

Bentley[®]
Advancing Infrastructure

Project Summary

Organization

Pestech International Berhad

Solution

Reality Modeling
Utilities Transmission and Distribution

Location

Banting, Malaysia

Project Objectives

- Extend 2-by-500 kilovolt-diameter substations at Olak Lempit in Banting from a 500-kilovolt substation to meet increased demand for power.
- Implement a 3D modeling solution to replace traditional CAD-centric design processes.

Products Used

OpenBuildings™ Designer, Bentley Raceway and Cable Management, Bentley Substation, ContextCapture, LumenRT, Navigator, ProjectWise®, Promis.e®

Fast Facts

- Pestech International was awarded an RM 79.5 million power system installation contract to upgrade the Olak Lempit substation in Banting.
- The team created an intelligent primary and secondary equipment library using Bentley Substation as the main design application.
- 3D models were constructed with multiple levels to visualize the substation and detect and resolve clashes using Navigator.

ROI

- The project team created construction drawings in one day with Bentley Substation, compared to 10 days using traditional methods.
- Accurate measurements of cables and electrical components reduced waste by 10 to 20 percent.
- Working in a comprehensive modeling environment using Bentley's automated and interoperable software saved an estimated MYR 200,000.



Pestech International Improves Design Time by 50% and Saves MYR 200,000 on Substation Expansion

Substation and Transmission Line EPC Contractor Leverages Bentley Substation for Project Coordination and Collaboration

Boosting Power to an Underserved Area

The power transmission and products business segment of Pestech International Berhad specializes in the manufacture and installation of high-voltage substations, transmission lines, underground cables, and equipment for utility companies in Asia. The organization leverages its broad experience in this field to successfully deliver projects on time and under budget. Pestech International focuses on emerging and developing countries that aim to advance their commitment to deliver reliable power and electric services to their citizens. The company provides power and transmission services within its home base of Malaysia as well as 20 other countries, including Cambodia, Papua New Guinea, and the Philippines.

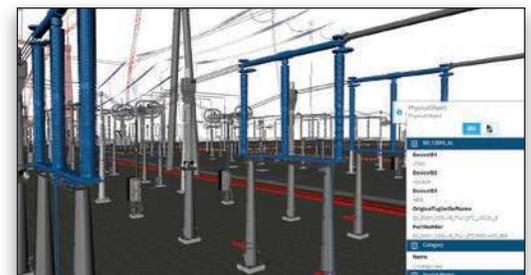
In 2017, Malaysia's largest utility company Tenaga Nasional Berhad (TNB) awarded Pestech International an RM 79.5 million power system installation contract to expand 2-by-500 kilovolt-diameter substations at Olak Lempit in Banting from a 500-kilovolt substation to provide power to the rapidly growing area. The project consists of supplying, erecting, and commissioning 2-by-1,050 MVA autotransformers, 500-kilovolt switchgears, 275-kilovolt switchgears, and ancillary equipment with associated civil works for the main Olak Lempit intake substation. The substation is strategically located 30 minutes from Malaysia's largest international airport and 45 minutes from Klang, the country's busiest shipping port. The site is a former palm oil plantation that is now an industrial zone with various plants and manufacturing facilities.

Traditional CAD-centric Design Slows Production

Among the challenges the project team faced was accessing the site without disrupting neighboring villages and plantations. The team also had to coordinate with another main contractor to deliver a separate section to the substation bays, and they had to utilize existing cable trays, ladders, and underground trenches laid by the other contractor from the existing control building. Working within a tight timeline and with a limited budget, Pestech International needed

to coordinate its labor resources with the other projects on which the organization was simultaneously working. Lastly, because TNB expected a high-quality design, Pestech International needed to deviate from a traditional CAD-centric design and implement a 3D modeling environment.

Because CAD-centric design processes focus on delivering standard design drawings through independent drafting efforts, such as single-line, physical layout, schematics, panel layout, and wiring diagrams, the drawings are frequently drafted by separate departments using different applications. CAD-centric design typically slows the design progress and prevents collaboration, which results in countless hours spent manually translating drawings for consistency, finding errors, managing changes across multiple drawings, and creating reports like bills of material and cable schedules. Moreover, this approach leaves corporate best-practice standards in the hands of the designer, which often results in inconsistency and poor quality across drawings and projects.



Bentley's automated and interoperable solutions enabled greater project team collaboration, faster project delivery, lower costs, and quicker approvals.

Reality Modeling Helps Avoid Clashes and Change Orders

To overcome these challenges and maintain the project schedule, Pestech International deployed Bentley's 3D modeling solutions, comprising OpenBuildings Designer, Bentley Substation, Bentley Raceway and Cable Management, ContextCapture, and LumenRT. Using Bentley Substation as the main design application, the team created an intelligent standard primary and secondary equipment library,

“Bentley solutions were implemented throughout this project, with Bentley Substation used for primary and secondary design and Bentley Raceway and Cable Management for cable routing design. Using symbol libraries and report templates, we were able to easily produce design drawings in 2D and 3D and automatically generate the reports.”

*– Sean Lee, Assistant Manager,
Pestech International*

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containing symbols, macros, titles blocks, device families, and manufacturer information. The contents of this library are used to generate reports and collaborate with other project team members. At the end of the design process, an iModel was published that allowed the team to detect and resolve clashes and view equipment information.

What helped the team avoid clashes and change orders from the outset was creating a 3D reality mesh of the site. “We took videos of the existing site and transferred them into photos. We then used ContextCapture to create a to-scale 3D intelligent model,” said Sean Lee, assistant manager at Pestech International. The 3D model was constructed with multiple levels to visualize the substation and detect and resolve clashes using Navigator. Bentley Substation’s lightning protection functionality was simulated on the model to check the coverage of the design and positioning of the lightning mast. Using this technique helps protect the substation from lightning damages. Incidentally, the model showed the multidiscipline team where the cable trays, conductors, and bus bars are placed and connected to the equipment.

Innovative Technology Increases Design Speed

The site includes a control building that houses the control panels within the SCADA system. Pestech International used OpenBuildings Designer to design the control building in a much more efficient and faster time than using traditional methods. For example, doors and staircases were easy to

place in the 3D model. With Bentley Raceway and Cable Management, team members could visualize the actual physical site and the cable ladders, trays, underground trenches, and cabling routes. The team had the ability to automatically generate a report with information of the source and target devices by using Promis.e to design the electrical schematics provided. The automatic routing function within the application calculates and optimizes the lengths and route of the cables, providing accurate measurements that helped save construction material costs.

Pestech International was able to maximize design automation using Bentley Substation to dramatically reduce manual drafting, errors, and rework, creating designs 50 percent faster. The significant increase in productivity allowed the team to complete the designs with the same amount of resources. Another benefit to implementing Bentley software is its interoperability with other applications, which avoids purchasing other software applications, reducing overhead for licensing, training, deployment, and maintenance. The upshot is greater project team collaboration, faster project delivery, lower costs, and quicker approvals by TNB.

Additionally, the software helps detect clashes earlier in the process, which allows construction to proceed more efficiently and with fewer change orders. Working in an open modeling environment using Bentley’s automated and interoperable software enabled the team to save an estimated MYR 200,000.