

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 (CGS) 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

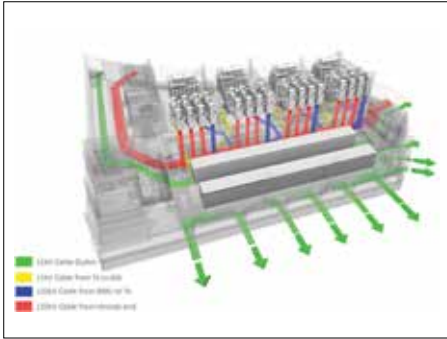


Image courtesy of CLP Power Hong Kong Limited

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

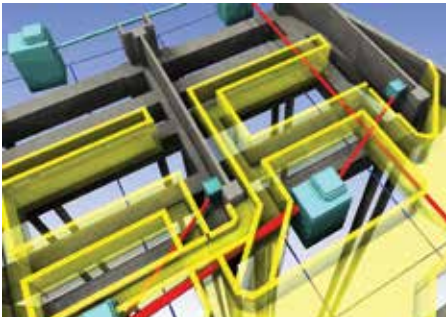


Image courtesy of CLP Power Hong Kong Limited



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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



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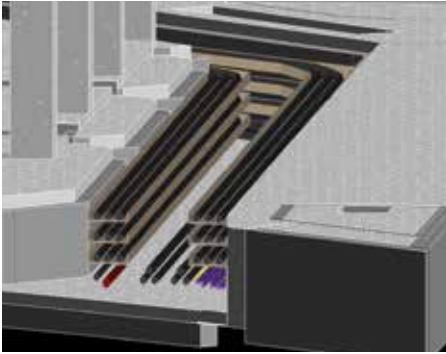


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relationship with local communities. Using the BIM model, the project team could demonstrate the building appearance, construction activities and operation processes to local people, addressing concerns in the early planning stage. All stakeholders 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.



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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.