Eliminate the Downtime

Traditionally, condition monitoring involves at least one technician walking around a mine site to perform a health check on the various pieces of equipment.

The time and legwork involved in capturing the machine data is significant and the technicians then still need to analyse the data, not to mention the travel costs and the inevitable risk exposures that come with a site visit, which may only happen once a quarter.

The age of COVID-19 now often means it is physically impossible for personnel to get to site, which means surveys are being missed. So what if the technicians and maintenance crew could constantly access real-time data at any time, from any location?

The Australian Mining Review spoke to GVS Reliability Products managing director Nathan Osborn and Waites technology product manager John Lawrence to discuss how the use of Waites wireless sensors is revolutionising condition-monitoring to eliminate downtime.

John said the mining industry was increasingly harnessing cutting-edge technology to monitor and manage assets, with the use of sensors gaining traction over the last five years.

He said GVS spent two years testing and researching various products before finally settling on the Waites Wireless Vibration and Temperature System.

"It was a long journey for us in evaluating dozens of systems out there and Waites is really the clear market leader in this space in terms of capabilities," he said.

"It is a topical technology and it's the way of the future for mining so it was important that we went with an established company. "The whole industry has been watching this space closely, especially in the last three years, and this system has all the bells and whistles and satisfies all the requirements."

Waites Wireless Sensor Technologies are a North American OEM founded in 2006 which designs and manufactures world class condition monitoring systems with more than 150,000 sensors now installed globally, saving clients about $100m a year annually.

How It Works
Machine diagnosis through vibration analysis is common but the Waites tri-axial sensor also measures temperature.

The system pre-emptively finds and resolves issues before they cause damage or catastrophic failures to prevent unexpected downtime, extends equipment life and revolutionises the way teams perform maintenance.

Sensors:
Waites sensors can be easily connected to any piece of equipment, even in the most hard- to-reach locations.

The sensors continuously gather full-spectrum vibration, temperature and more than a dozen other metrics. This data is securely relayed to the cloud via a mobile data connection.
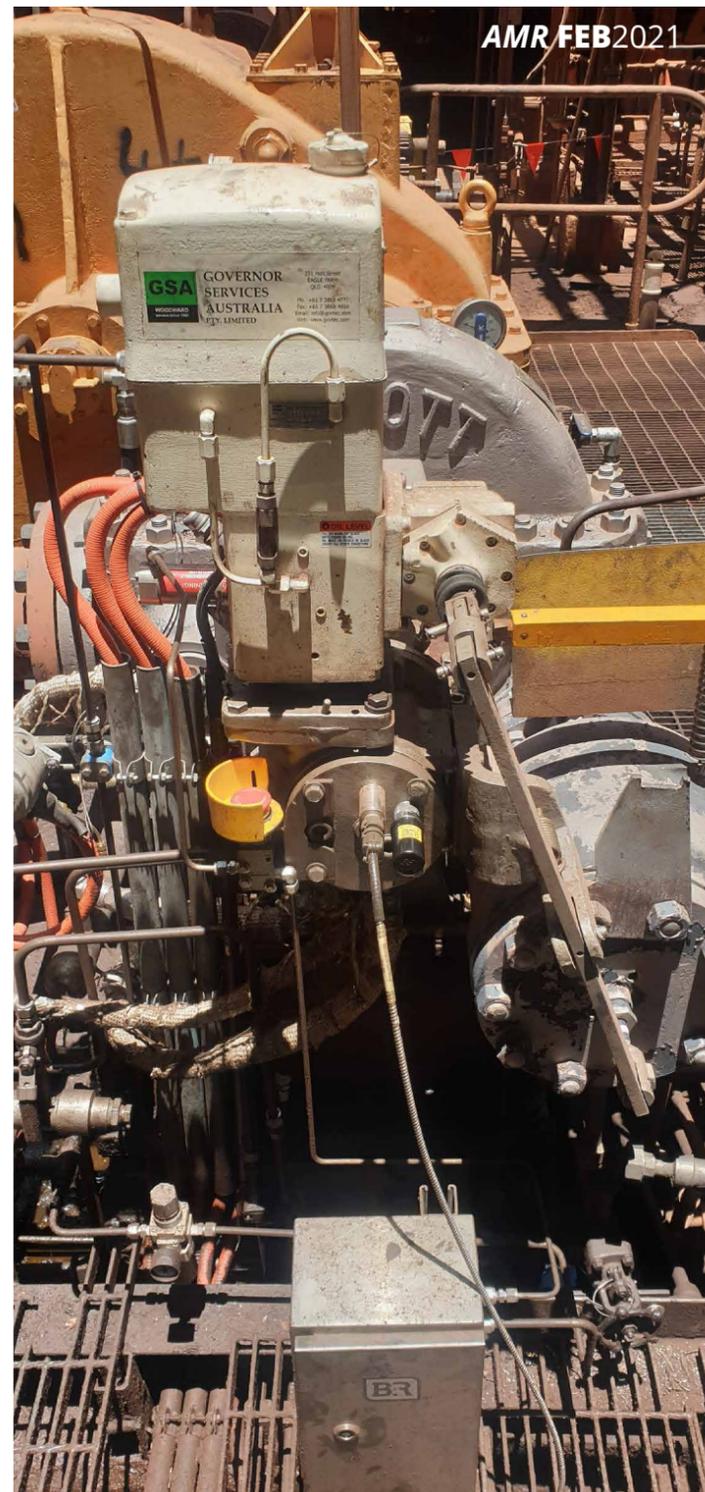
Mote:
The mote is a compact, full spectrum tri-axial and temperature sensor utilising the latest wireless technology. It includes a frequency range of up to 11.2kHz, an excellent dynamic range of 50g and a battery life of up to five and a half years.

Batteries are changed in situ using off-the-shelf CR123A lithium Ion batteries. Wireless communications are either via the wireless router or directly with the Gateway with a range of up to 600m line-of-site between each component.

Gateway:
The gateway manages the entire system. It wirelessly gathers data from the node and sensors and the uses a mobile phone data connection to securely pass that information to the cloud.

Plug And Play
John said the use of a mobile data connection is a major advantage because it eliminates the potential of interference with the facility's IT system and company servers. "I have done a lot of work in plants where the system has to tie into the network and getting that approved is like pulling teeth," he said.

"Other than letting the IT guys know it is going in there, there is no involvement because it is a standalone system, that is the beauty of it.
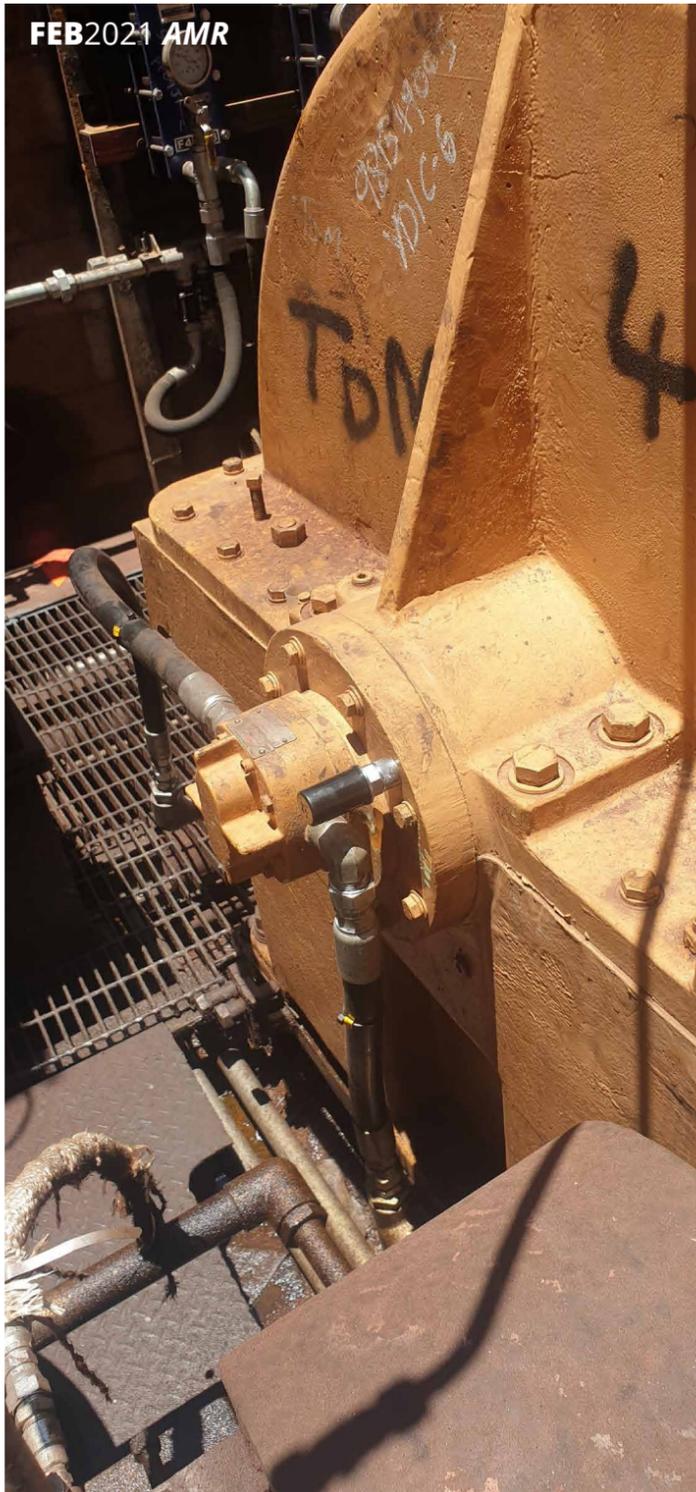
> ❝ The Waites Wireless sensors can easily be connected to any piece of equipment in the most hard-to-reach locations. ❞

"The gateway has a sim card that operates directly through the mobile phone network to the cloud and it creates its own wireless network back through the sensors.

"Routers can be used to extend the distance if required.

"Basically, the install is you mount a central gateway and that receives a signal and then you bang the sensors on and it starts recording within the hour.

"It is very quick and you are not running or securing cables.

"I know everyone promotes plug and play solutions but this one truly is."

The data can be viewed via a web browser from any location, at any time, by multiple users with unlimited frequency.

There is also a phone app, which provides a mirror of the cloud portal to give maintenance personnel access to data at their fingertips.

There is an API interface option as well, which acts as a cloud server that can transfer data into a site to allow an operator to monitor data through the plant while also being able to view the temperature and vibration values from the sensors on the screen.

The interface caters for everyone who may benefit from seeing the data from a consultant reliability engineer who is off-site to on-site employees who may need it for maintenance scheduling.

Software
The cloud analysis software platform is an intuitive, easy-to-learn program.

Data is stored at AWS (Amazon Web Services), using industry standard methods of security

including SSL/TLS, with encryption from the sensor to the database.

It is feature-rich and includes all the expected analysis tools plus some features usually only found in high-end online vibration systems.

Record on demand, statistical based alarm creation and a bearing database make this a powerful analysis tool.

Alarm notification can be sent via email or SMS to any of the unlimited number of software users.

Diagnostic capability:
• Cursors – Normal, Harmonic, Side Band, Delta
• Plots – Trends, TWF, FFT, Waterfall, Pk-PK,
• Crest Factor Alarms – Statistical generation, Email notification
• HFD - High Frequency Demodulation
• Bearing and Individual fault frequency markers
• Auto Correlation
• Record on Demand

Enhanced Fault Detection
The frequency range of up to 11.2kHz and dynamic range of 50g drastically reduces the chance of unexpected downtime through enhanced early fault detection.

John said plants were often going to the effort of adopting a sensor system for condition monitoring but the range was not big enough to pick up faults.

"Where we have seen it fail is they will have a frequency of 1 or 2 kHz and a measurement range of 8 or 16g, they can easily miss faults," John said.

"With lubrication issues for example, which will be one of the early indicators leading into bearing wear, that is going to need a

frequency range of 3 to 5 kHz.

"So they try and adopt technology but the vibration and sensor monitoring guys say: 'What is the point?'

The Waites system can be applied to multiple machines used in mining including conveyors, pulleys, gear boxes, motors, pumps and fans.

A lot of the time pulleys and conveyors are mounted up in areas that are inaccessible, so a wireless solution is ideal.

Low Cost
The use a mobile phone network means a plant could have hundreds of sensors running off a $15-a-month data plan.

As the installation is so quick and there is no interaction with the plant's servers, there is no need for downtime, which also saves money.

Traditionally vibration software is sold by the license or by the seat, forcing companies to pay handsomely for multiple users.

The Waites system allows for unlimited users.

GVS quoted against a competitor, which could only cover 40 sensors, and the Waites system, which caters for up to 480 sensors per gateway, came out less than half the price.

"The other beauty of the system is because it is a real time, cloud-based software, it is constantly under maintenance," John said.

"Other systems may only be upgraded once a year whereas the Waites system is upgraded at a rate of knots, there are constant improvements and updates."

John said the use of sensors was the way the industry was heading, as automation, asset digitisation, machine learning, robotics and other technological advances gained traction in the industry.

"For years everyone has been waiting for wireless sensors, but they just haven't been up to the job," he said.

"The offerings to date have left a lot of doubt in people's minds but this one covers all the bases."

GVS Reliability Products
GVS has earned a solid reputation for supplying world class reliability products to the mining industry for 13 years.

The company started out specialising in fixed accelerometers with cables and since then has expanded its product range to offer a whole suite of condition monitoring products.

The Waites wireless solution has slotted in perfectly with its historical focus on sensors and also within its new model of offering a full solution to customers—sales, installation and a maintenance service.

With offices in NSW, Queensland and Victoria, GVS is perfectly positioned to offer support across Australia, New Zealand and the Pacific regions. *AMR*