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Blue Dragon Finds Significant gold anomalies at Padbury

Black Dragon Gold (ASX: BDG) has identified gold in soil anomalies at its wholly-owned Padbury Gold Project near Meekatharra in Western Australia.

The soil program, consisting of 541 new samples, tested using the innovative CSIRO Ultrafine technique and is the first significant gold exploration program at the project beyond traditional surface prospecting activity.

This work identified several targets over a regional 8km gold trend, parallel with a regional WNW-ESE striking structural geological architecture and coincident with prospecting activity where numerous gold nuggets and gold in quartz have been identified in surface quartz lag deposits.

Significant gold in soil anomalies included:

- 3700m x 700m gold in soil anomaly at the Fenceline Prospect

- 2300m x 1100m gold in soil anomaly at the Ross's Bore Prospect
- 1000m x 350m gold in soil anomaly at the Honey Pot Hill Prospect

The Padbury Gold Project is an intrusion related gold target located on the northern Yilgarn Margin.

The application of the Ultrafine geochemistry soil technique reduces the nugget effect and is designed to detect bedrock accumulation including gold from intrusion related gold structures.

The company is now planning its maiden drilling program in WA to test the identified targets. **AMR**



Example of surface gold in quartz (left) and gold nuggets (right).



RC Chips from 22DDRC052 at Kelly's Ridge Prospect.

Drill rig at Kelly's Ridge

High-grade Gold Intersected at Kelly's Ridge

Thor Mining Plc (ASX:THR) has uncovered high grade gold intercepts from initial drill results at the Kelly's Ridge Prospect, Ragged Range, located in the Eastern Pilbara, Western Australia.

The first round of gold-only assays came from a few selected intervals in the first four holes of the 10-hole program, showing strong alterations.

Project highlights:

- Drilling returns high-grade gold from the silicified altered contact along Kelly's Ridge.
- Previous rock chip sampling at surface reported up to 15g/t Au and 535g/t Ag.
- Historical drilling reported 1.5m @ 22.97 g/t Au below these rock chips and four holes were designed to intersect this

anomalous zone at depth.

- Best intercept to date of 4m @ 12.2g/t Au from 194m (22RRC0052).

Nicole Galloway Warland, Managing Director of Thor Mining, commented: "We are delighted to share these high-grade intercepts from Kelly's Ridge.

The intercept of 4m @ 12.2g/t Au is an exceptional result under Kelly's Ridge, especially given the depth of the 194m down-hole, showing excellent grade continuity from the surface.

"This confirms the potential of the site as indicated by historical drilling. Furthermore, with more drilling results to come, we are looking forward to gaining further understanding of the project. We anticipate more positive news to be shared with the market

in due course."

The Ragged Range Project is 100% owned by Thor Mining (covering E46/1190, E46/1262, E46/1355, E46/1340 and E46/1393.

Drilling at Kelly's Ridge was multi-purposed: it was designed to test below the high-grade rock chips returning up to 15g/t Au and 535g/t Ag along the 1km silicified ridge at the contact between the Boobina Porphyry and Euro Basalt; as well as testing below and along strike of the historic drillhole (DDHK21), that intersected 1.5m @ 22.97g/t gold located at the porphyry-basalt contact.

This small reconnaissance program included six holes along Kelly's Ridge, two below the historic Kelly's copper mine and two at Kelly's NE gold target. **AMR**



Nicole Galloway

That's the Wrap for Woomera for now at Lake Dundas

Woomera Mining Limited (ASX: WML) has completed its Lake Dundas Lithium Project drilling program in the Southern Yilgarn Craton of Western Australia.

An initial 27 aircore holes for 673m were completed and Woomera has reiterated to the market that Lake Dundas is believed to be enriched in lithium minerals based on historical shallow auger soil sampling results of up to 54ppm Li and comparative enrichments in lithium-bearing salt lakes around the world.

Woomera said that adding to the project's prospectivity is its the proximity to the Bald Hill lithium deposit and the Mt Dean lithium occurrences south of the Norseman township.

The company considers there is potential for Lake Dundas to act as a trap site for concentrate lithium minerals within the flat-lying lacustrine lake sediments and described Lake Dundas as comparable to many of the world's largest lithium brine operations in terms of mineral concentration.

Woomera originally designed a drilling program comprising of 94 aircore holes for approximately 5,000m to assess the brine and evaluate potential bedrock lithium sources and/or anomalism.

As the program advanced, the exploration team found that obtaining representative water samples was relatively straightforward and the volume of water encountered was adequate to initially assess without having to complete the entire program. Furthermore, the drilling was originally

designed with 50-metre spacing between holes. As the program advanced, only every second planned hole was drilled so the spacing between each hole was 100m.

Woomera said the rationale for scaling back the program was that the company was able to collect adequate water samples to assess the brine potential with wider spaced drilling. Mapping of bedrock lithologies across the drilling area has also been completed, with lithologies encountered being intermediate volcanics and possible meta-mafics within larger, regional felsic intrusives.

Ultimately, the decision was taken to amend the program to ensure that unnecessary activity wasn't undertaken and to allow for results to dictate the path forward.

Woomera Managing Director, Jason Livingstone said:

"The drilling program at Lake Dundas was performed safely and without incident. Furthermore, the program was effective in the collection of representative samples for both the bedrock and the brine. Whilst we progress with further assessment of the lithologies and to characterise the water samples taken, we will also look to advance exploration at the Mt Cattlin Lithium Project just north of the Mt Cattlin Lithium Mine, Ravensthorpe.

"It is an exciting time for Woomera as we progress these projects through the exploration lifecycle. We eagerly await the results from this program at Lake Dundas, but are thrilled to start our assessment of Mt Cattlin." **AMR**



Jason Livingstone

An initial 27 aircore holes for 673m were completed

AuTECO Signs Pivotal Exploration Agreement with Ontario First Nation

AuTECO Minerals Ltd (ASX: AUT) and the Mishkeegogamang Ojibway First Nation (MOFN) have announced an exploration agreement that significantly expands the area of operation within the Pickle Crow Gold Project in the Uchi sub-province of Ontario, Canada.

AuTeco said the agreement provides continued First Nation support for access to tenure for exploration purposes, while providing confidence to the Indigenous inhabitants regarding commercial, social benefit and cultural matters.

"Both parties have a strong commitment to create mutual benefits while continuing to respect the traditional territories, activities, values and rights of the MOFN," AuTeco said. The revised agreement replaces the 2009 exploration Memorandum of Understanding and now incorporates all AuTECO tenure

that is located within MOFN traditional territories. The previous MOU covered an area adjacent to the historic Pickle Crow mine and all work completed by AuTECO to date has been restricted to the region defined under the terms of the 2009 agreement. The Company has significantly expanded the project area to ~500km² since assuming management control in March 2020 and the updated agreement ensures all tenure, including key regional exploration targets for the upcoming winter drill campaign, are included.

AuTeco said completion of the agreement secured support of exploration and advanced exploration activities at the Pickle Crow Project and outlines a path forward for an Impact Benefit Agreement should the company decide to pursue commercial development of the mine.

AuTECO said it welcomes the MOFN as shareholders via the issuance of 5 million ordinary shares to the community fund. The shares will be issued under the company's available Listing Rule 7.1 placement capacity for nil cash consideration.

AuTECO Chief Executive Officer Darren Cooke said: "We are delighted to sign this exploration agreement with the Mishkeegogamang Ojibway First Nation.

"I would like to pay tribute to Chief David Masekeyash and the Council for the spirit in which the discussions have taken place.

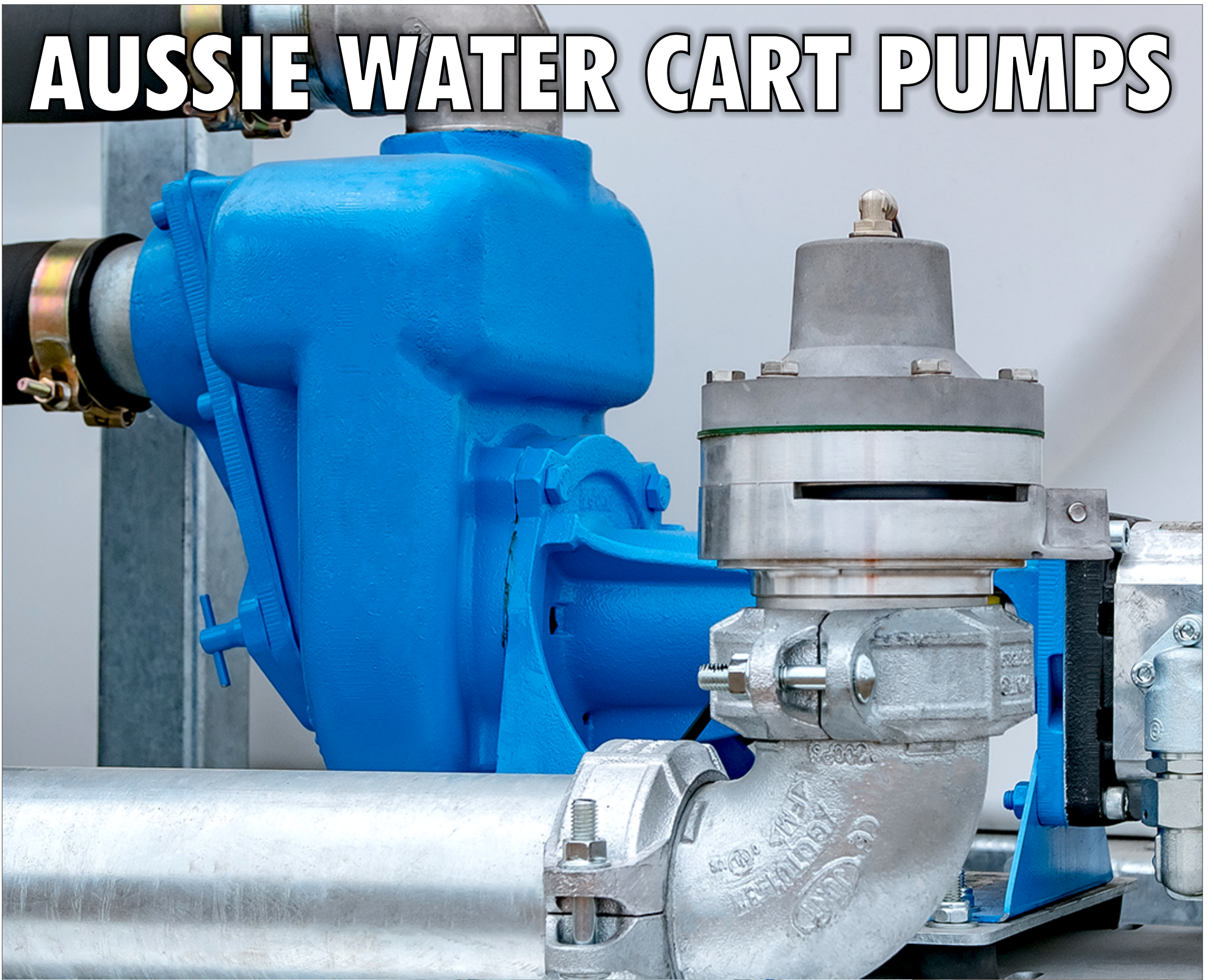
"We will continue to respect the land, tradition and culture of the First Nations peoples whilst doing our best to share the economic and social benefits of our investment in the Pickle Lake area.

"This is just the beginning of the partnership. With the Mishkeegogamang becoming shareholders of AuTECO, the community will benefit from our ongoing success at Pickle Crow."

Chief David Masekeyash of the Mishkeegogamang Ojibway First Nation said: "We are pleased to have reached agreement with AuTECO regarding their operations in our territory, which represents the strong and mutually respectful relationship that has resulted from our engagements.

"In this agreement, we have developed a strong framework for the protection of our land, and certainty our members will fairly benefit from the work undertaken. Each of these qualities are fundamental to building a relationship with our nation." **AMR**

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The Trouble With Copper

Copper is groaning under a weight of expectation. By any measure, demand is expected to far outstrip supply.

Dr Dave Lawrie | IMDEX Chief Geoscientist
Chief Technologist – Mining

Mining companies attempting to find, define and mine copper with enough speed and precision to meet at least some of the demand required for decarbonisation targets, the EV market, power transmission networks and other industrial uses are facing environmental, geological, and government headwinds.

Failure to meet demand could easily cruel economic growth; there is no doubt that we are facing a copper supply crisis, it's only the size of the crisis that varies.

And don't be lulled into complacency by the likely short-term increase in copper production as some new mines begin production during 2022 and into 2023.

This supply sugar hit will come as global economies struggle to contain inflationary pressures, with government actions to rein in spending potentially flowing through to an easing in demand for electric vehicles and a reduction in economic growth generally.

With copper a barometer of industrial growth, demand may ease — but any demand dip will be short lived and there are not enough new mines under development to make up the supply shortfall when demand inevitably surges.

The issue that remains widely underappreciated outside the mining and associated sectors is the extent to which big copper resources are hard to find, and difficult to mine when they are discovered — and the long lag between exploration

and production.

We have been looking for sizeable deposits for decades. We are consuming what we have found faster than ever, and we have not altered exploration methods or increased capital expenditure in response to the looming supply shortfall.

Recessionary risks and geopolitical uncertainty are adding to investor nervousness, reducing the likelihood of spending on the scale required to secure the next big copper mine.

Recent reports from the US and Canada suggest a reduction in copper production to 2026 among major miners.

A price dip is not helping, tempering the interest of mining companies to outlay the capital required for big projects.

Grade quality is decreasing, the ratio of waste to ore is increasing, and deposits if and when they are discovered are more likely to be deeper and in remote locations, presenting added costs around the provision of infrastructure to and at the mine.

Added to these geological and geographical challenges are Environmental, Social and Governance requirements which can extend the time between discovery and mining but as much as 15 years, depending on the jurisdiction.

Consultants Wood Mackenzie last month estimated that a US\$23 billion investment a year is needed over 30 years to deliver new copper projects to reach zero-carbon targets.

In its report Red Metal, Green Demand

Wood Mackenzie says that analysis shows that 9.7 million tonnes of new copper supply is needed over 10 years from projects yet to be sanctioned, equivalent to nearly a third of current refined consumption, if the industry is to meet the Paris Climate Agreement targets.

There is merit in Freeport McMoRan's call for US Government to add copper to its official list of critical minerals.

A recent S&P Platts report said that if copper shortfalls follow projected trends, climate goals would be "short-circuited and remain out of reach".

BloombergNEF says copper demand is expected to increase 53 per cent by 2040, against an increase in supply of just 16 per cent.

This alarming outlook is why IMDEX is supporting Copper for Tomorrow, a dedicated cooperative research centre established to focus on research and development priorities to solve challenges across the copper value chain.

The aim is to solve the copper paradox – how to produce the copper needed for a low carbon society while dealing with lower grade ores, without using more energy and water, and producing more waste.

It will do this through new research and technology that will:

- Dramatically improve copper mining and production
- Create processes that move copper production towards zero emissions, waste, and footprint
- Incorporate evolving ESG factors into business processes.

IMDEX is invested in finding answers to modern mining challenges. Our commodity agnostic geoscience-lead solutions seek to provide answers that unravel complex ore bodies, allowing for more informed decisions to be made earlier.

This data-rich decision making is important for all minerals in today's challenging mining environment but even more so with copper.

The difference between success and failure, between an economic and uneconomic deposit, is greater ore body knowledge, which will deliver improved processing intensity, less waste, less tailings, less water use, and greater overall efficiencies.

Mining companies able to access reliable data as early as possible at each step of the mining value chain from exploration and drilling, to planning and production, will be in the best position to meet the challenges.

It won't solve the supply deficit, but it may help to ease it — and may unlock some of the world's stranded copper assets. **AMR**



An initial 27 aircore holes for 673m were completed



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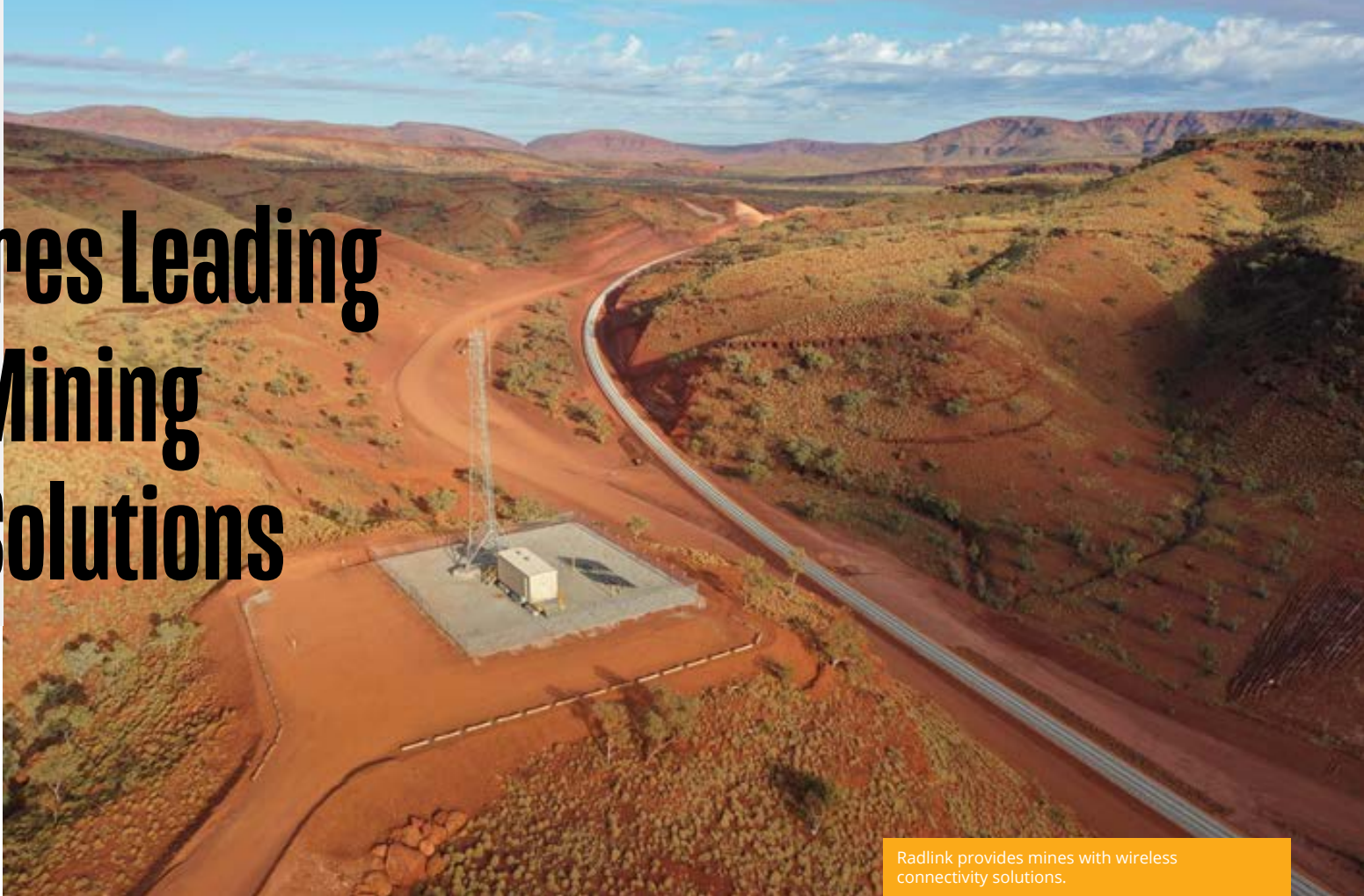
Epiroc Acquires Leading Provider of Mining Automation Solutions

Epiroc has agreed to acquire Remote Control Technologies Pty Ltd, an Australian company that provides automation and remote-control solutions for mining customers around the world. With this acquisition, Epiroc will be the world-leading automation solutions provider not only for surface and underground rock drilling but also for underground loading and haulage.

Remote Control Technologies, known as RCT, is headquartered in Perth, Australia, with customers in more than 70 countries. The company provides automation and remote-control solutions applicable for either a single machine or an entire mixed fleet of machines regardless of manufacturer or type of equipment. RCT also provides data and information systems, fleet and machine management systems, and machine protection systems.

RCT has about 225 employees and had revenues in the fiscal year ending June 30, 2022, of approximately MAUD 85 (MSEK 600).

“Automation is increasingly important for



Radlink provides mines with wireless connectivity solutions.

the mining industry to strengthen safety and productivity, and RCT’s advanced solutions complement Epiroc’s existing automation offering well. Together we will provide complete automation and remote-control solutions to support our customers on their journey towards optimal operations,” says Helena Hedblom, Epiroc’s President and CEO. “We are especially pleased that Bob Muirhead, RCT’s founder and a true pioneer within mining automation, will continue in an active management role. We look forward to welcoming the strong RCT team to Epiroc.”

The acquisition was expected to be completed

in the fourth quarter of 2022.

RCT will belong to Epiroc’s Parts & Services division once the acquisition is completed.

During the quarter Epiroc also completed the acquisition of a majority stake (53%) of Radlink, an Australian company that provides mines with wireless connectivity solutions.

Radlink, headquartered in Perth, Australia, designs, delivers, and integrates wireless data and voice communication networks and supporting infrastructure to surface and underground mines throughout Aus-

tralia.

Robust wireless networks are vital to support mining automation, including autonomous and teleremote solutions, which in turn strengthen safety and productivity. The company has approximately 330 employees and had revenues in the fiscal year ending June 30, 2022, of about AU\$145 million.

Epiroc announced on September 19, 2022, that it had agreed to acquire the majority stake.

Radlink becomes part of Epiroc’s Parts & Services division. **AMR**



Mining Expo Puts NSW in the Spotlight

The NSW mining sector put on show in Sydney in November, highlighting key technologies to more than 7,500 delegates from across the globe at the International Mining and Resources Conference (IMARC).

Deputy Premier and Minister responsible for resources Paul Toole said the event had been so successful, it would return to the Harbour City in 2023.

“It has been a massive week for mining in NSW and an exciting time for our State to spruik our globally significant deposits of critical minerals and capitalise on their increasing demand across the world,” Mr Toole said.

“This year NSW secured IMARC - the biggest event on the mining calendar - for the first time in its history and I’m pleased to say this

event has led to a \$17 million boost to the State’s economy”.

Mr Toole said IMARC helped to connect global mining leaders, Government, innovators, and educators from more than 100 countries.

“We took advantage of this opportunity to showcase what NSW has to offer through our Critical Minerals Investment Showcase and the launch of the updated NSW Mining Investor Register which connects 15 investment-ready projects with both domestic and international investors,” Mr Toole said.

“Exciting things are happening in the critical minerals and high-tech metals sector and NSW is ideally placed to be a global leader when it comes to developing emerging technologies for key defence, medical and aerospace industries.”

Celebrating the win, Business Events Sydney CEO Lyn Lewis-Smith said securing the event for a second year is a major coup for Sydney.

“This is great result for Sydney, and is a testament to what can be achieved when industry and government come together in a truly collaborative partnership around a shared goal to build industries of the future,” Ms Lewis-Smith said.

Mr Toole said NSW is experiencing an ‘exploration boom’.

“We expect this ‘boom’ to translate into significant growth in the mining sector so now is a great time to invest in an industry that contributes billions of dollars in economic activity, tens of thousands of jobs and is the lifeblood of many of our regional communities,” Mr Toole said.

Investment Boost for NSW

The NSW Government is investing \$130 million in mining projects to help position the State as a major global supplier and processor of critical minerals and high-tech metals.

Toole returned from the State’s Far West to announce that 19 organisations would share in more than \$8.6 million under Stream 1 of the \$130 million Critical Minerals and High-Tech Metals Activation Fund.

“Critical minerals and high-tech metals are going to be crucial to future technologies like advanced manufacturing, aerospace, ag-tech and renewables, and this fund will progress projects and support feasibility studies right across the State,” Mr Toole said.

“Our \$8.6 million investment is being backed in by industry co-contributions and together will drive \$30 million of investment into growing the critical minerals sector in NSW.

“We’ve already made it easier for exploration companies to search for critical minerals and produce high-tech metals projects by removing the Mineral Allocation Areas as a key part of the NSW Government’s Critical Minerals and High-Tech Metals Strategy.

“Now, we’re turbocharging the industry by driving investment to deliver feasibility studies, field trials, and environmental studies to get more projects off the ground.

“Our vision is to make NSW the number one investment destination for mining, exploration and advanced manufacturing, and we will continue to drive initiatives to achieve that.”

For further information on the Critical Minerals and High-Tech Metals Activation Fund, visit regional.nsw.gov.au/activation-fund

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Caterpillar Showcases First EV Mine Truck

Caterpillar has successfully demonstrated its first battery electric 793 large mining truck which it described as a significant investment to transform its Arizona-based proving ground into a sustainable testing and validation hub of the future.

Caterpillar completed development of its first battery electric 793 prototype with support from key mining customers participating in Caterpillar's Early Learner program. Participants of the program with definitive electrification agreements include BHP, Freeport-McMoRan, Newmont Corporation, Rio Tinto and Teck Resources Limited.

"Our global team came together to develop this battery truck at an accelerated pace to help our customers meet their sustainability commitments," said Resource Industries

Group President Denise Johnson. "This demonstration is a significant milestone, and we are excited for these trucks to get to work at customers' sites around the world in the near future."

Caterpillar said the Early Learner program was launched in 2021 and focuses on accelerating the development and validation of Caterpillar's battery electric trucks at participating customers' sites.

"This approach supports the individual commitments each Early Learner participant has made to reduce and eliminate greenhouse gas emissions from their operations. A primary objective of the program is for Caterpillar to collaborate more closely with its customers as the industry undergoes transformational change through the energy

transition," the company said.

Early Learner customers came together to witness a live demonstration of Caterpillar's prototype battery truck on a 7-km course. During the event, Caterpillar monitored over 1,100 data channels, gathering 110,000 data points per second, to validate simulation and engineering modelling capabilities.

Fully loaded to its rated capacity, the truck achieved a top speed of 60 km/h. The loaded truck travelled 1km (0.62 mile) up a 10% grade at 12 km/h. The truck also performed a 1km (0.62 mile) run on a 10% downhill grade, capturing the energy that would normally be lost to heat and regenerating that energy to the battery. Upon completing the entire run, the truck maintained enough battery energy to perform additional com-

plete cycles.

Mine Site of the Future

The prototype truck was built at Caterpillar's Tucson Proving Ground, located in Green Valley, Arizona. In support of the energy transition, Caterpillar is investing to transform the proving ground into a working, sustainable "mine site of the future" by installing and utilizing a variety of renewable energy sources. The objective is to implement the same sustainable solutions mining companies will use at their own operations to learn firsthand what it takes to run an electrified mine site and effectively support customers through the changes.

"The transformation of the Tucson Proving Ground allows Caterpillar to demonstrate our energy transition commitments and serve as a stronger advisor to customers as we navigate the changes together. We know it will take an integrated, site-level solution for miners to achieve their carbon-reduction goals, and we're here to help as they redefine the way they mine for generations to come," emphasized Johnson. **AMR**

Bellevue Achieves Key Milestone with Completion of Mine Camp



Project running on-time and on-budget, with production on track for second half of CY2023

Bellevue Gold Limited (ASX:BGL) has completed construction of the 343-person camp at its Bellevue Gold Project in WA.

Bellevue Gold said that completion of the camp, along with the other strong progressions being made on site positions Bellevue for production in the second half of CY2023. Bellevue Managing Director Steve Parsons said: "Completion of the camp marks another important milestone for the project and

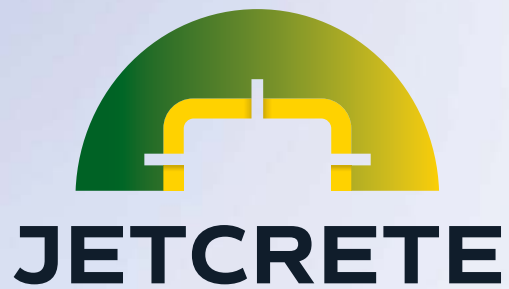
ensures that we continue to run on time and on budget.

"The camp design and key features were based on feedback from staff to ensure it meets their requirements for a modern, safe, comfortable and healthy environment. This will also benefit the company because it will help us to attract and retain staff". The completed camp will allow for the increased staffing levels for Bellevue and its contractors in the ramp up to production in a new purpose-built modern facility.

The company placed a high priority on men-

tal health and wellbeing during the camp design, incorporating a dependable high-speed Wi-Fi network and phone access to ensure site-based employees can communicate with their families, a large modern gym, sports court and other recreational facilities. Particular attention was paid to lighting design and resident safety, while the layout was aimed at minimising noise and disturbance, ensuring the camp is safe and inclusive. The dry mess includes state-of-the-art cooking facilities and rooms are 20% bigger than the industry standard to provide increased levels of comfort for camp residents. **AMR**



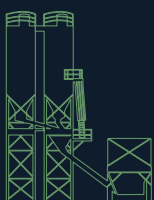


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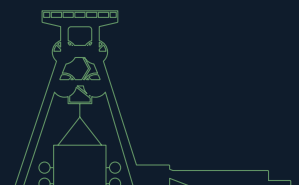
Concrete
manufacturing



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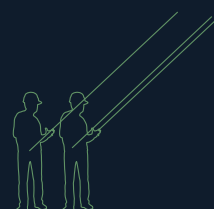
Remote shaft lining



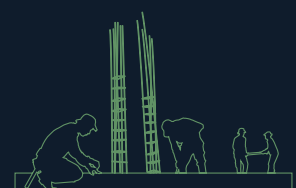
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ABT & Glencore To Develop New Braking System

Volvo Haul Truck Gets an Upgrade

Advanced Braking Technology Limited (ASX: ABV) has entered into an agreement with Glencore Australia Holdings to develop a heavy vehicle Sealed Integrated Braking System (SIBS) for the Volvo FMX Haul Truck.

The design solution will include Intellectual Property developed by ABT and related to the proven and trusted Failsafe brake for light commercial vehicles, that has been used extensively within both the Australian and international mining sectors over many years.

The parties are proceeding with the expectation that upon successful development, testing and validation of the SIBS, subject to Glencore's approval, Glencore will consider progressive deployment of the SIBS across its fleet of Volvo FMX Trucks globally.

Further, following successful validation and subsequent period of exclusivity, ABT will offer the product to the global market. The development costs are being shared between both parties recognising a mutual commitment to the success of the solution for the Volvo FMX Haul Truck, and for further market expansion by ABT into the medium term.

Product Development Agreement entered with Glencore ABT agrees to undertake product development works exclusively with Glencore to adapt the SIBS for use on the Volvo FMX mining specification haul truck by developing, manufacturing, producing and installing prototype units for validation and testing in Glencore mining operations.

At the completion of the development, validation, and testing, and subject to mutually agreeable commercial terms, it is intended to progress to low-rate production stage for use in Glencore mining operations. As Glencore is contributing to the development of the product, it is granted an exclusivity period and certain rights to priority of supply, with the intention of progressing to a commercial roll out phase, which in turn has the capacity to generate meaningful revenue for ABT.

Further, ABT may commence negotiations with other customers for supply of the product following the end of the exclusivity period with Glencore.

ABT CEO, Mr Andrew Booth stated: "the signing of this agreement achieves a strategic objective of diversifying our SIBS vehicle type applications in which we provide innovative braking solutions to Glencore and other international heavy vehicle fleet operators".

The potential value for the development stage of the ABT Glencore joint product development contract is up to \$2.8M over a term of 12 months and contingent upon the successful completion by ABT of project and development milestones.

The opportunities that it presents to diversify ABT's vehicle applications will provide further growth opportunity for the Company. ABT Mr Booth added: "we are very proud at ABT to be working with Glencore to deliver a world class Heavy Vehicle Brake solution designed for heavy ruggedised industrial applications. The signing of this contract marks a key milestone in the Company's development and future strategy". **AMR**



West Dome Stage 8 Approval Extends Life of Telfer Mine

Newcrest Mining Limited (ASX: NCM) is proceeding with the West Dome Stage 8 cutback at its Telfer operation, with the board a total investment of A\$214 million, inclusive of mine operating costs, and A\$73 million of capitalised production stripping.

Newcrest said the cutback would underpin continuity of operations at Telfer, with the mine now expected to extend operations into early FY25 .

Newcrest Managing Director and Chief Executive Officer, Sandeep Biswas, said: "We are delighted to further extend the life of our Telfer operation, highlighting our ability to maximise the full potential of our assets through our strong technical expertise. Telfer is strategically positioned in the highly prospective Paterson Province and we are continuing to progress several potential options to expand the resource base in the open pits and underground to unlock additional value."

Telfer Hedging
As at 30 June 2022 the total outstanding volume of gold hedged for Telfer was 137,919 oz and the average price for gold

was AU\$1,942.

Newcrest said Telfer is a large scale, low grade mine and its profitability and cash flow are both very sensitive to the realised Australian Dollar gold price. Following the approval of West Dome Stage 8 cutback, Newcrest has completed further hedging of a portion of Telfer's future planned production for FY23 and FY24 to secure margins and support investment in cutbacks and mine development.

A further 432,479 ounces of planned gold sales have been hedged in the form of Australian dollar gold zero cost collars. The total volume and prices of new hedges implemented for Telfer are as follows:

Financial Year Ending	Gold Ounces Hedged	Floor Price \$A/oz	Cap Price \$A/oz
30 June 2023	123,723	\$2,450	\$2,773
30 June 2024	308,756	\$2,500	\$2,886

Telfer guidance for FY23 remains unchanged, including gold production (355-405koz), sustaining production stripping (US\$55-75 million) and sustaining capital expenditure (US\$35-55 million). **AMR**

Thiess Secures Contract Extension for BMA's Caval Ridge Project

Thiess's mining services contract with BHP Mitsubishi Alliance (BMA) for the Caval Ridge operations in Queensland, Australia, has been extended. With a potential term of up to five years, the new contract starting on 1 December 2022 has revenue to Thiess valued up to \$600 million.

Under this contract, Thiess will continue to provide mining services at the Caval Ridge mine, operating and maintaining mining equipment to move overburden to support

BMA's production requirements.

Thiess Executive Chair and CEO Michael Wright said: "Thiess has been providing mining solutions to BMA at Caval Ridge since December 2017.

"Importantly, our team continues to have a clear commitment and focus on fostering diversity and respectful workplaces, with almost 30% of the workforce being female and 10% being Indigenous. We continue to

seek opportunities to bring under-represented groups into the mining industry, and delivering sustainable mining solutions for our clients and stakeholders."

Thiess Executive General Manager Australia East Cluny Randell said: "We're very proud to build on our safe and strong performance at Caval Ridge, and extend our deep working relationship with BMA.

We will continue to drive long-term econom-

ic value by creating local jobs and regional supply opportunities, and supporting the communities where we operate."

Thiess is currently recruiting for a range of roles including truck, multi-skilled and excavator operators in the Bowen Basin.

For more information go to www.thiess.com/careers

AMR



ON FIRE RACING RAISES THE STAKES

There are a lot of similarities between mineral exploration and owning a racehorse.

The next hole you drill may strike golden riches. Your next race starter might just turn out to be the next Australian turf champion.

That is certainly the belief of brothers Nathan and Jarred Kersten, the founders and driving force behind On Fire Racing.

Their passion for the horse racing industry started over 20 years ago with shares across multiple syndicators and dozens of horses. Over the years they became deeply involved with several stables at ground level, particularly with trainers, to fully understand the industry from the inside out.

It was during this time, the dynamic duo had a dream of creating their own team of horse racing enthusiasts. This would see the owners become members of the inner circle and establish a family like environment where everyone felt part of the journey.

And... 'they're off!'. In 2015, On Fire Racing

was born. Offering syndicated racehorse ownership across South Australia, Northern Territory, Queensland and Western Australia, On Fire Racing now syndicates a stable of horses, and proudly displays the striking red and black silks at most tracks around Australia.

As part of a broader community of horse racing enthusiasts, On Fire Racing's mission is to provide the best racing experience possible for people of all ages. There's nothing better than experiencing the thrill of racing together and making lifelong friends along the way.

Specialising in social racehorse shares and horse racing syndicates to suit all budgets, from 2.5% to 25%, buying a stake in a horse has never been more cost-effective. The On Fire Racing team simply make it easy to become involved in owning a quality racehorse.

To check out what the company has in their stable or to contact the team, visit <https://onfireracing.com.au/>

AMR



ON FIRE RACING



RED HOT OPPORTUNITY WITH ON FIRE RACING

On Fire Racing! A community of horse racing enthusiasts. Our goal is to provide the best enjoyable racing experience for people of all ages. Experiencing the thrill of racing together and making lifelong friends along the way.

Specialising in social racehorse shares and horse racing syndicates, designed to suit everyone's budget. We offer buyers 2.5% to 25% horse shares.

On Fire Racing Pty Ltd in an authorised representative (No 001294781) of Stable Connect Ltd (AFS License No. 336964).

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Record QLD Resource Funds in 21-22 FY

A new report has confirmed the importance of the resources sector to the Queensland economy, with a record \$94.6 billion contributed by coal, gas, and minerals producers in the 2021/22 financial year.

Queensland Resources Council (QRC) Chief Executive Ian Macfarlane said today the result was a new record and up an incredible \$10 billion or 12 per cent on the previous year.

"This year's annual Economic Contribution report shows how integral the resources sector is to the Queensland economy, with the figures telling the full story," Mr Macfarlane said.

"Our total figure of \$94.6 billion includes a

record \$9 billion in resources royalties, with international demand for Queensland commodities, particularly coal and gas, driving record prices and therefore record royalties for the Queensland budget.

"Resources royalties go straight into the state budget to help pay for hospitals, nurses, teachers, police officers and other essential government services.

"On top of this, the resources sector also supports the jobs of almost 451,000 Queenslanders and supports one in every four dollars spent in this state, which is up from one in five last year," he said.

Mr Macfarlane said the contribution by the resources sector to regional economies and employment has continued to grow for the

past five years.

"Towns and communities from the state's north-west down to the south-east corner all benefit from the prosperity of the resources sector and our associated supply chain," Mr Macfarlane said.

"In the past financial year, resources companies have also spent \$27 billion on supporting local business, sporting groups and charities, which brings enormous social and economic benefits to mining communities.

"More than half of that is spent outside the Brisbane region.

"Significantly, coal producers accounted for 69 per cent of the money spent by the resources industry across the state.

"Looking forward, as our trading partners look to Queensland to meet their energy, metals and steelmaking needs, along with a growing critical minerals market, it's more important than ever to have the right government policy settings in place to maximise this opportunity.

"Unfortunately, the Palaszczuk Government's decision to increase coal royalty taxes earlier this year has made investment in Queensland less attractive and threatens to derail these opportunities.

"The QRC continues to call on the Queensland Government to review this tax increase on our industry, and to work with us on a better plan that doesn't damage the state's number one export industry." **AMR**



Oar Resources Acquires Highly Prospective WA Lithium Project

Outcropping pegmatites within the granted tenement, E53/2198.

Oar Resources has signed an agreement with Denchi and First Standard Minerals to acquire one granted tenement and two tenement applications, bringing lithium to the company's diverse project portfolio.

The tenements bring prospective Lithium-Caesium-Tantalum (LCT) pegmatite targets with historic lithium and rubidium anomalies reported from previous rock chips into play.

Oar said initial reconnaissance had confirmed the presence of LCT pegmatites within the granted tenement which is a project in proximity to Lione Resources' Kathleen Valley Lithium Deposit.

The Project is targeting pegmatite hosted

DEC2022 **AMR**

lithium mineralisation, with initial indications pointing to the existence of Lithium-Caesium-tantalum (LCT) pegmatites. This type of pegmatite is the same host rock found at several key lithium projects including Pilbara Minerals' Pilgangoora project and Talison's Greenbushes operation.

The Project covers a combined area of 217.7km² across one granted tenement (EL53/2198) and two tenement applications (ELA53/2229 and ELA53/2230).

Located approximately 50km west of Wiluna in the Northern Goldfields of Western Australia, the project lies 120km north-west of Lione Resources' Kathleen Valley lithium deposit, which holds a current Mineral Resource Estimate of 156Mt at 1.4% Li₂O and 130ppm Ta₂O₅.

Historic lithium and rubidium anomalies, along with the presence of other minerals common in LCT pegmatites, were recorded in rock chips taken in 2019, which were provided to the company by Denchi and verified using DMIRS' historic exploration reporting system, WAMEX.

Oar said that recently completed reconnaissance had confirmed the presence of pegmatites at the location of the historic rock chip samples. Sixteen samples were collected by the company's geological team at the site of the historic samples and at numerous outcropping pegmatite dykes up to 500m from the initial anomalism.

OAR Executive Chairman Chris Gale said: "This exciting lithium project will add to our strategy of developing Oar Resources into a

battery metals focused company. OAR currently has a graphite project in South Australia, now with a lithium project in our stable we have two key battery metal elements to focus on, then hopefully develop to the next stage of drilling out a resource.

"The Denchi Project is in proximity to large, established lithium projects. The historic rock chip sample data, as well as our initial reconnaissance completed last month, which identified outcropping pegmatites, have demonstrated the project is prospective for LCT pegmatites and warrants imminent exploration activities.

"We see this project as a valuable addition to our stable of critical mineral assets that are in demand globally as the race for renewables continues to accelerate."

Targeting Exploration Geophysical and remote sensing data including ASTER, visible/near infrared [VNIR], shortwave infrared [SWIR] and longwave infrared [LWIR] imagery has been processed and interpreted by a specialist external consultant, allowing targeted exploration to commence without delay.

Oar said that further reconnaissance mapping across the project tenements will guide a systematic, project-wide mapping and rock chip sampling program over prospective pegmatite outcrops identified. The remote sensing target generation images provided by Denchi will be utilised in the field mapping and sampling programs.

As part of the project-wide mapping and sampling exercise, outcrop dimensions will be recorded and the mineralised outcrops will be ranked based on anomalism and dimensions. The criteria for "drill Ready" will also take into account the number of individual mineralised pegmatite dykes in any particular swarm. **AMR**



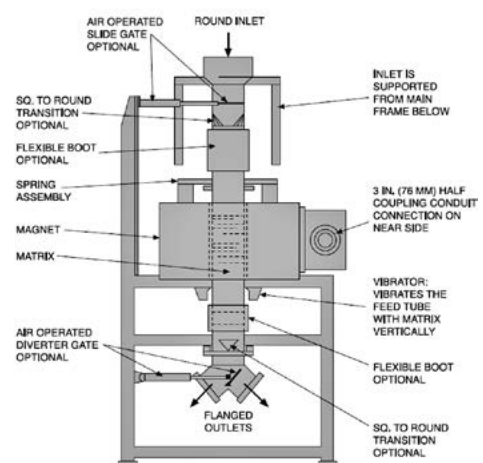
Chris Gale

ERIEZ FILTERS DELIVER HIGH CAPACITY & PURITY

News 15

The Eriez® Dry Vibrating Magnetic Filter (DVMF) removes very fine iron-bearing and para-magnetic contaminants from hard-to-flow powders, such as lithium, silica flour, glass powder, talc, clays, and chemical products, to produce cleaner higher-quality concentrates.

Eriez DVMF's utilise a powerful electromagnet and a flux converging matrix to amplify the magnetic field, creating high-intensity collection points. Contaminants are trapped as the powder is fed through the canister.



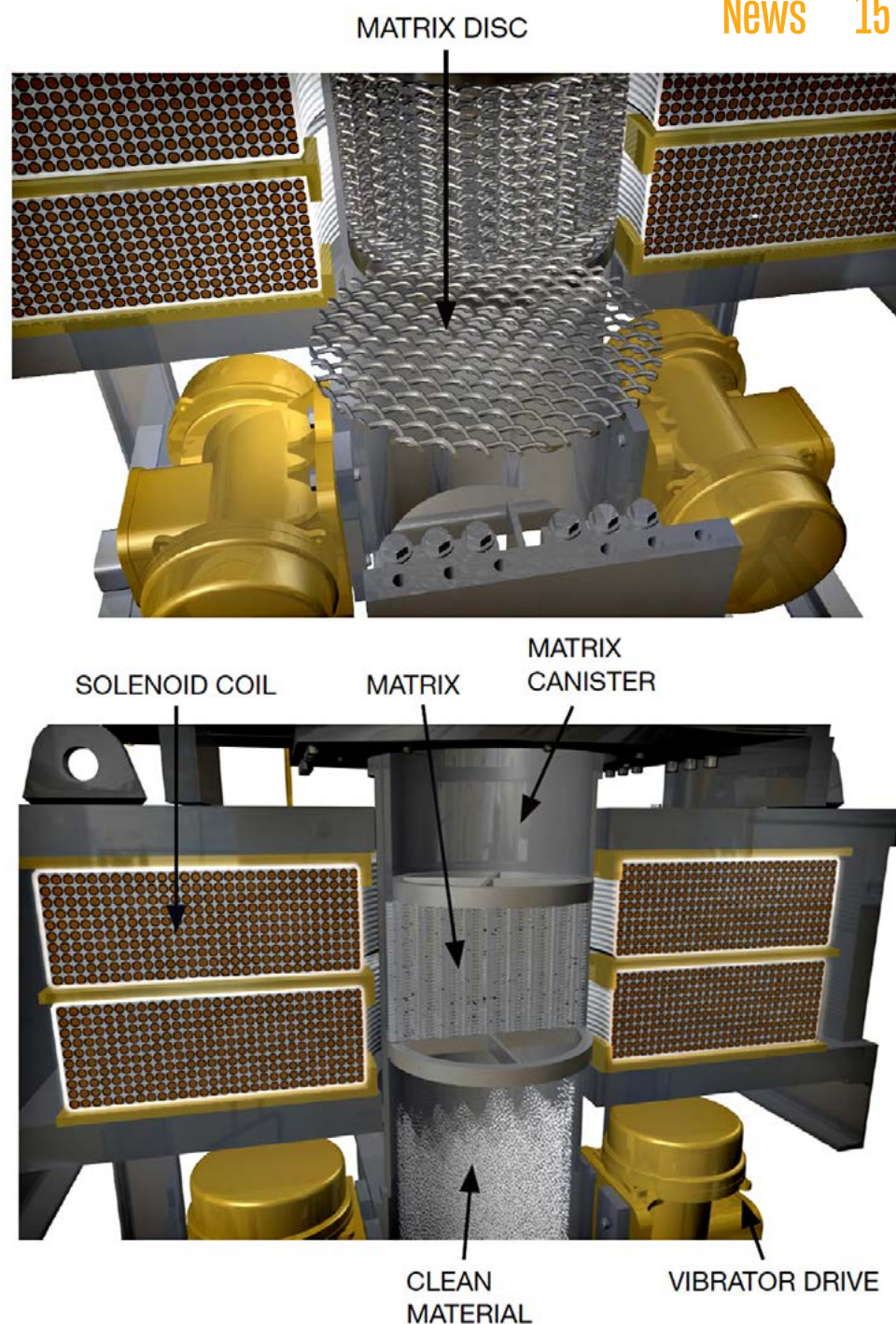
The canisters house a matrix pack which is agitated by dual high-frequency, low-amplitude vibratory drives. The vibrating action enhances the fluidity of the product, particularly fine and very difficult to flow powders. This results in a smooth and even flow of product through the filtration zone.

The design is enhanced by using finite element analysis to amplify the 0.5 Tesla background field strength to an induced field greater than 1.5T at the collection points. This maximises the removal of contamination to cleanliness levels measured in parts per billion. The innovation is a breakthrough in processing strategic minerals.

Eriez DVMF's come in 100mm to 300mm diameter sizes with capacities from 370 kg/hour to 3.3 tonnes/hour based on materials with a specific gravity of 2.65. The cleaning cycles are fully automated to ensure the matrix remains at maximum efficiency. Programmable controllers and a range of matrix configurations complete the package to deliver trouble-free operation.

For more information on Eriez' unique dry vibrating magnetic filters, visit www.eriez.com.au

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Former Woodside Exec Fiona Hick Becomes CEO of FMG

Hick, who is currently president of the Chamber of Minerals and Energy of Western Australia, will CEO of Fortescue Metals in February 2023. She will report to the Fortescue Board alongside Fortescue Future Industries CEO Mark Hutchinson.

Hick, who is president of the Chamber of Minerals and Energy, will focus on Fortescue's transition to a global green metals and energy company as the company strives to decarbonise by 2030.

Hick described her new role as "a once-in-a-lifetime opportunity".

"I come into this role with an enormous and exciting project pipeline to continue to grow and execute for Fortescue," she said. "I am excited to deliver our vision with the entire Fortescue family, working closely with an amazingly supportive chairman and board."

"We must provide the metals and the energy which will help to accelerate the energy transition. I join with, and commit to, Andrew (Forrest) and Fortescue's vision of becoming the leading green metals and energy company globally."

Forrest emphasised Hick's value to the company.

"Fiona has the natural humility and adaptiveness to flourish in Fortescue's rare leadership environment through values, as opposed to command and control," he said. "Fiona has the right personality to lead our metals organisation."

Hick was executive vice president for Woodside Energy for more than 20 years and has also worked for Rio Tinto in the Pilbara. **AMR**



Leo Lithium Announces Appointment of New Chairman

Leo Lithium or the Company) is pleased to announce the appointment of experienced mining executive, Mr Rick Crabb as Non-Executive Chairman, effective 1 November 2022.

Mr Crabb has been involved over the last 30 years as a director and strategic shareholder in many public companies operating in Australia, Asia and Africa (including Mali and Burkina Faso).

For over 20 years he was chairman of ASX/TSX listed uranium miner Paladin Energy Ltd which built 2 uranium mines (in Namibia and Malawi) and at various times had advanced projects in Australia, Niger and Canada.

Mr Crabb's executive level mining experience is strengthened by his legal background which has centred on mining, corporate and commercial law. Over a career spanning from 1980 to 2004 as a solicitor, Mr Crabb was partner of Robinson Cox (now Clayton Utz) and Blakiston & Crabb (now Gilbert and Tobin), advising on numerous

resource development projects in Australia, Asia and Africa for clients including Australian, Canadian, European and Japanese based multinationals, as well as Perth based entrepreneurial companies operating in Australia and overseas.

In 2001 he led a team of international lawyers on a World Bank project to rewrite the mining and related environmental and fiscal laws of Ghana which successfully saw a renewal of Ghana's mining industry. Mr Crabb has been a WA Councillor of the Australian Institute of Company Directors (AICD). He was awarded the AICD Gold Medal in 2021 for services to the business community and AICD. He holds degrees of Bachelor of Jurisprudence (Honours), Bachelor of Laws and Master of Business Administration from the University of Western Australia.

Leo Lithium's Managing Director, Simon Hay, commented: "We are delighted to welcome Rick Crabb as Chairman of the Company as we continue to progress the development of our world class Goulamina Lithium Proj-

ect. Rick is an experienced Non-Executive Chairman with an extensive history in the mining and metals space and brings strong business development, business planning, investor relations, and dispute resolution experience to the role.

His experience in West Africa will be an asset to Leo Lithium as we get closer to becoming the next lithium project of significant scale to enter production. On behalf of the Board of Leo Lithium I would like to thank Alistair Cowden for his contribution to the Company as inaugural Chairman, guiding Leo Lithium through many key milestones including securing the Joint Venture with Ganfeng Lithium, demerging and establishing the Company, IPO and listing. I wish Alistair well in his retirement."

Mr Crabb, incoming Non-Executive Chairman of Leo Lithium, said: "I am excited about joining Leo Lithium at this pivotal time when there is a clear opportunity to significantly advance the Goulamina Project from development into production and create

substantial shareholder value. The development work already completed at the world class Goulamina Lithium Project has been executed on budget and schedule, demonstrating the exceptional team I am joining at Leo Lithium. I look forward to working with Simon Hay and the team to deliver further significant project growth and develop Leo Lithium into a leading lithium producer." **AMR**



Stephen Biggins Appointed Non Executive Chairman of Winsome Resources

Winsome Resources Limited (ASX:WR1) has announced that lithium professional Stephen Biggins (MBA, BSc (Hons) Geol, MAusIMM) has been appointed as a Director and will transition into the role of Non-Executive Chairman of the Company in January 2023.

Mr Biggins was until recently Managing Director of Core Lithium (ASX:CXO), a position he held for over 10 years, during which time he led the company through the acquisition, discovery, permitting, financing, offtake and most recently production from the first lithium mine in the Northern Territory, one of the highest-grade lithium resources in Australia.

Mr Biggins has applied his Honours Degree in Geology and MBA as the founding Managing Director of several ASX-listed companies. Mr Biggins has built prospective portfolios of lithium, gold, uranium and base metal exploration projects in Australia, Asia and Africa.

Mr Justin Boylson, who has successfully led the company as Chairman from IPO for the first year of listing on the ASX, has elected to transition into a Non-Executive Director role at the end of 2022 and continue to contribute to the company's ongoing journey in

this capacity. The company thanked Justin for his leadership thus far and said it looked forward to continuing to have him on the Board of Directors.

Winsome Managing Director Chris Evans said: "Having Stephen join the Winsome team as Chairman is a major coup for the Company. His experience and expertise in the lithium industry will catalyse the fast tracking of our world class projects in Quebec and allow the Company to move to the next level in our development pathway after celebrating our first anniversary of listing on the ASX." **AMR**



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High-Grade Copper Target Comes into Focus at Mt Carrington

In a review of exploration data from 13-years ago, Thomson Resources (ASX:TMZ) identified a high-grade copper sulphide target in a previous drillhole.

The copper mineralisation is located near the Kylo gold resource in the polymetallic central core zone at Mt Carrington, in northern NSW. The target has been prioritised for follow up drilling as part of a broader resource extension drill program being developed to support Thomson's polymetallic New England Fold Belt Hub and Spoke strategy.

Rex Minerals (ASX:RXM) drilled diamond hole KYDD001 in February 2009 targeting a southwest dipping extension of the gold mineralisation at Kylo. The hole failed to intersect any significant Kylo-style gold mineralisation but did intersect two broad zones of copper sulphide mineralisation.

- 18.65m at 5.8% Cu, 0.74% Zn, 0.1g/t Au from 52.35m
- 10.1m at 7.26% Cu, 2.58% Zn, 0.12g/t Au from 88m

The copper mineralisation comprises several weakly banded quartz veins with semi-massive pyritechalcopyrite hosted by chlorite-carbonate altered volcanic rocks. The mineralisation has a brecciated appearance, and the core is broken in places making

the orientation of the veins difficult to determine precisely.

Hole KYDD001 is located in a broad area of supergene copper mineralisation centred on the Gladstone prospect area but extending east and northeast to All Nations and Kylo.

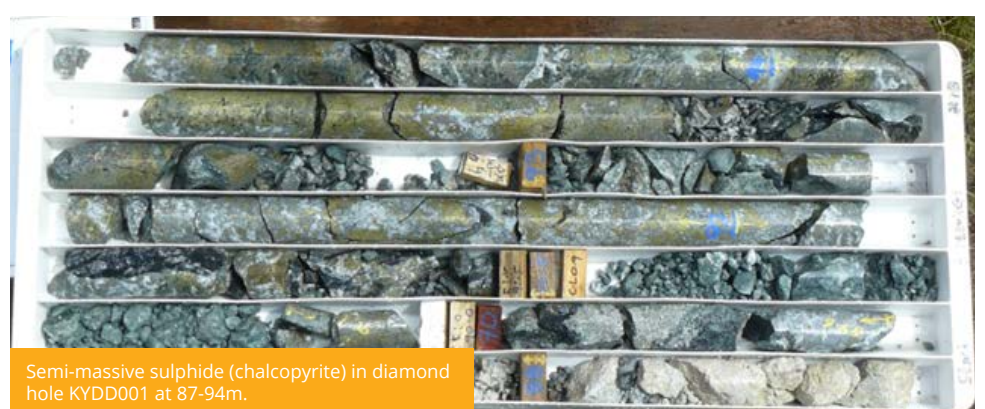
On a hill at Gladstone there are numerous old workings exploiting narrow veins but there has been strongly near-surface leaching with drilling indicating copper mineralisation commences in a supergene zone at ~30m depth. The copper mineralisation is within a northwest trending structural corridor called the All Nations Trend.

Thomson Resources said it is possible that the copper sulphide mineralisation in KYDD001 partly explains the supergene copper mineralisation. KYDD001 was drilled from the southwest towards the northeast parallel to the All Nations structural trend and as a consequence could have been drilled oblique to structures giving an exaggerated thickness to the sulphide mineralisation.

KYDD001 was not followed up with further drilling by Rex Minerals or White Rock Minerals Ltd (ASX:WRM) because their target was gold mineralisation supporting their 'gold first' development strategy. **AMR**



Malachite in the mullock seen south of Kylo Pit during a field trip.



Semi-massive sulphide (chalcopyrite) in diamond hole KYDD001 at 87-94m.

DONT BE LEFT IN THE DARK.



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A burst of COMPRESSED AIR can save your day!



Hurricane Air Cannon by Martin Engineering.

One of the biggest challenges faced by those transporting bulk material is ensuring that material is not lost along its way. After all, that material represents a profit and, therefore, any escaping product represents a potential financial loss.

This financial loss is amplified by variables surrounding the transport of bulk material. One of them, which we'll cover here, is **downtime caused by chute bottlenecks/obstructions.**

More common than we would like, obstructions in chutes and screens are quite a challenge! Its severity and shape depend on the type of material, weight, thickness, and other factors.

However, despite different levels of seriousness with blockages, there is one thing that always remains the same: the annoying need to stop the production for maintenance and dislodgement of the adhered material.

One of Martin Engineering's specialties is

the maintenance of material flow, so that your conveyor is always available and with a high level of reliability. With over 75 years' experience handling material flow issues, Martin Engineering developed **Air Cannons.** With continuous development this product has been improved and refined, and is now the most technologically advanced, powerful, and efficient Air Cannon in the market.

An engineered flow-aid device that strategically directs a controlled blast of air to dislodge and move material, our Air Cannons were developed to avoid the headaches of material accumulated inside chutes, allowing your production to follow the flow and the stipulated goal. By enhancing material flow, preventing bridging, clinging, arching, and rat-holing of bulk material in process vessels, without damaging your equipment, and keeping your chute clean, our solution provides efficiency, durability, and more safety to your employees.

Forget the outdated and dangerous methods used for years to maintain the

flow of material and the chutes clean, the time has come to optimize your production, protecting your employees, and amplifying your results.

WHY AIR CANNONS? MAN VS CANNON

	MANUAL CLEANING	AIR CANNONS
SAFE?	NO Workers interacting with material stuck in confined spaces is never a good idea.	YES Air cannons eliminate worker contact with material & equipment.
EFFICIENT?	NO There's only so much time in a day & labor is better applied elsewhere.	YES Air cannons free up labor & can be automated to fire when needed.
EFFECTIVE?	NO Manual cleaning is an attempt at a temporary fix to a persistent problem.	YES Air cannons constantly maintain proper material flow.

And your solution can even go further! More than keeping your chute free of blockages, our solution helps you to keep it clean, working along with or in place of a water lance cleaning system. This means more than just an efficiency raise, but also, a safer work environment.

Excess hosing in chutes for cleaning can be eliminated along with personnel hazard

exposures, as well as manual handling of heavy and high-pressure hoses, material splash back and dust exposure.

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The Obvious and Hidden Benefits of Good Laboratory Engineering

News 21

MARC Technologies are specialists in mining laboratory equipment and systems.

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MARC Technologies is a unique business specialising in the design and manufacture of mining laboratory equipment and systems.

These systems including extraction systems, HVAC, benching, air & gas reticulation and more.

Because of our vast experience with these many facets MARC has had a reputation as the “go-to guys” for a solution to mine site laboratory design needs.

We know what it takes to design these into your laboratory.

As not only a manufacturer but also a reseller of laboratory equipment, if we don't

manufacture it, we will know who can.

MARC has specifically chosen not to manufacture jaw crushers and ring mills which allows us to purchase from all the more reputable manufacturers.

As a result, we can select the most suited products available for use in your project.

Unfortunately, many equipment suppliers claim to be able to design a laboratory – it helps them increase their scope and sell more.

No qualifications or certifications are required to design a laboratory, but very few accept they are then responsible for the creation of a structure that may potentially

expose end-users to some of the most hazardous chemicals, gases and fumes used in industry.

The most frequently observed error is the lack of consideration of makeup air.

This shows a lack of real-world understanding of the risks involved in working with aggressive mineral acids and organic solvents during the design phase of the laboratory supply package.

There are also many engineering tricks we have learnt along the way that will reduce your lab's energy consumption, reduce capital costs, reduce maintenance costs and at the same time ensure you get a safe and efficient laboratory. **AMR**



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OLD KING COAL IS STILL



ALL AMERRY OLD SOUL

BY DALE GRANGER



Maules Creek Mine.

Whitehaven Coal will close out the year as the gift that kept on giving to shareholders in 2022 as record coal prices and global supply/demand dynamics dovetailed to send the miner's stock soaring almost 400%.

Remarkably, in a year where record average coal prices hit \$581 per tonne in the September quarter, Whitehaven also experienced a number of “acts of God” which impacted production in an epic year that saw WHC stock spiking from \$2.76 in early January to an all-time peak of \$10.96 in October.

Whitehaven Coal Managing Director and CEO Paul Flynn said of an epoch-making period in the annals of the 22-year-old miner, which listed on the ASX in 2008: “With demand for high quality coal continuing to outstrip global supply, coal prices set another record in the September quarter and continue to be well supported.

“We delivered strong operational performance in the September quarter at our Narrabri underground mine, but our open cut operations were impacted by wet weather

and flood related road closures in September. With La Niña forecast to be a feature through the Spring season, we have been working constructively with councils and developing measures to minimise the impacts of weather delays and flood related road closures as much as possible.

“Whitehaven generated \$1.55 billion of cash in the September quarter and we have a net cash position of \$1.93 billion at 30 September. The company is performing well for the benefit of all our stakeholders, and Whitehaven is extremely well placed to continue to support energy security for our custom-

ers and to deliver strong returns for our shareholders.”

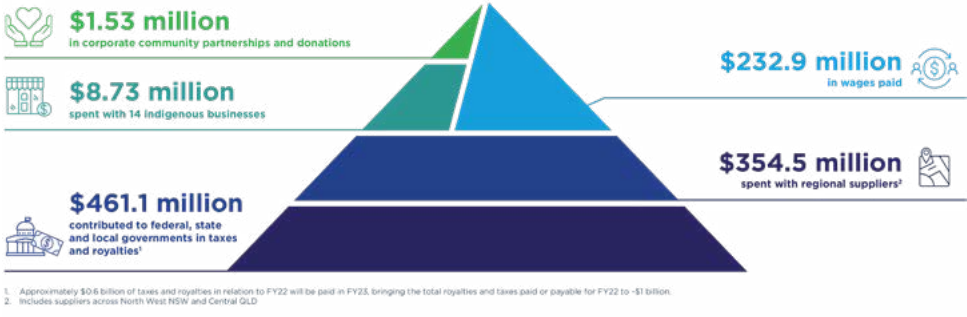
In spite of headline numbers, the September quarter was anything but smooth sailing. Run-of-mine production of 4.0Mt was down 37% from the June quarter, with open cut operations at Maules Creek, Werris Creek and Tarrawonga producing lower volumes due to mine sequencing and the September floods. The heavy rains closed access to Maules Creek for seven days and Tarrawonga for two days with haulage roads at the latter sealed for 14 days. Labour shortages, absenteeism and season impacts synonymous

with heavy fog and increased noise-related delays also took its toll in winter.

On the geopolitical front it was a year of global upheavals punctuated by war in Ukraine, subsequent western sanctions on Russian coal exports and uncertainties surrounding Soviet gas supplies to Europe that tipped the world into an energy crisis. Fossil fuels, as a collective climate change accused, remained in the dock but still supplied 80% of the world's energy with coal (36%) the dominant player.

Whitehaven's sales in the September quarter comprised 92% thermal coal and 8% metallurgical coal, with 100% of thermal coal sales being the coveted, high CV coal. The coal was on a roll from the Gunnedah Coal Basin of NSW, encompassing Narrabri, Tarrawonga and Werris Creek, and the Winchester South Project in the Bowen Basin of Central Queensland.

Moving into the new year, Whitehaven has reason to be bullish with northern hemisphere coal inventories expected to deplete rapidly in winter and Russian coal



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Maules Creek maintenance workshop.



Inspecting the Autonomous Operating Zone - Maules Creek.

unlikely to fill the void under the current strangulation of sanctions. At the same time, soaring gas prices has made thermal coal significantly cheaper on a per gigajoule basis.

The bulk of Whitehaven coal goes to Asia and volumes are tipped to increase. The company said the state-owned power utility in Taiwan stopped taking Russian coal in August, while Japan, Whitehaven's biggest client, would not be renewing deliveries of Russian coal after existing contracts expire in March.

Whitehaven prides itself on a product which is among the lowest carbon emissions per tonne coal in the world and the fruits of recent successes has had a cascading effect on Australian quality of life. The company paid \$1 billion in taxes and royalties in the past financial year and \$233 million in wages to its 2500-strong workforce, 75% of whom

live in regional areas. In addition, \$354.5 million was spent with suppliers and \$8.73 with Indigenous businesses.

This all adds up to a lot of bread winners and beneficiaries who will be serenading Old King Coal in the Christmas cheer, as opposed to reading him the last rites. Nevertheless, Whitehaven's Roadmap envisages a challenging path ahead. The company does acknowledge that coal contributes to greenhouse gas emissions and that the transition to a lower-carbon future will involve significant changes across the economy.

Whitehaven's mission statement supports relevant UN Sustainable Development Goals within the context of creating universal access to affordable energy.

"While more recently historic high prices for thermal coal have been attributed to the conflict in Ukraine, significant price improve-

ments in this market were being observed well before the commencement of hostilities by Russia," Whitehaven noted.

"This is because of enduring and deepening disparities between supply and demand. Measures to restrict investment in the coal sector on the basis of climate change considerations have tightened supply and contributed to price increases.

"Shutting down coal and gas or restricting investments in these sectors in the absence of viable alternatives has meaningfully contributed to the current energy crisis."

Whitehaven is committed to strive for a lower carbon future, but says that continued reliance on fossil fuels, including coal, reflects the reality that "global emissions reduction aspirations are out of step with our capacity to deliver on them".



Sunnyside 2020 planted Koala corridor in the south-east corner and rehab on the right-hand side.



Hannah Croft, Whitehaven Coal Environmental Manager, at Narrabri.

Citing a McKinsey & Company report: The net-zero transition: What it would cost, what it would bring? Whitehaven noted estimates of a \$275 trillion investment (7.5% of average annual global GDP) between 2021 and 2050 to replace fossil fuels in the electricity sector.

Australia supplied 28% of global coal exports in 2021 and Whitehaven's motivation for business to continue as usual in the short-to-medium term cites the International Energy Agency's (IEA) Stated Policies Scenario (STEPS), which envisages coal remaining the largest source of electricity generation until 2040. In the longer term the IEA expects continued decline in coal-fired electricity demand in developed economies to be offset by increased demand from developing economies, many of which are in Asia.

"Australia is ideally positioned to capitalise on Asian thermal coal demand on account of the high-quality properties of Australian coal, which generates fewer greenhouse gas emissions per MWh of electricity compared to lower-CV coal. Furthermore, Australia's relative proximity to key markets is likely to ensure it remains one of the most cost-competitive sources of high-quality thermal coal for Asia," White

Wood Mackenzie forecasts that demand for metallurgical coal in the Asian market will continue to grow to 2050. The biggest driver is expected to be a 200% increase in demand for Indian crude steel by 2050. Despite China's informal import restrictions, Australia still accounted for nearly 55% of the sea-borne metallurgical coal trade in 2022.

Growing consensus is that Australia would sooner or later commit to net zero carbon emissions on an economy-wide scale by 2050 and Whitehaven has pledged to that

its business would align with national targets and legislation.

While encouraged that the Australian Government does not support calls for a ban on further coal and gas development, Whitehaven also cautions that any policy changes regarding fossil fuels as a focal point of ongoing human and economic development should sensibly and incrementally strive to sustain Australia's competitiveness as a major exporter and employer.

"Our capacity to deliver on major carbon emission reductions on a global scale remains constrained by a number of factors including the physical and technological limitations of alternative energy sources and storage systems," Whitehaven said.

"The scale of the decarbonisation task is immense and represents a global challenge the likes of which humanity has arguably not previously encountered. We maintain our view that the energy transition must occur in an orderly way that does not disenfranchise developing economies or deny access to energy for the approximately 700 million people still living without access to electricity or in a state of profound energy insecurity."

Whitehaven said United Nations' development goals relating to poverty, hunger, health and wellbeing and industrial development, was inexorably linked to affordable and reliable energy.

"Further investment in reliable energy remains essential to deliver on aspirations to significantly increase the penetration of wind and solar technologies given the energy intensive nature of building these systems affordably at the required scale," the company said. **AMR**

WHITEHAVEN

WELCOMES PUBLIC COMMENT ON WINCHESTER SOUTH PROJECT

The Queensland Government is asking for public feedback on the proposed Winchester South Project, a primarily metallurgical open-cut coal mine located 30km south-east of Moranbah, in the heart of the Bowen Basin.

The project has been declared a Coordinated Project by the Queensland Government, recognising the potential strategic significance of the project locally, regionally and to the state of Queensland more broadly. If approved, the project would help fill the strong demand for metallurgical coal exports predicted for decades to come, as recently highlighted by QLD Treasury.*

As part of the comprehensive State and Federal Government assessment process, Whitehaven has carefully studied potential impacts, incorporating feedback from a wide range of stakeholders.

Following initial public feedback in 2021, Whitehaven has refined the project to further improve environmental and social outcomes, including fully abating Scope 2 emissions through the purchase of carbon neutral electricity.

If approved, the mine will create around 500 jobs and will produce a primary metallurgical coal product to make steel and a secondary thermal coal product for energy generation. At full capacity, the mine is targeting run-of-mine (ROM) production of up to 17 million tonnes per annum to supply the international market for about 30 years.

A coal processing plant and a rail loop will be built to connect with the existing Bowen Basin coal rail network. As the Bowen Basin is a well-established mining region, the site has direct access to key rail and port infrastructure, providing multiple coal export options.

Whitehaven Coal Managing Director and CEO Paul Flynn encouraged stakeholders to have their say during the public notification period and show their support for the Project.

"With an estimated 500 jobs, \$254 million in additional wages, and \$5.7 billion in supplier spend, Winchester South has the potential to significantly contribute to the Queensland economy and regional communities," said Mr Flynn.

"Australia's largest trading partners in Asia are relying on projects like Winchester South for an ongoing supply of high-quality coal, to support both energy security and economic development."

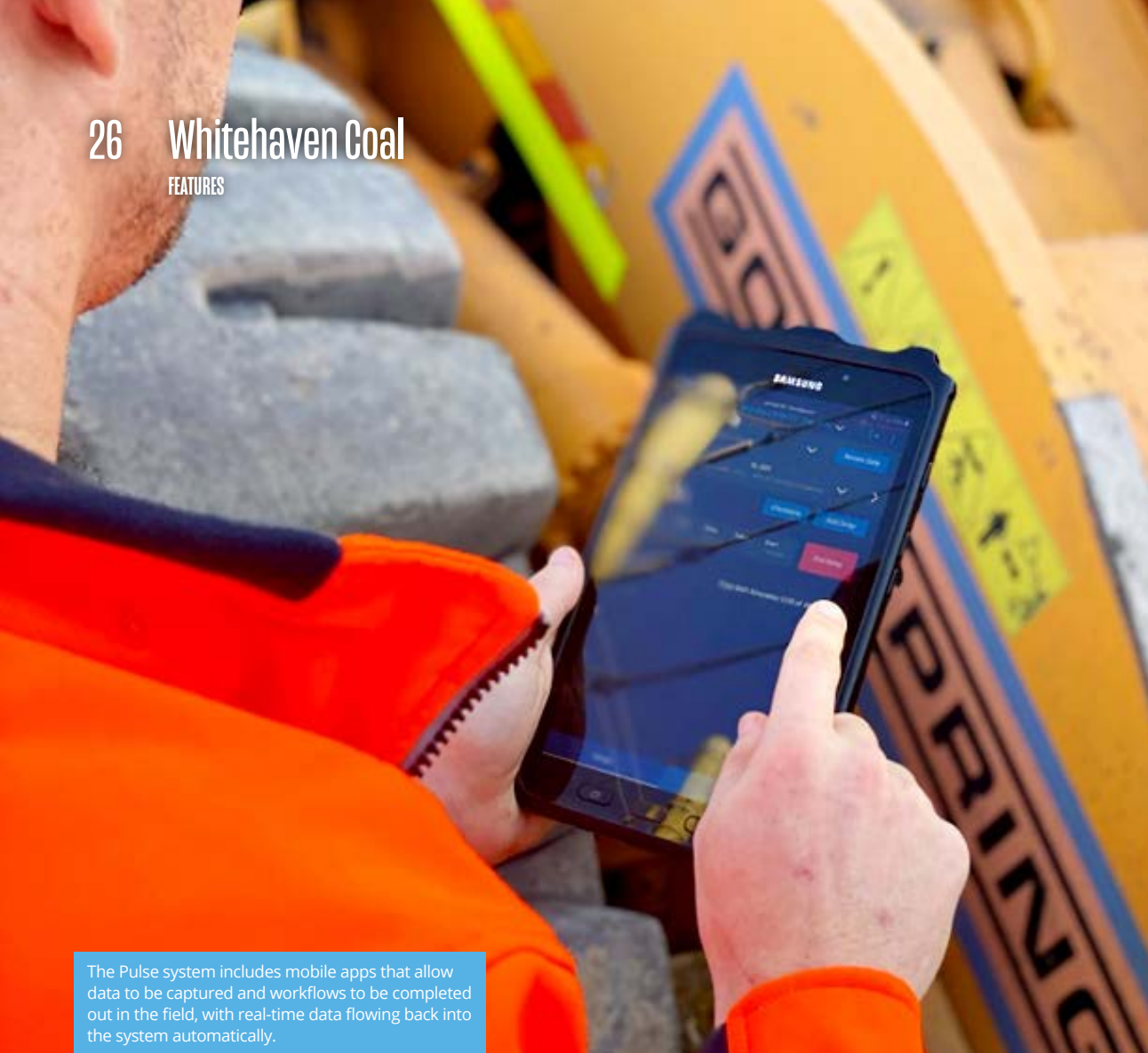
"As some mines reach their end of life, Winchester South can help fill the strong expected demand for Queensland metallurgical coal, while also keeping jobs in the region."

Find out more about Winchester South <https://whitehavencoal.com.au/our-business/our-assets/winchester-south/>. Winchester Coal is encouraging all stakeholders to have their say on the Queensland Government website by 19 December 2022.

Winchester South – key benefits

- 500 jobs during construction and operations
- \$254m in additional wages into the community (NPV terms)
- \$5.7bn to QLD suppliers (NPV terms)
- 30-year mine life supplying international markets
- \$882m additional net economic benefit to QLD (NPV terms)
- \$696m in royalties to the QLD Government (NPV terms)
- \$1bn investment
- Metallurgical coal for steelmaking and thermal coal for energy generation.

*Source: Queensland's Coal Industry and Long-Term Global Coal Demand, Queensland Treasury, November 2022



The Pulse system includes mobile apps that allow data to be captured and workflows to be completed out in the field, with real-time data flowing back into the system automatically.



Back in the 1980s, Pulse started developing software in the company founder's garage. By 1993, Pulse had established an office in this building near Newcastle, NSW, the world's largest coal export port.



Today, Pulse is globally headquartered in a purpose-built facility at the end of the M1 freeway from Sydney. The Pulse team, gathered for this photograph in 2019, has since increased to more than 60 people.

Is Pulse monitoring the heartbeat of YOUR mining operations?

The Australian Mining Review proudly speaks with the Australian software company that developed the world's first mining-specific ERP system and delivered the 'digital mine'.

IT ALL started back in the heady days of the late 1980s. It was a time when popular spreadsheet software Lotus 1-2-3 ruled the market, the Macintosh II computer had just been released – supporting colour graphics for the first time – and the most beloved gaming platform worldwide remained a battle between Sega and Nintendo.

Meanwhile in Australia's Hunter Valley region in NSW, framed by century-old vineyards and coal mines that first began operating in the 1790s, a small group of local computer programmers started creating custom-designed software programs so that mining companies could 'computerise' their data. Think basic data entry tools and spreadsheet information as revolutionary for businesses at the time.

Fast forward thirty-five years to today and the Hunter city of Newcastle is famous as the world's largest coal export port while the information technology sector has been almost inconceivably transformed.

Computers worldwide are now almost all interconnected, telecommunications have become wireless, and virtual reality work and play spaces are being deployed.

Yet the company behind the first wave of customised software systems for Australia's mining sector – Pulse Mining Systems – has also undergone a seismic shift in product development and technological advancement.

In fact, the Pulse ERP (Enterprise Resource Planning) system has evolved into a complete, fully integrated mining management system with mobility, analytics, and the latest digital tools for paperless, automated workflows and real-time visualisations.

Australian owned and developed specifically in response to the unique needs of mining businesses, the Pulse ERP is the only min-

ing-specific ERP system in the world and is used by leading overseas and local mining companies to manage underground and surface operations involving gold, silver and other metalliferous resources, as well as coal, and now also renewable energy production.

Where once the data that mining companies were able to access about their operations was promising but limited, these days the scope of information that can be collected and analysed has become infinitely more diverse and sophisticated.

Data from an array of sources, such as machine sensors; the environment, mobile and tracking devices and the Internet of Things (IoT) more generally, means that companies can have their fingers on the pulse of what is happening in almost any sphere of their business. Captured and validated within the Pulse system, this data becomes the 'single source of the truth' in auditable recordkeeping that the mining business can depend upon.

Capturing such data, of course, is one thing, but integrating, analysing and interpreting this data in time for effective decision making by management is another. What mining companies needed is for management at the strategic, operational and tactical levels of the business to be able to manage the performance of their operations, or particular business units; sites, facilities or teams, in virtual real time.

Responding to this need, the company's mine management reporting system – Pulse Analytics – was first developed more than five years ago. With more than twenty ready-to-go setups in the Pulse Analytics suite, the data captured and analysed from any sources (any ERP system, software, sensors, OEM apps etc) is immediately displayed as actionable Key Performance Indicators on business intelligence (BI) dashboards.

Extensively field-tested in live mining operations, the dashboards are powerhouses of information: visually rich, with charts and data indicating at a glance the current status of user-defined metrics, such as actionable KPIs for particular sites or analyses of different business functions, right down to key parts inside machinery and equipment.

Pulse Analytics has become so compelling worldwide that the dashboards are used to optimise mining production as far away from Australia as Canada and Brazil and have been deployed in manufacturing operations owned by the Australian industrial giant, Visy.

The Pulse ERP is configurable to manage all mining methodologies, resource types, ownership structures, and styles of venture, at multiple sites, anywhere in the world.

Ash Bosworth, managing director and CEO of Pulse, explains the company's ethos when it comes to partnering with mining companies and the benefits the software can bring.

"It's all about getting value out of the information you have," he said.

"Pulse engages with our clients in a very in-depth way, so that we know exactly what it is mining companies need and would most benefit from.

Our Pulse Analytics tool is useful for all levels of an organisation – from a CEO who is interested in KPI and trend charts and other graphical representations of their data – to people at the operational level who need to drill down into a root cause analysis and get right into transactional information, and the tactical management level in between where people might want to see both sides of these things.

The back-end software design by our team is really the strength of the tool and allows us

to develop things very quickly and very easily, in an agile manner, no matter what the data is structured like or what the source is.

Pulse Analytics provides the visibility needed for faster, evidence-based decision-making. Our customers almost always experience a substantial ROI within the first few months."

Indeed, it is Pulse Mining Systems' team of behind-the-scenes experts that is perhaps key to its ongoing successes and capacity for innovation and fast deployment.

With now more than sixty staff including software and app developers, business analysts at the company are typically transitioned from prior roles in the mining sector in areas such as mining maintenance, production, finance and procurement. This means they bring their mining expertise and years of experience into the design of the Pulse system and can easily interpret and anticipate what miners want and need.

As the company consolidates its successes to date and actively helps junior and mid-tier mining operators with fully digital systems for their new businesses to grow into, it is also heeding the call to work with established mining companies where technology may be aging. There are still many older mining companies yet to benefit from using the very latest automation tools and mobile applications and reaping the benefits of having every aspect of their business analysed, visualised and improved upon in real-time.

To book your free demonstration of how the Pulse system would transform your mining business, go to:
www.miningsystems.com/resources/demo
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MINING BUSINESS TECHNOLOGY FAQs

What is enterprise resource planning (ERP)?

Enterprise resource planning (ERP) is the integrated management of main business processes. The state-of-the-art ERP system, like the Pulse ERP for mining, offers a fully integrated, real-time, complete business management system. The Pulse modules are separable, however, with Pulse Production used widely on its own for production management and Pulse Analytics adopted internationally for turning complex mining data scenarios into easy-to-read BI dashboards.

What is business intelligence (BI)?

Business intelligence (BI) formally comprises the strategies and technologies used by enterprises for the data analysis and management of business information. Pulse Analytics is an agnostic BI offering, meaning that data from any number of different sources can be integrated into the dashboard visualisations of analysed data. Pulse Analytics has more than 20 dashboards ready-made for mining, with custom dashboards available plus tools for building your own dashboards from data stacks.

What is the meaning of 'digital mine'?

The term 'digital mine' is used in a variety of contexts for the roll-out of a mining company's vision for digital transformation. This broadly means gathering data from sources such as connected machinery and human inputs at the frontline, ending paperwork and spreadsheet dependencies, having real-time, actionable data, and other attributes available to companies using the Pulse ERP to achieve what Deloitte described generally as "data-driven planning, control, and decision making".

PROUDLY 100% AUSTRALIAN-OWNED AND DEVELOPED, THE PULSE SYSTEM IS PROVEN IN THE FIELD FOR MORE THAN 35 YEARS AND STATE-OF-THE-ART FOR 2023.

DISCOVER
PULSE

Pulse is the only fully integrated ERP system developed specifically for mining. Manage and optimise every aspect of your business with IoT and B2B connectivity, mobility, paperless workflow automation, live tracking, and real-time analytics.

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POWERING YOUR OPERATION



What it means to partner with KelaheR Industrial Services and KelaheR Instrumentation and Electrical

- We are locally owned, locally operated and all our employees are locals
- We have the most experienced and highly skilled people in the region
- We don't compromise on quality. This means better performing, more reliable and longer lasting plant and equipment
- We provide full visibility and transparency over your project through our industry leading customer communications app
- We provide full turnkey solutions utilising our electrical and construction teams
- You benefit from engaging a single contractor with all trades in-house, translating to better quality control and improved time and cost-efficiencies

The Kelaher family is raising the bar for New South Wales industry with their tailored range of mining services.

Spread across sister companies Kelaher Industrial Services and Kelaher Instrumentation and Electrical, the business-oriented family have brought more than 12 years of industry experience to North West NSW with a strict focus on performance and partnerships.

Established in 2015, Kelaher Instrumentation and Electrical provides engineering solutions designed to reduce downtime, increase efficiency and optimise flow and output.

The company specialises in maintaining mobile and network coverage – even in black spot regions – to support project communication systems.

Kelaher Instrumentation and Electrical also tests and repairs instruments, as well as provides electrical supervision and project management.

Kelahers Group Director Kayla Kelaher said Mitch Kelaher originally founded the business, which under his leadership bloomed from 3 employees to 14.

She said this quickly became a market leading company in the Gunnedah region of New South Wales, which motivated her family to see what more they could offer to local industries.

"Kelaher Instrumentation and Electrical is a leading electrical contractor and this position has been built and sustained by our unwavering commitment to service, our consistently superior performance standards and by curating a team comprising of the very best people in the area," Ms Kelaher said.

"Our reliability has created trusted partnerships with our clients, underpinning our business growth.

"We believe we created a really strong foundation with Kelaher Instrumentation and Electrical, so we decided to see what more we could do.

"In 2020 we saw an opportunity to expand our services into the mechanical and construction fields and as such Kelaher Industrial Services was launched.

"In just under 3 years it has grown from 3 employees to now employing nearly 60 staff.

"This is a credit to our team, our values, and

the fantastic partnerships we have with our clients."

Offering steel fabrication, construction, repairs and maintenance, Kelaher Industrial Services is 100 per cent owned and operated by an Indigenous woman with experience servicing Gunnedah and surrounding areas.

The company employs electricians, communication technicians, boilermakers, diesel mechanics, fitter machinists, builders, industrial painters, sheet metal specialists and operators.

Work is carried out from a well-equipped workshop and mobile service, which supports a wide range of projects spanning standalone fabrication or repair to turnkey solutions integrating construction and electrical.

Leveraging the expertise of their dedicated team, Kelaher Industrial Services caters to operations of any size across mining, oil and gas, agriculture and other sectors.

Mrs Kelaher said the company's willingness to dive headfirst into challenging projects had earned them a strong reputation in their region and meant Kelaher Industrial Services and Kelaher Instrumentation and Electrical were fast becoming the partner of choice for operators in New South Wales.

"We are recognised throughout the region for our ability to undertake a vast range of complex and challenging maintenance and construction projects that require a high level of expertise and diverse experience," Ms Kelaher said.

"We value integrity, and we work hard to maintain this by consistently providing a safe, high quality and cost-effective solution that exceeds expectations.

"Our combined business goals are to provide the Gunnedah region with a complete turn-key solution utilising our electrical and construction teams.

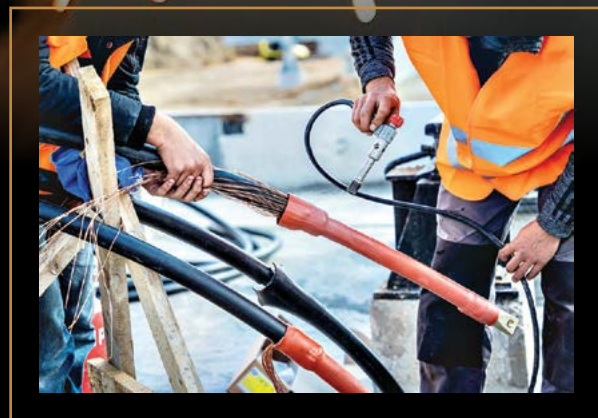
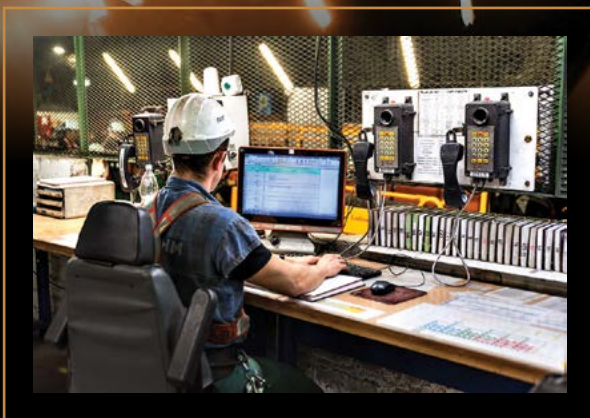
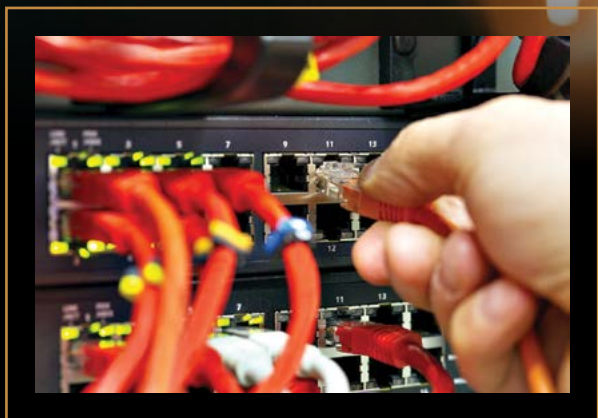
"Kelahers Group genuinely believes that there is no job too small or too big and there is no trade we wouldn't attempt to provide.

"We always strive to exceed our clients' expectations and provide a service that is second to none – after all, our clients are why we are in business."

For more information visit the Kelaher Industrial Services and Kelaher Instrumentation and Electrical websites. **AMR**

THE KELAHER MISSION

The Kelaher team has a simple mission. We are inspired to be the most trusted specialist services group in the delivery of projects, operations and maintenance services.



OUR POINT OF DIFFERENCE

KELAHER INSTRUMENTATION AND ELECTRICAL IS
GUNNEDAH'S LEADING ELECTRICAL CONTRACTOR.

We have been improving coal, gas, water, agriculture and commercial processes since 2015. Kelaher Industrial Services is 100 per cent owned and operated by an Indigenous woman. We're a fresh brand that has hit the ground running in the steel fabrication, construction, repairs and maintenance space.

Get in touch with us today.





THE ELECTRICAL AND ENGINEERING SPECIALISTS



When you're operating in complex industrial environments, customised electrical and engineering systems tend to be commonplace. Sophisticated mineral processing assets that utilise multiple tech platforms require the electrical expertise of seasoned professionals.

With the further electrification of plant equipment and machinery, it's no surprise there is an increasing demand for custom electrical equipment designed to suit specialised componentry.

Power Control and Communications (PCC) has always been an early adopter of new and emerging technology. The company specialises in end-to-end project delivery from design to installation, as well as one-off customised projects for complex industrial settings.

Whether it's designing purpose-built equipment, motor control centres, wireless communications, or solar-powered electrical installations, PCC delivers reliable products that meet industry best practice outcomes.

Based in the country town of Gunnedah, the specialist electrical and engineering business services mines across the North West and Central West regions of New South Wales.

"When you need a customised electrical solution for your unique work environment, we've got the expertise, team and resources to make it happen," said PCC's Rick Chorley.

"We've designed and built a solar skid for a communications tower, solar-powered boom gates, power maintenance gear for underground mining operations, and engineered specialised control centres for infrastructure projects," he said.

"Other services we manage include instrumentation systems, fibre optics, as well as water monitoring, pumping and management services."

In 2017, PCC identified a gap in the market for specialised electrical and engineering services. The company has since built a reputation for delivering high quality, tailored solutions that meet the unique electrical requirements of its clients.

"We provide quality electrical and engineer-

ing solutions to the mining sector, large-scale industrial operations, government agencies and major infrastructure projects," said Rick.

"From the design and engineering stage, to installation, commissioning, and maintenance, we manage the full end-to-end process for our clients when it comes to all their electrical services.

"It's about offering a seamless solution from a single supplier, and simply removing the headache out of dealing with multiple technicians from different service providers."

PCC also supporting mining companies with their environmental monitoring activities. Forecasting and predictive modelling are helping assets improve their production and cost management through forecasting and predictive modelling.

Monitoring environmental factors such as noise, vibration, emissions, dust, temperature and rainfall, provides real-time data insights that help mine operators make better decisions, whether its scheduled maintenance, onsite blasting activities, or shift changes.

"We work with clients to install and connect their monitoring infrastructure at strategic locations within their site network," said Rick.

"From the installation of sensors on earth-moving equipment to the site perimeter, we ensure the latest technology is setup in a way that helps companies capture data from all their onsite activities to keep them as productive as possible.

The PCC team has grown to over 35 electrical specialists capable of providing a complete suite of electrical and engineering products.

"Our clients expect reliable products, high quality standards, and a technical team they can trust to get the job done," said Rick.

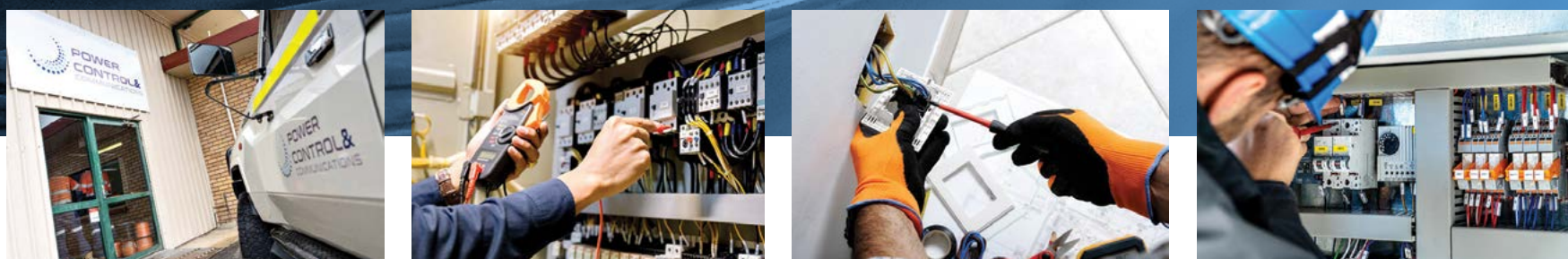
"That's why we provide a customised approach that aligns to their specific site layout, plant processes and industrial applications."

For more information, visit
<https://www.pccs.net.au/>

AMR



ELECTRIFIED SOLUTIONS



When you need a specialised electrical and engineering service, Power Control & Communications has the solutions. We support mining and industrial operations, government agencies and large-scale infrastructure projects around Australia.

From purpose-built equipment to environmental monitoring systems, we deliver end-to-end project delivery and custom solutions designed for the most complex sites.

Contact us today to learn how we can help you transform your site into a more connected and productive asset.

P: 0419 629 105

 www.pccs.net.au



STRENGTH IN PARTNERSHIP



Australian Conveyor Technologies and GFS Engineering have spotlighted the value of strong partnerships with their collaborative conveyor system solutions – products supporting Narrabri's industrial and mining community.

Located some 500km northwest of Sydney, Narrabri industry has flourished over the past decade, leaving companies hungry for local and experienced service providers that can meet their requirements.

Included in this exciting growth is Whitehaven Coal's Narrabri Mine, an underground operation approved to produce 11 million tonnes per annum of high-quality thermal coal until 2031.

Australian Conveyor Technologies General Manager Michael Egan said his team have been involved with the Whitehaven project since inception, delivering design, manufacture and conveyor equipment and component supply.

"We also support the safety and productivity of their operation by providing engineering design reviews on conveyors, including belt design calculations for required power and tensions.

"But a major part of our service is our partnership with GFS Engineering, which allows us to deliver complete OEM engineered equipment package solutions

for the Narrabri underground conveyor system – all through a local facility."

GIVING CLIENTS AN ADVANTAGE

Servicing Narrabri for roughly a decade, GFS Engineering is a family-owned business delivering a range of manufacturing and engineering services.

The company provides highly responsive fabrication, maintenance, and repair services to the underground mining sector in North West NSW.

Currently, GFS Engineering is the exclusive supplier of continuous miner components to Whitehaven, spanning mesh carrier pins, mesh carriers, access platforms, steps and handrails.

GFS Engineering Business Manager Roz Gale said the handrails were a newly developed design and the result of company collaboration.

"This was the brainchild of GFS and Whitehaven Coal staff working together towards a common outcome – increasing user safety," Ms Gale said.

"The results have been great, and we have seen these benefits in our partnership with Australian Conveyor Technologies too.

"Australian Conveyor Technologies are experts in providing certified, engineered

equipment, drawings, solutions and safety files.

"GFS Engineering then manufacture the equipment and install onsite making it a turnkey solution.

"Our businesses have a symbiotic working relationship that allows our teams to flourish within their areas of expertise and deliver fantastic outcomes for clients."

LOCAL SOLUTIONS FOR LOCAL PROBLEMS

Ms Gale said GFS Engineering's Narrabri location meant the team could promptly identify and address any issue onsite, providing Whitehaven with a highly responsive service that minimises downtime.

She said clients could be confident they would receive products manufactured from the highest grade of raw product with attractive turnaround times.

Broadly, GFS Engineering and Australian Conveyor Technologies are able to tackle challenges effectively due to their strong understanding of mining sector needs.

Mr Egan said it was common knowledge that operators achieved the best results when they worked with trusted Australian providers with an acute knowledge of industry and commitment to high standards.

"Having an intricate knowledge of how remote Australian underground mines work enables us to produce quality, reliable conveyor equipment, solve engineering problems and provide local tailored solutions that other companies are not equipped to provide," Mr Egan said.

"Our background and experience in conveyors, allow us to service Whitehaven successfully, as well as Hunter Valley mines and coastal mines in a timely manner.

"We work closely with key stakeholders onsite to develop viable solutions for their businesses.

"As a company, Australian Conveyor Technologies ACT is committed to delivering safe, reliable and robust bulk handling solutions for clients and we partner with businesses at the top of their game that are dedicated to the same.

"That forms the basis for our relationship with GFS Engineering.

"And it's how we make sure Whitehaven and other clients get what they need, on time, every time." **AMR**

For more information, visit
Australian Conveyor Technologies
www.ausconveyor.com.au and
GFS Engineering
www.gfsengineering.com.au

ABOUT AUSTRALIAN CONVEYOR TECHNOLOGIES

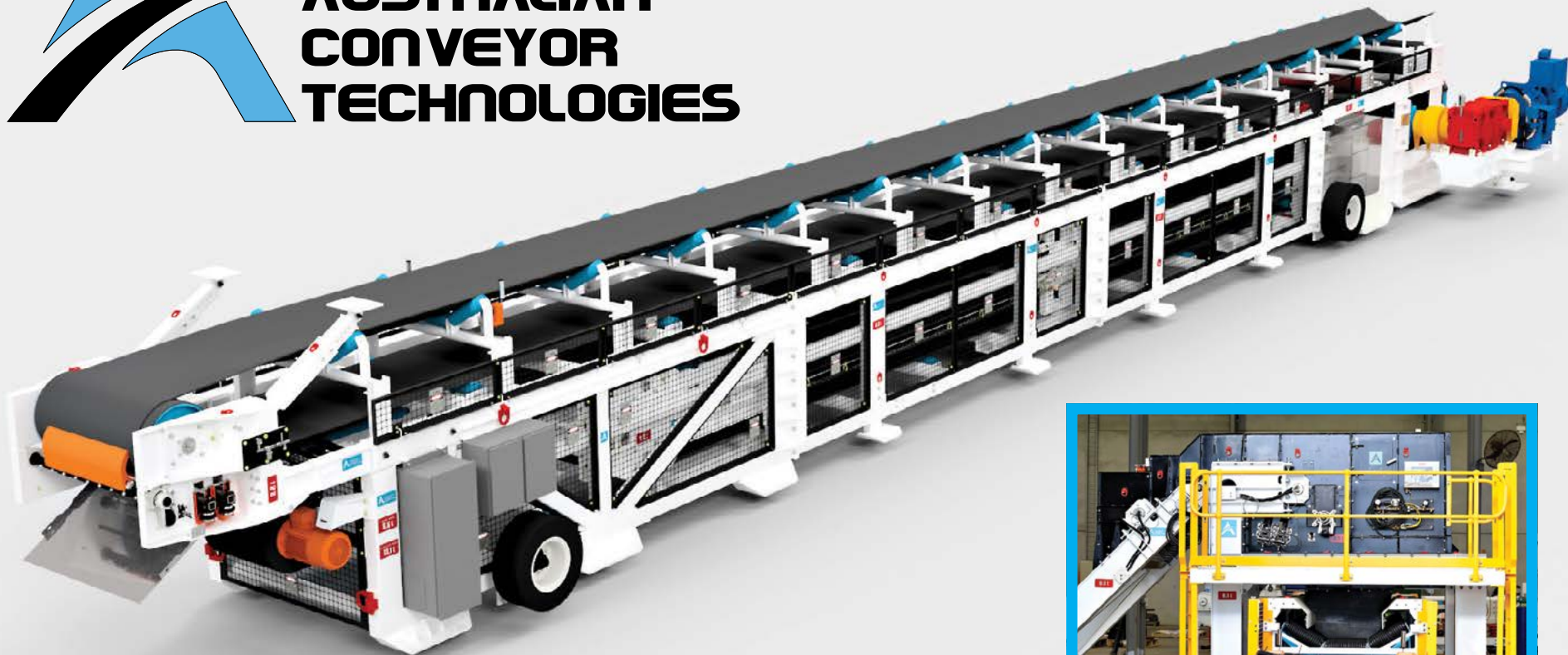
Australian Conveyor Technologies is a reformed Original Equipment Manufacturer-engineered conveyor equipment specialist in the Australian mining industry. With over 100 years of collective experience within our team we have the capabilities of competitors but outmatch them with tailored solutions and designs. Our specific design techniques are proven to cut costs for mines and deliver successful and effective bulk handling solutions for operators.

ABOUT GFS ENGINEERING

GFS Engineering is a family-owned business established by Andrew Gale, a Narrabri local with over 35 years' experience in the engineering and metal fabrication industry. GFS are known for high quality precision workmanship, quick response time, and the ability to problem solve and create innovative design solutions. They have fostered long term relationships with their clients and provide a range of services that integrate seamlessly with onsite operations.



AUSTRALIAN
CONVEYOR
TECHNOLOGIES

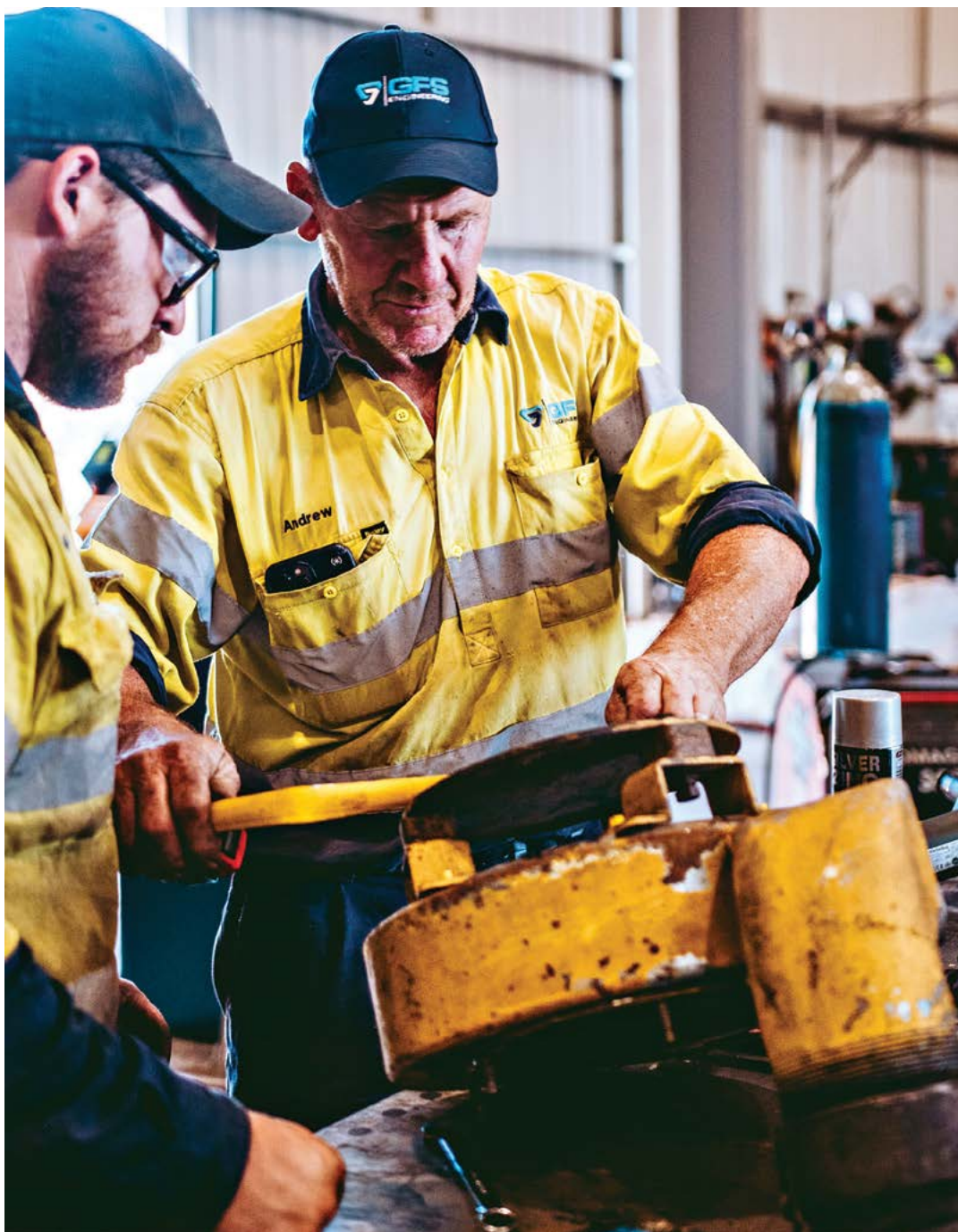


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HELPING YOU WORK SAFER AND SMARTER

The preferred choice for value-add Electrical Enclosure Systems, LED Lighting & Poles for Industry + Mining, Solar Trailers & Skids for Lighting + Communications

Phoenix LED Lighting

Phoenix Engineering & Manufacturing Solutions™ has completed a considerable amount of work on Whitehaven sites over an extended period of time.

Across our Phoenix EMS Iso-Connect portfolio, Phoenix EMS has successfully delivered a full range of Visible Break Isolators, Local Control Stations, Control Panels and Field Panels.

Additionally, Phoenix EMS are the preferred supplier for LED Industrial/Mining Lighting and are currently undertaking a program involving LED Bulkhead replacements onsite at Maules Creek utilising our Illuminator world class Phoenix EMS LED Lighting product.

The Illuminator™ is designed to push the light further than ever before with 15 metre spacing across Conveyor, Walkway and Platform Lighting.

Phoenix EMS strongly values our relationship with Whitehaven Coal and site preferred contractors, along with the opportunity to provide our products and services to the business.

Our market segments include OEM (Original Equipment Manufacturer), Mining, Coal, Metalliferous, Quarries, Concrete, Materials Handling, Distribution, Power Generation, Energy & Utilities, Water, Ports, Wharfs & Waterways, Chemical, Processing & Refineries.

Our manufacturing capability is enhanced by fully resourced engineering, planning, scheduling and purchasing. This allows Phoenix EMS to handle product variations as well as engineer bespoke designs.



DRIVING YOUR PRODUCTIVITY TO THE NEXT LEVEL

Whitehaven Coal 35
FEATURES

Emeco is delivering a new standard in mining rental reliability with their modern fleet of heavy earthmoving equipment.

With operations in all key mining regions of Australia, the business has one of the largest rental fleets of earthmoving equipment in the country, offering close to 1000 machines from leading brands.

The fleet is supported by a rigorous maintenance program propped up by a network of component rebuilding workshops that help operators extend the life of their equipment.

Emeco NSW General Manager Stephen Crofts said Emeco's capacity for repairing and rebuilding machines was now second to none, earning the company a strong reputation for rental reliability.

"We invested in Force Equipment to have total control over how our machines and components are rebuilt," Mr Crofts said.

"We own and operate workshops nationally and employ our own field service teams to have total control over how our equipment is maintained.

"We're obsessive about our machines so you always get the best reliability from them.

"But that's not the only reason we have become a trusted provider to the Australian mineral resources sector.

"EOS is a big part of that, too."

EOS is Emeco's fleet optimisation technology platform that brings a high-powered, contemporary edge to the earthmoving fleet.

The platform tracks shift performance in real-time, measures payload, dig rates, shift efficiency and machine utilisation.

Mr Crofts said these features meant operators were able to identify and address underperformance quickly, drive productivity forward and save operational expenses.

He said EOS was available on equipment rented or can be installed on client-owned machines.

"We believe anything that can be measured can be improved," Mr Crofts said.

"Big data is transforming mining globally,

and we wanted to deliver results for the sector in Australia, too.

"It means better information, better decisions, better predictions and overall, better performance."

Founded in 1972, Emeco has a half-century history of supporting Australian industry, with operations across the country's key mining regions.

Their highly experienced team already supports mining companies and contractors across coal, gold, copper, bauxite, iron ore and nickel, with a power group of services across their other businesses including component and asset rebuild company Force Equipment, line boring company Borex and Pit N Portal, a company that offers underground equipment rental as well as open pit and underground mining services.

Mr Crofts said Emeco ultimately wanted to offer high-value equipment and results for clients, so the team shaped their brand into a earthmoving rental one-stop-shop.

"What we offer is the experience that comes with providing for a sector for 50 years," Mr Crofts said.

"It means we understand exactly what operators need out of their earthmoving equipment, and we have adapted to make sure we can deliver.

"Our fleet is reliable and we assist our clients get the most out of their equipment to maximise productivity.

"That's the Emeco way."

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AMR



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RECORDS TUMBLE BUT THERE'S NO RESTING ON THE LAURELS FOR RIO IN THE PILBARA

BY DALE GRANGER

Rio Tinto's extensive rail network in the Pilbara spans 2000km.

Gazing down from the giddy heights of record financial results, Rio Tinto has reset the horizon in the Pilbara as it polishes the jewel in the company crown for continued radiance reflecting the largest mine replacement programme in the company's history.

The global mining supermajor paid its highest ever dividend of 1,040 cents per share in 2021, resulting in total shareholder returns of US\$16.8 billion flowing from a net cash haul of US\$25.3 billion.

The cash cow, once again, rose out of the red earth of the Pilbara, which accounted for 75% of net cash flow for the year from the company's 17 mines in the region transporting iron ore to four port terminals via a rail network spanning 2000km.

The grand hurrah had shareholders purring like Cheshire cats in a cream factory contemplating the record dividend payout of US\$16.8 billion. Australian supply chain business were also in good cheer considering that A\$8 billion was spent with suppliers in Western Australia, a 42% slice of the entire cake which Rio Tinto had dished up to all of its global suppliers.

Rio Tinto explained the windfall saying that iron ore prices and demand hit unprecedented heights in 2021 with China imports remaining well above one billion tonnes as consumption in the rest of the world largely recovered to pre-COVID-19 levels.

"The steel intensity of the global economic recovery also lifted steel prices and steelmaking profitability across regions to record levels, and global crude steel production grew by almost 100 million tonnes year on year – one of its largest absolute annual increments in history – to an unprecedented total of almost two billion tonnes," Rio Tinto said.

But much like the mountaineer who finally gets to summit Mt. Everest to savour the view, only to suddenly realise that there is a ceiling to even the loftiest ambitions, after such an epic year the question now posed of Rio Tinto in the Pilbara is: what now?

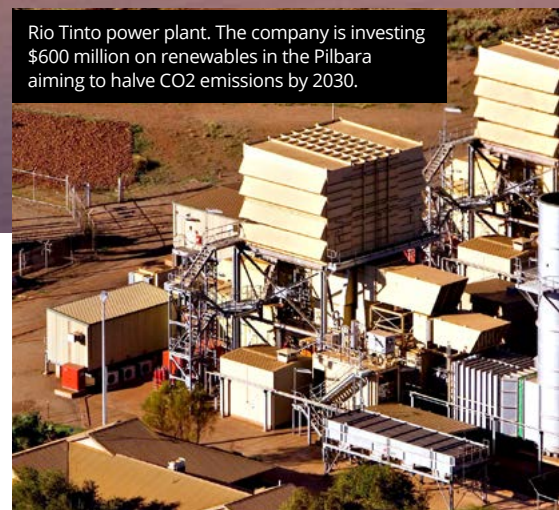
The buzzword is sustainability and with a focus on expansion, Rio has taken a number of key decisions in recent years to keep the trains on track by commissioning and ramping up a number of Pilbara growth and minefield replacement projects aimed at replacing 130 Mt of capacity from older and declining mines. These have included:

Advancing the \$2.6 billion Gudai-Darri, Rio's first greenfield iron ore mine in the Pilbara in more than a decade and its largest ever mine replacement programme. First ore was delivered in June this year and production is ramping up to full capacity of 43 million tonnes per annum in 2023. The company's most technically advanced production hub will replace depleting orebodies and provide incremental capacity. The mine will make its debut as one of the most technologically advanced in the world, but Rio Tinto has

admitted that unavoidable and unexpected setbacks, such as lingering pandemic issues, supply chain disruptions and inflation had disrupted the schedule and impacted the budget.

- The Robe River joint venture (Rio Tinto 53%, Mitsui 33%, Nippon Steel 14%) celebrated its 50th anniversary on October 5 having shipped 1.7 billion tonnes of iron ore and the good news is there will be many more cargoes to come. The JV has approved a US\$1.6 billion (\$0.9 billion Rio Tinto share) investment in the Robe River Joint Venture replacement iron ore mines, which are progressing apace. First ore at West Angelas (C and D deposits) was achieved in June 2021 and first ore at Robe Valley (Mesa B, C, H) ensued two months later. More recently, ongoing Mesa A wet plant construction and commissioning challenges had impacted production ramp-up. New wet plant components were on order with production operating at a reduced capacity until repairs are completed.
- The \$0.8 billion Western Turner Syncline phase 2 mine, which will also replace existing iron ore production, achieved first ore in October 2021, following commissioning of the autonomous mining truck fleet.
- At the Winu copper-gold project Rio has reported progress towards securing consent from the Traditional Owners

Rio Tinto power plant. The company is investing \$600 million on renewables in the Pilbara aiming to halve CO2 emissions by 2030.



in advance of submitting the necessary environmental and regulatory approvals. Drilling, fieldwork and study activities continue towards first production in 2024, having initially been flagged for 2023.

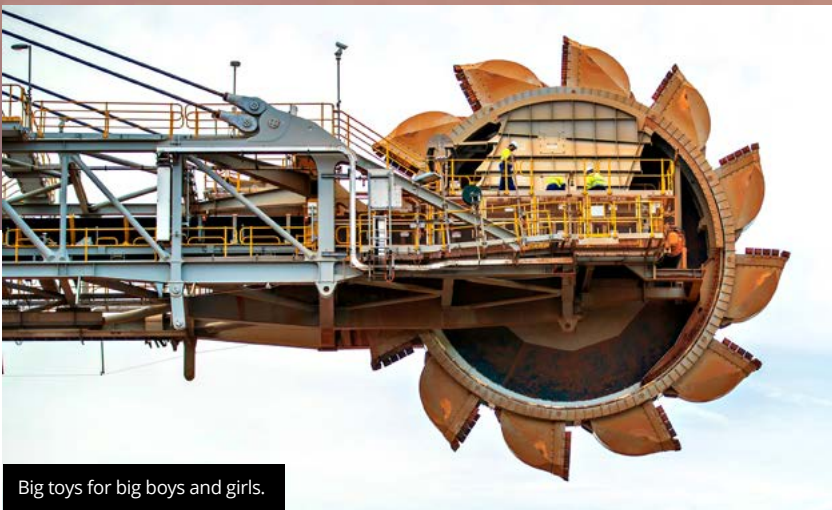
- Investment in the Greater Tom Price operations (Western Turner Syncline phase 2) to sustain iron ore production capacity includes construction of a new crusher and a 13km conveyor. Rio said this investment would enable sustained production of its Pilbara Blend™ and facilitate mining of existing and new deposits around Tom Price. The project achieved first ore in October 2021, in line with previous guidance.

Rio said the capacity of its Pilbara system over the medium term was between 345 and 360 million tonnes per annum and to reach and sustain the upper end of the range would require the next tranche of replacement mines to be approved and brought onstream.

Key projects include Western Range,



Rio sends its wares to world markets via four ports in the Pilbara.



Big toys for big boys and girls.

Bedded Hill Top and Hope Downs as well as Brockman Syncline 1 to be delivered between 2025 and 2027.

“We continue to engage with and work closely with our communities, Traditional Owners, and governments to seek approval for the new mining projects,” Rio Tinto said.

The company is well on the road to decarbonising its business and announced it would spend \$600 million in renewable energy projects in the Pilbara as it aims to halve CO2 emissions by the end of the decade.

“The delivery of one gigawatt of renewables in the Pilbara will support abatement of about one million tonnes of our CO2 emissions. Two-thirds will come from the displacement of power generation gas emissions, and one-third from providing electricity to enable the transition away from fossil fuels,” Rio Tinto said.

On the drawing board are two 100MW solar projects and a 200MWh on-grid battery storage to be installed by 2026.

“The Pilbara is extremely well-positioned to take advantage of renewable power with land, access to people, and abundant wind and solar resources,” said Rio Tinto Iron Ore CEO Simon Trott.

Any doubts that Rio Tinto isn’t in the Pilbara for a long game would have been firmly extinguished in November when the company and Wright Prospecting, the billionaire descendants of Lang Hancock’s business partner, Peter Wright, announced plans to develop the Rhodes Ridge project in East Pilbara.

The two parties had an existing agreement dating back to 1972 that had been idling on the runway until the afterburners were lit with the announcement that an order of magnitude study would consider development of an operation before the end of the decade with a capacity of up to 40 million tonnes of iron ore.

Rhodes Ridge, located 40km north-west of Newman, contains 5.8 billion tonnes of high-grade mineral resources at an average grade of 62.3% Fe. The project’s total resource, 6.7

billion tonnes at an average grade of 61.6% Fe, represents approximately one-third of Rio Tinto’s existing resource base in the Pilbara. At press time a resource drilling program was underway to support future project studies.

“Rhodes Ridge contains one of the biggest and best undeveloped iron ore deposits on the planet with proximate access to existing infrastructure. We are very excited we have been able to strengthen our relationship with Wright Prospecting and have a pathway to bring this high-quality resource to market,” said Trott.

“With its significant resource base, the Rhodes Ridge project has the potential to underpin production of the Pilbara Blend in the decades ahead,” he added.

Investment bank Goldman Sachs crunched the numbers and reacted to news of the new mine suggesting that Rio Tinto’s figures were conservative.

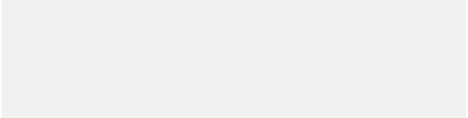
In a note to clients, Goldman Sachs’ Australian analysts Paul Young, Hugo

Nicolaci and Caleb Heiner said they believed the mine could be capable of delivering up to 200% more iron ore than what Rio and Wright had flagged.

“RIO is studying a 40Mtpa operation with first production by the end of the decade, but we think the deposit can support a 40-120Mtpa iron ore mine, and model 80Mtpa, with first production possible in 2028,” the note to clients said.

“We think Rhodes Ridge will be part growth, part sustaining, pushing RIO’s Pilbara production up >10% and over the 2017 production target of 360Mtpa, offsetting depletion from existing operations such as the 100% owned Tom Price/Western Turner Syncline (WTS), Channar, Yandi and Brockman/Silvergrass mines/hubs, and JV mines West Angelas and Robe River.” **AMR**

All images courtesy of Rio Tinto.





POWERING AUSTRALIA'S TOUGHEST PROJECTS

When you've earned the trust from companies like Snowy Hydro and Fortescue, it's no wonder Australia's top tier companies look to Viking Industrial for reliable, high quality solutions.

As Australia's largest fixed speed diesel specialists, Viking Industrial continue to set the benchmark in its trade, offering custom equipment to suit specific asset requirements.

Whether it's powering accommodation camps in innovative world-first projects, purpose-built solar trailers and fuel storage for remote mine sites, or portable industrial lighting towers built for the harshest environments, no challenge is off limits.

Viking Industrial offer convenient rent or buy options across their entire product range, which gives clients flexibility to meet dynamic project and budget demands. Being independent of engine manufacturers means it's uniquely positioned to source equipment directly and build bespoke power solutions aligned to client applications.

According to Viking Industrial BD and Brand Manager, Simon Luu, the company provides the complete package, from a comprehensive equipment range to a delivery strategy to meet project lead times.

"We offer installation, commissioning, training, and servicing, ensuring equipment is well maintained and productive while in use," said Simon.

"Our modern fleet gives our clients peace of mind they're receiving equipment in excellent condition."

"Our core business is really to provide reliable and cost-effective power to Australian projects at every stage. We aim to keep each project running safely, efficiently and on time – that is our promise."

The Australian Mining Review recently spoke with a few members of the Viking Industrial team to shine a light on some of their exciting projects.

Joel Keep – GM Sales

As part of the CPB-Ghella JV project in NSW, Viking Industrial supplied a range of power and lighting solutions for Station Boxes and Tunnelling (SBT) works on the Sydney Metro Western Sydney Airport line.

"Fourteen of our reliable VSLT 240 solar LED lighting towers were supplied to the project, along with six new generators ranging from 60kVA to 100kVA, plus some existing machines from the M4/M5 project, including one of the new 100kVA generators fitted with a custom exhaust purifier," said Joel.

"It's a real buzz watching our team operate, from planning and sizing a project, assembling and testing the equipment here in our workshop, and then finally seeing it arrive on site.

"As we enter the end of 2022, we are proud of how many large-scale projects we are supporting with fixed speed diesel power, solar lighting, fuel cells, cables and pumps. Additionally, our service team continues to be best-in-class, offering 24/7 national support and qualified electrical and mechanical expertise."

Will Fisher – West Coast BDM

Viking Industrial have powered all critical equipment to-date for BCI Minerals' Mardie Salt and Potash Project, the largest solar salt evaporation project on the Pilbara coast.

"We initially supplied four gensets and two fuel systems to power their 400 person camp, including power packages for their borefields, and standby power for critical administration amenities," said Will.

"We are now powering the first seawater primary intake pump station, which will be pumping seawater into the salt ponds.

"Thanks to the service team at our Karratha branch, we are located in close proximity to the site, allowing us to provide 24/7 service and maintenance for all our equipment."

Simon Luu – National BDM

The new Anglo American Aquila coal mine situated near Middlesbrough has supported Viking Industrial's expansion into the heart of North and Central Queensland.

"We tendered directly with Anglo American to provide a 2.5mVA generator and 40-foot self-bunded fuel cell to the site," said Simon. "Along with the huge genset, our service team provided full testing, commissioning, and transportation to the site."

Luke Rennie – Rental Director

"We've helped power Oz Minerals' new West Musgrave mine site in Western Australia,

and their team has been an absolute pleasure to work with," said Luke.

"What's impressed us is the level of awareness the company brings to their project, from working with local Indigenous communities and environmental organisations, to having a positive impact on the region."

"Oz Minerals have truly set the bar for how these types of projects can operate in harmony with local communities."

Viking Industrial have delivered four 500kVA generators to power initial living quarters and other critical infrastructure, as well as bore pumps and refuelling pumps.

"The mine site is fairly remote and situated near the borders of WA, SA and NT. Our team at the Karratha branch did a fantastic job getting the work over the line, and the Pilbara location has become crucial for us in

serving our Northern WA clients in the best way possible," he said.

Viking Industrial are a privately owned 100% Australian company, providing world-class diesel plant and equipment solutions.

It's footprint is growing with more branches strategically located around the country to deliver efficient serviceability to critical client projects. It has recently established new facilities in Cooma and Karratha extending its national footprint to six dedicated branches.

It offers a range of solutions from power, air, and water, to lighting and fuel storage with the flexibility to fully customise products to meet projects of all sizes.

For more information, please visit
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THE DREDGING EXPERTS

Dredging Solutions is leading the charge in sludge and sediment removal with its customised dredging services – an approach putting both clients and results first.

With locations in Perth, Sydney and Townsend, the company offers bespoke dredging and dewatering solutions to projects across Australia in the municipal, marine, industrial, power and mining sectors.

Managing Director Bill Kelly said Dredging Solutions had a vast amount of experience servicing Australia's mineral resources sector, using cutter and auger suction dredges depending upon the application. He said most clients required dredging or dewatering of sedimentation basins, blow-down ponds, tailings dams or mixing ponds and his team offered a customised solution for each request.

"We believe every project requires an individual approach," Mr Kelly said.

"So, we sit down with the client and make sure we understand their operation and what they want to achieve.

"This approach has allowed us to effectively tackle even the most complex dredging and dewatering problems.

Ahead of the Technological Curve

Dredging Solutions individualised dewatering services are underpinned by their

broad and transportable dewatering equipment range, spanning geotextile dewatering tubes, centrifuges, and filter presses.

These passive and mechanical technologies are matched by regular dredge and pump products, which enable the company to dewater a range of sludges and slurries.

The pre-eminent Australian contractor has had particular success with geotextile tubes, which present a viable storage medium for dewatered solids until they can undertake secondary processing.

Mr. Kelly said since the 2001 introduction of geotextile dewatering technology into the domestic market, Dredging Solutions has been at the forefront of utilising geotextile dewatering tubes for a variety of different projects.

He said depending on the project, a particularly effective solution was CRS Envitubes®, which have been used to dewater fly ash ponds, restore capacity to run-off ponds, dewater mine tailings and isolate contaminated marine sediment.

"CRS Envitubes® are high strength woven geotextile bags suitable for mining and industrial applications which can handle a wide range of materials," Mr Kelly said.

"Envitubes® are highly suitable for projects with ample space available on site and time

to allow the material to passively dewater.

"They represent an attractive alternative compared to mechanical dewatering technologies, highlighted by 24-hour continuous passive dewatering, excellent filtrate quality, high capture rate and unmatched feed flows.

"The benefit of utilising Envitubes® is emphasised by low CAPEX and OPEX costs compared to flow-limited mechanical dewatering alternatives as they are engineered to cater for large (>400m³/hr) flows governed only by pipework size and manifolding.

"Our team has a lot of knowledge and experience in this space – so once you tell us about your project, we can absolutely recommend the best solution for you."

Our Promise to Clients

Mr Kelly said Dredging Solutions know-how and mining project success had positioned it as an industry leading dredging and dewatering contractor known for reliability and top-quality service.

The company counts some of mining's big-

gest names on its client list – including BHP and Rio Tinto – and has also earned a strong reputation in other industrial settings.

Contributing to this reputation is Dredging Solutions' commitment to safe work practices and high environmental standards, which ensure that projects run smoothly and compliance measures are met.

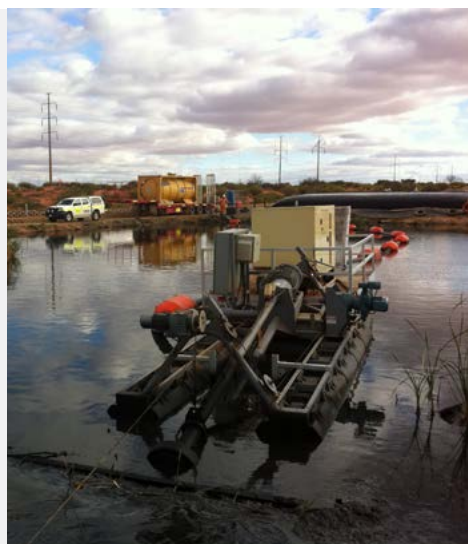
Mr Kelly said ultimately, the team wanted to deliver a safe and quality job at a good price.

"We take pride in offering our extensive fleet of cutting-edge equipment to customers requiring assistance with sludge and sediment difficulties," Mr Kelly said.

"With various dredging and dewatering options available to select from, combined with the wide variety of ancillary services we offer such as sludge surveying and biosolid beneficial reuse, we are well placed to tackle any project."

**For more information, visit
www.dredgingsolutions.com.au**

AMR



Meet our Dredging Fleet

Ruby K and Coonawarra

These demountable cutter suction dredges are fitted with GPS hydrographic monitoring systems and sophisticated environmental safeguards. They operate off anchored wires and/or spud carriages and feature soundproofed engine rooms to minimise noise emissions and further reduce environmental impact.

Rotomite 6000

This manned, air conditioned unit is a traverse cable secured diesel-powered auger suction dredge that can be transported easily via truck and deployed using a 60MT crane. The operator can articulate the cutterhead to keep the cutting teeth at right angles to the face of the dredged material. Coupled with the hydraulically powered ladder, which uses the dredges weight, this dredge can harvest compacted in-situ material if required.

FLUMP

The flump is a remote controlled auger suction dredge allows onsite operators to minimise contact with potentially hazardous materials. This flexible remote controlled unit incorporates a variable speed dredge pump and traverse winch system, along with auger head depth control and quick setup cable traverse system allowing for precise dredging and removal of a range of in-situ material.

DINO 6

The manned diesel powered Dino 6 auger suction dredge weighs only 1.7MT and has been designed to perform jobs inaccessible to other equipment.

PHOENIX

The Phoenix is a remote controlled, pontoon mounted, 6" Tsurumi submersible pump. It provides a safe and economical option for a wide range of dredging activities.



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Landside personnel inspect tyre imports at Port Hedland.

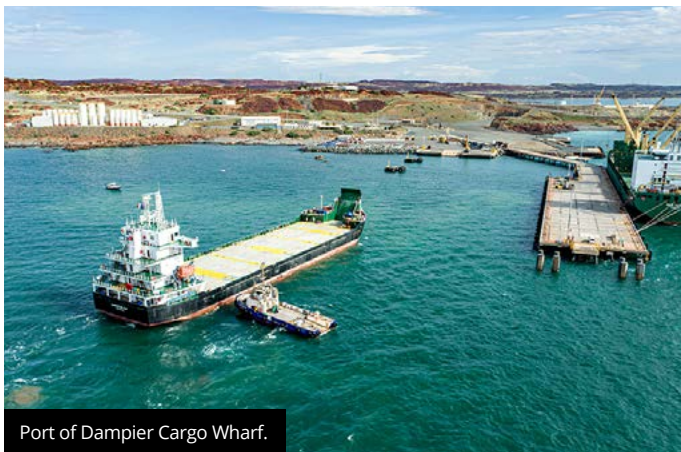


Port of Ashburton Materials Offload Facility.



Port of Hedland.

Lakeside operations at Dampier Cargo Wharf.



Port of Dampier Cargo Wharf.



Port of Varanus Island.

PILBARA PORTS

RAISES THE BAR AFTER RECORD EXPORTS & REVENUE

by Dale Granger

Some rival industries might debate the issue, but the Pilbara Ports Authority can stake a claim to having played the biggest single role in shoring up the Australian economy in the 2021-22 financial year which saw a record \$165.8 billion worth of commodities passing primarily through the ports of Hedland and Dampier.

Pilbara Ports Authority (PPA) CEO Roger Johnston said this was the accumulation that flowed from 17,376 safe vessel movements which had shipped 42% of the world's iron ore cargoes and almost 7% of global LNG trade - with 561.1 million tonnes (Mt) carried through the passage of Port Hedland and 161.9 Mt via the Port of Dampier.

Over the last decade mining has contributed \$254 billion in taxes and royalties to state and federal coffers. Australia's largest source of export revenue (\$413 billion in the last financial year) accounted for 10% of GDP and sustained 1.1 million jobs and the most significant conduit for this was Western Australia's Pilbara Ports.

In the 2021-22 financial year alone, mining paid a record \$43.2 billion in taxes and royalties after doing the heavy lifting that carried the country through the COVID-19 pandemic by keeping the economy afloat. Western Australia, ranked by the Fraser Institute as the top region in the world for mining investment, was the heavyweight champion as the source of 98% of Australia's iron ore and 60% of the country's gold reserves.

PPA, which counts Hedland, Dampier and Varanus Island under its umbrella, was proud of the crucial role it played keeping the ships sailing and the trains on track. The latest figures represented the fourth straight year of increased activity following 724.7 Mt in 2020-21, 717.2 Mt coinciding with the peak pandemic years of 2019-20 and 697.3 Mt in 2018-19. The FY2017-18 figures were 699.3 Mt.

Recent success has prompted PPA to sustain the upwards trajectory by growing capacity and diversifying trade across its ports with a number of expansion initiatives revealed

in its Port Hedland Development Plan. A revised version of the plan, which has been endorsed by the state government, will facilitate growth of iron ore exports to 660 Mt per annum as a result of infrastructure upgrades and investment growth strategies, including:

- Development of an additional iron ore export berth at Stanley Point Berth 3.
- A future bulk liquids berth in South West Creek.
- Development of a second general cargo berth at Lumsden Point.
- Increased capacity allocations of approximately 25% for existing port proponents BHP, FMG and Roy Hill.
- A new FMG shiploader on Anderson Point Berth 5 to support exports from the Iron Bridge project.

The review was embraced by Ports Minister Rita Saffioti, who said: "It is pleasing to reach this point. The Port of Port Hedland Plan was last reviewed in 2012, when it set a total throughput of 495Mtpa.

"We have well and truly exceeded this, with the port achieving a total annual throughput of 546Mt last financial year - of which 523 million tonnes were iron ore exports by port proponents.

"This in part was made possible by investing in world-leading maritime technologies to maximise port efficiency and safety, which has seen a 6.9% increase in potential shipping capacity at Port Hedland.

"We have made changes that will create jobs and provide certainty to industry. This updated plan will contribute to dredging and future development at Lumsden Point. I look forward to the plan being finalised in the coming months, which will support the long-term growth of the port of Port Hedland."

Modelling by ACIL Allen recently found that the development of Lumsden Point would increase Australia's GDP by \$18.7 billion (\$565.5 million per annum), boost WA's Gross State Product by \$10.0 billion (\$304.3 million per annum) and support 456.4 full time equivalent jobs by 2055.

Pilbara MLA Kevin Michel was as enthused: "This critical economic infrastructure will also enable the expansion of direct shipping services from Asia to the Pilbara, with the port of Port Hedland seeing an increase in container volumes over the past 12 months, resulting in lower costs for businesses and consumers.

"Lumsden Point will become the main export pathway from the Pilbara for battery metals and minerals, with growth of lithium and copper concentrates, which are used in the production of electric vehicles."

Australian Mining Review* will be following the unfurling story of the expansion of Pilbara Ports as we move into 2023. **AMR

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'TIME WAITS FOR NO MINE'

MAXIM KEEP THUNDERBIRD ON TRACK

Thunderbird plant site.

Glasses were raised at *Sheffield Resources'* West Perth office on the last day of October as the company's flagship, 50% owned Thunderbird Mineral Sands Project - currently under construction in north-Western Australia - passed the halfway point on the road to completion.

This was something to celebrate against the

background of a mining industry dusting itself off from still too close for comfort COVID-19 conundrums still absorbing the aftershock ripples of labour shortages and supply chain headwinds.

In an update *Sheffield Resources* announced that EPC construction by *GR Engineering Services* was on schedule at Thunderbird,

including steel structure installation and the delivery of long lead items, such as gravity separation spirals. Power generation facilities were also progressing well, as was construction of the tailings' storage facility, supported by local contractors that included Aboriginal business and contractor *Maramara*. At the current rate of development, at press time Thunderbird was on track for commissioning by as early as August 2023 with first sales on cue for early 2024.

Thunderbird developer *Kimberley Minerals Sands*, a JV company equally owned by *Sheffield Resources* and *Yansteel*, had kicked another significant major in September by securing approval from the Environmental Protection Authority of Western Australia for the bulk export of products from the Port of Broome - adding an alternative deep-water option to already sanctioned Port of Derby arrangements.

Thunderbird is located on the Dampier Peninsula, midway between Derby and Broome. *Yansteel's* investment in the project was subject to Australian Foreign Investment Review Board approval, which was granted in December 2020 giving the Chinese steelmaker a 50% interest in the mine. The catalyst for construction at the world class, \$484m project was a \$130m equity injection from *Yansteel* that ensued in late 2020.

The majority of Thunderbird's ilmenite product is destined for *Yansteel's* Titanium Dioxide plant in China for pigment production purposes. All products will be exported in bulk with approval granted for up to 30 sailings per annum out of Broome and approximately 7 round truck trips per day from the mine site to the port. KMS is seeking an amendment to the current Ministerial Statement, expanding capacity to ~26 round trips per day in Stage 1 and ~42 in Stage 2.

Thunderbird envisages exporting up to 1.5million tonnes per annum of bulk mineral sands from Broome, increasing to 1.6 million tonnes in Stage 2 contingent on a second FID pencilled in for the fifth anniversary of operation around 2029.

Sheffield Resources Executive Chair, Mr Bruce Griffin, had a sparkle in the eye reflecting recent successes on the rapidly unfurling pathway to production: "It is great to see further significant progress on site with the commencement of steel structure erection ahead of equipment installation. Thunderbird site construction activities are continuing in full swing following the FID decision in October (somewhat anachronistically with construction already underway)," he said.

"We also welcome the approval from the EPA for the export of bulk product from the Port



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...CONTINUED ON PAGE 46



Accommodation village.



A LEADER IN PROCESS DESIGN AND ENGINEERING

GR Engineering Services Limited (GRES) is a leading process design and engineering company which supports mining developments from study to operation.

The ASX-listed company provides fixed price Engineering-Procurement-Construction (EPC) and Engineering, Procurement and Construction Management (EPCM) project delivery services to the mining and minerals processing industries internationally.

The innovative engineering solutions developed by GRES enable its clients to confidently move into development with the knowledge that the outcomes from study work will be reproduced in the operation of their projects.

GRES has a proven track record of delivering integrated project solutions, having provided services in more than 20 countries and across a vast range of precious metals, bulk mineral concentrates and industrial commodities projects.

GRES has a presence in the Americas via its wholly owned subsidiary Hanlon Engineering & Associates, Inc. (Hanlon), based in Arizona, USA.

In the hydrocarbons industry, GRES also has a presence via its wholly owned subsidiary, Upstream Production Solutions (Upstream).

In mid-2021 GRES acquired MIPAC who were founded in Brisbane in 1997, a leading glob-

al provider of control systems engineering, automation and technology services.

GRES has successfully completed feasibility studies, process and engineering designs and construction for projects of various scale covering a diverse range of metalliferous and mineral commodities.

The company has delivered mineral processing, hydrometallurgical facilities and infrastructure for a range of clients, both in Australia and internationally.

With extensive experience across a range of commodity types, including gold, copper, lithium, graphite, iron ore, lead and nickel, the company is equipped to provide solutions for all types of mining projects.

GRES is pleased to continue working with Kimberly Minerals Sands (KMS), a joint venture between Sheffield Resources Limited and Yansteel Global Holdings Australia in developing the Thunderbird Mineral Sands Project in the Dampier Peninsula. Thunderbird is one of the largest mineral sands deposits hosting valuable heavy minerals including Ilmenite, Zircon, Leucosene, Rutile and Anatase.

GRES have been associated with the Project since 2017, completing a bankable feasibility study update, front end engineering design and an early works scope prior to the full Project award in October 2022. GRES looks forward to working with the KMS team to safely and successfully deliver the Thunderbird Mineral Sands Project. **AMR**

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CONTINUED FROM PAGE 44...

Tailing dam construction.



Processing Plant.



Spirals.



Plant steel installation.



Ilmenite and Zircon.

of Broome. With first customer deliveries on track for Q1 2024, this provides Thunderbird with a second bulk handling and export option, in addition to the Port of Derby.”

The economic metrics of the project brightened further in late September when the JV signed a five-year agreement for Woodside to supply 650 terajoules of liquefied natural gas (LNG) to Thunderbird from Woodside’s Pluto LNG Truck Loading Facility near Karratha. The LNG will be transported in a purpose-built road tanker fleet owned and operated by WEJV. Western Australia has an abundance of natural gas and the state has legislated domestic supply obligations from major exporters operating on the North West Shelf, which has made energy prices in WA the envy of Australia. After five years the LNG supply agreement has a five-year extension option.

Mr Griffin said, “We are extremely pleased KMS have established a strong relationship with Woodside and EDL as they support KMS by delivering a low cost, efficient energy solution for Thunderbird. Thunderbird construction is continuing to advance at a significant pace and remains on track for first production in early 2024.”

KMS also awarded a 9-year mining services contract to globally experienced mineral sands contractor, *Piacentini & Son* with an option to extend the agreement by a further 5 years.

Piacentini will provide a Mining Unit Plant (MUP) at Thunderbird and operate heavy mobile equipment to excavate and deliver ore to the MUP, ahead of delivering processed materials to the Wet Concentrator Plant.

Mr Griffin said, “The award of the mining services contract to *Piacentini & Son* was one of the final remaining commercial steps to completing the project financing arrangements for Thunderbird. We look forward to *Kimberley Mineral Sands* and *Piacentini* establishing a long and successful partnership as we bring the world class project into production.”

Thunderbird is fully funded to first production and it is estimated that the

project will deliver an annual average EBITDA of \$121m to *Sheffield Resources* and an estimated NPV of \$695m over the ~40-year life of the mine.

Dr Chris Baker, mining analyst at Bridge Street Capital Partners, said supply-demand metrics were favourable for Thunderbird.

Commenting in an investment report, Dr Baker said: “We believe SFX’s Thunderbird will begin delivering zircon into what will continue to be an undersupplied market for several years. Zircon has been the victim of a lack of exploration success and lack of capital investment by the major suppliers over recent decades (in particular Richards Bay Minerals, Iluka, Tronox).

“New supply has been driven by the juniors, such as Image, Base and Kenmare and from Strandline’s soon-to-be commissioned Coburn project. In all, this bodes well for zircon pricing in the medium term.”

Geoscience Australia said zircon’s hardness made it useful as an abrasive and high melting point characteristics (over 2500°C) allowed it to be used to line furnaces for the steel industry.

Being extremely hard and resistant to corrosion, zircon is also used to make pipes for harsh chemicals, cladding for nuclear reactors, heat exchangers and speciality alloys. Zirconium products are used in engines, electronics, spacecraft and the ceramics industry.

In November TASS reported that Russia had developed and successfully tested the Tsircon (Zircon) hypersonic missile.

The Soviet news agency stated: “A prototype of a mobile launcher for a coastal missile system with a Zircon hypersonic missile has already been created. As in the case of the Bastion missile defense system, the launcher will carry two missiles.”

Russia claims that the missile will nullify the most high-tech US air defence systems due to its tremendous speed which creates air pressure in front of the projectile and a plasma cloud that absorbs radio waves, thus rendering radar systems ineffectual. **AMR**



CIVIL CONTRACTING AND MINING – HAND IN HAND

For majority Indigenous-owned company Maramara, social good and business go hand-in-hand.

Based in Western Australia’s Pilbara region, the civil contracting company specialises in wet hire services for the State’s mineral resources sector.

The company provides a wide range of cutting-edge machinery and equipment, including high-quality, low-hour earthmoving equipment and plant.

Maramara’s low-loaders fleet and drop deck truck range means its team can transport any in-house plant with ease, while the company’s highly skilled HD fitters and mechanics keep all machinery and equipment in top condition.

Maramara General Manager Michael Still said the company was highly regarded for its civil supervisors, operators, managers, truck drivers, mechanics, site administrators and labourers.

He said each member of the team was experienced, known for delivering safe and efficient results and proudly part of company

actively seeking and nurturing Indigenous talent.

“Our underlying ethos is providing rewarding career pathways for Indigenous Australians,” Mr Still said.

“We are a majority Indigenous-owned company with experienced leadership that is focused on developing our team, providing growth opportunities for them and increasing Indigenous participation in the sector.

“And this mission goes hand in hand with delivering great service and results for our clients.

“We’re known for many things – our people, our service, our culture and our knowledge of the Pilbara and Kimberley terrain.”

Mr Still said Maramara had hit the ground running since the company was launched a few years ago, now supporting multiple mining projects in Western Australia, including Thunderbird Mine located between Derby and Broome.

The company was engaged earlier in 2022 to provide a variety of services, including

bulk earthworks, civil earthworks and site surveying.

Mr Still said Maramara was an attractive partner for projects like Thunderbird because of its Derby-based office, which meant operators could rely on quick on-ground support.

He said his crew’s knowledge of the Pilbara terrain was matched only by their ability to provide accurate expertise, highly responsive support and comprehensive end-to-end solutions.

“Maramara is an Indigenous word meaning ‘hand in hand,’” Mr Still explained.

“It’s the name of our company and it rep-

resents our relationship with our clients – we’re growing together, hand in hand.

“We don’t succeed unless our clients succeed, so we make sure our team is at the top of their game when it comes to delivering services and support.

“Our clients know that when they engage with us, they’re getting honest and practical advice.

“That’s the foundation of every relationship we build.”

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Nova Nickel Shone on the Resources S

Largely driven by record sales revenue at Nova Nickel Mine, IGO Limited recorded a bumper year in 2022 as it ticked a number of big boxes on its ambitious journey to playing a critical role in the decarbonisation of the planet.

The company said revenue from continuing operations, comprising primarily Nova, increased 34% year-on-year as a result of consistent metal production and a significant growth in average nickel, copper and cobalt prices.

The flow on effect was IGO's investment in the Australian lithium assets of TLEA delivering its first annual profit contribution to the Group.

The acquisition of Western Areas on 20 June 2022 further bolstered IGO's nickel asset portfolio, providing a platform for additional growth and returns to IGO shareholders over the next decade.

Nova's record sales capped a robust FY22 performance in which the operation delivered on production guidance and beat cash costs guidance, which IGO described as "an outstanding result" given the industrywide cost pressures.

This strong performance culminated in full year EBITDA of \$631.2 million at Nova, a 45% increase over the prior period.

IGO's lithium business also performed strongly in its first full year contribution to group earnings, with net profit from TLEA of \$176.7 million for FY22. This result was due to IGO's 24.99% economic interest in the Greenbushes Operation, which on a 100%

basis delivered \$1,348.5 million in EBITDA and \$890 million in Net Profit After Tax.

Greenbushes' FY22 spodumene production and unit Cost of Goods Sold (excluding royalties) were both within guidance at 1,134,580t and \$238/t respectively. Results from the Kwinana Refinery were also included within IGO's reported net profit from TLEA. A total of \$41.2 million in EBITDA losses was recorded, primarily as a result of commissioning activities at the Kwinana Refinery, which progressed positively with the first production of battery grade lithium hydroxide achieved in May 2022.

Collectively, the consistent operating performance and strong metal prices helped deliver a record underlying EBITDA for the fourth year running of \$716.9 million, a 51% increase on the prior year.

The nickel, copper, cobalt and lithium focussed producer was able to expand following the company's Western Areas transaction. Production was within guidance and cash costs were lower than expected at the company's 100% Nova Operation located in the Fraser Range, approximately 360-km southeast of Kalgoorlie.

"Our nickel business, which has recently expanded following the Western Areas transaction, has performed well. Nova nickel production was within guidance and cash costs were better than guidance for FY22, while we continued to advance development of the Silver Knight project," said Peter Bradford, IGO Managing Director and CEO.

"We have also worked quickly to integrate our new colleagues from Western Areas

into the IGO family, and progress important programs of work designed to optimise the Cosmos and Forrestania operations and deliver synergies."

Discovered in mid-July 2012, the Nova deposit only came online in July 2017 after a two-year construction and commissioning phase, before reaching nameplate capacity in December 2017.

In FY22 Nova achieved total production of 26,675 tonnes of nickel, 11,483 tonnes of copper and 982 tonnes of cobalt at a cash cost of A\$1.95/lb Ni (payable).

The company has set guidance for the 2023 financial year at 24,000 to 27,000 tonnes of nickel, 11,000 to 12,000 tonnes of copper and 900 to 1,000 tonnes of cobalt.

"At the core of our strategy is our belief that we have a critical role to play in the decarbonisation of our planet. Through the nickel, copper, cobalt and lithium products we are delivering to our customers, we are enabling the manufacture of high-performance lithium-ion batteries which, thanks to the accelerating roll out of electrified transport, are helping to displace fossil fuel emissions and the resulting impacts on the environment," Bradford said.

"We continue to be focused on operating our business to the highest environmental, social and governance standards on the belief that how we work is as important as what we do."

Moving into 2023, the company said exploration and discovery would be a key focus as it strives to deliver organic growth. In

2022 IGO said it had already zoned in on and identified and tested a range of targets across its portfolio. IGO has highlighted identified extensions to the Silver Knight sulphide ore body, proximal to Nova, as well as further maturation of their knowledge of the geology at the Paterson, Kimberley and newly acquired Broken Hill projects.

Bradford said, however, that the company's resilience had been tested in 2022 as COVID-19 infection rates had increased in Western Australia - which had prompted a number of operational safeguards.

"I am proud of the way in which all our people showed care, adaptability and patience during this time and that we were able to avoid any material disruption to our business," Bradford said.

In FY22, the IGO Board focused on key work areas designed to ensure oversight of IGO's environment, social and governance (ESG) performance, and its sustainability programs in general. These included improved workplace culture, continued development of relationships with Traditional Owners and the company's response to climate change.

"The concepts of inclusivity and diversity have long been part of IGO's unique culture and something we are all proud of. However, recent independent and government led reports have highlighted the broader mining industry has a lot more work to do in this area. IGO has had an ongoing program of work to ensure that our culture is one that creates a safe and inclusive environment for all of our people," IGO said.

The company's relationships with Tradition-



Stage in 2022



al Owners remains a focal point given IGO's high levels of ongoing exploration activity across a broad portfolio.

"In particular, through formal and informal training and education programs, we seek to ensure that every IGO employee understands their responsibilities to not act against the interests and concerns of the host communities in which we operate. Further, the Board is pleased with the progress that has been made on our response to climate change, with commitments to the expanded solar farm and energy storage system at Nova, placing the business on a path toward achieving our aspiration to be carbon neutral by 2035," IGO said.

In the short term, the company said it would focus on the successful integration of Western Areas into IGO, the development of Cosmos through to first production in mid-2023 and the continued expansion of the lithium business at Greenbushes and Kwinana.

IGO Chief Financial Officer Scott Steinkrug said the company was able to produce at \$1.95 per payable round of nickel produced in 2022 – having previously guided at \$2.00 to \$2.40/ as a result of controlled expenditure, despite inflationary cost pressures during the year. Unit cash costs had also benefited from strong realised copper and cobalt by-product prices.

FY22 represented another outstanding operating and financial result for IGO, one characterised by strong commodity prices and operational consistency across IGO's nickel and lithium businesses.

Nickel is used to make stainless steel and in

2022 supply was significantly reduced due to global sanctions imposed on Russia, one of the biggest exporters of the rare metal, for its invasion of Ukraine.

In lithium-ion batteries it is used in large quantities in cathodes to reduce the use of other more expensive metals, such as cobalt, which sells for up to twice as much.

Nickel has been used increasingly in nickel manganese batteries, which can contain up to 80% of the metal. It has been anticipated that nickel use in North America, which has greater driving distances than Europe and China, will increase as the rollout of electric vehicles gains momentum.

Australia is tied with Indonesia with the world's largest nickel reserves, but Western Australia is the only producer of nickel in the country and contributes 7% to global markets. In 2020-21, nickel was Western Australia's fourth most valuable mineral sector, worth \$3.5 billion. According to the WA Department of Mines, Industry Regulation and Safety; China, South Korea, Japan, Netherlands and the United States account for around 82 per cent of WA's nickel exports.

In early December UK company Altilium said it was partnering with New Generation Minerals to launch a new nickel processing technology in Western Australia. The partnership aims to promote, market and license the DNi Process to extract nickel, cobalt and other metals in laterite ore.

Altilium said it would commence scoping studies ahead of building the first planned DNi Process plant in WA. **AMR**



The accelerated production of EV cars has made nickel a prized commodity.

A close-up, profile view of a male mining worker wearing a black hard hat with a bright orange headlamp. He is also wearing safety glasses and yellow earplugs. He has a beard and is looking upwards and to the right with a slight smile. The background is a blurred underground mining environment with warm, orange-toned lights.

Leaders in hard-rock underground mining

Our purpose is to create enduring value and certainty for our clients and we are proud to continue our strong relationship with IGO Limited

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CONTINUING TO LEVERAGE THE COLLECTIVE SKILLSET

Nova Nickel 51
FEATURES



Barminco is one of the largest hard-rock underground mining service providers in the world. With over three decades of experience across Australia, Africa and North America we have developed a deep operational capability comprising of our people, expertise, equipment, systems and processes.

In all our partnerships, Barminco looks to create enduring value and certainty for our clients, and we recognise the importance of IGO being one of our longest running continuous relationships.

Barminco's history at Nova dates back to 2015, undertaking the initial portal works at the site and continuing to partner with IGO after it took over the project in 2017.

Our strong partnership is built on honesty and trust allowing both companies to resolve issues, highlight opportunities and optimise performance in a safe environment for all employees.

The recent acquisition of Western Areas by IGO creates a larger, single-ownership portfolio, that includes operations at Spotted Quoll, Flying Fox and Odysseus, in addition to Nova.

Perenti Contract Mining Vice President Australia, Mick Radi said the partnership with IGO across the takeover sites fits with Barminco's purpose of creating certainty and enduring value that supports our strategic objectives, and generates competitive returns that attract further capital investment.

"Barminco had previously operated the Western Areas projects so there's now a greater opportunity to create an enduring partnership with IGO and operate all four mines under one general agreement," Mick said.

"This will allow us to maximise flexibility and productivity for all four ventures across the group and provide synergies that unlock value across the IGO portfolio.

"The deal represents a logical consolidation of key nickel assets in WA for IGO and it's exciting for Barminco to be involved with a company that shares a vision of a sustainable future."

ESG (Environment, Social and Governance) aspects also form a cornerstone of the Barminco/IGO partnership.

"Both companies are committed to leveraging the collective skillset, driving world class performance, safety and implementing leading technologies," Mick said.

"An area of focus for both parties will be to further explore electrification opportunities for the resources industry, with plans to introduce battery electric vehicles (BEV) into the medium-sized fleet.

"By partnering with IGO we'll be able to gain the learnings from operating electric vehicles over their life cycle in an underground environment, helping us gain insight into power consumption, power demand and power supply as well as maintenance costs and operational performance.

"It's important for Barminco and IGO as electrification is still emerging within the underground resources industry globally. It's an opportunity to establish ourselves at the forefront of the BEV market and be leaders in electrification within Australian operations."

Barminco is a Perenti Group company.

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A NEW CHAPTER OPENS UP FOR HALL OF FAMER CSA COPPER

BY DALE GRANGER

The grand old mining legacy lives on, albeit with a golden chapter drawing to a close in the 151-year annals of the CSA Copper mine as Swiss mining giant Glencore prepares to step aside after 24-years, having sold the Cobar copper mine in NSW to Metals Acquisition Group (MAC) for US\$1.1 billion.

Glencore, who has owned the mine since 1998 and took the reins after it had been placed in receivership a year earlier under its previous owner, Ashanti Gold Fields, before restarting operations in July 1999, will retain a US\$50 million equity stake in MAC and a 1.5% net smelter return life of mine royalty after the transaction is completed in the new year.

Had the mine not closed down under financial duress in the 1990s, it would today be Australia's longest continually operating mine, with its 151-year history eclipsing that of the Mount Yell Copper Mine in Tasmania, which was discovered in 1883, by 15-years.

CSA Copper still has another 15-years of life remaining until the end credits roll up the screen acknowledging those who had key roles to play on a mine story that came to life in 1871 with the discovery of copper, lead and zinc as a precursor to the development of the mine in the early 1900s. It was named CSA after the nationalities of the mine's first owners who were Cornish, Scottish and Australian.

For some 70 or so years, mining occurred on an ad hoc basis at CSA Copper until 1961 and the discovery of a major resource by Broken Hill South Pty Ltd, which fast forwarded the transition to an underground operation in 1965. In 1980 the mine was acquired by CRA, who sold it to Golden Shamrock in 1993 in the same year that they were acquired by Ashanti Gold Fields.

Today CSA Copper stands tall among the global elite as a producer of the fourth highest grade copper on the planet. The resource ore grade averages over 5% at CSA

with some as high as 12%, making it one of the richest copper ore deposits anywhere.

Australia, a global mining superpower, ranks fairly low in the pecking order of copper producers, reinforcing CSA Copper's status for high quality output considering that the Lucky Country is the sixth largest producer of the red metal, according to the US Geological Survey, and produces only 4% of global supplies. Chile, with 27%, tops the list of 13 significant copper producing countries followed by Peru (10%), China (8%), Democratic Republic of Congo (8%) and the United States (6%). In 2021 total global copper production was 21 million tonnes. Copper demand is expected to increase by almost 600% within the next eight years, primarily driven by the rollout of electric vehicles which require up to 12 times more copper than fossil fuel vehicles.

The deal with MAC, a Special Purpose Acquisition Company which has a listing on the New York Stock Exchange, has valued CSA

at 4.5 times anticipated earnings and is being funded by a combination of debt, equity and cash.

The mine produces up to 50,000 tonnes of copper in concentrates each year, with silver as a by-product, operating 24 hours a day, seven days a week. It employs 500 people, including contractors, and its wares are railed 700km to Newcastle for export to smelters in Asia.

The nearby township of Cobar, located 11km away, has been a major beneficiary of the mine as many employees and contractors live in the area. The mine has focussed on positively impacting the close-knit community by supporting local and regional businesses wherever possible.

The central western New South Wales mine is not only one of the oldest and most prestigious in Australia, it is also one of deepest stretching 1.9km into the earth.

Within its catchment area is a treasure trove encompassing 820km² of tenements, which Glencore has flagged as having the potential to expand and extend the future life of the mine beyond the expected 15-years.

This would be a highly desired outcome in an age in which copper has become highly coveted with the price surging 83% within the past 33 months and peaking at a five-months high of US\$3.95 per pound in mid-November. Notwithstanding the fact that the price of copper has been suppressed by lockdowns in China as part of the global superpower's zero-tolerance policy towards combatting the Covid-19 pandemic, the rust-resistant metal has surfaced as a critical catalyst for a low carbon energy future.

Copper's vast range of household and industrial uses ranging from electronics, renewable energy and electric vehicles batteries and everyday products such as smartphones, electrical wiring, electricity production and transmission, circuit boards of iPads and Xboxes, plumbing, air conditioning units and car batteries.

Glencore says that copper "will continue to play a major role in enabling the global transition to a low carbon economy. It is the best non-precious conductor of heat, cooling and electricity and drives energy efficiency. Found in wind turbines and solar panels, it is 100% recyclable." **AMR**



An aerial view of CSA Mine in the present day.



CSA Mine in the 1960s.

FEELING THE VIBE



As a subsidiary of one Europe's leading manufacturers of electric and pneumatic vibrators, Aussie industrial vibration specialist Oli Vibrators is making waves down under.

The company's products are powering critical plant equipment in some of the country's flagship mining operations including shifting a range of materials in different applications.

When Copper Resources Australia needed a pan feeder capable of moving 275 to 350 tonnes of crushed copper sulphide ore per hour, it was clear which vibrator motors would be reliable enough to deliver a controllable flow within the conveyor system.

ToThink Engineering, an Australian owned equipment company specialising in vibrating screens, vibrating feeders and apron feeders, were engaged to devise a solution.

The new solution would replace an under-performing machine that had previously been installed onsite. The machine was used in a reclaim application feeding a conveyor under a stockpile. Its poor performance led to operators having to utilise wheel loaders to up the production rate by shifting material from the stockpile, and re-introducing it

further along in the process, bypassing the pan feeder altogether. The replacement feeder also had to fit within a similar space to the previous model.

Fitted with two Oli MVE3000/1 vibrator motors, ToThink's VRF900X2500 pan feeder proved the ideal solution.

Knowing the world-renowned reputation of OLI technology, ToThink continue to partner with Oli Australia to secure reliable, high-performance vibrator motors for use in their pan feeders and vibrating screens.

The new VRF900X2500 pan feeder is consistently delivering 380 tonnes per hour of material to the tunnel conveyor.

In addition to the feeder's high performance, the customer benefited from both availability of spare parts, and specialist technicians locally in Australia, for both the vibration motors and rubber springs.

According to Oli Australia General Manager, Mark Thompson, the joint effort between Oli Australia and ToThink Engineering was a

great example of two Australian companies delivering equipment that is assembled and manufactured here in Australia.

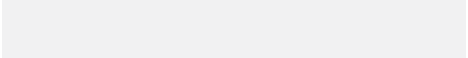
"Although the past two years have proven a challenge for most industries, our business has managed to effectively combat supply chain challenges, whilst continuing to maintain sufficient stock levels to keep our customers productive," said Thompson.

"We navigated through some turbulent global disruptions, but in the end it really came down to more diligent forecasting to ensure we could service our customers.

"2023 is gearing up to be a huge year for the Oli Vibrators team with new innovative products on the horizon," he said.

"We're well stocked and focused on expanding our product portfolio to meet the evolving needs of our customers here in Australia."

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AERIAL SURVEYS SET TO SOAR AS NET-ZERO 2050 TARGET DRIVES DEMAND

Aerial surveys of mine sites serve multiple purposes.

The magnitude of the task confronting global industries on the journey to net zero emissions by 2050 has presented the mining industry with steep challenges, according Jo Knight, Chief Customer Officer at geological software solutions provider, Sequent.

"There is huge demand for a better future overall, but one has to consider that a mobile phone contains 80 mineral elements. The world is unifying around net zero carbon by 2050 initiatives that sets us on this path of mass electrification and in the United Kingdom by 2030 they will cease to sell petrol and diesel cars," Knight said.

"But in every single electric motor there are more than one kilo of rare earth minerals. This changes demand dynamics which are now being driven by international policy, national government policies, product manufacturing. Our own consumer behaviour and societal demand is generating a demand curve that is arguably unsustainable.

"When we talk about mass electrification everyone is talking about lithium and research done by Benchmark Mineral Intelligence suggests we are going to need 385 new lithium mines by 2035. That means one opening every 12 days.

"But what if we told you it takes on average 15-years to open a single mine. You can take some of the guesswork if that's feasible or not. I would say it's a challenge. Then let's talk about the copper challenge. Solar, wind and renewable energy sources are 10 -20 times more copper intensive than traditional ways of generating energy.

"To put that into perspective. We've mined 700 million metric tons of copper since 4000BC and geologists have now identified that we will need an additional 900 million metric tons. To maintain 3% of global growth we are going to have to mine as much copper in the next 20-years as we have in the whole of human history.

"So it looks like our 2050 plan might have a small problem and I'd say that's quite a challenge and you could say that minerals are the new oil."

These demand/supply dynamics are driving exploration, encompassing aerial technologies deployment, and surveying challenges to a whole new level of increasing sophistication. Sequent uses some of its software for aerial reconnaissance programs that integrates gravity and magnetics with seismic data used by explorers seeking maxim effectiveness and minimising costs.

"It's expensive to go with just seismic first," says Jonathan Watson, interpretation manager at Bridgeporth Ltd, a geosciences company in Milton Keynes, UK. "Using gravity and magnetics at the outset can often help you understand what's going on with minimal costs and it allows you to fine tune and improve your seismic program based on what you've learned."

"Organisations are going to have to get there faster, smarter and cleaner. It's about how we are going to get those minerals out of the ground and there is a real, delicate balance between trying to meet global demand and trying to build a sustainable and more resilient planet," Knight said.

"We can't do this without technology. It is the key to being able to transform and Sequent is helping on that journey. It's very difficult to visualise what you can't see, so our software creates a 3D picture, a map if you will, of what's hidden beneath our feet. And the real value of this is when you can bring in geological, geophysical, geotechnical and geochemical... all those different types of subsurface data, to help extraction and exploration companies to do their jobs.

"There is a huge amount of complexity and uncertainty that goes on below the ground and the more we can help our customers

see how all of this data fits together, the more accurate they can be with their decisions and the faster they can do their analysis and ultimately make better decisions."

Aerial surveys have a key role to play through the entire life cycle of mines with the ability to capture the entire site swiftly with little or no disruptions to operations. From the air volumetric and stockpile analysis can be done, the safety and compliance of haul roads and windows can be ascertained and 3D modelling can be used for engineering design and site construction planning.

In the past few decades aerial surveying, often working in tandem with Lidar technology, has reshaped mining operations and exploration. Successful outcomes are often prescribed by the speed and expertise of the aerial survey company, mine staff support on the ground and favourable weather.

A quantum leap in software solutions has resulted in companies such as Bentley mine survey solutions weaving together mine site survey data, surface terrain models, digital images and point clouds for the production of a comprehensive 3D models of mine sites that are compliant with business standards.

AMR



DRONE ACCURATE and efficient corridor mapping

Using the Trimble RTX installing ground control points.

The Aerial Imaging and Mapping Market is expected to increase significantly over the following seven years, exceeding 2022 in terms of revenue, according to some recent analysis.

This is not a surprising news considering how important data-accuracy and safer surveying methods are now imperative for companies and contractors in order to not overcome budgets, deadlines or suffering significant setbacks.

However, just offering aerial surveys services versus traditional on-foot surveys, is not necessary what defines a better outcome.

It requires accuracy and quality to ensure the usability of the data obtained as well as an innovative and reactive approach to possible challenges faced on site – this is where RemSense is leading the charge.

A case study of a road corridor mapping and survey demonstrates how RemSense's Data Capture & Insights (DC&I) Division is one of Australia's leading organisations providing data-led business analytics and solutions derived from both aerial and terrestrial based scanning and imaging platforms.

Our client and its contractors, were assessing specific topographical conditions for a new 100km road in the Hammersley Ranges, WA, over a thousand kilometres from Perth.

The operational site was in difficult to access and hazardous terrain, as well as high ambient temperatures and in an area rich with 40,000 years of Traditional Ownership and current mining development.

The client needed to gain an understanding of terrain profiles and elevations also, assisting contractors to calculate volumes for

earthworks and price quoting for the new road corridor.

They approached RemSense to conduct only a low-level fly over of the route and provide a video.

The solution proposed was that as well as a video flyover, the clients' requirements would be better serviced with the addition of a drone based survey of the route.

A Lynx VTOL (Vertical Take Off and Landing), fixed wind drone was used for the survey operation, flying over 2,000 linear kilometres to capture 79,000 overlapping, high-definition images, to enable the creation of range of model and survey types.

To ensure data accuracy, a Trimble R2 GNSS receiver was also deployed, providing accurate ground control points (GCP's).

Additionally, a multirotor drone with 4K video camera was deployed to capture and video fly-through of the route.

Over the entire route, approximately 73km² was surveyed, capturing a corridor that was between 300-400m wide.

This enabled the production of highly accurate 3D ortho-mosaics of the site, as well as DEM's (Digital Elevation Models) and a colourised point cloud at a GSD of between 2-3cm.

This method of surveying benefits all sectors providing a significantly quicker survey, with increased data points and area coverage. **AMR**

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1. Map contour lines showing same elevation.

2. Colourised elevation model, highest red to lowest blue.

3. Shaded terrain map.



Video screen grab of the elevation represented in the ortho models showing scale.



General image showing general conditions.

RemSense
WE CREATE SOLUTIONS





United Aero Helicopters has long been synonymous with airborne geophysical surveys and the helicopter provider of choice for most survey companies exploring Australia and its many regions.

Since its inception, low-level airborne surveys have been an integral part of the company's core competencies, which reflects its reputation for providing the best low-level survey pilots in the industry.

United Aero Helicopters offer the complete mining support package, from remote exploration, geological mapping, drill rig support, remote-sensing, environmental and heritage surveying, to aerial construction, gas and utility inspections, camp resupply and cargo relocation.

The company also provides heavy-lift capabilities, medevac emergency services, firefighting support using winch-equipped search and rescue helicopters, and VIP IFR charter operations.

As one of the most experienced aerial work service providers in the country, the United Aero team operate a large modern fleet of helicopters to suit different customer needs.

"We recently expanded our fleet with the purchase of several Blackhawk helicopters," said Sam Borg, United Aero's Chief Pilot. "Our new Blackhawk's are considered the ultimate heavy lifters and we're excited to be able to make these available to the mining industry," he said.

"We also offer an in-house training school

and maintenance engineers that travel to remote areas to ensure aircraft are always safe, compliant and airworthy and minimising down-time to our clients."

United Aero have permanent bases in Sydney, Melbourne, Brisbane, Adelaide, Perth and Newman.

The company has further bolstered its commitment to the Pilbara by purchasing a hangar at Newman Airport, which has increased its service capabilities in the Pilbara and Northern WA region.

"We operate multiple AS350 Squirrel helicopters, which are permanently based in Newman, as well as other helicopter models throughout Western Australia," said Sam.

"Additionally, Cessna 182 RG fixed-wing aircraft are routinely based out of Newman and available for either charter or aerial work operations. Through our partner organisation, we provide LiDAR and aerial photogrammetry solutions on our fixed-wing aircraft throughout Australia."

For more information, visit <https://unitedaero.com.au/>
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RACQ LifeFlight
chopper at sunset.

NORTH WEST REAPS THE FRUIT OF RESOURCES FUND WINDFALL

North West Queensland has become a big beneficiary of the mining boom by securing new aerodynamic bases for the Royal Flying Doctor and RACQ LifeFlight Rescue - in addition to a new children's aqua play park and major new childcare centre upgrades.

Queensland Resources Council Chief Executive Ian Macfarlane welcomed the announcement of projects funds flowing from the Resources Community Infrastructure Fund (RCIF) coffers.

"The QRC is the peak body for coal, metal and gas explorers, producers and suppliers and we are very proud that members of our industry are contributing a total of \$70 million to the RCIF for projects that will have significant benefits for our local resource communities," Mr Macfarlane said.

An expert Advisory Committee considered RCIF applications for both funding rounds.

Committee Chair Tony Mooney said there had been strong interest in both of the RCIF rounds.

"Resources communities can now get ready to continue benefiting from the RCIF through this new round of projects," Mr Mooney said.

"The committee looks forward to resources communities, including workers and their families, enjoying the many benefits of these projects."

The funding arrangements were part of the second round of the \$100 million RCIF announced by Queensland Deputy Premier and Minister for State Development, Steven Miles, in which \$22,29 million was made available for infrastructure upgrades in the region.

Mr Miles said that Mount Isa would be the recipient of the co-located aeromedical hub and a new children's aqua play park while Cloncurry and Julia Creek would be getting the new childcare centres.

"North west Queensland is the big winner in this round of funding, with over half the funding being granted to Mt Isa, Julia Creek, and Cloncurry.

"Most importantly, thanks to RCIF, north west Queensland will have a new, co-located health emergency flight service that can

better serve the region as well as three excellent new facilities focused on children's recreation, care and early learning.

"The other grants will ensure north west Queensland's world class lifestyle is made even better, with a new early learning centre in Cloncurry, an upgrade to the child care services in Julia Creek, and an upgrade to the Mt Isa Splashez Aquatic Centre."

The two RCIF grants will help deliver a co-located Royal Flying Doctor Service of Australia (RFDS) facility at Mt Isa Airport featuring hangars and other facilities for both RFDS's fixed-wing flights and RACQ LifeFlight Rescue's helicopter services.

RFDS will gain over \$6.9 million to help establish the new facility that will better meet the needs in north west Queensland communities for emergency and primary health care services.

The facility will provide even better response times and experiences for patients.

The new RFDS base will include four hangars, patient-transfer facilities, nurses' stations, offices, rooms for operations, communications, meetings and training as well as kitchen, staff accommodation and maintenance facilities.

LifeFlight Australia receives a grant of over \$3.9 million to assist with the planned upgrade of their Mt Isa helicopter services.

Their air base will be co-located with the RFDS aeromedical base, enhancing coordination of services.

LifeFlight will be able to fly further and help more people in north west Queensland. Their new base will have a hangar suitable for a Bell 412 or AW139 helicopter, a helicopter pad, workshop, crew accommodation, amenities and offices.

Cloncurry Shire Council Mayor Greg Campbell said the town's need for additional child-

care would be addressed thanks to a new early learning childcare centre to be funded through a RCIF grant of over \$4.3 million.

"Staffing will continue to be an ongoing challenge, the RCIF grant allows us to build a modern fit-for-purpose facility and we will continue to support and grow our workforce in preparation for the opening of an amazing new facility," Mr Campbell said.

"Keeping pace with community growth is critical if we want our mining and agriculture sectors to flourish."

Julia Creek will also gain a major child services facility upgrade thanks to a RCIF grant of over \$6.2 million for McKinlay Shire Council.

"The grant will deliver a children's services hub providing childcare as well as a consultation room for visiting allied health services that will greatly improve access to children's health care," McKinlay Shire Mayor Philip Curr said.

"The hub will include indoor and outdoor play areas, a sleeping area for babies, kitchen, store rooms, administration offices and amenities as well as the allied health services consultation room."

Mt Isa City Council will upgrade the Splashez Aquatic Centre with a new aqua play facility thanks to a \$996,408 RCIF grant.

"Our town pool will be an even better and more dynamic space for families when we add the new water slide, which will really appeal to kids aged 12 and under and will really complement the new water play facilities at the soon-to-be-completed upgraded Family Fun Park," Mount Isa City Mayor Danielle Slade said.

"The water slide will be a great feature for Splashez - it's something that locals have been requesting for years, and now we will be able to deliver it to the community, thanks to the RCIF funding.

"The water slide will make Splashez an even more fun and attractive place in which to hang out and spend time with friends and family."

RFDS (Queensland Section) CEO Meredith Staib said the two RCIF grants would help deliver the new state-of-the-art aeromedical base at Mount Isa Airport.

"Our new Mount Isa Base will be custom-built and feature dedicated hangar bays, improved transfer facilities for patients, as well as an enhanced working environment for medical staff, pilots and ground crew," Ms Staib said.

"Vitality, the new facility will ensure we're able to continue to deliver the very best medical care to communities right across the region, including via our emergency retrieval and inter-hospital transfer service which we deliver in partnership with the Queensland Government.

"We're incredibly grateful to the Queensland Government for this funding and look forward to starting construction on the new Base in early 2023."

"This is fantastic news for the communities of north west Queensland. To be given such significant funding is a reflection of how important this region is to the State Government and a recognition of the vital work RACQ LifeFlight Rescue and RFDS undertake here," said LifeFlight Australia Chairman Rob Borbidge AO.

"Many deserving and worthy projects applied for this funding assistance and we are extremely grateful it was recognised that the joint Mt Isa base will deliver great value to the north west region. We sincerely thank the government for this commitment."

"This purpose-built facility will bolster our capability and ensure we are able to meet increasing demand for a fully integrated fixed and rotary wing emergency care response capacity in this vast region," said LifeFlight Australia CEO Ashley van de Velde OAM.

"Together, the RFDS and LifeFlight bring vital aeromedical retrieval services to the people of north west and Central West Queensland. We are complementary services. Our two organisations share a mutual commitment to the provision of care to people in regional and remote parts of the state." **AMR**



MORE THAN 40 YEARS OF TOP SERVICE IN CONCRETE SUPPLY

Bell Rural Contracting is continuing to bring unrivalled experience to North West Queensland industry with their strong range of concrete services.

With offices in Cloncurry and Richmond, the company tackles a wide variety of domestic civil, mining and government projects with the support of a highly experienced team and the latest machinery and technologies.

Bell Rural Contracting Director Allen Bell said the family-owned business had been servicing North West Queensland for more than four decades and had earned a solid reputation for ensuring high-quality results from the start.

He said Bell Rural Contracting stayed ahead of the curve by going the extra mile for clients, as well as delivering a high standard of workmanship and service.

“What really sets Bell Rural Contracting apart from other concrete suppliers is our mobile batching plants, which are capable of batching 30 to 40 cubic metres of concrete per hour in any location.

“As a result, concrete pumping or spraying for large infrastructure projects can be completed in a fraction of the time, delivering huge cost savings.

“Our Cloncurry premises also has a fixed

batch plant, capable of producing 30 cubic metres of concrete per hour.”

Mr Bell said the company's spraying service was also popular, as it allowed the concreting of hard-to-reach areas.

The company sources all products from accredited suppliers, all mix designs are approved by Cement Australia and trial mixes are tested by a NATA accredited company.

Mr Bell said his team's strict adherence to national standards as well as EPA guidelines positioned Bell Rural Contracting as the provider of choice for the Department of Transport, Main Roads and RoadTek.

He said he looked forward to servicing Australian industry well into the future, spanning from in-ground pools to house slabs to large mining infrastructure.

“At Bell Rural Contracting, our mission is to supply quality concrete product and pumping services to remote and rural areas of Queensland,” Mr Bell said.

“We pride ourselves on being timely, responsive and committed to working with the client to meet their needs, with highly competitive pricing on all services.

“If you think we can be of help to your project, get in touch.” **AMR**



OUR FLEET

- 2.5 tonne forklift
- 6 tonne crane
- 20 tonne excavator
- Concrete trucks
- 5000 litre Vermeer vacuum
- 590SL backhoe
- Changlin grader
- Caterpillar 966F loader
- Caterpillar D250E dump truck
- 2 batch plants

OUR COMMUNITY

At Bell Rural Contracting, we are a proud and active member of the North West Queensland community. Bell Rural Contracting sponsors local events such as the Cloncurry Muster and clubs such as the Australian Junior Rodeo Association Inc. The company performs volunteer work at local schools, including constructing new concrete walkways. Bell Rural Contracting also happily supports Cloncurry PCYC and donates children's books to local hospitals.



<https://bellrural.com.au>

Why
Choose
BRC



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“BRC are an easy to work with, professional, and reliable concrete supplier that we would highly recommend for any civil or construction works.”



“My first preference for concrete supply is indisputably Bell Rural Contracting due to efficiency, 24/7 service, exceptional concrete and overall integrity”.

Wayne Sanchez
CONCRETE PUMPING

Our Performance

- We are “Easy to Deal With”**
- We are “TMR Approved”**
- We offer “Practical Solutions”**
- We have “Ability to Execute”**
- We offer “Fixed and Mobile Batch Plants”**
- We place concrete “Where You Need It—Safely”**

'We prefer working with Bell Rural on our rural concrete projects - Allan is excellent to deal with, easy going and happy to help out with any challenges that arise'



C&C Civil & Mining Construction engaged Bell Rural Contracting (BRC) to batch and supply concrete to a remote project site 400km North West of Cloncurry in Q1 2020. BRC provided excellent service in a safe and timely manner with the benefit of local area knowledge. Given our recent positive experience with BRC we would not hesitate to engage their services on future projects.





Queensland’s Historic Ravenswood Gold Mine Aims for Olympic Podium

Ravenswood Gold Mine has been is in the starting blocks for Olympic glory at the Brisbane games in 2023, coming into play as a supplier of gold for the medals that will be given to the star athletes.

The 153-year-old mine, located 130km south of Townsville, received a new lease on life in 2020 when the Queensland Government approved the mine’s expansion, increasing production to 180,000 – 210,000 ounces of gold a year. Ramping up to full capacity, this would make Ravenswood the Sunshine State’s largest gold producer.

With Brisbane set to host the Olympics for the first time, what could be more appropriate than for Ravenswood to supply the gold

for the medals?

The idea was first mooted by QLD Deputy Premier for State Development Steven Miles when he announced the expansion of the mine and suggested further extensions.

“I extended the prescribed project declaration for Ravenswood’s mine expansion project for two years, until 30 November 2023, and I will continue to consider future extensions as they’re required,” Miles said.

“This job-generating mine currently employs over 350 full time workers and plans are in place to expand the workforce to over 400 full time workers. It could be supplying the gold for the many medals our great Aus-

ie athletes win in 2023. Wouldn’t that be a great Queensland success story,” Miles said. Miles suggested that further expansion remains on the cards to increase the life of Ravenswood beyond 2023.

“The mine has produced millions of ounces of gold since it was opened in 1868, predating the modern Olympic Games by 28 years. Now, it will have the chance to get involved,” Miles said.

“We want everyone in Queensland to be a winner and put Queensland businesses on the podium at the 2032 Games. Hosting the 2032 Olympic and Paralympic Games will generate \$8 billion in economic and social benefits in addition to 91,600 jobs.”

engraved on the obverse face. The figure of victory was accompanied by the inscription: “XXVII OLYMPIAD SYDNEY 2000”. All the medals were minted at the Royal Australian Mint in Canberra and at the Perth Mint with a composition of 6 gr for gold and silver.

The medals were 68mm in diameter, 3mm thick at the rim and 5mm thick at the highest point of relief. Space was left on the reverse side of the medals for the winning athletes to have their names engraved.

The 750 gold medals were 99.99 per cent pure solid silver with 5 gm gold plating, the 750 silver medals were 99.99 per cent pure solid silver, and the 780 bronze medals were 99 per cent bronze with one per cent silver.

Ravenswood produces gold dore bars, which is sold to the Perth Mint in Western Australia, which itself had a proud role to play in the design of the Sydney Olympic medals in 2000.

Gold medals were first awarded to Olympic champions at the St Louis Games in 1904. Prior to that the star performer received a silver medal and the runner up a bronze one, as gold was considered too expensive.

Today the host city is responsible for the design of the medals and each Olympics has its own unique theme. Two years before the 2000 Sydney Games the International Olympics Committee’s Medal Ceremonies Sub-Program launched a competition to select a new design for the medals.

Invitations were sent to 18 eminent artists, sculptors, jewellery designers and design students. The unanimous winner was Wojciech Pietranik, who created the Sydney Opera House, the Olympic torch and the Olympic rings on the reverse side of the coin.

The customary symbols, including the Victory Goddess holding a winner’s crown, were

For the 2000 Olympics the huge cost of producing the victory medals was largely alleviated by the donation of raw material by mining companies. Total gold required was 10.5kg, worth \$190,000 at the time, and all the gold came from the Orange and Blayney areas of central west NSW.

“In the case of Olympic medals, I think that this classical medal...will always look good,” Pietranik said.

“You can do it better or worse on the sculpturing side, but still the classical medal is understood. But in this case what I tried to do was to really distinguish that medal from the previous ones in the sense that you look at the medal and, without reading because it’s not a poster or anything, you straight away should know where the Olympics were held.”

Brisbane has a hard act to follow, notwithstanding the fact that the Sydney Olympics resulted in Australia’s greatest ever haul of gold, silver and bronze medals. The 16 gold medals Australia won in Sydney were eclipsed by the 17 golds pocketed four years later at the Athens Olympics. **AMR**



AMR DEC2022



HYDRAULICS AND PNEUMATICS THE LIFEBLOOD BEHIND PRODUCTIVE MINES

BY DALE GRANGER

Hydraulic systems date back centuries where they were utilised to power flour and timber mill processes, increase equipment productivity during the gold rush era, and keep steam engines chugging away. The brilliant minds and pursuits of early pioneers and innovators paved the way for advancements in technology that we continue to see today.

The introduction of IoT, automation and new technologies have dramatically reshaped the way different industries do things, how they overcome key challenges, and what they do to drive efficiencies in their day-to-day processes.

Mining is no exception, and the industry has undergone significant transformation in recent decades.

Asset owners are always looking for that extra edge that allows them to push the boundaries, set new benchmarks, and exceed their production targets. It's about getting more out of their equipment and mineral resource through technology.

This has led to innovation driven manufacturing practices in the production of earth-moving machinery and plant equipment that shift productivity and performance to new levels, whilst lowering costs wherever possible.

So, there's where the age-old debate between hydraulics and pneumatics comes into play.

No matter what team you're on, each system delivers specialised benefits for different mining applications and environments, all of which aim to protect workers, improve efficiencies, reduce downtime, and minimise maintenance costs.

Hydraulics rely on pressurised liquids like oil and water, whereas pneumatic systems are powered by compressed air. In hydraulic systems, higher pressure levels can be achieved, which in turn generates more power.

Hydraulic and pneumatic systems use pumps and valves respectively, to control the force and velocity of actuators, which in the case of some hydraulic mining applications, the force generated can be over 10,000 psi.

This is why hydraulic systems feature heavily in larger OEM equipment as they provide the necessary power for applications like shovelling overburden, hauling payloads, or providing critical structural support in long-wall mining.

Essentially, hydraulics are required to move heavier loads and achieve higher forces, and pneumatics for lighter mechanical and engineering applications.

Hydraulics are common in larger, more complex systems where industrial valves, pumps, cylinders and motors exist in excavators and front-end loaders, dump truck trays, scissor lifts, gearboxes, drill rigs, conveyors and crushing systems. The larger the system, the higher the pressure or torque needed.

As fluid is used as the power source in hydraulic systems, the risk of potential leaks demands preventative maintenance and replacement of parts such as valves, seals and hoses, in order to keep plant systems online, contributing to higher operational costs.

Due to the harsh conditions and tough applications mining equipment is subjected to, breakdown is inevitable. To protect equipment from damaging contaminants and reduce downtime, filtration systems play an integral role in effective maintenance of hydraulic systems.

Filters clean and remove contaminants such as dust and dirt from the fluid that is used to power hydraulic components. It also provides an additional line of defence and helps balance out the entire system to extend the life of mechanical parts and keep equipment productive.

One company investing in hydraulic tech-

nology to support its future growth and help boost production targets, is Silver Lake Resources.

In an announcement earlier this year, the gold miner said it would be replacing its older generation pneumatic longhole drill rigs with a modern fleet of electro-hydraulic rigs. The new machines will be used in an effort to shift production from 800 tonnes to 1,000 tonnes per day.

Silver Lake's investment in this next gen drilling, loading and haulage fleet reflects its push to improve operating efficiency, increase productivity and reduce costs at its Sugar Zone Mine in Northern Ontario, Canada.

The company's Sugar Zone Mine operation is one of Ontario's highest grade gold mines, and is strategically located in close proximity to transport corridors, grid power, established mining services and suppliers.

Pneumatic systems, on the other hand, tend to be more cost-effective and require less maintenance than their hydraulic counterparts. They are also safer to use with minimal risk of fire or shock damage as they are powered using filtered air, not flammable fluids.

Common applications include air compressors, industrial pumps, pressure sensors and switches, specialised equipment powered by pneumatic motors, as well as a range of power tools.

AMR spoke with Peter Willis, the Owner of Midwest Valves and Controls, to gain better insight into the role hydraulics and pneumatics are playing within the mining industry.

"Fluid power engineering and hydraulics are obviously critical components that keep sites running," said Mr Willis.

"No matter the application, all types of plant equipment feature componentry, from industrial valves and pumps, pressure gauges

and flow indicators, to temperature sensors and transmitters, switches, and automated controls for air, liquids and gases.

"Innovative air distribution system technology is available that greatly increases pneumatic pump efficiency by eliminating the issue of wasted air.

"There's also the 415 volt oil-free air compressors, which are designed and manufactured to provide a lifetime of reliable service. These systems have self-lubricating Teflon piston guides and rings that slide with minimal friction.

"Receiver tanks and driers are examples of equipment needed for many installations.

"In mining operations, compressed air systems need proper maintenance, so it's important companies choose a supplier that not only offers quality products, but also provides valuable technical expertise and service support.

"I always remind my customers to buy a compressor that is fully compliant with Australian health and safety regulations for industrial workplace use."

With shifting attitudes and commitments to robust sustainability agendas in the mining industry, combined with an increased uptake of environmentally conscious practices, will we start to see an emergence of cleaner hydraulic and pneumatic powered technology that meets the demands of the modern worksite?

AMR certainly expects greater investment in research and development, and automated technology, that further pushes productivity and safety of miners and mineral processors. **AMR**

SUPER HYDRAULIC POWER

Hydraulics & Pneumatics 65
FEATURES



WT HYDRAULICS OWNER KRAIGE COOPER HAS MORE THAN 35 YEARS' EXPERIENCE IN THE HYDRAULICS INDUSTRY.

As a Kalgoorlie-based hydraulic specialist, WT Hydraulics has been the go-to for hydraulic design, service, sales and repairs in and around Kalgoorlie-Boulder, Goldfields-Esperance and Perth in WA.

The *Australian Mining Review* spoke to WT Hydraulics owner Kraige Cooper about the work the company has contributed in the Super Pit, one of the largest open pit gold mines in Australia.

Q. If you talk to anyone at the Super Pit about the "High Reach" rigs, everyone knows WT Hydraulics designed them. How did it happen?

A. Like most of our projects, it starts from a

customer's problem, and a question, "What if?"

Q. Do you mean they asked, "What if we had a drill that could reach and stabilise the rock higher up the wall? That would make stabilising the rock safer?"

A. Yes, and for a contractor they know miners want the best equipment on site and especially a machine that will save the miner huge amounts of money. Steeper pit walls means less waste.

For the contractor, the money saved over years of reliable service is massive compared to the cost of the design and build.

Q. Why don't all contractors and miners save money through innovation?

A. Some don't ask the right people. I think they are scared to take a risk. They've heard stories about cost blow outs. Again, it means they just haven't talked to the right people.

Because WT Hydraulics has been bringing innovation to the mining industry for more than 20 years, our expertise mitigates that cost risk. Our stories are all about saving on costs and making profit.

Q. So, with your knowledge of the latest in technology does that mean you can keep updating and improving the performance and reliability of any mining equipment.

A. The first High Reach machine was built on a second-hand Kato crane back in 2008. It is a massive unit, and still in service now. We are about to update its control system to have a touch screen HMI.

We even modify brand new mining



WT Hydraulics's High Reach machine on a modified crane enables drilling at much higher levels with outstanding rock stabilisation.

machinery coming into Australia in 2022. Our customers are confident in our knowledge of control and condition monitoring systems. These will give improved performance and long trouble-free service.

An exciting project we are working on now is a full-hydraulic field support vehicle. It's packed with quality Dynaset gear – a powerful compressor, generator and high-pressure water pump.

It will be a model for every service vehicle operator in the future. The weight of the Dynaset products, means massive savings in fuel for the operator, and this will reduce their impact on the environment.

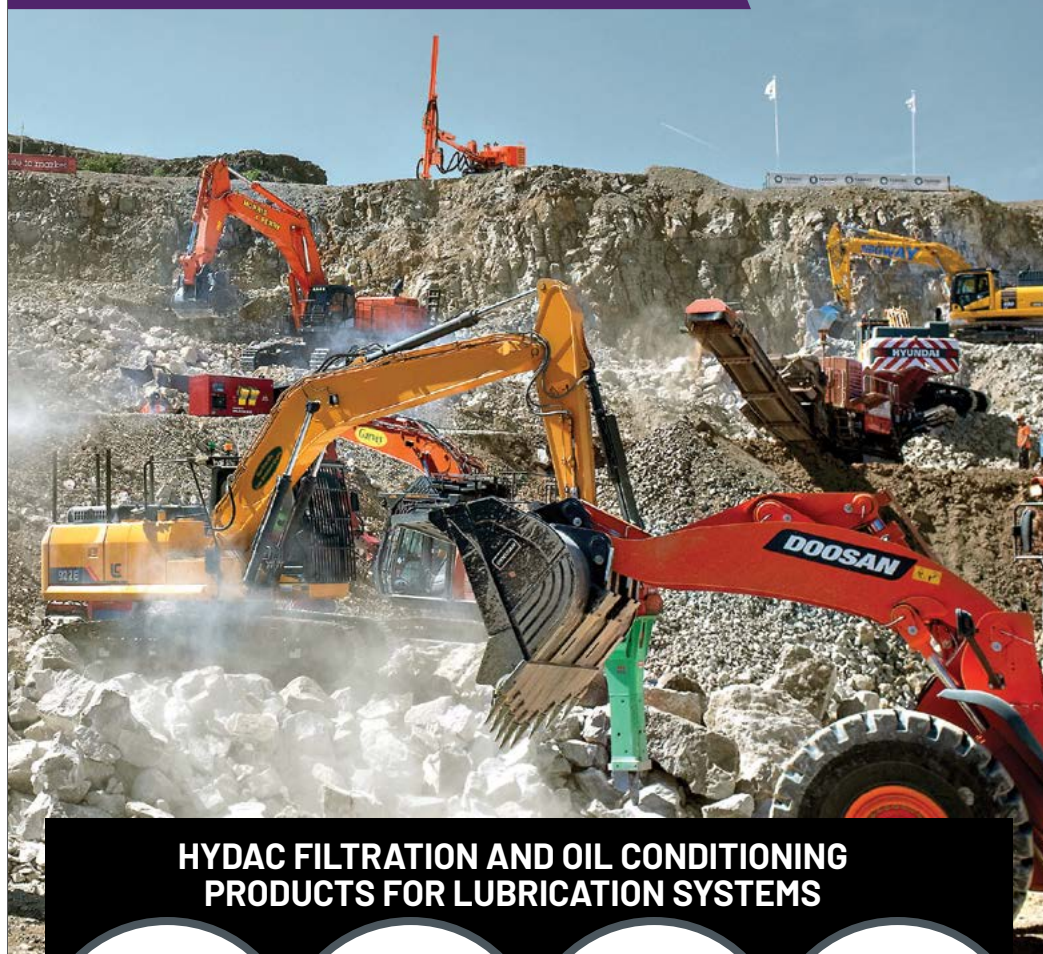
And the smaller sized components give the ability to carry a larger range of spare parts, oils, tools and fuel.

Q. Sounds like if anyone has a "What if" ... or an, "If only" question they need to talk to the right people at WT Hydraulics?

A. Absolutely! We support all of our customers with extensive product knowledge, the widest range of quality product lines and a flexible and practical approach.

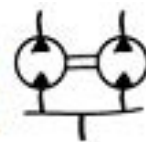
And just like the High Reach operators, when you have reliable equipment, you will always be in demand. **AMR**

THE PRESSURE IS ON IN THE MINING INDUSTRY



HYDAC FILTRATION AND OIL CONDITIONING PRODUCTS FOR LUBRICATION SYSTEMS

WT Experience the power of wise technology
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Pressure is what WT Hydraulics knows best.

Working together we will use this pressure and convert it into the power to drive your production and reduce your costs.

Dynaset HPW pumps are perfect for at the source Dust Suppression systems to improve worker health and safety.

HYDAC H2gO vacuum dehydration of contaminated oil extends system service life and reduces maintenance.

Call the WT Hydraulics Team at any of our branches. We can help you with a complete hydraulic system design, installation, maintenance, service and quality hydraulic components.

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Continental Hydraulics.

Worldwide. World-class. World-changing.

Continental hydraulic hoses and fittings exceed your demands in the harshest environments. From construction, oil and gas, mining and manufacturing to transportation; our designers and engineers constantly bring new innovations to the field to meet your hydraulic hoses needs for today and tomorrow.

We are your one source for a wide selection of high-performance hydraulic hose fittings, covering a wide range of designs, configurations, sizes and pressure ratings.

STAY CONNECTED UNDER THE HIGHEST PRESSURES.

Continental's crimp fittings provide maximum coupling retention on 1- and 2-braid hose as well as 4- and 6-spiral hose. Serrations penetrate the cover with a powerful bite into the wire reinforcement, resulting in even hose compression.

Continental fittings are constructed from a single piece of steel without brazed or welded joints to provide ultimate protection against leaks and potential leak paths. With full-length crimps and a low-profile design that will last longer, the interlocking Bite-to-Wire technology delivers maximum coupling retention for safer assembly and reliability under the toughest pressure — no internal or external skive required.

STAY CONNECTED UNDER THE HIGHEST PRESSURES.

Our Continental Constant Pressure Spiral Hydraulic Hose provides you with the superior quality and reliability you need in the toughest conditions. Our Extended Life™ high abrasion-resistant cover helps minimize downtime; the half-bend radius allows routing in tight spaces, which can reduce hose length requirements. The constant pressure performance across all sizes aids in selecting the right hose for the application; while our simplified fittings and color-coded system are faster, safer and more cost effective. When the pressure is on, you want Continental there.

STAY FLEXIBLE EVEN IN THE TIGHTEST SITUATIONS.

Flexibility plays a major role in your hy-

draulic hose operation and efficiency. With a bend radius up to 1/2 that of SAE conventional spiral hose standards, our hose is extremely flexible, easier to route and reduces the chance of bending too tightly. This helps provide increased hose savings and a reduction of shaped hose ends while equipping you with a safer, more cost-effective way to keep you moving throughout the day.

STAY TOUGH IN THE MOST EXTREME CONDITIONS.

You demand a lot from your hydraulic hose. That's why we put so much into making ours the longest-lasting, strongest, most dependable hose available.

Only our constant pressure hose has our exclusive Extended Life™ cover compound, which outperforms the competition in abrasion resistance. It's also MSHA-compliant, chemical- and oil-resistant and performs in even the harshest temperatures and weather conditions.

When the job requires tight bends, flexibility and abrasion resistance, this Extended Life™ XR16SC high-pressure hydraulic hose steps up to the task. Using a nitrile inner tube, two high-tensile steel wire braids of reinforcement and the Extended Life™ extra abrasion-resistant cover, it can handle a system working pressure up to 5,800 psi (31 MPa).

STAY UP, OPERATIONAL AND SAFER ALL DAY.

Our hydraulic hose laylines have been updated to include the most significant information about the hose, on the hose. Special icons make it quicker and easier to identify a hose's length, corresponding fittings and attributes. To top it off, new logos give more of an edge to our branding.

Our color-coding system is designed specifically for our hose and provides a safe and user-friendly replacement process. Quickly recognize which colours align to the different hose pressures to avoid injury and ensure you install the correct hose with confidence. **AMR**

THE FUTURE OF HOSE TECHNOLOGY AT YOUR FINGERTIPS

Continental introduces the new CrimpIQ™ controller — the next generation, intelligent, cloud-based controller for hydraulic and industrial hose crimpers.

The new Continental crimper controller is a 21st-century improvement over manual crimping. Precise digital crimping and cloud solutions: a quantum leap in the world of hydraulic and industrial hose. *Discover the next generation of crimper controllers.*

The PC200i is a high-volume, high-capacity stationary crimper featuring the Continental CrimpIQ™ Controller powered by Continental Fluid Solutions technology. This technology provides direct access to all crimping specifications and information. It supports a user-friendly interface to guide new and advanced users through the crimping process quickly and easily. Crimp settings, dwell time, pre-start positions and auto/manual operations are all easily set with electronic controls.

The PC200i standard package includes: 10-inch colour capacitive touch screen, foot switch, 99mm QCT, manual back stop, PC200 Rack, protective master die foam pads, 1 adapter die set, adapter die removal tool, spare set of die studs and QCT pins, Continental Bluetooth digital calliper, and mini grease gun w/ CRIMPX die lubricant grease tube.

With full MyCrimp™ crimp specification app integration, you can easily import and store up-to-date crimp specifications with no manual entry required.

The new crimper controller from Continental is a huge leap forward. No more hunting through manuals to find the right specs. To crimp a fitting onto a hose, simply use our touchscreen interface. Save presets, access tech support and back up your data to the cloud with the touch of a button.

The Future of Crimping is Here.
Visit CrimpCloud.com to learn more.





Australian Mines and Services Handbook 2023

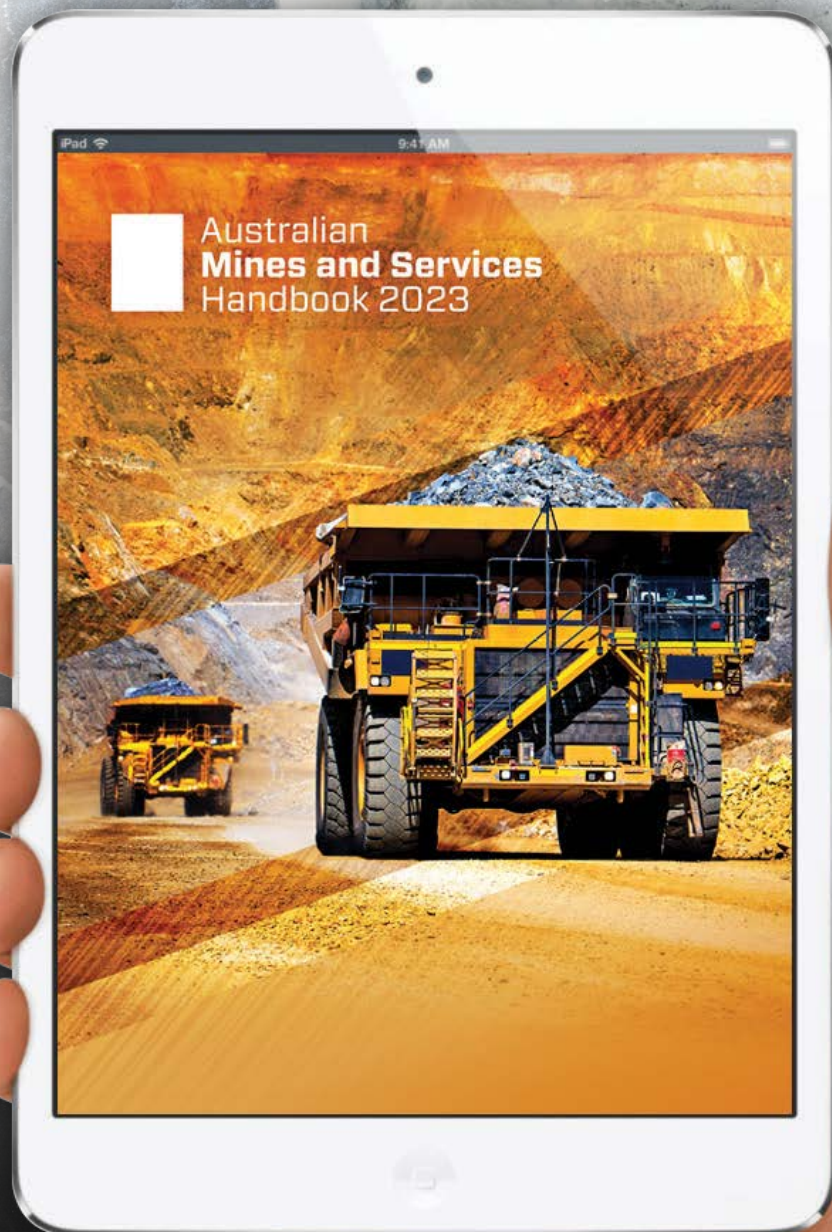
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The Transition from Diesel to EV Light Cars is Accelerating on Australian Mines

Alexander Bay, on the border separating South Africa and Namibia, is the place of mining legends with a rich De Beers diamond legacy that attracted tough divers from all over the world to seek their fortunes in the freezing waters of the south Atlantic.

When these divers weren't submerged, due to adverse weather conditions, you could find them warming themselves up in the local pub where they had developed a reputation for being the best pool players in Southern Africa.

Anyone who ever had the misfortune of losing a fast buck or two in a game of pool in Alexander Bay might have heard one of the urban legends relating to diamond mines on the Skeleton Coast. Once a vehicle entered the mine, it never left as a security precaution so that no diamonds could be smuggled out.

The divers did, however, tell the story of one intrepid rogue who found a way to beat the system and smuggle diamonds out of the mine. Apparently, he used carrier pigeons, quite successfully, until he drank one too many in the pub and couldn't resist boasting about his magpie qualities. Word spread and it wasn't long before the coppers came calling and the carrier pigeon enterprise was shut down.

These days of course, apart from diamond mines, light vehicles tend to come and go in the mining industry as all kinds of vehicles are needed to keep the wheels of commodities trading turning.

The most popular light vehicles being used on mines in Australia are Diesel Toyota LandCruisers. With a reputation for being rugged and reliable, LandCruisers have stood the test of time.

Nevertheless, the modern trend of big miners such as BHP, Rio Tinto and FMG is to invest in the electrification of these lighter vehicles for use on their mine sites.

Diesel emissions are now categorised as a Group 1 carcinogenic and with a focus on reducing CO₂ emissions, the rush is on to convert existing diesel and petrol-powered cars operating on Australian mines into clean and green chariots.

BHP, as an example, has set up electric car charging stations on its mines servicing not only light vehicles, but also small excavators and giant 50-ton dump trucks.

Electric vehicles tick a number of boxes under gruelling mine operating conditions. Primarily they are cheaper to run, don't need oil changes and have far fewer moving parts than internal combustion engines. Electricity is cheaper than diesel and mines do not

need to pump fresh air into the mine to offset the diesel fumes being discharged from these vehicles.

Particulate matter, sulphur dioxide and nitrogen oxide are three pollutants found in diesel, but noise pollution is another issue which makes silent EVs particularly attractive to mine owners.

While heavier, big RAMS do present some challenges in transitioning to electric power, a number of options have been developed for the more versatile LandCruiser 70 Series, the workhorse of the mining industry.

These range from custom builds and conversions with both builds adapted to cope with the tough working environment on the mines.

At least nine original equipment manufacturers have vehicles on the market and five of these are for LandCruisers. The remaining four options are custom builds.

The five LandCruiser conversion options are the Tembo e-LV Electric Cruiser, the RUN-E Electric Cruiser, Murray Engineering eLV, the Voltra Automotive ZED70 and ZED70Ti.

Most of the vehicles are charged by high-capacity charges capable of getting the vehicle from flat to 80% charged in two or three

hours. Some fast onboard chargers, however, have the capacity to get the vehicles from flat to 80% charged in 45 minutes.

In another league of its own are some of the ultrafast offboard chargers charging at 175kW that can do the job in 20 minutes.

The big question, of course, is cost and these EVs don't come cheap - within the range of \$200,000 to \$300,000.

In recent years GB Auto, one of the more significant players in the EV game, signed a deal to convert 2000 LandCruisers into EVs at their company in Orange, NSW. Murray Engineering also revealed that it would start manufacturing electric LandCruisers, in addition to underground DC vehicles chargers, in Pinjarra.

EV conversion companies have flagged costs as a critical issue driving the electrification of light vehicles on mines, claiming that diesel vehicles can cost between \$5000 and \$10,000 a month.

The technology has attracted the interest of Toyota itself, who partnered with BHP to test an electric LandCruiser on a mine in 2021.

Purchasers also need to consider battery options, with a bigger battery delivering longer range and a longer life in terms of overall distances travelled. **AMR**



The Toyota LandCruiser is the workhorse of the Australian mining industry.



Mining is a hive of activity with vehicles of all shapes and sizes transporting resources and people.

A JOURNEY FIT FOR YOUR PRIZED VEHICLE

The right transport service can make all the difference to ensure your prized possession not only reaches its destination in pristine condition, but is transported in the most convenient and economical way possible.

Whether it's traveling via the high seas, down a long stretch of highway, or across a dusty desert railway, managing what can already be an incredibly complex process requires a special skillset and insider knowledge.

Achieving a seamless experience and selecting the most strategic route simply isn't for the faint hearted.

There are many variables at play in the transportation game, from logistical hurdles and global supply chain challenges, to weather conditions, port labour strikes, ship availability, and transport carrier breakdowns.

Not only do vehicles come in varying weights, shapes and sizes, you need to consider vehicle modifications such as bull bars or roof racks, and if the vehicle is a new, vintage or

prestige model. This is particularly the case when determining how many vehicles can be loaded onto a single truck, and whether that truck is open or enclosed.

These factors along with space requirements dictate the appropriate mode of transport, and type of carrier setup selected, to ensure a smooth journey from pick-up to the final delivery point.

National Car Movers (NCM) has made the process easier than ever through the power of its online booking platform, advanced algorithms and proprietary software, and a team of transport specialists that support customers every step of the way.

After being in the Australian transport industry for almost 30 years, the company offers a unique service that delivers the best routes and carrier options available, ultimately allowing customers to create their dream itinerary.

"We're proud to have created such a sophisticated and competitive market offer," said

National Car Movers Operations Director, Robert Hawkins.

"NCM essentially manage the end-to-end process on behalf of our customers, and we have dedicated account managers that work on each individual case, no matter the transportation requirements involved," said Mr Hawkins.

"We manage the entire process from the type of transport carrier to real-time tracking updates to streamline the process for our customers.

"We deal directly with the transport carriers, so customers don't have to worry about the finer details. We simply take the stress and time wasting out of dealing with multiple parties and complex logistics."

The company has established solid relationships with all the major carriers, large and small, giving it buying power and the flexibility to combine services and offer personalised options that don't normally exist in the market.

In situations such as a remote truck breakdown, or vehicle onload/offload delays at ports, delivery times can be impacted. This is where a specialist transport company does its work.

"If your transport carrier experiences a sudden breakdown on the other side of the country, our team can quickly organise an alternative carrier to collect your vehicle and keep things moving to their final drop off point," said Mr Hawkins.

"We deal with any issues along the way, fluctuations in costs, supplier contracts, and what transport routes best suit specific vehicles being moved.

"So, whether you're moving a car, motorcycle, 4x4, caravan or boat, let us remove the headache out of transporting your prized possession." **AMR**

For the best transport solution for your vehicle or fleet, call NCM on **1300 396 099** or visit <https://nationalcarmovers.com.au/>

Choose from the cheapest, the fastest and the most convenient options for your car, boat, caravan or motorcycle.

Request an instant quote or book your next vehicle transport today!

Visit www.nationalcarmovers.com.au or call our dedicated team on **1300 396 099**



For over 25 years, National Car Movers has become one of the most trusted vehicle transport providers in Australia.

We are a one-stop-shop offering a customised door-to-door delivery service all from the click of a button. From seamlessly processing a booking or real-time tracking of a vehicle, we take the stress out transport.



PSQ EMPOWERS MINING OPERATIONS THROUGH AUTOMATION

There is no doubting the monumental role technology is playing in revolutionising the mining landscape.

Automation and analytics are changing the way asset-intensive sites overcome complex challenges at scale.

Asset owners are relying heavily on strategically deployed IoT to connect people, equipment and systems, improving operational efficiencies and cost savings.

Whether it is communication and control networks, autonomous equipment, scanning technology, wearable devices or surveying drones, companies are embracing new technologies to increase productivity.

Miners are becoming more agile by leveraging data-driven insights and sophisticated digital infrastructure to stay ahead of the pack.

These interconnected systems are offering teams greater power and visibility over their operations. Predictive analytics and remote monitoring are mitigating disruptions across the entire supply chain, and are further helping in identifying opportunities to streamline operations.

Automating Smarter, More Productive Operations

The mining environment is now synonymous with automation, with more driverless trucks and excavators showcasing their capability on haul roads and in open pits. The ability to control and monitor these autonomous machines remotely is driving productivity gains as remote operators can conduct scheduled maintenance and live works in the field.

Maintenance personnel can even test oil samples and obtain the results in real-time without the need to send samples to offsite labs.

The vast amount of data extracted from these types of activities not only requires powerful software, but a consultant with the technical expertise capable of deciphering the data and translating it into meaningful, actionable information.

For the past decade, award-winning technology services provider PSQ Group (PSQ) has built a reputation as an integrated solutions specialist in the mining industry.

Founded by engineers who believed that the focus of technology should be the people it can help, PSQ was immediately chosen to provide technical services for the Port and Mine components of a Roy Hill project in WA's North.

Now almost a decade later, PSQ focuses on creating solutions that streamline and automate operations, taking back the extra time and resources that can be better used elsewhere.

According to PSQ Group Managing Director Novica Piletic, the company is always looking for innovative ways to support mine sites across Australia in reducing costs and increasing productivity.

"We are seeing more and more companies invest in cloud, analytics and automation technologies," said Mr Piletic.

"Harnessing the power of real-time data using the Microsoft Power Automate platform and suite of Microsoft products is providing our clients with greater insight into their control and automation systems."

When you are running a fleet of machinery, plant equipment, and personnel across multiple sites around the country, the ability to fine-tune production processes significantly impacts performance.

"This has a flow on effect that helps asset owners reduce capital and labour costs, and streamline site efficiencies on a mass scale." Microsoft SharePoint and Forms are also highly collaborative tools that are empowering teams at different sites, and in different departments, to be more productive thanks to enhanced workflows and document automation."

Mr Piletic says data analytics from multiple technology sources is fuelling opportunities to further improve and refine the performance of both equipment and operators.

"By utilising Microsoft's suite of products, we can clearly present insights to our clients in a way that gives them the power to make intelligent decisions and fine-tune their assets accordingly," he said.

"Automation is essentially eliminating human error and creating safer, more productive and profitable sites, as equipment can run for longer, and more efficiently without

unnecessary downtime due to unscheduled maintenance.

"Predictive data analytics are simply helping drive better decision making in every facet of a mining operation."

Strengthening Digital Defences

Digital transformation, automation and artificial intelligence are rapidly changing the way mines operate. Connecting wirelessly and remotely between devices, people and plants is making companies more vulnerable to cyber threats.

As miners continue to adopt new autonomous technologies and enterprise applications, it is no surprise that increased exposure to cybersecurity risks will occur in the search for greater efficiency and process optimisation. This is where investment in robust digital defences comes into play.

"Our consultants deliver expert advice and solutions to strengthen our clients' digital infrastructure, ensuring it is secure and up to date," said Mr Piletic.

"We are supported by leading industry partners such as Microsoft and Cisco. Not only do we offer a suite of digital transformation and workflow automation solutions, but our cybersecurity services are best-in-class.

"We have now achieved ISO/IEC 27001 certification, the globally coveted standard for information security, because we understand the importance of securing our clients' data. "It's about identifying weaknesses in systems that can expose clients to malicious threats such as ransomware, phishing and espionage, as these can prove costly to a company, both operationally and financially.

"We explore opportunities to transition clients from outdated legacy systems as seamlessly as possible, without disrupting production. This is critical in keeping systems compliant.

"Due to the complex nature of a mining operation and the prevalence of interconnected technology, effective safeguards and security protocols must be in place to protect the network.

"Encryption, identity management and multifactor authentication are security measures that offer extra protection to network systems, particularly in remote operations

and sites that deal with multiple third party suppliers.

"We also work with our clients to run simulated attacks that test a network's vulnerability to a potential cyber threat. It allows us to identify any weaknesses in the system and make the appropriate adjustments accordingly.

"In the event of a real security threat, our clients can be assured that their system is protected, and the likelihood of a shutdown or unnecessary downtime is minimised."

A Connected, Sustainable Future

The pursuit for leaner and cleaner mining operations is fuelling giant leaps forward in product innovation and digitally connected mines. Companies want to extract as much value from their asset as possible, while lowering costs and achieving higher production targets.

The electrification of mining vehicles, longer-range wireless communications, and an explosion in the use of sensors are enabling asset owners to connect on levels never previously imagined.

"Mining companies are committed to building more sustainable operations, and their digital infrastructure plays a key role in this," said Mr Piletic.

"Real-time data from sensors provides service personnel with predictive insights that support preventative maintenance, minimising downtime and extending equipment life."

Integrated digital technology and artificial intelligence are helping operators make faster, smarter decisions in all areas, edging miners closer to achieving ESG goals and reducing carbon footprints."

As a leading technology provider, PSQ is dedicated to helping clients strengthen their digital assets. The company has established a culture of innovation and continuous improvement, and remains committed to keeping clients operating efficiently and securely for the long term.

For more information, visit
www.psqgroup.com.au

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PSQ Group is the award-winning, trusted provider of integrated technology solutions. When it comes to mining technology, we're committed to delivering results that see our clients grow and succeed. We're proudly ISO/IEC 27001 certified because we understand the importance of securing your data.

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COMPLETE SUPPORT FROM THE GROUND UP

INTRODUCING THE READY JET® DRUM BLASTER

The Remote Controlled High Pressure Cleaning Machine

The latest addition to Jetcrete's extensive ground support service offering, the remote-controlled, high-pressure cleaning system is designed to remove dead, hardened concrete from Agitator drums in a safer and more efficient method.

The Ready Jet® eliminates the need for workers to enter the concrete mixer drum, where they are exposed to confined spaces, loud noise, falling debris and respiratory dangers. Cleaning can now be safely controlled from outside of the drum using a remote control, resulting in significantly reduced health and safety hazards.

Not only is this method a safer way of high-pressure cleaning, the time taken to clean the drum is also reduced by up to 75%.

What would typically take three shifts for two workers to clean using a jackhammer and manual handling, can now be executed by one person in an average time of 2-3 hours.

Clean, potable water completely removes residue and polishes the surface, resulting in less build-up, reduced machine downtime and a larger storage capacity.

The Ready Jet® eliminates:

- The need for workers to conduct high risk jack hammering and manual handling tasks.
- Working in confined conditions.
- Exposure to airborne contaminants.
- Heat exposure.
- High pressure air hoses in working area.
- The need for compressed air and gas monitoring.
- Vibration injuries.
- Risk of falling debris onto operators.

Jetcrete is Australia's leading ground support specialist to the mining industry. Using the most advanced and innovative techniques, as well as specially adapted placement materials, Jetcrete delivers all surface and underground shotcreting and concrete spraying services to mine sites.

Jetcrete understands that no two mine sites are the same. With more than 40 years experience across the industry, the Jetcrete team has seen it all and can help navigate through any underground or above ground challenge.

The company manufactures about 271,000m³ of concrete each year and has installed 440,000m of cablebolts.

Its fleet of 183 mobile concrete trucks are ready to service any Australian mining operation, backed by a team of 500 personnel across the country, and can establish sites in remote areas in a matter of days.

UNDERGROUND SHOTCRETING

Jetcrete provides a complete service and one-stop shop solution for all stages of underground shotcreting.

These include excavation, onsite concrete, shotcrete and CAF manufacture, drains, high walls, bulkheads, vent walls, as well as the supply, delivery and installation.

The company's reputation for high-quality work across mine tunnels, portals and shafts has earned them a solid following in their field.

Jetcrete is trusted by and partners with mining majors including BHP, Glencore, Northern Star Resources, Newcrest Mining and Gold Fields.

A CUT ABOVE THE REST

Over the years, Jetcrete has introduced most of the modern technologies used for shotcreting in Australian mining, such as overhead wet shotcrete, robotic shotcrete units, hydroscaling and most recently the industry benchmark for shotcrete thickness measurement – shotcrete scanner.

The Perth-based company is the first and only shaft lining contractor in Australia equipped to safely operate in niche and

highly-specialised ERZ1 hazardous environments.

The shotcrete solutions provider is also capable of delivering surface and underground civil infrastructure works including earthworks, concrete slabs, heavy vehicle workshops and site offices.

WIDE ARRAY OF SERVICES

Along with shotcreting, Jetcrete provides a wide array of services including:

Concrete manufacturing: Jetcrete owns 16 batch plants, enabling mine sites to access 24-hour concrete, CAF and shotcrete manufacturing.

Delivery: A fleet of 75 underground agitators allows Jetcrete to support any site, including remote and hard-to-reach sites.

Ready Jet® Drum Blasting: Remote-controlled, high-pressure cleaning system for agitator drums eliminates the need for workers to enter confined spaces within the concrete mixer drum and reduces cleaning time by up to 75%.

Remote shaft lining: Jetcrete is the leader in remote shaft lining with three units in Australia, and further capacity in Indonesia and North America.

Cable bolting: Jetcrete is currently the largest Sandvik cable bolter operator in Australia.

Resin injection: An alternative active rock support system for underground mining, resin injection provides additional support for the encapsulation of TG cable bolts and ground consolidation.

Civil construction: Jetcrete's capabilities include heavy duty workshops, mine site offices, machine foundations and slabs, drainage and culverts, earthworks and high wall stabilisation. **AMR**





New remote workshop facilitating:

- Cat ET diagnostics
- Machining and turning
- Metal fabrication and welding
- Tyre repairs from light vehicles to large earth moving machinery
- Sand blasting and painting
- Hydraulic fittings and hose fabrication

Companies Gearing Up 73

INDUSTRY FOCUS

Workshop With Winning Formula

Mining is thirsty business and Desert Sands Cartage Contractors has the solutions.

Established in 1989, the Laverton-based company specialises in supplying the remote outback and servicing mining projects in regional WA and the Northern Territory with potable water and cartage.

But the maintenance of trucks and machinery is a key part of making this possible.

Realising this need, Desert Sands Cartage recently built a new workshop with the aim of reducing downtime, maintenance costs and ultimately improve production and reliability for its clients.

Its team of trained technicians are highly specialised in diagnosing faults, performing repairs and rebuilds and thinking outside the box in resolving challenges associated

with industry work in remote locations.

Desert Sands director Rex Ryles says his company has the capabilities to head out to remote locations with its new porta batch mobile batching plant and carry out large pours to mine construction and for remote community upgrades.

“We can also provide potable drinking water for personnel mobilised on-site for all stages of the mining process, for example, exploration, earthworks and construction phases,” he said.

“No matter where your site is located, we travel far and wide to ensure you and your staff are looked after and have a reliable source of drinking water.”

With clients including the Gruyere gold mine site to Anglo Gold Ashanti sites, Downer EDI, Gold Fields’ Granny Smith mine site, Poseidon and more, Desert Sands Cartage is well equipped to look after all jobs big and small.

The company also has extensive experience in hauling concrete, screened sand, dune sand, potable water and fuel to some of the most remote and isolated areas in Australia.

Desert Sands Cartage Contractors provide services including but not limited to:

- side tipper haulage;
- mobile batching plant / concreting;
- supply and deliver potable water;
- supply and deliver diesel and petroleum fuels;
- supply and deliver screened sands, river

- rock and blue metal materials;
- maintenance grading;
- road building and construction;
- excavator and loader works.

Other specialty services include contract screening, semi-drop deck hire, front-end loader hire, road maintenance and constructions for local government organisations, general civil works, bulk tipper haulage and much more.

For more information, visit www.desertsandscartage.com.au or call +61 8 9031 1326

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DESERT SANDS
CARTAGE CONTRACTORS
Est. 1989



Established Since 1989



- ✓ For all your transport and civil contracting requirements
- ✓ Supply of potable water to remote areas

- ✓ Side tipper haulage, including concrete, screened sand, dune sand, fuel and potable water
- ✓ Extensive experience in civil works and construction projects

GET IN TOUCH NOW

Rex Ryles 08 9031 1326 | office@desertsands89.com.au | www.desertsandscartage.com.au
Lot 501 Cox Street Laverton WA 6440

Think Outside the Circle – Think Layflat

Crusader Hose is Australia's leading manufacturer of layflat hose and reel systems. In their new campaign, Think Outside the Circle, Crusader Hose highlights the many benefits of using layflat hose over poly pipe.

Last month's edition featured one of the key benefits, ease of handling. In this issue, we focus on the unseen cost benefits and environmental sustainability.

Crusader Hose, current leaders in Australian layflat hose manufacturing, are now rising leaders in engineered reel systems. As part of their long-term vision, investments in new technology and design engineering expertise, have increased the company's capabilities in creating reliable hose deployment equipment.

As a combined event, Crusader Hose launched their new campaign, Think Outside the Circle, along with their big Open Day in September. To Think Outside the Circle is to think outside the circle of poly pipe and think layflat hose! Out of the invited guests, more than 30 attended from 19 registered companies. Everyone was impressed with the facility, demonstrations and factory tour. The campaign video was screened to the approval of many.

Manufacturing layflat hose for over 36 years, Crusader Hose has been offering dewatering solutions to mines across Australia to keep them operational. For both rapid in-pit dewatering and emergency flood pipelines, its layflat hose systems have been hailed as

both cost- and time-savers. These savings, however, are often not that obvious until one takes a closer look. Let's first examine transportation costs.

It's no secret that the federal government has ended the 6-month temporary fuel excise reduction on petroleum products. According to the ACCC website, on 29 September, the fuel excise officially ended, adding taxes of 25.3 cents per litre. That's 46.0 c/L being restored (we enjoyed a 50% reduction since March 2022) and the accompanying GST. Ouch! That will translate invariably to all shipping and transportation costs. Every truckload costs. More trucks will cost more.

Crusader Hose layflat hose is flexible and comes wound onto reels. Imagine 200 m of 12" layflat compactly wound into a coil and laid on a pallet. Projects up to 4,000 m of a required pipeline will easily fit onto one truck loaded when pallets are stacked. That's only one truck. One truck's worth of diesel. One driver's wages. With poly pipe, you'll need around 10 times more trucks, requiring much more fuel and more drivers' costs. Using layflat hose from Crusader Hose will save you this excess.

Secondly, unloading and setting up a layflat pipeline requires less equipment and

workforce once on-site. The Crusader Hose Hamersley and Argyle Reel Systems deploy the layflat pipelines quickly and easily. With layflat manufactured in continuous lengths of up to 200m, there is no welding required. Multiple lengths connect easily with Flange couplings. Four kilometers of layflat can be deployed and connected in two days by three operators. This is in far less time and with a smaller workforce than if you were laying the same length in poly pipe; pumping out of the pit so soon can significantly increase profitability.

Thirdly, using layflat hose as an alternative to poly pipe is better for mining companies who are concerned about their environmental performance.

Environmental performance, one of the three pillars of ESG, measures the energy a company uses, how much waste it generates, how much natural resources it uses and the consequence for the ecosystem and habitats.

Regarding energy use, let's revisit the transportation of layflat. Using up to 10 times fewer trucks is not only a cost-benefit but also reduces the pollution generated by burning fuel. Avoiding excess pollution is a number one priority in combating

global warming.

The flexible nature of the hose takes on the contours of the terrain, eliminating the need for digging trenches to accommodate the rigid nature of poly. Less alteration to the environment reduces the possible damage to the ecosystem.

When an in-pit dewatering pipeline needs to be moved or an emergency flood pipeline is no longer needed, the layflat pipelines are easily retrieved with reel systems and either redeployed to their new spot or put in storage. Being easily reusable is a huge benefit over poly pipe. You will never see abandoned layflat hose lying around waiting to be dismantled and removed from site, as you see disused poly pipe.

Managing Director of Crusader Hose, Francois Steverlynck, calls on the water management experts to think of using a layflat hose and reel system instead of poly pipe when planning rapid in-pit dewatering systems or requiring an emergency flood pipeline.

"We have worked with many mines in finding solutions for their dewatering projects and have seen first-hand the many benefits of using our layflat hose," he said. "Ease of handling is the most obvious benefit; however, some of the unseen benefits, such as cost-savings and supporting environmental sustainability, are also valuable and desired benefits," Francois continued. **AMR**



Deploy emergency flood pipelines with ease using the Argyle Reel System from Crusader Hose.



The Crusader Hose Rapid In-pit Dewatering System features the Hamersley™ Reel System and Waterlord® layflat hose.



UNIVERSAL WINS CICA LIFT OF THE YEAR

The Crane Industry Council of Australia (CICA) hosted the 2022 CICA National Conference, Exhibition & Crane Display in Adelaide in early November. The theme for the event was 'Leading the Way'.

As the leading industry group for the crane sector, CICA and its members helped navigate the industry throughout the uncertainty and ambiguity of the last two years and are now focused on leading the way in recovery efforts and major growth opportunities.

The Universal Cranes team attended the conference and thoroughly enjoyed reconnecting with clients, suppliers and friends. In addition to the conference, the team

LIFT OF THE YEAR, >20 TONNE LOAD

2020 Winner of the Lift of the Year > 20-tonne:
Universal Cranes - Kettle Tub Replacement Project

walked away as the 2020 Winner of the Lift of the Year > 20-tonne award.

These awards are sponsored by Cranes and Lifting magazine, and acknowledge and celebrate the contributions of exceptional crane and site teams who perform challenging lifts, and those who innovate to solve complex problems.

Universal Cranes North Queensland was engaged to replace a galvanizing kettle tub in Townsville, QLD.

To complete the project successfully, Universal Cranes conducted off site simulated lifting scenarios beforehand to calculate the required radius and weights to ensure the lift system and plan would work, as the shut-

down window between Christmas and New Year was the only suitable time to carry out the project.

In addition to the tight timeline, the project also faced challenges including ceiling height constraint and door width constraint.

This required thorough, detailed planning of the lifts and minimizing the impact to budget and extremely restrictive timeframes for installation.

A well-deserved win for the Universal Cranes North Queensland team – thanks to the CICA team for this recognition and for hosting another fantastic industry event. **AMR**

UNIVERSAL CRANES
ANY LIFT, ANYWHERE, ANY TIME

NATIONAL COVERAGE
Providing crane hire in Ballina, Brisbane, Gladstone, Mackay, Roma, Sunshine Coast & Townsville.

500 STRONG FLEET
Minicranes, pick & carry, Frannas, slew cranes, all-terrain, rough terrain, lattice boom crawlers & telescopic boom crawler cranes.

WA's Fabrication Specialists



Specialist steel fabrication company Arch Engineering has been operating since 1970.

With the capacity to complete a wide variety of fabricated steel projects for the mining, process, oil and gas industries, it can manage, implement, and integrate all aspects of complex industry projects from drafting, fabrication through to surface treatment and delivery.

The business, located in Bibra Lake, WA, has a 3000m² facility and employs a skilled workforce with commitment and experience to match all project requirements.

Arch's fabrication team is experienced and possesses strong capabilities to execute wide ranging fabrication projects for mining, oil and gas.

The team is committed to high quality standards and efficiency to ensure client expectations can be met, and boasts quality management system certification to ISO 9001:2008.

Arch Engineering's fabrication workshops are equipped for all type of fabrication and modularisation services.

They incorporate three fully equipped workshops utilising four overhead cranes with up to 20t capacity capable of handling all types of fabrication.

Its mining and mineral processing services include:

- A wide range of structural packages
- Screening equipment
- Crushing equipment
- Conveyors
- Shuttles
- Chutes
- Mining consumables and tools
- Plate work fabrication
- Pipe supports and clamps
- Railway equipment
- Handrails, stairs, walkways
- Trusses
- Silo conveyors
- Monorail structures
- General steel fabrication

AMR



AE ARCH ENGINEERING



9 Rivers St, Bibra Lake WA 6163

P. 08 9418 5088 E. admin@archeng.com.au

www.archengineering.com.au

All workshops are fully equipped for all types of fabrication services.

Facilities incorporate three fully equipped workshops utilising 4 overhead cranes with up to 20 tonne capacity capable of handling all types of fabrication such as:

STEEL FABRICATION

- PLATEWORK
- STORAGE TANKS
- CONVEYORS
- OFFSHORE STRUCTURES
- SUBSEA STRUCTURES

WA'S STEEL FABRICATION SPECIALISTS



GRID ROLLER



Broons has led Grid Roller development for over 20 years, with benefits to the mining sector:

- Road Compaction
- Maintain Tip Heads
- Haul Road Maintenance
- Maintain Pit Floors
- Rock Rubbilisation
- Risk Mitigation
- Tyre Wear Reduction
- Limit Suspension Fatigue
- Operator Comfort
- Reduce Fuel Costs
- Unrivalled Productivity
- Low Running Costs

BH-14 H
14 Tonne
Hydraulic Offset Drawbar



Features
Quality Cast Rings
Heavy Duty Chassis
Cone Scrapers
Removable Ballast



BH-14
14 Tonne
Fixed Drawbar

Broons Group (08) 8268 1988 - info@broons.com - www.broons.com

Servicing Regional Australia

Established in the coastal Queensland mining town of Weipa in 1999, Goodline is an Australian-owned provider of engineering, construction, and maintenance services nationwide.

The company has been engaged by dozens of prominent mining operators to build and maintain their facilities in the last two decades in a variety of remote locations across the country.

As Goodline expanded from their initial beginnings in Weipa; establishing themselves and becoming part of the communities they operate in and around has remained one of the most important factors in their expansion strategy as well as ensuring they can continue to bring small business values and operating efficiencies to large scale works.

By committing themselves in regional areas not only are they able to contribute to the local communities they have the ability to offer their workforce and their families an alternate to the typical fly-in fly-out employment often seen in mining and construction.

Goodline's Chief Operations Officer Jack Borserio said that he was proud of the bases that Goodline has created in regional Australia.

"We believe regional Australia has the best lifestyle in the country - maybe the world. All of our operational locations have exceptional fishing and camping as well as top notch sporting clubs, festivals and other community events" Jack said.

Goodline's residential teams form the foundations of their business. They are their core crew performing on-site shutdown works, housing maintenance and their smaller construction and maintenance projects.

Jack credits these strong foundations and local infrastructure are as being the driving force that allowed Goodline to venture into their first major project in Weipa in 2002 and Port Hedland and the surrounding Pilbara in 2006 and says they continue to underpin and support everything Goodline executes across the country to this day.

Among Goodline's more recent project's is

Fortescue Metal Group's newest mine and processing facility Eliwana - positioned roughly 96km west northwest of Western Australian mining town Tom Price.

In 2019, the world's fourth largest iron ore producer partnered with Goodline to deliver engineering detailing, procurement, fabrication and construction of overland conveyor systems, transfer stations, sample stations, and the train load out facility.

In 2021 this partnership continued with the award of the Canyon G project for Iron Bridge. This project includes the upgrade

of the stockyard and associated materials handling and shipping infrastructure.

Jack credits Goodline's success to a large group of hard-working people who are focused on a common goal. It's these same people that allow Goodline to hit stretch targets exceeding quality and performance and that ensure a track record of safely delivering projects on time and within budget.

For more information, visit <https://goodline.com.au/>

AMR



Goodline services:

- Civil
- Electrical and instrumentation
- Metal fabrication
- Plumbing
- Shutdown maintenance
- Housing maintenance and refurbishments
- Industrial blasting and painting
- Indoor environmental services (mould and air)
- Light vehicle servicing and panel beating
- Project services and execution

We are leaders in construction and maintenance services to Australia's major resource companies

We offer a **diverse range of services** spanning from project conception, completion, management and ongoing maintenance.



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WEIPA
Weipa, Queensland
(07) 4090 6500

PORT HEDLAND
Wedgefield, Western Australia
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East Arm, Northern Territory
(08) 8944 5000

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Nhulunbuy, Northern Territory
(08) 8996 8400

KATHERINE
Katherine, Northern Territory
(08) 8971 0717

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(08) 6159 2700



Exactly What You Need When You Need It

Field Machine Tools is Australia's largest stockist of specialist onsite machining and portable maintenance equipment.

We offer for hire and sale one of the most comprehensive ranges of portable equipment suitable for a large range of applications, materials and specifications.

FMT is a dry hire only company - we never compete against our customers for on-site service work - with conveniently located branches in Queensland, Victoria and Perth. Maximising equipment up-time is critical to shortening project completion times and increasing bottom line profits.

Removing equipment from the job site to a repair facility can delay project completion and put a damper on profits.

This is where Field Machine Tools can help. FMT has the on-site repair and maintenance machines that will minimise maintenance times and keep equipment working for companies and their customers.

Keeping equipment and plants in top operating condition is a constant challenge for today's mining, oil, gas and power generation contractors.

Our wide range of portable equipment is available for rent or purchase, Australia-wide from our three branches, and include equipment for machining applications such as Portable Milling Machines, Portable Lathes, Clamshell Pipe Lathes, Flange Facers (OD and ID mount), Line Boring Machines, Vessel Grinding Machines and Pneumatic Magnetic Based Drills.

For welding applications, there are Bore Welding & Cladding Machines and Induction Heat Treatment Equipment.

For valves, there are Valve Test Equipment, Valve Repair Equipment and Portable Valve Actuators and, for heat exchanger, condenser and boiler manufacture, repair and maintenance there are Tube Pulling Systems, Tube Cleaning Systems, Heat Exchanger Tools, Torque Controlled Rolling Motors and Australia's largest stock range of Tube Expanders and consumables.

FMT is the Australian agent for major international brands including:

Climax Portable Machine Tools, an impressive range of highly-sought after industrial equipment designed by a market leading manufacturer for the rugged challenges facing Oil, Gas, Mining, Chemical & Power Generation Industries.

CLIMAX pioneered the portable machining revolution in 1966.

For more than 50 years they have been the innovators and technology leaders in the industry they invented.

They're #1 for a reason!

Modex Motors and Portable Valve Actuators and Modex vane air motors have been used for 30 years as an alternative to traditional electrical motors in many demanding applications.

They supply OEM replacement motors to a wide variety of industries and application-specific motors to customer specification.

This includes a versatile range of Portable Valve Actuators for preventative maintenance of valves, even in the most demanding of environments, and incorporates a reaction device designed to reduce the risk of strain injury to the operator.

Krais Tube & Pipe Tools has been delivering top quality tube tools for over 40 years.

Designed and manufactured by their engineers, the whole process from paper sketch to producing the tools is controlled in-house with one of the biggest and most modern machinery and production line in the EU.

There is a comprehensive range of Con-

denser, Boiler Tube Expanders, Tube Rolling Motors, Tube Installation Tools, Tube Cutting and Removal Tools, Tube Pulling equipment and Accessories.

Goodway Technologies is a USA-based manufacturer of specialised industrial maintenance products for HVAC, Energy, Manufacturing, Food and Beverage Production markets.

Since 1966, facilities and plant maintenance personal have used their innovative products to maintain HVAC systems, plant machinery, hazardous material clean-up, surface cleaning and other critical maintenance needs.

Established in 1995, Field Machine Tools (FMT) is a privately owned Australian company that provides engineering solutions for field applications to minimise downtime.

The scope of operations is to provide the most complete product lines available to OEM equipment manufacturers, maintenance providers, field service companies, power stations, petro chemical plants, mining industry and other related industries.

Call Field Machine Tools on **1300 FMT FMT** (1300 368 368), email **sales@fmt.com.au** or visit **www.fmt.com.au** for more information. **AMR**



Field Machine Tools has a range of end prep machines suitable for 12.7mm to 610mm bore mount to face, bevel or counter bore tube and pipe.



Field Machine Tools has rugged and innovative portable flange facers for 19.1mm to 5054mm (0.75 to 199 inch) diameters. Several of the machines can be configured for facing, milling or both.



Field Machine Tools has OD mount flange facers suitable for 0mm to 3050mm (0 to 120 inch) diameters. Several models can handle flat face, raised face, RTJ, tongue and groove, lens ring, Grayloc and compact flanges.



Field Machine Tools has a range of Clamshell Lathes suitable from 33mm to 1676mm OD pipe preparation whether severing, bevelling or counter boring.



2022... MINING'S BIG

Contributed by Warwick Lorenz, Managing Director of Australian Pump Industries. Warwick is a veteran of the mine pump industry and is proud to have seen Aussie Pumps grow from a small operation, to a significant force in the industry. Their Australian designed equipment is now sold globally.

As we look back on the last eleven months, it's gratifying that some sections of government, State and Federal, as well as a bigger proportion of the population are realising that the productivity of our country is poor, except for two areas.

They are mining and agriculture. In these times of inflation, impending higher taxation and global supply issues, we see the mining industry delivering record volumes of product at what are sometimes record prices.

The efficiency of our industry, the people who work in it, and those who are the great entrepreneurs, all deserve to be congratulated from the population of Australia. Unfortunately, the politicians are reluctant to give that credit, even though there is a growing acknowledgement that apart from mining and agriculture we are a largely unproductive, inefficient economy.

Having said that, we also should comment on just what we've been doing at Australian Pump over the last year to help the mining industry with more efficiency for the future.

We know that the coal story isn't over, in spite of what you read in the papers. There are thousands of coal burning power stations being built around the world as people realise that electricity is superior to candles and wood fires. Coal may be required for at least forty years for quality steel production and we doubt that will disappear any time soon.

HERE'S WHAT AUSSIE HAS DONE TO CONTRIBUTE

First of all, we realised that time is money! Efficiency in mining is not just about profit, but also related to maintaining continuity of contracts, yes keeping faith with the customer. What resources we ship are vital for the economies of our customers. Delays or inefficiencies are unacceptable.

The last few months have seen floods put mines out of action on the eastern side of the country. We proved that our big 4" and 6" self priming centrifugal trash pumps are super effective at moving unwanted mine water from where it shouldn't be to where it ought to be.

The big 6" pump, featured in the paper over the years, delivers a whopping 6,000 litres per minute and doesn't require any additional priming devices. We know that dry prime pumps do have some applications where compressor and vacuum pumps are required to make them prime.

They are for operations where there is long suction lines involved or the machine is required to operate on 'snore'. When it comes to just moving volumes of dirty water fast, a self priming trash pump like our MQ600TD is by far superior in reliability, versatility and cost.

There's almost nothing to go wrong as the priming device is just a big check valve in the suction port. The pump is primed through a priming plug in the pump casing. When the engine is started, that check valve opens and a vacuum occurs in the pump body. Provided the suction hose is completely air tight on the suction port couplings, the pump will then suck any dirty water through a vertical lift of a maximum of 7.6 metres.

The huge open impeller will handle 3" spherical solids with ease. The pump is powered by a 80 hp air cooled Deutz diesel engine with loads of grunt for it to run eleven hour shifts without refuelling.

These pumps are currently doing a great job in flood rescue work for local governments in New South Wales and Victoria. Our engineering department is working on an 8" pump for release next year. Initial calculations indicate it will do 9,000 litres per minute and we're confident it will be on the market as a great first world product, but at a keen price for mining operators.

Since we live in a world where climate change is obvious, mines need that kind of capacity from products that are reasonably economical to buy, easy to service and maintain.

NEW 4" TRASH PUMP IN MINE SPEC

The same engineering team is working on a 4" trash pump that will deliver 30 metres head vertical lift and produce a maximum flow of around 2,200 lpm. In a different class to the big MQ600, the machine self primes

and has a front opening clean out port and a big open impeller, capable of passing solids in suspension of 39 mm.

It comes with a silicon carbide mechanical seal with an option for tungsten carbide with Viton if required. Best of all, it will self prime. A non clog design open impeller makes it suitable for a wide range of applications.

A 316 stainless steel version of the same pump will also be available. Both configurations are driven by a Kohler 26 hp air cooled diesel engine, mounted in a stainless steel heavy duty frame with integrated lifting bar. The Mine Spec versions in cast iron and stainless steel, will have battery isolation, E-stop, fire extinguisher and other work safe style features.

Both the 4" and the 8" pump are scheduled for release by mid 2023.

MUD PUMPS... HYDRAULIC OR ENGINE DRIVE?

When Aussie first started building trash pumps with engine drives, we found machines being used in the drilling industry as mud pumps, as well as for a wide range of other applications on site.

One thing we learnt was that having a self priming centrifugal pump, capable of pumping solids in suspension, with a front port for easy cleanout without dismantling pipework or hoses was a winner. The first machines we sold were small 2" pumps with Yanmar diesel engines.

From there, we saw a demand coming for hydraulic drive versions of the same pump, in cast iron, delivering 440 lpm and heads of 18 metres. Not a lot of performance but for particular application they were used in, they did the job.

Working with major drilling companies, Evolution and Australian Exploration, we started moving into bigger pumps that would handle up to 1,500 lpm with 31 metres head.

Available in semi trash configuration, the pumps feature silicon carbide seals, or tungsten, big open non clog style impeller, front clean out port and stainless steel wear plate.

Today, we have developed a range of mud pumps that can be built in all 316 stainless steel, nickel aluminium bronze or cast iron with stainless steel impellers. Elastomers are also available for most liquids to be pumped from buna N to viton where required.

By the end of 2023, we hope to be working with all the major mud pump manufacturers and suppliers in Australia. We'll have a great debt to those who we're working with now because of the feedback they gave us. That drove us to develop these products.

When you're in the pump manufacturing business, you can't know everything about every application. It's the customers who teach us. We respond to your needs.

CLEANER MACHINES... RELIABLE ASSETS

The mining industry found us! We started producing quality high pressure cleaners for earthmoving contractors. We built pressure cleaners with stainless steel frames, heavy duty slow speed pumps, hose reels with up to 30 or even 50 metres of high pressure hose and having them mobile for use on site. We learnt a lot fast.

Our Mine Boss product line, now available in up to 500 bar configurations was a big winner for both Australian Pump and the customers who operate them. Smaller machines like the 4,000 psi diesels, operated by Coates for mine sites across the country, do an amazing job.

The first units supplied were hot dipped galvanised frames, in our exclusive 'Scud' design. They have a superior OH & S friendly design and ease of serviceability. These machines are all Class A under the Safety Standards and therefore do not require operator certification.

Even the 5,000 psi Mine Boss Aussie Predator, a pressure cleaner designed to operator off a 26 hp Kohler air cooled diesel, can be trolley mounted in Scud design with four wheels for stability and manoeuvrability on site. All the machines in that product range that had galvanised frames, now have stainless steel frames and are available in Mine Boss configuration.



These 4,000 psi specially built Coates pressure cleaners are operating on mine sites all over the country.

The bigger product line, those requiring operator certification include our 500 bar machines. Called the 'Mine Spec Extreme' range, the machines are available with flows to 31 lpm and pressures to 7,300 psi. This equipment comes in a unique hot dipped galvanised frame that consists of a skid base, with multiple fork lifting points and integrating bunding.

Driven by a Yanmar water cooled diesel engine, they also offer an integrated control panel that includes full engine protection and hour meter. These Big Boys have a 50 litre fuel tank that will allow them to run without refuelling for up to eight hours.

In line with the safety standards under the Australian Standards Association, the machines are equipped with hose restraints, emergency stop, fire extinguishers, dual pole battery isolator, high vis Class B reflective frame markings and a flashing safety beacon. All wiring is double insulated.

They are designed for the toughest jobs on the planet and do a marvellous job.

HIGH PRESSURE STEAM TO SAVE TIME

We learnt from the industry that big gear covered with grease or caked on dust, comes clean faster when washed with high pressure steam. Most mining operations have dedicated wash bays where a high pressure cleaner is installed. Our research indicated these machines are almost all 3,000 psi capacity with flows of around 15 lpm.

Our engineering team decided to go one better and we developed a 4,000 psi machine that will deliver steam at up to 130 °C. Yes, that extra 1,000 psi does get the job done fast, and isn't that what we all want!

High pressure accessories are also readily available in the form of turbos, an essential if you ask us, long length hoses and stainless steel hose reels. There are loads more accessories available, including flat surface cleaners, telewands, even gutter cleaners that we've seen operators using to clean under the chassis of truck and plant.

The 4,000 psi Aussie Admiral has been a huge success and is the only 4,000 psi production line steam cleaner on the Australian



This 6" self priming pump working at a tailings dam moves dirty water fast!

market (that we know of).

Yes, it's a Class A so no operator certification is required!

SUCK IT UP!

All mining workshops and equipment need to keep clean. Aussie's big heavy duty wet/dry vacs are ideal for this application. They'll mop up spills with a standard squeegee, operating with chrome plated steel wands and all feature the unique Aussie Microweb 99.9% filtration system.

This is a reusable filter that is made from a homopolymer acrylic fibre and has a micro-porous membrane applied to the collection surface. This means that the filter can be cleaned by just giving it a shake because of

it's excellent 'caking' properties.

The big vacs (up to 75 litres), with wand kits up to 90 mm are matched with two or three motor drives. Those three 1,200 watt motors provide loads of power. The vac has a water lift capability of 2,600 mm! That gives amazing air flow of 181 litres per second, something that the others will find hard to match.

Best of all, the vacuum cleaner range, called the Aussie Eco Clean line, comes with a free five year warranty, something we haven't seen from any other industrial vac manufacturer!

AUSSIE'S ON THE RIGHT TRACK

As we see Australian manufacturers pulling

out of China and looking for other sources of supply, we are happy that we are an Australian manufacturer using Australian labour and innovation to build machines which are now being sold all over the world.

Our Aussie Mine Boss machines are operating in Mongolia, Central Africa, Vietnam, Kazakhstan, even West Africa. The industry trained us, we've applied the lesson and are proud that you like the result.

For more information on Aussie's range of Mine Boss machines, contact Australian Pump Industries. *AMR*



Aussie's Extreme Mine Boss range starts at 4,300 psi and goes all the way to 7,300 psi and loaded with safety features.

Perfectly Clean Oil

Triple R Filtration Australia is the leading provider of Triple R Filters and Tan-Delta oil condition sensors in the Australian market.

Engine oil filtration

Increased demands to extend oil change-out intervals on engines has resulted in the use of synthetic oils being used on modern engines. These synthetic oils have resulted in oil change-out intervals being significantly increased, thereby reducing costs associated with oil changes. Extended oil change-out intervals have also impacted the filter used on the engine. Change-out of the filter element is in most cases associated with a change-out of the oil and the filter element has therefore had to be adapted to meet this requirement.

Filter elements have also had to adapt to other aspects of modern engines.

- Improving fuel economy
- Improving power
- Reducing emissions

Clean oil improves fuel economy and power output by reducing friction and wear on moving parts of the engine. Increased wear causes oil to enter the combustion chamber, burns with the fuel and is exhausted into atmosphere as particles and hydrocarbons.

Full flow and by-pass filters

Filters usually installed and supplied with the engine are referred to as full flow filters.

A variety of housings makes the Triple R filter solution suitable for any size engine.



The total flow rate of the lubrication pump is directed through this filter to lubricate the engine. By-pass filters are an addition to the full flow filter. A flow of oil is directed from the main oil supply into this filter to enhance filtration capability. Filter media used in by-pass filters is specifically designed to capture small particles which the full flow filter cannot.

Soot

Soot and sludges in engine oil are formed as a by-product of incomplete combustion. When the air and fuel mixture fails to ignite completely, there is leftover particles. These particles find ways into the lubricating oil and is reflected as soot. It is very rare that the engine combusts completely, so most engines will produce soot.

Extended oil change-out intervals increase the risk of high soot build ups in the engine oil. Full flow filters installed on engine have limited ability to remove this soot as particles are too small for the filter to remove. By-pass filter however have the ability to remove this soot and sludges in oil.

Oil change out intervals

Oil change-out intervals are almost always dictated by the engine manufacturer. These intervals are based on distance or operational hours of the engine. There is an increasing trend to further extend these intervals.

Testing of oil samples has shown that this can happen after the recommended interval has elapsed.

Triple R by-pass filters

Triple R filter elements have unique features which make the element suitable for by-pass filters used on engine. No other filter element on market displays these unique features.

1. Engine oil enters the filter media in a radial direction. This ensures that oil is directed into the thick 114mm of depth media.
2. A 1st stage of filtration ensures that larger particles are trapped in the least compressed filter media. By doing this, element lifetime is extended.
3. In the 2nd stage, the filter media, which is now more compressed, ensures that

smaller particles are being filtered out of the oil. This again ensure maximum filter lifetime.

4. In the 3rd stage of filtration, the filter media is compressed at maximum by means of the outer wrap, which traps all small particles in the oil.

The filter element has a very large volume of cellulose filter media contained within. This volume or area of media ensures that the element is effective at removing contamination as well as ensuring extended lifetime of the element. A selection of housings makes the Triple R filter solution suitable for any size engine.

Selection of the type of filter housing is carried out quite simply by the sump size of the engine. Housings are typically available in aluminium, steel and stainless steel and range from single element housings to multiple element housings.

Housings are supplied with integrated valves needed for functioning of the filter as a by-pass filter fitted onto the engine. This makes installation hassle free with no other control valves to be installed.

Oil condition sensors fitted on-engine

Our expertise extends into providing solutions for on-line oil condition sensor solutions. These sensors are installed on-board engine and provide feedback to the user on condition of the oil. Use of continuous real time on-line oil condition sensors reduces risks associated with infrequent oil sampling and gives the user transparent information on oil condition to make more informed decisions on oil change outs.



Plug and play solutions for logging and retrieving data.



Tan-Delta

Triple R Filtration Australia is proud to represent Tan-Delta oil condition sensors in the Australian market. We are the leading provider of Tan-Delta sensors into Australian market. The Tan-Delta sensor outputs the condition of the oil as a value. Installation of the sensor is trouble free and the outputs from the sensor can be integrated with ease.

The Tan-Delta sensor is packaged into a mobile kit format.



Features

- Unique sensor technology measuring remaining useful life of oil
- Analyses the electro-chemical properties of oil with unrivalled accuracy
- This accuracy allows the sensor to also measure other contamination in the engine oil such as fuel dilution, wear metals and water in oil.
- Easy to understand output values
- The sensor also outputs the rate of change of the oil. This is a very useful value as it indicates the rate of oil degradation
- Plug and play solutions for logging and retrieving data
- Data communicated to a Cloud based platform if required

The sensor is also packaged into a mobile kit format. This allows the sensor to be used to measure condition of the oil on multiple compartments without the need of permanently installing one. **AMR**



Triple R



TANDELTA

THE NEXT GENERATION IN OIL FILTRATION

We specialise in providing solutions to improve oil cleanliness and condition by utilising Triple R depth elements.

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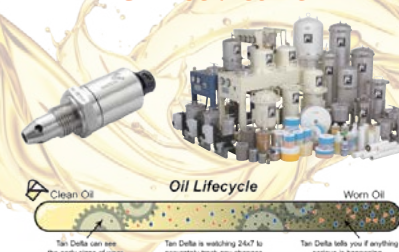
www.triplerfiltration.com.au

The 3 stages of filtration in the element ensures that the oil remains free of water, varnish, sludges and particles.

Applications include:

- Hydraulic systems
- Lubrication oil systems for
 - › Compressors
 - › Gearboxes
- Diesel and Gas driven engines
- Metal working fluids
- Heat transfer fluids

Measure and treat oil to maximise lifetime



NAPA AUTO PARTS KNOWS MINING

NAPA Auto Parts has your mining solutions sorted, with over 54 locations nationally and dedicated mining locations and teams to provide you with the right parts. NAPA Auto Parts Knows How to drive success and help create efficiencies on your site.

NAPA Auto Parts offers a comprehensive range of automotive aftermarket parts, with access to over 300,000 SKUs incorporating many of the world's leading OE and OEM brands they have what your fleet needs, when you need it.

NAPA Auto Parts are proud to partner with Freudenberg Filtration Technologies Australia, providing you with reliable filtration solutions.

Freudenberg have developed S.A.F.E.air, a purpose-built air handling system (filtration + pressurisation) for mining vehicles, designed to protect operators and equipment from dangerous mining dusts.

Dust in vehicles is a huge health issue and an enormous cost to miners globally, both above and below ground.

Ingress of dust in to mining vehicle electrical enclosures causes premature equipment failure, fire risks and requires substantial regular maintenance to ensure safety/ optimal equipment operation.

Freudenberg S.A.F.E.air alleviates dust related health and maintenance concerns through a combination of;

1. Multistage filtration (cyclonic, coarse & HEPA level) of outside air entering cabin. This ensures adequate protection from the outside environment at same time as low maintenance costs with the more efficient HEPA filters protected from upstream.
2. HEPA level filtration of recirculated air, removing smoke and dust that enters cabin through doors and on operators' clothes / boots.

3. Very high air flow rates designed to exchange full cabin volumes within around 20 seconds, quickly removing residual dust / smoke.
4. Pressure is kept higher (>100pa) than outside atmosphere, stopping any ingress through holes / door seals with some air also being vented to ensure air exchange and CO2 abatement.

The mining industry has recognised the issues of dust ingress and recently implemented a new standard for vehicular cabin air quality, ISO23875. The key benefits of Freudenberg S.A.F.E.air listed above are directly called for by the standard.

Freudenberg have a large and ever-expanding design data base covering most major OEM equipment found across the mining industry. From light vehicles and underground equipment through to the largest dozers, haul trucks, draglines and excavators, there is a Freudenberg S.A.F.E.air solution.



Komatsu Gen 2
With dash panel.

For more information on Freudenberg S.A.F.E.air and the rest of the range available for your mine site, please contact our dedicated mining specialists today.

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CHANGING *the* GAME

Collaborative robots, colloquially known as cobots, are changing the way welding operations can manage expansion and how to best leverage their existing skilled workers in a time of highly-skilled labour shortages.

While historically any robotic form of welding automation meant the tacit replacement of existing labour (or the prevention of introducing more labour for expansion), where cobot inclusions into welding operations differ from previous industrial robot welding automation is that they are not designed to replace labour, but to augment it. Ultimately, the welding cobot is a welder's mate.

The application of this augmentation is dependant upon your unique operational requirements: what are your existing welder's core strengths? What menial tasks are requiring extensive time for your welders to complete?

While it's intuitive to think of cobots as the smaller, more accessible form of their industrial robot ancestors, within the context of welding operations they are uniquely positioned to safely work alongside humans in close proximity – actually, they are specifically designed to do this and to do it safely. This collaboration allows for a multitude of potential applications that cobot welding has begun realising, but at the core of it is:

- Doubling your current welder's throughput.
- Reducing OHS risks and incidents.



- Eliminating the reworking of welds and improving consistent weld quality overall.
- Ideal for short run, high mix welds.

The above examples provide a perspective on what it means to introduce robotics into your operations that is wholly different than what is commonly understood in the robotics space – it's about leveraging your operational strengths through introducing systems that add to your existing capabilities. A cobot doesn't always need to complete the entirety of a task. It can work in unison with

a human, with the cobot welding the repeatable portion of the weld, while the skilled human takes care of the more complex areas of the task which essentially doubles the throughput when operating collaboratively.

The cobot itself occupies a small (essentially human-size) footprint and has a whole host of safety protocols in place that make it as safe as working alongside a careful, safety-conscious human. With torque-sensors on every one of it's six (and occasionally as required, seven) axis joints, and the ability to set "safety zones" and preventative "speed

limits" around the cobot, you're looking at a robotics system that is designed explicitly for safe collaboration.

It's truly a ground-breaking addition to the automation space, as previously you only had humans and industrial robots to perform these tasks. Now you have humans on one end of the operational spectrum, industrial robotics on the other end, and finally a solution that sits between them – the cobot welder, or, as we refer to it, your Weld Mate.

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Automate Your Welding with Industrial Robots & Cobots



INDUSTRIAL ROBOTS

COBOT WELD MATE 355

Increase weld quality, repeatability, efficiencies, and productivity

High throughput potential

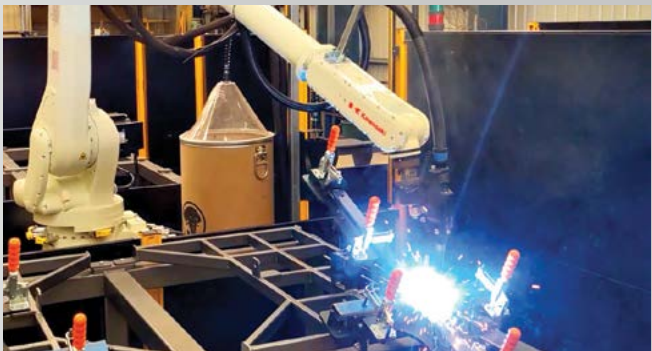
Ideal for short, long, and complicated welds

Large space required for deployment

Small space required for deployment

Requires caged-off area

Can operate safely alongside humans



LEARN MORE

Contact us and enquire
1300 069 970

GETTING SMARTER WITH SMARTTECH

SmartTech Australia has sharpened coal mining in Queensland's Bowen Basin with a suite of productivity and safety solutions expertly designed to save a mining operation time and money.

Launched in 2017, the technology provider expanded from Western Australia's SITECH to a national innovator of 14 branches servicing the civil and mining sector with a range of problem-solving technologies.

This well-regarded brand is certified with the National Measuring Institute (NMI), enabling them to provide certified Legal for Trade solutions for its growing client base.

Among the tech company's clients is Brisbane-based Vitrinite, a miner operating among the country's largest coal reserves with an extensive premium coking coal portfolio.

SmartTech General Manager Dan Barry said his company were engaged to satisfy a variety of material tracking and safety requirements, helping Vitrinite shape a more effective and economical operation.

"Typically a client needs revolve around

tracking material and examining it's movements around a site and beyond," Mr Barry explained.

"We are predominantly concerned with tracking mass through Loadrite onboard weighing solutions – for instance, clocking the tonnes per hour that filter through a machine or the amount of material pushed through a conveyor belt into a hopper.

"It's live information on your productivity and it helps operators answer the big economical questions – how to be more productive or how to increase your per-hour output within refined parameters.

"With the data you receive from the onboard scale you may find that you need more people to work hours on shift, or you need to expand your operation by buying more machines to achieve production targets.

"Whatever it is – it's a cost effective way to get a lot of useful information."

Nick Williams founder and Managing Director of Vitrinite comments.

"Loadrite scales help us control material movement around site safely and efficient-

ly, ensuring production visibility with a live feed to the site."

Mr Barry comments that SmartTech's safety solutions were also very popular, particularly their technologies that helped with production and safety management.

Features included preventing machines becoming overloaded or carrying material beyond manufacturer parameters.

SmartTech has also spearhead innovation in operator safety, including bringing to market a HEPA grade cabin air filtration solution that tests air quality inside and outside the machine's cab.

Designed to prevent operator being exposed to hazardous gases, this solution detects air quality issues and engage filters to address compromised atmosphere.

The device also features an alert system to make the operator and relevant staff aware of the issue, and also records incidents so site supervisors can map out, work around or engage further support for hot spots.

In a bid to offer in all-inclusive safety portfolio to their customers, the business has also

been experimenting heavily with collision avoidance, including working to enhance angle sensors and positioning technologies. Mr Barry said tech was becoming very impressive and his 60-strong team made sure to keep an eye on the fast-advancing space and bring the latest and greatest to Australasia's mineral resources sector.

"The beauty of our business is that we're always evolving," Mr Barry said.

"We also have a bit of a mantra.

"We try and find a solution to a particular problem, which is a little different as many other tech companies try and predict problems which can result in loss of objectivity.

"So we speak to people within the industry and find out exactly what they need, then we develop it through our R&D department, or we collaborate with other solution providers.

"We get our problems straight from clients and go from there."

For more information, visit www.smarttechaustralia.com.au
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Mines rescue brigades training for emergency response.

SPECIALISED SAFETY SOLUTIONS FOR ALL INDUSTRIES

NSW Mines Rescue is part of the Coal Services group that provides specialised health and safety services to help protect the health and safety of those working in the NSW coal industry.

They also service a broader customer base that includes other extractive and heavy industries.

Wayne Green, General Manager Mines Rescue and Regulation & Compliance, explained that while Mines Rescue's roots were founded in emergency response in 1926, today the business is better known for helping mining operators manage risk and operate safely through specialised safety training.

"Mines Rescue's primary role is to maintain

a response capability should an incident occur at a mine," he said.

"We train and prepare brigade members and surface emergency responders with an array of specialised tasks and rescue techniques."

"We also work with management teams to help incorporate widely accepted Australasian emergency response principles, such as the Incident Command and Control System, into their emergency management systems."

Fortunately, major incidents requiring brigades to respond are limited, which is a credit to today's safety focussed operations. Mr Green said that the training they offer looks beyond emergency response to build

the skills and knowledge that focus on safety awareness and working safely to reduce incidents from happening in the first place.

"Safety training and emergency preparedness are critical in any hazardous industry," he said.

"But it's equally important to ensure that health and safety policies are in place and that they are implemented and monitored on a regular basis.

"This is a side of safety management that can be difficult and complex, or even forgotten until it's too late."

To help employers better understand and manage their work health and safety obligations, Mines Rescue created a team ded-

icated to providing safety and emergency management consulting and compliance services.

It is a service that complements the work they do in safety training and emergency response.

This includes audit services, crisis and emergency management solutions, development and testing of emergency management systems and safety management systems, as well as risk scoping and assessment.

"No one ever walks into work or starts a shift expecting an incident to happen that day," said Mr Green.

"But those sites that put the time and effort into developing robust emergency management systems, training their personnel and regularly testing their systems, will be the best equipped to deal with the situation.

"It's about maintaining vigilance and not becoming complacent about safety."

About Coal Services

Coal Services is an industry-owned organisation that provides critical services and expertise to the NSW coal mining industry.

It operates a Specialised Health and Safety Scheme that provides an integrated suite of services aimed at preventing injury and illness in the workplace.

These services help employers to identify, assess, monitor and control many risks inherent in the NSW coal mining industry.

Coal Services is jointly owned by two shareholders, the NSW Minerals Council and the Mining and Energy Union.

For more information, visit www.coalservices.com.au

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Helping you protect the health and safety of your workforce

Our services are not limited to mining. Training courses include:

- Incident Command and Control Systems
- Emergency preparedness
- First aid
- Confined space
- Work safely at heights
- Fire fighting
- Emergency Warden
- And more

Mines Rescue Consulting

Specialised advisory and audit solutions for safer operations:

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My Epiroc is a digital fleet management solution, available for both web and mobile devices, that aims to boost fleet efficiency and safety. Regardless of role — a fleet manager focusing on uptime, a machine operator getting the job done, or a member of the service team keeping on top of equipment — My Epiroc is built to assist in accomplishing jobs and improving workflows.



epiroc.com/en-au

A little about us...

Australasia Fire and Emergency Response College offers a core set of training and assessment courses in fire and rescue, emergency services, mining emergency response, and disaster management. We aim to provide our students with the knowledge and practical hands-on experience to operate confidently and competently in a range of emergency situations.

We work closely with industry experts to ensure our courses are current and meet industry needs. We target a wide range of students including those looking for a career change or to expand their career opportunities, those already working in the industry looking to update or expand their skillset, as well as newbies looking to establish a career in fire, rescue, mines emergency response, and emergency management.



Supporting Safety on Site

Australasia Fire and Emergency Response College is going above and beyond to enhance the emergency response capacity of mining teams with their innovative Mobile Live Fire Unit.

Primarily based in Queensland, the College runs a series of Fire & Rescue, Emergency management and safety courses with training facilities on the Sunshine Coast and Gladstone in Queensland, in addition to locations in Sydney, Victoria, and PNG. The College also offers on-site training options to its varied client base.

Among the most sought after is the Mobile Live Fire Unit, which trains resource sector personnel in emergency response and management of sudden fire hazards.

Australasia Fire and Emergency Response College Chief Executive Officer Jason Humphries said the Unit is now considered an innovative and integral part of mine site safety training.

"There is a significant threat of fire on a mine or industrial site due to mining, processing and handling activities" Mr Humphries said.

"In urban areas, fire can be responded to and managed by nearby state services but mining operations are often in remote areas, meaning your usual authorities aren't in a position to respond in a timely enough manner.

"It is therefore imperative that mining emergency response teams have the confidence and capacity to respond effectively to fire.

"Our training provides participants with the necessary skillsets to respond to and manage a wide range of safety incidents effectively, calmly and safely."

Feet to the Fire

Mr Humphries said the Mobile Live Fire Training Unit is an accredited course designed and delivered by current and long serving former firefighters.

The training can be delivered on-site anywhere in Australia or overseas, allowing mining operations to conveniently empower their workers on their own site.

Live fire is used with a high volume of gas to deliver realistic scenarios, including car fires, tank fires, gas cylinder fires, airplane fires, just to name a few.

All live fire props have been approved by the Gas Inspectorate and are designed, built and engineered to Australian and New Zealand standards.

The highly engaging course features trainer presentations, small group work, independent self-paced learning and a variety of hands-on practical components.

Participants are assessed on safety knowledge, skill demonstration and some written exercises, dependant on the client requirements.

Mr Humphries said the ultimate goal of the Mobile Live Fire Unit was to increase worker competency, therefore our training instructors and content experts meticulously dedicate themselves to the training to ensure all participants understand and engage with the course material and practical work.

"Our trained instructors support each participant through their learning journey, drawing on their own experiences, which combined is well over 100 years' of knowledge and incident control," Mr Humphries said.

"Ultimately, we want participants to finish the training with the knowledge and skills to respond to an incident comfortably and with the utmost confidence in their own abilities.

"Our training addresses the physical and emotional requirements and impacts of emergency response and firefighting, and because we're exposing them to real live fire, each participant undertaking our training actually does feel the heat.



"Feedback on the course has been exceptionally positive and encouraging, and we take on board comments and suggestions from our clients in order to continuously improve and develop our service. This ensures our courses remain relevant and meet the continuously evolving industry requirements.

Training You Can Rely On

Australasia Fire and Emergency Response College's Mobile Live Fire Unit is one of many courses delivered by the approved live fire training provider.

Industry operators also engage the College for its First Aid Unit, Working at Heights, Confined Space Rescue, Road Crash Rescue and Vertical rescue courses, as well as several others.

All courses are developed with input from relevant industry experts and are regularly reviewed and updated to ensure course material is current and meets the needs of the client.

Mr Humphries said the College offers a comprehensive training service to empower the mineral resources sector staff, as well as other industrial operators, to ensure safety on site.

"We can tailor and develop any live fire situation for all types of industries, across short or long courses, either on the client site or at one of our many training facilities," Mr Humphries said.

"On successful completion students will be issued with a Statement of Attendance for non-accredited courses or Statement of Attainment for accredited courses.

"I have every confidence that our live fire training facility and mobile live fire unit and training props will provide participants with the fundamental and advanced skills to safely extinguish a wide variety of industrial fire situations.

"Please reach out with any enquiries or for a comprehensive training proposal tailored to your unique site requirements."

For more information, visit
www.aferc.edu.au

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Australasia Fire & Emergency Response College

Fire, Rescue & Emergency Response Training



COURSES WE OFFER

- | | | | |
|--|---|---|---|
| ✓ PUA20619 Certificate II in Public Safety (Firefighting and Emergency Operations) | ✓ PUA20719 Certificate II in Public Safety (Firefighting Operations) | ✓ PUA30619 Certificate III in Public Safety (Firefighting and Emergency Operations) | ✓ PUA30719 Certificate III in Public Safety (Firefighting Operations) |
| ✓ RII30719 Certificate III in Emergency Response and Rescue | ✓ PUA40319 Certificate IV in Public Safety (Firefighting Supervision) | ✓ RII41319 Certificate IV in Emergency Response Coordination | ✓ Aviation Firefighter Training |
| ✓ Vertical Rescue Training | ✓ Confined Space Rescue Training | ✓ Wild Fire Training | ✓ Live Fire Training |
| | | | ✓ Conduct fire team operations |

Fire Safety Courses

- ✓ Queensland Fire Safety Advisor Course

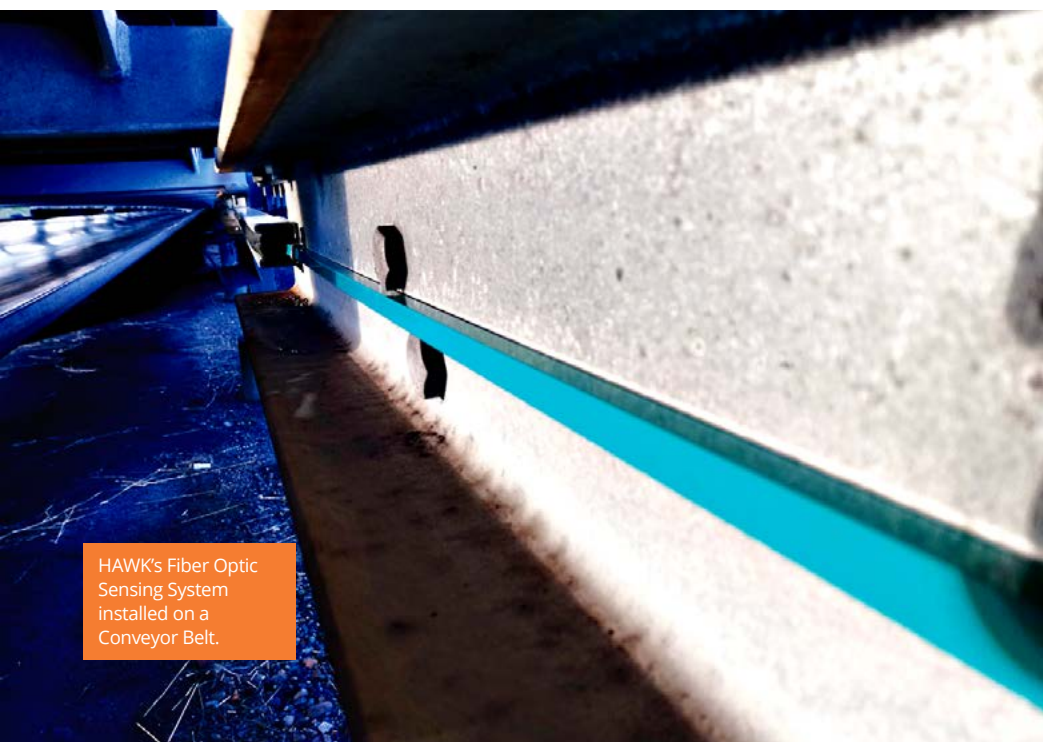
Our First Aid Courses

- | | |
|---|--|
| ✓ HLTAID009 Provide cardiopulmonary resuscitation | ✓ HLTAID012 Provide First Aid in an education and care setting |
| ✓ HLTAID010 Provide basic emergency life support | ✓ HLTAID014 Provide Advanced First Aid |
| ✓ HLTAID011 Provide First aid | ✓ HLTAID015 Provide advanced resuscitation and oxygen therapy |

CONVEYORS BEING DOWN GOT YOU DOWN?

A BRIEF LOOK INTO SELECTING THE RIGHT CONVEYOR
MONITORING SYSTEM FOR YOUR CONVEYOR APPLICATIONS.

HAWK's Fiber Casing improves signal and protects the sensing fiber.



HAWK's Fiber Optic Sensing System installed on a Conveyor Belt.

HAWK's Fiber Optic Sensing System is modular in design and can monitor up to 80km (50mi) of conveyor in real-time 24/7.

Conveyors by their very nature are large, complex, and have many moving parts. Ask any mechanical engineer and they will tell you that the first point of failure in any system is going to be wear on moving parts.

Thankfully, technology has progressed, and new types of sensors and data analysis techniques have developed to the point that autonomous monitoring of moving, and vibrating conveyor components are now available. The limitation now lies in the practicality of installing, commissioning, and maintaining sensors over long expanses of overland conveyors.

Normally this limitation means that critical pulleys at the head, tail, and return take up are monitored with a smattering of other instruments used at different locations of interest. However, the majority of moving components (Idlers) are not actively monitored and still rely on manual daily inspections (sometimes called belt walks) in order to determine ongoing wear and replacement needs.

Distributed sensing systems are a disruptive technology to multiple ongoing monitoring applications including but not limited to conveyor belts. They are more accurate and reliable than the existing manual inspections. There are many benefits that come with installing a single passive sensing element that continuously monitors all the carry and return idlers on a belt. But first, it is best to learn how fibre optic sensing works.

The general principle of operation of fibre optic sensors can be best described as a combination of time of flight for determining signal origin (similar to a radar or sonar) and backscatter diffraction. In simplistic terms, the energy from vibration and temperature changes the properties of the glass within the fibre optic cable, which change the way light is refracted by at that point in the fibre. By analysing the time of flight and the change in the diffraction pattern, it is possible to determine what is happening at any point along the fibre optic cable with no need for further sensing elements.

Distributed Sensors come in a couple of different configurations; however this articles focus is on fibre optic sensing using Hawk Measurement Systems' Praetorian Fibre

Optic Sensing system. The Praetorian Fibre Optic System utilises Distributed Acoustic Sensing (DAS) for detection of idler vibration and Distributed Temperature Sensing (DTS) for overhead heat and fire detection when used for conveyor monitoring applications.

When determining the best option for autonomous conveyor monitoring, consideration should be given to the combination of a DAS/DTS hybrid system capable of acting as a condition monitoring and emergency monitoring system. Primarily a pair of fibres mounted to the stringers of the conveyor monitor idler vibration and a single catenary supported fibre sits above the material under the weather shield which looks for localised increase in air temperature caused by fire on the belt.

By installing these fibres within Hawks HFC (Hawk Fibre Casing) the amount of vibrational energy detectable with the fibre is increased, leading to earlier detection. The fibre is protected mechanically from both interference and impact and from ongoing build-up of dust and other materials.

Subsequently, utilising just a few fibre optic cables, a single system can monitor kilometres of conveyor belt in an autonomous and continuous fashion, determining both the quality of operating condition and monitoring for emergency conditions. This is all done from a single powered unit with a single point of input to DCS or SCADA systems in a simple to understand priority (traffic light) based system. It also uses GPS tag position and historical data that is ready at the touch of a button.

Additionally, HAWK's User geographical information system graphical user interface (GIS GUI) is accessible from any mobile connected device allowing inspectors to look up the date alarm information in the field during their normal duties. Operators and managers can also look at the condition of the belts and place their orders for replacement idlers appropriate to their measured future needs. **AMR**

If your organisation is looking for ways to improve the reliability of new or existing conveyor belts, then contact Hawk Measurement Systems today for a technical discussion and/or presentation or visit www.HawkFiber.com



Tired of Idler Failure and Downtime?
Use what the top Mining Companies Worldwide are using -
HAWK's Praetorian Fiber Optic Sensing System
for Conveyor Health Monitoring

Instant Deteriorating Fault Alerts | Proactive Damage Prevention | Eliminate Machine Downtime



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LEVERLINK MAKES IMPACT

An idea by Leverlink founder Richard Sharp early in 1991 led to the production of the first “dynamic” impact bed for troughed conveyor belts in Australia, forming the foundation for Leverlink’s current leading-edge technology.

Mr Sharp had the idea to develop a better and more reliable product; one that would dissipate kinetic energy and provide the benefits of long service life, as well as assisting in reducing maintenance costs in terms of consumables and labour.

The design for the dynamic impact bed – using rubber torsion springs as suspension – was radically different from the static impact beds that were dominating the Australian marketplace at the time.

Load Zones and Transfer Points

Most belt damage occurs at conveyor load zones (e.g. under crushers) and transfer points. The reasons for this are many and varied.

Impact Bed or Belt Support Cradle?

Many so-called impact beds are nothing more than belt support cradles with limited design capacity to dissipate impact energy and provide belt damage protection.

Design and Engineering

Leverlink’s experience, engineering skills, and continuous improvement program through research and development and infield monitoring has made the company leaders in the design and application of dynamic impact beds in Australia.

All Leverlink dynamic impact beds are custom-built to suit the application, and in areas where installation space and access are restricted, the design can be such that the individual parts can be broken down and reassembled on the conveyor frame in manageable parts with minimum effort.

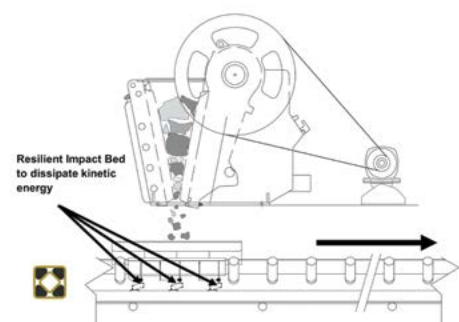
Rubber Torsion Springs - Impact/Vibration Attenuation

Leverlink has developed rubber torsion springs that provide a unique method of absorbing impact with the added benefit of vibration attenuation.

Rubber torsion springs are used extensively in its designs for various applications.

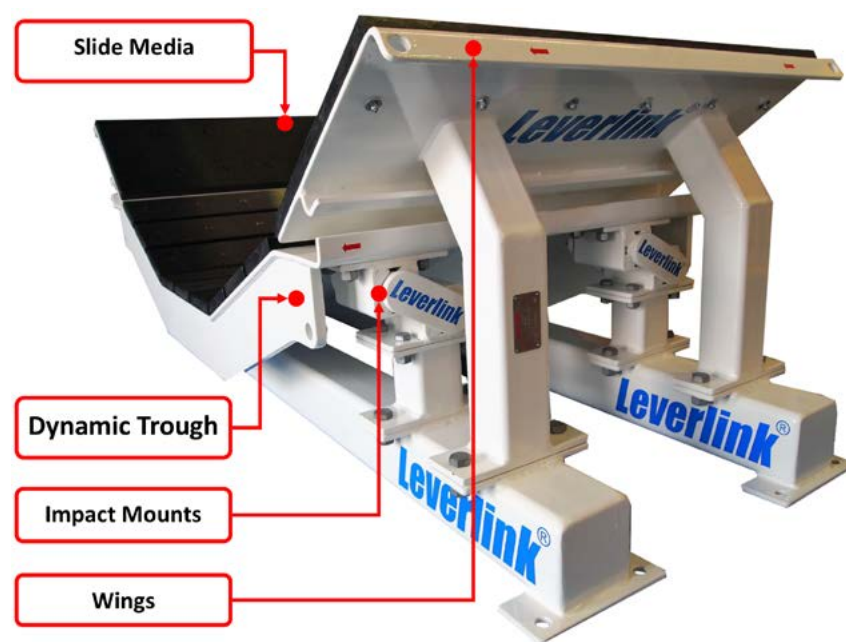
Leverlink is the largest manufacturer of rubber torsion springs in Australia, and also manufactures some of the biggest rubber torsion springs in the world.

With a proven track record, the company uses in-house engineering and design combined with extensive infield representation and has years of experience in mining, quarrying, and material handling problems.



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- No rollers to replace
- Reduced downtime
- Reduced maintenance costs
- Protects conveyor structure from impact damage

- Supports belt profile at load zone
- Long service life
- Cost effective
- Cost saving
- Easy to retrofit

Spillage Control

Spillage can be controlled by effective skirting and inner wear plate design and the added use of belt support systems.

Case Study One

Leverlink was contacted by a large mining operation who were continually experiencing failure of its impact roller frames.

The conveyor belt was 2000mm wide with a 45-degree trough angle, and the belt was running at 1.5 m/sec, the feed material was -500mm with a free fall height of 2500mm, and the production rate was 1800 tph.

With the functional specifications supplied, Leverlink then visited the site to determine what additional information could be

gained that would assist in the engineering and design of a Dynamic Impact Bed to minimise the damage to the conveyor belt and supporting structure.

The Dynamic Impact Bed was built and installed.

The goal was achieved, and the client completely satisfied, they then purchased a second unit for an identical load zone.

This was 26 years ago. In this time the slider bars have been replaced three times and the impact mounts twice, but it is expected the Dynamic Impact Beds will last another 10 years.

Case Study Two

An offshore copper mine commissioned Leverlink to provide a solution for extremely high costs due to belt damage at a conveyor load zone.

The conveyor belt was 2400mm wide, 23 degrees trough angle, and running at 3.35m/sec.

The material was hard rock/copper ore at -250mm with a free fall height of 6000mm. The peak capacity was 10,000 tph.

Engineering calculations determined a multi-trough Dynamic Impact Bed was required for the application.

This was designed, manufactured and exported to the client. When installed and commissioned it resolved the belt damage problem to the customer’s satisfaction.

One year later the mine ordered a second unit for a similar conveyor belt.

Leverlink has been at the cutting edge of rubber torsion springs and dynamic impact beds for about 30 years, and can provide fully customised impact beds, and many more products and services. **AMR**

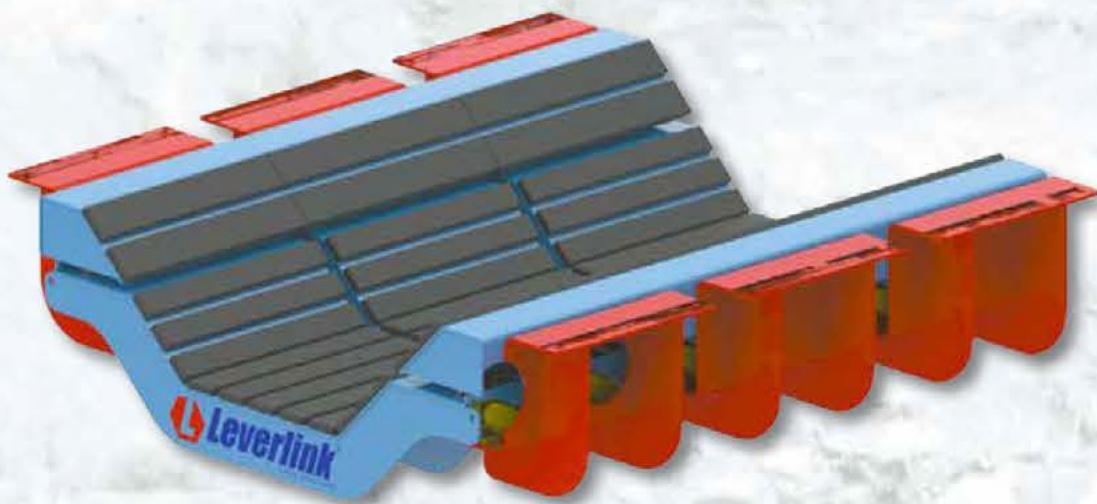


Load Zone Design

The design of an effective conveyor load zone can often be a complex issue.

Functional specifications such as belt speed, width, type of belt, product size, free fall heights, and product moisture content are all major design considerations.

AUSTRALIA'S CONVEYOR BELT LOAD ZONE PROTECTION SPECIALISTS



SUSPENDED

**CUSTOM
DESIGNED**

Custom designed and engineered
to protect the conveyor belt
and supporting structure



TRANSITION



FOOT MOUNTED

10

ASK US ABOUT
OUR 10 YEAR
WARRANTY



Made in Australia

Leverlink
THINK INNOVATIVE

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With a 6t capacity, a 2.4m turntable and 2m height clearance, the R7 Robowash was built for heavy duty component cleaning across multiple industries.

The R7 has a 2800L water storage capacity with both wash and rinse functions for eliminating contaminants when cleaning components.

AUTOMATE YOUR INDUSTRIAL CLEANING

- R7 ROBOWASH KEY FEATURES**
- PLC Control with HMI screen allowing for fully customisable cleaning settings
 - Space saving lid function with 200mm self-adjusting pneumatic safety cylinders
 - High torque, electrically driven basket with torque clutch
 - Highly efficient washing technique utilises dual pumps with 9-Bar pressure and high impact spray nozzles

Robowash offers the most advanced cleaning technology for the mining industry and is a market leader in the supply of automatic cleaning equipment.

Its high-pressure washing system is highly effective at removing oil, grease, dirt and grime from any material and eliminates the need for costly and labour-intensive manual cleaning methods.

Introducing the R7 Robowash machine

This machine is perfectly designed for heavy industrial cleaning applications and is capable of cleaning large, heavy components with precise cleaning and contamination control.

The R7 Robowash machine is suited for large off-road diesel 16-cylinder engine blocks and components, marine and stationary power rebuild and remanufacture, as well as large general engineering and manufacturing components.

Cleaning is contained in an enclosed cabinet, the automated process means employees are free from exposure risk, traditionally labour-intensive processes are minimised and operations enjoy increased productivity and throughput.

Options include additional spray bar for internal oil gallery flushing, on demand gas heating for high capacity cleaning applications, advanced filtration for contamination control as well as the ability to run caustic soda with additional rinse function.

R7 Machine Specifications

The R7 Robowash is unmatched in its reliability, superior performance and productivity. Specifications include the following:

- Load Capacity:** 6.0 Tonne / 6000 KG
- Basket Dimensions:** 2400mm Diameter
- Internal Height:** 1500mm / 2000mm
- Tank Capacity:** 2800 L
- Machine Weight:** 9.0 Tonne

Max Electrical load: Minimum 63A, 100A preferred for Electrical Heating.

Robowash also offers larger capacity machines and custom machines for any cleaning applications.

Commitment to Automation

Robowash Managing Director Jay Jasper said health and safety were among the company's top priorities, as well as providing customers with a one-stop-shop for industrial cleaning solutions.

"We offer a complete range of industrial parts cleaning machines for the mineral resources sector and all other major industries," Mr Jasper said.

"Whether it's for smaller precise cleaning or large, heavy industrial applications, Robowash machines are engineered to have increased cleaning capacity, advanced contamination control and reduced

energy consumption.

"This is the power of automation."

About Robowash

Robowash manufactures industrial aqueous parts cleaning machines for the mining, engineering and automotive industries. Industrial Parts Washers are our core business and we have supplied machines to many of the major equipment repairers in Australia.

In addition to the Robowash machine that automates industrial cleaning, Robowash offers a total service package that includes workshop assessment, installation and commissioning, operator training, wastewater removal and treatment, preventative maintenance and the flexibility of rental or purchase options. **AMR**



KEEPING IT CLEAN

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ROBOWASH 
AUTOMATIC CLEANING SYSTEM



6 VITAL TOOLS TO GROW YOUR BUSINESS

Our Mining Business Development Package has helped businesses like yours, across a range of industries, to form relationships with key decision makers on Australian mine sites.

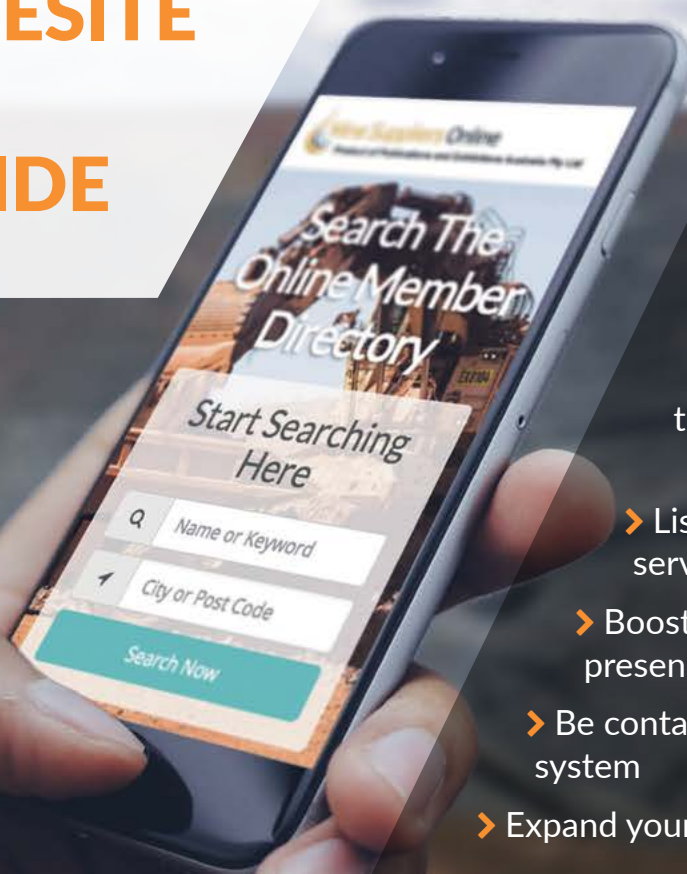
The 12 Month Package includes:

- Access to our Mines Database (Provides details for Key decision makers across 400 mines)
- Social Media Blast to over 7000 followers across all Publications & Exhibitions platforms
- 12 hard copies of The Australian Mining Review (monthly), including The Australian Oil & Gas Review
- Weekly Mining Report (Carefully researched, real business opportunities)
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INTEGRAL
SCAFFOLDING

**SETS THE
STANDARDS
HIGHER**



Sometimes a few strategically configured steel poles and planks can be the only structure protecting workers at heights. It's more than simply reaching greater heights, but providing better access in difficult to reach spaces.

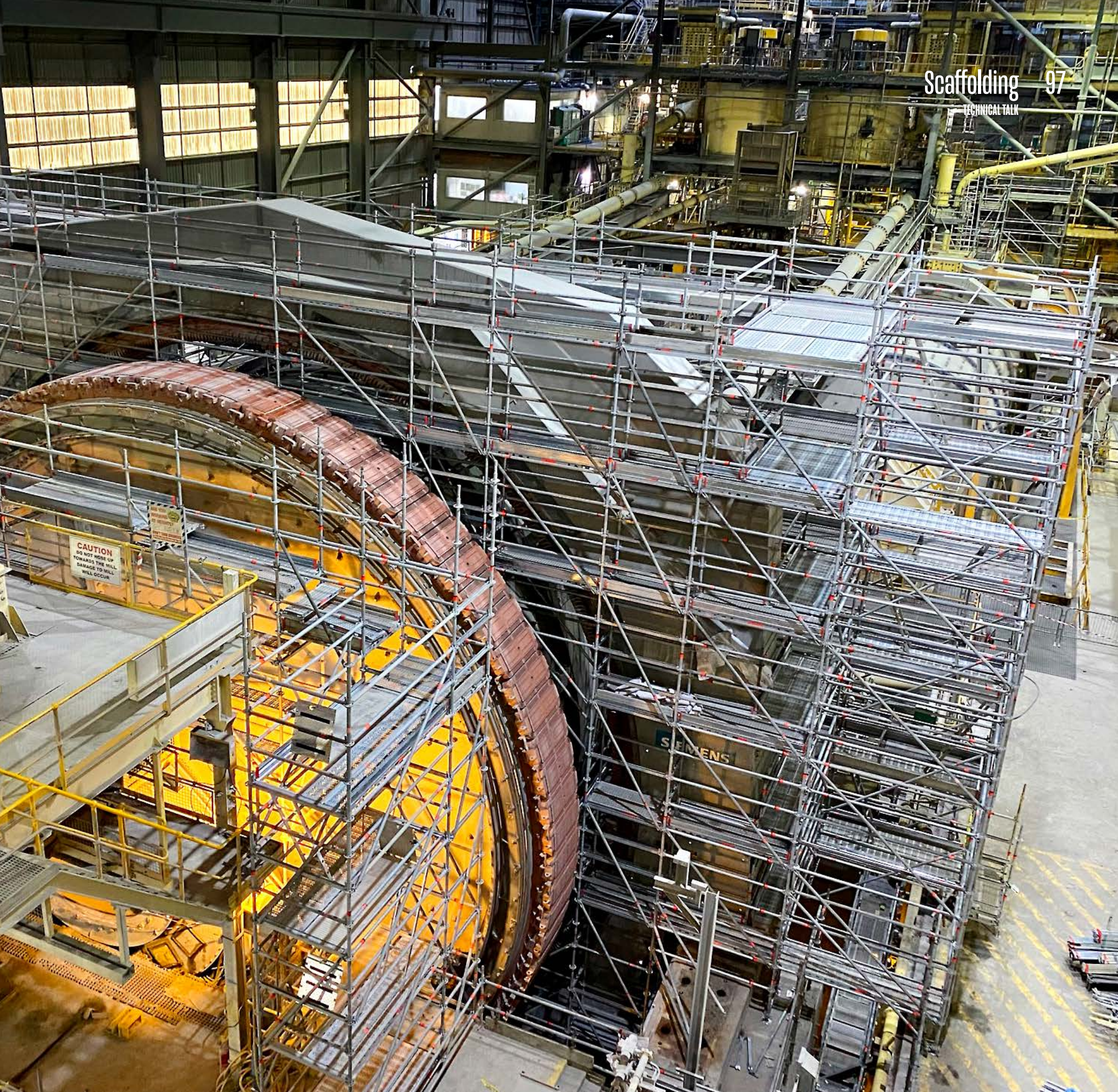
Scaffolding dates back thousands of years where it was used by the ancient Greeks and Egyptians to build the pyramids, or restoring religious places of worship in medieval times.

Today, albeit advances in technology, materials and safety standards, scaffolding continues to prove a critical staple in the construction of commercial megastructures and the repair of industrial plant equipment.

There's one highly specialised company raising the standard in scaffolding and delivering quality designed scaffolds at scale.

Integral Scaffolding services hard rock mines and various coal mining operations, government and local councils, commercial and residential construction projects, and large-scale engineering and infrastructure works.

Headquartered in Orange, and operates de-



pots in Mudgee and West Wyalong, as well as a national footprint of holding yards in multiple mines across the Central West and Pilbara region WA.

According to Integral Scaffolding Director, Matt Molloy, the company takes pride in its impeccable safety record and track record of delivering scaffold solutions to some of the most complex projects in the country.

"We're ISO 45001:2018 accredited, and our experience is second to none when it comes to scaffolding for mining, commercial, and residential projects," said Matt.

"Whether it's a straight forward scaffold, or a job that requires a complex scaffold design, we're well positioned to execute an efficient, cost-effective solution to meet the specific project requirements."

Elevating scaffolding to new heights

Integral Scaffolding is a business founded on specialist mining and shutdown scaffolding work. The company has over 20 years of experience servicing major contracts within the mining industry.

Mining assets serviced include Moolarben

Coal, Evolution Mining's Cowal Gold operation, Glencore's Ulan & Ulan West Operations, Peabody's Wilpinjong Mine, Centennial's Clarence coal mine, Tritton and Newcrest's Cadia Valley Operations.

In its commercial and residential portfolio, Integral Scaffolding has secured major NSW contracts for companies such as Borg Panels, Highland Pine, Zauner, Total Constructions, Cockram Constructions, Hansen Yuncken, ADCO Constructions and Nestle Purina Petcare.

"Safety is at the core of everything we do at Integral Scaffolding, whether it's across our supply chain, our offices and depots, or on customer sites," said Matt.

"We have over 40 highly trained and certified scaffolders in our team that can safely perform work at heights and have a skillset to complete the most complex jobs no matter what the environment.

"We also have crews available around the clock to meet the demands of shutdown scaffolding projects. We understand the challenges and tight timeframes of a shutdown, and the need to maintain a productive site."

To ensure Integral Scaffolding meets and exceeds project requirements, and deliver the highest quality solutions, the company leverages its partnership with leading global manufacturers including Layher, Waco Kwikform, and Aluminium Scaffolds.

"We are a distributor for Waco Kwikform International which allows us to have unlimited access to quality-controlled scaffold nationally," he said.

"Waco has depots in major states and territories that are strategically aligned to our customer sites.

"We also utilise the heavy-duty, quality German-made Layher Allround Lightweight scaffolding system, which offers faster, safer and more efficient component handling as it requires fewer components and is less labour intensive."

More than just scaffolds

Aside from its specialist expertise in all things scaffolding, the company also supplies confined space sentries, riggers, overhead crane operators, temporary fencing, access equipment hire, and truck hire, to support a diverse range of projects and events.

"We offer temporary fencing for hire to suit perimeter security, machinery or plant security, public events and construction works," said Matt.

"We can have it delivered, assembled, dismantled and removed from your site. Our safe fence system is supplied by Aussie owned Ready Fence, which was designed with added strength to improve on existing temporary fencing products.

"We also have a range of access equipment for different applications including ladders, forklifts and all-terrain Manitou gear for hire.

"Additionally, our vehicle fleet are MDG 15 compliant and vary from dual-cab light trucks to utes, and 25 tonne flatbed remote control crane trucks."



For more information, please visit
www.integralscaffolding.com.au

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A STEP ABOVE THE REST



Asset owners and site managers are aware of the risks associated with working at heights, and the need to implement procedures that keep workers safe when performing their duties.

While keeping projects on track, reducing operational downtime, and increasing productivity all have an impact on business performance, maintaining a safe environment for workers remains a priority.

When performing tasks at potentially dangerous heights, employees need the assurance that all the necessary steps have been taken to mitigate unforeseen risk.

From mining maintenance, construction sites and manufacturing workshops, to retail, warehousing and everything in between, OEM Group is a company that is keeping a step ahead in safeguarding workers.

In the early 2000's, the company identified a need to safely access heights, whilst maintaining production targets. OEM Group introduced various manufactured platforms to the East and West Coast, however quickly found that the products and logistics of such large products were not fit-for-purpose, or cost-effective for the jobs at hand.

After heading back to the drawing board, the team devised a safe, stable, flat-packed solution never before seen in the market. That's where STEPRITE® was born.

Designed and tested to eliminate fall hazards and manufactured to comply with AS 1892.1:2018, the company's STEPRITE® Safety Access Platforms are built for the toughest sites.

According to OEM Group Chief Executive Officer, Vincent Allegre, the company is committed to designing innovative solutions that improve safety across all industries.

"Our STEPRITE® safety access platform ladders have been specifically designed with performance and safety in mind," said Vincent.

"They offer added protection in mining and heavy industrial applications, and provide better access when working at heights for both fixed or mobile plant equipment."

Heavy-duty design for the toughest sites
Designed to perform in the toughest environments, the standard and mine-spec STEPRITE® safety access platform ladders are constructed from strong structural grade aluminium and have a 250kg working load limit.

The strong, portable and lightweight ladders feature conveniently positioned lifting handles and fixed wheels, which are easily manoeuvred by hand.

"Our mine-spec platform ladders include a one-way self-closing barn-style safety door,

and a boom-rail to prevent access up to a controlled point. Forklift pockets are also included to provide a simple solution for safe positioning," said Vincent.

"The unique frame is designed to allow for the platform to be flat packed, for cost-effective transport and storage," said Vincent.

"Special anti-slip bull nosing on the stairs and heavy-duty platforms assist in preventing slips and falls. The large non-slip rubber mounding's on the feet provide stable footing, and the fully welded 900mm high hand-rail with mid-rail allow safe access to the top of the platform.

"They are available in a range of standard sizes starting at a working height of 500 mm, and increase in 250 mm intervals all the way up to our largest at three metres."

Whether it's mining maintenance, aviation, construction, transport, agriculture, mechanical or manufacturing workshop, the STEPRITE® ladders are fully customisable, offering a high degree of flexibility when working at heights.

Stepping it up in safety
Although STEPRITE® platforms are used for multiple applications within the mining industry, they are becoming increasingly common in repair and maintenance of both fixed and mobile plant equipment in other industries where safety and productivity

are critical.

In instances where truck drivers, forklift operators and warehouse personnel have experienced falls from trailers when trying to restrain loads, STEPRITE® access platforms are providing a simple way of reducing the risk of falls and injuries.

The access platforms are also being used onsite by transport companies for mechanical maintenance and repairs, cleaning windscreens, warning lights and horns, all of which can be done without the risk of drivers having to climb up the side of their trucks or bonnets.

"As our STEPRITE platform ladders are engineered from steel or aluminium, we eliminate the need for scaffolding in fixed plant operations," he said.

"Not only are they a cost-effective solution, our platform ladders can also be fully customisable to meet unique customer requirements and site specifications.

"We engineer products to suit mobile equipment (trucks, dozers, loaders, excavators, etc.), train loadouts, crushers and conveyors, reclaimers, as well as vibrating screens, drums and chutes.

"Aside from our access platforms, we also manufacture a range of mobile equipment solutions including hub stands, tray dollies,





and diff skates for all makes and models of mining trucks, excavators, loaders and dozers.

“Our range of maintenance tooling is designed to increase safety and reduce downtime during shutdowns and onsite maintenance of mining trucks, excavators, loaders, dozers and recovery trailers.”

Setting the benchmark in fabrication

From specialised cleaning solutions to custom safety access platforms and special builds, it’s no surprise OEM Group has been at the forefront of innovative and creative safety solutions for over 20 years.

The company’s in-house design, engineering and fabrication expertise enables customised fit-for-purpose solutions that are aligned to specific end-user requirements – on time and within budget.

“Our portfolio includes specialised aluminium and steel welding, fabrication services and processes to create innovative equipment solutions to suit our customers’ unique applications,” said Vincent.

“We have an expert team of drafts people and engineers that support the custom design process, whether it’s a safety access platform, materials storage, workshop solutions, maintenance tooling, or a completely bespoke product. This includes 3D scanning for larger, more complex projects that re-

quire specific dimensions and weights.

“When you choose OEM Group, you can be assured you are getting a skilled team of fabricators capable of producing the best quality solutions.”

About OEM Group

For over 20 years, OEM Group has been the exclusive distributor for a wide range of pre-fabricated products and innovative industrial equipment.

Founded in Perth, Western Australia, OEM Group is proudly West Australian owned and operated. It works with some of the country’s leaders in the mining, civil, oil, gas, marine, aviation, transport and industrial sectors.

OEM Group is the exclusive WA distributor for SPITWATER Pressure Cleaners, JETFIRE Space Heaters, VACSTORM Vacuum Cleaners and manufacturers of STEPRITE® Safety Access Platforms, JACKRITE Jacking Stands and WESTCHOCK® Wheel Chocks.

For more information, please visit www.oemgroup.com.au

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- 1. SAFETY CHAIN & CLIPS**

All work platform ladders come with strong fully welded safety chains and clips.
- 2. SAFETY GATE**

All work platform ladders come with an inward opening safety gate, which can be locked in the open or closed position. This provides a kickplate all around the platform as required by Australian standards.
- 3. C-SECTION**

Specifically designed lightweight 'C' section provides high strength and torsional resistance. It also allows all fixings to be concealed and not protrude where they could cause injuries or damage.
- 4. HANDRAIL**

Seamless, fully-welded 915mm high handrail with midrail to ladders and platform.
- 5. FIXED WHEELS**

For easy maneuverability .
- 6. FRAME DESIGN**

Unique design allows the work platform ladders to be flat packed for easy cost-effective transport and storage. Each ladder comes with easy step-by-step installation instructions.
- 7. ANTI-SLIP**

Special non-slip to improve onsite safety by assisting with the prevention of slips and falls.
- 8. LIFTING HANDLES**

Conveniently placed lifting handles allows the unit to be moved around easily.
- 9. HEAVY-DUTY PLATFORM**

Non-slip surface with 4.5mm thick plate for added strength and durability.
- 10. TOOL TRAY**

Keep tools and equipment dry and clean using the included tool tray.
- 11. FEET**

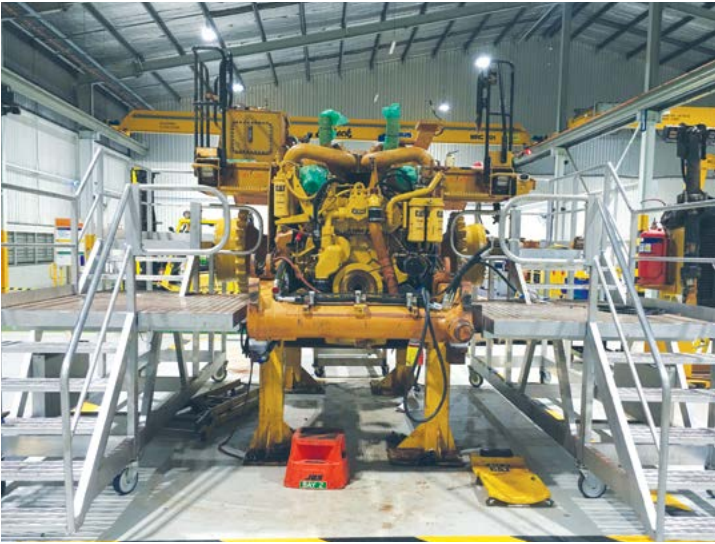
Large feet with non-slip rubber mouldings to provide a stable footing.
- 12. BARN-STYLE SAFETY DOORS**

One way self-closing barn style safety doors, with safety hinges and Safety Yellow paint.
- 13. BOOM-RAIL**

Barrier to prevent access up to a controlled point.
- 14. FORKLIFT POCKETS**

Providing a simple solution for the safe positioning of safety access platforms with a forklift. *SMP1000 (1mtr) and above.
- MINESPEC UPGRADE**
- OPTIONAL ACCESSORY**
- LOCKABLE SWIVEL WHEELS**

Steprite Safety Access Platforms are available with optional lockable swivel wheels for ease of manoeuvrability.



CARETAKER®

ALRS | Oil samples you can safely trust



ELIMINATE LIVE WORKS.

Sampling of lubricants, fuels and coolant can be a challenging task for today's service personnel. The time required to extract samples from earthmoving equipment can be a costly exercise, and one that impacts production.



Reliable Samples - reduce sampling errors

As part of a sample routine, the equipment must be isolated to provide safe access onto the machine, allowing the task of sampling components to commence.

Samples can be extracted in a number of ways depending on the different equipment being tested.

This can lead to inaccurate sample data due to repeatability issues, as some components require the equipment to be live in order to obtain a proper sample, which means the machine cannot be isolated completely.

Fortunately for mine service personnel, Equipment Placement has the ideal solution to improve the way in which samples can be extracted from either live or isolated equipment.

The company's CareTaker Automated Live Remote Sampling System (ALRS) is specifically designed to address ongoing

issues with fluid sampling methods and to mitigate risk for service personnel.

ALRS is capable of sampling components while equipment is in operation, which allows a true indicative sample of component lubricants, and the condition of the wear material within that compartment.

When a sample is taken by the ALRS, the oil is at operational temperature and in a live situation.

This gives the best representation of the compartment and the oil, without the intervention that previous techniques once required.

The ability to conduct sampling without the involvement of service personnel helps eliminate the need for live works to be undertaken.

According to Michael Murphy, Equipment Placement's Global Sales and Product

Support Specialist, the ALRS has completely revolutionised the way in which oil samples are taken from equipment.

"From my experience sampling fixed and mobile mining equipment over the past 20 years, the ALRS is the simplest and most effective way to collect oil from any compartment on any piece of plant," said Michael.

"The elimination of live works is a key objective for mining and contracting companies to provide a safe workplace.

"Our ALRS obtains a fluid sample, which can be collected during an equipment refuel, or at a set time prior to routine maintenance operations."

"The sample is then ready for collection by service personnel in a convenient and safe location on the equipment. The way samples can be collected has also allowed equipment to be in a fully isolated state.



Availability to sample equipment in operational state.

If the ALRS system is easily accessible at ground level, service personnel can remain outside of the footprint of the machine, which offers an additional safety measure during the maintenance process."

As the ALRS sampling unit is securely mounted to the equipment being sampled, the unit can be hoisted to the best possible sampling location on the component, even one that is not easily accessible.

When the sample location is fixed, and the sample time period is set, then sample reliability and repeatability can be guaranteed.

This leads to a more reliable trend process for the compartment and delivers more favourable outcomes in wear analysis and lifecycle of the components.

Michael says reliable sampling reduces the need to resample and can be up to 95% more efficient when sampling compartments on all equipment.

"The reduction can be quantified through the cost of equipment sampling including machinery downtime, labour costs, and the costs associated with sending samples to a lab for retesting and verification," he said.

"As all businesses have varied cost implications, we can determine the cost savings of a sample involved in a standard size truck mining fleet."

The Value of Better Sampling

A standard truck mining fleet could include 40 Trucks with three sample compartments.

A factor for standard fleet availability of 80% will be used, which equates to 7,000 hours per year. This means each piece of equipment that has a service schedule of 500 hours would have 14 services per year, which equates to 1,680 samples annually on standard compartments only.

The labour requirement to conduct sampling in either a pit prior to service schedule, or at the point of the equipment being serviced, can be on average one hour depending on when and where the sample is taken.

The time factor will be 40 hours per service period for all machines at the minimum to be sampled. Yearly sampling labour will total a minimum of 560 hours.

As an industry standard for extracted samples, there can be a requirement to resample a minimum of 25% due to inaccurate sample quality, sample results outside of specification, or insufficient sample fluid to deliver a result.

If a faulty sample is received, the compartment needs to be resampled. This increases equipment downtime and labour costs involved in obtaining a new sample. It can also impact trending of the component lifecycle due to delays in securing accurate data required in forecasting service and rebuild opportunities.

The costs associated with sampling the entire fleet can be broken down as follows:

- Oil sample analysis \$40 per sample
- Labour \$50.00 per sample
- Equipment downtime \$611.00 per sample
- Total sampling costs \$701.42 per sample
- Wasted samples \$24,549.70 per month
- Resample (10% costs) \$2805.68 per month
- Total sample cost \$1,178,385.60 per year

The ALRS Difference

As the sampling process has been replaced by the ALRS system, the only requirement is to remove the sample bottle and reset the system by service personnel.

The cost advantages of using ALRS can be calculated easily.

The reliability of the system to provide an accurate sample reduces the need of resampling to just a 5%.

There is also a significant reduction in the time taken to collect samples, and equipment downtime, as sampling can be performed when refuelling, or during a crew transition period.

This can equate to a time period of half an hour per machine.

The value added by ALRS is represented as follows:

- Oil sample analysis \$40 per sample
- ALRS labour Cost \$18.00 per sample
- ALRS equipment downtime \$232.85 per sample
- ALRS sampling costs \$290.50 per sample
- ALRS resampling costs \$232.85 per month
- ALRS total sample cost \$490,834.20 per year

Since 2002, Equipment Placement has been providing quality products, support and servicing to mining, oil and gas, civil construction, and other heavy industries. From mining companies to global OEMs and mining contractors, Equipment Placement offers specialist technical expertise and cost-effective solutions for mobile and fixed plant.

The company is committed to solving key industry issues through innovative solutions that set the benchmark in reliability and safety, including hydrocarbon management and unsafe practices. Its priority is to eliminate live work practices through best-in-class sampling techniques and technology.

For more information, visit www.equipmentplacement.com.au

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Isolate Equipment to gain access to sampled compartments.



SAMPLE REPEATABILITY AND RELIABILITY

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