HYDROCARBON PROCESSING®

Innovations in process and power generation: The Bentley finalists

At the 2022 Year in Infrastructure Conference and Going Digital Awards, Bentley Systems brought finalists from around the world to present their innovations in various forms of infrastructure. The finalists in the process and power generation category were OQ Upstream, Sarawak Energy Berhad and Shell Projects and Technologies. Each company presented its progression with digital technologies within the power generation sector.

OQ UPSTREAM

OQ Upstream is a global strategic management company based in Oman and was nominated based on its technical services in upstream. The company operates in 17 countries, with its fuels and chemicals sold in over 80 countries. OQ Upstream also provides downstream services, including jet fuel, diesel, polyethylene, ammonia and polypropylene, as well as green molecules such as green hydrogen and biofuels. However, this presentation focuses on its upstream services.

Asset performance optimization. OQ Upstream manages more than 110,000 maintainable physical assets, more than 44 plants and stations and over 4,300 km of pipeline, enabled by Bentley APM AssetWise. Asset performance optimization is one of the most significant challenges faced by the oil and gas industry. Shutdowns lead to loss of production, repair costs, environmental impacts and flaring, as well as safety risks.

"Failure mode identification is another challenge in this case," said Khulood Al Maawali, Asset Performance Engineer, OQ Upstream. "How can we eliminate our failures if we don't understand them? This is the key; we need to understand our asset failures mode, so that we can design it in the right way."

OQ Upstream utilized APM AseetWise in four main categories: reliability management, operation and maintenance, integrity and chemistry and lab. These applications have all been digitalized with APM AssetWise. One of the notable projects specified by the company was a project that began in 2019 using Excel. After being moved to APM AssetWise, the company's maintenance has been optimized, saving 14.8% of maintenance costs, its uptime is now at 98%, and zero tier one and tier two process safety incidents have been recorded for the past year. The company also made strides in environmental emissions, reporting a reduction of flaring by 82.6% in the last 5 yr.

SARAWAK ENERGY BERHAD

The second finalist was Sarawak Energy Berhad for the company's developments in its hydroelectric plant. Sarawak is a vertically integrated energy development and power utility company, covering all aspects of power generation from transmission to export. In addition, it is Malaysia's largest renewable energy developer.

Bakun hydroelectric plant. A pilot project on brownfield 3D modeling was conducted at the Bakun hydroelectric plant. Sarawak used 3D modeling for engineering documentation and drone photogrammetry. The company used asset tagging and integration with intelligent piping, instrumentation diagrams and enterprise applications. All this engineering data and more are accessible on the single digital twin visualization platform.

Several challenges were presented during this project, such as the unavailability of digital copies, outdated built drawings, accessing specific areas of the generator-turbine system without downtime and cybersecurity.

By incorporating Bentley's digital twin, the key achievements by Sarawak were productive contextual communication for operation and maintenance, access to data on one visualization platform, enabling learning with immersivity, reduced travel and implementation of remote operations.

SHELL PROJECTS AND TECHNOLOGIES

The third finalist was Shell Projects and Technologies for its digital moving assembly line. Shell Projects and Technologies develop large infrastructure projects in deepwater. These projects typically take 5 yr–10 yr, with thousands of people involved and typically cost about $2 B–$5 B. A digital twin has the potential to increase efficiency during these projects.

"At the beginning of projects, when groups are getting together to brainstorm ideas and discuss concepts, the project delivery platform allows for this collaboration to happen in a very visual way, where everybody sees the ideas and is able to work through them," said Vikas Jhingran, Project Manager, Shell Projects and Technologies. "Once a concept is selected, the projects delivery platform allows for collaboration to happen with the contractor, allowing for the FEED process to go through and the invitation to tender whereby the scope is awarded to a contractor for detailed design and execution."

Planning infrastructure. The three key aspects of this project are an integrated visual environment, a data pipeline and workflow orchestration. One of the key tools used in this project was FieldTwin by FutureOn, a partner company with Bentley. The technology enables the modeling of subsea concepts by dragging and dropping, ensuring that the sea infrastructure is appropriately placed.

Maps of existing infrastructure can also be brought in to ensure that the area does not become too congested. FieldTwin was then put into Bentley's PlantSight digital twin, which enables all data to be clickable and accessible by all engineers. PlantSight also enables engineers to see every piece of equipment being worked on at any moment. FieldTwin and PlantSight are then connected to Bentley's Synchro, allowing construction planning.

GOING DIGITAL AWARD

In a ceremony that took place in London, UK, Bentley announced the winner of the Going Digital Award for process and power generation. The award went to OQ Upstream for using APM AssetWise to decrease downtime and maintenance costs at the company's Oman plant. **HP**

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