

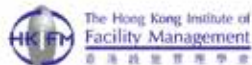
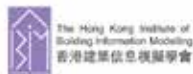
AUTODESK
HONG KONG BIM AWARDS 2014



Sponsor



Supporting Organizations



Acknowledgement

Sincere thanks to the five awarded organizations, CLP Power Hong Kong Limited, Henderson Land Development Company Limited, Hong Kong Housing Authority, MTR Corporation Limited and the Architectural Services Department of HKSAR Government, in providing such valuable information and pictures of their projects. Besides, we are extremely grateful for the contributions of the AIAB committee and members, Dr. Jack Cheng, Dr Stefan Krakhofer, Ms Erica Lam, Mr. Jonathan Lau and Mr. Jake Lucier who are profiled in this booklet.

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BIM Progresses From Futuristic to Increasingly Mainstream

In 2002, Autodesk released a white paper on the advent of a new generation of building software solutions, designed with current technology and purpose-built, which was required to fully realize the benefits information technology could bring to the building industry.

This next generation of information-centric software was a significant step forward from two-dimensional CAD. The white paper helped generate awareness of the potential of this software, and of a term hitherto known only to industry insiders: Building Information Modeling.

Now often known simply by an acronym, BIM is a process that involves creating and using an intelligent 3D model to inform and communicate building project decisions. Design, visualization, simulation, and collaboration can provide greater clarity for everyone involved in a project's lifecycle – from planning through to managing and even dismantling buildings.

When the white paper was published, BIM seemed futuristic, yet it has since developed rapidly, becoming an increasingly important tool for the building industry. The software is evolving too, becoming both more powerful and more user friendly.

As BIM becomes more mainstream, its proponents are no longer restricted to computer-savvy designers who are receptive to new technologies, but also include architects seeing their ideas accurately realised in 3D, as well as project managers who appreciate the way BIM models help stakeholders visualise buildings and share ideas.

The Autodesk HK BIM Awards highlight these developments, and are a fascinating way of tracking the ways project teams are realising the potential of this disruptive, fast emerging technology. The awards are now in their eighth year, and there are five winners.

On behalf of the Autodesk team, I would like to thank and congratulate this year's award winners: CLP Power Hong Kong Limited, Henderson Land Development Company Limited, Hong Kong Housing Authority and MTR Corporation Limited, together with honourable mention winner the Architectural Services Department of HKSAR Government.



Patrick Williams
Senior Vice President, APAC and Emerging Markets
Autodesk



Hong Kong Awardees Help Drive Global Adoption of BIM

While the advent of CAD – computer aided design – transformed ways buildings are designed, the rapid emergence of Building Information Modeling is set to impact the entire building industry. Not only does it enhance the design process, but BIM can lead to improvements throughout a building’s lifecycle.

BIM helps in the early planning process, whether for showing rock formations below ground and their relationship to piling, or choosing how to work with landscape features like trees and slopes, optimise views, and harmonise with nearby buildings.

The 3D models ensure everyone can visualise buildings in advance – from overall appearance right down to details like bedroom windows and lighting panels. It’s even possible to check how sunrays will illuminate interiors at different times of day.

Though extra dimensions might seem like stuff of science fiction and quantum physics, they are becoming commonplace in BIM. Models can incorporate time, such as to optimise construction work. Other “dimensions” that can be added include costs, and even quality.

Once a building is completed, the BIM model can prove invaluable for facilities management. It’s even possible to use BIM to determine the most efficient way to dismantle a building.

These are just some of the ways BIM has been deployed in projects that have been winners of the Autodesk Hong Kong BIM Awards. Now in their eighth year, the awards have become an important indicator of ways Hong Kong based design teams are playing key roles in driving the adoption of BIM, often through innovative uses of this exciting, fast evolving technology.

This year, there are four winners: CLP Power Hong Kong Limited, Henderson Land Development Company Limited, Hong Kong Housing Authority and MTR Corporation Limited, together with an honourable mention winner, the Architectural Services Department of HKSAR Government.

On behalf of the Autodesk Hong Kong team, I would like to congratulate all awardees; and I hope their stories in turn inspire others to deploy BIM in ways that create and maintain outstanding buildings.



Dr Wendy Lee

*Branch Manager, Hong Kong & Macau
Autodesk Far East Limited*

Award Winners:



CLP Power Hong Kong Limited

Project: West Kowloon Reclamation Substation



恒基兆業地產集團
HENDERSON LAND GROUP

Henderson Land Development Company Limited

Project: Proposed Office Development at 14-30 King Wah Road



Hong Kong Housing Authority

Hong Kong Housing Authority

Project: Bridging the Gaps with our Core Values – Successful Transformation of Revit Model to Enable Civil 3D/GIS/Revit Integration and Lighting Simulation & Rendering



MTR Corporation Limited

Project: Re-provisioning of Harbour Road Sports Centre and Wan Chai Swimming Pool

Honorable Mention:



Architectural Services Department
The Government of the Hong Kong Special Administrative Region

The Architectural Services Department of HKSAR Government

Projects: Preparation of Record Drawings for:

1. The Lady Hotung Welfare Centre
2. The Old Dairy Farm Senior Staff Quarters

CLP Power Hong Kong Limited

Project:
West Kowloon Reclamation Substation

Location:
West Kowloon Cultural District
(Austin Road West, Kowloon)

Type:
New Substation Building

Scheduled Time of Completion:
2016

“Do it right the first time.”

C L Mak,
Senior Substation Implementation
Manager,
CLP Power Hong Kong Limited

BIM Partners Involved:

Architect:
Andrew Lee King Fun &
Associates Architects Limited

MEP Engineer:
Parsons Brinckerhoff (Asia)
Limited

Structural Engineer:
Meinhardt (C&S) Limited

Quantity Surveyor:
Beria Consultants Limited

BIM Consultant:
isBIM Limited

Landscape Consultant:
Urbis Limited

BIM Helps Take another Step to Project Excellence

A safe and efficient design allows CLP Power's new West Kowloon Reclamation Substation better serve the West Kowloon Cultural District



Image courtesy of CLP Power Hong Kong Limited

CLP Power's first deployment of BIM yields benefits ranging from harmonious design stage, through construction and equipment installation, to facility management during the entire life of the Substation.

Challenges

As a CLP Power project team began planning a new substation in West Kowloon, they faced several challenges. There were concerns about the new development including the landscaping and building outlook. Plus, this is a high priority project, with a challenging schedule for the project from design to completion.

The site was small, so the substation would have to be compact, with 12 high voltage cables connecting the substation, and more than 60 distribution cables to dispatch

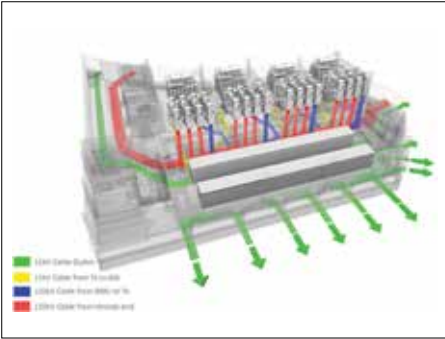


Image courtesy of CLP Power Hong Kong Limited

the electricity to the customer, confining to just two major frontages of the substation building.

Design quality and the optimisation process have been boosted with BIM

“Safety is our number one priority,” says C L Mak, Senior Substation Implementation Manager, CLP Power. “Apart from proper design of the substation facilities, we also sought a proper and efficient way of construction, such as minimising our impact to the community. Doing it right the first time is the motto of the project team.”

“We have used BIM from the beginning of this fast track project,” says Mr Mak. “Electrical plant design engineers, high voltage circuit design engineers and architects have all used the BIM model to optimize the substation design.”

The benefits soon became apparent during the design process, as the BIM model helped with determining the comprehensive building elements and how to fit the heavy plant facilities within a compact space that fully utilised the available land.

Electrical design engineers were able to decide the best routes for entry and exit of cables, and how to install equipment, with particular emphasis on safety measures, like electrical safety clearance.

“The electrical plant and associated high voltage cables routes are complicated and congested within a small substation building!” says Mr Mak. “If not well planned at early stage, it definitely will put pressure at the downstream construction process resulting in disruption to the tight project programme.” “Previously, we used numerous 2D drawings to illustrate the design and discuss requirements among the project team, but not everyone



Image courtesy of CLP Power Hong Kong Limited

can visualise a design – form a picture in their mind,” says Anthony Ip, Senior Project Engineer, CLP Power. “Occasionally, there were also physical models to roughly explain designs. But in planning and designing the West Kowloon Reclamation Substation, we employed 3D presentations with the aid of BIM.”

Enabling a compact substation be possible

The BIM model helped reduce clashes,



Image courtesy of CLP Power Hong Kong Limited

enabling identification and mitigation of changes to works during the design stage, so abortive works during construction could be kept to a minimum.

The compact site meant that there would be congested pipes and cables, requiring careful design so they could all fit correctly, as well as allowing room for operations and maintenance staff to access them. "Using the BIM model, we could design the cable routing more tidily and efficiently," says Albert Hsu, Building Services Engineer, CLP Power.

"Sometimes, for cable trenches, we might want to add cables later, but find there is not

enough space," says Mr Hsu. "People had originally used 2D drawings for the design, and tried to visualise in 3D which was not so precise. But with the BIM model, we could do a walkthrough, so the operations and maintenance team could raise issues. With BIM, we can plan 10 years in advance!"

The model also helped detect and resolve problems such as a structural beam that would obstruct access, but was hard to discern on 2D drawings that mainly showed detail at a lower level. Some panel covers would not have been flush with the floor, causing a safety hazard. To take for an example, a beam was to be built above the high voltage electrical plant in

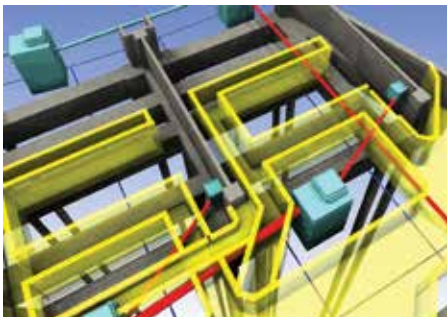


Image courtesy of CLP Power Hong Kong Limited



Image courtesy of CLP Power Hong Kong Limited

the roof of the building as a most economic design; but in checking how the plant would ultimately be installed by a crane, the team members realised it would be blocked by the beam, which was relocated.

The substation would house two transformers at initial stage, each weighing up to 100 tonnes. The BIM model, plus an animation created in Revit 3ds Max, helped optimise their orientation, and showed how they would be delivered and installed safely.

Enhanced communication with stakeholders and the community

These presentations enabled stakeholders who are not building experts to be involved in reviewing detailed designs, construction processes, future operations and maintenance activities during an early planning stage. The efficiency and effectiveness of the value engineering study were enhanced, and everyone could have clear picture of the actual substation.

With stronger communication between different parties in CLP Power, and information openly shared, there were more harmonious working relationships among the project team members.

CLP Power also strives for a harmonious



Image courtesy of CLP Power Hong Kong Limited

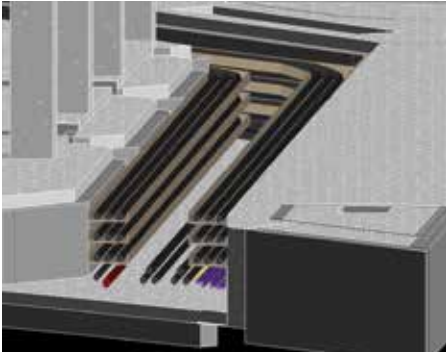


Image courtesy of CLP Power Hong Kong Limited

relationship with local communities. Using the BIM model, the project team could demonstrate the building appearance, construction activities and operation processes to local people, addressing concerns in the early planning stage. All stakeholders can visualise the design and how the substation works through BIM model and its walkthrough animation. They will be very impressed resulting in a deeper understanding on the design efforts we put in as well as the rationale behind. This greatly helps gain acceptance of the substation to the neighbours and the general public.

BIM enables on-going facility management during the life of the substation

The BIM model is also set up to help with operating and maintaining the substation, including small scale modifications by building quality 3D information from the outset.

“We aim to do everything at a very professional level,” says Mr Ip. “With BIM, we take another step to excellence. It’s not a luxury, as we can do things right first time. Using the model, we can also explain to young engineers how a 100 tonne power transformer

can be safely transported and installed.”

After a consultant helped with the pilot project in using BIM, CLP Power is now developing in-house competency, including specialised team, and the necessary workstations. The aim is to use BIM for all forthcoming building projects with BIM data reducing unnecessary shop drawings.

“We’ve found that the time required for using BIM model was not longer than that of studying 2D drawings,” says Mr Ip. “The process is smoother, and the deliverables are much more precise.”



Image courtesy of CLP Power Hong Kong Limited

Way Forward

BIM is a new technology and process to CLP Power. Although it is still in testing stage, CLP Power will aim to move ahead for adopting BIM to all new green substation projects by providing a harmonious design and efficient facility management as well.



Image courtesy of CLP Power Hong Kong Limited

About CLP Power Hong Kong Limited

CLP Power Hong Kong Limited (“CLP Power”) is a Hong Kong utility subsidiary wholly owned by CLP Holdings Limited, a company listed on the Hong Kong Stock Exchange and one of the largest investor-owned power businesses in Asia. CLP Power operates a vertically integrated electricity supply business in Hong Kong, and provides a highly reliable supply of electricity and excellent customer services to 5.8 million people.

Henderson Land Development Company Limited

Project:
Proposed Office Development at 14-30 King Wah Road

Location:
14-30 King Wah Road, North Point, Hong Kong

Type:
Office

Scheduled Time of Completion:
End of 2016

Enhancing Building Quality With 6D BIM

From designing, through coordination support to maximising views and minimising solar penetration, Henderson Land reaps innovative benefits of BIM

“The world is changing, and customers expectations are rising higher and higher,”

Kevin Ng,
Senior Deputy General Manager
Project Management (2) Department,
Henderson Land

“Our management supports use of BIM, as it helps achieve better quality.”

BIM Partners Involved:

Project Architect:
Dennis Lau & Ng Chun Man
Architects & Engineers (HK)
Limited

Design Architect:
Pelli Clarke Pelli Architects

BIM Consultant:
isBIM Limited

Sustainable Consultant:
ARUP

MEP Engineer:
P&T (M&E) Limited

Structural Engineer:
Stephen Cheng Consulting
Engineers Limited

Quantity Surveyor:
WT Partnership (HK) Limited



Image courtesy of Henderson Land Development Company Limited

Even once substructure works had commenced for an office tower at 14-30 King Wah Road, North Point, Hong Kong, Henderson Land Development Company aimed to enhance the superstructure. The design changes were to maximise sea views, boost building performance, and reduce the building's carbon footprint.

“It's a really grand site, with wide open sea views,” says Kevin Ng, Senior Deputy General Manager, Project Management (2)



Image courtesy of Henderson Land Development Company Limited

Department, Henderson Land. “Yet the best view – to Central – is also the worst for heat gain. We asked: ‘How to correct this?’” The solution would involve shading, and changing the building façade a little so it will have a curved façade. “We want it to look iconic, as it’s next to the harbour front,” added Mr Ng. The Design Team opted to use BIM for the changes, as it would enable faster decision making. Henderson Land had begun using BIM since the World Financial Centre (WFC) at Beijing in the late 2000’s, initially testing some of its capabilities, and since taking further steps to make better use of available technologies. “The world is changing, and customers expectations are rising higher and higher,” says Mr Ng. “Our management supports use of BIM, as it helps achieve better quality.”

Realistic picture

As typical with BIM, the Design Team employed the 3D model to carry out spatial coordination between structural design,

building services and green features. The Design Architect, Pelli Clarke Pelli Architects, led by founder Cesar Pelli, was among Project Team members who were generally well-versed with BIM, and was impressed to see the design realised in a virtual environment.

The BIM model became the common platform for communications, facilitating information sharing and corporate level collaboration among the various disciplines involved in the project. For Henderson Land, one of the key benefits of the 3D model in residential projects was that it gave a realistic picture of the size of apartments, with the key building components truly reflected, whilst previously this would have been judged by educated guesses based on 2D drawings. Accurate information relating to the building plan for residential properties under presales has become especially important, as they are required by the recently introduced Residential Properties (First-hand Sales) Ordinance.

But BIM can do more than simply deal with static 3D models.

Beyond 3D

“We talked about using 4D BIM, with the time dimension,” says Mr Ng. “Then 5D, adding a cost element. Someone asked: ‘Why don’t we make one step further and try 6D, with quality as well?’ After all, ‘time, cost and quality’ are the three main pillars for project management. Nevertheless, it is difficult to quantify quality which is thought to be subjective, but the Sustainability and BIM Consultants said we could try, using KPIs – Key Performance Indicators.”

A 4D BIM model will be incorporated into the tender for construction. The time element will help to visualise the sequence of work, and reshuffle the site logistics if required.

“We’ll be able to see what’s in the critical path, as the model will allow virtual construction,” says Mr Ng. “The Main Contractor may put the tower cranes, hoists etc in the model, and other temporary construction facilities to reflect the reality during the construction stage. They can decide which part of the work should go first, and which could be delayed. We are trying to make quicker decisions on changes – improving change management.”

Usually, quantities are discussed in terms of “trades”. For instance, assessing the cost of a column may involve three trade quantities: formwork, concrete, and steel reinforcement. However, Mr Ng says these can be combined in a BIM model, providing a result in terms of “elements” that’s easier to use, as figures are more readily understood. With BIM, designers can change an element and immediately see



Image courtesy of Henderson Land Development Company Limited



Image courtesy of Henderson Land Development Company Limited



Image courtesy of Henderson Land Development Company Limited

data on its size change and the impact on cost.

“Cost is a key consideration for us,” says Mr Ng. “BIM makes it easy to do before and after comparisons. While we can still coordinate by 2D drawings, BIM is a catalyst to speed things up. I think it’s good management if you can make a decision at the right juncture – it helps everybody.”

Helping make quality-based design decisions

The KPIs for quality in the 6D BIM models were employed for comparing design options. They included time and cost, and helped the Project Team with decisions such as opting for Y-shaped columns rather than straight columns in the King Wah Road Office development,

and choosing a glass wall instead of a tension truss in the main lobby.

The 6D models proved most important for helping determine how best to minimise solar penetration whilst maximising views. “We created models with and without shading fins, and visualized the differences,” says Mr Ng. With the help of BIM, the team designed a solar responsive façade; the fins are just above room windows, and tilted downwards a little so they provide shade whilst views remain expansive.

“The whole team is excited about this,” says Mr Ng. “We can use the sustainability concept to shape the building. This was presented to and accepted by the Building Authority after a lengthy presentation, adopting a scientific approach.”



Image courtesy of Henderson Land Development Company Limited

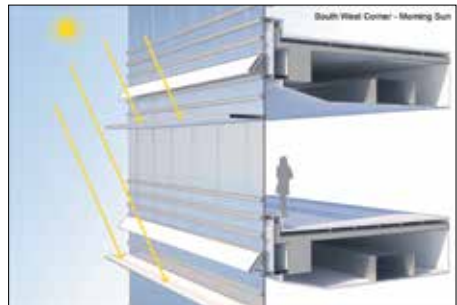


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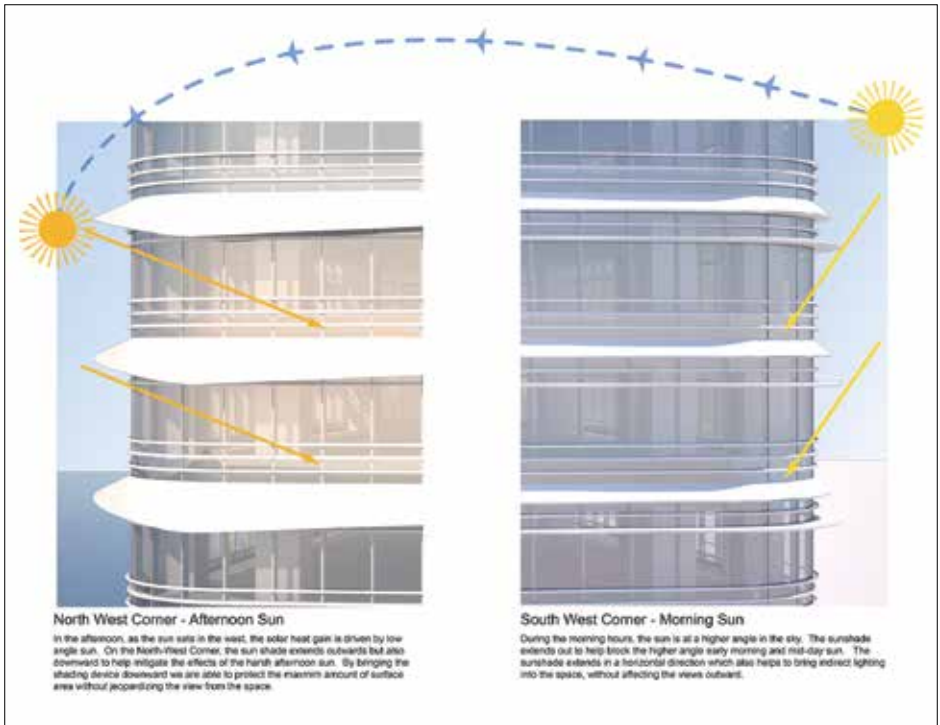


Image courtesy of Henderson Land Development Company Limited

The Henderson Land project management team is still testing such pioneering deployments of BIM, and hopes to gain more experience with models beyond 3D, using them in other projects.

Like a round table that helps with innovation

“BIM is not a conventional hierarchical system,” observes Mr Ng. “Everyone has the same message platform – it’s like a round table. BIM can help with innovation; we can explore new ideas collaboratively.”

14-30 King Wah Road is scheduled for completion by the end of 2016. Henderson Land aims for the Main Contractor to take on

and further develop the BIM model, which can then be given to the Facilities Manager for post-completion operations.

“Our task is to make things simple,” says Mr Ng. “The Facilities Manager can have an as-built BIM model, including machinery and building services.” This can prove user-friendly in various ways, such as clearly showing when items like fluorescent tubes should be replaced or when filters be cleaned for preventive maintenance.

Mr Ng envisages the facilities management technicians will find the BIM model simplifies and modernises their daily work in another way: “They’ll just need an iPad, rather than a pile of drawings.”



恒基兆業地產集團
HENDERSON LAND GROUP



Image courtesy of Henderson Land Development Company Limited

About Henderson Land Group

Listed in Hong Kong since 1981, Henderson Land is a leading property developer with businesses in Hong Kong and throughout mainland China.

We create award-winning high quality new homes and commercial developments, ranging from city landmarks such as the International Finance Centre complex in Hong Kong and World Financial Centre in Beijing, to exceptional residential properties such as 39 Conduit Road, Grand Promenade, The Beverly Hills, The Gloucester and Double Cove.

In addition to our core businesses of property development and property investment, Henderson Land also holds strategic investments in a listed subsidiary, Henderson Investment Limited, and 3 listed associates, including The Hong Kong and China Gas Company Limited (which in turn has equity stakes in a listed subsidiary, Towngas China Company Limited), Hong Kong Ferry (Holdings) Company Limited, and Miramar Hotel and Investment Company, Limited. This portfolio provides significant shared synergies.

Founded in 1976 by its current Chairman, Dr. The Honourable Lee Shau Kee, GBM, Henderson Land is one of the largest business entities in Hong Kong, employing approximately 8,300

staff. We have the largest agricultural land holding among all property developers in Hong Kong and an extensive land bank in mainland China.

The vision and values of Dr. Lee, an innovator and industry veteran, continue to drive our operations today. Our aim is to add value for our shareholders, customers and the community through a commitment to excellence in product quality and service delivery as well as a continuous focus on sustainability and the environment.

Our projects are the result of close collaboration with some of the world's foremost architects and professionals to ensure we deliver contemporary designs that are appropriate to their context. Our operations are vertically integrated, enabling the design, development, construction and management of all projects in a very efficient and consistent manner.

As we continue to build our business concurrently in Hong Kong and mainland China, we will introduce further iconic commercial and residential development projects, utilizing the same mix of innovative designs, high quality construction and property management and community commitment that have helped us to earn a solid reputation to-date.

Hong Kong Housing Authority

Project:

Bridging the Gaps with our Core Values – Successful Transformation of Revit Model to Enable Civil 3D/GIS/Revit Integration and Lighting Simulation & Rendering

Location:

Hong Kong

Type:

Public Housing

Scheduled Time of Completion:

2014

Innovative Integrations Boost Designing with BIM

Hong Kong Housing Authority overcomes doubts to integrate site formation and lighting design with Revit models



Image courtesy of Hong Kong Housing Authority

It is well-known that whilst most individual practitioners in the Hong Kong construction industry have extensive experience in deploying Revit for designing Architectural, Structural and Building Services works respectively, the BIM models are usually separated from the other key software packages. This meant that the capacity and power of BIM technology are not always fully realised. Examples are the separation of site formation and building design, as well as lighting design as a standalone process.

An integrated approach was much needed. Yet the software vendors, BIM consultants and architects/engineers could not find examples of information being readily transferred between Revit and packages such as Civil 3D or DIALux. “For a long time, people told us it can’t be done,” says Ir Dr Wong King-cheong, Senior Geotechnical Engineer, Hong Kong Housing Department.

Parties Involved in the Innovative Integrations:

**Hong Kong Housing Authority
Development & Construction
Division**

Building Services Section 2

Geotechnical Section 2

Architectural Section 4

Land Surveying Unit



Image courtesy of Hong Kong Housing Authority

Yet with the support from the IT, Architectural, Land Surveying, Geotechnical Engineering, and Building Services Engineering teams and the perseverance of staff, the Housing Department eventually achieved great success in integrating Civil 3D, GIS and Revit for a potential housing development in the northern fringe of Tai Po and in the integration of BIM and DIALux.

Integrating Civil 3D, GIS and Revit models

“We found that there were Paste Surface and Grading functions, which allowed us to do the site formation design directly on existing topographic surface in Civil 3D, and export the site formation design model to Revit using one button.” says Dr Wong.

This new approach provides a collaborative and holistic platform enabling the design, review and, evaluation of public housing

development proposals at feasibility and schematic design stages. A 3D digital model of the proposed platform and housing blocks layout can be built in Civil 3D, through combining the site formation design, along with digital ortho-photographs, digital maps and 3D spatial data from the Lands Department and LiDAR data from the Civil Engineering and Development Department.

“Before, the process was very difficult – we didn’t have topography in the models, and we needed to input it manually,” says Dr Wong. “Now, after we have changed to a 3D service, it’s easy to design retaining walls, cut sections and perform cut and fill calculations.”

This enables Architects to see more realistic 3D models. Also, though Civil 3D is an engineering tool, its virtual models are not ideal for live presentations. For instance, it may take longer to rotate them to view from different angles. Dr Wong’s team worked with

other GIS software such as Map 3D to create visualisations as well as carrying out spatial analyses. These helped shorten the design and approval process, enhanced design quality through optimization and carrying out studies on different design options. It also promotes teamwork and integration of professionals of different disciplines in the feasibility study process.

After finalising design of the building platform and housing blocks layout, the 3D model is exported to Revit, for the continuation of the architectural and structural design work. "Other government departments are interested in this workflow," says Dr Wong. "They too hadn't realised there was already such functionality in the software – which is powerful, and easy to use."

Prevent delay may last for months

Dr Wong believes this will eliminate major clashes and mis-matches that were sometimes only found unexpectedly during the construction stage, such as when a planned retaining wall could not match the profile. "These could prove very expensive costing to change the design at the construction stage. Delays could last for months with

serious disruption to project progress." he says. "Now, we are confident that a design will be buildable, though there may be minor troubles."

BIM for lighting simulation

"For lighting simulation and rendering, we are also trying to exploit the potential of BIM, which is a developing technology," says Ir Tse Sze-wing, Senior Building Services Engineer, Building Services Section 2, Housing Department. "We have been using very powerful DIALux software for lighting simulations. But we have to build our own models, place the luminaires and do the lighting simulation."

"The models we built in DIALux can only be a simple one, with little building information as we cannot afford to spend too much time and resources just on the lighting simulations. For instance, a room in the model might be simply a rectangular box with the ceiling, floor and walls only. Other building information often has to be forsaken."

"We tried to see if we could capitalize the information in Revit and do the lighting simulation in DIALux," says Ir Tse. "This could have more building information, such as

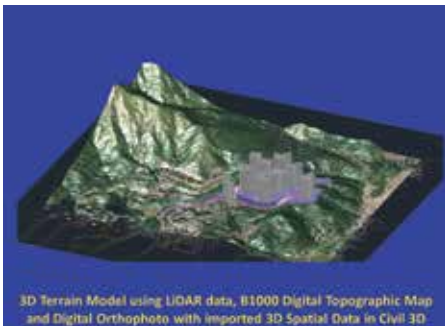


Image courtesy of Hong Kong Housing Authority

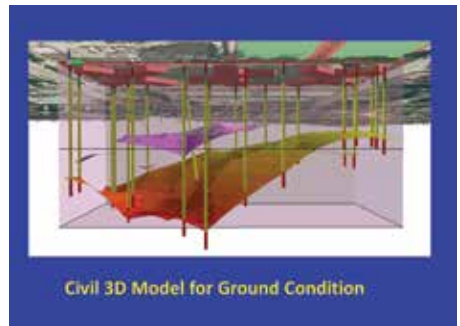


Image courtesy of Hong Kong Housing Authority

windows, metal gates, doors, lift landing doors and other reflective surfaces. Our staff ventured to integrate the two software. Inspired by the fact that ‘3ds’ format can be used in DIALux, our intuitions led us to venture into testing if Revit ‘rvt’ format can be transformed into ‘3ds’ format for onward manipulations in DIALux.”

As an intermediate step before simulation in DIALux, the team found that in 3ds Max, a photo rendering software, it can import and simplify the Revit model and then save as a ‘3ds’ file. “The Revit models are very large, so we need to simplify the information to such extent just enough for the lighting simulations,” says Ir Tse.

Richer lighting calculations

Rather than having to remove unnecessary items for lighting simulation item by item, it’s possible to carry out the simplification by discarding unnecessary items for lighting

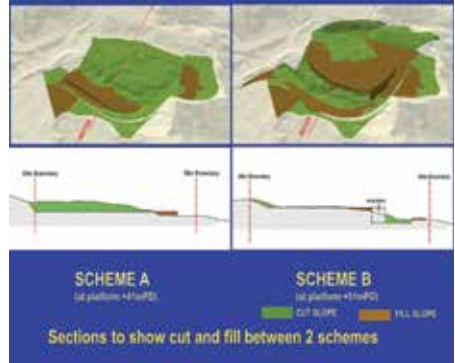


Image courtesy of Hong Kong Housing Authority

simulation by categories. Despite the simplification, the DIALux model contains far more than simple geometric shapes, enabling much richer lighting calculations.

“For exteriors, we can take account of topographic surfaces in our lighting simulation – we can have photo realistic rendering, as well as animations with much richer building information,” notes Ir Tse. Architects and housing management colleagues can visualise the effects of lighting placement in very early

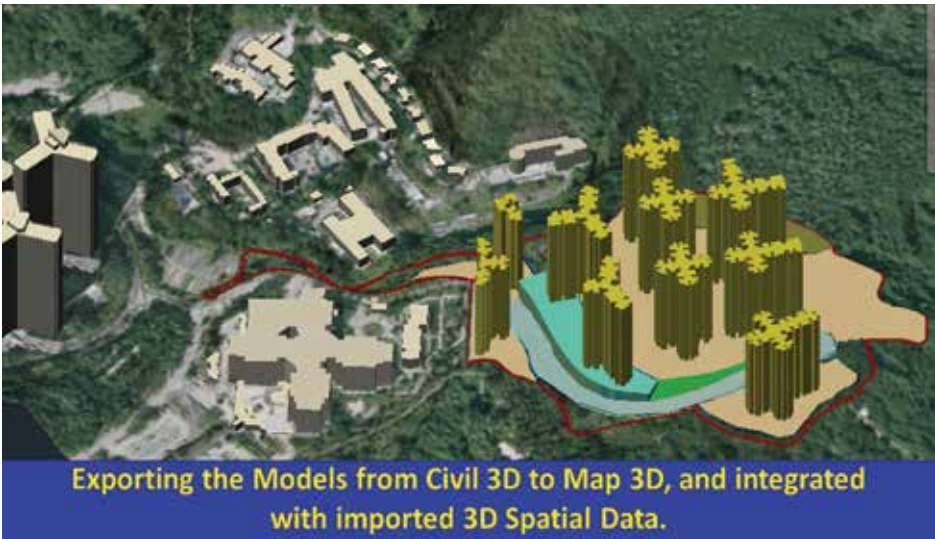


Image courtesy of Hong Kong Housing Authority



Image courtesy of Hong Kong Housing Authority

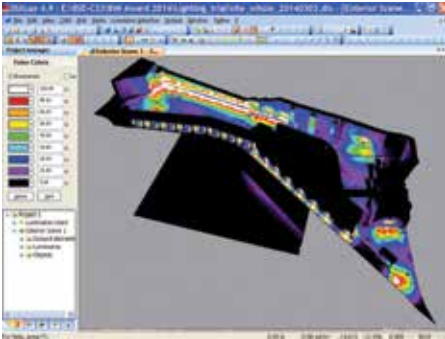


Image courtesy of Hong Kong Housing Authority

Bringing people together

“There’s direction from our management to use BIM,” says Alex K K Ho, Information Technology Manager, Information Technology Sub-division, Housing Department. “End users are in a much better position to exploit the use of BIM since they know what they want to achieve from BIM models based on the professional knowledge of their own fields. As a whole, we can shorten design lead time and increase the generation of design options. It’s now possible to start using BIM even as early as the Feasibility Stage.”

stages, for assessing aesthetic effect as well as operation and management considerations.

The method for integrating the Revit and DIALux models is now included in the Housing Authority’s BIM MEP User Guide. So it can be used by every project team. “I think many industry professionals are trying to capitalise on the potential of BIM,” says Ir Tse. “We are part of this process.”

In the past, the Housing Authority’s use of BIM was mainly IT driven. “Now it’s more a collaborative effort,” says Ir Tse. “The two ventures are good examples that BIM is a good platform for bringing people together.” “Together, we can venture into new frontiers,” says Dr Wong.



Image courtesy of Hong Kong Housing Authority

About Hong Kong Housing Authority

The Hong Kong Housing Authority (HA) is a statutory body established to develop and implement Hong Kong's public housing programme. Its mandate is to help low-income families in need gain access to affordable housing. Approximately 30% of the Hong Kong population is now living in public rental housing units.

The HA plans, builds, manages and maintains different types of public housing, including rental housing estates, interim housing estates, and transit centres. In addition, the HA owns and operates some flattened factories and ancillary commercial and other non-domestic facilities. Also, with the resumption of Home Ownership Scheme, HA builds 17,000 new HOS flats for four years from 2016/17 to 2019/20 and thereafter 5,000 new HOS flats a year.

The Housing Department acts as the executive arm of the HA to help the Government achieve its policy objective on public housing.

MTR Corporation Limited

Project:

Re-provisioning of Harbour Road Sports Centre and Wan Chai Swimming Pool

Location:

Harbour Road, Wan Chai, Hong Kong

Type:

Government owned public service building

Scheduled Time of Completion:

2017

“There’s a framework for using BIM in all future railway projects. With it, contractors can more easily visualise problems, such as in congested areas. As well as helping discover any genuine problems with constructability, BIM delivers benefits for projects as a whole.”

Vincent Chu,

Design Manager,
MTR Corporation Limited

BIM Partners Involved:

Architect:

TFP Farrells (Sub-consultant)

MEP Engineer:

Arup

Structural Engineer:

Arup

Quantity Surveyor:

Langdon & Seah

Civil Engineer:

Arup (Lead Consultant)

Building Sustainability Consultant:

Arup

Total Architecture Solution for Re-provisioned Sports Facilities

MTR Corporation uses BIM to design outstanding sports centre and swimming pool that can be built swiftly and efficiently



Image courtesy of MTR Corporation Limited

MTR Corporation is building a new railway line, the Shatin to Central Link. Construction will entail demolition of the existing Harbour Road Sports Centre and neighbouring Wan Chai Swimming Pool, as they are within the footprint of the planned Exhibition Station. However, like a phoenix rising from the ashes, a new combined swimming pool plus sports centre will be re-provided on the adjacent site.

The new facilities are now being constructed by MTR Corporation and will be handed over to and managed by the Leisure and Cultural Services Department, and maintained by government works departments. Though a relatively small project compared to the overall project of the Shatin to Central Link, which fully implements BIM, the facility presents several challenges.

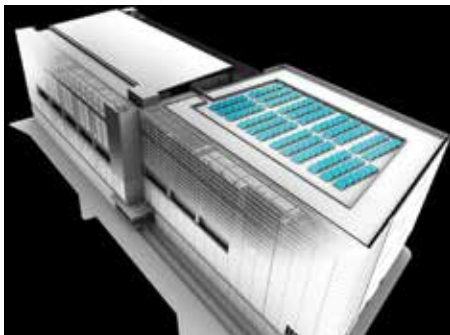


Image courtesy of MTR Corporation Limited

One key challenge is a tight timeframe. “From a civil construction perspective, the facility is on a critical path,” says Ir Vincent Chu, Design Manager-SCL, MTR Corporation. “Since the planned Exhibition Station is located underneath the existing sports centre and swimming pool, the re-provisioning works must be completed before the construction of the station.” Other challenges include restricted building height, a goal of making this the first BEAM Plus Gold certified pool and sports facilities in Hong Kong, and involving facility management and maintenance parties from early in the design stage, which will optimise various aspects such as lighting and air flow.

Better coordination in the design stage saves costs and time

Usually, MTR projects deploy BIM in the construction stage and beyond. However, the pool and sports facility project team implemented BIM in the design stage. “Using the BIM model, we can understand what we will build, and resolve clashes between disciplines,” says Ir Gary Ho, Senior Design Management Engineer - E&M, MTR Corporation. “With better spatial coordination, it will be easy for contractor to build the

facility. Also, with a BIM model for government departments to visualise, it will help with getting agreement about the design.”

Coordination during the design stage will significantly reduce abortive works – in turn substantially reducing costs for materials and labour, whilst saving time. This is especially important as the restricted building height limits space.

“The most challenging area is the swimming pool filtration plant room,” says Ir Ho.

“There will be highly sophisticated filtration equipment connected by pipework. We used the BIM model to accurately locate the

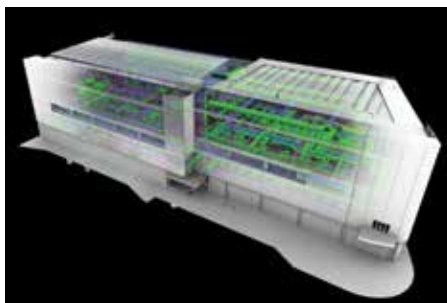


Image courtesy of MTR Corporation Limited

equipment, so to ensure it could be installed. We also designed the pipe route, while ensuring there is space for maintenance and access.”

With high level and low level piping, along with pipes side by side with equipment, Ir Ho believes that using 2D drawings for the design would have resulted in considerable abortive work during the design stage. But with BIM, the team found the design coordination was much effective.

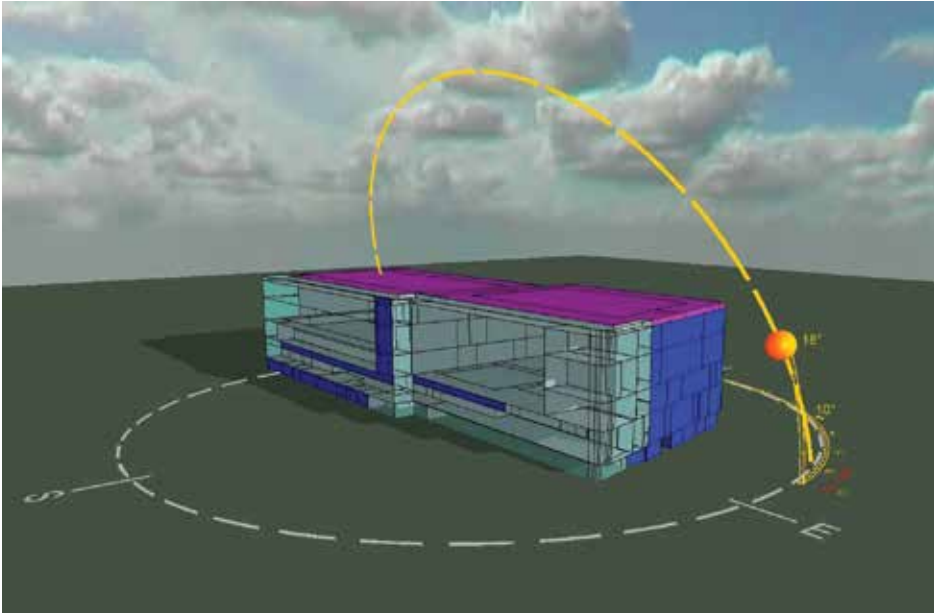


Image courtesy of MTR Corporation Limited

Aiming for BEAM Plus Gold rating

Achieving the BEAM Plus Gold rating requires careful planning and detailed considerations in the design strategy. BIM helped, through pursuing an integrated design process that combined energy efficiency and green features.

“We cross-linked the Revit BIM model with other computer simulations,” says Ir Ho. “For instance, we used Hong Kong Observatory data on the sun path to find the optimum arrangement of solar panels on the rooftop, while minimising sunlight reflection disturbance to nearby residents.”

Also by using sun paths, the design team determined the best places for positioning greenery.

Plus, information embedded in the BIM model was widely used to facilitate calculations required for BEAM Plus Gold rating, such as floor and room areas. The team found that statistical information could be easily extracted from the model.

BIM model helps in gaining supports

Using the BIM model, the project team readily involved the Leisure and Cultural Services Department and government works departments in the design process. During meetings, the BIM model could show vivid 3D visualisation images, illustrating aspects such as delivery and maintenance routes and access to services.

“We had a video showing animated figures walking around, showing that there were arrangements for maintenance access,” says

Ir Ho. This included a catwalk system over the swimming pool, providing convenient access to the lighting system close to the ceiling.

The BIM model enabled the team to show stakeholders how the new facilities will look like. Shading effects and the extent to which the facility will block sea views of nearby buildings were also simulated, which helps in gaining support from the stakeholders.

Modelling lighting and air flows

Other important aspects of the design that were enhanced through using the BIM model included lighting and air flow. For the sports centre, the project team optimised illuminance levels with reference to different games and activities.

“We could also check where columns or recesses might affect lighting, and ensure



Image courtesy of MTR Corporation Limited

there will be the lux levels required by law,” says Ir Ho.

The lighting design was also especially important for the swimming pool. “We avoided any glare that would affect the views of lifeguards,” says Ir Ho.

Also for the pool, it was important to ensure there would be air flows to prevent

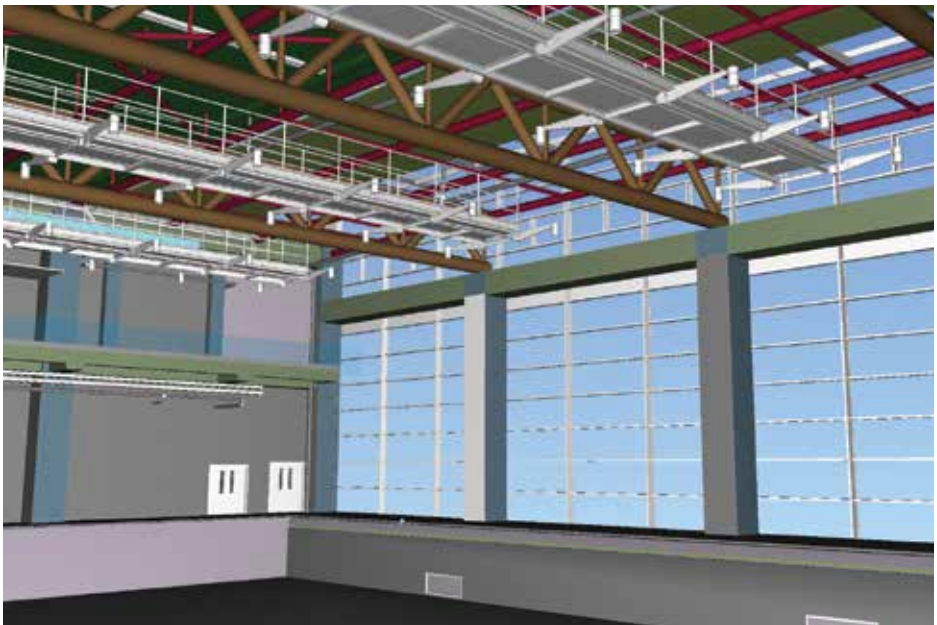


Image courtesy of MTR Corporation Limited

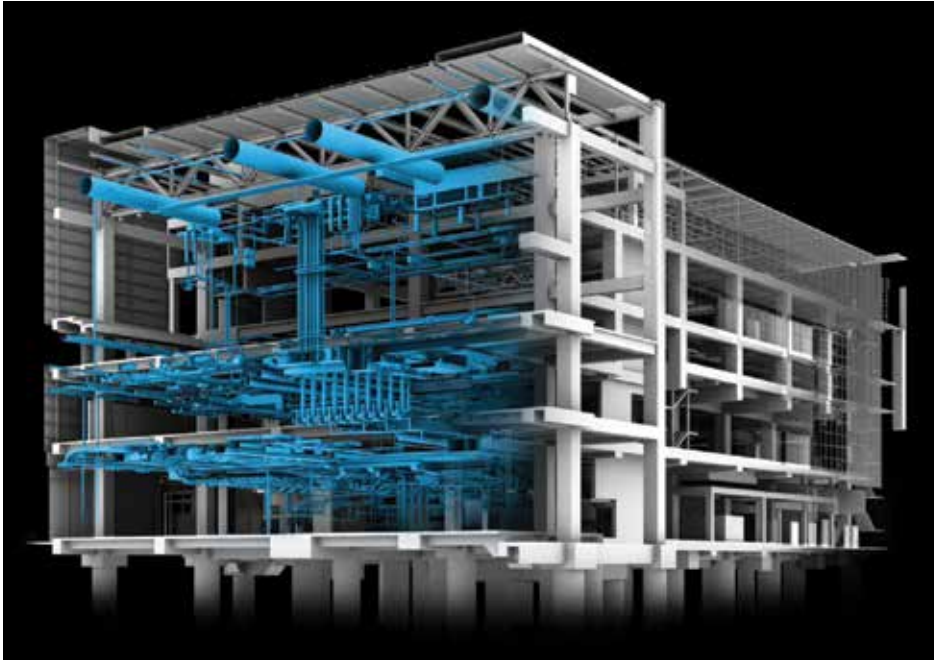


Image courtesy of MTR Corporation Limited

vapour condensation problems, which could even threaten serious damage. The design team addressed this issue by exporting the information from BIM model to carry out Computer Fluid Dynamics simulations and analyses of air flow and temperature, to understand the vapour condensation inside the indoor swimming pool in summer and winter scenarios. "We made an animated simulation, showing the movement of air around the pool," says Ir Ho. "Users could view this, and see how our pool design is better than others."

Delivering benefits for projects as a whole

Using BIM, the project team could further deploy a new procurement model, in which resources are expended upfront, in the design stage, which is expected to achieve significant cost and time savings. As it

combines architecture, civil plus electrical and mechanical engineering, they refer to this as a "total architecture" solution.

Ir Chu says the major benefit for this project could be in saving time, as it is crucial the re-provisioning of the sports centre and swimming pool would not affect the new railway construction.

"MTR aims to use BIM during both design and construction phases of projects," adds Ir Chu. "There's a framework for using BIM in all future railway projects. With it, the project team can more easily visualise problems, such as in congested areas. As well as helping discover any genuine problems with constructability, BIM delivers benefits for projects as a whole."



Image courtesy of MTR Corporation Limited

About MTR Corporation Limited

Carrying an average of 5 million passengers every weekday across all of our services, MTR is regarded as one of the world's leading railways for safety, reliability, customer service and cost efficiency.

MTR Corporation was established in 1975 with the former name "Mass Transit Railway Corporation" with a mission to construct and operate, under prudent commercial principles, an urban metro system to meet Hong Kong's public transport requirements. The sole shareholder was the Hong Kong Government.

The Company was re-established as the MTR Corporation Limited in June 2000 after the Hong Kong Government sold 23% of its issued share capital to private investors in an Initial Public Offering. MTR Corporation shares were listed on the Stock Exchange of Hong Kong on 5 October 2000.

The Corporation marked another major milestone on 2 December 2007 when the operations of the other Government-owned rail operator, the Kowloon-Canton Railway Corporation, were merged into MTR Corporation, heralding a new era in Hong Kong railway development.

Other than bringing more efficient and competitively-priced services to local rail passengers, the merger brought new growth opportunities to MTR Corporation's businesses in and outside of Hong Kong.

The merged rail network comprises nine railway lines serving Hong Kong Island, Kowloon and the New Territories. In addition, a Light Rail network serves the local communities of Tuen Mun and Yuen Long in the North West New Territories while a fleet of buses provide convenient feeder services.

The Corporation also operates the Airport Express, a dedicated high-speed link providing the fastest connections to Hong Kong International Airport and the city's major exhibition and conference centre, AsiaWorld-Expo.

From Hong Kong, passengers can travel with ease to Guangdong Province, Beijing and Shanghai in the Mainland of China using the MTR's intercity railway services.

Architectural Services Department

Projects:

- Preparation of Record Drawings for:
1. The Lady Hotung Welfare Centre
 2. The Old Dairy Farm Senior Staff Quarters

Locations:

1. Kwu Tung, New Territories
2. Pok Fu Lam, Hong Kong

Type:

Revitalization Scheme

Scheduled Time of Completion:

November 2013

“They (BIM) provide an efficient and effective means for all stakeholders to readily understand the buildings,”

Mr Kevin Li,
Senior Architect,
Architectural Services Department.

BIM Partners Involved:

Project Owner:
Development Bureau, HKSARG

Project 1:

BIM Consultant:
isBIM Limited

Project 2:

BIM Consultant:
Vircon Limited

3D Laser Scanning Service:
Topcon Beijing (H.K.) Limited

From BIM to HIM (Heritage Information Management)

Hong Kong's Architectural Services Department employs BIM to boost understanding and conservation of historic buildings



Image courtesy of Architectural Services Department

Hong Kong's Architectural Services Department recently prepared two Resource Kits for Revitalising Schemes – covering the Lady Hotung Welfare Centre and the Old Dairy Farm Senior Staff Quarters. They were used by the Commissioner for Heritage's Office (CHO), which supports implementation of Hong Kong's policy on heritage conservation.

“Heritage Information is not only an integral part of conservation projects, it must be accurate and kept up-to-date long after an intervention is completed,” says Mr. Kevin Li, Senior Architect. “It is the basis for the monitoring, management, and routine maintenance of a site, and provides a way to transmit knowledge to future generations.”

The information is essential for understanding the fabrics – the roofs, walls, floors and other character-defining elements – of historic buildings. Through using a variety of equipment and



Image courtesy of Architectural Services Department

surveying techniques, site conditions can be recorded and evaluated for revitalisation. It's important to gather accurate information, as without an in-depth understanding of the site and the historic buildings, proposed developments could harm the site, undermining and impacting the heritage value and sustainability of the buildings.

Heritage project team members are from multiple disciplines. They should have a holistic view of the site, an in-depth understanding of the historical value, and adopt a minimum intervention to historic buildings. Accurate information is a crucial part of the process.



Image courtesy of Architectural Services Department

"It's also necessary to collect data in a cost effective and reliable manner, within the established accuracy tolerance and programme," says Mr Li.

Errors associated with traditional 2D drawings

The traditional way of documenting heritage buildings is by means of 2D plans, elevations and sections. Data is gathered manually and eventually has to be transformed by means of computer-aided drafting technique. The process involves site measurements, and converting data into drawings.

"Although the understanding of site conditions by means of 2D drawings has a long tradition, the plans, sections and elevations only supply accurate information at the specified locations," says Mr Li. "This means information could be fragmented. Features and dimensions shown in different drawings may not be consistent, and inaccurate data could lead to



Image courtesy of Architectural Services Department

design errors and abortive work.” This leaves scope for enhancing the process, by deploying BIM, which is not restricted to use in new designs and construction, but can be equally applied to and benefit the conservation and revitalisation of historic buildings. A 3D interactive model could provide a more realistic visualisation for stakeholders, so they can swiftly and accurately understand unique character of a historic buildings and the site. This in turn

will lead to the creation of a more sustainable design for heritage conservation work.

Photogrammetry and 3D laser scanning

“Ideally, the surveys should be carried out with minimum scaffolding and physical disruptions – which will reduce both time spent on preparation work and risks associated with outdoor surveying,” said Mr Li. The resource



Image courtesy of Architectural Services Department

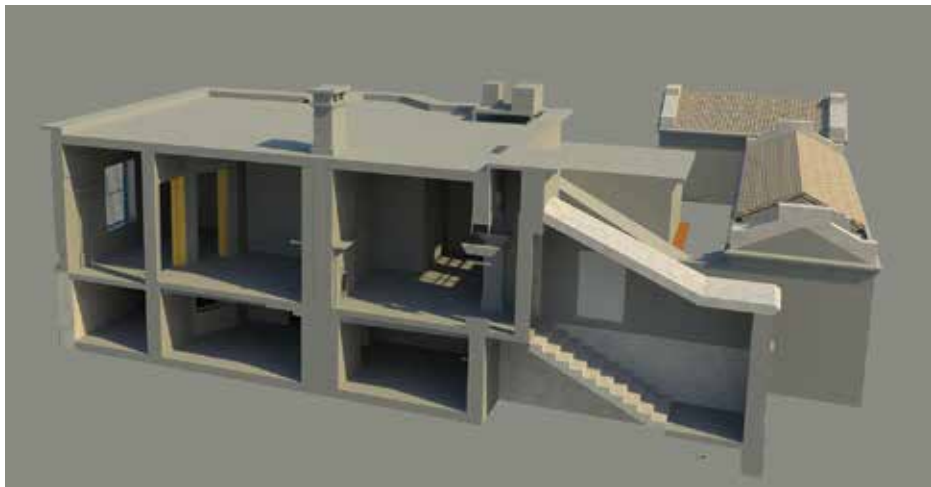


Image courtesy of Architectural Services Department

kit project team opted to use two main technologies for surveys: photogrammetry, and 3D laser scanning.

Photogrammetry was selected for the Lady Hotung Welfare Centre for its scale and surrounding. This recording process, in which 3D measurements are derived from photographs, allowing a thorough understanding of historic fabrics than typical survey methods.

The use of computer-aided close range photogrammetry software, interactive viewing software and BIM technology provided a comprehensive solution for recording, presenting and visualising the information for the Centre. Autodesk 123D Catch was used to convert high resolution images into mesh geometry in Autodesk's Cloud server. The interim product was then imported into Revit for calibration and further modeling.

In order to enhance the usefulness of the model, site topography and utility records are added. Where space constraints had

prevented satisfactory use of photogrammetry, supplementary structural survey data on the building's timber roof structure was added separately.

Trees obscure views of the Old Dairy Farm Senior Staff Quarters, making photogrammetry tough or impossible to use. Instead, the team opted to employ

proprietary 3D laser scanning equipment to obtain data. Much as with the Lady Hotung Welfare Centre, this data plus interactive viewing software and BIM technology provided a complete solution for recording, presenting and visualising the building information.

Helping stakeholders readily understand buildings

For both the Lady Hotung Welfare Centre and the Old Dairy Farm Senior Staff Quarters, the final survey products include 2D drawings, 3D models and animation clips. "They provide an efficient and effective means for

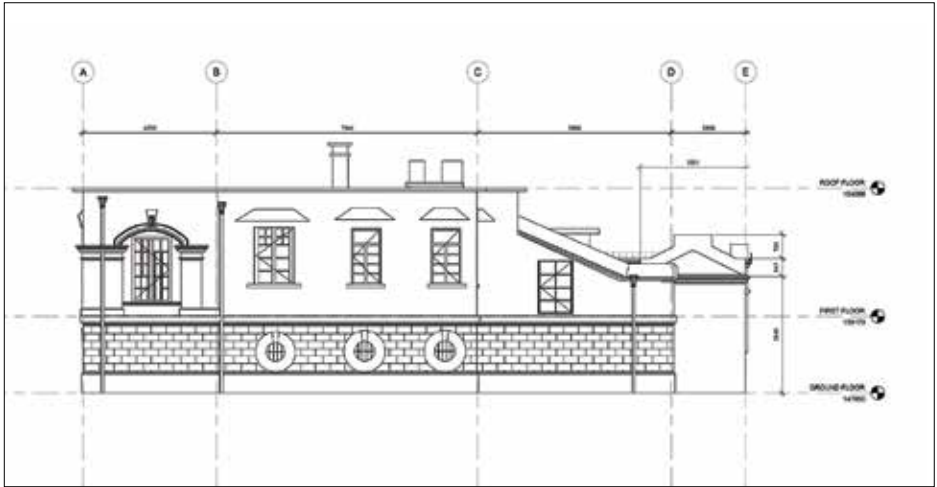


Image courtesy of Architectural Services Department

all stakeholders to readily understand the buildings,” says Mr Li. Drawings generated from the BIM models eliminate potential errors associated with traditional 2D drawings, whilst maintaining the required standards, and augmenting the visualisation and communication of the information.

“We are not aware of any heritage practitioners in Hong Kong using the same workflow, which we summarise as moving from BIM to HIM – Heritage Information Management,” says Mr Li.

“With more effort in organising the BIM

data, it will be possible to visualise changes to the historic buildings over the course of time,” predicts Mr Li. “Analyses of the models can help to gain an understanding of the changes, and formulate more comprehensive conservation strategies, so the heritage buildings can be better protected for future generations.”



Image courtesy of Architectural Services Department



Image courtesy of Architectural Services Department

About Architectural Services Department

Architectural Services Department (ArchSD) performs the following three core functions in relation to Government-owned and Government-funded facilities:

- 1) Monitoring and advisory services;
- 2) Facilities upkeep; and
- 3) Facilities development.

ArchSD commits to provide quality services to the public and explore every opportunity to integrate innovative and sustainable elements into its projects for the betterment of the society with due consideration on cost effectiveness.

In recent years, ArchSD projects received some recognition including but not limited to the Hong Kong Institute of Architects Annual Awards, the Hong Kong Institute of Landscape Architects Design Awards, Quality Building Award and Green Building Award.

Advisors' Comments

Introduction

This year, we are extremely honoured to receive the invaluable support from the local supporting organizations and overseas BIM advisors. Locally, an advisory panel was formed by the representatives of local supporting organizations 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:

- Autodesk Industry Advisory Board
- buildingSMART Hong Kong
- Chartered Institute of Architectural Technologists, Hong Kong Centre
- Chartered Institution of Civil Engineering Surveyors (Hong Kong Region)
- Hong Kong Information Technology Joint Council
- Hong Kong Institute of Project Management
- The Chartered Institute of Building, Hong Kong
- The Hong Kong Institute of Architects
- The Hong Kong Institute of Building Information Modelling
- The Hong Kong Institute of Facility Management

Advisors' Comments

Advisory Panel



CLP Power Hong Kong Limited

This case clearly demonstrates an effective application of BIM in resolving design decisions for a unique building type. It is also a good demonstration of how different systems can be coordinated in confined spaces by early involvement of different stakeholders. Maintenance and operation colleagues provided early input to identify design changes that could not be readily resolved in the construction stage.



Henderson Land Development Company Limited

This is a good demonstration of BIM usage in supporting design decisions. Different values – such as time, cost, and even quality – were evaluated with the support of information retrieved from the BIM model. Building performance factors including sunlight intensities, shading, and indoor ventilation were considered in this early stage. This demonstrates an advanced use of BIM – combining 4D BIM (time dimension), 5D BIM (cost element) and 6D BIM (quality).



Hong Kong Housing Authority

This submission demonstrates an innovative use of technology to transfer project information between different disciplines. It clearly illustrates the workflow between Geotechnical, Civil and Building engineers, to integrate information from GIS, BIM, and lighting analysis. It shows how technology can facilitate design workflow.



MTR Corporation Limited

This project clearly illustrates the benefits of using BIM in effective design workflow. It also demonstrates the competence of the MTRC project team in applying the latest technology to facilitate design decisions. The project team clearly identified project challenges and skillfully implemented an advanced workflow to resolve them.

Honorable Mention:

The Architectural Services Department of HKSAR Government

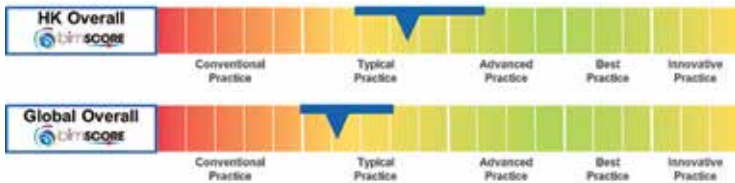
This case is a good demonstration of how to start and drive BIM in an organization. The BIM usage in this submission clearly demonstrates a new workflow, involving application of new skills in surveying techniques to capture existing architecture designs.

Advisors' Comments

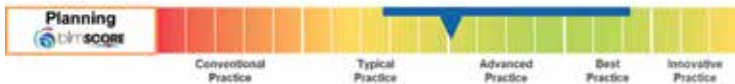
Dr. Calvin Kam

Overview

The 2014 Autodesk Hong Kong BIM Awards provide an impressive collection of leading edge BIM processes and applications. Applying the bimSCORE evaluation framework in a low confidence assessment (based on the evidence available from the presentations) we have benchmarked the 2014 winners against past award winners and other Hong Kong BIM projects. This year's winners fall in the upper range of "Typical" Practice, with some evidencing "Advanced" Practice for the Hong Kong market. Benchmarking the 2014 winners more broadly against the bimSCORE global knowledgebase of over 150 BIM projects from 14 countries, the Hong Kong BIM Award winners fall in the lower range of "Typical" practice. The 2014 winners are further analyzed below in the four bimSCORE areas of Planning, Adoption, Technology, and Performance.

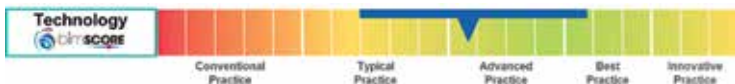


Planning



High performing BIM projects are driven by well-defined objectives and standards, and accessible technical and organizational support. The King Wah Road Office (KWRO) and Architectural Service Department (ASD) projects both employed BIM consultants to help manage BIM and supporting guidelines, whereas the Hong Kong Housing Authority (HKHA) relied on its in-house technical ingenuity and online resources to develop workflows to integrate BIMs for site modeling and interior lighting simulations. Relative to global BIM practice, BIM planning and standardization in the HK market is still evolving, but agencies like HKHA are leading the way in developing agency-wide BIM User Guides and requirements.

Technology



To meet unique project objectives and challenges, the award winners have made informed selections of BIM uses, their level of development (LoD), and their supporting information exchanges. The ASD projects used 3D laser scanning and photogrammetry to generate point clouds of existing conditions, and the KWRO project employed energy and daylighting analyses to reduce heat gain and carbon footprint. The MTR Harbour Road Sports Centre (HRSC) and

Wan Chai Swimming Pool (WCSP) project included CFD analysis to model exhaust and airflow conditions, and used BIM for interior lighting simulations. The award winner's wide range of BIM uses is at or near the level of many "Best" Practice projects from the Hong Kong market.

Adoption



In addition to employing a variety of BIM uses, the award winners have further leveraged the value of BIM by piloting integrated project teams and applying BIM across the facility lifecycle. The HRSC and WCSP project engaged facility management (FM) staff early in the BIM process to optimize maintenance processes and inform FM training, and the West Kowloon Substation project generated 4D animations to illustrate procedures for equipment installation and repair. Though these cases evidence wider BIM adoption across stakeholders and phases, further growth of BIM adoption in Hong Kong is impeded by a general lack of BIM requirements from owners, and reluctance from designers, builders, and facility managers to invest in BIM over traditional and proven processes.

Performance



A project may be sophisticated in BIM planning, tools, and processes, but without a quantitative reckoning of BIM performance, BIM adoption decisions are at risk of being misinformed. Though the award winners did have objectives for BIM use in evidence, it's not clear how they were documented, or ultimately tracked and assessed. The KWRO project stands out with the use of Key Performance Indicators (KPI) supported by BIM to objectively compare design alternatives on the basis of cost, revenue, schedule, aesthetics, and environmental impact. It is encouraging to see this adoption of KPI to evaluate BIM performance in Hong Kong, a practice typical of more advanced BIM markets like that of the United States.



Dr. Calvin Kam *PhD, AIA, PE, LEED AP*
Founder, bimSCORE

Dr. Calvin Kam is the Founder of bimSCORE (USA, Hong Kong, and Singapore) — the “GPS Navigator” for any enterprise or project team charting a course for design and construction innovation. Dr. Kam is also the Director of Industry Programs and a Consulting Associate Professor at Stanford University’s Center for Integrated Facility Engineering (CIFE), where he specializes in strategic innovation such as Building Information Modeling (BIM) and Virtual Design and Construction (VDC). He is a Co-founder and the Senior Program Expert of the National BIM Program with GSA Public Buildings Service and is an appointed international BIM expert for the Singapore government’s Building & Construction Authority; China National BIM Union has appointed Calvin as the only international Honorary Director. Calvin is a Principal Investigator with Disney Research Laboratory. He is on the Board Knowledge Committee of the American Institute of Architects, where he also serves as the National Co-Chairman of AIA Center for Integrated Practice, and the past National Chairman of AIA-TAP Knowledge Community.

Advisors' Comments

Phillip G. Bernstein



CLP Power Hong Kong Limited

The West Kowloon Reclamation Substation is a unique project that demonstrates China Light and Power Hong Kong Limited (CLP) impressive commitment to BIM-enabled sustainable design. CLP achieves a well-coordinated and attractive substation that also satisfies social, construction and maintenance requirements. It is also a good example of sustainable design through the use of landscape and efficient use of materials.



Henderson Land Development Company Limited

For the Proposed Office Development at 14-30 King Wah Road Project, Henderson Land project team clearly illustrates the value of BIM by developing a company-wide standard workflow. Design objectives are fully supported by information provided in BIM that enhances the decision-making process. The building facade is a significant design element which is effectively analysed in BIM in terms of environmental impact, truly demonstrating an advanced use of BIM technology.



Hong Kong Housing Authority

The Bridging the Gaps with Core Values Project is an exemplary use of a sophisticated BIM workflow combining information from different disciplines. The challenges of integrating different design information are well met and resolved by the HKHA team in a great example of innovation and commitment to design excellence. The project illustrates another significant jump in functionality and sophistication from work submitted in past years.



MTR Corporation Limited

The Design of Harbour Road Sports Centre is an excellent example of an integrated design approach. It demonstrates BIM is a crucial part of the design workflow at MTRC not only in railway station design but other design categories. The project is both technically complex and aesthetically interesting, demonstrating MTRC's great skill in both areas.

Honorable Mention:

The Architectural Services Department of HKSAR Government

This innovative use of BIM demonstrates the use of models to support site safety, warning the project team about dangerous situations like the climbing height necessary to scale the structure. Even though BIM is new to the ASD, they demonstrate great skill in introducing into their new workflows, allowing detailed measurement of the project and coordination of building elements.



Phillip G. Bernstein *FAIA, RIBA, LEED AP*

*Vice President, Strategic Industry Relations, Autodesk, Inc.
Lecturer, Yale School Architecture*

Phil Bernstein is the Vice President for Strategic Industry Relations at Autodesk, Inc. where he leads a team that sets the long term vision for the AEC industry. With bachelors and masters degrees in architecture from Yale University, he teaches at the Yale School of Architecture. He was formerly an associate principal at Pelli Clarke Pelli Architects. He writes and lectures extensively on the future of technology in the building industry.

Advisors' Comments

Ir. Ronan Collins



CLP Power Hong Kong Limited

The use of BIM to visualise the design of the sub-station is a good example of the benefits of 3D modeling, clash detection and design iteration. The BIM consultants have demonstrated the advantages of assembling detailed 3D models for CLP. Following the success of this project, the next step for CLP should be to specify the use of BIM by their design consultants to design all of the sub-stations in 3D, add operational data about the CLP equipment and produce the construction drawings directly from the BIM authoring tools.



Henderson Land Development Company Limited

The commercial development design using BIM tools for assessing design options, natural lighting, energy consumption, appearance and producing overall KPI's is a good example of using the I in BIM. The combination of time and cost into the 5D simulation provides a good assessment for the developer on the predicted cash flow. Looking to the future, it will be interesting to see if the development team can collate data from different projects and use BIM analysis tools to compare the design performance and actual as-built performance of the buildings.



Hong Kong Housing Authority

The Housing Authority continue to demonstrate the benefits of leveraging BIM and GIS for the design of their projects. Their examples of design visualisation, lighting analysis, internal lighting design and documentation using BIM demonstrates the power of the process. Their ongoing business transformation, training and skills development also illustrates their commitment and vision for implementing BIM on all of their projects.



MTR Corporation Limited

As another experienced owner in the implementation of BIM, this project example shows the excellent development of skills by the industry driven by the MTR requirements and vision. The consultants have designed the entire project in 3D and used the BIM processes to develop very detailed and well coordinated designs. They have produced sustainable designs with a clear focus on user experience and maintainability. This is an excellent demonstration of how we should design and coordinate projects in BIM.



Honorable Mention:

The Architectural Services Department of HKSAR Government

The examples of recording the heritage buildings using point cloud scans, photogrammetry, BIM and traditional drawings is another interesting use of BIM for conservation of historic buildings. The emergence of point cloud scanners and the improvements in data processing indicate a very close alliance between surveyors and designers on future projects for both old and new buildings.



Ir. COLLINS, Ronan

Ir. Ronan Collins is an experienced BIM Project Manager and the Chairman of HKIBIM. He specializes in the management of detailed and accurate BIM models for the purpose of design and construction co-ordination. He is responsible for planning and implementing BIM projects in collaboration with clients, consultants and contractors. As a Chartered Structural Engineer, Ir. Collins has completed the design and supervision of several commercial, infrastructure and educational projects. Ronan is also the Social Secretary for The Lighthouse Club construction industry charity, a member of the Royal Hong Kong Yacht Club and a member of The British Chamber of Commerce.

Outstanding Students' Projects

This year, we are excited to highlight three outstanding students from local institutions. The students show the advanced BIM usage in their projects. Autodesk supports the local educational institutions on making the latest technology available to student training, to nurture the skills of a new generation of architects and engineers who will play key roles in Hong Kong's AEC industry. The sophisticated use of BIM in all three projects is highly encouraging regarding the local development of BIM - which will in turn lead to better designed, more sustainable buildings in Hong Kong and across the region.

The three awarded students are: (by alphabetical order of the institutions)



HUNG Siu Chau

College of Science & Engineering,
City University of Hong Kong



LAM Joshua Wai Hon

School of Architecture,
The Chinese University of Hong Kong

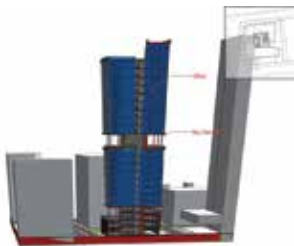


Srinath Shiv KUMAR

School of Engineering,
The Hong Kong University of Science and Technology

Outstanding Students' Projects

Name: Hung Siu Chau, Andrew
Institution: City University of Hong Kong, College of Science & Engineering, Bachelor of Science Architectural Studies, Year 4
Project Name: Twist Tower
Project Location: Kowloon Bay, Hong Kong



Challenges and Solutions:

- Develop a concept idea into an exercisable BIM that allows coherent design development and refinement in responds to tight site constraints.
- Integration of sustainable aspects such as solar and ventilation properties during the design development process.
- Developing an effective and efficient workflow that allows all involved parties to add value to the project.

How BIM Helps:

- The embedded information within a BIM allows rapid access of data (GFA, height, Energy usage, etc) for rapid prototyping the mass model.
- BIM provides one 3D model that enables a very efficient and controlled workflow, opposed to traditional workflows of multiple models and representations for different tasks.
- The combination and smooth exchange between 3D Revit and Navisworks enabled a clear 2D / 3D / 4D communication of the design to fellow students and supervisor.
- The automation aspects of Revit has tremendously increased efficiency by reducing the time necessary to produce 2D representations.
- The Autodesk Cloud function has demonstrated a powerful and high quality alternative for rendering perspective views in short time directly from the Revit model.

Outstanding Students' Projects

Name: LAM Joshua Wai Hon
Institution: School of Architecture, the Chinese University of Hong Kong
Project Name: Cadence
Project Location: Yim Tin Tsai, Sai Kung, Hong Kong



Challenges and Solutions:

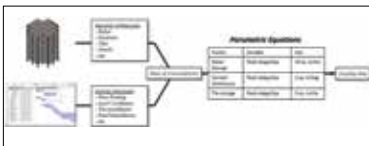
- BIM software Revit is first perceived as lack of flexibility in design, merely working as a tool for construction. Yet, In order to refute this belief, this project discovers the potential of BIM software Revit as a flexible design tool.

How BIM Helps:

- Flexibility in Design: Parametric design is enabled by adaptive components and massing function in Revit, generating free-formed drop ceiling fins in the design.
- Time-saving Gadget: Intelligence of BIM saves time in doing tedious jobs with high accuracy, allowing computer automatically generating some intuitive geometries and elements.
- Realisation of Actual Construction: Applying comprehensive in-build library in Revit, a realistic perspective about how the building is constructed is pictured, bringing the project from merely schematic design to realisation in the computer.
- Rapid Visualisation: Renderings are produced at ease through connection to Autodesk 360, allowing rapid visualisation of space upon designing.
- Streamlined Production Flow: Full set of architectural drawings are generated simultaneously and greatly improve the efficiency in preparing presentation.

Outstanding Students' Projects

Name: Srinath Shiv KUMAR
Institution: Year 1 MPhil, School of Engineering,
The Hong Kong University of Science and Technology
Project Name: Construction Site Layout Planning using BIM
Project Location: Clearwater Bay, Hong Kong



Challenges and Solutions:

- To determine the quantity of materials used in construction.
- To create accurate models of the construction site, representing every stage of construction.
- To develop a software tool for automated site layout planning.
- Optimising the layout of construction site storage areas and facilities.

How BIM Helps:

Using BIM, we developed a software tool to automate site layout planning.

- Using information in the BIM model to estimate size, type and number of temporary construction facilities required over time.
- Categorisation of the type and quantities of materials used in the project.
- Using the Revit API and Microsoft Visual C# 2010, to develop a Revit plugin for automated site layout planning.
 - The plugin enables planners to make early decision on site layout planning.
- Changes to design and construction plans are automatically reflected in the layout plans generated by our plugin.
 - Considerably reduces the time and effort of planners.

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 bi-directional communications. AIAB, as its title suggests, has an advisory role. Its main objectives include, but not limited to:

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

Want to know more about AIAB? Contact us now!

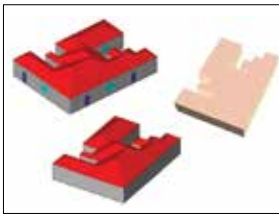
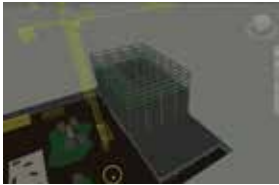
[Michael Chan](#)

Email: Michael.chan@autodesk.com

AIAB web site: <http://www.aiab.org>

AIAB Members

Dr. Jack Cheng



BIM – Opening New Possibilities

BIM is more than 3D modeling. Information is the key of BIM, and we can better leverage the information provided in BIM. For example, the time dimension of BIM helps us identify temporary and permanent clashes to evaluate constructability. The material information in BIM together with the project schedule allows us to plan and manage cash flows and supply chains of construction projects. BIM also enables us to predict and assess the environmental footprint of buildings during the design stage.

In addition, BIM is increasingly used as a component-based information hub for storing, integrating and managing building information in different aspects. For instance, we can integrate specifications and documentations of individual building components in BIM models. We can also link process data to BIM models for project monitoring and management purpose. Furthermore, BIM can also be integrated with other technologies such as GIS and laser scanning to support building design, construction and operations. All these applications were not possible in the past without BIM.

As BIM technology becomes popular and mature, many people in the industry are trying to push the limit of BIM and explore various new applications. In schools, students are also exposed to the potentials of BIM. HKUST, like other institutions in Hong Kong, offers courses in BIM and helps equip our next generation with the BIM knowledge. At HKUST, students not only learn how to create and use BIM, but also are encouraged to realize their ideas using BIM and to explore various possible uses of BIM through class projects. Creativity is important and can be promoted via BIM. I believe that BIM education to our next generation is beneficial and necessary.



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

Dr. Jack Cheng is currently an Assistant Professor in the Department of Civil and Environmental Engineering at the Hong Kong University of Science and Technology (HKUST). He teaches BIM, Construction IT and Construction Management at HKUST. While studying at Stanford University for his PhD degree, he was involved in multiple research projects in Virtual Design and Construction including BIM. His research areas include BIM, data mining and retrieval, supply chain management, carbon auditing, green building, and sustainable construction. His research has been published in various international journals and conferences in different countries. He has also delivered seminars overseas.

Dr Stefan Krakhofer



BIM Craftsmanship

BIM creates a paradigm shift, affecting the whole industry in workflows, team structures, resources, contracts, deliverables, etc. The rapid evolution of BIM demands agile learning and connected knowledge between business, design, construction and technology. The industry has to understand BIM in order to effectively transform it into a healthy business component. The questions to consider are: How does BIM improve efficiency of traditional services? How can BIM provide additional deliverables? How can the information of BIM be leveraged? The BIM team has to be inclusive of everyone and that needs vision and leadership.

BIM describes a holistic approach that cares deeply about the collectively created product. The importance of product is driven by the conviction to design that revives craftsmanship in the process. Craftsmanship demands an incredible amount of passion to fight for the creation of experience. The spatial experience of built architecture is the ultimate goal. However, BIM enables an intellectual experience during the design process. Every detail in a BIM mirrors the attitude of craftsmanship; its coherent naming of families and components, its assembly and formation of knowledge, its accessibility and exercisability of information, its continues improvement of know-how, etc. This passion runs deeply embedded within the project and carries on the quality and cohesive vision beyond BIM. The craftsman's perspective on BIM has empowered highly successful interior design projects that create unprecedented experience. Your desire to create coherent information triggers a design experience that inspires all project parties. For your next project embrace true craftsmanship and share your success.



Dr Stefan Krakhofer Dr.Tech; Dipl.Ing; Ing; MSc(Hon); Arch RIBA ARB-UK; EURING; HKIBIM; MHKDA;

Dr Krakhofer is a Building Engineer and Architect. His designs range from software to furniture & interior to mixed-use projects & masterplans. His work has been published extensively and exhibited at the Architecture Biennale in Venice, Hong Kong, etc. Stefan holds a Master of Architecture, a Master of Science in Computing & Design, and a Doctorate in Architectural Science. He is a Visiting Assistant Professor at CityU HK teaching parametric design, 3D-4D BIM, digital fabrication and design studio. Stefan's multi-disciplinary background in architecture, engineering, and computing enables a specialization in design tooling & digital craftsmanship. His research is concerned with new models of design thinking, and emerging modes of practice that transforms due to the pervasive role of information.

AIAB Members

Erica Lam



BIM – Incorporated to build a New World

Further to the advancement of construction technologies, Building Information Modeling (BIM) has become an important tool to coordinate different issues so as to improve the industries productivity. In the last seven years, I witnessed a drastic increase in popularity of BIM. These days, it has become part of the process of various projects such as preparation of design, government submission, and tender drawings during the stages of detail design, contract documents and construction period. Incorporating the best from BIM and the traditional method is now the new ways of processing.

As a part-time lecturer and trainer in various settings, I see BIM grows in the academic circles too. A few years ago, only the students in high diploma or above could have the chance to come across with BIM. I am privileged to be able to teach a selective course about building construction under a Yi Jin Diploma in which the BIM concepts and using Revit Architectural as the drawing tools for the building design project are part of the curriculum. Most of the students enrolled in this course usually do not come with any concept about building construction. The usage of BIM modeling gives an easier and more ready way for the students to understand the basic design of building space, building structure, quantities of different building elements, time control of construction, and further building management. It can help them to have better understanding in the different posts in our industries.



Erica Lam BAppSc(ArchSc), MHKIBIM, MbSHK

Erica is a currently a Project Coordinator at Aedas Limited. In the recent future, she will start working as an Assistant Manager (BIM) at New World Construction Co., Ltd. Over the last seven years in the profession, BIM has become her main work process. BIM projects include complex roof geometry of a railways terminus, airport midfield concourse, universities, cargo terminal, commercial building, and residential village. Erica is the award winner of Singapore's International BIM Competition 2011. She is also a part-time BIM lecturer and trainer in various institutes. Currently, she is the vice president of the Autodesk Industry Advisory Board (AIAB).



BIM for road alignment modeling

URS Corporation has been applying BIM technology software applications, specifically Civil 3D®, to civil engineering projects to create cost-effective solutions and designs. Hilly terrain is a dominant feature in Hong Kong and constructing new roads in this environment usually involves a substantial amount of earthworks. Civil 3D® allows us to visualise the alignment in order to minimise the amount of cut and fill.

The design typically begins with using Civil 3D® to create 3D models of existing surfaces from topographical data and as-built records. The surfaces formed typically include the existing ground levels, existing road networks, and adjacent buildings. From these surfaces, the road/footpath alignments can be created based on the design requirements specified by government authorities. Not only can the earthworks quantities be calculated from the models, the cross sections in any orientation can be also developed. This enables us to compare the constructability of various viable schemes, while also allowing for a smooth progression of detailed design in subsequent stages. The models also help engineers to identify quickly any elements that fail to comply with statutory requirements, such as those found in the government’s Code of Practise for Barrier Free Access (BFA).

To maximise the benefits gained from applying this technology, our civil engineering team works very closely with URS’ BIM team to ensure that all the information required to create a comprehensive 3D model closely reflects the actual site conditions and allows for an optimal design. The ultimate goal for utilising this technology is to develop high quality, innovative designs and pass on the savings – of both time and material costs – to clients.



Jonathan Lau BEng, MSc, DIC, CEng, MICE, MHKIE

Jonathan is an engineer at URS, and has been utilising BIM technology since 2010 to assist in his designs of road and drainage infrastructure projects in Hong Kong. As a member of the Infrastructure team, Jonathan is actively developing BIM applications for URS’ assignments on highways, rail and aviation works. His project experience includes the Widening of Castle Peak Road-Castle Peak Bay (Investigation) as well as MTR projects including MTR South Island Line (East) SOH and LET Stations, Shatin to Central Link (Hin Keng Station), and Express Rail Link (West Kowloon Terminus Station South). He is currently working on civil improvement works for Wynn Palace at Cotai (totalling over 6.5 hectares).

AIAB Members

Jake Lucier



Integrated Design with BIM

Building Information Modeling and Management is a dynamic practice with means and methods challenging design organizations and institutions to explore and study design. Traditionally, the practicalities embedded within the design process have constrained and burdened projects, teams and organizations from several different aspects. The integration of a BIM environment has the capability to alleviate many of these issues partly due to its interoperability and faceted approach to deliverables.

One way, by attaching information to our models we can query, alter, compute and mine data to influence design, resolve conflicts, procure spaces and negotiate contracts ensuring the highest quality of design is attained. The agility in BIM and development of ecosystems within design provide an organization the capability to answer back at the fast paced, information driven world we find ourselves in today making informed decisions for tomorrow.

These few items being coupled with easier to produce visualizations and semi-automatic documentation can be managed as a muted sub-layer to the design process with minimal interaction from designers liberating them of tedious tasks. This focuses their resources, abilities and ideas towards aesthetic and spatial reasoning to deliver innovative solutions and design. It is through these applications, environments and evolving our traditional processes which we empower the designer with information technology to advance our workflow and practices to deliver outstanding designs.



Jake Lucier

Jake Lucier is currently the Senior Design Systems Specialist for Starbucks Coffee implementing design system solutions, developing workflows and providing proactive assessment and education initiatives through the collaboration of teams and functions integrating BIM into the architectural design process. His primary market has been mixed-use and retail architecture for the past 10 years. He has trained and developed over 200 Architects, Engineers and Interior Designers through his technical stewardship working closely with project teams, clients and consultants globally with integrated design.



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[Contact Hours: 18 hrs]

Building Information Modelling (BIM) in Structural Design

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Introduction to Building Information Modelling (BIM) with ArchiCAD

[Contact Hours: 6 hrs]

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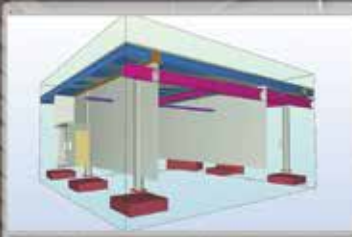


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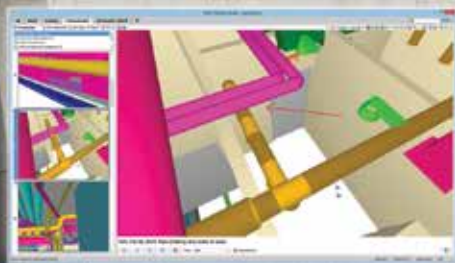
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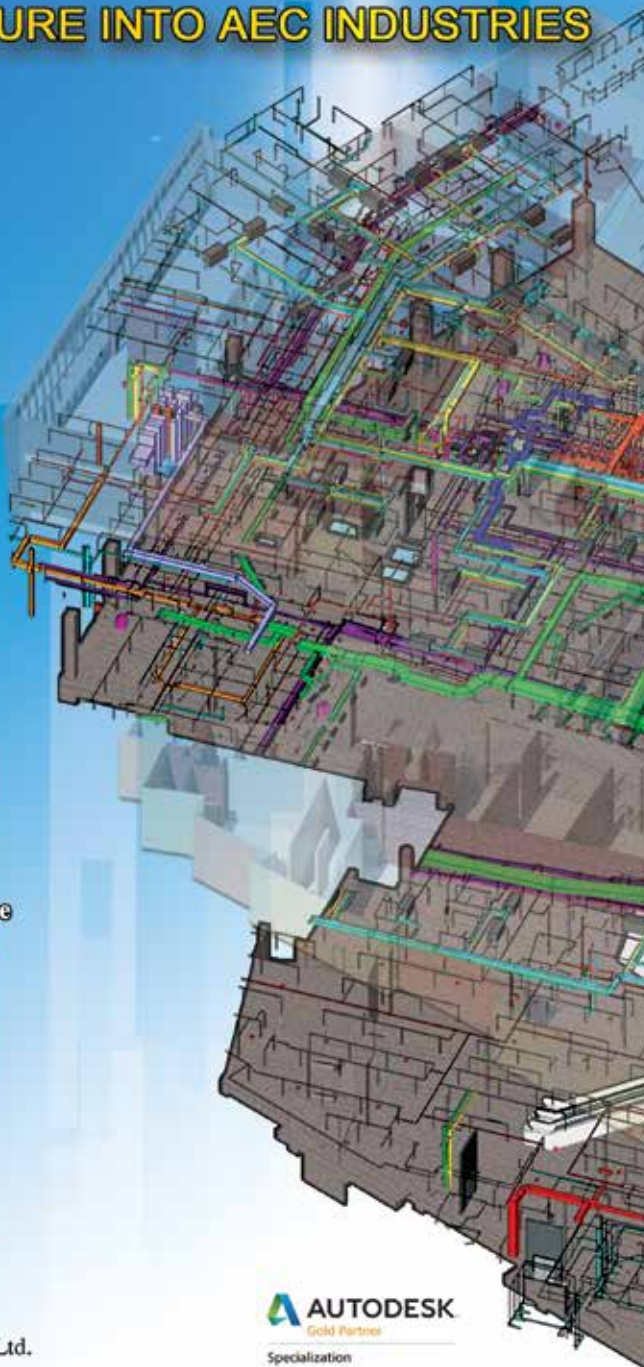
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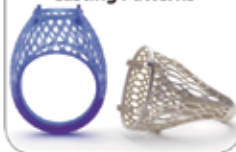
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