

AI analytics

Mining companies typically spend a massive 20-50% of annual operating budgets on equipment repair and maintenance, and reduced yield from downtime has an even greater financial impact. The major cause of downtime is that mines don't have the information they need to diagnose and prevent failures. Rithmik Solutions created Asset Health Analyzer™ which uses AI to give miners real actionable data insights. Paul Moore spoke to Kevin Urbanski, Co-Founder and CTO



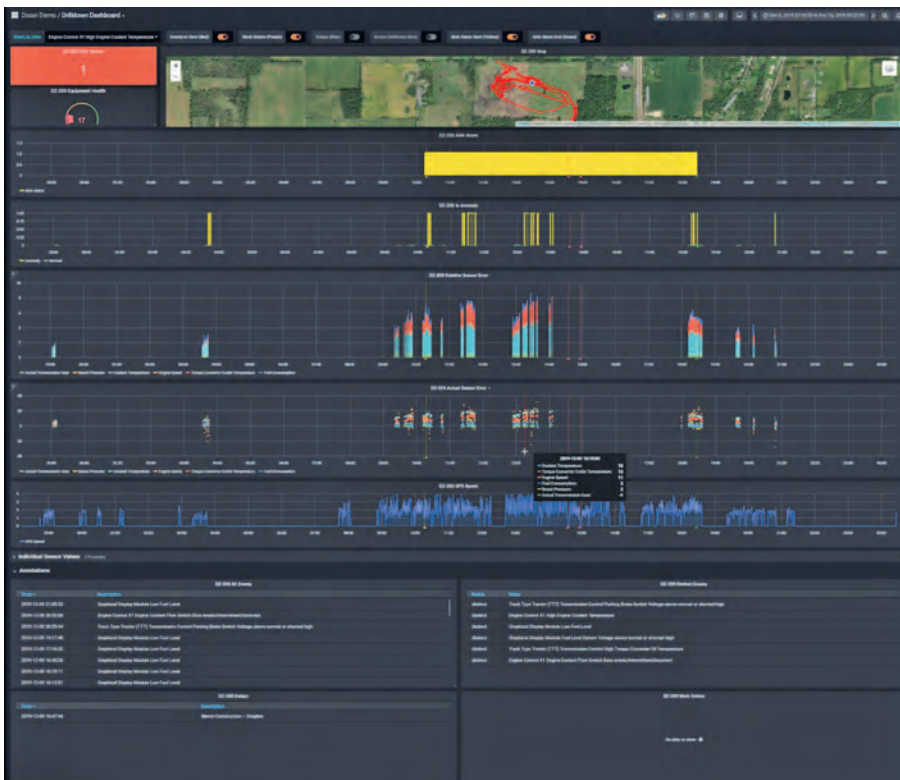
recognised the power of AI in extracting so much more insight from available data which some mines had been collecting for well over a decade. There is so much untapped value in this data. We set up Rithmik in 2018 with our core offering being Asset Health Analyzer™ or AHA™. Behind this is our analytics engine we call Rapid Analytics Infrastructure or RAI which enables extremely quick AI model testing and creation, leveraging the maximum potential of cloud computing. For example, some of the models we have generated would have taken three months on a single CPU; RAI utilised 3,300 virtual CPUs and 11 terabytes of RAM to get a result in five minutes.

Q What does all this mean in operational terms?

A What that means is that you are able to tell an AI algorithm, this is a set of data (eg RPM, oil temperature, oil pressure, coolant temperature) and feed this into the algorithm and it is able to find the interconnected relationships between all the sensor values. With the AI knowing these relationships you can get early prediction and classification of failure modes as well as deep insights into failure modes and inefficiencies, enabling more efficient, smart maintenance programs. These processes are the foundation of automated maintenance scheduling, and eventually — with augmentation from operational data — maintenance and operations orchestration. The future is exciting.

Q Can you give an example of a type of dataset this works on?

A A good example is the relationship between RPM and oil pressure. As RPM goes up, oil pressure naturally goes up. But throughout that range of RPM values, if you were to be setting strict thresholds for user defined events, you would have an infinite number of oil pressure thresholds over that RPM range. The AI can say, at 1,000 RPM, what is the normal oil pressure range? If it is outside that range, the algorithm will pick that out and indicate how much in psi



A Rithmik Asset Health Analyzer™ drill down dashboard that allows a user to dig into equipment health and operation, efficiency and failure modes

Q What is your background and what were your reasons for setting up Rithmik?

A Before Rithmik I had already been in the mining industry for ten years, starting out with what was then called Matrikon, which went on to be acquired by Honeywell. I started there when they were introducing their proof of concepts for the Matrikon Mobile Equipment Monitor solution; I was the hardware guy, getting on new pieces of equipment, figuring out how to get the data off, writing new software drivers. After the Honeywell acquisition I went to work for Teck Resources where I spent three years working with mining technology systems, including the Matrikon

MEM. I was working to get the value out of the sensor data – the standard approach was and is in the industry to set up so-called ‘user defined events’ where you set thresholds on sensor values from the equipment and when these are exceeded you can trigger warnings and alarms. But one of the challenges with this approach is that due to the conditions in the mines being so diverse with weather/temperature and topography with slopes that can change daily, the thresholds are tough to tune in because of the changing mine environment. False positives can be generated which can mean after a while the events and alarms no longer get looked at and therefore lose their meaning. This is the key reason that we started Rithmik. With AI, systems today have the ability to learn the multivariate relationships between sensor data. We



Asset Health Analyzer™ fleet overview screen

the oil pressure is outside the range under the current equipment operating conditions. The AI works in a similar way with other sensor values but this simple example illustrates the multivariate relationship well.

Q What progress in project terms have you made to date?

A Since setting up the company in 2018 we did a number of proof of concepts in 2019 leading to some more thorough studies in late 2019 to the current situation in 2020 where we have a market-ready product. We worked with technology solutions company iVolve, who were collecting Cat Data Link data off of Cat D9, D10 and D11 dozers operating in a US mine. This involved three months of data and it was a good dataset for us as there were a number of anomalies and equipment issues over that short period of time. Using the data we were able to

find early indicators of failure modes progressing well before the OEM alarms kicked in.



Q How do you work with partners and customers and how does Rithmik extract value?

A We work with data collection and fleet management partners like iVolve and also others. The idea is that we are doing the analytics on the data collected by these partners, delivering the results and insights to the existing visualisation, alarm management and software reporting tools that the mines are using. Many mines do not desire another

software package or another screen to look at. We charge licence fees per asset monitored by our solutions.

Q Where do you go from here? How do you stand out in the maintenance analytics market in mining?

A What we have right now makes it really easy for mines to get up and running quickly with accurate insights for better maintenance decisions. We're moving towards making those predictions more prescriptive. Our approach to the AI is different from what anyone else is doing, and we have been told that this approach will be the key to getting to full automation of maintenance programs and orchestrating interaction between maintenance and operations. Our analytics enable a cross-fleet look in real time, allowing you to see the health of different equipment units relative to one another. This lets you make decisions on what units need attention and which don't, moving away from an interval-based maintenance management approach. One of our indicators is a gauge showing how healthy the equipment unit

The system also gives an opportunity for maintenance personnel to get additional diagnostics before heading into repair jobs



Rithmik's analytics enable a cross fleet look, allowing you to see the health of different equipment units relative to one another

is together with an alarm but one which is tailored to only activate if there is an issue – without false positives. The following is a good summary of the breadth of insights that our software can enable:

- Condition-based and predictive maintenance planning and scheduling
- Equipment end-of-life planning
- Monitoring efficiency and environmental impact
- Root cause analysis and equipment health investigation for reliability engineers
- The opportunity for maintenance personnel to get additional diagnostics before heading into repair jobs
- Measuring and monitoring consumable wear. 