

THE AUSTRALIAN MINING REVIEW

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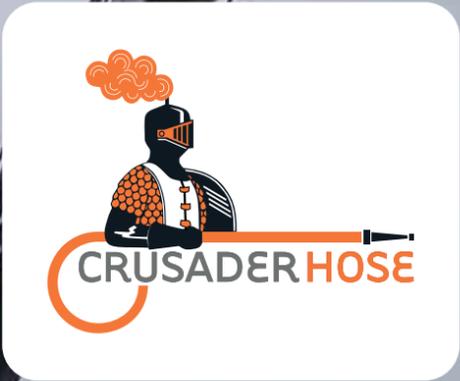


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The 2022-23 Federal Budget introduces significant investments in the development of hydrogen and critical minerals industries.

EXPLORING THE IMPACT

of the May 2023 Federal Budget on the Australian Mining Industry

Australia's 2022-23 Federal Budget brings forth a host of measures with far-reaching implications for various sectors of the economy.

Notably, the mining industry, a key pillar of the Australian economy, stands to gain from several of these reforms.

Despite challenging global circumstances, the outlook for the mining industry remains relatively positive.

Federal Resources Minister Madeleine King highlighted the importance of the sector in achievement of climate reform goals in a statement.

"The road to net zero runs through the resources sector," said Minister King.

"After a decade of delay and inaction under the Liberals and Nationals, the Albanese Government is providing the leadership, investment, and policy certainty the sector needs to thrive."

Investment in the mining sector

While investment in non-mining sectors is expected to drive growth in the coming years, a modest increase in mining investment is forecasted.

The investment is expected to remain flat in FY23 before modestly growing by 2% in FY24 and 1.5% in FY25.

This prediction primarily encompasses expenditure to maintain existing resource production capacity and a modest number of new Liquefied Natural Gas (LNG) and metal ore projects.

"Our vision is for an Australian resources sector that continues to grow national prosperity, supports jobs and opportunities, and drives the global transformation to net zero," said Minister King.

Nevertheless, the industry should remain vigilant of potential downside risks, such as elevated input costs and ongoing domestic and global headwinds that might prompt firms to delay or cancel projects.

Focus on hydrogen production

Hydrogen investment emerges as one of the key focal points of the Federal Budget.

The government has announced a \$2b investment in the Hydrogen Headstart program to bolster hydrogen production.

As hydrogen is expected to fuel critical operations in the mining industry, like powering haul trucks and providing electricity to remote mining operations, this commitment underscores Australia's intent to position itself as a world-leading hydrogen producer.

Corporate taxes and the mining industry

The Federal Budget also puts forward changes to corporate taxes that directly affect the mining industry.

The Federal Government has extended the instant asset write-off scheme, allowing mining companies to instantly deduct the full cost of eligible depreciable assets installed and ready for use until 30 June 2023. This move is likely to stimulate investment in new equipment and technology, encouraging economic growth.

By reducing the investment cost, mining companies can enhance their profitability and potentially generate new job opportunities in the sector.

Tackling multinational tax avoidance

Multinational tax avoidance is another prominent issue the Federal Budget addresses.

Measures are put in place to prevent multinational corporations from shifting their profits offshore, thereby helping to recover lost revenue and ensuring fair taxation practices within the country.

With an additional \$1.9b funding provided to the Australian Taxation Office (ATO), the government is geared to ramp up efforts against multinational tax avoidance.

Investment in critical minerals industry

In another significant move, the Federal Budget has allocated significant funding to the critical minerals industry, crucial for transitioning to a low-carbon future.

Minister King emphasised the importance of critical minerals in global efforts to decarbonise and meet Paris commitments.

"Australia has vast reserves of critical minerals," she said.

"Building the sector by generating new downstream industries and diversifying global supply chains will help Australia achieve net zero commitments."

The Federal Budget allots \$57.1m to the Critical Minerals International Partnerships Program, \$21.1m for the ongoing operation of the Critical Minerals Office, and \$2.2m for the Treasury to track compliance in the critical minerals sector.

These measures aim to build the sector, diversify global supply chains, and help Australia meet net-zero commitments.

Supporting small-to-medium businesses and start-ups

The Federal Government has also announced a new \$392m Industry Growth Program, designed to provide support and advice to small-to-medium businesses and start-ups in the mining industry.

The program aims to help these businesses commercialise their ideas and expand, providing grants and mentorship to increase the pipeline of investment-ready projects for the \$15b National Reconstruction Fund.

This investment is part of a broader commit-

ment to industry growth, which includes a \$101b investment in the responsible development of Australia's quantum and artificial intelligence industries.

Hydrogen and critical minerals: unexplored potential

While the Federal Budget brings mixed news for the Australian mining industry, it reflects the government's commitment to supporting the industry, investing in renewable energy, and preventing tax avoidance by multinational corporations.

With the potential of hydrogen and critical minerals yet to be fully realised, the industry has plenty of opportunities for growth and innovation.

Nevertheless, the industry must adapt and evolve to capitalise on these opportunities. In this context, the investment in the Hydrogen Headstart program and the critical minerals industry holds significant promise.

Promotion of a greener mining sector

The use of hydrogen as a clean energy source in mining operations could not only increase efficiency but also contribute to a greener and more sustainable mining sector.

Likewise, the growth of the critical minerals industry would help meet global demand for clean energy technologies and promote economic diversification.

Changes in corporate taxes aimed at promoting investment will help stimulate industry growth and technological advancement. The extension of the instant asset write-off scheme will make it easier for mining companies to invest in new equipment and technology, improving their operations and potentially creating new job opportunities in the sector.

This, in turn, could help boost local businesses and create a more sustainable supply chain for the mining industry, providing

a robust foundation for future growth.

Moreover, measures to curb multinational tax avoidance indicate a shift towards more equitable taxation practices.

These measures, coupled with additional funding for the ATO, are likely to improve the government's ability to recover lost revenue and ensure that all companies, including multinational corporations, pay their fair share of taxes in Australia.

Focus on SMEs and start-ups in the mining sector

The emphasis on supporting small-to-medium businesses and start-ups in the mining sector is another encouraging sign.

The Industry Growth Program, with its focus on helping these businesses commercialise their ideas and expand, is expected to facilitate industry growth and job creation.

Furthermore, the government's significant investment in the quantum and artificial intelligence industries signals a commitment to future technological advancements that can reshape the mining industry.

Navigating future changes in the mining industry

The Federal Budget 2022-23 is a comprehensive roadmap for the future of the mining industry in Australia.

It exhibits the government's commitment to supporting the industry while ensuring economic growth, job creation, and adherence to equitable taxation practices.

The mining industry is poised to undergo significant changes, with the rise of hydrogen and critical minerals playing a vital role. As the industry navigates this landscape, adaptability and innovation will be crucial to harnessing the opportunities presented by these changes. **AMR**



The newly announced \$392m Industry Growth Program signifies the government's support for small-to-medium enterprises and start-ups.

BHP's Green Strategy for Growth

BHP CEO Mike Henry spoke on the company's strategy to meet the mining opportunities and challenges head on. (Image source: BHP).



BHP's (ASX: BHP) chief executive officer Mike Henry delivered a speech at the Bank of America 2023 Global Metals, Mining & Steel Conference, discussing the company's strategies to drive value growth.

Mr Henry emphasised the long-term growth opportunities driven by factors such as population growth, urbanisation and decarbonisation.

"The global economy is expected to be 2.5 times larger by 2050, with the biggest contributions coming from China, where the economy is expected to double in size and India, where a four-fold expansion is anticipated," he said.

Mr Henry also stressed the need for increased capital-intensive investments and infrastructure development to facilitate decarbonisation and mitigate climate risks.

"In our 1.5-degree scenario, we expect the world would need almost twice as much steel, twice as much mined copper, twice as much potash fertilizer and four times as much primary nickel over the next 30 years, as the past 30," he said.

"Based on our estimates of a plausible upside case of a 1.5-degree scenario, the industry could require around a quarter of a trillion dollars in growth capital by the end of the decade.

"We will only pursue growth where we believe we can deliver long-term value for shareholders."

The speech highlighted the challenges associated with meeting the growing demand for metals in a decarbonising world.

Mr Henry discussed the potential shortfall in capital deployment within the industry, particularly in meeting the expected demand for copper.

He called for governments to accelerate the pace of bringing new supply to the market by streamlining permitting processes and maintaining stable fiscal settings.

Mr Henry presented BHP's competitive advantage, emphasising its unique portfolio of leading basin plays and operational expertise.

"Our portfolio of leading basin plays is

unique. Paired with our operating system and our capital allocation framework, this represents a competitive advantage," he said.

"Our industry leading Western Australia Iron Ore business sets us apart as the lowest cost iron ore producer globally."

The company expressed excitement about its potash projects, highlighting positive market fundamentals and providing updates on Jansen Stage 1 and ongoing studies for Jansen Stage 2.

"The long-term fundamentals for the [potash] market are compelling and have improved further since we sanctioned Jansen Stage 1," said Mr Henry.

Mr Henry shared insights into BHP's recent acquisition of OZ Minerals, emphasising the potential for unlocking synergies and expanding copper and nickel production.

"Combining Olympic Dam, Carrapateena, Prominent Hill and Oak Dam, will create a Tier One copper province in South Australia."

The speech concluded with an emphasis on BHP's commitment to being a reliable operator, delivering strong performance and attractive returns.

Mr Henry highlighted the company's recognition for operational excellence and its track record of successfully delivering projects on time and on budget.

"We have demonstrated our projects capability with our recent successes in Australia at South Flank and in Chile at the Spence Growth Option, both of which were delivered on time and on budget in spite of the challenges presented by COVID," he said.

BHP's focus on responsible and sustainable business practices, creating enduring benefits for stakeholders, was reiterated. **AMR**

Queensland Powers Six New Industries Towards Net Zero Future

The Queensland New Industry Development Strategy (QNIDS) has been unveiled by Queensland Deputy Premier Dr Steven Miles to propel industries vital in driving the global shift towards a net-zero economy, align with the State's renewable energy targets.

Under the QNIDS, Queensland will focus on six key areas of development:

- Renewable energy manufacturing and infrastructure;
- Critical minerals processing, manufacturing and product development;
- Battery industry development;
- Green hydrogen;
- Circular economy and resource recovery; and
- Bioeconomy, biofuels and sustainable aviation fuel.

To facilitate the identification of opportunities at the local level, the QNIDS will establish a state-wide Local Economic Opportunities Network, empowering Queensland communities to engage in the development process.

The Queensland Jobs Fund, totalling \$5.84b, will be deployed to drive initiatives that foster regional economic growth, particularly in areas affected by the transition to a low-emissions economy.

This includes the North West Minerals Province, the economic corridor leading to Townsville, Greater Whitsunday, Central Queensland, Darling Downs South-West, and South Burnett regions.

Deputy Premier Steven Miles emphasised the significance of Queensland's commitment to becoming a state of opportunity in industries essential for the global decarbonisation movement.

He highlighted the state's unique strengths, including abundant natural resources, world-class ports, a skilled workforce and established trading partnerships, which position Queensland favourably to leverage the emerging opportunities.

"Our Queensland Energy and Jobs Plan sets a strong foundation for a clean energy future that promotes innovation, more jobs, sustainable communities, and economic growth," said Dr Miles.

"With this New Industry Development Strategy, we are taking the next steps to strengthen Queensland's capabilities to manufacture the equipment needed to make the shift to decarbonisation and build whole new industries to support that transition."

Furthermore, as the host of the Brisbane 2032 Olympic and Paralympic Games, Queensland has a remarkable opportunity to showcase its clean energy credentials to the world, bolstering its position as a leading force in the global clean energy transition.

As of now, Queensland already relies on more than 20% renewable electricity, with over \$11b invested in 50 large-scale renewable energy projects across the State.

These initiatives not only reduce CO2 emissions by over 13.8mt annually but also support approximately 7,900 construction jobs. The state has committed to achieving renewable energy targets of 70% by 2032 and net-zero emissions by 2050. **AMR**

Renewable energy, manufacturing and infrastructure come under the spotlight in the new strategy.



Queensland has unveiled their plan to achieve the state's net zero goals.



Renewable energy, manufacturing and infrastructure come under the spotlight in the new strategy.

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\$50m Boost For Australian Critical Minerals

The Federal Government has approved nearly \$50m in grants to proceed critical minerals projects, including those belonging to Australian Energy Storage Solutions, IGO, International Graphite, Magnium Australia, Australian Strategic Materials and Queensland Pacific Metals.

Federal Resources and Northern Australia Minister Madeleine King says the projects will speed up and help Australia and its export partners lower emissions and meet net-zero commitments by 2050, along with diversifying supply chains and build domestic downstream processing.

"The successful projects will create jobs and opportunities across regional Australia and help Australia realise its ambitions to be a clean-energy superpower," she said.

"The 13 projects to receive funding under the Critical Minerals Development Program grants include plans to produce key inputs to lithium-ion batteries for electric vehicles and to support supply chains for advanced manufacturing for aerospace, medical, energy and defence applications.

"The grants will support Australia's new Critical Minerals Strategy, to be released shortly and which will outline how Australia can capture the significant opportunity of growing its critical minerals processing sector.

"Australia has remarkable potential to meet the increasing global demand for the critical minerals needed for clean energy technologies, such as electric vehicles and batteries, as the world moves to decarbonise."

Minerals Council of Australia (MCA) chief executive

Tania Constable says Australia's opportunity increases with new jobs, regional development and economic growth when the mining, processing and manufacturing industries integrate and work together.

"The [Critical Minerals Development] Program recognises the diverse mineral and metal inputs and how the mined materials get processed, refined and come together as active components of batteries and solar panels as well as aerospace, medical, energy and defence technologies," she said.

"Grants support the mining, processing and refining of raw materials, including heavy rare earths, tungsten in WA, and cobalt in Queensland, recognising the links between mining and manufacturing.

"The [Federal Government] is also supporting investment in the processing, refining and manufacture of energy chemicals and metals used in energy technologies such as batteries, wind turbines, electric motors, solar panels and nuclear facilities.

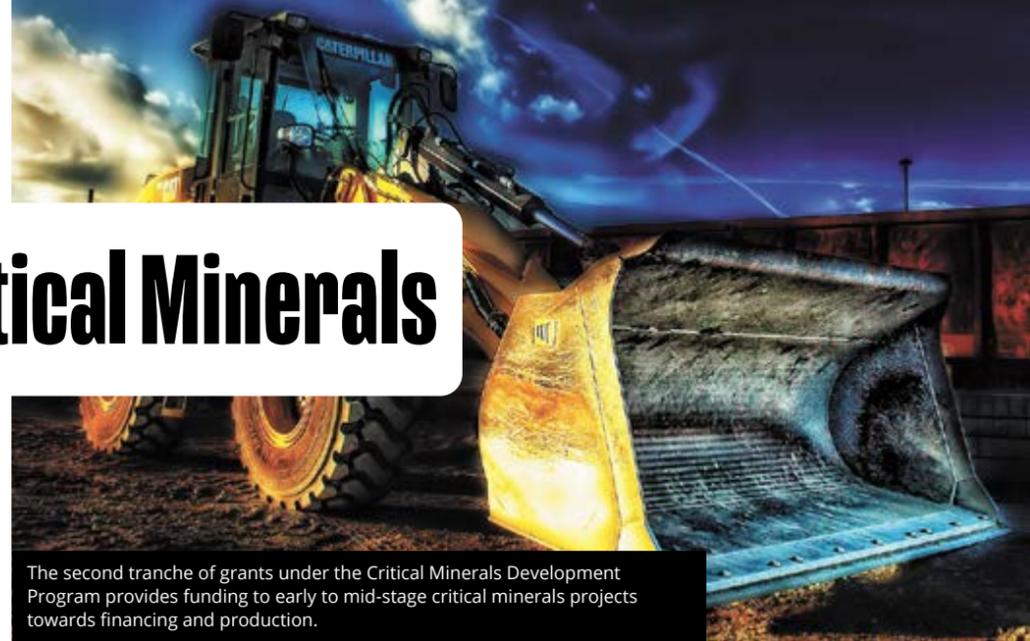
"The MCA looks forward to the release of the government's new Critical Minerals Strategy. "A cohesive strategic investment strategy is critical to unlocking Australia's remarkable potential along the energy technology value chain."

This second tranche of grants under the Program provides funding to help progress early to mid-stage critical minerals projects towards financing and production.

The successful projects are located in:

WA

\$5.5m to Australian Energy Storage Solutions Pty Ltd for a pilot to set up Australia's first precursor cathode active material manufacturing plant in Kwinana;



The second tranche of grants under the Critical Minerals Development Program provides funding to early to mid-stage critical minerals projects towards financing and production.

\$4.6m to IGO Ltd to support its integrated battery material facility at Kwinana, which will produce high value nickel-cobalt-manganese precursor cathode active material;

\$1.2m to Tungsten Metals Group Pty Ltd for the production of ferrotungsten powders for advanced manufacturing for aerospace, medical, energy and defence products;

\$4.7m to International Graphite Ltd to support the International Graphite WA Mine to Market battery graphite materials project;

\$5.9m to Northern Minerals Ltd to support its Browns Range heavy rare earths project at Halls Creek;

\$1m to Tungsten Mining NL to support test work for its Mount Mulgine tungsten project;

\$6.25m to Magnium Australia Pty Ltd to commercialise CSIRO-patented technology for clean extraction of magnesium metal, and a magnesium refinery pilot plant in Colliie.

NSW

\$6.5m to Australian Strategic Materials Ltd

for its Dubbo project, to support mining, separation and refining, and production facility for critical minerals including neodymium, praseodymium, dysprosium, terbium, zirconium, niobium, and hafnium;

\$2.0m to Clareville Pty Ltd for testing and scale up on its novel flotation separation additive which increases recovery of key critical minerals, such as lithium, cobalt and vanadium, by 50%, with no increase in carbon emissions or environmental impacts;

\$2.9m to Ecograf Ltd to support a graphite qualification facility at Lucas Heights.

QLD

\$5m to Queensland Pacific Metals Ltd for the engineering and design for phase 1 of a full-scale refinery for its Townsville energy chemicals hub;

\$1.2m to High Purity Quartz Ltd to support a pre-feasibility study for a project to build a solar PV grade quartz sand processing facility and a silicon metal production facility to establish solar PV cell manufacturing in Townsville;

\$2.2m to Evolution Mining Ltd to support Ernest Henry operations to retrieve cobalt from mine waste. **AMR**

Revival of Mines Promising for Sector

With a wave of new mine openings and re-starts in the last few weeks, this indicates a promising outlook for the Australian mining industry, pointing to increased investment, economic growth and job opportunities in the sector.

Galena Mining's (ASX: G1A) Abra Mine in WA is a prime example of a successful reopening.

"It's pleasing to see Abra respond after the stoppage," said Galena managing director Tony James.

"These daily production rates show that the mine has the instantaneous capacity to deliver on its production targets.

"The next step is to deliver these levels of performance on a consistent basis as we continue to transition to steady-state as quickly as possible."

Despite a temporary halt due to heavy rainfall, the mine and plant quickly recovered and have been operating continuously since May 3.

Galena Mining has reported setting daily production records, surpassing their targets for steady-state production.

This achievement demonstrates the instantaneous capacity of the mine to deliver on production goals and signifies a positive trend for the sector.

In Queensland, the Wolfram mine in Dum-

bulah is poised for revival after being abandoned in 2018.

"After consulting with industry groups, miners, explorers and local representatives last year, it was clear there was great interest in restarting resource activities at the abandoned Wolfram Camp mine," Queensland Resources Minister Scott Stewart said in a statement.

The Queensland Government's Abandoned Mine Lands Program recognises the site as a workable source of ore.

With interest from industry groups, miners, explorers, and local representatives, there is great anticipation for resource activities to recommence at the Wolfram Camp mine.

This project serves as a pilot for transforming abandoned mines into commercial operations, generating employment and royalties for the State.

Furthermore, the Bowen Coking Coal (BCB) company recently reopened the Burton Coal Mine in Queensland's Isaac region.

After being in care and maintenance since late 2016, the mine has resumed production and is expected to ramp up operations in the coming months.

According to Minister Stewart, Queensland possesses abundant high-quality resources, and projects such as the Burton complex will play a significant role in creating job opportunities within the state's resources sector.

"I want to congratulate Bowen Coking Coal for their continued investment in this project, which has already seen coal produced and shipped from the Broadmeadow East mine," he said.

"Queensland has high quality resources, a skilled workforce and world-class infrastructure but it takes investors to turn these into jobs and business opportunities in our regional communities."

BCB's refurbishment efforts include upgrading the coal handling and preparation plant (CHPP) to increase its capacity to 5.5mtpa. Additionally, New Hope Corporation has opened its New Acland Coal Stage 3 Expansion, which is set to create jobs and contribute to increased fossil fuel production in the Darling Downs region.

The reopening and opening of these mines highlight the strong demand for Australian resources. **AMR**

Underground truck at Abra delivering ore to ROM pad. (Image source: Galena Mining)





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Epiroc Acquires RC Drilling Manufacturer Schramm Australia

Epiroc has agreed to purchase the key assets of Schramm Australia, a leading Perth-based mining equipment manufacturer, particularly reverse circulation (RC) drilling products.

Schramm Australia has been in voluntary administration since February 2023, with assets including intellectual property, two production facilities near Perth, WA, and two service centres located in Queensland and South Australia.

Epiroc president and chief executive Helena Hedblom says Schramm Australia's approximately 80 employees will be offered employment at Epiroc.

"The Schramm products and brand are well known as a global leader in reverse circulation technology," she said.

"We look forward to welcoming the strong team at Schramm Australia to the Epiroc Group."

FTI Consulting voluntary administrator Hayden White says this is a great outcome for Schramm's employees "who have responded to the voluntary administration period with determination and commitment to continue to deliver for the company's customers".

"Ensuring employees will be retained by a new buyer has been a key focus of the ad-



ministration process," he added.

"Creditors and the wider exploration and mining industries will continue to be served by a world-class supplier of drilling equipment both domestically and internationally.

"The sale will ensure this globally recognised

brand will continue as a significant contributor to the mining industry in WA and globally."

The asset purchase is expected to be completed in the second quarter of 2023 with Schramm Australia belonging to Epiroc's Surface division. **AMR**

Bravus Helps Bring Meals for Mums to Rockhampton

Bravus Mining and Resources is helping the White Cloud Foundation expand its Meals for Mums service into Rockhampton as part of the company's enduring commitment to regional Queensland communities.

Meals for Mums delivers 14 nutritious, ready-to-heat meals to mums who are experiencing, or at risk of experiencing, perinatal depression, as a complement to their clinical care.

The ongoing partnership was announced at the White Cloud Foundation's Boardies and Bubbles fundraising lunch in Townsville, QLD, and builds on the success of the Bravus-supported Meals for Mums program in north Queensland to ensure the same practical assistance is provided to parents in central Queensland.

White Cloud Foundation founder and chairman Professor Adam Scott says early-intervention support programs are critical to assist people who are at risk or living with mental health conditions.

"It's the small things in life that make the biggest impacts," he said.

"We know practical support is crucial. By providing a single meal to someone in a time of need to give them the energy and the mental strength to support their family and kids, that's absolutely huge."

Professor Scott says White Cloud Foundation programs are aimed at overcoming barriers to access for both clinical and social supports for mental health.

"We've removed the barriers," he said.

"We're helping mothers during that perinatal period when we know it is really challenging having a baby.

"We're really proud to have Bravus as one of our sponsors to support the Townsville and Rockhampton communities."

Professor Scott started the not-for-profit in 2011 to address access to mental health services across the country.

White Cloud Foundation has since expanded to provide practical and targeted supports through Meals for Mums, a telehealth service for mental health, a social support program for men experiencing depression or anxiety, and a service for elite sportspeople.



(L-R) Madonna Simmons, Bravus' community manager Ally Foley, White Cloud Foundation's Professor Adam Scott and Bravus' head of community Kate Campbell at the Boardies and Bubbles fundraising lunch in Townsville, QLD.

Bravus Mining and Resources head of community Kate Campbell says the business is proud to support White Cloud Foundation's work in regional Queensland.

"We're proud to operate in regional Queensland and we always seek to back our local communities," she said.

"We recognise that many people who live in regional areas experience challenges in mental health and face additional difficulties accessing help.

"The White Cloud Foundation delivers evidence-based, practical supports to people when they need it, such as the standout Meals for Mums service.

"This is just another way we are helping regional communities to thrive on top of the jobs we support that help local families and the opportunities we create for local businesses. "Our Carmichael mine is exporting coal and ramping up production to meet growing demand so we are looking forward to sharing these kind of benefits with people in north and central Queensland for decades to come."

The sponsorship is funded under the Bravus Community Partnership Program, which offers grants of up to \$10,000 for not-for-profit businesses, groups, or associations in central and north Queensland.

The program is aimed at enhancing communities through education, skills development, health, sustainability, environmental stewardship, and social welfare.

Ms Campbell urges local community groups to apply for the annual program, which is awarded each quarter.

"If your local group has a great community initiative, we would really encourage you to jump on our website and put in an application," she said.

Since construction commenced on the Carmichael Mine and Rail Project, Bravus has contributed more than \$2m to not-for-profit, charities, school groups and other organisations across the businesses' operational footprint.

Rockhampton and Townsville remain the primary employment hubs for the Carmichael mine and continues to recruit workers who can drive to site from the Isaac Region. About 18 flights leave Rockhampton each week carrying local workers to the Carmichael mine.

During the construction of the mine and rail projects, Bravus Mining and Resources paid more than \$80m directly to local Rockhampton contractors and many millions more in indirect spending.

Through Bravus Mining and Resources' Community Partnership Program the busi-

ness has supported numerous Rockhampton community groups and not-for-profit organisations including: the Glenmore Bulls AFL Club, the White Cloud Foundation, Rugby Capricornia Limited, Rockhampton Musical Union Youth Choir, Breast and Prostate Cancer Association of Queensland, Indian Association for Central Queensland, the Fitzroy River Fish Stocking Association and CQ First Aid volunteers.

Bravus Mining and Resources also recently extended its sponsorship of Rockhampton Basketball, taking that association to six years and making it the business' longest running Major Partnership.

The Carmichael mine produces high quality coal for export and is ramping up production 10mtpa.

More than 2,600 people were employed and more than \$1b paid to regional Queensland contractors and businesses since construction began on the Carmichael project in 2019.

Although the primary construction phase is finished, Carmichael still has more than 750 people on site at any time while another third are on days off.

Carmichael coal is high quality with low sulphur, low trace elements and low ash which meets the import requirements of many international markets, including those in the Asia-Pacific region. **AMR**



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MCT Equipment Unveils New Henderson Facility in WA



MCT Equipment managing director Anthony Grosser and Magni sales director Rajen Nair cut the ribbon at the MCT Equipment Henderson branch opening.

Mobile cranes, telehandlers and associated lifting products supplier MCT Equipment has officially opened its new office and workshop in Henderson, WA, with the aim of expanding its support operations and providing state-of-the-art products to the Australian mining and construction industry.

MCT Equipment held a ribbon-cutting ceremony in late May this year that was attended by industry partners Magni TH, JMG Electric Cranes and Cimolai Technology.

MCT Equipment managing director Antho-

ny Grosser says the company is excited to make its mark at the new facility and continue providing innovative solutions to its client base.

"At MCT Equipment, we always strive to Think Different, Lift Different, and we are confident that our new location will help us to do just that," he said.

The company supplies lifting products in WA and the Northern Territory across the mining, construction, infrastructure and marine industries, with key focus on innovation, safety and efficiency.

This latest strategic move enables MCT Equipment to add further value to clients and industry by providing a range of top-quality, efficient equipment that enhance operations and productivity at work sites.

The modern Henderson facility is equipped with state-of-the-art and top-quality machines and equipment.

For more information about MCT Equipment, please visit www.mctequipment.com

AMR



MCT Equipment's new and modern office and workshop in Henderson, WA, showcasing state-of-the-art mobile cranes, telehandlers and associated lifting machines and equipment.

Hitachi Construction Machinery Australia Marks \$1m Donation Milestone to Humpty Dumpty Foundation

Hitachi Construction Machinery Australia has marked its \$1million donation milestone to the Humpty Dumpty Foundation with a Giraffe Shuttle, a neonatal transfer incubator, valued at \$30,780 and donated to Fiona Stanley Hospital in WA.

The Giraffe Shuttle allows for transfer of newborn babies to the neonatal unit in an incubator or on a panda and assists care teams in maintaining the baby's temperature during transfer.

Hitachi Construction Machinery's support for Humpty commenced during David Harvey's tenure as managing director and latterly as regional general manager.

"With Humpty's help, Hitachi Construction Machinery has been able to support hospitals in the areas where our branches and staff are located, from cities to remote and regional areas," he said.

"Supporting their communities, employees and their families is the core of Hitachi's Corporate Responsibility Strategy, and one that resonates deeply with our employees and business network."

Hitachi first began supporting the Humpty Dumpty Foundation in 2012 and its ongoing commitment resonates proudly with Hitachi's 1,500 Australian staff.

Hitachi identified the Humpty Dumpty Foundation as its chosen charity due to its equal wide-reaching footprint and ability to impact areas around the country where Hitachi has branches - in both metropolitan and regional areas.

Humpty Dumpty Foundation founder and chairman Paul Francis OAM says that some organisations have a great community spirit and are very conscious of putting back into their communities.



"Hitachi Construction Machinery is certainly one of those companies," he said.

"Over the last 10 years Hitachi has been an integral part of the Humpty family by donating 160 pieces of children's medical equipment to 64 hospitals across Australia.

"The total value of the equipment donated is over \$1m and has made a huge difference to the health outcomes of so many Australian children.

"It is only with the generosity and ongoing support of donors like Hitachi that the Humpty Dumpty Foundation can give our doctors and nurses the equipment necessary to care for our children no matter where they live."

Humpty has raised \$90m and in 2021 and 2022, donated over 1,050 pieces of medical equipment to paediatric wards, neonatal units, maternity and emergency departments in Australian hospitals and health

services.

The Humpty Dumpty Foundation provides equipment for approximately 20,000 children (0 - 18 years) who are in hospital on any given day.

On average in Australia, 1 in 5 babies will need medical intervention at birth. **AMR**



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from time to time, as well as their mobility are aspects perfectly catered for by the use of converted Shipping Containers. GAAS through it's innovative design and construction capabilities, plus it's reliability and cost effectiveness is now foremost in this field in delivering Shipping Container solutions across Australia.

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GAAS utilises modern 3D CAD solutions in their design process, allowing them to present clients with real time updates of design development. This is above and beyond normal industry practice and a point of pride for GAAS.

GAAS' commitment to sustainability is another reason why this company is getting attention. By repurposing Shipping Containers, waste is reduced and therefore lowers

carbon footprint. GAAS incorporate energy-efficient features into design, such as DC AC Systems, solar panels and passive heating and cooling systems.

To act with integrity is at the forefront of GAAS' business philosophy. The top-quality product is the result. It is clear evidence that GAAS' tier one clients are the beneficiaries. If you're looking for a company that can deliver high quality and cost-effective solutions

for your next project, look no further than the accomplished GAAS Shipping Containers.

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Latest drilling results from Aruma Resources reveal a new prospect.



Aruma RC Drilling Expands Salmon Gums Gold Footprint

Aruma Resources Ltd (ASX:AAJ) has announced promising results from its ongoing exploration activities at the Salmon Gums Gold Project in WA's Eastern Goldfields.

The company's recent drilling program, consisting of 44 reverse circulation (RC) holes and a shallow 894-hole auger drill program, has exceeded expectations, indicating the emergence of a new gold camp in the area.

In a statement, Aruma Resources highlighted the success of the RC drilling, which intersected multiple anomalous gold zones at the Iris and Thistle prospects.

"The Salmon Gums Gold Project has the potential to host a significant mineral deposit,"

said Aruma Resources' managing director, Glenn Grayson.

These positive results have expanded the gold mineralised footprint in the targeted areas. Additionally, a new prospect named Rose, located between Iris and Thistle, has been identified, boasting multiple gold intersections.

"As our understanding of the gold model at Salmon Gums increases, as a next step, we plan to undertake targeted diamond drilling in several orientations, to follow up the bonanza gold intersection of 5 meters at 50.2g/t from our previous phase of drilling and to increase our understanding of what is controlling the high grade gold," said Mr Grayson.

Among the notable results from the RC drilling were 1 meter at 3.0g/t gold at Iris, 1 meter at 1.3g/t gold at Thistle, and 5 meters at 0.4g/t gold, also at Thistle. At the Rose prospect, intersections included 1 meter at 2.3g/t gold and 1 meter at 2.1g/t gold.

Aruma Resources is now planning to proceed with targeted diamond drilling to further investigate the high-grade gold zone identified in a previous phase of drilling.

The auger drilling program, which tested strong coincident gold and arsenic soil anomalies, has also yielded positive results. Aruma has identified multiple new gold prospects, as well as rare earth element (REE) soil anomalies, including cerium (Ce) and lanthanum (La). **AMR**

Great Fingall's Outstanding Drill Results Continue

Westgold Resources Limited (ASX:WGX) has announced further impressive drill results from the high-grade Great Fingall gold deposit near Cue in WA.

The latest drilling program has reinforced the recently revised geological model, instilling greater confidence in the project's potential.

The key highlight of the drilling program is the discovery that the Great Fingall Reef is now believed to split into two parallel reefs, namely the Upper Fingall and Lower Fingall, below the historic workings.

This significant interpretation has been supported by the exceptional assay results obtained from various positions.

The new drilling results, combined with the revised geological model, will form the basis of a forthcoming Mineral Resource Estimation (MRE), scheduled to be announced in early June 2023.

Westgold anticipates that the updated MRE will demonstrate the increased mineral re-

sources and improved potential mine economics resulting from the new interpretation.

Westgold managing director Wayne Bramwell expressed his enthusiasm for the project.

"Westgold's latest results at Great Fingall herald a new future for this historic high-grade mine," he said.

"This new interpretation significantly de-risks development plans and has the potential to materially increase Mineral Resources and improve potential mine economics above prior estimates."

Mr Bramwell emphasised the company's growing confidence in the project and the potential for recommencing decline development in the first quarter of the 2024 financial year, pending a positive final investment decision.

The Great Fingall gold deposit holds historical significance in WA, having produced over 1.2moz of gold since the late 1800s. **AMR**



Impressive drill results from Great Fingall gold deposit.

Auric Commences Mining at Jeffreys Find in WA



Auric Mining (ASX:AWJ) has commenced open pit mining at its Jeffreys Find project, with first gold pour expected in early July this year.

WA Department of Mines, Industry Regulation and Safety (DMIRS) has approved the full mining proposal for the project, located about 45km northeast of Norseman in WA and about 750km from Perth.

Drill and blast of the first 5m bench has been completed, with contractor BML Ventures expected to be fully mobilised for all mining activities and operational by the end of this week.

Between 100,000-150,000t of ore will be hauled to the Greenfields Mill at Coolgardie, WA, from late May where it will be toll-treated.

Auric managing director Mark English says this is excellent progress and a terrific achievement by BML Ventures and Auric.

"Having the full mine proposal approved is fantastic, particularly given the high gold price," he said.

"I commend both BML Ventures and our technical team in working together to achieve this result.

Mr English says he looks forward to the next stage of mining and "actually producing gold".

Gold produced will be forwarded to the Perth Mint for final refining and sale.

Auric will be deducting all costs and splitting the surplus cash proceeds on a 50:50 basis with its BML Ventures after completing the first stage.

BML Ventures is then expected to expand the mine to the final pit design in 2024, with mining expected to be completed around 31 December 2024. **AMR**



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BREAKING BARRIERS

WOMEN DRIVING CHANGE IN THE MINING INDUSTRY



Efforts to increase gender diversity and foster safer workplaces are not only vital for promoting social justice but also for driving innovation and ensuring the sustainability of the mining industry.

Mining majors have expressed their commitment to diversification and highlighted the urgency of eliminating workplace harassment, at the recent Future of Mining Sydney conference.

Industry experts at the conference stressed the urgent need for diversification in the mining sector to ensure its sustainability.

The panel, including representatives from KPMG Banarra, BHP, Bloomfield Group, and Women in Mining New South Wales, emphasised the industry's imperative to change or face dire consequences.

BHP vice president procurement Robyn Dittrich expressed the pressing need for improvement within the mining industry.

"62% of all female mine employees, according to surveys, have reported experiencing harassment in the workplace," she said.

This statistic underscores the significant room for improvement in creating a safe

and inclusive work environment for women in mining.

Industry efforts

Fortescue Metals Group (ASX: FMG) has taken significant steps to increase inclusion and diversity within its operations.

In its FY22 Sustainability Report, women hold 23% of all positions, 24% of leadership positions, which are categorised as manager roles and above, and 27% of general manager and above roles.

The company offers flexible work arrangements, operates a Family Room at its Perth centre, and provides mentoring opportunities through various programs.

FMG also actively promotes gender pay equity, with mean gender pay gaps of 1.5% for iron ore operations employees and 2.6% for Fortescue Future Industries.

Mining giant BHP (ASX: BHP) has been at the forefront of efforts to create safer and more inclusive workplaces.

"BHP emphasises that there is no place for behaviours like sexual harassment, racism, and bullying in society or within the company," BHP stated in its half-yearly report.

"We continue to engage with external experts and our workforce to learn from best practice and enhance our approach."

The company is actively working to raise awareness, enhance prevention controls, and strengthen response and support systems for those affected by such incidents.

Initiatives include global safety stops, direct engagement with teams on topics of harassment and discrimination, deployment of active bystander training and efforts to encourage reporting and create a safe work environment.

BHP has set a goal of achieving gender balance, defined as a minimum of 40% women and 40% men, by the end of FY25.

Rio Tinto (ASX: RIO) has also recognised the

importance of gender equality, with the company reporting an increase in the number of women in its workforce, now at 22.9% of all positions.

"It is encouraging to see women keen to enter our industry as we work to create a more inclusive and diverse environment," said Rio Tinto chief executive Australia Kellie Parker.

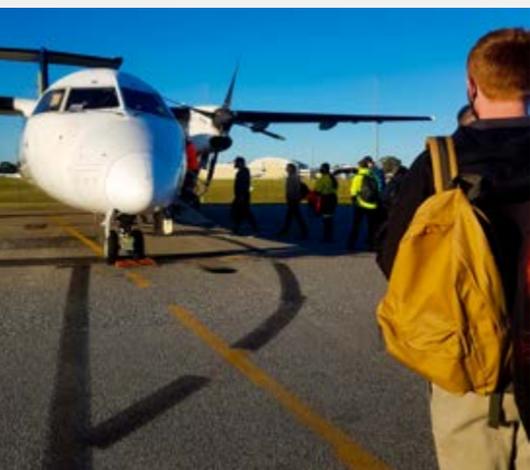
"By opening up our operational roles to women without industry experience, but with transferrable skills and talent, we not only increase representation of women in our business but also diversity across the industry as a whole."

The Chamber of Minerals and Energy of WA's Diversity and Inclusion Report showcases the progress made in female participation within the mining sector.

Since 2013, it indicated the proportion of women in the mining and resources workforce has increased from 18.8% to 21.5%.

AMR

FIFO Lifestyle: Balancing Work and Life in WA's Booming Mining Economy



Fly-in, fly-out (FIFO) work has become an integral part of the mining industry in WA, offering a unique employment arrangement that allows workers to commute to remote mining sites for designated work periods before returning home.

WA has emerged as the global hub for FIFO work, particularly in the mining industry. The State's vast distances and remote resource sites make FIFO a practical and efficient staffing solution.

In 2015, WA employed approximately 60,000-65,000 FIFO workers, accounting for about 65% of the total resources sector workforce in WA, according to a report by the Centre for Transformative Work Design. The WA mining economy has also experi-

enced significant growth in recent years, contributing to this increasing demand for FIFO workers.

Resources sales for 2022 were up an impressive \$15b from 2021 based on the latest annual data released April 2023 by the WA Department of Mines, Industry Regulation and Safety (DMIRS).

The State's exploration industry, on the other hand, recorded a record-breaking expenditure of \$2.54b in 2022, indicating a positive outlook for future mining projects and job opportunities, as reported by WA DMIRS.

"Western Australia's resources sector has delivered yet another exceptional performance and we are running out of superlatives to describe these record-breaking results," said WA Mines and Petroleum Minister Bill Johnston.

Further data in 2022 shows that WA achieved record sales of \$246b, generating employment opportunities of a high of 117,970 full-time equivalent jobs.

Benefits and challenges of FIFO work

FIFO work in WA has a rich history that traces back to the mid to late 1900s when mining companies faced the challenge of staffing remote mining sites.

Instead of building and maintaining small towns, companies started flying workers in from other areas on a temporary basis.

This innovative approach, known as FIFO, proved to be a cost-effective solution for both companies and employees.

Initially, FIFO work primarily attracted tradespeople and semi-skilled workers, but as the mining industry evolved, so did the nature of FIFO jobs.

Today, FIFO covers a wide spectrum of roles, including geologists, engineers, accountants, lawyers, machinery operators, and management professionals.

This diverse range of positions reflects the growing complexity and specialisation of the mining sector.

FIFO work offers several benefits to both employees and mining companies.

For workers, it provides an opportunity to earn high salaries while maintaining urban lifestyles and avoiding the need for permanent relocation.

The financial rewards often enable a higher standard of living and financial security. Additionally, FIFO work allows employees to explore different mining projects and gain valuable experience.

However, the FIFO lifestyle also presents challenges.

Long work hours, extended periods away from family and friends, missed milestones, and the isolation of camp life can take a toll

on workers' mental and emotional well-being.

Studies have highlighted mental health issues such as stress, depression, anxiety, and feelings of loneliness among FIFO workers.

These challenges require ongoing attention and support from both employers and authorities to ensure the well-being of FIFO employees.

"The WA Government listened to families and the wider community, and agreed that more needed to be done, which is why we commissioned [the Impact of FIFO work arrangements on the mental health and wellbeing of FIFO workers report]," said WA Health Minister Roger Cook.

"We hope the industry, unions and FIFO workers themselves will adopt the report recommendations, on site, and at home, to help improve the mental health and wellbeing of all FIFO workers, and their families."

AMR





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Mining Industry Launches Extensive Recruitment Drives in Response to Labour Shortage

Recruitment efforts play a vital role in securing the sector's future.

In the face of a severe labour shortage that is impacting the mining industry in Australia, mine sites are taking proactive measures by launching extensive recruitment drives to attract and hire new workers.

The growing demand for minerals and resources coupled with the challenges posed by the ongoing labour shortage has prompted companies to adopt innovative strategies to address the issue and sustain industry growth.

Leading mining companies such as Rio Tinto (ASX: RIO) and BHP (ASX: BHP) implemented targeted programs to actively recruit individuals from diverse backgrounds and industries, as well as underrepresented groups.

These initiatives aim to tap into new talent pools and create a more inclusive and diverse workforce.

Rio Tinto has introduced the Women in Mining Program, specifically designed to encourage more women to consider a career in the mining industry.

By offering entry-level positions and tailored training and development plans, Rio Tinto aims to increase the representation of women in their workforce while fostering diversity across the entire industry.

"The response to both of these campaigns has been overwhelming and it is encouraging to see women keen to enter our industry as we work to create a more inclusive and diverse environment," said Rio Tinto chief executive Australia Kellie Parker.

"Our recent review into workplace culture, the Everyday Respect report, showed clearly that we need to foster a more diverse and inclusive workforce, which includes increasing the number of women in our business.

"One way we are trying to do this is to better recognise leadership and work skills gained in other industries and help transfer those to our workforce."

BHP committed training and funding for 3,500 apprenticeship and training positions in 2020, to be rolled out over a period of 5

years and through its FutureFit Academy.

BHP's chief executive officer Mike Henry reaffirmed the company's ongoing commitment to apprenticeships and training.

"Providing apprenticeships, skills, and training opportunities for Australians of all ages and all walks of life, particularly in our regional communities, is a commitment we can make to help Australia bounce back," he said.

He emphasised the importance of the mining industry in driving economic growth and job creation.

"The mining industry has an important role to play as Australia's biggest export earner employing hundreds of thousands of people," said Mr Henry.

Regarding the BHP FutureFit Academy, Mr Henry highlighted its significance in creating a pipeline of future talent.

"These investments will create a pipeline of

future talent in highly skilled roles, working in an industry that delivers essential products to the world and generates export dollars that keep the Australian economy strong," he said.

By actively targeting underrepresented groups, facilitating skills transfer, and promoting mining careers, companies are taking proactive steps to attract and retain a diverse and skilled workforce.

As the mining industry continues to navigate the evolving labour landscape, these recruitment efforts play a vital role in securing the industry's future while providing valuable employment opportunities for individuals seeking rewarding and challenging careers in mining.

With ongoing recruitment drives and a concerted focus on attracting new talent, the mining industry aims to overcome the labour shortage and fuel its growth in the coming years. **AMR**

Port Hedland is a major iron ore exporting port in the Pilbara. (Image source: BHP)

BHP Strengthens Port and Rail Workforce with New Apprentices at Port Hedland



BHP chief operating officer Edgar Basto emphasised BHP's dedication to supporting new talent and creating rewarding careers. (Image source: BHP)

BHP (ASX: BHP) recently welcomed 20 new apprentices to its port and rail teams at the Port Hedland site in WA.

The diverse group of apprentices, ranging from school leavers to mature individuals, will undergo specialised training in trades such as electricians, mechanical fitters, auto-electricians and heavy vehicle mechanics. BHP's apprenticeship coordinator Amy Kelly emphasised the significance of the four-year apprenticeship program, which provides hands-on industry-led training within a global company.

She highlighted that the program not only equips the apprentices with valuable skills

but also opens doors for career growth and development both locally and internationally.

"We are focused on training and developing people from Port Hedland and Newman to provide local employment opportunities and support local communities," she said.

Located in the mineral-rich Pilbara region, BHP's Port Hedland operation is a major iron ore exporting port that plays a crucial role in the company's global operations.

The addition of these new apprentices is expected to enhance the efficiency and capabilities of the port and rail teams, contrib-

uting to the overall growth and success of BHP.

The welcoming of new apprentices aligns with BHP's broader vision for investing in skills and training in the mining industry.

Recently, BHP chief operating officer Edgar Basto spoke at the 2023 Austmine Conference and Exhibition, emphasising the company's dedication to supporting new talent and creating rewarding careers.

BHP has pledged to fund 2,500 new trainee and apprenticeship positions across Australia over the next five years, with 800 new students already welcomed and over 350

graduates.

The addition of these new apprentices reflects BHP's ongoing commitment to building a skilled and diverse workforce.

By investing in training and development, BHP aims to not only strengthen its operations but also contribute to the local communities where it operates.

With the mining industry poised for growth and technological advancements, BHP's focus on apprenticeships demonstrates its dedication to nurturing the next generation of mining professionals and ensuring a sustainable future for the industry. **AMR**

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Rio Tinto Takes Delivery of the 1000th Cat® 24 Motor Grader

Caterpillar® has celebrated a major milestone with the 1,000th Cat® 24 Motor Grader coming off the production line in the US and handed over to Rio Tinto in Perth, WA.

The 72t grader will now make its journey to Rio Tinto's Paraburdoo iron ore mine in the Pilbara region in the northwest of WA.

Caterpillar area manager for large motor graders Florian Dumalle says the large Cat 24 Motor Grader machines have "evolved over the past two decades to be a top performer with a great reputation in the mining industry".

WesTrac general manager of mining Shane

Thomas said the handover marked another significant milestone in WesTrac and Caterpillar's relationship with Rio Tinto, as the mining giant continues to develop mines across WA.

"We've celebrated countless milestones, many to do with world-leading technological advances, but it is pleasing to be reminded that the loyalty many operators have for Cat equipment stems from tried-and-true models such as the 24 Motor Grader, which has been made in the Decatur manufacturing facility for more than 25 years now," he said.

Rio Tinto general manager of mining equipment Ben Woffenden says the Cat 24 Motor Grader is well regarded within Rio Tinto as

it provides the right combination of power, weight and blade width to manage haul road maintenance at Rio's remote mine sites.

"The Cat 24 Motor Grader is a safe, reliable and high-performing machine, that plays a core role in building and maintaining haul roads across Rio Tinto's Pilbara and US operations," he said.

"This is the third-generation model we've used across our Pilbara mining operations and it is a privilege to take delivery of the 1,000th machine from Caterpillar and WesTrac.

"The machine will be put to work when it arrives at Paraburdoo.

As a 24 x 7 operation, the effective upkeep of haul roads is required to keep our fleet working productively and efficiently, so the 24 Motor Grader has a vital role to play."

The first Cat 24 Motor Grader was manufactured and assembled at the Decatur factory in 1996, designed specifically to build and maintain haul roads for ultra-class haul trucks.

Since then, miners around the world have favoured the model, which features a wide 7.3m blade, allowing operators to make fewer passes than in smaller graders. **AMR**

IN THE SPOTLIGHT

Pilbara Rail Maintenance co-founder and director Chris Prior



Pilbara Rail Maintenance (PRM) co-founder and director Chris Prior shares the story behind PRM's success (Photo: PRM).

AMR: Can you share the story behind how Pilbara Rail Maintenance (PRM) started and what you believe are the key factors that contributed to its success?

CP: As a newcomer in the rail industry, my co-founder Ian Abbott and I recognised that we needed more than just good banter to succeed.

Starting PRM as a start-up five years ago with no clients or track record, we aimed to fill critical gaps in service delivery, expertise, and technology.

Through a local-first approach, PRM has become one of the largest employers in the Pilbara, WA, region, providing career pathways and training in an industry facing global skills shortages.

We now have hundreds of experienced employees, a fleet of specialist rail machinery and fabrication premises.

AMR: What insights can you provide about the current state and future trends in the mining industry?

CP: Recognising the need for innovation, I believe that investing in advanced equipment and automation can revolutionise project completion, reducing the reliance on labour in the challenging Pilbara environment.

ESG considerations are crucial in the rail industry and, at PRM, we are committed to being leaders in this realm.

We anticipate the continued use of alternative fuels such as hydrogen to power heavy haul locomotives, further enhancing sustainability in rail operations.

AMR: What exciting developments or projects do you have in the works at PRM that you can share with us?

CP: At PRM, we have several exciting developments in progress.

One initiative I'm particularly proud of involves exploring the use of robotics for track maintenance and construction, allowing us to perform complex tasks in challenging settings.

We also acquired unique narrow head flashbutt welders, enabling us to build entire railway turnouts without aluminothermic welds, much to the satisfaction of our clients.

Additionally, our implementation of a proximity detection system on our hi-rail machines enhances safety by preventing contact with operating equipment.

Looking ahead, PRM's growth and success have positioned us to open a large facility in Perth and expand our services to other regions across Australia.

AMR: Throughout your journey with PRM, what are some of the notable challenges you have faced and how have you managed to overcome them?

CP: PRM faced its fair share of challenges as a new business.

Founding the company with Ian, while my wife and I were expecting our first child, added personal complexity.

Relocating to a remote town, obtaining finance, finding premises, attracting staff and juggling the demands of a baby were hurdles we faced.

Additionally, my wife experienced post-natal depression, requiring ongoing care, while I worked to ensure the survival and growth of the business.

In our second year, the COVID-19 pandemic further impacted operations, causing workforce availability and financial issues.

Our management team adapted, diversifying talent and meeting client expectations, sustaining growth despite labour shortages.

AMR: You were recently nominated for a Rio Tinto supplier award for innovation. Can you touch on the developments that saw you recognised?

CP: Our nomination acknowledged our investment in a transformative track maintenance technology that enhances safety, precision and delivery time.

The smart track laying system integrates a custom sleeper laying attachment with a high rail excavator and machine-controlled guidance system.

It enables a single operator to lift and place steel sleepers simultaneously, eliminating the need for rail surveyors and multiple technicians.

Currently, we are utilising this technology for Rio Tinto's track renewal campaign in the Pilbara.

AMR: Could you elaborate on the importance of rail maintenance in the mining sector and how PRM has played a significant role in this area?

CP: Proper rail maintenance and construction are vital in the mining sector, which led to the establishment of PRM.

Railways serve as the crucial link between mines and markets globally.

Inadequate track maintenance leads to performance issues, transport disruptions and costly ore stockpiling at mines.

Heavy haul networks require ongoing investment in high-quality maintenance services to ensure safe and consistent delivery of products to the market.

As a trusted partner to the mining industry, PRM employs a 200-strong team in the Pilbara region and operates the largest mobile high-rail fleet, catering to major miners like Rio Tinto that require track maintenance from the track itself.

AMR: In your opinion, what sets PRM apart from its competitors in the rail maintenance industry and how have you maintained a competitive edge?

CP: As a young and innovative company in a historic industry, PRM continually pushes boundaries and invests in transforming rail infrastructure.

Our success stems from significant investments in people, equipment and innovation.

Through advancements like our smart track laying system and the use of robotics, we drive step changes in rail maintenance and construction.

Instead of relying on traditional methods, we question and engineer ingenious approaches for safer, faster and more efficient outcomes.

ESG values are integral to our corporate identity, and we strive to improve industry diversity, environmental impact and provide a safe workplace.

Safety is a top priority, exemplified by our investment in proximity detection systems that minimise risks of contact between personnel and operating machinery.

AMR: How do you approach innovation and technological advancements within PRM and what impact have they had on the company's operations and services?

CP: At PRM, innovation is central to our values.

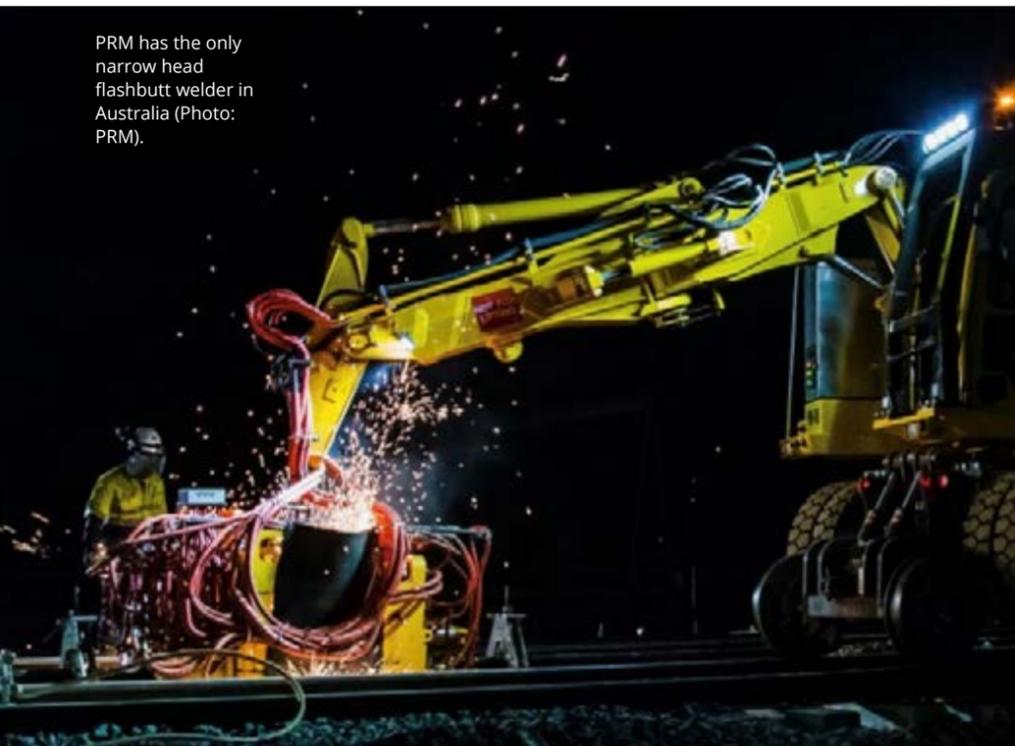
We constantly seek smarter approaches to track works, driven by our clients' ambitions for safety and productivity.

Recently, we partnered with a specialist company to procure robotic equipment, combining it with our own PRM equipment and a unique methodology.

This approach, a first in the heavy haul rail industry, allowed us to successfully complete complex rail works in challenging Pilbara terrain.

Our in-house workshop facility played a key role, enabling us to fabricate and modify equipment, including panel lifters, for work in otherwise inaccessible areas such as gorges and cliffs.

AMR



PRM has the only narrow head flashbutt welder in Australia (Photo: PRM).

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Gordon Brothers

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Running a productive mining and construction operation requires quality, reliable machinery. In the earthmoving game, every business owner understands the significant upfront costs involved in acquiring such equipment – Excavators, loaders, dozers, trucks, no matter the machine, hidden surprises are inevitable when it comes to ongoing maintenance costs and aftersales parts.

So, what if you could cut your costs from the start, and avoid the costly barriers associated with building your prized fleet? Gordon Brothers, a global advisory, restructuring and investment firm, has made the dream a reality by helping business owners secure critical machinery and equipment for over a century.

Backed by the largest team of specialised asset appraisers in the industry, and the hands-on expertise of a dedicated disposition team, the company offers clients the insight they need to keep pace with all the challenges they confront within the mining and mineral processing – heavy industry regulation, fluctuating international demand, and high asset-intensiveness.

Clients choose Gordon Brothers to access information from the most expansive and exclusive database resource of machinery and equipment asset values in the world. The company has completed more than 15,000 machinery and equipment appraisals, with appraisers working on client sites to create detailed equipment lists.

This is paired with in-depth knowledge and market analysis, which is driven by their proprietary network of industry contacts. Addi-

tionally, experience from the largest ASA-accredited team in the industry, and the direct recovery expertise of in-house industrial disposition specialists who have disposed of billions of dollars of industrial assets.

Collaborative Partnerships and Customised Financing Packages

In September 2021, Gordon Brothers partnered with global financial services group Nomura to structure a \$190 million syndicated facility to support Australian heavy earthmoving equipment company National Group's refinancing of its existing debt facilities.

In addition to participating as a lender, Gordon Brothers performed multiple roles to support the syndicate lenders. The firm was independently engaged by the lenders

to value over 250 assets and provide its expertise in structuring a tailored, asset-based facility in close collaboration with other syndicate lenders.

This partnership is just one example that demonstrates Gordon Brothers' deep understanding of assets, combined with extensive asset-based lending experience when it comes to bespoke financing packages.

In the same year, Gordon Brothers also provided private equity firm Allegro Funds with a \$160 million financing package to support its acquisition of Toll Global Express in Australia and New Zealand. The package featured a A\$150 million comprehensive finance package with the New Zealand borrowers receiving a NZ\$10 million facility.

This complex and transformative acquisition drew upon Gordon Brothers' financing, valuation, and asset remarketing expertise, where it worked collaboratively and quickly to structure a bespoke, financing package for Allegro Funds and valued over 11,000 assets. It served as a testament to the company's cross-team skills as they operated across multiple Gordon Brothers businesses to provide a customised solution for the client.

Gordon Brothers currently have several used earthmoving equipment for sale across Australia including late model dozers, articulated dump trucks, excavators, loaders, and water carts from renowned global manufacturers.

About Gordon Brothers

Since 1903, Gordon Brothers has helped lenders, operating executives, advisors, and investors move forward through change. The firm brings a powerful combination of expertise and capital to clients, developing customized solutions on an integrated or standalone basis across four service areas: valuations, dispositions, operations, and investments. Whether to fuel growth or facilitate strategic consolidation, Gordon Brothers partners with companies in the retail, commercial and industrial sectors to put assets to their highest and best use. Gordon Brothers conducts more than \$70 billion worth of dispositions and appraisals annually. Gordon Brothers is headquartered in Boston, with over 30 offices across five continents.



For more information, visit
www.gordonbrothers.com

AMR



Gordon Brothers



Unused Hitachi Excavators For Sale



Gordon Brothers is offering for sale by private treaty two unused Hitachi ZX670LC-5A hydraulic excavators. The assets' specifications include:

- ➔ Isuzu 6WG1X engine
- ➔ 6.8 metre boom BE and 2.9 metre arm BE
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Important information:
Viewing: By Appointment Only
Location: Ex Brisbane

Contact:

Matt Plunkett

Phone: +61(0) 413 627 716 | **Email:** mplunkett@gordonbrothers.com | **Website:** www.gordonbrothers.com

GOLDEN LEGACY AT NEWMONT TANAMI

In an interview with *The Australian Mining Review*, Newmont Tanami General Manager Justin De Meillon provided valuable insights into the operations and achievements of Newmont's ownership of the Tanami mine.



Justin De Meillon
Newmont Tanami General Manager
(Image source: Newmont)

Fully owned and operated by Newmont since 2002, Tanami mine is located in the remote Tanami Desert of Australia.

Despite its remote location, Tanami has emerged as a thriving operation under Newmont's stewardship.

Contributing \$466m to the Australian economy in 2012, Newmont is focused on extending the Tanami's mine life beyond 2040.

AMR: What has been the impact of Newmont's ownership on Tanami and how has it contributed to the mine's growth and success?

JDM: Newmont Tanami is located on Aboriginal freehold land owned by the Warlpiri people and managed on their behalf by the Central Desert Aboriginal Lands Trust, who have formal agreements in place with Newmont to share value and protect their land, heritage and culture.

Newmont acquired ownership of the mine in 2002, as a result of the merger with Normandy Mining Limited.

Newmont is the world's leading gold company and a producer of copper, silver, zinc and lead.

Newmont's world-class portfolio of assets, prospects and talent is anchored in favourable mining jurisdictions in North America, South America, Africa and Australia.

The company is an industry-leader in value creation, supported by robust safety standards, superior execution and technical proficiency.

Our scalable, integrated operating model, proven continuous improvement program sets the standard for safe, profitable and responsible gold mining.

Our operational focus is to continuously improve our cost and technical performance and maintain world class social and environmental practices.

This gives us the financial flexibility to invest in our most promising growth options, provide competitive returns to shareholders and maintain a strong balance sheet.

Newmont Tanami in Australia is a valuable, long-term asset that has received substantial investment from Newmont.

The mine's growth and productivity have been enhanced through various significant projects.

In 2015, an expansion project was approved,

focusing on developing the necessary infrastructure to increase mine productivity from the Callie and Auron ore bodies.

This initiative has been instrumental in driving operational efficiency and output.

The Tanami power project was successfully completed in 2018 and involved a significant investment in new gas-fired power generation on-site, accompanied by the construction of a 450km pipeline from Alice Springs.

This strategic move has bolstered the mine's energy capabilities and sustainability.

Building upon the success of previous expansions, Tanami received approval for Expansion Project 2 in 2019.

This project aims to further increase production and extend the mine's life until 2040.

The approval signifies Newmont's ongoing commitment to maximising the potential of Tanami gold mine and ensuring its long-term profitability.

These initiatives underscore Newmont's dedication to optimising the operational performance of Tanami gold mine, positioning it as a world-class asset capable of delivering sustained success in the mining industry.

Since Tanami was added to Newmont's portfolio, it has become one of its feature assets to Newmont in Australia and globally. Through a number of significant discoveries and investments, we have set up the mine to be a long-term asset for the Northern Territory economy.

AMR: How has the mine improved its operations to ensure sustainability and safety?

JDM: Newmont's purpose is to create value and improve lives through sustainable and responsible mining, and we are guided by our core values of safety, integrity, sustainability, inclusion and responsibility.

At Newmont, we have an unwavering commitment to health and safety.

Our safety culture underpins our operations, and as a global organisation we benefit from learnings and best practice from across the Newmont sites.

Our 'Fatality Risk Management' program requires critical controls to be checked as effective before work commences and, at Tanami, frontline leaders are trained in this program and verify controls at each shift.

Any significant potential events from across Newmont sites are reviewed using a structured process to ensure findings are hardwired into our safety standards to strengthen our controls and prevent repeat incidents.

Sustainability is fundamental to stable, long-term value creation and Newmont is committed to responsible resource development.

Globally, Newmont has committed to a 30% reduction emissions reduction by 2030. Tanami has a key role in Newmont's vision for zero emissions mining.

In 2021, Newmont announced a new strategic alliance with Caterpillar to deliver a fully-connected, automated, zero carbon emitting, end-to-end mining system.

Newmont Tanami will test and develop new battery electric haulage technology for underground mining, followed by the introduction of battery autonomous technology – an industry first.

Over and above this significant partnership, Newmont Tanami continues to progress studies for the development of renewable energy projects on site.

AMR: Can you speak more on the Tanami Expansion 2 project and how it will extend the life of the mine beyond 2040?

JDM: In 2015, the first expansion project was approved, which increased productivity and gold production to approximately 475,000oz gold per year.

Reflecting the company's commitment to the operation by investing in future growth and profitability, in 2019 Tanami Expansion 2 (TE2) was approved by the Newmont Board.

TE2 will deliver a 1.5km deep production shaft which will be used for the transportation of ore and people.

The project will deliver significant ounce, cost and efficiency improvements, and will support Tanami's future as a long-life, low-cost producer through to at least 2040.

AMR: Outline the community engagement initiatives and partnerships that the Newmont Tanami has been involved in?

JDM: At Tanami, we continued to provide support for the Central Land Council's Community Development role.

The role assists the nine Warlpiri communities that receive revenue through the Gran-

ites Mine Affected Areas Aboriginal Corporation with planning, implementation and administration of community projects.

We also initiated and implemented a strategic partnership with the Melbourne Football Club to extend chronic health prevention programs, community education and development outreach activities into Warlpiri communities.

We awarded more than \$200,000 in grants to community organisations, including the Central Land Council, Yuendumu Women's Centre, Alice Springs Ministers Association and Batchelor Institute of Indigenous Tertiary Education.

We also have a long-term partnership with Charles Darwin University, supporting the successful transition of two scholarship holders into full-time Newmont positions.

AMR: What were the significant contributions made by Newmont Tanami in 2022 in terms of gold production and financial support to the Northern Territory Government and the Commonwealth?

JDM: In 2022, Newmont Australia solidified its position as the country's largest gold producer by yielding a remarkable 1,282,000oz of gold from both Boddington and Tanami.

Within this impressive production, Newmont Tanami alone contributed 484,000oz of gold.

Moreover, Newmont Tanami's commitment to responsible resource development is exemplified by its substantial financial contributions.

In the previous year, the mine made significant impact by contributing US\$94m in royalty-related taxes to the Northern Territory government, further supporting local initiatives.

Additionally, Newmont Tanami contributed a substantial corporate tax of \$269m to the Commonwealth, emphasising its dedication to fulfilling its fiscal responsibilities.

These notable achievements underscore the significance of Tanami gold mine and Newmont's influential presence in the Australian mining industry, showcasing their commitment to excellence, community support, and economic growth. **AMR**

INNOVATIVE TECHNOLOGIES ARE REVOLUTIONISING EXTRACTION METHODS AND MINIMISING ENVIRONMENTAL IMPACT.

ADVANCEMENTS AND CHALLENGES IN MINERAL PROCESSING TECHNOLOGY



Associate Professor Laurence Dyer discusses the latest advancements in mineral processing technology and its impact on the mining industry's sustainability goals. (Image: provided by Professor Laurence Dyer)

The extraction and processing of minerals have significant environmental impacts that affect local ecosystems, water sources and air quality.

As a result, the mining industry has been investing in research and development of mineral processing technology to improve efficiency, reduce waste, and minimise its environmental impact.

The advancements in this area have also been driven by the need to meet the growing demand for metals and minerals, as high-quality deposits become increasingly scarce.

Curtin University associate professor Laurence Dyer shared his insights on the latest advancements in mineral processing technology, the challenges facing the mining industry, the most promising future trends, the role of universities in advancing research and development, and the relationship between mineral processing and environmental sustainability.

Advancements in mineral processing technology

Associate Professor Dyer discussed the latest advancements in mineral processing technology that were aimed at making the processes more efficient, cost-effective, and sustainable.

"The industry has shifted towards renewable energy supplies, including the development of technologies that can operate efficiently with a varied energy supply and the efforts to reduce emissions by removing reagents and processes that emit CO₂," he said.

"There is a focus on water and tailings management, by way of recovery of valuable

minerals and trace elements from tailings, as well as the reduction of the environmental impact of tailings."

According to Professor Dyer, these advancements are not only crucial for ensuring responsible operation within the mining industry but also for meeting the projected future demand for minerals.

"The latest advancements in mineral processing technology are driving towards a more sustainable future for the mining industry," he said.

Challenges facing the mining industry in mineral processing

Associate Professor Dyer pointed out several challenges facing the mining industry in mineral processing.

"One is the need for more efficient processing technology to extract metals economically from emerging deposits that are often remote and difficult to access," he said.

"Another is the demand for responsible operations that consider environmental and social impacts, creating tighter conditions for miners that are expected to meet growing metal demand.

"Skilled labour also presents a challenge, with a limited number of people experienced in relevant processes, for emerging technologies such as pyrometallurgy."

These challenges highlight the need for continued research and development in mineral processing technology to meet growing demand while operating sustainably and responsibly.

Promising future trends in mineral processing

Associate Professor Dyer highlights promising future trends in mineral processing.

"Reprocessing tailings material to achieve zero-waste processing would vastly decrease water consumption, physical footprint, legacy, and environmental risk," he said. "Decarbonisation and mineral carbon sequestration, as well as in-situ mining including phytomining, are also promising trends.

"These have the potential to revolutionise the mining industry, decrease the environmental impact of mining and create opportunities for new technology and careers.

"Lastly, recycling consumer products and infrastructure is another promising future trend in mineral processing.

"With the demand for metals and the drive for recycling technologies, the mineral processing skill set will be highly sought after for many years to come."

These trends have the potential to revolutionise the mining industry, decrease the environmental impact of mining, and create opportunities for new approaches and technology in the field, as well as a wealth of career opportunities.

The role of universities in advancing mineral processing research and development

Associate Professor Dyer highlighted the crucial role of universities in advancing mineral processing research and development.

"Universities are playing a critical role in advancing mineral processing research and development, and it's through our partnerships with mining companies and service providers that we can provide applied solutions that are industrially relevant," he said.

"Universities can play an advocacy role in helping improve the public perception of the industry and attract the next generation of talent, and emphasis must be placed on the revision of content.

"Maintaining up-to-date teaching content is crucial for educating the workforce and this requires a flexible and close relationship with industry partners supported by streamlined processes within the bureaucracies of both sides of the table."

The relationship between mineral processing and environmental sustainability

Associate Professor Dyer highlights measures to reduce mining's environmental im-

impact, including decarbonisation, water management, and tailings management.

"Zero-waste processing is a growing focus in the industry, where metals are extracted with no waste streams produced," he said.

"There has been a shift towards renewables and research has been conducted to develop technologies that operate efficiently with a varied energy supply.

"Efforts have also been made to reduce mining's carbon footprint.

"Clean water is being returned to the environment due to regulations requiring natural water sources to be replenished.

"Research is helping to recover trace elements and minerals of value from tailings, thereby reducing their environmental impact.

"Universities, mining companies and service providers are collaborating to advance mineral processing research and achieve a sustainable future for the industry."

Conclusion

Mineral processing is critical for extracting valuable minerals from ores, with advancements in this field focused on sustainability, efficiency, and reducing environmental impact.

Challenges faced by the industry include diminishing high-quality deposits, the need for more efficient processing technology and a shortage of skilled labour.

To address these challenges, promising future trends such as zero-waste processing, decarbonisation and mineral carbon sequestration are being explored.

Collaborations between universities, mining companies and service providers play a crucial role in advancing mineral processing research and development.

By pursuing more efficient and sustainable mineral processing technologies, the industry can ensure its future growth while minimising its environmental impact.

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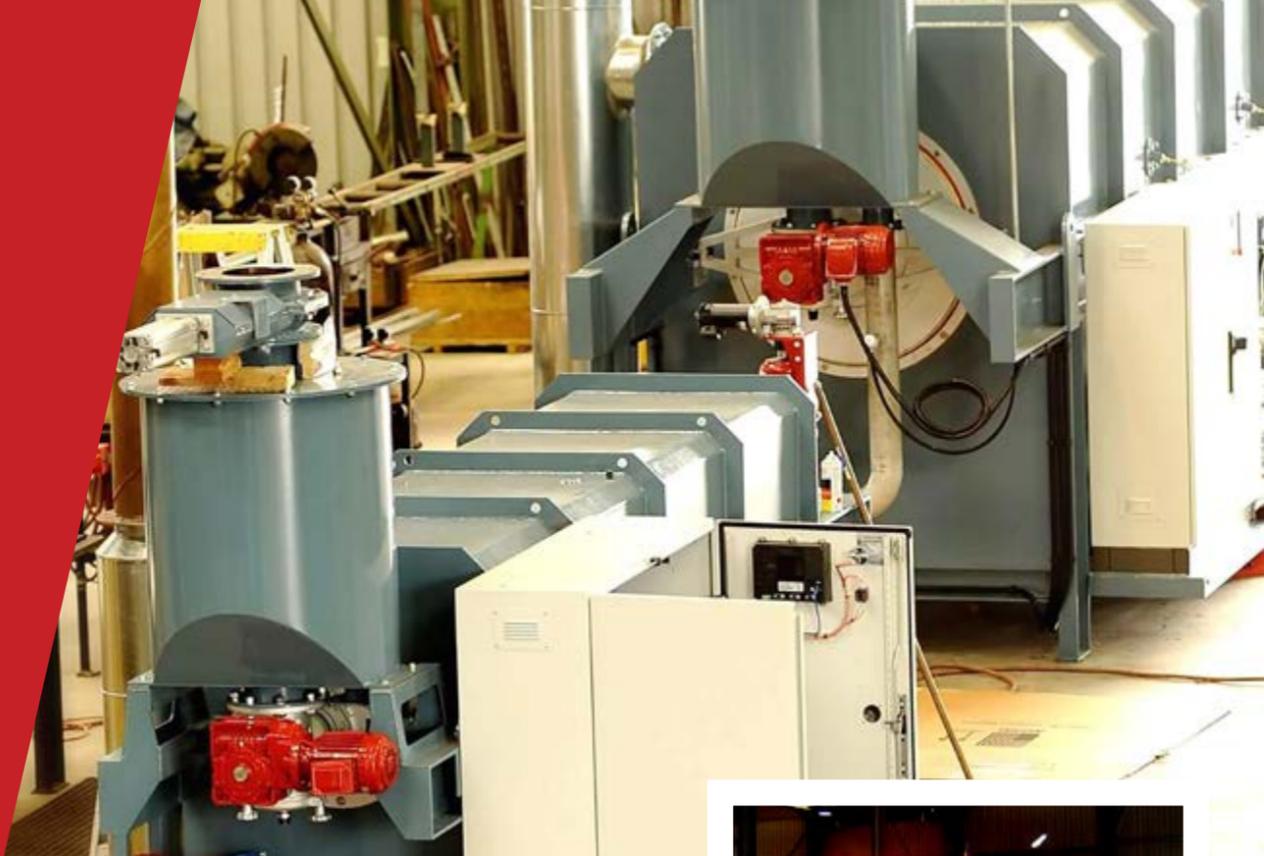




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STANTIL ENGINEERING

PROVIDING QUALITY ENGINEERED EQUIPMENT FOR THE MINING INDUSTRY



Stantil Engineering is an Australian-owned company based in Western Australia that specialises in the design, development, and manufacture of quality engineered equipment for the mining industry.

The company primarily supplies the Anzac brand of thermal processing equipment, which includes rotary kilns, oil heaters, tilting furnaces, and calcining ovens for gold processing, as well as mineral processing, paddle mixers and associated materials handling equipment.

For over 30 years, Anzac has been globally recognised for offering leading edge products with over 300 equipment installations in more than 50 countries, providing bespoke solutions to meet specific needs.

Charlie Martella, the original founder

of Anzac Pty Ltd, established Stantil Engineering in 2020 and the following year, the company formally took over the license to exclusively supply the Anzac brand.

Charlie's 50-plus years of experience in manufacturing underpins the quality of Anzac design, and the Stantil team led by his daughters, builds on this legacy to continue providing a quality service to mining clients around the world.

The flagship product of the brand is the Anzac Carbon Regeneration Kiln, which plays a central role in the gold recovery process.

The indirect-fired rotary style kiln with its centreline drive design has proven to be one of the most efficient and robust designs of its type. Over the years, this technology has also proven to be suitable in other

applications, including calcining and drying a variety of different feed materials.

Anzac thermal processing equipment can be found in a number of different industries, including gold, uranium, lithium, cobalt, scheelite, kaolin, rare earths, and other minerals.

Depending on the product material and capacity requirements, equipment can be supplied in a range of models to cater for higher or lower throughputs and different bulk densities.

The team works closely with clients throughout their project and beyond to ensure that the equipment provided meets their stated needs and continues to perform at its best over time.

Despite the added challenges of supply chain and labor shortages, Stantil Engineering



has worked hard to grow the business into a vibrant and strong industry position over the past couple of years. Their goal is to reinvigorate the brand with customer focussed quality builds and ongoing spare parts and service adhering to the high standards and expectations of Anzac clients.

For further information about Stantil Engineering and the Anzac suite of products, please contact enquiries@stantil.com.au

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Supplying the well established Anzac suite of specialised thermal processing equipment to the international mining industry.

Products include horizontal rotary kilns, oil heaters, tilting furnaces and calcining ovens for the gold industry as well as rotary dryers, paddle mixers and associated material handling equipment applicable in the processing of a diverse range of minerals.

Drawing on 30 years of manufacturing experience Stantil Engineering works with clients to tailor products to suit their project requirements.



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The Obvious and Hidden Benefits of Good Laboratory Engineering



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

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

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

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

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

manufacture it, we will know who can.

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

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

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

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

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

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

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

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



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BRINGS ENHANCED OFFERING TO THE IRON ORE INDUSTRY

CIMIC Group's minerals processing company, Sedgman, acquired Onyx Projects in 2022 enhancing Sedgman's growing Western Australian presence and offering to clients.

Introducing Sedgman Onyx

Now operating as a wholly owned subsidiary of Sedgman, under the Sedgman Onyx brand, its founding directors have extensive experience delivering brownfields sustaining capital works and specialist materials handling.

Sedgman Onyx has a proud history in the efficient delivery of process and non-process infrastructure for the iron ore sector, both hematite and other commodities such as nickel and salt minerals.

Since 2007, it has built an outstanding and proven track record in greenfield and brownfield studies and projects in mining and minerals processing for clients including Alcoa, FMG, BHP Iron Ore, Nickel West, Rio Tinto Iron Ore, Roy Hill and Atlas Iron.

An expanded, multidisciplinary service

The extensive experience and skills of Sedgman Onyx is complemented by Sedgman's capability in precious, base and critical minerals through feasibility studies, engineering design, procurement, and longstanding project delivery and operations capability. Sedgman and Sedgman Onyx are able to offer an expanded multidisciplinary service to the resource industry across Australia and internationally.

Innovative engineering solutions

Sedgman Onyx has a long-standing reputation for providing innovative engineering solutions particularly relevant in the ongoing growth of the iron ore sector. We can offer specialist design skills for the handling of more challenging bulk materials, associated mine site dewatering requirements and the development of magnetite concentrators in Western Australia.

Sedgman Onyx has extensive experience and skills in:

- detailed design of crushing, screening,

and wet iron ore processing circuits

- industry leading dynamic element analysis for material handling solutions
- electrical system modelling and
- hydraulic network analysis.

For existing operations, Sedgman Onyx has a dedicated sustaining capital team that provides plant upgrade and brownfield optimisation services. Sedgman's process engineering and plant operations capability further enhances Sedgman Onyx through process engineering, production optimisation solutions, and our maintenance planning, reliability engineering and online remote monitoring services.

Sedgman Onyx and Sedgman - highly efficient engineering

With a passion for excellence in engineering solutions optimised for specific ore characteristics, Sedgman Onyx and Sedgman provide a highly efficient engineering delivery service, with a dedicated and experienced team. Their in-house, dedicated team of designers, with multi-disciplinary capabilities,

produce comprehensive models for fabrication and construction. Ultimately, what drives value is our commitment to leading solutions and accountability for results.

Sedgman and Sedgman Onyx partner with clients to ensure tailored, world-class outcomes that stand apart for reliability, efficiency, productivity and performance – optimising client investments, maximising resource recovery and lowering unit costs.

Whether a new project, an expansion, or modifications and optimisations to an existing plant, Sedgman and Sedgman Onyx can deliver engineering certainty, project delivery and operational support solutions tailored to achieve the best outcomes for our clients.

To find out how we can support you contact Sedgman Onyx Project Director, Chris Grierson:

chris.grierson@onyxprojects.com

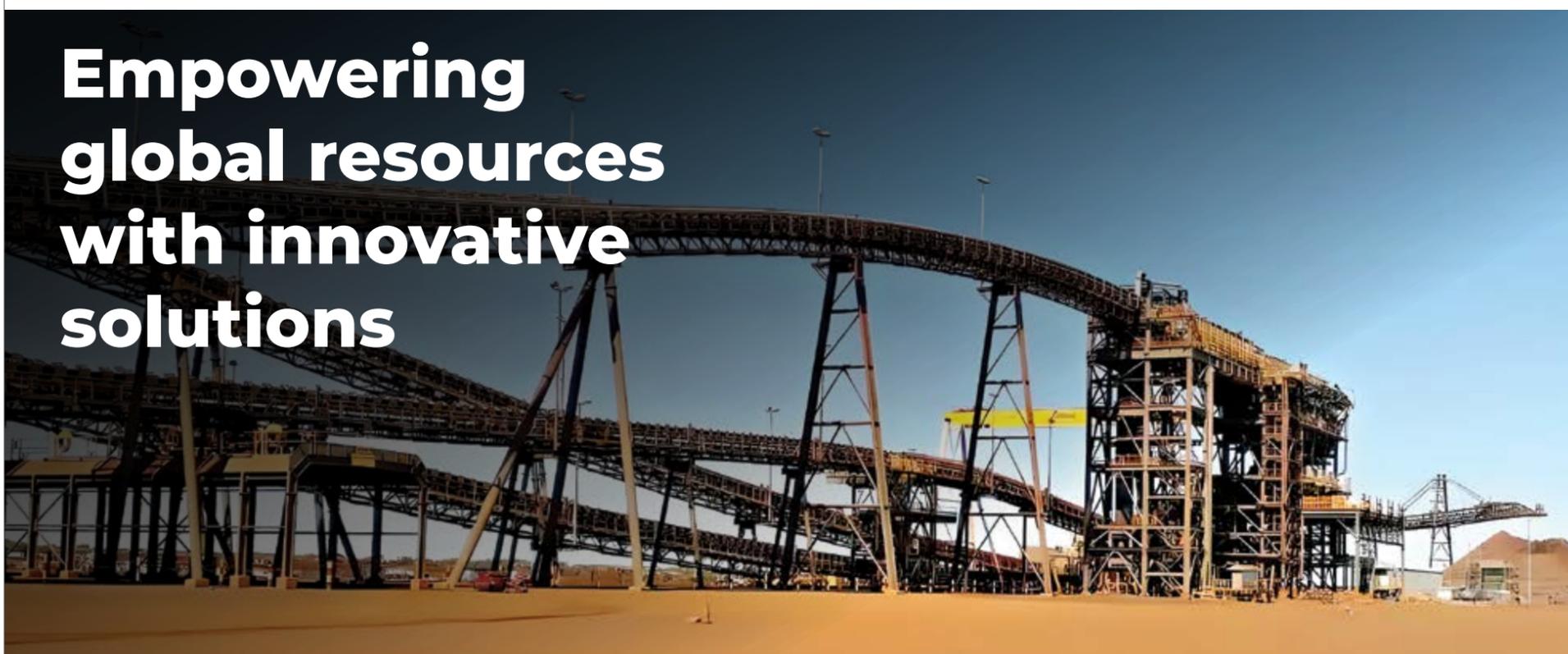
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Empowering global resources with innovative solutions



Sedgman is a leading provider of minerals processing and associated infrastructure solutions to the global resources industry.

Our technical expertise across major commodities is recognised globally and our regional experience spans major markets around the world. Sedgman's project history and team reach give us the ability to turn best practice into practical value, supported by multi-disciplinary engineering, that enables us to meet the demands and complexities of diverse and remote environments.





Delivering Precision Instrumentation Solutions for a Modern Industry



The importance of precision and accuracy in modern industries cannot be overstated. From monitoring and controlling processes to ensuring the safety of personnel and equipment, accuracy is crucial for success. AMS Instrumentation & Calibration offers a comprehensive range of process instrumentation solutions for various industries, including mining, water and wastewater, food and beverage, and oil and gas.

With nearly 50 years of experience, AMS is a reliable and knowledgeable supplier of high-quality instruments and calibration equipment. Their range of products includes temperature and pressure calibrators, flow meters, level instrumentation, and analytical instrumentation, providing solutions for a broad range of applications.

In the mining industry, accurate measurement and control of variables like pressure, temperature, and flow rates are essen-

tial for maintaining safe and efficient operations. AMS offers a range of pressure devices, including calibrators, calibration pumps, software, and related systems, to suit commercial and industrial applications. They also provide a complete range of fluid flowmeter devices, such as orifices, venturis, nozzles, and electromagnetic, ultrasonic, and thermal flow meters.

By providing precise and reliable measurements of these critical variables, AMS helps mining companies optimise their operations and improve their overall efficiency, resulting in increased productivity and profitability.

AMS's calibration equipment and software ensure that plants are maintained in optimal operation. The range of calibration software integrates fully with other maintenance software packages, streamlining maintenance processes and enabling easy data management. Furthermore, AMS of-

fers NATA traceable certificates with most repairs, providing peace of mind to clients that their equipment is in good hands.

AMS understands that every industry has unique needs and challenges. That's why they offer personalised solutions tailored to meet the specific requirements of each client. Their team of highly trained technicians is always available to offer on-site calibration and service, ensuring that clients' systems remain fully operational with minimal downtime. They also offer a full range of training courses on the range of equipment

they represent, allowing clients to get the most out of their investments.

AMS Instrumentation & Calibration is a reliable and knowledgeable supplier of precision instrumentation solutions for multiple industries. Their comprehensive range of high-quality products and services makes them a one-stop-shop for all process instrumentation needs. With a commitment to superior products and services, AMS Instrumentation & Calibration is the go-to supplier for precision instrumentation solutions.

AMR



AMS Instrumentation & Calibration Providing High-Quality Industrial Instrumentation and Calibration Equipment for All Industries



AMS has been supplying industrial instrumentation (flow, pressure, level, temperature, analytical and ancillary equipment) and calibration equipment to all industries, government departments and public utilities. AMS is proud to have developed these relationships over many years and will continue to do so and building new ones as they appear. Our proven track record over the many years is testimony to our commitment to sales and service.



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FEATURES



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Since 1995, Mineral Process Control (MPC) has found itself on top of the podium for innovation, manufacturing, and supply of gold mining and assaying chemicals and technologies. The company's technologies are rapidly becoming the go-to method for gold and silver miners when it comes to grade and process control. These technologies have revolutionised the way mining assets operate, with miners being able to obtain accurate results, quickly and cost-effectively.

As a leading provider of assay equipment, MPC's PAL1000 and Assay Tabs have gained popularity among miners around the world. The PAL1000 is an efficient and reliable cyanidation assay machine designed to produce high-rate, cost-effective, accurate and precise results. The machine has the capacity to analyse up to 52, one kilogram sam-

ples, which can be taken straight from the mine face or open pit. This makes it an ideal tool for miners that require fast and accurate data on the grade of their ore.

The PAL1000 combines a specific amount of cyanide and LeachWELL, via MPC's Assay Tabs, with the sample in a pot that contains grinding media. Its unique mechanical action initiates concurrent metal liberation and leaching. Analysing of the gold and silver involves several methods, including atomic absorption spectroscopy or inductively coupled plasma.

"The results produced by the PAL1000 are incredibly accurate and precise, with a detection limit of up to 0.005ppm Au," said MPC's Business Manager, Nathan Edwards. "This level of accuracy is unmatched by other large sample methods of analysis, and

ensures that miners have access to the most reliable data possible.

"The PAL1000 is perfectly suited for remote sites due to its robustness, ease-of-use, and the minimal amount of operator training required. It's simplicity and reliability are key features that support easy repair and maintenance for onsite staff, and in times of supply chain disruption, the PAL1000 guarantees operational peace of mind."

MPC's Assay Tabs are pre-measured tablets that can be added directly to the PAL1000 sample pot, or bottle roll, which eliminates the need for onerous weighing and measurement procedures. This significantly reduces the time and cost associated with traditional methods, while maintaining the accuracy and precision of the results.

Mr Edwards says the benefits of using cyanidation assays, such as those produced by MPC, are evident.

"Not only do they provide miners with a cost-effective, accurate, and precise method of determining the grade of their ore, but cyanide recoverable gold assays are directly relatable to plant recovery, which delivers a higher level of reconciliation between mine and plant," he said.

"With the PAL1000 and Assay Tabs, miners may obtain reliable data quickly, enabling them to enhance operational efficiencies and maximise profits."

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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.



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TECHNICAL NOTES

The PAL1000 contains 52 sample pots, each capable of processing up to 1kg ore samples. Samples are completely pulverised (typically >90% passing 75um) 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.



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Minister Koutsantonis with Premier Peter Malinauskas. Supplied: Neoen



Minister Koutsantonis speaks on issues facing the mining sector in South Australia. Supplied: AmCham

SUSTAINING GROWTH AND GREEN TRANSFORMATION:

THE PATH FORWARD FOR SOUTH AUSTRALIA'S MINING SECTOR

Mining is a crucial industry in South Australia, playing a significant role in the state's economy and job market. As South Australia moves towards decarbonisation, mining has become ever more important, providing access to critical minerals like copper, gold, and rare earths.

However, the industry faces a range of pressing challenges that could threaten its future growth and sustainability.

A recent interview with South Australian Energy and Mining Minister Tom Koutsantonis sheds light on the issues facing the mining sector in the state, including the need for a skilled workforce and access to water resources.

Challenges facing the South Australian mining industry

"One of the biggest challenges is the need for a skilled workforce," Minister Koutsantonis said.

"With South Australia close to full employment, it has become increasingly difficult to find trained workers for the industry."

Minister Koutsantonis acknowledged that fly-in fly-out (FIFO) workers and workforce consultants may be necessary but he emphasised that more investment was needed in the local workforce in South Australia.

Another pressing issue for the industry is access to water resources.

"Water is critical to unlocking minerals in the gold cretin and the north of our state," Minister Koutsantonis explained.

"That's why we're investing heavily into this northern water project, which is a large-scale desalination plant."

The Northern Water Supply project is one of a number of projects being considered for the Upper Spencer Gulf as part of the State Government's plan to decarbonise local industry, provide for future jobs and

economic development, thereby positioning the region as a global leader in the net-zero economy.

He noted that the project has significant ESG benefits, adding that the State Government is committed to ensuring that mining operations are conducted sustainably.

"We take ESG principles seriously," he said.

"We're prepared to partner with companies that are looking at long-term investments."

South Australia's commitment to environmental and social sustainability is reflected in various policies and programs in place to mitigate climate change impacts.

The State has set a goal to reduce greenhouse gas emissions by over 50% below 2005 levels by 2030 and achieve net zero emissions by 2050, making it a world leader in renewable energy.

The South Australian Government is also making significant investments in reforming social housing, education, skills and training, health, and well-being to support socio-economic advancement and empowerment.

Potential for decarbonisation

South Australia's abundant renewable resources and critical minerals make it an ideal location for the decarbonisation of the mining industry.

The State has transformed its energy system from 1% to over 70% renewable energy in just over 16 years, with a goal to achieve 100% net renewables by 2030.

To-date, it has attracted over \$6b investment in large-scale renewable energy and storage projects, with over \$20b in the investment pipeline.

The South Australian Government is making significant investments to support a transition to a low-carbon economy.

It has committed over \$40m in grants and

loans to the development of three megawatt-scale renewable hydrogen projects.

South Australia is growing 'green' minerals and processing industries to supply copper and other critical minerals across the globe, for low emissions technologies including electric vehicles and renewable energy technology

"We have lots of abundant renewable resources and probably the best solar wind resources in the world," said Minister Koutsantonis.

"Mining is critical for our aspirations for decarbonisation since we have copper deposits across the state including gold, silver, rare earth and other critical minerals."

The mining industry is already contributing to the South Australia's decarbonisation efforts by investing in hydrogen and green hydrogen.

"The opportunity for us here is green steel," said Minister Koutsantonis.

"We're making a massive nearly \$600m investment in hydrogen electrolyzers in the Upper Spencer Gulf."

South Australia's leadership in transitioning its energy system, abundant natural resources, skilled workforce, and research sector provide a strong base from which to transform its economy.

This sees development towards achieving its twin goals of reducing state greenhouse gas emissions by more than 50% below 2005 levels by 2030 and achieving net zero emissions by 2050.

Ongoing developments

The mining industry in South Australia is experiencing a period of exciting growth and transformation, with recent major developments that are sure to have a significant impact.

Among these developments are BHP's stra-

tegic acquisition of OZ Minerals, a move that is set to solidify South Australia's position as a leader in the copper industry.

Additionally, the expansion of SIMEC's Middleback Ranges mines represents a game-changing opportunity for the state to become a global leader in decarbonisation, with the potential for green steel production that would create jobs and increase the value added to the state's commodities.

Minister Koutsantonis says the recent acquisition of OZ Minerals by BHP is a significant development for South Australia.

"BHP is looking to make South Australia the one province in copper, and that is what we've been chasing for a long time," he said.

"We are on the precipice of becoming a tier one jurisdiction for copper.

"The expansion of SIMEC's Middleback Ranges mines is also a significant event for the industry, with the opportunity for South Australia to decarbonise the steel industry.

"The opportunity for us is to start exporting to the world advance manufacturing products like green iron, and ultimately green steel."

Conclusion

The mining industry is crucial to South Australia's economy and job market, providing access to essential minerals and contributing significantly to decarbonisation efforts.

Despite facing challenges like a shortage of skilled workers and limited access to water resources, the government and industry are making efforts to address these issues.

Recent developments such as BHP's acquisition of OZ Minerals and the expansion of SIMEC's Middleback Ranges mines signal exciting growth and transformation in the industry. These developments present an opportunity for increased value added to the state's commodities and potential for green steel production. **AMR**



Unearthing a Smarter Way in the Australian Mining Industry

AMC Consultants has a long-standing presence in South Australia, where they have provided mining consultancy services to major players in the region for more than a decade. Notably, OZ Minerals has been a key client, and AMC Consultants has been involved in several aspects of their mining operations, including the recent acquisition process by BHP.

With their substantial expertise in copper mining, AMC Consultants has worked closely with OZ Minerals to optimise their copper assets in the region. They provide a range of strategic, operational, and advisory services, leveraging their world-leading experts in strategy optimization, ventilation, backfill, underground hard rock mining, benchmarking, and the JORC Code, among others.

As BHP expands their copper interests in Australia through the acquisition of OZ Minerals, AMC Consultants looks forward to continuing their relationship with this key player in the region. Their unique approach to mining, driven by their SmartData™ System and decades of real-world experience, has allowed them to solve some of the

world's most complex mining problems in various environments.

AMC's SmartData™ System is the world's most comprehensive site-level validated data, and its two world-leading cost modelling systems regularly deliver estimates within 5% of actuals. This system enables AMC to rapidly benchmark and cross-check new data, providing an unprecedented level of insight and accuracy in its recommendations. AMC's diverse range of underground and open-pit mining services encompasses mining, geology, geotechnical, feasibility studies, corporate consulting, engineering services, metallurgy, and more.

With customised consulting services and the latest advances in process simulation software for underground and open pit operations, AMC can help clients unearth hidden value in real-time, raising productivity levels across the mining cycle.

AMC's over 40 years of experience, more than 10,000 projects completed, and over 1,800 clients served across 110 countries, has firmly established it as a leading mining

consultancy firm. Its reputation as an internationally recognised brand that stands for quality and independence is unparalleled in the industry, and it prides itself on being driven by data, frontline experience, and a team of highly experienced career miners with exceptional integrity.

AMC is committed to helping their clients achieve sustainable growth and create opportunities for local employment, small businesses, regional communities, traditional owners, and the South Australian economy. **AMR**



WHITE PAPER

Commodities supply and demand: How the global race for battery materials is changing mining



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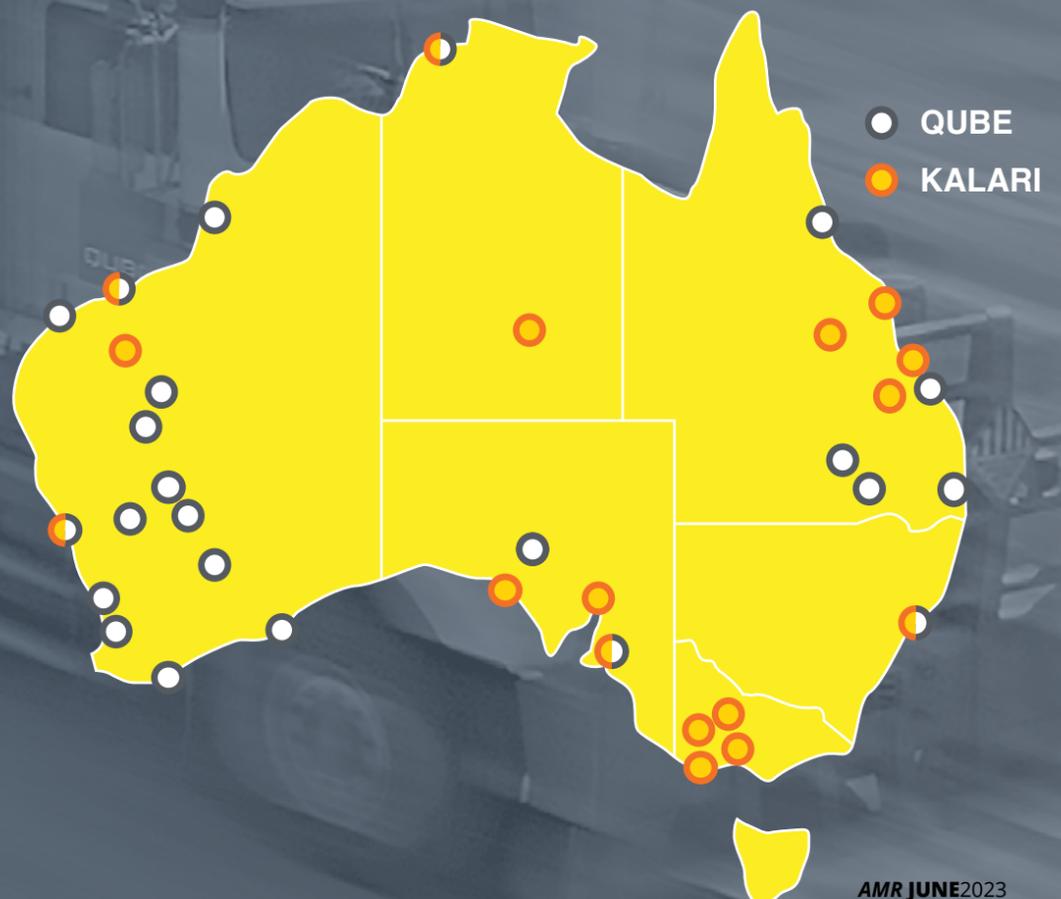


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POWERING THE FUTURE

PILBARA MINERALS CHARGES AHEAD WITH LITHIUM EXPANSION

PILBARA MINERALS ENDEAVOURS TO EXPAND ITS PRODUCTION CAPACITY TO 1MTPA THROUGH THE PILGANGOORA EXPANSION PROJECT. (IMAGE SOURCE: PILBARA MINERALS)

Pilbara Minerals (ASX: PLS) is an ASX50 company and one of the largest independent hard-rock lithium producers globally.

Operating in WA's Pilbara region, it plays a crucial role in the lithium supply chain.

The Pilgangoora Expansion project is a significant endeavour for Pilbara Minerals, aiming to increase production capacity to 1mtpa.

It encompasses construction works and upgrades to solidify the company's position in the battery materials market.

The expansion holds strategic importance, enabling Pilbara Minerals to meet growing lithium demand and diversify revenue streams.

By leveraging its expertise and partnerships, the company aims to become a sustainable and fully integrated lithium producer, contributing to the global transition towards clean energy technologies.

Background and project overview

The Pilgangoora project is a prominent lithium operation owned by Pilbara Minerals, located in WA's resource-rich Pilbara region.

The project currently operates two plants and has commercial production declared since 2019.

With a focus on growth, the Pilgangoora Expansion project aims to unlock the full potential of the Pilgangoora asset.

It has planned production capacity of 1mtpa, achieved through a combined throughput of 6.3mtpa from the Ngungaju process plant and the proposed Pilgan 5mtpa expanded process plant for the P1000 expansion project.

This expansion represents a significant opportunity for Pilbara Minerals to capture value and increase revenue.

The two existing plants at Pilgangoora have a current processing capacity of 580,000tpa, based on assumed product grade of SC5.7%.

These plants play a vital role in the production of spodumene concentrate, a key raw material in lithium-ion batteries.

The Pilgangoora asset is considered a Tier 1 asset, indicating its high-quality resource base and significant growth potential.

The project's strong growth trajectory posi-

tions Pilbara Minerals as a major player in the lithium market.

As the demand for lithium continues to rise, the Pilgangoora Expansion project offers an opportunity for the company to establish itself as a leading sustainable battery materials provider, ensuring a secure supply for the growing clean energy sector.

Vision and strategic goals

Pilbara Minerals' overarching vision is to become a leader in the provision of sustainable battery materials products.

With a focus on lithium, the company aims to contribute to the global transition towards clean energy technologies, such as electric vehicles and energy storage systems.

As part of its strategic approach, Pilbara Minerals recognises the importance of diversifying its revenue streams beyond the Pilgangoora asset.

While the project remains a core focus, the company seeks opportunities to expand its operations and offerings in order to capture value across the lithium supply chain.

Pilbara Minerals has set strategic goals to support its long-term growth and success.

These goals encompass expanding production capacity, enhancing operational efficiency, developing strategic partnerships and exploring innovative technologies to maximise value and ensure a sustainable business model.

Lithium demand and supply

The projected increase in demand for lithium, driven by the growing adoption of electric vehicles and renewable energy storage, has raised concerns about future supply.

By 2040, a significant lithium deficit is expected, prompting the need for substantial production capacity expansion.

To meet the projected demand, an estimated 13-21 Pilgangoora equivalents, based on Pilgangoora's production of 1mtpa SC6.0, would be required. This highlights the scale of the challenge in securing sufficient lithium supply to meet the growing market needs.

The lithium supply landscape is influenced by various factors, including the availability of resources, technological advancements, government policies, and investment in exploration and production.

While Pilbara Minerals aims to contribute to the supply through its expansion projects,

the company is also mindful of potential supply sources emerging globally.

By strategically positioning itself and aligning its goals with the increasing demand for lithium, Pilbara Minerals aims to play a significant role in meeting future market needs while ensuring a sustainable and secure supply of battery materials.

Expansion projects

The P680 Expansion project is a significant undertaking for Pilbara Minerals.

It involves construction works for the primary rejection facility and preliminary works for the new crushing and ore sorting facility. The project aims to increase production capacity to 680,000dmt of spodumene concentrate.

Commissioning is targeted for the September quarter of 2023, with full capacity production expected by the December quarter of the same year.

The P1000 Expansion project represents a major expansion plan for Pilbara Minerals.

It aims to increase production capacity to around 1mtpa of spodumene concentrate. The final investment decision (FID) for this project was completed in the March quarter of 2023.

Commissioning is targeted for the fourth quarter of the calendar year 2025, with full production following commissioning and ramp-up at the end of the September quarter of 2025.

Partnerships and value-add initiatives

Pilbara Minerals has formed a strategic partnership with POSCO, a leading South Korean steelmaker.

This partnership is significant for the South Korean lithium industry as it positions Pilbara Minerals at the forefront of the country's growing lithium chemicals and battery manufacturing hub.

The joint venture with POSCO includes the development of a lithium hydroxide monohydrate (LHM) facility in Gwangyang, South Korea.

This facility, with a capacity of 43,000tpa, is currently under construction.

Commissioning of the first train is targeted to commence from the fourth quarter of the calendar year 2023, followed by the second train in the first quarter of the calendar year 2024.

South Korea is home to prominent lithium chemical and battery producers, including LG Chem, SK Innovation, Samsung SDI and POSCO Chemical.

This presents potential market opportunities for Pilbara Minerals as it strengthens its presence in the region.

Pilbara Minerals is also engaged in a mid-stream project with Calix, aiming to increase lithium concentration, reduce waste and lower carbon energy intensity.

The project involves the development of a process that utilises electric calcination on-site to produce lithium salt with more than 35% Li₂O.

This initiative aligns with Pilbara Minerals' commitment to sustainability and enhancing the value of its products in the lithium supply chain.

Future Outlook

Looking ahead, Pilbara Minerals has a clear growth pathway and ambitious targets.

With the ongoing P680 Expansion project and the future P1000 Expansion project, the company aims to increase its production capacity to meet the growing demand for lithium.

The expansion projects will have a substantial impact on Pilbara Minerals' production capacity and revenue generation.

The increased capacity will position the company as a major player in the lithium supply chain, enabling it to capitalise on the rising demand for sustainable battery materials.

Pilbara Minerals' strategic positioning and successful execution of expansion projects have positioned it as an emerging leader in the sustainable battery materials industry.

The company's focus on sustainability, strategic partnerships and value-add initiatives sets it apart and strengthens its competitive advantage in the market.

With the expansion projects underway and strategic partnerships in place, Pilbara Minerals is well-positioned to meet the increasing demand for lithium and capitalise on the market opportunities.

The company's dedication to sustainability and its efforts to enhance the value of its products further solidify its position in the industry. **AMR**

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LEADING ELECTRICAL SERVICES FOR WA'S MINING INDUSTRY

The mining industry serves as the backbone of Western Australia's economy, driving growth, creating employment opportunities, and contributing to the region's prosperity. In this thriving landscape, JDN Contracting and Electrical Services has emerged as a leading electrical contracting and service provider. With a steadfast commitment to excellence and a deep understanding of the mining industry, JDN plays a vital role in supporting the sector's success.

An Established Presence in the Mining Industry

JDN Contracting and Electrical Services boasts an impressive track record of collaborating with reputable mining clients, including Pilbara Minerals, Rio Tinto, and BHP. These strategic partnerships have enabled JDN to establish a strong presence in the mining industry and solidify its reputation as a trusted service provider. Through their extensive experience and specialised knowledge, JDN understands the unique challenges and requirements of the mining sector, allowing them to deliver tailored and innovative electrical solutions that drive efficiency and productivity.

Comprehensive Capabilities for Client Success

JDN offers a comprehensive range of services that cater to the diverse needs of their clients in the mining industry. Their expertise extends to electrical contracting, project management, commissioning, and ongoing maintenance. By providing end-to-end solutions, JDN ensures seamless project execution, from the initial design and installation phases to the ongoing support and maintenance of electrical systems. This comprehensive approach streamlines operations, enhances reliability, and ultimately contributes to the success of their clients' mining projects.

Commitment to Excellence and Accreditation

JDN Contracting and Electrical Services sets the bar high for industry standards and demonstrates their commitment to excellence through recent ISO accreditations. Their achievements in Occupational Health and Safety (ISO 45001:2018), Quality (ISO 9001:2015), and Environment (ISO 14001:2015) showcase JDN's dedication to maintaining the highest levels of safety, quality, and environmental responsibility. These accreditations provide clients with confidence in JDN's commitment to delivering exceptional service, ensuring compliance with industry regulations, and promoting a culture of continuous improvement.

Expertise in Complex Project Management

JDN Contracting and Electrical Services prides itself on its highly experienced team that possesses a wealth of expertise in managing complex projects within the mining industry. With a deep understanding of the unique demands of the sector, JDN excels in every aspect of project management. From meticulous project planning and strategic staffing to efficient equipment procurement and stringent quality control, JDN ensures that projects are executed seamlessly, on time, and within budget. Their expertise extends to comprehensive electrical inspections and effective site management, guaranteeing the highest standards of safety, quality, and operational excellence.

Promoting Diversity and Inclusivity

In line with their commitment to promoting diversity and inclusivity, JDN Contracting and Electrical Services has forged a significant partnership with the Karlayura Group, resulting in the establishment of "Karlayura Electrical." This collaboration marks an important milestone for JDN as it embraces

Aboriginal ownership, with Karlayura Electrical being 51% Aboriginal-owned. Through this partnership, JDN actively promotes economic opportunities for Aboriginal people in the region while fostering a culture of diversity and inclusivity within the mining industry. The formation of Karlayura Electrical showcases JDN's dedication to driving positive change and creating a more inclusive industry for all.

Partnering with JDN for Growth and Innovation

As Western Australia's mining industry continues to thrive, JDN Contracting and Electrical Services stands out as the go-to provider for electrical contracting and services. Their unwavering commitment to excellence, comprehensive capabilities, and dedication to diversity and inclusivity make them the ideal partner for clients seeking growth and innovation. With a strong reputation for reliability, expertise in complex project management, and a focus on promoting diversity, JDN is poised to drive the mining industry forward and lead it into a prosperous future. By partnering with JDN, clients can expect a seamless experience, exceptional service, and a commitment to delivering results that surpass expectations. JDN's deep expertise in the mining industry, combined with their comprehensive capabilities, allows them to provide customised solutions that address the unique challenges faced by their clients.

With JDN as a partner, clients gain access to a team of highly skilled professionals who are dedicated to driving growth and innovation. From initial project planning to the final stages of commissioning and ongoing maintenance, JDN's expertise in complex project management ensures that projects are executed efficiently, on time, and within budget. Their meticulous attention to detail, strategic staffing, and rigorous quality con-

trol measures guarantee the highest standards of performance and safety.

One of the key aspects that sets JDN apart is their commitment to diversity and inclusivity. The formation of "Karlayura Electrical" in partnership with the Karlayura Group, with its majority Aboriginal ownership, showcases JDN's dedication to creating economic opportunities and fostering a more inclusive industry. This partnership not only brings valuable expertise and perspectives but also contributes to the social and economic well-being of the Aboriginal community.

JDN Contracting and Electrical Services is driving growth and innovation in Western Australia's mining industry. With their established presence, comprehensive capabilities, commitment to excellence, and dedication to diversity, JDN is the trusted partner that clients can rely on. By choosing JDN, clients gain a strategic ally who understands the intricacies of the mining industry and is committed to delivering exceptional results. Together with JDN, let's harness the power of collaboration to ignite growth, foster innovation, and shape a prosperous future for the mining industry and beyond. **AMR**





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UNEARTHING THE POTENTIAL OF DRONES IN MINING

By Olivia Stoch



Craig James,
CSIRO Minerals Resources Integrated
Mining Team, principal research engineer.
(Image: CSIRO)

"Drones have brought about a transformative impact in the mining industry, offering unprecedented capabilities for data collection, monitoring, and control. Their versatility in various applications has opened up new possibilities for optimising operations and enhancing safety."

CONTINUED FROM FRONT COVER

Drone control modes

Mr. James says that drones encompass a wide range of mobile machines that can operate in diverse environments such as the air, ground, water and even space.

"It is a term that encompasses various levels of control or autonomy," he said.

"As we talk about drones in mining, we are considering a spectrum of control modes.

"These modes include tele-operation, where individuals direct the machine either through line-of-sight or non-line-of-sight remote control.

"In the case of tele-operation, human operators are actively involved in the decision-making process."

Another mode is semi-autonomous, where people generally guide the machine although certain actions can be performed without direct control.

For example, an autopilot feature can be utilised to navigate the drone from one location to another, reducing the need for constant human intervention.

Lastly, there is the fully autonomous mode, where major functions are controlled by on-board computers without the need for human intervention.

However, remote operators retain the ability to override machine control when necessary.

In these cases, the term "human-in-the-loop autonomy" is used to describe the involvement of humans in the decision-making process.

On the other hand, fully autonomous drones, or those operating on autopilot, are referred to as "human-on-the-loop autonomy."

By encompassing this spectrum of control modes, mining companies can leverage drones to suit their specific operational needs and optimise efficiency in a variety of environments.

Survey and inspection drones

Mr James highlighted the immense potential of survey and inspection drones.

"These drones provide a rapid and efficient means of mapping mining environments, allowing for visual records and the creation of 3D models," he said.

"They have become indispensable tools for planning, tracking operations and gaining insights into exceptional events."

Mr James emphasised the benefits of continuous monitoring through the use of drones.

"Aerial drones equipped with visual or Li-

DAR sensors enable the periodic scanning of stockpiles," he said.

"This data can be used to calculate material movement and optimise inventory management.

"It offers a cost-effective and efficient solution for tracking and managing stockpiles."

Semi-autonomous haulage for efficient material transfer

Semi-autonomous drones are increasingly used for bulk material transfer in mining operations, according to Mr James.

"These drones, operated remotely by tele-operators at load and dump locations, minimise the need for human intervention during transportation," he said.

"They follow predefined routes, reducing the risk of accidents and optimising the efficiency of material transfer."

Mr James' insights underscore the significant potential of drones in mining, ranging from survey and inspection to continuous monitoring and efficient material transfer.

These applications have already demonstrated their value in enhancing operational efficiency, safety outcomes and data-driven decision-making in the mining industry.

Mr James highlighted the diverse range of sensors integrated into drones.

"The sensors installed on drones can provide a wealth of data," he said.

"From visual and LiDAR sensors to GPS, thermal cameras and ground-penetrating radar, the potential for collecting valuable information is vast."

Data applications: guidance, performance monitoring and maintenance

"Drone data plays a crucial role in providing guidance, navigation and control (GNC) during mining operations," added Mr James. "It offers situational awareness and aids in directing the drone's tasks.

"Additionally, the data collected by drones can generate key performance characteristics of the mining processes, assisting in performance monitoring and maintenance activities."

Mr James emphasised the significance of drone data in optimising fleet operations. "For haul trucks operating semi-autonomously, mining companies can leverage drone data to obtain statistics such as cycle times and vehicle operating parameters."

"This data helps in fine-tuning fleet operations and maximising efficiency."

Navigating underground mining

Underground mining presents its own set of challenges with confined and limited spaces. "Underground tunnels restrict the movement and navigation of drones compared to above-ground environments," said Mr James.

"Navigating through confined spaces and manoeuvring around obstacles becomes more complex."

Regarding safety considerations, Mr James indicated that it is crucial to establish exclusion zones for autonomous drone operations in underground mining.

"These zones minimise interactions with hu-

An Emesent drone in action during a cave training challenge in 2020 (Image: CSIRO)



This is a snapshot of an underground digital twins, including roadway development, developed in the Queensland Centre for Advanced Technology (QCAT) Remote Management Centre (RMC) for human-machine interface research, systems design, and stakeholder outreach. (Image: CSIRO)

ADAM Technology's 3DM Analyst Revolutionises Aerial Imaging for Industries

ADAM Technology's 3DM Analyst Mine Mapping Suite has revolutionised the way industries capture aerial images and create 3D models and maps of large areas.

With the ability to quickly and accurately process large numbers of images, ADAM Technology's software provides a cost-effective and flexible alternative to traditional methods of generating 3D data.

These advancements in technology have not only improved efficiency but have also enabled industries to capture more detailed and accurate data, leading to better decision-making and improved safety measures.

Quick and cost-effective aerial imaging
With a strong foundation in traditional photogrammetry, ADAM Technology's software generates accurate data with fewer images and less flying than alternative products.

This means that in addition to being faster

than competing products on the same imagery, it can also reliably generate data on imagery with traditional 60% forward overlaps and 35% side overlaps, requiring a fraction of the flying and images to be processed.

And, thanks to the photogrammetric underpinnings, it is able to do so without sacrificing accuracy nor the ability to reliably state the accuracy of the results.

Of course, the same software can also be used with oblique aerial images as well as images captured from the ground, including Image Fans, which are ideal for capturing pit walls.

Mapping and downstream processing
Creating the raw surface model is only half the story.

3DM Analyst includes typical surveying functionality like stockpile volume calculation, cartographic mapping with multiple capture styles, and high quality contour generation,

as well as structural mapping for geotechnical analysis.

These tools are so highly regarded that in response to customer demand, ADAM Technology has released two new editions of 3DM Analyst Edit Station to allow users of other products to augment them with a professional mapping solution, preserving their existing investment.

3rd party Photogrammetry and Lidar support
3DM Analyst Edit Station (Enhanced Edition) includes all the mapping functionality of 3DM Analyst with support for importing DTMs from a wide range of formats, including Wavefront OBJ.

It is ideal for users of 3rd-party photogrammetric solutions.

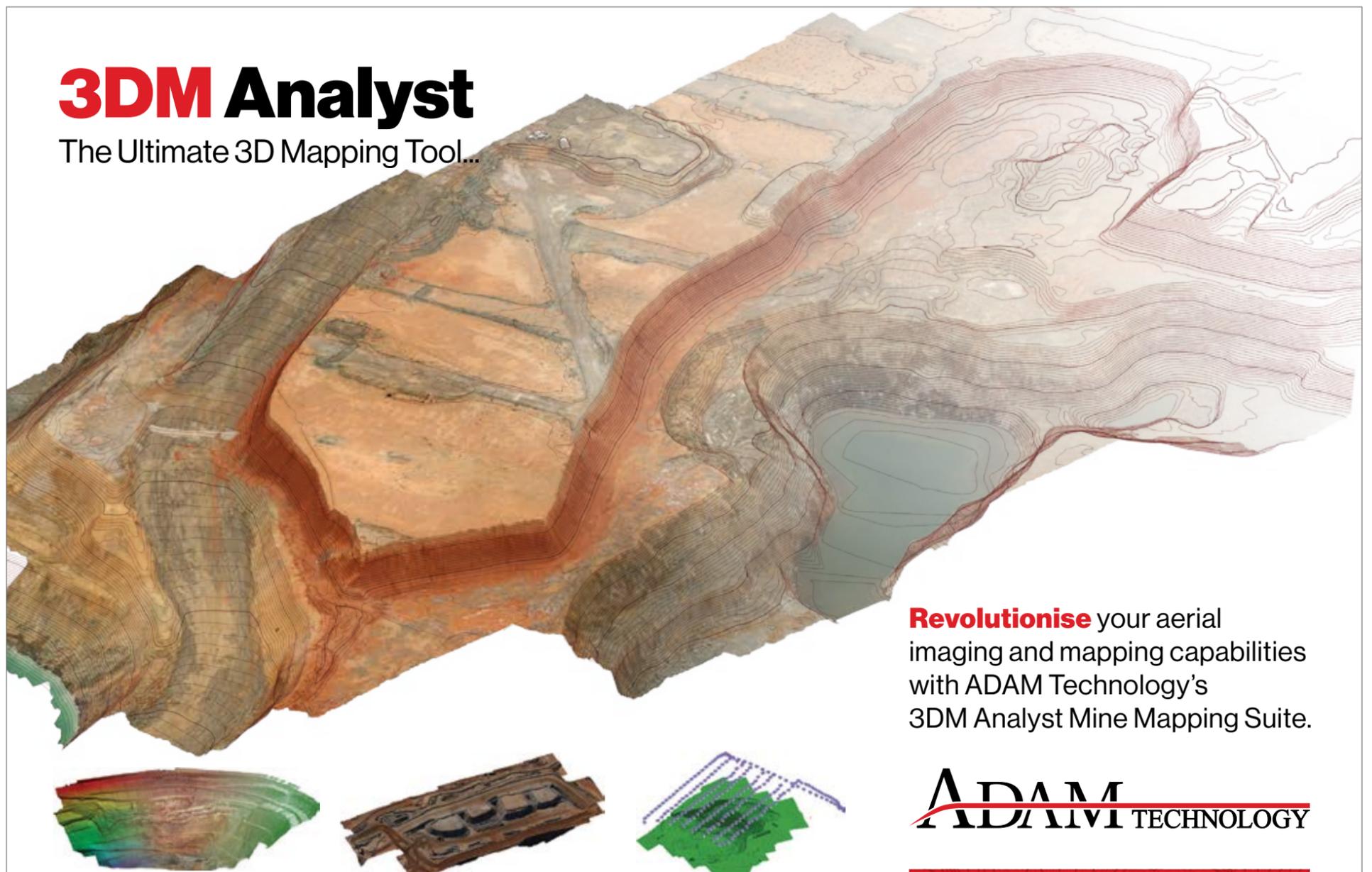
3DM Analyst Edit Station (Laser Edition) adds support for importing laser scanner point clouds in LAS and ASCII text formats

and generating high quality surface models from them. Colourised point clouds can even be turned into textured DTMs, ready for mapping.

ADAM Technology's software tools offer a powerful end-to-end solution for customers who want to process raw images from scratch as well as adding capabilities to those who are happy with their existing DTM or point cloud generating capability but wish to add more value to the data they generate. **AMR**



3DM Analyst The Ultimate 3D Mapping Tool...



Revolutionise your aerial imaging and mapping capabilities with ADAM Technology's 3DM Analyst Mine Mapping Suite.



› Resource Modelling › Surveying › Geotechnical Analysis + many more!

adamtech.com.au | +61 8 9479 5575



An Emesent drone during a training session. (Image: CSIRO)

CONTINUED FROM PAGE 40

mans and human-driven vehicles, reducing the risk of accidents," he said.

"However, providing dedicated spaces for autonomous equipment can require additional effort."

Mr James pointed out the need to manage explosion risk zones in underground mining.

"Certain mining environments require drones to operate safely in the presence of explosive gases," he said.

"This necessitates adherence to strict design constraints, which may involve costly redesign and compliance processes.

"Moreover, considering the higher concentration of dust in operational areas, drone sensors must be designed to handle these conditions effectively."

Mr James touched further on the challenges of using GPS and WiFi underground.

"Underground drones cannot rely on GPS for location information," he said.

"Instead, alternative technologies like high-end Inertial Navigation Systems (INS) or Synchronous Location and Mapping technology (SLAM) are used.

"The limited availability of WiFi due to tunnel walls requires robust communication infrastructure to maintain wireless connectivity for underground mobile equipment."

Improving safety outcomes with drone technology

Mr James discussed the safety benefits of survey and inspection drones.

"By conducting more frequent reviews of mining locations and infrastructure, survey and inspection drones help identify hazards before they become critical issues," he said.

"This proactive approach enhances safety outcomes and minimises potential risks." Mr James says drone technology can also be applied to semi-autonomous haulage.

By reducing the need for human operators to perform repetitive driving cycles, semi-autonomous haulage significantly reduces operator fatigue," he said.

"This, in turn, reduces the likelihood of accidents caused by human error and improves overall safety."

CSIRO's LASC technology: enabling zero-entry mining

"Our Ex-rated LiDAR and camera enclosures, along with Inertial Navigation Systems, enable semi-autonomous operation of mobile underground mining equipment from the surface," said Mr James, highlighting the contribution of CSIRO's LASC technology.

"This technology brings us closer to the goal of zero-entry mining, enhancing safety by

minimising human exposure to hazardous environments."

Mr James emphasised the importance of aligning drone technology with optimisation goals, stating that before implementing drones, mining companies should have a clear understanding of the key performance characteristics they aim to optimise.

"This ensures that drone usage is purposeful and targeted, leading to improved operational efficiency," he said.

Mr James highlighted the need for seamless data integration.

"Integrating drone data into existing operational technology (OT) and information technology (IT) systems is crucial for effective decision-making," he said.

"By aligning drone data with control systems, databases, and reporting mechanisms, mining companies can derive maximum value from their investments."

Addressing the integration challenges, Mr James emphasised cybersecurity and network considerations, as well as the careful integration of drone technology to minimise security risks.

"Bandwidth management becomes crucial due to the large amounts of data produced by drones," he said.

"Moreover, mobile network reliability must be ensured, especially when drones rely on wireless communication."

Mr James pointed out the need for specialised maintenance and operator training.

"The maintenance and servicing of drones may require different skills compared to traditional mining equipment," he said.

"However, with the increasing complexity of operational technology, mining sites are witnessing the availability of automation engineers and technicians.

"Additionally, training strategies need to adapt to the changing role of operators, shifting from hands-on mining to more of office-based control centres."

Drones in mining: evolving trends and implications

Mr James discussed the suitability of automation in the mining industry.

"Automation technologies, including drones, are well-suited for mining operations due to the 'four D's: Dirty, Dangerous, Dull, and Distant,'" he said.

"Mining processes often involve tasks that are physically demanding, hazardous, repetitive, or located in remote areas.

"Automation, including drone technology, can address these challenges and improve overall operational efficiency."

Mr James further highlighted the advancements in artificial intelligence (AI), machine learning (ML) and machine vision (MV) technologies.

"Mining industry is already benefiting from AI, ML, and MV technologies," he stated.

"These technologies support decision-making processes by analysing data from fixed sensors such as video streams.

"With increasing computing power, ML and MV capabilities are being integrated into mobile drone equipment, expanding the range of applications in mining operations."

Mr James emphasised the industry's alignment with the four D's of robotics, in that the mining industry inherently deals with tasks that are dirty, dangerous, dull and often distant.

"Drones, as part of the automation ecosystem, provide an opportunity to tackle these challenges efficiently," he said.

"By leveraging drones, mining companies can enhance safety, reduce human exposure to hazards and optimise operations in harsh environments."

Discussing future possibilities, Mr James envisions increased autonomy and swarm technology in mining.

"As autonomy technology continues to advance, drones used in mining operations can achieve higher levels of autonomy," he said.

"This, coupled with swarm technology where drones collaborate, presents opportunities to redefine the scale and scope of future mining equipment.

"Smaller drones working in coordination could reduce the size of infrastructure needed, leading to cost savings and environmental benefits.

"Drones operating autonomously or in swarms can improve operational efficiency by executing tasks with precision, reducing

human intervention, and optimising workflows.

"This opens up new possibilities for streamlining processes and achieving higher productivity."

Selecting and implementing drone technology

Mr James emphasises the importance of understanding key performance characteristics before selecting drone technology.

"Mining companies need to identify which aspects of their operations they aim to optimise," he said.

"This understanding is critical in selecting drone technology that aligns with their specific goals and operational requirements."

He advised mining companies to evaluate commercial-off-the-shelf (COTS) options while also considering collaboration opportunities.

"There are various COTS drone solutions available in the market," said Mr James.

"However, it is essential to assess whether support from research groups, subject-matter experts, or onsite personnel is necessary to develop an integrated solution from component parts.

"Collaboration with industry partners can provide innovative solutions and leverage collective knowledge."

Exciting emerging technologies and applications

Mr James discussed the expansion of information and control capabilities through drone technology.

He indicated that drones offer a pathway to increase the amount of information and control in mining operations.

"They enable operators to make more informed decisions by providing real-time data and insights," he said.

"By expanding information and control capabilities, mining companies can improve efficiency, safety, and resource utilisation."

The future of mining drones in lunar and Martian exploration

Discussing the future of mining drones, Mr James emphasises their potential role in lunar and Martian exploration.

"As humans return to the Moon through missions like Artemis and venture towards Mars, drones will be instrumental in prospecting and extracting resources," he said.

"These drones will utilise lunar resources for in-situ resource utilisation, establishing a foundation for future human activities on the Moon and Mars.

"Technologies developed for extra-terrestrial missions will likely have implications for the mining industry, pushing the boundaries of mining drone capabilities.

"The advancements made in mining drone technologies for space exploration can be applied back on Earth, driving innovation and pushing the boundaries of mining practices." **AMR**



This image displays the Remote Manage Centre (RMC) at the Queensland Centre for Advanced Technology (QCAT) It provides a unique blend of visualisation, mixed reality and human-interaction equipment and capabilities. The capabilities in the RMC are used to develop technologies for human-machine interfaces that focus on improving safety and productivity by enabling remote operation/supervision/collaboration and/or assistance. (Image: CSIRO)

DECARBONISATION IN MINING - PART 2

In the second part to a series across 2023, the *Australian Mining Review* looks at the very latest news, technologies and mining businesses leading the efforts to decarbonise Australia's mining sector, with a special report on government initiatives in last month's Federal Budget.

Last months 2023-24 Federal Budget has set aside \$4b dollars to invest in renewable energy initiatives in what the Federal Government hails as its quest to turn Australia into a renewable energy superpower.

A host of initiatives, ranging from establishing a hydrogen production program, to creating a centre to support Australian businesses looking to manufacture or adopt renewable technologies are all on the table, including investment in critical mineral partnerships and creating a national Net Zero Authority.

According to the Federal Government, the Federal Budget positions Australia to be a world-leading hydrogen producer by investing \$2b in Hydrogen Headstart, a new program to support hydrogen production.

It also boosts industry-driven innovation by establishing the Powering Australia Industry Growth Centre and it takes the first steps to unlock \$10b in new investment in firmed renewable generation and storage by funding the Capacity Investment Scheme's initial auctions.

These commitments bring the Federal Government's total investment to becoming a renewable energy superpower to more than \$40b.

The Federal Government also says the budget leverages existing funds to allocate \$12b to transformational transmission projects and over \$1.4b to power net zero growth opportunities in various regions.

A snapshot of some of the most significant decarbonisation announcements from the Federal Budget are detailed below, courtesy of the 2023 budget paper *Stronger foundations for a better future* released in May.

Boosting renewable energy generation

The acceleration of investment in renewable energy through the Capacity Investment Scheme will occur, which will unlock over \$10b of investment in the electricity grid.

This brings on new supply of clean, dispatch-

able capacity across the country, backing up intermittent renewables.

The budget provides \$46.5m to the Australian Energy Regulator to regulate energy markets and protect consumers through the transformation.

It also leverages \$12b of the Federal Government's \$20b investment in Rewiring the Nation to transformational transmission projects, including \$1b in Tasmania's Battery of the Nation projects, \$1.5towards Renewable Energy Zones and offshore wind in Victoria and \$4.7b to unlock critical transmission in NSW.

Electrification of the economy

Electrification is critical to achieving emissions reductions and lowering energy costs for households and businesses and according to the government, the budget will support small and medium businesses to make energy-saving upgrades through the Small Business Energy Incentive.

This incentive will help businesses save on their power bills through smarter energy use.

Australia's first National Electric Vehicle Strategy will also ensure consumers have a better choice of electric vehicles and encourage greater use of cleaner, cheaper-to-run vehicles.

As part of the strategy, the government is providing \$7.4m to support the introduction of a Fuel Efficiency Standard.

Building critical minerals industries

Australia's large critical mineral reserves offer opportunities to invest in advanced and renewable technologies needed for the net zero transition and critical minerals are essential inputs to clean energy technologies like electric vehicles and wind turbines.

The budget invests \$57.1m to develop Critical Minerals International Partnerships to secure strategic and commercial partnerships and it builds on the \$2b Critical Minerals Facility and \$1b targeted to value-adding in resources, under the National Reconstruction Fund.

Hydrogen and new energy industries

The \$2b Hydrogen Headstart is designed to accelerate large-scale renewable hydrogen projects and will bridge the commercial gap for early-stage projects, and position Australia to be a world leading hydrogen producer and exporter.

The budget provides for \$38.2m to establish a Guarantee of Origin scheme to underpin markets for green energy, including hydrogen and other low emissions products.

Powering Australia Industry Growth Centre

\$14.8m will be spent to establish the Powering Australia Industry Growth Centre, which will support Australian businesses looking to manufacture, commercialise and adopt renewable technologies.

This is in addition to the up to \$3b allocated to investment in low emissions technologies including green metals under the National Reconstruction Fund.

Skills for the clean energy economy

The Federal Government has commissioned Jobs and Skills Australia (JSA) to undertake a Clean Energy Capacity Study to evaluate workforce needs and enable Australia to strategically plan for the skills needed for the transformation to a clean energy economy.

JSA is engaging with key stakeholders to inform a final report by mid-2023.

Sustainable finance

To help make Australia a leading destination for global green investors, the Federal Government is implementing corporate climate disclosure requirements and developing a comprehensive Sustainable Finance Strategy.

Key new commitments include establishing an Australian Government green bond.

A stronger and more secure economy program, co-funding development of a sustainable finance taxonomy with industry, and resourcing ASIC to target greenwashing in financial markets.

Establishing a Net Zero Authority

The Authority will work across all levels of government and with workers, regional communities and First Nations people.

It will facilitate economic development and diversification and help smooth the changes as Australia moves to a clean energy economy.

The Authority will ensure workers are supported as they transition to new opportunities and enable First Nations Australians to meaningfully participate.

It will include a focus on the regions, industries and workers that traditionally powered Australia's economy and, as industries adapt, it will work to ensure new industries come online, and workers, communities and regions are supported.

Accelerating industrial decarbonisation

As part of the Powering the Regions Fund, the \$400m Industrial Transformation Stream will support the growth of new clean energy industries in regional areas, as well as innovative efforts to decarbonise existing industrial activities.

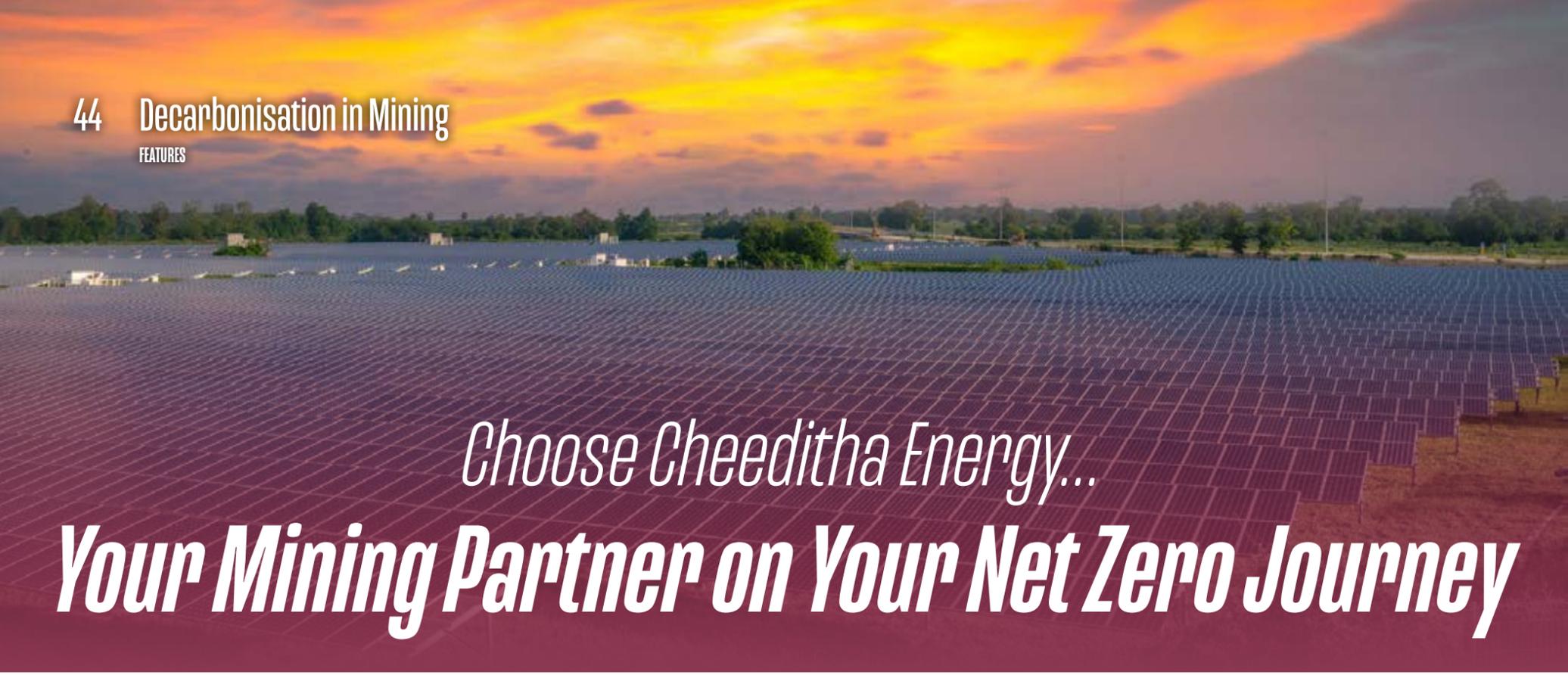
Securing critical inputs for the net zero transition

The \$400m Critical Inputs to Clean Energy Industries stream of the Powering the Regions Fund will provide grant funding to support the development of clean energy industries by investing in sovereign manufacturing capability of critical inputs, such as steel, cement, lime and aluminium.

Funding allows these industries to maintain production while they work to reduce their emissions, and ensures Australia has secure access to critical inputs for the transition.

Transforming Safeguard Mechanism facilities

The \$600m Safeguard Transformation Stream of the Powering the Regions Fund will support trade-exposed facilities covered by the Safeguard Mechanism to reduce their on-site emissions and boost their global competitiveness. **AMR**



Choose Cheeditha Energy...

Your Mining Partner on Your Net Zero Journey

If you are looking to kickstart the decarbonisation process at your mine site or resources business a company born and bred in Western Australia might just be your first port of call.

Cheeditha Energy – the largest renewable energy company in the Pilbara – is a multi-faceted net-zero consultancy and contractor to the mining sector, based in the heart of the region and boasts seven offices stretching across The Golden State.

Headed up by Perth native Brigette McDowell, who is now stationed at the company's head office in Karratha, the company champions a net-zero future for the mining sector, while also honing in on business profitability and efficiency.

The company rightly says that the Pilbara is presently a haven for environmentally responsible projects due to the endless supply of sunshine and wealth of natural gas reserves and the increasing implementation of greener energy methods by the mining sector have now coalesced to increase sustainable energy demands.

Seeking out the most practical solutions for businesses to reduce their carbon footprints

and increased efficiency isn't just about the securing a contract for the company but it is also a promise to the planet.

Cheeditha's vision over the next three decades is a future where every mining company is guided by net-zero practices – meeting or exceeding ESG and carbon abatement goals- but without impeding efficiency and profitability.

The company promises to work with mining operations to both decarbonise their footprints but also to grow revenue via a three-pronged approach: creating tailor-made solutions for each company it works with, taking into consideration each of its client's culture, operations and targets and ensuring everyone is on the same page in terms of comprehending what needs to be implemented and how and why.

Commencing operations in 2018, the company has partnered with the local Cheeditha Aboriginal community to supply better energy solutions and employment opportunities for the region and has also worked with renowned Yindjibarndi Aboriginal Corporation director Stanley Warrie to create long lasting revenue streams for his people through renewable sources.

Indeed, fifty per cent of the company is owned by the Cheeditha community and profit made is held on trust for the benefit of the community.

With global energy demands on the rise and untapped resources on our doorstep, Cheeditha invites companies and communities to partner with it to create the kind of change that benefits collective profits, people and the planet.

CEO of Cheeditha Brigette McDowell, who is passionate about renewable energy and regeneration as a whole, says the company is highly capable and has worked very hard to become ISO accredited.

"We have fully trained and extremely capable teams, that include electrical engineers, designers and skilled workers and we consult with mining companies in all facets of their businesses to see what areas they need assistance with, and how we can provide what they need with a focus on profitability" she says.

"We have a network already in place to service each mining basin in WA and we generally structure our pricing based on return on investment to companies.

So first of all, we will offer an initial assessment for what each client needs. With energy generation this can involve looking at a company's consumption records and consumption rates and then tailoring products that can help both reduce consumption and costs.



It's also about creating solutions that look at your whole operations, including increasing equipment efficiency, reducing non-renewable energy consumption and extending your equipment life".

Cheeditha Energy offers a range of services to the mining sector including: solar farms, off-grid solutions, specially engineered clean energy solutions, natural refrigerants, carbon management software, energy monitoring, electric vehicle charging stations and domestic and commercial PV installation and fleet management.

The company has installed an array of solar powered solutions on projects in areas from Port Hedland, Karratha and Tom Price, with companies enjoying tens of thousands of dollars in savings annually.

Cheeditha is continuing to respond to demand in the Pilbara for the design and installation of major solar projects, energy saving projects and environmentally friendly hydrocarbon refrigerant exchanges.

To learn more about how Cheeditha Energy, and its network of business partners across WA can assist your mining operation go to:

cheedithaenergy.com.au

AMR



CEO SNAPSHOT Brigette McDowell

Combining both business acumen with a passionate vision for environmentally sustainable and progressive business practices, Cheeditha Energy CEO Brigette McDowell completed a Bachelor of Commerce at Curtin University and entered the construction industry in Perth.

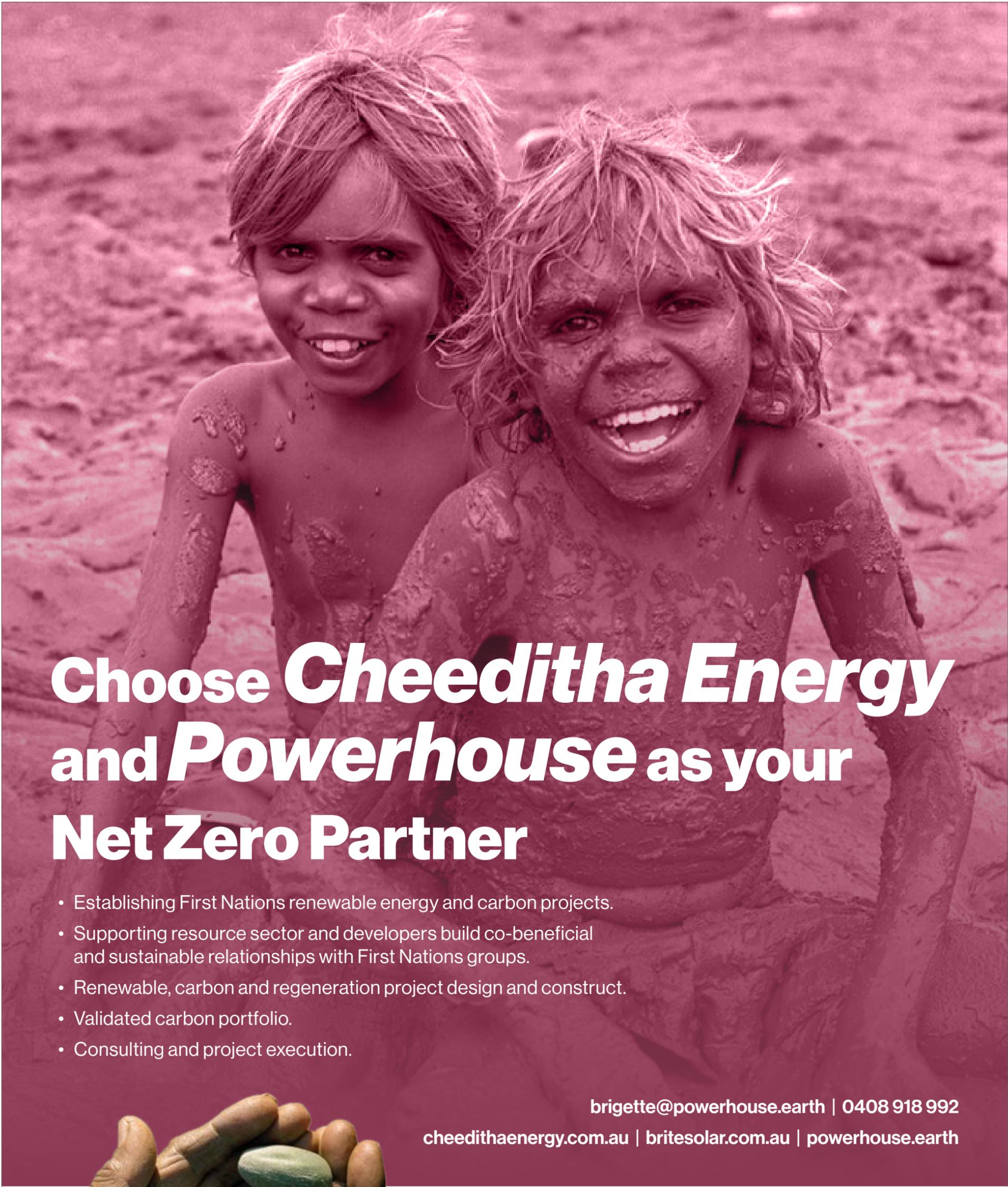
Over the next decade, she continued to study a Master of Project Management and Graduate Certificate in Energy and Carbon Studies.

In 2017 she relocated to the Pilbara, making Karratha home. Her strong connection with the Yindjibarndi people and her passion for the environment and sustainable futures, led her to co-found Cheeditha Energy in

partnership with Cheeditha Aboriginal Community in 2018.

As Brigette continues to grow her renewable energy company, her achievements are being recognised on a national platform, winning the 2022 Women-Led CORE Innovation Award, and recently being named a finalist in the Australian Women's Weekly Women of the Future Awards.

In March the innovative thinker was feted as a woman of influence by the Australian Financial Review for her start up business success and her growing profile sees her regularly invited as a guest speaker to a wide range of events across the country.



Choose **Cheeditha Energy** and **Powerhouse** as your **Net Zero Partner**

- Establishing First Nations renewable energy and carbon projects.
- Supporting resource sector and developers build co-beneficial and sustainable relationships with First Nations groups.
- Renewable, carbon and regeneration project design and construct.
- Validated carbon portfolio.
- Consulting and project execution.

brigette@powerhouse.earth | 0408 918 992

cheedithaenergy.com.au | britesolar.com.au | powerhouse.earth





BASF

We create chemistry

TO TACKLE CLIMATE CHANGE, THE IMPERATIVE TO DO MORE WITH LESS HAS NEVER BEEN MORE IMPORTANT, ESPECIALLY WHEN IT COMES TO WORKING WITH NATURAL RESOURCES. FROM KEY MATERIALS FOR LITHIUM-ION BATTERIES TO PROCESS CHEMICAL SOLUTIONS TO DIGITAL PLATFORMS, IN THIS ARTICLE, BASF SHARE SOME OF THE WAYS THEY ARE DELIVERING THEIR CORPORATE PURPOSE OF CREATING CHEMISTRY FOR A SUSTAINABLE FUTURE.

Climate change is the greatest challenge of the 21st century. Swift and resolute action is needed to ensure that the targets agreed in the Paris Climate Agreement can be achieved. At BASF we stand by this responsibility. In many areas, chemistry driven products and innovations are the key enablers to a climate-neutral future – from insulation foams for energy-efficient buildings to lightweight construction components and battery materials for e-mobility through to sustainable agriculture.

At BASF, chemistry is our passion. We strive to be the most attractive partner for challenges that can be solved with chemistry. Customer centricity is at the core of our products and technologies, which are backed by the power of BASF's Verbund integration and global innovation footprint. BASF's Verbund system creates efficient chains by intelligently connecting our production plants and technologies to efficiently use resources and leverage our expertise. This is our goal, and it is embedded in our corporate purpose: **We create chemistry for a sustainable future.**

Additionally, our net zero ambitions require sourcing from suppliers with low emissions who may also be sourcing chemistry from BASF, thus making them partially dependent on our own Scope 1 and 2 emissions. The imperative to do more with less will accelerate as our population grows and becomes increasingly industrialised. Therefore, BASF's priority is to enable customers to use reagents and other chemistry as efficiently as possible to maximise operational sustainability. This

is achieved through the supply of high-quality BASF products; continuous R&D into new chemical solutions; the use of digital enablers such as the **BASF Intelligent Mine powered by IntelliSense.io**; supply of **Sodium Sulfur NAS®** stationary energy battery technology; and through BASF's offering of cathode active materials based on recycled metals as a closed-loop solution.

Mining Process Chemical Solutions:

BASF offer products that deliver improved efficiency along with increased throughput and recovery, resulting in reduced Scope 1 emissions and improved operational costs. The efficiency of BASF's Verbund production sites and commitment to CO₂ emissions reduction via the use of renewable energy and feedstocks also delivers a reduction in Scope 2 emissions for our customers. Most importantly though, product solutions that offer grade/recovery optimisation can deliver reductions in Scope 3 emissions which typically represent the largest contributor in the minerals value chain.

BASF is focusing on the development of new collectors for flotation of spodumene and other lithium minerals. The processing of spodumene is still relatively new, with only a limited number of mines operating, and flotation and reagent research still in its infancy. Fatty acid collectors are the industry's current default product, and while they can be used as a collector across many mineral segments such as phosphate, their substitution with higher performing specialty reagents is also common and increasing. Inherent issues with fatty acids are their poor solubility, requiring long conditioning times with high energy mixing, immobile and

poorly draining froth characteristics particularly in the presence of fines which leads to issues with grades.

BASF offers specialty collectors that can offer improved performance in these key areas, along with optimised adsorption for specific ore bodies. Potential advantages of specialty reagents are; lower dose rates, improved grade/recovery profiles, reduced conditioning times, alteration of flowsheets to optimise throughput and economics and improved tolerance to fines. All these factors result in the ability to improve performance across many aspects of flotation, offering direct performance benefits in existing flowsheets and opportunities for flowsheets to be adjusted to capitalise on improved performance characteristics.

Digital Solutions:



In 2017 the BASF Mining Team recognised the need for our business to embrace the full potential of industry 4.0. BASF wished to digitalise our mining expertise so that we could provide our excellent post sales service to our customers 24 hours, 7 days a week. As a result, BASF sought the right partner and found it in IntelliSense.io. IntelliSense.io, like BASF, is comprised of mining experts who understand mining and mineral processing, with proven experience solving real industry problems based on extensive experience dealing with those problems.

BASF partnered with IntelliSense.io to create the **BASF Intelligent Mine Powered by IntelliSense.io**, combining our chemical and process expertise with their process, software, data analytics and AI expertise. Our joint process optimisation applications span the ROM stockpile, crusher, grinding, flotation, heap leach, solvent extraction and thickener circuits. They predict, simulate and optimise in real time and are connected via our Material Flow and Reconciliation models. These models reduce the siloing between processes and can track the material properties through operations.

Our platform, **brains.app**, and process optimisation applications, harness the unique

power of Scientific AI. Scientific AI is the fusion of physics models with machine learning techniques. Physics models are mathematical ways to describe the world around us. A well-made physics model enables us to understand processes and hence predict future events. On the other hand, certain events or processes with high variability, hidden states and endless properties of change, can be very difficult to model solely with physics. If you have limited knowledge about the behaviour of a process, then you cannot formulate a physics model to describe it in full and make accurate predictions. However, if you have a lot of data and a lot of example outcomes, machine learning models can find and learn missing behaviour to provide key inputs for the physics models. Additionally, physics model outputs can also be used to provide essential input data to machine learning models. This input/output approach is the power of Scientific AI and the reason it is so effective for variable ore deposits and complex metal extraction processes.

The result of this unique partnering of BASF and IntelliSense.io is a product that delivers:

- Chemical interaction embedded into applications, agnostic to both the chemical and equipment supplier
- A blend of process domain knowledge with data driven decision making
- Best practices integrated into software resulting in an upskilled workforce
- Optimised chemical usage and most importantly a more stable operation

Stationary Energy Storage Solutions:

BASF offer stationary energy storage solutions to the mining industry through the distribution of sodium-sulfur batteries (NAS® batteries). The NAS® battery is a containerised system with a base unit of 250 kW/1.45 MWh, which is scalable to any size depending on the project requirements. NAS® batteries are capable of functioning in extreme heat conditions without the need for air conditioning, have minimal maintenance requirements and an operational lifetime of 20 years, making them ideal for remote locations. With an optimal discharge duration of six hours or longer, NAS batteries are suitable for the integration of renewable energy sources into the grid or autonomous power supply with renewable sources. NAS®

batteries are a mature and proven technology with 5.0 GWh installed in over 250 locations globally. In February this year BASF installed the first NAS® battery in Australia as a demonstration project at IGO Nova's site in the Fraser Range. This demonstration battery energy storage system (BESS) has been integrated with the existing 36 MW hybrid diesel-PV local network, including the recent installation of a 10 MW solar array. The use of long duration BESS supports the rollout of renewables and the potential to fully decarbonise 24/7 industrial operations.

Battery Materials and Recycling:

BASF is a leading global supplier of advanced cathode active materials (CAM) for the lithium-ion batteries market with operations in all key regions, providing high performance CAM to the world's largest cell producers and for leading platforms of OEMs. In addition, we offer base metals sourcing and management as well as closed loop battery recycling solutions.

With increasing amounts of production scrap and used batteries, recycling will grow in importance. We offer CAM based on recycled metals as a closed-loop solution and based on responsibly sourced primary metals from mining operations to support our customers and end-users to reach their own net-zero targets. As the most economical and energy-efficient path with the lowest CO₂ footprint, closed-loop solutions will increase in importance during the next de-

cade and will continuously grow to reduce the need for primary metals.

Already today, we offer recycling services for end-of-life lithium-ion batteries as well as production waste through our strategic partner networks. We have already begun investment in innovation and assets which will allow us to further grow our recycling efforts as the market develops. We are constructing a large-scale battery recycling plant for the production of black mass in Schwarzeide, Germany with planned operations in 2024. It will mechanically treat end-of-life lithium-ion batteries and scrap from battery production to produce "black mass". Black mass contains valuable metals, such as lithium, nickel, cobalt and manganese, which can be chemically extracted in a next step. A prototype plant for such a refining process is expected to be commissioned in Schwarzeide end of 2023. The prototype plant will develop, test and refine the technology that will be used in a commercial hydrometallurgical refinery for battery recycling that BASF plans to build in Europe around the middle of this decade. With these recycling plants, BASF aims to further increase sustainability in the battery value chain – from collecting end-of-life batteries and recovering mineral raw materials to using these in the production of new battery materials.

Throughout the mining value chain BASF provides our customers with global expertise in chemistry, engineering, technology,



VALUE CHAIN SUSTAINABILITY

- EFFICIENCY VIA CHEMISTRY** ➔ use less, innovative chemistry to drive performance
- EFFICIENCY VIA DIGITALISATION** ➔ use less, great control of chemical reagents
- ENABLE RENEWABLES** ➔ 24/7 renewables, large scale chemical storage of electricity
- FLOW SHEET OPTIMISATION** ➔ use less, minimal steps to achieve the supply chain

and AI to support them in creating sustainable materials.

At BASF, we are committed to supporting our customers in achieving their sustainability targets and in building partnerships that will allow us to reach our net-zero target by 2050.

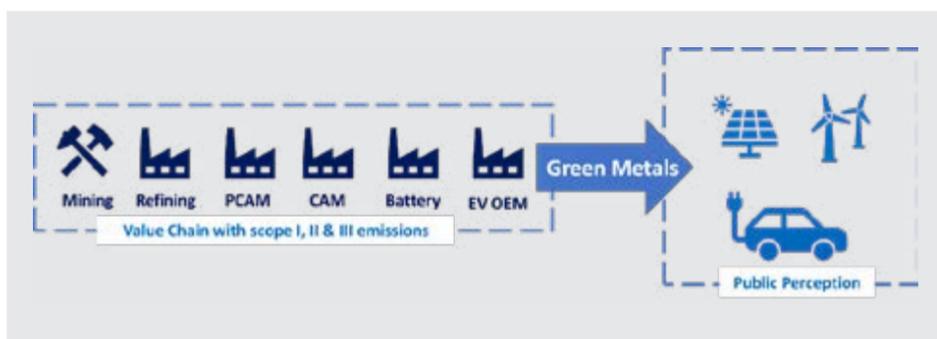
Together, we contribute to the accelerating deployment of electrification and digitalisation around the world. **AMR**

We look forward to finding innovative solutions with you.

For more information, click here:



<https://www.basf.com/au/en/legal/contact/contact-mining-solutions.html>



THE EAGLE HAS LANDED

SOARING GOLD P-AU-TENTIAL AT FOSTERVILLE

By Kate Dzienis



Preparing an underground stope for charging at Fosterville Gold Mine.

Ion Hann, Vice President of Australian Operations Agnico Eagle with the 4 millionth ounce gold bar.



Looking over the Ellesmere Pit and Underground Portal at Fosterville Gold Mine



The 4 millionth ounce gold bar.



2023 vacation students underground at Fosterville Gold Mine.

Victoria's largest gold producer Fosterville Gold Mine, operated by Agnico Eagle Mines Ltd, earlier this year reached a major milestone since the commissioning of its operation in 2005.

On 23 March 2023, the mine's four millionth ounce was poured, coming more than two years since its three millionth ounce pour in December 2020 – an extraordinary achievement for a mine that employs or contracts more than 800 people.

Agnico Eagle vice president Australian operations Ion Hann says the success of Fosterville's milestone in March would not have been possible without the combined efforts and skills of everyone involved.

"It's not only a tremendous achievement for Central Victoria and the Bendigo region, it's a testament to the hard work, perseverance and resilience of hundreds of employees, their families and business partners who have given a significant part of their lives to creating this milestone," he said.

"The operations were started on an official Mine Reserve of 1moz so to see the operation passing 4moz and still thriving is a great reward for everyone involved.

"Over the past 18 years, the mine has brought significant economic benefits for the community, with more than 800 people currently employed or contracted at the mine and more than \$295m being injected into the local economy annually."

Operations at Fosterville have seen significant success in recent times with the discovery of the ultra-high grade Swan Zone, but it wasn't always this way.

Mr Hann reveals that for many years, Fosterville was a relatively low-grade operation that changed owners multiple times with the real success being able to stay viable during lower gold price environments.

"At present, the operations are continuing to progress in line with our targets and this is being achieved through embracing technology and utilising the sheer innovation of our employees," he explained.

"For many years, we have shown that the best investment we can make is through

the exploration drill bit, and we continue to search for the next ultra-high grade zone(s) that we believe exist."

As part of continual preparations in securing Fosterville's future, the mine is undertaking an Environmental Effects Statement (EES) to assess potential environmental, social and economic impacts and benefits.

An EES is a document which examines the possible impacts a proposed development may have on the environment and aims to provide for the transparent, integrated and timely assessment of the environmental effects of projects capable of having a significant impact of the environment.

Mr Hann says being a living and thriving part of the Central Victorian community is vitally important for Fosterville, so an EES is important in ensuring people understand what will be happening over the next decade.

"Literally hundreds of our employees and their families have made the Bendigo region their home and make enormous contributions to the fabric of the communities they live in," he said.

"The Sustained Operations Project EES is a process that enables us to take stock of our current operations and re-assess the potential impacts our operations have on the local community and environment now and into the future.

"Although Fosterville has a very small physical footprint, we are always mindful of our place in the community and we are constantly working to ensure the enormous benefits to the community being generated by our ongoing operations far outweigh any potential impacts.

"The Sustained Operations Project EES will provide an opportunity for everyone in the community to understand what additional infrastructure will be required over the next 10 years for Fosterville operations to continue and provide an assessment of how the site will eliminate and/or minimise any perceived impacts to the local community.

"This work is being undertaken by both on-site staff, numerous Victorian-based business partners and in collaboration with all the main Victorian regulators." **AMR**



The Can-Do Contractor for Complex Mining Projects

Mancala is proud to have been able to support the Fosterville Mine for over 10 years providing services incorporating specialised mining equipment and personnel for shaft support and lining, shaft collar stabilisation and raise boring services. Our services have been provided by Mancala's maintenance, fabrication and logistics base in Bendigo: on site support and supply is minutes away.

The Mancala Group of companies is an award winning mining and civil service supplier who has operated successfully for over 32 years. Services are delivered both national and internationally based on our core values of Safety, Quality, Integrity, Innovation and People.

Services offered by Mancala are broad ranging leveraging off our fourth core value of Innovation. Mancala is widely recognised as the "can-do" contractor that can provide the complete project solution, from start-up to completion. Whether it be development and production contracts from statutory approval to rehabilitation to domestic metropolitan civil tunnel projects, innovation and cost

competitiveness are our hallmarks.

Commencing operations as a mine owner operator on the West Coast of Tasmania, Mancala and has since gone on to own and/or operate seven open cut and underground high grade mining projects. Within Mancala's vertical development division many km's of shafts have excavated by raise boring, sinking and strip and line methods.

With a Melbourne based head office, Bendigo workshop and subsidiary office and workshop in Tasmania Mancala delivers a diverse range of services including:

- Mine development and production projects, specialising in high grade/narrow vein operations
- Equipment hire (specialising in narrow vein capabilities).
- Raise boring and shaft lining (steel or remote fibrecrete) up to 4.5m diameter along with associated collar stabilisation and civil structures (fan foundation, knife gates etc.)

- Heavy steel componentry design and fabrication including machining capabilities to micron tolerances.
- Electrical and mechanical equipment repair and rebuild from pumps to boggers, incorporating manufacture and supply of cost competitive hydraulic hoses.
- Rehabilitation and development of civil underground infrastructure (eg. Hydro tunnels) and chambers without

impinging on the availability of the clients' normal operations.

- Slope stabilisation using drape mesh, catch fences etc.
- Specialised mining services, where modern and safe 'hand held' methods are employed in difficult environments (e.g. shaft rehabilitation, services install and/or repair).

AMR



Mancala
Innovative Mining & Civil Solutions

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THE 'CAN DO' CONTRACTOR



- WE SPECIALISE IN**
- Vertical Development** | raise boring, shaft lining and surface civil infrastructure.
 - Underground Infrastructure rehabilitation** | civil tunnels, chambers and shafts.
 - Mine Contracting** | Mine development and production with innovative, low risk commercial models, specialising in narrow high grade, narrow projects.
 - Equipment hire and Sales** | Equipment hire and refurbishment incorporating highly cost effective hydraulic hose manufacture and supply.
 - Fabrication Services** | design and fabrication of heavy industrial componentry and machining capabilities (lathes, vertical mills etc.).
 - Specialised Labor Hire** | modern and safe hand held expertise for those 'difficult jobs'.

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 pickups 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.



ARE YOU STILL WELDING?

Mining and other heavy industries heavily rely on skilled labour and specialized equipment to ensure smooth operations. But as demand for safety, efficiency and cost-effectiveness continues to grow, traditional fabrication and joining methods like welding are becoming more costly, time-consuming, and potentially hazardous. Moreover, the scarcity of skilled welders is putting added pressure on these industries.

It's time to consider alternatives that can deliver the same level of structural integrity, while being faster, easier to install, and more cost-effective. One such alternative is Huck, a reliable fastener solution for heavy industry

applications. Huck provides performance, safety, and efficiency without the need for traditional welding. It offers a viable option for heavy industries seeking improved productivity and cost-effectiveness.

Huck is synonymous with unwavering reliability and robust joints in all heavy equipment, even in the most extreme conditions. With consistent, exceptionally high shear and tensile strength, Huck fasteners hold their clamp steadfastly, even in the face of constant vibration.

Using the direct-tension/swaged-on method, carbon steel collars are pressed into graded steel threads, resulting in a lasting clamp force that endures. In any challenging environment and across diverse applications, Huck fasteners consistently prove their mettle, making them the preferred choice for industries that demand excellence.

Safety - Welding can be dangerous. Whether it's fire from a random spark, unintended injuries, spent rods littering the assembly floor, welding can interfere with worksite safety, organization, and cleanliness.

Simplicity - Huck is easy to install and requires minimal training. The Huck system requires a single trigger press to deliver high consistent preload. No operator discretion, adjustment or level of ability will change the quality of the installed values of the fastener.

Speed and structural integrity - Huck is famous for a high-level of vibration-resistance, creating joints that will perform in extreme conditions for years to come without the issues of weld fatigue. The speed of installa-

tion will deliver cost savings beyond money saved on labour.

Cost savings - Labour, fast installation, visual inspection, no electricity costs, and no surface preparation.

SO, ARE YOU STILL WELDING?

Contact us! Let's get our engineers together and see what efficiencies and savings can be gained.



IN SUMMARY

- Does not require highly trained and experienced workers
- Quick and easy to install
- Allows greater flexibility
- Often more cost-effective in terms of lifetime maintenance
- Consistent clamp and a permanent high strength joint
- Quick visual inspections
- Disassembly process that is simple, fast, and efficient
- No surface preparation, unlike welding
- Able to join different material
- They ensure the joint integrity over time



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POWER CRANK

THE LEADERS IN RELIABLE, DURABLE BATTERIES



As a privately owned Australian company operating since 1992, Power Crank offers the highest level of commitment when it comes to providing high quality batteries to suit all applications.

With an extensive range of batteries to accommodate everything from 4WD and all terrain automotives, trucks and tractors to forklifts, commercial and heavy industry machines such as generators and lighting towers, Power Crank is Australia's leading battery supplier that also offers customised maintenance programs.

The experts at Power Crank are all factory-trained and highly equipped to handle any questions and any problems, readily offering the best advice and the best in friendly service.

Power Crank provide a wide range of batteries including:

- Power AGM Batteries
- Power Lithium Batteries
- Starting Batteries
- Truck & Heavy Machine Batteries
- Dual Purpose Batteries
- Stop-Start Batteries
- Extreme Series Batteries
- Power Industrial Batteries
- Deep Cycle Starting Batteries

Power AGM Batteries

Power AGM Batteries provide improved cycling performance and faster charging over regular lead-acid and lithium batteries. They are resistant to freezing and are often used in applications where high reliability and low maintenance are critical, such as in uninterrupted power supply systems, telecommunications equipment and emergency light-

ing systems.

The AGM (Absorbent Glass Mat) technology used in these batteries helps prevent the acid from spilling or leaking, making the battery maintenance free as there is no need to add water or check acid levels – this technology involves suspending the electrolyte (battery acid) in a glass mat separator, making this possible.

Additionally, AGM Batteries have a low self-discharge rate, which means they can be stored for longer periods of time without needing to be charged. They are well-known for their high-cycle life, meaning they can be charged and discharged repeatedly without significantly reducing their overall capacity. Overall, Power AGM Batteries are a reliable and durable option for a wide range of applications that require backup power or reliable energy storage.

Power Lithium Batteries

A Power Lithium Battery is a type of rechargeable battery that uses lithium-ion technology to store and release electrical energy. Widely used in portable electronic devices like smartphones and laptops, they are also utilised in electric vehicles and grid-scale energy storage operations.

Compared to other types of rechargeable batteries, Power Lithium Batteries have several advantages – they have a high energy density, so they can store a greater amount of energy in a relatively small space, and they are lightweight. Like Power AGM Batteries, they too have a long cycle life, so they can be charged and discharged many times before their capacity begins to degrade.

Power Lithium Batteries are a popular and versatile option for a wide range of applications that require portable or stationary power. They are known for their high energy density, long cycle life and fast charging capabilities.

Deep Cycle Batteries

Deep Cycle Batteries are designed to provide sustained power over an extended period of time, typically several hours or more. Unlike a starter battery, which is designed to provide a burst of power to start an engine, a Deep Cycle Battery is designed to deliver a steady amount of power over a longer period of time.

Deep Cycle Batteries are commonly used in applications where a reliable source of power is needed, such as in off-grid energy systems; but they're also used in renewable energy systems like solar or wind power, where energy is stored during periods of high production and discharged when needed.

This type of battery is designed to withstand repeated charge and discharge cycles without significantly degrading their capacity, and there are several types made for the market, including Flooded Lead Acid, Sealed Lead Acid and Lithium-Ion.

Truck & Heavy Machine Batteries

If it's batteries for trucks and heavy machines you're after, Power Crank Batteries has the right product for your needs. The experts at Power Crank will ensure you have the highest quality product with reliable starting, longevity, safety and cost-effectiveness.

With Australian mine sites located in remote and challenging environments, the harsh conditions can put a lot of strain on equipment – including batteries. Having a reliable and durable battery is crucial for keeping the mine site operational.

In addition to reliability and durability, the right battery for mining operations must also meet specific power and energy requirements; different batteries have different power and energy characteristics, so selecting the right one can ensure the mine site has the necessary power to operate equipment and the energy storage to keep it running during periods of low or no power.

4WD Commercial Sector

Batteries in the 4WD sector are subjected to heavy loads and extreme temperatures which can reduce their lifespan and performance, but Power Crank can help you select the right battery to ensure reliability and efficient operation. Deep cycle and dual battery systems are two options that can provide the necessary power for 4WD commercial vehicles.

Power Crank Batteries are built for the most extreme conditions, designed for the Australasian market, and currently service nine OEM after-market automotive manufacturers including Hyundai, Ford, Maserati and LDV Ram.

The company prides itself on service and with quality, providing clients with the most competitive pricing on the market.

More Information
www.powercrank.com.au

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PEOPLE
TRUST**



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TECHNOLOGY **CARBON SERIES**

POWER CRANK

BATTERIES



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MARINE SERIES DEEP CYCLE**

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UNLEASH THE ENERGY WITHIN



The bright pink trucks of Bunhu Mining are testament to its dedication to raising awareness for breast cancer research and encouraging more women to enter the truck driving industry.

DRIVING SUCCESS

When Terry Danda arrived in Western Australia from Zimbabwe in 2015 he carried with him a determination to continue his family's legacy in the transport industry.

Eight years later, this journey has led him to create a successful company that sets the standard for quality services, innovation, and social responsibility.

At the heart of Bunhu Mining's operations is its specialisation in iron ore digging, crushing and haulage, a critical service in the mining industry.

Through years of hard work and a commitment to excellence, Bunhu Mining has established itself as a trusted and respected player in the field.

The company's dedication to delivering high-quality services has set a new standard for the industry, while its reputation for reliability and professionalism has earned the trust of its clients.

As Bunhu Mining continues to expand and make a significant impact, its success story stands as an inspiration to aspiring entrepreneurs in the transport and mining sectors.

Terry's journey from humble beginnings to the creation of a successful company showcases the power of perseverance and a vision for excellence.

Bunhu Mining is poised to shape the future of WA's mining industry and cement its position as a leading force in the field of iron ore haulage.

Terry's journey to success began humbly as

a brickie's labourer despite being a qualified boilermaker and started his own fencing and roofing labouring business.

His heart was set on returning to the transport industry and, in 2017, he progressed into earthworks and demolition as a sole trader.

In 2020, while working on a large civil job in the Pilbara, WA, he was offered the opportunity to sub-contract for Campbell Transport, transporting iron ore, and Bunhu Mining Marine & Civil Construction Pty Ltd was born.

Today, Bunhu Mining operates a fleet of 14 PBS based prime movers, 6 medium duty prime movers, over 85 trailers and employs 23 drivers.

The company's commitment to diversity and inclusion is evident in its dedication to raising awareness for breast cancer research and encouraging more women to enter the truck driving industry.

Terry even dedicated one of his trucks to these causes, honouring his mother, who has been his biggest motivator.

Diversification into Renewable Energy and its Industry Impact

In line with its forward-thinking approach, Bunhu Mining has set its sights on diversifying into renewable energy.

Recognising the global shift toward sustainable practices, the company aims to play a significant role in the transition to a greener future.

By expanding into renewable energy sectors, Bunhu Mining seeks to reduce its reliance on fossil fuels and contribute to the development of cleaner energy solutions.

Terry shared that Bunhu Mining's carbon reduction plans centre around their fleet.

"At the moment we're using high fuel efficiency trucks and gear," he said.

"We are working towards reduced emissions and we also are

planning to have all our gear hydro by 2030.

"We try by all means to reduce our carbon footprint by using bigger machinery.

"That's why we use road trains to transport our ore- instead of using 145 tonne rated trucks we use 220 tonne rated trucks, moving more volume using the same amount of fuel and down time."

Bunhu Mining recognises that diversifying into renewable energy is not only beneficial for their operations but also for the industry as a whole.

By embracing cleaner energy solutions, the company actively contributes to the reduction of greenhouse gas emissions and the promotion of sustainable practices.

"We are focusing on fuel-efficient trucks and gear, as well as working on having a fully hydro-powered fleet by 2030," said Terry.

Through their efforts to reduce carbon emissions and invest in greener technologies, Bunhu Mining aims to set a positive example for the mining industry.

By prioritising sustainability and actively working towards a greener future, they hope to inspire other companies to follow suit and drive meaningful change within the sector.

Bunhu Mining's diversification into renewable energy is poised to make a significant impact on the industry. By reducing their reliance on fossil fuels and adopting cleaner energy alternatives, they contribute to a more environmentally conscious mining sector and pave the way for a greener future.

Integration of Innovative Technologies and Advancements in Operations

Bunhu Mining stays at the forefront of industry advancements by embracing new technologies throughout its operations.

Terry explains the company's digital administration processes. "Speaking of our trucks themselves, the majority of our administration is done digitally," he said.

"We have embraced technology to streamline our administrative tasks and improve efficiency.

"We are currently working on a project to

create a technology that will revolutionise wheel Bearing temperature checks on our trucks.

"Traditionally, drivers manually check around 100 hubs on the truck.

"However, we are developing a technology in Korea that will be placed in each hub, allowing the driver to constantly monitor temperatures in cab using a tablet, and this information will be monitored centrally in the cloud."

Terry also highlights the company's commitment to fatigue management and safety.

"We use the Teletrac Navman fatigue management system, which plays a crucial role in ensuring the well-being of our operators," he said.

"By logging into a tablet, operators can track their fatigue levels on each shift and on a weekly basis.

"The system alerts them when it's time to take a break and monitors their hours of operation, and also provides insights into the efficiency and functionality of our trucks."

From digital administration processes to fatigue management systems and real-time monitoring through advanced camera systems, Bunhu Mining leverages technological innovations to streamline operations and ensure optimal productivity.

These advancements not only enhance operational efficiency but also contribute to the safety and well-being of its workforce. Bunhu Mining sets a new standard for excellence in the mining, civil, marine, and construction industries.

Customised Solutions

Bunhu Mining prides itself on providing customised solutions to meet the specific needs of its mining clients.

"We offer a comprehensive service, starting from digging in the pit, through to crushing, then placing on stockpile, and finally loading onto our trucks," said Terry.

"This integrated approach streamlines the entire process and eliminates the hassle for our clients."

Bunhu Mining has worked with reputable names across the industry.





BUNHU MINING'S

JOURNEY TO EXCELLENCE IN WESTERN AUSTRALIA'S MINING INDUSTRY



Bunhu Mining operates a fleet of 14 PBS based prime movers, 6 medium duty prime movers, over 85 trailers and employs 23 drivers.



This double side tipper was Terry's first truck in Australia.

"We have had the opportunity to work with Campbell Transport on a mineral resources job," Terry added.

"We have also worked on prominent projects such as the Wiluna project for Pilbara Resource Group.

"These collaborations have allowed us to showcase our expertise and build strong partnerships in the mining sector."

Speaking about the company's track record, Terry explains that "the majority of our work has been based on delivering exceptional services to our clients.

"We are proud of the relationships we have built, and the trust that our clients have in us is a testament to our commitment to quality and reliability," he said.

Expansion Plans and Challenges Faced

Bunhu Mining has ambitious plans for expansion in the mining sector.

"We are currently exploring a tenement with the potential to yield 9mt of iron ore, along with valuable manganese deposits," said Terry.

"Our goal is not just to provide mining services to other companies - we also aim to start mining our own products.

"We want to process it ourselves, load it on our trucks, and ship it overseas to the end buyer.

"To support this vision, we have placed an order for a \$23m bulk ship, which will enable us to control the entire supply chain from production to shipping."

Addressing the challenges faced Terry mentioned the main obstacles Bunhu encoun-

ters- namely the shortage of labour in the market.

"We are actively seeking solutions, but our hands are tied due to immigration red tape," he said.

"However, we remain committed to developing local talent and nurturing a skilled workforce within the region."

Fleet and Capabilities

Bunhu Mining boasts an impressive fleet of vehicles and machinery that cater to various specific purposes within the mining, civil, marine, and construction industries.

Terry provides a detailed description of their fleet, showcasing the company's commitment to utilizing advanced equipment for optimal efficiency and performance.

"In terms of heavy bulk haulage, we rely on the robust Kenworth T909 trucks, Mack Titans & Volvo" he explains.

These powerful vehicles are designed to handle large-scale transportation tasks, ensuring the smooth and safe movement of substantial loads.

Additionally, the company employs 60-meter PBS (Performance-Based Standards) rated road trains, further enhancing their capacity for bulk haulage operations.

For civil work, Bunhu Mining has a fleet of doubles consisting of Freightliner Cascaders and Volvo 6x4 trucks, Caterpillar 150 graders and various earthmoving machinery

To further enhance their capabilities, Bunhu Mining has an order in place for a 200-tonne Komatsu digger and a D10 dozer with Caterpillar. These heavy-duty machines will

augment their existing fleet and enable the company to handle even larger-scale projects and operations.

Additionally, the company has placed orders for three 150-tonne Komatsu dump trucks, further expanding their capacity for efficient material transportation. In addition to trucks and machinery, Bunhu Mining ensures they have the necessary ancillary equipment to support their operations effectively.

This includes essential tools such as dozers and graders, which are indispensable in various earthmoving and levelling tasks. By maintaining a comprehensive and well-equipped fleet, Bunhu Mining can execute projects with precision, efficiency, and the utmost attention to safety.

The Vision for the Future

Bunhu Mining is driven by a commitment to continuous improvement and staying ahead of industry trends.

"We believe in constantly improving ourselves and staying up to date with the latest advancements," explained Terry.

"This allows us to deliver the highest quality services and meet the evolving demands of the mining industry."

Emphasising their role in shaping a sustainable future for the industry, Terry explained that sustainability is a key focus for Bunhu Mining.

"We are dedicated to reducing our carbon footprint and embracing environmentally friendly practices," he said.

"Our goal is to transition to electric and hydro-powered equipment, ensuring a more sustainable future for the industry."

Looking Forward

Bunhu Mining Marine Civils & Construction Pty Ltd has emerged as a significant presence in the mining industry under the leadership of Terry.

The company's unwavering commitment to quality services, innovation, and social responsibility has set new standards within the sector. By providing customised solutions, fostering successful collaborations with reputable companies and consistently delivering exceptional services, Bunhu Mining has earned the trust and respect of its clients.

Looking ahead, Bunhu Mining is poised to make an even greater impact in WA's mining, civil, marine and construction sectors. With ambitious plans for expansion, the company is venturing into new opportunities to solidify its position in the industry.

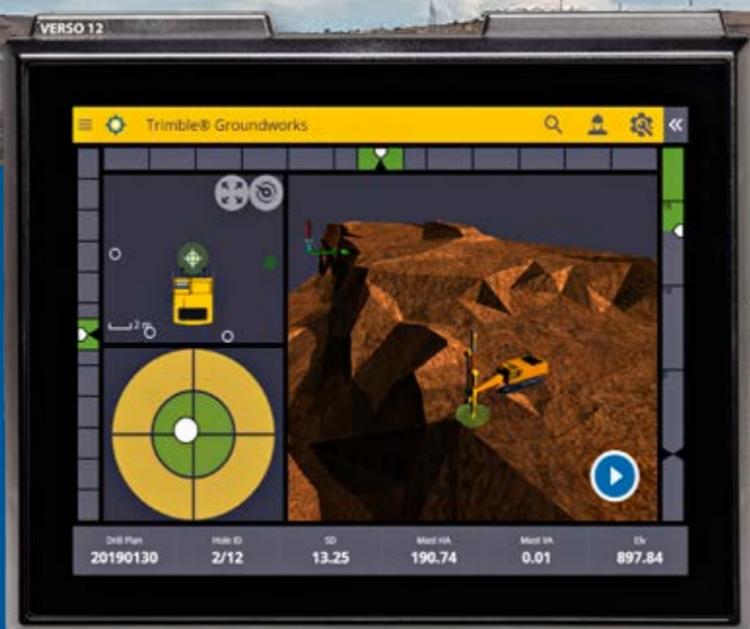
"We are currently working on a tenement and have made significant progress in our exploration efforts," said Terry.

"We have discovered the potential for 9mt of iron ore, along with valuable manganese deposits."

Their goal is not only to provide mining services to other companies but also to start mining their own product, process it in-house, load it onto their trucks and ship it overseas to the end buyer. **AMR**



Northing: 120788
 Easting: 249132
 Elevation: 104.37
 Drilling penetration rate: 5 m/min.



TRIMBLE'S MACHINE CONTROL SYSTEM

REVOLUTIONISES MINING EFFICIENCY

Efficiency and profitability are critical factors in the mining industry, where professionals strive to optimise operations, increase productivity, and ensure safety. Mining companies are constantly searching for advanced technologies that can achieve this. In collaboration with Trimble, Sitech has introduced a revolutionary machine control system specifically designed for drilling operations.

This innovative solution offers mining professionals a game-changing technology that can transform their drilling processes and deliver significant benefits in terms of precision, efficiency, and productivity.

This advanced technology empowers mining professionals to automate labour-intensive tasks, reduce downtime, and maximise drilling uptime. With state-of-the-art positioning technology, real-time calculations, features such as avoidance zones, and streamlined workflow and data management, Trimble's machine control system enhances precision, accuracy, and site safety. By seamlessly integrating these advancements, mining operations can achieve new levels of efficiency, productivity, and profitability.

Streamlining Drilling Operations

Efficiency and productivity are paramount in drilling operations, and Trimble's machine control system brings forth a high level of automation to alleviate labour-intensive tasks. By automating processes such as marking drill points and calculating drill depth, the system minimises the need for manual intervention and reduces downtime.

This automation enables mining professionals to optimise their resources, focusing on critical tasks that require human expertise.

With real-time adjustments and the flexibility to modify drill plans directly in the field, operators can adapt quickly to changing site conditions, ensuring optimal drilling performance and efficiency. By streamlining

operations and reducing project timelines, mining professionals can achieve increased productivity, cost savings, and a competitive edge.

Enhancing Precision and Accuracy

Trimble's machine control system incorporates state-of-the-art positioning technology to ensure precise drill depth, direction, and alignment. The system utilises advanced sensors and GPS technology to provide real-time data, allowing operators to achieve the desired drilling parameters with exceptional accuracy. This precision minimises errors, enhances drilling outcomes, and optimises resource utilisation. Furthermore, the system minimises overdrilling, reducing maintenance costs and extending the lifespan of drilling components. With heightened precision and accuracy, mining professionals can achieve higher-quality results, maximise equipment efficiency, and ultimately increase profitability.

Ensuring Site Safety

Safety is a paramount concern in mining operations, and Trimble's machine control system prioritises site safety. The system incorporates avoidance zones to eliminate blind spots around drilling machines, enhancing operator awareness and reducing the risk of accidents. By providing real-time notifications, operators can ensure the safety of personnel and equipment. Additionally, the system minimises the need for personnel to be in close proximity to drilling machines, reducing the risk of injuries. With enhanced site safety, mining professionals can create

a secure working environment and prioritise the well-being of their team members.

Workflow and Data Management Optimisation

Trimble's machine control system optimises workflow and data management, providing mining professionals with efficient and effective tools. Operators can create drill plans directly in the field, eliminating the need for office-based modifications and reducing potential disruptions. This streamlines the planning process, minimises delays, and maximises productivity.

The system also generates comprehensive productivity and quality drilling reports, offering valuable insights for performance evaluation and decision-making. These reports enable mining professionals to identify areas for improvement, optimise resource allocation, and enhance operational efficiency. Furthermore, the system ensures seamless data exchange with industry standards, facilitating collaboration and compatibility with other software and systems commonly used in the mining industry.

Cost and Time Savings

Trimble's machine control system delivers significant cost and time savings. By reducing reliance on traditional surveying methods, mining professionals can minimise expenses associated with surveying equipment, personnel, and manual measurements. This streamlines operations and reduces overall costs. Moreover, the system eliminates delays and interruptions by offer-

ing real-time adjustments, automation of labour-intensive tasks, and streamlined workflow management. By minimising downtime, mining professionals can maximise uptime, improve project timelines, and optimise resource utilisation. The cost and time savings achieved through Trimble's machine control system contribute to increased efficiency and profitability in mining operations.

Trimble's machine control system for drilling operations revolutionises the mining industry by enhancing efficiency, precision, and safety. The system's automation of labour-intensive tasks, real-time adjustments, and flexible drill plans streamline operations and reduce downtime, ultimately optimising resource utilisation and project timelines. With state-of-the-art positioning technology, mining professionals can achieve unmatched precision and accuracy, minimising errors and maximising productivity.

The system ensures site safety through the incorporation of avoidance zones and reducing personnel proximity to drilling machines. Additionally, workflow and data management are optimised, enabling on-site drill plan creation, comprehensive productivity reports, and seamless data exchange with industry standards.

Trimble's machine control system empowers mining professionals to unlock a new level of efficiency, productivity, and profitability in their drilling operations. By embracing this game-changing technology, mining companies can stay competitive in the evolving mining landscape.

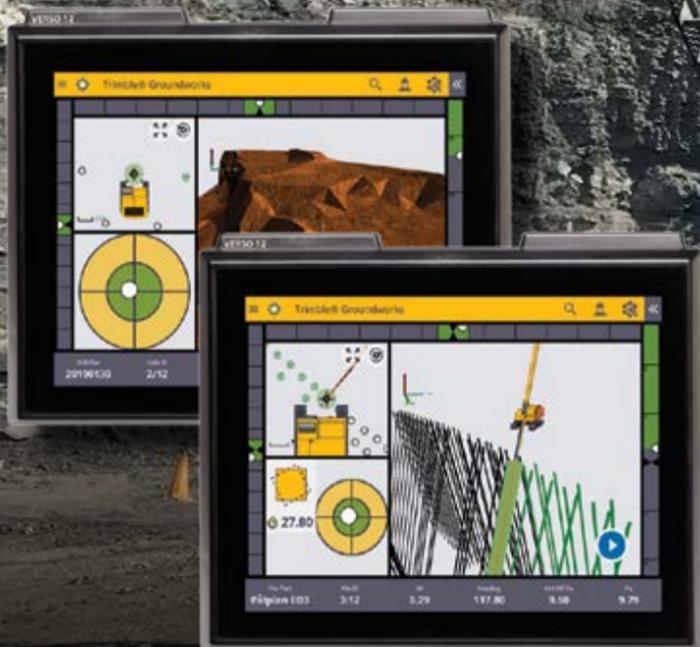
The system's ability to streamline operations, enhance precision, and prioritise safety positions it as an essential tool for mining professionals seeking to optimise their operations and achieve operational excellence. With Trimble's machine control system, mining professionals can redefine drilling precision and elevate their mining operations to new heights of success. **AMR**



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THE NEXT LEVEL OF RESPIRATORY PROTECTION FOR WELDERS

Protecting the respiratory health of welding operators on the mine site is crucial in ensuring a safe and healthy work environment.

In recent years, there has been a growing demand for respiratory protection that not only offers increased protection but also enhances comfort and visibility.

Welding Industries of Australia, a leading supplier of welding equipment, has addressed this need with its latest innovation, the Miller Vortex HDV PAPR System.

Designed to take respiratory protection to the next level, the Miller Vortex HDV PAPR System offers a range of features and exclusive technologies that set it apart from other systems.

Exclusive Technology

The standout feature of the Vortex HDV PAPR System is the HDV Technology that provides high-definition clarity, giving welders a sharp and detailed view with minimal distortion. This feature makes it easier for welders to see their work with greater accuracy and efficiency.

ClearLight 2.0 technology minimises glare and optimises the light spectrum, providing a clearer, brighter and more realistic weld view.

InfoTrack technology features a memory function and allows the operator to store two favourite settings and track weld time and arc counts.

X-Mode technology is another exclusive feature and major benefit to welding operators. Designed for outdoor usage, it eliminates sunlight interference, and the lens only darkens when the welding operator strikes an arc, making it ideal for low amp TIG and out-of-position welding.



Ground-Breaking Design

The system's lightweight blower unit weighs only 1362 grams, providing long-term comfort, allowing welders to wear it for extended periods without causing strain. The Vortex HDV PAPR System provides protection against welding fumes, making it an ideal choice for welders working in confined spaces.

The six air distribution points ensure that the air is evenly distributed, providing maximum cooling and comfort, while the three air speeds allow the operator to control the volume of air to meet their work conditions.

The audible and vibrating alarm increases safety by notifying the user in noisy environments of low battery.

Included in the package are two lithium-ion batteries, one to use and another for charging, eliminating downtime when it's time for a recharge.

Usage of the Vortex HDV PAPR System is easy, thanks to the LCD display that provides an easy-to-read screen for viewing fan speed, current time, and battery level, and a filter timer to remind the welder when it's time for it to be replaced.

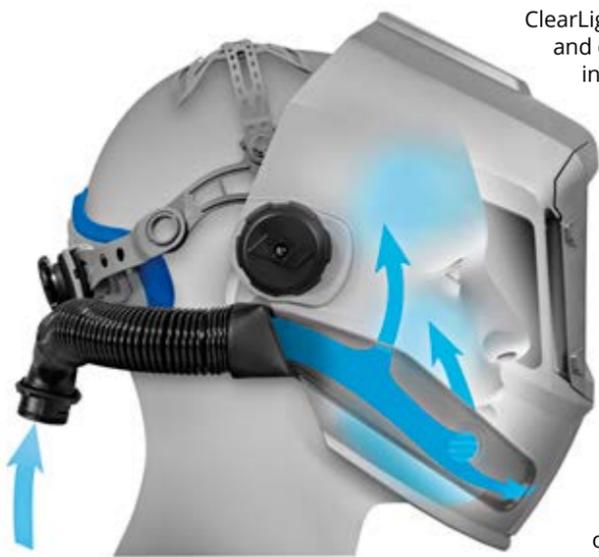
With all of these features and technologies combined, the Miller Vortex HDV PAPR System provides the ultimate respiratory protection for welders, ensuring greater clarity, comfort, and safety.

The Next Step in Respiratory Protection

The Miller Vortex HDV PAPR System is a game-changer in respiratory protection for welders, providing exclusive technologies and top features that offer the next level of protection, comfort, and visibility.

Its lightweight design and industry-leading features make it a must-have for welders in the mining industry in Australia.

AMR



VORTEX HDV PAPR SYSTEM

The Next Level of Welding Respiratory Protection.

- Increases wearability
- Maximises cooling and comfort
- Enhances visibility

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NEW

Making a positive difference in your community

Looking after people's wellbeing, whether they are facing extreme difficulty or just need some support along their journey, is what chaplaincy is all about. And looking after people is what builds the foundations of communities that people like to support, enjoy working in and love to live in.

One area that every community is connected to is the local school and YouthCARE supports wellbeing in over 600 public school communities throughout Western Australia. Over 460 YouthCARE Chaplains walk alongside students, parents, teachers and principals from regions including the Kimberley, Pilbara and Goldfields. Regardless of location, the availability of accessible, non-judgemental pastoral care helps build community – and for YouthCARE, it starts in schools.

Chaplaincy positively impacts several sectors and circumstances, that's why our chaplains' connections extend beyond the school gates. With various academic backgrounds and life experiences, YouthCARE Chaplains deliver care, respect, compassion and service to your community – wherever you are in WA.



(08) 9376 5000
youthcare.org.au



State Chaplaincy Conference

Supporting those that support our communities

Investing in and supporting staff, positively affects employee satisfaction and staff retention. The State Chaplaincy Conference is an opportunity to buy into the development and support of those caring for the wellbeing of the community.

The conference presents professionally acclaimed speakers, guiding pastoral carers through important topics addressing real-world challenges – professionally, practically and sensitively.

Delegates will be provided with industry leading insight into the topics of trauma and resilience, gender and sexuality, and cultural capabilities.

Through 5 unique sessions across the 2-day conference, our guest speakers deliver professional development needed to care for the

workforce and the wider community, even in the most trying of circumstances.

The conference is presented by YouthCARE and its CEO, Tamsyn Cullingford who said that, "as WA's largest chaplaincy provider, with over 50 years' experience, YouthCARE is ideally placed to share our connections and expertise in the field to curate industry specific training, networking and resourcing opportunities. With support from other attending pastoral care providers, chaplains will be better informed and equipped to meet the future needs of staff and community."

The State Chaplaincy Conference also offers opportunities to partner with YouthCARE in providing professional development to pastoral care staff.

State Chaplaincy
CONFERENCE

3rd & 4th July 2023



The Governor's Chaplaincy Awards

Recognising excellence in service and dedication

His Excellency the Honourable Christopher Dawson AC APM, Governor of Western Australia, in partnership with YouthCARE, will be recognising the work and inspiring stories of chaplains across Western Australia, from industries such as mining, education, health and social services.

"Both my wife and I, as Co-Patrons of YouthCARE, are pleased to support chaplaincy and the individuals who care for our most vulnerable and distraught during their times of need. This initiative recognises and celebrates the work being done across various communities throughout Western Australia," Governor Dawson.

Addressing the increasing need for access to wellbeing services, it is our workplace and

community chaplains who meet the needs of remote, regional and metropolitan communities.

The Governor's Chaplaincy Awards presents a unique opportunity to recognise and honour those that provide these services.

Award categories:

- ◆ Chaplain of the Year
- ◆ Regional Chaplain of the Year
- ◆ Chaplaincy Leadership and Innovation
- ◆ Outstanding Response to a Critical Incident
- ◆ Cultural Capability
- ◆ Community Connection
- ◆ Chaplaincy Partnership

His Excellency the Governor will be presenting the awards at Optus Stadium.



3rd July 2023



Sponsorship opportunities are available now. Find out how we can help you support wellbeing.

PREVENTING STRUCTURAL DETERIORATION WITH DURABILITY DESIGN

Premature decay can ultimately make or break a project as selecting the wrong materials in the design of a new structure can have costly consequences later down the track if maintenance and repairs are required post-construction.

Extending the operational life of an asset relies heavily on a number of factors. Critical steps include detailed design review, exposure and risk assessments, performance monitoring, material, concrete and reinforcement selection, and the application of specialty coatings to suit specific environments, to name a few.

Structural materials such as concrete and steel are generally the basis of any infrastructure design project. Although these materials are known for their structurally sound properties, they are prone to cracking, corrosion, deformation and other issues over the project life cycle if durability and performance related factors are overlooked. This is where the concept of durability design plays a fundamental role in the early stages of the project life unless you engage the right partner as part of a comprehensive consultation process.

Durability design is a niche field of expertise where very few industry players exist, or have the in-house capability to support large-scale infrastructure projects. Specialist consultants BCRC understand the unique challenges industrial asset owners face, and what it takes to design and build infrastruc-

ture that exceeds its expected operational life with minimal maintenance requirements.

"We are uniquely positioned to offer a complete durability consultancy service for major oil and gas and mining projects," said BCRC Director, Frank Papworth.

"As larger projects can incorporate many different durability mechanisms, we leverage the experience of durability experts from multiple disciplines. We cover all materials and applications, and conduct strict assessments that aim to prevent deterioration over the lifetime of a project. This helps mitigate potential cost blow-outs due to unforeseen repairs or upgrades that project managers had not incorporated into their plans.

It requires an understanding of exposure, materials, construction, operation and the reliability that the client wants, and that's why the largest mining exploration and mineral processing companies around the world engage us in the initial stages of their projects. Our clients understand the critical nature of getting things right from the start to prevent deterioration issues and financial pain at a later stage."

Durability plans form an integral part of the tender design process. BCRC's exclusive service life modelling offer, CREAD™ (Comprehensive Reliability & Engineering Analysis of Durability) is utilised to address structure design and planned interventions. It sets out

the approach for construction teams to understand the key exposures, client requirements and deterioration mechanisms. This gives the client greater visibility over contractor pricing, which includes provisions that will achieve durability of the structure to be constructed.

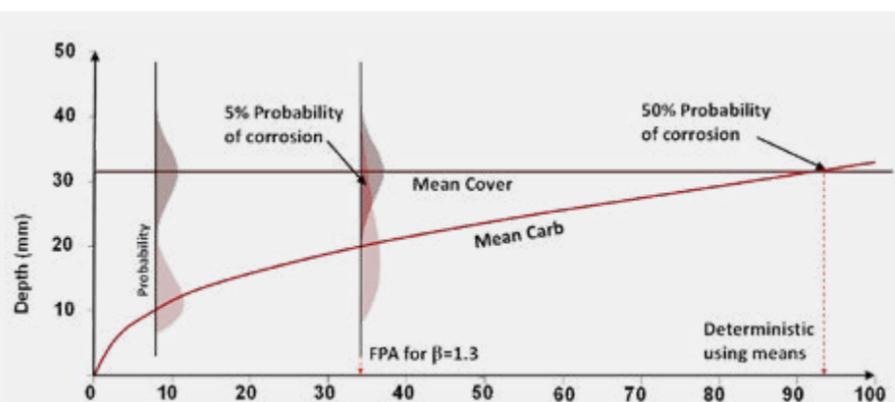
BCRC were recently contracted by one of the world's leading minerals companies that utilises sulfuric acid leaching in its industrial plant refinery.

"Following a successful tender process where we devised a durability plan specific

to client's plant environment and elements being processed within the facility," Mr Papworth said.

"Concrete and steel structures would be exposed to corrosive chemicals during the roasting and leaching process. Therefore, a detailed durability plan had to account for every possible scenario that would impact the structure where the minerals were processed."

For more information, visit <https://bcrc.com.au/>
AMR



Full Probability Analysis (FPA) – An essential tool for Design Life Assessment.

In durability modelling, it is important to realise performance measures are not discrete numbers, but all variables that determine an element's life are distributions. To determine reliability, these distributions must be used in a full probabilistic analysis. BCRC have developed FPA models for new and existing structures. This schematic shows that using mean values in a deterministic model could vastly overestimate life. FPA is the only way to get a reasonable assessment of reliability.



BCRC

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- Service Life Modelling – CREAD™
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HOW ROBOTIC AUTOMATION IN AUSTRALIA IS IMPROVING MINING OPERATIONS

Australian businesses, especially those in remote areas where finding skilled labour can be difficult, often face labour shortages and resulting bottlenecks due to expensive machines that often sit idle. To help companies overcome these challenges and improve their operations, Automation Solutions and Complete CNC Solutions have come together to offer industrial automation and machine tool services.

Automation Solutions specialises in providing innovative robotic solutions such as machine tending and material handling cells, which can streamline manufacturing operations. Complete CNC Solutions specialises in machine tools, special products, and services, complementing Automation Solutions' capabilities in industrial automation and robotics control systems.

Together, they offer a one-stop solution for businesses' automation and machine tool needs. These robotic systems handle raw materials and finished products that can run unmanned throughout the day and night, allowing mining companies to extend machine run time and achieve a sharp increase in output.

By reducing the labour required to produce finished machined parts, businesses can redirect current human resources to high-value tasks such as programming, quality, and machine set-up.

Lights-out machining, which allows for efficient finishing of production runs even outside regular business hours, can also be achieved with the assistance of robots.

Automation Solutions and Complete CNC Solutions offer comprehensive industrial automation and machine tool services that enable businesses to leverage the benefits of robotic automation, streamline operations, and reduce labour costs.

In addition to robotic automation, Complete CNC Solutions' maintenance and machine calibration services further enhance efficiency, minimising downtime and maximising productivity.

Not only providing new equipment solutions, but also able to upgrade existing machines to leverage the benefits of robots, seamlessly integrating robotics into the workflow. Upgrading existing machines offers cost savings, maintains functionality, and ensures a smoother transition.

Automation Solutions and Complete CNC Solutions provide innovative solutions to overcome production challenges faced by businesses throughout Australia. Their expertise in industrial automation and machine tools allows them to offer reliable solutions that help companies increase productivity, streamline operations, and reduce labour costs.

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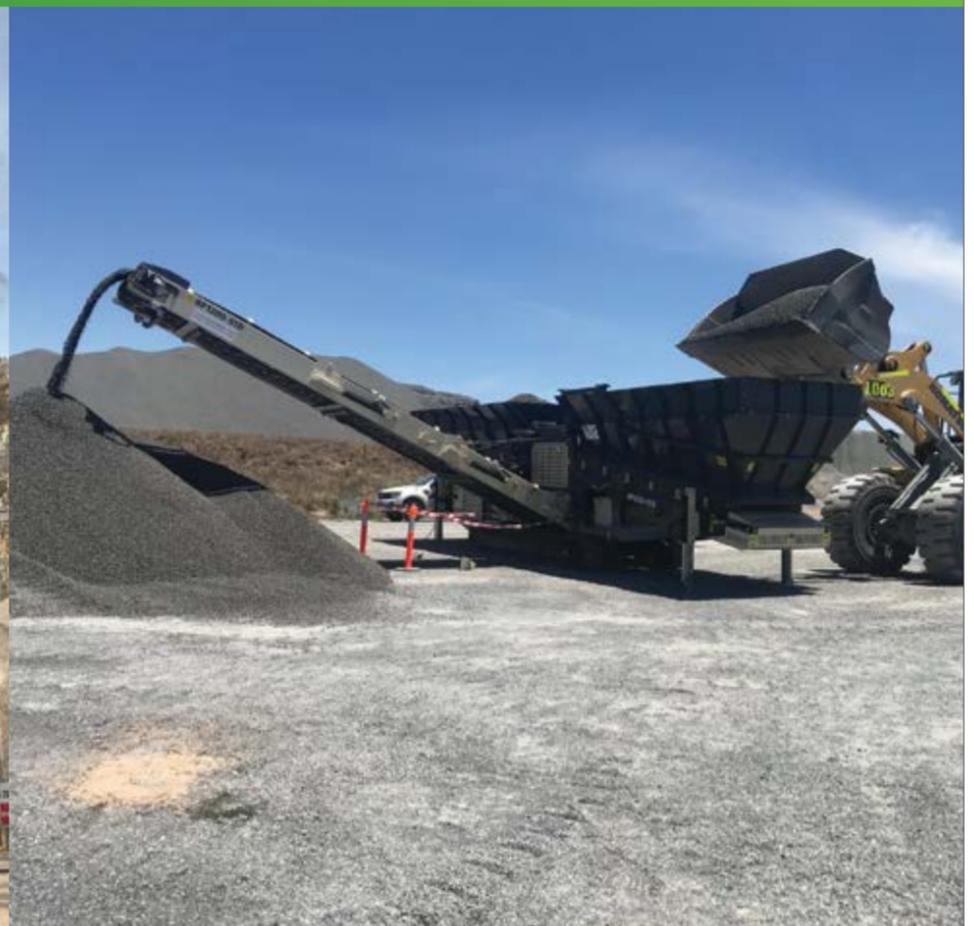


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3 Pathways to Eco-Friendly Mining

A big focus for mining companies right now is sustainability, with many moving towards more sustainable mining methods to protect the environment and create efficiencies. Mining techniques become much more environmentally sensitive when efficiency is improved, because less waste is produced.

Executives and consumers alike are increasingly aware of the need to protect our environment and there is more pressure than ever on companies to reduce their carbon emissions, minimising damage to local ecosystems.

Thankfully, new technologies have significantly improved efficiencies and reduced environmental impact in recent years. Rang-

ing from using cleaner technologies (and thus reducing the release of pollutants), to minimising the use of water and energy, as well as increasing recycling.

Here are 3 ways mining companies are reducing their carbon footprint and becoming more sustainable:

- Lower-impact mining techniques. Low-impact mining techniques such as in-situ leaching will minimise soil erosion, reducing surface disturbance as well as moving less material needing backfilling. This is a positive solution for both the mineworkers and our environment.
- Eco-friendly equipment. This shift can

significantly reduce the amount of carbon dioxide (CO₂) mining operations usually produce. Italian company EmiControls has made huge strides in this area by producing the world's first fully-electric dust suppression vehicle and it's now available here in Australia. The Dustcat 5000 is a revolutionary device designed to combat loose dust in difficult and inaccessible terrain, while minimising the dispersal of dust in the surrounding environment up to 90m.

- Reusing mining waste. Resource scarcity can be lessened by up-cycling, reusing, and recycling waste. Up-cycling transforms waste and unwanted products into new or alternative products. The waste can be reused by

the mine itself or sold to a separate company. For example, waste rock can be used as a material in landscaping projects or construction. Tailings, a common by-product of the mineral recovery process, can be given new life in the form of resins and glass to bricks and cement. Water can easily be recycled for use in the dust suppression process.

Overall the industry is making great progress towards creating eco-friendly solutions and moving in the direction of sustainability. Over the years as these solutions become more practical, we will see it moving forward exponentially. **AMR**

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Plasma Wear Parts Offers Long-Term Fixed Pricing for CAT Grader Parts

Equipment maintenance and repairs are essential to ensure optimal performance and efficiency in mining operations. However, fluctuating prices and supply shortages can make it challenging for mining companies to plan and budget effectively. Plasma Wear Parts, a leading provider of high-quality wear parts for mining equipment, has recently introduced a new long-term fixed pricing offer for CAT grader parts to address this challenge.

The long-term fixed pricing offer is a testament to Plasma Wear Parts' commitment to its customers, providing them with the stability and reliability they need to stay competitive in the mining industry. Customers can lock in prices for up to five years, ensuring that they are not affected by price fluctuations or sudden price increases. This allows mining companies to plan their maintenance and repair schedules with greater accuracy and avoid unexpected costs.

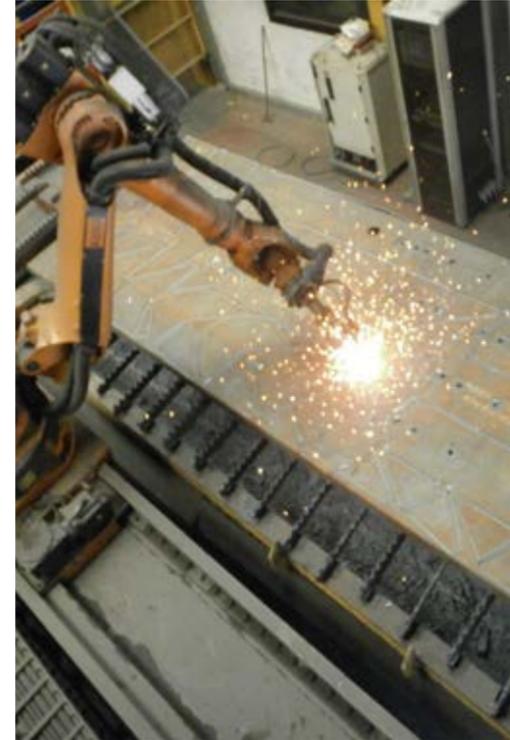
In addition to the fixed pricing offer, Plasma Wear Parts guarantees same-day shipping, regular stock inventory updates, and a consistent supply of parts. The company understands the importance of timely repairs and maintenance, and is committed to ensuring that its customers have access to the parts they need, when they need them. This commitment to fast and reliable service means that mining companies can avoid costly downtime and keep their operations running smoothly.

Plasma Wear Parts also recognises that every mining operation is unique and has different requirements when it comes to equipment maintenance and repairs. That is why the company offers customised kit options at the most competitive prices in Australia, guaranteed. This enables mining companies to tailor their orders to their specific needs, ensuring that they get the right parts at the right price.

Plasma Wear Parts' focus on quality, customer service, and innovation has enabled it to build long-lasting relationships with its customers. The company takes pride in being a trusted and reliable partner to the mining industry, providing the highest quality parts and services to help its customers streamline their operations and maximise their profits.

Mining companies no longer have to settle for suppliers with unreliable prices and inconsistent supply.

By choosing Plasma Wear Parts as their trusted partner for CAT grader parts, they can enjoy the peace of mind that comes with a long-term fixed pricing offer and the confidence that they are working with a company that prioritises quality and customer satisfaction. Contact Plasma Wear Parts today to learn more about their long-term fixed pricing offer and how they can help mining operations achieve their goals. **AMR**



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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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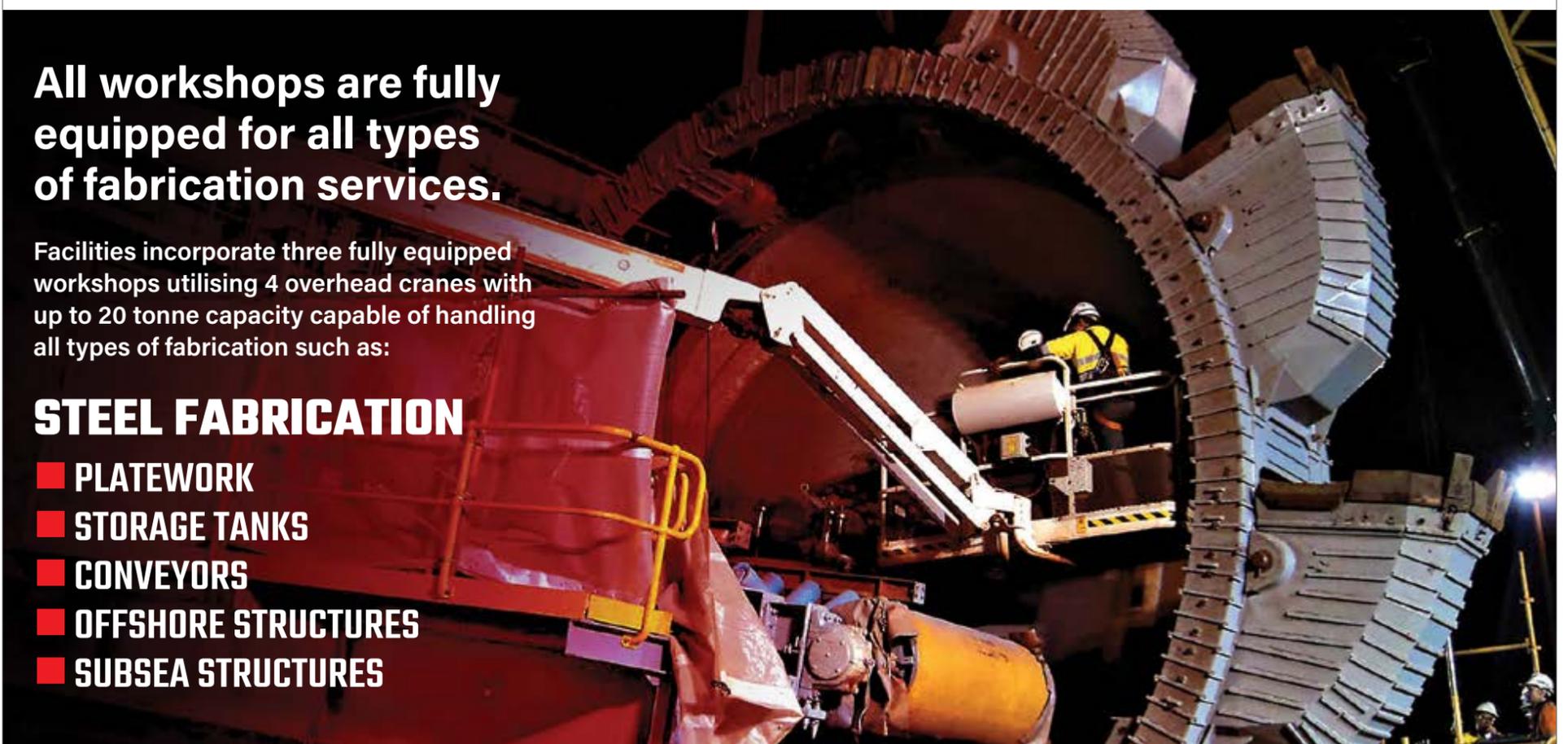
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All workshops are fully equipped for all types of fabrication services.

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- CONVEYORS
- OFFSHORE STRUCTURES
- SUBSEA STRUCTURES



WA'S STEEL FABRICATION SPECIALISTS

SOLAR IN THE SPOTLIGHT

The rise of renewables continues to be front and centre when it comes to improving operational efficiencies and strengthening environmental credentials in the mining industry. As coal generated assets slowly go offline, an increasing demand for solar, hydropower, biodiesel and electric vehicles are just some of the technologies becoming viable replacements.

Renewable energy sources, particularly solar, are not only proving a cost-effective and sustainable solution for asset owners in water pumping applications, but are offering easy access to power in complex, off-the-grid locations where traditional infrastructure is restricted.

For more than 30 years, Australian company BW Solar has made its presence known in

the solar water pumping space. It supplies a range of submersible solar and AC water pumping systems for the industrial, mining and agricultural sectors. BW Solar is also the distributor of Waterboy Pumps, a market-leading brand renowned for its quality, durability and performance.

Waterboy pumps are designed to suit specific applications and site requirements from bores to dams, stock water, dust suppression, aeration, spray water, and transfer.

Managing Director Des Ingleton has worked closely with mine operators, farmers and land owners to understand the challenges they face, and how the latest Waterboy solar pumping technology can best support their needs.

"We have certainly seen a shift in the industry with companies looking to adopt more efficient technology that reduces their carbon footprint and costs, it's a win-win," said Mr Ingleton.

"Our clients are moving away from tradi-

tional diesel or generator driven pumps and windmills, to more advanced solar powered pumping solutions such as Waterboy Pumps as they see the benefits these can deliver.

"The question I put forward to clients is, 'why pay to pump water during the night when you can pump for free during the day?' I am yet to see any pumped hydro projects in WA, however they won't be far off once you change the mindset around storing water as energy, and the technology coming online to support carbon reduction." **AMR**



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FAIR DINKUM SOLAR PUMPS

WATERBOY 4" 3kW Solar Pumping System



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- Simple installation
- Maintenance-free
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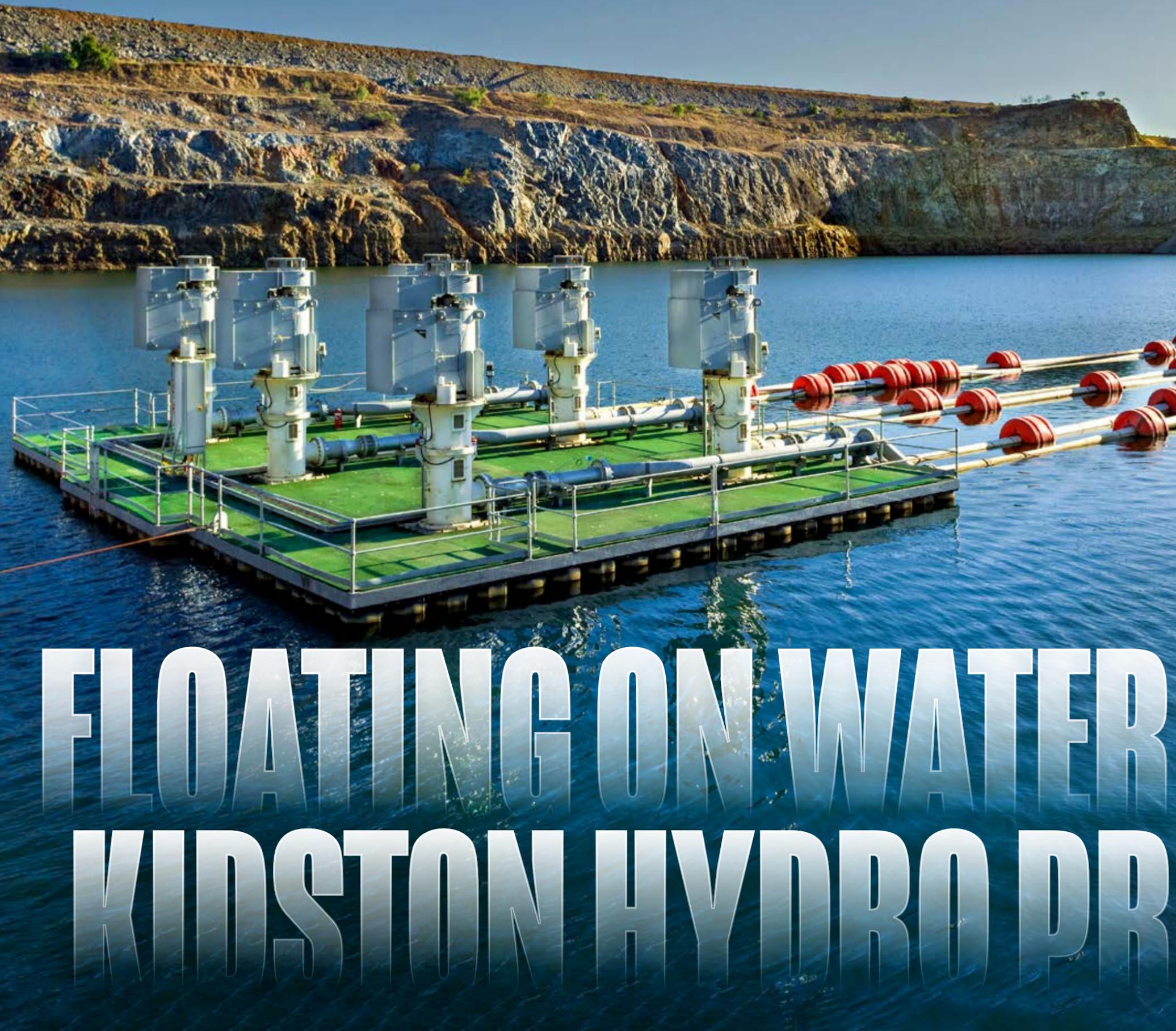
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FLOATING ON WATER KIDSTON HYDRO PR



Increased investment in renewable energy projects from government institutions such as NAIF and ARENA are helping accelerate infrastructure development across the country. This has led to more sustainable mining projects getting off the ground in an effort to reduce the country's reliance on fossil fuels and drive the transition toward cleaner energy.

The flagship A\$777M Kidston Hydro Project is one such landmark achievement that represents the mining industry's pursuit toward a greener future for Australians. The project is located in Kidston, approximately 400 kilometers inland from Townsville in Far-North Queensland. It is the first pumped storage hydro project in the country for over 40 years, which is being built for Genex Power.

Lead by construction contractor McConnell Dowell John Holland (MDJH JV), the large-scale energy storage system generates power during peak demand periods, which returns water to the upper reservoir during off-peak periods.

The contractor faced several challenges in the construction of the Kidston Hydro

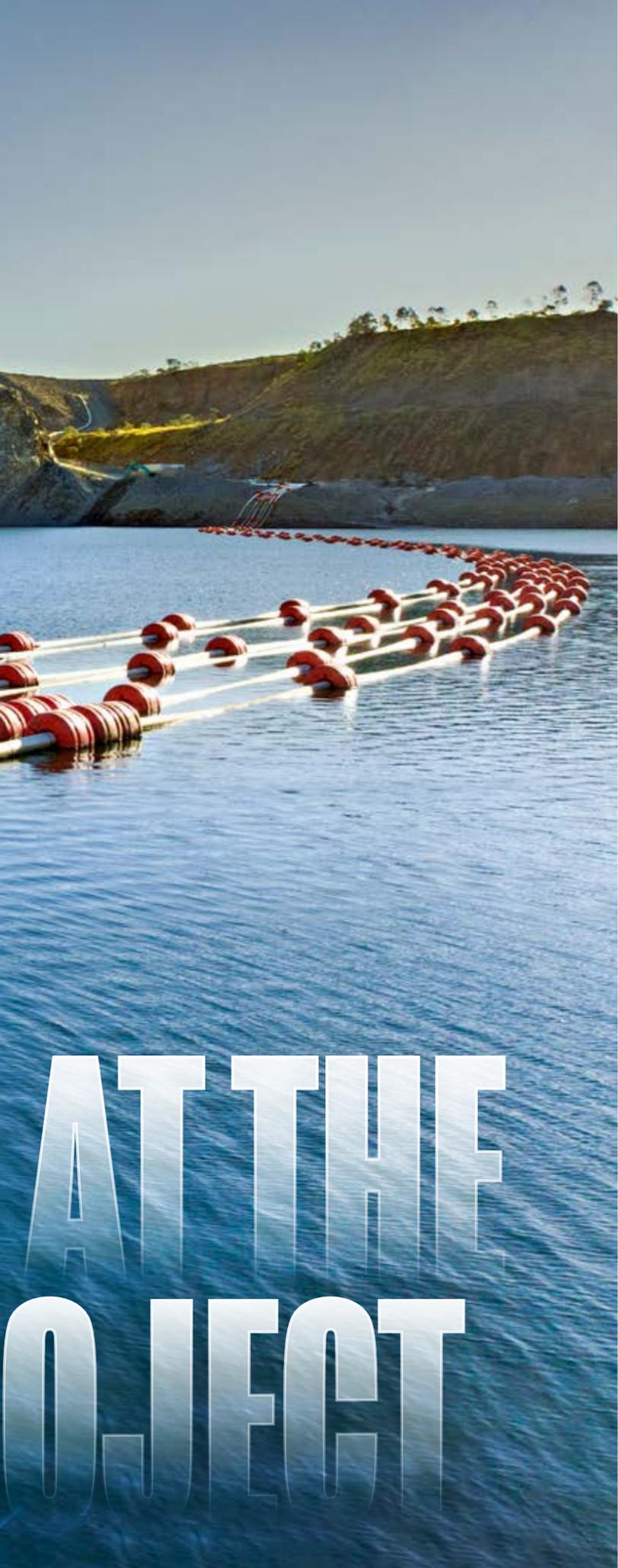
Project that demanded unique expertise and innovative solutions – the most significant involving the pumping of around 30 gigalitres of water out of the Eldridge Pit and into the new Wises Dam within a limited timeframe of less than one year.

In order to successfully pump this volume of water, overcoming complex logistical and technical challenges required engaging market leaders known for their likeminded innovative mindset, creative thinking and engineering capability.

The *Australian Mining Review* spoke with Coerco Division Manager, Gareth Wallis, to learn more about how the team approached the project, and what solution they developed as part of this massive undertaking.

“Coerco was approached by McConnell Dowell - John Holland JV in May 2021 to engineer a purpose-built floating solution to support the dewatering process,” said Mr Wallis.

“We needed to design something capable of handling an excessive volume of water within a complex, highly ambiguous environment that is essentially an unused mine pit.



AT THE OBJECT

"With a focus on safety and efficiency, our team worked closely with the site contractors to design and manufacture a mooring system that would adapt to the rise and fall of water levels within the pit during operation.

"The system needed to address a number of key performance issues. First, a stable, durable pontoon with the capability of carrying heavy weighted pumps safely. Second, a modular system that could be easily transported to site along challenging roads. Third, strict site limitations and available resources led to the development of an elaborate winching system to allow the pontoon to descend as the water level dropped during pumping of the pit."

Coerco's highly engineered solution required a consultative style approach that incorporated a methodical design and execution to ensure the constructed system met specific site requirements, as well as time and budget constraints.

Due to the location of the pit, intricate landscape contours, and limited access roads in and out of the area, some of which had washed away, meant that building the

required infrastructure was even more difficult than anticipated.

Mr Wallis explained that the geography had many unknowns, and the limited routes to site made it really difficult for them, particularly when it came to transporting and maneuvering the system.

"The modular pontoon features a marine grade PU foam filled float set for buoyancy, capable of supporting a total working weight of 120 tonne which includes the six custom manufactured motor/pump sets of 10 tonne each, the pontoon structure and piping."

"The pontoon is held in a controlled state with 3 x 14 tonne electric winch system spaced at 120°. Another unique element of the system is the 40-tonne capacity Dyneema rope, which is scuff resistant and does not conduct electricity."

"The three winches play a critical role, holding the pontoon in position, and allowing it to move to different locations when the dewatering process commences, without the physical involvement of people or boats," added Mr Wallis.

"As the water is removed from the lower reservoir, the pontoon swings in an arc formation of approximately 50 metres when the water is vertically lowered 180 metres. Flexibility in the winch configuration is therefore really important, particularly the ropes that extend out as the pontoon manoeuvres to its final pumping position."

The pontoon's modular design offered easy transportation and installation as it could be broken down into sections, something that would not have been possible with a traditional, non-modular unit.

As part of the design, the Coerco team also ran cabling from the pumps back onto discharge pipeline floats, which delivered cost savings for the client.

The project proved a truly collaborative effort between some of the industry's leading mining and construction service providers – from critical site infrastructure, project management and engineering expertise, to industrial pontoon, dewatering and pump system design and technical know-how.

"We are proud to have been involved with

such an incredibly important phase of construction within this iconic project, and to have seen our innovative solution advance through our project delivery process under such challenging circumstances, is very pleasing," said Mr Wallis.

"Our final solution reflects Coerco's ability to design and engineer an integrated fit-for-purpose pontoon system despite complex challenges and site requirements, whilst completing a project of this scale on time and within budget."

We certainly look forward to working with McConnell Dowell John Holland (MDJH JV) and other contracting partners on similar projects in the future." **AMR**

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MINETEK | TRANSFORMING NOISE REDUCTION IN MINING OPERATIONS

Mining operations face significant challenges posed by noise pollution, which can disrupt communities and nearby habitats, leading to reduced productivity and revenue. Minetek offers cutting-edge solutions utilising advanced technology and acoustic engineering capabilities to address these challenges. Their unparalleled sound reduction solutions enable mining operations to meet regulatory and community noise expectations while minimising the harmful impacts of noise on operators.

Community Impacts

Addressing the impact of noise on nearby communities is crucial, and Minetek provides sound attenuation solutions to mitigate these issues. Noise complaints from the community can result in reduced operating hours or even a complete cessation of production until noise exceedances are resolved. Minetek can effectively reduce noise levels on individual machines or throughout an entire fleet, depending on the specific needs of their clients.

Minetek's sound suppression solutions utilise advanced technology and engineered sound reduction components integrated into mobile mining machinery. This includes features like sound attenuated exhausts, radiator/fan attenuators, high grade sound media and more. By implementing these solutions, Minetek achieves impressive results of up to 50% reduction in accumulated noise produced by mining operations, resulting in significant benefits for nearby communities.

The key to Minetek's success lies in their strategic approach. They analyse and target the specific site asset circuits and the dominant frequencies that contribute the most to noise emissions. By treating these areas effectively, in many instances Minetek enables mining operations to operate 24 hours a day while meeting regulatory and community noise expectations.

Noise Compliance

Mining operations must comply with noise limitations outlined in their project approvals, in line with relevant government authorities and environmental impact assessments. Continuous monitoring by site and boundary monitors ensures compliance with imposed noise limits. In the event of ex-

ceedances, relevant government authorities issue a Notice of Exceedance, prompting the mine to rectify the breach. Further exceedances can lead to fines, reduced operating hours, or, in severe cases, a cessation of operations until compliance is achieved.

Minetek not only provides effective noise reduction solutions to ensure compliance for mobile mining assets but also offers exceptional project consultation and customer care throughout the entire compliance phase. This dedication to their clients is a testament to Minetek's commitment to delivering high-quality solutions.

Expansion and Growth

The success of Minetek's turn-key sound reduction systems instils confidence when submitting applications for mine expansions and new projects. A track record of site compliance and proactive responsibility towards noise reduction procedures positively influences government departments when considering further approvals.

Reduced Downtime- Increased Productivity
Downtime caused by sound exceedances significantly impacts productivity and revenue. By implementing Minetek's solutions, mining operations can achieve continuous 24-hour operation, minimise downtime, and ensure compliance with noise limits. Additionally, the reduction in mobile asset noise levels often enables machines to operate closer to boundary noise monitors, expanding the scope of operations.

Impact

Minetek's cutting-edge noise reduction solutions have made a significant impact on mining operations. One such success story involves the New Acland Coal Mine, where Minetek provided sound attenuation solutions to meet strict noise requirements and community expectations over an 11-year period. Through a reduction of over 50% in overall sound emissions, Minetek enabled sustainable 24-hour operation, significantly reducing downtime and increasing coal extraction, leading to substantial revenue growth.

Another notable case study involves the Liebherr R9800 Mining Excavator, known for its high operating noise levels. Minetek

designed a world-first sound attenuation package, reducing the excavator's operating noise by 12 dBA. This breakthrough allowed the machine to operate 1000 meters closer to the boundary/sound receiver, enhancing operational flexibility while ensuring compliance.

Service and Quality

A key strength of Minetek lies in its ability to customise solutions to address the unique noise problems at each mining site. Their services range from implementing a whole-fleet turn-key system to providing attenuation on one or two machines. Minetek ensures they can address any challenge, regardless of the project's size or scope. They work closely with global OEMs, mine management, operators, and contractors, offering complete sound attenuation packages for over 90 machine models.

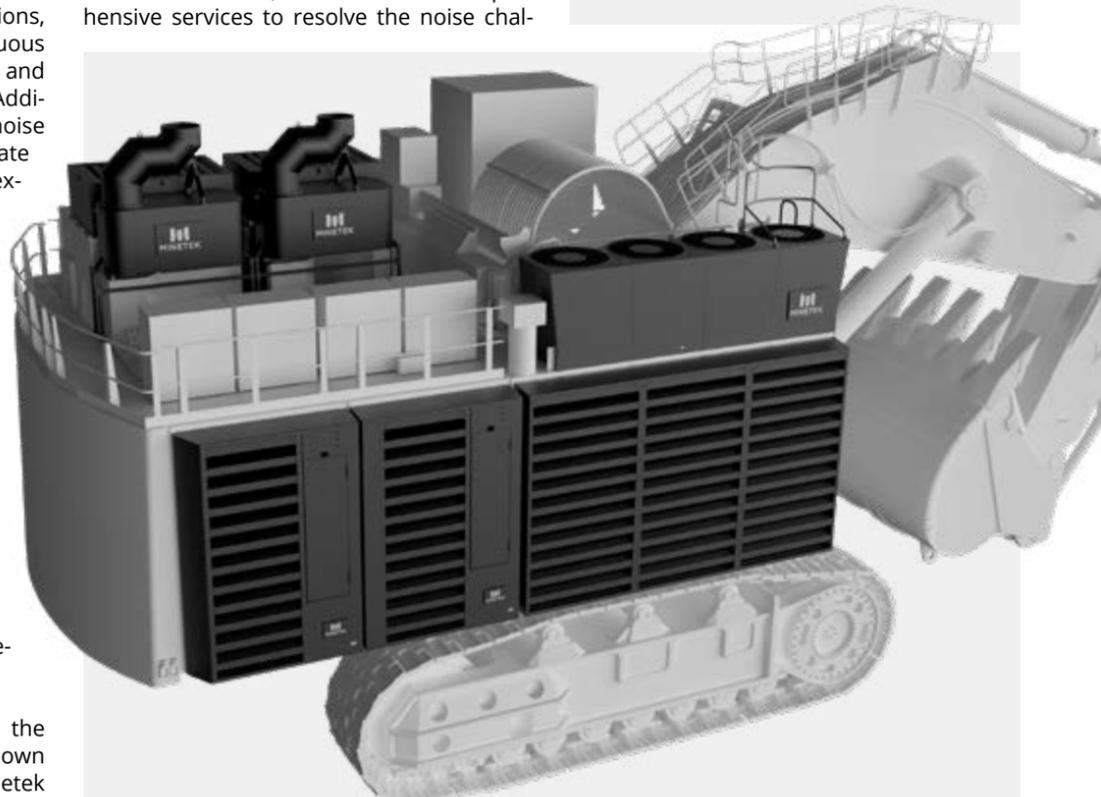
With over 30 years of operation, Minetek's global team provides sound solutions internationally, supported by the vast experience of its acoustic engineers and consultants. From initial consultation and ISO testing to asset assessment, supply, and site installation of sound kits, Minetek offers comprehensive services to resolve the noise chal-

lenges presented in mining.

Minetek's commitment to service and quality sets them apart in the industry. They prioritise customer satisfaction by providing first-class project consultation and support throughout the entire compliance phase.

Minetek's cutting-edge technology and acoustic engineering capabilities have revolutionised noise reduction in the mining industry. Their solutions address the challenges posed by noise pollution, enabling mining operations to meet regulatory and community noise expectations while enhancing productivity and reducing downtime.

The case studies of New Acland Coal Mine and the Liebherr R9800 Mining Excavator showcase Minetek's success in delivering tangible results and their ability to customise solutions to meet the unique needs of mining operations. With a track record of site compliance and a commitment to customer care, Minetek continues to be a trusted partner for mining companies worldwide, providing effective noise reduction solutions and strengthening community relationships. **AMR**



Industrial noise control.

Are sound regulations impacting operations?



Minetek have been proven to reduce site noise by over 50%.

Your mine site could be operational 24/7 if the regulatory noise requirements are met. Maximise productivity and increase operating hours with Minetek's Sound Attenuation solutions. Attenuated vehicles can often operate closer to the boundary or sound receiver, allowing for maximum mineral extraction and increased profitability.

Find out more.

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SPM INSTRUMENT INTRODUCES PROCESS OPTIMISATION FOR TUMBLING MILLS

The mining and mineral processing industry is no stranger to complex challenges. The stakes are high, and every improvement counts toward a profitable operation. Asset owners are faced with high equipment costs and energy-intensive processes with a large carbon footprint, all of which are key drivers for optimisation.

With over fifty years of innovation and development of high-performance solutions for condition monitoring, SPM Instrument's experience across a diverse range of industries and applications has seen it take mining operations to the next level when it comes to efficiency and profitability. It's transferring its extensive technical expertise into a new area of application for the high-resolution data of its patented HD condition monitoring technologies.

When the company first introduced the groundbreaking condition monitoring technologies SPM HD and HD ENV, the focus was entirely on the technologies' exceptional data quality and capacity to provide record-breaking early warning of mechanical and lubrication issues in rotating equipment.

More recently, SPM has discovered that HD technology data can provide information not only on the mechanical condition of production-critical machines, but also valuable insights into the industrial processes themselves.

Beyond condition monitoring – a new area of use for high-resolution data

The discovery that traditional vibration and shock pulse measurement has uses beyond industrial condition monitoring has since opened up an entirely new application area. The curious and careful monitoring and analysis of unfamiliar data patterns has revealed valuable information about the inner

workings of various industrial processes.

Aside from optimising machine operating condition, the same advanced measurement technologies, smart algorithms, and hardware used for condition monitoring now enables process industries to enhance new areas of their production.

Optimisation of the grinding process in tumbling mills

A particularly vulnerable aspect of the mining process is the grinding and crushing of the ore. In many mines, the tumbling mill constitutes a bottleneck through which the entire production passes. Tumbling mills are huge investments that are not easily replaced, therefore, increasing the operational efficiency of existing concentrator circuits is critical to maximising both production throughput and quality.

According to apt Group Managing Director, Geoff Soper, mining operations face a number of challenges concerning health, safety, and environmental factors.

"Crushing and grinding account for a large part of a mine's total energy consumption," Mr Soper said.

"More efficient crushing has the potential to reduce the carbon footprint of existing crushing equipment. Even minor improvements in the comminution process can improve resource and energy efficiency, resulting in reduced energy usage, lower greenhouse gas emissions, and waste reduction."

"Additionally, a smooth and well-functioning grinding process can help keep personnel safe, alleviating the need for personnel to work inside the drum to replace the liner and/or lifter bars, or clean-out clogged grinding materials."

Toe position monitoring

SPM's new process optimisation solution for tumbling mills (patent pending) monitors the charge toe position. The overall purpose is to keep the mill running as close to maximum working capacity as possible, while simultaneously avoiding the risk of fault modes such as mill overload, underload, and freewheeling. The solution is an effective tool for operators to determine the ideal feed rate for optimal grinding conditions.

Increasing grinding efficiency also enhances particle size distribution. As an essential parameter for efficiency in the separation stage, particle size optimisation has a positive impact on flotation performance.

This is particularly important in mining operations with a single concentrator circuit that may need to handle changing ore properties. The benefits of optimised crushing and grinding will propagate through the entire circuit.

Further benefits of this process optimisation solution include the monitoring of wear-and-tear on the liner and lifters, outlet blockage, density, and big rock occurrence.

"Mr Soper says the hardware installation is straightforward and robust, without any equipment attached to the mill's rotating shell."

"The toe position usually differs at the inlet and discharge ends of the mill. The solution is unique in that rather than measuring at a single position, it measures vibration at both ends, using patented HD vibration measurement technology.

The information derived from the vibration data is presented in a user-friendly, web-based dashboard in the control room, en-

abling mill operators to optimise the toe position of the charge, and therefore improve grinding efficiency, throughput, and raw material yields."

"The toe position monitoring solution is a user-friendly and highly impactful process optimisation tool with low investment cost and rapid return on investment," added Mr Soper.

Taking advantage of the same technologies and equipment as SPM's high-performance machine condition monitoring solutions, toe position monitoring has considerable potential to impact the bottom line.

Process optimisation and condition monitoring – a winning combination

This new application area for high-resolution process data aligns perfectly with condition monitoring. In an industry with high production costs, combining the benefits of condition-based maintenance with those achieved through process optimisation, proves a winning strategy.

These contribute to increased production speed and raw material yields, maximised equipment availability, enhanced plant condition, as well as health, safety, and environmental improvements.

A well-designed, well-implemented condition monitoring program paired with successful optimisation of critical processes brings out the best in both assets and production, allowing plants and operations to leverage new opportunities for increased profitability and business growth.

Contact apt Group

T: 1300 700 002
E: info@aptgroup.com.au
W: <https://aptgroup.com.au/>

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INDUSTRY-LEADING ONLINE & WIRELESS CONDITION MONITORING SOLUTIONS FOR SMART MINES



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MAXIMISE YOUR CONTROL, MINIMISE EXPENSES

Since 1975, Protoblast Company has led the way when it comes to engineered 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, Protoblast's full and partial recovery blast chambers, automatic blast machines, and ancillary equipment have redefined the blasting landscape. Time and time again, the company has found that the cost of logistics from outsourcing the abrasive blasting process is often hidden and overlooked, and not 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.

By owning your own equipment, you have the ability to manage the process and meet your exact specifications. This ensures projects are completed with the utmost quality and efficiency, without having to worry about coordinating with external companies or sacrificing your schedule to meet their needs.

Beyond the convenience of having your own equipment, there are also cost-saving benefits. The first one, of course, is going to be the logistics, then the ongoing savings of having control over quality and damage from mishandling. While there may be an initial investment, you can be assured that the return on this investment will outstrip your expectations.

In addition to cost savings, owning your own abrasive blasting equipment can expand your service offer. With in-house capabilities, you can experiment with different blasting techniques and materials to take on more projects and increase your revenue.

According to Protoblast Sales Manager, Ben Noble, the company has a strong focus on getting to know its customers, their products

and their processes, so their new equipment will outperform expectations and maximise their return on investment.

"We were recently contracted to design, manufacture and install an abrasive blasting booth at a fabrication facility in Southern QLD," said Mr Noble.

"Our customer had been outsourcing their blasting before powder coating, and the lead times were negatively impacting their bottom line due to lost revenue from having to get blasting done externally. Following the installation of a Protoblast blasting booth, complete with a Partial Floor Abrasive Recovery System, the customer significantly reduced the lead time from a minimum of six weeks to just two days.

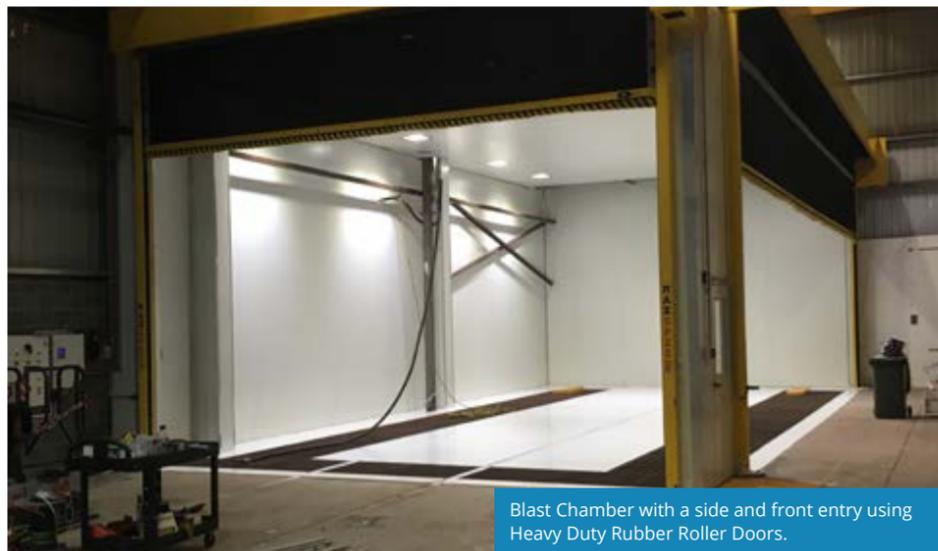
"The operations manager advised that they had to get a product ready for a show in a very short timeframe, and that it would have been impossible prior to installing their own Abrasive Blasting Booth. It made the process incredibly simple and effortless."

Investing in abrasive blasting equipment and selecting the right manufacturer is critical. Protoblast's full and partial recovery blast chambers, automatic blast machines, and ancillary equipment have revolutionised the blasting industry. From building machines for blasting ingot moulds and aluminium smelters to refurbishing heavy earthmoving equipment, surfboards, and even kitchen sinks, the company's capabilities are second to none. You can trust that you're investing in equipment designed and manufactured with the highest level of expertise and precision.

Protoblast's extensive experience, commitment to quality, and a broad range of capabilities make them a top choice for any industry. Take control of your abrasive blasting process and achieve your desired results with Protoblast.

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

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PRESERVING AND PROTECTING INFRASTRUCTURE THROUGH DURATEC BLAST AND PAINT SERVICES

In the age of industrialisation, the need for well-maintained infrastructure has never been more critical. Structures made of steel and concrete are in constant battle with the elements, and their wear and tear are only natural over time. Duratec, an Australian based company, has recognised this struggle and provides a solution with its blast and paint services. They have dedicated themselves to the preservation and restoration of these structures by offering abrasive blasting and coating services to combat corrosion, chemical attack, and abrasion.

Blast & Paint Capability

The protection of steel and concrete by abrasive blasting and coatings is one of the most economical and effective methods of combating corrosion, chemical attack, and abrasion.

With dedicated blast and paint yards throughout Australia, Duratec has the equipment, personnel, and experience to provide a quality, fast-tracked service for your next blast and paint project.

Whatever your requirements, Duratec delivers by utilising fit-for-purpose materials, from single and two pack epoxies and urethanes to high performance elastomers and polyureas.

Blast & Paint Services

The protection of assets from corrosion is a key commercial, safety and environmental issue. Duratec's expertise in the selection and application of high-performance protective coatings systems will significantly enhance your asset's operational performance and working lifespan.

Duratec's blasting and painting operations provide a valued abrasive blasting and protective coatings service for clients throughout Australia. From dump to trucks to mobile equipment and structural steel, Duratec has the capacity to deliver any size abrasive blasting and coatings project.

Services

- Abrasive blasting
- Protective coatings
- Commercial spray painting
- Industrial spray painting
- CIL tank maintenance
- Elastomeric urethanes
- Polyureas
- High build epoxies
- High-performance linings
- Waterproofing
- Acid proofing
- Wear resistant coatings
- Commercial flooring systems
- Industrial flooring systems

Train the Painter

Duratec is pleased to be one of Australia's first providers of an internationally accredited blast and paint training program. The program not only develops new talent but also provides experienced blast and painters with the opportunity to gain a formal qualification.

Train the Painter was developed by industry experts in response to strong demand from the industrial coatings industry. The course is delivered through an online platform and practical components are undertaken at one of Duratec's blast and paint facilities, using the same equipment and materials that would be used on site.

The program is aimed at coating applicators,

blasters and sprayers, and sets up participants for a successful career in the blast and paint industry.

Blast & Paint Apprenticeship

Duratec's nationally recognised Certificate III in Surface Preparation and Coating Application teaches you the techniques to abrasively blast-clean the metal surfaces of heavy industrial machinery, ships and infrastructure. You will then pair that knowledge with highly specific protective finishing methods delivered by a nationally accredited trainer and subject matter expert.

Karratha Blasting & Coating Facility

Duratec's state-of-the art, environmentally friendly, and efficient blast and paint facility in the Karratha LIA provides cost-effective abrasive blasting and protective coating services with exceptional quality finishes. The facility is cyclone rated, available in all weather conditions, and managed and maintained by their permanent local Karratha team.

Duratec's abrasive blast room is a fully sealed facility with an 1800cfm filtered dust extraction and abrasive recovery system. The facility is environmentally friendly, designed and manufactured to provide zero-discharge. The production line design allows equipment to be moved from the abrasive blasting process to the protective coating application process with ease and minimal set up using a trolley system within the fully enclosed facility.

The abrasive recycling system extracts contaminants and dust from spent abrasives and re-uses the material multiple times, which not only provides environmental benefits but also reduces abrasive costs and disposal charges. The dust extraction system

provides significant visual improvements, providing cleaner abrasive blast finishes the first time, every time.

Their new coating facility is a fully sealed 300 square metre room with a five-fan paint filtered paint extraction system enabling us to provide exceptional quality finishes. The entire process is completed within the facility, which means, items are not exposed to external conditions. The paint facility has a filtered louvre inlet system to ensure all incoming air is filtered and clean within the area. Much like the abrasive blast dust extraction, the paint extraction system removes overspray and dust particles from the paint application process, ensuring the cleanest and highest quality finishes. Significantly reducing the possibility of reworks.

A leading provider of protection and remediation services for steel and concrete structures, Duratec is dedicated to extending the lifespan of assets across a range of industries. As infrastructure ages, asset remediation and protection become increasingly crucial, and Duratec offers a comprehensive suite of services to address these needs. With a stable, long-term workforce, Duratec is well-equipped to deliver high-quality outcomes for clients and extend the lifespan of assets, ultimately reducing costs and enhancing the value of the assets over the long-term. **AMR**

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REVOLUTIONISING ROAD MAINTENANCE WITH THE GRADER PERFORMANCE MONITORING SYSTEM

Proof Engineers is a company at the forefront of developing advanced technology for the mining industry. Their innovative solutions are helping to revolutionise the way road maintenance is conducted, improving efficiency and reducing costs.

One of their recently developed products is the Grader Performance Monitoring (GPM) system, which provides real-time monitoring of road maintenance

activities. The GPM system displays critical data, including blade-down locations and key performance metrics, enabling efficient road maintenance. This advanced asset management system can be used as a standalone system or as an add-on to Proof Engineers' Road Condition Monitoring (RCM) technology, providing a comprehensive solution for road maintenance.

The GPM system is designed to help companies optimise their maintenance practices and improve overall road conditions. It provides real-time information on grader performance, allowing management to make data-driven decisions that result in cost savings and improved efficiency. The system is easily installed on the turntable above the blade, and data is uploaded in real-time through 4G LTE. The algorithms automatically calibrate

to determine blade up/down, and data is displayed on a secure online platform. The system provides automated and ad hoc reporting, and periodic reporting is available.

On the management platform, grader works (blade-down) are displayed, and green pixels show where the grader has worked, with the shade of green depicting the grading intensity. Red pixels show where the grader has travelled with its blade up. The GPM system calculates and displays key performance metrics, including productivity (time spent blade-down over total time) and efficiency (time spent blade-down over poor road sections). This efficiency metric is a vital parameter of the GPM system as it details whether the road maintenance team is working in the most valuable areas.

The GPM system integrates the road condition data gathered by Proof Engineers' RCM system to calculate the grader's efficiency. When the grader has had its blade down over poor road conditions, this is considered efficient grading. The GPM system provides a comprehensive solution for road maintenance, enabling operators to identify areas of the road network that require attention and prioritise maintenance activities based on actual conditions.

Proof Engineers' cutting-edge technology provides cost-effective results that enable operators to optimise their operations and improve their overall performance. By using the GPM system, mine site operators can make data-driven decisions that result in cost savings and improved efficiency, ultimately leading to a better road network.

AMR



PROVIDING SUSTAINABLE SERVICES WITH COST-EFFECTIVE SOLUTIONS

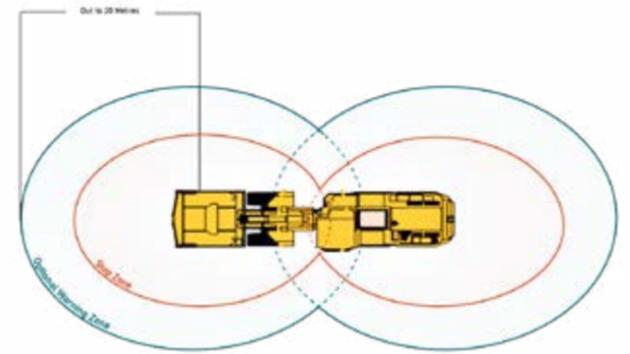


The Grader Performance Monitor (GPM) is a real-time asset management system used to monitor grader activities to display blade-down locations and key performance metrics. The GPM can be used as an add-on or standalone system to Proof Engineers' Road Condition Monitoring technology.

61 7 5522 0855

info@proofengineers.com.au

PROOFENGINEERS.COM.AU



ENHANCING SAFETY WITH MST'S PROXIMITY DETECTION SOLUTION

There is an inherent risk of collision when vehicles and personnel are travelling on the same shared roads and pathways, making it critical for all heavy operations to invest in a reliable Proximity Detection system – effectively putting a stop to potential risks before they arise.

MST Global's Proximity Detection solution provides real-time visibility to operators of personnel and light vehicles in their immediate vicinity, simultaneously reducing risk and significantly improving safety.

By creating a low magnetic field around ve-

hicles, the system detects and provides haptic-device alerts when pedestrians or light vehicles breach pre-set Warning and Danger Zones.

Magnetic pulse technology was chosen because it offers precision tracking, creates a consistent and repeatable detection range, is highly effective in detecting distances for both underground and surface environments (GPS can only be used on the surface) and, because it works independent of everything else, the system will remain operational in an emergency event or power-down situation.

Additionally, the system is unaffected by environmental low light, rain, dust or fog and is easy to install, making it both an attractive and cost-effective option for harsh environments.

The system can be customised to meet exact operational requirements and safety protocols, with three detection zone thresholds configurable from up to 20 metres:

- **Warning Zone** alerts the operator that something is in the vicinity, but not necessarily a danger.
- **Danger Zone** provides another alert; however, for heightened safety, automated Equipment Stop or Vehicle Speed Reduction can also be implemented for an extra layer of protection.
- **Safe Zone** is around the cab: when the operator is within that zone they do not trigger the system but, if they exit the cab, they move into the Danger or Warning Zone.

Distances for the detection zones are easily configurable through a simple, password-protected user interface, only accessible to authorised personnel on site. Further,

all events are logged and easily accessed for auditing or reporting.

Designed to be equipment agnostic, user-friendly and to be easily retrofitted to any existing vehicle fleet, MST Global's Proximity Detection solution is a great fit for underground as well as open pit operations, ports, as well as industrial and construction sites.

Because it's not restricted to a particular OEM, MST's Proximity Detection solution is easy to install to different pieces of equipment within an existing or mixed fleet - there's always an opportunity to improve the safety of your equipment and your people. **AMR**

LEARN MORE: CLICK BELOW



<https://mstglobal.com/proximity-detection/>

Proximity Detection



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Visual, audible & physical alerts



Unaffected by low light, rain, dust or fog

Self-contained, real-time proximity detection for personnel & vehicles.

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EVERYBODY DEALS WITH FATIGUE...

WHY IS IT SO IMPORTANT IN MINING?

Fatigue has been a major threat within the mining industry since its inception but is very rarely quantified into publishable statistics. A study published in 2007 (Viewpoint: Perspectives on Modern Mining by Caterpillar Global Mining) indicates up to 65% of truck haulage accidents in mining operations are directly related to operator fatigue. Additionally, There was a significant percentage of cases attributed where incidents were influenced by fatigue. While not the sole cause - fatigue resulted in an operator's inability to adequately assess and navigate a dangerous situation, such as a difficult haul road condition or a technical fault, resulting in an incident.

Mining puts workers in the line of fire regularly simply by the nature of the 24/7 role and industry. According to Safety Health Magazine the injury risk for night shift workers is 31% higher than their day shift counterparts and the risk of injury doubles by the 12th hour of a shift. After 17 hours awake, it is commonly estimated that the impact on reaction time is slowed by 50% or that of a person who would be convicted for Drink Driving with a 0.05% Blood Alcohol Content (BAC). If proper rest is not attained, the clock does not reset the next day for an employee who turns back up at work for their shift. At 24 hours awake it becomes that of a person with 0.1% BAC, magnifying the potential for errors.

The average Microsleep event lasts between 2 and 20 seconds. At 48 kmph and being generous with only 2 seconds of duration, that is just over 26.5 metres of driving a 400 ton fully loaded haul truck with their eyes closed.

For companies that employ people in the mining industry, fatigue is much more than just needing a coffee to get through the next hour. Fatigued employees can result in serious occupational and health safety risks to themselves and others around them as well as billions of dollars annually in lost productivity, attendance to work and other expenses.

Thankfully there is now a range of solutions and technology available to assist from a variety of angles at prices that suit all levels of budget constraints, ensuring fatigue management is accessible to all, not just Tier 1 producers with global operations because fatigue affects everyone.

Fighting Fatigue and Distraction with Single Source

Single Source Solutions work across multiple industries providing the relevant information to the end users in an easy to digest and quick to action format. Working directly

with their partners to service their 400 customers protecting over 15,000 vehicles here in Australia, the dedicated offering can work across any existing technology hardware provider or one of their recommended suppliers through various forms of integration. By remaining outcome-focused and hardware agnostic, Single Source empowers customers to choose the best-in-class product for their market fit and still get the same benefit as buying everything from the same manufacturer.

One of the biggest successes to date has been the implementation of various Driver Monitoring Systems (DMS) - AI powered camera solutions that monitor the driver (or operator) for real-time fatigue, distraction, or other events of concern. In remote areas across Australia, this has presented a unique set of challenges to deliver a solution that not only produces the reporting and satisfies the compliance / duty of care aspect but protects the drivers in the vehicles on the front line where there is limited or no coverage. This includes the incorporation of additional hardware such as a vibration motor on the back of the seat to wake the driver from microsleeps, creating harnesses that disable the system when the park brake

is applied to reduce the number of false events generated or fit different communication methods such as satellite where 4G coverage is patchy.

Using their proprietary platform continually developed and supported entirely here in Western Australia, Single Source can seamlessly incorporate data from multiple sources and hardware providers to give additional contextual information. For example, alongside the DMS event the customer sees the identify the driver and their phone number from the Telemetry unit, the weather conditions from Internet Sources and any other vehicles that may have been impacted from other Camera Systems. By benchmarking the data inside your company and against their existing population, you can access invaluable insights into how your individual drivers or operations compare to each other or the rest of the industry when it comes to metrics such as operating hours per fatigue event or kilometres driven per cell phone usage event.

Their management focused Native App is in Beta testing stage with existing customers, which will revolutionise how companies to manage and work through any DMS events

remotely. As soon as an event is triggered on the device in-cab, it will be available in the app and updated live as it goes through monitoring centres or is modified by other users. No more waiting for phone calls or having to drag the laptop out at all hours to review the footage, work out who is driving the vehicle and find their contact details - it is all in the same screen and ready to action as soon as it happens.

Reach out to Single Source Solutions to get an operational assessment today - through their partners they have a range of hardware solutions for almost any mining application combined with a network of technicians across Australia to support implementation and ongoing maintenance. They can connect to any of your existing systems to give you a single source of truth for your operation and assist in fitting sensors or IoT devices to obtain data from any legacy equipment.

To find out more about Single Source, call **0429 312 840** or email **enquiries@singlesource.com.au**

AMR

MORE THAN
114 MILLION
EVENTS DETECTED TO DATE

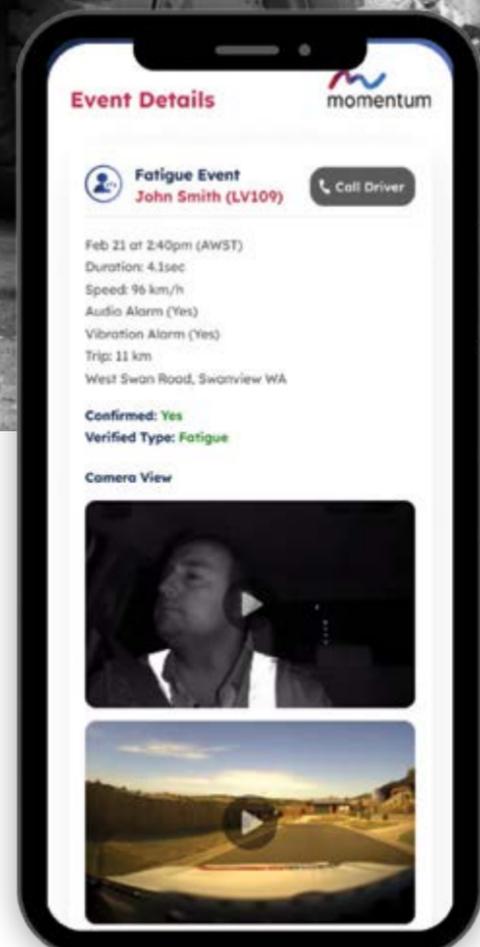
MORE THAN
570 THOUSAND
CLASSIFIED FATIGUE EVENTS

SCIENTIFICALLY PROVEN
TO REDUCE FATIGUE
EVENTS BY MORE THAN
90%

Manage Operator Fatigue & Distraction From Your Fingertips

One of the most significant safety risks in the logistics industry is driver fatigue or distraction.

Single Source innovates for driver safety through monitoring, detecting, and alerting.



single**source**
SOLUTIONS

singlesource.com.au



Accurately Measure Level Through Dust Suppression Sprays

Hawk Measurement Systems (HAWK) is a world leader in level, position, and flow measurement, providing cutting edge equipment to the global industrial market.

With 30 years of experience and a record of success in a wide range of areas including mining/mineral processing, water supply/wastewater, bulk material handling and chemical.

HAWK's on-going commitment is to provide industry leading technology and cost-effective solutions.

HAWK designed and developed a powerful level transmitter that accurately measures level through dust suppression sprays.

HAWK uses Acoustic Wave technology for their non-intrusive, Sultan Continuous Level Transmitter range.

Applications include, Primary Crusher Surge Bin, Secondary and Tertiary Crushers, Process Slurry Tanks, Stockpile Level Control, Truck Detection, Shuttle Conveyor Positioning Transmitter, Anti Collision Controls and more.

The major advantages that Acoustic Wave technology, brings to Mining applications are:

1. Automatic Cleaning of condensation and buildup off the face of the measuring diaphragm, that Radar technologies do not offer.
2. Continuous measurement of solids even when dust suppression sprays are activated.
3. A range of acoustic transmitters. 5Khz, 10Khz, 15Khz, 20Khz, 30Khz, 40Khz, 50Khz frequencies up to a maximum range of 300 feet, integral or remote versions.
4. Foundation FieldBus, ProfiBus PA, HART, integral two wired transmitters or remote transmitter versions.

Acoustic Wave products distinguish themselves from traditional ultrasonic and radar level products by combining low frequency, high power and adaptive gain technology.

In this way, you can measure even the most difficult level applications, such as, Primary Crusher Surge Bins, Process Sumps that suffer from condensation, froth and foam.

These applications have always been problematic on mine sites and by careful selection of transducer frequencies and housing materials, HAWK can offer process application guarantees.

A common application in the mining industry is to measure depth of ore, after a truck has dumped into a ROM Bin.

It is important to maintain a specific level of ore to protect the Apron Feeder and to indicate when the next truck can dump.

This application is challenging because of water dust suppression sprays, dust, build-up, large lump to fines, ore size, grizzly beams etc.

For this application we must always use a non-intrusive level technology that is positioned out of the way of being physically damaged by the truck and the falling Ore.

If a Grizzly is installed a position between two beams in a central position of the ROM Bin is always the best.

Two technologies are available: Radar and Acoustic level transmitters.

Both have the range capability in a dry application, but when Water Sprays are used to suppress dust, the water and dust build-up on the Radar will make it fail.

About Hawk Measurement Systems
Hawk Measurement Systems (HAWK), a world leader in level, positioning, asset monitoring and flow measurement technology, provides cutting-edge

equipment and complete solutions to the mining industry and the global industrial market.

HAWK specializes in reliable and continuous level measurement in storage silos, on conveyor belts, clarifiers, crushers and blocked chute detection with the ability to send real-time data to a computer, control room, or smartphone.

HAWK has a long history of success in the harshest of environments and applications. HAWK has won several prestigious awards for their breakthrough technologies.

Some of these technologies include Acoustic Wave, Ultrasonic, Microwave, Radar, and Fiber Optic Sensing.

HAWK designs and develops innovative measurement technology that is extremely

reliable and accurate, simple to install, easy to operate and offers maximum efficiency.

The mining industry presents unique challenges due to dust, mud, impact, abrasion and build-up of material on sensors and plant, which HAWK has successfully solved for over 30 years.

HAWK is committed to providing best-in-class products, services and technologies that will have unsurpassed value for their customers.

HAWK currently has two manufacturing facilities, headquarters in Melbourne, Australia and the USA manufacturing facility in Medina, Ohio.

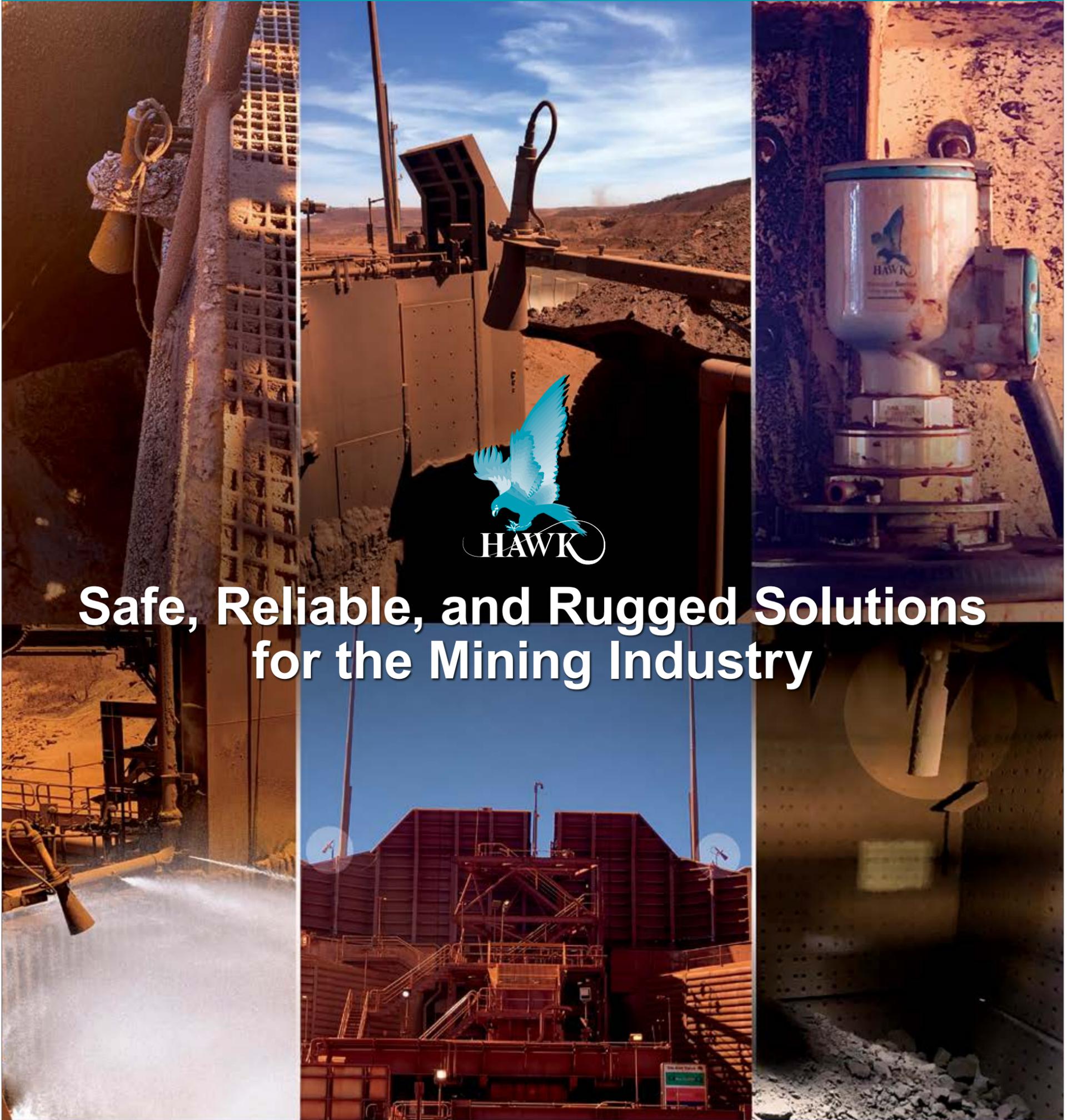
For further information, contact Hawk Measurement at inquiry@hawk.com.au

AMR



HAWK's Sultan Acoustic Wave Transmitter accurately measuring rock level in a rugged quarry application.

HAWK's Sultan Acoustic Wave Transmitter features a self-cleaning sensor and automatically cleans condensation and buildup off the face of the measuring diaphragm, that Radar technologies do not offer.



Safe, Reliable, and Rugged Solutions for the Mining Industry

Hawk Measurement Systems' (HAWK) award-winning products, technologies and complete monitoring solutions help the mining industry to increase profitability and eliminate downtime.

HAWK specializes in reliable and continuous level measurement in storage silos, on conveyor belts, clarifiers, crushers and blocked chute detection with the ability to send real-time data to a computer, control room, or smartphone.

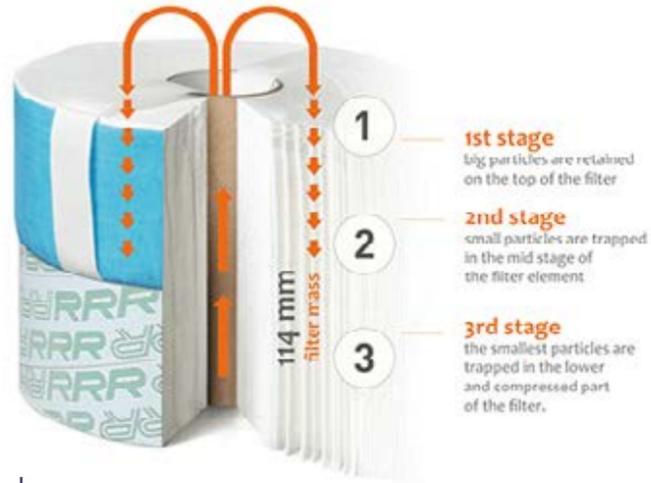
The mining industry presents unique challenges due to dust, mud, impact, abrasion and build-up of material on sensors and plant, which HAWK has successfully solved for over 30 years.

Our ongoing commitment is to develop & provide **industry leading technology** and **cost effective solutions**

Hawk Measurement Systems | inquiry@hawk.com.au | www.hawkmeasurement.com | T: +61 (0)3 9873 4750

PERFECTLY CLEAN OIL

Triple R Filtration Australia is the leading provider of Triple R Filters and Tan-Delta oil condition sensors in the Australian market.



Engine oil filtration

Increased demands to extend oil change-out intervals on engines has resulted in the use of synthetic oils being used on modern engines. These synthetic oils have resulted in oil change-out intervals being significantly increased, thereby reducing costs associated with oil changes. Extended oil change-out intervals have also impacted the filter used on the engine. Change-out of the filter element is in most cases associated with a change-out of the oil and the filter element has therefore had to be adapted to meet this requirement.

Filter elements have also had to adapt to other aspects of modern engines.

- Improving fuel economy
- Improving power
- Reducing emissions

Clean oil improves fuel economy and power output by reducing friction and wear on moving parts of the engine. Increased wear causes oil to enter the combustion chamber, burns with the fuel and is exhausted into atmosphere as particles and hydrocarbons.

Full flow and by-pass filters

Filters usually installed and supplied with the engine are referred to as full flow filters.

A variety of housings makes the Triple R filter solution suitable for any size engine.



The total flow rate of the lubrication pump is directed through this filter to lubricate the engine. By-pass filters are an addition to the full flow filter. A flow of oil is directed from the main oil supply into this filter to enhance filtration capability. Filter media used in by-pass filters is specifically designed to capture small particles which the full flow filter cannot.

Soot

Soot and sludges in engine oil are formed as a by-product of incomplete combustion. When the air and fuel mixture fails to ignite completely, there is leftover particles. These particles find ways into the lubricating oil and is reflected as soot. It is very rare that the engine combusts completely, so most engines will produce soot.

Extended oil change-out intervals increase the risk of high soot build ups in the engine oil. Full flow filters installed on engine have limited ability to remove this soot as particles are too small for the filter to remove. By-pass filter however have the ability to remove this soot and sludges in oil.

Oil change out intervals

Oil change-out intervals are almost always dictated by the engine manufacturer. These intervals are based on distance or operational hours of the engine. There is an increasing trend to further extend these intervals.

Testing of oil samples has shown that this can happen after the recommended interval has elapsed.

Triple R by-pass filters

Triple R filter elements have unique features which make the element suitable for by-pass filters used on engine. No other filter element on market displays these unique features.

1. Engine oil enters the filter media in a radial direction. This ensures that oil is directed into the thick 114mm of depth media.
2. A 1st stage of filtration ensures that larger particles are trapped in the least compressed filter media. By doing this, element lifetime is extended.
3. In the 2nd stage, the filter media, which is now more compressed, ensures that

smaller particles are being filtered out of the oil. This again ensure maximum filter lifetime.

4. In the 3rd stage of filtration, the filter media is compressed at maximum by means of the outer wrap, which traps all small particles in the oil.

The filter element has a very large volume of cellulose filter media contained within. This volume or area of media ensures that the element is effective at removing contamination as well as ensuring extended lifetime of the element A selection of housings makes the Triple R filter solution suitable for any size engine.

Selection of the type of filter housing is carried out quite simply by the sump size of the engine. Housings are typically available in aluminium, steel and stainless steel and range from single element housings to multiple element housings.

Housings are supplied with integrated valves needed for functioning of the filter as a by-pass filter fitted onto the engine. This makes installation hassle free with no other control valves to be installed.

Oil condition sensors fitted on-engine

Our expertise extends into providing solutions for on-line oil condition sensor solutions. These sensors are installed on-board engine and provide feedback to the user on condition of the oil. Use of continuous real time on-line oil condition sensors reduces risks associated with infrequent oil sampling and gives the user transparent information on oil condition to make more informed decisions on oil change outs.



Plug and play solutions for logging and retrieving data.

Tan-Delta

Triple R Filtration Australia is proud to represent Tan-Delta oil condition sensors in the Australian market. We are the leading provider of Tan-Delta sensors into Australian market. The Tan-Delta sensor outputs the condition of the oil as a n 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**



Triple R TANDELTA Oil Condition Monitoring

THE NEXT GENERATION IN OIL FILTRATION

We specialise in providing solutions to improve oil cleanliness and condition by utilising Triple R depth elements.

+61 3 5134 5345 or +61 3 7019 9351 info@triple-r-filtration.com.au

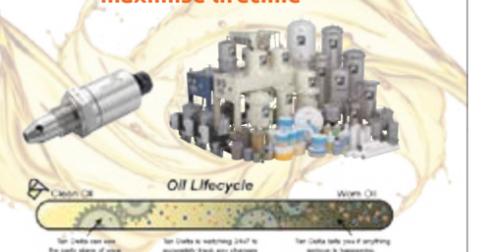
www.triplerfiltration.com.au

The 3 stages of filtration in the element ensures that the oil remains free of water, varnish, sludges and particles.

Applications include:

- Hydraulic systems
- Diesel and Gas driven engines
- Lubrication oil systems for Compressors
- Metal working fluids
- Gearboxes
- Heat transfer fluids

Measure and treat oil to maximise lifetime





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6 VITAL TOOLS TO GROW YOUR BUSINESS

Our Mining Business Development Package has helped businesses like yours, across a range of industries, to form relationships with key decision makers on Australian mine sites.

The 12 Month Package includes:

- Access to our Mines Database (Provides details for Key decision makers across 400 mines)
- Social Media Blast to over 7000 followers across all Publications & Exhibitions platforms
- 12 hard copies of The Australian Mining Review (monthly), including The Australian Oil & Gas Review
- Weekly Mining Report (Carefully researched, real business opportunities)
- Weekly Mines Activity Report (Operational Activity specific to Mine Sites)
- Directory listing on Mine Suppliers Online



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MINESITE RECYCLING LEADING THE WAY WITH SUSTAINABLE WASTE MANAGEMENT



Waste management is a critical aspect of the mining industry that often goes unnoticed, but it plays a vital role in ensuring that mining operations are environmentally sustainable and socially responsible. As the mining industry continues to grow and expand, the need for efficient and effective waste management solutions has become more pressing than ever. With over 20 years of experience in the mining industry, Minesite Recycling was founded by Mathew Sinclair with a deep understanding of the challenges that mining companies face in managing their waste.

The company has grown to become a trusted partner for mining companies in Western Australia, providing comprehensive waste

management solutions that are tailored to each client's specific needs.

Minesite Recycling's goal is to provide a one-stop solution for all site waste management requirements, emphasising convenience and adaptability while reducing costs and minimising environmental impact. With a focus on recycling whenever feasible and waste solutions tailored to each client's needs, the company's commitment to accountability and documentation ensures that all waste streams are handled responsibly.

The company's Leonora Landfill Facility is a prime example of Minesite Recycling's dedication to minimising environmental impact.

By transitioning to a class 2 landfill site, Minesite Recycling aims to reduce the overall footprint left behind by its clients while improving the separation and recycling of waste that would not be feasible onsite. The facility's fully certified weighbridge has led to increased turnaround time, which translates to better results for clients.

Minesite Recycling's extensive fleet of machinery is routinely serviced in the company's workshop located in Kalgoorlie. The fleet includes a range of trucks, material handlers, excavators, front-end loaders, forklifts, and trailers, allowing the company to offer cost-effective clean-ups and demolition services that cater to each client's individual needs.

In addition, the company's regular bin service runs ensure that all waste streams are cleaned up regularly, saving clients money on transport and keeping their site clean.

Minesite Recycling is a reliable and trustworthy partner for mining companies looking for waste management solutions that are environmentally sustainable and socially responsible.

With its comprehensive solutions, commitment to accountability and documentation, extensive fleet of machinery, and focus on supporting local communities, Minesite Recycling is a company that mining professionals can trust to deliver results. **AMR**



**MINESITE
RECYCLING**



GREEN • METAL

Comprehensive Waste Management Services for the Mining Industry

Minesite Recycling is your trusted partner for efficient and effective waste management solutions. With over a decade of experience and a commitment to sustainability, we provide comprehensive services tailored to the specific needs of mining companies in Western Australia. From recycling to landfill management, we are dedicated to minimising environmental impact while maximising cost savings.

Contact us:

08 9093 0913

admin@minesiterecycling.com.au

www.minesiterecycling.com.au

SPARTEL

REVOLUTIONISING SUSTAINABILITY IN THE MINING INDUSTRY

In an era of increasing environmental consciousness and regulation, the mining industry faces the pressing need for sustainable waste management solutions. Recognising this need, Spartel Pty Ltd emerges as a leading provider of innovative technologies and services tailored specifically for the mining industry. In business since 1996, Spartel has over 25 years of experience in the industry as experts in waste management and pollution control. With a commitment to environmental responsibility, Spartel offers a comprehensive range of relevant solutions to address waste management challenges and promote sustainable practices.

On-Site Organic Waste Composting Technology

One of the key technologies offered by Spartel is their state-of-the-art on-site organic waste composting technology. Designed to handle various organic waste streams, including food waste, green waste, and overburden, this ground-breaking technology enables mining operations to effectively manage their organic waste on-site. The composting technology comes with a remote access wireless process control system with a range of 2 km.

By implementing this composting system, mining companies can eliminate organic waste disposal to landfill, eliminate vermin and odour, produce a richer product for

mine site rehabilitation and prolong the life of the landfill leading to significant cost savings promote resource recovery, and contribute to a circular economy.

Glass Bottle Crushers and Recycling Services

Spartel understands the significant volume of glass waste generated in the mining industry. To tackle this challenge, they provide innovative onsite glass bottle crushers that can achieve an impressive 80% volume reduction. These crushers are designed to efficiently process glass bottles, transforming them into manageable cullet for recycling. Spartel also offers mine site glass recycling services, ensuring that the recovered glass is properly recycled and diverted from landfill, thereby minimising the environmental impact.

Plastic Bottle/Container Shredders

In addition to glass waste, plastic bottles and containers pose a significant challenge for the mining industry. Spartel addresses this issue by offering advanced plastic bottle/container shredders, achieving volume reduction of an amazing 96%, making the plastics recycling process more efficient and cost effective. By implementing these shredders, mining operations can effectively manage their plastic waste, promote recycling, contribute to a cleaner environment and achieve cost savings.



Certified Organic Fertiliser

Spartel revolutionised the fertiliser industry in 2006 with FABFert, an organic fertiliser designed for vegetable farms and mine site rehabilitation and landscaping. It combines high nutrient levels, low odour, and minimal environmental impact. FABFert contains valuable nutrients free of chemicals. Spartel ensures product quality control.

Odour Control Technologies and Products

Spartel provides advanced odour control

technologies and tailored products for the mining industry, creating a pleasant working environment while demonstrating environmental stewardship. They offer a wide range of innovative solutions to address waste management challenges, helping mining companies comply with regulations and enhance their reputation as responsible corporate citizens. Spartel leads in environmental innovation, delivering efficient solutions for a greener, sustainable future in the evolving mining industry. **AMR**



SPARTEL PTY LTD
Environmental solutions for a sustainable world

Cutting-edge Technologies and Services for Sustainable Mining Operations

On-Site Organic Waste Composting:

Efficiently manage food waste, green waste, and overburden through Spartel's advanced composting technology. We also provide complete organic waste collection and compost Plant operation services.

www.FAB-COM.com.au

Glass Bottle Crushers and Recycling:

Achieve an 80% volume reduction of glass waste while promoting recycling and minimising environmental impact. We also provide crushed glass collection and recycling services and lease arrangement for crushers.

www.bottlecrusher.com.au

Plastic Bottle/ Container Shredders:

Effectively process and manage plastic waste with Spartel's state-of-the-art shredders, contributing to a cleaner environment. We also provide shredded plastic collection and recycling services and lease arrangement for crushers.

www.bottlecrusher.com.au

Odour Control Solutions:

Address odour challenges in mining operations with Spartel's specialised technologies and products for a more pleasant workplace. For environmental compliance

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GREEN PLANET PACKAGING

Leading the Way in Sustainable Mining Practices

Did you know that for every tonne of poly pipe recycled, approximately 15.3 barrels of oil, 1800 litres of water, 98 million BTUs of energy, and around 30 cubic meters of landfill space are recovered? By introducing this material back into the manufacturing industry, Green Planet Packaging (GPP) is making a significant environmental impact.

GPP specialises in the resource recovery process of plastic materials, with a focus on poly pipe recycling. With over 20 years of experience, GPP offers comprehensive and eco-friendly solutions to mine sites, aiming to reduce their environmental impact and preserve natural resources.

GPP recognises the significance of plastic waste management in the mining sector, particularly in relation to polyethylene pipes used for water distribution. Their aim is to

make the process seamless and cost-neutral for mine sites, providing viable solutions that align with their environmental obligations.

GPP offers a wide range of recycling services tailored to meet the unique needs of mine sites. Their expertise extends beyond poly pipe recycling to include the collection and recycling of various materials such as IBCs, batteries, and both ferrous and non-ferrous metals. By expanding their recycling capabilities, GPP contributes to reducing overall mining waste and promoting a circular economy.

Safety is a top priority for GPP, and they ensure that all processing equipment used meets rigorous safety standards and is specially modified for mine site usage. They comply with Mine Safety Plans and maintain a culture of safety excellence through exten-

sive risk analysis training and adherence to mine site procedures.

In addition to recycling plastic waste, GPP also manufactures film wraps and reusable plastic resin, supporting local Australian businesses and fostering a sustainable and circular economy within the country.

GPP's commitment to safety, resource recovery, and sustainability positions them as a leader in promoting responsible mining practices. By reducing plastic waste and preserving natural resources, GPP plays a vital role in creating a greener and more sustainable future for the mining sector.

As part of their business, GPP has a second arm called 4Recycling. This division focuses on the recycling and reprocessing of LDPE and LLDPE soft plastics. 4Recycling offers

solutions such as reprocessing recycled plastics for manufacturing new products, collecting bulk soft plastics for recycling, pelletising LDPE for manufacturers to use instead of virgin material, and maximising recycled content through in-house reprocessing.

Green Planet Packaging and 4Recycling are dedicated to promoting sustainability, responsible waste management, and the circular economy in the mining industry.

Their comprehensive recycling services and commitment to environmental responsibility set them apart as leaders in promoting responsible mining practices.

Contact GPP today to learn more about their services and how they can help your mine site fulfil its environmental obligations while reducing its ecological footprint. **AMR**

DISCOVER THE POWER OF RECYCLING

With every tonne of poly pipe repurposed, Green Planet Packaging rescues 15.3 barrels of oil, 1800 litres of water, 98 million BTUs of energy, and a staggering 30 cubic metres of landfill space.

Contact us to transform your operation and make a real difference for the environment.

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Designed for all your raiseboring applications



United. Inspired.

An unbeatable combination in raiseboring equipment

Epiroc has a long history in raiseboring with a full product offering from the raiseboring machine, through to the raiseboring consumables, including the raisebore drill string. Are you looking for a raiseboring machine, drill pipes, pilot bits or something else when it comes to raiseboring? Look no further, we have all you need.

 **Epiroc**



epiroc.com/en-au

REVOLUTIONISING REAGENT DOSING FOR THE MINING INDUSTRY

In the mining industry, the process of extracting base metals from ore is complex and involves using reagents to maximise the yield. Reagent dosing also plays a part in toxicity reduction for waste processes such as in tailings dams.

Reagent dosing is a critical but fickle process: underdosing can reduce the recovery yield, while overdosing can be a waste of money and increase risks for mining operations. Overdosing can be particularly dangerous since reagents are inherently hazardous and can have significant environmental, occupational health and safety impacts. Dosing accuracy and reliability is crucial.

Finding an accurate, reliable, and customised solution that helps to achieve maximum recovery yield while minimising the use of hazardous chemicals, is where Bürkert Fluid Control Systems can assist.

An example of Bürkert technology applicable to mining applications is the Type 3361 valve process controller. The electromotive actuator with ball screw positions the control cone with highest precision at a positioning speed up to 6 mm/s, reacting almost delay-free to process signals.

Pressure fluctuations or surges in the medium are not transferred to the valve position, and each flow-optimised valve body can be equipped with up to five different valve seats for a precise adaptation according to needs.

The Type 8756 mass flow controller and mass flow meter is also particularly suitable for the very precise measurement or control of small quantities of liquid that also require a medium-separated sensor.

The measuring principle of the sensor is based on the Coriolis effect and is completely

independent of the medium, with pressure and temperature deviations have no impact on accuracy. In addition to the flow rate, the density and temperature of the liquid are also measured.

The device design enables a stable flow measurement that is immune to external vibration. Supporting flow measurement and control up to 120 kg/h, it offers high long-term stability, with no zero-point adjustment necessary.

The implementation can be done via your standard 4-20ma signals back to your SCA-DA or industrial Ethernet technologies, such as EtherNet/IP, by the mining industries also permits the use and transmission of both cyclic and acyclic data, providing valuable information for condition monitoring and preventative maintenance.

Bürkert devices such as the Type 3361 and

8756 can interface with most industrial Ethernet protocols currently available, maximising flexibility and potential implementation. The Type 3361 and Type 8756 are only two examples of the precision technology available, and as a provider of dosing control solutions, Bürkert Fluid Control Systems can provide the most suitable dosing solution for the application, providing tailored solutions that address each application's unique needs.

With its holistic approach, strong communication and engagement, and understanding of mining company sustainability goals, Bürkert Fluid Control Systems has been able to stay ahead of the curve in terms of emerging technologies and trends.

Bürkert Fluid Systems is revolutionising reagent dosing in the mining industry, providing optimised, sustainable, and cost-effective solutions. **AMR**



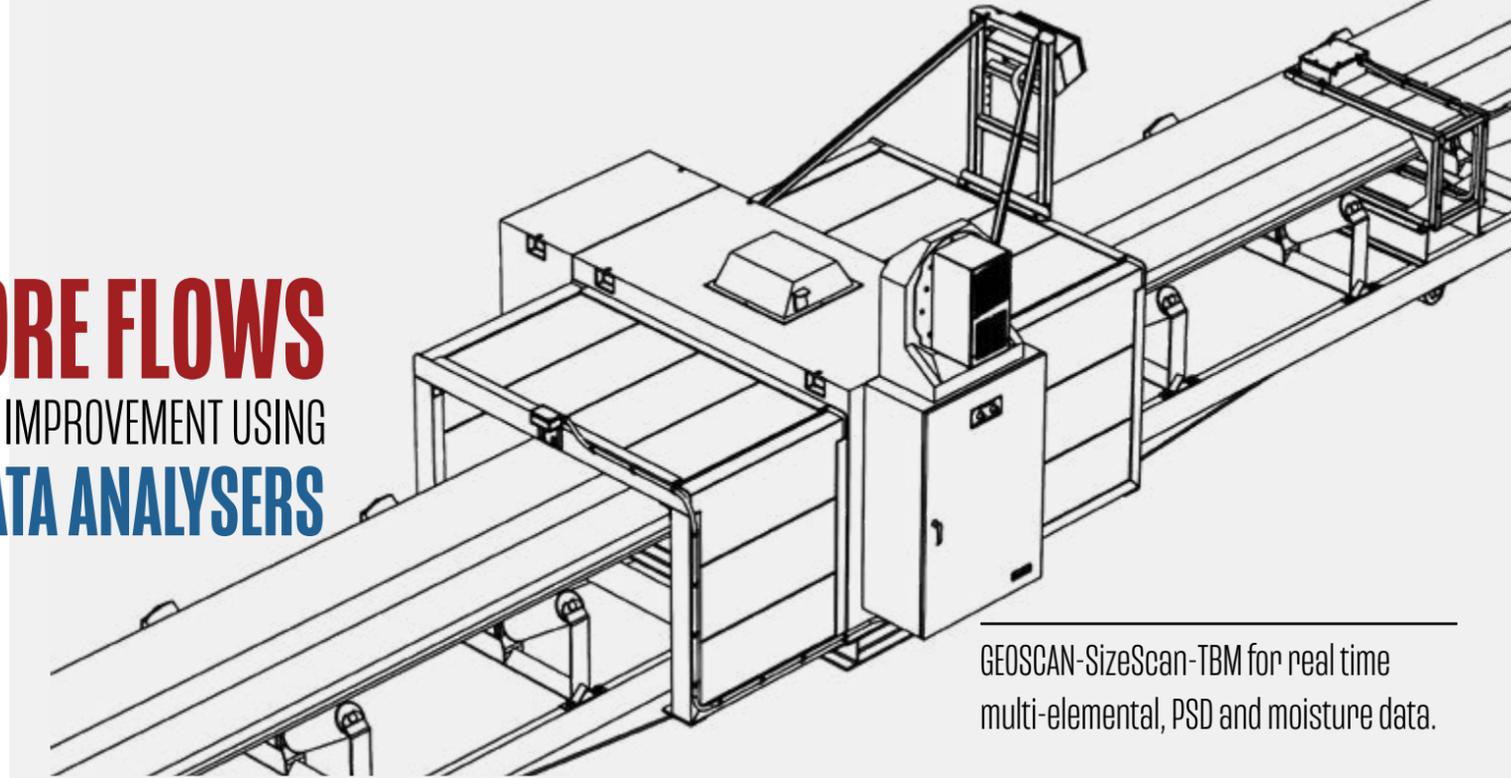
Mining prefer to partner with us for Process Control solutions



bürkert
FLUID CONTROL SYSTEMS

DIGITALISING ORE FLOWS

FOR PRODUCTION AND PROCESS IMPROVEMENT USING SCANTECH ROCKS2DATA ANALYSERS



GEOSCAN-SizeScan-TBM for real time multi-elemental, PSD and moisture data.

Pursuit of improvement opportunities inevitably requires more data – data from material flows not currently measured, and high quality data that provides confidence in decisions based on that data. Such data is generated through representative real-time measurement of conveyed material quality at various points between the mine face and mill feed. Real-time data enables effective decisions that improve operational performance.

Scantech International has developed and implemented a range of conveyed based analysers specifically for this purpose.

GEOSCAN GOLD is a premium elemental analyser featuring the highest specification prompt gamma neutron activation analysis (PGNAA) technology available. TBM moisture analysers utilise transmission microwaves to provide reliable moisture measurement in many commodities.

Sizescan is a next-gen 3D Infrared camera technology used in PSD (particle size distribution) and FOD (foreign object detection) applications with many demonstrable advantages over commonly used systems.

GEOSCAN GOLD is proven in multiple commodities to provide multi-elemental data each thirty seconds of conveyed flow

at high precisions at throughput rates up to 15,000 tph irrespective of belt speed, particle size, mineralogy, dust, moisture or segregation/layering. Many elements from carbon upwards are measured. Moisture data and Sizescan data is available every few seconds ensuring that measurements can be combined and utilised for parameters that may not be directly measurable, such as ore hardness. Moisture data on its own or in combination with particle size data can be used for material flow control (e.g. indicating stickiness and clumping), dust management, dry tonnage determination, metal accounting, dewatering optimisation, and TML (transportable moisture limit) monitoring.

Scantech's Rocks2Data approach ensures operations have access to reliable, frequent, accurate measurement data to manage ore supply quality and hence feed quality and process performance. Improvements in ore quality and consistency of process feed through bulk sorting to remove coarse waste produces major benefits including

better process recoveries. Rejecting waste generates major savings in energy, water, grinding media, and reagent consumption and reduces fine tailings generated per tonne of concentrate or product.

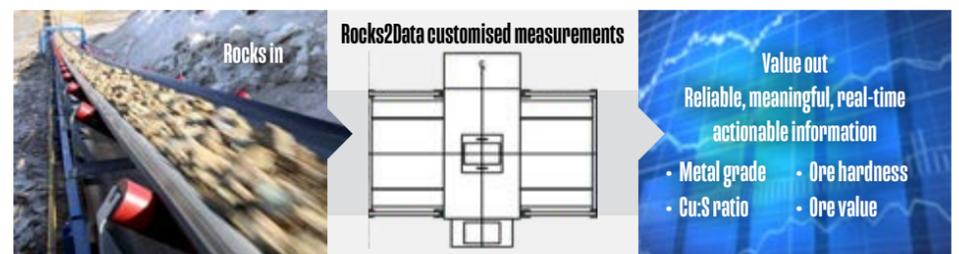
Reducing process feed quality variability alone can deliver up to 10% improvements in metal recoveries as a step change for mining operations. Bulk sorting has been shown to reject 5 - 20% of feed tonnes and increase feed grade by 10 - >20% while conveying material at full production rates.

Representative data produced by bulk sensing technologies on post-crusher

conveyed flow provides a representative measurement of mine product and plant feed that enables effective ore reconciliation, metal accounting, ore tracking, ore blending, bulk sorting, feedback to mining teams and feed forward control for process operators. The enabling technologies are vital for achieving improvements in process performance, resource utilisation, ESG outcomes and sustainability of mining operations.

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

AMR



GEOSCAN GOLD

Premium Quality On-Belt Elemental Analyser for Minerals

World first **GOLD** analyser for conveyed ore, unique capability, proven technology, digitalising ore flows through Rocks2data customisation module.



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Cooper Fluid Systems Leads the Way in Innovative Fluid Management Solutions

Wiggins JNX refuelling systems have become increasingly popular in the mining industry, offering efficient, safe, and reliable solutions for refuelling heavy equipment. Developed by AdelWiggins Group, a leading manufacturer of high-performance fluid transfer systems, these systems are distributed in Australia by Cooper Fluid Systems, a reputable supplier of fluid management solutions.

One of the key benefits of Wiggins JNX refuelling systems is its safety and reliability. Built with high-quality materials and engineered to exacting standards, these systems are designed to withstand the harsh environments of mining operations. They are also designed with safety in mind, incorporating features such as self-sealing couplings that prevent fuel spills and protect against fire hazards.

In addition to safety and reliability, Wiggins JNX refuelling systems are also known for

their superior performance. Designed to meet the demanding requirements of mining operations, these systems offer fast and efficient refuelling with high flow rates and minimal pressure drop. This means that heavy equipment can be refuelled quickly and easily, reducing downtime, and ensuring that operations run smoothly.

Another advantage of Wiggins JNX refuelling systems is its flexibility. They can be easily customised to meet the specific needs of different mining equipment and applications, with a wide range of options and configurations available. This means that operators can choose the system that best fits their requirements, ensuring that they have the right equipment for the job.

Overall, Wiggins JNX refuelling systems, distributed in Australia by Cooper Fluid Systems, have revolutionised the way heavy equipment is refuelled in the mining industry,

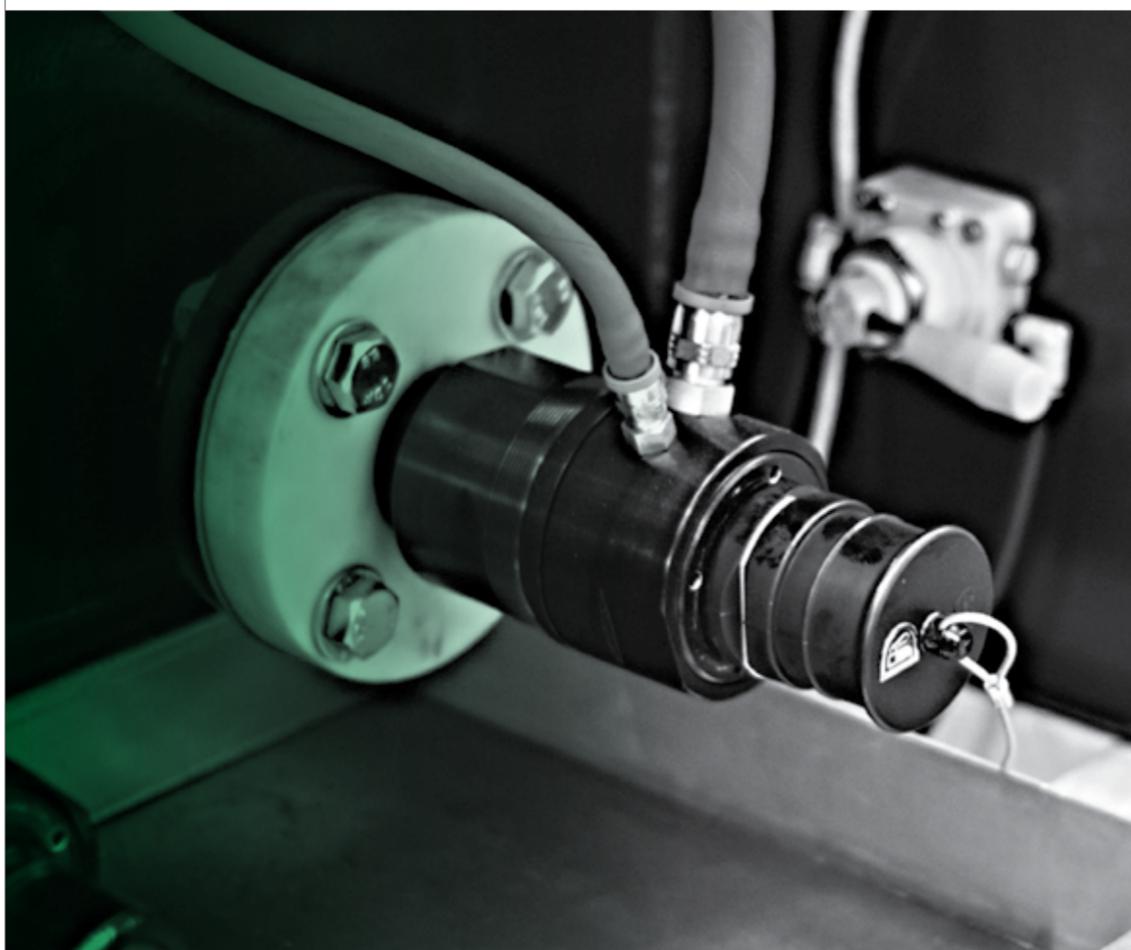
offering a combination of performance, safety, and flexibility that is unmatched by other refuelling systems. Whether used for surface or underground mining, these systems have proven to be reliable and effective, helping to ensure that mining operations run smoothly and efficiently.

As the mining industry continues to evolve and new technologies emerge, Cooper Fluid Systems continue to be a trusted supplier of fluid management solutions and play a leading role in delivering innovative fluid transfer systems like the Wiggins JNX refuelling systems that meet the needs of the industry. With a commitment to quality, performance, and safety, it is no surprise that the Wiggins JNX refuelling systems is trusted by operators in the mining industry around Australia. **AMR**

Safety and reliability are at the core of Wiggins JNX refuelling systems.



Local Solutions. National Strength.



Wiggins

Service Systems

THE WIGGINS JNX-SERIES
NON-PRESSURISING FAST FUELLING SYSTEM

SAFE | FAST | CLEAN

- **Safe** - Refuelling shutoff is automatic and cannot be overridden or overfilled, fuel stops at the right time, every time.
- **Fail-Shut** - Patented design requires a constant signal to keep the shutoff valve open.
- **Fast** - Decrease service times, refuelling at flow rates up to 1100 litres per minute, safely.
- **Non-Pressurising** - No tank pressure required to shutoff refuelling.
- **Reliable** - Jet Level sensor has no moving parts.
- **Compatible** - JNX system is adaptable to conventional fuel nozzles.
- **Original** - Wiggins Service Systems, the original fast fuelling brand.

P: 1300 026 673 W: cooperfluidsystems.com.au

Alfons Haar

A Leading Global Fuel Handling Equipment Business

Alfons Haar Australia is a specialist fuelling equipment supplier that provides a range of cutting-edge products, including bulk fuel pumps, metering systems, hoses, and fuel filtration. Established over 70 years ago in Hamburg, Germany, the company has grown to employ more than 400 staff across 17 offices, with a strong presence in Australia and a reputation as a global leader in the fuel handling equipment business.

Haar Australia is the preferred supplier of many major fuel transport companies that deliver bulk fuel and lubricants to mine sites. The company's product portfolio includes specialised aviation fuelling equipment, ship-based onboard helicopter fuelling systems, HIFR (Helicopter In-Flight Refueling) systems, tank gauging, LPG (liquefied petro-

leum gas) metering systems, AdBlue metering systems, and oil-free compressors for the bulk powder transfer industry.

One of the company's primary products to the mining sector is its electric-driven bulk fuel pumps, which are compact and built without needing a base plate, for design simplicity, and enabling quick deliveries. These pumps have flow rates from 100 to 4000 litres per minute and are used by major mining fuel service vehicle builders and bulk fuel storage providers.

One of the company's key strengths is its fuel filtration technology. Haar Australia is the Australian distributor and licensed vessel manufacturer for Faudi Diesel fuel filtration technology. Faudi's filter water separators and microfilters are the indus-

try's preeminent solutions for fuel quality and cleanliness. Faudi microfilters provide particulate removal, while Faudi filter water separators remove particulates and water, ensuring clean dry fuel. Other controls, such as differential pressure management, automatic sump draining, and water slug detection technology, complete the picture and ensure fuel quality on-site.

Haar Australia offers Faudi Diesel filtration as a complete filter vessel, and the company also offers replacement filter elements for existing microfilters and filter water separators from industry peers. By providing these solutions, Haar Australia ensures that its clients have access to the best fuel filtration technology on the market.

Haar Australia is a world-class fuelling

equipment supplier with a proven track record of providing innovative solutions to the mining and associated industries. The company's cutting-edge products, including electric-driven bulk fuel pumps, fuel handling valves, tanker equipment, hose reels, specialised aviation fuelling equipment, and fuel filtration, are designed to meet the unique needs of these industries. Haar Australia's fuel filtration technology is a particular strength, ensuring clients have access to the best solutions for fuel quality and cleanliness. As a trusted partner to many major fuel transport companies, Haar Australia is committed to providing efficient, reliable, and clean fuel handling equipment to its clients. **AMR**

ONSITE FUELING SOLUTIONS



Haar Australia



Minesite bulk fuel pumping and filtration specialists

Electric bulk fuel transfer pumps
FAUDI Diesel bulk diesel filtration solutions



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SEME Solutions: The Trusted Partner for Mining Security Solutions

As the mining industry continues to evolve, so too does the need for robust security solutions that can keep up with the unique challenges and risks associated with mining operations.

SEME Solutions, a national security system solutions business, has been providing packaged security system solutions to some of Australia's largest mining companies for decades.

National Security System Solution Provider

Established in 1967 in Perth, WA, and now a member of the SCEE Group, SEME Solutions has grown from a small electrical installation and repair business serving the Perth metropolitan area to a national security system solution provider with offices in Perth, Brisbane, and Mackay, as well as partner hubs in Sydney, Melbourne, Adelaide, and Hobart.

SEME Solutions offers a range of security solutions, including access control, CCTV, intruder detection, perimeter solutions, and duress systems, specialising in the consultation, design, supply, installation, integration, preventative maintenance, and servicing of these systems.

Experience With Complex and Dangerous Environments

One of the key factors that sets SEME Solutions apart is their extensive experience working in complex and dangerous environments, such as operational mine sites. Their safety awareness, technical expertise, mine experience, and in-depth product and site knowledge make them the ideal partner for mining companies.

Moreover, SEME Solutions designs, engineers, and custom builds solutions for mining companies with specific applications, such as interfaces with wireless mobile readers, solar powered mobile boom gates, solar powered mobile energy hubs, solar powered shut down kiosks, custom equipment cabinets, PPE vending machines, tag boards, and more.

SEME can work with businesses that require the integration of new technology with existing legacy products and systems, ensuring a seamless and effective integration process.

Safety-First Always

SEME Solutions prides itself on being a safety-first workplace.

They invest in their team's development and support their well-being, ensuring a highly motivated workforce that delivers the highest quality results.

Safety is paramount, and SEME Solutions focuses on achieving zero harm.

SEME Solutions offers a 24/7 service and installation support that provides their clients with peace of mind.

No matter where they are in Australia or what time of day an issue presents itself, SEME Solutions will be there to support them.

Ideal Partner For Mine Sites and Mining Companies

SEME Solutions is an ideal partner for mining companies looking for complete security system solutions.

With over 50 years of experience, a national presence, extensive mine experience, and a safety-first workplace, SEME Solutions offers an unmatched level of expertise and support for all security system needs.

Their ability to integrate market-leading products and custom build solutions makes them the go-to partner for the mining industry. **AMR**

For more information contact:
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DELIVERING PROJECTS FOR SOME OF AUSTRALIA'S LARGEST MINING COMPANIES

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SEME Solutions provide complete packaged security system solutions including consultation, design, supply, installation, integration, site support and routine maintenance.

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DRUG AND ALCOHOL TESTING ENSURING A SAFER WORKPLACE

In Australia, a total of \$2.1b in workplace productivity was lost in 2021 due to drug related harm. Excessive alcohol consumption costed Australian businesses another \$4.1b in the same year.¹

Workplace drug testing is effective in both detecting and deterring the use of drugs.

Australian Clinical Labs Drugs of Abuse Screening (DAS) services provide employers the opportunity to be proactive in identifying and managing the risks associated with the use of recreational drugs and alcohol amongst employees and contractors.

While many companies test for drugs after a critical incident occurs, Clinical Labs believes the best solution lies in prevention.

Drug and alcohol testing is beneficial in pre-employment assessment, preventing the hiring of employees who may pose a potential safety problem. Other common utilities include comprehensive, random, for cause, post incident, and return to work screening.

Why conduct drug testing?

Many organisations implement drug and

alcohol testing into their workplace to meet health and safety legislation and recognise benefits such as:

- Improved workplace safety
 - Fewer accidents¹ and disciplinary actions
 - Reduces potential workplace conflict¹ and violence
 - Assists employees to overcome their patterns of drug use
- Cost Savings
 - Reduction in product/service defects
 - Reduction in theft/fraud¹
 - Reduction in health, property and liability insurance costs
 - Reduction in workers compensation claims¹
 - Decreased costs in the hiring and training of new employees
- Improved Productivity
 - Reduction in absenteeism¹ and tardiness
 - Earlier detection and resolution of problems affecting job performance
 - Stable workforce
- Other Benefits

- Enhances the reputation of the company
- Improved employee morale due to a better and safer workplace

Tailor your company's drug screening program

Working directly with an accredited laboratory provider makes implementing a drug screening program simple and cost effective. Together with its clients, Clinical Labs can tailor a DAS service to meet your needs, providing screening at the work place or utilising a wide network of collection centres in metropolitan and regional WA.

The company's accredited collection centres and on-site collection procedures are AS/NZS 4308:2008 compliant and provide assurance that all samples collected are unadulterated and provided by the employee in question.

Full AS/NZS 4308:2008 testing is conducted in secure toxicology laboratories and services can be provided Australia wide. Clinical Labs can provide:

- Tamper evident urine collection kits
- Laboratory screening and confirmation of all drug classes included in AS/NZS

4308:2008

- Laboratory testing for other drugs upon request (i.e. barbiturates, oxycodone, buprenorphine)
- Specimen collection arrangements to suit individual company needs
- Expert advice and assistance
- Training and education
- Comprehensive suite of pathology testing options including pre-employment medicals, biological monitoring (exposure testing) and immunity screening

To find your nearest collection centre, visit www.clinicallabs.com.au/location

AMR



AUSTRALIAN Clinicallabs

REFERENCE
1) Rethink Addiction & KPMG 2022. Understanding the cost of addiction in Australia Report 2022. Available at: [https://www.rethinkaddiction.org.au/understanding-the-cost-of-addiction-in-australia] [Accessed 04/05/23].



Drugs of Abuse Screening

- ✓ Extensive network of conveniently located AS4308:2008 accredited collection centres
- ✓ Same day results at specified locations
- ✓ Online eResults portal with mobile app
- ✓ Pre-employment checks
- ✓ Random on-site screening
- ✓ Critical incident screening
- ✓ Access to laboratory staff for education and advice



For a full list of accredited DAS collection centres scan the QR code or visit clinicallabs.com.au/location

We value long-term partnerships and aim to provide you with unequalled service, every time.

Contact Clinical Labs for a tailored drug testing solution to suit the needs of your business today!

Commercial Team Enquiries

Bree Greer

0414 487 541 | bree.greer@clinicallabs.com.au

Induction Heat Systems for Safer and Faster Heating

Field Machine Tools carries a range of Induction Heating Systems with Digital Recorders rental units suitable for Pre-Heating, Post Weld Heat Treatment, Shrink Fits, Curing & Coating, Hot Tapping and other custom applications.

Induction heating is a non-contact method of electronically heating conductive materials. Utilising high frequency, alternating currents in coils creates a rapidly alternating magnetic field. This magnetic field crosses the work-piece creating a current flow (eddy currents) within the part; heat is then generated due to the resistance to eddy current flow within the material.

Our Induction Heating Units have many applications and benefits over conventional resistance heating methods or propane.

- Our Induction Heating Equipment is safer, up to 20 times faster and more efficient.
- Materials are heated up very quickly. For example 24 Inch x 2.34 inch thick pipe material carbon steel can be preheated to 450F in 7.61 minutes.
- Simple, lightweight and user friendly.

The Rapid Heat System can also be used for shrink fit of shafts and bearings up to 3 metres diameter.

- Lower power consumption. In most cases will operate from 30-amp 415volt supply as opposed to 63-amp 415-volt supply required for resistance transformers.
- Digital recorder allows storage of all documents for downloading later on to a P.C. Saves time in retrieval and managing documents.
- Eliminates use of Propane which creates uneven temperature transfer. In addition every kilo of gas burned creates three kilos of water – a problem when welding.

The key safety benefits are:

- Our heating cables remain cool to the touch while the material heats from within making welders work more comfortable and efficient, allowing for reduction in welding times.
- Very little reflected heat.
- No naked flames or exposed elements.
- The Rapid Heat 35 is designed to replace open-flame or resistance heating.
- Outperforms propane or radiant heating in efficiency, ease of use and heating uniformity
- Simple interface can be learned in a matter of minutes and provides operator tutoring
- Can be used as an air-cooled or liquid-cooled system
- Easily connected to a range of heating elements
- Can be used with or without a temperature recorder.

The Rapid Heat 35 System has a choice of four programmes Pre-Heat, Bake-Out, P.W.H.T. and Custom. In the programme you can set the target temperature, soak time/temperature, cool down temperature/rate deg/hr, ramp rate deg/hr, etc. The Rapid 35 controller will then monitor the attached thermocouples to ensure that the heating and cooling rates are not violated during the procedure.

Liquid-cooled heating cables are can provide uniform heating up to 788°C (1450°F). They are ideal for both pre-heat and PWHT needs including Stress Relieving, Hydrogen Bake-Out, Shrink Fitting and many other applications.

Our liquid cooled heating cables come in sizes 30ft, 50ft, 80ft and 140ft. The silicone cable encloses a special copper conductor specifically designed for carrying high-frequency current to maximise efficiency. The cable also carries the coolant, which cools the conducting wire. The cable is reinforced for strength and durability they are reusable and easily installed in a matter of seconds.

The digital recorder is commonly used in stress relieving and critical preheat applications however can be used in any process. The recorder stores temperature data based on time.

The Rapid Recorder offers unrivalled input accuracy with a 125ms total sample rate for 18 channels. The input channels are configurable to suite the process requirements. It has a touch screen display for simple programming and use. The colour display enables operators to clearly monitor the heating process in outdoor environment (direct sunlight).

They all have onboard Flash data storage capability, Ethernet communication and Compact Flash. Data is stored in tamper resistance binary format that can be used for secure, long-term records of the process. Some of our more common applications are:

- Pre and Post Weld Heat Treatment
- Hydrogen Bake Out
- Stress Relieving
- Structural Steel
- Flat Plates
- Vessels
- Fabrication
- Coatings
- Unfreezing Pipelines
- Trace Heating

Due to the flexibility of our systems, we can adapt our equipment to almost any heat treatment requirements. Our induction heating coils are easily wrapped around various shapes and sizes of components. **AMR**



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- Customised Builds

WE PROVIDE

- Innovative design & construction of permanent modular building solutions
- Rapid deployment of a variety of Rental Fleet buildings- one of Australia's largest rental fleets
- Unparalleled reputation & delivery experience in remote workforce accommodation

WHY MODULAR

- Speed of completion- expedited build and installation compared to traditional insitu construction
- Minimal site disruption- all manufacturing is completed off site
- Reduced wastage and improved quality
- Flexibility in design with the ability to relocate, decommission and re-purpose

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Layflat Hose Helps Support HSE

Health, Safety & Environment (HSE) factors are unarguably the most important concerns at a mine site. Minimising risk with reliable equipment and safe work practices are just two of the many ways to promote a mining team's health and wellbeing.

Issues surrounding the risk to the health, safety and wellbeing of mine employees are well documented. The Mining Accident Database, annual reports from the states' and territories' regulatory bodies, and audits prepared by mining companies allow for transparency regarding injury statistics.

These data are stark reminders that although the mining sector generates billions of dollars in taxes and royalties for the federal and state governments and is invaluable to the Australian economy, it also has one of the highest rates of injury and compensation claims due to manual tasks.

A recent Curtin University-led study found that Australian mining companies strongly focus on physical safety, and the research indicates that improvements in physical health have greatly improved over the past 15 years. Although there is still a lot of progress to be made regarding mental health issues and improving respect and workplace culture, the steps taken to improve mining safety and reduce severe injuries and deaths must be applauded.

Reducing risk to mine operators takes on

many forms: regular hazard assessments, implementing a strong safety culture, keeping machinery in good working condition, and increasing automation. Even with these strategies in place, hazardous manual tasks are consistently found to be the key area for incidents and related injuries.

Hazardous manual tasks, or manual handling, resulting in musculoskeletal disorders, cause over a third of all injuries in Western Australian mining workplaces. In a 2019 report entitled Serious injuries in the mining industry: preparing the emergency response, in The Australian Journal of Paramedicine, Jones, et. al., state that 69% of all serious injuries were strains and sprains and overexertion as the cause for 37% of them.

Handling large, heavy, awkward and bulky items is common at mine sites. Although many processes are automated, loading and unloading material may require pulling, pushing, lifting assisted or unassisted, carrying, moving and strenuous movement, which can all contribute to serious injury.

In WorkCover WA's Industry Statistical Report 2016/17-2019-20, there was a total

of 2,545 claims made in the 2019-20 period, resulting in \$132 million in payments. Fifty-eight per cent of these claims were for traumatic joint/ligament and muscle/tendon injuries. In the Safety Performance in the Western Australian Mining Industry 2020-21 report, surface mines were shown to have 9,380 hours lost time for the 383 injuries in the metalliferous sector. Although the cost borne by the mining companies for lost time injuries and potential compensation claims are not identified in the report, one can make an educated guess.

Crusader Hose manufactures layflat hose and fabricates reel systems for the mining sector. Their Rapid in-pit dewatering system and Flexibore® flexible riser for submersible pumps are but two of the systems embraced by the industry.

Working with layflat hose has many advantages. Its compact nature and inherent flexibility make for easier handling than conventional rigid pipe. Poly pipe and fibreglass riser pipes are bulky and challenging to transport, unload, set up and dismantle. Layflat hose, with its handling systems, reduces the manual handling associated with

laying pipelines.

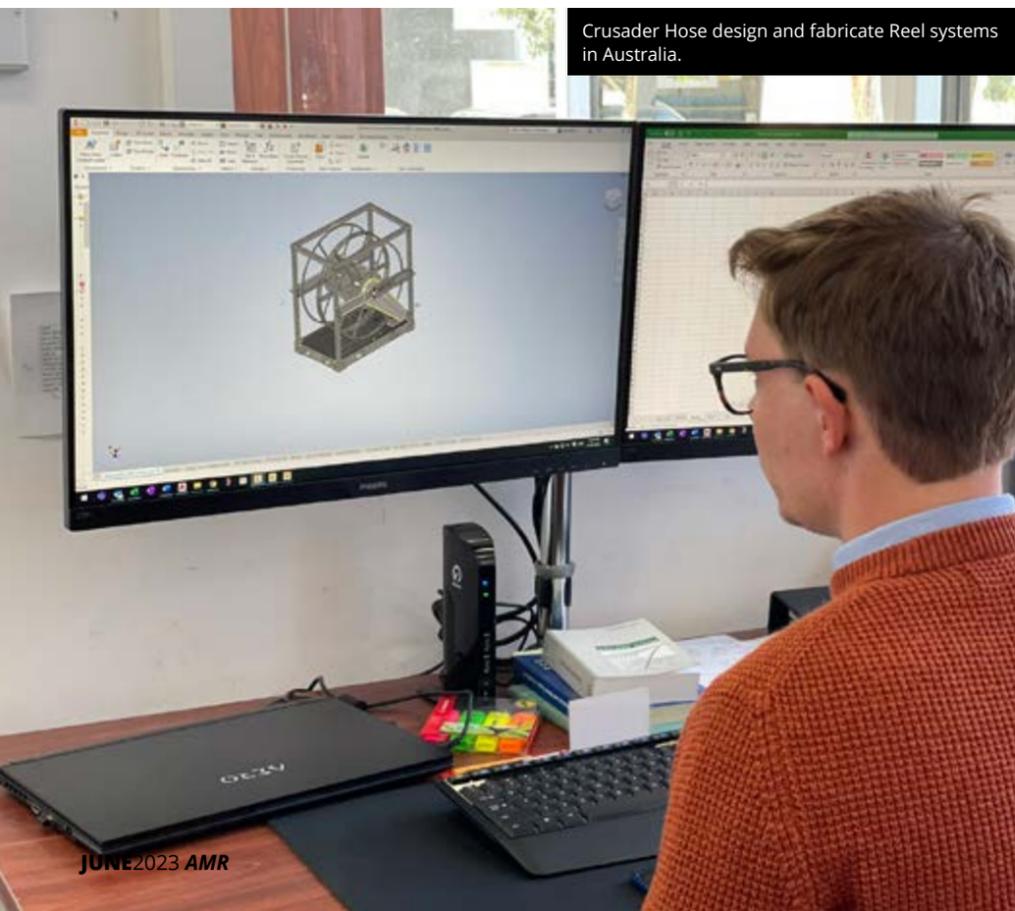
A company entrenched in continuous improvement, its design engineers are currently reviewing and redesigning their large-diameter hose handling system. The Hamersley™ is undergoing a significant upgrade; further reducing the interface between operator and machine and redesigning the reels to reduce handling risk are two major improvements.

"As part of our Continuous Quality Improvement Plan, we regularly review our designs and make improvements where possible. Brainstorming, feedback and our systematic approach guide us in making the upgrades," said Ben Strangward, Design Engineer at Crusader Hose.

Crusader Hose maintains that supporting the mining sector's HS&E, even on this relatively small scale, is a step in the right direction. Avoiding repeated overexertion and possible injury protects workers and reduces lost time.

Crusader Hose systems are Australian Made. **AMR**

Crusader Hose design and fabricate Reel systems in Australia.



The Flexibore® system has been embraced by the mining industry.



Safeguarding the Workplace



Pro3 Safety Director and co-designer Simon Noack.

All workers deserve to go home injury-free at the end of the day. Reducing dropped object risks, injuries and deaths should form part of any good plant design and safety management program.

Investing in dropped object prevention can also prevent damage to vital equipment and disruption to production schedules.

The Dropped Object Prevention System (DROPS) by Pro3 Safety tackles this risk head-on in a cost-effective way.

It offers a simple life-saving solution and provides the best protection for employees, contractors, and visitors against the risk of injuries, falls and dropped objects.

Pro3 has developed RetroGUARD™, RetroTREAD™ and RetroSTEP™.

These solutions can be retrofitted to existing stairs, platforms and handrails and are available in several finishes to suit a wide variety of handrail dimensions, shapes, and configurations.

Pro3 Safety director Simon Noack says the company is Australian-owned and its products are designed and manufactured locally with Australian steel.

"We are committed to supporting other Australian companies and jobs," he said.

"Our products are designed and tested for tough Australian conditions and have stood the test of time.

"We have product which has been providing protection on sites for over 10 years in the harshest parts of our country like outback South Australia."

Pro3 Safety director Andrew Crothers says his team can easily customise the products to clients' needs.

"We have a bracket system that simply clips on to existing handrails, filling a gap in workplace safety identified previously on sites where Simon and myself worked," he said.

"Our integrated products are fast to produce, easy to install and require no drafting, surface preparation or hot work.

"Our products are protecting people on roof tops, bridges, at mine sites, in warehouses, processing and manufacturing plants, power

plants and at airports both in Australia and overseas."

The company is committed to continually improving safety in the workplace and setting new standards in dropped-object prevention solutions and systems.

RetroGUARD™

The RetroGUARD™ Safety panel system can be retrofitted to existing handrails and maintains the existing handrail integrity.

It adapts to all types of platforms, stairs and walkways and can be quickly and easily removed to provide vital access to areas for maintenance works.

RetroGUARD™ is engineered to prevent injury from dropped objects and falls from personnel leaning through, standing or stepping onto handrails.

It maintains three points of contact during access and egress, it is fitted entirely from inside the safety barriers of the platform or stairs.

The flexible design of RetroGUARD™ gives complete coverage, even for internal and external corners.

RetroSTEP™

RetroSTEP™ barricades areas above and below stairs. The mesh covers the opening between existing steps.

Fast, affordable, and easy to install, no hot works are required during installation and no interruption to production schedules.

When combined with RetroGUARD™ and RetroTREAD™, it reduces dropped object risks from open stairs and walkways.

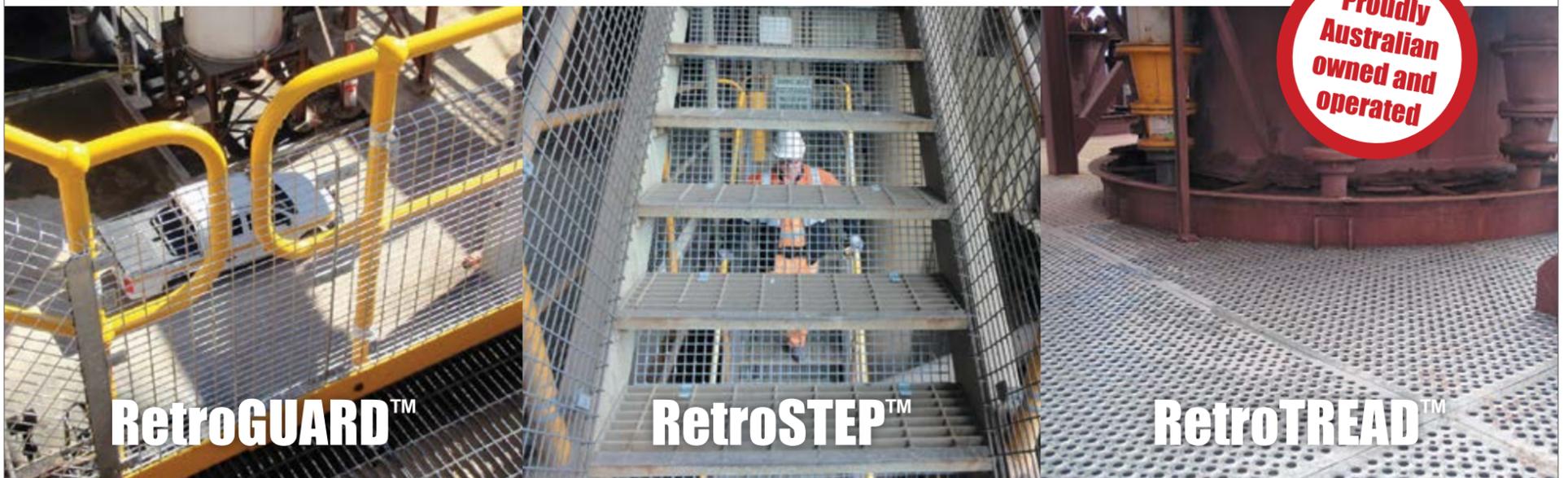
RetroTREAD™

RetroTREAD™ allows for fast and safe installation of safety flooring, with a clamp designed to clip to existing grid mesh floor.

Slip resistant floor sheets are quickly secured to the RetroTREAD™ clip, barricading areas above and below each platform level, preventing the risk of injury from falling objects. **AMR**



Dropped Object Prevention System



Proudly Australian owned and operated

Pro3 Safety's certified system can be retro-fitted to your existing handrails, stairs and platforms, providing a permanent life saving solution and the best protection for your employees against the risk of injuries and falls.

Cost effectively improve the safety in your workplace and become a DROPS free site.

Developed, designed and manufactured in Australia for Australian conditions.

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indux

DUST AND FUME EXTRACTION COMPANY

Revolutionising Industrial Environments -
Design Build Install & Service



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**



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PROVIDING *QUALITY TRAINING AND RECRUITMENT SERVICES* TO SUPPORT *THE FUTURE OF AUSTRALIA'S MINING INDUSTRY*

The mining industry is an essential part of Australia's economy, contributing billions of dollars to the country's GDP each year. With the industry's growth, the demand for skilled and qualified workers has also increased. Companies like Richards Mining Services (RMS) have become integral in providing the necessary training and recruitment services to support the industry's future.

RMS offers a unique approach to training that goes beyond traditional courses. RMS owner and accredited Mine Manager Graeme Richards has developed an online prerequisite requirement for all mobile plant courses consisting of comprehensive video training that the student can view in

their own time and at their own pace.

This allows continuity of training for all students, convenience of reducing classroom work and the most relevant content to a mining operation due to the messenger being delivered by Graeme himself. Students then attend RMS for their revision and practical component.

Consistency is a hallmark of RMS training. Regardless of when or where training takes place, operators receive a consistent message and outcome. The continuity in training ensures a comprehensive understanding of operational best practices and industry standards. RMS prides itself on being a one-stop shop, offering a full range of nationally

accredited mobile plant courses. From HR licenses to dump truck tickets and first aid certifications, RMS equips operators with the necessary qualifications to step into any company and hit the ground running.

Going a step further, RMS's actively facilitates connections between their accredited candidates and companies seeking skilled operators. By providing fully accredited potential hires, RMS saves companies the time and effort of searching for qualified individuals. On the other hand, students who enroll in RMS courses have the opportunity to secure employment even before completing their training. This placement service highlights RMS's dedication to bridging the gap between job seekers and industry demands.

With a proven track record spanning 22 years, RMS remains a trusted name in the mining, transport, and civil industries. Their expertise in mobile plant operations, comprehensive training programs, and unwavering commitment to quality have made them an indispensable partner for companies and individuals alike.

RMS continues to shape the future of Australia's mining industry by providing top-notch training and recruitment services. Through their focus on mobile plant operators and nationally accredited courses, RMS ensures operators are well-equipped to excel in their roles, drive productivity, and contribute to the industry's growth. **AMR**

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RMS
TRAINING & RECRUITMENT

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 rubbering 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, ex-

tremely 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



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 water for personnel mobilised on-site for all

stages of the mining process, for example, exploration, earthworks, and construction phases," he said.

"No matter where your site is located, we travel far and wide to ensure you and your staff are looked after and have a reliable source of drinking water."

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.

For more information, visit www.desertsandscartage.com.au or call +61 8 9031 1326

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- ✓ Side tipper haulage, including concrete, screened sand, dune sand, fuel and potable water
- ✓ Extensive experience in civil works and construction projects

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Rex Ryles 08 9031 1326 | office@desertsands89.com.au | www.desertsandscartage.com.au
Lot 501 Cox Street Laverton WA 6440

ATA AGORA & ALLQUIP WATER TRUCKS

Australia's Premier Water Cart & Water Spray Rig Manufacturer

ATA Agora, an Australian firm, specialises in the production of robust, large-capacity water carts and spray systems, specifically tailored for the mining sector. Designed to withstand the harshest Australian conditions, these water carts are adaptable to a variety of OEM off-road rigid and articulated trucks, as well as standard on-road chassis with mine-specific modifications.

In 2021, ATA Agora merged with Allquip Water Trucks, bolstering their industry experience and manufacturing capabilities. ATA's off-road tank designs have been operating in mining sites for half a century, making them industry leaders in heavy-duty spray rigs. The combination of ATA's experience with Allquip's two-decade history of providing on-road water cartage solutions allows the company to construct tanks of unparalleled quality. Together, ATA & Allquip manufacture over 200 water truck bodies annually at their New South Wales facility,

supplying tanks for mining and civil projects across Australia.

Their diverse product range includes steel, aluminium, polyethylene, and fibreglass water tanks assembled as water trucks, mine water carts, trailer tankers, hooklift tankers, and fire tankers. ATA's larger water cart bodies are specifically tailored to meet the needs of the mining industry and are predominantly constructed from steel. Allquip fabricates all steel water tanks on-site at their Rutherford facility and proudly holds Australian Made certification.

The ATA & Allquip Difference: Safety, Reliability, Compliance

Safety

Traditional water trucks often struggle with effective water distribution control. These vehicles usually offer limited spray options, making targeted watering difficult and potentially leading to uneven water distribu-

tion, ineffective dust suppression, and safety risks from overwatering haul roads.

To combat these issues, ATA & Allquip have developed innovative solutions tailored to the mining industry. These include advanced control and spray systems that allow efficient management of water distribution with low flow sprays for slow speed and high flow sprays that activate as speed increases. This innovative design ensures consistent water application on haul roads. The spray system also features directionally controlled water cannons, allowing operators to target specific areas accurately for effective dust suppression.

Understanding that water surge control is vital, particularly for larger scale tankers, ATA's water tanks are equipped with a unique baffling system. This system utilises internal tank walls to create separate compartments, minimising water surge during vehicle motion. All ATA tanker bodies com-

ply with Australian Safety Standards, including AS1657-2018 for tank access and AS/NZS2865-2009 for confined spaces.

By offering high-quality water tanks tailored to meet the unique demands of mining operations, ATA & Allquip is helping mining companies increase productivity, reduce costs, and enhance safety.

Although not designed as an emergency response vehicle, ATA's water carts can act as primary responders in a crisis. Stationed within the pit area, these trucks are ideally positioned to rapidly address fire emergencies and establish control while awaiting the Emergency Response Team (ERT). Depending on the fire's nature, the remote-controlled water cannons or sprays can effectively combat the flames.

Reliability

ATA's commitment to reliability is evident in their Certified Australian Made products.



They take pride in their world-class tanks and equipment, which start with the fabrication stage using exclusively Australian-made steel and plate.

Recognising the importance of corrosion protection in the mining industry, they grit blast and line their tanks inside and out with heavy-duty industrial two-pack tank liners. They finish with a high-gloss, two-pack top-coat paint system, including an additional under-tank coating for stone and muck protection on the tank's underside.

Their electrical harnesses and components are designed and manufactured to stringent MDG standards, ensuring dependable electrical systems and controls.

ATA's water carts are designed to be more fuel-efficient, leading to reduced operating costs. This is achieved through advanced technologies such as high-efficiency hydraulic variable pumps and world-class en-

gineering, which minimise power and fuel consumption without compromising performance.

Maintenance is crucial to ensuring longevity and optimal performance of any vehicle, especially in industries like mining and construction. One of ATA's truck-mounted tank's noteworthy features is its capacity to be fully raised for maintenance purposes. When fully lifted, the truck-mounted tank allows easy access to the truck's undercarriage, simplifying service and repair tasks. This accessibility allows technicians to perform routine checks and repairs more efficiently, reducing downtime and ensuring the truck remains in optimal working condition.

ATA exclusively uses high-quality Australian-made components to ensure longevity and local product support, further guaranteeing their products' reliability. This high standard of construction allows ATA &

Allquip to provide industry-leading warranties.

Compliance

Engineering and compliance are critical factors in all mining operations. ATA's engineering team produces weight distribution calculations to ensure that OEM vehicles comply with specifications and are not overloaded. In addition to weight calculations, centre of gravity (COG) reports are utilised. Determining the centre of gravity is crucial for any water cart, and ATA's engineers ascertain the location of the COG to ensure equipment safety and identify potential risks.

Operator induction training, conducted by a trained ATA staff member upon equipment delivery, is essential. Operator and risk assessments are supplied with the equipment, and operators are trained and signed off as part of the induction. Products made in Australia are designed and engineered to withstand their harsh environment and comply

with standards. Engaging with foreign companies regarding compliance and warranties can be challenging, but opting for Australian-made products assures hassle-free access to the necessary support and service.

ATA & Allquip Product Range

ATA Agora, manufactured by Allquip Water Trucks, offers a range of water tanks and spray systems purpose-built for off-road rigid or articulated trucks. They also construct water trucks with mine spec modifications, designed for companies and worksites that require an on-road licenced tanker.

Off-Road Tankers

ATA's water tanks and spray systems are designed for heavy-duty civil and mining vehicles and can be fitted to any major rigid or articulated truck brand, including Caterpillar, Komatsu, Bell, Volvo, and John Deere. Water tanks constructed for off-road articu-

CONTINUED ON NEXT PAGE





lated trucks are available in 23,000 or 33,000 litres, while larger rigid trucks can have a capacity of 50,000 or 75,000 litres. These tanker bodies are fitted with a hydraulic system that meets the AS2671-2002 standard, a Southern Cross pump, and adjustable rear spray heads.

Upgraded features, such as precise road delivery allocation or GPS/telemetry and system monitoring, can be added as required.

ATA & Allqu work closely with other renowned manufacturers. Therefore, in addition to Allqu sprays and controls, clients can choose to integrate systems and features from brands such as ADE, Hyden Engineering, and Magnum Australia, aiding in maintaining a uniform fleet.

ATA water tanker bodies are constructed using only reliable, genuine components that are fully backed by the manufacturer's war-

ranty. Every ATA off-road tanker is built by experienced tradesmen and undergoes rigorous testing for quality assurance before being delivered to the end-user.

On-Road Tankers

Allqu's on-road mine spec tankers are adapted from their core range of water trucks.

Available with steel, aluminium, or polyethylene water tanks, the cartage capacity of Allqu's on-road water trucks ranges from 7,700 to 18,000 litres, depending on the required tank material.

These water trucks are fitted with standard features, including galvanised pipework, rear deflector sprays, a hydraulic water pump, and an in-cab control panel. Optional upgrades, such as industrial water cannons, can be added to suit the operating requirements.

Designed specifically for the Australian mining sector, Allqu's mine spec builds are engineered to meet the client's requirements as well as mining safety standards.

Additional features such as rollover protection, fire extinguishers, and first aid kits are included. With hi-vis marking and custom signage, the new water truck will fit seamlessly into any existing fleet.

Service and Support

ATA Agora & Allqu Water Trucks not only deliver high-quality products but also offer exceptional after-sales service and support. They understand that customer satisfaction is critical to building long-lasting relationships, which is reflected in their approach to service and support.

Allqu provides a comprehensive range of servicing options, including routine maintenance, repairs, and refurbishments, performed by a dedicated team of experienced and well-trained technicians equipped with the latest tools and technology to ensure that every job is done to the highest standard.

Allqu has a vast inventory of replacement parts in stock, and they can quickly source any parts that are not immediately available. This minimises downtime and ensures that customers can get their equipment up and running again as soon as possible.

Allqu works closely with its customers to ensure that their equipment runs smoothly and efficiently. They provide advice and support on best practices for maintenance and operation, as well as training for customers and their staff.

In addition, Allqu offers a wide range of customisation options to ensure that their products meet the specific requirements of

different industries and applications. They can modify tank size, fittings, and features to fit their customers' needs.

Allqu's commitment to their customers does not end with the sale or servicing of their products.

They continue to support their customers throughout the life of their equipment, providing them with the necessary advice, support, and training they need to keep their equipment running at peak performance.

Capabilities and Experience

ATA & Allqu is based in New South Wales, with the head office and manufacturing facility located in Rutherford.

The company's team is comprised of experienced trade personnel, including boilermakers, fabricators, body builders, hydraulic fitters, auto-electricians, assembly personnel, foremen, and quality assurance, who work tirelessly to ensure the delivery of high-quality products to clients.

Choosing ATA Agora & Allqu Water Trucks for your water truck needs means choosing a team of experienced professionals dedicated to meeting your needs and delivering products tailored to your specifications.

Contact ATA & Allqu today to learn more about their products and services and find out how they can help meet your water truck needs. **AMR**

Contact Information:

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49 Racecourse Rd,
Rutherford NSW 2320, Australia
Phone: +61 2 4932 0044
Email: sales@allqu.com.au
www.allquwatertrucks.com.au



Driving FORCE



Driveshaft failure can cause a machine to be out of commission for weeks, using a locally engineered and built driveshaft can dramatically reduce machine downtime and improve shaft longevity.

In the vast and demanding landscape of mining and heavy-duty trucking, a reliable and robust drivetrain is essential for optimal performance and operational efficiency. Drivetrain, a renowned Australian company, is a prominent manufacturer of driveshafts, offering a high quality, cost effective and timely alternative to OEM options.

With in-house engineering expertise, a commitment to Australian manufacturing, branches across the country equipped with

state-of-the-art dyno testing equipment, fast turn-around times, and partnerships with industry leaders like Dana and Kessler, Drivetrain is a leader in the driveshaft industry.

KYNETIC ENERGY

Drivetrain released their Kynetic range of driveshafts around five years ago, having identified a need in the Australian mining market for a high-quality product which could be offered at a high level of service. At the time, the market was predominantly serviced by OEM or lower quality imported driveshafts.

The OEM products often had lead times of up to six months and the cheaper import-

ed shafts sometimes lacked in the quality of their manufacture and the length of their service life.

Drivetrain have since filled that void with a high-quality driveshaft range, designed and built in Australia, which uses high quality components such as Dana Spicer. The end result, is a shaft that is often superior to OEM offerings in durability and can be turned around in days rather than months.

IN-HOUSE ENGINEERING EXPERTISE

Driveshafts are high-wear, high-failure pieces of the driveline. Through experience, Drivetrain's engineers have been able to identify common areas that are prone to failure in the most popular driveshafts fitted to trucks, drills, loaders, and agitators.

Thanks to their own application engineering function within the business, they are able to combine the latest in engineering drawing and design, and the skill of their experienced staff, to create more durable solutions for driveshafts being used in the world's harshest environments. This experience comes from years of working with leading manufacturing companies to modify and build machinery of all kinds for off-road applications.

This team of skilled engineers collaborate closely with clients to design and develop customised driveshaft solutions that meet their unique requirements.

By leveraging advanced 3D modelling software, Drivetrain's engineers simulate and optimise the performance of each driveshaft, ensuring it can withstand the rigorous demands of mining and trucking operations. This meticulous approach ensures that Drivetrain's driveshafts offer superior reliability, durability, and efficiency.

FAST TURNAROUND

The mining industry is particularly sensitive to service levels. Due to the incredibly high cost of downtime in the sector, returning a truck or machine to active service in the shortest possible time is paramount. For that reason, mining contractors come to rely on companies that can supply high-quality, essential parts and services with a fast turnaround. Drivetrain have proven themselves in this area because they are able to repair or build a shaft and have it on site within three days in most cases.

This capability to deliver is made possible by a responsive engineering and manufacturing process and an efficient global supply chain, which ensures and a consistent supply of quality driveshaft components. The addition of quick order processing, precision manufacturing and prompt delivery, allows Drivetrain to minimise downtime and maximise productivity for its clients.

NATIONWIDE NETWORK AND IN-HOUSE DYNO TESTING

Drivetrain's extensive branch network across Australia includes Kalgoorlie, Perth, Adelaide, Melbourne, Newcastle, Mount Isa and Mackay. The close proximity of all these branches ensures accessibility and prompt service for its mining clients. Each of these branches also house cutting-edge dyno testing equipment, enabling comprehensive performance evaluations and quality assurance. This in-house dyno testing allows Drivetrain to test their driveshafts under load and through a range of duty cycles before they are sent to the customer. Once again, this provides great peace of mind to the customer, who can install the new shaft, knowing that it has been tested and will not fail on site, resulting in more costly downtime.





IN-HOUSE DYNO TEST CELLS

PARTNERSHIPS WITH INDUSTRY LEADERS

Drivetrain's commitment to excellence is further strengthened through strategic partnerships with industry-leading brands like Dana and Kessler. These collaborations enable Drivetrain to incorporate high-quality components into their driveshafts, enhancing their performance, durability, and reliability.

By leveraging the expertise and resources of these renowned partners, Drivetrain ensures that their driveshafts are at the forefront of industry standards and capable of meeting the most demanding requirements.

MORE THAN JUST DRIVESHAFTS

Drivetrain has built a strong legacy in the industry since its inception. Established as a pioneer in 1987, the company initially focused on the repair and maintenance of driveshafts. Over the years, Drivetrain expanded its services to include the manufacturing of driveshafts and other drivetrain components, solidifying its position as a trusted provider in the Australian mining and trucking sectors.

Drivetrain made their mark by supplying a variety of driveline parts for hard rock mining machinery. Their goal was to supply these critical components for a wide range of OEM equipment and become a one-stop shop.

Initially they catered for Allison, CAT, Dana and Kessler but that list now includes Sandvik, Atlas Copco, Epiroc and even their own range of Kovatera underground utility machines.

Their inventory includes new, rebuilt and service exchange axles, transmissions and torque converters. Drivetrain are the authorised Dana service centre for off-highway in Australia and actually designed the footprint for Dana's workshop layout, which has been adopted globally.

Their torque converters and transmissions are also tested in-house on their dyno test

cells by factory trained technicians ensuring that every item that leaves the workshop is proven and fit for service.

Just like their driveshafts, Drivetrain pride themselves on the quality and high service level they provide to mining clients with all their driveline components.

DRIVING FORWARD

Drivetrain is well established as a leading manufacturer of driveshafts in Australia, offering a high quality, cost-effective and timely alternative to OEM options.

With in-house engineering capabilities, a commitment to Australian manufacturing, an extensive branch network equipped with state-of-the-art dyno testing equipment, fast turn-around times, and strategic partnerships with industry leaders like Dana, Meritor and Kessler, Drivetrain has solidified its position as a trusted provider in the mining and trucking sectors.

By continuously pushing the boundaries of innovation, Drivetrain is driving the mining industry forward with superior driveshaft solutions. **AMR**

SOURCE
Drivetrain
W www.drivetrainpower.com



DANA

- T12000
- T16000
- T20000
- 18000
- 24000
- 32000
- 36000
- 6000
- 8000
- 5000
- TE
- 10,15,17,30,32
- TE50 (currently in development)

ALLISON

- 6600

CAT

- R2900
- R1700

MINE SHAFTS



GJ Drivelines in Victoria, guide the Australian Mining Review through the process of building a new driveshaft to replace a broken unit from a Volvo off-road loader.

Driveshafts fail - that is a fact of life in the mining world. Continuous use, heavy loads, harsh conditions and the inevitable ingress of dirt all work to shorten the life of tailshafts, driveshafts and PTO shafts across the industry.

In some cases, it is a lack of maintenance

that causes the failure. The driveshaft featured in this article suffered from a universal joint failure, resulting from dry needle bearings that ultimately disintegrated and allowed the trunnion to tear out of its cap. This then caused the universal joint to break the flange - from there the path of destruction continued on down the line, twisting the shaft itself and damaging the splines on the slip yolk. The end result was a shaft too badly damaged to repair, so GJ Drivelines set about building a replacement item from scratch.

The company has two branches in Victoria, one in Keysborough and the other in Somerton. With many decades of experience, the team has the knowledge to look at any given driveshaft, assess how it failed and determine an engineered solution that will increase both its service life and strength on the job. This both reduces the likelihood of another failure and gives their customers the confidence that their equipment will be in service for longer - mitigating the risks of very costly downtime.

The following images and captions document the process of building a brand new, high-quality driveshaft for the Volvo loader. The new shaft features a larger diameter and thicker walled tube, non-serviceable, sealed universal joints and a larger slip joint shaft with a higher spline count. All the right ingredients to make the shaft live longer in its high-load environment. Using high-quality parts that were in stock, the team at GJ Drivelines built this shaft and had it sent to the customer in one day. That is the beauty of an experienced operation with the right components, the right knowledge and the ability to simply get the job done.



1. This driveshaft from a Volvo off-road loader was destroyed after the universal joint failed, which, in turn, led to the flange being damaged, the tube being bent and the splines on the slip yolk also being damaged. It was clear that the universal joint had failed due to lack of maintenance. The needle bearings in the joint had been allowed to run dry and without grease they had disintegrated, allowing the trunnion to break free from its cap. The shaft was too badly damaged to repair, so the team at GJ Drivelines set about building a brand new one.

The first step was to measure the universal joint and select a new heavy-duty, sealed unit from the same series. Sealed units typically resist water and dirt ingress and retain their lubricating grease for longer. This increases the intervals required between inspection and servicing. The next steps involve measuring the flange patterns and dimensions and then measuring total, closed and working length of the shaft.

2. The brand new parts required were in stock at GJ Drivelines. These include: two universal joints; two flanges; a weld yolk (top left) and a slip joint assembly (top right). The slip joint assembly features a larger diameter and thicker walled tube for increased strength. The spline shaft diameter is also larger, providing more splines than the factory shaft, for greater load handling. Non-serviceable universal joints last much longer than greaseable joints in most applications.



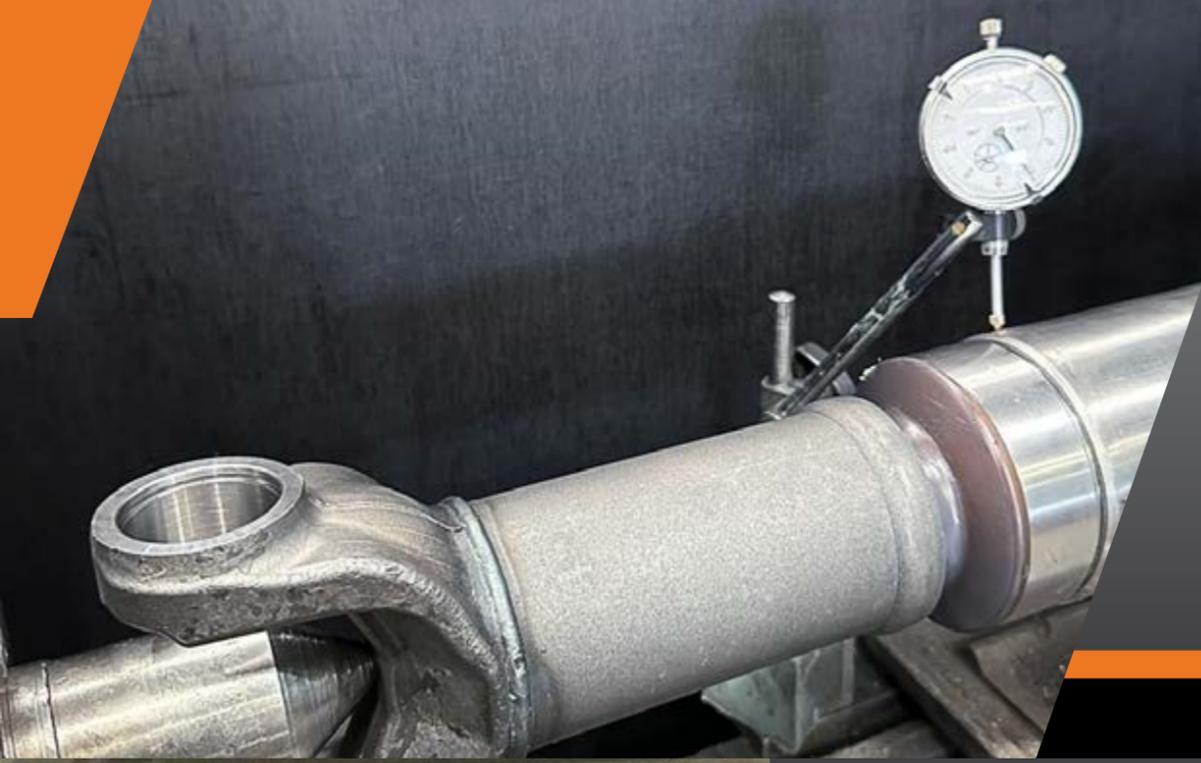
3. At this point, the slip joint is first pressed into the tube, followed by the weld yolk. To avoid balancing issues and damaging vibration while in operation, it is critical that both universal joints are perfectly phased - hence the use of two digital angle gauges to ensure that are zeroed relative to each other.



4.

The newly assembled shaft is set up in the welding fixture. Note the use of the centre in the end of the yolk. A dial gauge is used to measure the run-out in the shaft as it is slowly rotated. This process checks the concentricity of all the components. Total permissible run-out is .002-inch.

Once the run-out is within specifications, the yolks can be tacked in place, ready for final welding.



5.

The shaft assembly after welding. Flanges and universal joints have now been fitted and the assembly is complete.

6.

GJ Drivelines use a Schenk solid bearing balancer to balance the final assembly. Each style of shaft requires a different fixture to mount it in the balancer. Once again, a dial gauge is used to ensure the shaft is perfectly centred before balancing can commence. The tubes can be straightened by heat shrinking at this stage if necessary.

Shafts such as these are balanced to ISO1600, which requires testing balance at 1600rpm and achieving a balance of less than 5g at each end. Weights are welded to the shaft if required to reach these tolerances.

7.

The finished driveshaft. The brand new shaft has had the balanced weights tacked in place, received a new coat of paint and the all-important GJ Drivelines sticker. This shaft was turned around in a single day, making for one very happy customer.



GJ Drivelines - Somerton
(03) 9305 7261

GJ Drivelines - Keysborough
(03) 9706 3166

www.gjdrivelinestore.com.au



BROWNS RADIATOR SERVICE

In 1983, Perth based radiator and coolant specialist Browns Radiator Service commenced operations as a small radiator service and supply company but has since evolved into one of Western Australia's most agile and knowledgeable radiator companies servicing the mining and other sectors right across the state.

Headed up by director Glenn Brown, who took over the business from his father Robert around eight years ago, the proudly second-generation family-owned business initially started out by selling and servicing copper, brass and bolted tank radiators before gradually progressing to become a much more multifaceted operation with almost everything being done inhouse.

Throughout the years Browns Radiator Service has worked closely with original equipment manufacturers to overcome and redesign cooling system issues to suit the harsh Australian conditions and the company now has the capacity to handle all cooling system repairs; the manufacture and design of radiators, oil coolers and fuel coolers and the repair and manufacture of fuel tanks.

Browns has an onsite service which can care for any project from its inception to completion and sometimes this can involve deploying cranes to lift the new cooling package into place.

Based in the Cannington area, the company also has a fabrication workshop on premises and is adept at copying an existing ra-

diator and redesigning it to create an even better product.

With many radiators these days having a plastic tank and aluminium core for example, the company can fabricate one to the exact same specifications but produce a steel tank with a copper core which is of superior quality and lengthens the life and serviceability of the radiator.

To benefit the mining and industrial sectors the company has several workshops onsite that enable it to provide the best possible service alongside custom made orders.

Its welding workshop boasts three welding bays - each with Miller Dynasty water cooled TIG welders - Kempe MIG Welders and Hypertherm hand plasma cutters.

For onsite work the company uses gasless MIG and Stick welders, all of which are either Miller or Lincoln. It also has mobile Oxy equipment.

For its fabrication requirements, Browns use a house guillotine, a 135 tonne CNC press brake, a CNC plasma table for cutting up to 25mm of steel, in house CAD design for any customised work needed and computerised systems, which supply the capacity to repeat manufacture items needed quickly and effectively.

Speaking exclusively to the Australian Mining Review, company director Glenn Brown says he believes it is the businesses' knowl-

edge, agility and capacity for extremely good turnaround times that set it apart from others in the sector.

"Our turnaround times are very good and we have the ability to move quite fast when required particularly if a client has an urgent need.

"If someone needs a complete radiator built for example, we can have it drawn up and completed in three to five days if they are small to medium size and between five to ten days for large industrial radiators.

This is partly because we are not top heavy in management terms. As the director I make the decisions and we don't suffer from excessive red tape or hoops as others can. We also carry a lot of stock for Caterpillar, Komatsu, Kenworth, Mack, Western Star and others".

The company also says that it aims to provide products and services that will give the best value for money in the long term.

It provides advice and recommends products that will give not only long-lasting cooling systems, but also ones that provide better longevity of life to items such as engines, gearboxes, diffs etc.

This comes from many years of field testing a vast array of components such as cores, fans and coolants.

For the customer, this means all the re-

search and effort in trialling products best suited to the requisite environments and needs has been done, saving both time and money.

"We always ask ourselves - if we owned this machine, what could we do to extend the life of the machine and get the best performance from it?" adds Glenn.

With extensive experience on a range of OEM equipment - From Caterpillar and Hitachi to the Komatsu 830E-5 and general mining vehicles - Browns Radiator Service services the entire scope of mining operations that depend on radiators, coolers and fuel tanks to keep machinery moving and productive.

It works both directly for big mining companies as well as mining contractors for all their needs, whether it is onsite in the Pilbara or the Goldfields, or fabricating, servicing and supplying from its Perth workshop.

Onsite power generation is also a speciality with Browns Radiator Service boasting the ability to travel anywhere in the state and take a project from inception to completion stages.

Measuring up gen sets, returning to produce the CAD design, building the generator, managing all logistics and travel is all part of the company's expertise.

Browns Radiator Service has had the privilege of working with some great people on



Detroit V Cooling Packs.



5 Green Cooling Towers on Rottneest Island.



Plasma Machine cutting out Western Star Radiator Tanks.

TRUSTED FOR FOUR DECADES

projects such as Rottnest Island generator cooling packages.

Services

Fans

One of the most important components for any cooling system is an adequate fan. Browns stocks and supplies electric fans; multi wing fans and others. Also kept in stock are a number of extreme performance Spal fans.

Fuel Tanks

All service, repair and fabrication work as required.

Industrial Radiators

With decades of years' experience in designing and building cooling packages for drilling rigs, compressors and earthmoving machinery the company can create any requirement.

For different applications Browns can design a product that will perform and also supply excellent service life. For example, if the machine is working in an environment with corrosive elements cooling units can be built that will outlast all others, stainless steel bolts and even stainless-steel tanks if required.

In stock are a large number of replacement bolt on tanks to suit Mack, Kenworth, International and more and are normally on shelf with gaskets and ready to go. If not, the company will custom make a new tank for whatever the need.

Intercoolers

Browns stock a large number of Intercoolers on its shelf alongside intercoolers with Tube and Fin, Bar/Plate or rubber mounted cores with extended warranty. Custom made intercoolers are also easily produced.

Oil Coolers

There are a lot of oil coolers available off the shelf, but if an entirely new cooler is required, Browns can design and build the cooler necessary for the job, whether it is Pin Fin, Bar/Plate, Tube and Fin or a complete steel cooler.

The company also manufactures and supplies remote oil coolers with their own fan and sensor. This means they can be mounted anywhere and the sensor will have the fan come on when necessary, keeping the oil at an optimum temperature.

Welding and Fabrication

The company offers a complete welding and fabrication service.

For further information go to: www.brownsradiators.com.au or contact Glenn and his team on (08) 9451 8093

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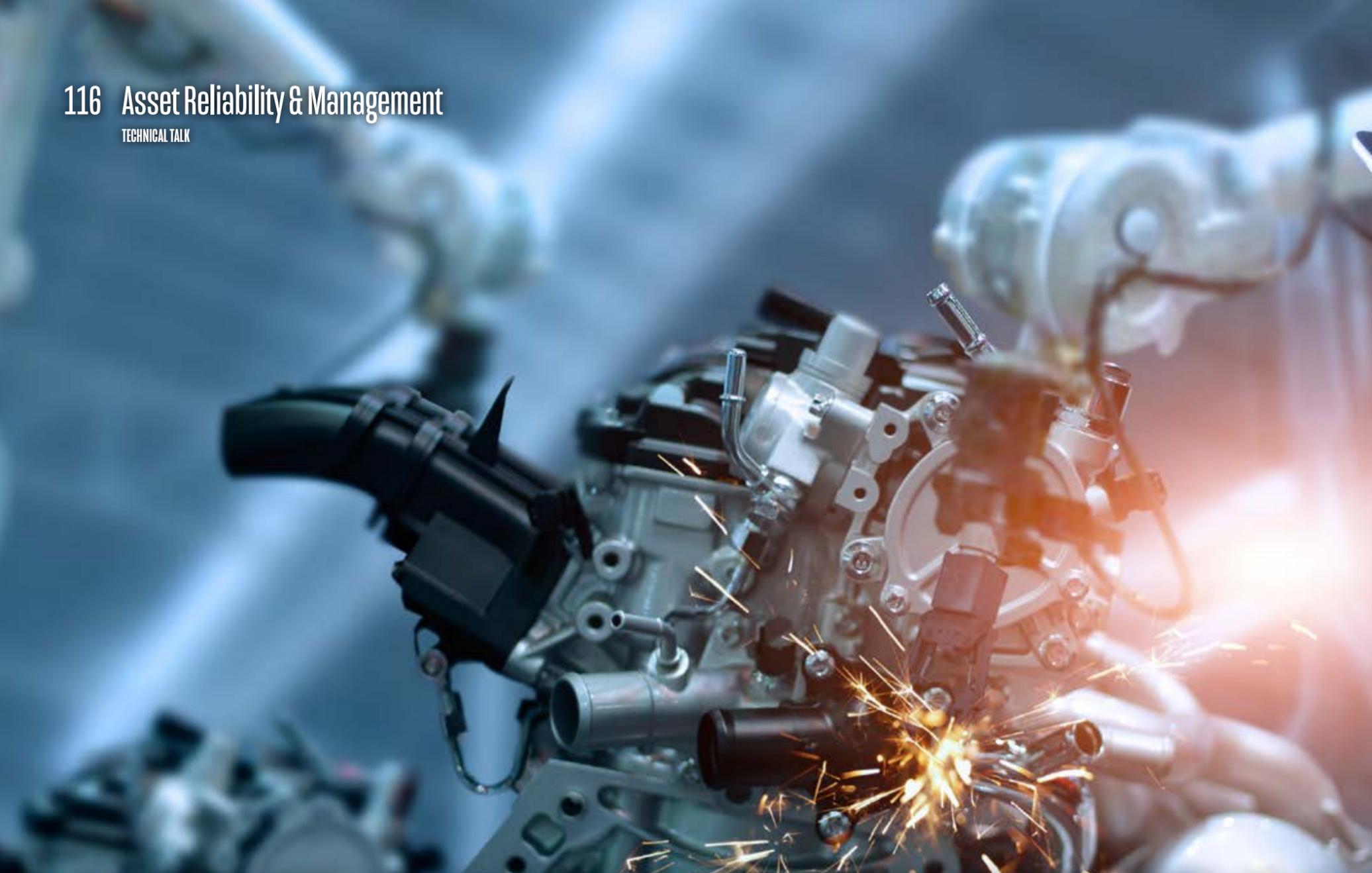


- RADIATOR SERVICE, REPAIR AND RECORE
- PERFORMANCE COOLING SYSTEMS
- OIL COOLER SERVICE, REPAIR, DESIGN AND MANUFACTURE
- HEAT EXCHANGER SERVICE, REPAIR, DESIGN AND MANUFACTURE
- COOLING PACKAGE DESIGNS AND MANUFACTURE
- IN HOUSE CAD DESIGN
- SPECIALIZED WELDING TIG MIG STICK OXY FOR ALL METALS
- CNC PLASMA CUTTING
- CNC BENDING
- ONSITE SERVICE
- FAN DESIGN AND SUPPLY
- WA AGENT FOR DIECON MARINE HEAT EXCHANGERS



Press Brake with Computer Screen.





ACCELERATING YOUR TRAN

It's inevitable that with advances in technology comes the need for transformation to take advantage of these technologies. Mining companies must regularly consider investing in their IT infrastructure to deal with an influx of connected devices, automated plant and equipment processes, and challenges of collaboration across geographically dispersed sites.

There are also the complexities of managing mine asset themselves, from high production costs of extracting and processing minerals, investment in critical equipment, maintenance and labour, to fleet tracking, logistics and transportation, all whilst trying to hit targets and maximise ROI.

Smart automation is essentially driving the need for asset owners to implement more efficient, more secure software that can help streamline their processes, including the real-time collection, analysis, storage and protection of an overwhelmingly large amount of data, day-in day-out.

In the world of digital transformation, to achieve the desired operational efficiencies and deal with technologies requires the implementation of a robust Enterprise Resource Planning (ERP) system.

There are many ERP systems available and the assessment of which one suits which client is not an insignificant exercise. Additionally, service providers will not specialise in all ERP possibilities, so clients will need to be satisfied with an implementors' experience, expertise and working culture.

ERP systems by their very nature are not intended to be customised for individual enterprises, however most can be. Customisation adds cost, complexity, risk and requires additional resources and time. This is about clients' flexibility in matching their business

processes with the practices embedded in the chosen ERP system.

An important decision for any ERP product is the reason you are moving to a particular product. What are you trying to achieve, and how do you know when you have achieved it. The 'how do you know' justifies the investment made, however is frequently ignored or overlooked. Implementing a product is the first part of the journey, and using it to improve your business with the technology you have procured, in a changing world, is the next part.

DAS Consulting is one firm with an in-depth understanding of the challenges asset owners in asset intensive industries face along their transformation journey, and how the right tools and expertise put them in pole position to improve the management of their asset.

The Australian Mining Review caught up with DAS Consulting Director Keith Johnson, and General Manager Gordon Hang Gong, to learn more about the power behind ERP software and why choosing a customised platform is so important in industries such as a resources and Defence.

AMR: Firstly, can you give us a background into what DAS Consulting do and the industries you serve?

KJ: At DAS Consulting, we implement ERP solutions across asset intensive industries, including public and private companies in the mining and resources, Defence, transport and utilities space. For us, it's about understanding every aspect of that industry, and providing a solution that meets the industry expectations of our clients.

We are a leading ERP systems provider that combines experience, technical expertise,

and domain knowledge to deliver what we and our client have collaborated on, to effect a satisfactory solution. We treat each implementation as a collaborative journey, working closely with our technology partners and clients to drive value at every stage of the process.

Asset intensive industries such as mining demand 'operational readiness' as they operate in a fluid environment with frequent changes in the positioning of assets and resources. Asset management in mining focuses on the availability of physical assets and resources to service the operational plan in a timely manner and on budget, while generating income for the enterprise.

We implement ERP solutions that offer in-depth functionality for usability and optimum total cost of ownership through the lifecycle of the system. From evaluating opportunities to solving hidden productivity challenges, we help improve business performance across operations and the plant and equipment lifecycle.

Our belief is that software alone does not solve business problems, but it is the people who make the difference. We pride ourselves on our capability of providing products and services for the digital transformation of asset intensive industries whose main business platform is SAP ERP. Our current industry specialisation is with SAP's Defence, Security, and Aerospace, including S/4HANA DFPS.

We are a licensed partner of iSEC7 for SAP Mobility Solutions and Baton Simulations for ERP business process simulation on live S/4HANA Fiori systems, which allows us to provide solutions that streamline complicated and inefficient asset data collection procedures. Additionally, providing our clients with business efficiencies and significant

improvement in maintenance practices to reduce maintenance unit costs and increase asset reliability.

AMR: In a mining operation, there would clearly be several problematic areas along the transformation journey. What do you see as the key issues and how do you address them?

GHG: As a business transformation company, DAS Consulting has worked with mining organisations for over 25 years, it's safe to say we have addressed almost every potential issue that could arise in projects of this scale. The priority in any transformation project we work on is increasing operational efficiencies, optimising costs, and implementing a solution in the shortest time possible without impacting site productivity.

I would say the three most common issues that exist centre around data, security, and training. As mines become more automated, it's only natural that greater amounts of data are extracted which require powerful software platforms and processes to manage it. From driverless trucks, wireless communications networks, drones and surveying technology, to plant sensors, remote oil sampling, and fleet tracking equipment, all these activities demand robust and secure data management systems.

As data is extracted and monitored in real-time, the quality of data is critical, particularly with the increased reliance on predictive maintenance, machine learning and artificial intelligence.

But, there's also an increased vulnerability to cybersecurity threats as mining operations embrace new autonomous technologies and enterprise applications. As companies invest in cloud, analytics and interconnected devices that integrate devices, people and

TRANSFORMATION

DAS Consulting

"Your solution is only as good as the experience of the people doing it"

plant, it's critical to ensure systems are up-to-date and compliant.

This is where our highly trained and qualified consultants come into play to help companies select the right ERP solution and strengthen their digital infrastructure aligned to their unique site requirements. We offer a suite of digital transformation and workflow automation solutions that provide the necessary safeguards to protect their digital infrastructure.

Training forms an important part of our ERP implementation process as it is an area many service providers in the market seem to neglect. DAS Consulting has actually partnered with Baton Simulations to offer a digital acceleration solution that uses gamification and visualisation as part of in-application learning and support. It is essentially an ERP simulator which removes the need for expensive shelfware, publishing lead-time and classroom training. Users can see an end-to-end process on screen, so they understand their role and that of the application transactions in their organisation.

AMR: You mentioned the IFS cloud-based enterprise software. Can you provide some detail around its suitability for mining companies?

GHG: Although SAP is still our core business, we are starting to see incredible value in the award winning IFS software, which is a cloud-based enterprise software offering a modular package approach aligned to the individual needs of a specific enterprise.

There are a number of larger companies transitioning away from SAP to IFS. This is common in the start-up space where smaller mining service providers simply can't afford the financial investment in SAP.

That is why we have partnered with IFS as it's not only cost-effective, but provides a much shorter implementation time backed by a super-efficient training program.

The 'IFS Cloud' product is Cloud first, but not Cloud only, and deployment can be cloud based or on-premise. It offers a high degree of flexibility as we can build out a tailored solution for clients with only the relevant modules that align to their specific business needs.

IFS can manage ERP requirements while providing best-in-class performance for specific industries, with mining being one of the core industries. It has a robust and thorough methodology, which allows us to significantly shorten the ERP implementation timeframe, subsequently saving the client money, while enjoying the advantages of these solutions earlier. This extends beyond implementation into the operational lifecycle.

From the back office to the operations, we look at every opportunity to increase efficiencies through a collaborative system. Most other systems neglect a company's business plan once the new system goes live where it just becomes part of the functionality they use to keep the business on track. If our clients are unsure of what ERP they need, we conduct a Business Value Assessment that provides high-level insight into what modules they require. This is then presented to senior management as the Business Plan with expected costs and timeframe and serves as an evaluation tool project plan, configuration requirements and KPI's. **AMR**



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BRINE MINING AND SWRO



Brine mining has the potential to add a significant revenue stream to sea water reverse osmosis (SWRO) – and possibly be a more profitable business than the production of fresh water itself – while simultaneously reducing the amount of brine discharged into the sea and increasing SWRO plants' freshwater output.

That's why Saudi Arabia's SWCC recently announced a major initiative to start brine mining in connection with its Jubail 2 desalination plant, which in addition to fresh water is expected to produce two million tons of sodium chloride and 3,600 tons of bromine annually.

Indeed, other SWRO operators from Spain to Indonesia are beginning to mine their brines. Other valuable chemicals extractable from seawater, albeit in smaller quantities, include magnesium and potassium.

How is brine mining different than traditional mining methods?

Brine mining is an alternative to traditional and much more widespread mining techniques such as surface and underground excavation.

Like all mining, its purpose is to extract valuable minerals from the earth. However, instead of searching for minerals in dry-rock ores, brine miners look for these as solids dissolved in brines, or concentrated solutions of salts in water.

Such salts include sodium chloride (NaCl) – the stuff we sprinkle on our food – but in chemical terms refer to any inorganic or organic compound with ionic bonds.

Of course, we don't want most of these salts anywhere near our dinner tables, but we do rely on the many chemicals derived from them in all kinds of other ways.

Brine mining is a profitable way to obtain valuable minerals and compounds

Strictly speaking, brine mining began millennia ago when people discovered they could use the sun's heat to evaporate seawater, our planet's most abundant brine, and crystallize salt for use in preparing and preserving food. The same artisanal processes are still in use now in many countries.

Today, however, most brine mining is carried out at a much greater scale by large industrial operations that use specialized equipment to concentrate, extract, and process a range of minerals and compounds from brines that might be located far from the sea. In Chile and Argentina, for example, the brine mining process for lithium begins with drilling wells to access the underground brine deposits, followed by brine pumping to the surface for further processing. The brine is then treated to concentrate and finally isolate lithium hydroxide.

Advances in technology, environmental restrictions on surface and underground mining, the depletion of easily obtainable dry-rock ores, and rising commodity prices have made it increasingly feasible and financially attractive to extract some minerals from brines.

While all commodity prices fluctuate, demand generally continues to rise along with population growth and industrialization. This includes sodium chloride and many other compounds found in brines.

In some cases, notably for metals critical to electricity generation, storage, and distribution, price developments are even more volatile.

For example, prices for lithium hydroxide, essential for batteries, increased more than five-fold between mid-2020 and end-2022.

Brine mining can be a more environmentally sustainable solution than traditional mining

For several reasons, brine mining is usually considered more environmentally sustainable than dry-ore mining:

- Brine mining can be less energy intensive than other forms of mining for the same minerals, as the salty water acts as a natural solvent and makes it easier to extract and process compounds compared to processes that involve the extraction of ores from hard rock.
- Brine mining does not require the excavation of large amounts of land, which can significantly impact local landscapes and ecosystems. However, extracting large volumes of water from underground deposits does affect the water table and can lead to land subsidence.
- The highly saline environments in which brine is found are inhospitable to most plant and animal life, so brine mining's impact on biodiversity is minimal.

In addition to the mineral extraction business, many industrial and mining processes use brine mining as part of their wastewater management. Depending on the chemical composition of the brine, brine mining can play a role in both minimum liquid discharge (MLD) and zero liquid discharge (ZLD) wastewater treatment strategies to comply with relevant legislation. Instead of disposing brine effluents into bodies of water or sewer systems, injecting them into deep wells, or letting them evaporate in ponds, wastewater brines are treated in a variety of ways to concentrate it to decrease its volume and disposal costs and derive valuable chemicals – in addition to fresh water.

In a circular economy context, brine mining is more than a potential add-on to MLD and ZLD strategies. It can also provide financial and compliance incentives for wastewater

treatment, and, in some cases, even pay for itself by transforming, at least in part, harmful waste products into useful by-products.

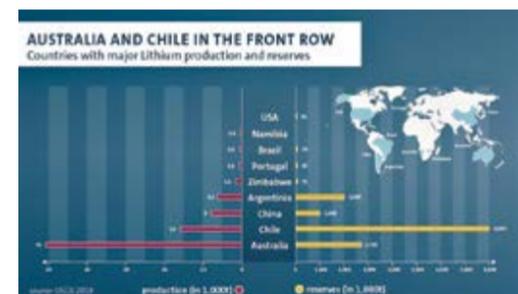
The same forces that drive brine mining growth in general will drive its growth in connection with SWRO

With its estimated volume of approximately 1.3 billion cubic kilometres, the world's most ubiquitous brine is, of course, seawater.

Broadly speaking, interest in brine mining in conjunction with SWRO is motivated by the same two factors discussed above: for-profit extraction of minerals and compounds with commercial value and managing wastewater to minimize environmental impact.

Brine mining seawater for profit

- Demand for the minerals and compounds found in seawater continues to grow with increased industrial and agricultural output.
- Six ions comprise approximately 99% of all sea salts by weight: chloride (Cl⁻), sodium (Na⁺), sulfate (SO₄²⁻), magnesium (Mg²⁺), calcium (Ca²⁺), and potassium (K⁺). Sodium chloride is the most prevalent seawater chemical with ionic bonds, but seawater also contains many other dissolved salts with commercial value, albeit in smaller volumes.



Most of the world's lithium currently comes from dry ore mining in Australia, but Chile and Argentina have much greater lithium reserves within underground brine deposits. Source: Volkswagen/USGS



ENGINEERING
TOMORROW

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- Because of its prevalence, sodium chloride is the most valuable chemical that can be extracted from seawater. The primary industrial use of sodium chloride is to produce chlorine and caustic soda, which are used to manufacture a variety of products, including plastics, textiles, and paper. But sodium chloride is also used in the chemical industry to produce sodium hydroxide and hydrochloric acid, as well as in the oil and gas industry to extract natural gas and remove impurities from oil. In addition to its industrial uses, sodium chloride is, of course, also a common ingredient in food. However, only about 8% of worldwide sodium chloride production is used in the food industry, either as table salt or as an ingredient in processed foods.
- Magnesium is another valuable chemical that can be extracted from seawater. It is used in the production of magnesium metal and in various other applications in the pharmaceutical and agricultural industries.
- Potassium is used in the production of fertilizers, as well as in a variety of other applications, including in the food industry and in medicine.
- Bromine has a wide range of uses in various industries, including water treatment, flame retardants, chemical production, and the food industry. Its

versatility and effectiveness make it an important and valuable chemical element.

Mitigating SWRO's environmental impact through brine mining

RO brine, also known as reject or concentrate, is a waste product of SWRO. Indeed, its disposal back into the seas from which the seawater was extracted is a controversial issue in some quarters, but not everywhere. Some argue that it has no practical impact on the environment; others maintain that it has extremely negative effects on marine life. While the debate is ongoing and beyond the scope of this blog, it is clear that better science and more studies are needed to fully understand the impacts of brine discharge.

At any rate, there is no doubt that brine mining has the potential to reduce the amount and concentration of SWRO brine that is discharged into the ocean as part of a ZLD or MLD strategy.

Which brine concentration technology is the right one?

Brine mining depends on brine concentration technologies, essentially the same used in MLD and ZLD, to reduce brine volume prior to the evaporation and crystallization processes that yield dry solids. Solar evaporation is typically used to the extent possible, but membrane systems are always necessary.

In addition to the reverse osmosis (RO) common to SWRO, several other membrane technologies are emerging to concentrate brine. Each of these technologies has its advantages and disadvantages relative to what brine elements can be concentrated, optimal pressure ranges, and membrane scaling effects.

These brine-concentrating technologies are either pressure- or electrically driven:

Pressure-driven:

- Osmotically Assisted Reverse Osmosis (OARO)
- Nanofiltration (NF)
- Ultra-high pressure Reverse Osmosis (UHPRO)

Electrically-driven:

- Monovalent Selective Electrodialysis (MED)
- Electro Metathesis (EDM)
- Bipolar Electrodialysis (BPED)

As yet, there is no general consensus on which of these technologies will eventually dominate brine mining in connection with SWRO. All are considered to be ripe for further technical optimization that will impact brine mining and could have broader implications for the desalination industry.

In its massive Jubail 2 project, SWCC will use a dual brine concentrator that deploys nanofiltration prior to the SWRO process to first remove most of the seawater's calcium and magnesium, and then further concentrate the highly saline RO reject. It will then crystallize the 99.6% pure sodium chloride and bromine for use in Saudi industries.

Will brine mining mean changes for SWRO operators?

Brine mining's disruption of the SWRO industry has begun, but no one yet knows where this process will take us.

Clearly, the advantages of scale will matter, and the impact of change is likely to begin with very large SWRO producers. For example, the business case for extracting and selling two million dry tons of high-quality salt per year, as SWCC's Jubail 2 plant intends to do, is made possible only by combining the brine mining investment with a greenfield, one million m³/day SWRO plant. At present, this is not something for small and medium SWRO producers. But this, too, could change.

Another likely impact of brine mining on SWRO will concern technological innovation. As brine mining grows in connection with SWRO, wastewater treatment, and mineral mining as such, the market for brine concentration technology will also grow.

Membrane producers will compete to develop better anti-scaling solutions and ways to do more with less pressure.

EPC contractors will vie for projects that depend on new technologies. All this innovation will not only shape the emerging SWRO-brine-mining industry – it will also usher in innovation that could also disrupt “traditional” SWRO, too.

Indeed, the combination of brine mining and SWRO might cause some to ask, “What business are we in?” Will mining companies begin to ramp up their activities in brine mining and sell fresh water as a by-product? Will SWRO companies become mining companies? Will new companies be born with a foot in both industries?

Another open question regards cost and affordability. What will brine mining mean for the price of SWRO water?

Will new business models make SWRO even more affordable for coastal communities in developing countries that are hardest hit by climate change and water scarcity?

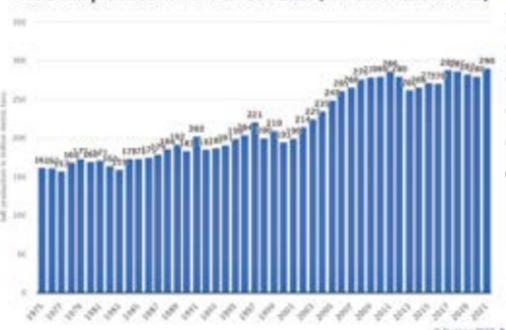
And what will brine mining mean for permitting and compliance? For example, will regulators require more MLD and ZLD solutions to greenlight SWRO projects?

One thing is certain: The combination of brine mining and SWRO will look very different in 10 years than it does now!

For more information, visit <https://www.danfoss.com/en-au/>

AMR

World salt production from 1975 to 2021 (in million metric tons)



4" trash pumps are built to Aussie Mine Boss standards and shipped globally.



MINING SAVES THE DAY

We should all congratulate the new Federal Government on being able to produce their first budget with a surplus. The first in a decade!

If you saw the budget speech on television you would see very pleased looking people taking credit for that turnaround. What we missed out on seeing was details of exactly how it was achieved, particularly the part that our industry, Mining, played in this reversal of fortune.

Of course, at the end of Covid and prices for other commodities, including agricultural, play a part in this as well. Shortly after the budget was produced, we also see the Western Australian Government coming up with a \$4B surplus. Again, looking very pleased with themselves.

HOW DID THEY DO IT?

People involved in the mining industry know it's dirty work, like agriculture, but in a much bigger way. It's a major contributor to the wellbeing of the rest of the population. What most people don't understand is there is only around ¼ million people involved in mining and yet it produces literally hundreds of billions of dollars income for Australia. All by the efforts of the Mining Industry.

To quote the Commonwealth statistician, Resources and Energy Quarterly, it's iron ore that is the star at about \$155B, LNG next with more than \$90B, followed by thermal coal at \$76 B and metallurgical coal at \$63B. Yes there are other key players as well. For example, gold at \$24B and other minerals, copper, lead, lithium etc, producing another \$70B or so!

All that is accomplished by less than 1%
JUNE2023 AMR

of the total population of the country! We could probably do a similar exercise of agriculture but the numbers would be smaller with the amount of professional farmers probably about the same as mining.

WE SALUTE THE INDUSTRY

Australian Pumps' Warwick Lorenz, who contributed this article, believes Australian miners are the best in the world.

"They're innovative, adventurous, certainly risk takers", he said.

Australian Pump works with the drilling industry and plays a major role in supporting all mining extractive operations from big open cut coal mines to underground and surface gold operations.

"We understand the fundamentals of the Australian economy. Without our mining industry, it would be much more like New Zealand's than the dynamic potential we have in Australia", said Lorenz. "The fact that the industry has saved the reputation of a number of governments over the last 30 years is obvious. The industry makes good economic managers look even better".

WHY ARE AUSSIES GREAT MINERS?

The majority of our population don't know that it was gold mines at Ophir, compliments of Mr Hargraves, that put Australia on the map. We hear stories about Sydney Harbour being choked with ships where the sailors had deserted the vessels and gone off to the gold fields. Our population exploded from a few convicts and entrepreneurs to real people getting out and "trying their luck".

Many of us have ancestors who go back to

that explosion of population in the 1860's! The reality is Australians have been mining for almost 200 years and have become very good at it. There is hundreds of stories from "Lasseter's Lost Reef" to the founding of BHP at Broken Hill when it was just a nob of black rock.

Now we see the world's best in machinery being utilised by the world's best mining companies to build Australia's wealth, and ultimately our security.

AUSSIE'S PART IN ALL THIS

Australian Pump Industries, (Aussie Pumps) play our part in mining. Innovative, adventurous, just like the miners we serve, we keep exploring ways of building better pumps, hydrotesters for gas and similar products to help serve the industry.

"We find Australian engineers working on mines in Africa, South East Asia, even in Mongolia and Chili. They specify our equipment because we are ahead of other major equivalent operators. All that, and yet we're only a small company of around 50 people, looking for another 25, exporting our products around the world. We have a huge debt to the mining industry for the encouragement and support we've had over the years", said Lorenz.

AUSSIE'S MINE BOSS SUCCESS

"It was miners who taught us what was required. Our engineers learnt from experience what works in mining and what doesn't. One thing we know is products need to be virtually unbreakable and safe to operate. Those are the two basic principles our designers use when producing new ideas or, making what were good products even better", said Lorenz.

Aussie's Chief Engineer, John Hales, puts himself in the position of the user and asks what would work for him. His team do a lot of research directly with the mines dialoguing with operators. "It is from that experience we get the inspiration to improve the products and to value add features that will make them safer and more efficient", said Hales.

AUSSIE MINE BOSS TRASH PUMPS

Aussie's first adventure in a product designed for mining was their trash pump range. Everybody has to move water on mines. In and underground mine, you have to make sure it's dry so miners can work safely. In open cut mines, you have to empty the water if it's flooded.

Aussie started out with small 2" and 3" trash pumps built to take the rigors of operating in tough conditions, both from the climatic and rugged environment. Miners expect the product to work first time, every time. The company's first Mine Boss trash pump designs came out looking like they'd been designed by Caterpillar in Peroria. Super heavy duty frames in hot dipped galvanised steel, integrated lifting bar, reliable first world engines fitted with electric start with E-stop, battery isolation and even fire extinguisher.

"We soon moved on to big 4" and 6" pumps, similarly equipped for the industry, knowing that machines can take a hiding", said Hales.

YANMAR AND KUBOTA

Aussie uses Yanmar single cylinder engines for smaller pumps and Kubota water cooled drive on the 4,000 lpm 6" Aussie QP60TD trash pump. All trash pumps have big front clean out ports. That allows the operator to clear chokes in a matter of minutes.

The pumps are all self priming! That is a huge benefit to the user, not having to prime the suction hose is a real plus. The Aussie pumps prime first time every time. The operator only needs to ensure the suction hose is absolutely secure with no air leaks.

Bigger trash pumps have since been introduced and are used for mine dewatering and flood mitigation.

"We know we have to deal with climate change and Australia's mining industry is particularly susceptible. We learnt that lesson in Queensland decades ago when all those big open cuts filled with water. We saw the photos that show the boom of a crane sticking out of a completely flooded mine. That created real challenges for mine operators to pump what often was contaminated water out of the mine and dispose of it safely", said Hales.

WET PRIME PUMP VERSUS DRY PRIME

Aussie learnt in the early days the real value of 'wet prime' versus 'dry prime' pumps. Dry prime require a priming device, either a compressor or vacuum pump. They have their place where pumps have to operate on 'snore' or have to draw water from deeper vertical lifts than 7.6 metres. Compressors and vacuum pumps can be temperamental, especially if they're pumping contaminated water.

Aussie's wet prime pumps are significantly simpler. They consist of big cast bodies with an integrated priming tank designed into the bowl. Taking their 6" pump, the Aussie MQ600TD, you'll see the shoulders on the pump are the built in priming tank, all cast in as one piece.

Those big pumps, driven by Deutz 80 hp diesel engines, are super reliable and have very few moving parts. There is a stub shaft coming off the engine to mount the impeller and a mechanical seal that is oil lubricated and made from tungsten titanium carbide.

Super heavy duty wear resistant high SG iron volute and impellers make up the only other components inside the bowl. The pump is so simple to prime. You simply fill the pump with water through the priming port, ensure the suction hose is sealed at the front of the pump and that's it. Start the engine, the water inside the pump is evacuated, creating a vacuum inside the bowl. The check valve on the suction side opens, drawing water up through the suction hose through a lift of as much as 7.6 metres.

They are maintenance free and built to last. The MQ600TD pump comes with a 152 litre fuel tank, enabling it to operate for eleven hours before refilling.

Aussie is now building bigger, cast iron self priming and 316 stainless steel pumps for mining applications. The company knows

there are highly corrosive liquids in mining and reliability is everything.

"We've even glass coated the inside and outside of some of these pumps and been astonished to find the same product with the original internal lining is still intact a decade after the pumps were supplied. Even the challenge of pumping water contaminated with abrasive slurry didn't stop them", said Hales.

WE SALUTE THE DRILLERS

Without the exploration industry and the work that goes into prospecting, we wouldn't have a mining industry. We salute those operators and the great work they do.

"Certainly, we keep working with them on developing mud pumps that will be super reliable in cast iron, nickel aluminium bronze and 316 stainless steel configurations. More recently major exploration rig operators seem to be preferring heavy duty cast iron bodies but with 316 SS impellers.

Hydraulics are the go. We are now working with Australia's leading drill rig operators with a view to getting their input on the ideal mud pump specification", said Hales.

LOOKING TO THE FUTURE

Aussie is big on pressure cleaners as well, also built in Mine Boss configuration. They

also ship loads of hydrotesters to the Middle East where they work on water and gas pipelines.

"It's the mining industry that gave this company a break when we first started out 30 years ago. Without mining Australia would be in a very different place and we would be living very different lives", said Lorenz. Aussie's 30 year celebrations will go all year. Like Australia's mining industry, Aussie is growing too. Their new facility in Sydney's Northwest business district is a huge warehouse/workshop complex that will enable them to grow substantially in support of Australia's most important industry.

Further information including two great new publications are available from aussiepumps.com.au. Pump Smart 8 covers everything you wanted to know about self priming water pumps. Blaster Blitz 8 is all about high pressure cleaning done the Aussie way. Loads of free training courses also available.

Aussie has it's eye on the world market and their expansion will enable them to supply more products for the export market that have been tried and proven in Australia's Mining Industry.

"That's another one we owe mining", said Lorenz. AMR



This Aussie 6" 'Trashie' will handle 6,000 lpm flow with up to 80 mm spherical solids.



One of two GEH2 hydrogen generator units running at the Formula 1[®] Australian Grand Prix 2023, which powered the event's Tech Hub, with zero onsite noise or air pollution.

FOREFRONT OF THE HYDROGEN REVOLUTION

First Autonomous and Zero-Emission Power Source

As the Australian mining industry transitions to clean energy, mine sites are taking steps to reduce their environmental footprint and reach net-zero emissions over the next few decades.

Decarbonisation and sustainability goals remain the focus for the mining majors, notably BHP targeting a 30% reduction in Scope 1 and 2 emissions by 2030, Rio Tinto aiming for 15% and Fortescue Metals Group committing to net zero (which includes Scope 3) by 2040.

Most of Australia's emissions stem from energy production, transport, agriculture and industrial processes, with about 90% of the world's carbon emissions coming from the burning of fossil fuels, according to the CSIRO.

Within the context of energy production in Australian mining, the majority of mine sites in remote locations rely on diesel generators as prime solution for power generation due to the lack of grid connectivity.

The Australian Mining Review spoke to Blue Diamond Machinery director Justin Pitts about powerful solutions currently available for the Australian mining industry to transition to cleaner energy and reduce carbon emissions through the use of cost-effective and practical energy alternatives.

Autonomous and Zero-Emission Hydrogen Generator

Introducing the GEH2, Australia's first zero-emission hydrogen generator.

While traditional generators run on diesel, gas and fossil fuels, this world-first autonomous and carbon-free power source has been designed to replace typical gensets in a variety of settings and operations, including mobile, prime and standby applications. What this means for mine sites is that there are no CO₂, fine particulate matter nor noise emissions – the only output is a little water and some heat.

Each of the GEH2 unit features a lithium-ion phosphate battery, the latest generation Toyota fuel cell and functions just like a traditional generator, delivering strong, reliable, efficient power supply through instant start-up, without relying on the electricity grid.

The GEH2 provides 100kVA/80kW of clean,

quiet and instant power in a 3350L x 2200H x 1100W and 4t casing, coupled with a 44kWh buffer battery.

There is on-board intelligence software that monitors via the cloud and offers direct notification, including a remote interface for mine site staff on-the-go.

Each unit is equipped with event-driven electrical outlets, standardised frequency and voltage levels (230V / 400V – 50Hz & 60Hz).

The state-of-the-art GEH2 provides scalable power via modular units, perfect for off-grid, remote and isolated settings, construction sites, confined spaces (mine sites and tunnels), electrical vehicle (EV) charging, grid maintenance, emergency applications,



SANTOS: SUSTAINABLE BUGGY CHARGING

Australian oil and gas producer Santos partnered with Blue Diamond Machinery to explore eco-friendly and sustainable charging options for their on-site electrical buggies that transport the team around their large Moonba facility in South Australia.

telecom, peak shaving, back-up power and large-scale events.

Flexible implementation allows the GEH2 hydrogen generator to connect with other diesel or gas generators, even the grid, for continuous supply of autonomous energy.

Strategic Global Solutions Powering GEH2 Technology

Blue Diamond has partnered with French company EODev (Energy Observer Developments) to become the exclusive Australian distributor for the GEH2 hydrogen generator.

EODev is the company behind the iconic Parisian landmark, the Eiffel Tower, being lit up in green as part of the "Paris de l'hydrogène" event organised by Energy Observer in mid-2021.

The green light symbolised the certified renewable hydrogen that was used to power the Toyota PEM fuel cell inside the GEH2 generator, developed by EODev, and powered by the supply of renewable hydrogen from Air Liquide.

With the GEH2 unit's ability to generate hydrogen gas on-site, it eliminates the logistical complexities and costs associated with the transportation and storage of hydrogen.

Hydrogen mobility, along with the use of GEH2 as a substitute for the Paris' electricity grid, shows the power of this first autonomous and zero-emission GEH2 hydrogen generator to produce carbon-free power to illuminate the French landmark.

The current 100kVA hydrogen generator can power a 30-person mine camp, with EODev planning to release 200kVA and 500kVA versions of the hydrogen generator in the near future.

The Toyota fuel cell which equips the GEH2 is a module similar to the one developed by the Japanese brand, world-renowned for its reliability and exceptional life span, specifically for its hydrogen fuel cell electric vehicle, the Toyota Mirai.

Toyota Motor Europe president and chief executive Matt Harrison says that "hydrogen fuel cell technology will play a key role to enable Toyota to reach its goal of carbon neutrality by 2050".



Two GEH2 hydrogen-fuelled generators running at the Formula 1® 2023 Australian Grand Prix in Melbourne.

Fuelling the 2023 Formula 1 Australian Grand Prix

Closer to home, Blue Diamond recently launched Australia's first hydrogen power solution at the Formula 1® Australian Grand Prix 2023 in Melbourne.

Attended by just under 500,000 people over four days, the technical hub for this large sporting event was powered by just two 100kVA GEH2 electro-hydrogen generators, compared with a plethora of diesel generators elsewhere on-site powering other applications.

"Blue Diamond's proven capacity to deploy lower carbon technologies at large-scale events like the Grand Prix will ultimately contribute to decarbonisation efforts," says Justin.

Though the GEH2 was regarded as low emission at the Grand Prix, it could potentially operate 100% emission-free once the supply of green hydrogen becomes more accessible.

Hydrogen, the most abundant element on earth, is rapidly becoming a market disruptor and gaining huge attention.

Europe's largest equipment rental company LOXAM has already embraced the use of this new technology by offering the GEH2 hydrogen generator for hire.

The same is happening in the US market through United Rentals.

"Hydrogen is real and it is happening," says Justin.

"It is an alternative to fossil fuels and provides energy security.

"There is phenomenal interest in hydrogen generators and we are on the pathway to making it commercially viable."

Economies of Scale

Beyond the environmental benefits, the GEH2 hydrogen generator presents a compelling economic case for mining companies.

With lithium-ion batteries and hybrid power solutions now commercially viable and hydrogen production costs projected to decrease in the coming years, these generators offer a cost-effective alternative to traditional diesel-powered systems.

"In the medium term, the industry target is that the price of hydrogen will drop and reach a level that is acceptable to many customers," says Justin.

"Once hydrogen goes below \$10/kg, it'll be much cheaper to run than diesel.

"There is a clear pathway to the number of

projects coming online in the next two-to-five year period and, in this medium-term, the price parity between diesel and hydrogen is going to cross over and at that point these will be cheaper to run in many applications than a diesel generator."

Australian Generator Market

Blue Diamond Machinery's flagship products include diesel generators as well as being the exclusive national distributor of the Japanese-made Denyo generators.

Diesel generator use make up 19% of Australia's overall CO₂ emissions and use approximately 2.5b L of diesel annually. Of that, a total of 30% of Australia's diesel use comes from the mining and construction industries.

The Federal Government wants to achieve net zero emissions by 2050 and reduce greenhouse gas emissions by 43% below 2005 levels by 2030.

Blue Diamond is spearheading the early adoption of new technologies in the Australian generator market.

The inaugural GEH2 hydrogen generator supplies clean energy, producing energy without any emissions of CO₂, fine particles, smells and noise – it only rejects water and heat.

Early Adopter: Fortescue Future Industries

There is currently insufficient green hydrogen at the right price commercially and Fortescue Future Industries (FFI) has emerged as a trailblazer by producing its own green hydrogen on-site.

Parent company Fortescue Metals Group (ASX: FMG) has targets to fully decarbonise its operations and reach net zero emissions by 2030.

Hence the FFI was created, which harnesses the world's renewable energy resources, like solar, wind, hydropower or geothermal

energy, to produce renewable electricity, green hydrogen, green ammonia, green iron and other green industrial products.

Green hydrogen is manually produced through a process called electrolysis by running electricity from renewable energy resources through demineralised water, thereby splitting the water into green hydrogen and oxygen.

The resulting oxygen is released back into the atmosphere and the green hydrogen, due to zero carbon dioxide emissions, is able to be used domestically or exported for uses around the globe.

FFI says green hydrogen is the fastest way to decarbonise Fortescue's mining and shipping fleet, including trucks, drill rigs and trains, with chief executive Mark Hutchinson saying there is "an urgency to produce green hydrogen and green ammonia and support global decarbonisation as quickly as possible".

Hydrogen Headstart

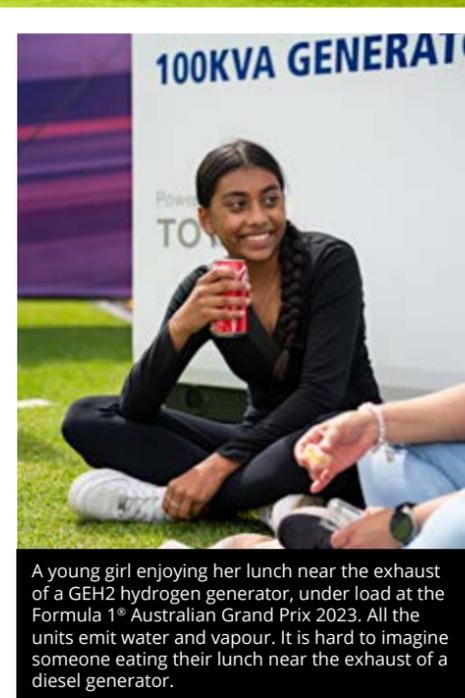
The Federal Government recently announced the \$2b Hydrogen Headstart program as part of its May 2023 Federal Budget to accelerate Australia's renewable hydrogen industry and position the country as a world-leading hydrogen producer and exporter.

The Program underwrites the biggest green hydrogen projects in Australia and ensures large-scale hydrogen projects already in development can get off the ground.

Funding will close the commercial gap between the cost of hydrogen production from renewables and its current market price.

The Program aims to support two to three flagship projects which could provide up to 1GW of hydrogen electrolyser capacity.

Latest McKinsey analysis and the Federal Department of Climate Change Energy Environment and Water (DCCEEW) modelling



A young girl enjoying her lunch near the exhaust of a GEH2 hydrogen generator, under load at the Formula 1® Australian Grand Prix 2023. All the units emit water and vapour. It is hard to imagine someone eating their lunch near the exhaust of a diesel generator.

shows that Australia's hydrogen industry could generate \$50b in additional gross domestic product (GDP) and create more than 13,000 regional jobs and a further 13,000 jobs from construction of new renewable energy infrastructure by 2050, according to the Australian Renewable Energy Agency (ARENA).

Blue Diamond: Net Zero Equipment

Blue Diamond has been providing power, air and industrial solutions for a decade.

After seeing the growing need for equipment to help its mining and industrial customers reduce carbon emissions, the company launched its new range of Net Zero equipment to provide a high-end range of green solutions which include hydrogen, battery energy storage, low emissions and solar technologies, hybrid power systems and electric site utility and transport vehicles.

All are backed by industry-leading engineering and technical know-how.

"Blue Diamond Machinery is committed to being at the forefront of the energy transition and assisting in Australia's commitment to net zero carbon emission by 2050," says Justin.

As seen by its strategic partnerships with EODev and Toyota, the company is heavily investing in alternative power solutions to the traditional diesel offerings.

"We believe there will need to be a variety of solutions available to achieve this goal of net zero, particularly in relation to reducing carbon emissions from powering mining and construction sites," Justin added.

"Blue Diamond aims to be at the forefront of these solutions through a range of offerings including hybrid generators, energy storage systems (ESS) and hydrogen powered generators." **AMR**



POWERING
A CLEANER
FUTURE

Blue Diamond Powers the Formula 1 using Hydrogen Fuelled Generators

A big step towards Net Zero future was the first fully sustainable activation at this year's Australian Formula 1 Grand Prix. Working together with Australian Grand Prix Corporation iEDM, Blue Diamond & Net Zero Equipment, EODev, the organisers sampled a taste of the future by using Hydrogen Fuel Cells to sustainably power the Grand Prix Tech Hub. The EODev GEH2 Hydrogen fuelled generator is powered by Toyota Fuel Cells, which combine Hydrogen and Oxygen to produce usable electricity. With the only exhaust material being water. The fuel cells operated over the event, producing approximately 1.8MWh of green energy. With zero carbon emissions, and whisper quiet operation. It's been great to see this technology in action and taking greater steps towards achieving Net Zero targets in Formula 1.



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