Autodesk Hong Kong BIM Awards 2022

AUTODESK



Acknowledgement

Sincere thanks to all the winners – AECOM Asia Company Limited, Agrivert Limited, Alchmex International Construction Limited, Andrew Lee King Fun & Associates Architects Limited, Architectural Services Department, HKSAR, ATAL – Chun Wo – Ming Hing Joint Venture, ATAL Engineering Group, China State Construction Engineering (Hong Kong) Limited, China State Construction International Medical Industry Development Company Limited, China State Construction Science and Technology Limited, CLP Power Hong Kong Limited, David S.K. Au & Associates Limited, Drainage Services Department, HKSAR Government, Electrical and Mechanical Services Department, HKSAR, Henderson Land Development Company Limited, Hip Hing Construction Company Limited, Hip Hing Engineering Company Limited, Hong Kong Baptist University, Hong Kong Housing Authority, Hong Kong Science and Technology Parks Corporation, Kwan Lee - Chun Wo Joint Venture, Leader Bright Limited, P&T Architects and Engineers Limited, Paul Y. - CREC Joint Venture, Shui On Joint Venture, Summit Technology (Hong Kong) Limited, Swire Properties Limited, The Jardine Engineering Corporation Limited, Transcendence Company Limited, Vircon Limited, Water Supplies Department, HKSAR Government, WSP (Asia) Limited, Lao Weng Lam, Li Mingkai, Liu Yuhan and Wong Chun Lok in providing such valuable information and pictures of their projects. Besides, we are extremely grateful for the contributions of the advisor - Dr. Calvin Kam and the AIAB committee and members, Kevin Cheng, Simon Ng and Froky Wong who are profiled in this booklet.

Disclaimer

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Empowering a Sustainable and Green Future with Innovation



Over the past few years, we have all gone through an incredible journey of transformation. From greener buildings to smarter products and mesmerizing blockbusters, Autodesk is committed to empowering innovators like you to design and make a better world for all. With the vision of creating a positive impact on the world, Autodesk strives to advance into a more sustainable, resilient, and equitable future with technology. Building Information Modelling (BIM) undoubtedly plays an indispensable role.

Sustainability is no longer a trend but an imperative for all. As we face unprecedented disruptions, we need novel solutions and creative minds. Today, talents in the architecture, engineering, and construction (AEC) industry are demonstrating their outstanding capabilities to design, collaborate, and build in ways that improve productivity while reducing waste, saving costs, and addressing pressing needs not just for today but also tomorrow.

More innovators worldwide are working together to make net-zero energy buildings, implement low-waste and industrialized construction, and develop smart and sustainable cities. At this year's BIM Awards, we are glad to celebrate the notable successes achieved across the AEC industry in Hong Kong over the past year. These include building isolation and treatment facilities at the highest possible standards to fight the pandemic; conserving a historical building from the Qing Dynasty; staying on the cusp of the next wave of change by building an iconic landmark that reimagines "Office for the Future", and many more. All of these are stellar examples of how the smart use of BIM can help transform and advance our future into a better world.

At Autodesk, we are committed to being a trusted long-term partner for our customers and innovators as we navigate the journey of transformation and envision the new possible with technology. As we celebrate the achievements accomplished by the talents, Autodesk is constantly innovating to bring new game-changing technologies that unleash potential with substantial productivity improvements. This year, we are introducing our new AEC industry cloud, which aims to unify BIM workflows for teams who design, build, and operate the built environment. This is just the beginning of the "next-generation" toolset for the AEC industry at Autodesk. Powered by AI and machine learning, the new technology will enable us to empower the pre-design and early design stages with the extended use of BIM. In addition, we are also sparing no effort in providing better support to our customers and innovators across the building lifecycle, with innovations that enable centralized data management, improved organization, and closer collaboration.

As an industry leader, Autodesk strives to bring new and better experiences, ideas, and value to help innovators advance their capabilities and create new opportunities. The winners of this year's Autodesk BIM Awards have shown us their inspiring vision, extraordinary drive, and exemplary execution that raise the industry's bar. On behalf of the Autodesk Asia Pacific team, I salute every one of them for their impressive achievements. I hope their success will offer insights and inspiration to all of us as we work together for a more sustainable and resilient future. Let us not wait for progress, let's make it together.

Haresh Khoobchandani Vice President, Asia Pacific Autodesk

Autodesk Hong Kong BIM Awards 2022 Congratulations to all the winners!



The Hong Kong University of Science and Technology Li Mingkai, Liu Yuhan, Wong Chun Lok, Lao Weng Lam

Award Winners





ORGANIZATION Architectural Services Department, HKSAR PROJECT Heritage Building Information Modelling for Cultural Heritage Conservation at Tai Fu Tai Mansion

ORGANIZATION

ORGANIZATION

PROJECT

Architectural Services Department, HKSAR China State Construction Engineering (Hong Kong) Limited China State Construction International Medical Industry Development Company Limited PROJECT Design and Construction of Community Isolation and Treatment Facilities at Penny's Bay and Area Adjacent to the Kai Tak Cruise Terminal



ORGANIZATION Architectural Services Department, HKSAR Shui On Joint Venture Vircon Limited PROJECT Design and Construction of a purpose-built Multi-Welfare Services Complex



The Henderson
ORGANIZATION
Hip Hing Construction Company Limited
Leader Bright Limited
ATAL Engineering Group



Leader Bright Limited ATAL Engineering Group Vircon Limited PROJECT SOGO Kai Tak

Hip Hing Construction Company Limited

Henderson Land Development Company Limited

ORGANIZATION Hip Hing Construction Company Limited Swire Properties Limited PROJECT Two Taikoo Place

ORGANIZATION Hong Kong Baptist University China State Construction Engineering (Hong Kong) Limited China State Construction Science and Technology Limited Transcendence Company Limited P&T Architects and Engineers Limited PROJECT Jockey Club Campus of Creativity (JC³)



ORGANIZATION

Water Supplies Department, HKSAR Government ATAL – Chun Wo – Ming Hing Joint Venture Summit Technology (Hong Kong) Limited PROJECT In-situ Reprovisioning of Sha Tin Water Treatment Works (South Works)

- Water Treatment Works and Ancillary Facilities



Architectural Services Department, HKSAR

PROJECT

Heritage Building Information Modelling for Cultural Heritage Conservation at Tai Fu Tai Mansion

LOCATION

Wing Ping Tsuen, San Tin, Yuen Long

Facility Management

SCHEDULED TIME OF COMPLETION August 2021

"Tai Fu Tai Mansion is the first government owned Chinese style monument in testifying the use of BIM on heritage conservation in Hong Kong and is one of the pilot projects for the purpose of building up the as-built BIM inventory for Architectural Services Department. In echoing government's support of innovation and technology, we hope to establish a comprehensive database together with HBIM models for managing conservation information to facilitate effective facilities upkeep of historic buildings in future.'

—Alan Sin

Assistant Director (Property Services), Architectural Services Department, HKSAR

—Liny Lau

Senior Maintenance Surveyor/ Heritage, Architectural Services Department, HKSAR

—Ken Ma

Senior Property Services Manager/ SD32, Architectural Services Department, HKSAR

BIM PARTNERS

WSP Hong Kong Limited Revival Heritage Consultants Limited

AUTODESK PRODUCTS USED Autodesk® BIM 360® Docs

Autodesk Forge® Autodesk® ReCap® Pro Autodesk® Revit®

New Era of Heritage Conservation with Adoption of Heritage Building Information Modelling



Project Background

Tai Fu Tai Mansion is a two-storey grey brick mansion with delicate design and rich embellishments in around 1865 in the fourth year of the Tongzhi Reign of the Qing Dynasty. It is a rare example of traditional Chinese residence in Hong Kong built by an eminent gentry (Man Chungluen) who received the imperial title of Tai Fu. As such, the residence is named as Tai Fu Tai. The main building of Tai Fu Tai is a two-hall, three-bay structure with side chambers flanking the courtyard. There is a one-bay ancillary building on each side of the main building. It was declared a 3D Photogrammetry Scanning VS Existing Conditions Image Courtesy of Architectural Services Department, HKSAR (ArchSD)

monument in 1987.

The project is about developing a Heritage Building Information Model (HBIM) for the Tai Fu Tai Mansion to augment conservation and facilities upkeep of the historic fabrics. The project lasted for 7 months and was completed in August 2021.

Objective of HBIM

By the adoption of 3D photogrammetry scanning and historical research, the existing environment and historic merits could be accurately collected for building up the BIM model and also the phasing



Revival of Tai Fu Tai Mansion through HBIM Image Courtesy of ArchSD



InstaPro 360 Degree Camera & Tripod for conducting 3D scanning works Image Courtesy of ArchSD

of architectural changes from 1865 to 2021 to illustrate the historic evolution of the site and its context. The HBIM for Tai Fu Tai Mansion is developed as an interface and platform to visualize, share and navigate the heritage information available on the dimension and state of conservation of the historic building for bettering of heritage conservation and facilities upkeep. The as-built BIM models allow easy extraction and dissemination of data and information for the production of architectural drawings with detailing of Character-defining Elements (CDEs) such as artworks including painting, carving, ceramic and plaster figurines, murals and mouldings.

Conservation Management Plan (CMP)

Built over a century ago, Tai Fu Tai Mansion has witnessed many human activities and experienced various alterations. Design information, drawings and construction records of heritage buildings are usually missing or lost. In order to retain the tangible and intangible heritage values, an extensive research on its architectural merit, historical interest, social values and maintenance requirements was conducted. Interview with academics, Antiquities & Monuments Office and local villagers were carried out to verify the information. The aim of Conservation Management Plan is to examine the heritage values, identify the CDEs of the site, assess their significance as well as opportunities and constraints so as to develop a Practical Conservation Policy. Information of research findings would be integrated with Building Information Modelling (BIM).

Data Collection by Photogrammetry

3D photogrammetry scanning has been utilized for many years to record and model the geometric features of buildings and environments. These technologies can be used to perform Heritage Building Information Modelling to digitally restore valuable artifacts and spaces. This 3D scanning solution allows the creation of high quality photorealistic 3D models. The diversity and complexity of the close range objects allow us to confirm the feasibility of the processing to archive high quality virtual outputs either in 2D drawings or in 3D models and objects. Furthermore, true dimensional BIM objects with realistic texture can be quickly generated or converted from photorealistic 3D models to enhance the visualization and quality of as-built BIM models.

Character-defining Elements (CDEs)

According to the Standards and Guidelines for the Conservation of Historic Places, character-defining elements mean "the materials, forms, location, spatial configurations, uses and cultural associations or meanings that contribute to the heritage value of a historic place, which must be retained in order to preserve its heritage value". Tai Fu Tai Mansion, with many exquisite and colourful timbercarved elements, plaster motifs and sculptures, Shiwan ceramic figurines, wall paintings, etc. demonstrates a high level of craftsmanship, architectural and aesthetical values of the building. It is essential to identify, record the CDEs of the monument and their level of significance in the BIM model to justify any future treatment to CDEs.

Development of HBIM

The HBIM model is developed as an interface and platform to interlink, visualize, analyze and navigate the heritage information available on the dimension and state of conservation of the monument, including: Storyboard - Illustrative images recorded significant changes of Tai Fu Tai Mansion in 6 Phases from 1865 to 2021.

Virtual Tour - Formed with seamless 360-degree spherical panoramic images, key plans, information tags with historical information and images, interactive 3D objects which enable project team or potential user to navigate and visualize the building anytime even when the site is closed or far away from town.



erate 3D scan model from data collected on site Image Courtesy of ArchSD



Heritage Building Information Modelling of Tai Fu Tai Mansion Image Courtesy of ArchSD

團屬

Image Courtesy of ArchSD

3D Objects converted from 3D Scan Model and Historical Information

animations enable maintenance personnel for visualization of the construction

sequence of selected CDEs (the laying of Chinese-style pitched roof structure, timber bracket support, decorative plaster moulding, operation of screen door and brick laying) and helps preserving our valuable heritage to our next generation.

records, animations and essential building information. Production of 4D



BIM-generated as-Built record drawings Image Courtesy of ArchSD



pitched roof Image Courtesy of ArchSD



4D Animation illustrates construction sequence of plaster moulding Image Courtesy of ArchSD

Web-based 3D Model - User friendly, fast, full of features, easy to control and software free for daily navigation and operation i.e. sectional box, dimensioning, zoom & selection, data entries.

4D Animated Video - Simulated the construction sequence or techniques of this monument to enhance the understanding of traditional construction techniques for maintenance personnel.

Application of Innovative Technology

High-resolution 3D mesh model may have trouble being handled in 3D software, therefore a lower-resolution mesh model are required for daily operation. The objective is to make the lower-resolution mesh looks as similar as possible to the high-resolution mesh by generating a normal map using photogrammetry technique. This technique allows UV Map application which is the process of projecting a 2D image to a 3D model's surface for texture mapping. UV texturing permits polygons that make up a 3D object to be painted with colour from an ordinary image. The image is called a UV texture map. When the scene is rendered, each triangle will map to the appropriate texture. This process is known as UV unwrapping. The mesh optimization is performed to reduce unnecessary geometry complexity keeping the look same as the original one.

Facilities Upkeep and Maintenance

The production of accurate as-built BIM models is set according to ArchSD Building Information Modelling (BIM) Guide for Facilities Upkeep. It also demonstrates the potential of using BIM for facilities upkeep and heritage conservation, especially the use of timeline function to illustrate the contextual development of the site and the storage of archival records by means of CDEs schedule, photographic



Virtual Tour Image Courtesy of ArchSD





Timeline development of Tai Fu Tai Mansion Image Courtesy of ArchSD

About Architectural Services Department, HKSAR

Architectural Services Department (ArchSD) was found in 1986 serving as one of the works departments under the Development Bureau of the HKSAR Government for the development and upkeep of public facilities. Our aim is to provide efficient and cost-effective professional and project management services for the design, construction, maintenance and refurbishment of government buildings and facilities. We also provide professional and technical advice to the Government and quasi-government organizations. Our mission is to serve and care for our community by enriching the living environment through high quality professional services; and to promote best practices in the building industry.

Architectural Services Department, HKSAR China State Construction Engineering (Hong Kong) Limited

China State Construction International Medical Industry Development Company Limited

PROJECT

Design and Construction of Community Isolation and Treatment Facilities at Penny's Bay and Area Adjacent to the Kai Tak Cruise Terminal

LOCATION

Penny's Bay and Area Adjacent to the Kai Tak Cruise Terminal

түре

Government Project

SCHEDULED TIME OF COMPLETION June 2022

"In the post-pandemic era, faced with various changes and uncertainties, we should always maintain an adaptive and creative mindset. We should quickly introduce innovative methods to build the necessary infrastructures. By this we can fulfill the mission bestowed by this era, and also breathe new vitality into the traditional construction industry."

—Zhang Yi

Assistant President, China State Construction Engineering (Hong Kong) Limited

General Manager, China State Construction International Medical Industry Development Company Limited

BIM PARTNERS

China State Construction Science and Technology Limited

AUTODESK PRODUCTS USED

Autodesk® 3ds Max® Autodesk® AutoCAD® Autodesk® BIM 360® Autodesk® CFD Autodesk® Civil 3D® Autodesk® Navisworks® Autodesk® Revit®

Turn the impossible to possible!



Image Courtesy of Architectural Services Department, HKSAR and China State Construction Engineering (Hong Kong) Limited and China State Construction International Medical Industry Development Company Limited

In late January 2022, the fifth wave of Covid-19 struck Hong Kong, and the demand for medical isolation facilities increased sharply. Our project team is honored to undertake the anti-pandemic project's design and medical planning work once again.

As the isolation and treatment facilities with the highest standards, projects located adjacent to the Cruise Terminal located on the runway of the former Kai Tak Airport and Northeast to the Lantau Island. The Kai Tak project covers an area of 108,200 square meters with a construction area of 114,773 square meters. Penny's Bay project covers an area of 449,743 square meters, with construction area of 271,784 square meters. In total the two projects provided 9,112 isolation units with 20,064 isolation beds, which is more than double of the existing isolation beds number in Hong Kong.

The projects also provide supporting facilities for the Civil Aid Service, the



The KT Community Isolation Facility Image Courtesy of Architectural Services Department, HKSAR and China State Construction Engineering (Hong Kong) Limited and China State Construction International Medical Industry Development Company Limited



Image Courtesy of Architectural Services Department, HKSAR and China State Construction Engineering (Hong Kong) Limited and China State Construction International Medical Industry Development Company Limited

Hospital Authority, the Department of Health, the Fire Services Department, the Electrical and Mechanical Services Department and the Hong Kong Police Force for the daily operations. Penny's bay used "Nature" as the graphic design theme, combining with the theme's colors and the blue sky and beautiful sea view of the Penny's Bay, relieve the tension of the users. For the first time in Hong Kong, an elevator system has been built to service the 4-storey building within community isolation facility. A series of color schemes and the theme patterns of city silhouette, sunshine, rainbow, combining with the design elements of "Kai Tak Current of Vitality", bring in vitality and color to the facility. The design theme is named "Hong Kong Kai Tak • Rainbow After Rain", which symbolizes Hong Kong people standing together to overcome the epidemic and welcome the rainbow after the storm. Total Green areas of 140,000 square meters are incorporated with plants of different colors to bring vitality to the community. A stone feature wall with the shape of lion is set in Kai Tak project Phase 3, symbolizing the Lion Rock Spirit of overcoming adversity in the epidemic.

As medical isolation facilities, the separation of clean and dirty zones is well planned for both projects. The MiC area is the dirty zone, while the supporting facilities are clean zones. In each isolation building, the isolation room is the dirty zone, and the corridor is relatively clean zone. The bathrooms are offset to the opposite building; natural ventilation design is adopted to avoid the un-predicted flow due to the use of exhaust fans. The condensate drainpipe of the air-conditioner is specially equipped with U-Trap to prevent cross infection and backflow of polluted air. The interior wall finishing is made of antibacterial material, with easy-cleaning skirting. Sewage system adopts W-Trap design,

and drainage pipes are connected to the vent pipe to prevent siphon effect; the drainage system is two pipes system with easy maintenance design. CFD simulation is carried out for the air flow pattern in the roof area. By using the Autodesk CFD, according to results under extreme conditions such as wind speed of 220 kilometers per hour, the height of the vent pipe was raised to more than 3 meters, so that the polluted air can be directly discharged into high-velocity area, complying with the infection control standards and requirements of the World Health Organization and Hong Kong local standards.

Based on DfMA design concept, with the help of the Autodesk products and BIM technologies, the design team uses MiC rooms as the main body, with MiC corridors, MiC stairs, MiC ELV Room, DfMA corridors and the first mixed-structure DfMA lift shaft in Hong Kong. Compared with traditional methods, modular construction method reduces 80% construction waste, and is low-carbon and energy saving. The factory production work runs simultaneously with the site preparation work, achieving higher quality and efficiency. The dimensions of all modules are designed to enable easy transportation and installation, and disassembly and reassembly in future. The project has set a record in the prefabrication ratio among the permanent buildings in Hong Kong and is a pioneer in the era of construction industrialization.

In addition to the modular building, the team use DfMA method to design the



BIM Simulation in MiC Hoisting and Installation Image Courtesy of Architectural Services Department, HKSAR and China State Construction Engineering (Hong Kong) Limited and China State Construction International Medical Industry Development Company Limited



The Penny's Bay Community Isolation Facility View in Night Image Courtesy of Architectural Services Department, HKSAR and China State Construction Engineering (Hong Kong) Limited and China State Construction International Medical Industry Development Company Limited



The Lion Rock inside the KT Community Isolation Facility Image Courtesy of Architectural Services Department, HKSAR and China State Construction Engineering (Hong Kong) Limited and China State Construction International Medical Industry Development Company Limited



Image Courtesy of Architectural Services Department, HKSAR and China State Construction Engineering (Hong Kong) Limited and China State Construction International Medical Industry Development Company Limited



mage Courtes of Architectural Services Department, HKSAR and China State Construction Engineering (Hong Kong) Limited and China State Construction International Medical Industry Development Company Limited



Laser Scan for BIM Model Checking Image Courtesy of Architectural Services Department, HKSAR and China State Construction Engineering (Hong Kong) Limited and China State Construction International Medical Industry Development Company Limited



The CFD Simulation by Using the Autodesk CFD Product Image Courtesy of Architectural Services Department, HKSAR and China State Construction Engineering (Hong Kong) Limited and China State Construction International Medical Industry Development Company Limited

supporting facilities as well. For instance, the DfMA water pump is assembled at the factory, and shipped to the site for quick installation. All pumps are equipped with LoRaWan wireless signal transmission system. By this IoT technology, the transmission distance can be up to 10 kilometers and the operation of pumps can be remote monitored at the central control room in real time.

The two project provides 8408 standard rooms, 306 2-unit family rooms, and 216 3-unit family rooms. There are 182 units designed for handicapped, with 1.5-meter width barrier-free corridor. This meticulous attention to meet the needs of various users reflects a human-centered design approach.

The Community Isolation and Treatment Facility at Kai Tak and Penny's Bay Project meet the permanent building standard and requirement. It is also a major pandemic cum people's livelihood project. It can be used as an important backup medical facility in Hong Kong. Once again, by adopting the BIM and related innovative technologies, we have created an icon for design and rapid construction, and another leading success on the road of construction industrialization!



The project team Image Courtesy of Architectural Services Department, HKSAR and China State Construction Engineering (Hong Kong) Limited and China State Construction International Medical Industry Development Company Limited

About Architectural Services Department, HKSAR

The Architectural Services Department (ArchSD) serves and cares for our community by enriching the living environment through quality professional services. ArchSD ensures the quality, cost effectiveness and sustainable development and upkeeping of community facilities; provides quality professional advisory services on community facilities and related matters; and promotes best practices in the building industry. ArchSD is also committed to collaborating with the industry partners, user departments and stakeholders in developing and maintaining the public facilities for providing a better service to the general public.

About China State Construction Engineering (Hong Kong) Limited

China State Construction Engineering (Hong Kong) Limited started its construction business in Hong Kong in 1979. The Company engages in building construction and civil engineering works. China State Hong Kong plays an active role in the construction industry by means of its sound quality management and has professional expertise capable of undertaking high quality and technically advanced projects. It has undertaken over 800 construction projects in Hong Kong and Macau over the past 40 years and has acquired substantial experience and capabilities in doing so.

About China State Construction International Medical Industry Development Company Limited

CSIM is well known for its expertise in the design and construction of high-standard hospitals and is exceptionally familiar with Hong Kong, UK, US & EU construction standards. In addition, through its continuous and active participation in the construction of numerous large-scale hospitals projects in Hong Kong over the past decades, CSIM has built up its reputation in high-standard international hospital construction and has developed a highly experienced management team for EPCO hospital projects.

Architectural Services Department, HKSAR Shui On Joint Venture Vircon Limited

PROJECT

Design and Construction of a purpose-built Multi-Welfare Services Complex

Area 29, Kwu Tung North New Development Area

Multi-welfare Services Complex

SCHEDULED TIME OF COMPLETION Q4 2022

"One of the pioneer project of North East New Territories New Development Area sets a new benchmark for its kind. With the advantages of development collaboration by Building Information Modelling (BIM), Modular integrated Construction (MiC), Multi-trade integrated MEP (MiMEP) and Design for Manufacture & Assembly (DfMA), the project achieves safety, less pollution and greater digital uses with innovation tools adopted. ArchSD, SOJV and Vircon believe that the tools we used will strive for the better future for the project lifecycle."

— Ms. Xenia Kwan Senior Project Manager, Architectural Services Department, HKSAR

- Mr. TS Chan Project Manager, Shui On Joint Venture

— **Mr. Jim Yiu** Senior BIM Engineer, Shui On Joint Venture

— **Dr. Neo Chan** Director, Vircon Limited

BIM PARTNERS

P&T Architects and Engineers Limited J. Roger Preston Limited Southa Technical Limited

AUTODESK PRODUCTS USED

Autodesk® AutoCAD® Autodesk® Civil 3D® Autodesk Construction Cloud® Autodesk Forge® Autodesk® InfraWorks® Autodesk® Navisworks® Freedom Autodesk® Navisworks® Manage Autodesk® ReCap® Pro Autodesk® Revit® Autodesk® Vehicle Tracking Stepping Forward to Construction 2.0 – with Digitalization, Innovation, BIM, MiC, MiMEP and DfMA



Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

Multi-welfare Services Complex

Multi-welfare Services Complex is located at Area 29 of Kwu Tung North New Development Area. It spans a site area of approx. 10,300 m2 and a total gross floor area of approx. 44,000 m2. Managed by ArchSD, the project was commissioned to SOJV for the design and construction of the complex in December 2019. The project consists of a 8-storey building, providing 1,750 places of residential care homes for the elderly, care and attention home for disabled persons, and day activity centre cum hostel for mentally disabled persons. The MWSC will provide reprovisioning accommodation for the eligible elderly residents currently living in Dills Corner Garden in the vicinity.

BIM Adoption and key statement

To align with project vision and building concept, the project team integrated



Off-site MiC production factory in Humen(虎門), China Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited



BIM with innovation and technology during whole project lifecycle, which includes MiC, Design for Manufacture and Assembly (DfMA), Multi-trade Integrated MEP (MiMEP), Safety enhancement, Smart Building and Digitalization. The extensive use of BIM can nurture promising coordination, valuable design, and ultimately be beneficial to all stakeholders in the project.

Collaboration of BIM + Common Data Environment + open BIM Integrated with Autodesk

To enhance whole project coordination efficiency throughout the project lifecycle, all stakeholders are encouraged to make effective use of the innovative and integrative digital platforms, to timely update, review and provide feedbacks on project matters with the support of BIM. CDE BIM 360 serves as the core carrier for Project Information Models (PIM) and documents. Autodesk Revit and Navisworks also support with open BIM collaboration, which defines the schema in neutralizing BIM formats, to smoothen the information exchange across different digital platforms. The sophisticated collaboration practice of CDE will continue to as-built stage. In the meantime, integration with other types of technology has also been practised and further investigated.

Combination of Modular Integrated Construction (MiC), Multi-trade integrated MEP (MiMEP) & Design for Manufacture and Assembly (DfMA)

To achieve well-organized preparation, all stakeholders are involved to build up the MiC module in early design stage into BIM model. After first BIM module prototype has been released, further detailed coordination could be proceeded by analyzed BIM Data; such as concrete volume and weight of MEP services extracted for accurate structural analysis to design assembly methods etc. The BIM module prototype is further developed with technical details. To ensure the buildability in the construction site, experience gained from off-site mockup trial run is applied to further developing reliable BIM model by optimising design through BIM simulation before off-site fabrication.

As the MiC construction is a relatively new technology and construction method in Hong Kong, there is a lack of experienced site workers. The chaotic situation and high-risk construction during the installation is predictable. To enhance the understanding of the 16-day MiC installation cycle involving frontline from massive trades, visualized 4D construction sequence was presented to frontline supervisors as well as workers to "easy-to-understand" the steps of installation for each prefabricated component. Furthermore, in order to prevent industrial accidents and enhance the safety awareness for workers involved, VR enabled BIM training kit is well prepared for them to experience the site workplace and all potential risks in the virtual environment to meet "safety first" spirit and protocol.

Benefits of BIM and Innovation

The use of BIM significantly improves the communication among project teams and enhance the design and manufacturing quality of MiC. Since project commencement in Dec 2019, a short summary of achievements was presented on the environment, community, and economy.

In this project, a total of 1,764 MiC



Clash analysis and collaboration in BIM 360 Platform Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited



Automatic checking of staircase headroom by Autodesk Dynamo Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited



Interior Rendering of MiC Dormitory Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited



First Run of MiC Mock up and lifting for future MiC Installation Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited



Cycle Installation of trunking by Multi-trade Integrated MEP (MiMEP) in MiC corridor Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited



Integration of RFID with BIM in Common Data Environment Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

modules were successfully installed, and no MiC module was discarded due to fall-short of standard. As 42% of total CFA was constructed by MiC technology, in-situ dust and noise nuisance to the surrounding environment, together with construction waste, has been diminished compared to traditional in-situ construction method.

For health and safety, MiC modules were fabricated on ground level inside the factory. It eliminates the risk of fall from height for those who are working-aboveground like formwork erection and rebar fixing. In addition, the indoor working environment protects the workers from suffering adverse weather condition. For example, 58 days "Very Hot Weather Warning" were recorded in 2021 and hence the risk of heat stroke can be reduced.

Good Practice: Sample Showcase of Practicing Innovative Ideas

This project trivially demonstrates that initial BIM standardization, as guided by CIC BIM Standards - General (Ver 2.1), DevB BIM harmonisation guidelines v1.0, and ISO 19650 in design and construction stage, and ArchSD BIM Guide for Facilities Upkeep (Version 2.0), will open the door to plenty of technology integration opportunities. Innovations could not be achieved without solid foundation of reliable metadata. Such foundation, to our fortune, has been collaboratively set up by huge pool of stakeholders throughout the project lifecycle.

At the design stage, Architect, Structural Engineer, BS Engineer and Specialist Sub-contractors paid joint effort in the BIM input process through regular design workshops. This workflow allows reliable and data-rich BIM model for application in other deliverables. For instance, clash analysis, phase planning, financial model, digital fabrication, etc.

Full adoption of CDE also demonstrates another good practice. Due to COVID-19



Implementation of dashboard to demonstrate the instant data of concrete volume Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

pandemic in the past few years, quarantine measures are required for both entering and returning from Mainland. To support the factory-based project team members to conduct routine inspection and management on MiC production, continuous and instant information exchange between project site and MiC factory was accomplished by means of CDE.

Therefore, it is important to setup the Common Data Environment (CDE) for information and knowledge exchange, especially when project team members are working at different locations.





Overall Bird View, Pioneer MiC project located in Kwu Tung North Image Courtesy of Architectural Services Department, HKSAR and Shui On Joint Venture and Vircon Limited

About Architectural Services Department, HKSAR

Architectural Services Department (ArchSD) was found in 1986 serving as one of the works departments under the Development Bureau of the HKSAR Government for the development and upkeep of public facilities.

Our aim is to provide efficient and cost-effective professional and project management services for the design, construction, maintenance and refurbishment of government buildings and facilities. We also provide professional and technical advice to the Government and quasi-government organisations.

Our vision is to serve and take care of our community by enriching the living environment through high quality professional services; and to promote best practices in the building industry.

About Shui On Joint Venture (HKSE 00983.HK)

A member of SOCAM Development Limited, SOJV is a joint venture of Shui On Building Contractors Limited and Shui On Construction Co., Ltd., combining solid and extensive experience in the construction of public housing, commercial and institutional projects for the government and major institutions.

SOJV has integrated the client, design consultants and various specialist contractors into a single work team so that the design intent and buildability are recognized by all parties throughout the entire development process.

The Shui On corporate culture is based on its commitment to integrity, quality, innovation and excellence, on a set of corporate governance principles, and it is our quest for perfection that has brought Shui On so far. The "Better Tomorrow 2021-2030" strategy sets out what SOJV aims to achieve, as the Company moves to create a positive impact on the economy, environment and the community.

About Vircon Limited

With over 20 years of experience, Vircon Limited is an ISO 19650 certified Hong Kong's premier Digital Twin & BIM solution provider. We have successfully implemented 300+ local and international projects. Vircon is dedicated to providing high quality services and products, customer satisfaction, and continual improvement of our processes. Our Digital Consultants and BIM Specialists help clients to improve safety, optimize production, reduce costs, and mitigate risk throughout the Building Life Cycle. We pride ourselves on supporting innovation, sustainability, and social impact.

Hip Hing Construction Company Limited Henderson Land Development Company Limited

PROJECT

The Henderson

LOCATION

2 Murray Road, Central, Hong Kong TYPF

Office & Commercial Tower

SCHEDULED TIME OF COMPLETION 2023

"The Henderson is set to become a world-class architectural landmark of Hong Kong, "an icon amongst icons". The new super Grade-A office tower will be a showcase for health, resilience, smart technology and sustainability. The Henderson echoes the organic beauty of the natural world, reinterpreting the structural forms and layering of a Bauhinia bud about to blossom."

Kevin Ng

Senior Deputy General Manager, Project Management 2 Department, Henderson Land Development Company Limited

-Edward Chan

Deputy General Manager, Project Management 2 Department, Henderson Land Development Company Limited

— Michael Huen

Project Manager, Hip Hing Construction Company Limited

— Billy Wong General Manager (BIM), Hip Hing Construction Company Limited

-King Wong Assistant Project BIM Manager, Hip Hing Construction Company Limited

BIM PARTNERS

Zaha Hadid Architects Ronald Lu & Partners (Hong Kong) Limited WSP (Asia) Limited Ove Arup & Partners (HK) Limited Sane Form Limited

AUTODESK PRODUCTS USED

Autodesk[®] 3ds Max[®] Autodesk[®] AutoCAD[®] Autodesk[®] Civil 3D[®] Autodesk[®] Dynamo Autodesk Forge® Autodesk[®] Navisworks[®] Autodesk[®] ReCap[®] Pro Autodesk[®] Revit[®]

The Henderson: Master of Curve Unleashed from BIM



Located in the heart of Hong Kong's CBD with sober architectural marvels nearby, The Henderson is targeted to create an "Office for the Future" and "Icon amongst the Icons", with her curvaceous glass façade designed by prestigious Londonbased Zaha Hadid Architects, that mimics layers of a blossoming Bauhinia bud. Erected with high-tensile steel structure, the Tower offers wide span column-free floor plans, providing maximum functional spaces to cater for ever-changing operational needs.

Adding with an all-rounded smart system, The Henderson is envisaged to be an exemplary Grade-A Office for the coming generation and beyond.



Main Entrance (Render by PixelFlakes) Image Courtesy of Hip Hing Construction Company Limited and Henderson Land Development Company Limited and Zaha Hadid Architects

Major Challenges

The high complexity of design gives rise to some unprecedented challenges:

- 1. Comprehensive information diversity (united with over 20 BIM parties from worldwide)
- 2. Massive pre-fabrication scale (over 16,000 tons of steel structure, and double-curved glass panels that is first of its kind in Hong Kong)
- 3. Steel-RC structural interfacings (including capping beams, pre-loaded struts, underslung and outriggers)
- 4. Challenging site constraints (in the world's busiest CBD, with three pairs of live MTR tunnels surrounding the site)



Double-laminated double-curved glass panels (Render by MIR) Image Courtesy of Hip Hing Construction Company Limited and Henderson Land Development Company Limited and Zaha Hadid Architects



Systematic issue records via Navisworks add-in Image Courtesy of Hip Hing Construction Company Limited and Henderson Land Development Company Limited

Solution to Information Diversity – openBIM Approach

Autodesk-openBIM Interoperability To facilitate complicated design interfacing, the project team intensively adopts openBIM to retain maximal graphics and information originated from different design authoring tools. We are pleased that Autodesk products keep the same pace with openBIM advancement, which highly enhances the flexibility for multi-disciplinary collaboration.

BIM Coordination Meeting

Engaging with international stakeholders in this project, a digitization mind-set with cloud-based CDE has early been practiced since design stage. This elevates BIM capability and traceability when it comes to construction stage. With growing BIM maturity, BIM-based coordination has constituted a routine habit, that occupies over 50% of total meetings in construction. This capacity already excels contract requirement, but it in turn creates extra values for information administrations and technical analysis.

Design Review and optimization

Empowered by the insights brought by 4D coordination, the project team frequently collaborates to simulate construction plans ranging from basement excavation, E&M installation, master top-down construction sequence to equipment transportation. Besides, Revit schedules for 5D cost estimation are also configured to consolidate real-time material quantities.

Shop Drawing Production

After intensive coordination and quality checks, the model and data information are maintained in a standardized manner, to ensure a single source of truth for data exchange. Shop drawings such as CSD, CBWD are then consistently re-generated whenever the models are updated.

Solution to Pre-fabrication and Interfacings – DfMA and Site Verifications

Extensive DfMA for Precast Curb In view of multi-faceted challenges and risks in relation to the construction of irregular facade curbs, the DfMA concept is implemented. The façade curbs are inclined in form and possess difficulty on related site works such as concrete formworks. Dynamo is adopted to analyse façade inclination factor, which is applied to modularize the façade curbs to enable pre-cast approach. Eventually, over 70% of facade curbs are modularized and 30% construction time were offset to off-site pre-fabrication factory, which enhances the flexibility of construction plans.

Precision Verification using Laser Scanning Tools

Laser scanning is performed for critical locations to extract as-built conditions accurately. The point clouds are stitched in Recap, and then incorporated with construction BIM models for analysis. The deviation levels are presented in table format for reports, and a colour-coded distribution map for illustration. This implementation effectively controls construction tolerance and keeps tracks on the structural performances of elements such as pre-cambered beams.

MEP Installation Planning using AR Tools

Steel-concrete hybrid framing system in atypical floor layouts creates considerable constraints on vertical clearance of MEP pipe ducts. Moreover, with tight headroom allowances, the MEP routing arrangement is particularly challenging. The project team actively resolves these challenges through walkthroughs, clash detections, and BIM coordination meetings in Navisworks, which has been found to be one of the most efficient viewing engine, in handling enormous model integrity with the least compromise of navigation fluency. After structural framing construction, AR technology is also adopted for MEP installation planning. Site staff can use their own handy smart phones, to overlay the BIM model with the as-built site background, providing them a new intuitive review of installation beyond 2D construction drawings. Due to active BIM contribution, 90% of MEP routings can be coordinated and deployed within the steel floor truss zone, which maximizes clear headroom spacing as per client requirements.

Solution to Site Constraints – Existing Conditions Modelling and Substructure Design Optimization

Existing Environment by 3D laser scanning

Apart from precision verification, 3D laser scanning can also re-create the existing environment in point-clouds, which can



Full BIM in coordination meetings Image Courtesy of Hip Hing Construction Company Limited and Henderson Land Development Company Limited



BIM collaboration process using Autodesk tools Image Courtesy of Hip Hing Construction Company Limited and Henderson Land Development Company Limited



Extensive DfMA for facade curb Image Courtesy of Hip Hing Construction Company Limited and Henderson Land Development Company Limited

integrate with BIM models, to convey the relationship between existing site surroundings and construction models including temporary works. It allows the construction team to visualize the design and construction in a macro perspective.

Vehicle Path Simulation

Located at the Central Business District, the site is compact and particularly sensitive to the traffic flow. Site logistics must be well planned to avoid stagnation of site vehicle and minimize interruption to existing traffic. Vehicle swept path analyses are preformed to ensure a feasible logistic path for site vehicles.

Optimized Design for Pre-Loaded Struts Being surrounded by three pairs of live

MTR tunnels, stability of ELS system and underground earth movement is one of the prime concern of the project team to ensure public safety. BIMenabled design review on the ELS and basement construction was actively adopted. Pre-loaded struts, with their position optimized, are adopted instead of conventional struts in the ELS design. As a result, the top-down construction proceeds smoothly, without warnings of land subsidence.

Keep Exploring, the Sky Is the Limit

The project team endeavors in expanding the value of BIM. For instance, the team leverages the outstanding rendering performances of 3ds Max, to create virtual mockups with a high degree of realism, which will then be exported to VR-enabled tools. As such, clients can get a firstperson perspective on the visual outcome of building views through this immersive experience. The team is also developing an intelligent flow of information among BIM models, Internet of Things sensors, and Facility Management portals, getting prepared for the soft landings towards operational phase, to realize the vision "Office for the Future" and "Icon amongst the Icons".



MEP installation planning using AR tool Image Courtesy of Hip Hing Construction Company Limited and Henderson Land Development Company Limited



Verify installation precision of steel beams between point clouds and BIM Image Courtesy of Hip Hing Construction Company Limited and Henderson Land Development Company Limited



Optimized Design (Preload Strut) Image Courtesy of Hip Hing Construction Company Limited and Henderson Land Development Company Limited





The Henderson (Bird's eye view, Render by Arqui9) Image Courtesy of Henderson Land Development Company Limited and Hip Hing Construction Company Limited and Zaha Hadid Architects.

About Hip Hing Construction Company Limited

Since being established in 1961 Hip Hing Construction Co., Ltd. ("Hip Hing") has grown to become one of the leading contractors in Hong Kong. During this time we have been trusted by our clients to construct many of the landmark buildings which define Hong Kong. The construction services provided by Hip Hing Construction Group have contributed to the development of Hong Kong and its economy and have helped to shape a better living environment for the people of Hong Kong. We have also been embracing advancing technologies to take our services to the next level, so as to meet our clients' needs.

About Henderson Land Development Company Limited

Founded in 1976 and listed in Hong Kong since 1981, Henderson Land Development Company Limited (Stock code: 12) is a leading property group with a focus on Hong Kong and mainland China.

Henderson Land is carrying on its legacy into the future, curating a property portfolio that grows from strength to strength and encompasses award-winning landmark projects such as the International Finance Centre complex and The Henderson.

Henderson Land has a long-term commitment to sustainability and is a pioneer in green building and sustainable practices which harness innovation and technology to create new, smarter living. The Group is a strong advocate of social responsibility and invests in a broad range of community causes and initiatives. For more information, please visit www.hld.com.

Hip Hing Construction Company Limited Leader Bright Limited ATAL Engineering Group Vircon Limited

PROJECT

SOGO Kai Tak

LOCATION

Kai Tak Area 1E Site 2, Kai Tak, Kowloon TYPE

Commercial

SCHEDULED TIME OF COMPLETION End of 2023

"We have faced many challenges since the very beginning of the project. However, the client, consultants, our team and other construction partners work together to bring up ideas to mitigate the impacts. BIM allows us to examine our ideas in a virtual environment to resolve many of potential conflicts, and to make better decisions."

—Jacky Leung

Project Manager, Leader Bright Limited

—Tony Za Deputy Head of Contracts Division,

Hip Hing Construction Company Limited

—Larry Cheung Senior Project Manager (Contracts), Hip Hing Construction Company Limited

Billy Wong General Manager (BIM), Hip Hing Construction Company Limited

BIM PARTNERS

DLN Architects Limited WSP Hong Kong Limited WSP (Asia) Limited

AUTODESK PRODUCTS USED

Autodesk[®] 3ds Max[®] Autodesk[®] AutoCAD[®] Autodesk[®] BIM 360[®] Docs Autodesk[®] Dynamo Autodesk[®] Navisworks[®] Autodesk[®] ReCap[®] Pro Autodesk[®] Revit[®]

SOGO Kai Tak - BIM Enabled Virtual Environment for Better Collaboration and **Decision Making**



SOGO (Kai Tak)

"To capture the rising purchasing power in the East Kowloon area in Hong Kong, the Kai Tak Development Project commenced ground-breaking in December 2017, with the twin towers topping out in the second quarter of 2022. Upon completion, the twin towers will host a new SOGO department store along with complementary retailing, entertainment, dining, and lifestyle servicing facilities. The retail complex is expected to be in business by the end of

2023, tentatively, and is set to become a new landmark in East Kowloon, thereby further fortifying the Group's leading position in the Hong Kong retailing market. ---- Leader Bright Limited

Site Constraints and Major Challenges

1. The Tuen-Ma Line MTR tunnel runs through below the project site, and there are other construction sites in close proximity. During the basement



Image Courtesy of Hip Hing Construction Company Limited and Leader Bright Limited and ATAL Engineering Group and Vircon Limited



View from Kai Tak Station Square Image Courtesy of Hip Hing Construction Company Limited and Leader Bright Limited and ATAL Engineering Group and Vircon Limited

construction, our project team spotted that the monitoring data of MTR settlement was close to action level. To avoid the aggravation of settlement level, the stakeholders jointly decided to change the construction scheme for the basement structure. The revised scheme would retain all shoring which significantly increased the complexity of the site works and extended the construction period.

 An extensive area of drainage reserve zone is located within the construction site. Therefore, extend and layout of foundation works is highly restricted. However, such constraint leads to one of the most iconic designs of this project. To meet the structural need, a mega truss system was designed to hang the 9 Storeys of structure beneath it and shift the loadings to the core.

Design Review and Existing Condition Modelling

Hip Hing Construction Limited has established a company policy to mandate application of laser scan to all basement ELS (Excavation and Lateral Support) system since 2015. And the company policy also requires all Hip Hing projects to coordinate the clashes in BIM platform. In our project, the laser scan result was loaded into Autodesk Recap for federation and the point cloud model was imported into Autodesk Navisworks for further coordination. The project team was able to visualize the installations, detect clashes and resolve potential conflicts between existing ELS system and the basement structure. The early virtual design and construction enhanced design certainty and accuracy and provided

valuable insights for planning the efficient construction to the works, and therefore mitigating the risk of abortive works. The early virtual review also assisted the team to shorten the basement construction period by a month.

Compared to traditional 2D drawing context, BIM environment enables an extraordinary immersive approach to review the design of complex system. For example, the mega truss system weighed more than 1,000 tons and the parts of the system were pre-fabricated in a factory. To avoid the material wastage and abortive works on-site, the client, consultants, our team, and other construction partners collaboratively coordinated in the BIM enabled virtual environment. Eventually, we managed to identify and resolve all critical issues before the fabrication of the parts. In addition, the BIM platform enabled project team to consider the operational space requirement of the site condition, which prevented disruption to the construction sequence and ensured smooth construction in the future.

Construction Phase Planning and Site Utilization Planning

Construction phase planning allows the project team to have better control of the overall programme and prevents potential risks. In addition, the 4D simulations significantly increased the efficiency of communication between our team and other parties. For example, to ensure the construction duration of mega truss system and adjacent concrete structure falls within 2.5 months, our engineers and BIM specialists conducted multiple "trial and error" analysis in 4D environment to find out the most efficient DfMA sequence of installation. The project team also added the scaffolding arrangements and related safety measures into the simulation to ensure the effectiveness of the planning. And our BIM specialists used Dynamo to facilitate smooth data exchange process. Another example is the simulation of the dismantling sequence of the temporary truss system. Due to the limited operational area, 4D simulation was utilized not only for the works sequence, but also the best and safest position of the mobile crane.



Point Cloud Model of ELS System Image Courtesy of Hip Hing Construction Company Limited and Leader Bright Limited and ATAL Engineering Group and Vircon Limited



Steel Truss and MiMEP Image Courtesy of Hip Hing Construction Company Limited and Leader Bright Limited and ATAL Engineering Group and Vircon Limited



Dynamo Script for Data Management Image Courtesy of Hip Hing Construction Company Limited and Leader Bright Limited and ATAL Engineering Group and Vircon Limited



VR Simulation Image Courtesy of Hip Hing Construction Company Limited and Leader Bright Limited and ATAL Engineering Group and Vircon Limited



Cloud Collaboration (BIM360) Image Courtesy of Hip Hing Construction Company Limited and Leader Bright Limited and ATAL Engineering Group and Vircon Limited

Multi-Trade Integrated MEP (MiMEP) and Modular Integrated Construction (MiC)

To shorten the construction period, we deployed Multi-Trade integrated MEP (MiMEP) for E&M construction to reduce the potential risks for design, to minimize material consumption, production, on-site installation time and fabrication cost. The Modular Integrated Construction (MiC) method was adopted in lift machine room to take advantage of off-site fabrication. It helped achieve better quality and accelerate construction. To facilitate MiC and MiMEP, the BIM technology is an essential tool for the complete design and construction process. The BIM model maturity should meet the manufacture LOIN requirement without clash and discrepancy between each drawing sheet and each model component. As a result, the application of the MiMEP and MiC helped the team to shorten the construction period by 3 months.

Cloud Collaboration

Due to the COVID-19 pandemic and restrictions on face-to-face communications, the project team was confronted with the constraints of communication. However, the adoption of BIM virtual platform such as BIM 360 Docs helped resolve the issue and enhanced our communication and coordination significantly. Besides, BIM360, as the common data environment, allows all project stakeholders to access to the



Image Courtesy of Hip Hing Construction Company Limited and Leader Bright Limited and ATAL Engineering Group and Vircon Limited

same secure, cloud-based information. Furthermore, collaborations, such as clash analysis and review can be performed to review the design of Architectural, Structural, and Building Services Design with other parties effectively. Assisted by the cloud collaboration method, the stakeholders together reviewed and resolved more than 1,500 design issues in weekly BIM coordination workshop before actual construction.

BIM with Innovative Technology

The benefits of adopting BIM extended to the interior design. By adopting VR (Virtual Reality) simulation, the visualization tool provides a realistic demonstration of the design features to the stakeholders. It helped to design freeze and minimize abortive works. Furthermore, the virtual environment experience helps engineers to enhance their understanding of the complex structure and to get insights for safety measures planning.

A project-based Digital Works Supervision System (DWSS) is adopted for submission and acceptance of the request for inspection/survey check form as well as safety and environmental inspection checklist. The designated plug-in enables two-way exchange of information between the DWSS and Autodesk BIM360. Teams in the field can manage complex and custom processes and inspections with confidence in the latest model/drawing from BIM 360.

BIM for Facility Management

The application of BIM stimulated information exchange among various stages. To achieve the required LOD-G in the client's Exchange Information Requirement (EIR), we adopted mixed application of laser scan and 360-view photos as verification method. BIM for facility management workshops was kicked-off by the project team a year before acquiring occupation permit. The early involvement of client's facility management team helps the project team to re-examine the previously defined information requirement to avoid abortive works and rush modification in later stage. Thanks to Autodesk Revit's extensive interoperability functions, the project team can easily convert the native model into the required format and export COBie data sheet for the integration with client's facility management platform.



Construction of SOGO Kai Tak Image Courtesy of Hip Hing Construction Company Limited and Leader Bright Limited and ATAL Engineering Group and Vircon Limitec



Corner Entrance Image Courtesy of Hip Hing Construction Company Limited and Leader Bright Limited and ATAL Engineering Group and Vircon Limited

About Hip Hing Construction Company Limited

Since being established in 1961 Hip Hing Construction Co., Ltd. ("Hip Hing") has grown to become one of the leading contractors in Hong Kong. During this time, we have been trusted by our clients to construct many of the landmark buildings which define Hong Kong. The construction services provided by Hip Hing Construction Group have contributed to the development of Hong Kong and its economy and have helped to shape a better living environment for the people of Hong Kong. We have also been embracing advancing technologies to take our services to the next level, so as to meet our clients' needs.

About Leader Bright Limited

Lifestyle International Holdings Limited (together with its subsidiaries, including Leader Bright Limited, the "Group") is a Hong Kongbased premier retail operator that specializes in the operation of mid to upper-end department stores in Hong Kong. The Group's two SOGO department stores in Hong Kong include the flagship store in Causeway Bay, the largest and leading department store in Hong Kong, as well as the Tsim Sha Tsui store. Characterized by the "one-stop shopping" concept with unparalleled brand equity, the Group's department stores offer a wide variety of goods ranging from daily necessities to luxury products as well as personal care services, such as beauty salons, in a comfortable shopping environment. To stay competitive in the ever-evolving retail landscape, the Group will continue to forge closer ties with consumers and keep abreast of market changes, leveraging on its omni-channel and upgraded system, with a view to offering seamless and compelling customer experiences with attentive care that stand out from the market.

About ATAL Engineering Group

Established in 1977, ATAL Engineering Group ("ATAL") is a leading electrical and mechanical ("E&M") engineering service provider headquartered in Hong Kong, with operations in Macau, Mainland China, the United States and the United Kingdom. Serving a wide spectrum of customers from public and private sectors, ATAL provides multidisciplinary and comprehensive E&M engineering and technology services in four major segments, including Building Services, Environmental Engineering, Information, Communications and Building Technologies ("ICBT") and Lifts &Escalators. ATAL's parent company, Analogue Holdings Limited, is listed on the Main Board of the Stock Exchange of Hong Kong (Stock Code: 1977).

About Vircon Limited

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Hip Hing Construction Company Limited Swire Properties Limited PROJECT

Two Taikoo Place

LOCATION

Taikoo Place, 979 King's Road, Hong Kong

Commercial Development

SCHEDULED TIME OF COMPLETION 2022

"BIM bridges the physical and digital worlds, leading the project team to stand in a safer environment to conduct the coordination among project stakeholders, which increases the productivity and reduce abortive works, achieve cost effectiveness and progress monitoring during the project lifecycle."

— Joseph Choy Senior Manager, Projects

Swire Properties Limited

—**OK Cheng** General Manager Hip Hing Construction Company Limited

— Kelvin Lo Senior Project Manager Hip Hing Construction Company Limited

— **Billy Wong** General Manager (BIM) Hip Hing Construction Company Limited

BIM PARTNERS

Wong & Ouyang (HK) Limited Ove Arup & Parthers Hong Kong Limited J. Roger Preston Limited Rider Levett Bucknall Limited NBBJ LP Eckersley O'Callaghan Limited Adrian L. Norman Limited HS&A Limited Gustafson Porter + Bowman LLP Urbis Limited Hugh Dutton Associes Choi Comer Asia Kingsfield Engineering Limited

AUTODESK PRODUCTS USED

Autodesk® AutoCAD® Autodesk® BIM 360° Docs Autodesk® BIM Interoperability Tools Autodesk® Dynamo Autodesk® Navisworks® Autodesk® Plangrid® Autodesk® ReCap® Pro Autodesk® Revit® Two Taikoo Place Creative BIM Journey - Decarbonize Construction and Digitalize Facility Management



Two Taikoo Place External View Image Courtesy of Hip Hing Construction Company Limited and Swire Properties Limited

Two Taikoo Place aims to cultivate a human-centric mixed-use community with a triple Grade A rated office tower. Adjacent landscape forming 70,000 sq. ft. of open space offers communal spaces with stunning water features, quiet pathways, and extensive green areas. An elevated walkway is designed and linked with nearby MTR station and facilities to enhance connectivity for the office community.

The vision for Two Taikoo Place is to set a new benchmark for innovative design. Emphasis was placed on adopting an integrated design approach which incorporates BIM technology throughout the project lifecycle, including Design Reviews, Drawing Generation, Spatial Coordination, Existing Conditions Modelling, Phase Planning, Digital Fabrication, Construction Quality Management, As-built Modelling and Asset Information Modelling, etc. Therefore, different BIM platforms were adopted to optimize the design and resolve construction issues. This helped reduce material wastage and shorten the construction period.



Taikoo Square Overall View Image Courtesy of Swire Properties Limited



Major Challenges and Site Constraints

Two Taikoo Place is a project with innovations in design and construction aspects. Located at business district, it is surrounded by a lot of buildings in the proximity and constrained by limited working space. There are some major challenges as below:

- 1. Jumbo Glass Panels spanning up to 15 meters
- 2. Full BIM implementation in complex walkway

Maximising Transparency Whilst **Resisting Typhoon Loads**

In this project, at the podium level, the 15m tall panels are laterally restrained by pre-stressed high-strength stainless steel rods, lying entirely within the glass panel build-up, composed of four 12mm thick plies and laminated with 1.52mm thick sheets of Sentryglas ionoplast interlayer.

Due to the juxtaposition of flat and curved glass panels at the façade corner angles and Hong Kong's high winds, movement joints between the rods were introduced to allow differential movements and avoid peak stresses in the glass panels. Hence, pre-tension system with tension rods, the first in Asia, was adopted in Two Taikoo Place project.

Drawing on our engineering and BIM technology expertise, our project team was able to visualise the installations. detect clashes and resolve potential conflicts between tension rods and glass panels prior to installation. The early virtual design review and simulation enhanced design certainty and accuracy and provided valuable insights for planning the efficient installation sequence of the works, and therefore mitigating the risk of glass panel crack and abortive works.

Jumbo Glass Panels spanning up to 15 meters Image Courtesy of Swire Properties Limited

Interfacing for Design Optimization

Applying the BIM analysis technology, the accurate spatial information was provided for project team to review spatial relationships in each building components. With reliable information such as the critical clearance between the tension rods and glass panel and fly beam. Each potential issue could be easily identified by Navisworks for reviewing all geometry interfacing to enable design optimization in components, such as the walkway portal frame and tension rods. The risk management strategy was established for tolerance control and clash detection prior construction.

Fly Beam Position Control

To ensure constructability and smooth work sequence of jumbo glass panels, fly beam position must be controlled. This is challenging since the interfacing of tension rods and fly beam is sensitive with the allowable tolerance of 6mm. Therefore, we used the Revit to demonstrate the fly beam splice joint and coordination points for position control before installation. The use of BIM achieved our aim of enhancing the guality control and mitigating the misalignment of position during the installation.

Glass Panel Installation

Adopting Virtual Design Construction (VDC), the project team conducted 4D construction sequence and method simulations for planning installation arrangement. The workflow of jumbo glass wall installation can be visualized for project team to review easily and closely on the proposed procedures to foresee potential risks before actual construction starts. This helped us eliminate unnecessary abortive changes & miscommunication for the design and planning. In particular, the risk of glass crack during installation was mitigated and safety was improved.

With BIM, the project team was able to provide the virtual mock up for installation sequence in a digital environment. As a result, the 15m tall panels were installed with zero accident.

Full BIM Implementation in **Complex Walkway**

The walkway design is complex, and therefore it requires a higher level of information need model for real-time collaboration. "Centralization in One" is our project strategy which leads to adoption of openBIM approach in our BIM journey. Revit and Navisworks are compatible platforms to help us to handle the different file formats. Furthermore, all 3D geometry was incorporated into the 3D environment for coordination & design optimisation, which included the façade and MEP bracket.

High model maturity ensure the capability of coordinated model to facilitate the Design for Manufacture and Assembly (DFMA) approach for drawing generation and fabrication. The manufacturer will



Image Courtesy of Hip Hing Construction Company Limited





Defect Logging and Dash Board Image Courtesy of Hip Hing Construction Company Limited and Swire Properties Limited



Mixed Reality (MR) Simulation Image Courtesy of Hip Hing Construction Company Limited and Swire Properties Limited



BIM Live Collaboration Image Courtesy of Hip Hing Construction Company Limited and Swire Properties Limited

use the mature model to prepare the fabrication drawing for manufacturing and assembly, which minimises material wastage, production time and fabrication cost. Furthermore, site verification was conducted by 3D laser scanning for quality control to ensure the alignment of design, construction, manufacturing and assembly.

Construction Quality Management

To manage construction quality, we adopted Digital Works Supervision System (DWSS) throughout the contract period. One of the purposes of adopting this system is to record site defects spotted by site inspection team. The records will be dispatched to relevant parties for follow-up actions, and the status will be monitored until the defect is fixed.

PlanGrid provides a streamlined commissioning and quality management workflow to help us to manage all discipline in defects ratification status through the centralized platform, which saved 40% of paper documents and 50% of the document processing time.

Intergradation with Asset Information Model (AIM) and Mixed Reality (MR)

To achieve the LOIN (Level of Information Need) required for AIM, 360 panorama



Multi-Trade Integrated MEP (MIMEP) Image Courtesy of Hip Hing Construction Company Limited

photo was used for site verification for the as-built modelling. Asset management information is progressively integrated into BIM model in the exchange format required by operation team.

Realising the unmatched visualisation capability of MR in future operation and maintenance, the project team actively coordinates with client operation team to integrate MR and BIM implementation. For example, MR virtual tours lead to early identification of the assets installation readiness and therefore brings huge saving in terms of cost and time.

Digital Fabrication

Multi-Trade Integrated MEP (MiMEP) for MEP Modularization was adopted in various building services systems that were fabricated before delivery to the construction area. Fabrication modules were modelled and coordinated before being fabricated in factory. For the cooling tower plant modular set and booster pump set, the installation time was saved by 50% compared with the conventional approach. A digital MEP module was created for coordination with other systems, aiming to demonstrate the space required for installation. The coordinated model was then adopted by the subcontractor to generate the shop drawing for MEP modules fabrication.

BIM Live Collaboration

Despite social distancing and quarantine due to coronavirus outbreak, BIM collaboration and document exchange were seamlessly continues as all the models are shared on the cloud based BIM 360 Docs. Information, comments, and changes to the BIM models were efficiently exchanged digitally even stakeholders are at different physical locations. As a result, the team is still able to accomplish all coordination targets on schedule against all odds.



Full BIM Implementation in Complex Walkway Image Courtesy of Hip Hing Construction Company Limited and Swire Properties Limited



SWIRE PROPERTIES



Two Taikoo Place Overall View Image Courtesy of Hip Hing Construction Company Limited

About Hip Hing Construction Company Limited

Since being established in 1961 Hip Hing Construction Co., Ltd. ("Hip Hing") has grown to become one of the leading contractors in Hong Kong. During this time we have been trusted by our clients to construct many of the landmark buildings which define Hong Kong. The construction services provided by Hip Hing Construction Group have contributed to the development of Hong Kong and its economy and have helped to shape a better living environment for people of Hong Kong. We have also been embracing advancing technologies to take our services to the next level, so as to meet our clients' needs.

About Swire Properties Limited

Established in Hong Kong in 1972, we have investments across Hong Kong, the Chinese Mainland, Singapore and the US. Adhering to our core values of integrity, originality, long-term focus and quality, we aim to create sustained value by developing and managing large-scale mixed-use projects that serve as focal points of the surrounding urban areas. Swire Properties was listed on the Main Board of the Stock Exchange of Hong Kong in 2012 (Stock Code: 1972).

Hong Kong Baptist University China State Construction Engineering (Hong Kong) Limited China State Construction Science and Technology Limited Transcendence Company Limited P&T Architects and Engineers Limited

PROJECT

Jockey Club Campus of Creativity (JC³)

30 Renfrew Road, Kowloon Tong, Kowloon

New Construction of University Hostel and Academic Building Complex

SCHEDULED TIME OF COMPLETION Q3 2024

"Technological construction is the future development trend of the industry. We have been committed to researching the combination of traditional construction and technological construction, such as the application of BIM technology in the entire construction process. To carry out better quality, safety and progress work, it can bring more efficient managing strategy to the management team."

---Wang Song Senior Site Manager,

China State Construction Engineering (Hong Kong) Limited

AUTODESK PRODUCTS USED

Autodesk® 3ds Max® Autodesk® Architecture, Engineering & Construction Collection Autodesk® AutoCAD® Autodesk® BIM 360® Autodesk® BIM Collaborate Pro Autodesk® Civil 3D® Autodesk® Dynamo Studio Autodesk Forge® Autodesk® InfraWorks® Autodesk® InfraWorks® Freedom Autodesk® Navisworks® Freedom Autodesk® Navisworks® Manage Autodesk® ReCap® Pro Autodesk® Revit®

Everyone a BIM Soldier!



360 VR Performance Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited

History of China State Construction Engineering (Hong Kong) Limited

China State Construction Engineering (Hong Kong) Limited started the BIM implementation since 2010.

Starting with the first BIM project of Housing Authority in Yau Tong, besides fulfilling employers' requirements, China State Construction Engineering (Hong Kong) Limited aimed to change the old roles, relationships and the working practice.

BIM team was established and practical evidence shows the benefits and the powerful incentive in communication of BIM. BIM training center established in



C-Smart - Progress Management Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited



3D coordination with parties Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited

2020, CSHK BIM Standard and 'Everyone a BIM soldier' policy was also published.

BIM is the cornerstone towards Digitalization and Industrialization of Construction. Integration of BIM with digital technologies ensure innovation and process optimization to achieve a sustainable and efficient production.

R&D towards smart site, digital twin and Metaverse will be the company future direction. Also use of advanced hardware tools, including 3D laser scanning to collect as-built data and establish point cloud model for better MEP system coordination, and target that 100% utilization of BIM 4D & 5D in all BIM projects.

Award Winner

Hong Kong Baptist University - Jockey Club Campus of Creativity is located at 30 Renfrew Road, Kowloon Tong. The building development comprising the construction of four 13 to 17-storey student hostels block and 4-storey academic building complex with associated external works.

The contract stated clear BIM requirement in PS up to facility management. The contractor's in-house BIM team utilize BIM in every aspect including 3D life-cycle modelling, 4D simulation, DWSS inspection, BIM 5D quantity take off, laser scanning, and



Multi-discipline BIM model

Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited



Point Cloud Data in Mobile Device Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited



Leica Cyclone 3DR - Point Cloud vs BIM Heatmap Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited



Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited

company-developed smart site system -C-Smart etc.

Life-cycle Modelling

For 3D BIM Coordination, all drawings, including Combined Service Drawings (CSD) and Combined Builders Works Drawings (CBWD) are produced directly from BIM. The process speeds up coordination compared to paperbased communication, provide a platform to resolve design issue before construction. BIM models in Common Data Environment ensure data consistency, saving time to exchange files and the single source of truth. BIM

coordination meeting hosted regularly to proceed walkthrough and visual checking with appointing party and appointed parties in order to resolve and review issues.

OpenBIM Clash Resolution

To provide the function of 3D clash resolution, BIM-track openBIM software is adopted. BIM-Track act as a BIM Collaboration Format, it collects all BIM issues and clashes on web-based platform, enable all parties to access and review the issue easily. BCF automatic generate clash report and summary for analysis.

Common Data Environment

The whole BIM model is working on Autodesk Construction Cloud, a Cloud based CDE. All parties can access the Model and provide comments which will be processed to issue or RFI for site team. BIM Team create project, manage project access, information and the gateways align the standard ISO 19650; other project stakeholders can review both 2D nad 3D with browser, markup and comment individually.

4D Simulation

Baseline master programme simulation is produced to reflect the planned programme for engineer review. Also Plan vs Actual comparison is introduced, which reflect the true condition of concreting progress for management. To avoid manual process and human error,



Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited Image Courtesy of Hong Kong Baptist Un

a sets of dynamo scripting is used for streamlining the workflow of concreating zone allocation.

5D Cost Estimation

Project information model is prepared based on Client's 5D Standard, including data of concrete grade, STR Usage, Fire Resistance Period etc.

6D Laser Scanning

An independent developed drone platform by china state is used for all point cloud models. The construction site is 3D Scanned by laser workstation & drone in a regular basis. Also, Cintoo Cloud platform is used for reading point cloud data and BIM model(s) which is in .ifc format, compare and visualize in order to check the quality of works. Those point cloud and BIM model can be measured and for coordinate if any possible clashes may be occurred.

API Automation

Company invented API tools enhance the productivity for CSD and CBWD deliverables, also support BIM workflow



Cintoo Cloud Platform - Point Cloud vs IFC Model Overlay Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited



Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited



4D Simulation - Planned vs Actual Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited



Combined Services Drawing in BIM360 Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and Transcendence Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited



Combined Builder Works Drawing in BIM360 Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited

such as NWC output, family rename, and parameter edit.

C-Smart Site Platform

Designated smart site platform developed by China State provide function of Digital Works Supervision System with aid of BIM Modelling & AI technology. Platform used to visual Quality Assurance and Quality Control, report any hazard activity immediately.



 b 法 宏 技 芥 斉 阻 公 司 TRANSCENDENCE COMPANY LIMITED





Image Courtesy of Hong Kong Baptist University and China State Construction Engineering (Hong Kong) Limited and China State Construction Science and Technology Limited and Transcendence Company Limited and P&T Architects and Engineers Limited

About Hong Kong Baptist University

Hong Kong Baptist University (HKBU) has remained committed to the pursuit of excellence in education, research and service to the community. As one of Asia's finest institutions of higher learning, HKBU is dedicated to nurturing future generations of civically engaged community members, and it provides them with a broad-based, transdisciplinary and creative education. Its eight faculties/schools offer a wide array of programmes across a diverse range of disciplines, from the arts, business, communication, and social sciences to science and technology, Chinese medicine and sport. With its fundamental strengths in the arts and humanities, HKBU offers an education and research environment that fosters technological progress with a focus on the human dimensions. At the same time, the University is using technology to push the envelope of human imagination in the arts and cultural sphere. Coupled with our unceasing efforts to achieve breakthroughs in science and Chinese medicine, HKBU strives to contribute to the building of a better world and a more compassionate society.

About China State Construction Engineering (Hong Kong) Limited

China State Construction Engineering (Hong Kong) Limited started its construction business in Hong Kong since 1979. It's a vertically integrated construction powerhouse, engaging in building construction and civil engineering operations as well as foundation work, site investigation, mechanical and electrical engineering, highway and bridge construction, ready-mixed concrete, pre cast production and infrastructure investment. In July 2005, China State Construction was listed on the Main Board of The Hong Kong Stock Exchange (stock code: 3311). China State Construction is amongst the largest construction contractors in Hong Kong to deliver Buildings, Port Works, Roads and Drainage, Site Formation and Waterworks. China State Hong Kong plays an active role in the construction industry by means of quality management and has professional expertise capable of undertaking high quality and technically advanced projects. It has undertaken over 800 construction projects in Hong Kong and Macau over the past 40 years and has acquired substantial experience and capabilities in doing so.

About China State Construction Science and Technology Limited

China State Construction Science and Technology Limited (CSCST) adheres to the enterprise spirit to "exercise prudence in the performance of our undertakings, and to build a solid foundation to achieve greater success", and gradually develops into a comprehensive technology enterprise, integrating BIM talent training, BIM application service and digitized engineering management. The company's BIM services cover the entire life cycle of construction projects, including BIM bidding, BIM construction guidance, BIM operation and maintenance programs, corporate BIM team formation consulting, corporate BIM training and consultants. The company adopts Hong Kong CIC BIM standard, which can customize different implementation goals and processes according to the implementation entity, achieve design optimization, construction management improvement, control cost, improve collaborative management, and ensure construction safety. At the same time, it cooperates with many efficient and BIM software vendors in Hong Kong, Macao and the Mainland to provide comprehensive support for digitalization of construction and management.

About Transcendence Company Limited

Transcendence Company Limited was established in 2014, aiming to integrate and apply technology, such as big data, artificial intelligence (AI), cloud-based analysis, Internet of things (IoT), ultra wideband positioning system, to the construction industry, society, commercial and daily life. In addition to collaborating with different technology companies, as an experienced stakeholder in this industry, we have also developed our own products which being practical and innovative allow us to integrate them to daily and commercial activity, eventually making contribution to our society.

About P&T Architects and Engineers Limited

P&T Group is an award-winning, global design firm, providing clients with innovative, commercially successful and sustainable design solutions since its inception in 1868. Consistently ranked in the top largest consultancies in the world, our 1600-plus architects, engineers, urban designers and interior designers operate in over 70 cities, on an excess of 10 million square metres of combined floor area, annually. By sheer volume and a shared commitment to design excellence with each and every project, our work has, and will, continue to positively transform communities and improve lives.

Water Supplies Department, HKSAR Government ATAL – Chun Wo – Ming Hing Joint Venture

Summit Technology (Hong Kong) Limited

PROJECT

In-situ Reprovisioning of Sha Tin Water Treatment Works (South Works) - Water Treatment Works and Ancillary Facilities

Sha Tin, New Territories

TYPE

Water Treatment Works SCHEDULED TIME OF COMPLETION

2026 Q1

"BIM adoption and development have always been in WSD's ongoing agenda. The project of In-situ Reprovisioning of Sha Tin Water Treatment Works (South Works) - Water Treatment Works and Ancillary Facilities, is a proven example of success in BIM uses. WSD promotes BIM application and innovative technology driving the engineering industry towards full implementation of BIM uses to maximise the productivity and cost-effectiveness."

—Horace Ng

Senior Engineer/Project Management, Water Supplies Department, HKSAR Government

BIM PARTNERS

AECOM Asia Company Limited Binnies Hong Kong Limited

AUTODESK PRODUCTS USED Autodesk® 3ds Max® Autodesk® AutoCAD® Autodesk® BIM 360® Docs Autodesk® Civil 3D® Autodesk® Dynamo Autodesk® Navisworks® Autodesk® ReCap® Autodesk® Rendering Autodesk® Revit®

BIM Technology Drives Waterworks Project Success



Initial Condition of STWTW Image Courtesy of Water Supplies Department, HKSAR Government and ATAL – Chun Wo – Ming Hing Joint Venture and Summit Technology (Hong Kong) I imited

The Sha Tin Water Treatment Works (STWTW) (comprising North Works and South Works) is the largest water treatment works in Hong Kong, serving a population of over 2 million. The proposed works comprise the in-situ reprovisioning of the STWTW South Works, which has deteriorated with age and become uneconomical to maintain its operation, with its reliable output reduced significantly after over 50 years of service since its commissioning in 1964. Apart from replacing the aged treatment facilities, the reprovisioning works will also uprate the treatment capacity of the South Works by over 50% from 360 000 cubic metres (m³) to 550 000 cubic metres (m³) per day to meet the increased water demand arising from future developments around the territory. The completed works would be significant to the living of a huge population of citizens, as it is currently the largest water treatment works in Hong Kong in terms of daily output capacity, and is a major source of water supply for the areas of Sha Tin, Central Kowloon and even to as far as part of Hong Kong Island.

The key scope of the works comprises demolition of existing structures and the construction of new plants within the same footprint including Flocculation & Sedimentation Tanks, Ozone Building, Stage 1 (biological) Filters, Stage 2 (granular) Filters, Washwater Equalization Tank, Washwater Recovery System, South Works Pumping Station, Elevated Walkway, and other ancillary facilities. The new treatment works adopt advanced treatment technologies including twostage ozonation, inclined plate settler



Point Cloud Image of Existing Clarifer Image Courtesy of Water Supplies Department, HKSAR Government and ATAL – Chun Wo – Ming Hing Joint Venture and Summit Technology (Hong Kong) Limited
Award Winner

for sedimentation, two-stage filters and ultra-violet disinfection, which would enhance the treatment and disinfection capabilities and enhance the reliability of water supply. As a critical challenge of the project, extensive control and monitoring on the impacts of works are crucial to ensure the existing operation and services of the North Works, adjacent to South Works within the same compounded area, undisturbed.

The project is awarded to ATAL - Chun Wo - Ming Hing JV (ACMJV) who engages Summit Technology (Hong Kong) Limited as the BIM consultant, while AECOM Asia Company Limited is delegated as the Project Manager for project supervision. These companies are well-positioned to overcome different challenges with the innovative solution of Building Information Modelling (BIM) throughout the project life-cycle.

BIM Adoption

Under the supervision of AECOM, ACMJV and Summit faithfully execute the BIM requirement under the contract requirements, as well as leveraging on BIM, the innovative cloud-based technology, to create an up-todate common platform for teams to concurrently exchange information and



Design of Underground Ulities in BIM Image Courtesy of Water Supplies Department, HKSAR Government and ATAL – Chun Wo – Ming Hing Joint Venture and Summit Technology (Hong Kong) Limited



Water Treatment Facitilies at Reprovisioned South Works Image Courtesy of Water Supplies Department, HKSAR Government and ATAL – Chun Wo – Ming Hing Joint Venture and Summit Technology (Hong Kong) Limited

get a good grasp of the project's latest progress. The project of re-provisioning South Works of Sha Tin Water Treatment Works involves design, demolition and construction, where BIM assists to visualize the integration of existing and new elements, design change, construction sequence, site logistics and the future project deliverables. The platform also enables multi-disciplinary parties to collaborate closely to resolve clashes of design that may cause delay and abortive works, as well as achieving a precise programme for timely completion.

BIM Collaboration in Design, Construction and Asset Management

To develop the design based on existing condition, BIM is adopted to form the existing condition model with information obtained by laser scanning photogrammetry, conventional survey method, record drawings, etc. The existing condition model is verified by point cloud survey to improve the accuracy, which is



As-built BIM of Pipe Works Image Courtesy of Water Supplies Department, HKSAR Government and ATAL – Chun Wo – Ming Hing Joint Venture and Summit Technology (Hong Kong) Limited

used as the initial condition to develop and integrate the new elements.

During the planning cycle, BIM is used to develop the construction programme including the estimation of excavation and fill volume required for the proposed works and the subsequent logistics planning for the excavated soil disposal. BIM also enhances the collaboration and coordination for multi-disciplinary design including structural, architectural, electrical, mechanical and building services, where clashes can be found at early design stage to mitigate the risks of clashes during construction stage. Apart from major buildings design, BIM not only helps the design of alignments for underground utilities such as CLP cables, signaling cables, fresh water mains, drainage, sewage pipes, fire services and existing dosing pipes for water treatment, but also contribute to precise planning of excavation and lateral support (ELS) construction and E&M installations in new buildings.

During the construction cycle, monitoring the current site progress of ELS construction is relied on BIM as well. It enables instant monitoring on the excavation progress, reviewing the construction sequences of ELS installation from time to time and the need for on-site mechanical mobilization. BIM rendering produces images with better visualization to improve communication and coordination between stakeholders (i.e. Client, Consultant, Contractor and Designer), which contributes to collaboration of all parties to resolve issue efficiently and optimize the construction progress.

During asset management cycle, the information such as product brand, model ID, size, properties, etc. of E&M elements including cables, pipes, pumps, ventilation, etc. are incorporated into the as-built BIM and COBie worksheet for ease of operation, maintenance, future repair, replacement and upgrading for end users.



Construction Progress Monitoring Image Courtesy of Water Supplies Department, HKSAR Government and ATAL – Chun Wo – Ming Hing Joint Venture and Summit Technology (Hong Kong) Limited



BIM for Operation and Maintenance Image Courtesy of Water Supplies Department, HKSAR Government and ATAL – Chun Wo – Ming Hing Joint Venture and Summit Technology (Hong Kong) Limited

Innovation by BIM

Referring to the original working programme, a permanent Washwater Equalization Tank (WET) is required be constructed and commission prior to the demolition of the existing South Works facilities. Due to the unforeseen site constraints, there is risk of delay for critical WET construction, which can potentially cause significant impact to project completion.

With the deploy of BIM collaboration platform, the risks and challenges are eliminated and resolved by an alternative proposal of modifying and reusing an existing sump tank at the decommissioned South Works pumping station, which is to be demolished at later stage, as a temporary WET (TWET). To explore this innovative idea, the project team immediately reviews the structural modifications and pipework design with the assistance of BIM. The detailed schemes are built and clearly illustrated on the CDE platform (i.e. BIM360) for easy exchange of ideas, swift trial on different scenarios and enhancement of design accuracy. As a result, the whole design and modification works for the TWET are completed and the permanent WET construction is no longer at the critical path of the programme. The saving of approximately 4-month duration substantially enhances the float time in the contract period and maintains the targeted project completion date.

Apart from the successful TWET idea, BIM is used for the feasibility study of North-South Interconnectivity (NSI) to explore the possibility of connecting the North and South Works together to allow flexibility of future operations. BIM is also employed for the DfMA/MiC study for the major treatment equipment, such as Ozone System and Dissolved Air Flotation System, which improves the efficiency and quality of construction and safety, providing a win-win solution beneficial to all parties.

WSD's Vision in BIM

Although the project has been facing numerous obstacles throughout its various phases, WSD, AECOM and ACMJV have overcome and addressed all issues by working as a united team. With the widely usage of BIM related software especially the CDE collaboration platform, the latest designs and issues can be shared, discussed and resolved promptly. Working together with excellent team spirit and mutual trust, potential risks and delays are mitigated, bringing out the best solutions to the project execution and performance. WSD promotes to build on the BIM successful practice within the project of STWTW reprovisioning works and will remain steadfast in advocating for BIM culture and BIM diversity in upcoming projects.





General View of STWTW Created by Image of North Works and BIM of South Works Image Courtesy of Water Supplies Department, HKSAR Government and ATAL – Chun Wo – Ming Hing Joint Venture and Summit Technology (Hong Kong) Limited

About Water Supplies Department, HKSAR Government

Water supply is an indispensable part of the livelihood of the people and critical to the territory's sustainable developments. WSD has the mission to provide reliable and quality services of water supplies to a population of about 7.5 million. WSD adopts BIM and other cutting-edge technologies in key infrastructure projects to build innovative waterworks assets of the future and achieve transformative performance in collaborative project management.

About ATAL - Chun Wo - Ming Hing Civil Joint Venture

ATAL – Chun Wo – Ming Hing Joint Venture (ACMJV) is formed by ATAL Engineering Limited, Chun Wo Construction & Engineering Company Limited and Ming Hing Civil Contractors Limited, who provides its clients with the best quality of work using BIM technologies.

About Summit Technology (Hong Kong) Limited

Summit Technology (Hong Kong) Limited is dedicated to actively working with the local AEC industry in providing BIM deliverables and project solution, as well as research, development, training and coaching of BIM for achieving better engineering solution.

Outstanding BIM Applications - Project Safety and Risk Management



ORGANIZATION Hong Kong Housing Authority PROJECT BIM for Construction/Safety Planning and Risk Mitigation

Honorable Mentions



ORGANIZATION Agrivert Limited Alchmex International Construction Limited The Jardine Engineering Corporation Limited WSP (Asia) Limited PROJECT O·PARK2



ORGANIZATION CLP Power Hong Kong Limited PROJECT CLP Ma Sik Road Substation



ORGANIZATION Drainage Services Department, HKSAR Government AECOM Asia Company Limited Kwan Lee - Chun Wo Joint Venture PROJECT Shek Wu Hui Effluent Polishing Plant - Main Works Stage 1 - Civil Works for Sewage Treatment Facilities



ORGANIZATION Drainage Services Department, HKSAR Government AECOM Asia Company Limited Paul Y. - CREC Joint Venture PROJECT Yuen Long Effluent Polishing Plant – Main Works for Stage 1



ORGANIZATION Electrical and Mechanical Services Department, HKSAR PROJECT Chiller Plant Replacement at Tai Lung Veterinary Laboratory



ORGANIZATION Hip Hing Engineering Company Limited Hong Kong Science and Technology Parks Corporation Andrew Lee King Fun & Associates Architects Limited David S.K. Au & Associates Limited PROJECT Main Works Contract for Development of Micro-Electronics Centre



ORGANIZATION Water Supplies Department, HKSAR Government PROJECT 5/WSD/19 - Improvement to Dongjiang Water Mains P4 at Sheung Shui and Fanling COMPANY Hong Kong Housing Authority PROJECT BIM for Construction/ Safety Planning and Risk Mitigation LOCATION Hong Kong TYPE Residential SCHEDULED TIME OF COMPLETION Varies

Planning for Success: BIM for Construction/ Safety Planning and Risk Mitigation



The Hong Kong Housing Authority (HA) is a statutory body established in 1973 under the Housing Ordinance to provide subsidised public rental housing to lowincome families, and to help low to middleincome families gain access to subsidised home ownership. The Housing Department is the executive arm of the HA to help the Government achieve its policy objective on public housing.

BIM PARTNERS

CR Construction Company Limited

Hanison Construction Company Limited

Shui On Building Contractors Limited

Sunley Engineering & Construction Company Limited

Woon Lee Construction Company Limited Yau Lee Construction Company Limited

AUTODESK PRODUCTS USED Autodesk® AutoCAD® Autodesk® BIM 360® Autodesk® Dynamo Autodesk® Navisworks® Autodesk® ReCap® Autodesk® Revit®

Project Description

The Hong Kong Housing Authority's (HKHA) mission to meet housing demand requires careful planning on all fronts. The project for the Autodesk Hong Kong BIM Awards 2022 is the exploration of the BIM application for construction/ safety planning and risk management. To ensure timely delivery of flats, our vision is to utilise BIM extensively for construction planning and risk mitigation so that problems can be solved before actual work is carried out on site.

香港房屋委員會 Hong Kong Housing Authority

Project Challenges

HKHA is faced with an unprecedented challenge to meet housing demand with a challenging construction programme. Adding to the complexity of this task:

· The building sites for public housing development are getting more complex; and

• Our buildings, especially those adopting Modular Integrated Construction (MiC), are highly intricate and require new approaches to construction and practices.

Solutions for Challenges

To address the above issues, HKHA used BIM to conduct extensive pre-construction studies and verification to ascertain the buildability of our designs, minimise risks and enhance construction and safety planning so that problems can be solved and risks can be mitigated before actual work is carried out on site.

How does BIM benefit the project?

Since 2020, contractors are requested to submit simulation (4D modelling) videos to illustrate the construction process, as part of the technical proposal for complex building tenders and foundation tenders, to demonstrate their construction planning and identify the potential risk.

In the past, contractors submitted traditional 2D plans and bar chart schedules for their proposals, which were difficult to be visualised. Thus, we needed to spend a lot of time to judge its feasibility. With the simulation videos, the construction works and sequence can be clearly demonstrated, so that we are able to assess whether the contractor has an accurate understanding of the work involved and if their construction programme is feasible. The benefits are especially significant in complex projects with congested site.

Better with BIM

Projects in highly congested sites and complex situations were used to exemplify the successful adoption of simulation videos, with the following aspects:

- 1. Construction Planning
- 2. Safety
- 3. Risk Mitigation
- 4. Tender Assessment
- 5. Site Coordination
- 6. Demonstration of Innovative Technology

We have seen great success in applying BIM in construction planning and risk mitigation for tender assessment work. Our next target is to bring it forward to early design stage and extend it to construction and post completion stage to cover the complete project life-cycle.



Wang Chiu Road Phase 2 Image Courtesy of Hong Kong Housing Authority



Long Span Footbridge Connecting Hoi Ying Estate and Hoi Tat Estate Image Courtesy of Hong Kong Housing Authority



Hang Fu Street Image Courtesy of Hong Kong Housing Authority



Java Road Image Courtesy of Hong Kong Housing Authority



Tung Chung Area 99 Image Courtesy of Hong Kong Housing Authority



Anderson Road Quarry Site RS-1 Image Courtesy of Hong Kong Housing Authority



Hin Fat Lane Image Courtesy of Hong Kong Housing Authority



On Muk Street Image Courtesy of Hong Kong Housing Authority

COMPANY

Agrivert Limited

Alchmex International Construction Limited The Jardine Engineering Corporation Limited WSP (Asia) Limited

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O-PARK2

LOCATION

Kong Nga Po Road, Sha Ling, N.T.

TYPE

DBO

SCHEDULED TIME OF COMPLETION 2024

About Agrivert Limited

Agrivert has established itself as a market leader in the development and operation of organic waste treatment facilities, derived from 25 years of extensive operational experience.

About Alchmex International Construction Limited

Alchmex International Construction Limited (UK) is a subsidiary of China State Construction for sustainable construction and building service innovation and development. We provide excellent design - build - operate services with advanced technologies and management systems towards carbon neutrality.

About The Jardine Engineering Corporation Limited

Jardine Engineering Corporation (JEC) is a leading provider of engineering services, sourcing and contracting expertise. Established in Shanghai in 1923, JEC is headquartered in Hong Kong and operates throughout Asia.

About WSP (Asia) Limited

WSP is one of the world's leading professional services consulting firms. We have been active in Asia since early 1970s, contributing to many of the region's infrastructure, building and urban developments.

AUTODESK PRODUCTS USED

Autodesk[®] BIM 360[®]

Autodesk[®] Civil 3D[®]

Autodesk[®] Navisworks[®]

Autodesk[®] Revit[®]

BIM - Based: Global and Interdisciplinary Collaboration



Project Description

O-PARK2 adopts anaerobic digestion technology to convert food waste into biogas for electricity generation and fertilizer as by-product for landscaping or agricultural applications. In addition to providing electricity and heat for its own facilities, the surplus biogas produced can be converted to about 24 million kilowatt-hours of electricity annually, sufficient for use by some 5,000 households. With the commissioning of O-PARK2, the decrease in the use of fossil fuels for electricity generation together with an annual reduction of about 110,000 tonnes of food waste to be disposed of at landfills will prevent the emission of some 67,000 tonnes of greenhouse gases annually.

Project Challenges

- 1. Disciplinary Collaboration. The O•PARK2 project involves many disciplines and the internal structure of the building is complex. There are numerous files shared among various stakeholders and contractors.
- Global Collaboration. During the COVID-19 pandemic, cross-boundary traveling to work is extremely difficult, particular to O-PARK2. The project involved technology provider partners from UK and Equipment suppliers from around the world.
- 3. Tight Schedule. The conventional procedure of combining the design from different disciplines engineers to generate the final design is extremely time-consuming. The O•PARK2 design team is formed by many engineers from various backgrounds and different regions, which makes the design combination even more difficult and time-consuming.

Solutions for Challenges

Many challenges have been solved through BIM. BIM models from different disciplines can be federated in Navisworks. These stakeholders work together through BIM 360. By using Common Data Environment (CDE), information can be exchanged effectively regardless of the georgical boundary. And we use BIM to do the spatial analysis to reduce design error and save time. BIM 4D simulation can make the construction sequencing visualize feasibility. Although it will take some time to set up the initial model, the communication based on one single truth of BIM allow us to avoid misunderstanding during the design combinate with considerable time-saving.

How does BIM benefit the project?

- Multidisciplinary collaboration by using 100% BIM;
- More accurate and streamlined planning;
- Full project visualization;
- Early identification and mitigation of clashes;
- Monitor and track progress during construction;
- Improved communication across teams;
- Competitiveness better projects and more bids; and
- With the great effort from AJA Joint Venture and WSP, BIM is widely promoted amongst internal and external counterparts.

We believe that the BIM is well implemented and developed during the project period.

Better with BIM

Except for wide BIM uses covering all mandatory BIM Uses and some optional BIM uses in Development Bureau Technical Circular,O•PARK2 project has three major innovative BIM uses, including global collaboration via BIM, smart construction management (C-Smart) system developed based on BIM, and investigation on integration of BIM and CIC carbon assessment tool (CAT) for sustainable construction. Moreover, the anaerobic digester construction involving complicated construction sequences is a special case for adopting BIM to prevent setting out errors in this project.





Six steps for DfMA – footbridge construction. Image Courtesy of Agrivert Limited and Alchmex International Construction Limited and The Jardine Engineering Corporation Limited and WSP (Asia) Limited



C-Smart - Remote construction system. Image Courtesy of Agrivert Limited and Alchmex International Construction Limited and The Jardine Engineering Corporation Limited and WSP (Asia) Limited



Materials and elements are categorized and counted by using Cubicost TAS. Image Courtesy of Agrivert Limited and Alchmex International Construction Limited and The Jardine Engineering Corporation Limited and WSP (Asia) Limited



We use DfMA for footbridge construction. Image Courtesy of Agrivert Limited and Alchmex International Construction Limited and The Jardine Engineering Corporation Limited and WSP (Asia) Limited



BIM 4D data is useful for outlining and fine-tuning schedules. Image Courtesy of Agrivert Limited and Alchmex International Construction Limited and The Jardine Engineering Corporation Limited and WSP (Asia) Limited



Information collects on-site to build up the asset information model. Image Courtesy of Agrivert Limited and Alchmex International Construction Limited and The Jardine Engineering Corporation Limited and WSP (Asia) Limited

COMPANY CLP Power Hong Kong Limited PROJECT CLP Ma Sik Road Substation LOCATION Fanling, Sheung Shui Town Lot No. 281 TYPE Industrial building SCHEDULED TIME OF COMPLETION Mar 2023

Utility of the Future -Digital Substation Twin

CLP 🔂 中電

About CLP Power Hong Kong Limited

CLP Power Hong Kong Limited (CLP Power) is committed to supporting Hong Kong's long-term development as a world-class smart city. Being the largest electricity supplier in the city, CLP Power develops electricity supply infrastructure continuously to deliver a safe, reliable and environmentally friendly power supply to over 6.2 million people in its supply area. The company strives to provide excellent customer services and develop smart substations through innovations and adoption of emerging technologies.

BIM PARTNERS

Andrew Lee King Fun & Associates Architects Limited

Beria Consultant Limited

David S.K. Au & Associates Limited Hip Hing Construction Company Limited isBIM Limited WSP (Asia) Limited

AUTODESK PRODUCTS USED Autodesk® AutoCAD® Autodesk® BIM Collaborate Pro Autodesk® Build® Autodesk® Docs Autodesk® Dynamo Autodesk® Navisworks® Freedom Autodesk® Navisworks® Manage Autodesk® Revit® Autodesk® Takeoff

Project Description

Ma Sik Road (MSR) Substation is a 132kV transmission substation owned and operated by CLP Power. This substation is located at the rural – urban fringe area in Fanling, surrounded by residential developments, village houses and agricultural lands. The new MSR Substation will provide reliable electricity supply to support the growing population at New Territories North and the development of Northern Metropolis where commercial, community, recreation and cultural facilities will be developed in the area.

Project Challenges

The development of MSR Substation undergoes multiple phases of the building life cycle, starting from inception, detail design, procurement, construction to operation. Challenges encountered in different phases include design coordination issues, change of work scope, change of site condition, construction safety, etc. To provide a safe and reliable electricity supply to support rapid development in nearby areas, careful site work management and quality control have to be maintained in constructing the new substation. On the other hand, as the project is located near residential area, it is vital to minimise construction impact to the community.

Solutions for Challenges

Implementation of Building Information Modelling (BIM) had played an important role in the multi-disciplinary stakeholders' collaborative process. An effective common data environment was established with BIM technology for different project team members including project manager, consultants and contractors. The 3D BIM model of MSR Substation with relevant project information was built at design stage and used for coordination throughout the project life cycle. With the clouded platform and BIM model, project team can identify the design or site problems and resolve the conflicts at early stage.

How does BIM benefit the project?

With the use of BIM, 3D model with building information and 4D animation were generated quickly and it helped exchange project information and data between parties involved across different phases of the life cycle of MSR Substation. The visuals also facilitated communication with the concerned stakeholders including local residents and district council members as it gave a clear and comprehensible picture of our project. BIM helped the company perform value engineering for both initial and long-term investment of MSR Substation during the early planning and design stage. BIM was deployed to assess the feasibility of MSR Substation regarding the functionality and constructability as well.

Better with BIM

CLP Power attaches high importance to safety at work. With the use of BIM technology, animation of critical work process can be generated and visualised easily. Project team and operator can assess the safety risk of those tasks and carefully plan at early project stage. The construction team can fully understand the site condition and pay attention to some specific areas and avoid unnecessary accident or injury. The BIM model could also provide an immersive training with Virtual - Reality (VR) device, where operators could simulate the work process before actual site work.



Design of Ma Sik Road Substation Image Courtesy of CLP Power Hong Kong Limited





CLP Power's BIM Platform for Transmission Substations Image Courtesy of CLP Power Hong Kong Limited



Sun Path Analysis Image Courtesy of CLP Power Hong Kong Limited



Design of Ma Sik Road Substation Image Courtesy of CLP Power Hong Kong Limited



Construction Monitoring (Eagle Eye System) Image Courtesy of CLP Power Hong Kong Limited



Construction Simulation of Metal Grille in Transformer Bay Image Courtesy of CLP Power Hong Kong Limited

COMPANY

Drainage Services Department, HKSAR Government AECOM Asia Company Limited Kwan Lee - Chun Wo Joint Venture

PROJECT

Shek Wu Hui Effluent Polishing Plant - Main Works Stage 1 - Civil Works for Sewage Treatment Facilities

LOCATION **Shek Wu Hui, Hong Kong**

TYPE DSD - Sewerage & Sewage Treatment

SCHEDULED TIME OF COMPLETION
Mar 2024

About the Drainage Services Department, HKSAR Government

The Drainage Services Department of the HKSAR Government, the DSD, provides worldclass wastewater and stormwater drainage services enabling the sustainable development of Hong Kong. The DSD continuously improves drainage services, throughout the territory, in a cost-effective and environmentally responsible manner. Through its many successful projects and initiatives, the DSD strengthens relationships with community, industry and worldwide partners.

About AECOM Asia Company Limited

AECOM is a premier multi-disciplinary engineering firm, delivering professional project lifecycle and management services on all types of buildings and infrastructure. AECOM solves complex engineering challenges and helps their clients to realise their built projects in order to improve livehood and create sustainable legacies for generations.

About Kwan Lee - Chun Wo Joint Venture

Kwan Lee - Chun Wo Joint Venture is a partnership between two leading companies in the construction industry of Hong Kong and is one of the main contractors to realise the next phase of the Shek Wu Hui Effluent Polishing Plant.

Kwan Lee Holding Limited, founded in 1993, provides road improvement, drainage, sewage and pipe installation works and site formation works, with a passion and commitment in local civil engineering construction.

Chun Wo Construction and Engineering Company Limited, is engaged in the core construction and property development business. An acclaimed contractor and developer in Asia, Chun Wo's dynamic growth, in city and infrastructure development, makes it possible to improve people's quality of life at every turn.

BIM PARTNERS

Syntegrate Limited Blue BIM Limited

AUTODESK PRODUCTS USED

Autodesk[®] AutoCAD[®]

Autodesk[®] BIM 360[®]

Autodesk[®] BIM 360[®] Docs Autodesk[®] BIM Collaborate Pro

Autodesk® Civil 3D®

Autodesk[®] Dynamo Studio

Autodesk[®] Navisworks[®] Manage

Autodesk[®] ReCap[®]

Autodesk[®] Revit[®]

Critical Insight - Visualising Spatial Elements and Project Lifecycle through BIM



Project Description

The existing Shek Wu Hui Sewage Treatment Works (SWHSTW) has been operating for 30 years, treating sewage generated from Sheung Shui, Fanling and adjacent districts. The design capacity of the existing SWHSTW was 93,000 m3/day. After sewage treatment and ultra-violet disinfection, the treated effluent is discharged to Ng Tung River.

As the next phase of upgrading the SWHSTW, the current project, Shek Wu Hui Effluent Polishing Plant - Main Works Stage 1, or SWHEPP, comprises the proposed Inlet Works No. 1, Primary Sedimentation Tanks No. 1 - 4, Bioreactor No. 2A & 2B, Membrane Facilities Building No. 2, SAS Pumping Station, auxiliary facilities, and associated works. After completion of Main Works Stage 1, SWHEPP's treatment capacity will be increased to 190,000 m3/day.

Project Challenges

In the design and construction stages, one of our team's principal responsibilities is to protect and maintain existing infrastructures and record all as-built data. The effluent polishing plant has been in operation since 1978 and contains a massive amount of underground utilities in addition to its existing buildings. Most of the as-built data had not been captured in any form of BIM. The project team found numerous differences between the real conditions and the official records. After creating a reliable model of the existing conditions, the BIM team could evaluate clashes between the proposed design and existing structures.

Additionally, site work is always susceptible to real-world constraints, which means that, wherever the asbuilt structure deviated from the proposed, extra time and workload was required to update the as-built data into the BIM model.

Solutions for Challenges

Our project utilises BIM technology to form a BIM-based working practice and a Common Data Environment (CDE) is used as the construction collaboration platform. Inter-teams working efficiency showed noticeable improvement with the issues identified in the model and resolved through a BIM-enabled workflow. BIM models from the different contracts making up SWHEPP must be federated to coordinate interfacing works and for interference checks. Our contract, has the complexity of being one out of four main contracts that make up the Main Works Stage 1 and we have interfacing works with two other main contractors; hence, the use of real-time Design Collaboration facilitated by BIM Collaborate Pro on our CDE is essential to our productivity. The Independent BIM Consultant manages our CDE to control the BIM model's delivery at various stages of construction.

In the immediate future, the preparation of the Asset Information Model, with verified as-builts, COBie exports, asset data input, and interoperability with operations-phase Asset Management processes will be the focus for post-construction BIM activities.

How does BIM benefit the project?

BIM technology has been and will continue to be widely applied in this project from design conception to site operation, and as such, is highly relevant to all stakeholders.

Through BIM, we visualise, evaluate and form accurate predictions of future site conditions. From that, we are able to make effective plans and take proper actions on site. We visualise the existing and proposed design at the work area to identify clashes and site constraints, and implement protection measures for the existing underground utility services. As work proceeds, the utility services model is progressively updated with the findings of the ground radar survey and inspection pit excavations.

4D phasing and construction methods simulation models demonstrate construction sequences and allows the project team to visualise and refine the construction process to meet Key Date requirements.

Cost modelling or 5D modelling, through quantity takeoffs from the Revit models, supports the quantity surveying team in managing and monitoring material orders and the progress of sub-contractors' works.

Overall, BIM has demonstrably maximised the time-efficiency of our work and reduced wastage in material resources.

Better with BIM

BIM creates value across multiple activities, not only for design and construction, but also safety and material management .

3D Virtual Reality (3DVR) is a cost-efficient way to identify clashes in the design or discrepancies between the BIM model and as-built structures. Also, 3DVR can clearly convey the spatial conditions of working underground, help workers understand the dangers of working in such spaces, help the safety team to evaluate risks and assist in the preparation for such works.

RFID and the Web-based Building Component Management System (BCMS) incorporates IoT and RFID technologies into the materials tracking process and enables real-time monitoring of the installation of building components. Data (including delivery tracking, installation, component data, and maintenance records etc.) is synchronised with the BIM to create reports to maximise the data accuracy of the project life cycle.





30VR for clash detection between model and as-built structure Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Kwan Lee - Chun Wo Joint Venture

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CDE for real-time Design Collaboration and Activities Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Kwan Lee - Chun Wo Joint Venture



Shop drawing of door component in Revit Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Kwan Lee - Chun Wo Joint Venture



4D Modelling (Phase Planning) and Site Utilisation Plans Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Kwan Lee - Chun Wo Joint Venture



Section diagram of Shek Wu Hui Effluent Polishing Plant (SWHEPP) Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Kwan Lee - Chun Wo Joint Venture

COMPANY Drainage Services Department, HKSAR Government AECOM Asia Company Limited Paul Y. - CREC Joint Venture

PROJECT

Yuen Long Effluent Polishing Plant – Main Works for Stage 1

LOCATION

Yuen Long

TYPE

Infrastructure Project

SCHEDULED TIME OF COMPLETION Nov 2026

About Drainage Services Department, HKSAR Government

Drainage Services Department (DSD) provides world-class wastewater and stormwater drainage services enabling the sustainable development of Hong Kong. Since the establishment in September 1989, DSD has strived to upgrade sewage treatment and flood protection levels in Hong Kong, and has acquired noticeable achievement and has committed to strengthening relationships with community, industry and worldwide counterparts.

About AECOM Asia Company Limited

AECOM Asia Company Limited (AECOM) launched when a handful of employees from design and engineering companies shared a dream of creating an industryleading firm dedicated to delivering a better world. AECOM became an independent company formed by the merger of five entities. While our official founding was in 1990, many of our predecessor firms had distinguished histories dating back more than 120 years. Since then, more than 50 companies have joined us and, in 2007, we became a publicly traded company on the New York Stock Exchange.

Paul Y. - CREC Joint Venture

Paul Y. Construction Company Limited, China Railway Group Limited, and China Railway First Group acting in joint venture under the name Paul Y. – CREC Joint Venture was awarded by DSD in Nov 2020 the Contract No. DC/2019/10 Yuen Long Effluent Polishing Plant – Main Works for Stage 1, and has committed in delivering and completing this project effectively, professionally and successfully through dedicated resources and expertise by the parties.

BIM PARTNERS

Syntegrate Limited Tyfron Consultancy Limited

AUTODESK PRODUCTS USED

Autodesk[®] AutoCAD[®]

- Autodesk[®] BIM 360[®]
- Autodesk[®] Civil 3D[®]
- Autodesk[®] Navisworks[®]
- Autodesk[®] Revit[®]

BIM-based Construction - Yuen Long Effluent Polishing Plant





Project Description

The existing Yuen Long Sewage Treatment Works (YLSTW), commissioned in 1984 now serves Yuen Long Town, Yuen Long Industrial Estate and Kam Tin area with treatment capacity of 70,000 m3/day at secondary sewage treatment level. To cope with the population growth and development needs, YLSTW will be upgraded in stages to 150,000 m3/day and be transformed into Yuen Long Effluent Polishing Plant (YLEPP) at tertiary treatment level within the same tight footprint to meet the more stringent discharge requirements.

Project Challenges

A number of challenges / difficulties were encountered during the course of the upgrading works, including, but not limited to the following:

- 1. Work within the existing operating sewage treatment plant.
- 2. Numerous existing utilities and sewage process pipes are required to be maintained in service to support the sewage treatment services.
- 3. Congested works area with upgrading works within the same tight footprint of YLSTW.
- 4. Tight construction programme, requiring construction of multiple buildings at the same time.
- 5. Surrounded by ecological sensitive receivers, restricting percussive piling works and demolition using excavator-mounted breakers only from April to October of the year.

Solutions for Challenges

Challenges always lead to Opportunities. We embrace a new innovative concept to achieve the following:

- 1. Designate a site personnel to take charge.
- 2. Overlay all details and elements on a building plan on a common platform to facilitate discussion amongst stakeholders.
- 3. Establish a better communication channel a common platform for quality collaboration amongst teams, from management levels to frontline workers
- 4. Increase the productivity by eliminating human errors
- 5. Track and document how the works are progressing.
- 6. Enable early identification of problems and resolve them by immediate discussion.
 - 7. Reduce the use of paper.
- 8. Better training on site safety to frontline workers.

How does BIM benefit the project?

By incorporating design into BIM, designers and architects are able to evaluate designs for feasibility, function, and aesthetics within a more immersive environment. Additionally, clients can experience a richer review process. In this way, the changes become more easily identified and design options and proposals can be evaluated more quickly.

Using BIM models during the construction phase, the Client, Project Manager and Contractor can work out better planning, construction phasing and method of construction on each activity. By allowing the site information to be visualized in three dimensions, BIM enables a better understanding of the scope of the work.

Better with BIM

With BIM, it is now possible to visualize the BIM model on-site at any time. The BIM model can be automatically and accurately mapped on-site, so that the user will be able to isolate focused digital information and understand the geometric relationship between BIM and the site.

Autodesk BIM 360 provided a excellent common data environment to allow multiple stakeholders to collaborate on the project, including;

- 1. Reduction of risk and increased reliability of data
- 2. Streamlining the process of checking, versioning, and reissuing information.
- 3. Enhance collaboration and improve outcomes.



Overall View for YLEPP (with Artist Impression) Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Paul Y. - CREC Joint Venture



Cost Estimation by Using BIM for construction of CLP substation and 11kV switchgear house Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Paul Y. - CREC Joint Venture



Clash Analysis for construction of CLP substation and 11kV switchgear house Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Paul Y. - CREC Joint Venture



Stakeholder Collaboration for construction of Inlet Works Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Paul Y. - CREC Joint Venture



Proposed Roof Garden with Bird Hide (with Artist Impression) Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Paul Y. - CREC Joint Venture



Proposed Inlet Works with MEP arrangement Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Paul Y. - CREC Joint Venture



Federated Model in Common Data Environment for YLEPP Image Courtesy of Drainage Services Department, HKSAR Government and AECOM Asia Company Limited and Paul Y. - CREC Joint Venture

COMPANY

Electrical and Mechanical Services Department, HKSAR

PROJECT

Chiller Plant Replacement at Tai Lung Veterinary Laboratory

LOCATION

Tai Lung Veterinary Laboratory, Lin Tong Mei, Sheung Shui

TYPE

Repair, Maintenance, Alteration and Addition (RMAA)

SCHEDULED TIME OF COMPLETION 09/2021-09/2022

About Electrical and Mechanical Services Department, HKSAR

EMSD has two functional arms - Regulatory Services and Trading Services - to provide E&M services for enhancing the safety and quality of life of Hong Kong.

Our Regulatory Services arm operates a number of divisions each specialising in different areas of mechanical safety, gas safety, electrical safety, railway safety, energy efficiency and utilities monitoring.

The Electrical and Mechanical Services Trading Fund (EMSTF) provides a wide range of E&M engineering services pertaining to airport services, schools, environmental hygiene, government buildings and facilities, hospitals and clinics, leisure and cultural venues, ports and harbour, postal services, project management and consultancy. The EMSTF operates under international certification systems to provide quality services to her customers while sustaining green operation and maintaining occupational health and safe working environment.

BIM PARTNERS

REC Engineering Company Limited Global Virtual Design and Construction Limited

AUTODESK PRODUCTS USED

Autodesk[®] 3ds Max[®]

Autodesk Forge®

Autodesk[®] Navisworks[®]

Autodesk[®] ReCap[®] Autodesk[®] Revit[®]

The First MiMEP Pilot Project in EMSTF - Chiller Plant Replacement at Tai Lung Veterinary Laboratory



Project Description

The chiller replacement project essentially leverages the benefits brought by BIM in wider aspects such as 3D laser scanning, Augmented Reality (AR), MultiTrade Integrated MEP (MiMEP), asset management and project management with the adoption of various digitalization features. Incorporating the advanced technologies not only provides clients with more efficient services, a shorter construction period, better quality control, enhanced work safety and site management, and minimise the impact on clients' daily operation, but also reduces materials consumption and boosts productivity.

Project Challenges

In order to maintain an uninterrupted air-conditioning service for the laboratory's daily operation during replacement works, the installation works were arranged in two phases. The new chilled water headers with branch pipes prefabricated modules were designed to install on the top of the existing headers within a narrow space.

Moreover, the lifting space of the premises and width of the public road (a single lane of less than 3 meters) for equipment delivery is very limited.

Solutions for Challenges

In view of the congested area with new and existing services, clash detection analysis in BIM Model was essentially performed to facilitate the design of new chilled water pipework routing to avoid any hard or soft clashes with existing pipework, and supporting framework.

The 4D BIM simulation is of paramount importance to effectively simulate and ascertain holistic logistic arrangement and swap path analysis of each MiMEP module all the way through to the site, particularly at the main entrance where the existing nearby planters were of significant spatial concern.

How does BIM benefit the project?

With the aid of the BIM Model, the project team carefully planned and designed the modules for manufacturing and assembly on site.

The use of AR to overlay BIM model against the existing environment was adopted to perform design verification. In the future maintenance point of view, any potential clash or hindrance to operation would cause further rectification work.

Upon completion of the project, a completed BIM model with Asset Data was successfully obtained to form an Asset Information Model (AIM) for building operation. The integration of AIM and IoT technology could achieve smart facility management.

Better with BIM

BIM has been implemented across the project life cycle from the design and construction, to asset management. The application of BIM facilitates the adoption MiMEP technology in module design, logistic arrangement.

The BIM model serves as a presentation tool for the team to visualise the project apart from site via the "Big Room" Concept. Project team members can discuss and review the site issues with the use of BIM model on spatial coordination, programming and progress reporting, logistic consideration, phasing planning, modularization planning, safety consideration, maintenance feasibility, facility upkeep etc. to ensure the project development is in the right track.



Chiller Plant at Tai Lung Veterinary Laboratory f Electrical and Mechanical Services Department, HKSAR





Image Courtesy of Electrical and N





of Electrical and Mechanical Ser



Image

Augmented Reality (AR) - Design Verification Image Courtesy of Electrical and Mechanical Services Department, HKSAR



Project Completion Image Courtesy of Electrical and Mechanical Services Department, HKSAR

COMPANY

Hip Hing Engineering Company Limited Hong Kong Science and Technology Parks Corporation

Andrew Lee King Fun & Associates Architects Limited

David S.K. Au & Associates Limited

PROJECT

Main Works Contract for Development of Micro-Electronics Centre

LOCATION

Fuk Wang Street, Yuen Long INNOPARK

Private – Industrial

SCHEDULED TIME OF COMPLETION Jan 2024

About Hip Hing Engineering Company Limited

Founded in 1964, Hip Hing Engineering Co., Ltd. (Hip Hing) undertakes the design and construction of building and civil engineering works for public sector clients. Over the past decades, Hip Hing has grown to become one of the leading contractors in Hong Kong, and has been trusted by our clients to construct many of the landmark buildings which define Hong Kong.

About Hong Kong Science and Technology Parks Corporation

Hong Kong Science and Technology Parks Corporation (HKSTP) fosters a culture of promoting innovation and a vision to adopt new technologies, so as to strengthen the industry's sustainable development and build a future with abundant innovation opportunities for the younger generation.

About Andrew Lee King Fun & Associates Architects Limited

Andrew Lee King Fun & Associates Architects was first established in Hong Kong in 1962 and was incorporated as a limited company in 1998. It is now one of the most innovative and technological forefront architect services in Hong Kong, offering professional architect services, innovative design proficiency and efficient project management.

About David S.K. Au & Associates Limited

David S.K. Au & Associates Ltd. (DAAL) is a well-established consulting firm, operating in Hong Kong since 1980. It offers a truly comprehensive, multi-disciplinary consultancy service package from one office.

AUTODESK PRODUCTS USED

Autodesk® 3ds Max® Autodesk® AutoCAD® Autodesk® BIM 360® Docs Autodesk® BIM Collaborate Pro Autodesk® Civil 3D® Autodesk® Desktop Connector Autodesk® Dynamo Autodesk® Navisworks® Manage Autodesk® Revit® Autodesk® Vehicle Tracking

Utilizing BIM for Seamless collaboration in fast-track construction project







Project Description

Micro-Electronics Centre (MEC) is a first state-of-the-art technological, industrial building to specialize in micro-electronic manufacturing in Hong Kong. The project consists of a 4-storey of Main Building and a 3-storey of Central Utility Building. Equipped with flexible design dedicated cleanroom and special chemical handling room. MEC is established to support the research, development and pilot production of new generation microelectronics products, thereby generating new business opportunities, high-skilled employment and a brighter future career for the young generation.

Project Challenges

For MEC project, the 132k-Volt Substation is included in the Central Utility Building (CUB) provide electricity to the building. To swiftly meet the strong and ever increasing regional market demand of microelectronics, the MEC has to be delivered in tight project schedule, with the handover of the Substation to be completed within first 5 months. Only a 1-month challenging window was therefore allowed for fully coordinating relevant underground utilities and E&M services, which was further strained by the coincidental overlapping with the 5th local wave of COVID-19. Team members had to work concurrently across different physical locations inevitably.

Solutions for Challenges

BIM coordination is the key to reduce rework while boost productivity. BIM360 Docs, a cloud-based CDE which enables all project stakeholders to review latest models and issues in real-time, and at different locations. Also, 4D Simulation was done using Navisworks Manage to simulate construction sequence for congested site planning in advance. In addition, Civil 3D and Vehicle Tracking were adopted to generate swept paths to visualize different scenarios for project team to determine the best route for site logistics. Dealing with the tight deliverables schedule, automated tools developed by Dynamo is adopted to facilitate drawing production, which reduced 30% of total required man-days.

How does BIM benefit the project?

MEC contains special equipment, which have specific spatial requirements for operation and maintenance. BIM is adopted to unveil the potential headroom issues and fine-tune the design earlier before construction. With Revit and Navisworks, clash analysis can be carried out to check the design-intent spatial requirements. In addition, BIM team has assist QS team to conduct quick Quantity Take-off using Revit and Dynamo. The concrete volume can be estimated to meet the tight approval schedule for the counter-proposal. Autodesk Docs provides single source of truth which enables virtual project coordination. Deliverables submission can be completed on schedule even facing unforeseeable challenges.

Better with BIM

Adoption of BIM plays an important role throughout the project stages. As Design for Manufacturing & Assembly (DfMA) and MultiTrade integrated MEP (MiMEP) are adopted into the proposed development, BIM visualizes the design and identify clashes and issues earlier before construction, so as to make sure the pre-fabricated items could be well-fitted into the design and be successfully installed into the particular location. In addition, the information-enriched BIM model with Virtual Reality (VR) technology could simulate the As-built environment. VR not only adopted for design review, but also for safety training and FM training in later project stage.





Rendered image of Main Building Main Entrance Lobby Image Courtesy of Hip Hing Engineering Company Limited and Hong Kong Science and Technology Parks Corporation and Andrew Lee King Fun & Associates Architects Limited and David S.K. Au & Associates Limited



Logistic Swept Path Analysis generated by Civil 3D Image Courtesy of Hip Hing Engineering Company Limited and Hong Kong Science and Technology Parks Corporation and Andrew Lee King Fun & Associates Architects Limited and David S.K. Au & Associates Limited



Transformer Installation Completion Image Courtesy of Hip Hing Engineering Company Limited and Hong Kong Science and Technology Parks Corporation and Andrew Lee King Fun & Associates Architects Limited and David S.K. Au & Associates Limited



Rendered image of Main Building Main Entrance Image Courtesy of Hip Hing Engineering Company Limited and Hong Kong Science and Technology Parks Corporation and Andrew Lee King Fun & Associates Architects Limited and David S.K. Au & Associates Limited



. Heat-map of Headroom and Drawing Production using Dynamo Image Courtesy of Hip Hing Engineering Company Limited and Hong Kong Science and Technology Parks Corporation and Andrew Lee King Fun & Associates Architects Limited and David S.K. Au & Associates Limited



Aerial image of CLP 132kV Substation at completion Image Courtesy of Hip Hing Engineering Company Limited and Hong Kong Science and Technology Parks Corporation and Andrew Lee King Fun & Associates Architects Limited and David S.K. Au & Associates Limited

COMPANY

Water Supplies Department, HKSAR Government

PROJECT

5/WSD/19 - Improvement to Dongjiang Water Mains P4 at Sheung Shui and Fanling

LOCATION

Sheung Shui and Fanling

TYPE

Water works

SCHEDULED TIME OF COMPLETION 01 2023

About Water Supplies Department, HKSAR Government

Hong Kong enjoys one of the safest and most reliable water supplies in the world. The Water Supplies Department (WSD) is responsible for operating and maintaining fresh water and flushing water supplies and distribution systems to ensure reliable water supplies to the customers. The fresh water supply system covers not only the populated city centres and satellite towns but also rural areas and villages covering a total of 99.99% of Hong Kong's population. On the other side, the seawater supply network for flushing covers about 85% of the Hong Kong's population.

BIM PARTNERS

Summit Technology (Hong Kong) Limited Build.IT

AUTODESK PRODUCTS USED

Autodesk® Architecture, Engineering & Construction Collection Autodesk® BIM 360®

Autodesk[®] ReCap[®] Pro

Digital Transformation and Hardware Upgrade of Raw Water Supply System



Project Description

The Dongjiang water mains (DJWM) P4 is one of the raw water mains for transfer of DJ raw water. It transfers the DJ raw water from Muk Wu Raw Water Pumping Station to Tai Po Tau Raw Water Pumping Station, where the DJ raw water will be further distributed to various water treatment works and the Plover Cove reservoir. The glass reinforced plastic (GRP) pipes of the section of DJ water mains P4 at Sheung Shui and Fanling were laid more than 30 years ago. They are approaching the end of their service life. Therefore, we need to replace this section of the GRP pipes timely to ensure the reliability of water supply to Hong Kong. The scope of the project comprises the replacement of about 5 kilometers (km) of aged GRP pipes of the section of DJ water mains P4 by steel pipes of diameters ranging from 2 100 millimeters (mm) to 2 300 mm. Moreover, digital transformation of the existing DJ water main P4 and Muk Wu Raw Water Pumping Station is required to facilitate asset management.

Project Challenges

The existing DJWM P4 water main has been shut down for its replacement works. A very tight schedule, i.e., laying about 5km of large diameter (2.2m) water main within 2 years, has been set for the project to minimize the additional electricity cost.

The project team has to exercise extreme care to ensure the safe operation of the MTRC's rail and Fanling Highway when replacing the proposed P4 water main adjacent to them. In particular, the project team has to deal with high pedestrian flow, high traffic flow, congested underground structures and utilities for the proposed trenchless works near the Sheung Shui MTR Station.

Solutions for Challenges

The project team integrate BIM together with the following latest technologies to overcome the above mentioned challenges:

- Tunnel Boring Machine (TBM);
- Laser scanning for generating a point cloud model of the existing P4 water main;
- Ground Penetration Radar (GPR) to verify the locations of the underground structures;
- Gyroscope for ascertaining the alignment of the existing cable tunnel of CLP.

The information gathered was incorporated into the federal BIM model for determining the alignment of the proposed P4 water main. The project team has successfully identified a feasible alignment and satisfactorily completed the works without clashing with any existing underground structures and utilities.

How does BIM benefit the project?

The foremost benefit brought about by BIM is communication. Its 3D environment is the perfect platform for collaboration. Clash detection of BIM enables the project team to identify the best water main alignment in terms of construction time and cost to suit the site conditions. 5D BIM can expedite the option evaluation of water mains' alignments in both design and construction stages and account finalization of the works contract after its completion. The staff resources can be saved. Last but not the least, the BIM models for this project can be used for asset management via COBie. A water network model can be created from the BIM model of water mains for assessing the performance of water supply systems and identifying improvements.

Better with BIM

By using the as-built BIM model of the water mains, the project team can now locate the water mains on-site in real time to facilitate design of new water mains and asset management of existing water mains. The first method is to use GPS. The BIM models of water mains can be downloaded in a tablet and combine it with the real environment via AR technology for locating the water mains on-site. The second method is to locate the water mains indirectly via platform for 3D Geospatial such as Google Earth or Cesium.



DongJiang Water Main P4 in Google Earth Image Courtesy of Water Supplies Department, HKSAR Government



Replacement of Exposed DongJiang Water Main P4 Image Courtesy of Water Supplies Department, HKSAR Government



Clash Detection of underground utilities Image Courtesy of Water Supplies Department, HKSAR Government



TBM Launching Pit near Sheung Shui MTR Station Image Courtesy of Water Supplies Department, HKSAR Government



Completion of TBM Tunnel Works Image Courtesy of Water Supplies Department, HKSAR Government



Lifting and aligning of 002000 PE pipes for butt fusion welding Image Courtesy of Water Supplies Department, HKSAR Government



Surveying Point Cloud of Muk Wu Pumping Station by Drone Image Courtesy of Water Supplies Department, HKSAR Government



Cross-Sectional View of Muk Wu Pumping Station Image Courtesy of Water Supplies Department, HKSAR Government

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.

Advisory Panel



Vicky Chan Communications Chair 2022, Past President 2020, AIA Hong Kong



Froky Wong Committee member of AIAB, Autodesk Industry Advisory Board

Dr. Francis Chan



Ar Prof Ada Fung, BBS President. Hong Kong Alliance of Built Asset & Environment Information Management Associations (The Hong Kong Chapter of buildingSMART International)



Ryan Leong Director, Board of Directors, Architects Association of Macau



Simon J Gallagher Director, Chartered Institute of Architectural Technologists, Hong Kong Centre



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



Stellar Leung Co-Organizer, Hong Kong Revit User Group



Ir Steven Lai Vice Chairman, Institution of Public Private Partnerships

Hong Kong Institute of Project Management



Lam Wai Choi Chairman, The Chartered Institute of Building (Hong Kong)



Guan Ting Honorary Secretary, The Hong Kong Institute of Building Information Modelling



Ir Raymond Lui Committee Member, The Hong Kong Institution of Engineers (IT division)



Dr. Calvin K. Kam FAIA, PhD, CCBM, PE, LEED AP Founder and CEO, Strategic Building Innovation • bimSCORE



Sr Daniel Sum Chairman. The Chartered Institution of Civil Engineering Surveyors (Hong Kong Region)



Michael Leung Head of BIM Affairs, The Hong Kong Institution of Engineering Surveyors



Edison Lai Deputy Vice President, The Macau Institute of Engineers

Advisory Panel - Award Winners



Architectural Services Department, HKSAR

Heritage Building Information Modelling for Cultural Heritage Conservation at Tai Fu Tai Mansion

To assist in the preservation and maintenance of the historical fabrics, the project's objective was to establish a Heritage Building Information Model (HBIM) for the Tai Fu Tai Mansion. This beautiful example of an extraordinarily well performed project, displaying a very persuasive use of BIM with concise execution, especially considering the challenges in scanning and the lack of proper drawings. The use of technology to preserve and document Chinese traditional architecture benefits not just the government but also the Chinese architectural culture.



Architectural Services Department, HKSAR

China State Construction Engineering (Hong Kong) Limited

China State Construction International Medical Industry Development Company Limited Design and Construction of Community Isolation and Treatment Facilities at Penny's Bay and Area Adjacent to the Kai Tak Cruise Terminal

The Penny's Bay project has a total area of 449,743 square meters, of which 271,784 square meters are used for building. The two projects (Kai Tak and Penny's Bay) combined to offer 9,112 isolation units with 20,064 isolation beds, more than doubling the number of isolation beds now available in Hong Kong. It is a fantastic accomplishment that BIM was used in conjunction with multidisciplinary collaboration to finish this mission-critical project on time and within budget.



Architectural Services Department, HKSAR Shui On Joint Venture Vircon Limited

Design and Construction of a purpose-built Multi-Welfare Services Complex

The project consists of an eight-storey structure with 1,750 senior residential care homes, a care and attention home for the disabled, and a day activity center/hostel for people with mental disabilities.

BIM technology was used to handle and solve the project's complexity. It serves as a solid illustration of how MiC may be incorporated into BIM modeling and clearly illustrates the benefits of each aspect of BIM adoption and integration such as 4D BIM with PowerBI. The KPI elements' measurements were clearly specified.



Hip Hing Construction Company Limited Henderson Land Development Company Limited

The Henderson

The Henderson is intended to establish an "Office for the Future" and an "Icon among the Icons" and is situated in the center of Hong Kong's CBD with stern architectural wonders close by. Her curved glass façade was created by the esteemed Zaha Hadid Architects of London and is meant to resemble the layers of a budding Bauhinia. The Tower was built with a high-tensile steel frame and has wide-span, column-free floor layouts that enable the most usable spaces possible to meet changing operational needs. The Henderson is envisioned as a model Grade-A Office for the next generation and beyond, including a comprehensive, smart system.

This project is quite challenging. Facade designs with extremely intricate geometry necessitate meticulous attention to detail and close coordination amongst stakeholders. The utilization of BIM technology was successful. Using BIM, the design of a striking, futuristic structure with initially complex architectural components was made possible in order to make it easier to construct and operate. This project makes extensive use of BIM technologies and shows where the field should be headed.

Advisory Panel - Award Winners



Hip Hing Construction Company Limited Leader Bright Limited ATAL Engineering Group Vircon Limited

SOGO Kai Tak

The Kai Tak Development Project broke ground in December 2017 and plans call for the twin towers to be completed in the second quarter of 2022 in order to take advantage of the rising purchasing power in Hong Kong's East Kowloon neighborhood. A project that was carefully thought out and presented. Very solid explanations provided during the interview stage allowed for a deeper comprehension of the problems encountered during construction and how they were resolved. Overall, this is a superb illustration of a practical application of BIM in construction. The project team showed that the use of BIM technologies effectively can prevent rework or conflicts between activities on site and reduce site-related uncertainty.



Hip Hing Construction Company Limited Swire Properties Limited

Two Taikoo Place

With a triple Grade-A office tower, Two Taikoo Place seeks to create a mixed-use neighborhood that is focused on people. The goal of Two Taikoo Place is to establish a new standard for creative architecture. The adoption of BIM technology was emphasized at all stages of the project lifecycle, including design reviews, drawing generation, spatial coordination, modeling of existing conditions, phase planning, digital fabrication, construction quality management, as-built modeling, and asset information modeling.

An effective illustration of the use of BIM and MEP in a significant project. Before moving to the construction site, the project uses BIM to help them resolve problems. This project also appears to have taken into account the operations phase of the project lifecycle.



Hong Kong Baptist University China State Construction Engineering (Hong Kong) Limited China State Construction Science and Technology Limited Transcendence Company Limited P&T Architects and Engineers Limited

Jockey Club Campus of Creativity (JC³)

The Jockey Club Campus of Creativity of Hong Kong Baptist University consists of a 4-storey academic building complex and four hostel buildings with a height of 13 to 17 stories. This is a great illustration of how BIM is being properly integrated with 3D and VR technologies. The project also did well with the inclusion of aerial photos. This project has shown how CDE and the C-Smart solution may be used to work on a variety of data exchange formats between various software/ platforms



Water Supplies Department, HKSAR Government ATAL – Chun Wo – Ming Hing Joint Venture Summit Technology (Hong Kong) Limited

In-situ Reprovisioning of Sha Tin Water Treatment Works (South Works) – Water Treatment Works and Ancillary Facilities

The Sha Tin Water Treatment Works (STWTW), which includes the North Works and South Works, is Hong Kong's biggest water treatment facility, providing service to more than 2 million people. The proposed works comprise the in-situ reprovisioning of the STWTW South Works, whose reliability has been considerably lowered after more than 50 years of service since its commissioning in 1964.

A well-executed project with many good examples of BIM application across the project's various phases. Using a BIM model, the project successfully integrates civil and M&E construction; in particular, the 4D staging and sequencing has been carefully considered.

Advisory Panel - Honorable Mentions



Agrivert Limited

Alchmex International Construction Limited The Jardine Engineering Corporation Limited WSP (Asia) Limited

O·PARK2

O-PARK2 uses anaerobic digestion technology to turn food waste into fertilizer as a byproduct for landscaping or agricultural uses as well as biogas for electricity production. The excess biogas produced can be transformed into around 24 million kilowatt-hours of electricity yearly, enough to power about 5,000 households in addition to providing electricity and heat for its own facilities. With the opening of O-PARK2, the amount of fossil fuels used to generate electricity will drop, and there will be a corresponding decrease in the amount of food waste disposed of in landfills each year, saving about 110,000 tonnes in total. It appears that the project team's ability to efficiently collaborate across time zones and locales was aided by the usage of BIM, with innovative application of the C-Platform developed.



CLP Power Hong Kong Limited CLP Ma Sik Road Substation

The 132kV Ma Sik Road (MSR) Substation is a CLP Power-owned and -operated transmission substation. This substation is surrounded by residential communities, hamlets, and agricultural regions near the rural-urban frontier of Fanling. The development of Northern Metropolis, where commercial, community, recreational, and cultural facilities will be built, and the expanding population in New Territories North will both benefit from the steady energy supply that the new MSR Substation will provide.

This project is likely the first to truly incorporate building operations and maintenance into the BIM model together with systems and equipment. Additionally, this initiative does a good job of assisting modular construction projects. The project develops a novel BIM model application to make sure the solar panels' output performs as intended.



Drainage Services Department, HKSAR Government AECOM Asia Company Limited Kwan Lee - Chun Wo Joint Venture Shek Wu Hui Effluent Polishing Plant – Main Works Stage 1 - Civil Works for Sewage Treatment Facilities

The existing Shek Wu Hui Sewage Treatment Works (SWHSTW) has been operating for 30 years, treating sewage generated from Sheung Shui, Fanling and adjacent districts. As the next phase of upgrading the SWHSTW, the current project, Shek Wu Hui Effluent Polishing Plant – Main Works Stage 1, or SWHEPP, comprises the proposed Inlet Works No. 1, Primary Sedimentation Tanks No. 1 - 4, Bioreactor No. 2A & 2B, Membrane Facilities Building No. 2, SAS Pumping Station, auxiliary facilities, and associated works. After completion of Main Works Stage 1, SWHEPP's treatment capacity will be increased to 190,000 m3/day. It is a high quality project with well-illustrated BIM workflow process for BIM Project Management. In addition, it is one of the few projects that has proactively incorporated operations and maintenance into the BIM model and planning.



Drainage Services Department, HKSAR Government AECOM Asia Company Limited Paul Y. - CREC Joint Venture

Yuen Long Effluent Polishing Plant – Main Works for Stage 1

With a treatment capacity of 70,000 m3/day at the secondary sewage treatment level, the current Yuen Long Sewage Treatment Works (YLSTW), which was commissioned in 1984, currently serves Yuen Long Town, Yuen Long Industrial Estate, and Kam Tin region. In order to fulfill the increasingly stringent discharge criteria, the YLSTW will gradually be upgraded to 150,000 m3/ day and converted into the Yuen Long Effluent Polishing Plant (YLEPP) at the tertiary treatment level within the same constrained footprint. BIM workflow is transparent throughout the building lifecycle with creative technology application.

Advisory Panel - Honorable Mentions



Electrical and Mechanical Services Department, HKSAR

Chiller Plant Replacement at Tai Lung Veterinary Laboratory

With the use of different digitalization elements, the chiller replacement project essentially exploits the benefits given by BIM in broader dimensions including 3D laser scanning, Augmented Reality (AR), MultiTrade Integrated MEP (MiMEP), asset management, and project management. Utilizing cutting-edge technologies not only minimizes the impact on customers' everyday operations while also delivering clients with more effective services, a shorter construction duration, greater quality control, improved work safety, and site management.

A great illustration of the application of BIM from design to construction and asset management. The project also serves as a compelling illustration of the value of BIM and a very creative application of technology (welding robot, accurate phasing and modular MEP).



Hip Hing Engineering Company Limited Hong Kong Science and Technology Parks Corporation Andrew Lee King Fun & Associates Architects Limited David S.K. Au & Associates Limited

Main Works Contract for Development of Micro- Electronics Centre

The Micro-Electronics Centre (MEC) is Hong Kong's first industrial structure of the highest technological standard dedicated to the production of microelectronics. A 4-storey Main Building and a 3-storey Central Utility Building make up the project. In order to create new business prospects, high-skilled jobs, and a more promising future for the next generation of workers, MEC was created to support the research, development, and pilot production of new generation micro-electronics products.

Civil3D vehicle tracking, in addition to BIM360 documents used for sharing the real-time BIM model, assisted in choosing the most efficient approach for site logistics and material delivery paths. Throughout the course of the project, BIM was implemented with other technologies and building techniques.



Water Supplies Department, HKSAR Government

5/WSD/19 - Improvement to Dongjiang Water Mains P4 at Sheung Shui and Fanling

The project's objective includes replacing about 5 kilometers (km) of deteriorated GRP pipes on the DJ water mains section P4 with steel pipes with a diameter ranging from 2,100 millimeters (mm) to 2,300 mm. In order to improve asset management, the current DJ water main P4 and Muk Wu Raw Water Pumping Station must be digitally transformed.

Overall, the project appears to be clever and well-executed, and it serves as a nice illustration of how Autodesk products like Civil 3D may be used. In order to create a very accurate model of subsurface facilities, this project combined BIM with GIS, IoT, and other data collection tools. The whole project execution benefits from this. The project team should be recognized for using the BIM model to identify the optimal design choice to reduce energy consumption during operations.

Dr. Calvin Kam FAIA, PhD, CCBM, PE, LEED AP

Overview

The 2022 Hong Kong BIM Awards witness a diverse collection of projects that champion a wide spectrum of inspiring and creative BIM and openBIM®-enabled technologies and process automation supported by artificial intelligence (AI) / Machine Learning (ML)-based smart platforms. The winning projects have leveraged BIM and openBIM® to innovate and achieve successful outcomes, ranging from Community Treatment Facilities to multi-welfare Services Complexes. Several Hong Kong BIM Award winners from past years (2017 to 2021) have also appeared as awardees this year (e.g., ArchSD, China State Construction, Hip Hing). They have further **expanded on BIM-based collaboration through Common Data Environment (CDE) implementation, advanced new BIM-based technologies, Multi-Trade Integrated MEP (MiMEP), UAV-based laser scan, etc. for better project performance. Applying the evaluation framework (which was developed by our team - an international management consulting firm "Strategic Building Innovation-bimSCORE") for a preliminary assessment based on the evidence provided in the submissions, we have benchmarked this year's winners against our global knowledge base of hundreds of projects from over 16 countries using our 5 maturity tiers ranging from "Conventional" to "Innovative" Practices. Within the global context, 2022 winners fit mainly in "Advanced" Practice. The winning projects are further analyzed for the bimSCORE's four evaluation areas: Planning, Performance, Adoption, and Technology. The figures below illustrate the Overall bimSCORE and four area scores of the 8 winning projects in 2022, referenced against the scores of the 2021 and 2017 awardees. In general, the figures indicate smaller variations in scores and an increase in average scores this year.**



** Projects were evaluated based on the materials submitted by the applicants without interviews.

Planning and Performance

Planning for BIM implementation requires targeting objectives for success, supporting achievement with the needed tools and training, 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 the alignment of BIM capabilities among project stakeholders. **China State Construction (CSC)** (Hostel and Academic Building Complex) established BEP at the beginning of the projects to ensure alignment among the stakeholders in terms of Score, Communication, Coordination, and Time requirements. The project saved 60% time during the information exchange process. **Hip Hing** (Commercial Development of NKIL6557) tracked the nearby MTR settlement during the construction and changed the construction process to minimize the impact on the surroundings. The project was also able to implement MiMEP on 30% of the total modules. **ArchSD** (Tai Fu Tai Mansion) established objectives with BIM Key Performance Indicators (KPIs) and targets to measure project outcomes. **Henderson Land Development Company Limited** (The Henderson) set up an information exchange process through a series of documents (OIR, PIR, ETR, AIR, BEP, PIM, and AIM), to mitigate risks and ensure efficient BIM Implementation. The project was able to resolve 700+ issues, saved 45% installation time & 15000 HKD in costs, and had 100+ BIM users. Overall, more performance metrics were tracked and documented by 2022 awardees including time, labor, staff training, and MiMEP/MIC installation. In a formal setting of bimSCORE evaluation, the Performance score accounts for the qualitative responses of stakeholders (such as user emotion) and 3rd party auditing of the claimed evidence. Given it was not stated in the applicants' submitted materials, the confidence level of the Performance scores is relatively low.

Some variations were observed among projects in the Planning and Performance area, ranging from upper "Typical Practice" to "Best Practice" on the global scale. Organizations are therefore encouraged to establish BIM-based objectives, give recognition to exemplary projects that demonstrate auditable, repeatable, and objective quantification of benefits, and develop respective quantifiable and qualitative measures of success to track project performance and realize improvement throughout the project lifecycle. SBI has also been working with DEVB to **formulate BIM KPIs**, & has recommended a **BIM measurement framework** to gauge BIM adoption.



** Projects were evaluated based on the materials submitted by the applicants without interviews.

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 have witnessed a growth in technology implementation to achieve different use cases for the projects. CDE Implementation has also been seen in most of the project submissions this year to facilitate information exchange and smoother workflow. **Water Supplies Department** (In-situ Re-provisioning of Sha Tin Water Treatment Works) conducted Design for Manufacture and Assembly (DfMA) study for PV Panel Installation, Elevated Walkway Construction, etc. with support of BIM to develop proper installation sequence for the modular unit, save on-site construction time and minimize material wastage. **Swire Properties Limited** (Two Taikoo Place) demonstrated AI+BIM-based Digital Twin Platform to support Facility Management. The project also implemented Smart Safety Helmet for workers' health monitoring. **Henderson Land Development Company Limited** (The Henderson) rationalized 30% of curved façade panels to support 3D printing. The project also implemented COBie, had 4D IoT integration, and implemented Fabrication BIM. **ArchSD** (Multi-welfare Services Complex) applied 4D for MiMEP, automatic laser-scan, and RFID-based site installation process to save time and cost. **China State Construction** (Penny's Bay and Area Adjacent to the Kai Tak Cruise Terminal) adopted BIM Collaboration Format (BCF) to facilitate openBIM-enabled stakeholders' collaboration workflow.

In comparison to 2021 awardees, 2022 awardees have a better technological implementation having some of the winners in the "Best Practice" category. Also, the BIM implementation has involved more project areas from design to maintenance. Project owners are therefore encouraged to better balance the breadth and depth of BIM uses in response to the project and client objectives, as well as the project team and market capability. Also, good to focus more on organizational processes to ensure better BIM adoption by applying BIM to all the project stages, and engaging all the stakeholders.



Dr. Calvin K. Kam FAIA, PhD, CCBM, PE, LEED AP Founder and CEO, Strategic Building Innovation·bimSCORE; PlanMeetDone.com Adjunct Professor Center for Integrated Facility Engineering, Stanford University

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 was a former National Chairman of the Center for Integrated Practice and the Technology in Architectural Practice Knowledge Community (supported by 10,000+ professionals) with the American Institute of Architects, for which he had also served on the Board Knowledge Committee.

Dr. Kam has been working with Construction Industry Council, Development Bureau, English Schools Foundation, Hong Kong Housing Authority, Lands Department, Sun Hung Kai Properties, University of Chicago, Walt Disney Imagineering, etc. In 2011, the Singapore government's Building & Construction Authority appointed Calvin as an international expert to advise its construction productivity and BIM roadmap. In 2013, China's National BIM Union and Standard appointed Calvin as the only international Honorary Director to advise the international harmonization and collaboration of its nationwide BIM standards/development. In 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" and BD+C's "40 under 40", Calvin is a Registered Architect, Professional Engineer, and LEED AP in the 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 for the Hong Kong AIAB BIM Awards since 2008.



Li Mingkai, Liu Yuhan, Wong Chun Lok and Lao Weng Lam

INSTITUTION

The Hong Kong University of Science and Technology

PROJECT NAME

OpenBIM-based Design Optimisation and Prefabrication Automation of Steel Reinforcement

PROJECT LOCATION

Ma Chai Hang, Kowloon, Hong Kong

Design optimisation and prefabrication automation of steel reinforcement

AUTODESK PRODUCTS USED Autodesk[®] AutoCAD[®]

Autodesk[®] BIM 360[®]

Autodesk[®] Dynamo

Autodesk[®] Revit[®]

Autodesk[®] Robot[™] Structural Analysis

OpenBIM-based Design Optimisation and Prefabrication Automation of Steel Reinforcement



Automatic generation of clash-free rebar BIM model Image Courtesy of The Hong Kong University of Science and Technology

Structural analysis using Robot Image Courtesy of The Hong Kong University of Science and Technology

Project Background

In recent years, the industry and academia have growing interests in offsite construction. The Hong Kong Government also introduced policies to support offsite prefabrication and prefabricated steel reinforcement (also called rebar) components. The design of rebar is important and necessary for the construction of RC structures. Currently, rebar design is performed manually or semi-automatically by structural engineers with computer-aided design software, which is tedious and labour-demanding, and possibly over- or under-designed. Building information modeling (BIM) technology with open processes and standards allows us to coordinate effectively and access information needed for clash-free rebar design optimisation and prefabrication automation.

Project Challenges and Solutions

Firstly, since the conventional rebar design is conducted manually or semi-automatically, we integrated metaheuristic algorithms and deep learning to generate optimal designs efficiently. Secondly, we employed Robot to enable smooth transformation from the BIM model to structural analysis model to avoid the tedious and error-prone model



establishment process, and developed a plug-in based on IFC to extract the results from Robot for design optimisation. Thirdly, to get rid of time-consuming human operations to solve rebar clashes and establish rebar model, we developed a plug-in based on Dynamo to generate the rebar BIM model integrating a rebar clash solver that can automatically identify and parametrically resolve the rebar clashes. With the clash-free BIM model, the rebar bending schedule, drawing and BVBS code can be generated automatically using developed plug-in based on IFC to support prefabrication. Last but not least, BIM360 was adopted to allow the remote collaboration of our team members.

Automatic and parametric rebar clash avoidance Image Courtesy of The Hong Kong University of Science and Technology

How does BIM help for your project?

BIM provides a common data environment for us to work smoothly and efficiently, connecting the architectural model, structural analysis engine, cloud application and customized plug-ins. In addition, the BIM model consists of different types of information required for clash-free rebar design optimisation. In the project, the integrated workflow based on Revit and Robot and the IFC-based information extraction significantly improve productivity and enhance accuracy of design. More importantly, the information in the design stage contained in BIM can further support downstream activities. The generation of rebar BIM model facilitates rebar fabrication and onsite installation. A customized plug-in was developed based on IFC to automatically generate rebar bending schedule, drawing and BVBS code to support prefabrication automation. In addition, BIM improves communications between our team members and its cloud application allows us to collaborate remotely.





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

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Autodesk Industry Advisory Board - AIAB - Hong Kong



Kevin Cheng MArch, BArch (Hons)

With over 15 years of experience, Kevin has built a varied repertoire of concert halls, façade designs, and BIM projects across Europe and Asia.

His architectural career began intertwined with music working in the Harbin Concert Hall and the Shanghai Symphony Hall. His experience later progressed into façade engineering becoming the Director of VS-A for all their Asian projects.

Holding a Master of Architecture from the University of Toronto, his projects can be found in Canada, Panama, Japan, South Korea, China and Hong Kong. Parallel to architecture and BIM, his passions in design span site installations, to branding, to large-scale illustrations.

Real-Time Quality Control

OPEN, DOCUMENT ACTIVE TIME & SYNC DURATION



With a growing number of projects requiring BIM, the industry has been struggling to keep the quality of the models and their information. Although some ISOs are helping to standardize naming conventions and track workflow, BIM quality is still very inconsistent across the industry.

In recent years our projects have become more varied, and our teams have become larger and more

experienced, making quality control an increasingly more complex and manual task. So, we started looking at ways to collect and analyze the data of our BIM models to control our quality and optimize workflow.

To start automating our quality control, first we identified all the parameters that can affect the health of a BIM model. Parameters such as file size, sync time, warning counts, number of users, linked models are extracted from Revit with BIM Beats and stored in Elasticsearch's database. Once the data is retrieved, we can customize dashboards that give us real time data on the project models.



Additional to these parameters that mostly affect workflow and logistic, we are also able to track specific BIM standards. For example, we do not allow for model groups as they bulk up the file size instead opting for worksets. We also do not allow for detail lines in our federated models as they are troublesome to track and also increase file size. We can track these elements down to the user and the time resulting in warning popups when rules are triggered.

As our teams are internationally located, we need to be able to guarantee our quality of work and always provide BIM work that adhere to our bespoke guidelines. With these dashboards, we allow our BIM brand and experience to be applied in all our projects across the board.



Simon Ng

Mr. Simon NG is the Head of BIM in China State Construction Engineering Hong Kong Ltd. Simon leads a team of around 100 BIM specialists to support BIM implementation across projects, his team also serves as central support in development of corporate BIM standard, workflow of various BIM application, training plan, and automation tools, etc.

Simon was the Chairman of AIAB in 2015-2017, and is also currently the board member of the HKIBIM. He actively participate in BIM promotion by delivering seminars, maintaining the HKIBIM youtube channel, and organising various industry activities. He was also awarded the "CIC Young BIMer of the Year 2014"

Simon has extensive experience in BIM management such as standard, execution plan, template, family, skills development, training, etc. He is a Mechanical Engineer in background and had a wide range of experience in engineering design, project management and application of Information Technology in construction industry.

Digital Transformation from "Red Ocean" to "Blue Ocean"



Recently there are 2 companies that draw to the writer's attention: (Disclaimer: the writer has no business interest with these 2 companies, this article is just a review of their business strategies)

1. Hainayun (海納雲) – a company offering advance digital technologies from IoT, BIM based web platform, Smart Operation Centre, CIM and Smart City solutions.

This company indeed comes from the Haier group, a home appliances manufacturers in China. Digital transformation is one important strategy across the group. IoT, Robotics and digital solutions were introduced in its manufacturing plants and supply chain. Haier also proactively develop its own brand technologies by incubating experts from universities and industry specialists. And hence setting up this company who is the driver of the digital eco-system. It not just offers its digital solution, but also keep digging out new technologies partners to offer solutions to solve problems in its supply chain.

Haier not just modernize its manufacturing eco-system, but also embrace digital as a new business model.

2. Space Tech (萬物雲) – brings a new concept of "SpeceTech" about space optimisation, Smart office, Smart Facilities Management (FM) platform, etc.

This company comes from Vanke group. Apparently, it is its strategic development of digital technologies that brings traditional real estate business into new digital business. I believe it brings a lot of possibilities: such as Co-space, new mode of sharing space resources, new mode of property management such as predictive maintenance, digital twin, etc.

Haier and Vanke, players in 2 traditional industries: Manufacturing and Real Estate. Due to their need of digital transformation, they setup new companies dedicate to technologies that brings to new business model. Both companies went IPO at initial setup. These are good examples of transforming from "Red Ocean" to "Blue Ocean".

Going back to the construction industry, also a very traditional one. How the digital transformation can be? We heard of the term "ConTech" for a while. I look forwards to hear more successful stories of ConTech companies as digital transformation engine to our industry.



Froky YH WONG

Froky Wong is the Manager of Building Information Modelling at Airport Authority Hong Kong. He has a master of science in Intelligent Building Technology and Management from the Hong Kong University of Science and Technology. Froky worked for consultants, contractors and clients to define and deliver the strategy for the solutions serving the architecture, engineering, construction, and facilities operations in the last 15 years, over a decade of providing BIM services for Planning, Design, Construction, and Operation projects. He is a professional and board member of HKIBIM, Certified BIM Manager of HKCIC, a member of HKCIC BIM standards and a panellist in local BIM awards organised by HKCIC, Autodesk and local BIM communities. He is currently leading the team in developing innovations for an integrated common data environment - the Digital Twin solution, an advance in the building life cycle through integrated enhancements to Building Information Modeling (BIM), Geographic Information Systems (GIS) and Asset Management Systems (AMS).

Digital Twin - An advancement of the integrated construction technologies

New Technology is creating opportunities to improve the results with cost and time effectiveness. Empowering BIM information and building data could work with clients to create a better future. The smart city initiative makes the world aware of the importance of digital building solutions. Integrating the information from digital solutions for the smart building becomes essential to achieve this target. Today's new technology will probably become a requirement for tomorrow. It's now to start thinking about harnessing those solutions today to enhance the bargaining power and equip it to enable the ability for tomorrow. It's time to realise the digital twin vision your way.

Digital Twin is a concept that allows the public to transform rich data into business intelligence, it would help the Architecture, Engineering, and Construction (AEC) firms harness BIM (Building Information Modelling) data throughout the building lifecycle. It is not only to help owners connect operational systems but also to optimise the fragmented data into business intelligence. By harnessing BIM (Building Information Modelling) data throughout the process, AEC firms can create and handover a digital twin to building owners and operators. The easily accessible, contextual, and insightful data they receive makes for ready-to-go operations. Further, it allows AEC firms and owners to create and manage data-rich digital twins that mirror the built environment for a more integrated workflow, improve collaboration between owners and project teams, and achieve the desired operational outcomes.

Digital Twin is an integral part of tomorrow to collect the knowledge of the utilisation and operation performance of the facilities, providing all the information owners need in a single environment. Through data visualisation, a digital twin can show the impact of disruption, predict equipment failure, and simulate events to facilitate decisions with greater insight.

Start Digital and Stay Digital



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++本中心保留所有更改課程內容,上課時間,費用等的權利.而不作另行通知++

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2013

不同的BIM課程榮獲CITF及 RTTP認可,政府大力支援及資助 BIM教育

2018

增設課程 "BIM for Constrcution Managers", 讓工程管理者更有 效融入BIM流程

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2007

開設 Civil 3D 課程,並獲持續進 修基金 (CEF) 認可。是本港最早 期的BIM訓練課程

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Robotics is a topic that offer opportunities to introduce students to complex subjects like programming and engineering; but in a way that's fun and interactive.

Being comfortable around computers and technology of any kind will not just be a boost for your future, but a necessity. With this in mind, it's essential to introduce yourself to as many different types of technology as possible, such as autonomous programming and artificial intelligence.









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