Australian Mining
safetowork
THE FIRST PRIORITY FOR AUSTRALIA'S MINING INDUSTRY
ISSUE 34 - NOV-DEC 2024

To the RESCUE

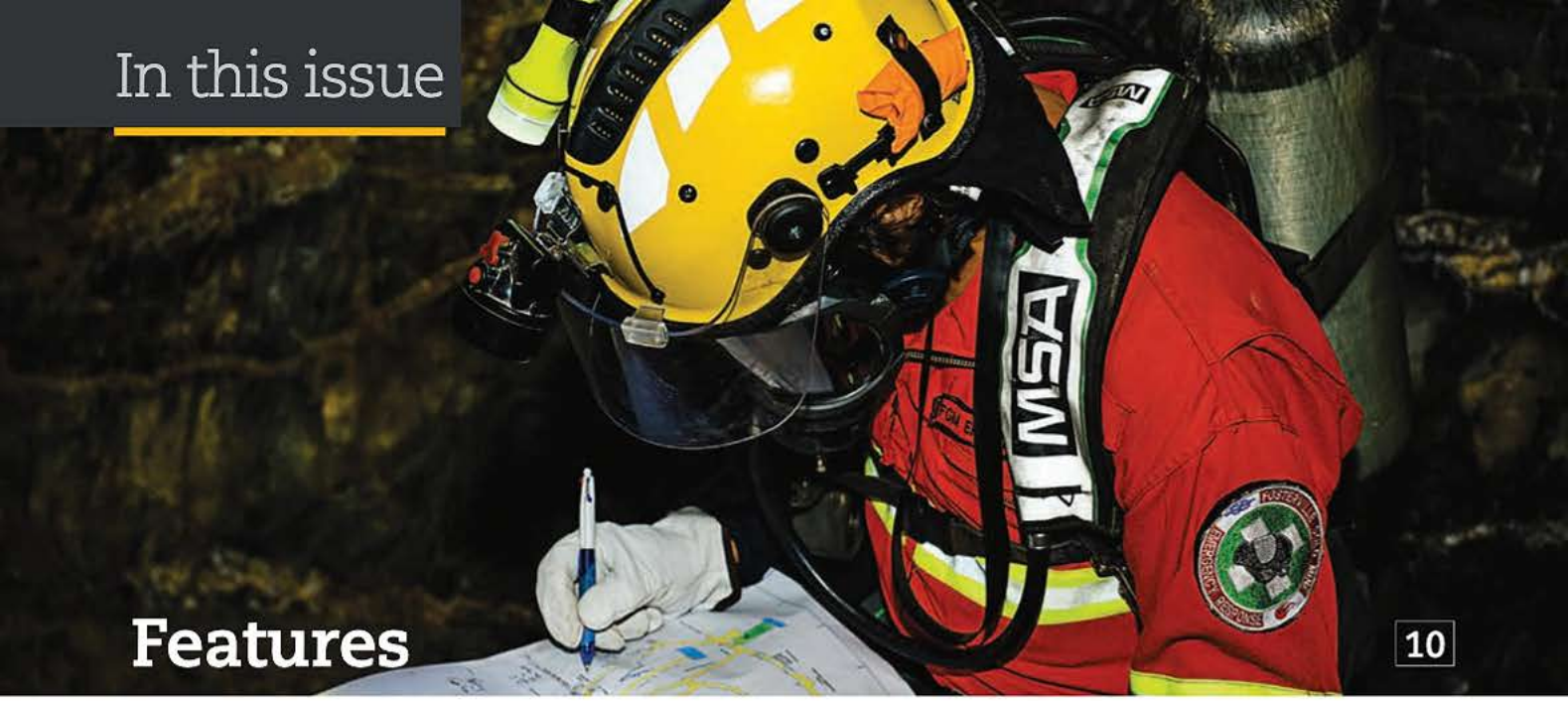
Getting a handle on hazard avoidance

OFFICIAL MEDIA PARTNERS

AUSTMINE AusIMM WAHA Working at Height Association AIOH AUSTRALIAN INSTITUTE OF OCCUPATIONAL HYGIENISTS

Autonomous equipment ▲ Fly-in, fly-out ▲ Mine rescue

In this issue



Features

8 A safety revolution
Cutting-edge hazard avoidance and autonomous technologies are quickly becoming industry mainstays, with some of the biggest names in Australian mining leading the charge towards a safer future.

14 Evolving with industry needs
Diacon Australia has a 20-year legacy of improving industry standards in conveyor safety and efficiency.

20 Safety from the ground and beyond
Epiroc's Mobilaris Situational Awareness solution can now be utilised at underground and surface mines.

28 A double HELIX at MINExpo 2024
The HELIX platform has successfully helped mines across the world streamline their data. Now, MST is back with two key technologies aiming to offer miners even more operational autonomy.

34 Resourcing the industry
Western Australia's mining sector is flourishing in large part thanks to fly-in, fly-out workers. But for the industry to keep riding on the wings of success, it needs critical resources.

36 A labour of glove
Mechanix Wear gloves are being recycled into the very fabric of a greener future.

44 Raising awareness to new heights
The Australian Working at Height Association wants to see the increasing rates of height-related injuries and fatalities slashed.

48 A future free from silicosis
Safe to Work sat down with the Australian Institute of Occupational Hygienists to discuss what can be done to protect workers against the threat of silica exposure.

56 A night to remember
The 2024 *Australian Mining* Prospect Awards was a night of celebration, recognition and connection for the best and brightest the mining sector has to offer.

REGULARS 3 COMMENT 6 PRODUCTS

Embracing a culture of holistic maintenance

MARTIN ENGINEERING EXPLORES HOW A COMBINATION OF PREVENTIVE AND PREDICTIVE MAINTENANCE MAY BE THE BEST APPROACH TO KEEP OPERATIONS RUNNING SMOOTHLY.

Effective upkeep of high-tonnage conveyor systems is critical to maintaining production and profitability.

Maintenance repair and operations professionals need a comprehensive plan with a foundation built on workplace safety.

Formulating such a strategy requires an understanding of the advantages and disadvantages of reactive maintenance, preventive maintenance and predictive maintenance. Key to this is establishing goals that include minimising unscheduled downtime, improving safety, raising efficiency and reducing the overall cost of operation to achieve a better return on investment (ROI).

REACTIVE MAINTENANCE

Even today, many companies practice what can be called reactive maintenance on their conveyors, meaning they simply fix whatever breaks.

Belt mistracking is a common indicator that maintenance is due.

Modern torsion arm trackers detect slight variations in the belt path and make preventive adjustments before it drifts off centre.

Images: Martin Engineering

Components are left to run until they fail and the resulting system downtime is unscheduled, disruptive and expensive.

Among the contributors to the costs of this approach are unplanned production stoppages, ancillary equipment damage (when a broken component damages something else), overtime and emergency service fees.

Other disadvantages include shorter asset life expectancy, since components are not maintained in optimal running condition, as well as uncontrolled budgets and potential safety hazards.

Additionally, technicians tend to take more risks and make more mistakes when under pressure to restore operations in the shortest possible timeframe.

Despite the clear downside of a predominantly reactive maintenance strategy, it's been estimated that half of all conveyor maintenance activities in the average US facility follow this approach.

One reason this may occur comes down to budget – reactive maintenance requires less staff, less planning and a lower initial investment. But such a strategy can lead to ineffective planning, insufficient oversight and far less system control.

THE SHIFT TO PREVENTIVE MAINTENANCE

The deficiencies of reactive maintenance have driven an evolution to a more preventive approach to minimise failures that force unplanned shutdowns for repairs. Guidelines are typically based on time in service or operating hours.

It's the same approach that consumers use when they take their car in for scheduled oil changes to extend engine life.

Preventive maintenance prolongs component life, increases productivity, improves overall efficiency and reduces maintenance costs.

Bulk handling equipment endures ongoing punishment by transporting millions of tonnes of rock, aggregate and sand in fluctuating weather conditions, potentially creating dust emissions, spillage and carryback

Martin Engineering workers performing belt inspections.

– and an effective preventive maintenance schedule requires strict adherence and consistent updating.

Some firms take this responsibility in-house, but others find specialist service providers can deliver a better return on their maintenance investment. This can allow them to rely on the expertise of industry experts so their employees can focus on core activities.

Generally triggered by time, metered inspection or common indicators like mistracking and spillage, the preventive maintenance approach to conveyor maintenance assumes that each component has a typical equipment life based on previous similar applications and environments.

Using observation and experience, preventive maintenance determines when relevant parts should be retired, replaced or refurbished, before the expected failure point.

The result can often mean greater safety, higher system efficiency, reduced spillage and better overall system control.

PREDICTIVE MAINTENANCE

Predictive maintenance directly monitors equipment performance during normal operation with the aim of more accurately anticipating failure.

Relying on sensors and supported by software, information is collected over time and facts are aggregated and fed into an algorithm to deliver a practical result that is made available to stakeholders.

When combined with regular physical inspections, this type of data-driven system can provide far more complete, accurate and actionable information for service technicians and operations personnel.

Some component manufacturers offer structured conveyor inspections and belt cleaner maintenance as part of a managed service relationship.

Their monitoring systems can track component wear and update the service technician and operations team via Wi-Fi or cell phone on upcoming service needs.

The technology will also send an alert through a mobile app in the event of upset conditions, allowing service technicians and plant operators to access real-time data. Emerging systems can even adjust belt cleaner tension automatically.

Highly trained service technicians provide an added set of eyes on the conveyors, travelling to and from the equipment to be serviced and logging details in their reports.

Because technicians see so many different applications, they can often alert operators to problems that general maintenance personnel may overlook or have become accustomed to ignoring.

With factory-direct managed service, the responsibility for maintenance falls on the provider, allowing the staff to focus on other priorities.

Unlike preventive maintenance that is determined by an average or expected life statistic, predictive maintenance is based on the actual condition of the equipment.

Sometimes called 'condition-based maintenance', when predictive analysis identifies a potential issue, the repair can be scheduled at a time that minimises the impact on production.

The benefits of this approach can include further optimised system performance and component life, a reduced need for visual inspection and minimised guesswork through a more automated, analytics-based system. Although it doesn't fully eliminate the need for personal inspections and maintenance, for conveyor systems that can be miles long and, in some cases, cover difficult terrain, the approach saves time and reduces potential hazards.


Sensors can feed data to cloud-based software, which then broadcasts to mobile applications in the field.

PREDICTIVE MAINTENANCE IMPLEMENTATION

A predictive maintenance program starts with data collection and storage, and then proceeds to analysis.

In the past, adding new points of measurement could be a time-consuming and expensive undertaking, but wireless instruments have greatly reduced these costs.

With more readily available data collection, storage and analytics options, some bulk material handlers are recognising that each critical component can and should be monitored and analysed to optimise performance.

Sensors can also feed data to cloud-based software which then broadcasts to mobile applications in the field.

The initial capital expenditure for these systems may appear steep, but cloud-based technology can defray some of the cost of entry.

The potential benefits of extended equipment life, tighter budget forecasting, more reliable maintenance scheduling, increased worker efficiency, decreased downtime and better productivity can all add to a swift ROI.

MACHINE LEARNING

Unlike preventive maintenance, which relies on wear life determined by manufacturer or operator observations, machine learning can adapt maintenance needs to a specific operation and service environment, fuelled by all previous input.

The benefit can be a tailored experience where equipment seemingly communicates its needs directly to decision-makers.

A recently commercialised example is a belt cleaner position indicator that monitors the blade and tracking and reports its remaining service life.

The device continuously gathers data on primary belt cleaners, notifying factory-trained service technicians and plant operations personnel when re-tensioning or replacement is required or when abnormal conditions occur.

Managers and service technicians can quickly access information on any networked cleaner via phone or Wi-Fi.

The device delivers critical real-time intelligence and aims to reduce worker exposure to moving conveyors, improving efficiency and safety.

Maintenance planning can be simplified by having detailed information available on demand, allowing service personnel to deliver and install replacement wear parts during scheduled outages.

Relying on actual operating conditions instead of human judgement to monitor blade wear and tension for optimal cleaning performance, the indicator can maximise the blade's usable surface area and report when a blade is nearing the end of its useful life.

Taking the technology a step further are sensors that constantly monitor blade pressure and inform stakeholders of their status of wear, meaning maintenance personnel no longer need to visit each cleaner and manually re-tension.

This reduces maintenance time while maximising the usable area of every cleaner and takes the concept of preventive maintenance to another level.

Rather than optimising for a process parameter or other metric, the approach can make real-time profitability the priority outcome.

COMBINING PREVENTIVE AND PREDICTIVE MAINTENANCE

Predictive maintenance has many advantages over preventive maintenance, but in the past, it was often too expensive or impractical to implement this strategy on all but the most critical components.

Now that data collection, storage and analysis is becoming easier and less expensive, additional components and systems are likely to become part of a plant's conveyor maintenance program.

Bulk material handling systems working in harsh operating environments can experience unexpected failure events that are often difficult to predict when they are caused by random,

A belt cleaner position indicator that monitors the blade and tracking and reports its remaining service life.

abnormal overloads or human error. Maintenance staff need to have some capacity to react to sudden failures.

During unscheduled downtime, managed service providers can take advantage of the outage to maintain or upgrade equipment.

Some service providers are also taking steps to help customers whose facilities have limited access. By partnering with their maintenance staff, service providers can remotely train employees to effectively maintain their conveyor systems, and offer guidelines on preventive maintenance, inspections and replacement blade options.

During this process, factory-direct technicians remain in close contact with periodic check-ins and operate within key parameters with the aim of assuring optimum performance.

With the goal of an efficient and cost-effective maintenance schedule, human labour will always be needed to design and carry out solutions, just like data will always rely on human experience to be properly applied.

That's why leveraging the benefits of both preventive and predictive maintenance is often the best approach.

Given unscheduled downtime, prematurely degraded wear parts and unnecessary labour can have such a serious impact on the cost of operation, applying each method to a maintenance strategy can maximise the effectiveness of both. S