operated a construction business. In 1993, it was listed on the Main Board of the Hong Kong Stock Exchange under the name "Chun Wo Holdings Company Limited" (stock code: 00711.HK) and its business has since been expanded to include construction, property development and overseas business. And, in November 2007, to better reflect its dedication to developing a more diversified business, the Company changed its name to "Chun Wo Development Holdings Limited".

In 2016, the listed company name was changed to "Asia Allied Infrastructure Holdings Limited" (stock code: 00711.HK) in order to enhance the Group's corporate image and better reflect its long-term strategic goals. As the Group actively explored various forms of development, "Chun Wo Development Holdings Limited" has become a major branch of the Group in Hong Kong and will continue to develop its core businesses.

BIM PARTNERS
Chun Wo Construction & Engineering Co., Ltd.

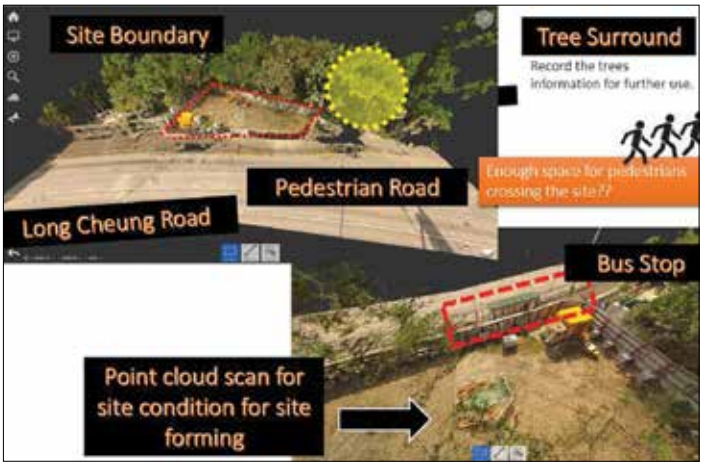
MDM Group Inc. Limited

P&T Architects and Engineers Ltd

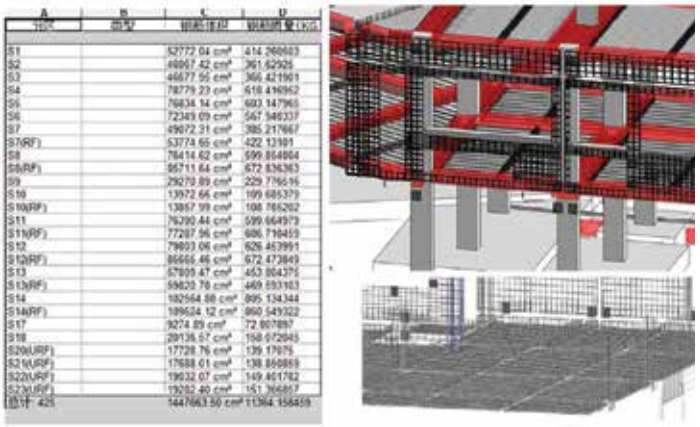
Tam & Philip So & Associates Ltd

WEC Engineering Consultants (International) Limited

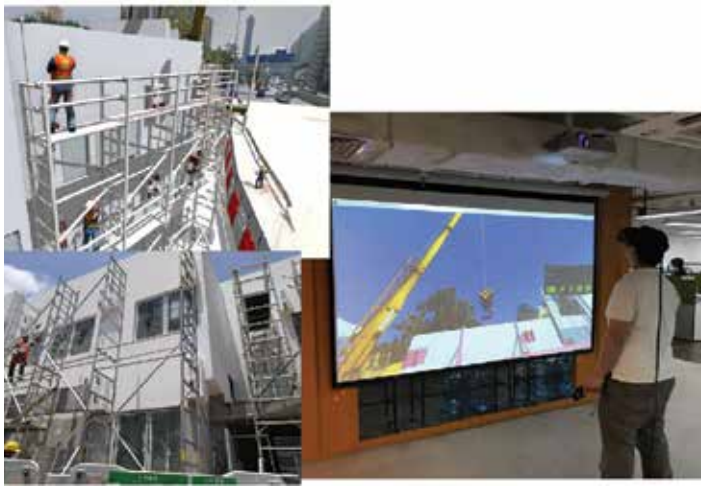
We use point cloud to fast check the site condition with the road nearby and surrounding trees.
Image courtesy of Chun Wo Construction & Engineering Company Limited



We use point cloud to fast check the site condition with the road nearby and surrounding trees.
Image courtesy of Chun Wo Construction & Engineering Company Limited



Semi-precast slab, facade, and stairs with detailed design drawing which include rebar, void form and precast concrete enhancing QTO.
Image courtesy of Chun Wo Construction & Engineering Company Limited



Safety Officers, Engineers, and Foreman using VR + 4D construction simulation to preview facade installation procedures.
Image courtesy of Chun Wo Construction & Engineering Company Limited

The clients are using VR technology to preview the building before construction in first person perspective.
Image courtesy of Chun Wo Construction & Engineering Company Limited

COMPANY
Civil Engineering and Development Department,HKSAR Government / AECOM Asia Company Limited

PROJECT
Widening of Tai Po Road (Sha Tin Section) – Design and Construction

LOCATION
Widening of Tai Po Road (Sha Tin Section)

TYPE
Infrastructure Works

Visual Simulation Eases Design and Implementation of Road Widening Project

Project Description

The objective was to carry out the detailed design of the proposed road widening works of a 1.1 km section of Tai Po Road (between Fo Tan Road and Sha Tin Rural Committee Road) from dual 2-lane to dual 3-lane carriageway to cope with the anticipated traffic demand. The design included the noise mitigation measures to minimise the traffic noise impact to the nearby residents.

Project Challenges

The major challenge of the project was to carry out construction works along a congested and highly demanded road. The project shall be completed in a satisfactory manner to hand over the works to the relevant departments/agents for maintenance and operation while also taking care of the safety and health of the construction workers and the general public. The project should be completed in a timely and cost effective manner throughout the design and construction works.

Solutions for challenges

AECOM Innovative Solutions Department produced a 4D model for the design of the project, using BIM to resolve design and anticipated construction challenges. BIM was used to aid in the exploration of different design options, the easy communication of design intent with the public with photorealistic renderings, the scheduling of construction the sequences, and the identification of design clashes. BIM allowed the project team to fully coordinate the 4D model in the design phase.

How does BIM benefit the project?

The project team completed a virtual model that included viewpoints for each individual clash and identified design issues in a fast and accurate manner. The 4D simulation allowed for more thoughtful planning of the construction sequences and phasing of access for specialised contractors. Realistic images were generated from the BIM model for ACABAS submission. Traditionally, designers take time to produce photomontages from fixed angles of view for ACABAS review, and when the angle of images is changed, it requires great cost and time for photomontage preparation. However, BIM enabled the creation of different realistic images from the models at any angle, and therefore dramatically improved the efficiency of submission preparation.

Better with BIM

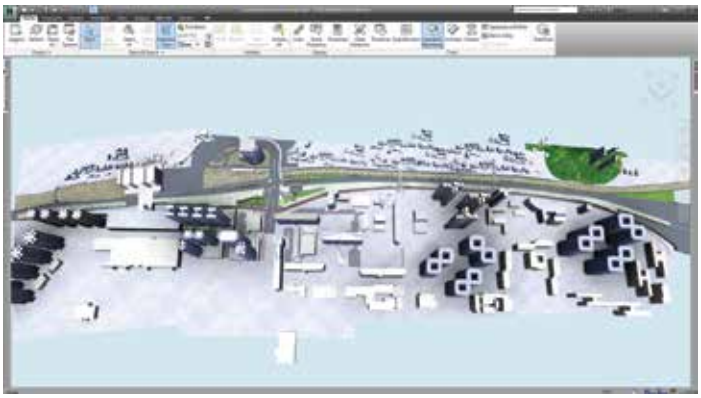
AECOM provides a blend of global reach, local knowledge, innovation and technical excellence in delivering solutions that create, enhance and sustain the world's built, natural, and social environments. The AECOM design team have rich collaboration experiences in large scale building and civil projects using BIM technology. BIM brings design visualisation that allows engineers to effectively review detailed design conflicts between multi-disciplinary designs in 3D views, therefore, BIM can improve design efficiency.

About AECOM Asia Company Limited

AECOM is a global provider of professional technical and management support services to a broad range of markets, including the transportation, facility, environment, energy, water and government markets. With approximately 100,000 employees around the world, AECOM is a leader in all of the key industries that it serves.

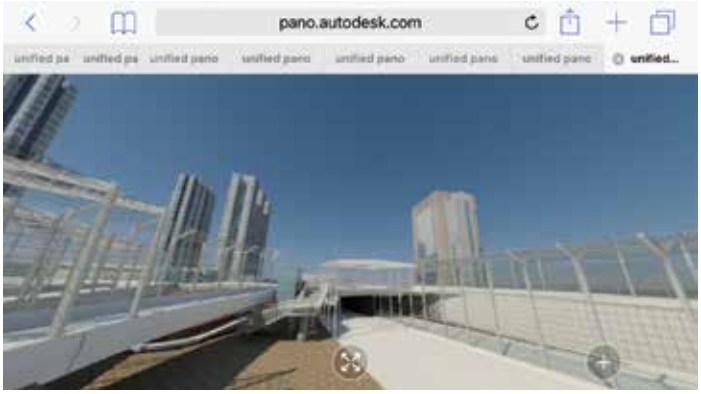
AECOM is built to deliver a better world. We design, build, finance and operate infrastructure assets for governments, businesses and organisations in more than 150 countries. As a fully integrated firm, we connect knowledge and experience across our global network of experts to help clients solve their most complex challenges. From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital.

Widening of Tai Po Road (Sha Tin Section) Overview
Image courtesy of Civil Engineering and Development Department, HKSAR Government and AECOM Asia Company Limited

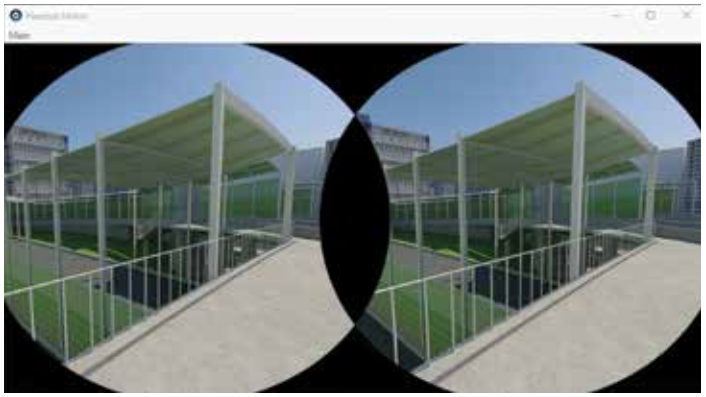


Civil Infrastructure BIM in Naviswork
Image courtesy of Civil Engineering and Development Department,
HKSAR Government and AECOM Asia Company Limited

4D Simulation with Project Programme
Image courtesy of Civil Engineering and Development Department,
HKSAR Government and AECOM Asia Company Limited



VR Experience for the Proposed Design View 1.
Image courtesy of Civil Engineering and Development Department,
HKSAR Government and AECOM Asia Company Limited



VR Experience for the Proposed Design View 3.
Image courtesy of Civil Engineering and Development Department,
HKSAR Government and AECOM Asia Company Limited

COMPANY
Sun Hung Kai Properties Limited

PROJECT
Proposed Residential Development at T.M.T.L No.515, King Sau Lane, Tuen Mun

LOCATION
T.M.T.L.No.515, King Sau Lane, Tuen Mun

TYPE
Residential

SCHEDULED TIME OF COMPLETION
2nd Quarter of 2019

Condensed Project Schedule Made Possible and Safer with BIM

新鴻基地產
Sun Hung Kai Properties

Project Description

In current trade practices, design models have to be remodelled in construction stages. To help resolve this challenge, Sun Hung Kai Properties (SHKP) adopted the Integrated Project Delivery (IDP) approach for the "Proposed Residential Development at T.M.T.L No.515, King Sau Lane, Tuen Mun" project from the beginning, and to be continued for the whole project stage. That is, one model is used all the way through the project life cycle. The model and workflow are well organised to meet the purpose of design as well as construction study.

Project Challenges

As SHKP always puts the customer first and offers quality products for customers, BIM models are used to provide the best end-user experience.

With the tight schedule and site constraints, project matters like detailed design, construction method, schedule and cost etc. are hardly optimised. For example, we are planning to employ a climbing scaffolding system to replace bamboo scaffolding. But there is no real case applications in Hong Kong. There is a risk for a new application.

Solutions for challenges

An integrated Project Delivery (IPD) approach was used from the beginning. The model and workflow are well organised to meet the purpose of design as well as construction study.

The integrated project team for design and construction maximises the value of BIM models. With the BIM team and construction team involved in the project at very early stage, they can advise the project team on the construction schedule, cost and buildability according to any project design changes, by means of the BIM model. The program schedule can be condensed as well, and let the design team have more time and more information to optimise the design and better prepare the construction planning.

How does BIM benefit the project?

As the project schedule is tight and there's a requirement to improve safety and conditions in the construction site, we are planning to employ climbing scaffolding to replace the bamboo scaffolding. We used BIM to do the feasibly study on the climbing scaffolding for construction use – such as by simulating the construction cycle to present the working zone for each trade, for each floor, so they can understand the planning of the construction cycle and identify the potential problems with using climbing scaffolding and possibe dangerous areas in the scaffolding design.

Better with BIM

To enhance safety awareness, we use BIM to present the Emergency Escape, for all workers to easily remember and record the escape routes. The study of the BIM model is one of the tasks of the safety officer in preparing the risk assessment. For example, the climbing scaffolding system is a good solution for enhancing safety. But, it is tailor-made design. The safety officer will study the relationship between the BIM design model and climbing scaffolding BIM, and the construction sequence of the climbing scaffolding, to determine potential danger zones and discover potential problems.

About Sun Hung Kai Properties Limited

Sun Hung Kai Properties Limited ("SHKP") was publicly listed in 1972 and is now one of the largest property companies in Hong Kong. It specialises in developing premium-quality residential projects, offices and shopping centres. The Group employs more than 37,000 people.

Sun Hung Kai Properties puts its long-standing belief in "Building Homes with Heart" into practice, on the one hand by developing residences of the finest quality and offering first-class service to its customers, and by contributing to the good of the community to make Hong Kong a better home for everyone.

The Group understands that buying a home is one of the biggest decisions people make in their lives, and so it spares no effort to deliver the very best. Vertical integration from planning, material sourcing and construction through to project monitoring and property management ensures high standards in every aspect of a development.

The Group's seasoned management team follows prudent strategies for long-term business development and the company's philosophy includes a strong sense of corporate social responsibility, both to its customers and to the public. The Group works for the benefit of the community with wide-ranging initiatives to protect the environment, care for the less fortunate and foster educational development.

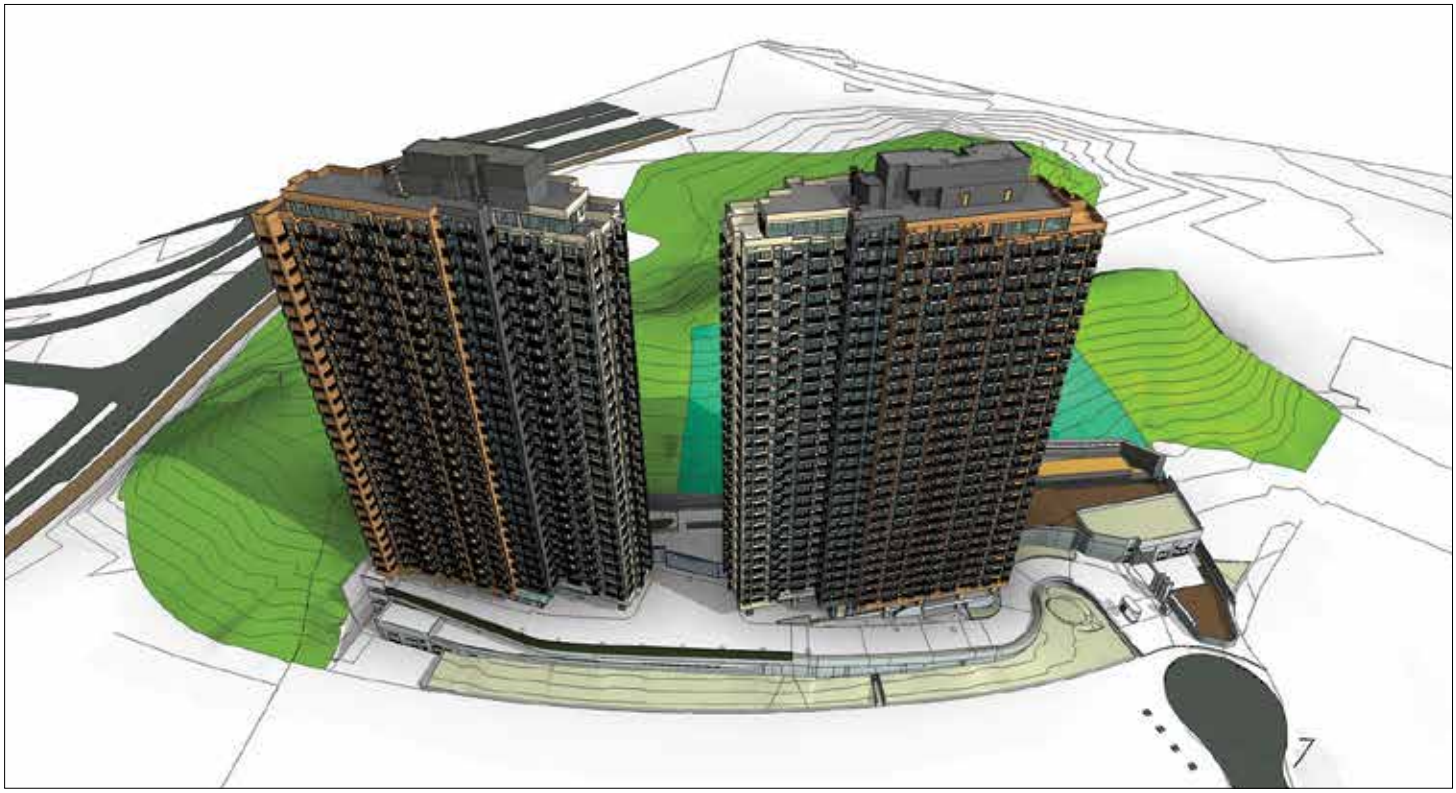
Sun Hung Kai Properties – We're "Building Homes with Heart".

BIM PARTNERS
Sun Hung Kai Architects & Engineers Limited

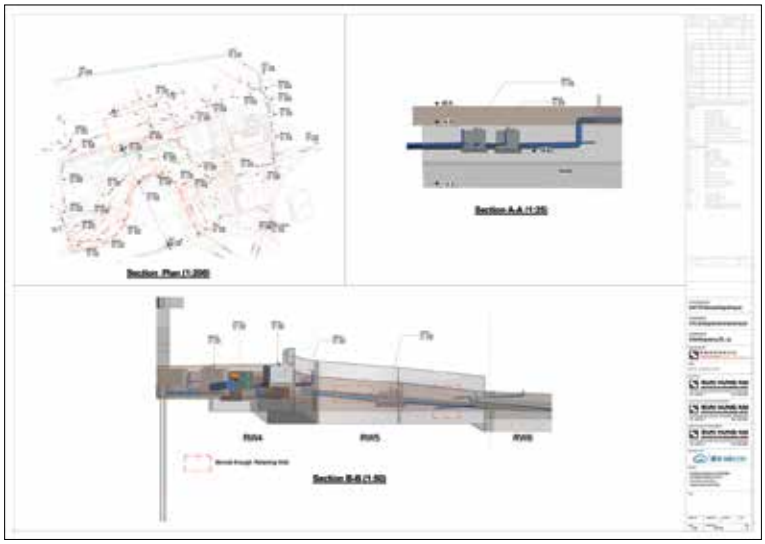
Archiplus International Limited

Teamfield Building Contractors Limited

Vircon Limited

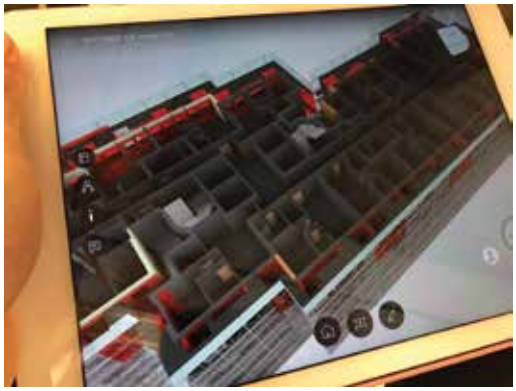


Proposed Residential Development at T.M.T.L No.515, King Sau Lane, Tuen Mun
Image courtesy of Sun Hung Kai Properties Limited

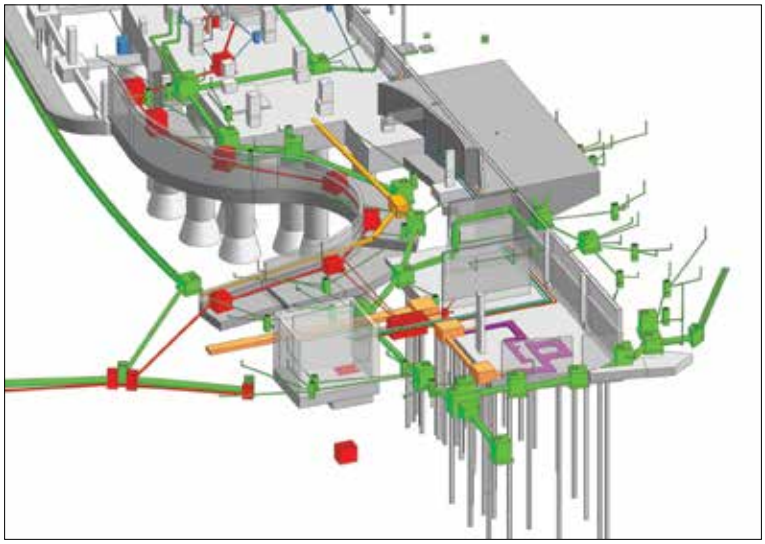


Exported CAD Sections of pavement submitted to Construction team
Image courtesy of Sun Hung Kai Properties Limited

Safety Officer can review the model through VR to prepare risk management
Image courtesy of Sun Hung Kai Properties Limited



Use A360 to review the design.
Image courtesy of Sun Hung Kai Properties Limited



Create construction model in design stage to show the relationship between building services and structural layout
Image courtesy of Sun Hung Kai Properties Limited

Advisors' Comments - Introduction

This year, we are extremely honoured to receive the invaluable support from the local supporting organisations and overseas BIM advisors. Locally, an advisory panel was formed by the representatives of local supporting organisations to discuss and review the selected projects, and their comments were consolidated and recorded. In addition to the comments of the selected projects, the overseas advisors also shared with us about the BIM development in other parts of the world.

Advisor Panel

Dr. Jack C.P. Cheng
Chairman
Autodesk Industry Advisory Board

Ir. Henry Cheung
Council Member
Hong Kong Information Technology Joint Council

Dr. Garfield X. Guan
Co-opted member of Council
Hong Kong Institute of Utility Specialists

Mr. H.F. Wong
Vice President and BIM Committee Chairman
The Chartered Institute of Building (Hong Kong)

Mr. David Kwok
Board Member
The Hong Kong Institute of Building Information Modelling

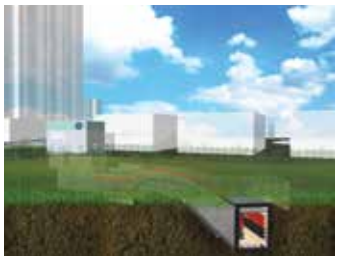
Mr. Stephen W.K. Luk
Vic-chairman
Chartered Institute of Architectural Technologists, Hong Kong Centre

Dr. Francis Chan
Chair of External Affairs & Accreditation
Hong Kong Institute of Project Management

Mr. Wong Yuen Hung, Froky
MSc IBTM, Bsc(Hon), MHKIBIM, MbSHK
Hong Kong Revit User Group

Sr Miranda Lui
Immediate Past Chair
The Chartered Institution of Civil Engineering Surveyors (Hong Kong Region)

Advisory Panel - Award Winners



CLP Power Hong Kong Limited

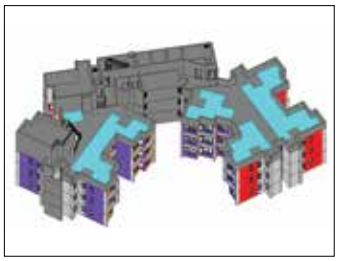
BIM Life Vitality • Power of Kai Tak Cable Tunnel

This cable tunnel construction project ensures the stability of electricity supply to the Kai Tak area development. The team has applied A360 Cloud, Computational Fluid Dynamics (CFD) analysis, and Revit throughout the design and planning stages to facilitate the team collaboration, to optimise energy efficiency and to identify the potential risks such as during emergency evacuation and flooding. Early stage prevention and 4D simulation help the team to develop a safe working concept. The EBIM system has been introduced by CLP to integrate BIM and equipment information, which enables the staff to monitor in real time and maintain the cable tunnel facilities.

Drainage Services Department, HKSAR Government
Summit Technology (Hong Kong) Limited

Advance Works for Shek Wu Hui Sewage Treatment Works - Further Expansion Phase 1A and Sewerage Works at Ping Che Road

In this project, BIM helps to visualise and coordinate both old and new sewage plants. When designing the membrane facilities building, engineering professionals can benefit from BIM to effectively coordinate different chemical zones and the highly complicated piping systems. The model has also been considered as an asset for the facility management, utilising the visual programming tool for Revit – Dynamo was adopted to merge the equipment information with the Revit model. Dynamo script is easy to learn and write when compared with a traditional programming language. This automates the data management process to avoid unnecessary human error.



Hong Kong Housing Authority, HKSAR Government

1. BIM enabled Semi-automated Foundation Design (BIM-SAFD)
2. BIM-enabled Residential Thermal Transfer Value Calculation (BIM-RTTV)

It is exciting to see the Housing Authority's innovative design solutions in BIM. The SAFD process has streamlined the structural design and drawing production workflow; meanwhile, the design accuracy and efficiency are enhanced. Quantity take off can also be performed. Model users can also collect the quantity take off result by Standard Approach to Modelling (SAM). The RTTV is a way to fulfil the energy efficiency requirements of PNAP, which enhances the speed, traceability, and accuracy of the calculation and minimises the manpower required.

Sun Hung Kai Properties Limited

Proposed Residential Development at Inland Lot No. 8963, Stubbs Road

This residential project is located on a hill. The developer SHK makes use BIM from the design and the application of clash analysis in CSD coordination in the construction period as well as setting up a hand over information team to finalize the as-built model for facilities management in the handover stage. The BIM project's execution plan has been set up in a clear and thoughtful manner; a complicated work process has been standardised and made manageable, while team members can gain a good understanding of what to do on reaching different milestones. New innovation and exploration in visualisation such as CCTV simulation, Revit Live, and Stingray for virtual reality could enhance the value of the model from the design stage to the completion handover stage.

Urban Renewal Authority

Revitalization of Shophouses at 600-626 Shanghai Street, Mong Kok

The historic asset is priceless. This renewal project shows a good example of how historical buildings could embrace BIM. A Revit model and 4D simulations have played significant roles during the demolition and construction process. As parts of the façades have to be retained and other areas need to be removed and redesigned for leisure and education purpose, new MEP systems have also been added to fit the modern requirements. BIM offers a good platform for communication and coordination. The building has been renewed physically and digitally; hopefully, its sustainable story may grow with the Revit model in future.

Water Supplies Department, HKSAR Government

Chlorine generation at Tai Po Water Treatment Works (TPWTW). The chlorine generation is part of the Works under the overall expansion of TPWTW from 400 Million Liters per Day (MLD) to 800 MLD

This project is a big challenge as it will be built to process dangerous chemicals on site. Therefore, every step from design, construction, and installation needs to be fully considered, monitored and handled. Design engineers directly applied Revit for the mechanical system design, and it was out of their expectation that BIM can save a lot of time in coordination when compared with the traditional approach. BIM is useful when presenting complex design ideas to the multi-disciplinary project stakeholders, since the chlorine generation facilities have strict requirements on applying for licences and permission.

Advisory Panel - Honorable Mentions

Architectural Services Department, HKSAR Government

Refuse Collection Point at Kai Tak Development, Kowloon

The lean construction concept, using BIM in the small scale project, is inspiring. Especially when a small project has a limited budget, the building materials and construction workflow must be carefully planned. ASD has created and applied specific Revit families for modelling and scheduling work.

Chun Wo Construction & Engineering Company Limited

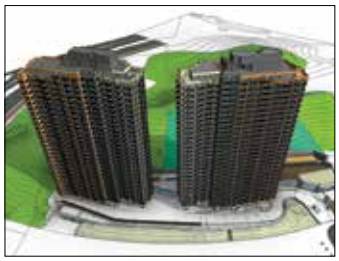
The Hong Kong Breast Cancer Foundation Kowloon Centre

Chun Wo has utilised BIM in this design and build project. Beyond checking visualisation, coordination, site safety and constraint using BIM, detailed drawings for a precast façade have been produced for manufacturers, and facility management information has been explored in this project.

Civil Engineering and Development Department, HKSAR Government
AECOM Asia Company Limited

Widening of Tai Po Road (Sha Tin Section) – Design and Construction

This project has adopted BIM cross disciplines, since Civil 3D and Revit has been used for civil, architectural and structural works, respectively. Virtual reality and 4D simulations also have been heavily used to ensure the proper, responsible allocation of risks and design.



Sun Hung Kai Properties Limited

Proposed Residential Development at T.M.T.L No.515, King Sau Lane, Tuen Mun

This project has adopted Integrated Project Delivery (IPD) approach with the application of BIM, with all project stakeholders working on the same page in the construction stage to further enhance the coordination of work.

Dr. Calvin Kam

Overview

The 2017 Hong Kong BIM Awards honor a diverse collection of projects that champion a variety of creative BIM applications supported by well-informed planning and team collaboration. Applying the Strategic Building Innovation (SBI) bimSCORE evaluation framework in a preliminary assessment based on evidence available from the submissions, we have benchmarked the 2017 winners against our global database of 200+ projects from 16 countries. Within the global context, this year's winners fall between "Typical" and "Advanced" Practice, and are further analyzed with respect to the four bimSCORE evaluation areas of Planning, Adoption, Technology, and Performance. The included figures illustrate the Overall bimSCORE and four area scores of the 6 winning projects, and compare their performances to the 2016 HK BIM Awardees.

Planning and Performance

Planning for BIM implementation requires targeting objectives for success, supporting achievement with the needed tools and technical processes, and developing standards to guide an integrated project team. ***Performance*** monitoring of objectives is enabled through BIM and increased automation in quantitative tracking of project performance metrics to inform design and project management decisions.

The award winners recognize the importance of establishing and tracking objectives throughout the project lifecycle. **The Water Supplies Department (WSD)** reduced their project design time from months to weeks in part through BIM-enhanced communication and spatial understanding among design engineers, WSD, and regulatory agencies, including the Environmental Protection Department and Fire Services Department. **The Drainage Services Department (DSD)** established multiple objectives to guide the preparation of models, 3D coordination of designs, development of library objects, model-based operation and maintenance process, and knowledge transfer. **The Urban Renewal Authority (URA)** also defined clear objectives for revitalization and conservation that informed their technical implementation.

Though these projects may be leading Hong Kong in Planning and Performance, they remain in the range of "Typical" to "Advanced" practice on the global scale. We encourage projects to establish more quantitative objectives to provide an objective understanding of their performance and return on investment (ROI) with BIM, and for projects to consider tracking performance past construction into the operation and maintenance phase. There is still a great potential in the HK regional market to tap into the values of advanced metrics that drive superior project performances.

Adoption and Technology

Adoption of BIM is measured across the project lifecycle (design through operations) and project stakeholders (designers, builders, owners, and agencies) to understand the degree of BIM implementation.

Technology considers the informed selection of BIM analyses and tools that are supported by interoperable information exchanges and information-rich models.

We are excited to see the benefits of advanced BIM uses leveraged throughout the full lifecycle and range of stakeholders of the awarded projects. **CLP Power Hong Kong Limited** leveraged BIM to optimize their planning, design, and construction management, and well-coordinated model exchanges allowed the model to be used on-site by contractors who benefited from the operational walkthroughs and detailed guides generated from the BIM. **The Housing Authority** created a highly interoperable BIM environment by synergizing the capabilities of multiple tools to automate critical components of their project design and derive important parameters for more effective project management. **Sun Hung Kai** maintained strong collaboration among multiple stakeholders by having well-defined BIM roles and tracking outstanding issues with a centralized issue management tool.

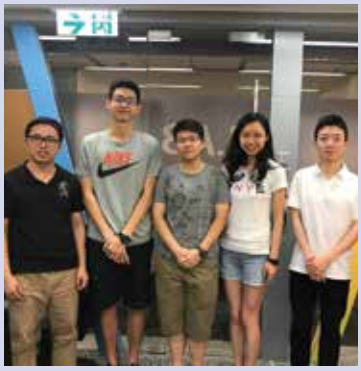
Awardees this year are driven in BIM Adoption, placing them in the upper "Typical" to upper "Advanced" Practice range. Technology showed more variation, with winners ranging from "Typical" to upper "Advanced" Practice when compared with projects across the globe. To promote advances in Technology and Adoption, project owners should standardize requirements for BIM uses and collaboration among project stakeholders to drive lifecycle application of BIM and advanced design and construction analyses.

Dr. Calvin K. Kam
PhD, AIA, PE, LEED AP

Dr. Calvin Kam is the Founder of Strategic Building Innovation (SBI) and bimSCORE.com - the "GPS Navigator" for any enterprise or project team charting courses for construction innovation. SBI was invited to present and facilitate at both the 2014 and 2015 APEC workshops and to author APEC publications. Dr. Kam teaches undergraduate, graduate, and professional courses and leads research as an Adjunct Professor at Stanford University's Center for Integrated Facility Engineering, where he partners with industry members in areas such as Building Information Modeling, Virtual Design and Construction as well as Smart and Sustainable Developments. Calvin is serving on the International Practice Committee and Research Advisory Group with AIA National. He was a former National Co-Chair of the Center for Integrated Practice and former National Chair of the Technology in Architectural Practice Knowledge Community (supported by 10,000+ professionals), and served on Board Knowledge Committee.

Since 2008, Calvin has been the Vice President for Strategic Innovation with Optima—an award-winning integrated real estate developer. Since 2009, Calvin has been advising the U.S. General Services Administration as a Senior Program Expert advising its National BIM Program that he co-founded in 2003. Since 2011, Singapore government's Building & Construction Authority has appointed Calvin as an international expert to advise its construction productivity and BIM roadmap. Since 2012, China's National BIM Union and Standard have appointed Calvin as the only international Honorary Director to advise the international harmonization and collaboration of its nationwide BIM standards/development. Since 2015, Calvin was appointed an Expert Advisor to the Shanghai government's BIM advancement center.

A recipient of various honors/awards including ENR's "20 under 40", Calvin is a Registered Architect, Professional Engineer, and LEED AP in USA with Ph.D. from Stanford University. Dr. Kam has presented at 100+ industry events/universities across 18 countries and regions and published a number of book chapters and journal publications. Calvin has served as an Expert Advisor of the Hong Kong AIAB BIM Awards since 2008.



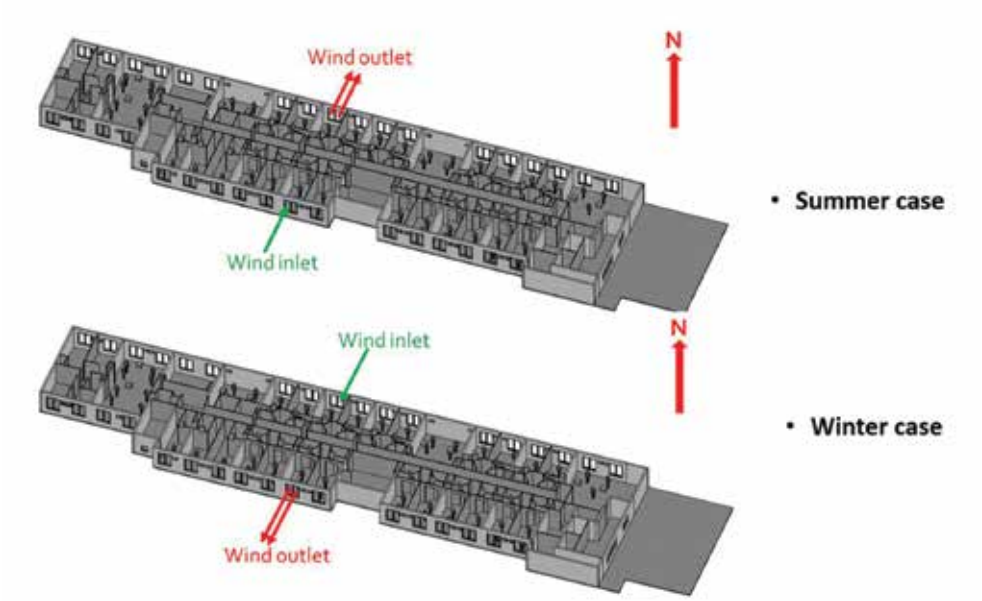
Deng Min
Gan Jielong
Tsang Wing Sum
Wong Long Yee, Mary
Yip Shing

INSTITUTION
The Hong Kong University of Science and Technology

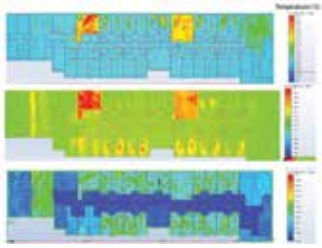
PROJECT NAME
Analysis and Evaluation of Indoor Ventilation and Energy Consumption Using Building Information Modeling

PROJECT LOCATION
Student Hall VII, HKUST, Clear Water Bay, Kowloon, Hong Kong

TYPE
Residential (student dormitory)



Ensuring Comfort for Studying and Living



Project Background

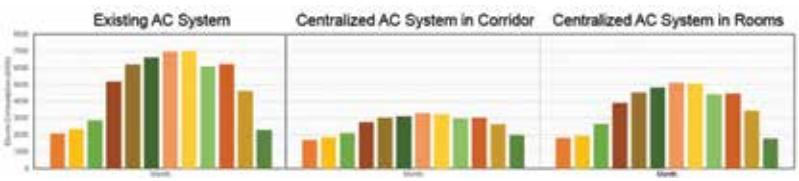
UG Hall VII is a student hall in HKUST with seven floors, which aims to provide a safe and comfortable residence for HKUST students. There are around 20 flats, two recreation rooms and two learning common rooms for each floor. Because creating a good living and study environment for students is very important, a human comfort analysis has been conducted in order to improve the comfort level of different zones in the Hall. Meanwhile, energy modelling and analysis were also conducted, to seek effective approaches for reducing the energy consumption of the Hall.

Project Challenges and Solutions

Air flow simulation, human comfort analysis and energy modelling require information exchanges between different platforms and engineering software. Data losses may occur, leading to unexpected errors. Traditional simulations only focus on the results for a certain period; it is very challenging to conduct a simulation that can clearly express conditions across different phases of the building life cycle. The simulation generates a large amount of results, such as wind pressure on buildings, air flows, and room temperatures. Proper representation is important for a better understanding of the simulation results. In this project, the team strived to investigate the wind effect on the indoor thermal environment and human comfort. However, existing software lacks the functionality to analyse the wind effect on the heat gain or heat loss of human bodies.

How does BIM help for your project?

Based on the 2D drawings, a BIM model for the Student Hall was created using Autodesk Revit in order to achieve better data interoperability between the BIM models and different engineering software, for an integrated building performance analysis. Our BIM models created in Autodesk Revit are automatically transformed into Autodesk CFD for indoor airflow simulations. The CFD simulation outcomes are then used in Autodesk GBS to analyse the impact of natural ventilation on human comfort and building energy consumption. In Autodesk CFD, the wind pressure, velocity and temperature in a building are represented by colour gradient graphs. The simulation results of different time frames can also be obtained to show the dynamic changes in the building's indoor thermal environment.



About AIAB

AIAB (Autodesk Industry Advisory Board) is formed by a group of experts who are willing to share their valuable experience from Building, Civil, Media and Entertainment industry.

Mission

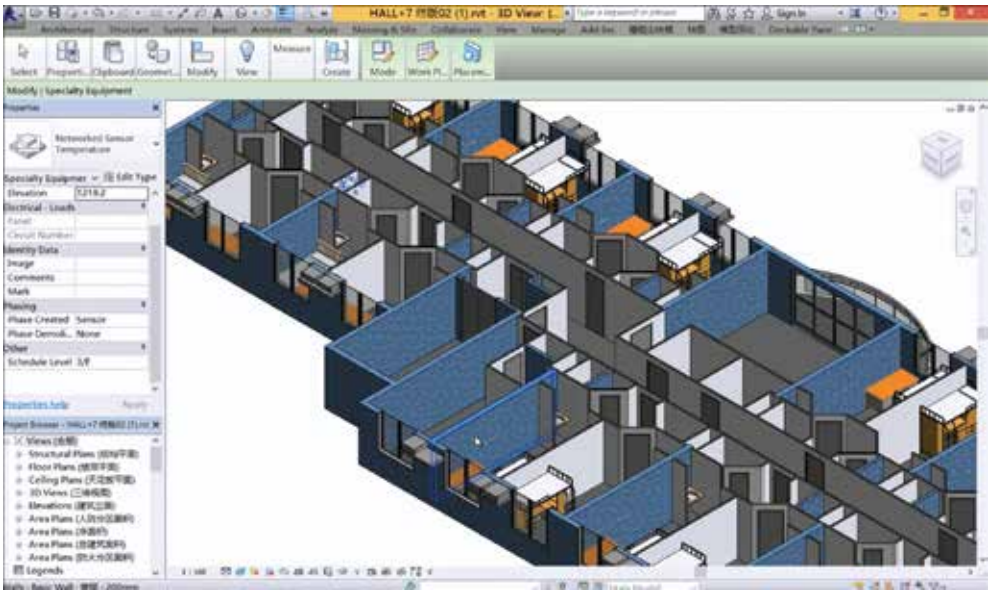
Autodesk Industry Advisory Board (AIAB) is an informal and non-profit making interest group that acts as a bridge between the industry and Autodesk for solid and bidirectional communications. AIAB, as its title suggests, has an advisory role. Its main objectives include, but not limited to:

- Act as a platform for technology exchange and experience sharing
- Advance the professional standards on Autodesk products
- Express and share opinions and views on technology development
- Promote the development, usage and awareness of design technology in HK, mainland China and Macau
- Provide cross-border technology exchange/visit
- Provide latest technology update

Want to know more about AIAB?
Please visit: http://www.aiab.org

Dr. Jack C.P. Cheng
PhD MPhil BEng MHKIBIM MbSHK
MASCE CAP MAEE

Dr. Jack Cheng is currently an Associate Professor in the Department of Civil and Environmental Engineering at the Hong Kong University of Science and Technology (HKUST). He teaches BIM, Construction IT and Construction Management at HKUST. While studying at Stanford University for his PhD degree, he was involved in different projects in Virtual Design and Construction including BIM. His research areas include BIM, 3D GIS, Internet of Things (IoT), data mining, construction informatics and management, green buildings, and sustainable construction. He is an author of over 150 referred publications in international journals and conferences. He has delivered seminars overseas as well. He is currently the Chairman of Autodesk Industry Advisory Board (AIAB), Vice-Chair of ASCE Global Center of Excellence in Computing, Treasurer and Director of ASCE Hong Kong Section, and Editor or Editorial Board Member of several international journals.

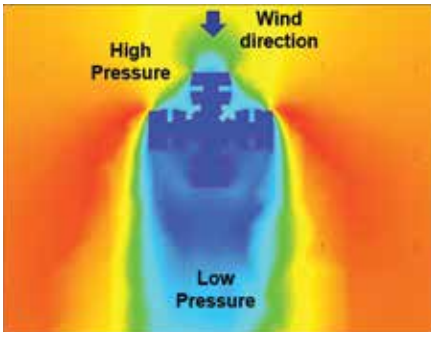


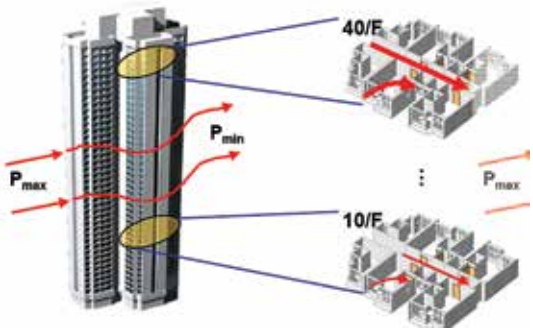
Get Ready for BIM.

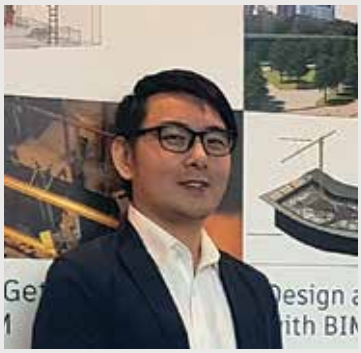
As stated in the latest policy address, BIM will be adopted in the Hong Kong public sector in 2018 and will be encouraged in the private sector in near future. We have now changed from considering whether to use BIM, to how to use BIM in own disciplines and projects. Discussions shall change from focusing on the business values of BIM, to investigating the best practices of BIM. BIM uses such as clash detection, design review, 4D modeling, etc. are commonly known already. But are we all ready for this BIM adoption?

We need to adopt BIM quickly in order to follow or even lead the global trend of BIM adoption. To successfully implement BIM, we need the whole project team or even entire organization of different disciplines to understand BIM and get ready to use BIM. Education and training are hence very important for BIM adoption. In addition, software and hardware need to be ready for efficient modeling, sharing and management of BIM information. Standards shall be available for common BIM representations and approaches for various tasks. Contractual arrangement also need to support procurement, communication, management and delivery of BIM projects in a collaborative manner. There are still several challenges for us to widely adopt BIM currently.

Especially, people are the key for BIM adoption. BIM is about technology, process and people. HKUST and some other higher education institutions have been teaching BIM to our own students in recent years. There are also many BIM seminars and activities in the local industry. However, more efforts are needed to get ourselves ready to the BIM adoption in a cross-disciplinary and full lifecycle manner. For fax machines, benefits to individuals increase as the number of users increases. It also applies to BIM. Hopefully, a larger community of us will get ready for BIM and we can enjoy the full benefits of BIM very soon.







Mr. Froky Y.H. Wong
MSc.IBTM, BSc(Hons), MHKIBIM, MbSHK

Froky is professional member of HKIBIM and Manager working for Hip Hing Construction Co., Ltd. He established an in-house BIM team to support the construction projects. In his career, he has leaded his team on various projects and winning an Autodesk Hong Kong BIM award 2016. He has obtained a Master Degree in Intelligent Building Technology and Management. He is over 10 years of experience on BIM implementation, development and management in Architecture, Engineering & Construction industries and work for BIM projects on Hong Kong, Shanghai, South Korea, Australia, UAE and Qatar.

Froky is currently the Vice Chairman of Autodesk Industry Advisory Board (AIAB) and Co-opt member of the Hong Kong Institute of Building Information Modelling (HKIBIM).

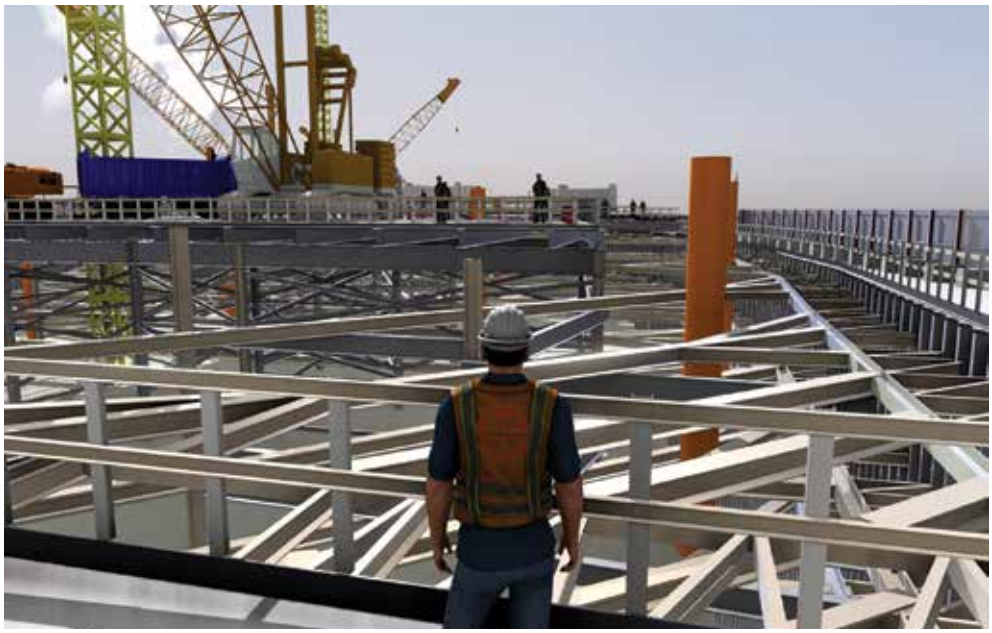


Image courtesy of Hip Hing Construction Co., Ltd

BIM for Construction Management

Autodesk in Hong Kong Construction Industry

Autodesk provides virtual design and construction management solutions to help improve the overall planning, coordination, and control of a project from beginning to end. The Autodesk BIM solutions allow us to explore and evaluate a project's constructability before it's built, improve cost reliability, visualize construction processes through 4D simulation and resolve conflict, increase coordination between stakeholders throughout the design and construction process, and better predict, manage and communicate project outcomes.

Collaborate and contribute for the better new world

Building Information Modelling (BIM) is one of technologies for Virtual Design and Construction (VDC); I believe it also the power of innovation to drive communication and collaboration between architects, engineers, contractors, builders, developers. Among the top benefits of BIM are the reduced project cost and delivery time, the increased productivity, safety and quality, the construction cost control and predictability and the potential of building lifecycle management. These factors affect the design and construction process and also the way the project is managed and delivered.

In recent years, Hong Kong Architecture, Engineering, Construction and Operation (AECO) Industry are benefiting from the new technology and reaching a new stage when company experienced the benefits. As participator we have to think to collaborate and contribute to build our better new world.

Image courtesy of Hip Hing Construction Co., Ltd

Hanson Chan
Design System Specialist,
Store Design
Starbucks Coffee

Hanson Chan manages design system for Starbucks Asia Pacific Store Design team which consists of architects, interior designers and graphic designers. The team designs every store for markets including Australia, Brunei, Cambodia, Hong Kong, Indonesia, India, Korea, Macao, Malaysia, Philippine, Singapore, Taiwan, Thailand and Vietnam. Asia is Starbucks's fastest growing region globally and Hanson assists his company to complete over 500 projects in the region last year. The scope of the team includes not only interior design works but also architecting stand-alone building for multi-stories project. Hanson also involved in multiple high-profile projects which require advance use of BIM. Apart from interior designs, he has solid experience in BIM solutions for engineering consultancy and construction.

BIM for Interior Design

Starbucks mission is to inspire and nurture the human spirit – *one person, one cup and one neighborhood at a time*. Achieving this while growing our store portfolio rapidly across Asia is central to our aspirations, ensuring that each new store provides a warm space that fosters moments of connection. In Asia, our fastest growing region, BIM offers increased efficiencies in drawing production which helps us to achieve long-term sustainable growth.

BIM software offers a clear advantage for Starbucks designers who seek to create drawings that are accurate and informative, working in a high growth, fast-paced environment. While there are common industry perceptions that BIM is *not* relevant for use in interior design projects (tight project timelines do not allow designers the luxury to build a 3D model from 2D drawing, and interior design projects have more detail and organic designs which BIM software is not strong at handling), Starbucks believes that BIM is a great asset in the designers' toolkit if it is used with brand relevant training and comprehensive design system management. Here are some ways in which BIM software can enhance design work when used strategically.

Design with BIM Saves Time

Unlike most BIM projects in Hong Kong where BIM models are built from 2D drawings, Starbucks uses BIM software to design every store from day one. Using BIM Software with project templates, designers can generate a full set of 2D drawings from the BIM model. Section views can also be created with one click. From our experience, designers spend less time to build a BIM model than a full set of drawings. When we include drawing revisions, the amount of time saved is even more significant.

Automatic Scheduling

Scheduling is also a big advantage we see in using BIM for interior design. With proper preset parameters, schedules are generated automatically from area of wall finishes to number of coffee machines. BIM provides schedules which helps planning and store operations to order items accurately and manage the shipping time. This allows for more efficient coordination with different functions to expedite the planning activities for each store.

3D Visualization

While 3D visualization is nothing new with BIM, it is relatively more important for interior design than it is for construction. It allows non-design professionals (like operators and business analysts) who are less comfortable with reading 2D drawings to understand the design intent and be involved in coordination at the early stages of a project.

BIM + VR

The future of BIM + VR (Virtual Reality) will elevate Interior Design to the next level through a first-person experience. With BIM + VR, a designer can sit at our Design Studio in Hong Kong and study the sunset through the glazing in a store in Bali, and the next second she can bask in every detail of the artwork in a High-Profile store in Seoul.

BIM technology is integral to the Starbucks Store Design teams' creativity and helps us to achieve excellence and deliver the *Third Place* experience to our customers as we rapidly expand our store portfolio, one store at a time.

Mr. David Fung
Business Manager, E Tag Solution & Services Ltd

Mr. Michael Soong
Technical Manager, E Tag Solution & Services Ltd

Mr. David Fung and Mr. Michael Soong are the specialists on Internet Of Things (IoT) solution like BIM data management, Real-time Locating System (RTLS), Video Analytics, Ultra-low power computing and BMS (BACnet) network integration.

Both of them are the founders of E Tag Solution & Services Ltd.

Mr. David Fung is currently the HKCIC BIM Data Management training course tutor.

Construction Operations Management by Real Time Location System (RTLS)

Building Information Modelling (BIM) is growing rapidly and demonstrating its utilization on over-coming tighter schedules, less waste and increased efficiency. Integrating BIM with **Real-time Locating System (RTLS)** brings as a new level capabilities to construction job sites management and **operations on 3D model**. The abilities to real-time and accurately locate people, resources and assets in 3D model on desktop or mobile device, from early job site operations through to post-construction services for building owners. Powerful application includes:

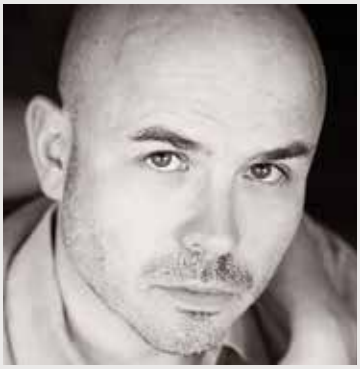
Real-time location and tracking

- Latest RTLS application provides reliable **accuracy of <50cm** of tracking a single object or for building large-scale infrastructures for simultaneous real time positioning of **hundreds of objects** in a web page (Assets/Resources/Materials) without numerous phone calls
- Site workflow movement was tracked and supervisor or manager could **optimize workflow** from site or remote office

Safety Alerts & Management

- If any **emergency or event happens**, the worker can press the RTLS tag button for report and help immediately.
- Besides the reporting the object location, the RTLS can determine the spatial orientation (yaw / roll / pitch) of an object. For example, a forklift felt down or a worker approached a defined hazard area, the RTLS could **detect and automatically send alert** to safety officer immediately

The latest RTLS infrastructure & components support easy deployment and reuse as per your evolving job site's needs.



Marcin Klocek
BIM Manager,
P&T Architects and Engineers Limited
MSc Arch, HKIBIM

Having studied both architecture and computer programming, Marcin is a devoted BIM and computational design enthusiast since 1996 (long before the Revit era). After moving from his native Poland to Hong Kong in 2002 he switched from ArchiCAD to Revit and helped to implement BIM process for geometrically complex projects in Dubai, Singapore and Hong Kong (West Kowloon Terminus). Marcin also taught BIM and Revit at the Faculty of Architecture of the Hong Kong University and spoke at annual Autodesk University (AU) and AIAB conferences. With P&T Architects and Engineers Limited he has been recently working on standardisation of a BIM design process for Hong Kong while publishing from time to time on his website RE-VIT.COM.

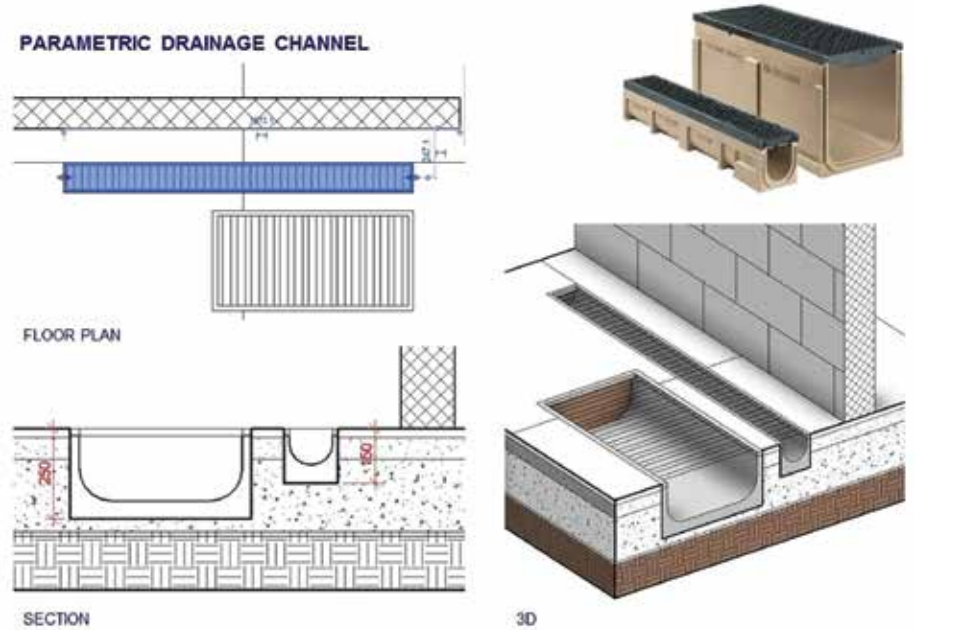


Image courtesy of P&T Architects and Engineers Limited

Parametric BIM components – the key to BIM success

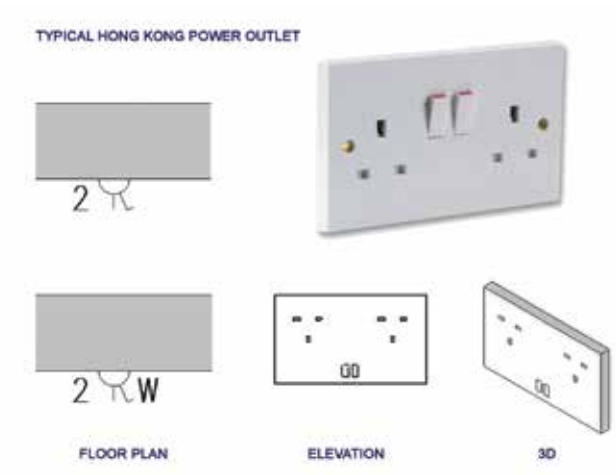


Image courtesy of P&T Architects and Engineers Limited

BIM professionals know well that a BIM system in an organization has to be "implemented" not just "installed" in order to be effective. Implementation is a process of creating BIM standards, training BIM users and running pilot projects. A highly important part of any BIM standard, both for an organization and a jurisdiction (like Hong Kong) is an extensive library of parametric building components ("families" in case of Revit). Such library must be based both on a deep knowledge of general professional standards and the specifics of local regulations and practice. In order to be well understood and easy to use, the library must have a standard of its own covering almost every aspects of its creation process – from component file naming, naming of parameters, ways of managing component visibility in plan, section, elevation, 3D, interaction with the user and other components - to controlling the Level of Detail (LOD) for various uses and project stages. The library of components is to a great extent responsible for the intelligence of the entire BIM system and without much exaggeration it can be said that it is one of the deciding factors behind the success or failure of the full BIM implementation (from concept to construction). However, the most important components for everyday use of the designer are the generic ones rather than commercial objects produced for specific manufacturers. Such generic objects should be used from the very first stage of design when no details are known, because by being highly parametric they offer the level of flexibility necessary for the architects, structural and MEP engineers and other disciplines. There is a shortage of good generic objects available publicly, because building them requires a lot of knowledge, work and testing, which means time. And time is money. There are very good initiatives worldwide for making BIM libraries available publicly, like the British NBS National BIM Library, but even their components, when closely examined in real projects have a lot to be desired. In Hong Kong we can draw conclusions from attempts of other countries and create opportunities and incentives for HK companies to contribute their existing families to the Hong Kong BIM Library. It is high time for the BIM community and public organizations in HK to begin work on such a project together.

Ken Mao
BSc, BEng, MBA, RPE (BUD), MCIOB, MHKIE, MHKIBIM, MbSHK

Ken is currently a Senior Technical Manager working for Paul Y. Engineering Group. In his career, he has engaged in planning and coordination work for a range of construction projects such as commercial & residential buildings, roadwork, slope maintenance and foundation works, etc. over 15 years. In recent years, apart from planning and coordination work, he assists the company to establish an in-house BIM team which provides BIM deliverables to construction projects.

Cloud Collaboration for Construction

From simple file storage, shopping, social media to sophisticated navigation system, more or less we are being immersed in cloud computing technology in our everyday life. Cloud collaboration is not a new term to construction industry. It has been more than decades, online project and document management systems (PDMS) have been implemented in construction projects where project team members are allowed to effectively manage hundreds of thousands submissions, approvals, instructions and inter-parties correspondences. Particularly for mega projects or projects involved with many subcontractors, this kind of cloud-based solution has been proven beneficial to project clients in terms of traceability, reliability and transparency.

With the cloud computing technology getting more mature than the old days, opportunities are given to software developers transforming their desktop applications to online apps providing mobility to the end-users. We have seen the blossom of mobile apps and web apps connecting to a wide range of cloud computing technologies like 3D modelling, 3D model viewer, rendering, photogrammetry, augmented reality (AR), file synchronization and management, defect management system, etc.

The primary benefit of using cloud computing technology in construction projects is that the BIM users like us may be easier to push the tech-reluctant project staff and subcontractors to view and comment the BIM models by using **A360**. For those project staff with CAD experience like project engineers and building services engineers, they are able to easily walk through the BIM models, take measurement, cut sections, track the differences of the BIM models and CAD drawings in different versions, issue RFI, etc. via the aid of **BIM 360 Team**. For modelling team, **Collaboration for Revit (C4R)** helps the on-site BIM modellers to work seamlessly with the off-site BIM team in updating the BIM models being evolved everyday upon design changes are given and site coordination is done. With all these cloud functions, more and more project staff and subcontractors may manipulate the BIM models by themselves. That improves the working efficiency and productivity of the project BIM workflow.

"Single source of truth" is an important element to every project Client because it helps to eliminate the delay and extra cost arising from abortive work, misuse on outdated drawings, missing important instructions, etc. By using **BIM 360 Field**, project team members may assist the project Clients to track defect items and report completion of defect rectification via mobile devices (e.g. iOS and Android) online such that the whole defect management process becomes more and more transparent, efficient and green. Besides, using cloud-based solution may save the project Clients the initial setup cost and maintenance cost for in-promise I.T infrastructure (e.g. servers, firewall, VPN, etc.) serving the same functions of the cloud.

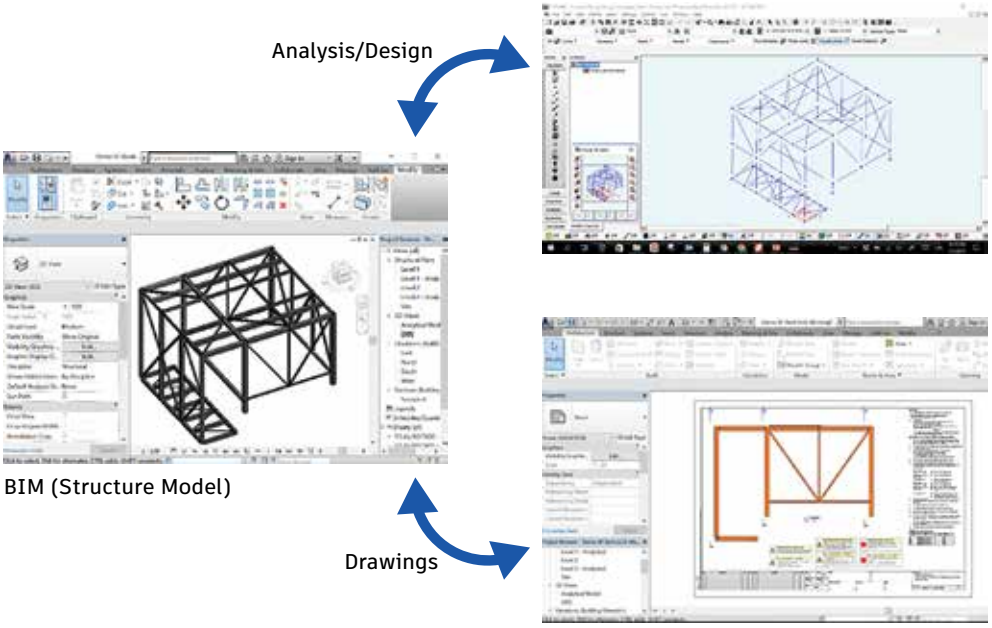
In short, it is definitely that cloud computing technology can really leverage the benefit of BIM in construction projects in terms of collaboration and productivity. In spite of the advance cloud-based collaboration solutions helping the BIM workflow, we should not miss the most basic but essential concept of collaboration which is called teamwork.

Ir Dr George C.K. Wong
PhD MPhil BEng MIStructE
MHKIE RPE

Ir Dr Wong has joined CivilConnect Limited in 2017 as a Technical Director and has been involved extensively in BIM training and development works of structural plug-in for Revit. He also focuses on the technical implementation of BIM for 3D structural modelling with design and analysis data to 2D drawings submission following BIM standard.

He obtained a bachelor degree in civil engineering from the University of Hong Kong. He went on to have MPhil and PhD degrees from the same university with researches in structural analysis and numerical method for highway traffic modeling.

Since his PhD graduation in 2002, Ir Dr Wong has embarked on his structural engineering career and elected as a member of the Institution of Structural Engineers in 2008. He had gained more than 10 years of experience in structural analysis and design and project management of building projects in Hong Kong, Mainland China and Macau while working for ARUP, Meinhardt and Scott Wilson. In addition to structural engineering experience, he was a lecturer at the Department of Civil Engineering, the University of Hong Kong from 2012-2015.



Dear Structural Engineers, let's SIM with BIM!

In a recent survey that I prepared for the HKIBIM Annual Conference 2017 about the status of BIM implementation in Hong Kong Structural Engineering (SE) workflow, it was found that some practitioners who are top management persons of the companies commented that BIM is "useless" for SE. When asked what would be useful to SE workflow in terms of software capacity, they all mentioned something like "(after input data) press a button and then analysis and design results as well as drawings can be produced automatically.". Ironically this is exactly what BIM does! It seems that true meaning of the ubiquitous word or acronym BIM and its usefulness have not been fully conveyed to SE community in Hong Kong.

Thanks to (1) the last Policy Address (Jan 2017) by the then Chief Executive Chung-Ying Leung emphasizing the use of BIM to undertake design of major government capital works; (2) the PNAP ADV-34 by the Building Department (Sep 2016) accepting submission of BIM for reference and (3) the Development Bureau's May 2017 letter to urge companies in the construction industry to get prepared to facilitate the smooth implementation of the BIM initiative, there are more and more structural engineering consultancy companies inquiring about BIM implementation and how it can enhance SE workflow.

Using Revit ®, the most commonly used BIM software in Hong Kong as an example, I have been demonstrating to clients how it can greatly increase the efficiency and improve the quality of works for structural analysis, design and drafting. It is a very simple process. Everything starts with creating a BIM model. Structural analysis and design can then be carried out using its structural analysis plug-in or other common structural analysis software like ETABS and S-FRAME linking Revit. The results will be shared back to the BIM model for drawing production and documentation. This process can be termed Structural Information Modelling (SIM) that is a subset of BIM as it contains information that is necessary for the analysis and design of the structures.

In fact, structural engineers have long been doing SIM by manually linking the three aspects of the workflow: Analysis, Design and Drafting. I believe it is time to advance to automatic linkage between these processes to avoid human error in handling data and improve quality of works as well as communication efficiency.

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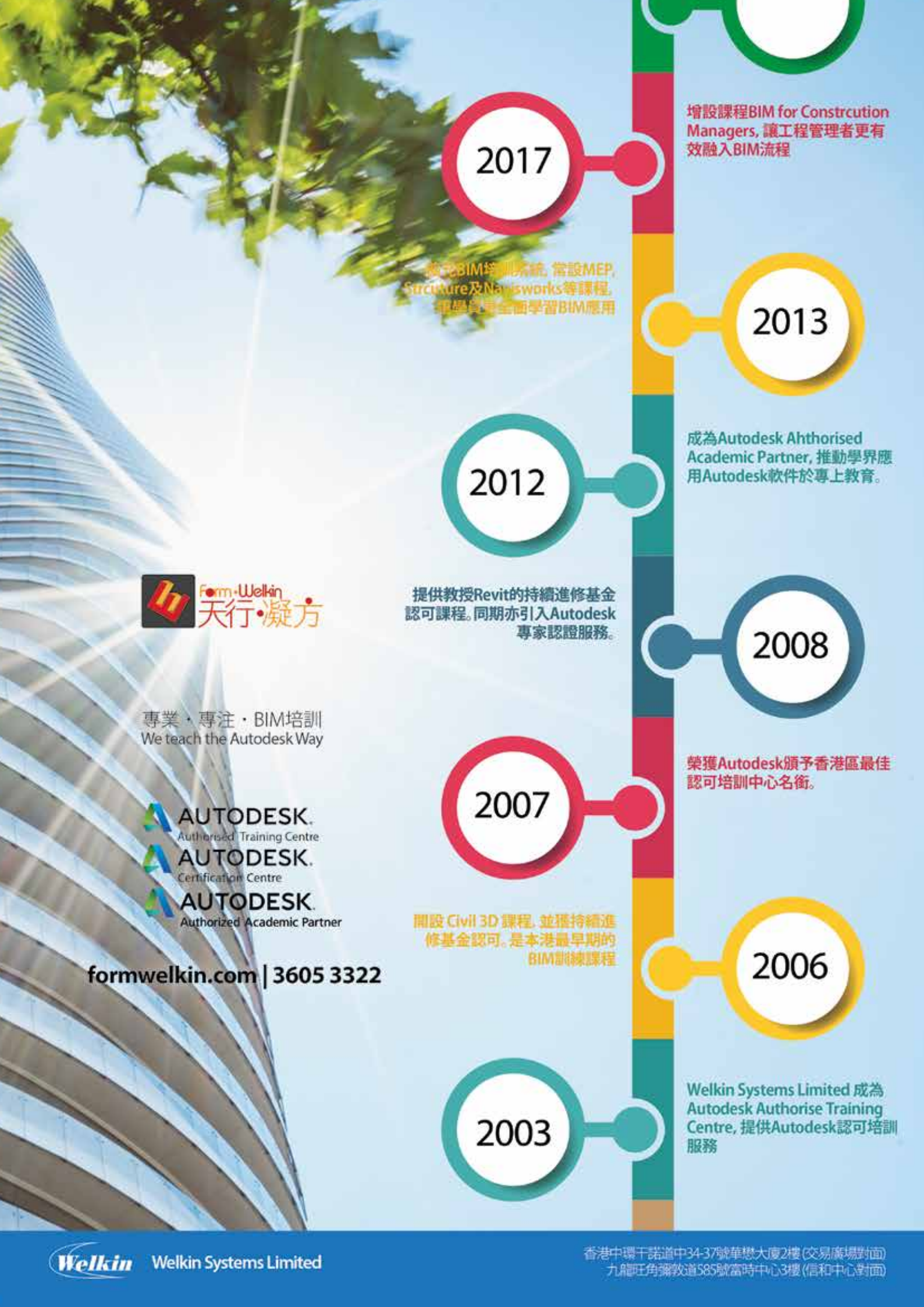

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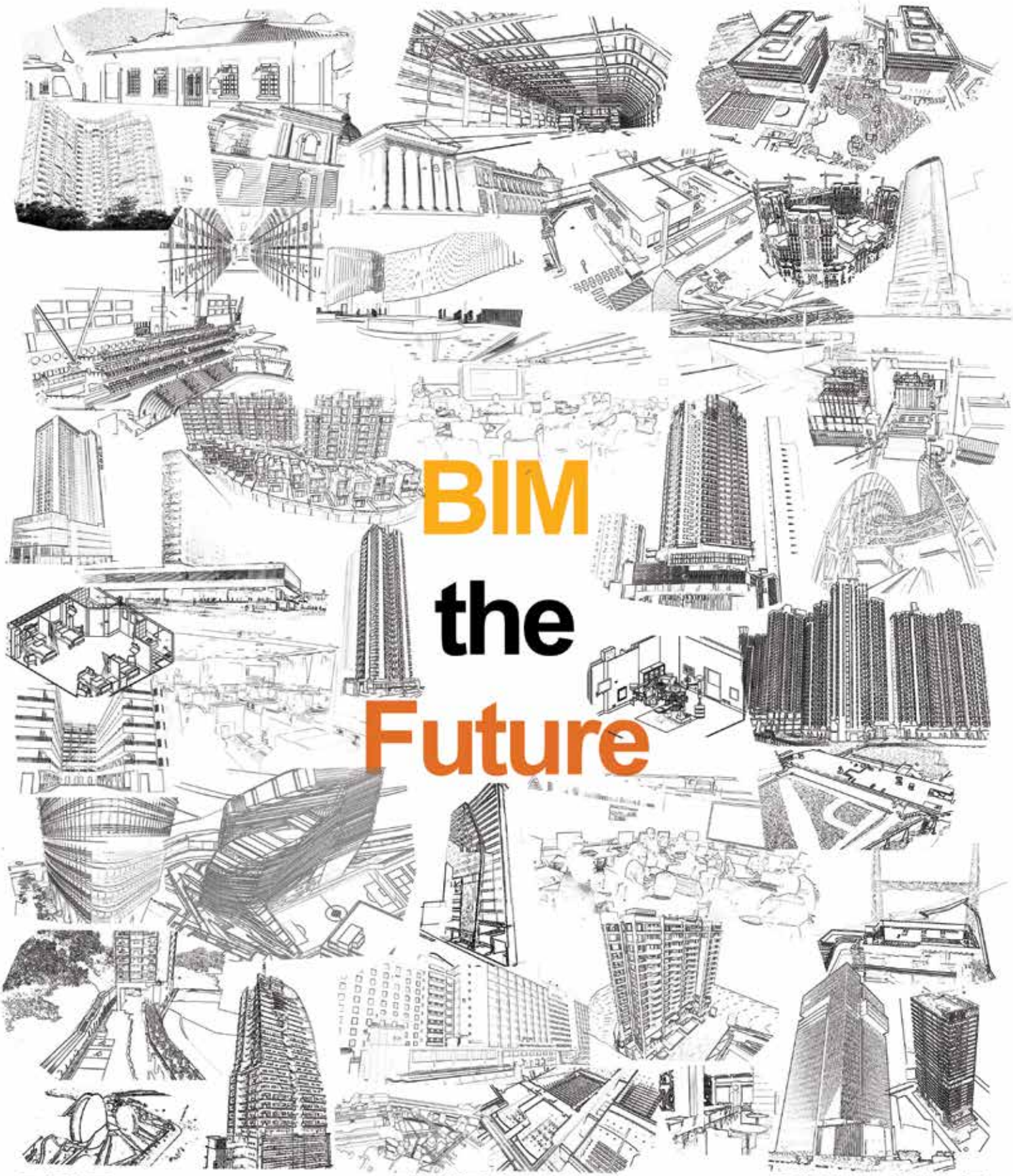

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BIM in Asset Management

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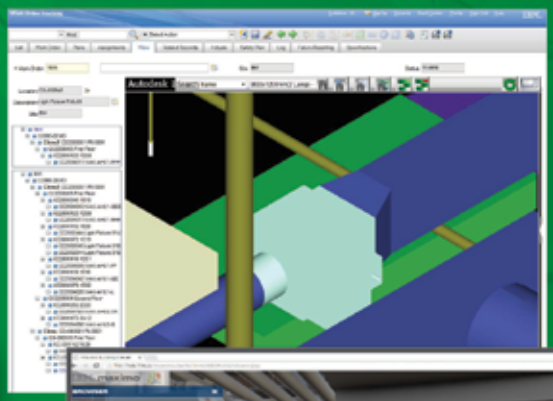
With a BIM model containing all the detailed information regarding the interconnected systems /associated parts and asset history, building owners can manage the operations more effectively and efficiently. The BIM model can be well leveraged as a means of intelligent asset management.

Maximo for BIM Integration

Previously, the process of loading the as-built information into Maximo, your maintenance system is costly, time consuming, and may introduce errors.

Now with the launch of **Maximo for BIM Integration Package**, automatic loading of the data in the BIM model into Maximo is just at your fingertips. Once the data is imported, this package provides 3D visualization of the full building model in context with the imported data. The data, with any changes made during operations may be exported to update the model for a renovation project, or for use in other tools.



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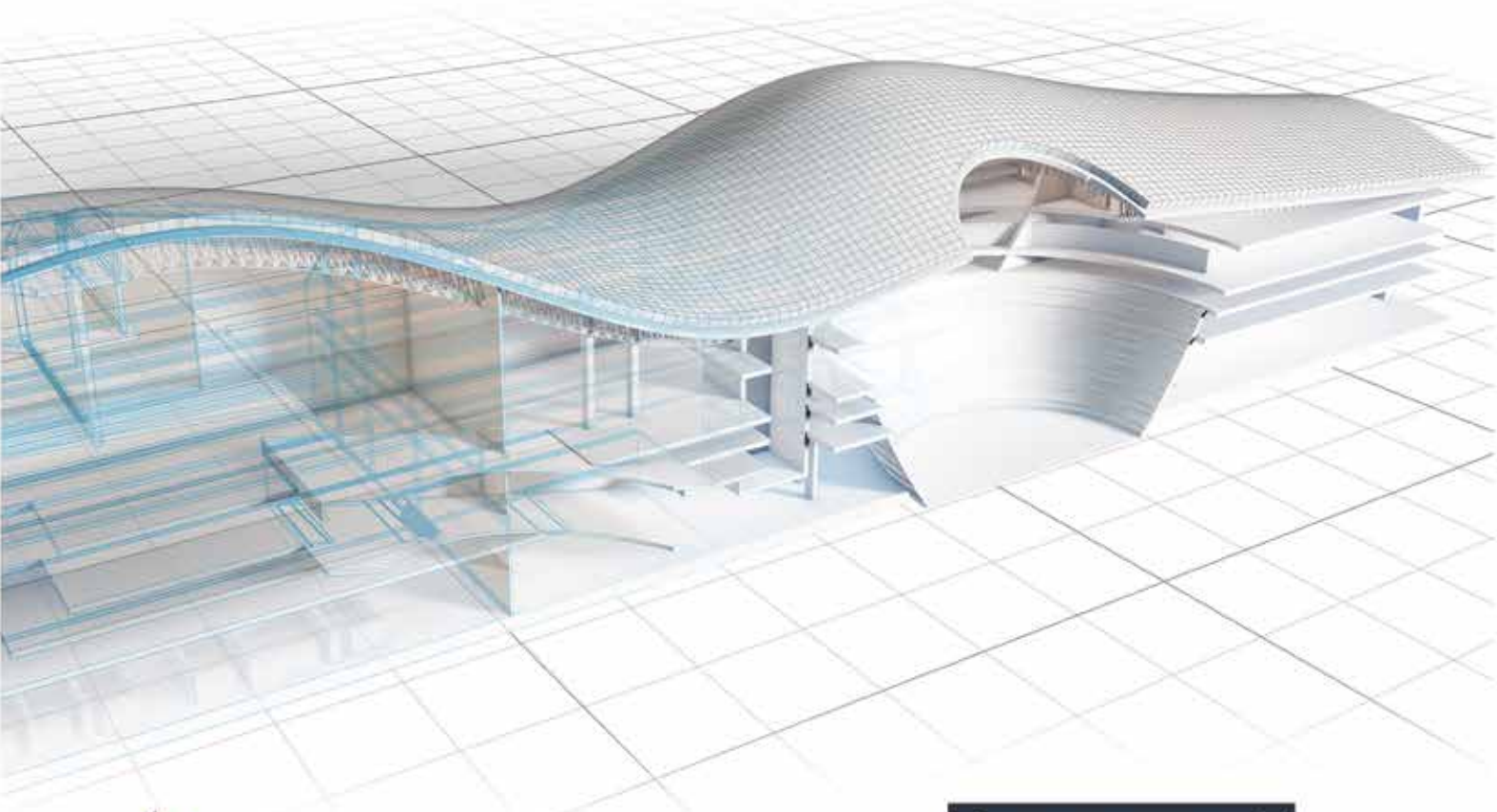

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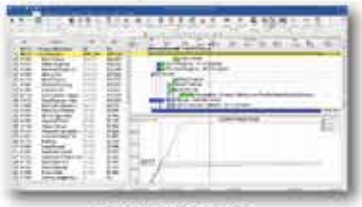

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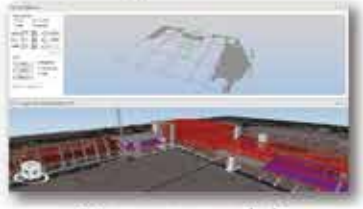

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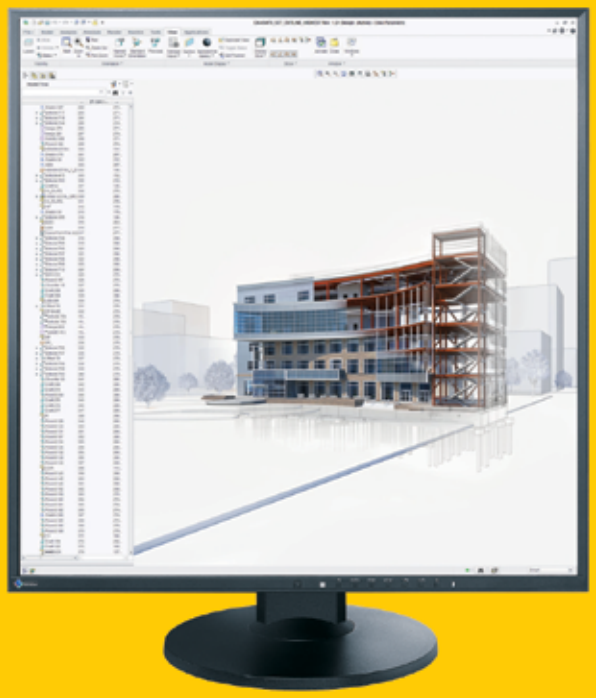

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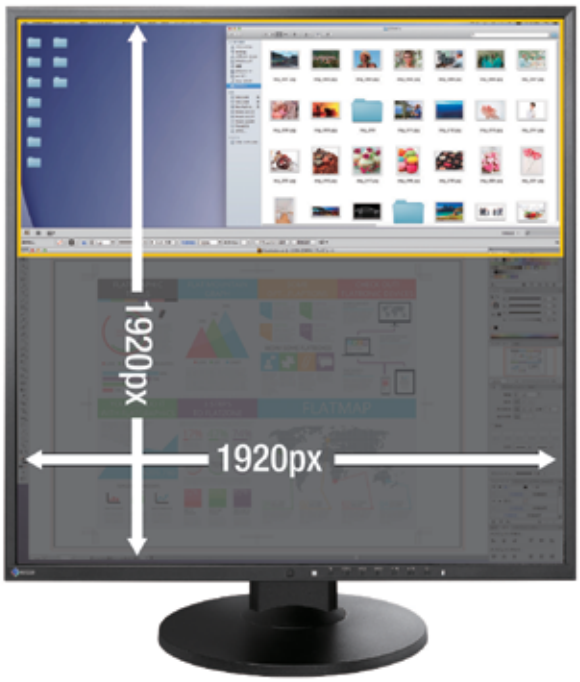

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