

Pestech Drives Cambodia's Utility Digitalization with a 230-kV Substation, Providing Power to 11 Rural Villages

Bentley's Collaborative Modeling Accelerated Design Time by 50% and Reduced Changes by 60%

STRENGTHENING CAMBODIA'S POWER GRID

With Cambodia's existing transmission infrastructure approaching capacity, the government has set energy sector development as a national priority. As part of that plan, the national electrical utility Electricite du Cambodge initiated a USD 2 million project to expand transmission network lines, providing essential power to 11 rural villages in Koh Kong, located along the border of Thailand. The substation project includes construction, installation, and commissioning of two 230-kilovolt overhead line bays to transmit additional power to meet the anticipated load demands of Cambodia's supply network.

Pestech International Berhad was awarded the 38-month engineering, design, and construction contract for the substation work, but faced some initial challenges and site constraints, such as navigating several palm oil plantations and villages, along with a tight timeline and budget. Upon completion, the substation is expected to strengthen the reliability of Cambodia's power grid, improving electricity access and quality of life for area residents. "Once the Koh Kong substation is completed, the project is expected to provide the essential 230-kilovolt power injection into the 11 villages in the district, strengthening power supply reliability of the grid system in Cambodia," said Muhammad Afiq Rosli, design engineer at Pestech.

ADDRESSING KEY CHALLENGES

"There are three key challenges in the project, which are time, cost, and quality," stated Rosli. With respect to timing, using Pestech's traditional manual drafting, drawing, and calculation methods, along with fundamental CAD software to update and verify construction drawings,

would cause significant delays in their project execution. Traditional CAD-centric design and drawings are often done in separate departments with different software applications that inhibit collaboration, with manual changes and calculations being made across multiple drawings and reports. The entire process is time-consuming and very susceptible to errors, resulting in inconsistent quality. They needed to avoid material wastage design and construction errors, improve client and stakeholder communication, and streamline coordination among civil and electrical disciplines. They also sought to seamlessly integrate the new transmission lines with existing substation infrastructure, minimizing costs and providing timely, quality deliverables.

Pestech quickly realized that their conventional, time-consuming, and error-prone design strategy would not suffice and would impair productivity. They wanted to improve efficiencies in the substation design process, streamlining collaboration and data management, and provide the client with a quality product. To achieve these objectives, Pestech sought a unified digital approach and needed integrated 3D modeling technology to automate previous manual processes and establish coordinated workflows. "Given site constraints along with a tight timeline and budget, Pestech found out that manual substation design methods were time-consuming and error prone. So, we decided to integrate intelligent modeling technology," said Rosli.

BENTLEY APPLICATIONS DIGITALIZE WORKFLOWS

Already familiar with the applications, Pestech chose Bentley technology to overcome the project challenges and establish a lifecycle digital solution. They used OpenBuildings to model the substation control building and

PROJECT SUMMARY

ORGANIZATION

Pestech International Berhad

SOLUTION

Utilities and Communications

LOCATION

Koh Kong, Cambodia

PROJECT OBJECTIVES

- ◆ To digitalize substation design to strengthen Cambodia's power grid.
- ◆ To establish an integrated design environment to streamline workflows and accelerate design.

PROJECT PLAYBOOK

Bentley Raceway and Cable Management, iTwin[®], iTwin.js, LumenRT, MicroStation[®], Navigator, OpenBuildings[®], OpenRoads[™], OpenUtilities[®], SYNCHRO[™] 4D

FAST FACTS

- ◆ Two 230-kilovolt overhead line bays will connect to the Koh Kong substation, strengthening the reliability of Cambodia's power grid.
- ◆ Pestech was awarded the USD 2 million contract and faced site constraints amid a tight timeline and budget.
- ◆ Bentley's integrated technology provided a collaborative digital solution to streamline workflows and overcome inefficiencies of conventional substation design methods.

ROI

- ◆ OpenBuildings and OpenUtilities saved Pestech 50% in design time, while using 3D models for clash detection reduced design changes by 60%.
- ◆ Automating material quantity extraction and construction deliverables saved costs while reducing wastage and environmental impact.
- ◆ Bentley's intelligent technology solution improves the entire substation lifecycle, driving smart digital practices in Cambodia's utility industry.

Image courtesy of Pestech International Berhad.

“Bentley is by far the only integrated software product for intelligent electrical and physical substation design in a unified environment that can meet Pestech’s requirements.”

– Muhammad Afiq Rosli, Design Engineer, Pestech International Berhad



OpenUtilities for primary design of the overhead line bays, incorporating all civil and electrical elements into a unified 3D model. These elements included equipment and buildings, addressing the entire substation lifecycle. Integrating Bentley Raceway and Cable Management, the team designed the cable layout and imported that into the 3D substation model where they performed clash detection to identify and resolve design issues prior to construction. The connected digital solution established a collaborative modeling environment where ProjectWise was used to manage, share, and store design and construction data. “Bentley’s [solution] integrates the design environment and cross-references equipment layouts to electrical schematics to ensure the design is quickly, reliably, and accurately coordinated across disciplines,” said Rosli.

Upon completion of the 3D design model, Pestech provided an intelligent iModel to stakeholders and the client, enabling them to digitally walk through all components of the virtual model and check all interfacing elements. Using LumenRT, Pestech produced an animated rendering of the whole substation, providing visual insight and better understanding into the entire design. Using Bentley applications to digitalize workflows and deliverables improved design quality, helped increase client satisfaction, and will facilitate more efficient construction processes.

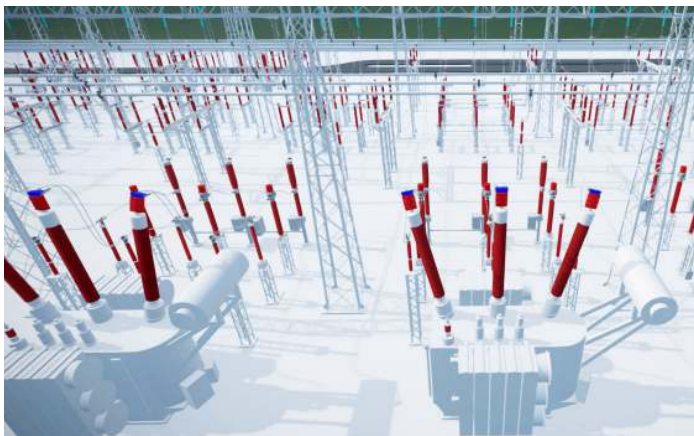
DRIVING SMART SOLUTIONS IN THE UTILITY SECTOR

Using Bentley applications, Pestech digitalized workflow processes and established a connected data environment, saving 50% in design time. Integrating their database of intelligent parts and automating substation deliverables using the 3D model contributed to the time savings

during design and reduced time and cost of producing and updating construction drawings and reports. They could automatically extract materials and construction deliverables directly from the 3D model, avoiding manual errors, minimizing wastage and environmental impact, and increasing design quality.

In addition, Bentley’s integrated technology solution consolidated the design environment, eliminating the need for multiple separate software applications and facilitating greater cross-discipline collaboration that reduced design and construction resource hours, lowering costs. Having a more accurate design with fewer errors, construction plans could proceed more efficiently. “Using the 3D substation models to detect clashes and interferences reduced the number of revisions required to arrive at final plans by 60%,” said Rosli.

By providing digital deliverables in the form of an iModel, Pestech eliminated delivery of scattered documentation, enabling the client to review the entire design in one system. The 3D model also provides an intelligent means for managing equipment maintenance and lifecycle operations for a more reliable, sustainable power supply network. With smart technology, utilities can keep pace with refurbishment requirements and reduce regulatory compliance risks, driving intelligent digital solutions in the utility sector. “Bentley’s utilities solution addresses the entire lifecycle of the utility. From 3D substation layout, cable wiring and management, and transmission corridor visualization, to distribution design and estimation, Bentley has the solution to design, build, and operate the utility of the future,” said Rosli.



Pestech was tasked with delivering two 230-kilovolt transmission bays to provide reliable power to 11 villages in rural Koh Kong, Cambodia. Image courtesy of Pestech International Berhad.



OpenUtilities and OpenBuildings digitalized workflows to save 50% in design time, while working in a digitally connected environment reduced design changes by 60%. Image courtesy of Pestech International Berhad.