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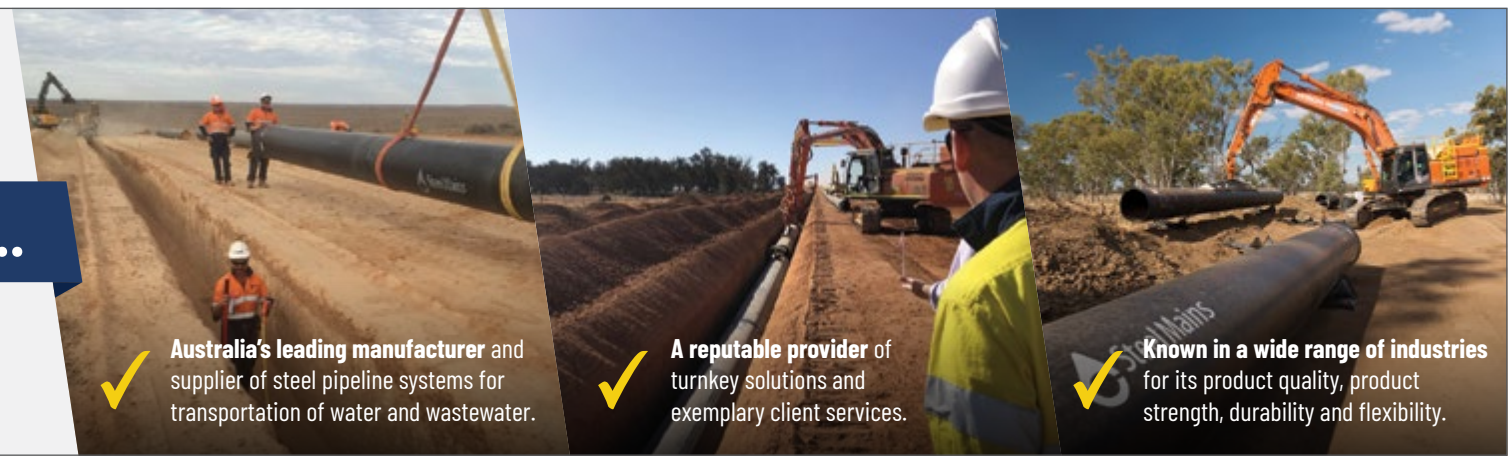
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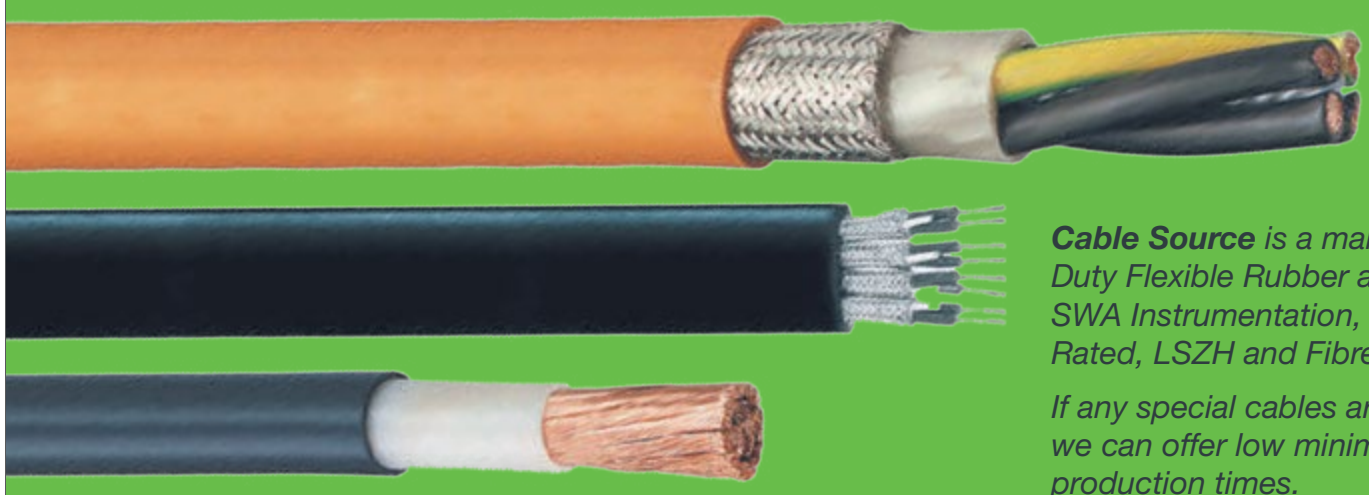
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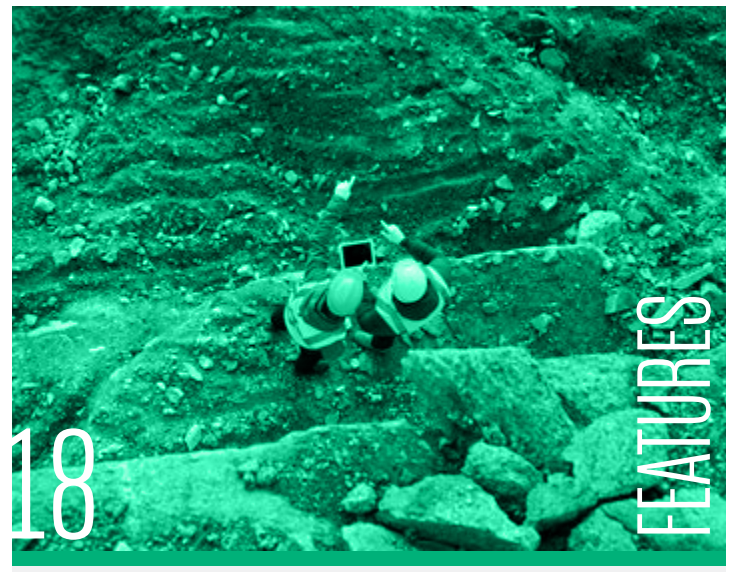
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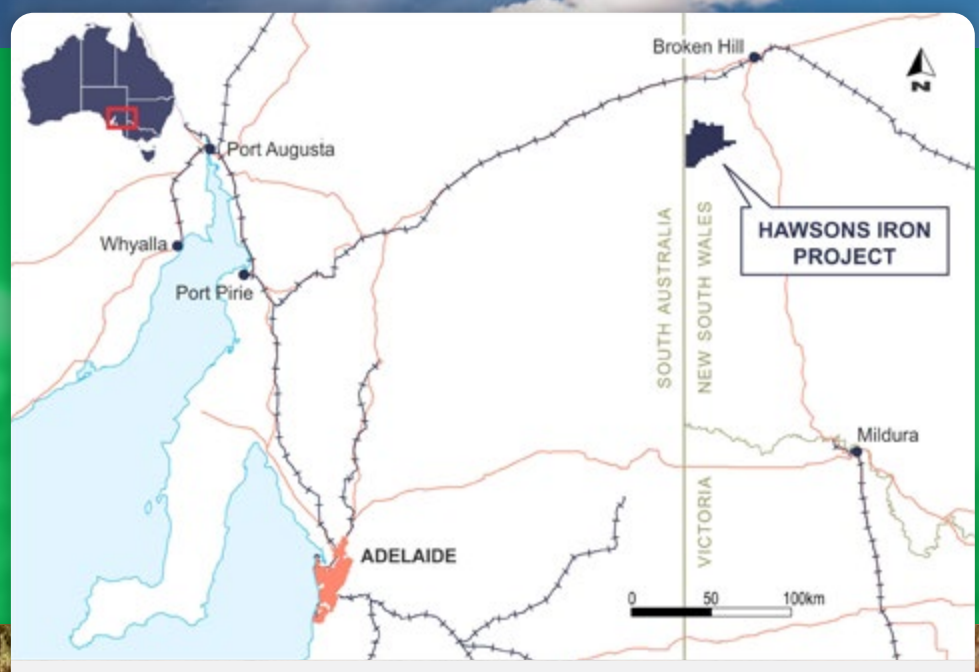


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- Outstanding location with access to renewable energy sources and multiple transport options
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Definitely a company to watch, Hawsons Iron is an emerging producer of low cost, high grade quality iron ore products.

Its Hawsons Iron Project south-west of Broken Hill is rated by global research firm Wood Mackenzie as one of the world's best high-grade iron ore development projects excluding projects owned by established majors.

Capable of profitably producing the world's highest grade iron ore product, the Project is a game changer in the steel industry's 'green steel' push to net-zero carbon emissions, using advanced technologies, renewable energy and less to no fossil fuels.

The Hawsons Iron ore metallurgical features of being 'soft' and having a coarse grain size which breaks around the grain boundaries mean less energy is required to produce a high grade, low impurity concentrate product. This product is ideally suited to Direct Reduced Iron (DRI) and Hydrogen steel manufacturers at the cutting edge of low-to-no-carbon emission green steel production. DRI shows strong future growth underpinning the demand for the Hawsons Supergrade® product while also attracting a premium above 62%Fe pricing.

Forging Ahead

The first drill rigs arrived on site last October to shore up important geological data for the company's Bankable Feasibility Study (BFS) as it moves closer to taking the mine into production.

Hawsons Iron's Executive Chairman, Mr Bryan Granzien said the drilling program was a significant step forward for the Project which recently reported a Mineral Resource Upgrade in accordance with 2012 JORC Code and Guidelines (see below).

Mining Study findings also confirmed the outer boundary of the total resource hasn't yet been fully identified and the economic pit shell is significantly larger than the one that was used in the Prefeasibility Study (PFS) 2017.

Mr Granzien said the Hawsons Iron Project's asset base is very significant and the life of mine tonnages will increase further with the planned resource extension drilling.

"We are extremely excited by the site works, the recent Resource Upgrade and the opportunities emerging in taking the project into production," he said.

"We have proved that the resource is larger than was identified in the PFS study based on 10-12 Mt per annum production for the mine life of over 20 years," he said.

"What we know now is that we have approximately 400 Mt Mineral Resource, however, the mining study findings mean that there is still more iron ore to be drilled out within the Hawsons' tenement area and we expect that to be proved further during confirmatory drilling," he said.

The financial resources to undertake the Hawsons Iron BFS, targeted for completion in December 2022, were delivered through a fully underwritten recent capital raise of $35.6million (before costs). A further A$200 million equity financing agreement was signed with US group LDA Capital to access additional funds if required.

The deal provides enhanced certainty and a key piece of the capital stack needed to develop the project.

The Hawsons Iron Project and its Hawsons Supergrade® product are set to change the face of iron ore production in Australia and advance the global supply of high-grade product essential in the transition to zero-carbon steel. Hawsons Iron is now focused on completing its BFS, securing the mining lease, and commencing production during 2024.

Read more about Hawsons Iron, its unique orebody and why its high-grade product is essential to a carbon-free steel future at **https://hawsons.com.au**

AMR

Mineral Resource Upgrade

Category	Mt	DTR %	DTR Concentrate Mt
Indicated	960	13.7	132
Inferred	2,100	12.9	268
Total	**3,060**	**13.1**	**400**

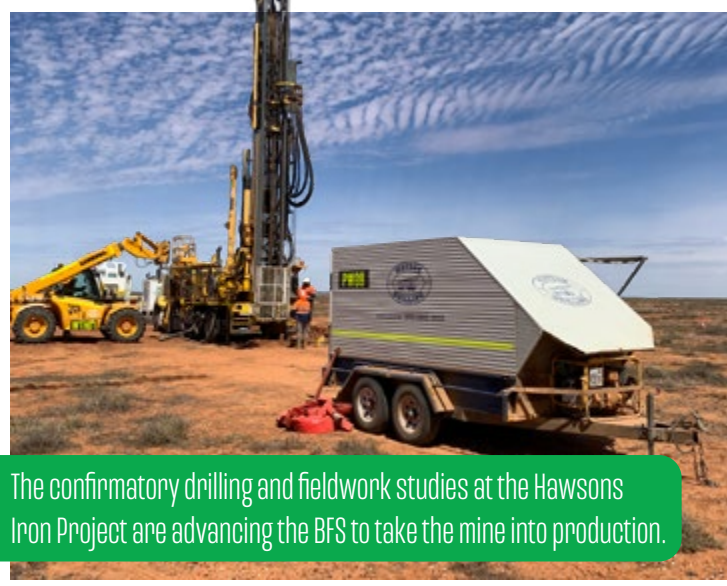
9% increase in Indicated Resources to 132 Mt and 18% increase in Inferred Resources to 268 Mt.

Concentrate Grades

Category	Fe %	SiO2 %	Al2O3 %	S %	P %	LOI %
Indicated	69.9	2.6	0.19	0.002	0.003	-3.0
Inferred	69.7	2.8	0.20	0.003	0.004	-3.1
Total	**69.8**	**2.8**	**0.20**	**0.003**	**0.004**	**-3.0**

Mineral Resource Upgrade reported in accordance with the 2012 JORC Code & Guidelines





The confirmatory drilling and fieldwork studies at the Hawsons Iron Project are advancing the BFS to take the mine into production.

Capricorn Drilling To Support Mt Gibson Pathway To Development Decision



Capricorn Metals Ltd (ASX: CMM) has commenced a key 81,000m drill programme as it progresses its Mt Gibson Gold Project in Western Australia towards development.

The drilling is being carried out across eight kilometres of strike within the current 2.08 million ounce resource.

The objectives of this programme include:

- Infill drilling of resource to broadly bring the drill density to 25 x 25 metres;
- Test gaps between resource pit optimisation shells along the eight kilometres of strike of current resources; and
- Test for extensions of gold mineralisation below the current resource shells.

Drilling has commenced with one RC drill rig and is expected to ramp up to three rigs over the next two months. The programme is expected to take in the order of four to six months to complete at a cost of approximately A$10 million.

Results of this programme (and any extensions to it) will be used as the basis for a resource update and a maiden Ore Reserve Estimate in 2022.

Outlook

The current extensive resource drilling programme will underpin an update to the MRE targeted for the September 2022 quarter.

Other technical studies will be advanced in parallel with the drilling with a view to having completed sufficient technical work to allow the estimation of a maiden Ore Reserve Estimate, also in the September 2022 quarter.

Executive Chairman Mark Clark says it is expected that the Ore Reserve and technical studies will facilitate completion of a Feasibility Study and a decision on the development of the project in the December 2022 quarter.

"The commencement of the major drill programme in and around the current two million ounce Mt Gibson gold resource is the first step towards Capricorn's goal of developing a gold mining operation at the project," Mr Clark said.

"We look forward to estimating a maiden Ore Reserve and completing a feasibility study to underpin a development decision in the second half of 2022.

"With Karlawinda now fully operational, we have a clear focus on expediting development of Capricorn's second Western Australian mining operation."

MGGP Opportunity

The combined area of the granted tenure at MGGP covers approximately 213 square kilometres and in excess of 15 kilometres of strike on the gold bearing Retaliation Greenstone Belt, in the SW portion of the Yalgoo-Singleton Greenstone Belt.

The MGGP has been the subject of approximately 660,000 metres of exploration and operations drilling, of which less than 5% is deeper than 150 metres below surface.

The deepest open pit at the MGGP finished only approximately 100 metres below surface while the average depth of mining is between 60 – 80 metres below surface.

The gold price in 1999 when the mining operations ceased was in the order of A$450 per ounce (compared to current price of circa A$2,500/oz).

Mr Clark said that in addition to the resource expansion potential at the project there is also a significant broader exploration opportunity on the tenure package.

The parallel (immediately west) structure to the Mt Gibson Mine Trend and the Highway/ McDonalds area located five km north of the current resources have been identified as significant immediate exploration targets.

Significant opportunities for Capricorn at MGGP include:

1. The resource estimate extends over a length of eight kilometres to an average depth of 140 metres and maximum depth of 220 metres below surface.

   There are significant drillhole data gaps between areas of the resource optimisation shells along the length of the resource strike. There are also numerous targets (derived from both deeper historical drill results and from geological interpretations) below the depth limits of the current resource.

2. Although the density of drilling in the resource is very good, (ranging from 25m x 25m to 50m x 25m) the resource is currently all classified in the Inferred category until database validation drilling is completed in the planned programme;

3. The deposit is open along strike both to the north and south of current resource shells; and

4. Known gold occurrences have also been identified elsewhere on the granted tenure outside the immediate current resource areas.

Capricorn has planned extensive drill programmes for both resource development and first pass exploration. ***AMR***

St George Defines New Mt Alexander Targets

St George Mining Limited (ASX: SGQ) has obtained further strong results from a seismic survey completed late last year at its flagship high-grade Mt Alexander Project, located in the north-eastern Goldfields of Western Australia.

Three new targets have been added to the portfolio of seismic targets prioritised for drill testing. These large targets are named S3, S4 and S5, and have been selected as prospective for massive nickel-copper sulphides based on their increased seismic amplitude and coincidence with an intrusive structure.

The three new seismic targets are in addition to previously announced targets S1 and S2. John Prineas, St George Mining's Executive Chairman, said the seismic targets are located within Exploration Licence E29/548 (100% St George) apart from S3 which is within E29/638 (75% St George: 25% Western Areas).

"The outstanding results from the seismic survey continue with another three targets identified. "With drilling already underway at S1, it is a great outcome to add to the pipeline of priority targets for drill testing in the current diamond drill programme," Mr Prineas said.

"The high-grade discoveries already made in the Cathedrals Belt are proof that we have a fertile and high-grade mineral system. The sheer scale of the structural network now being revealed by the seismic data strongly supports the potential for further significant mineralisation in the project area.

"We are excited to be drilling a portfolio of high-quality exploration targets at a time when the nickel price is reaching 10-year highs and investors are looking for new discoveries."

New Seismic Targets

Key features of the three new targets are:

- S3 – located within an unexplored south-dipping structure that intersects the Cathedrals Belt structure at depth. S3 is modelled with a dip-extent of 350m commencing at 210m below surface.
- S4 – located within the Transits Belt, an underexplored structure parallel and 1,200m to the north of the Cathedrals Belt. S4 is modelled with a dip-extent of 320m commencing at 475m below surface. The target was identified on seismic survey Line 1 and is 1,000m east of S2, also within the Transits Belt.
- S5 – located within an unexplored north-dipping structure parallel and 3,000m to the north of the Cathedrals Belt. S5 is modelled with a dip extent of 300m commencing at 250m below surface and was identified on Line 3.

The reflective properties of the new targets are consistent with the reflective properties recorded in the seismic for the known massive sulphides in the Cathedrals Belt. All targets are within an intrusive structure, which is a favourable setting for potential massive sulphides. ***AMR***



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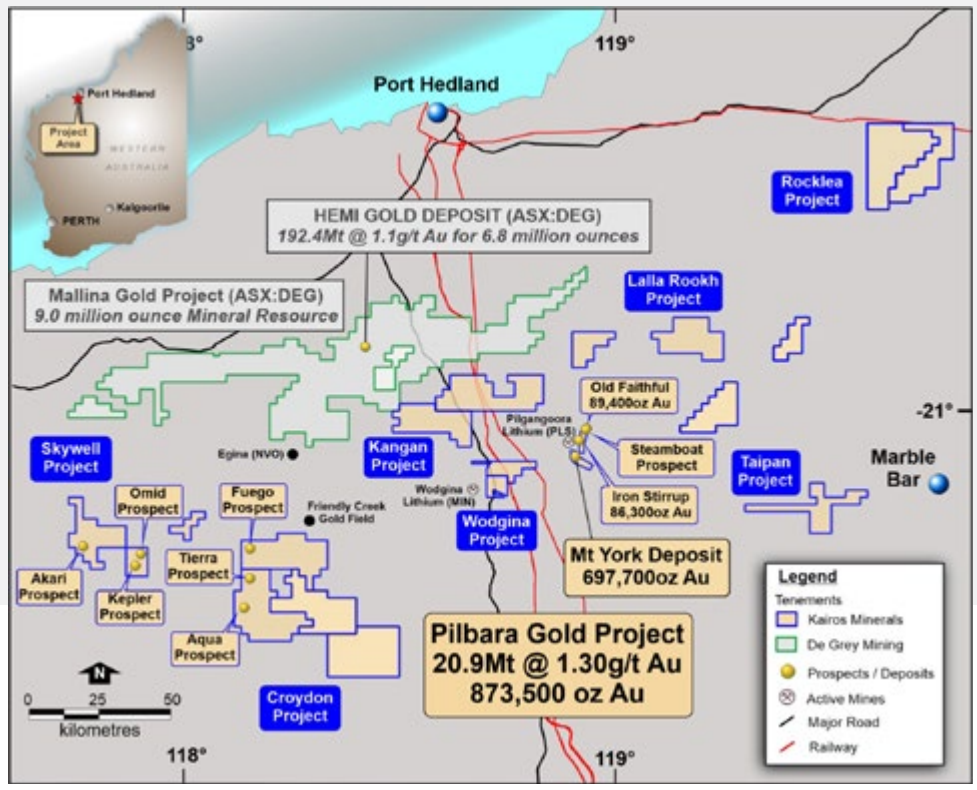
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Kairos Minerals Defines New Gold Target At Mount York Project



Kairos Minerals Ltd (ASX: KAI) has identified a significant new greenfields gold target located outside the current Mineral Resource base at its 100%-owned 873,500oz Mt York Gold Project located in the Pilbara region of Western Australia.

The company has received highly encouraging assay results received from rock chip samples collected at the newly-identified Steamboat prospect, with values up to 4.6g/t Au.

In addition, the company has received assay results from five more Reverse Circulation (RC) holes drilled last year at the Mt York Project. Assay results are pending for 23 drill holes.

"The discovery of an exciting new gold target outside of the current 873,500oz Mineral Resource inventory at Mt York is a great way to start the New Year," Executive Chairman, Terry Topping, said.

"Given the proximity of the Steamboat prospect to the existing Old Faithful deposit and the strength of the surface rock chip samples and mapping, this is shaping up as a priority focus for our exploration activities at Mt York in 2022.

"The discovery of new zones with the potential to increase our resource base is an exciting development and we are looking forward to returning to this area with drilling during the 2022 field season.

"We have already completed an extensive drone survey and mapping for the new Steamboat prospect and heritage surveys have already been completed and approved.

"The slow turnaround of assay results remains an ongoing industry-wide frustration, and we are still awaiting assays from a significant number of holes drilled at Mt York last year. That said, we are continuing to see some very encouraging results which will be incorporated into a future resource upgrade and ongoing mining studies.

"We look forward to updating the market on numerous other upcoming gold and lithium exploration activities in the near future and reporting additional results from RC and aircore drilling completed last year."

Steamboat Prospect

The first-stage geochemistry sampling programme conducted by Kairos geologists and contractors identified a new target area, located approximately 500m south-east of the Old Faithful deposit, with anomalous rock chip samples of up to 1.1g/t Au coincident with an arsenic-in-soils anomaly trend.

The anomalous gold results were returned from brecciated cherts and BIFs. The company followed up the initial results with a drone survey, rock chip sampling and a heritage survey.

Kairos has received initial results from the second-stage rock chip sampling programme, with assays of up to 4.6g/t Au confirming and extending the target area.

The high-resolution drone survey assisted the field mapping, and a digital terrane modelling (DTM) was generated. Critical geological features were observed from the drone survey and will assist with further mapping and drill-hole planning.

A heritage survey was conducted over the target area late last year in order to obtain access clearances for drilling.

Mount York RC Drilling Program Kairos has received assay results from five more RC drill holes completed at the Mt York Project.

KMYC183 returned exceptional assay results and extended a historical thick intercept of 117.4m @ 1.97g/t Au some 50m down-dip.

The results are from four-metre composite samples, with one sample returning 4m @ 6.16g/t Au from 108m.

Drill-hole KMYC187 returned a significant result of 28m @ 0.85g/t Au from 76m in "the Gap" area west of the historical Breccia Hill pit, where minimal historical drilling has been conducted.

This result included a zone of 4m @ 2.22g/t Au from 100m.

Significant results from the last assays received are:

- 80m @ 0.93g/t Au from 108m in KMYC183, including: 12m @ 2.73g/t Au from 108m and 4m @ 6.16g/t Au from 108m, including: 4m @ 2.37g/t Au from 172m, and 4m @ 2.12g/t Au from 184, and 4m @ 0.98g/t Au from 184m.
- 4m @ 0.68g/t Au from 84m in KMYC184 and o 4m @ 0.56g/t Au from 116m, and 4m @ 0.73g/t Au from 132m, and 8m @ 2.06g/t Au from 172m, including 4m @ 3.37g/t Au from 172m.
- 56m @ 0.99g/t Au from 96m in KMYC186, including 4m @ 3.38g/t Au from 108m, and 4m @ 2.61g/t Au from 148m.
- 28m @ 0.85g/t Au from 76m in KMYC187, including: 4m @ 2.22g.t Au from 100m.
- 8m @ 1.31g/t Au from 96m in KMYC188, and 8m @ 0.53g/t Au from 128m

Assay results are pending for 23 drill holes.

All of the assay results received to date are from four-metre composite samples.

The single-metre samples are being collected, according to the results obtained from the composite samples, and submitted to Intertek Laboratories in Perth for gold and multi-element analysis. ***AMR***

Carnaby Obtains "Stunning" Drill Results At Lady Fanny

Carnaby Resources Limited (ASX: CNB) has described as "stunning" its initial drill results from the 100% owned Lady Fanny Prospect within the Greater Duchess Copper Gold Project in Mt Isa, Queensland.

The company says "exceptional" assay results have been received from the first five holes drilled at Lady Fanny outlining a broad shallow high grade copper gold deposit.

Significant results:

- LFRC009 – 27m @ 2.8% Cu, 0.8 g/t Au from 61m; incl. 9m @ 4.0% Cu, 0.3 g/t Au from 65m and Incl. 11m @ 3.3% Cu, 1.6 g/t Au from 77m
- LFRC013 – 20m @ 2.3% Cu, 0.5 g/t Au from 30m; Incl. 6m @ 5.5% Cu, 1.4 g/t Au from 38m
- LFRC012 – 17m @ 2.1% Cu, 0.9 g/t Au from 74m o Incl. 7m @ 4.2% Cu, 2.0 g/t Au from 77m

The company subsequently reported further high-grade intersects from a further six holes drilled at Lady Fanny, including: 40m @ 1.0% Cu from surface and 11m @ 1.7% Cu from 71m.

Managing Director, Rob Watkins, said that remarkably, the drilling at Lady Fanny by Carnaby represents the first known recorded drilling within the historical Lady Fanny mining lease area, of which Carnaby owns 100%.

He said ioutcropping copper gold mineralisation at Lady Fanny has been traced for over 400m strike length and these first drill results remain open along strike and at depth.

Lady Fanny is located only three km north of the high-grade Nil Desperandum's December 2021 discovery of 41m @ 4.1% copper, 0.5g/t gold. Both are located within a vastly underexplored and rapidly emerging >five km long major Iron Oxide Copper Gold (IOCG) corridor.

"These stunning first pass drill results from Lady Fanny just three km north of the spectacular Nil Desperandum high grade discovery really demonstrate the untapped potential of the greater than 5km long IOCG corridor that is rapidly emerging within the Greater Duchess Copper Gold Project," Mr Watkins said.

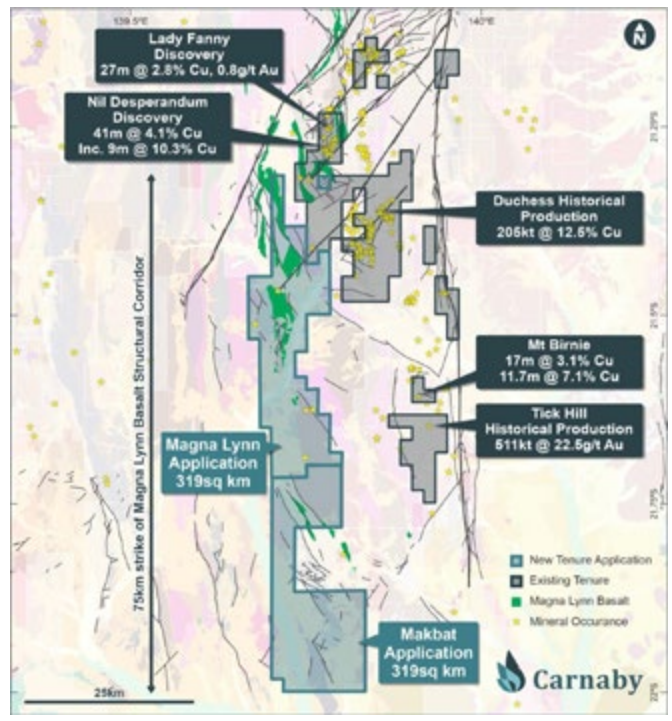
He said the broad intervals of high-grade copper and high-grade gold mineralisation at Lady Fanny is highly encouraging, clearly demonstrating shallow mineable open pit widths and grade.

Lady Fanny remains completely open and undrilled to the north of the high-grade result in LFRC013 and to the south results from a further four holes drilled are awaited as well as results from two additional RC holes drilled at the Burke & Wills prospect.

Mr Watkins said the Lady Fanny results and high-grade Nil Desperandum discovery demonstrate how vastly underexplored the >5km long Iron Oxide Copper Gold (IOCG) corridor is and the potential of this corridor to develop into a major new copper gold district.

Carnaby plans to complete a major drill out of the >400m strike of the Lady Fanny lodes and explore for additional strike extensions to the north, where the mineralisation tracks under quartzite scree slope cover, and to the south where the outcropping mineralisation tracks under shallow alluvial cover.

The Lady Fanny and Burke & Wills prospects will also be targeted with ground Induced Polarisation (IP) surveys to aid with drill targeting in search of large chargeability anomalies that may exist beneath the historical workings. ***AMR***



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Helix Intersects Further Massive Canbelego Copper

Helix Resources Limited's (ASX: HLX) diamond drill hole CANDD006 has intersected visible copper sulphide mineralisation at the Canbelego Main Zone target position near Cobar in NSW.

The zone lies approximately 50 metres down dip from the high-grade intercept of 18m at 3.4% Cu intersected in May, 2021 (included 14 metres at 4.22% Cu).

The Main Zone intercept occurs from 405 to 434 metres comprising mainly incipient veins and disseminated chalcopyrite (CuFeS2 – copper sulphide mineral) and includes approximately 1.3 metres of massive to semi-massive chalcopyrite from 425.2 metres.

Several intervals of mineralisation were observed higher in the hole which support the interpretation of parallel lode positions to the west of the Main Zone:

- from 80 metres a 20-metre interval of oxide copper minerals, malachite and possibly chalcocite; and
- between 100 to 200 metres downhole – several zones with scattered chalcopyrite veins, some associated with narrow quartz-breccia and quartz veins, including two observations of high-tenor copper mineral, Bornite (Cu5FeS4) with coarse grained chalcopyrite in sugary quartz.

A 12 to 15 hole RC drill programme has commenced to test for parallel lode positions to the south-west. VTEM and soil geochemistry also indicate potential for new lodes to the north-east, but with denser vegetation cover further target definition work is planned here prior to clearing access for drilling.

Helix Managing Director Mike Rosenstreich said Cobar style copper deposits commonly present as a series of structurally controlled, parallel lodes. Helix is developing its exploration strategy around a Cobar deposit model.

"This is an encouraging start to the resumption of drilling at Canbelego. We have done a lot of work to understand the prospect scale geology and controls on the copper mineralisation – including how to target some of the higher grade, massive copper-sulphide shoots such as we hit in May last year, 18 metres at 3.4% copper," Mr Rostreich said.

"It's still very early days but we are also very interested to test the concept of repeat lodes which is typical for the 'Cobar Style' of copper deposits, which are often blind at surface or have small footprints but can extend for up to several thousand metres vertically.

"The mineralisation we observed higher in the hole may correlate with anomalous copper mineralised zones hit at shallow levels in drill hole 5 last year. This fits with an observed trend in some other historical drill holes in the project area and has helped develop our emerging parallel lode target concept.

"We have just commenced RC-drilling at Canbelego to test some shallow mineralised positions at the Main Zone as well as these possible new, parallel lode positions to the west." ***AMR***

Miramar Identifies Promising New Target At Gidji JV

Miramar Resources Limited (ASX:M2R) has identified the new "Highway" target with exploration activities at its 80% owned Gidji JV Project, located 15km north of Kalgoorlie in the Eastern Goldfields region of Western Australia.

Re-examination of historical data, in particular historical auger data, has identified a 1km long auger Au anomaly parallel to the Marylebone and newly outlined Blackfriars targets.

The main part of the newly identified "Highway" target has not been tested by historical or recent drilling however two historic aircore holes at the western and northern edges of the target (PKAC527 and PKAC034 respectively) both intersected 4m @ >0.5g/t Au.

In addition, a number of aircore holes completed by Miramar at the southern end of the target, testing the Piccadilly target, increase in grade in a north westerly direction towards the main part of the auger anomaly.

Executive Chairman, Allan Kelly, said the identification of another new target at Gidji reinforced the potential for a significant new gold camp, with multiple new gold deposits, to be discovered.

"The Gidji JV Project is located in a prime geological position within a major mineralised structure and along strike from several large gold deposits," Mr Kelly said.

"Outcrop is minimal with the most prospective geology and structures obscured by transported material and the northern 50% of the Project also covered by recent lake sediments," he added.

"Over the last 12 months, we have shown how underexplored this project is with significant new results coming from every drill programme and the identification of several new targets beneath shallow cover, each capable of hosting a significant new gold deposit.

"The identification of a large new target straddling a major highway is further evidence of how underexplored the Gidji Project is and the significant opportunity we are uncovering," he said.

Upcoming Work

The company is currently awaiting results from the Phase 5 aircore drilling programme completed in late 2021 and is planning a substantial exploration programme at Gidji during 2022 including:

- RC bedrock testing of the Marylebone target in the first quarter of 2022
- Extending the detailed ground magnetic survey over the northern Boorara Shear Zone
- Aircore (+/- RC) drilling of various targets including: Blackfriars (infill) Highway, Boorara North and Boorara South
- Refining "The Jog" target for RC and/or diamond drill testing

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WoodMac Says 2022 Will Be A Year Of Rebalancing For Metals And Mining

If 2021 was the year of rebound for metals and mining (M&M) commodities, then 2022 is shaping as the year of rebalance, according to leading international resource sector research firm Wood Mackenzie.

"The most likely outcome is an environment where commodity prices can settle from the extraordinary highs of 2021. But there are plenty of risks to this outlook. The pandemic's tendrils continue to ensnare markets for all mined commodities," Wood Mackenzie vice chair, Julian Kettle, said recently.

According to Mr Kettle, much of the evidence points to a year of lower demand growth. Government stimulus could wane, while fiscal and monetary policy will tighten. 2022 should be a year when supply chains refill and start to better meet the needs of consumers.

"But there is plenty of uncertainty. With lockdowns out of favour in most places, the demand risks from new variants may be usurped by supply and logistics impacts, as workers isolate or refuse to vaccinate. Stimulus could be prolonged too, as governments, and central banks, fret more about the impact on growth than the looming inflation risk. China's economy-versus-emissions dilemma will be critical to M&M markets."

Supply: Investment muted despite supply constraints and earnings boom

WoodMac says mine supply shortages and logistics constraints will remain a feature across M&M markets in 2022. The European and Chinese energy crises are unsolved, directly affecting coal prices, and keeping input costs higher across all products, particularly the energy-hungry base metals. Logistics bottlenecks, container and chip shortages, plus some unhelpful trade policies, will also keep regional price differentials and product premia skewed.

"Supply will improve, but we do not expect a meaningful investment spike this year, despite the reinvigorated balance sheets of M&M companies. An obvious question is where will the record earnings of 2021 be directed?" Vice president Robin Griffin, said.

"We know that the diversification trend from fossil fuels to future facing commodities will continue, but there has been a dearth of capital allocated to organic growth from diversified miners."

Decarbonisation: Increased scrutiny to drive surge in low cost abatement

With COP26 fresh in the memory, and COP27 already looming, WoodMac believes miners can expect mounting pressure to meaningfully align with a 1.5-degree warming scenario. Calls for comprehensive net zero plans, and more sophisticated disclosure, will increase this year as investors seek to rank assets on ESG metrics.

"Miners and consumers will understandably focus on decarbonisation options that make the most economic sense. So, expect a plethora of new renewable PPAs and captive solar and storage plans this year at production sites.

"Mine haulage will get plenty of attention too with Komatsu's 930E hydrogen fuel-cell haul truck trial at Anglo's Mogalakwena platinum mine worth watching. But also look for more traction on battery, gas, bio- and green-diesel haulage options," Mr Kettle said.

Urban mining - recycling and scrap use - will be front of mind for consumers, both as a low cost decarbonisation option in ferrous markets and a potential solution to looming supply deficits elsewhere. Expect plenty of noise from the nascent battery recycling sector.

Costs: Inflation to hasten margin decline

Cost inflation was a global phenomenon in 2021, and for the second year in a row will continue to affect most miners and smelter-refiners. Wood Mackenzie's 2022 mine estimates include modest cost rises in 2022 but the risk is to the upside. Labour, fuel and electricity costs remain elevated as supply struggles.

Mine labour costs, in particular, could gather momentum due to a combination of lockdowns, sickness and worker movement restrictions that are exacerbated by vaccine mandates. Attracting and retaining skilled mine labour is difficult, particularly in coal markets, and especially where competition from miners of battery raw materials or base metals is high.

The cost increases, combined with revenue falls, will accelerate the decline of margins in 2022. Average annual margins will stay close to 2021 highs, but by year's end the current record profits will have fallen to below pre-pandemic levels for most commodities.

China: Both underpinning and undermining commodity markets

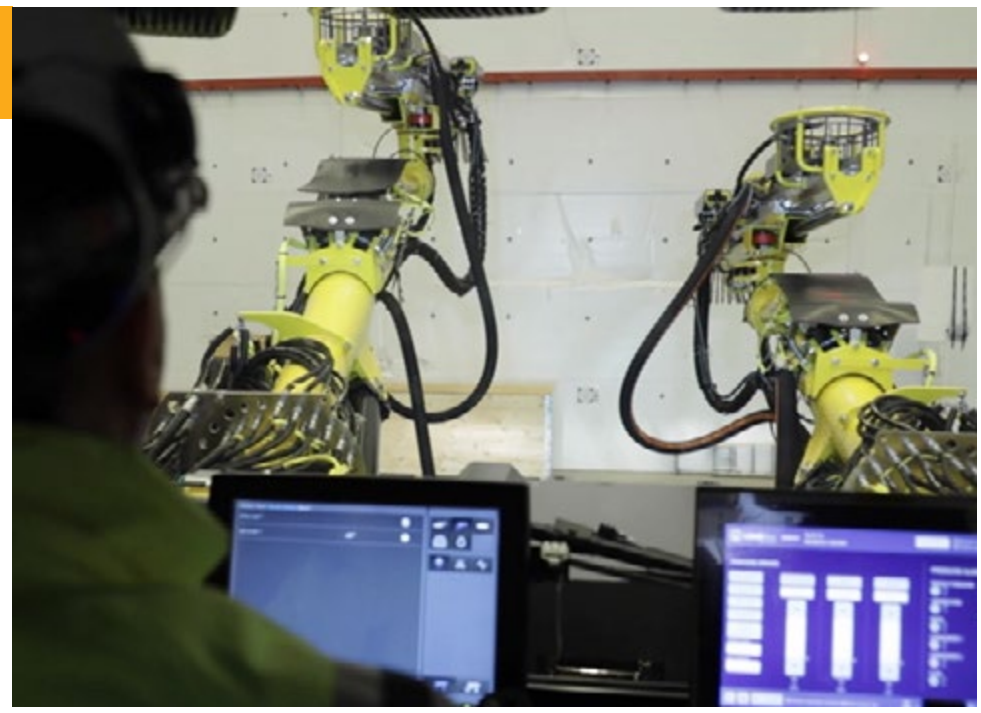
China, as ever, will dominate market outcomes across M&M commodities. Decisions around geopolitics, pollution control and energy consumption will be of particular importance.

"We see little chance of an end to current bans on Australian coal imports this year, and major improvements in global bilateral relations are probably too much to ask. Prices for energy commodities in China will remain higher-than-necessary, with implications for energy prices that in turn affect producers and consumers of M&M products," Mr Griffin said.

China's approach to decarbonisation and pollution targets will drive uncertainty and volatility. Summary closures of energy intensive industries in order to meet emissions targets have been the modus operandi under China's 'dual control' regime. While the 2021 closures were bad for steel raw materials and alloys demand, complementary pollution controls saw mined output more than offset demand losses.

Meanwhile, base metals markets saw power-hungry smelter production plummet overnight, creating global supply shortages. Expect more interventions in 2022, although with broadened carve-outs to limit the kind of wild price swings seen last year. ***AMR***

Avatel To Debut At Australian Mine In 2022



The world's first mechanised development charging system, Avatel is set to enter Newcrest's Cadia underground mine in Australia the later half of 2022 as the first commercial trial globally.

Co-developed by Epiroc and Orica, Avatel is a first-of-its-kind semi-automated explosives delivery system designed to remove people from harm's way and drive productivity in underground development operations.

The innovation enables a single operator to prepare and wirelessly charge a development face from within the safety of an enclosed cabin, while providing superior blast control and operational reliability with Orica and Epiroc's flagship technologies.

The award-winning solution will offer mine operators like Newcrest, the largest producer of gold in Australia an effective solution to keep personnel out of harm's way, by moving from traditional to mechanised development charging.

A critical enabler of Avatel is the second-generation wireless initiation initiating system, WebGen 200 which will eliminate the need for wired connections and subsequent exposure to crews at the face, enabling continued and safe access, even in poor or seismic ground conditions, to accelerate.

Newcrest's Group Manager for Directional Studies and Innovation, Tony Sprague, said this will be the first commercial deployment of the Orica and Epiroc co-developed system anywhere in the globe.
"We do expect teething issues as is common when deploying any new technology.

"However, it will be well worth it if we can ensure our tunnel faces are charged with all human work completed from the safety and comfort of Avatel's operator cabin."

Avatel is currently undergoing trials at Epiroc's Kvantorp underground test mine in Sweden under controlled conditions before heading to Agnico Eagle's Kittila mine in Finland to complete extended underground trials in the production environment.

Australia will receive the first commercial unit in the second half of 2022, with Canada following closely toward the end of 2022. ***AMR***

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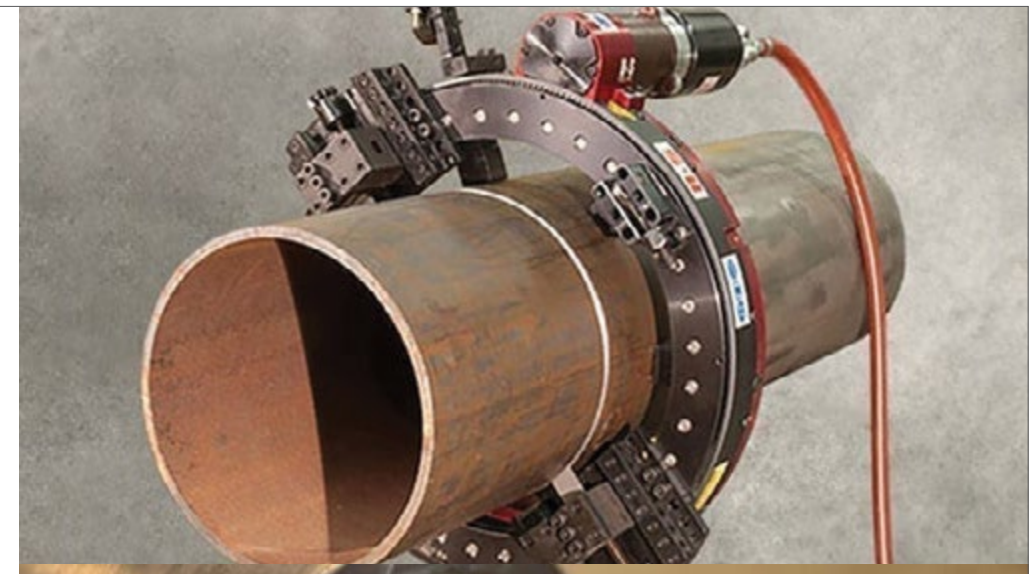
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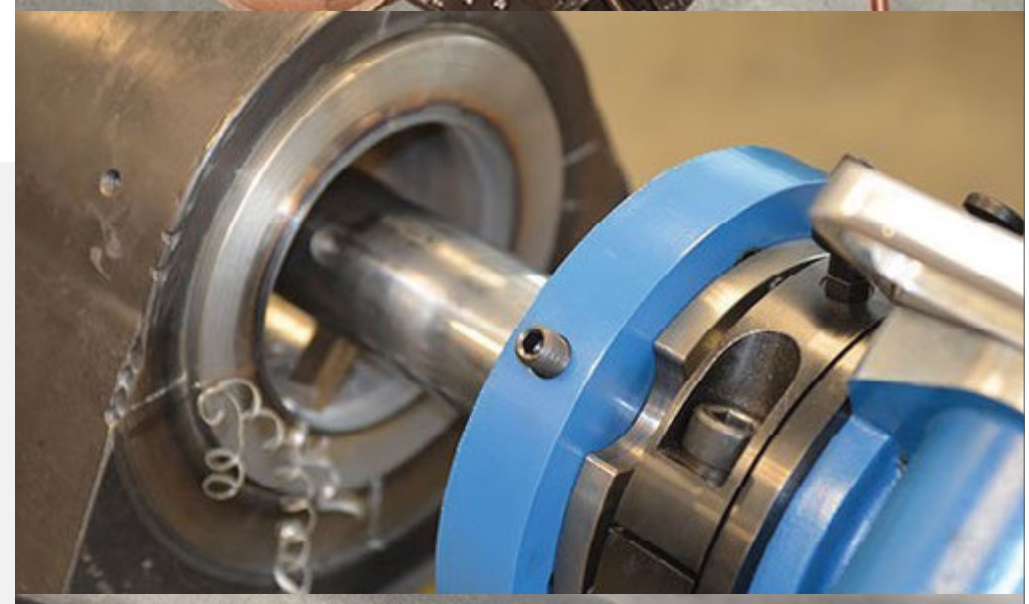
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Chris Gibbs - CEO and MD, Marty Weems - Head of the US business, Sara Stotter – Geologist Dwight

Australian Rare Earths Specialists Signed Up For Key US Energy Project

Australian miner, American Rare Earths (ASX:ARR) has joined a US Department of Energy project partner in developing rare earths supply chain security for the US.

The company's wholly owned subsidiary Western Rare Earths Corp. has been named a Team Member of Critical Materials Institute (CMI); a U.S. Department of Energy (DOE) Energy Innovation Hub.

The company's assets have been identified as having the potential to be some of the largest rare earth deposits in the United States.



Kinnes - Chief Technical officer on site at the Halleck Creek Project in Wyoming.

The agreement means Western Rare Earths now sits alongside the world's second-largest metals producer Rio Tinto on the highly esteemed Critical Materials Institute (CMI) Team Members list, with both companies the only rare earths miners in the select group. Other members include leading universities, national laboratories and other private companies.

The Critical Materials Institute (CMI) is a multi-institutional, multi-disciplinary consortium led by the Ames Laboratory. CMI is an Energy Innovation Hub of the U.S. Department of Energy. Its focus is innovation to assure supply chains for materials critical to clean energy technologies with special focus on the Rare Earths supply chain for the United States.

These critical materials are essential for American competitiveness in clean energy, including wind turbines, solar panels, electric vehicles, and energy efficient lighting. The Department's "Critical Materials Strategy" reported that supply challenges for five rare earth metals may affect clean energy technology deployment in the coming years. CMI is a public/private partnership, led by the Ames Laboratory, that brings together the best and brightest research minds from universities, national laboratories, and the private sector. The shared goal is to find innovative technology solutions that will help avoid a supply shortage that would threaten the US clean energy industry as well as security interests.

Strategic objectives for Team Members include opportunities to drive R&D, the option to license technology for deployment, and provide input to CMI research programs. CMI Team Members have research subcontracts from CMI or are providing cost sharing funds.

Requirements include specific research project deliverables within the entity's areas of expertise, based on a scope of work and a negotiated budget, including cost-share as applicable.

Western Rare Earths' invitation to become a CMI Team Member is a result of being a cost sharing co-applicant to a recently approved CMI R&D project expected to be announced in early 2022. The project includes other CMI Team Members, in the National Lab and University categories, as the primary researchers and Western Rare Earths providing feedstock, beneficiated Rare Earths mineralised ore, and industry guidance.

Marty Weems, CEO of Western Rare Earths and the President for the US Business Unit of American Rare Earths says that as a member of the Critical Minerals Institute the company will be working with some of the brightest minds in the world leading the innovation efforts to assure the supply chain for materials critical to the United States.

"Marty and the US team have been working diligently with various R&D partners to establish our presence with a number of the rare earth innovation efforts," American Rare Earths CEO, Chris Gibbs, said.

"It's our vision to be more than just a mining company but rather a technology leader in this space: vertically integrated and one day producing the rare earth metals that are critical to our future. It's our strategy to not only focus on developing our rare earth mining projects that have some of the cleanest ore in the world but to work collaboratively with R&D leaders building processing and refining capability, using new, disruptive, green and clean technologies that will provide critical minerals for future generations. Becoming a member of the Critical Minerals Institute is one important step in the pursuit of our vision and the journey that lays ahead." ***AMR***

Australia and South Korea Join Forces On Critical Minerals

Australia and the Republic of Korea are further strengthening cooperation in resources and energy with a new agreement on critical minerals.

A Memorandum of Understanding on Cooperation in Critical Mineral Supply Chains was recently signed when South Korea President Moon Jae-in visited Australia to mark the 60th anniversary of diplomatic ties.

Minister for Resources and Water Keith Pitt signed the agreement with the Minister for Trade, Industry and Energy of the Republic of Korea, Moon Sung-wook.

"The MOU will deliver on a shared ambition between our two countries to develop robust and commercially viable critical minerals supply chains," Minister Pitt said.

"The Republic of Korea is one of our nation's top trade and investment partners for resources and energy and this agreement will build on our existing links.

"It will foster Korean investment in Australian critical minerals projects and boost our exports, while the Republic of Korea will secure a reliable supply.

"Australia has rich deposits in critical minerals including rare earths, lithium, graphite, cobalt and nickel, and we are developing our capability in downstream processing.

"We share the Republic of Korea's ambitions to develop a fully integrated supply chain in critical minerals and look forward to increasing Korean involvement in the local sector."

The MOU builds on previous commitments outlined in the 2019 Memorandum of Understanding between Australia and the Republic of Korea on Energy and Mineral Resources Cooperation.

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Liontown Orders SAG Mill For Kathleen Valley Lithium Project

Liontown Resources Limited (ASX: LTR) has awarded a key contract to Metso-Outotec for the design, fabrication and delivery of a Semi Autogenous Grinding (SAG) Mill for its flagship Kathleen Valley Lithium Project in Western Australia.

Following the completion of the Definitive Feasibility Study (DFS) for Kathleen Valley in November 2021, the vompany has completed further engineering optimisation to confirm the scope and duty of the SAG Mill to a sufficient level of detail to enable it to place the order with Metso-Outotec.

The contract, which has a value of ~A$10 million and is in accordance with DFS estimates, is for the design, fabrication and delivery of a 7.9m (26") diameter and 4.4m effective grinding length 5.5MW SAG Mill.

This is inclusive of all lining, lubrication, cooling, electrical and mechanical drive systems necessary for installation and commissioning.

The SAG Mill will accommodate both base production of 2.5Mtpa and the planned expansion to 4Mtpa in Year 6 of the mine plan.

The SAG Mill is one of several critical long-lead items identified for early award and represents the largest single piece of equipment required to be purchased for the Project by size, value and lead time.

Detailed engineering and design for the A$473 million Kathleen Valley Project continues and Liontown is targeting the award of all key equipment packages over the next six months to maintain schedule and meet its target of first production of lithium concentrate in 2024.

Metso-Outotec is a class-leading processing equipment supplier with multiple comparable mill installations in operation across the world. It is a frontrunner in sustainable technologies, end-to-end solutions and services for the aggregates, minerals processing and metals refining industries globally.

Liontown's Managing Director and CEO, Tony Ottaviano, said other key project deliverables including final permitting and securing the Engineering, Procurement & Construction Management (EPCM) partner to build and commission the Kathleen Valley Project are progressing to meet the targeted Final Investment Decision (FID) milestone by the end of Q2 2022.

"The SAG Mill contract is the first of the long-lead items to be ordered and represents an important milestone for the Kathleen Valley Project," Mr Ottaviano said.

"Placing this significant order with a world-class partner in Metso-Outotec is a great way to start the year and reflects our commitment to advance the Kathleen Valley Project rapidly towards first production.

"Detailed engineering and design work continues to advance, with the vompany's recent $450 million share placement ensuring that Liontown is well capitalised to progress the Stage 1, 2.5Mtpa development at Kathleen Valley, including the early award of the SAG Mill and other key long-lead items.

"This will enable us to lock-in production slots, maintain our development schedule and meet our target of achieving first lithium concentrate production in 2024."

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Rio Tinto Going Electric With Pilbara Trains

Wabtec Corporation (NYSE: WAB) has received an order from Rio Tinto for four FLXdrive battery-electric locomotives to support sustainable operations of the mining company's rail network in the Pilbara region of Western Australia.

The 100-percent, battery-powered locomotive will help Rio Tinto's effort to achieve a 50-percent reduction in Scope 1 and 2 carbon emissions by 2030.

"Our partnership with Wabtec is an investment in innovation and an acknowledgment of the need to increase the pace of our decarbonization efforts," said Rio Tinto Iron Ore Managing Director of Port, Rail and Core Services, Richard Cohen.

"By locking this in now, we are making progress in our efforts to reduce our Scope 1 and 2 carbon emissions by 50 percent by 2030."

Rio Tinto ordered the newest version of the FLXdrive battery-electric locomotive, which features an energy capacity of seven megawatt-hours (MWh).

Based on the route from the mine to the port at Dampier in Western Australia and Rio Tinto's mainline rail operations, the FLXdrive is anticipated to reduce the company's fuel costs and emissions in percentage by double digits per train.

"The FLXdrive is ideally suited to support Rio Tinto's sustainability targets for their Pilbara system," said Rogerio Mendonca, President of Freight Equipment for Wabtec.



"This locomotive provides the tractive effort, fuel savings, and emissions reductions to cost-effectively run rail networks in the mining industry. The rapid adoption of the FLXdrive by Rio Tinto and other mining operators demonstrates the industry's commitment to decarbonizing their operations. This solution represents a major step toward achieving zero-emission locomotive fleets in the future."

Wabtec will deliver the FLXdrive battery locomotives to Rio Tinto in 2023. The mining company plans on using the locomotives in multiple applications including as a shunter in the railyard and ultimately in mainline service.

In mainline operations, Rio Tinto currently uses three diesel-electric locomotives in a consist to pull trains with 240 cars hauling about 28,000 tons of iron ore.

The FLXdrives will transition from the diesel locomotives in mainline service to form a hybrid consist, and recharge during the trip through regenerative braking and at charging stations. Wabtec's next generation energy-management software system will determine the optimal times to discharge and recharge the batteries along to route ensuring the most fuel-efficient operation of the entire locomotive consist during the trip.

"Rio Tinto is a progressive leader in the mining industry adopting advanced technologies necessary to drive sustainable, efficient operations that deliver results for its customers, shareholders, and communities," said Wendy McMillan, Regional Senior Vice President South East Asia, Australia, and New Zealand for Wabtec.

"We are proud to continue our long-standing relationship with Rio Tinto and support their efforts to reduce emissions and operating costs with the FLXdrive battery locomotive." Wabtec continues to build momentum in the mining and rail markets for the FLXdrive battery locomotive.

The FLXdrive is the world's first 100-percent, battery-powered locomotive, and part of Wabtec's vision to develop the next generation of zero-emission locomotives. The company has a clear path in the rail industry to power new locomotives – and repower existing locomotives – with batteries, hydrogen internal combustion engines, and hydrogen fuel cells.

It is part of Wabtec's vision for the rail industry to play a key role in building a clean energy economy and will enable the reduction of up to 300 million tons of global carbon emissions. ***AMR***

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Soaring Industrial Demand & Supply Crunch = Chinese Energy Crisis

China's ongoing energy crisis reached its peak in Q3 of 2021. At the peak, the energy problems were largely due to a coal shortage. The country's 'double carbon' drive – a series of policies that aim at carbon neutrality – was part of the reason for this. While clearly laudable in many respects, 'double carbon' has led to some of the world's strictest regulations surrounding coal production and use. And, in 2021, this clashed with surprisingly strong industrial demand for energy.

An unexpected COVID dividend

In the first three quarters of 2021, China's total energy demand grew by 14% compared with the equivalent period in 2020. For comparison, total energy demand for Qs 1-3 of 2020 was up only 3% compared to 2019. Industrial demand for coal was driven in part by the very strong post-COVID economic recovery that China has enjoyed. But the situation in 2021 was exacerbated by events in Europe, the USA and ASEAN (the Association of Southeast Asian Nations).

In Europe and the USA, a radical improvement in vaccination rates in 2021 aided a general economic recovery that resulted in soaring demand for manufactured goods from China. Meanwhile, the outbreak of Delta in ASEAN caused unprecedented factory shutdowns throughout the region. The customers of these ASEAN factories then shifted most of their demand onto Chinese suppliers. As a result, Chinese exports reached record highs.

All this helped contribute to a situation where demand for energy from Chinese industry by late 2021 was the highest it had ever been. With four industries alone accounting for 25% of total energy demand: non-ferrous metals, chemicals, steel, and non-metallic minerals.

A supply crunch

The energy crisis was (and continues to be) exacerbated by several factors on the supply side.

China's 14th five-year plan – running from 2021-25 – is designed to help the country hit new targets that have been set by central government. These include hitting peak emissions before 2030 and achieving total carbon neutrality by 2060. To that end, in 2021, China was striving to reduce energy consumption per unit of GDP by 3%.

On top of this, China's national development and reform commission introduced a measure known as "dual control", which is designed to reduce both total energy consumption and energy consumption intensity. Areas that fail to reduce energy consumption intensity are given official warnings, leading to some local governments in 2021 deliberately restricting or rationing power, causing power outages.

The practical, real-world impact of dual control is that reductions in energy consumption intensity get much higher priority than reductions in total consumption. Additionally, regions that export power to other regions (i.e. where the self-sufficiency rate exceeds 100%) are in a strong position, while regions that import electricity are at higher risk of being impacted by power problems.

Finally, strict safety regulations surrounding coal mining in China make it still more difficult to rapidly scale up output as a response to price rises. And a major drought last summer also hit hydropower generation, meaning that the energy network in Q3 2021 was more dependent on coal than ever before.

A crisis that will be felt outside of China too

In response to these problems, Chinese authorities raised coal production targets for the fourth quarter of 2021 to 12 million tons (compared to 10 million tons in a normal year). This will not be enough to solve the problem on its own, but it should ease matters. Additionally, the government has also put in place a pricing policy to ensure that the allowed fluctuation range in coal prices cannot exceed 20%, although the largest energy users are not covered by this and some have seen their energy prices go up by over 30%. Ultimately these pricing policies are likely to see revenues in the power industry increase by between 6 and 15%, but it will not be enough to offset rising costs at power generation companies, meaning that profits will still be squeezed badly.

At the height of the crisis, the largest energy consumers – such as chemical and steel companies – found energy prices so prohibitive that they had to restrict their own production. This caused the prices of their own products to rise, which helped many to maintain at least some degree of profitability.

For less intensive power users, the energy shortage led to problems such as rising raw material prices and delayed deliveries.

The Chinese energy crisis eased in Q4 but continues to have important impacts on manufacturing industries. Ultimately, the impacts will ripple out of China and will be felt across the entire global industrial value chain. The general rise of electricity prices that the market is still experiencing is causing further rises in the overall costs of manufactured goods. And, as inflation increases, the marginal increase in raw material prices slows down, meaning that the profits of energy intensive industries will be eroded.

Jan Zheng has a 20-year background in industrial design and strategic research leadership, Jan brings a deep and diverse set of research skills to the table.



She heads up our APAC operations and is a Senior Research Director for our Industrial Automation and Robotics research groups. ***AMR***

The Four C's Of Post-Pandemic Construction: Complex Challenges, Culture And Climate

BY PETER SALVESON, CEO OF HANSEN YUNCKEN

Like a double-edged sword, the construction industry's ability to operate throughout Australia's COVID-19 restrictions has presented its own unique challenges.

In 2022, the sector must continue to adapt to address fresh, emerging priorities: delivering increasingly complex builds, maintaining a safe and positive workplace culture and climate action.

The Remote Era

Like many industries, the pandemic pressed 'fast forward' on the adoption of several innovations and opportunities across the construction sector. The ability to work remotely was suddenly essential to many projects, calling for digital innovation and lateral solutions.

Some might say the better part of the last two years have seen us perfect remote working, with newfound technology undeniably here to stay - even reshaping the way we build.

With this, comes the construction industry's broadened ability to deliver more complex challenges and refine more efficient and precise processes.

One example of this emerging technology is Building Information Modelling (BIM). The innovation enables teams to not only create projects in a digital environment, but to meticulously plan each step of the process, enabling them to foresee where clashes between trades may occur and to rectify this through careful coordination of services.

Combined with 360 degree videography and drone deployment, this technology allows an entire build to be monitored remotely in real time. The benefits of this are multifaceted, and not only improve productivity and quality of the build itself, but allows any safety hazards to be identified early. These can be duly corrected without impacting timings, delaying the projects or increasing usage of materials.

Looking ahead: how will digital innovation rebuild Australia's construction industry?

Digital innovation in construction supports creativity and explorative design without concerns, or impact, of the 'real world' environment. When you consider the rapidly evolving landscape humans face, this in itself is a game changer.

There is tremendous power in this ability, particularly when combined with a 'big data' approach, to collect and collate information to inform project planning. Doing so will help create better, more significant learning outcomes which in turn lead to greater efficiencies, outputs and ultimately client satisfaction.

Currently, Hansen Yuncken is implementing a centralised platform that allows us to collect data from across multiple projects to innovate worksite safety, realtime reporting and quality control.

How culture and safety is supported by digital innovation

Digital innovation should be seized by industry leaders as an opportunity to project its greatest asset - its people. Improving site safety and boosting team morale, in turn increasing productivity, will prove crucial to the sector's future success.

While it may not be a widely adopted view, the construction sector must maintain a people-centric culture - regardless of how building practices evolve.

After all, building revolves around teamwork. Australia's prolonged border closures, both domestic and international, have resulted in skill shortages across the sector, highlighting an immediate need to train and strengthen its existing talent pool.

Breaking the mould, diversifying its workforce, is also essential to overcome these challenges. While the sector is strongly, traditionally, dominated by males, we expect the longstanding gender imbalance to gradually even out. This is being made possible through an increasing amount of industry-wide efforts to elevate female presence in construction, particularly at a senior level.

Hansen Yuncken is proud to announce gender parity among its graduate intakes, with 50% being female, and a participation rate of 33% female at the executive level.

We will continue to prioritise increasing these rates, with a 25% target of female participation across the business by 2024.

Unsustainable practice is... clearly, unsustainable

With the Australian government's 2050 Net Zero commitment, all industries must adopt a progressive approach to sustainability as standard practice, rather than an 'add on'. Construction is no exception.

With the construction sector contributing over 18% of Australia's carbon footprint, there is serious work to be done. Organisations should look to greener materials, digital innovations to reduce wastage and work with their clients and stakeholders to reduce climate impact.

Becoming greener requires an end-to-end view of the construction process. After all, can a building be truly sustainable if it was carbon intensive to build? Addressing the complete supply chain is essential, which requires collaboration with suppliers and partners.

At Hansen Yuncken, this work has already started with the adoption of materials such as green concrete. Continuing innovation of business practices is also maximising the use of renewable energy and use of recycled water where possible.

At a community level, Hansen Yuncken works with local subcontractors to ensure clients' investments support local economies. Onsite education, and building knowledge in these areas, also adds to workforce capabilities to deliver future, sustainable projects.

Environmentally speaking, relocating wildlife is highly important to ensure Australia's unique biological diversity, as is creating new, green spaces.

The post-COVID construction industry is one that has not so much changed as rapidly grown. Sustainability, digital innovation and equality have always been a priority and, as lockdowns end, we will continue to build a better, shared future for generations to come. ***AMR***



Robotics Partnership Leads the Way For Better Productivity and Safety

A partnership between two leaders in the robotics industry is set to bring the latest inspection technology to the petrochemical, renewable energy and mining industries, enhancing capabilities in Australia and the United States.

Perth-based robotic inspection and testing solution provider Nexxis has entered a partnership agreement and development collaboration with Blueprint Lab, an Australian robotics company which develops advanced robotic arms for harsh environments.

The partnership will enable the world's smallest underwater robotic arm - Blueprint Lab's Reach Alpha – to be used by clients including top-side petrochemical companies, to support the inspection and maintenance of their assets.

The technology will be focused at onshore facilities but can be easily adapted for offshore assets such as oil rigs. Target regions will include Western Australia and Houston, where Nexxis has operations.

Nexxis Founder and CEO Jason De Silveira said the partnership was great news for these industries, ensuring ongoing access to the latest smart technologies.

"We look forward to continuing to collaborate and develop together, while solving both customer and industry challenges with the right solutions," he said.

"Petrol and chemical processing facilities and mining and renewable energy sites have infrastructure that needs regular inspection and maintenance.

"Our exciting partnership will enable Blueprint Lab's robotic arms to be integrated on Nexxis platforms, utilising our state-of-the-art software and technology to offer a complete comprehensive solution for clients tailored to their individual requirements."

Sam Perez, Nexxis' General Manager in Houston, said the technology would be invaluable for petrochemical companies, assisting them with non-destructive testing (NDT), close visual inspection (CVI) and foreign object search and retrieval (FOSAR) of their assets.

"Advancing dexterity and maneuverability capabilities is crucial for the future of robotic technology. This collaboration is an exciting step forward on this journey," he said.

Blueprint Lab products offer complex inspection and intervention for industries including maritime infrastructure management, military/police operations such as special recovery, marine science and autonomous robotics research applications.

Blueprint Lab's Business Development Manager, Anders Ridley-Smith, said Reach Alpha would "enable companies to inspect and maintain their assets without downtime, thereby increasing productivity".

BluePrint Lab's robotic arms are used in all kinds of harsh environments, mainly subsea, but the applications can be easily transferred to above water situations.

The cutting-edge robotic arm technology, developed by Blueprint Lab in 2018, will be able to access confined spaces and hazardous areas which pose a risk to human operators. Its capabilities will include inspecting the condition of pipes and other infrastructure, checking for corrosion or cracking and recovering debris.

"Many large petrochemical companies have a mandate to remove humans from confined spaces and harsh environments by 2025," Mr Ridley-Smith said.

"This partnership will play a significant role in helping these companies on this journey."

Mr Ridley-Smith said Blueprint Lab had worked with Nexxis over the past three years and was excited about the latest collaboration.

"Nexxis is a leading petrochemical robotics company with a huge amount of industry knowledge and a global presence," he said.

"We see great value in this collaboration. Nexxis knows the industry's needs and we look forward to working together to develop specific solutions for our customers." ***AMR***



Industry Waits for Eureka - Or Urea - Moment

Australians might have heard of urea.

It's an important ingredient in agriculture fertilizer and yes, it's the chemical found in urine.

Though it may seem surprising that something found in every bathroom could be in such short supply, a series of unfortunate events have left industrial urea trade stifled and prices sky high.

Industry observers place blame on several issues; from American hurricanes temporarily closing down chemical plants to heavily congested ports.

The finger has also been pointed at COVID-19 and its impact on the energy sector, as both natural gas and gas from coal are used to produce the chemical.

But ultimately, Australia has been suffering because China completely banned urea exports last year to get a better grip on the country's out-of-control fertilizer prices.

Since the East Asian behemoth previously supplied Australia with 80 per cent of its urea, China's move has left farmers down under more than a little anxious.

But the gut punch has also been felt in the mineral resources sector, because urea is a critical component of a diesel exhaust fluid known as AdBlue – a product working behind-the-scenes to help power critical industries.

It isn't strictly necessary to make a vehicle drive, but it is necessary to make a vehicle compliant.

Australia, along with many other governments around the world, have mandated the engine additive be used to lower noxious emissions from diesel exhaust and convert them into harmless nitrogen and steam.

Run of the mill passenger cars run on diesel and AdBlue, as well as commercial vehicles, non-road mobile machinery and even trains.

The environmental requirement is designed to combat atmospheric pollution and smog in urban areas and is apparently working, with the Federal Government reporting significant air quality improvements over the last decade.

Given the obvious and direct threat to the transport and logistics sector, truckers have been sounding the alarm for months about the disastrous consequences of an AdBlue shortage on their profession and all interlinked supply chains.

And with diesel accounting for 41 per cent of the domestic mining industry's energy, it's also clear that an unresolved urea crisis could bring one of the country's great economic powerhouses to its knees. ***AMR***

Not Yet Greener on the Other Side



Australia's $234 billion mineral resources sector primarily uses diesel to power trucks and trains hauling ore and topsoil.

Steadily, operators have been looking to break their reliance on diesel and move to other energy sources, both to strengthen sector autonomy and bolster their green credentials.

Among the voices calling for a greener industry is Western Australian Mining and Pastoral Region MP Wilson Tucker, who has urged governments to prioritize more initiatives like Project Haber, a proposal for a 1.4mtpa urea fertiliser production facility to be built in WA's Mid-West.

The Project is slated to replace the country's reliance on more than $1 billion worth of fertiliser imports annually and reduce carbon loads associated with Australian farming.

Mr Tucker said Project Haber was a great example of prioritizing local production with environmentally-friendly results.

"I am optimistic about the prospect of increased domestic urea production, particularly here in Western Australia, such as Project Haber," Mr Tucker said.

"However, to ensure the long-term sustainability of the resources sector, we need to be exploring the opportunities presented by hydrogen as a fuel source.

"A number of mining companies, including Forescue, are already investing in hydrogen powered trucks and trains.

"The integration of hydrogen powered vehicles into the supply chain, combined with domestic hydrogen production, will guard against future supply chain disruptions and ensure the resources sector can continue to deliver value in a way that is environmentally responsible and sustainable."

Though fleets are slowly becoming electrified and hydrogen fuel cells are beginning to pepper the map, the industry's massive logistics demands have kept a diesel stronghold, which is predicted to only climb.

According to WA Mining and Pastoral Region MP Neil Thomson MLC, Western Australia's diesel consumption increased by over 60 per cent between 2011 and 2021 and the resources sector accounted for over a third of the Gross State Product.

Mr Thomson said it was clear unsolved issues with legally compliant diesel would be a critical hit to the economy; ramifications which have previously been felt in his home state.

"A pertinent example was demonstrated in my region in 2017 when heavy rains brought diesel supplies to a standstill at the Newmont mine sites located along the Tanami Road in the Northern Territory, costing millions in lost revenue," the Shadow Minister for Planning Lands and Heritage said.

"This event was a strong motivator for developing a gas pipeline to replace diesel fired electricity generation systems which also had the added benefit of reducing the mines carbon footprint.

"Worldwide strategic uncertainty means both the State and Federal governments should be planning for greater fuel self-sufficiency." ***AMR***

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Government on the Move

In 2020 the WA Government revised the Domestic Gas Policy to ensure security around general supply and gas needed to produce urea.

The Department of Mines, Industry Regulation and Safety's Jeff Haworth said the government also strongly supported the upstream domestic gas industry through a number of strategies.

According to the Geological Survey and Resource Strategy boss, these measures included producing high-quality geoscientific data to better understand the State's gas resources.

"We are also administering a successful petroleum and geothermal exploration scheme and developing legislation to facilitate greenhouse gas capture, transportation and storage," the Executive Director said.

At the Federal level, Indonesia agreed to hand Australia 5000 tonnes of refined urea in January.

Future deliveries were flagged as a priority among manufacturers, shipping companies and ports to make sure the chemical is fast-tracked.

Meanwhile, industry big wigs have formed an AdBlue taskforce to devise a long-term solution to Australia's urea needs, with members including the Chair of Manufacturing Australia, the former CEO of Dow Chemical Company and Australia's Chief Scientist.

Manufacturers and other industry stakeholders have also been granted special permission to collaborate on ways to increase the supply of AdBlue by the Australian Competition and Consumer Commission.

Ordinarily cooperation would breach national competition laws, but the Federal regular moved to suspend legal consequences in late December.

Under the new rules, industry can share information about stock levels, supply channels and manufacturing opportunities, while collaborating on production and implementing sales limits.

They can also prioritise the sale of urea and AdBlue to locations that need it most, but they are still unable to share information or reach agreements about price.

Perhaps most significantly, the Federal Government also struck a deal with fertilizer manufacturer Incitec Pivot to locally produce refined urea and ramp up supply of diesel exhaust fluid.

The agreement came merely a month after the ASX-listed multinational announced it would close its Gibson Island plant – one of Australia's largest fertilizer operations – because of an inability to secure a long-term gas supply.

Federal Industry Minister Angus Taylor said the deal was a big leap forward in providing Australian industries with certainty around chemical supply.

"This agreement with Incitec Pivot will enable domestic production of technical grade urea or supply of an AdBlue product to domestic manufacturers to ensure current supply chain disruptions don't impact on Australian businesses," Mr Taylor said.

"The ramping up of production by Incitec Pivot will be done without impacting agricultural fertiliser supply to local farmers or disrupting local distribution chains for AdBlue.

"This agreement is another important part of the Government's broader strategy to build supply chain resilience, which includes addressing shipping issues, ensuring local supplies of critical products and bolstering local manufacturing capability."

Following the Federal agreement, the Gibson Island facilities in Brisbane have been transformed to a 24/7 operation and feature quality assurance testing of AdBlue volumes.

An Incitec Pivot spokesperson said the newly commissioned work would ensure an adequate supply of the diesel exhaust fluid and alleviate short term supply concerns.

The spokesperson also said the revitalised Gibson Island initiative would be part of a long-term strategy to support the nation's diesel needs.

"Our expert teams worked non-stop throughout the holiday period to expand our domestic AdBlue manufacturing and distribution capability in response to Australia's AdBlue shortage, following limited supply from overseas suppliers.

"In the short term, Incitec Pivot Limited is focused on AdBlue production to ensure industry has volumes to service their markets.

"Longer term, we are assessing the manufacture of Technical Grade Urea to directly replace what was previously imported."

Australian Mining Review approached mining peak industry bodies for comment. ***AMR***







Hydrogen-powered freight trains on the Aurizon for the renewable State

Queensland's pursuit of the renewable energy opportunity continues at pace with the announcement by Aurizon and Anglo American that they will undertake a study into using hydrogen-powered trains for bulk freight.

Deputy Premier and Minister for State Development Steven Miles said the feasibility study will explore whether hydrogen fuel cell and battery hybrid power units could be used in heavy haul freight rail operations.

"The Feasibility Study will focus on the potential deployment of Anglo American's hydrogen power technology on Aurizon's Moura rail corridor and also the Mount Isa Rail corridor," Mr Miles said.

"The Moura corridor operates between Anglo American's Dawson metallurgical coal mine and the Gladstone Port, and the Mount Isa rail corridor operates between the North West Minerals Province to Townsville Port, via Aurizon's Stuart Terminal.

"The announcement is more proof that Queensland is committed to capturing every section of the renewable energy value chain."

As part of its commitment to carbon neutral by 2040, Anglo American has taken a global lead in the development of green hydrogen solutions for its ultra-class 290 tonne payload mine haul trucking fleet.

Anglo American's unique combination of powertrain technologies, designed to operate safely and effectively in real-world mine conditions, will displace the use of the majority of diesel at its mining operations.
Mr Miles said Queensland is perfectly positioned to be the world's renewable energy superpower.

"This project is more proof of that future. Where we use cheaper cleaner energy to power Queenslander's lives and to make the equipment the world needs as we move towards more decarbonisation," he said.

"Imagine new economy minerals which can be used to make batteries to store renewable energy, being moved from the North West Minerals Province to Townsville, on a train powered by hydrogen made from Queensland sunshine."

Minister for Energy Renewables and Hydrogen Mick de Brenni said the project showed yet again the way renewable energy and the burgeoning hydrogen industry meant more jobs in more industries for more Queenslanders.

"Projects like this are important because they enable domestic demand and create an ecosystem for green hydrogen," Mr de Brenni said.

"Transport accounts for 14 per cent of emissions, and is the fastest growing sector for emissions.

"However, we recognise that transport can lead the emissions reduction push if we move quickly with initiatives like this one.

"The Palaszczuk Government welcomes today's announcement as it is making sure Queenslanders and local businesses are at the front of the queue building the skills needed for the hydrogen industry and the thousands of jobs it will create."

Tony O'Neill, Technical Director of Anglo American, said the agreement with Aurizon marks the first time their hydrogen power technology could be tested beyond the existing mine haul truck program.

"Displacing our use of diesel is critical to eliminating emissions at our sites and along our value chain. We believe that our innovative hydrogen-led technology provides a versatile solution, whether for trucks or trains or other forms of heavy duty transport," he said.

Aurizon is Australia's largest rail freight company, with the decarbonisation of its supply chains at the centre of its target to reach net zero operational emissions by 2050. Aurizon has also commenced research & development for battery-powered trains with a number of industry parties and Australian universities.

"Hydrogen offers enormous opportunity in decarbonising and continuing to improve the competitiveness of Australia's export supply chains," Aurizon's Managing Director & CEO Andrew Harding said.

"This is especially true for bulk products underpinning the Australian economy including minerals, agricultural products and fertilisers, industrials and general freight." ***AMR***



New CME Report Highlights WA's Hydrogen Opportunity

A technology and 'colour'-agnostic approach, increased alignment and collaboration between industry and government and the establishment of realistic export targets will be keys to WA becoming an internationally competitive hydrogen producer – according to a new position paper released by the Chamber of Minerals and Energy of WA.

The report, titled Towards Competitive Clean Hydrogen, examines the opportunities and challenges associated with WA's aspirations to establish itself as a globally significant producer of clean hydrogen.

CME's report examines nascent development pathways and global hydrogen use case examples, informed by competitiveness analysis by Australian Venture Consultants.
"Hydrogen has certainly become a high-profile commodity in recent times – and there are numerous CME member companies which are moving rapidly into that space," CME Director of Policy and Advocacy Rob Carruthers said.

"It's easy to see why hydrogen has captured the imagination. It's a versatile commodity that can carry stored energy or be converted into energy, and it produces no greenhouse gas emissions when it is used or burnt.

"The WA mining and resources sector is one of a number of industries that is strongly focused on decarbonisation, and the significant potential for hydrogen to assist with that endeavour offers up a range of exciting opportunities for a state like WA.

There are a wide variety of initiatives at both levels of government geared around hydrogen, including the Western Australian Renewable Hydrogen Strategy at a State level and National Hydrogen Strategy being pursued federally.

"We welcome the strong interest of both the WA and Federal Governments in hydrogen," Mr Carruthers said.

"It's clear that governments are on the front-foot in promoting these opportunities, and industry for its part is well advanced through various investments in research pilots and assessing prospective large-scale hydrogen developments from the top to the bottom of WA - and also across Australia."

However, as the report outlines, those opportunities will only be realised in a competitive and timely fashion with an even greater focus on collaboration between industry and the State and Federal Governments.

"Given how competitive global hydrogen markets currently are and will continue to be, it's vital to have aligned and well-targeted support from government that encourages the establishment of WA as a user, producer and exporter of competitive, low-cost, reliable and clean hydrogen," Mr Carruthers said.

"A number of recommendations in our report identify the form this support could take.

"This includes accelerating the establishment of hydrogen hubs to facilitate technological development and shared learnings, the development of a practical multi-purpose land use framework in WA that supports both hydrogen development and other high value uses, and the need for State and Federal alignment on certification for low-emissions hydrogen.

"Important to this is to ensure that we are technology agnostic, with the focus instead on ensuring the delivery of cost-competitive production, transportation and use cases that also, critically, provide certainty for decarbonisation pathways in line with national and State goals."

Mr Carruthers said another aspect of developing a WA hydrogen industry highlighted in the report was the requirement for a timely yet realistic and iterative development approach.

"Hydrogen is a very busy space – one in which WA is now competing with other states in Australia and also countries around the world that are eyeing off similar opportunities," Mr Carruthers said.

"Middle Eastern countries such as Qatar, Oman and UAE are likely to be significant competitors when it comes to hydrogen – as they currently are in the global LNG market - and it's crucial that WA keeps pace.

"There also needs to be a realisation that hydrogen isn't like LNG or iron ore where WA is at a competitive advantage simply because of its resources and reserves. Hydrogen can be produced anywhere around the world.

"We do have many things that will help – including land that could be made available to build large-scale renewable energy generation plants, high solar irradiance and plentiful wind resources – but these don't provide a clear absolute, competitive, or comparative advantage.

"Our strong existing industry presence and upstream operational predominance in WA may be helpful in attracting investment and be a source of advantage compared to other jurisdictions."

Mr Carruthers said demand identification for end uses of WA-produced hydrogen was another key element explored in the report.
"There is a pathway being established for blending hydrogen into our existing natural gas networks and using hydrogen for domestic ammonia production, for example. However, as it stands WA's domestic demand is comparatively small, and we therefore need to explore opportunities to build on this and also look further afield for trade partners who would be interested in sources of large-scale hydrogen," he said.

"As our paper outlines, Japan is a natural fit for hydrogen exports due to its long-time interest in incorporating hydrogen in its fuel mix, including increasing the uptake of hydrogen fuel cell electric vehicles (HFCEVs) and the strong LNG relationship it holds with WA.

"Similarly, South Korea looms as a potentially attractive trade partner because of its targets around increasing the number of HFCEVs and refuelling stations to support local manufacturing."

"Both Japan and South Korea are excellent examples of long- term, mutually beneficial trade partnerships for Western Australia, which have the further potential to expand into hydrogen export in the decades to come." ***AMR***



Hydrogen Specialists Answer Questions On Australia's Hydrogen Future

With the Australian Hydrogen Forum coming up, PWC recently interviewed two of the speakers about the future of the sector.

Lachy Haynes is a partner in PwC's Integrated Infrastructure, Environmental Transactions and Advisory practice. Benjy Lee is the owner of Benjy Lee Consulting, a strategic adviser to the Future Fuels CRC, providing advisory services to a wide range of clients on new energy technology, policy and market matters.

They delve into what it will take for Australia to be a global hydrogen superpower, which industries are first off the block for adoption, as well as reflecting on what has happened in 2021 and what is upcoming in 2022.

What would it take for Australia to be a major global player in hydrogen by 2030?

Lachy Haynes:
Australia has abundant land and high-capacity-factor renewable energy – the building blocks to produce globally competitive renewable hydrogen to service a growing international market. Industry and government will need to act quickly to ensure Australia achieves a price point at which we are advantaged, or at the least competitive, with other hydrogen producing jurisdictions.

This will involve establishing a hydrogen-ready supply chain, implementing appropriate policy and regulation, and engaging with partners and off-takers. We addressed the challenges and opportunities along Australia's pathway to building a competitive hydrogen industry in our recent series: Getting H2 Right.

Australia's domestic economy is not of the size to support the scale of technology commercialisation and infrastructure development required to become a global leader. International partnerships and major export projects will be essential in reaching the volumes where Australia's competitive advantages can be demonstrated and capitalised upon.

Australia is already one of the global leaders in energy exports - we are one of the top LNG export countries globally and there is an opportunity to replicate this for clean hydrogen as the sector grows. Australia has all the precursor requirements: proximity to key demand centres, large land mass, abundant renewable energy resources, disparate population and existing industry knowledge.

As the hydrogen industry evolves, Australia has the opportunity to pivot from its traditional role as a raw commodity exporter to exploit hydrogen derivatives, including green ammonia and green steel.

With the growing focus on ESG performance, the application of, and adherence to, emerging hydrogen certification schemes across the end-to-end supply chain will be critical. Attention must be given to improved stakeholder management - this includes proactive engagement on native title and taking a more expansive view on the opportunities for the involvement of indigenous businesses. The hydrogen industry also presents opportunities to pursue regional development and the reskilling of those workers impacted by the decline of sunset industries.

Benjy Lee:
The next two years is absolutely critical. We need more collaborative leadership by key players across and within key sectors of the Australian economy and then investment flows starting to back up the talk. Growing the hydrogen industry capability isn't just an energy sector leadership issue... it's transport, it's manufacturing, it's mining, it's water, it's super funds and other investors, and of course critically it's all governments, state/territory and federal.

This type of new industry doesn't get built on pure economics alone; it needs substantial incentives (an understatement!) and well-coordinated policy to help drive its success in the pre-commercial phase. The social licence issues associated with the scale of infrastructure deployment are far from trivial too, so dealing with this as proactively as possible will be important. Finally, an unrelenting collective focus on the mission of hitting the hydrogen under $2 metric!

What are the industries that are going to be first adopters of hydrogen domestically and overseas?

Lachy Haynes:
Hydrogen has multiple uses and no actively traded market. With no merchant market, projects will require a bankable offtake arrangement to attract funding. To underpin the returns the project is likely to achieve, a project will need clear end-use markets and customers, and certainty of volume and price.

Displacement of grey hydrogen and the use of clean hydrogen in gas blending are emerging as some of the first financeable domestic applications, supported by the existing downstream infrastructure and market. Higher cost green hydrogen can be introduced periodically and small increases to the average product price can be passed onto the large downstream customer base.

Heavy duty vehicles (line-haul, back-to-base fleets), remote power and materials handling (forklifts) present opportunities for breakeven business cases for high-cost hydrogen. Yet, significant downstream infrastructure and supply chain complexities need to be overcome for these applications to achieve scale.

Domestically, we expect heavy transport to emerge as a stable use case across the next five years, particularly with growing commitments from state governments. In October, the NSW government committed $3 billion to commercialise hydrogen supply chains, with a target of 100 hydrogen refuelling stations and 10,000 hydrogen vehicles on the road by 2030.

Internationally, the transport sector is a key first adopter. For countries such as Japan, hydrogen vehicles present as one of the only solutions to decarbonise the transport sector given land constraints and high costs of renewable energy (which would otherwise be required to support widespread EV uptake).

By 2030, the Japanese government is targeting one million FCVs in operation. Green ammonia is emerging as a foundational use case for export projects, driven by Japan's ambition to co-fire its coal power stations.

Benjy Lee:
Within Australia we're already seeing the gas networks as first adopters building and starting to scale real hydrogen infrastructure through blending projects in most Australian states. These projects started at around the 0.5MW electrolyser level and the latest are up to 10MW – so there are already great practical lessons being learnt on how to ride up the scaling curve.

Existing users of hydrogen in Australia, such as fertiliser manufacturers, look to be well positioned to increase adoption. Heavy transport has a great case for early adoption too, however the big transport players are yet to make their move. As for the rest, it's still like betting on a Melbourne Cup race at the moment!

Overseas, particularly in Japan and Korea's early adopters could be fertiliser manufacturers, heavy transport and power generation.

2021 in review – what has been the most significant development in hydrogen in the last 12 months?

Lachy Haynes:
The commitment at both Federal and State government levels to act as a catalyst to further hydrogen industry development:

The Federal government commitment to low emissions technology (including hydrogen), which will involve the establishment of the Low Emissions Technology Commercialisation Fund.

State government commitments, including the release of the NSW Government's Hydrogen Strategy with $3 billion in incentives to commercialise hydrogen supply chains and reduce the cost of green hydrogen and the launch of the Queensland Renewable Energy and Hydrogen Jobs Fund, with up to $2 billion for government investments.

Significant early progress with both export-orientated and domestic hydrogen projects - major industrial organisations and developers are rising to the opportunity with several export-orientated and domestic hydrogen projects progressing; at present there are already more than 20 export projects announced.

The increasing collaboration with trading partners and participation of international investors - we have observed strengthening global partnerships with key trading partners, including the commitment by Australia and the Republic of Korea to work together to drive increased adoption of low and zero emissions technologies (including hydrogen) through a new Australia-Republic of Korea Low and Zero Emissions Technology Partnership. Many significant international companies have joined hydrogen project consortia, including Kawasaki, ENEOS and Iwatani.

Benjy Lee:
The step change elevation in the industry and public conversation on hydrogen in 2021 has definitely been a welcome development, with lots of exciting and visionary feasibility projects being looked at and discussed.

However, it's the stakes put in the ground for real infrastructure scale up that are most welcome from my perspective, so seeing the ARENA funding announcements of three projects with 10MW electrolyser capacities in Australia was the most significant signpost that I took most notice of in 2021.

The continued implementation of the National Hydrogen Strategy with strong bipartisan support and industry collaboration over 2021 has been a critical but understated development.

And what do you think is exciting for 2022?

Lachy Haynes:
'Green shoots' emerging with respect to the development of a broader hydrogen ecosystem, with developers teaming with distributors, hydrogen vehicle manufacturers, fleet owners and additional stakeholders to collectively address the demand and supply sides of the hydrogen equation.

Continued activation at a state government level, with funding being deployed to support industry development at both a project and supply chain level.

State led evaluations of the domestic supply chain, with multiple states undertaking supply chain evaluations in 2022.

Further project announcements, including the initiation of new production projects and milestone announcements for existing projects, some of which are expected to reach FID in 2022; we also anticipate further announcements regarding the development of onshore electrolyser manufacturing.

Benjy Lee:
Too many exciting things to mention, there's so much going on!

I'd like to see the design (and moving into implementation) of a Renewable Gas Target scheme in at least one state to signal that policy incentives are on the way for much broader hydrogen infrastructure project deployment in Australia.

I'd also like to have some surprises on decisions on investment commitments on Australian hydrogen projects being brought forward and made next year too. Lots to look forward to!

Forum
You can hear more about the future of Australian hydrogen at the Australian Hydrogen Forum 2022, from 23-25 March - Sheraton Grand Sydney Hyde Park, Sydney & Virtual

For further information please go to:
www.hydrogenforum.com.au
AMR



FQM's Shoemaker Levy Development Off To A Smooth Start

First Quantum Minerals (FQM) recently achieved a major milestone at its Ravensthorpe Nickel Mine when the next phase of the South West Western Australian operation was officially opened.

The new Shoemaker Levy development has boosted Ravensthorpe's mine life by an estimated 20 years – at a time when nickel demand is growing globally because of its perceived future role as a battery metal and part of the EV future.

The Australian Mining Review recently caught up with Ravensthorpe general manager David de Vries to hear about the start-up success and to learn about the project's impact on the local community.
Mr de Vries said the start-up of Shoemaker Levy was a significant occasion for FQM and Western Australia.

"The official opening was an important event and was attended by the Western Australian Minister for Mines and Petroleum, Energy, Bill Johnston, First Quantum Chairman and CEO Philip Pascall, and a number of other dignitaries," he said.

"Unlike a number of official openings on this occasion the timing worked out so that that the opening was pretty much around when the project was completed.

"It was an important occasion as it marked the transition from the past to the future at Ravensthorpe, with Shoemaker Levy accessing the material which sets us up the next 20 years."

Mr de Vries said covid had presented various significant challenges to construction, including labour shortages with resulting cost and schedule impacts. However, despite the difficulties the project was now up and performing well.

"Overall, we're very pleased with the end result. The physical infrastructure of the new primary crusher circuit and the overland conveyor has worked well."

He noted that said the Ravensthorpe project is already noticing important benefits from the addition of Shoemaker Levy material to the operation.

"The Shoemaker Levy orebody is significantly better than the Hale-Bopp orebody we have been treating for the last couple of years, so we have seen a good improvement in performance through the plant. The beneficiation process works a lot better on the Shoemaker Levy ore so we are seeing really good grades into the plant, without materials handling issues.

"Importantly the results were are seeing are consistent with metallurgical testwork performed on the orebody. Everything has been really positive"

With around 650 people working at the Ravensthorpe operations, the mine is a major employer in Western Australia's south-west and Mr de Vries said the company had a major focus on employing locally.

"Our biggest contribution to the communities down here is that we have a really strong drive to employ locally.

"This involves two groups. One is locally, which means people who are living in either Ravensthorpe or Hopetown - we've got about 124 people currently in those two towns. Then we also try to draw from the local regions. If you go from Esperance down to Albany, or a little bit west of Albany, we have about 157 people out of those regions as well. And then the rest of the workforce is FIFO out of Perth.

"But we push really hard to make sure we either recruit locally, or we find people who are willing to relocate.

"And of course, we do other things like sponsor events and support schools and things like that, but the number one thing we do and bring to the communities is people on the job."

Project background
The Ravensthorpe facility is a laterite nickel operation producing around 30,000 tonnes per annum of a mixed nickel-cobalt hydroxide intermediate product used in the production of nickel sulphate.

Three of the operation's 18 megawatt steam turbines generate power using waste heat from the mine's production process.

In his speech at the opening ceremony, Minister Johnston highlighted that nickel sulphate is a key material in lithium-ion batteries for electric vehicles.

"This new mine will add decades to the life of this rejuvenated operation, securing jobs and strengthening the McGowan Government's vision for WA's future battery industry strategy," he stated.

Mr de Vries agrees that the start-up of Shoemaker Levy is well timed with the strong current market interest in nickel and cobalt.

"We feel really positive about the potential to be a supplier of environmentally sourced nickel which is increasingly in demand as a battery material - and so we hope that trend continues." ***AMR***





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Monford's Adaptability and Skills A Winning Formula At Ravensthorpe

A willingness and an adaptability to support a new client led to Monford Group significantly expanding its involvement with FQM's Ravensthorpe Project in Western Australia.

Monford was initially contracted to undertake civil works on a new crushing facility at the Western Australian mine, however, by impressing with the quality of its initial work and its ability to pitch in where needed - the leading construction company soon had its involvement significantly expanded.

Monford's Chief Commercial Officer, Ciaran Shannon, said that the company's flexibility and abilities in multiple trades meant it was able to assist in meeting a wide range of requirements.

While the company was initially expected to have a six month involvement, the Monford team recently celebrated 18 months of on-site participation – and its role still continues. "Initially our whole goal down there was to complete the civils for establishing a new primary processing facility and a 10.5 km conveyor line back to the existing processing facility.

"When we first became involved, the design was still in the process of being completed. "We provided some input into the design and rationalise things where possible to ensure best fit for the projects as economically as possible and we were able to do that by bringing in a good deal of experience and expertise.

"So, we were not only able to assist with the concrete works, we also helped with the clearing and the earthworks, as well as providing mechanical and electrical resources to ensure the conveyor was completed on time."

In the end, Monford played a key role in the Shoemaker Levy project, which started production late last year and included facilities like:

- Building a conveyor line,
- Building a primary crusher, sizer station and a transfer station and a 10km overland conveyor
- Constructing two conveyor overpasses and a conveyor bridge

To manage its growing participation, Monford's onsite team grew to around 140. "We still have a small crew of 14 to 20 guys down there just assisting with the operational side of things."

Mr Shannon said Monford's first involvement with FQM has created a good relationship with the mining company.

"I think our involvement in the project itself went down very well," Mr Shannon said.

Monford didn't only impress its client, but also the local community.

"We like to try and become involved with local communities where we work and we have a separate arm or entity which helps with that.

"In Ravensthorpe we have been particularly supportive of the Royal Flying Doctor service. Obviously, with the remoteness of the whole project, the Flying Doctor seemed to be an easy choice for us to support."

In its 11th year of trading, Monford has grown quickly and now creates around $65 to $70 million in turnover annually across multiple sectors, including resources, energy and infrastructure - Australia wide.

"Our mantra is to provide consistent delivery of projects on time within budget, safely and with a sustainability mindset and it certainly seems to be a winning formula," Mr Shannon concluded. ***AMR***



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RavMech
Maintenance Solutions

Ravensthorpe Mechanical Services (RavMech) is supporting Western Australia's thriving mineral resources and agricultural sectors with their established maintenance solutions; a range of services designed to assist an operation's mechanical needs.

Located in the Western Australian town of Ravensthorpe, the business is a proud team of professionals that specialise in heavy diesel maintenance, hydraulics and light vehicle maintenance.

With a 26-year history, the business has evolved from humble beginnings into a mainstay of the area with extensive knowledge of local industries.

RavMech manager Tom Farrell-Barnes said the business has been family owned and operated since 1995 and the team was extremely community minded.

"There's a diverse mining and agriculture sector around Ravensthorpe which we proudly support," Mr Farrell-Barnes said.

"Ravensthorpe and surrounds is a thriving area and we look forward to continuing to provide our services well into the future."

Most recently Ravensthorpe has witnessed the opening of First Quantum Minerals' Shoemaker-Levy mine at the company's previously established nickel-cobalt operations.

The facility is a laterite nickel operation producing around 30,000 tonnes per annum of a mixed nickel-cobalt hydroxide intermediate product, which is used to produce nickel sulphate – a key ingredient in making lithium-ion batteries for electric vehicles.

At the moment, roughly 650 people work at the Ravensthorpe site, which is expected to be in operation for at least another two decades.

The new mine is the latest in a pipeline of operations that have flourished in the area, along with multiple other commercial sectors.

Though RavMech is well-positioned to support local activity, the business also has the capacity to service all regions of Western Australia when required.

Mr Farrell-Barnes said the business had various industrial clients in WA that they were able to service on site.

"We offer a fully equipped field service arrangement, remote and satellite site maintenance solutions and product/labour support.

"We also offer light vehicle maintenance, based out of our local workshop as well as hydraulic support and tyres.

"We have a tight nit, reliable team of professionals, from our office staff to our technicians, our business could not function as it does without the support of the people in our team"

For more information,
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email info@ravmech.com

AMR





World Leader in HPAL and POX

Callidus has been servicing High Pressure Acid Leach (HPAL) and Pressure Oxidisation (POX) clients since 1997.

With facilities throughout the Asia-Pacific region and extensive experience in complex operations, Callidus provides its clients with total high end flow control solutions.

Its extensive range of capabilities and services enable clients to improve overall performance, translating to greater cost and time savings, through a full range of technical solutions, from conception to implementation.

Callidus works closely with clients, building long-lasting business relationships aimed at reducing clients' operational down time, improving clients' safety in daily operations and delivering client solutions for significant cost and time savings. ***AMR***

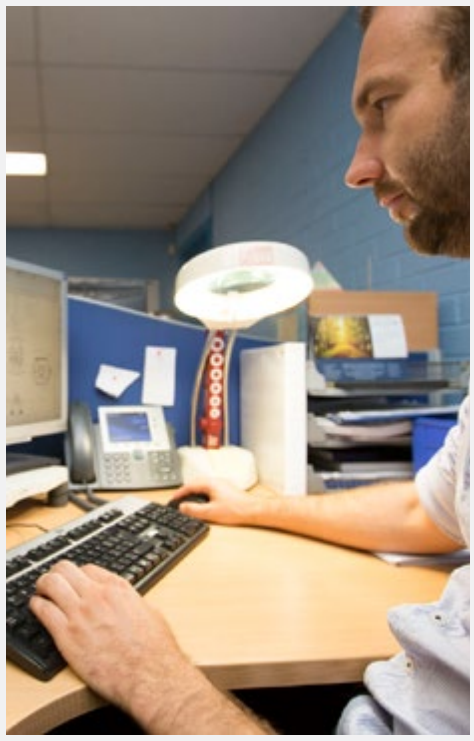


Actual inline valve failure where in branch pipe was broken from the main body.

Case Study

A valued HPAL client was referred to Callidus to fix recurring incidents of valves failing in line due to external cyclic loading.

Being categorised as a major and serious safety concern, an immediate solution was requested.



The Process

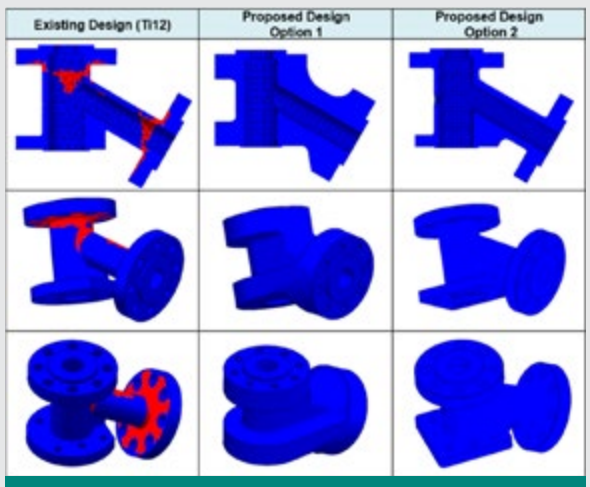
Callidus engineers utilised the vibration data from previous assessments, and redesigned a valve body that could withstand cyclic loading over the equipment's life expectancy.

A series of FEA study trials, focusing on fatigue failure and several dimensional adjustments, were performed to optimise the design.

The Solution

At the end of the study, Callidus offered two options to the client:

1. A body with the same Ti12 material.
   In this option, the weight of the body increased significantly due to the added mechanical reinforcements.
2. A body upgraded Ti5 material.
   In this option, there was a minimal increase in the overall weight due to improved mechanical properties.



FEA models comparing the existing to the proposed design options; Red signifies expected failure areas due to fatigue over the valve's life expectancy.

The Outcome

The client responded positively with the outcome of the study and decided to install the option 2 modified design.

This was not only for their 600CL, but also on the 300CL locations.

The previous failure mode was completely eliminated and valve run times have been considerably increased.



New valve body ready for despatch.

Client Benefits

- Valve life cycle extended from 6- to 18-month duration
- Elimination of unscheduled shutdowns, saving the client an average of 3 days lost production for each valve failure
- Increased client production output
- Considerable cost savings to the client due to less frequent valve replacement



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Callidus



Ravenswood Gold Proud to be Part of the Local Community

Ravenswood Gold is an Australian business that owns and operates the gold mining operation in the town of Ravenswood, 120km south of Townsville in Queensland.

It is jointly owned by EMR Capital and Golden Energy and Resources.

In 2020, Ravenswood Gold committed to a significant expansion of the existing mining operation that will see gold production increase to over 200,000 ounces a year and extend the life of the operation by at least 14 years.

The expansion will include re-mining the former Buck Reef West and Sarsfield/Nolans open pits, increasing the size of the processing plant and constructing a new tailings storage facility. Ravenswood Gold is a major employer in the region, with around 320 permanent staff already working at the site and still growing.

More than 300 regional businesses have worked on or supplied to the expansion project so far, representing over 30% of total expenditure.

Ravenswood Gold has confirmed its commitment to working responsibly and sustainably to protect and preserve the people, environment, community and heritage associated with its operations.

Project
Gold production target: 180-210,000 ounces a year Planned processing rate: >7 million tonnes a year

Capital expenditure: Over $450 million

Economics
Employment: 400 employees by end 2021, 90% live in North Queensland, >20% women

Contractors: Up to 470 contractors/day during construction and 200 permanent regional contractors

Regional investment: >30% North Queensland, >60% Queensland

Community
Local investment: >$250,000 in local support, events and sponsorship annually, plus project investment

Indigenous relations: Collaborative relationship with the Birriah People, focused on jobs and training

History: Over 150 years of mining in Ravenswood

Environment
Efficiency: Maximising water recycling

Monitoring: >100 water quality, air quality, noise and vibration monitoring sites

Waste minimisation: Reprocessing and reusing waste rock

Ravenswood Gold is proud to be a part of the long mining history of Ravenswood and is actively working with local people to preserve and enhance the town's mining history and foster a sustainable tourism industry for the town.

Mining history
Ravenswood Gold is preserving the area's mining history through two Heritage Agreements with the Queensland Government's Department of Environment and Science. The most significant activities undertaken under the agreements involved the conservation of three chimneys located within close proximity to a planned mine pit and the dismantling and storage of another three chimneys.

Working with an expert heritage stonemason, Ravenswood Gold repaired, repointed and strengthened three chimneys in-situ to keep them standing for generations to come.

Ravenswood Gold also worked with expert heritage consultants and engineers to design a bespoke dismantling process for three other chimneys which were originally earmarked for destruction. The dismantled pieces are stored at a purpose-built facility within the boundary of the heritage area for future public display, reassembly or research purposes.

Local investment
Each year, Ravenswood Gold directly contributes over $250,000 to the local community through support of local organisations, donations, sponsorships, tourism development and events. In addition, the company provides local medical services, town maintenance and local improvement projects.

The expansion of the mine has and will result in additional contributions including:

- A new state-of-the-art primary school for Ravenswood, incorporating relocated and renovated heritage buildings from the historic school site
- Major road upgrades to improve safety and wet weather access
- A new, environmentally friendly waste transfer facility
- Upgrades to local tourist attractions Traditional owners Ravenswood Gold has a positive, collaborative relationship with the Birriah People and is working on a number of initiatives as part of Native Title Agreements.

This includes:
- Increasing Birriah employment
- Provision of apprenticeship and traineeship opportunities for Birriah People
- An annual contribution to support training and professional development
- Regular collaboration opportunities.
- Water and energy efficiency

Ravenswood Gold prioritises water recycling and has worked with key contractor Ausenco to design the new processing equipment in way that minimises water and energy use intensity. Around 80% of mine water usage is recycled water, with fresh water usage restricted as much as possible.

Regional employment
Around 90% of Ravenswood Gold's permanent workforce live in the region and drive to and from places such as Townsville, Charters Towers and the Burdekin.

Local goods and services
More than 60% of total project expenditure [to date] has been spent in Queensland and more than 30% has been spent with regional businesses. This includes businesses such as Simmco Qld Pty Ltd, which has supported mining excavation and earth works in North Queensland for decades, Towers Concrete, a concrete batching and delivery company based in Charters Towers and Thomas Steel, a Townsville-based steel manufacturing and installation group. ***AMR***



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The water supply operator's kit

Enhancing Safety

Modec portable valve actuators from FMT safeguard operators and the overall water system.

Modec has been a provider and market leader of Portable Valve Operating Systems for many years.

These systems are used across a broad spectrum of industries.

The water distribution sector has used Modec systems for many years to operate the underground valves that are part of these distribution systems.

A key part of this service provision is maintaining the pipe network and carrying out repairs when necessary.

Water supply pipes are predominantly concentrated in urban areas, with the block valves that control water flow situated in the middle of busy roads and streets.

Whenever operation technicians need to open a valve for maintenance or repair, they are working in areas of heavy traffic with all the dangers that involves.

Equally, much of the water supply pipe network is very old, and many of the original manual block valves (opened and closed by turning an iron rod inserted in the hand-wheel) have deteriorated over time, becoming more difficult to manoeuvre.

This means that operators are having to exert greater force to open the valves, increasing the threat of repetitive strain injury—namely tennis elbow.

Additionally, there is the risk of opening the block valve too quickly and creating a water hammer effect, which can cause serious damage in a water supply system.

System operators are seeking a way to manage these valves that offer greater protection to both operators and the overall water system.

Modec have adapted portable valve actuators to fulfil this requirement.

Rather than two operators exerting equal pressure on each end of an iron rod fixed to the hand-wheel, the procedure requires just one operator to set up the tool and hold it in place.

The technician is stationary, therefore better able to observe the traffic, and there is no risk of occupational strain or injury as the portable actuator is doing all the hard work.

It also does the work in about half the time.

The other major advantage is it opens and closes the block valves at a controlled speed, thereby eliminating the danger of the water hammer effect, which can prove so costly.

It will also simply stop turning if the force applied threatens to break the valve.

Health and safety is a major issue – both the safety of the personnel working on busy roads, and the safety of their equipment – and Modec are pleased to work with companies to find a unique solution to their needs.

These portable actuators help to improve the security of both their employees and their supply system, while at the same time improving operational efficiency.

Through research and feedback from this sector, Modec has now created a standard "kit" for use in operating these underground valves.

This standard kit was formed within Modec to develop offerings that address specific applications in the water industry, paying particular attention to solution development to address common issues that are seen globally throughout this sector. ***AMR***



The technician is stationary, therefore better able to observe the traffic, and there is no risk of occupational strain or injury.



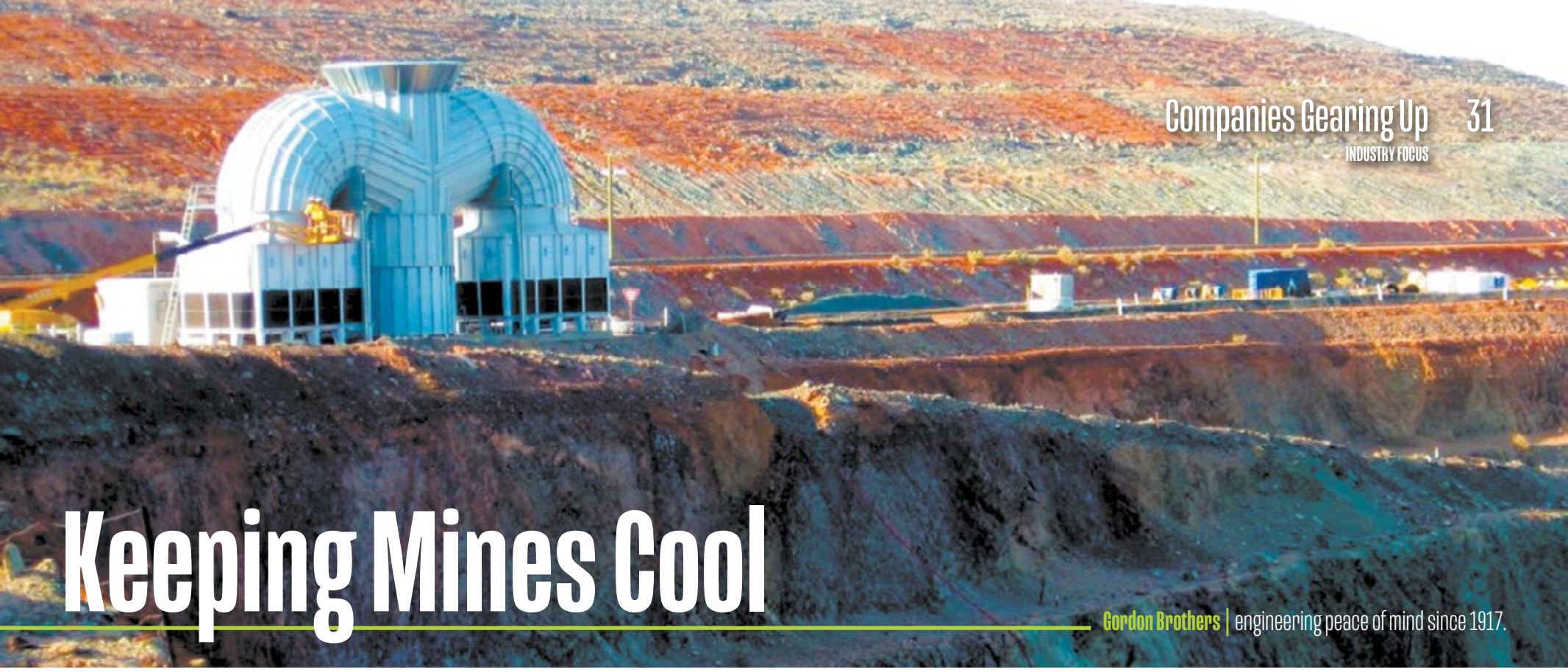
The water kit comes with a suitcase that allows the operator to check at a glance that everything is there.

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Keeping Mines Cool

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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**

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Goodwood Cost Consulting is a specialist cost and commercial management consultancy focused on providing project services to a range of clients including mine owners, engineering firms and contractors within the resources, energy, process engineering and civil infrastructure sectors.

With core competencies rooted in the profession of quantity surveying and construction economics, Goodwood helps clients to eliminate and reduce exposure to commercial risk by actively managing project finances and construction contracts throughout the project lifecycle, from concept to completion.

Goodwood Cost Consulting Director, Ryan Smit, said his company is uniquely positioned to ensure their clients projects are resourced with the highly skilled people, efficient processes, and the latest technology.

"We recognize that projects are complex, and each has its own set of unique challenges. It's important for us to understand this from the onset such that we can implement effective strategies to ensure projects are completed on time, within budget and to the correct standard of work. Our clients realize the importance of getting things correct upfront and having the proper expertise onboard to manage this through execution."

Their commitment to professionalism and superior quality with a "best for project approach", has proven to promote productive and collaborative relationships with all stakeholders, and in doing so, ensures that projects are managed with a high degree of accuracy, accountability, transparency, and control.

"Our clients demand a high degree of commercial governance on their projects, and that requires the application of professional expertise and technology to create visibility into real-time project cost performances and contract status reporting. Our job is to make that happen in an independent, equitable and responsible manner. Our clients don't like surprises..."

"Quality of workmanship is of utmost importance to us, to our clients and all project stakeholders. The integrity of the entire project management lifecycle must be managed with professional skill, care and due diligence. It is for this reason that a robust quality control policy and procedure is adhered to when preparing estimates, procuring services or managing construction contracts. All work performed must conform to policy guidelines and verified to be in accordance with all client specifications."

With a wide range of international experiences across Africa, Australia and Canada, Goodwood continues to supplement existing client teams with specialist cost and contract management skills for both short-term and long-term assignments. Their capabilities extend across all trades and disciplines including excavations, civil works, building works, structural steel, mechanical installations, piping, electrical and instrumentation.

"While the industry struggles to find suitably qualified project personnel, we are able to leverage our international networks and provide the appropriate resources required. And of course, with the advancement in communication technologies we are continuously able to find way to collaborate on a global scale. We currently have offices in Australia and Canada, and with a robust growth forecast over the next 12 months we are planning further expansions into Africa and the Middle East."

The business offers a number of specialized services, including cost estimating, cost planning, procurement services, quantity surveying, project controls, commercial management, expert witnessing and dispute resolution.

For more information visit,
goodwoodcostconsulting.com
AMR

Goodwood niche market sectors:
- Underground and open pit mine development, shaft sinking, lateral drill and blast, tunnelling
- Material handling systems, ore storage, and mineral processing plants
- Energy and power distribution networks
- Civil infrastructure including roads, bridges, rail and pipelines
- Industrial factories, warehousing and manufacturing

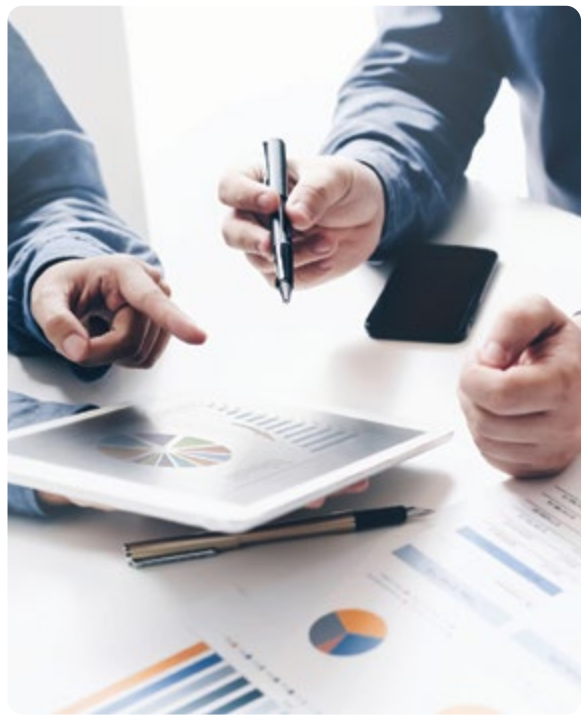


Reduce your project risk.

At Goodwood Cost Consulting, we:

- Specialise in providing project services to clients within the resources, energy, process engineering and civil infrastructure sectors.
- Provide clients with accurate project cost projections and contract and commercial solutions.
- Aim to reduce or eliminate commercial risk exposure through successful project finance management.
- Pledge an enduring commitment to professionalism and high service quality.

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With scales in continuous operation for over 30 years, Tecweigh is your ideal solution partner for weighing and material handling in the mining and aggregate industries.

Tecweigh's professional team works with clients to prepare tailored weighing solutions including on-site service.

All weighing products are manufactured in Australia and there is a full testing, spare parts and repair services team ready to be deployed across the country.

Conveyor Belt Scales
Conveyor belt scales, also known as Weightometers, are integral instruments in the mining industry, designed to weigh products as they flow on a conveyor belt.

Tecweigh is a leading designer and manufacturer of belt weighers and is still experiencing success with its next-generation product, the WY15 Conveyor Scale.

In keeping with the company's tradition of unbeatable accuracy, dependability, and ease of use, Tecweigh's WY15 single idler (+-0.5%) or dual idler (+-0.25%) conveyor belt scale combines the unique time and labour-saving features of its belt scale calibration with strain gauge load cell technology.

It utilises two hermetically sealed stainless steel IP66 bending-beam load cells, featuring a rigid all-welded construction, making it more reliable, durable and thanks to inbuilt calibration weights is easier to use than other scales on the market.

Tecweigh's equipment features: powder coated or stainless-steel frame and speed sensor; low voltage input power 9-36V DC; LED scoreboard displays; outdoor stainless cabinets; wireless remote rate/total displays; and industrial network communication protocols (Ethernet, Profibus, DeviceNet, Modbus RTU and others).

Weigh Belt Feeders
Many of Tecweigh's weigh belt feeders have been in operation for over 15 years, making them the most rugged Weighbelt Feeders in the mining industry.

Whether it is used for conveying, blending, loading or batching, Tecweigh's weigh belt feeders can withstand the rough handling and the toughest material, day in and day out, thanks to its rigorous design, testing and construction.

While the standard range for the weigh idler system is from 100kg/hr to 1000t/hr, Tecweigh can custom design for greater capacities, with no impact on its high performance.

Tecweigh's weight belt feeders use stainless steel, hermetically-sealed load cells.

Calibration is quick, easy and safe, utilising self-storing calibration weights that eliminate any bulky chains or awkward hand-on weights.

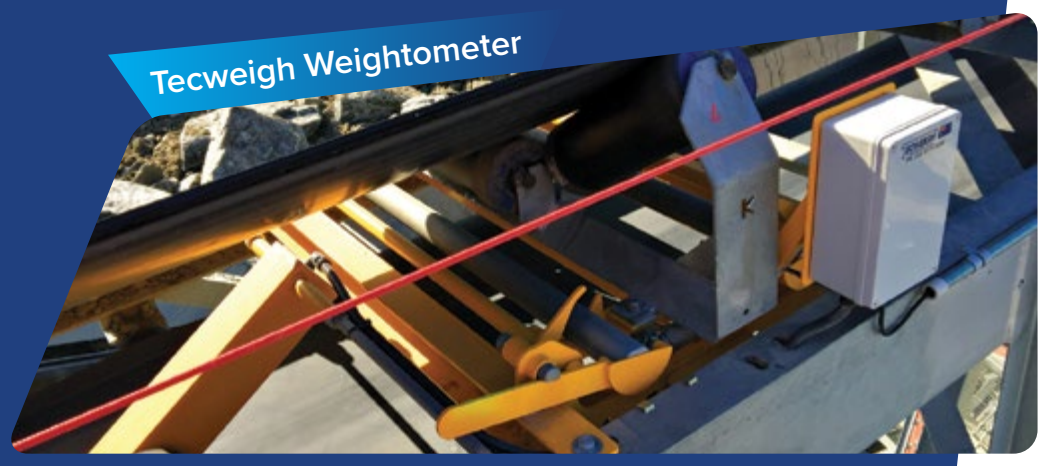
Being sized for specific applications means these weigh belt feeders provide the most accurate calibration possible and the most exceptional accuracy for clients. ***AMR***



Tecweigh's WY15 conveyor belt scale combines Stainless Steel IP66 load cell technology with rugged long-term accuracy.


Tecweigh's open and enclosed weigh belt feeders for truck-filling.

Custom engineered weightometers & other weighing solutions


Tecweigh Weightometer


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Tecweigh Weightometers or Conveyer Belt Scales are designed to measure accurately your product throughput whilst employing your existing idlers - No Special Weigh Idlers are required.

Tecweigh Weigh Belt Feeders offer an extensive range of models. Available in throughputs from 100 kilograms per hour to 1,000 tonnes per hour, our Weigh Belt feeders are available with a custom design for greater capacities. They can be used for Blending or Dosing together with Truck Filling- Benefit only one trip to the Weighbridge.

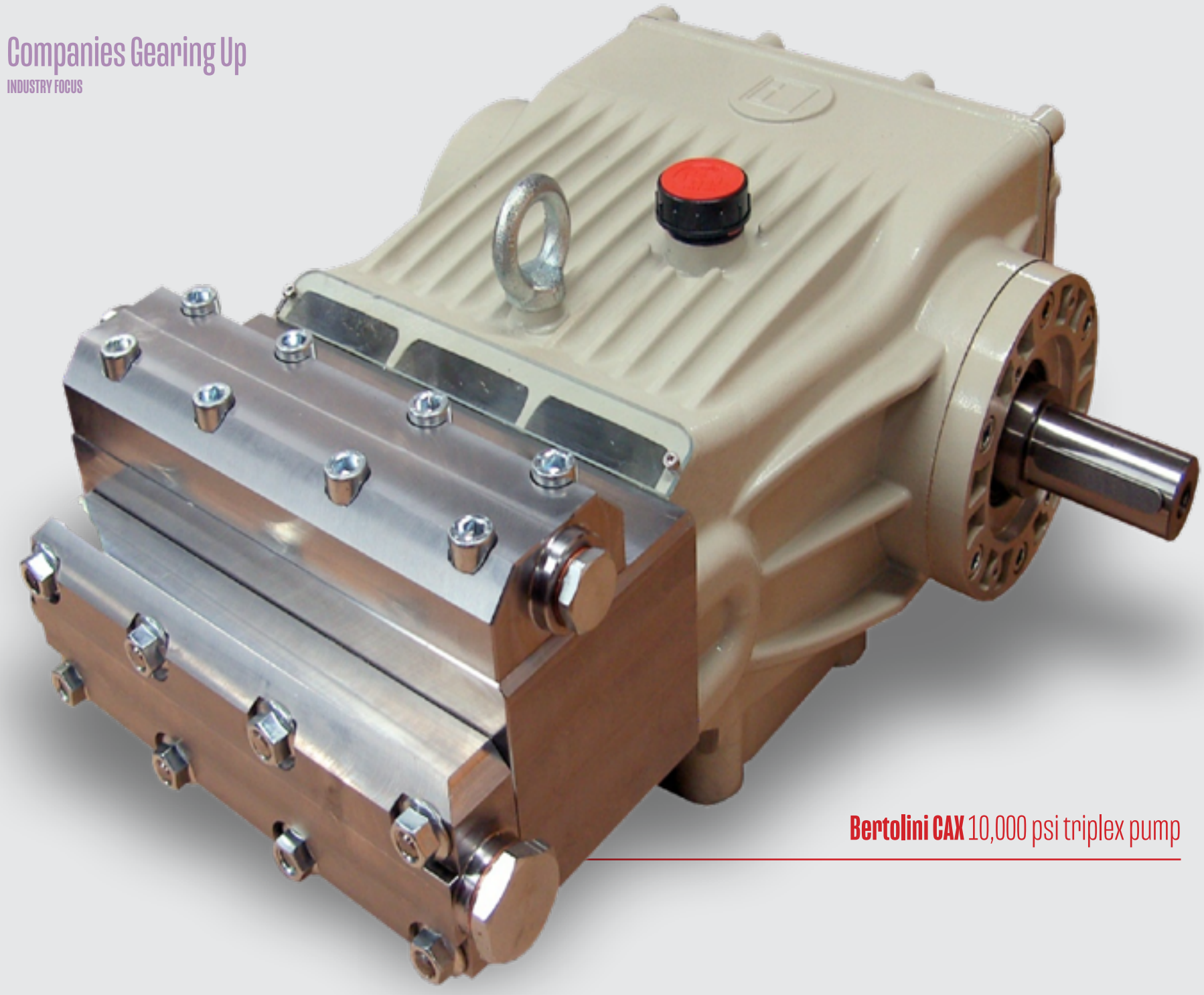
Tecweigh Products have Accuracies of +-0.5% for a Single Idler Scale and +-0.25% for a Dual Idler Scale. Instantaneous and Total throughput is available from the WP20 Weight Processor which can be equipped with an Ethernet/IP Modbus TCP communications option.

This allows your Plant PC/PLC to access all Scale parameters in real time and control the process optimally.



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Bertolini CAX 10,000 psi triplex pump

High Pressure Wash Safety

Pressure cleaning plant is an indispensable part of maintenance. Servicing a clean machine is not only easier but substantially more efficient, allowing technicians to clearly identify any issues.

The purpose of this story is to stress the need for safety in pressure cleaner operation, bearing in mind the old principle of "Familiarity Breeds Contempt". Aussie Pumps' Mood Ellahi and Aussie's Chief Engineer, John Hales, put together these very important guidelines.

Here we take the mystery out of high pressure pump technology by showing, in simple and easy to understand terms, just how a high pressure system works. We explore the pitfalls, potential dangers and provide practical advice on how the machine can be used effectively.

We also highlight the stringent rules laid out in the Australian Safety Standard AS/NZS-4233.1..2013.

IT STARTS WITH THE PUMP

When Australian Pump Industries started in pressure cleaners we knew the market was overcrowded. Our plan was to leapfrog consumer style products and talk directly to users of industrial pressure cleaners on mine sites.

We wanted to know how machines could be more efficient and operators stay safe at the same time. Our initial surveys showed a "cavalier" attitude to safety, coupled with a general ignorance of just how a triplex high pressure piston pump actually works.

We quickly established a whole string of "no no's" is terms of very basic rules of safe cleaner operation.

OUR LIST OF "DON'TS

1. Guns with a cable tie holding the trigger open for the convenience of the operator (and to prevent RSI).
2. Leaks in the gun or hose assembles at the couplings ignored.
3. Long length hoses joined together with leaking intermediate couplers.
4. High pressure hose assemblies worn down to the steel braiding.
5. Pressure pumps not protected by safety valves.
6. Machines without regular service checks on fundamentals like nozzle size (is another potential area of injury).

As foundation members of the Australian Jetters Association, Ausjet, Australian Pump track injuries involved in pressure cleaning. The biggest single issue is always failed hose assemblies. Hoses blowing have the potential to cause very serious injuries to the operator.

"In those cases the hose often fails right at the gun, adjacent to the operator" said Mood Ellahi.

SAFETY IS NOT AN OPTION

From working with operators, we found that training was the best way to protect them, and that freely sharing knowledge can help technicians avoid injury.

UNDERSTANDING THE PUMP FEATURES

The heart of every system is a high pressure piston pump. The "Big Berty" Bertolini heavy duty triplex piston pump is the basis of our Aussie machine design.

1. The pumps are built with real strength and quality. For example they feature a premium, oversized bearings for extended pump life.

2. They have extra long, forged crankshafts providing a solid coupling for pump and motor (engine)

3. Bertolini have oversized conrods for extra strength and easier lubrication.

4. The large stainless steel, martensitic plunger rods are stronger, harder and smoother. They ensure longer seal life.

5. High quality, solid ceramic pistons deliver uninterrupted high pressure performance. That is an important factor. You will see some pumps advertised with 'ceramic pistons' that are in fact stainless steel with a ceramic coating. It is a much cheaper solution but without the same wear characteristics.

6. Bertolini also developed the exclusive double V and double U self-lubricating packing seal. This has an elastomer prevents water contaminating the oil in the crankshaft and provides years of leak free operation.

7. The pumps also feature "rapid action", mirror finish 316 stainless steel check valves. This eliminates corrosion, as opposed to cheap grades of stainless steel that can cause real problems down the track.

8. Low stress valve caps are unique to Bertolini. By putting a sealing ring at the bottom of the valve cap, not at the top, the threads are not subjected to pressure. That minimises the possibility of a dangerous valve cap blow out.

9. Bertolini use high efficiency brass heads, with thicker walls to withstand high pressure. The heads on higher pressure machines, 500 bar to 1000 bar, use 316 stainless steel.

10. All Bertolini pumps have a unique "Cool Fin" smart crankcase. These have pronounced fins for extra cooling. Lower running temperatures to extend pump life!

11. "Big Berty" pumps are used with gearbox drive right the way through the Aussie range from 3,000 psi machines all the way to the big 500 bar Raptor units. Gearboxes eliminate the need for belt drive and are a safer OH &S option.

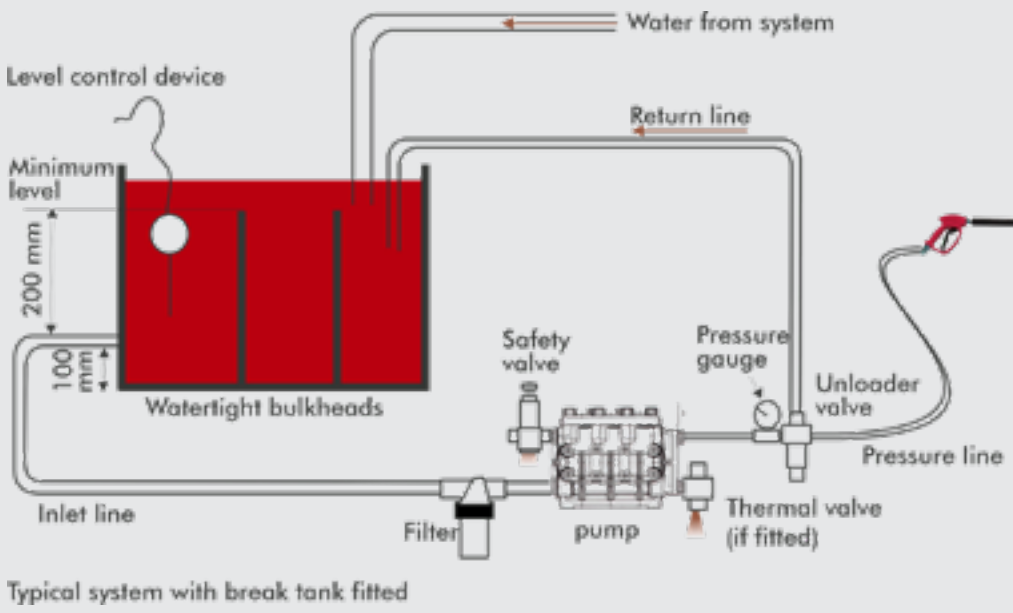


Training and sharing knowledge on high pressure systems increases understanding on how to maintain machines and reduces injuries



Mood Ellahi (left) & John Hales prep new prototype Mine Boss!

Circuit diagram of components of a high pressure system



Typical system with break tank fitted

HOW THE PUMP WORKS

The pressure produced in the system is the result of forcing a known volume of water through a restricted orifice (spray tip). This pressure is measured in bar or pounds per square inch (psi).

THE FLOW

The flow is determined by the speed at which the pump is rotated (rpm). The faster the shaft is spun the higher the output volume. This water flow is measured in litres per minute (lpm). Thus the operation is simple – The pump draws water in through a series of inlet check valves as the three plungers move back. As the plungers move forward again the inlet valves close forcing the water to travel through a series of outlet check valves.

The water exits the pump, and the direction of the flow is controlled by an unloader or regulator valve. The positive displacement pump delivers a certain volume of water regardless of whether the gun trigger is open or closed.

The Unloader controls the direction of the flow to either the gun, or when the trigger is closed, back to by-pass to the inlet of the pump!

Every pressure cleaner operating with a gun system must have a pressure relief valve! At Aussie Pumps we understand how fundamental the quality of the unloader is to the whole high pressure system and the safety of the operator.

THE NOZZLE ORIFICE

Setting the pressure of the unloader valve depends entirely on correct nozzle selection. If an incorrect nozzle is selected the performance will not meet the pump specification!

At Aussie Pumps we produce and circulate a great chart that makes it easy for operators to select the right nozzle to suit the flow and pressure required.

"We tell everybody that nozzles wear" said Hales. "That's because water is abrasive and over time the nozzle orifice will get larger resulting in a pressure drop. Changing the nozzle regularly is an inexpensive way of keeping the machine operating at its maximum rated performance," he said.

Nozzle sizes are calculated based on the flow and pressure of the pump. They are available in a wide range of spray angles depending on the type of job being done. For example, Aussie standardised on a zero degree for laser like cutting applications while 15 degree and 25 degree fans are the most common. 40 degree nozzles are also an option for cleaning large flat surfaces.

THE HIGH PRESSURE CIRCUIT

The circuit diagram shown shows the key components in the system and how the interrelate to each other. Note that there is a suction filter (regarded as essential), a safety valve, standard on all Aussie machines, and a top quality high pressure gun and lance combination.

Users and suppliers need to be conscious of using only high quality pressure cleaner hoses and guns that are correctly rated to the capacity of the pump.

Mixing up guns and lances amongst a range of machines can result in injuries. In other words, you can't use a 3,000 psi rated gun with a 5,000 or 7,000 psi rated machine!

These fundamentals relate to all pressure cleaners, both hot and cold.

MADE FOR MINES

Australian Pump produce a wide range of machines for the mining industry that are built tough and are part of the "Aussie Mine Boss" range. Those machines, now built in stainless steel trolley frames with big flat free tyres, are fitted with good quality Yanmar or Kohler diesel engines. The blasters are set up with an E Stop, battery isolation, double insulated wiring and gel battery.

"Our registered SCUD design is quite unique" said Hales. "We absolutely minimise "sharps" and the balanced machine is easy to move around on site. It can be easily adapted to trailer, Ute or truck mount where required with stainless steel hose reels now being readily available as part of the kit" he said.

Aussie Pump's stainless steel reels will handle up to 85 metres of high pressure hose, allowing for safe storage that can dramatically extend hose life.

SAFETY TRAINING

Aussie's Pro Operator Class A Safety Training Course is also readily available. It is free of charge to all operators and technicians interested in high pressure water blaster operation and safety.

"Keeping operators safe is fundamental" said Ellahi. "We understand operators are sometimes using this equipment outdoors, in adverse conditions, high temperatures and for up to 10 hours at a time" he said.

Mood Ellahi stressed that fatigue can be a key factor in operator injury and that all of us should be aware of our physical limitations and the danger of continuous long shifts.

Next month we will bring you the basics of the use of high pressure steam, either with mobile diesel operated machines running up to 5,000 psi or, in electric drive wash bay style units designed for tough mining applications. It has its own peculiarities that need to be understood for safe operation.

Operator safety is not an option!
aussiepumps.com.au
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Reinventing Driver Training

Now any company or government department can afford high quality driver training and they don't need to send their staff to a venue for a day.

E-learning programs are available from $44 to $88 per person.

These are a perfect tool to induct new personnel to safe driving or update the knowledge of existing drivers.

Already completed by thousands of participants is a Defensive Driving package and Safe Operation of 4WD Vehicles package.

But now for 2022, Safe Drive Training offers a Trailer Towing and a Bus Defensive Driving course.

Many schools and colleges operate buses but not many are aware of their driver training obligations. Now they can have their bus drivers and teaching staff who drive buses complete additional driver training.

Managing Director, Joel Neilsen says employers must realise that they have a legal obligation to train an employee in the safe operation of any machinery.

"It would be gross negligence to require someone to operate a chain saw, tractor, forklift or earth moving equipment without suitable training or qualifications. So why is a motor vehicle overlooked," he said.

"The Workplace Health and Safety Act doesn't ignore a motor vehicle. It requires employers to train employees in the use of a motor vehicle. And importantly a driver's licence is not regarded as suitable training."

The content is made in Australia and is attention grabbing via professionally made videos which provide a unique perspective with driving scenarios staged or captured from dashcam clips and vision from a driving simulator.

Users are telling us how it is great to be able to Pause and Rewind the videos and how much they are discovering about safe, defensive and fuel efficient driving.

Safe Drive Training is also seeking to partner with training providers and insurance companies who wish to resell this content to their clients. It is like having a virtual vending machine to resell driver training courses.

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Committed to Healthy and Safety



Recon is passionate about fresh quality food and prides itself on giving the best hospitality and service to customers and clients.

Recon Catering is regarded as a leader in contract catering and accommodation services, along with facilities management, for various mining, gas and offshore industries.

An integral service provider to a range of clients across Australia, and proudly 100% Australian owned and operated, the company is passionate about fresh quality food and prides itself on giving the best hospitality and service to customers and clients.

No location is an obstacle as Recon manages set-ups to shutdowns, including rolling camps. It remains focused on catering, accommodation, and all aspects involved, including waste management, janitorial services, wet mess management, village maintenance and aerodrome services.

With a proven track record with all our current clients, Recon Catering has established a reputable work ethic from its management to the dedicated and qualified staff.

Recon Catering has been established with a fresh and capable approach to fulfill projects on time, on budget, with quality goods and services.

Due to low company overheads and a well-skilled workforce, Recon Catering has some distinct advantages over the competition.

It establishes long-term quality relationships with clients, through high end product delivery and a flexible adaptable attitude and culture throughout the company.

Recon Catering industry competence covers a broad variety of services delivered by experiences, safe, professional, and well-mannered staff, all selected through specific recruitment process and internal training.

The Vision

It is Recon Catering's aim to become an industry recognised mid-tier service provider that delivers tailored facility management services with the flexibility to satisfy every client's personal needs.

Its teams are known for their open and proactive approach and committed to the principles of collaborative contracting. It understands that the delivery journey is as important as the final product.

Each Recon catering team is defined by the project they are delivering, and are chosen on a best-fit basis.

Recon Catering is fortunate to employ a pool of talented people, across all levels of staff from senior management to camp managers.

The core team specialises in key areas such as HACCAP, quality assurance, and environmental management.

Ongoing training and development programs keep our staff skills at the forefront of the industry.

The Core Team

Nigel Stevens: Founder of Recon Catering, Nigel has more than 25 years' experience in the hospitality industry, working in remote areas.

Kristina Kolosova: The Operations Manager, Kristina has been in this position for four years. Highly experienced in HR and mining/defence OH&S, she brings a wealth of experience from her six-plus-years in hospitality administration.

Victor Fitzpatrick: The company's Executive Chef plays a pivotal role in the Recon Catering team and has been with Recon for three years. A chef for over 20 years, he has a passion for great food, which is passed on through the team. ***AMR***

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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, dozer 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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Complete Dust Solutions for Respirable and Nuisance Dust



Dust issues in mineral mining and processing are commonplace, a nuisance and danger to workers and equipment.

Since dust generation can occur wherever product is disturbed or stockpiled, processes such as truck dumps, crushing, screening, conveyor transfers, stacking and reclaiming, train loading and unloading, and ship loading and unloading all have the potential to create harmful emissions.

MARC Technologies, a wholly owned subsidiary of ALS Limited, has the know-how to control these dust issues with leading solutions and technologies.

DSI Dry Fog™ Dust Suppression Systems

There are many technologies available for dust mitigation, but few can effectively suppress airborne respirable dust. Water sprays, for example, have limited effect as the droplet sizes tend to be too large to knock down liberated dust, created when dry material is handled or new dry surfaces exposed during crushing.

Dust Solutions Inc. (DSI) Dry Fog™ systems use an ultra-sonic nozzle, and low pressure air and water to produce fog particles less than 10 microns. Dry to the touch, this fog is used to scrub out airborne dust by binding with like size particles and dropping them out of suspension. Dry Fog™ can be used with a variety of materials, including moisture sensitive products such as cement and clinker, phosphates, and bauxite. It uses around 1/5th of the water used in a traditional spray, eliminating issues with carry back and belt wear. Blockages are rare since the nozzle's venturi design includes relatively large water and air orifices, and the nozzle vibrates slightly when in operation. The systems also offer dual filtration as standard to factor out poor quality water supply.

DSI NESCO™ Dust-Pro Misting Systems

With over 1000 installations in the US and beyond, NESCO is a well-established and well-respected high pressure misting dust suppression system that works by forcing controlled amounts of moisture into the product, and using atomising sprays to control airborne dust where necessary.

This minimises dust liberation further down the process, allowing less water to be used downstream. A single NESCO system can typically treat multiple areas such as truck dumps, primary, secondary and tertiary crushers, screens and stackers.

The systems run at around 15 bar, which allows for generation of finer droplet sizes and is important for control of fugitive dust. NESCO is effective in controlling dust within the material handling process by mounting sprays in strategic positions to knock down generated dust. Sprays into areas such as crushers also allow moisture penetration into newly exposed dry surfaces, and this lessens subsequent dust generation from downstream materials handling.

DSI DustTamer™ Windfences

DustTamer™ Windfences are an effective method to prevent dust migration from larger areas such as stockpiles. DustTamer systems drastically reduce wind velocity within a shielded area by exerting a drag force on oncoming wind and allowing a portion of the wind to penetrate the screen, evening out wind pressures on either side of the fence.

Controlling the top surface of the pile with water cannons or chemical surfactants offers limited protection, and must be constantly applied for a live stockpile, there are detrimental effects with excess water on the material and constant chemical addition can be costly.

Windfences are a permanent structure, using hard wearing UV stable knitted polyester material that is strong enough to be used in cyclonic regions, and are guaranteed for 20 years, with many installations that have been installed for many more with no replacement of material.

Smaller windfence panels can also be used around ROM bin structures, large hoppers and to clad troublesome transfer or crushing towers to mitigate escaping dust by reducing the wind velocity through the structure. Used in conjunction with other effective dust control measures such as Dry Fog, these can add up to an effective dust control method that has minimal running costs.

DSI systems are supplied by MARC Technologies, who have been successfully delivering dust control solutions to the mining and industrial sectors since 1995.

MARC Technologies is a wholly owned subsidiary of the Brisbane based ALS, providing a global presence.
www.marctech.com.au

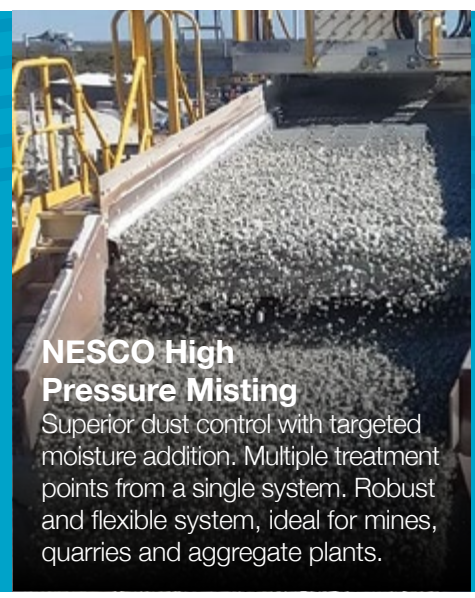
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IT'S TIME TO GET SERIOUS ABOUT DUST CONTROL



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NESCO High Pressure Misting
Superior dust control with targeted moisture addition. Multiple treatment points from a single system. Robust and flexible system, ideal for mines, quarries and aggregate plants.



DustTamer Windfences
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THE WORLD'S PREMIER DUST CONTROL TECHNOLOGIES



VEGA Sensors Improving Reliability

VEGA Australia area manager (Western Australia) Andrew van de Sande says sensors are helping improve the reliability of the water level indicator in water carts.

During a pre-start meeting at Rio Tinto's Mesa A iron ore operation in Western Australia, an issue in this area was reported in water trucks at the operation.

In attendance was Rio Tinto manager mining, Robe Valley operations, Phil Scott, who agreed it had been a persistent problem.

He reflected on how the issue had been discussed by operators for "as long as (he had) been in mining".

Rio Tinto approached Current Engineering Solutions senior electrical engineer Paul Smith, who has worked with VEGA radars in fixed plant environments for more than 10 years, to assess the concern.

Smith says it was amazing that mining has trucks that drive themselves, but still hadn't overcome the issue with the level indicator in water trucks.

According to Smith, the problem originates from the use of mechanical switches and moving parts, which are "always a disadvantage".

"The system they were using comprised of multiple cable float switches that were held together with a plastic wire," Smith says. "This technology is unreliable due to its moving parts."

Smith worked with VEGA's van de Sande to make sure Rio Tinto received a suitable outcome.

First, they fully tested the VEGAPULS C11 series sensor and VEGAMET 841 controller in both a bathtub and swimming pool before they proceeded with a trial at the Mesa A operation.

The installation of the VEGAPULS C11 and VEGAMET 841 sensors on Mesa A's water trucks would be the first application of its kind for the products.

VEGAPULS C11 was released last year and is usually used for non-contact level measurement in water treatment, pumping stations and rain overflow basins.

"The new C series radar stood out as a good choice as it was well within the required dynamic range extending up to eight metres," Smith says.

"And being both contactless without moving parts, this was seen as the perfect choice to replace the existing system that comprised multiple mechanical type float switches."

The VEGAMET 841 controller is an upgraded series of the VEGAMET model, an already proven sensor at Rio Tinto's mine operations.

It allows a simple conversion of pump controls and flow measurements on open channels, and weirs and totalisers.

Smith says what makes VEGAMET 841 a standout technology is the controller has a dedicated housing that withstands harsh environments, instead of being integrated to a switchbox or programmable logic controller (PLC).

"We put them through some rigorous testing in the bathtub and swimming pool for the conditions we were expecting them to be put under at the mine site," van de Sande says.

"We submerged them underwater and we made large waves in the pool, but their performance surpassed all expectations. They worked beautifully without any teething issues."

The private trial confirmed the men's confidence in the products' new application, leading them to proceed with a trial at the Mesa A operation in December.

Smith says that the Mesa A site team was supportive of the trial and accommodated this with water cart access and an operator to work with for multiple cycles while on site.

"They were also very proactive in implementing other elements that were required to be completed for a successful deployment, including the management of change for the trial and single point lesson detailing the new system," he says.

Rio Tinto testified of the accuracy of the system during the trial, having experienced zero reliability issues.

"The sensor was very accurate, and to date, we have had no issues at all with reliability or accuracy. The operators now have an almost exact percentage or level height measurement that they can use to work out how far they can travel before running out," Rio Tinto's Scott says.

"This may not sound like a big deal, but in a very hot and dusty condition, water truck operators are often under immense pressure to keep up with the requirements of mitigating dust levels."

Smith says one can imagine the frustration in driving down the haul road for 40 minutes thinking they had enough water, only to run out and having to drive back for another 40 minutes to refill the truck with water.

He adds that it creates more complications for the mine site. The higher movement of trucks means that they are creating more dust, while increasing vehicle interaction on an already busy haul road.

The unreliability of water indicators also translates to water wastage when an overfill at the water stand happens, causing wash outs that put others at a safety hazard.

"The system is now being sold as a complete pre-programmed kit with all the necessary installation materials, including the radar, display, mounting adapters, terminal box, terminals, glands and reducers for installation, as the water carts go into the workshop for a scheduled service," Smith says.

At VEGA, for instance, Smith anticipates the company's solution at the Mesa A mine will be a catalyst for mining companies to demand this standard of technology from OEMs.

"Knowing there's a solution out there means that the problem will no longer be accepted," he concludes. ***AMR***



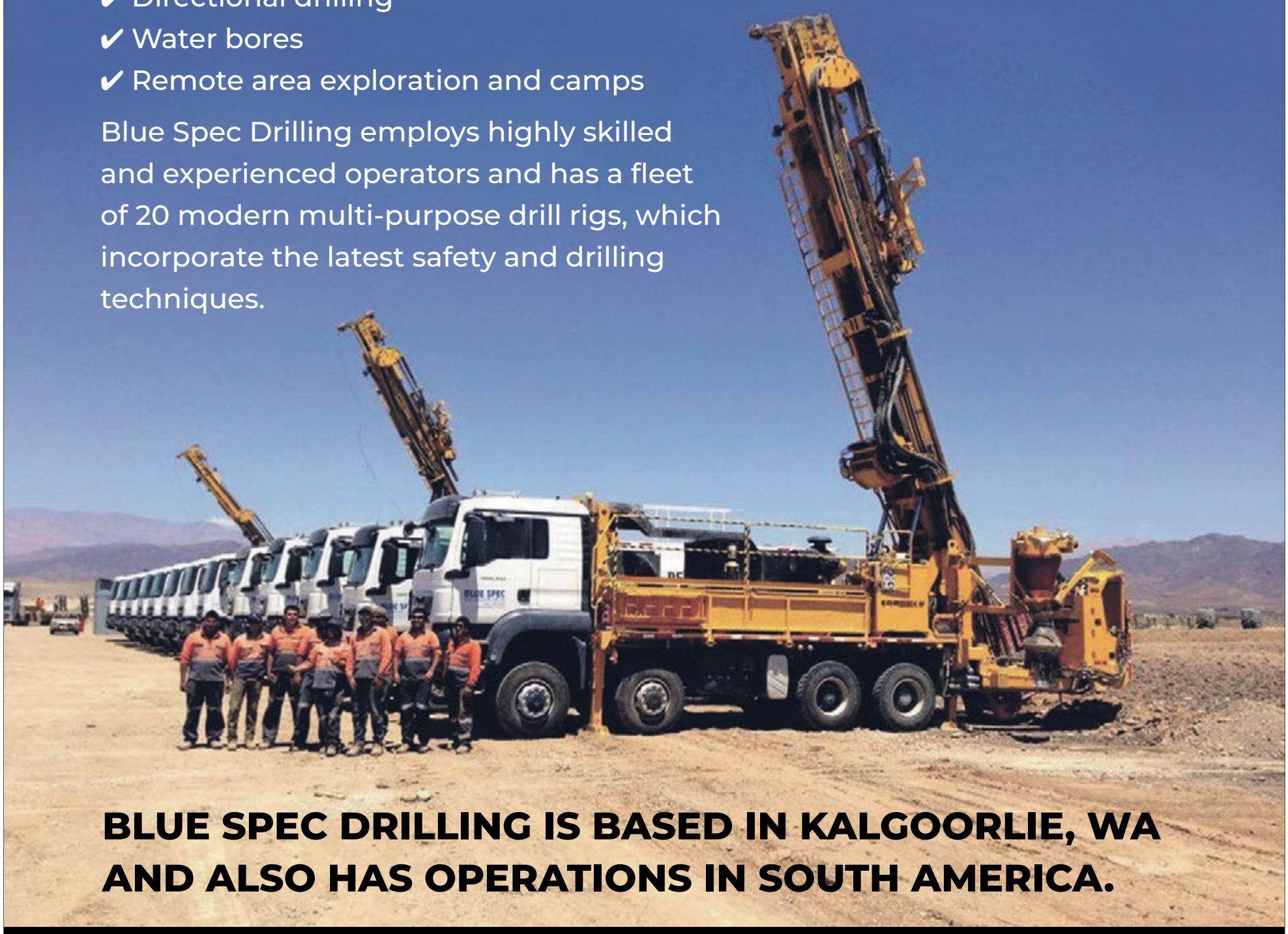
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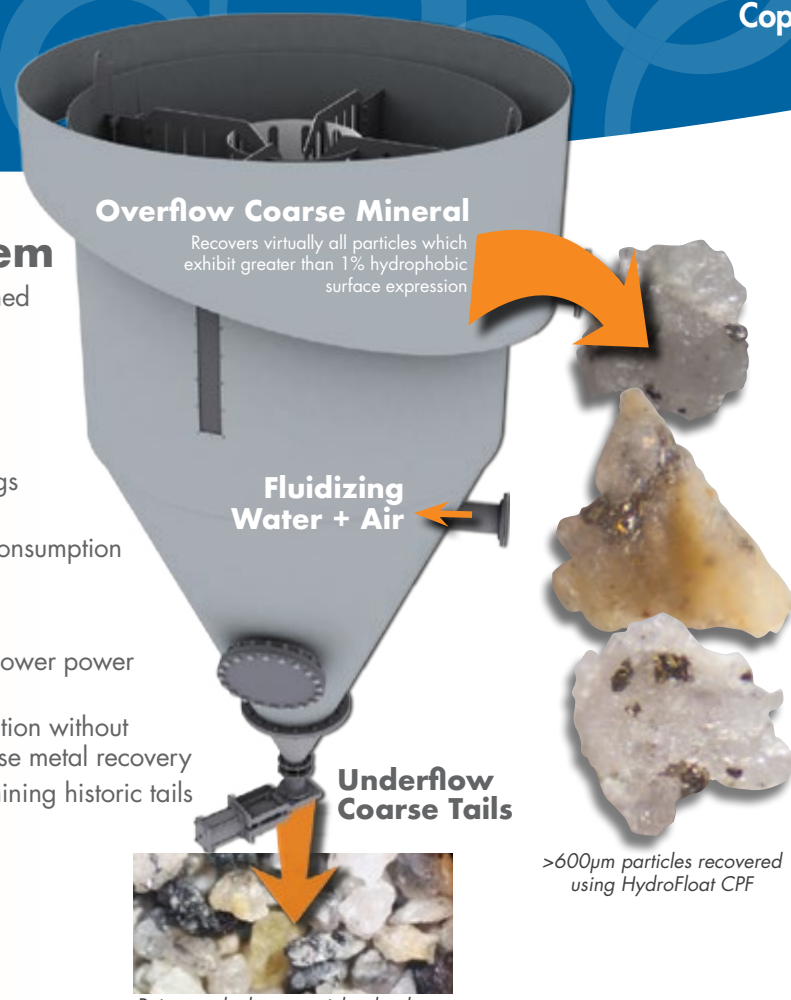
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Brownfield Projects: Increase production without expanding primary grinding, increase metal recovery

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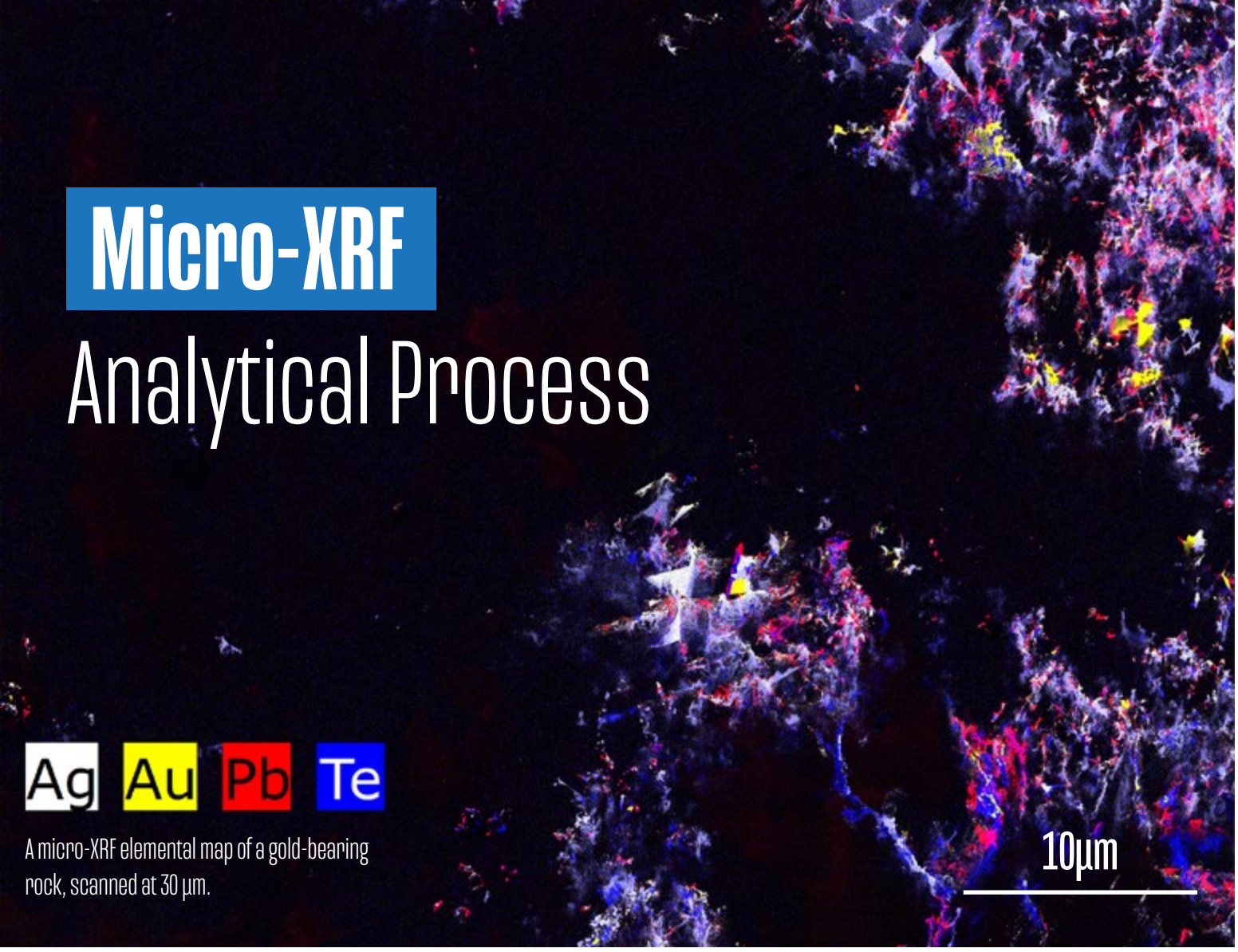
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Micro-XRF Analytical Process



A micro-XRF elemental map of a gold-bearing rock, scanned at 30 µm.

Portable Spectral Services (PSS) is home to Australia's only commercial micro-XRF instruments (µ-XRF).

The micro-XRF technique is a rapid, non-destructive analytical process used to acquire qualitative and quantitative geochemical and mineralogical data at a high spatial resolution (i.e., µm-scale).

PSS are industrialising this established technology, primarily available in academic settings, by delivering unique, affordable, and competitive access to contextual chemistry and mineralogy for a wide range of sample types.

This technology enables samples to be analysed with minimal to no sample preparation, at a resolution down to 4 µm, to produce elemental and mineralogy maps at a micro-scale for an area up to 19 x 16 cm.

The µ-XRF scan data can be processed with the Advanced Mineral Identification & Characterisation System known as AMICS.

This software package provides mineral identification and liberation information, including mineral abundance, assay grade, grain size and distribution, in addition to the visualisation of textures and spatial arrangements of the minerals.

The practicality of the µ-XRF, enables the technology to affordably bridge the geochemical and mineralogy gap between the small scale of Scanning Electron Microscopy (SEM) and chemical analysis at the meter scale.

Bruker's newest, most advanced spectrometer, the M4 TORNADO PLUS features the new dual Silicon Drift Detectors (SDDs).

Combined with a new super-light element window, the SDD's lower atmospheric pressure settings to create conditions necessary to detect light elements.

This yields greater response of all light elements, most remarkably being carbon (Z=6), in addition to O, F, Na, Mg, Al, Si, P and S.

This has substantially improved the detection and accurate identification of silicates, carbonates, and halide phases in samples.

The M4 TORNADO PLUS also provides the option to run measurements at atmospheric pressures in conjunction with a helium-purge system, which enhance the response of light elements that cannot be measured under vacuum (e.g., hydroscopic minerals).

PSS also offers MineralCube™ videos for clients to see the µ-XRF scans in a 3D form. For examples and more visit PSS' YouTube Professor Spectrum.

When it comes to spectral technology, look no further than the experts, Portable Spectral Services (PSS).

Located in the heart of WA's mining hub – West Perth, PSS offer powerful mineral processing at affordable, competitive prices on both the Bruker M4 TORNADO and M4 TORNADO PLUS models. *AMR*





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Danfoss

Built to last

Modular and adaptable, the VLT AutomationDrive fits into any environment. Featuring the extremely compact new generation D- and E-enclosures and a wider operating temperature range – from -25°C to +50°C (-13°F to +122°F) – without derating, this robust drive operates effectively and reliably even with the most demanding applications and in the most challenging environments.

Additionally, a full range of 690V rated drives, options for ruggedisation and high environmental class enclosures means that even the more challenging applications found in the Chemical and Marine industries are well served with the robust VLT AutomationDrive.

Packed with innovation

The VLT AutomationDrive features both hardware and software enhancements that maximize performance and provide a level of application flexibility that truly boosts your business.

The Integrated motion controller (IMC) provides advanced functionality to perform high-precision positioning or synchronisation with asynchronous or PM motors with or without an encoder connection. Not only does the IMC save cost when your application doesn't require the dynamic performance of a servo drive – such as rotary tables, cutting machines and packaging machines – but it also saves time due to the commissioning process requiring no advanced programming.

Additionally, the Motion Control Options provide a way to replace mechanical controls with intelligent, energy-saving electronic solutions that result in reliable, high-quality processes that increase productivity and performance.

With these options, it's possible to add electronic cam control with the VLT Motion Control Option MCO 305, reducing system and maintenance costs, or increase the capacity of applications such as palletisers with the VLT Synchronising Controller MCO 350.

Regardless of your need, utilising these options with your VLT AutomationDrive can provide increased control and operational efficiency, providing a faster return on your investment.

When safety is your foremost concern, the VLT AutomationDrive also offers many options to tailor your drive to meet your functional safety needs. From the standard Safe Torque Off (PL d, SIL 2) to the VLT Safety Option MCB 150 and MCB 151 options that include several safe speed options, such as Safe Limited Speed (SLS) or the addition of PROFIsafe with the VLT Safety Option MCB 152, there are several ways to meet your functional safety needs.

The company has also have made safety commissioning easy using visual instructions within the VLT Motion Control Tool MCT 10 that ensures both fault-free wiring and that safety parameters are correctly transferred from the PC to the drive. MCT 10 also offers easy diagnosis and the creation of a dynamic commissioning report required for safety acceptance tests.

Seamlessly into the future

Smart factories are at the heart of Industry 4.0. The VLT AutomationDrive has been designed with the built-in intelligence to fit right into this new standard. It takes full advantage of all that the new digital age brings to offer:

- web-based configuration, EDI, transparent order management
- tailor-made documentation dependent on your application needs
- high-quality design and durability through embedded protective functions
- motor and system independence and adaptability
- embedded intelligence (for example, integrated motion controller, pump functions) and functional safety
- interface to cloud-based data (for example, Danfoss ecoSmart)

As with all Danfoss drives, you're free to equip the perfect combination of motor and fieldbus technologies with the VLT AutomationDrive. All common motor technologies – Asynchronous, Permanent Magnet (IPM and SPM), Synchronous Reluctance and Permanent Magnet assisted Synchronous Reluctance – are supported giving you the assurance that, no matter your application, it completely fulfills your requirements and optimises your processes throughout the entire lifecycle. ***AMR***


Intelligence
to empower
your industrial
applications
Versatile, reliable and
consistently awesome
Chosen for its versatility, respected for its reliability, the VLT® AutomationDrive is now tougher and more intelligent than it has ever been before. Containing half a century of drives expertise, and built to last, this robust drive operates intelligently and effectively even with the most demanding applications and in the most challenging environments.
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ENGINEERING
TOMORROW
Danfoss

How to Transform Your Mining Project;

recent examples of innovation that enabled step-change outcomes

AUTHORS
Matt Pyle, Sirpa Tennant, Greg Lane, Andrew Hoyle and Ben Strong





Silvercrest's Las Chispas Site and Tailings Filters

This article explores industry drivers and challenges facing current projects. It provides insight into practical developments, including new and emerging approaches that are creating step-changes in projects, enabling producers to meet market expectations and improve a wide range of Environmental, Social and Governance (ESG) outcomes. Some examples of recent projects where innovation was key to achieving successful results are presented.

INDUSTRY CONTEXT

There are a wide range of changing market forces that are reshaping projects and operations: Decreasing orebody grades, more complex metallurgy, shifting commodity focus, increasing demand for resources, high commodity prices, realigned national sovereignty focus and a virus that has impacted travel and resulted in increasing freight, equipment and bulk materials costs are examples of changes that require response. In addition to these headwinds, the investment markets are demanding improved ESG performance and a drive toward net zero emissions.

We continue to see global copper projects decrease in grade and reserves, while larger projects with simple metallurgy tend to have increasingly complex social and environmental issues that impact permitting.

Supergene oxide gold projects are diminishing in frequency, scale and grade. Other gold projects in Australia and Africa are transitioning from non-refractory to refractory ore sources, requiring additional processing complexity through oxidation circuits to maintain acceptable recoveries.

Spiking demand for battery metals is driving development of new projects and markets. Circular economies are commencing to manage the battery revolution.

HOW TO TRANSFORM MINING PROJECTS

As Ausenco's Greg Lane said, "Our aim is to maximise the value of a client's project through smart thinking".

Common pitfalls include a lack of focus on fundamental business economics, over-capitalisation, mismanaged constraints, conservatism, poor engineering, poor assumptions, or lack of good and timely decisions.

A good project manages the business and project constraints and improves the outcomes for all stakeholders. Improvements can be achieved through new and different approaches that fundamentally improve recoveries, increase product purities, shrink capital and operating costs and better manage project impacts.

With strong business economics as the basis, engineering solutions that may (or may not yet) exist in the market can be adapted to address specific technical challenges. For some projects, a 'back to basics' rethink is all that is required. Other times, an innovative approach is necessary which can involve researchers, technology start-ups, in-house experts, commercialisation partners and forward-thinking clients in order to maintain a competitive edge. Successful methodologies and solutions from one project often translate to another.

TRANSFORMED PROJECTS

Some recent examples of Ausenco teams transforming projects to deliver great outcomes are presented below;

Mina Justa Oxide and Sulfide Copper Projects

At Mina Justa, we worked with Marcobre to understand the fundamental project economics and to drive value. We simultaneously designed and built a 6 Mt/y sulphide plant and a 12 Mt/y oxide plant. Andrew Hoyle, the Principal Process Engineer responsible for the study said about the approach "This enabled revenue to be generated from the 100 m deep layer of near surface lower-margin oxide ore whilst enabling access to deeper higher-grade sulphide ore to generate returns earlier. This approach improved the economics of the project which had been studied for decades".

Both the oxide and sulphide circuits include high pressure grinding roll comminution circuits to minimise energy and media consumption. The oxide circuit implemented an unusual vat leaching circuit, designed to maximise recovery of copper at optimum acid consumption. These vats comprised large concrete containers, each measuring 46 m x 36 m x 14 m, with 15 vats in the train, measuring 700 m in length, supported by travelling materials handling infrastructure. This approach at such a large scale was novel but was critical for the project to be successful.

Newcrest's Cadia Coarse Particle Flotation Circuit

For Newcrest, at the Cadia mine site in Orange, NSW, Ausenco engineered a coarse particle flotation circuit that was commissioned in 2018. This was the first application of the Eriez Hydrofloat™ technology in a hard rock application. This circuit has enabled Newcrest to coarsen grind sizes, increase copper and gold recoveries, increase throughputs and reduce energy consumption, media consumption and operating costs per metal produced.

Coarse Particle Flotation can reduce energy and water consumption by 30% and reduce TSF volume and costs if sand (produced as byproduct) is used for TSF wall construction. The technology has widespread application within concentrators across a range of commodities and is well suited for projects with limited access to water. We are studying and implementing this technology for a range of clients for existing operations and new projects, and we expect this technology will continue to achieve step change reductions in energy, water and operating costs across the industry for both fine and coarse-grained ores.

Preconcentration at Ravenswood

Pre-concentration enables low-grade ore to be rejected earlier in the value chain, preserving energy and water. At a gold mine in North Queensland, we are completing an expansion that leverages a characteristic evidenced in some orebodies where gold preferentially associates with finer (rather than coarser) particles in the crushing circuit. Matt Pyle, Ausenco's Director of Technical Solutions said, "Rejecting coarser and lower grade ores at Ravenswood enables over 30%



Mina Justa Oxide HPGR Crushing Circuit (foreground) and Leach Vats (background)

reduction in energy and water compared to milling those same particles. And this same approach can be applied to a range of other orebodies and commodities under the right conditions".

Recent technology developments leverage bulk and particle sorting to similar effect and can create a step change improvement in business outcomes.

Delivery of a gold plant with dry tailings

The Las Chispas project in Mexico, which was entirely constructed during the COVID pandemic for a fixed price, is nearing completion ahead of schedule. The project also includes dry tailings (tailings filtration) to minimise tailings footprint and water consumption.

Novel Hydrometallurgy Projects

We are working on several bespoke hydrometallurgy flowsheets to unlock project value for our clients. According to Ben Strong, Director Minerals and Metals for APAC/Africa, "These projects require an 'all in the one tent' approach to be successful, requiring technology owners, test work laboratories, consultants and engineers to work together". These projects are mostly focussed on battery metals and many are leveraging proprietary and patented chemistry and flowsheets.

Optimising Power, Tailings Sand and Price Certainty

For Mantos Copper on the Mantoverde project, we optimised the tailings transport system to install a second thickener and reduce the energy that would otherwise have been wasted pumping water for no gain. The project also includes a tailings sand cyclone station that produces sand for TSF wall construction (reducing the amount of fill required), while also increasing water recovery from the tailings facility. This tailings sand approach is common in South America but less so in Australia, in part due to finer mineralogies and finer grind sizes.

Tailings sands are likely to have greater applicability in Australia when coupled with coarse particle flotation (which can produce sand directly). The Mantoverde project is also delivered for a fixed price, giving Ausenco greater control of managing project risk factors while also improving cost certainty for the client.

Optimisation Projects Leveraging Data

We continue to provide consulting services to optimise operations, focussing on the use of data, particularly within the comminution circuit. Our success leverages small data, experience and expert knowledge of the cause and effects within systems to provide a quick return on investment to achieve specific objectives.

Once short term gains are realised, the focus shifts to larger (bigger) data sets with expanded focus on machine learning techniques, but still with defined objectives and outcomes. This methodology is continually driven by the fundamentals of the system by those with operations backgrounds who understand the practical context of the data. This approach mitigates against data 'analysis paralysis' and correlation versus causation errors which are common pitfalls for data-driven optimisation projects.

Sirpa Tennant, Study Manager for APAC/Africa said, "these examples of step-change outcomes demonstrate how we continue to redefine the paradigms for schedule and cost performance with people who know what good looks like and are able to adapt to fit the specific needs of the market and the project".

If you'd like to know how we can tailor custom solutions and reshape your projects, please get in touch with **Ausenco.**

AMR

As a service provider to the mining industry, we regularly observe and help resolve project development challenges.

We Provide

- ✓ Consulting services
- ✓ Study services
- ✓ Project delivery
- ✓ Asset optimisation
- ✓ Operations and maintenance
- ✓ ESG services

...from pit to port!



Ausenco



A West Coast Poly 38000L Raw Water Storage Tank with Cyclonic Restraint Ring.



WCP 12000L Raw Effluent Storage Tanks fully bunded HD steel frames with bund high level alarms.



West Coast Poly Delivery of 23000L Tanks for storing Sodium Hydroxide Solution.

West Coast Poly Continues to Build On its Service Offering

Canning Vale-based West Coast Poly (WCP) has added a new arrow to its quiver of offerings to the Australian mining industry, recently designing and manufacturing certified restraint rings.

Rated for Region D, CAT 2 wind loading regions, the restraint rings range from 4,500lt up to 50,000lt.

Unlike using chains/cables, the restraint rings are easy to install on-site and can limit any trip hazards around the tank.

WCP Sales Manager, Chad Southcott, says the severe damage related to Cyclone Seroja which battered Kalbarri and Northampton last year is a reminder that you don't always need to be in cyclonic regions to be hit by severe storms and these restraint rings give users the piece of mind that their storage tank will be safe during these events.

The new restraint rings are just the latest in a long line of products developed by the innovative company.

In 2020 West Coast Poly also introduced the new SRM Series 3-Sided Shuttle Rotomoulding Machine, one of the largest machines of its type and a first for West Coast Poly and Western Australia.

Capable of manufacturing polyethylene storage tanks up to 50,000lt with state-of-the-art computer systems, monitoring temperatures, rotations and cook times, WCP's manufacturing process is second to none.

With advanced manufacturing equipment and technology, West Coast Poly has been supplying the mining industry over the past 23 years and has a well-earned reputation for supplying tanks that stand the test of time and are capable of handling the tough Australian environment.

For almost a quarter of a century, West Coast Poly have supplied storage tanks to all major mining sites throughout Western Australia, including Potable Water tanks to Mesa J, Waste Water tanks to Koodaider and Sodium Hydroxide storage to St Barbara to name a few.

Striving for excellence, the company's tanks are certified under ISO 9001:2015 for Quality Management covering design, manufacture, delivery and installation of their tanks.

With polyethylene's versatility and resistance to a large range of chemicals their tanks are the ideal choice for project sites for potable water, process water, wastewater treatment and chemical storage.

The company's processes manage all stages of the production cycle ensuring clienteles receive a product of supreme finish, strength and durability.

Growing Range

West Coast Poly built its reputation on its water tanks and have since evolved its range to be known as one of the most forward thinking and technically advanced manufacturers specialising in polyethylene storage tanks and custom-built products.

Versatility and resistance make these tanks the ideal choice for project sites for potable water, process water, wastewater treatment and chemical storage.

West Coast Poly's manufacturing prowess ensures each tank is of the highest quality.

Its tanks are moulded in one piece from high quality polyethylene, a material that is rugged, durable and shows outstanding chemical and environmental resistance.

The company's manufacturing processes are designed to achieve optimum properties from the moulded material and can offer impact testing in accordance with AS/NZ 4766:2020.

The tanks can be fitted with a wide range of brass, stainless steel and polyethylene fittings in threaded and/or flanged up to 600mm diameter.

These fittings can be factory fitted, using specialised techniques in polyethylene extrusion welding and fusion welding and positioned to suit your exact specifications shown on your plans. ***AMR***

westcoastpoly.com.au







PIRTEK We'll Keep You Operating

When customers call Pirtek their equipment has stopped, and the job remains unfinished. They're losing money and patience. They're under pressure. Whether it's a big customer with a long-term relationship or the first visit to a Pirtek centre, our customers have one thing in common: they need our expertise to keep them operating.

Pirtek people thrive on getting a customer out of a bind, out of trouble and out of stress. With products as true as our word, and a global network with local knowledge, whatever it takes, Pirtek will keep you operating.

HOW DO WE DO IT?

Our premium positioning comes from offering superior value to our customers: delivering what they need, when they need it—to the highest possible standard.

Pirtek's ability to Keep You Operating comes from an unmatched offering across four pillars – **PRODUCTS, SYSTEMS, PEOPLE, SERVICE**

PRODUCTS

CUTTING EDGE QUALITY

From international mining operations to one-man local businesses, our customers rely on our products to maintain their livelihood. That is what drives us to source and to create the very best products from the best manufacturers in the business.

Our assurance for quality, reliability and continuous improvement delivers confidence in our ability to provide only the highest quality products, made from the best materials and sourced from world-class suppliers.

Pirtek invests in all stages of the supply chain and has an on-site NATA certified testing laboratory. We are constantly producing state of the art products with cutting edge quality. They're precision-engineered, laser measured and batch coded. It also ensures our inventory range stays ahead of the curve.

Innovative storage and transport facilities maintain the integrity of the product right through to installation.

SYSTEMS

GROUND BREAKING EFFICIENCY

Pirtek's global business is underpinned by groundbreaking systems that ensure quality control and order efficiencies. These systems allow us to guarantee the highest level of service in the industry by connecting the expertise and skills throughout our global network. Our resource planning and data traceability systems ensure efficient management and delivery of orders.

To deliver products and services in a reactive way, you need access to people, experience, product range, and immense coverage at scale. Our customers know they are able to leverage the security and reliability that scale brings to our business at any time, without any hesitation.

With new machines and technology emerging at an increasing pace, learning and development is more important than ever. Pirtek people have a thirst for knowledge and a drive to learn, and our training systems keep our network up to speed with the utmost efficiency.

PEOPLE

SOLUTIONS UNDER PRESSURE

At Pirtek, no two days are the same. We never know when our customers will break down and need us urgently. We never know what machines we'll find ourselves under tomorrow. Every day brings a new problem to solve.

Being highly aware of the risks involved in making even the smallest mistake, it's imperative our people combine a sense of urgency with the ability to remain calm.

SERVICE

WE'LL NEVER LET YOU DOWN

With a 24/7 service offering, there's always someone on call at Pirtek.

We pride ourselves in having the people and experience to respond immediately when our customers need us most. But we don't just solve problems.

Our true business is in preventing them.

Tough machines rely on tough components, parts that stand the test of time and get the job done day after day. Keeping big equipment operating requires quality parts and reliable service technicians. Our team are on call 24/7, 365 days a year making sure we're there when you need us. ***AMR***





COMPLETE SUPPLIER TO THE MINING INDUSTRY

- Safety first approach
- Industry leading customer service and technical support
- Full design, engineering, manufacture, assembly & hose management
- Underground audit process for our customers
- 24/7 supply and support nationally
- NATA certified hose testing & reporting
- Mobile Service Unit truck fleet or bulk supply & containerised workshop solutions
- Quality management system certification to ISO9001:2015

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134-222
National Service 24 hours - 7 days
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Robust Piping Solutions for Australia's Mining Operations

Water scarcity affects every continent globally, with consumption of the resources having risen more than twice the rate of population growth over the past century.

Moving a scarce resource like water in remote destination is no easy feat in Australia.

Faced not only with its scarcity, mining companies must also contend with the challenges of overcoming the distance between mine sites and water sources.

This underlines how critical water pipelines are as a means of water conveyance.

"Water pipelines are costly to build, taking lengthy periods to have major projects approved and funded by project owners. And it is highly expensive if water pipelines break down and cause unintended shutdowns," Steel Mains business development manager – mining, Amir Vahdani tells AMR.

Whilst it is obvious that operators want to continue digging for valuable minerals – they certainly do not want to be wasting time digging up faulty water pipeline systems.

There are a number of pipeline products on the market including imported products from overseas countries which are often considered as a cheaper alternative.

Steel Mains steel pipeline system is backed by an extensive track record of delivering high-quality steel pipes to some of the country's major mining operations.

"This is why Steel Mains provides substantial value in our Australian manufactured custom-designed pipeline solutions, offering companies the longest service life as well as maintenance-free features."

Steel Mains focusses on meeting project specific requirements and total cost of ownership (TOC) in assessing the long-term value of a purchase as opposed to looking simply at the material supply price.

These include taking into account considerations such as aggressive waters (low pH) and corrosive soils (acidic), extremely high service temperature (over 60 degrees Celsius) and high pressure rating capability that long distance mining pipelines are commonly designed for (PN35), while supplying all the relevant fittings including bends, reducers, air valves, scour valves tees and flanges.

"When it comes to mine sites, water can serve different purposes," Vahdani states.

"It may be needed for supply of water through high pressure water mains, often from sources located far away from the mine site (desalination plants or bores), port operation and stock yard. Whether it is for a potable use, processing use, or dust suppression applications – they all require water, and Steel Mains is equipped to provide a unique solution to meet each project-specific requirement."

Wastewater transferred from mining sites tends to have high levels of acidity, which Vahdani says Steel Mains' pipes can withstand – and often outlive the life of a mine.

Notwithstanding such extensive requirements, Steel Mains' high pressure steel pipeline system provides the mining industry with the optimum solution in conjunction with the lowest carbon footprint.

"Ninety-eight per cent of our product is Australian manufactured, employing Australians , with Bluescope Australian steel," Vahdani says.

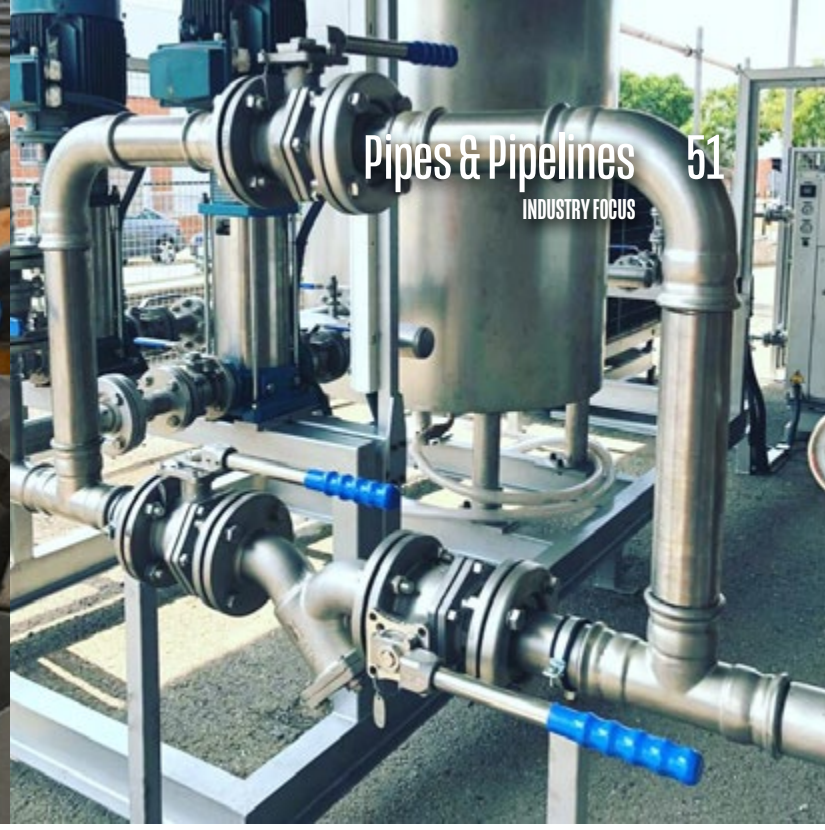
"Our pipeline system's corrosion protection coating and linings are also locally sourced from Australian manufacturers.

"Once the product comes to the end of its useful lifespan, most of the components are recyclable to provide optimum sustainability benefits to the environment." ***AMR***









Strong as Steel

AusPress Systems have brought an advanced range of drainage and piping solutions to market under their high-quality stainless-steel range; a line of premium products brimming with benefits.

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

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

AusPress Systems General Manager and CEO Jason Nelson said this made Press-Fit a safe onsite product that was easy to maintain, which were just some of the advantages.

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

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

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

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

"At AusPress Systems, we meet with our clients and ask them what they need, why they need it and a take a number of other factors into consideration.

"Of course, 70 per cent of our products offering is stainless simply because it is cost effective, longer lasting, hygienic, aesthetically pleasing and easy to work with compared to some other products."

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

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

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

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

He also said certification by the relevant body in an operation's sector was critical, as well as choosing a product that performs as required and lasts' as long as necessary.

"AusPress is able to assist with all of this," Mr Nelson said.

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

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

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

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

AMR



WE ARE AUSPRESS

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

Supporting Australian industry since 1992, we are a hand-picked, highly skilled and professional team providing first rate services for clients in the commercial, water processing, heavy industrial, medical, marine and offshore, food and beverage, resources and energy sectors.

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AusPress®





Providing The Smart Solution

Multi-award winning pipe fabrication solutions provider Smart Fabrication has a mantra of doing the right thing, every time, for its customers.

The Australian Mining Review recently caught up with Business Development Manager, Les Shearn, to hear about the company's continued successes.

AMR: How would you describe your company in brief?

Les Shearn: Smart Fabrication, and its Engineering Design company Ingenia, are passionate about achieving quality outcomes and delivering smart solutions that meet client's needs and challenges. Both are proud South Australian engineering design & engineering fabrication companies committed to exceeding client's expectations by delivering products of the highest quality, on time and at a competitive price.

This Smart Group have an outstanding track record of partnering with a range of clients to deliver results in all facets of engineering; from quoting and designing to fabrication and painting.

They work collaboratively with others to deliver impressive results, are committed to ensuring future workforce training and are proud of their efforts to proactively engage with Indigenous companies.

AMR: What services did you carry out at recent projects?

Les Shearn: The Smart Group's approach is to meet with a client at the earliest time to discuss the project in detail and determine the best way forward. The company is focused on solving the most complex challenges and ensuring a quality result is delivered on time, to budget and to the highest quality.

Recent project examples on the Australian Naval Defence Precinct at Osborne in South Australia are cases in point.

AMR: What did your services enable the project to achieve?

Les Shearn: The Smart Group's sound understanding of all faceats of Engineering is focused on removing the complexity and ensuring the safe effective delivery of the most complex projects.

The Group's approach and way of working with the client during the planning phase enable technical challenges to be discussed in detail up front to define the best possible options and an agreed way forward.

Adopting this type of approach builds buy in, removes risk and ensures the safest solution is implemented.

AMR: What projects does the company plan to work on in the future?

Les Shearn: The Smart Group operates across multiple sectors where the focus is on delivering the highest quality result, delivered on time and safely at the most efficient cost.

Both companies have a wealth of experience across a range of sectors that include Oil & Gas, Resources, Defence, Infrastructure, Government and Civil.

AMR: Is there a speciality that you would like to highlight?

Les Shearn: Smart Fabrication is a specialist fabrication company, Ingenia a highly skilled Engineering Design house with no project or challenge being too big for the Smart Group!

The Smart Group is committed to the ongoing development of its workforce and that of the sector. They are actively involved in the training of their workforce and working collaboratively with other companies to ensure clients are supported by a strong supply chain delivering quality outcomes.

AMR: So the Smart Group are the right solution for your engineering and pipe fabrication needs. ***AMR***





Lift Us Up Where We Belong

West Cranes & Access Hire will continue to lift Australia's core industries with their high-quality equipment range; the largest mobile crane and access boom hire fleets in Western Victoria.

Originally known as Westlift Crane Hire, the prominent business was first established in 1978 when founder Gary West purchased a nine-ton cap, LS20 in Stawell.

Growing substantially from its humble beginnings, the business now features a wide range of cranes for hire, spanning from the 12T through to 100T and more.

Working to fill complex accessibility needs within critical industries, the Australian company also offers elevated work platforms (EWP's), scissor lift hire, tilt tray hire and container hire or sale.
Still leading the business roughly 45 years' later, Mr West said the key to sustained success was maintaining high-service standards and connecting positively with the local community.

"West Cranes & Access Hire is exceptionally proud to be an Australian business employing local people within our community," Mr West said.

"Remaining local is extremely important to us, along with strongly supporting the wider community through various functions, events and sporting teams.

"We do this via sponsorships and supplying necessary hire equipment, including EWP's and Scissor Lift hire which are much needed services at various community events.

"Since building our business through strong community partnerships, we now boast the largest Mobile Crane Hire and Access Boom Hire fleet throughout Western Victoria."

Mr West said he had noticed industries in his region growing and changing, with various sectors such as Farming and Agriculture, Wind Energy, Land Mineral Resources, Mining, Road and Rail, Festivals, Functions and Events requiring a greater range of equipment and support.
Looking to expand and accommodate the evolving needs of local clients, West Crane & Access Hire have also changed and innovated, bringing increasingly supportive technology to the forefront.

Their cranes are versatile and mobile, suitable for rough terrains and are proven to reduce operational downtime, while operators with additional needs can hire a mobile hydraulic crane for lifting loads that are large-scale and heavy duty.

Mr West said the equipment for hire was regarded the best in the business and his company was routinely adding to their impressive range and shaping their services to better support Western Victoria.

"Ensuring we have a high standard range of products and services is part of our long-standing commitment to clients," he said.

"You can find us on Ararat Road in Stawell and you can access our equipment throughout Western Victoria and beyond."

Towns regularly serviced

- Ararat
- Avoca
- Beaufort
- Birchip
- Dimboola
- Donald
- Elmhurst
- Hamilton
- Hopetoun
- Horsham
- Kaniva
- Lismore
- Maryborough
- Nhill
- Ouyen
- Rainbow
- Skipton
- Stawell
- St Arnaud
- Warracknabeal
- Wycheproof

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Aerial photo courtesy of Gladstone Aerial Media.

Universal Cranes 2 Piece Air Lift

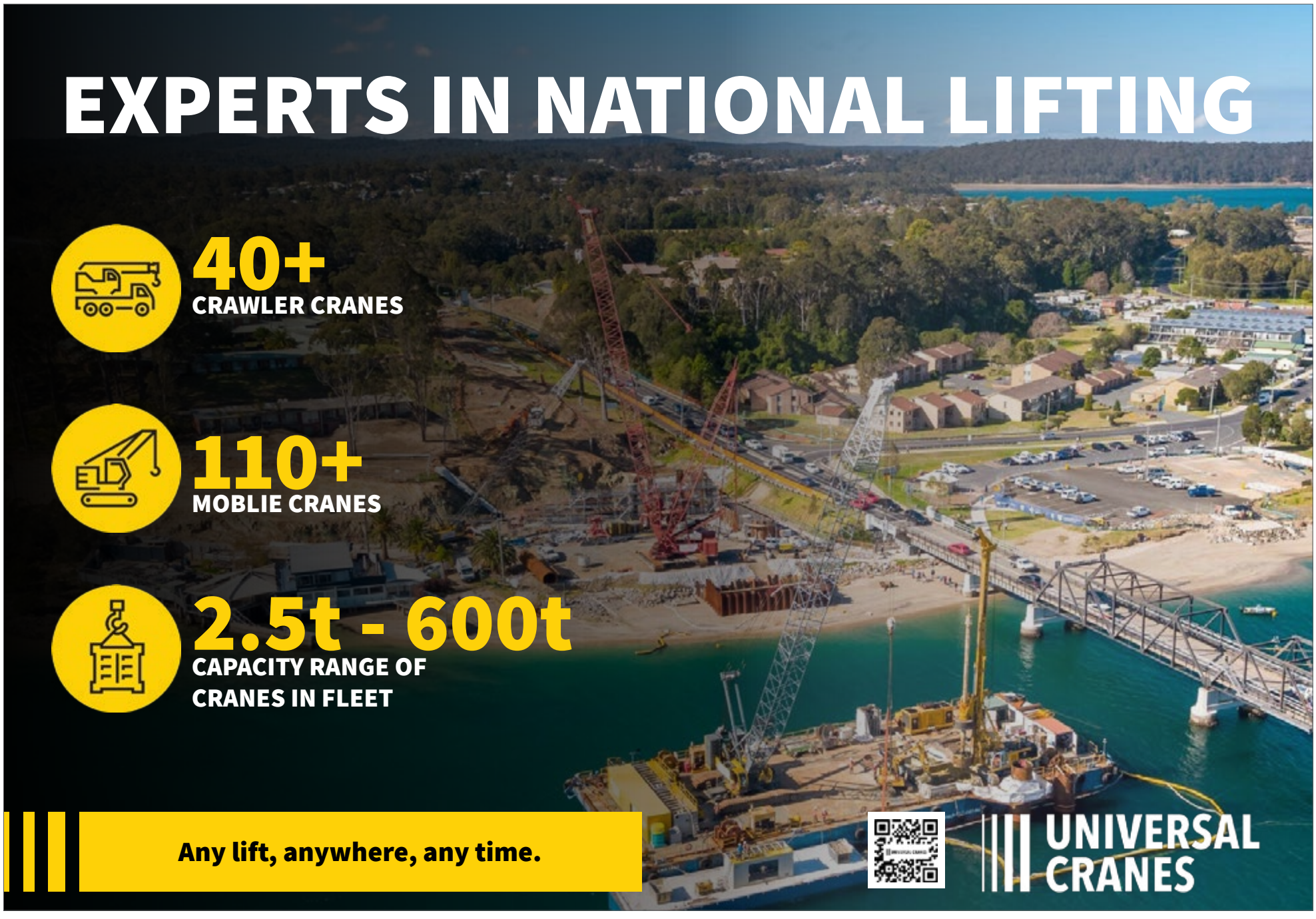
Universal Cranes was engaged by Xtreme Engineering in October 2021 on the Air Separation Unit (ASU) Decommissioning Project. The scope of the project was the deconstruction of an air separation unit cold box distillation tower and the associated equipment.

The air units were constructed in 2005 by Air Liquide at Rio Tinto's Alumina Refinery to supply oxygen to the refinement.

The most challenging task required the use of our 450t Grove to lift the 47m high cold box down in two sections. The team had to cut the cold box in half. The two sections weighed in at 44 tonnes (higher piece) and the lower piece at 60 tonnes. These sections were then tailed from the vertical into the horizontal position with assistance from the 300t Liebherr in preparation for the sections to be transported to their final destination in India.

Lots of spectators came out to watch the milestone moment as the two pieces were lifted down safely.

Key Equipment Utilised: Grove GMK 7450, Liebherr LTM 1300/1, Grove RT890E, MAC 25 Franna. ***AMR***



Working at an Optimum Level



Seifert Systems Australia, provides thermal products designed to keep enclosed electronics cool working to optimum performance.

Ideal for harsh environments such as mining, Seifert recommend the Peltier Thermoelectric series of precision coolers.

Thermoelectric elements create a temperature differential between ambient and internal heat sinks. This encourages an internal cool air circuit while fans help transfer convective heat to atmosphere.

Cooling capacities range from 30W up to 800W.

These units are available in Stainless Steel 304 or 316.

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

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

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

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

Suitable for indoor and outdoor applications. Multiple Peltier units can be installed in side mount orientation only. Top mounting is to be avoided as this can promote condensation.

Condensation drip trays are also available.

Seifert continues to supply these units side mounted to enclosures located at underground mine sites in South Australia. The environment is extremely hazardous, dirty and subject to explosion. The units are performing and equipment is operating as expected. ***AMR***





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.

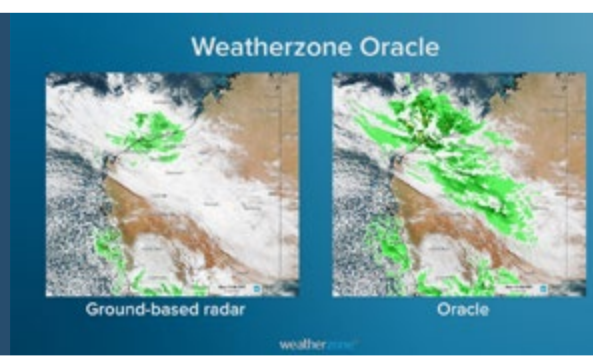
Oracle can be used in a "nowcast" mode, providing detail of rainfall, anywhere in the country outside of weather radar coverage. But, Oracle delivers more than this and accurately predicts temperature, wind, rain, cloud and lightning up to three hours in advance, leaving operators with plenty of time 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.

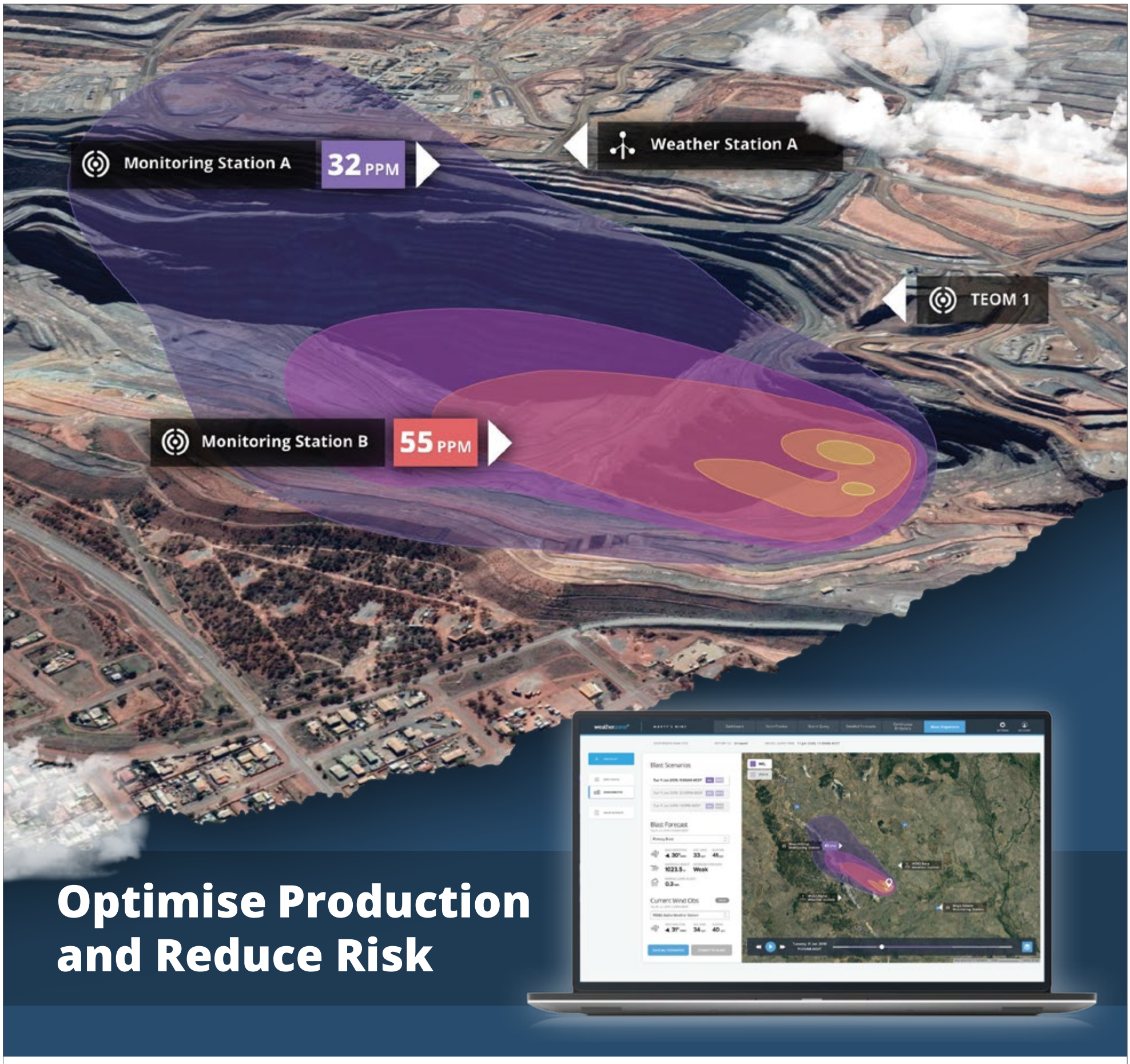
The gold mine was using a single site lightning sensor but, questioning its accuracy, decided to trial Weatherzone's lightning network in tandem to compare their response. It was while trialling the service that thunderstorms moved through the area.

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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INDUSTRY FOCUS

Congratulations BHP

2021 Ignition SCADA Firebrand Award Winner

BHP's TROC HMI project built with Ignition SCADA won a prestigious Firebrand award at the recent Ignition Community Conference (ICC).

We congratulate the BHP team on this landmark project built by BHP for BHP.

PROBLEM:
BHP Technology Remote Operations Centre (TROC) operates 24x7 supporting critical technology across assets in Australia to prevent and minimise safety and production impacts to the assets.

Prior to HMI, BHP TROC technicians performed this process manually, monitoring thousands of uncontextualized emails, manual and automated phone calls, or simply through "eyes on glass," monitoring multiple application screens and logs.

A missed alert or delayed response could result in the shutdown or evacuation of an entire operation, or worse, someone being injured.

SOLUTION: Ignition SCADA
After extensive research, BHP defined "what good looks like."

TROC technicians receiving ONLY critical data, presented in near-real time, in a way that provides actionable context, displayed on a single pane of glass.

Developing the solution was complex, as BHP's Australian operations consist of:
- 30+ sites
- 20+ network domains
- Tens of thousands of devices
- Hundreds of thousands of data-monitoring points

For the software backbone of HMI, BHP chose Ignition SCADA.

Ignition provides the means to present information in a modern browser interface, provides a zero-install environment, is mobile-device-friendly, and allows BHP to present all the information to the TROC technicians in a familiar SCADA environment.

Importantly, Ignition's an off-the-shelf solution with traditional SCADA functionality, alongside modern IoT connectivity options.

The development team has spanned BHP's Australian assets to collect device health and process data via the existing OSI PI historian infrastructure, collecting and contextualizing 1.1 million data points every few seconds.

This data is automatically mapped back to data models, while bringing in ServiceNow data on current incidents, problems, and changes, to provide more context in an alarm situation.

BHP also hooks into predictive Splunk alerts and consolidates this along with all the asset downtime into Ignition alarms.

BHP monitors:
- 800+ servers
- 1,400+ switches
- 79 GE PLCs
- 257 AB PLCs
- Many services and applications

BHP's TROC HMI project built with Ignition SCADA won a prestigious Firebrand award.

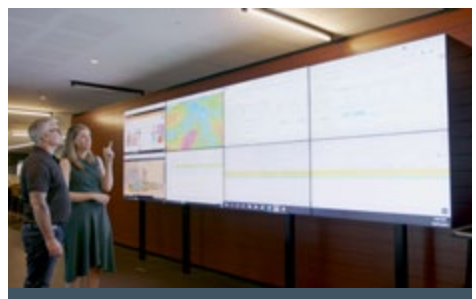




BHP's Technology Remote Operations Centre (TROC) operates 24x7



TROC supports critical technology across BHP assets in Australia to prevent and minimise safety and production impacts to the assets.



BHP chose Ignition SCADA.

Most of the data models built for these devices in Ignition are scripted and automated, so BHP can quickly deploy at scale and provide the ability to refresh when new devices are added or removed from the landscape.

iControls Pty Ltd, Australian Distributor of Ignition SCADA provide continued technical support in BHP's development and deployment of this solution. ***AMR***



Optimising through automation



United. Inspired.

Automation and Information Management

We offer some of the industry's most advanced automated mining solutions to improve safety, productivity and profitability in your operations. Expedite the flow of information between assets and systems to the right place at the right time by connecting the unconnected for a smarter, integrated operation that increases efficiency. Which area of your mining operations do you want to optimise?

Epiroc

epiroc.com/en-au

Accurately Measure Level Through Dust Suppression Sprays

Hawk Measurement Systems (HAWK) is a world leader in level, position, and flow measurement, providing cutting edge equipment to the global industrial market.

With 30 years of experience and a record of success in a wide range of areas including mining/mineral processing, water supply/ wastewater, bulk material handling and chemical.

HAWK's on-going commitment is to provide industry leading technology and cost-effective solutions.

HAWK designed and developed a powerful level transmitter that accurately measures level through dust suppression sprays.

HAWK uses Acoustic Wave technology for their non-intrusive, Sultan Continuous Level Transmitter range.

Applications include, Primary Crusher Surge Bin, Secondary and Tertiary Crushers, Process Slurry Tanks, Stockpile Level Control, Truck Detection, Shuttle Conveyor Positioning Transmitter, Anti Collision Controls and more.

The major advantages that Acoustic Wave technology, brings to Mining applications are:

1. Automatic Cleaning of condensation and buildup off the face of the measuring diaphragm, that Radar technologies do not offer.

2. Continuous measurement of solids even when dust suppression sprays are activated.

3. A range of acoustic transmitters. 5Khz, 10Khz,15Khz,20Khz,30Khz,40Khz,50Khz frequencies up to a maximum range of 300 feet, integral or remote versions.

4. Foundation FieldBus, ProfiBus PA, HART, integral two wired transmitters or remote transmitter versions.

Acoustic Wave products distinguish themselves from traditional ultrasonic and radar level products by combining low frequency, high power and adaptive gain technology.

In this way, you can measure even the most difficult level applications, such as, Primary Crusher Surge Bins, Process Sumps that suffer from condensation, froth and foam.

These applications have always been problematic on mine sites and by careful selection of transducer frequencies and housing materials, HAWK can offer process application guarantees.

A common application in the mining industry is to measure depth of ore, after a truck has dumped into a ROM Bin.

It is important to maintain a specific level of ore to protect the Apron Feeder and to indicate when the next truck can dump.

This application is challenging because of water dust suppression sprays, dust, build-up, large lump to fines, ore size, grizzly beams etc.

For this application we must always use a non-intrusive level technology that is positioned out of the way of being physically damaged by the truck and the falling Ore.

If a Grizzly is installed a position between two beams in a central position of the ROM Bin is always the best.

Two technologies are available: Radar and Acoustic level transmitters.

Both have the range capability in a dry application, but when Water Sprays are used to suppress dust, the water and dust build-up on the Radar will make it fail.

About Hawk Measurement Systems

Hawk Measurement Systems (HAWK), a world leader in level, positioning, asset monitoring and flow measurement technology, provides cutting-edge equipment and complete solutions to the mining industry and the global industrial market.

HAWK specializes in reliable and continuous level measurement in storage silos, on conveyor belts, clarifiers, crushers and blocked chute detection with the ability to send real-time data to a computer, control room, or smartphone.

HAWK has a long history of success in the harshest of environments and applications. HAWK has won several prestigious awards for their breakthrough technologies.

Some of these technologies include Acoustic Wave, Ultrasonic, Microwave, Radar, and Fiber Optic Sensing.

HAWK designs and develops innovative measurement technology that is extremely reliable and accurate, simple to install, easy to operate and offers maximum efficiency.

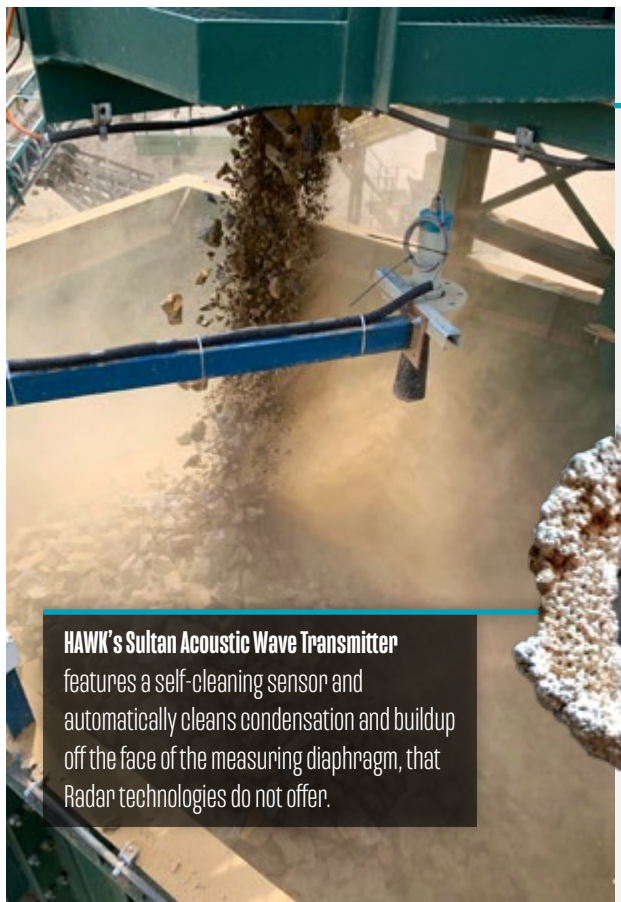
The mining industry presents unique challenges due to dust, mud, impact, abrasion and build-up of material on sensors and plant, which HAWK has successfully solved for over 30 years.

HAWK is committed to providing best-in-class products, services and technologies that will have unsurpassed value for their customers.

HAWK currently has two manufacturing facilities, headquarters in Melbourne, Australia and the USA manufacturing facility in Medina, Ohio.

For further information, contact Hawk Measurement at **inquiry@hawk.com.au**

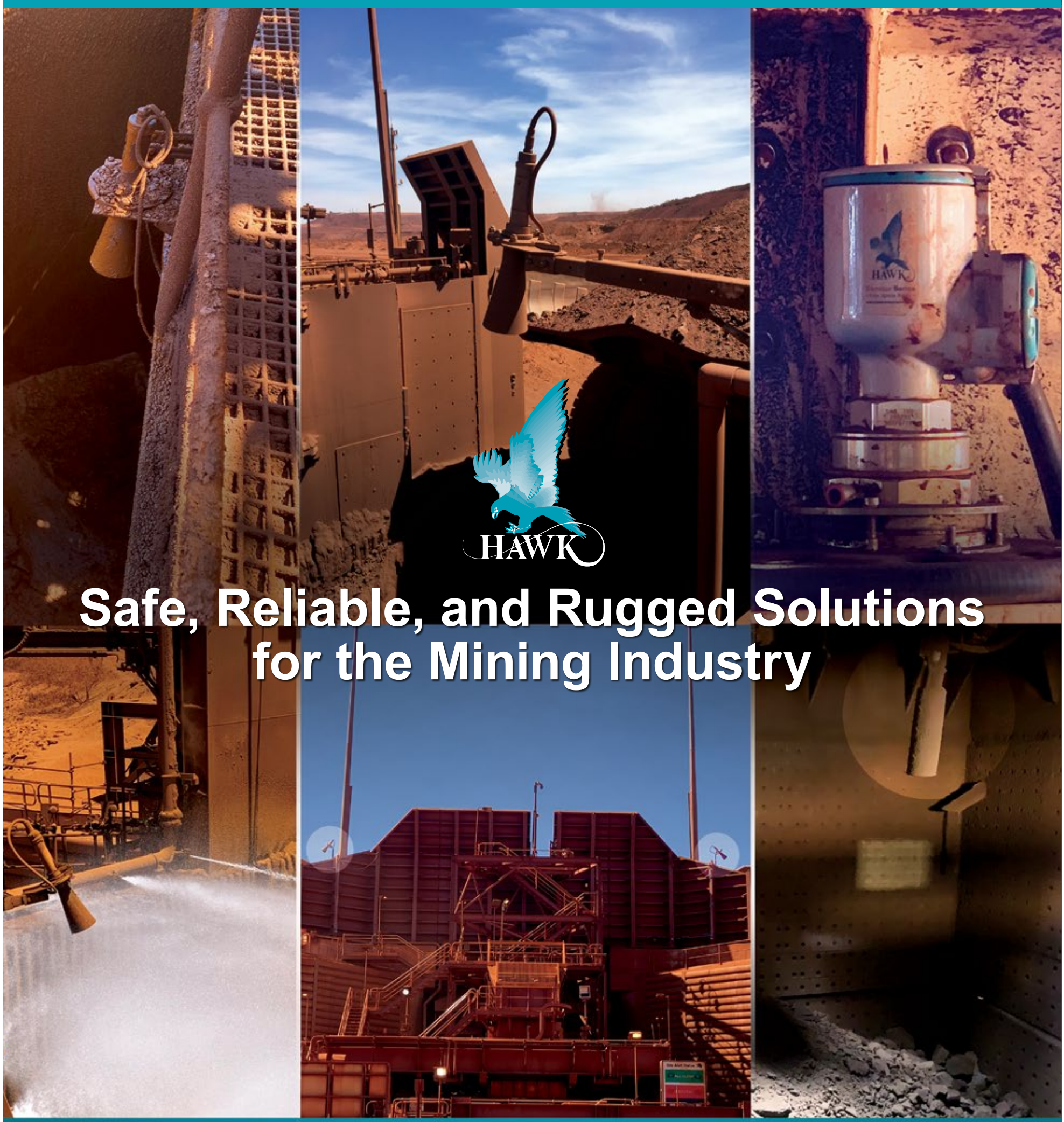
AMR



HAWK's Sultan Acoustic Wave Transmitter features a self-cleaning sensor and automatically cleans condensation and buildup off the face of the measuring diaphragm, that Radar technologies do not offer.



HAWK's Sultan Acoustic Wave Transmitter accurately measuring rock level in a rugged quarry application.



Hawk Measurement Systems' (HAWK) award-winning products, technologies and complete monitoring solutions help the mining industry to increase profitability and eliminate downtime.

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The mining industry presents unique challenges due to dust, mud, impact, abrasion and build-up of material on sensors and plant, which HAWK has successfully solved for over 30 years.

Our ongoing commitment is to develop & provide **industry leading technology** and **cost effective solutions**

Hawk Measurement Systems I inquiry@hawk.com.au I www.hawkmeasurement.com I T: +61 (0)3 9873 4750

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.

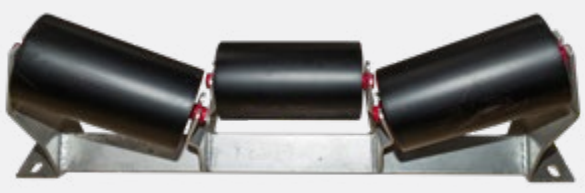
In 2000, founder Mel King and partners formed Minspec, a mining equipment manufacturer.

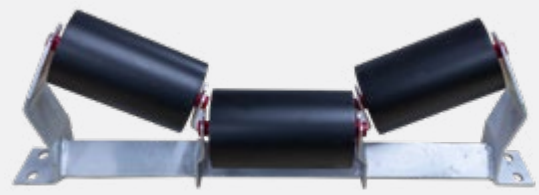
By the mid-2000s, King partnered with Brelko on the engineering of Encaplock and Keyliner dust sealing and chute lining systems.

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***





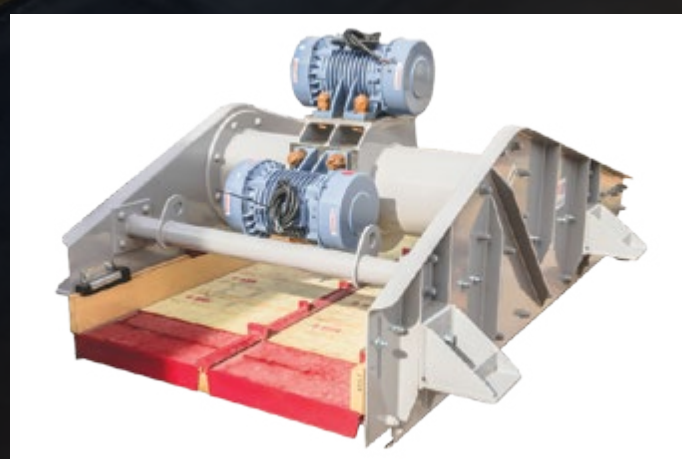
Oreflow supplies a range of standard and customised roller and idler frames for a variety of mining applications.

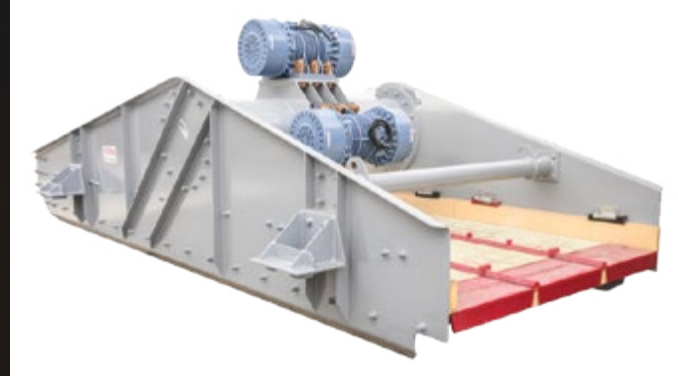


The E905 poly head pulley belt scraper, suitable for all types of conveyor belts and metal fastener systems.









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.

We are now the Australian agents for **AIRSWEEP®**: https://controlconceptsusa.com/airsweep/

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BRELKO® CONVEYOR PRODUCTS

OREFLOW AUSTRALIA PTY LTD



Getting to the Core of the Matter

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
- Full CAD system design and engineering inhouse
- Broad product range
- Low cost – deal direct with the manufacturer
- Short delivery times
- Special requests to suit customer applications

adept conveyor technologies

Talk to Adept now, the conveyor manufacturer with the field experience.

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+61 3 9357 8814 (Melbourne)
E: sales@adeptconveyor.com.au

www.adeptconveyor.com.au

DRC Rollers

Now Making It Happen In Mackay



DRC is an Australian owned and operated company that has been supplying conveyor components and replacement parts nationally to the bulk handling industry in Australia for over 50 years.

In 2021 new owners took over the opportunity to continue and expand the business that has successfully supplied Australian industry by leveraging from their own long history working with conveyors from manufacture to installation and ongoing maintenance.

Their experience will ensure the continuation of providing a professional service to all our current and new customers.

DRC have recently invested in new machinery, upgrading existing machinery and modernising the NSW factory.

They have also invested in a new equipment to set up a facility in Mackay, Queensland, to offer the same service DRC is known for Australia-wide.

The new manufacturing facility in Mackay will commence production of conveyor components and spares in January 2022.

DRC can offer conveyor components to all industries with a diverse range.

All components are manufactured to a high standard locally at our sites in Heathcote, Sydney, and Paget,Queensland, for fast and efficient distribution Australia wide, with quick turnaround times being our specialty.

DRC has a close working relationship with Australian Conveyor Technologies Pty Ltd that allows them to provide drafting and engineering support where required for any component design that our customers may require.

Through our many years of continuous operation, DRC have supported all our customers with a full range of replacement components for both new and used conveyor systems.

DRC specialise in manufacturing conveyor components in any volume to a customer's identified specification or supplied sample.

DRC require no minimum order amount and have the capability to supply one roller or a complete conveyor system, and we take pride in being able to meet all our customer's requirement with the same degree of professionalism with a product manufactured in Australia.

We also keep a database of your specific manufacturing requirements, your codes and references which enables us to provide easy repeat ordering for your specific location and requirements.

The following is a summary of some of the manufactured items we can supply, and all items are available in the individual customer's sizing:

- **Head, Tail and Take-up Pulleys** – (with running equipment and crowned, lagged if required)
- **Pulley Take-up assemblies** – (to suit any sized conveyor frame)
- **Trough frame, Picking frame, Retractable frame, Transition frame, Training frame** (available in offset or inline)
- **Steel trough rollers, Impact trough rollers** – (to suit any belt width requirement)
- **Steel carry Idlers, Impact carry Idlers** – (with mounting brackets to suit any belt width requirement)
- **Steel return Idlers, Rubber disc return Idlers** – (with mounting brackets to any belt width requirement)
- **Belt Guide rollers** – (full range with brackets to support both load and return conveyor belt runs)

We have increased our feed stock balances to compensate for supply chain delays and this foresight will ensure that our customers will see minimal impact from shipping delays currently being experienced through the world.

We are also expanding our feed stock suppliers to ensure supply but also to include Australian production of parts that currently are procured from other countries.

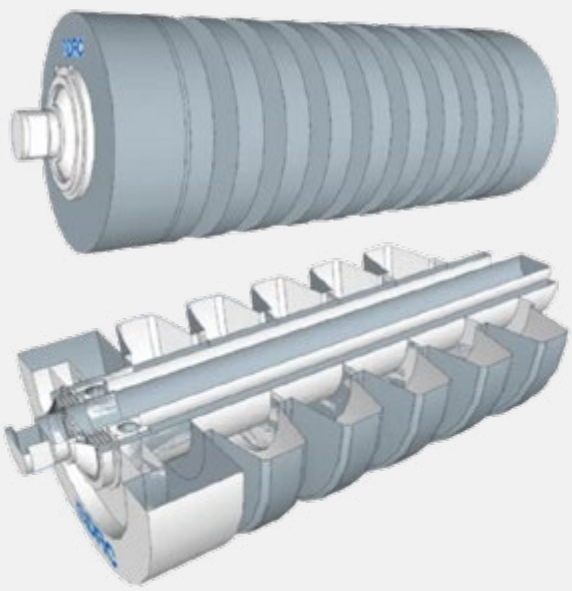
We believe this is the best option to ensure that we are able to continue to provide Australian built components in a timeframe that ensures our customer's needs are met.

We are continually looking at our processes, inputs and new technology to ensure that we always provide the best options available for our customers.

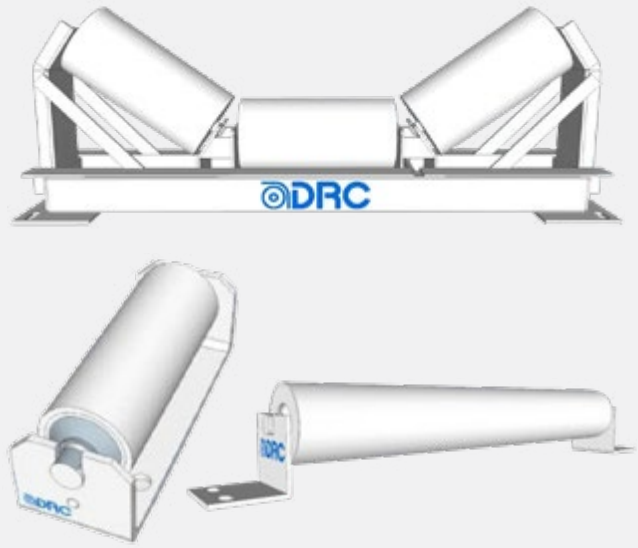
If we can be of assistance to your operational requirements with Australian-built components, please contact the DRC Sales team at **sales@drcrollers.com.au** and we would be more than happy to assist you with any enquiry you may have. ***AMR***



Some of the frames and rollers manufactured at DRC's NSW workshop.



DRC supplies impact rollers for the mining industry.



A small selection of roller, frame and bracket combinations offered by DRC.



Feet to the Fire

Leading industrial ceramic supplier Annexus WA has pledged to shorten the supply chain of Australian mining operators with their direct product pipeline; a range of industrial ceramics (wear linings, fire assay consumables, bulk handling solutions and kiln furniture refractory) direct from source to site.

The business, based in Western Australia, offers a wide range of standard industrial ceramic products and materials, as well as turn key solutions for clients requiring custom consumables.

Keeping their service a one-stop-shop, Annexus WA manages the design, engineering, procurement, production, quality assurance, clearance and delivery of all products, which can be transported to any destination.

With a history of servicing all continents but Antarctica, Annexus WA has successfully delivered product to industry around the world and become significantly experienced in designing thermal solutions for complex and challenging applications.

Established in 2013, the business has flourished into a reputable supplier of fire assay consumables across Australia, Europe, Asia and the America's.

Annexus WA Managing Director Wayne Horn said, maintaining a strong relationship and interest in our supply chain allows us to guarantee a high-quality product and to better support clients.

He said their range of **ceramic wear linings** were suited for a range of applications within the mineral resources sector and were substantially less expensive than other products due to their design and material properties. Our range of wear linings include but are not limited to ceramic lined spools, reducers, T-Pieces, Y-Pieces, hydrocyclone liners, wear pad and others.

Annexus WA supplies **ceramic grinding media** for Ultra Fine Grinding (UFG) to the mining sector, our range of ceramic beads are tailored to our customers' requirements. Our range includes high purity Alumina and Zirconia materials with a variety of sizes and densities.

"Our aim is to bring high-quality industrial ceramics to market within a shortened supply chain," Mr Horn said.

"We want to offer the complete package and deliver products straight from source to site.

"At heart, we have a passion for developing innovative solutions that deliver performance results beyond what we thought possible."

"We are not limited by materials, and we are not restricted by manufacturing techniques, leaving us uniquely positioned to evaluate the needs of each client and recommend a carefully considered solution."

In Addition Annexus WA assembles, supplies, installs, and maintains a range of **conveyor belt scrapers**. Our patented DirtWhacker scrapers are unique in design and operation offering our customers a safer, cleaner, and user-friendly workplace. To complement our bulk handling portfolio we supply rollers, idlers, v-ploughs and a variety of belt trackers.

Annexus WA **fire assay crucibles** have a well-deserved reputation for multiple firings due to our choice of material providing high thermal shock and corrosion resistance.

Making our products more durable, and more cost effective. Mr Horn said. "Our clients also appreciate the important benefits of reducing cost per firing and ultimately increasing profitability."

We stock and supply a large range of consumables (crucibles, cupels, ceramic blankets & boards, D-Mould muffles & vents, ceramic anchors, kiln batts and other) for the fire assay industry in our warehouse facility in Wangara, WA.

Among their offering is an expansive range of kiln car **refractory** and use of a cordierite-mullite material that can withstand temperatures of up to 1300 degrees Celsius.

The thermal and wear resistant products are specially created for the harsh conditions in heavy clay-based manufacturing environments and boast multiple benefits, including low maintenance costs, less down time, and power savings due to less material weight and innovative design techniques.

Mr Horn said "Their range of comprehensive and expertly produced consumables were made using fully automated equipment that guaranteed quality consistency across products and meant they could offer custom sizes."

"At Annexus WA, we carefully consider the best production outcomes and results for operators."

For more information,
visit **www.annexuswa.com**

AMR





Cool Your Jets

Shotcrete Solutions Specialists

Operating for more than 35 years, the trusted shotcrete solutions provider is now quickly earning a reputation as a leading ground support specialist, significantly strengthening its broad service offering.

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

These new technologies have significantly improved development rates for miners through faster excavation cycles, improved early strength support, and increased bonding between the fibrecrete and substrate surface.

Adding to their cache of services, the company has also added capabilities in resin injection and cable bolting services, while being the first and only shaft lining contractor in Australia able to safely operate in ERZ1 hazardous environments.

Resin Injection
Designed to stabilize the ground, resin injection has been proven a success within underground mining operations, while also being a faster and less invasive solution.

Resin is pressure injected into the strata to fill gaps, voids, cracks, and cavities to achieve stability of rock, sand, and caved material. Jetcrete Oz, which is already a major presence within the hard rock mining industry, has supplied the services at Argyle Mine, a Rio Tinto diamond operation within Western Australia's East Kimberley region.

The ISO-accredited business currently operates in North America and on 23 domestic mine sites with a number of mid-tier and major clients including Goldfields, Northern Star Resources, Glencore, Metals X, MMG, Evolution Mining, Newcrest Mining and Oz Minerals.

Cable Bolting
Cable bolting is 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 Oz does the majority of its cable bolting work in major mining operations in NSW, where the technique is well-established and sought-after among operators. The ground support specialist is considered the largest cable bolting operator in Australia

Among the company's successfully executed projects are Newcrest Mining's Cadia Valley operations in south Orange and work at Broken Hill.

Shaft Lining
Aside from resin injections and cable bolting, Jetcrete Oz is also a leading innovator of shaft lining solutions and has successfully completed projects all over Australia, including coal mines in Queensland and New South Wales.

The refined remote shaft lining system eliminates the need for personnel to enter the shaft during the entire process, saving time and reducing safety risks.

Jetcrete Oz can deliver remote application of shotcrete in shafts up to 400m deep and 6m wide including vent shafts, escape ways, ore passes and more.

It carries out the mandatory pre and post-shotcrete application camera surveys and its state-of-the-art shaft lining unit is purpose built, with features including:

- Industry-first EX d Group I equipment
- Continuous CH4 safety monitoring and end-of-life protection units
- Remote speed control of lining applicator
- Compliance to AS/NZS 4871 standard for electrical equipment for mines and quarries

With 17 batch plants, 90 agitators, 59 remote shotcrete units, 11 Cablebolters and mobile plant and equipment, the shotcrete solutions provider can do any job, anywhere.

At the core business, Jetcrete Oz has extensive experience in all aspects of concrete spraying and can establish sites in remote areas in a matter of days.

The shotcrete experts are actively pursuing more mining contracts and have capacity to provide a complete service for all stages of underground shotcreting, including onsite concrete products manufacturing, delivery and application.

Jetcrete Oz is also capable of delivering surface and underground civil infrastructure works including earthworks, machine foundations, drainage and culverts, concrete slabs, heavy workshops and site offices.

For more information,
visit **www.jetcrete.com.au**

AMR



Core Competencies

- Underground Incycle and Remediation Shotcrete Contractor
- Underground Concrete Delivery
- Cable Bolting Service Provider
- Shaft Lining Services Contractor from 1m–6m shaft diameters
- Underground–Surface Mining Civil Constructions
- Resin Injection Contractor



Making a Difference

- Largest Shotcrete Contractor in Australia
- Largest Sandvik Cable Bolting Operator in Australia
- Shotcrete Technologies Innovator
- Leading Innovator of Shaft Lining Solutions
- Remote Area Concrete Supplier
- ISO Accredited Company

JETCRETE



AUSTRALIA'S LARGEST SHOTCRETE CONTRACTOR

Jetcrete has been at the forefront of shotcrete technologies in the mining industry for more than 35 years.

The company's two newest capabilities are **resin injection** and **cable bolting** for enhanced ground support in underground mining.

- Shotcrete Technologies Innovator
- Resin Injection
- Cable Bolting
- Shaft Lining Solutions
- Remote Area Concrete Supplier
- Mobile Plant and Equipment

JETCRETE

Call our shotcreting experts now on

08 9270 1000

jet_admin@jetcrete.com.au

Liquip - Fuel Equipment & Storage Specialists



Solar-Powered 88,000L Diesel Storage Tank.

With more than 50 years of supplying equipment for the bulk liquid handling and storage industry, Liquip has earned a reputation as a dynamic and robust company committed to continued growth as a leader in quality products and solutions for specialist fluid transfer applications.

In markets across the globe, Liquip is renowned for its comprehensive product range with exceptional whole of life value. The company's products can be found right throughout the mining fuel supply chain, from loading couplings to complete fuel farms and on-site refuelling vehicles.

With an extensive range of options, Liquip has the ability to provide safe and cost-effective storage solutions for fuel, AdBlue, waste oil, lubricants, aviation fuel, chemicals and other hazardous and non-hazardous liquids.

Owner and Managing Director of Liquip Victoria, Jeff Borg, says that with many years of working with the mining sector, Liquip has advanced to meet ever-changing demands and has been able to provide strong engineering-based solutions to accommodate accordingly. As a result, the company is often regularly engaged by customers to provide full-service fuel handling and bulk storage systems.

"Our key strength is our inhouse ability to design and engineer a solution meeting all the statutory requirements, as well as build the equipment or package without the need for external and expensive contractors," Mr Borg told the Australian Mining Review.

"Our sales and engineering team work directly with our customers to understand their requirements and enable concepts to be established. Once all specifications have been finalised, our team of experienced mechanical and electrical engineers develop all drawings along with inspection and test plans and documentation," he said.

"Our production process uses only the best materials, with all piping consisting of stainless steel and high-quality valves and fittings. Once delivered to site, our team install and commission the system. The final part of our complete turnkey solution is regular maintenance and servicing when required, completed by our knowledgeable service team."

Mr Borg said Liquip Victoria's large range of Self Bunded Tanks are highly customisable to suit its customer's needs.

"These can include solar powered options, monitoring systems, pump and meter packages and fuel management.

"We are proud to be able to provide our customers with a complete turnkey solution, from start to finish, including service and maintenance – we are there every step of the way," he added.

Some of the company's offerings include:

Self-Bunded Tank Range

ISO Classic
Liquip's main self-bunded tank range, the ISO Classic, is built to Australian Standards: AS1940, AS1692 and AS1657. Offering safe bulk liquid storage, as well as multi compartment storage options, sizes start at 12,000 litres and extend through to 115,700 litres. For bigger projects, the company also designs and constructs fuel and lube farms where multiple Self Bunded Tanks are linked to provide up to one million litres of onsite bulk storage.

Cubes
Liquip's smaller Self Bunded Tanks offer a more cost-effective and reduced footprint option for users requiring an easily relocatable and stackable solution, whilst still supplying an efficient fuel dispensing system. Safe storage of ULP, diesel, waste oils and more can be accommodated. The company offers multiple tank sizes in their range, starting from 1,000L, up to 10,000L and can be run as a total off grid bulk liquid storage solution, using solar energy.

AdBlue
For the safe and economical storage of AdBlue, Liquip has a range of AdBlue stainless steel internal tanks. Ranging from 3,000L to 50,000L (including a SLIMLINE) these tanks are built to international standards. All tanks are insulated between tank walls to ensure a consistent internal temperature of the solution.

SBT Trailers
Liquip's heavy duty Self Bunded Tank trailers provide efficient and economical means of fuel delivery by keeping equipment and machinery fueled and running onsite. ADR and AS approved, these Diesel Trailers are able to be registered in any Australian State or Territory. Liquip offer three tank sizes; 1000L, 1500L and 2200L.

Fire Rated Tanks
In situations where a fireproof tank is required, Liquip can supply and fit the trusted Fireguard® Tank design. This double wall steel storage tank design provides secondary containment and eliminates the risk of combustion in a fire.

Filtration
Over the last 10 years there has been a huge shift in the requirement to filter diesel to meet engine manufacturers increased cleanliness specifications. Clean fuel helps minimise expensive repairs and unplanned downtime, and thus is an important aspect of fuel storage and dispensing at the fuel loading terminals as well as on-site at the refuelling point. Liquip, through its aviation refuelling experience, has worked with filtration for many decades and has applied this knowledge to improve diesel quality.

The company is partnered with global leader Facet Filtration to utilise high quality filtration products in all of their solutions.

SBT Advantages
Liquip's self-bunded tanks (SBT) are highly versatile, easy to relocate, cost-effective fuel storage options. They are easy to deliver to site, via rail, truck or ship, as their design allows them to be stacked when empty.

Set-up and installation on site is very simple and a quick commissioning process by the company's experienced team can have a tank ready to be filled and operational within hours of delivery.

Tanks can be customized, offering complete control on the dispensing process and system the customer would like to use. This can also include remote monitoring using Automatic Tank Gauges (ATGs).

Powering of the tank for fuel pumping is not limited to mains power. Off-grid solar powered systems, ideal for remote locations such as mine sites, where mains power is not available are now a cost-effective option.

Fuel Management and Monitoring Systems
Liquip offers a large range of fuel management systems, including SmartFill, Transponder Technology, Compac and Piusi, as well as other systems. These systems enable fuel security, asset cost allocation and prevent fuel pilferage.

Liquip also provides fuel monitoring, utilising its Automatic Tank Gauge (ATG) systems that are linked to the fuel management system. These monitoring systems allow the customer and their fuel provider to view their tank levels via the Liquip web portal, which is offered to customers free of charge.

Advanced functions like centralised site management, precision inventory reconciliation, and loss prevention analysis provide a higher level of fuel management capabilities as well as enable greater transparency and due diligence.

SBT Rentals
"What sets us apart from most companies is our Self-Bunded Tank Rentals," Mr Borg told Australian Mining Review.

"We offer medium to long term rentals along with rent to buy options. This is beneficial for mining companies that require short term refuelling solutions that reduce capital expenditure. This helps to speed up the process and get equipment on the ground."

In addition to their SBT Rentals, Liquip Victoria also provide Road Tanker Rentals to help urgent start up requirements where necessary.

With half a century of experience and a top-class team, Liquip is able to offer state-of-the-art solutions to the Australian mining sector. ***AMR***


Easily Relocatable and Fully Self Contained.





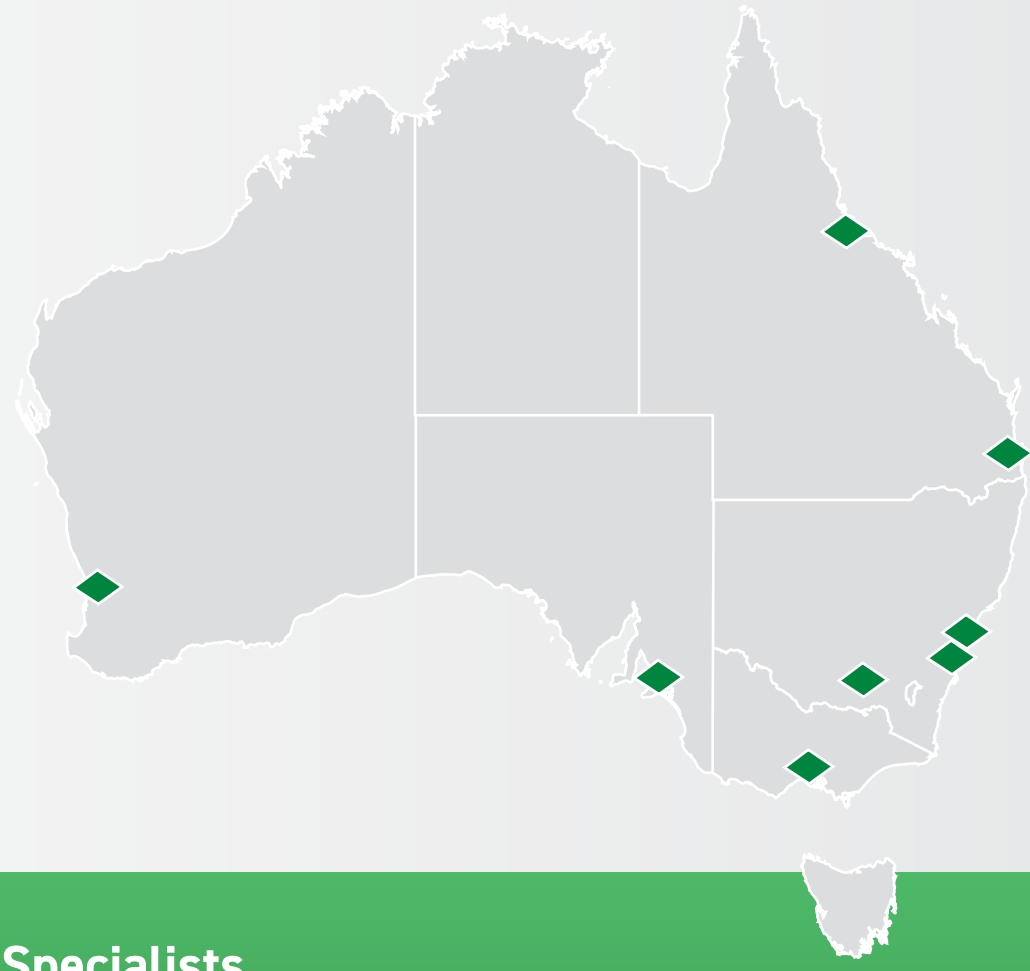
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Self Bunded Tank Specialists

Rent or Purchase from our Self Bunded Tank Range...



- **ISO classic** (12,000L to 115,700L)
- **Cubes** (1,000L to 10,000L)
- **Trailers** (1,000L to 2200L)
- **Aviation Tanks** (6,000L to 100,000L)
- **AdBlue** (3,000L to 50,000L)
- **Fire-Rated** (4,000L to 55,000L)
- **Waste Oil** (1,000L to 10,000L)

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476 BOUNDARY ROAD, DERRIMUT, VIC, 3026



Why You Need Thermal Inspections of Electrical, Mechanical and Solar Equipment?

RISK.

Let's understand the risk of equipment and components. All manufactured equipment or components **FAIL**. Preventative maintenance helps plant owners and managers to extend the life of the equipment and components.

Strategic inspections of the equipment and components allows us to understand if and when these components may fail. Catastrophic failure, especially in electrical equipment, generally leads to hot spots and potentially further along from that a fire - potentially destroying the equipment and facility and creating am unsafe place for employees.

Thermographic Inspections carried out by a certified Thermographic employer can help prevent these failures and reduce the risks.

Thermoscan Highlights Critical Importance of Thermographic Inspections

Thermoscan Inspection Services has revealed that more and more insurance companies are requiring thermographic inspections of electrical switchboards and components and that companies should give strong consideration to ensuring their systems will meet the required standards.

According to Thermoscan, due to the technicalities and legalities of conducting an electrical thermographic survey, it is important for business owners and property managers alike to understand that, not only will a professional assessment of their electrical switchboards and components ensure they will meet insurance requirements, it may save lives and property.

Reports claim that 10% of fire incidents take place in manufacturing properties. Many of these fires are linked to electric system issues including electrical insulation, terminals and other component failures. Such failures may expose the employees to live electrical circuits and unsafe working environments.

Thermographic inspections, also known as infrared inspections, are based on sensing the heat produced from an object's surface in infrared radiation form and are considered the most reliable mode of establishing the safety of electrical switchboards and components.

Case Study

A Thermoscan Case Study of an incident in Brisbane is a perfect example of why thermographic inspections are so important. When Thermoscan carried out its inspection for a major facility in Brisbane a contactor in an electrical switchboard was identified as operating above "normal" temperature and showed signs of potential failure.

The item was nominated in the company's Inspection Report as a Priority 1. The customer was notified immediately whilst on site and advised it was Thermoscan's recommendation that the contactor required immediate attention.

As an "Independent" thermographer, Thermoscan's role is to carry out thorough thermal inspections, identify any potential issues and offer its recommendations. However, the company can only provide guidance, because it does not have the authority to enforce the recommendations nominated.

During the inspection it was identified that the contactor was in the process of disintegrating and if left any longer it no doubt would have caused extensive damage to the switchboard, or more seriously, the facility. It may have also caused potential downtime, loss of property or life!

Fortunately, the repair was undertaken before any catastrophic event occurred.

Sorem H.VIR Windows

Thermoscan is proud to be the Nationwide and NZ and Pacific Islands distributor for Sorem H.VIR Windows.

The Interior of electrical equipment is often inaccessible for carrying out checks. With H.VIR Windows it is possible to perform maintenance by infrared thermography under representative load conditions.

H.VIR is the only infrared window on the market to be equipped with a Wide-Band crystal (Bands I, II and III), this makes it possible to cover the field of use for all cameras on the market. (0,3 µm to 13 µm).

All Sorem H.VIR Windows feature a secure cover that opens easily with one hand - which means there is nothing to remove, drop, mix up, or lose.

Sorem's broadband crystal allows cameras to capture visible light pictures as well as thermal images and lets LED and laser illumination pass straight through for clearer visual assessments.

Why Choose Thermoscan?

Established in 1980, Thermoscan provides independent specialist consulting thermography services to thousands of businesses across Australasia. The company's thermographers are highly trained electricians with Level 1 or 2 thermography qualification. Thermoscan's technicians are based in Queensland, (Brisbane, Gold Coast, Sunshine Coast), New South Wales, Victoria, South Australia and Western Australia and the company covers all other areas at least four times per annum where travel restrictions allow.

The company uses highly trained technicians and state-of-the-art FlIR infrared equipment to capture and interpret thermal images (or thermograms). A thermal inspection from Thermoscan provides instant results in the form of feedback from its trained professionals. Furthermore, the company produces a report detailing crucial diagnostics of your specified electrical assets via its reporting programme MYASSETVIEW.

Having been part of the thermography industry since 1980, Thermoscan has become an essential source of thermal imaging across Australia and the Pacific Islands. Its thermal imaging services provide a compelling Return on Investment (R.O.I.) driven by three elements:

1. The cost of an inspection and report is a fraction of the cost of a potential failure. Any incident which causes failure will incur additional costs in terms of consequential loss and possibly injury or loss of life.

2. Regular inspections provide insurance underwriters with a better insight into a true fire risk, which often results in improved insurance coverage and lower premiums.

3. As well as offering an independent thermographic inspection, Thermoscan also report on any physical problems that pose additional risk to electrical safety and O.H. & S.

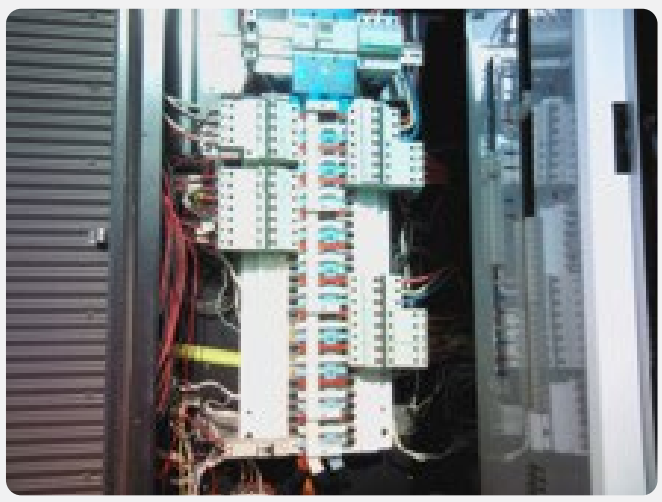
Thermoscan operates to internationally recognised standards and uses proven techniques during the inspection and assessment process. The preventative maintenance services it can offer includes: electrical and mechanical condition monitoring, power factor correction unit testing and thermal imaging along with building and all other thermal imaging requirements.

The company's training regime follows the internationally recognised Infrared Training Centre (I.T.C.) syllabus. ***AMR***

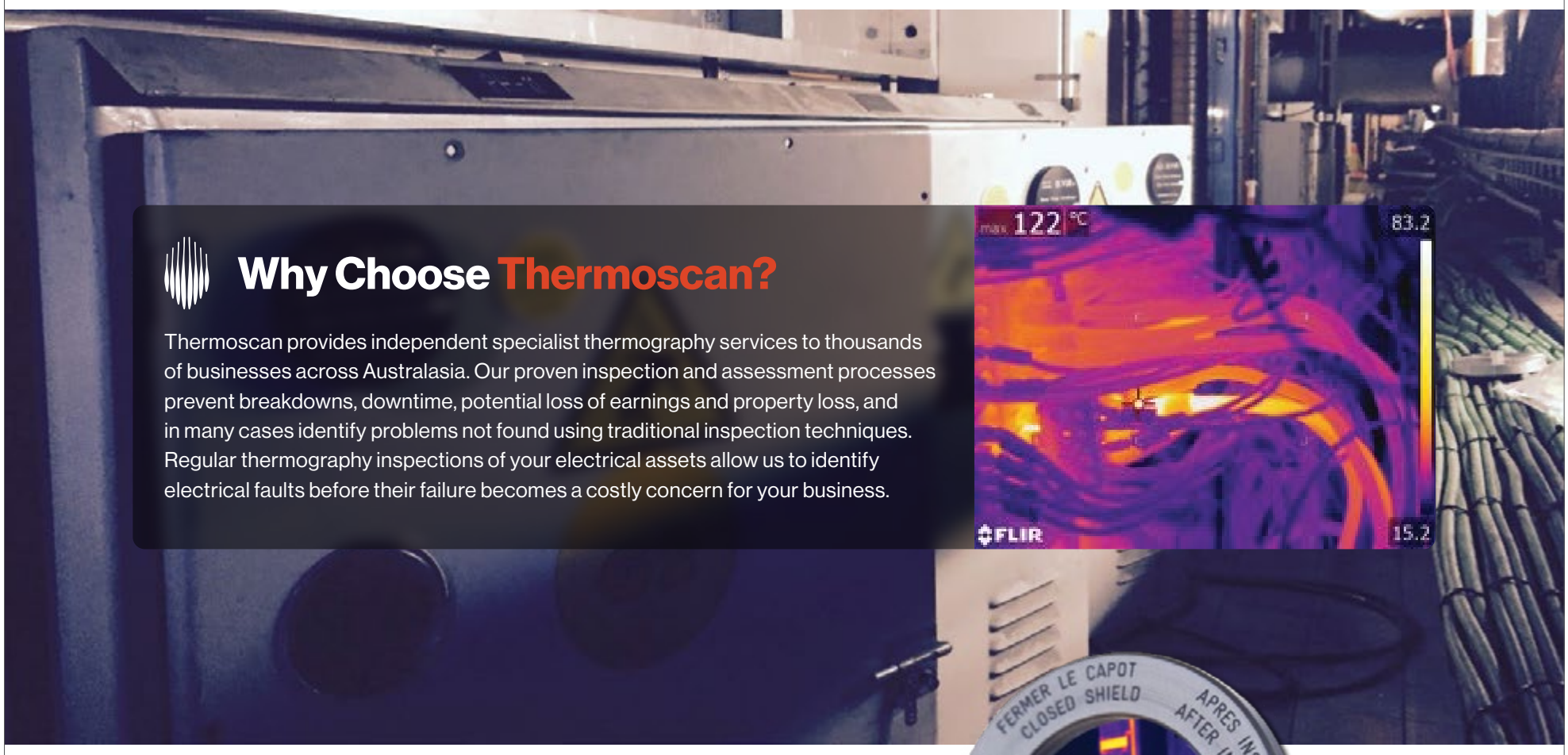


Switchboard Inspection Windows





THERMOSCAN
FOR ASSET, FOR LIFE



Why Choose Thermoscan?

Thermoscan provides independent specialist thermography services to thousands of businesses across Australasia. Our proven inspection and assessment processes prevent breakdowns, downtime, potential loss of earnings and property loss, and in many cases identify problems not found using traditional inspection techniques. Regular thermography inspections of your electrical assets allow us to identify electrical faults before their failure becomes a costly concern for your business.

Providing Nationwide Thermal Imaging & Preventive Maintenance Expertise

Thermoscan is a nationwide thermal imaging and preventive maintenance provider specialising in accurate thermography scans and reports.

Our team of industry qualified electricians and thermographers responds quickly and provides accurate scan reports for most thermal imaging applications. We're ISO Safety & Quality Certified and 100% independent, unlike some electrical contractors who invent "phantom" faults... so they charge to fix them!

Our "fast-quote, fast-report" process allows us to generate a quote in under 24 hours and provide an accurate, detailed report within 24 hours of completing a scan.



CONTACT US NOW FOR A FAST QUOTE!

1300 132 517

quotes@thermoscan.com.au

thermoscan.com.au

SOREM



Panansonic's Toughbook

Taking *"Rugged"* To Another Level

In its 25th year of operation, Panasonic's rugged Toughbook laptops and tablets are going deeper and further to help miners in their everyday operation.

Since its launch a quarter of a century ago, Panasonic's rugged Toughbook range has proven to be the market leader in tough, reliable laptops that can measure up to a wide range of applications being undertaken within the resource sector.

The Australian Mining Review recently caught up with Ranjit Sohoni, Panasonic's Senior Product Marketing Manager for Mobile Solutions – Oceania – who says the rugged standard of the Toughbook range has now evolved into the new G2 – with a few modern upgrades to whet the appetite of the product's users.

Delivering greater flexibility, innovation and security than ever before, the Toughbook G2 is designed for the next generation mobile workforce.

Leveraging a 'customer-first' approach, the rugged Windows device is built in direct response to the complex needs of any agile workforce. Boasting a ground-breaking modular design, the Toughbook G2 offers three expansion areas and up to 36 different combinations to ensure users receive the ultimate customised computing experience. And that's just the beginning!

"With the G2 we have brought in the modular design concept - which we introduced with our previous model, the Toughbook 55, a 14 inch laptop. The G2 is a 10 inch two in one so it can be used as a tablet and as a laptop, and with the modular design it also includes user removable accessory packs," Mr Sohoni said.

"This offers unparalleled customisability and future proofing, allowing users to configure devices to suit their current needs without worrying about ongoing upgrades. You can simply purchase optional modules and expansion packs for whatever functions are required and interchange them on the fly. Ultimately, this saves time and cost and improves the productivity in short."

Security at the highest level

Mr Sohoni said that with Toughbook's new products – security has been set at the highest levels.

"With Windows 11 coming to the Toughbook G2 from 2022, our Secured-core PC will couple with the most secure Windows yet, offering built-in chip to cloud protection to ensure an organisation's data stays secure wherever work happens."

This is considered particularly important in the typical Toughbook environment, where users operate in mission-critical situations in some of the most data-sensitive industries – like mining.

With the G2, Panasonic has added a third level of security, with Absolute software - a cloud solution built into the BIOS which manages and secures data, devices and applications.

"So, it is clear we are now focusing on security and modularity. These are two of the new things we've enhanced with the 55 and the G2, in addition to the long rugged heritage that we have," Mr Sohoni said.

He added that the G2 has a number of additional technologies which will be attractive to the mining sector. One of these is edge computing.





New **TOUGHBOOK** devices incorporate a modular design concept with user configurable expansion packs.

"As a response to the pandemic that we've been facing for the last two years, digitalisation is becoming of growing importance for mining companies, with people having an even greater focus on what really matters in creating digitally connected smart mines. Miners are taking a closer look at things like artificial intelligence (AI) and the Internet of Things (IOT) in helping to improve productivity."

"There's also a big stress on Remote Connectivity to help streamline production to prioritise safety and develop some longer-term strategies for the mining companies. And then there is predictive analytics."

"All these things need something on the edge to capture that data and with that we're talking of edge computing. It's the deployment of mobile technology into these environments, which are not always conducive, you know, with the needs of relatively sensitive equipment, like tablets and PCs. You can't have a consumer grade product out there as the edge computing device. And that's where Toughbook comes in."

"In mining and other related industries, users like field techs and remote staff want to have options or they want to be more autonomous, particularly if they aren't able to return to say a central location - and that's why modularity is important."

"In the new G2, users themselves can actually take out and replace a part of the device with something else if they need to, or just insert a particular component when they need to use it."

"For example, it could be a case when you are going to a site and need to do some scanning and asset tagging which requires a built-in barcode scanner, but the next day you will be at a different site diagnosing equipment and need to connect with legacy equipment which incorporates an old school serial port – well the G2's modularity can help you cope with that with the minimum fuss."

Mr Sohoni said the mining sector is increasingly using these kinds of devices to capture and transmit field data and therefore integrate people, processes and the technology that they use.

Taking "rugged" to a new level

When we talk about a Toughbook there is obviously the market leading "ruggedness" which really makes it a big winner with the mining sector.

In a current example of how "tough" a Toughbook is, Panasonic is working with a company called Australian Droid and Robot, which is sending G2's out as controllers on droids and robots that are entering into places deep below the earth where humans cannot go.

"They chose Toughbook because it is the toughest product available and its reliable connectivity is also critical in safely guiding these droids and robots in places from which it would be impossible for them to be retrieved by human hand," Mr Sohoni said.
It is this type of toughness that will significantly benefit miners now and in the future. ***AMR***

TOUGHBOOK

Panasonic
BUSINESS



Mobile computing power, purpose-built for the field.

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Rammer's premium line of hydraulic rockbreakers—the Excellence Line—includes the Rammer RD3 remote monitoring device.

Rammer Hits The Spot

The use of advanced hydraulics, materials technology, strength calculations, impact wave theory and production technology have cemented the Rammer's position as the go-to rockbreaker solutions provider for the Australian mining and construction industry.

For over 40 years, Rammer has been considered the most trusted and respected hydraulic rockbreaker manufacturer in the world. Driven by innovation, Rammer has consistently pushed the industry forward by developing innovative technologies and incorporating them into its powerful tools.

Rammer's premium line of hydraulic rockbreakers—the Excellence Line—includes the Rammer RD3 remote monitoring device, which, when coupled with MyFleet, is the world's first cloud-based telematics monitoring system for hydraulic rockbreakers, arriving on the market just in time to usher in the IoT era. As an added bonus, the RD3 can also be retrofit on any Rammer rockbreaker built after 2009. Many operators won't have to upgrade their toolbelt to take advantage of the cutting-edge technology.



For over 40 years, **Rammer** has been considered the most trusted and respected hydraulic rockbreaker manufacturer in the world.

Rammer is also the first company to offer remote data access on the utilisation, impact, and stresses of hydraulic rockbreaker while under operation.

RD3: How it Works

The RD3 is a self-contained unit that's built to withstand the toughest working conditions. The device features a built-in battery that typically lasts for 3,000 reports at a pace of one report each day.

Every RD3 device is linked to each rockbreaker's serial number. Depending on the installation type, rockbreakers are equipped with either the RD3-FACE (installed on the surface of a device) or the RD3-RECE (installed in a recess of a device).

The RD3 transmits its data to the cloud through a 2G/3G network. When a rockbreaker is under operation, the RD3 gathers data about the position, location, motion patterns, tilt, temperature, and utilisation (i.e., hours in operation) and transmits that data back to a central location.

It's also equipped with a three-axis shock sensor that enables it to measure the stresses and forces being applied to the rockbreaker during each use.

The RD3 uses a GPS signal to transmit location data. If a GPS signal is not available, mobile network triangulation is used to locate device.

Being able to keep tabs on a rockbreaker's impact and stress levels in real time is a major development in the industry. With more data on hand, operators are now able to use their rockbreakers more effectively, thereby increasing each tool's lifespan.

Using the MyFleet portal, operators can also look at tool usage trends over time and use that data to adjust operating patterns accordingly. For example, an owner might learn that one device operator's method of hammering causes lower stresses and impacts on the rockbreaker compared to other operators. The team can then learn from the lower-impact operator's techniques and figure out a better way forward.

Over time, the entire fleet will be able to reduce stresses on their devices, leading to more uptime and lower repair costs down the road.

Proactive Monitoring

Correct operation is vital to minimise the chance that rockbreaker fails and causes costly unscheduled downtime. One of the major causes of premature failure in rockbreakers is long cycles where the operator continues to hit the button and the piston keeps striking for an extended period of time.

By using advanced electronics to sense the impacts and stresses on the rockbreaker, RD3 provides information on how the rockbreaker is being operated. With the RD3 data, customers can provide operator education when needed to avoid maintenance costs due to premature failure.

MyFleet: A Look Under the Hood

Rammer's MyFleet platform is a cloud-based software suite that integrates with the RD3 monitoring system to give managers more insight and more control over their equipment.

Using MyFleet, operators can monitor real-time telematics data that's being transmitted by the RD3 monitoring system. With 24/7 access to data, operators will know exactly how many work hours are being logged with each rockbreaker, where the rockbreaker is located, and how a rockbreaker is being used.

If a fleet owner wants to ensure a device is only used in one specific area, or wants to assign multiple devices to specific areas, owners can set a geofence in their MyFleet portal.

A geofence is a virtual boundary that uses GPS technology to define where a device should be located at any time. If a device is removed from this boundary, MyFleet will automatically trigger a notification that alerts the owner of the situation.

Preventative maintenance

Simply by logging into the MyFleet platform, customers can see all the data on operating hours and required service intervals helping them manage service periods and minimize machinery downtime by scheduling maintenance during times of least impact on production.

With downtime planned at optimal times based on the data of rockbreaker usage, maintenance programmes can be streamlined to improve efficiency and reduce costs.

The hour meter shows MyFleet users the total time the rockbreaker has been engaged in rockbreaking that can ensure a higher re-sale value as the actual work hours are known.

Tool Lubrication and Correct Greasing Practice

Rockbreaker tool is subject to extreme wear that requires proper lubrication and care to achieve a long, trouble-free life. Tool lubricant must have properties to withstand high temperature and extreme pressure.

As part of Rammer's aim to help support more sustainable rockbreaking operations, Rammer has developed Rammer BIO Tool Grease, a high-performance biodegradable grease for hydraulic rockbreakers in collaboration with key customers in mining, construction and demolition industries to help them actively reduce impact of their operations on the environment.

BIO Tool Grease is specially formulated to be biodegradable and environmentally friendly, making it safe for use in areas with strict building codes like urban and city sites, in underwater applications, and in environmentally sensitive locations like groundwater areas.

The greasing practice depends on application and operating method. Tool grease consumption is higher in applications where the tool is penetrating and movements are longer than in impact breaking applications where the tool is steadily against thrust ring. Greasing should be increased in dusty applications.

The proper procedure is reached when wet grease is visible about the length equal to tool diameter on the tool just beneath the housing bottom plate.

Rammer customers find instructions for correct greasing practices in the model specific operator's manual, although the operator should adjust suitable practice for the application on a daily basis.

About Rammer
Rammer, the most respected brand for hydraulic attachments, is a part of Sandvik Rock Processing Solutions business area that operates within Sandvik Group, the global engineering giant in mining and rock excavation, metal-cutting and materials technology.

Rammer has brought several innovations to the hydraulic rockbreaker market, including constant blow energy, idle blow protection, attachment-mounted dust suppression, automatic lubrication and with integrated smart technology and customer-focused product features, Rammer has created great experiences for its customers.

With powerful and durable rockbreakers equipped with the revolutionary RD3 remote monitoring device, 28 boom system options and specialty demolition attachments, there is a Rammer solution for virtually any demanding breaking application that requires a boom-mounted percussive tool.

Being one of the world's most trusted brands is not about technology and innovation only, it is about listening to what the customers say, what their application specific needs are and helping them reduce breaking times and avoid unnecessary downtime.

Rammer was the first brand to offer large and heavy duty hydraulic rockbreakers for tough conditions and the first on the market to add remote monitoring system for hydraulic rockbreakers.

Right Tool is a key to productivity
Correctly matching the right tool to the job application is critical to achieving the highest level of production with lowest possible operating costs.

First, it is vital to determine if the job is an "impact" or "penetrative" breaking application. Rammer has several tool models designed with "job specific" work requirements, providing excellent value, long life and maximum performance.

Authorised Rammer dealers supply genuine tools and will help you select the correct tools and parts for your attachment and application.

Support
Rammer products are supported by a dedicated global dealer network with ready access to genuine Rammer parts and a wealth of operational knowledge and experience to ensure that Rammer product continues to contribute to customers' profitability for its entire working life.

With authorised Rammer dealership in every state, territory and also in PNG, Rammer offers factory-approved maintenance and warranty services to keep rockbreakers doing what they do best – turning big rocks into little rocks. ***AMR***



The RD3 is a self-contained unit that's built to withstand the toughest working conditions.



Factory fitted remote monitoring hardware, RD3 as standard

SMART ROCKBREAKER TECHNOLOGY

Rammer's cutting-edge technology offers:

- real-time data on operation
- reduced breaking times
- lower cost per tonne of material broken
- protection against premature failure
- longer tool life
- simplified maintenance
- reduced downtime

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It's "Tuff" Stuff

National Pump & Energy have answered a demand for reputable Australian-made products with their leading Minetuff Pump range; heavy-duty equipment specially designed for mining and construction applications.

Made from hi-spec materials, the dewatering pumps are generously thick and durable, with adjustable hydraulics to meet operator requirements.

Spanning between 5kW to 90kW in range, the pumps prioritise fast serviceability, high-quality and resistance to wear, with proprietary PolyTuff polyurethane linings and SteelTuff stainless impellers ensuring protection against sand, silt and fines.

Minetuff Sales Specialist Desiree Pozzi said National Pump & Energy became the exclusive Australian distributor for Minetuff Pumps in August 2017, adding to an extensive portfolio of product and innovation for the leading pump supplier.

She said Minetuff was predominantly used in underground mining, but the quality of the product had seen it become in hot demand in other sectors.

"These pumps are also currently used in processing plants, civil dewatering and open pit dewatering," Ms Pozzi explained.

"Basically – wherever there is water to move.

"Water is critical to the mining industry – too much or too little and production ceases.

"Whether it be moving excess water or feeding the mill, Minetuff have a product that can support any client with their water issues.

"As the name suggests, built "tuff" to mine "tuff."

Ms Pozzi said Minetuff popularity was largely the result of their Australian design, with the product manufactured in Australia and specifically made by an experienced team for the domestic mineral resources sector.

The range is uniquely tailored to Australian conditions, is built to be long-lasting and capable of withstanding harsh dewatering environments.

Ms Pozzi said the Minetuff line was just one of many National Pump & Energy product offerings that brought new technology and innovation to market, ensuring they were able to match each client with the best fit for their operation.

Aside from supplying new pumps, the company provides spare parts for clients that want to undertake onsite maintenance.

It also has a range of rental units available and has a broad range of after-sale help, including capacity to conduct repairs at one of their Submersible Service Centres.

Ms Pozzi said the leading brand was committed to supporting the mining industry and had developed comprehensive support services to ensure both long pump life and low pumping costs.

"Through our exclusive distributorship, National Pump & Energy aim to provide our clients not only with long-lasting, high-quality Australian Made products but also new technology and innovation," she said.

"This ensures that our clients are achieving the best fit for their site.

"National Pump & Energy are committed to supporting the mining industry and understand that reaction time and response must be fast.

"Mining is a 24/7 game and our commitment to providing clients what they want, when they want is what sets us apart from our competitors.

"Innovation is the key – and it is something we embrace

Our belief is that no two clients are the same and we are committed to finding the best fit for each of them."

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

AMR





More Than a Connection

NLT (Northern Lights Technology) Digital Solutions have brought a digital backbone to Australia's mineral resources sector with their advanced N-Connex platform; rugged and cost-effective network infrastructure for hard rock mines.

Designed to further improve mine safety, security and productivity, the platform is a modular plug and play solution suitable for both small-scale sites and large operations.

It's an Internet of Things design, meaning sensors, high processing ability, software and other technologies link up and exchange data to give operators comprehensive and accurate information on a project.

NLT Digital Solutions Managing Director Tim Haight said new technology was trending across the mining sector, as operators looked for increasingly streamlined yet exhaustive site improvements.

Recognising a gap in the market for hard rock environment solutions, Mr Haight said the company innovated and became first in the world to introduce an underground Wi-Fi network in coal mines.

The turn-key partner has since developed a broad client base, with global mining and tunnelling markets flocking to the product for its fibre Gigabit+ backbone, ethernet and Wi-Fi connectivity, as well as its smart-programming.

Mr Haight said operators also appreciated the platform's ability to combine and onload either its own, or any customer-preferred, software applications in a simple and cost-effective manner.

"In short, operators have rapidly deployed the N-Connex platform for its simplicity, sophistication and modular approach," Mr Haight said.

"Combined with pre-terminated fibre and ethernet cables, a mine level can be quickly deployed and, importantly, it can be easily maintained thereafter.

"The IP67 rated modules do not require additional enclosure or mounting hardware, so the solution is very scalable and easily expanded.

Another proven advantage is that installation and maintenance can be carried out by non-IT specialists, for example mine electricians.

"Being Wi-Fi and Ethernet standards compliant, any supporting clients' devices can easily connect over the N-Connex system."

With N-Connex both user-friendly, expansive and designed for harsh environments, mine sites globally have adopted the platform.

Among the company's growing list of partners is Kirkland Lake Gold, a senior gold producer operating in Australia and Canada.

The global operator partnered with NLT Digital Solutions to develop a network backbone that would connect the operation's entire IT infrastructure at Fosterville mine.

A Kirkland Lake Gold spokesman said the company chose N-Connex for its ability to meet several important needs, as well as it's affordable cost per metre of installation, simple design and inclusion of PoE bolts to cover long distances without the need for additional power cables.

"Essentially, we don't need to be sparkies to handle this," the spokesman said.

"We installed 45 kms of the system with non-electrical background labour and easily
"It is durable and we very rarely have any faults or issues.

"The solution has performed well and partnering with NLT has been unreal.

"They are very responsive and helpful and willing to do custom work that we required."

The multi-award winning platform has been recognised in both Australia and the USA for it's features and design, while the product has continued to grow with new modules each year.

At the moment, NLT Digital Solutions have deployed 37 systems across 16 countries, spanning from England to Ecuador, South Africa to Poland. The latest N-Connex platform is currently being installed in Morocco.

For more information,
visit **www.nltdigital.com**

N-Connex

Transition to a more connected mine
Digital networks for harsh environments









- Plug n' play, high speed modular network
- Pre-terminated fiber eliminates splicing underground
- Rapid deployment and easily maintained
- Turnkey data and voice communications solution
- Data Networking via a gigabit backbone
- Monitoring and control systems
- Video Surveillance and Monitoring
- Personnel and vehicle tracking
- Install the modules you need as required
- Connect and future proof your mine

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BIG SPACES FOR BIG IDEAS



Steel Sling Specialists

Andromeda Industries is an innovator in the wire rope industry in Australia, being the only manufacturer of Flat Woven Steel Slings and the 12-Strand Plaited Wire Rope in Australia.

Its specialty is the design and manufacture of plaited and woven steel cables as well as terminal fittings for these cables to be used in the lifting and rigging industries.

The products minimise risk to construction workers' lives and last longer compared to other products.

"These factors alone outweigh the added cost for quality," an Andromeda spokesman said.

Andromeda has been designing and manufacturing the Superflex Cable at its factory in Moonbi NSW since the 1970's.

Fast forward four decades, and Andromeda now has the capability to design, manufacture and test Superflex Slings from 10mm to 96mm diameter.

The company continues to be at the forefront of safety and design with its range of Flat Woven Steel Slings that have a safety of 5:1 as a wire rope sling.

The straps for the Slings are mechanically woven on a weaving machine and all fittings are also designed, tested and manufactured at Andromeda's Moonbi base.

The range of Flat Woven Steel Slings are manufactured using 24 Galvanised Wire Ropes Laid in parallel (Warp) and 2-wire ropes (Weft) continuously woven through.

The Slings can be made from 50 to 250mm. Andromeda manufactures two types of Sling: Type 1 for Cradle Lift and Type 2 for Basket Hitch.

The Slings are ideal for use in applications where damage from cutting and abrasion are a risk.

The Slings are also UV-resistant, and as they are wire ropes, there is no need for mandatory quarterly inspections.

The Slings are also available in stainless steel for use in corrosive and underground environments.

All products are individually tagged according to the relevant Australian standards.

The standard tags are made from 1mm steel, and permanently fixed by means of steel cord swaged into the ferrule.

The following information is provided on each tag:

a) Manufacturers name (Andromeda)
b) Size and type of the sling
c) Working Load Limit (WLL) in various applications
d) Test number and the date of test

Andromeda is both National Association of Testing Authorities (NATA) and Lifting Equipment Engineers Association (LEEA) accredited for the manufacture and testing of wire rope slings.

Superflex Slings and Cable are exported internationally and also used widely in the mining, construction, offshore and infrastructure industries nationally.



Andromeda Industries' 24-0 (96mm) Strops being used to lift a large boiler.

Andromeda continues to be proud of how its high quality products contribute to the added safety of lifting projects both in Australia and abroad.

This also contributes high benchmark standards in the rigging industry to ensure lower quality and less safe products are not considered by companies doing the work onsite.

"As rigging work is very repetitive with riggers using the Slings up to several hundred times a day depending upon the job, they are sensitive to the way the slings perform," the spokesman said.

"Our products are easily handled, leading to higher safety and efficiency of their work."

For more information on Superflex cables, visit andromedaindustries.com.au

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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ARCH ENGINEERING

9 Rivers St, Bibra Lake WA 6163
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www.archengineering.com.au

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

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

STEEL FABRICATION

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

WA'S STEEL FABRICATION SPECIALISTS

KÄRCHER

MADE FOR DIRTY







Industrial vacuum cleaners **Ice blasters** **High pressure cleaners**

Kärcher products are made for dirty and built to handle even the toughest dirt on your worksite. As the global industry leaders in cleaning, we bring innovative, quality, German engineered cleaning machines to your doorstep. Our new Ice Blaster features patented technology for integrated dry ice production from liquid CO_2 and our High Pressure Cleaners with EASY!Force technology make cleaning easier than ever before. We have been designing purpose-built industrial cleaning machines for over 80 year's so if you've got dirt, we've got the machine to clean it.

karcher.com.au

Contact us for a free site survey today!

Scan or call 1800 675 714



FleetCrew Driving Success In 4WD Hire

FleetCrew has positioned themselves ideally to support the existing demand as well as the forecasted resource sector growth in the eastern states.

With mining sector growth accelerating in its home state of Queensland, 4WD hire specialist FleetCrew continues to power ahead, recently expanding its workshop facilities in Brisbane and Mackay.

Headquartered in Brisbane, FleetCrew has additional branches in Mackay, Dysart and Mount Isa and can deliver vehicles for hire to all parts of Queensland, while for longer term contracts, its vehicles are available across the eastern states.

FleetCrew Executive Director, Ben Harris, says the company's success is supported by its proven business strategy of going that extra mile to find the right solution for its clients.

"A key difference of doing business with FleetCrew versus other car hire companies is that we are specialists in the 4WD hire industry.

"We also have an intense focus on maintenance and customising fitouts to suit site requirements."

As one of the major suppliers of vehicles to the mining industry in Queensland, FleetCrew has positioned themselves ideally to support the existing demand as well as the forecasted resource sector growth in the state.

The company maintains an extensive fleet of high spec 4WD vehicles, opting for the reliability of the Toyota brand. Each vehicle can be individually customised to suit site specific requirements, including vehicles that are BMA site access certified and contain pre-programmed VHF radios. FleetCrew regularly hire vehicles with alternative specs for clients across Queensland including BHP, Anglo American,Glencore and Peabody sites.

Mr Harris said that the company's 4WD spec 12-seat minibuses are also proving highly popular with the mining and oil & gas industries.

"Our buses move teams of contractors around site in one go - saving multiple 4WDs at a time. It's a great opportunity for us to work with our clients and their contractors to deliver a more effective solution," Mr Harris said.

The 4WD spec minibuses are available on a standard driver license which means no special qualifications are required.

All vehicles undergo extensive preventative maintenance, and every vehicle is thoroughly inspected after every use to guarantee it is ready to go when it next leaves the yard.

Tailored Solutions

FleetCrew's highly experienced team will guide customers through the process of choosing the right vehicle for each application.

Customers will have access to:

- A quality fleet of recent-model Toyota 4WD's, 2WD's, Utilities and Buses that are reliable, purpose-built and compliant to the most stringent site standards
- 1300 number for easy access to one of our team
- Unlimited kilometres
- Tailored quotations to ensure we answer your questions and meet your needs
- Complete transparency for all rates and charges
- We can deliver vehicles directly to site throughout the eastern states
- Proactive maintenance with each vehicle prepared to the highest standards for your use and safe utilisation
- Timely access to a knowledgeable, experienced team

If you want a 4WD vehicle to match your specific needs, then the crew at FleetCrew should be your first call.

More information can be found at
www.fleetcrew.com.au

AMR

Knowing what you need is our specialty.

FleetCrew is one of the largest suppliers of mine spec light vehicles in Australia. Our highly experienced crew will guide you through the process of choosing the right vehicle to get you on site fast.

Speak to our mine spec 4WD specialist team about your project needs on 1300 551 400.

fleetcrew.com.au



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4WD HIRE SPECIALISTS



BLAST OFF!

The global dry ice market is expected to grow significantly in the medium term, driven by rising demand in blast cleaning in the industrial sector and the increasing use as a refrigerant for frozen food items, replacing water-based ice.

Dry ice is the solid form of carbon dioxide, used as a cooling agent due to temperatures lower than water-based ice, or 0°C.

When used in industrial cleaning, dry ice sublimates or vaporises upon contact with another surface, leaving no secondary waste as does sandblasting for instance, quickening the cleaning and clean-up time.

Compared with other forms of industrial cleaning techniques, dry ice blasting is far superior by way of its cost-effective, environmentally-friendly, non-toxic, non-abrasive, non-electrically conductive and non-flammable nature.

The Australian Mining Review spoke to Kärcher Professional Sales and Marketing Director Mick Askew about the applications for dry ice blasting in the mining industry and its flow-on benefits in terms of cost and time savings.

What is Dry Ice Blasting

"Dry ice blasting is a method of cleaning with compressed CO_2 pellets, or dry ice, that are accelerated with compressed air," Mr Askew said.

"One of the greatest benefits of this technology is that it leaves no residues as the CO_2 sublimates as soon as it hits the surface."

Sublimation is the process of solid materials turning into gas without first becoming liquid.

"Compared to other industrial cleaning methods we don't need any water, chemical, sand or other elements to clean," he added

Technology Behind Dry Ice Blasting

Dry ice is produced by the quick expansion of liquid CO_2, which causes a temperature drop to -79°C cold "snow".

It is then compressed into dry ice pellets ranging from 0.5-3 mm, with the production of these pellets done in CO_2 plants across Australia.

The pellets are not just used for cleaning but also in the food industry and all kinds of refrigeration applications due to its high cooling capacity.

"The cleaning technology of dry ice blasting works, thanks to the three effects of mechanical impact, temperature and sublimation," Mr Askew said.

"When the accelerated pellets are fired on the surface we have a mechanical impact that loosens the dirt.

"The very cold temperature of the pellets, creates micro-thermal shocks, which help to crack and delaminate dirt.

"Lastly the CO_2 increases volume about 400 times when turning into gas giving the sublimation effect."

Mining Applications of Dry Ice Blasting

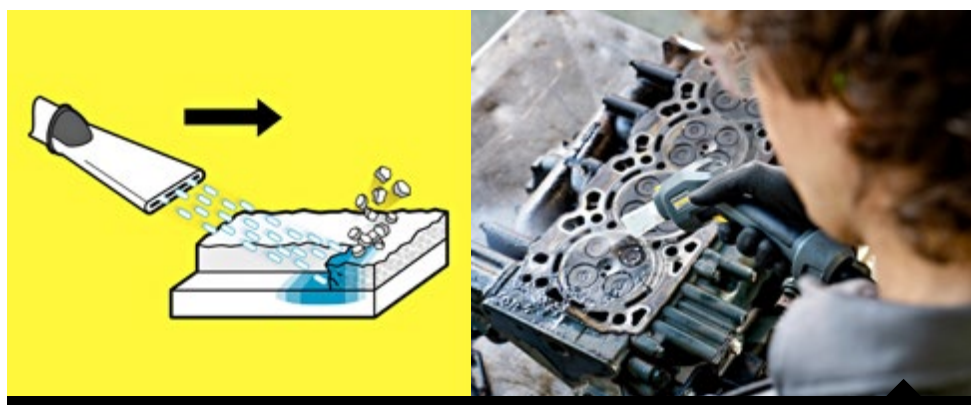
Equipment can be cleaned on line and in place, with no need for disassembly and reassembly of small and large complex machinery. The flow-on effects being minimised downtime, reduction in labour costs and increased productivity.

When there are significant time and cost savings in the cleaning of complex surfaces and equipment, this presents a huge benefit to the mining industry with its mass adoption of automation and robotics.

"Dry ice blasters enable the cleaning of sensitive surfaces that might not be cleaned otherwise, such as electrical components," Mr Askew said.

"This ensures longer lifetime and reduced cost for repairs and maintenance.

"Compared with other cleaning methods, equipment can usually be cleaned by dry ice blasting on the spot without the need to move or disassemble it.



Dry ice blasting also works through sublimation: Parts of the frozen carbon dioxide penetrate the cracks of dirt crusts or paint applications, go from a solid to a gaseous state and can really break up the dirt thanks to this increase in volume.

"It does not leave behind any residues other than the dirt that falls to the ground in the process, which can be easily swept or vacuumed away."

Ice blasting is currently used in multiple industrial applications, such as the cleaning of:

- Power generation
- Heavy machinery with large build-up of grease, oil and carbon
- Welding
- Cabinet cleaning
- Conveyer cleaning
- HV bushings
- Component overhauling

Logistics of Dry Ice Pellets

The logistics and storage of CO_2 pellets are challenging however; it has historically been too costly for short-term applications.

"Traditional dry ice blasting requires CO_2 pellets that need to be planned for and sourced from a supplier," Mr Askew said.

"These pellets need to be stored in special cooling box to prevent sublimation.

"Ice pellets continually deteriorate over time and after just three days they can no longer be used.

"Another challenge of using ice pellets is that it can be difficult to know how much exact dry ice is needed for the cleaning task.

"This means there is always a risk of having too much or too little available."

Revolutionary Solution with Kärcher

In a World-first, Kärcher has released a dry ice blaster with integrated dry ice production from liquid CO_2.

"This is the first time that dry ice blasting is possible on demand without having to plan a few days in advance," Mr Askew said.

"Our latest innovation, the IB 10/8 L2P, generates ice pellets itself, when necessary," Mr Askew said.



Very narrow areas can be reached with dry ice. The cleaning of a tool changer is easily done. Emulsion, deposits and metal shavings are reliably removed.



Sensitive filter mats are not damaged by dry ice during the maintenance cleaning of a ventilation system.



Over the years, vapours or dust containing oil may end up in control cabinets and cause malfunctions or even a fire. With dry ice blasting, deposits are removed from the sensitive electronic components and contact points gently and without any residues.

L2P stands for Liquid-to-Pellet; liquid CO_2 can be stored in gas cylinders for practically an unlimited amount of time.

"All you need is a liquid CO_2 bottle, compressed air and a standard 10A energy supply, the machine takes care of the rest," he added.

"The very low compressed air consumption of the machine also significantly reduces the infrastructure requirements."

The IB 10/8 L2P

Marking the entry class of dry ice blasting, the IB 10/8 L2P cleans very gently and is the perfect solution for cleaning small to medium sized surfaces.

Leaving no water residue, it can be used to clean around delicate areas such as electrical switchboards.

It is also great for complex contours such as bearings or grooves and in the case of heavy contamination such as burnt-on encrustations.

There are no abrasive residues and this mobile easy-to-operate dry ice blasting machine comes with an ergonomic blasting gun.

It is invaluable for short-term cleaning applications without the complicated logistics of sourcing dry ice pellets.

Clean On Demand – No Lead Times

With this new IB 10/8 L2P being the World-first leading technology allowing the generation of dry ice pellets from a liquid CO_2 supply, the benefit translates to cleaning on demand without any lead times.

The Kärcher IB 10/8 L2P machine removes the challenge of sourcing dry ice pellets and produces them on demand whilst in operation.

The liquid CO_2 that is needed to produce the pellets, and the cylinder that it comes in, can be stored on-site, almost indefinitely.

This solves two main problems: the storage and also the planning of the correct quantity.

Improved Efficiencies

Mr Askew says the introduction of this revolutionary integrated dry ice production ice blaster has allowed industries and end users the ability to achieve similar results to the established, larger ice blasting machines without the need to store ice pellets.

"This has created strong demand and interest, specifically in industries that have sensitive, critical equipment as well as large machinery that shows build-up of grease, oil and carbon dust," he said.

"Dry ice blasting can now clean these machines gently and efficiently without the requirement and storage of ice pellets.

"This awareness will continue to evolve dry ice blasting in Australia, where we will see a large range of applications across a range of industries, particularly the mining industry."

"The growing momentum of this cleaning technique will change the way some industries approach cleaning, and allow for better cleaning results that may not have been achieved in the past," he said.

Kärcher Range Of Dry Ice Blasters

For very heavy applications and large surface areas, Kärcher offers bigger dry ice blasters with the capacity to move larger volumes of dry ice pellets at an even higher speed.

Metals, plastics, wood, glass or textiles can be cleaned for flawless results, including vehicle maintenance as dry ice blasting restores old rusted surfaces back to new.

Kärcher offers a range of dry ice blasters from the IB 10/8 L2P which has integrated pallet production, through to the super class IB 15/120 using dry ice pellets.

"With this range available, we can provide a cleaning solution for a wide range of applications across mining and industry," Mr Askew said.

Whether the surface is metal, plastic, wood, glass or textiles, Kärcher's range of dry ice blasters combine powerful cleaning performance for maximum protection of surfaces.

About Kärcher

Kärcher is a World leader in cleaning technology and solutions for the industrial, professional and home environments.

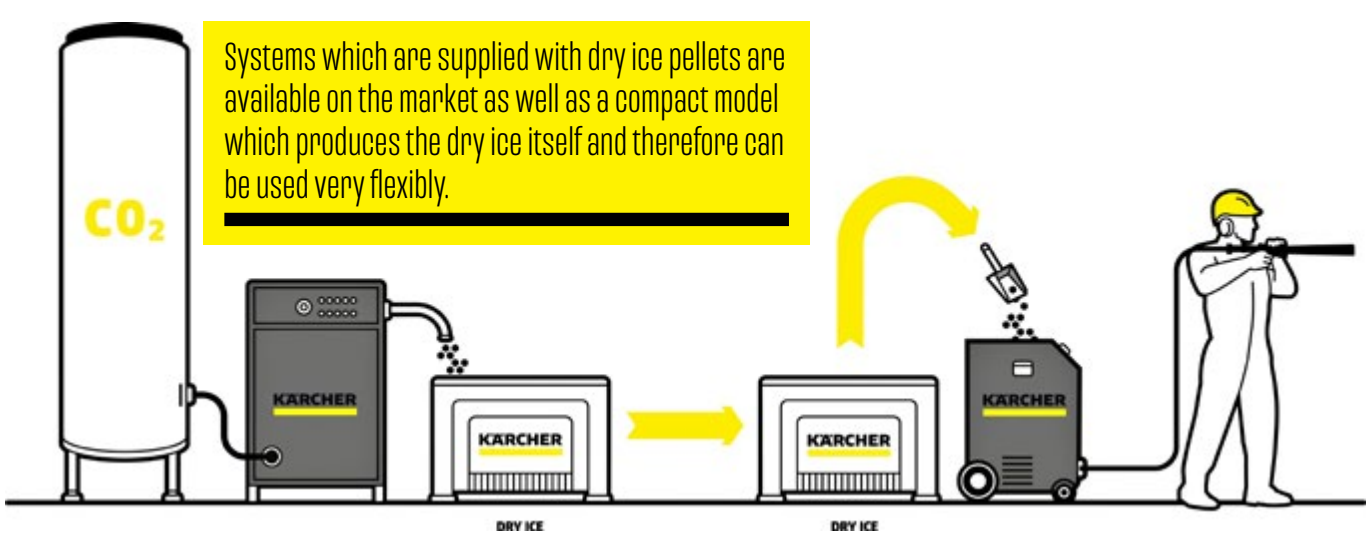
Customers rely on Kärcher worldwide for its innovative industrial vacuum cleaners, floor scrubbers, pressure washers, industrial sweepers and dry ice blasters.

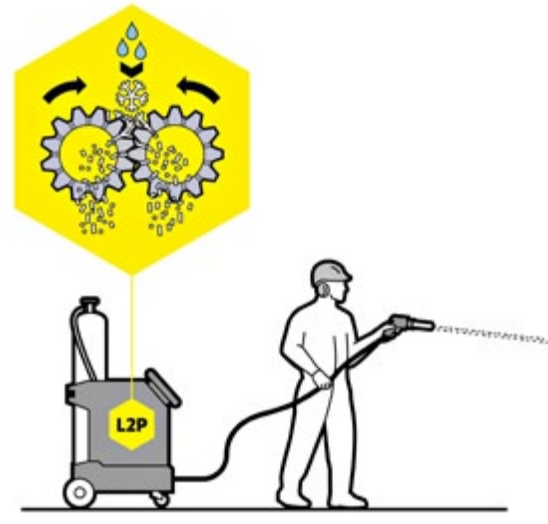
Kärcher Australia has a nationwide service team dedicated to the maintenance or repair of equipment whenever needed.

The Kärcher professional sales team works with every customer to ensure the right dry ice blaster for every application. "We make sure all customers are offered a solution, not just a product," Mr Askew said.

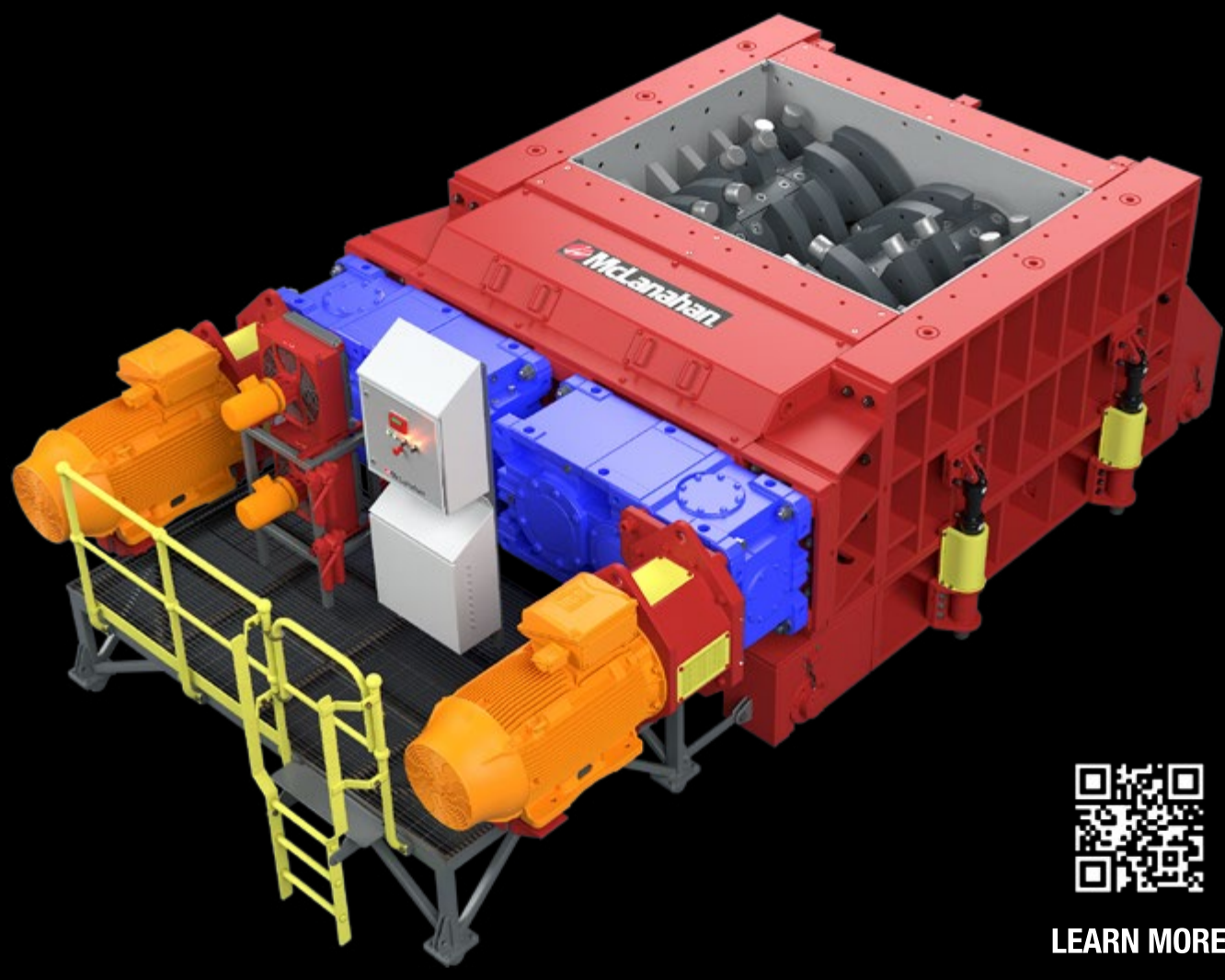
"This means all elements required to achieve the best outcome are taken into account as well as all safety measures, ensuring safe use of the machine in the required environment." ***AMR***

Systems which are supplied with dry ice pellets are available on the market as well as a compact model which produces the dry ice itself and therefore can be used very flexibly.





MINERAL SIZER



LEARN MORE

The McLanahan mineral sizer delivers a lower total cost of ownership with its value driven design. Our innovative design features provide immediate returns to your operation with faster, safer maintenance and reduced down time. Featuring the latest condition monitoring technology and backed by McLanahan's trusted local manufacture, local expertise, and local support.

McLanahan®

FEEDING // CRUSHING // SAMPLING // DEWATERING // SCRUBBING

mclanahan.com.au



KSB GIW® Slurry Pump Assembly.

KSB GIW® MDX 550 Cyclone Feed Pump

Sustainable Slurry Pump Solutions

Slurry pumping is one of the toughest jobs in mining and clients are demanding more from their heavy-duty slurry pumps to maintain high ore yields.

In the face of aggressive and potentially corrosive slurry, extreme mining conditions and decreasing ore grades, the market is looking to bigger and more powerful slurry pumps to maintain operation yields.

KSB delivers wear-resistant, durable GIW® slurry pumps as a sustainable solution for customers and for the best total cost of ownership.

ABRASION RESISTANCE

Slurry is made up of ore, tailings and a carrier liquid, and these specialised pumps transport slurry in large volumes to mineral processing plants for separation.

Abrasion and, to some extent, corrosion, are major challenges for the mining industry, according to KSB VP of Sales & Marketing for Hard Hard Rock Mining Jonathan Samuel.

"We are constantly in the process of researching the mechanisms of abrasion and finding solutions to overcome them," he said.

Reducing wear through optimised hydraulic design is a key focus for the KSB research and development team, as is cladding, a technology where a thin layer of abrasion resistant material is laid on top of white iron.

"KSB has been collaborating with external partners in order to bring Enduraclad™, a proprietary material, to the customer and this has found a lot of success in extremely abrasive applications," Mr Samuel said.

TOTAL COST OF OWNERSHIP

The abrasive nature of slurry leads to the constant wear and tear of heavy-duty slurry pumps from day one and, together with unplanned downtime, increases the cost of running a plant.

"KSB is focused on reducing the capital expenditure cost for the customer through efficiencies and intelligent design of our pumps. Our solutions are to reduce the operating expenditure throughout the lifetime of the project or mine," Mr Samuel said.

"We have invested in technology that brings the best value to customers – such as pump sensors, wear modelling, feedback mechanisms that tell the customer when to operate and where to operate the pumps – for the best total cost of ownership."

SUSTAINABILITY

KSB has a number of programs that work towards the sustainability of resources.

The first initiative is the buy-back of white metal scrap, which are then melted down to make new pumps.

KSB also buys back old equipment, re-manufactures them, then places the equipment back into service, rather than producing brand new ones.

Another focus area for KSB is working with alternate fuels, for example clean-burning LNG, to drive very large pumps, including diesel-powered pumps for remote areas.
"Tailings management is a big concern," Mr Samuel said.

"As tailings ponds grow bigger, customers are looking to new technologies such as the dry stacking of tailings KSB is researching solutions to help with this process that conserve resources and reduce the need to move large volumes of water."

ENERGY EFFICIENCY

KSB' mining division has over 126 years of experience in the design and application of heavy-duty centrifugal slurry pumps and hydraulics.

The research and development team provides continuous imporvements making products more energy efficient through hydraulic design, mechanical design, high-efficiency drives, as well as wear and material technology in order to conserve the planet's precious resources.

KSB's heavy-duty slurry pumps conserve more power, save more water and are reliable and durable enough to run for years. ***AMR***

SOURCE
KSB
P 1300 073 887
E enquiries@ksb.com.au
W www.ksb.com.au

NO TIME IS A GOOD TIME FOR DOWNTIME.



GIW® MDX - Mill Duty Extra Heavy Pump

Single-source supplier - your partner for pumps, valves and service

KSB Australia offers custom-engineered solutions for the mining industry from GIW® Slurry Pumps that can handle even the harshest pumping conditions to high-performance mine drainage and process water solutions that improve your bottom line.

Learn more at www.ksb.com.au or speak with a KSB representative 1300 073 887.

KSB MINING

KSB



Pictured: Specially designed LFCUs involving 6000 tonnes of fabricated steel ready for shipping.

LFCU A Game-Changer For Tailings Handling

Mineral Technologies (MT) is attracting a great deal of international interest for its innovative transference of its Lyons Feed Control Unit (LFCU) system across industry.

This technology, a proven success for one commodity, is now helping to overcome a problem faced by other sectors of the mining industry.

For nearly two decades the company's LFCU (Lyons Feed Control Unit) technology has proven a major success with mineral sands producers; assisting them in their efforts to process large volumes of ultrafine ores.

However, Mineral Technologies' innovative LFCU is more than just a fancy surge-bin. It is so much more. It can function simultaneously as a mass-flow storage bin delivering constant density slurries to downstream processes from continuously fluctuating and unstable mining operations, whilst classifying the feed to remove unwanted ultrafine particles (<45um slimes) based on both their size and density.

It is also being used to reduce water demand by de-watering slurries as part of the conditioning stage of long-distance slurry pumping operations. The bin being able to produce stable, high density, >65% solids by weight, slurries.

Now the technology is already providing a major impact for local iron ore miners for the recovery of ultrafine iron ore from magnetite tailings. MT is also investigating its potential use with a range of other minerals.

The Australian Mining Review recently spoke with MT's Engineering Projects Lead, Dustin Pepper, about the background to the LFCU and future plans to expand the use of the technology within the resources industries.
Dustin says the first LFCU surge bin was installed in 2003 at Iluka Resources' Douglas mineral sands project in Victoria.

Since then, MT has continued to refine the LFCU technology while supporting a number of mineral sands developments across the country and overseas.

"It has basically become our standard design for surge bins for all of the mineral sands projects we have worked on for almost 20 years - and just recently we expanded that into fine iron ore projects," Dustin said.

The processing of large volumes of ultrafine ores has long challenged mineral processing operators leading lower recoveries and increased tailings. This has led to many deposits, or parts of existing deposits, being viewed as uneconomic.

The inability to process some of those tailings has also created environmental issues. This is a growing problem and faces increase scrutiny as stakeholders increasingly focus on the Environmental, Social, and Governance (ESG) performance of resource companies.

Historically, slurry surge bins were designed without considering the mode of flow within the bin. The mode of flow was inevitably funnel flow where the slurry flowed down a central channel to the discharge point. This resulted in an inconsistent slurry density at the discharge and poor utilisation of the bin volume.

With the mining industry no longer able to afford to overlook resources that require finer sizes to achieve liberation or result in high tailings losses, the need for technologies to address these issues has increased – and the use of this technology which has proven so successful with the mineral sands industry is now being recognised by a range of other commodity producers.

While the LCFU units were initially utilised to stabilise and control the feed to processing plants, MT is now also finding application in stabilising tailings discharges and in desliming and upgrading fine heavy mineral feeds.

Mineral Technologies has recently worked successfully with a prominent Australian iron ore producer over five years to implement an LFCU technology for the beneficiation of ultrafine magnetite. The magnetite mineralisation requires a liberation size of < 40µm and selective rejection of ultrafine silica prior to magnetic separation. The process design upgrades the feed by rejecting 20% of feed mass to tails whilst recovering > 94% of iron to product.

"One of the key first steps in the further development of this mineral sands-related technology is through its use in a fine magnetite application where separation is based on density," Dustin says.

"In the final stage, in the magnetite flow sheet, we are producing a high-density underflow, like 62%, solids content and the undeflow goes into a pipeline and transported to the dewatering plant."

MT has delivered the 10 LFCUs for the magnetite project and they are currently being installed onsite. Commissioning is planned for late in 2022.

How it works

The LFCU is suitable for magnetite beneficiation due to its ability to elutriate finer, lower density gangue particles from the higher density magnetite particles.

The magnetite in the feed consolidates in the LFCU under its own weight (autogenous), displacing water, and forming a dense underflow (u/f) stream.

The LFCU is designed to facilitate the formation of an impermeable consolidated layer above the underflow (u/f) stream which gravitates towards the discharge manifold without blockages. This is achieved through the selection of suitable geometry that promotes mass flow inside the LFCU.

The water released from the consolidated layer flows upwards in the vessel and travels to the overflow (o/f) launder. The velocity of this overflow stream is controlled sufficiently to carry lower density fully, or nearly liberated, gangue minerals with it.

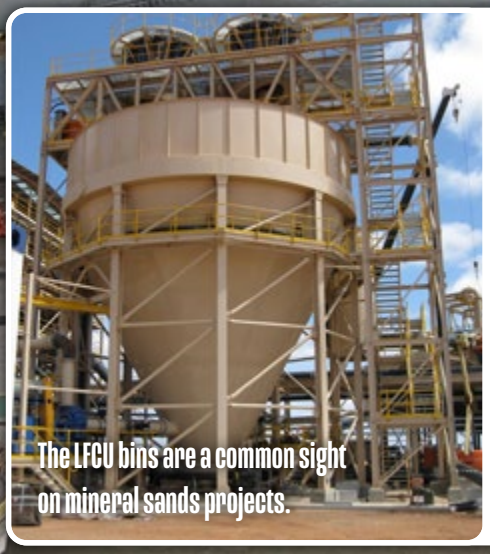
"Autogenous Classification" is the term MT uses to describe this separation process. This process can be used to classify feed by particle size and/or density.

An LFCU generally operates by varying particle settling flux rate (measured in t/h/m^2) and overflow rise rate (measured in m/h) to control particles rejection rates.

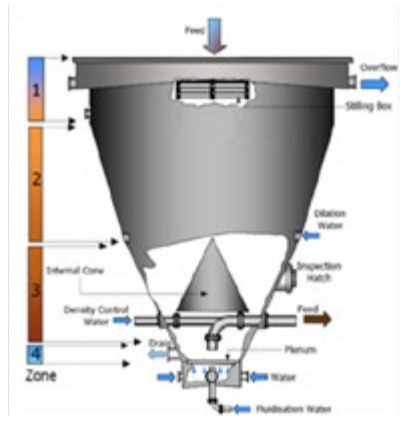
Assays of the feed, overflow (o/f) and underflow (u/f) samples show that after processing through the LFCU, the iron grade increases from 53.7% to 63.8% whilst SiO_2 grade decreases from 19.7% to 8.8% in the u/f stream.

Data obtained by MT and its clients shows clearly that the LFCU effectively separates magnetite from silica finer than 10 µm particle sizes. The u/f stream iron grade increase notably below sieve sizes of 25 µm, indicative of the liberation point of the material. The u/f stream SiO_2 grade is significantly lower than the o/f stream SiO_2 grade in all size classes.

The elemental recovery by size plots shows that the majority of the iron in the feed reports to the LFCU u/f irrespective of the particle size. The SiO_2 distribution data shows that fine (38 µm) preferentially reports to the LFCU underflow.



The LFCU bins are a common sight on mineral sands projects.



Mineral Technologies continues to refine use of the LFCU technology.

Extensive testwork in the laboratory and pilot scale LFCUs has been conducted to validate the technology. The testwork data showed that the LFCU can recover more than 90% of the iron units within the feed, whilst removing approximately 64% of the silica (primarily ultrafine). The LFCU treated a feed with a P80 particle size of 33 µm.

The testwork data also showed that efficient particle separation takes place at particles sizes of less than 10 µm. A reasonable correlation was found between the pilot and laboratory LFCU units, which aided in the development of the scale-up model.

Wide range of sizes

Dustin says the LFCU bins come in a range of sizes ranging up from 2.5 metres in diameter, with the biggest ones to being 24 metres diameter.

"Those large units, built for a magnetite project, stand about 30 metres tall, so roughly about the size of a 10 story building - they are really massive."

MT fabricates its LFCU bins locally and overseas, with the biggest unit to date fabricated in China.

Designed to support an Australian magnetite project, the construction of the 10 LFCUs involved 6000 tonnes of fabricated steel.

"It was a massive project, and unfortunately it kicked off at the same as COVID was being recognised around the world.

"So, we couldn't send anybody there in person, we had to secure all of our surveillance of the construction remotely.

"We were able to get through those challenges successfully and we managed to deliver them on time. The LFCUs are being installed on site right now."

Overview

Reticulating high density slurries, with constant rheology, enables resource companies to reliably pump their tailings and slurries with much lower water contents. This offers significant advantages by lowering power demand, capital costs and reducing the quantity of water introduced into tailings storage facilities (TSF).

LFCU's have proven that they consistently deliver a slurry at >65% solids by weight. Operating at such a high pulp density greatly reduces the volume of water pumped to tailings' storage areas. The 13.5m diameter unit alongside holds up to 1000 tonnes of tailings and processes at a rate of 7000 tonnes per hour.

By using an LFCU to produce a consistent high slurry density, only a third of the normal volume is sent to the TSF compared to traditional tailings disposal systems. This also results in capital cost savings e.g. smaller diameter pipelines, in this case a 36% reduction in pipe diameter; smaller pumps and reduction in operational expenditures that are directly proportional to the >60% reduction in pumped tailing's slurry volumes.

Further, there are substantial savings resulting from an optimised process water management system due to increased recovery of process water within the concentrator building.

All of MT's LFCUs are designed for each application based on the results of tests conducted using client-supplied material in their dedicated test facility.

This process ensures units are correctly sized, with optimal wall and internal component angles and with the most suitable coatings applied to the plate work to prevent material build-up.

LFCU technology provides operators with a cost efficient and proven solution for the removal of ultrafine SiO_2 and Al_2O_3.

The popularity of the LCFU technology has already spread to mining jurisdictions around the globe with a number of units operating in Brazil, the United States and South Africa. ***AMR***

SOURCE
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W mineraltechnologies.com/contact

Graphic interpretation of a cluster of LCFU bins.



Iron ore benefication.

All the **MIGHT** *Without the* **MUSCLE**



THE GENDER EQUALISER

"Women on Boards has welcomed BHP's revision of its ambitious target for a 50/50 gender split by 2025 as being more realistic. The mining giant will now push for 40% female representation across its 80,000-strong global workforce by 2025."

www.womenonboards.net/en-au/news/40-gender-target-more-realistic-for-bhp

As the global mining industry moves towards a more inclusive working environment, many more females will enter mining at all levels. In doing so, manufacturers will need to work towards gender equalisation when it comes to the provision of tools in the industry. This will entail designing lighter tools, being more task-focused and allowing an individual with a smaller stature to perform the task of a larger co-worker.

The **Snap-on Pow'rench** series of tools provides a step in the right direction to cater for this shift. A function of mechanical mine maintenance is dealing with large hard to remove fasteners. In most cases, the average fitter uses leverage to overcome resistance, resulting in back strains or other injuries. The use of sizeable Heavy Breaker Bars as a method of leverage will achieve the desired result however this often means you also end up with broken bolts and stripped fasteners. By increasing the length of leverage, you lose the sense or feeling of resistance which causes damage to the equipment being worked on and increases the overall length of time to complete the task.

The **Snap-on Pow'rench** provides a tool that is not excessively heavy, is compact in size and allows for agility (feeling) through the handle to ensure damage is not occurring. Most importantly, it removes the need for the use of large, heavy, cumbersome breaker bars and permits an individual of any size or strength to perform the task usually undertaken by larger and beefier mechanical fitters.



So let's talk numbers; the **PHTPW2000100**, the largest unit, comes with a 1" square drive and can produce 2000 ft.lbs of rotational torque or 2,711 Nm. In layman terms, this means if you had the wrench attached and had a metre long handle, you would need to apply 276 kgs of downward force at the tip of the bar to produce the resultant torque at the drive head. Hence, the reason why historically we have used long heavy breaker bars. The force required is halved for each extra metre from the pivot point however, the further you are removed from the pivot point, the less feeling you have and the subsequent damage you may be about to achieve.

We all have seen some heavy lads working on large mobile equipment, but I don't know too many that come in above 135kgs. The large **Snap-on Pow'rench** is 24" in overall length or 21 ½" from pivot point to overall length, so to achieve a rotational torque of 2711Nm, you would need to apply 426kgs of downward force.

This is where the **Pow'rench** magic takes over. The wrench is designed to work as a progressive ratchet, with very little applied force being required to achieve the desired outcome. Every 30 degrees of handle rotation allows the internal ratchet to click a cam claw over until the cam releases its internal hammer striking an inner mandrel, providing vast rotational torque to the socket.

The largest **Snap-on Pow'rench**, as described above, weighs 10.45kgs without any impact sockets attached. It's not a lightweight, but it's not a behemoth either for what it achieves. Any person who can lift 15kgs can operate this wrench and therefore can undo any secured fastener requiring less than 2700Nm of torque to remove, or the equivalent of 426kg of force.

Not too bad for something that looks like your average ratchet.



The Pow'rench comes in three models:

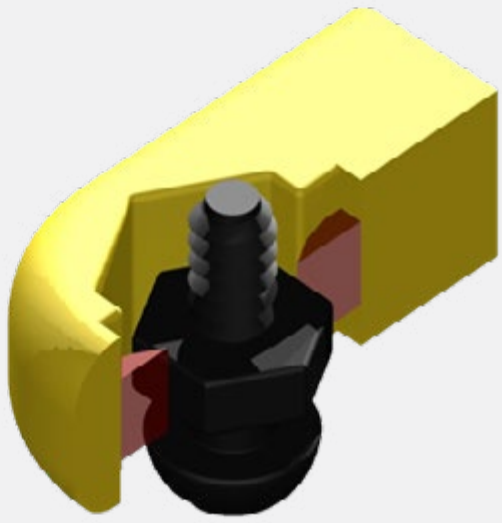
PHTPW50050
½" Drive produces a maximum of 500ft.lbs or 677Nm of torque. It is 12" or 304mm in length and weighs 6 lbs or 2.72 kgs. The maximum downward force required is 39lbs or 18kgs.

PHTPW80075
¾" Drive produces a maximum of 800ft.lbs or 1084Nm of torque. It is 16" or 406mm in length and weighs 11 lbs or 5 kgs. The maximum downward force required is 50lbs or 23kgs.

PHTPW2000100
1" Drive produces a maximum of 2000ft.lbs or 2711Nm of torque. It is 24" or 608mm in length and weighs 23 lbs or 10.45kgs. The maximum downward force required is 75lbs or 34Kgs.







Double Action

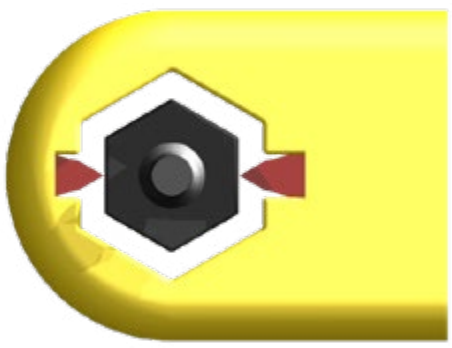


Snap-on Auto-SPLITTER is a double-acting hydraulic nut splitter.

For any fitter, corroded fasteners are a nightmare. Having to arrange a hot work permit, complete a JSA organise the Oxy set, transport it to the job, not to mention having to do the task in the middle of our Australian Summer. This doesn't even start covering the flashes and molten metal dropping inside your work boot.

The conventional single nut splitter only does half the job. Working on large fasteners over 36mm means all your tools are heavy and awkward, and single-sided nut splitters mean you are required to split the first face and rotate the splitter 180o and conduct another split.

The **Snap-on** double-acting hydraulic nut splitter performs the single action double face split, cutting the nut on both faces in one clean single hydraulic action. There is no tool rotation, no realignment, just one simple, clean-cut ensuring the nut falls away from the thread with no thread damage.



FEATURES AND BENEFITS

- Cuts through the largest frozen nuts in just seconds, with virtually no risk of injury or accident
- Cutting chisel is easily calibrated, so only the nut is cut with no damage to bolt or stud threads
- Fast setup – goes from toolbox to ready-to-use in less than 5 minutes
- Hands-off operation - reduces the danger to the operator or nearby equipment
- 9 models available for cutting fractional and metric sizes and nuts of virtually any shape. It can also be used on stainless steel
- Fits most API and ANSI flanges and virtually all valve bonnets
- Remove nuts without the hassle of torches, hammers and chisels
- The double cutting model eliminates the need to reposition the nut splitter at 180 degrees from the first cut to break the nut from the stud, reducing operator effort and saving time



PRODUCT RANGE

AS105DC
Stud Dia 5/16 – ¾ (M8 – M20)
ATF 11/16 – 1-1/4 (16 – 36)
Weight 20 (9)

AS200DC
Stud Dia 7/8 – 1-1/8 (M22 – M30)
ATF 1-7/16 – 1-11/16 (36 – 55)
Weight 21 (10)

AS204DC
Stud Dia 1-1/4 – 1-3/8 (M33 – M36)
ATF 1-13/16 – 2-3/16 (46 –60)
Weight 61 (28)

AS210DC
Stud Dia 1-3/8 – 1-1/2 (M36 – M39)
ATF 2-3/16 – 2-3/8 (55 – 65)
Weight 62 (28)

AS308DC
Stud Dia 1-3/4 – 2 (M45 – M52)
ATF 2-5/8 – 3-1/8 (65 – 90)
Weight 95 (43)

AS314DC
Stud Dia 2– 2-1/4 (M52 – M56)
ATF 3 – 3-5/8 (80 – 90)
Weight 100 (45)

AS404DCDA
Stud Dia 2-3/4 – 3-1/4 (M72 – M85)
ATF 3-3/4 – 4-1/4 (95 – 110)
Weight 206 (94)

Snap-on 18v CTM Cordless Torque Multiplier is specifically designed to improve performance and data traceability in safety-critical and heavy industrial operations. The CTM is ideally suited for all applications where conventional electric or pneumatic power is not available or simply in situations where the removal of hoses and cables is highly desirable for workplace safety.

POWERFUL DUAL-SPEED TORQUE

CTM1000 (250-1,000 ft. lbs.)
CTM2000 (500-2,000 ft. lbs.)
CTM3000 (750-3,000 ft. lbs.)

ACCURATE RESULTS

The Snap-on CTM is a transducer controlled battery powered torque tool designed for accurately applying torque to threaded fasteners. The unique 'intelligent joint sensing' technology continually measures the joint during tightening and, when necessary, employs dynamic braking to avoid torque over-shoot due to motor inertia, consistently achieving highly accurate results of ±3% of setting.



SAFETY

The CTM 'safe to start' button (which needs to be pressed at the same time as the trigger) ensures hands are safely positioned at start up.

Once the tool is running, the operator can relocate their hand securely to the supplied secondary handle.

TWO-WAY COMMUNICATION

The Snap-on CTM allows two-way communication via Bluetooth or USB cable, downloading up to 3,000 time and date stamped readings or live streaming data from the tool. It is also possible to upload information.

to the device, such as tightening sequences. To manage this data, tools are supplied with complimentary software. As an added benefit, data can be output in CSV format to communicate directly with customers' own data management systems. In addition, the CTM can communicate with smart devices, such as mobile phones and tablets, which enables the ability to gather tightening data specific to a known set of GPS coordinates.

When working in safety critical applications, such as mining infrastructure, this enables the CTM to provide invaluable traceability data.



AUDIT MODE

The new CTM is also equipped with an 'Audit Mode', which offers the ability to perform a check on pre-tightened bolts. Most electric tools if applied to a tight bolt will further tighten it. So, even if the bolt was fastened correctly, the test will destroy the original tightening integrity.

Under 'Audit Mode' the CTM will run at a speed that allows it to stop almost instantaneously once the set torque is achieved. If a bolt is found to be loose then the tool will tighten it to the desired level, recording the angle of turn required to do so.

For more information on any of these dedicated Snap-on Tools for the Mining Industry, please contact;

Snap-on Industrial
1800 810 480
sota.indsales@snapon.com

Moving From **Standard Safety Protocols and Procedures** to **Robust Engineered Solutions**

The Dropsafe Barrier is designed to prevent items such as tools, handheld devices and maintenance equipment falling through open guardrailing on walkways, stairways, scaffolding and elevated work platforms.

With many mine operators seeking safety measures beyond standard, administrative controls and procedures to minimise risk in these high-pressure, high-risk environments, there is an increasing demand for technically sound, engineered solutions.

In partnership with its global manufacturing partner, Dropsafe, Perth-based industrial safety supplier Teksal Safety, is addressing these safety challenges in the mining industry.

The Australian Mining Review recently caught up with Joe Hischar, Managing Director, Teksal Safety, and Mike Rice, Dropsafe, who believe engineered controls should be included in best practice Drops prevention programmes and that Drops prevention in Australia should go beyond its traditional stronghold sectors.

AMR: What is the current sentiment around safety solutions in Australia?

After many years in the business, Joe says he has observed an increased interest and demand for the uptake of engineered safety solutions in mining environments.

"We're certainly seeing increased awareness about safety in general, particularly in mining. In the early days, we saw crude, makeshift solutions being used in that sector, but over the years the standard of solutions has matured," he said.

"Operators recognise the importance of using robust solutions that have been designed and tested, and safely implemented."

AMR: What challenges does the Australian mining market face in adopting engineered safety solutions?

"Awareness will always be a key focus. Embedding best practice and educating leaders about comprehensive prevention programmes remains as crucial as ever.

"Despite today's connected world, in Australia in particular, remote environments can be challenging. Facilities with significant hazards, such as mine sites, are often far from high-density centres – potentially thousands of kilometres away. To maintain high safety standards in these remote project sites, it ultimately comes down to creating and embedding a strong, consistent safety culture."

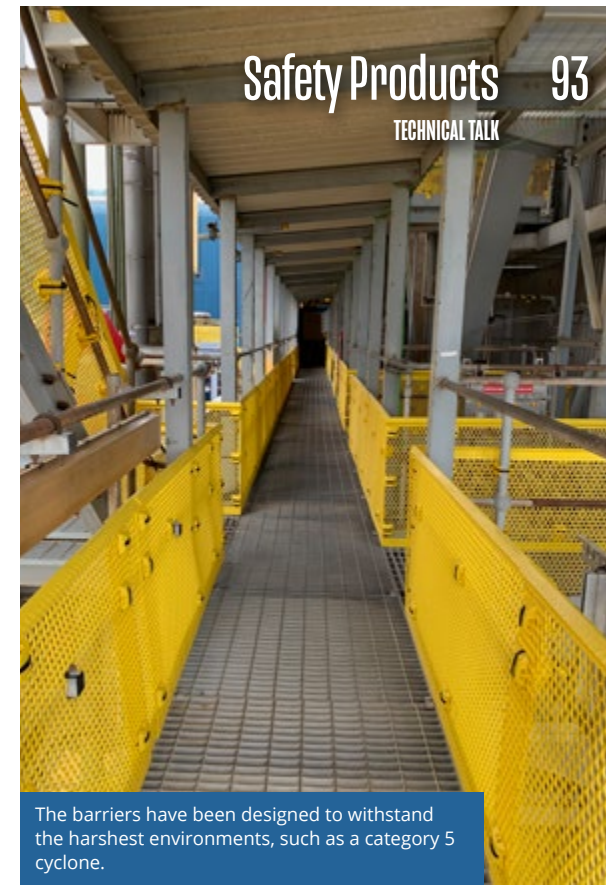
AMR: How are industrial safety controls implemented in the mining environment?

"Firstly, it is important to follow the hierarchy of safety controls and engineer out the risk as a priority. You could put a sign up on a walkway that warns personnel not to drop objects over the deck. But this is an administrative control. It is low on the hierarchy, and ultimately, incidents could still occur. However, a physical barrier prevents this.

"Secondly, continue to build awareness of risks and prevention solutions. Education is key in all industries – even those that are more established. The risks evolve, the



Robust, long-lasting, reusable and recyclable, the Dropsafe Barrier panels are fast and easy to install or remove.



The barriers have been designed to withstand the harshest environments, such as a category 5 cyclone.

solutions evolve, and operators must keep pace.

"Finally, we would challenge the industry to innovate. Don't settle for the status quo, search for the best solutions, and improve the situation."

AMR: How is Teksal Safety working to help mining companies keep their workers safe?

"Our goal is to protect people, plant and process. Safety culture often emphasises administrative controls and things like PPE. While these play a key role within a wider HSE programme, we focus on engineered controls to mitigate risk at a high level.

"While we have solutions that tackle administrative issues that capture residual risk, our main aim is to mitigate the risks further up the chain."

AMR: How has working with Dropsafe helped address these issues and bring technically innovative, engineered solutions to the industry?

"We were introduced to Dropsafe through mutual business partners at an exhibition. I'd long been aware of Dropsafe because of the strength of its solutions, and was excited to be introduced to the company because we identified common goals and a clear synergy between our brands. So it was the right time and the right fit.

"Dropsafe is a market leader, yet continues to innovate. Its product quality – including the testing and documentation – is second to none.

"As a partner, its professionalism is exceptional, and the drive to spread its safety message to the market is clearly communicated.

"We're proud to be associated with the brand. It's always good to have a flagship brand in your product suite, and that's how we feel about our partnership with Dropsafe."

The Game-Changing Dropsafe Barrier

The AMR was also privileged to meet with Dropsafe Commercial Director, Mike Rice, who gave us a unique insight into the company's unique Dropsafe Barrier.

The Dropsafe Barrier is designed to prevent items such as tools, handheld devices and maintenance equipment falling through open guardrailing on walkways, stairways, scaffolding and elevated work platforms.

"The barrier system came off the back of a conversation with a driller who was basically looking for a stainless steel net to put up against a handrail to prevent objects falling through," Mike said.

"At the time, we said to them: 'This is a not an ideal solution because you're going to have problems installing and maintaining it and the issues will be compounded by its weight'.

"We started the development process and ended up with a high-grade polymer system instead of stainless steel."

Robust, long-lasting, reusable and recyclable, the Dropsafe Barrier panels are fast and easy to install or remove, attaching along the inside of guardrailing and under stairs.

The system has three main components: the long panel, the short panel, and the securing device.

The long panel, which is primarily used on straight sections on guardrailing and stairway handrailing, has a solid infilled base to contain smaller floor debris, while still able to be flat packed for shipping and easily stored.

As the short panel is flexible and can bend to a 350mm radius, it is used around corners and under stairs, and its small aperture makes it suitable for machinery guarding.

"It's much simpler to bend the panelling than it is to cut and shape it, using a bunch of carpentry skills—we try to avoid the use of tools wherever possible," Mike said.

"The securing device is a two-part system. It has a 316 stainless steel band that goes through the aperture of a panel around the back of the post, back into the securing device, which is then clamped in place.

"The beauty of the stainless-steel band is that it's thin enough to go around any shape or handrail, whether you have angle iron, flat bar, or round tubes.

"The securing device has an anti-fail system built into it and each component withstands up to 130kg of load."

Mike says the Dropsafe Barrier solution has evolved, based on real-life settings.

"Over the years we've spent a lot of time talking to customers to find out the problems they're facing, day in and day out, and develop solutions that address them.

"We've designed this system to survive for 10 years so it is a very robust system that you can put in place for the short or long term.

"A lot of companies are now using it for shutdowns and maintenance when they get a lot of traffic on site with third-party contractors."

Dropsafe also offers customers a 'material degradation test' in which a snippet of a panel is analysed to see how much life it has left in it before it needs to be retired/to determine its longevity?

"At that point, we have a recycling programme for the panels to be returned to us," Mike said.

The Dropsafe Barrier has been designed to withstand the harshest environments, such as a category 5 cyclone.

"From a strength point-of-view, the product was designed to tolerate a drop of a 10kg sledgehammer.

"We try to imagine the worst-case scenario, and design products to exceed that worst case.

"We then go through a rigorous internal and third-party testing process to check they live up to the high standards we set.

"It is resistant to more than 100 chemicals and has the highest fire rating for any plastic.

'The secret to the system is the plastic we use—it took us two years to identify a material that could meet our performance requirements, as well as the high UV resistance and durability.

"Overloading handrails in high wind is a real concern. To test its strength, we went to the bottom of a wind tunnel to expose it to 250km/h winds for 12 hours."

Similar tests were carried out for intense and extensive rain.

Designed for industries that involve working at height and therefore have increased risk of drops incidents, the Dropsafe Barrier prevents tools and equipment from falling through open guardrailing, stairways and elevated work platforms.

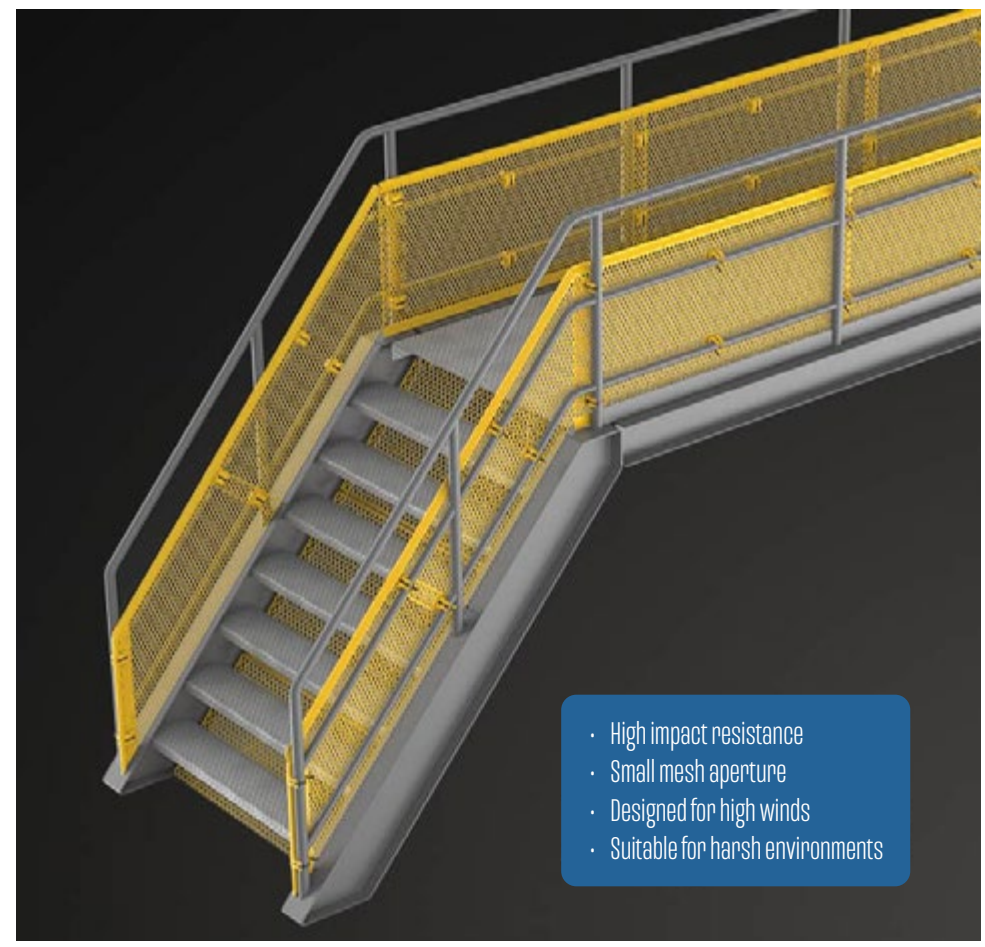
How? It attaches along the inside of the guardrailing of elevated walkways, stairways and access ways of permanent or temporary structures, using a universal attaching system.

The Dropsafe Barrier is modular, with impact and heat-resistant panels, and small honeycomb apertures.

It is recommended by both DROPS online and SfS as Drops Prevention best practice and is ABS DOPP+ type approved. ***AMR***

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Line Boring Onsite Delivers Cost Saving Benefits



DMMeng's on-site machining services boast a quality array of both workshop and mobile equipment capabilities.

DMM Engineering has been operating since 1987, providing the mining industry with a range of capabilities including, design, fabrication, machining and engineering maintenance services.

The team has extensive experience with in-situ machining, capability to do onsite or workshop-based machining, and a fabrication division that can tackle all jobs big and small from site repair, installation to erections.

Sometimes, your existing machinery might have to go offline or need to undergo **on-site heavy equipment repair** for it to be able to continue to perform at its best.

However, the world doesn't stop turning and the job needs to get done, which is why DMM Engineering provides high-quality portable machining services so we can continue to provide the same exceptional standard of service.

"With our on-site machining, you can ensure daily operations keep running as effectively as ever. We understand what downtime really costs you. Infact, preventative on site line boring can prevent much more extensive and expensive workshop repairs down the track" according to Brendan Pyle, DMMeng Director.

"So on site line boring not only saves downtime, but money and machine productivity which, if left deteriorating, can cause more extensive machine breakdowns and required rebuilds" explains Brendan.

DMMeng's **on-site machining services** boast a quality array of both workshop and mobile equipment capabilities, including milling, flange facing, key way cutting, journal lathe, rotary welding, honing, drilling and tapping, rubber grinding, stud removal, linishing and stellite sat removal.

"Pretty much anything we do in workshop can be achieved in field with our fully equipped DMMeng work trucks", Brendan proudly explains "DMMeng's unmatched expertise provides the complete balance of project deliverables from risk and safety assessment through to maintenance solutions being developed and pre-tested off site to minimise interruption to customers' operations on site".

Our team have more than 100 years of trade experience," Mr Pyle said. "The expertise attained over this period includes plant maintenance, engineering services, fitting, machining, structural fabrication, heavy mechanical, in-situ machining, plant installation and onsite services."

These skills are embedded through comprehensive on the job training for both tradesmen and apprentices alike.

"The very fact that many of the original apprentices are still employed with us some six years after completing their training is testimony to the special culture of our company," Mr Pyle said.

All of DMMeng's work comes fully warranted for further peace of mind and is completed to certification standards such as SAFETY AS 4801, OHSAS 18001, QUALITY ISO 9001 and ENVIRONMENTAL ISO 14001.

More information can be found at
www.dmmeng.com.au
or calling **(03) 5625 3183**
or Brendan Pyle direct on **0498 330 030**

AMR

WE GET TRUSTED WITH THE HARD JOBS

The team at DMMeng excels at the challenges of in-situ machining and has developed a wide range of **innovative customer solutions** in many facets of complex machining. We have developed the expertise to complete these tasks on-site because we clearly understand what downtime means to customers and industry.

DMMENG.COM.AU

Case Study | Innovative Solution

In-Situ Line Boring: Coal Dredge Bucket Brackets



Customer Challenge:
To safely and cost effectively repair the pin holes that retain the cutter and pre-cutter dredge buckets, back to OEM specifications on both the radial and cord dimensions, while the dredge is still in the working pit area, to reduce dredge downtime.

DMM Engineering Innovative Solution:
DMM developed an in-situ refurbishment process, utilising a custom engineered jig that enabled the bearing housings to be pre-set so when the line boring bars are assembled for boring the OEM specification are accurately achieved.

Service Delivered:
The DMM Engineeering team of six staff, working two 10-hour shifts over six-days-and-nights, using two line boring units in parallel, enabled the task to be completed in a fraction of the time taken in previous attempts, allowing the dredge to resume full production as scheduled.

Customer Benefit:
Huge time saving compared to previous methods and with greater final accuracy, which prolongs cutter and pre-cutter wear and enables high production rates for longer. ***AMR***

HOW OUR TEAM CAN HELP YOU

The DMMeng team has developed specialised skills supported **by custom built mobile** equipment that enables engineers to complete complex refurbishment projects safely and on-time.

The ability to work on heavy equipment while it's still in the field, for example at the mine operating slope, delivers massive savings to plant operators by greatly reducing the down time of their equipment and their work force.

With our commitment to continuous improvement, we challenge ourselves to seek innovative or better ways to solve a problem – be that in a cost, performance or time saving manner.

Our customer satisfaction guarantee involves meeting client deadlines, while not leaving the site until the serviced equipment is proven.

DMMeng has built an impressive list of case histories where on-site and in-situ maintenance tasks have saved operators hundreds of thousands of dollars in down time costs.

DMM eng.com.au
INNOVATION SOLUTIONS

Talk with DMMeng Director, Brendan Pyle today on 0498 330 030 ***"What we promise, we deliver"***

OUR EXPERTISE IS SOUGHT ACROSS AUSTRALIA



Spacepac provides unique battery-electric powered equipment handling options.

Spacepac | A Pioneer In Battery-Electric Equipment

NSW-based Spacepac Industries is ahead of the curve when it comes to supplying battery-electric equipment to the mining sector.

With the international move to reduce CO_2 production a hot topic of late, the use of battery-electric equipment in mining is making headlines across the globe.

While the equipment it supplies is on a much smaller scale than the giant electric dump trucks and rail engines global mining giants like BHP are now introducing into their operations, it should be noted that Spacepac introduced battery-electrical technology to the mining sector almost a decade ago.

The Australian Mining Review recently caught up with company spokesperson, Steve Davey, to obtain some background on the company and its operations.

Founded by Mike Davey in 1982, Spacepac Industries has long been focussed on the supply and distribution of materials handling equipment, storage, access and safety products.

Ten years ago, the company started a separate division for Battery Electric Movers, Lifters and Transporters called EMOVEIT. They operate a web-based virtual showroom and a refined delivery system for their products – a winning formula in these COVID times.

Applications are diverse across the mining, healthcare, manufacturing, and waste management industries.

For the mining sector, Steve says there are a few main product types that Spacepac supplies on a regular basis.

"One is the battery-electric dumper and lifter which has either a skip tray or a drop-down tray for carrying rubble or for clearing areas. They are probably comparable to a large wheelbarrow in size.

"We also supply what we call trackers – that run on continuous treads and can be remote controlled to transport equipment down narrow areas that larger vehicles can't easily get through.

"Other applications are for activities such as the addition of hydraulic lifters for maintenance work or clearing conveyor belt waste. You can attach a suction tube back to a generator and run the RC trackers underneath conveyor belts to use for clearing a lot of dust waste and particles. In practical terms, it becomes a heavy-duty remote-control vacuum cleaner."

Steve explained that Spacepac provides products with more than one application which are suitable for widely different uses in both the Commercial and Industrial fields. A range of Pedestrian Tugs for example can safely tow anywhere between 1000-12,000kg.

Examples of these include the T373-W Lift and Tilt Platform Crawler supplied with remote control and lithium batteries, currently being used by Titeline Drilling Pty Ltd on several exploration sites - and Railroad and Tunnel Cars.

T373-W lift and tilt, platform crawler

Features:

- The T373-W is an ecologically designed pedestrian controlled electric vehicle, featuring a heavy-duty frame and stable track propulsion
- Designed to face the most difficult ground conditions, it is extremely effective around building sites, in tunnels or underground and in places where tracked traction and zero emission are essential.
- The Control system employed in the T373-W is with the remote control, both Wired and Wireless. This ensures the highest safety standards.
- Engineered for extreme reliability and built with operator safety in mind, this machine is made for industrial maintenance, repair and restoration work.
- The T373-W is quiet and produces no hazardous exhaust.
- Advanced engineering allows an efficient use of energy and power.
- Suitable for indoor restoration work or moving materials in an environment where the exhaust, noise and smell of a combustion engine is not acceptable.

Railroad and Tunnel Cars

The battery-electric tunnel cars such as those used by BHP at several sites in Western Australia are custom-built to safely transport materials through tunnels and confined spaces.

They are silent, cost-effective to run, reliable and produce no fumes or pollutants when compared to traditional vehicles.

Not only can Spacepac help design tunnel cars for a client's particular application, they can also help with training so that all members of a customer's team are competently trained in safe usage and basic maintenance.

To handle safety, the tunnel cars' wide range of options allow for uses such as medical recovery as well as a range of loading and seating configurations.

Spacepac's range of heavy-duty batteries (maintenance-free AGM and Lithium versions) and design options will allow users to haul all the equipment that a customer's staff needs to work comfortably and safely.

Steve says Spacepac can supply products that measure up to a range of applications, however, the company tends to stock flexile base products, which the company can customise to meet client requirements.

"That could be just a matter of adding

The ruggedness and versatility of the Spactrac equipment has made it popular on a number of mine sites.

blades on the front for clearing paths or custom additions. The equipment is very adaptable."

Steve says Spacepac is always on the lookout for new applications that it might be able to apply within the mining industry.

"I suppose it's also a matter of seeking out some of the niche applications in mining as well. It's important to keep on top of what's happening in the field through publications like Australian Mining Review and talking to customers to find solutions for their problems."

Spacepac acts as the importer and national distributor for a number of global brands, providing it with access to knowledge and experience from major international manufacturers and their networks.

"One of our bigger manufacturers is Alitrak, based in Italy. We work with their country distributors in places like Chile and South Africa, where they are very much focused on mining. So, we exchange ideas, and we also can use equipment and add-ons that they've used for their local mining clients."

With its well-established network, Spacepac can supply equipment across Australia, New Zealand, PNG and internationally.

"We have technicians in Brisbane and Melbourne, and we service New South Wales from our base in Wollongong. We also directly support and service clients in Western Australia."

While Spacepac's main output is as an equipment supplier, it does undertake some specialised small-scale manufacturing.

"I have a background in electro-mechanical product development and sensor integration, so we can design and incorporate many of the system additions in-house. Whether it be lifters, guards, skips or location alarms and sensors. We've been building the capability and tools for that over the last few years.

"Spacepac is a family company and I've just come back into the business. I'm an engineer and have been working in product development for healthcare/medical tech and sustainable power applications for the last 20 years.

"So, it's a good fit for me, because I get to continue developing our product range, design capability and solutions. It keeps things very interesting as every customer presents unique challenges."

With a range of proven products and a global knowledge of the growing application of new and proven technologies, Spacepac/Emoveit is ready to support mining and other industries across Australia. ***AMR***

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Envirosuite Preparing to Launch a Step-change in Environmental Monitoring



At a time when mining operations around the globe are coming under increasing scrutiny from regulators and society for their environmental stewardship, Envirosuite is preparing to launch a new solution that will provide a step-change in environmental management.

A market leader in continuous environmental monitoring for many years, Envirosuite is putting the final touches on its latest solution - a new platform called EVS Omnis – with the new product set to be launched in the first half of 2022.

The Australian Mining Review recently caught up with Matt Scholl, Envirosuite's Global Head, Mining & Industrial and Ryan Smyth, Managing Director & Mining Solution Provider (Stratium Group) to hear about the latest developments in Noise and Vibration Control and Monitoring and to receive an update on the Omnis development.

Ryan pointed out that Omnis is a platform that not will not only manage noise and vibration, but also provide state-of-the-art monitoring of air and water.

"It is a really powerful thing to have all of that on the one platform" he said.

"It's more than just a monitoring solution. It now offers real time monitoring as well as predictive management of air quality impact." he added.

Ryan says Omnis is part of an Envirosuite product strategy that fits with the business approach of bringing together the company's industry leading skills and knowledge to provide the best answer for its clients.

"For our customers, when you can have more solutions on one platform, then that makes life easier and highlights how technology has moved on."

According, to Ryan the system is particularly easy to operate.

"It is provided as a software service platform. Once it is configured from the customer side there is no significant effort for them to run it, apart from integrating the information from the system into their decision making."

As with all modern systems involved with the digitalisation of the mining industry, Omnis collates a significant amount of data.

"There is a lot of data, however, the system presents it in a way that it tells you when you need to know something and we do that with easy-to-understand indicators, or messages, that are sent through to the operators," Ryan said.

"Typically, the operators will have a responding action which they take based on the information that was sent to them.

"The system does collect a lot of data, however, on the customer side, we try to keep it as simple as we can, so that they can just use the outputs to make their operational decision.

"Envirosuite is enabling different streams of data to be used together. In the past, environmental monitoring was done mainly by periodic grab sampling. You really can't learn a lot from overlaying two datasets of periodic measurements if the data points don't line up, but when you have continuous streams of data, and you have the computing power to analyse that, you can discover efficiencies that perhaps you were not able to determine before.

"And any product that increases operational efficiencies for miners is extremely valuable."

HIGHLY ADAPTABLE

Ryan says that the Envirosuite system can be introduced into a project at just about any stage.

"The Prefeasibility Study (PFS) phase is an obvious place to start introducing our system into planning for a mining operation.

"Aside from the operational efficiencies that may be unlocked by introducing the system from the very start, if you do have regulatory challenges, then typically the regulator welcomes the ability to capture data in real time, so it may help with obtaining approvals on a case-by-case basis.

"On the other hand, we also have a lot of mines in Western Australia that have been operating for a very long period of time with legacy systems that were perhaps set maybe 10 to 15 years ago.

Those systems were fit for purpose for that point in time.

"However, sometimes those mines have increased their footprint as they have increased the output of their operations and now, very often, solutions that were designed 10 years ago for a particular asset, are not fit-for-purpose anymore.

"So, existing well-established operations will also benefit from Envirosuite's Omnis system. It is very complimentary with existing devices. We can connect easily to existing devices. It's very modular in its design and that enables us to engage with the customers, wherever they are at in their operating cycle today."

Envirosuite supports several existing Tier One customers in Western Australia, with the company being particularly dominant in Port Hedland, as well as supporting miners across commodities such as iron ore, minerals sands, coal and copper in multiple regions around the world.

"These customers are already using versions of Envirosuite's solutions, and they are always looking for better ways to enhance operational efficiency.

"A lot of our product and our roadmap is built through interaction with our customers. We've been around for a long time, interacting with our customers in the industry, which influences the capabilities that we build into our solutions.

"Our typical contracts are anywhere from one to five years and that affords us that opportunity to be taking on board feedback throughout the contract about what we're doing well, and what we could do better and how they can improve their operation.

"Omnis and its capabilities will help them to do that."

THE DIGITAL AGE

Matt says that after what some considered a slow start, the mining sector is now moving quickly to adapt and take advantage of new digital technologies.
"The Tier One miners, the major mining companies, are building teams around digitalisation now.

"They are rapidly responding to the challenge. They have assembled their own internal teams focused on digitalisation. They're using the power of IoT to bring data from all aspects of their operations to centralized locations where the data is used to optimize plans and guide operations with data-driven decisions.

"Digital solutions are also enabling miners to enhance the safety of their workforce, for example, by monitoring things remotely, which means people can be removed from locations of higher risk to their health and safety.

"The evolution of digital models has also been enhanced by the power of computing, which means that customers can now actually model and assess operating scenarios routinely and make plans accordingly. And that goes well beyond environmental modelling and managing those impacts. I mean, whether it's blast planning or production planning, you know, there's a lot of simulations that are now incorporated into the decisions that are made across a mine site.

"Australian Mining is regarded world-wide as being very innovative, it's had to be, because we have some of the highest labour costs on the planet and a strict regulatory environment and yet the world relies on us to supply the extensive range of minerals that modern life requires. Envirosuite has operated as part of this sector for many years, introducing state-of-the-art technologies to support our customers."

VALUE ADDING

According to Matt, technology change is enabling miners to meet new challenges – including around Environmental, Social, and Governance (ESG).
"ESG is hot right now, however, our solutions have been assisting our customers in this area for years.

"Envirosuite helps to operationalise ESG principles. What that means is if you make a commitment to ESG, you need to be able to assess and manage the factors that drive your ESG performance.

"Well, the first thing that you need is data – and it's even better if you have the data coming in continuously so that you can analyse and react to what it is telling you.

"And then if you have foresight to predict what's going to happen, you're in an even better position. That is what Envirosuite enables a company to do. So, once you've made that commitment, you can rest assured that if you've got this system, then you're going to be managing it the right way."

Both men agreed that while the mining sector is adapting to the digital age, there are still issues that it is not keeping up with.

"There is the age-old problem of companies not reacting to a requirement for a risk management solution. People often don't recognise the value of the risk until it's already occurred and that maybe too late.

"This type of solution could really help them manage and get ahead of those risk issues."

One of the big changes that Envirosuite has noted is the growing impact that the pressure from social groups is having on mining around the world.

"A social licence to operate is equally important as a regulatory license. So one of the real benefits of Envirosuite is balancing or optimising productivity against potential impacts on the community, you know, and getting that right," Matt suggests.

"As an example, traditionally, you might do an impact assessment, and set a limit and the company will look to stay below the limit, so they set that as a fixed limit.

"In reality, you could probably operate well above that limit most of the time and not have a problem. So essentially, they're leaving money on the table.

"We enable them to operate with an adaptive management plan, where our solutions provide them with information so that they can have confidence to operate up to a higher limit on a good day, but it might predict that tomorrow or in two days' time there is a high-risk day.

"So, that's when you need to take measures to manage your impact. That's when you need to either change your operating plan or bring in additional controls, or whatever the solution is, but let's not curtail production on a good day.

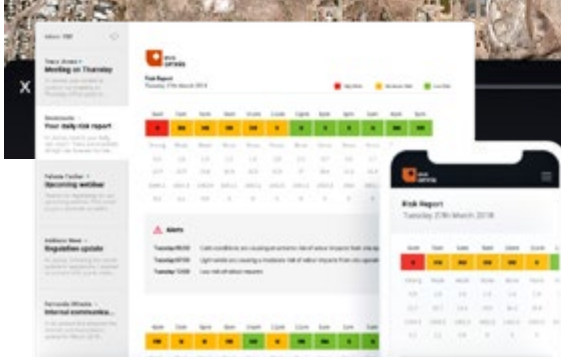
"Our solutions use data such as environmental and weather monitoring. There are known weather conditions that may be high risk to the local community, and they might be specific to a site, so we can configure our solution to monitor the risks that are specific to that site and provide the customer with the data they need in real-time to make the right risk level decision.

"Combining operational data with environmental data helps you have a whole-system view of the operation. It supports rapid responses to changing conditions and even enables planning to prevent problems and improve efficiencies across the operation.

"And that is what we all want." ***AMR***







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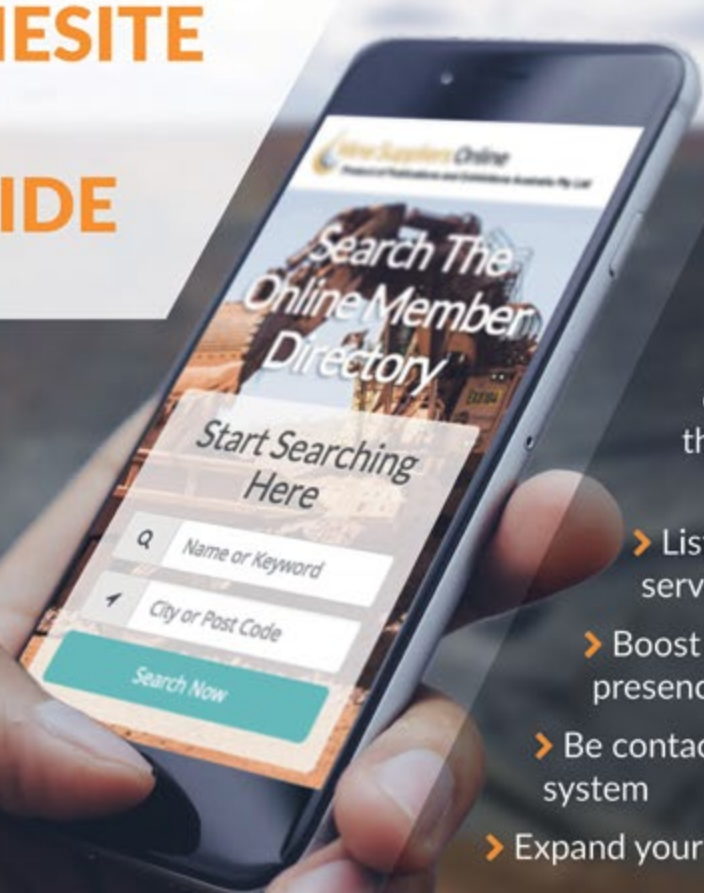
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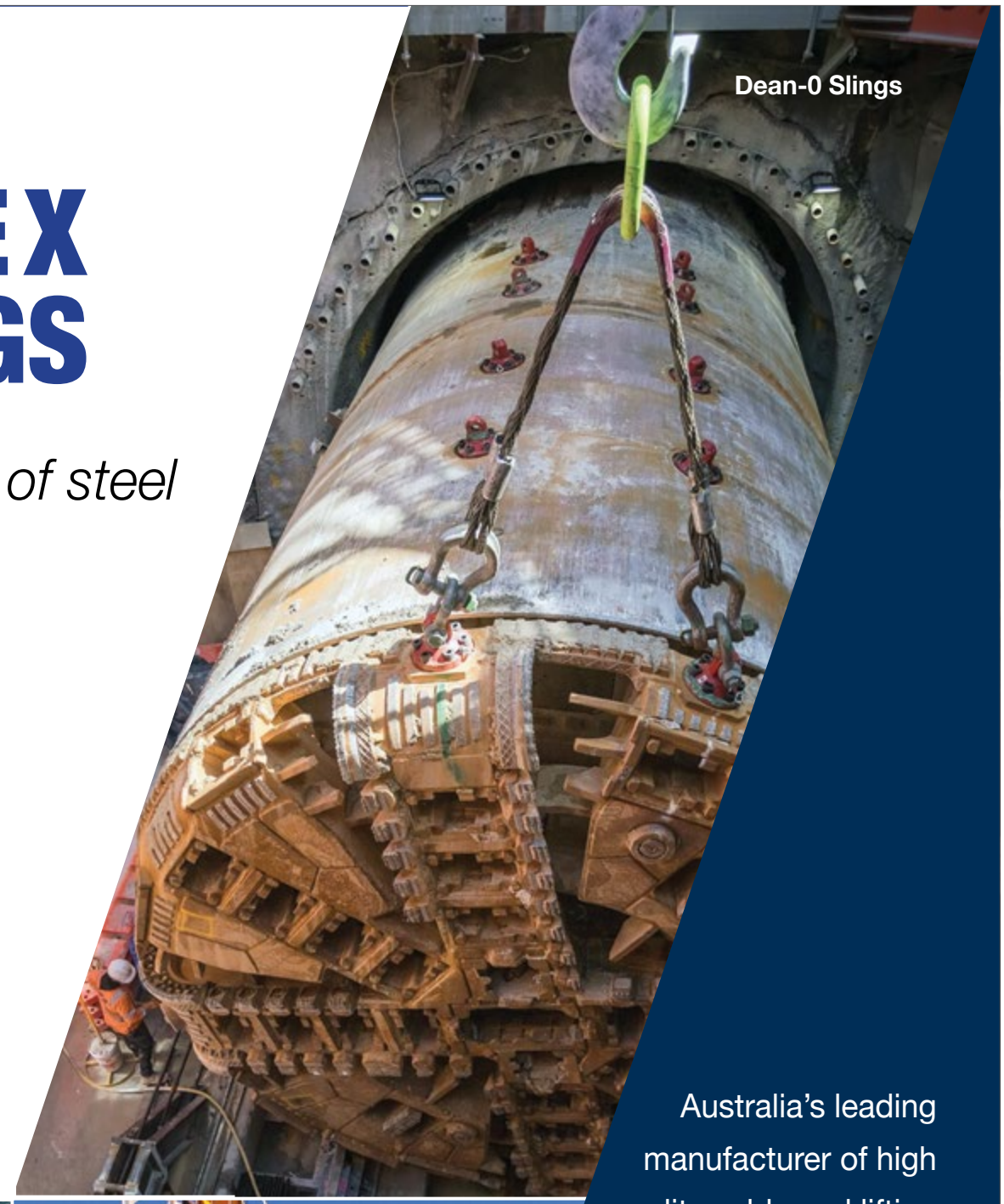
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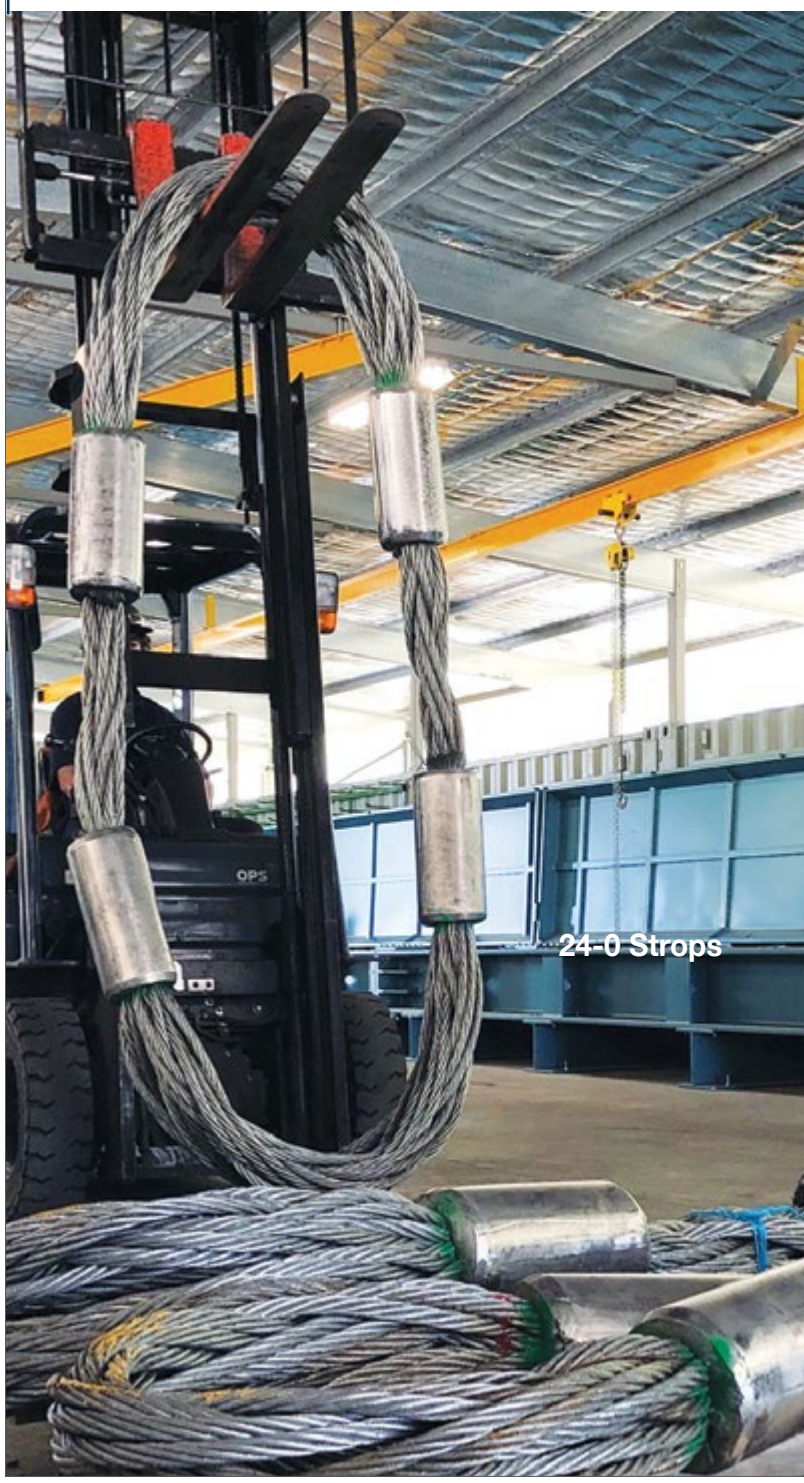
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