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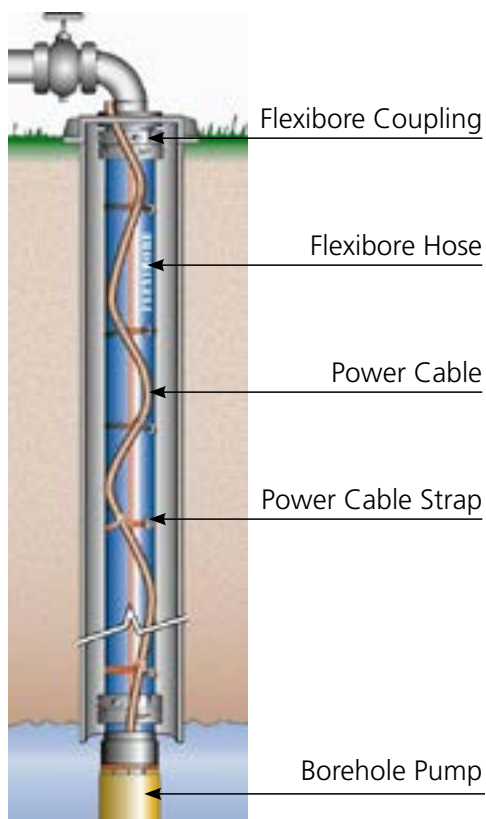
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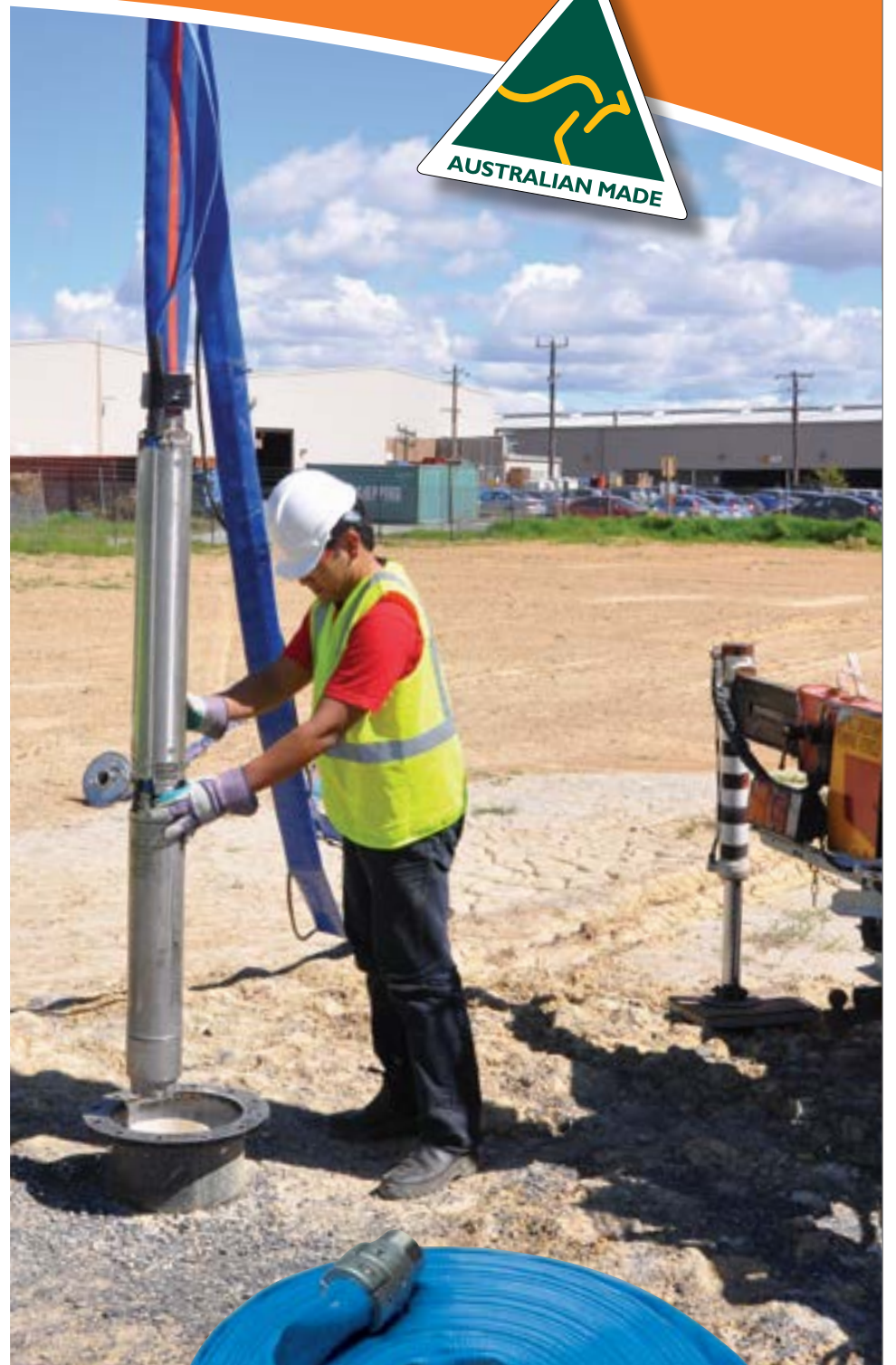
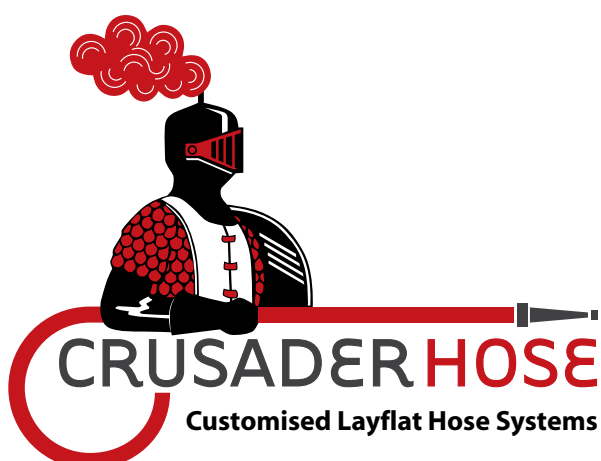
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LOOKING OUT FOR MATES



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GOLD ON FIRE



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MAINTENANCE IN MINING

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MAJOR COMMODITIES SNAPSHOT

GOLD SUS/oz

The gold price has stagnated around \$US1900/oz and continues to be influenced by the US dollar and election. Many investors were hopeful a fiscal stimulus package could reignite another rally in the safe-haven asset as the election drew nearer.



IRON ORE SUS/t 62% Fe CFR China

Prices dipped slightly due to a lull in iron ore buying from Chinese steelmakers and are expected to drop further to about US\$100/t over the final quarter of 2020 and to about US\$80/t by the end of 2021.



COPPER SUS/t LME Price

China's strong economic recovery is underpinning a rally in the copper price, which is also being driven upwards by the weakening greenback and fears over supply disruptions in Peru and Chile.



COBALT SUS/t LME Price

Cobalt prices remained steady due to continued demand from battery makers and rumours of stockpiling in China. Tesla's push for cobalt-free batteries is expected to push prices down in the longer term.



ALUMINIUM SUS/t LME Price

Rising demand from China and some parts of Europe have sent aluminium prices on an upwards trajectory since early October. Prices have risen almost 30 per cent since April.



COAL SUS/oz LME Price

Coal has defied expectations of price drops amid higher than expected demand from China and the near completion of the Adani's Carmichael mine in Queensland. The mine will produce 10mt of thermal coal a year, to be exported to India and southeast Asia.



LEAD SUS/t LME Price

After reaching a seven-month high in mid-August, the price of lead has dropped slightly amid an easing over supply concerns and continued global uncertainty.



NICKEL SUS/t LME Price

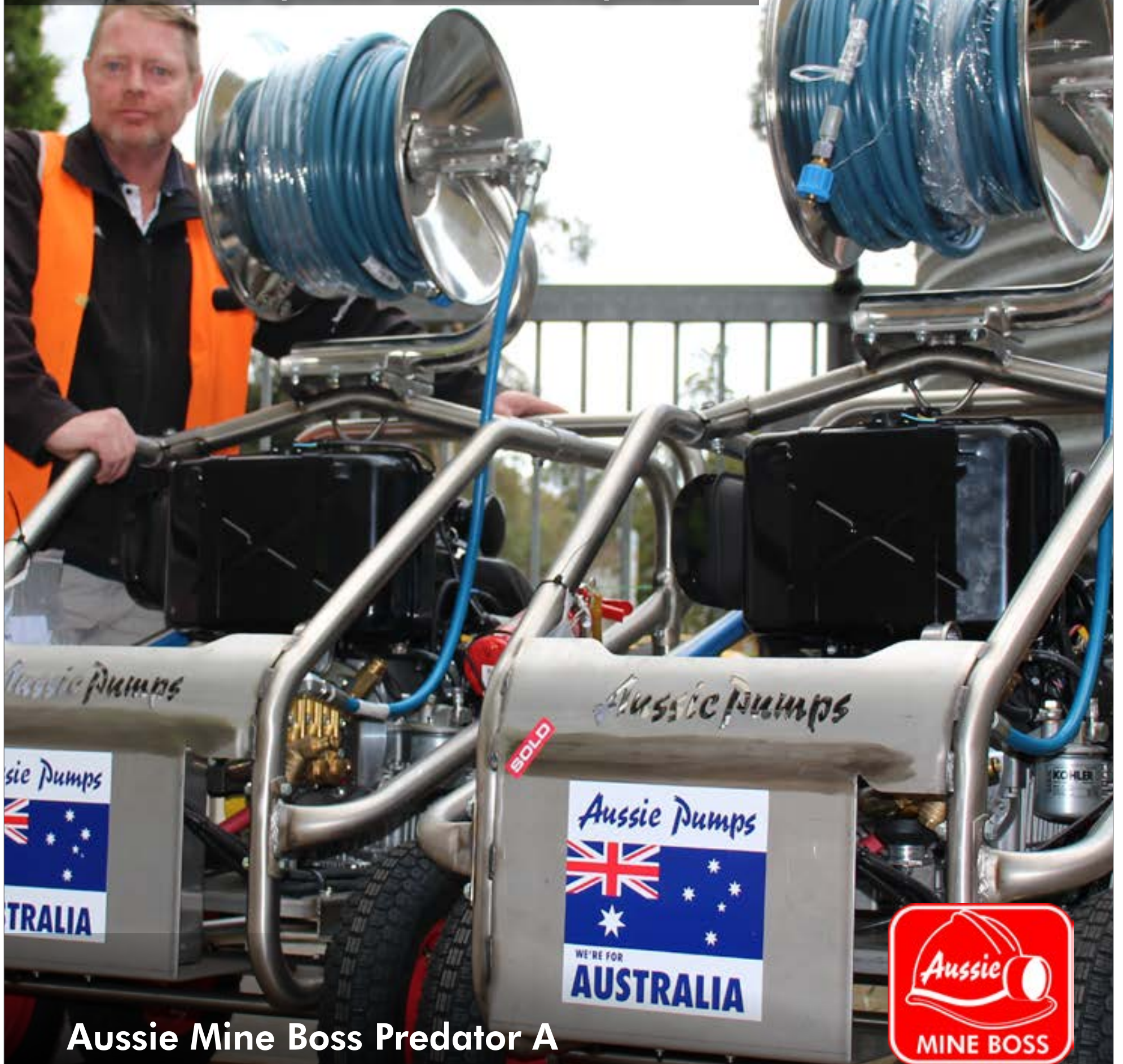
Nickel has continued its upward trajectory due to strong Chinese demand, stimulus spending expectations, concerns over shortages and Elon Musk's call for miners to lift production.



* Prices as at the 1st November 2020

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BUDGET RECOGNISES MINING ROLE

The Australian Government's 2020-21 federal budget has prioritised the development of northern Australia and Australia's gas and resources sector by focusing on training and education, research and development in manufacturing and supporting industries.

As part of its COVID-19 Economic Recovery Plan, the Government has announced a series of reforms to the Northern Australia Infrastructure Facility (NAIF) aimed at improving the speed and scope of projects to be funded, that will further unlock economic opportunities and more jobs across the north.

The 2020-21 Budget also contains measures to support a gas-fired economic recovery, as well as initiatives to strengthen the resources and exploration sectors, and investing in regional communities undergoing water reform.

Resources

As part of the gas-fired recovery plan, the 2020-21 Budget includes \$28.3m to develop five Strategic Basin Plans which will unlock and accelerate the development of vast gas reserves, increase domestic supply and lower prices for households and businesses. This will start with plans for the Beetaloo Basin in the Northern Territory and the North Bowen and Galilee Basin in Queensland.

In addition, the Government is providing \$13.7m over four years to provide quality assured scientific research and information to communities living in gas development

regions through the CSIRO's Gas Industry Social and Environmental Research Alliance. Also in the resources sector, the Budget includes \$124.5m to fund an expanded Exploring for the Future Program.

The program, operated by Geoscience Australia, will deliver detailed data on potential resources in vast areas that have yet to be fully explored. This funding will help unlock new resources along two major corridors identified as resource-rich in both western and eastern parts of Australia.

The Government is also investing \$103.6m to undertake the critical foundational work required to build the National Radioactive Waste Management Facility, including establishing a dedicated agency for the management of Australia's radioactive waste that brings together responsibility and expertise in this important and specialised field.

The new Australian Radioactive Waste Agency will be based in Adelaide and be responsible for all functions of the National Radioactive Waste Management Facility, including engagement with the Kimba community in South Australia.

Northern Australia

Reforms for the Northern Australia Infrastructure Facility (NAIF) will ensure the \$5b facility will have more flexibility to bankroll investment in a wider range of projects across northern Australia, and will speed up investment approvals. This comes on top of July's announcement of a five-year extension to the NAIF until June 30, 2026.



The Budget will fund rehabilitation works for the former Rum Jungle copper and uranium mine in the Northern Territory.

The 2020-21 Budget also includes \$3.5m over two years to fund preliminary rehabilitation works at the former Rum Jungle copper and uranium mine in the Northern Territory. The funds will support land management and training jobs for local Indigenous communities.

Employment

A new JobMaker hiring credit will aim to accelerate employment growth for a post COVID-19 recovery, giving businesses incentives to employ job seekers aged 16 to 35 years old.

This \$4b pledge will support about 450,000 positions for young people from the 2020-21 financial year to the 2022-23 financial year, aiming to ensure Australians have the right skills for the jobs of the future.

The Government will also reduce regulations that impose costs, making it easier for new mining projects to get up and running.

WA

Meanwhile, WA has forecast a budget surplus of \$1.2b this financial year, despite the economic impacts of COVID, with Treasury anticipating the state's hard border will be down sometime between April and June next year.

Bumper iron ore royalties mean WA coffers will continue to exceed \$1b for three of the four years of the forward estimates, reducing to \$363m in 2021/22 and rebounding to almost \$1.5b by 2023/24.

The income from iron continues to prop up the state's bottom line, and is expected to generate \$7.4b this financial year alone. And that is based on an iron ore rate of US\$96.60/t, well below current levels.

The windfall means WA is the only state in Australia to avoid a deficit during the pandemic. Overall, the state economy is expected to grow 1.25% this financial year, defying global trends and the grim forecast of recession that was anticipated in April.

Treasurer Ben Wyatt said Treasury had based its modelling on the state's hard border coming down in the June quarter next year, although he stressed it was not government policy, and any decision would be based purely on health advice.

He said business and consumer sentiment were rebounding strongly, with retail trade increasing faster during August than in the past seven years. **AMR**



WA has the second largest nickel reserves in the world. Image: BHP

NICKEL NOT FICKLE FOR WA

Nickel may have been fickle, but it's one of the few commodities around which is performing solidly in the wake of COVID.

The fact was highlighted by WA Mines, Energy, and Petroleum Minister Bill Johnston as he opened the 2020 Paydirt Nickel Conference held in Perth in October.

He said WA, in particular, was in good stead when it came to the metal as a result of growing demand for lithium ion batteries, Indonesia's nickel ore export ban and the impact of the global pandemic.

"WA has the second largest nickel reserves in the world and some of the highest-grade deposits," he said.

"These deposits are clearly ideal for production of nickel sulphate, one of the mineral components that's used for a lithium-ion battery."

He said the State Government was a supporter of a downstream nickel processing industry in WA and he welcomed BHP Nickel West's continuing efforts to strengthen its nickel sulphate plant in Kwinana.

"We expect that plant, when it is completed, to be producing 100,000t of nickel sulphate, and we expect to see that in production next year," he said.

"Many people outside this room don't realise there is more nickel in a lithium-ion battery than there is lithium.

"So, we have a rapidly emerging battery metals processing sector here in WA, and we have got very strong relationships with the principal battery industry countries, like China, Japan, and South Korea.

"We have got a strong, proven and clear industry regulation framework that aligns with social expectations for environmental sustainability around the world."

Boosting the industry is the Future Battery Industry's (FBI) Property Research Centre, consisting of three main programs in train supporting industry development, including a \$10m pilot plant near Curtin University which aims to produce battery cathode material. **AMR**



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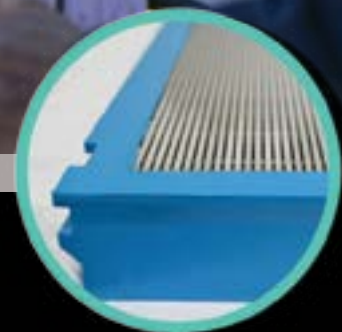
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SUPER MERGER FOR SUPER PIT

BY KATHLEEN SOUTHWAY

The merger between Northern Star Resources and Saracen Mineral Holdings, announced in early October, has sent ripples through the Australian gold mining industry.

The friendly alliance between the Australian owners of the Super Pit, managed by Kalgoorlie Consolidated Gold Mines (KCGM), will effectively create a new Top 10 global gold major with a \$16b market capitalisation.

The completion of the merger, anticipated around February 2021, will target new production levels of 2mozpa by FY27 from its Tier 1 locations at Kalgoorlie, Yandal and North America.

Northern Star Resources executive chairman Bill Beament, who will transition to Non-Executive Chair in July 2021, says the company has only ever pursued growth that will create value for its shareholders.

“This merger-of-equals will create an abundance of value for both Northern Star and Saracen shareholders,” he said.

“This is a significant value-creating M&A [and] our position as joint venture partners at KCGM, the close proximity of the majority of the combined company’s assets and a host of other synergies makes this a unique opportunity exclusive to Saracen and Northern Star shareholders.”

Northern Star’s Australian assets include its Kalgoorlie operations at Kanowna Belle,

Kundana, South Kalgoorlie and the KCGM (Super Pit) joint venture, as well as its Yandal operations at Jundee and Bronzewing.

The company, which enjoyed record throughput of 2.3mt at Jundee and 2.1mt at Kanowna Belle in FY20, including record product sales of 900,388oz, will hold its Annual General Meeting on November 25 as a fully virtual online event.

Saracen Mineral Holdings managing director Raleigh Finlayson, who will transition to Managing Director of the new conglomerate, said significant benefits will flow to Saracen shareholders from the merger.

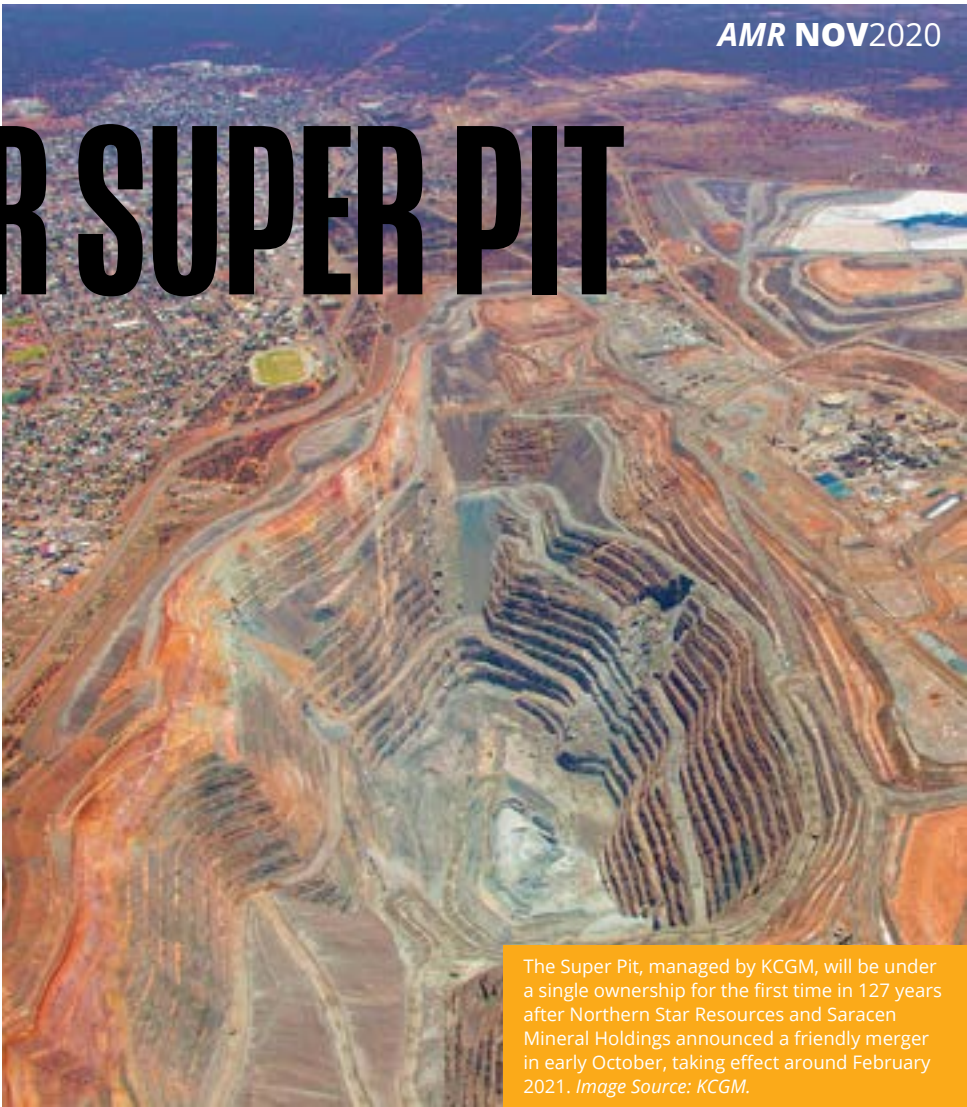
“The pre-tax synergies alone are expected to be worth in the order of \$1.5b to \$2b over the next 10 years,” he said.

“This is one of the most logical and strategic M&A transactions the mining industry has seen.

“Saracen shareholders will own 36% of the combined group and therefore share in the significant benefits of these synergies, which is value that would not have been available to our shareholders otherwise.

“The savings, the synergies and the growth opportunities it will generate make the transaction extremely compelling.”

Saracen held its last Annual General Meeting on October 6, celebrating record gold production of more than 520,000oz in FY20 from its three operations, which all lie within 300km of Kalgoorlie (the Super Pit, Carosue



The Super Pit, managed by KCGM, will be under a single ownership for the first time in 127 years after Northern Star Resources and Saracen Mineral Holdings announced a friendly merger in early October, taking effect around February 2021. Image Source: KCGM.

Dam and Thunderbox).

The Super Pit is now 100% Australian-owned and under single ownership for the first time in more than 125 years, leveraging Northern Star’s underground and Saracen Mineral Holding’s open cut expertise.

Gold was discovered along the “Golden Mile” in 1893, with Kalgoorlie Consolidated Gold Mines (KCGM) formed in 1989 to operate

the Fimiston Open Pit, now known as the Super Pit.

The Golden Mile has produced more than 40moz of gold since discovery, while KCGM produces about 800,000oz of gold per year.

A Federal Government report indicates that Australia will overtake China as the world’s largest gold producing nation in 2021. **AMR**

A CENTURY OF ACHIEVEMENTS

Celebrating 100 years in business this year, WA company R. Moore & Sons (RMS) has witnessed and contributed to great change in the mining industry since its inception.

The third-generation family outfit, based in Kewdale, is a world-leader in inspecting, testing, servicing and remanufacturing diesel engine components, providing a vital link in the supply chain for OEMs and major repairers.

RMS general manager Stuart Davis said the company, which was founded by entrepreneurial Irish migrant Robert Moore, has successfully tackled the unique challenges of geographical isolation, the harsh Australian climate, and the impact that has on componentry by continually moving with the times.

“As mining has undergone a rapid transformation, we have too; a culture of continuous learning and improvement is important to us and to our customers,” Mr Davis said.

“We also value pre-empting and preparing as early as we can for changes that might impact our customers and actively embrace new technologies, such as computer-controlled machining equipment, to allow us to better fix problems for our clients.”

Mr Davis said new technologies and collaboration with original equipment manufacturers and its broader customer base have also delivered crucial cost savings for the mining organisations it works with by extending equipment life between rebuilds



RMS is a vital part of the Australian mining industry’s supply chain, this year celebrating 100 years in business.

without sacrificing reliability.

“This has also helped clients significantly lower their overall environmental impact,” he said.

Growth and valuing staff are also top-of-mind for this 100-year-old company.

Of the 65 current employees, the average length of service is about eight years, and the company aims to continue building on both of these numbers through recruiting

quality people and training.

“We’re focused on a team member’s willingness to learn and their ability to make sound decisions, and that’s created a unique culture here,” Mr Davis said.

“Our team members are not just hired hands; we empower them to help drive new solutions for our customers and to help us in remaining globally competitive.

“We’re committed to the precious skills

and jobs at RMS remaining onshore for a more vibrant and sustainable future in the Australian market.”

RMS is one of only a handful of independent companies worldwide that has the extensive facility, skills, technology and know-how to regenerate diesel engine components, breathing new life into existing machinery to enable it to perform as though it were new, at times better than new. **AMR**



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NEW WAVE OF EXPLORATION

BY KATE CHRISTIAN

Alex Dorsch (Chalice Gold Mines), Mark Wilson (Legend Mining), Trigg Mining (Keren Paterson) and Kas de Luca (Novo Resources).

Australia is in the midst of a greenfields discovery boom as investors plough their money into exploration projects across the country.

That was the general consensus at the 'Explorers on the Move' panel discussion featuring four well-respected mining company executives at the WA Mining Club recently.

But not all of them agreed on the extent of the labour shortage facing the resources sector.

Chalice Gold Mines managing director Alex Dorsch said Australia was experiencing a "new wave" of discoveries being driven partly by increasing demand for technology minerals.

"The last 10 years have been dominated by brownfields discoveries and what we are seeing just in the last year or so is some fantastic greenfields discoveries all around Australia," he said.

"I can't remember a time in Australia where we had so many major greenfields discoveries going on at once and it's a hugely exciting thing.

Chalice started 2020 as a \$50m company with 15 employees.

Now the company has a market valuation of more than \$800m with 30 full-time employees and another 30 contractors off the back of a high-grade nickel-copper-palladium discovery at its Julimar Project about 70km north east of Perth.

"It looks to be Australia's first palladium discovery and to have made this rare type of discovery around the time of the COVID-19 pandemic and for it to be essentially under

our noses just outside of Perth is nothing short of remarkable," Mr Dorsch said.

"The company has been drilling on that discovery since March and we are enjoying success in the market and growing rapidly.

"We have essentially unlocked a totally new mineral province and it is a really game changing discovery by all accounts and we are aiming for a maiden resource in the middle of next year."

Mr Dorsch said demand for metals like nickel and copper was fuelling the new wave of exploration as the world moved to a low carbon future with an emphasis on sustainable technology like electric vehicles.

"It is exciting to hear people like Elon Musk at Tesla's Battery Day talking about potentially getting into the nickel mining space, I think that is an early signal that nickel in particular, but a range of metals are going to be critically important to our lifestyles," he said.

Legend Mining Managing Director Mark Wilson said investors were hungry to invest in exploration projects in Australia. In his lifetime he could not recall another time when there had been the amount of "exciting, potentially company-making" discoveries as there had been in the last year.

Legend started as a silver explorer at the Elizabeth Hill project in the Pilbara before heading to West Africa for its Cameroon Project, which the company sold in 2014.

Now it is focused on its Rockford nickel project in WA's Fraser Range where the company has exploration licenses covering 3000m².

"Last year we have gone from a market

capitalisation of \$85m to \$400m in that 12 months and the number of employees went from five to 20," Mr Wilson said.

"My perspective on 2021 is I really hope the industry can deliver on the expectations that have been put on it with the choke point on the availability of labour to go about our business."

Mr Dorsch said the mining industry needed to do more to attract young talent. "Getting drillers, fieldies and geologists in particular is a huge challenge and we really need to do better as an industry," he said.

"We also need to invest heavily at the school level and make sure our tertiary education system is gearing up and equipping students with the tools in the right industries."

Trigg Mining founder and CEO Keren Paterson said they had a more positive experience recruiting as people have wanted to connect with the "purpose-driven" company's role in achieving food security.

Ms Paterson said the industry had become too fixated on hiring people with mining related degrees and needed to think more broadly about the types of people who could contribute to their success.

She said Trigg is focused on securing Australia's sustainable agriculture future through the exploration of essential potassium fertiliser, sulphate of potash (SOP), an important ingredient in global food production.

Trigg was on track to for a maiden air-core drilling program of up to 23 holes in the last week of September at its highly prospective Lake Throssell SOP project in Laverton, where the tenure has been expanded to 937sqm.

The program is designed to establish a maiden JORC Mineral Resources Estimate for Lake Throssell. Novo Resources General Manager Exploration Kas De Luca said the demand for labour ebbed and flowed with the cyclical nature of the mining industry.

"We have some top-notch senior geologists who could all be exploration managers in their own right and they do a fantastic job of cascading their skill sets and knowledge-base down," she said.

"That works really well, we are really not finding that much trouble in finding people to get interested in the conglomerate gold world."

Ms De Luca said Novo was a well-funded exploration company in the process of becoming a producer with its Beatons Creek Gold Project in WA's northern Pilbara region, where the company has a 14,000m² landholding.

She said Novo was looking at enhancing the tonnage and the grade at the project.

"It's a strategic area, we have 1200sqm of contiguous land holding there and 30 target areas we are wanting to assess and will be working on that soon."

Ms De Luca said technology was playing a crucial role in exploration projects such as the work Novo is doing with mechanical ore sorting.

"I am astonished in a positive way in how we are taking old technologies in a sense and rebadging them."

Mr Wilson said the key to undercover projects was not necessarily new technology but rather the "ability to integrate the cutting edge with chemistry, physics and good old-fashioned geology". **AMR**

COVID PROVES TO BE A TRENDSETTER

The COVID-19 crisis will prompt a rethink of operational strategies, supply chain vulnerabilities, and investment trends over the coming years.

According to risk analysis and management group Fitch Solutions, since the start of 2020, the pandemic has led to weaker prices for many metals, operational hurdles, and significant disruptions in supply chains.

Its latest report highlights the impact of COVID-19 on the metals and mining industry, among others, and the long-term consequences as the global economy moves into recovery mode, and industry further assesses its strengths and weaknesses and works to future-proof

against similar shutdowns.

The report also notes that "COVID-19 will amplify and accelerate many of the commodities sector's megatrends".

Though it does not see corporate strategies radically changing through the pandemic, Fitch notes that "COVID-19 has added new impetus to the strategic shifts already under way".

One such trend is the ongoing shift to a low carbon economy, with a focus on sustainability. Economic recovery packages and stimulus plans in the EU in particular are aligning with sustainable development in the commodities sector through climate-friendly policies.

The European Green Deal is one such initiative, putting climate at the fore of future development plans. With the aim to make Europe climate neutral by 2050, the European Green Deal covers areas such as clean energy, sustainable industry, sustainable mobility which will have immediate impact on the metals and mining industry.

Many players in Europe's metals and mining industry are already actively working to reduce their carbon footprint, such as ongoing developments of new lithium extraction techniques in Western Europe and in the growing use of renewable steel production in the EU.

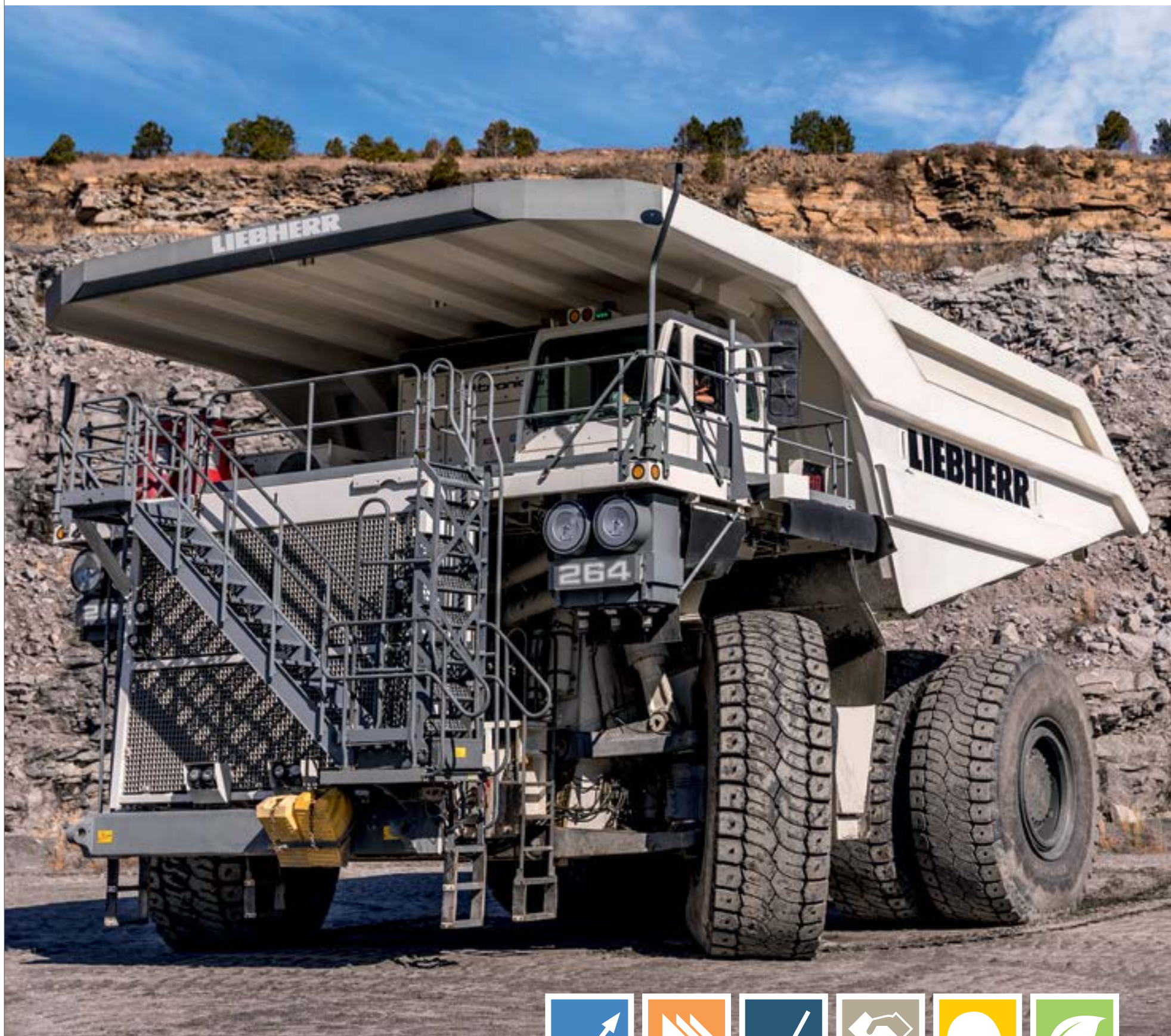
The global shutdown also understored

the rise in international political and social risk, bolstering resource nationalism and protectionist trade policies, all of which further highlight the importance of simplified supply chains.

The report said that while mines shut down and movement became highly restricted over the first half of 2020, the importance of secure, regional supply chains came to the forefront of many industry discussions.

It said governments across the globe are now working to ensure domestic supply for crucial minerals and metals, regional manufacturing hubs, and more to help close any future supply chain gaps. **AMR**

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UNLOCKING THE CARBONATION POTENTIAL

BHP is working with leading Australian and international experts to investigate methods to enhance mineral carbonation rates to store more CO₂ into tailings through different processes and engineering solutions.

An example can be found at BHP's Mount Keith nickel mine in WA's Goldfields, home to one of Australia's biggest tailings dams which also serves as a massive carbon sink.

The 5km-wide dam helps lower the operation's carbon footprint through the natural weathering process of mineral carbonation, where carbon dioxide reacts with mineral rocks such as serpentine to form harmless solid carbonates.

This allows for the safe and permanent storage of about 40,000t of carbon dioxide each year, the equivalent of taking 15,000 cars off the road.

BHP Nickel West's Samantha Langley said minerals in ore could absorb CO₂ in the same way trees can.

"Although mineral carbonation is a process that can take thousands of years in nature, we don't have thousands of years to address the impacts of climate change," Ms Langley said.

"It's an exciting opportunity to see if we can use technology and different tailings management practices to speed up the process, and store away carbon dioxide much faster."

Mineral Carbon International (MCI) CEO Marcus Dawe said mineral carbonation was not just a way of reducing carbon emissions but also provided profitable decarbonisation pathways for the mining, manufacturing, hydrogen and other power generation sectors.

MCI's "global reference pilot plant" in Newcastle, NSW, uses carbon engineering processes to transform captured CO₂ emissions from industrial sources into solid materials that can be used to manufacture valuable products such as building materials.

The plant has demonstrated how mineral carbonation can be integrated at scale in mineral processing, steel, cement, hydrogen, gas and chemical production.

"It is the only place in the world where you can validate the economics of a large-scale plant as we progress the technology towards commercialisation," Mr Dawe said.

"We are raising significant capital and doing pre-feasibility studies for multiple mining companies and talking to the biggest



Samantha Langley of BHP Nickel West.

companies first to basically pave the way for multiple MCI plants to be built adjacent to industrial facilities right around Australia.

"MCI has shown how to decarbonise much of the mining and manufacturing sectors without the need for an immediate price on carbon.

"Mineral carbonation is very aligned to the production of hydrogen—almost every hydrogen project has MCI in its consideration."

Mr Dawe also described the technology as a "gateway technology to sustainable metals" that would also enable recycling and

remediation of hazardous contaminants in the mining industry."

The Federal Government recently announced five priority technologies — hydrogen, carbon capture and storage, soil carbon, low carbon steel and aluminium production and long duration energy storage — will get funding under the Technology Investment Roadmap that would plough \$18b into low emission technologies over the next decade.

Mr Dawe said the announcement was a step in the right direction as it would enable projects that could harness mineral carbonation to produce valuable products.

AMR



Tesla CEO Elon Musk has confirmed that the company is officially entering the mining business.

Making the announcement at Tesla's Battery Day last month, Mr Musk said the rights to a 10,000-acre lithium clay deposit in Nevada had been secured.

The possibility had been flagged at last year's shareholder's meeting, when it was teased that Tesla "might get into the business of mining minerals used in electric vehicle batteries".

The lithium mine not only lets Tesla build

a cheaper, more efficient battery that will ultimately allow it to lower the price of its vehicles, but also will bring its supply chain closer to its home.

Mr Musk and Drew Baglino, the SVP of powertrain and energy engineering at Tesla, laid out the company's plans and progress to eventually have 10-20TW hours of annual battery production.

At the heart of that plan is a new tabless battery cell that the company introduced at the event. A new manufacturing system is still under development and Tesla plans to build infrastructure to support it.

The lithium mine as well as a cathode facility, both of which will be in North America, will be two new additions to Tesla's growing portfolio of factories and operations.

"We're going to go and start building our own cathode facility in North America and leveraging all of the North American resources that exist for nickel and lithium, and just by localising our cathode supply chain and production, we can reduce miles traveled by all the materials that end up in the cathode by 80%," Mr Baglino said.

Next to the cathode plant will be a lithium conversion facility, with the company

working on a new sulphate-free process that he claimed will reduce lithium costs by 33%.

Mr Musk also said the company had a new process that can extract the lithium from ore using sodium chloride, or table salt.

"Nobody's done this before, to the best of my knowledge, nobody's done this, and all of the elements in the process are reusable. It's a very sustainable way of obtaining lithium," he said. AMR

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ACCELERATED ASSAY OUTCOMES

Reinforcing its reputation for leveraging new technology to achieve operational excellence, Kirkland Lake Gold has signed a deal to install Chrysos PhotonAssay for its Fosterville Mine in Australia.

Delivering faster, more accurate gold analysis, Chrysos PhotonAssay is a quantitative, chemistry-free replacement for fire assay on-site and in the laboratory.

Hitting samples with high-energy X-rays, the technology causes excitation of atomic nuclei allowing enhanced analysis of gold, silver, and complementary elements in as little as two minutes.

Importantly, Chrysos PhotonAssay allows large samples of up to 500g to be measured and provides a true bulk reading independent of the chemical or physical form of the sample. The process is completely non-destructive, and all samples can be retained for further testing or analysis if required.

Kirkland Lake Gold Chief Geologist in Australia, Wess Edgar, said potential benefits of the PhotonAssay method included simple sample preparation, fast turnaround times for high-quality results, and improved outcomes related to health, environment, and the community.

“In relation to the advantages of Chrysos PhotonAssay over traditional assay methods, the sample charge used in the PhotonAssay method is about 10-20 times larger than existing fire assay, and thus has potential for a more representative assay result of the entire crushed sample,



Chrysos PhotonAssay delivers faster, more accurate gold analysis.

which is considered important for samples containing high gold grades and/or visible-gold, as are often found at Fosterville,” he said.

Originally developed at Australia’s national science agency, CSIRO, PhotonAssay’s latest market success has drawn a positive response from CSIRO Chief Executive Larry Marshall.

“It’s very rewarding to have a global leader like Kirkland Lake embrace this new Aussie technology, which sees our research continuing to improve the efficiency and environmental sustainability of the industry around the world,” he said.

Kirkland Lake Gold is a growing gold producer operating in Canada and Australia and has three high-quality operations, including the Fosterville Mine located in the

Australian State of Victoria, and the Macassa and Detour Lake Mines, located in Northern Ontario, Canada.

Operating since 2005, and with a 2019 production of 619,316oz, the high-grade, low-cost Fosterville underground mine near Bendigo, is the largest gold producer in Victoria.

Chrysos CEO Dirk Treasure said the PhotonAssay installations provide single-touch operation and improved safety outcomes, whilst also reducing labour requirements and the potential for human error.

“The technology’s fast turnaround on high sample volumes provides customers with time-critical operational data and drives optimisation through their entire value chain,” he said.



AMR NOV2020

Chrysos PhotonAssay is a chemistry-free replacement for fire assay.

Looking ahead to the future of PhotonAssay, Mr Treasure was similarly confident.

“We are seeing increasing interest in Chrysos PhotonAssay from both laboratories and miners,” he said.

“Recent developments across the sector are driving a desire for technological solutions that deliver measurable productivity gains and true competitive advantage. This is an exciting time, not just for us, but for the entire industry.”

Delivery of the PhotonAssay unit for Fosterville has already occurred, with the installation to be fully operational by early October.

On-site Laboratory Services in Bendigo will staff and operate the unit on behalf of Kirkland Lake Gold. **AMR**



Universal Field Robots, in partnership with IMDEX Ltd, has won the Greyhound Innovation (METS) Award at this year’s Queensland Mining Awards.

The business joined nine other technology and services companies with innovative industry solutions such as Industrial Internet of Things condition monitoring, autonomous industrial drone mapping, and a global online crowdsourcing competition for diverse site access solutions.

Universal Field Robots (UFR) joined forces with global sub-surface intelligence solutions leader IMDEX on a collaborative project that combines UFR’s E20C 2-ton robotic platform

that operates UFR Autonomy (called AutoLog), and IMDEX’s downhole sensor technology to deliver IMDEX BLASTDOG, a semi-autonomous system that helps optimise blasting based on measuring hole physicals and high-resolution three-dimensional material models built from sensor data.

To perform the sensing, UFR AutoLog drives on the mining bench to hole locations as provided by the IMDEX system derived from mine data.

It uses robotic vision to check the hole location and then lowers the IMDEX sensor down the blasthole.

The valuable data is sent to IMDEXHUB-IQ system in the cloud in real-time to be used by mining engineers to make changes to blast design.

The improved blast design can lower the cost of blasting, improve fragmentation, and reduce the dilution of ore to improve mining outcomes. UFR AutoLog and IMDEX BLASTDOG move people out of a dangerous zone to improve safety, increase productivity and reduce risk.

The IMDEX BLASTDOG solution moved from concept to prototype in just four months, providing geological data and enhancing productivity.

The premier bi-annual Queensland Mining Awards celebrate the spirit of innovation, excellence and collaboration fostered within a highly competitive industry.

All companies involved in Queensland’s minerals and energy resources sector, from mining companies right through to contractors and suppliers, were invited to enter the Awards and gain recognition for their hard work and entrepreneurial spirit.

The 2020 Queensland Mining Awards were presented by the Bowen Basin Mining Club (BBMC), in partnership with the Queensland Resources Council. **AMR**



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Bar, Water Cannon, Evac Points,
Isolators.....\$310,000+GST



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Bucket, FOPS Guard.....\$POA



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Ripper, Isolator, E-Stops, 4-in-1
Bucket.....\$POA



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Push Block, New 17.R25 Tyres & Rims,
Licensed.....\$269,000+GST



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Ride Control, STD Lift, EPA,
Auto Lube.....\$925,000+GST



2018 CAT 980M WHEEL LOADER

2,413Hrs, CAT Payload, STD Lift,
Supp. Steer, Ride Control, Auto
Lube, New Tyres.....\$510,000+GST



2018 CAT 972M WHEEL LOADER

3,200Hrs, CAT Payload, Supp.
Steer, Auto Lube, STD Lift, Ride
Control.....\$395,000+GST



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Steer, Auto Lube, STD Lift, Ride
Control.....\$325,000+GST

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Regis Resources managing director Jim Beyer opens Day 3 of The Diggers and Dealers conference, discussing the exciting growth opportunities at Duketon and the McPhillamys project in its final approvals: one of Australia's largest open pit gold resources. Image: Gold Industry Group

MORE CAN BE DONE ON DIVERSITY

Fortescue Metals Group chief executive Elizabeth Gaines has used the 2020 Diggers and Dealers Mining Forum in Kalgoorlie, WA, to continue pushing for gender equality in the mining sector.

And she even urged conference organisers themselves to do more by discouraging male attendees from filling local pubs to ogle at skimpy barmaids, a traditional pastime at the town that draws in conference delegates every year.

At last year's event, Ms Gaines expressed her disappointment that there were more male speakers called "Peter" than there were women. And this year, she said the situation had not improved, with just three women in the 56 speakers scheduled over the three-day conference.

"As we continue to see examples in large

Australian companies of behavioural and cultural standards that are simply unacceptable, stakeholders are now strongly demanding change, and in our view that change must be led by a renewed focus on diversity," she said.

Referring to Kalgoorlie's custom of staffing bars with scantily clad women, Ms Gaines said if the event wanted to improve diversity, it would need to make sure there were venues that women were comfortable going to.

"I don't get why somebody wants to go and do that. I just don't understand it. That's a female perspective," she said.

"I don't know of many women who want to walk into that environment.

"You've got to have venues that are far

more appropriate ... and actually reflective of society as a whole. Not objectification of one part of society, and the other part of society looking on.

"But it is particular to Kalgoorlie and some people like it so, who knows? Maybe it's a big tourism thing."

Conference organisers have previously distanced themselves from skimpy, noting pubs and bars were free to arrange their own events and entertainment over the course of the conference.

Ms Gaines said FMG had reached 19% female employment, which was higher than the 15.9% industry average.

She said the recent chief executive women's census showed the number of women reaching senior leadership positions in ASX 200 companies was actually flatlining, and while improvements had been made at a board level in recent years, she was concerned at the lack of people in C-level jobs.

She said COVID had disproportionately impacted women and new cultures needed to be created to bring about change in hiring practices.

"We need to make sure the settings are in place to support the women getting

back into the workforce and that we don't find there is this whole portion of people who were impacted and don't find a way forward," she said.

Meanwhile, St Barbara Mining (SBM) has resumed operations at the Gwalia mine, after a ground fall forced the company to temporarily suspend mining. Located near Leonora in WA, the mine is one of Australia's oldest and deepest underground sites, having been established in 1897 by former US president Herbert Hoover.

Speaking at the conference, St Barbara head of business development Meryl Jones said the company remained committed to Gwalia.

The ground fall at the mine occurred 1600m below the surface in the Hoover Decline, named after the President, and was caused by a large firing which, in turn, triggered a series of seismic events, the largest of which measured 1.9 in local magnitude.

Ms Jones said St Barbara has updated its guidance to account for the interruption, anticipating production for the September quarter to be down by around 2pc.

However, it expects to be able to increase production in the following quarter and has made no change to its full-year guidance of between 175,000-190,000oz of gold. **AMR**



Saracen managing director Raleigh Finlayson spoke on the alliance with Northern Star Resources to create a Top 10 global gold producer, saying "it just shows what two companies with a can-do attitude can bring to the table". Image: Gold Industry Group

If WA Premier Mark McGowan was nervous about how conference delegates would react to the state's hard borders, he wasn't showing it. Opening the event, Mr McGowan referred to the tumultuous proceedings in the wake of COVID.

"What a year it's been. We have been fighting tooth and nail against a dangerous health risk to our state, and we've been successful in keeping this great threat out of WA," he said.

"But now that we have successfully dealt with Clive Palmer, we can turn our attention to COVID-19," he said to laughter and warm applause.

He also acknowledged the Northern Star and Saracen \$16b alliance between the two WA-based gold miners and owners of the Super Pit.

"The deal will create the 10th biggest gold mining company in the world," he said.

"It shows that there is a great deal of confidence in WA, to do a deal like that right now. We have the most stable and reliable jurisdiction in the world, and it is a fundamental reason to bet big on WA."

But there were rumblings of discontent at the borders and the effect on the mining industry, with some companies bemoaning a smaller pool of talent as employees from other sectors were lured to fill vacancies left by east coast workers who were shut out.

There was also talk of rival commodity miners recruiting from each other.

But Saracen managing director Raleigh Finlayson said caution was warranted.

"As much as it would be great to get back to normal, the flipside is if we open up too soon and start getting cases or we start getting cases in a regional place like Kalgoorlie or one of our mine sites, we will very quickly regret it," Mr Finlayson said. **AMR**

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FRESH PUSH TO EXPAND MINING OFFERING



An ISS Street Food Event bringing diverse food experiences to a mining site in WA.

The 119-year-old Danish company ISS and its Australian arm ISS Pacific is pushing to expand its presence and product offering to Australia's resources sector, and has armed itself with a new executive general manager and a fresh vision for enhancing the onsite experience of minesite personnel.

The strategic asset and facilities management company first commenced operations in Australia in 2002, servicing sectors such as health, resources, aviation and transport, and has since become one of the largest providers in the Pacific.

Leaning on the experience of its parent company ISS Global, which operates in more than 46 countries, ISS Pacific employs around 15,000 people in Australia and New Zealand and has cross sector revenue of around \$790m each year.

Its resources division currently offers facilities management services to 17 minesites in WA, SA and Qld, and has secured contracts valued at more than \$129m each year.

Heading up ISS's Resources division is executive general manager Paul Archer, who is based in Australia's resources city, Perth; and although fresh to the role, he has worked with the company for several years, having previously been based in New Zealand as chief operating officer undertaking a restructuring of the country's business.

Last year the company fine-tuned its sector focus and decided to expand its mining and resources services with an emphasis on people, technology,

food and accommodation.

Originally a chef by trade, Mr Archer gained extensive experience in hospitality and hotel services while working with the Accor hotel group for two decades, and has worked in different parts of the world such as Asia and India, where he learned different modes of hospitality delivery, food services and customer experience.

Moving to Perth and heading up ISS's resources division wedded his corporate knowledge and hospitality learning into a fusion of expertise that is now driving the divisions aims.

"When I came into ISS's resources division, the immediate feeling I had was that I had come home again. The transition was easy and I felt I could add value from day one", Mr Archer said.

Part of the process of learning more about the mining sector's needs involved looking at the dynamics of the sector, particularly in relation to FIFO workers and the shifts in worker composition.

The company also knew the importance of needing to align its services to take account of the particular health and safety needs in resources and to develop a multi-faceted service where, as Mr Archer says, it is all about 'connecting people and places to make the world work better'.

'Hotels' at Remote Mine Sites

According to Mr Archer, what the company seeks to give mining personnel is more of a hospitality experience at minesites. "What workers are looking for when they are on site is great hospitality, great connections with

technology and people, freshly prepared food and resort-style amenities like tennis courts, food 'eat streets' and clean facilities," he said.

"What we are doing is building upon what hospitality has been doing for years, but ramping up the enjoyment factor by trying to make everyone feel special and enjoy their experience on site.

"A lot of mining clientele these days are highly educated and worldly, and when they come back off-site, they go home to big cities with nice restaurants and cafés. What we aim to do is replicate these kinds of experiences on-site."

The company seeks to create places that 'give back' to people, believing that when employees feel special, then the flow-on effects to mining companies are numerous, including higher staff retention, higher job satisfaction, lower recruitment costs and better productivity.

Investment in the Resources Sector

Although the company has always considered resources a definitive part of its business, during its fine-tuning last year the decision was made to focus on sectors that better fit its business model moving forward – and mining and resources was a stand-out. According to Mr Archer, this meant further investment in people, service and technology.

To ameliorate this, the company has boosted investment in these areas and has initiatives in the pipeline to deliver increased diversity in food and beverage offerings on sites, programs to promote physical wellbeing and various mental health resources.

It is also harnessing the power of technology to deliver these outcomes and is in the process of developing a smartphone app called 'Site-Life' that will enable people to order food online, and access information about maintaining a balanced lifestyle and how to keep healthy while working remotely.

Personalised Service

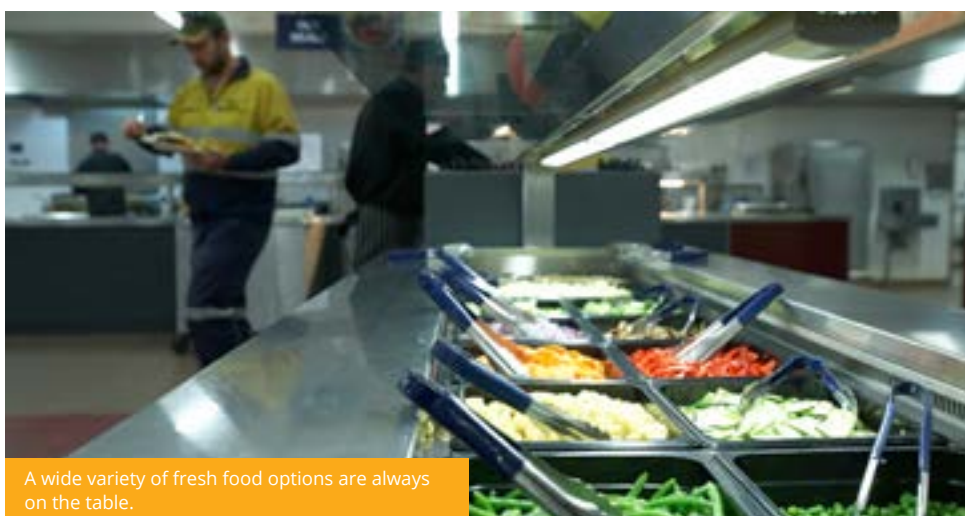
As a full-service facilities management specialist, ISS provides complete village management services such as catering, accommodation and housekeeping, cleaning, grounds maintenance, transport, retail and tavern management, security and pest control, along with leisure and lifestyle services such as accredited fitness instructors and gym instructors.

While its scope of expertise is broad, Mr Archer says that the company is geared towards mining companies that want their staff to feel like people, rather than numbers, and says its key accounts are in turn treated like a family.

"I think our focus on superior hospitality services is our key differentiator but it is also our personal touch with clients," Mr Archer said.

"We really get to know them well, and our clients get to know us well and we make ourselves available right up to the senior leadership level in our company. This can make a big difference when it comes to quick decision-making."

Each day, the company cleans and manages 12,500 rooms and serves 15,000 meals. Its clients include BHP, Oz Minerals and the Fortescue Minerals Group. **AMR**



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ISS executive general manager Paul Archer.



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MINERS CAN RELY ON MATES

Mental health and wellbeing will be important to Australia's recovery from COVID-19, according to the Minerals Council of Australia (MCA).

In its pre-budget submission, the MCA encouraged the Australian Government to extend funding to crucial initiatives that promote mental health and wellbeing, such as the MATES in Mining program. The program was established after the success of the MATES in Construction program, which works to reduce levels of suicide in the construction industry.

In its submission, the MCA said that the mining industry recognised that the pandemic, which has required companies to locate employees, minimise the number of workers on site and institute longer shift cycles, had placed pressures on workers' relationships and mental health.

According to the MCA, depression is the leading cause of ill health and disability worldwide. A study released by Deloitte in 2019 found that the cost of untreated mental health issues is estimated at \$4.5b per annum.

The study, The cost of ignoring the mental health and wellbeing of your workforce, also found that for every \$1 invested in interventions to improve mental health, employers can expect a return of \$4.70.

In September 2018, a report produced for the WA Mental Health Commission, Impact

of FIFO work arrangements on the mental health and wellbeing of FIFO workers, found that some FIFO workers found camp life lonely and felt it did not support meaningful connections, especially when there were limited opportunities for social interaction.

It found that workers on even-time and shorter rosters reported significantly better outcomes on all mental health and wellbeing measures, compared to FIFO workers on longer rosters with less time for recovery.

The MCA referenced Rio Tinto's peer support program introduced in 2012, which equips employees across the business to support their colleagues through difficult times.

It also referenced initiatives which BHP has implemented to address mental health, including its annual Mental Health Roadshow, specific mental health awareness and resilience training and peer support program.

The MATES WA team recently approached BHP to involve the mining giant in the program.

As it stated in its MATES Onsite magazine, "BHP management in Perth were taken through the MATES program and immediately saw the value and benefits in what we do and how we do it ... then began the start of a beautiful new friendship!"

"The MATES WA Team were given the welcomed opportunity of rolling out MATES training across one of Australia's biggest construction projects for an iron ore facility at South Flank," it said.

"In August alone, we successfully trained a whopping 825 people in General Awareness Training, welcomed 94 new Connectors to the MATES family and in addition, BHP now have 22 ASIST trained employees – all working towards the common goal of helping their mates and providing support

when they need it most."

Glencore Australia played a key role in establishing the MATES in Mining initiative, together with industry peers and MATES in Construction, to build on leading international practice in community-based suicide prevention.

"In Australia, the leading cause of death for men aged 25 to 44 and women aged 25 to 34 is suicide," the mining company said.

"Our workforce is predominantly male and aged between 25 and 44, with many employed as operators and in manual labour.

"The MATES in Mining model for suicide prevention has been independently tested and found to be associated with lower suicide rates in the construction industry."

AMR

KALGOORLIE HUB NOW PART OF WASM

A Western Australian start-up hub focused on mining research and innovation has officially become part of one of the world's premier mining schools.

The Kalgoorlie-Boulder Mining Innovation Hub, an initiative of the Cooperative Research Centre for Optimising Resource Extraction (CRC ORE), has transitioned to be part of Curtin University's Western Australian School of Mines (WASM).

Affectionately known as the 'Kal Hub', it has been operating out of the Chamber of Mines and Energy (CME) office in Kalgoorlie since 2018.

The Kal Hub was established in the renowned Goldfields mining community thanks to a partnership between CRC ORE, Curtin University, the Minerals Research Institute of Western Australia (MRIWA), the City of Kalgoorlie-Boulder and CME.

CRC ORE Chief Operating Officer Luke Keeney said he was pleased that the Kal Hub has become part of WASM and will continue this collaborative innovation.

"We are proud of what has been achieved through the Kal Hub since its inception and look forward to seeing great things under its new stewardship," Dr Keeney said.

"It is an optimal outcome that Curtin University, one of our valued Research Participants and key partner in the Hub to date, is ensuring the future of the Kal Hub as a centre of mining innovation for WA and beyond."

Curtin University Kalgoorlie Campus Director Sabina Shugg said the Kal Hub is a welcome addition to the local campus.

"The Kalgoorlie-Boulder Mining Innovation Hub is growing in stature and already has strong ties to the University, WASM and the local community," Ms Shugg said.

"It is fitting that the Kal Hub is now operated locally to focus on innovations and solutions for the local mining industry."

Reflecting on the Hub and its achievements while operating as a node of CRC ORE, Dr Keeney said the flagship Integrated Screening and Particle Sorting project was a standout.

"This collaborative study with Australian mining companies BHP, Norton Gold Fields and Saracen on the integration of screening and particle sorting techniques is delivering benefits across the resources sector," Dr Keeney said.

"Run through the Hub, this study developed a robust and scientifically rigorous framework for collecting, testing and reporting results for integrated screening and particle sorting techniques in a variety of ore domains."

Dr Keeney said the Hub creates opportunities for innovation, collaboration, employment and education.

"We're particularly proud of being able to engage students – mining's future brightest minds, with the Hub through the vacation student program," he said.



Kal Hub Technical Adviser Dr Laurence Dyer.

As part of the transition, Kal Hub Technical Adviser Dr Laurence Dyer now works full time for Curtin University, dividing his time between Hub projects and his existing role as Curtin's Discipline Lead for Metallurgical Engineering.

"I'm looking forward to continuing to support collaborative innovation throughout the Goldfields region and beyond," Dr Dyer said. Curtin University is planning several new initiatives for the Kal Hub, including scaling up an existing major water management

project and new partnerships with leading mining technology providers.

Following its transition to Curtin University, the Kal Hub will continue to be supported by CRC ORE's technical staff and have access, and be able to contribute, to CRC ORE research.

More information on the Kalgoorlie-Boulder Mining Innovation Hub can be found at KalHub.com. **AMR**



EXPRESSION OF INTEREST NOW OPEN

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SHOWING: 25,337 Hours



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FIT FOR THE FUTURE

BHP will train and fund 3500 new Australian apprenticeship and training positions, driving up to \$450m into supporting business opportunities in Australia's mining, equipment, technology and services (METS) sector.

BHP CEO Mike Henry said the major skills and technology package would be good for the company and good for the country, as Australia focuses on its recovery from the COVID-19 pandemic.

The nearly \$800m package comprises three key elements to be deployed over the next five years:

- An increase of 2500 apprenticeships and traineeships through the BHP FutureFit Academy, established earlier this year, with associated spend of \$300m.
- A further 1000 skills development opportunities across a range of sectors in regional areas. BHP will invest \$30m and work with the Australian Government to create advanced apprenticeships and short courses in areas of potential future workforce demand.

BHP will commit up to \$450m spend in contracts with Australian METS companies and further advancement of this sector. It will work directly and through its major technology providers to source more local products and services, and will invest in technology pilots and emerging businesses.

"As Australia looks to rebuild its economy and provide jobs for the future, the mining industry has an important role to play as Australia's biggest export earner employing hundreds of thousands of people," Mr Henry said.

"The mining and METS sector is a critical pillar of our economy, and it has never been more important than now.

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

"These investments will create a pipeline of future talent in highly skilled roles, working in an industry that delivers essential products to the world and generates export dollars that keep the Australian economy strong."

BHP employs about 45,000 people in Australia, and in the 2020 financial year contributed about \$33.4b in economic value through jobs, suppliers, taxes, royalties and community investments.

BHP accelerated payments and reduced payment terms for small suppliers during the peak of the pandemic, hired an additional 1500 people on temporary contracts to support its Australian operations, created a \$6m fund to support labour hire companies and their employees, and established the \$50m Vital Resources Fund to support regional communities.

BHP FutureFit Academy

BHP will create 2500 new apprenticeship and traineeship positions over the next five years through the BHP FutureFit Academy, established in March this year, with associated spend of \$300 million.

Places would be split between the Academy's campuses in Mackay in Queensland and Welshpool in WA.

Apprenticeships are on offer for heavy diesel fitters and mechanical fitters, with the program also offering a one-year Certificate II maintenance traineeship. Training is delivered in conjunction with CQ University

and North Metropolitan TAFE (Perth). To date, more than 450 people have enrolled.

METS Sector

BHP has identified a package of \$450m that it could bring to bear to support METS sector growth in Australia, including new BHP contracts with Australian suppliers, working with its major technology providers to source more local products or work, and new investments in technology pilots and emerging businesses.

Regional Skills Development

BHP is in working with the Federal Department of Education Skills and Employment in relation to the Future of Work Partnership program.

This program will involve working with the tertiary sector to create opportunities for up to 1000 people over the next five years in regional areas to receive skills and training across a range of industries to help support healthy, diverse local economies.

The training is designed to support access to employment and employees small to medium businesses, particularly those outside the mining sector who may have felt the impacts of COVID-19 more greatly. **AMR**

TURQUOISE TRUCK SIGN OF INCLUSION

A new Komatsu 930E-5 haul truck at BMA's Goonyella Riverside Mine in Queensland stands out from the rest - with its tray painted turquoise in celebration of BHP's LGBT+ ally community, Jasper.

The group's name was inspired by the gemstone jasper - an opaque and fine-grained variety of quartz known for its unique multi-coloured patterns - reflecting the rich diversity of BHP's lesbian, gay, bisexual, transgender and others (LGBT+) staff and allies.

BHP said the LGBT+ ally network focused on strengthening the company's inclusion culture by providing advice on ways to mitigate bias and ensuring that LGBT+ people were respected, valued and free from discrimination.

Diana Sanchez, Superintendent Mods and Ops Projects from the BMA Asset Engineering team, identified an opportunity to work with the haul truck suppliers, Komatsu and DTHload, to implement the initiative.

She said she believed that symbols like this sent a powerful message to employees.

"The Jasper truck might look different, but it



does exactly the same job as all the other trucks in the pit, it carries the same amount of dirt. Just because it is different, doesn't mean that it is any less important," Ms Sanchez said.

Formally endorsed by the BHP Executive Leadership Team and Global Inclusion and Diversity Council in 2017, Jasper's aim is to drive a safe and inclusive work environment for everyone by providing advice on ways to reduce bias and ensure LGBT+ people are respected and valued no matter their sexual or gender identity.

Jasper is open to all employees whether they be LGBT+ identifying or an ally. **AMR**

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ELECTRICAL ENGINEERING AND MANUFACTURING

Those offering electrical engineering and manufacturing services in the mining industry face complex, hazardous and extremely costly risk exposures.

Businesses are often designing, engineering, manufacturing and even delivering a whole range of electrical products to mining clients. This can include multi-million-dollar switch-rooms to power massive mine sites, or transportable kiosk substations suited to the harsh and remote environments of the mining, oil and gas and heavy industry sectors.

All stages of the supply chain, from design to manufacturing to transport to final installation to ongoing operation, present a myriad of risks requiring a customized insurance solution.

Connect Business Insurance (CBI) specialises in providing tailored insurance cover and risk management solutions to the mining industry, including to manufacturers working in the electrical engineering space. Generally, fire, public liability and products liability will always rate highly from a risk hazard rating perspective.

But each business offers specific activities and specialist services with a risk profile that presents unique challenges.

CBI understands there is never a one-size-fits-all approach, but these are some of the key risks covered by its comprehensive insurance policies:

- **Goods in Transit including Marine Transit Insurance:** Electrical products being delivered to mine sites are often arriving from overseas or interstate and worth millions of dollars. This insurance is designed to protect businesses transporting goods by sea,

air, rail or road due to loss, damage or non-delivery of goods. This coverage includes damage to property caused by fire, theft, sinking, capsizing, and grounding.

- **Professional Indemnity Insurance:** If a business provides design services in addition to manufacturing, then it is deemed to be providing a professional service or advice. This insurance protects professionals who provide advice or specialist services if they are found to be negligent or in breach of their professional duty. If a third party like a client or customer claims a business's services or advice has caused damages, injury, or loss, it can involve hefty legal bills. This insurance can cover breach of duty, damages due to dishonest and negligent actions of employees, intellectual property, defamation, and contractual liability, including claims from professionals who have failed to follow and meet contractual agreements.
- **Workers Compensation Insurance:** One of the most common exposures for clients in the electrical engineering field relate to workers compensation and employer liability. Common tasks that put these workers at risk of electrocution and other dangers include the manufacturing of electrical products, electrical installation and repairs, testing and inspection of equipment and maintenance activities. The plethora of risks stem from exposure to damaged tools and equipment, inadequate wiring and overloaded circuits, exposed electrical parts, improper grounding and damaged insulation.
- **Public Liability:** Electrical engineering and manufacturing by its nature will

pose a litany of risks and business owners have a duty of care to take reasonable steps to ensure the safety of third parties during the course of business activities. This insurance provides cover in the event a client, supplier, subcontractor, or member of the public are injured or suffer property damage as a result of negligent business activities.

- **Business Interruption:** CBI can provide cover to protect a company in the event of an unforeseen issue that makes running a business impossible such as extreme weather events, fire, theft, vandalism and damage to plant and machinery. Particular attention needs to be paid to the time it would take to resume normal business output following a major loss, which can run in to millions of dollars from just a few hours of downtime at a mine site.

Machinery Breakdown

Machinery breakdown on a mine site can present huge financial risks from consequential losses due to downtime.

The high costs of repairs and project delays should be adequately insured against. This is a critical cover for businesses where the breakdown of machinery or electrical products has a direct impact on productivity. According to Connect Business Insurance director Paul Cohalan, manufacturers of electrical goods face a myriad of risk exposures throughout every step of the process, including the commissioning, design, manufacture, delivery, installation, and ongoing maintenance.

"Whether it's a switch-room or switchboards, there is also the operational side if something fails," Mr Cohalan said.

"The consequential loss of a shut-down at a

fixed plant at a mine site can be enormous. "Businesses need to understand their contractual obligations from when they originally tender, when there will be an initial contract and scope of works.

"If they involve their insurance broker early on, we can review and look at potential exposures that are unique to them.

"Then we can tailor an insurance and risk management solution that is right for them.

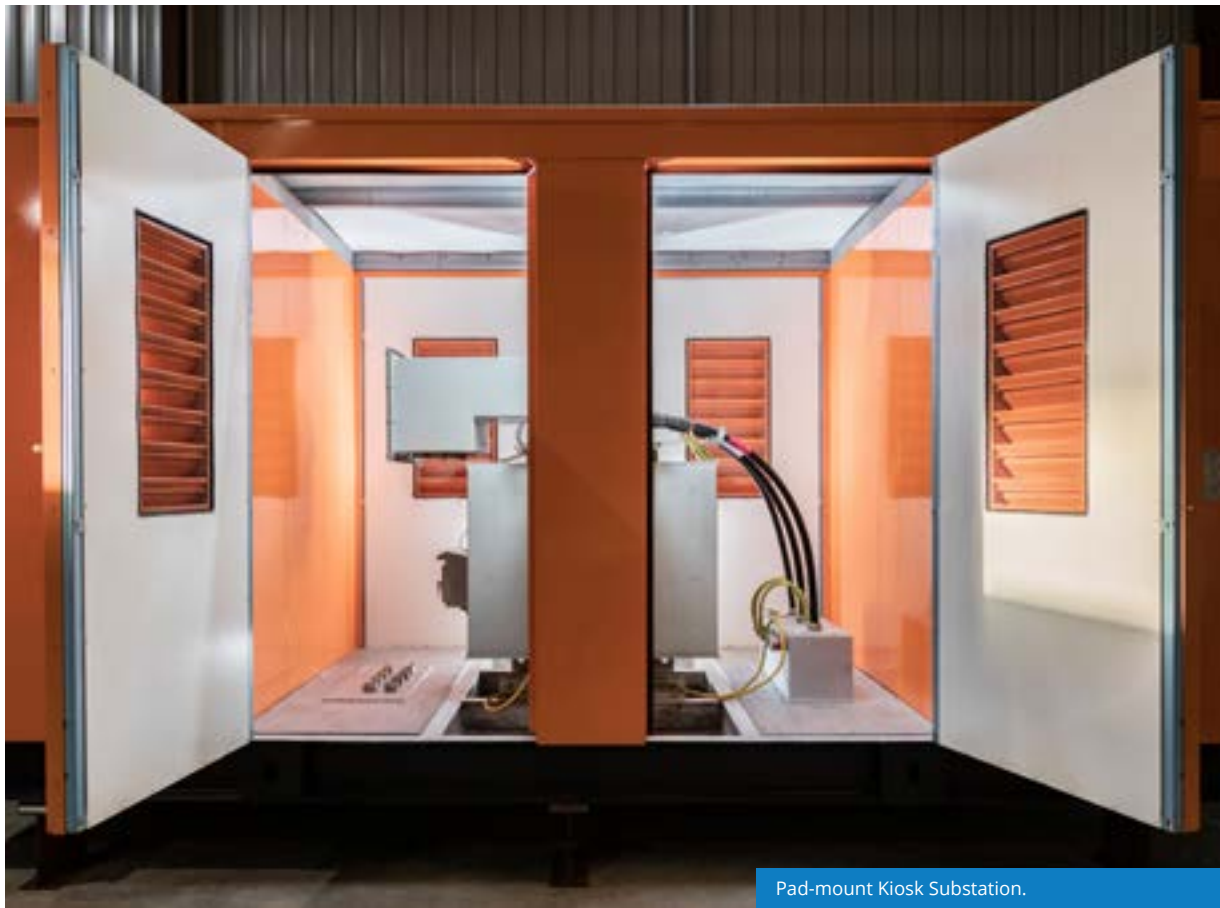
"They have to look at this from the get-go before they even get the job because if they have an outage on a mine site, the consequential loss could be the \$100mil+ and the average company can't take that on.

"Engaging your insurance broker and risk advisor from the tender process right through to the end, is crucial." CBI is the trusted provider of insurance for electrical engineering and manufacturing businesses operating in the mining industry, including Surge Engineering.

Q&A with Surge Engineering
Production and Quality Assurance
Manager Richard Price

Q: Can you summarise the service that Surge Engineering provides to the mining industry?

A: We design, engineer, and manufacture a complete range of electrical products, ranging from low voltage switchboards, kiosk substations, skid-mounted power solutions, switch rooms, low and medium voltage switchboards, control, instrumentation, and telemetry panels. We can provide a



Pad-mount Kiosk Substation.



Control and Instrumentation Panel.



total turnkey package including upgrades to installations, commissioning and maintenance works on site.

Q: Why is it so important for electrical engineers to have insurance?

A: The risk factors at times can be high with the scope of works from the client on occasions, being slim and not well defined.

Sometimes it can start off with a simple square on a piece of paper saying: 'I'd like to build this', so you have to cover your risks. At the end of the day, the risks invariably fall back on to us.

Q: Can you talk about the high risks associated with manufacturing and delivering products to mining clients?

A: We in general, face a lot of risks and challenges. At times with respect to client specifications, we have the requirement to procure large scale equipment from overseas.

We have the risk of these suppliers suffering from a range of issues, such as raw materials shortages, shipping delays and such like. We also face the implications of possible shipping delays, especially now with COVID-19 upon us. In these instances, with the high cost of airfreighting goods, this option is price prohibitive.

So, in the event that our suppliers do fall behind with our deliverables, we have to then manage the effects at our end, as our client's deliverables remain unchanged. If we fall short of their requirements, then we will be liable for liquidated damages.

Q: What types of insurance cover does Connect Business Insurance provide to Surge Engineering?

A: They provide marine transit insurance, third party public liability, workers compensation insurance, professional

indemnity, and business interruption insurance.

Q: What are the three most important types of insurance in the electrical engineering and manufacturing field?

A: **Professional indemnity** is very important because you are looking at items such as intellectual property, confidentiality, claims mitigation, contractual liability and defamation; all these items are big ticket items.

Marine transit insurance: When we are transporting goods worth multi million dollars to site, if something were to happen, when a product like this is damaged, there are usually no pieces to pick up. You basically have to start again and the lead time on some of our products is six months to procure or re-fabricate. Most of our client's requirements demand a custom-built solution.

Business insurance: The value of our work in progress (WIP) could range from a quarter of a million dollars up to \$3.5m.

In this regard, we are facing risks such as fire and theft, when we are building products in our outdoor construction areas, the risk of theft is high, even though we have very secure premises with 24/7 monitored cameras, barbed wire fences, electric gates and periodic security patrols.

When we are manufacturing our switch rooms, for example, we have tens of thousands of dollars' worth of cable being installed at any one time, with which, may have needed to be custom manufactured from the likes of Germany. So, it is very important for us to be insured against this risk.

Contact Paul Cohalan at Connect Business Insurance on:
Phone: **1300 477 662**
Email: **insure@connectbi.com.au**
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-  mining
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RAVENSWOOD DRIVES GOLD RUSH

Ravenswood will recommence open pit mining next month and is set to become Queensland's biggest gold mine.

The development of Queensland's biggest gold mine and a new wave of investment is set to put the historic gold mining towns of Ravenswood and Charters Towers back on the map.

Ravenswood Gold is pushing full steam ahead with its recommencement of open pit mining next month (December) in the historic Ravenswood mining district, about 130km south of Townsville.

The upgraded and expanded Ravenswood Gold Mine will rejuvenate the old mining town through the creation of 400 new jobs: 250 permanent staff and another 150 workers through the construction phase.

It will involve an initial investment of at least \$300m with \$200m in capital expenditure, to be spent on upgrading the processing plant and development of a tailings dam, as well as \$100m on fleet purchasing to be spent over the next 18 months.

Ravenswood Gold chief executive officer Brett Fletcher said the operation's vision is to build and operate Queensland's largest gold mine.

Mr Fletcher said the project centered on a new and expanded open pit mine at Buck Reef and a cutback of the existing Sarsfield/ Nolans open pit.

He said it would involve mining about 120 Mbcm over a 14-year period to produce more than 2.6moz of gold with a targeted production of 120,000oz next year, before ramping up to 250,000oz over the next few years.

The venture has already drawn huge positive interest from the region with more

than 2000 applications received for various mine operator roles.

Major contracts have been issued to local companies Towers Concrete for construction concrete supply, and Wulguru Steel for supply and construction of steelworks associated with the fixed plant upgrade.

Design projects have been awarded to three Queensland-based consulting teams: Australian Mine Design and Development (AMDAD) for mine optimisation work, ATC Williams for tailings dam design, and Ausenco for the processing plant upgrade design.

Hitachi's newest model of dash-7 mining excavator, the EX3600-7, has arrived at the mine site for its Australian debut.

Mr Fletcher said the exploration and resources team had "been extremely busy" since Ravenswood Gold, a joint venture between EMR Capital (EMR) and SGX-listed Golden Energy and Resources, bought the operation from Resolute Mining in April.

"Despite the fact that Ravenswood is a mature exploration area, the team are excited by the great number of near-mine and regional targets that have potential," Mr Fletcher said.

"A number of targets haven't been looked at for 20 years, when the gold price was only \$500, and there are geochemical, geophysical and structural targets plus lines of old workings that have yet to be drill tested."

The geology team is using the latest mining software to optimise Reverse Circulation

drill hole planning while modelling and validating dilution and grade control.

"The survey and mining technical team at Ravenswood uses the cutting-edge survey, fleet management and drone software to ensure mining is undertaken safely and efficiently and to check compliance to design," Mr Fletcher said.

"Mining of the pit will be planned by our technical services team using the state-of-the-art mine planning software to design, schedule and monitor mining operations at Ravenswood."

Mr Fletcher said Ravenswood had partnered with industry leaders to ensure "world-class" blasting, which would be carefully designed to minimise the impact on the community.

The township of Ravenswood was founded in 1868 when gold was first discovered in the area, and has been through several mining booms and busts through the late 1800s and early 1900s.

While the modern mine has been operating in the town since 1987, Mr Fletcher said the Ravenswood Gold bigger, long life, low cost expanded operation would rejuvenate the town, bring numerous additional employment opportunities to the local region and further support the proud mining township of Ravenswood.

Over the years the mine has supported the local community through projects, sponsorships, donations, provision of medical services and collaboration.

Most recently, the mine funded the relocation of the local primary school to a new state-of-the-art facility and is currently

working with the Charters Towers Regional Council and local stakeholders on upgrading town facilities.

Pajingo 2.0

Minjar Gold has declared 2020 the "year of the drill bit" at its Pajingo operation, located about 75km south of Charters Towers.

Pajingo Gold Mine general manager Dale Oram said the plan was to explore for the continuation and extension of the current underground ore lodes while also looking for open pit resources and testing the potential for further mineralisation throughout the extensive tenement holding.

"2020 has seen the biggest drilling campaign at Pajingo for many years with Minjar confident of the operation's potential," he said.

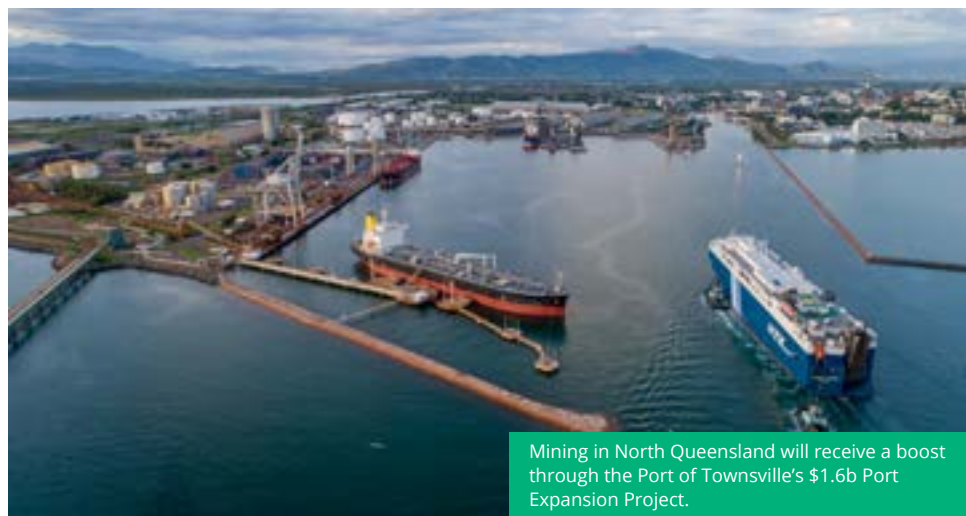
"Extensive exploration and resource development drilling programs during the year indicate that open pit resources may become available for mining and milling in 2022 while also increasing the underground resource and reserve base."

Pajingo has produced about 3.3moz since 1986, when it achieved first gold production with nine open pits and 26 underground zones mined or defined for future mining since then. The mine is expected to produce about 50,000oz this year before ramping up to 75,000oz next year as it returns to fulltime milling in the second quarter of 2021.

Mr Oram said a new style of mining was in place in one of the underground areas where a thin skin of remnant ore is being extracted against the backfilled stopes of previously mined ore lodes.



Minjar Gold has declared 2020 the "year of the drill bit" at its Pajingo operation.



Mining in North Queensland will receive a boost through the Port of Townsville's \$1.6b Port Expansion Project.

A new underground operation named Lynne was commenced late 2019 with a box cut put in place a short distance from the current Vera decline that services the Vera Nancy Underground Mine.

“Ore production is scheduled from Lynne early in 2021 and is the start of the future for Pajingo which has been coined Pajingo 2.0,” Mr Oram said.

He said Charters Towers in its early days was the premier gold mining centre of Australia, producing more gold than the gold mining hubs in WA and Victoria.

“It is a gold camp meaning it is a proven gold producing area and with new exploration techniques and increased activity there is always the potential for further discovery,” he said.

“There is great potential so the future could hold some exciting times for mining in the district and put Charters Towers back on the list as a premier gold mining centre.”

Pajingo provides work for 232 employees and 161 contractors.

“We support and spend in Charters Towers with 32 goods and service supply contractors,” Mr Oram said.

“Minjar has several substantial long-standing relationships with specialised contract workforces providing ongoing support in mining related services such as underground mining, supply of explosives, assay and metallurgical services and specialist equipment maintenance and repair.”

New Economy Metals

Townsville City Council Mayor Jenny Hill said the mining sector in Queensland’s northern region created 2500 jobs and generated \$290m in wages in 2018-2019.

She said while the region was well known for producing gold, copper, zinc and lead, there was also a lot of new money being invested in the region in the hunt for rare earth elements like vanadium and “new economy” metals for the technological age.

Australian Mines’ Sconi project near Greenvale, west of Townsville, will be a leading supplier of cobalt and nickel for high-grade advanced battery materials.

Ms Hill supported CopperString 2.0, a high voltage transmission line that will connect the North West Minerals Province to the national electricity grid near Townsville.

“It’s about bringing affordable energy into the mining sector, it should have happened 10 years ago when it was first mooted,” Ms Hill said.

“The main advantage is reliable power at a known price and allows us to inject renewables into the system which means many of these mines can seek a green accreditation as we move into the 21st century.”

Ms Hill was excited by new investment in the region such as Multicom Resources’ flagship Saint Elmo vanadium project near Julia Creek in the North West Minerals Province. Multicom CEO Shaun McCarthy said the NWMP is a world-renowned mineral-rich region in which there has been more recent focus towards extracting “the new generation of critical minerals for their intended use in clean energy and new technologies”.

“The project proposes to take advantage of the increasing supply gap associated with high-strength steel production, the growth market of vanadium batteries and the emergence of vanadium-based compounds as a revolutionary metal in new technologies,” he said.



Ravenswood Gold operations manager Dave Mackay and chief executive officer Brett Fletcher with the first Hitachi EX3600 dash-7 model to arrive in Australia.

“There is an increasing global demand for lighter weight and higher strength steels as well as an increasing global demand for renewable and reliable energy, making vanadium a valuable resource.”

The project has received Major Project Status from the Federal Government, Prescribed Project Status from the Queensland Government and has been recognised as a Project of Regional Significance.

The project Definitive Feasibility Study has considered an initial target production of 4300tpa of vanadium pentoxide for a 30-year mine life.

The company has progressed its permits and approvals on the basis the project could grow to 20,000tpa during that period subject to demand. Final approval of the Environmental Authority is anticipated for January 2021.

Port Expansion

Mining in North Queensland will be one of the big winners from a massive transformation of the Port of Townsville.

The \$1.6b Port Expansion Project, which will add a new outer harbour, six new berths and associated infrastructure, is on track to dramatically change the future of the region and the economy.

The project will expand the Port’s total land area by almost 60% and increase its handling capacity five-fold from about 8mt to 40mt per year.

The Port’s general manager business strategy and sustainability Claudia Brumme-Smith said the expansion was a vital step in the Port’s goal to be “Australia’s Port for the Future”, and to ensure that the Port is well-equipped to accommodate projected three-fold trade growth over the next 30 years.

The first stage of the expansion project is the \$193m Channel Upgrade project, currently

underway, which will widen the port’s access channel to increase vessel length limits from 238m to 300m.

It will also reclaim 62ha of new land for future expansion. A 2.2km rock wall, which will bund this port reclamation area, is currently under construction and is on track to be complete by February 2021.

Almost 660,000 tonnes of rock has been delivered to site – more than 85% of the total rock required to build the sea wall. About \$25m of contracts have been awarded to seven local suppliers of rock: Holcim, HY-TEC, Ravenswood Gold, Barro’s Black River Quarry, Hard Rock Earth Works, Camm Quarries and Gromac Quarries.

The full Channel Upgrade project remains on track for completion by late 2023 while the port expansion project will continue until 2040.

“The Channel Upgrade is an important first step as it will allow the Port of Townsville to keep pace with shipping lines in multiple industries across the globe as they phase out smaller vessels in favour of larger, more economic vessels,” Ms Brumme-Smith said.

“Failure to accommodate larger vessels would result in a gradual decline of trade volumes being shipped to and from North Queensland.

“While the Port of Townsville is the largest multi-cargo port in Northern Australia, its access channel is approximately half the width of those at other major Australian general-cargo ports.”

Townsville is the largest export port in the country for copper, zinc, lead, sugar and live cattle. Top mining exports out of the port include zinc, lead and copper concentrates, zinc ferrites, refined copper and zinc and lead ingots.

Mineral exports out of the port have

recovered since suffering a 25% drop following the closure of Clive Palmer’s Queensland nickel refinery in 2016. Total throughput rose 12.6% from 6.76mt in 2017-2018 to 7.61mt in 2019-2020, with mineral exports jumping 37% from 1.95mt to 2.67mt over the same period.

The region will receive another boost from Sun Metals Corporation’s expansion of its zinc refinery, 15km south of Townsville.

A spokesman for SMC said the expansion was “progressing well”.

“We are just about at peak construction with as many as 400 people working on site daily across various disciplines with COVID-safe plans in place,” he said.

“The expanded refinery will be commissioned in early 2021 with a total investment by Sun Metals of over \$400m.”

Thalanga

Another big employer in the area is Red River Resources’ Thalanga mine, located 65km south west of Charters Towers, which provides jobs to between 150 and 175 employees and contractors. Thalanga mines about 350-400ktpa of ore a year to produce copper, lead and zinc concentrates.

The company’s managing director Mel Palancian said “pretty much all of their contractors and suppliers” come out of Charters Towers or Townsville. Next year Mr Palancian said the company would start developing its Liontown project, which will employ another 50 to 80 staff.

Charters Towers was “family and community oriented” and was renowned for its annual Goldfield Ashes competition, the largest amateur cricket carnival in the southern hemisphere.

He said mining was hugely important not just to the Queensland economy but to Australia as a whole. **AMR**



The Ravenswood expansion centres on a new open pit mine at Buck Reef, where mining will commence next month, as well as a cutback of the existing Sarsfield/Nolans open pit.

SOLID AS A ROCK



Adia board director and Eagle Drilling NQ general manager Sally Forgan with Steve Budiselic of IMDEX, Mark McQuillan of Eagle Driving NQ, and Scott Hamilton of Reflex Instruments, in a photo taken before COVID social distancing measures were implemented.



Eagle Drilling NQ provides specialist hard-rock drilling services across North Queensland, operating on the surface and underground, offering diamond drilling and multipurpose drilling solutions.

Clients range from large mining companies to smaller, independent prospectors.

Eagle Drilling NQ services areas between the wide bay Burnett region to the Torres Strait Islands, out west to Mount Isa and beyond, with its head office strategically located in Charters Towers, where an extensive fleet, including the company's own aircraft's, enables it to work across Queensland with ease.

The business employs some of the best professionals in the industry — skilled,

capable and experienced in all aspects of surface exploration drilling.

As a drilling specialist, Eagle Drilling NQ prides itself in leading the industry, using the best in technology, systems and equipment to get the job done safely, on time and within budget.

Surface Exploration Drilling

The team uses leading technologies, systems and equipment to deliver productive mineral exploration services.

It offers productive drilling services which involve:

- Modern, well-maintained equipment for effective, reliable production
- A large team of qualified staff, boasting decades of experience
- Project management and resources for

- on-time, on-budget results
- Working with clients from large mining companies to independent prospectors.
- Culture of safety and professional production.

Drilling Capability

The company's experienced team are complemented with qualifications ranging from Certificate 11 in drilling up to an advanced diploma in drilling management.

The team has a hands-on management approach to support the crews and projects for logistical and technical assistance.

The teams deploy from multiple locations, allowing them to readily service areas between the wide bay Burnett region to the Torres Strait Islands, out west to Mount Isa and beyond.

This allows flexibility around changes to programs and conditions, and enables the company to make fast and informed decisions and redistribute resources where needed to keep projects on track.

Eagle Drilling NQ is committed to understanding the needs of its current and future clients and work in partnership to provide safe, productive drilling services, where and when they are needed.

This commitment to quality customer service runs strongly throughout Eagle Drilling NQ, making the company a trusted provider, and your best choice, for hard-rock drilling services in Queensland. **AMR**

Eagle Drilling NQ invests in:

- Top shelf capabilities
- Partnerships with stakeholders
- Specialist regional knowledge
- Developing local expertise



ENQUIRIES

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📍 P.O. Box 1576, Charters Towers, 4820

CRUSHING INNOVATOR

If your quarry or mining business is looking for a pedestal boom system, whether it be for a new crushing plant installation application or replacing an older boom system, contact Montabert.

The French-based company specialises in the design, production and marketing of hydraulic demolition and drilling equipment, specialising in civil works, mine and quarries applications. Montabert is a world leader in the field of breakers and drills.

The company is founded upon technical excellence, which is what has placed it in the top three manufacturing firms globally in the hydraulic business. Montabert's success is driven by the success of its customers.

The organisation is a pioneer in constant innovation and product development in breakers such as the world-renowned, patented variable speed technology.

Adopting this type of know-how, combined with the breaker's lower input power requirement, results in better percussion efficiency. This, along with the company's industry-recognised energy recovery and regulation system, leads to greater hydraulic effectiveness.

Overall, higher breaker output power means greater productivity in fractured and semi fractured rock. Montabert – in partnership with global pedestal boom manufacturer, Tramac – bring you the latest in boom system design, technology, and cost effective installation benefits.

Important items to consider when selecting

boom systems include:

- Rock hardness and size, expected duty cycle (number of rocks per hour) and physical size of chute or crusher.
- Type of applications: fixed crushing installation, Grizzly, underground mine treatment or mobile crushing.
- Whether horizontal and vertical reach and breaker size requirements are met.
- The use of correct control systems, such as advanced safety processors to be implemented, remote operation option and readiness, to spare parts access.

Montabert has the right boom system to meet your production requirements. Key to this is the quality robust design that includes a low-profile base, incorporating shaped plate steel, which provides an extremely strong foundation to fit any platform mounting requirement.

Also, heavy duty cylinders with high strength steel, welded construction and aligned bushing ensure long life, and therefore maintenance costs savings with ongoing wear and tear. Modern technology is essential in a pedestal boom system to enable safe operating practices.

This can be achieved through utilisation of line-of-site remote control, collision avoidance systems, full automation, tele remote operation with the goal of eliminating exposure to your most important asset: site personnel. **AMR**



A pedestal boom system.

CRUSH TO THE NEXT LEVEL



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TAILORED SOLUTIONS FOR MINING

Jungheinrich is an official partner of Manitou, the global leader in specialist mining equipment.

Jungheinrich Australia is expanding its footprint into Central and North Queensland, where the mining industry has defied the economic downturn.

The company continues to strengthen networks and partnerships with businesses across Queensland, as exciting new mining projects are rolled out.

Jungheinrich Australia's Jayson Johns manages sales in Central Queensland, where the coal industry is still going strong, as well as North West Queensland, where the skyrocketing gold price and hunt for "new economy" minerals has stimulated new projects.

With a comprehensive portfolio, Jungheinrich, one of the world's leading companies in Material Handling Equipment, are able to offer tailored solutions for any mining project.

The company is an official partner of Manitou, the global leader in rough terrain material handling, supplying Telehandlers and specialist attachments developed to suit the Australian mining sector.

Jungheinrich delivers Manitou mining solutions at a number of mining sites across Australia offering new, used, short or long term rental including specialised mining and support services.

Mr Johns said the Manitou MT-X 1030S Telehandler is proving popular.

With an industry focus on the safety requirements and design certification on work platforms he has seen a huge increase in enquiries on the already compliant machine.

The MT-X 1030S is a superior product, user-friendly and has an extensive list of advantages when it comes to safety features.

"The machines come out of the factory with all the safety systems included rather than locally sourced and fitted," Mr Johns said.

"This provides peace of mind when it comes to service support as all parts are genuine and technical documents are 'as built'.

"Customers prefer the safety features to be factory standard so our Manitou products come out with all the bells and whistles ready to go."

The underground models are "first class

mining machines" manufactured in the Manitou Competency Centre in Italy.

Compliant to Australian Mining Regulations MDG15, the machine offers a 10m lifting height and 3t capacity plus a wide range of attachments to suit any mining task.

The machine integrates a series of factory adaptations and safety features such as a fail-safe braking system, emergency steering, external emergency stop, protection of critical components and a guardian angel mining system.

Manitou have worked hard to ensure the machine fits to the conditions and the tasks while ensuring safety is paramount, Mr Johns said.

The machine provides greater flexibility through the two solutions.

"The ability to choose between a standard and an MCC machine allows our customers to ensure they are meeting their requirements in the most cost effective and safest way," he said.

Jungheinrich Australia covers all mining options whether it is surface, underground, all-terrain, or a rough terrain forklift which can be 2.5t up to a 23t Telehandler.

Mr Johns said a number of mines were interested in Manitou attachments such as the scaler, attached to the front of most Manitou Telehandlers for underground mining. The scaler is used to chip away at rocks and knock them down like a big jack hammer after drilling work.

The shaft handler hooks up to the hydraulics and picks up the shaft before placing it onto a belt wheel.

"This enables a safer and more efficient process than doing it manually with cranes, manual handling and chains, so it removes the human factor and makes it safer."

The shaft handler is most suitable to the coal industry but can be used in any mine or related industry that handles conveyor belts.

Jungheinrich have enjoyed strong partnerships with miners in the region, including Glencore at Mount Isa Mines and MMG at Dugald River and are supplying machines to a range of contractors including Straitline Drill and Blast, based at Ravenswood. The company is excited to expand its footprint in the region where a

number of new projects are taking flight.

"There's extensive activity from Townsville all the way out west in Mt Isa and Cloncurry with copper and zinc, which is good to see," Mr Johns said.

"With a range of new and expansion projects in the Central Queensland region and beyond, we are excited to further support the industry.

"Mining in Queensland has a huge future and for many years to come.

"Covid 19 has been a bit of a speed bump

this year, however it's certainly heading in the right direction now."

Jungheinrich Australia are investing, moving to a larger, more modern facility in Townsville. Developing their service hub in Mackay will ensure the company can continue to provide a high level of service support.

"The future is looking bright and we are excited to continue to build our partnerships within the mining industry in Queensland and the wider Australian market. Jungheinrich Australia is your right partner!" **AMR**



Jungheinrich supplies a full range of Manitou mining machines and attachments.

The Jungheinrich logo, featuring a red upward-pointing arrow above the word "JUNGHEINRICH" in bold, black, sans-serif capital letters.A red graphic element consisting of a thick curved line and a partial circle, positioned to the left of the main headline.

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Jungheinrich Australia, official partner of Manitou have a large range of Telehandlers that can be tailored to meet both your above and below ground requirements. We provide a number of specialist attachments including mining platforms, tyre and cylinder handlers specifically developed to suit the Australian Mining sector.

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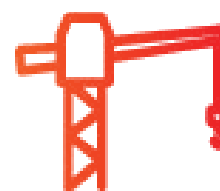
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JUMBO CRUSHER FOR LARGEST GOLD MINE



Rapid Crushing's Jonsson L160 crushing machine, one of the largest track mounted crushing machines in the world, is now located at the Ravenswood Gold Mine site.

What is believed to be one of the biggest track mounted rock crushing machines in the world has recently arrived in Queensland and is being installed at the Ravenswood Gold Mine.

Rapid Crushing and Screening Contractors, based in WA with a branch in Mackay, is installing the mega machine, a Jonsson L160 primary crusher.

The machine, weighing in at nearly 190t, is being assembled at Ravenswood for undertaking its first project.

The machine is somewhat appropriate for the site, as Ravenswood Gold is planned to

become Queensland's largest gold mine.

Rapid Crushing's Operations Manager, Glenn Irvine, said the crusher was built in Sweden and is the first of its type in Australia.

He said Rapid is the only private contractor in the world to own one of these units.

This "mega unit" has been fitted with a host of optional features – a Metso C160 jaw crusher, a large feeder, rear support legs and hopper extensions.

"It is the ultimate mobile machine for open quarries and mines that require a seriously high capacity, heavy duty unit with the ability to accept up to 1200mm ROM rock," he said.

Mr Irvine said its use reduces costs incurred through sorting oversize ROM as it nearly eliminates the need for separate rock breaking.

"It can produce big tonnages, at the best price possible and is the ideal solution for mines having a stand-down or unplanned failure of a mine's primary jaw crusher."

In this case it is the third installation for crushing rock at the mine. Rapid already has two track-mounted crushing and screening circuits at the site.

Mr Irvine added that the L160 is the ideal machine for use as a stop-gap measure to minimise downtime and maintain high

volume processing.

And judging by the enquiry interest it could be in big demand.

The machine's fleet number is 747, hence it has been appropriately nick-named 'Jumbo'. Whilst 'Jumbo' does not have the capacity to fly from site to site, Mr Irvine said the machine is surprisingly easy to transport, which is just as well as the project at the Ravenswood site meant it had to be transported all the way from WA.

For further information contact Neil Constantine at Rapid Crushing and Screening Contractors, 577 Bickley Road, Maddington, WA or phone **(08) 9452 5888. AMR**

PROUD TO BE PART OF... RAVENSWOOD'S GOLD PROJECT!

At Ravenswood Gold our role is to provide a reliable and efficient crushing and screening process with the capacity and flexibility to increase throughput beyond the contract quantities if called upon to do so.

We are currently running 2 Track mounted crushing and screening circuits on site.

In addition, a Jonsson L160, one of the largest track mounted crushers of its type in the world, is now being commissioned on site with other plant to commence work at Ravenswood in mid-October.

This will be the third crushing and screening circuit installed by Rapid for this exciting project that is planned to become Queensland's largest gold mine.



One of the 2 Track mounted crushing and screening circuits on site.



The Jonsson L160, one of the largest track mounted crushers of its type in the world



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AT FOREFRONT OF TAILINGS MANAGEMENT

ATC Williams has been at the forefront of tailings management in Australia and internationally for more than 30 years.

The business provides strategic consulting engineering services and technical advice on tailings management, water management and waste management to mining companies worldwide.

The team at ATC Williams takes a pragmatic approach combined with innovative thinking and a strong emphasis on safety and quality.

ATC Williams strives to understand its client's business, strategies and goals to enable delivery of solutions that are sustainable, cost effective and fit-for-purpose in the long term.

With projects across Australia as well as in the Americas, Africa, Europe, the Middle East and Asia, ATC Williams has a proven track record of successful project delivery, reliability and excellence in specialist market sectors.

ATC Williams has been working at the Pajingo Gold Mine for ten years to contribute to management and ongoing development of its tailings management system.

This has included design and construction

support for tailings dam raises.

Assistance with water management aspects of the operation has also been provided to ensure regulatory compliance.

ATC Williams advocates for the new Global Industry Standard on Tailings Management (GTSM) and facilitates implementation of this standard to assist mining companies achieve the common goal of zero harm to people and the environment as related to tailings and mine water management systems.

A universal objective of the GTSM is to prevent catastrophic failure and enhance the safety of mine tailings facilities.

Most notably, the standard embodies transparency, accountability and safeguarding the rights of project-affected people.

These aspects reflect the values upheld by ATC Williams in its contributions to the mining industry.

It is important to note the GTSM is directed at operators of tailings storage facilities, whilst providing a robust framework for tailings management.

It is therefore necessary for owners and



The tailings dam at Pajingo Gold Mine in Queensland.

operators to be aware of two critical elements of the GTSM; Governance and Emergency Preparedness.

Mining companies will be encouraged through the GTSM to consider the inclusion of Accountable Executives, Engineers of Record and a Responsible Tailings Facility Engineer in their team, along with independent review provisions.

ATC Williams is able to offer expertise to assist mining companies navigate the requirements of this new standard.

This support comes with a comprehensive understanding of other prominent guidelines and standards for tailings management including those from ANCOLD (Australian National Committee on Large Dams), ICOLD (International Commission on Large Dams), and CDA (Canadian Dam Association).

In an Australian context, most state authorities also apply specific requirements through codes of practice or regulations, all of which are well understood by ATC Williams, with relationships existing across relevant government departments. **AMR**



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✓ Dam Engineering

✓ Slurry and Mechanical Engineering

✓ Materials Characterisation
- ✓ Water Management

✓ Hydrogeology

✓ Closure and Rehabilitation

✓ Laboratory Testing

Contact Lis Boczek
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GOING FOR GOLD

With the gold price holding around the US\$1900 per ounce mark between July and September this year, we look at how some of the major gold operations in Australia are performing, including their projects and developments.

BY KATHLEEN SOUTHWAY

The Newmont Tanami Operations processing plant will be expanded as part of the Tanami Expansion 2 project.

The price of gold has climbed steadily since the COVID-19 pandemic began about six months ago, rising by about 40% from the bottom of US\$1474 on March 19.

Historically, the price of gold has been on the upward trend over the last 50 years. More recently, the impact of COVID-19 has driven investors to park their money in this metal as a safe haven.

Gold outperformed all major assets in the first half of 2020, providing an almost 17% return, according to the World Gold Council.

Federal Government

The September *Resources and Energy Quarterly* shows Australia's gold exports are forecast to reach a high of \$31b in FY21, making gold the country's third largest commodity export behind iron ore and LNG.

Federal Resources Minister Keith Pitt says Australia is now on track to become the world's largest producer of gold by 2021.

"Strong prices for gold, iron ore and other minerals are leading to new investment plans, including the reopening of gold mines long closed and a steady stream of new projects awaiting final investment decisions," he said.

While the International Monetary Fund (IMF) projects a 4.9% reduction in global growth in 2020, Australia is well-placed to weather the financial impact from COVID-19 and global lockdowns due to its focus on gold mining and the resources sector.

"The resources sector has underpinned Australia's economy throughout 2020 and will continue to play a crucial role for the nation as the global economy recovers from the COVID-19 pandemic," Mr Pitt said.

"Robust commodity earnings will be more important than ever to the Australian economy as the country emerges from the largest global contraction since the 1930s.

"Australia's reputation as a reliable, low-cost supplier of mineral and energy products remains intact, with virtually no operational COVID-19 shutdowns, unlike some of our competitors."

Mine Expansions

The top 40 global mining companies by market capitalisation at December 31, 2019 include Newmont Corporation and AngloGold Ashanti.

The report, titled *Mined 2020*, released by PricewaterhouseCoopers (PwC) in June this year, ranks Newmont at number seven and AngloGold Ashanti at number 26 globally.

Both mining giants have mine expansion projects underway in Australia, Newmont with its Tanami Expansion 2 project and AngloGold Ashanti with its Boston Shaker underground mine development, which has recently achieved commercial production.

Tanami Development

Newmont is the number one gold producer in the world, with assets producing more than 6mozpa of gold to 2029.

Within Australia, Newmont's world-class ore bodies include the Boddington gold mine in WA and the Tanami operation in the Northern Territory.

The fully-owned Tanami underground mine has been in operation since 2002 and produces an average of 500-600koz gold per annum.

The Tanami Expansion 2 project aims to increase production by an additional 150-200kozpa for the first five years beginning 2023.

Newmont Tanami Operations general manager Vince De Carolis says the project is going well, with all critical activities progressing to plan, despite the current COVID-19 climate.

"The Tanami Expansion 2 project cements Newmont Tanami's position as a key asset for the Northern Territory and will extend the life of mine out to 2040," he said.

"This expansion demonstrates our confidence in the mineral prospectivity of the Tanami district.

"The project includes the construction of a vertical shaft and 80m headframe at the Callie underground mine, along with

supporting infrastructure.

"Box cut for the production shaft foundation was completed in July, and a second raise bore was placed on surface."

Newmont has the largest reserve base in the industry at 100.2moz in 2019, underpinned by world-class ore bodies in top tier jurisdictions.

Latest Newmont production figures in the three months to June show the Boddington and Tanami operations are on track to meet annual guidance of 553koz of gold for 2020, with 294koz achieved in the three months to June.

Tropicana Development

Tropicana, a joint venture with IGO in which AngloGold Ashanti has a 70% holding, is an open pit operation 200km east of Sunrise Dam and 330km east-northeast of Kalgoorlie in WA.

Consisting of the Tropicana, Havana, Havana South and Boston Shaker open pits, the joint venture approved the \$105m development of the Boston Shaker underground mine in March 2019.

The underground project recently achieved commercial production, reaching a rate of 0.7mtpa, on-time, below budget and with no recordable safety incidents.

AngloGold Ashanti senior vice president Michael Erickson said underground mining

at Boston Shaker will leverage further value from this high performing operation, achieving payback in just over three years.

"The underground mine will contribute higher grade mill feed from the current quarter onwards, improving the gold production profile and enhancing cash flow during 2021-2023 when the mine plan includes periods of higher waste stripping in the Havana open pit," he said.

The first production stope was fired in June 2020 and production is currently ramping up, expected to reach full capacity by the first half of 2021.

The Boston Shaker underground mine at Tropicana will contribute about 100kozpa of gold over a seven-year mine life.

Underground diamond drilling at the Boston Shaker decline is also scheduled for December 2020, while the joint venture continues with its Havana stage 2 open pit cutback to access the deeper Havana open pit ore from 2022.

A decision on the Havana Stage 3 open pit cut-back is expected to be made in 2021. AngloGold Ashanti is aiming for annual gold production from the Tropicana mine of between 450-500koz from 2022 onwards.

CONTINUED ON P36



Haul trucks at the Newmont Boddington open pit mine.

GOLD PROVIDES SAFE HAVEN

The Perth Mint, a subsidiary of Gold Corporation, is Australia's largest fully integrated precious metals enterprise, providing premium gold, silver and platinum products. It registered a record profit before tax of \$47.55m and an annual turnover of \$23.87b in FY20.

BY **KATHLEEN SOUTHWAY**

One kilo 99.99% pure gold Perth Mint cast bars.

The Perth Mint has experienced the highest demand for its gold and silver products in its 120-year history.

The spike in demand for gold, coupled with the relatively weaker Australian dollar, saw a flood of revenue earned as foreign currencies at The Perth Mint.

By June 30 2020, the depository at the Perth Mint was safeguarding more than \$5.73b worth of precious metals for more than 60,000 clients from over 130 countries, with allocated gold ounces increasing 96% during the year.

Investors flocked to precious metals as a safe haven after the world economy shut down due to the COVID-19 pandemic, driving up the price of gold.

Profit for The Perth Mint before tax jumped 258% from FY19's \$13.26m and annual turnover increased 32% from the previous year's \$18.07b.

These record results didn't come without its share of challenges for the business.

The Perth Mint's general manager of refining, Nathan Edwards, said global supply chains were heavily disrupted at the start of global lockdowns and still are in some areas of logistics.

"There were questions early on about whether we would stay open," he said.

"The world's transportation routes shut down overnight and we worked very hard with transport providers and our operational customers, who are the major and junior mining companies around the globe, to get their material into our refining operations," he said.

"Delivery timing was a key challenge as commercial airlines shut down their operations due to the large drop in passenger numbers, affecting our supply chain not only upstream but also downstream in terms of getting our refined products out."

The WA Government's decision to keep The Perth Mint operating during global lockdowns, together with record demand, saw the refinery operating at full capacity during the pandemic.

It currently has the capacity to refine 1000tpa of 99.99% gold and the same for silver.

"Our shareholder is the WA Government and they recognised the importance of the gold mining industry," Mr Edwards said.

"We were declared an essential business and therefore we were able to remain open. "It was important we remained open to

support businesses from not just WA and Australia but also from Papua New Guinea, Alaska and some West African countries such as Ghana and the Ivory Coast."

Processing

The Perth Mint refines more than 90% of Australia's gold doré products and processes gold from the Oceania region, including production from Australian-owned projects in North America and Africa, as well as recycled gold from Asia.

It also refines silver doré, which is cast it into value-added products or manufactured into a variety of minted products, including bars and coins.

The Perth Mint's total refining throughput for FY20 was 16.06moz of gold and silver.

With two chlorine refining furnaces, each with a 1t capacity, the Miller process is used to refine gold to a minimum purity of 99.5%.

This purified gold is suitable for casting into 400oz bullion bars that meet the physical requirements of the premier regulatory body London Bullion Metals Association (LBMA).

The Perth Mint has accreditation from the world's five major precious metals exchanges and is the only facility in Australia to be accredited by the LBMA for

refining gold and silver.

Other major accreditors include the Tokyo Commodity Exchange (TOCOM), New York Commodity Exchange (COMEX), Dubai Multi-Commodity Centre (DMCC) and the Shanghai Gold Exchange (SGE).

The Perth Mint recently upgraded its silver processing plant due to the continued high demand for its silver coins and bullion products.

The commissioned external processing plant, based near the Perth Airport, utilises its existing gold processes to better respond to the demand for both gold and silver.

"We produce a significant amount of silver investment products so it made sense for us to have the capacity to refine and feed into our silver coining program," Mr Edwards said.

"Silver used to be gold's poor cousin but they seem to have decoupled a little, as silver is an emerging commodity and is used in growing industries such as renewable energy and solar panels.

"In terms of price and price movement, silver is probably a more attractive investment for non-institutional investors than gold and it is a more accessible product." **AMR**



400oz 99.99% pure gold Perth Mint cast bars on a trolley inside one of The Perth Mint's central bank grade vaults.

Nathan Edwards, General Manager Refining, with 400oz 99.99% pure gold Perth Mint cast bars.



CONTINUED FROM P35

Boddington Automation

Automation can help in a crisis by reducing on-site presence, streamlining processes, computerising workflows, limiting production risks and reducing inefficiencies.

Earlier this year, Newmont approved full funding for the implementation of the first Autonomous Hauling System (AHS) at its open cut gold mine at Boddington in WA.

With an investment of \$150m into Boddington's AHS, the fleet of autonomous CAT 793F is expected to be fully operational at the site in 2021.

Newmont aims to generate an internal rate of return of more than 35% with this more controlled and efficient haulage operation, and in turn extend the mine's life by at least two years.

Newmont Boddington Operations general manager Mark Rodger says the project remains on track for full deployment, setting a new industry benchmark in safety and efficiency.

"Boddington was selected as a mature operating site with demonstrated technical leadership in innovation," he said.

"Despite COVID-19, necessary work has continued for deployment, including orders for long lead items, infrastructure upgrades and execution of a robust people strategy which includes providing opportunities for reskilling and redeployment of haul truck drivers to other roles supporting AHS."

Once fully operational in 2021, Boddington will be the world's first open pit gold mine with an autonomous haul truck fleet. Boddington is WA's largest gold producer and currently employs about 1200 staff and 500 contractors.

Tropicana Automation

In what is believed to be an industry first for hard-rock mining, AngloGold Ashanti has rolled out a \$6m autonomous drill fleet at Tropicana this year, after a successful trial in 2019.

Macmahon Holdings, the mining contractor at Tropicana, now operates five autonomous CAT MD6250 drill rigs as part of its drilling fleet at the mine site, with support from

Flanders, a world leader in autonomous drilling.

Within a month of transitioning from manned rigs, the autonomous fleet recorded an 8% increase in instantaneous penetration rates and a 14% reduction in delay times.

A drill controller can operate up to five rigs from one console, with two ground crew on

the pit floor supporting the automated rigs. AngloGold Ashanti manager technology Martin Boulton says the autonomous drill fleet has benefitted the Tropicana mine site.

"[There are] increased operating efficiency and asset utilisation as the equipment can operate through lightning and inclement weather, explosive detonation and eliminates the need for operator fatigue breaks," he said. **AMR**



The crushing plant at Newmont Boddington.

BLUE SPEC

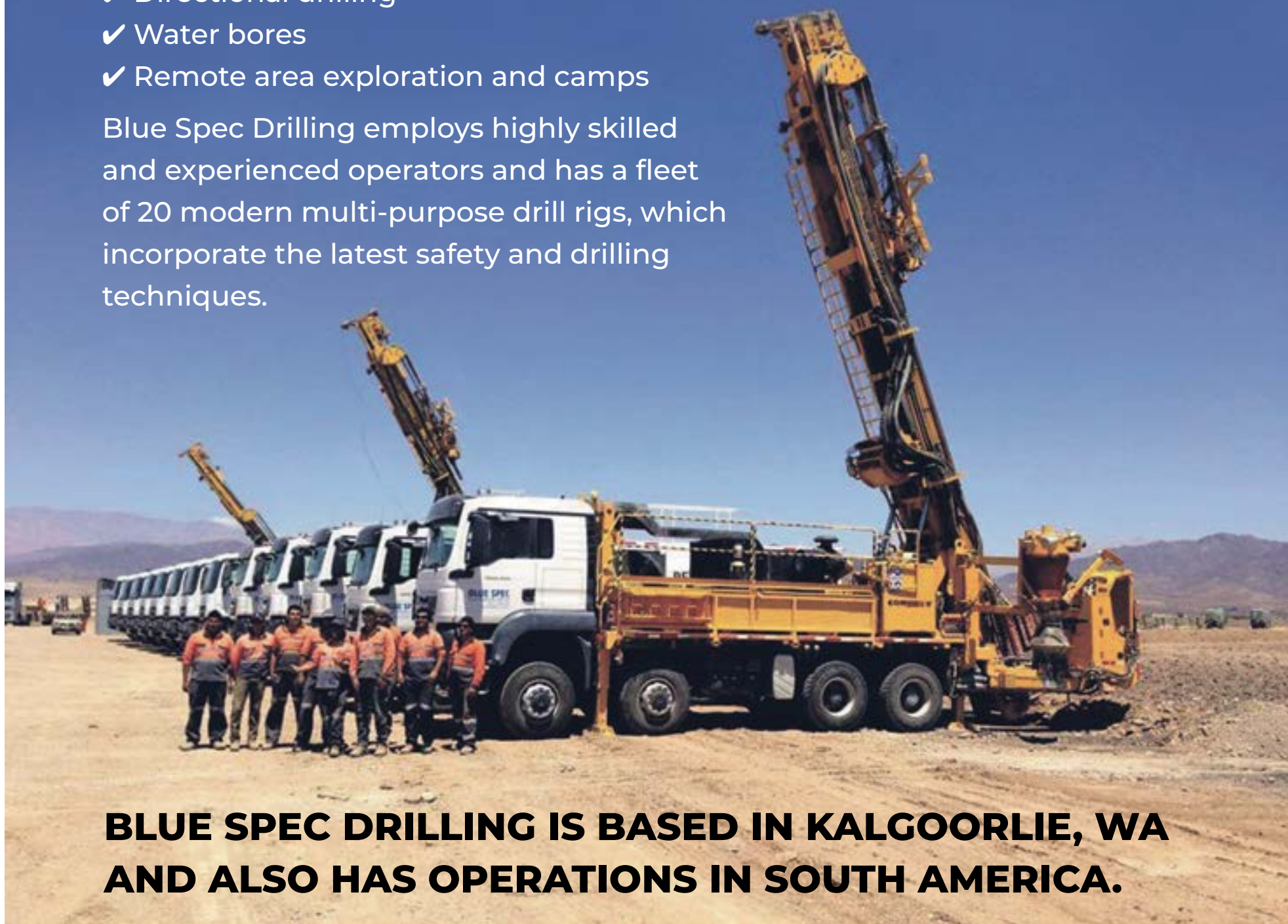
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A rebuilt L6C Simba at MSD Mining Solutions' office located at Canning Vale, WA.

DELIVERING SOLUTIONS SAFELY

MSD Mining Solutions was formed in August 2011 to provide quality personnel to the mining industry to assist mines throughout Australia with manning levels particularly for management and supervisory roles.

In September 2014, MSD Mining Solutions developed a production drill service providing the opportunity for its clients to receive an advanced service in the specialised field of underground production drilling.

MSD Mining managing director Murray Deacon said the company strives to deliver a safe, quality and productive service to all their clients.

"We maintain a high focus on safety while achieving the mine production targets set by our clients," Mr Deacon said.

"MSD Mining Solutions supports this service through key management personnel with 20 to 30 years-plus experience in this field.

"All MSD Mining Solutions drills are supported with experienced underground production drillers and maintenance fitters who can provide a production drilling service to our clients above all others in the mining industry."

Over the past six years, MSD Mining Solutions has evolved to become a leader in the underground production drilling field, providing underground production drilling support and services to clients throughout Australia.

MSD Mining Solutions currently have active contracts in North Queensland, NSW and WA.

"Some of these contracts have been in place for more than five years, demonstrating the commitment we place on integrating with our clients to ensure mutual success," Mr Deacon said.

"MSD Mining Solutions has a track record for undertaking contracts and

continually gaining extension of time at all sites we conduct production drilling at, demonstrating our willingness to work with the client under all circumstances.

"Our value is that the project always comes first and that we will assist in all ways and means to ensure our client and the project performs both safely and productive."

The fleet of nine production drills provided through MSD Mining Solutions is quite diversified, allowing for many different mining methods with regards to hole length, diameter and direction.

MSD Mining Solutions' equipment is manufactured by EPIROC, to whom MSD Mining has had a close allegiance to throughout its journey. Over the years, the company has bought new and second-hand production drills through Epiroc.

More recently, since August 2018, MSD Mining Solutions purchased two new SIMBA E7C production drills and one new SIMBA S7C production drill ex-Sweden from Epiroc.

These acquisitions now provide the company with the opportunity to provide its clients with underground production drills of the highest standard. The drills boast the latest in world-class technology with regards to hole set-up and alignment and full automation drilling componentry.

"The equipment is supported with regular planned re-builds to maintain the production drills to perform at the high availability rates required to achieve the service we deliver," Mr Deacon said.

"MSD Mining Solutions works closely with Maintenance Technique, with regards to re-builds and maintenance support.

"MSD Mining Solutions intend to grow as an industry leader in underground production drilling and provide a service that will add value to your operation and be the contractor of choice for mine sites across Australia." **AMR**



MSD purchased a new S7C Simba from Epiroc.



The new S7C Simba drilling down-holes for a client.



A new E7C Simba purchased in August 2020 heading to one of MSD's new clients.



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- Competitively priced parts and consumables
- Tilt tray and float services

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ENGINEERING MINING SOLUTIONS

The design of truck bodies has evolved dramatically over the past 50 years since Austin unveiled its first piece of mining equipment in 1969.

With a proven track record of innovation, Austin's engineering team have been at the forefront of developing mining equipment to client-specific requirements that are focused on the specific challenges of any mine site.

Austin is known as a trusted innovation partner, working closely with customers and steel manufacturers to develop products that have set it apart as the world's leading customised dump truck body manufacturer. Austin is a market leader in the design and manufacture of customised off-highway truck bodies, buckets, water tanks, tyre handlers, mining attachments and other ancillary products.

The company consistently challenges status quo thinking to design fit-for-purpose mining equipment solutions for all commodities, including iron ore, copper, gold, coal and lithium, to name a few.

Global Engineering Manager Rick Reynolds started working for Austin in the early 1980s when the company was manufacturing truck bodies for a major Original Equipment Manufacturer (OEM).

"The OEM bodies we were building back then were standard cookie-cutter bodies but we were also doing a whole lot of modifications to them – side boards and/or tail extensions to make the volume capacity larger or by adding liners to make the bodies last longer," Mr Reynolds said.

"Then, in the late eighties, steel materials started to get better and we identified a new type of steel which was particularly promising, both structurally and for its abrasion resistant properties.

"These properties allowed us to remove the liner plate from our bodies, which substantially reduced the overall weight of the body and led to the creation of what we believe was the world's first light-weight body."

It took a while for the concept to gain traction in the mining industry, but the early adopters understood how the light-weight body allowed an increase in payload, which enabled their mine sites to flourish long before others did, so it eventually caught on.

Austin has worked closely with steel manufacturers in product development to look for innovative alternatives in the design of one-of-a-kind mining equipment solutions for forward-thinking operations.

"The most significant innovation over the past 30-40 years has been around the use of steel materials," Mr Reynolds said.

"Over that time, we have constantly pushed the steel industry to improve their product, because the better steels we get, the more we can do."

Hardox 500 Tuf

In a perfect example of a close collaboration that has benefited the whole mining industry, Austin worked with steel company SSAB to develop the innovative Hardox 400 abrasion resistant steel plate into a liner application.

This dramatically reduced the body weight of mining trucks, immediately increasing payload.

Austin was the first in the industry to make

that move, which accelerated the migration from heavy, inefficient equipment to lighter, more efficient trucks.

Through continued research and development, the companies have partnered to drive innovation together and evolve the product.

The latest iteration is the ground-breaking Hardox 500 Tuf, which features outstanding weldability, formability and impact toughness to deliver extreme hardness and guaranteed toughness in a single wear plate.

The product has proved a perfect fit for the rigorous mining industry and reduces the weight of components by as much as 25% without sacrificing wear life.

The Hardox 500 Tuf has already been rolled out in three strategic areas in North America and is now being introduced into designs in South America and Australia.

Computer Modelling

Computer modelling and analysis was another major game-changer for the industry and has paved the way for Austin to be a pioneer of mining solutions.

"When I started, everything was designed on the drafting boards and all calculations were done by hand," Mr Reynolds said.

"The software we now have to analyse our designs far exceeds what could be achieved in the early days and includes innovations around heat analysis when designing heated truck bodies.

"When you're dealing with heating bodies by using the engine's exhaust with temperatures up to 650°C, you need to be working with top of the line software.

"This software has enabled us to be at the forefront in the creation of a lot of new concepts at the time such as 'Gate Free' body designs.

"By getting rid of the gate at the back of the body we significantly reduced the level of maintenance required, reduced the overall cost and increased the capacity."

In 2009, Austin created its highly successful 'Flow Control' body, which reduces dust emissions, extends the life of the chassis and body, and most importantly solves the issue of releasing material evenly during the unloading cycle.

"We did this by designing a unique floor configuration that allows material to be released from the body progressively, rather than letting it all flow out at once," Mr Reynolds said.

"We have patents on the design because we felt this would be a major improvement for truck body operations as well as a major improvement in safety."

Where others had tried and failed to pull off this design, Austin excelled and won the Wyoming Engineering Project of the Year Award for it.

Austin's leading customised designs saw the company make it into the Guinness Book of World Records in 2012 with its T282C Flow Control Body, which was recognised for carrying a record load of 470.4m³ at a coal density of 0.86t/mc.

The body was a combination of the Flow Control and Gate Free body designs that



Innovative floor designs built into the Austin ULTIMA truck body offering assist with reduced overall floor wear and improved machine stability.

was being customised for a coal company. Austin is continuing to innovate.

Mr Reynolds said the team were excited about a new body called the "Premier".

"It is a body where we are using new grades of steel, applying new manufacturing technology and using our computer analysis system to make sure we only put material where it's needed and remove steel that adds weight, from where it's not needed," he said.

"There's already a lot of interest out there in this type of body."

The shared experience and depth of expertise across Austin's engineering hubs, strategically located across four continents, delivers a powerful competitive edge. Austin has the largest global footprint of manufacturing facilities of any dedicated customised off-highway truck body and bucket provider.

The company has a solid footprint in Australia with a head office in Brisbane, manufacturing hubs in Perth and Mackay and sales representatives throughout Australia.

Engineering Manager Deon Wessels, who is based in Austin's Perth engineering hub, said there were three types of operators in the truck body market: the truck OEMs, the customised product providers, and other providers of more basic product lines.

"Austin is the industry leader of customised product providers globally," Mr Wessels said.

"We are able to provide bespoke solutions to our clients and focus on listening to the voice of the customer to ensure their individual requirements are met."

Mr Wessels said one of the key advantages with Austin is it "develops, builds and repairs mining equipment attachments."

"The repairs are provided on both our products and on competitor products, including those made by the OEMs," he said.

"This allows us to get first-hand information on failure modes of equipment in the market which helps influence our new product design.

"The reality is that it is difficult for the OEMs to match what Austin can do in terms of customising body designs.

"Their factories are set up for high production, not for a one-off production run or a run of two or three."

Austin's ability to be flexible by doing shorter production jobs almost as efficiently as if it were doing a bulk order was a "critical differentiator".

"What sets us apart is the way we combine the same software and technology as the OEMs, a thorough understanding of our



The Austin ULTIMA innovative truck body design delivers the lowest cost per tonne truck body solution on the market.



The world's first and only truly two-piece bucket design by Austin, was an innovation to reduce the exposure to stored energy due to reducing the need of onsite maintenance.



Faster cycle times due to the innovative liner-less Backhoe bucket design is delivering Austin customers higher productivity results.

customers’ needs and the deep knowledge base of our engineering teams,” Mr Wessels said.

Underground

Austin designs customised truck bodies for work in underground mines, an environment which carries unique risks and challenges for those who work in them.

Compared to competitors, Austin’s designs are proven to deliver a substantial reduction in carry-back, which is the material that sticks to the body and is carried back after dumping the load.

This tends to be a big issue for underground miners as they often operate underneath and within water tables, meaning sticky material is a constant challenge.

ULTIMA

The Austin ULTIMA body was released in 2018 and was described as the “next generation in mining dump bodies”, bringing together 50 years of engineering expertise from its US and Australian teams.

Mr Reynolds said the ULTIMA was a game-changer because it did not typically have a liner and the design also includes the minimum amount of ribbing which, importantly, makes it lightweight.

“The ULTIMA’s curved design has been really well thought-out and really works for miners in many regions where they like liner-less bodies,” he said.

“We now have well over 100 ULTIMAs out in the field and we are continually working to make further improvements.

“At the moment we’re trialling a new grade of steel in the ULTIMA body at different mine sites around the world, including in WA and in the US.”

Mr Reynolds said Austin works with different mine sites to understand their plans and goals to design fit-for-purpose solutions, never taking a one-size-fits-all approach.

With many different types of bodies – JEC, the LD, the ULTIMA, WESTECH, the Flow Control and Premier – Austin can tailor each model to customers’ needs in any given application or unique challenges that a particular mine might have.

“Some in the industry have one body and that’s what you get,” Mr Reynolds said.

“Not us, we are all about customising for each mine site’s needs.”

He said regions tend to have their particular preferences with North American customers preferring liners in their bodies, and many parts of the US, Canada and the Arctic desiring heated bodies because of the colder temperatures.

“The key thing, however, is to work with the miners to find out what their goals are.” Mr Reynolds said.

“Our range of bodies can be designed and customised to haul everything from a light coal material to metal scrap, to hard rock, to copper, to gold, to diamonds mined in the extremes of the Arctic.”

Two-Piece Excavator Bucket

In 2019, Austin won the People’s Choice category of the Swedish Steel Prize and was runner-up in the main prize, as well as being recognised as one of Australia’s most innovative companies in the AFR/BOSS Magazine’s annual award ranking, for its Two-Piece Excavator Bucket.

Not surprisingly, Austin came up with this innovative product, which captured international recognition, by listening to the customer.

Austin brought a fresh approach to designing the bucket so the bottom structure, which wears out faster, could be easily separated from the top structure, which is longer lasting.

This has meant the bottom section can easily be removed when it needs replacing without having to rework the top structure, saving money.

“At the same time, as the bottom section is replaced more regularly, we can customise that to meet the customers changing needs,” Mr Wessels said.

“This allows the flexibility to provide a liner-less option, a light-weight option for

increased payload or a lined option if the customer prefers.

“This unlocks the versatility of this bucket design making it a high-performance bucket.”

Stairway Access Tank

Water tanks are essential equipment in mines for dust suppression and firefighting, so in 2014, the team revolutionised the way water tanks are designed with the release of the Stairway Access Tank (SAT).

When Mr Reynolds visited a mine site in Canada in 2009, he was faced with the prospect of doing special training, a certification and costs of about \$10,000 just to inspect a water tank, due to safety regulations.

After meeting with a consultant from the relevant peak safety body, Austin designed the SAT which meant workers could go up and down a staircase and move inside the water tank much more easily.

There are now almost 100 SAT systems in operation around the world.

Mr Reynolds said the best way to ensure Austin remains a market leader is to keep pushing the boundaries of innovation in the mining industry, whether it be through working with material suppliers, incremental evolutionary design improvements, or revolutionary designs like the Two-Piece Bucket. **AMR**



All of Austin's designs are analysed during the design process to ensure the end users receives the benefits of the innovative designs.



Not just a truck body manufacturer, Austin truly does have the full mining attachment offering, being market leaders with water tank designs for 30 years

NOT SAFE? NOT HAPPENING

Departing from an outback community.

Goldfields Air Services (GAS) has experienced steady growth to become one of Australia's leading charter companies since its inception in 1982.

But GAS managing director Dougal McQuie said the company's biggest growth period began around 2008 when it started flying exploration crews out to the Tropicana gold operation in WA's Goldfields.

"GAS has been a charter company for 38 years and has always had a strong focus on customer satisfaction," Mr McQuie said.

"We have evolved a lot over the past 10-15 years, particularly in tandem with AngloGold Ashanti, which has been a solid partnership of ours.

"We were with them from the day they started at Tropicana, where we flew crews out to what was just a patch of red dirt that later became an airstrip.

"The site literally consisted of a few tents under a black oak tree back in the day.

"It is surreal now to see a whole mine built in the middle of the desert."

In the early days of the partnership with AngloGold Ashanti, Goldfields were flying crews once a week in Cessna 210 and 310 aircraft before moving to Cessna 402 and 404 planes.

As the operation grew, GAS switched to turboprop aircraft with the Beechcraft King Airs — the B200 and C90 — and now flies crews in daily.

Mr McQuie said he was thankful to AngloGold for continuing to support the company by

flying out of Kalgoorlie.

"They could have easily started flying out of Perth but they've continued to employ people out of Kalgoorlie and I think the support of local community aspect of AngloGold is phenomenal," he said.

"The community really supports them, I think the Tropicana venture is as important to Kalgoorlie as the super pit."

The move to turboprop aircraft was also in line with safety and regulatory requirements which saw an industry shift from single to twin engine aircraft.

Mr McQuie has placed a big emphasis on the company's mantra: 'Not Safe, Not Happening', since he bought the company in 2011.

"We continued to build on a very proactive attitude around safety and culture once I took it over," he said.

"I could see there was no room for not having that and that our reputation and safety focus was the thing that was going to underpin the company moving forward.

"For a charter company at our level, I believe we are industry leaders in that regard."

GAS can transport small crews of up to nine people into the most remote locations, whether it be for crew changes, exploration work or flying in urgent parts and personnel to fix breakdowns.

Mr McQuie recalls a time the company picked up a specialist operator after he had just touched down in Perth from Singapore in the middle of the night.

Within hours GAS had dropped the operator, and specialist bolts needed to fix an equipment breakdown, at a mine site in Kambalda.

The mine was up and running by first light. Another time he recalls transporting 1000kg of motor bearings to a site in Telfer, 460km east of Port Hedland.

From its base at Kalgoorlie-Boulder airport, no job is too remote for GAS which does regular runs to Wiluna, Laverton and other communities in central WA.

Mr McQuie said GAS understands the importance of keeping downtime to a minimum, which saves companies millions. "Flying in crews, parts, support personnel and handling logistics is our bread and butter," he said.

"We can offer a service any hour of the day or night; getting an hour's notice sometimes is a bit of a luxury.

"As long as the site has a suitable runway to land on, we can take personnel or freight to wherever it needs to go.

"We have taken exploration crews to Lake Wells and Lake Carnegie east of Wiluna.

"Sometimes you are talking about a 14-hour drive compared to an hour's flying and you still have to get equipment up there.

"For personnel changes, it makes perfect sense, not just in a timing sense but from a safety aspect, if you have crews driving long distances and getting tired you only have to hit a kangaroo or have some other accident and it can become a major logistical challenge."

GAS has recently opened an office in Jandakot, which gives the company the ability to provide services and crew changes out of Perth.

"Our head office will always be in Kalgoorlie but we are offering a service out of Perth as we acknowledge that's where there is a large demand for our services," Mr McQuie said. GAS operates four B200 and two C90 King Airs between Kalgoorlie and Jandakot and its fleet also includes two Cessna 402C, three Cessna 172s and a Cessna 182T.

The company also does sales and promotional trips, aerial survey and photography, search and rescue, freight drops and fire spotting.

Scenic flights include trips to the magnificently pink Lake Hillier on Middle Island via Cape Le Grand National Park.

GAS also offers flying training, catering to everyone from beginners to commercial pilots at its Kalgoorlie Flight School. Advanced pilot training, including Turboprop training and Instrument training and instructor training, are conducted from its Jandakot base

Apart from mining and exploration companies, regular clients include major national and international companies, service and supply companies, sports groups and tourists as well as law enforcement and emergency services crews.

GAS is also a tier 4 search and rescue agency which means that it can be called up at any time by AMSA to look for missing personnel or aircraft or marine vessels. It often provides services when the AMSA jets are either busy or unavailable or when a local response is more practical. **AMR**



The King Air B200.



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COST-EFFECTIVE CUSTOM STEEL SHEDS

WA-owned family business AUSPAN is one of the country's leading steel frame design and construction companies, this month celebrating its 1000th project since launching in 2009.

The business, which services clients across WA and the Northern Territory, offers a streamlined, cost-effective solution for the design and construction of steel building structures – an attractive option for mining projects in remote locations.

“At AUSPAN, we’ll design, manufacture and then install the shed you need, anywhere in WA, the Northern Territory and beyond,” Auspan design and construction director Steve Richardson said.

“Our steel structures are custom-designed, individually fabricated, carefully transported, and quickly and safely installed all to your unique, practical, time and budgetary specifications.”

For mining clients, this included power generation buildings, heavy vehicle workshops, and storage warehouses.

“We also offer kit buildings if you already have installation personnel on site and offer the complete service so you don’t need to enlist any third parties (engineers or architects),” Mr Richardson said.



This month, AUSPAN celebrated its 1000th project since launching in 2009.

“We take care of everything from feasibility through to completion.”

Mr Richardson said the company has a unique method of on-site installation which allows all roof sheeting and accessories to be installed while the building is at

ground level.

The unique ‘AUSPAN roof lift’ method reduces construction cost and site time significantly.

This progressive approach to embracing

and developing new technologies and techniques has established AUSPAN as the steel frame construction partner of choice for mining clients across WA.

More information on AUSPAN’s services can be found at: www.auspangroup.com.au. **AMR**

AUSPAN



WA’s LEADER IN THE DESIGN & CONSTRUCTION OF STEEL FRAME SHEDS AND BUILDINGS



**WA OWNED
& OPERATED
SINCE 2009**

IN PEAK FORM

Peak Downs coal mine has been one of the bright spots for the Australian economy.

BY KATE CHRISTIAN

After starting production in 1972, Peak Downs is now one of the world's biggest coal mines and is one of the shining lights for the Australian economy amid the COVID-19 pandemic.

Peak Downs is one of seven BHP Billiton Mitsubishi Alliance (BMA)-operated mines in the Bowen Basin, described by Queensland Resource Council chief executive Ian Macfarlane as the "engine room" of the Queensland economy.

"Queensland's coal industry, for which the Bowen Basin contributes 97% of the volume, delivers \$52.5b to Queensland's economy, supports 261,553 full time jobs, pays \$3.8b in wages, funds \$4.4b in royalties and invests \$15.5b in local businesses and community organisations," he said.

Mr McFarlane said the Bowen Basin was doing the "heavy lifting" for Queensland with the resources sector now supporting one in every seven jobs while raking in \$1 in every \$5 for the economy.

Peak Downs is one of Australia's oldest coal mines and with an estimated 718mt of recoverable coal reserves as of June 2019, it has many more years of production ahead of it.

Peak Downs is one of the world's leading producers of hugely in-demand metallurgical coal, producing 11.6mt in the year ending June 30, 2020, according to BHP's annual report.

The mine contributed to a record year of metallurgical coal production for BHP Billiton in 2018, when output jumped by 7% to a record figure of 43mt.

BMA is Australia's largest coal producer and supplier of seaborne metallurgical coal, primarily used to make steel.

The Federal Department of Industry's latest resources quarterly snapshot forecasts that from 2021, metallurgical coal prices are expected to begin to recover in line with increasing steel production.

Coal production on the basis of saleable product at Peak Downs was 1487kt in the September 2020 quarter, according to BHP's latest operational review.

BHP CEO Mike Henry said group production rose 2% from a year ago driven by solid results in metallurgical coal and iron ore.

BHP Mitsubishi Alliance (BMA) Asset President James Palmer said BHP contributed more than \$33b to Australia in 2020 through the creation of jobs, funding projects to support communities and through payments to small business suppliers and contractors.

"In Queensland BHP paid about \$920m in taxes and royalties, helping fund

Queensland's hospitals, schools and the services we rely on," he said.

The mining giant established the BHP Vital Resources Fund to support communities during the COVID-19 pandemic.

Peak Downs generates jobs for hundreds of people, whether it be directly on-site or indirectly through providing work to local suppliers.

The mine's contractors range from smaller companies like iCutter Industries and Extreme Excavators up to Thiess, the world's largest mining services provider.

Peak Downs, located about 40km south of Moranbah, is open-cut and uses draglines and truck and shovel fleets for overburden removal.

Thiess began providing services at the mine in 2017, delivering FleetCo hire equipment and maintenance services to both Peak Downs and Caval Ridge.

Under a three-and-a-half year contract, Thiess was required to remove 90m bank cubic metres (bcms) of overburden at Peak Downs and 45m bcms of overburden at Caval Ridge.

National Group's heavy transport solutions brand National Heavy Haulage delivered five ultra-class Liebherr T282C dump trucks—among the largest in the world—to Peak Downs in 2018.

Queensland Coal has access to key infrastructure in the Bowen Basin, including a modern, multi-user rail network and its own coal-loading terminal at Hay Point, near Mackay.

BHP also invested US\$204m in the Caval Ridge Southern Circuit (CRSC), an 11km overland conveyor system which transports coal from Peak Downs to the Coal Handling Preparation Plant (CHPP).

People at Peak Downs

• Kathryn Young

The geotechnical engineer recently won the Exceptional Young Woman in Australian Resources category at the BHP 2020 Women in Resources National Awards.

The award recognised Ms Young's contribution to promoting the Australian resources industry's social licence to operate and increasing gender diversity in the sector.

Ms Young started her career at BHP through the graduate program in 2014, and actively promotes STEM careers, while mentoring and encouraging female students to pursue careers in the industry.

Her many career highlights include achieving Chartered Professional status in the area of Geotech with AusIMM, being registered as a



Peak Downs geotechnical engineer Kathryn Young.

Professional Engineer of Queensland, and then being named Practitioner of the Year by the Bowen Hunter Open Cut Geotechnical Society recognising her contributions to the industry.

"I am so passionate about geotechnical engineering and thankful for the incredibly rewarding career I've been able to have so far," she said.

"When I started my career, I never realised how many opportunities I could pursue in the industry, and I'm hopeful young women looking at my experience can see the career pathway I've been able to follow, and consider becoming part of the resource industry themselves."

"Kathryn's hard work, persistence and outstanding performance is hugely impressive," Mr Palmer said.

"It's critical that we have people like this in our business to drive change and help build our workforce for the future.

"We'd also like to acknowledge the efforts of the other BHP finalists - Jayson Smeeton and Priya Gore - for their collective achievements in paving the way for others in the resources sector in Australia."

• Dean Jorgensen

Dean was destined for a career in mining.

"I was born and raised in Mackay in

Queensland, and my father worked nearby at BMA's Blackwater Mine," he said.

"My older brothers and family friends were also part of the industry, so I was surrounded by mining growing up."

When he left school, Mr Jorgensen landed a job in hospitality, which he stayed in for 10 years, saying it was a great foundation to grow and develop his customer service skills.

But after a few years, he made the switch to mining to "reach the dreams" he had for himself.

Mr Jorgensen said it was his position with Operations Services at Peak Downs which changed his outlook on his personal and professional goals.

"The leaders in OS helped me refocus my goals, and after eight months of saving, I'm at the stage where I'm building my first home," Mr Jorgensen said.

"During such a tough time in the world, I feel incredibly fortunate to have a secure job where I'm happily employed and still making grand strides towards one of my many dreams.

"I'm in great position in my life thanks to my job with OS, I have never felt more happy, healthy - both mentally and physically - and financially sound and secure." **AMR**

FAST, EFFECTIVE, RELIABLE

Extreme Excavators is a leading provider of mining and equipment maintenance. The business has built up a solid reputation for supplying fast, reliable and professional repairs for maintenance operations to coal mines around the Bowen Basin.

Extreme Excavators specialises in excavator fault diagnosis and hydraulic tuning to ensure the machines are operating at their optimum efficiency and reliability.

Extreme Excavators also carries out major shutdowns, rebuilds and mid-life work and can assist contracting companies in setting up equipment and machinery on new sites. Since starting Extreme Excavators 14 years ago, managing director Rob Darlington said the business had enjoyed a strong relationship with the BMA Peak Downs coal mine.

"We started Extreme Excavators in 2006 in Moranbah, basically in the foothills of the coal mines of the Bowen Basin where Peak Downs is one of the biggest mines, and assisted in the care and maintenance of excavators onsite," he said.

"We have always supplied specialist excavator labour and assistance, but have also diversified to supply labour for



Extreme Excavators is located in Mackay, ideally placed to provide excavator repair and maintenance to mines in the Bowen Basin.

workshop support and drill support.

"Being from an OEM background, it was always important for us to maintain that high level of service and experience which has been the basis that we have built our reputation on.

"We also supply parts and components and cover all the trades from electrical to boiler making, fitting and supervision."

Mr Darlington said the business specialises in repair, maintenance and relocation of mining equipment from sites in the Bowen Basin and into other the states and territories.

At Peak Downs, Extreme Excavators assists BMA to look after the hydraulic fleet of field equipment including excavators from Hitachi, Liebherr and TEREX, as well as drills from Sandvik and Atlas Copco, we also have our team assisting on the breakdown crews to rapidly address and machine breakdowns and get them back up and back into production as soon as possible.

"Keeping downtime to a minimum and machine availability to maximum is a key part of what we do at Peak Downs mine," Mr Darlington said.

"We ensure repairs and breakdowns are addressed quickly and efficiently and repairs are carried in a timely manner."

Mr Darlington said Peak Downs was hugely important to the local economy and has been a key part of developing the next generation of mine workers.

"Peak Downs is one of the oldest and largest mines in the Bowen Basin and creates a lot of the employment opportunities for people living in towns like Moranbah and Dysart," he said.

"Peak Downs train and develop a lot of people and have provided lifelong careers and experience and knowledge for people to further their careers in mining or related industries.

Peak Downs has been critical in the

development of tradespeople who have been able to progress from tradesman/operators and moved into supervision and management positions onsite and also in the bigger BMA/BHP business. They carry with them the knowledge and experience from Peak Downs that is essential to carry out their roles effectively and implement improvements.

"The four qualities of excellent customer service, quality workmanship, reliability and safety underpin the culture at Extreme Excavators, our team onsite are our heart and soul of what we do.

"The team knows and understands every industry requirement that's necessary to ensure the company offers maintenance work that is not only timely but also safe, consistent and professional."

Based in Mackay, the business is ideally situated for mines in the Bowen Basin, but also services the Galilee and Surat Basins in Queensland as well as the Gunnedah and Gloucester Basins in NSW. **AMR**



LEADING PROVIDER OF MINING & EQUIPMENT MAINTENANCE

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PROUDLY INDIGENOUS-OWNED

● Cutter Industries is an Australian-owned and operated indigenous business that services the drill and blast mining sector on Australia's east coast from its base in Mackay, Queensland.

After being founded two years ago in a small shed, the family company is now recognised as a leader in service and knowledge in the blast hole drill industry.

iCutter Industries services manager Dallas Morris said the company had grown into a strong drilling consumables business through hard work and effort.

“Due to the success of iCutter Industries and the demand for our premium quality drill consumables, we are moving to a larger site in Mackay that is double the size of our current space,” Mr Morris said.

BHP Mitsubishi Alliance’s Peak Downs coal mine is among the bigger mines the company services, for which it supplies refurbished klaw bits, picks, and the tools for pick change outs.

“This style of bit is a great way to increase the rate of penetration and help site to keep to their tight schedules, ultimately optimising their operations and keeping costs at the lower end of the cost curve,” Mr Morris said.

“Peak Downs is a loyal customer and with its purchasing of iCutter Industries’ goods and services, this helps us to keep our current work force secured and helps our vision to further grow our business and employ more local people.

“The Bowen Basin, which encompasses some of the biggest coal mines in Australia

including Peak Downs mine, is a great asset, not just to Central Queensland but the Australian community and economy.”

iCutter Industries’ vision is to build a sustainable business that employs local people from the region who live up to their core values of Integrity, Intelligence and Energy.

The company has more than 30 years combined experience in the exploration and mining drilling divisions.

Capabilities

iCutter Industries supplies premium drill consumables to the drill and blast mining sector. It consults, advises, trains, and optimises mine site drill operations.

The company also distributes premium drill and blast consumables for leading coal mining companies such as BHP and BMA.

It refurbishes fixed cutter drilling consumables for the mining and oil and gas markets, and takes on the recovery, recycling, and re-deployment of assets.

The business supplies blasting consumables and works closely with drill and blast contractors to bring cost down through selecting correct tooling for projects.

Parts

iCutter Industries works continuously to develop even safer products. These include fixed cutter blade bits, premium Kennametal drilling tools and premium Epiroc drill pipe and claws.

It also supplies Black Diamond rotary drilling tools, DTH hammers, bits and hammer



Scott Cox, Dallas Morris, Kalari Morris, Alyce Morris and Glen Millwan from the iCutter Industries team.

rock drilling tools.

Services

Production training: iCutter Industries’ highly experienced team take the time to coach drill rig operators in methods and fundamental principles, production design, stope design and optimisation.

Production consulting: The team uses client supplied data to track the performance of products in the field and frequently consults to maximise onsite equipment efficiency. Refurbishments

iCutter Industries locally refurbishes all makes and models of fixed cutter drill bits including bit subs, roller stabilisers, shock subs and deck bushes for the mining, oil, gas and exploration.

Drill bit purchasing and recycling: iCutter purchases drill bits and re-purposes them into other industries or recycles them to recover the various metals. The company can also connect sellers with customers through its broad range of contacts throughout Australia and overseas. **AMR**

MAKE A BIG IMPACT

KEEP OPERATING COSTS AT THE LOWER END OF THE COST CURVE

- ✓ Production Consulting
- ✓ Production Training
- ✓ Supply Premium Drill Consumables
- ✓ Refurbish Drill Consumables

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BUILT TOUGH

McDonald Murphy Machinery (MMM) has partnered with EHS Manufacturing to supply the Case IH Maxxum 110 tractor to mining customers including several coal mines in the Bowen Basin.

With a horsepower of 112, it is classed as a medium-sized tractor but with a big engine capacity of a 4.5L four-cylinder diesel, with no pollution requirements.

MMM salesman David Brown said the company had been supplying this size of tractor, which is more "robust" than previous models, for about four years.

"Previously, the mines were using smaller horsepower and framed tractors which just couldn't cope with the demands out on the mine site resulting in drive line issues," Mr Brown said.

"The Maxxum is a heavier built tractor with heavier axle loadings on the front and rear."

MMM provides Maxxum 110s to the mines for various jobs, but mainly for:

- Cable-handling tractors, fitted out with front and rear cable reels by EHS Manufacturing
- Rehabilitation work, with slashers to maintain overburden piles and rehabilitated areas
- Pump tractors for moving pumping equipment around

A stand-out feature which makes this tractor ideal for mine sites is the bigger 90mm lift

rams on the back with anti-pitch ride control. "When the tractors are travelling between jobs with the heavy implements on the back, the lift rams act as shock absorbers which means less pressure and stress on the major components of the tractor drive train," Mr Brown said. "It's also more comfortable for the operator as there is less pitching."

Another feature which sets it apart from competitors is the "ultra-view" cabs which provide drivers with an almost 360o view.

"They also have a sloping bonnet which enables better vision of front mounted implements like the cable jib and cable handling attachments," Mr Brown said.

"The larger 38-inch fitted tyres also enable better vision for the operator as the cab sits higher as well as better ground stability."

MMM is very aware of the need for a high-level safety with its tractors, implements and attachments.

The company has considerable experience in fitting out tractors for mine compliance for various mine sites, meeting the extensive list of safety requirements.

"For example, we ensure all front-end loaders on our mine tractors are fitted with anti-drop valves by EHS Manufacturing," Mr Brown said.

"We work closely with EHS Manufacturing in the fit-out of our tractors for the mine sites to meet the specific needs required tasks and safety requirements.

"They provide a range of cable handling attachments including cable forks, front end

loader jibs, cable manipulator mini reels as well as rear attachments including large single reeler, dual reeler and cable drag bar."

EHS Manufacturing managing director Steven Lawn said the company had fitted out and supplied many CASE IH Maxxum 110 Tractors with EHS cable-handling equipment to mine sites for the safe and productive handling of trailing cables on electric draglines and shovels.

"The visibility is a key feature of these tractors with some convenient operator functions that make it very suitable and safe for cable handling," he said.

The tractors are also an ideal size for use by local councils and by the agricultural and cattle industries. **AMR**



A Case IH Maxxum 110 tractor fitted with a front-end loader, EHS Manufacturing Jib with cable manipulator mini reel and single cable reeler on the back, used to move the large electric surface trailing cables of the draglines.

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When it comes to laying asphalt in rugged conditions, many mining companies look toward EZ Street cold asphalt. The versatile product, manufactured by Fulton Hogan, is used wide and far for road repairs and fixing hazards, and can be stored onsite at the mine in bulk.

The product remains workable for a year, and it's ready to work the second it's needed. EZ Street's unique polymer modification and revolutionary production design enables the cold patch asphalt to perform long term, much in the same way you could expect a hot asphalt to.

EZ Street cold asphalt pothole patch will seal off and cut in to the edge of the pavement, protecting the surrounding areas from any further cracking or breakup. It has proven to be the equal of hot asphalt in the key areas of stability, rutting, stripping and permeability.

EZ Street cold asphalt is so strong that it is even used on international airport runways, and many airstrips in mining areas. It will hold up as a permanent road patch and pothole repair even when water is present in the pothole. On compaction, the water will be displaced from the pothole until eventually all liquid is drawn from the pothole patch.

EZ Street cold asphalt will still seal off as a permanent road repair, pothole repair or driveway repair just as it would in dry areas. And EZ Street doesn't bleed. Traditionally in cold asphalt, the bitumen content would rise to the top of the patch creating a dangerous shiny surface that needs to be removed prior to any future asphalt overlays.

EZ Street's design has eliminated this from occurring. There is no need to remove shiny surfaces from EZ Street patch repairs prior to an asphalt overlay.

All of the EZ Street asphalt products throughout Australia utilise renewable resources, instead of standard petroleum diesel, a testament to Fulton Hogan's commitment to building safe and environmentally friendly communities.

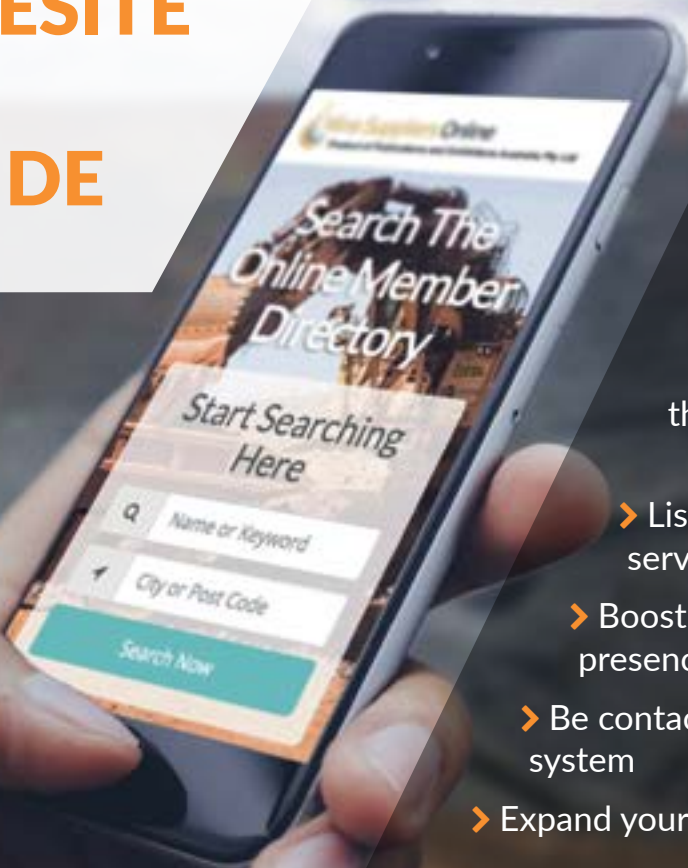
This means the environmentally-friendly product minimises health and safety claims from fume and handling damage. EZ Street cold asphalt comes in many forms to suit all needs: revolutionary re-sealable one-person bags, tough 20 kg buckets, large 1t bulk sacks or loose bulk asphalt.

The product is available from Fulton Hogan agencies in every state. **AMR**



EZ Street cold asphalt is so strong that it is even used on international airport runways, and many airstrips in mining areas.

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MILESTONE FOR MARDIE

BY KATE CHRISTIAN

Sunrise over the Mardie Project camp.

BCI Minerals is set to start early construction work on its flagship project next month after a study demonstrated it has the potential to be a “globally significant” Tier 1 operation.

The positive Definitive Feasibility Study (DFS) released on July 1 demonstrated the Mardie Salt and Potash Project could produce 4.4Mtpa of high purity salt and 120ktpa of premium sulphate of potash (SOP) fertiliser.

BCI Minerals managing director Alwyn Vorster said another important parameter established by the study was the mine has an “infinite” life as it would run off an inexhaustible seawater resource, due to its ideal location on the west Pilbara coast in the heart of Australia’s key salt producing region.

“We are working to a 60-year mine life but its arguably a 100-year mine life or longer because it is different from inland SOP projects that pump water from ancient aquifers underground,” he said.

“The economic results from the DFS include a pre-tax NPV of more than \$1b.

“Importantly for most investors who look at this type of project, it has an annual Earnings Before Interest, Taxes, Depreciation and Amortisation (EBITDA) of nearly \$200m, which for an annuity for the next 100 years, is quite significant.

“We are really pleased with the result of the DFS and really the confirmation that Mardie has the potential to be a globally significant Tier 1 salt and potash fertiliser project.”

The project has received major project status from the Federal Government following a six-month process with the Departments of Resources and Industry.

It is the first large scale solar evaporation salt project to be undertaken in Australia in two decades.

“It is important to reflect on the fact that there hasn’t been a project of this nature constructed for more than 20 years in Australia,” Mr Forster said.

“Mardie is a relative novelty in the Australian industry so the Department of Industry looked at it from that perspective and measured it in terms of what benefits it can bring to the community.”

The project ticked the boxes on six major criteria, including the economic benefits to WA and Australia through taxes and royalties as well as the creation of 500 new

construction jobs.

From a regional development point of view, KPMG produced a study showing the project would contribute a Gross Regional Product of more than \$2b to the Pilbara region over 60 years.

The project would also be powered by renewables, deriving 99 % of its energy from natural solar and wind energy.

It would also provide new infrastructure such as a new port facility.

“We will also be the first Australian salt project where we are planning to do a secondary processing for the salt waste, which will be converted into the SOP fertiliser on site,” Mr Vorster said.

The WA-based BCI Minerals successfully completed a \$48m capital raise in October which will enable early construction work on Mardie to start next month (December).

This would involve construction of a trial pond to test different construction materials and methodology.

It would also involve the construction of major roads, a large accommodation village, power and communications infrastructure needed for the final construction work.

The early construction program is due for completion in May 2021, to coincide with when BCI wants the main capital raising completed by.

“The DFS shows the project has a \$780m capital cost, so if we assume two thirds of that comes from debt and one third from equity, we are talking about \$250m that needs to be raised by April or May next year for final construction to start,” Mr Vorster said.

The plan is for BCI to obtain all required funding and approvals allowing full project construction to commence by May 2021.

“It is a three-year construction program and that is the nature of a solar evaporation project,” Mr Vorster said.

“It is a three-year period from filling the first pond to putting the first salt on ship, so it is a long natured project, and that is why we’re focusing on a certain type of shareholder who is patient and prepared to wait.

“Investors will get decades-long annuities but they will need to understand it takes a while to get into production.”

The company’s major shareholder Wroxby Pty Ltd (Wroxby), which currently has a voting power of about 29%, has committed to taking up its full pro rata entitlement of approximately \$14m.

An ASX statement released on August 20 stated that with a cash balance of \$41.5m at June 30, zero debt and ongoing Iron Valley royalty earnings, BCI is in a strong position to advance the Mardie Project to a final investment decision targeted by early 2021.

The Iron Valley iron ore mine delivered strong earnings for BCI in the year ending June 30, with a record EBITDA of \$23m off the back of high iron ore prices.

“The Iron Valley royalties is valuable at the moment for BCI for doing all the studies and the initial de-risking for the project,” Mr Vorster said.

“But given the history of Iron Valley royalties is between \$10-20m a year, it is clearly not enough to fund the Mardie development.

“So while it will always be a very healthy supporting funding mechanism for the company it is not the main funding source for Mardie.”

Mr Vorster said he was still “absolutely comfortable” with the company’s decision to diversify beyond iron ore. BCI had earlier emerged from a fight for survival due to operating a high cost iron ore mine (Nullagine) at a time when the iron ore prices were declining rapidly.

“As BCI found 10 years ago with the Nullagine deposit, it looks excellent when the prices are \$100/t, but once they drop below \$50/t then the company is in trouble so we never wanted to be in that position again,” Mr Vorster said.

He said there were many important

milestones to look forward to over the next six months, such as the EPA assessment which would pave the way for final environmental approval.

“Then we also have important target milestones for the debt component of the project so we hope we can have an announcement with the banks we are negotiating with,” he said.

“That will give investors some confidence to see we have made tangible progress on the funding.

“We are also hoping to show more regional presence by opening an office in the Karratha towards the end of the year, to have people on the ground there to assist us in our regional engagement and make sure local contracting becomes a priority for us.”

Mr Vorster said BCI had reached “a very important pivot point” after making the transition from being an exploration company three years ago.

“We are now at the cusp of developing into construction and then hopefully into being an operating company and with that will come big changes,” he said.

“We are appointing significantly more people into the company and with that transition comes a change in culture so it is a very exciting time for BCI.”

Mr Vorster said Mardie would supply the salt and potash growth markets in Asia over many decades, with the salt to be used to create tens of thousands of end products, including PVC piping for the construction industry and electric vehicles, glass, paper, paints, parts for aircrafts and more.

“Anything that you touch on an everyday basis that isn’t wood contains an element of salt,” Mr Vorster said. **AMR**

Natural salt visible on the Mardie Project mudflats.

SALT PRODUCTION DYNAMICS, TRENDS AND FORECASTS

Since 1970, and every 10 years thereafter, the following quantities of salt were produced worldwide:

	1970	1980	1990	2000	2010	2020
World total (mt/y)	146.6	172.8	187.2	216.6	282.6	338

Source: USGS (Ref. 1), BGS, Roskill, Salt Partners

Between 1970 and 2020, world salt production grew 131% with an average annual growth rate was 1.71% (Chart 1).

The salt production growth can be put into context with the human population growth during the same period.

According to the UN Statistics (Ref. 2), the world population grew 111% from about 3.7b in 1970 to an estimated 7.8b in 2020, an average annual growth rate of 1.51%.

When the salt consumption figures are adjusted to grams per day and divided by the world population, and assuming the salt production and consumption are about equal, we obtain the following salt consumptions per capita:

	1970	1980	1990	2000	2010	2020
World consumption (g/person/d)	109	106	96	97	111	118

Source: USGS (Ref. 1) and UN DESA Population Division (Ref. 2)

The world salt consumption per capita has been fluctuating between 90g and 120g per day and experienced a small average growth rate of 0.2% a year (Chart 2).

The minimum human physiological salt intake, required for bare survival, is about five grams a day.

The excess consumption facilitates production of a myriad of products including synthetic fibres, plastics, aluminium, glass and other materials that enhance our comfort and standard of life.

World Salt Production Capacity, Trends and Forecasts

The world salt consumption per capita has been more or less constant. It follows that the main driving force behind the growth of salt production is the increase in the world population.

Assuming that the world population growth rate will not change, the world salt consumption around 2029 will reach about 400mt/y.

The salt industry must have the capacity to produce the salt that the world needs. So, what will have to be the production capacity needed to produce the required salt?

Industrial production capacity utilisation is, on average, a slightly below 80%.

Salt is produced as brine and vacuum salt, as rock salt and as solar salt.

Whereas solution mining and vacuum operations are steady, rock salt production fluctuates depending on de-icing salt demand. However, solar salt production depends on the climate and the weather.

Therefore, solar saltworks need high capacity reserves to achieve the required average production.

This reduces the utilisation of the overall salt production capacity to only 76%.

In 2019, the total available salt production capacity was 435mt/y (Chart 3, end of full red line).

In 2014, 20mt/y of new salt projects were announced (beginning of the full green line). The end of the green line shows 73mt/y of new salt projects announced in 2019.

If only a half of the announced projects are implemented and the time period between announcement and full production is six years, in 2020 there will be 10mt/y additional production capacity.

This would bring the total to 445mt/y, which, utilised to 76%, will facilitate the production of 338mt/t.

However, already in 2021, the predicted salt production of 343mt/t will require 451mt/y production capacity, which is 16mt/y more than available in 2019.

In 2015, 22mt/y new salt projects were announced. If 11mt/y actually come on stream, there will be a shortage of 5mt/y.

It follows that six years earlier, in 2015, 10mt/y additional production capacity should have been announced, shown as the green dotted line.

Expanding this to 2029, it follows that in the year 2023, 164mt/y of additional salt projects should be initiated, whether announced or not, to provide 82mt/y additional production capacity needed to produce 393mt in 2029. Shown as the red dotted line, without new projects, the production capacity deficit would grow to 82mt/y.

Salt Prices

Without new projects, there would be a salt supply shortage and prices would rise. This would increase the profitability of salt production, which would attract investments into new salt production facilities.

Therefore, most forecasts predict only minimum salt price changes, just in line with the general rate of inflation. The least expensive source of salt is salt in solution mined brine, available in the USA and in Europe at about USD\$6/t.

More expensive is rock salt in bulk, available at mines for truck or rail delivery at USD\$10-15/t. Solar salt supplied by the major producers in Australia, Mexico and India, sells at USD\$18-25/t on a Free On Board (FOB) bases.

With overseas trade, much depends on the shipment, which can vary between 10,000t and 150,000t. It can also depend on other factors like the salt quality or whether it is a long- term contract or a spot sale.

Highest bulk prices are paid for vacuum salt, which vary in the countries of the northern hemisphere between USD\$60-90/t. Dry packaged refined salt in big bags and table salt in small packages is much more expensive.

The >99.999% Suprapure® salt for laboratory use sells at almost USD\$1000/kg.

Increasing Salt Production Capacity

There are three basic ways of increasing salt production capacity. One way is to build new facilities. New, grassroots projects are the most expensive and time-consuming option. Explorations, land acquisition, planning, obtaining numerous approvals, securing finance, et cetera, take years of focused efforts. When publicly quoted companies embark on such projects, their progress is well documented. For example that of BCI Minerals, referred to in the ASX publications, such as the latest one available under the link given in Ref. 3. The other way is to expand the existing facilities, where possible. Such brown roots projects are less expensive and faster because all the project elements are known and approvals exist.

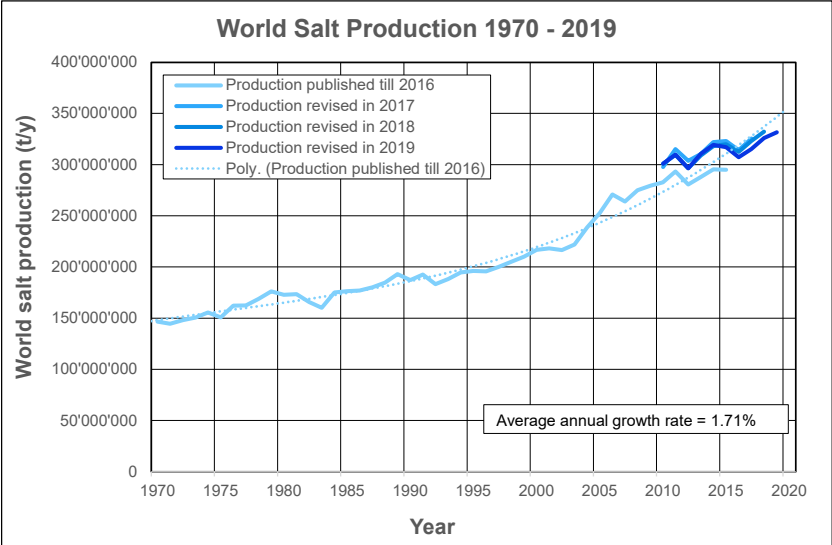


Chart 1 World salt production 1970 - 2019

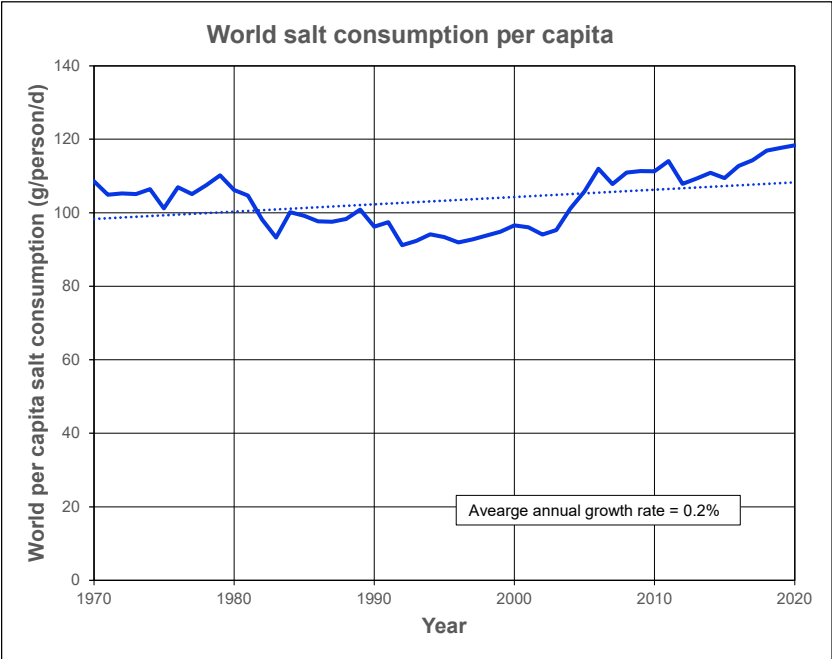


Chart 2 World salt consumption per capita

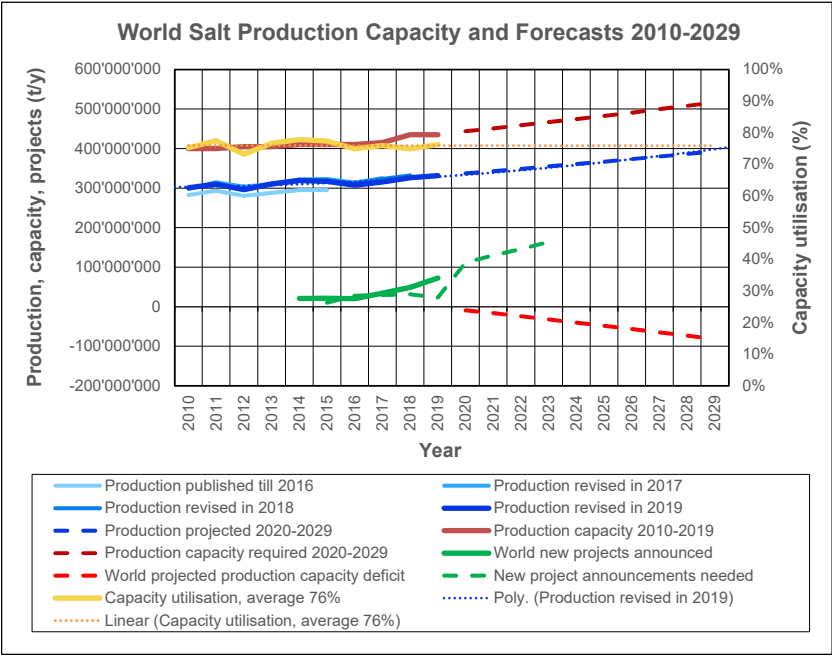


Chart 3 World Salt Production Capacity and Forecasts

However, planning, procurement and construction are the same. Finally, advanced technologies can increase productivity and thus expand production capacity.

For example, the HYDROSAL-XP® technology can reduce salt processing losses in solar saltworks producing high quality salt, from frequently experienced 18-20% down to 3 4%.

Thus, HYDROSAL-XP® technology can increase production capacity by 14-17%, at a fraction of a new saltworks cost. At the same time, the salt quality is improved and the achievable price is increased. **AMR**

The author, **Vladimir M. Sedivy** is President of Salt Partners Ltd., www.salt-partners.com, Swiss salt consultants and engineering contractors. In 2018, Salt Partners were entrusted by BCI Minerals to design a 700 t/h HYDROSAL-XP® salt purification plant for their 4mt/y salt and potash project at Mardie, Pilbara, WA.

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Salt Partners

Turning salt into gold

We are proud to have contributed our HYDROSAL® salt purification technology to the BCI Minerals' Pilbara project.

MINE DEWATERING IN PAPUA NEW GUINEA



Flexibore being installed over a guide roller.

A project to expand the Lihir Gold mine, located on a volcanic island in Papua New Guinea's north-east, proved to be a challenge due to a high water table.

To reduce the water level in the pit to allow for expansion, experts were brought in to design and provide a dewatering solution. Crusader Hose was one of the equipment manufacturers that was involved in the project, supplying flexible layflat hose.

The Lihir Gold mine is an open-pit mine located within one of the island's large volcanic calderas, the Luise Caldera, which borders the sea.

While the volcano is considered extinct, it is still geothermally active, evidenced by fumaroles – smoke emanating from the rocks within the pit.

Due to the pooling of rainfall and regular seepage of seawater through the crater rim into the pit, the pit needed to be pumped out in order for the mine expansion plans to go ahead.

Designing the Dewatering System

The prime contractor for the project was a

large pumping company from NSW, which was an expert in designing mine dewatering systems.

The company was brought in to provide a solution to lower the water table, so that mining could be expanded.

The final design included a dewatering system that used three 350kW submersible bore pumps inside an angled poly-pipe casing suspended from flexible hose.

Each pump was driven by a separate generator and connected to a platform, which cantilevered over the pit wall.

In order to construct the angled bore casing, 900mm diameter poly-pipe sections were welded together to form an insulation sleeve, which rested at an angle along the pit slope.

The length of poly-pipe into the pit was 175m long and the water level was about 45m below the headworks.

The bore casing was then securely anchored from the headworks, which incorporated a concrete-padded, steel-framed platform, all surrounded with safety rails.

Once the bore casing had been secured, installation of the submersible pumps commenced.

Each 350 kW stainless steel submersible pump was mounted on a skate which slid within the casing, allowing the pumps to be let down inside the poly-pipe, plus acting as a centraliser.

The pumps were connected to Flexibore, the flexible layflat hose supplied by Crusader Hose, which suspended each pump under its own weight, as it was lowered 175m into the pit.

The Hose of Choice for the System

Flexibore was chosen for the project as it allowed for easy installation of the pumps over a roller while clamped from a crane.

Crusader Hose managing director Francois Steverlynck said that being manufactured from woven fabric, the hose acts like a lifting sling, and a high tensile load of up to 16t can be suspended from it.

"The hose is also supplied in one continuous length," he said.

"The 8in Flexibore also has a burst pressure

of 440m, which was well within the design pressure for the project. Since then we have developed a stronger riser which has a burst pressure of 700m and a tensile load of 30t."

A Successful Installation

With the submersible pumps safely lowered inside the poly-pipe casing, they were then connected to the diesel generators via the power cables attached to the Flexibore hose.

Settings and flow rates were controlled until each pump attained a flow rate of 168 litres per second.

The CAT diesel generators were supplied by Taranis Power of WA.

Gabriel Hoascar, the engineer from Taranis who connected the pump cables and fired up the generators, said he was impressed at how efficiently the system worked".

"Our company will look to supply more systems using Flexibore hose, especially the new high pressure version," he said.

For more information about Flexibore, visit crusaderhose.com.au

AMR



Flexibore is the system of choice at Lihir Gold mine.



The dewatering system inside pit.

"CELEBRATING **50** YEARS
SERVICING THE MINING INDUSTRY"

BUILT ON TRUST

The Lennon Family Group is celebrating 50 years.

The Lennon Family Group is celebrating 50 years of servicing the mining industry.

The third-generation family business prides itself on its exceptional reputation in the Australian and international mining community.

Over half a century the Lennon Family Group has evolved and diversified into a substantial mining supply company.

Lennon Heavy Equipment is the machinery sales entity of the Group, which had modest beginnings as an equipment sales company in 1969.

Founder Loche Lennon succeeded in making Loche Lennon & Co one of the most successful and respected used earthmoving

companies in Australia until he passed away in 1986.

After Loche passed at the young age of 46, Rhett, at age 21, and Loche's wife Desley took over the family business with Grant, Ryan and Brad joining the team over the next few years.

Rhett Lennon, the eldest son and the company's CEO, described his father as a charismatic, hardworking member of the community, and was a well-respected and very successful businessman.

"To this day we still hear stories about Loche and receive compliments about his character from people who had known or dealt with him," Rhett said.

"Loche's old-school values have been

instilled in the family and passed down through the generations," Rhett said.

Our business mindset is to offer a hassle free, complete service to our customers while keeping a tight knit group of dedicated and loyal employees.

"We are fortunate enough to have six family members working within the business which has proven to work very well for us."

"We also have Steve Reed who has been a dedicated employee for over 28 years whom we consider to be a part of the family."

The team has a combined 158 years' experience in the mining industry.

Lennon's services include the procurement and disposal of used mining equipment,

parts, and components and OTR tyre supply. The company has developed into a significant Australian and international mining supply group with its Machinery and OTR Tyre divisions earning a reputation as being one of the leading suppliers worldwide.

"Due to our extensive network of suppliers we can source almost any machine, part or OTR tyre, no matter the quantity, brand or size."

"We are always looking for machinery and tyre inventory from mining and earthmoving companies both in Australia and internationally."

The Group also offers a logistics service to move machinery anywhere within Australia or around the world.



Loche (fifth from the left), and his Hasting's colleagues dining at the National Hotel in Brisbane in the 1960's.



Loche (far right) doing what he loved, entertaining with close industry contacts.



Loche Lennon & Co in the 1990's with Nick Lennon, Loche's grandson, sitting on the push arm.



"We pride ourselves on taking extra care and going the extra mile to ensure the equipment, tyres and parts are demobilised, packaged and transported professionally and cost-effectively, whether it be in the country or across the globe to ensure our clients get a premium service," he said.

Of course, none of this would be possible without the support of the mining industry contacts who we are very appreciative of.

The Group has three divisions: Lennon Heavy Equipment (LHE), Lennon OTR (LOTR) & Lennon Mining Parts (LMP).

Lennon Heavy Equipment (LHE) has been built on a solid foundation of trust and loyalty with customers and suppliers, many of whom still remember the Group's humble beginnings from when it was founded by Loche in 1969.

LHE's success is based off a solid reputation in securing, marketing and completing the sale of a single machine through to a complete mine site.

The team understand that disposing of a complete mine or major mining fleet can be quite a process.

They visit the site to get a full understanding of the conditions and regulations, particularly in regards to safety/ environmental requirements before researching the teardown and transport corridor in which the equipment needs to travel to the nearest port or the elected mine site if in country.

Lennon OTR (LOTR): has developed into one of the leading global OTR tyre sales companies since its first tyre sale more than 15 years ago where it sourced and delivered haul truck tyres from Sweden to a large local Australian contractor.

The company has delivered thousands of OTR tyres around the world to many major mining companies and smaller operations alike.

Lennon Mining Parts (LMP) can offer a wide range of new and used parts and components for most mining or earthmoving application.

With an experienced sales team, LMP is able to supply a complete global service.

LMP has established two yards, one in Ayr and another in Brisbane, plus a storage facility in USA.

Q&A WITH RHETT LENNON

Q: How has the business grown and diversified over the last 50 years?

A: Traditionally we have been a used equipment dealer that also moved into hire. We diversified into OTR Tyres about 15 years ago and have since become one of the leading OTR tyre supply companies in the world, selling more than 12,000 OTR Tyres.

In more recent years we have diversified further into parts and components and have begun stripping complete machines as well as sourcing individual components worldwide, which goes hand in hand with our other two existing divisions.

Q: Can you talk about how Lennon Family Group has moved back into equipment hire?

A: Equipment Hire was a fundamental part of our equipment division for almost 20 years.

Due to the GFC, like many companies, we were forced to restructure which centred on the disposal of our hire fleet. Lennons are now rebuilding this division.



Six members of the Lennon family are continuing Loche's legacy, with Nick, Jake, Grant, Rhett, Brad and Matt Lennon pictured with Steve Reed.



Our Parts division has since allowed us to rebuild and stock components for immediate component change outs to support any of our hire machines.

Q: What mining equipment have you sold and what countries and mining companies have you done business with?

A: We have completed many major projects over the years throughout many different countries, too many to mention. We have sold fleets of more than 20 machines on numerous occasions.

In recent years we have sold hundreds of pieces of major mining equipment to more than 15 countries.

Some of our recent mining equipment sales include but are not limited to 150 haul trucks (36x 830E's, 58x 730E's, 18x HD785-7's, 14x 777F's), 24 excavators or faceshovelers (6x 996B's, 5x EX5500's, 2x EX3600's, 6x EX2500's), 16x dozers (10x D11R's, 4x D10T's), 9x wheel loaders (1x WA1200- 6, 1x 994D, 3x 992G's), 13 motor graders (11x Cat 16H's) and 3 Sandvik drill rigs to name a few.

We have dealt with many notable mining companies, both in Australia and Internationally. We have conducted business in many parts of the globe including Australia, Brazil, Canada, Chile, China, Europe, Ghana, India, Indonesia, Japan, Mozambique, New Caledonia, New Guinea, New Zealand, Oman, South Africa, South Korea and USA.

Q: Your company has grown with the mining industry through boom and bust periods, what is the secret to survival in tough times?

A: I would say all businesses are different however for us, the key has been to be adaptive and diversify. If you don't change with the times you may be left behind.

By diversifying and restructuring we have managed to roll with the punches and keep our company's head above water through the tough times.

Q: How would you sum up the ethos of the Lennon Family Group?

A: Being a family business, your reputation and relationships are everything.

We wear our name proudly across all our companies, so it is important we uphold our ethical values.

We have managed to create a very good reputation in the industry over the years and that is something we don't take for granted. A good reputation takes a lifetime to build, but a moment to lose.

Q: How important will the mining industry be to pulling Australia out of the Coronavirus recession and do you feel privileged to be a part of that?

A: The mining industry is obviously faring much better than many other industries in this global pandemic.

We are fortunate to be in an industry that can continue moving forward, even if it may be at a reduced pace, and continue to stimulate the economy in so many ways, you would be amazed at how it trickles down to benefit so many different industries within our country.

The mining sector is one of the backbone industries in Australia and a huge key to the successful and quick recovery of our country.

All of us at Lennon's are proud to be a part of this industry and hopefully will continue to be for generations to come. **AMR**

AUSTRALIAN MINES

THE BACKBONE OF THE COUNTRY

As we struggle with Coronavirus, the massive downturn in the country and the highest unemployment since the Great Depression, we have to reflect on the power and importance of Australia's mining and resources industries.

Accounting for 73% of all product exported, this industry plays a major role in the country's economy.

With approximately \$300b of exports per year, we can all reflect on the essential nature of the industry and the part it plays in our daily lives!

WHERE AUSSIE PUMPS FITS IN

Australian Pump Industries, known as Aussie Pumps in the industry, started out as manufacturers and suppliers of portable pumps for agricultural applications.

These included high pressure pumps for crop spraying, firefighting and even a range of trash pumps for piggeries and chicken farms.

It wasn't long before the company started to understand that the mining industry was hungry for Australian designed products for a wide range of applications.

Whether it was dust suppression, tailings pump out, water supply or even firefighting, the company was able to adapt its products to the needs of Australian miners.

THE IMPORTANCE OF WATER

No mine can operate without a water supply. Whether it is for staff needs or for processing, it's always an essential part of any mine or gas project. Sometimes mines must compete with farmers and local government bodies for the water that is available.

Mines need to move water to where they do need it and can use it.

DUST SUPPRESSION, TANKER PUMPS, THE UNSUNG HEROES

Keeping dust down and wetting down haul roads or mine access points are all part of the life of a tanker.

Yes, they can even be used for carting toxic liquids from mines for disposal.

Australian Pumps has focused on supporting this market area and works with Australia's best tanker manufacturers whether they use polyethylene or steel tanks for long life and durability.

Aussie produces a diverse range of tanker pumps to suit the most extreme applications.

AUSSIE GOES HYDRAULIC

Virtually all today's mobile plant is fitted with hydraulic systems. We have come a long way since cable operated dozer blades or mechanical bucket excavators.

The hydraulics on water carts, from 5000l minis right up to serious 40,000l and 50,000l tankers, are all capable of supplying power for this unit.

Aussie Pumps' Chief Engineer, John Hales, said the Aussie GMP heavy duty cast iron self priming pumps are ideal for tanker applications.



Aussie's breakthrough high pressure G3TMK-A, developed for dust suppression and water cannon duties.

"We first started supplying them to the mining industry with Yanmar or Hatz air cooled diesel engines," he said.

The initial pumps supplied were 2" semi trash pumps for smaller tankers, delivering a maximum of around 440l per minute!

Today's range includes big 4" semi trash pumps, in cast iron, but with capabilities of up to 2200l per minute flow. Those 4" semi trash pumps move a lot of contaminated water fast!

"The diesel drive pumps we built originally were powered by Yanmar 10hp engines," Mr Hales said.

"The performance limitation was the horsepower of the engine. Bigger two- or three-cylinder air cooled drives were bulky and it was difficult to find space to install on the vehicles."

At the same time, the design team were working on a 3" heavy duty tanker pump

that would deliver both high pressure and high flow.

That evolution spawned the Aussie B3XRA-ST, a semi trash pump capable of handling slurries or small solids in suspension.

Added features included a big heavy duty cast iron open impeller, a stainless steel wear plate and silicon carbide seals.

"The B3XRA-ST was a great success commercially in the construction and local government areas," Mr Hales said.

"We started building a lot of these machines with Honda 13hp petrol engines. The performance was remarkable for a 3" pump, delivering 1000 lpm and a maximum head of 28m. The limitation was the engine, not the pump.

"When we put a Hatz 1B50 12HP diesel on the same pump, we got substantially more head, up to 30m, and flows of up to 1250l per minute."

The complications of engine drive were eliminated by the company's introduction of hydraulic drive pumps. The two biggest problems of space and limited horsepower vanished.

"Harnessing the power of the prime mover to hydraulically drive the Aussie GMP pump was an inspiration," Mr Hales said. "The benefit was plenty of horsepower and the requirement for space efficiency was met easily!"

THE PRODUCT RANGE GROWS

Although the Aussie GMP B3XR-A with hydraulic drive is now regarded as probably the best overall tanker pump in the country, even it has limitations.

Flow is limited to around 1500l per minute and heads to around 31m.

The pump will self prime, draughting water through a six metre vertical lift.



Tankers can be easily converted to use closed circuit compact dust free hydraulic drive pumps.

The hydraulic motor was attached on a pedestal with a bell housing, making a nice, compact package that was easy to install and dismantle from the vehicle for servicing. Tanker manufacturers around the country got onboard fast. They realised this compact cast iron pump was so simple in design, capable of self-priming to load the tanker where necessary, but able to produce volume and pressure without the risk of overloading petrol or diesel engines.

MORE PRESSURE REQUIRED

As the EPA around the country have proposed more and more regulation on both mine and construction sites, the requirement for efficient tanker pumps capable of driving everything from a water cannon to a 40m-wide “halo” emerged.

Aussie’s response was the development of a higher pressure 3” pump that would run off the same size 22cc per rev hydraulic motor, producing the equivalent of around 12.5 kW of power.

Called the G3TMK-A/ST HYD 22, the high pressure pump delivers less water, with flows of 1100l per minute but, a major increase in pressure, right up to 55m head, the equivalent of 77psi.

Best of all, at 40m head, it delivers around 800lpm flow! That’s a lot of water at high pressure!

It’s now the choice of earthmoving contractors and road maintenance teams who needed additional performance.

Both the G3TMK-A/ST and the B3XR-A/ST are 3” pumps, both are self-priming and semi trash configuration. The difference is that extra pressure and the ability to throw water further where required.

MORE VOLUME, LESS PRESSURE

Believe it or not, there are applications where loading water carts in mining or quarry applications is just as important as emptying the tanker.

In this case it’s big flows that count for more than pressure. The result was the development of Aussie’s GMP B4KQ-A/ST. This is a 4” by 4” pump that will move up to 1600lpm, with a maximum delivery head of 14m. That’s around 20psi.

That may not be much pressure, but the pump’s capability is in moving large volumes of often dirty or contaminated water fast. This compact 4” hydraulic drive pump will self-prime through a vertical lift of 6m.

BIG VOLUME... HIGH PRESSURE... IT’S POSSIBLE

“Continuing this journey, we started looking at ways of getting more volume and pressure at the same time,” Mr Hales said. The result of that was the development of a new 4” heavy duty pump B4XR-A/ST, literally almost twice the casing size as the previous model.

Designed to not only deliver more water but also at higher pressure, this pump delivers a whopping 2200lpm, will pass a 39mm solids in suspension through the big open impeller, and produces close to 50psi!

A pump this size requires a 35cc hydraulic motor, the equivalent of around 20kW.

“It’s a big piece of iron,” Mr Hales said. “We designed the volute into the pump body so that there are minimal components.”

The company’s elimination of non-essential componentry is all about reliability and the simplicity of overhaul.

“You can carry out an overhaul on this big pump by simply replacing the mechanical seal and some gaskets,” Mr Hales said.

“Replacing an impeller may take a little longer but there just isn’t anything else to wear out.”

CONTAMINATED WATER... NO PROBLEM

Aussie’s GMP product line doesn’t just cover these big cast iron “iron age” style products. In many cases, the same pumps are available in nickel aluminium bronze material.

“That’s the same bronze mix that the US Navy specify on their warship fire and salvage pumps,” Mr Hales said.

“Nickel aluminium bronze pumps, with stainless steel fasteners and 316 shaft, can handle brackish or saltwater, or a wide range of compatible chemicals. Tailings? Depends on the mine but, it can do that job as well.”

WHAT ABOUT REAL CORROSIVE LIQUIDS?

Aussie GMP pumps are also available in 316 stainless steel configuration. These big cast pumps are not semi trash pumps but do offer big open impellers that will pass 32mm solids in suspension.

“They’re abrasion resistant with the ability to handle corrosive liquids, even hard water,” Mr Hales said.

The Australian Army is now using both 3” and 4” Aussie GMP 316 stainless steel hydraulic drives on their Hallmark water carts.

CUSTOMERS ALWAYS WANT MORE

The Aussie GMP semi-trash pump range is designed to handle extreme duties.

With more and more requirement for higher pressures, the company is now working on developing 3” pumps that will handle 19mm solids and still achieve heads as high as 78m. Standard configurations are cast iron but these big pumps, requiring up to 25 kW hydraulic drives, can perform major duties that others simply can’t.

“Here’s our semi trash pump checklist,” Mr Hales said.

- **The pump should be self priming.**
- **The pump needs to deliver a high flow, at least over 1000lpm**
- **The requirement for high pressure. We did that by building a bigger body with a bigger diameter impeller.**
- **It needs to be protected from the medium being pumped. That was achieved by building in a stainless steel wear plate and using top quality silicon carbide seals able to cope with abrasive liquids.**
- **The body needs to be cast iron to deal with the possibility of pressure spikes when used with either firefighting nozzles or water cannon. Sudden shocks delivered by a ball valve can affect lighter weight pumps. These big cast bodies handle it with ease.**
- **Easy clean-out port is required. We put a clean-out port mounted below the suction port at the front of the pump. That’s a huge gift to the operator who can easily hose out the pump bowl without disconnecting pipework. Thus, impellers can be cleared of blockages in a matter of minutes.**

“The Aussie GMP product range is a real breakthrough. We came up with simple, compact designs and are now working on easy rejuvenation kits to simplify maintenance,” Mr Hales said.

“These are very cost effective and include all wear parts from the mechanical seal to the check valve in the suction port.”



Big 4” Aussie GMP cast 316 stainless steel pumps in hydraulic drive provide flows to 2200lpm for the mobile transfer of corrosive and abrasive liquids.



Aussie's GMP ATEX-rated pumps enable safe, high volume transfer of diesel fuel.

The pumps are all designed and built to ISO 9001 quality standards, with the bronze pumps even gaining DNV approval and classification on a wide range of marine applications.

PUMPING DIESEL FUEL?

The company has adapted the same cast iron pumps for fuel handling by fitting specially configured ATEX-rated, flameproof electric motors. The motors, manufactured in accordance with ATEX 94/9/CE standards, make it safe to pump diesel fuel on a mine, quarry or construction site.

The pumps are all fitted with Viton seals and offer a range of performances from compact 1½” pumps delivering 290lpm of fuel, all the way up to a variation of the B4XR-A (ATEX)

with a whopping 2300lpm. Refuelling dump trucks is a breeze for these big pumps. They’re also used in a wide range of marine applications. Uniquely, the Aussie GMP range is covered by three-year warranty against faulty workmanship or materials.

The company is now working on designs for 6” and 8” diesel engine drive semi trash pumps to deliver huge volumes of water. They can also provide high pressure performance for any application from dust suppression to firefighting.

A comprehensive guide to Aussie’s GMP range for the mining industry is readily available from Australian Pump Industries...
02 8865 3500
AMR



PRECISION AND INNOVATION

A Leverlink industrial chain tensioner.

When it comes to products, quality of manufacture and design, along with a long service life, are the two key attributes that all big operators look for from their suppliers.

Leverlink, a Brisbane-based design and manufacturing company with almost 30 years of experience, leads the world in providing mine sites with products that exemplify these characteristics.

As part of its long-running Continuous Improvement Policy, Leverlink has over time developed products that simply outstrip the competition in terms of quality and service life.

Richard Sharp, Leverlink's Managing Director and an established source of innovation at the company, notes that "in terms of our service life, no one else in the world can touch us".

"Generally speaking, we build products to around 10 years, and we often re-furbish at 15 years," he said.

"So in effect, the original product can be in the field for 30 years."



Managing Director Richard Sharp.

To design and build to such quality is a mark of excellence that few companies in the world can match. And it comes from a few factors that are unique to the company. Firstly, Leverlink is Australia's leading OEM of stored energy motor bases and dynamic impact beds for conveyors, along with a range of other products.

Its design team of expert chemical engineers and its lean and sophisticated factory in Queensland means Leverlink has absolute control over all parts of the design and manufacture process, leading to the kind of high-end manufacturing that world-class mine operators can depend on.

Importantly, because Leverlink does not outsource design or manufacturing to third parties, it has the capacity to tailor-make products for each individual customer. Indeed, custom design is a core feature of the company.

"We do that on a daily basis. That's what keeps us ahead of the game," Mr Sharp said. Innovation is also core feature of Leverlink, particularly around its development of rubber torsion springs, which can be applied to a wide range of different applications.

For its Dynamic Impact Beds, for example, the springs work to provide a unique and effective method of absorbing impact and attenuating vibration. Leverlink offers customers a broad range of high-end products.

There are too many to list here, but delivering motor bases, dynamic impact beds, chain and jockey tensioners, guarding motor support structures, vee belt tension gauges, lever springs for vibrating screens and feeders, conveyor dust enclosures and conveyor wear plates are just some of its manifold offerings.

Importantly, each is custom-made and fitted to meet the customer specifications. The flexibility of its manufacturing for dynamic

impact beds is a case in point. Belt speed and fall height will vary from site to site, and Leverlink works assiduously to meet these varied demands.

"No two beds are ever the same," Mr Sharp said.

"Each is customised to suit the application, and when we receive the information from the mine site, we design our beds to fit in with and improve their operation."

What's more, Leverlink can build to belt sizes 1.6m to 2.5m in width.

"There is no one else in the world who can do that," Mr Sharp said. "We are the world leaders for those sizes."

And though custom-design means no two products are ever the same, a general principle prevails across all products, and that is brilliance in innovation. Leverlink's large chain tensioners are a case in point.

"The conventional way of doing things was to have a large sprocket, but that can weigh up to 100kg with the bearings and everything in them," Mr Sharp said.

"The vibration, or the chordal effect, which creates energy, eventually destroys the bearings in the chain system, so what we did then, we looked for another way of doing things.

"We applied large polymer rubbing blocks to fit into the chain profile, and we've been doing that for 25 years, and they work very successfully.

"Where a conventional sprocket bearing system will last probably two or three years, we get up to eight or nine years out of the units.

"The way the unit engages the chain, it doesn't create any vibration.

"And because it is shaped like a football, after it wears one side, we just turn it around and use the other side.

"And the total weight of the unit is about 7kg to 10kg.

"One man can literally get up pick it up and walk it around with his hand, and re-fit a new one easily."

Altogether, Leverlink does the kind of things that other companies simply don't do, or can't do. Everything it does tends to be at a larger scale. For its chain tensioners, for example, the company specialises in 2in to 6in sizes. Leverlink also specialises in custom-made guarding structures that come with any package ordered by a mine site.

For example, say an operator needs a pump base frame to be replaced, and might wish to install a Leverlink motor base onto it, Leverlink can re-design the pump base frame and the guarding system to go with it, and supply the site with a new and upgraded motor base.

Leverlink has been doing this for 20 years, matching the pressing and complex demands of mine operators with skilfully designed and manufactured solutions.

Leverlink's innovative brilliance, design quality and high-end manufacturing capacity has made it a trusted supplier to both Australian and international operators, particularly those based in the United States, Europe and West Africa.

Indeed, Leverlink's excellence has made it a target for technology theft and copying. Though there is no clear way to mitigate this, the fact of it demonstrates that Leverlink is a world-class enterprise. **AMR**

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CASE STUDY: A LARGE NICKEL REFINERY

Positive pressure respiratory protection made simple.

CleanSpace Respirators have significant benefits for mining companies and personnel.

A large nickel refinery in Queensland has illustrated the challenges large industrial sites have when protecting their staff from hazardous airborne contaminants in the workplace.

Based in the north east of Australia, the refinery employs 1000 people and is a global leader in the production of high-quality nickel and cobalt. The nickel and cobalt-bearing laterite ores are dried, ground, roasted and leached before being separated for sale to a global market.

Despite system controls in place, the extraction process generates rogue nickel dust emissions of soluble and insoluble nickel forms with differing exposure standards requiring controls around personal respiratory protection.

Following an internal safety review, the nickel refinery's occupational hygienist examined a broad range of respiratory options with a focus on high levels of protection. Trials included passive P3 half masks through to Powered Air Purifying Respirators, including loose and tight-fitting head tops.

The Challenge

The challenge at the nickel refinery's site was maintaining compliance and productivity for staff wearing personal respiratory protection due to demanding requirements. For instance, operators and maintenance staff needed protection for six hours (some up to eight hours) on a daily basis wearing RPE.

Meanwhile, managers and engineers required RPE for short periods of time but needed ease of donning/doffing as they moved through the contaminated areas on site.

The plant also covers an area the size of a football field and has a high point of six levels up that can be reached via stairways. The physical layout and the vast network of kilns, conveyors and elevators needing routine checks, adjustments and sampling meant operators are highly active and require mobility around the equipment.

In addition, industrial rotating kilns contributed to high temperatures in and around the plant of 45°C.

The Solution

Negative pressure masks caused staff to struggle with acute discomfort from over-tightened straps and heat under the mask when worn for several hours. Many of the belt mounted positive pressure systems proved too restrictive for normal day to day tasks and were too bulky and difficult to carry when operating machinery or temporarily

moving in and out of contaminated areas.

"When trialing belt-mounted PAPRs, my maintenance and operating teams complained that the battery packs made driving forklifts difficult and head tops limited their head movement which is important when running equipment checks," one of the site managers stated.

At the time of the case study, CleanSpace Respirators had been utilised at the refinery for over a year and worn by the staff every day. The original trial of CleanSpace Respirators found it suited the team across a range of tasks, supporting staff to carry out their daily duties with ease.

The Result

The powered nature of the CleanSpace Respirators ensured the high level of protection the nickel refinery management were after and delivered fresh air to the wearer thus reducing risks of heat stress and respirator fatigue.

"The staff reported good battery life, comfort and easy transition from their traditional mask to the CleanSpace Respirator. The built-in battery and compact neck mounted unit meant it was easy to carry around and clip on before entering controlled areas," the site manager said.

Over time, the refinery noted additional benefits in using the CleanSpace Respirator, such as long filter life and peak load filter alarm (which alerts the wearer when to change filters ensuring the full life is achieved from each filter); ease to clean the mask and low maintenance on the unit; and toughness and durability as even with daily use and long wear, the CleanSpace kits remain in good condition.

Importantly, the refinery has seen no reduction in compliance with staff wearing the CleanSpace Respirators. The management contributes this to the additional comfort of fresh air and on-demand air flow when staff have high exertion work or working in hot temperatures.

Since issuing CleanSpace Respirators to its staff, other sites that experienced high dust loads and developed blocked half masks, have adopted CleanSpace.

CleanSpace Respirators

CleanSpace Respirators are PAPRs - they are a revolution in the area of respiratory protection because they provide all the protection of a PAPR plus they are free from belts, battery packs and hoses making them more comfortable and easier to deploy.

Compared to disposable masks, CleanSpace Respirators offer more protection and are

more economical as the cost of replacing disposables stacks up. Disposable masks are well-known for causing fogging of eyewear and discomfort, leading to low compliance.

When used in hot or humid conditions, CleanSpace Respirators provide cool, clean air to the user and eliminate fogging and moisture. CleanSpace Respirators are light, easy to put on, reliably safe and comfortable.

They are also easy to operate using a one-button smart system. These unique features mean more workers can wear the powered respirators for a full shift.

CleanSpace offers both half face and full face masks (the full face mask also has a high impact rating).

CleanSpace Respirators are compact systems that have up to eight hours run time and fast top up charging.

"The feedback we get from teams wearing CleanSpace Respirators with the full face mask for mining, is that the mask is comfortable to wear all day, and the cool fresh air on the face is a dramatic

improvement on disposable or reusable half masks," CleanSpace chief executive Alex Birrell said.

"They have also told us there is no fogging or hot moisture on their face."

Product Range

CleanSpace Technology currently has three respirators depending on the requirements of the industry. CleanSpace EX is intrinsically safe so that it can be worn in potentially explosive environments such as mining.

CleanSpace Ultra is IP rated 66, making it water tolerant, and CleanSpace2 can be used in a variety of industrial applications where water tolerance or intrinsic safety is not required.

CleanSpace Technology, an Australian company based in Sydney, also assists in product training, fit testing and instructions on maintenance and care with attentive customer support.

More information can be found at: www.cleanspacetechnology.com

AMR



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CleanSpace Respirators provide all the protection of a PAPR plus they are free from belts, battery packs and hoses.



CleanSpace Technology currently has three respirators available, depending on the requirements of the industry.

100,000TH HYDRAULIC HOSE

Liebherr-Australia celebrated 100,000 hydraulic hose assemblies manufactured in its Adelaide-based head office complex in September, a milestone that represents the growth and success of the new facility since it was commissioned in 2014.

Situated in the 12,000m² state-of-the-art National Distribution Centre, the workshop manufactures around 17,000 high-pressure hydraulic hose assemblies each year for the entire Liebherr mining range of excavators and dozers.

The hoses are both assembled and tested in the facility to stringent OEM and international standards, including MDG 41 and ISO 9001. Although this milestone represents the hoses manufactured in the new facility, hose production for Liebherr started in Australia in 1999, with mass production in 2006.

This was around the same time Liebherr-Australia Group Leader for Hose Production, Matthew Bowes, joined the company as a hose technician. Mr Bowes experienced firsthand not only the development of the facility and its capabilities, but also the team, with the hose department growing from three people producing 70-120 assemblies per week in 2007, to 11 team members producing 350-450 assemblies per week today.

Liebherr-Australia's hose fabrication facility in Adelaide.

"I have been able to grow with the company as well as be part of its development, starting as a technician before moving away from hoses to complete a mechanical apprenticeship with our remanufacturing department, and then returning to the hose department as a Team Leader and currently Group Leader," Mr Bowes said.

Hydraulic hoses are an integral component in keeping the equipment running, but they can also pose a potential safety risk; a notion

that the Adelaide team take very seriously.

"Every team member knows how important it is to manufacture hose assemblies to a very tight tolerance. Our quality and compliance checks are of the best standard, and our safety culture within the team is fantastic," Mr Bowes said. "Although hose fabrication can be a repetitive job, all of our technicians take great pride in their work, and want to produce the very best product every day."

While the hose department consistently operates with an already robust process, Mr Bowes said the company was always looking for quality improvements and efficiencies, along with the potential for future expansion to cater for increased demand.

"This milestone achievement of 100,000 hoses is a great opportunity for the team to take a moment to celebrate the great work we do every day," he said. **AMR**

The milestone 100,000th hose.

UNDERGROUND MINE DUST CONTROL

Fine particle management company Reynolds Soil Technologies (RST) has expanded its range of services to specialise in comprehensive dust control solutions for underground mining and tunnelling.

In response to industry demand for preventative measures to suppress dust emissions from underground mining and tunnelling activities, RST has developed advanced methods for sealing loose dust to walls and roofs as well as roads and hardstand areas for longer periods of time, reducing the need for ongoing watering programs.

By targeting specific areas and activity with customised products and applications, RST assists operators of underground mines and tunnelling activities to successfully manage their dust emission challenges while delivering significant operational benefits, personnel protection and regulatory compliance.

RST Operations and Technical Director David Handel said tunnels and underground mines require a broad range of targeted control methods to adequately control the hazard of dust emissions.

"Dust emissions from underground mining and tunnelling activities move around the tunnel systems by ventilation and machinery air displacement with unsafe levels of build-up occurring on walls and roofs," he said.

"Without targeted treatment, ongoing air displacement causes the dust to become dislodged and become airborne again.

"As part of our overall strategy to mitigate dust, each surface is targeted separately with specific dust suppression strategies to minimise the circulation of dust.

"Our dust suppression methods are customised with specialised chemistry based on determining factors such as material type, water quality, application procedures, duration and durability."

Mr Handel said spraying tunnel walls and roofs with water was inefficient as the water saturated the roads and dried very fast on the walls and roof surfaces with the rising of hot air, which quickly returned the surfaces to their natural state.

He recommends adding an advanced crusting agent to the water for spraying onto the walls and roofs to seal and bind loose dust to the rock surface, which remains active for much longer periods of time and reduces the need for ongoing watering programs.

RST's recommended product for this treatment is the company's advanced formula Guardian Dust Binder due to its versatility, cost effectiveness and long-term dust mitigation results.

The team identified its products RT20 Dynamic Stabiliser, Shield All Weather Road, Guardian Road Binder and Zero Waterless Dust Suppressant for the treatment of roads and hardstand surfaces in underground mines and tunnels, with treatments tailored and applied in conjunction or separately.

RST also strongly recommends using a



RST has developed advanced methods for sealing loose dust to walls and roofs.

foaming dust suppressant for materials handling, which is far more effective than plain water as the foam expands water and binds dust particles for greater lengths of time so significantly less water is required to achieve the highest levels of dust control efficiency.

With operational challenges and environmental conditions differing at every site, RST specialises in customising products and services to suit various requirements

for dust control, surface stabilisation and erosion mitigation.

RST has worked closely with process chemists to develop its range of unique dust suppressant formulas to significantly improve dust control efficiency of water spray systems already in use to advance their effectiveness in capturing airborne dust and improving material dust extinction moisture levels without affecting the processing results. **AMR**

116 YEARS AND COUNTING

Johnson Screens designs and manufactures its products under the roof of a 40,000m² facility.

Johnson Screens, a brand of Aqseptence Group, is one of the largest manufacturers of separation and filtration screening systems, and has been proudly manufacturing its products in Australia for more than 60 years.

Johnson Screens is based in Geebung, Brisbane, with a sales and service location in Mackay, and employs more than 150 hard-working Australians.

Johnson Screens designs and manufactures its products under the roof of a 40,000m² facility and has wire shaping, Vee-Wire screens, fibre laser-cutting and polyurethane casting capabilities in-house.

"We're proud of our manufacturing heritage in Australia providing local solutions, and export our products around the world due to our high-quality standards producing superior products," Aqseptence Group business manager for mining and industrial products Ray Holman said.

"Johnson Screens' range of classifying and dewatering solutions for mineral processing operations are world-class due to having

complete quality control, from sourcing raw materials, engineering design, Vee-Wire (wedge wire) production to final product."

Johnson Screens panel designs include a variety of aperture and fixing systems, available in Vee-Wire (wedge wire), polyurethane or perforated plate.

"Our field service technicians perform maintenance services work at coal handling processing plants across many sites and pride themselves by working with you to optimise your process at the lowest cost," Mr Holman said.

"The Johnson Screens range also includes sieve bends and centrifuge baskets for the coal industry, along with interstage screens for gold processing."

The brand also provides solutions for water management in mining, collectively offering more than 150 years of screening and industrial water treatment experience.

"Our aim is to provide solutions and sustainable practices, for the treatment of wastewater from underground mines,

mine processing, tailing dams and leaching (cyanide, ammonia, alkali, acid) by removing contaminants improving wastewater recovery," Mr Holman said.

When it comes to bore hole screens, Aqseptence Group's Business Manager for Water Wells, Moyez Poonawala, considers Johnson Screens as the "heart of the well", given a screen has the vital responsibility of determining the success or failure of a well.

"We believe that an ample supply of clean water is the foundation to healthy lives and we have been doing just that, one well at a time, for 116 years and counting," Mr Poonawala said.

A successful screen must allow the gathering of an ample quality of water, while maintaining a minimal head loss.

Understanding the costs associated with a higher drawdown due to incorrect screen selection is critical, as it could end up costing more in capital and pumping costs.

A benefit of Johnson Screens is its ability to provide a screen with a very high open

area, allowing for better access to the entire formation ensuring a laminar flow into the borehole. Fines and drilling fluid are removed quickly and completely, resulting in better well development.

"Our mission is 'Improving our world through separation and screening solutions,'" Mr Poonawala said.

Johnson Screens' well screens are used in infiltration galleries, geothermal bores, oil and gas bores, high flow municipal bores, construction dewatering, mine dewatering, residential and agricultural bores, etc.

The brand is confident that whatever part screening plays in your process, Johnson Screens can improve it with more than 100 years of design experience, vast manufacturing capabilities and around-the-world support.

Johnson Screens can be contacted at **07 3867 5555**, **info.johnsonscreens.au@aqseptence.com** and **www.johnsonscreens.com**

AMR



A water well screen being welded.



Because of their strength, durability and flow characteristics, Johnson Screens support grid and distributor tray systems are widely used in hydrotreaters, hydrocrackers, molecular sieves, sand filters, gas sweeteners and other absorption systems.

UPSKILLING FOR MINING BOOM

The Australian mining industry has roared back to life with a flood of investment in exploration and new projects around the country. Now the race is on for the next generation of mine workers to upskill to address the looming skills shortage.

The Engineering Institute of Technology (EIT) will play a key role in plugging this gap and offers a unique online delivery methodology featuring remote and virtual laboratories, simulation software, an international pool of expert lecturers and live stream web conferencing.

While many education and training providers are new to online learning and simply record lectures, EIT offers live and interactive online short courses, diplomas and degrees which have been honed over 10 years.

EIT has dedicated learning support officers who offer one point of contact for students who use software to manipulate real equipment to simulate a work environment. The lecturers are industry professionals, not just academics, and students can complete courses while still working.

EIT is also unique in that it straddles both the Vocational and Higher Education sectors, which means students can graduate with skills that allow them to operate as a technician, technologist or professional engineer.

Or, for any of those three disciplines, they can upskill with industry-driven short courses.

Tradespeople with work experience can complete diplomas or advanced diplomas.

Those with higher education qualifications can cross-skill with an undergraduate certificate, bachelor's degree, graduate certificates, master's degrees or a doctor of engineering.

EIT is one of the only institutes in the world specialising in engineering, with most fields relevant to the mining space.

School of Industrial Automation, Instrumentation and Process Control: Industrial Automation provides the technology to control and monitor a process plant using concepts such as feedback, cascade, feed-forward and advanced process control. Students can complete a vocational advanced diploma all the way up to a master's level.

School of Civil Engineering: Civil engineers plan, design, construct, maintain and recycle the structures in communities such as dams, bridges, roads, buildings, pipelines, railways and tunnels. EIT courses provide a solid foundation in the fundamental knowledge and troubleshooting skills of civil engineering.

Advanced Diploma of Electrical and Instrumentation Engineering in Mining: Skills in the latest technologies used in mining operations around the world, credibility as an expert in one's firm, improved career prospects and income, practical guidance from mining experts and networking opportunities. Or students can enrol in a live online program for 18



EIT alumnus Ray Crawshaw.

months part time.

Advanced Diploma of Remote Engineering, Mechatronics and Robotics: This advanced diploma is delivered with a strong practical focus and covers a variety of skills such as electrical/electronic systems, mechanical systems, computers, and control systems. Upon completion of this program, you will gain skills and knowledge in the latest and developing technologies in remote engineering, mechatronics, and robotics.

Alumnus Example

EIT alumnus Ray Crawshaw has 35 years of experience in the oil and gas, power generation and mining sectors, and had already worked for Chevron for a year when he enrolled in EIT's Master of Engineering (Industrial Automation).

He seamlessly integrated what he was doing at work into his thesis for EIT and became the E&I area construction manager, overseeing the construction and pre-commissioning of engineering equipment crucial to the LNG operations on those projects.

He also studied the Advanced Diploma of Applied Electrical Engineering which also helped him develop his career and upskill.

Mr Crawshaw went on to become a project manager of Synergy and is now a construction and commissioning manager at Fortescue Metals Group.

EIT's vocational programs and higher education degrees are registered and accredited by the Australian Government.

AMR

Upskill for the mining resurgence while maintaining employment.

Our unique, live online courses provide you with cutting-edge skills valued by employers and remain current with rapidly changing technology and industry developments.



Industry Relevance

Our live online short courses, diplomas and degrees are designed by an international body of industry experts in industrial automation, instrumentation and process control; data communications; electrical, instrumentation and power systems; mechanical engineering and plant design; and civil and structural engineering.



Unique Delivery

Our unique online delivery methodology provides you with access to cutting-edge simulation software alongside remote and virtual laboratories to test concepts and deepen your understanding of program content.



Dedicated Support

Our dedicated learning support officers and small class sizes encourage you to advance your technical knowledge and remain engaged in your studies while forming global networks.

Find out more at
www.eit.edu.au



CRICOS Provider Number: 03567C
Higher Education Provider Number: 14008
RTO Provider Number: 51971

WHERE EXPERIENCE COUNTS

With a customer base including heavyweights such as Yancoal, Newcrest, BHP, Evolution Mining, Peabody, and Downer, it's easy to see why TyreDoctor has earned its stripes as one of Australia's leading OTR tyre and rim specialists.

TyreDoctor, established in 1986, has grown from humble beginnings as a hot-vulcanised tyre repair specialist servicing the NSW Riverina, to a 'full-service' business for the mining and heavy earthmoving sectors across eastern Australia.

The second-generation family company's most unique expertise is in hot vulcanised repair of OTR tyres – a craft requiring extensive experience, an understanding of tyre construction, and in-depth knowledge of OTR operating conditions.

That expertise continues to grow with key personnel actively supervising each individual tyre repair job, including extensive preventative maintenance repairs on 57" & 63" ultra-class tyres for major mining fleets.

Substantial workshop facilities in Western NSW, Hunter Valley and the Bowen Basin has enabled TyreDoctor to continue expanding its services throughout eastern Australia, offering the knowledge and expertise of an experienced OTR tyre repair specialist along with in-house wheel and rim testing, repair and manufacturing capabilities.

A company-owned fleet of specialised rigs for transporting ultra-class tyres, and a number of onsite fitting trucks handling up to 63" tyre & wheel assemblies, allow

TyreDoctor to provide a complete gate-to-gate service and retain full control of service response and lead-times.

TyreDoctor carries a large, constantly moving stock of both new and second-hand OTR tyres, backed up by in-depth knowledge and experience of tyre and wheel applications

in underground mining, surface mining and heavy earthmoving.

The company is now the second largest independent dealer for Michelin OTR in Australia; and a significant dealer for other major OTR brands including Yokohama, and Maxam.

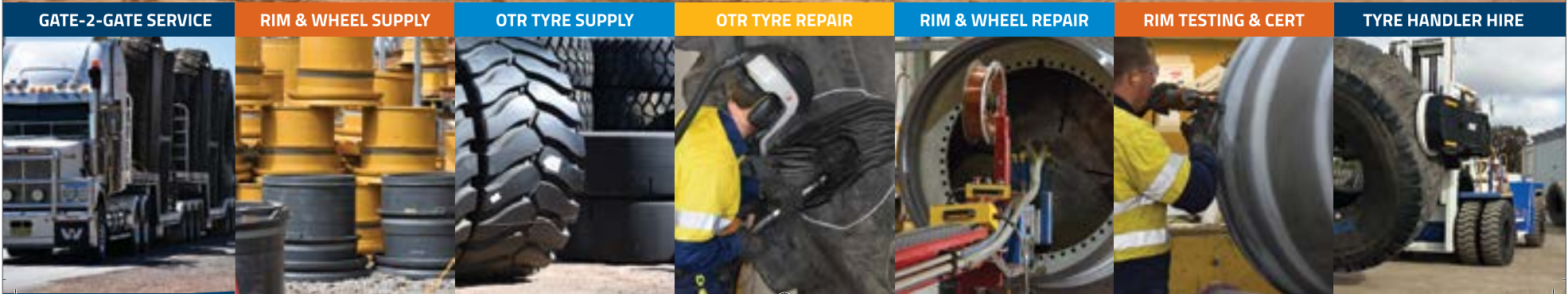
All personnel are highly trained to comply with Australian standards, with ISO 9001 and 14001 certifications in place across all company operations.

More information can be found at www.tyredoctor.com.au or by calling 1800 897 336. **AMR**



TyreDoctor has substantial workshop facilities in Western NSW, the Hunter Valley and QLD Bowen Basin.

TYRE + RIM REPAIR SOLUTIONS FOR MINING. WITH SHORT, RELIABLE TURNAROUND.





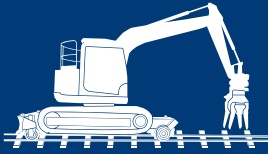
OVER 35 YEARS
OF BUSINESS



Harrybilt Engineering is a family owned, Ballarat based manufacturing business. Starting out as a small engineering company in 1985, the team have developed significant experience in the rail industry. Their products can be found throughout Australia as well as New Zealand, Malaysia and America.

Harrybilt Engineering have become experts in the design, development and manufacture of specialist equipment for Rail Infrastructure Networks across Australia. Their reputation has led them to become the supplier of choice all over Australia and internationally for Road Rail Trucks, Excavators and Trailers, along with Rail Maintenance Attachments and Work Tools.

All equipment is built to withstand the toughest conditions and the team are always improving and increasing their product range to keep pace in this specialised industry.



LIGHT RAIL
MACHINES

Harrybilt Engineering have over 19 years' experience in installing Hi Rail Systems on tracked excavators. Over the years the team have worked on machines such as Hitachi, Hyundai, Komatsu, Kubota and more.

Harrybilt Engineering is certified to provide Road Rail Vehicle Compliance Testing for most networks in Australia. Excavators are commissioned and tested so every Hi Rail Machine is **Rail Ready** when it leaves the workshop. This is what makes Harrybilt Engineering one of the safest and most reliable Hi Rail System manufacturers in Australia.

The rail wheels can be set to either Narrow, Standard or Broad Gauges. A single manually operated valve is installed to switch from track to rail mode while still allowing the excavator to operate in travel mode.





HI BRID RAIL SYSTEM

Since 2000, Harrybilt Engineering has grown to include a full time Mechanical Engineer. Over the years, the team has developed an extensive range of skills and manufacturing experience in the rail industry and are always looking to provide new products to this market. Harrybilt are often challenged with unique rail problems and by listening to customer feedback, the team are able to design and manufacture a customised product.



Harrybilt Engineering have developed a customised Rail System, the **Hi Brid** which allows a wheeled excavator to run on both standard and narrow gauges.

This unique system means the machine is set up the same as the Rail Guidance System; with the excavator's tyres providing acceleration and braking on rail when running on standard gauge. On narrow gauge, the machine tyres contact a drum that drive the rail wheels. This is also known as a friction drive set-up.



The dual-gauge system was developed after discussing with customers in the rail industry that by having a machine that has the capability to switch between narrow and standard gauge networks, it would significantly increase their efficiency. By listening to this customer feedback, Harrybilt were able to design and manufacture the Hi Brid System to best suit the needs of the industry.

The Hi Brid System includes 4 failsafe braked rail wheels for increase safety, twist for negotiating track irregularities and is fully compliant with Australian Rail Standard AS7502.



S SERIES RAIL EXCAVATOR



Harrybilt Engineering have partnered with Hitachi Construction and Machinery Australia to develop the **S Series** Rail Machine. This machine has been developed for the operator. Operators need a machine that can withstand the most severe working conditions while remaining safe, versatile, efficient and simple to operate. Harrybilt Engineering have developed this machine with the concept for safety first. The **S Series** is one of the safest Rail Machines on the market, manufactured in Australia for Australian conditions.

The S Series Rail Guidance System Excavator has retractable rail wheel assemblies that are installed on the excavator, positioning the vehicle on the rail while allowing the tires to continue to provide traction and braking. The blade has a mechanical twist mechanism to meet Australian Standard.

The S Series Hi Rail System Excavator can be set to either narrow, standard or broad gauges. A single manually operated valve is installed to switch from track to rail mode while still allowing the excavator to operate in travel mode.



Options include;

- Directional Lighting at the front and rear of the machine. This is a Red / White lighting system mounted to the Undercarriage.
- Harrybilt Engineering are dealers and installers of a number of brands of Tiltrotators, such as Engcon and Steelwrist.
- The Height, Slew, Load and Virtual Wall System features a key lock out system for unauthorised actions. This includes a visual display touchscreen providing the operator with full status information to allow safe operation with all conditions.
- Height and Slew as well as a Slew only system is available for excavator movement control.

PROUD TO BE AUSTRALIAN

Oreflow Australia has built up a reputation as an industry-leading national and international supplier of mineral processing mining equipment.

But the company has never lost focus of its Australian roots, proudly manufacturing and assembling its broad range of screens in WA.

Whether it be a screen for waste processing or a vibrating screen for materials separation, Oreflow can offer a tailored screen solution to achieve the outcomes and aims of any project.

Customised operating parameters ensure accurate sizing and high quantity processing of materials ranging from ores and rock to mineral sands.

The company understands that to get it right when it comes to material size, conforming to a rigid specification relies heavily on using the appropriate screen size.

Different materials have different separation rates, and that is why it is important the correct screen size is used, as it will maximise the efficacy and efficiency of the screen.

Oreflow's innovative and practical range includes static and excited wet and dry screens, portable screening plants and heavy duty Horizontal Linear Motion Screens (HLMS).

Its products are designed to be fit-for-purpose, capable of operating in the harshest conditions and able to be integrated into new or existing plants.

Oreflow founder and technical expert Mel King said the products are widely used in Australia and around the world due to their ease of installation, low maintenance requirements and exceptional performance.

Mr King said the company's strong reputation had paved the way for the company to supply screens, crushers, feeders and belt scrapers to almost every corner of the globe, including Ghana, Tanzania, Burkina Faso, Guyana, Indonesia, United Arab Emirates and Senegal.

Oreflow has the capacity to tackle larger projects while also providing a personalised, customised experience through a small team of experts.

"For us no project is too small and we treat small projects with the same diligence as a larger one," Mr King said.

"We have only one philosophy, which is ensure our clients get the quality products and support that they expect.

"We pride ourselves on dealing with customers' enquiries as soon as possible so we do not interfere with their business."

Oreflow is the Australian master distributor of Brelko Conveyor Products for spillage control, offering a premium range of belt scrapers and skirting systems.

"Brelko has been part of our business for 20 years: they supply excellent products and spend a lot of resources on research and development," Mr King said.

The E905 is a new head pulley belt scraper, which is ideal for when wet and sticky materials are conveyed and is suitable for all types of conveyor belts and metal fastener systems.

Adjustable Brelko torsion twist tensioners allow the scraper to maintain a constant

pressure on the belt while allowing it to deflect away from any obstruction, a significant safety feature.

Specially formulated polymeric blades maximise the life of the scraper while keeping the potential risk of damage to belt repairs, splices and metal fasteners to a minimum.

A V-base blade mounting makes blade changing quick and simple while a streamlined scraper construction prevents material build-up.

The E205 Secondary Belt Scraper is the universal choice for all normal cleaning applications but is not suitable for mounting directly onto the head pulley.

This scraper is used in conjunction with torsion arm mountings to accommodate different belt thicknesses and excessive belt movement. Brelko offers different keyskirt sizes to accommodate different types of spillage.

The Keyskirt Size 2 provides an effective chute sealing system designed to control spillage at conveyor load areas and is suitable for all belt conveyors carrying material with a particle size of less than 75mm.

The patented mounting track system results in simple installation and skirt rubber replacement while self-cleaning grooves trap spillage allowing it to be carried away by the belt.

The Keyskirt Size 3 is designed to cope with spillage of large lump material larger than 150mm.

Features include a robust and abrasion-resistant polyurethane sealing strip and a mounting system for easy strip replacement. Apart from capital equipment, Oreflow offers a wide range of other services including bulk material handling, abrasion control as well as air cannons and magnets.

In 2000, Mr King and partners formed Minspec, a mining equipment manufacturer, and by the mid-2000s the company had formed the beginning of a long running and successful partnership with Brelko.

In 2013 the operations were expanded to form Oreflow, which evolved to encompass and service all areas of mineral processing systems and bulk materials handling from design to installation, maintenance and repair.

The company prides itself on being Australian-owned and never compromising on quality.

"Most of our equipment is manufactured locally which negates any problems with shipping and unnecessary hold ups," Mr King said.

"Our clients are happy with our local supply

as they can inspect them at all stages of the process."

Oreflow now has a business development manager operating out of NSW to help increase the company's presence, provide a point of contact and enable more site visits in the eastern states.

Oreflow prides itself on a rapid response and quick turnaround for design and engineering, manufacturing, feasibility studies, quotations and supplies.

The company offers service and replacements seven days a week with factory-trained Brelko scraper technicians.

It uses 3D modelling for plant design integration as well as simulation software applications to optimise the performance of a new or existing plant.

All products and services meet Australian quality, safety and environmental standards while applying industry best practices relating to safety. **AMR**

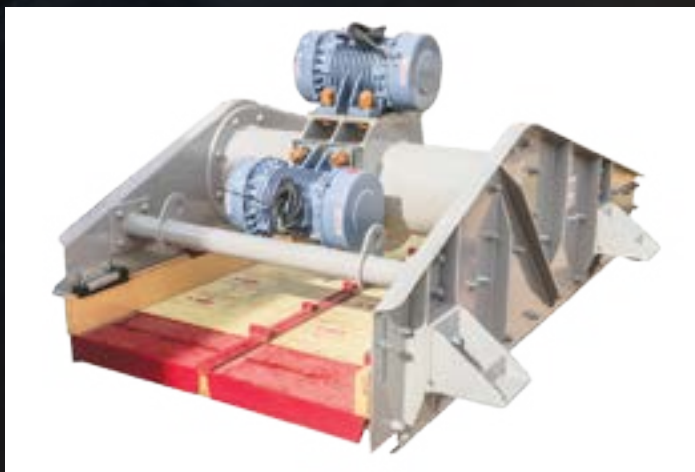


“

The E905 is a new head pulley belt scraper suitable for all types of conveyor belts and metal fastener systems.

“

Oreflow screens are manufactured and assembled in WA.



ONE OF AUSTRALIA'S LEADING MINING EQUIPMENT SUPPLIERS

CONVEYING FULLY SUPPORTED SOLUTIONS

Oreflow Australia specialise in designing conveyor and bulk material handling solutions capable of operating effectively in even the harshest processing conditions.

As the Australian distributor for Brelko Conveyor Products, Oreflow supplies conveyor systems, chute and hopper skirting solutions, belt cleaning systems, air cannons, and impact beds to Australia and Asia.

We supply quality capital equipment both in Australia and abroad, specialising in bulk materials handling and processing plant design and manufacture.

Our products are designed to be fit for purpose, capable of operating effectively in even the harshest conditions and able to be integrated into new or existing plant.

The Oreflow range includes heavy duty Horizontal Linear Motion Screens (HLMS), excited by under and over Uras out of balance motors and available in single or multiple deck configurations.

Customized operating parameters ensure accurate sizing and high quantity processing of materials ranging from ores and rock to mineral sands.

Our screens are manufactured and fully assembled in Western Australia and are widely used in Australia and around the world due to their ease of installation, low maintenance requirements and exceptional performance.



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BRELKO 
CONVEYOR PRODUCTS

OREFLOW 
AUSTRALIA PTY LTD

CONTRACTOR OF CHOICE

MLG Oz provides a fully integrated engineer, procure, construct and manage (EPCM) crushing solution for customers

The Crushing and Screening division of MLG Oz provides clients with the full range of services including run-of-mine ore crushing, concrete aggregate production, road base production and general screening.

MLG Oz managing director Murray Leahy said the division had been built on an ethos of delivery, flexibility, efficiency and collaboration with customers.

He said the company caters to the “full spectrum” of requirements including small projects, delivering items such as road base, blast hole stemming and aggregate with a mobile crushing and screening fleet placed directly on customers’ sites. This is achieved through use of a rapidly deployable, mobile fleet at the mine interface.

“Further to this, we offer a longer-term crushing solution through semi-mobile crushing fleet,” Mr Leahy said. “This enables us to deliver items such as run-of-mine mill feed, direct shippable ore crushing and road base and aggregate production over medium term durations at higher volumes.

“Finally, we provide a fully integrated engineer, procure, construct and manage (EPCM) solution with our team providing the full design parameters, engineering oversight, procurement, construction and ongoing operation of fixed crushing and screening plants for our customers’ long-term crushing needs.”

Along with the contract crushing and screening business, MLG also offers customer support around the screening requirements for paste fill contamination

control, mill scats clean-up and mineral concentrate blending.

In addition to wider contract crushing and screening operations, the business owns and operates a series of hard rock and sand quarries throughout regional WA. This enables the company to deliver the full range of aggregate and sands for use in the road building, construction and mining industries.

MLG’s product line includes 2t armour rock right through to the full range of the Australian standard concrete aggregates and sands.

The current MLG fleet is broken down into three key elements:

- Mobile, Terex Finlay track-mounted crushing and screening equipment that is rapidly deployable and quick to action in delivering short term crushing requirements for our customers.
- Semi-mobile, skid-mounted Striker and Terex modular crushing units utilised to deliver medium-term and capacity crushing solutions without the engineering or civil earthworks requirements in a timely manner for our customers’ needs.
- Long term EPCM with an in-house team delivering the full design, construction and ongoing operation of large, permanent crushing facilities for customers run-of-mine and ore processing needs.

With a growing fleet of crushing equipment,

MLG Oz is able to provide customers with cost effective crushing and screening solutions on short-lead times, ensuring customers are provided with timely solutions.

MLG Oz started in 2002 with one employee operating from a spare bedroom at home.

“The business has now grown to have more than 600 employees across 18 operational sites with four regional support depots and a corporate office based out of Perth,” Mr Leahy said.

“Through its foundations as a small family business, MLG has grown in conjunction with its customer-base over the last 20 years to now be an industry leader in delivery of our customers crushing and screening requirements with a core value built around its foundation principles of family, camaraderie and culture.”

MLG Oz’s roots have historically been in hard rock mining but has grown to offer a diverse suite of supply chain solutions.

Bulk Haulage and Supply Chain Solutions

With a fleet of modern Kenworth prime movers, side-tipping and end-tipping trailers and their various configuration options, MLG Oz has the flexibility to tailor its trucks to best suit the needs of each individual job.

Providing a wide range of services including on-road and off-road mine site ore haulage, construction material haulage, road maintenance services and any run-of-mine ore handling requirements, MLG Oz strives to provide a timely and cost-effective service to all its customers.

Construction Materials

As one of the preferred bulk suppliers of construction materials throughout regional WA, the Construction Material division of MLG Oz provides the highest quality product to its client base in a timely and cost-effective manner.

With its various quarry operations strategically located throughout the region, the company offers a wide range of bulk materials, including:

- Lime
- Cement
- Granite Concrete Aggregate (Australian Standard)
- Granite Sealing Aggregate (Australian Standard)
- Concrete Sand (Course and Fine)
- MRWA Specification Gravel and Road Base
- Filling Sand

Commodity Export

MLG Oz’s export division specialises in delivering a fully integrated service tailored to its customers export and import needs, including mine to port transport (both bulk and containerised), container packing and devanning, Import receival and distribution and shipping documentation.

From its family foundations, the company continues to work to the philosophy of “Keeping it Simple”.

MLG Oz strives to provide a high quality of service with minimal fuss. The company prides itself on its ability to fulfil its obligations to customers on time and in an economical, safe and efficient manner. **AMR**



MLG takes the customer’s crushing need, designs and engineers the plant, procures the required equipment, constructs and then manages the ongoing operation for customers.



Semi mobile medium-term iron ore crushing.



MLG Oz offers bulk haulage solutions. Pictured is the Off-Road Triple Road Train.

MLG provides comprehensive supply chain solutions with a focus on efficient, safe and productive outcomes.



- ✓ Bulk Haulage
- ✓ Mine Site Services
- ✓ Contract Crushing and Screening
- ✓ Construction Material Supplies



☎ (08) 9022 7746
🌐 mlgoz.com.au
📍 10 Yindi Way, Kalgoorlie, WA

LOCKER SCREENS ON MINING STAGE

In 2012, Locker announced it would return to the mining space and has spent the past eight years ensuring it has the right team in the right locations, with the expertise and experience to provide a viable alternative to the major panel suppliers.

Currently, Locker's industry-leading screening media are being used at mine sites across Australia and New Zealand.

Led by Brett Walker and Jeff Zubovich, Locker's dedicated mining team includes industry experts who understand the site-specific complexities of the screening process from years of experience in the mining industry.

Through research and development, the team has finessed an extensive product range of screening media to meet individual site and machine requirements.

Mr Walker said all rubber and polyurethane products are made in Australia, which provides the fastest turnaround to customers along with the highest quality under Australian manufacturing standards. This also provides peace of mind to mine sites as global supply chains become increasingly disrupted by COVID-19.

"We manufacture and supply screen media that would suit 95% of the vibrating screen machines in Australia, no customer is too big or small, no location too remote," Mr Walker said.

The independent technical and process support available through Locker will be unrivalled, no matter which type of machine, screen deck, fixing system or aperture that is currently running.

Locker is not aligned to any screen machine manufacturer, which equates to advice with no strings attached.

The extensive product range includes fire-resistant panel options, which have literally become a hot topic in the mining industry.

There are a variety of fixing systems and material choices to suit individual site applications in wet and dry duties.

Locker is focussed on servicing the customer, offering a screening solution that assists them in achieving their targets, whether that's:

- improving throughput
- reducing the cost of screening, per tonne
- minimising downtime due to screen replacement or failure (design panels to suit shut cycles).

"Our aim is to make screening on your site worry free so you can focus on the more important issues at hand," Mr Walker said. Locker will custom design aperture profile and size to suit individual requirements, taking into account feed size and rate, moisture content and final product requirements.

Various openings can be incorporated into the same deck design, including feed impact zones.

The flexibility of a modular system allows the screen to include a combination of different apertures, tapered openings, and

different material in panels.

Along with modular screen panels, Locker continues to offer the market cross-tension screens in either polyurethane, rubber or wire depending on the application requirements.

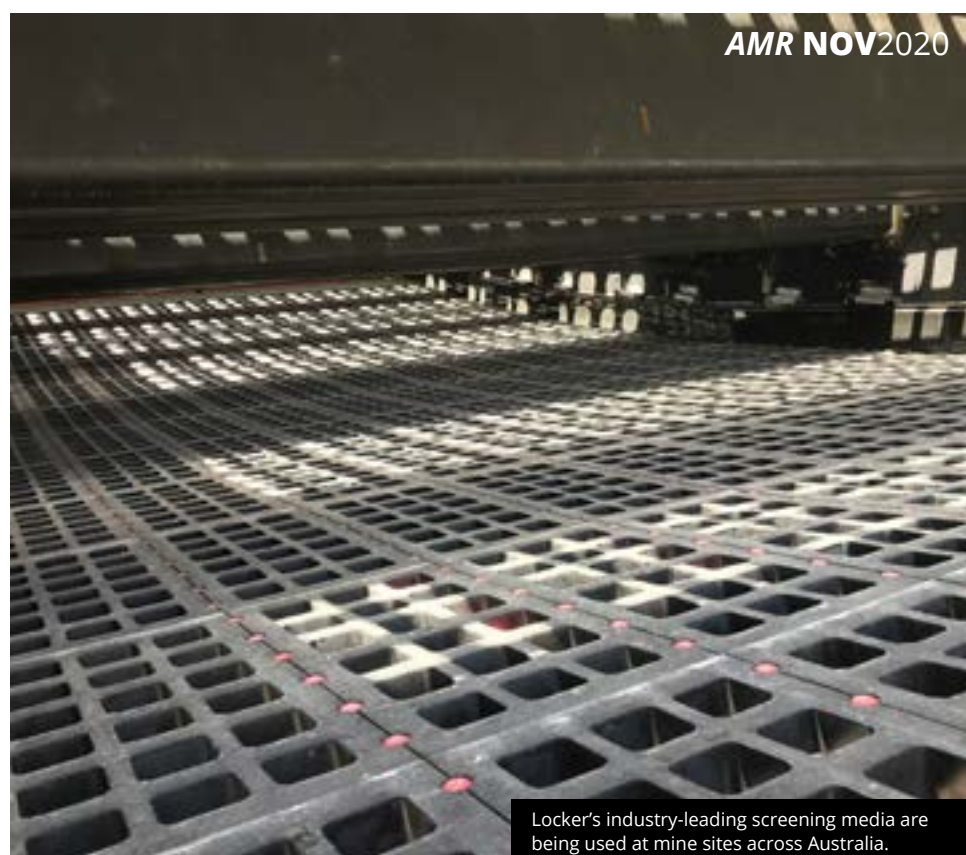
This includes the very popular Polyripple screens, along with high engineered products with substantial extended life such as Tufflex.

It can also provide custom and off-the-shelf accessories to complement the range of screening media provided, including poly nozzles, fixing rails, wear liners and assorted castable items including sieve bends.

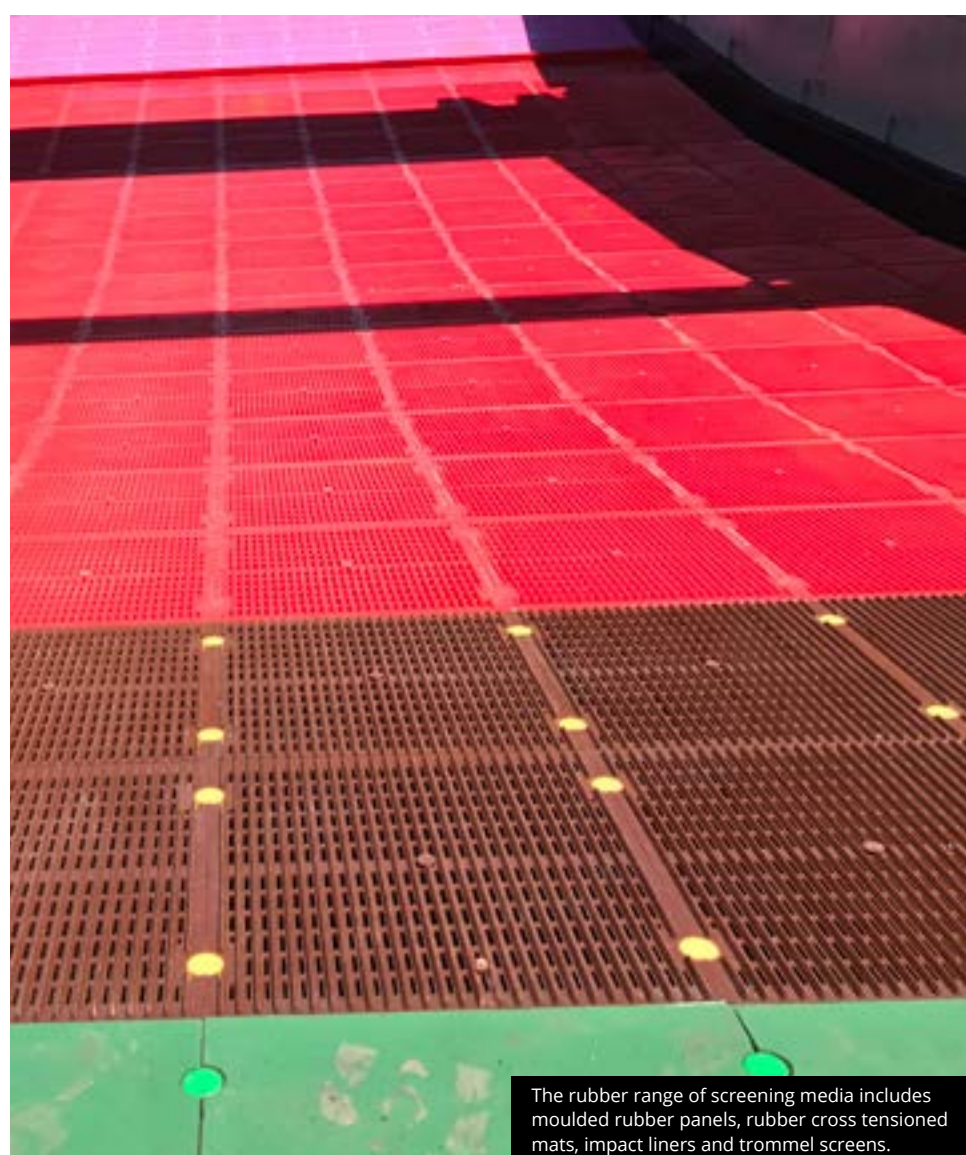
Screen Media Products

- **Modular:** Available in polyurethane, rubber or wedge wire, modular screens deliver safety and wear life benefits compared to traditional cross tension systems. They come in a variety of fixing system (and colours to help with identification) and are suited to vibrating screens, trommel and static sieve bend applications.
- **High tensile woven wire:** The traditional choice for quarries in most applications, proving its quality and cost-efficiency through years of use in the field. With four sites, Locker offers rapid turnaround for this product.
- **Tufflex:** These polyurethane coated woven screens offer a wear life of four to 10 times longer than traditional screening options. Lighter and more flexible, they require fewer changeovers and less cleaning, equating to more operational time.
- **Polyripple:** These screens feature a high open area, as well as increased flexibility within the screen with features reducing pegging and blinding compared to woven wire screens.

Contact Locker today for dedicated friendly service. **AMR**



Locker's industry-leading screening media are being used at mine sites across Australia.



The rubber range of screening media includes moulded rubber panels, rubber cross tensioned mats, impact liners and trommel screens.

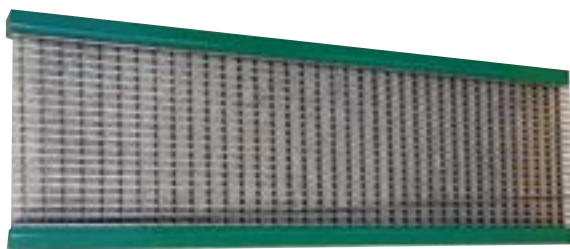


All of Locker's rubber and polyurethane products are made in Australia.



A Locker rubber panel.

Locker Mining and Quarrying



Extensive market and product experience provides the basis for Lockers technical advice. Locker is able to offer a complete range of screening media to meet individual site and machine requirements

- Rubber Modular Systems
- Polyurethane Modular Systems
- Wedge Wire
- High Tensile Woven Wire
- Poly ripple
- Tufflex
- Rubber Tension Mats
- Poly and Rubber Wear Liners



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INDUSTRY-LEADING DRILLING SOLUTIONS



More information can be found at:
www.idrilling.com.au

Servicing mining operations nationally, iDrilling Australia is a sought-after exploration provider, offering diverse and reliable drilling solutions that exceed client expectations, every time.

"At iDrilling Australia, we've been delivering high-quality drilling support for many years," iDrilling Australia director Barry Seaman said.

"We understand our clients have individual needs and some projects may be located in far remote regions with difficult terrains, which is why we customise all our services to

fit your unique project and requirements."

The company places an importance on offering highly competitive pricing and value, for quality outcomes that are on time and on budget.

Its core services included exploration drilling and mine camp establishment services, and water wells, with the expert team covering a range of drilling disciplines including RC, Diamond Drilling, Air Core, RAB and Water Bores.

"Our Rigs are designed to significantly reduce

the footprint of ground and vegetative disturbance, and they are compact with the capability of drilling to various depths with on board and auxiliary air," Mr Seaman said. "While our Diamond Rigs have the capacity of up to 1600m."

Mr Seaman said the company's ultimate goal was to provide geology teams with the best possible sample in the safest and most cost-effective way at all times.

"We don't just drill holes," he said.

"Safety is a high-level focus within iDrilling

Australia and is considered as a prime business objective."

The company's Safety Management System is risk-based with policies and operational procedures developed to be fully compliant to the Occupational Health & Safety Act, Regulations & relevant Codes of Practice.

The iDrilling team can be contacted at admin@idrilling.com.au or 08 9206 0604 for further information. **AMR**



LEADING THE WAY IN EXPLORATION

iDrilling offers reliable turn-key drilling solutions to the Australian mining industry.

- ✓ INNOVATIVE TECHNOLOGY
- ✓ EXTENSIVE FLEET
- ✓ COMMITMENT TO SAFETY



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MINE SITE MAINTENANCE



A great partnership has been entered into with MSM.

INNOVATIVE AUSTRALIAN-MADE DRILLING FLUIDS

In the height of the COVID-19 global pandemic, shipping delays and uncertainty clouding overseas production have reinforced the importance of a thriving local manufacturing sector.

This is something privately-owned and operated Australian company Mudex has taken a great interest in, with the aim on ensuring most of its products are made in Australia, supporting local workers, suppliers and businesses.

Mudex founder and managing director Dave Williams said this year, there had been a renewed interest in fostering a strong local manufacturing industry and generating local jobs across the company's warehouses across all major capitals in Australia, plus several regional depots.

"At Mudex, we supply high-quality and environmentally friendly drilling fluid products for the HDD, mining, water well and civil construction industries, and are proud to say most of our products are made in Australia and are certified to Australian standards," he said.

"This means less time waiting for your products to be delivered to site, greater accessibility and security for your operation, all while supporting Australian workers and their families."

Backed by Experience

Mudex was formed in 2014 after a strategic partnership with NorthStar and MayanStar drilling fluids. The partnership provided Mudex with a global reach in the US, Canada, and Mexico, as well as access to a wide range of quality products.

Mr Williams said while Mudex was a young company, its staff had more than 50 years combined experience in all facets of the drilling fluids industry.

"With our in-house R&D team, Mudex can design and engineer innovative drilling fluid products, coupled with detailed mud programs for unparalleled performance to meet the precise needs of our customers in a fast and ever-changing environment," he said.

"Unlike our industry peers, we have our own manufacturing facilities and Intellectual Property, giving us the ability to swiftly alter formulations to suit your project's specific needs.

"We provide on-site technical support and training of drilling personnel and place a focus on reliable service, competitive pricing, and a complete range of performance-proven products."

Improving Productivity

Mudex' drilling fluid solutions have been designed to control down-hole problems, reduce drilling costs and improve productivity.

"Our VIS range of polymers are designed to handle the extreme conditions of the drilling environment where high shear stress and temperatures, water quality and other contaminants can severely reduce the performance of a polymer," Mr Williams said.

The VIS range has gone through extensive field and laboratory testing to ensure the highest performance in all types of drilling situations, and water types, from fresh water to Hyper saline, and is able to perform across a broad range of contaminates and pH levels.

Mr Williams said the Mudex team worked with clients from the initial tender process to determine the amount and type of product required, based on geology, rig capability and environmental regulations.

"A fluids program is then generated to streamline drilling fluid performance once the project starts," he said.

"During all project stages, technical support is available 24/7 via phone, internet and site visits.

"Our technical support team ensures that you use the best products for your situation, whether environmental, logistics, economical and mixing considerations."

Global Expansion

However, this was not all. In 2020, the company also expanded into Africa, announcing a partnership with African-based supplier Mine Site Maintenance (MSM).

MSM provides the broadest range of maintenance services in the continent and were specialists in mining supplies with a focus on client relationships.

"We are very excited to now offer our Mudex products to African projects via our new distributor partnership with MSM," Mr

Williams said.

"No matter where you are in the world, or what time the sun rises in your country, you can get the world's best drilling fluid from one of our distributors.

"With our partners NorthStar Fluid Solutions, we offer world-class solutions no matter the location.

"We can move what you need, when you need it, in a cost-effective, safe and secure manner."

More information can be found at:

www.mudex.com.au

AMR



Mudex is proud to be manufacturing in Australia.

KCB AUSTRALIA

TAILINGS MANAGEMENT EXPERT

KCB staff installing automated monitoring equipment for real time tailings storage facility monitoring.

The Global Industry Standard on Tailings Management (GISTM) will help prevent further human and environmental tragedy through greater transparency and accountability in the mining industry.

That is according to Senior Geotechnical Engineer James Penman, who is an Associate at Klobn Crippen Berger (KCB), a world-leading company specialising in tailings management.

KCB helped revolutionise the design of modern tailings facilities 60 years ago and today provides solutions for some of the largest, most technically challenging tailings storage facilities in the world.

The standard, released by the Global Tailings Review, was a joint effort by the International Council on Mining and Minerals (ICMM), the United Nations Environment Program (UNEP) and the Principles for Responsible Investment (PRI). The standard was informed by existing best practice as well as findings and lessons learned from past dam failures.

KCB supported the forensic failure assessments on the recent failures in Brazil, Australia and Canada and Mr Penman said that the knowledge gained by KCB was reflected in feedback provided on the standard by KCB.

He said the main impact of the standard on the mining industry within Australia would be around transparency and accountability with the requirement for more public disclosure around how dams are designed and managed, and the risks they pose to downstream communities.

"It will increase scrutiny on, and accountability within, operators in terms of dam safety so that will be the main driver of improvement," Mr Penman said.

"You will see a lot more public disclosure under the standard which will lead to operators lifting their game.

"I think a good comparison is what happened with Bre-X, which led to a loss of trust and the introduction of minimum standards such as NI 43-101. These changes led a step change in the industry and something similar is expected for tailings management."

The standard includes a requirement for an "Accountable Executive" and other named

positions for the people who are taking ownership of tailings management and reporting issues up the chain of command.

A need for a dedicated engineer or specialist on site as well as an engineer of record off-site would also enhance accountability and transparency, he said.

Mr Penman said a major challenge for Australia will be the lack of tailings engineers to facilitate the creation of the new roles required by the standard.

"The industry is pretty tight at the moment; there's not a lot of people with 20-30 years plus experience who can give the high level of care and advice that is often needed," he said

Mr Penman said the new "Future Tails" initiative, a partnership between the University of WA, Rio Tinto and BHP, will help plug the skills gap through training programs in global tailings management.

The Online Professional Certificate in Tailings Management being offered by AusIMM, in conjunction with leading experts in the mining industry, will also help develop the next generation of tailings engineers.

But it will take time and work by all in the industry.

"It takes quite a lot of years and exposure to different facilities and operations to get around the complexities of tailings dams, so I think that will be the key challenge, to get the right talent, guidance and support over the next few years," Mr Penman said, "KCB is fortunate that as a specialised firm we have a large group of experienced professionals ready to help our clients".

Mr Penman said KCB was open to working collaboratively with competitors to support mining clients to implement the standard.

"One of the key aspects of the standard is the requirements for independent peer review, so getting another consultant to look at your design and provide feedback," he said.

"That also involves other independent checks throughout the life cycle so there's going to be a lot more back and forth with consultants leading to continuous improvement."

For a company like KCB with an engineering

approach that continues to be a hallmark of international best practice, it will be "business as usual" in terms of complying with the standard.

"For us, these approaches are already ingrained within our standards and we see limited change to our day-to-day work," Mr Penman said.

"We have been involved in developing these standards so we are well aware of what is required and are able to meet those expectations."

KCB Australia has done extensive work in Australia, Papua New Guinea, Indonesia, Peru, Brazil, North America and Canada, where the company was founded.

The company would like to increase its footprint in Australia where it has about 90 employees with offices in Perth, Brisbane and Newcastle.

"We are well known globally for our tailings management with our forensic work, review and dam safety work," Mr Penman said.

"We are building on that reputation in Australia and are getting quite well known here as well so we are looking to expand our client base and footprint to offer our help to more and more companies."

Mr Penman said Australia was already a world leader in tailings management, with the ANCOLD guidelines providing a solid base for competent design of tailings dams in Australia.

"The guidelines provide pretty good

technical standards but there are other aspects around governance that need improvement," he said.

Mr Penman said many lessons could also be learned from the failure at Mount Polley, which saw toxic mine waste released into pristine waterways in British Columbia in 2014 — one of Canada's worst environmental disasters.

"The key takeaway is water makes everything worse so with Mount Polley there was a massive pond of water on top and that led to a lot more material being washed away and a lot greater impact," he said.

"It was the same with the Brazil failures, their tailings were very wet which led to much more extensive flow so the water management aspect of tailings is super important.

"In Australia we are fortunate with our climate as it doesn't rain very much and there's a lot more evaporation but poor water management can still happen.

"There is a requirement in the standard to look at alternatives so things like dewatering the tailings which would take more water out before you put waste into the facility, so that is something that is being looked at now by mining companies."

Tailings dam management is at the core of what KCB does in Australia but the company also offers groundwater management, geochemistry, surface water management and mine closure services to the mining industry. **AMR**



Tailings storage facility starter dam construction.

70 1950
2020



CELEBRATING 70 YEARS
of service and innovation



www.klohn.com



Klohn Crippen Berger

For 70 years, Klohn Crippen Berger has participated in some of the largest and most challenging engineering, geoscience and environmental projects across the world.

KCB was among those to revolutionise modern tailings facility design over 50 years ago. Today we continue our pioneering role through coupling our mine waste designs with environmental, socioeconomic and water management solutions. We have worked on hundreds of mining projects worldwide and bring practical solutions to your mining challenges.

We are proud of our legacy, and continue to build a better world through excellence, innovation and teamwork.





CONFIDENCE, QUALITY WITH CONTATORE

Now in reaching its 30th year of business, Contatore Engineering has become synonymous with delivering a high-quality product and service to its customers.

Quality of product has always and continues to be the most important aspect for Contatore Engineering, therefore the decision to become the exclusive Australian distributor to Socomec was an easy one.

The durability, quality and diverse Socomec product range complements Contatore Engineering as both companies share the same drive and vision to constantly evolve and improve their respective product ranges.

Founded in 1972 and originating from Italy, the Socomec range is rated the "Number

One" hammer in Italy, with its range available in two sizes: light to medium (07-15.5t) and medium to heavy (15-100t).

Known for their adaptability and innovation to meet customers' ever changing needs, the Socomec range continues to improve, with the company recently revealing new record-breaking technology.

Breakers in its medium to heavy range (up to 47 tonne capacity) are now equipped with the revolutionary "Monoblock design" without tie rods, joining its light to medium DMS range of rock breakers.

The DMS range of breakers are manufactured as a sole piece made from a fully forged rod, sporting the huge advantage of having eliminated the tie rods – the main issue often encountered with

traditional breakers – thus making them more secure and reliable.

In 1997 Socomec was the first manufacturer in the world of the "Monoblock Demolition Breakers".

The "Monoblock" is lined with replaceable bushes eliminating any contact with moving parts and has a 10-year warranty.

In addition, the medium to heavy range offers the option to pressurise the stroke chamber for tunnelling or underwater application: a special dust protection seal has also been installed in the range to the lower part of the breakers in order to stop any debris or dirt from entering.

Contatore Engineering managing director Ernie Contatore said many of the machines

and equipment produced by its factory and also by Socomec, return to them decades later still going.

"We have always strived to provide our customers with strong equipment that they would not have to replace, but rather maintain, so we stock a full range of after sales parts and accessories so that they can be re-used and upgraded," he said.

The Socomec product range at Contatore Engineering continues to be a growing part of the business not only in new sales but also as a hire service.

To learn more about the Socomec range or how Contatore Engineering can assist you, visit the website at

www.contatoreengineering.com.au
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CONFIDENCE & QUALITY WITH CONTATORE

Contatore Engineering is an Australian-owned and operated manufacturer, repairer and supplier of earthmoving products to the mining and earthmoving industries.

We're the exclusive Australian Distributor for the Socomec Rockbreaker range, available for sale or hire.

THE CONTATORE / SOCOMEC ADVANTAGE

- Contatore Engineering has been the Australian Distributor for over 17 x years
- Two ranges available - Light to Medium Range – (07 – 15.5T), Medium to Heavy Range - (15-100T)
- Contatore Engineering hold a full range of after sales parts and accessories
- Experienced after- sales Technical Consultants on hand to assist.
- Underwater kit is available to suit most of our Rock Breaker ranges.
- 10 year warranty on the Monoblock within the Rock breaker

FIND OUT MORE ABOUT THE SOCOMEC RANGE

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BAEG LEADS THE PACK

Despite the current global climate, 2020 has still seen great innovations in the mining industry. One company leading the way is BA Equipment Group (BAEG), which has introduced a series of new developments and improvements across its products in remote monitoring and critical safety.

According to BA Equipment Group managing director Campbell Nunn, innovation is at the heart of BA Equipment Group.

"It can be seen across all our products, including our selection of Epiroc hydraulic hammers and silent demolition products, and our range of fixed rock breaking boom systems," he said.

"Whether you are looking for equipment to complete primary breaking, or a hydraulic hammer to have in a secondary production line, we've selected the best and most proven industry-leading tools to support operations."

BAEG has been bringing ground-breaking products to Australian operations since 1987. With experience in operations of any scale, the company offers a high-quality sales team capable of accurately analysing operational needs to help companies achieve a competitive advantage.

Its products are also backed with factory-trained OEM grade technical and support staff. As mining operations are firing back up around Australia, the Federal and State Governments are cutting red tape to help the industry expand project expenditure and drive job creation throughout the industry.

"With opportunities like increased and extended instant asset write-offs, now is the perfect time to be evaluating your operations to capitalise on these incentives," BAEG WA State manager Robert Lake said.

BAEG have conducted multiple case studies to validate operational and equipment efficiencies of replacing competitor hydraulic hammer systems with Epiroc products.

"The innovative improvements that Epiroc have engineered into the root of their design has helped our customers see increased operational periods and decreased downtimes and maintenance costs," Mr Lake said.

"Coupled with quality boom-based configurations these hydraulic breaker setups offer increased safety through moving operators away from the destructive end of operations."

BA Equipment Group has worked with the versatility of the Epiroc tools to have equipment mounted to mobile operational units, allowing for the reduction of rock sizes prior to transport to production lines.

The tools can also easily be fitted to fixed plant rock breaking boom systems to increase efficiencies and reduce maintenance downtimes of production lines. Further information about the technical side of the innovative products BAEG offer to the Australian market can be found at www.baeg.com.au

AMR



BA Equipment Group are hydraulic breakers, hammers and attachment specialists.

Combine your tough Epiroc HB Hammer with the HATCON System to achieve new levels of control

BREAKERS & ATTACHMENTS EQUIPMENT GROUP

Epiroc HB Hammer Series

Highly adapted for primary and secondary rock breaking on mining and construction sites.

Robust design and high durability make the HB Hammers suitable for the toughest jobs.

HATCON - Protect Your Investment

Next level fleet management by tracking operating hours, location, and service intervals.

Get access to all of your data on the go, and notifications when it's time for service.

We have locations in QLD and WA. Visit us on www.baeg.com.au





LAST LINE OF DEFENCE



Uncontrolled release of energy is a major safety concern in any industry that utilises heavy machinery, mobile equipment and mechanical plant in the production cycle.

Bringing to rest an uncontrolled moving object in a controlled manner is an engineering challenge that has both the potential to prevent catastrophic damage to equipment, and more importantly the potential to save lives.

The Technogrid Strain Energy Absorber is a novel solution to this problem, and was developed by Hamilton Stephenson and Gawie Mahne of Technogrid Pty Ltd.

Established in 1995, Technogrid Pty Ltd has been at the forefront of research and development for energy absorption devices. The solution was initially developed as a station stopper for loads on horizontal rails

and was later developed to accommodate vertical applications such as shaft and inclined conveyances. Technogrid is represented in Australia through agent and distributor, Reliance Hexham, in NSW.

Technogrid is a ground-breaking invention that controls dangerous impacts by absorbing potential energy to allow the safe deceleration of large masses in a predictable and controlled manner, before damage to equipment, structures or people occurs. The energy is absorbed through the deformation of a metal grid of known design and characteristics through controlled stroke deformation.

Essentially, the Technogrids act as a controlled and purely mechanical crumple zone for any major impact. It is the last line of defense in a potentially catastrophic event where electronic safeguards fail to activate.

Technogrid comprises a series of multi-bar units connected in a staggered grid shape in such a way that an impact will cause the grid bars to yield and deform under a process of double curvature bending, undergoing a strain hardening that absorbs the impact energy.

It is the yielding of the bars that allows the unit to open up and undergo stroke, with the strain hardening of the material absorbing impact energies in the order of 5000kJ all the way up to 40,000kJ. The impact energy is thus absorbed by the device instead of the surrounding structures or equipment.

Technogrid provides predictable outcomes because of the consistent relationship between energy absorbed, stroke and reaction force. The absence of moving parts results in a low maintenance requirement that amounts to a simple visual inspection.

The product is used in various industries world-wide, is highly customisable and has been adapted to suit a large variety of applications – to arrest track-bound equipment, or runaway protection for large equipment such as ship loaders or stacker/reclaimers, to arrest falling counterweights used on conveyors, arresting the energy of a bin or silo collapse, for cage and skip headframe overwind and shaft bottom underwind arresting, and as jack catch arresting. Technogrid systems are single use only, and so after each full impact are replaced with new units ready for the next impact.

Counterweight Arresting in Conveyor Systems

Every bulk haulage conveyor utilises a hanging counterweight to maintain tension on the belt. In the event of belt or tension cable failure, the counterweight can fall creating a dangerous situation





and potentially causing damage and long down times. The Technogrid counterweight arresting system can arrest a falling counterweight before the surrounding structure can be damaged.

Mine Shaft Overwind Arresting

Two of the major hazards associated with mine shaft operations are overwind and underwind, whereby the skip, cage or man carrier is allowed to be wound past the designated stop point due to some failure in the control and/or stopping/breaking mechanism.

Without an arrestor system, the load continues upwards or downwards along the line of the shaft, which can result in the load being pulled into the head frame, the winding gear or the conveyance dropped to the bottom of the shaft, causing catastrophic damage and placing operator lives in danger.

To safeguard against this, Technogrids are installed in suitable positions inside the shaft with a light catch-frame where the conveyance can impact. In the event of an overwind, the catch-frame activates the Technogrid unit, which is pulled through a controlled stroke, absorbing the energy and bringing the conveyance to a stand-still. The stand still then causes the winding engine to trip out and cease winding.

Tailor-made Solutions

Since the relationships between material, stroke length and stopping forces are known, the design can be completely tailored to the desired application.

Technogrid size and shape can be customized to fit most spaces and absorb any impact as long as the framework is designed to put the grids into tension. In shafts, the units are designed to sit inside the head frame on either side of the conveyance. Steel strings extending from the units are then connected by anchor points onto the shaft’s steelwork.

The tailored design also takes into account requirements for higher/lower deceleration rates as required by design or regulations. In Australia, design standards permit 1g of deceleration force for man carriers, and 2g for production hoists, with 1g in the head frame.

The Importance of Mechanical Energy Absorption Devices

One of the worst known incidents in recent history of uncontrolled kinetic energy was in 1995 in South Africa, whereby a runaway locomotive breached the shaft gates and plunged into the shaft, resulting in more than 100 fatalities.

Whilst it may be fair to assume these incidents are rare due to today’s sophisticated equipment and rigorous standards, they happen far more regularly than expected because sophisticated systems can also fail. In 2009 at an Australian mine, a failure in the breaking mechanism caused a kibble to undergo freefall, dragging another kibble up into the head frame. This resulted in a reported \$200m in associated damage costs and production loss.

Last month, there was reported three overwind incidents in South Africa alone. One particular incident involved a kibble which was overwound into the head frame, causing the ropes to snap. Once the ropes snapped, the kibble underwent freefall after the jack catchers failed to fully arrest the fall, resulting in three fatalities and one injury.

Several weeks later, a personnel-carrying conveyance with five people was overwound into the head frame at low speed causing the ropes to detach and allowing the cage to be restrained in the headframe.

Luckily, the detaching hook engaged and prevented the conveyance from falling back down the shaft resulting in no injuries.

The third incident involved an overwind event in a shaft where the Technogrids are installed. The load came into contact with the Technogrid assembly at a speed of 4m/s, and the Technogrid successfully deployed.

Upon inspection, it was observed that the Technogrid system had only used 10% of the available energy capacity, successfully preventing major damage to the winding equipment and shaft.

The unit did not need to be immediately replaced as it had 90% remaining capacity and was still well within safe working limits, thus there were no significant resultant production lost costs due to downtime as the winding plant could continue to operate immediately regulatory clearance was issued. The replacement catch straps and Technogrid unit could then be procured with standard delivery periods and with significant cost savings as no manufacturing overtime was incurred.

International Reach

Technogrid systems are currently installed all over the world – Freeport (Grassberg) mine in Indonesia, Mosaic’s Pot Ash mines in Canada, Rio Tinto’s Oyu Tolgoi in Mongolia, as well as North America, South America, Africa and Australia.

In the past four months, Technogrid systems have successfully arrested counterweight freefall in four belt failure incidents in

Namibia, South Africa, Canada and South America. Three custom systems are currently installed in Australian operations.

Quality Assurance and Testing

Technogrid Pty Ltd has engaged the CSIR (Council for Scientific and Industrial Research) to perform static tests whereby the Technogrids are pulled to destruction. Results are then provided to Technogrid Pty Ltd and verified against in-house testing and data.

More recently, a 6.5m dynamic drop test tower was commissioned in Cape Town, specifically to perform dynamic tests for an upcoming project in Australia. In a standard dynamic testing scenario, more than 1000 points of data are collected over 500 milliseconds to verify stroke diagrams and measure performance.

According to Technogrid Director and engineer, Hamilton Stephenson, the CSIR static tests are used “to ensure the product meets minimum requirements and in-house dynamic tests are used to further improve real-world performance”.

Other Safety Devices

Technogrid Pty Ltd is now established as one of the world leaders in energy absorption safety devices on offer that also utilise viscous damping and cellulous material damping principles in their system designs.

The product offerings include Multiple Impact Buffers, Hydraulic Shock Absorbers for port cranes and overhead cranes, Cellular Buffers used on long travel and cross travel on overhead cranes, and adjustable rail fixing systems.

Moving Forward

Technogrid Pty Ltd is currently heavily invested in research and development.

“I have been in the energy absorption game since 1992, and Technogrid have been going for 22 years and we are still discovering and developing incredible new ways of absorbing energy. Hence the R&D program,” Hamilton said.

“Every single application is different. You might do four technical solutions in a week, and not one will ever be the same. One engineer may recommend a longer stroke, whereas another might recommend a little bit more energy capacity. It’s all a matter of optimising the solution to its application.”

Conclusion

As technology, systems and equipment have become more sophisticated over time, it is easy to forget that sometimes the simplest solution is the most effective.

As far as simple solutions go, it doesn’t get much more effective than the Technogrid: a purely mechanical bolt-on attachment with no-moving parts and no maintenance requirement other than that of a visual inspection. The Technogrid is the last line of defence against uncontrolled kinetic catastrophe - a global product with a myriad of applications that can minimise downtime costs and production losses, but most importantly, it can save lives. **AMR**

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ONE STOP SHOP

Some of the quality, specialised work carried out by Mining Equipment Maintenance.



Specialised Mining Maintenance

Mining Equipment Maintenance (MEM) is a diverse and leading mechanical, fabrication and auto electrical service provider to the Central Queensland region.

Based in Rockhampton, MEM not only specialises in providing mechanical services to the mining and minerals processing industry, it also provides structural design and fabrication solutions to whomever requires a specialised solution.

Managed by qualified engineers, mechanics, project managers and mining professionals, MEM's 20 acre industrial complex is fully equipped to deliver heavy mining equipment repairs and rebuilds, fabrication and design solutions (for both mobile plant and stationary/structural requirements), light and medium vehicle maintenance.

MEM boasts a comprehensive complex, complete with a mechanical workshop including a wash-down bay, an abrasive blasting and painting workshop, a cylinder rebuild facility, three undercover concrete hardstand mechanical workshop bays, a fabrication workshop, a medium vehicle

servicing workshop, and a large handstand area to enable pre-work staging of equipment and pre-delivery testing.

MEM also offers as a fully qualified and highly trained team of field technicians capable of providing professional in-field and on-site services including maintenance, fabrication and electrical repairs.

MEM understands that asset life, reliability and utilisation are critical factors to customer's success. It works closely with valued clients to fully understand their particular requirements.

Mining Equipment Repairs and Rebuilds

MEM carries out complete overhauls on heavy mining equipment as well as total machine rebuilds.

Specialties include repairing wheel-ends, differentials, steering, clutches and brakes, cabin refurbishment, hydraulic and pneumatic pumps, motors and valves, brake actuators and chambers.

Further services include manufacture and repairs of shafts/drums/pulleys,





modifications to plant and equipment, turning and milling, fabrication and repairs, line boring, reclamation of worn parts, arc spray and shaft reclamation, larger hydraulic cylinder repairs, slotting machines for internal keyways, and mine compliance modifications.

Housed within the complex is MEM's dust-free, pressurised and air-conditioned component re-assembly facility that offers a perfectly controlled environment and capability to rebuild and repair major components such as transmissions, torque converters, differentials, wheel groups and engines up to and including the 3516 CAT engine (7484kg /1492kW).

MEM employs a diverse, comprehensive, and versatile team with the background, ability and training to diagnose and repair machinery and components of all brands, including Caterpillar, Komatsu, Hitachi and Terex.

A detailed management system is combined with a team of highly skilled tradespeople to ensure rebuilds are kept on schedule, on budget and completed to the highest standard. For larger rebuild and overhaul projects, MEM can also provide detailed project planning and management services complete with real-time cost-to-date reports and project summaries.

Engineering and Heavy Repairs

With more than 60 staff on-site and in

the field, MEM is equipped to provide a broad range of heavy fabrication and refurbishment services from major body rebuilds to minor weld repairs.

With a dynamic team with a focus on upskilling, MEM is constantly increasing its capabilities.

Examples of services provided include rear dump truck body repairs; track frame refurbishment; loader and excavator bucket repairs, refurbishment and construction; dozer blade re-skinning; wear package replacement and repair; dozer track frame refurbishment and modification; rear and belly dump truck re-skin and wear package replacement; grade circle refurbishment and segment replacement; grader blade re-rail, re-skin and general repairs; scraper bowl ejector re-rail; chassis extension, reduction and modification; general fabrication and repairs; service truck body manufacture; drill mast repair and design and manufacture of any new work.

MEM is able to provide major refurbishment of dump trucks, which includes undergoing abrasive blasting before being crack tested, with preliminary inspections and detailed scope of works being provided to the client before any repair work commences.

MEM has also developed a strengthening package for Caterpillar track frames, which reduces cannon tube cracking and strengthens the track frame body.

Engineering Fabrication

When it comes to fabrication, MEM has the capability to fabricate complex and sophisticated components in large batch runs as well as one-off, specific components to suit existing machinery.

MEM is also able to offer fabrication of structural assets including access platforms, stair wells, floors, bins and other custom structural requirements.

Light and Medium Vehicle Maintenance

When it comes to servicing trucks, semi-trailers, tankers, concrete agitators, 4WD vehicles and mining vehicles, MEM offers both maintenance and modification services from design and development of tray bodies and specialist projects, through to complete overhauls and inspections.

MEM's fully equipped drive-through workshop offers all the essentials, including auto-electrical repairs (including air conditioning), component rebuilds, chassis repairs, fuel injection flushing systems, industrial blasting, painting and suspension repairs.

In addition to the service, repairs and modifications undertaken at the specialised facility, MEM also offer road-worthy certification and are an approved Queensland Transport Inspection Station for medium and large vehicles (including inspections for light trucks, semi-trailers and cherry pickers).

MEM as an added extra also carries out mine site compliance including BMA mine specifications and certifications.

Field Services

MEM offers a diverse team of fully qualified tradespeople, from fitters to auto-electricians, and all personnel are backed by a fleet of fully mine-compliant field service vehicles.

Field technicians have completed all relevant safety inductions, training courses and competencies required to operate in the field.

MEM field service capabilities include onsite repairs and maintenance, emergency repairs and rebuilds, long term hire arrangements and complete shutdown services including maintenance planning supervisors.

The company is committed to regular onsite representation and reviews to ensure staff continue to meet the performance expectations of customers.

Safety and Quality

MEM boasts a quality policy and quality management system consistently maintained to ensure compliance with AS/NZS ISO 9001. The company quality policy is structured to ensure that each team member is dedicated to achieving the best solutions by establishing quality objectives, structured systems and review standards for each project.





To complement the quality management System, MEM's Safety Management Plan focuses on behavioral-based safety programs, which ensure that safety is the first consideration for all employees during all activities.

MEM, knows that people are the most important resource. It employs highly skilled and motivated personnel, with a strong focus on customer service, safety and quality to ensure the best possible outcomes for its clients.

The customer-focused culture is led by management, to ensure a whole of company approach that reflects core values of safety, quality, integrity and continuous improvement.

Future Service Capabilities

MEM has recently partnered with a large engineering design firm, which will expand service offerings to include fully engineered designs, including fully engineered CAD Designs, 3D modelling and testing, process system design, materials handling design, finite element analysis, compliance reports and 3D laser scanning and analysis.

This new addition to the business represents MEM's commitment to continued growth and expansion in order to deliver the latest, most efficient and most comprehensive technology and services for their clients in the mining industry.



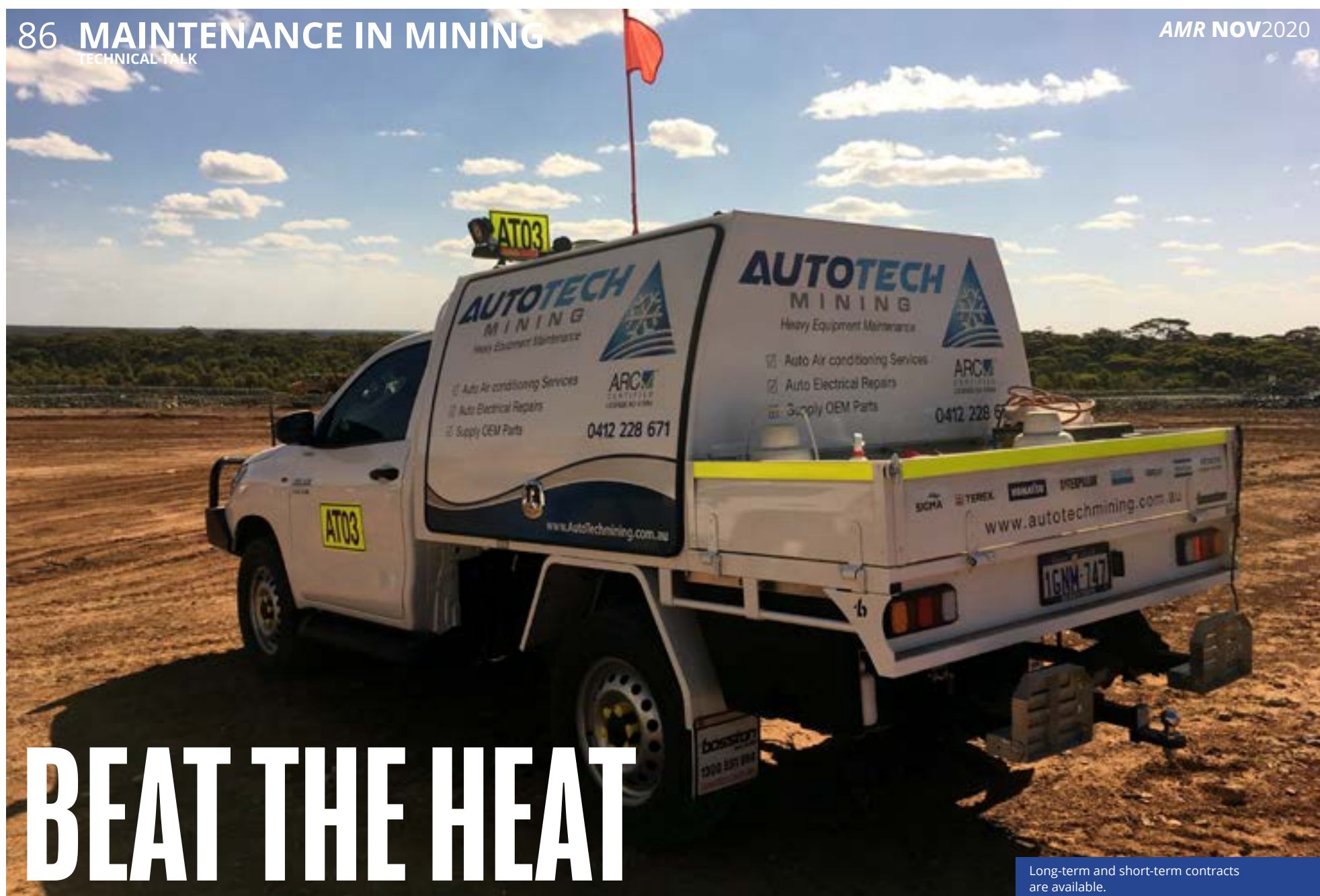
One Stop Shop

Being located conveniently within the main industrial area of Rockhampton enables convenient and immediate access to MEM's comprehensive range of quality service offerings, that is as diverse as it is large.

Whether your requirements are big or small, service-oriented or require design and fabrication, there is no need to travel further than the one-stop-shop that is Mining Equipment Maintenance. **AMR**

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BEAT THE HEAT

Long-term and short-term contracts are available.

In WA, the temperature in remote areas is a formidable force that often finds its way to the top of the safety topics discussed at the start of each shift.

Temperatures in the Pilbara and Goldfields often exceed 45°C, and operators often find themselves at the mercy of their machinery's air conditioner.

On a hot day with the engine running, the inside of a machine's cabin can reach up to 70°C. Without a working air conditioner, it is often required that the machinery is parked up until the air conditioner is fixed. For sites that depend on drilling to keep the ball rolling, it can mean a significant delay in the schedule.

For sites that require large diggers to load trucks, a digger breaking down can have a direct financial loss for each truck left waiting for a load (a single 100t truck of iron ore equates to about US\$10,000 at recent iron ore prices) – six trucks missed per hour of digger downtime can mean a loss of US\$60,000 per hour.

AutoTech Mining is well aware of the importance of air conditioning in mining equipment, and so has made it its mission to be the premier air conditioning specialist in WA – and with several major clients throughout the state, it is achieving just that.

One client has explained that with AutoTech Mining's support, over one year a single digger's availability increased to 95% and had the best availability across all of the sites operated by that particular client.

Achieving this huge reduction in downtime meant not only aiming to reduce unplanned downtime, but also employing strategies to reduce scheduled downtime (ie. planned maintenance) by designing and following a preventative maintenance plan using high quality evaporator and condenser units and condenser fans, fit-for-purpose service kits, preferred hoses, quality labour hire and other key service offerings.

Radiant Evaporator and Condenser Units
One of the key offerings is the supply,

service and rebuild of radiant evaporator and condenser units for Caterpillar, Terex, Hitachi, Liebherr, Sandvik and Epiroc diggers and drills.

In particular, given the importance of these pieces of equipment, AutoTech Mining offers rotatable unit services whereby fresh units are swapped onto the machine on site while the worn units are taken back to the Perth workshop for a comprehensive and detailed service and rebuild.

Traditional services with the units still attached to the machine can mean the machine is down for days at a time, while swapping the unit out only takes a few hours and the machine is back up and running immediately.

Maintenance-Free Condenser Fans
Where traditional condenser fans may need servicing and replacing every couple of months, AutoTech Mining is able to supply a maintenance-free condenser fan for diggers with a one-year working life.

The unit is waterproof, dust-proof and made for harsh mining conditions. It needs no maintenance for a year, at which point it is simply swapped out with a new unit, reducing both scheduled and unplanned downtime related to condenser fan service and failures throughout the year.

Service Kits
Often in mining wrong machine parts are ordered and they are either returned or thrown away, or force maintenance personnel to perform "half" services.

By offering dedicated service kits for each model of machine, AutoTech Mining ensures that all the required parts for each service are readily available exactly when required. Brands supported include Sandvik, Sigma, Rencool, Hitachi, Atlas Copco, Terex, Caterpillar and Komatsu.

AutoTech Hoses and Clamps
Traditional blown hoses often require several hours to disconnect and thread through the machine before being replaced and rethreaded.



Maintenance-free condensor fan assembly.



Mining AC breakdown repairs being carried out.



Liebherr AC rebuild units.



Prevention maintenance to eliminate unscheduled downtimes.



Hitachi AC rebuild units.

AutoTech Mining prefers to use and supply particular hoses that can simply be cut and clamped back together if it blows or a leak is found.

By simply cutting the blown portion of the hose off and clamping the clean ends together, AutoTech Mining is able to have the machine back up and running in less than 30 minutes.

The hose then does not need to be swapped out until the next midlife service.

Prevention Maintenance Plan

The importance of proper maintenance planning is not lost on AutoTech Mining,

which offers customised Prevention Maintenance Planning for mobile heavy equipment on site.

AutoTech Mining come to site, conduct pre-inspections, identify scope of works, allocate labour and parts required, then manage the execution of the plan so that downtime is kept to a minimum.

Labour Hire

Further to AutoTech Mining's service offerings is the ability to supply skilled tradespeople to companies who are in need of auto air conditioning system specialists – either on call, or on a permanent/fixed basis.

Other Key Service Offerings

AutoTech Mining's services also include supplying air conditioning power for mobile heavy equipment (digger/drills/trucks/ ancillary machinery and light vehicles), supplying complete air conditioning midlife service kits, and supplying Sigma air conditioning units and parts for Caterpillar, Terex, Sandvik all at competitive pricing, digger shut down services, onsite maintenance and services, preventative yearly maintenance, drill shutdown services and hose making with 24/7 Technical Support via phone or email.

Safe Operations

AutoTech Mining's aim is to minimise

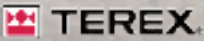
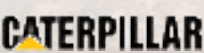
downtime and improve reliability and availability in the safest possible manner for the client by providing quality parts and experienced air conditioning and auto technicians both onsite and at their workshop.

Currently completely LTI free, and with a track record of success, AutoTech Mining is ticking all the boxes and helping to beat the heat. **AMR**

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EUROPEAN QUALITY, AUSTRALIAN INGENUITY

The steel cross slats, which carry the conveying belt, are secured to and supported by two strands of BERCO chain which are sprocket-driven. Belt slippage and miss tracking is eliminated and spillage minimised.

Crusher-conveyor systems are the first port of call for freshly mined material, typically involving heavy mobile equipment such as front end loaders transferring stockpiled ore from the ROM into a primary crusher, which is then fed onto an apron feeder and into a secondary and tertiary crushing circuit via a series of conveyor belts.

Whether the material comes from an underground shaft mine, or open pit bulk mining, the destination is the same - its going to the crusher! And if it doesn't pass through the initial screen, out comes the rock breaker ready to bust open any stubborn oversize.

The crusher is the single-point operational bottleneck that needs to operate at all times. It's an exciting process that requires robust and reliable machinery to get the job done effectively - there's no point mining the rock in bulk if the processing equipment is unable to keep up. This is where Transmin, a company recently celebrating its 30-year anniversary, steps up to the plate.

Established in Perth in 1987, Transmin has grown to be one of the largest bulk materials handling equipment suppliers and engineering service companies in Australia, recognised for its quality equipment, integrity and innovation.

The Transmin equipment range includes but is far from limited to feeders and conveyance systems, loading and unloading hoppers, rock breakers, bin isolation gates and silos. More recently Transmin has branched out to supplying proven Berco track and undercarriage componentry for dozers and other tracked construction and mining machinery.

Two proprietary products in particular that showcase the engineering prowess and innovative know-how of Transmin mechanical engineers and technicians is the innovative and unique Low Profile Feeder ("LPF") and the accompanying Remote-Operated Rock Breaker.

Low Profile Feeder

Transmin's LPF is Australia's original hybrid feeder, incorporating features of both traditional apron feeders and belt feeders, delivering the advantages of both traditional pieces of equipment in one machine. The first feature of the Low Profile Feeder is its very low profile compared to conventional apron and belt feeders, which is typically about 1m from belt line to ground level!

While widths range from 800mm to 4m, Transmin has ensured the design height of the unit remains under 1m delivering major plant space saving potential, the additional vertical space gained can lead to significant advantages such as an increase in hopper capacity, improving the ease of tipping for front end loaders, and the lower profile also allows for space for even larger hoppers to be equipped. Bring on the bigger loader bucket size!

A normal belt conveyor uses a thick rubber belt to transport crushed rock from point A to point B, but has issues with wear and tear from continuous impact with the crushed rock. A belt can also undergo a shift in alignment (known as tracking) and belt slipping issues.

An apron feeder performs a similar function but has steel pans that are able to withstand greater impact, and so are more suited to being placed directly under the chute of a crusher. However, because the steel pans have gaps, there is the problem of spillage which requires a spillage conveyor to take care of the mess.

The LPF uses sprocket-driven steel cross slats similar to an apron feeder, which eliminates tracking issues, but also carries a thick rubber belt to provide a seal and minimise any spillage.

The LPF can include an inclined section as standard allowing ore to be transported to an elevated discharge and transfer point eliminating the need for complex transfer points between conveyors. The bend transition section can allow a change in direction from horizontal to 25° without the requirement of a second machine!

Other impressive features include reverse capability, simple modular sections for belt changeout and being suited to conventional belt cleaners for ease of cleaning. The unit is manufactured using proven industry standard chain, roller and sprocket components sourced from Italy, which confirms the respect for robust quality engineering and manufacture Transmin has for its products.

Currently installed at the Karara Iron Ore project in WA, the client said the machine was used above and beyond its initial design spec and never missed a beat. "This thing is bullet-proof," the client said. A summary of the benefits vs conventional belt and apron feeders can be found in Table 1, and a video demonstration can be viewed by using your



Transmin's BoomerHD rock breakers are renowned as some of the heaviest and largest in the world.

FEATURES	TRANSMIN LPF™	CONVENTIONAL BELT FEEDER	APRON FEEDER
Space occupied within the plant	Minimal - e.g. 3.0m wide belt, 4000tph iron ore = 1.0m vertical height	Can be substantial when high belt tensions present due to large head pulley diameters	Can be substantial, especially when spillage conveyors are required
Belt tracking	No adjustments necessary	Belts can mis-track and require adjustment	No adjustments necessary
Belt slippage	Eliminated	Belt can slip	N/A - no slip
Product spillage	Minimal	Minimal	Pan leakage
Requirement for spillage conveyors	Not required	Not required	Frequently required
Ease of cleaning	Conventional belt cleaners	Full width conventional belt cleaners	Can be difficult to clean effectively
Belt change out	Simple modular sections	Belt splicing station required	N/A
Elevated discharge	Can change direction by the introduction of a bend	Limited to horizontal or inclined only	Limited to horizontal or inclined only
Suitability for ROM Dump Applications	Consult Transmin	Generally not suitable	Proven for large run of mine dump applications

TABLE1 TRANSMIN LPF VS CONVENTIONAL BELT/APRON FEEDERS



VIDEO 1 LOW PROFILE FEEDER



VIDEO 2 TRANSMIN FULL EQUIPMENT OFFERING



Transmin's Rocklogic technology uses a Microsoft Xbox Controller to operate remotely over 4G wireless networks.



smartphone's QR Reader App (standard Camera App for the latest iphone users) to scan the 2D Barcodes.

Remote Operated Rock Breaker

Rock breakers go hand in hand with any primary crushing operation, but Transmin has really outdone itself with this level of innovation and taken it to the next level.

Not only does Transmin offer some of the largest grizzly-partnering rock breaking equipment in the world (official product name the "BoomerHD" series), the optional Rocklogic automation technology available for the system is also world class and cutting edge.

By utilising a common Microsoft Xbox Controller, operators are able to remotely control the rock breaker from completely remote locations through the power of 4G connectivity.

Berco Track and Undercarriage: Parts and Servicing

Transmin is also an official Australian distributor of Berco track, chain and undercarriage componentry. The quality is evident and the synergies are impressive when you consider the drive gear that propels tracked dozers is the same components that drive the Transmin feeders.

The Berco brand has been around for 100 years and is a brand name synonymous with quality (having supplied major manufacturers such as Komatsu and Liebherr) and so directly aligns with Transmin's aim to provide high end equipment.

High quality materials and careful manufacturing processes provide assurance that the components exported from Italy are reliable, durable and wear at predictable rates, reducing the operating cost over the

life of the components.

The European quality of product gives longer outright life, longer intervals between scheduled maintenance work and less failures resulting in unscheduled repairs.

Berco is one of the last major component manufacturers still made in Europe, reflecting the higher quality build and better longevity of parts compared to those manufactured in other cheaper regions of the world.

Impressively, Berco parts are directly compatible with common major equipment such as the CAT Dozer range, and comparative Berco/CAT chain, sprockets, rollers, idlers and hardware are all available from Transmin.

Transmin's highly trained and dedicated service division boasts a team of qualified mechanical fitters with years of track and undercarriage experience, and also offers complete round-the-clock after-market support including regular site visits and stock holdings, ensuring downtime is kept to a minimum which translates to a direct cost saving for the operation.

Testimonials

Berco Mobile Plant:

Raywell Contracting

Supplying dozer and excavator undercarriage for a fleet of contracting and hire machines, Raywell works in a range of conditions and trusts Berco to perform.

Transmin is committed to stocking and supporting the need of its contractor clients. "Teaming up with Transmin and Berco has given us the confidence we need for our machine maintenance. We know we receive a quality product at a competitive price and

are able to remove the hassle of shopping around."

- Steve Denham – Raywell Contracting

Berco fixed Plant:

Northern Star

Transmin was commissioned to refurbish its Stockpile Apron Feeder FE-04, including a full track chain and pan replacement, head and tail end bearing replacement, drive sprocket replacement, carry idler and return carry idler replacements. Access and timeframe was limited to carry out the scope of work and Transmin delivered on both.

"Not only do I use Transmin for Apron Feeder work and spares but also for our crusher and conveyor spares. The team at Transmin are professional and experience and they do an excellent job trying to get solutions to suit your needs. Yes, I would recommend Transmin to other businesses and colleagues."

- Charlie Groat - Shutdown Planne

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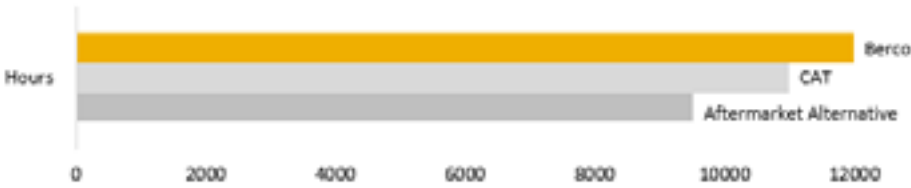
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		Chains	Shoes	Idlers	Sprockets	Rollers	Pin Press	Hardware
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	D8N/R/T	✓	✓	✓	✓	✓	✓	✓
	D9N/R/T	✓	✓	✓	✓	✓	✓	✓
	D10N/R/T	✓	✓	✓	✓	✓	✓	✓
	D11*	✓	✓	✓	✓	✓	✓	✓
	D375A	✓	✓	✓	✓	✓	✓	✓
	PR764	✓	✓	✓	✓	✓	✓	✓
	PR776	✓	✓	✓	✓	✓	✓	✓
Excavators	EX1200-6*	✓	✓	✓	✓	✓	✓	✓
	PC1250*	✓	✓	✓	✓	✓	✓	✓
	320D/DL	✓	✓	✓	✓	✓	✓	✓
	329D/DL	✓	✓	✓	✓	✓	✓	✓
	336D/DL	✓	✓	✓	✓	✓	✓	✓

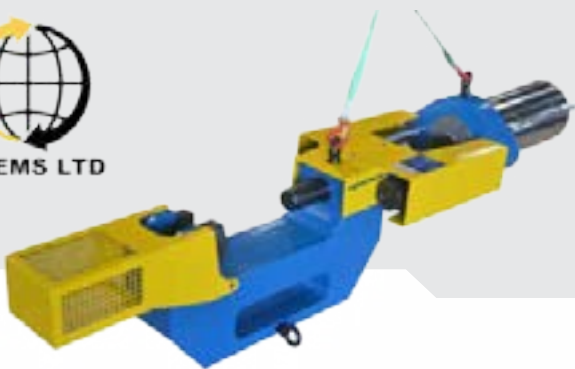
*HME Mining discount applies

Case Study – D10T on Open Pit Coal Mine



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HEAVY METAL



A completed excavator boom and stick.

Some maintenance jobs are just too big or require too much precision to be done on site. In those instances, mining companies opt for fully equipped workshops with the processes and machinery to tackle the largest jobs and deliver quality work on time.

J&S Engineering and Maintenance, in the Hunter Valley, is the largest of the privately owned engineering workshops in the region and has set itself up with enormous machining capacity and the most advanced CNC tooling to complete any repair, service or maintenance requirement.

Its Rutherford workshop has more than 125t of crange and a specialised machine shop built to handle large excavators, track frames, drag line components and truck drivelines.

The Big End of Town

In pride of place within the workshop is the enormous 11-axis Soraluze FP CNC travelling column.

This high precision giant features a 40t rotary table, total horizontal travel of 10m, 3.2m of vertical travel and has a 30t head.

Its spindle can produce full torque from 1rpm, enabling it to carry out interpolation turning like a CNC lathe. Thanks to an integral Renishaw touch probe, it can also scan items and create a 3D program.

J&S Engineering recognised early in its 30-year history that a lot of mining maintenance and repair work simply cannot be done properly and with the required degree of precision on site.

Another example of its high precision

capabilities is the metrology arm, capable of scanning across 5m of travel with a Renishaw touch probe. Utilising Geomagic software, this process generates highly detailed, high speed images of a job for either engineering or QA applications.

By integrating these advanced scanning, repair, machining and finishing capabilities, J&S is able to inspect any piece of equipment in finite detail and then determine the best course of action for its repair – all the while advising and updating the client at every step if required.

The workshop has a steady flow of booms and sticks, large excavator car bodies and track frames, which are transformed from worn and dirty hulks to fully blasted, crack tested, repaired, machined and freshly painted components ready for thousands more productive hours on site.

Drill Rods and Carousels

J&S Engineering has other strings to its bow. The first is a blast drill rod manufacturing and repair facility that houses numerous multi-axis CNC lathes and specialised pipe lathes.

These lathes allow new drill rods to be manufactured right here in Australia but it also allows worn drill rods to be repaired and re-threaded. J&S has the ability to get three lives from each drill rod, which dramatically reduces the cost of blasting operations over the life of mine.

The company monitors thread wear and erosion on these consumables to keep outright rod replacement to an absolute minimum.

J&S's intellectual property extends to drill rig carousels, where it has developed the



A dipper lip change-out.



ID welding taking place.



Machining a Dipper handle.



Machining a shovel track frame.



Machining an excavator track frame.



Machining an excavator car body.

know-how to keep these critical pieces of equipment operating correctly – a real boon for any drilling crew.

Heavy Engineering

In addition to large scale CNC machining and drill rod manufacture, J&S also has a heavy engineering division.

This department rebuilds drag line and dipper buckets and repairs even the largest excavators and dump trucks.

Once again, J&S' intellectual property extends to CAT track frames, where it has developed a number of proprietary repair procedures for the service and repair of heavy undercarriage components.

This extends to dozer blades and push arms. OEM repairs for Hitachi equipment is also conducted in-house.

In fact, J&S has developed a process with Hitachi, which has recently been further enhanced, which utilises metal spraying to reclaim worn material from bearing mounting surfaces on Hitachi wheel hubs.

Once the damaged surface has been reclaimed with new metal, it can be machined back to OEM specifications and new bearings installed.

Apart from excavator boom sticks, the company also repairs, services and maintains other componentry such as hydraulic tanks, steering spindles and axle boxes.

Ground engagement tools and wear plate replacement and even repairs to massive Komatsu 4100s 90t face shovel buckets are all in a day's work at the heavy engineering workshop.

Sheave Reclaiming

Another very popular repair at J&S Engineering is sheave reclaiming. Wire

ropes under hundreds of tonnes of strain eventually grind their way through the grooves on these huge pulleys. The company is equipped to fully remanufacture these sheaves with some further, heavy duty equipment.

The first of this is the 25t rotator, capable of turning sheaves from 1m to 3.5m in diameter and between 6-7t in weight at a constant rate, enabling sub-arc welders to do their bit, reclaiming the eroded metal after a specialised pre-heating process.

Once the welding is complete, new grooves with correctly tapered sides are machined into the sheave's circumference and the unit is once again suitable for service.

Long History, Bright Future

So, after 30-years of mining engineering and maintenance, carrying out high precision work for some of Australia's biggest blue chip mining companies, J&S Engineering now has the equipment to take on the biggest jobs in the industry.

But machinery is only one part of the equation. The company's greatest assets are its 100 employees, who bring a long-term, experienced work force to the table to perfectly complement the workshop's state-of-the-art measuring and machining capabilities.

J&S Engineering continues to build on its long history because it is passionate about becoming the premier repairer to the mining industry. For those who shovel rock, they salute you! **AMR**

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Using a meteorology arm to measure a track frame.



Rope drum and gear.



Finding new solutions to old problems is par for the course at Mining Maintenance and Fabrication Services (MMFS), where the motto is 'if we can't do it, no one can'.

Possessing unrivalled reliability, MMFS is a full-service company offering support for projects large and small, from their design and inception to implementation and finalisation.

MMFS fabricates, rebuilds and repairs mobile and fixed plant equipment for companies operating in heavy industries across WA.

Having started out offering field service repairs on mine sites around the state, the company opened its Perth-based workshop about 12 months ago after MMFS director, Terry Newell, realised the potential it represented.

The workshop had allowed the team to rebuild and repair heavy equipment that may have previously been too large to deal with on site and would simply have been replaced, such as excavator buckets.

"Our Perth-based workshop now has a

range of equipment suitable for any general or custom fabrication, asset rebuild or repair," Terry said.

"We can help our customers get the most out of their assets by rebuilding them to as-new or better-than-new standards.

"Whether it's mobile or fixed plant equipment, we do it all."

"This ability to take heavy equipment off site and rebuild or repair at the workshop represents significant savings for MMFS' clients, who are now able to have their equipment returned to new at a fraction of the cost of repurchasing.

"It has also seen MMFS' ability to deliver quality products and services to its clients go from strength to strength.

"We go the extra mile to resolve any challenges we come up against and we truly believe that if we can't solve the problem at hand, no one can."

Best in the Field

Although the workshop has expanded its capability, MMFS still offers a first-rate field service whenever and wherever needed.

This consisted of a full field repair and maintenance service provided by MMFS' qualified and highly experienced fabricators and boilermakers.

The field service technicians can assist with all on-site support of industrial equipment and are responsible for providing hands-on repairs and technical supports.

The company also has the capacity to provide cranes and service trucks, with staff highly experienced in servicing and conducting preventative maintenance.

Field services include effective supervision and monitoring, delegation of field service personnel, diagnostics, repairs and adjustment, servicing, on-site technicians, equipment inspections, general fabrication, and tray repairs and relines.

From Start to Finish

MMFS can deliver a wide range of mining services.

"We can deliver an end-to-end or standalone service as required, from in-house engineering and drafting through to fabrication, rebuilds, repairs, and blast and paint," Terry said.

"When it comes to drafting, the team at MMFS brings a fresh approach and innovative thinking to every design, which Terry believes is vital in the ever-changing mining industry.

"MMFS offers a high-class mechanical drafting service to our mining clients.

"We can offer support for various drafting platforms and can manage complex projects, focusing on the accuracy and functionality of every project."

MMFS' capabilities in drafting include product development and the design of wear packages, GET, mechanical components, 3D modelling, technical documentation and prefabrication function testing.

As for fabrication, the team at MMFS works with a variety of materials to produce precise results for its clients.

Taking projects from design to finish, the experienced technicians can assist with all stages of the fabrication process.

No matter the size of the job, MMFS is dedicated to producing dependable results using a combination of technology and





training to ensure projects are completed to exact specifications.

MMFS' unmatched customer service meant the process was guaranteed to be hassle-free and completed on time.

The company's ability to undertake in-house metal fabrication reduces the cost burden for its customers as well as the hassle that can sometimes be involved in fabrication, as there is no need to outsource necessary materials from another firm.

MMFS' capabilities in fabrication include package design and drafting, fabrication on and offsite, installation, wear maintenance, replacements, upgrades and repairs, inspections, heat treatment, project planning, preventative maintenance and line boring.

One of MMFS' current fabrication projects includes the construction of a new ROM dump hopper.

The ROM dump hopper was constructed in the Perth workshop over three months and will be transported to site on the back of up to seven semi-trailers, before being bolted together on-site.

When it came to field service, MMFS was dedicated to providing the right people to complete the job every time and at every site.

The company offers a variety of workforce solutions from long-term and larger team operations to short term hires.

MMFS saves clients time and money by vetting employees first through an interview process and by providing them with the flexibility of only hiring the people they need for the time that they need them. The company has proven results for setting exceptional standards in cost control, planning, scheduling and safety.

MMFS not only provides the manpower but also the tools, equipment, transport and supervision required to complete the job.

Its personnel include boilermakers, heavy duty diesel mechanics, truck drivers, electricians, management, engineers and trade assistants.

Ultimately this provides a cost-effective, timely and worry free solution for clients who can leave the entire project to MMFS and know that the job will simply be

managed well and completed with diligence.

No Compromise on Quality

Above all, MMFS is committed to getting the job done no matter what the challenges and with zero compromise on quality.

According to Terry, this was the cornerstone of the company's success, earning it repeat business and referrals.

"We build trust by being honest and ethical. "If we identify a more cost-effective solution, we'll let our clients know.

"We also understand the importance of running an operation efficiently, including reducing operating costs and equipment downtime."

MMFS maintains its high standards in workmanship, efficiency and safety though its stringent employment and training practices.

As the sustainable development and growth of the company is dependent on client satisfaction, it is committed to assuring the quality of the completed product through provision of a quality management system.

It provides conformance to customer briefs, contracts and statutory requirements for projects through all stages, from implementation through to completion.

MMFS was particularly committed to achieving a high standard of safety and health management through continuous improvement and awareness.

The company believes that all incidents are preventable and that working safely is a condition of employment.

MMFS' own health, safety and environment principles are rooted not just in meeting industry standards but exceeding them.

This includes a commitment to providing the expertise, funding and resources to maintain safe and healthy working environments and various measures to mitigate any environmental impacts. **AMR**

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TAKING CARE OF HEAVY LIFTING

Lifting heavy machinery to undertake maintenance is a high-risk activity on any mine site, with potentially disastrous outcomes if not done correctly.

Before anyone gets underneath a large mining truck, they must be confident that the jack supporting it is in proper working order.

This need for absolute confidence has remained a key focus for EDMO Australia as it continues to develop new equipment and encourage newer, safer practices.

According to EDMO director Scott Bullard, “if you’re asking someone to lift a 300 ton truck and then get underneath it, the last thing you want is for them to be worried about whether the jacking equipment being used to lift and hold it is working”.

“The confidence our customers have in our equipment is vital.”
As part of EDMO’s commitment to producing

jacking equipment to allow for safe heavy lifting, every jack that leaves its factory has gone through a full testing regime, which exceeds Australian standards.

That regime takes all safety features and nameplate operating capacity into account, whether it is a newly manufactured jack or one that has come in for service.

This process includes dynamic load testing, conducted at a purpose-built in-house facility, which is electronically controlled.

Scott said the testing regime was an integral part of EDMO’s manufacturing process.

“During the testing phase, each jack is subjected to twice the load it has been designed to take and each stand is subjected to three times its nameplate capacity to check for any deformities,” he said.

“That means that if you have a 150 ton stand, we’ve got 450 ton punching through a test facility to make sure that it won’t give

up the ghost if an unintended load were to be experienced.

“Like all testing, it’s well documented and customers are privy to the results and can see the relevant documentation.”

Safer Practices

As a result of its commitment to safety while heavy lifting, EDMO maintains a zero-incident record; however, according to Scott, the company is always striving to improve.

“All mine sites consider jacking and standing to be a high-risk activity and they have quite a stringent set of operating procedures with regards to those operations,” he said.

“However, one of the areas we’ve identified for improvement is regular testing of jacking equipment.”

Although most jacks and stands are inspected every six months on mine sites, they are not always tested under dynamic load.

Scott said testing practices regarding jacking equipment should be brought into line with other high-risk activities and should be part of a site’s service strategy.

“We believe that given the importance of the equipment, the jacks really should be tested to show that the load and safety control devices are in fact operating as they were intended and that can only be determined under load, so we’re really trying to encourage that on mine sites.”

Jacks of the Future

Beyond encouraging a change in processes on site, EDMO is also examining innovations in the equipment itself to improve safety and operator confidence.

Although currently still in development, Scott said EDMO was working closely with the mining industry to produce new, more user-friendly lifting options.

“We’re listening to industry and we know that when it comes to jacks there is a real



The company is dedicated to providing top quality jacking equipment suitable for any job at mine sites around the world.



EDMO examines innovations in the equipment itself to improve safety and operator confidence.



Every jack that leaves EDMO's factory has gone through a full testing regime, which exceeds Australian standards.

push for ease of operation, lighter materials and anything that creates safer operator outcomes with regard to the use of mining equipment,” he said.

“At the moment, we’re trying to work towards solutions that accommodate those requirements and make them more user friendly when it comes to the physical demands of using the equipment.

“It’s a very symbiotic relationship with regards to developing new processes and implementing new equipment.”

The new lifting options would not only improve safety outcomes in the traditional workforce but would support major miners’ goal to encourage more employment diversity. It comes after EDMO was tapped to provide jacks to BHP’s FutureFit Academy, which has campuses in Queensland and WA.

Launched in May 2020, the Academy was designed to open the door to a more diverse group of workers, particularly those from non-mining backgrounds who were looking to reskill or pursue a new career. BHP describes it as the workforce of the future.

Scott said the team at EDMO were always happy to part of product development and

was always looking for industry feedback as well as the chance to pitch their own ideas. “The good thing about the mining industry is that they’re always welcoming new product development that gives a better or safer outcome to an existing operation,” he said.

“If you prove to them, or if it’s obvious that by introducing a certain process or a refinement of a product, it will create a safer outcome, they’re quick to encourage the development of it.”

Custom is King
While innovation is always in mind at EDMO, Scott said the company was also dedicated to continuing its long history of providing top quality jacking equipment suitable for any job at mine sites around the world.

“EDMO is in a position to be able to provide specialised applications for particular requirements,” he said.

“Not all mine sites run the same gear, so for example, if someone’s got a jacking requirement for the biggest of haul trucks then they could use our jacks and stands, but we also provide specialised load caps for the many models of trucks available.

“A load cap is the final piece of the puzzle, so you have your jack, sometimes a small



extension, and then you have the load cap that’s sitting on top of it as the interface between the jack and the actual lifting point of the truck.”

Lifting points, or jack points, are not always flat and they do not always have a uniform configuration. Scott said in this case, a specialised fitment must be manufactured to give the best possible fit and the best possible safety and operator security.

“Similarly, trucks have different jack heights, so the jack point on some trucks could be really quite low,” he said.

“It’s not a one-jack-fits-all application, and as many trucks there are out there, so too are there different kinds of interfaces and jacking requirements.

“At EDMO, we look at all the different requirements and produce a jack to match.” Scott believes it is this ability to customise and adapt that has seen it continue to corner the Australian market and to thrive internationally.

“The biggest thing we can provide is that in a situation when a customer comes to us with a problem like a new truck that won’t fit with an existing load cap, we can go out on site to take a look, measure it, create a design,

engineer it, and it will be available for our customer within a few months,” he said.

“We can pivot and be nimble so that we can take something from an idea to a fully engineered, bespoke piece of equipment.”

Scott said this ability to adapt went beyond jacks and stands.

“We also manufacture jack stands, stand carriers and tyre stands” he said.

“Just recently we had a customer with an existing EDMO tyre stand who wanted to create efficiencies in an operation by being able to accommodate two tyres instead of one, so it meant going back, extending, re-engineering and recertifying.”

All EDMO equipment is manufactured in Australia to meet or exceed safety standards throughout the world.

Founded more than 50 years ago, EDMO is now used in 22 countries including the United States, China and Africa. **AMR**

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SPECIALISED WELDING IN RECORD TIME

Time is money in mining and K & M Solutions has a way to save both thanks to the use of the game-changing Miller Pro-Heat 35. Used in both weld pre-heating and stress relieving applications up to 788°C, the Miller Pro-Heat relies on a liquid-cooled induction heating system, instead of the traditional flame and resistance heating processes.

According to K & M Solutions managing director, Kieth Haywood, this allows his technicians to heat parts up in a fraction of the time and at far more consistent temperatures than possible with traditional methods. “With traditional methods, you’re heating a part from the outside in and a lot of the time the middle of it never gets to the desired temperature to complete the full stress relief required or to properly preheat it,” he said.

“Induction heating starts from the inside out, so we know that once the temperature probes on the outside reach the desired set temperature it means that the heat is 100% saturated through.

“We’ve seen 40% cost savings when we conduct stress relieving procedures on parts.” Kieth said he had seen even better results in the preheating process, with a reduction in time of up to 400%.

“Every job is different, but we’ve seen jobs that would have taken five hours using traditional methods and we’ll have it preheated in 45 minutes to an hour,” he said.

“So if you just imagine that you arrive at a mine site at 6.30am and you start warming up a part, it could take you until 12pm waiting for it to be hot and in the meantime you’ve got a tradesman there who’s lost half a day in work while they wait.

“We can have that same job done in an hour, maybe an hour and half if it’s a really big job, and instead of six to eight hours of work time available, a tradesman can still have 10 to 11 hours.

“There are so many benefits to this machine that it’s a real game changer, but a lot of people don’t know too much about it yet.”

Breaking it Down

On top of massive reductions on time taken to complete stress relief and preheating, the Pro-Heat creates a safer working environment by ensuring that welders are not exposed to the open flame, explosive gases and hot elements associated with fuel

gas heating and resistance heating.

The lack of fuel requirements also guarantees lower consumable costs, with reusable post weld heat treatment blankets that can be used 50 times or more. Blanket efficiency insulates and optimises coupling distance between the coil and the workpiece while protecting the liquid-cooled cable.

The Pro-Heat induction power source is also equipped with a built-in temperature controller allowing for manual or temperature-based programing using up to four control thermocouples. At more than 90% efficiency, the Pro-Heat power source transfers more energy to the part, reducing operating costs over different heating methods.

Just one Pro-Heat power source has two outputs and can run one or two heating cables at a time.

According to Kieth, the applications for the Pro-Heat are wide-ranging. “Just about everything on a truck, dozer or grader should be preheated prior to welding and on the stress relieving side of things, it can be used for things like casting repairs, and equaliser bars,” he said.

“There are many things out there that are even just manufactured out of normal steel that a client might want stress relieved.

“Rather than throwing out an old component and buying a new one, our clients come to us and we can repair the component, stress relieve it and basically make it as good as new for half the price of replacing it.”

Access Solutions

A commitment to efficiency and innovation goes beyond the Pro-Heat at K & M Solutions with the company producing a range of custom products to provide machinery access solutions and safety equipment.

Kieth said K & M Solutions began manufacturing specially designed access and safety equipment such as mobile platforms and maintenance handrails after identifying a gap in the market.

“The issue is that large mining machinery is tall, and the heights involved to access the machinery for even the most basic and everyday maintenance work requires scaffolding, harnesses and working at height permits,” Kieth said.

“I realised that if I could help remove the need for scaffolding for these everyday



The Miller Pro-Heat 35 is one of the many innovations used by K & M Solutions.



The Miller Pro-Heat 35 has a wide range of applications.



The Hitachi EH5000 Chassis Access Handrail Kit.



The Hitachi EH5000 Chassis Access Platform.



K & M Solutions can produce a range of equipment such as the CAT 789 A frame yolk replacement.

maintenance tasks, I'd be helping my clients cut down on the time spent completing these tasks, while improving the safety of their personnel.

"From what I had seen, there were items out there that could be purchased, but none of them were specialised to a certain piece of machinery or job.

"It was rather surprising to hear from clients, who just hadn't been able to access products that suited their requirements."

K & M Solutions has since manufactured mobile platforms specifically designed for a wide range of equipment. Recent designs include the KMK-0162 mobile platform, which is a 20 step aluminium work platform designed to access the chassis of a Hitachi EH5000 for servicing.

Standing at 5018mm, the heavy aluminium construction includes four 200mm castors for maneuverability, self-closing gates and powder coated steel fork tine pockets. The KMK-0162 works in conjunction with the KMK-0163 mobile platform, which is a handrail used to create a temporary barrier during maintenance activities on the Hitachi EH5000.

It includes an EH5000 chassis handrail kit, four-piece aluminium handrail kit and a four-piece mild steel clamp kit. K & M solutions has now manufactured specific access systems for a wide range of equipment including CAT and Hitachi.

Another unique design is the KMK-0171. Kieth said the three-step aluminium platform was designed to gain access to drain oils while servicing after a client identified an ongoing issue following filter changes.

"The coordinator out at that particular mine was sick of seeing oil on the ground every time they changed filters under the haul trucks," he said.

"We designed this so that they have access to the machine and can do it in a way that keeps the area both safe and clean."

The KMK-0171 comes with removable handrails, a 60-litre holding tank with viewing glass and a telescopic funnel. When it comes to manufacture and design, the sky is the limit for K & M solutions, according to Kieth.

"We've got the list of products that we have from working with our clients, but we're not looking to stop there," he said.

"We can manufacture custom orders of any kind and we do a lot of the research and development for our clients, so all they have to do is provide us with a basic concept and then we take it through from research, development, drafting, and engineering to manufacturing.

"We have a fully equipped workshop, and all of our boilermakers and welders are certified to an Australian standard, so we've got top quality tradespeople and no need to outsource anything."

Asset and Structural Auditing

On top of innovative products, K & M Solutions provides asset and structural auditing to ensure its clients get a full life out of almost everything on site. "Mines and other large companies end up having a lot of assets on site and these can become degraded over time," Kieth said.

"For these clients, we create a full asset register and we conduct inspections every three months, followed by a condition report.

"We can also look after any necessary repairs, whether it be on fixed or mobile plant or tooling around the workshop." **AMR**

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A service platform designed to remove filters and catch oil content.

REACHING NEW HEIGHTS

The large-scale nature of mobile and fixed plant mining equipment and infrastructure means operators often are required to access and work at heights to fulfill complex repair, inspection, and maintenance requirements. The threat of workers falling and sustaining serious, or even fatal, injuries is a common and ever-present threat to the productivity of the workplace.

Mining companies both large and small under current Australian individual states and federal workplace regulations will be held liable if they do not implement suitable control measures including product solutions to successfully manage the risks of falls to prevent these kinds of workplace injuries, and so in addition to the direct and indirect human cost, any fall from heights can also increasingly threaten the bottom-line of an organisation.

More than this, navigating through the numerous current Australian individual states and federal workplace regulations, codes of practices and Australian Standards relating to compliance around managing the risks of falls can be complicated and overwhelming to most companies.

For companies that need to maintain a safe working environment and to remain compliant to the stringent codes governing this area, they need fall protection systems that are flexibly designed, reliable and manufactured to an Australian standard of excellence.

Beaver Technology Services (BTS) is a fast-growing and successful Australian company with a global reach. It is a company with a rich history in providing mining companies with practical product solutions for managing the risks of falls within their workplace, including working at heights and confined spaces, using the most advanced technology available today. BTS is certified to ISO9001 and holds accreditation as a NATA test laboratory for fall protection equipment.

The BTS range of AirHook mobile overhead fall protection solutions and its range of AirDock mobile work platforms and stands allow operations in many cases to effectively manage the risks of falls around accessing and working on both mobile and fixed plant on an operational site.

The AirHook and AirDock are fall protection structures used by an extensive and impressive roster of the world's most advanced and successful mining companies and OEMs such as Caterpillar, Hitachi, Komatsu, Thies, Rio Tinto, BMA, BHP, Graymont, Newmont and Sibelo to name a few.

Australian Mining Review recently spoke with BTS General Manager for Strategic Markets, Naizal Buksh, about the company's industry-leading products aimed for this market.

The AirHook Range of Mobile Fall Protection Structures

The BTS AirHook range consists of two main types of overhead fall protection anchor points. The first type is a trailer-mounted version that is designed for use on both on-road and off-road applications.

The second type is a counterweight-base type configuration more suited for workshop and hardstand-type applications.

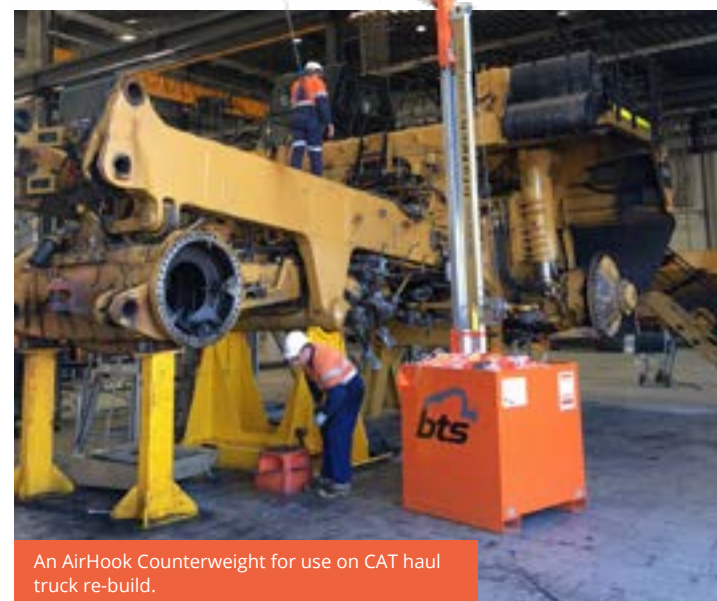
Both the trailer version and the counterweight version provide overhead fall protection for up to two workers and can



An AirHook Max Trailer used in break-down maintenance on-site.



A BTS Work Platform used to reach the side of a truck and an AirHook to work on top.



An AirHook Counterweight for use on CAT haul truck re-build.

also be configured and used for confined space applications including rescue and retrieval.

"The AirHook range when used in combination with a Type 2 Inertia Reel allows for workers to work in Limited Free Fall type scenarios where any falls will be arrested within a max distance of 600mm to prevent serious harm and injury to the workers," Naizal said.

AirHook Trailers

To cater for different client requirements, BTS has three individual models within the AirHook Trailer range. These individual models are called AirHook Junior Trailer, AirHook Trailer, and the AirHook Max Trailer. All three models are designed

and compliant to the relevant Australian Standards for Industrial Fall Arrest Anchors and, furthermore, are also certified to be registered and used on all Australian roads.

The AirHook Max Trailer is a truly impressive large-scale fall protection structure suitable for work on the kind of mammoth mobile plant equipment common across large-scale mining operations, manufactured by Hitachi, Caterpillar, Liebherr, Komatsu and other OEMs.

The Airhook Max Trailer is rated to provide overhead fall protection for two workers who may be undertaking maintenance and repair activities in field environments.

"Transporting large dump trucks, shovels,

excavators and the like back to the workshop can be extremely costly and time-consuming enterprise for a company from a logistics point of view," Naizal said.

"The benefit of our mobile trailers is that it allows the worker to undertake the repair and rectification directly at the breakdown area which in many cases can be many tens of kilometres from the workshop."

Using an electric (DC) hydraulic pump and valve assembly, the main mast of the AirHook Max Trailer can be raised to a height of 12m and provides overhead fall protection for two workers. The AirHook Max Trailer can be set-up by two workers in a matter of minutes

Other standard features include electric brakes and a battery-operated break-away system, built-in equipment storage box, all terrain wheels with full-size spare, and a high-performance deep cycle battery with built-in solar panel with 240v battery charger to charge the unit when it is either being towed or set-up in the field.

The AirHook Junior Trailer and AirHook Trailer is an ideal solution for when the 12m anchor point height of the AirHook Max is not required. The AirHook Junior Trailer and AirHook Trailer come with an overhead anchor point of 7m and is also rated to provide overhead fall protection for two workers.

A key difference between the AirHook Junior Trailer and the AirHook Trailer is that the former requires the worker to raise and lower the main mast via a manual hydraulic assembly. With the AirHook Trailer, the entire set-up is done via the electric (DC) hydraulic pump and valve assembly, which reduces a considerable amount of time and effort.

Like with the AirHook Max, other standard features of the AirHook Trailer include electric brakes and a battery-operated break-away system, built-in equipment storage box, all terrain wheels with full-size spare, and a high-performance deep cycle battery in the AirHook Trailer for the operation of the hydraulic pumps and valves.

Both the AirHook Junior Trailer and AirHook Trailer can be set up in the field by two operators in a matter of minutes for not only fall arrest applications but also for working in and around confined spaces.

AirHook Counterweight

The counterweight variations of the AirHook are ideal for environments with restricted space, such as within a busy workshop where there is no unused real space in and between bays.

Like the AirHook Trailer range, the AirHook Counterweights are also available in three variations to suit different client needs for portable fall protection. The largest with a 12m anchor point height is the AirHook Max, and the other two models with a 7m anchor point are the AirHook and the AirHook Lite.

Designed to minimize takeable footprint either in a busy workshop or outside hard-stand, all three-counterweight working-at-heights solutions can be moved by either a forklift or hand-pallet truck.

With the AirHook Max, the main mast is raised and lowered via an electric (DC) hydraulic pump and valve assembly. The AirHook and AirHook Lite use a hand-winch to raise and lower the vertical mast.

All three models have the ability for the mast to rotate a full 360o within the counterweight base, providing the worker with the flexibility to position the unit between two bays and service them both. This is particularly useful for complex jobs requiring movement and work at multiple points.

“The worker doesn’t need to reposition the fall arrest structure for every part of the job, but rather can move freely and effectively with this flexible piece of equipment,” Naizal said.

The AirHook Counterweight range of equipment allows workers on sites to safely access a range of mobile and fixed plant equipment in a safe and secure manner, not only for fall arrest applications but also for working in and around confined spaces.

An impressive feature of both the AirHook and AirHook Lite is its ability to be re-configured and joined via a 10m horizontal rail structure allowing two workers the ability to walk across either fixed or mobile plant equipment where repair and rectification is



A BTS Mobile Access Platform for access around a dozer.

required in different areas.

Custom Design

These offerings are in themselves expertly designed and engineered to meet a range of fall-protection needs. But BTS is not the kind of company to simply build a product and leave it.

Innovation, attention to each individual situation and recognising the unique requirements of each client sit at the heart of the BTS business model. To this end, every part of the Airhook Trailer and AirHook Counterweight systems can be re-configured to fit particular client specifications.

“One of the things we’ve found over the years that we’ve been operating is that each mining company has got a unique set of requirements. And because of our in-house engineering service and our capacities in fabrication, we have got the ability to accommodate customer requirements,” Naizal said.

“So, for example, somebody wants a fire extinguisher, or a safety beacon and buzzer positioned on the left-hand side, or at the rear of the trailer, we can do that. If they want it positioned on the right inside, or the front of the trailer, we can do all those kinds of minor modifications and even do major modifications to suit client requirements.”

Highlighting a great example of this kind of customization, Naizal noted a client who wanted trailers changed from orange to another colour.

“We have had another who wanted the product to be all in the colour white. So in addition to our standard range of products, we’ve got the capability to accommodate and facilitate these more particular demands as well,” he said.

AirDock Work Platforms and Work Stands

Along with the Airhook systems that allow sites to effectively manage the risks of falls, BTS has responded to client requirements and has recently developed and launched a new series of aluminium work platforms and stands suited for both fixed and mobile plant equipment access.

Meeting all requirements stipulated for manufacturing and testing to Australian Standards, these 6061-T6 aluminium platforms and stands allow workers a safe means of access and egress to work areas and a stable platform to undertake the required maintenance activity.

BTS offers five standard broad platform styles. These are: self-levelling stairs, flat-truck bed access platforms, adjustable height platforms, cantilever platforms and fixed-height work platform ladders.

All of these platforms and work stands are designed to be mobile and can be deployed to a range of jobs across operations.

Importantly, these platforms are designed with Australia’s harsh mining conditions in mind. The chief material is high-strength 6061-T6 aluminium. This allows the product to be lightweight for moving around on site without forgoing the strength, durability and corrosion-resistant characteristics required for mine site environments.

The excellence of design and manufacture using high quality components means these platforms and stands can be utilized for years on site without fail.

The versatility of the self-levelling stairs is particularly impressive, and promises to provide a safe and stable work platform for a range of jobs on complex mobile and fixed plant equipment.

“Imagine you’re doing any kind of temporary work at the mine site, and you might need to go from one level to another,” Naizal said.

“Depending on the application, the worker can change the height and angle of the platform, and as such the height and angle of the work they’re doing. As you go along, you adjust the platform, and this allows workers flexibility as they work.”

The truck-access platforms provide for an excellent solution for accessing and working on flat-bed trucks. Whether workers need to tie-down or position loads, take loads off, or put loads on, these platforms in three-length sizes reliably provide safe access and egress with fall protection.

All the equipment is load rated to a Working Load Limit (WLL) of 200kg.

An interesting application for the platform ladders is to serve as a kind of bridge over fixed plant on the mine site. For example, instead of constantly having to step over or manoeuvre around fixed pipeline systems, BTS can easily install and fix these platforms to help workers cross over fixed plant with ease and speed, elevating the overall productivity of the site.

Versatility and adjustability are core features of these platforms, all of which are carefully designed meet the varied needs of mine sites.

“Depending on what the application is, we can build them to different sizes. These platforms can be used to access different parts of mobile plants or, different parts of the engine. They can be used to access the back of dump trucks, or easily access the hydraulics of a front-end loader,” Naizal said.

This focus on building products specifically to match the complex and particular needs of operators points to the BTS edge.

The BTS Edge

BTS is an end-to-end design, manufacture, supply, and consulting company with a long



An AirHook Jr Trailer for maintenance activities on a dozer.

and successful history of providing practical product solutions to manage the risks of falls within many Australian industries. Even though its Airhook range and AirDock work platforms and stands are built to standard configurations, BTS also has the flexibility internally to cater to client requirements and custom configure standard products to meet client specifications

Each component can be re-worked to fulfill every need a mining company is looking for. In the complex work of mining, this is exactly what companies need from their suppliers to prosper.

“We have the ability to create bespoke solutions to suit individual client requirements. So whether it be a specific height, specific width dimensions, or even different colours, we can meet the needs of our customers,” Naizal said.

The design and consultation process is intricate and detailed to ensure the quality of the end-product.

Initially, the team at BTS engages with the client to understand what the issues are and what the company needs. The query is transformed into a client brief, which outlines the engineering challenges that need to be addressed.

The design team gets involved, looking at all relevant Australian standards, work practices and codes that are required for the design, and then a prototype is developed and tested to ensure it is right for the particular application.

BTS’ roster of major clients demonstrates that this remarkable capacity to generate bespoke solutions to complex problems makes it a market leader in fall protection and general workplace safety platforms.

What’s more, its commitment to its customers does not end at the point of sale. “We provide a full after-sales service in terms of the servicing, recertification, repairs, everything. We are the whole thing from end-to-end,” Naizal said.

And there is no limit to its reach. BTS can service all mine sites across Australia, from the Pilbara down to Tasmania, and has the capacity to service international operations in Papua New Guinea, Indonesia, Chile and even Mongolia.

The business has been in operation since 1978, and its ingenuity and experience shows. Whether it is custom-designed, or the already-versatile standard configurations reviewed earlier, BTS has engineered systems that make work on mobile and fixed plant safe and productive. **AMR**

MEAN MACLEAN MACHINE



The MacLean ss5 Shotcrete Sprayer.

MacLean has unveiled its next generation shotcrete sprayer, the SS5, the latest addition to the MacLean EV Series line of zero emissions mining vehicles.

Since the launch of the company's full-fleet electrification program in 2016, MacLean has commissioned 30 battery electric production support mining vehicles (BEVs) at mine sites across Canada, with more than 50,000 working hours logged to date.

The BEV version of the MacLean SS5 delivers a zero DPM, low noise, low heat, low vibration, low maintenance, data-rich and high performance ground support option to the Australian mining industry, from a strong foundation of in-country infrastructure out of the company branch in Perth and satellite facility in Broken Hill.

The ss5 is not only the first battery powered sprayer in the EV Series line, it is also the first of the next generation of MacLean sprayer with technology enabled and ergonomic design that deliver safety and cost savings to mining operations:

- Cab-forward design with overhead viewing window
- Ability to spray from within cab using Maclean-designed, OEM remote control
- Spray measurement and enhanced dosing technology to reduce shotcrete and chemical accelerant consumption
- Purpose-designed pump that allows the use of regular concrete for underground construction applications.

These design features are specifically conceived to create a mining vehicle built for the shotcreting application in Australian mines.

The unit's mutually reinforcing blend of ergonomic design and integrated technology for remote control and spraying and dosing provide safety benefits and cost savings that are as relevant to Australian miners as they are to underground operations around the hard rock globe.

'No boots on the ground' is an Australian industry ethos, but the drive to make operations safer by removing operators from harm's way is universally shared in mining.

According to MacLean GM for Australia Jari Tuorila, the launch of the BEV and tech-

enabled sprayer is a product development milestone for the company globally as well as an exciting opportunity for MacLean in Australia.

"The Maclean approach is to partner with customers to design fit-for-application mining vehicles, combined with establishing branch roots above ground where our mobile equipment is working underground globally," he said.

"From design through commissioning to field service and remote troubleshooting, customer partnerships and full lifecycle support are the pillars of the MacLean way."

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ELECTRIC VEHICLE

MacLean tech-enabled underground mining vehicles

- Zero emissions
- Enhanced safety with ‘no boots on the ground’ operation
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- Enhanced savings on consumables



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THE DANGERS OF DIESEL

Professor Tim Driscoll.

Diesel fuel is one of the prime energy sources propelling mining operations across Australia. Heavy machinery, from excavators to loaders, run on diesel, and dump trucks hauling ore and overburden use up a significant amount of diesel fuel. Electricity is also generated using this fuel.

Diesel is a preferred energy source for operators because it is reliable and durable, and suitable for heavy machines engaged in demanding work.

However, all good things come with a cost, and one of the chief costs of diesel use in mining is the negative environmental and health hazards associated with diesel emissions.

Diesel fuel is a mixture of hydrocarbons, and the diesel engines embedded in the machinery deployed to mine sites convert the chemical energy contained in the fuel to mechanical power.

During the combustion process diesel engine exhaust is emitted, and these emissions contain a complex mixture of gases, vapours, liquid aerosols and particulates, including nitrogen (N₂), carbon dioxide (CO₂), water (H₂O), carbon monoxide (CO), nitrogen oxides (NO_x), sulphur oxides (SO_x) and particulates (soot).

Much is made of the deleterious environmental effects of CO₂ emissions, but perhaps a more direct threat to mining operations is the hazard posed to worker health by these emissions.

A 2019 report from the Department of Natural Resources, Mines and Energy notes that the International Agency for Research on Cancer has classified diesel engine exhaust as carcinogenic to humans.

Specifically, it is now widely established that extended exposure to diesel emissions increases the risk of contracting lung cancer. Professor Tim Driscoll, a leading expert in public health from the University of Sydney and an associate with the Cancer Council, said the consensus is that diesel engine exhaust fumes definitely increase the risk of lung cancer to people who have been exposed to it.

"The International Agency for Research on

Cancer, which is a World Health Organization body that is seen as the final word on whether something causes cancer or not, has determined that diesel engine exhaust definitely causes lung cancer in humans," he said.

It is also possible that exposure to diesel exhaust could increase the risk of bladder cancer in mine workers, though the level of certainty for this particular hazard is not as strong as it is for lung cancer.

This is a troubling new reality for mining operations across Australia. The evidence is in, and moving forward, confronting this challenge should be at the forefront of occupational health and safety across mining.

Though improvements in diesel engine technology may reduce the scale and danger of emissions, and though new technologies promise to deliver much-needed energy needs without the costs of damaging health effects, it is likely that diesel engines will still be used in mining for decades to come.

What's more, until diesel engine improvements and new technologies are methodically tested and proven to eliminate carcinogenic risk, companies dedicated to worker safety must err on the side of caution.

"There's been quite a bit of debate about diesel engine exhaust and the risks it poses because a lot of the evidence about the increased risks come from people who've been exposed over the last 40-50 years," Professor Driscoll said.

"And critics of that information, say, well, there's much newer engine technology. Now there are new fuels and the risks are much lower or might not even be present.

"And to that we say, OK, but there's no evidence to say that. There is clear evidence to say that people who've been exposed to diesel engine exhaust in the past, definitely have increased risk of lung cancer.

"So the approach that most people in occupational safety would say, and definitely what the Cancer Council position is, is that until it's known that modern diesel engine technology is not a problem, we have to assume it is, because there is still diesel

engine exhaust produced."

Surprisingly, there is at present no uniform standard for acceptable diesel emissions exposure. The current working level revolves around 0.1mg/m³, a common level of exposure for Australian mine workers. "That is way too high," Professor Driscoll said.

Indeed, studies from the US mining sector demonstrate how dangerous this level is. Exposure levels are established by calculating the risks to a worker over a 45-year working lifespan, from age 20 to 65, working a usual shift of eight hours a day for five days a week.

When health and safety standards are being developed, a typical approach is to use one extra case in every 1000 exposed workers as the risk cut-off. An exposure level that resulted in more than one extra case in every 1000 exposed workers would be seen as being too high and the exposure standard would be set below this exposure level.

"Let's say that in Australia, because everyone is at risk of lung cancer, let's say that the standard number of deaths of lung cancer across the entire population was 600 per 100,000. So that would be six per 1000 people," Professor Driscoll said.

"If exposure to diesel engine exhaust at a certain level increased that figure from six per 1000 to eight per 1000, that would be seen as too much. That's an extra two cases." A recent study from the US conducted over the last five years demonstrated that a lifetime exposure to diesel fuel, at a level of 0.025mg/m³, produced an extra 69 cases per thousand.

Though there are differences between Australians and Americans in health, the populations are roughly comparable and so evidence drawn from the US mining sector has application to Australia.

So, a reduction in diesel exposure from the current Australian working level of 0.1 mg/m³ to 0.025, a sizable reduction, would still produce an unacceptable increased risk of lung cancer.

If we extrapolate from this study, and reduce the exposure level to 0.01mg/m³, a reduction of ten times the current working level, that would produce an extra 20 cases

per 1000.

At an exposure level of 0.001 mg/m³, the extra cases would be 1.7 per 1000.

From this, we can see that the current working level is much too high, and must be reduced from roughly 0.1mg/m³ to something closer to 0.001 mg/m³.

"It's clear that the current de facto standard of 0.1 is way too high," Professor Driscoll said.

So then, how should mining companies respond to this new threat? The adoption of new technologies which eliminate or reduce diesel engine exhaust is the best path forward.

"We definitely propose the usual hierarchy of control approach," Professor Driscoll said. "So we would say, don't use diesel engines if you can avoid it. Use the newer engines and the lowest sulphur fuels.

"If you can, make sure you keep the engines as well tuned as possible to minimise exhaust, make sure you've got appropriate ventilation to minimise the levels. And only when you get down to having done all of those things, if you've still got workers who are going to be exposed, and you probably still will have people in that situation, make sure they have appropriate respiratory protection. But you don't want to rely on that."

That being said, we should caution against panic. "Underground miners who have worked with diesel material, they should not lie awake at night fearing that they're going to get lung cancer," Professor Driscoll said.

"But there's no doubt that their risk of getting lung cancer is increased compared to people who have not been exposed. And if they have considerable exposure, which definitely has been the case in Australian mines within certainly the last decade or so, then their risk is increased a meaningful amount."

Though long-term exposure to diesel emissions is not a death knell, it is clearly dangerous, and mining operations must do what they can to minimise exposure wherever possible. **AMR**



TANGELO / PHOTO

ENGINEERING
the Future

R.Moore and Sons (RMS) is a world-class company providing a vital link in the supply chain for OEMs and major repairers.

As one of only a handful of companies worldwide who have the skills, technology and know-how to restore components to their original format (or better than their original format), RMS delivers immense value to their customers. By returning engine components to a ‘zero-hour state’, RMS breathe new life into existing machinery, enabling the engine to perform as though it were new, and as such lowering costs, emissions and overall environmental impacts for their customers.

moorediesel.com.au





Regen's founder and CEO, Frank Spiteri, and the team.

REGENERATION STATION

A diesel particulate filter (DPF) is part of a modern diesel engine's exhaust system and is designed to trap dangerous and toxic metal particles before they enter the atmosphere and human lungs in the vicinity.

Diesel particulates are associated with a number of serious health conditions and diesel engine manufacturers are required to contain and eliminate those particles in the interests of worker safety and environmental responsibility.

Inside the housing of the filter is a substrate comprising thousands of tiny cells that allow exhaust gases to pass through them but trap the diesel particulate matter. At various stages of the driving cycle, the on-board computer initiates a regeneration sequence that increases the temperature inside the DPF to 600°C, which converts the diesel particulates to ash.

This non-toxic ash is then small enough to pass through the wall of the filter and out the exhaust system.

These DPFs work well – until they don't! Under certain operating conditions and if other engine faults occur, they can become blocked – choking the exhaust system and significantly decreasing engine power and efficiency, while simultaneously sending diesel consumption skyward.

Faults and Failures

DPF Regen is a well established company in Sydney set up to clean, repair and diagnose faults arising with and surrounding DPFs in everything from light vehicles to the largest mining equipment.

The AMR interviewed DPF Regen's founder and CEO, Frank Spiteri, to shed some light on this very topical issue. Frank has decades of experience with diesel diagnostics and says that the DPF Regen business grew out of necessity from diagnosing and repairing numerous upstream faults that resulted in blocked DPFs.

"Particulate filters block for a number of reasons, most of which stem from upstream issues that corrupt the combustion process and lead to over-rich fuel mixtures that clog

the intake, EGR and exhaust systems," Frank explained.

"You can't just look at the DPF blockage in isolation, it takes time and knowledge to look at what caused the fouling or damage and repair the original source of the problem or else the filter might block again in a very short period of time."

One of the most common causes of DPF clogging is a split intercooler pipe or another leak in the intake system of a turbocharged diesel. An undetected split will often only be visible under boost. In operation, the escaping intake air does not find its way into the cylinder to match the fuel injected by the ECU.

This results in an overly rich mixture which quickly carbons up the exhaust system, EGR valve and the intake manifold. The DPF does not fare well either.

Frank can examine the quantity, texture and colour of the soot in the DPF and determine the upstream culprit in most cases. By alerting the vehicle's maintenance staff

about the problem, they can look for and repair what may seem like an unrelated failure and ultimately save their operation tens of thousands of dollars in repeated unscheduled downtime.

It is not just air leaks that cause DPF clogging. Over time, intake manifolds become blocked as do the Exhaust Gas Recirculation (EGR) valves that divert soot-laden gases back into the engine as part of their emission control cycle. Eventually the walls of the valve and the intake manifold runners build up with choking carbon that inhibits the flow of air into each cylinder.

Once again, the ECU cannot measure or counteract this loss of air flow, so it continues to deliver what it calculates to be the correct mass of fuel to each cylinder. However, because the air flow is reduced, an over-rich mixture is created that leads to DPF blockages.

It is therefore essential to regularly inspect and clean not only the DPF but also the intake manifold and EGR valve to ensure they are not responsible for rapid re-





blocking of the filter.

Another cause of DPF blockage is stop/start driving. Most manufacturers rely on a period of sustained highway (higher speed) driving in order for the ECU to trigger a regen cycle to clean the DPF. If a vehicle is constantly stopping, starting and operating at low speeds (ie: in town or the CBD) the ECU may never see the correct conditions to initiate the regen, hence the DPF will begin to block and need cleaning more regularly.

Inspection and Cleaning

According to Frank, the first step in any cleaning process is visual inspection. As mentioned, the state of the DPF's substrate and the type and quantity of trapped soot can give he and his technicians a very clear picture of why the filter is blocked in the first place.

It is also important to inspect the diesel



oxidation catalyst (DOC) which sits inline before the DPF in the exhaust system. This is similar to a CAT for a petrol engine and also helps to reduce the number of particles in the exhaust, before they reach the DPF filter. In most cases, the DOC can be cleaned and restored to full functionality, just like a DPF.

In extreme instances, they DPF can become so blocked that only a small path remains for normal exhaust gas flow. As all the exhaust is passing through a much-reduced aperture, the associated heat in that area builds rapidly. At 1200°C the DPF substrate itself starts to melt and once this occurs it is time to replace the unit as it is damaged beyond cleaning or repair.

Allowing a DPF to go uncleaned to the point where temperatures soar to this level can result in catastrophic damage to the entire vehicle from resultant exhaust rupture and

fire. Factory exhaust components are not built to withstand 1200°C.

The cleaning process varies subtly for each application. DPF Regen use a range of two-part, biodegradable solutions and a specially designed ultrasonic cleaner to break down the carbon and flush intakes, EGR valves, DOCs and DPFs clean – restoring their original flow. Each solution is designed to tackle a different application and each works at a particular sweet spot of temperature and vibration frequency for optimum cleaning.

Training Centre

Due to the enormous cost of vehicle and machine downtime, Frank recognised that the industry could benefit from education in this area. Diesel mechanics needed to know how to correctly diagnose the cause of the faults they were seeing, so that the original issue could be repaired once and correctly.

This process of correcting upstream issues ensures the DOCs and DPFs do not become blocked prematurely, leading to costly unscheduled downtime.

To that end, DPF Regen also have a training centre for mining staff and other technicians to learn more about diagnosing and fixing engine faults – despite what the scan tool might tell them. Courses are available for all diesel technicians.

The moral of the story is simple: keep diesel particulate filters clean in the interest of worker health and safety, machine uptime, cost minimisation and to prevent total asset loss by fire. The best way to do that is speak to an expert in the field. **AMR**

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 **DPF REGEN**
Australia's DPF Cleaning Specialists

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 **dpfregen.com.au**

**IMPROVE YOUR MARGINS
WITH LESS DPF HASSLES**

DPF Regen is a diesel particulate filter & engine component cleaning company committed to quality and service. Whilst we have been cleaning DPF components for over 10 years; we are fully qualified mechanics and diagnostic technicians with experience spanning 40+ years in the industry.

At DPF Regen, we use state of the art ultrasonic technology to clean DPFs on Mining equipment, Passenger Vehicles, Trucks & Machinery, ERG Valves, Inlet Manifolds, Turbo Intercoolers, SCR AdBlue Mufflers and more.

But we don't just clean DPFs; we sell new DPF's and offer a consulting service on DPF diagnostic advice. Our services are available nationwide and we offer a fast turnaround.




**HIGH QUALITY
NEW DPFs
ALSO AVAILABLE**


**CUSTOMER
SATISFACTION
GUARANTEED**


**SERVICING
WORKSHOPS &
DEALERSHIPS**


**20+ YEARS'
DIAGNOSTIC
EXPERIENCE**


**NATION-WIDE
RELIABLE
SERVICE**

KEEPING FIRE UNDER WRAPS



In 2013, the NSW government released a report analysing all underground metalliferous mine fire incidents from 2008-2012. During this period 128 fires were reported at underground metalliferous mines for an average of 26 underground fires per year, of which mobile plant accounted for 76% of those fires.

The report goes on to mention that 20% of all reportable incidents were fire related, and that fire comprised about 25% of all reportable incidents regarding mechanical plant.

Of these, 18% were reported as resulting in damage to plant. Thankfully, there was only one fire-related injury during this period.

The report also highlighted that the most common heat sources for fires are the exhaust system, engine surfaces and turbochargers, while the most common fuel source is hydraulic oil, lubricating oil, fuel and grease.

This reflects a common scenario in mining whereby a combustible oil leaks from a hose or fitting onto or near a hot surface in the engine compartment causing it to ignite.

The report goes on to make several recommendations, specifically that 'consideration should be given to the consequences of oil and fuel coming into contact with hot engine components as part of a fire risk assessment. Where reasonably practicable, consider shielding to prevent that contact'.

Kool Wrap is a company with a range of products that helps equipment owners adhere to the recommendation made above.

Its products are designed to significantly reduce the incidence of mechanical equipment fires by providing a physical, fire-resistant barrier between the combustible fluids and the hot surfaces by mitigating against various types of heat transfer including convection (where heat is carried by a liquid from one part to another), conduction (where heat is transferred through the object itself), and radiation (where heat is emitted as through the air).

Kool Wrap's products are made from

various types of heat-resistant materials including heat-treated fibreglass as well as new materials such as basalt fibres (known as 'lava wrap'), which comes with a higher heat rating than fibreglass and has various applications such as inside turbo blankets, heat sleeves, and reflective wrapping.

What Makes Kool Wrap Cool?

The products are hand-tailored and are offered as off-the-shelf items for many common applications or can be customised to suit any application.

The typical composition begins with a stainless steel mesh, followed by a 10-20mm thick section of silicon or needle-felt wool (which provides air pockets responsible for the insulation) held in place by a fibreglass outer layer.

The fibreglass layer is then coated in silicon or teflon (which prevents oil or fuel soaking into the fibreglass) and then it is finally stitched together with Kevlar or fibreglass

thread, resulting in a durable, reliable and safe product.

Turbo Blanket Advantages

During the combustion phase of an engine cycle, rapidly expanding exhaust gas is pushed out of the combustion chamber by the upward movement of the piston. The hotter the gas, the faster it expands. Likewise, if it is allowed to cool (i.e. dissipate heat) then the expansion slows.

It is the rapid expansion of gas that turns the compressor wheel in a turbocharger. The faster the gas expands, the faster the turbo spins.

Normally, heat is dissipated into the turbo exhaust housing and then transferred into the air in the engine compartment, which provides an element of cooling.

However, a turbocharger housing operating under load can exceed 1000°C, which is enough to instantly heat most flammable

liquids to flash point, creating an engine bay fire.

By installing a turbo blanket, not only does the insulating properties of the blanket protect other components in the engine bay from the heat emitted by the turbo, but it actually improves the performance of the turbo by ensuring the gas inside the turbo remains hot for as long as possible.

By wrapping the turbo in a Kool Wrap exhaust blanket, the heat is kept inside the compressor housing where it belongs, improving the overall performance.

From a safety perspective, the turbo blanket can prevent serious burns and keep maintenance personnel from contacting these dangerously hot surfaces.

Heat Trick Up The Sleeve

The residual heat emitted from engines, turbos, exhaust manifolds and exhaust pipes can cause damage to pipes and hoses not





designed to withstand high temperatures – for example, flexible hydraulic and fuel lines. By wrapping these lines in Kool Wrap heat sleeves, they are insulated from any conduction or convection within the engine compartment.

Since the heat sleeves are often lined in reflecting aluminium foil (which can handle up to 600°C), radiant heat is also deflected. Protecting flexible lines in this way not only prevents them from melting and releasing fluid onto hot surfaces but it also delays the rate at which they degrade, for longer service life.

About Kool Wrap

Kool Wrap has been a successful Australian supplier of heat protection products since 1995, originally providing heat sleeves and exhaust lagging to the high-performance car racing industry and then later moving into heavy industries such as the marine sector, farming and mining.

The product range not only includes turbo blankets and heat sleeves but other products such as embossed aluminium heat shield panels, heat reflective tape and other forms of heat protection available on their website.

Fire is one of the greatest hazards in the mining industry, causing substantial damage to plant and equipment, creating significant costs to operators and potentially life-threatening risks to personnel.

It is for this reason that appropriate, fit-for-purpose heat protection devices must be fitted to not only comply with statutory regulations but also to avert the hazards of onsite fire. **AMR**

SOURCE
Kool Wrap
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ENVIRONMENTALLY FRIENDLY ALTERNATIVE

Black smoke bellowing out of a diesel engine exhaust was once used as a visual indicator of solid performance. With the introduction of new legislation and an acknowledgement by industry that greener standards must be met, efforts have been made to reduce the amount of black soot, ash and NOx gasses being released into the environment.

Anybody who has worked underground knows the discomfort of working near active diesel engines that have defective exhaust systems.

Two systems in particular are responsible for removing most diesel exhaust contaminants: Diesel Particulate Filters (DPFs) and Selective Catalytic Reduction (SCR).

Diesel Particulate Filters (DPFs)
DPFs are typically able to remove about 85% (and in some cases 100%) of the soot from diesel exhausts. Since the soot is collected as the exhaust gasses are passed through the system, the filters eventually become built up with soot particles and are required to undergo what is known as “regeneration”, whereby high temperature air is flushed through the system in order to burn off the collected particles on a regular basis.

The temperatures generated during this process can be up to 600°C, which destroys the soot particles but also deteriorates the DPF material over time and can lead to a catastrophic failure of the substrate.

Replacing a worn/damaged DPF can cost anywhere between \$3000-\$8000 for passenger vehicles to over \$50,000 for

underground mining vehicles.

Selective Catalytic Reduction (SCR) systems
SCR systems are an active emissions control technology that uses industrial grade urea as a catalyst to convert toxic NOx gasses into nitrogen, carbon dioxide and water – all of which exist naturally in the air already.

Typically Ad Blue, the fluid used in the catalytic convertor fitted to exhaust systems, is added to the process to assist in treating harmful contaminants before they are emitted.

The importance of DPF and SCR maintenance
As the diesel ash builds up inside the DPF, it increases the back-pressure and restricts the flow of air running through the exhaust

system, reducing the overall performance and increasing fuel consumption of the vehicle.

Regular cleaning extends the life of the DPF, increases time between regenerations, and can prevent the hassle of unwanted downtime.

Carbon cleaning fluids added to the tank often end up with a large amount of built up sludge inside the DPF, which prevents the onboard regeneration process from being effective as the sludge completely blocks the hot air from being able to pass through at all.

With SCR systems where Ad Blue is added to reduce the harmful exhaust gasses, the product can occasionally crystallise and set like concrete inside the SCR leading





to restricted air flow and increased back pressure.

Flash Cleaner

Traditionally, cleaning a DPF meant cutting it apart and exposing the parts to extreme temperatures, much like an on-board regeneration process.

Enviro Exhaust uses a patented Flash Cleaner Machine that provides an effective and environmentally solution to cleaning DPFs and SCR systems.

The Enviro Exhaust flash cleaner machine is imported from Italy and achieves 98% of the original new condition with certified results without the need to cut/reweld/bake the DPF.

The technology guarantees complete

removal of contaminants such as PM10, cerium and other oil deposits without damaging the filter.

The technology can clean every kind of filter and catalyst device on cars, buses, trucks, plant and mining equipment.

Unlike other machines in the industry, the Flash Cleaner is designed to completely clean and dry the DPF or SCR device in one cycle, allowing a same-day turn around.

Enviro Exhaust provides back-pressure tests both before and after the cleaning to ensure results.

How Does Flash Cleaner Work?

Flash Cleaner Machine uses a chemical back-flush system with air pulse to assist in clearing contaminants.

The DPF or SCR is placed inside the machine and eco-fluid is flushed through the unit, washing away contaminant build up without the need to expose the part or materials to extreme temperatures as would usually be the case with traditional regeneration techniques.

About Enviro Exhaust

Enviro Exhaust is a division of Global Heat Transfer Australia, which has been in business since 2003 and has serviced locations all over Australia that includes Maddington (WA), Mackay (QLD), and Granville (NSW).

The staff at Enviro Exhaust are not only trained to clean and maintain the DPFs from small vehicles, to government-owned buses, right up to heavy mining equipment - but also to assist in diagnosing problems with

the diesel system as a whole which can help to reduce the rapid buildup of diesel soot in the first place.

The company's patented Flash Cleaner Machine is a cost-effective, time-effective and environmentally friendly solution to maintaining and extending the life of any DPF or SCR system.

Videos of the machine can be shown in action on their website, and the results speak for themselves. **AMR**

SOURCE
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W dpfclean.com.au



SWISS EXCELLENCE

Much has been written about the threat of suspended particulate matter to worker health on mine sites, particularly the health costs associated with long-term exposure to diesel emissions. At present, diesel emission exposure standards revolve around a level of 0.1mm/m³.

It is now widely established that exposure to diesel exhaust fumes increases the risk of lung cancer in mine workers.

To combat this problem, companies have invested heavily in improvements to diesel engine technology to reduce the health hazards posed to the workforce by diesel exhaust exposure.

These improvements in diesel engine technology have reduced the size of particulates, but as particle size has reduced, the need to monitor and measure the threat

posed by exposure to nanoparticles has expanded.

A nanoparticle is an ultrafine unit with dimensions measured in nanometres (nm). It is important to track and measure exposure to nanoparticles because it has been demonstrated that these smaller particles appear to be more toxic than larger particles, although they have a very low mass. This is explained by the larger surface area of the smaller particles.

The particle surface is the place where our body/tissue interacts with the particles. Particles can transport adsorbed toxins on their surface, or their surface can act as catalyst inside a cell, creating reactive oxygen species. There is clear evidence that surface area is a more important metric than particle mass or particle number for biopersistent particles.

It is important, therefore, to track and measure lung-deposited surface area (LDSA), as it appears to be the most relevant physical metric for quantifying exposure to particles.

The Naneos Partector 2 is a wearable aerosol dosimeter that is the most sophisticated, elegant and advanced monitoring system on the market for LDSA measurements.

But it does so much more than just this one vital measurement. Specifically, the Partector 2 is designed to capture five key metrics that operators need to properly monitor and interpret nanoparticle exposure.

These are LDSA, particle number concentration, average particle diameter, total surface area concentration and ultrafine particulate mass (PM0.3).

The concentration ranges are as follows: for LDSA 0-12,000 $\mu\text{m}^2/\text{cm}^3$, for particle number concentration 0 - 106 cm^3 , for total surface area 0 - 50,000 $\mu\text{m}^2/\text{cm}^3$ and for particle mass PM0.3 0 - 2,500 $\mu\text{g}/\text{m}^3$.

In terms of particle size, the Partector 2 measures from 20nm-150nm (fixed deposition voltage) and 10nm-300nm (adaptive deposition voltage). The response time for measurements is user-adjustable at 2, 4 and 8 seconds.

For a non-laboratory, hand-held field device, the precision of the Partector 2 is remarkable. Its typical accuracy rates lead the industry in portable measurements, to the point where it can compete with the precision of a tightly controlled laboratory environment.

The measured data is presented on an elegant graphical display screen and stored on a μSD card. One particularly smart feature built into the graphical display function is the colour-coding system for LDSA data.

The figures are classified in green, yellow and red colours, depending on the values picked up by the device. LDSA values below 50 $\mu\text{m}^2/\text{cm}^3$ are displayed in green, values above 250 $\mu\text{m}^2/\text{cm}^3$ in red, and values in between in yellow.

This elegant visualisation feature means the worker can see clearly and immediately if levels are safe (green), approaching dangerous levels (yellow), or are at unacceptably high levels (red).

The display screens also show a wide array of relevant statistics and figures which the worker can immediately access, including ambient environmental data such as temperature and altitude along with specific statistics related to nanoparticles.

The data is captured and displayed in real-time, and so the worker is never in the dark about his operating environment or exposure levels.

Crucially, an alarm system can be input into the Partector 2, and when certain thresholds are met or breached, the device will produce an audible warning through its own internal buzzer, or a louder additional external alarm box with audio and visual signals.

What's more, future iterations of the Partector 2 promise an even more refined alarm system. An exciting feature presently in development is the promise of a trigger function, whereby a breached threshold can trigger an email or SMS text to alert the responsible party of the breach, and so give workers and management the opportunity to immediately assess the danger, just the kind of sophistication that world-class mining operations need to effectively manage and contain problems.

The Partector's sharpened and expanded range of monitoring comes from 10 years of concentrated research and innovation.

Based on the principle of aerosol measurement with induced currents, the technology simply outstrips anything else on the market at present. Using a method of non-contact detection by induced currents, Naneos instruments are made more reliable and robust, allowing for longer service intervals.

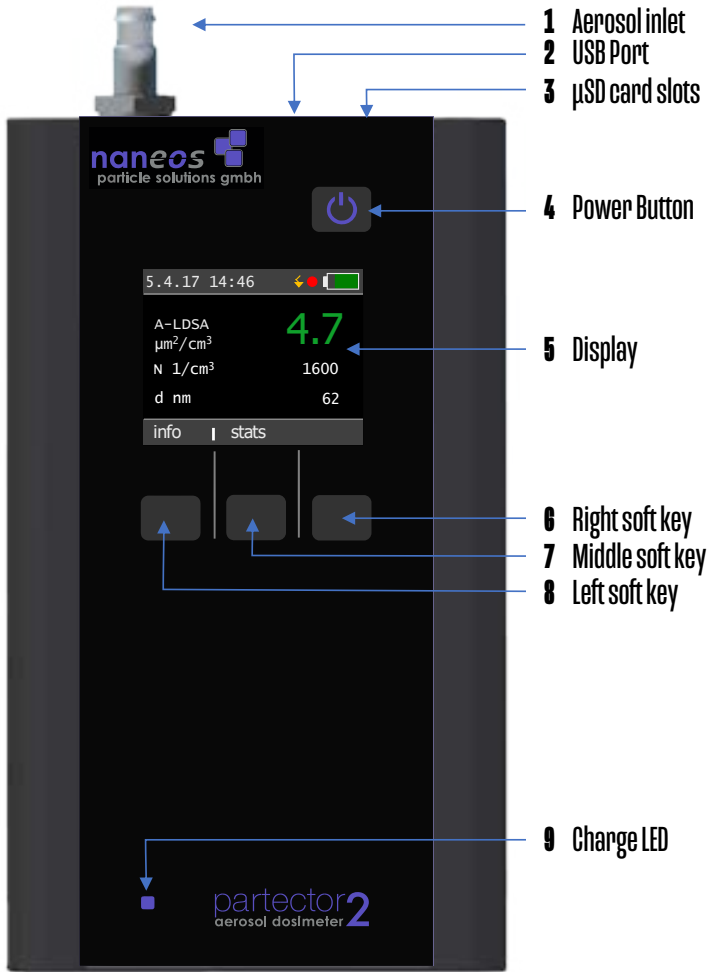
What is most impressive about the Partector 2 is that this technological sophistication is integrated into a monitoring system that is remarkably light-weight and compact. Indeed, it is the world's smallest multi-metric nanoparticle detector. It weighs just 420g, and holds dimensions of 8.8cm by 14.2cm by 3.4cm.

This makes the device easily attachable to a worker, either to a standard-issue miner's belt or to a lanyard over the shoulder, and it's something that won't get in the way as workers go about their workday.

An innovative new application for the dosimeter is to attach it to a drone and



The compact Partector 2 linked to PC and android smartphone.



The main parts of the Partector 2.

follow trucks from an elevated position as they move around the mine site.

In this way, operators can track nanoparticle exposure from the operations of heavy machinery at every point across the site. Though this function has yet to widely penetrate operations across Australia, it is used to great effect throughout Europe and the United States.

Altogether, the compact design of the Partector 2 constitutes a marked improvement on the old method of using Condensation Particle Counters (CPC) to measure nanoparticles.

These hand-held devices are difficult to set up and they're not compact and wearable like the Partector 2. Furthermore, unlike a standard CPC, the Partector 2 is orientation-independent, which means it can measure accurately regardless of whatever position it is in. With a CPC, any slight deviation from a flat and stable surface can distort results. With the Partector 2, operators won't have this problem, saving them time and reducing stress on the job.

Every part of the device is manufactured to a heightened degree of excellence. It features a 12Wh rechargeable lithium-ion battery, capable of running for up to 22 hours.

To charge it, simply connect the device via USB to a USB-charger or to a running PC or laptop. Operating temperature is between 0-40°C, relative humidity range is 0-80% and operating height is from 0m-3000m.

Taken together, this means the device can withstand the kind of of harsh conditions common across both open cut and underground operations throughout the country.

Any serious operation knows that real-time data capture, transmission and analysis is crucial for ensuring a sophisticated and effective monitoring regime. The Partector 2 excels in this area.

Alongside the remarkable hardware built into the device is an equally impressive Java data analysis tool that runs on all major operating systems.

The data is re-configured into easily readable graphs and charts, making the assessment process easy and swift.

The data can be exported into most conventional software packages including excel, which can then be extrapolated and transformed into any kind of report the operator desires.

What's more, there are few limits to the amount of information and data that operators can process via a range an integrated data management software packages.

Transmission of data is also simple. The Partector 2 can send data via wireless communication to an android smartphone, which in turn displays real-time charts of measurements. This is useful if the unit is placed in an inaccessible location or if the display cannot be read due to its mounting or carrying method.

Alternatively, the Partector 2 can be linked to dedicated IoT hardware, allowing for the remote real-time monitoring and visualisation of data on a website-based measurement data visualisation platform.

The latest iteration of the Partector 2 also features an impressive Google Earth plotting function. With location tracking and the android app, operators can plot where they've taken a sampling, and the movement they've taken throughout the workday. The dosimeter will then track that back to the Google map function, and operators can see the pathway and the readings along the pathway.



The Partector 2 attached to a drone.

This is a particularly welcome innovation because it means those responsible for maintaining safe exposure levels can precisely pinpoint dangerous working areas, and instigate mitigation strategies.

Another welcome feature of the Partector 2 is the fast and simple set-up process. Where other devices take up to five minutes to turn on and get going, the Partector 2 takes just 30-seconds. Over time, this means a significant time-saving for operators. What's more, complicated training isn't required to quickly and immediately draw benefits from this ingenious device. The data is stored on a spacious μ SD-Card, which allows for many of years of data.

To begin using the Partector 2, insert the μ SD-Card with contacts facing downwards into the Partector 2 until it snaps in. Once turned on, the instrument writes data onto the μ SD-Card automatically until it is turned off. A blinking red dot on the main screen indicates that data is being stored. To end

the measurement process, simply press and hold the power button for two seconds and the device will turn off.

Mine Tech Australia, a technical contract mining services provider involved in bringing new and innovative end solutions into the mining industry, is the distributor for this remarkable piece of technology.

Founded in 2016, the company has quickly established a reputation for excellence across a vast range of services in addition to its role as a distributor. Its personnel have deep and extensive experience in the mining arena, and whether it's proximity control systems, fire suppression systems, thermal fragmentation mining or high-angle access and geo-technical control, Mine Tech Australia's technical and practical experience and unique fleet of equipment can provide operators with a diverse set of highly-refined services.

Its extensive offering of high-end services

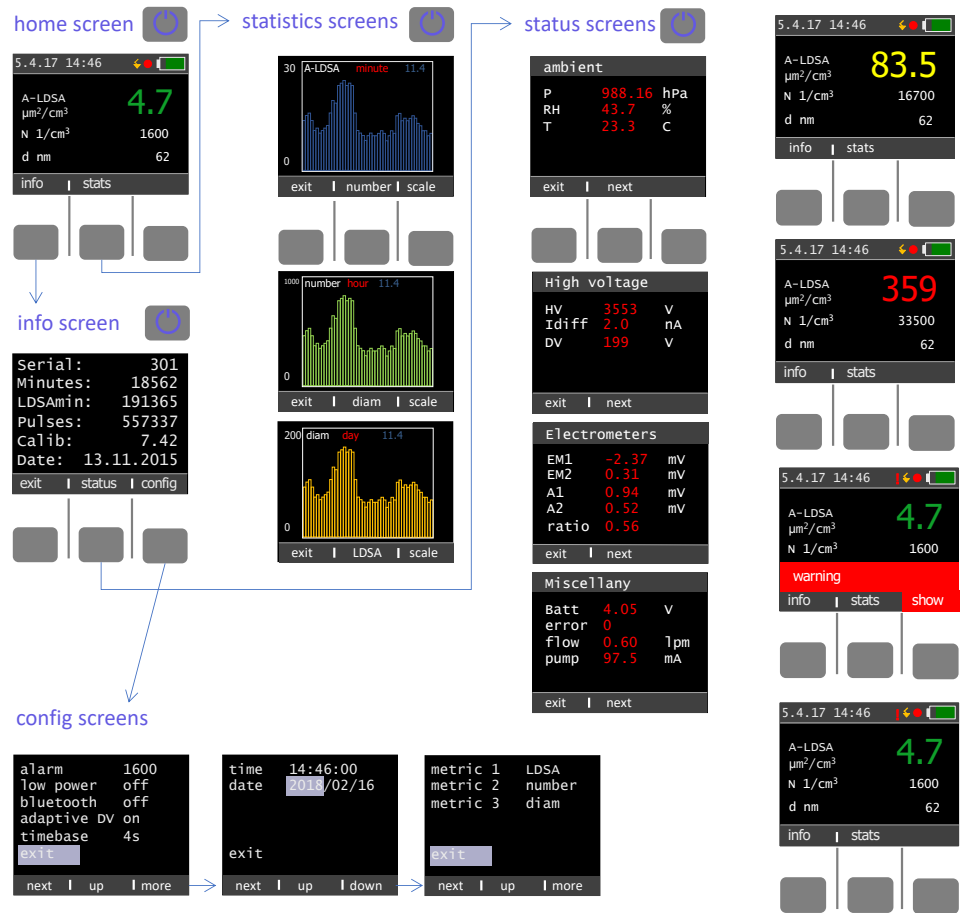
and its supply and distribution wing make it an exciting presence in Australian mining. Based in WA, Mine Tech Australia can service any mine site across the country.

The Naneos itself is the product of highly refined Swiss research and innovation, and it is fitting that a company like Mine Tech Australia should be trusted with the distribution of the Partector 2 across Australia.

Switzerland has a rightly earned reputation for excellence, and the Partector 2 is the latest example of Swiss excellence. It promises refined measurement capabilities encased within a single, elegant package.

It's an important and necessary addition to any worksite dedicated to the health and well-being of its workforce. **AMR**

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The extensive display features of the Partector 2.

GLOBAL REACH, LOCAL PRESENCE



Robust communications and high data transfer rates are among the many requirements during an exploration phase. Mobility and the ability to link disparate systems such as radio and satellite can be a more cost-effective solution to keeping in touch across large remote areas.

With many minesites located in remote regions, efficient communication can often be a problem, posing challenges that are vital to business operations.

It goes without saying that it is essential for personnel to stay in touch at all times, to ensure not only efficiency but also for safety reasons.

In the modern era, miners are indeed fortunate that technology has advanced to the stage where satellite communications solutions exist to help improve contact procedures, which can range from simple voice and data, to corporate VSAT bandwidth connectivity solutions, anywhere in the world.

Australian Mining Review spoke with the Applied Satellite Technology Group, a leading global provider of end-to-end satellite communications solutions, incorporating a comprehensive range of terminals and devices, high quality voice and data services, and world-class value-added services.

Performance and Passion

AST supports all stages of a mine operation from early exploration to full exploitation. As requirements will vary significantly, the company provides solutions to meet the needs from lone worker safety to complex communication systems, and asset

monitoring and management.

With nearly 30 years' experience in the mining sector, the privately-owned technology group is an expert in providing all requirements to enable the efficient running of mining sites from initial exploration, construction to production, and ongoing maintenance of all communications solutions.

AST provides real-time progress with live video coverage over satellite, reducing travel and personnel expenditure. The company prides itself on being at the forefront of satellite communication technology through research and innovation.

For example, the company's Active Data is a significant technological advancement which enables secure, encrypted, high quality, real time voice, video and data transfers from remote mining locations.

Its cost-effective solutions provide access to data, internet, radio, telephone, video and satellite television, improving routine operations that are essential for both business and management, as well as improving staff morale.

With the ongoing developments of its unique INTEGRA Control platforms, AST is able to deliver real-time control of the applications using clients' satellite connection.

Users can set traffic volume limits by application category, prioritise bandwidth for business-critical applications and stop usage allowance from being consumed by unwanted data. Shaping bandwidth by application category allows them to preserve bandwidth and ease congestion, providing more consistent performance over time.

AST's intelligent global IP network delivers reliable, end-to-end VSAT and L-band connectivity with multi-layered cybersecurity controls, optimised performance and data management capabilities, bringing a more efficient and cost-effective way to achieve global connectivity.

With the largest, most comprehensive global VSAT broadband service available, AST's custom-designed network offers near 100% uptime with a minimum of 10Mbps to support the connectivity needs of customers.

Features include:

- A Committed Information Rate (CIR) that guarantees the contracted bandwidth
- Maximum Information Rate (MIR) that enables temporary "burst" when available
- A network platform which supports

Automatic Beam Switching (ABS) to allow for overlapping satellites and portable bandwidth

- Automatic satellite power adjustments ensuring reliable connectivity, even in harsh weather conditions
- No usage restrictions or Fair Access Policy
- End-to-end private networks which can be provisioned with VPN tunnels or via last mile
- Connectivity from AST's PoP to client offices ensuring secure corporate connections
- Bandwidth which can be increased on demand

Production: As the mine site progresses into production, the same VSAT system can also enable critical applications such as monitoring of site security, surveillance, access control, alongside asset tracking and management, from anywhere in the world.

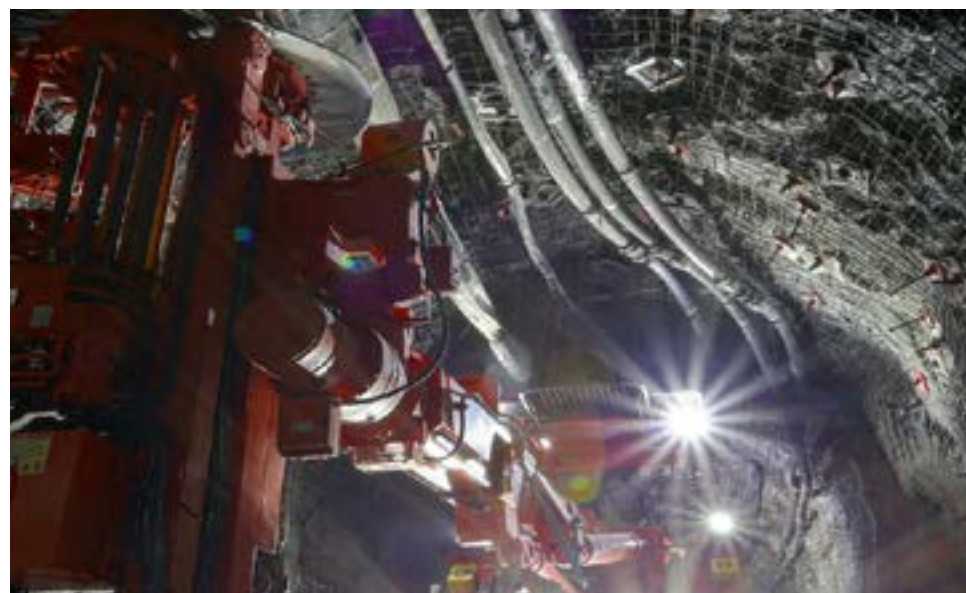
Construction: During the construction phase, communications will be at their highest with voice and data being used at an extreme rate. During this period, a fixed VSAT system is most often recommended, allowing for high bandwidth usage and full

THE AST ADVANTAGE

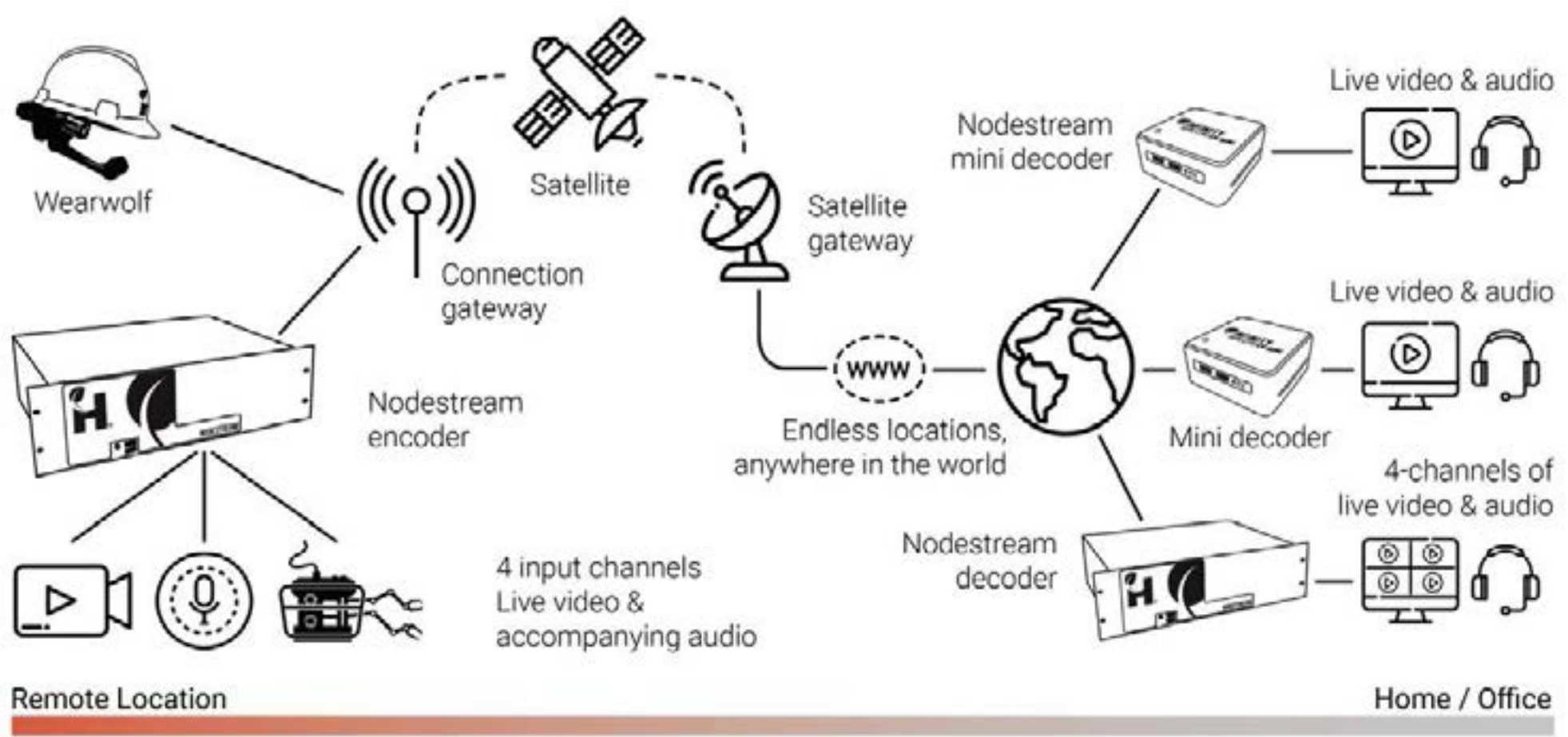
With truly global service and a local presence, AST is uniquely positioned to offer independent, unbiased advice to ensure customers receive the best communication solution to meet their business needs at a cost-effective price, anywhere in the world.

- 24/7 support and maintenance
- Providing comprehensive VSAT support from the network operation centre and remote troubleshooting via Team Viewer
- AST's 24/7 Global Customer Support team are always on hand for technical support via email, telephone, skype and live chat
- Cobham Satcom certified repair centre
- Fully trained in-house engineering capabilities
- Installation engineers available locally
- Customer training (in-house or external)
- Advanced warranty replacements available
- Equipment shipped with latest firmware
- Repairs and advice

During construction phases, a fixed VSAT system is most often recommended, allowing for high bandwidth usage and full network management via INTEGRA from AST.



As the mine site progresses into production, the same VSAT system can also enable critical applications such as monitoring of site security, surveillance, access control, alongside asset tracking and management, from anywhere in the world.



By utilising satellite, cellular and/or wi-fi, AST Active Data provides a cost effective solution to keeping in touch with live video and voice across large remote areas. Image: Harvest

network management via INTEGRA from AST.

Exploration: Robust communications and high data transfer rates are among the many requirements during an exploration phase.

Mobility and the ability to link disparate systems such as radio and satellite can be a more cost effective solution to keeping in touch across large remote areas.

The Whole World in its Hands

The AST Group has provided satellite and radio solutions to all major mining companies across the world. With offices in six continents, AST is able to provide a truly global service with offices situated in key cities to facilitate urgent requirements or support if needed.

AST Australia has offices in Brisbane, Sydney and Perth. The local presence and continual investment in data networks, software and support services have enabled AST to maintain a position at the forefront of remote IP management and delivery, catering for voice, fax, data, asset tracking, M2M, video, and IOT.

High quality customer service has always been key to AST’s success, ensuring strong customer satisfaction and confidence. As an ISO 9001:2015 Quality Management certified company, AST has provided large

integrated, complex satellite services for various key projects, both to locally based companies and international corporations.

According to AST spokesman James deVroome, meeting customers’ objectives means thoroughly understanding the context and the specific and wider needs to ensure that the appropriate technology package is provided to cater for mining industries’ remote connectivity challenges.

“Unlike many of AST’s competitors, the AST Group has no debt, loans or other financial constraints with profits being re-invested back into the business,” he said. “What this means is that AST is capable of weathering technical or financial difficulties as it has done since commencement and continues to do in the face of the current global pandemic.

“We also are one of few which has a complete and truly manned 24x7x365 fully trained technical and customer support team.”

Case Study

One of the world’s largest mining companies approached AST to provide a solution to enable a team of mining executives, investors and engineers from around the world to collaborate upon a new project in West Africa without the need for travel and co-ordination of personnel. They had previously missed project

milestones and experienced major delays in the decision-making process due to travel restrictions and co-ordination logistics.

AST, working closely with its partner Harvest Technology Group, a remote monitoring and communications specialist, assisted by providing a vehicle-mounted camera and antenna system where remote live video and voice from the minesite was fed, via satellite, simultaneously to the companies team based in London, Sydney and Cape Town.

The solution was easily deployed by existing staff at the minesite by utilising a four wheel drive vehicle, driven on a set schedule, to provide live streaming of the progress via video coupled with personnel wearing hard hats fitted with mounted cameras to provide a more detailed view of specific areas of interest.

By utilising satellite technology and AST Active Data, the company was able to meet its time scales for the project with no delays and reduced expenditure, both in terms of travel and personnel costs.

Immediate decisions could be made during the broadcast and investors were given the opportunity and reassurance of seeing progress on the site in real-time.

Stay Active

The AST Active Data solution is suitable for a range of uses from remote assistance, inspection, audits and surveillance for the mining, maritime, oil and gas, transport and first responder sectors.

Using high quality, robust hardware and reliable connectivity solutions, the AST Active Data solution allows flexible, secure, low bandwidth video and voice to be distributed to multiple feeds via point-to-point from anywhere in the world via satellite, wi-fi or cellular networks, in real-time.

Whether viewed on a PC, tablet or mobile phone, the data can be live streamed across the world, providing a cost-effective solution to keeping in touch with live video and voice transfer across large remote areas. Multiple video feeds are also a feature of this ground-breaking technology.

By utilising satellite, cellular and/or wi-fi, AST Active Data provides a cost effective solution to keeping in touch with live video and voice across large remote areas. Using superior-grade video mounted helmets, satellite connectivity equipment and easy to use software, users can be up and running within moments. **AMR**

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Using high quality, robust hardware and reliable connectivity solutions the AST Active Data solution allows flexible, secure, low bandwidth video and voice to be distributed to multiple feeds via point-to-point from anywhere in the world via satellite, wi-fi or cellular networks, in real-time.



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DUSTROVER NEW FRONTIER IN INTELLIGENCE

The DustRover is a compact monitoring system that can be installed on mobile equipment to monitor ambient dust levels and other environmental parameters required for determining the condition of the mine site haul roads and roadways.

The system's integral GPS tracker provides detailed information on the vehicle's current position, speed, and elevation.

By tracking and recording the vehicle location together with the dust levels and environmental parameters, valuable localised data is continuously available to mine site operators that will enable them to suppress dust levels in specific problem areas around the site.

Tyre wear is an important consideration for all haul trucks. The DustRover gives you the ability to deploy water carts when and where they are required for dust mitigation activities and to maintain optimum road surface temperature and moisture levels.

The DustRover can be fitted with an accurate non-contact temperature sensor to provide operators with up-to-date haul road temperatures relative to the vehicle location.

Primarily, a network of DustRovers are deployed on haul trucks and water carts to monitor data across the whole pit area. However, the system can be as simple as a single system mounted to a light vehicle deployed to record data as it is traveling around the pit.

Reducing dust levels during surface mining activities can effectively reduce the overall mine airshed dust levels and assist in reducing exceedance levels recorded on the mine ambient dust monitors.

It is important to reduce the magnitude of dust plumes before they reach sensitive receptors such as the mine administration/accommodation areas and surrounding towns and properties.

Mine site operators can view the DustRover's comprehensive data-set on a web-based dashboard, which is continuously updated to ensure that the operators can make informed decisions on precisely where and how to manage and enact dust mitigation measures.

The live dashboard displays the current vehicle location on a map as well as the vehicle track. Dust levels and temperature data are also displayed on the dashboard.

Sensor Set Options

- Dust Monitor
- GPS
- Road surface temperature
- Ambient temperature/ Relative humidity
- Water Flow
- Vibration monitoring

Track Monitors and Sensors

The dust monitor used in the DustRover system is a robust monitor that can effectively measure the low to very high levels of dust encountered in mining applications.

Dust monitors for ambient air monitoring employ light or beta measurement principles to measure dust. These monitors require routine maintenance, are large, and

are generally not robust enough for mobile vehicle applications.

By contrast, the DustRover dust monitor measurement principle is based on the successful Inductive Electrification Technology. By using this technology in the DustRover system the dust monitor requires limited maintenance, no routine maintenance, and for trend monitoring only applications no calibration is required.

The monitor is robust enough to withstand wash-down and cleaning without permanent damage to the sensing system. The primary dust monitor is mounted on the rear of the vehicle usually near the axle or wheel arch.

However, when ambient/airshed monitoring is required around the pit, a second monitor can be installed at the front of the truck in an elevated position. This rear monitor provides an indication of the dust concentration near the road surface and during tipping.

The DustRover's road surface temperature sensor is a non-contact infra-red temperature sensor that is mounted off the side of the vehicle to measure the instantaneous road surface temperature.

The sensor can be mounted up to 5m above the road surface, well away from any water spray and road debris. Surface temperature readings are taken every few seconds at the same rate as the GPS data is recorded.

Operators can use the current vehicle location and temperature data to assist in detecting changes between wet and dry road surfaces. In this way, water usage can be minimised by only wetting down dry surfaces.

Optional Ambient/Pit Airshed Monitors and Sensors

The system can be supplied with an optional ambient station mounted at the front of the haul truck.

This station includes a dust monitor with a temperature and relative humidity sensor and is used to not only provide ambient dust concentrations in the pit, but also provide a reference between the current ambient air temperature and the road surface temperature.

By tracking the temperatures and localised humidity readings, additional information can be gained that will better inform operators of the current pit environment.

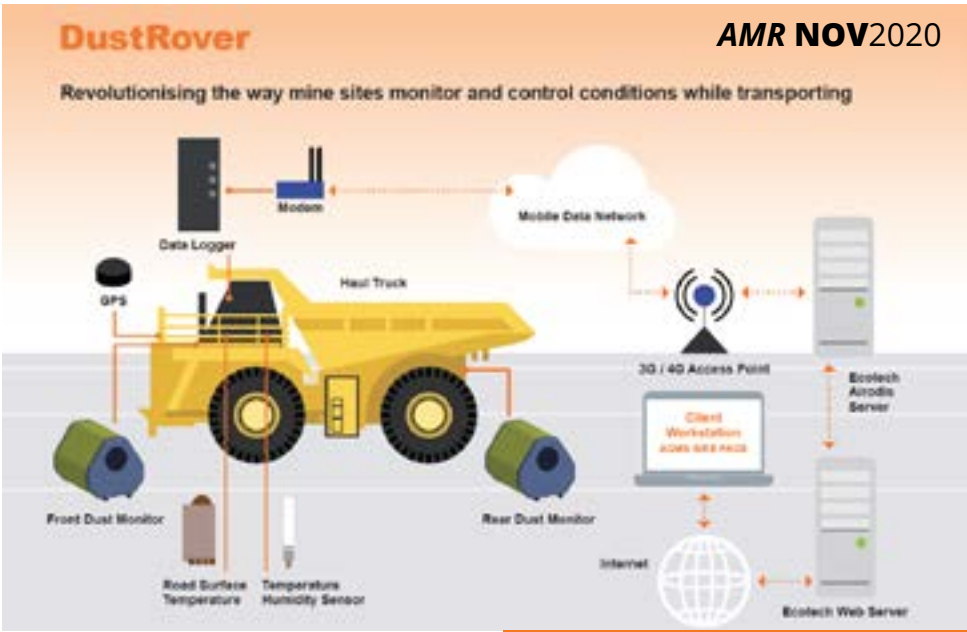
The sensor is installed on the vehicle in an area where radiated heat is at a minimum. A multi-plate radiation screen is supplied with the sensor to ensure that the readings represent the true ambient conditions.

Additional screen options are available if the sensor is in location on the vehicle in an area that is prone to being impacted by water during washdown activities.

Operations Dashboard

Data is logged every few seconds and can be continually uploaded from the system to provide up-to-date information on the vehicle location and road environmental parameters. There is also an option to push data from the system to an FTP server that enables data to be uploaded into multiple databases.

The basic system can log dust and position



The complete DustRover system.



DustRover communications box, monitor and GPS.



The Airodis map feature with colour-coded tracking.

and options allow for additional logging of the road surface temperature and ambient temperature and humidity levels.

Web Page

A secure web-based dashboard is used to view the readings from the network of DustRovers. The page can be viewed on an operator workstation and/or a large screen monitor in a control room.

The dashboard displays a coloured vehicle track that indicates the vehicle's current location within the pit. The truck's tail displays roads recently travelled. The track dynamically changes colour as the dust levels change. This enables the operator to view the trending dust levels from either a single vehicle or multiple vehicles.

Track colours used are:

- Green - Dust conditions below background levels
- Yellow - Dust levels are above background levels
- Red - High dust levels, dust mitigation required

A tabular display on the dashboard displays the following information:

- GPS Data
- Dust Levels
- Track Temperature

The operator can also use the dashboard to display historical data to review recent dust events and fine-tune dust

mitigation strategies.

Other Uses

The DustRover's modular design means that the monitor can be easily adapted for alternate mine site monitoring applications. The high measuring range and robust design of the dust monitor ensures that it can perform at extremely high dust levels; ideal for use as a trending tool to monitor peak dust events.

Alternate Uses

- Monitor mineral tipping payloads
- Conveyer systems under belt dust levels
- Rail car dumping activities
- Conveyer transfer station monitoring
- Gathering data on the effectiveness of dust suppression treatments.

Several dust monitors can be connected to via a multidrop data link and be monitored by one logger module. This is advantageous when monitoring multiple levels on a conveyer transfer station or along a conveyer belt.

The GPS system can still be utilised to show and record the location of a particular dust monitor cluster. Conveyer temperatures can also be monitored in the same way in that a series of connected sensors can feed to a single data logger unit. **AMR**

DustRover

The tailor-made solution for haul truck and mobile vehicle dust monitoring



Meeting the demands of Australian mining - DustRover's efficient system can identify and alert workers to any dust spillage event or change of conditions in the mine pit itself, in stockpiles, on conveyor belts or on haul tracks.

Dust emissions from mining sites are generated during the hauling process. If left uncontrolled, they can become a health and safety hazard by impairing the operator's visibility and increasing the risk of haul truck accidents.

Accurate monitoring of dust emissions during hauling is critical to help protect the health and safety of mining employees and local populations.

DustRover's proven ability to effectively monitor dust also improves productivity, reducing the cost of tyre wear and tear, and enhancing water truck intervention efficiency.

FOR MORE INFORMATION

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McNeill Plastics is the only company in Australia which has the capability and capacity to pour large and complex nylon products up to a size of 3000mm x 3000mm.

PLASTICS FANTASTIC

Plastics are employed for a variety of applications in the mining industry, primarily for bulk material handling and transport.

Material such as UHMW, nylon, and HDPE are excellent for liners in rail cars and trucks, as well as sheaves, gears and other wear-resistant parts, which must operate in harsh environments while moving and aggregating bulk materials in continuous operation.

Plastics are ideal for mining equipment due to their wear-resistance, impact-resistance, and thermal mitigation properties.

In addition, their resistance to corrosion and water allow them to perform better than metal components in sifting, cutting, cleaning, and transport.

Australian Mining Review spoke to McNeill Plastics, a wholly Australian-owned and operated plastics manufacturing and engineering business with nearly 50 years of experience across industrial plastics.

More about McNeill Plastics

The company manufactures custom cast components. The Austlon® cast nylon products are Australian-made, manufactured in-house at its NSW headquarters.

According to sales engineer Damon Taheri, the cast nylon components are the preferred industrial plastic, and can be found in almost every industry: from mining and materials handling, through to construction, transportation, infrastructure and more.

"Here at McNeill Plastics we provide a complete and integrated plastics engineering service: from design through to custom cast components machining, and more," he said.

"Our extensive industry experience, integrated approach and commitment to innovation ensure we maintain superior standards of service and Australian manufacturing while continuing to be agile and responsive to our customers."

McNeill Plastics and Mining

Damon said McNeill Plastics has extensive experience across the mining industry.

"Not only do we have ample experience and knowledge of the mining sector in Australia,

but we also export our products to mines across the globe: from Russia, to USA, Canada and more," he said.

"In our work with the mining sector, we are able to replace components which are traditionally made of brass or bronze, with Austlon®."

Damon said the benefits of replacing components traditionally made of metals with Austlon®, are numerous and include:

- Cost savings over the long-term as Austlon® lasts longer than other alternatives
- Contribution to a reduction in an organisation's labour costs with regards to replacement
- Reduced maintenance costs due to its longevity and quality
- A higher degree of ease and safety as it is a lighter weight material

Some of the components McNeill Plastics engineer for the mining industry include, but are not limited to:

- Bale arm bushes
- Equaliser bushes
- Wear pads
- Wear plates
- Rollers
- Polyurethane buffers
- Sheaths for drilling machines
- Sliding blocks

McNeill's clients have included giants such as BlueScope Steel, BHP, YanCoal, and Glencore.

A Bit About Austlon®

AustLon® is a high grade engineering plastic manufactured exclusively by McNeill Plastics. It is a monomer cast nylon produced by a unique process known as activated anionic adiabatic polymerisation. This method of nylon production results in a highly crystalline engineering plastic, which means it is tougher and more wear-resistant.

"Austlon® provides mining organisations with components that will outperform and outlast any other alternative materials," Damon said.

"It has consistently proven itself to be the preferred material where issues stemming from abrasive wear, impact strength, bearing strength, noise, weight and corrosion have been difficult to resolve.



AustLon® is a highly crystalline engineering plastic, which means it is tougher and more wear-resistant.



McNeill Plastics engineers can work with mining organisations to design, engineer and manufacture custom cast parts, according to business needs.

“In addition, AustLon® provides superior performance — with and without lubrication — in a range of applications, in particular as a bearing material.

“It is lightweight, offers extremely good wear and abrasion resistance, high mechanical strength and high modulus of elasticity when compared to other industrial plastics.”

Other advantages of AustLon® include:

- High impact resistance
- Excellent noise reduction and vibration dampening
- Resistance to brittleness and UV deterioration
- Low friction due to high lubricity
- Exceptional machinability
- Suitable for the food industry
- Flexibility of design
- Resistance to chemicals and corrosion

“Plus, AustLon® is Australian-made, with 100% of production done in-house at our NSW headquarters,” Damon said. “With AustLon®, mining organisations don’t need to worry about any potential disruption or delay to supply, or be concerned about a lack of quality.

“When mining organisations choose AustLon® and McNeill Plastics, they can be confident they are selecting an engineering plastics partner that outsmarts and outperforms the rest.”

One and Only

McNeill is unique: it’s the ONLY company in Australia which has the capability and capacity to pour large and complex nylon products up to a size of 3000mm x 3000mm.

Managing Director Josh Budd elaborates: “Unrestrained by size or design constraints, our experienced and knowledgeable engineers can work with mining organisations to design, engineer and manufacture custom cast parts, according to business needs.”

Josh said there were numerous benefits of choosing McNeill Plastics for custom casting.

“With custom casting the design possibilities are limitless. Our experienced engineers work with our customers to conceptualise and deliver according to their business needs,” he said.

“This service, combined with our state-of-the-art machining capabilities, means we can provide all component solutions, including CNC milling, turning and component assembly.

“As we are an Australian-owned business that designs and manufactures in house, we can guarantee reliable supply and a quick turnaround time, as well as timely and responsive service.

“And with two headquarters in Australia, companies can be sure they will receive their order, on time, every time.

“And last but not least, our team’s dedication to customer satisfaction and superior customer service is supported by our comprehensive end-to-end quality assurance for every single component we produce.”

Local Heroes

There is no doubt that there are a multitude of benefits in choosing to buy Australian-made products.

“As our manufacturing is done in-house, our customers don’t have to worry about any potential disruption or delay to supply,” Josh said.

“And when it comes to our components, everything we produce is done to Australian Standards, both from a safety, quality and environmental perspective, which means better value for money for our customers.

“The COVID-19 pandemic, and its resultant disruption to supply chains has seen an increase in the demand for Australian-made products.

“With us, customers can be assured they can continue to operate at a ‘business as usual’ capacity, as our in-house manufacturing ensures reliable supply and quick

turnaround times.

“In particular, with mining we have seen an increase in the number of mining companies seeking replication of OEM parts they have been unable to source due to supply chain issues.

“Not only have we resolved the supply issue, but in most of these cases we have also improved the design to an extent that the mining companies are now opting to remove the OEM part numbers from their machine drawings, replacing them with MNP Austlon® part numbers.”

Josh said that alongside the benefits of buying Australian-made products, are the service benefits of working with an Australian-owned business.

“Not only do our customers benefit from home-grown expertise and industry knowledge, but here at McNeill Plastics, we have a long-term vested interest in knowing how to best serve our customers,” he said.

“We’re here from start to finish. From concept to delivery, and beyond. We’re here for the long-term relationship, not just a quick sale.” **AMR**

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McNeill Plastics provides a complete and integrated plastics engineering service: from design through to custom cast components machining, and more.



Managing Director Josh Budd.



Everything McNeill Plastics produces is done to Australian Standards, both from a safety, quality and environmental perspective, which means better value for money for customers.

SLAM DUNKS

Blue tones show underbreak, red tones show overbreak. Stresses inducing buckling on opposite sides of the hole can be seen.

Established in 2019, MINELiDAR is a young Australian company at the forefront of 3D scanning technology, specialising in the application of Light Detection and Ranging (LiDAR) technology in a range of industries including mining, agriculture, forestry, archaeology, environmental conservation, construction and civil engineering.

While the company may be young on paper, the extensive geotechnical engineering background of the company directors offers a distinct advantage of being fully versed in the challenges faced by industry, in particular underground, open pit, raisebore and shaft mining operations.

As Australia's first ever service providers for the Emesent Hovermap and Autonomy Level 2 (AL2) drone-mounted scanner technologies, MINELiDAR is able to offer specialised and customised scanning solutions that go beyond the simple capture of spatial survey data, with applications in

geological and geotechnical mapping and analysis in GPS-denied environments.

The synergies with MINELiDAR's sister company MineGeoTech enable them to offer of technicians, geotechnical engineers and mining engineers to assist in the capture, processing, interpretation and analysis of the results. Furthermore, MINELiDAR is able to provide demonstrations for all Emesent Scanners throughout Australia.

LIDAR – What Is It?

LIDAR technology uses lasers to illuminate a target and measure the reflected light using sensors which convert the information into data for use in visual analysis.

MINELiDAR's scanning technology differs from standard survey technology due to the type and amount of data it is able to capture. While a standard survey Cavity Measuring System (CMS) uses LiDAR to capture spatial data only, MINELiDAR is capable of capturing spatial data as well as using the

intensity of the reflected light to identify and map geological rock types and materials, geotechnical structures, and even ground support such as bolts and mesh.

SLAM

MINELiDAR's specialized Emesent Scanners employs a world leading technology known as SLAM – Simultaneous Localisation and Mapping, which allows mobile mapping in GPS-denied environments (though it does have onboard GPS if required).

Capabilities include recording about 300,000 data points per second, allowing for an accuracy of +/- 3cm or approximately 8mm with repeat scans as the data becomes more dense.

Every time the scan starts, the system creates its own local datum at 0,0,0 then builds its own model based on that.

All that is required to align the data with the operational datum is to pick up a particular

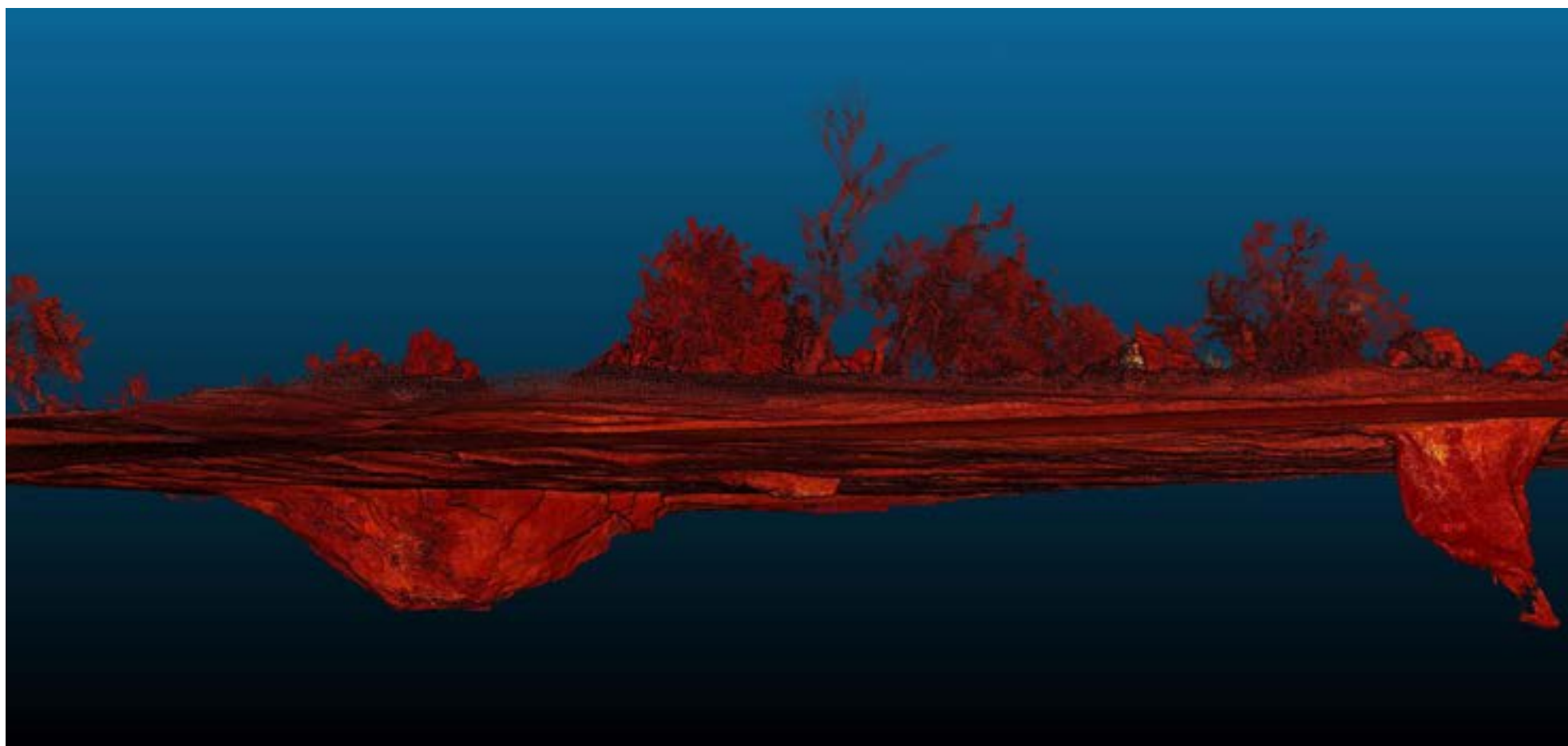
survey peg and map it to that location.

The versatility of the intensity field can even be leveraged to pick up a quick custom datum using something as simple as spraying bright white painted "X" on the wall.

Data Collection Handheld Scanning

The LiDAR scanners are portable to such an extent that they can be carried by hand at normal walking speed. A great benefit of walking scans is that the user is free to move the scanner around so that he can scan underneath and above nearby objects.

Handheld scanning can be used to map the location of rock bolts, blast holes, equipment or pipe work. Furthermore, the process can be used to highlight areas of water inflow, measure displacement or chance between two or more scans, identify changes in geological units, measure the thickness of a pillar or wall, and create high resolution as-built models of buildings, excavations or



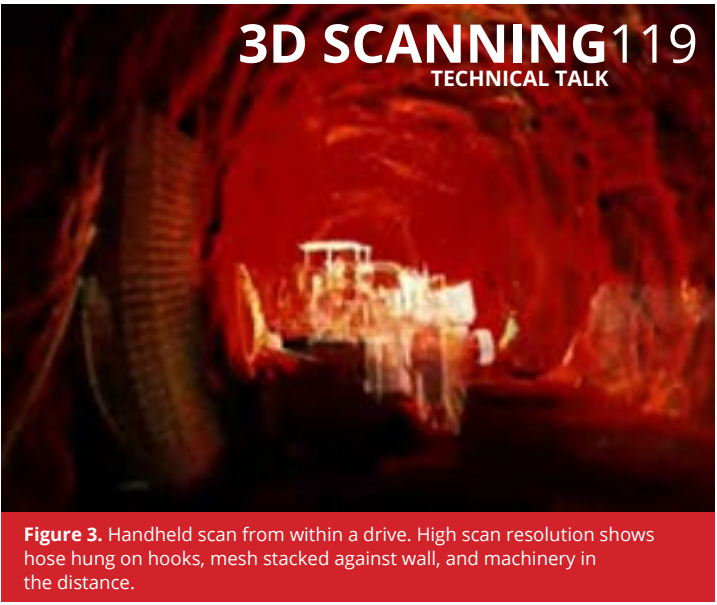
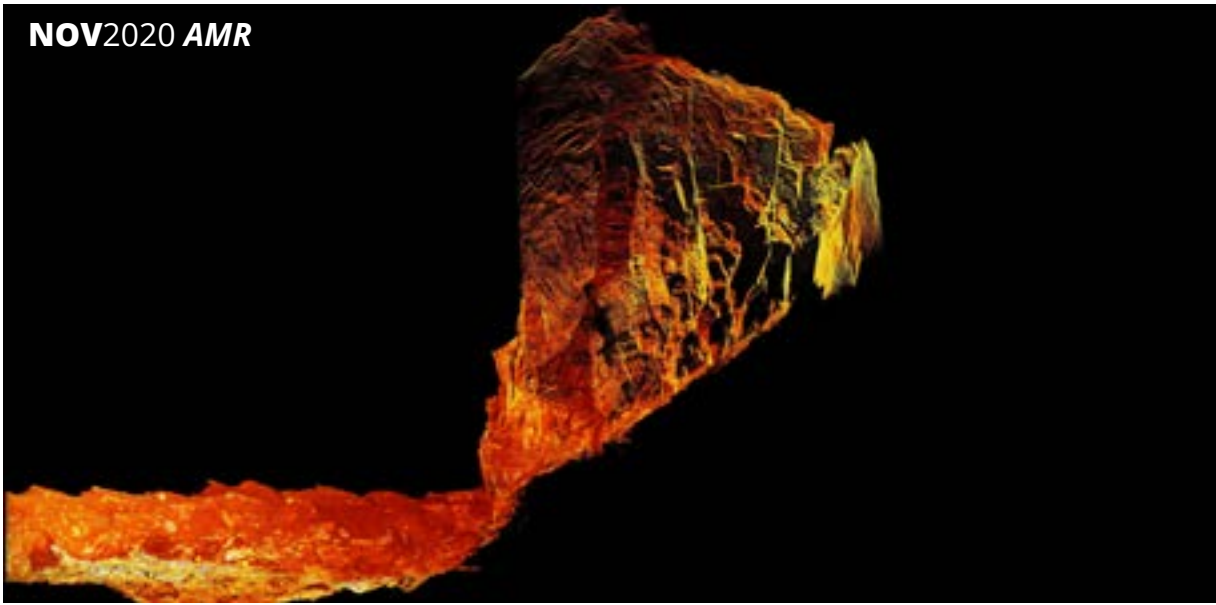


Figure 3. Handheld scan from within a drive. High scan resolution shows hose hung on hooks, mesh stacked against wall, and machinery in the distance.

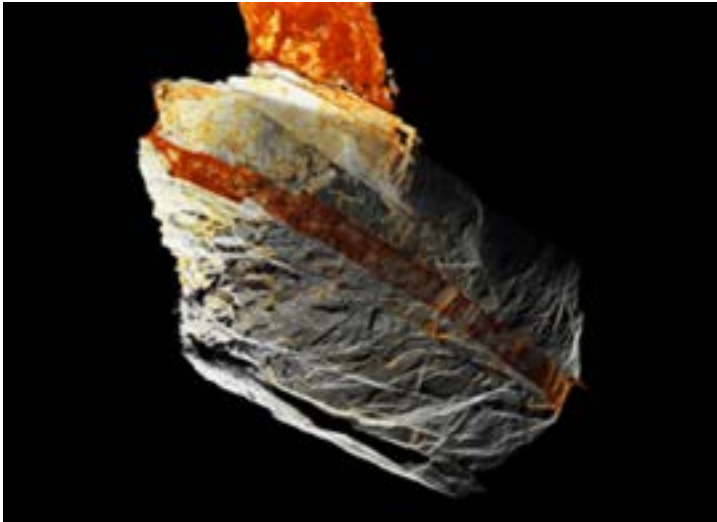


Figure 2. Plan View – Dyke has been identified using the light intensity field.



infrastructure.

Vehicle Mounted

MINELiDAR is capable of mounting its Hovermap scanners on almost any vehicle (e.g. light vehicles, heavy vehicles and even remotely operated equipment which can be useful for scanning of areas considered too hazardous for personnel to enter).

Because of this, MINELiDAR is able to rapidly map entire underground tunnel systems, identify location of pipes and services within a tunnel, and conduct repeat ground movement scans on roadways, tunnels or infrastructure corridors.

Drone Mounted

MINELiDAR's drones are able to scan and map areas that would usually expose people to hazards (for example stopes, open holes, unsupported ground, and open pits with floors containing voids from old underground workings).

MINELiDAR's drones are operated remotely and don't need a lot of room to manoeuvre. This can be useful in scanning the "blind side" of a bridged stope where a typical survey CMS may suffer from laser shadow.

Winch Mounted

Shaft or Raisebore scans are made extremely easy using MINELiDAR's winched LiDAR scanning devices.

By attaching the device to a winch, scans of up to hundreds of metres can be achieved easily and repeatedly. MINELiDAR can conduct shaft scans up to 1000m deep and over 10m wide.

Imagine a scenario where there is an excess of unplanned dirt appearing at the draw point of a raisebore hole after the raisebore has been completed. Using the winched scanner, the origin of the unplanned dirt can be identified while at the same time gaining information on stress/strain/damage in critical areas of infrastructure.

Combined Scans

The data from all of the above scanning methods can be merged to form a single model that can help provide an even clearer picture.

Applications

MINELiDAR aims to improve a mine's geological and geotechnical understanding of rock structures underground which can then be leveraged for multiple applications – including but not limited to failure mechanism analysis, planning ground support requirements and assisting in ground support quality assurance.

Other applications include:

- High resolution excavation scanning for use in underbreak/overbreak analysis.
- Rock bolt capture for use in quality control (e.g. ensuring correct spacing between bolts etc)

- Using the intensity field, can help to identify more reflective structures (e.g. Quartz veins and other intrusive bodies)
- Identifying and mapping geotechnical structures within mined cavities including stopes as well as wedge formation in a raisebore hole or shaft.
- Stope scanning to ensure the main lode has been fully excavated.
- Scanning can be used to identify and record blasted half-barrels in tunnel, stope and open pit excavations.

Case Study #1: Raisebore Examination 1km Below Surface

In WA, a geotechnical assessment of a 4.5m x 163m raisebore hole required the use of MINELiDAR's scanning services. Overall the scan captured information that led to:





- Confirmation of 90o rotation of the stress field in proximity to a regional fault
- Assessment of numerical modelling criteria to compare forecast deformation against measured maximum overbreak
- Part of the raise with stress spalling and parts of the raise with stress induced damage to structure
- Validation against site seismic system
- Assessment of drillers comments on face stability and empirical face stability
- Comparison of empirical stable diameters with overbreak depth and overbreak areas

- Observation of buckling on one side of the rise and minor fall out on the other
- Assessment of the influence of penetration rate on seismicity and overbreak
- Lithological controls on overbreak

Case Study #2: Tunnel Collapse Scan
A scan of a historic development drive in Eastern Australia captured:

- Tunnel profile from the surge shaft to debris flow clearly showing the blasting profile from the original 1940's development
- Along the debris flow showing block sizes and allowed an estimate of volume of failure

- Scan captured inside the major failure where the use of LiDAR intensity clearly identified a dyke within the fault zone and fault offsets through the dyke (Figure 2)
- The failure surface and rill of failed material
- Failure dimensions measured and failure volume calculated to feed back to bypass tunnel design engineers

Summary
MINELiDAR is bringing the industry forward with its unique and highly versatile scanning system that enables clients to analyse problems that may not be readily visible, and helps eliminate guesswork for any dangerous areas.

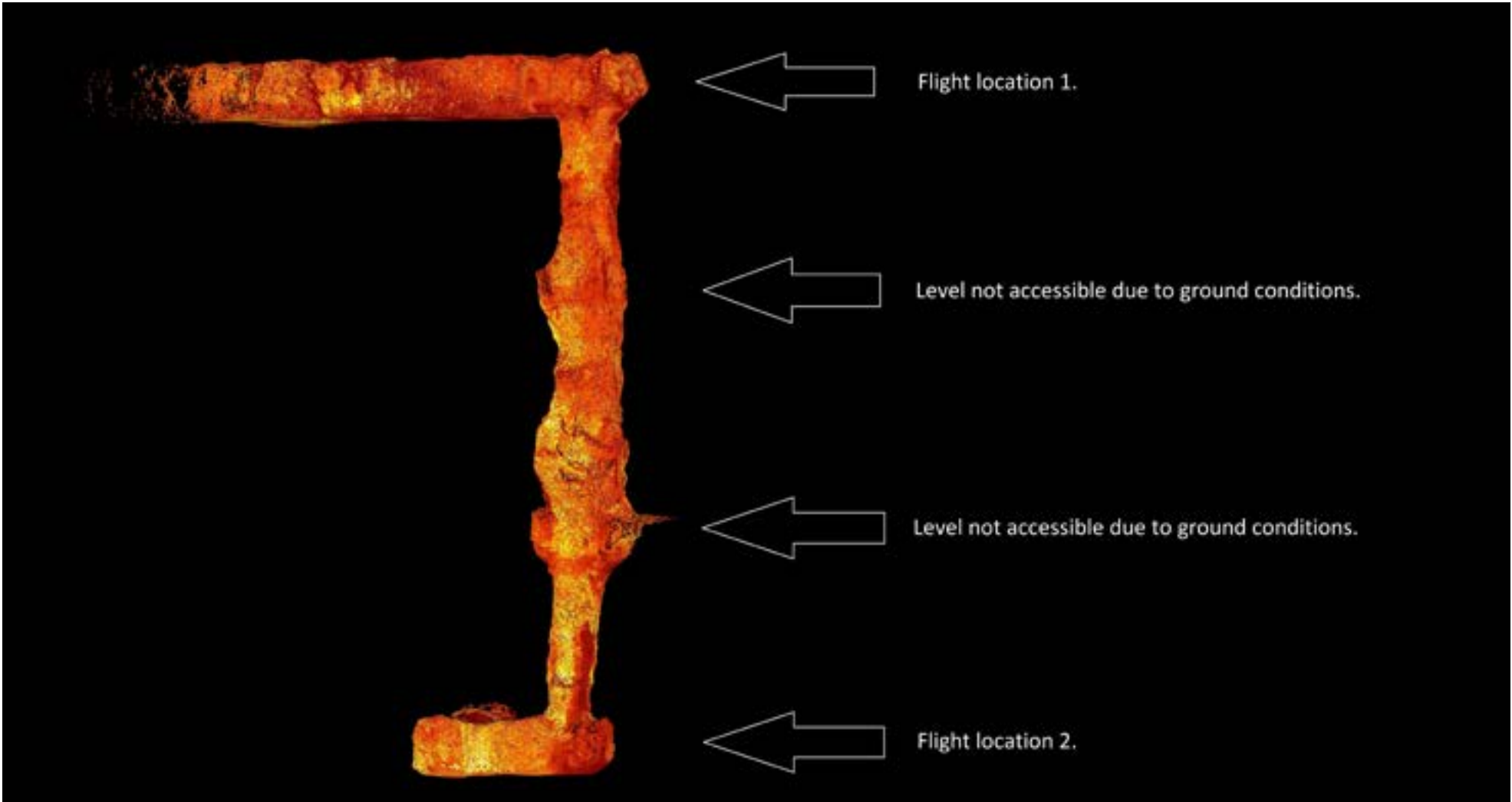
The system is particularly useful for

condition monitoring, helping to gain information on stress/strain/damage in critical areas of infrastructure such as raises, shafts and open stopes.

The ability to mount the scanners to mobile vehicles and aerial drones allows for rapid large scale scanning and compiling of as-built models containing more than simply spatial data which can be used in geological, geotechnical and structural modelling.

It can be used to make informed mine planning decisions that ensure any operation remains safe. **AMR**

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Final assembly of a centrifuge in the Sydney factory.

THE PROCESSING EQUIPMENT SPECIALISTS

In any mineral processing application, fluids are introduced to separate the coarse from fine material, the heavy from the light and the valuable material from the waste. After this, dewatering is essential to remove water or other fluids from the final solid product or waste material.

Dewatering centrifuges are commonly used in various mineral processing applications. A centrifuge is a machine that uses centrifugal forces to separate the feed slurry, based on their density.

When the centrifuge spins, it creates a strong centrifugal force, the solids are then dewatered by passing over a screen. Continuously operating centrifuges are the best solution for mechanical separation of solids from liquids, from a technical and economical point of view.

They can dewater large quantities of solids to low final moistures, while needing little space, energy or time. A simple process, but as with all simple processes – they're never that simple! One company in Australia is well aware of what it takes to ensure a high-quality output, through the use of high-quality equipment and technology.

Siebtechnik Tema is an Australian company that is part of a globally operating group of more than 80 companies and over 3500 employees. The company specialises in manufacturing high quality centrifuge, drying and screening equipment for the Australian and global mining industry.

Originally, the company Siebtechnik GmbH was founded in Germany in 1922, and continues to be a market leader in centrifuge

innovation, design and manufacture. In Australia, the company is already operating for over 40 years (previously trading as Tema Engineers).

It also manufactures a range of other major equipment including vibrating screens, sand filters, settlers and other dewatering equipment (such as belt presses and gravity drainage decks).

Centrifuges

Since the 1960s, more than 1600 vibrating and screen scroll centrifuges have been proudly manufactured at the 4000 m² manufacturing plant in Revesby (greater Sydney, NSW). Siebtechnik Tema predominantly supplies locally manufactured centrifuges for coal and salt dewatering purposes.

Since Siebtechnik Tema is part of global group of companies, the range of centrifuges for other mineral processing applications such as the dewatering of lithium carbonate, lithium hydroxide, nickel sulphate, cobalt sulphate, ammonium sulphate, potash, schoenite and iron ore are part of the standard portfolio.

According to the General Manager Henry van As, the company offers a centrifuge for any application, ranging from small laboratory scale up to large scale mineral centrifuges that can handle many hundreds of tons per hour.

Screens

Screening is an integral part of every mining operation, where granulated ore is separated into multiple grades by particle size. The company manufactures and supplies a range of mechanical screens,

such as vibrating, banana screens, grizzly, horizontal, multi-deck etc.

Mr van As said, no matter what the screening requirements, Siebtechnik Tema can offer a solution.

"We can offer reliable and clean separation of heavy, light, large, small, dry, dusty or even wet and sticky screening materials," he said.

"While we manufacture the more common screens such as grizzly, horizontal or banana screens in Sydney, we can also source screens from our German colleagues for specialised screening applications. These would include LIWELL or Flip-Flow screens for sticky and normally difficult to screen materials."

Service , Spares and Consumables

Apart from the head office and factory in Sydney, Siebtechnik Tema branches are conveniently located in the main mining regions:

- Hunter Region (Rutherford, NSW)
- Bowen Basin (Mackay & Emerald, QLD)
- Perth (Wangara, WA)

Siebtechnik Tema provides a single solution for all your onsite service and maintenance requirements, where highly skilled engineers and service technicians perform site work. It provides experienced specialist labour to support the mines maintenance department and servicing of processing equipment.

Additionally, the company also stocks high quality OEM Australian manufactured

spare parts and consumables. These are commonly used in centrifuges, screens, belt filter presses and crushers. The consumables include items such as wedge wire centrifuge baskets, filter press belts, grizzly screen decks and ceramic wear resistant parts.

"We can supply and install spare parts and consumables not only for our own machines, but also for machines from others OEM's, which sets us apart from our competition," the Operations Manager said.

Custom rotatable equipment maintenance systems can also be set up after careful consultation with the client to ensure that the specific needs and maintenance targets are met.

The additional availability associated with rotatable swaps is significant when one considers that a machine can be down for up to a week compared to one day by simply craning the old unit out and swapping in new unit.

Water Treatment

Siebtechnik Tema has the capability to provide a range of water treatment equipment, including continually self back-washing filters, lamella clarifiers, belt presses and gravity drainage decks – all manufactured in Australia.

The components can be used for treatment of mine water run-off, process water, mine camp water including grey water, slurry, sludge removal, and tailings treatment.

With Siebtechnik Tema's water treatment equipment there is little to no spare parts or maintenance required. The belt presses can also be used for high specific gravity slurries such as coal tailings.

"We have designed some features for the most optimum dewatering possible in a wide range of applications, especially in the mining sector," said one of the sales engineers.

Innovative Equipment

The mineral extraction process is as long, as it is complex and at every step of the way there is a push from all directions for continuous improvement.

Two particularly innovative after-market value-adding offerings include the SENSOTEQ wireless vibration monitoring system and LuCoTec air suspension system – both products developed to tackle the problem of machine vibration, each with a different approach.



Vibrating screen with LuCoTec air suspension system.



Water treatment equipment.



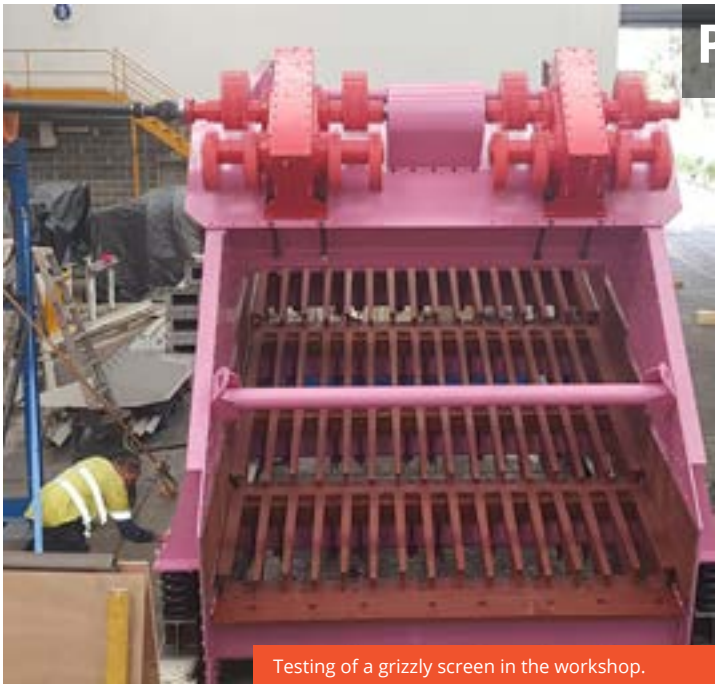
Part of the spares workshop in the Hunter region.

Siebtechnik Tema currently has the sole rights to supply SENSOTEQ and LuCoTec equipment in Australia and by adding both products as optional extras to their equipment the client can expect to add serious value to their systems and save on both scheduled and unscheduled downtime.

SENSOTEQ Wireless Monitoring System
SENSOTEQ is a complete monitoring system that collects live data on vibration, heat, bearing condition on critical equipment.

It uses Bluetooth to provide fully wireless monitoring across multiple portable devices that allows technicians and supervisors to monitor the status of the equipment online on any common mobile device.

Where traditional units are typically hard-wired in, the SENSOTEQ unit quickly adheres to the machine using magnets, so the portability of the equipment is extremely high and allows the operator to periodically change the unit out to monitor different machines.



Testing of a grizzly screen in the workshop.

The SENSOTEQ unit can be setup with custom parameters and thresholds to trigger alerts, warnings and automatic shut downs, and can cover a wide range of operating equipment such as pumps, fans, compressors, gearboxes, centrifuges, screens, and any other vibrating equipment.

By attaching the SENSOTEQ unit to a vibrating piece of equipment, bearing or shaft, it can alert technicians as to when preventative maintenance may be required (for example if any out-of-the-ordinary vibration is measured), and can also be used to sense vibration in equipment that shouldn't be vibrating at all.

LuCoTec Air Suspension
Traditionally, vibrating screens and feeders have relied on conventional coil springs or solid rubber buffers to absorb vibration and isolate the vibrating machine from its supporting structure.

While the traditional means of vibration dampening are effective, the LuCoTec

air suspension system provides superior oscillation isolation which extends the lifespan of vibrating components and mounting structures.

The LuCoTec air spring system is an air bellow (or 'cushion') that replaces conventional steel springs as suspension and protects the substructure on which it is placed.

Before servicing, a traditional coil spring suspension is typically jacked up and springs removed to completely de-energise the system before service can start.

With LuCoTec, the bellows are simply deflated and then re-inflated after service, saving time and reducing manual handling hazards.

New Equipment Outlook 2021
In 2021 Siebtechnik Tema are launching a new vibrating coal centrifuge, which is in the final stages of development in conjunction with their German research and design office.



Machining components in the workshop.

"Currently Siebtechnik Tema is busy developing a new vibrating centrifuge, adding a new model to our current portfolio of vibrating centrifuges," Mr van As said.

"The new centrifuge will typically be used in coarse coal dewatering applications, which was identified as a key market for this new model."

"The detailed design phase is ongoing and trial runs will take place early in 2021, before the new centrifuge line will be rolled out commercially towards the end of 2021."

Siebtechnik Tema has been on the forefront of equipment design and manufacture for almost 100 years already. Over the years, hundreds of robust and high quality machines were installed all over Australia and are strongly positioned to continue confidently into the future. **AMR**

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SIEBTECHNIK TEMA

SIEBTECHNIK TEMA is part of a globally operating group of companies, manufacturing and supplying a wide range of mining equipment.

- Centrifuges
- Screening equipment
- Dryers & cooling systems
- Water treatment equipment

We pride ourselves on our customised equipment, where every unit is carefully designed to meet client-specific requirements.

Our Australian head office and factory is located in Sydney, with service and spares branches in the main mining regions:

- Hunter Valley (Rutherford, NSW)
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- Perth Branch (Wangara, WA)

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Australian Mines and Services Handbook 2021



The inaugural **Australian Mines and Services Handbook 2021** will be distributed this year and will be an invaluable resource for those who work in the mining industry.

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The **Australian Mines and Services Handbook 2021** will comprise three sections:

- 1. Commodities and the Year Ahead
- 2. Directory of Mines (Divided into states and cross referenced against main commodity)
- 3. Directory of Services to Mines



Cadia Valley Operations

State:	NSW
Location:	25km South-West of Orange, 33.4580°S, 148.1110°E
Ownership:	100% Newcrest owned
Stock Exchange:	ASX: IGO
Management:	Peter Sharpe - GM Cadia Valley Operations
Mine Status:	Operational
	Care and Maintenance
	Copper and gold discovery in the Cadia Hill area. Mining began at the Cadia Hill Open Pit and Ridge.





MICHAEL BEAUMONT

GROUP MANAGER - ACCOUNT ENGINEERING FM GLOBAL

Q: How is climate risk changing the threat faced by mining operators?

A: As a result of a changing climate, scientists forecast more frequent extreme and erratic weather events. This might not mean entirely new risks, but it is likely to mean mining operators may experience the manifestation of those risks more frequently, intensely and at times when they may not expect them.

Flooding has always been the number one threat to mines in Australia and with the increased frequency of cyclones, the impact of these flooding events can be expected to intensify. Extreme weather doesn't just mean cyclones, but also severe thunderstorms, non-cyclonic wind events and bushfires, which already present a significant hazard for mining operators.

While we can't inextricably tie storms like Cyclone Mangga, which hit WA outside of the traditional cyclone season, to climate change, it is a potential example of how climate risk could manifest for mining operators as increasing sea temperatures lead to more frequent and unexpected cyclones.

The mining industry needs to pay particular attention to issues such as cyclones and the storm surges they can bring, given that shipping of mining resources takes place in coastal areas which are susceptible to these hazards.

Q: What have proven to be the most damaging natural events for mining operators to date?

A: Flood has traditionally been the greatest threat to the mining industry from a natural hazard perspective.

The massive 2011 flooding event in Queensland is a perfect example. In addition to impacting communities significantly, mines saw largescale losses, with only 15% of mines left operational in the immediate aftermath of the floods.

The price of coal even changed. It's important operators have an emergency flood response plan to mitigate potential damage. Other weather events that can cause significant losses include non-cyclonic wind events.

While a cyclone can often be seen coming for days, these may eventuate a lot faster. Many mining operators, particularly those who manage bulk materials, will find themselves subject to significant wind events all year around.

Historically, we see losses resulting from these non-cyclonic wind events through damage to balance equipment such as stackers, reclaimers and ship loaders. It's equally important to have a wind emergency response plan.

Q: How significant of a risk are bushfires for mining operators and if so how can they best prepare to mitigate this risk as we head into the 2020 bushfire season?

A: Lots of mines are heavily exposed to bushfire, with the changing climate contributing to longer bushfire seasons and prolonging and deepening this exposure.

Mines in south-east Australia, Tasmania, and southwest WA, where they are surrounded by dense bushland, are particularly exposed. However, in most areas of Australia there can be some threat of bushfire exposure from low lying scrub that may expose key buildings or power lines feeding the site - the most serious threat from bushfires.

If business critical transmission lines are knocked out it can have a detrimental effect to operations.

However, as KPMG noted in ITS recently released Australian Mining Risk Forecast 2020/2021, bushfires found other ways to significantly impact mines in NSW during the most recent bushfire season, with poor air quality concerns precipitating temporary suspension of operations and lost production.

When it comes to mitigating bushfire risk, in many ways, a mine is not necessarily different from a risk mitigation perspective to other sites. Control of vegetation must be taken into account in emergency planning - even low-lying bush.

It's also important to ensure that there are no combustible materials hanging around the site and ensure you have a fully-equipped emergency response team.

Q: To what extent would you say mining

companies are adequately preparing for these risks?

A: Unfortunately, we do see some complacency around climate risks. In particular, there's a tendency for mining operators to misunderstand their risk level when it comes to major cyclones.

Too often there's a perception that because a mining operation weathered a severe cyclone without significant damage, this means they were adequately prepared.

Often our engineers will discover that while a major storm was in the area, local weather data often indicates that weather suffered at that site was less severe.

As you move away from the eye of the storm, the damaging effects decrease exponentially, so this is not a fair reflection of the damage they may face in the event of more direct strike.

Q: What's your advice for how mining companies can effectively prepare for these risks?

A: To successfully minimise the chance of losses and business interruption in the event of any natural hazard, climate change related or otherwise, it's critical that businesses look to how they can use engineering to support loss prevention. Loss can be prevented, and resilience built into operations through proactive engineering.

FM Global recommends to policyholders that they should look back long-term at what has happened in their area to get a better gauge of their risk when it comes to natural hazards.

With this in mind, a year-round emergency response plan that is site specific should be developed and potential points of failure that could be critical to the business identified. Complying with the applicable standards represents a minimum starting point.

Any plan must have full employee support. Without employee buy-in, it will not be effective. In addition, test and update the plan regularly. The last thing you want to do is to wait until the moment you need to enact the plan to find out if it's feasible and if everyone knows the role they have to play.

Plans should be reviewed at least once a year and in particular after an emergency event to see if there are opportunities to improve.

Q: What's the pay-off from being properly prepared?

A: Time and time again, we see the value of undertaking comprehensive preparation. When natural hazards strike sites with thorough emergency response plans, we see a significant difference in outcomes. Our data over a 10-year period shows that when emergency response plans were ineffective, losses were on average four times larger.

We've also recently released research which demonstrates just how damage from natural hazards can impact a company's long-term value. The study, conducted by analytics advisory group, Pentland Analytics for FM Global, examined 71 of the world's largest publicly traded companies, all of which reported financial damage from a major flood event in recent years. Twelve months after those flood losses, their shareholder value had declined by an average of five per cent.

Insurance can help offset some of the impact of a loss that is poorly planned and prepared for, but not the impact of your business shutting down and competitors taking over market share, or investors pulling away.

Q: What's the role of mining executives in getting this right?

A: Senior executives must lead from the top when it comes to emphasising the importance of identifying and developing plans to mitigate climate risks.

As mentioned above, employee support of any plan is critical and this is extremely hard to win without clear demonstration of leadership on the issue.

In addition, senior executives should ensure that staff who have responsibility for managing these tasks are clearly identified and given sufficient resources not only to plan but also to ensure their plans are carried out in the event of an emergency.

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