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Remote Control Centers (ROCs) for 2MOGI Integrated Industries

Rio Tinto was one of the early adopters of ROCs, introducing the world's first fully autonomous haul trucks at its Pilbara iron ore operations in 2008 followed by the launch of an automated hub in Perth, Western Australia, in June 2010, which controlled its rail systems, infrastructure facilities and port operations, 1,500 km away from site. In July 2013, BHP followed suit, opening an automated ROC in Perth for its seven Pilbara mines. Today, all the major players globally have introduced similar ROCs to their operations.

Australian Mining Giant Bhp'S Stride to Operate Mines Remotely: Are We Seeing Global Trend?

In its Perth-based Integrated Remote Operations Centre, or IROC, BHP gives its business a real-time picture of its iron ore network in Western Australia, and makes use of a range of tech. IROC is "at the frontier of digital operations and innovation".

Is it going to be the trend in the industry? The industry is a known laggard to innovation "I'm not sure — I think there is a lot happening and a lot that we aren't seeing because a lot is happening in remote locations", General Manager opines. IROC is state of the art, **enabling the business to control equipment from "pit to port".** This includes everything from drill control to the dispatch of trucks in a pit, train control and port control.

"How it all comes together is really through the technology that supports this asset, and this is the whole point, I guess, of the digital operations," the manager added. "**Our critical assets are actually systems — production systems, downtime management systems, telecommunication systems, networks, CCTV cameras, so that we can keep eyes on the ground at any point in time**."

These systems are integrated and highly reliable, she said, allowing BHP to keep its operations going 24/7, some 1,500 to 2,000 kilometers away from where physical assets were located. Joined-up thinking is crucial to the smooth running of things. "Despite being a digital operation, working in very close collaboration with our site stakeholders and the relationship with sites is at the forefront of everything we do," She said, adding that relevant parties have to stay connected when they make decisions. "**We have to make sure that our controllers here understand the impact of the decisions they make here on the ground over there, and conversely, we need to be aware of anything happening over there**".

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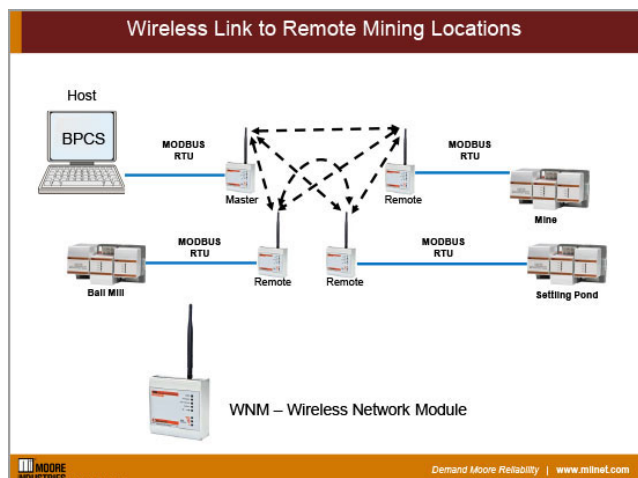
Remote mining control center (Garpenberg, Sweden).

Online 3D Digital Twin of the Mine

By using state-of-the-art 3D visualisation engines and proprietary algorithms, service and system developers integrate multiple operational **systems to create an online 3D digital twin of the mine**.

They not only boost performance but improves processes and practices, save money and create more situational awareness. **Such a solution allows you to take your smartphone out of your pocket and you can see what is happening and make decisions in real-time.**

Actual Data Gives Insights

The software monitors the mine in real-time, identifies the extraction areas, locates key equipment and reviews the surface extracted by the landing equipment every 15 minutes. Through an automated mine plan compliance feature, companies can monitor where they need to dig to comply with weekly and monthly plans. Such systems improve processes by visualising the drilling inventory and compliance to plan in real-time, assessing where extra effort may be required

to meet operational targets. Detailed information about the location, performance and status of loading units can also be retrieved. This includes access to the past 24 hours of performance, providing an understanding of where the hauling fleet is losing speed against planned performance through an updated heat map every two hours.

Boosts Collaboration

The software allows interdisciplinary teams across companies to discuss, decide and agree to actions, while together or remotely using the updated 3D digital twin of the mine. "The product boosts collaboration while working remotely, and with less travel required due to fewer non-essential personnel at the operation". The solution reduces the need for unnecessary visits to the

Online 3D digital twin of the mine.

mine site by mirroring what is happening hour-by-hour from a safe and remote platform, increasing safety measures and reaction times to issues.

The Remote System Operates Loaders 1,000 Kilometres Away

The Australian mining company, Barminco has announced that it successfully piloted an operations centre that allows it to remotely manipulate, from the comfort of an office, underground equipment used at mine sites around the world. The test took place at Barminco's head office in Perth and the machine being operated was **working at Independence Group's Nova nickel-copper-cobalt underground mine, located almost 1,000 kilometres away in Australia's Goldfields**.

"**The innovation was made more impressive given the remote operation occurred via the internet, instead of through a fibre-optic cable**, which is the method that mine owner-operators have historically used". Besides the support of Independence Group, the Barminco Remote Operating Centre, also known as BROC, was trialed

in collaboration with Swedish engineering company Sandvik, whose LH517 loader was being operated from afar.

"Whilst many mine sites have operators remotely operating equipment from the mine's surface, we are one of the first, if not the first service provider, to operate underground equipment on a client's site from a much greater distance," Barminco's general manager of technology and innovation, Darren Kwok, said in the media brief. **"Our future plan is to have a dedicated**

Barminco Remote Operating Centre. (Image courtesy of Barminco)

remote operating centre manned 24/7 where our team and our client's people can work collaboratively side by side to deliver a world-class mine-site".

The Challenges

Mining companies are admittedly still in the early stages of their digital transformation, continuously looking at ways to improve to deliver on objectives. Companies have implemented cloud-based systems that aggregate site data into a single data lake that can be accessed, analysed, and visualised for decision support, creating a 'room of screens'; other companies manage and actively control plant automation systems, fleet management systems, and remote-controlled machines

from the ROC. The most sophisticated companies manage all these functions on a larger geographic scale, covering the value chain from end to end, optimising post-processed ore logistics and port facilities used by multiple mine sites within a region, with regional parts and supply warehouses monitored across multiple assets for supply-chain optimization. The following changes are necessary as per McKinsey and Company:

- The importance for leaders to set clear expectations of bottom-line impacts from ROCs to measure value and the need for a new decision-making structure to allow ROCs to reach their full potential.

- A new mandate, a new way of working, and a new decision-making structure, the ROC staff will struggle to capture the frontline team's attention," the McKinsey and Company report stated. "And, although the ROC is implemented and functional, it never reaches full potential for value. Without a conscious focus on organisation, a ROC can be counterproductive, creating redundant organisational structures".

- Careful consideration must also be given to data and systems reliability, location of primary physical storage infrastructure, back-up systems and having a robust cybersecurity approach to protect ROCs from potential threats.

- These decisions can impact connectivity, bandwidth, and latency, each of which must be sufficient to enable the ROC to effectively control on-site operations in real-time: for example, adjustment of plant processing parameters or remote control of mobile equipment and process optimisation tools, such as machine-learning algorithms.

- With the right technology foundation, the ROC can function as the analytical centre of excellence, setting data standards, creating and updating analytical optimisation models, building analytics capability and driving partnerships to co-develop solutions aligned