

THE AUSTRALIAN MINING REVIEW

2023 | January

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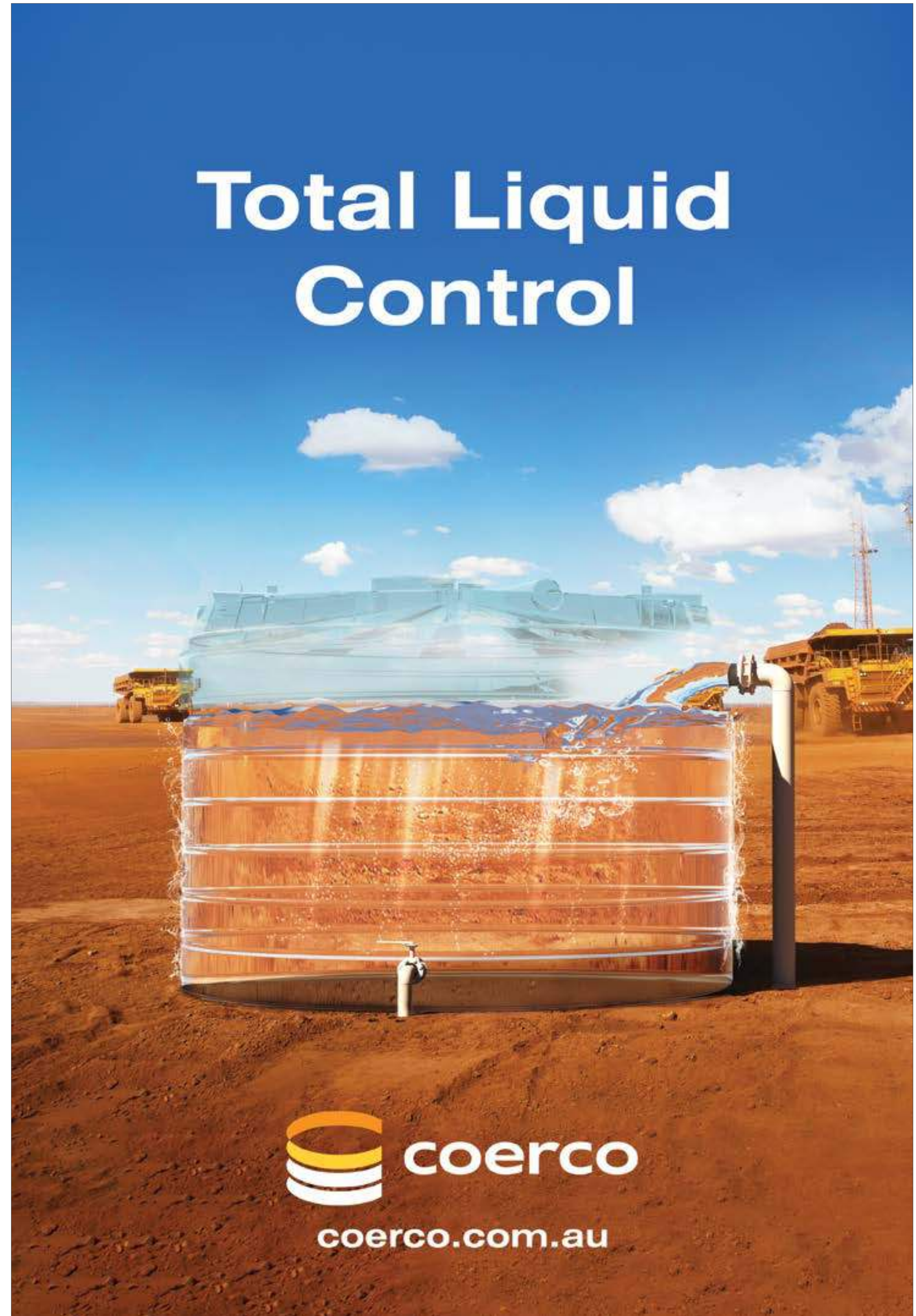
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CONTACT US
P (08) 6314 0301
F (08) 9481 7322
134A Charles Street, West Perth, WA 6005
PO Box 8023, Perth BC, WA 6849
Email the editor at
editorial@australianminingreview.com.au

GENERAL MANAGER
Trevor Pickett
0429 916 282
trevor@australianminingreview.com.au

EDITOR
Dale Granger
dale@australianminingreview.com.au

ACCOUNTS MANAGER
Teresa Sabatino
accounts@australianminingreview.com.au

JOURNALISTS
Tamra Carr, Kane Dive,
Kathleen Southway

RESEARCH
Jason Strydom, Wayne Dyson

AMR SALES TEAM COORDINATOR
Cal Christelow
cal@australianminingreview.com.au

SALES EXECUTIVES
Donna Orton, Quentin Roberts,
San Ienco, Chris Ritson

PRODUCTION MANAGER
Jeremy Pickett
jeremy@australianminingreview.com.au

GRAPHIC DESIGNERS
Jeremy Pickett,
Rebecca Johnson

PRINTER
Australian Community Media

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Skills and Supply Chain Shortages Squeeze Mining and Construction Margins



AMEC Chief Executive Warren Pearce called the current worker shortage crisis one of the worst in living memory borne out of the reality that almost across the board, big and small mining companies alike have had to defer projects and lower guidance under the pressure of supply chain squeezes.

The canary in the mine was looking off colour in October when St Barbara's shares dived 20% after the gold miner cited labour shortages for flagging production at its flagship Gwalia mine in Western Australia, which dropped 20% to 34,078oz for the quarter.

The company said a contractor had not been able to find enough maintenance staff to keep equipment running.

Big coal players BHP and Whitehaven both lobbied the federal government to expedite skilled migration incentives, citing labour shortages as a key reason for sales slumping 38% and 32% respectively.

Mining supermajor Rio Tinto had also felt the pinch and admitted that supply chain disruptions, and lingering pandemic issues related to COVID-19 had disrupted schedules and impacted budgets. The new Gudai-Darri mine was originally budgeted for \$2.6 billion and capital costs blew out to \$3.1 billion.

On the construction front, the industry was stunned in early December when century old builder Clough - an active player in the resources sector who was recently awarded the construction contract for the ore handling plant at the BHP South Flank Project - went into voluntary administration. Clough joined a growing list of recent construction casualties that have included; FIRM Construction, Probuild, Condev Construction, Pivotal Homes, Waterford Homes, New Sensation Homes, Privium, Home Innovation Builders and Pandan Group.

To make sense of the madness, AMR asked Migration Agent Sheila Woods, Managing Director of Interstaff - who has been watching human relations calamities unfurl a bit like a train crashing in slow motion over the past few years - to explain the fallout.

While a near-perfect storm of international border shutdowns has played a key role in the jobs and skills famine, Woods says that constantly changing government policy in recent years has caused more harm than good. But after keeping a keen eye and ear out on the recent Jobs and Skills Summit in Canberra, she says there is light at the end of the tunnel.

"When the new Labor government came in they said that we needed a summit to discuss skills crisis and migration and not a moment too soon," Woods said.

"The question soon became one of what do we do with a visa system that is not fit for purpose? We have a temporary skills system and a permanent skills system in the employer sponsored migration program, the former was dramatically revised in 2017 and 18 and the changes reflect some very poor reforms to the old system.

"For at least the 20-years prior to those amendments, under the previous regime, you had the 457 visa whereby if you had skills that were highly coveted, you could come into Australia to work and two years later you apply for permanent residence if your employer sponsored you for a 186 visa The system also made provision for highly skilled and needed professionals to apply directly for permanent residence.

"Under the new system, adopted in 2017-18, the pathway to permanent residence was much more uncertain: under the new 482 visa you could come and live and work in Australia under the new 482 visa but you needed to work for three years instead of two, and if your occupation fell off the list during that time you could not apply. Previously it did not matter if the occupation list changed, as long as you remained working with your sponsoring employer for two years.

The other issue was that in 2018 when the new 482 visa came into effect, it split the temporary skilled program so that some visa holders had a pathway to permanent residence and others were effectively guest workers who would be on a temporary visa for two years, but then you could renew

their visa once in Australia and then were expected to go home. The impact of this bifurcation was somewhat ameliorated in late 2019 by the introduction of the regional visa program and the 494 visa and provided a permanent visa route for the 482 visa holders who were cut off from the 186 program, but it came with greater cost and complexity for applicants and businesses alike.

"That changed rolled out in 2018 and 2019, two years before COVID-19 shut borders which forced government to adopt a travel exemption program as there was always going to be vital exemptions who would have to travel.

"The question was for who and how long would the program be needed. An online portal was developed to facilitate a fairly sophisticated system that processed almost one million exemption requests to verify who could, or would not enter or leave Australia and this largely drove who had visas approved in that period. Mining was well supported at this juncture and we did a lot of work for people coming in for critical purposes such as infrastructure that needed to be maintained. While the borders were closed, many visas applications were not finalised, though new applications were made - this meant that a backlog was slowly created.

"We knew that we would come out of COVID eventually and then, quite suddenly in December 2021, the borders opened and WA

Sheila Woods
MANAGING DIRECTOR OF
INTERSTAFF INTERNATIONAL

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The Australian Government has updated the Short-Term Skilled Occupation List of professionals who are applicable for the two-year stream of the 482 visa.

In mining and resources the most sought after jobs for mining and related industries include:

- Matel fitters and machinists
- Precision instrument maker and repairer
- Toolmaker
- Power Generation Plant Operator
- Medium and Long-term Strategic List Skills
- CEO or Managing Director
- Construction Project manager
- Engineering manager
- Environmental manager
- Surveyor
- Civil Engineer
- Geotechnical engineer
- Quantity surveyor
- Structural engineer
- Electrical engineer
- Industrial engineer
- Mechanical engineer
- Mining engineer
- Petroleum engineer
- Environmental research scientist
- Geophysicist
- Hydrogeologist
- Meteorologist
- Physicist

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followed in March 2022. At this point we had a hobbled skilled migration program, a large visa backlog and a huge transition required to address both issues.

“The expense, complexity and uncertainty of skilled visa options in a post-COVID world in which we are competing with other countries is only compounding the concerns that migrants have about having some security when moving to Australia in terms of their long-term options to stay here.

“Three years is a very long time to wait to buy a house and to feel free to put down routes in a new country. There are ways to obtain permanent residence sooner, but again they involve more cost and processes including obtaining formal skills assessments.

“With Interest rates going up and property prices and inflation rising, overseas professionals have told us of their reticence to commit to migrating. They want their kids to be in good schools and their families to settle down in an area where they can make friends and get on with their lives. We are not making ourselves very attractive as a destination country given the uncertainty and complexity involved in working out long term options.

“The old system generally worked pretty well and while it was in need of reform, many of the changes that were made were poorly

and frankly cynically done at a time when no one had a clue that a pandemic was just around the corner. Governments have used migration as a political football and now of course we have a new government who are desperately trying to rethink strategically what we are trying to deliver and they are undertaking a review to determine what will be required to create a migration system that is fit for purpose for the next decade.

“At the September summit it was revealed that Australia needs an extra 35,000 people coming into the skilled program for the current year up until June 2023.

“The problem is the complexity of a costly system in which many cannot make it to permanent residence or have limited options. Thus, the process of acquiring skills overseas is cumbersome. You really need to figure it out on a case-by-case basis and often need advice to work it out.

“You have to jump through multiple hoops which starts with advertising for four weeks on three different platforms, including a government portal, even for skills that are patently in shortage in Australia. As an example, the LMT requirements for temporary visas are overly bureaucratic and are not performing the purpose they were established to perform. There was broad agreement at the Summit that they either need to go or be drastically reformed and the government seems committed to this having established Jobs and Skills Australia which

will advise government on labour force needs.

“It can take six to eight months to get the critically skilled person you need to Australia. It could cost \$15,000 to \$20,000 for a family to relocate and most of that will be non-refundable for employer and employee (with a similar investment for permanent residence). And after they’ve arrived, there is no guarantee they might not be poached by another company, in which case you start all over again.

“From a glass half full perspective it looks like positive things are happening and that change is coming. There has been an increase in numbers getting over here and a real improvement in visa processing times. There is a tacit acknowledgement that we need more skills and government has poured more money into processing visas that used to take four months and are now getting issued within two weeks or less.

“It’s a good start in clearing the massive backlog and new applications are already being processed in weeks instead of months. Now we need to remove or change cumbersome and unfocussed regulations. Government looks like it genuinely wants to make changes and appears to already be making inroads in the commitments it announced at last year’s Summit - we are hopeful that legislative hurdles can be amended to streamline things and even the keel sometime next year.” **AMR**

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Mining is **SAVING MILLIONS** of Dollars Using Drone Technology

BY DALE GRANGER

Drones have changed the way mining companies are operating with a multitude of tasks that used to take days or weeks now being done in a fraction of the time delivering better more accurate data, faster and safer that is saving the millions of dollars.

That's the view of Mahmood Hussein, founder and CEO of Global Drone Solutions, a company who has trained thousands of drone pilots making them compliant with Civil Aviation Safety Authority (CASA) regulations now applicable to Remotely Piloted Aircraft Systems (RPAS) operations.

It's not hard to fathom why. A drone dropping out of the sky is a potentially lethal weapon, that can be hazardous to people, but also vehicles and machinery.

Mr Hussein, who established the drone school in 2016 in Australia, says drones are safe in the hands of properly qualified pilots, who ensure the aircraft are properly maintained and flown within CASA compliant guidelines.

"In the mining space, drones are being used to conduct surveys, equipment maintenance inspections and make 3D models of mine operations and for environmental assessment approvals. Inspections and surveys, which used to take days, can now be conducted in hours, or in the example, environmental surveys for rehabilitation purposes, from three months to two weeks.

"In some applications drones are being deployed to sow up to 10,000 seeds in one day to regenerate vegetation. On the flipside, if you need to spray to eradicate some types of weeds in difficult and dangerous areas of the mine, drones are getting the job done swiftly and smoothly with minimum disruptions to mining operations.

"One of the many applications of drones in the resource sector is their usefulness in survey mapping the stockpiles, in the pre-drone days you had to send someone out on foot carrying \$100,000 dollar scanner on their back and it used to take half a day to do the same survey that a drone pilot now captures in 30 minutes, faster and safer. Regular pit wall inspections are also done by drones whereby you simply set the sensors,

plot the coordinates and the drone will fly an automated route and capture any movement in the pit wall since the last flight.

Against this backdrop, it's no surprise that Global Drone Solutions, who trains up to 600 people a year, counts big mining companies as its biggest clients.

"We have trained people from Rio Tinto, FMG, Shell, Chevron and Woodside, as well as many medium sized businesses, and it is growing. At first drones were seen as sophisticated toys, but now they are regarded as very useful tools for a multitude of applications and the list of applications is growing all the time.

"It's not only surveyors who are using drones, but maintenance engineers and paramedics. It can take about 35 minutes to drive into the pit to assess the damage arising from any incident. But now, if there is an accident you can be there in seconds and sending bird's eye view visuals back to the control room for an emergency situation assessment before you decide whether paramedics are needed and what medication and safety equipment may be required.

"On the exploration side of things, aerial surveys that used to require Cessnas, or small aircraft, are now being done by drones using Lidar and other sophisticated software. But it's not just what drones are doing above ground that is impressive, but below ground too.

"Previously, drones were difficult to operate in GPS-denied locations, like underground mines. But now mounted with Lidar sensors, drones can be flown safely in these GPS denied locations. Lidar sensors building a virtual cage around the drone allowing to conduct drone operations, safer and faster.

"This is a gamechanger for the mining industry as multirotor drones can now be operated up to 2 kilometres underground for a variety of purposes. In some instances, the drone's battery life may only be 30 minutes, but they can be deployed by robotic carriers to maximise their time and effectiveness under the ground. From there you are able to livestream footage to a control room anywhere in the world.

"In the past very large sensors were needed to perform surveys, but in the last two-three

years they've become miniaturised, but just as powerful and are able to get airborne via a drone. A package deal using Lidar that once cost around \$250,000 can now be acquired for \$40,000 to \$50,000 and it's a real gamechanger.

"Similarly, technological leaps in drone technology means that now you can lift up to 40-50 litres of liquid for killing weeds or sowing seeds for rehabilitation purposes. Much like the computing chip industry, drone capacity is growing in leaps and bounds as if it were on steroids.

"On the oil and gas side, which is also a form of mining, drones have made a huge difference used for inspection purposes on offshore platforms. At some \$2 million a day, shutdowns can get very expensive shutting down the operation for two weeks at a time for regular maintenance inspections.

"Now you have a pilot doing the flying and an engineer controlling the gimbal/sensor putting a drone up and 20m away from the equipment, using a 50* zoom camera, they are able to perform the same task in a fraction of the time.

"In Africa there have been problems with mining companies having their truck convoys attacked and resources stolen. Some companies are now flying a drone 2-3km ahead of convoys to check that the route is safe.

"We live in an era where no company wants to be fingered for leaking emissions, methane in particular, and drones are making a huge difference keeping the planet cleaner by being used for asset inspection and leak detection purposes. Equipped with thermal cameras and gas detection sensors, they can pick up leaks on pipelines and methane coming off tankers before they can enter ports.

"A global plan is on the table to cut methane emissions off ships and drones are playing a pivotal role in this respect." **AMR**

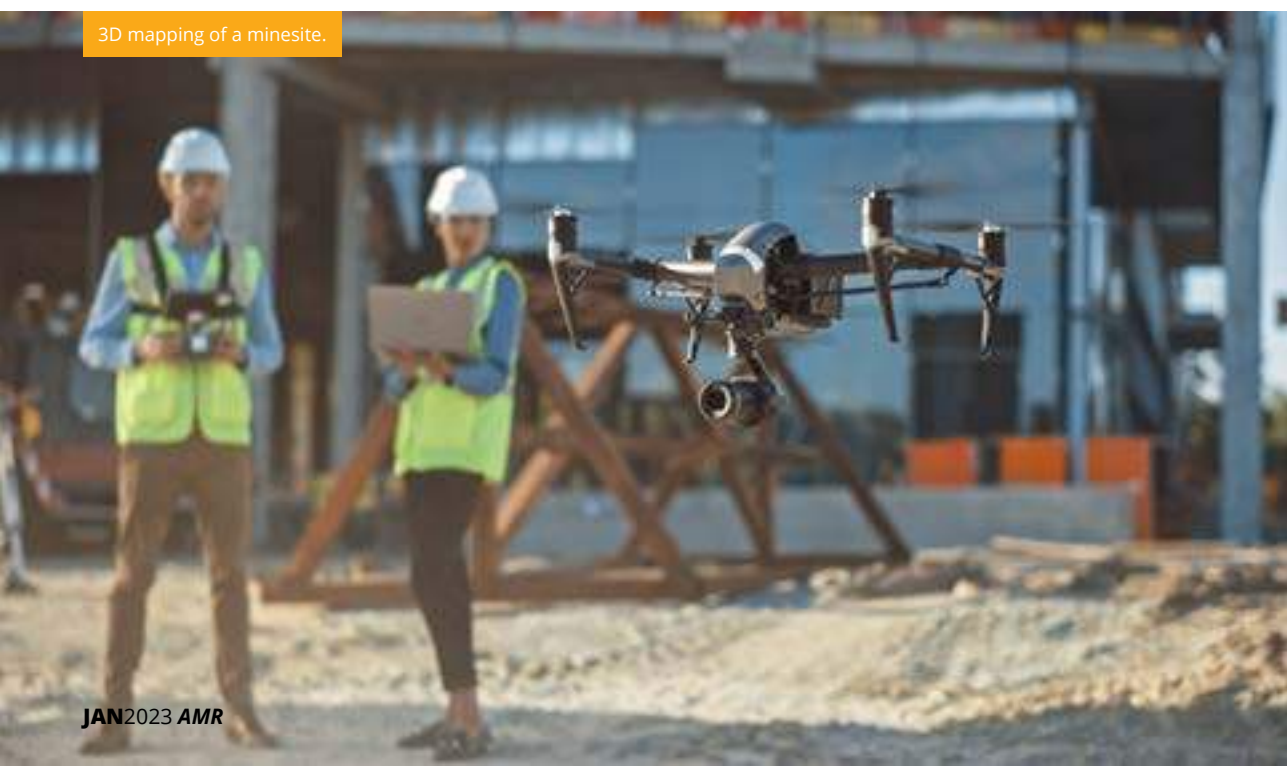
Mahmood Hussein



Drones are used for a multitude of tasks on mine sites.



Aspirin drone pilot trainees earning their wings.



3D mapping of a minesite.



Blasting on a mine site as seen from a drone's eye view.



ON FIRE RACING RAISES THE STAKES

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

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

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

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

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

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

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

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AMR



ON FIRE RACING



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

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

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The Importance of Geology

Mine site geotechnical engineering is fraught with uncertainties, with risk management key to driving a balance between safety and production. One of the largest risks to personnel onsite is fall of ground. Whether this includes rock falls, subsidence, minor to major structural failures, all of these falls are rooted in geology.

Most geotechnical engineers will be familiar with the notion that the geotechnical model is split into the following constituents:

- Geology Model
- Structural Model
- Rock Mass Model
- Hydrogeological Model

The first component is straightforward in its relevance. The structural model is rooted in geological concepts. Rock mass is primarily an engineering section. And hydrogeology deals with the nature and behaviour of the groundwater in the system. Three of these components are heavily embedded in geology. So why is there not a greater focus on geology?

There is an extensive list of geotechnical hazards and problems that require geological input. Within the design phase, input from all four parts of the model is crucial, depending on the commodity and mining method. A pit shell is built using geological horizons, in a position and orientation that favours the intrinsic structural framework, using geometries that are within tolerances for the strength parameters of the rock units, and that also suits the

hydrogeological aquifers and pressures of the system.

The outcome of these assessments is of greater importance than they are often given. One unfavourable fault in an open cut coal deposit may signify the movement of a highwall design back a few hundred metres, resulting in an increase in stripping costs. The position in which this fault is modelled, relies on sufficient information and time to make the geological interpretation that determines in which direction it propagates and which geological horizons the fault is limited to.

It must be fervently stressed that this is not always clear. With limited drillhole or seismic information, geologists must apply a +/- accuracy on their interpretations. The inaccuracy depends on two things; the expensive data that needs to be acquired, and the skill necessary to make an educated interpretation. In a world where the stripping ratio makes or breaks the development of a mine, it is an understatement to say that changes to these values will cause a few headaches.

The learning curve to be an effective geotechnical practitioner is extremely high, given the sheer amount of content to learn between the engineering and geology doctrines. In fact, this is partially why there is the split between geotechnical engineering, and engineering geology. Just like the nomenclature of sandy clays and clayey sands in soil classification, a geotechnical engineer is more of an engineer, and an engineering geologist is more of a geologist. But this still doesn't answer the question about why geology remains as an afterthought in the industry?

Within the industry itself, a mine site will commonly employ geologists and geotechnical engineers as separate entities. The geologist is primarily responsible for maintaining a geological model, supervising the adherence of production mining to said model, mapping any structures in the pit, and in some cases also dealing with product blending and logistics (trains, shipping, etc). The site geotechnical engineers rely on the geologists to maintain a lot of the

information. Geological data feeds into what can be multi-million-dollar design and hazard remediation plans created by the geotechnical engineers.

In a production setting, production will always take precedent in a geologist's time. From experience on both the geotechnical and geological sides of operations, the primary focus will be on mining recovery, plant throughput, and grade recovery. Quality Control is not without its own merit of importance, as the flow on effects of missing a train, for reasons like coal ash content being over specification, can amount to millions of dollars in itself. But there is only so much time in a day. When it comes to deciding between spending the time meticulously mapping out a fault system on an exposed highwall, or crunching blend numbers to optimise product, the latter will nearly always win.

This leads onto the next problem. In times of hardship in the economy, there is a consistent pattern of belt-tightening that goes on throughout the technical services department. Among the first to be downsized are usually the environmental team, project teams, and of course, geology. An unappreciated portion of the geology services comes from the exploration budget – funds spent on developing the resource for improving tonnages and granularity in the ore zones. When this is cut, the mine geologists, and by extension the geotechnical engineering team, suffer greatly.

Any case study involving unknown structures and geological domaining can be used as an important learning tool here. Take, for example, an operating open-cut coal mine progressing from one strip to the next. The planning phase for this strip turnover highlights a potential for a pit-ward dipping fault, unfavourably oblique to the wall. The lithology is comprised of predominantly weaker siltstone, with intermittent beds of hard sandstone with variable thickness. The overburden lithology is not mapped, and feature mapping of joints along the face is minimal.

The geotechnical engineer needs to use all the available information to make an informed estimate on the risk of that next strip. If the geologist cannot be counted on to provide additional data due to their own workload, then it must be up to the geotechnical engineer to do what they can with what they have. Here is where the geological knowledge base is so important.

Can the geotechnical engineer make inferences around the lithology ahead from drill-holes in the area – and build stability analysis models from this? Can they build a correctly filtered kinematic model from the available joint sets mapped from the face, and have the knowledge to discount low quality data? Can they ascertain strength properties from the fault and the surrounding rockmass from any downhole acoustic logs, and quantify the confidence of that structure in strips ahead? These skills are a selection of many that do not often fit into role descriptions or training programs for geotechnical engineering. It is a lot to ask from the geotechnical engineer to have the tools to do all these things. But the value is clear.

Piecing this all together, we have a highly intricate geotechnical design process. So, what can we change to make improvements in the industry?

- The first, but not always easiest, step is to ensure there is sufficient funding and resources given to the geology team;
- Second, to provide geotechnical awareness training to the site geologists to provide context on the value and importance of the information they are gathering for the geotechnical engineers;
- Additionally, provide geological training to the site geotechnical engineers to bridge the gap between the two departments of information; and,
- A cultural shift in the management team, to recognise that uncertainty of geology plays a major factor in mining costs, both proactively and reactively

There will be some that read these options and immediately see them as a cost to the business. Resources, whether it be additional personnel, training costs, and tech tools for the job, cost money. The challenge for the geoscience teams is to show the value of this. In an effective team, with the right resources, can the cost of the team offset the cost of geotechnical failures or last-minute design changes?

The fact is, that no one has x-ray eyes. Our best hope in understanding the risks ahead in the mining process is to trust the geology. The geology community will never have the exact answer, but we will give the best answer with the time and the data that is provided to us. **AMR**

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MINING AND EXPLORATION BOOM LOOMS IN NSW

An additional \$27 million will be invested by the NSW Liberals and Nationals Government to fund advanced stage mining infrastructure projects and exploration for critical minerals in NSW.

In December Deputy Premier and Minister responsible for Resources Paul Toole announced the successful recipients for Stream Two of the Critical Minerals and High-Tech Metals Activation Fund and Round Five of the New Frontiers Exploration Program.

"Our Critical Minerals and High-Tech Metals

Activation Fund paired with co-contributions will see \$65.4 million invested in three advanced-stage projects to deliver major infrastructure and remove barriers for investment which will support the critical minerals sector in NSW," Mr Toole said.

"This is about making sure our State is in the best position to lead Australia's critical minerals boom.

"Valuable deposits including silver, lead, zinc and cobalt, rare earths and minerals sands will drive future technologies like advanced manufacturing, ag-tech, aerospace and re-

newables, and it's companies right here in NSW which are leading the charge."

Mr Toole said the New Frontiers Exploration Program would support explorers in search of metallic minerals including critical minerals and high-tech metals deposits in NSW.

"We have the technology to discover where these deposits are located. Round Five of this program will provide \$1.5 million to 22 explorers with grants for exploration drilling and geophysical programs to ensure future projects are able to hit the ground running," Mr Toole said.

"By funding programs like these, we are bringing to life our vision for NSW to be the number one investment destination for mining, exploration and advanced manufacturing."

For further information on the successful recipients visit:
regional.nsw.gov.au/activation-fund
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MORE THAN JUST COMPLIANCE

Providing Health Support That Enables Safe Operations



Baseline Onsite's Occupational Physician and Medical Director, Dr Matt Atkins, has spent 15 years immersed in the mining and resource industries around Australia.

Attending work sites, staying in camps and living the FIFO experience, he intimately understands how work groups respond to health initiatives, and more importantly, why they respond the way they do.

It's this first-hand experience that Dr Atkins credits for his understanding of the unique workplace health needs of mining and resource companies and their people.

"Providing top level occupational medical and health support isn't just about picking services from a website menu," he says.

"The best providers of workplace health initiatives deeply understand the issues and drivers at play in an organisation and can recommend a bespoke approach that directly tackles the problem.

"Tailoring the solution provides better cost efficiency because it dedicates resources in a targeted way. I often find spending a bit of extra time with our client to fully understand the problem and break it down into components makes the optimal solution pathway a lot clearer."

A Full Time Relationship

The commitment to a relationship-based

approach is what Dr Atkins loves about his role.

"It is a 24 hours a day, 365 days of the year relationship, just like the operation of a mine or resource organisation," Dr Atkins says.

"When I sit with a HSE team and hear the unique challenges they're facing, I know I can design the right mix of support for their needs.

"It is a real partnership and the benefit of being an established medical director was highlighted during COVID. When urgent help was needed, there was no time for familiarisation or orientation with our clients, we hit the ground running and had the expertise and readiness to step up quickly. The trust, relationships and knowledge of operations was already there."

Around the Clock Medical Support

Baseline Onsite's poisons permit structure means Dr Atkins builds close relationships with the health centres, emergency services and clinicians attending to site-based staff.

"A poisons permit isn't just a piece of paper to us," Dr Atkins says.

"My view is that a permit contract allows our clients full access to our experience and guidance. Effectively this means I'm always available as a sounding board on any presentation that the site health team may be challenged by, not just the medical authority

to prescribe medication and treatments.

"This way I build an intimate knowledge of each site and can recognise and anticipate patterns and developing issues in the workforce that may impact productivity, HSE Strategy, or be a risk to an employer's duty of care obligations.

"More and more, we see these risks that evolve from a reactive or 'tick box' OHS culture, and that makes company directors and senior management potentially liable for not having the right systems in place."

A Finger on the Workforce Pulse

"The mining and resource industries are acutely aware of their health and safety obligations and the importance of keeping their people well and safe," Dr Atkins says.

"By having daily conversations with our site health staff and their HSE or Emergency Response managers, I can support them to meet their health and safety obligations.

"Being at the coalface means I can provide accurate, timely information about the health and wellbeing challenges of a staff group and how that might be optimised to meet operational needs."

Sharing the Learning

Passionate about quality, evidence and risk mitigation culture, Dr Atkins believes that systems, policies and strategic planning are imperative to managing the known, and hid-

den hazards in work environments.

He works closely with clients to co-develop policies that remain the intellectual property of the client's organisation. However, with many issues being common across the sector, Dr Atkins can draw on his years of experience for the benefit of all employers and employees.

"We've learned over the last few years that there will always be new challenges that need new solutions," Dr Atkins says.

"Collaboration is more important than ever. Re-inventing the wheel for each request we receive is unnecessary and inefficient, we can see the patterns across industry and communities and know what will set our clients up for success. Each mining operation benefits if the industry as a whole is safer.

"Working with organisations to design programs that protect their workforce whilst also driving the operational and financial goals of a strong business is the key mission of my work with Baseline Onsite."

To discuss how Baseline Onsite can keep your workforce safe, visit baselineonsite.com.au or call (08) 9363 2900.

AMR



Expert protection for your most important asset. People.

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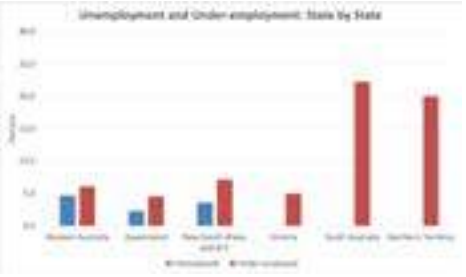
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THIRD QUARTER RECORD SLIGHT DETERIORATION IN GEO’S EMPLOYMENT CONDITIONS

OVERALL EMPLOYMENT TREND REMAINS POSITIVE

The results of the latest quarterly snapshot of Australian geoscientist employment conducted by the Australian Institute of Geoscientists recorded a slight increase in both unemployment and under-employment (geoscientists able to secure less than one quarter of their desired workload) during the three months between July and September 2022.

The unemployment rate amongst geoscientists nationally was 3.5%. The under-employment rate was 6.3%. This compares with unemployment and under-employment rates at the end of March 2022 which were both 2.9%. There was no survey at the end of June 2022.



The latest results continue a general downward trend in unemployment and under-employment rates evident since March 2016. The unemployment rate was the sixth lowest recorded since this survey series commenced in June 2009.

Results varied markedly between states. No survey respondents from Victoria, South Australia and the Northern Territory reported being unemployed. The under-employment rates in Victoria, South Australia and the Northern Territory were 5.0%, 22% and 20% respectively.

Queensland recorded an unemployment rate of 2.3% for the quarter, followed by New South Wales at 3.6% and Western Australia at 4.5%.

The corresponding under-employment rates were 4.5% for Queensland, 6.0% for Western Australia and 7.1% for New South Wales.

Too few responses were received from Tasmania to enable rates to be stated with any confidence.

Some 339 responses were received to the survey, representing around 6% of an estimated 6,000 professional geoscientists currently working or seeking work in Australia.

The survey recorded a decrease in long term unemployment, with 36% of survey respondents reported not having worked as geoscientists for more than 12 months.

This figure remains high but is lower than that recorded in previous surveys.

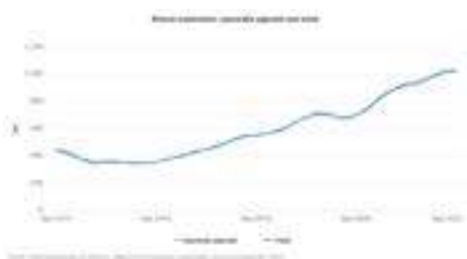
Some 68% of respondents reported being employed full time, 2.7% part time and 4.7% on a casual basis. Some 25% of respondents were self-employed contractors and consultants, which represents a significant increase on previous surveys.

Junior exploration and mining companies were the leading source of employment opportunities, employing 33% of respondents. Major and mid-tier mining and exploration companies accounted for 14% and 15% of employment opportunities respectively.

Public sector employers accounted for only



The AIG says gender imbalance remains a feature of the geological profession

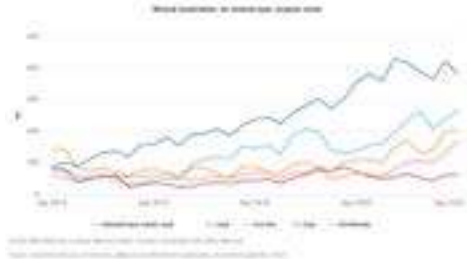


6.2% of geoscientist employment opportunities.

The ageing of Australia's geoscience professionals is of increasing concern with more than 41% of respondents reporting having more than 30 years' experience, putting them within 15 years of retirement. Early career geoscientists (less than five year's experience) accounted for only 6% of survey respondents.

Gender imbalance remains a feature of our profession, with 85% of survey responses received from men and only 15% from women overall. When broken down into years of professional experience, the highest proportion of women in geoscience is amongst geoscientists with 5-9 year's experience, where the rate peaks at 45%. The proportion of women in Australia geoscience declines as years of experience increases, except for a small increase in the range of 20-24 year's' experience, potentially attributable to women re-entering the profession.

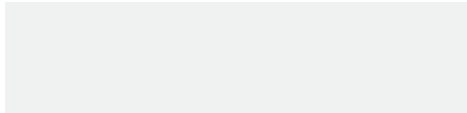
The major concern in the chart is amongst early career geoscientists (0-4 years's experience) where the survey results show very few women taking up geoscience as a career in recent times and pursuit of geoscience ca-



reers by women only slightly lower than the overall average rate of 85%. This data challenges frequently quoted perception that women enter geoscience as a profession but do not remain in the profession long-term (i.e. for more than ten years), instead suggesting that women have not been taking up geoscience as a career for the past five years.

The data could be a product of early career professionals not responding to the survey or engaging in professional activities and development opportunities provided by Australia's professional institutes and learner societies, but this does not appear to be supported by survey contribution rates. Either way, the process of improving gender equity seen as a priority by our profession may be considerably more difficult than currently perceived.

The December quarter survey will open for contributions early, in the third week of December, and will remain open until mid-January 2023. **AMR**



Surefire Clink Glasses on Vanadium Assay Boost

Surefire Resources has released assay results from RC drilling at its Victory Bore deposit in the Mid West of Western Australia that it is serenading as among "the best" in Australia.

Three parallel mineralised lodes were uncovered, including intercepts of up to 56m at 0.46% vanadium oxide that will expand the company's 151 million tonne resource.

This was in the second tranche of assay results received from the recently completed drilling campaign

The campaign of 62 holes for 5,189m was designed to in-fill existing drill sections. It has succeeded in clearly defining three wide, continuous, and consistent Vanadium lodes, Surefire said.

The Main Lode and Central Lode were delineated by previous drilling on 400m sec-

tions. This programme infilled a 1.4km portion of the resource to 100m spaced sections. The aim was to upgrade the resource category. Significant new lode material was encountered that will potentially increase that resource. Drill holes targeted a south-south-westerly trending newly interpreted Banded Iron Formation (BIF) dipping 72o west within a coarse crystalline gabbro.

The Main Lode is situated on the eastern side and is thick, predictable both along strike and down dip with wide consistent downhole intersection thicknesses rarely less than 50m, and up to 92m. The vanadium pentoxide grades range from 0.41% to 0.48% V2O5. The Central Lode is situated approximately 70m to the west of Main Lode and features mineralised thicknesses varying from 24m to 64m in downhole intersections. While drilling was focussed on the Main and Central lodes, additional vanadium mineralisation was defined and called

West Lode. While the West Lode remains open to the west, it has already been shown to average 60m true width of vanadium mineralisation @ 0.23% V2O5.

Mr Vladimir Nikolaenko, Managing Director of Surefire, commented: "Vanadium prices are predicted to increase in line with an increase in storage requirements with the uptake of electric vehicles to support the global push for decarbonisation. The drilling results from Victory Bore continue to display huge true widths and exceptional continuity, both along strike and down dip. This represents an ideal bulk mining proposition. Based on these drilling results, Victory Bore is shaping up to be a world class vanadium deposit and certainly one of the largest in Australia.

"It is becoming apparent that the Victory Bore vanadium deposit is not only fast becoming one of Australia's largest vanadium

deposits, but the thickness and continuity of the mineralisation means it can sustain a large, long-life bulk mining operation at low stripping ratio, mining dilution and mining operation costs," Mr Nikolaenko added.

Surefir said the remaining 13 drill holes or 589 sample assays are due. Once verified and QA/QC checked, the new, updated drilling database will be submitted for re-estimation of the Mineral Resource to conform with the JORC resource criteria.

The Company continues to compile data for the completion of a prefeasibility study on the back of a positive Scoping Study assessment of the project (ASX:3 May 2021). An application for conversion of the Exploration Licence to a Mining Lease was submitted to the West Australian Department of Mining Industry Resources and Safety (DMIRS) in 2022. **AMR**

Brightstar – Kingwest Merger Aspires to Producer Status



Brightstar Resources and Kingwest Resources have agreed to merge as the Goldfields explorers aspire to a marriage of convenience that will expedite the step up to production of both their assets.

Under the scheme of arrangement Brightstar will acquire 100% of Kingwest's shares and on completion of the deal, Kingwest shareholders will hold 43% of the merged entity and Brightstar's 57%.

The Kingwest Board has unanimously recommended that Kingwest Shareholders vote in favour of the scheme and Kingwest Directors intend to vote all the shares that they hold in Kingwest in favour of the merger - in the absence of a superior proposal.

Bill Hobba, Managing Director of Brightstar, said: "This is a transformational transaction for Brightstar which marks a refreshed strategic direction for the company.

The merger with Kingwest creates a larger, diverse junior gold play and means the company can now start to assess development options utilising a larger resource base and our significant existing infrastructure."

Kingwest said Alex Rovira was coming in as their new Managing Director to guide the company through the exciting next stage of growth.

Greg Bittar, Chairman of Kingwest, said: "This is a compelling transaction for Kingwest and provides the scale, resource base and processing infrastructure needed to unlock the inherent value of the Menzies Gold Project.

The transaction is an outstanding opportunity for Kingwest given the ability for Kingwest's high grade open pit ounces to be processed at Brightstar's infrastructure located in Laverton.

Kingwest shareholders retain a meaningful stake in the merged group, and we strongly believe in the potential of the combined asset portfolio."

Kingwest described the merger as a "strategically compelling transaction that rapidly advances both companies towards development" and said the gold assets of Brightstar and Kingwest "immediately creates a company of scale that will attract investment from a wider audience". **AMR**

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Surefire Resources drilling at its Victory Bore deposit

AUSTRALIA HIT RECORD MINERAL EXPLORATION EXPENDITURE IN SEPTEMBER 2022



AMEC Chief Executive Officer Warren Pearce

Mineral exploration expenditure statistics for the September 2022 quarter reached a new record high, according to the Australian Bureau of Statistics (ABS) r

"Mineral exploration expenditure across Australia increased by 2.6% in the September quarter, quarter on quarter, up by \$27.6M to \$1.08B in original terms. The rise was led by Queensland who had a 21% rise quarter on quarter and Western Australia expenditure that lifted again by 3%," said Mr Warren Pearce, Chief Executive Officer of the Association of Mining and Exploration Companies (AMEC). "

Greenfield exploration rose by 9.7% to \$344m, while brownfields exploration slipped slightly by 0.4% to \$740m. The in-

crease in greenfield mineral exploration is crucial to the discovery of new mines that will create new jobs and opportunities."

"During the period, the total meters drilled fell by 1.7% to 3,048.9km. The distance drilled focussed on brownfields targets fell 5.9% to 2,101.7km, while greenfields drilling searching for new discoveries rose 9.0% to 947.1km"

"In original terms in the September quarter 2022, mineral expenditure rose in Queensland (21%), Northern Territory (21%) and Western Australia (3%), and fell in Tasmania (-23%), Victoria (-16%), South Australia (11%), and New South Wales (-8%)"

"The search for the what the ABS broadly categorises as 'other minerals', which in-

cludes lithium and critical minerals, were up 37% nationally to \$140m"

"Nationally, gold exploration expenditure slipped by 10%, including by 6% in Western Australia. However, gold is still the dominate metal explorers are looking for. It is calculated that 35 cents in every dollar of national mineral exploration is invested in exploring for gold, and 26 of those cents are in Western Australia." "

As our industry continues to work through labour shortages, the commitment to mineral exploration is key for the industry. Our ability to remain an investment destination of choice is paramount if we are to discover the mines of the future and deliver long-term, wide-ranging social and economic benefits to Australia." **AMR**

Elated Tietto Reaches First Gold Pour in Quick Time



West African gold explorer and developer Tietto Minerals Limited (ASX: TIE) (Tietto or the Company) Has commenced wet commissioning its 4.5Mtpa CIL processing system at its 3.45Moz Abujar Gold Project in Côte d'Ivoire, West Africa.

Tietto Managing Director, Dr Caigen Wang, said: "To build a gold mine the size of Abujar in less than 12 months is a monumental achievement.

"To do it during COVID with supply chain issues, escalated pricing and skilled people shortage made it, almost, mission impossible.

Our in-house construction team has demon-

strated it can be delivered through careful planning, diligent management and hard work.

"What a great team and achievement led by the captain, our COO Mr. Matthew Wilcox.

"I would like to thank our mine construction team, ESG team, mining team, contractors and consultants, local communities, government authorities at various levels and many more.

"We would also like to thank our shareholders who have put us in a position where we have no debt, zero hedging and in a position to produce ~260,000 ounces in the first 12 months of production once we reach commercial production."

Tietto Chief Operating Officer, Mr Matthew Wilcox said: "I am extremely proud of the team who have delivered the project in less than 11 months from pouring first concrete, which I believe, is the most challenging schedule for a project of this magnitude that has been achieved in the last decade in West Africa. A schedule made possible by an outstanding owners' team and a great team of contractors and consultants who achieved the job safely and on budget.

I would like to thank the construction team led by Daniel Kotzee, our outstanding engineering consultants in Primero and ECG, as well as our key contractors; Wacom (Concrete), Friedlander (Field Erected Tanks), NCP (Mill Installation), EPSA (mining), Peloton (Electrical Labour) and Enikon (SMP),

as well many other local contractors, who all went above and beyond to achieve the schedule.

"A great effort by the projects commercial team, led by Hesbon Okwayo, who achieved an outstanding result under difficult global conditions, and supported by Antrak Logistics and Bollore, who managed to get the equipment to site in the time frames required.

Also special thanks to our owners' earthworks team, led by Guillaume Hubert, and supported by Citland (HDPE lining), who achieved amazing work under difficult conditions." **AMR**

Specialist psychologists are available to counsel couples buckling under the strain of frequent periods apart and some companies offer workshops aimed at uprooting relationship problems in the bud before they anchor and begin to drag the ship down.

"Relationships are challenging for most people who aren't even engaged in FIFO work and the roster does magnify issues of deterioration. All too often partners have not been able to continue healthy discussion levels when one was away and discuss their relationship in a sustainable way," said one psychologist with experience of dealing with FIFO families under the cosh.

"Friendship is one of the key pillars to strong connectivity and this tends to go over the cliff when people in relationships are apart for significant periods.

"The focus on prevention being better than cure means that as long as partners stay friends there will be no lost connectivity, even under the burden of difficult circumstances. There is such a thing as constructive conflict, which needs to be considered to help strengthen relationships. While a lot of conflict is negative, unmet needs need to be spoken about, which is much more beneficial than no discussion at all.

"The FIFO work/life balance is stressful and it is essential that partners/spouses buy into a shared purpose pertaining to why you are doing it and what you would like to achieve. How long one wants to continue doing FIFO can be critical and having a shared vision relating to an exit strategy, if desired, at some point is essential to protecting the harmony of the relationship.

"It is vital that partners always know why they are doing anything in particular when one or both are having bad days. It is a collective issue and relationship growth and individual growth are both critical for the relationship.

It is very important that FIFO impacted families create special moments to look forward to, such as holidays, dates or outings when they are all together. The non-travelling partner can be constructive by making vid-

eos or taking pictures of special events, such as birthdays and so forth, to share with the travelling worker on his/her return.

Single parenting is a big strain on the FIFO workers' partner that can create big problems on the return home of the one who is off on their swing.

The home bound parent may not feel a part of the co-parenting ideal at this juncture as the issue that very quickly comes to the fore is: When does the partner who has been at home get their rest and relaxation?

This gets most negated when the family has plans in place. But mostly both have expectations for their own downtime and things can turn toxic very fast when one partner returns and wants to spend all of the time in the pub with mates.

Frequently, after being with colleagues on site for up to three weeks, families are not very understanding why a homecoming dad/mum comes home and wants to spend most of the time with friends. They start asking the question: Are we not as important as your drinking buddies?

The dialogue on date nights needs to be focussed on a meaningful understanding of each ones perspectives as friends who have a common objective. A focus on positive things accruing from FIFO work, such as paying down the mortgage, creates a future focus for both partners who then become united striving towards a shared goal. This can make the sacrifice of FIFO work feel beneficial to both the stay-at-home parent and the frequent flyer.

It is important for the home bound partner to understand when the FIFO parent is on site to be sympathetic

during phone conversations that often their other half is often exhausted after a 12-hour shift and can struggle to communicate long-distance in a loving, enthusiastic way under the circumstances.

The loneliness of the long-distance worker gets worse under a cloud of silence. Having to deal with criticism on the phone when one or both are exhausted after a hard day's work can lead to disengagement from the interaction of just hanging up in hurt and frustration. Now the problem is that issues are not being resolved and a vicious cycle is at play punctuated by continued criticism and defensiveness spiralling out of control as things shift to a negatively based focus.

Things need to be kept in perspective and its wise to understand that you don't have to win every fight. All too often it is easy to be stubborn and stand fast, but often the bigger picture needs to come into the frame.

The long-suffering FIFO worker and their partners/spouses lead different lives switching between two dynamics like a light-switch. For a period of time one is absent and then all of a sudden they aren't. Both have to adjust to the new routine and a vacant space that is suddenly filled.

Alcohol often causes problems and can impact a relationship very quickly. It's very i m -



portant that the right balance is found between work, family and social life.

One, or even both, partners can stray into cheating not necessarily because they want to be with someone else, but because they want to be someone else and are after an exciting new dynamic.

It's tougher for FIFO families facing more stress and strain than a more conventional family. But that does not mean they cannot have meaningful and rewarding relationships.

It is important that anyone who is concerned about their relationship seeks professional help who can help partners to remove malignant growths in their marriages before they become terminal.

No two couples are alike and while some FIFO couples enjoy the distance between them and find that absence makes the heart grow fonder, most are susceptible to stress, pressure, space and isolation issues that can derail relationships quickly.

The FIFO worker already has to cope with long workhours in an isolated environment and maintaining robust mental health goes a long way to reinforcing family bonds.

Some turn to drugs or alcohol to cope with stress and sleep problems and need recovery times from the strain of hard labour, which means meticulous planning on how to spend days off on their swing is essential to developing coping mechanisms fit for the whole family. **AMR**

FIFO Families Don't Have to be Fragile and Can be Formidable

Big mining companies have, in more recent times, pulled out all the stops to try and replicate the closest recreational benefits to home that they can for their workers on site striving to look after the rank and file with gyms, golf simulators, swimming pools and social centres offering stress relieving, closer to home comforts to fortify the mental health of their human assets.

The FIFO dynamic can create a divide between even the strongest of couples



WANT TO CREATE A HEALTHY AND PRODUCTIVE WORKPLACE? HERE'S HOW TO PUT THE *LIFE* INTO FITNESS

It is not just the Corporate Head Office "in the Terrace" that can see the benefits of providing its employees with an opportunity to exercise while at work. Any mine site worker who is living onsite can appreciate the physical, mental, emotional and productivity benefits that are available from a workplace fitness facility.

Life Fitness, the global leader in commercial fitness equipment, is driven to provide tailored solutions to help employees lead active, healthy and productive lives while living at work. Their commitment to health started 50 years ago, when Life Fitness created the world's first electronic exercise bike. Today, they have a portfolio of innovative products that are used by leading companies around the world, to help their employees reach their personal fitness and wellness goals.

"We're a premium supplier of fitness equipment. The brands we carry include Life Fitness, Hammer Strength and Keiser. Historically, we have supplied equipment to the likes of health clubs, recreation centres, hotels, residential accommodations and the defence force; but in the past 10 or so years, we've also achieved continued success with our installations in mine sites. As a result, they have become an ever-increasing market segment, which we really enjoy working with," said Guy

Arrowsmith, Life Fitness Sales Manager for Western Australia.

"Mining camps are often harsh environments for fitness equipment and the gyms are typically very well used. Our equipment is widely regarded as the industry benchmark with an impeccable reputation for durability and longevity. For mine sites, investing in industrial-grade fitness equipment is essential, as it will significantly reduce ongoing costs by limiting the need for future repairs and consequential downtime."

"You can significantly increase the satisfaction and retention of your current employees, whilst also attracting new staff when you provide the same quality of gym equipment that they use when they go to the gym at home," explained Arrowsmith.

Once an order has been processed, products are delivered to local warehousing facilities in sealed containers direct from Life Fitness factories in the USA. Each product is ISO 9001 Certified, and all equipment is thoroughly tested and calibrated prior to dispatch. This ensures a seamless onsite installation process.

Once installed, you will remain fully supported by Life Fitness, which has the largest service and support division of any Australian

commercial fitness supplier. "We provide remote assistance via a web-based service portal and onsite maintenance and service visits, which are performed by our factory-trained service technicians."

Life Fitness offers a complete turnkey solution for the mining and resources sector.

"We offer cardio machines with fully integrated entertainment consoles that feature on-demand workout classes, internet access, as well as television and streaming apps like Netflix and Foxtel. On the other hand, we also have a whole range of machines that are self-powering and don't need to be plugged in at all."

"We can also provide a full suite of cardio products including treadmills, cross trainers, bikes and Powermills (featuring a revolving staircase) which, these days, are as popular as the treadmills of old!"

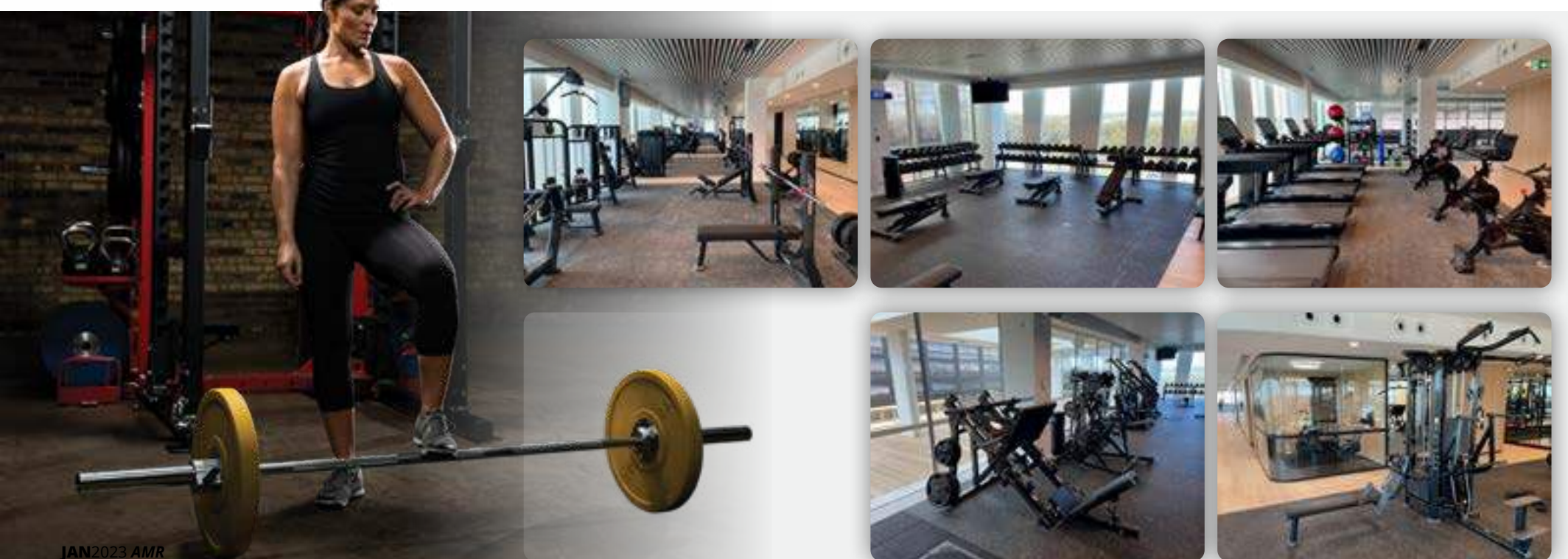
Life Fitness installed a new 1,000-square-metre gym at the new Mineral Resources Limited (MinRes) head office in Osborne Park. Arrowsmith describes it as an "incredible facility, featuring the best of everything. It's a fantastic example of the working environment that companies are striving to produce in an effort to keep their workforce fit and happy".

Life Fitness also has a vast selection of cardiovascular, selectorised strength, plate-loaded, functional training and accessory/free-weight conditioning equipment to suit every budget. Life Fitness has state-of-the-art showroom facilities in Brisbane, Melbourne, Perth and Sydney, which showcases their full line of premium commercial equipment solutions.

As a special offer to Australian Mining Review subscribers, Life Fitness Australia is offering a free, no-obligation consultation service for mining and resources providers who are looking to upgrade, expand or implement a new onsite gymnasium facility. This FREE service includes an initial consultation, recommended equipment selection, a floor-plan design and cost-estimate for budgetary purposes. AMR



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2019 Finalist



Work in the mining industry can be physically and mentally demanding.

From long work hours to isolation from family and friends as well as exposure to hazardous conditions, the mining sector can at times take a toll on a person's mental health and wellbeing.

An experienced psychologist helps work through a variety of difficult situations and can equip mining staff with mental health and wellbeing strategies to cope with the industry's unique challenges.

Hedland Psychologists - Port Hedland, WA
Hedland Psychologists is a trusted and independent allied health service provider in the Port Hedland area offering psychological support services with convenient appointment times at workplaces and within Sonic Healthplus, South Hedland.

Its commercial agreements provide free confidential counselling sessions to organisations via their Employee Assistance Provider (EAP) programs.

With locations that are central and convenient for locals' needs and Telehealth ses-

sions available within 24 hours, it's never been easier to get the quality healthcare Mondays through Saturdays.

Strategic Workforce Development - Perth, WA
Strategic Workforce Development provides an extensive array of mental health services to the mining sector from its Perth office.

Its portfolio of offerings includes counselling, mentoring, toolbox chats, EAP sessions, health and safety forums, mental health training and onsite psychological support.

Additional services such as workshops, learning labs, guest speakers, critical incident debriefing and outplacements further support a psychologically healthy workplace.

The team of experienced psychologists are equipped with the right tools including cognitive behavioural therapy, dialectical behavioural therapy, mindfulness and hypnotherapy to help mining staff work through issues such as depression, anxiety, relation-

ships, stress, grief, lack of confidence and self-esteem.

Locally Owned and Operated
Both Hedland Psychologists and Strategic Workforce Development are owned and operated by WA practising psychologist, Caroline Rodgers.

For over 20 years, Caroline has been a mental health practitioner and strong advocate in this field.

Caroline is both a licenced registered psychologist with the Australian Health Practitioner Regulation Agency (AHPRA) and full member of The Australian Association of Psychologists Inc, as well as a Fellow of the Australian Institute of Management.

In Good Hands
Caroline led the charge to cultivate a healthier and safer work environment for Rio Tinto Iron Ore's Gudai-Darri mine personnel.

During its construction phase from September 2019 to March 2022, Caroline made 27 visits to the site for a total of 120 days, delivering an astounding 362 presentations, with a further 8500 participants in attendance at her mental health awareness sessions and health and safety forums.

Findings from these sessions and forums demonstrate an overwhelmingly positive response to Caroline's workshops: 98% of attendees agreed that it was presented appropriately, 92% that its timing was suitable and 97-98% viewed the discussions as logical and comprehensive.

Furthermore, 97% indicated they would recommend this topic to a friend or find onsite mental health support beneficial.

Caroline is also proudly affiliated with the peak organisation for mental health, BeyondBlue and is also an accredited MHFA facilitator. **AMR**

HEDLAND PSYCHOLOGISTS

P +61 8 9442 9696
E admin@hedlandpsychologists.com.au
W www.hedlandpsychologists.com.au

STRATEGIC WORKFORCE DEVELOPMENT

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The 1Mtpa Tomingley Gold processing plant (permitted for 1.5Mtpa) has been operating since 2014.

SITTING ON A GOLD MINE

One mine has been consistently meeting and exceeding production guidance since it began operations nearly a decade ago.

Alkane Resources Ltd (ASX: ALK) is poised to become the nation's next multi-mine gold producer and has projects predominantly in the Central West region of NSW.

Headquartered in Perth, vast distances across the continent are no barrier to this star performer with its exploration team also based in Orange, NSW.

Alkane owns and operates the Tomingley Gold operations, southwest of Dubbo, NSW. It holds several highly prospective gold and copper tenements in the region, with its Boda deposit east of Dubbo having the potential to be a large, tier-one gold-copper project.

Alkane Resource chairman Ian Gandel says the company achieved significant milestones for its Boda and Tomingley projects in FY22.

"We announced an initial resource estimate for Boda of 10.1Moz gold equivalent," he said.

"I can confidently say this is just the beginning.

"A large drilling program has demonstrated the significant potential of the Boda system, with mineralisation extending over more than 3km.

"We are well advanced in a shallower drilling program at Kaiser that should enable an initial resource to be confirmed there soon.

"We also announced an upgrade to the Roswell resource this year, bringing the combined San Antonio and Roswell resources to nearly 1.3Moz of gold.

"We stand on the cusp of approval for development of these deposits, which should support production at Tomingley for at least another ten years."

Tomingley Gold Mine
An open pit and underground mining development with a 1Mtpa processing facility.

Tomingley Gold Operations Pty Ltd is a wholly owned subsidiary of Alkane.

Mining has been based on the Wyoming One, Wyoming Three, Caloma One and Caloma Two gold deposits.

Since 2014, a total of 500,000oz of gold have been poured at the operations, which has met or exceeded guidance every year in operation.

Gold pour at Tomingley in FY22 again exceeded guidance (55,000-60,000oz), closing the financial year with 66,802oz of gold poured at an AISC of A\$1460/oz.

This was below the cost guidance of A\$1500-A\$1650/oz.

Above-forecast grades and team resilience from the impacts of COVID contributed to Tomingley's strong performance.

A fleet of new equipment, including a production drill, four loaders, four trucks and a jumbo were added to the operation's underground development.

Activities included development of the previously approved underground exploration drive, which extends south from Wyoming One towards the Roswell deposit.

FY23 guidance for Tomingley is 55,000-66,000oz at an AISC of A\$1650-A\$1900/oz.

Tomingley Gold Extension Project
Total San Antonio and Roswell (SAR) resource-

es now stand at 1,264,000oz gold.

Alkane is targeting the extension of gold mining operations at Tomingley by including the San Antonio and Roswell (SAR) resources immediately south of the existing mine.

The life of mine plan incorporating SAR was announced in June 2021, which extends the life of the Tomingley asset to 2031, producing around 745,000oz of gold.

Alkane continued to progress approvals for this NSW State Significant Development throughout FY22, with the Environmental Impact Statement (EIS) publicly exhibited in March 2022.

Initial Mineral Resources for San Antonio and Roswell were announced in FY21 and an update to the Roswell Mineral Resource brings the total SAR resources to 1,264,000oz of gold (19.9Mt at 1.90g/t Au).

This resource upgrade upholds the life of mine plan, which discussed the upside potential to extend Roswell underground and maintain production at over 100,000ozpa of gold, not only from 2025, but beyond 2028.

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The Tomingley Gold operations underground portal.



Tomingley Gold operations poured its 500,000th of gold in May 2022, eight years after plant commissioning in January 2014. Here, General Manager Operations Jason Hughes (centre) celebrates with the Tomingley management team.

RECRUITING THE NEXT GENERATION WITH ROBSON

As one of Australia's leading civil construction companies, Robson Civil Projects continue to build productive partnerships with major industry players and engineering consultancies, transforming the country's mines, dams, roads and infrastructure.

For over 60 years, the privately owned company has demonstrated proven technical capability in every project it has delivered.

From large-scale industrial subdivisions, road intersection upgrades, structural works,

and mine rehabilitation and infrastructure projects, the company is highly experienced in the management of complex projects with significant compliance requirements.

When it comes to mining infrastructure, Robson Civil Projects offers integrated mining services including bulk earthworks, dam construction, mine haul and access roads, site preparation and concrete structures.

The company also has extensive experience working through active mine sites and mine traffic management plans for some of the

world's largest miners.

A big part of the company's success can be attributed to its strong family based culture.

It's not just access to a first-class fleet of machinery, but its 300 employees that help drive project success day-in day-out.

Chris Dickson, Business Development and Marketing Manager of Robson Civil Projects says the fact that many employees have surpassed 30 years of service demonstrates the strength of the company's culture and values.

"We are always on the lookout for motivated people to join our team as we understand a team based approach delivers the best outcomes," said Dickson.

"If you're someone out there wanting to advance your career in civil engineering and construction, then seriously consider Robson Civil Projects. We encourage job seekers to reach out to us and have a chat about their future in the industry.

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

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BEYOND THE CALL OF DUTY DELIVERS FOR DUBBO POWERHOUSE

Benjamin Franklin, the father of the United States, famously wrote that time is money, a maxim all too familiar to Dubbo Powerhouse Pty Ltd after nearly a decade of assisting Alkane Resources' Tomingley Gold Operations with projects and maintenance shutdowns.

In 2022 the family-owned electrical distribution company celebrated its 20th anniversary reflecting back on some glowing memories, including the inception of a branch in Cobar, NSW in 2006 and the near decade-long relationship with Tomingley Gold. This has seen Dubbo Powerhouse grow its company to employ 11 staff across the two branches.

Alkane Resource's Tomingley Gold started their working relationship with Dubbo Powerhouse back in 2013 and this relationship has continued to go from strength to strength after Alkane toasted a golden milestone this year with the pouring of its 500,000th ounce of gold, representing

a prestigious achievement.

"The last thing any mining company wants are unplanned shutdowns," said Dayne Gardiner, who came onboard five years ago. He along with older brother Jakke and both parents Darren and Sherree, make up the core of the family-run company.

"When it comes to shutdowns mining companies need a lot of equipment for the task at hand, primarily cables, circuit breakers and motors. There needs to be good, quality communication between both parties on what sort of equipment is required and the planning that is involved to ensure that everything runs as smoothly as clockwork."

"As a company we base our whole business ethos on customer service and communication and going beyond the call of duty when required. We've been with Tomingley Gold for almost 10-years now and we like to think that it's our dedication

to some good old-fashioned values that has kept the wheels turning."

"We employ an industrial rep who does a fair bit of travelling calling in on customers on a regular basis to maintain the relationships established and also for feedback and any suggestions on where we can improve."

As a member of Gemcell Electrical Group, a coalition of independent NSW electrical wholesalers using weight of numbers to compete with large multinational wholesalers, one of Dubbo Powerhouse's mottos is that charity begins at home.

"As a locally owned and operated family business, we encourage the support of locally owned Australian business as opposed to internationally owned or multinational companies. It's part of our DNA and a philosophy we strongly subscribe to," said Gardiner. **AMR**



GEKKO
CARBON SCOUT



WORKING TOWARDS REDUCING GOLD IN SOLUTION TAILS AT TOMINGLEY GOLD OPERATIONS

ABOUT GEKKO SYSTEMS

Gekko Systems is a global leader in mineral processing, providing fully integrated solutions to mining companies around the world. Gekko has developed strong capabilities in the design, manufacturing, installation and commissioning of energy efficient mineral processing equipment and complete plants.

More recently Gekko developed the Carbon Scout in collaboration with the Curtin University in Western Australia (WA). The unit enables the plant operator to automatically get the carbon inventories, pH and density measurements from a single ground-based unit. This then automates the carbon transfers into each tank, ensuring that the gold solution losses are kept to a minimum.

CLIENT SITE

Tomingley Gold Operations (TGO) is a wholly-owned subsidiary of Alkane Resources. Operating since 2014, TGO is located about 50km southwest of Dubbo, NSW. Like most gold extraction plants, TGO uses cyanide to dissolve gold and recovers gold using activated carbon-in-leach (CIL), annually producing 55-60,000oz of gold.

CHALLENGE

Maximising the efficiency of gold extraction in the CIL circuit requires frequent, accurate data measurements from various tanks in the plant. 85-90% of GIC (Gold-In-Circuit) in the processing plant is in the carbon in the CIL tanks. Therefore, accurate measurements of carbon concentrations are required.

Manual data collection is difficult and time-consuming. TGO operators had to climb tanks 12m high to collect gold-in-circuit (GIC) or samples of gold-bearing carbon in slurry weighing up to 2kg. Operators were trained to collect samples manually at maximum depth reached by extending a scoop into the slurry. This method is prone to errors and individual variation in sampling.

In each 12-hour shift, it took approximately an hour to collect six samples manually. Results varied from 10 to 30 g/L, which could lead to inaccurate carbon management, metallurgical accounting and production reporting, resulting in gold losses.

SOLUTION: GEKKO CARBON SCOUT

After testing alternative carbon measurement technologies, in early 2018, TGO installed a Carbon Scout MK4 from Gekko Systems, comprising a central ground-level station connected by pipes to sampling droppers at the top of the CIL tanks.

Every hour at 5 minutes interval the Carbon Scout automatically collects a sample from each CIL tank, analyses the slurry, separates and cleans the carbon, and directly measures the carbon concentration. Operators can adjust this concentration based on setpoints for each tank to help minimise variance and maximise gold extraction and recovery.

In late 2021, to further enhance operational efficiency and gold production, TGO retrofitted the Carbon Scout MK4 to an MK6 model with a new dashboard interface, hardware

and updated software. TGO is working with Gekko Systems to apply the Carbon Scout data to control the carbon transfer pumps that balance carbon concentrations in each of the CIL tanks.

Gekko Systems provides onsite and remote technical support to help maintain the Carbon Scout's performance.

ADVANTAGES

The Carbon Scout collects data more safely, frequently and accurately than manual methods, freeing operators for less repetitive tasks. The Carbon Scout also measures pH and dissolved oxygen levels from the same sample used for measuring carbon concentrations, eliminating the need for multiple probes in each tank.

"I was sceptical about the Carbon Scout in the beginning, as manual sampling is the industry standard. After seeing the consistency of results from the Carbon Scout and comparative manual samples I was convinced. The Carbon Scout works; it's the best in the industry and I recommend it for Carbon in Leach (CIL) and Carbon in Pulp (CIP) circuits. Gekko provides excellent technical support both onsite and offsite."
- Jeffrey Hianjuku, TGO Metallurgist.

Without the Carbon Scout, if any carbon concentration result appeared to be incorrect, there was no backup data point for comparison. The Carbon Scout produces a complete set of carbon concentration results every hour to help determine if an unusual result is an outlier.

TGO's monthly metallurgical accounting process has improved significantly through use of the consistent carbon concentration data generated by the Carbon Scout.

NEXT STEPS

TGO aims to automate the carbon transfer pumps using the actual carbon concentration in each tank, provided by the Carbon Scout in real-time. The Carbon Scout will be further upgraded with an X-ray fluorescence analyser to measure the concentration of gold on carbon in each of the CIL tanks.

To learn more about the Carbon Scout contact gekkos@gekkos.com or visit the Gekko website gekkos.com.

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CROSSING THE BRIDGE



Train transporting shipping containers at FMG rail operations. Image source: Fortescue Metals Group.

Fortescue Metals Group (ASX: FMG) will celebrate two decades of success in 2023 after rising from humble beginnings as an exploration company to become one of the world's leading mining giants.

The company's unwavering belief in early-stage exploration is what has propelled them forward and, this March quarter, they are set to unlock even more value with Australia's largest magnetite project coming on-line.

Fortescue commenced ore feed into the processing plant at their Iron Bridge Magnetite Project, located in Australia's Pilbara region.

Production will start this quarter, creating a total of 900 new jobs and generating a higher grade 67% Fe magnetite concentrate for global markets.

As the world's fourth largest iron ore miner, Fortescue has ambitious plans to reach zero Scope 1 and 2 emissions by 2030.

Significantly, it could be come of the miner's first fossil fuel free sites through a world-leading US\$6.2b decarbonisation investment.

Iron Bridge is a game-changer for Fortescue, located 145km south of Port Hedland in remote northwest WA.

Its export potential yields 22mtpa of high grade 67% Fe magnetite concentrate, enabling the company to tap into an elite market segment and further expand their annual production and shipping capacity with unprecedented success.

The Iron Bridge Magnetite Project is a feat of engineering and construction, with a total of 12.8 million work hours culminating in the design and building of its mine, pipelines, village, and infrastructure since April 2019.

These efforts have supported over 3000 jobs thus far while promising an additional 900 permanent full-time positions in operations when completed.

There are currently 3,470 people working across the Ore Processing Facility (OPF) and pipelines scope of work.

The Iron Bridge Project is a model of operational efficiency across energy, water use and cost, taking advantage of the unique ore bodies found in the area while utilising cutting-edge dry crushing and grinding technology.

To further reduce costs and bolster sustainability efforts, Fortescue has invested heavily into Pilbara Energy Connect - an integrated energy transmission line system, solar gas hybrids with battery storage solutions delivering low cost power to Iron Bridge.

Fortescue executive chairman Dr Andrew Forrest says that the company takes pride in consistently delivering on its promises and that Iron Bridge was one of them.

"Building on our track record of safely and successfully developing and operating iron ore projects in the Pilbara, Iron Bridge will lead the way for magnetite operations in Western Australia," he said.

"This project demonstrates Fortescue's commitment to our strategic pillars of investing in the long-term sustainability of our iron

ore business, investing in growth, maintaining balance sheet strength, as well as delivering strong returns to our shareholders.

"As we transition to a global green energy, technology and resources company, Iron Bridge is an obvious choice to be considered as one of our first decarbonised, fossil fuel free sites, as we deliver on our target to achieve real zero Scope 1 and 2 emissions by 2030."

Fortescue chief operating officer iron ore Dino Otranto says the Iron Bridge high grade magnetite product is a significant differentiator for the company.

"Led by the highly-experienced project team, I am incredibly pleased with the significant progress made to achieve first ore feed into the processing plant," he said.

"This is a project that has been delivered during a challenging environment, and despite a global pandemic, rising inflationary pressures and a tight labour market, the Fortescue Values have risen to the forefront and demonstrated our ability to continue delivering this ground-breaking project."

WA Deputy Premier and State Development Minister Roger Cook congratulates Fortescue on achieving this milestone.

"The Iron Bridge project is going to create hundreds of jobs and make a significant contribution to the WA economy," he said.

Iron Bridge represents a rare beacon of progress in the iron ore industry - incorporating two world-class magnetite ore bodies, North Star and Glacié Valley, to create one of the largest global expansion projects currently underway.

rently underway.

The project is a strategic collaboration between FMG Magnetite Pty Ltd (69%) and Formosa Steel IB Pty (31%), with low capital expenditure requirements and competitive operational costs.

The capital estimate of the project is US\$3.6 - US\$3.8b, with Fortescue's share US\$2.7 - US\$2.9b.

At the Iron Bridge project, a low-cost open-pit truck and shovel mining approach is being employed to maximize value.

This will be coupled with an automated haulage and drilling system for further operational optimization.

A large-scale pilot plant (phase one) has been laid out and has processed 1Mt of ore utilising full-scale HPGRs alongside air classifiers.

Ore will undertake a multi-stage process, commencing with primary and secondary crushing. Tertiary crushing using high pressure grinding rolls will be followed by dry screening and magnetic separation.

The slurry is then transported down an epic 135km pipeline for further drying before being shipped to China and other international partners.

Key Milestones Q2 FY23

- The final module ship from China was unloaded at Port Hedland, and all remaining critical path items delivered to site.
- The 220km transmission line from Solomon to Iron Bridge was energised providing commissioning power to site from the existing Solomon Power Station.
- Commenced commissioning of Dry Processing Line A primary and secondary crushing and ancillary equipment, together with commissioning associated electrical switch rooms and supply systems.
- Continued progress on the installation of the concentrate and return water pipelines across excavation, welding and laying.
- Completed the structural concrete installation at the Concentrate Handling Facility at Port Hedland, with civil, structural and mechanical works progressing.

Facts and Figures:

- A total of A\$2.8 billion in goods and services have been sourced within WA for the Iron Bridge project and operations, including over A\$285 million awarded directly to Nyamal businesses since 2020.
- Commissioning of the OPF is progressing on site, with load commissioning commencing on the dry process in early October 2022.
- The 220km pipeline from Canning Basin is being installed to supply 20GL per annum of raw water to the Iron Bridge operations.
- The 135km twin concentrate and return pipelines are under construction, on track and will transport concentrate material from the plant to Port Hedland, and return water back to the plant.
- Concentrate Handling Facility construction is progressing at the Port Operations; the facility will dewater concentrate material and export the magnetite product.

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UTILITY FUSION HITS THE SUMMIT IN JUST 60 MONTHS

UTILITY FUSION IS ON TRACK AND ON TIME TO COMPLETE ONE OF THE LARGEST HOPE WATER/MAGNETITE PIPELINES IN AUSTRALIA.

FIVE YEARS AFTER launching Utility Fusion as a one-man start-up specialising in pipeline fusion welding, the company is on the cusp of celebrating a record project for Fortescue Metal Group's new Iron Bridge mine in the Pilbara.

Utility Fusion are on track to complete one of the largest HDPE pipelines in Australia for the new mine: A 23km 1200mm diameter HDPE raw water pipeline which will supply water to the ore processing facility at the mine to produce the magnetite and in addition to this, they have provided specialised labour and equipment to assist in the construction of a mammoth 260km HDPE pipeline which will transport the magnetite ore concentrate to Port Hedland for export to overseas markets.

The 9-month project represents a pinnacle for Utility Fusion as Nathan Blackledge, General Manager - Utility Fusion explains, "nothing has been done before on this scale in Australia".

Utility Fusion were sub-contracted by industry leading pipeline contractor MPC Kinetic for the task and ticked all the right boxes when it came to completing the project on time, within budget and safely.

The company deployed 85 people to site, using extendable trucks and specialised vacuum lifting equipment to transport and string the pipe in the pipeline corridor, before being welded, lowered into the trench and the land rehabilitated.

That's some journey from 2017 when Brisbane-based Blackledge, an experienced Project Manager who had worked in the oil and gas and mining industries, set out on his own with only one pipe welding machine and lots of hopes and dreams.

Today the company has offices in Perth and Brisbane and most of its customers are miners in the west.

"We just kept taking on better opportunities as we went along, emphasising our expertise as specialists in pipe welding and installation, and pipes that weigh up to 7 tonnes each require specialised lifting and welding equipment, which we have got that is fully automated without any people having to go near it," Blackledge said.

With pipelines being cheaper to install and maintain than railway tracks, engines and carriages, Utility Fusion is on the front row of the grid and Blackledge says pipelines are simply "of greater efficiency" when it comes to getting the mine's wares to market.

Extensive experience within the mining, energy and utility sectors is what has given Utility Fusion Services an edge in the development and maintenance of many large-scale projects. Maintaining dynamic client relationships and successfully delivering contracts without incident and to the highest levels of quality on time and on budget is the DNA of a company subscribing to standards that has served it well on its record-breaking journey of success.

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www.utilityfusion.com.au



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Utility Fusion Services has extensive project experience within the Mining, Energy and Utility sectors. Our services have been integral to the construction, development and maintenance of many large scale projects. Our continued involvement with these projects reflects our ability to maintain dynamic client relationships and successfully deliver contracts without incidents and to the highest level of quality.

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Mining equipment at Iron Bridge. Image source: Fortescue Metals Group.



Mining equipment at Iron Bridge. Image source: Fortescue Metals Group.

GREEN WITH ENVY: SOUTH MIDDLEBACK RANGE IRON ORE



(Image source: SIMEC Mining). South Middleback Range iron ore operations.

GFG Alliance's mining arm, SIMEC Mining, has produced its first high quality GREENSTEEL pellets that will underpin the future of decarbonised steel production in Whyalla, South Australia.

SIMEC has a key focus on developing large scale green energy capacity to support GFG's low-carbon metals and industrials strategy, also known as GREENSTEEL.

These pellets were produced from the company's Duchess South drill core in the Southern Middleback Ranges using innovative technologies proposed for SIMEC's magnetite expansion operations.

As part of routine production, a small parcel of concentrate was successfully converted to pellets in the existing pellet plant.

The successful production of the Direct Reduction (DR) grade pellets is another significant step forward in GFG Alliance's GREENSTEEL transformation at Whyalla, and is coupled with the successful commissioning of a 400tph demonstration pilot plant to test an innovative technology integral to current and future mining operations.

Both milestones build on GFG's announcement earlier last year of its magnetite expansion project and construction of a debottlenecking process to increase magnetite concentration production.

The process, known as a Dry Low Intensity Magnetic Separation (DLIMS) plant, is designed to reject non-magnetics from a coarse crushed fraction of the feed material, thereby upgrading the quality of feed to the magnetite concentrator.

Performance of the plant has exceeded expectations by rejecting over 20% of the feed mass as waste, while still recovering more than 98% of magnetics to product.

SIMEC's magnetite expansion plan continues with a feasibility study underway for Stage 2, which is evaluating a new 5mtpa magnetite concentrate supply chain to supplement the existing Stage 1, 2.5mtpa facility.

The current optimised mine shell contains 443mt of magnetite ore from the JORC compliant Duchess South reported resource of 614mt.

The proposed flowsheet for processing this ore generates a product containing 68–70%Fe magnetite concentrate with less than 2% silica.

This quality is referred to as direct reduction, or DR quality product.

The life of the mine is estimated to be in excess of 20 years, with the mine producing 7.5mtpa of magnetite concentrate, and generating annualised revenue of more than \$800m over that time.

GFG Alliance Interim CEO Primary Steel and Mining and Director Industrial Projects Theuns Victor says this grade of magnetite is a key enabler to Whyalla's GREENSTEEL future

"It strengthens its position as a consistent global supplier of premium quality magnetite to support low carbon intensive steelmaking," he said.

"When combined with renewables, particularly solar from our Cultana Solar Farm, our port, a skilled workforce, and supportive community and government, we have all the ingredients to create a world leading GREENSTEEL hub at Whyalla and fulfil our CN30 mission."

SIMEC Mining General Manager Magnetite Expansion and Growth Gavin Hobart says its existing iron ore operation in Whyalla

is home to some of the highest purity and most desirable deposits of magnetite in the world.

"The high quality of our ore makes it a critical resource to enable GREENSTEEL manufacturing and this successful pellet production is a significant milestone toward realising our plans," he said.

"Stage two of our magnetite expansion project represents a generational opportunity for economic growth in Whyalla.

"Once operational, the project is expected to employ more than 1,200 workers and support around 3,500 people in the broader community."

South Middleback Ranges

SIMEC Mining owns and operates a 10mtpa iron ore mine in the Middleback Ranges in South Australia, approximately 60km from the town of Whyalla.

These operations incorporate the Iron Baron, Iron Knob and South Middleback Ranges mine sites, which produce hematite and magnetite iron ore and are railed and piped to Whyalla.

The majority of the magnetite is pelletised (c.1.45mtpa) and used within the steel works.

The hematite ore (c.8mtpa) and excess

magnetite is loaded onto ships for transport to a primarily Asian customer base.

Total reserves and resources are just under half a billion tonnes.

Mining continued in the Iron Magnet and Iron Duchess Pits in 2021 but the ore beneficiation plant ceased operation and low-grade ore is no longer processed prior to export.

Magnetite ore is crushed and processed through the concentrator and the magnetite product continues to be pumped to the pellet plant in Whyalla as a slurry.

Dust management remains a priority and subject to continuous improvement actions.

Strategic Plan

SIMEC Mining's parent company GFG Alliance has a 20-year strategic plan to:

- fully transition its mining operations and iron ore customers to new higher-grade complete products;
- increase its iron ore reserves;
- unlock further large-scale magnetite potential via existing Middleback Ranges assets and new magnetite projects; and
- implement "Project Prime" to reduce the cost of magnetite pellet production.

As part of "Project Prime", GFG Alliance aims to upgrade the pellet plant to increase output from 1.6mtpa to 2.2mtpa, upgrade the fusion pellet crusher and upgrade the concentrator to extend the life of magnetite production until 2045, which would enable the processing of Duchess South Pit magnetite.

Infrastructure is the Key

GFG Alliance believes infrastructure development within South Australia is the key to unlocking resources development and bringing them to production phase.

In the development of the State's magnetite export industry, GFG says that opening up the Braemar iron ore province presents a significant opportunity for the company to increase magnetite concentrate production.

GFG estimates that development of these projects costs about \$1.5b and, once this investment is made, it catalyses further infrastructure development.

These include the development of a Whyalla deep water port as a staged proposition predicated on reaching movement of 20mtpa of product through the Port, then investing in the Port to bring it to cape-size capacity.

Whyalla Port Studies

Several studies for the Whyalla Port mapped expansion concepts for bulk handling of exports in 5mtpa increments up to 20mtpa.

Current throughput is about 8mtpa and is projected to decline over the next 3-5 years, meaning development of a deep water port will require an additional 15mtpa to be sourced from GFG's development of new magnetite projects

Production of iron ore from the Braemar also provides feedstock to upstream processing activities located in the Whyalla Industrial Hub through conversion of magnetite

concentrate to pellets and the conversion of pellets to steel.

Maritime logistics

Early last year, SIMEC Mining took steps to digitalise its maritime logistics at Whyalla Port in South Australia through Norwegian technology company Klaveness Digital.

A digital twin package called CargoValue will be used to manage inventory and shipping schedules.

Hematite ore and excess magnetite from the South Middleback Ranges mine are shipped to customers in Asia and SIMEC Mining aims to build resilience and cost savings across its supply chain.

Mining contractor

Golding Contractors Pty Ltd has a \$600m mining services agreement with SIMEC Mining until 31 January 2025.

Under this arrangement, Golding provides mine planning, load and haul and maintenance services at the South Middleback Ranges and Iron Baron mining area, including recommencement of the Iron Knob mining area.

Golding employs around 600 people at the mines, with most living in the Whyalla district of South Australia.

About GFG Alliance

The Gupta Family Group (GFG) Alliance has combined turnover in excess of US\$13bn and combined net assets in excess of US\$2.3bn.

Its activities span renewable energy generation, mining, shipping and commodities trading through its key hubs in Europe, the Middle East, Asia and Australia.

GFG Alliance also owns a portfolio of non-ferrous mining assets located in South Australia. This includes the Ardrossan Dolomite Mine which supplies dolomite flux to Liberty's Whyalla Steelworks, as well as a collection of copper-gold exploration projects.

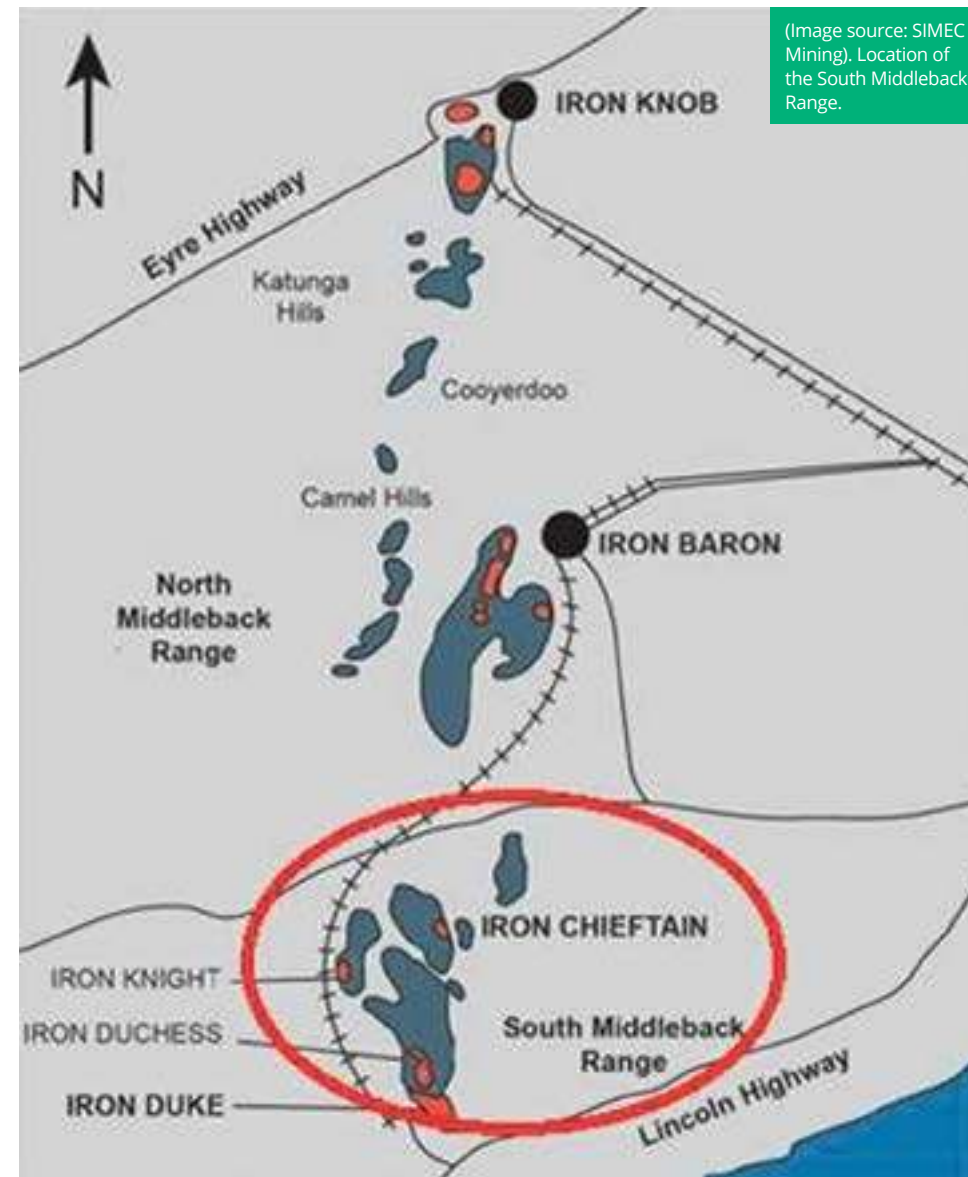
About SIMEC

The SIMEC Group is an international energy, infrastructure and natural resources business, founded 50 years ago.

In 2016, SIMEC Group had an annual turnover of almost \$2.5b and net assets valued at \$350m.

Through SIMEC, GFG Alliance owns iron ore mining assets in Whyalla and iron ore bulk handling facilities at the Whyalla port.

SIMEC's mining activities also includes coking-coal operations at Tahmoor.



(Image source: SIMEC Mining). Location of the South Middleback Range.

SIMEC Energy Australia is growing its capability as a supplier of renewable energy.

As part of the global GFG Alliance, SIMEC has

a key focus on developing large scale green energy capacity to support GFG's low-carbon metals and industrials strategy – known as GREENSTEEL. **AMR**

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Motor Control Centre installation for the Pelletising P for Simec Mining.



WILL SAFEGUARD YOUR ELECTRICAL ESSENTIALS ADDING VALUE & OPERATIONAL SECURITY AT EVERY STAGE

In resources time is money and one of the biggest disasters that can impact mines are unplanned shutdowns as a result of electrical blackouts that can tear thousands, if not millions, of dollars off the bottom line.

In Australia many mines are located in the most remote parts of a vast country, where power supply and electrical equipment reliability is essential to the smooth operation of a business that doesn't sleep.

This is where Aquest Electrical comes into the picture, ensuring you have sound sleep at night safe in the knowledge that the heavy equipment on your mine is soldiering on 24/7.

Whyalla based Aquest Electrical not only specialises in the installation of PLC and SCADA systems, but also the HV & LV maintenance, testing and inspection of all electrical machinery and data installation among an array of services.

The electrical specialists deliver site-based project management involving planned shutdowns and outages and subscribes to the maxim that prevention is better than cure when it comes to power supply with preventative, predictive and routine maintenance schedules all a part of the package.

Maintenance crews are located close to isolated mining operations and will perform regular diagnostic assessment of all your electrics.

Aquest, provides HA skills to install & Maintain electrical infrastructure at Port Bonython oil import and export jetty, is also a specialised communication system installer that repairs and maintains CCTV and Process Monitoring applications, fibre optic installation and repairs telemetry systems in difficult to access areas.

Air conditioners and refrigeration are vital to not only the comfort of employees but creating controlled climates essential for the reliability of your sensitive electronic equipment. Aquest HVAC team will not only install these essentials, but also provide ongoing maintenance.

The ISO accredited company provides urgent remedial works on LV & HV motors and transformers and is fully compliant with high voltage termination, repairs and maintenance requirements.

Thermography inspections and preventative reports are part of the Aquest package that is mobile and fast-paced encompassing electrical switchboard and control assembly services and fibre optic installations, terminations and fusion splicing.

Aquest can assist and monitor your process like a hawk to minimize any unnecessary downtime, striving to add value at every stage for the client's operation. **AMR**

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- Preventative, predictive and routine maintenance
- Inspection, testing and reporting
- Specialised communication system installation, repair and maintenance, CCTV for Process Monitoring
- Remote location maintenance crews
- Relief plant operator maintainers

WHAT WE DO

- Mobile and fixed plant repair, refurbishment and maintenance
- Thermography inspections and preventative maintenance reports
- Hazardous area installation and maintenance & Certification.
- HV Installation, Terminations & Switching
- Mobile and fixed operation power installation and maintenance
- Communications, data and telecommunications including fibre
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WASTE NOT, WANT NOT



(Image Source: Evolution Mining Sustainability Report 2022.) Proper waste management is essential for the sustainability of mining operations, as well as for the protection of the environment and human health.

Waste generated on mine sites in Australia is typically classified into broad categories including solid waste (putrescible, non-putrescible, restricted), liquid waste, hazardous or non-hazardous waste and special waste.

The mining industry generates a significant amount of waste, both in the form of solid waste and liquid effluent.

Proper waste management is essential for the sustainability of mining operations, as well as for the protection of the environment and human health.

Each mine site has its own waste management plan to ensure all waste and product materials generated from mining and processing are handled, stored and disposed of appropriately.

Solid Waste

Solid waste in the mining industry includes materials such as excess rock, tailings, overburden and other mineral waste.

These materials are generated during the extraction and processing of minerals and can contain a range of contaminants, including heavy metals, acids and other toxic substances.

If not properly managed, solid waste can have serious environmental and health impacts, including water pollution and land degradation.

Solid Waste Solutions

One solution for managing solid waste in the mining industry is to reduce the amount of waste produced through the implementation of more efficient mining processes.

This can involve the use of new technologies and techniques, such as more precise blasting methods and the use of water cannons to break up rock.

By minimising the amount of waste generated, mining companies can reduce their environmental impact and operating costs.

Another solution is to properly dispose of solid waste through the use of landfills, which are specially designed areas for the safe and secure disposal of waste.

Landfills can be lined with materials such as clay or synthetic liners to prevent contamination of soil and water.

The waste can also be covered with a layer of soil or other material to prevent the release of contaminants into the air.

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(Image Source: CSIRO Annual Report 2021-22.) The CSIRO is committed to reducing Australia's plastic waste by 80% by 2030 through its Ending Plastic Waste Mission.



(Image Source: CSIRO Annual Report 2021-22.) The CSIRO developed an innovative process for turning inexpensive titanium alloy waste into a high-value wire product suitable for the additive manufacturing market.

Evolution Mining

Evolution Mining's (ASX: EVN) operations produced 27,088,089 of waste rock to extract 22,815,747t of ore in FY22, representing a 1:19 ratio of waste to ore.

This is a decrease from the 3:3 strip ratio in FY21 due to the inclusion of Ernest Henry which uses a block caving mining methodology.

Zero waste is reported for Ernest Henry as all material mined there is combined and processed.

For Evolution's non-mineral waste in FY22, about 16,015t was generated, of which 68% was classified as non-hazardous waste.

Recycling of non-mineral waste increased by 15% compared to FY21, resulting in 38% of total non-mineral waste being recycled across all of Evolution's operations.

Evolution has also partnered with the University of Queensland through the Sustainable Transformational Reuse and Economic Alternatives for Mine Waste Project (UQ STREAM) to find new ways to manage mine waste and reduce environmental impact.

Waste Water

In addition to solid waste, the mining industry also generates significant amounts of liquid effluent, including process water, mine water and stormwater runoff.

This effluent can contain a range of contaminants, including heavy metals and chemicals used in the mining process.

If not properly managed, liquid effluent can have serious impacts on the environment, including water pollution and harm to aquatic life.

Waste Water Management

One solution for managing liquid effluent in the mining industry is through the use of treatment facilities, designed to remove contaminants from the effluent before it is released into the environment.

Treatment facilities can use a variety of techniques, such as chemical precipitation, filtration, and biological treatment in order to remove contaminants and make the effluent safe for release.

Another solution is to reuse or recycle the

effluent, rather than releasing it into the environment.

For example, process water can be reused in the mining process, reducing the need for fresh water and minimising the volume of effluent that needs to be treated.

Mine water can also be treated and used for irrigation or other purposes.

CSIRO

The CSIRO recognises the importance of water in mining while also managing this precious resource safely in order to meet regulatory requirements.

It has developed a suite of novel water-treatment technologies and services to help the mining industry effectively manage their water.

Various water streams from the mines are treated to enable greater water recycling, meet environmental discharge requirements and reduce the inventory of saline water storage onsite.

For example, their licensed Virtual Curtain technology uses hydrotalcites to trap metal contaminants in wastewater.

Sludge is a semi-solid by-product of wastewater treatment, therefore reducing sludge production has huge environmental and economic benefits.

The CSIRO tested its Virtual Curtain technology on wastewater at a Queensland mine, removing metal contaminants and safely discharging the equivalent of around 20 Olympic swimming pools of rainwater-quality water.

Other Solutions

In addition to these waste and waste water management solutions, the mining industry can also take a number of steps to prevent waste and reduce its environmental impact.

This can include the use of more efficient equipment and processes, the implementation of energy-saving measures and the adoption of sustainable practices, such as the use of renewable energy and the conservation of water resources.

Overall, effective waste management is essential for the sustainability of the mining industry.

By implementing a range of waste management solutions, mining companies can reduce their environmental impact and protect the health and well-being of communities and the environment. **AMR**



Workshop With Winning Formula

Mining is thirsty business and Desert Sands Cartage Contractors has the solutions.

Established in 1989, the Laverton-based company specialises in supplying the remote outback and servicing mining projects in regional WA and the Northern Territory with potable water and cartage.

But the maintenance of trucks and machinery is a key part of making this possible.

Realising this need, Desert Sands Cartage recently built a new workshop with the aim of reducing downtime, maintenance costs and ultimately improve production and reliability for its clients.

Its team of trained technicians are highly specialised in diagnosing faults, performing repairs and rebuilds and thinking outside the box in resolving challenges associated

with industry work in remote locations.

Desert Sands director Rex Ryles says his company has the capabilities to head out to remote locations with its new porta batch mobile batching plant and carry out large pours to mine construction and for remote community upgrades.

"We can also provide potable drinking water for personnel mobilised on-site for all stages of the mining process, for example, exploration, earthworks and construction phases," he said.

"No matter where your site is located, we travel far and wide to ensure you and your staff are looked after and have a reliable source of drinking water."

New remote workshop facilitating:

- Cat CT diagnostics
- Machining and turning
- Metal fabrication and welding
- Tyre repairs from light vehicles to large earth moving machinery
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Waste & Wastewater

FEATURES

- rock and blue metal materials;
- maintenance grading;
- road building and construction;
- excavator and loader works.

Other specialty services include contract screening, semi-drop deck hire, front-end loader hire, road maintenance and constructions for local government organisations, general civil works, bulk tipper haulage and much more.

For more information, visit
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PUMP SOLUTIONS FOR DIVERSE MINE REQUIREMENTS

Pumps play an integral role across the mining sector, essential in moving material from one point to another.

As specialist Australian pump supplier, Kelair Pumps Australia have provided pumping solutions to many major mining organisations and build pumping solutions and customise to what the customer requires.

Pumps In Mining

“Kelair Pumps is heavily involved in mining process plants where we design systems involving suction pumps, multistage pumps, dosing pumps, acid pumps and all other types of chemical pumps,” said Michael Charnley, Kelair Pumps Australia Regional Sales Manager.

Pumps work in a range of mining applications from water supply and boosting, wastewater and tailings transfer to abrasive sludge dewatering, mineral processing, slurry transfer and reagent (acid and chemical) dosing to name a few.

Some of the pumps used for these processes include centrifugal pumps, slurry pumps, submersible pumps, magnetic drive pumps and diaphragm pumps.

Kelair provides a wide range of pumps for mine sites.

- Containerised fire pump units are purpose-built by the Kelair Pumps Building and Fire Division to suit individual requirements.
- Kelair Pumps is revolutionising sewerage treatment with the Kelair-Blivet, a low energy, high performance, easily installable system that quickly turns effluent into usable irrigation water.
- Designed for clean water, Lowara's stainless steel range of centrifugal pumps are ideal for a wide range of mine site requirements including pressure boosting and camp water supply.
- For dewatering, the Sandpiper HD20F flap-check valve AODD pump is ideal as it has the advantage of being both a flap-check valve pump as well as having a non-metallic body.
- For the efficient handling of paste and mud tailing Abel Pumps have available two pumping design alternatives, the SH and HMQ series.
- More and more of Kelair's mining industry customers are turning to peristaltic technology such as Albin Pump to provide solutions to specific problems including tailings treatment.

Reliability, Efficiency and Durability

Speed, efficiency, and reliability of pumps are paramount to the smooth running of systems at any operation.

Efficiency is about getting the most work done for the least possible power. An efficient pump is usually a reliable pump.

All pumps have a “best efficiency point” and it is imperative to get the unit to operate at the point where it should operate.

Understanding the application of the pump or series of pumps on a mine site is critical to achieving efficiency.

“An in-depth look at the application of the pump and its uses requires careful consideration of the following: what does the pump have to do, where will the pump spend its time, how will be manage the external factors and environment,” Michael said.

“The more we can spend talking to our clients about what exactly their pumps are going to do, the more likely we are going to get an efficient solution. It's about sizing the pumps properly for the job. That's what really makes the difference to efficiency”, Michael said.

Pump flexibility with repairs and maintenance

Understanding the pumping system at the time of pump selection is critical, particularly when we see pumps are damaged through the process called cavitation.

Cavitation is a common problem in pumping systems, but with proper pump sizing, pipe design, and careful use of filters and strainers, damage to pumps and their impellers can be largely avoided.

According to Michael, when we see pumps that are damaged onsite, quite often we prefer to repair them because it may take less time than supplying a new pump, and secondly the repaired pump is as good as or better than the pump originally was.

We can make improvements to the mechanical seals. Diagnose problems, so we can go to the customer with something which is much more reliable and typically below the cost of a new pump.

Kelair Pumps

Since 1975, Kelair Pumps has specialised in providing pumps and pump packages for the diverse needs of mining operations across Australia. When pump knowledge matters, you can rely on Kelair. **AMR**

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PRIMING THE MINING PUMP

The use of pumps and valves in the Australian mining industry dates back to the early days of the country's history, when the mining of gold and other minerals first began to play a significant role in the economy.

Since then, the industry has undergone significant changes and developments, and pumps and valves have played a crucial role in this evolution.

Pumps

One of the earliest uses of pumps in the Australian mining industry was for the extraction of water from mines.

As the mining of gold and other minerals often took place deep underground, it was necessary to remove the water that seeped into the mines in order to make them safe and accessible for workers.

Initially, manual pumps were used for this purpose, but these were eventually replaced by more efficient steam-powered pumps in the late 19th century.

As the mining industry in Australia grew and developed, so too did the technology used for pumping and valve systems.

In the early 20th century, electric pumps became more widely used, and these were followed by the development of diesel and petrol-powered pumps in the mid-20th century.

These advances in pump technology allowed for greater efficiency and cost-effectiveness in the mining industry, and they played a key role in the industry's continued growth and expansion.

There are many different types of pumps used in the mining industry today, each with its own specific set of features and capabilities.

Some of the most common types of pumps used in mining include:

Centrifugal pumps: These pumps use the kinetic energy of a rotating impeller to move fluids. They are widely used in the mining industry due to their high efficiency and versatility and are available in a range of sizes and materials to suit a variety of applications.

Positive displacement pumps: These pumps move fluids by trapping a fixed volume of fluid and then forcing it through the pump. They are commonly used in high-pressure and high-volume applications, and they are often used to transfer slurry and other abrasive materials in the mining industry.

Slurry pumps: These pumps are specifically designed to handle abrasive and high-density fluids and are commonly used in the mining industry to move slurry and other abrasive materials. Slurry pumps are available in a range of materials and configurations to suit different applications, and they are often used in combination with other types of pumps to ensure efficient and effective pumping.

Dewatering pumps: These pumps are used to remove water from mines, pits and other areas where water accumulates. They are often used in conjunction with other types of pumps, such as centrifugal pumps, to ensure that mines remain safe and dry.

Vacuum pumps: These pumps are used to create a vacuum or a region of low pressure in order to move fluids or gases. They are commonly used in the mining industry to move gases and other hazardous materials, and they are available in a range of sizes and materials to suit different applications.

In addition to these pumps, there are many other types of pumps that are used in the mining industry, each with its own specific set of features and capabilities.

The type of pump used in a particular mining application will depend on the specific requirements of the application, including the type and volume of fluids being pumped, the distance the fluids need to be transported, and the environmental conditions in which the pump will be used.

Valves

The use of valves in the Australian mining industry has also undergone significant development over the years.

Valves are used to control the flow of fluids in pipelines and other systems and they are an essential component of many mining operations.

In the early days of the industry, valves were often made of metal and were manually operated but with the advent of new materials and technologies, valve systems have become increasingly sophisticated.

Today, valves are often made of high-strength plastics and are equipped with automated control systems that allow for precise and efficient operation.

Some of the more common types of valves used in mining to control the flow of fluids in pipelines and other systems include:

Gate valves: These are often used to control the flow of slurry and other abrasive materials.

Globe valves: These valves are often used to control the flow of gases and other hazardous materials.

Ball valves: These valves are also used control the flow of slurry and other abrasive materials.

Butterfly valves: These valves are often used to control the flow of slurry and other abrasive materials.

Check valves: These valves are used to prevent the backflow of fluids and ensure that fluids flow in the correct direction.

Sustainability

One of the major challenges faced by the Australian mining industry in recent years has been the need to reduce its environmental impact.

In response to this challenge, many mining companies have adopted more sustainable practices, including the use of pumps and valves that are more energy-efficient and have a lower environmental impact.

This has led to the development of new technologies such as variable speed drives and energy recovery systems, which help to reduce energy consumption and greenhouse gas emissions.

Overall, the history of pumps and valves in the Australian mining industry is one of continuous innovation and development.

From the early days of manual pumps and metal valves, to the sophisticated systems in use today, these technologies have played a crucial role in the growth and success of the industry.

As the industry continues to evolve, it is likely that pumps and valves will continue to be at the forefront of technological advances, helping to ensure the safe and efficient operation of mining operations across the country. **AMR**

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STUDWISE IS THE STUFF OF LEGENDS

It reads like a rags to riches story starting in 1991 when Graeme Johnson set out with a tent, a Stud and a vision to distribute worldwide, Wear-resistant studs compatible with multiple mining equipment and other applications under duress.

Fast forward to the present and Studwise proudly distributes its products in Russia, Indonesia, New Zealand, South Africa, Philippines, Chile and, of course Australia, where clients have coveted the company's superior quality Wear Resistant Studs and Stud Welding Units for 32-years.

Studs are used in mining operations to reduce wear on surfaces exposed to friction by forming a protective layer between the machine and moving material and Studwise has stepped up to the plate with a number of world class products that do the job excellently, Eastern State Hp Rolls Crushers manufacturers have hailed the benefits and performance of Studwise Wearstuds issued in Queensland coal mines for roll crushers. But it's not only coal mines that have benefitted.

Field operations in Iron Ore, Mineral Sands, Gold and Nickel Ore bodies are a testimony to the quality of Studwise's proven and cost-effective products.

Studwise's reputation stretches across the ocean and recently Studwise General Manager Mr Graeme Johnson was invited to Zambia where Kemari Engineered Solutions were interested in the company's products, which are now deployed in Zambian Copper mines. After three decades Studwise has developed a peerless reputation for quality and service.

Studwise goes further than just manufacturing and distributing Wear Resistant Studs. The company puts a premium on consultation, training, marketing and support for end users, including blue chip mining companies such as BHP Billiton, Rio Tinto and Alcoa.

Studwise's Wearstuds can be applied four times faster and last three to ten times longer than wear-plates or hardfacing. Consequently, speed and ease of application means downtime is lessened.

The benefits are invaluable:

- Coupled with superior wear resistance, Studwise Wear Studs can extend the life of your equipment five to ten times longer than traditional protection systems, saving thousands of dollars.
- As Wear Studs are easily applied

with a welding gun, an area can be covered in a few hours, rather than the several days required by conventional hardfacing methods.

- Studwise Wear Studs provide a weight advantage up to 10:1 over steel plate of the same profile.

- Wear Studs provide an early visual indicator of the need for stud

replacement, which reduces the need for wear checks. In addition, areas of extremely high wear can be re-protected by simply applying a Wear Stud on top of the worn stud.

- Studwise Wear Studs significantly reduce the number of maintenance hours spent on equipment, minimising the risk of injury to personnel. **AMR**



The early days - Graeme Johnson working out of a tent in the Goldfields with just hopes and dreams.

AUSTRAL TECHNOLOGIES HITS THE SPOTX WHEN IT COMES TO LONGEVITY

Australia, and especially mining in Australia, can be a tough prospect in some of the harshest conditions on earth where longevity translates into profit and longer-lasting operations.

In this terrain Austral Technologies has repeatedly delivered with distinction for 30-years, developing and deploying a number of SPOTX hardfacing products with revolutionary materials that are designed to combat extreme in-service degradation and provide the best performance in aggressive environments where impact, abrasion and corrosive wear are critical sources of material failure.

Here are some of the testimonies to Austral Technologies success.

A Reliability Engineer said after trials of SPOT60: at Pilbara Dampier Operation "The photo of bucket 0 was taken only days before I left the Pilbara but I could safely say that the SPOT60 teeth with the cross hatching could have achieved at least one year in operation. I stopped the trial after six months due to my impending departure. This compares to the 2-6 months they were getting previously.

"This stuff is expensive but as a rule, the % life extension always was greater than the % increase in cost. So, when you take into account downtime and labour costs it pays for itself."

SPOT60® has been utilised by the mining, power generation and mineral sands industries since 2001 for use in areas of extreme sliding abrasion.

It is manufactured using a unique High Deposition PTA Welding System. Austral Technologies is the only company in the Southern Hemisphere to operate two off these unique deposit overlaying systems.

Four Times the Liner Life with Improved Overlay Plate

At an iron ore mine located in Western Australia, the customer had an ongoing issue with high wear rates in their scrubber discharge chutes. During each shutdown in a 12-week shutdown cycle, the existing 20mm alloy-chromium carbide overlay plate supplied by a competitor was found to be completely worn through, resulting in damage to the exposed parent metal of the chute.

It was recommended improving the material selection by replacing the existing overlay plate with SPOT60 overlay liners, which are composed of one of the highest wear resistance materials produced in the world today.

The result was a remarkable improvement in wear rates:

- The SPOT60 overlay liners exceeded the life of the competitor's plate with only 2.5mm wear on the leading edge after 12 weeks,
- The plant extended maintenance shut-downs to every 48 weeks, instead of

12 weeks.

- Significant reduction in the exposure to health and safety risks due to the reduced frequency of repairs.
- The hire of a 250 to 300 tonne crane every 12 weeks is now required once every 48 weeks.
- The client estimates a saving of \$600,000 in combined labour and crane hire, with the relief on maintenance resources alone expected to be around 300 hours per annum. **AMR**



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Studwise is living the vision manufacturing superior quality Wear Resistant Studs and Stud Welding Units for 32 years with distributorships in Russia, Indonesia, New Zealand, South Africa, Philippines and Chile.

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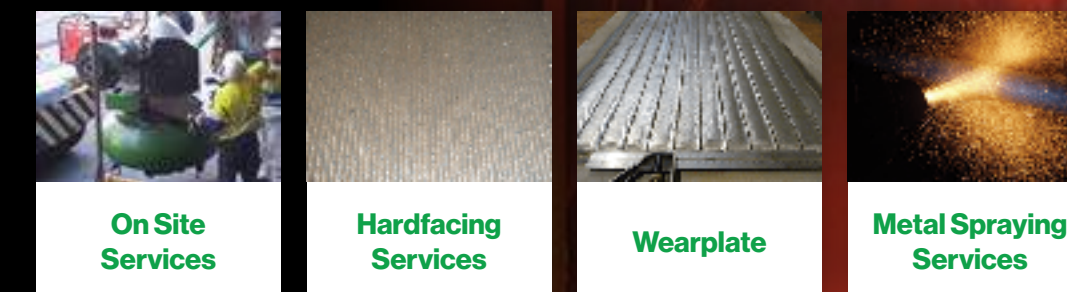
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RHINO TRAILERS & LOW LOADERS

DONT CUT CORNERS WHEN IT COMES TO QUALITY

It takes an Australian born and bred trailer manufacturer to understand the tough operating conditions heavy haulage can endure in the Lucky Country and after 50-years in the business, they are continuing to improve and learn about how to better serve the road transport industry.

More recently The Davey Group, which is proudly 100% Family and Australian owned, has turned its focus on clearing supply chain hurdles that arose from the Covid-19 pandemic.

The company took the decision to increase

production capabilities by extending the production line at its 40,000m² Toowoomba base in Queensland, which was bought in 2007 and constantly redesigned to produce a range of trailers meeting the highest standards, with the addition of 22 new overhead cranes to maintain the highest design and manufacturing standards.

Engineering capacity has also expanded with the addition of two dedicated draftsmen with extensive design experience and mechanical trade qualifications. Several low-loader designs are being refined and re-engineered for improved strength, qual-



ity, operation and manufacturing efficiency. The emphasis on continued striving for better efficiency and service has also seen the company starting up new and fulltime school-based apprenticeships and upskilling tradesmen and labourers on a continual basis.

It's some journey from Kempsey, NSW, three decades ago. A seminal moment in the Davey Group's story occurred in 2004 when Lusty Low Loaders moved to the Sunshine State, was acquired by The Davey Group and relocated to Toowoomba in 2007.

As part of the company's modus operandi, Low Loader's original trailers have subsequently undergone an extensive design review to ensure the entire range subscribes to the highest standards set by the parent company.

The purpose-built division of the Davey Group focuses on custom-built road transport equipment, low loaders and purpose-built heavy haulage equipment all designed and built by skilled Australian craftspeople for Australian conditions.

Rhino Trailers carry a long-standing reputation for quality custom built semi-trailers with a reputation for superior strength synonymous with the company logo 'Strength in Design'. Take your pick between Single Units, B Doubles and Road Transport Configurations also include dollies, 2 rows of 4 and 2 rows of 8, 4 Rows of 4 Deck Wideners and Suspension Wideners, 4 Rows of 4 Deck Wideners and Suspension Wideners and 3 Rows of 8 and 4 Rows of 8 Full Wideners. Deck Wideners are also available in an Extendible Model.

The company's Toowoomba hub is a one-stop shop offering full repair and maintenance services including its own foundry, CNC precision engineering, sandblast, protective coatings and modifications if desired.

The Davey Group doesn't cut corners when it comes to its proud reputation for creating and manufacturing a diverse fleet of tough trailers built to deliver in the harshest Australian conditions.

These trailers have gone beyond the call of duty and distinguished themselves on mining terrain, transporting livestock and a mul-

titude of heavy haulage tasks. The drop-bed bulk tubs are made in alloy and high-tensile light weight steel to work with light weight, high volume loads

If you're after a model in the tipper range, you're spoilt for choice from high-tensile, light-weight steel and aluminium trailers that include their hybrid range.

Quality & ISO certification

You won't find the Davey Group running any red lights when it comes to quality, which is why two years ago the Group made a commitment to developing and implementing an Integrated Management System (IMS) to achieve certification in: ISO 9001:2015 Quality Management Systems; ISO 45001:2018 Safety Management Systems; and ISO 14001:2015 Environmental Management Systems.

This gives clients and customers a vote of confidence that trailers are continually evolving on an upward trajectory when it comes to quality at the Davey Group as a result of standards and controls that are raising the bar to the highest tier when it comes to performance and reliability.

The Rhino division, sings off the same hymn sheet with an onus on customer satisfaction derived from a no compromise ethos when it comes to quality and a focus on satisfying customer specifications, constantly delivering and improving certified ISO 9001:2015 Quality Management System and conducting in process and final quality test inspections.

You can't beat over 50 years of industry specific experience, not to mention the knowledge and expertise Lusty Low Loader and AFM-O'Phee Trailers derived after joining forces under the shelter of one dynamic, parent company umbrella.

At the moment there's a focus on growth and production output capability. Across the industry, lead times to manufacture new trailers are excessive - customers having to wait extended periods to obtain new equipment. We're working on ways to improve lead times. **AMR**

RHINO

LOW LOADERS



SUSPENSION WIDENERS

- 3x4 / 4x4 low loaders
- Spring / Air / Hydraulic
- Std / Bifold Ramps



DECK WIDENERS

- 3x4 / 4x4 low loaders
- Hydraulic Suspension
- Rear Steer
- Std / Bifold Ramps



ROWS OF 8 SWINGING

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- 12.5 deck
- Bifold Ramps
- 2x8 Dollies



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A DRIVING FORCE



Safety Management Systems in place ensuring compliance by identifying, assessing and controlling risk with regular relevant training provided.

Inventory, knowledge, compliance and people, have allowed DHH to assist clients on projects such as the West Gate Tunnel Project with the movement of 400Tonne loads by platform trailers and hydraulic gantry systems along with contributing to assist the construction of various Rail Level Crossing Removal Projects requiring the transport of 65m long bridge beams.

When Warwick Doolan purchased his first truck in 1986 leading to the formation of Doolan's Heavy Haulage (DHH) he didn't think that this move would lead to DHH becoming a major operator in the Heavy Haul sector. He forged a unique position as a standalone Australian family-owned enterprise with the ability to compete with corporate majors, whilst retaining its personal touch and delivering heavy haul services across Australia.

Headquartered in Melbourne, and with strategically located operational bases in Hobart, Perth, and Port Hedland, supported by over 100 employees, DHH is well placed to provide services Australia-wide to major industry sectors including mining & resources, oil & gas, civil construction, project cargo, wind and renewables, as well as wharf cargo receiving and delivery.

With its wealth of knowledge gained over a 37-year span, DHH have continued to expand their resources and capabilities to meet market and industry demands. Along with its subsidiaries Machinery Movers and Tasmanian Heavy Haulage, DHH can offer economical, tailor-made solutions for alternative lifting and transport requirements from concept to completion.

DHH is equipped to manage the entire 'wharf or factory to foundation' transport experience and, along with its core service of over size and over mass (OSOM) transport assisted by its "knowledge bank" DHH can provide additional services, such as:

- consultancy and advisory services for project planning and management requirements,
- in-house engineering solutions,
- optimum equipment selection,
- management of the road transport permit process from application to award
- specialist transport engineering services along with AutoCAD and 3D capability.

In addition to building on "Experience" over the past 37 years DHH have grown their fleet to include over 50 Prime Movers along with 320 lines of Drake steerable Low Loaders from 3 x 4 up to 13 x 8 (fixed and extendable) as well as 100 plus lines of European draw bar style hydraulic platform trailers (Scheuerle and Nicolas) along with Scheuerle 3.5 to 4.9m widening platforms with 1.8m axle spacings which are ideal for some of those larger resource related OSOM project moves. Various Drake / Scheuerle / Nicolas trailers can be made into Jinker combinations to accommodate those very long loads which are experienced in project situations and having remote control steering they make negotiating those "tight corners" encountered on some routes, easier to negotiate.

In addition to the various on-road platform and Jinker trailer combinations, DHH also have Self-Propelled Modular Transporters (SPMT) in 4 and 6 axle line combinations. At 2.5m wide with 360-degree steering capability they can be configured into unlimited combinations of length and width, to cater for those extra heavy or irregular shaped modules which require precision placement in confined spaces and for which SPMT, are ideal!

For other lifting and placement situations within confined areas where surrounding structures may pose side clearance and headroom safety issues for cranes, DHH can offer alternative lifting solutions through Machinery Movers who offer vertical and horizontal engineered transport solutions utilizing two or four leg Hydraulic Lifting Towers. The precision driven self-powered units are available as 320 and 500Tonne (4 tower) combinations. Various beam lengths allow loads of up to 16m wide to be straddled while lengths can vary up to 20m and can be moved in three directions with the use of powered Lift Links allowing cross-ways travel on the lift beams.

While building inventory, knowledge, and people over the past 37 years, DHH has also been building its business around Policies and Procedures greatly assisted by attaining ISO Certification in the following categories.

Quality Management - ISO 9001:2015
OH&S - ISO 45001:2018
Environmental Management - ISO 14001:2015

Along with ISO Certification DHH have relevant accreditation through various state and national road authorities who require

For more information, visit
<https://www.doolanshh.com.au/>



www.doolanshh.com.au



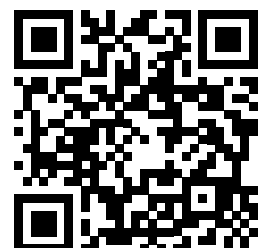
PEOPLE – COMMITMENT – SERVICE

For the past 37 years, Doolans Heavy Haulage has been a driving force behind Australia's major industries. DHH provides heavy haul services to mining and resources, oil and gas, civil construction, project cargo, wind and renewables, and wharf cargo.

Along with its subsidiaries Machinery Movers and Tasmanian Heavy Haulage, DHH offers economical, tailor-made solutions for alternative lifting and transport requirements from concept to completion.

Contact DHH today to discuss your unique haulage requirements.

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- > Corrosion and scaling resistant
- > High Safety Margin in physical parameters
- > Long operational lifespan

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Super Aquauct

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- > Rapid deployment and retrieval capability
- > Easily stored and transported
- > Low operating cost



Flowmaster™

Flowmaster is a flexible layflat drag hose for all types of irrigation applications.

- > Ideal for remote/emergency transfer scenarios available in lengths up to 400m
- > Highly flexible for minimum pressure loss and maximum efficiency
- > Rapid deployment for emergency situations
- > Rapid deployment and retrieval
- > High performance capability



Chemicoil

A cost-effective flexible layflat hose for fuel and chemical delivery operations.

- > Flexible solution for fuel and chemical transfer
- > Static discharge capability with UV impregnation
- > High pressure fuel delivery (28 Bar)
- > Exceptional chemical resistance
- > Rapid deployment for emergency situations



Offshore 850

A flexible layflat hose for all types of marine and offshore supply operations.

- > Floating fluid transfer flexible pipeline
- > Rapid deployment and retrieval
- > High performance capability with UV impregnation
- > Ideal for remote/emergency transfer scenarios
- > Designed for the marine and offshore supply operations sector



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Strong as Steel

In 1992, AusPress were the first company to offer an advanced range of drainage and piping solutions to market under their high-quality stainless-steel range; a line of premium products brimming with benefits.

Known for having a high resistance to corrosion, the popular material is affordable and long lasting, leaving AusPress clients with strong, cost-effective, and durable systems.

Their Press-Fit system is a particularly sought-after product, in-demand for its fast installation and the lack of a hot works permit requirement.

AusPress General Manager and CEO Jason Nelson (who also represents the Australian Stainless Steel Development Association on Australian Standards committee for AS3500) said this made Press-Fit a safe onsite product that was easy to maintain, which were just some of the advantages.

"Stainless steel has many benefits depending on its application," Mr Nelson said.

"Its superior when considering its corrosion resistance, fire and heat resistance, impact resistance, sustainability and in particular that it is very hygienic.

"More and more now, we are getting increased everyday uses for stainless steel even in general house plumbing.

"This is encouraging because stainless steel has long been considered an industrial use product.

"At AusPress, we meet with our clients and ask them what they need, why they need it and a take a number of other factors into consideration. It's more about listening than selling" "Of course, 70 per cent of our product offering is stainless simply because it is cost effective, longer lasting, hygienic, aesthetically pleasing and easy to work with compared to some other products."

Growing from an exclusive importer and distributor to the Australia and New Zealand markets since 1992, AusPress have flourished into a proud Australian-owned and Australian-operated company.

A large line of their drainage products are manufactured in Adelaide and the business is actively looking to expand local manufacturing capabilities to ensure high quality and customisable options for clients.

Aside from a strong choice in material, Mr Nelson said the most important factors to consider for drainage systems were a fit-for-purpose design and purpose and certification.

He said engaging a reputable provider such as AusPress would ensure that project operators had systems installed that conformed to local standards and were approved for a specific application.

He also said certification by the relevant

body in an operation's sector was critical, as well as choosing a product that performs as required and lasts' as long as necessary. "AusPress is able to assist with all of this," Mr Nelson said.

"We have been the leading supplier of stainless press-fit and drainage piping systems in Australia since 1992.

"We have a focus on the mining, marine, food processing, medical and water processing sectors and we have an ever increasing focus on technically advanced piping solutions.

"We are a proudly Australian company providing complete systems for "Water in and Water out".

For more information, visit
<https://auspress.com.au>
AMR

WE ARE AUSPRESS

We are the leading suppliers of press-fit, drainage and press tool solutions.

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Waterlord® for Rapid In-Pit Dewatering

Compact reels of layflat hose ready for deployment.

Using layflat hose for in-pit dewatering has recently been demonstrated to be an efficient method at a mine in Western Australia. Waterlord® layflat hose deployed using the Hamersley™ reel system from Crusader Hose proved to be a labour-saving and time-saving way for the mine operators to move excess water.

During a recent trip to the Pilbara in Western Australia, Francois Steverlynck, Managing Director of Crusader Hose, saw firsthand how well the Waterlord® rapid in-pit dewatering system performs.

After offering expert technical advice on how best to secure the couplings, the layflat pipelines were deployed using the Hamersley™ reel system. The Waterlord® dewatering system is unique and often the only way to safely establish temporary pipelines from inside the pit to the ring main.

The key benefit of using Waterlord® layflat is its flexible nature. This flexibility is its unique characteristic that affords mine operators opportunities and options other types of pipe cannot and will never be able to.

Flexible layflat hose can be easily laid over rugged terrain and up high pit walls. Waterlord® layflat will pump water up high pit

walls without requiring any support at the top.

Once the bore water has been extracted, mine operators can easily relocate Waterlord® hose within the pit to the next bore or wherever it's needed next.

The weaving technology and the through-the-weave extrusion manufacturing process constructs a textile reinforcement that can withstand very high pressures. These pressures fit comfortably within the necessary safety margins.

The hose is flexible and robust in its construction, allowing trucks to drive over it. Carefully driving along the length of the hose is a quick and easy way to empty the hose of water.

With very secure couplings that can be fitted on-site with minimal equipment, multi-

ple lengths of Waterlord® can be assembled quickly and easily.

The Waterlord® rapid in-pit dewatering system consists of layflat hose compactly wound onto reels and a Hamersley™ drive unit. The interchangeable reels are lifted into the drive unit, which then connects to an excavator or a similar machine.

The excavator moves along as the reel is unwound during deployment or rewound during retrieval. After deploying the reels of hose and connecting the lengths, attaching the layflat pipeline to the ring main is easy and quick. This feature saves a lot of time when the pit is extended, and the hose needs to be relocated.

The shifting nature of many open-cut iron ore mines requires dewatering planning as the ore needs to be excavated in a dry state. "With the constantly moving pipework

needed to connect to the in-pit bores, Waterlord® layflat hose has proven to be an efficient and effective product. The operators I worked with think it's really the only system available that allows the job to be done safely and quickly and would never consider anything else," said Francois.

Industry knowledge has highlighted the necessity to offer complete hose and reel systems. With a considerable reinvestment over the past five years, Crusader Hose now has more engineers and improved technology to fabricate reeling systems specifically designed for the mining sector.

"We've been manufacturing layflat hose for over 37 years," Francois continued, "and are now designing reel systems to support the use of our hose to reduce the manual handling requirements of large-diameter hose. Our new reeling systems have been designed in consultation with industry as a direct response to their pain points."

Crusader Hose has several reel systems affording their particular benefits and limitations. As mining projects differ, so, too, are the systems offered. There is a range of options to suit many applications. AMR



Francois Steverlynck from Crusader Hose on-site in WA.



Waterlord® layflat hose can pump water up high pit walls without requiring support at the top.



Waterlord® layflat hose is flexible and adapts to rugged terrain.

Future Facing Pipeline Infrastructure

Clover are an integrated pipeline infrastructure business.

Clover Pipelines' highly experienced team combines robust, reliable service with versatile capability in the delivery of unique product solutions for a wide spectrum of mining and resource applications.

As a total-package provider, it's about end-to-end quality at every stage of a project: considered solution design, rapid procurement, dependable supply, durable products and responsive service.



Plan

Every mining and resource project is unique. Regardless of the commodity—whether coal, iron ore, precious metals, lithium, or CSG—Clover combines specialist technical knowledge, creative thinking, and extensive experience to assist clients with detailed project planning and consultation services.



Source

Total-package capability means a comprehensive ability to source a wide range of standard and custom products—rapidly—and as needs evolve on site. Clover Pipelines offers a wide range of high quality products—certified to the relevant Australian and International standards—spanning fit-for-purpose polyethylene, steel, ductile iron, PVC and GRP pipe products to suit a range of mining applications.



Supply

In the face of hard deadlines and shifting priorities, Clover is perfectly suited to deliver over the long haul, both in time and distance.

With a national warehouse and distribution network across Australia and a proven ability to supply large scale remote mining projects, Clover has the capability to support continual site operation.



Products

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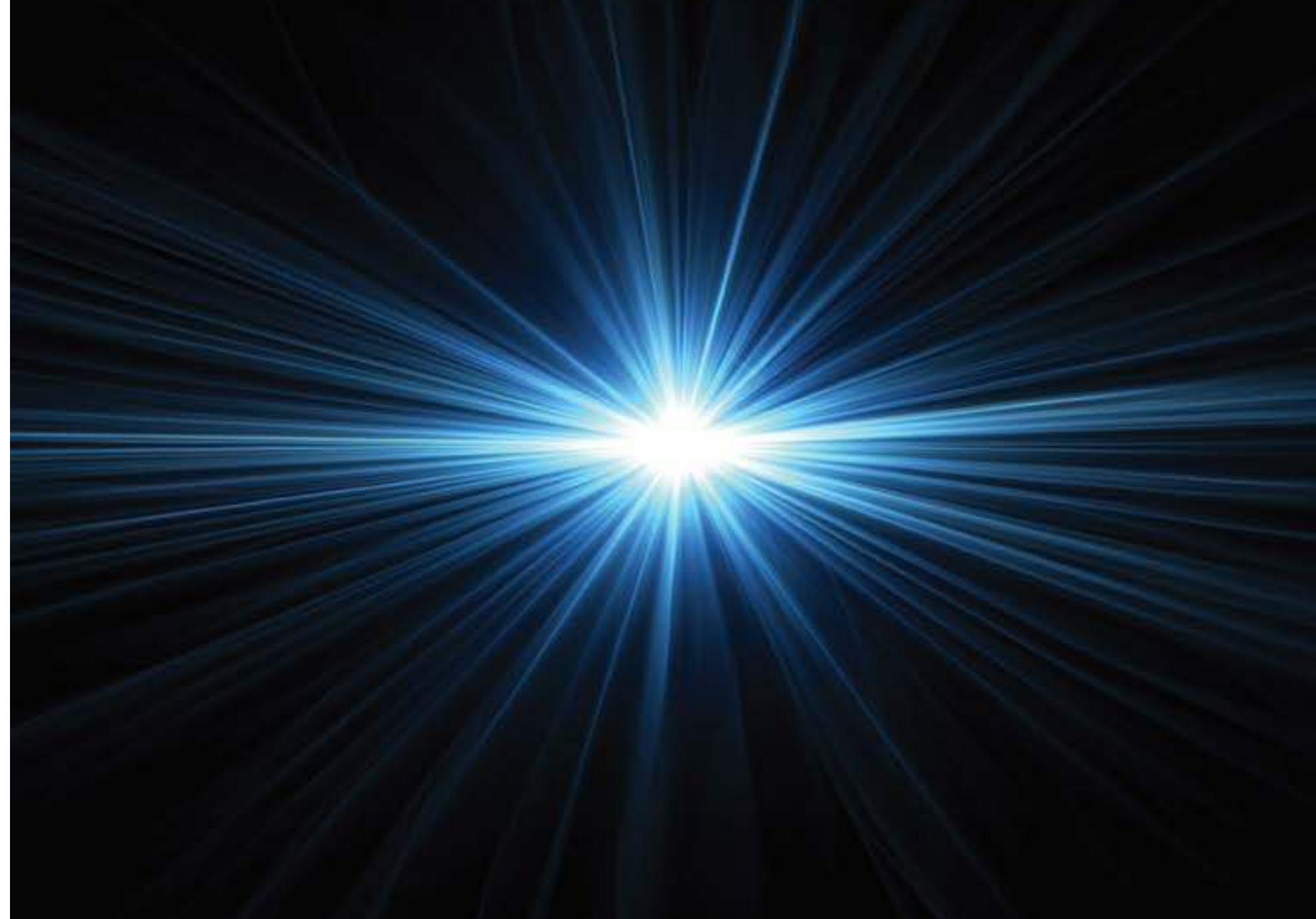
WE ARE CLOVER, AN INTEGRATED PIPELINE INFRASTRUCTURE BUSINESS.

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THE AUSTRALIAN
MINING REVIEW

DON'T GO BUST BECAUSE OF DUST



The V22 Dust Control Cannon goes to work, firing mist and fog into the atmosphere

Dust can prove deadly when it comes to mining operations in harsh, arid climates that not only threaten workers on site, but can shut down the whole operation.

This is why technical solutions company, Tecpro Australia, has entered the war on dust by introducing a high-quality Italian-made V22 Dust Control Cannon to Australia, superior to most of the products currently available in the market, with some major companies already on the books.

Tecpro Director, Patrick Cooper, explains why: "Dust in the air poses risks beyond the visibility of operations being impaired. There are threats to the health of the workforce on mines, as it can cause respiratory diseases,

notably silicosis, and coal dust exposure causing black lung disease, or pneumoconiosis (CWP). That is the prime concern, but secondary issues are that too much dust can spill over into residential areas or carry into nature reserves and impact the environment.

"The ramification of insufficient equipment is that a mine can be forced to close and face pretty hefty fines for not complying with EPA stipulations. The dust can be generated not only from high winds, but also blasting, crushing and moving parts, such as a conveyor belt transfer points."

Enter the V22 Dust Control Cannon on to the battlefield. This military-looking device, when combined with CURT monitoring soft-

ware, can be remotely operated from anywhere in the world and fires fog or mist up to 80m into the air where it has the effect of fine droplets in the atmosphere that causes the dust to drop like dead flies.

The V22 Dust Control Cannon can rotate 360 degrees and, operated from a control room thousands of kilometres away, adjusted to which direction the wind is blowing from.

An invaluable companion to the V22 Dust Control Cannon is the Dustroid, a Tecpro distributed particulate dust monitoring device that can monitor dust ranging from 1-100 microns in size, including Ultrafine Suspended Particulate Matter, Suspended Particulate Matter and Respiratory Sus-

pended Particulate Matter. The ability to profile particulate matter by size ensures a highly detailed analysis is possible. When the particulate dust levels exceed the nominated threshold, automatic alerts are triggered and can activate Dust collectors, Mist cannons, Sprinklers and fogging systems.

Mr Cooper says mine sites, by very nature often being far from cities and main hubs means it's not as easy as a quick "pop to bunnings" if things go wrong. Invest in quality tech and you're going to minimise delays and issues."

You can't take dust lightly, the consequences can be literally as catastrophic as "ashes to ashes, dust to dust." **AMR**



Dust Control Solutions
INDUSTRY FOCUS



The war on dust

LOOKING FOR DUST CONTROL SOLUTIONS?

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WHEN THE DUST SETTLES...

Good dust management is the backbone of successful mine operations.

Not only does it protect workers' health and safety, it also keeps operational running costs down while maintaining proper stewardship over the local environment.

CoolMist Systems Australia is committed to providing effective dust control solutions for mine sites through its cutting-edge misting and fogging technologies.

As a locally owned and operated business since 2005, CoolMist Systems Australia has consistently developed custom-made solutions for Australian mine sites to meet their unique challenges.

With a dedicated team that understands the complex challenges posed by each operation, and a company culture driven by an un-

wavering dedication to growth, knowledge, and innovation, CoolMist Systems Australia has the combination of first class products and professional service to tackle any dust control issue for long-lasting peace of mind.

Take one of its current projects for a gold mine site, for example: over a length of 1.5km, from ROM to stacker then to ball mill, there are five strategically placed dust suppression mist systems that ensure the client's mine site operations and processes remain at peak efficiency and protected against air pollution risks.

CoolMist has supplied superior dust suppression and mist cooling solutions to major operations across Australia, including giants such as Fortescue Metals Group, Newcrest, Regis Resources, Capricorn Metals, Consolidated Minerals, BHP and Chevron Barrow Island.

CASE STUDY:

Mobile Mist Cannons

Recently CoolMist® supplied mobile mist cannons at a large iron ore mining operation in the Pilbara region.

Its brief was to implement a dust suppression solution to minimise and mitigate the drift of dust from mine stockpiles onto areas of heritage and cultural significance, in order to lessen the residual impact and to help preserve flora and fauna.

A total of 8 AJET® Mist Cannons were required. All were purpose-built for site needs:

- 4 cannons AJ80-SBH complete with control panel, generator and mounted to trailers
- 4 larger cannons AJ150-CLU complete with control panel and generator mounted on trucks

- Radio control handset for each cannon (operate easily at a safe distance)
- Each model has a throw of 80m & 150m respectively, without wind
- Robust construction, built for heavy duty work
- Automatic oscillation and generous vertical tilt allows wide-ranging area coverage
- Easy clean nozzles, mounted for easy access
- A two-stage water flow on the AJ150-CLU allows water flow adjustment as needed
- Multi flow water delivery can also be incorporated on the AJ80 cannons

Running long hours over each week, the mobile mist cannons prevent dust migration off-site, assisting with EPA compliance directives. **AMR**

MOORVALE DELIVERS EARTHWORKS WITH EXCELLENCE

Moorvale Earthmoving is a family owned business based in Central Queensland's Bowen Basin region specialising in the provision of earthmoving services to the mining, construction and rural sectors.

Headquartered in Mackay, the company operates site offices in Coppabella and Moura, as well as a workshop facility near Coppabella that provides in-house maintenance services for major repairs, and on-site field maintenance support.

Since its inception in 2002 servicing new mines, Moorvale has continued to achieve strong growth through a focus on delivering quality site services to major clients such as Anglo American, Peabody, BMA, and Pembroke Resources. The renewal of master agreements is testament to Moorvale's reputation within the industry.

The company proudly runs a fleet of around

100 heavy machines, comprising Cat D11 dozers with GPS, scrapers, excavators, articulated trucks, graders, and water trucks, all of which are operated by qualified and safety driven crews.

Moorvale's sister company SimlaQuip is also expanding its presence in the industry, with a recent regeneration of the fleet to lower its average hours and offer clients the most reliable service possible.

A long-term focus on mine site rehabilitation has seen Moorvale become an industry leader in this area, particularly having undertaken all of the rehabilitation work across Anglo American and Peabody operations in Queensland for many years.

Although mine rehabilitation specialists, the company maintains a core focus on earthworks including mine development and maintenance, haul roads and light vehicle

service road construction, tailings dam and storage cell construction, to name of few.

"We take pride in ensuring every project is delivered to the highest standard," said Joy Deguara, Director of Moorvale Earthmoving.

"To supplement the range of services we provide our clients, we also operate Moorvale Quarrying from our home property, Daunia Station," said Deguara.

"We develop a considerable number of granite products suitable for mine site operations and road construction on our property."

Deguara says its quality workforce is a critical factor in how it achieves its mission of delivering projects safely, efficiently and on budget with zero incidents.

"Developing long-term relationships, com-

munity partnerships, and a sustainable business requires the best people.

"With a workforce of 200 to 300 people depending on project activity, we focus on HR processes tailored to both our clients policies and our own business needs.

Diversity plays a large role in our workplace, particularly people that are aligned to our company values.

"Our team is led by Managing Director Aaron Deguara, and we have a CFO, backed by a full line-up of operational and project managers, and administrative personnel."

For more information, visit www.moorvaleearthmoving.com.au or contact Aaron Deguara on +61 427 437 137.

AMR



EFFECTIVE DUST CONTROL WHEN YOU NEED IT



For professional advice, design, installation, and service contact:

Dust control over large open areas and inside buildings is vital to protecting your operation & staff.

CoolMist® Systems customised misting systems provide an affordable dust suppression solution in areas where extraction is not possible or cost-efficient.

Since 2005, we have supported numerous clients with our tailored dust control solutions.

Our industrial dust suppression misting systems are used throughout Australia in mining operations, waste transfer facilities, recycling facilities, bulk processing facilities, excavation, and construction sites, building demolition, and asbestos remediation work.

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At Moorvale Earthmoving, we specialise in the provision of contract services to the mining, construction and rural sectors. For over 15 years, we have expanded our footprint and capability in Queensland's Bowen Basin. Our extensive fleet and equipment solutions continue to support critical projects that are reshaping the landscape.

Contact Moorvale Earthmoving today to learn how we can support your next project!

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CAPS EXPANDS RENTAL CAPABILITY ADDING POWER GENERATORS

When it comes to providing rental options for the mining industry, CAPS Australia has flexibility and applicability front of mind.

CAPS Australia offers one of the widest ranges of industrial air compressors and power generators in the country.

In a world where mining supply chains are incurring more disruptions than ever before and sourcing locally has never been more important, hire options have become increasingly popular – and necessary.

CAPS' National Rental Co-ordinator Rhys McIntyre believes this demand can also be put down to distinct financial preferences within the mining sector.

"A lot of the mining companies rely a lot on operational expense instead of capital expenditure," he told The Australian Mining Review.

"So, it's quicker and easier to get the required machines on site through rental, if sites need a short-term, medium-term, long-term solution, they can come to us and we can provide it."

Indeed, everything from portable diesel air compressors to electric air compressors, dryers, receivers for a complete air solution can be rented from CAPS. As of halfway through 2022, CAPS also added a range of quality AIRMAN power generators to its rental range.

It's one thing to hire a machine, but it's another to ensure that machine is applicable to a particular mining environment. And that's why standardisation is so important.

"Over the last four years, we've been

focused on standardising our equipment," McIntyre said. "This helps ensure safety, interoperability, and compatibility of equipment we supply to sites."

"If a customer wants multiples of one type (of air compressor) and comes to us and says, 'We want 8000 CFM (cubic feet per minute) at -20 to -33 (dew point)', CAPS can provide 8 x 1000 CFM portable diesel machines connected to fuel tanks and plumbed into desiccant dryers and air receivers."

CAPS also has its rental purchase option (RPO) available for all stocked rental machines. Customers can rent for a minimum of 12 months up to 48 months and have the option of purchasing the equipment on any anniversary. The monthly rental rate of the equipment is reduced every 12 months as it wears.

McIntyre said the RPO was about giving mining companies greater flexibility.

"It can often be hard to get capital expenditure approved, so what we offer with the RPO is it's like a rental but at every 12-month anniversary they've got the option to purchase it," he said.

"So, it gets to four years and the capital expenditure might be \$20,000 instead of \$150,000 to buy it originally. This is a more palatable figure for capital expenditure."

CAPS has its own ISO (International Organization for Standardization) accredited engineering division to ensure all rental machines can be customised to an operation's unique requirements.

"All of our equipment is mine-spec (mine specification) as standard," McIntyre said. "We have standardised our product

modifications across the range so all machines are compliant with mine site specifications and will withstand the hot and harsh conditions."

Once equipment has been commissioned, CAPS has service centres across the country to attend to all rental equipment servicing requirements or product alterations.

As a trusted partner to the Western Australia mining industry, the company has an especially strong presence in Perth and Kalgoorlie, though it has also established itself in Mackay (Queensland) and elsewhere in Australia.

CAPS has had a presence in Newcastle for over 30 years and to add to its support of the area, the company recently opened up a dedicated rental facility in the city.

"Newcastle's a really strong hub for the Hunter Valley coal mining region and is going to be our large east-coast rental hub," McIntyre said.

"So, we'll be offering a lot of the larger portable diesel and large electric compressors, a range of generators with all the necessary ancillary equipment such as dryers, fuel tanks and air receivers to suit."

CAPS has also launched a service hub in Launceston (Tasmania), assisting companies

and contractors with all their air compressor service, repair and rental needs.

With more than 42 years in the books, CAPS' reputation alone solidifies the company as an important part of the Australian mining equipment, technology and services (METS) industry.

You can't build a reputation without a focus on product excellence, premium service and having an affinity for innovation. CAPS has these in spades.

For more information, visit www.caps.com.au | AMR



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Focus on Monitoring



Novecom is a leading environmental monitoring solution provider for the mining, resources, energy, and industrial sectors. Novecom specialises in the supply of sensor-based environmental monitoring and reporting systems for various aspects of the environment including weather, air quality, noise, and water. Underpinned by the philosophy of data driven decision making, Novecom's solutions ensure you get trusted information when you need it.

Based in Newcastle NSW Novecom works throughout Australia and the Pacific installing, maintaining, and operating over 250 monitoring systems. Supported by expertise in software and database development, electronics system design and manufacturing, calibration, and maintenance Novecom will deliver the right outcome to support your monitoring needs.

Environmental management starts with monitoring. The adage 'you can't manage it if you don't measure it' will always remain true.

Having a trusted source of monitoring data is key to good environmental management. Novecom designs, assembles, installs, and maintains environmental monitoring stations and instrumentation to suit most monitoring needs.

Typical applications for a monitoring station include:

- Particulate monitors
- Environmental noise
- Rainfall
- Automatic weather stations
- CCTV
- Water quantity / quality

Novecom aligns its solutions with the leaders in environmental sensor technology. The trusted vendor list includes Vaisala, RM Young, Hyquest, Met One, ATTEX, Thermo Scientific, Thomson Environmental Solutions, Campbell Scientific and Kipp and Zonen.

Remote and real-time monitoring applications require a robust and reliable data acquisition and reporting application.

The SentinelX platform (SentinelX) is an industry leader in providing trusted and timely information to end users. SentinelX provides an end-to-end data management service that includes:

- Device management
- Data acquisition and communication
- Automated reporting
- Alerts
- Data management

SentinelX provides a single platform for all your environmental monitoring needs, whether it be weather, noise, air quality or water.

Applications for environmental monitoring

- Energy management – solar forecasting to maximise asset life and minimise operating costs of your solar power systems
- Air quality – atmospheric temperature profiling for boundary layer detection and dispersion modelling
- Erosion and sediment control – automated rainfall stations to initiate water sampling
- Acoustics – wind and temperature profiling to understand noise propagation
- Downtime and production delays – rainfall data to manage extension of time claims
- Weather monitoring – AS3580.14 compliant weather stations.

Benefits delivered by Novecom

- True end-to-end solutions, the buck stops with us
- System design by application experts
- Real-time data platform accessible on any internet connected device
- Automated alert system
- Automated report generation
- Remote, managed, and reliable
- Compatible with the majority of third-party production control systems
- Remote and onsite support
- Professional asset management system

The type and complexity of your monitoring solution depends on the application and the use of the data. Novecom will discuss your requirements and provide you with the system that is best suited to your project needs and budget. **AMR**



Remote monitoring delivers both process optimisation and productivity gains through better resource management and maximal uptime. With remote pump control and visual verification you can be confident in your water management outcomes.



Air quality monitoring including weather and dust monitors.

SentinelX provides a single platform for all environmental monitoring needs, be it weather, noise, air quality or water.



ENVIRONMENTAL MONITORING SOLUTIONS

SentinelX
remote data acquisition and reporting

SynaptiX
Industrial IoT

Novecom will design, assemble, install and maintain your environmental monitoring systems to ensure you get trusted information to support your operational needs.

- System design
- Site selection
- Sensor selection
- Installation and commissioning
- Project management
- Support and maintenance
- Data management
- Reporting

Phone 02 4924 5460 or email mail@novecom.com.au and chat with one of the Novecom team today.

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Reducing Risk, Uncertainty and Costs Through Localization

BY JIM BRYCE, PROJECT DIRECTOR | Ausenco

The Las Chispas project in Mexico shows how a 'Local First' strategy can help mine owners and developers reduce risk, manage uncertainty and control costs.

Engineers like to take the variables out of the equation. Variables bring risk, uncertainty and – in many cases – additional cost. So when engineers find something that works, they tend to stick to it. It's not surprising, therefore, that most mine development and operational sites in the emerging markets are filled with expat workers, imported parts and foreign suppliers.

Yet, in today's political and economic environment, parachuting imports into a job site brings its own risk and uncertainty. Expat workers are becoming harder to find and more expensive to retain. Supply chain disruptions and rising transportation fees are creating delays and increasing costs. Trade disputes are causing uncertainty. The pandemic taught us to be prepared for lockdowns, travel restrictions and work stoppages. Simply put, moving people, goods and supplies across borders has become increasingly risky.

At Ausenco, our people are focused on reducing risk, not variables. And our experience suggests that – in certain cases – project risks, costs and timelines can be better managed with a 'Local First' approach.

Risk and Reward

Consider a current project we are delivering in Mexico. Las Chispas is considered to be one of the highest-grade silver gold projects globally with approximately 3.35 million tons of silver and gold bearing ore, based on initial reserve estimates. Its owner, SilverCrest Metals, a Canadian exploration and development company, should see average annual production of 12.9 million silver equivalent (Ag Eq.) ounces from 2023 to 2029.

Like many other mine sites, Las Chispas is in a somewhat challenging and inhospitable environment. Water is extremely scarce – until it isn't. The lack of reliable year-round water required smart engineering. The tendency of the nearby river to flood and overflow required smart planning, logistics

and construction. The site was also remote, sitting around 180 kilometres northeast of Hermosillo with no access roads or infrastructure. Pumas and other wildlife roam freely.

Let Local Lead

There were many reasons to favour localization for this project. In part, we knew localization would help reduce the costs. Sourcing locally would deliver lower material and shipping costs, as well as reduce any potential duties and import taxes. Hiring locally would not only help manage salary costs, but also eliminate relocation and travel costs. Not moving people and materials across borders would reduce any costs associated with delays.

Speed was also a factor. Like always, we wanted to deliver this project on time. And we knew that local service providers would be better placed to help navigate the market. Local permitting agents, lawyers, engineers and others were engaged early

in the process to help identify any potential barriers and help remediate them before they turned into delays. And, by hiring locally, we were able to build stronger relationships with appropriate government officials to ensure the process went smoothly.

To be clear, not all emerging markets and jobsites have equal access to skilled labour, quality materials and professional service providers. But Mexico, with a long history of mining and resource extraction, boasts a strong and robust mining ecosystem. So, for this project, we were able to find almost everything we needed locally.

Our mechanical contractor was a large Mexican firm in Guadalajara. Our steel components – including structural tanks and thickeners – were produced in Hermosillo. That's also where our civil contractor was based, as well as the local office of our electrical contractors. The workforce included skilled workers from Hermosillo, as well as some members of the closest community (Arizpe, with a population of around 2,000 people).

Delivering a Win-Win

Our Local First approach quickly proved prudent. The COVID-19 pandemic was declared shortly after we broke ground at

the site. Other mine developments quickly ground to a halt as borders shut, workers became stranded and supply chains seized. Not ours. We implemented stringent health protocols to protect our workers and suppliers. And, since we had sourced and hired almost exclusively from local sources, we were able to keep to schedule throughout the pandemic.

The proof is in the results. The mine was delivered on budget and ahead of schedule. With costs managed, the project should deliver a one-year payback period for the owner. Aside from a broken bone (a trip case) and a sore thumb (a badly aimed hammer strike), health and safety was extraordinarily high. Employee loyalty and community support remains very strong, with most of the operational staff trained from the local community. And nobody was forced to fight a puma (not a traditional measure of success in mining, but a definite win in this situation).

We believe that our Local First approach delivered significant benefits to the mine owner. And we are confident that it added measurable value to the local community, mining ecosystem and economy. A win-win for everyone involved. **AMR**

Las Chispas, SilverCrest Metals, Mexico

Local first.

Achieving success for our clients through technical excellence and a local first approach.

#FindABetterWay

Ausenco

A HEALTHY WORK ENVIRONMENT STARTS WITH FRESHFILTER



SmartTech Australia is raising the bar when it comes to workplace health and safety standards with their new Freshfilter systems, an innovation in cabin air filtration for the mineral resources sector.

The cutting edge products combine stainless steel durability with high grade HEPA filters and digital controllers, enabling operators to monitor cabin pressure, carbon dioxide levels and hydrocarbons.

Clients can choose from a variety of purpose-built systems, including the F20, F33-R and FF Multibox XS.

With a diameter of only 350mm, the F20 is a particularly compact solution for tight-fit arrangements, while the F33-R is also limited in height and considered perfect as a roof unit.

SmartTech Australia's General Manager, Dan Barry, said the FF Multibox XS was designed specifically to protect operators against severe dusts and gasses, making it the ultimate safety solution for domestic mining projects.

He said the 3000 Series Controller unit was also a highly-sought after solution, and popular for its stainless steel components and optional hydrocarbon sensor.

"The Freshfilter 3000 series control system is the standard choice," Mr Barry said.

"It's a robust, stainless steel design with capacity to regulate air flow to maintain cabin air pressure.

"It has audible and visual monitoring and can be upgraded with a hydrocarbon sensor.

"Meanwhile, the 6000 Series Control System is the advanced option in controllers.

"It's similar to the 3000 Series but can be upgraded with both a CO2 Monitoring and hydrocarbon sensor."

With offices nationwide and a highly experienced team, SmartTech Australia was trust-

ed to be the exclusive distributor of Freshfilter systems, underpinned by the ability to provide both installation and support for clients.

The company's extensive offering to the civil and mining sectors is backed by a highly experienced team with their finger on the pulse of the latest market and technological trends.

Launched in 2017, Australian specialist has its roots in SITECH WA, where it first expanded from with just four employees.

Within a year, the exciting new company had acquired LOADRITE dealerships across the Northern Territory, Queensland, Victoria, Tasmania and New South Wales.

Combined with SITECH WA, SmartTech Australia is now the world's biggest Trimble LOADRITE dealership and has grown to more than 20 experienced technicians.

Mr Barry said his consulting teams offered clients a first rate experience that hit the mark every time on safety and budget, giving operators a strong competitive advantage.

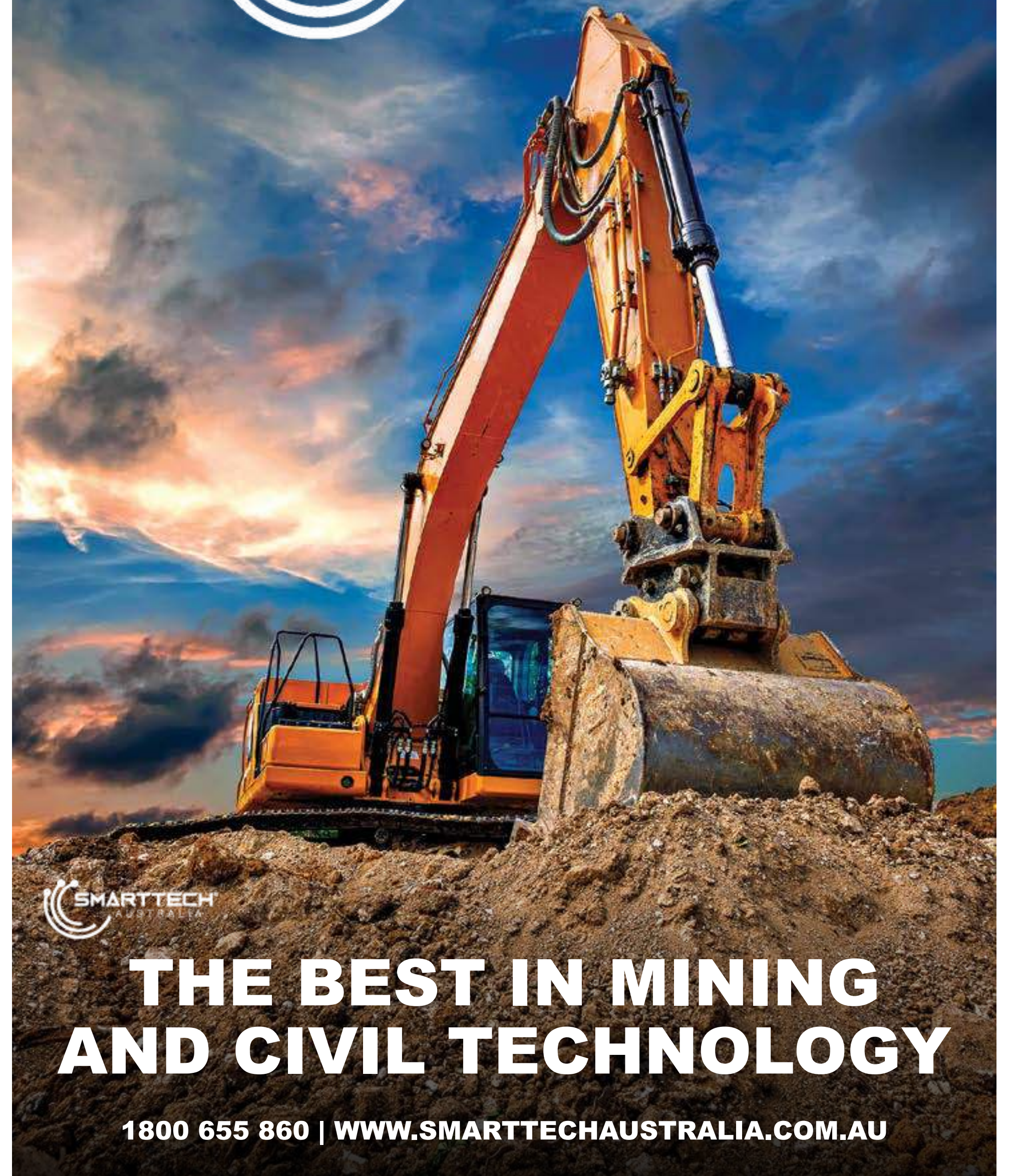
"SmartTech Australia has you covered, no matter the tech you want to engage, data you need to collect, reporting you need to provide and the industry you are in," Mr Barry said.

"Through us, you can learn how easy it is to utilise technology that makes significant improvements in project workflow and solves your biggest challenges

"With the addition of On-Board Weighing, Safety and Software solutions to your civil construction projects, you're in a stronger, more competitive position.

"You'll experience new levels of productivity that will enable you to earn the bid and be profitable, project after project.

"Only one partner offers the broadest, deepest and most advanced set of tools, advice and support to revolutionize your construction workflow – SmartTech Australia." **AMR**



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AUSSIE MINERS ARE BEST MINERAL DEVELOPMENT SURGE

With the change of government, low Australian dollar and increasing exploration costs, Australia's mining industry is showing the world what is possible. The Minister for Resources, Madeleine King is confident that our resources sector will continue to be the mainstay of the Australian economy, even though it employs only 1/4 of a million people directly.

The Minister was recently quoted as saying there was a huge number of new projects in the pipeline. In spite of that, it's no secret that the Minister is also concerned about the challenge to find more workers for the industry. That's a problem echoed by companies like Australian Pump Industries.

Aussie Pumps has developed a great range of Mine Boss equipment, designed around the Australian mining industry experience. Those products have been picked up by other countries around the world. They recognise that the machines being built here in Australia for our mines and quarries are literally way ahead of other products produced in either the USA or Europe.

Here, Aussie Pumps Chief Engineer, John Hales, points out how the customer experience has been employed to develop more and better products for the mining and quarry industries.

A PUMP COMPANY THAT'S DIFFERENT

When Australian Pump Industries was a start up 28 years ago, they had very little understanding of the mining industry. By designing and building pumps for farmers and construction applications, they had no real understanding of the depth of the importance of the mining industry to Australia.

JAN2023 AMR

lia's economy, and the potential for product development to suit that specific tough environment.

"We knew we needed to build them tougher, stronger and with built in features that would enable them to carry out the difficult tasks required in the mining environment", said Hales.

The company started out with Honda petrol engine drives however they quickly changed to diesel using the Yanmar L series range of engines as the prime driver for Mine Spec units.

"We weren't tempted to go with cheap third world engines, not for the mining industry", said Hales. "We specified Yanmar as they have service distributors not just all over Australia, but all over the world. Their engines are well known and easy to service with excellent spares support", he said.

The result was 2", 3" and later on 4" super heavy duty Yanmar powered trash pumps with a performance range from 600 litres per minute to 1200 lpm.

"We knew the core product was going to be a winner. The internal components were super heavy duty high SG cast iron impellers and volutes. The 'big shoulders' design enabled the pumps to prime fast and through a vertical lift of 7.5m", said Hales.

The company then turned it's attention to solids handling and opened up the impeller to a big non-clog style that is basically the heart of the pump. It was able to handle solids as big as 1" diameter. From there, they moved to a 4" model which could handle 1½" solids.

The pumps had to be built in frames that were very different to the commercial equivalent. Encapsulated in hot dipped galvanised 38mm frames, the pumps were located on a floating base plate with anti-vibration mounts. Integrated lifting bars were incorporated into the design and battery isolation and E-stop included. The company added a top quality fire extinguisher and fluro markings on the outside of the frame to enhance visibility.

"By the time we finished, the machines looked like they were built in Peoria by Caterpillar. They were solid, engineered like tanks and designed to take rough treatment on site. The lifting bar enables the unit to be lifted by an excavator, crane or front end loader bucket and moved anywhere on the site", said Hales.

One of the big features the company already had incorporated in the trash pumps was a huge front opening port. That clean out port can be opened up in a matter of seconds with a couple of toggles. The port pulls straight out of the pump body, bringing with it the volute and leaving the impeller completely exposed. From that point, cleaning out chokes takes just a matter of minutes or seconds and without having to undo pipework or dismantle the pump!

Customers applauded the concept and the mining industry, being particularly super conscious of safety and efficiency, loved the idea. The Mine Boss was a huge success and led to similar developments with Aussie's range of high pressure water blasters.

PRESSURE CLEANERS THAT ARE MORE READY

Aussie's industrial pressure cleaners had already been tried and tested in the very

onerous applications, operating around the country.

"We took our uniquely Australian 'Scud' design galvanised frame and beefed it up further. We then incorporated the Mine Boss safety features used on the trash pumps", said Hales.

Hales is referring to the battery isolation with E-stop mounted on each unit, the fire extinguisher and other safety features to protect both the operator and machine.

"The safety kit includes both a safety valve and a thermal dump that we named ASP (Aussie Safety Protection). What we wanted to achieve was to keep the operator safe and the machine virtually trouble free. The safety valve is set at the factory to be 10% over the operating pressure of the machine. If some misadventure happens, for example a pressure spike, the safety valve releases water, avoiding the possibility of a dangerous spike.

We know that operators can be tempted sometimes to try and wind the pressure up on the machine. It's hot, the environment is dusty, they just want the job done as fast as possible. An unauthorised person adjusting the unloader means injuries can occur, hoses blow off from pressure spikes and similar misadventures. We design those events out", said Hales.

With 4,000 psi machines originally built in Mine Spec configuration, the company quickly moved to 5,000 psi with a mobile machine called the Predator. The Predator is now built with stainless steel frame and can come with a stainless steel reel with either 30 m or 50 m of high pressure hose and features a big 5,000 psi Class A 'Big Bert' Bertolini pump.

Bertolini pumps are claimed by Aussie Pumps to be the best triplex pump product in the world.

"The Big Bert pumps are now available all the way up to 15,000 psi (1,000 bar). The pumps are super reliable, made from the highest first world standard components and built in such a way that they provide a long trouble free life", said Hales.

Those features include solid ceramic pistons, forged brass pump head, and a huge crank case to enable the pump to run cooler than other pump brands that skimp on materials.

EXTREME PRESSURE CLEANERS

The demands from the mining industry quickly alerted the company to the need for even higher pressures and bigger flows. The result was the super heavy duty diesel drive 'Aussie Extreme' range of machines up to 500 bar (7,300 psi). Those machines are powered by three or four cylinder Yanmar water cooled diesels, are built in a big heavy duty hot dipped galvanised steel frame with fork tine facilities on all sides. A 50 litre fuel tank, with an eight hour run time and a 60 l stainless steel water break tank with low water shutdown are standard.

Aussies ASP is also included. Hose restraints are fitted as these machines are Class B and therefore require compliance with the Australian New Zealand Safety Standards AS/NZS 4233.1. A flashing beacon, banded frame and double insulated wiring complete the package. A stainless steel hose reel with 30 m of high pressure R2 double wire braid hose is fitted.

They have been a huge success on mines

around Australia and have attracted interest from mining companies in Canada, Mongolia and through South-East Asia.

WHERE TO NEXT?

John Hales works with the sales team who are in constant contact with Australian and international miners. "It's been extremely encouraging and particularly when we introduced our big self priming range of motor pumps in 316 stainless steel, cast iron and nickel aluminium bronze configurations", said Hales.

Those pumps are 100% first world construction, can be supplied either in hydraulic drive, bare shaft, diesel drive or with electric motor. The pump range now includes machines up to 6" and 8" sizes with flows as high as 9,000 lpm.

The products come with a three year warranty and are being widely used in the mining industry in everything from filtrate applications to drill rig mud pumps.

An Atex range is also available in sizes up to 4", with flows as high as 2900 lpm, for safe diesel fuel transfer.

Australian Pump is dedicated to servicing the Australian mining industry.

"We know it's the backbone of the Australian economy. We learn from you, it is a pleasure supporting Australia's mining and resource industries", said Hales.

aussiepumps.com.au | AMR



This 6" pump right at home on a mine site delivering 360,000 litres per hour.



Aussie's unique Scud design pressure cleaners now moving into stainless steel reels.

A zero-emission family



Boomer M2 Battery



Boomer M20 Battery



Boomer E2 Battery



Scooptram ST14 Battery



Minetruck MT42 Battery



Boltec M Battery



Boltec E Battery



Simba M6 Battery



Simba M4 Battery



Simba E7 Battery

United. Inspired.

All the power you need

We are leading the charge towards sustainability in mining through electric battery-driven, zero-emission equipment. Our proven battery offering and zero-emission underground fleet includes loaders, mine trucks and rigs for face drilling, production drilling and rock reinforcement.



epiroc.com/en-au



Figure 1 section overview of the inspected area to find mine shafts & Cropped image of land with open mine shaft.

Visualising your environmental impact statement in predevelopment phase

Sources: GlobalData* // industry.gov.au

The use of drones for data capture is increasing across the mining sector (from 44% in 2018 to 65% in 2022*), driven by benefits such as improved productivity, safety, and reduced costs, with a wide variety of use cases: mining exploration; mapping; monitoring and inspection; site safety management; blasting assessment and haul road optimisation.

Drones can support the urgent and challenging demand for sustainable mining, particularly at the early stages of the mining lifecycle, where exploration activities can generate significant sustainability impacts, if not managed properly.

The benefits of using drones for data cap-

ture to support environmental impacts statements are growing.

The energy industry is lobbying the EPA (environmental protection authority) to accept the evidence provided by this technique to support environmental application approval.

This provides a safe non-destructive, non-invasive method of providing information for environmental flora and fauna reports.

The use of drones for evidence gathering allows companies to consider the unique botanical richness and condition of the land prior to undertaking any operations to identify the biodiversity of the habitat and determine the values in the interested area of flora and fauna and report on the current

as-is state

This evidence allows for identification and conservation till rehabilitation and restoration of de-commissioned areas.

In recent delivered projects, RemSense has successfully supported mining companies and their contractors by using drones for flora and fauna identification prior exploration activities, as well as localisation of abandoned open mine shafts which are a serious safety risk for the community and the environment.

Remote identification of vegetation and open mine shafts has previously been carried out by ground-based inspection. This is where RemSense drone survey and inspection services have played a pivotal role for

mining exploration. By mapping vegetation and ground characteristics of otherwise inaccessible areas we produced high quality images.

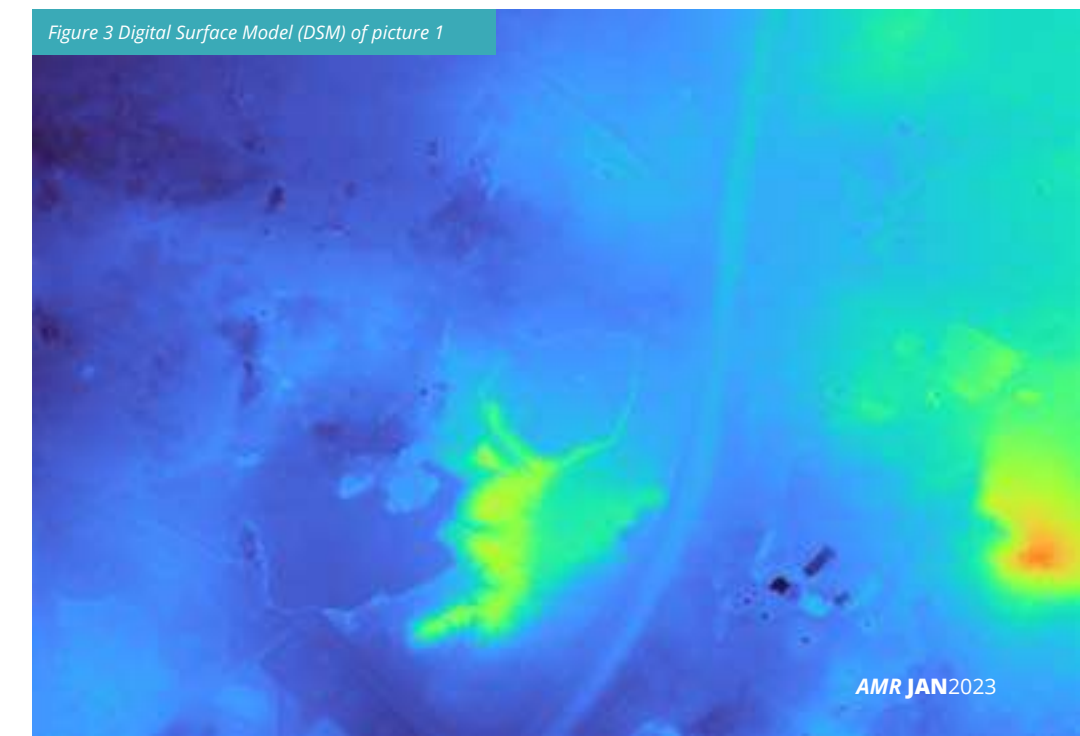
Our drone survey and inspections provide a greater quality of information that can be assessed remotely. Location, identification and classification can be completed quicker and safer by anyone at anytime and anywhere. **AMR**

RemSense Technologies Limited
P +61 (0) 8 6118 5610
E info@remsense.com.au
W [remsense.com.au](https://www.remsense.com.au)

Figure 2 Contour model 40cm of picture 1



Figure 3 Digital Surface Model (DSM) of picture 1



Blackwoods

THE CHANGING FACE OF RESPIRATORS



While tackling the harmful effects of, silica dust, hazardous gases, and airborne viruses, other factors such as user comfort, fatigue and the work environment have contributed to an increasing trend towards the use of Powered Air Purifying Respirators (PAPR).

With Reusable Respirators (RR) still commonly used on worksites, perhaps looking at the differences in more detail, may provide better insight as to why 'the PAPR' is fast becoming the 'go-to' respiratory protection equipment (RPE) for many customers.

"THE RR"

Reusable Respirators, often referred to as 'half-face' and 'full-face', come with a variety of different cartridges and filters. The RR's get their name from the fact that many of their components can be maintained, replaced, and re-used. If they are well maintained, they can last for some time.

Also, it is of critical importance that they

must be fit-tested to each individual wearer. "Because of the negative pressure created on inhalation, it's imperative to conduct regular fit checks of the assembled respirator, prior to entering any contaminated workplace," says Graham Powe of Safety Equipment Australia.

As with the case with any respirator, it's essential that the correct type of filter is chosen according to its suitability to protect from relevant contaminants and hazards. "It's critical filters are replaced frequently, in line with a risk assessment conducted by a competent person, with a full knowledge of the respiratory hazards in the workplace," says Timothy Khoo of 3M, Personal Safety Division.

"THE PAPR"

A Powered Air Purifying Respirator uses a battery powered fan-unit that pulls ambient air through the filters delivering clean air to the head coverings or facepieces. Unlike RR's, the PAPR...

- Does not require individual fit-testing if used with loose fitting head and face coverings, such as hoods or helmets. Potentially increases the comfort of the wearer. This includes the option of reducing the weight of filters carried on the facepiece, particularly during long periods of use.
- Potentially allows the wearer to integrate multiple types of PPE (Personal Protective Equipment).

There are many benefits of using PAPR's. They can help keep the wearer cool and provide protection factors of up to 100+ for certain configurations. "A PAPR helps reduce the workload for the user, due to the positive airflow the fan unit delivers inside the mask," says Graham.

"There's also a wide range of hoods, head tops and accessories to suit a variety of applications. Some with hearing protection and microphone, and two-way communications", says Sanya Kranenburg of 3M, Per-

sonal Safety Division.

PAPR's are ideal for use in a vast array of situations and industries, including:

- Asbestos removal
- Jobs in which silica dust is present
- Pharmaceutical manufacture
- Smelting
- Waste Control
- Land remediation
- Welding
- Agriculture

Because of their suitability to variety different situations, PAPR's are becoming more widely used in the workplace, and the global COVID 19 pandemic saw the expanded use of PAPR in the health care sector as a means of protecting medical personnel.

For more information and products, please visit www.blackwoods.com.au
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SAFETY

SPOTLIGHT

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- // The changing face of respirators
- // Upping the ante of fall prevention, and much more!

SCAN TO
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INDUSTRIAL TANKS FOR THE MINING, COMMERCIAL, AGRICULTURE AND PETROLEUM INDUSTRIES

With 3 branches across Victoria, New South Wales and Queensland (and 1 branch in Ayr servicing far North QLD and North-West QLD), Clark Tanks have the specialised knowledge and versatility to provide industrial tanks to suit the requirements of a range of industries – and in the case of the mining sector, a range of applications within the one industry.

We have experience with the supply and delivery of custom fitted industrial tanks for;

- Industrial water storage,
- Water retention & detention,
- Water treatment plants,
- Chemical storage & processing,
- Liquid feed (including a range of Silo's),
- Liquid fertiliser transport & storage,
- and we also supply custom fitted diesel and adblue tanks to the petroleum industry where we can retro fit your tank to your specifications today!

Clark Industrial supplies custom fit Silo's



Clark Industrial tanks are manufactured to contain liquids with a specific gravity ranging from SG1 through to SG2, due to the precision rotomoulding techniques which comply with AS-4766:2006. All industrial tanks ranging from 1,000L to 50,050L can store a wide range of chemicals such as, sodium hypochlorite, liquid alum, hydrochloric acid etc.

Our range of industrial fittings includes extension flanges, backing rings in Table D, E and ANSI available in galvanised, stainless steel and plastic-coated, full-face flanges and a huge range of BSP threaded fittings. We also supply sight glasses and float level assemblies, along with lifting lugs and hold-down lugs. **AMR**

Industrial Tanks



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EXPANDING FOOTPRINT INTO NEW HYDROGEN HUB

Just Valves has established itself as a leader in flow control technology with a world-class product range and extensive industry knowledge.

The company has major mining clients right across Australia and the Asia Pacific Region but has expanding its footprint into north Queensland, where the industry is booming.

In recent times Just Valves won an award to supply valves to Fortescue Future Industries new green hydrogen hub, which is under construction at Gibson Island.

Managing Director Daniel Lippiatt moved over to the Sunshine State to help the company branch out into Bowen Basin's coal mining hub.

Headquartered in Perth, the company is still very active in WA, where it has operated predominantly in the Pilbara with an office in Newman.

"We continue to work with FMG on their iron ore mines in the Pilbara, which led to the more recent Hydrogen Hub contract," said Mr Lippiatt.

Lippiatt founded the company in 2003 with an office in Mount Pleasant and the company has been growing ever since.

"In WA we have moved into a bigger premises at Bibra Lake, we also have an office in Hallam in Victoria and we are establishing an office in Townsville," Mr Lippiatt said.

"There is a lot of work going on in Queensland at the moment and WA is also booming."

Just Valves is a certified ISO 9001:2015 industrial valve supply company, which is contactable 24 hours a day, 365 days a year.

The company specialises in hard-to-find equipment and offers same day or overnight delivery to almost all locations in Australia.

Just Valves repair and refurbish virtually any size, type and pressure class of valve while also providing procurement, stocking, modification, overhaul, repairs, testing and certification for valves in both onshore and offshore services.

The company conducts on-site audits on valves and related equipment.

Each item is identified, its condition inspected and its site location recorded.

"We have mine approved vehicles and technicians who are inducted to enter various mine sites," Mr Lippiatt said.

"Our technicians are available for induction to all other sites and hold the appropriate police clearances."

The Townsville engineering workshop has large capacity lathes, milling machines, line benders, drills and presses to assist a number of industries.

It also offers a professional repair and reconditioning service for pumps, valves and ancillary components of all shapes and sizes.

"Our fully equipped workshop caters for the rebuilding of any brand, style or size of Safety Relief Valve," Mr Lippiatt said.

"Our dual testing laboratories in Townsville are capable of testing valves with inlet sizes up to 600mm.

"We also provide corrosion protection



services based on the application of a range of high technology coatings and composites."

Just Valves' major mining clients include the likes of BHP, Rio Tinto and FMG, and the company is keen to build awareness around a new product in its range the Airsweep.

Just Valves' supplies some of Australia's largest industrial markets including power generation, water, irrigation, sewage and desalination and Mr Lippiatt said the new Airsweep eliminates bridging, ratholes and material build-up in storage vessels.

Each nozzle emits a high-pressure, high-volume, 360-degree burst of compressed air to lift and sweep stalled material back into the flow stream – clearing the way for higher factory efficiency.

The new Airsweep offers reduced flushing/cleaning time between product runs and improved batch uniformity, while preventing vibration stress or wear to container walls.

AMR

Just Valves
LEADERS IN VALVES & FLOW CONTROL

AIRSWEEP



THE PROOF IS IN THE FLOW!

Airsweep eliminates bridging, ratholes and material build-up in storage vessels.

Each nozzle emits a high-pressure, high-volume, 360-degree burst of compressed air to lift and sweep stalled material back into the flow stream – clearing the way for higher factory efficiency.

SPEED

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SENSING A SHIFT IN TEMPERATURE WITH MIDWEST

Miners are always on the hunt for technology that offers greater accuracy and stability in their various applications. This is certainly the case in coal mine operations where Resistance Temperature Devices (RTD) are used to monitor bearing temperatures on pulleys and rotating shafts.

RTD's have proven to be far more accurate, stable and repeatable than thermocouples when it comes to temperature readings.

An RTD sensor is a device that tracks the temperature of an application by measuring the change in resistance of the sensor in relation to temperature. This change in resistance is predictable, depending on the resistance curve of a certain RTD, and can be measured in order to calculate the temperature the RTD is sensing.

The RTD sensor is made of a pure metal like platinum, copper, or nickel. Platinum is generally the preferred material for delivering both the most accurate results, but also its versatility when used across a wide temperature range.

Since 2001, Midwest Valves and Controls has become a leading supplier of industrial valves, pumps, hoses, process instruments and pneumatic products. It continues to expand its product offer and introduce new technologies within different industries. For the past four years, Midwest has been reselling RTD sensors and associated fittings to a company specialising in conveyor support and maintenance for coal mines in NSW.

According to Midwest Owner and Chemical Engineer, Peter Willis, RTD's are more widely used than thermocouples and play a critical role in applications such as conveyor systems.



tions such as conveyor systems.

"It is vital that mines have shafts rotating as per design and by sensing the temperature of bearings within rotating equipment, to avoid costly failures on their conveyors or other gear," said Peter.

"Our client has been using 15 metres of triple wire cable, which is normally a sufficient length along the conveyor."

"It is usually protected by a stainless steel sheath in order to withstand harsh mine site conditions."

"An external electronic device such as a temperature transmitter is used with the RTD sensor to deliver a milliamp or voltage output to the control system."

Pressure Valves in Mining

As a specialist supplier of industrial valves in the mining industry, Midwest has built strong partnerships with trusted manufacturers such as Ebro Armaturen Pacific Pty Ltd and Bray Controls Pacific Pty Ltd. Bray is one company that is fast becoming an industry leader, notably due to its safety driven product designs that has miner protection in mind.

Midwest supplies the Bray Series 768 bidirectional knife gate valve, which is designed for slurry applications, and features a two-piece bolted wafer body for easy maintenance. A protective stem cover is standard increasing cycle life in hazardous environments, and a fully encapsulated J-ring provides sleeve reinforcement and memory assist, guaranteeing bidirectional zero leakage performance. In the open position, the energized sleeves shield all metal components from direct contact with the flowing process media.

It has a maximum allowable operating pressure of 10 bar for sizes DN 50 to 400, while the maximum allowable operating pressure is 6.2 bar for DN450 and 600. The standard body material is ductile iron with gate materials in 304, 316, 317 Stainless Steel, SAF 2507, SAF 2205, 17-4PH, Hastelloy® C, Monel®.

The Bray Series 740 bidirectional knife gate valve provides repeatable bidirectional shut-off in a rugged, single piece cast body. The valve features a replaceable steel reinforced elastomer seat for enhanced sealing, and is easily automated for on/off applications in mining processes.

The Series 740 valve is also designed for easy, quick conversion between manual and pneumatic actuation, and features a lubricant injection port for continuous, smooth operation with minimal maintenance. The clevis design and horizontal bolting stabilizes gate ensuring proper alignment, and a standard multi-layer square packing provides exceptional gland sealing.

It has a maximum allowable operating pressure of 10 bar for sizes DN 50 to 600, while the maximum allowable operating pressure is 7 bar for DN750 to 900.

When other valves reach their physical limits, the Ebro HP111 butterfly valve is the ideal high performance solution for high pressure and extreme temperature applications.

The Ebro valve is available in DN50 to 1200 and is suitable for the shutoff of gaseous and liquid media. It's double eccentric valve disc design features centering pieces that can be used as an installation guide. DN50 to 150 bar valves have a maximum operating pressure of 40 bar, while the valves greater than DN150 have a maximum operating pressure of 25 bar. **AMR**



Midwest Valves and Controls

are specialists when it comes to isolation and control valves. Isolation valves have lever handles, gear operators or chain wheels. Control valves are fitted with pneumatic, electric or hydraulic actuators.

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Field Machine Tools is Australia's largest stockist of specialist onsite machining and portable maintenance equipment.

We offer for hire and sale one of the most comprehensive ranges of portable equipment suitable for a large range of applications, materials and specifications.

FMT is a dry hire only company - we never compete against our customers for on-site service work - with conveniently located branches in Queensland, Victoria and Perth. Maximising equipment up-time is critical to shortening project completion times and increasing bottom line profits.

Removing equipment from the job site to a repair facility can delay project completion and put a damper on profits.

This is where Field Machine Tools can help. FMT has the on-site repair and maintenance machines that will minimise maintenance times and keep equipment working for companies and their customers.

Keeping equipment and plants in top operating condition is a constant challenge for today's mining, oil, gas and power generation contractors.

Our wide range of portable equipment is available for rent or purchase, Australia-wide from our three branches, and include equipment for machining applications such as Portable Milling Machines, Portable Lathes, Clamshell Pipe Lathes, Flange Facers (OD and ID mount), Line Boring Machines, Vessel Grinding Machines and Pneumatic Magnetic Based Drills.

For welding applications, there are Bore Welding & Cladding Machines and Induction Heat Treatment Equipment.

For valves, there are Valve Test Equipment, Valve Repair Equipment and Portable Valve Actuators and, for heat exchanger, condenser and boiler manufacture, repair and maintenance there are Tube Pulling Systems, Tube Cleaning Systems, Heat Exchanger Tools, Torque Controlled Rolling Motors and Australia's largest stock range of Tube Expanders and consumables.

FMT is the Australian agent for major international brands including:

Climax Portable Machine Tools, an impressive range of highly-sought after industrial equipment designed by a market leading manufacturer for the rugged challenges facing Oil, Gas, Mining, Chemical & Power Generation Industries.

CLIMAX pioneered the portable machining revolution in 1966.

For more than 50 years they have been the innovators and technology leaders in the industry they invented.

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Modex Motors and Portable Valve Actuators and Modex vane air motors have been used for 30 years as an alternative to traditional electrical motors in many demanding applications.

They supply OEM replacement motors to a wide variety of industries and application-specific motors to customer specification.

This includes a versatile range of Portable Valve Actuators for preventative maintenance of valves, even in the most demanding of environments, and incorporates a reaction device designed to reduce the risk of strain injury to the operator.

Krais Tube & Pipe Tools has been delivering top quality tube tools for over 40 years.

Designed and manufactured by their engineers, the whole process from paper sketch to producing the tools is controlled in-house with one of the biggest and most modern machinery and production line in the EU.

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denser, Boiler Tube Expanders, Tube Rolling Motors, Tube Installation Tools, Tube Cutting and Removal Tools, Tube Pulling equipment and Accessories.

Goodway Technologies is a USA-based manufacturer of specialised industrial maintenance products for HVAC, Energy, Manufacturing, Food and Beverage Production markets.

Since 1966, facilities and plant maintenance personal have used their innovative products to maintain HVAC systems, plant machinery, hazardous material clean-up, surface cleaning and other critical maintenance needs.

Established in 1995, Field Machine Tools (FMT) is a privately owned Australian company that provides engineering solutions for field applications to minimise downtime.

The scope of operations is to provide the most complete product lines available to OEM equipment manufacturers, maintenance providers, field service companies, power stations, petro chemical plants, mining industry and other related industries.

Call Field Machine Tools on 1300 FMT FMT (1300 368 368), email sales@fmt.com.au or visit www.fmt.com.au for more information. **AMR**



Field Machine Tools has a range of end prep machines suitable for 12.7mm to 610mm bore mount to face, bevel or counter bore tube and pipe.



Field Machine Tools has rugged and innovative portable flange facers for 19.1mm to 5054mm (0.75 to 199 inch) diameters. Several of the machines can be configured for facing, milling or both.

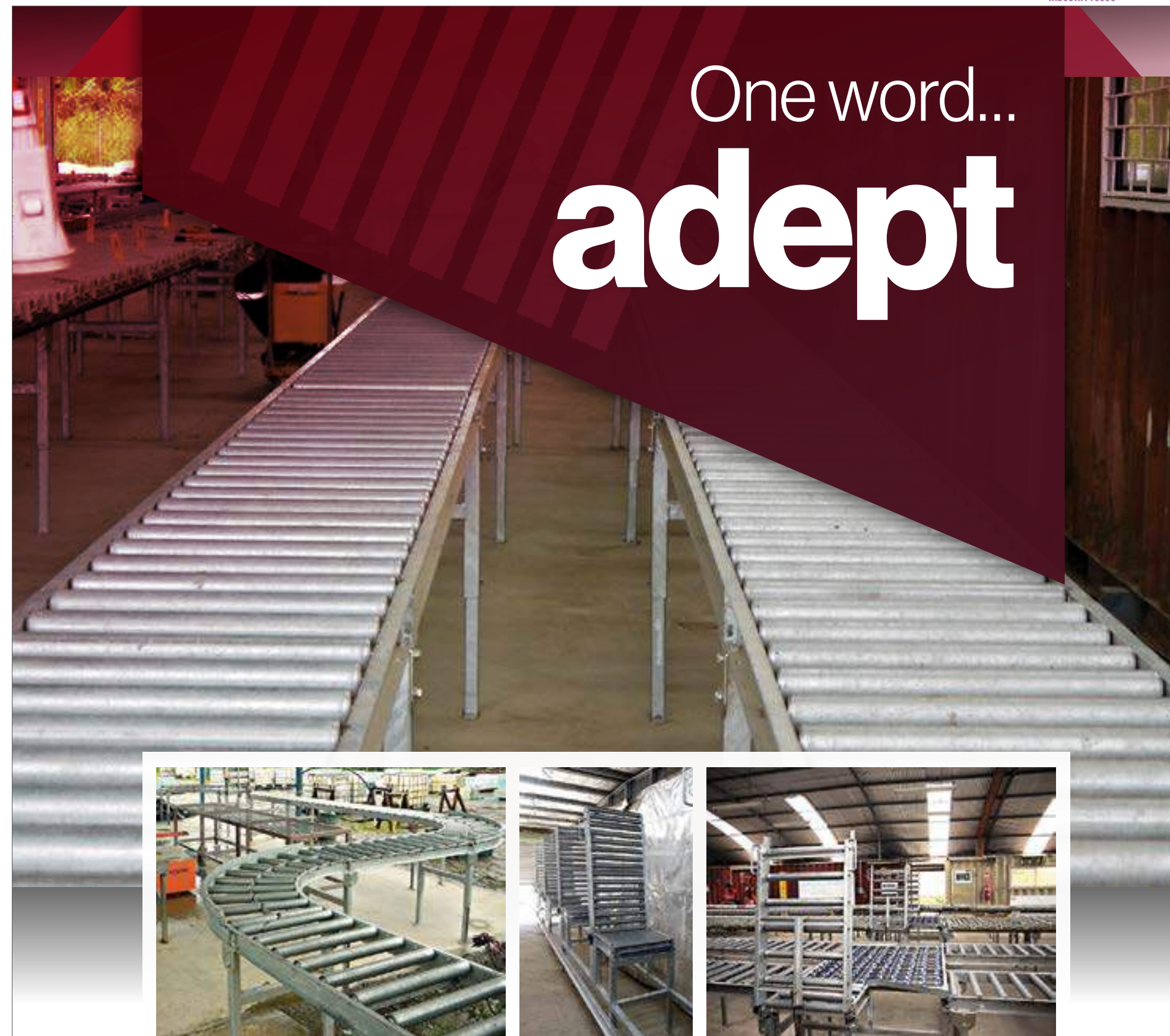


Field Machine Tools has OD mount flange facers suitable for 0mm to 3050mm (0 to 120 inch) diameters. Several models can handle flat face, raised face, RTJ, tongue and groove, lens ring, Grayloc and compact flanges.



Field Machine Tools has a range of Clamshell Lathes suitable from 33mm to 1676mm OD pipe preparation whether severing, bevelling or counter boring.

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POWERING PRODUCTION OF ALL SIZES

Whether you're running a large-scale iron ore operation, setting up an accommodation camp, or powering critical equipment on a rail infrastructure project, you need a stable supply of electricity. This is obviously a challenge in remote locations where there's no connection to a power grid or in instances where emergency power supplies fail.

Diesel generators provide a reliable, consistent power to meet the demands of an asset, and keep it productive. They are portable, require minimal maintenance, and offer a cost-effective solution to alternative electricity supply.

As a market leader in fixed-speed diesel

power, Viking Industrial is an Aussie company supplying some of Australia's largest mining, construction and industrial projects. Its diesel generators are trusted solutions on a range of rail, hydro, mineral processing and infrastructure projects around the country.

PROVEN POWER AND LIGHTING SOLUTIONS

When it came to powering the Iron Bridge Magnetite project in Western Australia's Pilbara region, Viking were contracted to supply diesel generators for the construction phase. This included 12 generators, three 350kVa generators and a distribution board to power a 300 person fly camp. Viking also supplied 12 solar lighting towers. The ongoing with contract which extends for the next 20 plus years involves a running list of

equipment that can be called upon depending on demand.

Powering a world-class facility is no easy feat. Genex Power engaged Viking to power its accommodation camp during the construction of its hydroelectric facility in Far North Queensland. The project involved the world-first conversion of a disused gold mine into a pumped-storage hydroelectric power generation facility, which required the conversion of two existing mine pits into reservoirs.

Viking supplied a 1250kVa prime generator and 10,000L fuel cell to power the accommodation camp, which would then serve as a backup generator once the main power was

connected. The Cross River Rail is the largest infrastructure project in Queensland's history. With major works now underway, over a dozen active worksites span across Brisbane's cityscape.

A number of generators were supplied to power the various site works, and included a 1250kVa genset for power tunnel boring scrubbers, and a 600kVa for a gantry crane. Viking also supplied a 300kVa, 200kVa and an 80kVa genset on hire for various uses such as powering offices and standby power for pumps. **AMR**

If you're looking for lighting or power solutions for your large-scale project, visit <https://vikingindustrial.com.au/>

VIKING ACQUIRES RAM INDUSTRIAL

In a boost to its power generation product portfolio, Viking Industrial Group recently announced its acquisition of Central Queensland power generation specialist, RAM Industrial.

This acquisition enables Viking to expand its business strategy and national service capabilities, including 24/7 breakdown and maintenance response for RAM and Viking Industrial customers.

It also increases the company's rental fleet to over 3000 assets, which consists of generators, compressors, lighting, fuel storage and electrical distribution.

RAM Industrial will continue to operate as RAM, a subsidiary of The Viking Group, and existing RAM Industrial customers will continue to benefit from local branch support, with the high level of service customers have come to expect.

As part of the Viking Industrial Group, RAM Industrial customers will have the added benefits of a national service network, in-house engineering, electrical, mechanical and fabrication capabilities, complete turn-key Power Generation packages, major Infrastructure and mining experience, sales stock on Hand, and Australian-made, custom-built equipment, independent of engine manufacturers.

Anthony Jensen, Managing Director of Viking Industrial, says the acquisition of RAM has helped the company accelerate its expansion into Moranbah and Central Queensland.

"This move is a win-win for all parties, increasing our capability and support for RAM and Viking customers," said Jensen.



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AURY SEEKS OUT AUSSIE VIBRATOR SPECIALIST



Aury Australia is a world-class mineral processing equipment solutions provider for the country's top tier mines. When it needed trusted vibration technology, there was only one company with the right products and local serviceability.

OLI Australia was front of mind when it came to sourcing vibrating motors for use in Aury's range of coarse coal centrifuges and vibrating screens, sieve bends and feeders.

As a subsidiary of Europe's leading manufacturers of electric and pneumatic vibrators, OLI Australia's products have been the workhorses behind some of the most productive mine operations.

Mark Thompson, General Manager of OLI Australia, expressed the importance of maintaining a reputation as a trusted and reliable supplier.

"We pride ourselves on stocking a quality product range and a local service capability that's second to none," said Thompson.

"Our team has always been very responsive and we've worked tirelessly to ensure our stock levels have remain consistent despite global supply chains pressures.

"Aury is one of many examples where our team has gone out of their way to make the impossible happen and supply products to

support critical project applications.

"We make ourselves available around the clock as we understand the impact on our customers and their sites if plant equipment is isn't operational."

Backed by a team of over 2,500 industry professionals, Aury continues to expand its footprint across Australia, Asia, North America, and Africa. In Australia, the company's headquarters are in Rutherford NSW with facilities also in Perth WA and Mackay QLD.

Since 2009, Aury has serviced all the major mining and engineering companies including BHP, Sedgman, Anglo, American, Rio

Tinto, Glencore, and Yancoal, to name a few.

A commitment to product advancement in screening and vibration technology has seen Aury continue to deliver the highest quality products and service to customers no matter the size of the project or application.

Relationships with suppliers like OLI Australia play a key role as the company ventures into the future, supporting customers and the communities in which it operates.

For more information on the latest industrial vibration technology, visit www.olivibra.com

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COMPLETE SUPPORT FROM THE GROUND UP



Jetcrete is Australia's leading ground support specialist to the mining industry. Using the most advanced and innovative techniques, as well as specially adapted placement materials, Jetcrete delivers all surface and underground shotcreting and concrete spraying services to mine sites.

Jetcrete understands that no two mine sites are the same. With more than 40 years experience across the industry, the Jetcrete team has seen it all and can help navigate through any underground or above ground challenge.

The company manufactures about 271,000m³ of concrete each year and has installed 440,000m of cablebolts.

Its fleet of 183 mobile concrete trucks are ready to service any Australian mining operation, backed by a team of 500 personnel across the country, and can establish sites in remote areas in a matter of days.

UNDERGROUND SHOTCRETING

Jetcrete provides a complete service and one-stop shop solution for all stages of underground shotcreting.

These include excavation, onsite concrete, shotcrete and CAF manufacture, drains, high walls, bulkheads, vent walls, as well as the supply, delivery and installation.

The company's reputation for high-quality work across mine tunnels, portals and shafts has earned them a solid following in their field.

Jetcrete is trusted by and partners with mining majors including BHP, Glencore, Northern Star Resources, Newcrest Mining and Gold Fields.

A CUT ABOVE THE REST

Over the years, Jetcrete has introduced most of the modern technologies used for shotcreting in Australian mining, such as overhead wet shotcrete, robotic shotcrete units, hydroscaling and most recently the industry benchmark for shotcrete thickness measurement - shotcrete scanner.

The Perth-based company is the first and only shaft lining contractor in Australia equipped to safely operate in niche and

highly-specialised ERZ1 hazardous environments.

The shotcrete solutions provider is also capable of delivering surface and underground civil infrastructure works including earthworks, concrete slabs, heavy vehicle workshops and site offices.

WIDE ARRAY OF SERVICES

Along with shotcreting, Jetcrete provides a wide array of services including:

Concrete manufacturing: Jetcrete owns 16 batch plants, enabling mine sites to access 24-hour concrete, CAF and shotcrete manufacturing.

Delivery: A fleet of 75 underground agitators allows Jetcrete to support any site, including remote and hard-to-reach sites.

Ready Jet® Drum Blasting: Remote-controlled, high-pressure cleaning system for agitator drums eliminates the need for workers to enter confined spaces within the concrete mixer drum and reduces cleaning time by up to 75%.

Remote shaft lining: Jetcrete is the leader in remote shaft lining with three units in Australia, and further capacity in Indonesia and North America.

Cable bolting: Jetcrete is currently the largest Sandvik cable bolter operator in Australia.

Resin injection: An alternative active rock support system for underground mining, resin injection provides additional support for the encapsulation of TG cable bolts and ground consolidation.

Civil construction: Jetcrete's capabilities include heavy duty workshops, mine site offices, machine foundations and slabs, drainage and culverts, earthworks and high wall stabilisation. AMR



A Cut Above the Rest

HD Plasma and Laser Cutting Services provides an innovative and dynamic profile cutting service to all steel manufacturing industries within Australia.

The purpose-built, multi-function, steel processing business located in Bibra Lake, WA, is seen among the leaders in the steel cutting industry.

Laser Cutting

The technology of the HD Plasma and Laser Cutting Services machines delivers superior performance, giving the ability to provide clients with exceptional quality, together with 24-hour operations, shorter lead times compared with other conventional laser cutting machines.

- Cutting table size 4000 x 2000mm
- Capable of processing up to 20mm thickness mild steel
- Capable of processing up to 20mm thickness QT Material
- Capable of processing up to 32mm thickness aluminium
- Capable of processing up to 25mm thickness stainless steel

Plasma Cutting

HD Plasma and Laser Cutting Services operates three plasma machines - one Kinetic K4000 and two Kinetic K5000.

These state-of-the-art, heavy duty combination plasma/oxy/machine centres can process a wide variety of materials at an extremely fast rate.

The 62m plasma cutting bed, together with 24-hour operations, allows high volumes of cutting to be achieved with short lead times.

- Counter sink/counter bore
- Drilling - 3mm up to 60mm
- Plasma cutting - 3mm up to 50mm
- Oxy-cutting - 60mm up to 300mm
- Beveling - up to 50mm with maximum of 45°

Steel Plates

HD Plasma and Laser Cutting Services holds steel plate in stock.

Plate is sourced from quality local and imported steel mills, to cut a wider range of materials at a greater thickness range than most of its competitors. **AMR**

GRADE	THICKNESS (mm)
AS 3678-250	UP TO AND INCLUDING 300mm
AS 3678-350	UP TO AND INCLUDING 300mm
FLOOR PLATE - S	UP TO 10mm
BOILER PLATE - ALL GRADES	UP TO 80mm
QUENCHED AND TEMPERED	UP TO 80mm
CARBIDE OVERLAY	UP TO 40mm
ALUMINIUM PLATE	UP TO 32mm
PGI, ZINCANNEAL, GALVANISED & COLORBOND	UP TO 6mm
STAINLESS STEEL - ALL GRADES	UP TO 40mm



THE STATE-OF-THE-ART, HEAVY DUTY COMBINATION PLASMA/OXY/MACHINE CENTRES CAN PROCESS A WIDE VARIETY OF MATERIALS AT AN EXTREMELY FAST RATE.



A cut above the rest



HD Plasma & Laser Cutting Services Pty Ltd is a purpose built, multi-function, steel processing business located in Bibra Lake, Western Australia.

We can deliver an innovative and dynamic profile cutting service to all steel manufacturing industries within Australia.

HD Plasma & Laser Cutting Services philosophy of progressive service to our customers is what is bringing us to the forefront of the steel cutting industry.

A continual process of system and service development and refinement is where our key advantage lies. We constantly find new ways to add value to the service we deliver to you.

Progressive service and quality is about staying one step ahead.

Services



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C-SINKING/TAPPING



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SEEING BEYOND THE SURFACE



In the world of mining, heightened seismic activity and unforeseen natural events can be catastrophic. The structural collapse of an underground mine shaft, a major tailings dam failure, or other uncontrollable factors can have grave consequences for mine workers onsite and the surrounding communities.

There is also the situation of whether there are trapped survivors following a mine incident. When time is of the essence, a successful rescue mission relies on sophisticated detection technology, particularly when communication networks have been disabled.

What if you could accurately predict disasters well before they happen, or locate trapped miners thousands of feet underground. New and sophisticated technologies are now available that allow real-time monitoring of mine structures and tailings storage facilities to increase safety, save lives, and prevent environmental damage and reputational loss.

SureWave Technology is one company literally making seismic waves in the global mining industry on a global scale.

Headquartered in the UK, SureWave offers a suite of monitoring systems that are being used to detect seismic shifts in coal and underground mining applications across Australia and around the world.

The company also has the world's first proven technology to detect and locate trapped miners in real-time 2000 feet below ground. The Australian Mining Review recently spoke with SureWave's Managing Director, Philip Shaw, to learn how their breakthrough early warning technology is helping mining companies secure their assets and prevent the worst-case scenarios.

AMR: Can you tell us a little more about your technology and how it works?

PS: SureWave Technology has developed

a unique micro-seismic technology that is capable of detecting and identifying micro-seismic signals generated on both surface and deep subterranean environments.

It involves the use of highly sensitive ground sensors that relay the micro-seismic signals to a CPU programmed within our unique software. This software can filter out extraneous seismic signals to detect the release of energy from strata under stress. For example, it can detect micro-seismic waves generated by the movement of material or liquid.

Once a specific signal is identified and located, we can present the information in a three dimensional real-time display. The level of a particular signal may only be 1/100,000th or 1/1,000,000th of those emitted by surrounding noise and vibration.

With respect to our TDS2 tailings dam monitoring system, there are up to four tri-axis sensors per CPU system covering a dam wall length of up to four kilometres. Each sensor can detect up to four kilometres depending on ground conditions.

The system has a huge dynamic range of over 140dB. This allows detection of tiny events which are hidden under large noise signals of similar frequency. Essentially, it can detect strata particle stress millions of times smaller than the mine noise.

Our technique involves 'seeing through' the majority of surrounding noise to detect, locate and categorise these tiny signals. This enables us to track moving liquid, stress build-up within the tailings, or movement of the tailings. This is unaffected by animals, weather or surface traffic activity.

AMR: What role do your products and techniques play in the mining industry?

PS: Firstly, traditional sensors and instruments including radar, satellite monitoring, piezoelectric sensors and vibration monitors all play a role in detecting

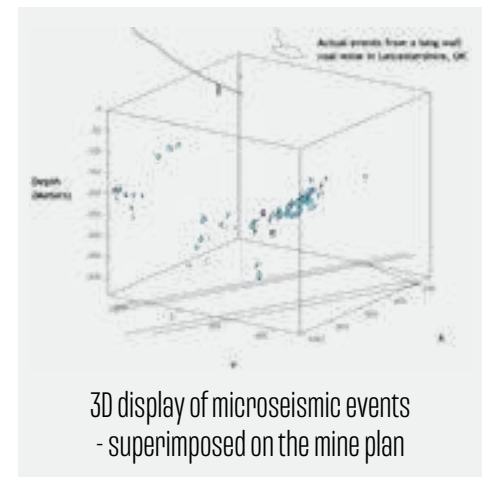
seismic activity.

However, monitoring liquid penetration and strata stress requires sensitivity millions of times greater than traditional monitoring systems. This is where the SureWave technique is unique in that it is 15 million times more sensitive and provides far superior detection capabilities in relation to mine and dam stability.

Monitoring the build-up of stress during mine operations is invaluable, particularly if you can provide advanced warning of potential structural failure. By analysing the source mechanics calculated by the system from the micro-seismic events, it can be demonstrated that stress within the structure is releasing seismic energy at a microscopic level.

This technology allows us to 'see' into a structure and provide advanced warnings of liquification and structural instability. We previously used this technique to warn a UK coal mine 18 weeks prior to an underground structural roof failure.

Early detection such as this can be a matter of life and death, and is the most important preventative measure in protecting life and assets.



AMR: Can you explain how your technology

gy detects potential tailings dam failure?

PS: Current advance warning systems either detect dam movement as it happens, by which time it can be too late to take remedial action, or indications of potential failure are given only within a short range of their sensors, significantly limiting their effectiveness.

Our SP2 system incorporates sensors mounted in shallow holes on or near the top of a tailings dam structure. SP2's unique technology means that a sensor can typically monitor micro-seismic activity at unprecedented distances of up to 500 metres.

4 sensors, 12 channels, can be linked to a single CPU. The micro-seismic activity is displayed as a 3D image and updated in real-time. The micro-seismic events displayed indicate stress build-up within the side walls or dam structure, potentially leading to a failure. Water penetration of the structure can also cause liquification of the dam base and consequent failure, which can be mapped in real-time.

One of the most troublesome causes of dam failures is internal erosion due to uncontrolled flow of water. This can cause distress to a dam embankment.

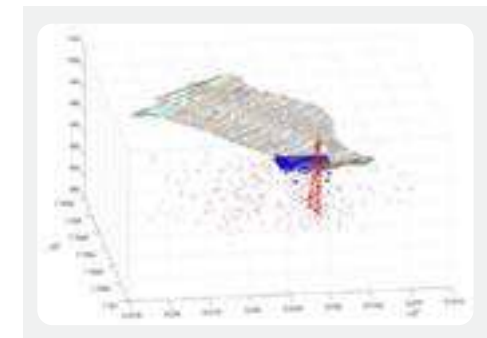
However, most embankments exhibit some level of seepage, the velocity and quantity of which must be controlled. This seepage occurs through the earthen embankment or dyke, and/or through its foundation.

If uncontrolled, seepage can erode fine soil material from the downstream slope or foundation, and continue moving towards the upstream slope to form a pipe or cavity in the dam. This often results in a complete failure of the embankment.

Such a failure is generally referred to as internal erosion or 'piping'. Silt and fine sands, which are common in iron ore tailings, are most prone to piping as they erode easily.

The use of micro-seismic technology like SureWave is capable of filtering environmental signals to detect liquid movement inside the dam, and forewarn uncontrolled or unexpected seepage inside the dam.

An illustration of an early warning of a dam failure is depicted below. Real-time, 3D images of movements of liquids are represented in blue, and real-time stress or movements within the dam in red.



AMR: Is there an example of a project where you successfully utilised your technology and how you strategically setup the equipment?

PS: One globally significant incident occurred on November 5th, 2015. Brazil's Fundão tailings dam collapsed, releasing over 32Mm³ of tailings into the Fundão River overtopping Santarém Dam, and caused what is considered to be Brazil's worst ever environmental event.

SureWave's technology provides drastic improvements in how seismic activity is detect-

ed and monitored in tailings dams.

Equipment deployment is relatively quick. No user adjustments are required onsite and the system automatically calibrates and differentiates activity. Sensors are placed just below the surface on supplied 'spikes' suitable for site conditions. Sensors are cabled back to the CPU system, which is powered using solar energy, and wireless communications from the CPU allow remote real-time monitoring.

In 2016, in partnership with Samarco and Fundação Gorçex, we were contracted to set up a six-channel mine monitoring system at the top of the Germano Dam within the Samarco site.

The solar powered system featured a 3G modem connected to the internet. Cabling enabled the sensors to be placed 300 metres apart across the dam wall.

The system recorded all the micro-seismic activity across the dam. The resulting data was displayed in real time on a 3D site model of the dam. Liquid ingress was identified on the east side of the dam which allowed a drain channel to be formed to prevent any further risk from this. Valuable data was collected with micro-seismic events clearly evicted from both the dam and water reservoir.

AMR: When the stakes are so high in mining operations and tailings dam management, it's no surprise asset owners are looking to technology companies like SureWave to leverage preventive measures and protect their people from future incidents.

For more information, visit
www.surewavetechnology.co.uk
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Provided by Geospatial Intelligence Pty Ltd

THE FUTURE OF MINE TAILINGS MONITORING

As the supply of higher-grade mineral deposits gradually declines globally, mining companies are targeting increasingly lower quality ores. This reinforces the need for effective tailings management due to the greater amounts of waste being produced for the equivalent amount of end product.

Mine tailings are often concentrated with high levels of toxic minerals and heavy metals, which pose significant risks to human health and the environment. Improper storage and management of tailings storage facilities (TSF) can lead to environmental and humanitarian catastrophes, with ecosystems taking decades to recover and clean-up activities potentially costing many hundreds of millions of dollars.

Mines are often in remote, hard-to-reach locations where accurate monitoring of waste material can be difficult. Traditional, in-field methods of monitoring tailings are costly and time intensive, requiring significant infrastructure and highly trained personnel.

Satellite remote sensing may help fill this gap by increasing the accessibility and ease with which information can be collected. This can facilitate consistent, reliable estimations of tailings waste and the timely monitoring of infrastructure.

The *Australian Mining Review* caught up with Geospatial Intelligence Pty Ltd CEO, Rob Corey, to find out more about how remote sensing technology is being used to manage mine assets in Australia and abroad.

AMR: Can you shed some insight on the impact of tailings and what tools can be used to effectively monitor them?

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RC: Tailings present one of the greatest risks to a mine, from both the naturally unstable makeup of tailings themselves, but also the potential damage they can have on communities, the environment, and a mine's bottom-line if not managed properly.

Tailings are often concentrated in toxic compounds that tend to stick around for years, leading to clean-ups that can outlast a mine's lifespan. Best practice risk management is a proactive approach based on consistent monitoring and evaluation of infrastructure and early intervention.

Tailings dam monitoring has typically been conducted using a combination of in-ground and above-ground sensors, with measure-

ments conducted at equal intervals across the dam wall and interpolated between points. This involves a combination of visual observations, piezometric sensors to measure pore pressure and bank stability, and accelerometers to measure structural movement.

These instruments provide point data, making the quality of monitoring dependent on the number of and spacing between measurements. The spacing between sensors means that they may not detect the initial stages of structural deformation, which lead to larger fractures and potential infrastructure failure.

To accommodate this, medium to large-

scale mines must position a vast number of measurement points at a significant initial expense with ongoing labour costs.

AMR: How is new technology improving the way tailings dams are monitored?

RC: Many older and smaller mines rely on manual assessments rather than automated instruments, leading to potential inefficiencies in data collection and processing.

In recent years, satellite imagery has emerged as a valuable tool for monitoring structural changes in in tailings dams. It has the benefit of very high spatial resolution (sampling many more points than the large intervals between point measurements) offering greater accuracy in determining potential dam instability.

As a pioneer in high-resolution satellite imagery and analytics, Geospatial Intelligence Pty Ltd has been a leader in driving collaboration with the resources sector.

Satellite imagery has sub-daily revisit rates, which enables monitoring to be done in near real-time. For the monitoring of TSFs, synthetic aperture radar (SAR) provides highly accurate monitoring regardless of weather conditions or time of day. SAR can be used for change detection purposes, monitoring visual changes on the mine surface, and for interferometric analysis (InSAR).

InSAR is particularly effective for tailings dam monitoring to show surface deformations, subsidence and inflation (or buckling) of storage infrastructure with millimetre scale accuracy.

Geospatial Intelligence Pty Ltd has access



Surface deformation of tailings dam wall one week prior to collapse measured through InSAR

to numerous satellites which can monitor deformation on a weekly basis via InSAR, which offers clients a cost effective, reliable alternative to traditional deformation sensing options such as aerial LIDAR.

While InSAR does not diagnose the causes of structural deformation, it gives mine managers the necessary data insights to make informed decisions about where costly field resources are utilised, how to better manage risk, and improve efficiencies.

AMR: Can you share an example that demonstrates how captured data can be utilised in the prediction and prevention of a mine tailings dam incident?

RC: Geospatial Intelligence Pty Ltd (GI) recently undertook a post-dam collapse analysis of a TSF in Southern Africa. The dam, which released 12.8 million m3 of tailings into downstream communities, posed an environmental disaster and contributed to housing and infrastructure losses.

The results collected indicate that during the months leading up to the collapse, perceptible displacement occurred along parts

of the dam wall. In effect, the GI team were able to retrospectively measure movements across the dam wall surface from historical data, indicating a potential weakening and increased stress along various points.

These stress points correlated with the dam wall sites where structural failure eventually occurred, demonstrating the effectiveness of GI's analytics products. Regular monitoring using these techniques as part of a risk mitigation strategy may assist in avoiding the costly environmental clean-up and loss of production by allowing early intervention when problems are detected.

AMR: What role does regulatory compliance play in remote sensing, and where is the future of tailings dam management headed?

RC: TSF regulation has a strong focus on maintaining tailings in stable and erosion-resistant infrastructure. GI can help mining companies meet their regulatory and risk management obligations through regular condition reports detailing TSF surface deformation and potential areas of concern.



With increasing expected demand for rare earths and other critical minerals in coming years, regulators and governments are looking to expand their available resources to ensure TSF compliance, particularly in remote regions.

GI's remote sensing and InSAR products can provide an effective balance for both regulators and mining companies in relation to monitoring and compliance, time and cost.

In recent years, there have been a number of high-profile tailings dam collapses in Australia and internationally, which have resulted in loss of life, livestock and property, but also a considerable impact on the environment surrounding the events. The volume of mine tailings released annually through storage failures has experienced a significant upward trend since the 1970s.

As mines exhaust high-quality ore deposits and move toward lower-quality ores with much greater tailings volumes needing to be stored, this trend is predicted to continue.

Governments have responded by introducing stricter standards, compelling compa-

nies to be more proactive in their approach to managing tailings storage, with a Global Industry Standard on Tailings Management released in 2020.

This standard reflects a general trend towards increased scrutiny of all, not just the largest mines, with the expectation that every industry player will have robust monitoring and evaluation processes in place.

This is likely to highlight any limitations or inefficiencies in traditional monitoring techniques in meeting compliance requirements as resources and personnel become increasingly stretched. A shift to a smarter technology and risk management-based approach could assist in bridging the gap. GI's team of specialist analysts are well positioned to apply and interpret these emerging techniques to the mining sector. **AMR**

For more information, visit
<https://geoint.com.au/>



AMR JAN2023



SOLVING COMPLEX WATER PROJECTS WITH AQUA ENERGY GROUP

Every liquid management project in the industrial, commercial and resources space carries a degree of unknown risk. It takes something special to tackle complex liquid management problems on a commercial scale.

Aqua Energy Group is one company that's taking this specialised area to the next level. They design, supply, install, commission and maintain water and slurry packaged pump systems and electrical equipment for major mines in Australia.

The company prides itself on its ability to deliver 'off the shelf' or custom designed solutions to suit specific site requirements, with equipment that's engineered to the highest Australian and International standards.

Aqua Energy Group has quickly gained a reputation within the mining industry for dealing with the most complex and challenging projects, particularly when it comes to integrated pump systems.

According to Daniel Thompson, Project Director of Aqua Energy Group, many com-

plexities exist when it comes to liquid management in the mining industry.

"When faced with a complex project, many considerations are at play including the liquids and site applications involved, the type of pontoon selected, and of course the pumping system required to effectively manage different liquids," said Thompson.

"Add to this a multitude of other factors and complexities within a project, and it's no surprise that it takes a unique set of skills to deliver a practical, cost-effective solution.

"We have completed a significant number of projects over the years, from small pump-stations to large turnkey projects such as containerised fire pumps and pontoon pump stations, dewatering operations and waste water treatment plants.

"Our pumping and electrical solutions are on show across multiple industries including mining, fire, civil, renewable, and tunnelling, with projects including mine sites, municipal projects, renewable hydro power plants, and industrial sites."

To achieve such feats, it takes more than just great products, but an experienced team backed by proven processes and innovative solutions. That's where establishing valuable partnerships with specialist engineering firms comes into play. It's vital to understand that one missing piece of a puzzle in the world of liquid management can add unnecessary time and money to a project.

This is particularly evident in projects that face time pressures on designs that require integration of liquid management products, or unique expertise from different industries as a single point of contact, to facilitate a holistic approach to the project.

As the industry's liquid control specialists, Coerco have found the silver bullet, which is a collaborative approach and long-term partnership with industry experts such as Aqua Energy Group.

This has seen the dynamic duo take the industry by storm with Coerco designing and supplying the floating pontoons, and Aqua Energy Group building the pumping systems, for projects all around the country.

Mining and water infrastructure industries utilise pontoons and floating walkways to support heavy pumping equipment or machinery during floating applications.

Floatation on liquid, specifically industrial pump pontoons, is a specialised area where Coerco are leaving the competition in their wake. The company is responsible for designing mining pump pontoons, or modular industrial pontoon systems, for use in different environments.

"Whether it's maintaining dam tailings, mine site dewatering, sludge pond reclamation, dredging, or access walkways for remote and flood relief, you can be assured we'll deliver," said Thompson.

"Knowing Coerco's extensive experience in pontoon design, and our capability from a pump system perspective, we leverage mutual expertise and resources that are second to none."

Controlling liquids with fit-for-purpose pontoons

Firstly, determining the types of liquids in an

environment will help determine the appropriate pontoon and pump system to use.

Preventing toxic substances from leaking into nearby water or local ecosystems is a core function of pump pontoons which are used to drain excess water from mine tailings dams.

Dewatering is performed regularly in most open-pit and underground mining operations that are prone to flooding as a result of a shifting landscape and heavy rainfall. Dewatering reduces flood risk and helps operations avoid shutdown.

A floating pontoon equipped with heavy pumping equipment is an ideal solution for miners when de-sludging and pumping effluent water from holding ponds. It's also suitable for reclaiming and cleaning shallow bodies of water or pits without heavy excavation and drainage.

Mine sites commonly use floating pontoons to provide a reliable platform when dredging pumps in high solid industrial pumping applications. They can also serve as stable

access walkways for mining, or industrial floating operations in remote areas during floods.

Coerco have been building floating walkways and pontoons for decades. With many different styles, sizes and materials available, the type of pontoon depends upon the site requirements and type of environment in which liquids are being managed.

"When we work on a specific project with Coerco, we ensure the pontoon configuration and our pump system will function from a design point of view," said Thompson.

"Whether it's a heavy-duty, lightweight poly, or modular setup, the type of pontoon makes a big difference to how we integrate the required pump system.

"The heavy-duty pontoons work really well for clients needing a robust, safe and stable platform capable of handling large pump setups and heavy loads of up to 25 tonnes.

"You've also got lightweight and versatile poly pontoons, ideal for tight spaces and

temporary setups. These are manufactured using high-quality polyethylene materials, and are UV stabilised and resistant to corrosion and harmful chemicals.

"Then there's the modular pontoons, which easily adapt and change your pontoon's shape and size as your project requirements change. These can support a maximum load of 5 tonnes and are simple to assemble and disassemble as required."

Collaboration to overcome complex projects

Coerco and Aqua Energy Group have partnered on a number of major mining projects, delivering solutions that aim to solve the most complex problems in liquid management.

They have leveraged their shared capabilities to achieve success in the areas of liquid containment, floatation on liquid, and liquid movement.

Two recent mine infrastructure projects the companies have worked on are based in the Queensland region of Moranbah, both of

which were complex tailings management projects requiring a high-spec engineered solution.

"The first project was for tailings storage management, which involved the design, supply and installation of all electrical and mechanical requirements," said Thompson.

"We had two dual electric pontoons and custom walkways, two kiosk substations, and mine spec control panels, instrumentation, and electrical and pipework manifolds that were commissioned and integrated.

"The second complex tailings infrastructure project came off the back of a successful tender win for a flagship mining company. It involved a full turnkey solution from design to commission, and required a huge collaborative effort between ourselves and Coerco."

For more information, visit
<https://www.coerco.com.au/>
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WORLDWIDE TANK SERVICES. SO FAR, SO GOOD.



For close to 40 years, Worldwide Tank Services has been providing a range of safe and certified services both here in Australia and throughout the world. Senior Project Manager Toby Todhunter said the company is involved in pretty much all industrial and resource related sectors.

"Our business is focused on assisting clients who rely on bulk storage tanks and the safe storage of dangerous goods. We're working across a number of industries including oil and gas, mining, mineral processing, petrochemical, petroleum, water and chemical storage and with companies operating tank terminal facilities – so our level of expertise is significant," Toby said.

"We also pride ourselves on the relationships we've established with an ever increasing number of international blue chip clients including Rio Tinto, Chevron, Petronas Malaysia, Exxon Mobil, Shell and Worley. These companies have extremely high expectations when it comes to their storage tank assets and we've consistently exceeded those expectations," Toby added.



And when it comes to safety, Worldwide Tank Services has an impeccable record.

"Yes, so with the type of work we perform, compliance and safety are absolutely paramount and there is quite literally zero margin for error. We subscribe to exactly the same workplace safety practices as our clients and all of our engineers, designers and technicians have achieved the required national and international certifications. Our safety-first approach has led to us being a certified ISO9001 company for all works including tank lifts. We are also an API certified training centre and regularly conduct courses in tank maintenance and for the overall management of tank farms," Toby said.

For more information about the range of services provided by Worldwide Tank Services, please contact Toby Todhunter directly on 0409 889 002 or visit worldwidetank.com.au

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IF YOU RELY ON BULK STORAGE TANKS, WE SPEAK YOUR LANGUAGE.

WORLDWIDE TANK SERVICES

Since our establishment in 1983, we have delivered over 2,000 tank-related projects in over 40 countries and our Perth-based headquarters enables local, national and international deployment on short notice.

We provide a range of specialist certified services to the oil and gas, mining, petrochemical and power generation sectors – plus we are an ISO 9001 certified company and all of our engineers are certified by the American Petroleum Institute API653.



A snapshot of our services:



Tank inspections and certifications



Tank design and engineering



On-site tank maintenance



Scheduling and remediation work



TANK LIFTING

We are the only company in Australia that can safely lift up to 50 metre diameter tanks two metres off the ground to facilitate base course remediation – and we have completed 300 successful tank lifts around the globe.

For more information about how we can assist your operation, please call our Senior Project Manager Toby Todhunter directly on 0409 889 002 or email toby@worldwidetank.com.au

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WTS008

HAMMERING OUT MAINTENANCE IN STYLE

You don't need to venture too far on a mine site before locking your sights on a hammer in action. Whether it's in mineral exploration, open-pit, blast hole, water well, geothermal or rock anchor applications, hammers are widely used in drilling activities in every mining operation around the globe.

A hammer is essentially the workhorse responsible for penetrating and displacing rock in drilling applications. A hammer works by a piston striking the back of the hammer bit and creating a percussive force to break up the rock at the bit face.

Due to the repetitive, constant force required in tough conditions, it is critical that a hammer operates reliably and efficiently. In order to achieve this high level of productivity and performance, and to extend their service life, hammers require

regular maintenance.

A hammer that doesn't fire efficiently lacks the impact to effectively chip the drill material, leading to poor penetration rates, slowing weight on bit time, and in turn increasing operating costs.

Hammer failure is also common in poorly serviced hammers that can cause bit shanking, spline fracturing, excessively worn bit tungsten's and piston failure. In some cases, this results in drill rods becoming stuck down the hole, subsequently increasing costs due to drilling downtime, equipment loss and revenue.

In open-pit drilling, this can have major implications on the mine processing equipment such as damage to belt conveyors.

Therefore, proper hammer maintenance helps drive a

more successful, profitable, and safer drilling program, particularly when quality purpose-built service equipment is used.

Corporaal Enterprises is an Australian company that is redefining how drilling attachments in mines are serviced and given a new life. Its innovative breakout benches have proven a genuine breakthrough in the maintenance of DTH hammers.

According to Corporaal's General Manager, Kevin Corporaal, mine managers play a key role in providing a safe and productive work environment for maintenance personnel.

"We're proud to have engineered the most reliable breakout bench on the market," said Kevin.

"It ticks all the boxes when it comes to hammer maintenance. There's no chains or manual hydraulic pumps, just a quality fabricated product that eliminates risk and keeps operators safe when performing their duties."

Breakout Benches Built to Last

Threaded hammer connections become torqued up extremely tight due to the heat and constant percussive action that a hammer endures during drilling. Breaking apart these threaded hammer connections demands equipment that is purpose-built for the job.

That's where the breakout bench proves its worth. It's specifically engineered for safer, simpler, more streamlined hammer maintenance. Designed with the highest quality

components, the bench is a compact, self-contained unit that offers all the tools and attachments needed to perform hammer maintenance.

"Our bench is designed to contain all tool storage, hydraulic power packs, fold-away controls, and a safety cage within the base dimensions of the unit, which prevents floor clutter such as loose spanners and hoses, to ensure a clean workspace," said Kevin.

"There's also the practicality aspect. We have three breakout bench models available including a 4-8 inch, 6-12 inch and 12-18 inch, all of which have customisable attachment configurations such as different spanner sizes to suit each bench clamp range," said Kevin.

"We also offer the choice of three pump power pack options, either single phase, diesel or air over hydraulic."

Maintenance that's Safer and Simpler

Mine managers are responsible for ensuring maintenance operators have the safest equipment available that is designed to suit the tasks at hand. Appropriate equipment selection in hammer maintenance is no exception.

Corporaal conducted market research, working with their clients to understand how they used their equipment, what features were important to them, and what would support them in performing maintenance in a safer, more productive way.

This provided valuable insight to help the design and development process for their new fit-for-purpose breakout unit. It also supported previous suspicions that other breakout benches available in the market were cumbersome and dangerous to use.

"We identified real issues with other machines in the market that threatened the safety of operators," said Kevin.

"The use of chains for clamping the barrel and chain wrenches, were still a common part of most of existing units.

After talking with contractors and hammer manufacturers that used these kinds of machines, they informed us of occurrences where chains broke under load with pieces of chain projected through service areas, and in some circumstances, would penetrate through the service shed wall.

"After hearing what end-users were experiencing, we knew that our design had to have safety as the core consideration" said Kevin. Corporaal also worked closely with major hammer manufacturers and mines to ensure their new breakout bench delivered on every aspect of the machine.

"We designed and built every machine keeping the basic fundamentals of safety in mind," said Kevin.

"Aside from the important factor of having a machine that works, we looked at concealing pressure loaded spots, eliminating pinch points around working areas, incorporating lift-assist for heavy components, safe operating distances, and small fragment containment.

"Feedback from operators has highlighted the ease of use and the minimal effort required to operate the machine. It's simply well built, reliable and offers all the safety features to complete any hammer maintenance task.

"It's also about significantly reducing the risk of injury. Operators can get frustrated with awkward and underperforming equipment, resulting in unsafe and erratic decision making, which is a major cause of injury.

"That's why our breakout bench has built a reputation as a standout choice within the

industry for providing maintenance personnel with the safest and most productive experience to-date."

About Corporaal Enterprises

Western Australia based Corporaal Enterprises was founded on a passion for developing new technologies and drilling techniques in the mining industry. This has paved the way for the future of the industry, improving safety and operational costs to drive the most efficient drilling and mining assets as possible.

Since 2012, the family-owned and operated business has offered a range of products and services, from drilling consumables, rig attachments & sampling systems.

As a one-stop shop for drilling equipment, the company designs and manufactures products that meet exact specifications and built to the highest quality.

With over 100 years of combined experience in the drilling industry, the team is at the forefront of innovative drilling technologies. Corporaal Enterprises is built on a solid foundation of innovation and creativity.

For more information, visit
www.corporaal.com.au
AMR



"It ticks all the boxes when it comes to hammer maintenance. There's no chains or manual hydraulic pumps, just a quality fabricated product that eliminates risk and keeps operators safe when performing their duties."



LIGHTING IT UP WITH MOMA SOLAR

When you're running a mining camp or major mineral processing operation, reliable and durable equipment are what keep production moving.

With multiple projects happening simultaneously in different areas of a site, particularly in applications prone to low visibility and high wind, dusty conditions, the ideal lighting solutions are critical.

Mining companies want products that perform when it counts and rely on suppliers to understand what problems that may encounter ahead of time. This comes down to products that are designed to meet specific site needs, but can also be adapted to constantly changing onsite activities.

In the absence of electrical connectivity in remote sections of a mine, combined with a shift toward more sustainable technology, products must be able to rely on alternative forms of power derived from renewable sources.

Australian company MOMA Solar is shaking up lighting solutions in the mining industry with its range of high quality, environmentally conscious products.

The company supplies a range of solar products including both temporary and permanent solutions, from lighting pathways, buildings and storage containers to radar speed signs, vandal proof bollards and se-

curity cameras. Once installed, their solar LED systems require minimal maintenance and also help companies lower their operational costs.

According to Michael Jarvis, Director of MOMA Solar, the company has worked extensively alongside Australia's most recognised mining companies to design products that meet the unique requirements faced by mines of all sizes.

"As miners look for solutions that help them achieve their robust sustainability agendas, it's only natural they adopt renewable technology," said Mr Jarvis.

"We're committed to creating positive environmental change by developing sustainable solutions at an affordable price, and our commercial and industrial solar LED lighting solutions reflect this."

MOMA's water and sand filled bases have proven ideal for mining camps as they offer a no-dig solution to temporary lighting, are easy to move in fluctuating weather conditions, and can be reused for future camp sites.

The company's bases are category A and B wind region certified, and the solar panels are easy to clean with soap and water for high dust areas. MOMA's lighting products have been designed to operate with continued autonomous battery maintenance in

low light areas, reducing the chance of battery depletion during low light or dim weather conditions.

Weighting just 37kg when empty and approximately 637kg when filled, it is not only a great zero emissions alternative, but can also help reduce onsite risks often associated with lighting and lighting towers.

The module is fitted with convenient lift handles and does not require any additional equipment to assemble. It is an ideal alternative to concrete or diesel generators which can weigh up to 1 tonne, which pose a risk to onsite personnel during the unloading, assembling and dismantling process.

The Pop-Up Base removes this risk entirely to create a safer working environment. The lightweight nature of the base provides easy stacking for transportation and storage, which promotes ongoing use and reduced waste. The base can be easily moved if lighting requirements change over the course of a project without the need to re-hire or transport specialised equipment to facilitate the move.

It's also compatible with the patented Swivel Joint pole created by Swivelpole. Available in either 4m or 6m, the Swivel Joint pole can be easily lowered or raised as required, eliminating the need to assemble or access mounted lighting or equipment at heights.

"Working at heights is often one of the most common risks associated with mine sites," said Mr Jarvis.

"By removing risk with products like the patented Swivelpole, we are able to offer clients peace of mind when it comes to ongoing maintenance in high dust areas. No specialised equipment is needed to access the solar light head, which provides easy maintenance, and seamless removal and replacement if required.

"Additionally, onsite electricians have a high risk of electrical shocks or short circuits with low voltage equipment often in use. To combat any potential risk, our solar light head is extra low voltage, which allows the electricians to conduct maintenance checks or install replacement parts, without compromising their safety."

Aside from onsite personnel, there are also environmental risks to be considered when erecting lighting towers. In the case of diesel powered towers, common risks include emissions, spills, ground leaching and noise pollution.

Although more applicable to onsite personnel, the installation of concrete bases poses an environmental risk due to the ground surface impact and subsequent removal of the unit. The area around a concrete installation experiences heavy disturbance from the equipment required to keep personnel

safe. Despite these necessary safety measures, the environmental risk relates to the equipment used, which is generally diesel powered.

"Using a solar light head and water fillable base mitigates these risks," said Mr Jarvis. "Our bases are made of durable MDPE that do not leach any harmful chemicals into the water over the duration of its use, making it safe to empty onsite as required.

"As the light head is battery powered, you don't get any noise pollution or any low ground vibration from the use of engines. The unit can also be assembled by hand, removing the risk of heavy ground impact during installation and removal from site."

Another obvious risk relates to low light conditions or unreliable lighting. Insufficient lighting for a specific application can often lead to hazards associated with poor visibility. This can include potential trip hazards or site personnel running into obstacles that are not clearly visible, through to more significant risks such as poor visibility when operating equipment.

A fit-for-purpose lighting tower removes these risks and provides a safer working environment for all personnel actively performing duties or during their downtime.

While poor lighting can be associated with low lighting, bright light and glare must also

be considered. MOMA Solar offers lighting engineering services at no additional cost for this very reason, ensuring fit-for-purpose lighting is provided in alignment with all Australian Lighting Standards and any site lux requirements.

The easy assembly and disassembly of the Solar Pop-Up Module allows mine managers to secure sufficient lighting quickly wherever it's needed. Should either a higher or lower lux level be required, the pole can be easily lowered and a new light head attached to suit site applications. The same base and pole can also be repeatedly used to reduce waste, extending the life of the product.

Allowing not only lighting to be mounted, but also additional onsite equipment that would otherwise be mounted using a concrete or a diesel powered base, mine sites will benefit from the ability to mount air monitoring equipment, communications modules, road monitoring equipment and instrumentation, onto a single unit.

For more information, visit
www.momasolar.com.au
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Patented Swivel Joint pole from Swivelpole™ can be easily lowered or raised, eliminating the need to work at heights.

Provides safe access and easy maintenance.



STREAMLINING MINING OPERATIONS WITH ELIOS 3



In the mining industry, efficient operations rely on safety and operational clarity. This work requires constant monitoring and periodic inspections, which at times can be very dangerous and expensive, especially when inspecting large assets in remote and hostile environments.

Flyability's Elios 3 drone was created for operations in confined spaces, allowing inspectors to inspect, survey, and map inaccessible areas from a safe distance while the drone collects inspection data.

Elios 3 is the world's first collision-tolerant drone equipped with a LiDAR sensor for indoor 3D mapping. The drone is powered by a new SLAM engine called FlyAware™ that lets it create 3D models as it flies and is accompanied by a new version of Flyability's software for inspectors, Inspector 4.0.

Flyability pioneered confined space inspection drones with its first product in 2016. With the launch of Elios 3, it continues its pledge to create cutting-edge technology designed to keep humans out of dangerous

places to perform the most demanding inspection tasks.

"The Elios 3 has some of the very best stabilization in the world, a modular payload, the ability to create 3D models in real-time while in flight, and it paves the way towards an increasingly autonomous future," said Patrick Thévoz, co-founder and CEO of Flyability.

"For industrial inspections, the Elios 3 is a key enabler of Industry 4.0, presenting an inspection solution that can make inspections safer, more efficient, and less expensive than ever before."

Underground applications for the Elios 3 are extensive. Thanks to its rotating LiDAR sensor, Elios 3 provides an omni-directional field of view, ensuring 3D data is collected in all directions. Accurate model measurement and volume calculations are made possible without GPS.

Equipped with Elios 3 and its high-density point clouds, surveyors and engineers can quickly collect data in no-go zones and pro-

vide underground insights that have not been possible before. In addition to carrying a LiDAR sensor, the Elios 3 can accommodate a second payload that allows it to be customized for each individual user's needs.

The Elios 3 is powered by Flyability's new proprietary **SLAM** engine FlyAware™, allowing it to turn the drone's **LiDAR data** into 3D models in real time, while the drone is in flight. FlyAware™ also gives the Elios 3 groundbreaking stability, combining data from the drone's three optical cameras and its LiDAR sensor to catch the tiniest unpredictable movement and instruct the flight controller to compensate for it. This stability and other ease-of-use features make the Elios 3 incredibly easy to operate, so that new pilots can be trained and perform their first inspection in the same day.

Using Flyability's new Inspector 4.0 software made for reporting with the Elios 3, inspectors can now visualize Points of Interest found during an inspection in a high-resolution 3D map using Inspector 4.0's 3D Map Viewer. This feature lets stakeholders navi-

gate from POI to POI in a digital representation of their assets, providing a clear visualization of the defects found within them to support planning, monitoring, and maintenance efforts.

During a recent inspection in an Ore mine, 3D maps from Elios 3 has helped the mining operation find the cause of ore pass hang-up in 10 minutes. The Elios 3 was able to fly directly up the ore pass and provide both visual and LiDAR data represented in a 3D Live Map showing exactly what the hang-up looked like, providing crucial information for determining its cause. This has significantly reduced the time from two months to just ten minutes to find the cause, and provide precise locational data, thus potentially avoiding weeks of waste labour in drilling exploratory holes to pinpoint its location. The Elios 3's 3D Live Map and its geolocational data allowed mine personnel to see exactly where the hang-up was located and how it was situated in the ore pass, potentially avoiding weeks of wasted labour in drilling exploratory holes to pinpoint its location.

"The Elios 3 is the single biggest project that Flyability has ever undertaken," said Adrien Briod, CTO of Flyability. "If you think of the Elios 2 as your classic flip phone, only designed to make phone calls, the Elios 3 is the smartphone. It's made to be customized for the specific demands of each user, letting you attach the payload you need so you can use the tool as you like, and allowing it to grow and improve over time with new payloads or software solutions."

Flyability has been working on the Elios 3 for four years. In that time, its engineers have spent thousands of hours on research and development and performed over 200 missions in the field to collect feedback, learn what clients want, and refine the technology in order to make the most reliable indoor drone on the market. **AMR**

For more information on Elios 3
www.flyability.com | sales@flyability.com

https://www.youtube.com/watch?v=37fjx7tdY8ab_channel=flyability

Click to play video! ↗

Contact

Website



FORGET FATIGUE WITH FLEETWARE'S SMART AI DASHCAM

It's hard to imagine how fleet managers kept track of their drivers and vehicles before the introduction of dashcam technology currently used in today's mine sites. The lack of visibility in monitoring driving behaviour when hauling payloads at the helm of a 300 ton dump truck day-in-day out is certainly a daunting prospect.

In-Vehicle Monitoring Systems (IVMS), GPS tracking, and real-time video streaming are just some examples of technology supporting mine managers to improve safety, compliance and profitability across their operations.

These technologies are delivering valuable

insights and greater visibility over driver behaviour through timely alerts and notifications that eliminate human error, preventing crashes and safety incidents.

In 2020, Frost and Sullivan released a video telematics whitepaper that highlighted the benefits of installing an all-in-one video telematics solution in a vehicle based on the causes of accidents.

It reported an 80% reduction in driver distraction, a 65% reduction in speeding incidents, a 70% increase in seatbelt usage, a 60% reduction in collisions, and a 25% reduction in insurance claims.

Trusted by hundreds of companies, both large and small, Fleetware leverages over 20 years of combined experience to support clients in maintaining safe, productive sites from mining, construction and earthmoving, through to trucking and heavy haulage, transport, Government and agriculture.

Fleetware's reliable GPS tracking and telematics solutions are designed to give fleet managers peace of mind, offering improved asset utilisation, reduced costs and increased productivity, in-depth analysis and monitoring of vehicle operators, and performance enhancements and efficiencies.

According to Fleetware Director, Matt Cooper, technology that monitors driver behaviours is becoming increasingly critical in identifying and overcoming the root causes of vehicle accidents.

"Our systems improve driver safety and keeps them accountable with automatic detection and in-cab notification of risky and

distracted driving, whether it's mobile phone usage, safe distance monitoring, front and pedestrian collision, and lane departure, or speed sign recognition, fatigue and seatbelt detection."

"We're seeing mining companies start to push back on contractors to ensure their vehicle fleets are equipped with smart dashcam and fleet tracking technology.

"IVMS and sending video clips to the cloud are one thing, however the latest systems are utilising artificial intelligence to monitor everything both inside and outside a vehicle.

"We take a highly consultative approach to business and partner with multiple best-in-class technology providers. This means we can offer a bespoke solution that meets the specific needs of a vehicle or site, with technology that all integrates within Fleetware's comprehensive software solution."

THE SMARTEST CAB COMPANION YET

Fleetware's smart AI dashcam combines the power of telematics, artificial intelligence, machine learning and edge computing to create a powerful in-vehicle safety system. It captures and analyses video footage and sensor information in real-time, identifying high-risk events both inside and outside the vehicle.

This compact, all-in-one solution combines a telematics unit with real-time streaming video, a forward-facing ADAS camera and a driver-facing fatigue camera.

The forward-facing camera detects lane

departure, forward collision, pedestrian collision, following too close and overspeeding by reading speed signs. The driver-facing fatigue camera detects yawning, falling asleep, distraction, smoking, seatbelt and phone usage.

As mining applications are inherently risky, particularly in the case of heavy earthmoving equipment, Fleetware's AI smart dashcam automatically detects and uploads risky driving behaviour, providing fleet managers with complete visibility of how vehicles are being operated. This in turn reduces the rate of incidents, keeping drivers safe and vehicles on the road.

The dashcam technology also proves useful in instances where video evidence is required to exonerate drivers following an accident. The 5K road facing camera with 60 metre ADAS detection range, records extreme detail which can be used to protect drivers and get buy-in.

Drivers can also manually trigger the panic button to capture brake checks or other erratic driver behaviour.

Ultimately, a core function of the smart AI dashcam is to improve driver behaviour and prevent safety incidents through real-time, optional cab audio and visual feedback. It serves as a virtual coaching and training tool to instruct drivers about risky situations on the spot using real-time video streaming.

When it comes to insurance and repair costs, Fleetware's technology saves companies time and money. With a reduction in accidents, comes a reduction in insurance claims, insurance excesses and the pros-

pect of increasing insurance premiums. It also avoids the tedious and time-consuming process of dealing with insurance assessors and workers compensation claims.

"Our solution is truly the most comprehensive offering in the market," said Matt.

"Not only does our AI dashcam feature everything you need, it comes at a fraction of the cost of other technology available. The Fleetware system is easy to install and doesn't require a time consuming and costly setup process, so you will see benefits immediately."

"There is also the issue of chain of custody. When a client requests a piece of machinery, they are unable to place undue pressure on the equipment or delivery contractors due to the potential risk of accident involved, which can lead to them being accountable.

That's where technology like our AI dashcam plays a critical role in monitoring driver behaviour and reporting incidents in real-time, keeping drivers safe at each stage of their journey.

"Whether its checking for seatbelt and device usage, smoking and speed detection, the dashcam will alert the driver and send a video clip to cloud.

"This extends to the haul roads on a mine site. As these roads and assigned speed limits change on a regular basis, which automatically updates, ensuring drivers are always up-to-date."

Fleetware's solution also incorporates a range of value add safety features for when

vehicles are on the move, or inappropriate manoeuvring is detected. From lane departure alerts, headway monitoring, imminent forward collision, and pedestrian collision, to speed sign recognition, drivers are alerted when the system detects inattention and distraction.

MORE THAN JUST FLEET TRACKING

Far too often, businesses make significant investments in hardware and software that fail to deliver on what they actually need. Implementing a fleet tracking and telematics solution is about determining the ideal technologies and solutions that best align to the needs of a business based on productivity, compliance, profitability, safety, customer service and efficiency.

Fleetware not only prides itself on delivering innovative fleet tracking technology, but also offering its clients an end-to-end telematics consulting service.

As an industry leader in telematics consulting, the company connects entire assets with a single, integrated platform that offers solutions for both equipment and fleet management.

Another area where Fleetware is providing expertise is in simplifying fuel tax claims and maximising rebates for clients. Its customised fleet tracking systems help reduce the complexity of fuel tax credit claims using GPS and telematics.

"With the automatic classification of roads and locations, tracking of mileage and key vehicle information, and fuel expense capture, our systems are simple to use thanks to automatic calculations of real-time on-road and off-road travel, helping maximise tax rebates," said Matt.

"Our technology is ideal for mine operations as it enables you to precisely identify all your fleet's off-road activity and increase the accuracy, efficiency and transparency of your claims.

"This is achieved through detailed GPS data, mapping and spatial analysis that provide accurate fuel appointment, combined with automated telematics integrations and advanced analytical processing that deliver results at the start of the month, every month."

For more information, visit
fleetware.net.au
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INTUITIVE TELEMATICS THAT CONNECT AND PROTECT

Safety and compliance are constantly in the crosshairs of mine operators, particularly in the area of fleet management where protecting people and plant is critical. As the mining industry transitions to more automated and digitally connected operations, technological advancements are driving improvements in safety and compliance.



From integrated automation, data analytics, and artificial intelligence, to drones, GPS fleet tracking, and environmental monitoring, asset owners are leveraging new technology to reduce or eliminate risk, and increase productivity and efficiency.

Data captured by connected assets, vehicles, and equipment provides mine managers with deep, actionable insights that can streamline site processes, saving time and money. It also allows more effective tracking of valuable assets and personnel in remote, sometimes hazardous areas.

Digitally enabled solutions are helping improve safety and compliance by reducing human error, and making it easier and less dangerous for mine workers to operate plant equipment. This is becoming increasingly evident in applications such as collision avoidance, real-time fleet and asset scheduling, employee training and accident tracking and reporting.

The convergence of fleet management and telematics solutions are providing mining companies with critical insights to improve onsite operations and prevent life threatening accidents.

Whether it's greater visibility of assets and vehicles, task and journey management, driver behaviour and performance monitoring, optimised communication or improved worker safety, telematics are revolutionising how sites perform on many different levels.

According to Brodie von Berg, Managing Director of MiX Telematics Australasia and MEA, telematics technology such as in-cab video monitoring systems have become a core element of overall safety and fleet management strategies.

"Telematics systems are proving an increasingly effective solution to lowering the risk of mine vehicle collisions and making vehicle and equipment movement onsite more efficient," said Mr von Berg.

"Intuitive in-cab video monitoring alongside telematics can also help protect drivers by providing instant alerts for specific violations and improve driver safety.

"Our new AI dashcam technology is taking fleet safety management to the next level. It can detect fatigue, lane departure, distraction, seat-belt use, front collision likelihood and more.

"By combining AI and data insights with the power of real-time video and advanced sensors, businesses can take full advantage of their entire telematics system by leveraging this data to secure worksites and transport routes."

The Future of Mine Vehicle Safety

Driving-related crashes cost fleet operators millions each year. Not only as a result of accidents, fines, maintenance and damages, but also due to insurance claims that are sometimes false and often unnecessary.

Now, new technology such as MiX Vision AI, is allowing customers to determine exactly which events and driving behaviours typically contribute to a crash. This is supported by accurate AI-powered data that serves as visual evidence when it matters most.

MiX Telematics offers solutions that are integrated with a comprehensive In Vehicle Monitoring System (IVMS) for evaluating driver behaviour and overall fleet efficiency. A fully integrated solution like this means that video can be automatically added to driver profiles for easy coaching, and linked to reports depicting specific triggered events.

The company's MiX Vision AI Dashcam is a true example of an AI video telematics solution that detects, alerts and provides insights into risky driver behaviour. The AI video telematics can be configured to provide a full view of the road and in-cab, and can be connected to any vehicle type.

"Video is not only useful in accident investigations, but also in identifying unsafe driving behaviours such as speeding, harsh acceleration, hard braking and corner handling," said Mr von Berg.

"When managers integrate in-cab video monitoring with an IVMS, they can include video recordings in driver safety scoring reports, which serves as a valuable tool to educate drivers about safe driving behaviour and support their future learning."

"Our data-rich vehicle telematics are essentially offering asset owners a comprehensive fleet management solution with full operational visibility over their assets."

Intelligent Bird's-Eye View

What makes MiX Vision AI different is its use of advanced machine learning technology that integrates seamlessly into MiX Telematics' premium fleet management solution.

It features an intelligent camera that detects and monitors vehicle and driver behaviours, and anticipates which of these behaviours could potentially lead to an accident – from speeding, harsh acceleration and braking, driver fatigue and seat belt usage, to phone use while driving, lane departure, forward collision warning and following distance.

When a predetermined driving event is triggered, a video recording is automatically started and the driver is warned via an in-

cab alert to correct the behaviour.

Video recordings and data from the vehicle's on-board computer flows via secure hosting infrastructure to where it can be accessed by customers in the MiX Fleet Manager software platform, as well as via the MiX Fleet Manager Mobile app.

In both report and data view, video icons are intuitively positioned, making access to relevant videos and coaching of drivers that much easier.

Extended high-resolution videos are available on demand, offering accurate visual evidence before, during and after an event, which is a critical factor in the subrogation of insurance claims and preventing future incidents.

More Than Just In-Cab Video

By adopting smart video technology like MiX Vision AI, fleet managers are able to connect and protect their vehicles and people in a way like never before.

Aside from improved safety, efficiency, and cost savings, managers gain supervisory insight into what drivers do while on the road. Mr Von Berg says the company's MiX Vision AI technology helps managers detect and act on fatigue, improve driver coaching with the use of visuals, reduce incident-related costs and liability, improve accident investigation and lower risk-related insurance overheads.

"AI-powered video is not only beneficial for fleet managers, but also for drivers," he said. "Drivers receive more contextual information related to their driving performance, are more engaged in the coaching process, and feel protected by their employer when faced with potentially false insurance claims.

"At the end of the day, MiX Vision AI improves driver retention as it demonstrates the company is invested in helping them achieve their goals and improve safety with driver-focused, duty-of-care technologies.

"Our clients also have the added bonus in that they receive one complete solution, one contract and one service provider to monitor risky driving behaviour and get access to insightful, data-rich reporting."

For more information, visit
www.mixtelematics.com/dashcams

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mX | TELEMATICS

MINE SAFER WITH CREW COMPANION



Harsh environments like underground mines are places where security and safety matter most. Blocked tunnels, disrupted communication lines and blackouts will make an evacuation a chaotic nightmare even for a well-trained team. With difficult conditions and the nearest exit kilometres away, locating employees in a timely manner is critical.

Blasting is no exception. Mine operators are well aware of the difficulty and stress associated with precisely locating a workforce in time within the blast schedule. Intelligent tracking technology offers an easy way to monitor the location and safety of personnel while they perform their duties, either underground or at the blast site.

Whether you're working in a team, or as a lone worker, tracking the location of personnel in real-time is an invaluable way of improving safety in an emergency event. Real-time data provides mine managers and rescue teams with the ability to monitor workers' whereabouts, quickly respond to emergencies, and prevention of escalations. Modern tracking devices incorporate RFID technology, which communicates with a central server, and is accessible by mine managers or emergency services, giving them accurate location details to support a strategic response.

Identec Solutions is one company delivering peace of mind to miners through its proven, scalable and customisable personnel monitoring solution, Crew Companion.

Crew Companion is specifically designed to deliver real-time location data enabling mine managers to pinpoint where their workers are, improve blasting performance, and increase overall efficiency.

According to Geir Nerbø, Global VP Sales of Identec Solutions, if you are looking for a reliable proven alternative to manual access and exit routines in mines, why not benefit from an automated solution that delivers all personnel location data in one dashboard.

"Crew Companion was developed to address the complex demands of underground and open-pit mine operations, while meeting strict industry and HSE guidelines," said Mr Nerbø.

"It's an automated safety system that combines flexible hardware and software, which offers real-time information on your personnel's location exactly when and where you need it.

"We give mine managers complete control and visibility over their operation, improving safety and delivering valuable insights that help teams function more efficiently, and better utilise their resources.

"That's why we're trusted by the world's largest underground mine operators across the world, including Codelco's El Teniente copper mine, and LKAB's Malmberget and Kiruna iron ore mines."

Real-Time Headcount Underground

In an effort to maximise safety and productivity, Crew Companion uses a personnel transponder that is easily carried in a pocket, around the wrist or neck, or attached to the helmet. It enables effective and reliable day-to-day operations without human intervention.

Crew Companion relays vital location data to the control room operator so they know exactly where personnel are at all times, and ensures they are well clear when it nears blast time. In an emergency, the operator is alerted if personnel have reached designated safe areas or exited the mine, or determines when and where they were last seen.

"Built on a highly dependable backbone, Crew Companion features several integrated optional modules that provide you with automated personnel visibility, access control systems and workflow optimisation," said Mr Nerbø.

"A key feature of the solution is its modular, fully scalable and customisable design,

which allows mine managers to increase the number of personnel transponders by adding, removing, or relocating mustering zones with minimum effort.

"You can add several thousand transponders to the system, making it very scalable to fit your individual needs. There's also no need for swipe cards or manual actions, which eliminates the risk of human error.

"The transponders are easy to install and maintain in all areas of a mine, and is the only system on the market that is intrinsically safe and doesn't require heavy steel enclosures to meet ATEX requirements."

When it comes to improving safety and efficiency in an emergency, Crew Companion's mobile identity check includes an offline mode to mitigate network connectivity issues, and features an explosion-proof system with an automated headcount per mustering zone for real-time and rapid identification of missing personnel.

With visibility comes insight, and operators can now analyse and fine-tune processes to improve blasting performance.

Crew Companion also includes an access control system for all the entry and exit points of a mine, and works with the same transponder worn by personnel.

In instances where search and rescue teams are deployed, the system provides the added insight that all personnel are located in a secure chamber or safe zone. This eliminates the need to risk more lives during a rescue mission, allowing teams to wait until the situation is safely under control.

LKAB's Trusted Companion

Europe's largest iron ore producer LKAB historically lacked an effective asset tracking solution, meaning blasts had to be stopped if a miner could not be located, resulting in production delays, unnecessary downtime, and higher costs.

The threat of injured or missing personnel, and reduced profit, led LKAB to search for a suitable and 100% reliable solution to cover their monitoring needs.

LKAB has been using Identec's Crew Companion for almost 20 years, without a single failure stopping their blasting schedules. The system has increased safety underground, allowing operators to oversee all personnel in all areas of the mine at once, and in real-time.

When LKAB conducts blasts, all personnel which are supposed to still be in the mine, move into safe zones and remain at a safe distance while hazardous gases and dust are ventilated following an explosion. Miners then return as soon as it is declared safe to complete their duties.

The use of Crew Companion reflects the company's strict focus on safety and protecting their workers underground.

"An important feature for LKAB is the ability to grow the Crew Companion system as the mine expands and goes deeper," said Mr Nerbø.

"They can install the reader themselves, add them to the database, and immediately start monitoring in new areas.

"The decision to shift to RFID technology proved the right choice for LKAB, especially in relation to daily shift changes in their Kiruna mine. From a performance perspective, several hundred people move in and out of the mine in busses at a speed of 50 km/h. Crew Companion reads all of them and displays them based on the current zone.

"The LKAB team required a proven system with strong after-market service capabilities, and that's exactly what they received with Crew Companion."

For more information, visit
www.identecsolutions.com

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Crew Companion
User Interface

NOTIFICATION

CHECK-CIRCLE KNOW WHAT YOU HAVE AND WHERE IT IS.
CHECK-CIRCLE LOW COST TRACKING FOR STAFF AND EQUIPMENT.

The process of monitoring plant equipment and people doesn't have to be complicated or expensive. With the latest in IoT asset management solutions, keeping track of every valuable asset is now easier than ever.

Solutions that were once expensive and heavily engineered were only available to companies at the big end of town. However, these are now accessible to everyone, from small businesses to large-scale enterprises.

Today, there are simple, plug and play solutions that seamlessly connect and integrate a site's assets into its existing business systems.

As businesses search for better ways to increase operational and cost efficiencies, while gaining greater visibility over their assets, tracking personnel, equipment and tools remains in the spotlight.

With significant investment in equipment, maintenance, and personnel, identifying opportunities to optimise productivity in day-to-day operations can be achieved through IoT enabled solutions.

Whether it's tracking lost or misplaced tools, or people across a site, real-time asset visibility can help locate assets quickly, minimising downtime and associated costs.

Melbourne-based company IOTTAG, is changing the game when it comes to asset tracking in mining and construction operations.

Their low-cost, low maintenance asset tags collect data in real-time based on behavioural characteristics of an asset, which deliver deep insights into operational performance through rich data analytics and location awareness.

According to Stefan Camille, Co-Founder of IOTTAG, the Australian company empowers asset owners that previously had limited asset activity data required to enable actionable insights for a competitive edge.

"Our asset tracking solutions offer incredible insight via a simple platform which is accessible to businesses of all sizes," said Stefan.

"We deliver real value that improves decision making to reduce downtime and increase asset utilisation. Our technology essentially allows asset managers to monitor, locate and protect their assets from anywhere, at any time."

For equipment and personnel heavy businesses, IOTTAG pioneers smart alerts that focus on reducing the industry average 16% CAPEX waste created by equipment, and 9% OPEX waste from staff, to increase overall site performance and profitability.

Track anything that moves
Whether above or below ground, protecting your people no matter the environment is paramount. The ability to simply attach an asset tag to anything that moves, is not only

inexpensive, but it provides a single pane of glass view into your operations.

Stefan says Iottag's smart asset tracking solutions empower operational managers and automate business processes more effectively by collecting, reporting, analysing and actioning data. This makes it possible to manage individual assets across vast sites.

"Our tiny wireless, battery operated tags can be attached to any asset. This powerful system allows fleet managers to remotely keep track of all their assets from the palm of their hand.

"Integration is easy, and asset activity data can be delivered via API to existing business systems, for seamless integration.

"As a technology agnostic service provider, we're unbiased with the tech we use, so our clients benefit from access to a wide range of best-in-class products suited to their specific site requirements.

"It's really just a balancing act to select the right technologies that are fit-for-purpose. We harvest data from sources such as Wi-Fi, Bluetooth, GPS, and RFID, so it just depends on the clients' cost, maintenance and accuracy requirements."

The company's asset tags, combined with its versatile Atlas app platform, provide a new

level of smart asset management. It not only offers comprehensive fleet visibility, but it's been designed with staff, contractors, and management in mind.

"Asset protection is a key feature of the system," said Stefan.

"We understand it is difficult to gain 100% compliance of staff and contractors, so we have created advanced automated sign-in and sign-out methods.

"The built-in monitoring mode protects assets by delivering timely alerts to staff and management when danger of misplacement or non-compliance are detected. It essentially improves accountability for the assets across a site.

"Awareness of where your staff are when performing their day-to-day duties ensures they can be monitored for safety and warned in case of emergency.

"Our asset tracking also proves an effective solution when it comes to personnel safety in emergency evacuations or shutdowns. All personnel can be tracked from the field to designated muster points."

Aside from safer work environments and personnel tracking, IOTTAG's technology is helping drive a return on investment among the flagship companies it works with

U ~A

STEP 2: TRACK, MONITOR & ALERTS.

EQUIPMENT TRACKING

STEP 1: ATTACHED A TINY TAG TO ANYTHING.

ASSET TRACKING MADE SIMPLE



CHECK-CIRCLE REAL-TIME LOCATION
CHECK-CIRCLE ASSETS MISSING ALERT
CHECK-CIRCLE UTILISATION REPORT
CHECK-CIRCLE CUSTODIAN REPORT
CHECK-CIRCLE STAFF TIME-IN/OUT REPORT

through cost efficiencies, productivity gains and better project management.

From improved equipment utilisation and protection, to workflow optimisation and site productivity, Iottag's solutions are a value add to the modern fleet manager's toolkit.

Eliminating loss with comprehensive records of where equipment is, and data insights on how productive the assets being

tracked are, supports performance and productivity improvements year-on-year. **AMR**

For more information on Iottag's asset management solutions, visit <https://iottag.com.au/> or contact one of their experts today on 1300 662 280.



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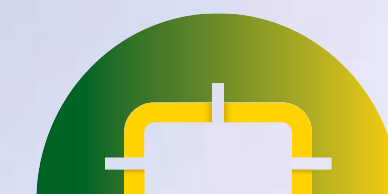


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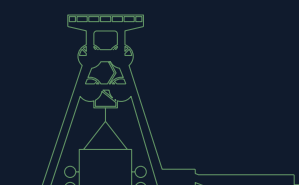
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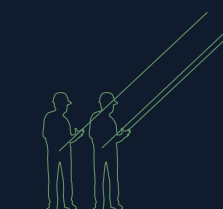
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P (03) 9703 2250
F (03) 9703 2285
E sales@fmt.com.au

BRISBANE

A Unit 2, 5 Percy Drive, Brendale QLD 4500
P (07) 3889 7622
F (07) 3889 7621
E sales@fmt.com.au

PERTH

A Unit 3, 48 Hardey Road, Belmont WA 6104
P (08) 9470 6088
F (08) 9470 6388
E sales@fmt.com.au

