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INDEPENDENCE DAY

The **technology** behind the world's largest single autonomous haulage fleet at the Roy Hill mine in WA's Pilbara region.

SEE STORY PAGE 30



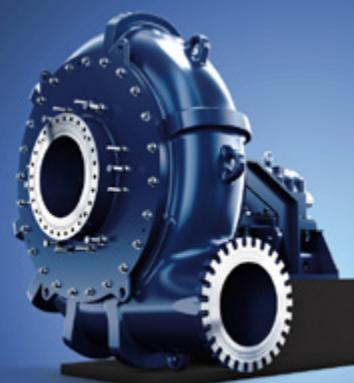
The *Australian Mining Review* also speaks with Hancock Prospecting Group Operations chief executive Gerhard Veldsman about the Roy Hill mine's automation journey.

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BRISBANE TAKES CENTRE STAGE IN AUSTRALIA'S FIRST-EVER WORLD MINING CONGRESS



(Image source: BHP) BHP chief executive Mike Henry.



(Image source: Fortescue Metals) Fortescue Metals chief executive Fiona Hick.



(Image source: Rio Tinto) Rio Tinto chief executive, minerals, Sinead Kaufman speaking at the World Mining Congress.

For the first time ever in over 60 years, the 26th World Mining Congress (WMC) was held in Australia from June 26-29.

The world's most prestigious international mining event was held in Brisbane at the convention and exhibition centre and hosted international representatives from some of the world's foremost resource economies.

First held in Poland in 1958, the congress sets the scene for high-level discussions and international agreements that influence mining practices and the global resource industry.

More than 3000 delegates spoke from 70 countries to discuss anything from the use of artificial intelligence to NASA's plan to mine on the moon.

Arguably, decarbonisation took centre stage over the four-day event with many businesses highlighting their green efforts. We'll look at some of the biggest speakers and the topics they covered.

BHP
BHP chief executive Mike Henry began by covering the increase in awareness of policy makers on metals and minerals.

"Ongoing population growth, urbanisation, rising global living standards, renewal of ageing infrastructure and decarbonisation of the global energy system all mean the demand for many metals and minerals will grow, even as existing resources are depleted," he said.

He said the demand brings significant opportunities for companies, communities and countries but also challenges in regard to the capital required and the need to develop and operate new mines.

"We need a massive wave of capital investment — perhaps an additional US\$100b per year in capital investment in the resources sector — if the world is to meet the Paris aligned 1.5 degree scenario," he said.

According to Mr Henry, this is going to require significant multiples of metals and minerals over the coming decades with responsibilities including finding the needed minerals and extracting them safely in a

way that has positive social and economic effect.

He highlighted the use of new technologies and innovation and the roles they play in lifting productivity and expanding output.

"Today, the opportunities to innovate and invite good ideas into our companies, and being more prepared to take calculated risks in developing and implementing technology are immense," Mr Henry said.

"The progress we make towards our goal will depend on how much we can improve the way we currently do things."

According to BHP chief technical officer Laura Tyler, the company has been partnering with tech and innovation companies to make sites safer, more sustainable and run better.

"We have extended automation to our fleets in WA and here in Queensland and we are in implementation at Spence and Escondida in Chile," she said.

"Decision automation using real time data feeds from on the board fleet management systems provides a more efficient and productive result, shift in and shift out, delivering more safe tonnes per truck per year.

"The next stage is zero emission trucks and at BHP we are investing in electric — even as we watch the hydrogen journey like hawks."

Fortescue Metals Group

Fortescue Metals chief executive Fiona Hick stated the company has drawn on their experience to deliver solutions needed to operate more sustainably.

"At Fortescue, we've made the decision to draw on 20 years of experience in large scale infrastructure, in operations, in automation, to deliver some solutions that we need to operate more sustainably," she said.

"We have set an ambitious goal to achieve real zero emissions by 2030 across our iron ore operations.

"We are diversifying our product mix and

geographical footprint to include higher-grade iron ore and international operations to supply the demand of the future.

"And we have developed a green energy arm, Fortescue Future Industries, which is working to decarbonise our operations, and in time, to share that technology with the world."

Fortescue will do this through the Iron Bridge magnetite project, its Billion Opportunities program, the Belinga project and decarbonisation.

Being the fourth largest iron ore producer in the world, Ms Hick said decarbonising its operations made sense.

"Decarbonising our operation makes compelling business sense," she said.

"We are a large fuel consumer, and fuel, particularly diesel, is a significant part of our cost base.

"If we run on renewable energy instead, we will lower operating costs and create opportunities for maintenance efficiencies and productivity improvements."

In the next seven years, Fortescue plans to have its operations running on renewable energy.

To help with the decarbonisation, the company is using solar power, wind generation and batteries, and is developing new technologies around green hydrogen and green ammonia to deliver a green mining fleet and rail operations.

"Later this year we will have our first green hydrogen fuel cell haul truck prototype on site for testing," Ms Hick said.

"Our goal is to have the first green haul truck operational at our sites in three years, in 2026."

Rio Tinto

Rio Tinto chief executive, minerals, Sinead Kaufman echoed Ms Hick, saying the company is focusing on decarbonising its own business — as well as continuing to produce materials the world needs to transition to a low carbon future.

"Firstly, we are accelerating our own de-

carbonisation, switching to renewable power, electrifying processing, and where possible, running electric mobile fleets," she said.

"We are increasing our R&D to speed up the development of technologies that will enable our customers to decarbonise.

"Technology and partnerships have a key role to play."

Another way Rio Tinto is decarbonising is through breakthrough technologies.

The company has developed a fleet of autonomous zero-emissions haul trucks.

"In Australia we have been pioneering remote operations at our Pilbara iron ore mines, introducing the world's first autonomous trucks in 2008," Ms Kaufman said.

"This was followed by the launch of an automated hub in Perth in 2010, which controls 17 mines, 2000km of rail systems, four power stations and four port operations, 1500km away from the site.

"Today at our Gudai-Darri, our newest iron ore mine in the Pilbara, we are partnering with global leaders in technology to ensure we remain at the pioneering edge of mining well into the future.

"For example, we're working with Caterpillar to develop a new fleet of autonomous, zero-emissions haul trucks, and Gudai-Darri could be the first mine in the world to use them."

Symposiums

A range of symposiums were also held, providing a range of deep-dive discussions across a range of topics.

The Minerals Policy and Governance for the New Economy symposium looked at the relationship between government and industry, while the Sustainable Construction Materials symposium looked at sustainable construction commodities.

A third symposium, titled Mine Closure and Post Mining Transitions, looked at rehabilitation from an indigenous perspective and how to absorb mine site closures.

AMR

GLADSTONE:

DIVERSIFYING ALUMINA SUPPLY CHAINS



Rio Tinto Yarwun employees.

Rio Tinto and Sumitomo Corporation will build a first-of-a-kind hydrogen plant in Gladstone, Queensland, as part of a \$111.1m program aimed at lowering carbon emissions from the alumina refining process.

The Rio Tinto-Sumitomo Yarwun Hydrogen Calcination Pilot Demonstration Program, where hydrated alumina is heated up to 1000°C, received a \$32.1m funding boost from the Federal Government's Australian Renewable Energy Agency (ARENA).

Rio Tinto Aluminium Pacific operations managing director Armando Torres says the pilot plant is an important step in testing whether hydrogen can replace natural gas in Queensland alumina refineries.

"At Rio Tinto we have put the energy transition at the heart of our business strategy, and this is one of the ways we're working towards decarbonising our operations," he said.

Rio Tinto is committed to achieving net zero emissions by 2050 and has targets to reduce Scope 1 & 2 emissions by 50% by 2030 from 2018 levels.

Sumitomo Corporation Energy Innovation

Initiative director Seiji Kitajima says the company is excited to be delivering this hydrogen project along with Rio Tinto and ARENA.

"Demonstrating real-world applications of hydrogen in industrial settings with motivated partners is essential to reducing carbon emissions and working toward our company's vision of achieving carbon neutrality by 2050," he said.

If successful, the program could pave the way for adoption of the technology at scale globally while contributing to Australia's own emission reduction goals.

The project will consist of construction of a 2.5MW on-site electrolyser to supply hydrogen to the Yarwun refinery and a retrofit of one of Yarwun's four calciners so it can operate at times with a hydrogen burner.

The trial is expected to produce the equivalent of about 6,000tpa of alumina while reducing Yarwun's carbon dioxide emissions by about 3,000tpa.

Converting the entire plant to green hydrogen could reduce emissions by 500,000tpa, which is the equivalent of tak-

ing about 109,000 internal combustion engine cars off the road.

Construction will start in 2024, with the hydrogen plant and calciner expected to be in operation by 2025.

Sumitomo Corporation will own and operate the electrolyser at Yarwun site and supply the hydrogen to Rio Tinto directly.

The electrolyser will have a production capacity of more than 250t of hydrogen annually.

This pilot plant follows the success of a \$1.2m feasibility study co-funded by Rio Tinto and ARENA that was announced in 2021.

Alpha HPA \$300m+ Gladstone Facility

Alpha HPA announced in early April this year it received up to \$21.7m in funding from the Queensland Government's Industry Partnership Program for the construction, commissioning and operation its second stage (full-scale) HPA First Project in Gladstone.

The \$300m-plus Gladstone facility is expected to create up to 117 jobs.

Queensland Acting Premier Steven Miles says, "investments like Alpha HPA's are growing the State's critical minerals processing capability and ensuring new industries have the materials to deliver safe, sustainable, high-performing products to market".

The project is commercialising production of HPA and related HPA precursor products in Gladstone using Alpha HPA's proprietary licenced solvent extraction and refining technology.

When the second stage is completed, Alpha's low-carbon process technology will enable extraction and purification of aluminium from an industrial feedstock to produce 4N (>99.99% purity) alumina and 5N (>99.999% purity) aluminium salts for sale into high technology markets for products including LED lighting, lithium-ion batteries for electric vehicles, semiconductors, and consumer electronics.

Queensland's Battery Industry Strategy, which is due to be released later this year, will focus on building diverse and sustainable supply chains. **AMR**



Indonesian President Joko Widodo.

WA Premier Roger Cook has signed a Plan of Action with Indonesia's Chamber of Commerce and Industry (KADIN) during the Republic of Indonesia President Joko Widodo's visit.

This agreement will further strengthen the economic ties, trade and supply chain opportunities between WA and Indonesia.

The 2023-2025 Plan of Action has three pillars of cooperation which are key to developing resilient and sustainable supply chains, grow a skilled workforce and support strong environmental and social governance outcomes.

To implement the plan, activities include high level meetings, business forums and the commissioning of strategic analysis to

WA SIGNS STRATEGIC PLAN WITH INDONESIA FOR CRITICAL MINERALS PUSH

map future opportunities for WA and Indonesia to work together under the three pillars of cooperation.

Premier Cook says he was pleased to meet with the Indonesian President and sign the Plan of Action.

"WA is already firmly established as a global leader in the supply of critical minerals and rare earths, with lithium hydroxide and other critical minerals processing quickly becoming established in our state," he said.

"We're committed to growing the State's participation in global battery and critical mineral supply chains, with a view to

further developing our value-adding and manufacturing industries.

"Working with Indonesia, and important trading partner and our closest neighbour to explore partnerships, share information, knowledge and strategies and facilitate business links will fuel our mutual economic growth and green ambitions."

The agreement follows a memorandum of understanding (MoU) signed between WA and KADIN in February to provide a framework that constructs and secures the supply chains of critical minerals and promotes investment and collaboration to develop value-adding critical minerals and battery industries. **AMR**

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CEDRENT ENTERPRISES

AWARDED \$8M LIGHT VEHICLE SERVICE CONTRACT WITH BHP

A boriginal-owned care hire company Cedrent Enterprises has been awarded an \$8m three-year contract to provide light vehicles to BHP's WA and South Australian operations.

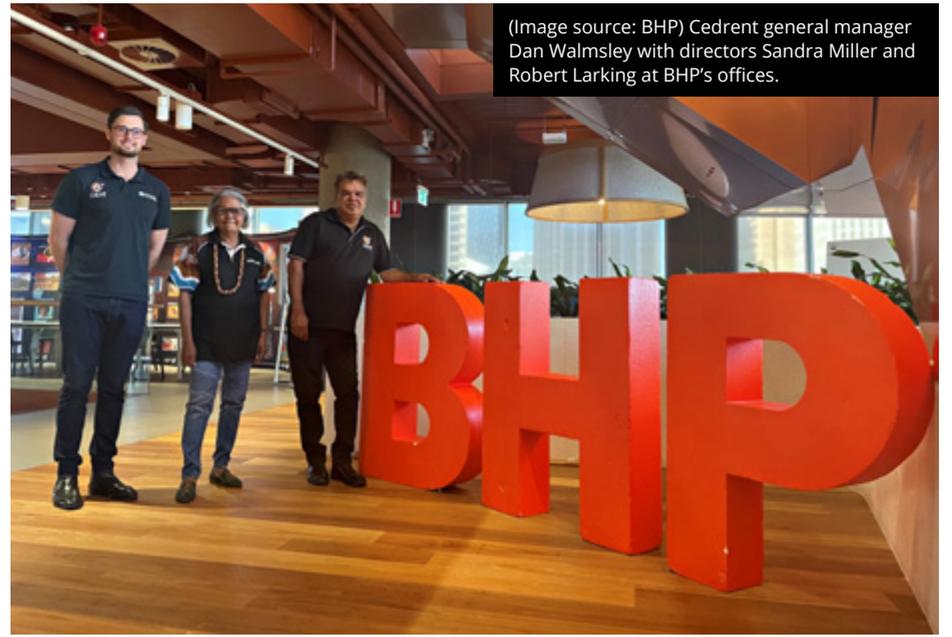
This partnership gives BHP employees an alternative for short and long-term vehicle hire at Olympic Dam in South Australia and across the Newman and Port Hedland operations in the Pilbara region of WA.

Cedrent will share a portion of its profits with Far West Coast Aboriginal Corporation and Yindjibarndi Corporation.

Cedrent general manager Dan Walmsley said the contract is a significant milestone for the company.

"This collaboration with BHP not only underscores our shared commitment to social responsibility and sustainable development but also fuels our efforts to create opportunities within the First Nations business sector," he said.

"We're also proud to be providing a portion of our profits to Far West Coast Aboriginal Corporation in South Australia, or Yindjibarndi Aboriginal Corporation in WA,



(Image source: BHP) Cedrent general manager Dan Walmsley with directors Sandra Miller and Robert Larking at BHP's offices.

which are both devoted to giving back to their communities through programs that upskill youth, support local businesses and create a growing demand for Indigenous goods and services."

BHP head of global Indigenous procurement Chris Cowan said this is the first time the company has awarded an Indigenous-owned business a contract of this type.

"By selecting Cedrent's services when hiring vehicles for work, our people will be supporting a business that creates op-

portunities for First Nations people, prioritising Indigenous community engagement, job creation and procurement," he said.

"It's the first time an Indigenous-owned business has been awarded a contract of this type with BHP, and we look forward to working together to help empower more Indigenous businesses and communities across Australia." **AMR**

Green hydrogen renewable energy production pipeline.



NORTH QUEENSLAND LANDMARK GREEN HYDROGEN HUB ONE STEP CLOSER TO REALITY

The signing of a landmark heads of agreement between the Han-Ho (Korea-Australia) H2 Consortium partners and the Queensland Government could be one of the first major projects in the state to export green ammonia to Korea.

The consortium consists of Australian-based Ark Energy and its parent company Korea Zinc, as well as Korean conglomerates Hanwha Impact and SK Gas.

Queensland Resources Minister Scott Stewart commented on the agreement.

"Townsville and North Queensland are perfectly placed to be at the forefront of

hydrogen, renewable energy and critical mineral developments," he said.

"We have the critical minerals in the ground, the expertise above and the right infrastructure to support the development of both the resources and renewable industries."

The proposed mega-project in North Queensland will produce up to 1.8mtpa of green ammonia and will support the development of up to 4.5GW at Ark Energy's Collinsville Green Energy Hub."

The project's development during feasibility stage will be supported by the Queensland Government investing \$8.5m

for the Abbot Point Activation Initiative under the Queensland and Energy and Jobs Plan hydrogen hubs program.

This investment will rapidly advance the master planning, development and infrastructure arrangements that are needed for Abbot Point to become a hydrogen export super hub.

Queensland Premier Anastacia Palaszczuk said she looks forward to unlocking Queensland's renewable energy potential.

"We look forward to working closely with the consortium partners to unlock Queensland's renewable energy potential

and become a large-scale producer and exporter of green hydrogen," she said.

"North Queensland has some of the best solar and wind resources in the world located near Queensland's largest dam.

"Working in collaboration with the Han-Ho H2 Consortium, we will transform the state into a renewable energy powerhouse, delivering clean, reliable and affordable power for generations and providing good secure jobs for the future."

By 2040, Queensland's energy exports are estimated to support up to 10,000 jobs and \$33b in economic activity. **AMR**

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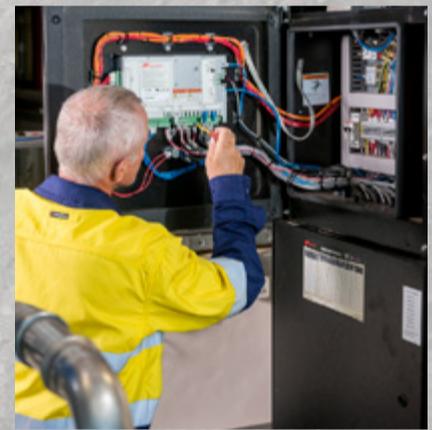
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WesTrac warehouse operations manager Natalia Trewin with one of the robot pickers called Pickachu.



The WestTrac AutoStore warehouse in Tomago, NSW.

WESTRAC LOOKS TO FUTURE AHEAD OF AI APPRECIATION DAY

Leading Caterpillar® dealer WesTrac has marked the third annual Artificial Intelligence Appreciation Day, a celebration of artificial intelligence, or AI, and what it can offer the business and customers in the future.

WesTrac jumped on the AI tidal wave by incorporating it into day-to-day operations at its Tomago, NSW, parts distribution warehouse, with the launch of the AutoStore system.

AutoStore uses unique robots with memory technology powered by AI to understand where specific parts are stored in the warehouse, before they go and retrieve the orders within 5 to 10 minutes.

WesTrac warehouse operations manager

Natalia Trewin said the AutoStore system has made the distribution centre operate in a safe and efficient manner by using robots to pick up orders, keeping people out of harm's way.

"WesTrac's warehouse operates 24/7 to provide our customers with efficient service, and with the tight labour market, we needed a practical solution to fulfill our customers' orders as quickly as possible," she said.

"We decided to implement the AutoStore system, which is set up similar to a Rubik's cube, with very densely packed plastic tubs sitting on top of each other in a large cube that robots dip down into to pull out needed parts.

"The system uses 24 robots, who are

all uniquely identified with colours and names like Wall-E, Bumblebee and Pickarella, that are capable of picking 500 product lines per hour.

"Not only does our warehouse operate more efficiently, but the design of AutoStore enabled WesTrac to gain an additional 1,000 square metres of space."

Ms Trewin says that over time, the AI-powered robotic system will adjust locations of the parts in the warehouse based on live usage data, so the most required parts are at optimal positions.

"Since these robots joined the WesTrac team, we have started looking at potential future growth thanks to their quick turnaround time, which includes increasing

customer orders and boosting the scale of our operations," she said.

"We are entering a new and exciting era as AI becomes more advanced, and for WesTrac, using AI to provide better support for our customers was a no-brainer."

In the lead up to AI Appreciation Day, AutoStore demonstrates how one of the world's largest Caterpillar dealers is using artificial intelligence to improve safety and efficiency at its operations. **AMR**

CRC MINE TRANSITIONS AND FLIPPING THE SCRIPT ON MINE CLOSURE

One of the most significant issues facing communities, regions, governments and the mining industry is what happens after mining ends.

This challenge is growing with some mines, especially those that began during the mining boom and are now approaching end of life at the same time as decarbonisation drives unprecedented minerals demand.



(L-R) CRC TIME chief executive Guy Boggs and CRC TIME research director Professor Tom Measham.

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At the recent World Mining Congress in Brisbane, the Cooperative Research Centre for Transformations in Mining Economies (CRC TiME) worked to ensure closure was at the forefront of discussions.

CRC TiME research director professor Tom Measham brought together experts from Canada, the USA, Finland, Mongolia, Poland, Ghana, India and Slovakia for these discussions.

The symposium featured advances in best practice and case studies on different aspects of transitions to post mining economies and explored the significance of improving outcomes to the sector's future.

Professor Measham said a highlight of the symposium was the First Nations perspective on sustaining and transition.

"A highlight of the symposium was the opening panel focused on First Nations

perspectives on sustainability and transitions in mining economies," he said.

"It was a standout discussion and put First Nations themes at the heart of the symposium, recognising the continued connection to traditional country before, during and after mining as well as the importance of acknowledging the trauma from past mining and opportunities to heal country while embracing post-mining economic futures."

CRC TiME chief executive Dr Guy Boggs said the need for a renewed approach is why the world's only research organisation dedicated to post-mine transition was established.

"It's time to think differently and more holistically about mine closure — at the World Mining Congress it was exciting to hear commitments made at the highest level to a 10-year vision of thriving com-

munities post-closure, nature positive futures and producing significantly less tailings," he said.

"While there are hundreds of examples globally, few in Australia realise the significant potential for mines and related infrastructure to be used for other opportunities such as tourism, recreation and conservation.

"For example, Lake Kepwari in WA was once an operating coal mine and is now a community recreational asset. In Victoria, the Stawell underground physics lab — the only one in the southern hemisphere — is located alongside the Stawell gold mine, helping to diversify the local economy.

"Both show what is possible through innovative thinking and the right partnerships and investments." **AMR**



Lake Kewparrie in the 1990s before mine transition.



Lake Kewparrie post-mine transition.



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Building on its expertise

Since 2006, Fuelfix has delivered innovative and cost-effective fuel management solutions across its core business activities of equipment hire, equipment sales, repairs, maintenance, engineered solutions, and facility management. As alternative energy storage options have become available, Fuelfix has continued to build on its knowledge and capability, integrating data analytics and insights to best meet customer needs.

Fuelfix's overarching strategy of Two Pathways, One Goal not only gives its customers the power to maximise the efficiency of their hydrocarbons infrastructure, but provides alternative energy solutions where it is practical to displace diesel.

According to Fuelfix Chief Executive Officer Patricia Welsh, a rich history of innovation in hydrocarbons management has strategically positioned the company to advise customers on how to mitigate, eliminate,

and offset their carbon emissions and reduce their energy costs.

"Helping our customers understand where, and how they use fuel, allows our specialist technicians to design solutions to reduce the cost of production, maintenance, and NGER compliance," Ms Welsh said.

"Industry is looking for tangible strategies to reduce their scope 1 and scope 2 emissions now, whilst maintaining energy reliability and cost efficiency. This is where we can help."

Launching its Go-Greener brand, including its low and zero emissions product range, Fuelfix are providing sustainable solutions to help customers make greener choices. At the core of this strategy is effective monitoring and data modelling, with a tested methodology that provides a clear supported pathway to maximising fuel efficiency and mitigating scope 1 and 2 emissions.

Data modelling and review process

Fuelfix aspires to set their partners up for success. This begins with the supply of the right measuring tools, followed by an audit of existing infrastructure and operational processes.

This process helps customers establish

correct data capture and management policies, which provide the platform for emissions efficiency and reduction analysis.

Effective data management enables customers to correctly capture tangible data. This data can then be used to understand fuel usage trends, fuel infrastructure requirements, plant health, and fleet utilisation.

Fuelfix' technicians, engineers, and analysts help customers interpret the information captured by fuel management systems, and using live monitoring data sets, recommend industry tested solutions to reduce or mitigate fuel costs wherever possible.

By exploring low investment and easy-to-implement solutions, their customers are finding multiple opportunities to create efficiencies in their operations. These micro-efficiencies compound to significantly improve equipment and infrastructure utilisation.

Although investing in large-scale emergent projects in the carbon reduction space can offer practical options for the future, mining companies find it challenging to produce medium to short-term results.

By focusing on low-hanging opportunities,

Fuelfix' customers can secure measurable and immediate benefits. These include lower scope 1 and 2 emissions, reduced fuel consumption, extended plant life, and optimised fuel delivery infrastructure, to name a few.

Australian miners are also looking for easy wins due to increasing fuel and compliance costs. Fuelfix is proving that with good data collection and an ongoing review of operational systems, the mining industry can move closer to their cost savings and emissions reduction targets.

A trusted partner

By upgrading fuel infrastructure, switching fuel usage, or changing the way fuel equipment is controlled and operated, Fuelfix can recommend and provide impactful solutions to meet current demands, accurately measure fuel usage, and make improvements that reduce or displace diesel.

This work is already achieving tangible results with Sojitz Blue, who are partnering with Fuelfix to analyse data models, which proactively reduces emissions and reduces operational costs.

Ann Houston, Head of Environment, Social and Governance says Sojitz Blue is committed to reducing their carbon emissions in accordance with Sojitz Group Policy.

"Diesel reduction is an important part of this, and we are partnering with Fuelfix to actively reduce diesel use and movements, through comprehensive monitoring." Ms Houston said.

"This huge data set is providing insights into the optimal placement of fuel tanks, the best fuel truck volumes and movements, as well as identifying any losses. We are putting this data into action to immediately reduce our fuel usage with demonstrated cost savings."

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AI NEEDED TO UNLOCK TREASURE TROVE OF MINING DATA

Artificial intelligence was a vital tool to transform the tsunami of data in modern mining operations into ore body knowledge that would enable resource companies to make better downstream decisions, IMDEX chief geoscientist Dr Dave Lawie has told the World Mining Congress in Brisbane.

Chairing a session on AI and rapid resource modelling, Dr Lawie said the Internet of Geosensing – the network of cloud-connected tools and sensors gathering information across the mining operation – delivered a treasure trove of data, “but the last thing you can do with a mine is generate a lot of raw data because no-one has time to look at it”.

“This is where AI comes in,” he added, which can turn the data into information that is directly usable by the mining company in virtually real time.

Dr Lawie says more mining companies are coming to the realisation that they need either better ore body knowledge or a better understanding of the data already obtained.

“There are a lot of mining operations around the world now who are encountering more problematic ores at greater depths, lower grades, more variability than they are used to and it’s affecting their ability to maintain profit margins,” he said.

“A lot of the higher-grade deposits of ore bodies have been mined out.

“In times of lower prices, mining companies will cherry pick the highest grades so they can still be profitable but then they are left with lower grades and a mine that is compromised.

“They need ore body knowledge to get at these lower-grade materials and get them out at a good profit.

“It’s a theme that’s running through the industry – but they don’t have the data, they’ve never measured it.”

Cracking The Code To Find Digital Specialists

IMDEX is tapping into university high achievers’ programs and coding camps

as well as using traditional employment methods to recruit digital specialists amid a cross-sector skills shortage of IT workers.

Its head of software development Rob van Selm says the company has used its global reach to fill senior positions but luring top talent through internships and graduate programs is also important.

“There is a shortage of software engineers,” he said. “They are highly skilled and in demand, not only in the resources industry but across all industries.”

IMDEX sponsors She Codes, a coding school that offers online coding workshops for women and collaborates with Curtin University to offer internships to students to provide experience across multiple disciplines in the business.

Mr van Selm says coding camps are becoming popular and the students there tend to have “more tangible, practical experience”.

IMDEX also offers internships, which run



IMDEX chief geoscientist Dr Dave Lawie chaired a session on AI and rapid resource modelling at the recent World Mining Congress in Brisbane.

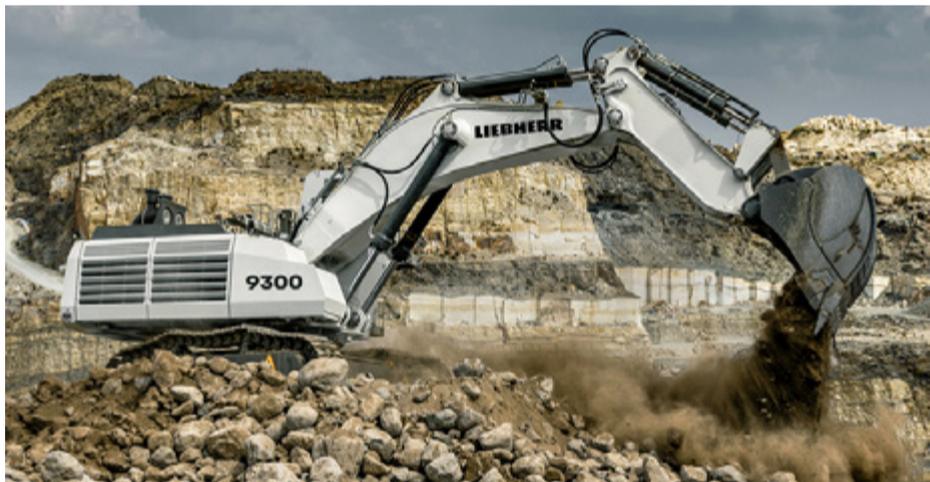
from November to March each year and offer paid positions.

Last year, the company took on five software interns among a total of 15 interns who worked across the business.

Mr van Selm said IMDEX’s small size relative to major mining companies meant that IT specialists often take a product from ideation through development to market release and beyond.

“We help drilling contractors and resource companies to understand their orebodies with greater speed and precision,” he said.

“Leveraging digital technology and having a team of great software specialists are key enablers of that vision; they make a tangible difference.” **AMR**



LIEBHERR BREAKS NEW GROUND WITH CUTTING-EDGE 250T MINING EXCAVATOR

Liebherr Mining’s latest addition to its excavator portfolio – the R 9300 Generation 8 (G8) – replaces the R 9250 in the 250t class.

As part of the validation phase for the R 9300, Liebherr Mining partnered with its customer PT Karunia Armada Indonesia (Karunia) to establish the capabilities of the excavator on site.

Karunia – a mining contractor based in East Kalimantan, Indonesia – began operating a pre-series unit of the R 9300 in September 2022 to remove and load overburden into 100t and 130t trucks at the Tabang mine.

Since September 2022, the R 9300 has averaged 486 operational hours per month and 94% availability – surpassing Karunia’s KPIs for the machine. These results highlight the true potential of the excavator for improving onsite productivity.

To further demonstrate the capabilities of the R 9300, a production study of the pre-series excavator at Tabang mine was conducted in March 2023.

During the study, the R 9300 achieved a 26-second average cycle time, helping the excavator reach instantaneous productiv-

ity of 1,371 bank cubic metres (BCM) per hour (3,017tph) – an impressive result for an excavator in the 250t class.

The R 9300 also attained a fuel efficiency ratio of 9.22 BCM per litre of fuel burned.

When considered alongside the productivity of the machine, this establishes the next-level efficiency of the R 9300.

As a result of Liebherr Mining’s commitment to reducing emissions, the R 9300 has been designed to lower fuel consumption and therefore decrease the amount of greenhouse gasses emitted by the machine.

The R 9300’s engine is available in FCO and US EPA Tier 4/EU Stage V compliant versions (with SCR after-treatment technology) to adhere to strict international emissions standards.

Liebherr Power Efficiency (LPE) – a proprietary engine and hydraulics management system that helps to decrease the amount of fuel a machine consumes while maintaining optimal productivity and performance – comes as standard in the R 9300.

With this system, the R 9300 reduces fuel

consumption by 15% when compared to its predecessor, the R 9250.

Further, this decrease in fuel consumption contributes to a 25% increase of fuel efficiency for the R 9300 compared to Liebherr’s previous 250t excavator.

An electric-drive version of the R 9300 is currently under development and will be available in the near future.

The R 9300 has an updated attachment design that is lighter and stronger than that of the R 9250.

The new attachment comes with high-performance components such as a new stick and boom design and aluminium covers all installed as standard.

This lean design has enabled an increase in bucket size in both the backhoe and face shovel configurations.

The standard bucket sizes of 16.5m³ in backhoe configuration and 16m³ in face shovel configuration (at 1.8t/m³ with the heavy-duty wear package) make the excavator an effective pass match for trucks with 100t, 130t and 180t payloads.

The R 9300 has also been designed for simplified maintenance and a longer service life.

This excavator shares parts commonality with Liebherr’s current excavators to help minimise maintenance costs and streamline onsite inventory.

The lifespan of the R 9300 has been increased by 33% above the R 9250 from 45,000 to 60,000 hours.

Extending the service life of the R 9300 helps the machine to better align with the service life of major excavator components.

Further improvements can be found in the cab design of the R 9300.

The new cab includes enhanced cabin ergonomics, larger touch screens, a new control panel design, and optimised visibility to help promote operator wellbeing while increasing safety.

The R 9300 will enter serial production in 2024, with the backhoe configuration available from Q1 and the face shovel configuration from Q2.

AMR



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MINER MOVE

KEEPS BRAVUS MINING AND RESOURCES ANCHORED IN TOWNSVILLE

Bravus Mining and Resources' enduring commitment to Townsville has been further cemented with the successful move into a new head office.

The miner relocated from the Telstra building in South Townsville at the end of a six-year lease – but not far; just 200m into a new fit-for-purpose premises at the corner of McIlwraith and Dean streets.

Bravus Mining and Resources chief operating officer Mick Crowe said the new multi-year tenancy aligned with the business' commitment to being an operation that can keep employing people, keep engaging local suppliers and keep giving back to the local community over the long term.

"What is so exciting about this new office is how it builds on the successes the Carmichael mine has enjoyed in operations to date and how it puts our people in the right environment to continue to succeed," he said.

"The foundation of our commitment to providing long-term jobs and economic opportunities for our people and our local communities is us being a responsible and sustainable miner and our new home in McIlwraith Street is a fundamental part of that.

"We're really pleased to still be in a fantastic part of the city with access to Palmer Street, which our people love, and now we're even closer to the stadium for when we go to cheer on the Cowboys."

Mr Crowe said the long-term upside for local people was enormous, with generational work and business opportunities for north and central Queenslanders in mining as people in nations like India, Vietnam and the Philippines sought a comfortable and modern lifestyle with fridges, consumer goods and televisions.

"The reality is global energy demand is increasing, not decreasing, as nations in Asia lift their people out of poverty by providing affordable and reliable thermal energy to partner with renewables," he said.

"India, for example, has more people than Europe, America and Oceania put together – all up around a sixth of the world's population – and they all want the same standard of living we enjoy in Australia.



Bravus staff at the opening of the new building in South Townsville.

"What that means is our export coal sector will be a vital part of the global energy mix for decades to come, and for the people of Townsville, that means a secure job for you, for your kids and your grandkids at Carmichael as an operator or a tradie or a chef or any of the dozens of roles you find on our mine site." **AMR**



Oreflow Australia's director and sales manager Chris Comley and head of capital department and lead engineer Craig Coetzee.

Trusted and leading equipment supplier Oreflow Australia celebrated 10 years in operation in June this year as it welcomed a new head of capital department and lead engineer Craig Coetzee, a 20-year mining equipment veteran from South Africa.

This changing of the guards comes as founder Mel King steps down from the helm after starting the company under its original name Minspec in 2000.

Oreflow Australia director and sales manager Chris Comley says COVID-19 was no barrier to the company's evolution over the last decade.

"It has been fantastic to see the continual growth over the past 10 years, despite the adversities faced during the COVID-19 pandemic, and it is a real testament to everyone at Oreflow," he said.

"We've been lucky to have a very stable team, with a strong core to draw a lot of experience and knowledge from.

"It instils confidence in our customers knowing they have a reliable team of familiar faces that understand the nuances and requirements of their operations."

Oreflow Australia was formed to expand Minspec's operations to encompass the

ORE-SOME ACHIEVEMENT!

entire supply and service chains of mineral processing systems and bulk materials handling.

"We are proud of our standing as a 100% family owned and operated business in WA," said Mr Comley, who joined Minspec in 2007 to help the original business expand its footprint as a supplier to the mining industry and has been with Oreflow in its entirety.

"June 2023 marks our 10th year in operation as Oreflow Australia.

"It has been an incredibly rewarding decade as we have established ourselves as a trusted name in the industry, renowned for delivering quality Australian made equipment around the world.

"We're incredibly grateful for the relationships we have built with our expanding client base and suppliers.

"We look forward to continuing to nurture these relationships and finding ways to

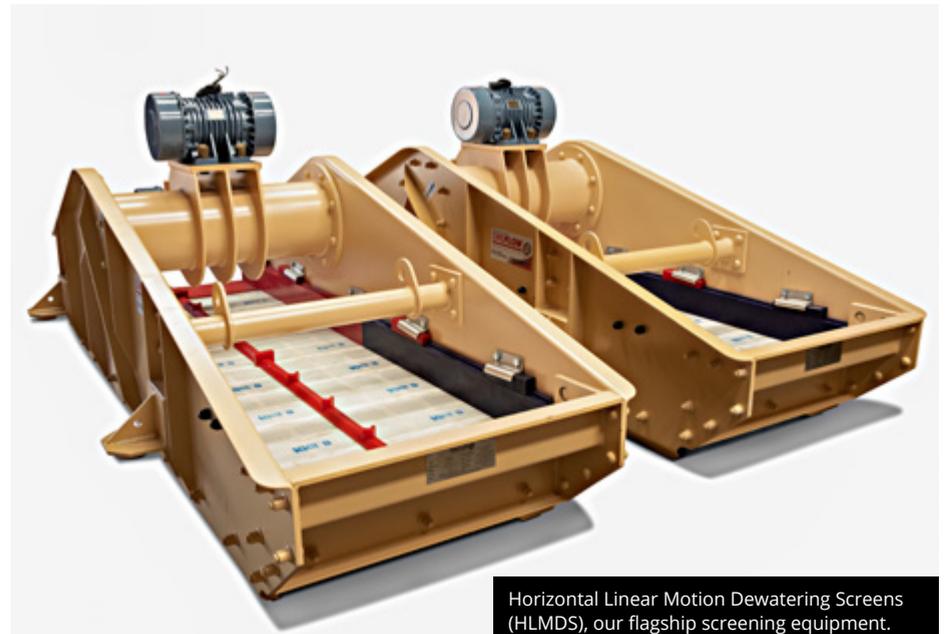
continually improve for the next decade to come.

"And lastly, we would not be able to celebrate this milestone today without the effort, commitment, and positivity of all staff, past and present for the last 10 years.

"We'd like to extend a heartfelt thanks to our small team whose hard work allows us to continually punch above our weight in a mightily competitive industry!"

Craig Coetzee, who has two decades of experience as senior mechanical design engineer, technical support and new equipment sales for a South African vibrating equipment supplier, brings his extensive knowledge of tendering for capital equipment jobs to Oreflow Australia.

He will continue Mr King's work of mentoring the capital sales team within the business, including team member Tait Comley who recently made the step up after nine years working within Oreflow Australia's operations. **AMR**



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BRIGHTSTAR RESOURCES EXPANDS MENZIES GOLD PROJECT ADJACENT TO MGP



(Image source: Brightstar Resources) Outcropping pegmatite at the Menzies gold project.

Brightstar Resources (ASX:BTR) has added a further 12km² of highly prospective gold tenure adjacent to the Menzies gold project (MGP) in WA.

Brightstar and Ardea Resources (ASX:ARL) recently executed a binding term sheet for a tenement swap of exploration tenure from the Menzies and Goongarrie gold projects — owned by Ardea.

This term sheet allows both companies to advance exploration and development of their respective projects.

The transaction will see Brightstar swap a number of non-core tenements south of Menzies and Ardea swap a number at Goongarrie in order for Ardea to advance the Kalgoorlie nickel project – Goongarrie hub.

Notably, Brightstar will keep the gold rights to the exploration licences at Goongarrie and is only transacting on the non-gold rights and ability for Ardea to develop infrastructure.

In return, Brightstar will acquire 10 pros-

pecting licences immediately adjacent to or along strike its existing tenements at the MGP.

This tenement swap falls in line with Brightstar's objective of rationalising its portfolio to maintain its streamlined pathway towards a low capex restart for gold production.

Brightstar managing director Alex Rovira said the acquired ground has significant exploration potential.

"The acquired ground has significant exploration potential to host further gold mineralisation given then combination of known Menzies 'mine corridor geology' within and adjacent to the Menzies shear zone and has seen limited historical exploration for gold due to shallow cover," he said.

Shortly, Brightstar will conduct early-stage greenfields exploration across the newly acquired tenements to outline targets for reverse circulation drill testing. **AMR**

STELAR METALS BEGIN ON-GROUND FIELD ACTIVITIES ON TRIDENT

Critical mineral explorer Stelar Metals (ASX:SLB) has begun on-ground field activities on its newly acquired Trident lithium project in Broken Hill, NSW.

A number of exploration programs are being coordinated by Stelar to build a series of strong hard-rock lithium pegmatite targets for drilling.

In early June, soil surveys began over the northern area of the Euriowie pegmatite field which extends over the Huel Bijerkerno, The Ruby and a number of smaller historic tin workings.

Around 1500 to 2000 soil samples are planned to be collected over the numerous small tin mines and workings in this area.

Further, the recently acquired high-resolution magnetic and radiometric datasets over Trident have been processed by Montana Geoscience with initial interpretation in progress.

These images will significantly contribute to the understanding of the structural architecture and potential controls on pegmatite placement and morphology which will assist in drill target identification.

SensOre, who commissioned the high-resolution geophysical survey, are also processing the new datasets which are being integrated with surface geochemistry to remotely detect caesium isotopes from the airborne platform.

In preparation for the drilling, independent environmental, cultural and heritage assessments are underway over the Trident-Triumph-Lady Don area where an inaugural drill program has been planned.

Stelar will submit its drilling application to the NSW regulators in the coming weeks. Once drill sites and access tracks are finalised, cultural heritage clearances will be undertaken with the traditional custodians and Pastoral Lease holders.

AMR



Birdseye view of geological sampling process.

OD6 METALS RELEASES MAIDEN MRE FOR SPLINTER ROCK

OD6 Metals (ASX:OD6) has released a maiden inferred mineral resource estimate (MRE) for its Splinter Rock rare earth project in WA.

The maiden MRE of 344Mt at 1308 parts per million (ppm) total rare earth oxides at a 1000ppm cut-off grade includes 149mt at 1423ppm TREO with 23% magnet rare earth oxides (MagREO).

Notably, less than 5% of the targeted clay

basin area is included in the estimate, with on-going exploration to further expand the known mineralisation.

OD6 Metals managing director Brett Hazelden said the release of a maiden MRE for Splinter Rock was a remarkable milestone for the company.

"Our Splinter Rock project maiden mineral resource estimate of 344mt at 1308ppm TREO is emerging as one of the largest

and highest-grade clay-hosted rare earth resources in Australia," he said. "

"This remarkable milestone has been achieved within our first year of listed life.

"With less than 5% of our clay basin area tested and phase three drilling underway, over the next six to 18 months there is significant potential to grow the resource base and by applying our geometallurgical exploration techniques prioritise the 'best of the best' in terms of grade, MagREO content, thickness and metallurgical recovery is the backbone of the company's focus and we look forward to both expanding the current resource and zeroing in on our high-priority areas."

OD6 will now continue infill drilling to update the maiden MRE to indicated classification, undertake metallurgical

(Image source: OD6 Metals) Drilling at Splinter Rock.



studies to design an appropriate flow sheet and concentrate further immediate geological work on identifying high-grade material. **AMR**



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Alcoa Australia president Matt Reed checks out Earbus Foundation of WA's mobile clinic with Earbus coordinator Chontae Hayden, following the announcement of a renewed partnership that will continue to deliver ear health services to children in need across the Kwinana, Peel and Upper South West regions in WA.



Earbus nurse audiometrist Sanacha Naidoo assists one of the 1,350 children provided with ear health support to-date, as a result of a continuing partnership with Alcoa.

EAR HEALTH BOOST ANNOUNCED DURING NAIDOC WEEK

A unique program that tackles ear health for Aboriginal and at-risk children in a bid to avoid permanent hearing damage and associated educational challenges will run locally for at least another three years thanks to support from aluminium producer Alcoa.

In celebrating NAIDOC week, Alcoa has announced its global charity, the Alcoa Foundation, will provide Earbus Foundation of WA with about \$450,000 to continue to deliver its program across the communities near where it operates in the Kwinana, Peel and Upper South West regions.

The commitment builds on the \$330,000 in funding Alcoa has already provided in support of the innovative ear health service in this part of WA since 2018.

Ear infections among Aboriginal children occur at a far higher rate than in non-Indigenous children and can result

in hearing loss episodes or permanent hearing damage, affecting their ability to learn.

Earbus delivers multi-level support to children and their families in their own communities with the aim of reducing the incidence of middle ear disease to below the World Health Organisation (WHO) benchmark of 4%.

Alcoa's support to-date has enabled Earbus to provide mobile one-stop-shop ear assessments for about 1,350 children across 33 schools, day care centres and early learning centres.

That has included 3,046 ear screens, 1,647 hearing tests and 844 health checks.

Over the past three years, rates of middle ear disease in the areas served by the Alcoa Earbus program have reduced from 10.4% to 9.4% of the target population and

rates of hearing loss have dropped from 11.6% to 4.7%.

Alcoa Australia president Matt Reed says the company is keen to help build on that success as there is nothing more important than a child's health or education.

"Middle ear disease seriously impacts early childhood development and we are proud to be helping to turn this around so these children can learn and achieve their full potential," he said.

"Hearing loss from middle ear disease can lead to a cycle of poverty, disengagement from education and reduced employment prospects.

"This partnership enables Earbus to give these children the best possible start in life with children who can hear more likely to be engaged in the classroom."

Earbus Foundation of WA chief executive and co-founder Dr Lara Shur says the program is crucial for improving the lives of some of the most at-risk children in WA.

"This renewed partnership with Alcoa will allow us to continue this vital program with our team that includes an ear health screener, audiologist and nurse practitioner, enabling us to provide a quality screening, treatment and surveillance program," she said.

Mr Reed added that the timing of the announcement was a great way for Alcoa to launch NAIDOC Week celebrations, which included multiple events across the company's two bauxite mines and three alumina refineries in the south-west of WA and its aluminium smelter, in Portland, Victoria. **AMR**

MINING INDUSTRY SUMMIT

TO HELP DRIVE CULTURAL CHANGE ACROSS THE MINING SECTOR

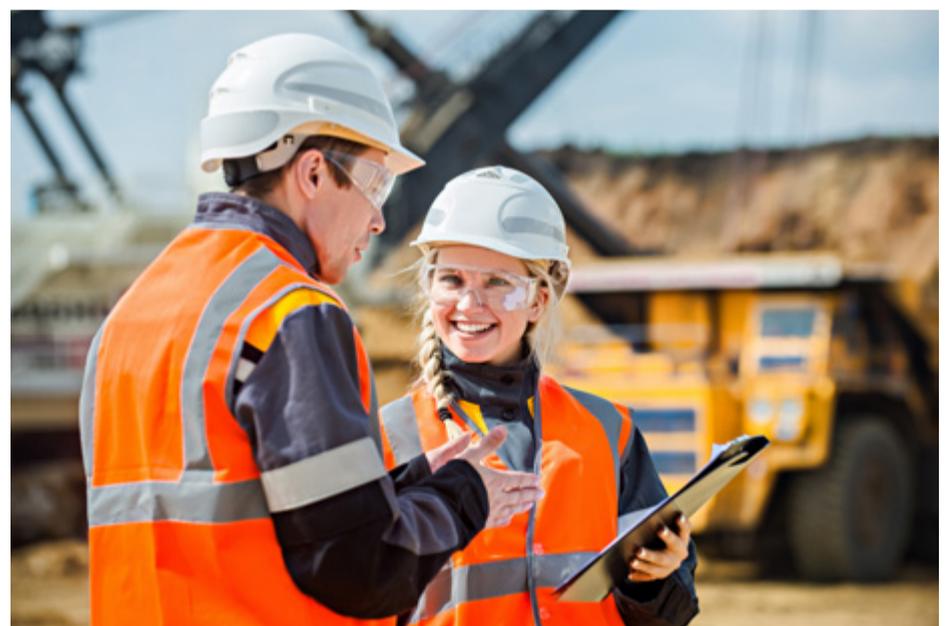
Scheduled for August 1, 2023, the Mining Industry Summit will underline the WA Government's ongoing commitment to drive cultural change across the mining sector and eliminate inappropriate behaviour from WA mining workplaces.

The *Mining Industry Summit: Driving Respect*, will bring together company boards, mine management, health and safety representatives, safety professionals and supervisors to empower and educate leaders to take meaningful action on safe and respectful workplaces.

The summit forms part of the State Government's response to the *Enough is Enough* report published in June 2022.

Former Sex Discrimination Commissioner Kate Jenkins, international workplace culture expert Dr Dean Laplonge and Australian organisational behaviour and leadership development expert professor Sharon Parker will speak.

Following consultation with industry bodies, community groups, unions and academics, the summit will give participants case studies from WA mining organisa-



tions and expert panel discussions currently underway.

WA Industrial Relations Minister Bill Johnston says the summit marks an important step in tackling workplace harassment.

"The *Mining Industry Summit: Driving Respect* is one of the important steps we are taking to help tackle workplace harassment and discrimination in the mining sector," he said.

"While the resources sector has made significant progress on changing workplace culture, the state government acknowledges there is more work to be done.

"We welcome the mining industry's commitment to work alongside the state government in driving cultural and legislative change to better educated WA's existing and future workforce."

AMR



EX-MINER DOMINATES HOTSHOT INDUSTRY FOR WA MINING, OIL & GAS

Harmon Transportation was founded with a simple yet ambitious goal: to provide reliable and efficient transportation services to the Australian mining industry.

As a former miner himself, founder Paul Harmon understood the importance of timely and dependable deliveries in keeping mining operations running smoothly.

With this vision in mind, Paul set out to establish a company that would deliver on its promises, and, through sheer determination and a commitment to excellence, he has built a thriving business that has become the go-to provider for hotshot transportation services in WA's mining industry.

Available any time of the day or night, 365 days a year, Harmon Transportation keeps your mine operating.

With its expanding fleet ranging from 1t utes to 8t trucks – operations won't be hampered while you're waiting for a part.

For interstate and urgent deliveries, Harmon Transportation can also provide air freight hotshots.

At the heart of Harmon Transportation's success is a simple strategy: do what you say you will do.

This means understanding the needs of the mining industry and being aware of the urgency and cost of downtime.

To ensure timely deliveries, the company uses only its own fleet of vehicles, which are wrapped in bright yellow with the company logo.

Harmon Transportation Chief Executive Paul Harmon describes the company's vehicles as "beacons of light."

"When our clients see our bright yellow vehicles, they know they can count on us to deliver on our promises," he said.

"We take pride in our vehicles being reliable and recognisable, and they serve as a symbol of our commitment to providing exceptional service to our clients."

In addition to providing leading transportation services, Harmon Transportation is committed to giving back to the community which has supported them.

Led by Paul and his team, the company donates a percentage to The Pantry, a not-for-profit organisation that provides food and other essentials to those in need.

Harmon Transportation also supports local Aboriginal communities and schools by providing essential items.

This dedication to community support is an outworking of the company's values of reliability, urgency and social responsibility.

Harmon Transportation's remarkable success story is a testament to the hard work and determination of this family business.

With a deep understanding of the mining industry and its needs, Paul Harmon has built a company that not only provides reliable and efficient transportation services but also gives back to the community.

Starting with just one ute 15 months ago, the company has grown to service over 20 clients throughout WA, stretching up to the Pilbara and across Port Hedland.

As the mining industry continues to grow, companies like Harmon Transportation will be essential in ensuring smooth operations and reducing costly downtime.



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SERVING THE WA AND INTERSTATE MINING, OIL & GAS INDUSTRY



INAUGURAL CYRIL KNOX ART PRIZE

TO UNCOVER LOCAL ABORIGINAL TALENT



Les Knox on the right holding original art from well-known Narrabri local Cyril Knox.

Entries are now open for the inaugural Cyril Knox Art Prize, a biennial award that will recognise and celebrate the best Aboriginal artists in North West NSW.

Whitehaven Coal (ASX: WHC) is partnering with Narrabri Shire Council to deliver the first ever Cyril Knox Art Prize exhibition at The Crossing Theatre in Narrabri beginning Saturday 23 September, with the theme for this year's prize to be the NAIDOC Week theme "For our Elders".

The top 10 finalists in each category will have their artworks displayed for the week, with the community invited to come along and experience the artists' unique talents for themselves. The inaugural Cyril Knox Art Prize winner will be announced on Friday 5th October via Whitehaven's website and social media platforms.

The winner will receive \$5,000 while community members will be able to vote for the people's choice award, with the winner receiving \$1,500.

There will also be a junior prize of \$500.

The Cyril Knox Art Prize is named in honour of Cyril Knox, a well-known Narrabri

local and exceptionally talented Aboriginal artist.

The Prize will celebrate his artistic talents and endeavours, while also encouraging emerging Aboriginal artists to follow in his footsteps.

Members of the Knox family will be on the judging panel for the awards, alongside representatives of Narrabri Shire Council and Whitehaven Coal.

The Prize is a new initiative developed by Whitehaven to support its Stretch Reconciliation Action Plan (RAP) activities.

As part of its RAP, Whitehaven has committed to commissioning an Aboriginal artist to produce an artwork to display in its corporate offices each year, with three artworks on display today.

The Cyril Knox Prize expands on this commitment and will highlight and support the talents of a wider range of Aboriginal artists for the entire community to enjoy.

Whitehaven Coal managing director and chief executive Paul Flynn said the company is proud to be championing this exciting new initiative.

"Cyril Knox had a significant impact on the local community that extended far beyond his artwork," he said.

"We're delighted to be launching this Prize in partnership with Narrabri Shire Council as a way to celebrate his contribution to the region and provide a platform for emerging Aboriginal artists to show off their talents.

"It builds on the great work our team is already doing as part of our Stretch Reconciliation Action Plan, which has a particular focus on the areas where we can make a substantial and sustainable difference, including health and wellbeing, education, employment and procurement.

"We take a holistic and long-term approach to our work helping to empower local Aboriginal and Torres Strait Islander communities, and the Cyril Knox Art Prize will be an important part of this for years to come.

"We're grateful to the Knox family for their support and we look forward to sharing the fantastic entries with the local community."

Les Knox said "the Knox family are ex-

remely happy that our father is being recognised for his art achievements, but also for his ongoing encouragement to other Aboriginal artists to continue to develop their artistic skills".

"Our father was a well-respected elder in the Narrabri and Toomelah communities and we think this year's NAIDOC theme is fitting," he added.

"We'd like to thank Whitehaven and Narrabri Shire Council for this wonderful initiative." **AMR**

Artists can head to <https://form.jotform.com/231937769825877> to enter and for further information about the Prize criteria.

The link is also available on the Whitehaven website.

Entries opened on 14 July 2023 and will close on Sunday 10 September 2023 at 5pm.

SOUTH32'S ILLAWARRA METALLURGICAL COAL (IMC) OPERATION EXTENDS IWHC PARTNERSHIP

South32's Illawarra Metallurgical Coal (IMC) operation in NSW has extended their partnership with Illawarra Women's Health Centre (IWHC) for a further three years.

This extension will support the creation of the *Experience into Expertise* program which is designed to raise awareness of domestic, family and sexual violence and promote systematic change in the community.

Delivered through IWHC's Women's Trauma Recovery Centre, the program will provide training and guidance for victim-survivors to use their lived experience to help bring change through community engagement, research, media advocacy and working with government and industry partners.

Illawarra Women's Trauma Recovery Centre director Lula Dembele commented on the program.

"Victim-survivors know what they need to be safe and there is no group of people more motivated to ensure that these types of abuse do not happen to others," she said.

"This program draws on the knowledge of survivor advocates who have been at this work for years, upskilling the participants to develop advocacy campaigns, navigate government, and find opportunities to apply their contextual expertise across community engagement, research, programs, policy and law reform."

Over the three years, IMC will provide \$300,000 to support the design, delivery



(Image source: Jenny White from Region Illawarra).

and evaluation of the Experience into Expertise program.

IMC vice president operations Peter Baker says South32 is continuing to raise awareness of violence and prevent it from happening.

"At South32 we are continuing to work with our communities to raise further awareness of gender-based violence and helping to prevent it from happening. Sadly, gender-based violence remains far too common," he said.

"Upon establishment, the Women's Trauma Recovery Centre will undertake vital work supporting those impacted by gender-based violence and helping them step-by-step through what can often be a long process of recovering from that trauma.

"The establishment of the new *Experience into Expertise* program builds on that important work and is the next step in helping to prevent gender-based violence in our communities." **AMR**

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No matter the industry, businesses right across Australia are rethinking the way in which their food waste and compostable materials are managed. They are searching for more responsible and innovative solutions that make the process easy.

This is particularly the case in remote and isolated areas, where waste processing and landfill mitigation can be both challenging and costly.

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AMR

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IN THE SPOTLIGHT

AquaBlue Seafoods Managing Director Neil Meyrick

AquaBlue Seafoods is one of Australia's most modern and technically advanced aquaculture operations on the east coast, created by **Neil Meyrick** and **Terry Brissett** to bring dams, ponds and lakes back to life.

Now expanding into end-of-life mine cycles, the *Australian Mining Review* spoke with Neil about the history behind the company and how stocking former minesite dams is environmentally friendly.

AMR: Can you share the story behind how AquaBlue Seafoods started?

NM: I was working in Sydney at the time and a friend of mine, Terry Brissett, mentioned that he'd like to grow fish. It struck a chord with me as something beneficial for the environment and ease the pressure on our natural resources. Restocking was mentioned in our discussion, and perhaps even feeding the world as Terry had put it – he said he would love to feed the world, aquaculture is one of the world's fastest growing sectors. With Terry's help and philanthropic support, we formed a company and started with a small system in Sydney, just in a backyard garage and, within a few years, we'd become quite successful and, to expand our horizons, purchased a property. It was difficult to find a property that was perfect for aquaculture as we needed access to salt and fresh water, but we bought a farm in the year 2000 and things got underway. We branched out from there into breeding, and it took three to four years to complete the infrastructure required, including planning and building the sheds and getting everything into place, before actually getting live fish involved. Not many people are prepared to do three or four years of work without income, and it's not just about setting up a fish hatchery farm. You have to acquire healthy quality selected brood stock. Native Australian Bass brood stock collecting commenced in 2005. We collected Bass from the wild with a licence from NSW Department of Primary Industries (Fisheries), collecting from the wild to enhance genetic diversity. Our first Bass breeding season of 2005-06 was a great success. Native silver perch, shrimp, yabby and mussel seed

stock was also underway at this time. It's been an incredible process to see it grow from strength to strength.

AMR: Can you elaborate on the Dollar For Dollar Native Fish Stocking program? This is an exciting initiative.

NM: The Dollar For Dollar program, run by the NSW Department of Primary Industries (DPI), is a chance for fishing clubs, councils and public stocking groups to stock public water with fish species. So, if a stocking group were approved to put \$1,000 worth of fish in a dam or river, the NSW DPI would match that and put in \$1,000 worth of fish. This year, however, the NSW DPI announced it would match \$2 to the dollar because of the drought and it's done to support the stocking of native fish to protect and enhance the surrounding environment. We've participated in a number of public stocking programs already at Parramatta Lakes, Penrith Lakes, and Glenbawn Dam. This type of program supports aquaculture businesses such as ourselves, and we can continue to stock private farms successfully.

AMR: Can you expand on how working with mining companies helps with their ESG during the end-of-life mine cycle phase and what the process is?

NM: When mining companies are rehabilitating formerly mined land, they often use native trees and grasses to create the final landform. Stocking native fish in former mine water storage can be a valuable addition, site-specific of course, as each mine has different requirements. Mining companies have thorough reporting systems

and great water quality control so the dams are more than adequate to support animals. AquaBlue Seafoods will check the pH and temperature to assist with acclimatising the fish into the water. The environmental aspect of it is so incredibly important. It's fantastic to have live fish in these site dams to take care of the mosquito population, which in turn attracts birds and generally sees more native fauna making an appearance. Because these dams aren't connected to river systems, there's nothing better than stocking native Australian fish that can live and grow sustainably – the fish grow and have long, happy lives.

AMR: What species does AquaBlue Seafoods provide, and why those particular types?

NM: About five years ago, we stocked Glencore's former mining operation Westside open cut in the Lake Macquarie Area of NSW with Australian Bass Fry. This year I received a call from Westside environment and community manager Ben Clibborn who said the Bass have grown in size and are healthy. This is a prime example of how Australian Bass can thrive in areas of mine rehabilitation while simultaneously adding value to the ecosystem. As the fish don't breed, we recently did an enhancement stocking at Westside. It was fantastic to see that the dam was crystal clear and beautiful. It's really shows that Australian Bass can be a fantastic addition to a mining operation's rehabilitation program.

AMR: What areas of Australia do you currently service and what gives you the competitive edge?

NM: We can freight small orders, a few 100 fingerlings, yabby, shrimp, fresh water mussels, to most large cities and large town areas, some rural areas and maybe regional depot collections to minimise freight times. We also supply and deliver larger orders of fingerlings with a fish

transport vehicle within a day's drive. We also deliver larger silver perch (25cm+), ready to catch, and we supply fish to private farm dams and aquaponic fish growers in NSW, Queensland and Victoria. There are some translocation restrictions to supply WA, but we do intend to expand in the future. Our competitive edge is that we can supply the complete package – native fish, natural foods and living water filters. Stocking native fish is a great addition to dams/ponds. We are proud to be a part of the native fish stocking program and we receive many photos from dam owners with kids and grandchildren holding up the prize catch from their own private dams. It's rewarding to work with Mother Nature.

AMR: What exciting developments do you have in the works for the future of AquaBlue Seafoods?

NM: We are a NSW DPI Fisheries HQAS quality assurance approve fish hatchery, and we have received many inquiries and orders for the Dollar for Dollar program's restocking 2023/24 season. We are well under way with this fantastic season's response. We've recently stocked more than ever before due to an increase in demand for sustainably farmed, market-size food fish. Plus, our recent work at a former mine site is really valuable, so thank you to Westside open cut for the opportunity. Stocking of fingerlings and natural self-producing foods is a sustainable and rewarding exercise for a future filled with healthy, thriving fish. In fact, the silver perch that we stock is listed as critically endangered nationally, vulnerable in NSW, threatened in Victoria and protected in parts of Queensland. So having this species in waterways is a complete benefit to the environment. AquaBlue Seafoods is proud to make a real difference in this area. **AMR**



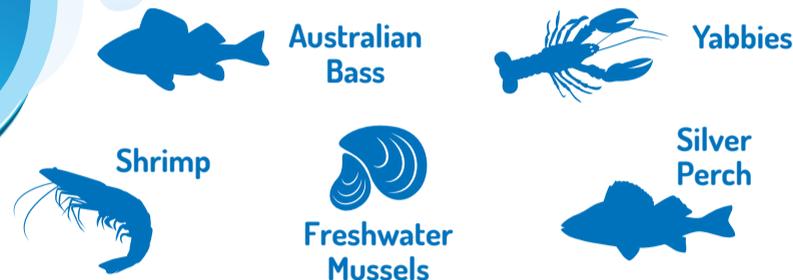
AquaBlue Seafoods
managing director
Neil Meyrick.





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Southern Peru Copper Corporation | Toquepala Mine

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Lior Avidan | Process Engineer, Amiad Water Systems



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AUG2023 AMR



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DMI-65 is a manganese dioxide (MnO₂) infused media whose surface acts as a good oxidant and is effective in removing both arsenite and arsenate, as well as iron/arsenic complexes and precipitants.

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Build up of iron and manganese results in very high maintenance overheads, loss of production and potentially system failure. DMI-65® efficiently removes dissolved iron to the almost undetectable levels as low as 0.005mg/L and manganese to 0.001mg/L as well as particulate, effectively removing this risk.

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The total cost of the iron and manganese removal water filtration system is significantly less than alternative solutions, the effectiveness, but relative simplicity, of DMI-65® based systems reduces the upfront capital expenditure on plant complexity as well as the ongoing operational expenditure in chemicals, power and backwash waste water recovery.

HIGH FLOW RATES

The infused technology of DMI-65® promotes the highest oxidation rate of any catalytic filtration media. This permits a significantly higher water flow rate to achieve the same level of iron and manganese removal. DMI-65 can operate at linear filtration velocities up to twice that of conventional media with a corresponding reduction in capital equipment costs.

HIGH LOAD CAPACITY

DMI-65® also has higher iron and manganese load capacity which can extend the duration of filter runs and the time between backwashing, thereby reducing downtime, operating expense and wastage.

REGENERATION NOT REQUIRED

The media operates with a continuous injection of sodium hypochlorite at low residual levels (0.1 to 0.3mg/L) which eliminates the need for Potassium Permanganate.

WIDE OPERATING ENVIRONMENT

Stable and satisfactory performance at pH 5.8 to 8.6 and a maximum operating temperature of 113° F (45°C) reduces the need for investment to alter the operating environment.

LONG LIFE

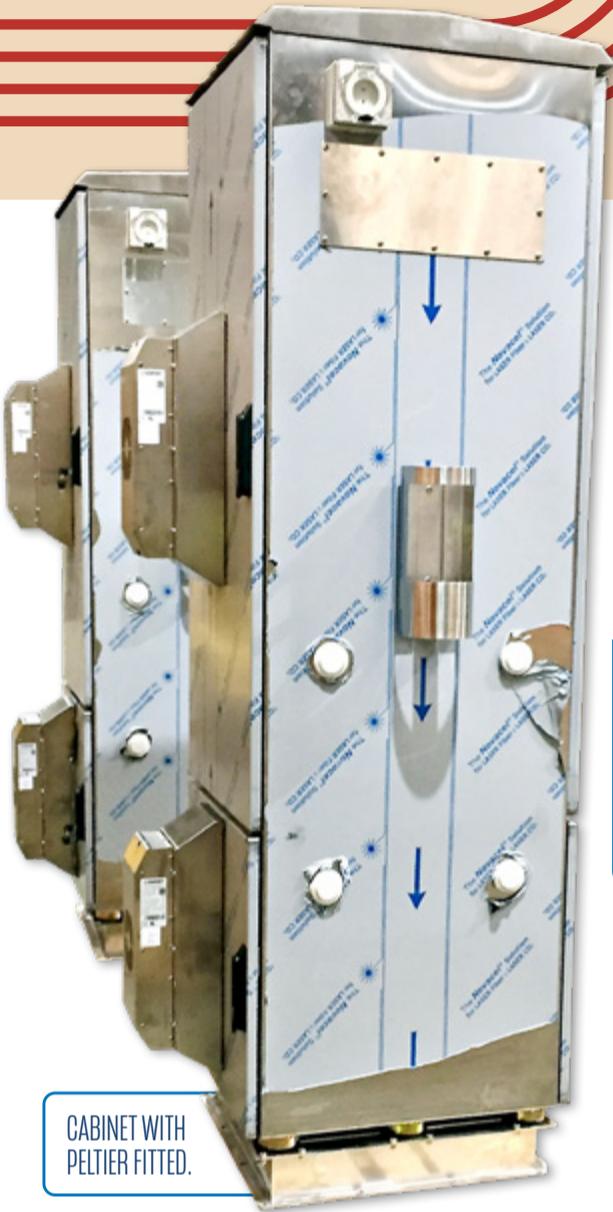
DMI-65® is not consumed in the process giving it an expected operational life of up to 10 years, providing considerable advantages over other processes or media. The media does not display a decaying capacity to do its catalytic work. Over the 5 to 10 year period, through many backwashing operations of the bed to remove retained solids, an attrition loss of the media occurs by contact between particles and mechanical abrasion.

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Seifert Peltier units offer an alternative cooling option where conventional compressor / condenser systems are inappropriate.

Thermoelectric elements create a temperature differential between ambient and internal heat sinks. This encourages an internal cool air circuit while fans help transfer convective heat to atmosphere. Cooling capacities range from 30W up to 800W

These units are available in Stainless Steel 304 or 316

They are an ideal cooling solution for harsh environments such as mining, especially where maintenance is limited.

The smaller units are wired to "on". That is the fans are working 24/7. The option to introduce a thermostat then regulates the units on/off according to temperature changes, this extends the life cycles of the fans. The larger units have a temperature set controller built in.

They are resistant to extreme ambient conditions and operate well in dusty, oily environments where temperatures can vary from -20DegC to +65DegC.

These units are available in 12V, 24V and 48V DC and 120 - 240V AC

The external fans on these units are rated to IP68. However, the units as a whole are rated to IP66.

Suitable for indoor and outdoor applications.

Multiple Peltier units can be installed in side mount orientation only. Top mounting is to be avoided as this can promote condensation.

Condensation drip trays are also available.

These units are offered in a recess format and with an external duct fitted.

The recess version suggests part of the Peltier will penetrate into the enclosure to be cooled, use this option when their minimal equipment to be cooled.

Equally use the duct to keep the Peltier external to the enclosure. This option assumes the enclosure is crowded with equipment.

AMR



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ROY HILL

PAVING THE WAY FOR MINE SITE AUTONOMOUS IMPLEMENTATION

By Kate Dzienis



Hancock Prospecting Group Operations chief executive officer Gerhard Veldsman.

Heralding life in the Pilbara region of northern WA, the world-class mining operation of Roy Hill is the only independent iron ore operation in the area that has a majority of West Australian ownership.

Having recently celebrated a decade of operation, last financial year Roy Hill shipped more than 60mt of iron ore to its international customers.

Today, the mine has estimated reserves of more than 2bt and an estimated mine life of about 10 years, with the potential to extend beyond that if further regulatory hurdles and approvals are achieved – a significant challenge, given the current environment which is deterring investment and growth opportunities.

Despite the hurdles, Roy Hill's automation journey began back in 2020 with testing space and just recently began its autonomous haulage system (AHS) expansion this year, converting its mixed fleet of conventional haul trucks to driverless operation.

In doing so, it is well on the way to being the world's single largest autonomous mine.

The AHS expansion was possible due to Roy Hill's partnership with Epiroc and ASI, with Hancock Prospecting Group Operations chief executive officer Gerhard Veldsman – who has responsibility for the group's two iron ore producing businesses, Roy Hill and Atlas Iron – saying the program is in its final stages after kicking off in March 2023.

"Roy Hill is three months into the final fleet expansion phase of the project with 19 of the 96 haul trucks converted," he said.

"The autonomous haulage system project is a truly innovative program, delivering a fleet of 96 conventional haul trucks to driverless operation, to create the world's largest autonomous mine.

"In addition, more than 200 ancillary vehicles will be adapted to support the autonomous operation."

About four years ago, Hancock Prospecting executive chair Gina Rinehart, together with her executives, travelled overseas to meet with autonomous operators and chose to recommend global mining equipment and solutions provider Epiroc and

automation specialist ASI Mining to the Roy Hill Board.

Since then, Roy Hill, Epiroc and ASI have worked in partnership to develop a world-first autonomous haul truck solution that's interoperable and scalable regardless of manufacturer, known as Original Equipment Manufacturer (OEM) agnostic.

"Testing of the first converted haul trucks on the mine's calibration pad, or testing space, started in 2020," Mr Veldsman explains.

"And since then, the number of converted trucks operating within a dedicated Autonomous Operating Zone (AOZ) has grown steadily.

"Critical mining methods are fully proven in a 24/7 production circuit and trucks are running at maximum optimal speeds of 60km/hr in a two-digger environment, interacting safely at intersection, waste dumps and load areas.

"For the remainder of the Fleet Expansion phase, up to six trucks will be converted each month.

"In addition, up to 19 ancillary vehicles will be fitted out monthly to support the operation."

The autonomous haul trucks have been meeting the desired safety metrics and achieving higher productivity rates than the conventional haul truck fleet, both key objectives of the program since implementation.

Reskilling and Redeployment Programs

Roy Hill's AHS expansion is an example of the mine using innovative solutions to meet the challenges of an extremely tight labour market, while supporting its people with retraining and helping them transition into other critical roles in the business.

Mr Veldsman says the company remains committed to supporting its people impacted by the project, with reskilling and redeployment programs in place to help operators transition to new roles.

"A dedicated team has been established to support our employees with reskilling and redeployment options," he explains.

"To-date, more than 150 truck drivers have been redeployed into other roles.

"As AHS deploys, a range of other operational and support roles have been created to support the autonomous system, based both on-site and in Perth.

"Autonomy offers opportunities for personnel to redeploy from heavy duty roles to safer, cleaner jobs that are less physically demanding.

"Leaders anticipate Roy Hill will transition from a working model focused on the efficiency and safety of operator interactions to an autonomous model that offers greater safety though improved mine design, optimisation of resources and upgraded functionality."

An extensive training program available to all Roy Hill staff has provided more than

In January 2023 Roy Hill announced the expansion of the autonomous haulage system (AHS) to create world's largest single autonomous mine.



Roy Hill remains committed to supporting its people impacted by the autonomous haulage system (AHS) project, with reskilling and redeployment programs in place to help operators transition to new roles.

26,000 hours of targeted training to upskill employees, promoting a confident approach to the operational changes according to Mr Veldsman.

"Roy Hill understands the unease automation can bring some employees and has worked hard from the outset to provide an open and honest environment where they know they can talk to their leaders and get straight answers," he said.

"As we've progressed, they can see the redeployment successes for themselves.

"There has been an incredible reaction, to the point where our truck operators, who could have easily been upset that their roles were being phased out, are now some of the biggest advocates for the automation program because we have been able to allay their fears – with more than 150 operators already in new roles in the business."

Expanding Horizons

Monika Wodzynska spent her first years with Roy Hill driving haul trucks and water carts before moving into the processing lab as a metallurgical technician.

When the AHS project encouraged truckies to look for new roles, she investigated the internal vacancies at Roy Hill and was later offered an interview for a metallurgical technician role at the processing lab.

"If there's one thing I've learned in my time at Roy Hill, it's to keep an open mind and put your hand up when something interests you," she reflected.

"I'm grateful for the career choices on offer at Roy Hill and I feel so supported by my workmates, my line leader and the company."

Toni Anderson is one of many former truckies who have changed jobs ahead of Roy Hill's transition to AHS.

Some years ago, Toni heard about the AHS project and the changes it would bring to the mine's operations so she spoke to the People team about Roy Hill's plans to help truckies with reskilling and redeployment in line with the automation roll out.

"We heard about AHS and the changes it meant for truckies, and I saw a chance to explore new roles within Roy Hill," she explained.

"I have to say that right from the start, the process was easy and I always felt supported by Roy Hill."

When a blast technician position came up soon after, Toni moved over to join a crew of 30 operators and says she hasn't regretted it for a minute.

Since then, she has loved being part of the

D&B crew and says it's like a second family to her.

Safety On The Cards

When it comes to safety, Mr Veldsman says no stone has been left unturned and the system provides significant safety benefits compared to conventional operations.

"This includes a pre-determined haul truck route that is visible to all operators via the virtual mine map displayed in every site-aware vehicle," he said.

"Another safety benefit is an obstacle detection system that detects potential hazards in the truck's path along with improved blind spot coverage due to RADAR and LIDAR on AHTs, and a proximity monitoring system which creates a body boundary buffer around each AHT.

"In addition, the implementation of autonomy presents opportunities for our workforce to move into safer, newly created AHS-support roles that utilise their significant operational experience."

The ground-breaking automation expansion will run throughout 2023 and into 2024, allowing Roy Hill's innovative solutions to utilise different skillsets amongst its people and building on its abilities to help transition employees into other critical roles within the company.

Mr Veldsman says key objectives of Roy Hill's AHS program include improved safety for Roy Hill's workforce and increased productivity.

"Now in its expansion phase, the autonomous fleet is meeting desired safety and productivity metrics," he explained.

"Twenty haul trucks have been converted to use traffic management and on-board automation systems to navigate the mine's virtual map, communicating with operator-driven ancillary vehicles and controllers who work from Roy Hill's Remote Operations Centre (ROC) in Perth.

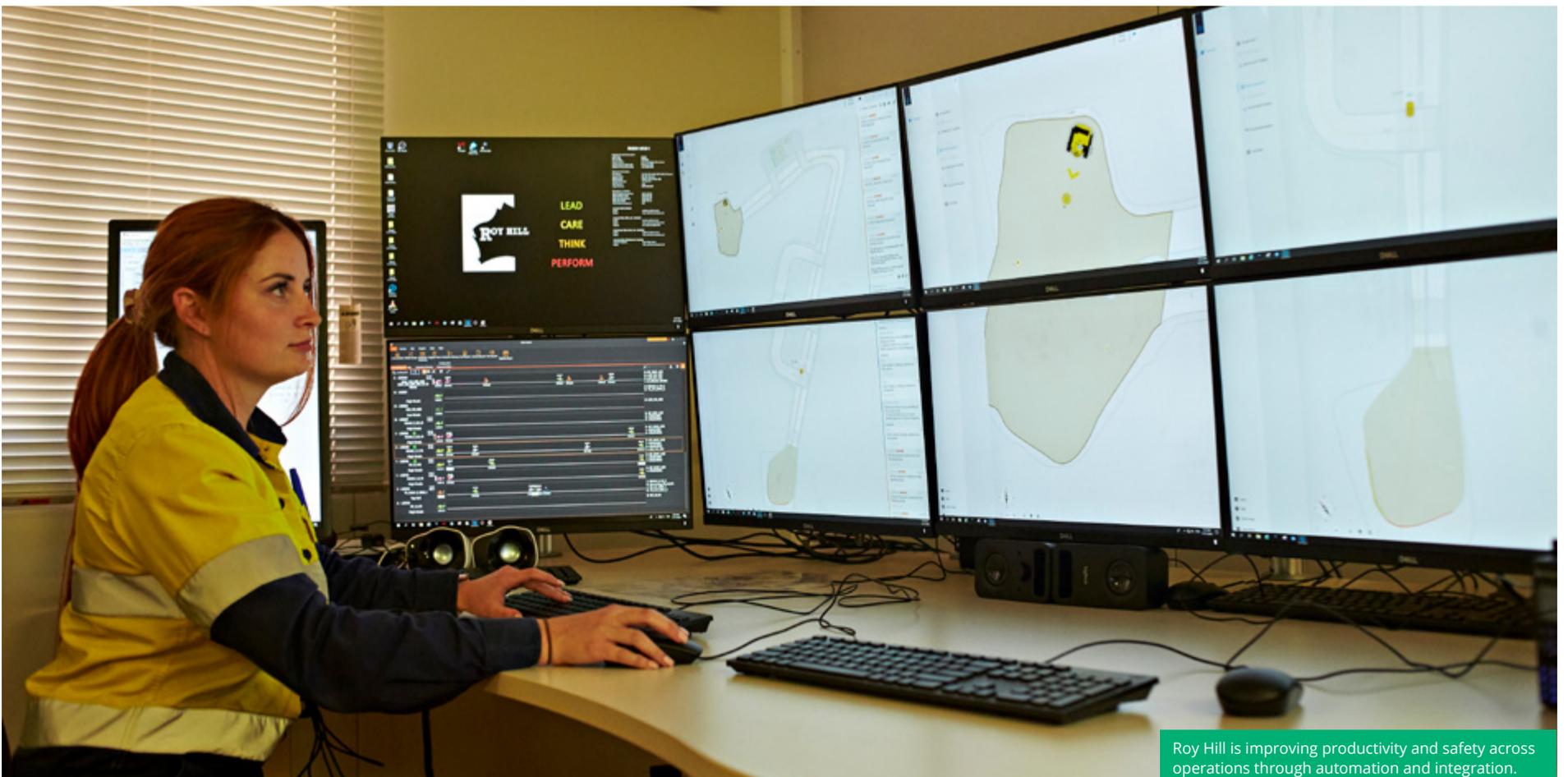
"Autonomous haul trucks are running around the clock in a dedicated Autonomous Operating Zone, interacting safely with two excavators and numerous ancillary vehicles at intersections, waste dumps and load areas.

"Post deployment, Roy Hill is targeting reductions in recordable injuries as well as near miss and accident damage events."

AMR

Upon completion of the project, Roy Hill's fleet will consist of:

- 24 Hitachi EH5000 (290t)
- 18 EH 4000 (228t)
- 54 Caterpillar 793 (230t) haul trucks



Roy Hill is improving productivity and safety across operations through automation and integration.

INDEPENDENT

The time for a proven, alternative autonomous haulage system is at hand.

The Roy Hill project in Western Australia, is about to become the site of the world's largest single autonomous haulage fleet, once all of its 96 trucks are converted to operate within this revolutionary new system.

This globally significant autonomous control system is the result of a collaboration between ASI Mining in the USA, Epiroc in Australia and the Roy Hill mine itself. Each partner has brought a significant contribution to the whole and the end result is a scalable autonomous solution that is OEM agnostic (ie: it can be applied to most OEM brands and models of mobile mining equipment). It has now been proven and field tested to operate at the highest level in one of the harshest environments in the world.

Development

For over 20 years, ASI Mining has been developing and building automation systems for mining equipment that were not tied to any specific make or model. They have been working tirelessly to offer a mature and viable alternative to current OEM programmes – their OEM agnostic solution. This end goal has now been fully matured and commercialised with the success of the Roy Hill project.

There are many advantages to this type of system for mine operators. Firstly, they are not locked into any particular make or model of haul truck, dozer or loader fleet. Each truck model is fitted with standard control hardware and a tailored actuation kit that converts the truck to drive-by-wire capability (which we will discuss later), which ultimately allows it to operate autonomously. ASI Mining's system also allows interoperability at key points in the technology stack, which includes an interface with third-party fleet management systems.

This interoperability extends further though. At the system level and the machine level, the ASI Mining system can talk to the vehicle's OEM onboard systems via various open interfaces. For participating OEM's, including Liebherr and others, this allows the ASI Mining system to talk to the truck system natively. For other OEM trucks, ASI Mining installs a retrofit kit which converts the vehicle to autonomous control. In Roy Hill's case, both Caterpillar and Hitachi trucks are controlled and monitored just as a human operator would.

Flexibility

Such a flexible and powerful system is also scalable across a variety of mining applications such as drills, blasting programmes, wheel loaders, dozers and more.

Modern mining is a constantly changing and evolving environment, which means that mining operators are constantly looking for ways to improve efficiencies, reduce costs and remain environmentally compliant. Decarbonisation and the push towards carbon zero production is driving the industry towards clean technology such as electric and hydrogen powered vehicles. The ASI Mining system offers the flexibility to pivot to the truck solution of choice, regardless of its brand or powerplant. It is a future proof solution for autonomy.

Furthermore, having a system that can be fitted to a combination of makes and models provides mining operators with the broadest possible options for purchasing or leasing a new fleet. They are not locked into any particular brand and can therefore acquire trucks that best suit the application and budget, rather than having to purchase vehicles that will work with a given OEM autonomy programme.

The industry seems to have been asking for this type of solution for many years and it is now available in a mature, safe, compliant and high performing package with full aftermarket support, warranty and parts supply. It is a truly proven commercial alternative for autonomous vehicle control.

Iron Clad Partnership

ASI Mining started from humble beginnings. Their first project back in 2006 was automating a CAT 777 truck, building the hardware and designing the software. Over the years, they developed into a company that now delivers rapid and agile solutions in what seems to be two-to-three times faster than typical OEM offerings. The Roy Hill project has been their coming of age, however, due to its scale and rigorous demands.

The massive Roy Hill automation system had to incorporate, among many other things, a cyber security protocol, compliance with the WA Safety Code of Practice and it also had to be scalable to cope with 96 trucks and over a hundred other ancillary vehicles. In addition, the hardware had to be tough enough to endure dirt, dust, heat and vibration on a non-stop basis. Its software had to integrate with Roy Hill's existing fleet management system (Wenco) and blend seamlessly with its daily operations, while delivering boosts to safety and efficiency. This aggressive and ambitious set of requirements has honed the final product into a truly global solution that can be tailored to any mining application.

Apart from over 20-years of development from ASI Mining, the final success of this ambitious project also required the critical input of Epiroc and Roy Hill.

CONTINUED ON PAGE 32



CHALLENGE DAY





CAT 793 complete with automation kit.



In-Cab Client Screen used to display Mobius maps.

Epiroc brought a considerable contribution to the table. Initially, they provided their experience to assist in commercialising the product. They applied the engineering knowledge from their world class drill technology as well as a local team of more than 100 staff to provide boots on the ground in WA. The size and scope of their operation also meant that they could provide logistics, global supply chain management, warehousing of parts and after sales servicing and maintenance.

Epiroc will also establish training boot camps around the world to train local staff and provide a controlled roll out of the system in due course. This will initially include the USA, Canada, and South America.

Roy Hill's contribution of time, resources and operational expertise was critical to the ultimate success of the autonomous haulage solution (AHS) project. Onsite testing at the company's extensive Pilbara operation provided the real-world data and conditions necessary to fine tune ASI Mining's autonomous system and create a fit-for-purpose autonomous haulage solution.

In an active mine, it is not possible to predict exactly what can go wrong or when, so having the opportunity to test in the actual environment in which the trucks would operate was invaluable.

Working on site allowed a Roy Hill-specific solution to be developed that responds in a safe and predictable way, in accordance with their specific criteria.

Installation and Operation

ASI Mining has developed dozens of different retro-fit conversion kits for a wide range of mobile mining machinery, while its parent, Autonomous Solutions Inc. (ASI), has developed kits for well over 100 models of various machine types.

While much of the on-board hardware is standard, the actuation kit module is developed specifically for that particular vehicle, allowing control of throttle, brake, transmission, steering and tipping (in the case of haul trucks). Applications range from early Komatsu 930E2 trucks (20 years old with 60,000+ hours on the clock) to the very latest autonomous ready trucks. Most of these trucks were not originally designed to be autonomously controlled,

so ASI Mining's engineers had to leverage the OEM systems to gain access and allow remote operation and monitoring.

Each vehicle is fitted with two modules. The first is a tailored, model-specific, control kit which enables electronic actuation of the vehicle and allows it to be operated remotely.

The second is a generic automation kit, which also includes obstacle detection, system inputs from sensors and gives it perception capability. This module then allows the vehicle to communicate and integrate with ASI Mining's software – *Mobius*. This allows it to become a fully independent and autonomous addition to the mine site.

Mobius brings the vehicle to life. This smart software not only monitors the state and position of the vehicle but also makes localised decisions based on its assigned path and tasks as well as right of way hierarchies and road rules.

The key to the whole system is the fact that each vehicle is fitted with these two modules, which allow it to not only perform its own duties but also interact with all other vehicles on site in a huge, orchestrated operation that never needs rest, is always operating at peak efficiency and functions with the best possible operating procedure in place for that particular piece of equipment.

Apart from monitoring the state and health of the vehicle and reporting any critical faults, *Mobius* takes information from the fleet management system and passes it to the truck.

This is used to create a route, determine speeds and generally set the behaviour of the truck once in operation.

Its onboard telemetry uses mission assignments received from *Mobius* and GNSS coordinates to plot its path, while its other sensors are constantly monitoring its proximity to other vehicles and obstacles.

Epiroc's team handle the installation of both modules, which arrive on two pallets and currently take approximately four days to install into each truck. This installation time is constantly reducing though, as the team become faster and

more familiar with the process. At the time of writing, Epiroc had completed 16 trucks, with 80 still to go. Installation is simultaneously being carried out on a fleet of support vehicles, including graders and dozers. It is anticipated that these will be completed at a rate of 15 vehicles per month.

Disruptive Flexibility

The net result of decades of development and this recent alliance between three highly complementary partners, is a highly flexible and agile autonomous solution, which can be applied to virtually any piece of machinery – regardless of brand, model or age.

Furthermore, the adaptive software and robust hardware allow the system to be tailor-made to suit any mining application anywhere in the world.

Mine operators now have access to a fully mature and complete automation solution that allows them to integrate all their equipment, from haul trucks to dozers and graders, into one comprehensive system.

A system which is OEM agnostic and will interact seamlessly with existing fleet management and monitoring software.

The Roy Hill project has given rise to a truly viable alternative to OEM autonomous vehicle control. Managing the largest single fleet of autonomous trucks in the world is an excellent way to make your mark and prove your value to other miners in Australia and around the world.

In a time when the mining industry faces unprecedented challenges in labour supply, a proven system for vehicle autonomy has never been more relevant or important.

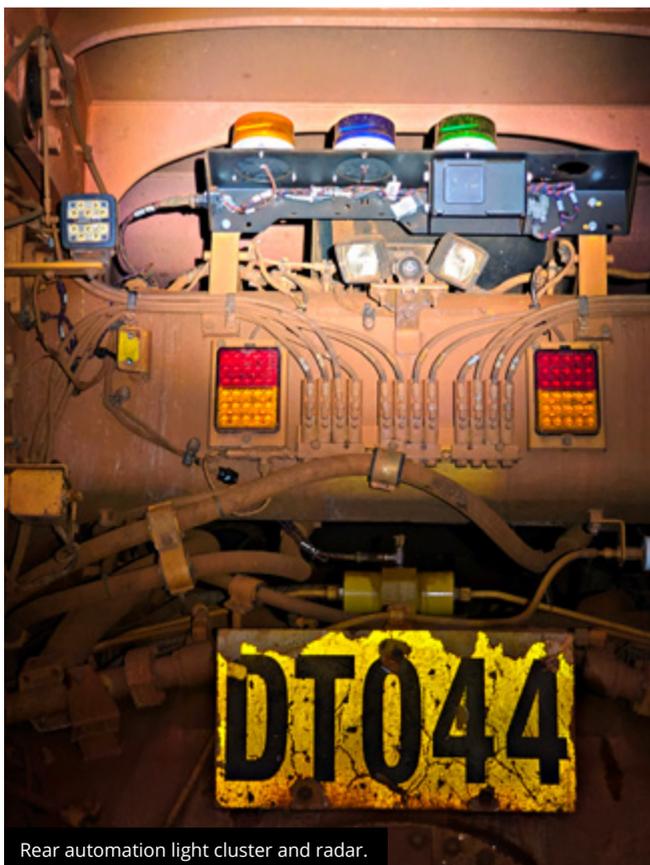
Independence Day has arrived. **AMR**

SOURCES:

ASI Mining
www.asirobotics.com

Epiroc
www.epiroc.com/en-au

Roy Hill
www.royhill.com.au



Rear automation light cluster and radar.



LIDAR forming part of the front mounted perception system.

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One company that has redefined rock-breaking is Total Rockbreaking Solutions



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(TRS) with their exclusive BoomSafe® automation and control package for fixed plant rockbreaker booms.

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BoomSafe® is purpose-built for hydraulic boom systems. It provides safe and reliable remote operation, and incorporates automated movements and advanced collision prevention to improve the safety of any fixed pedestal boom system.

There's no doubting the versatility of the TRS BoomSafe® system. It can be retrofitted to any brand of boom without the need to make any large changes to hydraulic equipment, which means no heavy lifting equipment is required for installation or commissioning.

According to TRS Engineering Manager Paul Ingleson, BoomSafe® is designed for simple operation and maintenance, and combines a series of customisable features to make the system as user-friendly as possible.

"BoomSafe® provides collision prevention and remote control capability by monitoring the position and orientation of the boom, and 'supervising' all operator movement instructions, whether from local radio control or a remote control room controller," said Mr Ingleson.

"The system also incorporates self-aligning gyro sensors, mounted in heavy-duty housings, which are fitted to the boom, stick and hammer, as well as a rotary encoder to determine slew location. BoomSafe® can determine the precise orientation and position of the rockbreaker at all times."

Collision Prevention

At the heart of BoomSafe® is an automat-

ed collision prevention system allowing maintenance personnel to set up a safe work area where the boom is allowed to operate.

All commands from either the local radio control or remote operation station are supervised by BoomSafe® to avoid damage to the boom and surrounding infrastructure, preventing all movements which would result in the boom moving outside the designated safe work area.

A unique 'operator assist' function automatically corrects and adjusts human operator-initiated movements which may be caused by error or operator fatigue, directing the boom back into the safe work area, instead of halting the boom operation and requiring further operator intervention to continue.

Additionally, the system can take inputs from other sensors such as safety gates, to ensure the integrity of the safe 'no go' area. A SIL rated safety system can also



be included for added assurances that the rockbreaker will stop if someone enters the designated working area of the rockbreaker.

Automation and Remote Operation

A standout feature of BoomSafe® is its ability to offer operators control of all their network-connected rockbreaker boom systems from a single workstation. Remote operators can execute automated movements such as 'Park', 'Deploy', 'Tool Replacement Position', 'Hammer Change Position' with the press of a single button, improving speed and precision. These commands are easy to setup and can be configured without specialist technicians.

"The system can also control hammer orientation, enabling accurate positioning of the hammer to a specific location and orientation for tool replacement or hammer change," said Mr Ingleson.

"Our aim is to help customers take advantage of efficiencies by leveraging the latest

technologies available in the areas of automation and control.

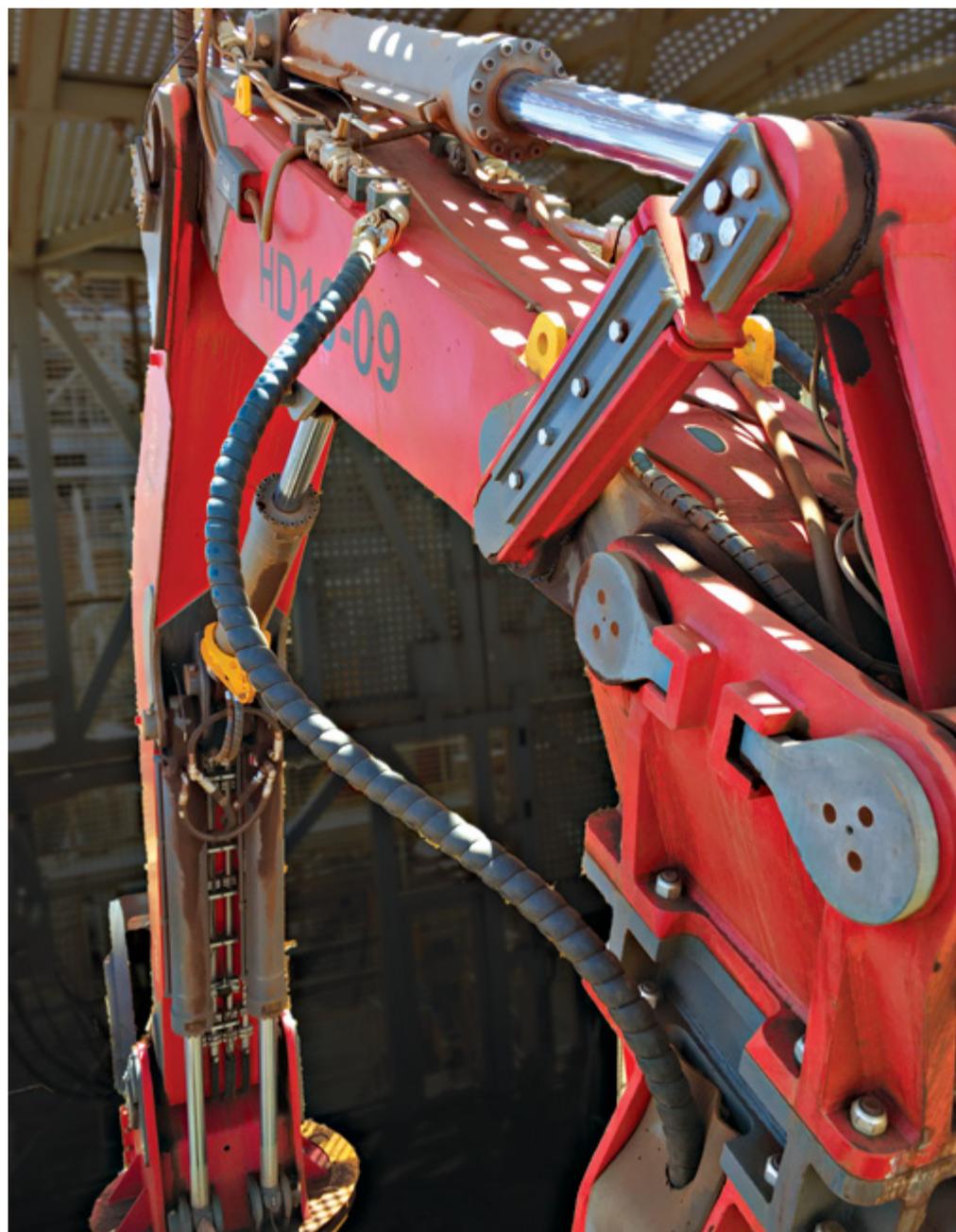
Controlling multiple rockbreaker boom systems remotely from a single central location is now a reality. BoomSafe® has been designed with true multi-operation in mind, allowing a single remote module application to control a group of rockbreakers on a single workstation."

About Total Rockbreaking Solutions

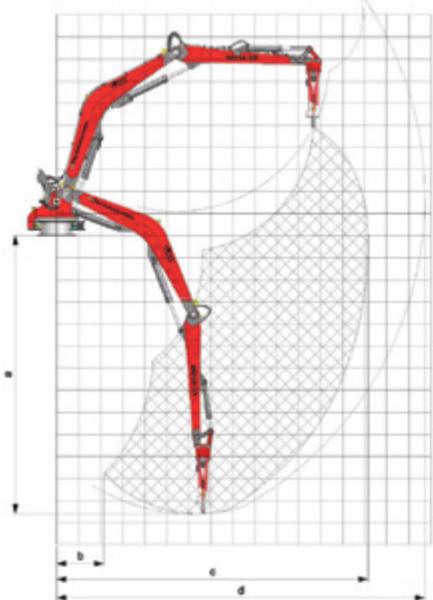
TRS is a wholly Western Australian owned company, focused entirely on the design, sales and service of hard rock mining boom systems, hydraulic power units and a large range of specialist hydraulic attachments for the mining, quarrying, construction and recycling industries.

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ALCOA

COMMITTS TO BUILDING ON 60-YEAR SUCCESS WA



(Image source: Alcoa / supplied)
Wagerup Alumina Refinery.



(Image source: Alcoa / supplied)
Kwinana Alumina Refinery.



(Image source: Alcoa / supplied) Environmental improvement specialist Cameron Blackburn plays an integral role in the return of native flora as part of Alcoa's extensive rehabilitation.

Aluminium producer Alcoa is celebrating 60 years of operating in Australia this year. In 1963, the company started mining bauxite near Jarrahdale, refining it into alumina nearby at Kwinana, and smelting alumina to make aluminium in Victoria. This was the nation's first integrated bauxite, alumina and aluminium industry.

Today, Alcoa Australia operates two bauxite mines and three alumina refineries in the south-west of WA and an aluminium smelter in Portland, Victoria.

Rehabilitation and Restoration

The shallow, mosaic nature of bauxite mining means a moving footprint and progressive rehabilitation and restoration of forest environments. Alcoa does not mine in old growth forests or areas of high conservation value.

About 80% of all areas Alcoa has cleared for mining have been rehabilitated and are at different stages of development.

Alcoa Australia president Matt Reed said the company's commitment to continuous improvement was instrumental in ensuring only WA native species had been returned to mined areas since 1988.

He added that Alcoa was the first mining company in Australia to officially hand back a significant area of rehabilitated land, work that was recognised with a State Government award for environmental excellence.

"Having dedicated more than 50 years of research and development into forest restoration, Alcoa has achieved an average of 93% botanical species richness return to previously mined areas over the past 20 years," he said.

"We continue to pursue a 100% species return target, which we first achieved in 2001, and are committed to returning healthy and resilient jarrah forest ecosystems."

Alcoa measures the extent of species return in the second year after completion of rehabilitation activities, comparing results to flora richness in multiple refer-

ence plots in nearby unmined forest. Mr Reed said while Alcoa had a strong record of success in mine site restoration, it continued to research and implement enhancements to drive greater success and accelerate the rate of rehabilitation.

"Alcoa pioneered leading restoration methods that have led to significant success in returning a healthy jarrah forest ecosystem," he said.

"We continue to evolve our practices in line with emerging science and factors such as the drying climate and increased bushfire risk.

"In 2022, we planted more than 510,000 seedlings and returned 2.2t of native seed, in addition to seed-rich topsoil, to areas that we rehabilitated. We rehabilitate more than 500ha of previously mined land each year and we are focused on increasing that into the future."

Another area of focus for Alcoa is water management.

Mr Reed said Alcoa took its responsibilities of avoiding, mitigating and managing any risks related to water very seriously.

"In 60 years of operation, we have never had a negative impact on public drinking water supply and we are implementing even more stringent controls to ensure that remains the case," he said.

Alcoa's ambitions are to achieve zero greenhouse gas emissions across its global operations by 2050 and Mr Reed said Alcoa Australia, which produced about 50% of the nation's alumina from its WA operations and 20% of the country's aluminium from its Portland smelter, was leading the charge on a range of carbon reduction initiatives.

"We've brought together experts from around the globe to design the alumina refinery of the future," he said.

"Two technologies being trialled in WA have the potential, when combined with a decarbonised electricity grid, to reduce a refinery's carbon emissions by about 98% and reduce freshwater use by up to 70%."

Saying No To Mining Near Dwellingup

Alcoa says its recent commitment to not mine close to the WA forest town of Dwellingup is testament to its continued focus on evolving to meet changing environmental, social and sustainability requirements.

The company recently announced an 8344ha no mining zone in and around Dwellingup to help protect important environmental and social values.

Mr Reed said Alcoa — like others in the mining and resources sectors — was working hard to maintain a social licence to operate as expectations changed and the world addressed climate change.

"We respect the Dwellingup area has immense lifestyle, ecotourism and forest recreational values that people want to continue to enjoy now and into the future," he said.

"That's why we have decided not to mine this highly prospective area that is more than four times the size of Rottneest Island."

The announcement follows Alcoa adopting similar no mining zones near Jarrahdale, another WA forest town, and withdrawing plans to export bauxite, reaffirming its commitment to refine all the ore it mines in the state at its three local alumina refineries.

Alcoa also moved to modernise environmental approvals for its WA bauxite mining operations about three years ago when it referred its next two proposed mine regions to the state and commonwealth for assessment. This process is ongoing.

"We are working to continuously improve the way we operate including modernising our approvals framework so we can continue to produce the aluminium needed for everyday use and a decarbonised future," Mr Reed said.

Aluminium Demand

According to the International Aluminium Institute, global demand for aluminium is forecast to increase by 80% between 2018 and 2050.

"Alcoa Australia is poised to play a big part in meeting that demand, and we need to ensure we continue to innovate and improve, delivering bauxite, alumina and aluminium in a safe and sustainable manner," Mr Reed said.

At the same time, we must add value for our stakeholders including the communities near where we operate. Some of the ways we do this is through employing local people, engaging local suppliers, and providing training and development opportunities for future generations."

Alcoa Foundation

Mr Reed said Alcoa also had a proud history of community investment that included support from the company's global charity, the Alcoa Foundation.

The foundation focuses on partnering with communities and not-for-profit organisations to address biodiversity conservation, climate change mitigation and adaption and equitable access to education and skills.

Key work the Alcoa Foundation has supported in Australia in recent years includes:

- The Three Rivers, One Estuary initiative – with Peel Harvey Catchment Council, Greening Australia and The Nature Conservancy – that aims to protect and restore key waterways in the Peel region of WA.
- The WA Department of Biodiversity, Conservation and Attractions' Western Shield program that protects native animals in WA's Northern Jarrah Forest from the threat posed by feral predators.
- The Alcoa Community Black Cockatoo Recovery Project, with BirdLife Australia, that aims to support three endangered Black Cockatoo species in the south-west of WA.
- Working with the Waalitj Foundation to enhance opportunities for Indigenous jobseekers and businesses in the Kwinana, Peel and Upper South West regions of WA. **AMR**

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TRANSFORMATIVE TECH & DECARBONISATION: AIMEX 2023 ADDRESSES HOT-BUTTON ISSUES

With only a month to go until thousands of attendees gather at Sydney Showground for Asia Pacific's International Mining Exhibition (AIMEX), over 250 local and international companies are gearing up to put their best foot forward as part of the free-to-attend trade exhibition.

From 5-7 September, leading companies supplying the mining sector with technology and equipment that improves efficiency, productivity and sustainability will showcase their best at AIMEX, Australia's longest-running mining event.

With exhibitors including Bosch Rexroth, Danfoss, CR Powered by Epiroc and XCMG Mining Equipment, the trade expo promises a one-stop destination to meet local and international suppliers and investigate new technologies.

Industrial hydraulics powerhouse Bosch Rexroth and ground engaging tools (GET) specialists CR Powered by Epiroc will be exhibiting in the Transformative Technology Pavilion, a new addition to this year's event showcasing exponential technologies such as AR, VR, robotics and data utilisation.

The space will gather exhibitors who are solving specific industry issues with technology, like Bosch Rexroth's eLion electrification solutions for mobile machinery or CR's GET Trakka, a GET loss detection system that uses embedded IoT connected sensors.

Bosch Rexroth NSW State Manager Peter Hopewell says AIMEX 2023 represents an exciting opportunity to meet face-to-face with suppliers and showcase new product lines from their Hydraulics and Industrial Automation solutions.

"This year at AIMEX we will be unveiling exciting new products and technologies that will shape the future of the mining industry," he said.

"This exhibition will be the first time we are showcasing our eLION solutions in Australia.

"eLION is Bosch Rexroth's electrification solution specifically designed for the electrification of off highway machinery."

While the Transformative Technology Pavilion would be dwarfed by one of CR's Hurricane dragline buckets, the company is looking forward to engaging with customers around their digital solutions for maintenance and productivity.

"We're delighted to be exhibiting at AIMEX this year and sharing both our hardware and complementary technology with visitors," said Hannah Sabih, Global Marketing Manager for CR Powered by Epiroc.

"We'll be showcasing Titan 3330, our digger-based payload management system which visitors will be able to experience for themselves at the show.

"Titan has been proven across commodities to increase operational productivity by up to 22%, tighten payload spread by up to 25%, and reduce associated emissions by making load haul circuits more efficient."

Of course, we'll also have interactive mod-

els of our lips and GET for both surface and underground machines, designed to increase payload and decrease maintenance-related downtime."

The second new addition to the trade exhibition this year is the Decarbonisation Zone, supported by International Copper Association Australia and populated by companies like Danfoss and XCMG Mining Equipment, aiming to offer real solutions to industry's decarbonisation challenges and ESG obligations.

Danfoss Pacific Region General Manager Chris Page says the mining industry has plenty of opportunity to support decarbonisation goals through smart solutions like enhanced energy efficiency and integrated energy systems.

"At Danfoss we integrate our ESG ambitions into everything we do," he said.

"Our unique products and solutions provide real value to our customers through sustainable innovation and leading application know-how, supporting them in their journey toward decarbonisation in an intelligent and cost-efficient way.

"We are particularly proud to be supporting the mining industry as it takes a lead-

ing role in the transition to net zero and beyond.

"This year's AIMEX conference and exhibition in Sydney provides a fantastic opportunity to hear more about the current challenges facing the industry and for partners to find out more about Danfoss' energy efficient solutions."

XCMG Mining Equipment may be a new face within the mining industry, but as the world's third-largest construction machinery manufacturer, they have plenty to offer, particularly in the decarbonisation space.

Roy Rossini of XCMG says the company has been working on electrified and natural-gas powered products for almost a decade.

"As the world looks for a greener, cleaner construction industry, XCMG is delivering solutions that reduce carbon emissions across the whole industry chain and total life cycle," he said.

"As early as 2013, XCMG were researching and developing new energy projects.

"They were the first in China to launch a natural gas-powered truck crane, motor grader, loader and hybrid excavators.

"The energy savings equate to over 25%, when compared to diesel powered products."

Attendees interested in decarbonisation and transformative technology will also be interested in the free-to-attend conference that runs in parallel with AIMEX's trade exhibition.



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MANAGING EXTREME WEATHER IMPACTS ON MINING OPERATIONS

Unprecedented has become the buzzword when discussing the weather, and for mining companies the world over, unprecedented climate extremes have been creating chaos.

In early March 2023, operations were suspended throughout the North West Minerals Province in Queensland, Australia, due to record-breaking rainfall. One site recorded over 600 mm in just two days — more than the annual average. Globally, severe storms and heavy rainfall continue to cause operational delays and revenue losses, compromising equipment and mine infrastructure. Flooded supply chain networks delay shipments and delivery, driving up unit costs.

At the other end of the spectrum, drought causes a complete rethink of water management on-site. The mining sectors in Mexico and Chile, and their vital lithium and copper production, have been impacted by crippling drought — for more than a decade in Chile alone. Water shortages challenge output and can create tension with local communities as severe scarcity affects everyone across struggling regions.

Utilising meteorological consultancy and the decision-support interface Miningzone provides an opportunity to fine-tune existing systems of management for each mining project.

Gaining situational awareness of extreme weather events

Preparation and hyperlocal monitoring are integral when confronting unprecedented climate risk. Weatherzone Business, a DTN company deploys robust solutions delivering invaluable foresight: improving safety, reducing profit loss, and modelling what lies beyond the horizon.

Utilising meteorological consultancy and the decision-support interface Miningzone provides an opportunity to fine-tune existing systems of management for each mining project, optimising each site's unique preparation for and response to adverse weather conditions.

When storms threaten safety and operations

Lightning creates potentially fatal conditions on-site. There is a misconception that mining vehicles create a perfect Faraday cage, providing adequate physical protection. Large windscreens and side windows still enable lightning and side flash to penetrate the cabin, creating a dangerous environment for operators. Pyrolysis — the mixture of volatile compounds within the air chamber of tires that can potentially ignite — creates tire rupture or explosion. This process is sometimes delayed, posing a lying threat to workers within the vicinity of the vehicle post-strike.

Reducing the physical risks of lightning for mining companies

Stopping operations during storms when the lightning is within an unsafe radius is the best way to safeguard staff and mitigate damage to assets.

Accurate detection of local strikes identifies when lightning penetrates this radius. It supports the efficiency of Trigger Action Response Plans (TARPs) and reduces costly and unnecessary downtime caused by hyper-sensitive on-site sensors.

Weatherzone offers the Weather and Lightning Alerting Solution (WLAS), which operates in over 400 mines across the globe. Drawing on data from 1,800 sensors in more than 100 countries, WLAS delivers precise warnings of lightning proximity, configured to each mine's thresholds.

Each site receives clear guidance on when to halt and restart production. When WLAS is used in conjunction with WZBob Onsite Alerting, conspicuous, site-wide audible and visual alerts provide enhanced safety outcomes for mining personnel.

Monitoring weather conditions to protect mining infrastructure

Preparing a site by ensuring mobile mining equipment and operators are undercover takes time. Having the ability to visualise potentially damaging systems before they hit maximises the time needed to safely shut down.

Stormtracker is the solution that allows a mine's control room operator to chart the progress of incoming weather and mount a targeted response. A Geographic Information System (GIS), Stormtracker displays multiple weather layers mapped over each geofenced mining site. All infrastructure is visible, providing a clear picture of what and who needs to be prepared and protected.

Mining projects vulnerable to tropical cyclones

Tropical cyclones and hurricanes pose a growing threat to mines globally. Weatherzone offers a 7-Day Tropical Cyclone Service that's completely customised to each mine's site and infrastructure. Conditions are remotely monitored 365 days a year. When a system develops within 600 nautical miles of a mine site, our meteorologists begin communicating vital data to operators.

Tailored risk assessments are provided to enhance site preparation. Meteorologists are on call 24/7 throughout the impact, and visualisation via the Miningzone interface improves spatial awareness of its track.

Warm oceans and humid, volatile air influence the development and strength of these systems. It's widely accepted that their intensity will increase with time. For vulnerable mines, accurate monitoring provides time to secure a site and evacuate personnel to reduce loss across the board.

Close consultation with our industry meteorologists drives the capacity to respond to climate impacts with confidence.

Supporting the mining industry to manage climate risks

Utilising meteorological modelling and consultancy creates added layers of protection and situational awareness for mine operators. Close consultation with our industry meteorologists drives the capacity to respond to climate impacts with confidence.

Seasonal outlooks are the key to analysing the possibilities that weather has in store and underpins considered preparation. Foresight regarding potential drought, high rainfall, and tropical cyclone activity guides effective risk mitigation. The success of planning water management, electricity storage, TARPs, and evacuation procedures is influenced by a detailed awareness of the potentiality of extreme conditions.

The urgent need for detailed risk communication

For the day-to-day management of immediate weather threats, quality risk communication is paramount. Our meteorologists dissect complex data and deliver tailored briefings and analytics around the clock. This support drives confident, rapid decision-making when severe weather is imminent.

Audits of current weather management systems provide profitable opportunities to improve preparations and response, well before the storm inflicts its wrath.

It is indisputable that now is the time for companies to think ahead, strategising to mitigate the effects of increasingly volatile weather patterns.

DTN supports mining sector plans for climate variability

Top-tier weather and environmental data and analytics drive adaptability and preparation within the mining industry. It is indisputable that now is the time for companies to think ahead, strategising to mitigate the effects of increasingly volatile weather patterns. Only the most robust and trusted weather and data systems will deliver a dependable foundation for this kind of recalibration. Weatherzone offers advanced solutions built on years of collaboration with the resources sector and will continually innovate as each new challenge arises.

Learn more about Weatherzone Business, a DTN company Mining Solutions today.

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Give your enterprise the best chance to protect personnel and profit

Access customised weather and environmental intelligence trusted by mines worldwide.

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business
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Weatherzone Business, a DTN company, is your industry leader in mining weather solutions and analytics. With precise monitoring and alerting you can respond rapidly, safeguarding your uptime and output. **Utilise valuable foresight and decision-making tools to enhance your efficiency.**



Miningzone's Actionable Insights

Miningzone is your **customisable, IP-secure interface** centralising all your key meteorological and environmental solutions. Your teams can utilise concise insights and alerting to drive their confident decision-making.



ObsConnect Weather Station

Improve your forecast accuracy with onsite meteorological observations. Our **ObsConnect Weather Station** provides **exact, real-time monitoring of onsite conditions**, vastly improving forecast modelling and situational awareness.



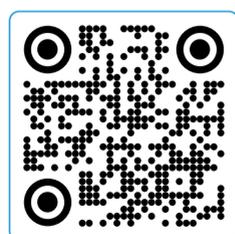
Powerful Operational Forecasts

Visualise weather threats in real-time, and out to 7+ days. Your onsite parameters are ingested into our **Operational Forecast System**, which then delivers **targeted risk forecasts with meteorologist commentary.**



Blast Dispersion Modelling

Simulate and forecast blasts, based on hyperlocal forecasting and your site thresholds. Visualise the trajectory and intensity of pollutants and **pinpoint the optimal time to blast.**



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Weatherzone Business - powering smarter weather decisions

CMI MINING COUPLERS

CMI Electrical Products established in Sydney since 1954, are experts in the field of explosion proof mining equipment.

Under the Minto Industrial Products brand, which has become synonymous within the Mining Industry in Australia, specialising in manufacturing High Voltage mining couplers.

Products in our range include Couplers, Receptacles, Back-to-Back Receptacles, Earthing Couplers Adapters and Cable Glands that connect voltages from 660 – 11,000 Volts.

In amperage ranges from and 60 Amps to 800 Amps.

Minto Industrial Products have been supplying couplers and receptacles for underground mining in Australia for over 40 years.

Our reputation is now a global one, with exports to mining installations in Indonesia, Papua New Guinea, China, South Africa and Mongolia.

Continually developing new and improving on existing products as with the Retrained range of plugs with an ingress protection of IP68.

A new Stainless-Steel interior replaces the previous Dough Mould Compound (DMC) material. Using teflon insulators, which beside being far more reliable, reduces the overall weight of the plug.

The new Stainless-Steel interior improves safety by having phase segregation ensuring no phase to phase faults and allows for easier access to sockets with a unique two-piece design protecting the captive insulators whilst still easy to remove and replace.

In conjunction with the teflon insulators, the Morse taper socket & thimble arrangements form a solid connection for reeling and trailing cables.

The result is a robust interior with improved features, safe for use in open cut mining, hard rock mining and tunnel applications and has an explosion protected certification for use in any underground mining applications.

Earthing receptacles have been added to the existing Retrained Series.

The Earthing receptacle is IP68 rated, with a newly designed brass interior bonding the three phases to earth.

Long lengths of insulated cable have an inherent capacitance, which must be eliminated by discharging voltage to earth when disconnecting for maintenance, to make the installation safe in any mining application.

This product can be used in above or below ground mining and tunnel applications and is explosion-protected certified.

Colour coded to AS1299 green, with voltage and current identification to ensure the correct plug is inserted to ensure safety.

The B-Series, or "Bolted" Coupler has been part of our range for over twenty years and works within the range of 300-425 Amps for either 660 or 1100 Volts.

We recently developed a new interior phase carrier unit, that's inserted into the existing Bronze outer casting.

The interior holds the insulators phase sockets & thimbles for connection to a feeder cable.

The interior is more robust, introduces phase segregation and improves the maintainability of the product and is retrofittable to existing CMI B series product.

This product is IP68 and can be used in hard rock mining and tunnel applications and as it has an explosion-protected certification making it suitable for use in underground coal mining applications.



This interior captures and locks in place teflon phase insulators for the three phase and pilot sockets.

The new interior is lighter, is far more durable, reliable and improves the overall dependability of the product as the interior is easy to remove and dismantle, which allows for clear access to the sockets and thimbles for replacement and repair.

In the 800A series, we've launched the 11kV COBRA couplers, specifically designed for above ground mining, tunnel and roadway applications.

The COBRA coupler has increased level of protection from damage and corrosion, compactly designed, is easy to access for cabling and capable to perform for long periods between maintenance cycles.

Can be quickly dismantled thanks to its innovative design features and use

of robust materials and able to handle extremely harsh conditions.

Below is a summary of some of the key features for the Minto 800A, 11kV COBRA coupler:

- Fully rated for a continuous operation 11kV @ 800A
- Modiewark No Contact - Voltage Test compatible windows, one on each phase
- Teflon Insulators
- Silver plated high purity copper current path elements
- Lower heat losses for longer service life
- Removable Stainless-Steel faceplate, which can be easily replaced if damaged
- Choice of armoured or rubber cable clamps
- Easily opened for inspection and re-termination
- Small and Large Gland body to suit cable type and size
- Choice of Rubber Cable or Steel Wire Armoured cable glands
- Custom designed ergonomic handles for lifting and handling

For more information on this product, you can get in touch with CMI on 1800 264 222, or go to their website at <https://www.cmielectrical.com.au>

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Specialists in Electrical Cable & Mining Connectors



cmi
Electrical

Expertise and Precision is our purpose.

CMI Electrical Products are specialists in the manufacture and distribution of electrical cables and associated components for industrial, mining, infrastructure, commercial, petrochemical and information technology applications throughout South East Asia and Oceania.

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BLASTING BEYOND BOUNDARIES



Since 1975, Protoblast Company has led the way when it comes to engineered abrasive blasting systems for all industries. Today, the Australian-owned and operated company is still run by the same family, now in its third generation, with all equipment designed and manufactured in Picton, NSW.

With over 45 years of experience, we have found time and again that the cost of logistics from outsourcing the abrasive blasting process is very often hidden and overlooked and has shown that it is, more often than not, approximately equal to the invoice value of the blasting. This has driven Protoblast to help local manufacturers become more efficient and self-sufficient by providing high quality locally made and serviced abrasive blasting equipment.

Streamlined Processes for Enhanced Efficiency

Protoblast understands the importance of minimising lead time and maximising operational efficiency across all industries. Through innovative technologies, such as automated blasting systems, Protoblast enables customers to streamline their surface preparation processes. By integrating advanced control systems and specialised airless blasting technology, these machines optimise blasting operations, reduce manual labour and significantly improve productivity. Customers can achieve faster project turnaround times, ensuring that their operations remain on schedule and minimizing downtime.

Uncompromised Commitment to Quality

Protoblast places a strong emphasis on delivering high-quality products and services to their customers. By employing stringent quality control measures and utilising advanced manufacturing techniques, Protoblast ensures that their abrasive blasting systems meet the highest standards. The precision and consistency achieved by their systems result in uniform surface profiles, improving coating adhesion and enhancing the overall quality of the finished product. By partnering with Protoblast, customers can take control of the quality of their surface preparation processes and achieve superior results.

Cost Optimisation and Financial Control

Protoblast understands the importance of managing costs within the industries they serve. That's why they offer a range of cost-effective solutions designed to help customers optimise their budgets without compromising on quality. Protoblast's innovative technologies reduce labor costs through automation, minimise abrasive waste through advanced recycling systems, and extend the life of protective

coatings. The implementation of Protoblast's solutions allow mining companies to exercise greater control over their expenses, improving their bottom line to achieve long-term financial sustainability.

Customisation and Tailored Solutions

Protoblast recognises that every operation is unique with their own unique challenges. While a standard product range is available, they specialise in providing tailored solutions that meet specific requirements. The company's team of experts works closely with clients, conducting thorough assessments and collaborating on design and engineering processes. This partnership ensures that the blasting systems delivered by Protoblast are perfectly suited to the operational context, and contribute to increasing efficiencies and desired outcomes. When taking advice from Protoblast, you can be assured you are talking to the manufacturer.

Environmental and Work, Health Safety Responsibility

Environmental sustainability and WHS is a priority for both Protoblast and their customers. Protoblast's advanced technologies incorporate dust collection and filtration systems that effectively capture and contain harmful particles generated during the blasting process. These systems reduce dust emissions and protect the environment, ensuring the safety and wellbeing of workers, as well as compliance with environmental and WHS regulations. Partnering with Protoblast lets customers take control of their safety and environmental impact, demonstrating their commitment to sustainable practices.

Protoblast's relentless pursuit of innovation, unwavering commitment to quality, cost optimisation, and environmental responsibility has positioned them as a trusted partner in the abrasive blasting industry. Their advanced technologies empower customers from large mining companies through to small local manufacturers to take control of their lead time, quality, and cost, ultimately driving efficiency and financial sustainability.

By delivering tailored solutions, fostering partnerships, and promoting sustainable practices, Protoblast equips customers with the tools they need to excel in their surface preparation processes.

As the industry evolves, Protoblast continues to lead the way, enabling mining companies to achieve exceptional results while upholding their commitment to environmental stewardship.

For more information, visit
www.protoblast.com.au

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A leading Australian manufacturer of

ABRASIVE BLAST EQUIPMENT



Problast has been designing and manufacturing to suit customers' individual needs since 1975.

ABRASIVE RECOVERY SYSTEM

AIRLESS BLAST MACHINES

SECTION BLAST MACHINES

DUST COLLECTORS

The best way to prepare a surface for a coating is by using the abrasive blasting process. Whether you need to blast earthmoving equipment, turbines, structural steel or railway lines...

We have successfully completed projects for Bechtel, BHP Billiton, ThyssenKrupp and BAE Systems just to mention a few.

Problast has the experience to design and supply equipment that is fast, efficient, improves your product and saves you money ... year after year

PLEASE VISIT OUR NEW AND UPDATED WEBSITE:

www.problast.com.au



NAPA AUTO PARTS

INTRODUCING A GAME CHANGER IN ENGINE DUSTING PREVENTION

THE SCAVENGER SNORKEL,
DEVELOPED BY WORKAIR
TECHNOLOGIES, COMBATS
ENGINE DUSTING.

NAPA Auto Parts has been a leading provider of automotive aftermarket parts and equipment for over 90 years. However, the company's expertise extends far beyond this, and we are a valuable partner to the mining industry.

Through collaboration with our customers and our leading suppliers, NAPA Auto Parts has been able to identify, develop and source a growing range of innovative products and solutions, to improve efficiency, safety, and profitability that are crucial to the success of mining operations. Our commitment to delivering high-quality products and services has made NAPA Auto Parts a trusted supplier to some of the Australia's largest mining companies.

Introducing the Freudenberg Scavenger Snorkel, revolutionising Mining Operations Fleet Vehicles with advanced engine dusting prevention.

In the world of mining, engine dusting is a persistent challenge that hampers mining companies' operations. Not only does it diminish engine performance, but it also poses a significant threat to the working parts of the vehicles.

Fortunately, a ground-breaking solution has emerged: the Scavenger Snorkel. This innovative technology combats engine dusting, optimises efficiency, and creates a safer working environment for mining operations.

Engine dusting occurs when fine particles, such as dust and debris, infiltrate the engine compartment of mining vehicles, specifically Toyota Landcruiser 70 series and Toyota Hilux. These particles bypass air filters, contaminate lubricants, and hinder engine performance.

The consequences of engine dusting include increased wear and tear, reduced

fuel efficiency, frequent breakdowns, and a shortened engine lifespan.

The Scavenger Snorkel, developed by Workair Technologies, stands out as a game-changer for mining companies seeking an effective solution to combat engine dusting.

This pioneering technology acts as an advanced filtration system that prevents harmful particles from entering and damaging the engines of Toyota Land Cruiser and Hilux vehicles.

The Scavenger Snorkel incorporates an ingenious vacuum-assisted cyclonic pre-cleaner chamber, setting it apart from other snorkel systems. This chamber ensures efficient dust removal, making it particularly suitable for dust-prone environments in mining applications.

The Freudenberg Scavenger Snorkel is an

exceptional solution for mining applications, efficiently removing dust and dirt from incoming air.

By integrating pre-filtration and a high-grade air filter element, the Scavenger Snorkel offers superior protection against dust-related engine damage.

Mining companies can confidently rely on this innovative technology to enhance efficiency, reduce maintenance costs, and prolong the lifespan of their vehicles, even in the harshest dust-filled conditions.

For more information about NAPA Auto Parts and their widest range of leading automotive specialist and mechanical brands, solutions and innovations, visit napaparts.com.au/mining.

AMR

SOURCING INNOVATIVE SOLUTIONS.

We have expanded into a wider range to offer a complete solution for your heavy duty needs. We're also partnering with leading brands to design and develop innovative solutions and products that resolve safety and efficiency issues on site, saving you time and money.



AUTOMOTIVE



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MINING

Visit napaparts.com.au/mining for more information.



AUTO PARTS

indux

DUST AND FUME EXTRACTION COMPANY

Revolutionising Industrial Environments -
Design Build Install & Service



AIMEX

FEATURE 49

In the dynamic landscape of workplaces and industries, there is a pressing need to prioritise the health, safety, environment, and quality of operations.

From wood & metal workshops to chemicals, grains & food processing plants, and the demanding mining industries, businesses face a common challenge—ensuring worker well-being and creating a conducive environment.

One of the key challenges lies in airborne hazards that can have detrimental effects on workers' health. Dust particles, pollutants, and contaminants measuring less than 10 microns silently linger in the air, posing risks that can lead to long-term illnesses. It is essential for businesses to address this issue and implement effective solutions to safeguard their workers.

This is where INDUX steps in as a trusted partner and provider of industrial environmental solutions. With decades of experience in the field, they are dedicated to helping businesses mitigate risks, combat hazards, and prioritise the well-being of their workforce.

At INDUX Dust and Fume Extraction Company, their experienced leaders, Ish Singh and Phil Vidler, highlight the importance of investing in robust measures from the start.

By taking proactive steps to prioritise workers' health, safety, environment, and quality, businesses can lay the foundation for long-term success. INDUX addresses the critical issue of airborne hazards by offering a range of specialised solutions.

Their dust extraction systems and scrubbers are designed to effectively capture and neutralise particulate matter and pollutants, preventing their release into the atmosphere.

By implementing these solutions, businesses can create cleaner and safer working environments while meeting regulatory requirements.

INDUX provides a comprehensive suite of products and services tailored to meet specific industry needs.

- Dust and fume extractors

- Cyclones
- Wet & Dry Scrubbers
- Spray paint booths,
- Extraction fans,
- Welding arms,
- Carbon filtrations

Indux is a 100% Australian owned company and their in-house design and manufacturing teams are able to customise clients design needs.

At INDUX, they understand that every industry has unique requirements. Their team of experts works closely with clients to customise solutions that align with their specific needs.

They ensure that their products meet international standards and utilise the latest technology to improve efficiency and quality.

Over the years, INDUX has built a strong reputation for reliability and efficiency. They have collaborated with major mining companies, showcasing their ability to provide solutions that cater to diverse industries.

When businesses choose INDUX, they can be confident that they are partnering with a trusted provider that prioritises their success and the well-being of their workforce.

INDUX is committed to transforming workplaces, safeguarding workers' health, and optimising operations.

With their expertise, personalised solutions, and dedication to excellence, they empower businesses to overcome industry challenges and achieve new heights of success.

Join the INDUX family today and experience the difference they can make in your industry. Contact them to embark on a journey of transformation and create a safer, healthier, and more efficient working environment for your workforce. **AMR**



Compliant with Australian standards

DUST & FUME EXTRACTION SYSTEMS SPECIALISTS



THE AUSTRALIAN LOCAL COMPANY – DESIGN CONSTRUCT INSTALL & SERVICE

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In today's volatile environment, mines need to quickly detect and respond to maintenance issues. Water is a critical part of a mine's daily operations and the failure of water infrastructure can result in water loss, emergency repairs, reduced reliability and economic loss.

The application and use of innovative pipeline technologies has become more critical as expectations and goals associated with infrastructure expand. By leveraging condition assessment technologies and turning data into actionable results, mining companies can assess risk and prioritise assets in need of rehabilitation or replacement.

Detection Services provides state of the art, multi discipline pipeline monitoring solutions covering water and wastewater management. Our solutions and technologies provide major benefits to the mining industry in the area of water loss management including detecting and managing water leakage, pipeline corrosion and water transportation through pipeline inspection.

ACCELERATE VALUE

Our predictive condition assessment technology and solutions can help mining companies get more out of their equipment, increasing productivity and margins.

The p-CAT™ (pressure condition assessment technology) is a unique, patented solution developed here in Australia in partnership with the University of Adelaide. p-CAT™ has always been at the forefront of

PIPELINE CONDITION ASSESSMENT

A Targeted Approach



innovation utilising cutting edge technology for pipeline condition assessment and continues to challenge

other more conventional technologies, creating a more targeted approach and delivering high resolution results.

INTELLIGENT CONTROL

p-CAT™ works by analysing the partial reflection of a small, controlled transient signal that is injected into the pipeline. The signal is monitored and recorded by sensors that are temporarily installed on existing pipe fittings. The transient wave experiences partial reflection when it encounters any change in pipeline structure, including known features of the system.

This proven technology can determine remaining wall thicknesses over long sections (many kilometres) of pipeline as well as detecting and locating defects such as air and gas pockets, internal blockages and restrictions, unknown connections, pipe material changes as well as other issues related to pipe deterioration.

p-CAT™ analyses hundreds of kilometres of pipeline with extreme accuracy and saves on costs by locating defects within the pipeline and limiting repairs and replacements to only the sections in need of attention.

OPERATIONAL FLEXIBILITY

This leading edge technology is non-invasive, non destructive and provides a reliable, accurate condition assessment of the pipeline, its condition and its potential for water loss. Most other pipe inspection systems require the pipeline to be decommissioned and de-watered, p-CAT™ is designed to work while the system is in operation delivering value and securing supply. No downtime for mining operations is a key benefit to optimising performance.

Discover the Detection Services Difference

1300 722 835

detectionservices.com.au



HENRY PLANT & EQUIPMENT

DRAWING ON 90 YEARS OF EXPERIENCE TO PROVIDE EARTHMOVING SERVICES NATIONWIDE



Based in Lithgow, NSW, Henry Plant & Equipment Hire is a family-owned company that draws from over 90 years of industry-leading experience, providing earthmoving, heavy haulage and crane hire services nationwide.

As an industry-leading plant and equipment business, Henry continually strives to build long-standing business relationships, with the customer's satisfaction top priority.

Earthmoving Experts

Henry Plant & Equipment Hire specialises in bulk excavations of any material and earthmoving in any given situation.

Operating predominantly throughout NSW, Henry provides various excavation,

earthmoving and general earthwork services.

Machinery includes a range of excavators, augers, hammers, rippers, rollers, dump trucks, bulldozers, wheel loaders, graders, earthmoving compactors and water carts.

Heavy Haulage

Henry can handle any transport requirement you may have from moving dirt and materials to specialist heavy haulage.

To take all the hassle out of your next transport project, all transportation services are carefully planned before to ensure safe and efficient moving, and Henry ensures all legal and permit requirements are in place before beginning transport jobs.

Crane Hire

At Henry, all the necessary heavy lifting equipment is available, from a 4.5T mini crawler to a large mobile hydraulic crew. All are on standby for your specific crane needs.

Their ability to supply a range of cranes to suit any project ensures that Henry Plant & Equipment Hire is a one-stop-shop for all crane and access needs.

Site Rehab

Backed by years of experience and a wealth of knowledge, Henry's team of in-house project managers are available any time to discuss, oversee and design any project that needs to be taken care of.

As experts in the industry, Henry is with

you from initial consultation to design and full project implementation.

They have the experience and the right people to ensure conservation earthworks and site rehabilitation needs are met in a timely and cost-effective manner.

With a focus on zero harm, Henry's full-time workplace health and safety manager delivers rehabilitation services that comply with safety norms.

For more information and to know more about Henry's equipment availability, visit www.henry.net.au, call 02 6351 2486 or email admin@henry.net.au. **AMR**

EARTHMOVING, HEAVY HAULAGE AND CRANE HIRE SERVICES IN CENTRAL WEST NSW



Established 90 years ago, **Henry Plant & Equipment Hire** are a locally owned company servicing the Lithgow NSW region, supporting mining and industry. Henry Plant & Equipment Hire provides heavy haulage, craneage and earthmoving services, in addition to site rehabilitation projects.

Visit www.henry.net.au or call 02 6351 2486 for more information





BET ON BARTLETT AT EVERY DEPTH



Mineral exploration is tough work at the best of times, but drilling in remote and isolated areas of Australia comes with added challenges.

When Bartlett Resources Director Gerry Bartlett set out in the drilling industry over 30 years ago, he couldn't have imagined his company would grow into the drilling contractor it is today.

The Serpentine based exploration drilling contractor offers a specialised service in Air Core (AC) and slimline Reverse Circulation (RC) drilling for mining companies in diverse geological environments across the country.

Gerry and his team bring a wealth of knowledge in mineral exploration to every

drilling project, proving the magic formula in his success and the level of quality of service his customers have come to expect.

"We are a company committed to tackling exploration projects in extreme environments, which has made us leaders in our field," Mr Bartlett said.

"Delivering a first rate service and exceeding clients' expectations is a core focus for us, and extensive skillset and experience are simply a bonus."

As leaders in AC and slimline RC drilling, Bartlett Resources utilises a range of drilling techniques to achieve the best project outcomes in different environments. From Rotary Air Blast (RAB), mud rotary and

geotechnical SPT drilling, to exploratory earth probing and soil sampling, you can be assured Bartlett has the right methods to suit every application.

Mr Bartlett said the company had recently completed drill programs in the Goldfields, Kimberley and Pilbara regions.

"In order to perform at our peak, and meet the demands of projects in these locations, we run an extensive fleet of drill rigs, rotary splitters, drilling equipment and support vehicles ready to engage any project, anywhere," he said.

"We have undertaken extensive rebuilds of two AC drill rigs with safety and reliability being the forefront of our construction requirements.

"With a quality line-up of field service equipment, we can optimise machine availability, whilst maintaining a low impact on the environment."

Safety is clearly a top priority in any drilling environment. Bartlett approaches every contract with the highest safety standards, from their equipment and drilling personnel, to logistics management and safety compliance.

The company is capable of meeting the strictest project requirements, providing customised solutions and competitive rates to suit unique site needs.

For more information, visit
www.bartlettresources.com.au/

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EXPLORATION DRILLING AT ITS FINEST

With over 30 years in the drilling industry, Bartlett Resources has your drilling programs covered at every depth, in any environment. Utilising a range of specialist drilling techniques to **achieve the best project outcomes in different environment, you can bet on Bartlett to deliver.**

- Air Core (AC) Drilling
- Slimline Reverse Circulation (RC) Drilling
- Rotary Air Blast (RAB) Drilling
- Mud Rotary
- Geotechnical - SPT Drilling
- Exploratory Earth Probes
- Auger - Soil Sampling



www.bartlettresources.com.au



BARTLETT
resources
EXPLORATION DRILLING
0411 379 247



If you're looking for an exploration drilling contractor with experience managing projects in extreme environments, contact Bartlett Resources today!

P: 0411 379 247 E: drilling@bartlettresources.com.au

POWELL GROUP EXHIBITING AT AIMEX



Powell Group is Australia's largest independently owned integrated fluid solutions company with 12 locations nationally all with fully equipped hose assembly centres that can manufacture, test, certify and package any fluid conveyance needs you may have.

Powell's general manager Darren James said the company is excited to exhibit at Asia-Pacific's International Mining Exhibition (AIMEX).

"As a group, we are excited to be exhibiting at this major event in the Asia Pacific and have created an eye-catching and innovative display of industrial and hydraulic hose and fittings," he said.

"Our reliable and trusted brands, Exitflex and Optima will be featured on our stand."

New Partnerships

The Powell Group has recently partnered with Wire Aid, a dynamic company specialising in the design, manufacture and sup-

ply of hose restraints, cable stockings and cam buckles.

Powell is the national Australian distributor of Wire Aid products that are ISO 9001 certified for quality management systems. They are made in Australia and used globally.

"Both businesses are built on keeping people safe, which is highly valued by our customers, where safety and the latest technology are extremely important," Mr James said.

"In May this year we launched our first ever Exitflex Crimp App to the market as

demanding conditions require innovative solutions, whether you work in controlled workshop conditions or on a mobile service truck in extreme outdoor environments, the Exitflex Crimp App is the smart solution."

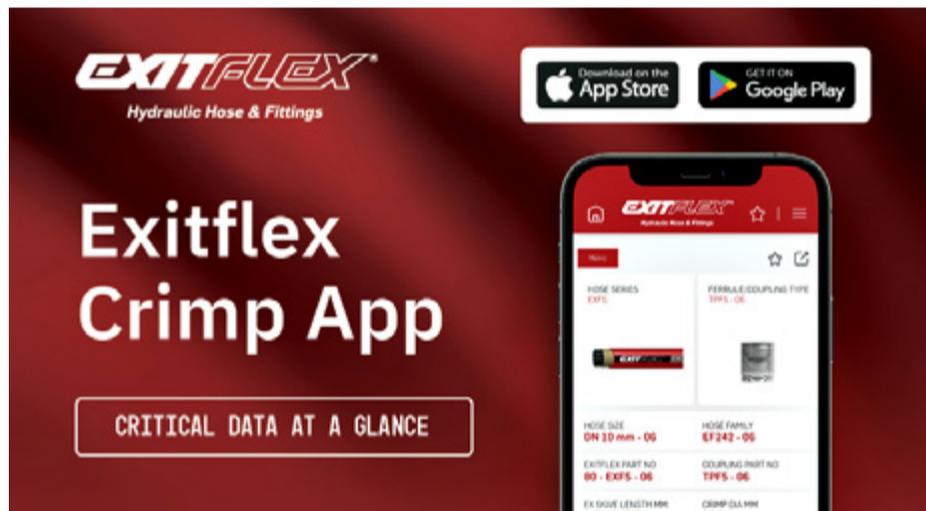
The Powell Difference

While our products are in demand, it is the company's experience and understanding of our client's needs that set our team apart.

Our knowledge and experience allow us to deliver the most innovative and highest-quality products on the market.

Our position as a market leader is also underpinned by the company's strong partnership with manufacturers and its commitment to continuous technology advancement.

Research and development are the cornerstone of the Powell Group and the company has invested heavily in facilities that kept the team at the cutting-edge. **AMR**



Flexible Mining Solutions

Powell Group is the leading Australian owned supplier of integrated Industrial and Hydraulic fluid conveyance solutions.

> BEST SERVICE

> BEST VALUE

> BEST ADVICE



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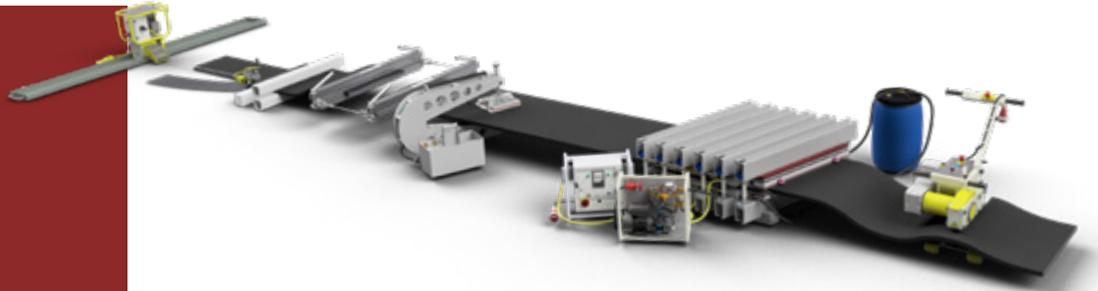
powellindustrial.com.au

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**WAGENER
VULCANIZERS**

YOUR PARTNER IN PRESSES



Established in 1897, WAGENER Vulcanizers GmbH & Co. KG is part of the Ziller Holdings Group in Germany which includes NILOS GmbH & Co KG. It is known around the world for the development of high quality and innovative conveyor belt equipment and products for mining and heavy industry.

NILOS and WAGENER Vulcanizers presence in Australia has existed in various incorporations over the past 30 years. The original Nilos Australia company was a steel cord conveyor belt reconditioning business up until 2005. This investment was done in partnership with G&F Beltline Services, a leading conveyor belt service company in Western Australia at that time and a longstanding NILOS partner plus a reputed Venture Capitalist.

In 2021, NILOS GmbH & Co. KG re-established Nilos Australia Pty Ltd in a new organizational structure and with a re-energized focus on promoting its Nilos / Wagener Vulcanizers product range and technical expertise to provide a value-added supply package to its customer base around Australia.

In 2023, Nilos Australia Pty Ltd was re-named Wagener Vulcanizers Australia Pty Ltd to align with its key focus to become a leading authority in vulcanizing press equipment in Australia.

At Wagener Vulcanizers Australia, we understand the critical role that vulcanizing presses play in maintaining the integrity and performance of conveyor systems. Whether for the mining, manufacturing, or heavy industry sector, our German-made state-of-the-art vulcanizing press equipment are designed to deliver unparalleled results, ensuring maximum durability and safety.

Wagener Vulcanizers Australia also provides specialized cutting equipment (the ROTOCUT) for steel cord and fabric conveyor belts which greatly improves safety and operation efficiency. The ROTOCUT provides increased safety and reduced hazards in the cutting process through the elimination of sparks, cutting debris and burnt gases, as well as necessary hot work site permits.

Our mission is to provide our high-quality vulcanizing press equipment, conveyor belt cutting solutions, and conveyor products together with fast and dedicated technical support so that our customers can maximize their conveyor belt productivity in a safe working environment. **AMR**

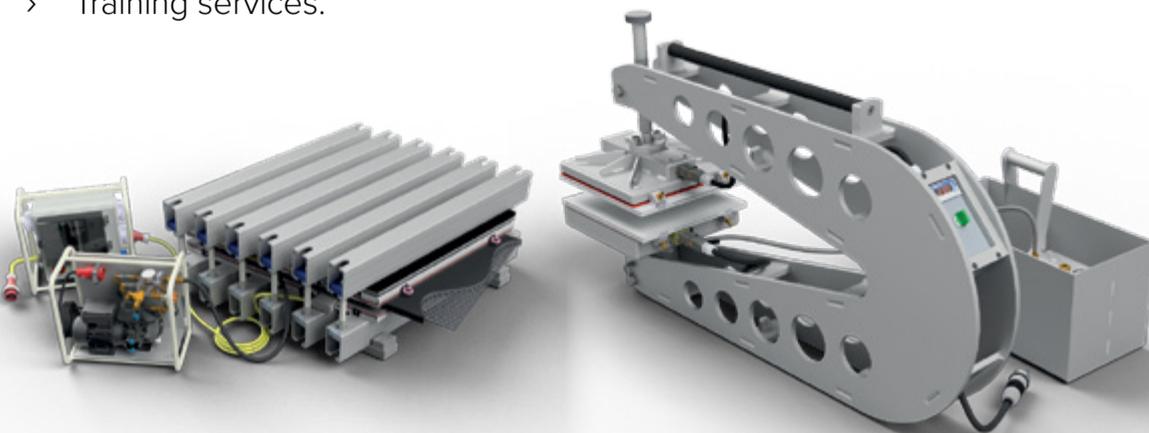
For further information and contact details please view our Australian company websites, www.nilosaustralia.com and the new www.wagenervulcanizers.com.au.



SPECIALISTS FOR VULCANIZING PRESSES AND CONVEYOR PRODUCTS

WAGENER VULCANIZERS AUSTRALIA are a leading authority in the design, development, and manufacturing of vulcanizing presses and cutting equipment for conveyor belts. Made in Germany since 1897.

- > Vulcanizing presses.
- > Vulcanizer spare parts and accessories.
- > Vulcanizing press repair and overhaul services.
- > Vulcanizing press rental.
- > Conveyor belt cutting equipment.
- > Belt splicing hand tools and equipment.
- > Training services.



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VULCANIZERS**

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AUSTRALIA PTY LTD**

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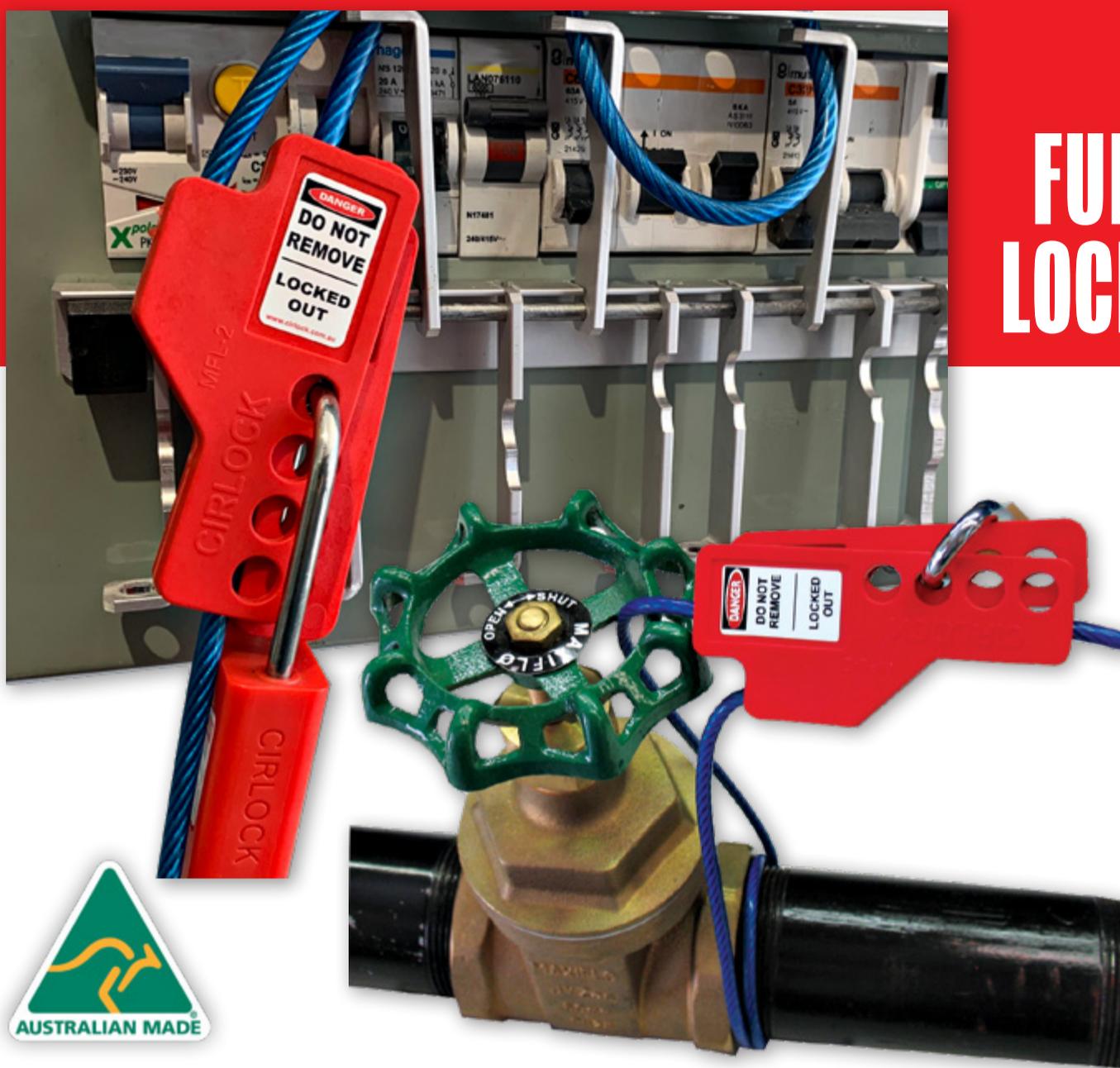
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MFL-2 MULTI FUNCTION CABLE LOCKOUT DEVICES



The MFL-2 Multi Function Cable Lockout Devices from Cirlock are versatile devices which can be used to lock out several different energy sources, including valves and steering wheels on vehicles.

They can also be used to limit the number of padlocks needed on a job as the cable can be fed through several lockout devices on one electrical board, with 1 padlock applied. The flexible cable is also handy for those tight situations where a hasp won't fit, and group isolation is required. Accommodates up to four padlocks.

The Cable Lockouts are available as standard with one or two metre cables, and are available with a steel wire cable, or a non-conductive plastics cable, for use where metal cannot be used (eg electrical cabinets). Additional cables can be supplied in various lengths, making these devices suitable in many situations.

Proudly Made in Australia by Cirlock and sold at your local electrical wholesaler.
<https://www.cirlock.com.au/products-shopping/Cable-Lockout-Device-5mm-Steel-Wire-Cable-p109853486>

CIRLOCK

LOCKOUT / TAGOUT EQUIPMENT

LOCKOUT EQUIPMENT

GROUP LOCK BOXES

When multiple people need to work on the same equipment, a Group Isolation Box is often used. The equipment is Locked Out by a maintenance padlock (or a supervisors padlock), the key is placed inside the Group Isolation Box and all workers place their keys on the outside of the box preventing access to the Equipment Key until all work is complete. It keeps each team member safe and also eliminates the need for multiple padlocks on individual isolation points.

LOCKOUT PADLOCKS

Cirlock's Lockout Tagout Padlocks come in 8 different colours, with various shackle sizes and shackle types (Non-Conductive and Stainless Steel) and can be keyed differently, keyed alike or master keyed, to suit your requirements.

Cirlock Padlocks are available for immediate dispatch.



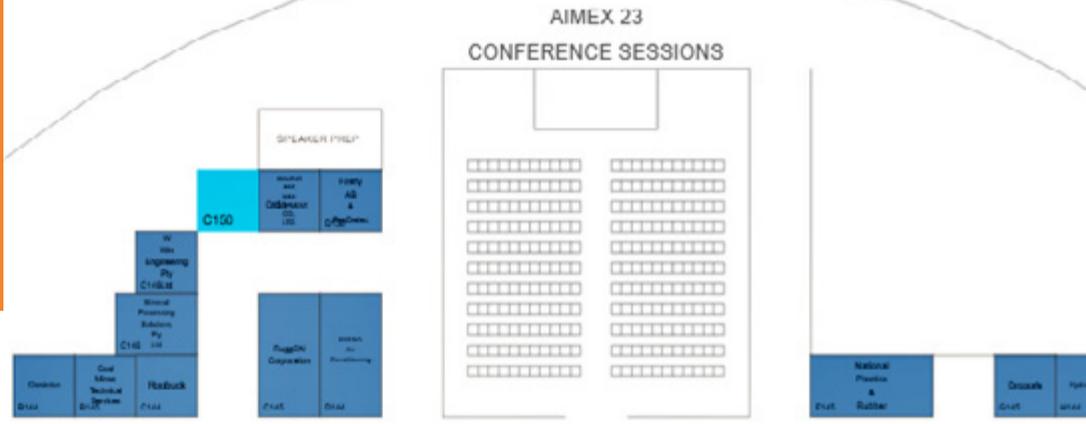
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- EVLUBE
- Alta Battery Technology
- Regal Rexnord
- Andromeda Industries
- Anval International Pte Ltd
- APS Lighting & Safety Products
- Atlas Copco
- AUMUND Asia (H.K.) Limited
- AusProof
- Austrmine
- Australian Concrete Mats and Posts
- ALS Global
- Avweld Australasia
- China Coal Technology & Engineering Group (CCTEG)
- BAC Systems Pty Ltd
- Bard Engineering Group Pty Ltd
- Batt Mobile Equipment Pty Ltd
- Bauer Kompressoren Australia
- OKUSLIDE
- Beijing Huahai Machinery Co., Ltd.
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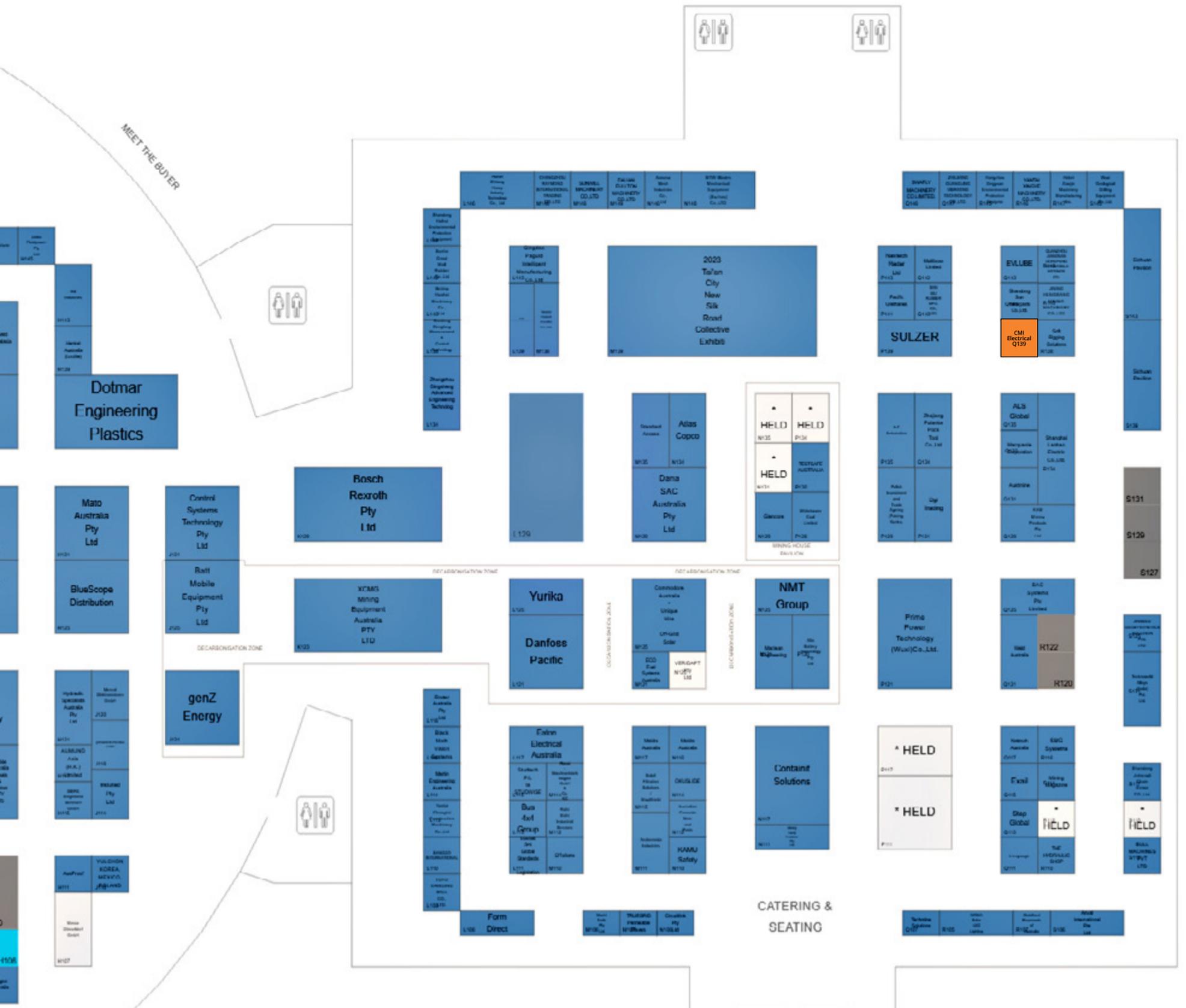
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- N112
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- G151
- A121
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- Q139**
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- Q115
- P129
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- R145

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- hiSky
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- J120
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- Mining Magazine
- Motion
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- D111 SWAFLY MACHINERY CO.LIMITED.
- L118 TAIZHOU BELLITE MACHINERY CO.,LTD.
- C145 Techmine Solutions

- L111
- Q140
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- R107
- G114
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- Zhengzhou Dingsheng Advanced Engineering Technology Co.,Ltd
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COAL-SLAW

\$120M CRUNCH TIME

Panoramic and birds-eye view of Vickery.



Whitehaven Coal managing director and chief executive Paul Flynn.

The grass is greener in North West NSW with the go-ahead of one of the most significant sources of employment and investment there over the coming years.

It has the potential to create about 1000 jobs and hundreds of millions of dollars in wages and supplier payments for decades.

In April 2023, the Whitehaven Coal (ASX: WHC) board gave the green light for early mining of the Vickery coal deposit, located midway between the company's Tarrawonga mine and the Gunnedah coal handling and preparation plant (CHPP).

About \$120m will be spent on the full-scale Vickery project, with the mine expected to produce more than 6400 CV thermal coal with low ash content of between 6-10% and provide more optimised blending across Whitehaven's portfolio.

Whitehaven Coal's full-owned Werris Creek open cut mine winds down in FY24 – this means equipment and people will be available to transfer to Vickery in varying stages.

Werris Creek has been in operation since 2005 and currently produces about 2.5mtpa of coal, both thermal and PCI with low-medium ash, low sulphur, low phosphorous and medium-high volatility.

Vickery's construction commenced in June 2023, with the design of its temporary mine infrastructure facilities, preparation and tendering of construction works and mobilisation of a dedicated project/operations team to site.

A dedicated recruitment campaign is also currently underway to secure the necessary labour for this stage of the project.

First coal from Vickery is expected around mid-next year, with production ramping up in FY25, following which ROM production will be around 1.2-1.3mtpa (about 0.9-1.0mtpa sales).

The Vickery coal mine was previously owned and operated by Rio Tinto, with open cut and underground mining operating from 1991-1998.

In August 2020, the Vickery Extension Project received approval from the NSW Independent Planning Commission to operate an up-to-10mtpa open cut metallurgical and thermal coal mine, with onsite processing and rail infrastructure.

On September 16, 2021, the Federal Environment Minister approved the project under the Commonwealth's Environment Protection and Biodiversity Conservation Act 1999.

The Australian Mining Review spoke with Whitehaven Coal managing director and chief executive Paul Flynn about the Vickery extension project and its early mining activities.

AMR: Why has the Board approved the early mining of the Vickery coal deposit?

PF: Early mining of the Vickery coal deposit will comprise of a low capital project

that utilises surplus coal processing and washing infrastructure capacity at the Gunnedah CHPP as well as existing road haulage, rail and port capacity.

It provides an exciting opportunity to commence production with a low capital start-up version, before transitioning to the full-scale operation at a later date.

The timing to get started is good as it coincides with the wind down of our Werris Creek mine in FY24.

We will be looking to transition our people and equipment progressively across to Vickery, which is great for continuity and ensures ongoing employment opportunities for our workforce.

AMR: What are the key timelines for the Vickery extension project and early mining?

PF: Work required to commence construction is underway, which will include establishing water management infrastructure, overhauling mining equipment, constructing modest site facilities and establishing a box cut.

First coal is expected from early mining around mid-next year with production ramping up in the 2025 financial year.

A decision around further investment and commencement of full-scale operations at Vickery will be considered by the Board at the appropriate time, which is expected later in the year.

AMR: How will Vickery integrate into existing Whitehaven Coal operations?

PF: Vickery produces a proven, high-quality coal. The inclusion of Vickery's high-quality coal will provide attractive blending opportunities across our portfolio and it also brings the added benefit of the flexibility to move between thermal and semi-soft depending on what the market wants, like we can at Maules Creek.

The volumes from early mining at Vickery will broadly offset the volumes we will lose as our Werris Creek operation comes to the end of its mine life over the next year or so.

That's very positive trade from our perspective, replacing our lowest quality tonnes with what will be our highest quality tonnes.

There are plenty of customers who remember the high-quality Vickery coal and they're very excited about the prospect of us producing it again.

AMR: What are the benefits to the local community and businesses of the Vickery extension project?

PF: We believe the local community should be the main beneficiary of our presence and we're incredibly proud of the role we play supporting regional communities across North West NSW.

In FY22, we spent \$510m on wages and supplier payments in the region, and Vickery will help to ensure this support can continue for decades to come.

Early mining will allow us to provide ongoing employment for our people at Werris Creek, while also creating new opportunities for workers and local businesses that will help to sustain the long-term prosperity of North West NSW.

As part of full-scale operations, we expect 500 jobs to be created during the construction phase and 450 during operations. We also estimate approximately 170 new jobs will be generated in locally based supplier businesses. **AMR**

Next month

Our second part of our Whitehaven Coal feature series, the *Australian Mining Review* looks at the company's other development projects including the Narrabri underground mine Stage 3 extension project and the Winchester South metallurgical coal project.



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For more than 30 years, Bearing Accessories has dealt with all things mechanical, automotive, industrial, agricultural and mining.

Spearheaded by Cameron Bullock, the professional team is committed to keeping its customers' operations running smoothly, and provides the best products

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week," said Bearing Accessories Manager, Cameron Bullock.

"In the mining and industrial space, we have serviced Whitehaven Coal for the past 20 years. We have supplied critical products across all their sites, as well as conducted multiple training courses with bearings, seals and lubrication systems manufacturer SKF.

"For me personally, this relationship reflects the dedication of our people and our capability of delivering quality solutions that meet the strict demands of a mining operation like Whitehaven."

Bearing Accessories sell more than just bearings. It is the first choice for automo-

tive kits, seals, v-belts and pulleys, chains and sprockets, and a wide range of tools to suit a wide range of industrial applications.

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BEARING ACCESSORIES



Rachel Jones from Whitehaven Coal with award sponsor Paul Cragg from Commonwealth Bank at the 2023 HVTC Excellence Awards.

WHITEHAVEN APPRENTICESHIP PROGRAM RECOGNISED IN 2023 AWARDS

Vocational education and training (VET) pathways provide the foundations for people to excel in their career and education journeys that are key to creating a pipeline of skilled workers for Australia's future. As one of the country's oldest and largest Group Training Organisations, HVTC has supported more than 30,000 people through skills training and employment opportunities in NSW, with over 750 current apprentices and trainees employed across a network of over 200 host employers.

For more than 40 years, HVTC has supplied quality apprentices and trainees for industry-leading mining organisations across NSW, including Whitehaven Coal. As one of HVTC's largest host employers,

Whitehaven have hosted a large number of placements in a diverse range of vocational areas, including electrical, mechanical, automotive electrical, mobile plant technology, and business administration.

Whitehaven's commitment to supporting VET pathways within the mining industry, and providing high-quality training and employment opportunities, were recently recognised at the 2023 HVTC Excellence Awards, where Whitehaven was named Large Host Employer of the Year. This award recognises the organisation's commitment to providing quality training and employment opportunities in regional areas, and highlights the value of Whitehaven's contribution to bridging the skills gap across NSW. The award was present-

ed to Whitehaven at the HVTC Excellence Awards event held in Newcastle on Friday 2nd June.

Whitehaven have produced many talented apprentices who have transitioned to ongoing roles within the organisation and have continued to achieve successful careers in the mining sector. The high-quality apprenticeship training delivered by Whitehaven is reflected by the number of award-winning apprentices recognised at a regional and state level, including recent apprentice graduate, Matthew Nott. Matthew consistently performed to a high standard throughout his electrical apprenticeship with HVTC and Whitehaven, achieving outstanding results in his formal training and receiving great feed-

back from his colleagues and supervisors. After successfully completing his apprenticeship last year, Matthew progressed into an ongoing role with Whitehaven and was recently named Apprentice of the Year at the 2023 New England Training Awards.

HVTC continues to work with Whitehaven to provide quality training and employment opportunities, currently hosting 24 apprentices and trainees across multiple site locations. Applications are now open for a number of positions at Whitehaven's Maules Creek site.

For more information and to apply now, visit <https://www.hvtc.com.au/>

AMR

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STRONGER TOGETHER



With machinery designed to perform every time, no matter the size of the project, Hitachi Construction Machinery Australia (HCA) delivers world-leading equipment and solutions to projects of all sizes. From large-scale mines to local owner-operators in regional towns, the company prides itself on building productive, long-term partnerships with their customers and the communities in which they operate.

Whitehaven Coal is no exception. HCA's Gunnedah and Muswellbrook branches continue to serve as key hubs in supporting Whitehaven's critical operations within the region. The relationship between both

companies dates back years, specifically HCA's successful support of Whitehaven's Maules Creek project, which has also received industry recognition as an outstanding supplier.

The Hitachi ultra-class hydraulic excavators and flagship dump trucks are common sights across Whitehaven's mine assets. The duo is renowned for delivering best load and haul fleet performance at the lowest cost in the market. The HCA team services more than 113 mining machines in the Gunnedah region, over 90 of which are owned by Whitehaven.

According to HCA's General Manager of

Mining, Sean Ryan, the company continues to invest in new facilities as part of a commitment to supporting the mining and construction equipment needs of their customers across regional NSW.

"Our longstanding partnership with Whitehaven Coal in the Gunnedah region only continues to strengthen," said Mr Ryan.

"The investment in local infrastructure facility such as the Gunnedah facility including the New Off-Site Rebuild centre, plus the supply of new machinery and ongoing parts and service support along with over 80 Gunnedah employees, reflects our commitment to long-term growth within

the region. Maintaining strong relationships is not only important in the case of Whitehaven, but for all our customers in the local mining industry."

The HCA team is always looking for ways to improve machine uptime, keeping their machines and customers' operations as productive and efficient as possible. You can be assured that all genuine parts that the company sells is covered by a factory warranty and is guaranteed to meet your expectations every time.

For more information, visit <https://hitachicm.com.au/>

AMR

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LIFTING & SHIFTING

No job is too big, too small, or too far away for Gunnedah based GBP Cranes & Heavy Haulage. For almost 50 years, the family owned, Gunnedah based business has specialised in heavy equipment hire and haulage services for projects of all sizes across the New England North West region.

Since 1975, the business has made a name for itself within the mining and heavy industrial community, continuing to grow both its client base and equipment fleet. As Gunnedah's largest progressive crane hire company, completing projects safely and efficiently remain top priorities.

What started with a single truck mounted crane has now grown into one of the re-

gions' largest most modern crane companies. With a fleet of 30 cranes ranging from 15T, 20T, 25T and 40T pick and carry Franna's, through to two Liebherr 250T slew cranes, all of which have high maximum load capacities, GBP is well positioned to tackle any project.

The business now runs a fleet of trucks and trailers that allow them to move anything from small pieces of equipment all the way up to 10-metre-wide haul truck bodies and other large mining equipment.

This is backed by a team capable of operating a fleet of their own pilot vehicles, including everything from small moves to larger police escort logistics.

GBP have also recently acquired height access equipment including quick stage scaffolding, boom lifts and elevated work platforms, which are available for dry hire.

"We have been involved in the establishment and ongoing operations of all mines and major works in the New England region," said GBP General Manager, Damien Roman.

"This has involved the provision of services for initial setup of mine sites and coal handling facilities in both open-cut and underground.

"Our partnership with Whitehaven Coal is a true reflection of our capability in the mining industry. We are the longest serv-

ing contractor that has supplied services to every Whitehaven operation since 1999, and Whitehaven Coal remains our largest customer.

"Whitehaven's operations have made a significant impact to the local Gunnedah economy and surrounding communities. We are looking forward to strengthening our relationship with Whitehaven and its stakeholders, while gearing up to support Vickery, their newest open-cut coal mining project."

For more information, visit
www.gbpcranes.com.au/
AMR



EXPERT OPERATORS WITH OVER 45 YEARS OF EXPERIENCE



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- Operations Managers
- Purchasing Officers
- HR Managers
- Process Managers
- Exploration Managers
- Maintenance Managers
- Engineers
- HSE (OH&S)
- Emergency Response

VALUE \$3,000

2.

WEEKLY MINING REPORT

The Weekly Mining report is emailed to your inbox every Friday.

Key industry information includes:

- Acquisition
- Developments
- Projects
- Capital Raising
- Exploration Programs

The weekly Mining Report is carefully researched, with real business opportunities and is mine operator specific.

VALUE \$1,500

3.

MINES ACTIVITY REPORT

The Mines Activity Report is emailed to your inbox every fortnight and is mine site specific.

Key industry information includes:

- Shutdowns
- Projects & Managers
- Machinery Types
- Power Plants & Sources
- Exploration Programs
- Construction
- Upgrades & Extensions
- Associated Infrastructure

VALUE \$1,500

4.

MINE SUPPLIERS ONLINE

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SITTING ON MANY GOLD MINES

By Kate Dzienis

Regis Resources (ASX: RRL) is Australia's fourth largest ASX-listed gold producer, announcing on 7 July 2023 its record gold production of 458,354oz in FY23.

The company's Duketon gold project in WA's Eastern Goldfields currently has two distinct project areas producing gold and, in the March quarter, reported 76,500oz gold produced at an AISC of \$1,919/oz.

Whilst the figures were below expectations, Regis Resources continues to deliver solid operating cash flows and is progressing with its long term plans for all of its projects.

Duketon North & South

While recent wet weather impacted the Duketon North operations, Regis Resources managing director Jim Beyer explains it was a short-term issue that only impacted short-term production, with no permanent problems developing as a result of the disruption.

"Duketon North, the original mill that was built for Duketon, is facing the end of its life so the number of alternative production sources for ore is quite limited," he said.

"The wet conditions created water problems in one of the pits and we had nowhere else to run for a while, but we're very much back in there now.

"These sorts of things are always taken into account – weather unpredictability – and certainly across our site, historically, works have been done to ensure there are protocols in place to keep the water out."

With Duketon North heading into its wind-down stage, open pit mining is largely complete in CY23 but there will be some mining undertaken in the first half of CY24; there are low grade stockpiles and exploration targets near term that Regis Resources is pursuing.

Mr Beyer says there are a few options available.

"We see the production profile that Duketon North will start to wind down, but Duketon South has certainly got considerable life in it still for much, much longer – both from the open pits and from the underground mines that we have, Garden Well and Rosemount," he revealed.

"From a production point of view, do we have plans to ramp up Duketon South? Not so much on an annual basis, but we certainly have plans to extend its life through the underground.

"And, in fact, it's the underground operations...which, three or four years ago, Duketon South was on a declining production profile and it's the underground that allowed us to get stronger grade feeds into the mills.

"We've been able to counter-balance some of the declining grades that we were seeing in the open pits.

"Basically, we've been extending the life rather than increasing its ounces production level."



Jim Beyer

Regis Resources
Managing Director



Duketon Vent Fan.

9MW Solar Farm

As modern-day mining companies move to make sustainability a priority, so too has Regis Resources by targeting carbon emissions and installing a 9MW solar farm at Duketon South that will reduce the company's carbon intensity and also improve its cost profile.

With the solar farm commissioned in the first week of July this year, Mr Beyer says another focus has been reducing and minimising dilution.

"It's a bit of a scourge of mining, where if you don't get your dilution under control, you end up processing material that's got no gold in it," he explained.

"We're doing quite a bit of work to focus on that.

"About a year or so ago we made a lot of modifications to our processing plant at Duketon South to allow it to be able to process more variability in the ore to deal with various ore type feeds and maintain our recoveries, which was quite successful.

"We're very pleased with that."

Tropicana Gold Project

Regis Resources also has a 30% stake in the Tropicana Gold Project, located about 330km north-east of Kalgoorlie in WA.

The company purchased the 30% share off IGO, which sold out in 2021, and now holds a joint venture with AngloGold Ashanti, which owns the other 70%.

Following a \$903m bid, Tropicana has provided Regis Resources with a whole new cornerstone for the business.

As a partnership providing significant strategic benefits for both companies, Mr Beyer says Tropicana has been a great addition to Regis Resources' portfolio with it being one of Australia's highest producing gold mines.

"It makes cash and it will move into a more significant cash generating capacity over the coming years," he explained.

"We're seeing continued underground extensions of the deposit and for that reason, we really like that deposit – it's got incredible potential."

In the March quarter, Tropicana saw 27,200oz gold produced at an AISC of \$1,458/oz.

McPhillamys Gold Project

The 100% owned McPhillamys gold project, located about 250km west of Sydney in central western NSW, is one of the country's most significant growth projects.

Regis Resources purchased the site 10 years ago anticipating that the development would occur faster than it has but, as Mr Beyer says, a lot of work has been done.

"The approvals regime in NSW has been quite thorough and detailed – we're very pleased to see that back in March we got State approvals in the form of the Independent Planning Commission approving the project with conditions," he said.

"The Federal Department, the EPBC, approvals have been granted and we're waiting for our outstanding Heritage Act Section 10 to be confirmed now."

Once Regis Resources have those final approvals in place, it is anticipated they will finalise designs for the processing plan and complete the feasibility study work in the new calendar year.

This will allow Regis Resources to be in a position to take it to final investment decision in the 2024 June quarter in the hopes of seeing first gold out of McPhillamys in mid-2026.

Regis Resources' portfolio consists of long-life assets with a growth profile across Australia and is well set up to deliver in both the short and long term for the gold industry. **AMR**

COP-PER LOAD OF THIS

By Kate Dzienis

Aeris Resources' Cracow Gold Operations.

With a copper-dominant portfolio, mid-tier base and precious metals producer Aeris Resources (ASX: AIS) sees a strong future for copper and is excited at what its Tritton tenement in central NSW is delivering to the market.

With copper concentrate operations at Tritton commencing in 2005, the project's underground mining complex feeds 1.8mtpa through a processing plant railed to the Port of Newcastle for export.

More than 750,000t of copper have been discovered at the Tritton tenement package since modern exploration began at the site in the 1980s and recent exploration activities have led to the discovery of deposits including Constellation and Avoca Tank.

Recently, Tritton faced geotechnical issues at its Budgerygar deposit when boring the ventilation shaft.

The incident delayed mining at a full rate from the deposit, however the project has still been able to mine lower volumes of development ore and completion is now expected in early Q1 FY24.

Q4 FY23 production from Budgerygar is not at risk as the scheduled tonnes can be mined with existing infrastructure, prior to completion of the primary ventilation shaft.

Aeris Resources executive chairman Andre Labuschagne says a significant ramp up in production of the mine was going ahead, whilst favourable growth opportunities were continuing with research and investigations occurring north and north-east of Tritton copper operations.

"Once the ventilation shaft is completed (July), production rates from the Budgerygar mine can ramp up considerably," he explained.

"We are currently undertaking mining studies on the Constellation deposit located 50km north of the Tritton processing plant.

"Constellation is a large, higher grade resource that has the potential to be a long life source of ore feed for the Tritton mill.

"As well as Constellation, this year we defined a maiden resource on the Kurrajong deposit.

"Kurrajong will be a target for further exploration and subsequent mining studies with a view to bringing it into the mine plan in future years.

"The Tritton tenements are highly prospective for copper mineralisation and we have identified a number of other early-stage exploration targets that we are following up."

Currently, Tritton's deposits show excellent continuity at depth and are typically only limited by drilling.

Mr Labuschagne explains that Murrawombie, north of Tritton's processing facility, demonstrates long term viability whilst Avoca Tank is an appealing and impressive new project.

"At Murrawombie, we drilled a deep hole 250m below the current resource and intersected high grade mineralisation," he said.

"This is a target for further drilling and has the potential to extend the life of the Murrawombie underground mine.

"Similarly, we think there is potential for resource extension at many of the other deposits at Tritton.

"Avoca Tank is an exciting new mine for Aeris.

"The mine commenced stoping production in May and will be a significant source of mill feed for FY24.

"The deposit has a reserve grade of 2.5% Cu (which is already significantly higher than the Tritton reserve of 1.4%) with gold grades close to 1g/t but the initial stopes are running 3.0% and gold grades around 1/2g/t, which is contributing to the much-improved forecast production this quarter.

"The Avoca Tank mineralisation is not closed off there is potential to add further resources at depth."

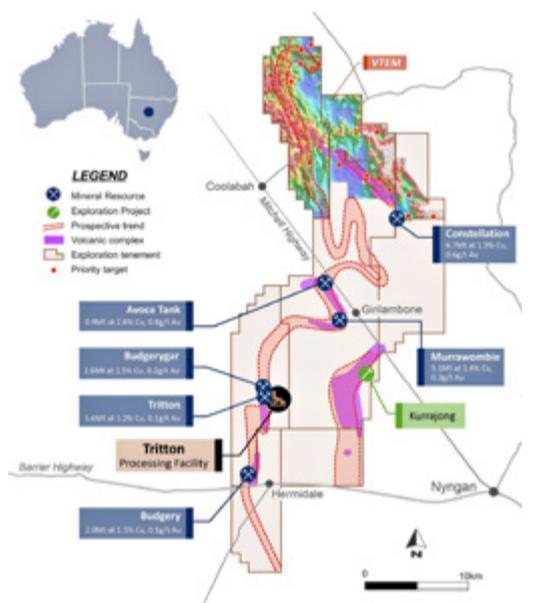
Growth plans for Aeris are focused on organic opportunities at all of its operations – Tritton, Jaguar (Eastern Goldfields, WA) and Cracow (central Qld) have significant near-mine exploration potential that could extend mine life and/or increase production rates.

Mr Labuschagne says Aeris' large tenement package in North Queensland is highly prospective, with a near term opportunity in the restart of operations at the Barbara project.

"Most importantly though, we are advancing the feasibility study on the Stockman project in Victoria," he revealed.

"Stockman could be the next big step in production at Aeris over the next few years with the prefeasibility work estimating a +30ktpa copper equivalent production over a 10-year mine life.

"While we are not actively seeking M&A, we will always evaluate opportunities as they come up."



And what does the future of copper look like according to Mr Labuschagne?

"The guidance of 53-63kt copper equivalent for the financial year is on track," he said.

"Aeris is currently in the process of finalising budgets for FY24 and will update the market soon on guidance for next year.

"Despite short-term weakness in the copper market, all market commentators are predicting strong, longer term pricing as copper demand ramps up on the back of the transition to new energy sources globally.

"New supply is becoming harder to discover and bring into production, particularly in jurisdictions like Australia.

"We believe that copper has a bright future and Aeris is well positioned to be a part of it." **AMR**



Andre Labuschagne
Aeris Resources
Executive Chairman



Finniss lithium project in July 2022.



First DSO stockpile from Finnis.



The Rossana berthing in preparation for the loading of Finnis DSO.

AUSTRALIA'S NEWEST LITHIUM MINER:

CORE LITHIUM | *By Ashleigh Melanko*

With its Finnis lithium project situated on the outskirts of Darwin, Core Lithium (ASX:CXO) is Australia's newest lithium miner.

Finniss lies within the Bynoe Pegmatite Field — one of the most prospective areas for lithium in the Northern Territory — and covers over 500km² of granted tenements.

Finniss hosts a JORC 2012 compliant mineral resource of 15mt at 1.3% lithium oxide and the definitive feasibility study (DFS) in 2021 highlighted an average production of 173ktpa of high-quality lithium concentrate and total ore reserves of 7.4mt.

In early 2020, the Northern Territory Government formally approved the final regulatory hurdle required for the commencement of site activities — the mine management plan.

An extension scoping study then outlined lithium production over 10 years comprising open pit production from reserves and resources at the Grants and Hang Gong prospects and underground production at the Grants, Carlton and BP33 prospects.

In December 2022, the first direct shipping ore (DSO) shipment from Finnis set sail for export from Darwin to Fangcheng, China. This first shipment totalled 15,000 dry metric tonnes of 1.4% lithium oxide DSO.

Core chief executive Gareth Manderson said the first shipment was a significant milestone for the company.

"The first DSO shipment being loaded for export from the Darwin Port is another

significant milestone for the company," he said.

"Core has made good progress during 2022 to transition from a mine developer to lithium producer.

"In 2023 we will continue this transition and the work required to build a quality operating business."

Major Project Status

In March 2021, Core received major project status (MPS) from the Federal Government for Finnis.

The award of the MPS, which carries a three-year period, represented a major milestone in Core's path towards bringing Finnis into production.

Major project status is the Federal Government's recognition of the strategic significance of a project to Australia. It provides companies with extra support from the Major Projects Facilitation Agency, including a single-entry point for Australian government approvals.

Core's managing director at the time Stephen Biggins said the granting of MPS for Finnis was another major milestone for the company.

"The award of major project status for our flagship Finnis lithium project is another major milestone for both the company and the Federal Government," he said.

"When in production, the Finnis Project will be the first Australian-lithium producing mine outside of WA, with our proximity to Darwin Port — the country's nearest port to Asia — serving as a direct route for

our lithium to be processed and delivered to end users worldwide.

"This opens up a pathway for a critical minerals hub to be established in Northern Australia, along with the potential for significant associated local manufacturing opportunities."

Offtake Agreements

Core has established offtake agreements with multiple companies and is also in the process of finalising agreements with other parties.

China's Sichuan Yahua Industrial Group has committed to 75,000tpa of product from Finnis over an initial four years with the possibility to extend.

In early 2021, Yahua signed a five-year deal with electric vehicle manufacturer Tesla to supply battery-grade lithium hydroxide. It's expected that Finnis will play a major role sourcing the materials for Yahua to meet that commitment.

Core also has a non-binding memorandum of understanding with Transamine Trading for the supply of 50,000tpa of spodumene concentrate over five years.

Mr Biggins said Core was thrilled to reach the agreement with Tesla.

"Core Lithium is thrilled to have reached this agreement with Tesla and look forward to further growing this relationship in the years to come," he said.

"Subject to execution of a definitive agreement, Core's supply to Tesla is scheduled to commence in 2H 2023 and will cease on the date that is four years after com-

mencement of supply or until a total of up to 110,000 dry metric tonnes has been delivered."

Community Grants Program

Recognising they have an important role to play in the Darwin region, Core Lithium aims to deliver mutual benefits to the local community.

Core Lithium supports inclusive, grass-roots, community-led activities that provide benefits and create opportunities across education, training, the environment, sport and recreation, health and wellbeing, innovation and arts and culture.

Organisations, local clubs and community groups in Darwin, Berry Springs, Tumbling Waters, Belyuen, Wagait Beach/Mandorah, Dundee Beach and Palmerston are invited to apply for funding through the program.

Twice a year, applications for the community grants program are open with grants ranging from \$100 to \$2500.

Future Operations

According to Core, a longer-term objective is to assess and explore the potential of adding downstream processing opportunities in the Northern Territory to accommodate Finnis.

Core is considering the downstream potential given the project's collaboration with the adjoining Middle-Arm industrial infrastructure, the alignment with Australia's modern manufacturing strategy and the rapid expansion of global lithium-ion battery supply chains.

AMR

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SABRN - IMPROVING SAFETY IN THE MINING INDUSTRY WITH NOVEL TECHNOLOGIES

Mining, by the nature of its industry, revolves around austere environments. Although significant advances in technology over the past decade have significantly reduced the number of people at the 'coalface', there still needs to be a small number of 'humans-in-the-loop'.

These austere environments have the potential of becoming hostile rapidly for these workers.

Despite the best planning, accidents are unpredictable and potentially fatal if life-saving care is not provided urgently.

Regardless of significant improvements in safety protocols, mining remains a very high-risk industry.

Currently, the mining industry depends on traditional 'ambulance and paramedics' to provide first responder care of mining casualties. It needs to become more agile and incorporate new technologies to improve outcomes of casualties, especially in context with the recent death in the Pilbara region.

Unique risks are associated with specific types of mines (surface coal, underground coal, surface minerals, underground minerals and quarries). In the future, this

could extend to include extra-terrestrial environments.

There are significant numbers of high potential incidents (HPIs) and serious accidents (SA) identified which can result in death. Fortunately, fatalities resulting from these types of accidents in Australia remain fairly low.

According to the WHS statistics Australia 2021, the total number of mining fatalities in 2020 was five, with a rate of 2.1 fatalities per 100,000 workers.

A total of 2555 serious claims were made during this period with a frequency rate of 5.1 serious claims per million hours worked and an incidence rate of 10.9 serious claims per thousand employees.

Most of the injuries resulted from explosions, falling debris, or similar mechanisms that require time-critical rescue and resuscitation interventions. Any one of these serious injury claims have the potential of escalating to becoming a fatality and have the potential of serious liability to the mining company.

How SABRN Is Helping
SABRN is developing multiple solutions for improving outcomes for casualties within the mining and defence industries.

SABRN's R&D arm, SABRN Tech, is currently developing several projects, including a proof-of-concept circular economy from end-of-life industrial plastic materials in Port Lincoln, a proof-of-concept transportable life-sustainment-pod (SABRN E-Life-Pod) and a proof-of-concept immersive training module using virtual reality to train the next generation of clinicians.

SABRN is currently working with the US Army to develop the E-LifePods for the extraction of combat casualties.

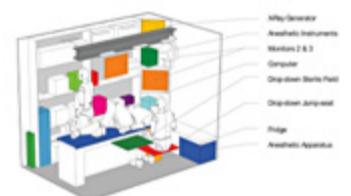
The E-LifePods will have superior diagnostic, monitoring and treatment capabilities, in conjunction with continuous two-way telehealth or augmented-reality based communications with a tertiary hospital emergency response team.

It has a simple replicable exoskeleton design that is standardised making it interoperable. It is flatpackable, therefore more can be delivered to required destinations.

It can be modularised internally and is therefore customisable. It is transportable (mobile and agile) and vehicle-agnostic (therefore compatible across all domains).

After the scan from the pod, an emergency response team will then provide clinical and medicolegal support to ensure provi-

SABRN E-LIFE POD

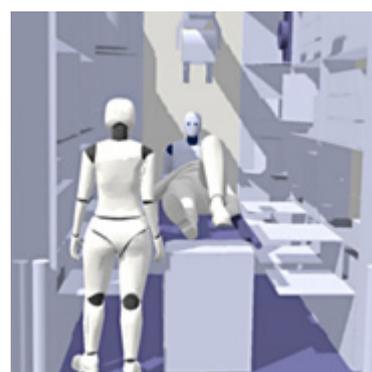
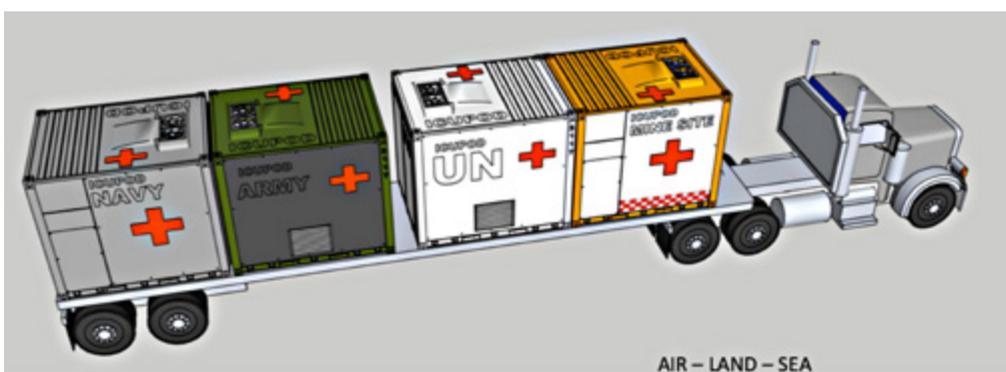


sion of life saving treatment to the patient whilst the pods are transported to a safe environment by remote control or autonomously.

In scenarios where the patient is trapped or crushed, remote-controlled robotic equipment would work in conjunction with the pods to improve clinical outcomes.

These strategies may also be beneficial in the mining industry. The immersive strategies and mobile patient retrieval pods could potentially reduce the fatality rate further within the mining industry and establish a new benchmark for improved mining safety standards.

SABRN Tech is developing several novel projects that will help to improve the potential challenges of how combat casualties will be managed in future conflicts. **AMR**





People & Planet First



The SABRN Group of Companies is multifaceted, innovative, and purpose-driven. Founded in South Australia by Dr Abe Chandra, the Group aims to use cutting-edge technologies to maximise the benefit to the planet and its inhabitants. It prioritises the health and wellbeing of individuals and the communities in the most effective, ethical and sustainable way possible.

- SABRN Tech – R&D
- SABRN Circular – Building Circular Economies
- SABRN Health – Providing Equitable Healthcare
- SABRN Education – Making Education Accessible

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The quest to achieve higher productivity, generate greater profits, and improve safety and efficiency in mining and quarrying applications has forced asset owners to employ payload management technology into their operations. This becomes even more important when assets mature and lower ore grades are extracted, along with longer haul distances.

By integrating advanced onboard weighing systems into earthmoving equipment such as haul trucks, loaders, excavators, and conveyors, operators and site managers can accurately capture valuable data in real-time, monitor and track material weights, productivity and machine performance in the most challenging conditions.

Onboard weighing systems not only provide accurate load measurement to prevent overloading, machine damage, and risk to site personnel, but they help operators optimise payloads and lower costs associated with fuel usage, labour and transportation.

The *Australian Mining Review* recently caught up with SmartTech, an authorised dealer of Loadrite in Australia, to learn how Loadrite scales have transformed operations at Sunshine Coast quarry and concrete producer, Cordwells.

Fourth generation family-owned business, Cordwells, has been an integral part of the Sunshine Coast's growth since its establishment in 1965 by founder Vic Cordwell upon his return from World War II.

A lot has changed since Vic started out in the early days, screening sand and gravel onto a flatbed truck, loading and unloading by hand.

The next generation family members have helped exponentially grow the business, building a reputation for ready-mix concrete production, cement haulage, sand and gravel production, geotechnical and concrete testing, and hard rock quarrying.

LOADRITE REVOLUTIONISES MATERIAL MANAGEMENT AT CORDWELLS



It's certainly no surprise Cordwells are keen adopters of new technology like Loadrite scales to support their quarry and concrete production operations.

According to Cordwells Operations Manager, Martin Cordwell, the company relies heavily on trusted technology such as Loadrite to drive efficiencies across their operations.

"Loadrite is a key component to our success as it provides real-time feedback on the weight of materials loaded and unloaded from our fleet of trucks, loaders and excavators, which ensures accurate and efficient material management," Mr Cordwell said.

"By tracking our production output,

we are able to identify any trends and cross-check these with downtime and performance. This gives us the confidence that we are loading out the correct material weights when selling products, but also assisting our sales and operations teams on market trends and daily breakdown of stock needs in advance.

"Our Loadrite scales make the loading process so simple, giving operators piece of mind that they are loading out correct weights when distributing axle weights, and correct load limits on the trucks.

"Another major plus of the system is the automation of weigh dockets, which customers can receive as soon as the truck is loaded. This guarantees they are getting

the correct payloads while tracking the total tonnages required".

Like in any successful mining or quarrying operation, real-time data is pivotal to all aspects of Cordwells' daily production and overall asset management. Utilising this technology is making them more efficient, helping them achieve safe loading limits, and drastically reducing the time spent on administrative duties.

Mr Cordwell explained that as the company continues to grow, they will be able to leverage the current systems in place, while further strengthening the company processes through the use of Loadrite scales.

"We decided to partner with SmartTech as we felt they were a standout when it came to going that little bit extra to deliver on our exact requirements. When we first approached them, their team did everything possible to look after us. Even after constant date changes, shifting ideas, and tight deadlines, they worked hard in making the process seamless at every stage.

"When you get looked after the way we have, why would you look elsewhere. We are excited about building a continued working relationship into the future as we expand and introduce new technology into our operations," he said.

From suburban backyards to major infrastructure projects on the Sunshine Coast, Cordwells delivers quarry materials and concrete for a wide range of customers. Other notable civil works have included several dam wall upgrade projects, and most recently the Ewen Maddock Dam, which features over 3,000 cubic metres of concrete and 10,000 tonnes of various quarry materials, all of which were supplied by Cordwells.

For more information on Loadrite, visit www.smarttechaustralia.com.au/

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CONCRETE DURABILITY

IN MINING



Dr. Inam Khan
BCRC Technical Director

Understanding and managing the heat of hydration in mass concrete elements is paramount, given its potential to trigger serious issues such as cracking, delayed ettringite formation (DEF), and long-term durability problems. In an industry like mining, where the strength and durability of structures are non-negotiable, understanding the complex nature of concrete, its composition, and its behaviour under varying conditions, is essential and requires a high degree of expertise.

BCRC Technical Director Dr. Inam Khan, brings a profound level of experience and a next-level skillset to address key challenges typically encountered in large mass concrete pours – from heat of hydration, thermal cracking and DEF, to heat mitigation, crack prevention and material selection, to name a few.

As an expert in durability and modelling, Dr. Khan understands the complexities of these processes and their profound implications for the industry, to ensure the strength and longevity of critical infrastructure.

Heat of Hydration

“At the core of the concrete curing process is the heat of hydration, a chemical reaction that occurs when water and cement interact,” said Dr Khan.

“As the cement hydrates, it generates heat, which contributes to the hardening of concrete. This process is crucial to the overall strength and durability of the concrete structures.

“Excessive heat of hydration can lead to issues like delayed ettringite formation, thermal cracking, premature drying, and structural weakness, particularly in large-scale construction, often seen in the mining industry.”

Thermal Cracking

When the heat generated by hydration is improperly managed, it can

lead to thermal cracking. This cracking generally arises when the temperature differential between the interior and exterior of a concrete structure is too significant. As the interior heats up and expands while the exterior cools and contracts, it creates tensile stresses within the structure that can exceed the tensile strength of the concrete, therefore resulting in thermal cracking.

Dr Khan added that thermal cracking is a considerable concern in the mining industry as it can severely compromise the structural integrity of concrete structures.

“This can create significant safety hazards and potential operational shutdowns. Additionally, cracks provide a pathway for aggressive substances that potentially cause reinforcement corrosion and a reduction in the structure's longevity.”

Delayed Ettringite Formation

While heat of hydration and thermal cracking are well recognised challenges, another less obvious yet critical issue is DEF, a harmful chemical reaction that occurs in hardened concrete.

Ettringite is a mineral commonly formed during the hydration process, and is generally harmless in properly cured concrete. However, when the concrete's internal temperature exceeds a critical limit, typically considered to be 70°C - 80°C during curing depending on the concrete mix composition, this mineral can dissolve, and reprecipitate later as the concrete cools, causing internal pressure and eventual cracking.

DEF is a significant concern in mining due to the risk of long-term structural damage. This form of degradation can lead to a substantial reduction in the load-bearing capacity of concrete structures, with symptoms often not surfacing until several years after construction.

Mitigating Heat and Preventing Cracks

According to Dr Khan, several strategies can be employed to manage the heat of hydration and prevent thermal cracking in concrete structures.

Selection of materials – Low-heat cement, which releases heat at a slower rate during hydration, can be utilised for large concrete structures. Additionally, incorporating pozzolanic materials like fly ash or slag in the mix can reduce the heat of hydration.

Pour sequencing – In large concrete pours, strategic pour sequencing plays a vital role in mitigating restrained cracking issues. Carefully planning the sequence and timing of pours minimises the restraint imposed by previously poured concrete. This reduced restraint can significantly reduce the risk of cracking due to differential thermal contraction between adjacent pours.

Pre-cooling methods – Techniques such as use of ice in the concrete mix, utilising thermal blankets, and night-time concreting when temperatures are lower, can help manage thermal differentials during the curing process.

Post-cooling methods – Techniques such as embedded pipe cooling, where cold water is circulated through pipes embedded in the concrete, can be used to dissipate heat from the interior of large concrete structures.

Testing and Monitoring – Regular testing for signs of DEF and consistent monitoring of concrete temperatures during curing can assist in early detection and timely interventions.

Addressing these challenges from the design phase is integral to achieving successful project outcomes. Selecting the right concrete materials, intelligent pour sequencing, and appropriate construction techniques, can pre-emptively curb potential thermal issues.

Advanced thermal modelling techniques, such as finite element modelling, can predict temperature rises, assess the risk of thermal cracking, and support the design of an effective thermal control plan. This proactive approach during the design stage greatly minimises the risk of thermal issues during construction and throughout the structure's lifetime.

As emphasised by Dr. Khan, these design considerations form the bedrock of strategies to tackle the heat of hydration and thermal cracking. They highlight the importance of design in preserving the durability of infrastructure within the mining industry, and reinforce the notion that prevention is, indeed, better than cure.

For more information, visit
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Field Machine Tools Manager Michelle Mills said the Climax range included Flange Facers that had proven to be popular amongst

Australian industry for their durability and precision.

Ms Mills said clients had 29 different models to choose from, this extensive range allows operators to tackle an unrivalled range of applications from 0 to 199 inches (0 to 5054 mm).

"We have available a very comprehensive range as we understand that in industrial settings, flanges come in many different shapes and sizes," Ms Mills said.

"Being able to maintain them with a selection of machines that are synonymous in operation is incredibly advantageous for operators, because it can significantly cut down on productivity down time and the costs associated with repair.

"So we pride ourselves on offering a versatile range.

"For instance, machines like the CLIMAX FF1200/2400/3600 are designed to perform in the harshest of environments, this machine can handle flat face, raised face, RTJ, tongue and groove, lens ring, Grayloc®, and compact flanges.

Ms Mills said the CLIMAX FF5300 was also an exhibition of versatility, with a more compact swing diameter with a minimum clearance of 22.75 inches (577.9 mm).

The product's range spans from 5.7 to 40

inches (144.8 to 1016 mm), meaning it can work in a large range of applications that would usually require at two machines.

Aside from versatility, the Climax products stand out due to their performance-focused design and ability to minimise tool deflection during cutting.

The machines are rigid and provide reliable results, even over bolt-hole patterns and weld overlays, making them a preferable choice over other models.

With a user-friendly build, the Climax range boasts an abundance of features that help technicians reduce setup time and allow users to perform more work in less time.

Ms Mills said this included features like setup fingers and leveling feet, which reduced crane time by enabling quick machine alignment.

"These machines are also easier for technicians to set up, operate and transport because they are lighter and modular," Ms Mills said.

"They perform well, because they are also made well.

"These durable flange facers are built to last under demanding conditions.

"The manufacturer uses quality materials,

high-grade bearings & gears, robust motors, high-grade cutting bits or tooling.

"It won't just do its job in a showroom; it will keep providing great results for two decades and be an excellent return on investment.

"And, importantly, it's extremely safe."

Ms Mills said the range's safety features included pinch point protection, remote-controlled operations, safety interlocks and hands-free feeds to protect technician hands from moving parts.

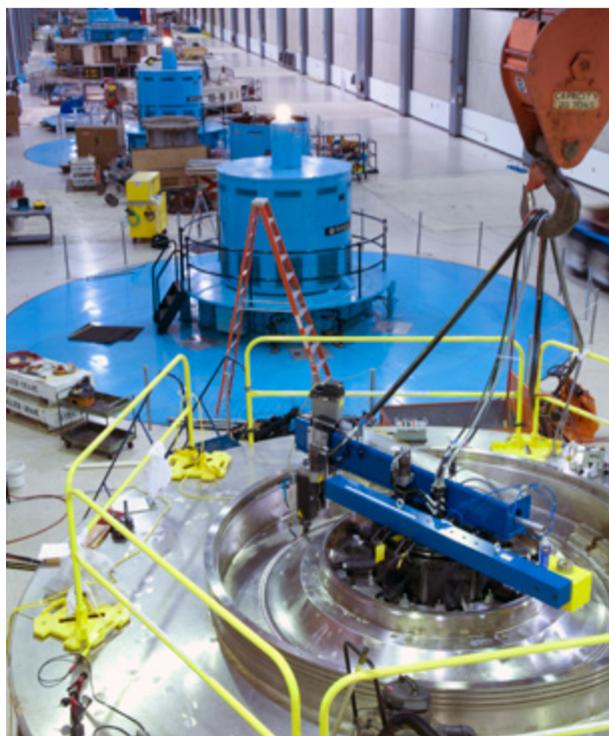
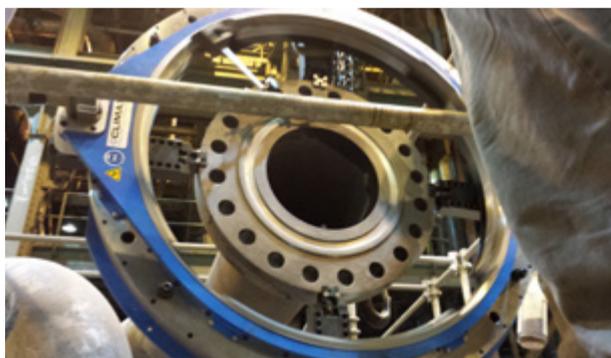
Additional measures included an emergency stop feature and a low-pressure safety system to prevent unintended restarts.

The original manufacturer has also strengthened the product's credentials with a comprehensive after-sales service offering, including training and application support from experts.

Clients can call the manufacturer – Climax – at any time or contact Field Machine Tools for support.

For more information, visit www.fmt.com.au

AMR



Innovative Products

ID MOUNT FLANGE FACERS

Field Machine Tools has rugged and innovative portable flange facers for 0.75 to 199 inch (19.1 to 5054 mm) diameters. Several of the company's machines can be configured for facing, milling or both. Many of the models reface, mill, bevel, square, counterbore, or cut end-prep configurations for welding. For easy setup, smaller units use an integral mandrel to quickly lock into place, while the larger units can be installed with a separate mount or chuck to which the facer body is installed.

OD MOUNT FLANGE FACERS

Field Machine Tools also offers various models of OD mount flange facers to reface, mill, bevel, square, counterbore, or cut end prep configurations for welding. Also considered both rugged and portable, the flange facers are suitable for 0 to 120 inch (0 to 3050 mm) diameters. Several of the company's machines can be configured for facing, milling, or both. For easy setup, larger units can be installed with a separate mount or chuck to which the facer body is installed.

SYGMA MINIFACERS

Best suited for small flanges, this product range comprises of powerful manually operated flange facers for machining connectors in hard to reach places. The setup only takes minutes, while the machining is finished within seconds. It eliminates the need for heavy equipment compressors and other power sources while being extremely easy to operate. They are compact, hand-held and delivered in a hard case to guarantee safe transportation and storage machines wherever needed.



WAKE UP TO DAILY PRODUCTION DATA WITH TRIMBLE STRATUS



In today's rapidly evolving mining industry, the ability to access accurate and up-to-date information is crucial for making informed decisions and optimising project outcomes. Trimble Stratus is an advanced drone data platform designed to revolutionise site mapping, measurement and information sharing. With its wide range of applications, Trimble Stratus helps mine sites to enhance planning, streamline operations, uncover non-compliance issues and improve overall efficiency.

Trimble Stratus, available from SITECH WA, streamlines the surveying process in mining operations by leveraging drones to conduct surveys more efficiently, covering large areas in much less time compared to traditional surveying methods. The software enables surveyors to accurately map and monitor mine sites, allowing enhanced visibility into operations with up-to-date aerial imagery to facilitate precise mapping of mine boundaries, protected areas, equipment locations and infrastructure. This information assists in effective planning, resource allocation, tracking material movement and monitoring of mining activities and progress.

A major advantage of Trimble Stratus is the ability to calculate exactly how much material you have in inventory and accurately measure changes in stockpiles on a frequent basis. The user-friendly software allows surveyors to easily and quickly upload images into the system, where the software creates detailed and interactive models which record the usage of material for each stockpile. This allows surveyors and site managers to make sure reconciliations reflect the actual inventory. Other useful applications of the system include: measuring haul road gradients, generating terrain maps, uploading planning areas to visually track progress based on a 3D location survey, comparing different measurements to see changes over time and faster, better inventory estimates.

Safety and compliance are paramount in mining. Trimble Stratus offers the ability to survey inaccessible or hazardous areas using drones, which reduces the need for personnel to physically enter these spaces, minimising potential dangers. The platform also enables the tracking of changes in slope angles, allowing better management of potential risks like slips and erosion.

Additionally, frequent and detailed images provided by Trimble Stratus assist in demonstrating compliance with regulatory requirements, particularly in terms of environmental responsibilities. For example, the software offers hydrology analysis to visualise how rainfall will affect runoff and closely monitor site conditions, ensuring compliance.

Trimble Stratus is an excellent communication tool as the platform's intuitive interface facilitates seamless sharing of survey data and imagery among team members, contractors and stakeholders. By eliminating information silos and ensuring everyone works from the same up-to-date digital survey data, Trimble Stratus enables faster decision-making, reduces misunderstandings, improves coordination and reduces delays. The instant access to real-time information amongst collaborators reduces the need for multiple site visits, as stakeholders can track progress and inspect work remotely.

Trimble Stratus is a game-changing solution for mining professionals seeking to

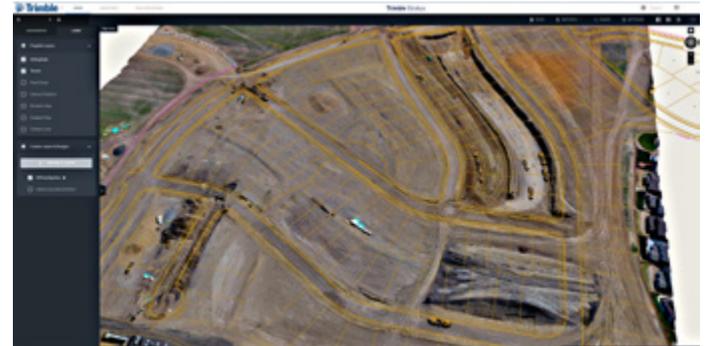
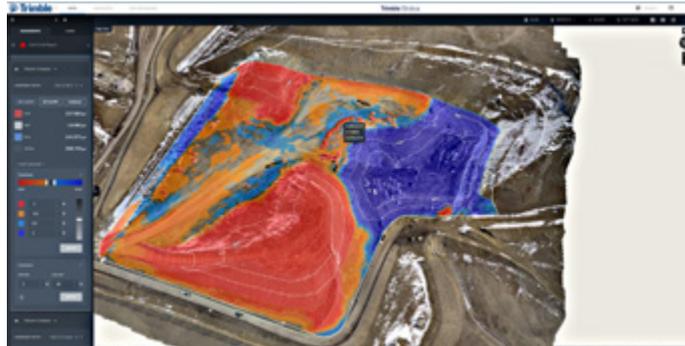
unlock the full potential of drone data in their projects. The platform's advanced mapping, surveying, and data analysis features empower mining companies to make informed decisions, streamline workflows, optimise resource allocation and reduce costly mistakes to drive project success.

As technology continues to rapidly evolve, drone surveying software will become industry standard and those who continue using traditional methods will fall further behind in efficiency. With its comprehensive features and benefits, Trimble Stratus is reshaping the mining industry, driving efficiency and delivering exceptional results.

To learn more about how Trimble Stratus can improve surveying efficiency and reduce costs at your mine site, contact the team at SITECH WA on (08) 9392 8800 or sales@sitechwa.com.au.

Trimble Stratus is easy to set up with 6 simple steps:

1. Place ground control
2. Fly drone over site
3. Upload ground control
4. Upload drone images
5. Dataset is processed
6. Analyse and share site maps and models





NEED REAL, MEASURED PRODUCTION MORE OFTEN?

- Remove drone data processing overheads and outsource to Trimble Stratus
- Remove information silos and increase collaboration across departments
- Increase safety performance through reduction of people-to-machine interactions



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EXTENDING WEAR LIFE WITH AUSTRALIA'S WEAR & HARDFACING EXPERTS

As humans and science continue to find new ways to fight the signs of ageing, miners and fleet managers are constantly looking for ways to extend the life of their machinery and associated wear parts.

Whether it's tungsten carbide hardfacing to strengthen buckets and components, reinforcing cutting edges, high quality wear plate, bucket rebuilds, or complete wear packages, the end goal is keeping machinery working harder and for longer.

Mining companies place a lot of trust in their equipment manufacturers and parts suppliers to help them deliver greater productivity, reduce downtime and costs. They simply want to spend more time in the pit, and less time in the maintenance shed.

NQHF is one major player that has the proven capability of extending the life of weld-on, bolt-on and pin-on components, and reducing the wear on buckets.

Since 1996, NQHF has provided tailored, cost-effective solutions focused on extending the life of equipment throughout North Western Queensland, and have now grown to service mine sites all across Australia.

The company has become synonymous with quality and innovation across the mining, quarrying, construction, and agricultural sectors.

NQHF are also experts in designing effective wear packages for loader and digger buckets, while using the right materials in the right place to deliver exceptional wear life, without overweighing the bucket.

According to Blair Delle Baite, Director of NQHF, the company's philosophy is to cost-effectively extend the life of wear components and buckets, and reduce the day-to-day maintenance scheduling on all types of plant, whether it be fixed or mobile, large or small.

"At NQHF, we're all about achieving top quality when it comes to our range of ground engaging tools (GET) for earthmoving, mining and quarrying equipment," said Blair.

"Our customers know that when they need their gear to perform in the toughest conditions for sustained periods of time,

they can trust our specialised coatings and engineered solutions every time.

"We offer a wide range of wear solutions for mobile fleet, surface and underground mining and processing plants. We also tend to wear and cost issues for all types of GET and machinery including loaders, diggers, graders, dozers, buckets, trays and tubs, crushers, chutes, liners, wear plate, wear bars and strips. Anything that is causing problems, we can tailor make a solution."

To achieve the best results, NQHF offer a range of products such as tungsten carbide hardfacing, Hardox and high quality Q&T wear plate, overlay chromium wear plates, and design of weld on or bolt on systems including studding.

NQHF's capabilities extend beyond just strategically coated wear parts and com-

ponents. The company operates a dedicated abrasive blasting and painting shed, and offers a range of workshop services including fabrication welding, refurbishment works, cutting, drilling and pressing.

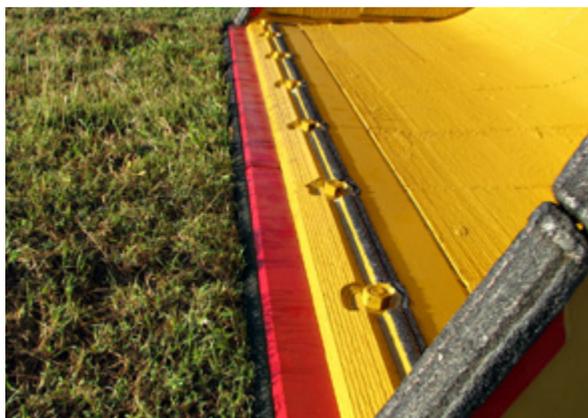
"Whether you need to fabricate new components or repair existing equipment, our workshop is fully equipped with the latest tools and machinery," said Blair.

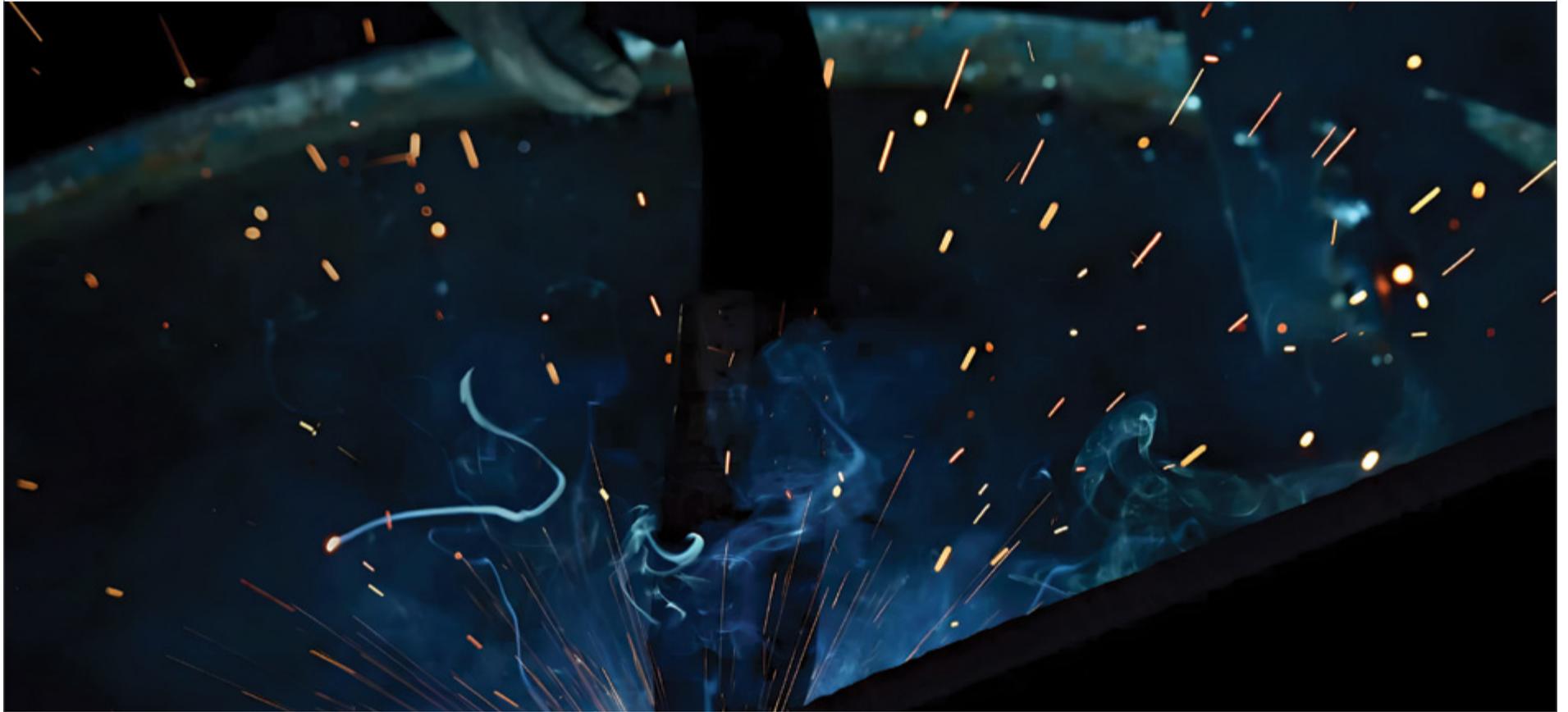
"We have all the machinery available to manage fabrication and repairs of all sizes and complexities. From state-of-the-art precision equipment including steel plasma cutting technology, and CNC vertical milling machine that allows us to drill and countersink into 500 grade wear plate, to other machining services and stud welding, we're capable of providing any type of cutting edge or chute liner required out of any material.

"We complete all processing in-house, and have a dedicated design team, which allows us to fabricate a wide range of light and heavy components, from one-off fabrications to more significant mining project work." **AMR**

For more information, visit <https://nqhf.com/> or contact Blair on 0429 778 438 to discuss your hardfacing and wear package needs.

AMR





HARDFACING WITH A DIFFERENCE

Since 1996, **NQHF** has proudly serviced the mining, quarrying, construction, and agricultural sectors. As a market leader in tungsten carbide hardfacing, we're all about extending the wear life of your equipment to maximise productivity and reduce your costs.

OUR SERVICES

- ✓ Tungsten Carbide Hardfacing
- ✓ Stockist of Hardox Steel Plate 3mm to 60mm
- ✓ Abrasive Blasting & Industrial Painting
- ✓ Specialist Fabrication & Engineering
- ✓ Liner Plates
- ✓ Wear Strips & Bars
- ✓ GET for all Machines
- ✓ Bucket Refurbishment & Wear Packages
- ✓ Plasma Cutting
- ✓ CNC Drilling, Countersinking & Machining
- ✓ Stud Welding
- ✓ Chute Rebuilds & Packages
- ✓ Chromium Overlay Plates



REDSTAR

PROVES THE PERFECT BLASTING FORMULA

For miners and quarry operators seeking improved blasting outcomes, you don't need to look much further than Impact Drill & Blast (Impact).

The integrated drill and blast services contractor is widely recognised as a trusted partner in successfully managing mining, quarrying and construction projects safely, efficiently, and cost-effectively.

As Australia's only fully integrated drilling and blasting company, Impact offers a one-stop-shop for rock-on-ground services, from bulk product manufacturing, blast design, mark-out and surveys, to drilling, loading and shotfiring.

The company leverages a suite of technologies, from drones and advanced surveying technology, 3D modeling and blast simulations, GPS guided drill rigs, and electronic detonators, all of which help op-

timise blast patterns and reduce blasting costs.

There is absolutely no margin for error when it comes to the use of commercial explosives. In combination with other technology and technical knowledge, the right emulsion is a key element of any successful blast program.

Backed by state-of-the-art bulk explosives manufacturing capabilities in Marrakai, Northern Territory, Impact's RedStar NT high energy emulsion offers the ultimate solution.

With 28 years in industrial R&D, including 23 years in mining explosives manufacturing and applications, Impact's Product Development & Technology Specialist, Dr Jeff Gore, knows the critical role quality emulsions play in a well-executed blasting program.

"The ammonium nitrate formulation in our RedStar NT emulsion is specifically designed to optimise detonation when blasting in the most challenging applications, particularly the harsh conditions in the Northern Territory," he said.

"When combined with our sophisticated blast surveying, design and electronic initiation systems, superior blast outcomes can be achieved at a drastically lower cost quicker, and with more effective fragmentation.

"It is manufactured using premium raw materials, which minimises performance and shelf-life issues. This is also due to its ability to be transported over long distances and exceptional temperature stability when stored.

"The high energy dual salt formulation with high density and low water provides a

lower critical diameter and high velocities of detonation. The fully coupled product and higher detonation pressure developed optimises rock breakage in harder ground."

The use of higher quality emulsions such as RedStar NT provides both safety and environmental benefits.

Not only can the emulsion product blend be tailored to suit blasting requirements, but the higher water resistance in the emulsion lowers the environmental impact arising from loss of nitrogen into the ground and minimises post-blast fume generation.

For more information, visit
<https://impactdrillblast.com/>

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More Innovation. Less Waste.

That's IMPACT!

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At Impact Drill & Blast, we do what it takes to make a positive IMPACT on your mining, construction or quarrying operation. From the front office to the front line, we harness the power of integration and technology to dramatically boost your business performance.

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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

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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



A TRUSTED LIFELINE FOR REMOTE SITES.

Established in 1989, Laverton-based Desert Sands Cartage specialises in supplying remote outback and mining projects in regional WA and the Northern Territory with potable water, sand, fuel, and various other bulk haulage requirements.

Desert Sands also offers earthworks and mobile and on-site concrete delivery to clients for various construction projects.

In response to increasing demand for portable concrete supply and delivery, Desert Sands Cartage recently increased its capabilities by adding a Porta-Batch mobile concrete batching plant to its fleet, with a 50-tonne cement silo.

The batching plant can produce more than

32 cubic metres of concrete per hour and can be deployed at most remote locations in the Outback.

This is one of two similar batching plants Desert Sands Cartage has put to work to supply large-scale construction projects in remote areas.

Servicing Remote Regions

Desert Sands director Rex Ryles says his company can mobilise to remote locations to service its clients, whether it be to batch and deliver concrete using its new Porta-Batch plant, deliver earthworks materials and services, alongside many other services for mining, civil, and local government projects.

"We can also provide potable drinking wa-

ter 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."

No job is too big or too small for Desert Sands Cartage, with clients ranging from the local Shire to larger operations such as Gruyere gold mine, Anglo Gold Ashanti sites, and various other large-scale mining projects.

A Range of Cartage Solutions

Desert Sands Cartage Contractors provide services including but not limited to:

Side tipper haulage, mobile batching plant/concrete delivery, supply and delivery of potable water alongside diesel and petroleum fuels, screened sands, river rock and blue metal materials.

Other services include maintenance grading, road building, site works, construction and excavator and loader-work.

Desert Sands can also provide 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. **AMR**

For more information, visit
www.desertsandscartage.com.au
or call +61 8 9031 1326

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- ✓ 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

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NORDFAB:

A LEADING PROVIDER OF INNOVATIVE AIR SOLUTIONS AND AIR CONTROL



With over 30 years of experience in providing innovative solutions for air pollution control and dust collection, Nordfab Australia offers a wide range of products and services designed to meet the specific needs of customers.

Nordfab's ducting is an integral part of dust, mist and fume collection systems in tens of thousands of installations across the globe.

Nordfab Australia products are known for their efficiency with the latest technology used to ensure their products are highly effective at removing harmful particles from the air.

Another benefit of the systems is their durability. Nordfab uses high-quality materials to ensure their products are built

to last, minimising the need for frequent repairs or replacements.

Dust Collection System

One of Nordfab's main products is the dust collection system. Designed to remove dust and other harmful particles from the air, this system ensures improved air quality.

This system can be customised to meet the specific requirements of each customer.

With Nordfab's dust collection systems, customers can reduce the risk of respiratory problems and improve overall health.

Fume Extraction System

Another one of Nordfab's popular products is the fume extraction system.

The fume extraction system is designed to remove hazardous fumes from the air, making the environment safer and healthier for workers.

This system is ideal for use in a wide range of industries including pharmaceuticals, welding and chemical manufacturing.

Fume Collectors

Nordfab's fume collectors are designed to remove mist and oil particles from the air. These collectors are ideal for use in the metalworking and food processing industries as oil and mist can be a significant problem.

Ducting System

Ducting systems play a crucial role in a dust extraction system by providing several benefits including efficient dust collec-



tion, improved air quality, noise reduction, equipment protection, regulatory compliance and reduced cross-contamination.

For more information, visit nordfab.com/Australia, call 1800 673 828 or email contact@nordfab.com.

AMR

Shape The Future For Clean Air With Nordfab Australia



Nordfab Australia is a leading provider of innovative solutions for air pollution control and dust collection for businesses and companies.

With over 30 years of experience, Nordfab Australia offers a wide range of products and services designed to improve air quality.

Today, Nordfab has sales and manufacturing facilities in Australia, Denmark, Thailand, the UK and the USA.

Visit nordfab.com/australia or call 1 800 673 828 for more information.





A KEY MILESTONE IN SCHENCK PROCESS MINING'S INTEGRATION INTO SANDVIK

On the 1st of November last year, the global mineral processing related business of the Schenck Process Group – SP Mining, was acquired by global, high-tech engineering group Sandvik AB.

The company provides enhanced productivity, profitability and sustainability solutions for the manufacturing, mining and infrastructure industries through its three Business Areas: Manufacturing and Machining Solutions, Mining and Rock Solutions and Rock Processing Solutions.

Each Business Area has several divisions which are responsible for the R&D, production and sales of their respective products and services.

Since the acquisition, Sandvik has been focused on bringing together its expertise in crushing with the screening, feed-

ing, weighing and loading know-how of Schenck Process Mining.

According to Sandvik, the union between its Rock Processing Solutions Business Area and SP Mining will allow it to provide even more value to the mining industry.

SP Mining's President Asia Pacific Terese Withington says that the scale of Sandvik's operations and commercial reach will help to accelerate the combined innovation portfolio of Sandvik Rock Processing Solutions and SP Mining.

She says that together, the company aims to deliver even better digitalisation, sustainability, and productivity solutions.

"Since we became part of Sandvik's Rock Processing Solutions business late last year, we have been working through the

integration process which will eventually see SP Mining become a seamless part of the Sandvik organisation," she said.

"Our Australian operations are the largest part of SP Mining's global business, employing around 450 industry professionals.

"As such, Australia is playing a key role in the overall integration."

In August the company will reach a significant integration milestone with around 50 of its Australian employees moving from their combined sales, engineering, services and R&D facility in Beresfield, NSW, to the Sandvik Hunter Valley site in Heatherbrae.

The Heatherbrae complex houses several Sandvik divisions and according to With-

ington, the move provides excellent opportunities for the business.

"The scale of the Heatherbrae complex is impressive," she said.

"It caters well to the needs of our people as well as to our future growth ambitions.

"This is a very positive move, which will bring our people even closer to our customers in the Hunter region.

"As we move through our integration, we continue to look forward to servicing the needs of our customers and remain fully focussed on the delivery of high-quality equipment, consumables, OEM spare parts and services to help them achieve their business objectives. **AMR**

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Stronger together



Schenck Process Mining has become part of Sandvik Rock Processing Solutions.

SP Mining & Sandvik share a deep passion for innovation. Our combined global footprint of R&D and

production facilities bring the expertise of our people even closer to our customers.

We are now better positioned than ever, to develop innovative solutions to the challenges of our industry.



Watch this video to learn what this new partnership means to your business or visit our website:

ROCKPROCESSING.SANDVIK



we make processes work

World-Class Bulk Material Handling Systems

Oreflow designs, manufactures and supplies quality conveyor and belting equipment systems to Australia and abroad. Pictured here is the Bald Hill mine.



For world-class conveyor, belt and apron feeder systems, look no further than Oreflow, the industry-leading choice for quality bulk material handling systems.

Oreflow supplies conveyor systems, chute and hopper skirting solutions, belt cleaning systems, air cannons and impact beds, to name just a few, and is renowned for their excellence in plant design, engineering and manufacturing.

As a global supplier of conveyor and belting equipment across a range of commodities, rest assured knowing that wherever you are in the world – Australia, Ghana, Senegal, Burkina Faso, Mali, Tanzania, Indonesia, Philippines and Zambia – Oreflow will deliver quality products, services and solutions for all your mineral processing and bulk material handling.

Rollers, Frames and Idlers

Oreflow offers fully-supported solutions with its conveyor and belting systems.

The company carries and supplies a range of rollers including trough, return, impact, as well as HDPE (poly) rollers on request.

The range of frames to go with these rollers include trough, transition, training frames for belt tracking, return roller brackets and retractable frames on request.

All frames and rollers are made to Australian specifications and are interchangeable to industry standard, originally set by Prok.

Along with delivering conventional steel idlers and idler frames (inline, offset, impact), Oreflow can also customise idlers for specific environments.

Example of these include the provision of extreme duty urethane sleeved idlers.

Since 2012, Oreflow has dealt directly with one factory in China to successfully deliver for all projects.

Oreflow's Australian workshop also has a well-stocked inventory of ready-to-go items, with the capability to order in or locally source through backup suppliers.

Conveyor Belting

Oreflow also sources its high-quality conveyor belting direct from one factory, which it has built up a great working relationship over the past five years.

The flow-on benefits to customers including faster lead times, with belting being manufactured and ready to be shipped in under two weeks from receipt of order.

Backup suppliers are also on-hand locally for emergency or much faster lead times.

Pulleys

Oreflow performs all aspects of pulley design, pulley manufacture, pulley repairs and refurbishments – within Australia.

Whether customers require head, tail, take-up or refurbished pulleys, including pulley lagging (cold bonded, hot vulcanised, diamond groove, to name just a few options), all are manufactured to the very best quality and exactly to spec.

Oreflow collaborates with customers to deliver fit-for-purpose materials handling solutions.

All aspects of conveyor design, manufacture and installation are included in the service by qualified installation and service personnel.

Replacement Parts

Oreflow saves customers time and energy by allowing them to source all replacement parts from one place.

With its large stock of idlers, frames and spillage control equipment always on-hand and in-stock, customers can obtain industry standard spare parts via walk-ins and pick-ups from its Welshpool warehouse in Perth, WA.

Walk-in stock include replacement rollers, belt scrapers, conveyor and feeder frames and brackets, rubber lining cold bonding adhesives.

Order and pick up items include: conveyor rollers and frames, new pulleys, pulley refurbishments, dust containment, belt tracking frames, scrapers ploughs and impact beds, as well as air cannons.

Brelko – Spillage Control

Oreflow is the Australian master distributor of Brelko conveyor products for spillage control, offering a premium range of belt scrapers and skirting systems.

Oreflow founder and technical expert Mel King says Brelko has been part of the company's business for 20 years, supplying customers with high quality products, backed by extensive research and development.

Oreflow delivers Brelko skirting, belt cleaners and impact beds right around Australia, Asia and Africa, servicing the mining industry in a whole range of commodities including iron ore, alumina, lithium, gold, copper, quarries and concrete batching plants, to name just a few applications.

As heavy-duty as they are, Brelko rubber skirting is currently being used by a large Australian company to stop spillage from their railway ballast track machines.

Belt Scrapers - E905 and E205

The E905 is a new head pulley belt scraper, ideal for wet and sticky materials and suitable for all types of conveyor belts and metal fastener systems.

Adjustable Brelko torsion twist tensioners allow the scraper to maintain a constant pressure on the belt while allowing it to deflect away from any obstruction, a significant safety feature.

Specially formulated polymeric blades maximise the life of the scraper while keeping the potential risk of damage to belt repairs, splices and metal fasteners to a minimum.

A V-base blade mounting makes blade changing quick and simple while a streamlined scraper construction prevents material build-up.

The E205 secondary belt scraper is the universal choice for all normal cleaning applications, bar direct mounting onto the pulley head.

This scraper is used in conjunction with torsion arm mountings to accommodate different belt thicknesses and excessive belt movement

Keyskirts – Sizes 2 and 3

Brelko offers different keyskirt sizes to accommodate different types of spillings.

The Keyskirt size 2 provides an effective chute sealing system designed to control spillage at conveyor load areas and is suitable for all belt conveyors carrying material with a particle size of less than 75mm.

The patented mounting track system results in simple installation and skirt rubber replacement while self-cleaning grooves trap spillage allowing it to be carried away by the belt.

The Keyskirt Size 3 is designed to cope with spillage of large lump material larger than 150mm.

Features include a robust and abrasion-resistant polyurethane sealing strip and a mounting system for easy strip replacement.

About Oreflow

Oreflow designs, manufactures and supplies quality mineral process equipment to Australia and abroad.

In 2000, founder Mel King and partners formed Minspec, a mining equipment manufacturer.

By the mid-2000s, King partnered with Brelko on the engineering of Encaplock and Keyliner dust sealing and chute lining systems.

In 2013, operations expanded to form OreFlow, supplying rubber products, belt conveyor glues and repair supplies.

Since then, Oreflow has evolved to service all areas of mineral processing systems and bulk materials handling, from design and installation to maintenance and repair.

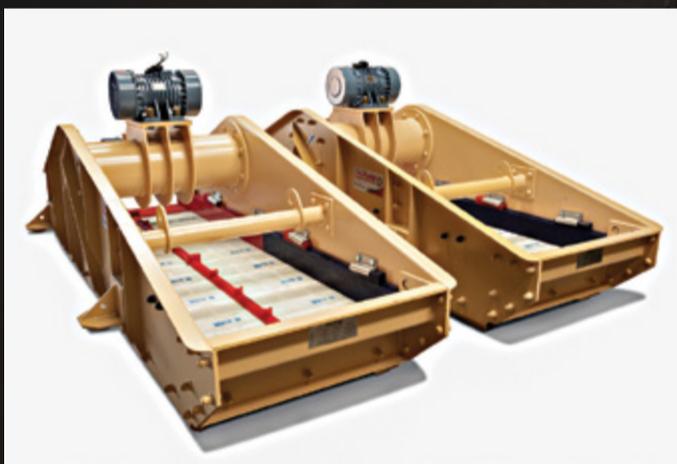
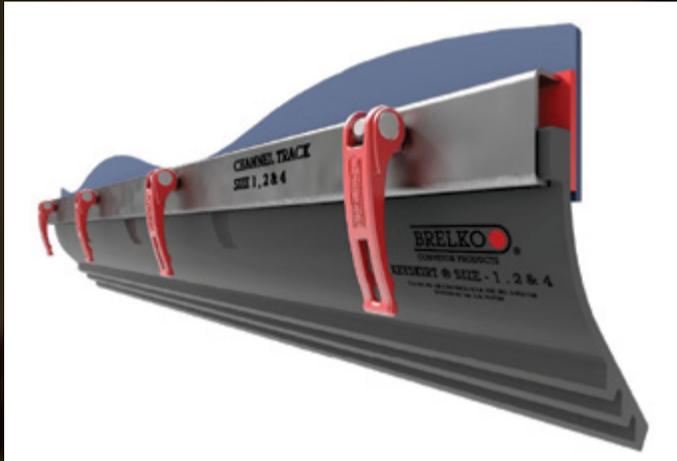
With over 30 years mining experience, quality tradesmen and specialists are available seven days a week to support with design, engineering, 3D modelling, equipment and circuit application, including specially-trained Brelko scraper technicians. **AMR**



Oreflow supplies a range of standard and customised roller and idler frames for a variety of mining applications.



The E905 poly head pulley belt scraper, suitable for all types of conveyor belts and metal fastener systems.



ONE OF AUSTRALIA'S LEADING MINING EQUIPMENT SUPPLIERS

CONVEYING FULLY SUPPORTED SOLUTIONS

Oreflow Australia specialise in designing conveyor and bulk material handling solutions capable of operating effectively in even the harshest processing conditions.

As the Australian distributor for Brelko Conveyor Products, Oreflow supplies conveyor systems, chute and hopper skirting solutions, belt cleaning systems and impact beds to Australia.

We supply quality capital equipment both in Australia and abroad, specialising in bulk materials handling and processing plant design and manufacture. We cover a huge range products from apron feeders, conveyors, vibrating pan feeders and much more.

Our products are designed to be fit for purpose, capable of operating effectively in even the harshest conditions and able to be integrated into new or existing plant.

The Oreflow range includes heavy duty Horizontal Linear Motion Screens (HLMS), excited by under and over Uras out of balance motors and available in single or multiple deck configurations.

Customised operating parameters ensure accurate sizing and high quantity processing of materials ranging from ores and rock to mineral sands.

Our screens are manufactured and fully assembled in Western Australia and are widely used in Australia and around the world due to their ease of installation, low maintenance requirements and exceptional performance.

We are now the Australian agents for **AIRSWEEP®**:
<https://controlconceptsusa.com/airsweep/>



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IMS – BP1200-9TB Track Blender with two 5.5 meter long feed hoppers with mixer and production up to 1000 tonnes per hour.



IMS electric modular Pugmill & twin hopper Blender with and 24-meter radial conveyor with auto radial return and auto lift as the stockpile height increases, fully automated and in stock. Option of four hoppers.

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BUILDING TOMORROW TOGETHER



Cape is a values-based company with more than 30 years of operating experience in Western Australia. Cape aims to be recognised as a leader in our chosen fields.

We are dedicated to sustainable practises and the long-term generation of value for our clients. We are a safe pair of hands and an employer of choice.

Cape is a multifaceted provider of crushing and screening services with expertise in numerous crushing, screening, and material processing projects. Cape has worked on numerous large-scale mining and construction projects, producing materials including armour rock, ore crushing

and screening, road base material, stemming's and speciality aggregate products that meet our clients specifications.

The Cape team is steadfastly dedicated to "Building Tomorrow Together" with a mentality of "Think Safe, Act Safe". To accomplish this goal, Cape sets measurable goals that let us keep track of our practises and policies. Cape provides our clients with a committed organisation that is professional in all aspects of our business, knowledgeable in our field, and integrate our systems into the client's requirements to ensure seamless cohesion.

Our goal at Cape is to 'do what we say we'll do, even when it's hard', and we know

that cooperation is essential for success, especially in challenging settings. In the early phases of a project, we invest a lot of time in designing the optimal crushing and screening circuits utilising the most effective and efficient equipment available.

We take great pride in the culture that Cape has developed, we have an awareness and respect for the surroundings and coworkers in which we operate. We make sure that our employees are dedicated and aware of the significance of both the company's and their own obligations through our employee assessment process, education, and induction procedures.

To ensure that there is no additional bur-

den on our client's resources, we put together a proposal as part of our thorough examination of the project needs. This includes having the appropriate equipment, which may reduce the number of people needed on the project. To guarantee that our concept designs are acceptable, we encourage and promote early dialogue with our clients. Through early communication, Cape can provide our clients cost-saving ideas that will help the project succeed.

Contact Brad Schafer to enquire about Cape's crushing and screening services on 0422 784 112 or b.schafer@cape.com.au

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CAPE

Tell us how you want your tomorrow to look, and we'll build it together.

- ▶ When it comes to your mining projects, we have the expertise, workforce and equipment to get your job done, the way you want it done.
- ▶ Cape is a trusted and respected West Australian company that provides world class solutions to businesses operating in the resources, utilities and infrastructure sectors.
- ▶ Our areas of expertise encompass civil, mining services and underground utility installation and maintenance. Cape's services include; crushing and screening, installing gas and water pipelines, water management, civil earthworks and cable installation.
- ▶ We have more than 30 years' experience operating in Western Australia and are a company built on values. Cape aims to be recognised as a leader in its chosen fields, including safety, and an employer of choice that is committed to sustainable practices and the long-term creation of value for our customers.



Phone: (08) 9272 0100

Email: info@cape.com.au

cape.com.au

DELIVERING ENGINEERING SERVICES TO PROJECTS OF ALL SIZES

Fraser-Lever provides professional engineering services to the mining, quarrying and mining services industries across Australia and Papua New Guinea.

With every Fraser-Lever professional providing a wealth of knowledge to service civil, mechanical, electrical and control engineering and drafting disciplines, the company has the proven capabilities to design and draft all types of mine infrastructure, material handling and mineral processing plants across all engineering disciplines with senior civil, mechanical, electrical and control capability.

Undertaking work for greenfield and brownfield sites in coal, gold and base metals projects, previous materials handling and minerals processing projects include:

- Material handling equipment, bins and chutes
- Copper processing plants
- Lead processing plants
- Coal processing plants
- Gold processing plants
- Mineral sands processing plants
- Crushing and screening plants
- Flotation circuits

- Dewatering systems
- Thickening systems
- Feeder design
- Tripper design
- Ship loader design

Fraser-Lever personnel have experience in site work involving operating, maintenance and construction roles. They bring extensive knowledge and skills to find the **right solutions** to resolve clients' complex business problems.

As specialists at all stages of Feasibility Studies for mining projects, Fraser-Lever consultants complete the design, planning, estimation of works and reports to underpin the work. All preparation of study estimates is supported by an internal estimating system, which contains an extensive cost and productivity database.

Designing the most logical layout, from a safety and productivity perspective, of a mine site, in particular, the Mine Infrastructure Area (MIA) is a core competency for Fraser-Lever, a business that has been involved in many projects at study and detailed design levels.

The maintenance and operation of plants and infrastructure are also well supported, with Fraser-Lever regularly conducting condition and safety inspections of plants and other infrastructure. These inspections can assess structural, electrical, guarding, safety or project completion competence.

Fraser-Lever also completes design and study projects driven by stay in business, asset condition, reliability or safety issues across all disciplines. Staff are well-regarded and are regularly seconded into clients' teams to assist with peak workloads.

The company's mechanical, structural and electrical sections undertake all forms of mine infrastructure and plant design.

The company's civil section incorporate all forms of surface mine infrastructure, including the design of dams, haul roads, crude ore and product pads, haul and access roads, as well as hazardous dam inspections. Complete designs of council and main roads and intersections are also available.

The engineering work Fraser-Lever under-

takes is supervised and approved by chartered engineers and employs engineers who are registered with RPEQ and IEPNG.

The company completes design reviews and sign-offs on design work completed by clients for both Australian and Papua New Guinean projects. Safety in design is incorporated into project work with full engagement from clients' teams and all those involved.

Through Fraser-Lever's design and site experience and by working closely with its clients, quality project decisions can be made quickly, together with short-circuit optioneering studies, through in-depth discussions.

Fraser-Lever's expert civil, structural, electrical, mechanical consultants provide practical, certified, accurate, quality-engineered project solutions for the resources sector. Catering for all stages of projects, Fraser-Lever are the specialists you've been looking for.

For more information visit:
www.fraserlever.com.au

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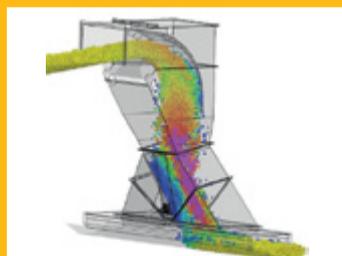
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ENGINEERING THE RIGHT SOLUTIONS FOR YOUR PROJECT ACROSS AUSTRALIA AND PAPUA NEW GUINEA

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- SURFACE MINE INFRASTRUCTURE
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- BROWNFIELD DESIGN WORK
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From fresh produce to wine cellars, industrial plants and workshops, to dust suppression, selecting the most appropriate cooling solution for the right application is a critical choice faced by site managers.

Controlling temperature and humidity levels can drastically influence the quality of final products, but also the efficiency of plant equipment and the working environment for personnel.

It's important to consider the difference between regular fans compared to more advanced cooling systems. For instance, regular fans simply circulate the existing air, same humidity at the same temperature, whereas more advanced solutions such as evaporative coolers take that same air, and combine it with evaporating water, which dramatically lowers the temperature.

In some work environments like mines, the control of the temperature and dust is an ongoing challenge due to the associated health risks and equipment deterioration.

Quietaire Australia knows all about the benefits that evaporative coolers can offer. The Brisbane based business has been manufacturing the original 'Big Blue Quiet-cool' portable evaporative coolers for over 25 years.

Proudly Australian made, its cost-effective and efficient solutions are designed for a

range of applications from air cooling and circulation, air scrubbing, humidification, through to cooling large workspaces and machinery quickly and efficiently.

"Pre-cooling can increase the efficiency of equipment and machinery that runs hot such as generators which means they consume less energy," said Quietaire Director Paul Godwin.

"Our portable evaporative coolers are a proven solution for cooling machinery and equipment during and after shut down. The cooling pads in our systems also act as an air scrubber, which removes dust and debris from the air that passes through the unit.

"The fan blades we use are specifically designed to distribute the air as it leaves the unit, pushing away from the unit in a 'V' formation, cooling a broader area the further away you move from the unit."

Quietaire's success can be attributed to its commitment to manufacturing world-class products backed by strict quality control measures at every stage of the manufacturing process.

The company also offers aftersales support and spare parts for all their units, and can ship right across Australia, as well as to other countries around the world.

For more information, visit www.quietaireaustralia.com

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Delivering prompt, highly accurate analytical results for improved decision making on mining investments and processing



Gekko's Assay Laboratory

Based in Ballarat, Australia, Gekko's Assay Laboratory is a world-class facility certified by NATA to ISO-17025.

Gekko's Assay Lab operates to the highest occupational health and safety standards, and quality control. Standard operating procedures are in place for all in-house systems and processes.



Laboratory Capabilities

- ✓ Sample Crushing & Milling equipment
- ✓ Coarse Nuggety Gold Testing
- ✓ Geochemical & Metallurgical Testing
- ✓ Environmental Testing

Contact gekkos@gekkos.com or visit website gekkos.com for more information.



SGS team in their Perth facility:
Graeme Farrant, National Quality Manager - Geochemistry
Katie Donnelly, Laboratory Manager

SGS: WORLD LEADERS IN ANALYTICAL TESTING

From beginning as a grain inspection house on the docks of Rouen, France, to a world-leading testing, inspection and certification company, the evolution of SGS was driven by innovation, expertise, and ambition.

With its dedicated solutions that mitigate risk, improve product quality, and increase operational efficiencies, SGS supports businesses all over the world.

Mining operators face increasingly complex business environments, with high stakeholder expectations, including a focus on automation and sustainability. Supporting these companies during every stage of the supply chain, SGS is recognised as the benchmark in helping deliver safe, high-quality, and compliant iron ore products to global markets.

SGS general manager natural resources Australia Juan Smith said the company is at the forefront of innovation.

"SGS is at the forefront of innovation in the analytical space," he said.

"We offer end to end solutions for the entire mining value chain across exploration, discovery, development and production or reclamation, minimising risk and improving decision making.

"Our expanding operations for iron ore, critical minerals and gold analysis with PhotonAssay alongside our unmatched expertise ensures our customers get quality data they can trust."

Iron Ore

With the demand for iron ore remaining high around the world, SGS offers independent and reliable testing, inspection and risk management services that support exploration, processing, and trade.

These processes help improve operational efficiencies, reduce costs, and enhance product quality.

To ensure the highest quality iron ore, SGS offers a range of solutions covering all steel making materials including iron ore fines, lumps, run-of-mine (ROM) and pellets.

It also offers comprehensive services in-

cluding on site laboratories, maritime inspections, sampling operations, mechanical sampling system design and operation and state-of-the-art analytical testing.

Laboratory Testing

Employing the latest technology internationally, you can be assured you will get the most accurate and reliable results.

SGS staff are trained to the highest standards, have an in-depth knowledge of the field and business needs, and have experience in meeting both international and local regulations for a wide range of industries.

With the same ethical principles, procedures and quality standards as its on-site laboratories, SGS' mobile laboratories allow access to trusted third-party laboratory services in locations that might not support full laboratory facilities.

Benefit from the same fast turnaround times and technical expertise while avoiding project and shipping delays.

PhotonAssay

For precious minerals testing, traditional chemical assay analysis can be time-consuming, labour-intensive and only measure a small volume of material.

PhotonAssay analysis is a non-destructive environmentally friendly technique that delivers faster, safer and more accurate

analysis for gold, silver, copper and complementary elements.

Delivered from SGS world class commercial laboratory, the technique uses high-energy X-rays to deliver results in as little as two minutes per sample.

PhotonAssay allows analysis of larger sample sizes, saving time, increasing efficiency and saving you money.

With greater focus on ESG in the mining sector, PhotonAssay ticks all the boxes by optimising plant performance, grade control and geological modelling while avoiding contaminated waste and the associated costs.

Analytical Testing

As the world's leading testing, inspection and certification company, SGS provide a suite of analytical services for the entire mining value chain.

SGS provides the world's most comprehensive range of inspection, testing, certification and consulting services, powered by the latest technology and digital tools.

Their global network of experts supports you with laboratory outsourcing, commodities logistics, geochemistry, metallurgy, sustainability and market intelligence solutions to help you reduce risk, make informed decisions and ensure integrity.

Their technical expertise in geochemistry, metallurgy, process development and consulting, commodities, trade and sustainability services are unmatched around the world.

SGS help organisations meet environmental, social and governance (ESG) and sustainability expectations, and engage in the circular economy. With a range of solutions across land, water and data management, manufacturing inspection and technical inspection, technical staffing solutions and geotechnical capabilities, SGS ensures your needs and requirements are met.

Remove the guesswork from your mining operations and partner with the industry's leading experts to shore up your operations, increase efficiency, maximise return on investment and demonstrate your sustainability credentials.

SGS Training, Certification & ESG Solutions

To keep up with the latest industry practice, ever-changing technical standards and comply with the current legal and regulatory obligations, SGS provides the necessary skills and knowledge needed to transform your business with a wide range of training and certifications for mining and ESG requirements.

General manager of knowledge solutions Sharn McAulley said SGS aims to support clients across the entire mining chain.

"We aim to support clients across the entire mining value chain, and this includes our comprehensive training and certifications for ESG and mining," she said.

"We encourage customers to come to us with their requirements and we can design a bespoke solution to meet their needs."

With a proven track record delivering in person, online and in-house courses, the training courses cover everything from safety to quality, compliance to sustainability and brand protection to risk management.

SGS' customised training, certification and ESG solutions ensure you comply with legislation, and company and sustainability reporting requirements. **AMR**



The PhotonAssay machine is up and running in SGS Perth.

Leaders in Mineral Analytical Services

Gain a competitive advantage with our trusted and independent insight

- Expert Gold analysis with PhotonAssay
- Bespoke On-site lab solutions
- Critical Mineral & Iron Ore analysis

CONTACT US TO DISCOVER OUR SERVICES



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SGS

UNLOCK THE SECRETS OF YOUR ORE BODY



In exploration, mining, and mill operations, understanding the composition and behaviour of an ore body is crucial for making informed decisions and maximising profits. Traditional assay methods often fall short in providing a comprehensive understanding of the ore's grade and recovery potential.

However, a groundbreaking solution exists that is transforming the industry – the PAL1000 and AssayTab combination cyanidation assay.

The PAL1000, a one-of-a-kind laboratory system that can be used onsite, when combined with the patented AssayTab reagent, creates an unmatched partnership as a standalone technology. This powerful duo offers explorers, miners, and mill operators with a unique opportunity to uncover the mysteries of their ore deposits.

A key advantage of the PAL1000 and AssayTab combination is the provision of cyanide leachable gold and silver grades. When referenced to ore reserve assays, metal recovery can easily be interpolated. By accurately quantifying the amount of gold and silver present in the ore, as well as their recoverability, stakeholders can gain valuable insights into the economic potential of their operations.

The PAL1000 streamlines the assay process, significantly reducing turnaround time and increasing productivity. With its ability to handle large sample sizes and volumes, the PAL1000 allows for efficient processing of 52, 1kg samples in a single run. This not only saves time and resources, but also enables faster decision-making and quicker identification of high-value areas within the ore body.

AssayTab, on the other hand, is an advanced cyanidation assay technology that perfectly integrates with the PAL1000 system.

Its revolutionary tablet-based approach simplifies the assay process, eliminating the hassle of complex reagent mixing and handling.

Its innovative design ensures consistent and reproducible results, offering highly accurate and precise data every time.

Operators can say goodbye to the guesswork and variability of traditional assay methods as AssayTab brings a new level of confidence and reliability to assay data.

The PAL1000 and AssayTab technology also prioritises safety and environmental responsibility. This minimises human exposure to hazardous substances, thereby creating a safer working environment and mitigating risks.

Additionally, reagent consumption has been optimised to minimise waste and reduce the environmental footprint.

The comprehensive understanding of ore grade and recovery potential achieved through this revolutionary technology empowers stakeholders to make better decisions, improve operational efficiencies, and maximise profitability.

With its design, precision, real-time monitoring, and safety-forward features, the PAL1000 and AssayTab combination is a win-win when it comes to gaining a competitive edge in mineral processing.

For more information, visit <http://mineralprocesscontrol.com.au/>

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Fast, High-Quality, Low-Cost Gold Analysis

MPC'S PAL MACHINE

The PAL1000 is an ideal tool for rapid turnaround gold assays, delivering a large number of assay results at low cost. Short pulverizing/leach times of 1-hour have assays reported within 2 hours. Large sample size capability makes the PAL100 ideal for coarse gold analysis, reducing the nugget effect.



Up to 400
SAMPLES per
12-hour shift

TECHNICAL NOTES

The PAL1000 contains 52 sample pots, each capable of processing up to 1kg ore samples. Samples are completely pulverised (typically >90% passing 75µm) and simultaneously leached with MPC's uniquely formulated Assay Tabs™. Once leaching is complete, leach solution is collected and analysed for gold by AAS. Silver and Copper analysis can also be performed. The pots and grinding media are washed before returning the media to the pots for the next sample. By simply adding water, ore samples and Assay Tabs™, the unit ready for the next run.

OPERATING NOTES

The PAL 1000 is fully enclosed for safety and noise reduction with safety interlocks. Operating parameters such as grinding media charge, reagent dose rate, sample size, run time and speed can all be varied onsite to suit sample requirements.

Grade Control,
Mill Samples,
Exploration



For your onsite gold analysis needs, contact your PAL's at:

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Powering Australian Pipelines



Caman Engineering is strengthening industry supply chains with solar-powered manufacturing – a move that has put a welcome green spin on flange production.

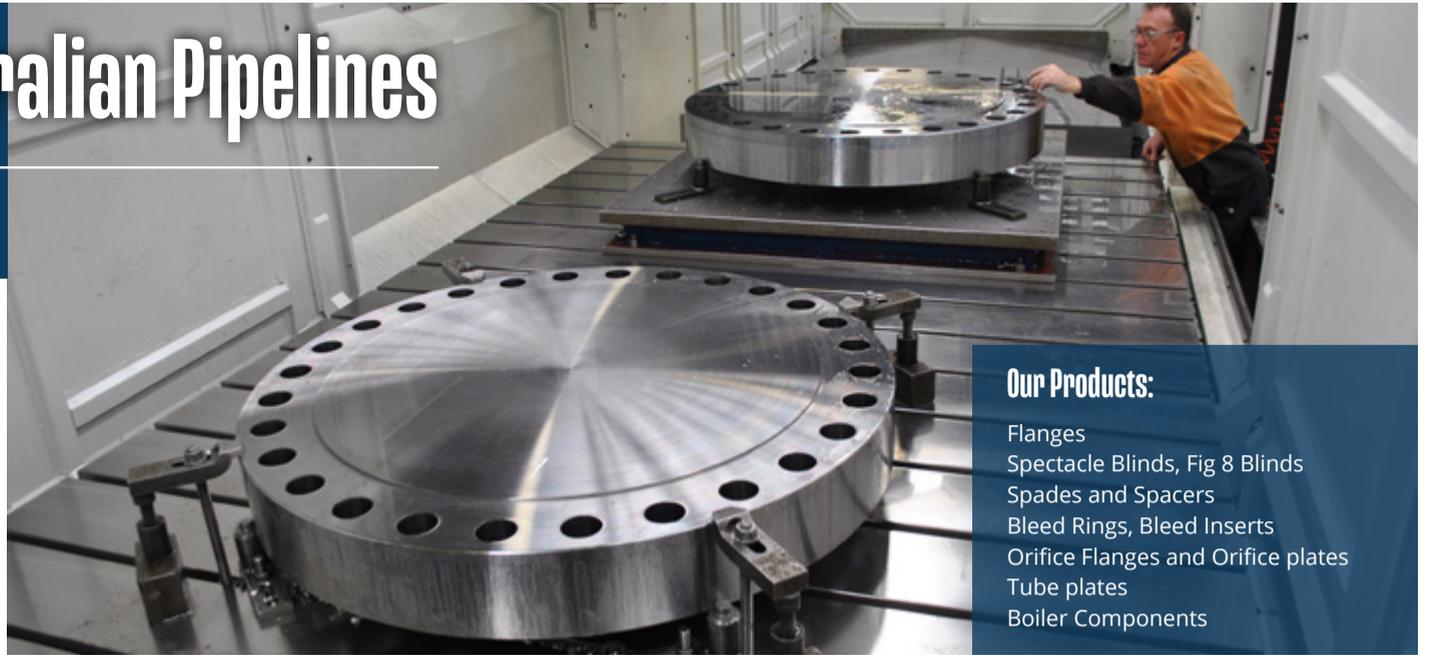
Following almost 70 years’ of service, the Australian-owned company has pivoted to a sustainable production solution that accommodates the increasing number of operators prioritising environmentally friendly mine sites and suppliers.

The family business’ in Sydney and Perth now has a 100kw solar system installed to power flange-making machines in its factories, which supports a variety of oil, gas, mining and petrochemical companies throughout Australia.

Caman Engineering Director Mark Cavanagh said the company boasted the nation’s **largest independent stockist of flanges** and had become a mainstay in the mineral resources sector for its durable and well-designed products.

He said the flanges were manufactured to various standards to meet process conditions, but the company was more than capable of supporting clients with unique or complex requirements.

“If a specific engineering requirement dictates the need for special material or manufacture, we are absolutely able to meet



Our Products:

- Flanges
- Spectacle Blinds, Fig 8 Blinds
- Spades and Spacers
- Bleed Rings, Bleed Inserts
- Orifice Flanges and Orifice plates
- Tube plates
- Boiler Components

that need,” Mr Cavanagh said.

“We are a manufacturer with full ISO 9001 certification, and we can package flanges according to either engineering or project specification, capped off with remarkably short delivery times.”

Caman Engineering’s comprehensive flange stock is matched only by its diverse range of valve products.

As well as flanges, Caman also does bleed rings, spades, spacers and spectacle blinds - amongst many other products. To suit customer needs and demands, the range of products constantly evolves and a large range in stock is on hand and ready to go.

The major valve supplier leverages forged steel, stainless steel and cast steels to make unrivalled components for a

range of mechanisms spanning screwed, flanged, and socketed.

The products can withstand a vast array of demanding and challenging environments, including extreme pressure, fire, and other high-temperature applications.

Clients unsure of the products best suited to their requirements are supported by a dedicated and highly experienced sales team, which provides data sheets and drawings detailing the capabilities of each product.

With investment in state-of-the-art computer operated drilling and turning machines and a holistic understanding of industry needs, Mr Cavanagh said Caman Engineering would only continue to be a trusted and key supplier to the mineral resources sector.

“Caman Engineering is 100 per cent Australian and owned by the same family that started the company in 1954,” Mr Cavanagh said.

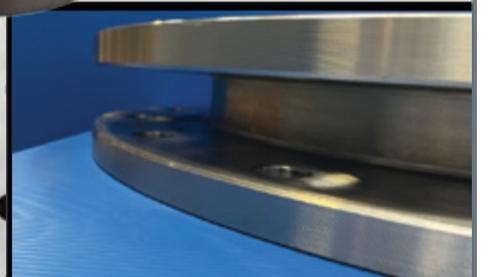
“We have evolved with the Australian mining sector, with knowledge passed down through the generations.

“Our leadership have built and sustained a successful business centred on customer service and high-quality products.

“We are an accredited company and approved manufacturer and supplier, able to fulfil the needs of oil, gas, mining and petrochemical companies all across Australia.”

For more information, visit www.camaneng.com.au

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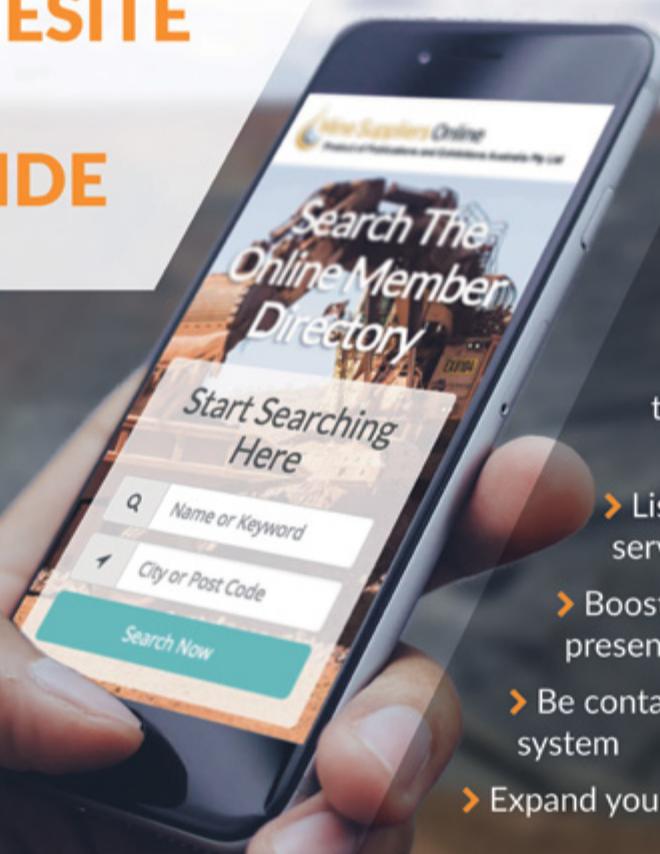
120+
leading suppliers

60+
expert speakers

WA Mining Conference and Exhibition is the destination for thought-provoking content and technical and digital solutions transforming the mining industry. The high-calibre conference will explore the mining sector's evolution through technological and sustainable improvements across the entire mining value chain. Alongside the conference will be an expanded exhibition featuring over 120 leading suppliers where you can see first-hand the latest equipment and digital innovation shaping the sector. New at WA Mining this year is the **Decarbonisation Zone**.

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Get a listing today!

Stop the mess with the FlangeLock Tool



The FlangeLock Tool is the ultimate contamination control tool for protecting any hydraulic system.

Produced in the United States, FlangeLock Tool is an easy-to-use cap that slides over the flange and is sealed by tightening the bottom plug by hand, keeping oil in and contaminants out.

CKC Equipment imports the FlangeLock Tool into Australia, which is then sold nation-wide through the company's extensive network of distributors.

The FlangeLock Tool was developed by Greg Molloy who realised there had to be a better way than using plastic bags and rags to prevent contamination and leaks.

With an easy on, easy off process, the FlangeLock Tool offers a leakproof solution to hydraulic system and environmental cleanliness that is guaranteed to stop the mess and reduce the need for expensive clean ups.

The reduction in oil leaking from hoses also drastically reduced the risks associated

with slip and fall hazards, representing a huge benefit to staff safety, as well as a decreased chance of environmental contamination.

The FlangeLock tool can be used across a breadth of industries including construction, mining, oil fields, dredging applications, wind turbines, and large machine tools.

Currently manufactured in lightweight aluminium, it is produced in twelve sizes for 8, 10, 12, 16, 20, 24, 32, 40, 48, 56 and 64 in SAE Code 61, 62 and CAT.

Other advantages of the FlangeLock Tool are that no tools or expensive hardware are required, while rags stuffed into hoses and messy plastic caps are a thing of the past. Installation and use is quick and easy, requiring just one hand, with no additional equipment required.

To improve safety and reduce risk – get your FlangeLock Tools now, visit www.ckcequipment.com.au/flangelock-distributor-list/

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FLANGE LOCK TOOL™

THE CONTAMINATION CONTROL TOOL

ultimate



A leakproof solution to hydraulic system and environmental cleanliness.

The FlangeLock Tool allows for the simple sealing of open SAE Code 61, 62 & 62 CAT-Style hydraulic flanges without tools. Constructed out of lightweight high tensile strength T2200 anodized aluminium. Easy on, easy off.



20/32TBS Kit

A selection of common sizes including 2062, 2462, 3261, 3262 to suit both code 61, 62 and CAT flanges including blanking discs and o-rings.



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SAVE MONEY
IMPROVE SAFETY
REDUCE CONTAMINATION**



STATE-OF-THE-ART FLANGE FACING & ON-SITE MACHINING



Flange facing can be used on a multitude of applications. Traditionally, it is used to re-machine flanges or heat exchanger faces in situ when they have become warped, worn or damaged. Machining these surfaces can take anywhere from 12 hours to 12 days to complete, which can then translate to thousands of dollars in lost productivity.

Morgan Engineering has been delivering specialised engineering services to the coal mining and construction industries for over 40 years. Since its establishment in 1975, the company has grown from a small engineering shop to one of the most extensive in the Hunter Valley.

Although we have been offering machining services for almost four decades, that doesn't mean we're happy to just keep doing things the way they've always been done. Our team is inspired by a culture of innovation, integrity and quality, working closely with clients to ensure the smooth and efficient delivery of all services.

With many clients in mining, power, water treatment and heavy fabrication, we became aware of the need for a more accurate and cost-effective solution to flange facing machining, with reduced lead time. This is where our team really shines.

We have earned a strong reputation for our innovative approach to delivering bespoke engineering solutions, and this extends to our machining capabilities. We invested in cutting-edge technology and adapted our machining processes, introducing an innovative digital approach. This allows us to provide a far greater scope than businesses that use more analogue methods.

When an unusual application or restrictions make it impossible to fit a standard machine in the space provided, our highly experienced team is fully equipped to go on-site and inspect the item. We take detailed measurements of the equipment and scope using our Leica Absolute Track

AT403 (laser tracker) and leverage our extensive knowledge and skill to build a special machine to complete the job.

Using our 3D laser tracker, we're able to deliver a level of precision that is second to none – on both standard and highly unique applications. The Leica Absolute Track (from Hexagon Manufacturing Intelligence) is an all-in-one metrology solution, which is more portable than any other on the market. The integration of this tool means that we can provide unmatched measurement process speed, improved accuracy and reduced downtime cost – all while maintaining operational simplicity.

This laser tracker is used to determine where the bores are and the XYZ axis and depth, eliminating the risk of human error through digital precision. This extra level of quality assurance gives customers confidence their assets are repaired to within specification, with an exceptionally high standard of workmanship. Our award-winning in-house training pro-

grams for machinists are delivered with care and precision by qualified experts, which radiates through the successful projects we've delivered for clients all around Australia.

Our partnership with Field Machines Australia (FMT) gives us access to an incredible array of tools, which means we've always using the right tool for the job.

FMT also trust us as their partner for on-site machining, and regularly refer clients to us for support on their projects.

Our modern and innovative approach to equipment, technology, processes and training has all culminated in feedback from our clients that they have seen increased accuracy and reduced turn-around time, while also enjoying a cost reduction.

If you're looking for flange facing work to be completed, or any on-site machining, then we are your go to team.

Our on-site machining, field service, and line boring division is complemented by our ultra-modern, high-capacity workshop facility.

Specialising in engineering design and drafting, large capacity CNC Machining and heavy fabrication, our team is equipped to handle end-to-end customer needs.

We work with our clients to provide innovative and tailored solutions. We make it happen.

Contact us today on (02) 6572 2032 or morganengineering.com.au/contact/ to find out more.

AMR





MORGAN ENGINEERING

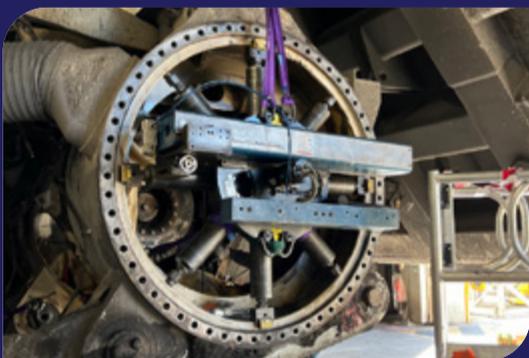
EXPERIENCE. QUALITY. RELIABILITY.

Since 1975, Morgan Engineering has been focused on delivering state-of-the-art capabilities with advanced equipment, providing clients with tailored solutions.

We have proactively shifted away from the traditional analogue approach to the flange facing/flat face circular milling, utilising the latest in digital technology, the Leica Absolute Tracker AT403 to provide a better bespoke solution.

Flange facing can be used on a multitude of applications, which is why the use of our 3D laser tracker that captures measurements and allows for a more precise setup is beneficial for a wide range of industries. The direct advantage for clients is increased accuracy, faster turnaround and reduced cost.

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GETTING TO KNOW INDUCTION BEND MANUFACTURER: INDUCTABEND



Australia's premier induction bend manufacturer Inductabend specialises in high integrity heat induction bending of pipe and other sections for gas pipelines, mining and construction. Generally, if it can't be cold bent, it can be induction formed.

Founded in 1992 by Barry Crouch and Rob Stead, the business has been servicing the mining, oil and gas and building industries in Australia for over 30 years.

Its founders both had extensive experience in manufacturing and engineering, with Barry having previously worked as an engineer for the SEC and Rob owning and operating several manufacturing businesses.

Their first experience working together was running Smithweld, a specialist cold rolling and bending company.

After a few years cold rolling, the opportunity to purchase an induction bending machine, originally brought into Australia to assist with the construction of coal fired power plants, presented itself and thus Inductabend was born.

As managing director, Barry has been involved in the day-to-day operations of Inductabend from the beginning. He and other long serving employees including general manager John Rea contribute to the wealth of experience and knowledge Inductabend has at its disposal to aid its customers in ensuring their bends are made to fit their purpose.

Presently, the business is entering a transitory phase with the directors committing to the long-term future of the business in Australia. This is being done through investing in, updating and upgrading its plant and equipment, as well as continuous investment in research and development of new cutting-edge induction bending (and heat treatment) technologies.

New management is also being implemented with the introduction of Nathan and Jordan Crouch into the business. Both are experienced professionals with backgrounds in civil engineering (utilities water and gas), finance and accounting.

What Is Induction Bending?

Induction bending is a hot bending process specifically designed to produce high

quality pipe bends with mechanical properties equivalent to or exceeding those possessed by the mother pipe the bend it's produced from.

Inductabend has continued to develop and improve its capabilities, product offerings and overall quality as the core value adding proposition for Australia's industrial markets.

"We work with our customers to tailor bend geometries and mechanical characteristics to their needs. In order to ensure consistent performance of our bends we employ a wide range of destructive and non-destructive testing methods to create custom testing programs tailored to our client's pipeline application and risk profile".

Products

Inductabend owns and operates three induction bending machines that cover a wide range of applications. Pipe diameters from DN25 to DN900 with wall thicknesses of up to 100mm can be bent to the purchaser's exact desired angle and radius (generally 2.5D and up) with custom tangent lengths on each end of the bend.

Complex compound bends can also be produced, including S bends and even helical bends for specialist applications.

Induction bending is compatible with a wide range of materials including all carbon steels, alloy steels, high X grade steels, stainless steels, nickel alloys, titanium and other exotic alloys.

Recently, Inductabend internally developed a new world-first method of bending that allows us to utilise induction bending for the forming of bends with radii from 14m and up, allowing for gradual consistent changes in direction to minimise wear on steel pipelines whilst maintaining their desired mechanical properties.

Additional services such as end preparations for welding, Victaulic grooving and coating are also available to customers when placing orders with Inductabend.

Inductabend also owns some cold field benders (up to DN1200 capacity) that are available for dry hire. **AMR**



INDUCTABEND

Shaping Australia for over 30 years

We specialise in applying our

INDUCTION TECHNOLOGY

to solve seemingly intractable problems

- Induction bending of pipe up to DN900, wall thicknesses up to 100mm.
- Carbon steels, stainless steels, clad pipe and other exotic alloys
- High X grade bends
Compound bends
Helix bends
Custom OD mandrels
- Structural steel section bending
- Fully customisable bend geometry
- Other specialist heating applications
- Onsite induction bending (large diameter high volume projects)
- Cold field bending machines also available for hire (up to DN1200)

For security of supply and the circular economy
we support Australian manufacturing

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**THE AUSTRALIAN
MINING REVIEW**



Pumping water up high mine walls with layflat hose is safe & easy to handle.



Reels of Waterlord layflat hose stored on site and ready for reuse.



Thousands of metres of compact layflat hose can fit on one truck, reducing emissions.

PIPELINES WHEN SUSTAINABILITY MATTERS

The mining life cycle requires robust and reliable equipment, and in attempts to help protect our planet, sustainable solutions. Crusader Hose challenges the usage of “single use” HDPE poly pipe for pipelines. They believe their “reusable” flexible layflat pipeline solutions offer more in supporting the environment than those of rigid poly.

Water logistics is integral to mine management. Moving water from A to B requires efficient and safe execution for storage, distribution, acquisition, or transportation. When planning dewatering pipelines, beyond asking whether the chosen method is the most reliable, what is often overlooked is whether it best supports the mine’s sustainability objectives in reducing single-use plastics.

Plastic waste is a global problem, and many mines have adopted programs to eliminate single-use plastics. At the larger iron ore sites in the Pilbara, many miners will have noticed that plastic containers have been eliminated from the dining rooms. Initiatives like this have been successful and well-promoted as environmentally responsible.

However, the elephant in the room is the large amount of HDPE plastic pipe continuously used for virtually all temporary water transfer projects. “Why stop at riding the plastic containers from the dining mess when one meter of discarded 350 mm PE is probably the equivalent of two thousand of those? Wouldn’t it be logical to review the total amount of HDPE use when committed to limiting single-use plastics?” asks Francois Steverlynck, Managing Director of Crusader Hose. “Imagine the tons of all this extra plastic waste,” he added.

Francois believes that most pipeline decisions do not consider the removal cost of all the used plastic HDPE pipe. Decisions are made on the pipeline’s capital cost, including transportation, unloading, welding and laying. “Rarely have I heard anyone discussing the removal cost,” he said, “and I wonder, are they just intending to cover it over in the pit, or are they leaving this problem for future management?”

Until recently, there has not been a suitable alternative for HDPE, so mines have never considered alternatives. Crusader Hose believe they have a viable alternative to poly pipe, their Waterlord® high-pressure layflat hose, designed and manufactured in Australia. “In no way are we advocating for the total removal of poly pipe from mines,” said Francois. “We are, however, not only offering a reusable product but are certain that our flexible hose offers other benefits over poly,” he added. With flexible layflat pipelines and reel systems from Crusader Hose, mines are now able to consider layflat pipelines as a dewatering option.

Crusader Hose has been manufacturing layflat hose for over 37 years and has gained a reputation for reliability, trust and excellence. The company has consulted with the mining sector to design its

innovative and high-quality Hamersley™ Rapid In-pit Dewatering System. Its reel drive unit removes the need for manual handling, and its flexible layflat hose pipelines are hard-wearing, reliable, and handle pressures 5x higher than HDPE.

“There are many layers to understanding the value of limiting single-use plastic in the mining sector. Some are blatantly obvious, whereas others need to be better explained to be appreciated,” said Francois.

Reducing CO₂ emissions

Unlike poly pipe, Crusader Hose layflat hose is flexible and comes wound onto reels. Its smaller footprint results in a smaller load. Two hundred meters of 12” Waterlord® layflat hose compactly wound onto a single reel is no larger than a standard pallet. When packing layflat, projects up to 4,000 m can fit onto one truck. That’s only one truck’s worth of diesel. Only one truck’s volume of CO₂ emissions.

With an equivalent pipeline of poly pipe, you’ll need around 10 times more trucks. That’s 10 times much more fuel. That creates 10 times more pollution.

Everyone knows avoiding CO₂ emissions is the number one priority in combating global warming. Transporting flexible layflat hose will reduce the need for more fuel and, in turn, reduce the negative consequence of using more fuel.

Waste generation

When flexible layflat dewatering pipelines are no longer needed, the layflat pipelines retrieve easily with the Hamersley and can be either redeployed to their new location or stored for future projects. Being easily reusable is a major ecological benefit over poly pipe. If managed properly, you will never see abandoned layflat hose lying around waiting to be dismantled and removed from site.

Francois calls on the water management experts to consider all aspects of using flexible layflat hose and reel systems instead of poly pipe when planning rapid in-pit dewatering systems.

“We have worked with many mines in finding solutions for their dewatering projects. In particular, pumping up high mine walls with layflat hose is safer and easier to handle. These are hidden qualities and characteristics that better support safety and sustainability than poly,” Francois Steverlynck, managing director of Crusader Hose said. “Although the benefits are possibly deemed as small and insignificant by some mining engineers’ values, we stand by our conviction that flexible layflat pipelines better support the health of our planet,” continued Francois. **AMR**



WE ARE AUSPRESS

Quality stainless steel pipes and fittings make all the difference when running a large-scale facility.

Whether it's a heavy industrial plant, food and beverage facilities, marine or offshore infrastructure, a mine site, or water treatment asset, you need products that can resist harsh chemicals, corrosion, and high fluid pressure.

Australia's leading suppliers of press-fit, drainage and press tool solutions AusPress Systems (AusPress), proudly celebrated their 30th anniversary in 2022. The company has earned an enviable reputation for providing quality products, sound technical advice and professional service to the Australian market since 1992.

Growing from humble beginnings, AusPress has never lost sight of its core mission to provide clients with leading industrial pipe and fitting products and the best service in Australia with warehousing and distribution in every capital city..

AusPress General Manager & CEO, Jason Nelson says the company is more than a just supplier of stainless steel pressure and drainage systems.

"We offer solutions to our clients' unique problems that are designed to solve the most complex challenges no matter what the environment," said Mr Nelson.

"Being the first supplier of press-fit systems in Australia 30 years ago, we boast the most experience and highest level of

technical knowledge of our core products from leading European Manufacturers and OEM factories from around the world, our clients know they are receiving the highest quality equipment in the market."

The AusPress product portfolio has continued to expand over the years, and so too has its technical expertise and industry knowledge. The company is now a market leader in hygienic and high performance stainless steel plumbing solutions for the mining, construction, food and beverage manufacturing, and maritime sectors.

Nr Nelson highlighted that the company remains 100% Australian owned and operated, is certified to ISO9001 and ISO45001,

ensures its products are built to Australian Standards and carry HACCP and Watermark certification.

"The strong relationships we have built with our clients reflects our commitment to delivering excellent customer service, backed by quality products and technical plumbing expertise and knowledge that spans more than 25 years," he said.

"Behind AusPress is a hand-selected team of skilled and dedicated people spread around the country that provide the high level of service our clients have come to expect from us."

For more information, visit
<https://auspress.com.au/>

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Leading suppliers of press-fit, drainage and press tool solutions since 1992 – We are AusPress

AusPress Systems is more than a supplier of stainless steel pressure and drainage systems. We offer solutions to your problems.

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THE GWG DIFFERENCE



For almost 40 years, Global Water Group (GWG) has been providing specialised products and solutions to the mining, civil, agriculture and aquaculture industries. The company has become a one-stop shop for the supply of polyethylene pipe fittings, pipe and valve systems.

GWG is committed to delivering the highest quality products and services to suit the unique requirements and technical specifications of its customers, no matter how complex or small the project. From design and sourcing to distribution and delivery, the GWG point of difference comes down to quality.

With strategically located and fully stocked

warehouses in Townsville and Brisbane, GWG not only services Queensland, but the entire eastern seaboard of Australia and beyond.

This network allows the company to transport its products anywhere in Australia, ensuring, quickly and within tight delivery timeframes. GWG's innovative product range and tailored solutions have gained high recognition within industry circles for delivering lower costs, without compromising on quality.

According to GWG Director Darren Werda, the company prides itself on supplying the right products for the right applications at the most competitive prices.

"Our customers depend on us to deliver the critical products they need, when and where they need them," said Mr Werda.

"Whether it's design advice, product supply, technical expertise, installation, or on-going support, our focus is adding value to our customers' operations and simply being a reliable, trusted partner over the long-term.

"We believe that our dedication to achieving the best quality products has greatly contributed to the continued growth of our business. From production to delivery, we only use the highest quality materials and the latest technology operated by

skilled and certified teams. All our products undergo rigorous quality testing to ensure strict compliance and adherence to Australian and international industry standards."

GWG offers more just an extensive range of pipes, fittings and valves. It also offers a complete range of electrofusion couplings, welding equipment, galvanised stainless steel flanges, backing rings, tapping saddles, rubber expansion joints, gasket sets and specialised machinery and tooling.

For more information, visit
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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.



- 1 **1st stage**
big particles are retained on the top of the filter
- 2 **2nd stage**
small particles are trapped in the mid stage of the filter element
- 3 **3rd stage**
the smallest particles are trapped in the lower and compressed part of the filter.



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.



ters. 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.

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 an easy to understand 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**



Plug and play solutions for logging and retrieving data.



THE NEXT GENERATION IN OIL FILTRATION

We specialise in providing solutions to improve oil cleanliness and condition by utilising Triple R depth elements.

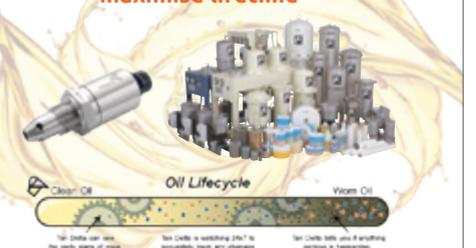
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The 3 stages of filtration in the element ensures that the oil remains free of water, varnish, sludges and particles.

Applications include:

- Hydraulic systems
- Diesel and Gas driven engines
- Lubrication oil systems for
 - › Compressors
 - › Gearboxes
- Metal working fluids
- Heat transfer fluids

Measure and treat oil to maximise lifetime





MEET THE EXTRAORDINARY UPTIME CHALLENGES OF MINING

**Valtek®
Survivor™**

Advanced Erosion
Control for Slurry and
Flashing Applications.

Mining is tough on equipment, tough on the workers who operate it, and tough on the operations. Because we know our way around the mines, we can help you minimise hazards while maximising uptime.



FLOWSERVE®

As mines are located all over the world, often in obscure and hard-to-reach places, our local Quick Response Centers (QRCs) are located where you are. This ensures we have what's needed to service your mine and get you back up and running within hours. In fact, our long and distinguished industry record logs less uptime loss than our competitors.

Safety first and foremost—for your employees and the environment

Flowserve engineers its products and services to ensure that everyone at the mine—and the environment around it — is safe and secure. In fact, our safety record is second to none.

Extend valve life in extremely erosive and flashing applications

The Valtek Survivor control valve provides outstanding service life in extreme applications experiencing severe erosion due to flashing fluids that contain abrasive particulates.

Valtek Survivor valve installed in flashing slurry letdown service.



Process fluids that flash or outgas dramatically increase fluid velocities, resulting in severe erosion. The unique Survivor design stands up to near-sonic velocities and abrasive fluids, even in services containing corrosive fluids.

Engineered to last

Building on the solid performance of the popular Valtek Mark series of control valves, the Survivor incorporates special features that enable it to withstand the most severe applications.

- The sweep angle design significantly reduces erosion by making the flow turn gradually, rather than a sudden change in direction, which would increase erosion.
- The clamped seat ring design simplifies maintenance and extends service life. It eliminates the need for a cage, without introducing internal threads that will seize and make the seat ring difficult to remove.
- Special packing configurations provide extra protection in services where particulates could cause packing leaks.
- Optional seat extensions are available to protect tank walls and other downstream equipment from damaging jets associated with flashing.*
- Optional ceramic trim provides durable control in corrosive, flashing, slurry, high-velocity or other erosive applications.

Longer life through better erosion control

A valve is only as reliable as its weakest design element.

Erosion, corrosion and flashing applications can take a costly toll. Every part of the Valtek Survivor control valve has been designed and refined to withstand these

conditions. The result is a longer-lasting valve that helps you extend unit uptime.

Built for the toughest applications

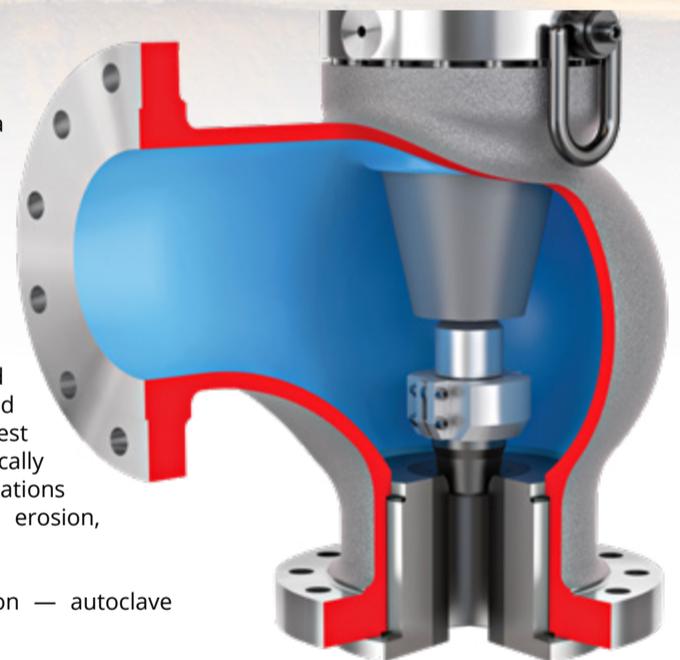
Since the mid-1980s, the Valtek Survivor valve has helped mining and refinery operators extend valve life under the harshest conditions. It is specifically engineered for applications that include aggressive erosion, corrosion and flashing.

Typical mining application — autoclave level control:

- 20–25% flashing, resulting in sonic and even supersonic velocities
- 30–40% erosive crushed raw ore
- High concentration of sulfuric acid
- 61 bar (885 psi) inlet pressure; 50.5 bar (733 psi) pressure drop
- 270°C (518°F) inlet temperature

Specifications

- Sizes DN 25–350; NPS 1–14
- Body form Sweep angle
- Pressure rating PN 10–250; ASME 150–1500
- End connections Raised face flanged, RTJ
- Packing PTFE, graphite, AFPI, SafeGuard, SureGuard, customs available
- Actuator types
- Double-acting cylinder with fail-safe spring (25, 50, 100, 200, 300 square-in cylinder); electro-hydraulic
- Positioners Valtek®, beta pneumatic and electro-pneumatic;
- Logix series digital positioners
- Shutoff Metal seats: Class IV and V
- Ceramic seats: Class IV



Selecting the right materials for your application

Flowserve has spent decades developing and perfecting the ceramic trim options for the Valtek Survivor control valve.

Many times harder and more resistant to both erosion and chemical attack than traditional valve materials of construction, ceramics can greatly extend valve service life. Flowserve's extensive experience can assist in guiding the user in selecting a suitable ceramic tuned for the application.

A range of ceramics is available to meet the needs of:

- Erosion resistance
- Chemical compatibility
- Thermal shock
- Fracture resistance

For more information visit
<https://www.flowserve.com/en/>

AMR



up to
8
metre
sheets!

ENDURA CLAD: LEADING THE WAY IN WEAR PLATE TECHNOLOGY

Regarded as one of the most important components that manufacturing and industrial companies need, wear plates are used to keep machines safe and offer protection from all kinds of damage.

They can be applied and installed to a wide range of mining and industrial equipment including crushers, chutes and buckets to secure and prolong the lifespan of a part or component, increase productivity and efficiency and enhance the quality of results.

When it comes to the wear plate industry, one Australian company prides itself on being a global leader.

With offices in WA and Queensland, Enduraclad International prides itself on supplying the world with wear solutions. It is committed to providing high-quality products and servicing customers in a safe working environment.

Beginning in 2011 from owner and managing director Jason Kell's garage on donated tools, the company grew rapidly when he was given the opportunity to rent a small factory space in an unused facility in Rockingham.

This is where he installed a borrowed plasma cutter which allowed him to cut steel internally, entering a market that demanded urgency to supply but wasn't available.

Since 2014, Enduraclad has been the recipient of many business awards, with the most honoured being Medium sized business of the year from the Telstra Business Awards in 2017 and Optus manufacturing business of the year in 2018.

Rio Tinto Supply Contract

Being awarded a three-year contract from Rio Tinto for the supply of chromium carbide overlay wear plate is an exciting new chapter for Enduraclad International.

This contract provides a steady and long-term partnership with one of Australia's

leading mining companies, ensuring a stable and consistent demand for Enduraclad's manufactured products.

With Rio Tinto's extensive mining operations and their commitment to quality, safety and efficiency, the contract signifies a recognition of Enduraclad's like-minded operations along with expertise and reliability.

The contract opens up opportunities for growth and expansion, allowing Enduraclad to invest in advanced manufacturing processes, increased production capacity and further enhance the quality of their chromium carbide overlay wear plate.

Additionally, the contract establishes a strong reputation in the industry and serves as a solid foundation for attracting new customers and partnerships, ultimately leading to sustained business growth.

Local Plate Manufacturing Including Eight-Metre Sheets

With eight uniquely engineered robotic controlled weld overlay machines at their Henderson facility, manufacturing wear plate locally brings forth numerous benefits, particularly in terms of plate size, fast turnarounds and integrity.

By producing overlay plates up to eight meters in length, it eliminates the need for extensive imports and reduces transportation costs.

Enduraclad's local production capability enhances supply chain efficiency and ensures timely availability of large-sized plates, meeting the specific requirements of various industries.'

Furthermore, fast turnarounds in manufacturing provide agility and flexibility in meeting customer demands, enabling quicker response times and reducing project timelines.

The close proximity of the manufacturing facility allows for streamlined communi-

cation and collaboration, resulting in improved customisation options and faster order fulfillment.

Additionally, local manufacturing ensures greater control over the entire production process, ensuring high-quality standards and maintaining the integrity of the weld overlay plate.

It allows for strict adherence to industry regulations and quality control measures, fostering customer confidence and satisfaction in the reliability and performance of the locally manufactured products.

Emex

The latest in wear plate technology developed by Enduraclad is Emex overlay produced in premanufactured wear plates as well as being applied to G.E.T castings to provide additional wear life beyond traditional overlay products.

Developed using proprietary and patented technology, Emex is fast becoming the new standard in wear protection.

Weld Overlay

Manufactured to world-class standards under strict Australian safety guidelines, Enduraclad's range of welded overlay liners is amongst the industry's best.

Different welding processes are better suited to different metals and fabrication projects and Enduraclad ensures the welding process yields adequate penetration and strength and that it will also meet the budget and timeline of the project.

Enduraclad's products are generally thicker and longer lasting than others in the market with its 32mm thick overlay rapidly developing into 50mm thick.

Enduraclad's ECI60 is widely used amongst civil and earthmoving applications, ECI80 is suitable for high wear areas and Superflow is used to promote material flow and minimise friction.

CTC6000 and ECI MAXI are the super ex-

treme wear plate designed for applications that experience severe abrasion and moderate impact.

Castings

Enduraclad's Endurablock products are used to prolong wear life on fixed and mobile plant equipment that is subject to high abrasion.

Its wear buttons offer excellent wear protection and are extensively used in hotspot areas found on heavy equipment such as buckets, loaders, draglines and excavators while its wear bars can be formed and welded onto flat or curved surfaces, allowing them to be used on a range of fixed plant and mobile equipment including buckets and chute liners.

Ceramics

Typically outlasting standard metallic overlay and giving a longer life expectancy, advanced ceramics have been the proven frontrunner in wear protection.

Ceramic wear liners are in high demand for protecting areas with extreme sliding abrasion from bulk material handling, particularly in coal and ore mineral applications.

With its superior mechanical and physical properties, Enduraclad's Enduratile withstands intense flow applications under extreme conditions.

The company's Enduratile rubber ceramic and Enduratile XT rubber ceramics consist of extremely wear resistant zirconia toughened alumina ceramic tiles bonded to a 250-grade steel backing plate.

The endurables are made up of very dense, high grade alumina ceramic tiles — a material almost as hard as diamond. **AMR**



Supplying the World with Australian-Made Wear Solutions



Australian innovation since 2011, Enduraclad International is an independent one stop shop provider of wear solutions.

With offices in WA and Queensland, Enduraclad International prides itself on supplying the world with wear solutions.

It is committed to providing high-quality products and servicing customers in a safe working environment.



Phone
(08) 9437 4506

Email
perth@enduraclad.com.au



enduraclad.com.au

AUSTRALIAN DESIGNED FOR AUSTRALIAN CONDITIONS



Since 2004, ground engaging tools leader Wear Parts Australia (WPA) has specialised in the production of high-quality, longer-lasting machine parts designed to withstand the toughest Aussie conditions.

WPA has filled the void in the market for machine operators that demand the best earthmoving parts for when they want to dig for longer and shift more payloads. Whether it's high quality bucket teeth, more durable cutting edges, or extreme performance rippers, WPA's products are built to last.

Australian designed from the ground up, WPA understand the importance of using the best materials and techniques to produce products you can count on. They hold a hardened focus on wear performance innovation and product quality, propelling them to top tier status as a trusted GET supplier. By embracing an innovative approach and deep industry experience, WPA's team of experts constantly work on developing new technologies that redefine wear life.

XP® Range

Exclusively developed by WPA, the XP® range of extreme performance wear parts is specifically designed to deliver a better quality product to suit the most abrasive and toughest earthmoving applications. "We have created a product that is unmatched in terms of durability, efficiency, and cost-effectiveness," said WPA Director Sean Mason.

"Our goal is to provide customers with products that exceed their expectations. That's why our team is committed to pushing the boundaries when it comes to innovation, to deliver superior wear performance and wear life, as well as a solid return on investment on every wear parts changeout, and every machine in their fleet.

"From materials like our 1XP® Advanced Wear Steel and 2XP® Cast Alloy, to our cutting edge heat treatment processes like Advanced Through Hardening and Double Tempering, we strive to provide the best solutions for our customers in every application."

Forged Scarifiers

Historically, WPA has observed too many customers experiencing frequent issues with their scarifiers, which led to downtime and unnecessary maintenance costs. The company identified that the industry standard metal used in manufacturing was not always strong enough to withstand the demanding conditions of the job.

The WPA team took decisive action and switched to forged steel in order to provide customers with an alternative that would stack up and meet the tasks at hand.

"The results were remarkable, with the higher quality forged steel offering higher durability, strength and resistance to breaking," he said.

"The shanks made from forged steel are able to withstand harsh conditions, and significantly reduce the frequency of breakages. This saves our customers time and money, allowing them to focus on the job at hand without the fear of breakdown.

1XP® Cutting Edges

The 1XP® advanced wear steel represents WPA's commitment to continuous improvement and product innovation. The key ingredients in 1XP® wear steel create a unique cutting edge with 'work hardening' capability, which means the harder you work, the harder the steel becomes.

As proven in several trials in the toughest, most abrasive conditions, 1XP® wear steel delivers substantial wear performance improvements of up to 30 per cent, compared to the industry standard 30MnB steel that other market players supply.

This innovation extends to improving material flow with **sharper bevels and clean**

ramp angles, which reduce loading times, whilst also addressing critical running costs by improving fuel burn and reducing tyre wear.

Tougher Ripper Boots

Cast using 2XP® wear alloy, WPA's XP-R® ripper boots are subjected to longer exposure times during normalisation, and then effectively double heat treated to create a tougher, more resilient casting. Increased toughness means less chance of breakage, higher performance, and extended wear life in even the most extreme applications. The XP-R® ripper boots continue to outperform other brands that may simply fail or wear out, enabling customers to work longer and hit production targets faster.

"Our team works tirelessly to ensure every product produced not only meets the highest industry quality standards, but meets our own standards of excellence," said Mason.

"We're well aware that our customers rely on us for high quality, longer-lasting machine parts, and we stop at nothing to deliver on that promise.

"One of the ways we set ourselves apart from the competition is through our focus on customer service as we believe that building strong relationships is essential to success. That's why we work closely with each of our customers to understand their unique needs, and devise tailored solutions that meet those needs. Whether you're a small business owner or a major mining operation, we're committed to providing the same high level of quality service and support.

For more information, visit
www.wpa.com.au

AMR



WPA[®]

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NOT ALL PARTS ARE MADE THE SAME

The **WPA** team are your GET experts. If you have used us before, Thank You! and we look forward to your continued success. If you haven't, we look forward to working with you!

Our core business is providing you with the best GET solutions, exceptional GET products, to maximise machine uptime, on your projects, for your plant, and ultimately for your business.

Over 19 years we have developed our own metallurgy, our own **WPA** branded products, and have introduced a growing number of innovations and enhancements to existing ones.

Teeth, cutting edges, rippers, grader blades, shims, bucket armour, chocky bar, and much more

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COMBAT WEAR WITH TUNGSTEN CARBIDE



Extending the service life of critical wear components on any mine site or oil and gas production plant is a top priority for operators, fleet managers and maintenance teams alike. In these environments, equipment is subjected to extreme temperatures, corrosive substances, and abrasive conditions that impact the performance of those parts.

Whether it's hardening excavator and dozer buckets or reinforcing cutting edges, operators rely on equipment manufacturers and parts suppliers to help them push their gear to the limits and keep it running harder in the field for longer.

Maintaining high machine availability, hitting production targets, and lowering operational costs are dependent on not only the performance of the equipment at hand, but the protective coating or material fused within it. This is where the applica-

tion of advanced solutions and techniques such as tungsten carbide hardfacing grit and tungsten thermal spray coatings prove highly effective in improving the performance and reliability of wear components.

When it comes to crafting high performance solutions to combat the most extreme wear, Australian company Tungmet has the industry covered.

Established in 2011, the company is a specialist in everything tungsten carbide, continuing to help earthmovers and drillers protect their assets in the harshest conditions. In the Australian market, Tungmet are distributors for world-class manufacturers of tungsten carbide and wear solutions including thermal spray powders.

Tungmet has gained recognition as a specialist supplier of high-quality tungsten

hardfacing grit within the mining industry. Its crushed tungsten carbide grit is screened to meet a variety of different specifications and sizing requirements, particularly in hardfacing applications for components such as bulldozer blades, bucket teeth, valves and pumps, drill bits and compressor blades.

"Tungsten carbide grit provides long lasting wear protection in areas of high abrasive wear," said Tungmet Manager, George Boxsell.

"It is an efficient means of protecting machinery and related parts by providing a significant increase in the longevity and durability of those parts, which reduces downtime and the associated cost involved with unprotected parts.

"Our tungsten thermal spray coating also provides an exceptional level of wear re-

sistance that extends the longevity of wear components. It acts as a protective barrier against abrasion and erosion caused by tough operating conditions, and reduces the frequency of maintenance and replacement cycles.

"As any mine operator or driller knows, corrosion is huge problem when you're working in corrosive environments. This is where tungsten thermal spray coating really makes an impact as it forms a dense and impermeable layer on the surface of parts, providing a barrier against corrosive agents. It inhibits the formation of rust, oxidation, and other types of chemical degradation, extending the service life of components and reducing the risk of equipment failure."

For more information, visit www.tungmet.com.au

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TUNGMET
TUNGSTEN METALLURGICAL

If you're looking for high performance solutions that extend the wear life of your critical parts, it's time to choose Tungmet!

Whether it's hardening excavator and dozer buckets or reinforcing cutting edges, our tungsten hardfacing grit and thermal spray coatings will help you push your equipment to its limits, keeping you working harder for longer.

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ESET AND ITS PLAN TO ESSENTIAL 8 ALIGNMENT

In today's world, cybersecurity has gone from being an afterthought to a critical consideration for businesses.

To help Australian businesses identify and prioritise areas of protection, the Australian Government introduced a curated suite of eight cybersecurity risk mitigation strategies known as the essential eight.

Businesses, including mining companies, hoping to align with the essential eight face the challenge of selecting and implementing the right tools to execute each strategy.

The increasing options and the continuing influx of new solutions can make it difficult to identify cost-effective solutions that maximise protection.

What are the Essential Eight?

Introduced by the Australian Cyber Security Centre (ACSC) in 2017, a list of 37 strategies that can mitigate cybersecurity incidents was created.

The ACSC then categorised each based on its relevance to Australian businesses, ranging from 'essential' to 'limited' with those categorised as 'essential' becoming the essential eight.

Each element in the essential eight focuses on a different aspect of cybersecurity including application control, patch applica-

tions, user application hardening, regular backups and multi-factor authentication.

Others include configure Microsoft Office macro settings, restrict administrative privileges and patch operating systems.

The essential eight — recommended by ACSC — for all organisations to implement is fast becoming the de-facto cybersecurity framework in Australia, giving organisations a pathway to begin and progress their cybersecurity journey.

How ESET Can Help

With over 30 years of technology-driven innovation and backed by the world's best threat intelligence and research, ESET fills the void by delivering robust and flexible solutions.

By covering many essential eight aspects, ESET's solutions can reduce both cost and complexity whilst increasing the ease and speed of implementation of the essential eight.

Notably, its solutions not only meet but frequently surpass the requirements of the essential eight.

ESET's Endpoint Detect and Respond toolset provides multiple layers of defence to prevent malicious macros from running, its reporting functionality enables administrators to remove disallowed ap-

The Risks of Poor Patch Management

Unpatched vulnerabilities that can be exploited by threat actors can be extremely costly



Average global data breach cost in 2022 was **\$4.35 million** (up 2.6% compared to 2021)

57% of cyberattack victims said their breach was due to unpatched vulnerabilities



34% knew of the vulnerability but failed to apply patches in time

Source: www.cyberbr.ibm.com/blog/the-risks-of-poor-patch-management

eset Digital Security
Progress. Protected.

lications, and the ESET Identify console allows you to configure asset identification and operating system vulnerability.

ESET PROTECT scans the environment and highlights vulnerabilities and missing patches, ESET Endpoint Protection provides a comprehensive solution to prevent the execution and spread of malware and ESET's Secure Authentication helps implement the highest level of multi-factor authentication across VPNs.

With high usability and unparalleled speed, ESET is dedicated to protecting the progress of its customers and ensuring maximum protection.

To learn more about how ESET enables organisations to meet the Essential Eight, please get in touch with our team.

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Progress. Protected.

EFFECTIVE PROTECTION FOR STEEL AND CONCRETE COMPONENTS

Steuler's rubber linings provide effective protection for steel and concrete components against chemicals, mechanical attack and organic contaminants.

Depending on the medium and temperature, Steuler uses materials based on natural rubber, halobutyl rubbers, chloroprene and styrene-butadiene rubbers.

Steuler's rubber linings are used at temperatures up to about 120°C. A unique feature is its KERABUTYL HT, which extends the application range of rubber linings up to 150°C.

Rubber linings offer:

- high chemical resistance to a wide range of different media;
- high flexibility, which allows use even with movement in the substrate;
- high resistance to abrasive loads;
- high resistance against diffusion.

As a full-service supplier, Steuler offers the optimum quality for every application, every timeframe and every installation situation.

Steuler has extensive internal tests to assess their rubber lining's chemical resistance and many years of experience in application and external tests, such as technical approvals or confirmation of suitability in the potable water sector.

ON-SITE RUBBER LININGS

Steuler's on-site rubber lining systems are

the means of choice when the application of rubber lining is required directly on-site at the construction site or at our customer's plant.

They are used, for example, when vessels are too large and heavy for transport or vulcanisation would be technically impossible or too time-consuming.

For large or built-in vessels, Steuler draws on a range of rubber linings that can be vulcanised on-site without the need for an autoclave.

These rubber linings achieve similar properties to autoclave vulcanised materials without the need to transport the vessels to be lined.

If on-site vulcanisation is not possible, self-vulcanising grades that vulcanise even at ambient temperature can be used.

Alternatively, pre-vulcanised grades can be used, which are ready for use just a few hours after bonding.

The focus is on easy transport of the sheets

already vulcanised at the workshop, extremely safe processing with Steuler's new KERATEX adhesive, as well as fast commissioning.

WORKSHOP RUBBER LININGS

For transportable components such as smaller tanks, pipelines and filter plates or mobile units such as transport vessels and ISO tank containers, rubber lining at the workshop is an option.

Thanks to the use of unvulcanised and thus easy-to-process rubber sheets, even highly complex components such as filter plates or fans can be lined without any problems.

The final vulcanisation in the autoclave leads to optimum adhesion in the seams and between rubber and steel.

Steuler's materials for workshop rubber linings are optimised for easy application in combination with maximum chemical and thermal resistance:

From conductive hard rubber linings with

high tolerance to organic contaminants even at temperatures above 100°C to soft rubber linings for the alternating transport of a wide variety of media such as waste acids, mixed acids, chlorine bleaching lyes and rubber linings for pipes subject to high abrasive loads.

In Steuler's portfolio, clients can find the right system for every application.

REPAIR SYSTEMS

Even the best rubber lining can be damaged at some point.

Minor damage caused, for example, during the cleaning of vessels or the installation and removal of scaffolding or built-in parts can be quickly and easily repaired with the help of our repair mortars in order to maintain operations.

Depending on chemical and thermal load, these mortars can serve as a permanent repair or at least provide corrosion protection until the next scheduled period of downtime and repair with the original material. **AMR**

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STEULER | Linings

DRILL BITS FOR DRILLERS



Hard Metals Australia is an Australian based manufacturer of interface products for the drilling, construction and agricultural industries.

Our philosophy is firmly entrenched on the understanding clients spend significant amounts of capital on machines to perform dedicated tasks in pursuit of a commercially positive outcome for their projects. What is often overlooked is the interface between that machine and the project.

This is where Hard Metals specialises. With

over 40 years of experience in the design of drilling tools, Hard Metals has an impressive portfolio of IP and exceptional tools now sold overseas through agents and our subsidiaries in Canada and the USA.

Our list of accomplishments includes the Wombat Hole Opener which has been accepted by the North American Drilling Companies for Oil and Gas Applications.

The original variant was based around PDC cutting elements.

The latest upgrade will enable the reamer to use TCI Roller Cones for difficult and very hard conditions.

The new Wombat Rock Roller has been developed to allow drilling in these extreme conditions where PDC drilling is not suited.

The Wombat Rock Roller is equipped with premium roller cones, designed specifically for HDD applications.

Because the roller design is interchangeable with the standard Wombat body,

existing PDC reamer wings can be easily swapped when the requirement arises. The Wombat hole opener is a significant step forward in the art of reaming and hole opening.

With built in stabilisation, the flexibility of simple replacement of cutter types and diameter in the field combined with excellent down the hole performance make this a worth accessory to any drillers tool box.

The future of HDD hole opening is here...
AMR

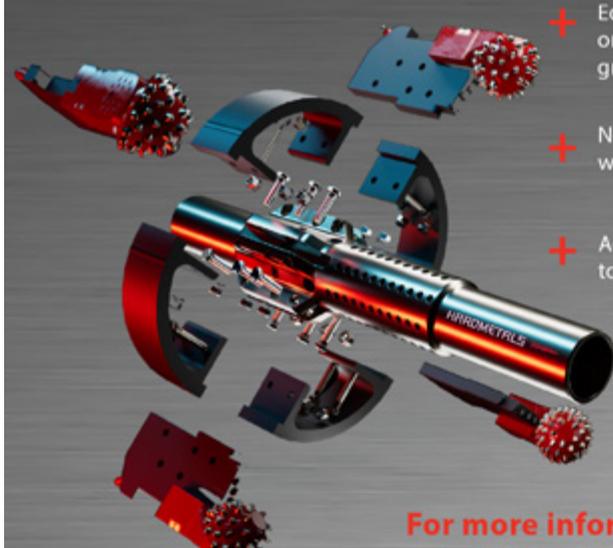


ROCK ROLLER

The new Wombat Rock Roller has been developed to allow for drilling in high hardness and unfavourable conditions where our PDC Wombat is not suited.

The Wombat Rock Roller is equipped with premium roller cones, designed specifically for HDD applications. The service life of the Wombat Rock Roller is greatly improved with added gauge protection.

- + Equipped with tungsten carbide insert or mill tooth rollers to cope with difficult ground conditions.
- + New roller design is interchangeable with existing carbide or PDC reamer wings.
- + Additional gauge protection added to ensure reduced wear of the shirrtail.



For more information, contact:
sales@hardmetals.com or (02) 9009 4455

PDC HOLE OPENER

Make your HDD projects run efficiently with the Wombat Hole Opener. The Wombat features innovative field replaceable cutting wings, roller cones, tungsten carbide wings and PDC as required for any and every condition. This flexibility allows for worn cutters to be changed out and cutting diameter increased without requiring removal from the drill string. Combined with in-built stabilization and superb down hole performance, the Wombat is a worthy addition to any professional driller's toolbox.

- + Quickly and easily change diameter with replaceable cutters from 10" to 60"
- + Patented ring design to improve structural rigidity and simplify the assembly and disassembly process
- + Tungsten carbide gauge protection for improved stability during drilling
- + Premium grade PDC's for improved bit life and impact resistance
- + Backout teeth to protect the reamer during a tripout



Standard Body Types	
Product Code	Item Description
RB1.54	Wombat Reamer Body 2 3/8" IF D=10"-16"
RB2.54	Wombat Reamer Body 2 3/8" IF D=16"-22"
RC1.54	Wombat Reamer Body 2 7/8" IF D=10"-16"
RC2.54	Wombat Reamer Body 2 7/8" IF D=16"-22"
RD1.54	Wombat Reamer Body 3 1/2" IF D=12"-24"
RD2.54	Wombat Reamer Body 3 1/2" IF D=18"-30"
RE1.54	Wombat Reamer Body 4 1/2" IF D=12"-30"
RE2.54	Wombat Reamer Body 4 1/2" IF D=16"-36"
RF1.54	Wombat Reamer Body 6 5/8" IF D=16"-28"
RF2.54	Wombat Reamer Body 6 5/8" IF D=24"-42"
RF3.54	Wombat Reamer Body 6 5/8" IF D=36"-60"

Custom sizes available on request.



SLURRY MICROTUNNELLING WITH PRECISION

Digging trenches and boring through hard rock beneath the surface isn't for the faint hearted. It requires a special set of skills and a high degree of technical knowledge to successfully navigate the challenges faced in a harsh, subterranean environment.

From the installation of stormwater, sewerage, and pressure pipelines, to road and rail culverts, you're bound to encounter a variety of ground conditions such as rock, sand, clay and water, which all require specific piping and boring techniques.

Fortunately, whatever the job at hand, Perth based slurry microtunnelling and civil works specialists, GM Microtunnelling, have been horizontal boring for 49 years, helping contractors elevate their projects to the next level.

The company's General Manager Gary Miller and father Jim, founded Western Australia's first horizontal boring company, Horizontal Under Road Boring, in the early 1970s. Starting out with the Grundomat Air Tool, in 1974 Gary and Jim soon realised the demand for horizontal boring larger pipe diameters, where he purchased auger boring machines from America that were capable of boring up to OD 1600mm.

During this time, Gary also tried his hand with pipe cracking up to OD 600mm and pipe ramming up to OD 600mm.

Gary taken over the Business in 1986 since then, Gary has kept pace with the latest trenchless technology, investing in a fleet of Iseki TCC, TCZ and TCS slurry microtunnelling equipment including six complete systems that enable his team to bore up to OD 800mm.

"At GM Microtunnelling, working as both head contractors and subcontractors, we specialise in sewerage, water and drainage works, often partnering with project engineers to provide advice in relation to planning and technical aspects," said Gary.

"When we work with consultants on different projects, they always seek my advice on what solution will work best. They realise that we understand the complex nature of the work we do, and that's reflected in the quality of our service.

Our team participate in ongoing training and development programs to ensure we remain up-to-date with evolving industry regulations and trenchless technology."

Microtunnelling Made Easy

Slurry microtunnelling is a trenchless construction method for installing pipelines beneath buildings, highways, railroads, runways, rivers, and environmentally sensitive areas. It is particularly suited to gravity sewer, water and drainage pipelines as the process is extremely precise with deviations from target less than +/- 10mm over 160m.

GM Microtunnelling knows its way around different pipe materials and applications. It works with PVC, steel, RCP, VC and GRP from 150mm to 800mm in a range of ground conditions and bore lengths.

"Our microtunnelling solution is essentially a Lazer guided, pipe-jacking operation that provides continuous support to the excavation face by applying fluid pressure to balance groundwater and earth pressures," he said.

"We currently specialise in sewer microtunnelling DN300 and DN375 PVC series 2 jacking pipes, and work with clients to customise a system to suit their specific requirements."

Gary explained what is considered a very methodical process and what you need to consider when approaching trenchless construction works.

"The microtunnelling process requires jacking and reception shafts at the opposite ends of each drive. A microtunnel boring machine (MTBM) is pushed into the earth by hydraulic jacks mounted and aligned in the jacking shaft. The jacks are then retracted, and the slurry lines and control cables are disconnected.

"We then lower a pipe or casing into the shaft, which is inserted between the jacking frame and the MTBM or previously jacked pipe. Slurry lines, power and con-

trol cable connections are made, and the pipe and MTBM advance by another drive stroke. This process is repeated until the MTBM reaches the reception shaft.

"Upon drive completion, the MTBM and trailing equipment are retrieved and all equipment is removed from the pipeline. Precise control of line and grade is accomplished using the laser guidance system and steering jacks to locate and steer the MTBM during a microtunnelling drive."

Microtunnelling delivers several benefits that ultimately drive project success, whilst improving safety by mitigating risks to workers and the public.

Aside from greater accuracy to line and grade, microtunnelling minimises traffic interruptions and allows access to areas that aren't usually accessible via open cut trenching, such as under railway lines, buildings, waterways, highways, trees and vegetation. It is also a more environmentally-friendly method.

Additionally, no dewatering of the entire pipeline is required when working below the water table, as dewatering is only required in launch and receival pits.

For more information, visit www.gmmicrotunnelling.com.au/

AMR



THE LEADERS IN SLURRY MICROTUNNELLING & CIVIL WORKS

GM Microtunnelling is based in Western Australia, GM have 49 years of experience in Slurry Microtunnelling and the expertise you need for your next project. Working as both subcontractors and head contractors, GM specialise in sewerage, water and drainage works statewide.

We utilise the latest technology in boring that includes the Iseki range of Slurry Microtunnelling equipment. With six complete systems and 11 heads in our fleet, we can microtunnell from 150mm to 800mm pipe to line and grade using PVC, concrete, VC, GRP and steel pipes.



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GM
Microtunnelling



Clover Pipelines makes first-in-Australia contribution to Pilbara mining project

As you read this, production is about to commence on Fortescue's Iron Bridge magnetite mine, located 145 kilometres south of Port Hedland, Western Australia.

Construction on the project began in 2019 and Clover Pipelines was involved in the early design and specification stage for the borefields and return water pipelines package.

Clover is an integrated pipeline infrastructure business that combines strategic project consultation, product innovation and service excellence. We work with local and global partners to specify world-leading pipelines across Australia and the Asia Pacific region.

Our role in the Iron Bridge project was extensive. It included recommending material type and a constructability review.

It also covered manufacture, type testing, supply, delivery, unloading, de-nesting and staging at laydown site, as well as loading, transportation, and unloading from laydown to the construction site. Quality assurance, site inspections, verification of installation practices and supply of plant and labour were also critical elements of our contribution.

The project is significant for Fortescue, the world's fourth largest iron ore miner. The site incorporates the North Star and Glacier Valley ore bodies and, once fully operational, will deliver 22 million tonnes per annum of high-grade 67% Fe magnetite concentrate.

It was significant for Clover, as well. This is, to date, the largest and most complex mining project the company has participated in. It is also undoubtedly the most challenging.

The vast majority of the project was delivered at the height of the COVID pandemic. It goes without saying that this was a period of enormous economic uncertainty and constraint. On the 5th of April, 2020, Western Australian closed its borders; the restrictions were only lifted two years later. While the original design called for a steel pipeline, through a process of workshop consultation (including cost comparison, specifications, material data and type testing), we suggested an alternative product: glass reinforced polyester (GRP). Because the product can be delivered nested (and can then be de-nested on site), it had the potential to reduce the material freight costs by more than fifty percent. Despite being lighter, easier to handle and quicker to install than steel, the corrosion-resistant material has a nominal working pressure rating of PN35 (3,500kPa) (or extremely high pressure).

So what was the catch? It would be the first time GRP had ever been used in Australia in this application for mining.

Despite the pandemic and the obstacles that inevitably come from implementing something for the first time, we maintained an uninterrupted supply chain throughout the project, and recorded zero lost time injuries or medically treated injuries.

How?

Originally, Clover proposed to deliver the project in-house, using majority Clover employees. After the seriousness of the pandemic and the stringency of the border restrictions became clear, we quickly changed tack, and continued our work using Western Australian workers (including subcontractors). Adhering to our commitment to employing First Nations people, a significant contingent of these employees were local Indigenous labourers and operators. We also used local transport, local supplies and local services throughout the project.

Because senior staff and managers were unable to visit the site for the majority of the project's lifespan, it was managed

mostly remotely from Clover's east coast headquarters. Part of that remote management included the establishment and operation of a 100,000 square metre inter-modal site. We were required to conform to extremely strict Fortescue controls after achieving and maintaining prequalification as a mining contractor. We stringently adhered to health, safety, environment, security, fatigue management, working-in-heat and cyclone management protocols. In fact, we had more than one cyclone near miss over the period of our engagement.

In spite of the obvious limitations that come with remote management, we maintained these robust quality and safety processes, an experienced pipeline team and on-site supervision for the duration of the project.

Upon completing the contract, Clover had delivered very close to 20 million kilograms of product over 47,865 hours, including 179 kilometres of GRP pipe (of between DN900 and DN1100) and 571 individual fittings. It was, as we mentioned earlier, easily the largest, most complex and most challenging mining project we have ever worked on.

At the conclusion, we had contributed to the installation of the largest high-pressure GRP pipeline in the Southern Hemisphere.

Our success under trying circumstances demonstrated that our experience in pipeline infrastructure has transferred seamlessly not just into mining as an industry but into mining projects of significant scale.

Clover's experienced team combines robust and reliable service to deliver unique product solutions for a wide spectrum of mining and resource applications. Find out more about our experience in the mining and resources industry. [AMR](#)





WE ARE CLOVER, AN INTEGRATED PIPELINE INFRASTRUCTURE BUSINESS.



Clover hit the bullseye every time, even when the target was moving. That's the level of service we demand when you've got guys and machinery ready to go on site. It has to be perfect.



GET IN TOUCH WITH OUR TEAM

For additional information on product pricing, technical data, project support and more.

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BIG TED

Since Nivek Industries launched Big TED™ at the start of the year, there has been plenty of discussion around its potential for the mining industry.

A larger and stronger version of their renowned Tracking Elevated Device™, Big TED has been specially designed to make heavy mining equipment servicing more efficient, cost-effective and most importantly safer for the maintenance personnel.

Below, we take a look at how Nivek Industries' latest innovation can save you time and money on maintenance. Learn how to reduce risk, increase productivity and keep fitters safe on every shift.

Minimise expenses and maximise efficiencies

With Big TED, mine fitters can perform maintenance without chains and pulleys, saving your site invaluable time and money.

Big TED™ is a larger and stronger model of the original TED™, sharing many of its features and benefits. However, this new version can lift loads as heavy as 3,000kgs to a height of 1,600mm, all while keeping a low profile and ensuring easy manoeuvrability.

Big TED™'s rechargeable battery system

powers up to 2 hours of continuous operation. Operated by remote control, its robust drive system has sufficient torque to haul the heaviest loads within the workshop. Plus, the tracks enable travel over all terrains for deployment in the field, saving you money on equipment transport.

Perhaps Big TED's best feature is its unparalleled adaptability. Its range of versatile attachments can be mounted to the turntable or table front. With jigs in all different sizes and designs, there's no limit to the variety of tasks that Big TED can shoulder the weight of.

Nivek Industries offers attachments for both general servicing and more specialised maintenance work on Komatsu, Hitachi, Caterpillar, Liebherr Ultra Class and more machinery.

Stay on top of workers' safety

Lifting heavy components without support can be a major source of physical fatigue amongst maintenance personnel. Unfortunately, exhausted workers usually have lower levels of alertness, delayed reactions, reduced motor skills and compromised judgement.

Let Big TED take care of the grunt work during servicing and rebuilds. Its unique design makes a variety of tasks less physically demanding and hazardous for the

maintainers it helps. Ultimately, that means fewer onsite accidents, shorter servicing times and greater cost-efficiencies.

Put simply, Big TED makes the job safer and easier for everyone involved - and your workers can perform far better when they are not exhausted or injured.

Here's how you can service your digester pot faster and for less

Let's take a digester pot as an example.

The weight of this pot is usually between 1.5 and 2 tonnes. It typically takes up to three days to service a row of digester pots. Being in a hard to access location, the removal and installation is a physically-demanding task that can be extremely dangerous and costs approximately \$40,000 per hour in downtime.

On average, Big TED can help to get your digester pots reinstalled and back in action one whole day sooner. That's an estimated \$960,000 saved in down time every couple of months, not to mention freeing up the maintainers for further tasks a day sooner.

To achieve this, Big TED supports the digester pot whilst the maintainers undo the mounting bolts and safely lowers the pot and drives out from underneath the plant.

During installation is where Big TED excels, maintainers can drive the pot into position, safely raise the pot to the desired height and then with its side shift and powered turntable, maintainers can easily align bolt holes without having to wrestle the pot.

Thanks to its extra load-bearing capacity and functionality, the innovative product helps to make traditionally-challenging maintenance work safer, simpler and faster.

Think Big TED could make your mine site safer and more productive?

Developed by a fitter, for fitters, Big TED is now in high demand across the mining industry. Offering custom solutions based on each client's distinct requirements, Big TED and its tailored attachments ensure hard to reach suspended loads can be safely removed/installed.

Take the weight out of servicing with Nivek Industries' Big TED and the rest of its revolutionary mine safety products. The manufacturer's nationwide network of Service Agents can help to simplify your setup with onsite training and induction packages.

Request a catalogue or quote today.

AMR

BIG TED



TAKE THE WEIGHT OUT OF SERVICING WITH BIG TED.

A larger and stronger version of the renowned Tracking Elevated Device™, Big TED has been specially designed to make heavy mining equipment servicing more efficient, cost-effective and most importantly safer for the maintenance personnel.

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nivekindustries.com.au



ROXSET PROVIDING CUSTOMISED FLOORING FOR THE MINING INDUSTRY

After being founded over 30 years ago to resolve production flooring issues, Roxset continues to pioneer a range of innovative solutions to address flooring integrity, employee safety and workplace practices.

With its large in-house team and refined installation process, Roxset offer a 24x7 service throughout Australia, including remote locations.

From its large modern factory facilities incorporating a diverse fleet of trucks — ranging from small utes to HD semi-trailers — Roxset can provide customised tailored flooring to large, small and regional clients.

Roxset services a range of industries including food processing, pharmaceutical, industrial and mining, wineries and hospitality and clubs.

Roxset aims to provide a custom-tailored solution to suit all requirements and has developed a range of unique epoxy flooring and wall solutions called ROXSET SE to meet HACCP, BRC and AQIS Compliance.

The Roxset WS Super Bonding Agent allows for the bonding of cementitious screeds and provides superior bonding and ultimate strength while their expansion joints are made from pourable grade epoxy and provide a flexible result. Roxset's flooring systems have a graded

finish to waste outlets, ensuring liquid is correctly and efficiently drained.

Their flooring covering technology is unique in that it connects walls and floors to create a seamless 'One Surface' solution. By using wall to floor covering, excess waste liquid can be dispersed quickly, avoiding the effect of harmful bacteria growth.

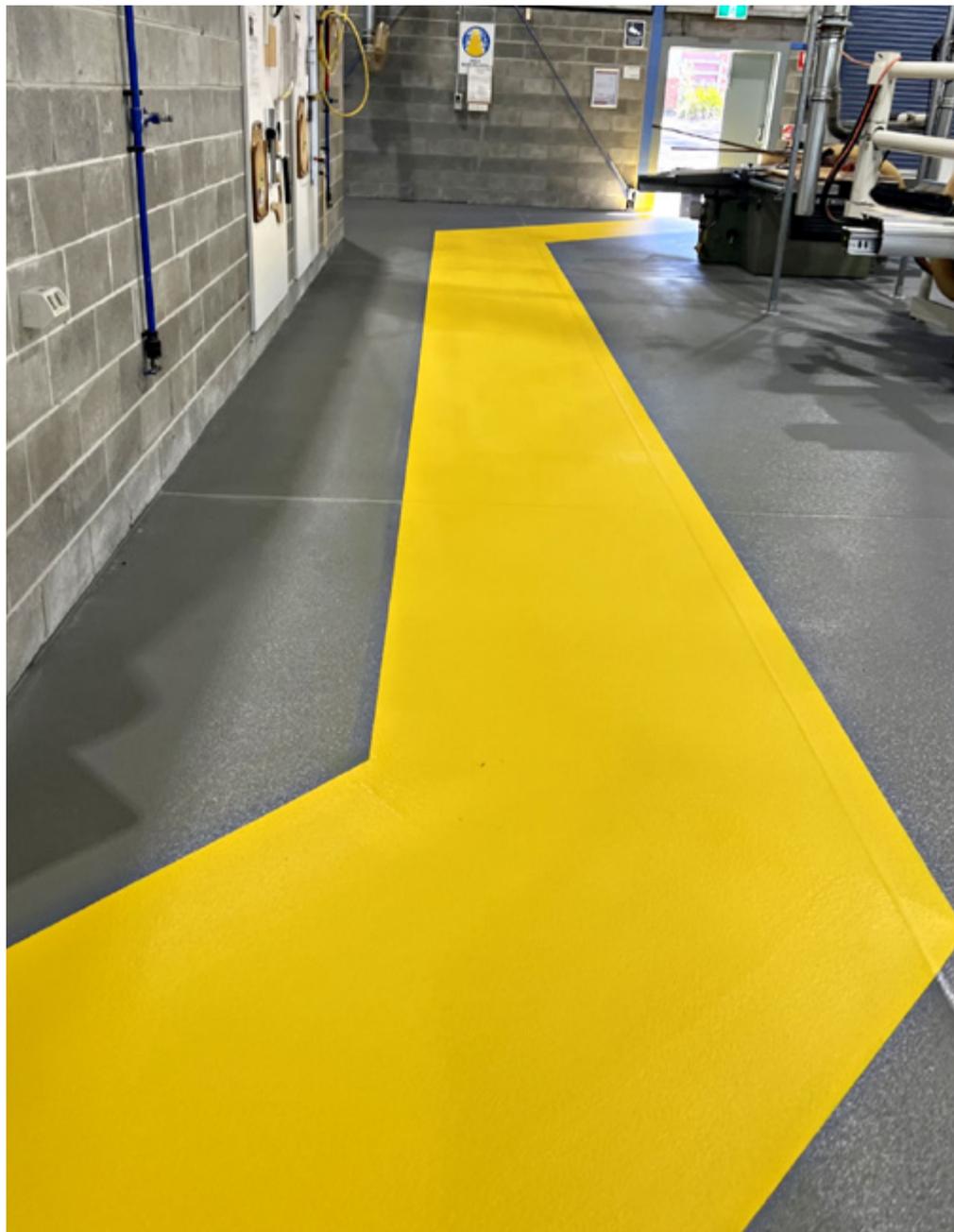
Flooring Solutions In Mining

As they are typically in remote exposed areas that are prone to heat, cold and dust, mining and industrial flooring can often face extreme challenges.

Roxset SE Flooring solutions for industrial and mining applications can withstand a broad range of impact abrasive conditions whether in heavy vehicle workshops, mess halls, kitchens and amenities. Recently, global mining giant Rio Tinto turned to Roxset to provide a long-term fail-safe solution for its vehicle maintenance area.

The Roxset SE heavy-duty epoxy mortar system was installed at 6mm, with minimum downtime and provides a shrink free, highly chemical resistant coating which has excellent thermal and impact resistance.

To find out more, visit <https://roxset.com.au/> or call 1800 769 738.

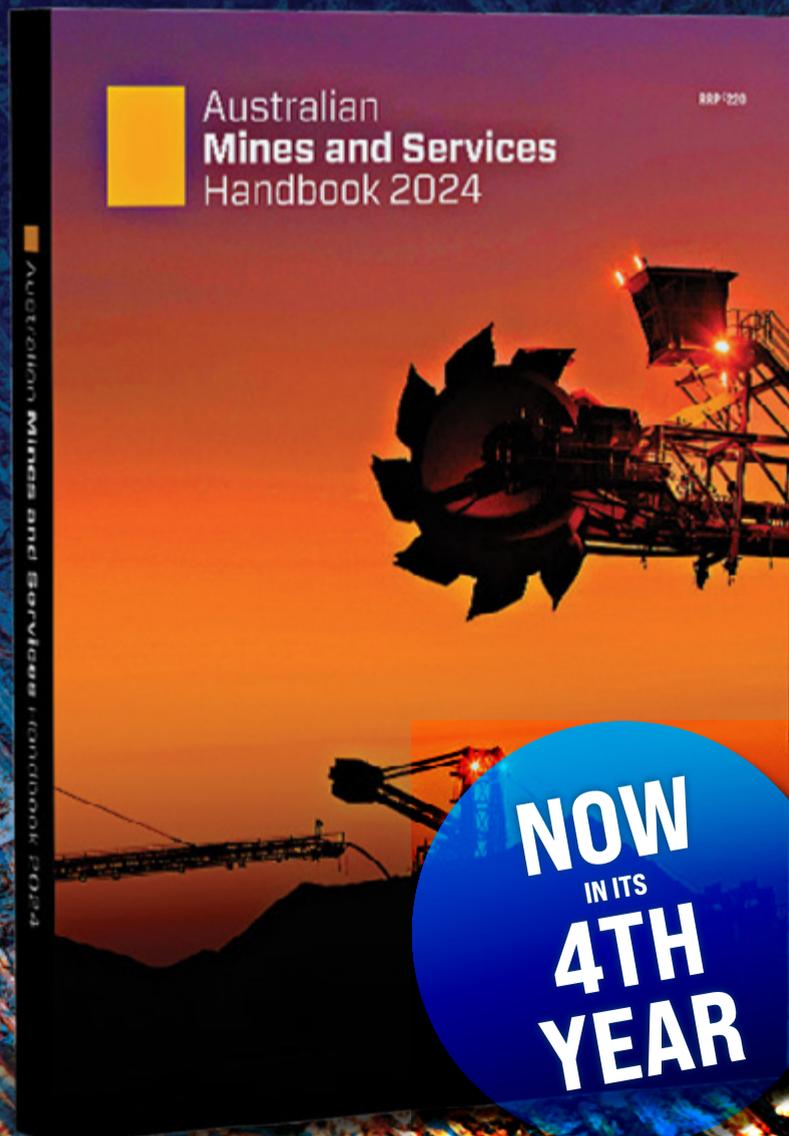


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The role of LiDAR and VoidMapper in Convergence Analysis in Mining

Convergence Analysis in Mining: The Role of LiDAR

Convergence analysis is the process of tracking changes in the rock in underground mines. It is used to monitor the structural integrity of mines and tunnels, and to detect hazards before they become major problems.

There are a number of factors that can contribute to convergence in mines, including:

- The type of rock
- The mining method
- The stress on the rock
- The presence of water

When the rock in a mine starts to converge, it can cause a number of problems, including:

- Tunnel deformation
- Rock falls
- Pillar collapses

These problems can pose a serious hazard to miners and can also lead to production losses.

LiDAR is a valuable tool for convergence analysis because it can provide accurate and repeatable data. Mobile LiDAR is particularly useful for this application because it can be used to collect data quickly and easily without disrupting production.

LiDAR works by emitting a laser beam and

measuring the time it takes for the beam to return. This information is then used to create a 3D point cloud of the environment.

The 3D point cloud can be used to track changes in the rock over time. This information can be used to identify areas that are at risk of convergence and to take steps to mitigate these risks.

In addition to tracking changes in the rock, LiDAR can also be used to:

- Map the mine
- Identify hazards
- Plan mine operations

The Benefits of Using LiDAR for Convergence Analysis

There are a number of benefits to using LiDAR for convergence analysis, including:

- Accuracy: LiDAR data is highly accurate, which can help mines to identify and mitigate hazards early on.
- Repeatability: LiDAR scans can be repeated over time, which allows mines to track changes in the rock and to identify trends.
- Speed: LiDAR can be used to quickly collect data, which can help mines to save time and money.
- Safety: LiDAR can be used to collect data without sending personnel to inaccessible or unsafe areas and without disrupting production, which can help to improve safety in mines.

The Role of VoidMapper in LiDAR-based Convergence Analysis

VoidMapper is a software platform that can automate the process of processing LiDAR data for convergence analysis. This can save mines time and money, and it can also improve the accuracy and reliability of the data.

VoidMapper works by using a cloud-based processing pipeline to automatically extract features from LiDAR data. These features can then be used to create a 3D model of the mine, which can be used to track changes in the rock and to identify hazards.

VoidMapper is a powerful tool that can help mines to improve the efficiency and effectiveness of their convergence analysis.

Conclusions

LiDAR is a valuable tool for convergence analysis in mines. It can help mines to improve safety, to save time and money, and to make better decisions about the management of their assets.

In the future, LiDAR-based convergence analysis is likely to become more widespread and more sophisticated.

Mines will be able to use LiDAR to track changes in the rock in real time, and to identify hazards before they become ma-

ior problems. This will help to improve safety in mines and to reduce production losses.

VoidMapper is the software platform that can automate the process of processing LiDAR data for convergence analysis.

The future of LiDAR-based convergence analysis is bright. The technology has the potential to make mines safer and more efficient. As the technology continues to develop, LiDAR and VoidMapper will become an essential tool for the management of underground mines.

Mobile Mapping SLAM products come in many forms, including handheld systems, backpack-mounted scanners or mounting SLAM systems on drones. GeoSLAM, is the market leader in SLAM technology, and its flagship handheld scanner, ZEB Horizon, was designed with versatility in mind. The ZEB Horizon is typically used as a handheld scanner, however, can be quickly mounted to vehicles, drones, backpacks, and a variety of other accessories.

Caroni in Australia is the expert in selling GeoSLAM's hardware and software, especially in the mining sector. Caroni is also the developer of VoidMapper and will guide you through the data capturing process and analyse the data and extract the right information effectively.

AMR

UNDERSTAND THE WORLD AROUND YOU



At **Caroni**, we understand the importance of spatial information in safeguarding your people and assets. Our spatial solutions enable effortless data capture, helping you improve productivity, reduce costs, and make more informed decisions.

Caroni is the developer of VoidMapper and authorised distributor of GeoSLAM solutions for the mining industry.

CONTACT

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Perth, WA 6000

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P: +61 8 6189 8709



Convergence Analysis

Our VoidMapper solution provide mine operators with a quick and safe workflow to analyse changes in rock movement, highlighting potential rockface instability. Operators can capture data in dangerous areas much faster than previously possible, making it easier to repeat scans, and VoidMapper will process and analyse the data accurately and reliably.

Stockpile Volumes

With GeoSLAM Volumes, mine operators can calculate stockpile tonnage within a few minutes, and monitor change over time. Handheld laser scanners can determine accurate stockpile volumes, silo reserves or mining tempos, without the need for GPS.

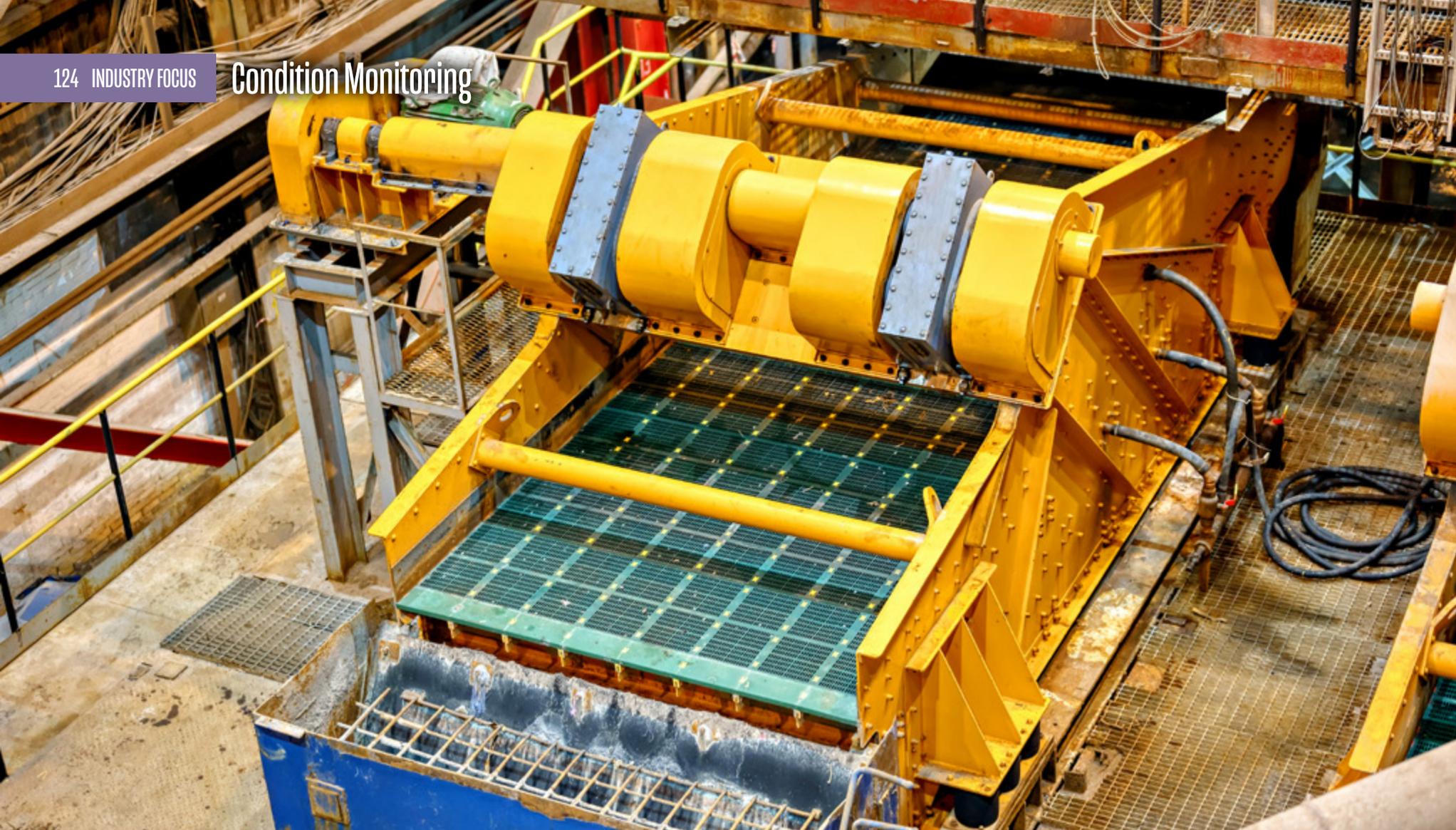
Shaft Inspection

Combining hardware and advanced SLAM, the GeoSLAM Shaft Inspection solution collects data in dangerous vertical shafts and locations with difficult access. It's a proven solution for mining companies to secure data insights that support quick, cost-effective decisions, whilst keeping personnel safe.

Production Mapping

GeoSLAM Production Mapping allows companies to make quick, short-term operational decisions on newly mined production areas. Rapid data capture minimises downtime and reduces costs, keeping operations on track with the agility to make any necessary logistical changes.





SPM INSTRUMENT PRESENTS PROCESS OPTIMISATION FOR VIBRATING SCREENS

For over fifty years, SPM Instrument have supplied high-performance condition monitoring solutions. As the global leader in condition monitoring technology, the company exclusively develops technology to measure, analyse and present condition data from complex machinery such as vibrating screens.

The recent introduction of its groundbreaking process optimisation solution is set to revolutionise the vibrating screen industry, with an innovative tool that maximises screen performance and operational efficiency.

Vibrating screens are indispensable in various production processes, and play a critical role in achieving optimal screening results in the mining, quarrying and construction industries. The key to achieving peak performance lies in ensuring uniform movement of the screen corners. Even a slight deviation from the desired motion can result in reduced efficiency, decreased throughput, and increased maintenance costs. Recognising the significance of this challenge, SPM's extensive research and development has resulted in a comprehensive screen performance monitoring solution that addresses these concerns head-on.

According to apt Group GM Geoff Soper, the advanced solution provides operators with a highly detailed and real-time visualisation of screen motion.

"By leveraging cutting-edge sensor technology and sophisticated algorithms, the solution accurately captures and analyses the dynamics of the screening process. Operators can easily access and interpret the data, gaining valuable insights into the performance of the vibrating screen. This

enables them to make informed decisions that increase efficiencies and maximise productivity."

"A high performing vibrating screen not only delivers exceptional performance, but it also extends its working life by minimising wear and reducing the need for manual cleaning of the screen decks."

"Traditional maintenance practices often rely on predefined schedules or reactive approaches that can lead to unnecessary downtime and increased costs. However, with our process optimisation tool, operators can effortlessly maintain the screen's optimal performance, providing substantial cost savings and improved productivity."

Best-In-Class Screen Performance

SPM's technology is a real game-changer in the market. Built on the foundation of its renowned Intellinova online system, the new solution allows simultaneous measurements at all four corners of the screen. This complete coverage gives operators a holistic understanding of the screen's performance, leaving no room for blind spots or unreliable data.

Dashboard screenshot displaying the orbital movement of all screen corners. The flatter the orbits, the better the screening performance.

playing the orbital movement of all screen corners. The flatter the orbits, the better the screening performance.

Unlike other solutions, there are no limitations on the frequency of measurements. Data can be captured as frequently as required, providing the opportunity for detailed analysis and immediate intervention.

"Our wired solution enables the seamless transfer of continuous measurements, providing real-time feedback on screen performance. It's essentially an instant mechanism that empowers operators to make timely adjustments where required," said Mr Soper.

"By continuously monitoring and optimising screen motion, operators can proactively detect and address potential issues before they escalate, ensuring smooth and uninterrupted operations, mitigating the risk of costly breakdowns and maximising uptime."

Advanced Condition Monitoring

SPM's process optimisation solution is equipped with high-definition technology, which provides in-depth insights into the health of critical components such as

bearings and gears. By continuously monitoring these components in real-time, operators can identify any signs of wear, misalignment, or abnormal behaviour, allowing for timely maintenance interventions. This not only enhances the overall reliability and longevity of the vibrating screen, but also minimises the risk of unexpected failures and costly repairs.

Mr Soper emphasised that the screen process optimisation solution is specifically tailored to the needs of process and production personnel.

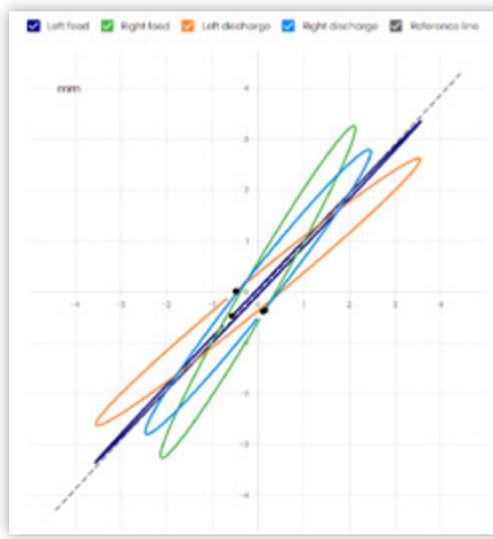
"Our solution is designed to empower operators with the necessary tools and insights to fine-tune their operations and drive continuous improvement."

"In today's competitive landscape, adopting this process optimisation tool can help businesses unlock the full potential of their vibrating screens and gain a true competitive advantage."

"We understand that every business is unique. That is why we can customise our solution to meet specific requirements, and seamlessly integrate the technology into existing workflows and processes."

SPM Instrument remains committed to pushing the limits in the field of condition monitoring. Continued investment in research and development, combined with leveraging emerging technologies and industry best practices, will accelerate the company's capabilities when it comes to vibrating screen innovation. **AMR**

For more information, call apt Group on 1300 700 002, email info@aptgroup.com.au or visit <https://aptgroup.com.au/>



Dashboard screenshot displaying the orbital movement of all screen corners. The flatter the orbits, the better the screening performance.

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FAULT PREDICTION WITH PRECISION



Predictive maintenance and intelligent fault detection are secret weapons for optimising operational efficiencies in coal and mineral processing applications. Asset owners and maintenance teams must harness the power of technology in order to maximise productivity and eliminate potential faults from their production processes.

AURY Australia is no stranger to innovation and condition monitoring technology. Its vibrating screens, feeders and dewatering centrifuges are renowned as the best available solutions in the global mining market.

The company manufactures a complete range of high-quality equipment that is backed by a national team of products specialists. With advanced screening equipment that incorporates unique and

proven design features, AURY is committed to helping customers lower their power consumption, improve screen life, and increase screening efficiencies.

In the pursuit of absolute operational efficiency, Aury's latest CMS equipment status monitoring system is making waves across the mining industry. Independently developed by AURY (Tianjin) Intelligent Equipment Co., Ltd, it provides real-time status monitoring, fault prediction and diagnosis, and vibration data analysis.

The system monitors vibration acceleration, oil temperature, amplitude, operation trajectory, lateral amplitude, oil level, flow rate and other critical equipment data in real-time. Sensors are installed in specific components such as motors, exciters, transmission shafts, machine bodies, and lubrication oil circuits, which

gives full visibility of the equipment status. Maintenance personnel can analyse and diagnose faults in bearings, gears, and machine bodies, predict equipment service life, all of which can be viewed from a mobile device.

Online Monitoring Made Easy

The CSMS800 is an online monitoring unit accurately monitors equipment faults, and is a precise tool for maintaining critical industrial equipment. It is a multi-channel state acquisition system launched by Orui for the non-stationary operation characteristics of industrial equipment. The product has 8, 16, and 24 channels of acceleration and temperature acquisition, speed measurement, and slow variable acquisition.

A prominent feature of the system is its modular design, which supports up to 24

channels of acceleration and temperature acquisition, and can also be configured as 12 channels of slow variable physical data acquisition, such as pressure, temperature, voltage, and current, to name a few.

The product has two channels of rotational speed for speed correlation collection, and has configurable input and output modes.

When in communication mode, CSMS800 offers multiple modes such as ethernet, fibre optic, Wi-Fi, Bluetooth, and 4G, which ensures applicability onsite. CSMS800 can also transmit data to DCS or PLC through two RS485 or EtherCAT buses, truly integrating with the onsite control system.

For more information visit
www.auryaustralia.com.au

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AURY
AURY Australia Pty. Ltd.

Advanced Screening Technology



Phone: +612 4937 6935 | Email: sales@auryaustralia.com.au | Website: www.auryaustralia.com.au

COMPLETE CIVIL MINING SOLUTIONS AND THE IMPORTANCE OF BULK EARTHWORKS



Unless you participate in this sector of WA, you may not know how important bulk earthworks are in enhancing civil construction projects.

It's these civil construction projects that build the communities locals enjoy today. Complete Civil Mining Solutions' bulk earthworks include the services that remove, relocate and place in all aspects of civil, mining and quarrying.

With a fleet of heavy construction equipment to effectively assist in this work, Complete Civil helps you reach project goals and fulfill civil & mining work needs.

For quite some time, Complete Civil has been a trusted supplier of mining and bulk civil services across WA.

Their services help manage the end-to-end requirements and that includes the construction of tailings storage facilities (TSFs), mining contracts and bulk earthwork projects across WA.

Tailings should be handled with care because not only do they consist of ground rock, scrap bits and organic matter, they also consist of dangerous materials which can be potentially hazardous if not handled by a professional earth-moving solutions company.

Complete Civil also prides itself on being an expert in constructing tailings dams — new dam projects to wall lifts, including buttresses across all commodities in WA. They work with key dam designers across WA in consultation with the client expecta-

tions to achieve a combined satisfied outcome in line with design.

Complete Civil will keep you compliant with regulatory requirements for the environment and safe mining waste management.

Capable Across a Range of Deposits
Complete Civil has worked across a range of mineral deposits and provided its services across WA.

This includes open pit mine sites, haul road construction, water dams, mining development works, tailings storage facilities and many more areas in the mining and civil sector.

One of the larger projects is hauling and

placing clay and rock into a large TSF starter embankment project. Clay must be mixed to optimum moisture and rolled to meet compaction specifications.

Complete Civil takes the time to plan out our projects, including site facilities and maintain modern fleet with GPS controllers and full workshop mobile and experienced teams.

CCMS pride themselves on providing quality and performance and safety to their valued clients.

For more information visit
completecmsolutions.com.au

AMR

QUALITY & PERFORMANCE IS OUR GOAL

Our company prides itself on providing a smaller but elite team of skilled professionals from management to operators.

We provide quality labour which includes quarry manager support with engineering, supervision, training, safety and maintenance to high performing operators.

As the director I personally recruit all our team to ensure the right fit for our company.

Having worked cross several companies in WA and in a multiple of roles I understand what clients are after in this market



Contact details:

Brendan Franklin
Managing Director
COMPLETE CIVIL & MINING SOLUTIONS PTY LTD

Email: admin@completecmsolutions.com.au

Web: www.completecmsolutions.com.au



TRISTAR WATER SOLUTIONS PROVIDING A RANGE OF WATER AND WASTEWATER TREATMENT SOLUTIONS

Established in 2008, Tristar Water Solutions supplies customers with a complete range of solutions for water and wastewater treatment.

Priding themselves on delivering the best quality at affordable prices, Tristar provides the highest international standards of design, materials, service and workmanship.

Tristar delivers complete turnkey solutions from design, construction and installation to operation, maintenance and routine servicing.

Due to its ability of providing extensive expertise and supplying high quality water and wastewater products, Tristar has rapidly grown within the market and continually is APAC's most trusted brand.

These ethics have established Tristar as a provider of products which their clients depend upon to ensure they meet water quality compliance and effective plant operations, now and into the future.

Tristar's systems are designed for a changing world and can be effortlessly expanded or contracted as necessary without any negative impact on the availability or quality of the treated water.

Tristar's systems are based on proven technologies, having been designed to provide robust and reliable performance and are particularly suited for operation in remote locations where access to maintenance personnel is not often readily available at short notice.

Tristar's plants are designed with built-in redundancy for this exact reason with a track record of reliability in the Australian environment.

With emergency breakdown 24/7 service, technicians are ready to travel on short notice to get your plant back up and running.

PRODUCT RANGE

Tristar's product range has been developed to offer their clients a comprehensive range of water and wastewater treatment plants to suit their specific site needs.

They specialise in the design, manufacture and installation of high-quality water and wastewater treatment plants.

Water Treatment

Tristar ensures the treatment of water

meets the stringent standards in the Australian drinking water guidelines.

Typical methods include brackish water reverse osmosis, seawater reverse osmosis, ultra and micro filtration and disinfection/chlorination.

The best method of treatment depends upon the results of a water analysis undertaken on site.

Wastewater Treatment

Tristar offer a wide range of wastewater treatment systems for mining, commercial and industrial sectors considering environmental regulations and impacts.

Whether you are treating sewage or a by-product of processing, Tristar can provide the expertise in delivering a reliable system for your needs.

Plant Operations and Maintenance

Routine and long-term servicing is essential to keep your system at peak operating performance.

Tristar offer a variety of services including onsite full or part time operations, ongoing maintenance plans and regular inspections, online monitoring, servicing and maintenance for the entire systems.

Chemicals, Consumables and Spare Parts

Tristar offer a total back up support with any plant and have a complete range of chemicals, consumables and spare parts for your water or wastewater plant.

All products are high quality with a reasonable price tag.

Hire Systems

Tristar offer one of the largest rental fleets available, providing for short term or long-term hire solutions.

With a vast offering in both water and wastewater hire equipment including ancillary equipment, they will have a solution to suit your needs.

Systems come in various sizes and are based on rapid deployment and simple plug and play technology requiring minimal setup onsite. **AMR**

If you're looking for water and wastewater treatment services, call Tristar Water Solutions on 08 9331 6133 or email sales@tristarwater.com.au to find out more.





ECOLOGICALLY SUSTAINABLE WASTEWATER TREATMENT

TRISTAR WATER SOLUTIONS commenced operations in 2008 and has rapidly grown within the market due to its ability to provide extensive expertise and supply of high-quality water and waste water products. These original ethics have established Tristar as a provider of products which our clients depend upon to ensure they meet water quality compliance and effective plant operations, now and into the future.



Tristar Water Solutions recruit key industry and water technology proficient personnel to continue to offer the products and services which our clients expect.

Australian Company

Tristar Head Office and factory is located in O`Connor, Perth, Western Australia with a regional

office in Brisbane QLD and Dubbo NSW to service Eastern Australia.

As the primary design of our water and wastewater plants are of modular construction, Tristar is well positioned to provide plant installations to the worldwide market offering rapid deployment and installation.

For more information.

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HOSHIZAKI'S EFFICIENT SOLUTIONS: ENSURING RELIABLE ICE SUPPLY FOR MINING OPERATIONS

Hoshizaki, a leading manufacturer specialising in ice machine and ice dispensing, understands the critical importance for a reliable, efficient and safe ice supply to mining site staff.

The **Hoshizaki DB-200H Worksite** and **Hoshizaki DB- 200H Worksite H2O** ice dispensers provide a continuous supply of ice and or water and ice with the push of a button.

Both variations feature a storage capacity of up to 91kg and store ice in an enclosed bin, preventing any risk cross-contamination and maintaining the cleanliness and

safety of the ice for various mining processes.

To operate the Hoshizaki DB series ice dispenser, simply place your 5l drink container or esky underneath the convenient dispensing spout, push and hold the button until the desired ice and or water has been dispensed.

Hoshizaki's KM series Crescent ice machines play a significant role in ice production for many mining applications.

Equipped with EverCheck alert system and removable air filters, they are easy to clean and maintain.

Hoshizaki have different options available to suit the DB dispensers depending on the demand of ice required.

Hoshizaki KMD-201 has up to 175kg production, **Hoshizaki KMD-270** has up to 255kg production and **Hoshizaki KM-660MAJ-E** has up to 280kg production.

The KM series ice machine mounts directly to the DB series ice dispenser, providing high quality, clear and versatile crescent-shaped ice.

Equipped with a double-sided stainless-steel evaporator plate, the KM series

requires fewer cycles to fill the ice dispenser, resulting in reduced energy consumption.

Hoshizaki's KM series ice machines match perfectly to the Hoshizaki DB series ice dispensers, making a reliable and efficient solution for ice production and dispensing within all types of mining operations.

Their user-friendly features, energy-saving designs and focus on preventing cross-contamination ensure that all staff remain safe and stay hydrated during work hours. **AMR**



HOSHIZAKI ICE DISPENSERS



The DB200 Dispensers are made in America and have a 2-year parts and labour warranty.

The KM Series crescent ice machine heads to pair with the dispensers have a 3-year parts and labour warranty along with 5 years on the compressor and condenser.

There are warehouses across Australia.

DB200
+ Head



KM Series
Head+
Dispenser



KM Series
Head



1300 721 752

MIDWEST VALVES & CONTROLS

SUPPLIES RTD EQUIPMENT TO MINING

Mining in general has a pre-requisite for technologies that offer greater accuracy, safety and stability in their various applications. This is certainly the case in all mining operations where Resistance Temperature Devices (RTD) are used to monitor bearing temperatures on rotating equipment.

Platinum RTD's have proven to be more accurate and more repeatable than thermocouples when it comes to measuring the temperatures associated with rotating equipment.

A RTD sensor is a device that changes in resistance in response to temperature change. The RTD change in resistance is predictable, and is measured and converted to show the temperature the RTD is sensing. Therefore, positioning and thermal coupling of the RTD to the application is critical.

The RTD sensor is made of a pure metal such as platinum, nickel or alloys. Platinum is generally the preferred material for delivering both more stability and as it has a wider temperature range and repeatability than nickel or alloys.

Since 2001, Midwest Valves & Controls has become a leading supplier of industrial valves, pumps, hoses, process instruments and pneumatic products and they continue to expand our product range and introduce new technologies within different industries.

For the past four years, Midwest Valves &

Controls have been supplying RTD sensors and associated fittings to companies specialising in conveyor support and maintenance for NSW Coal Mines.

Midwest Valves & Controls Proprietor and Chemical Engineer, Peter Willis, says RTDs are more widely used than thermocouples in mining and play a critical role in applications such as precisely monitoring temperatures in conveyor belt systems. The company also sells and services Ultra Dynamics Ultra-Weigh and Moist-Scan conveyor belt instruments.

"It is vital that mines and process plants have shafts rotating as per design. By sensing the temperature of bearings within rotating equipment, costly failures can be avoided on their conveyors and repairs made before disaster strikes," said Mr Willis.

"We usually supply our clients with an average length of 15 metres of triple wire cable, which is normally a sufficient length along the conveyor. It is protected by a SS sheath in order to withstand the harsh mine site conditions.

"We also supply external electronic devices such as a temperature transmitters and switches, used with the RTD to deliver a milliamp, voltage or an alarm set-point contact output to the control system."

Industrial Valves in Mining

As a specialist supplier of industrial valves to the mining industry, Midwest Valves & Controls has built strong partnerships

with many trusted valve manufacturers, each having their own special design alternatives and material use.

A proven example is the company's capability to supply a bi-directional knife gate valve, which is designed for slurry applications, and features a two-piece bolted wafer body for easy maintenance. A protective stem cover is standard increasing cycle life in hazardous environments, and a fully encapsulated J-ring provides sleeve reinforcement, thus guaranteeing bi-directional zero leakage. In the open position, the energized sleeves, shield all metal components from direct contact with the flowing process media.

It has a maximum allowable operating pressure of 10 bar for sizes DN 50 to 400, while the maximum allowable operating pressure is 6.2 bar for DN450 and 600. The standard body material is ductile iron with gate materials in 304, 316, 317 stainless steel, SAF 2507, SAF 2205, 17-4PH, Hastelloy® C, Monel®.

This bi-directional knife gate valve provides repeatable bi-directional shutoff in a rugged, single piece cast body. The valve features a replaceable steel reinforced elastomer seat for enhanced sealing, and is easily automated for on/off applications in mining processes. It is also designed for easy, quick conversion between manual and pneumatic actuation, and features a lubricant injection port for continuous, smooth operation with minimal maintenance. The clevis design and horizontal bolting stabilizes gate ensuring proper

alignment, and a standard multi-layer square packing provides exceptional gland sealing.

The valve above is just one example of the wide variety of various styles of valves best specific to an individual application that Midwest Valves & Controls has on offer and can assist you with. Knife Gate, Butterfly, Globe, Needle, Spigot, Ball, Regulating, Actuated and Proportioning Control, Midwest Valves & Controls is a 'one-stop shop' for all your industrial, mining and agricultural needs in valving and many more applications.

Selecting the Right Pressure Reducing Valve

Midwest Valves & Controls provides customers with the support they need when it comes to the correct style and sizing of valves, such as selecting a pressure reducing valve for air or water applications.

The selection has to provide a velocity that is not high enough to cause large pressure drops or noise levels that will be conveyed through the piping system. Manufacturers provide velocity-flow rate charts that indicate acceptable flow conditions for pressure reducing valves to avoid cavitation that results in damage to the valve and the pipework.

For more information, or to obtain a quotation with relevant valve data sheets from different manufacturers, visit www.midwestvalves.com.au or call 02 6374 2808.

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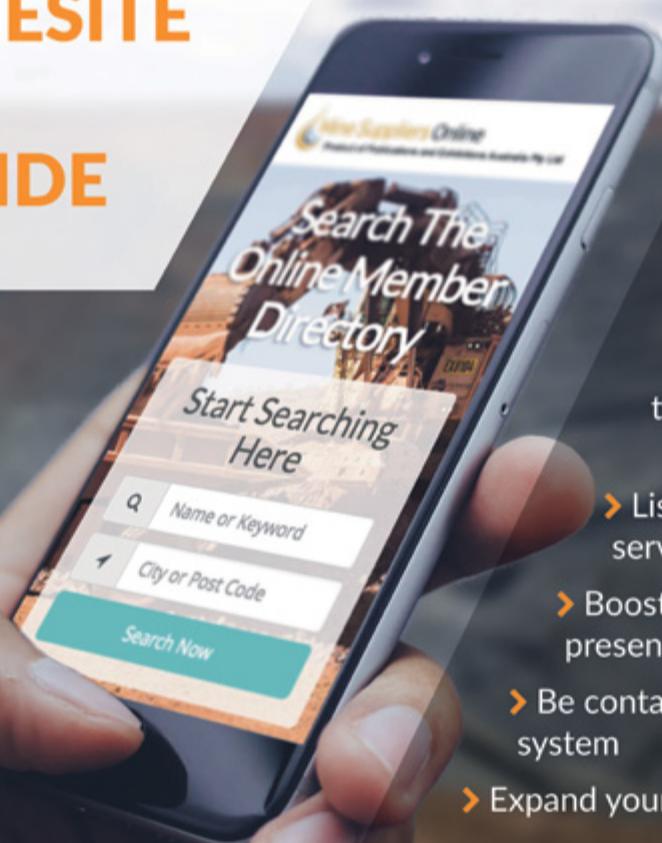
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For over 30 years, Westair has provided customer-tailored compressed air solutions for all applications throughout WA and Australia.

Westair is the sole Australian distributor of SCR rotary screw air compressors for over 13 years and have supplied many industries including the mining sector throughout this period.

With a commitment to reducing carbon dioxide and carbon emissions, Westair Pneumatic Systems has an impressive range of highly efficient permanent magnet variable speed drive (VSD) compressors.

WA owned and operated with a national distributor network, Westair has highly experienced installation and service technicians as well as an extended five-year warranty on all SCR rotary screw compressors.

Westair can provide customer-tailored solutions for all applications, from com-

pressors to air receivers, dryers, filters and quality aluminium air piping systems. They work with you to figure out your compressed air needs, from initial consultation right through to after-sales support.

Rotary Screw Compressor

As the sole distributor of SCR rotary screw compressors in Australia, Westair offer a comprehensive range of energy efficient, oil injected and oil free rotary screw air compressors to suit your requirements.

We can also do special builds for your compressors to include stainless steel cabinets for corrosive environments, outdoor kits which include rain hoods and louvered doors. If you let us know your requirements, we can build to suit your needs.

Westair keeps a full range of compressors, and they have a huge array of service and spare parts in stock. They have stock locations in Perth, Melbourne and Sydney.

Scroll Compressor

For oil free air applications, Westair offer the SCR XA Series scroll compress which features leading Iwata airends to produce class 0 TUV certified air.

For compressor buyers wanting to buy a quiet alternative to a traditional piston style reciprocating workshop compressor, Westair also offer the Scroll-X oil lubricated range.

Air Piping System

Westair has partnered with Airpipe to deliver an engineered aluminium compressed air piping system that has been tested for safe operation in all compressed air applications.

The Airpipe system is easy to install and modify as no specialised tools are required.

To ensure optimum performance, Airpipe is of high quality, corrosion free, UV resis-

tant and is compliant with Australian standards.

Westair's dedicated and experienced team can install your air piping system, specifically tailored to meet your air requirements.

Air Dryers

Westair offer a wide range of refrigerant dryers, heavy duty refrigerant dryers and desiccant dryers to suit all your compressed air needs.

Coming soon is the desiccant dryer – a heatless regenerative desiccant dryer ideal for oil free air treatments.

Vertical Air Receiver

Westair's range of vertical air receivers range from 190 to 3000l to suit all industrial air system requirements.

All receivers are designed and manufactured to Australian Standard AS-1210.

Air Treatment

Westair also stocks a range of air filters, water separators and auto drains.

The air filters provide premium instrument quality air, the water separators are equipped with automatic drainers designed to focus on the elimination of water contamination in air tools and the auto drains remove compressed air condensate from air receivers. **AMR**





Westair Pneumatic Systems

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 Advanced Energy Saving Compressed Air Solutions

WestAir has provided customer-tailored compressed air solutions for all applications throughout WA and Australia for over 30 years.



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- ✓ Heavy duty air filtration
- ✓ Marine grade paint upgrades
- ✓ Electrical cabinet upgrades to suit mine site specifications
- ✓ Industrial external filter mats



With a commitment to reducing CO₂ and carbon emissions, Westair Pneumatic Systems has an impressive range of highly efficient permanent magnet variable speed drive (VSD) compressors.

Why Westair Pneumatic Systems?

- Western Australian owned and operated with a national distributor network
- Highly experienced installation and service technicians
- Compressed air audits
- Extended 5-year warranty with all Westair SCR rotary screw compressors
- Comprehensive range of service spares & parts
- Rotary screw compressors and ancillary equipment for the mining sector

We provide:

- Onsite service, repairs, commissioning and installation
- Oil lubricated and oil free rotary screw compressors
- Energy saving variable speed drive compressors with permanent magnet motors
- Mine spec compressors and ancillary equipment
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ARB'S SMARTBAR IS LEADING THE WAY IN POLYMER VEHICLE PROTECTION

Since 1996, SmartBar has been leading the way in vehicle protection development, and more specifically, roto moulded polymer-based frontal, rear and under-vehicle armour.

Designed and manufactured in Adelaide, their vehicle protection systems turn heads thanks to their innovative, light-weight and durable design.

SmartBar's team of experts combine years of rotational moulding experience with an in-depth knowledge of the automotive industry, allowing the company to innovate and evolve its products constantly.

By being a hands-on manufacturer, gives the highest level of control over each of the processes involved in the creation of products to ensure the optimal result.

SpartanBar

The original SmartBar, SpartanBar is the maiden polymer-based bull bar and the first of its kind.

Using a flexible, resilient and incredibly durable polyethylene material, SmartBar's cutting-edge design and rotational moulding process creates a bull bar that offers unsurpassed levels of safety.

Independent research undertaken by the University of Adelaide confirmed that

SpartanBar outperforms all other frontal vehicle protection systems available.

This is because the strong, one-piece hollow-bodied bar has the unique ability to absorb and disperse impact energy forces and then return to the original shape.

In most cases, SpartanBar can flex up to 85% of their width and return to 95% of its original shape in a matter of minutes following an animal strike.

StealthBar

Designed using the same cutting-edge polyethylene material and the same manufacturing process as the SpartanBar, the StealthBar provides unparalleled vehicle protection and a tough aesthetic at 30% less weight.

Notably, it's the only bull bar approved for use in Europe.

Recognising the innovation and extensive research and development required to achieve this, the StealthBar won the 2017 most innovative new aftermarket 4WD product at the AAAA Innovation Awards.

Under Vehicle Armour

SmartBar's under-vehicle armour (UVA) offers vehicle specific under vehicle protection, set to minimise the risk of damage to the most vital components of your vehicle.

The rotational moulding process allows the team to develop unique shapes and offer greater surface protection.

Made from a special cross-link polymer material, the UVA offers superior impact protection and combines SmartBar's design, engineering and manufacturing techniques.

Rear Protection Bars

Due to the rear overhang and vehicle body shape obstructing visibility for many vans and four-by-four vehicles, rear quarter panels and factory bumper bars are very susceptible to damage.

SmartBar's rear protection bar (RPB) is an over bumper bar that complements the design and shape of the vehicle while helping protect vehicle panels in the event of reversing collisions.

It has already won several design awards to recognise the innovation levels it exhibits and its durability.

ARB Frontier Portable Tanks

In addition to their core vehicle protection range, SmartBar also manufactures an assortment of speciality products and the ARB frontier tanks.

Using the latest roto-moulding processes, the ARB Frontier Portable range offers storage solutions for both water and diesel on four-by-fours or work vehicles. The ARB Frontier range offers impressive strength, resilience and rigidity, engineered from a tough UV-stabilised polymer.

Engineered from a tough UV stabilised cross-link polymer, the ARB Frontier offers impressive strength, resilience and rigidity.

Due to the polymer construction, products are immune to rust and have the capacity to absorb impact. Polymer products also possess greater insulation properties than metals and weigh less than metal alternatives.

With a capacity of up to 28l, the ARB Frontier wash station is a convenient and easy solution for storing drinking water or for washing your hands on the go. Designed to mount under the utility/flatbed tray or in front or behind the rear wheels, it is built to withstand frequent and rugged use.

The ARB Frontier diesel tank features a 30l carry capacity and is equipped with a quick pour nozzle, built in breather and is compatible with SmartBar's quick-release mounting bracket.

The unrivalled vehicle safety systems protect many commercial vehicles across mine sites globally, with many new polymer products in development.

For more information head to www.smartbar.com.au

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The smart tech helping small-caps punch above their weight

Guest contributor:
Trevor Smales



In 1965 when Gordon Moore, co-founder of Intel and namesake of 'Moore's Law', spoke of the exponential growth of semiconductors, never could he have envisaged how pervasive technology would become in everyday life.

And while few of us sit comfortably at the 'early adopter' stage of the technology adoption cycle, small-cap miners have figured out how to level the playing field using tools like AI, GIS, AR, and automation.

In the past, innovative tech solutions have only been accessible to global mining giants, with deep pockets and large R&D funding pools. The size and scale of these businesses allowed them to take risks, given the potential payday from rising commodity prices.

Today, the proliferation of generative AI and other smart tech applications has allowed smaller mining operations to leapfrog – or at least match their monolithic industry peers – especially in the exploration space.

Essentially, small and mid-tier mining operations, have been able to demonstrate 'big end of town' thinking on a start-up budget.

When it comes to biggest bang for your buck there is one clear leader in terms of smart tech – spatial.

Spatial or 'GIS technology' acts as an easy entry point for any sized mining company looking to digitally transform or optimise their operation. The wins are usually quick and easy.

Apart from the relative ease of access, GIS tech has an amplifying effect on the ROI of other smart tech. Even better, there is nothing 'experimental' about applying a spatial approach to both tried and tested work practices, as well as emerging technologies such as AI, drones, and automation – the use cases are extensive.

GIS tech has an amplifying effect on the ROI of other smart tech.

Observing business operations through a spatial lens helps decision-makers ef-

fectively identify, manage and monetise their resources, optimise workflows and communicate with everybody from field crews, engineers, and investors to regulators, community groups, and everyone in between.

The visual aspect of the tech is what makes it so universally accessible to its extensive user base as it literally identifies the information that matters most in a format that transcends language and technical ability.

Can't see the forest for the trees?

You may be asking, "if the benefits of spatial are so obvious then why isn't everyone using it?" Good question.

The perception often attached to 'spatial thinking' is that it is a craft requiring a science degree or two – and potentially a theodolite. Not the case.

The business of mineral exploration and extraction is by its very nature – spatial.

The business of mineral exploration and extraction is by its very nature – spatial.

Since most mines cover large expanses of land, miners require access to volumes of location-based information to guide their operation.

The spatial element is already present in the data informing mine operations – it's

simply a matter of focus, or more accurately, perspective. Forest for the trees.

From discovery and production, to mine closure and reclamation, spatial is at the core. And it is the versatility of GIS as a tool for collecting, storing, analysing, and sharing information – that has been the biggest driver of its adoption across the sector.

GIS is increasingly being integrated into core business systems with the primary objective of increasing productivity and improving asset and infrastructure management workflows.

The tech is commonly used to map the geology of a region and analyse operations, to determine where mining components, such as drilling sites, processing plants and tailing storage facilities, should be located and how to best minimise environmental impacts. The vast array of applications is what earns it the 'best bang for your buck' label.

A revolution in smart thinking

Even after 50 plus years of innovation, GIS tech is far from reaching its maturity.

The predictive analytics capabilities embedded in the tool have increasingly been leveraged by mine operators to model and reduce risk. More technically literate users have begun to use GIS to build 'living' digital twins of mine assets.

For those at the technological coal face though, GeoAI – is where new ground is being broken.

...At the technological coal face though, GeoAI – is where new ground is being broken.

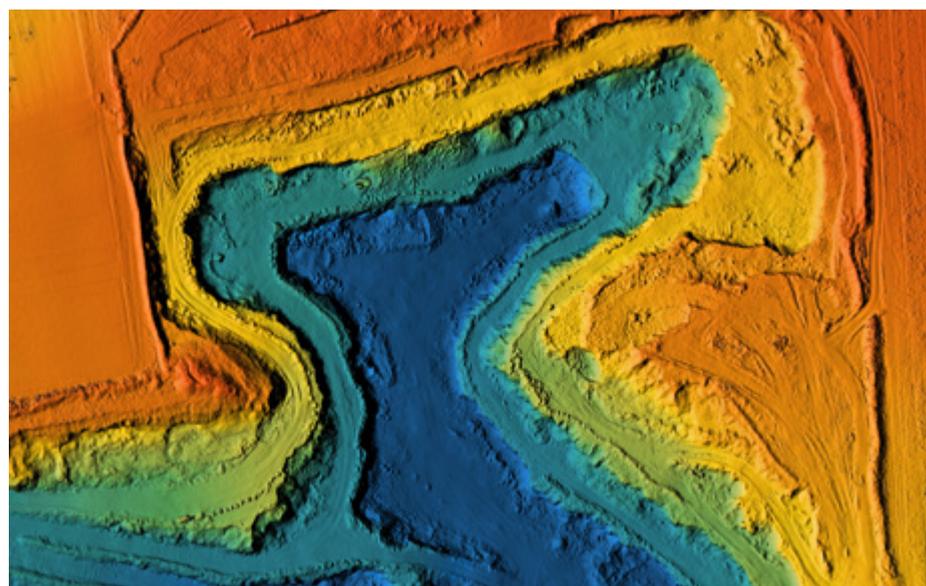
GeoAI uses machine learning algorithms, data mining, and natural language processing capabilities to rapidly analyse everything from satellite imagery, geological maps, in-field data, IoT feeds and much more to drive better decision-making. Across health and safety, site and drill operations, disturbance management, heritage, and environment – nothing is off the table.

Most importantly, for small-cap and mid-tier miners, the emergence of GIS-as-a-service and the proliferation of other smart technologies has made digital enablement far more accessible – both from a cost and operational perspective.

About Trevor Smales

Trevor is the Practice Lead for Esri Australia's Mining and Resources Division. He's part of a global network of location intelligence specialists who have been enabling the digital transformation agendas of some of the world's most progressive mining operations – both big and small.

Contact: tsmales@esriaustralia.com.au



DOWNLOAD:

The Essential Guide to
Geospatial Technology for
Small-cap and Mid-tier Miners.



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THE FUTURE OF REMOTE CONNECTIVITY HAS LANDED AT PIVOTEL



From machinery and vehicle fleets to surveying drones and wearable devices, and everything in between, the demand for reliable communication services that provide always-on connectivity is an assumed expectation, no matter the location.

As Australia's leading provider of rural and remote communication solutions, Pivotel has kept people and assets connected in critical environments for more than 20 years, making it well-positioned to deliver the latest solutions that operators can count on.

Every organisation knows how important it is to have operational visibility and reliable communication.

However, when operations are in remote locations or spread across vast areas of land, it becomes critical. Thanks to the

space race that has seen the development and deployment of new and innovative satellite networks, connectivity that was once only available in metropolitan cities is now available everywhere.

The arrival of Starlink and OneWeb bring with them the potential to revolutionise businesses operating in remote parts of the country.

With mobile, portable and fixed satellite internet at speeds up to 350 Mbps, and latency of 25-50 ms, the high-bandwidth, high-availability satellite networks of Starlink and OneWeb, and their LEOsat constellations, offer endless possibilities to businesses.

These technologies also open up the opportunity for countless integrations that increase operational efficiencies and improve worker safety.

Whether it's exploration, drilling or production, Pivotel's solutions for the mining industry work in every corner of the continent. Operators can use connectivity as the catalyst that empowers any number of systems and gain visibility of assets in real-time.

Changes and adjustments can be made as things unfold, allowing for maximised productivity and continuity as expected, with alerts and notifications if issues arise at any point.

Data and analytics provide informed decision making, and workers can communicate in the field via over-the-top (OTT) apps for safety purposes.

The technology also advances another step closer towards deploying systems that add value to businesses with the adoption of technologies such as precision

mining, understanding what is onboard and where, as well as predictive maintenance across fleets of important assets and machinery.

As a partner and supplier of the world's leading satellite technologies, including Starlink and OneWeb, Pivotel and its team of experienced satellite solution architects and engineers can provide technical advice and recommendations, solution support, installation, SD-WAN and fully managed services that delivers coverage to even the most remote parts of Australia.

To understand how Pivotel can keep your operations connected, visit www.pivotel.com.au

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OPTIME

Ecosystem

Innovative condition monitoring and smart lubricant management in one solution

Industrial mining and manufacturing operations feature a diverse range of critical plant equipment and components that need to be constantly monitored around the clock to avoid any potential shutdown that can lead to costly downtime and maintenance. Due to the harsh conditions and heavy wear that plant equipment is subject to when production processes are in full swing, the need for intelligent technology that can diagnose and eliminate faults in advance and help facility managers make more informed decisions to improve operational performance.

Global automotive and industrial supplier Schaeffler combines smart condition monitoring and lubricant management to form one predictive maintenance solution. It offers intuitive operation via a mobile app to ensure the smooth running of machines and production processes, all while being simple to install and delivering a quick return on investment for entire plants and facilities.

The all-in-one solution combines Schaeffler's OPTIME Condition Monitoring system with the sensor variants OPTIME 3, OPTIME 5, and OPTIME 5 Ex for wireless condition monitoring, as well as the intelligent, interconnected lubricator OPTIME C1 for automated lubrication to form one solution – The OPTIME Ecosystem. This integrated technology creates a cost-effective predictive maintenance solution, which effectively and sustainably minimises downtime and high maintenance costs in production facilities.

With longstanding expertise in the fields of bearing technology, vibration analysis, lubrication, and product design, Schaeffler's OPTIME Ecosystem is geared towards the day-to-day tasks of maintenance teams. The system supports plant operators by offering convenient initial operation thanks to the plug-and-play function whereby hundreds of OPTIME elements can be in-

stalled and integrated within a very short time period. A subsequent expansion can be carried out quickly and reliably at any time. Low investment costs, savings due to reduced machine downtime, and increased efficiency in scheduling maintenance procedures guarantee a rapid return on investment.

According to Schaeffler Australia Head of Industrial, Martin Grosvenor, the OPTIME Ecosystem gives customers 24/7 wireless, high-functioning condition monitoring of their assets, as well as a centralised view of their lubricators.

"The system's plug-and-play design enables quick and easy setup of the system with no prior knowledge required and has an easy-to-use web and mobile interface that helps interpret data," said Mr Grosvenor.

"A smart operating concept and the intuitive mobile app with a prize-winning user interface make it easy for users to gain greater visibility of their assets and more control over production processes. It also ensures a high level of acceptance among both beginners and experienced users. The OPTIME Ecosystem not only supports day-to-day maintenance operations with easy-to-understand warning messages and automatic analysis but helps with the data-based creation of maintenance plans."

The OPTIME Ecosystem is simple, cost-effective, and scalable. Additionally, the predictive maintenance solution improves the sustainability of facilities by reducing material waste and energy consumption through lower unplanned downtime.

Schaeffler will further develop and add new elements to the OPTIME Ecosystem based on proven success achieved in customer projects across different industrial

The OPTIME Ecosystem – The sensor variants OPTIME 3, OPTIME 5, and OPTIME 5 Ex and gateway for wireless condition monitoring combined with the intelligent, interconnected lubricator OPTIME C1 for automated lubrication.

sectors and applications. This means the OPTIME Ecosystem will continue to optimise efficiencies and ensure the smooth operation of machines and facilities by providing users with all relevant information at a glance.

Mr Grosvenor highlighted that online condition monitoring has historically been cost prohibitive and cumbersome to setup, maintain, and operate. However, the introduction of technology such as the OPTIME ecosystem has eliminated the complex, expensive infrastructure needed in other systems.

"Simply install the sensors, provision with your device, and the system will do the rest, automatically creating a mesh network and analysing the data. It really is outstanding value, feature rich technology."

About Schaeffler

As a leading global supplier to the automotive and industrial sectors, the Schaeffler Group has been driving forward groundbreaking inventions and developments in

the fields of motion and mobility for over 75 years. With innovative technologies, products, and services for electric mobility, CO₂-efficient drives, chassis solutions, Industry 4.0, digitalization, and renewable energies, the company is a reliable partner for making motion and mobility more efficient, intelligent, and sustainable – over the entire life cycle. The technology company manufactures high-precision components and systems for powertrain and chassis applications as well as rolling and plain bearing solutions for a large number of industrial applications. The Schaeffler Group generated sales of EUR 15.8 billion in 2022. With around 84,000 employees, Schaeffler is one of the world's largest family companies. With more than 1,250 patent applications in 2022, Schaeffler is Germany's fourth most innovative company according to the DPMA (German Patent and Trademark Office).

CONTACT

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The cost-effective predictive maintenance solution minimises downtimes and high maintenance costs in production facilities effectively and sustainably.

SCHAEFFLER



MAKING TRACKS WITH TOUGH DOG SUSPENSION

No matter the terrain or offroad environment, your vehicle fleet must be fitted with quality parts in order to sustain unknown day-to-day encounters. Mine sites and haul roads are certainly no exception. Drivers and fleet managers alike require heavy-duty suspension solutions designed for these types of tough conditions.

Since 1985, and with 100 years of combined experience, the team at Tough Dog have been fuelled by a passion for all things 4WD and a shared commitment to investing in the strength of the Australian offroad industry. The company is now an industry leader in innovative and quality suspension systems for just about every 4WD application.

Today, Tough Dog products have become world renowned backed by an extensive distribution network that spans 42 countries. With some of the harshest conditions right here in Australia that provide the perfect outdoor playground to test out products, the gear that makes it to the market is a cut above the rest.

The company's commercial solutions are built to last. With a focus on quality, durability, and safety, it's no surprise Tough Dog is a trusted provider to the heavy industries like mining that demand heavy-duty equipment that is synonymous with rugged landscapes.

Quality Suspension Built Tough

What sets Tough Dog apart is its unrivalled pursuit for quality. All products are made from the highest quality materials using advanced engineering techniques to deliver superior performance and reliability. Every single item is assembled and inspected at the company's Sydney Headquarters in Marsden Park, before making

its way to a customer's fleet. Consistently applying multi-layered quality control procedures makes Tough Dog ideal for operations that need reliable and durable solutions capable of withstanding the rigours of commercial use, especially within the mining sector.

Occupational health and safety are also a top priority for Tough Dog. All aspects of their suspension systems are not only up to code, but designed with safety in mind. Tough Dog product's internal systems and practices consistently exceed the requirements to achieve ISO:9001 certification, which is re-audited every year to ensure compliance, and is also subject to random inspection.

GVM Upgrades

The allowable payload on most modern 4WD's seems great on paper, but this quickly gets eaten up when the vehicles are fitted with bull bars, trays, equipment and passengers. Remaining under the manufacturer's Gross Vehicle Mass (GVM) specifications can seem like a tough task, but this is where the Tough Dog GVM program can assist. Tough Dog Suspension provides a solution for owners and fleet managers of vehicles who have a need to carry loads that exceed the manufacturer's specifications, while meeting the practical application and documentary compliance.

Tough Dog has gained recognition as a Second Stage Manufacturer (SSM), which

facilitates the development and federal certification of components to increase a vehicle's GVM. Each complete GVM kit has been extensively tested to maintain ADR compliance. So, whether you're looking to upgrade your vehicles for increased payload capacity or to meet new regulations, Tough Dog's GVM upgrades will help you get the results you need.

What makes all this possible is the company's commitment to local product innovation and process improvement. Tough Dog has invested heavily in research and development to create products that are specifically designed to meet the needs of businesses operating in the challenging Aussie environment. This gives customers the confidence their suspension systems will perform as intended.

All of this is backed by a comprehensive three-year unlimited kilometre commercial warranty. This speaks to Tough Dog's confidence in the quality of its products and its commitment to providing reliable solutions to fleets around the country. Whether you're operating a mining fleet or running a commercial business that requires rugged and durable vehicles, you can trust that Tough Dog's suspension systems will deliver the performance you need.

With a focus on quality, safety, and performance, the company offers solutions that are designed to meet the needs of businesses operating in the toughest conditions. Whether it's a new suspension system or a GVM upgrade, Tough Dog has the expertise and experience to deliver the results you need.

AMR

For more information, visit www.toughdog.com.au



HEAVY DUTY SUSPENSION

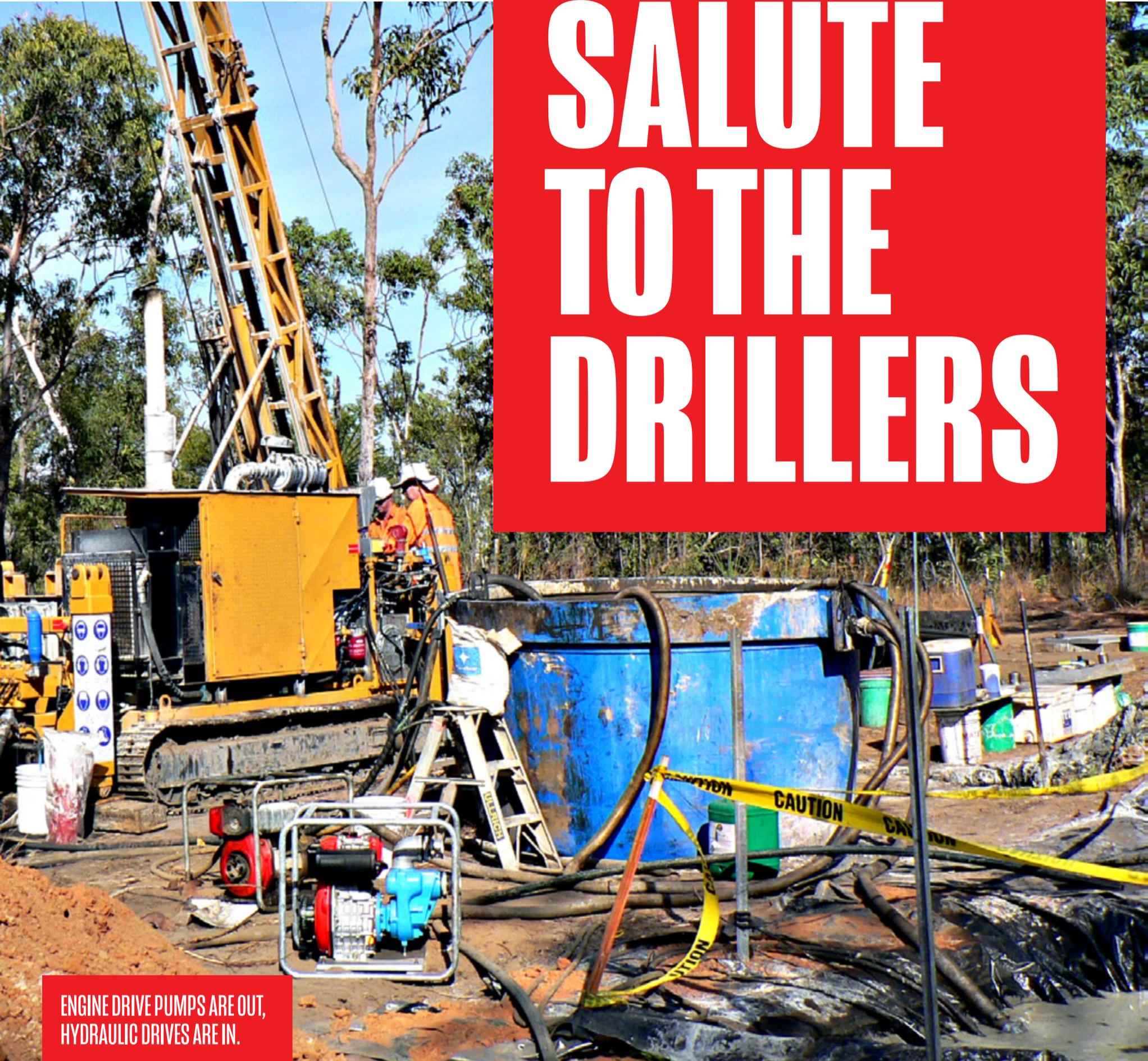


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SALUTE TO THE DRILLERS



ENGINE DRIVE PUMPS ARE OUT, HYDRAULIC DRIVES ARE IN.

We all know that mining is the backbone of the economy. This story is contributed by Australian Pump Industries as a salute to the indispensable drilling industry. Their activity is the beginning and continuation of Australia's most important and most productive business.

It's obviously a great credit to Australia's drilling industry that we have manufacturers who can design and build not just the drill rigs but equipment to handle the indispensable mud lubricants.

Diamond drilling operations can obtain core samples from two thousand metre depths. The mud cools down and lubricates the diamond drill bit, helps cutting speeds and the flushing of material from the cutting teeth. It also helps to provide downward pressure which prevents the hole from collapsing.

That's why the mud has chemical and sol-

id adjustments to target certain density. Working with Australian Exploration, our Aussie Pump engineers build pumps that are suitable for this harrowing application.

In the past, mud tanks have been served by commercial engine drive lightweight pumps. Many of these, from third world countries, soon became regarded as disposable items. Engine drive pump breakdowns are common, disrupting the work flow.

AUSSIE PUMP SOLUTION

By working with some of the best in the business, and with drilling rig operators on a direct basis, Aussie Pumps' engineers learned a lot about the pumps required. They are currently developing what they believe will be the perfect mud pump!

"We started without any real in depth knowledge. We still have a long way to go," said Aussie Pumps Chief Engineer John

Hales. "We owe a big debt to the companies who work with us and gave us the inspiration for product development" he said.

THE HYDRAULIC MUD PUMP

The first hydraulic mud pumps that Aussie provided to the industry were two inch cast iron self priming hydraulic drive units. Fitted with big open impellers, they were able to pass a degree of solids in suspension. The hydraulic drive gave them loads of power.

After a period of operation with some of Australia's leading drillers, Aussie found that cast iron impellers were wearing out. "The solution was to go with cast 316 stainless steel," said Hales.

The cast 316 stainless impeller provided substantially longer life. The company is now experimenting with pump bodies in cast 316 as well to ensure resistance to

abrasion and for that matter, even corrosion.

That combination of cast iron and stainless steel works, but some drill rig manufacturers have specified nickel aluminium bronze bodies for bigger pumps with 316 stainless impellers. The results have been excellent!

MORE FLOW REQUIRED

The two inch pumps originally supplied are a rugged self priming design but obviously limited in terms of flow. With a maximum flow of 440 litres per minute, they didn't suit every job.

Aussie Pumps worked with key mud tank manufacturers with a view to coming up with bigger capacity pumps. The final outcome was a high pressure and high flow three inch pump!

With three inch ports, self priming capa-

bility and hydraulic motor, the pump was able to attain flows of up to 1100 litres a minute and heads as high as 55 metres.

“That’s an awful lot more capacity than the two inch pumps, which are still doing their job in drill rigs all around Australia,” said Hales.

Called the G3TMK-A series, the three inch pumps form part of Aussie’s GMP range of heavy duty products. The hydraulic drive version can either be built in cast iron semi trash configuration with a front opening port, nickel aluminium bronze, or cast 316 stainless.

Standard silicon carbide seals are part of the kit, as well as a stainless steel wear plate in the cast iron versions.

Best of all, the need for small single or twin cylinder petrol or diesel engines to drive mud pumps was completely eliminated. The hydraulic system, designed by the mud tank manufacturer, provides all the power required!

Pump in support of the drilling industry is continuing.

“We learn every day from talking to maintenance fitters, buyers, drillers and designers” said Hales.

THE PERFECT MUD PUMP

“We think we are getting close to something that’s got a 316 stainless steel body, 316 stainless steel impeller, Viton elastomers, and a tungsten carbide mechanical seal. That would go a long way towards making these pumps virtually indestructible” said Hales.

The Viton elastomers will handle any corrosive compounds in the liquid. The tungsten carbide mechanical seals and counterfaces will guarantee the longest possible wear life, even in the most abrasive applications.

“We’re trying to make a mud pump that is maintenance free,” said Hales. “We don’t operate drill rigs but we certainly listen to the people who do,” he said.

SOLVING THE SEAL PROBLEM

Although the pumps originally were supplied by Australian Pumps with silicon carbide seals, the company noticed users were going through seal kits and bearings on a regular basis.

The biggest problem was isolated to an operational issue of pumps being allowed to run dry! No mechanical seal will stand up to both abrasive material and dry running.

To combat the abrasive liquids, Australian Pump is introducing tungsten seal kits. Both the counterface and the mechanical seal itself are in tungsten. The elastomers can be now also provided in Viton. Both are major steps forward in proving better reliability and reducing maintenance costs.

“We’re not quite sure how to train the drillers not to let the pumps run dry. Perhaps the drill rig and mud tank manufacturers can come up with an automated system shutdown when the tank’s empty” said Hales. “We’re working with some of Australia’s leading specialists in this area and are confident of a solution” he said.

The journey of education for Australian

COOLER RUNNING PUMPS

The company has also now introduced hydraulic drive high pressure wash pumps that will handle up to 4,000 psi and 20 litres per minute. These are Class A units so operators don’t require RTO certification.

The pumps are big Bertolinis with ceramic pistons, bronze heads and big finned crankcases for cooler running. Aussie knows that these machines will be operating in 40 degree temperatures and that cool running aids longevity.

The triplex pumps come with high pressure hose, gun and lance. It can be easily accommodated by the hydraulic systems on drill rigs, water carts and even the mud tank system itself.

FURTHER INFORMATION

Aussie’s new ideas for drill rig pumps are a tribute to the people who find the material that enables our miners to keep mining!

For information on Aussie’s drill rig and mining pumps visit www.aussiepumps.com.au

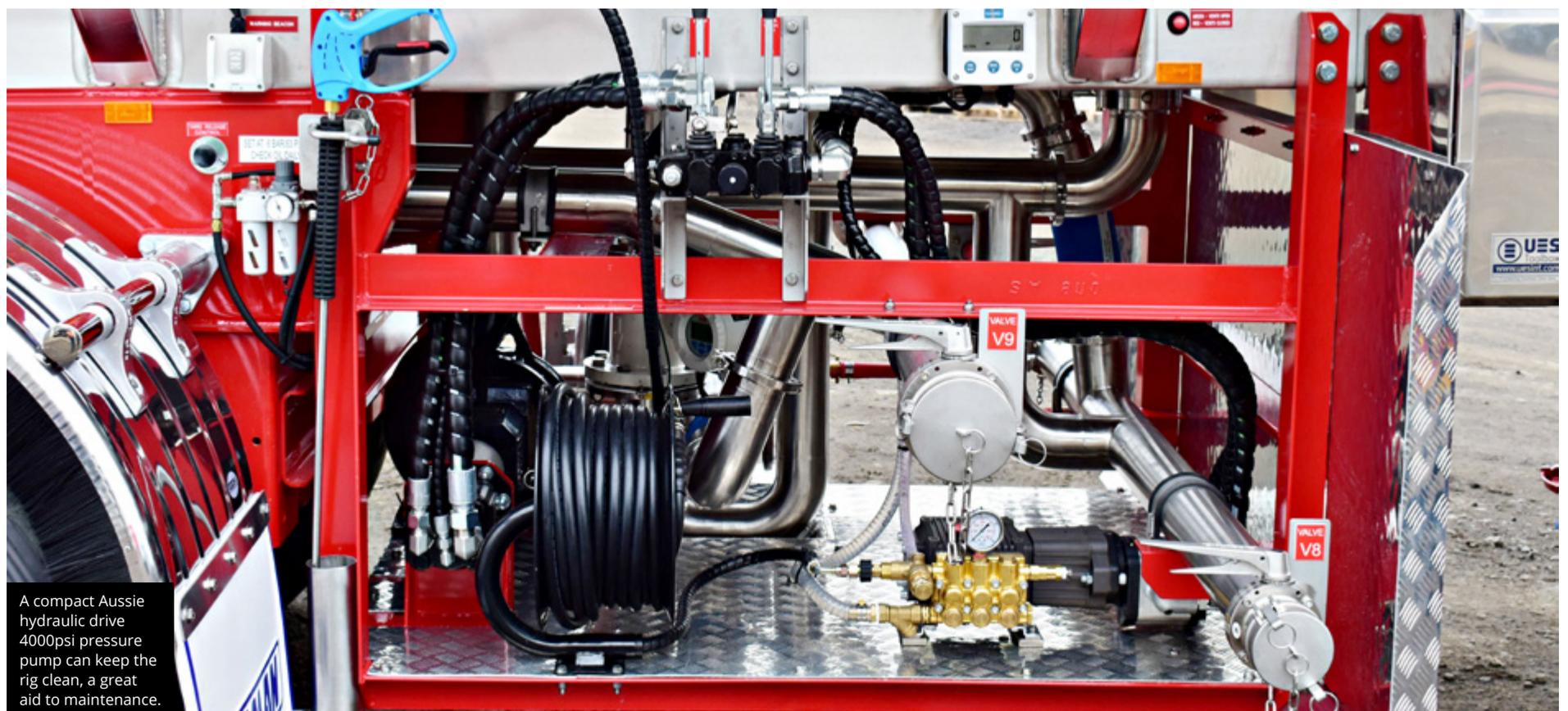
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This 2 inch Aussie cast iron semi trash pump handles mud with ease



The future?... Aussie’s first run of 316 stainless steel hydraulic mud pumps.



A compact Aussie hydraulic drive 4000psi pressure pump can keep the rig clean, a great aid to maintenance.



A large 7m diameter magnetic resonance sensor integrated into the NextOre haul truck sensing system, designed for use in a large copper mine. Photo supplied courtesy NextOre Ltd.

CONCENTRATING THE MINE

by David Miljak,
Research Program Director
(Sensing and Sorting),
CSIRO Mineral Resources.



David Miljak, Research Program Director (Sensing and Sorting), CSIRO Mineral Resources.

Clear long term mega-trends have emerged that present significant challenges to mining and mineral processing.

The inexorable decline in mined ore grade for many metals is well known.

Without mining productivity improvement, this trend will naturally lead to higher energy and water use for each kilogram of metal produced.

In parallel, there is a growing market focus on decarbonising mining and metal production itself, that links to ESG imperatives and social licence to operate.

Finally, the decarbonisation of world-wide industry and energy will require a predicted huge increase in the production of key metals used for batteries and electrification, all in comparatively short time frames that seem incompatible with traditional mine development cycles.

In this environment, there is a pressing need to both improve mining productivity and adopt enabling technologies that will unlock the future required resource.

There are few technological “levers” that can provide true step-change in mining productivity but sensor-based sorting and preconcentration is one potential pathway.

Ore sorting, or the separation of low grade ore from feed ore prior to processing, is a preconcentration method used since the beginning of mining.

In the modern context, automated sensor-based sorting holds promise for transformative outcomes.

Sorting can be applied to brownfield applications to mitigate ore dilution and to uplift ore grade in mill constrained operations and simultaneously provide coarse tailings.

In favourable cases, sorting can uplift feed grades by 20% or more.

Sorting can also be configured to remove penalty elements or extract high grade streams from waste stockpiles.

Sorting is also a key future enabler for greenfield development, for example, allowing economic mining of low grade deposits otherwise considered unviable, by reducing the capital intensity and environmental footprint required by the processing plant.

CSIRO has pioneered the development of Magnetic Resonance sensing technology that has enabled on-conveyor bulk sorting on primary ore conveyors at high tonnage

rates at thousands of tonnes per hour, matching tonnage rates that are characteristic of much of the world's metal production.

Bulk sorting involves the separation of pods of ore, in contrast to particle-by-particle sorting.

The sensing technology is related to Magnetic Resonance Imaging used in clinical medicine but does not require the complicated generation of large static magnetic fields.

The radio-based technique delivers highly penetrative and discriminating measurement of selected minerals.

This leads to fast and accurate measurement at typical mine cut-offs that is a vital technical pre-requisite for efficient bulk sorting.

A previously niche laboratory technique, this particular class of Magnetic Resonance has been brought to industrial relevance by CSIRO through fundamental discovery of mineral resonances and application of advanced engineering.

The on-conveyor sorting technology is now commercialised to NextOre Ltd, a joint venture between RFC Ambrian, Worley and CSIRO.

CSIRO has also recently developed a large Magnetic Resonance sensor for integration into NextOre systems for measurement of ore carried by large mine haul trucks.

This is an alternative preconcentration approach to conveyor sorting, where truck destinations may be selected based on measured ore grade.

Currently, the destination of trucks, for example, waste, stockpile or plant, is typically guided by a mine plan, which usually has limited spatial resolution such that trucks are not always correctly assigned to the correct destination.

The direct and accurate measurement of truck ore grade can reduce the misassignment rate, leading to a potentially large lift in plant feed grade.

CSIRO research for enabling sorting and selective mining is continuing.

CSIRO is developing new methods for rapid bulk iron ore sensing, where ore signatures may for example be used to rapidly detect or infer deleterious elements and minerals associated with problematic ore groups such as shale zones.

Sorting approaches based on such measurements may ultimately assist Australian producers to meet compatibility with emerging green steel production processes that generally require higher ore purity.

Magnetite sensing and sorting is also a current area of CSIRO research focus which aims to upgrade plant feed and increase the viability of processing Australia's large magnetite resource.

Bulk sensing based on an X-ray technology called Gamma Activation Analysis is also being investigated by CSIRO in a proof-of-concept demonstration for direct gold sorting.

Many gold deposits are known to have high in-situ variability, making them highly amenable to bulk sorting.

The current work is directed at validating accurate measurement performance for cut-offs at sub parts-per-million gold concentrations, in short time scales.

Sorting configurations applicable to medium tonnage rates up to 1000tph are being explored.

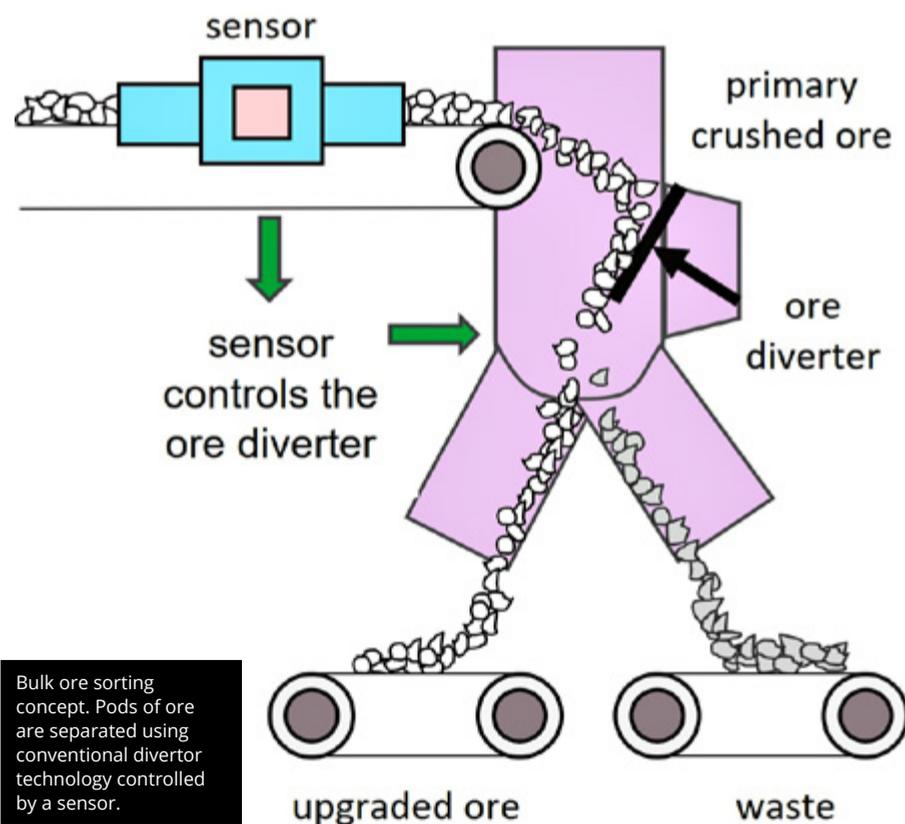
Currently, there is no single sensing technology or “silver bullet” that can span all sorting applications.

However, technical developments by CSIRO and the industry more widely demonstrate recent progress in establishing new sorting applications.

The early miners understood the basic value of simple hand-sorting of ore.

In the modern era, the value of sorting could again emerge as a key enabler of sustainable mining.

With a combination of continued sensing developments and understanding of ore body knowledge, sorting could well find widespread application to meet the existing and future industry challenges. **AMR**





UNLOCKING SUSTAINABLE RESOURCE EXTRACTION:

EXPLORING THE PROMISING FUTURE OF ORE SORTING IN AUSTRALIA

In recent years, the mining industry in Australia has witnessed a remarkable technological transformation with the advent of ore sorting. This technique has revolutionised the way minerals are extracted and processed, unlocking many benefits for both mining companies and the environment. By harnessing the power of advanced sensors and auditing systems, ore sorting has become an industry disruptor, enhancing operational efficiency, reducing waste, and paving the way for sustainable mining practices.

This article will look at various aspects of ore sorting, its advantages, challenges, use cases for top commodities in Australia, as well as practical questions to ask yourself before considering ore sorting.

Understanding ore sorting

Ore sorting involves identifying and removing waste and below-cut-off-grade ore from valuable minerals using tried-and-tested technology. Advanced sensing technologies such as X-ray transmission (XRT), laser, and electromagnetic sensors are employed to identify and differentiate valuable ore particles based on their physical properties. This real-time data is then used to identify and distinguish between ore and waste rapidly and accurately. Doing so, mining operations can optimise and streamline their processes and significantly increase resource recovery.

Ore sorting technology also holds great potential for material upgrading, which refers to the process of enhancing the quality and value of low-grade or suboptimal ore by separating it into high-grade and low-grade fractions. By implementing ore sorting techniques, mining companies can effectively identify and extract valuable minerals from previously uneconomical

or low-grade ore deposits, increasing resource recovery and maximising the value of their operations.

By subjecting tailings (the by-product of the mining process) to sorting technology, mining companies can also extract residual valuable minerals. This means that valuable resources that were previously overlooked can now be reclaimed, promoting a more sustainable and efficient use of mining waste materials.

Diagram 1.0

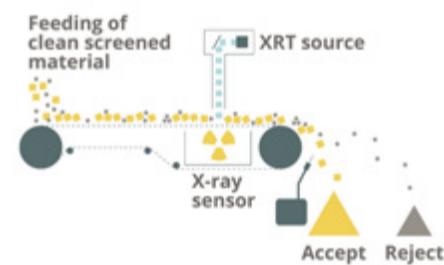


Diagram 2.0

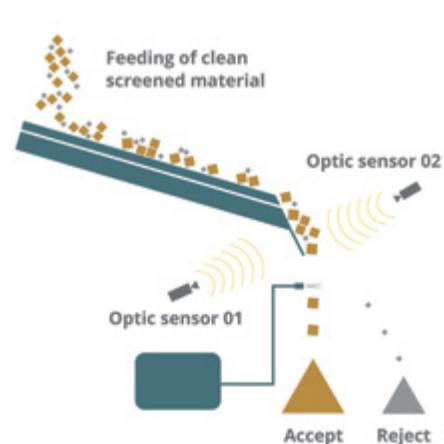


Diagram 1.0 and Diagram 2.0 Ore sorting examples

The role of ore sorting in modern plants

Ore sorting has become an indispensable tool for modern mining plants striving for increased productivity and responsible resource utilisation. It enhances operational efficiency by enabling higher processing rates and improved mill throughput.

By swiftly and accurately separating valuable minerals, mining operations can optimise their processes and focus on extracting high-grade ore, minimising the need for costly downstream processes.

Ore sorting also reduces the impact the mine has on the environment, reducing carbon emissions and helping mines to contribute to a carbon-neutral future.

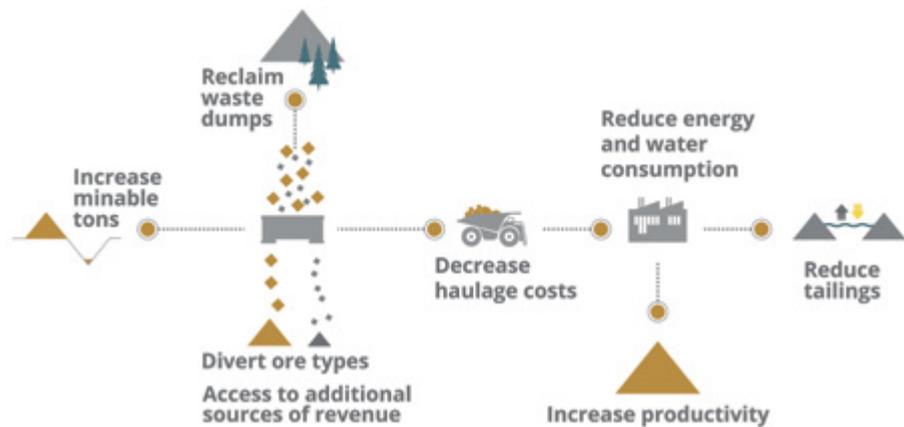
It aligns with sustainable mining practices by conserving precious resources and contributes to greener mining, safeguarding local ecosystems. By integrating smart technologies, mines are also better positioned to gain green eligible status and qualify for green loans.

The 7 most important benefits of ore sorting in Australia

- 1. Increased resource recovery:** Ore sorting enables mines to extract a higher proportion of valuable minerals from the ore, resulting in increased resource utilisation and improved overall productivity. It also allows for the extraction of lower-grade ores that were previously discarded, extending the life of mines.
- 2. Enhanced operational efficiency:** By efficiently separating valuable minerals from waste early in the extraction process, ore sorting optimises downstream processes,

reduces processing costs, and enhances operational efficiency.

- 3. Improved product quality:** Ore sorting technology allows for the identification and separation of high-grade ore, resulting in improved product quality and higher market value for the extracted minerals.
- 4. Reduced water consumption:** By being able to dry sort and process less materials, mining operations can drastically reduce water consumption, a critical concern in arid regions like Australia.
- 5. Reduced environmental impact:** By separating valuable minerals from waste early on, not only do mines minimise the amount of land disturbance but the amount of material sent to fine tailings dams is also drastically reduced. This matters because tailings dams occupy significant land space and can pose environmental risks, such as the contamination of surrounding ecosystems. Now, it's possible that waste can be returned to the environment in an unaltered state.
- 6. Green-linked loans:** By integrating ore sorting technologies, mining operations are more likely to secure green loans because they minimise overall ore extraction, which will result in reduced energy consumption and greenhouse gas emissions.
- 7. Cost savings:** By reducing the amount of waste material sent for processing, ore sorting lowers operational costs associated with transportation, energy consumption, and downstream processing, leading to significant cost savings for mining operations. It also means that companies are transporting saleable ore and not waste.



The successful implementation of ore sorting

The success of ore sorting technology is evident across various commodities in Australia.

In gold mining, ore sorting has demonstrated significant improvements in resource recovery and operational efficiency. By segregating gold-bearing ore from waste early on, mining companies have achieved higher grades, increased production rates, and reduced processing costs.

Lithium, a key component in the production of batteries for electric vehicles and renewable energy storage, has witnessed a surge in demand. By employing ore sorting techniques, mining companies can effectively separate lithium-bearing minerals from waste early in the extraction process, optimising resource recovery and increasing the overall grade of the ore. Sensor-based sorting technology enables precise identification and sorting of lithium-rich particles, improving operational efficiency and reducing downstream processing costs.

With iron ore being a key component in steel production, its efficient extraction and processing are critical for the Australian economy. By utilising advanced sensors, such as X-ray transmission or electromagnetic sensors, mining operations can precisely identify, and separate, iron ore particles based on their iron content. This allows for targeted processing, reducing the need for costly and energy-intensive downstream processes.

The application of ore sorting has displayed notable success and become prevalent in uranium mining in Australia, playing a significant role in the global nuclear energy sector. The ore sorting process focuses on separating waste rock with low concentrations of valuable minerals from the process prior to the material being fed to the mill, reducing the amount of material that is processed in the uranium mill. This makes it possible to only lose a minor fraction of the contained uranium. Uranium minerals have very high densities, there is a clear distinction when compared with the lower density waste material (cal-cite).

Australia has become one of the leading copper producers globally, the introduction of ore sorting has helped the industry grow. It's possible to now upgrade feed to mineral processing plants with ore sorting, separating mineral rock at a high speed and at high feed rates. This increases efficiency of processing plants because more mineral is processed and less rock. Ore sorting works as a pre-concentration method for copper mining to remove a significant amount of waste material.



Questions you should ask before implementing ore sorting

Before implementing ore sorting, mining companies need to consider several fac-

tors. While ore sorting can be highly effective, it may not always replace traditional dense media separation (DMS) processes. It is crucial to evaluate the specific characteristics of the ore deposit and determine if ore sorting alone can meet the desired objectives or if a combination of ore sorting and DMS would be more suitable for optimal mineral processing.

Any reputable ore sorting advisor will tell you that the process always starts with the deposit. Before making the commitment to ore sorting, have your deposit evaluated so that you can understand its characteristics and whether it is amenable to ore sorting. Assess if the ore has significant variability and heterogeneity in its mineralogy, particle size, or chemical composition, as these factors can impact the effectiveness and efficiency of sorting technologies.

Finally, choose your ore sorting advisors and specialists with care. By partnering with the right integrators, you'll have access to the ongoing technical expertise you'll need to be able to operate and maintain the sorting systems and get the required assistance and support to develop and train personnel.

Stark Resources: Next generation solutions around ore sorting

Stark Resources is a unique, independent end-to-end integrator of ore-sorting technologies and has made significant inroads in Australia's mining industry. The team leverages its unique set of capabilities and expertise to develop next-generation solutions around ore sorting. They consider a wide range of technologies and partner with an extensive group of best-in-class suppliers, to ensure that miners have access to tried and tested solutions that will

help them meet their unique needs and get into production. A core belief at Stark is to always start with the deposit to ensure that the team understands and designs a

plant around the geology of the deposit. Once the deposit has been assessed, the team determines if ore sorting is the most appropriate solution or whether a hybrid solution centred around ore sorting and DMS would better suit the ore.

The team has experience that extends beyond the past 20 years, making them an ideal partner for mining companies seeking to upgrade their operations and maximise yields.

They understand the complexities of the industry as well as the opportunities that ore sorting offers and have become the go-to partner for mining companies striving to embrace greener practices.

With their expertise and focus on smart, simple, and fast integration, Stark Resources is paving the way for a more sustainable and efficient future in mineral processing.

What really sets Stark apart is their belief that an engagement with a client is first and foremost a partnership. They work closely with their clients to get the plant into production and beyond.

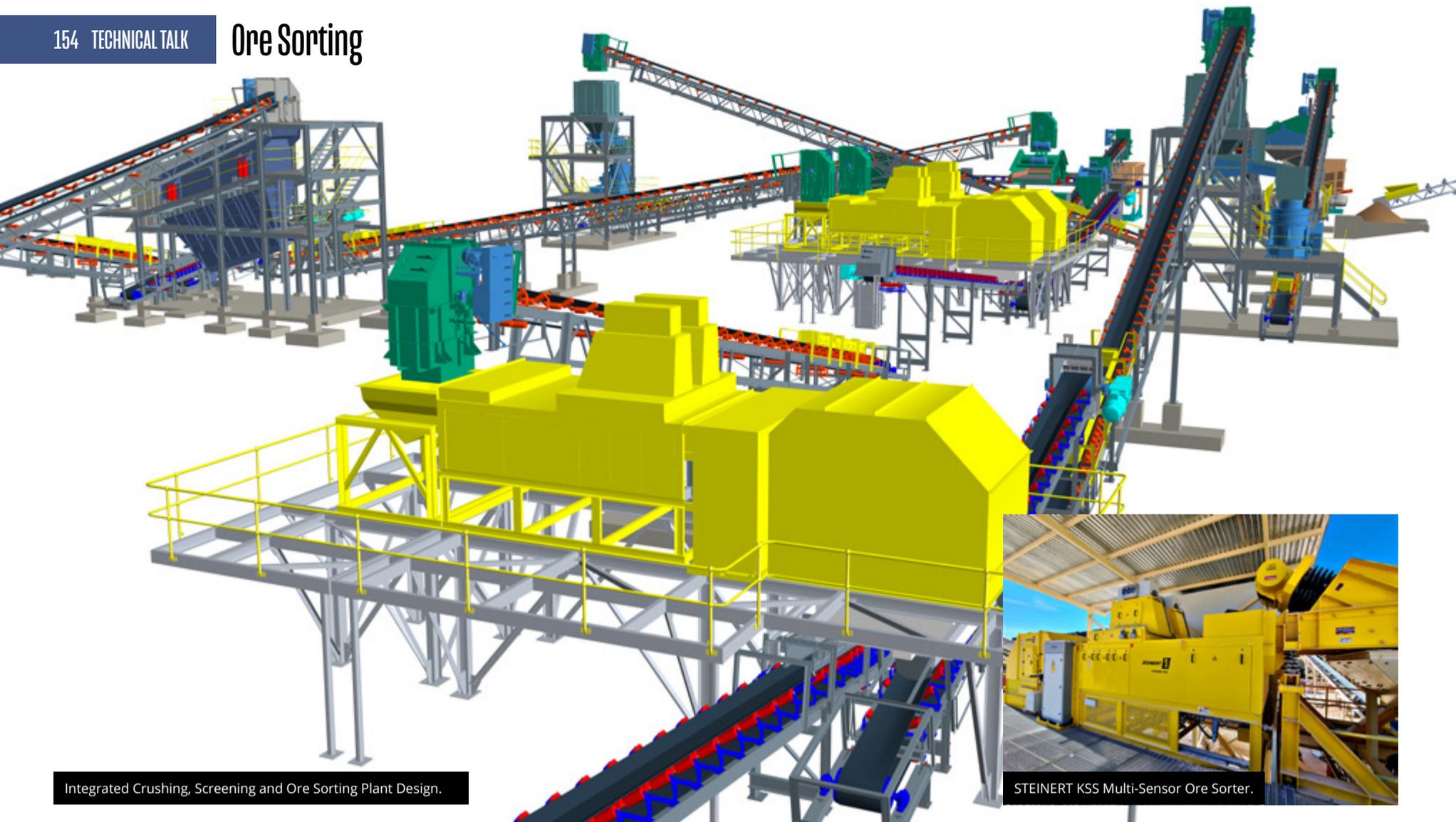
Once the plant is in production and operations have been assessed and optimised, the Stark team trains and develops personnel on-site, so that they are equipped to ensure successful, optimal recovery.

Conclusion

With Australia being rich in mineral resources, the adoption of ore sorting technologies positions the country as a global leader in efficient and responsible mining practices. As Australia continues to lead the way in environmentally conscious mining, ore sorting stands as a testament to the country's commitment to innovation and a greener future for the mining sector. For more information on how to partner with Stark Resources and integrate ore sorting technologies into your plant, contact info.au@stark-resources.com.

AMR





Integrated Crushing, Screening and Ore Sorting Plant Design.

STEINERT KSS Multi-Sensor Ore Sorter.

ORE SORTING TECHNOLOGY

NEXUS BONUM HELPS MINERS UNLOCK RESOURCE VALUE AND ENHANCE ESG OUTCOMES

Asset owners are increasingly looking to technological developments to improve processing efficiency and reduce environmental impacts. Sensor based ore sorting is now an established viable pre-concentration process to achieve such goals through efficient removal of waste and sub-economic grade ore from run-of-mine feed before proceeding to milling and further downstream processing. This smart technology not only significantly reduces downstream milling and processing

costs, power and water requirements, as well as plant capex, however it offers ESG benefits including lower carbon emissions and tailings generation per unit of final product.

Australian company Nexus Bonum holds the key to unlocking this potential across the value chain for mines both in Australia and abroad. It adopts a technology-focused, yet practically driven approach to implementing ore sorting technology and applying process engineering expertise.

An approach developed after many years of involvement in ore sorting, which now positions the company as the leading ore sorting consultancy in Australia.

In late 2014, Nexus identified ore sorting and associated scanning technologies as a real game changer, which led to the development of a unique service offering to the mining industry.

The *Australian Mining Review* caught up with Nexus Bonum Senior Consultant, Dr

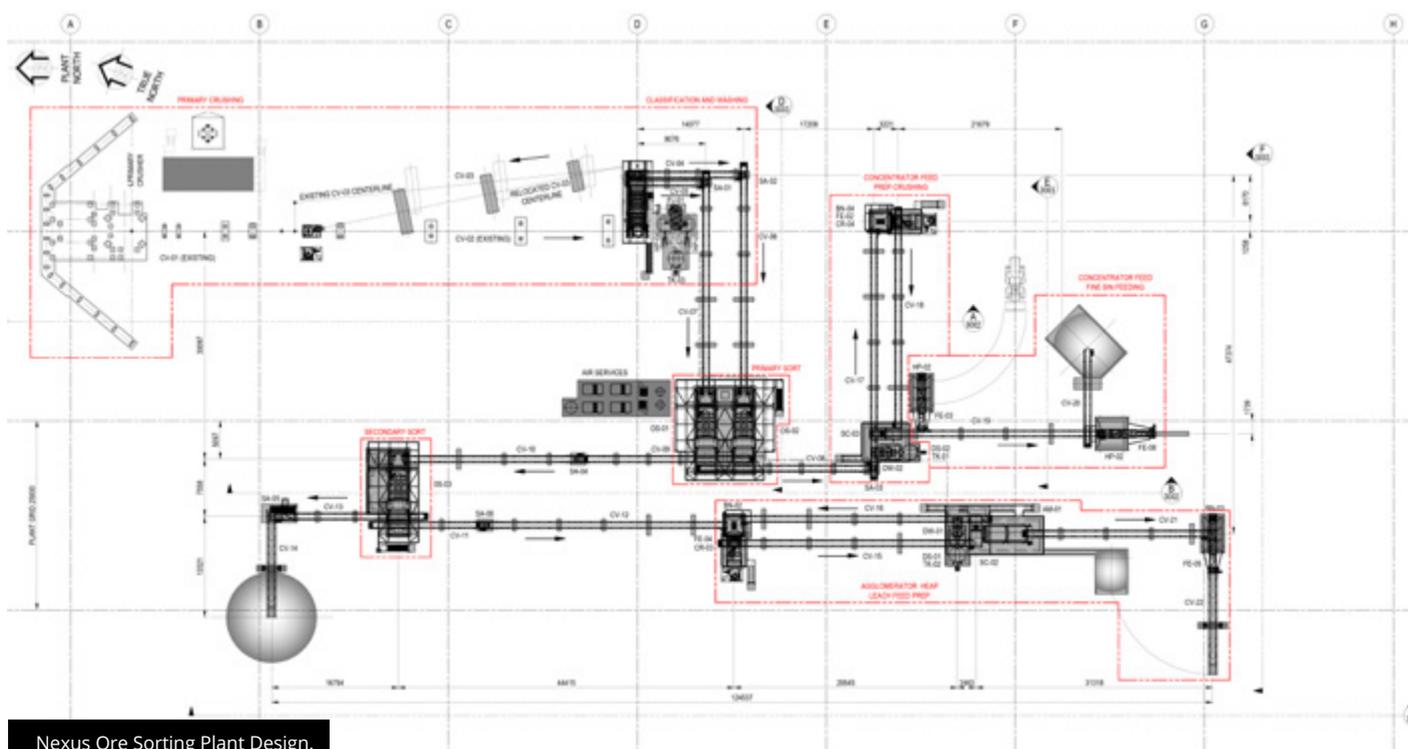
Tony Parry, to understand what tools the company uses to optimise economic and environmental outcomes in mineral processing operations.

AMR: Can you walk us through how Nexus Bonum started out, and how it has positioned itself within such a specialised field?

TP: When we set out in 2014 as a consultancy geared toward the mining and resource sector, we focused on leveraging the breadth of metallurgical, technical and engineering expertise our team had developed after decades within the industry. After conducting comprehensive reviews among major players in the mining space, it became clear that a significant number of marginal or near viable projects required a 'technology shift' or 'enabler' to extract value from their site processes. The typical strategy of chasing economies of scale through resources growth had clearly left many projects in a stranded state.

At that stage, sensor-based ore sorting technology was really coming into focus as a credible pre-concentration (i.e. early-stage waste-removal) process in mineral processing due to the development of new scanning capabilities (e.g. X-Ray transmission and laser), as well as the dramatic increase in computing capacity driving higher throughputs for each sorting machine.

Subsequently, sensor-based ore sorting has proved an effective and reliable method, and more readily accepted and inte-

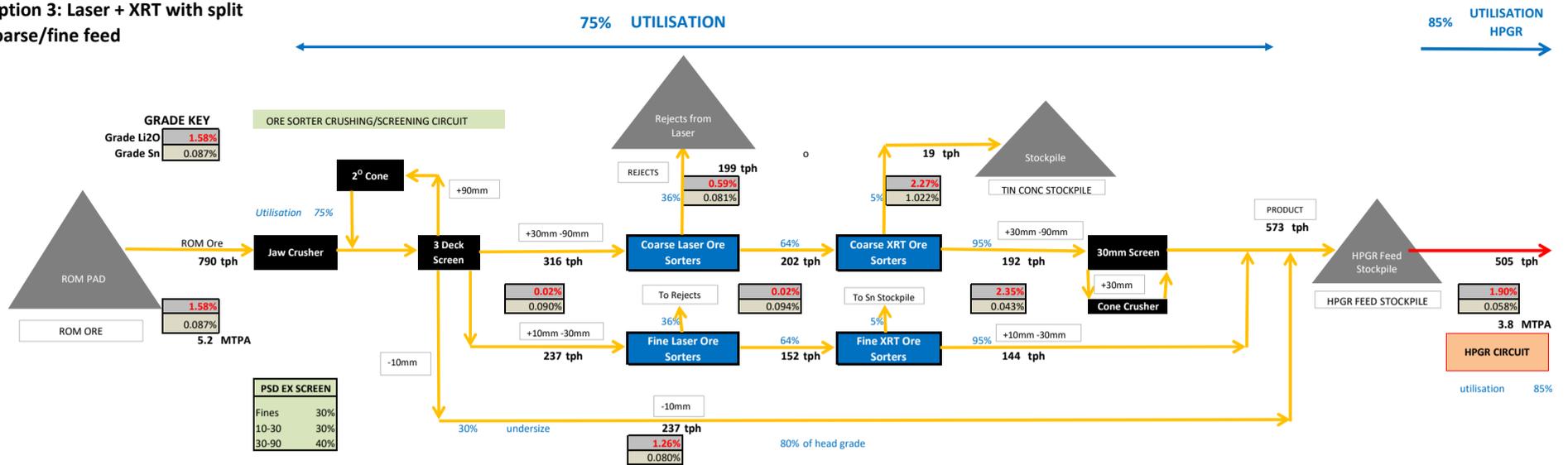


Nexus Ore Sorting Plant Design.

L-XRT - Coarse

CONCEPTUAL ORE SORTING FLOWSHEET

Option 3: Laser + XRT with split coarse/fine feed



Ore Sorting Flowsheet Development from Test Work.

grated in greenfields designs, and retro fitting in brownfield operations.

With considerable experience in ore sorting projects combining metallurgical, chemical and mechanical engineering expertise, the Nexus team has been able to create a unique position within the market. We provide a holistic approach to the application of sorting and related technologies to mining projects (from early-stage test work to engineering studies), leveraging our in-depth knowledge of available sorting technologies and their specific application.

Importantly, we are able to close-the-gap between clients' requirements and ore sorting technology providers' capabilities to maximise the potential for project development. We have established a niche position as an integrated engineering support team, and have supported the delivery of project outcomes, particularly for junior mining companies.

AMR: Nexus' integrated process is obviously highly technical. Can you share some insights into your unique approach and the steps you take when it comes to ore sorting and pre-concentration?

TP: Evaluating ore sorting pre-concentration technology is not just about undertaking test work and evaluating the inputs/outputs and efficiency of the process being tested.

The key is then taking that test work data and realistically modelling and assessing the economic and environmental benefits that can be generated by adopting the technology, while understanding the practical implications of using a particular flowsheet and the ability to conduct appropriate risk assessments.

For Nexus Bonum, this entails scenario analysis and appropriate Concept and Scoping Studies that detail things like capex, opex, and plant layouts. It is essentially moving from the test centre towards a 'real world' analysis for the client in order to provide a sound basis for progressing to a Definitive Feasibility Study (DFS) and an investment decision.

Pre-concentration test work is often frequently undertaken without bridging the gap between test work performance outcomes and a proper engineering and economic assessment of the practical implementation of the ore pre-concentration processes being assessed.

AMR: Can you provide more detail on the steps you take with clients seeking to assess the benefits of ore sorting?

TP: Our work commences with the engagement of geologists. The unique mineralogy of any ore body will determine the potential for pre-concentration through ore sorting, and that's exactly where we start – mineralogical assessment, drill core scanning, and planning of sampling programs undertaken with the client. If the mineralogy is not amenable to ore sorting, we need to close that off at an early stage. If sampling is not carefully planned to ensure representivity, a lot of time and money can be wasted in test work.

Following sample extraction, we develop feed preparation and test work plans, working closely with selected laboratories to ensure adequate feed preparation and assay programs are in place. We then plan and manage multi-stage ore sorting test work programs using the technology providers' test centres – typically Steinert in Perth or Tomra in Sydney for Australian-based projects, and overseas test centres for international projects.

Whenever ore sorting test work is underway, we encourage the client to attend. Once test work programs are completed, we proceed to technology validation by presenting mass yield/grade/recovery relationships, and identify the ore sorting 'sweet spot' to optimise the potential.

We then move into the engineering phase with the development of process flow sheets and process design criteria. This informs a Concept Study or Scoping Study for brownfield or greenfield applications, integrating with the front-end crushing, screening circuit, and downstream processing circuit. These studies present preliminary capital and operating cost estimates, and enable a realistic economic analysis of the benefits of introducing ore sorting.

Subject to the outcomes of the above studies, we will then progress to a more advanced DFS, which will underpin a final investment decision by the client.

AMR: What are some of the other services you can provide asset owners that adds value to their operation?

TP: The depth of experience of our team means we can offer a wide range of ad-

ditional services to our clients. These include project execution, technical advisory, and the assessment of opportunities to not only monetise stranded assets and harmful waste stockpiles, but also those for low-capex expansion, with ore sorting.

We also review mining cut-off grades and opportunities to increase mineral reserves and mine life through the application of ore sorting, as well as opportunities to produce direct shipping ores. Additionally, project intervention, assessment and recovery plans, plus project study reviews and financing strategy support also provide clients with significant value in their operations.

AMR: It's no secret that mining operations have an impact on the land and communities in which they operate. What environmental benefits does ore sorting provide in the long-term?

TP: ESG considerations in relation to mining project development and growth are now front of mind for all mining company Directors. In fact, they face a great challenge in shifting community perceptions. The application of ore sorting technology can play an influential role in this area due to the significant environmental benefits – from reduced power, water and chemical consumption, through to a lower carbon footprint.

Other environmental benefits include reduced wet tailings production, tailings storage facility requirements, and the gen-

eration of potentially useful benign aggregates and engineering fill products rather than tailings.

AMR: Where to from here for ore sorting technology and Nexus Bonum?

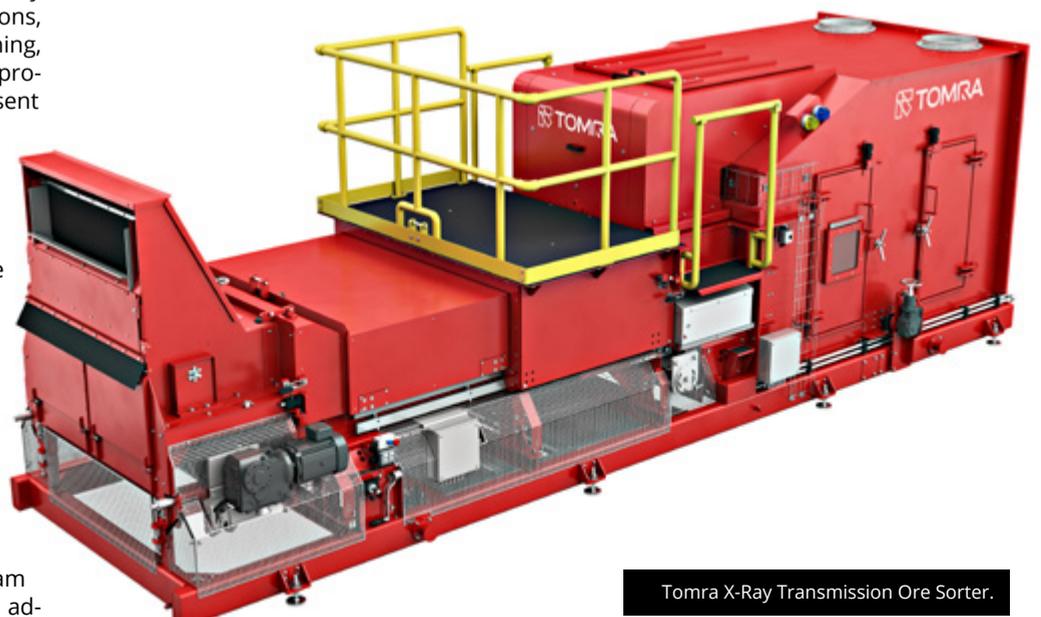
TP: We see the technology continuing to evolve at a rapid pace with the need to address environmental issues, as well as higher profits being a major driver. The dynamic information ore sorting sensors acquire will become valuable for downstream process control.

As sensors, particularly spectral, become more robust and accurate, the real-time diagnostic capabilities of ore sorting machines will become immensely powerful, more so when coupled with the application of artificial intelligence.

While looking forward to future technical innovations, Nexus Bonum is looking into the integration of ore sorting to underground operations and potentially to continuous surface mining operations.

For more information, visit <https://nexusbonum.com/> or email tony.parry@nexusbonum.com

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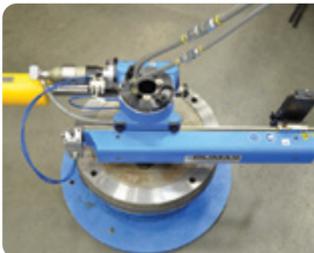
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