



APPLICATION SOLUTIONS

Cheal oil field leverages open control platform from Rockwell Automation

Unified control approach keeps oil flowing and brings flexibility to expand operations.

A mile beneath the hills of western New Zealand lies a vast reserve of solid, waxy oil. Unlike the familiar smooth, dark liquid that gushes from the ground, this oil can only be extracted after it's heated and softened. Austral Pacific Energy Ltd owns this reserve, called the Cheal oil field, and wanted to build a production station that would accelerate one of the industry's most important metrics: "time to first oil." This begins with the initial decision to drill and culminates when the station begins pumping crude oil.

Beyond speed, Austral Pacific wanted sophisticated, integrated technology to manage its fast-growing operation. It needed an automated system that could control and monitor everything from oil temperature to equipment performance, while capturing the data for complying with rigid regulatory requirements.

To equip the Cheal oil field with a system reliable enough to help reduce downtime and flexible enough to easily expand, the contractor chose a solution based on Rockwell Automation products and services.

"The complex nature of Cheal's production and information needs demanded a system that could maximize uptime," said Alan Hooker, an instrument and electrical engineer with Independent Technology Ltd. (ITL), the engineering, procurement and construction (EPC) contractor hired to design and build the station.

"The site can only handle around five hours of downtime before it begins to lose heat, and if all heat is lost, it takes up to two weeks to heat the wells up to the desired temperature," Hooker explained.

Heat begins the complex oil extraction and production process at Cheal. Two centrifugal pumps powered by 350-kilowatt motors inject 115 degrees Celsius water a mile beneath the surface, softening the oil. To prevent the oil from re-solidifying as it ascends, continuous heat is applied. The fluid exits the site's four wells and then travels to a separator drum. There, the oil, water and natural gas divide as their densities dictate. A pump forces the separated water back down the wells and a pipeline exports the separated gas to another production station for further processing.



A network of pipes and pumps extracts oil from nearly a mile beneath the surface and carries it through the production process.

Challenge

Austral Pacific was looking for "a system with DCS functionality, as well as the overall look and feel of a DCS system," said Cheal's systems integrator, Guy Heaysman, managing director of Engineering Control Limited (ECL). As traditional DCS systems can be complicated and inflexible to integrate with other equipment and systems, they looked for a less costly system that would provide greater operational flexibility and a global view of their remote sites. After assessing options, "we

selected a control system based on the Rockwell Automation Integrated Architecture™.”

Solutions

The Rockwell Automation Integrated Architecture system uses sophisticated control, networking, information and visualization technologies to consolidate Cheal’s full range of needs. As part of the Integrated Architecture, Cheal selected Allen-Bradley® ControlLogix® L62 Programmable Automation Controllers (PACs).

The ControlLogix PAC provides all of the capabilities of a traditional DCS system, but is multi-disciplined, meaning that it can manage Cheal’s thousands of discrete, process and safety I/O points using a single platform.

“Using ControlLogix controllers helps lower the cost of ownership, provides better flexibility and offers more scalability than a traditional DCS system,” Hooker said. “The open architecture of the controllers, software and other automation equipment from Rockwell Automation also helps give Cheal the versatility to integrate field instrumentation and equipment from other vendors.”

Using the RSLogix™ 5000 configuration tool, ECL leveraged a library of built-in process control instructions. Also, user-defined add-on instructions helped reduce upfront engineering and design time for both ITL and ECL.

“In addition to being simple to configure, the software’s neatly laid-out programming code makes it easier for users to diagnose problems and make changes down the road,” Heaysman explained. “The system uses tag-based memory, which means that all the physical addresses are in real-world terms like ‘Well 3 sensor’ that can be understood by people throughout the enterprise.”

The FactoryTalk integrated production and performance suite from Rockwell Automation also sits at the core of Cheal’s information handling capabilities. The software, which is tightly integrated with the PAC controllers, provides performance, visibility and data management capabilities to operators at the Cheal production station.

Equipped with FactoryTalk View Site Edition (SE) software, Cheal’s industrial computers provide a complete view of the Cheal oil field. Designed for supervisory-level monitoring, its scalable architecture supports distributed-server/multi-user applications. The software gives pager-toting field operators remote access to the control system, equipment and instrumentation.

To supply operators and geologists with the information they need to make business decisions and to produce required regulatory reports, FactoryTalk Transaction Manager stores data generated by the controller and converts it to a spreadsheet. “Operators gain production information about the site’s pumps, motors, flow rate, vibrations, pressures and temperatures so they can manage and trend the information as well as monitor performance,” Hooker said. “Access to this data is crucial to maintaining reliability.”

If an emergency situation arises, controllers at the Cheal oil field can automatically send out an alarm to pagers in user-defined situations. These alarm capabilities are inherent in the FactoryTalk Services Platform, which tracks alarm states and stores timestamp information.

Tying the Rockwell Automation system to Cheal’s KEPServerEX server technology helps field instrumentation send information back to the ControlLogix controllers. These field devices measure flow, temperature and other process metrics, then send data to the controller through a 4-20 mA connection.

To ease on-site system monitoring, an EtherNet/IP network transfers information from five remote-site

pipelines to an Allen-Bradley PanelView™ human-machine interface. Cheal's three networks support a common language, called the Common Industrial Protocol (CIP). This commonality seamlessly connects production devices to the rest of the enterprise.

Besides a full suite of Rockwell Automation products, the Cheal oil field receives several services to support its intricate site. Rockwell Automation provides training to Cheal operators; and Industrial Automation Limited, the distributor, provides timely supply and after-sales service of products. With the TechConnectSM support agreement from Rockwell Automation, Cheal has unlimited, real-time access to a global network of SCP-certified (Service Capability and Performance) technical support centers and technical resources available 24 hours a day, seven days a week.



An oil tanker pulls up to the Cheal production station to transport the oil to a nearby port.

Results

Despite the Cheal oil field's complex production process, it achieved quick time to first oil - production began 10 months after the company signed on with Rockwell Automation. Typically, a production site of this size can take up to 12 months. "The integrated control system helped accelerate setup and streamline the intensive commissioning process," Heaysman said.

Configuring the system to Cheal's specifications went just as smoothly. With Integrated Architecture, Austral Pacific simplified the configuration process by simultaneously addressing safety, process and control disciplines. Also, tight integration of the HMI and controllers helped reduce programming errors, as changes only had to be done once to be reflected throughout the enterprise.

Now that oil production is under way, the system requires only one or two on-site operators. The reliable production station helped reduce downtime, a critical outcome for a process dependent on keeping the site heated at all times.

Local support from its distributor and systems integrator, coupled with the TechConnect service agreement with Rockwell Automation, simplifies technical support management, helps reduce downtime and improves productivity of the complex operation.

Austral Pacific achieved a lower cost of ownership than a traditional DCS system could offer because of the seamless interaction between controllers, engineering and visualization tools, networking capabilities and field instrumentation. Austral Pacific immediately benefited from its system's inherent flexibility when geologists discovered a nearby oil field shortly after the control system was programmed. Due to the scalability of Integrated Architecture, Austral Pacific quickly incorporated the Cheal B site into its existing control system.

"As Cheal expands its operations by developing new oil fields, we plan on continuing our use of Rockwell Automation products and services," Hooker said. "Based on the success we've had in terms of reliability, flexibility and support, the benefits are undeniable."

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