

Rio Tinto Alcan Gove Improves Operator Training and Startup Time with UniSim



“Honeywell’s UniSim enabled us to train our operators in advance so they could practice new skills without adversely affecting the plant operations and meet our startup needs.”

Manoj Pandya, Manager, Alumina Projects, Rio Tinto Alcan

Benefits

Rio Tinto Alcan (RTA) Gove was embarking on a \$3 billion expansion of its alumina refinery in Australia’s Northern Territory. The expansion was expected to nearly double alumina production, and was predicted to have a 10 percent improvement in recovery of alumina from bauxite and a 25 percent reduction in residue through improved digestion technology. RTA Gove had not previously used this digestion technology which represented a significant operational risk. In order to mitigate some of the risk, RTA Gove decided to develop an operator training simulator of the digestion process.

RTA Gove turned to Honeywell’s UniSim® simulation technology for testing and training. A UniSim simulator was constructed and connected to RTA Gove’s distributed control system (DCS) to mitigate the risk by training the operators and testing the control system configuration prior to plant commissioning.

Benefits RTA Gove has achieved through the use of UniSim include:

- Operators were trained in advance without adversely affecting plant operations
- Simulator allowed for comprehensive code testing before transferring data to the site
- Operating procedures were created and validated



RTA Gove improved operator training with Honeywell’s UniSim simulation technology.

Background

The Rio Tinto Alcan Gove bauxite mine and alumina refinery is located at Nhulunbuy on the Gove Peninsula in the east Arnhem Land region of Australia’s Northern Territory. The Gove refinery is 100 percent owned by Rio Tinto, a global leader in aluminum and packaging and one of the world’s largest alumina producers.

The RTA Gove alumina refinery has just completed a US \$3 billion expansion, which when fully commissioned will increase alumina production from 2 million to 3.8 million tonnes per annum. The expansion represents a significant investment, delivering long-term security and economic benefits to the Gove region, and allowing the refinery to operate independently of its local bauxite reserves.

Challenge

As part of RTA Gove's expansion, the company chose a new technology to improve plant capacity called double digestion. Double digestion uses both low temperature digestion for removal of trihydrate alumina followed by high temperature digestion for the monohydrate alumina. Few double digestion circuits are in use today so RTA Gove could not learn from other refineries' experience. Without a simulator, it would be difficult to effectively train operations personnel without adversely affecting plant operations.

Another hurdle RTA Gove faced was that the control system architecture involved interfacing between multiple DCS platforms, presenting a strong probability for a mismatch of data.

Solution

RTA Gove chose UniSim to maximise the effectiveness of its new double digestion technology by enabling many months of operator training prior to plant startup. UniSim Operations is a direct connect, full replica, dynamic process simulator. It is an integrated collection of computer and control system hardware and software, which allows a high fidelity model of the process to run in real time and appear from the DCS console as though a real plant is being controlled.

UniSim software contains a library of modules that mathematically represent the behavior of process equipment, logic and control components under dynamic conditions. The modules include heat and material balances, operating equations, thermodynamics and physical property calculations. These modules are used as building blocks to create a realistic representation of a specific process, area or plant.

More Information

For more information on UniSim, visit www.honeywell.com/ps or contact your Honeywell account manager.

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At RTA Gove, the digestion process model includes 135 tank modules, 85 pumps, 1037 control valves and approximately 158 other pieces of unit process equipment such as heat exchangers. There are 386 field operated devices, mainly manually operated valves and 7370 control points are simulated. Training features include 1242 malfunctions. The process model takes about 0.2 cpu seconds to run on a personal computer and the model runs every two seconds, which is more than sufficient to realistically simulate the process dynamics.

In order to enable operator training in advance of plant commissioning, the control system had to be developed six months earlier than would have been necessary without the simulator. While this placed an additional burden on the control system engineers, the system was able to be tested and commissioned on the simulator well in advance of plant commissioning. This resulted in more than 240 suggestions ranging from "nice to haves" to critical needs. This meant that the control system was fully tested and operational prior to commissioning allowing the commissioning engineers to focus on the process and equipment.

"One of the biggest benefits we've received from UniSim is improved operator effectiveness. Like most operating alumina refineries, our equipment is operated continuously and many operators are not well practiced in running under startup, shutdown or emergency conditions. Similarly, in new installations, operators may have even less skills in managing the process and the knowledge of the equipment limits, even under normal operating conditions. UniSim enabled us to train our operators in advance so they could practice new skills without adversely affecting the plant," said Manoj Pandya, Manager, Alumina Projects, Rio Tinto Alcan.

The RTA Gove project was delivered to enable many months of operator training prior to plant startup. This resulted in the operators being knowledgeable on the process and the control system, and how to control the process. Thus the operators became a valuable part of the commissioning team and were able to retain the lessons learned from commissioning.

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