Success Story

Control Performance Optimizer Provides BHP Billiton's Queensland Nickel Total Boiler Solution

"Honeywell's efforts on the control systems upgrades at the Yabulu Refinery […] were great. The support throughout the project and beyond has been second-to-none."

Marc Reid, QNI Project Manager

Challenge

Ongoing expansion of an existing plant and aging infrastructure prompted BHP Billiton's Queensland Nickel to seek out a new control system to operate their boilers in a safe, reliable and efficient manner, at today's standards.

Solution

Honeywell was selected to address the challenge of designing and installing a complete control strategy that emphasized both safety and performance. Honeywell was chosen due to its independence, recognized experience in control system design and implementation and extensive experience with boilers and power plants.

Advantage

- Increased safety and improved regulatory compliance
- Increased performance and efficiency
- Integrated control system able to seamlessly mesh with ongoing project
- Enhanced system performance diagnostics
- Plant simulation for operator training and maintaining competency

Increasing Demand on Aging Infrastructure

Queensland Nickel (QNI) required a control system to operate their boilers in a safe, reliable, and efficient manner. Using state-of-the-art DCS technology for the boiler control and Triple Modular Redundant (TMR) safety controllers for the burner management system, Honeywell worked with in house expertise to supply a 'turn-key' control system solution across all boilers.

Power generation and process steam supply at Queensland Nickel's Yubulu Refinery includes four boilers, one coal-fired (boiler 4), two using heavy fuel oil (boilers 1 and 2) and a third gas-fired unit using coalseam methane. All existing site power and steam requirements can be met by boiler 4 with boilers 1 and 2 operating as backup in the event of losing boiler 4 to a forced or scheduled outage.

Once the ongoing Yabulu Expansion Project is complete however, site power and steam requirements will exceed the capacity of boiler 4 alone and boiler 3 will be required as a duty boiler. When boiler 4 began showing signs it would soon require a major overhaul, it became apparent that the remaining boilers would be unable to operate for an extended period of time without undergoing a similarly significant overhaul.

As part of this overhaul, QNI realized there existed an opportunity to upgrade the control and monitoring facilities to today's standards.

Some of the challenges faced in the scope of the project were:

- QNI's aging plant
- Legacy DCS
- No programmable safety systems Numerous PLC makes and Wonderware SCADA
- Problems with alarms and connectivity from DCS/SCADA to modern historians and analysis tools
- A need to train operators on a simulation of the process

The control strategy would not only control boiler 1, which was to be overhauled first, but would include the other three boilers as they were upgraded. The end product required:

- the supply of control-related hardware and software
- installation of all electrical and instrumentation systems
- training of operators and other staff in the function and operation of the control system

Offline Simulation Allows Commissioning of System Earlier

Drawing upon internal boiler process control expertise, Honeywell was able to design a control strategy, utilizing core Powered by Matrikon products such as Control Performance Optimizer, Control Performance Monitor and Alarm Manager, enabling the majority of operations to be controlled automatically and allowing one operator to control and monitor all four boilers once they were upgraded. Using Control Performance Optimizer to simulate the operation of the boiler, Honeywell was able to factory test the correct operation of the boiler control software and to pre-tune the control loops, thereby minimizing the time needed to commission the final system.

Control Performance Optimizer, Control Performance Monitor and Alarm Manager are Powered by Matrikon, which represents vendor neutrality. These products work with third-party control systems and applications.

This process saved up to four weeks commissioning time as compared with traditional final acceptance testing methods. The installation of Control Performance Monitor offers QNI the ability to monitor the health of plant process control loops online and in real time. In this application, Control Performance Monitor detects upcoming failures of both instrument transmitters and control valves, affording QNI improved overall operability and stability of process units along with reduced maintenance costs.

Alarm Manager, an enterprise alarm and event management product that helps operators stay on top of the production process, is used to more effectively control alarm management at QNI. By collecting and storing alarms and events, identifying and eliminating bad actors, and by providing long-term monitoring to sustain results, Alarm Manager eliminates QNI's nuisance alarms and allows operators to quickly identify and respond to process issues before they turn into critical problems.

The use of the latest state-of-the-art DCS system together with triple redundant safety PLCs made it possible to implement a control system that was fully integrated, allowed future expansion and integration with the planned site-wide control system upgrade and the Yubulu expansion project. It also provided enhanced diagnostics and fault-finding capabilities, improved process performance and plant reliability and complied with Australian boiler codes.

Room to Grow

QNI have now upgraded boilers 1, 2 and 4 with a reliable DCS-based control system that allows it to perform at peak efficiency without compromising the safety of its employees, in turn allowing them to move on to upgrading their remaining boilers with confidence. By using a controller-based system, QNI now have the ability to build a modular system, which is relatively easy to troubleshoot or enhance at a later date.

Once the boilers have all been refurbished QNI may look at increasing the power and process steam output of the power station to enable greater output from its Yabulu facility.

About QNI

Queensland Nickel (QNI), part of BHP Billiton's Stainless Steel Materials group, is involved in the exploration, processing and marketing of high quality nickel and cobalt. With an annual production of capacity of 30,000 tonnes of nickel and 2,000 tonnes of cobalt, QNI's Yabulu Refinery near Townsville employs around 700 people. The size of this refinery is such that it justifies its own power generation facility. The refinery exports its products to Asia, USA, Europe and South Africa and generates around AUD$450 million in export earnings annually.

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'Powered by Matrikon' symbolizes that this product/solution is system and application independent.

For more information:

For more information about Control Performance Optimizer, visit our website www.honeywell.com/ps or contact your Honeywell account manager.
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