Rinehart's Roy Hill mine digs deep into the data

IoT, data analytics, drones, automation and robots set to work out on the Pilbara

George Nott (CIO)
08 February, 2017 17:31

Relatively speaking, the neighbourhood around the Roy Hill mine in the Pilbara region of Western Australia is getting crowded.

Walk 90 kilometres in a straight line from Roy Hill, which you'd have to be very brave to attempt given the conditions here, and you'll reach BHP's Yandi mine.

Next door, just an hour's drive through the vast emptiness of the outback, is the Christmas Creek mine, operated by Fortescue Metals Group. Continue for 40 kilometres more and you'll reach another FMG mine, Cloudbreak.

Despite a fall in the global price of iron ore in recent years (which are beginning to rally again), there are nevertheless dollars in the dirt. In this competitive, red-earthed landscape, the major players are all

continuously striving to optimise their operations in every way they can. And it is technology – from dusty robots to drones and, in particular, data analytics – that is helping them to do so.

Ramp up

Majority owned by Gina Rinehart's Hancock Prospecting company, Roy Hill is the most recent iron ore mine to open in the region, at a cost of $10 billion. Over four years contractors built, from scratch, the mine, a 344 kilometre railway line, a process plant and a two berth port.

More than 25,000 construction workers were involved in building it, sharing 38 million hours of labour.

The first load of processed ore was loaded onto a ship in December 2015. The build complete, the handover took place last February.

Rebbecca Kerr joined the company in 2013, and was one of the first purely operation employees. As general manager technology, her priority now is to help the business quickly “ramp up” to its target 55 million tonnes per annum peak.

And there’s also Gina Rinehart’s missive from the top that Roy Hill’s main goal is to be cost competitive, achieved by “driving efficiencies and leading industry best practice”.

As Kerr explains: “We’re taking it challenge by challenge”.

Drill down

As the mine dials up its output, Kerr and her team are increasingly seeking to identify and solve and pinch points through data analytics. Data is drawn from every point of the operation, from processing plant to port. Bringing it together to make sense of it all is difficult.

Roy Hill recently commissioned Ajilon for a business analytics platform, which runs on Microsoft Azure. Using Microsoft tools, the platform ingests large volumes of data in real-time, enabling the mine’s data scientists and engineers to soon self-serve visualisation tools, develop predictive algorithms, and combine disparate information sources.

To create the platform, the first of its kind in Australia, partner Ajilon had a direct line to the development team at Microsoft's Redmond research campus.

“You need to be able to explore and understand the data and in particular how the data relates to itself,” explains Andrew Hall, Roy Hill's manager technology planning and architecture. “We don’t want to be doing analysis that takes days to run. We want to be able to run multiple scenarios in a time effective way.”

Hall says that Roy Hill wanted to go beyond using Azure as a static analysis environment.

“If we want to say change driver attitudes or we want to optimise performance, we need to do it in real time. You need to be providing the feedback at the appropriate times so appropriate action can be taken,” he says.

In some cases that may be at the start of a worker’s shift, and in others that might mean immediate corrective action.

While the team is still “on that journey” and Azure is “not quite there yet” Hall is confident the platform “will continue to push the boundaries of functional capability”.

Test bed

The mine has become something of a test bed for how far technology can be exploited to optimise operations. Analytics proof of concepts, in and out of Azure, are taking shape. IoT sensors run from pit to

port. A range of partners, including researchers from Curtin University, are pushing their capabilities to the limit.

Take the mine's giant pink trucks. Although not self-driving (the technology simply wasn't ready at the time of putting together the mine's business case Kerr says), they are being closely monitored and analysed.

"There no perfect way to drive, that's one of the things to understand. It's dependent on conditions, it depends on the payload in the truck, any number of different things," says Kerr.

To get closer to perfect, sensor and GPS data, combined with external data like weather reports are being analysed. Soon, reports – timely enough to be up to date for when each shift begins – will help Roy Hill better educate drivers on how their behaviour can change to reduce say tyre wear or fuel consumption.

Meanwhile, refuelling robots are being placed in the pit to save drivers from lining up at the bow line. Housed in a shipping container, the robot senses an approaching truck, removes the fuel cap and fills it at a rate of 1200 litres a minute – far higher than the maximum allowed when refuelling by a human operator.

A 20 strong team from across the business are taking part in the trial, testing its ability and durability ("it gets pretty dusty up there," adds Kerr).

The rail network too, will use sensor data and analysis to optimise the running of the network and predictive maintenance. Drones survey stockpiles and run environmental assessments, alerting operators to the wet spots after heavy rains. There are robots in the labs which test the ore. Drills and bulldozers are operated remotely from Roy Hill's offices in Perth.

Must do

Every efficiency gain counts out here on the Pilbara. The company calls itself "a margin-focused business". And a successful ramp-up is reliant on avoiding any pitfalls.

"We're always looking at different technologies, different styles, different arrangements to build our knowledge and capability up," adds Hall.

"We're taking full advantage of the newness of the infrastructure and the technology we've implemented. Technology along with the capability and attitude of our people strengthens the foundation for our future," says Kerr. "Innovation is a must do."