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Core Ramps Up at Finnis P34

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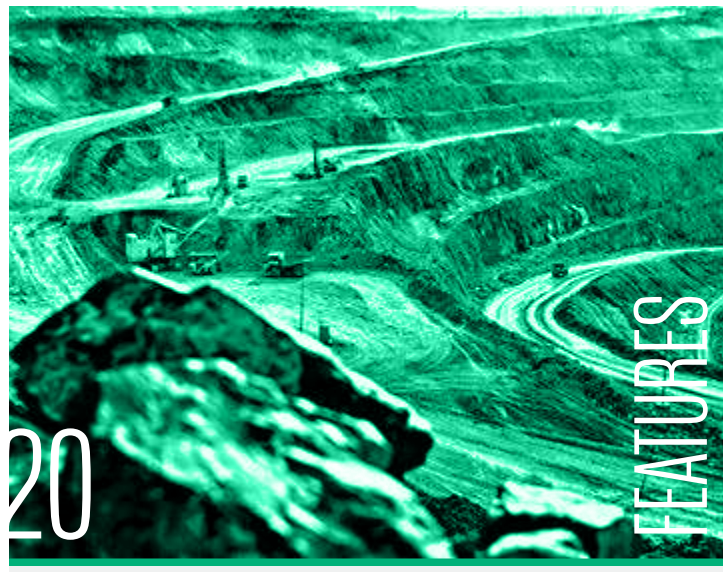
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Panther Obtains Bonanza 478g/t Peak Gold Assay From Burtville East



Panther Metals (ASX:PNT) has obtained multiple bonanza grade hits and visible gold the result of recent drilling at the company's Burtville East Prospect, part of the Merolia Gold Project in Western Australia.

Highlights:

- Hole BVE006 uncovered a new shallow broad high grade gold zone with an intercept of 15m at 53.94g/t gold from 27m.
- This included bonanza assay results of 1m at 79.90g/t gold from 27m, 1m at 478.00g/t gold from 28m, 1m at 125.50g/t gold from 34m, and 1m at 43.80g/t gold from 35m.
- Visible gold was also panned in hole BVE006

"The first round of drilling at the Burtville East Project consisted of six reverse circulation (RC) holes for a total 675m drilled and was designed as an initial first pass program to test accepted mineralisation trends and explore the potential for alternative trends," Managing Director and CEO, Daniel Tuffin, said.

"The results from this short programme of drilling at Burtville East are simply stunning. Some of the holes drilled into the accepted trend model did not perform as expected, while others, particularly in the case of hole BVE006, intercepted a new shallow broad highgrade zone of 15m at 53.94g/t gold.

"BVE006 was planned to investigate a conceptual, and untested, alternative mineralisation trend theory. The interception of a new shallow broad high-grade gold zone in hole BVE006, in conjunction with confirmation that unprocessed local stockpiles contain gold in previously unprocessed 'mineralised altered zones' requires a rethink about the accepted mineralisation trends at Burtville East.

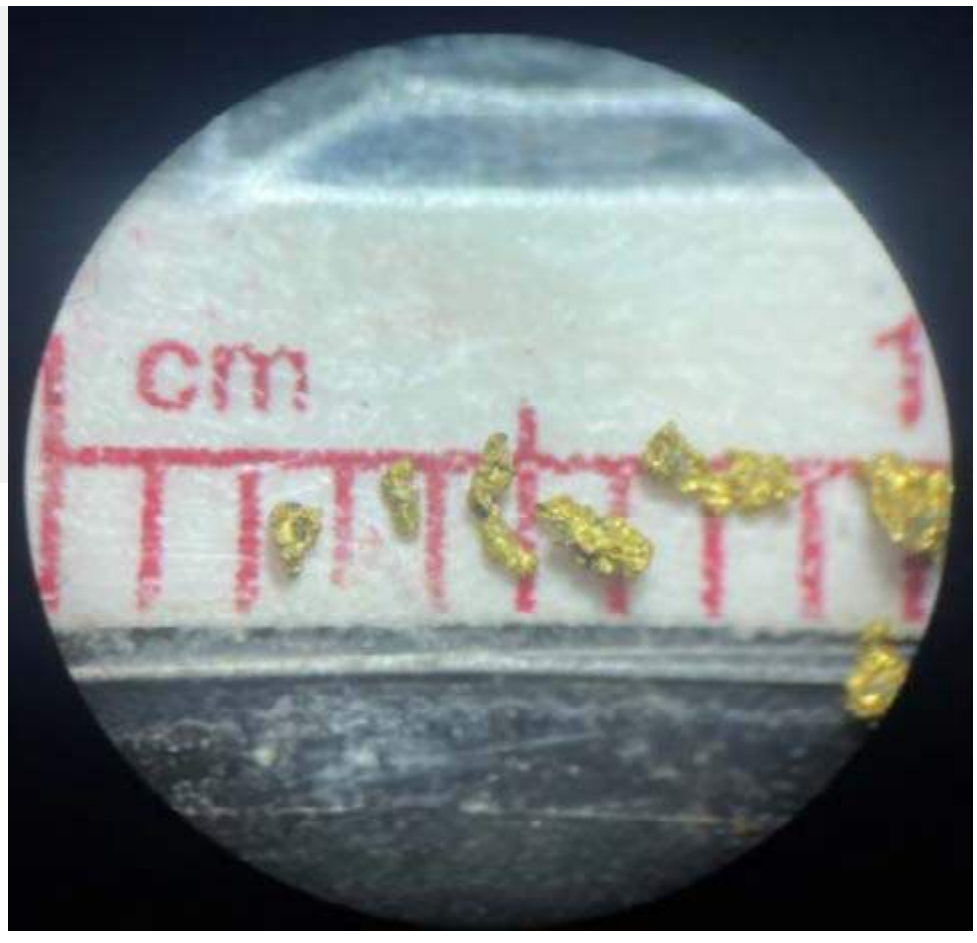
"The company will now progress with a full review of the results and follow up with a new drill plan to further test, and explore for new, mineralised trends in the area."

Burtville East Gold Prospect

Burtville East is one of four gold prospects located in the Merolia Gold Project that contains a dominant land holding over some of the region's most prospective and under-explored ground covering an area of 90 sq. km.

The prospect area contains historical underground workings, along with mineralised stockpiles of historically rejected material ready for treatment. Historical grab samples from this altered mineralised zone have returned grades of up to 38.45g/t Au at Burtville East. ***AMR***

Odyssey Hits "Stunning" High-Grade Gold At Maybelle Deposit



Odyssey Gold Limited (ASX:ODY) has returned a "stunning" high-grade gold intersection of 4m @ 53.9g/t Au in RC drilling at the Maybelle Deposit part of the Tuckanarra Project in the Murchison Goldfields of Western Australia

"The result of 4m @ 53.9g/t Au is the highest gram metre result ever drilled at Maybelle and successfully confirms and extends the interpreted high-grade shoots below the Maybelle Pit," Managing Director, Matt Briggs, said.

"Structural analysis and modelling by our geologists identified the plunge as more steeply dipping than previously interpreted as confirmed by this latest hole.

"This latest high-grade intersection is very encouraging and demonstrates the clear potential to establish a quality resource footprint at Maybelle.

"Historic mining has barely scratched the surface with mineralisation now continuous from the base of the 30m deep pit to 100m below surface.

"The high-grade shoot remains open for 150m to the north of this hole. Our drilling strategy across the Tuckanarra Project is continuing to highlight the potential scale and high-grade nature of our portfolio, and we are looking forward to reporting assay results from similar targets recently drilled at Maybelle North, Lucknow and Douglas."

Current Drilling Strategy

Odyssey's Tuckanarra Project is part of the prolific Murchison Goldfields. The Murchison Goldfields are host to a +35Moz gold endowment (historic production plus current resources).

Recent drilling by Odyssey has focussed on defining high grade shoots extending below the Bottle Dump, Bollard and Cable Pits, along with extending the system to the north and to the east at the highly prospective Highway Zone structure.

Several other advanced targets have also been RC drilled, including Maybelle, Maybelle North, Lucknow, Douglas and Cable North.

Maybelle Background

Gold mineralisation at Maybelle is associated with steeply dipping sheared sediment that extends for over 1.5km along a line of historical workings. A shallow oxide pit, on the southern 450m of sediment, was predominantly mined in the mid 1990's.

Total bedrock drilling at Maybelle since discovery includes 56 RC holes and 7 diamond drillholes with most holes less than 60m in depth and only one hole deeper than 100m below surface.

Mining was to a maximum of 26m below surface. Ore treated from mining at Maybelle up to 1904 is reported as ~554t @ 5.7g/t Au for 103oz produced.

Subsequent open pit mining to a depth of 30m in the early 1990's produced 52kt @ 3.6g/t Au for 6,020oz before mining was halted as the ores started to transition to primary sulphides.

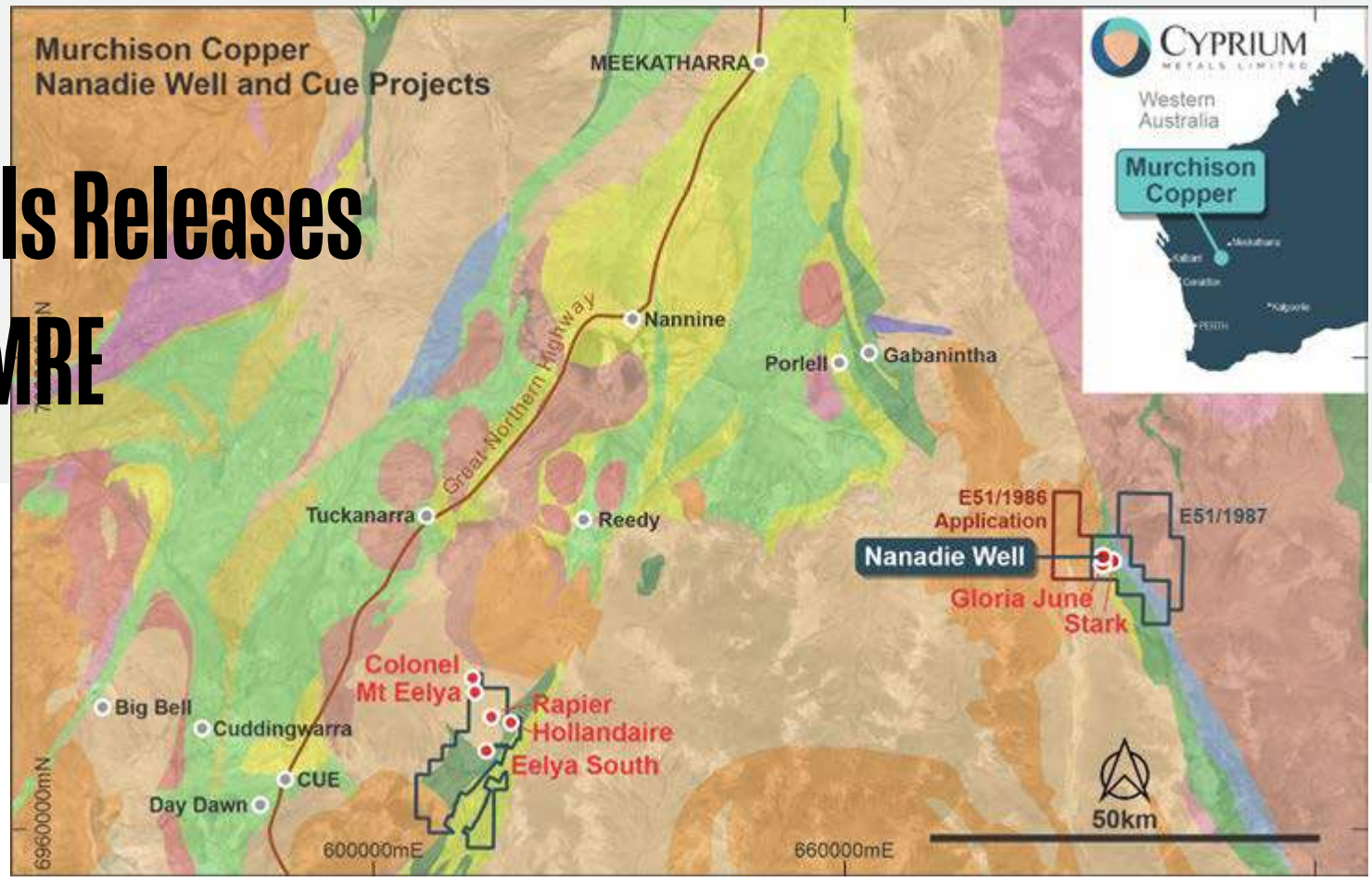
Metallurgical testwork completed in 1994 on composites from fresh sulphide mineralisation recovered over 98% of gold in fresh rock.

Future Work

Drilling at Maybelle has successfully confirmed and extended the high-grade shoot below the Maybelle Pit. Further RC drilling in planned up plunge and to the north of MBSRC0098, with additional drilling likely to extend the high-grade mineralisation to be included in a future resource estimate.

Assays are pending for RC drilling along strike at Maybelle North where an additional 450m of strike of the Maybelle structure has been drilled, and a number of other targets on the project including the Highway Zone. ***AMR***

Cyprium Metals Releases Nanadie Well MRE



Cyprium Metals Limited (ASX:CYM) has unveiled the company's maiden Mineral Resource Estimate for the Nanadie Copper-Gold Mine deposit in Western Australia.

The Mineral Resource Estimate forms part of Cyprium's broader Murchison Copper-Gold Project.

Highlights: Nanadie Well polymetallic orebody, preliminary Mineral Resource Estimate contains: - Copper 162,000 tonnes - Gold 130,000 ounces - Silver 1,364,000 ounces - Cobalt 2,200 tonnes - Nickel 11,900 tonnes - Zinc 6,500 tonnes

Executive Director, Barry Cahill, said the broader Nanadie Well model further highlights the potential to expand the known resource both along strike and down dip. The current resource tapers with depth and the potential exists to expand this laterally at depth with further deeper drilling.

"We are very pleased to announce the results of our maiden mineral resource estimate at the Nanadie Well Copper Project in the east Murchison region," Mr Cahill said.
"The mineral resource highlights the extensive polymetallic potential of the Nanadie Well Project. This mineral resource estimate also now means the Company has 2012 JORC compliant mineral resources at all of our copper projects.

"The shallow Nanadie Well Resource and the Hollandaire Resource are complimentary deposits which are expected to deliver operational synergies. The Nanadie Well diamond drill core obtained in 2021 will provide sample material for metallurgical leach test work for inclusion in a scoping study."

The current resource is modelled from near surface to a nominal depth of 220mRL (255m from surface) but potential exists to increase the depth extents to beyond the limits of the deepest drilling which is currently down to 160mRL (315m from surface).
Mr Cahill said certainly, deeper holes that extend beyond the lower limits of the modelled 2022 resource have intersected mineralisation with similar down hole mineralised widths and grades as those included in the modelled resource.
This further highlights the potential to identify additional mineralisation within the layered intrusive body at depth. The model also highlighted trends in the mineralisation with Nickel and Cobalt grades increasing towards the northern end of the current Inferred Resource. There is also potential to expand the known resource along strike with further closer spaced drilling.

The Cyprium Ordinary Kriged 2022 resource model is based on geological information sourced from all previous drill holes with only the assay data from the 145 RC holes and six diamond drill holes drilled since 2004 utilised in the latest resource estimate. The resource is reported at a 0.25% Cu cut-off.

The Nanadie Well block model extends from 6993900mN to 6995350mN and 692600mE to 693600mE and from 160mRL to the topographic surface nominally around 475mRL. The Inferred Resource is confined to the more densely drilled area between 6994040mN and 6995120mN and 692800mE and 693180mE.

A broader block model has been generated to aid future drill planning and identify structural trends in the mineralisation. The Nanadie Well Mineral Resource Estimate currently extends from the base of the Quaternary surface cover sands and clays from only 0.5m to 6m below surface, down to a maximum depth of 220mRL (255m from surface).

The bulk of the currently defined resource lies above 250mRL (above a depth of 225m from surface. The mineralisation remains open at depth. The resource is estimated 60m beyond the last fence of drilling at the north end and 100m beyond the last fence of drill holes at the southern end.

The estimated resource extends from 20m to 100m below the greatest depth of drilling in some areas but elsewhere the current drilling extends beyond the base of the estimated resource.

The wireframe models that were used to generate the model domains extend a further 140m to the south and 230m to the north of the reported resource limits. The full model extends beyond the limits of reported Inferred Resource. This was done both to aid future drill planning and also to ensure that any preliminary open pit shells would lie within the modelled limits. More specific details on the estimation parameters used are summarised below and explained in further details in the accompanying JORC. ***AMR***



Anax Kicks Off Whim Creek Exploration Drilling After Discover Of High-Grade Gold Rock Chips

Anax Metals Limited (ASX: ANX) has commenced reverse circulation (RC) exploration drilling at the Whim Creek Project, located 115km southwest of Port Hedland in the West Pilbara Mineral Field of Western Australia.

"Exploration drilling at Whim Creek Project marks a milestone for Anax," Managing Director, Geoff Laing, said.

"The company has defined several drill targets, including a new gold prospect at HLF, as well as extensions to the known resources, pinpointed using the innovative UltraFine+ soil sampling technique and 3D structural modelling.

"Other new prospects defined with the UltraFine+ method, including Rushalls and Airstrip PGM Prospects, will be drilled following the completion of heritage clearance surveys, currently being scheduled."

Exploration RC drilling is planned to cover the following prospects sequentially.

- 1,300m RC drilling (nine holes) at HLF Gold Prospect
- 650m RC drilling (four holes) at Whim Creek investigating near-mine and extensional copper-zinc targets, east and west of the existing open pit
- 1,050m RC drilling (five holes) at Mons Cupri, including 200m at the historically mined Comstock Hill
- 450m RC drilling (two holes) at Evelyn, 25km southeast of Whim Creek, where newly defined JORC 2012 Resources suggest potential for extensions at depth.

Anax took the opportunity to expand the proposed 1,000m programme to 3,500m and secured the services of Kalgoorlie based K-Drill to undertake the work. ***AMR***

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Meeka Hits Highest Grade Rare Earth Assays To Date From Circle Valley



Meeka Metals Limited (ASX:MEK) has obtained ongoing high-grade rare earth assays from the Circle Valley project in Western Australia.

Assays continue to confirm widespread rare earth mineralisation grading up to 2,439ppm TREO. Intersections up to 36m thick have been recorded and mineralisation persistently demonstrates a high proportion of the grade, up to 45% in these results, as valuable magnet rare earths.

The rare earths accumulate within the saprolite clay horizon creating thick, near surface mineralised zones below shallow transported cover.

In addition, the depth of cover appears to shallow toward the west.

Notable intersections (above a 500ppm TREO grade) from this tranche of assays include:

- 8m @ 2,245ppm TREO (44% Magnet REO) and 61g/t Scandium from 12m (22CVAC188)
- 8m @ 1,432ppm TREO (39% Magnet REO) and 15g/t Scandium from 28m (22CVAC237)
- 8m @ 1,236ppm TREO (40% Magnet REO) and 43g/t Scandium from 20m (22CVAC251)
- 8m @ 1,218ppm TREO (32% Magnet REO) and 21g/t Scandium from 32m (22CVAC245)
- 8m @ 1,003ppm TREO (37% Magnet REO) and 19g/t Scandium from 16m (22CVAC240)
- 12m @ 799ppm TREO (17% Magnet REO) and 19g/t Scandium from 16m (22CVAC241)
- 12m @ 719ppm TREO (21% Magnet REO) and 17g/t Scandium from 16m (22CVAC213)

"The sustained delivery of high-grade assays highlights the large-scale, high-grade rare earth opportunity at Circle Valley," Managing Director, Tim Davidson, said.

"Pleasingly, the results continue to display very high proportions of the valuable magnet rare earths, which is an important determinant in the economics of these deposits.

"With metallurgical results now also showing there is a pathway to production of a commercial product and plans in place for infill drilling and delivery of an initial Mineral Resource this financial year, the team is making excellent progress advancing Circle Valley.

"In tandem with the work at Circle Valley and working with the Esperance Shire and community at our 100% owned Cascade Project, we remain on track for drilling to commence in the first half of FY23.

"Given the very high-grade rare earths intersected in the southern corridor, we are eager to get back and target the central and northern blocks, approximately 1,000 sq. km, within our remarkably large landholding." ***AMR***

Thomson Resources Obtains Further Outstanding Bygoo Tin Results



Thomson Resources (ASX: TMZ) has intersected further strong mineralised greisens in recent drilling at the Thomson's 100% owned Bygoo Tin Project, located in the Lachlan Fold Belt in New South Wales.

Results have now been received for two more batches of assays from the 2022 drilling program, including four holes drilled at the new discovery at "Stewarts", 300m NW of the Main Zone.

The holes were following up an intersection of 111m at 0.45% Sn from 57m depth in BNRC69.

Drilling at Stewarts was initially aimed at defining the width of the zone as it was thought that the discovery hole, BNRC69, may have drilled down dip. As it turns out this is partly true, but instead of the mineralisation being 10-15m wide it is variable and up to 60m wide.

The observed greisens are variable in strength and mineralogy, varying from quartz-tourmaline to quartz-topaz. Within the overall "greisen" zone there are patches of unmineralised granite between stronger greisen development.

Executive Chairman David Williams said there is one final batch of assays that is still in the laboratories for assay. Results are expected in late July or August.

"Some further great results for the Bygoo Tin Project coming out of the Lachlan Fold Belt drilling program conducted earlier this year. The tin grades are fantastic and interesting to see some copper coming into it as well," Mr Williams said.

"The expansion of the Stewarts zone we are seeing is great and shows the continuing potential of this tin project."

The zone itself appears to be thickest and strongest next to the Ardlethan granite boundary. Holes drilled under the shallow workings in the granite outcrop area returned weak intercepts of poorly developed thin greisens. Heading northeast the zone is open, although it is partly constrained by the barren hole BNRC81.

Mr Williams said further drilling is needed to extend the zone to the northeast. BNRC80D was drilled as a diamond hole partly due to weather and logistics. The hole was designed to stay in the greisen (Figure 2) and collect information on the geology and geometry of the mineralisation. It intersected 69.5m at 0.5% Sn from 60m including 2.5m at 2.1% Sn from 70.6m and 7m at 1.7% Sn from 98.4m. One individual 60cm sample at 100.5m depth assayed at 10.1% tin. That sample had 0.84% copper as well and an interval of 4.7m from 100m ran 0.25% Cu (no other significant elements). ***AMR***

Weebo Project Turning to Gold for Midas in WA

Midas Minerals Ltd (ASX: MM1) has intersected very high-grade gold in reverse circulation (RC) drilling at its Weebo Project in Western Australia's Goldfields region.

The 24-hole programme totalling 4,236m comprised:

- 16 holes on the Scone Stone and Ockerburry Prospects, located 21-28km along strike and to the north of Northern Star Resources' Thunderbox mine. Intercepts at Scone Stone included: o 3m @ 15.6g/t gold from 69m, including 1m @ 45.3g/t gold from 69m in hole MDRC0029 o 9m @ 4.6g/t gold from 64m, including 1m @ 28.2g/t gold from 65m, and 20m @ 0.7g/t gold from 79m in hole MDRC0030.

- Four exploration holes at the Otto and Otto North prospects located 5-11km north of NST's Otto Bore gold mine. The most significant intercept at the Otto prospect was o 6m at 2.4g/t gold from 162m including 1m at 8.6g/t gold from 165m in hole MDRC0044.

Midas also completed three holes targeting nickel and one gold exploration hole drilled on the Warrida Well Nickel Prospect. Each of the three nickel exploration holes were terminated prior to target depths. However, two of the holes intercepted ultramafic. The single gold exploration hole intercepted weakly anomalous gold mineralisation.

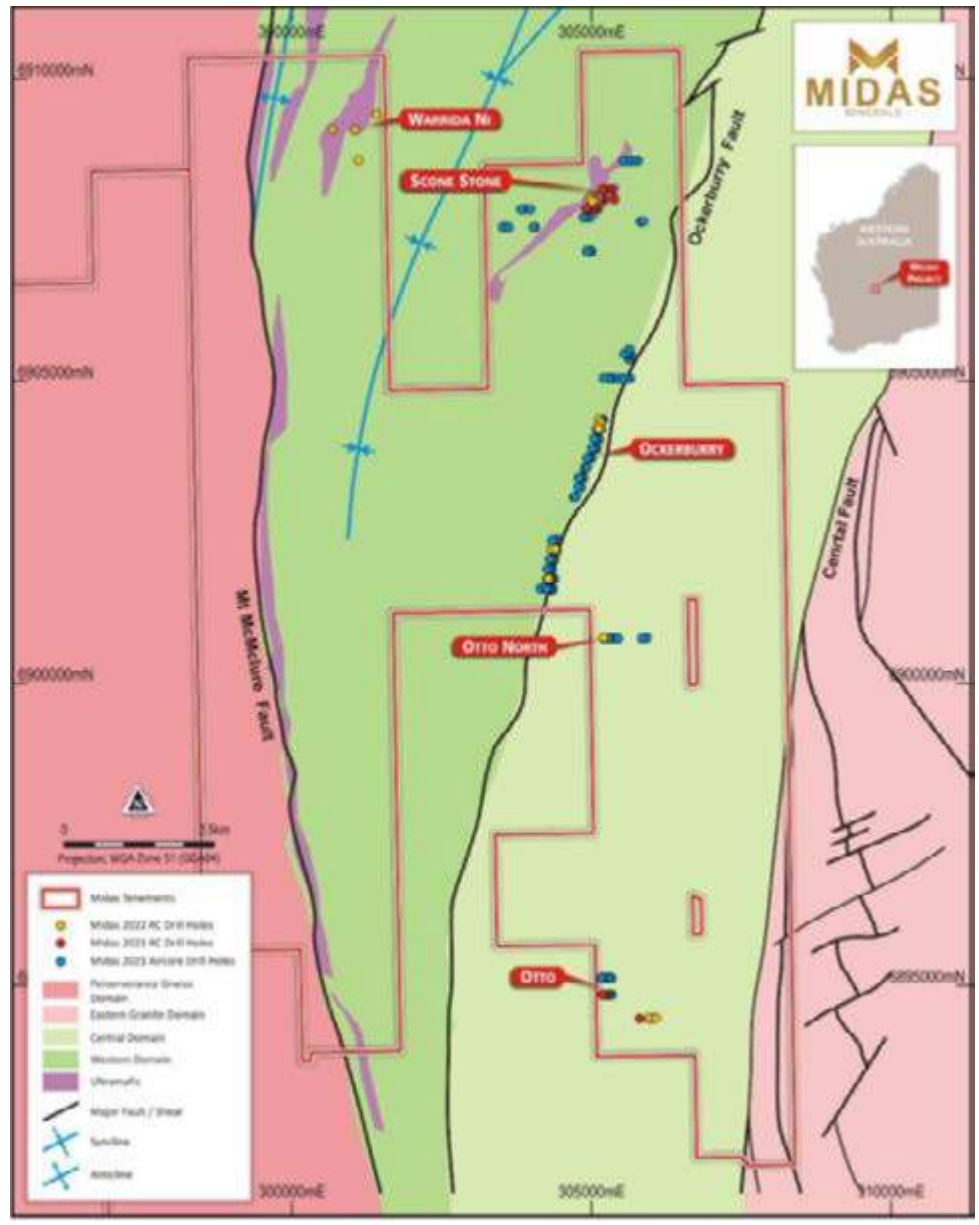
Midas completed downhole electromagnetics (DHEM) on one hole at each of the Scone Stone and Otto prospects. DHEM on hole MDRC0044 at Otto identified an anomaly characteristic of a conductor sitting below the drillhole.

"Results of drilling at the Scone Stone area are highly encouraging, adding further scope to a cluster of holes containing high-grade zones and wider low to medium-grade gold intercepts which is now ready for resource drilling," Managing Director Mark Calderwood said.

"Drilling at Otto intercepted a new potentially significant zone of quartz veining and sulphide mineralisation below Permian cover where prior wide-spaced drilling located anomalous mineralisation over 1.2km strike. Scone Stone is located 27km north of the Thunderbox gold mine and Otto is located 5.6km north of the Otto Bore gold mine."

Next Steps

Midas will undertake further drilling in areas of significant mineralisation at the Scone and Otto prospects, as well as initial drilling of several of the strongest gold geochemical anomalies identified in early 2022.



After recent MLEM data from Warrida and Try Again Bore ultramafic targets is modelled, Midas will plan core drilling, including one hole at Try Again, to be completed as part of the WA State Government's Exploration Incentive Scheme (EIS) co-funding agreement. ***AMR***



Black Cat Hits High-Grade, Near Mine Gold At Paulsens

Black Cat Syndicate Limited (ASX:BC8) has obtained significant, near mine, high-grade results from previous drilling at Paulsens Gold Operation in Western Australia.

Highlights

- Black Cat is undertaking an extensive geological review as part of its objective to find another Paulsens (+1Moz). This review includes new interpretations of the Paulsens orebody and incorporating all drilling intercepts into revised Resource models. Structural and 3D seismic reviews are also underway.

- The review has identified previously unreleased diamond core assay results from drilling undertaken in 2020.

- Significant, near mine, high-grade results from outside of the current reported Resource highlight strong potential to extend the current underground Resource (89,000oz @ 5.8 g/t Au): o 1.42m @ 102.37 g/t Au from 19.34m (PDU4518) o 6.19m @ 15.86 g/t Au from 23.72m (PDU4550) o 0.94m @ 58.10 g/t Au from 19.50m (PDU4544) o 1.33m @ 26.07 g/t Au from 22.02m (PDU4542) o 1.26m @ 25.36 g/t Au from 14.60m (PDU4491) o 0.88m @ 36.77 g/t Au from 7.62m (PDU4501)

- Furthermore, thick, high-grade infill results emphasise the robust nature of the current Resource: o 5.72m @ 35.32 g/t Au from 36.78m (PDU4536) o 5.99m @ 25.23 g/t Au from 16.88m (PDU4537) o 3.00m @ 42.68 g/t Au from 1.00m (PDU4518) o 4.20m @ 25.61 g/t Au from 4.00m (PDU4539) o 8.05m @ 11.09 g/t Au from 59.96m (PDU4555) o 2.00m @ 30.30 g/t Au from 13.00m (PDU4524)

- Paulsens is a dewatered, ventilated and well maintained high-grade underground mine which produced more than 900,000oz @ 7.3 g/t Au until being placed on care and maintenance in 2017.

- Black Cat will embark on its objective to find another high-grade Paulsens-style orebody with the commencement of extensional and discovery drilling in September 2022.

"Paulsens is a high-quality, well-maintained operation with significant Resource growth potential," Managing Director, Gareth Solly, said.

"We consider the mining and processing of remnant resources could have the potential to repay the Paulsens and Coyote acquisitions. However, the main game is to find another Paulsens (+1Moz) near existing underground infrastructure.

"We have made a strong start on this front, with a detailed geological review well underway and are expecting to generate numerous high-quality targets as we embark on our quest to discover another Paulsens with drilling to start in September 2022.

"Our track record to date is that we have discovered 1.5oz for every 1oz acquired and we plan to better this at Paulsens." ***AMR***



Liontown Executes Binding Lithium Offtake Agreement With Ford

Western Australian lithium project developer Liontown Resources Limited (ASX: LTR) has executed a binding Offtake Agreement and Funding Facility with leading global automaker Ford Motor Company.

The Offtake Agreement with Ford is for the supply of up to 150,000 DMT per annum of spodumene concentrate – a source of lithium essential in key EV battery chemistries. The spodumene concentrate will come from Liontown's flagship 100%-owned Kathleen Valley Lithium Project in Western Australia for five years.

The agreement represents Liontown's third and final foundational offtake required to underpin the development of Kathleen Valley – marking the culmination of the disciplined execution of its offtake strategy.

Together with the previously announced binding full-form offtake agreements with Tesla and LG Energy Solution, Liontown's total offtake commitments now stand at up to 450,000 DMT per annum of spodumene concentrate, representing approximately 90% of Kathleen Valley's start-up SC6.0 production capacity of ~500ktpa.

The remaining production from Kathleen Valley is intended to be retained for spot volume sales and/or discrete offtake agreements.

Supply to Ford is expected to commence in 2024, with volumes of 75,000 DMT of spodumene concentrate in year one of operations, increasing to 125,000 DMT in year two and 150,000 DMT for years three to five of the initial five-year term.

The commercial terms of the Offtake Agreement reflect the continued strength in demand for spodumene concentrate and were not subsidised by the Funding Facility.

Under a separate Funding Facility, a Ford subsidiary will provide a A$300 million debt facility to Liontown, with the proceeds to be used towards partially funding the development costs of Kathleen Valley. The Funding Facility, together with the A$463 million raised by Liontown in December 2021, means that Liontown has now secured commitments for the required funds to support the full development of the Project through to first production.

The finalisation of debt funding, along with completion of foundational offtake arrangements, paves the way for a Final Investment Decision for the Project.

"The signing of our third and final foundational offtake agreement is a momentous milestone for Liontown and the Kathleen Valley project, with approximately 90% of Kathleen Valley's start-up capacity now under secured long-term binding offtake agreements," said Liontown's Managing Director and CEO Tony Ottaviano.

"Our disciplined approach to our offtake strategy has enabled us to build a customer base of Tier-1, globally significant customers in the EV battery supply chain, validating Kathleen Valley's status as a globally relevant lithium asset.

"In addition to the offtake, the A$300 million funding facility from Ford, together with the capital raised last year, means that we have secured commitments for the funds required to support the full commercial development of Kathleen Valley through to first production."

Ford's vice president of EV Industrialization, Lisa Drake, said the motoring company continues working to source more deeply into the battery supply chain to meet its goals of delivering more than two million EVs annually for our customers by 2026.

"This is one of several agreements we're working on to help us secure raw materials to support our plan to deliver EVs for customers around the world and meet our environmental, social and governance commitments."

About Kathleen Valley

Kathleen Valley is a new, globally significant, lithium development project located 680km north-east of Perth in Western Australia's premier mining district.

Underpinned by a world-class lithium deposit with a Mineral Resource Estimate of 156Mt at 1.4% Li2O and 130ppm Ta2O5, Kathleen Valley is forecast to initially produce ~500ktpa of SC6.0 spodumene concentrate expanding to ~700ktpa.

The Project also has an integrated and value-adding ESG focus with greater than 60% renewable power supply planned at start-up and a strong working relationship with the Traditional Owners of the land (the Tjiwarl). ***AMR***



Liontown Awards Lycopodium With Kathleen Valley Lithium Project EPCM Contract

Liontown Resources Limited (ASX: LTR) has awarded the EPCM Contract for the Kathleen Valley Lithium Project in Western Australia to Lycopodium Minerals Pty Ltd.

The appointment of Lycopodium follows its successful completion of the engineering services for the Definitive Feasibility Study (DFS) in November 2021 and agreement of key commercial terms.

Lycopodium will provide the engineering design, procurement of equipment and materials, construction management, pre-operational testing and commissioning services for the processing facilities and associated non-process infrastructure at Kathleen Valley.

Since completion of the DFS, Lycopodium has been providing the Front-End Engineering Design (FEED) services under a preliminary services agreement. As a result, the DFS engineering team was retained and detailed engineering is well advanced, enabling the company to award over 75% of mechanical equipment long-lead items as well as awarding total process plant and non-process infrastructure packages with an estimated value of A$103 million, ensuring that the Project remains on schedule.

"Awarding the EPCM Contract is another significant milestone for Liontown and the development of Kathleen Valley," Liontown's Managing Director and CEO, Tony Ottaviano, said.

We are delighted to have appointed a company of Lycopodium's stature and capability, building on their long-standing involvement with the Kathleen Valley Project in overseeing testwork, piloting and design since 2018. "We believe Lycopodium is an ideal engineering and construction partner, with substantial experience in mineral processing plant design and construction expertise, making it ideally placed to deliver the Project."

Lycopodium's Managing Director, Peter De Leo, said Kathleen Valley is a lithium project of global significance that will supply vital battery minerals to the burgeoning electric vehicle and energy storage industries.

"Having worked with Liontown through the evaluation and study stages, we are extremely pleased to have the opportunity to continue into the engineering and construction phase of this exciting project." ***AMR***

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Binduli North Gold Project Officially Opens



Norton Gold Fields has officially opened its $278 million Binduli North heap leach project located around 10 km west of Kalgoorlie.

The project created 300 jobs during construction and will employ 200 workers during production.

The operation has an estimated 10-year life span and is expected to produce an average of 75,000 ounces of gold per year.

Once the heap leach facility reaches capacity, the additional output will place the company among the State's top 10 gold producers. Norton has recently produced up to 180,000 ounces of gold annually from its Eastern Goldfields tenements.

Heap leaching is a well-known process that involves stacking crushed ore on a lined pad and applying a chemical solution to dissolve precious minerals. The leached solution is collected and treated in a processing plant to extract the gold.

The project will enable Norton to mine and process low-grade ores that may have otherwise been left in the ground.

"Congratulations to Norton Gold Fields on the opening of its Binduli North heap leach project, which will deliver millions in royalties to the WA economy, Western Australian Mines and Petroleum Minister, Bill Johnston, said.

"It's always pleasing to see companies like Norton driving growth in WA's regional communities.

"With more than $16 billion of sales in 2021 and as WA's second most valuable commodity, gold will continue to play a significant role in our economic future."

Binduli North Operations

Binduli North will consist of four open pits, including the cut back of the existing Janet Ivy, Fort Scott and Fort William open pits and the commencement of the Karen Louise open pit.

Associated waste rock dumps will be combined for Janet Ivy, Fort Scott and Karen Louise with a separate waste rock dump developed for Fort William.

The ore will be crushed on site and delivered by conveyor to the surge bin before being fed to the agglomerator drum.

Agglomerated ore will be conveyed to the heap leach area via a series of grasshopper conveyors to a radial stacker which will stack the ore in a series of cells.

Loaded carbon will be transferred into an elution circuit for stripping, followed by electrowinning and smelting in an on-site gold room.

With known Mineral Resources, Binduli North is expected to complete mining in 2029. However, Norton continues to successfully explore the project.

Historically, ore from the Janet Ivy mine pit and other pits south of Great Eastern Highway has been trucked to Norton's iconic Paddington mill for treatment.

Norton Gold Fields Pty Ltd is one of Australia's largest domestic gold producers, with recent annual production of up to 200,000 ounces. The Company has a mining and processing complex in Western Australia's world-class Kalgoorlie gold region, including a highly prospective tenement package of more than 1,000 sq. km surrounding the 3.8Mtpa Paddington Mill. ***AMR***

TNG Receives A$300M Support For Mount Peake Critical Minerals Project



TNG Limited (ASX:TNG) has received a conditional Letter of Support from Export Finance Australia (EFA) that considers the provision of up to A$300 million of debt funding for the construction of TNG's flagship 100% owned Mount Peake Vanadium-Titanium-Iron project in Australia's Northern Territory.

EFA is Australia's export credit agency and is guaranteed by the Commonwealth of Australia. It is administering the Australian Government's A$2 billion Critical Minerals Facility, which has been established to assist in funding critical minerals projects.

The Mount Peake Project is one of 15 Australian critical minerals projects identified by the Australian Government in its Resources Technology and Critical Minerals Processing: National Manufacturing Priority Road Map.
The Mount Peake Project, which is one of the largest undeveloped vanadium-titanium-iron projects in the world, has been awarded Major Project Status by both the Australian Government and the Northern Territory Government.

The receipt of this non-binding Letter of Support highlights the broad alignment of the Project with objectives of the Australian Government's Critical Minerals Strategy which is to diversify global critical minerals supply and capture more value from the critical minerals value chain.

EFA's non-binding Letter of Support notes the need for progress on a number of commercial matters and outlines the following: 1. EFA can consider the provision of debt funding up to A$300 million; 2. a successful outcome is contingent on several conditions including: a. meeting EFA "know your customer", sanctions and anti-bribery requirements and checks; b. provision of detailed financing proposal and independent due diligence material; c. TNG making satisfactory progress towards the Project's funding plan including the raising of equity and securing funding from other lenders; d. TNG making satisfactory progress securing offtake agreements for the Project's products with counterparties acceptable to Export Finance Australia; e. a contracting strategy and contractors for the engineering, construction and commissioning of the Project acceptable to Export Finance Australia; and, f. the Project complying with our environmental and social risk policies, including receiving the required regulatory and environmental approvals.

The tenor of the Project will be supported by Mount Peake's long project life (>37 years) and JORC Ore Reserves.

TNG's debt financing strategy is to secure a multi-source funding package consisting of government and commercial bank funding. Pursuing a multi-source funding strategy allows TNG to optimise its debt financing, providing greater access to low-cost lending, offering greater flexibility in loan structuring and ensuring that TNG's funding package aligns with its development and offtake partners.

Following the accomplishment of this important milestone for the Mount Peake Project, TNG will now further engage with EFA to progress the customary due diligence process for obtaining finance. EFA's non-binding Letter of Support does not constitute a commitment to provide finance and there is no certainty that an agreement will be reached between the parties.

"We are delighted with the support received from the Australian Government through the Export Finance Australia," TNG's Managing Director and CEO, Paul Burton, said.

"This non-binding Letter of Support lays a solid foundation for the Company to secure the debt financing package for the development of its Mount Peake Project.

"Mount Peake is a significant critical minerals project for Australia as it will contribute to the diversification of global critical minerals supply, specifically of vanadium and titanium, and will bring more value from the critical minerals value chain to the country.
"We are looking forward to continue working with the Export Finance Australia and other financiers to structure the best debt financing package for the Project." ***AMR***

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Australia's Mining Industry Contributes Record $43B To Nation's Coffers



New figures show that the return to the community from Australia's mining industry has again hit record levels with a combined $43.2 billion in company tax and royalties paid in financial year 2020-21, a 16 per cent increase from the $37.3 billion contributed in the previous period.

Company taxes paid reached a new record high of $26.5 billion and royalties also reached a high of $16.7 billion in 2020-21 contributing significantly to federal, state and territory governments at a time when they needed it most during the COVID-19 pandemic.

The record company and royalties payments are highlighted in an Ernst & Young report commissioned by the Minerals Council of Australia (MCA) which also shows that in the last decade (between 2011-12 and 2020-21), the mining industry contributed $254 billion in company taxes and royalties ($142 billion and $112 billion respectively).

MCA CEO Tania Constable said company tax and royalties payments are expected to continue increasing in 2021-22 in line with increases in export earnings. This is driven by a positive outlook in the price and quantity produced of metallurgical and thermal coal coupled with a robust year for iron ore, gold and base metals.

"The industry in Australia continues to pay the highest average wages, the most company taxes, delivers the most export revenue and is critical to supporting regions and communities – supporting 1.1 million jobs in the mining industry and its supply chains," Ms Constable said.

"The Australian mining industry always pays its fair share of tax while providing royalties to state governments to pay for improved roads, hospitals and other infrastructure and services.

"Mining companies also support thousands of regional businesses around Australia and their workers who provide essential services that keep the industry operating.

"In addition to new jobs across the nation and paying its fair share of taxes and royalties, the mining industry has been supporting local communities through the COVID-19 pandemic, providing substantial donations to hospitals, charities, child care centres and schools." ***AMR***

Suvo Granted Pittong Kaolin Mining Licence Extension In Victoria

Suvo Strategic Minerals Limited (ASX: SUV) has successfully completed the renewal of its Pittong mining licence which has been approved by Victoria's Earth Resources Regulation, Department of Jobs, Precincts and Regions (DJPR).

Approval by the regulator extends the Pittong mining licence held by Kaolin Australia Pty Ltd, a wholly owned subsidiary of the company, to December 2045.

The renewal follows the company's recently announced maiden 2012 JORC guidelines mineral resource estimate at Pittong, which is located only two km from the company's kaolin processing facility. The JORC compliant report estimated the Pittong asset contains 3.74Mt indicated and 1.97Mt inferred of kaolinized granite.

"This is a significant milestone supporting Suvo's growth plans for Pittong, focussed around increasing production capacity and diversifying our product basket," Suvo Non-Executive Chairman, Henk Ludik, said.

"This approval will support Suvo's ongoing capital investment into the Pittong operations and will enable Suvo to continue playing a part in the local community as a responsible corporate citizen for years to come.



"Our investment in the Pittong processing facility will increase capacity, making sure we can fulfil the surge in demand for high quality kaolin products.

"Coupled with enhanced production capacity comes our company-wide focus on achieving better environmental and social outcomes, which will be realised through more energy efficient operations, rehabilitation practices and producing metakaolin products that support the decarbonisation of the cement and concrete industries."

The 100% owned Pittong Operations, located in Victoria 40km west of Ballarat, is the sole wet kaolin mine and processing plant in Australia and has been in operation since 1972.

Pittong comprises of the Pittong, Trawalla and Lal Lal deposits located on approved Mining Licences MIN5408, MIN5365 and MIN5409 respectively.

At Pittong mining contractors deliver crude kaolin ore to stockpiles from the two currently operating mines, Pittong and Lal Lal. The plant takes its feedstock from the ROM and it is processed into four separate product forms for end users. These products forms are 10% moisture lump, high solids slurry, 1% moisture powder and 1% moisture pulverised powder. The solids slurry is used in paper and board manufacturing.

The other products are used in paper, coatings, paint and specialist industries including rubber and pharmaceutical applications. Around 20-25kt per annum is supplied to various end users. ***AMR***







WORKSHOP BUILDING EXPERT

Trust Anderson Construction for all your workshop construction needs. This local company, based in WA, recently built a HV/UG/LV workshop for one of the largest gold mines in Western Australia.

Red 5 and mining contractor Macmahon currently mine the open pit and underground gold mines at King Of The Hills (KOTH) near Leonora, WA, and required a new workshop to service its fleet of surface, underground and light vehicles.

Anderson Construction co-director and construction manager John Anderson said the company delivered the project on-time and on-budget.

"We started with some basic initial drawings and overview of what the client required for the workshop," he said.

"One of the main features is the 30t overhead crane in the HV workshop – this had to be high enough to pass over a dump body if they were working on it while it was raised.

"From there we created a 3D model of the structure, dimensions being 75m long x 22m wide x 18m high.

"We presented this to the client and they were happy for us to move forward with the design based on our price.

"Our Scope of Works included design and engineering, procurement including the overhead crane, delivery of all the components and construction machinery to site, management of the project and construction.

"We started construction January 2022 and finished mid-April 2022.

"We built it fast & we built it safe."

King Of The Hills consists of a 4.12Moz Mineral Resource and 2.4Moz Ore Reserve.

First gold was poured on 5 June 2022, with ramp up to full production in the September quarter 2022.

Its underground mine fleet comprises two jumbos, two boggers and a supporting fleet and includes the use of tele-remote technology.

The open pit fleet consists of one 360t excavator, two 260t excavators, sixteen trucks and a supporting fleet.

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Laneway Shipping High-Grade Ore To Georgetown Gold Processing Plant

Laneway Resources Limited (ASX: LNY) has commenced carting of high-grade ore from its Agate Creek gold mine in North Queensland to the Georgetown Gold Processing Plant and crushing of the ore at Georgetown.

Highlights

- Haulage of high-grade ore underway from Laneway Resources' 100% owned Agate Creek Gold Project to Georgetown Gold Processing Plant
- Crushing of high-grade ore at the Georgetown Gold Processing Plant has now commenced
- Georgetown Gold Processing Plant refurbishment progressing well with processing of Agate Creek ore through the plant on schedule to commence mid-August with first gold pour expected shortly thereafter.

The commencement of haulage and crushing of high-grade ore follows on from the recommencement of mining at Agate Creek in June after receiving the approval for the Environmental Authority amendment to allow Agate Creek ore to be treated through the Georgetown Processing Plant.

Mining operations are continuing to perform well with daily mining rates at or above targeted levels. The first phase of the refurbishment of the Georgetown Gold Processing Plant in North Queensland continues to progress well with site works and electrical and mechanical refurbishment programs remaining on track to enable the commencement of processing of ore and first gold pour in August.

Laneway has entered into a Share Sale Agreement to purchase Masterson Minerals Pty Ltd, owner of the Georgetown gold processing plant and an extensive portfolio of mining and exploration tenements with settlement of the acquisition scheduled for August.

Managing Director, Brad Gordon, said the imminent restart of the Georgetown Gold Processing Plant will enable Laneway to take control over its gold production future, generate material free cashflow and begin building the platform for a regional gold processing centre.

Forecast gold production for FY23 is 15,000 ounces with production expected to increase in FY24 to 40,000 ounces.

"With the carting of high-grade ore from Agate Creek underway, the commencement of crushing of the ore at Georgetown and the continuing good progress on the works for the restart of the Georgetown plant, Laneway is continuing its rapid progress towards commencement of gold production which will provide an ongoing revenue stream that will establish a base for unlocking the considerable value in our project portfolio," Mr Gordon said.

Transitioning To Gold Producer

As part of its refreshed strategy as the company transitions from explorer to producer, Laneway will be seeking shareholder approval to change the company's name to Savannah Goldfields Limited and to also consolidate the company's share capital on a 1-for-40 basis. ***AMR***



Bellevue Awards EPC Contract For Namesake WA Gold Mine

Bellevue Gold Limited (ASX:BGL) has taken another key step in its project development strategy with the Engineering, Procurement and Construction (EPC) contract for the 1 Mtpa Bellevue Gold Project processing plant in Western Australia awarded to GR Engineering Services Limited (GRES)

The agreement is for a total fixed contract price of A$87.8 million. As part of the contract, Bellevue can pay up to A$7.5m of the contract price to GRES in Bellevue shares, aligning GRES with the project and reducing Bellevue's pre-production cash funding requirement.

The award of the contract is particularly important because it further insulates Bellevue against rising costs. The EPC contract is the last of the large capital expenditure items on the pathway to production, meaning 90% of the project's pre-production expenditure is locked in either via contracts or tenders (79% under contract and 11% under advanced tender).

The processing plant has been designed so that throughput can be expanded to 1.2Mtpa at no additional expense, allowing for ongoing organic growth at the project.

Bellevue Managing Director Steve Parsons said the appointment of GRES ticked another key box on the path to production and cashflow.

"The appointment of GRES to build our processing plant means we have yet another tier-one contractor helping ensure we meet all our operating and financial targets," Mr Parsons said.

"GRES knows the Bellevue project well, having been involved in the early studies. And they are extremely experienced in designing and building gold plants in WA.

"Their readiness to accept Bellevue shares as part-payment is a strong vote of confidence in our project and the outlook for our company."

Plant Designed for Growth

The design criteria incorporates sufficient headroom to support an increase in throughput to 1.2Mtpa with no additional capital required across the entire plant.

Further expansions beyond 1.2Mtpa can be achieved for a low level of additional capital. Optimal renewable energy penetration rates.

The design of the crushing circuit has been optimised to maximise renewable energy usage by incorporating higher throughput rates, enabling its use to rise and fall in line the availability of renewable energy while not restricting overall throughput.

By optimising the power demand curve to better align with key daytime and night-time energy peaks and troughs in the generation of power from renewable energy sources, it will create the optionality for the crushing circuit to maximise crushing in peak renewable energy generation periods.

This will have the potential to offset more than 1MW in demand on thermal power generation.

Approvals Pathway on Track

Bellevue has also been advised by the Environmental Protection Authority that it has successfully completed the environmental review process, ensuring it remains on track for production in the second half of next year.

The Project

Bellevue Gold Ltd is developing a high-grade underground gold mine at the Bellevue Gold Project. The project is designed around a 1.0 Mt per annum processing plant and using a conventional gravity and leaching circuit. Mining will be predominantly from underground production from two production centres accessed from the same portal.

The project is currently under development with the first gold pour planned for second half 2023. The project has an initial 10 year mine life based on a LOM of 1.85 Moz @ 5.8 g/t gold and includes a probable ore reserve of 1.34 Moz @ 6.1 g/t gold.

When operational the Bellevue Gold Mine is forecast to be one of the highest-grade, lowest cost mines in Australia with the first 5 years producing an average of more than 200,000 ounces per year at an all-in sustaining cost (AISC) of A$1,000-1,100 per ounce. The high-grade nature of the mine at Bellevue is conducive to profitability and the mine is forecast to produce $2.1 billion of free cashflow (pre-tax) over the life of mine (assuming gold price of A$2,500/oz).

With a highly experienced management team in place the company is fully funded into production with a $200 million underwritten and credit-approved loan secured to fund construction and development activities. ***AMR***



CMI B-Series Upgrade





CMI's continuous development of new and improved products, are proud to announce a major upgrade for the stalwart B-Series Range of couplers.

The B-Series, or "Bolted" Coupler works within the range of 300-425 Amps for either 660 or 1100 Volts. We have developed a new interior phase carrier unit, that's inserted into the existing Bronze outer casting.

The interior holds the insulators phase sockets & thimbles for connection to a feeder cable. The interior is more robust, introduces phase segregation and improves the maintainability of the product and remains backward compatible.

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

We've replaced the existing Dough Mould Compound (DMC) material of the old interior carrier, for a new carrier made of brass and aluminium. This interior captures and locks in place teflon phase insulators for the three phase and pilot sockets.

The new interior being made of brass and aluminium is far more durable, reliable and Improves the overall dependability of the product as the interior is easy to remove and dismantle, which allows for clear access to the sockets and thimbles for replacement and repair. ***AMR***



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WASTE MATERIALS

SUPPORTING A SUSTAINABLE APPROACH TO CORROSION INHIBITION AT MINE SITES

By Professor Peter Junk, Dr Nazli Rad and Mr John Colvin

Mobile plants, such as dump trucks, are a common site across the mining and resource industry, but they can be very expensive to run, susceptible to corrosion and managing their environmental waste is also a challenge.

With each truck generating up to 2000L of waste coolant each, Prochem Agencies, a well-established Queensland-based company providing environmental and truck maintenance to the mining and resources industry, were keen to explore if the old engine coolant could be recycled in a way that could help tackle truck corrosion, reduce maintenance costs and deliver on improved environmental outcomes.

But finding the right research and development expertise can often be a challenge for many companies to navigate on their own, which is where programs such as the Australian Government's Innovations Connections programme can assist. Delivered nationally by CSIRO, it connects businesses with the right research and development (R&D) expertise from across the country and provides funding support to lower the risk of R&D.

Through this programme, Prochem were connected to James Cook University (JCU) chemistry researchers, Professor Peter Junk and Dr Nazli Rad, who specialise in understanding corrosion and developing new technologies to combat corrosion. Currently their main approach is to use Rare Earth metal complexes in recycle waters where they have an Australian Research Council Discovery Grant to fund their research.

Professor Peter Junk said that corrosion is a common problem encountered across mine sites.

"At a number of mine sites at Moranbah Queensland, corrosion to mobile plant - specifically dump trucks - was resulting in equipment lifespan of eight years versus the expected 12, due to high mine water salinity and the harsh acidic environment," Professor Junk said.

"This corrosion impacts truck frames and engine bays, but also smaller workhorse vehicles on site. The large cost of such equipment means that extending their lifespan can afford large savings to companies.

"When engine coolant is spent - no longer meets the required specifications for its use - each truck can generate up to 2000L of waste coolant, which is up to approximately 50 per cent propylene glycol, 5 per cent corrosion inhibitor, and the balance being water.

"Similarly, wastewater from washing down equipment and materials at the site ends up, after some limited treatment, in liquid waste dams, and could be re-used in wash-downs. However, this wastewater is acidic and composed of many other contaminants.

"This is a lot of waste product so coming up with new solutions to manage this waste coolant and waste-water made a lot of sense."

Dr Nazli Rad said the aim of the team was to incorporate all of this waste, into a formulated surfactant based, corrosion inhibiting truck wash.

"Ideally this wash should not only provide a measurable level of corrosion inhibition, but also having good soil removal properties would be desirable as it normally takes an operator up to eight hours using a high-volume water blaster to clean one truck," she said.

Materials directly sourced from the mine were initially used for testing alongside suitable controls to do formula performance experiments in the JCU lab. These experiments were performed in several different ways. Firstly, experiments involving mild steel coupons were tested using the formulation and comparing results against controls where samples were placed in sodium chloride solution (ASTM G31) following by electrochemical corrosion testing (ASTM G3).

Next, experiments were performed on real truck parts obtained from the mine sites. Again, tests were performed using the formulation and comparing against controls of corroding truck parts in sodium chloride solution. The formulation again showed performance against corrosion was excellent (Figure 1).

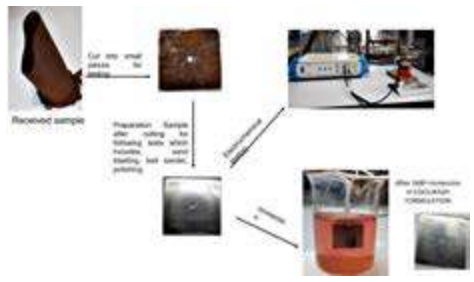


Figure 1. Truck sample preparation and testing plan

Finally, electrochemical experiments were performed where it was found that corrosion was significantly inhibited where the polarisation curves strongly tended towards noble domains, meaning corrosion was enormously mitigated (Figure 2).

Based on all these findings, a test product was formulated for trial. Prochem Agencies, in conjunction with one of their largest clients - a world-renowned mining company - were satisfied that preliminary research data could be trialled in a real mine setting, on real equipment.

Director of Prochem, John Colvin said the results were good for the environment and good for the bottom line and allowed the company to remain competitive during the pandemic.

"Being able to reuse waste that would normally go to landfill naturally this made good businesses sense for our client, with the potential for substantial cost savings through the extended the operating life of mobile mining equipment through reduced corrosion," Mr Colvin said. ***AMR***

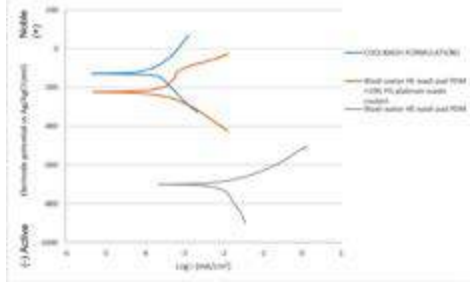


Figure 2. Sample preparation for electrochemical measurements on received truck pieces.

New Drilling Fluid Technology Advancing Mineral Exploration

Researchers at Curtin University have developed new technology for the rapid cleaning and reuse of drilling fluids, paving the way toward more efficient and environmentally-friendly mineral exploration.

Designed to support next-generation drilling technology, the reformulated fluids are hydrocarbon-free, reducing the risk of environmental harm to exploration sites.

Supported by the Minerals Research Institute of Western Australia (MRIWA) and the Deep Exploration Technology CRC, Dr Masood Mostofi and his research team at the Western Australian School of Mines: Minerals, Energy and Chemical Engineering (WASM: MECE) at Curtin University developed the new technology as part of their ongoing research toward automating fluid monitoring and handling in the drilling industry.

Drillers exploring deep beneath the surface for mineral deposits need specialised fluids to lubricate and cool the active drill head, and that won't leak away through cracks and porous rocks around the drill site.

"New Coiled Tubing drilling technology being developed for mineral exploration needs much higher volumes of these special fluids than conventional drilling," said Dr Mostofi.

"We have developed a system that can meet these fluid needs in remote locations where geologists might explore for new mineral deposits, and reduces the risk of releasing fluids that might affect the local environment.

"Our reformulated drilling fluid eliminates the use of hydrocarbons, and we have developed a new method for both keeping boreholes stable and rapidly separating rock chips and solid materials from the fluid as it returns to the surface.



"Working alongside partner technologies being developed in the MinEx CRC, this method will help deliver continuous samples of the rock material a drill is cutting through up to 1000m below the ground, while allowing the drilling fluid to be efficiently cleaned and recycled."

In releasing the research report, MRIWA CEO Nicole Roocke said the research helps move the exploration industry towards safer, greener and cheaper drilling. "This is an important step forward for the mining industry," Ms Roocke said.

"By supporting these improvements in drilling technology, the Western Australian government is helping our exploration industry develop the tools it needs to succeed." ***AMR***



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Game-Changing Technology Reducing Compliance Costs



As the cost of doing business continues to rise both in Australia and globally – new locally-developed real-time compliance monitoring technology is offering companies the opportunity to streamline their processes, and potentially reduce both cost and risk.

Chief Executive Officer at Know Your People software company CVCheck, Michael Ivanchenko says the digital platform, known as Cited, was borne out of a direct need from within the resources industry - offering a real-time, efficient system to track employee compliance data.

"Whether it's on-site inductions, first-aid requirements or even the recent Government-mandated vaccinations, all your workers across all your locations can be monitored in one place quickly, and easily."

"Cited is an absolute game-changer in that it allows a company to see in real-time which of your employees need to take action, and when, to remain up-to-date."

"It creates one single source of truth and removes any margin for error."

Mining companies must adhere to various Acts and regulations, resulting in growing compliance costs through personnel time and wages, duplication of effort, software and technical equipment needs.

The cost of non-compliance is even higher, with maximum penalties ranging from tens of thousands of dollars, through to millions.

But Mr Ivanchenko says there's also another cost, beyond the financial burden.

"Being non-compliant risks your very company in terms of reputation, ability to secure future business, and in some cases, there's the possibility of jail."

"It's a risk companies shouldn't be taking, yet some businesses are inadvertently exposing themselves to penalty, simply because keeping track of the various regulations and requirements is a complex process."

Mr Ivanchenko said as well as mitigating the risk of non-compliance, Cited software can potentially create cost efficiencies for business;

Reduce Administration: Constantly having to check whether employee credentials are up to date is time consuming and costly.

Once employee data is onboarded, the compliance monitoring software sends out real-time alerts, reducing duplication of effort and cross-checking requirements, freeing up admin staff to take on other tasks.

Streamline Auditing and Investigations: With all documentation in the one place, and the ability to check compliance details at any time in the past, generating reports for auditing and/or investigation purposes is time-efficient and simple.

Digital Credentials Passport so Employees Can Start Work Sooner: CVCheck also provides OnCite, a free mobile app available to any worker. OnCite links seamlessly to Cited to create a real-time, secure, digital credentials passport that allows employees to have their data available at all times, and can easily transfer required information to a future employer if they're using the same system.

Supports 'Know Your People' Initiatives: Companies can manage much more than just certification – it can assist with well-being and personal safety of staff, allowing companies to truly know their employees and contractors.

Tailored to Individual Requirements: Companies can add and remove credential checks as required. New on-site inductions or changes to regulations can be added immediately, and workers' updates can be seen in real-time, reducing the potential for downtime while checks are carried out.

Offline Access: Once employee credentials are onboarded, details can be accessed even when offline, including in remote areas and during times of internet/WiFi outage, which again reduces the potential for downtime.

Mr Ivanchenko says privacy concerns have also been considered, with the employee remaining the owner of all data, at all times.

"We've enabled the workforce to control their interaction in that they can upload as much or as little as they're comfortable with and can delete information at any time."

"We've created a digital tool that is as of much value to the employee as it is to the company. Everybody stands to win."

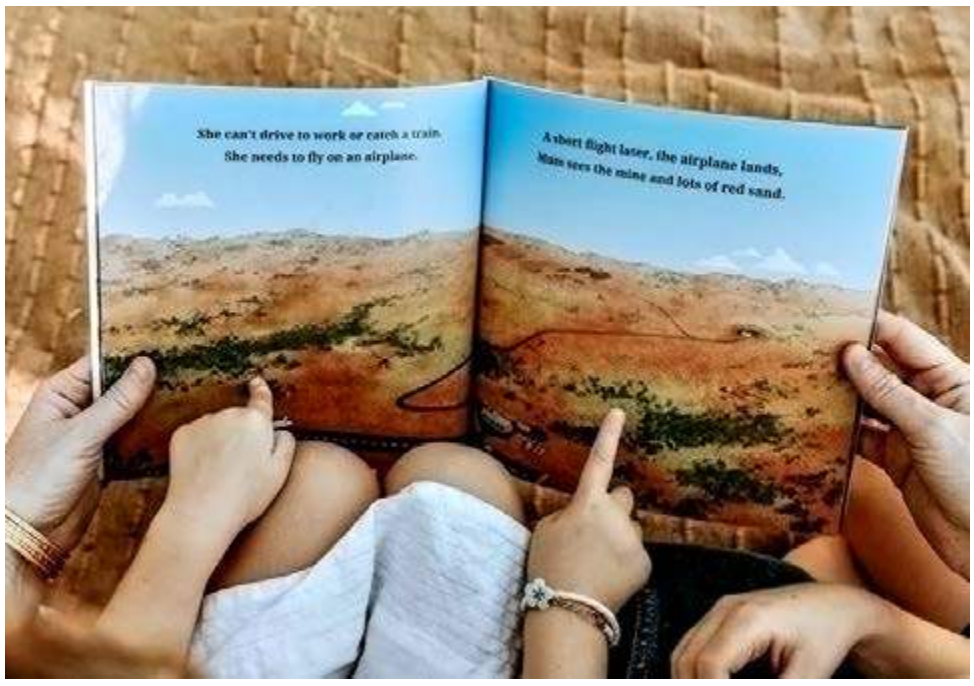
About Cited:
Cited is an online platform allowing for real-time compliance monitoring of employees. Once information is onboarded in the easy-to-use dashboard, Cited sends real-time alerts to keep track of employee certifications and various expiry dates.

The OnCite app is available to download on apple and android devices, allowing Cited data to be accessed on the go.

CVCheck is an ASX listed company, offering screening and verification services to a wide range of industries including mining and resources, oil and gas, recruitment, banking, financial services, health, education and aged care. ***AMR***



FIFO & ME EDUCATING LITTLE MINDS IN FLY IN, FLY OUT WORLD



FIFO life is not for the faint hearted. Numerous studies cover the mental health concerns for FIFO workers and FIFO partners, with 33% of FIFO workers and FIFO partners reporting high or very high levels of psychological distress however it's the children of FIFO families that are often overlooked. Where does my dad go? What does he do?

These questions are my inspiration for creating the FIFO & Me children's book collection. As a FIFO wife myself, my children thought my husband lived at the airport while working away.

It is this reason I have created a fun rhyming and engaging book to educate children about the mining process, developed in a language they would understand. Diversity and inclusion are also an important factor in this collection, with the books featuring characters of multiple ethnicities and genders.

The FIFO & Me: Mum edition is also close to my heart. With more and more women joining this sector and the FIFO workforce, I felt it's important to shine a light on women thriving in a heavily dominated male sector.

The intention of FIFO & Me: Mum edition is to not only celebrate women in mining but to also inspire and empower little girls that they too work in the mining industry and achieve great things.

The FIFO & Me Collection is proudly authored, illustrated, and printed in Australia and I am honoured to display the Australian Owned & Made logo on each book.

FIFO & Me is available to purchase at www.kiaraellis.com.au For further information please contact: Kiara Ellis ***AMR***

STEEL BLUE KICKS OFF NEW TREADLIGHTLY INITIATIVE TO RECYCLE OLD WORK BOOTS

Safety footwear manufacturer, Steel Blue is stepping up to help reduce its environmental footprint.

Together with TreadLightly, a new national recycling program – powered by the Australian Sporting Goods Association (ASGA) and recycler Save Our Soles (SOS) – along with key industry brands, Steel Blue is participating in a pilot programme to recycle work boots.

TreadLightly takes unwanted sport and active lifestyle shoes and gives them a second life as gym mats, anti-fatigue mats, and retail flooring among other things.

But with the support of safety boot manufacturers, led by Steel Blue, TreadLightly is expanding its capacity through a six-month trial with recycling bins placed in leading safety supply stores including IWS Group, SWF Group and Hip Pocket as part of a pilot program where Victorians can dispose of their old work boots.

"We are continually looking for ways to reduce our environmental footprint; be it through reducing the use of solvent-based chemicals in our manufacturing or introducing more recyclable material into our packaging," Steel Blue CEO, Garry Johnson, said. "A well-built shoe can take over 1,000 years to decompose.

The TreadLightly program means that our boots will continue to benefit people instead of contributing to the world's waste problem.

"I love the thought that once our boots have done their time as safety boots, they will continue to support the health and safety of workers as anti-fatigue padding and exercise mats."

As part of its "In Our Stride" social responsibility strategy, Steel Blue collaborated with TreadLightly to secure the participation of rival work boot manufacturers.

"To amplify the outcomes of the trial, it was important that we also secured the support and participation of our competitors.

The need for a recycling program is apparent to everyone in the industry and we are excited to be able to step up and take a leading role in this project," Mr Johnson said.

"Cross industry collaboration is key in having a meaningful impact. We want the pilot program to succeed so we can get more recycling stations, in more stores, across Australia."

"Steel Blue boots are built to last in tough Aussie working environments. We've recently enhanced our GraphTEC range with graphene, a nanomaterial that's superior in strength to diamond. Unfortunately, once those boots eventually wear out, that longevity can cause problems for the environment if they aren't properly recycled."

"We want to encourage all work boot wearers to utilise the TreadLightly bins and ensure their old work boots don't end up in a landfill," said Mr. Johnson. ***AMR***



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AUSTRALIAN COAL CONTINUES TO THRIVE IN A DIFFICULT MARKET

The news of my death has been greatly exaggerated" While environmentalists and some market watchers have been prematurely celebrating the demise of Australia's coal industry, new figures from the Office of the nation's Chief Economists show the real story is vastly different.

New data contained in the Department of Industry, Science and Resources' June Quarterly Report show that both Metallurgical and Thermal coal exports from Australia have been performing powerfully in recent months on the back of strong global demand and pricing.

Metallurgical Coal
According to the Quarterly Report, Metallurgical coal prices remain at historic highs, pushed up by supply disruptions and market uncertainties as a result of fallout from the Russian invasion of Ukraine.

The Australian premium hard coking coal price is forecast to average over US$420 a tonne in 2022. However, it is expected to fall by almost half as supply conditions normalise. Prices are ultimately expected to reach around US$220 a tonne by 2024.

Higher production in NSW and Queensland is expected to push Australia's exports up from 171 million tonnes in 2020–21 to 174 million tonnes by 2023–24.

Australia's metallurgical coal export values are forecast to track with price movements, rebounding from $23 billion in 2020–21 to peak above $60 billion in 2022–23, before falling back to $41 billion by 2023–24.

Prices
Metallurgical coal prices are expected to ease gradually Metallurgical coal prices have risen by around US$120 a tonne (to more than US$520 a tonne) in the wake of the Russian invasion of Ukraine.

Price pressures softened in April, as disruptive weather conditions in Australia eased momentarily, allowing some extra supply to enter markets. However, renewed flooding in May and June is affecting Australian coal output again.

According to the Chief Economist, prices are expected to ease over the forecast period, with volatility also expected to decline. However, price and volatility are both likely to remain above typical levels through the outlook period.

Market Factors
The Quarterly Report suggests a range of factors (weather events, potential COVID disruptions, import bans from China and Europe, and the conflict in Ukraine) will all play out in unpredictable ways over the next two years. Risks remain mostly on the supply side, with low inventories likely to exacerbate the impact of any further supply disruptions in 2022.

Australia Metallurgical coal export earnings have risen despite supply issues Australian metallurgical coal exports and prices have lifted recently.

The rise has been driven by strong growth in demand in several major markets, including Japan, Taiwan, and South Korea. Brazil, typically a minor market, has seen rapid growth in recent months. Exports to Europe rose by almost 25% in the year to March 2022.

Work on unlocking additional capacity continues, with QCoal's Cook mine now operational. This mine is one of several small restarts and expansions, with most expected to take effect over coming months. Weather conditions eased in April, as the La Niña period weakened.

However, renewed floods in the Bowen Basin have again affected output, flooding several mines. Rains have exceeded 250mm in some mining pits, with pit owners currently assessing their options for resuming mining. At this stage, no declarations of force majeure have been made, though dewatering is expected to take several weeks.

Flooding has also affected port and rail facilities, with the Abbot Point coal terminal reporting that moisture levels for their coal stockpiles are now near the maximum limit allowable for shipping. Ongoing weather issues represent the primary risk to Australian production at present, with labour and shipping issues caused by the COVID-19 pandemic now easing.

Higher demand from India is expected to support Australian exports, though buyers in Japan, South Korea and Taiwan have also expressed interest in higher supply."

Exploration Falls
On the downside, Australia's coal exploration expenditure decreased to $43 million in the March quarter, to be 15% off the level of March 2021. Prices have risen markedly for Australian coal in recent months, but thermal coal producers face issues with finance, insurance and social licence. Exploration is thus likely to be dominated by metallurgical coal in future.

Thermal Coal
Thermal coal pricesalso remain elevated, driven by extreme weather and COVID-19 disruptions, and market uncertainties linked to the fallout from the Russian invasion of Ukraine.

As more normal conditions return, the Newcastle benchmark price is forecast to ease from an average of US$280 a tonne in 2022, to around US$115 over 2024 (still well above historical averages).

A resolution of recent supply disruptions is expected to see Australian thermal coal exports increase from 192 million tonnes in 2020–21 to 207 million tonnes by the end of the forecast period (see Australia section).

Record prices are expected to see export values reach $39 billion in 2021–22, with a peak in 2022–23 and a subsequent (price-driven) easing to around $31 billion by 2023–24.

Prices are expected to continue to be relatively high and volatile Thermal coal prices surged at the start of 2022, propelled by supply shortfalls against a backdrop of persistently low inventories.

Prices
After peaking in late January, prices eased slightly in mid-February before rebounding

again late in the month. Prices rose further in March, topping a record US$375 a tonne by the middle of the month. Prices eased again in early April and then rebounded late in the month, remaining above US$400 a tonne at the time of writing. Prices are not just high but highly volatile, with daily average swings far above their historical average during 2022.

According to the Quarterly Report, these fluctuations have become more self-reinforcing over time, with large swings drawing in speculators and increasing fears among some utilities of inventory shortages coinciding with peaking prices.

The Report suggests Australian thermal coal exporters face volatile conditions in H2 2022 Australian coal supply is expected to pick up slowly over the outlook period, as a range of disruptions linked to weather and COVID-19 gradually pass.

The La Niña weather event is fading, with previously disrupted shipping starting to catch up in late April and early May. However, other weather issues may emerge linked to the Indian Ocean Dipole. Mines in the Hunter Valley are still affected by long periods of heavy rain, which flooded some mining pits. However, progress has been made in dewatering them. Recovery from weather disruptions may be hampered by renewed heavy rain in parts of Queensland and NSW, but weather disruptions may ease temporarily with the passing of the La Niña event.

Labour shortages, which have also affected exports in the March quarter, appear now to be gradually easing, though some companies still report shortages of engineers. Rail maintenance, which has affected some shipments in the March quarter, has now been largely completed.

Recent high wholesale power prices, have also added to input costs for some miners in the March quarter. Among individual companies, BHP has continued to face labour shortages and flooding, with output in the March quarter falling to the lowest level for more than 10 years.

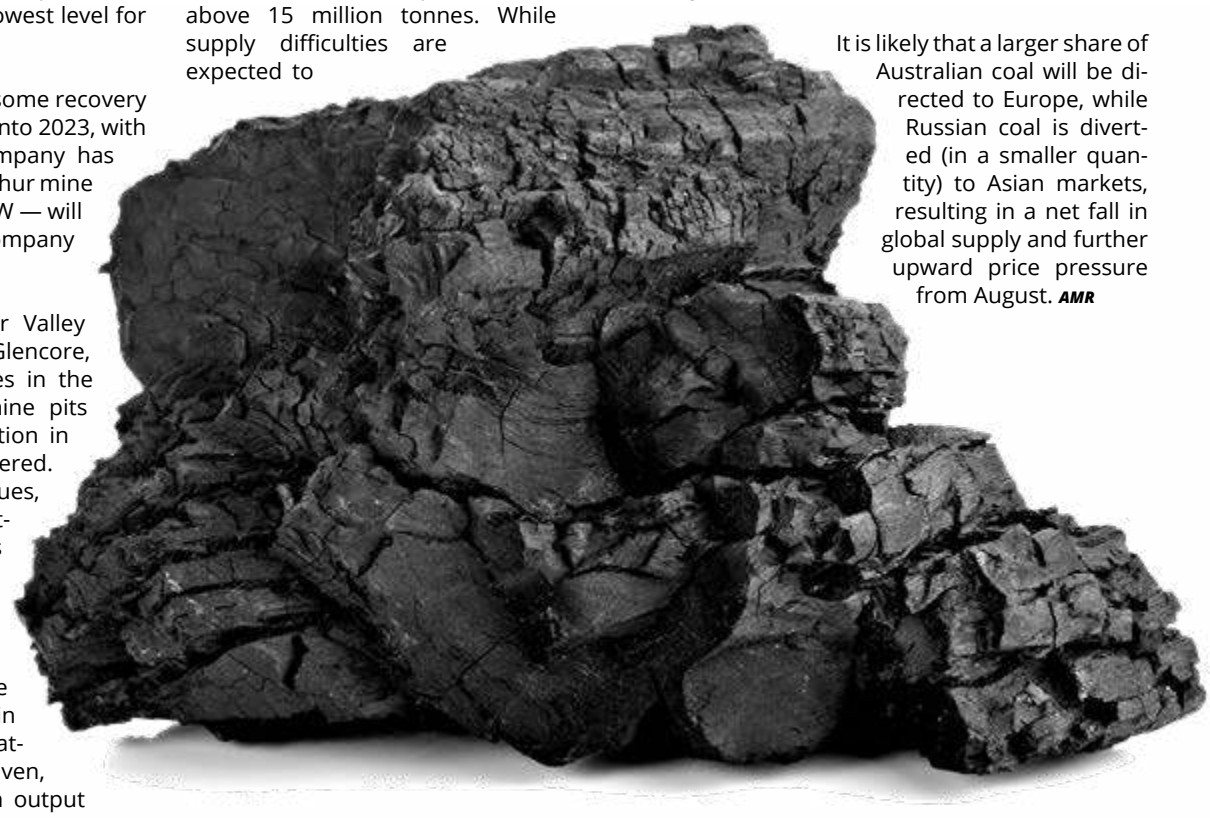
Company guidance suggests some recovery through the rest of 2022 and into 2023, with output set to grow. The company has also announced that its Mt Arthur mine — the largest coal mine in NSW — will be closed in 2030 after the company failed to attract a buyer.

Heavy rainfall in the Hunter Valley has affected Yancoal and Glencore, which operate sizeable mines in the area. Flooding of several mine pits resulted in delays in production in April, as pits had to be de-watered. Peabody has faced similar issues, with flooding and labour shortages reducing output at its Wambo mine.

A rebound appears to have occurred in the June quarter. The passing of disruptive weather in the Gunnedah Basin has helped companies operating there, notably Whitehaven, which suggests a rebound in output over coming quarters. The company's Narrabri extension project has been approved by the Independent Planning Commission. In 2021–22, the company's output appeared little changed. Two trial shipments have taken place from the Carmichael mine.

The Adani group has announced that it will seek to build annual exports from the mine to more than 10 million tonnes annually from 2023, with the potential to increase above 15 million tonnes. While supply difficulties are expected to linger over the short-term, an easing in weather and labour conditions should result in a small lift in export volumes over the second half of 2022.

Australian coal remains in high demand in the wake of the Russian invasion of Ukraine, being the primary alternative supplier of higher coal grades. This has led to additional price pressure among the higher coal grades.



It is likely that a larger share of Australian coal will be directed to Europe, while Russian coal is diverted (in a smaller quantity) to Asian markets, resulting in a net fall in global supply and further upward price pressure from August. ***AMR***

KESTREL COAL

LOOKING TO BUILD ON 30 SUCCESSFUL YEARS





Located 40 kilometres north of Emerald in Queensland's Bowen Basin, Kestrel is an underground coal mine producing approximately seven million tonnes of metallurgical coal annually.

Its capability spans the entire mining process from development, to extraction and processing, environmental management and sustainable rehabilitation.

Its coal is exported from Gladstone Port to steel mills and coke makers across Asia, Europe and South America.

The company is a joint venture between EMR Capital and Adaro Energy (80%) and Mitsui Coal (20%).

Kestrel has an approved mine life until 2033 and reserves to 2046.

Since 1992, Kestrel has gained status as a world leading coal producer securing accolades along the way including being awarded the Australian Mining Monthly Mine of the Year in 2019.

Proudly celebrating its 30 year anniversary, Kestrel now has its sights set on extending operations out to a half century.

According to Kestrel Coal CEO, Shane Hansen, the company is a big part of the local community and the 30 year milestone is an amazing achievement.

"The fact that it's a coal mining area has been a strong part of our relationship with the community and we're blessed with great resources in the ground that has helped with our longevity," said Hansen.

"For us to have continued operating for so long, it's obviously a testament to our people and their dedication to keeping the company highly productive and competitive."

When you're one of the largest global coal producers with a strong demand from multiple markets, a future focused mindset is critical to ensure sustainable product supply.

Kestrel is one such company that has big plans for future expansion.

"We're in the process of applying for a mining lease extension, which will add another ten years beyond that.

"At the moment it's business as usual from a people and equipment perspective. It's just a new mining area that we're hoping the government will grant us a mining licence for, which will allow us to extend our current line into the new area," he said.

The company confirmed it will continue to focus on its underground mining operation. There are approximately 400 employees within the Kestrel team, the majority of which are from the local region. They have an additional 400 contractors to support their processing activities.

When asking Shane about the company culture, he mentioned the real sense of community and how its people have had a valuable impact in the local area.

"We have a unique culture within our company," he said.

"I think we've certainly succeeded in building something different. We focus on our values as an organisation and making the individual count so we get the best results."

Looking ahead and reflecting upon its 30 year anniversary, Kestrel has a few celebrations lined up.

"We're excited to be hosting an anniversary gala on Friday 5th August at the Emerald Town Hall. We've also organised a Family Open Day the following week on Saturday 13th August, which will be held at our coal mine.

"These events will be attended by Emerald locals, mine workers and of course asset owners.

"It's a way for us to really thank our people and the community for all their support over the past three decades," he said.

Kestrel Coal's History – From Gordonstone To Kestrel And Beyond

Kestrel first started its life in 1982 when Denham Coal Management acquired the authority to prospect in the area. At the time the area was known as Gregory South.

The mine lies on the western limb of the gently dipping Talagai Syncline, which plunges southwest, resulting in an overall regional dip of the stratigraphic sequence to the south and south-east, according to Golder associates.

The coal reserves are located within the Permian German Creek Formation in the Bowen.

In 1987 the Atlantic Richfield Company invested in the project and acquired eighty per cent of the site with Mitsui holding the remainder.

In 1990 a mining lease was granted and operations at the site commenced in 1992 where it was originally known as the Gordonstone Mine.

In February 1999 Rio Tinto purchased Atlantic Richfield's 80% interest for US$150 million.

The mine was subsequently redeveloped and recommenced production in June 1999, under its current name Kestrel, supplying metallurgical grade coal.

The name Kestrel pays homage to the Australian Kestrel Falcon – or Nankeen Kestrel - which is widespread throughout Australia and visible within the site's surrounds.

In 2018 Rio Tinto sold its 80% stake in the site to EMR and Adaro for US $2.2 billion.

Kestrel Coal Resources is now owned by EMR Capital of Australia and PT Adaro Energy of Indonesia with EMR owning a 52% share and PT Adaro Energy owning a 48% share. Mitsui retains its 20% ownership.

Its purchase of the Kestrel site was the first metallurgical coal investment by the company and each entity is an enthusiastic investor in metallurgical coal in its own right.

EMR is a private equity investment company based in Melbourne and Hong Kong and invests through its managed funds, in mining companies and projects around the world in the copper, gold, potash and metallurgical coal sectors.

PT Adaro Energy is a coal mining development and production corporation based in Jakarta, Indonesia.

The company is listed on the Jakarta Stock Exchange and is a significant producer of energy coal, producing more than 52 million tonnes in 2017.

It seeks to grow its energy coal and metallurgical coal businesses in both Indonesia overseas markets.

100% of Kestrel product is shipped from Gladstone Port in Queensland to customers all over the world. Steel mills and coke makers across Asia, Europe, and South America covet Kestrel coal's niche coking properties.

India remains the site's largest market, followed closely by North-East Asia. ***AMR***

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OUR PROMISE

- **Health and Safety** – During the execution of our projects we take particular care to ensure that all risk is evaluated and managed effectively.
- **Social Responsibility** - Our vision is to enhance the quality of life for the host communities in which we operate.
- **Environmental Stewardship** - conservation and the continued health of our planet is everyone's responsibility, and we will continually strive to facilitate the least possible during operations.
- **Quality** - Our commitment to quality flows from the fact that long after our involvement on the project is completed our reputation will continue to be influenced by the work and service we provided.
- **People** - A core set of values binds us together and provides the ethical framework for conducting our business day-to-day
- **Community** – We foster open and honest communications and contribute to the sustainability of the communities we operate within.

OUR VALUES

- **Integrity** - We will be honest and reliable, reflecting the highest ethical standards in all our business practices.
- **Respect** - We will trust and treat people with respect and dignity.
- **Leadership** - We will recognise the unique contribution and intrinsic worth of each individual and provide an inclusive environment focused on consistently delivering value.
- **Value Creation** - We focus on doing the simple things really well.
- **Collaboration** - We promote open communications as the key towards influencing and inspiring high-performance outcomes.

Australian company ABM Contractors is strengthening domestic mining operations with their comprehensive range of services – an offering that puts strong partnerships at the forefront.

Based in Queensland, the company has become well known for their high quality project management, supplementary labour, shotcrete services and longwall support, as well as their work in ground consolidation and coal development.

Through the veteran company, clients can access first-rate drill and blast services, secondary support, VCD installations, fault driveage, equipment hire, equipment repair and major conveyor installations and recovery services.

ABM Contactors Director Jamie Abraham said his highly experienced team were also specialists in fall recovery, drifts and decline, which positioned the company as an ideal partner to many operators within the mineral resources sector.

He said this included Kestrel Coal Mine, one of the world's largest producing underground coking or metallurgical coal mines.

"Our team began working at Kestrel Coal Mine's Kestrel North in 2000 and we remained one of the major contractors at the operation until 2013," Mr Abraham said.

"During this time, we completed all secondary support and VCD installation requirements, as well as providing supplementary labour to outbye services and development.

"The quality of our service delivery meant we were awarded the contract for the KME Project (Kestrel South), in 2011 to do further secondary support and VCD installations.

"The team again began work at Kestrel South in 2019 to complete conveyor installations and we later were awarded another major services contract for additional projects, outbye services, development and longwall.

"Kestrel has always been a fantastic place to work and we wish the operation well as it marks it's 30 year anniversary."

Mr Abraham said a key ingredient of ABM Contractor's successful relationship with Kestrel Coal Mine was their shared commitment to local community support.

He said modern mining operators were committed to improving host communities and embracing environmental sustainability goals, meaning it was critical for them to partner with service providers that had a similar vision.

First established in 2000, ABM Contractors has gained a nationwide reputation for tackling tough jobs headfirst both on time and on budget.

Their strong track record has pushed the company into expanding their services into the New South Wales Illawarra and Hunter Valley regions, and into opening a new workshop to better accommodate the growing equipment hire and repair needs of clients.

The family-owned business is also poised to start a new venture providing underground shotcreting services to operators within the coal industry.

Mr Abraham said this venture – called ABM Ground-Con – would mark an exciting new phase in the company's journey and be another innovative solution for the dynamic sector.

He said ABM Contractors had always been at the forefront of time-saving and cost-effective services and he added that his team took great pride in completing tasks without incident or impact on day-to-day operations.

"Having worked general services contracts for many years, ABM Contractors has a solid understanding of the needs of a mining operation and the standards to which work must be completed," Mr Abraham said.

"Our professional reputation rests upon successful project completion and consistent predictable results.

"Our capabilities and experience in performing a number of disciplines that modern mining projects demand, comes from the depth and enthusiasm of our people. In short, our people are our business." ***AMR***

For more information, visit
Delivering quality, innovation & value - ABM Contractors



About us:

The ABM way is grounded in respect for diversity and commitment to creating exceptional opportunities, regardless of the size or pedigree of competitors.

We offer a distinct and unique portfolio of experiences that enable us to not only differentiate but surpass competitors in quality, innovation, and value in a fiercely competitive market.

Our services:

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- Equipment Hire, Sales & Repairs
- Coal Development
- Conveyor Installation
- Longwall Support
- Mining Consumables

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DyFlex Your SAP Solutions Specialist

DyFlex Solutions has been implementing and supporting SAP solutions for Australian Energy and Natural Resources companies for over a decade.

With operations across Australia and almost 100 customers DyFlex is the premier Australian SAP Partner for resources companies.

The company's success stems from deep industry knowledge that accelerates implementation timeframes whilst ensuring that the quality of the outcome is never compromised.

The company provides solutions for mining companies at every stage, from start up through to full operations. Its client base includes junior explorers, Iron Ore, Gold, Coal, Lithium and Rare Earth miners and its solutions provide coverage across all stages of operation including processing.

"Whether you are an established miner upgrading systems or investing as a junior explorer, fit for purpose solutions that provide value and scalability are key to supporting long term growth and success," Managing Director of DyFlex Solutions, Peter Lander, said.

"Start-up companies often initially require only Finance, Projects, Tenement Management and Procurement solutions.

"One of our differentiators is that we start with a small footprint at this early stage and scale with the business as they move through the construction and operations phase. The later phases of a mine development require more complex solutions such as Project and Asset Management, Consolidation and Treasury and enterprise integration capabilities.

"As an example, we have recently gone live with a Lithium Miner on SAP S/4HANA Cloud. That client started with DyFlex as a junior explorer and now has a major project under construction. DyFlex has been on the journey with them every step of the way. Their move to S/4HANA Cloud will support the construction, commissioning and ultimately the full operation of two lithium mines and all related Finance, Project, Supply Chain, Asset Management and People Management"

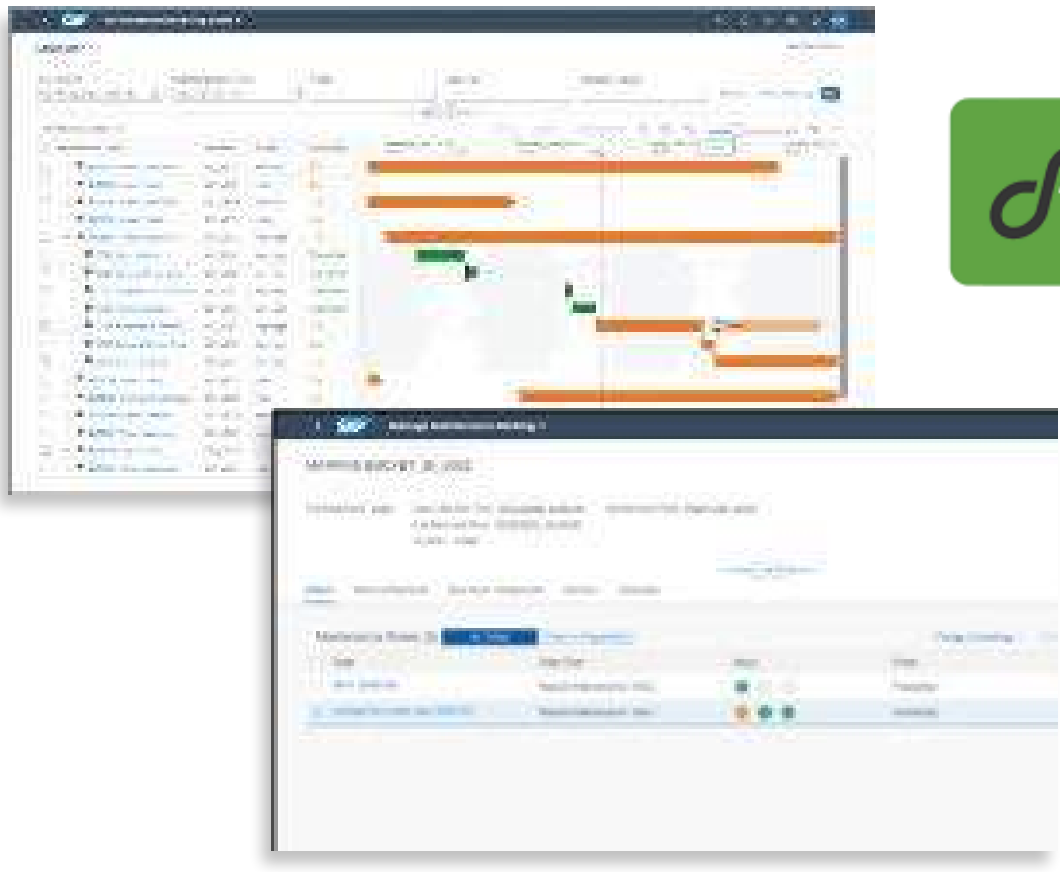
"We are also seeing increased demand from existing SAP customers looking to take advantage of the latest SAP innovations and modern user interface. Many of these clients are moving to cloud based solutions, either Public or Private Cloud which in effect provide an 'evergreen' platform that requires zero infrastructure, which is very attractive, as it provides a great deal of agility, innovation opportunities and a significant overall cost reduction."

"SAP have always been the world's most successful ERP solutions provider. The speed of innovation, particularly in its Cloud solutions has been phenomenal, this innovation combined with DyFlex' s unique industry experience is part of the reason Kestrel Coal Resources have partnered with DyFlex and SAP on its transformation journey, Kestrel Coal have been exceptionally successful over the last 30 years and DyFlex are proud to be part of their success in the future." ***AMR***



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Pirtek Emerald Shows Commitment To Its Clients And The Community

With a hands-on approach to providing high quality customer support and the strength of Australia's premier fluid transfer solution products and service business behind it, Pirtek Emerald is ticking all the boxes for mining companies and the community in Central Queensland.

Owned and managed by brothers Tim and Peter Eversham for the past six years, Pirtek Emerald has become a key part of the local community, not only as a service provider to the resource and agricultural sectors, but as a significant employer and supporter of local sporting programmes.

Over the past six years the Emerald team has also successfully implemented the famous Pirtek service offering, including 24 hour On-site Mobile Breakdown Service, installation and supply of Hydraulic, Pnuematic and Industrial hoses, pipes, hose end fittings, connectors, valves and associated equipment and accessories, hose cleaning and tagging and preventative hose maintenance programmes.

According to Tim Eversham, having the Pirtek name behind the business is significant.

"I have been with Pirtek since 2006 and Pete's been with them since 2004 and they are a great company to be associated with," Tim told the AMR.

"Pirtek is massive as far as the quality of the product and the engineering solutions behind any issues you come up with. Pirtek is second to none for quality and support.

"We had a customer come in here and do an audit recently and we blew his socks off by the time he was finished.

"He basically said using Pirtek is like the equivalent of shopping for the most reliable model car on the market. You just know you are going to get a good product and it is going to be reliable for the long run."

With its own workshop, Pirtek Emerald has earned a reputation for providing specialised solutions to its mining clients, including roof support kits.

Assembled in the Pirtek Emerald facility, the full hose kits for roof supports are a plug and replace solution, which can be a significant time and cost saver for underground situations, particularly with Tim and Peter providing specialised hands on support.

Pirtek Emerald has also recently added to its arsenal of support by developing the capacity to design and construct four and six inch flexible shouldered pipe bends that can also be made to custom lengths.

Apprentice Programme

Tim and Peter are particularly proud of the apprenticeship programme they have established at Pirtek Emerald.

"We have already had one young lady pass through the programme and we have four apprentices in the programme at the moment. So that is a big thing for Pirtek and us."

A big part of the local community, Pirtek Emerald is a significant sponsor of a number of sporting groups, including a number of the local senior and junior rugby league teams, the local golf club and motocross racing.

When it comes to quality service and community commitment, the Emerald team is proud to do it the "Pirtek" way. ***AMR***



SENTINEL

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Surrounded by mining operations, it is no surprise that Emerald-based Sentinel Engineering and Fabrication is a highly-regarded service supplier to the resources sector in the region.

Engineering, Design, Fabrication, Supply, Overhaul and Onsite support of all mobile equipment and fixed plant. The goal at Sentinel is to provide its valued customers with a one-stop-shop solution in Queensland.

The company has extensive experience working for most original equipment manufacturers (OEM's) and customers both domestically and internationally. With this experience it allows the company to put forward proven concepts and strategies for its customers to optimise all equipment, whilst ensuring a very high level of accredited safety and quality, every time.

Abrasive Blasting And Protective Coating
Sentinel Blast and Paint specialises in professional and high-quality Abrasive Blasting and Industrial Painting services its clients throughout Central Queensland.

With a state-of-the-art facility and a mobile unit for onsite projects, Sentinel Blast and Paint is well-equipped to care for all mining, construction, agricultural, industrial, and transport equipment needs.

The company's facilities have been designed with the latest paint and blast technology in mind, while also considering the needs of its clients. The result is a 800s sq. m facility with a 26,000 sq. m holding yard.

The highly qualified and experienced team at Sentinel can provide all-weather premises and 24-hour capability to ensure a fast turnaround at the highest standards. Sentinel Blast and Paint also has highly skilled personnel and equipment to facilitate all onsite requirements.

Transport And Heavy Haulage
Sentinel is an ideally situated and highly competitive transport provider dedicated haulage equipment.

Its experienced team routinely transports heavy plant and equipment for the mining, construction, agricultural and transport industries.

The company's haulage equipment includes Tilt Tray Truck; Super Tilt; Drop deck Trailers; Flat Top Trailers; Low Loader; B Double and Road Train configurations. *AMR*

PROTECTING YOUR INVESTMENT

Sentinel Group Australia is a one-stop-solution serving Central Queensland and wider Australia for high-quality fabrication engineering, design, fabrication, overhauls, abrasive blasting and painting as well as transport and heavy haulage.

With more than 100 years of experience in the mining, agricultural and construction industries, our team offers extensive technical support in all aspects of life cycle management for Mining, Construction, Agricultural and Transport Equipment. We offer onsite support of all mobile equipment and fixed plant, as well as transport and heavy haulage to and from our Emerald facilities.

We have extensive experience working for most original equipment manufacturers and customers both domestically and Internationally. We employ proven concepts and strategies for our customers to optimise all equipment, whilst ensuring a very high level of accredited safety and quality, every time.



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MANNERIM PARTNERS
YOUR BUSINESS PARTNERS

Mannerim Partners is celebrating its 7th year of operations in 2022 and continues to focus on working with great clients to transition and transform their business for the future.

Established in 2015, Mannerim Partners is a firm of experienced professionals with Australian and international business development experience making them an ideal partner for complex projects, small or large.

This includes Central Queensland's Kestrel Coal Resources, one of the world's largest underground metallurgical coal operations. Kestrel Coal Mine produces around 7-million tonnes of metallurgical coal every year, shipped to customers around the world.

Mannerim Partners Managing Director Neil Grimes said his team were engaged to lead the business transition for EMR Capital of Melbourne and PT Adaro Energy of Jakarta when they purchased Kestrel from Rio Tinto in 2018.

"Mannerim Partners were engaged to provide project management services for Kestrel Coal's transition and business integration into the EMR and Adaro investment portfolios," Mr Grimes said.

"We built the project team, arranged the new name of Kestrel Coal Resources, developed the branding and the organisation design, managed the process of assignment of all major and procurement contracts and coordinated all communications, whilst working closely with the transaction and legal process teams.

"We also found the new head office, arranged the hiring of the senior management and head office team, implemented a new IT network with our friends at Frontline Services and the Pulse ERP for the new Kestrel Coal Resources business.

"This was one of the largest Private Equity acquisitions in coal in Australian history and the whole ownership transition was completed in just four months and four days.

"It was a fantastic team effort and a great partnership and we are thrilled to have been part of the Kestrel Coal story over its 30 years"

Mr Grimes said that the Mannerim Partners approach and quick delivery by the whole team saved Kestrel more than $250,000 in project management fees and facilitated access to revenue two months earlier than expected.

The significant cost savings is not an unusual outcome for a Mannerim Partners' client, with the consultancy firm demonstrated to have saved project operators in excess of $1 million over the last few years.

Backed by a dedicated and experienced team with innovative strategies, the business also has a reputation for enabling faster access to revenues and new cashflows.

Mr Grimes said at its core, the goal of Mannerim Partners is to help project owners and operators maximise their investment and provide the tools needed for them to succeed.

"Simply put, it's all based on expert advice and practical solutions," Mr Grimes said.

"Get in touch with us to learn about how we can support your own business transformation." ***AMR***

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AND SUCCEED IN AUSTRALIA AND SOUTH EAST ASIA

Mannerim Partners is a consulting firm with a proven track record helping business owners improve what they do and how they do it.

We walk with you every step of the way – from initial plans, to financing, to management planning and operations.

We look to help businesses maximise their profits and grow in their chosen markets.

For the right advice when it comes to business planning, effective strategies, risk assessment and feasibility – contact us today.



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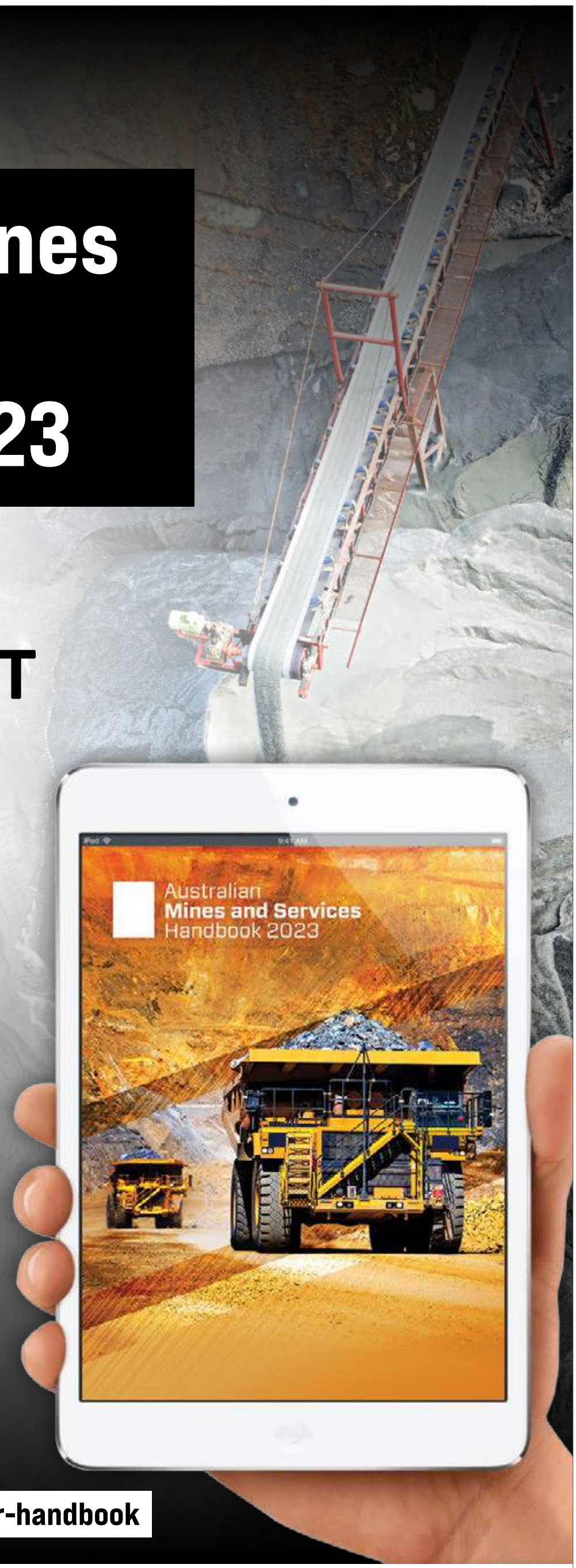
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ELIWANA

CONTINUES TO RISE IN THE PILBARA

The successful delivery and ramp up of the Eliwana project has assisted Fortescue Metals Group turn in a strong quarterly performance in the Western Hub development area in Western Australia.

The Eliwana mine, located 90 kilometres west of Tom Price, extends Fortescue's existing iron ore operations in the Pilbara region.

The operation includes a new dry ore processing facility with capacity of 30 million tonnes per annum and a new 143-kilometre rail line.

Western Australian Mines and Petroleum Minister Bill Johnston was on hand when Fortescue Metals Group officially opened the Eliwana iron ore mine in the Pilbara in December 2022

"This important project created around 2,000 jobs during construction and will create 500 full-time site positions as the team move into operations," Minister Johnston said.

"Fortescue's Eliwana mine will deliver a significant boost to Western Australia's economy, during the post-COVID-19 recovery phase, and contribute to the State's ongoing successful iron ore industry."

Fortescue is developing the Western Hub, which includes significant amounts of high iron content bedded iron ore and is home to the Eliwana mine.

Located 140km to the west of Solomon, the Eliwana mine spans over 30km and commenced operations in December 2020. The operation includes 143km of rail linking to the Hamersley rail line and a 30mtpa dry OPF.

Together with Eliwana's innovative low profile designed OPF and dual stacker reclaimer, Eliwana has the capacity to direct load onto trains up to 10,500 tonnes per hour.

Eliwana is now producing at an annualised run rate of 30mtpa, contributing to Fortescue's low cost status and providing greater flexibility to capitalise on market dynamics.

Contracts valued at $1.83 billion were awarded to Australian businesses during the project's development, including 290 WA businesses and $150 million worth of contracts to Aboriginal businesses and their joint venture partners.

The contract winners include MACA which completed early works for the Eliwana iron ore mine and rail project, over a two year period.

The Eliwana Mine and Rail project was delivered by NRW Contracting (formerly BGC Contracting).

NRW Contracting (NRWC) was awarded a bulk earthworks & infrastructure contract with Fortescue Metals Group at its Eliwana Mine and Rail project located in the Pilbara region of Western Australia.

The project was the second stage of a 143-kilometre rail line extension connecting the Eliwana mine to the existing Fortescue Hamersley Line.

Eliwana iron ore project geology and mineralisation

The Eliwana iron ore project is located approximately 90km from Tom Price and 120km from the Solomon project in Pilbara. The proposed area is located on the southern limb of the Jeerinah anticline within the Hamersley Province, which extends over more than 80,000 sq. km.

The project comprises a narrow zone, which is believed to have formed along with the mineralised Brockman and Marra Mamba Iron Formations. Tertiary sediments occur in the valley separating the outcropping formations.



Mineralisation predominantly occurs as bedded iron deposits (BID) with some detrital iron deposits (DID). It is distributed variably within an area of approximately 40km along strike and 3.5km across strike. Mineralisation occurs at surface and extends to depths of 350m below surface.

Infrastructure facilities for the Eliwana iron ore project

The Eliwana iron mine and rail project is currently accessed from Tom Price using a combination of public and private roads. Eliwana mine development envelope (MDE) is also proposed to be connected to the North West Coastal Highway by a new 130km road.

Water for the mining activities will be sourced from a combination of mine dewatering and water supply bore fields.

Power supply for the mine is proposed to be sourced from the company's existing Solomon power station via a new 132kV overhead transmission line.

Other options include the construction of a new 25MW diesel-fired power station or a gas-fired power station with a capacity of 25MW connecting either to the Fortescue River gas pipeline at Solomon or to the Goldfields gas pipeline.

Workers will be accommodated at the construction camp, while operational staff are proposed to be accommodated at the permanent accommodation village. ***AMR***

DONT BE LEFT IN THE DARK.



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CORE RAMPS UP LITHIUM NUMBERS AT FINNIS



ASX-listed Core Lithium Ltd (ASX: CXO) has recently achieved significant increases to its Mineral Resource Estimate and Ore Reserve Estimate for the company's wholly-owned Finniss lithium project located near Darwin Port in the Northern Territory.

The positive results eventuate from comprehensive drilling and exploration activities in 2021.

It's mineral resource estimate increased by 28% to 18.9Mt @ 1.32% Li2O, with the measured and indicated resource categories increasing by 61% to 13.3Mt @ 1.40% Li2O. Additionally, the ore reserve increased by 43% to 10.6Mt @ 1.3% Li2O.

Core Lithium Non-Executive Chairman Greg English said, "This is a tremendous outcome for Core and our shareholders and testament to the efforts of our operations and exploration teams as we focus on growing Finniss' mine life and scale beyond last year's DFS assumptions.

"The new Ore Reserve Estimate has resulted in a 12 year mine plan. In parallel, our teams will complete the 2022 drilling campaign to see if it can deliver equally impressive results across both our open pit and underground deposits.

"Most of the deposits at Finniss – including BP33, Carlton, Hang Gong, Ah Hoy and Sandras – remain open at depth and along strike and we are confident in the potential to deliver further significant increases to the Finniss resource and reserve position."

"The announcement adds to the significant momentum being generated by the safe and timely development of Finniss Stage 1.

"Fully funded to first production, Finniss remains on track to ship first lithium by the end of this calendar year to herald Core's arrival as Australia's next lithium producer."

Powering the Future of Batteries

Awarded Major Project Status by the Australian Federal Government, Core's Finniss project is regarded as one of the most capital efficient lithium projects. It delivers high-grade and high-quality lithium globally for use in lithium batteries that power electric vehicles and renewable energy storage.

The Finniss project has arguably the best supporting infrastructure and logistics chain to Asia of any Australian lithium project. It is within close proximity to power stations, gas and rail, and is 88km by sealed road to Darwin Port – Australia's nearest port to Asia.

Increased production capacity supports the company's move to become Australia's most advanced lithium producer. It continues to build momentum as it shifts into first lithium production on the back of its 2022 drilling campaign with further significant increases in Mineral Resources and Ore Reserves.

Core has also established binding offtakes and is finalising further agreements within the lithium battery supply chain and electric vehicle industry. Earlier this year, the company entered a binding Term Sheet with Tesla for the supply of up to 110,000 tonnes of Li2O from the Finniss Project over a term of four years.

World-Class Capability

Core Lithium leverages an experienced team with a proven track record of managing diversified mining assets and metals projects, and delivering value growth.

Aside from the renowned Finniss lithium project, the company operates several other national projects within its portfolio – these include copper, zinc, lead, uranium and other critical minerals projects.

For more information on the company's Finniss project and how it is supporting a global demand for critical minerals, visit https://corelithium.com.au/. ***AMR***

Qube is proud to partner with Core Lithium in delivering the Finniss Lithium Project.

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Lucas In Control At Finniss Lithium Project

In September 2021, Lucas TCS began a three-year Mining Services Agreement with Core Lithium to undertake civil construction and mining services at the Finniss Lithium Project near Darwin, Northern Territory.

Lucas TCS have been tasked with the construction and mining of the Grants Open Pit Mine, with our specialist team to conduct drill and blast and open pit load and haul services.

The Grants Open Pit Mine is the first lithium mine ever constructed in the Northern Territory and will begin lithium production later this year.

Mining services will be supported by Lucas TCS's brand new fleet of plant purchased for this project, including two 200-tonne and one 130-tonne hydraulic excavators, 12 CAT 777 rigid dump trucks and three blasthole drill rigs.

Lucas TCS have also taken on over 100 new personnel to carry out this project, with almost 95% of them locally based in Darwin or surrounding areas. This has allowed much of our workforce to travel home after each shift, reducing the need for FIFO operations. Additionally, the Lucas TCS in-house maintenance team, made up of heavy diesel fitters, boilermakers and auto electricians, have been of great service on this project, providing planned and unplanned maintenance as required.

Within a month of the final contract execution Lucas TCS mobilised to site and commenced construction of the site access slip lane, site clearing and open pit pre-strip.

Our crews successfully navigated a challenging wet season that presented unfavourable conditions, managing to set up the project to begin construction at the end of the wet season.

To this project Lucas TCS have brought unique experience and expertise in large-scale lithium mining, having conducted open pit load and haul services at other operations in iron ore and lithium. ***AMR***







A GOLDEN OUTLOOK FOR EVOLUTION MINING

ASX-listed Evolution Mining Limited (ASX:EVN) has transformed into a global mining powerhouse with a reputation for delivering shareholder value and maximising the potential of its assets.

Since establishing its first resource, North Queensland's Mt Carlton, in 2010, Evolution has continued to grow, successfully transforming this initial resource into one of the world's highest-grade open pit gold mines.

As a premier gold company, Evolution now operates five wholly-owned mines including Cowal in New South Wales, Ernest Henry and Mt Rawdon in Queensland, Mungari in Western Australia, and Red Lake in Ontario, Canada.



Production Ramps Up

The recent release of the company's quarterly report detailed its FY22 performance and outlook for FY23 and FY24.

Despite facing a number of significant challenges in FY22, the company achieved higher production results, reflecting its strong leadership, culture and the quality of assets. From wet weather restricting access to the open pit at Cowal, to COVID hitting production at Mungari, Evolution never lost sight of its targets.

For the June 2022 quarter, the company achieved 16% higher gold production than the previous quarter at 172,722 ounces.

Following six months of full ownership, the Ernest Henry operation contributed in excess of $435 million net mine cash flow in FY22. The company also plans for an extension of its copper-gold footprint.

The transformation of Red Lake delivered a 17% increase in production compared to the previous quarter at 38,620 ounces. Ore tonnes processed increased by 8% to a record quarter of 258,000 tonnes. The grade processed was 8% higher than the previous quarter.

Cowal overcame the impact of further significant rainfall in April to increase material movements and ore tonnes mined, which lifted production to over 60,000 ounces for the quarter. Its Underground Project remains on schedule with first stope ore expected for the 2023 June quarter.

Mungari production rose 7% to over 35,000 ounces in the final FY22 quarter. Progress was also made with the integration of the Kundana assets, which mitigated the impacts from COVID-related staff absenteeism.

Gold on the Horizon

Following a strong FY22, Evolution maintains a healthy outlook for FY23 and FY24, with a focus on building on the strengths of its assets.

FY23 gold production is expected to increase 12% to 720,000 ounces with a further 11% to 800,000 ounces in FY24. This equates to a total increase of 25% over the two years.

Red Lake is set to produce 160,000 ounces in FY23, increasing to around 200,000 ounces in FY24.

The guidance for FY23 major capital remains at $530 - $600 million, while FY24 expects a lower outlook of $330 - $380 million. The majority of this capital is for development of the Cowal Underground mine, the transformation of Red Lake, and progressing studies on growth opportunities at Cowal open pits, Ernest Henry extension, and plant expansion at Mungari.

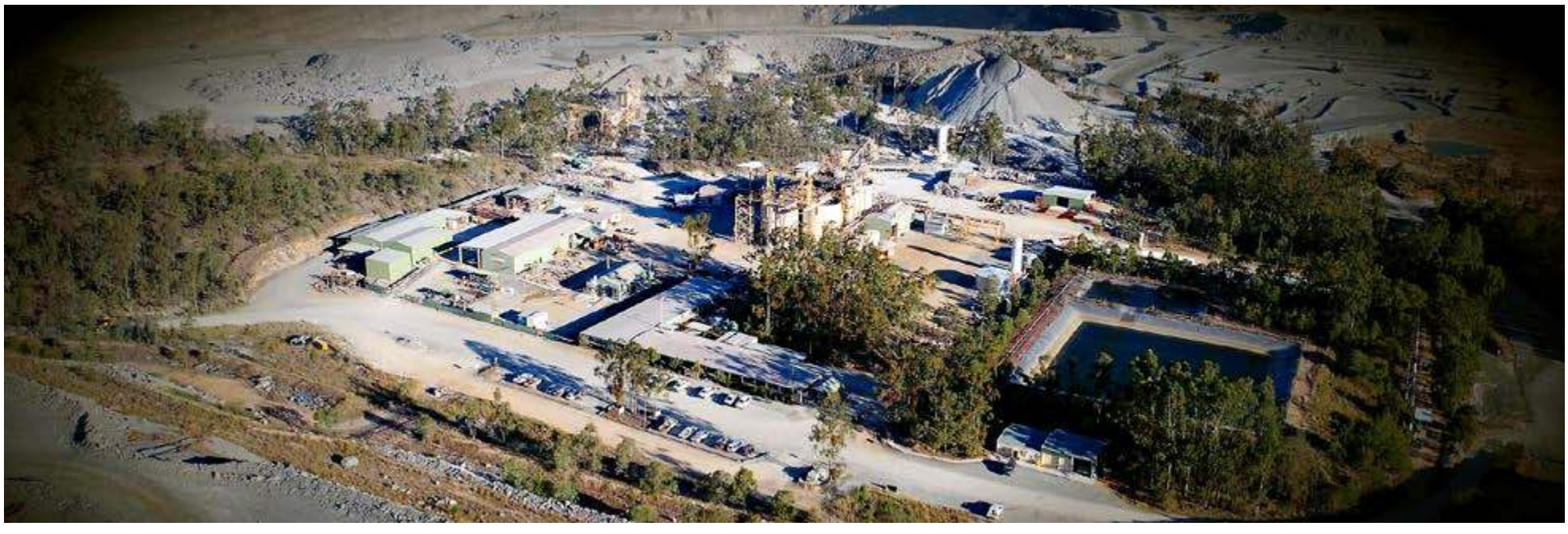
The guidance and outlook for both sustaining and major capital has also been impacted by some investment in FY22 being deferred or delayed into FY23. This has contributed to capital spend being toward the bottom end of the FY22 guidance.

"Our portfolio is well positioned. Our confidence in the turnaround and potential at Red Lake is growing, the Cowal underground mine is on budget and schedule and the cash generation and geological upside at Ernest Henry is outstanding," said Evolution's Executive Chairman Jake Klein.

"Aligned with our strategy, during this period of increasing costs and a challenging labour market, all planned expenditure will be thoroughly assessed and gated with a focus on ensuring we continue to prioritise margins over volume and earn an appropriate return on capital. I am confident that Evolution is one of the best positioned gold companies with its high-quality, low-cost portfolio of assets."

For more information on Evolution's gold assets and future plans, visit https://evolutionmining.com.au/

AMR





Mining, at a Deeper Level

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

Barminco currently employ over 5,500 people, at 25 projects in seven countries and our alumni are renowned for being among the best miners in the world.

In all our partnerships, Barminco looks to create enduring value and certainty for our clients and we are proud to be extending our contract at Cowal gold mine and further developing our relationships with Evolution Mining.

Mining CEO Paul Muller said the contract win is a great coup for Barminco.

"In more than 30 years of operation, Barminco has never had a presence in New South Wales," he said.

"Looking back, we adopted a long-term strategy that has now paid off and is extremely satisfying for the business."

Barminco commenced operations in New South Wales in 2021 when we secured a contract with Evolution Mining to carry out exploration decline and diamond drill work at Cowal.

This initial work enabled us to establish a professional relationship with the mine owner and prove our commitment and capabilities to ensure production targets are met on site.

In May 2022, Barminco was awarded the contract for underground development and production work at Evolution Mining's Cowal gold mine.

Valued at $520 million over an initial four-year term, this contract will see Barminco expand its scope of works to include the development of a second portal at the mine and conduct all underground development and production works.

Cowal is our first operation in NSW and this contract will ultimately be one of our largest projects within Australia.

Chief Operating Officer Mick Radi, said "New South Wales is a large and important underground mining jurisdiction for Barminco going forward."

"A contract of this nature brings certainty to our business and our local workforce and is the continuation of Barminco expanding our footprint on the east coast."

We look forward to continuing to deliver operational excellence for Evolution Mining, while also creating enduring value for the local, regional and Indigenous communities of the Cowal region.

We are excited to be a part of Evolution's bright future in NSW and look forward to forging a strong partnership with Evolution, built on honesty and trust, allowing our companies to resolve issues, highlight opportunities, and optimise performance without delay. ***AMR***



Project Manager Marty and Bogger Operator Jack, helping to lead the way in Barminco's expansion at Cowal.







BLAIR ATHOL SECURES OFFTAKE AGREEMENT

TerraCom Limited (ASX: TER) has confirmed an offtake agreement has been signed with its long-term Japanese trading partner for the delivery of up to 1.25 million tonnes over 13 cargoes from the Blair Athol (BA) operation during the period August 2022 to August 2023.

Key terms of the Agreement are as follows:

- One cargo per month during the Offtake Term
- Each cargo to deliver between 67,000 and 88,000 tonnes (+/- 10%), subject to the tonnage as nominated by the offtake partner
- Total tonnes to be delivered between 0.78 and 1.25 million tonnes over the Offtake Term - Pricing linked to the global COAL Newcastle Index

TerraCom recently told shareholders that the Blair Athol operation continues to perform well and remains on track to achieve coal sales of 2.3 million tonnes for the financial year ending 30 June 2022.

For the financial year ending June 30, 2023, BA is forecasting coal sales of 2.2 million tonnes and is fully sold until October 2022.

Post October 2022, there remains up to 450,000 tonnes unsold for the remaining eight months up to June 2023, which depending on market conditions, is targeted to be sold in the spot market.

TerraCom , Executive Chairman, Craig Ransley said all coal sales that are agreed for the upcoming financial year have been sold against applicable indexes.

"We are very proud of the BA team who continue to deliver on production to meet ongoing sales commitments," Mr Ransley said.

"The finalisation of the offtake agreement has cemented the upcoming coal sales profile for the Blair Athol operation and represents up to 50% of the annualised coal sales for the operation.

"We look forward to being able to deliver another solid performance at BA with a forecast annual run rate of 2.2 million tonnes per annum for the financial year ending 30 June 2023.

"The export thermal coal market remains strong and the full year Operating EBITDA2 attributable to TerraCom for the year ending 30 June 2022 is still forecast to be approximately A$420 million."

Blair Athol coal is fully sold until end July 2022. For the June 2022 quarter, BA is forecast to deliver eight cargoes equating to approximately 650,000 tonnes.

Of these cargoes, six are currently index linked, and two are contracted at a fixed price of US$300 per tonne 5500 NAR basis.

The main markets Blair Athol sells coal to are: I Japan and South Korean energy markets, and II. Indian sponge iron market – being the process of direct reduction of iron ore into iron by an elemental carbon produced from thermal coal.

Blair Athol

TerraCom Ltd acquired the Blair Athol Coal Mine, located in Clermont, Central Queensland In 2017. Since the acquisition TerraCom successfully restarted mining operations exporting up to three Mtpa of high-quality thermal coal and are undertaking the progressive rehabilitation of the site as part of its ongoing mining operations.

TerraCom Ltd is the owner of the Mine, which is operated by a contract mining services provider.

TerraCom have completed several significant achievements at Blair Athol:

- Ramped up to in excess of 2.7 Million Tonnes Per annum production rate within 18 months of taking ownership
- Re-established BA strong coal brand in strong Japanese and Korean markets
- Upgraded the existing unused agricultural line which runs across the Blair Athol Mine Site and connects into the main Goonyella Rail Line, which then continues to Dalrymple Bay Coal Terminal
- Increased the JORC profile to 28.7 Million Tonnes Reserve with 45 Million Tonnes Resource of which 31.5 Million Tonnes is Measured and 11.6 Million Tonnes is Indicated

Coal Quality

Blair Athol coal has a strong brand history with over 250 million tonnes of Thermal coal sold into the Asian Markets. The coal is mid energy, low ash, ultra-low sulphur and low trace elements which makes it attractive to Japanese and Korean Power Utilities.

AMR





The Steel Fabrication Specialists

Family-owned company Gregory Fabrications has enhanced their offering to Central Queensland's industry with their new painting and sandblasting workshop – an innovative addition to the steel fabricators' growing range of services.

Based in the major mining hub of Clermont, the newly opened workshop will join Gregory Fabrication's other dedicated locations, including its main 603m^2 facility, it's 800m^2 heavy machinery warehouse and additional industrial retail site.

The fresh workshop will also strengthen Gregory Fabrication's popular mobile service offering, which enables the privately-owned business to cater for a wide range of mining needs in rural or remote locations.

Gregory Fabrications Workshop Manager Jarrod Humphreys said the company's welding teams provided 24 hour field maintenances services through five fully equipped mobile welding units and containerised onsite workshop facilities.

He said this meant mining operations and other industrial projects were serviced as needed, minimising impact to productivity.

"All Gregory Fabrications tradesmen have extensive experience in onsite maintenance and construction," Mr Humphreys.

"Their experience ranges from small to large and complicated jobs, and it's complemented by the company's comprehensive in-house processes.

"It enables our teams to expedite work on breakdowns and maintenance shutdowns and accommodate project schedules without delays.

"We know in the mineral resources sector and wider Australian industry that time is money, and we shape our services around delivering results quickly and efficiently."

The Australian company's in-demand services include high pressure welding, heavy and light steel fabrication, general machining, drilling and stainless steel welding.

Gregory Fabrications also offer sandblast and painting, aluminium and cast iron repairs, and CNC machine shop capabilities.

Their expansive retail site is known for stocking a variety of reputable brands such as Milwauke, Speedglas, Hitachi, and Kingchrome.

Established in 2001, the veteran company has been servicing the Central Queensland mining industry for more than two decades and its staff boast expertise in a range of competencies, including oil and gas field construction and general engineering.

Over the years the steel fabrication specialist has built a strong and handpicked workforce of qualified and site compliant boilermakers, diesel fitters, mechanical fitters and oil and gas field pipe fitters.

The team also includes trade assistants, pipe welders and site compliant line borers.

Mr Humphreys said the team had successfully delivered on multiple mining sector projects and had positive long-term relationships with their stakeholders.

He said this included multinational mining giant Glencore, sustainable coal seam gas company Arrow Energy and Australia's second largest metallurgical coal producer Anglo American.

"For Glencore in particular we have an ongoing contract to do site support, repair and maintenance," Mr Humphreys said.

"This includes heavy mine equipment repair.

"We also do design and drafting, with third party certifying.

"At Gregory Fabrications we pride ourselves on superior quality, customer service and versatility.

"We look to develop a strong understanding of our client's needs and their schedules, and we work around that.

"Get in touch with us to learn how we can support your operation."

For more information, visit
http://www.gregoryfab.com.au/index.php
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At Allied Equipment Sales, we buy, sell and source unused and low-hour quality mining and construction equipment.

Our head office is based in Perth, Western Australia which includes a full workshop and wash plant facilities. An additional branch is based in Penrith NSW, servicing the entire East Coast.

Are you in need earthmoving equipment for your next project? We have a wide range of machinery including excavators, dozers, graders, backhoes, trucks and loaders. More information about our unused and used machinery is available on our website.

Along with our branches in Perth and Sydney, we have an extensive network of suppliers. This network enables us to source high-quality earthmoving equipment and machinery for a range of different industries.

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2018 CATERPILLAR D8T

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2019 CATERPILLAR 775G

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2019 CATERPILAR 777E

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Raglan Drilling has the capacity and capability to work around Australia with 18 rigs specialising in RAB, Air Core, Reverse Circulation, Diamond, Auger and Lake Drilling.

The company has come a long way since 2006, when brothers Hugo and Gus Lacey started out with a one air-core rig in Kalgoorlie, WA.

Fifteen years later, Raglan Drilling has become well-known for delivering high-quality sample recovery and safe exploration drilling services.

Raglan Drilling director Gus Lacey started out in the mining industry as a geologist and has experience running resource definition programmes, grade control drilling, grade control modelling and ore extraction.

"With drilling experience from both sides of the industry, Raglan Drilling understands issues relating to poor sample recovery, hole deviation and the effects on resource estimation, head grade, block model calculations and dilution," he said.

His brother Hugo started as a driller's offsider for McKay drilling and worked his way through to a driller in record time.

Hugo is also a competent RC & AC driller who provides a wealth of knowledge in all aspects of air drilling.

"Our long-term clients include AngloGold Ashanti, Apollo Consolidated, Breaker Resources, Horizon Minerals, Lefroy Exploration, Nexus Minerals and St Barbara," said Gus.

"We strive for effective and clear communication to ensure the best outcome for every drill program."

With dedication and a 'can do' attitude, Raglan has gained a reputation for strong client relationship and satisfaction amongst a crew of 80 people.

Raglan Drilling's commitment to the health and safety of its employees and the protection of the environment is demonstrated by four-plus years of ISO accredited systems.

The list of equipment that Raglan Drilling provides includes a fleet of modern Deep Hole RC rigs, Deep Hole Diamond and fully mobile small foot-print Air Core rigs.

With 10 years of Salt Lake Drilling, Raglan offers a full suite of drilling disciplines and specialty skills for those "hard to reach" exploration targets.

Raglan Drilling also supplies complete remote camp setups with either Explorex-type caravans or transportable buildings.

Every three months, Raglan Drilling holds geology lectures with the Goldfields geoscientific community in Kalgoorlie, WA.

Drop Raglan Drilling a line now on
08 9021 3833 or email
admin@raglandrilling.com.au
to find out more. ***AMR***



WA's Fabrication Specialists



Specialist steel fabrication company Arch Engineering has been operating since 1970.

With the capacity to complete a wide variety of fabricated steel projects for the mining, process, oil and gas industries, it can manage, implement, and integrate all aspects of complex industry projects from drafting, fabrication through to surface treatment and delivery.

The business, located in Bibra Lake, WA, has a 3000m^2 facility and employs a skilled workforce with commitment and experience to match all project requirements.

Arch's fabrication team is experienced and possesses strong capabilities to execute wide ranging fabrication projects for mining, oil and gas.

The team is committed to high quality standards and efficiency to ensure client expectations can be met, and boasts quality management system certification to ISO 9001:2008.

Arch Engineering's fabrication workshops are equipped for all type of fabrication and modularisation services.

They incorporate three fully equipped workshops utilising four overhead cranes with up to 20t capacity capable of handling all types of fabrication.

Its mining and mineral processing services include:

- A wide range of structural packages
- Screening equipment
- Crushing equipment
- Conveyors
- Shuttles
- Chutes
- Mining consumables and tools
- Plate work fabrication
- Pipe supports and clamps
- Railway equipment
- Handrails, stairs, walkways
- Trusses
- Silo conveyors
- Monorail structures
- General steel fabrication

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All workshops are fully equipped for all types of fabrication services.

Facilities incorporate three fully equipped workshops utilising 4 overhead cranes with up to 20 tonne capacity capable of handling all types of fabrication such as:

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- PLATEWORK
- STORAGE TANKS
- CONVEYORS
- OFFSHORE STRUCTURES
- SUBSEA STRUCTURES

WA'S STEEL FABRICATION SPECIALISTS

SERVICE IS OUR SUCCESS



Tranz Logistics is becoming the partner of choice for Australian mining operators, following a successful record of delivering first-rate, client-focused supply chain solutions.

Headquartered in New South Wales, the privately owned and operated specialist transport company is well known in the building, oil and gas, civil and industrial maintenance sectors for comprehensive services and product offering.

The business also has a heavy presence in the mineral resources sector, delivering a range of services including haulage, maintenance, site remediation, planning, management and logistics support for chemicals and dangerous goods.

Tranz Logistics is underpinned by a strong commitment to developing customised logistics services that leverage expertise, people, and equipment to provide safe, efficient, and innovative operational solutions.

The key to producing excellent results on every contract is establishing partnership agreements.

Our customised supply chain solutions are based on strong customer focus which ensures we fully understand and fulfil their logistics requirements.

Our reputation within the tunnelling, infrastructure, construction, and mining sectors has also been built on strong long-term partnerships.

We are committed to delivering a high-performance, offering quality, safety, and value to ensure our customers' ongoing success.

The partnership-focused approach has led to securing significant high-level contracts within the road and rail tunnelling sectors, which require the deployment of state-of-the-art equipment.

This includes innovative tunnel trucks with fire suppression capabilities, lane changing assistance, motion sensors, E-Stops, and a wealth of other safety features.

Tranz Logistics is an industry leader in safety and consults extensively with experienced engineers to develop innovative solutions that minimise workplace risk.

Tranz Logistics has kept its finger on the pulse of technological advancements, as an early adopter of solutions such as in-vehicle monitoring systems, GPS tracking and fatigue management systems.

Tranz Logistics' current project mix includes Australia-wide services to mining and LNG operators. This includes the deployment of dry hired vehicles specially designed for the job.

We pride ourselves at designing and implementing innovative supply chain solutions, including customised fit-for-purpose equipment for Australian supply chains.

Currently, we are servicing the largest natural gas projects in Australian history which hold the title "the biggest financed project" ever arranged on the international market. We will continue to provide these projects with expertise and horsepower leveraging the specialist knowledge of our team.

With technical expertise and understanding of the industry, our team collaborates closely with operators to provide a wide range of safe and reliable supply chain solutions.

We adhere to the National Code of Practice for the Construction Industry and the Australian Government Implementation Guidelines.

The company is also an active and accredited member of the National Heavy Vehicle Accreditation Scheme, a nationally recognised management and standards system.

Tranz Logistics' best practice standards for safe delivery of transport logistics solutions are done through stringent management policies that ensure compliance with current safety guidelines.

Tranz Logistics assist clients maximise productivity through efficient and effective supply chain solutions – every step of the way. Tranz Logistics customers are offered genuine "best value" solution to their transport requirements.

Our service offer is based on the right equipment, our operational expertise and safety and quality systems.

For more information, visit https://www.tranzlogistics.com.au

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Our Promise To You:

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We support you with transport equipment for wet and dry hire. Wet hire is the provision of an operator and any associated services. Dry hire is long-term hire of our assets without an operator.

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HEAVY HAULAGE

Our extensive range of specialists' heavy haulage fleet provides you with transport services Australia wide.



Reliable Water for Remote Sites

Desert Sands has recently acquired a Concrete Batching Plant, which has a 70 cubic metre capacity. The plant also includes a water chiller, to assist with hot weather projects.

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

Established in 1989, the Laverton-based contractor is a specialist service provider to mining projects in regional WA and the Northern Territory, with one of its key services including potable water supply and cartage.

According to Desert Sands director Rex Ryles, when projects are in the exploration, earthworks and construction phases, the company is called in to provide potable drinking water for personnel mobilised on-site.

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

"We've worked with mining companies and regional shires far and wide from the Gruyere gold mine to Anglo Gold sites, Downer EDI, Gold Fields' Granny Smith mine, Poseidon and many more."

At the Gruyere gold project, Desert Sands was involved from the first shovel in the ground through to production, looking after civil earthworks, camp/plant concrete set up, and camp potable water.

The contractor also has extensive experience in hauling gold ore, nickel ore and concrete, along with screened sand, dune sand and fuel into some of the most remote and isolated areas in Australia.

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

More information on the company's offerings can be found at **www.desertsandscartage.com.au** or by calling **(08) 9031 1326**

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Open-pit mine dewatering using large diameter Flexibore®.

LAYFLAT HOSE THE ALTERNATIVE TO RIGID PIPELINES

The use of rigid hose for mine dewatering is commonplace. Although cumbersome to handle and relocate, few mines have sought to find an alternative. With over 36 years of manufacturing experience, **Crusader Hose is challenging the mining sector to 'Think outside the circle'** of poly pipelines and consider flexible layflat hose for their mine dewatering needs, from extracting from deep pits to transferring water across long distances.

Poly pipe (HDPE) and fibreglass are frequently seen as pipeline materials for water extraction at mining sites, as are the large cranes and specialised labour force required to manage these rigid pipes. Although effective in transferring water, rigid pipelines are cumbersome to handle and install, and their relocation is time-consuming and expensive.

Crusader Hose has manufactured flexible layflat hose for over 36 years and has redefined water transfer pipelines with flexible layflat hose and reeling solutions.

When needing to extract water from open-cut pits due to rising water tables, cyclones or storms, time is of the essence as operational downtime can be very costly.

Temporary water extraction solutions from pits and across distances require a high-pressure pipe. Waterlord® hose and reeling systems are a practical alternative to installing rigid pipelines. Large-diameter Watertlord® can handle the required high pressures and flow rates. When pipelines need to ascend high pit walls, the flexible nature of layflat hose handles more pressure than rigid pipe.

The newly-developed reeling systems from Crusader Hose make handling flexible pipelines quick and easy. In consultation with industry, the hose deployment and retrieval systems have been designed and fabricated to reduce the challenges of handling long lengths of large-diameter layflat and OH&S issues.

The Hamersley™ and Bayswater™ reduce the labour required for pipeline deployment and retrieval.

Interchangeable spools of the Hamersley™ make it quick and easy to deploy multiple lengths of hose, whereas the Bayswater™ is a trailer-mounted modular system ideal for pipelines up to 8 inch.

The benefits of using layflat as an alternative to rigid pipe are many. Transporting compactly-wound flexible pipe is much more cost-effective as layflat needs only one-tenth of the space on a truck vs HDPE. This benefit also has a flown-on effect regarding carbon emissions. Fewer trucks equal less pollution; it's kinder on the environment. A win for all.

Another ecologically friendly benefit is the reusability of layflat pipelines. As many pipelines are used temporarily or in emergencies, Crusader Hose flexible pipelines can be retrieved with the reeling systems and the wound-up hose stored with a small footprint, ready for its next use. Unfortunately, since HDPE is expensive to relocate and reuse, it is not uncommon to see derelict rigid pipelines pollute the mining landscape.

Submersible pumps with Flexibore® rising main are quick and easy to install, allowing mining operations to resume without too much interruption. Flexibore® has proven to be the solution of choice for many dewatering tasks due to its ease of handling and robust construction. It is much easier than handling fibreglass pipe in 6m sections. Flexibore® is manufactured in a range of diameters and is suitable for depths of up to 400 metres.

Flexible layflat pipelines offer a suitable alternative to rigid pipe systems in emergencies or other shorter-term applications. "We are confident there are many benefits in using flexible layflat hose and reeling systems in small or large projects, and we are eager to assist mining engineers in finding more efficient solutions for their dewatering requirements," continued Francois, "we are not here to replace poly or fibreglass, just to offer alternatives to rigid lines. Our challenge to the industry is to have engineers think outside the circle of rigid pipe and consider layflat." ***AMR***

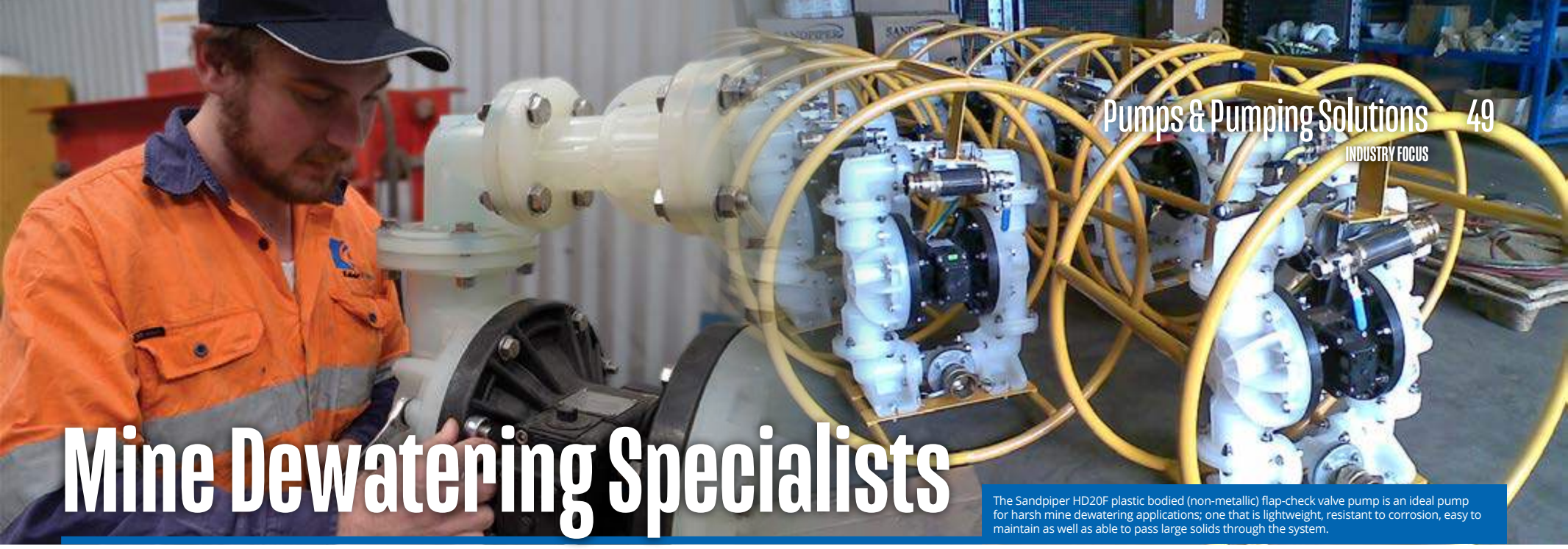


Trailer-mounted Bayswater Mobile Hose Crate with 203mm layflat hose.



Hamersley Reel System deploying 200m of 305mm Waterlord®.

Mine Dewatering Specialists



The Sandpiper HD20F plastic bodied (non-metallic) flap-check valve pump is an ideal pump for harsh mine dewatering applications; one that is lightweight, resistant to corrosion, easy to maintain as well as able to pass large solids through the system.

KELAIR Pumps Australia is a privately owned and operated company, specialising in industrial pumps and pump packages for the resources industry and industry in general.

An ideal pump for harsh mine dewatering applications would be one that is lightweight, resistant to corrosion, easy to maintain as well as able to pass large solids through the system, according to Kelair's General Manager Myro Bratkovic.

Weight, Corrosion and Maintenance

According to Mr Bratkovic, typical cast iron or other non-metallic diaphragm pumps are not only very heavy and cumbersome but carrying them can also pose a major health and safety issue.

"In some instances, workers cannot get their underground vehicles close enough to where they need to install the dewatering pump, meaning that they might have to carry the pump 500m or 600m away," he said.

"A 2inch cast iron pump can weigh over 60kg, which causes a major health and safety issue. Furthermore, over time, the pumped solution can corrode the body of a metallic pump, and eventually lead to the pump being inoperable or costly to repair," Mr Bratkovic said.

Plastic bodied ball valve pumps are commonly used in mine sites, and while they can be up to half the weight and resistant to corrosion, they require disassembly off-site in order to carry out any basic maintenance works.

"As miners' time is precious and expensive, the less downtime caused by pump maintenance, the better."

"Because of this, a flap-check valve pump with a non-metallic casing is ideal for longevity and serviceability of your dewatering equipment.

Solving Onsite Problems with Proven Technology

According to Mr Bratkovic, the Sandpiper HD20F is the next generation in mine dewatering, as it has the advantage of being both a flap-check valve pump as well as having a non-metallic body therefore preventing corrosion.

"The flap-check valves on the Sandpiper HD20F allow access to the pump without having to dismantle the pump or remove it from the site.

"To further aid maintenance, there are access ports on the side that are unique to this Sandpiper design and are not found on any other dewatering pump on the global market."

The Sandpiper HD20F flap valve design allows the pump's two-inch suction hose, along with the pump to pass large solids up to 44mm through the system, without causing any damage to the pump.

"As well as this, comparison testing in the Sandpiper laboratory has shown that the Sandpiper HD20F pump can consume between 25% to 40% less compressed air than other brands of pump."

According to Mr Bratkovic, the Sandpiper HD20F was designed around the existing metallic Sandpiper Heavy Duty HDF2 that has long been known for its proven technology in terms of its air system, diaphragms, and flap valves.

"Because of this longevity, you can be sure that the plastic bodied HD20F will last longer than the metallic model in corrosive environments and replacement/repair parts are readily available for onsite servicing and maintenance.

Kelair Pumps Australia

"As the sole distributor of Sandpiper pumps in Australia, Kelair Pumps have access to Sandpiper's energy consumption calculation program, which helps calculate the cost of operation based on air consumption and provide clients with both an energy and dollar saving."

You can rely on Kelair Pumps to provide the pump knowledge and expertise required. ***AMR***

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- Fuels and lubricants
- Refining, smelting and milling process
- Water treatment



Heavy Duty Ball Valve Pumps



Heavy Duty Flap Valve Pumps

We know the importance of choosing the right equipment to match your process. With our extensive range of pumps, first class customer service and ongoing comprehensive support, Kelair Pumps are second to none when it comes to your pumping requirements.

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ENGINEERING TOMORROW
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Danfoss Leverages Global Expertise To Upgrade Hex Technology

With a history of innovation spanning almost 90 years, Danfoss has become one of world's leading suppliers of innovative, energy efficient solutions.

Founded by Mads Clausen in 1933 in his parents' farmhouse in Nordborg, Denmark, Danfoss is a Danish multinational company with more than 40,000 employees globally. The company has grown from a solo enterprise into one that is now renowned for its significant contribution to the Green Restart.

Here in Australia, Danfoss products have been available since the 1950's. In 1970, the Australian owned company Russell Armstrong Pty. Ltd. became a distributor for the Danfoss industrial, heating, and compressor product range. In 1986, Russel Armstrong Pty. Ltd. became a wholly owned subsidiary of Danfoss A/S, Denmark.

Today, in the Pacific region, Danfoss employs 175 staff members and has offices in Melbourne, Sydney, Brisbane, and Perth, as well as an office in Auckland, New Zealand.

Danfoss is a key industry player targeting mineral and mining applications and is constantly evolving and upgrading its product portfolio. As specialists in the development and manufacture of genuine OEM parts, they produce their own tooling, hydraulic presses, and gaskets in-house. This improves quality control practices, reduces dependency on sub-suppliers, and helps establish price leadership.

Heat Exchanger Innovation

When it comes to creating a unique and efficient heat exchanger solution, it is no surprise that Danfoss is once again leading the way.

Danfoss' engineers recently improved the way heat exchanger plates are designed with the introduction of the new D-plate series. Drawing on years of experience within heat transfer technology and deep application knowledge, the company has made significant upgrades to the traditional Fishbone plates to truly redefine the way we think of heat exchanger plates.

Maximising both performance and product life, the D-plate series is a milestone in innovation and moves plate heat exchanger technology into a new era of advanced, yet simple solutions.

The Australian Mining Review recently spoke with UK-based Push Dhillon, Danfoss Global Sales Driver – Industry, about the future of heat exchanger technology and the difference between a plate heat exchanger and other heat exchangers.

He explained that the working principle is the same in that two media are separated by a metal plate and exchange heat.

"The difference is in the heat transfer area. Within a gasketed heat exchanger, the plate material is thinner, so heat transfer is higher, resulting in a high heat transfer coefficient," said Dhillon.

"Each channel plate has an efficient distribution area and plate chevrons that fully utilise the pressure drop. High turbulence occurs leading to high wall shear. The upside of turbulent flow is minimised fouling on the plate surface.

"The idea is the same for both technologies. We have a wall of metal and you transfer heat from one media to another. However, in gaskets, HEX provides improved heat transfer due to the distinctive size and plate design, a unique plate pattern, high turbulence of media between plates, and plate thickness, providing users with better heat transfer."

Danfoss uses a wide range of technologies in its heat exchanger solutions including Spiral, Block, and Gasketed plate technology, as well as Danfoss shell heat exchangers for use in condensation and steam applications.

Sustainability at the Core

Danfoss has an uncompromising focus on quality, reliability and innovation that helps its deliver smart and energy efficient products, services and solutions.

It's comprehensive climate solutions program helps it achieve sustainable growth and deliver products aligned to their customers need for energy efficiency and improved performance. Customers also benefits from greater thermal efficiency, streamlined maintenance, low hold-up volumes and better environmental footprint.

The company decarbonises urban energy networks by making them more resilient and energy efficient. This includes a reduction in CO2 emissions in commercial buildings, and cost-effective smart heating technology for residential property owners and tenants.

As the original inventor of both the radiator thermostat and the automatic differential pressure controller, Danfoss continues to be at the forefront of ground-breaking heating solutions.

Today, its product and services portfolio supports customers across the complete lifecycle to meet a vast number of applications — from creating comfortable, sustainable, and smart buildings to laying the foundation for integrated district energy infrastructure.

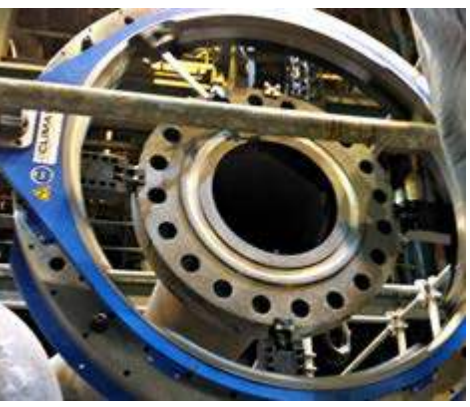
To learn more about how Danfoss' smart heating technologies are empowering communities and industries, visit www.danfoss.com/en-au/

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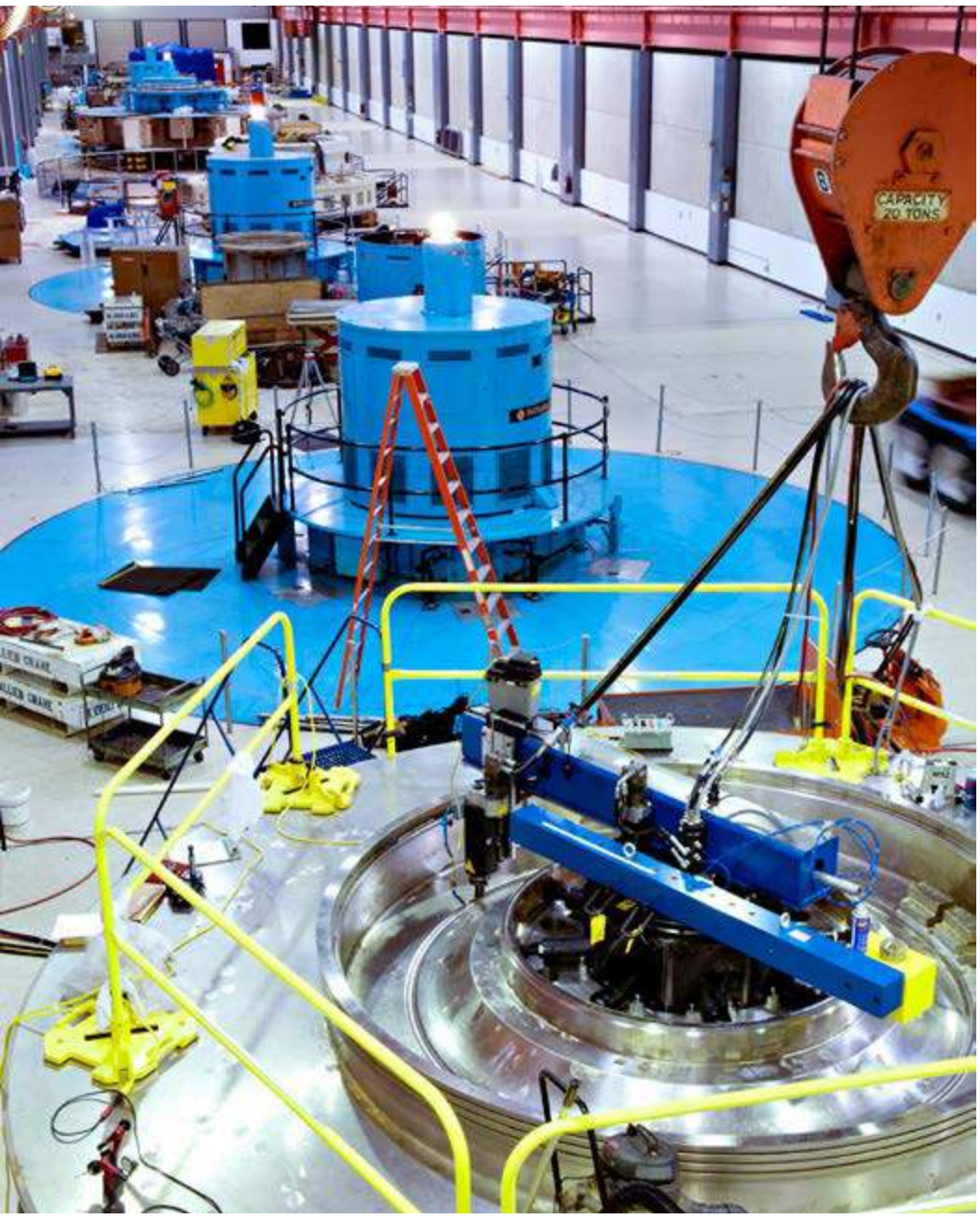

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Solutions for Mining Equipment







Keeping mining and heavy construction equipment in top operating condition is a constant challenge for today's mining and construction contractors.

Maximising equipment up-time is critical to shortening project completion times and increasing bottom line profits.

Removing equipment from the job site to a repair facility can delay project completion and put a damper on profits.

That is where CLIMAX can help.

CLIMAX has the on-site repair and maintenance machines that will minimise maintenance times and keep mining and construction equipment working for companies and their customers.

Thousands of worldwide mining and construction companies rely on CLIMAX to keep their fleets of tractors, loaders, excavators, draglines, cranes, and other heavy-duty equipment out-in-the field maximizing their profits.

Mining operations are almost inevitably remote, gruelling, complicated, and cramped.

Competition is fierce and profit margins are thin, while downtime can be devastating.

In this kind of environment, it is easy to see why portable machine tools in general and CLIMAX in particular, were discovered by the mining industry long ago.

Companies that serve today's mining industry face formidable challenges.

These include difficulties inherent to the business itself, as well as those caused by a still-uncertain economy.

Mining repair projects, especially those underground, must be undertaken in close, cramped quarters that make an already arduous task even more demanding.

For contractors, even winning a job is a tough task; competition is fierce, customer loyalties tenuous, and concerns with bottom line issues intense.

One of the biggest challenges faced by customers in their work for the mining industry is expediting the rigorous process of underground repairs.

Adjustability and equipment versatility are critical to enable workers to perform a variety of repairs efficiently and effectively in extremely close quarters.

Finding a tool that can meet these demands is a top priority for mining and construction contractors.

The CLIMAX BB5000 is a compact, flexible line boring machine that installs in 30 minutes.

The line of automated on-site welders interface with the boring bar system, enabling one set-up for both items, to help decrease weld time and improve productivity.

The system's adaptability to bore and welding simultaneously makes it useful for repairs on mining and heavy construction equipment.

Customers trust CLIMAX for mission-critical machining, welding, or valve testing projects, in a wide variety of industries including oil and gas, mining and heavy construction, power generation, ship building and repair, aerospace and defence, and many others.

With CLIMAX sites and factory-certified representatives covering the globe, its team is committed to delivering an outrageously good customer experience – every interaction, every time, everywhere – 24/7.

Go to **www.climaxportable.com** for more information on products. Contact Field Machine on **1300 368 368** for applications, engineering, custom design, training, start-up and commissioning, after-sale service, spare parts, equipment repair and maintenance, and rentals. ***AMR***





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

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- Reporting

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JETCRETE POWERING AHEAD ON BACK OF STRONG BUSINESS GROWTH

Leading ground support specialist Jetcrete has undertaken a successful re-branding and is now looking to add to its workforce with its business going through a strong growth spurt.

The company, which is now offering a larger range of solutions to support the Australian mining sector, continues to win new contracts and field new enquiries and is looking to build on that momentum.

Hoping to improve and increase its scope, Jetcrete recently added two more capabilities to its broad range of services. The company employs the latest techniques in resin injection and cable bolting, which are alternative active rock support system in underground mining.

The resin injection service in particular has become a major presence in hard rock mining and was successful with resin injection for ground stabilisation at Argyle Mine. Resin is injected into the foundation and expands like a gel to create pressure and achieve stabilisation of rock, sand, gravel, concrete and caved material.

It has proven to be a faster and less-invasive solution than previously used methods. Meanwhile, cable bolting is an established technique and an alternative active or passive rock support system for underground mining, with the bolts dramatically improving the shear and tensile strength of the rock mass.

Jetcrete does the majority of its cable bolting work in major mining operations in New South Wales, such as at Broken Hill and at Newcrest Mining's Cadia Valley Operations in south Orange and is actively pursuing more mining contracts in this field.

The Perth-based company is considered a leading innovator of shaft lining solutions and has refined the remote shaft lining system, with a continuous effort in upgrading its system reducing safety risks. The business is capable of providing a complete service for all stages of underground shotcreting - from onsite concrete products manufacture - to delivery and application.

The shotcrete solutions provider is also capable of delivering surface and underground civil infrastructure works including earthworks, concrete slabs, heavy vehicle workshops and site offices. Jetcrete has extensive experience in all aspects of concrete spraying and is able to establish sites in remote areas in a matter of days.

It has successfully completed Shotcrete Solutions Specialists projects all over Australia, including shaft lining coal mines in Queensland. Jetcrete operates in North America and 19 mine sites across Australia, working closely with a number of mid-tier and major clients.

The company, which is ISO-accredited and is backed by mature and robust health, safety, environmental, and quality systems. With 17 batch plants, 90 agitators, 59 remote concrete units and operating over 12 cable bolting plant, Jetcrete can do any specialist ground support job, anywhere.

Jetcrete has been the trusted provider of shotcrete solutions to industry for more than 35 years and has earned a reputation for high-quality work.

It is the first and only shaft lining contractor in Australia equipped to safely operate in ERZ1 hazardous environments.

Over the years, the company has introduced most of the modern technologies used for shotcreting in Australian mining, such as overhead wet shotcrete, robotic shotcrete units, hydroscaling and shotcrete thickness scanning solution.

Jetcrete has positions available for a range of skilled staff. ***AMR***



JETCRETE

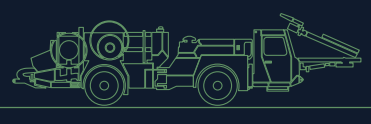
Complete support from the ground up

Australia's leading ground support specialist to the mining and construction industries

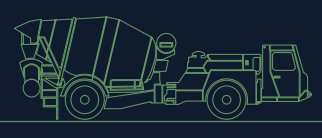
We use the latest techniques and specially adapted placement materials to provide a shotcreting service for clients across the country including:



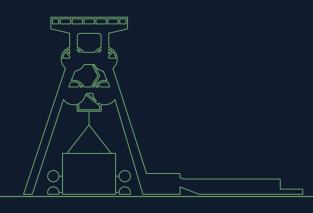
Concrete manufacturing



Shotcreting



Delivery



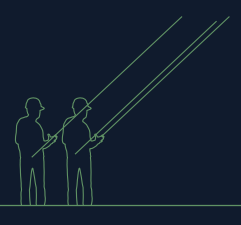
Remote shaft lining



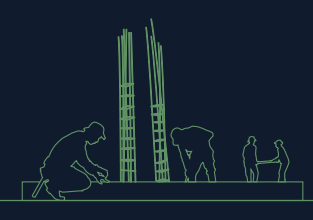
Cable bolting



Resin injection



Laser scanning



Civil construction

Find out more about our services and careers, visit:

jetcrete.com.au

Professional Weather Station Solutions



The Weather Maestro package incorporates the best of Environdata's weather station and the powerful flagship software, WeatherMation Live.

Environdata's weather stations are robust and reliable, built for the harsh Australian climate. This Weather Maestro and weather station in the Pilbara, WA, is still going strong after 12 years.

Why do Australian mines require a good, automatic weather station? Along with providing continuous, accurate, timely and site-specific weather data, mine site managers can use the data to inform planning and decision-making, some of which include:

- **EPA and Statutory requirements: Environmental Impact Statement (EIS)**
  Environdata's weather station meets Australian Standards' EIS submissions. Authorities require anywhere between two to five years of weather data from an on-site weather station and a local climate (microclimate) weather audit will provide sufficient baseline data to monitor dust and toxic gases, wet season run-off, leaching of chemicals into waterways and much more for mining lease, extension and approval applications.

- **EPA and Statutory requirements: Licences to Operate**
  Most mines in Australia have a requirement from their state government to monitor the local weather, usually as part of a development application or environmental licence. The standard licencing requires the mine's weather station to meet the Australian Standards such as "AS/NZS 3580.14:2014 Methods for sampling and analysis of ambient air meteorological monitoring for ambient air quality monitoring applications". Environdata is well-versed in all statutory requirements and can help mine sites decide the best weather stations for them.

- **Mine production, workplace health and safety and surrounding communities**
  Environdata's automatic weather stations provide ongoing data on rainfall, soil moisture, evaporation, wind direction and speed, lightning and UV radiation, to name just a few. These can inform risk management strategies regarding mine and site flooding, all-weather road access, slope stability, siting and construction work on mine site infrastructure, rehabilitation, tailings dams and other water storages, dust and hazardous gases, as well as worker heat stress.

- **Operational planning and decision-making**
  Weather data has implications for the design, selection and maintenance of plant and machinery capable of operating under the climactic conditions at the mine site. The data helps determine plant and machinery maintenance cycles, the selection of oils and lubricants, corrosion management strategies and tyre pressures in dump trucks and other mine site vehicles.

Mines and Weather Data

Australian mine sites must meet these environmental regulatory requirements in order to operate and which typically include the monitoring of weather in accordance with Australian Standards, utilising a 10m instrument mast (standard meteorological height), sensors of high accuracy, and correct location and installation.

Other licensing requirements include the monitoring of dust or gas drift and dispersion including Sigma Theta, the likelihood of inversion layers, rainfall intensity, as well as evaporation, barometric pressure, solar radiation temperature and humidity.

On-site mine managers therefore require automatic and ongoing solutions that monitor and report on weather data for mine site planning purposes, operational activities and machinery limits to meet environmental licensing requirements as well as manage worker heat stress risks.

Weather Maestro

The Weather Maestro package incorporates the best of Environdata's weather station and the powerful flagship software, WeatherMation Live.

Featuring a data logger that can be equipped with up to 20 different sensors, the weather data can be exported in multiple ways for viewing in tabular or graphical form or in real-time, with reports customised at daily, hourly or more intensive intervals.

The software integration capabilities include performing complex calculation from multiple weather stations, "AirData' Vector Analysis firmware to generate wind trajectory data and facilitate Sigma Theta analysis (the coefficient of dispersion), as well as Wind Rose software for analysing wind distribution.

The 10m instrument mast (IS37) meets EPA licensing conditions and enables mine staff to monitor winds by Australian Standards using the wind direction and wind speed sensors. The mast can withstand 57m/sec wind gusts (over 205km/hr), and in terms of managing dust drift, the Weather Maestro can also detect inversion layers.

WeatherMation

Environdata's weather station software WeatherMation allows clients timely and convenient access to their weather data from single- or multiple-connected weather stations – whenever, wherever and however they require them.

This software manages data collection, storage, calculation and distribution on clients' behalf, with multi-user access available on any device via secure login to a portal.

Hosted on Environdata's secure servers in its Brisbane data centre, clients have a customised dashboard displaying both live and historic weather data, with alerts and reporting capabilities, including Wind Rose reports.

Alternate options exist, including self-hosting on clients' own servers or an entry-level solution with direct access – clients can rest assured knowing they retain complete ownership of their weather data.

Thermal Work Limit

Based on research conducted by Curtin University, Thermal Work Limit (TWL) indicates the limiting metabolic rate a worker can sustain given the environmental factors to which they are exposed.

TWL has been shown to provide a high level of heat stress protection for workers in hostile conditions while increasing productivity over older more conservative measures, with detailed management guidelines.

Environdata can now incorporate TWL into its weather stations, giving occupational health and safety professionals and line management the means to implement safe working limits based on weather conditions at any given moment.

The TWL calculation can trigger alerts directly from the logger or via SMS from the optional Next G modem package.

On the basis of these alerts, decisions can be taken to protect workers from heat stress related injury.

About Environdata

Environdata specialises in professional weather stations for all industries as well as for compliance requirements.

The company designs and builds professional weather monitoring solutions from integrated, multi-parameter weather stations to modular weather stations, from weather sensors to telemetry and software.

With extensive, long-term experience in the configuration of weather monitoring solutions for the mining industry, these comprehensive and robust range of weather stations, data loggers and weather sensors are proudly Australian-made and have been since 1982.

These locally made and readily available infrastructure and parts meet the rigours and demands of Australia's harsh outback and they are fully-backed by remote support and technical staff who travel Australia-wide.

Environdata also supplies the software and brackets to install these integrated and custom-built modular weather stations, rain gauges, sensors and convertors that help mine sites meet their environmental licence conditions and comply with Australian Standards. ***AMR***

Colour Me Happy



Environdata works with customers to design and manufacture the right monitoring solution for each location including custom masts, custom paint colours and additional sensors.

Councils monitor the movement of wind from landfills and waste transfer stations to minimise dust and odour complaints from nearby residents.

The installation of a 10m weather station mast, with wind speed and wind direction sensors, fulfills the Australian Standards and environmental monitoring guidelines, however locals may baulk at the sight of a bright white, very shiny and 10m tall mast amongst the landscape.

Environdata recently assisted a council in Southeast Queensland by custom powder coating one of their masts in a neutral pale eucalypt colour with a satin finish to minimise the visual impact.

The resulting weather station allowed the council to proactively manage local community concerns while still keeping their mast on-site to collect quality weather data.

Environdata works with all customers to design and manufacture the right monitoring solution for each location.

Custom masts, custom paint colours and additional sensors are all part of the solutions-based approach Environdata uses to help solve each client's weather monitoring issues.

Environdata
WEATHER STATION SPECIALISTS

ROBUST, RELIABLE & AUSTRALIAN

MINING & GAS WEATHER STATIONS

Your Weather Data
- When and How You Need It!

Automate Your Weather Data Collection & Distribution

Live & Historic Weather on Our Secure Web Portal

SMS & Email Alerts

Robust, Australian-Made Weather Stations

Meet Australian Standards & EPA Licence Conditions

AUSTRALIAN MADE AND OWNED
Proudly Designed & Manufactured in Australia













Environdata's Australian-made weather stations and *WeatherMation LIVE,* weather data management and alerts system, provides your mine with a robust, reliable weather monitoring and alert solution.

Ideal when you need to alert your chosen staff about Heat Stress, Lightning, High Winds, Rainfall at remote sites or along access roads at night.

For detailed information about our Weather Stations and their specific applications for the Mining industry go to **www.environdata.com.au** and click on Industry Applications.
http://environdata.com.au/our-industryapplications/mining-weather-stations

07 4661 4699
www.environdata.com.au

Environdata
WEATHER STATION SPECIALISTS



SAFEGUARDING THE WORKPLACE

THE SYSTEM TRUSTED BY MAJOR MINING COMPANIES TO PROTECT WORKERS AGAINST DROPPED OBJECTS.

Pro3 Safety Director and co-designer Simon Noack.

All workers deserve to go home injury-free at the end of the day. Reducing dropped object risks, injuries and deaths should form part of any good plant design and safety management program.

Investing in dropped object prevention can also prevent damage to vital equipment and disruption to production schedules.

The Dropped Object Prevention System (DROPS) by Pro3 Safety tackles this risk head-on in a cost-effective way.

It offers a simple life-saving solution and provides the best protection for employees, contractors, and visitors against the risk of injuries, falls and dropped objects.

Pro3 has developed RetroGUARD™, RetroTREAD™ and RetroSTEP™.

These solutions can be retrofitted to existing stairs, platforms and handrails and are designed to fit various handrail dimensions, shapes, and configurations.

Pro3 Safety director Simon Noack says the company is Australian-owned and its products are designed and manufactured locally with Australian steel.

"We are committed to supporting other Australian companies and jobs while providing a quality finished product that saves lives," he said.

"Our products are designed and tested for tough Australian conditions and have stood the test of time.

"We have guarding which has been providing protection on sites for over 10 years in the harshest parts of our country like outback South Australia."

Pro3 Safety director Andrew Crothers says his team can easily customise the products to clients' needs.

"Our integrated products are fast to produce, easy to install and require no drafting, surface preparation or hot works.

"Our products are protecting people on building roof tops, bridges, at mine sites, in warehouses, processing and manufacturing plants, power plants and at airports both in Australia and overseas."

The company is committed to continually improving safety in the workplace and setting new standards in dropped-object prevention solutions and systems.

RetroGUARD™
The RetroGUARD™ Safety panel system can be retrofitted to existing handrails while maintaining the existing handrail integrity.

It adapts to all types of platforms, stairs and walkways and can be quickly and easily removed to provide vital access to areas for maintenance works.

RetroGUARD™ is engineered to prevent injury from dropped objects and falls from personnel leaning through, standing or stepping onto handrails.

It maintains three points of contact during access and egress, it is fitted entirely from inside the safety barriers of the platform or stairs.

The flexible design of RetroGUARD™ gives complete coverage, even for internal and external corners.

RetroSTEP™
RetroSTEP™ barricades areas above and below stairs. The mesh covers the opening between existing steps.

Fast, affordable, and easy to install, no hot works are required during installation and no interruption to production schedules.

When combined with RetroGUARD™and RetroTREAD™, it reduces dropped object risks from open stairs and walkways.

RetroTREAD™
RetroTREAD™ allows for fast and safe installation of safety flooring, with a clamp designed to clip to existing grid mesh floor,

Slip resistant floor sheets are quickly secured to the RetroTREAD™ clip, barricading areas above and below each platform level, preventing the risk of injury from falling objects. ***AMR***





Pro3 Safety™ Pty Ltd

Filling the gaps in Safely

Contact us today:

Simon: 0421 635 518

Andrew: 0400 446 167



SAFETY PRODUCTS FOR HANDRAILS, PLATFORMS & STAIRS





Pro3 Safety supplies a comprehensive and integrated Dropped Object Prevention System.

Our safety products are retro-fitted to new or existing handrails, platforms and stairs providing a cost effective, life saving solution to dropped object injuries and fall prevention.

We offer great service with site assessment and guidance with product selection, to provide you with the ideal safety solutions and a quality product to meet today's modern work place standards.

Join with Pro3 to protect your team. Reduce falls and prevent dangerous or fatal DROPS injuries.

Developed, designed and manufactured in Australia for Australian conditions.

RETOGUARD™ | RETROTREAD™ | RETROSTEP™ ARE IDEALLY SUITED FOR USE IN:

- Greenfield construction or existing plants
- Factories, Warehouses and Storage Facilities
- Mining, Coal, Oil and Gas processing plants
- Drilling Rigs of all types
- Manufacturing plants

MADE IN AUSTRALIA | SUPPORTING AUSTRALIAN INDUSTRY. pro3safety.com.au



SMARTTECH
BRINGS CLEVER IDEAS TO MINING CONSTRUCTION

Sometimes a company's name doesn't quite line-up to how it operates. However, with SmartTech Australia you know you are going to receive exactly what you were looking for.

A drive to be a leader in the Advanced Solutions that it offers its clients has become a key component of the success of SmartTech's business.

The company uses innovation and flexibility to take its customers through a complex range of products and adds to that the ability to put viable solutions together taking its clients to the next level of capability.

One of the key areas that SmartTech's philosophy clearly shines out is its support of mining and construction.

The company offers the latest in remote operation and Artificial Intelligence (AI) solutions to ensure today's mines operate more efficiently and safer, with improved environmental outcomes via real time data management.

SmartTech ties all of this together with a range of systems that improve asset productivity while continually working to lower personnel safety risk.



These products include:

RAJANT'S KINETIC MESH

Rajant's Kinetic Mesh is the only wireless network that autonomously adapts to operational and environmental change, dynamically evolving to keep applications, equipment, and open-pit mine production running nonstop.

Rajant provides a simple but robust solution to modify or expand network coverage dynamically as your mine footprint evolves. The unique nature of the Kinetic Mesh architecture allows open-pit operations to easily introduce, relocate, or remove network infrastructure – without causing any network downtime – to deliver highly adaptable coverage and continuous connectivity.

Here's how: All network nodes can be mobile and create a mesh between moving equipment. Multi-radio, multi-frequency redundancy delivers mission-critical reliability.

Lightweight BreadCrumb nodes work peer-to-peer to form a multi-radio Kinetic Mesh network. These nodes can be deployed on fixed infrastructure or moving assets such as trucks and shovels, uniquely enabling vehicle-to-vehicle (V2V) communications between mobile equipment.

Once configured for the mesh, if coverage needs to be shifted, the compact nodes can be easily relocated and will instantly reconnect to begin meshing with nearby nodes. BreadCrumbs are able to hold multiple connections over multiple frequencies simultaneously, creating hundreds of potential paths over which to direct traffic.

Rajant's InstaMesh networking protocol works in real-time to select the fastest path or paths for delivery. If a path becomes unavailable or blocked, InstaMesh will dynamically route communications via the next-best available path.

That means nodes can be relocated without causing any downtime, and interference or signal blockage caused by the changing open-pit environment will not compromise network performance.

SAFEYE COLLISION AVOIDANCE SYSTEM

SAFEYE is an advanced stereoscopic machine vision system that detects and differentiates between pedestrians, industrial machines like dump trucks, excavators, forklifts, cars, and other machines typically found on industrial sites.

With the most advanced artificial intelligence (AI) built in to SAFEYE, operational safety is improved while employees and stake holders acknowledges safety as a valued and important priority.

Designed to operate in any harsh environment, SAFEYE only generates alerts to operators when absolutely required. Thus avoiding distraction alerts which are not relevant.

Advantages
- No RFID tag or signalling device required.
- Low light sensitive camera with wide field of view
- Ultra-rugged design for harsh environments
- Multiple camera configurations and options for any type of machine installation.
- Customisable detection zones and three distance configuration zones.

CLEARVIEW Optional Add-On Features
- Remote video monitoring
- Remote SAFEYE configuration
- GPS position monitoring of machines
- Speed monitoring of machines
- Near-miss monitoring of pedestrians
- Near-miss monitoring of machines
- Berm and Vidar detection monitoring
- Void - Stockpile detection
- Connectivity monitoring to SAFEYE sensors
- SAFEYE system health (including Dirty-Lens monitoring)
- Remote software updates

VIRTUAL SUPERINTENDENT (VS)

Virtual Superintendent (VS) represents the best in market cloud reporting software.

VS allows its users to make more impactful and informed project decisions. Realtime data provides better visibility into where your machines are, their performance and if they're working safely. Benefits include:

Greater Control
Control your production, quality and safety out-comes. Real-time data helps optimise machines, control costs, avoid project delays and enforce on-site health and safety

Reduced Costs
Manage and control budget blowouts. Real-time data gives visibility of project operations to relevant staff members, allowing them to make faster decisions on expensive activities from any location.

Data Aggregation
The Virtual Superintendent aggregates data from on-machine devices, a mobile app, sensors and integrations with other software applications to give a detailed view of production, cost and safety on a project

Real Time View
The Virtual Superintendent provides a real-time view of your production rates with a tailored list of reports, dashboards and map views

Cost Data
Cost data is displayed in real-time and is combined with your production data to give a complete picture of how your project is progressing today, or this week, or this month

Key Metrics
Key metrics can be seen in the office or out in the field For example, a Foreman will know exactly how much dirt has been moved so far today, if they are ahead or behind target, and how much per m3 it is costing to move it Virtual Superintendent (VS) represents the best in market cloud reporting software

Target Tracking
The Virtual Superintendent's understanding of what is happening on site allows for prediction against targets Key staff on site can see if they are on track to make their target today and adjust accordingly

FRESH FILTER

SmartTech Australia has introduced Freshfilter to the Australian Market. This new era in Cabin Air Filtration combines the durability of stainless steel components, with high grade HEPA filters and digital controllers which monitor cabin pressure, CO2 & hydrocarbons.

All Freshfilter systems utilise advanced cabin air filtration technologies that are designed to combat any health issues due to poor air quality now, or into the future. Each Freshfilter Cabin Air Filtration System has been designed to comply with:
- International Standards ISO 10263 & ISO 23875
- Recognised Standard 20 (RS20) Queensland Mining Safety
- HEPA Filter International Standards EN1822 / 29463
- Active Carbon Filters International Standards EN14387
- Relevant Australian Industry Standards

As the exclusive distributor of Freshfilter systems with offices nationwide, SmartTech Australia can provide complete solutions, installation, and support while delivering safety with fresh filtered air for all industrial environments.

With a clear desire to help improve mining and construction operations, SmartTech has brought together a whole range of clever ideas to support industry and make operations safer and more productive. ***AMR***

SMARTTECH® AUSTRALIA

The Best in Mining & Civil Technology



About us

The field and office staff at SmartTech are trained and experienced in the Mining & Civil industry, we have over 20 technicians, some who have been with us from the beginning carry extensive product knowledge within our portfolio.

Learn how easy it is to utilise technology that makes significant improvements in the project workflow. The team at SmartTech know how to apply this innovative technology to effectively solve your biggest Mining & Civil challenges.

With the addition of On-Board Weighing, Safety and Software solutions to your civil construction projects, you're in a stronger, more competitive position. You'll experience new levels of productivity that will enable you to earn the bid and be profitable, project after project.

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

Loadrite Services

Our technicians are the only in Australia that certified by the National Measurement Institute to verify Wheel Loaders to be Legal For Trade (6.8) for LOADRITE onboard weighing systems.

With our experienced team, comes an equipped fleet. SmartTech has a calibration truck in every state we service (Western Australia, Northern Territory, Queensland, New South Wales, Victoria and Tasmania.)

1800 655 860 **www.smarttechaustralia.com.au**

STOP MANAGING YOUR PUMP FAILURE



The mineral resources sector is getting more bang for its buck with PumpEng's expertly crafted dewatering pumps – products leading the industry with their design and performance.

Based in Perth, PumpEng is an Australian pump designer and manufacturer offering sales, hire, and parts to customers in Australia, the Americas and South East Asia. They supply quickly, limiting downtime.

The full-service OEM manufacturer also delivers improvement-focused repairs, aftercare services and ongoing consultative data-based assistance.

PumpEng Commercialisation Manager Matt Oliver said the Australian company's products and services drew on extensive industry experience, as well as insights gained from Australian maintenance and mining operators.

These innovations have placed PumpEng ahead of the curve in the specialist submersible pump market and made the company the partner of choice for many mining companies.

\Matt Oliver discusses the reasons for PumpEng's success. "Our solutions are backed by a vigorous research and development process, and they are purpose-built for harsh mining conditions. Pump failure has just been accepted as the norm. Not anymore!"

Over the last year, we have worked hard to accommodate the fast-growing interest in our products, leading us to open new interstate and international offices to be connect with our growing network of reputable international distributors."

Well-designed products are only half the story. PumpEng is also committed to first-rate installation practices, strategic and innovative thinking, and a data-driven approach.

PumpEng leverages industry trends and collaborates with mining operators to better understand contemporary underground dewatering needs and adjusts its offerings accordingly.

Increased mine productivity through modern mining methods means that PumpEng are here to challenge the status quo in pump design to keep up.

The company performs regular site inspections, thoroughly analyses repair data and conducts quarterly reporting to get a well-rounded view of how the pumps perform.

This information and feedback helps PumpEng create products that reduce the number of maintenance events exposing crews to the hazardous combination of water and electricity. This improvement significantly increases site safety.

PumpEng pumps are also known to reduce maintenance costs because they require much less repair or replacement due to the type of materials used in manufacture. Operators report lower labour costs and a decrease in production delays caused by pump failure.

Matt Oliver explains the levels of company involvement. "Our commitment to our clients extends past industry specific designs, quality manufacturing, and timely supply of pumps and repairs, with full aftermarket support to ensure each pump is used correctly to reduce pump failure."

PumpEng has partnered with major foundries and quality manufacturing facilities located within Australia and abroad to facilitate the reliable supply of quality parts and pumps.

While the manufacturer has a primary focus on supplying underground mine operators and contractors, it also has a national footprint across several other industries.

Ultimately, PumpEng has developed an experienced team dedicated to delivering a good at work when it comes to underground dewatering.

ABOUT PUMPENG

PumpEng is a manufacturer with its patents and products breaking industry pump performance records.

This Australian company evolved from a venture between Paul Meneghel and the owners of Galvin Engineering.

Paul's initial vision was for pump parts tough enough for Australian conditions. As a company founder, he drew on his extensive experience with submersible pumps in mining, stretching back to the 1980s.

Harnessing more than 100 years collective experience in foundry processing and manufacturing, the original PumpEng team set out to improve the design of mass-produced submersible pump components for Australian operating conditions.

The company has since grown well beyond Paul's original 2001 vision to improve pump component design.

PumpEng's branch network spans Perth, Kalgoorlie, Townsville and Adelaide. On the international stage, the company also maintains officers in Indonesia and North America and emerging markets in South America. ***AMR***

The PumpEng Range

All PumpEng products are built to last because of their innovative design expertise and use of durable materials. Among the products earning an industry-wide reputation for extraordinary performance is:

JetGuard



This pump has an all-metal wet end with a high chrome impeller and is designed for use in the harshest environments. The product is perfect for when polypropylene fibres for shotcrete, high amounts of aggressive sulphides or drill fines and tramp are in the wastewater. The hydraulic water curtain guards against floating fibre entering the pump. JetGuard is suitable for underground mining, surface mining and general dewatering applications.

Raptor

This pump is suitable for underground mining, surface mining, construction and general applications. Parts interchangeable with other OEM supplied BIBO ranges. The Raptor is available in 5kW, 8kW and 20kW to suit all markets.



Guardian

No more pumps with rubber and polyurethane components! The Guardian is an upgrade to the Raptor range. It incorporates an all-metal wet end and a high chrome impeller which extends pump life and reduces repair costs.



ScatPump

This pump is a heavy-duty submersible slurry pump with high chrome impeller and agitator. Flows available up to 100l/s and heads up to 32m. ScatPump is available in 1.5kW - 22kW to suit all markets.



Metal Vest

The all-metal design of MetalVest™, together with the impeller constructed of HRC provides a longer wear life. This added strength extends the life of this high head dewatering pump and reduces repair costs. The MetalVest™ are available in 37kW - 110kW to suit 50 cycle markets.



Creating a good day at work for our team and clients.

Give us a ring:
+61 491 251 891



Protect Your Pumps Against Shotcrete Polyfibre

Tough Pump for the Modern Miner.

JetGuard® provides A Good Day at Work for Mining Operators:

Protected
Less Fibre Gets In

Reliable
Less Failures

Toughened
Metal Is Best

Unique
Innovative, Patented Design

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Patent Numbers:
AUSTRALIA - 2015230662 | CANADA - 2941904 | USA - 10514047
CHILE 59.801 | SOUTH AFRICA 2016/06902

PumpEng CELEBRATING 20 YEARS

All the power you need



United. Inspired.

A zero-emission family

We are leading the charge towards sustainability in mining through electric battery-driven, zero-emission equipment. Our proven battery offering and zero-emission underground fleet includes loaders, mine trucks and rigs for face drilling, production drilling and rock reinforcement.

Epiroc

epiroc.com/en-au

STRAIGHT to the POINT



The Rigging Shed has brought another cutting-edge innovation to the mineral resources sector with COLT – a load monitoring app significantly strengthening workplace safety.

Delivered in partnership with reputable manufacturer Straightpoint, COLT – or Clamp On Line Tensionmeter – is a Bluetooth-equipped system that measures tension on wire ropes of up to 5000kgf and up to 25mm in diameter.

The COLT is purposefully designed to accommodate the complex make-up of ropes and address the unique sizes, construction, core type and lay.

The solution is also designed to address the varying rigidity and calibration differences in wire ropes through the COLT's hardware and software.

The state-of-the-art product clamps onto a pre-tensioned wire rope, eliminating the need for additional sheaves or tooling, and an integral Bluetooth module transmits tension data wirelessly to any smart device.

The COLT app, which can be found on Android or IOS, contains an infinite wire rope library and tension can be measured and logged within seconds.

Straightpoint Director David Ayling said the COLT was an accurate and reliable tension-measuring application beyond what was previously thought possible.

He said the cleverly-designed product simply originated from industry insights and thorough research.

"Therein lies the two revolutionary features of the product," Mr Ayling said.

"Measuring tension of differing wire rope diameters often requires exchanging different sheaves, requiring tools and other ancillary equipment.

"The COLT boasts an integral quick adjustment mechanism to measure wire rope diameters from 5mm to 25mm.

"Like many Straightpoint innovations, we based the COLT on feedback from end-users that apply our technologies.

"Combining industry intelligence with our research and engineering expertise, we devised a product that fills a gap in the market and supersedes alternative solutions."

The COLT features a computer numerical control (CNC) machined aluminium construction with high precision roller bearing pivot.

The product boasts high leverage tensioning arm; IP67 waterproofing rating and exceptional battery life of up to 1,000 hours operational time.

It also comes with a purpose-made carry case, made suitable for on-site cable tension measurement applications across the world.

The innovative Straightpoint product is available at The Rigging Shed, a Western Australian business serving clients in need of lifting and rigging.

Founded in 2000, the veteran company is endorsed by DNV, NATA AND LEEA, and is known for its strong track record in high-quality work and safety.

The Rigging Shed also has a reputation for providing flexible and proactive solutions to the unique needs of Western Australian operators and can meet businesses on their terms using it's Sling Doctor mobile service.

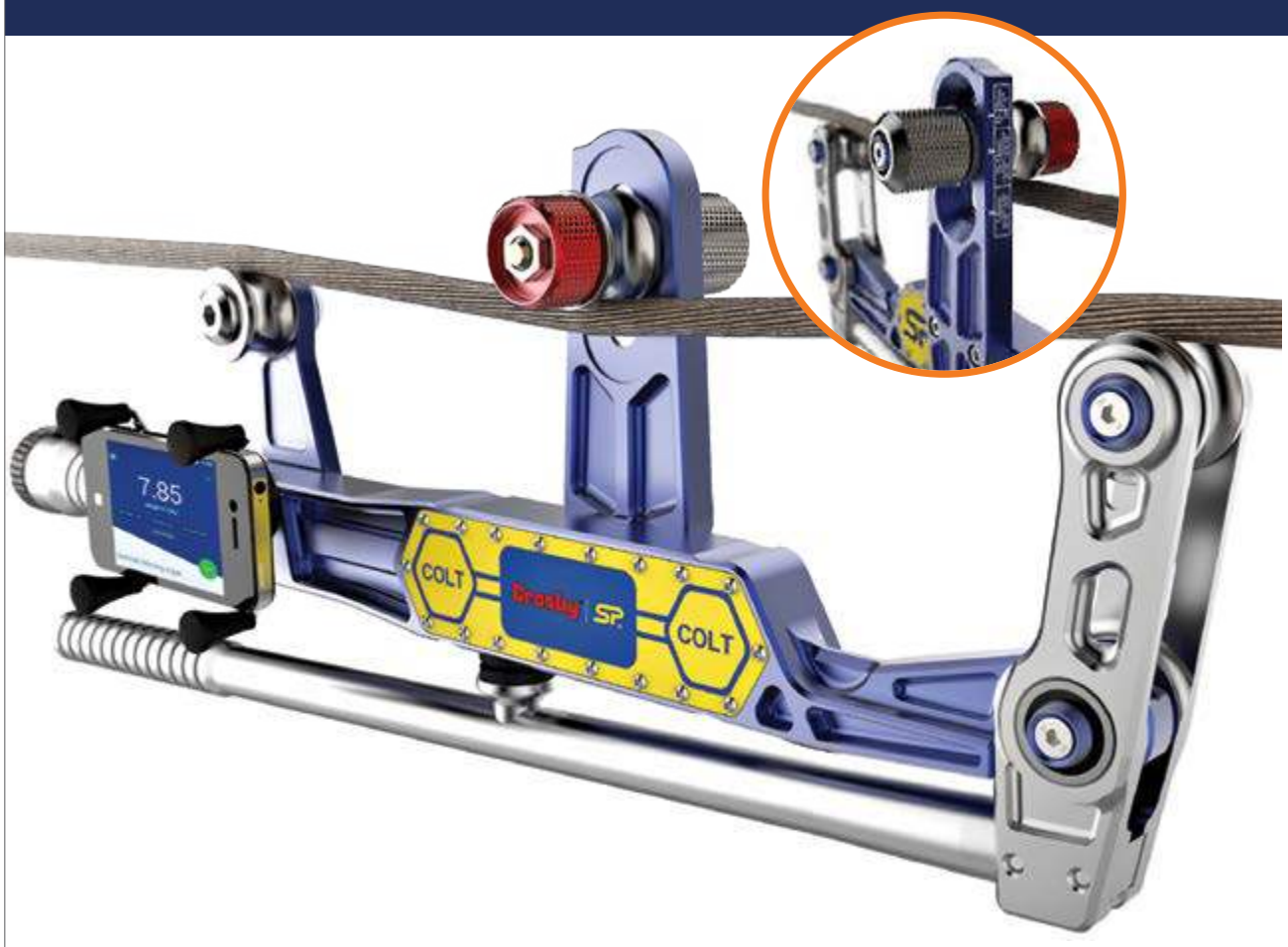
The comprehensively stocked facility can test and repair most standard items on site at short notice and is matched only by the wide-ranging stock of lifting equipment available throughout The Rigging Shed's four locations.

Project operators can find this range in Wangara, Kalgoorlie, Bibra Lake and Port Hedland.

For more information, visit https://theriggingshed.com.au

AMR

LIGHTWEIGHT. FAST. ACCURATE.



Measure up to 11,000lbf/5000kgf and up to 1"/25mm diameter with the Straightpoint COLT.

FEATURES & BENEFITS

- Unlimited wire rope calibration database via Android or iOS app
- Main swivel joints fitted with high-quality bearings
- Lever ratio of 5.3:1 allows effortless, safe, clamping onto pre-tensioned wire ropes
- Wireless Bluetooth enabling the operator to stand at a safe distance if needed
- Quick intuitive adjustable centre sheave makes changing wire rope sizes fast and easy
- No easily broken external antennae
- High waterproof resistant design for all weather use
- Massive battery life of 1000 hours operational time
- As the library of wire rope diameters and constructions is increased each app user will benefit when they update and receive any new data.

DON'T HESITATE TO GET IN TOUCH
(08) 9406 9999 | INFO@THERIGGINGSHED.COM.AU

THE RIGGING SHED
LIFTING & RIGGING EQUIPMENT SPECIALISTS



LIFTING UP INDUSTRY STANDARDS



Lifting Equipment Engineers Association (LEEA) members are setting the standard. Positioning them ahead of the curve when it comes to lifting equipment inspections and safety.

Backed by more than 75-years' experience, LEEA is a globally recognised organisation created to support firms and their people in the lifting equipment industry.

The leading trade association is tasked with raising the bar when it comes to industrial lifting safety and limiting workplace risk with first-rate training and esteemed certifications.

LEEA Australia and New Zealand Regional Manager Justin Boehm said industry could be sure that LEEA members were compliant with national standards and legislation no matter where in the world a project was located.

He said this was one of several things increasingly making leading association members the partner of choice for operators.

"Lifting can be hazardous work across most industries in Australia, but the recommended safety standards are actually voluntary," Mr Boehm.

"At LEEA, we feel it's important to address this with adequate training and certifications, so operators can feel confident professionals tasked with doing the inspections are incredibly well-trained and capable.

"Maintaining safety standards at work is critical – particularly when it comes to the stringently monitored mineral resources sector – and we believe lifting work should have to meet thoughtfully considered criteria, too.

"Most operators seem to agree.

"We are noticing an increasing share of our members being prioritised and engaged to undertake lifting equipment inspection, testing and certification."

LEEA members must first comply to an ISO9001 based audit and are given well-rounded education on eliminating workplace risks, injuries, and fatalities.

Mr Boehm said LEEA training courses were centred on inspection and thorough examination of role-specific lifting equipment to ensure members operated to stringent technical, legal and safety standards.

He said the trade association helped companies across the design, manufacture, maintenance, testing and inspection of lifting equipment become competent in their work.

According to the Regional Manager, members are biannually subject to short notice technical audits to encourage the repeated raising of standards and their employees are required to undertake expertly crafted training.

To keep up to date with any legislative changes or evolving industry expectations, member employees also undertake Continual Professional Development (CPD) delivered every three years.

"We have an extensive and regularly updated library of best practice information and guidance documents that we leverage to deliver training and provide advice," Mr Boehm said.

"Our technical library provides a unique source of information on all aspects of the design, manufacture, testing, examination, certification and supply of lifting equipment, as well as its servicing and safe use.

"We are well known and highly regarded across the globe both within the industry and with end users, who are increasingly expecting LEEA membership from their suppliers."

Originally established to service England some 75 years ago, LEEA now has locations worldwide and has been operating in Australia for more than a decade.

The company works alongside a variety of vision-driven partners in Australia to enhance their service offering, including national peak employer organisations and national peak bodies.

LEEA also closely works with the country's leading independent standards organisation Standards Australia, the National Offshore Petroleum Safety and Environmental Management Authority and the WorkSafe departments of multiple state governments.

For more information, visit https://leea.com.au

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OUR MEMBERS CAN BE FOUND IN

- **Construction**
- **Marine**
- **Oil and Gas**
- **Infrastructure**
- **Manufacturing**
- **Mining**
- **Ports**

OUR KEY SERVICES

- **TRAINING**
  We deliver training across the world through our Training Specialists and e-Learning platform.
- **TECHNICAL SUPPORT**
  Our highly knowledgeable and experienced technical officers are available to provide members with technical consultancy and advice services, as well as regular updates on a range of issues including new standards and regulations and warnings about dangerous equipment.
- **OFFICIAL INDUSTRY REPRESENTATION**
  We are the industry voice for our members and aim to represent the lifting equipment industry at the highest levels.
- **RESOURCES AND INFORMATION**
  We produce a range of publications, including our Code of Practice for the Safe Use of Lifting Equipment, which generally accepted as the most authoritative source of information on specifying, using and maintaining lifting equipment.
- **MEMBER ENGAGEMENT**
  We work closely with members to facilitate a strong and supportive partnership, focused on compliance audits, invigilate assessment exams and technical advice to ensure members are using best industry practices.

EDUCATE, INFLUENCE, AND ENABLE SO THAT BEST PRACTICE IS EVERYDAY ACTION.



We are LEEA

We are the globally recognised trade association for all involved in the design, manufacture, hire, repair, maintenance and use of lifting equipment.

Our members have unrivalled access to the latest technical, legal and safety information needed to operate successfully and credibly in the lifting industry.

Our range of instructor-led and online training courses transform teams into experts on the inspection and examination of lifting equipment and best practice.

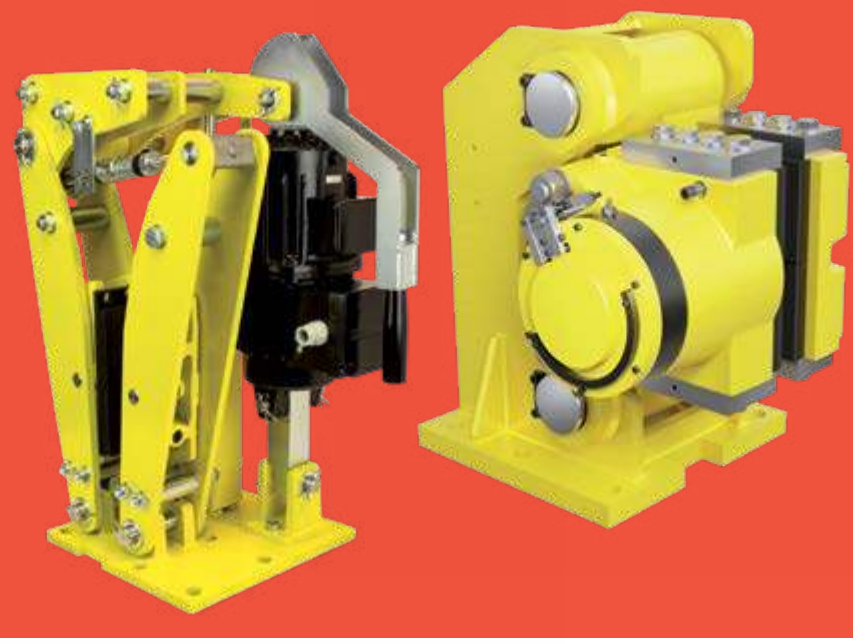
Get in touch with us today

www.leea.com.au
info@leea.com.au
0400 001 000

LEEA

RINGSPANN®
Your benefit is our motivation

A One Stop Shop for Mechanical Power Transmission Products



RINGSPANN is a leading technology manufacturer of power transmission products such as freewheels, backstops, brakes, clamping fixtures, shaft-hub connections and overload clutches. It also leads in precision clamping fixtures and remote controls. The company has nine manufacturing facilities in Germany and across the globe.

With almost 500 employees in more than 25 countries through dedicated offices and distributing companies, RINGSPANN prides themselves on providing the latest and reliable high tech products to an abundance of customers worldwide in the field of industrial gears and geared motors, mining, machine tools, food and packaging machines, energy generation, material handling, marine, rail, aerospace, vehicle construction, pulp and paper as well as in general machine building and plant construction.

While headquartered in Germany since 1944, the company had been expanding its presence in Australia through other distributors. It made a conscious decision to set up a dedicated Australian office in 2018 located in Melbourne and is now well-established as a leading technology manufacturer with the team there ready to service and tailor their products to suit applications and optimise solutions and will continue to service the market with a mix of existing and new products introduced every year.

Freewheels

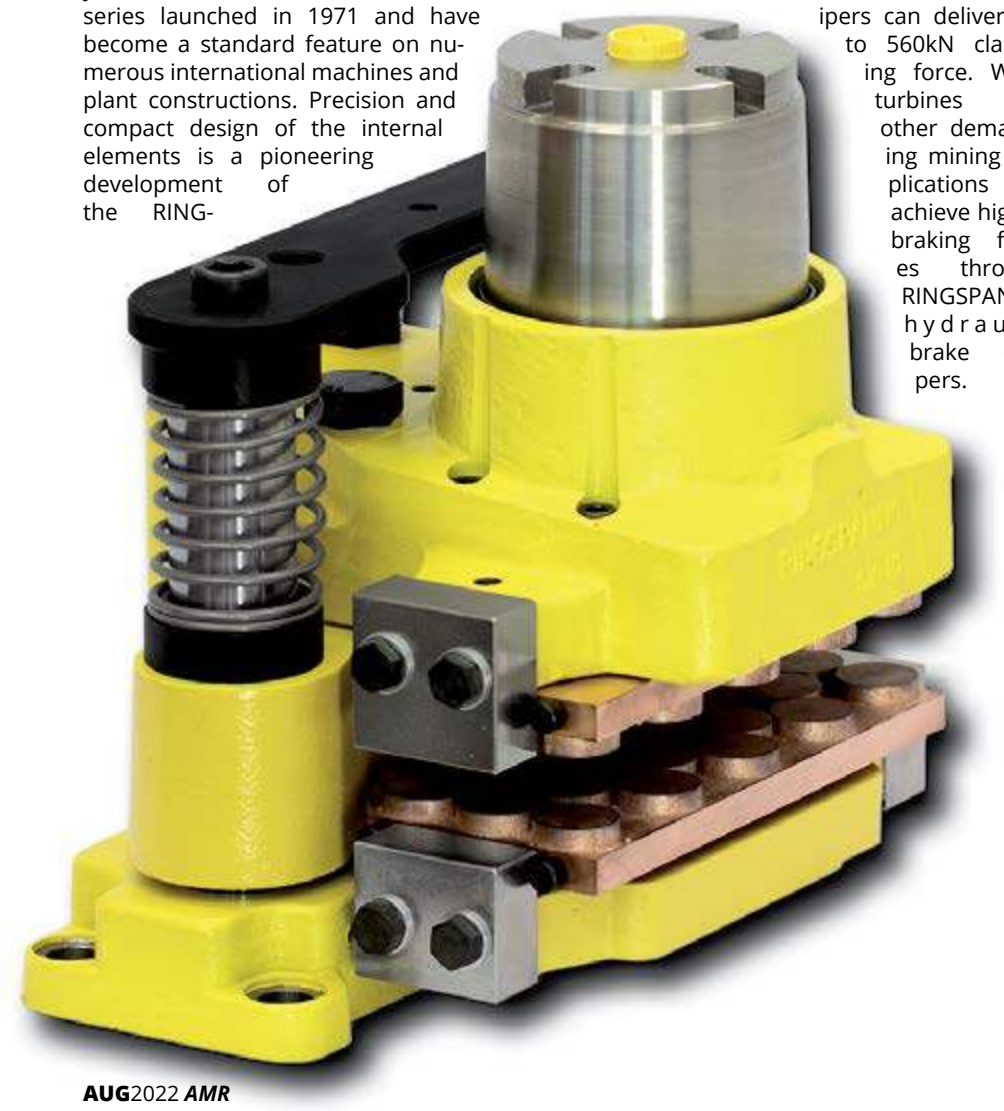
Setting the global standard for almost 50 years, RINGSPANN freewheels of the FXM series launched in 1971 and have become a standard feature on numerous international machines and plant constructions. Precision and compact design of the internal elements is a pioneering development of the RINGSPANN design and engineering department. They offer low maintenance "fit and forget" solutions on industrial drive trains and being equipped with the legendary "Sprag Lift-Off Type X", they offer low lift-off speeds and wear-free continuous operation and can even be used with friction reducing solid lubricants.

The whole FXM series, comprising of more than 40 standard sizes, have race diameters from 31 to 750mm. Depending on the variant, the torque they generate can range from 110Nm to 1,230,000Nm. They do not have their own bearing support and are typically used as backstops on intermediate shafts of spur gearboxes in conveyor pulley drives or as overrunning clutches in the gearbox units of bucket elevators, automatically engaging and disengaging main and creep drives. The FXM series is continuously being redeveloped and designed to meet the demand of today's applications.

Design and development engineers can find technical data sheets, 3D CAD models and installation instructions for all FMX Freewheels in the company's online portal: www.ringspann.com.au.

Brakes

Under the RINGSPANN brake portfolio the company boasts an extensive range, spanning pneumatic brake calipers, electromagnetic brake calipers, manual brake calipers, clamping units and accessories along with hydraulic and electrohydraulic braking and control systems. Our spring activated Hydraulic release brake calipers can deliver up to 560kN clamping force. Wind turbines and other demanding mining applications can achieve higher braking forces through RINGSPANN's hydraulic brake calipers.



For the mining industry, RINGSPANN can supply calipers along with a Hydraulic Powered unit(HPU) with pressure valves and regulating PLC's that can be controlled remotely.

Some of the installations in drive technology and machine construction requiring smaller braking torques up to a maximum 8000Nm are covered by RINGSPANN'S compact and lightweight electromagnetic disc brakes. The brake calipers from their new series DT, FEA and H-ST are much slimmer in design than conventional industrial drum brakes. The key reason for this is a constructional variation that saves an enormous amount of space.

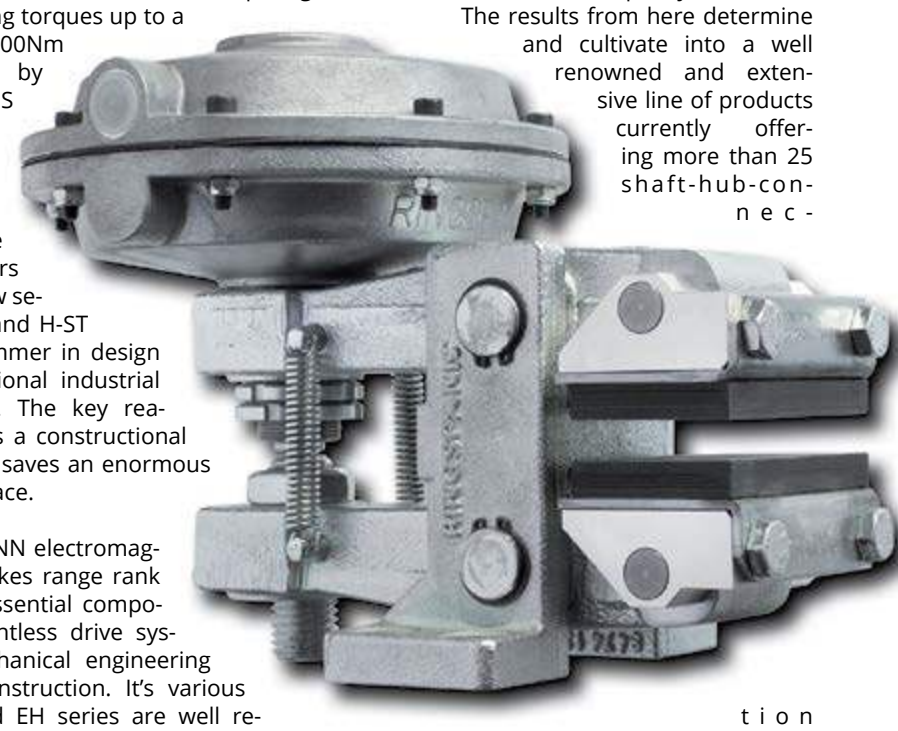
The RINGSPANN electromagnetic disc brakes range rank among the essential components of countless drive systems in mechanical engineering and plant construction. It's various DH,DV,EV and EH series are well received globally for various braking applications. These can be deployed for stopping, control and holding and cover a wide range of braking torques from 94Nm to 6590Nm.

Users can access the RINGSPANN developed online brake calculation tool that is free for anyone after registering on www.ringspann.com.au. This tool allows users to determine braking torque and clamping force on a specified disc diameter thus selecting a suitable and efficient braking system for the application.

Locking Assemblies

With a collaboration with universities coupled with decades of practical experience from key users all aroung the world, RINGSPANN stays committed and devoted to the ongoing further development of the frictional locking principle.

As a long-time manufacturer of locking assemblies, RINGSPANN posess a well-founded design procedure within this industry and have their own testing facility for fundamental research and quality assurance. The results from here determine and cultivate into a well renowned and extensive line of products currently offering more than 25 shaft-hub-connection series for torque ranges from 0.16Nm to 4,225,000Nm. This product portfolio comprises of locking assemblies, shrink discs, cone clamping elements, rigid shaft couplings as well as clamping systems for mounting torque motors.



RINGSPANN's three-part shrink discs were introduced to the successful standard series RLK603 S which are ideal for conveyor systems, stirrers, mixing plants, construction machinery and wind turbines, offering powerful externally clamping connections for the play-free connection of hollow shafts with their extremely high torque capacity across a range from 18Nm to 156,700Nm.

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Custom-made Solutions

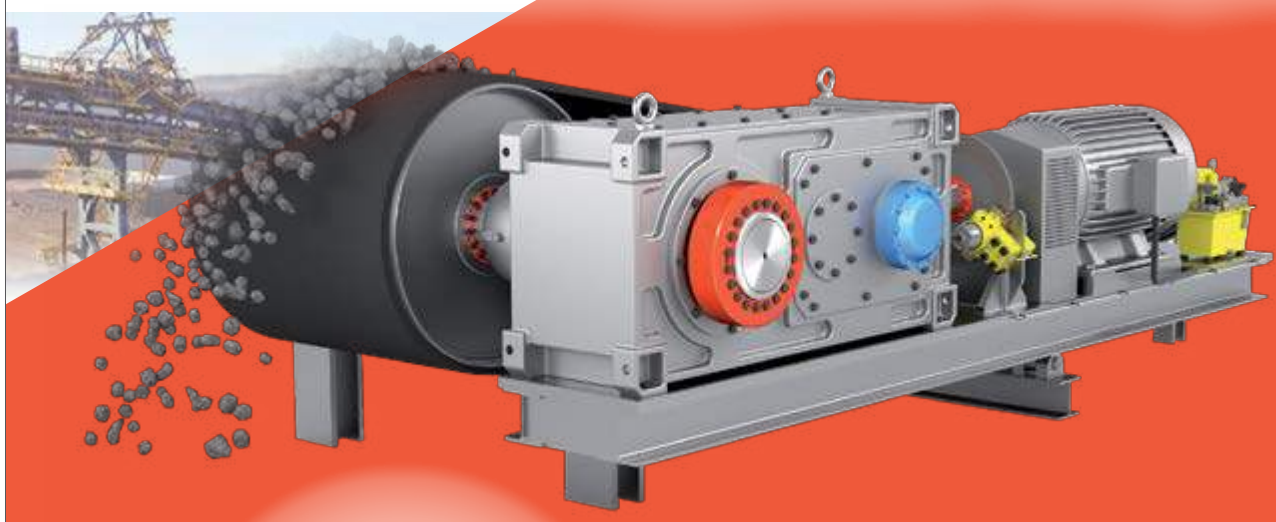
Australian miners have also turned to RINGSPANN for it's custom-made solutions. Its not just about supplying standard products but supplying solutions. Customers can talk to RINGSPANN about their applications and what they require and the team can assess and provide a solution to meet the customer's needs. This may include interaction with the finest industry engineers and designers in the world that are part of the RINGSPANN family and they will reach to great heights to provide the best solution to the application.

RINGSPANN will continue to strengthen its foothold in the Australian and Global mining as well as the manufacturing industries. Whether their solutions are made in Germany or in RINGSPANN factories worldwide, we offer the same quality and uniform engineering standards, which is our strength.

RINGSPANN®

Your benefit is our motivation

Power Transmission Equipment for Conveyor Pulleys





High Speed Backstops

Installed on gearbox to prevent reverse motion



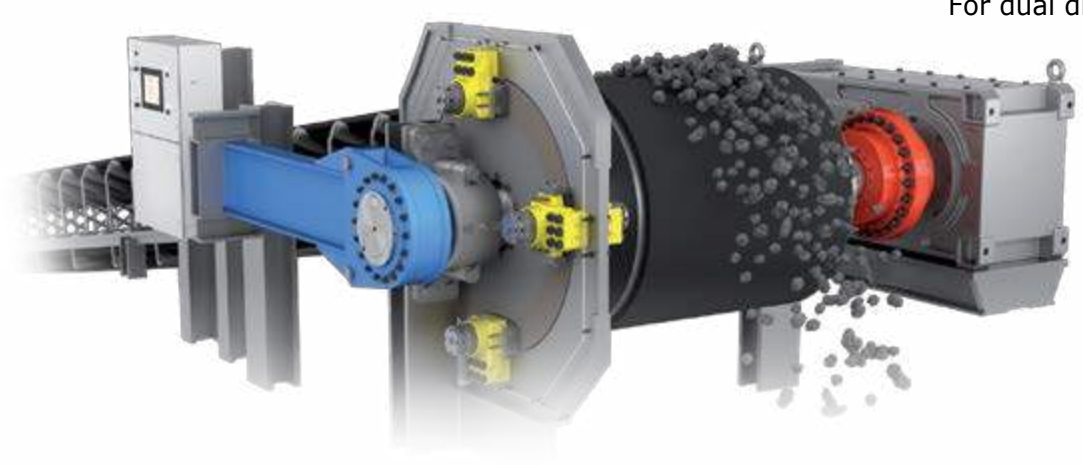
Low Speed Backstops

Installed on conveyor pulley end to prevent reverse motion



Housing Freewheel FH

For dual drive applications



ABOUT US

RINGSPANN® is a leading manufacturer of power transmission components for belt conveyors, bucket elevators, bucket wheel excavators, stackers and reclaimers, for mine hoists and crushers.

RINGSPANN® high speed backstops integrated into the intermediate shaft of gearboxes have long since become a benchmark of drive trains in the Australian mining industry. Equipped with the now legendary sprag lift-off type X, they impress with maximum torques of up to 1,230,000 Nm, low lift-off speeds and wear-free continuous operation.

RINGSPANN® is also a quality supplier of Low Speed Backstops, for nominal torques up to 900,000 lb-ft and bores up to 21 inches.

Our Low Speed backstops with torque arm support and Taconite seals on the conveyor pulley side are designed for use in inclined conveyorbelts, elevators or pumps.

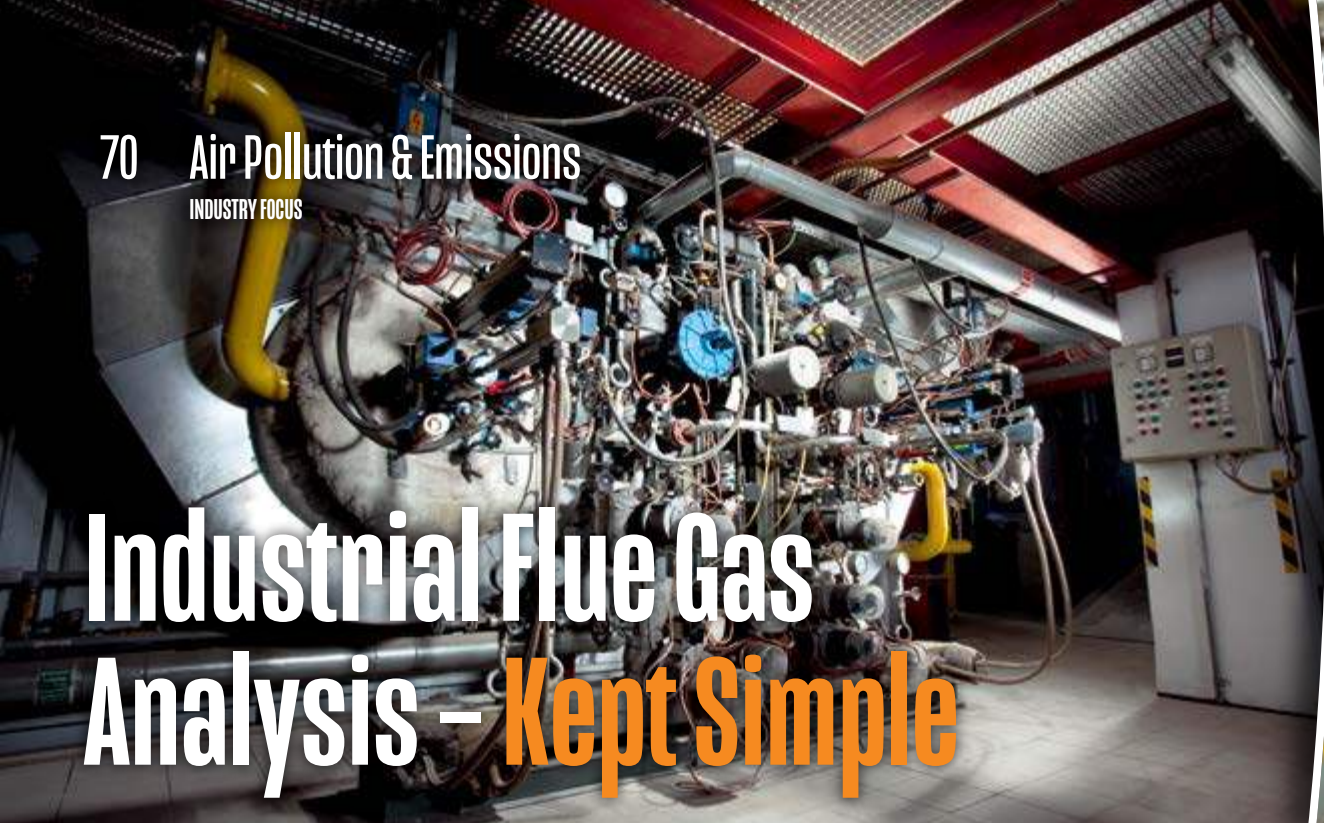
Our products also include freewheels, brakes, shaft-hub-connections overload clutches and couplings.

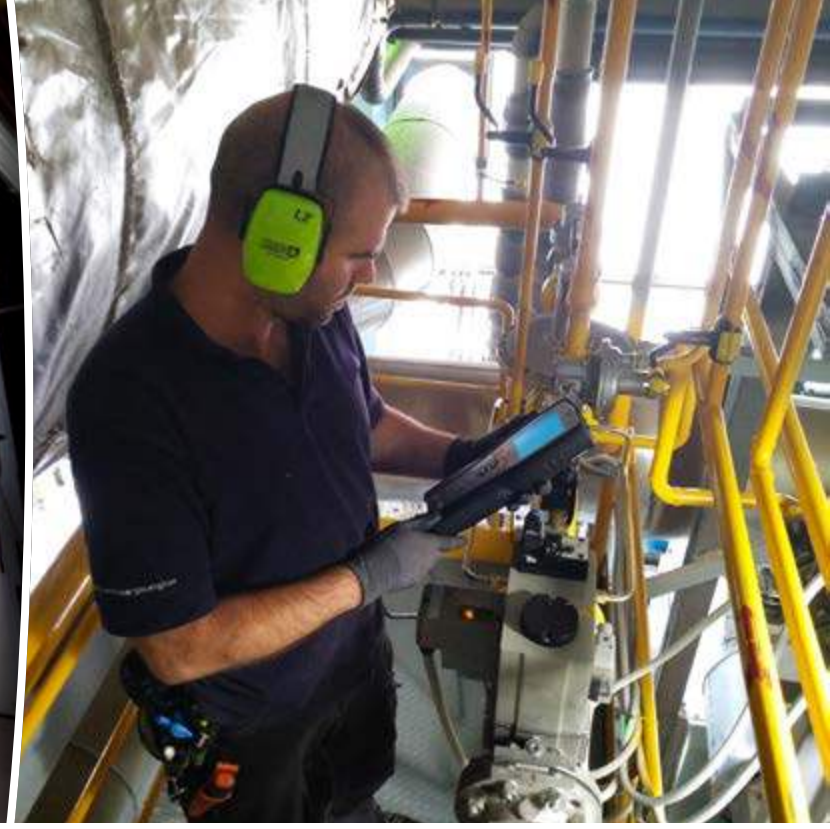
Contact us in Australia for any of our product lines. Our Technical team is available to discuss your application requirements.

GERMAN ENGINEERED

RINGSPANN® Australia Pty Ltd

www.ringspann.com.au





Industrial Flue Gas Analysis – Kept Simple

Accurately measuring gases with low concentrations can be critical to the efficiency of systems such as industrial turbines.

Furthermore, as the onus is on a variety of industries to do their best to limit environmental emissions, combustion systems that emit low concentrations of nitrogen oxide are becoming more important.

Treating flue gas after the fact can be costly, so keeping nitrogen oxide concentration to a minimum – and tracking and measuring it accordingly – is crucial for industries which are attempting to complete their processes in a cleaner fashion.

Low nitrogen oxide combustion has a plethora of applications. Any system that requires a boiler or furnace – including industries varying from power production to metal manufacturing – is capable of utilising a burner that outputs a low concentration of nitrogen oxide.

Accurate flue gas analysis is key to ensuring that the output from any combustion system is consistent. The versatility, robustness and scalability of the testo 340 emission analyser is ideal for industry professionals looking to carry out measurement, monitoring and maintenance work in their particular sector.

One of the main features of Testo's emission analyser is its sheer ease of use. Combining a compact design with reliable technology, the unit makes it incredibly easy to register and record accurate measurements.

The instrument has the space to house up to four gas sensors. An oxygen sensor comes as standard, but there are carbon monoxide, nitrogen oxide, nitrogen dioxide and sulphur dioxide sensors available.

Furthermore, the testo 340 is also suitable for measuring low concentrations of carbon monoxide and nitrogen oxide with optional high accuracy sensors.

Thanks to the optional automatic measuring range extension, whichever sensor is housed in the testo 340 has its spectrum of readings extended by a factor of two. There's also automatic sensor protection, meaning the unit will not allow itself to be overloaded, even under the added strain at high gas concentrations.

Single slot dilution to a factor of five is standard and can be used to also extend the measuring range of any of the following sensors:

- Carbon monoxide. 50,000 parts per million (ppm)
- Nitrogen oxide. 20,000 ppm
- Sulphur dioxide. 25,000 ppm

After gathering readings, deciphering the information to find the root cause of any issues is made easy when the unit is used with testo easyEmission software.

Readings are shown in either table or graph form and can even be made available online through Bluetooth wireless transmission or USB connection. These can then be turned into physical insights and distributed accordingly when used alongside a testo Bluetooth printer.

The data can be implemented into individual formulas which can take into account any specific fuels, making it incredibly easy to pinpoint any inefficiencies.

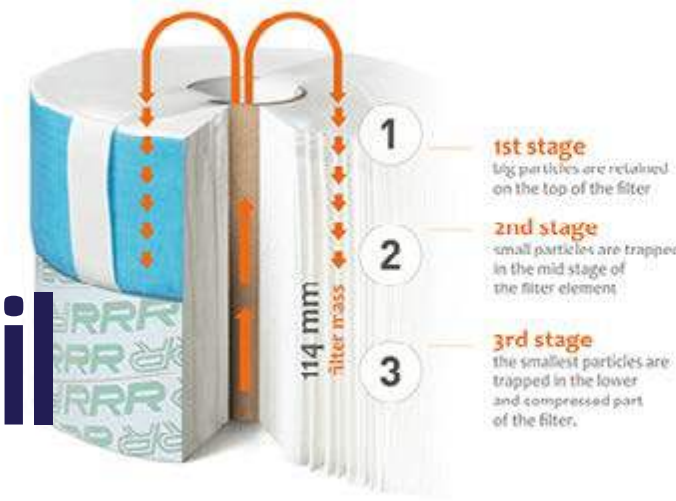
Only adding to its versatility, there are also a number of probes available which can be used in tandem with the testo 340. Different flue gas probe lengths, diametres and temperature tolerances all add up to create a flexible solution which is applicable across many industries.

Discover the technology at **testo.com.au** or contact Testo on **(03) 8761 6108**

AMR



Perfectly Clean Oil





Triple R Filtration Australia is the leading provider of Triple R Filters and Tan-Delta oil condition sensors in the Australian market.

Engine oil filtration
Increased demands to extend oil change-out intervals on engines has resulted in the use of synthetic oils being used on modern engines. These synthetic oils have resulted in oil change-out intervals being significantly increased, thereby reducing costs associated with oil changes. Extended oil change-out intervals have also impacted the filter used on the engine. Change-out of the filter element is in most cases associated with a change-out of the oil and the filter element has therefore had to be adapted to meet this requirement.

Filter elements have also had to adapt to other aspects of modern engines.
- Improving fuel economy
- Improving power
- Reducing emissions

Clean oil improves fuel economy and power output by reducing friction and wear on moving parts of the engine. Increased wear causes oil to enter the combustion chamber, burns with the fuel and is exhausted into atmosphere as particles and hydrocarbons.

Full flow and by-pass filters
Filters usually installed and supplied with the engine are referred to as full flow filters.

A variety of housings makes the Triple R filter solution **suitable for any size engine**.



The total flow rate of the lubrication pump is directed through this filter to lubricate the engine. By-pass filters are an addition to the full flow filter. A flow of oil is directed from the main oil supply into this filter to enhance filtration capability. Filter media used in by-pass filters is specifically designed to capture small particles which the full flow filter cannot.

Soot
Soot and sludges in engine oil are formed as a by-product of incomplete combustion. When the air and fuel mixture fails to ignite completely, there is leftover particles. These particles find ways into the lubricating oil and is reflected as soot. It is very rare that the engine combusts completely, so most engines will produce soot.

Extended oil change-out intervals increase the risk of high soot build ups in the engine oil. Full flow filters installed on engine have limited ability to remove this soot as particles are too small for the filter to remove. By-pass filter however have the ability to remove this soot and sludges in oil.

Oil change out intervals
Oil change-out intervals are almost always dictated by the engine manufacturer. These intervals are based on distance or operational hours of the engine. There is an increasing trend to further extend these intervals.

Testing of oil samples has shown that this can happen after the recommended interval has elapsed.

Triple R by-pass filters
Triple R filter elements have unique features which make the element suitable for by-pass filters used on engine. No other filter element on market displays these unique features.

1. Engine oil enters the filter media in a radial direction. This ensures that oil is directed into the thick 114mm of depth media.

2. A 1st stage of filtration ensures that larger particles are trapped in the least compressed filter media. By doing this, element lifetime is extended.

3. In the 2nd stage, the filter media, which is now more compressed, ensures that smaller particles are being filtered out of the oil. This again ensure maximum filter lifetime.

4. In the 3rd stage of filtration, the filter media is compressed at maximum by means of the outer wrap, which traps all small particles in the oil.

The filter element has a very large volume of cellulose filter media contained within. This volume or area of media ensures that the element is effective at removing contamination as well as ensuring extended lifetime of the element A selection of housings makes the Triple R filter solution suitable for any size engine.

Selection of the type of filter housing is carried out quite simply by the sump size of the engine. Housings are typically available in aluminium, steel and stainless steel and range from single element housings to multiple element housings.

Housings are supplied with integrated valves needed for functioning of the filter as a by-pass filter fitted onto the engine. This makes installation hassle free with no other control valves to be installed.

Oil condition sensors fitted on-engine
Our expertise extends into providing solutions for on-line oil condition sensor solutions. These sensors are installed on-board engine and provide feedback to the user on condition of the oil. Use of continuous real time on-line oil condition sensors reduces risks associated with infrequent oil sampling and gives the user transparent information on oil condition to make more informed decisions on oil change outs.



Plug and play solutions for logging and retrieving data.

Tan-Delta
Triple R Filtration Australia is proud to represent Tan-Delta oil condition sensors in the Australian market. We are the leading provider of Tan-Delta sensors into Australian market. The Tan-Delta sensor outputs the condition of the oil as an easy to understand value. Installation of the sensor is trouble free and the outputs from the sensor can be integrated with ease.



The **Tan-Delta** sensor is packaged into a mobile kit format.

Features
- Unique sensor technology measuring remaining useful life of oil
- Analyses the electro-chemical properties of oil with unrivalled accuracy
- This accuracy allows the sensor to also measure other contamination in the engine oil such as fuel dilution, wear metals and water in oil.
- Easy to understand output values
- The sensor also outputs the rate of change of the oil. This is a very useful value as it indicates the rate of oil degradation
- Plug and play solutions for logging and retrieving data
- Data communicated to a Cloud based platform if required

The sensor is also packaged into a mobile kit format. This allows the sensor to be used to measure condition of the oil on multiple compartments without the need of permanently installing one. ***AMR***



World-Class Bulk Material Handling Systems



Oreflow designs, manufactures and supplies quality conveyor and belting equipment systems to Australia and abroad. Pictured here is the Bald Hill mine.

For world-class conveyor, belt and apron feeder systems, look no further than Oreflow, the industry-leading choice for quality bulk material handling systems.

Oreflow supplies conveyor systems, chute and hopper skirting solutions, belt cleaning systems, air cannons and impact beds, to name just a few, and is renowned for their excellence in plant design, engineering and manufacturing.

As a global supplier of conveyor and belting equipment across a range of commodities, rest assured knowing that wherever you are in the world – Australia, Ghana, Senegal, Burkina Faso, Mali, Tanzania, Indonesia, Philippines and Zambia – Oreflow will deliver quality products, services and solutions for all your mineral processing and bulk material handling.

Rollers, Frames and Idlers
Oreflow offers fully-supported solutions with its conveyor and belting systems.

The company carries and supplies a range of rollers including trough, return, impact, as well as HDPE (poly) rollers on request.

The range of frames to go with these rollers include trough, transition, training frames for belt tracking, return roller brackets and retractable frames on request.

All frames and rollers are made to Australian specifications and are interchangeable to industry standard, originally set by Prok.

Along with delivering conventional steel idlers and idler frames (inline, offset, impact), Oreflow can also customise idlers for specific environments.

Example of these include the provision of extreme duty urethane sleeved idlers.

Since 2012, Oreflow has dealt directly with one factory in China to successfully deliver for all projects.

Oreflow's Australian workshop also has a well-stocked inventory of ready-to-go items, with the capability to ordered in or locally source through backup suppliers.

Conveyor Belting
Oreflow also sources its high-quality conveyor belting direct from one factory, which it has built up a great working relationship over the past five years.

The flow-on benefits to customers including faster lead times, with belting being manufactured and ready to be shipped in under two weeks from receipt of order.

Backup suppliers are also on-hand locally for emergency or much faster lead times.

Pulleys
Oreflow performs all aspects of pulley design, pulley manufacture, pulley repairs and refurbishments – within Australia.

Whether customers require head, tail, take-up or refurbished pulleys, including pulley lagging (cold bonded, hot vulcanised, diamond groove, to name just a few options), all are manufactured to the very best quality and exactly to spec.

Oreflow collaborates with customers to deliver fit-for-purpose materials handling solutions.

All aspects of conveyor design, manufacture and installation are included in the service by qualified installation and service personnel.

Replacement Parts
Oreflow saves customers time and energy by allowing them to source all replacement parts from one place.

With its large stock of idlers, frames and spillage control equipment always on-hand and in-stock, customers can obtain industry standard spare parts via walk-ins and pick-ups from its Welshpool warehouse in Perth, WA.

Walk-in stock include replacement rollers, belt scrapers, conveyor and feeder frames and brackets, rubber lining cold bonding adhesives.

Order and pick up items include: conveyor rollers and frames, new pulleys, pulley refurbishments, dust containment, belt tracking frames, scrapers ploughs and impact beds, as well as air cannons.

Brelko – Spillage Control
Oreflow is the Australian master distributor of Brelko conveyor products for spillage control, offering a premium range of belt scrapers and skirting systems.

Oreflow founder and technical expert Mel King says Brelko has been part of the company's business for 20 years, supplying customers with high quality products, backed by extensive research and development.

Oreflow delivers Brelko skirting, belt cleaners and impact beds right around Australia, Asia and Africa, servicing the mining industry in a whole range of commodities including iron ore, alumina, lithium, gold, copper, quarries and concrete batching plants, to name just a few applications.

As heavy-duty as they are, Brelko rubber skirting is currently being used by a large Australian company to stop spillage from their railway ballast track machines.

Belt Scrapers - E905 and E205
The E905 is a new head pulley belt scraper, ideal for wet and sticky materials and suitable for all types of conveyor belts and metal fastener systems.

Adjustable Brelko torsion twist tensioners allow the scraper to maintain a constant pressure on the belt while allowing it to deflect away from any obstruction, a significant safety feature.

Specially formulated polymeric blades maximise the life of the scraper while keeping the potential risk of damage to belt repairs, splices and metal fasteners to a minimum.
A V-base blade mounting makes blade changing quick and simple while a streamlined scraper construction prevents material build-up.

The E205 secondary belt scraper is the universal choice for all normal cleaning applications, bar direct mounting onto the pulley head.

This scraper is used in conjunction with torsion arm mountings to accommodate different belt thicknesses and excessive belt movement

Keyskirts – Sizes 2 and 3
Brelko offers different keyskirt sizes to accommodate different types of spillings.

The Keyskirt size 2 provides an effective chute sealing system designed to control spillage at conveyor load areas and is suitable for all belt conveyors carrying material with a particle size of less then 75mm.

The patented mounting track system results in simple installation and skirt rubber replacement while self-cleaning grooves trap spillage allowing it to be carried away by the belt.

The Keyskirt Size 3 is designed to cope with spillage of large lump material larger than 150mm.

Features include a robust and abrasion-resistant polyurethane sealing strip and a mounting system for easy strip replacement.

About Oreflow
Oreflow designs, manufactures and supplies quality mineral process equipment to Australia and abroad.

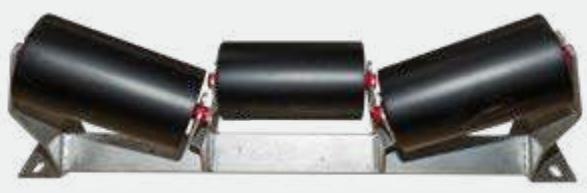
In 2000, founder Mel King and partners formed Minspec, a mining equipment manufacturer.

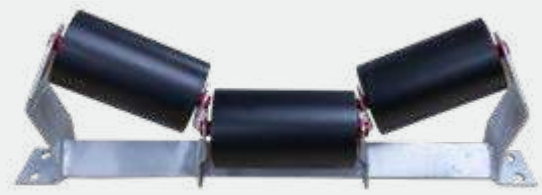
By the mid-2000s, King partnered with Brelko on the engineering of Encaplock and Keyliner dust sealing and chute lining systems.

In 2013, operations expanded to form OreFlow, supplying rubber products, belt conveyor glues and repair supplies.

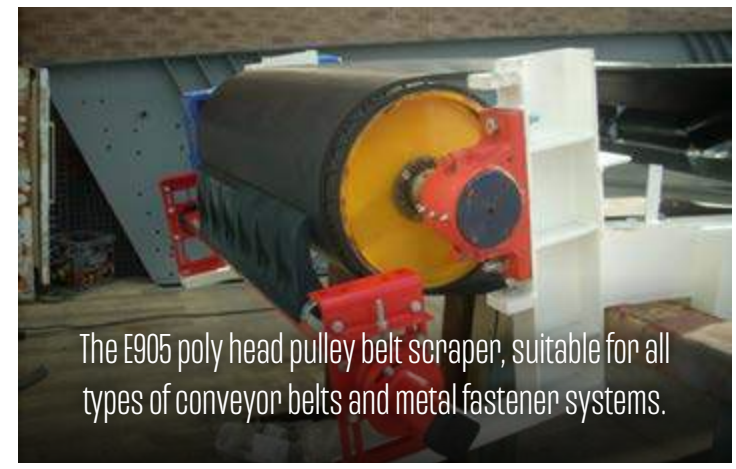
Since then, Oreflow has evolved to service all areas of mineral processing systems and bulk materials handling, from design and installation to maintenance and repair.

With over 30 years mining experience, quality tradesmen and specialists are available seven days a week to support with design, engineering, 3D modelling, equipment and circuit application, including specially-trained Brelko scraper technicians. ***AMR***





Oreflow supplies a range of standard and customised roller and idler frames for a variety of mining applications.

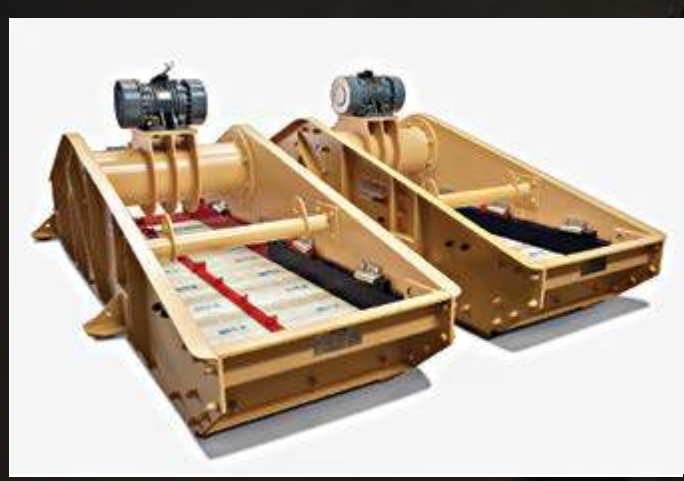


The E905 poly head pulley belt scraper, suitable for all types of conveyor belts and metal fastener systems.









ONE OF AUSTRALIA'S LEADING MINING EQUIPMENT SUPPLIERS

CONVEYING FULLY SUPPORTED SOLUTIONS

Oreflow Australia specialise in designing conveyor and bulk material handling solutions capable of operating effectively in even the harshest processing conditions.

As the Australian distributor for Brelko Conveyor Products, Oreflow supplies conveyor systems, chute and hopper skirting solutions, belt cleaning systems and impact beds to Australia.

We supply quality capital equipment both in Australia and abroad, specialising in bulk materials handling and processing plant design and manufacture. We cover a huge range products from apron feeders, conveyors, vibrating pan feeders and much more.

Our products are designed to be fit for purpose, capable of operating effectively in even the harshest conditions and able to be integrated into new or existing plant.

The Oreflow range includes heavy duty Horizontal Linear Motion Screens (HLMS), excited by under and over Uras out of balance motors and available in single or multiple deck configurations.

Customised operating parameters ensure accurate sizing and high quantity processing of materials ranging from ores and rock to mineral sands.

Our screens are manufactured and fully assembled in Western Australia and are widely used in Australia and around the world due to their ease of installation, low maintenance requirements and exceptional performance.

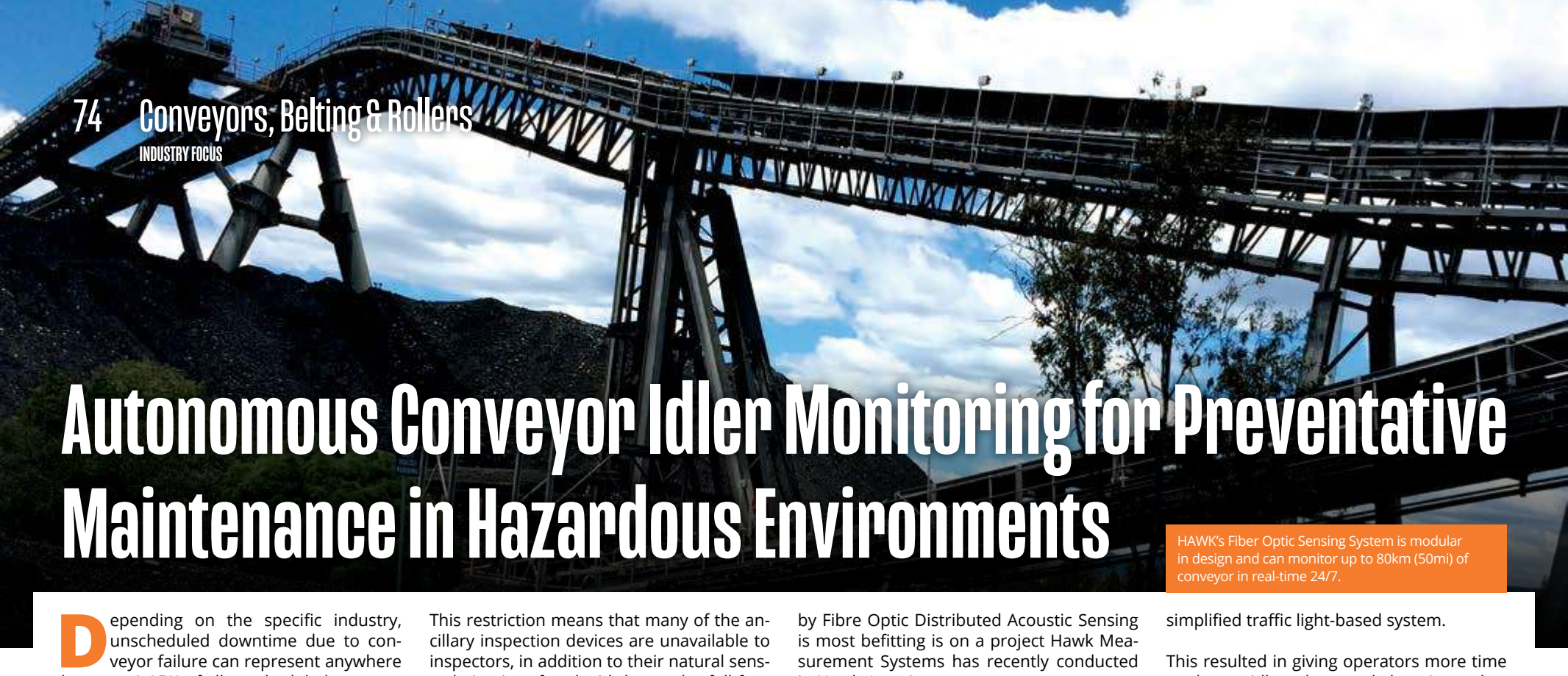
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BRELKO® CONVEYOR PRODUCTS

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Autonomous Conveyor Idler Monitoring for Preventative Maintenance in Hazardous Environments

HAWK's Fiber Optic Sensing System is modular in design and can monitor up to 80km (50mi) of conveyor in real-time 24/7.

Depending on the specific industry, unscheduled downtime due to conveyor failure can represent anywhere between 8-25% of all unscheduled non-productive hours in a bulk handling process.

Most of these conveyor failures are the fault of tracking or idler failure.

Depending on the nature of the plant, an unmonitored conveyor can easily be the difference between long term success and failure of an operation.

Current processes involve inspections manually conducted by "walking the belt" and using an operator's eyes and ears to look for noticeable faults.

This process is an industry wide standard and even enshrined in legislation in some parts of the world, requiring staff with statutory functions to make these inspections to a given schedule.

This process can be further improved using handheld monitoring devices such as infra-red cameras (Thermography), vibration analysers and other recording devices such as cameras and microphones.

These ancillary devices increase the quality of inspection monitoring of idlers, but there are still two main factors working against this methodology and that is the operator themselves and the fact that inspection is periodic rather than continuous.

Human inspection by its nature is flawed meaning that the inspection can be no better than the person on the day, operator condition, fatigue, workload, and other biases.

This results in varied measurement responses, additionally since the inspector can only be there periodically and only at one given part of the belt at one time, they are unable to look at the behaviours of failing idlers.

Additionally, some areas of the mine site or minerals processing areas are designated hazardous environments due to the potential build-up of explosive concentrations of flammable dusts or gasses (typically underground belts, tunnels, and some loading facilities).

This restriction means that many of the ancillary inspection devices are unavailable to inspectors, in addition to their natural senses being interfered with by masks, full face respirators and ear protection that may be required.

The hazardous area restrictions and environment amplify the main problems with manual inspection by placing the inspector under greater pressure within his working environment, as well as making the working environment unpleasant enough to incentivise doing the job of inspection as quickly as possible.

The manual measurement of idlers is a task that has a high error rate, is standardised, has a high frequency, is time consuming, and is prone to process adherence problems.

It is an application ripe for automation and with the number of measurement points available is perfect for modern big data solutions.

Unfortunately, the number of point instruments required to be installed, commissioned, integrated, maintained and operated for large linear assets like conveyors has meant that traditional point instruments are generally impractical, uneconomic and the status quo of maintaining manual inspection methodologies has remained a mainstay process worldwide.

Distributed Sensors are a disruptive technology that spread their sensing elements over a wide area.

In the example of fibre optic distributed sensors, they do this over a length of passive fibre optic cable which is installed on the application.

Because of the low loss in fibre, this sensing element can be a fibre that is many kilometres long and is broken up into discreet small areas less than a meter in length, in this way, fibre optic distributed sensing devices can do the work of tens of thousands of point sensors whilst only needing to be installed and commissioned once.

Case Study
A prime example of where idler monitoring by Fibre Optic Distributed Acoustic Sensing is most befitting is on a project Hawk Measurement Systems has recently conducted in North America.

This legacy coal mine transported raw coal downhill from the mine pit to the coal handling preparation plant in the valley below where it was washed prior to being loaded by rail.

Just over half of this belt is run through a tunnel cut straight into the mountain which has only one entrance and exit point along its one-mile length.

Because of the lack of ventilation, the gassy nature of the coal, and confined space surrounding the conveyor, the tunnel has a Hazardous area rating of Class 1 Division 1, meaning that electrical devices placed within this area must be certified to that level.

This applies to both portable handheld devices and to permanently installed instruments.

Additionally, the dust and lack of egress points in this tunnel means that access is restricted for inspection during normal operation.

Subsequently, both the quality and quantity of idler inspections of this belt were in doubt and to increase belt reliability an autonomous solution was sought.

The Solution
In this case Hawk Measurement Systems specified a Praetorian Conveyor Health Monitoring System that utilised Distributed Acoustic Sensing.

This device was mounted in a nearby control and switching room.

A fibre optic cable was laid from this point to the head end of the conveyor at the bottom of the valley and run along both sides of the conveyor (along the stringer).

This provided the client with an autonomous and continuous measuring and monitoring solution for their conveyor, measuring vibrational levels in every idler frame.

Thus, providing an output via SCADA in a simplified traffic light-based system.

This resulted in giving operators more time to change idlers that need changing rather than inspecting the idlers that don't.

Additionally, since the electronic components are not installed within the hazardous area there is no concern for specialized hazardous area certification.

In this way, if the fibre is of suitable construction, it can be installed anywhere the fibre can conceivably be placed and offer monitoring solutions in nearly any environment.

Summary
Two additional distinct advantages become prevalent in a Conveyor Health Monitoring System installation like this once it is up and running.

Firstly, because the idler is being monitored and providing a data point continuously rather than once per inspection this means that trends can be developed from data to compare and contrast signal behaviour over time.

These trend lines form the basis of predicting faults before they occur allowing the introduction of the best practice for conveyor maintenance (preventative maintenance) to be adopted by the site.

Secondly, because the unit provides a "hit list" of idlers that need to be looked at the operator can complete their maintenance tasks more quickly and assess and replace the idlers that need replacing, freeing up their time from inspections.

In summary, utilising a Fibre Optic Distributed Conveyor Health Monitoring System like Praetorian from Hawk Measurements Systems allows the facility to take the personnel already being utilised by the existing inspection routine and upgrade their capacity whilst automating the laborious inspection procedures associated with maintaining current day conveyors.

To learn more, contact Hawk Measurement Systems (HAWK) at **www.hawkfiber.com** or **+61 (0)3 9873 4750**

AMR



HAWK's Praetorian Fiber Optic Sensing System runs along the conveyor to detect when critical parts of the idler and beginning to fail.



HAWK's Fiber Optic Sensing System detects breakages and failures before they actually occur.

About Hawk Measurement Systems

Hawk Measurement Systems (HAWK), a world leader in level, positioning, asset monitoring and flow measurement technology, provides cutting-edge equipment and complete solutions to the mining industry and the global industrial market. HAWK specializes in reliable and continuous level measurement in storage silos, on conveyor belts, clarifiers, crushers and blocked chute detection with the ability to send real-time data to a computer, control room, or smartphone. HAWK has a long history of success in the harshest of environments and applications. HAWK has won several prestigious awards for their breakthrough technologies. Some of these technologies include Acoustic Wave, Ultrasonic, Microwave, Radar, and Fiber Optic Sensing. HAWK designs and develops innovative measurement technology that is extremely reliable and accurate, simple to install, easy to operate and offers maximum efficiency. The mining industry presents unique challenges due to dust, mud, impact, abrasion and build-up of material on sensors and plant, which HAWK has successfully solved for over 30 years. HAWK is committed to providing best-in-class products, services and technologies that will have unsurpassed value for their customers.

HAWK currently has two manufacturing facilities, headquarters in Melbourne, Australia and the USA manufacturing facility in Medina, Ohio.

HAWK

Praetorian

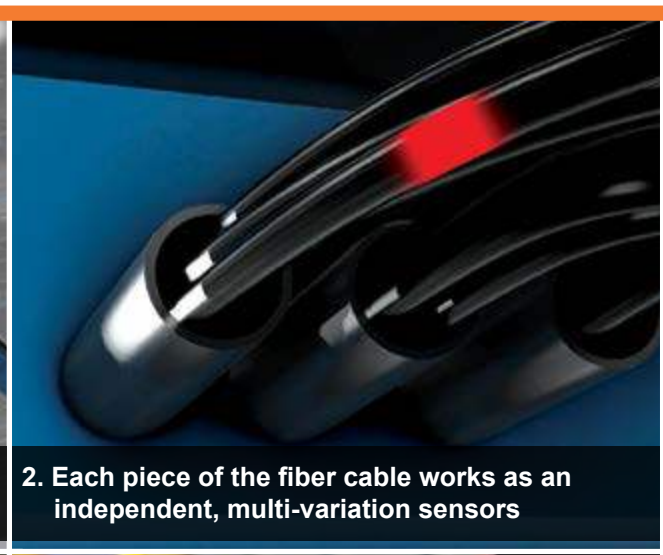
Conveyor Health Monitoring System

Innovative, Multi-functional Predictive Maintenance Methodology to Increase Mine Safety, Productivity & Profitability

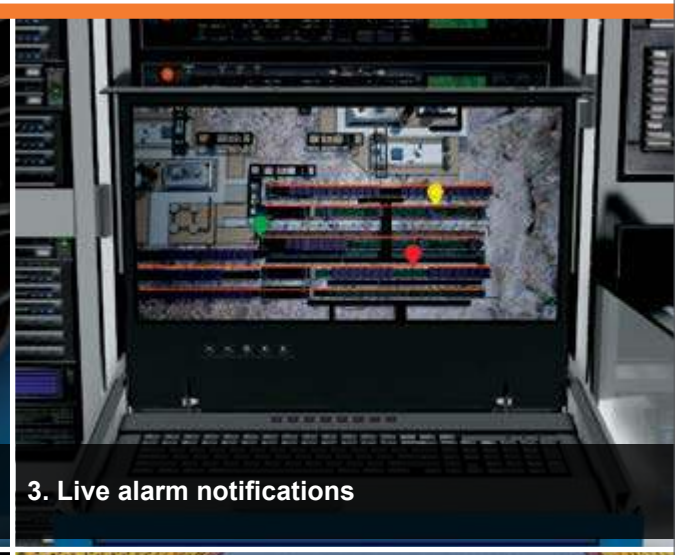
Instant Deteriorating Fault Alerts | Proactive Damage Prevention | Eliminate Machine Downtime



1. Hardware installed in indoor controlled environment nearby



2. Each piece of the fiber cable works as an independent, multi-variation sensors



3. Live alarm notifications



4. Detects multiple different failure conditions



5. Provides conveyor status, report updates GPS view and alert notifications



6. On the go notification of alarms and reports to any mobile device



7. Moment by moment updates of dynamic conditions across multiple belts



8. Detail down to each line stand showing individual idler set condition and historic trends



9. Heat detection option available for seamless fire safety integration

Our ongoing commitment is to develop & provide **industry leading technology** and **cost effective solutions**

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Solutions for Mining and Exploration Geologists

Getting to the Core of the Matter

Handle and Store Drilling Assays with Confidence

Are you looking for the very best core sample handling system for your drilling and assaying needs?

Look no further than Adept Conveyor Technologies – a leader in the field of core sample tray conveyors, roller racks and benches, as well as drill core handling systems.

The company designs and manufactures roller core tray racks, industrial roller racks, mobile storage shelving units, bench arrays and a range of roller racking system solutions at the best price and in the shortest lead time.

Core Tray Benches for Mining and Geo-Physics

As a supplier with extensive field experience, Adept Conveyor Technologies services all your exploration and analysis operations at remote sites anywhere around the country.

The team are specialists in static and gravity conveying equipment that assist in the manual handling of core trays.

Drilling samples can be placed on these core sample roller tray racks for assaying, analysis and storage in line with current regulations.

Everything is catered for – from the smallest single conveyor section to replacement parts and accessories to complete integrated project systems.

The designed and fabricated conveyor and rack systems are made of mild steel and fully galvanised, with stainless steel options.

Occupational Health and Safety

Adept Conveyor Technologies' mobile roller conveyor racks deliver optimum workflow, efficiency and ergonomics effectively and reliably.

There is no lifting work required by core tray operators as the modular and mobile steel roller racks, which are on wheels, can be detached and moved to make other configurations.

The team at Adept can assist in the mitigation of occupational health and safety issues by providing proper hardware solutions in the manual handling of materials handling.

Static and Gravity Systems for Core Sample Handling

Static and gravity systems offer low inertia and free movement of core sample trays throughout the sampling area with ease of operation for all manual handling staff.

Most equipment requires no external power source to operate, providing the most economical options in system design and start-up costs. The cost of ownership is incredibly low, with the equipment being virtually maintenance-free.

Adept specialises solely in core shed design, using standard stock roller racking parts, and has designed many systems that can meet your exact requirements.

A wide range of gravity roller table conveyors are available to suit any core shed application.

Cost Savings

Involving Adept in the planning and design stages can lead to a reduction in power costs during operations.

Key markets that Adept Conveyor Technologies supply include the mining, materials handling, warehousing, supply chain logistics and manufacturing industries.

Adept has more than 40 years' experience designing and building large, complex conveying systems for major clients in line with advancements in conveying technology.

Let Adept Conveyor Technologies maximise your return on investment with intelligent, benchmark quality solutions for all heavy industry fit-outs.

Flexible, Quality Solutions

With decades of creating solutions and designing hardware solutions for clients, Adept offers the ability to purchase direct from the manufacturer with full in-house design and engineering expertise, cutting out resellers with limited product and engineering application knowledge.

All parts are manufactured in Australia to quality benchmark standards and all systems are installed and commissioned right around Australia.

Adept has a comprehensive range of products relating to core sample tray conveyor benches. ***AMR***

Need more information? Contact Adept Conveyor Technologies now (details in the advertisement next page).



Adept is a leader in the field of core sample tray handling, delivering optimum workflow, efficiency and ergonomics effectively and reliably.



Drilling and assaying samples can be placed on these core sample roller tray racks for assaying, analysis and storage in line with current regulations.

Cost of ownership is incredibly low, with the equipment being virtually maintenance-free.

One word...

adept







For the very best core sample handling systems in all exploration and analysis operations.

- Core sample tray conveyors
- Core tray roller racks
- Core roller benches
- Drill core handling systems
- Static and gravity conveying equipment

Adept Conveyor Technologies is a leader in the field of core sample tray handling, delivering optimum workflow, efficiency and ergonomics effectively and reliably.

- Australian design and manufacture
- Leaders in materials handling systems
- Specialist core sample handling systems
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- Broad product range
- Low cost – deal direct with the manufacturer
- Short delivery times
- Special requests to suit customer applications

adept conveyor technologies

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Under the Weather

Weatherzone's total lightning system in action showing where the thunderstorms are and have taken place.

Weatherzone, a DTN company, is keeping Australian mining operations safe from the storm with their purpose-built weather and alerting solutions; the only services specifically created for the mineral resources sector.

Founded in 1998, the country's largest private weather service has innovated to meet the needs of several critical global industries, including energy, construction, renewables, insurance and the mining sector.

With years of dedicated consultation and innovation in the Mining sector, we have created a suite of services which aims to answer weather risk questions faced by mining operations across the country on a day-to-day basis. From mitigating the risk of thunderstorms and lightning to limiting the exposure of hazardous gasses caused by blasting.

Weatherzone Mining; a solution expertly designed to help operators assess and accommodate weather risk, optimise their site operations, and reduce incidents of damage to assets and staff.

Currently deployed across 400 mine sites across the world, Weatherzone Mining delivers site specific weather and environmental forecasts and severe weather alerting in real-time, helping operators stay several steps ahead of risk.

Struck by Lightning

Among the company's expansive support systems is the Weatherzone Total Lightning Detection Network (WZTLN); Australia's only total lightning network.

With lightning responsible for up to 40 per cent of power outages and striking around 550 times an hour, the network has been hailed as welcome tech for operators determined to prevent lightning-related deaths, injuries, and damages.

The WZTLN was built in Australia and is the only system capable of dangerous thunderstorm alerts and capturing all lightning, enabling better visibility and situational awareness.

The ground-breaking technology means operators can work much more efficiently and safely than by using the usual thunderstorm warnings, can track where the storm is headed and can detect heavy rainfall missed by the existing network of weather radars.

Having a Blast

While the WZTLN is one of the world's best methods for lightning detection, Weatherzone's Blast Modelling system has also hit the mark for delivering accurate and concise information on every planned blast.

Operators can determine the ideal blast window by running simulations, estimate the extent of blast pollutants and manage or mitigate fumes with a specialized tool.

The system uses EPA approved modelling and makes use of high precision site-specific forecasts and integrated environmental observations to deliver a complete picture of every site.

Remaining ahead of the curve, the system boasts advanced automated report generation which transforms forecast information, weather station and monitor data into clean and informative reports.

Operators can easily justify a decision to blast with fully auditable report trails, which also support licensing and legislative requirements.

Opticast

Developed by Weatherzone more than 10 years ago, high-precision forecast system Opticast is still recognised in the market as an industry-leading platform.

Optimised for both "realtime nowcasting" as well as up to 15 days, Opticast has been independently verified to outperform similar systems in temperature, humidity, wind speed and direction, cloud cover and rainfall.

Forecasts are updated hourly based on real-time observations and guidance from a suite of Numerical Weather Prediction models.

Accurate and fast learning, the system boasts almost 500,000 forecast points across the country, allowing it to adapt quickly to local conditions and adjust estimates accordingly.

Weatherzone's Opticast is considered the most trustworthy system of its kind in Australia. While it is sensitive to small weather changes, it is especially powerful in rapidly changing conditions through use of proprietary algorithms and Artificial Intelligence.

Oracle

Complimenting Opticast's reputable forecast system is the Oracle, developed by Weatherzone and Solcast.

The product is a satellite-derived gridded nowcasting system that forecasts fields at a 1-2km resolution and updates every 5 minutes, as it takes observations of satellite data and adapts forecasts.

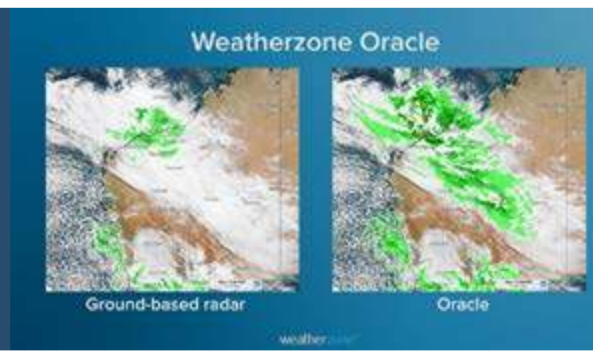
Oracle can be used in a "nowcast" mode, providing detail of rainfall, anywhere in the country outside of weather radar coverage. But, Oracle delivers more than this and accurately predicts temperature, wind, rain, cloud and lightning up to three hours in advance, leaving operators with plenty of time to prepare or adapt to unforeseen weather events.

With Australia regularly facing harsh seasonal temperatures, Oracle has become the answer to helping industry manage electricity demand during severe summer heatwaves or frosty winter periods.

Oracle has also been proven to help operators manage key infrastructure like transmission lines, which are often affected by extreme heat. ***AMR***



Oracle showing the precipitation and lightning - where the most severe storm is happening.



This shows ground based radar v's Oracle. The benefit Oracle offers is a view of precipitation where there is no coverage from the ground-based radar, as well as providing you with more extensive coverage.

Case Study

Following an incident at their site that impacted operations and raised questions about the reliability of their existing service, a major Australian gold mine upgraded to the extensive services offered by Weatherzone Business.

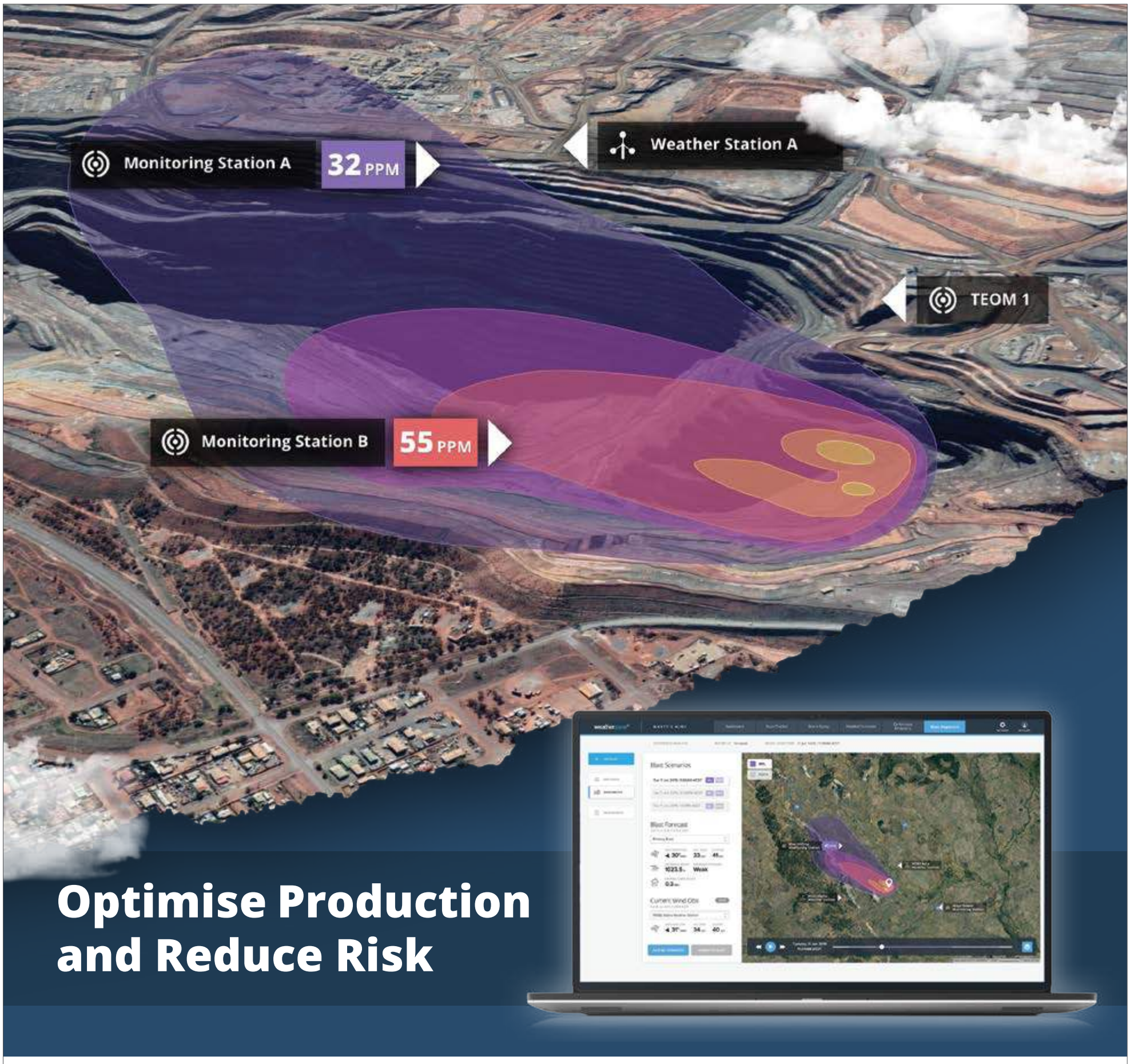
The gold mine was using a single site lightning sensor but, questioning its accuracy, decided to trial Weatherzone's lightning network in tandem to compare their response. It was while trialling the service that thunderstorms moved through the area.

Their original single site sensor triggered several "red alerts" and put the mine into a 2-hour shutdown.

By contrast, Weatherzone's network, which accurately detects adverse weather and lightning strikes as close as 200m, showed that the lightning was greater than 30km away and not within the "red alert" zone.

Post-event analysis proved the single site sensor had been too sensitive, costing money and time.

Weatherzone's alerts were accurate and had the mine been actively incorporating our lightning alerts for their operations that day, the two hours of site shutdown would have been avoided.



Optimise Production and Reduce Risk

Alerting and SMS

Automatic alerts based on site specific variables sent to wherever you are.

Opticast

Industry leading high-precision forecast system, for “realtime” to 15 days.

Total Lightning Network

Australia’s only total lightning network with superior detection and forecasting.

Custom Weather Feeds

We provide developer-friendly XML and JSON web service API options.

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a DTN company



Keeping Mines Cool

Gordon Brothers | engineering peace of mind since 1917.

It is well known that there are a number of safety issues in regards to underground mining in Australia and around the world.

One of the hottest topics associated with this form of mining is the high risk of heat illness which can lead to a loss of productivity, health issues and high worker turnover rates.

Auto compression, strata heat, water, people, explosives, oxidation, compressed air equipment, electric and diesel machinery are all heat load sources in underground mining that can result in operating temperature conditions well above safe working limits.

Often excessive heat load problems can be controlled through various ventilation techniques — but if the heat loads are too high and safe working limits are exceeded, then the only means of maintaining acceptable working temperatures is through correct application of refrigeration.

Most mines in Australia make use of Bulk Air Cooling (BAC) prior to entry of the mine's air intakes.

This method is ideal where most of the air cooled will be utilised and has the advantage of all maintenance activities on the refrigeration system being surface based.

If the mine is very deep, or only a small proportion of the air chilled on the surface is of benefit, then other forms of cooling may be considered.

There are two main refrigeration systems that can provide the refrigeration required by the bulk air coolers; vapour compression systems and absorption systems.

Vapour compression refrigeration systems are the most common refrigeration system for the mining sector offering high COP's (coefficient of performance), flexibility, and versatility; refrigerant vapour is compressed, condensed, expanded, and then evaporated in a continuous cycle.

Absorption refrigeration systems are similar to vapour compression systems except that, instead of a refrigerant passing through a compressor, it passes through a generator, an absorber, and an absorbent pump.

The primary advantage of absorption systems is they can be driven by waste heat or low cost forms of heat, which supply the energy for the internal chemical reactions to take place instead of electrical power.

The waste heat required can be obtained from a variety of sources such as exhaust heat generated from gas and diesel power station exhausts and jacketing, and via the burning of coal seam methane.

Through the installation of bulk air cooling equipment utilising vapour compression and absorption refrigeration systems, it is possible to provide the required cooling to maintain safe working temperatures for employees, maintain or increase production, and take a mine to new depths.

Readers who would like to know more about industrial refrigeration can visit **www.gordonbrothers.com.au**

AMR



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Leaders in Industrial Refrigeration and Mine Cooling Solutions

100 years 1917 - 2017 engineering peace of mind

Our Mine Cooling solutions are custom designed, supplied, installed, commissioned and we can provide ongoing service support by our expert team located across Australia.

With Australia's largest team of engineers, technicians and project managers, Gordon Brothers has the expertise to look after all your cooling needs, from mine cooling to food processing.

To ensure we always have the parts you need, we stock Australia's biggest range of spare parts and lubricants.

DETAILS

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- 12 hard copies of The Australian Mining Review (monthly), including The Australian Oil & Gas Review
- Weekly Mining Report (Carefully researched, real business opportunities)
- Weekly Mines Activity Report (Operational Activity specific to Mine Sites)
- Directory listing on Mine Suppliers Online



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MEET THE KSB GIW® MDX-850



The MDX-850 is the latest and largest addition to the already impressive line of KSB GIW® slurry pumps. Due to mining operators experiencing increased demand for minerals and ore, the need for a mill duty pump larger than the MDX-750 was clear. Capable of pumping service class four slurries upto 16,000m3/hr, this pump will meet your plant design tonnes and maintenance wear life expectations.

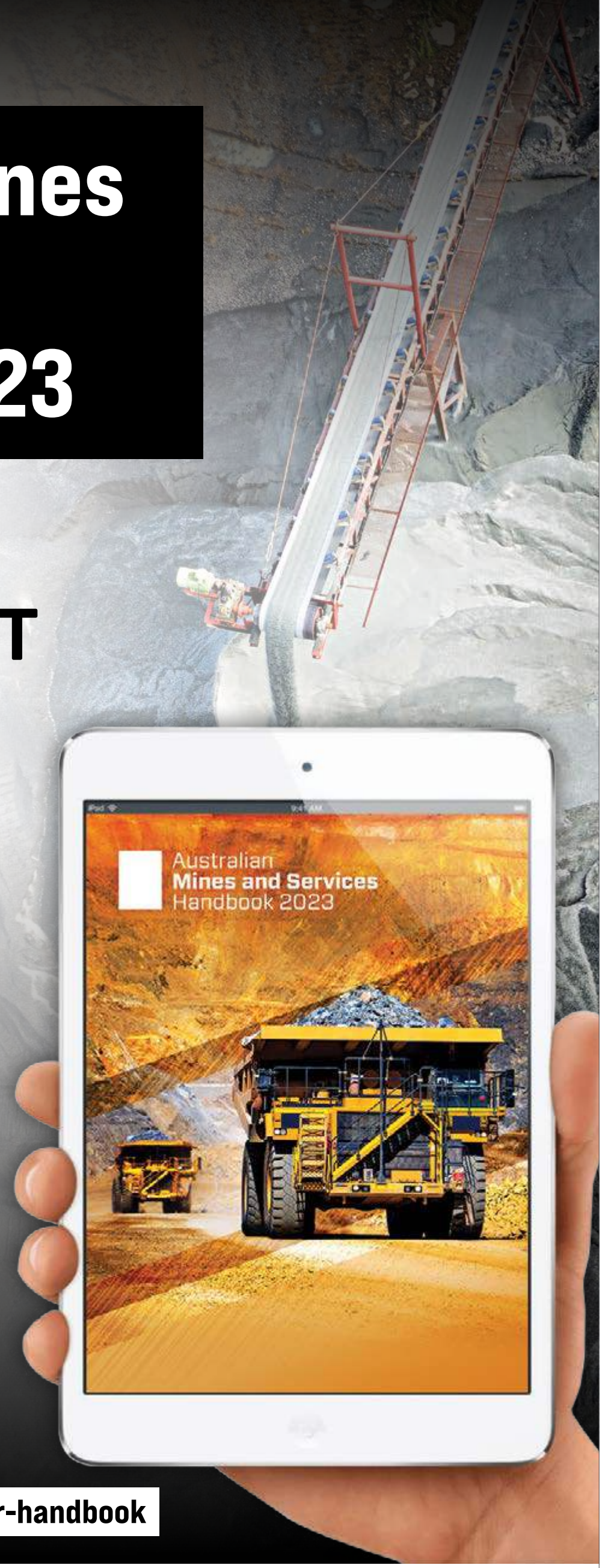
The KSB GIW® MDX is equipped to tackle the most extreme slurry pumping duty conditions. With its patented wearing parts and material technology, the MDX matches operating cycle times with scheduled mill outages meaning fewer disruptions and increased operational efficiency.

Learn more at www.ksb.com.au or speak with a KSB representative 1300 073 887.

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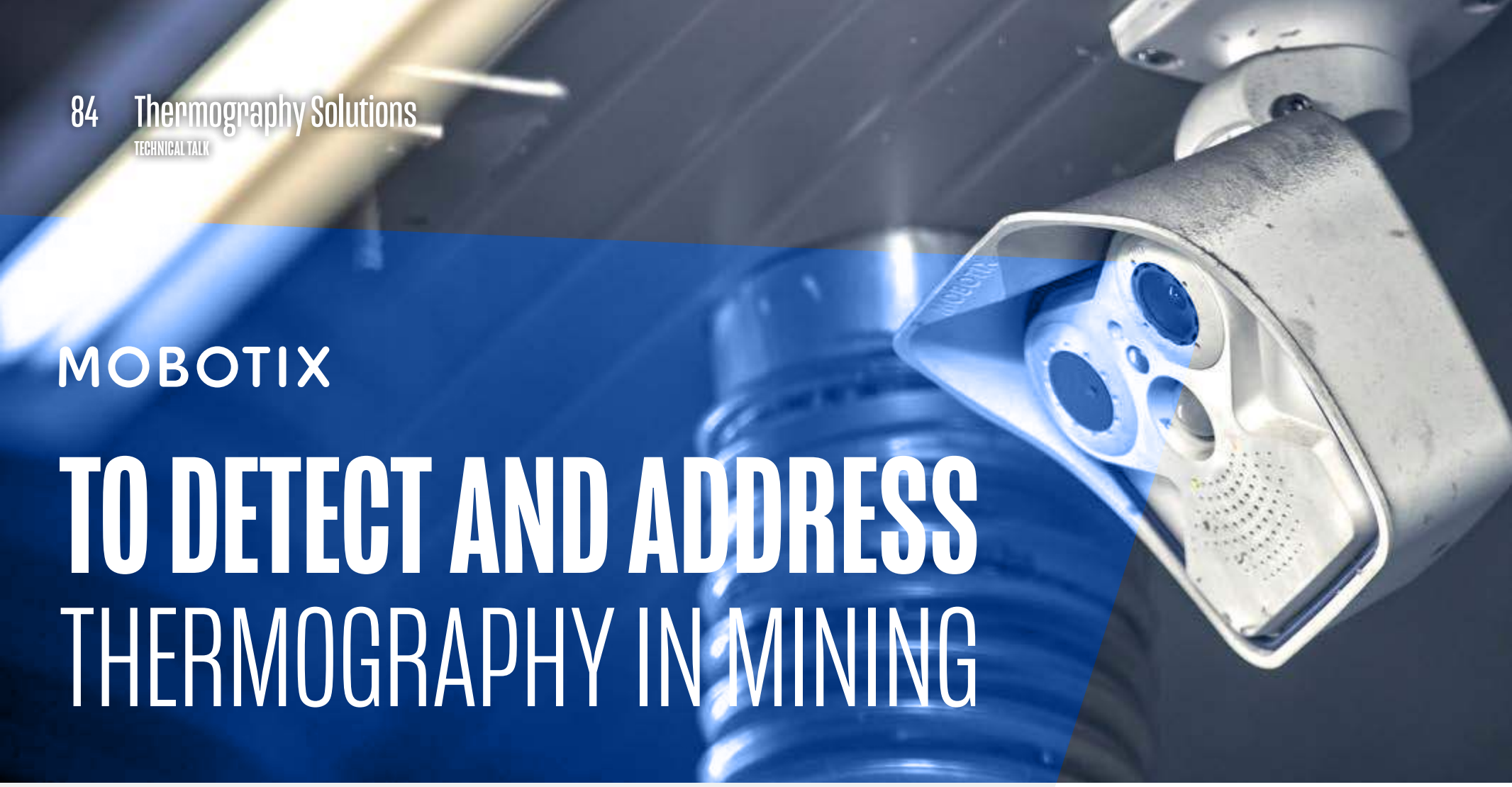


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MOBOTIX

TO DETECT AND ADDRESS THERMOGRAPHY IN MINING

"Our mission statement to go 'Beyond Human Vision' is the heart of a philosophy that recognizes that video surveillance is part of a wider potential with MOBOTIX as a foundational platform for innovative solutions to real world challenges in manufacturing, retail, healthcare, transportation, and many other areas." **- Thomas Lausten, MOBOTIX CEO**

Smart technologies manufacturer MOBOTIX is strengthening the safety of the mining sector with their cutting-edge thermal cameras, a diagnostic tool helping operators identify issues with equipment.

Established in 1999, the Germany-based company is a well-known imaging solutions provider with an office footprint in eight countries and staff trained to service projects across the globe.

The company has earned a strong reputation for its high-quality and multi-purpose cameras that do not have moving parts and consume less power than alternatives.

The highly sought-after products boast a very low breakdown rate and the modular design means operators are able to customize with various lens angles and meet their needs with over 250+ different configuration sets.

Made with a strong polycarbonate, the cameras are rust-free, ideal for harsh environments, solar powered and are designed to work in locations without direct access to mains power.

With global trends towards green energy in mind, the MOBOTIX range is supplied with only minimal amounts of energy, only relevant data is transmitted via the network and they do not need permanent power from external computers or mass storage systems.

MOBOTIX Vice President of Sales for the Asia Pacific Region Ryan Philp said a complete solution from MOBOTIX saves energy and IT resources over many years, making it one of the most attractive and economical systems on the market.

"The durability of MOBOTIX cameras is another financial and ecological benefit," Ryan said.

"Because our cameras often survive multiple generations of devices from other market players, they save material and costs.

"Today, even 15-year-old camera models are still serviced with cybersecure software updates and can be repaired inexpensively, thanks to the intelligent modular design.

"By the way, some MOBOTIX cameras have already been running for about 20 years without needing any replacement parts.

"We are a German manufacturer of smart IP cameras for a vast variety of applications across multiple industries.

"But when it comes to the Australian mining sector, among the most popular are our thermal cameras."

Going Thermal

Ryan said thermal cameras were increasingly considered a vital diagnostic tool in Australian industrial settings and used for protection, warning, asset management and health.

The solutions are a safe and non-destructive method of identifying potential equipment issues, allowing operators to plan maintenance with minimal disruption and test or observe equipment and components in hazardous or inaccessible locations.

By using heat signatures and applying ranges based on environment and application, MOBOTIX Thermal Solutions mitigate overheating, risk of fires, identify elevated temperatures and enable first line defence in both day and night.

Particularly popular is the camera's capacity for fire prevention, due to the product's ability to integrate with third party applications like SCADA, alarms and sprinkler systems.

The cameras are also widely deployed to monitor bearings deterioration on trucks, conveyor belts and similar machines so operators can schedule maintenance, reduce time wastage, and minimise associated costs.

The thermal cameras are typically used for intrusion detection and perimeter monitoring and are especially known to be useful at night or low light environments.

Ryan said the MOBOTIX overlay was a one-stop-shop for distinguishing between false alarms and actual events, identifying and addressing risk, faster reaction times and gaining a secure overview of an area.

"Our cameras also have artificial intelligence," Ryan said.

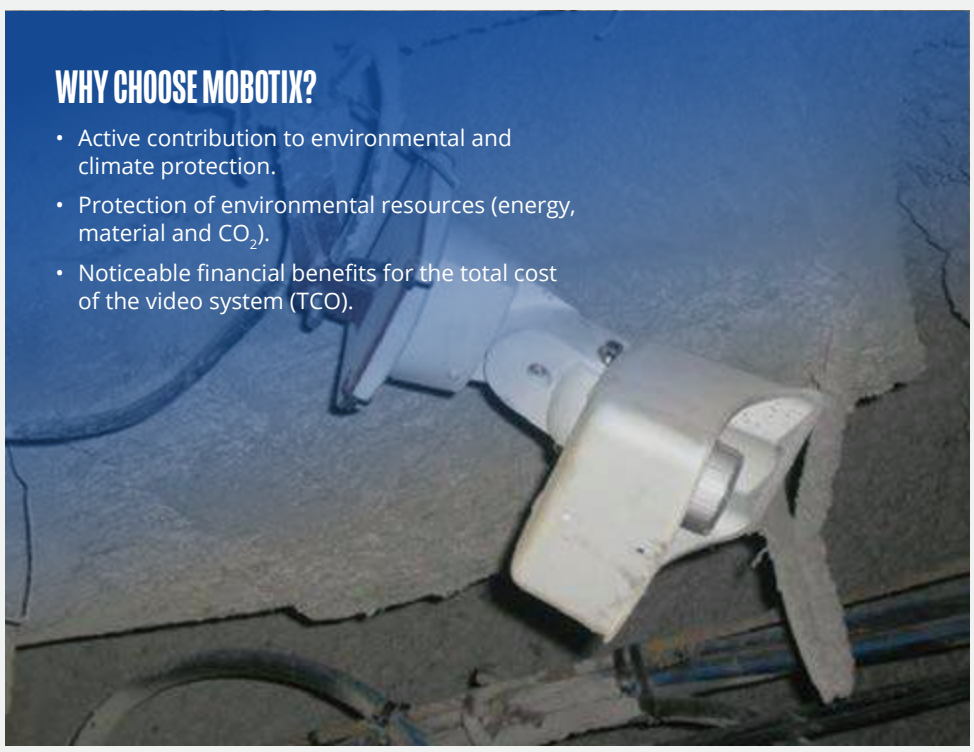
"They're capable of object recognition and generating other helpful data.

"It means false alarms can be reduced or eliminated, which is particularly helpful in environments where wildlife or the heat from engines may trip alarms.

"Our thermal cameras can be used to monitor gas pipes for leaks and enhance staff safety by detecting irregularities in a mine shaft environment.

"MOBOTIX technology has also proven to be useful during the COVID-19 pandemic.

"It can detect overcrowding in an area to help operators maintain social distancing









requirements, it can detect mask wearing and temperature abnormalities in people, that may be indicative of illness."

The Mobotix Way

Considered across the globe as more than just a camera manufacturer, MOBOTIX has positioned itself as a tech solutions specialist centred around a product that essentially acts as a computer with a lens.

It provides uncompromisingly reliable, intelligent technologies that can be expanded without limits and offer long-term investment security.

MOBOTIX's success has followed a slew of innovations in the surveillance technology market, which has transformed the way people design and use cameras.

Breaking hot into the scene, MOBOTIX's first product – an IP camera with recording and DVR management technology built-in - was considered a showstopper.

Ryan said the product was a world first and pioneered decentralized architecture, which meant less reliance on servers. He said this was considered revolutionary for manufacturers and operators, through enabling a high-quality product in environments with poor network capabilities or similar issues.

"It was a world-first," Ryan said.

"It changed the video surveillance industry forever because the camera was completely self-managing and expensive central recording systems were, for the first time, no longer required.

"The MOBOTIX decentralized system platform uses comparatively little computing power, even in megapixel resolutions, so it is far more cost-effective and easier to scale in size than traditional centralized systems.

"As more cameras are added to the system, you only need to add more storage - no dedicated servers or recording software licenses needed.

"This low-cost, low-maintenance solution saves customers both upfront and over the life of the system.

"Great imaging starts with great technology.

"MOBOTIX has developed a very loyal following of experienced partners with the skills and expertise to deploy innovative projects, meeting unique customer needs.

"Each and every product is carefully constructed using the most advanced optical, electronic, and manufacturing technologies.

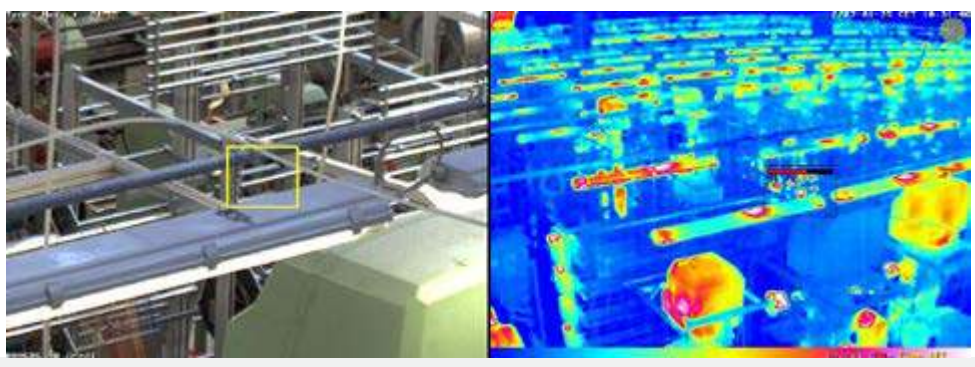
"We use only the highest-quality CMOS sensors and develop image processing software, which enables our cameras to produce exceptionally sharp, clean images."

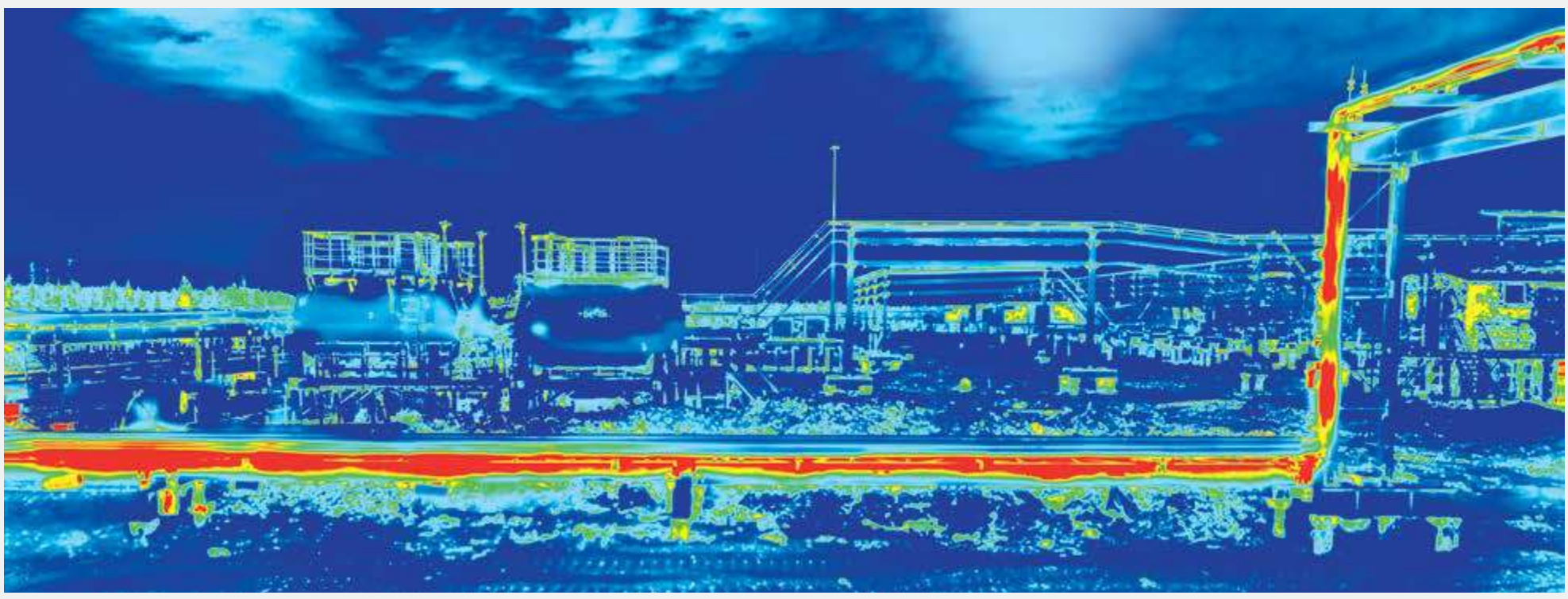
For more information, visit **Unique Quality - Made in Germany (mobotix.com)**

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UNITED WE PUMP

Original Equipment Manufacturer Sterling Pumps has strengthened its offering to the mineral resources sector with the acquisition of a well-established Australian pump maker.

The recent takeover saw Sterling welcome into its portfolio United Pumps Australia (UPA), another Original Equipment Manufacturer based in Victoria.

Founded in 1984, UPA has earned a solid reputation amongst industry for its impressive development and supply of pumps for Australian and international specialized oil and gas projects.

Sterling Pumps Managing Director Anton Merry said the company had hit the ground running to deliver a specialised range of products and services for industry operators.

"The acquisition was a positive move for both Sterling and United Pumps Australia," Mr Merry said.

"UPA will now contribute to an extensive product portfolio of reliable and high-quality pumps for both the water and oil/gas segments.

"It also brings us extensive technical and manufacturing capabilities, a large pump test facility and enhanced market knowledge.

"Both companies will continue to operate production facilities in Pakenham and Sunshine, with each plant having comprehensive testing capabilities and industry leading people.

"This capacity will allow UPA to continue to focus on the specialised oil and gas markets while Sterling Pumps continues its expansion into the water focused rural/irrigation, fire protection and mining markets."

THE DYNAMIC DUO

The combined power of Sterling and United Pumps Australia has already given the pump makers an increased competitive edge off the back of improved process efficiencies, engineering design expertise and greater manufacturing resources.

Sales and Contracts Manager Ron Astall said their strong local knowledge and experiencemade them the partner of choice for Australian industry operators and put them a cut above imported products.

He said the partnership had also laid the foundation for a fresh wave of innovation between the two companies.

"We have found the synergy between some of our oil and gas designs can be adapted to the wider market," Mr Astall said.

"Additionally, we have heritage designs that can be sold into the wider application market that Sterling serves.

"Also the distributor network of Sterling Pumps has opened up greater opportunities for UPA in the mining sector.

"Particularly within UPA's engineering department, we have sophisticated engineering capabilities and techniques to utilise products for specific applications and customer requirements."

MINING, OIL AND GAS – A PUMP FOR EVERY APPLICATION

While Sterling Pumps product and service portfolio stretches across a broad range of industries, the company is particularly strong on mining solutions.

The Victorian company has been repeatedly engaged by some of the world's leading mining companies to deliver pump solutions for critical projects in Australia and overseas.

This includes line shaft turbine pumps, submersible pumps and motors, split case pumps and multistage pumps to dewater open cut pits, below ground shafts, and supply water for ore processing, firefighting and mining communities.

Mr Merry said Sterling Pumps had expertise and capabilities up to and over 2,500 m3/h, allowing the team to offer the best solution from an extensive range of standard cast iron pumps, fabricated 304SS and 316SS submersible pumps, carbon steel and cast 316SS pumps.

He said for harsher mining duties, Sterling Pumps could also satisfy operator needs with Duplex and Super Duplex stainless steels, Zinc Free Bronze, Nickel Aluminium Bronze, Inconel 625 and Zeron 100.

"Particularly popular are our submersible pumps for deep well operation for water supply to projects," Mr Merry said.

"Also popular are our vertical turbine pumps mounted on pontoons that provide dewatering.

"Moreover, we have done extensive work through the Australian oil and gas sector using a whole range of pumps.

"This stretches from our single stage overhung pumps through to our high end multistage horizontal pumps."

Sterling Pump's service to the oil and gas sector is matched only by United Pumps Australia, which is a specialist manufacturer of API 610 pumps.

Mr Astall said UPA's handpicked team







of experts were especially attuned to the needs of oil and gas operators, including requirements to accommodate high pressures, high temperatures and dangerous settings.

"Our DNA is in oil and gas," Mr Astall said.

"For many applications in this sector, pumps are required to be very strong, rugged and designed for a 35-year lifespan.

"So, we have purposefully designed units that have a long service life and can withstand tough conditions when it comes to applications such as high-pressure jetting, dewatering and pipeline transfer."

INNOVATION AT THE CORE

Sterling and United Pump Australia's comprehensive product offering is underpinned by significant research and development, aimed at keeping the manufacturers ahead of the curve when it comes to market movements.

Currently, the Sterling team is working on new higher efficiency and lower operating temperature submersible motors to reduce power requirements and the impact of corrosive water on motor casings.

The continual product improvements run parallel to the company's custom design offering to meet the sometimes complex and unique requirements of operators.

Mr Astall said the service included ability to engineer new and modern pump solutions into old situations.

"For example, if a client is unable to obtain spare parts for a pump, or the pump is obsolete, we have the ability to "shoehorn" a new design into the existing pipework, mounting, etc," Mr Astall said.

"We have been pioneering the use of composite and ceramic materials in pumps, greatly increasing time between service.

"Should standard products not meet your mine pumping needs, then we can custom design and manufacture a pump set to suit your specific project specifications." ***AMR***

UNITED PUMPS
STERLING PUMPS

ABOUT STERLING & UNITED

Sterling Pumps was established in 2004 to service the irrigation industry.

Its submersible and turbine pumps soon found a place in the mining industry due to their efficiency, robust design and local manufacture and support.

Sterling Pumps now design, manufacture and test a range of submersible and vertical turbine pumps specifically for the mining and oil and gas industries. Its Australian made submersible pumps are widely used in mine dewatering and water supply applications.

The offering extends from 100mm through to 700mm diameter pumps with a range up to 300mm (12") held in stock in 316ss material. The company offers duplex and super duplex variations for harsh water.

The motors are high temperature wound as standard be able to operate in water up to 45°C without de-rating.

Meanwhile, United Pumps Australia started in 1984. It's heritage, however, lies with Harland Engineering Australia, IEL and Indeng, which date back to the early 1960's.

UPA own all the IP, patterns, and records for these brands, which has enabled it to assist with spare parts for older pumps.

UPA's' design, manufacture and test its solutions in Australia. It supplies a range of oil and gas and mining specific high head, end suction and split case pumps.

The company's single stage end suction pumps can achieve differential heads of over 300m with double volute hydraulically balanced designs that ensures smooth operation and long bearing life.

Their double suction between bearings 2 – stage pumps can achieve over 500m in a single lift. All pumps are designed and manufactured in Australia, with spare parts and service based locally.

For more information, visit
https://www.sterlingpumps.com.au
https://www.unitedpumps.com.au



ALL FABRICATION SPECIALISTS

TAILOR-MADE SOLUTIONS!

Brisbane-based metal fabrication business All Fabrication Specialists has built a reputation for high quality, customised products and solutions to suit a range of industries, including the use of remote telemetry systems.

With over 30 years' experience, the proudly Australian owned and operated business leverages specialist design and engineering capability to manufacture bespoke solutions.

Whether designing, manufacturing, repairing or rebuilding, the team has a unique skillset when it comes to fabricating mining and construction equipment.

From dewatering mine pumps, truck fill point standpipes and machinery trailers and dust suppression solutions, designing the right solution for the right application is what they do best.

"It's difficult in the current climate to source supplies as everyone is dealing with the pressure of economic supply chain restrictions.

Fortunately, we have the advantage of a team, which is well trained and has industry experience with many products, to be able to offer a solution for any customer requests without being fixed to one brand or one supplier.



We carry out our own internal programming and network commissioning (when feasible) prior to anything leaving our facility. That way we can offer a level of after sales support that is second to none to ensure our customers are confident their product is always functioning to capacity."

The Right Pump System

When Companies put a call out for custom skid pumps, pontoons, and fill points, one company was ready to respond.

According to All Fabrication Specialists Director, Shane McNeilly, his team are experiencing increased demand from mining operators to design fit-for-purpose solutions for dewatering.

"These requests highlight our industry capability for designing tried and tested products," said McNeilly.

"We can supply or fabricate any water management product or solution for specific site requirements. From pre-designed and certified dewatering pumps, mining pump systems, water cart fill points, to break tanks, sediment tanks and dust suppression solutions.

Skid pumps and pontoons are key solutions the business builds for mine sites, particularly those in remote areas.

The Rise of Telemetry

"When offering our customers solutions, having the ability to supply back to base monitoring of equipment only using off the shelf, well-know and tested brands, goes a long way to customer satisfaction.

To be able to track, monitor and even run your equipment off your smart phone or computer desktop is proving more and more an industry standard. This technology helps with preventative maintenance, asset management and also elevates the requirement for staff to travel to the asset's site or location to monitor an engine or log a calculated flow total of a flow meter.

This can now all be done remotely from a safe environment. When populating monthly reports for management, having the ability to download data from equipment is a valuable tool everyone wants. We are excited to offer this technology with all these advantages and so much more, with the best thing being that we have the ability to do this all in-house with our experienced team."

Flexibility Proves the Winning Formula

All Fabrication Specialists cater for both the small players and the big end of town. Flexibility is key and the business is ahead of the game due to their capability to custom build products.

"If a customer asks us for a different type of discharge pipe work, or they want stairs and handrails or other gear moved around to suit their site, we can do it. However, a lot of other businesses basically supply an off-the-shelf product as that's all they have.

"It's this flexibility that has won us projects because we can custom build gear depending on how big a customer wants to go, or how big their budget is."

Unmatched Solutions

Decades of know-how and manufacturing excellence combined with a leading product range is what separates the best from the







best. The All Fabrication Specialists team continues to apply its skills to offer solutions for custom modifications for mining, commercial or construction equipment.

Its drafting and engineering division provides the necessary expertise to ensure equipment is certified, compliant, and meets strict quality and industry standards.

All Fabrication Specialists are happy to supply full turnkey packages, ready to work or they can use customer supplied equipment and build to suit. They are not restricted to one brand of pump or engine and have good working relationships with most popular OEM which enables All Fabrication to build any combination a customer requires.

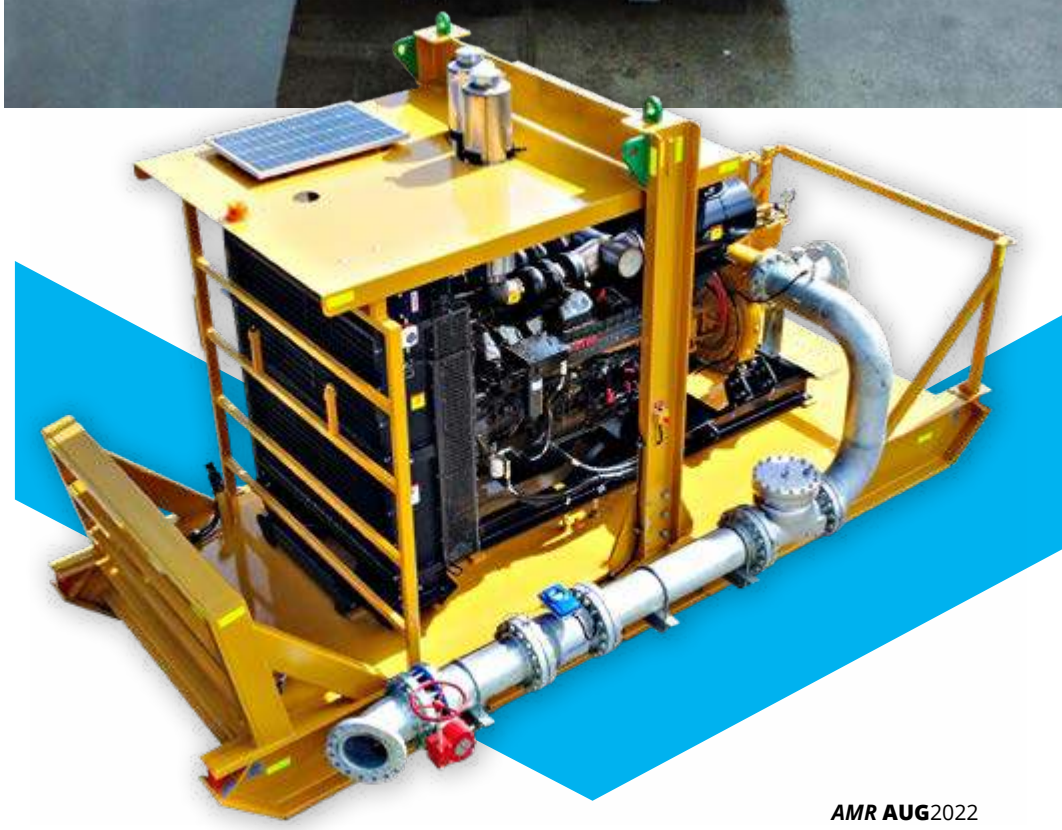
The team can also provide lift in light weight poly version pontoons that carry 2-10 ton to heavy duty mining skid base pontoons which have a carrying capacity from 6 – 20 ton. To complete these pontoons they can supply floating access and walkways from bank to dam.

They offer a certified range of galvanised fill points from 100mm to 400mm with 9m clearance and can design custom-built units to suit any customer's requirements.

The team designs equipment to withstand the harshest conditions and offers a dedicated service and maintenance solutions to help customers achieve the highest levels of safety and minimised downtime. All Fabrication's products are used in mining, gas and oil, construction and utilities in every state.

More information on the company's range of customised metal fabrication products and solutions can be found at https://www.alltrays.com.au/

AMR



2022... WHAT A CRACKER

A huge congratulations to the Resource and Energy Industries for once again coming to the rescue of Australia's economy. We know we've got a trillion dollars in debt but, the current statistics indicate export earnings of $405B in Resource and Energy exports in the year 2021-2022!

To do even better, the statisticians are predicting that this year, 2022-23 will give us around $419B in exports. This is based on high prices and commodity demand but, is still a mighty achievement for the industry. Driving the sharp surge is energy and base metals.

In spite of production disruptions and what looks like fairly ordinary GDP forecasts for the global economies, the Australian mining industry appears to be in a strong position to support the economy. Star performers are iron ore and LNG but copper, gold and even coal (that apparently unpopular fuel) played their part. In fact, Australia is the world's number one exporter of metallurgical coal based on the latest figures.

We can see that the mining industry is what we all depend on in this wonderful country!

SALUTE TO THE INDUSTRY

Australian Pump, who contributed this story, are deeply involved in building special machines just for the mining. Their product range, marketed not just in Australia, but around the world under the Aussie Mine Boss brand, has been a huge success from Kazakhstan to Kenya.

"Working with mining engineers all over the world has been a great privilege for our company", said Aussie Pumps Chief Engineer, John Hales. "The input we get not just from Australian operators, but also from those in what can be a very difficult and often dangerous export locations is inspiring and extremely educational", he said.

The company recently shipped big 6" pumps to South Sudan to help divert the flooding Nile River.

"When that project is over, we know they're probably going to end up in a major mine site in Nigeria", said Hales.

THE AUSSIE PUMP MINING STORY

Aussie Pumps has a huge respect for the mining industry. It's not just because of the wealth produced but the resilience with which the industry deals with the ups and downs. Whether it's weather fluctuations, floods, or price variations in the international markets, mining deals with it.

Australian miners are renowned for high quality production, meeting schedules and are known to be a dedicated and motivated workforce who are highly professional. Many of the international jobs Australian Pump has won has largely through the influence of Australian mining engineers working as expats in Central Asia, South East Asia and Africa.

"Yes, we even have our heavy duty pressure cleaners working in copper mines in Chile, compliments of the Australian influence there", said Hales.

DEVELOPING COUNTRIES OFFER OPPORTUNITIES

"It all started with Japan and their economic propulsion in the beginning of the 1950s, rolling right through until the end of the century. Imagine a little country like that being the number two economic power in the world after the USA. Now of course it's China!", said Hales.

We can't forget it was other countries like Korea, Taiwan, Thailand and even India who benefited from the raw materials we were able to export.

Even today, it's noticeable that Japan is our biggest market for LNG! They take 19% of world production leaving our rivals, Qatar to supply the EU and other international blocs. The reality is that SE Asia has done a brilliant job of value adding, building wealth for their nations and bringing millions of their population out of poverty. It's all based on our ability to produce the raw materials for their industrial growth. It's not just Australia that benefits, it's all of the SE Asian bloc including China.

AUSTRALIAN MADE... WHY CUSTOMERS LIKE IT

Although Australia has been deluged in low cost cheap machinery from third world countries for home consumption, the mining industry has stayed pure. Not because of any particular patriotism. It's because they know that Australian made equipment, built by people who know the application, understand the challenges and realise how important safety and reliability is.

THE MINING IMPERITIVE

With the mining industry's importance, the high cost of operation and the stakes that the big mining companies play for, you would imagine they have to have some appetite for risk. Aussie Pumps know this complex and dynamic industry has very special requirements for suppliers and particularly for machinery manufacturers.

"We're not Caterpillar or Komatsu, but we are highly focused in particular areas of technology and in those areas are on the way to becoming not just Australian leaders, but international players as well", said Hales. The company's philosophy is very simple. The Aussie team believes in listening to the customer, understanding the problem and taking action promptly to improve or develop solutions.

"Helping miners to be more efficient is vital for us. So by coming up with efficiency ideas and with a major preoccupation with safety, we win business from imported products where those requirements are not really understood" said Hales.

Australian Pump know that innovative Australian miners are always looking for ideas that will make their jobs more productive, safer and more efficient.

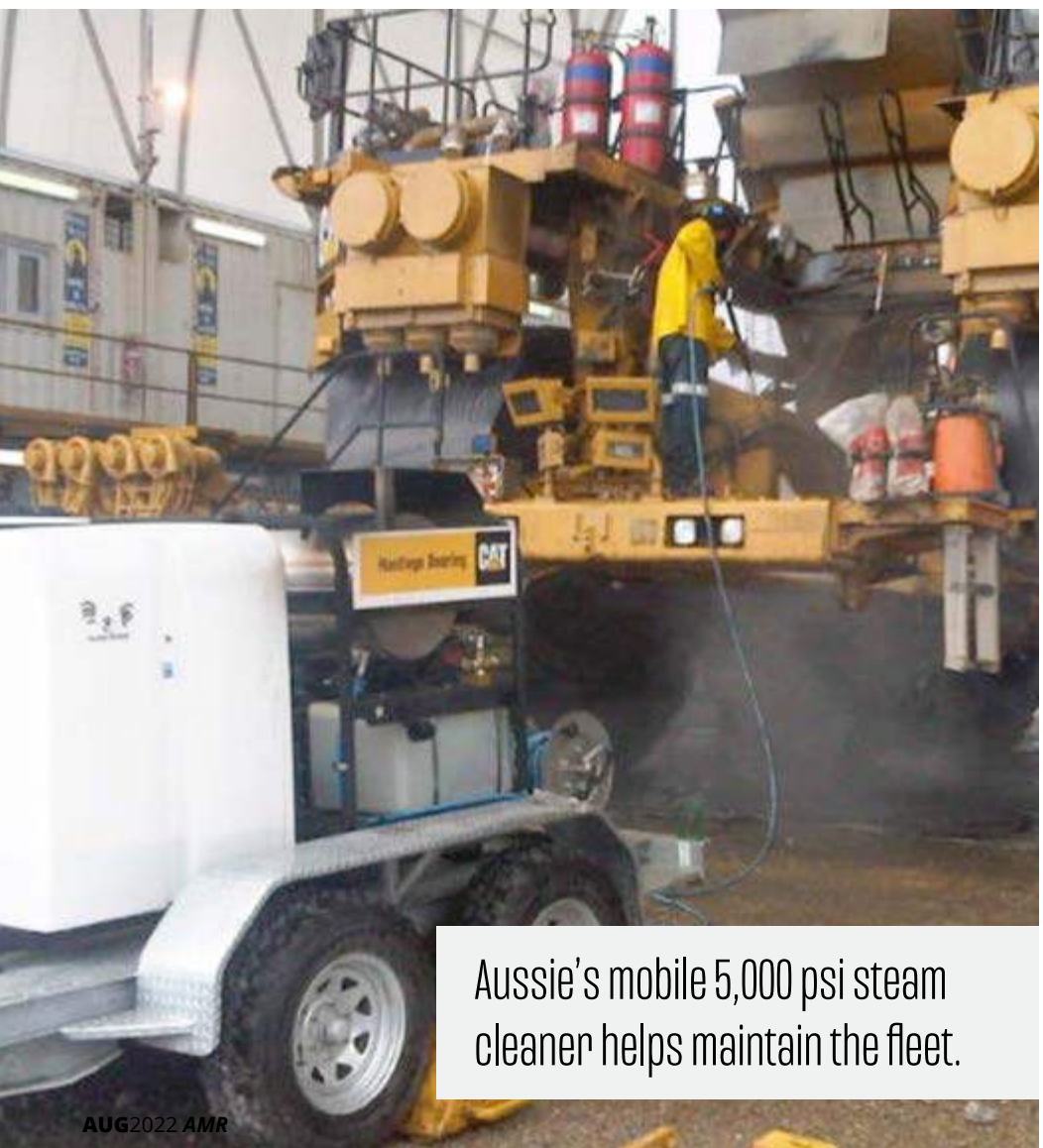
RUGGED DESIGN DOESN'T HAVE TO BE UGLY

When the company first started building the Mine Boss machines, the design brief was simple. The big 3" and 4" trash pumps had to be diesel powered but installed in a frame that was virtually indestructible. That design was designated the Aussie Mine Boss.

"We used 38 mm tube, hot dipped galvanised and built like a tank with an integrated lifting bar", said Hales. "Although the frame that protects the pump is super solid, it's not unattractive. Being functional doesn't mean it has to be ugly", he said.

The super heavy duty pumps, capable of flows up to 6,000 lpm, are designed to handle solids in suspension and be either mobile or portable in the sense they can be moved onsite by an excavator or front end loader, or trailer mounted.

To comply with mine requirements, the company built in emergency stop and lockable battery isolation. They also added a fire extinguisher, knowing that fires



Aussie's mobile 5,000 psi steam cleaner helps maintain the fleet.





Aussie's 3" Mine Boss trash pumps roll off the line at Castle Hill.

Aussie's cast iron 3" tanker pumps is hydraulic drive and built to last.



on mobile plant are becoming more frequent in the industry.

THE MINE BOSS EVOLVES

Those first 3" and 4" heavy duty trash pumps were adopted by the mining industry from the start. Not only did the industry love the strength and performance. They started giving Aussie ideas of what other products they should be making that could be built to the same formula.

The company began with lightweight portable fire pumps, powered by Yanmar air cooled diesel engines, enclosed in Mine Boss style super heavy duty frames. They are equipped with battery isolation, E-stops and the essential fire extinguisher. Fire pumps are now available in sizes up to 4" with performance figures up to 1,000 lpm and pressures up to 100 psi.

Aussie makes single and twin impeller versions, all built from the highest quality materials and only with engines from reputable first world manufacturers.



Aussie Extreme 500 bar hydro blaster is built to work.

MINES COME CLEAN

The next adventure with the development of the Mine Boss range was Hales engineering pressure cleaners that were attractive to look at but, built like the proverbial Mine Boss design concept. They started out with 4,000 psi, driven by a Yanmar 10 hp diesel engine. Those machines, relatively lightweight are now enclosed in a stainless steel frame that is 'sculpted' with virtually no sharps. That made it OH & S friendly, and at the same time, particularly attractive to look at.

"A contractor told us he thought it looked like a cross between a Ferrari and a Bobcat", said Hales.

The sculpted exclusive Scud design was registered and is now used in a wide range of high pressure cleaning models.

They use 'Big Berty', Bertolini, premium heavy duty triplex pumps for pressure cleaning type applications. Bertolini don't just make pressure cleaner pumps, although their range of that product goes up to 10,000 psi. They also make large pumps with flows up to 250 lpm and pressures and high as 150 bar.

Those pumps are used in a wide range of mining applications, as diverse as dust suppression and wash bay installations.

On the base of the Scud designs, the company recognised there were major applications for larger machines and that is where the Aussie 'Extreme' series began. These machines, starting with 5,000 psi, and 25 lpm flow and blossomed into 500 bar (7,300 psi) units with flows as high as 24 litres.

"We use Yanmar diesels, put them in a frame that would be acceptable on any mine site on the planet and built in all the safety gear to match", said Hales.

High pressure accessories, such as stainless steel hose reels, long length hoses, heavy duty turbos and other labour saving gear as well as engine shutdown safety protection kits are all included.

"The mining industry loves them", said Hales.

HOT WATER MINE BOSS

With requests from mines around Australia for portable, diesel drive hot wash machines, the company developed their Aussie Hydrotek range. These machines, powered by Kubota water cooled diesel engines, offer pressures up to 5,000 psi. Trailer mounted, with heavy duty off-road design and hot dipped galvanised finish, they are popular in coal applications. They also go good service in gold mines in Papua New Guinea.

AUSSIE TANKER PUMPS... MINE READY

Another area where Aussie Pumps has become a leader in the field is in pumps for water carts. Aussie found the market needed pumps that wouldn't be susceptible to pressure spikes, could handle vibration from the amount of roadwork they do and at the same time, had drive systems that were ultra-reliable.

"We started building them with Yanmar diesels and chose to use cast iron for these big 3" and 4" self priming models", said Hales.

The Aussie GMP range will handle up to 2,000 lpm and also offer reasonably high pressures to 40 or 50 psi. For tankers involved in dust suppression or simply carting water to remote mine sites, these pumps have many attributes that has been design to suit those applications. They feature big cast iron open style impellers that will pass small solids in suspension. They are optionally available with 316 stainless steel impeller, for use with corrosive liquids.

The pumps self prime! "For us that is an essential as the pumps have to load the tanker from another water source like river, lake or dam", said Hales.

Recently the company has developed hydraulic drive tanker pumps which offer real advantage over engine drive.

Hydraulics provide a closed circuit of power from the PTO pump right through to the water pump on the back of the tanker. That closed circuit is free of contamination! Apart from that, they also don't need to be refuelled, have the oil checked on a daily basis, or any of those other inconveniences for the tanker operator.

Aussie also built in a front mounted clean-out port so the pump can be cleared of chokes without having to disconnect pipework. That is a huge advantage for the operator!

These semi trash pumps have integrated stainless steel wear plates and silicon carbide seals as standard equipment. Viton seals are available for specialist applications where aggressive liquid is being handled or, alternatively diesel is to be pumped!

An added bonus in the Aussie GMP range is that these cast iron pumps can also be offered in nickel aluminium bronze, resistant to seawater and other corrosive liquids, as well as 316 stainless steel. Some of the those stainless steel pumps are already turning up on drill rigs, along with bronze and cast iron versions.

AUSSIE'S FREE SAFETY TRAINING PROGRAM

This company has developed a series of safety training programs that are absolutely free to operators of pressure cleaners and high pressure drain cleaning water jetters. They developed the courses in line with the basic parameters of the Standards Association AS/NZS 4233.1.

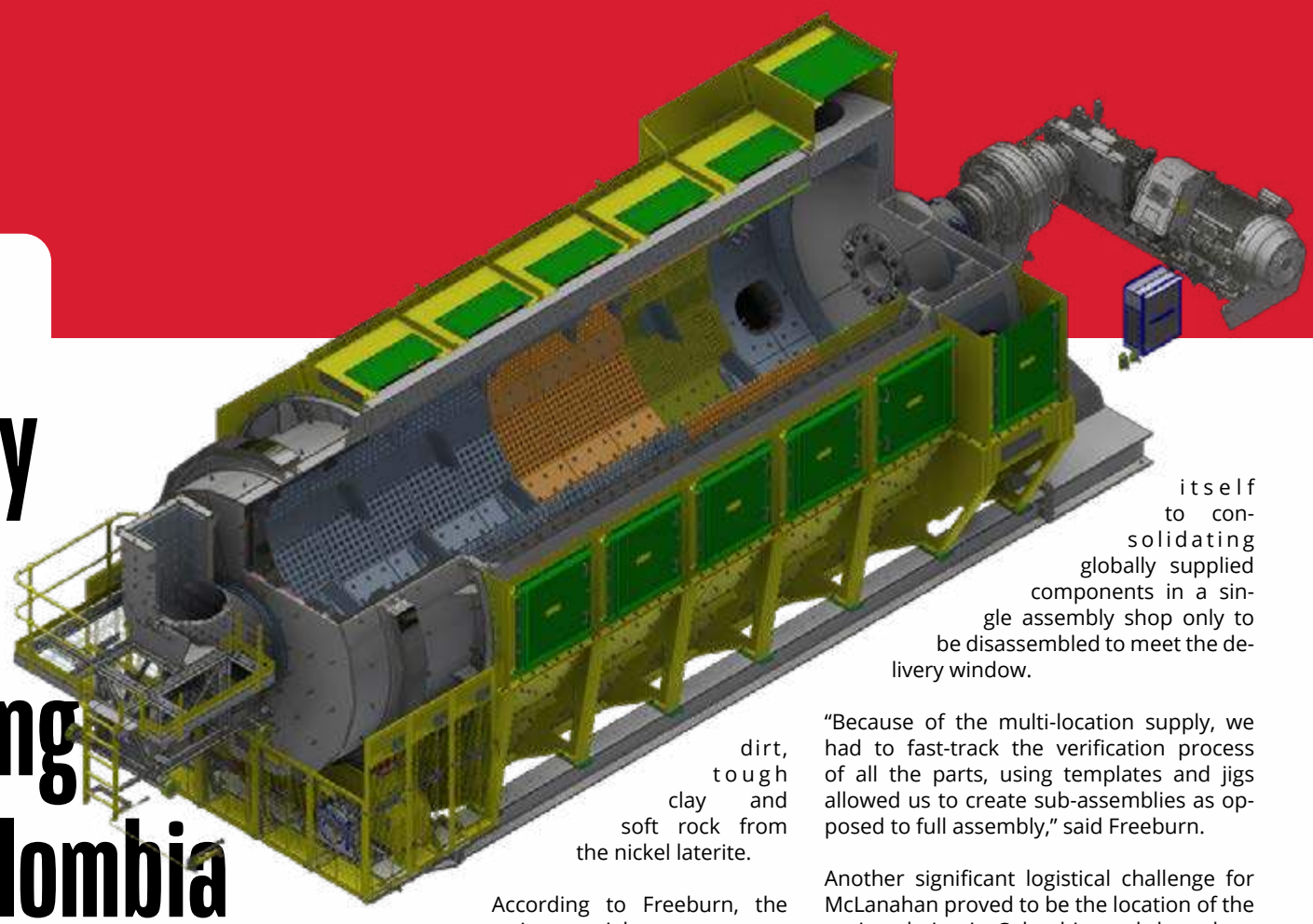
"We want operators to be safe but we know most major mining companies have got their pressure cleaner operators trained and certified to use the equipment they have, for those who don't, we offer this free service", said Hales.

Everything Aussie does is about keeping the customers safe, making them efficient and building machinery which requires minimum maintenance, even in the toughest applications. It's a simple formula but, it's becoming a great Australian success story.

aussiepumps.com.au | *AMR*

McLanahan®

Innovative Rotary Scrubber Helps Elevate Processing Efficiencies In Colombia



When global equipment manufacturer McLanahan was faced with a particularly challenging request to support a Colombian nickel-laterite mine, the company was able to offer a unique solution.

According to McLanahan Mechanical Design Manager, Ben Freeburn, the company was tasked with designing something unique while having to overcome the challenge of distance in a COVID world.

As a leading manufacturer of rotary equipment used by multiple mineral processors worldwide, McLanahan was well positioned to meet the requirements of this demanding project.

"We needed to draw on our experience in rotary equipment, specifically rotary scrubbers, trommels, screens and rotary breakers, to design a bespoke solution, said Freeburn.

"There really wasn't an alternative OEM that could offer such a unique solution as this.

"The tight timeframe and design specifications meant we had to select the best manufacturing locations for each of the main components," said Freeburn.

Fit-for-Purpose Design

Recently delivered and installed in the nickel laterite open-cut mine in Colombia, McLanahan's newly designed piece of equipment is a customised rotary scrubber, nicknamed the 'Rubbler'.

The need for this type of equipment was part of a long-term process improvement project and an upgrade to the customer's current process flow. This new process involves feeding oversized material, that was previously going to the waste stockpile, into the McLanahan Rubbler.

The Rubbler then softly peels off the outer layer of the material to remove additional nickel rich material, which is then fed into the leaching process. This prevents valuable material entering the waste stockpile, saving the customer money.

Scrubbing for Success

The demand for reliable and quality rotary equipment is critical to increasing mineral processing efficiencies. It's about achieving longer life from your equipment and reducing operating costs per tonne of production. This is certainly the case when it comes to maximising the recovery of nickel laterite from the ore.

Scrubbing is a process that removes deleterious materials and coatings from minerals prior to the downstream process. McLanahan's solution utilises material-on-material attrition to separate the valuable product from the deleterious material. This means, removing waste fractions such as dust and dirt, tough clay and soft rock from the nickel laterite.

According to Freeburn, the customer's material recovery rates were fairly low using the previous system they had in place.

"They realised the valuable product was actually on the outer skin of the ore, which was unusual as they didn't actually want to crush and mill the ore to recover the nickel laterite or send it to their leach process. They just wanted the outer coating of the material so they could recover as much of the material as possible," he said.

"It wasn't like scrubbers or wet processing systems where you mine the ore and it's covered in clay and dirt, and then it gets washed. This machine wasn't doing any of that, it was dry processing without any water being introduced."

The McLanahan team had to effectively create a customised machine that was integrated the features of several other machines. This meant configuring the Rubbler from scratch, albeit by using proven technologies. "We worked diligently with the customer's process engineers to ensure our product was customised to their specific application," said Freeburn.

Delivering on a Global Scale

McLanahan was able to manage the difficult process of sourcing the required parts from multiple locations around the world including Brazil, Europe, China and Australia.

The tight delivery envelope necessitated a degree of site assembly. This did not lend itself to consolidating globally supplied components in a single assembly shop only to be disassembled to meet the delivery window.

"Because of the multi-location supply, we had to fast-track the verification process of all the parts, using templates and jigs allowed us to create sub-assemblies as opposed to full assembly," said Freeburn.

Another significant logistical challenge for McLanahan proved to be the location of the project, being in Colombia, and the subsequent impact on transport.

"The design was impacted by delivery requirements, so we had to ensure the components could fit into purpose-built containers with maximum width, height and mass limits," he said.

"We had a 25 tonne limit and a much narrower dimensional envelope for transport. We knew we had to come up with modular sub-assemblies, and ingenuous frames that allowed the customer to use as assembly jigs, ones that featured lift points for transportation in a single orientation, and could then stand up for a four metre barrel.

"Our objective was to deliver a machine that was tunable, configurable on commissioning to either retard the material and have greater operating volume for more efficiency, or lower operating volume for less, depending on tests carried out during commissioning.

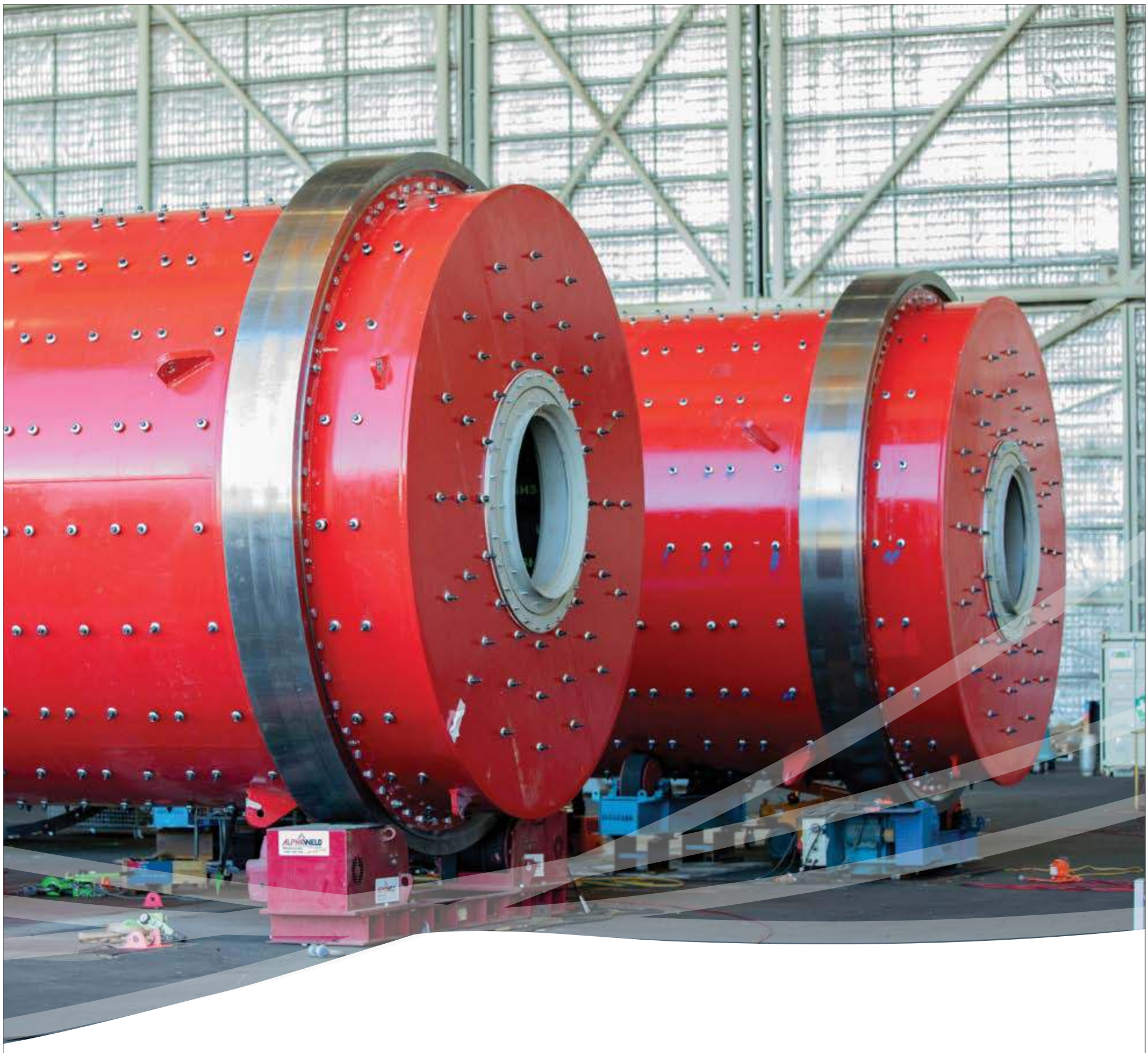
"In the end, the McLanahan designed Rubbler is something truly unique. It was a collaborative effort across our three global operations in Australia (engineering design and project management), Chile (sales and supervision) and America (installation and commissioning services)."

Further information on McLanahan's range of products and solutions for the mineral processing industry is available at **www.mclanahan.com.au** | *AMR*









INDUSTRY LEADERS IN IRON ORE SCRUBBER DESIGN AND OPTIMISATION

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Transform How You Monitor, Track And Manage Your Inventory



Create a safer, more efficient shutdown or major construction event with SFI Australia's Monitor: Logistics Management System. The need to streamline processes and improve operational success on tight budgets and deadlines is becoming the new normal for site shutdowns and major construction projects.

We find ourselves searching for ways we can better monitor and manage our inventory and compliance to create efficiencies, minimise risk, and achieve Zero Downtime. At SFI Australia, we partner to deliver end-to-end solutions for shutdowns and construction projects. That's why we provide SFI's Monitor: Logistics Management System on every site - a turnkey solution that tracks tools, equipment, consumable, and industrial supply usage and compliance.

At SFI, we solve the problem.

Meet Monitor

At SFI Australia we strive to deliver Zero Downtime for shutdowns by offering a full comprehensive supply and logistics service to perform any size shutdown.

Our industry standard Monitor™ tracking software system is an integral part of what we offer.

Monitor ensures compliance and maintenance is carried out proactively, avoiding downtime on shutdowns and major construction events.

Why use Monitor?

In a market where skilled labour is not easy to come by, compliance is critical to the safety and overall success of a project. Site shutdowns, construction projects and maintenance events benefit from recognising the impact, and scope can extend far beyond just maintenance and repair.

Improving shutdowns means having a better understanding of your costs, scheduling, risks, and the level of management you need to execute these projects effectively. With the ability to track tool and equipment location, usage, and compliance, you have greater oversight and commercial control of your project. SFI Australia also strive to ensure zero stock outs on consumable items, de-risking any supply issues – all thanks to Monitor™.

The Benefits of Monitor

Being able to access relevant information via management information systems, such as Monitor™ helps to inform the appropriate managing of activities and identify future improvements. Accessing data allows companies to maintain control of their activities. SFI Australia help implement a full-service monitoring system to make this process as easy and efficient as possible, all as part of our Zero Downtime ethos.

Safety and compliance

Safety compliance and risk management are a major concern for any work site. Your operation during a shutdown or turnaround is very different than normal operating periods. Shutdowns and turnarounds come with numerous risks and challenges for safety with large numbers of contractors working on site. In addition, employees and contractors often carry out many tasks which are not routine and can only be performed during shutdowns.

See the difference with Monitor

By transforming how you monitor, track, and manage your inventory, you achieve a safer, more efficient project, reduce costs and mitigate risk.

SFI partner with companies to facilitate end-to-end shutdown and construction events, ensuring they run seamlessly from tools and equipment through to consumables and staffing, all made easier and giving you not only supply security but greater commercial control.

Real-time reporting and analytics

Our Monitor™ software gives you flexibility and real-time access to Smart Analytics. This helps guide efficient stock decision making, tracking usage of consumables, providing easier management of inventory levels and top up requests, therefore reducing costs.

Monitor tracks compliance and indicates when and which tools and equipment needs to undergo a compliance check to ensure the item is safe to use and fit for purpose. This compliance is aided by Monitor's ability to identify tools and equipment on site that require test and tag, calibration, and servicing.

Achieve Zero Downtime with SFI

In partnering with SFI Australia, we give you access to our expertise, equipment, tools, and consumables, including Monitor software to make managing the shutdown as simple as possible, giving you peace of mind and security of supply.

SFI Australia are industry leaders with the capacity and know how to get stuff done, having worked with companies such as Chevron, BHP, AGL, UGL Downer, and Bechtel to deliver Zero Downtime and provide them with tailored shutdown and turnaround solutions, so that they can get back to business sooner, all by utilising our Monitor System.

If you would like any more information or would like to discuss your next shutdown – don't hesitate to reach out on **1800 734 000**

Head over to **sfiaust.com.au** to download the Monitor Logistics Management Resource Guide. ***AMR***

bit.ly/SFI_Monitor_Guide



Monitor offers several key benefits including:

- Ensure cost certainty on tools, equipment, and industrial supplies
- De-risk your supply chain with supply validation and local and strategic reach
- Ensure safety and compliance with tracking and tracing capabilities
- Achieve sustainability through a circular economy structure with asset buyback and guaranteed supply

Download our Resource Guide
bit.ly/SFI_Monitor_Guide

https://www.youtube.com/watch?v=T00lRck7CPw

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FITNESS FOR SERVICE

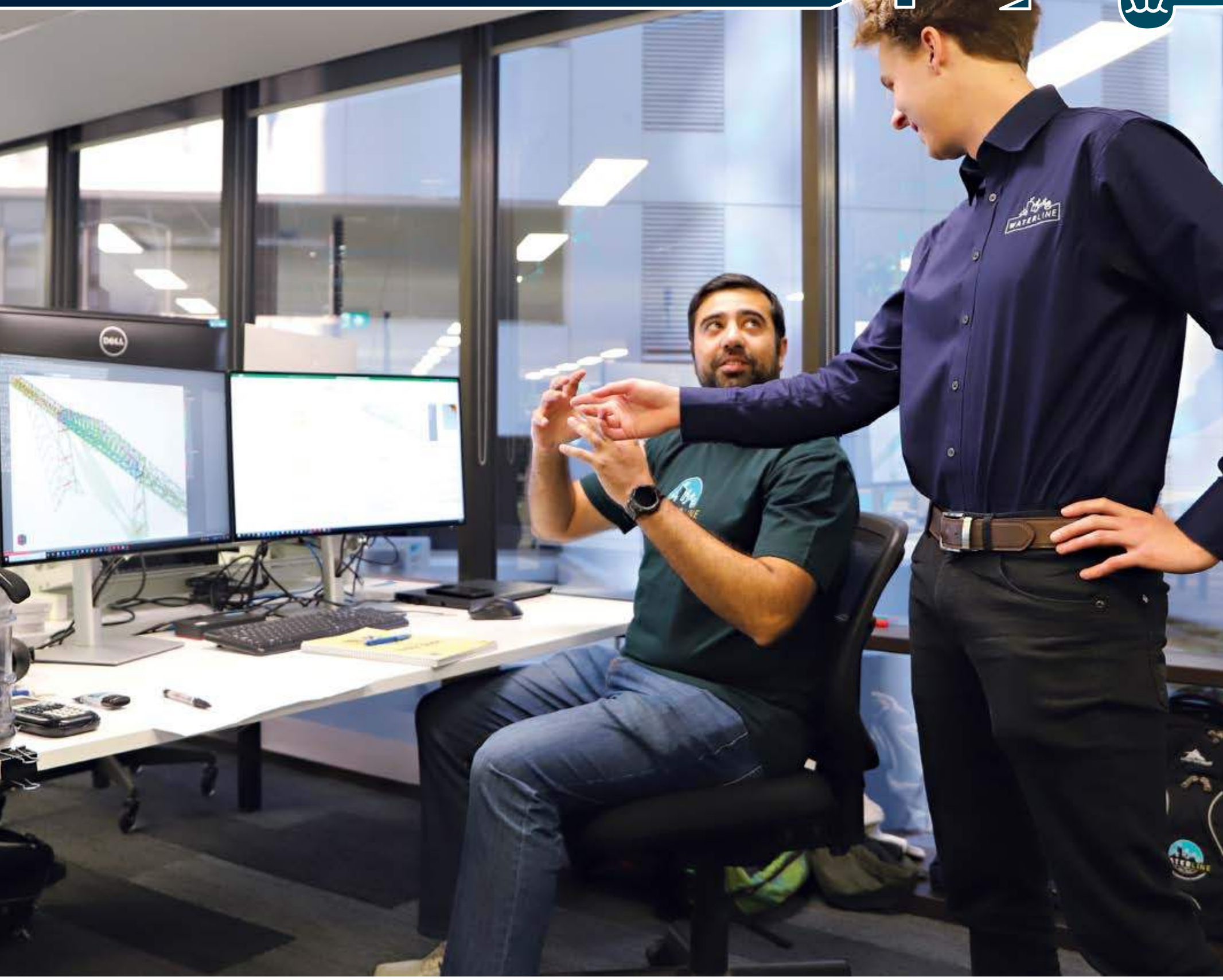
THE LATEST WATERLINE WEAPON IN ASSET PROTECTION

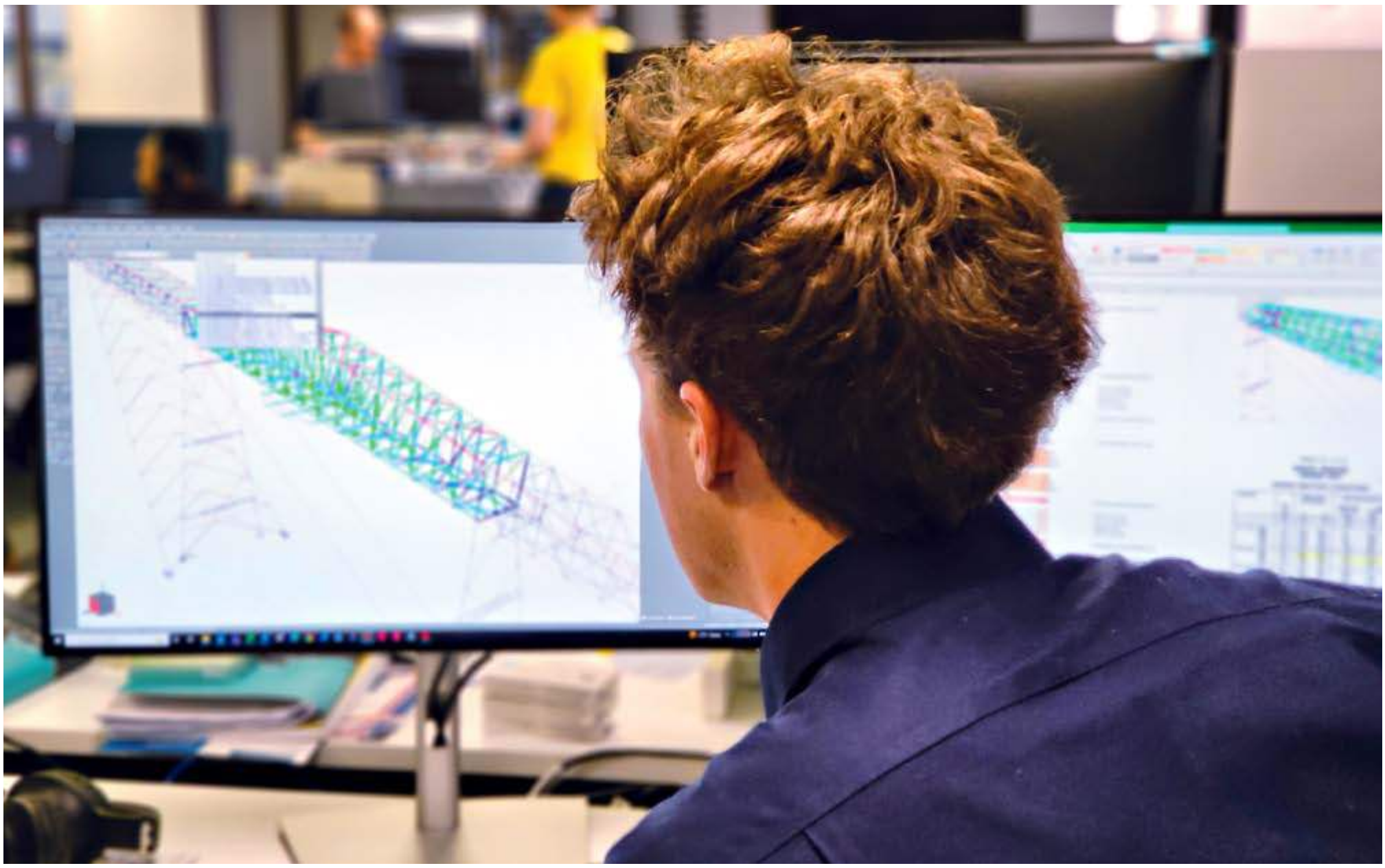
When it comes to keeping a major project running smoothly, the ability to predict and identify issues in plant equipment and site assets is critical in preventative maintenance.

Waterline is an engineering company who offers a well-rounded inspection service backed by site-experienced engineers who work with large asset owners and operators to improve the safety, productivity and capacity of their operations.

The company supports minerals processing facilities, mine sites and ports across the east coast of Australia, covering all aspects of the commissioning of new plant, design, modelling and installation, as well as ensuring the safety and integrity of existing assets.







The *Australian Mining Review* recently spoke with Muhammad Fahad, a Mechanical Engineer for Waterline, to gain insight on how Waterline is helping to educate the industry about the benefits of Fitness for Service.

AMR: Can you explain what Fitness for Service is and what it involves?

MF: It's essentially a technique or methodology used to assess the fitness of equipment to operate, while it has developed flaws during operation. Our team takes the thickness measurement results of the pressure equipment and assesses the equipment against API, ASME and British Standards to identify the critical flaw size. We perform Level 1 and Level 2 assessments with results available to clients within 24 hours. For more complex scenarios, we perform Level 3 assessments using Finite Element Analysis (FEA). Our team extracts the stress results from FEA to predict the service life of damaged equipment, calculate critical flaw sizes such as maximum allowable crack size, creep damage limits, brittle fracture risk, allowable pitting, general corrosion limit, and dent and gouge assessments. We also calculate the rate of degradation to estimate remnant life.

The methodology is consistently used in pressure equipment, like pressure vessels, piping, tanks and similar equipment. If corrosion exists, rather than simply shutting down the plant and replacing or repairing the equipment, you assess it while it's in service to better gauge performance. We then determine whether you can continue to operate as normal—basically, if the asset is fit for service or not.

This assessment provides our clients with greater insights on their assets, such as the estimated remaining life, while predicting when they'll need to shutdown for repairs. This increases the life of the equipment because it offers less conservatism compared to the design codes associated with compliance and operation.

AMR: I imagine preventative maintenance is a top priority for every large asset owner. How does Fitness for Service differ from a normal inspection? Is there a special technique involved or specific equipment required?

MF: It's not like a regular site inspection, however it's completed if you find a flaw in the equipment. If a flaw is discovered, and you want to assess whether that flaw is extremely bad and doesn't allow for the equipment to operate as normal, then you would do an assessment.

The Fitness for Service technique is all mathematical. For example, when you find corrosion in a piece of equipment, then you take thickness measurements around the areas with corrosion, and those without corrosion. Assessing the undamaged and then damaged areas gives you the extent of the damage. You then input those measurements into a specific set of equations.

We usually use the methodology provided in the API 579 standard. It can be done in Microsoft Excel, or you can use specialised software that follows the standard. At Waterline we do both to ensure clients meet compliance requirements, and then input equipment details like vessel/tank diameter, amount of pressure, type of material, temperature, height, etc.

The results will indicate the remaining thickness and level of damage in the equipment. If damage exists, there will be reduced wall thickness, and subsequently a loss of strength.

Based on the mathematical formulas for stress and pressure, the data indicates whether it's still in that failure envelope or not. According to the API 650 design standard, if the diameter of the tank is less than 15 metres, then the wall thickness should not be less than five millimetres. By incorporating Fitness for Service, thicknesses as low as 2.5 to 3 millimetres may be acceptable for those tanks depending upon corrosion allowance and other factors.

Essentially, all you need is some NDT to do the required measurements. It's generally already done on the client sites, so you conduct thickness testing and a visual inspection. That's more or less what you need.

AMR: Do you assess how a particular flaw occurred or what is required to fix it?

MF: It is important to understand the damage mechanism, to prevent future failure of the equipment being assessed, and other similar equipment. Waterline helps investigate the failure mechanism for clients. However, it is not a necessity for the Fitness for Service calculations. When we identify a flaw, we then look at the extent of it and see if it's Fit for Service and whether the equipment can continue to operate. If not, we then look at how it should be repaired or rerated.

AMR: This type of service doesn't appear to be a commonly used technique in the industry. Is it a relatively new offer by Waterline and have you received much interest from clients?

MF: As part of our multi-discipline offering, Waterline has been providing Fitness for Service support for several years. Our offering has evolved over these years, growing from one Senior Mechanical Engineer, who is now Chief Executive Officer at Waterline, to an expanding team of Mechanical Engineers who collaborate closely with in-house designers. This ensures we're nimble in assisting our current clients while managing the growing demand for this key service.

The challenge we see is the limited industry awareness, mainly due to a lack of understanding of what the service technique is, how it works and benefits it can deliver for sites. When clients ask for our opinion, we advise them that the first step should be a Fitness for Service assessment. If the results are acceptable, they can continue to operate, however if not, we can offer advice on immediate repair.

This is obviously helpful for our clients as they are generally unaware that this option exists.

If clients need equipment repairs, we're uniquely positioned to provide them with more options and valuable expertise. This technique is really important as it ultimately gives them greater confidence in their assets.

We believe more awareness and education is needed within the industry about this type of service. Some clients ask us to provide Fitness for Service support, as they are already aware of it from previous consultations with us. The oil and gas and petrochemical industry already use Fitness for Service to their advantage. It is time that the mining industry also embraces it. If we can build awareness of this technique, it's something that all industries can benefit from.

AMR: With an experienced engineering team and specialised service capability, maybe it's time to consider giving your assets a fitness check. ***AMR***

For more information on how Waterline can support your projects visit https://waterlineprojects.com/



Flexibladder The Flexible Liquids Storage Solution

NSW headquartered Flexibladder is working closely with mining professionals, project managers and engineers to provide storage solutions that are simple to install and require no maintenance.

The company produces high-strength flexible solutions in polyester coated fabric for the storage, processing and transport of a range of liquids up to 2,000m^3.

The Flexibladders are considered the perfect solution for fluid storage in mining, construction, and agriculture.

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Flexibladders are Scaleable For Mining

- Installation in as little as 1 hour
- 7 x 1 Million Litre bladders installed in one day.
- Liquid storage for firefighting, dust suppression, greywater storage, effluents and Leachate, UAN Liquid Fertiliser up to 2 Million Litres each Bladder.

We can send our tanks anywhere in Australia

- No scaffolding permits for installation
- No infrastructure required
- No working in small space or at heights permits required





How Portable Are Flexbladders?

Flexibladder can send its tanks anywhere in Australia.

From point of manufacture and dispatch through to storage and transport to site, Flexibladders are extremely compact and space efficient. Delivering massive savings on storage and transport cost.

FlexiBladder presents a significant logistical advantage, especially in terms of optimising the cost of transport. Flexibladders can fit into the back of utes and trailers easily. Maximising unused cubic metres for back loads on large logistic freight routes.



Ease of Installation

The Flexibladders are well known for their ease of installation

For example, in Pad Preparation no concrete infrastructure is required.

The five key points of installation ease:

- Remove topsoil
- Fill road base
- 100mm sand bed
- Compacted and Stabilised
- Laser bobcat finished dead level
- Roll out

Installation Process

The Flexibladder installation is the easiest 500,000L storage install you will ever see, simply.



STEP1 Prepare Flat Pad



STEP2 Unloading



STEP3 Rollout



STEP4 Connect Valves



STEP5 Connect to System



STEP6 Filling



Cleaning up Australian Dams with Country's Largest Aeration Specialist



Whether you're treating water in a dam, lake or lagoon on a commercial scale, the right expertise and technology is critical in delivering long-term, sustainable results. There is a growing need for better wastewater management practices in the mining industry.

Water Quality Solutions is one leading Aussie company that is working closely with mining asset owners to help clean up their tailings dams through specialist aeration technology and water treatment strategies.

The ***Australian Mining Review*** caught up with **Scott Tucker, the Managing Director of Water Quality Solutions**, to obtain his view on how his company is creating healthier waterbodies.

AMR: Can you tell us a little more about Water Quality Solutions and what you do?

ST: We offer the largest range of aerators and biological treatment solutions in Australia. It's something we've been doing for over a decade. From hobby farmers to commercial wastewater plants, we essentially treat and improve water quality, and do so using chemical-free methods wherever possible. It's simply about rebuilding the natural ecosystem of a waterbody by reducing things like algae, weeds, sludge, odour, and dead wildlife.

AMR: Mining operations obviously produce a range of by-products that end up in tailings dams. What issues do they face from a water treatment perspective, and do these differ from other commercial assets?

ST: When it comes to water treatment, the mining industry is no different from any other waterbody. The principles are the same, but the equipment is slightly different depending on factors like the size and depth of the dam.

There can be a lot of mining sites. More of them are getting into wastewater and some of the mining tailings dams, which may have different processes, and different chemicals or nutrient loads entering that water.

Most problems that arise relate to a lack of aerobic bacteria that's responsible for cleaning up the water issues.

When there's no aeration, and little or no oxygen in a dam, you end up with anaerobic species of bacteria that dominate the environment. Anaerobic species cause odour, biofilms and bio fouling, which means organism growth in pipes on suction lines.

When irrigating or pumping water out, the pipes are constantly getting blockages and failing sprinklers, filters and pumps. In most cases, this is caused by anaerobic organisms.

In aeration, the objective is to increase aerobic bacteria. In the aerobic process, oxygen is required, so it's important that an aeration system is sized appropriately and the right type of aerator is recommended. The issue with many companies out there is the fact they're using one aerator for multiple purposes.

We see a lot of outdated, large-scale aerators that need to be lowered by crane into a dam, particularly in the mining industry. These aerators also tend to be really power hungry.

Today, there are far more power efficient options including solar powered and wind generated units. That's a very important one in mining as you may be operating in an off-grid site or remote environment where there's no power.

We can aerate large waterbodies with solar power. It's important as most of the problems occur at the bottom of dams where all the sludge and organic material builds up. That's another reason why depth is very important when it comes to sizing up an aeration system. If you only aerate the top surface layers, you're not actually doing much as most of the issues are down below.

AMR: You stock the largest range of aerators in the country. What are the main solutions you offer clients and how do they differ?

ST: There are two main types of aerators — surface and sub-surface.
Surface aerators work by sucking water up and out of your dam and dispersing it across the surface. This aerates the water through surface transference and can also provide mixing benefits. Sub-surface aerators on the other hand work by pushing air through hoses to air diffusers at the bottom of your dam.

In the case of sub-surface aeration, there are rising columns of bubbles in air pods located around the dam. Air is pumped into them and thousands of little bubbles rise to the surface. As they rise, they get larger due to pressure reducers and they drag all the water from the bottom to the surface. This is the best type of aeration for deep dams, and the most power-efficient as you're pumping in water.

We have partnered with two solar powered manufacturers — one in Taiwan, and the other in the United States. We have special inverters that allow us to solarise the units so they can run on a standard, standalone solar system. We also have a windmill option that utilises a wind turbine generated system.

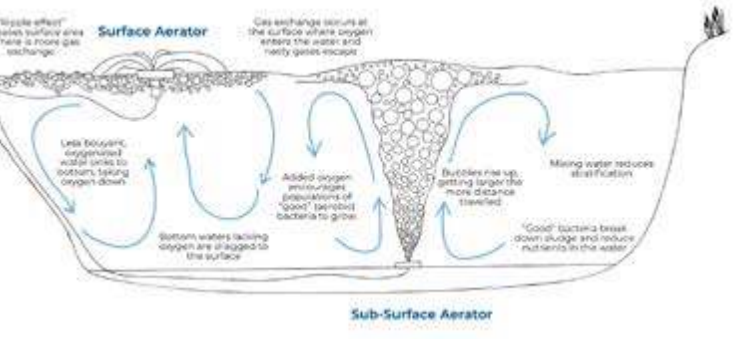
The primary option is a surface aerator. These are the types you see on golf courses and in council parks, which are commonly used in wastewater.

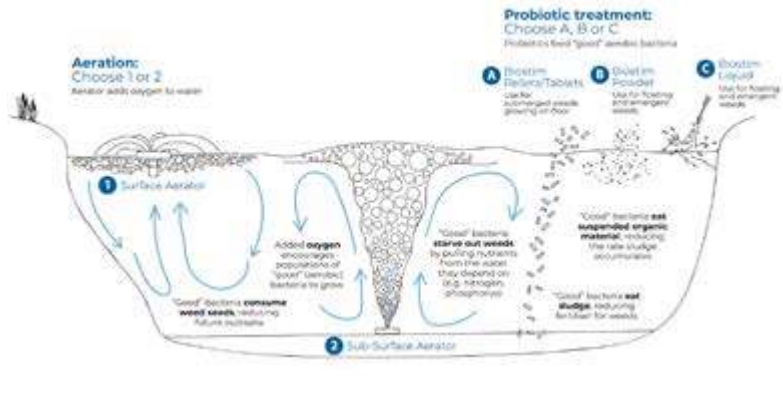
We also have dedicated solar options and hybrid motors for these types of surface aerator systems. They can operate off solar power and interchange between the two when the sun is available. If there's no sun and a need for 24/7 aeration, they can connect to a generator backup and run off solar.

A relatively new technology worth noting is a system called Nano bubbles, which is becoming more affordable. In a Nano bubble system where you have an oxygen generator, you inject 95% pure oxygen, stripping the nitrogen out of the air which creates 95% pure oxygen through this Nano bubble











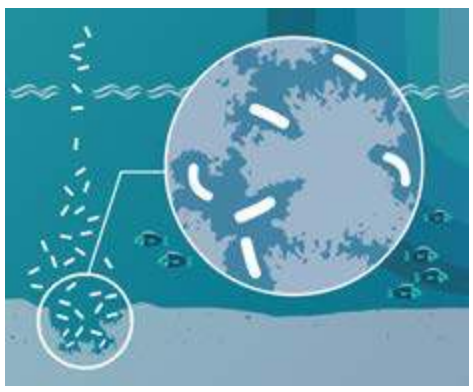
injector. This is then injected into the water bubbles where it remains for roughly a month.

Systems like these are becoming common in industrial processes, particularly mining operations, as they can be integrated in tanks and anywhere where oxygen is important. It's also gaining popularity in the horticultural industry in the United States. You can't get that sort of oxygen transfer from air to water in any other way, so it's somewhat revolutionary technology. It's just another solution we can offer our clients.

AMR: Assuming an existing tailings dam or waterbody has an aeration system in place, what other treatment options are available to improve water quality?

ST: The core method of improving water quality is reducing algal blooms and odour by manipulating the microbiology of the system so it's more in favour of aerobic species of bacteria.

Coming back to what I originally said, the primary way in which you're trying to clean up water is by reducing the nutrient load. In order to achieve this, you need to increase the population of aerobic bacteria. Aeration is one aspect where you get more oxygen into the water, and therefore more beneficial bacteria grow. This is due to the change in environmental conditions which enables them to thrive.



The second part of improving water quality is increasing bacteria numbers through the use of biological stimulants. The process involves combining blends of bacteria, trace elements, micronutrients, and enzymes, which are basically things that bacteria are usually deficient in, and subsequently limits their growth.

A fitting analogy to demonstrate this process is dropping your child off at a birthday party, they get loaded up with sugar and go crazy for a few hours, then finally calm down. That's what you're doing with these biological stimulants. You feed the bacteria things they are deficient in from the existing natural environment, which helps facilitate an increase in their numbers.

Combining biological stimulants with aeration helps further increase bacteria growth in two different ways, both of which complement each other, and are chemical-free.

AMR: Are there any other processes that help facilitate healthy bacteria growth?

ST: Other things we can do to support nutrient reduction is to introduce floating islands. These are basically floating rafts that are planted with aquatic plant species that will grow with their roots remaining suspended in the water. These massive suspended plant roots serve two purposes.

First the plants themselves remove nutrients from the water, rather than from the sediment they were planted in. Second, the plant roots provide a large surface area for the good bacteria to thrive in.

It's actually all about bacteria — that's the main mechanism in which those systems function. The plants are secondary to the bacteria. Most of the nutrient reduction comes from the bacteria that live on the plant roots.

AMR: Can you provide more detail around what happens once the floating rafts are installed. Can the plants be moved around the dam or removed completely?

ST: While many floating wetlands require a crane to deploy them into the dam – ours don't and can be easily manhandled into position. Once the plants grow and become more established, they remain in place and you can't remove them.

We actually have removable planter baskets in our floating raft systems. This means you can grow plants, remove them, and plant new seedlings or new plants, or propagate the existing ones so that you're getting more active growth.

As more active growth will remove more nutrients, the nutrients that you're primarily targeting with a floating wetland are phosphorus in the aquatic environment as this is the main limiting nutrient that plants need to grow.

As part of many mine site processes, they end up with a lot of phosphorus in their dams. It also builds up naturally due to bird waste and rotting organic material. You can't remove phosphorus from the system, and you can't process it within the system either. It needs to be physically removed, locked up or bound in an organism.

By being able to easily add new plants, and remove others, you will be removing all the phosphorus from those plants that are removed from the system. It is also important to keep aquatic plants under one metre in height to prevent them from acting as a sail in windy conditions.

AMR: What are some of the advantages provided by maintaining a healthy aquatic environment?

ST: If you're in a remote mine site, having the right aquatic environment means you can actually grow edible species such as Asian herbs and vegetables. This also helps mitigate logistical issues like transporting fresh produce to site.

We also do quite a bit with aquaponics. That's where you use fish waste to grow plants in a self-contained symbiotic system. One of the systems we do is modular, which can be land based such as a tank for mine sites to have a self-contained aquaponic system with fruits and vegetables grown onsite.

Some of the things you can do beyond that are generally chemical options, or service aquatic herbicides. However, that's never the problem in a dam. It's always the symptom. If it's becoming unhealthy, it's telling you the system is out of balance and the problem is the nutrient supply. That's what you've got to tackle with the bacteria, the aeration, and the floating wetland. You're basically creating competition for the available foods, allowing bacteria to be the dominant growing organism.

Again, the principles are the same. Water treatment is consistent, whether in wastewater, aquaculture in fish tanks, backyard lawns, or natural rivers and streams. It's all about bacteria. It's just how you get the bacteria to thrive and the type of equipment required to suit different environments. It's definitely not a one size fits all approach.

AMR: Aeration and water treatment technology is clearly an increasingly important part of maintaining a healthy aquatic environment. Specialised technology is playing a critical role in supporting industry to improve water quality. Water Quality Solutions is one such company that leverages its decade long experience to shift water treatment to the next level. More information on their comprehensive aeration and water treatment solutions can be found at https://waterqualitysolutions.com.au/. *AMR*





Engineering the Future of Tailings Facilities with **Klohn Crippen Berger**

Klohn Crippen has taken its services all over the world, including the Hidden Valley project in Papua New Guinea.

The vast scale of modern mining results in the currently unavoidable annual processing of billions of tons of ore for extraction of metals and minerals with concomitant production of tailings and rock waste at scale. Due to growing demand and decreasing ore grade, the volumes of tailings for many commodities are ever increasing.

Although there is an unknown number of active, closed and derelict tailings facilities across the globe and no central record of where they are all located, the majority of tailings facilities have been operated without concern.

Nevertheless, continued reports of lesser - and recent catastrophic failures have led to increased industry and societal scrutiny of tailings facilities and related ESG risks. This is apparent from:

- compilation of the Global Industry Standard on Tailings Management (GISTM) as an outcome of the Global Tailings Review (GTR). The GISTM was convened by the International Council on Mining and Metals (ICMM), United Nations Environment Programme (UNEP) and Principles for Responsible Investment (PRI).

- establishment by UNEP and the PRI of the independent Global Tailings Management Institute to support the adoption of the GISTM and oversee adherence to and independent verification of the adoption of the GISTM.

- review of tailings monitoring systems and the feasibility of a global monitoring system along the lines of those that are in place for other industries such as aviation and nuclear power generation.

Forensic evaluation of tailings facility failures commonly identify that these failures are preventable if appropriate design and/ or operation with correct governance were applied.

A Tailings Engineering Leader

One company that continues to lead the way in tailings engineering, management and dam safety is Klohn Crippen Berger (KCB) - an award-winning engineering, geoscience and environmental consulting firm with a strong culture of quality, health and safety, community engagement and ethics.

KCB has advanced the design of modern tailings storage facilities for over 60 years and continues to develop sustainable solutions to projects in the hydropower, mining, transportation, infrastructure and energy sectors.

Leveraging an experienced team of engineering, geoscience, and environmental consultants, it's no surprise that KCB is sought after by clients from all corners of the planet.

From the tropical jungles of Papua New Guinea to the dry high-altitude terrain of the Peruvian Andes, KCB delivers solutions for geologically complex areas, in seismically active terrains, and in extreme weather conditions.

According to KCB Senior Geotechnical Engineer, Dr. Louis Kirsten, tailings facilities increasingly figure prominently on balance sheets, social licenses to operate and closure inventories.

"A combination of experience and technology is a proven formula in the design and development of safe and sustainable tailings storage facilities with dam failures often due to design and operational deficiencies," said Kirsten.

"There are many risks associated with tailings facilities from an engineering perspective. Cost is obviously a key driver in dam construction, but designing advanced mine waste and water management facilities requires engineering and review oversight at the appropriate technical and experience level."

Historically, tailings were simply dumped into, or adjacent to, rivers – with the waste eroding into the rivers and streams. By the late 1960s, the increasing volume of mine wastes and clear environmental impacts lead to significant regulatory tightening. It was at this time, Klohn (as KCB was known) pioneered one of the world's first engineered tailings dams, the centreline configured, cyclone sand dam.

Today, this KCB design continues to stand the test of time by meeting modern seismic criteria for tailings facilities. Although tailings slurry is mostly stored by impoundment storage, tailings slurries are also deposited in mined-out pits, co-disposed with mine waste rock, filtered to produce dewatered tailings stacks and blended with cementitious binders for underground placement.

KCB is an established global tailings industry leader, employing a network of tailings engineers in over 25 countries with a head office in Vancouver and other offices across Canada, Australia, the United States, the United Kingdom, Peru and Brazil.

Enduring Commitment to Industry Standards

KCB continues to evolve and apply its expertise to the design of tailings facilities, and importantly, ensuring that ESG considerations are included in engineering solutions.

On the basis of its expertise, KCB contributed to development of the GISTM Conformance Protocols for the International Council on Mining & Metals (ICMM). The GISTM established robust global requirements for improved management of existing and new tailings facilities and minimising the risk of catastrophic failure of tailings facilities.

"A real concern the industry faces is the relative frequency of occurrence of catastrophic failures" said Kirsten.

"Our company regularly participates in the review of tailings practices and participates in dam safety reviews and forensic investigations of dam failures such as the Fundão and Brumadinho failures."

KCB's core business is to assist in improving the way in which tailings facilities are designed, constructed and operated to minimise the risk of dam failure.

"However, there is a critical skills shortage in the heavy industrial engineering space. On the one hand, plenty of opportunity beckons for those that may have an appetite for a career in mine geotechnical/ tailings facility engineering. On the other hand, most people would be familiar with what civil engineers do, but likely have little idea of what geotechnical/ tailings dam engineers do".

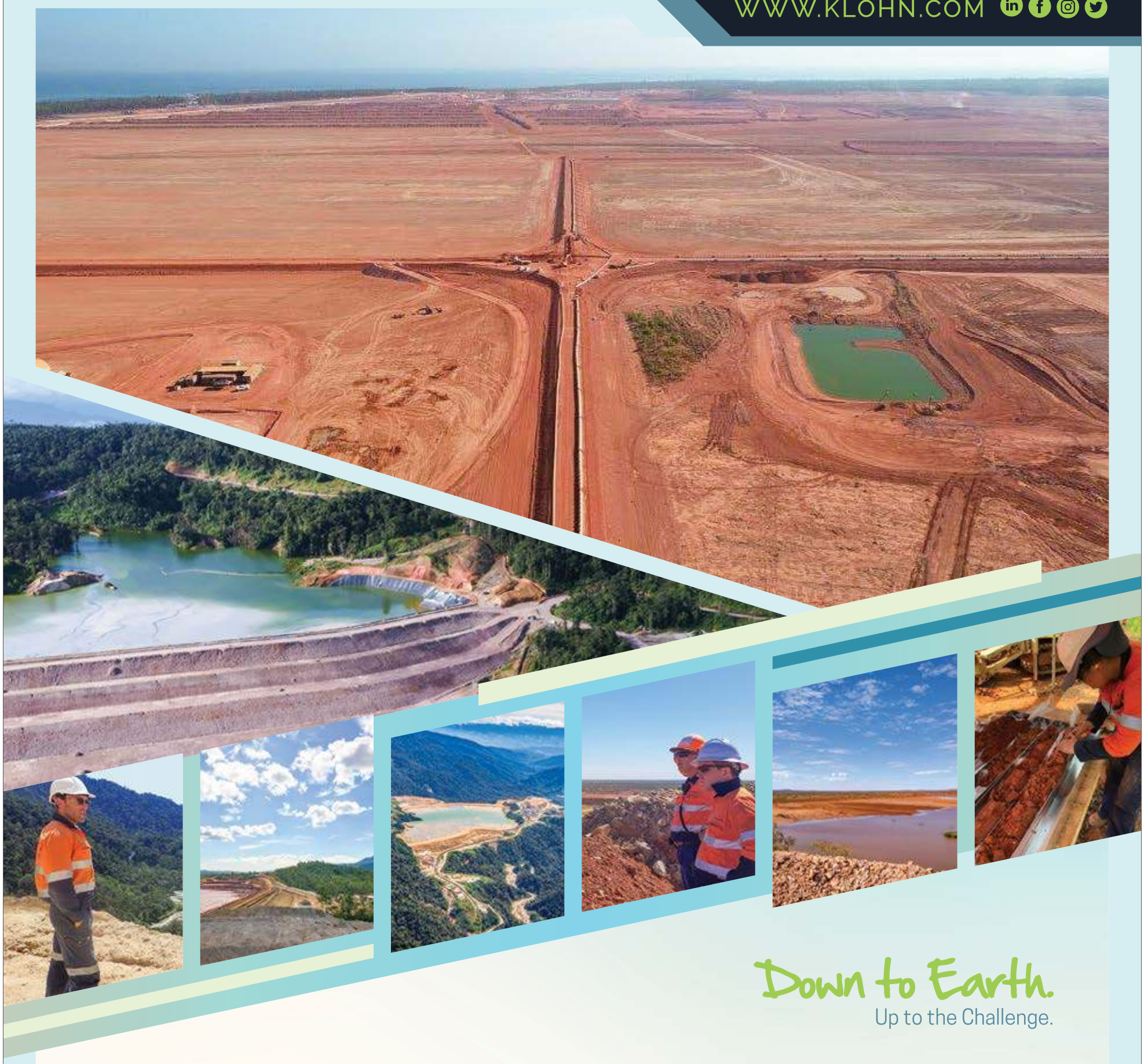
"We're dealing with some of the most serious issues facing the mining industry. I believe owners, operators and relevant key stakeholders need to implement integrated strategies to source, develop and secure the necessary talent to continue servicing the mine tailings industry."

More information on the company's engineering capability and tailings management solutions is available at **www.klohn.com**

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WWW.KLOHN.COM



Down to Earth.
Up to the Challenge.

For over 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.

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Engineering, Geoscience and Environmental Services

Cooling the Competition with Radiator Specialists RDM Group

RDM Group supplies Cummins KTA50 Radiators.

Whether hauling payloads, harvesting seasonal crops, or powering a yacht, you need radiators and heat exchangers built to perform in the harshest environments.

From mining to marine, agriculture to automotive, few companies have the specialist capability to engineer custom cooling solutions for multiple industries. Keeping equipment productive for longer depends on the reliability of its parts.

One Australian manufacturer pushing the boundaries when it comes to quality and performance is RDM Group.

With a passion for reverse engineering of specialty parts, it has earned a reputation as a leading supplier of radiators and heat exchangers for some of the world's largest OEMs including Caterpillar, Cummins, Komatsu and Hitachi, to name a few.

According to RDM Group Australia's Sales and Marketing Manager, Josh Zampech, the company has become synonymous for supplying purpose-built radiators, heat exchangers, coolers and manifolds, for industrial, mining, marine, agriculture, transport and rail applications.

"We're proudly Australian and we design and manufacture high quality copper, brass and steel cooling solutions for many different industries," said Zampech.

"Anything that requires a cooling system, we've either dealt with it, or we can deal with it."

"Mining is definitely a core industry for us. We see plenty of sites out there using gear from overseas which just doesn't cut it here. You need the peace of mind that your equipment will withstand our hot and dry climate, and that's what our company is renowned for".

"Our products play a critical role in some of the most remote and hostile environments across the country, so we make sure it's built extra tough to deal with these sorts of conditions."

Beyond just Boats and Radiators

For around 13 years, Redback Radiators has provided solutions for everything from diesel locomotives to tractors and vintage cars. Following the acquisition of Diecon Marine around six years ago, the two companies merged to form RDM Group.

Diecon Marine provides products to both the marine and mining industry.

"Heat exchangers are a significant part of Diecon Marine, so when we bought the business around six years ago, we also secured all the intellectual property attached to it," said Zampech.

"We're talking heat exchangers, oil coolers and manifolds, which apply to multiple industries, not just marine. We've added these products to our existing range allowing us to provide a solid offer to our customers."

Diecon Marine has played a pivotal role in terms of facilitating the broader company's expansion and serviceability within the mining sector.

"Over time, we've developed relationships with customers who deal with mines directly, which has opened the door to provide more products and better service to such a critical industry.

"We sell hydraulic oil coolers for lifting and gear box applications, as well as standard heat exchangers which are used in large dump trucks and other earthmoving equipment."

Expansion on the Radar

Moving products around the country demands a reliable network, particularly when your parts are critical to the continuity of a

mining operation. The company has partnered with distributors including Browns Radiator Service (Perth, WA), Bayswater Road Radiators (Garbutt, Qld), Pacific Radiators (Cairns, Qld), H-E Parts International (NSW, SA & Qld), and MRC Australia (NSW, Qld).

Although heat exchangers make up just ten per cent of RDM Group's business, it is focused on driving expansion over the next 6-18 months with more products including manifolds, exhaust mixers and more.

"Part of our growth strategy is to increase awareness of our product offering via our national network of wholesalers," said Zampech.

"Our goal is to ensure the mining industry knows they can obtain locally made high quality engine cooling products to minimise downtime and improve operational efficiency.

"As we don't deal directly with the end user, we've established a network of approved and reliable distributors of our full product range."

The Forefront of Fabrication

As one of Australia's most respected manufacturers, and a Tier 2 supplier to the mining, marine and transport industries, RDM Group offers a full custom fabrication service.

It has an in-house design team capable of re-engineering cooling products to improve performance to suit specific client applications.

The company's manufactures all products in a dedicated facility on the Gold Coast, which uses the highest quality raw materials available.

Examples of radiators supplied to the mining industry include the Cummins KTA50, welded Kenworth truck radiator, and Komatsu D475 mining dozer radiator. It has also fabricated several complete oil cooler units including the Diecon ZZ2350, ZZ2310, and ZZ1390.

"We do things in two ways – one is our standard product line, and the other is our customised service," said Zampech.

"Our engineering team can design, develop, and manufacture fabricated components in a range of materials. The CNC machinery allows us to precision fold up to 6mm and cut various materials up to 16mm in thickness.

"When we need to do any repetitive welding, we have a robot welder on hand, as well as a dedicated welding booth for small batch quantities and one-off fabrications."

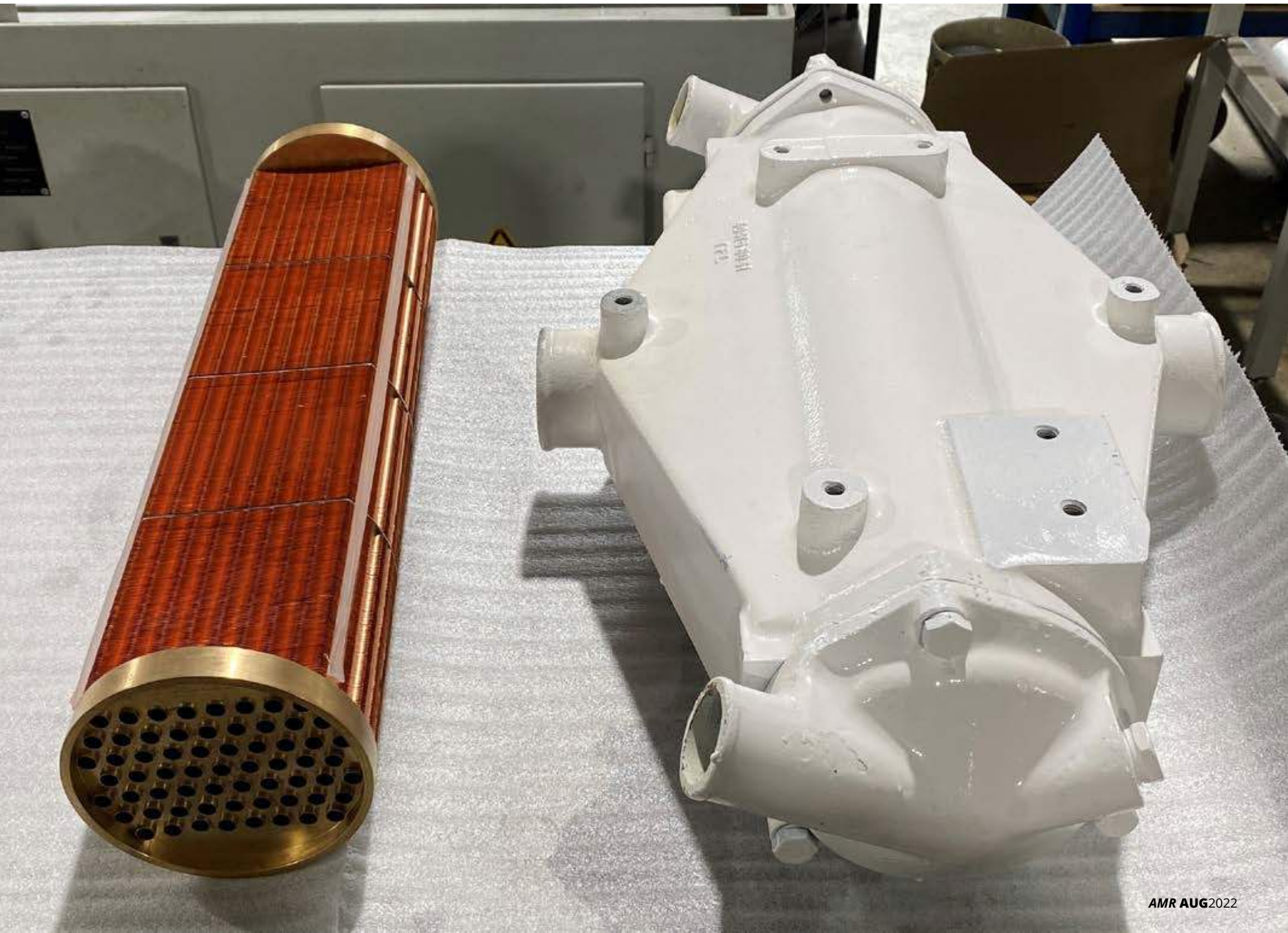
"We can fabricate and build a solution to meet different applications which is of immense value to our clients. We designed and manufactured a three-metre-long keel cooler for a dredge that was externally mounted. It really demonstrates our local, in-house capability."

A radiator or heat exchanger may not necessarily be visible on the outside, however RDM Group's products are keeping equipment running harder and longer for all types of heavy-duty applications.

From agriculture and transport to mining and marine, RDM Group can deliver the right cooling solution to suit your requirements.

More information on the company's specialist radiator and heat exchanger products is available at
www.rdm.group/about

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CRUSHING SERVICES AUSTRALIA
ON STRONG GROWTH PATH

A smart company will always recognise that its people are its best asset. That is certainly the belief of the management team at the Perth-headquarters of Crushing Services Australia (CSA).

Since establishment in 2018, the team at CSA have worked diligently to build CSA into a successful company that thrives on meeting targets safely and efficiently. From the outset, CSA has had systems and processes in place achieving ISO accreditation in Quality, Safety and Environmental.

CSA's focus is on building a team equipped with knowledge and experience to operate crushing and screening equipment. Since 2018, CSA has grown to a team of 30 plus employees and a fleet of made-to-measure equipment.

CSA offers on the job training through mentoring and knowledge sharing, ensuring the team at CSA are highly skilled and knowledgeable in their field.

According to CSA's Director, James Kelleher, "The expertise and reliability of its employees is the secret behind the company's impressive record of success." James says, "The company's experienced team are adaptable, competent, efficient, highly skilled and are eager to complete challenging projects."

"Having the right people on our team is the most critical part of our business. Our people are team players, exemplary in carrying out their roles and are excited by daily challenges. Our team have never let us down. That is the cornerstone of our success."

CSA has an Aboriginal engagement policy in place. CSA strives to engage and work with indigenous contractors across their projects and understands the importance of hiring locally as well as supporting local business.

CSA offers a wide range of specialist crushing and screening contracting solutions including but not limited to:

- Mobile crushing and screening services including management
- Production of aggregates, roadbase, and ore
- Supply and hire of plant and equipment;
- "Turn key solutions"
- Customised solutions; and
- SCAT processing plant capable of removing in excess of 10ton of millballs per shift.

CSA has built an extensive fleet of highly maintained equipment including but not limited to crushers, screeners, stackers and material handlers. CSA has a number of crushing plants available ranging from 400 to 1000 tonnes per hour.

"We provide customised equipment and machinery which is custom built to endure the harsh Australian climate and conditions. CSA designs its own electrical systems, installs Australian cooling systems with the primary goal of improving reliability and optimising results for our clients," James said.

A key to CSA consistently hitting targets on projects is due to the tremendous team at the Perth based work shop and their trusted suppliers.

With CSA's reputation growing amongst the leading mining companies, the company has expanded its area of operation and its facilities. CSA has and continues to undertake significant projects, the majority of which has been secured through word-of-mouth recommendations. The core to CSA's success is again the teams skills, dedication and "can do attitude" which has allowed CSA to grow.

Management at CSA foreshadow a busy start to the new financial year with a number of projects already secured in Western Australia and others on the horizon specifically in Queensland and South Australia.

CSA's understands the importance of working with clients. It is dedicated to developing and nurturing relationships with past, current and future clients. Building strong relationships with clients ensures our longevity in the industry and our position in the market as a leader in the industry.

We are focusing on business expansion and have secured major contracts with preeminent mining companies and civil companies.



Project success

- Current and past clients include:
- Gascoyne Resources GNT LTD.
- Ngurrara Pty Ltd.
- CITIC Pacific.
- Westgold.
- Kimberley Metals Group.
- Monadelphous Group.
- WBHO, South 32 Worsley Alumina Refinery Project.
- Q H & M Birt – South 32 Groote Eylandt & Eliwana Rail Project.
- Maca Mining & Civil.
- Sedgman, CIMIC Group.
- Minjar Gold.

The company continues to focus on growing its business, team and capabilities.

CSA is proud of its hands on approach. The team at CSA are adaptable to the environment they work in. The team is flexible performs well under pressure and is capable of ensuring work is completed, even if a client requires a task to be completed on an urgent basis.

"We have the personnel and facilities to get a job done as safety and quickly as possible."

CSA believes productivity and safety are intertwined with each other. You cannot have one without the other.

With a strong team in place and a "can do" attitude, it is no surprise Crushing Services Australia is building a strong and reputable business. ***AMR***

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CSA

CRUSHING SERVICES AUSTRALIA



DELIVERING A COMPLETE SOLUTION

Crushing Services Australia (CSA) is a crushing and screening operation that specialises in the crushing and screening industry across Australia. In addition, CSA services and maintains mining equipment as well as offering plant and equipment for hire. CSA was established in 2018 after a need for a competent crushing contractor was identified in the market that could safely meet targets and deliver on time.

At CSA the focus is on building a team armed with a depth of knowledge and experience to operate crushing and screening equipment. CSA offers constant on the job training through mentoring and the sharing of knowledge. This ensures the team of fitters, electricians and operators at CSA are highly skilled and knowledgeable in their field.

Learn more at **www.crushingservicesaustralia.com**

Australian Mines and Services Handbook 2023



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LM6000
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