

THE AUSTRALIAN MINING REVIEW

PP100007123

OCTOBER 2019

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SURGE AFTER
SAUDI ATTACK**

AUSTRALIAN OIL
AND GAS REVIEW
INSIDE



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DOWNUNDER**

NEWS
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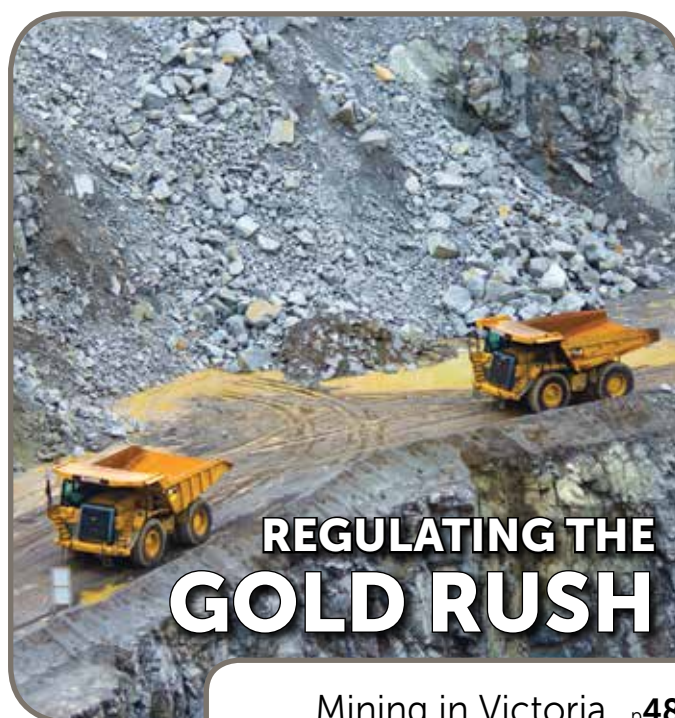
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PUBLISHED BY
ABN 28 112 572 433A product of
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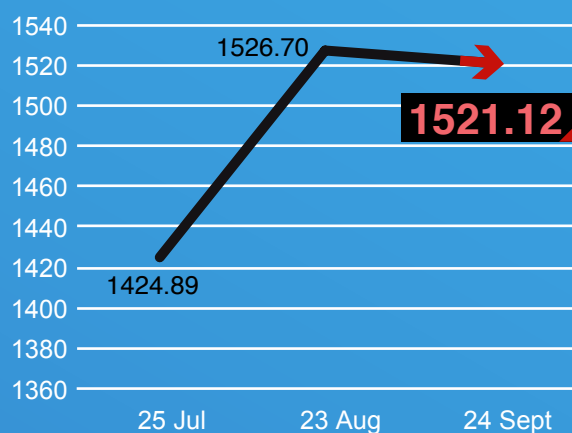
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MAJOR COMMODITIES SNAPSHOT

GOLD

\$US/oz

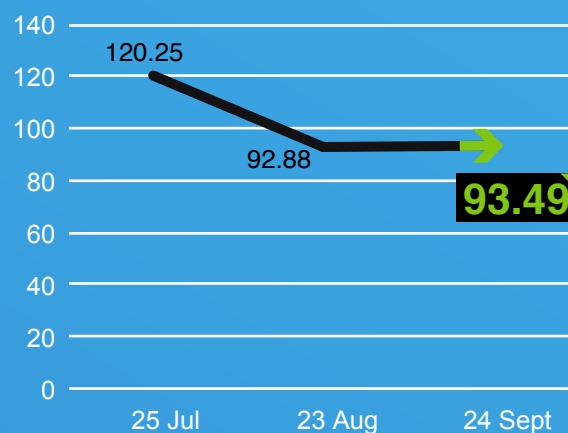
Gold prices remain strong amid global tension and poor markets, however gold producers remain cautious in overspending.



IRON ORE

\$US/t
62% Fe CFR China

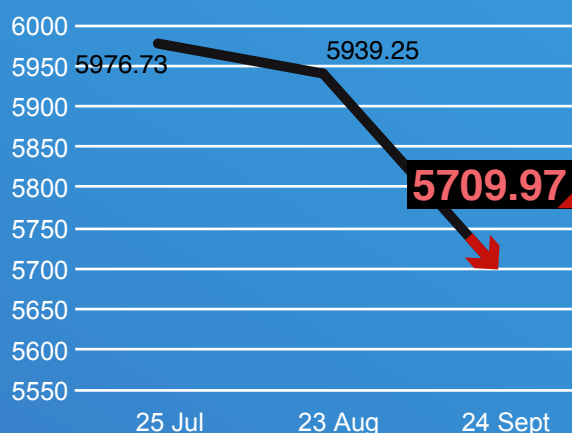
While still above the US\$80/t price we saw at the beginning of the price spike, iron ore made only a slight recovery.



COPPER

\$US/t
LME Price

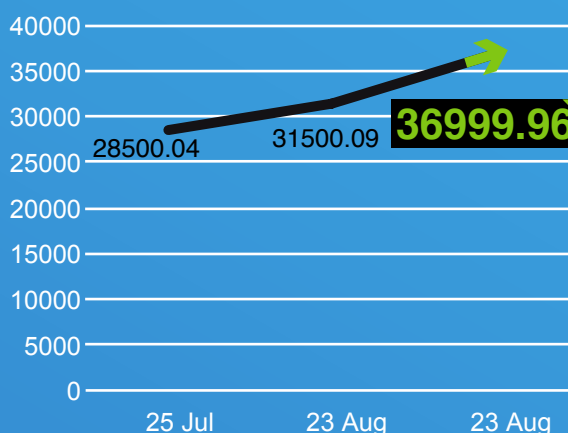
Copper has continued to bear the brunt of US and China tensions as prices continue to fall, even while demand is stable.



COBALT

\$US/t
LME Price

Cobalt prices surged again as the supply chain comes to terms with the closure of the Mutanda copper-cobalt mine in the DRC.



ALUMINIUM

\$US/t
LME Price

Aluminium dipped slightly and remain under pressure with trade tensions, however demand is rising, and is reflected in the price rise.



ZINC

\$US/t
LME Price

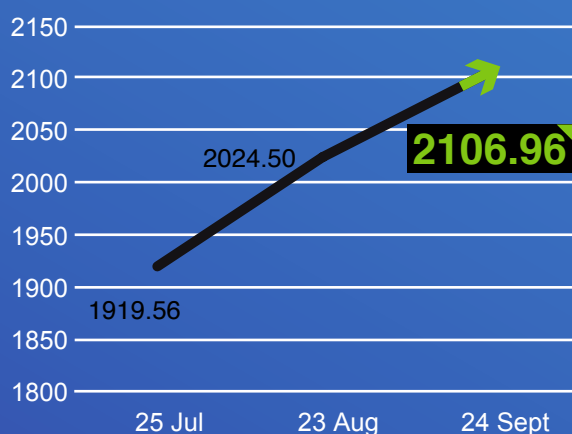
Although zinc made a slight comeback this month, the galvanising metal continues to stare into the bear pit as Chinese smelters remain under maintenance.



LEAD

\$US/t
LME Price

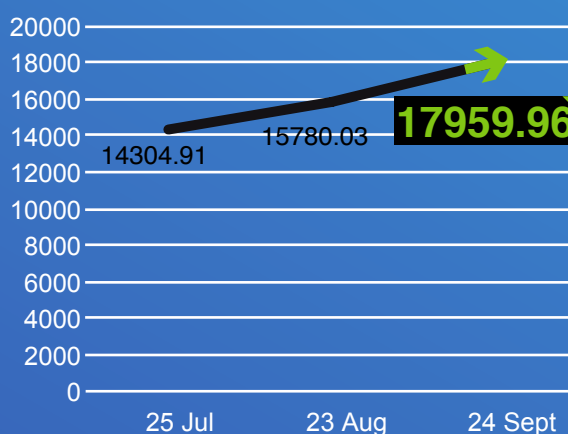
While existing lead stockpiles are adequately meeting supply deficits, lead has had another strong month with prices reaching their highest point since March.



NICKEL

\$US/t
LME Price

Nickel prices continue to climb as demand increased as a potential Indonesian ban on nickel ore export threatens to create supply deficit.



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IN BRIEF

Govt urged to consider nuclear

NATIONAL

THE Minerals Council of Australia has reasserted its call for the national nuclear energy prohibition to be lifted.

The mining group's recommendations are contained in a submission to a federal parliamentary inquiry launched by Energy and Emissions Reduction Minister Angus Taylor to investigate the potential for nuclear power in Australia.

The lobby organisation, 60pc of which is funded by giants BHP and Rio, argued that compact nuclear reactors could eventually provide the "cheapest zero-emissions 24/7 power" if they were rolled out to replace retiring coal-fired power stations.

Nuclear power is illegal in Australia, despite boasting the largest known uranium reserves, and the Labor opposition and green groups have vowed to resist any change.

The Council hopes that interest in small modular reactors could overcome political opposition to repealing the ban.

The group advocates replacing coal generators with the plants, which would complement electricity created by wind and solar, which are unpredictable and unreliable.

Chinese funds recharge for lithium miner

WA

CHINA'S largest lithium battery maker has acquired an 8.5pc stake in Pilbara Minerals, after a slump in prices drove the lithium producer to raise equity to fund working capital.

The move by Contemporary Amperex Technology (CATL) is part of a \$91.5m capital-raising, with the Chinese firm buying the stake in Pilbara through a \$55m placement.

Along with this and a potential \$20m from a share purchase plan, both at 30¢ a share — the CATL cash will bolster Pilbara's balance sheet amid a downturn in the lithium market that is squeezing suppliers.

Pilbara Minerals exports a lithium-rich spodumene concentrate. CATL has offered to buy excess concentrate that might be available if existing customers fail to meet their offtake commitments.

The lithium miner is believed to have had more than 50,000t of spodumene stockpiled at its Pilgangoora project at the close of June and Chinese chemical converters are understood to be holding twice their usual volumes of product, which will need to be used up before a lift in lithium prices is seen.

It has reportedly already dismissed workers at Pilgangoora as it waits for the inventories to run down.

Women in the workplace

EMMA DAVIES
WA

IMPROVING culture and conditions in the workplace was a central theme of the Women in Mining and Resources Summit held in Perth in August.

Organised by the Women Leaders Institute, in partnership with the Minerals Council of Australia, the event showcased women leaders in the industry, their experiences and suggestions on how to improve diversity in the workforce.

Creating a sense of value and belonging was a key theme by speakers, with BHP mining engineer Stacey Hannam stating that ensuring women received equal opportunities to grow and develop in mining and resources roles was one way of being inclusive in the workplace.

"In recruitment, have a look at job ads, to see what words we are using that are potentially gendered," she said.

Ms Hannam suggested taking job ads out to the team who the new employee would be working with to determine what skills were critical to the role.

"The reason I applied to work for BHP in the first place is because they used these strategies in the job advertisement for a mining engineer," she said.

"I'm not a mining engineer, I'm a chemist and I would never have applied for a mining engineer role if the job ad



FMG Linda O'Farrell spoke about ways to increase inclusion, retention and performance for women in the workplace.

said that a mining engineering degree was required.

"That's the only reason I had the confidence to go into a discipline that I wouldn't necessarily have considered before."

In her roundtable workshop on developing and maintaining a diverse workforce, UGL Aboriginal and Torres Strait Islander coordinator Gningala Yarran Mark noted that often mining companies would place lengthy job advertisements and applications in English — presenting a barrier to indigenous applicants.

Instead she suggested video

advertisements with an interpreter to explain the job requirements to applicants as a way to encourage Indigenous workers to apply.

Finding females for apprenticeships was an issue raised by FMG group manager Fortescue people Linda O'Farrell, who said the company had noticed that, while it was hard to recruit 17-year-old girls fresh out of high school to become boiler makers, existing female staff in other roles with other skills could be interested in further education.

Ms O'Farrell said that FMG needed to provide lifelong learning opportunities to see change and innovation in the business.

"If you've got women who are working on mine sites already who actually have a whole range of skills, why not offer apprenticeships to people a bit further down the line?" she said.

And then, once a more diverse workforce has been hired, there is the issue of retention.

FMG offers flexible working arrangements, casual child care and even residential child care support for staff in Port Hedland.

"I couldn't do my job unless I had the benefit of working in a company that basically focusses on what's important — which is outcomes — not whether you sitting at a particular desk at a particular time," Ms O'Farrell said.

"You're going to retain fantastic people if you allow flexibility."

BHP pushed on climate change

RAY CHAN
INTERNATIONAL

MINING titan BHP is being pressured by investors to suspend its memberships of business groups, including Australia's Minerals Council and Business Council, which have been accused by activists of undermining the Paris climate change goals.

Atlassian co-founder Mike Cannon-Brookes' private investing vehicle Grok Ventures, Vision Super, Denmark's MP Pension and the Church of England Pensions Board are among institutional who've backed a shareholder resolution filed by the Australasian Centre for Corporate Responsibility (ACCR) to be presented for a vote at BHP's annual general meeting.

In the resolution to be heard at BHP's annual meetings in London this month and Sydney in November, the group of shareholders praised the company's commitment to the goals of the Paris climate accord — reiterated in July by BHP chief executive Andrew Mackenzie — but recommended suspending their membership of the lobby groups.

ACCR director Brynn O'Brien said that as perhaps the most influential company in Australia, BHP's choice in directing shareholders' money on policy advocacy had real world impacts.

"We have met with BHP on multiple occasions and we have given them a long list of examples of adverse climate lobbying by their industry associations," Ms O'Brien said.

"The company does acknowledge that there is a serious issue but has been



Atlassian co-founder Mike Cannon-Brookes (left).

unable or unwilling to resolve it."

In his much-publicised speech in July, Mr Mackenzie said the world's dependence on fossil fuels posed an "existential" risk to the planet, with climate change escalating towards crisis point.

He pledged that BHP would extend its climate change policy to include monitoring and trying to influence its customers' carbon emissions, with executive remuneration linked to the success of greenhouse gas reduction.

But Mr Cannon-Brookes said until BHP stopped funding for coal lobbyists, critics would continue to be extremely sceptical of the company's environmental or green credentials.

Energy company Origin faced an investor rebellion last year when almost half of its shareholders backed a motion

asking it to review its membership of certain lobby groups, and establish criteria for continued support.

In a letter sent to investors last week, Business Council chief executive Jennifer Westacott stated that the group supported strong action on climate change, and sought to clarify the "misinformation" suggesting BCA was blocking meaningful action on climate change.

"If we are to finally achieve a durable climate policy, we must have an open and honest debate about the impact of the changes required to become a lower emissions economy," the letter said.

Backing Australia's 26-28pc emissions reduction target by 2030 under the Paris accord, the BCA said it supported a market-based price signal to limit carbon emissions.

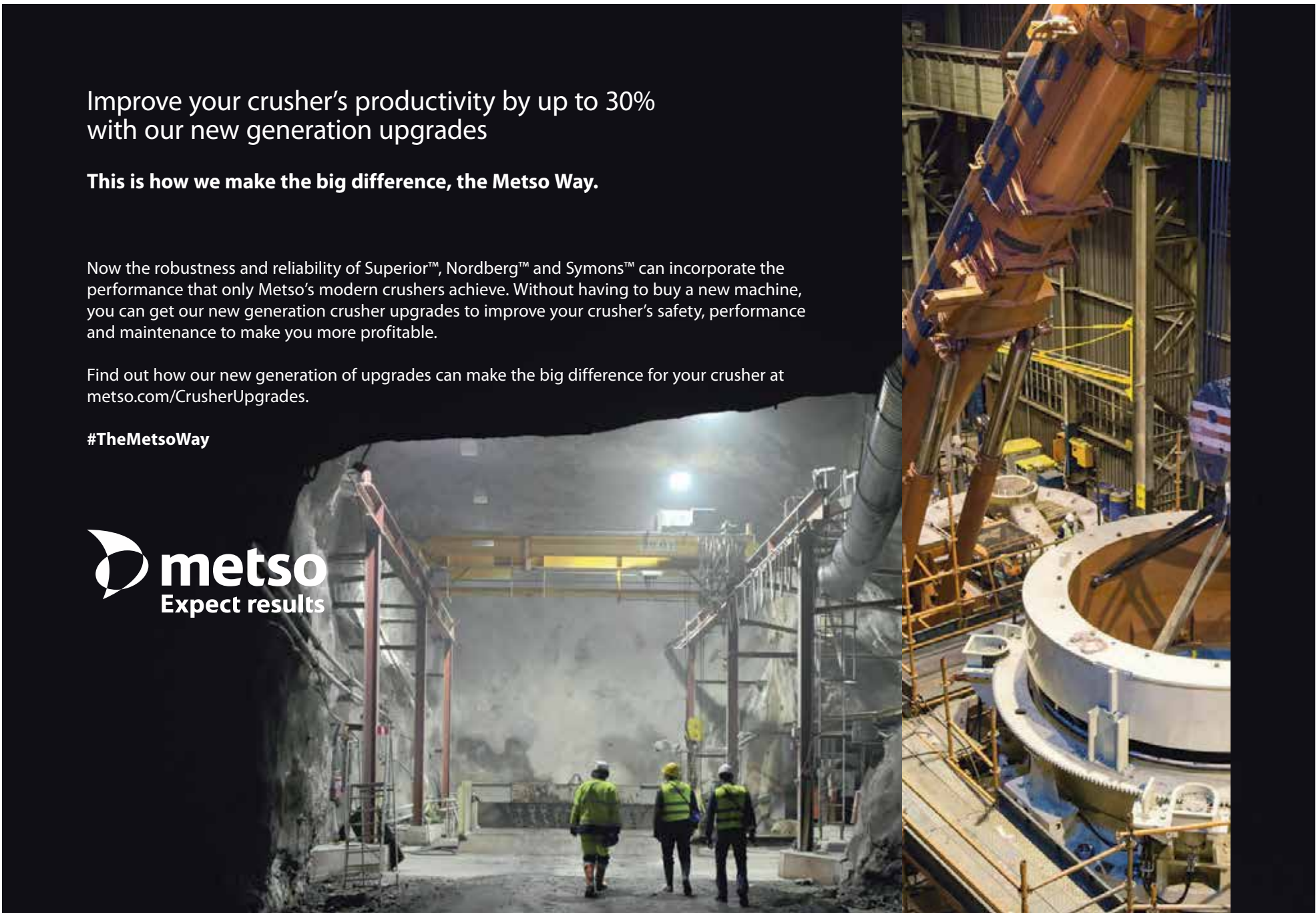
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Walkabout in no rush on graphite bids

RAY CHAN
WA

THE Australian company looking to build and operate the highest grade of graphite reserves in Africa says it will continue to carefully assess and not be rushed on all funding options for the base case US\$27.8m mine, due to considerable variance in the options available.

And Perth-based Walkabout Resources noted that of the past 12 months of funding negotiations for its Lindi Jumbo graphite project now under construction in Tanzania, some proposals submitted were little more than “low ball attempts to take over the company”.

Speaking at the Paydirt Africa Downunder conference, Walkabout director Andrew Cunningham said funding negotiations were continuing and had been enhanced by the binding and other offtake deals secured this year for Lindi, which included binding agreements covering the nameplate capacity of the processing plant of 40,000t of concentrate per year with partners Hong Kong’s Wogen Pacific, Shandong’s Qingdao Rising Dawn and Inner Mongolia’s Qianxin Graphite.

Non-binding agreements for additional offtake concentrate are still in play with customers in Germany, Shandong and Heilongjiang.

“Our shareholders want Lindi’s funding structure to be maximum debt with the Top 40 keen to participate where possible through private equity and debt arrangements,” Mr Cunningham said.

“Some potential financiers see the mine’s low capital cost of US\$30m as too little for them but are keen to look at something around the US\$50m requirement.

“This compares to the smaller potential funding players who can appreciate Lindi’s upside and have a reasonable approach to project risk – so we are just working through all of that.”

Site works for Lindi have commenced and long-lead items are being sourced for the 41.8Mt deposit with an estimated grade of 10.8pc TGC, including a super high grade core of 4.7Mt at 22.8pc TGC for 1.1Mt of contained graphite.

The deposit exhibits abundant large flake from surface and remains open along strike and down dip – a possible pointer, Mr Cunningham said, to future expansion potential.

Feasibility studies found Lindi would have a mine life of 24 years at a production rate of 40,000 tonnes of concentrate per year.

“This is a small, fit for purpose, simple operation that is low risk, low capex and opex and easy to manage,” Mr Cunningham said.

“Critically, Walkabout has continued to set and meet milestones despite a very competitive graphite marketplace globally.

This has driven the real offtake and funding interest from established producers, end-users and graphite marketers.

“However, the company in the past year has rejected at least three funding proposals that were nothing more than low-ball takeover attempts - but we continue to make significant progress in working through the funding options.”

Seize African opportunity

RAY CHAN
WA

AUSTRALIA has been urged to more rapidly take up economic opportunities in Africa beyond mining, as trade war impacts see China snaring the lion’s share of growth across the continent, particularly at the expense of the US.

The plea was issued by one of Australia’s most respected miners, Resolute Mining managing director John Welborn, whose company has been operating for more than 20 years in Africa and has gold mining operations in Mali, Ghana, and Senegal.

Speaking on the first day of the three-day Paydirt 2019 Africa Downunder mining conference in Perth, Mr Welborn said Australia understood current economic stimulus initiatives in the US, China, South East Asia and Europe.

“However, we often do not recognise just how big Africa is and therefore have failed to recognise the growth and partnership opportunities there – opportunities now being snapped up by China,” he said.

“The fundamentals tell the forward picture.

“The population demographics in Africa will be the largest in any area in the world between now and 2050.

“This is on the back of being a continent that has seen enormous change in recent years.

“Since 2000, half of the countries in the world with the highest annual growth rates have been in Africa.

“We are potentially missing what is happening around us.

“The Australian economy is focused on China and South East Asia and so is worried about China’s trade tensions with the US and emerging Pacific presence.

“Yet during the first 20 years of my life,



Resolute managing director John Welborn speaking at the conference.

Australia, both government and business, missed what was going in Asia – and faces making the same mistake with Africa currently.”

Mr Welborn said the reality was that while Australia had historically been a partner to Africa, the Australian economy was not focused on present and future developments in Africa’s population growth and economic stimulus.

“By 2050, one in every four humans in the world will be African and more than half of that African population by then will be middle and upper class,” he said.

“The explosion of middle class wealth in China is a key driver of the current Australian economy and we are facing a similar opportunity from the future explosion of middle class wealth in Africa.”

Mr Welborn warned such growth dynamics needed to be considered against the current backdrop of global trade tensions.

“Ten years ago, China and the US had equal levels of investment in Africa,” he said.

“Now China is three times that of the US and it has moved the majority of that investment from mining to infrastructure, construction and finished goods – and that is the lesson for Australia.

“Mining is often a great opportunity to establish infrastructure links and that is exactly the opportunity China is grasping in Africa – at the expense of Australia and the US.

“This opportunity is not just being seized by the Chinese government, but increasingly by Chinese private enterprise and small business.

“Australian businesses and investors, supported by the Australian Government, need to recognise this opportunity and join the African economic growth story – and do it now.”

Madagascar move for Base

RAY CHAN
WA

A PERTH company driving Africa’s mineral sands industry says it expects a Definitive Feasibility Study to be completed by December this year on proposals to expand its current output in Kenya.

The Base Resource DFS covers the proposed \$439m Stage 1 work on the Toliara mineral sands project in Madagascar, and at a deposit the miner describes as one of the best mineral sands development projects in the world.

Speaking at the Paydirt 2019 Africa Downunder mining conference, Base Resources managing director Tim Carstens said the planned expansion came at a time the company was experiencing high demand from its customers, and a tightening in supply generally in the market for mineral sands products.

“Following two years of pricing gains, demand stabilised in FY19 due to global trade tensions and economic uncertainty,” Mr Carstens said.

“Current zircon supply is tightly managed by major producers, and this is providing a solid foundation for ongoing market stability – but longer term supply remains constrained.

“Even demand for Base Resources’ zircon from current customers exceeds



WA Premier Mark McGowan formally opened the conference. He said WA served as Australia’s gateway to Africa, not simply because of geographical proximity, but through an already developed relationship that was stronger links with the east coast.

our ability to supply all of it.”

The market dynamics come after a strong year’s performance by Base Resources at its Kwale mine in Kenya

in which it recorded favourable prices (28pc higher for zircon), higher output and a lift in full year profits.

The company is currently expanding its future mining resource and capability at its Kenyan operations.

But it is in Madagascar that Base is looking to add a second long life production stream with the DFS now underway.

“We are currently establishing early capability and capacity building programs at Toliara, advancing land acquisition and initiating the debt funding process,” Mr Carstens said.

“This is a truly world-class mineral sands development project with a long mine life.”

Situated 40km north of the southwest regional town and port of Toliara, the site is underpinned by the large, high grade Ranobe deposit, containing a JORC 2012 compliant Mineral Resource of 1,293Mt at 5.1pc heavy mineral (HM), with 794Mt at 5.8pc HM in the Measured and Indicated categories.

Mr Carstens says this is sufficient to support a 40-plus year mine life at a scale similar to the company’s Kwale operations in Kenya.

Base is targeting a Toliara final investment decision in 2020 for a planned start-up in 2022.

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The Mines and Petroleum Minister of Mali, Madame Lelenta Hawa Baba Ba, spoke about opportunities to invest in Mali's mining sector, the challenges and keys to success.

Understand the African way of life

RAY CHAN
WA

AUSTRALIAN miners operating in Africa have been warned about the importance of social governance when engaging with local communities on local exploration and mine development approvals and economic opportunities.

Gilbert + Tobin Lawyers energy and resources partner Phil Edmands told the conference that, across a continent which had suffered the deep-rooted and negative impacts of historic colonial settlement, modern day social governance now needed to be part of the DNA of the investing company, not a condescending annoyance.

"The most precious commodity for resource investors in Africa is certainty, which helps insulate against overreach in changes to African regulatory and fiscal regimes where that doesn't occur," Mr Edmands said.

"The skillsets necessary for social governance in a country which still struggles from a lack of local capital formation and development, requires an understanding by Australian participants of Africa's history, the indelible stain of colonialism and pre-existing attitudes that African peoples were 'inferior and would benefit from civilising'.

"Africa has also had to manage global reaction to its long fight for economic independence; and this has seen the continent pilloried in Western media for failed attempts at such desires for nothing more than wanting their own people to actually fairly share in the riches of African lands."

Getting the balance right should include recognising and valuing the major differences between Western and African cultures. Mr Edmands said these included:

- The concept of land – as a generalisation, Western societies did not have the same concept of land as part of soul and identity
- African cultures are much more people-based
- Western culture is about right and wrong – a danger for foreign investors is assuming their ideas are right and they just have to convince counterparties why
- There are generally many paths and not everything is reducible to an economic or mathematical formula. There's a need to appreciate the wisdom of other cultures
- Acknowledgement of unconscious bias: colonial powers considered Africans inferior, so it didn't occur to them to consider the ethics of their treatment of Africans although the world has moved on since then
- Unless miners truly accepted African people as equal, they cannot fully engage with them.

Inconsistent costs in gold sector

RAY CHAN
WA

THE world's gold sector has been called to account for fostering potentially misleading and inconsistent reporting of its actual cost structure – with suggestions actual costs may be higher than those being publicly declared.

The concern has been voiced by one of gold's most respected international players, Gold Fields Ltd chief executive Nick Holland.

The company is a global gold major with four mines in WA, as well as numerous gold mines and development projects in Peru, Chile, Ghana and South Africa.

Mr Holland told delegates at the Paydirt conference that potential under-reporting was occurring in the context of a gold industry that generally was under-capitalised.

"We face a situation where gold miners have not been spending enough capital to sustain production, let alone grow production," Mr Holland said.

"Any growth capital people speak about is in fact largely sustaining capital

"On the face of it, cost performance of the gold industry has been good – but this has been at the expense of sustainability of production.

"The cost to sustain production is increasing. The industry is mining more tonnes at lower grade to maintain ounces. Therefore, replacement is becoming more expensive as miners are having to go deeper to extract lower grade gold ore from more complex geological structures.



Gold Fields chief executive Nick Holland.

"More complex geology simply means higher processing costs, lower recoveries and harder rock."

Mr Holland also questioned the merit of consolidation – with "big bang mergers" simply resulting in assets being recycled and rebadged.

"Consolidation does not address the undercapitalisation of the world's gold industry," Mr Holland said.

"In 2013, the World Gold Council (WGC) defined the true cost metrics under the All In Sustaining Cost (AISC) protocols and also defined non-sustaining costs.

"Between 2012-2016, AISC cost trends

per US\$/oz decreased at a rate of just under 7pc per year, but increased from 2017 onwards within an environment where there was a notable decrease in sustaining capital from US\$313/oz in 2012, to US\$166 in 2016 – a level maintained since.

"Gold exploration budgets were also slashed with the bulk of such exploration over the past five years being brownfields projects and near-mine development.

"At the same time, growth in global mine supply slowed significantly, increasing only 1.8pc in 2018 compared to 6.2pc in 2013."

Mr Holland said about 30pc of global gold reserves are currently associated with assets where a construction decision is yet to be made.

"It questions whether the gold industry is telling its full cost story," Mr Holland said.

"Last year, some AISC reports by the industry excluded some capital and exploration costs that should have been included as per the 2013 World Gold Council guidelines.

"The amount of capital and exploration excluded in the reported AISC has been increasing over the past five years at a level equivalent to around US\$30/oz.

"Despite the obvious slowdown in production, expenditure classified by the industry as 'growth' or 'non-sustaining', has increased significantly.

"Growth capital is therefore not really growth as the industry is not significantly increasing production, especially not the majors."

Awards for African initiatives

RAY CHAN
WA

SYRAH Resources and Resolute Mining have been named as the winners of the inaugural Australia-Africa Minerals and Energy Group (AAMEG) Awards.

Presented as part of the Paydirt conference, the initiative recognises and promotes the leadership and innovation demonstrated by Australian companies operating in Africa in the areas of capacity building and workforce development.

AAMEG Vice-Chair and awards judge Ben Gargett said the awards set the benchmark for Australian mining companies delivering projects that have sustainable and tangible benefits to local African communities.

Syrah Resources Limited took out the award for 'Best Innovation in Corporate Social Development' for its Balama Professional Training Centre project, located in Cabo Delgado, Mozambique.

The project has in the past four years mobilised and trained a workforce of close to 1000 employees in Mozambique, of which 55pc reside in the local host communities, 96pc are Mozambican nationals, and over 20pc female.

University of WA regional development co-director and awards judge Fiona Haslem-McKenzie said that Syrah Resources showed exceptional dedication to upskilling members of the local community and their commitment to retaining this workforce was providing long-term, local economic advantage.

These achievements aligned closely with the awards' efforts to recognise success in building local resilience and capacity building.



Resolute managing director John Welborn and AAMEG CEO William Witham with the "Best Workforce and Industry Development Initiative" award for Resolute's Malian Talent Development Program in south Mali.

Resolute Mining walked away winning 'Best Workforce and Industry Development Initiative' for its Malian Talent Development Program, situated in south Mali.

This project utilises the latest underground remote operation technology and has recruited a significant number of senior school students to participate in a three-year apprenticeship program, which currently has eight apprentices.

Final year students are given the opportunity to undertake an internship program, and college students are accepted for vocational training, the top student receiving a yearly bursary scheme to study at an Australian university.

African Dream Foundation founder and award judge Fadzai Matambanadzo said the award was based on the Resolute's leadership and extraordinary

efforts to proactively hire, recruit and train a local and diverse workforce at its Syama underground gold mine - one of the most sophisticated and advanced gold mines in Africa and in the world.

Base Resources was recognised as a Highly Commended entrant in the 'Best Workforce and Industry Development' category for its efforts in developing Kenya's mining workforce through its Kwale Operation in Kenya.

Proving highly effective, the innovative "Fencing System" has recruited a 70pc local workforce, employing more than 1100 employees from the surrounding Kwale County, and a further 28pc from wider Kenya.

To learn more about the awards and winners visit: <https://aameg.org/aameg-africa-awards/>

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Cash injection for Cue project

RAY CHAN
WA

EVOLUTION Mining has entered into an earn-in joint venture agreement with Musgrave Minerals over the Cue Project in the Murchison Province of central WA.

Located about 50km south of Evolution's Murchison joint venture, it hosts a gold endowment in excess of 30m ounces and is prospective for Archaean greenstone gold deposits.

The Cue joint venture covers a prospective mineralised trend, extending from Musgrave's Lena and Break of Day resources to the south.

The prospectivity of these tenements is demonstrated by drilling results previously released by Musgrave in December 2018, which included several promising yields.

Under the agreement, Musgrave will retain 100pc ownership of areas



Evolution Mining has entered into an agreement with Musgrave Minerals over the Cue Project.

surrounding the Lena and Break of Day resources, and the Mainland Option area.

Evolution will subscribe for

18.6m shares of Musgrave for a cash consideration of \$1.5m.

Subject to a decision to mine, Musgrave

may elect for Evolution to fund its share of development costs, repayable with interest from commercial production.

Evolution can also earn a 75pc interest in the joint venture area by sole funding \$18m over five years with a minimum expenditure of \$4m to be completed in the first two years.

If Evolution does not spend the entire \$18m within five years, Musgrave will retain full ownership.

The completion of the transaction remains subject to standard regulatory conditions.

Evolution Discovery and Business Development deputy president Glen Masterman said the project had the ability to generate new drill results that extend previously identified mineralised zones.

"The agreement is consistent with our strategy of focusing on orogenic and epithermal deposit styles that can create value through future discovery," he said.

New Hope mine hopes for the best

RAY CHAN
QLD

THE New Acland open cut coal mine has made 150 workers redundant as its stage three project continues to be in abeyance pending final approvals.

One-on-one meetings were held with mine operators as they came off shift.

New Acland general manager Dave O'Dwyer said the news had been extremely tough, particularly for the affected workers and their families.

"The redundancies have also taken a huge toll on those remaining at New Acland," he said.

"Specialists, including counsellors, have been supporting the entire workforce through this extremely difficult time.

"The safety of the New Acland workforce has always been my number one priority, and that will continue, despite the difficult circumstances."

Mr O'Dwyer put the blame on the indecision of the Queensland Premier Anastacia Palaszczuk and Natural Resources, Mines and Energy Minister Anthony Lynham.

"The Premier and Mr Lynham could have ended the uncertainty and approved New Acland stage three, and helped New Acland provide long term certainty to its employees, suppliers and the local community," he said.

The mine, run by The New Hope Group, has been a major employer and economic spur to the Darling Downs region.

New Hope said the company remained focussed on securing all necessary approvals for Acland stage three to target continuity of operations and employment for the workforce and contractors who rely upon the operation to support their families.

The redundancies come in the wake of 2019 financial year results which showing the company had achieved a record full-year profit.

21,000 new workers needed



Australia's mining industry will demand about 21,000 new on-site operational employees by 2024,

RAY CHAN
NATIONAL

A NEW report claims the Australian mining industry will require about 21,000 new on-site operational employees by 2024 in order to meet the demand for mining projects.

The 2019-2024 Mining Workforce paper released by the Australian Resources and Energy Group, AMMA, found that 57 projects worth \$41b, which have either been committed or considered likely by the Australian Department of Industry, will need 20,767 on-site operating employees by 2024.

The forecast occupational breakdown includes 8660 mining plant operators, 2847 heavy diesel fitters and 4180 engineers, technicians, geologists and various related roles.

AMMA chief executive Steve Knott said understanding future workforce demand was critical to assisting industry with workforce planning strategies, and to assist government in directing skills and labour mobility initiatives.

"Australia's mining industry is facing

new workforce demand at levels not seen since the previous investment and construction 'boom'," he said.

"While demand across the next four years will be far steadier than the unprecedented growth we saw in 2005-2012, it is clear that securing the pipeline of skills to support mining project growth to 2024 will be a significant challenge.

"This challenge must be met head-on, collaboratively, by industry and government.

"Employers, peak industry bodies and state and federal governments are united in our desire to be well prepared for the workforce demands of this next phase of industry growth.

"We must avoid a scenario where nationally significant mining projects are delayed by skills shortages, or competing for engineers, trades and skilled operators with the \$100b worth of public infrastructure projects reportedly in Australia's pipeline."

State-by-state analysis shows Western Australia will have the greatest new mining workforce demand, with 30 projects requiring 10,679 operational employees by 2024.

Iron ore accounts for 29pc of this forecast growth, with lithium, gold and copper also strongly represented.

Queensland will require 5714 new mining employees, driven by a number of large coal projects coming online over the next four years.

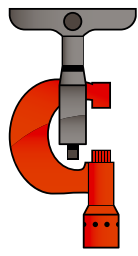
Importantly, AMMA's report does not factor in the 153 prospective mining projects considered by the Department of Industry as 'possible' to proceed over this timeframe.

"AMMA was determined for this forecast to be highly conservative," Mr Knott said.

"We have put forward the minimum likely number of new on-site workers our industry will demand over the next four years, based on projects already committed or very advanced in feasibility studies.

"This conservative approach also factors in automation, remote operating centres, closure of ageing mining projects and other factors that could impact workforce availability in the near future.

"Should a number of projects considered 'possible' in the mining project pipeline become committed, AMMA's forecasted new workforce demand of 21,000 by 2024 could be exceeded very significantly."



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IN BRIEF

Project boost
for vanadium
and Beyondie

WA

THE Federal Government has granted Major Project Status to two projects that will create more than 700 jobs in the Pilbara.

The Australian Vanadium Project (AVP) will develop an open pit mine and plant to convert vanadium into specialty steel alloys and energy storing batteries.

The Beyondie Project will establish the nation's first commercial supply of the premium fertiliser Sulphate of Potash, which farmers are currently having to import.

It will create up to 80 jobs during construction and employ around 50 full-time workers over the 30-year life of the mine.

It will also bring important infrastructure to the regional community, with the construction of an airstrip, upgraded roads, improved communications and a 78km gas pipeline.

Resources and Northern Australia Minister Matt Canavan said the AVP aligned with the Government's strategy to position Australia as a critical minerals powerhouse

"Vanadium is on the critical minerals list for Australia and the US, which means there is a market there for this globally significant resource," he said.

"This Australia-first project has also been backed through a \$74m loan through the Northern Australia Infrastructure Facility (NAIF)."

First production from Beyondie is expected in 2020, and in 2022 for the AVP.

Safety reset
almost done

QLD

OFFICIAL figures have shown that 96pc of workers in Queensland's resources and quarry sectors have completed safety resets.

The procedure had been put in place after a spate of mining fatalities in the state in the past year.

Queensland Resources Council (QRC) chief executive Ian Macfarlane said the resources industry had been fully engaged in the reset process, underscoring the sector's commitment to safety for all workers.

There have also been occasions where the resets have identified external issues that could improve safety, for example upgrading roads near mine sites.

Mr Macfarlane also said that QRC supported the two independent reviews commissioned by the Queensland Government, which are due to report back by the end of the year.

The reviews will focus on why mine and quarry workers have died over the past 20 years, how industry can improve, and how the mines inspectorate can work better.

Mothballs for Bald Hill



The processing plant at the Bald Hill lithium mine.

RAY CHAN

WA

THE Bald Hill lithium mine is set to be placed into care and maintenance after owner and lithium producer Alita Resources entered into voluntary administration.

After its directors decided the group of companies was insolvent or likely to become insolvent in the future, Alita appointed KordaMentha as the administrator for the company and its five subsidiaries: Alliance Mineral Assets Exploration, Tawana Resources, Lithco No. 2, Tawana Gold and Waba Holdings.

The company had been negotiating the terms of a potentially viable restructure

proposal from a consortium of unsecured creditors, existing shareholders and new investors, in conjunction with its new unsecured lender.

The move comes after ASX-listed Galaxy Resources gained effective control of the company by purchasing a US\$28.8m debt exposure to its troubled smaller peer.

Galaxy bought the debt from a group of lenders led by fund manager Tribeca Investment Partners, making Galaxy a secured lender to Alita as well as its largest equity holder.

KordaMentha stated it would shortly meet with key stakeholders to reduce the "ongoing monthly cash burn" at the Alita Group's operations.

Alita owns the Bald Hill lithium and

tantalum mine in Kambalda, WA, and has a 15pc interest in the Cowan lithium project adjacent to Bald Hill.

The Bald Hill hard rock lithium operation, which entered commercial lithium concentrate production in 2018, boasts a top quality +1mm spodumene concentrate (low mica, low iron) and a significant tantalum by-product production.

It is understood Alita also owes money to the Primero Group, which had been engaged to complete the design, procurement, construction and operation of the dense media separation circuit at Bald Hill.

Alita's receivership is in the wake of an oversupplied global lithium market, which has left Australia's miners feeling the pinch.

Northern Star eclipses Echo

RAY CHAN

WA

ECHO Resources has been taken over by its former largest shareholder, Northern Star (NST).

Under the bidding implementation agreement, NST acquired all of the issued and outstanding ordinary shares in Echo that it did not already own under the terms of an off-market takeover bid.

The move values Echo at \$242.6m, with Echo shareholders receiving 33c for every share held, representing almost a 40pc premium to the company's August trading price of 23c.

Echo Resources chief executive Victor Rajasooriar said that the board was pleased to accept the offer in the absence of a superior proposal, and that the offer reflected the strategic nature of Echo's Yandal gold project.

NST is continuing its heavy growth strategy investment after posting underlying NPAT of \$179.2m for the June year (FY19), down from its \$211.5m profit a year earlier but incorporating its \$50m acquisition of the Pogo gold mine in Alaska, USA.

NST is a Perth-based international miner, gold producer and explorer in the Ashburton, Pilbara, Murchison and Kimberley regions of WA, whole Echo



The Orelia open pit at the historic Bronzewing mine, part of the Yandal gold project. Image: Echo Resources

is a Perth-based company focused on exploration tenements in the Yandal gold project, which encompasses 1600sqkm in WA's Yandal greenstone belt about 400km north of Kalgoorlie.

In late June, Echo released an updated resource for the project with global resources for Yandal totalling 28.6mt at 2g/t gold for 1.8moz.

A bankable feasibility study was unveiled in April revealing pre-production capital expenditure of \$42m to build an initial four-year operation producing 95,000oz gold a year for pre-tax project free cash flow of \$225m – a figure

expected to be much higher now with soaring gold prices.

The project also hosts the historic Bronzewing mine and associated infrastructure, including an 1.8mt per annum processing plant.

Northern Star aims to consolidate the Yandal gold project and secure the plant.

Its Jundee mine is also located at Yandal, and combined with Pogo and its Kalgoorlie operations, the company expects to produce up to 900,000oz in 2020.

Echo shareholders have been urged to accept the unconditional offer promptly.

Burns hire and sale specialists

NATIONAL

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THE RIPPLE EFFECT

Since Glencore announced intentions to close its Mutanda Mine in the Democratic Republic of the Congo (DRC) by the end of 2019, cobalt prices have started to rise – but while the existing stockpile should meet demand next year, supply out of the DRC is anything but certain going forward.



Image Glencore.

Glencore intends to close its Mutanda mine in the DRC by the end of 2019.

EMMA DAVIES

ON August 7 this year, Glencore announced its plans to close the Mutanda mine, citing reduced economic viability and the low prices as the main drivers behind the decision.

Glencore chief executive officer Ivan Glasenberg said the company had planned to transition the Mutanda operation to temporary care and maintenance by year end, “reflecting its reduced economic viability in the current market environment, primarily in response to low cobalt prices”.

According to Benchmark Mineral Intelligence analyst Caspar Rawles, the announcement actually had a ripple effect in the market, which had experienced a downward trend from the first quarter 2018 through to the beginning of August 2019 (when Glencore released its half year report), mainly due to fears over oversupply.

“We saw some big supply commitments from incumbent producers in the DRC, and when all of those numbers came together, it became quite evident that there was a concern around security of supply for cobalt and that drove the downward market,” Mr Rawles said.

“In August 2019, the market turned, and prices started to rise again.”

It’s worth noting that the Mutanda mine is the world’s largest cobalt mine (by production) sitting at about 20pc of global production – or enough cobalt for 2.5 million EVs with today’s technology.

“Now they cited the low cobalt price and increased operating costs as the main drivers – particularly sulphuric acid which they need a lot of to operate that mine – but they left a five month window between the announcement and planned closure by the end of this year which could mean that they could reverse the decision,” Mr Rawles said.



The Katanga mine is still operational but the company is working around issues with uranium at the site.

“But it seems very likely that it’s going ahead, and information I have suggests that they are already ramping down production and getting rid of some of the expat workers.”

Glencore also has another DRC operation – Katanga Mining – which while still operational, has some issues with uranium at the mine.

“They need to install some equipment to remove that uranium before they can begin to export cobalt from there,” Mr Rawles said.

“That was due to be installed and commissioned by the end of this year, but they announced that it wouldn’t be ready until at least 2020.

“So that means they’re expecting to have no production from both mines during the first six months of next year – so they’ll be reducing their stockpiles.”

This means the stockpiles accumulated

over 2018 and 2019 have been key in driving the downward trend in prices and starting to reverse and rebalance the market.

“We expect the mine to be closed for about two years and over that time the demand will grow enough that switching it back on won’t then flood the market,” Mr Rawles said.

Ongoing impacts

Prior to Glencore’s announcement and with low prices, Benchmark didn’t expect any new projects to coming online to get financed, and Mr Rawles believed that the cobalt market would be over supplied until 2022 or possibly 2023.

“Following the Glencore announcement that picture changed, taking that 25,000t of material out of the market for two years,” Mr Rawles said.

“It looks as though next year we’re going to be in a big deficit but there are big

stockpiles, so I don’t think that’s going to be the case,” he said.

“We think in 2020 the market will be supplied with ongoing production and stockpiled material, but from 2021 onwards there’s a question about how well supplied the market will be.

“Obviously prices will react as a result and the only other unknown factor is how quickly other DRC operators can respond but there have been problems with that.”

Eurasian Resources Group (ERG) is one company currently ramping an operation to pump tailings from a conventional dam which has been dumped as a result of historic mining, but Mr Rawles said it had operational problems and hasn’t performed as well as expected this year.

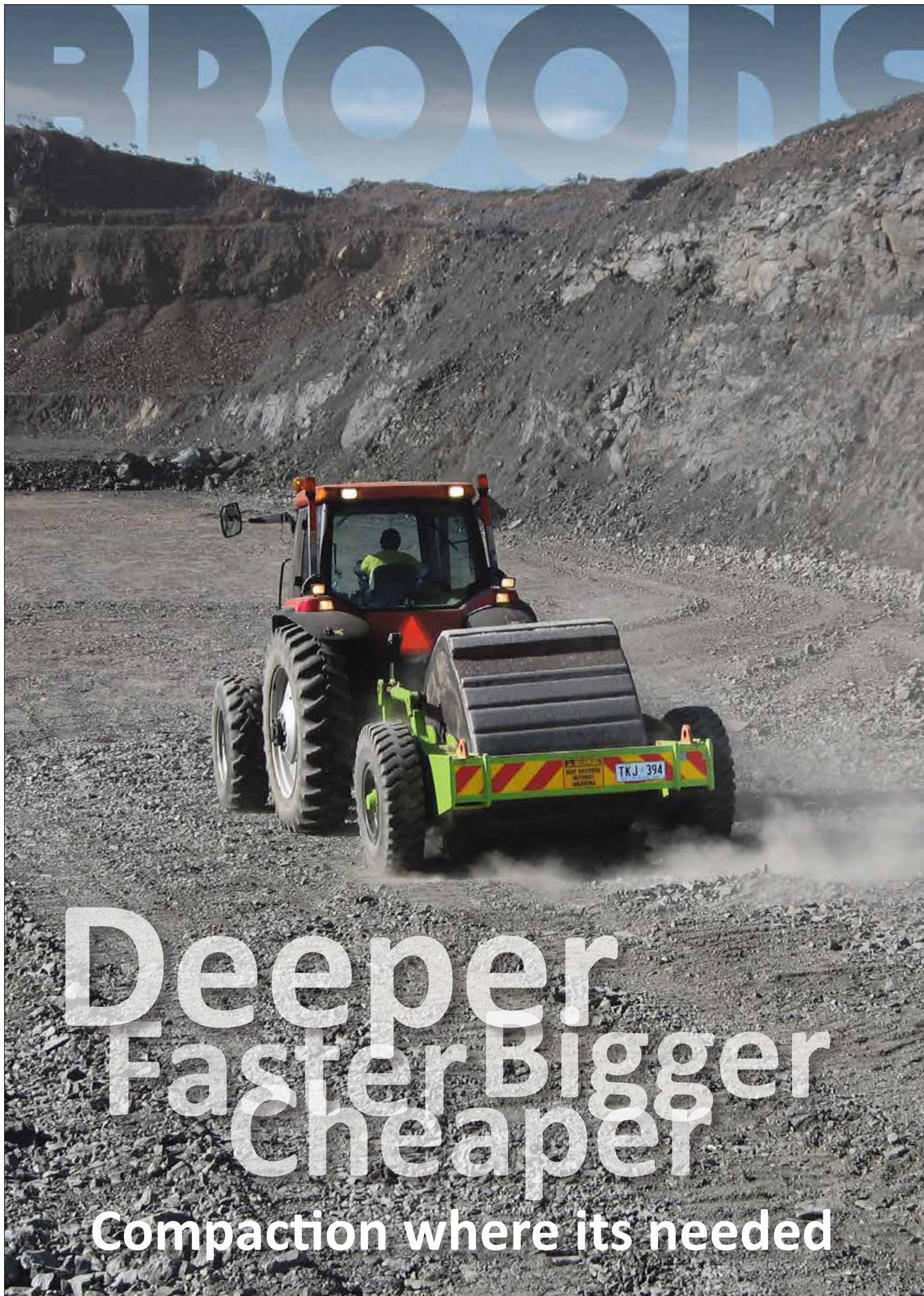
“There’s another company called Schema, who are building a new cobalt hydroxide refinery in the DRC which was expected to come online this year but now that’s looking like that won’t be online until 2021,” Mr Rawles said.

“So, DRC supply is anything but certain going forwards - which has a big impact on sentiment with producers.”

Mr Rawles said noted that, prior to the Glencore announcement, large downstream buyers in negotiations for next year’s annual supply contracts for cobalt felt they had a good chance of getting fixed payables on their supply deals for cobalt hydroxide, or even in some cases a fixed price.

“They’ve now said they don’t think that will be the case and producers have already asked for more favourable terms in their contracts,” he said.

“So, it’s looking like we’re going to have a higher priced environment going in to 2020.”



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Whitehaven Coal will transition from five mines producing about 23mtpa to four mines producing 40mt over the next decade.

GERARD MCARTNEY

WHITEHAVEN Coal has reported a record year amid falling coal prices, and has released its strategy to face climate change head on.

The company reported a record net profit after tax before significant items of \$564.9m, which put it up 8pc from FY18.

This improved the total cash generated to \$964.1m, and reduced net debt to \$161m at June 30.

ROM coal production was up 4pc on 2018 to 18.4mt, and both the Narrabri and Maules Creek mines' strong finish to the year enabled the company to exceed production guidance.

It reported an underlying net profit after tax of \$564.9m and produced 23.2mt of ROM coal.

This allowed it to declare 50c per share dividend for the year and payed out dividends equivalent to 88pc NPAT.

Whitehaven Coal chief executive Paul Flynn said that he was excited about the company's outlook and was looking to transform the business to almost double the production capacity.

"We are in the middle of a significant transition," he said.

"This includes moving from operating five mines that produce about 23mt of coal annually to four major mines that will produce around 40mt within the next decade."

Maules Creek

Production of ROM coal increased from 11mt to 11.7mt in FY2019, while the saleable production of coal was down from 9664mt to 9200mt.

The company said that this was reflective of the phasing of ROM coal production toward the backend of FY19, accompanied by a yield loss associated with the production of higher quality thermal coal.

"Management remains focussed on continuing to expand the open cut pit at Maules Creek to facilitate optimised mining conditions for the long term," the company said.

"This phase of the mine's life is characterised by out of pit dumping and a resulting increase in haul distances and haul elevation.

"These activities will underpin the continued expansion in ROM production towards the approved level of 13mt per annum and importantly facilitate the consistent delivery of this production over the course of each year."

Narrabri

Whitehaven's 70pc-owned JV with J-Power, EDF Trading, Upper Horn Investments Limited, Daewoo International Corporation and Korea Resources Corporation – all 7.5pc owners – increased marginally in its ROM coal production from 6.3mt to 6.4mt.

A strong June quarter allowed the mine to surpass full-year production, which the company said "was encouraging given the longwall negotiated an extensive fault zone during this period".

The company said that the impact of the depth of cover was fully felt at the mine in the group results of FY19, and that deeper work not only impacted the development and longwall production rates, it also required higher primary and secondary support intensity.

However, the company says that toward the end of FY19 production was strong, and that strategies employed over the past two years were reaping the benefits.

In the December quarter of 2019, Whitehaven will install a new, larger capacity set of hydraulic cylinders to further increase the strength of the longwall face support.

Tarrawonga, Werris Creek, Rocglen and Sunnyside

In line with planned production, FY19 production was lower than FY18 for the year at 5mt ROM coal production.

The board approved the expansion of Tarrawonga which it hopes will increase ROM production in 2020 to 3mtpa.

This expansion will require a larger and more efficient mining fleet that the company says will be funded via asset financing facilities.

Sunnyside is being rehabilitated, and after the reserves at Rocglen were completely mined in FY19, it too entered the rehabilitation phase.

Producing coal for a low carbon world

As the world gradually shifts toward a low-carbon economy in order to stop the planet warming by two degrees, mining companies are embracing corporate responsibilities that ethically minded investors demand from them.

Addressing climate change in its sustainability report, Whitehaven Coal said that it would thrive under almost any policy mix introduced to combat climate change, and that Australian coal would be strong into 2040, regardless of how governments across the world respond.

Whitehaven Coal formally acknowledged that the production and consumption of coal contributes to greenhouse gas emission, and said that it was a central challenge when considering the international supply of cheap energy to emerging nations.

"Limiting global temperature rises from climate change requires reduction in global CO2 emissions," the report said.

"But achieving emissions reductions while maintaining a reliable energy supply poses some significant challenges."

The company said that it is well positioned to leverage what it perceives as economic benefits of climate change, and that key to maximising profits is the "growing market demand for high-quality Australian coal in a more carbon-constrained world".

"Whitehaven considers an effective and enduring response to climate change should contemplate a range of complementary measures to support the transition to a lower-carbon future.

"According to the IEA, coal will remain a critical pillar of electricity generation globally and a non-substitutable component in metallurgical processes for generations to come."

The company says that the quality of its coal will keep demand strong for the next 20 years, and that it was on track to nearly double exports over the next decade.

"While our significant growth as a

company has meant GHG emissions have risen year on year, we are looking at ways to better integrate productivity and operational efficiency measures," the company said.

Whitehaven forecasts the Asian demand for thermal coal would be stable out to 2040, and that the demand for coal among developing economies would continue to grow as electrification reaches new parts of the developing world.

"Coal-fired plants typically require large upfront capital expenditure, which in turn provides 40 to 50 years of operating life.

Given the early cycle of these assets, we are likely to see sustained demand of coal as a fuel input over a significant period of time."

Looking forward

In its annual report, the company said that it was a volatile time to be in the coal business.

It cited low seaborne LNG prices, Chinese import restrictions and the global GDP contraction felt by the US-China trade tensions.

European gas prices have dropped 60pc from US\$9GJ to US\$3GJ which had led power generators to switch from coal to gas, while Chinese power demand is increasingly being met by hydroelectricity and the increased use of solar and wind power.

While Whitehaven does not export thermal coal to China, the dwindling Chinese need for imported thermal coal has driven the price down.

However, the company said that production globally is on the rise, and that the market should rebalance eventually.

"With the benefit of both good weather and good prices, seaborne coal supply from Indonesia, Russia and Australia has increased year on year," it said.

"With the softening of prices in the first half of 2019 the market is expected to rebalance as high cost producers moderate production.

"With seaborne LNG trading below breakeven levels for new supply, some rebalancing can be expected to occur in this market."

The company said that while coking coal prices are low, it expected that long term demand was stable.

TransGrid supports local development

NATIONAL

TRANSGRID is the operator and manager of the high voltage transmission network in NSW and the ACT, and plays an essential role within the National Energy Market (NEM).

With more than 13,000km of transmission lines and cables, TransGrid's network connects major load centres, industry and customers directly with generation sources.

It also connects NSW to Queensland and Victoria, providing a safe, secure and reliable platform for the transportation and trading of electricity.

The NEM is undergoing a period of transformation, as changes in generation sources and patterns of energy use across the NEM bring new challenges and opportunities for Australian industry.

As this transformation continues, ensuring the availability of affordable and reliable energy through the utilisation of emerging and existing energy generation technology will be important to maintain the viability of Australian industry and economic growth.

TransGrid works closely with its customers across NSW, providing a safe and secure connection to the transmission network for both generators of electricity

and large energy users.

It is focused on ensuring the reliability of supply and demand across NSW and the ACT.

"TransGrid aims to provide cost effective connections and energy at scale, to maximise the opportunities for entities across the NEM to be commercially successful," TransGrid's head of infrastructure services, Nigel Buchanan, said.

Mr Buchanan acknowledged the important role that successful industry plays in maintaining regional investment, employment and growth.

"We provide the energy connection point for large businesses such as Whitehaven, and understand that a reliable supply of power is essential for their operational requirements and their commercial objectives," he said.

As Australia's energy transformation continues, TransGrid continues to facilitate customers' access to safe, reliable and affordable energy.

"We are committed to supporting all customers to achieve their business objectives and continuing to support regional economic investment," Mr Buchanan said.

For more information about TransGrid and its services, visit: www.transgrid.com.au.



TransGrid workers at a substation in Western Sydney.



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Digital finger on the Pulse

NATIONAL

KLAUS Schwab, author, founder and executive chair of the World Economic Forum, is credited with saying “In the new world, it is not the big fish which eats the small fish, it’s the fast fish which eats the slow fish”.

For mining to follow this natural order in the age of Industry 4.0, Ash Bosworth, managing director and chief executive of Pulse Mining Systems, believes companies quick to embrace digital transformation with integrated Industrial Internet of Things (IIoT) business systems and real-time intelligence will inevitably predominate.

Mining company empowerment

“Start-ups using Pulse can roll out the latest technology from day one, from the planning stage progressing into production,” Mr Bosworth said.

“But even when a mining company is long-established and invested in traditional ways, it can quickly and economically evolve into one of the industry’s ‘fast fish’, eclipsing the performance of businesses that are slower to adapt.”

He said that Pulse technology is already delivering digital transformation through full integration, business process automation and inter-operability, real-time IIoT business analytics, mobile interactivity and live data-capture for every site, division, and department within the business, consolidated into any type of corporate structure.

Digital transformation can rapidly optimise current business performance and facilitate future expansion without any corresponding increase in administrative overheads.

Mr Bosworth will be speaking in several arenas at IMARC 2019 on the topics of digital transformation and collaborative best practice for mining business optimisation.



Pulse Mining Systems managing director and CEO Ash Bosworth is a speaker and discussion panelist at IMARC 2019.

Efficiency and optimisation

“To get more value from the mining business, whatever the prevailing market conditions, the race is on to become more efficient,” Mr Bosworth said.

“The Kestrel business, acquired from Rio Tinto in 2018, was transitioned to Pulse from SAP within three months.

“Long-term users of Pulse can move closer towards digital transformation at any pace they like.

“With Pulse, the latest tools and extensions are already there, it’s just a matter of switching them on as each site or division chooses to make the transition.”

The Pulse suite of solutions comprises modules for business management which can be used separately to improve any single area of the business, or combined

into a fully integrated ERP system as deployed by industry-leading mining companies in Australia and other countries.

The core modules are financials (including foreign currency, corporate consolidation, and GL account reconciliation); marketing and logistics (sales, invoicing, blend optimisation, stockpile management, live shipping interface); operations (production, maintenance); supply (end-to-end supply chain management); and workforce (payroll, OHS, training), with fully integrated budgeting and operational planning modules for release at IMARC 2019.

Automation and mobility

Pulse also comes with an optional automation suite to slash the time spent

on manual business processing and eliminate keystroke errors.

Pulse DocRocket is a revolutionary time-saver for AP and other paperwork-heavy departments as it automatically reads text from email attachments, such as supplier invoices, and pre-loads the relevant data for human verification and one-click entry.

Pulse SmartParts can save 75pc of the time normally taken for humans working in maintenance to identify the required parts, create online shopping orders with suppliers, raise internal purchase orders, obtain necessary approvals, and update both AP and inventory – just one of the cases for Pulse in B2B.

Mobility is another key area of development for Pulse with a whole range of new apps to be unveiled at IMARC.

This is where some of the most exciting changes are happening for businesses in 2019-2020, according to Mr Bosworth.

“Virtually every division and department in the business has been mobile-enabled by Pulse this year. We’ve created a live interactive and interoperable ecosystem surrounding the hub of Pulse,” he said.

A breakthrough in HR, for example, the Pulse LiveKiosk app provides self-service on mobile for all employees, including system non-users, to access pay information and available leave, submit leave applications, manage return-to-work actions, and more.

Relevant supervisors and managers can approve leave applications on mobile without delay.

Information captured via mobile is automatically updated throughout the system, saving double-entry and double-handling along the way.

Approval processes in general are streamlined by Pulse with LiveApprove able to automate any approval process with hierarchical approval structures and real-time notifications on mobile.

LiveAdmin allows expense claims to be submitted and approved via mobile, fully integrated to Pulse Financials.

The LiveCheck app manages digital checklists used in any area of the business, again with full system integration and limitless configurability.

In operations management and the supply chain, Pulse Mobility solutions are changing the way people, machines, and systems are interacting.

“PulseTrack is a suite of apps for the live tracking of assets and drivers or operators with the asset location, activity, status, and other information captured on mobile in real-time,” Mr Bosworth said.

“The new apps LiveOCE and LiveDeputy allow supervisors to enter shift data in real-time, from wherever they are, with the world-first approval of a tablet for underground situations helping to level the digital playing field for users in different resource sectors.”

Pulse LiveChain can deliver mobile interactivity to everyone working in the supply chain for real-time approvals, for example, and stocktaking on mobile with inventory and asset accounting instantly updated.

Users of the LiveChain stores optimisation tool have reported savings on inventory of up to 30pc.



The success of Pulse Analytics at Centennial encourages other mining companies to make huge gains and savings through integrated real-time business intelligence dashboards, at Centennial Springvale displaying the analysis of latest underground machine data combined with ERP data.

“The Pulse offerings for 2019-2020 are so ground-breaking, it’s causing a paradigm shift in general industry expectations,” Mr Bosworth said.

“While some entities are still in the consultation phase with regard to digital transformation, the Pulse approach to agile collaboration and responsiveness can easily put any average-sized mining company in front of relative behemoths for overall efficiency.”

Pulse Analytics

The video case study of Pulse Analytics in world-premiere use at Centennial – making massive productivity gains when machine data was integrated with ERP data, analysed, and visualised not just for management, but for all staff to view on big TV screens throughout common areas – has encouraged other companies to embrace real-time business intelligence with fully customisable dashboards and instant drill-down.

Because Pulse Analytics is 100pc agnostic, able to work with any types of data from any sources, and successfully field-proven with IIoT integrations in the mining industry, in 2019 the suite of dashboards has been adapted for use in other IIoT industries, such as manufacturing and transport, where it brings together data from different sources to automatically create meaningful visualisations of real-time business performance from any desired perspective – board-level, C-level, management, supervisory, or frontline.

GMG inter-operability alignment

The most recent release of the Global Mining Guidelines group report on



Pulse integrated IIoT solutions for rapid digital transformation are used to manage the business of mining any type of resources by either underground or open-cut methodologies.

inter-operability alignment cast the Pulse philosophy of business-wide integration and interactivity as “bang-on for futureproofing in the mining industry”, according to Mr Bosworth.

“Integration has always been central to the Pulse philosophy, and not just the integration of our own solutions, but integration in an agnostic sense as well,” he said.

“Like with Pulse Analytics, our whole new B2B suite, and the live shipping interfaces in marketing and logistics – our

solutions are offering connectivity with the rest of the technological world and bringing it all together for users in the most intuitive way.”

But he said that the one area where Pulse needs to step up, with respect to the GMG inter-operability alignment report, could be education.

“While we’re proactive in delivering Pulse training, helpdesk support, and online user guides, we probably haven’t been loud enough about our new product releases and explaining the quantum

leaps now available to the people and businesses that would most benefit from using them,” he said.

As Platinum sponsors of IMARC 2019, with a large interactive exhibition stand under iconic new Pulse branding, and Mr Bosworth featuring in speaking spots and panels over the course of the conference, Pulse is living up to its name as ‘the first word in mining systems’.

If you’re at IMARC this year, you can visit Pulse at stand CA15.

The first word in mining systems is the last word in digital transformation - Pulse.

Complete suite of mining-specific business solutions - use alone or combine as a fully integrated mining ERP. Management modules with business process automation, interactive mobile apps, interoperative B2B. Real-time business analytics integrating data from any sensors, software, spreadsheets. Pulse delivers the digital mine today.

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WORKING out of Narrabri, NSW, WTC Earthmoving has built its reputation on its commitment to reliability, professionalism and the highest quality of work.

After 15 years in the business, WTC Earthmoving managing director and company founder William Childs has established the company as one of the most trusted names in earth moving.

This reputation is maintained by the highly experienced management staff, a dedicated team of operators and a fleet of well-maintained machinery that ensures clients' requirements are always met.

All operations at WTC are managed under the WTC Earthmoving 'Quality, Health and Safety Environmental Plan'.

With a diverse portfolio of experience and projects, WTC has proven its capabilities in all areas of the earthmoving industry.

The company has carried out works in in mining, oil and gas, tailings dams, rail formation, pump stations, roads, and overburden removal to name a few, and it has a proven track record of adhering to the highest standards of safety and the strictest industry requirements.

The company prides itself on its ability to build and maintain a strong working relationships with existing



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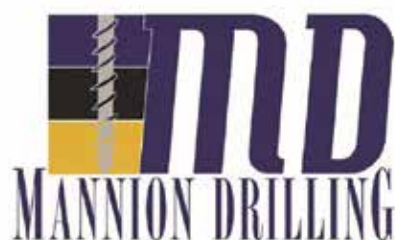
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100 years of drilling

NSW

DRILLING is in the Mannion family's blood.

Mannion Drilling principal Jason Mannion is a fourth generation driller, and purchased the company from his father in 1999.

This year marks a century of Mannions in the drilling industry.

The company relocated to Gunnedah in 2011 from Inverell and currently employs a workforce of 32 crew members, largely recruited from the local labour market.

Mr Mannion said that he is committed to improving his company, and improving the lives of the people who work there.

"Mannion Drilling has developed a robust training program, developed and implemented in-house, in order to maximise skill development and retention," he said.

"And, the company has a commitment to sustaining a 30pc benchmark for Aboriginal employment opportunities."

Mannion puts a strong focus on safety and the health and wellbeing of crew members, and safely services some of the most remote and challenging areas of far and central west NSW.

Since relocating, Mannion Drilling has continued its investment in world-class equipment and now has nine rigs in operation.

It has expanded its workforce from



The Mannion family has been in the drilling industry for 100 years.

six workers to 32, and has made a considerable investment in the shire's industrial precinct with the construction of the Mannion Drilling administration office and workshop.

All of these investments will ensure the company is well equipped to support future growth and the next generation of Mannion drillers.

Mr Mannion said that his company's point of difference was its unique size and structure that allows it to be big enough to get the job done, but small enough to provide the personal service bigger companies simply can't.

"The company is large enough

to provide clients with world-class equipment, expert technicians and operational management to oversee drill projects, and small enough to customise services to build meaningful, collaborative working relationships with clients and the local community," he said.

"The story behind Mannion Drilling is one that is quite rare these days, and I take great pride in the fact that I have continued to grow our family business and reach goals that, frankly, were farfetched dreams as a young lad learning the trade alongside my father."

As Mannion Drilling approaches its centenary, it brings a swathe of accolades with it.

The company was a finalist in the 2018 NSW state business awards, winner of the 2018 local business awards, and winner of the 2018 regional business awards.

"The history of our company provides me with the motivation to seek out excellence in every aspect of business operation to secure a promising future for generations of Mannion drillers to come," Mr Mannion said.

"With our expanding scope of works and large asset projects, we are always on the lookout for high energy, innovative and experienced drillers and assistants to join our team."

Ultra Fleet is going the extra mile

NATIONAL

IN an industry dominated by large multinational companies, getting a foot in the door can often be the hardest part.

The coal mining boom in the Gunnedah Basin provided the window of opportunity that Ultra Fleet founder Jacinta Mannion needed to establish her company and provide quality, flexible vehicle hire in regional NSW.

Boasting 83 highly specialised four-wheel-drives, the company is perfectly positioned to service the resource contractors who required high-quality, site and safety approved vehicles.

Ms Mannion said that it was a long-term ambition to break into the mining sector.

"I learnt my trade from my parents, who owned and managed a successful transport company in Tenterfield for over 16 years," she said.

"The time I spent with mum and dad in the business taught me so many important skills and lessons that I make sure are at the heart of how I run my own business today.

"I know that the people who work in our business and the people who use our services matter most."

By setting up operations in Gunnedah, the company has positioned itself to be central to the major coal mining projects in NSW, with resource longevity and new coal mine approvals always around the corner.



Ultra Fleet has 83 highly specialised four-wheel-drives custom fitted to service the resources sector.

It has given Ultra Fleet the opportunity to develop partnerships with highly skilled support businesses, and its proximity to two regional airports makes it the perfect option for airport transfers.

And the company supports jobs in regional communities – not only by direct

employment, but by forming strong working partnerships with local businesses and suppliers.

"The mining industry can be a hard nut to crack, but taking the time to truly understand our clients and adapting our services and equipment to meet their individual needs

has been our defining factor and the key to our success," Ms Mannion said.

"We take the time to carefully build and nurture partnerships with our clients and will 'go that extra mile' to make sure the job is done right, with our clients' expectations exceeded every time."



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Self-bunded oil tanks

NATIONAL

POLYMASTER'S ChemMaster Bunded (double-walled) tanks have been used at Whitehaven, Australia's largest independent coal producer in NW NSW, which runs five mines – four open-cut at Maules Creek, Tarrawonga, Werris Creek and Sunnyside and one underground at Narrabri.

Servicing equipment and keeping a workshop in full operation while having a mine site under construction has its challenges.

Workshop and engineering teams need a flexible way to bulk store oil and coolant and meet OH&S requirements.

A temporary/semi-permanent system was needed at Whitehaven to be plumbed directly into shop operations to replace fluids when required. As the mine expands, the tanks can be relocated quickly.

Bulk deliveries must be catered to, with quick tanker connections to dispense into double-walled storage tanks with a capacity of 80,000L.

No one has an unlimited budget, so there is always the need for a solution to address all requirements – from usability to capital investment.

Polymaster's ChemMaster Bunded (double-walled) tanks offer the perfect solution; the super strong and versatile polyethylene tanks have been customised to not only meet every requirement of the



The semi-permanent PolyMaster ChemMaster tanks meet all bunding standards in AS3780-2008: The storage and handling of corrosive substances.

workshop but to last in an open-cut mine.

Positioned on the slab next to the workshop, they are directly plumbed for ease of operation.

Pre-engineered with a hose-reel, integrated air-operated pump, a flow meter, mechanical and digital level controls and dustproof vent in each unit, a lockable cabinet is fixed to the tank to keep all running gear secure and weather-proof.

The significant civil work that goes hand-in-hand with constructing a concrete bund was avoided, as the Polymaster ChemMaster meets all bunding standards in AS3780-2008: The storage and handling of corrosive substances.

These tanks reduce the physical footprint on-site by up to 66% as each bundled tank is fully enclosed.

All costs generally associated with the disposal of contaminated water collected from

a traditional concrete bund is eliminated.

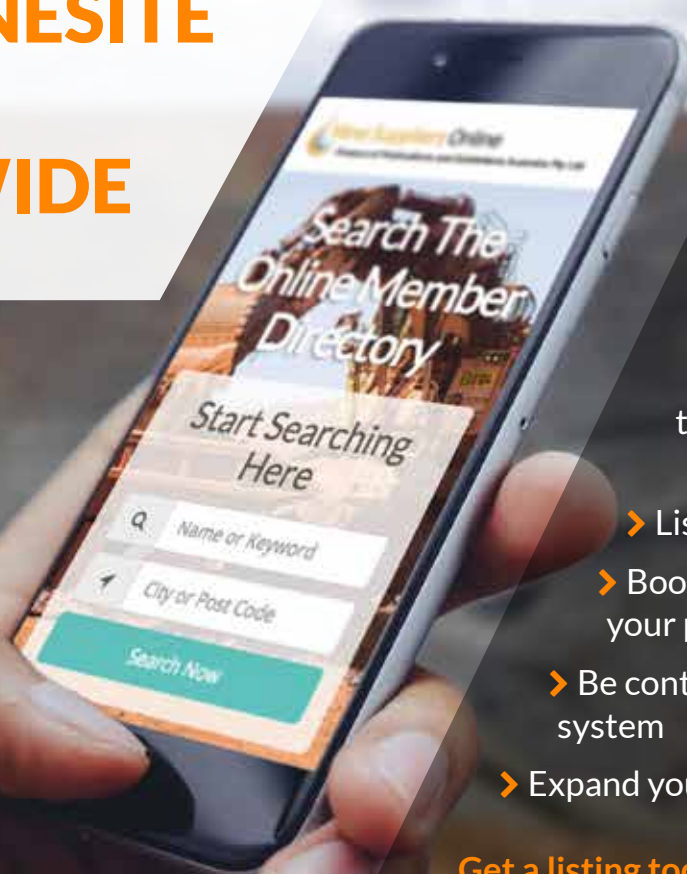
Being UV stabilised the tank can withstand Australia's harsh climate, especially in the Gunnedah Basin.

Since installation, eight tanks have already been successfully relocated around the site – saving installation costs as planned.

Polymaster is proud to have supplied its self-bunded tanks to one of Australia's coal mining powerhouses.



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Hitachi's Gunnedah and Muswellbrook branches were nominated for the outstanding supplier award by Whitehaven, for their role in assisting the success of the Maules Creek Project.

Hitachi best in business

NSW

FOR several years, Hitachi Construction Machinery Australia and Whitehaven Coal have maintained a longstanding successful partnership in the Gunnedah region which only continues to strengthen, providing incentives for further investment in the region with the opening of a new Hitachi facility in

Gunnedah earlier this year.

In addition to supplying new machinery, Hitachi Gunnedah provides ongoing parts and service support to the growing population of mining equipment in the region and manages strong relationships not only with Whitehaven Coal, but also other major customers and local industries.

The Gunnedah facility signifies HCA's

commitment for long-term growth within the mining industry and regional NSW.

HCA were recently announced the outstanding supplier of the year at the NSW Mining Industry and Suppliers Awards.

Hitachi's Gunnedah and Muswellbrook branches were nominated for the award by Whitehaven, for their role in assisting the success of the Maules Creek Project.

The HCA team services more than 90 machines in the area, with Whitehaven Coal owning about 65 of these.

HCA's general manager of mining, Eric Green, said the company was investing in new facilities and showing all mining and construction equipment customers that it aimed to continue its support for their current and planned new fleets of equipment.

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Australia’s largest mining event, IMARC, is in its sixth year, and will be held against a background of record gold and iron ore prices, increasing US-China trade tensions, and pressure from environmentalists.

RAY CHAN

IT’S been a tumultuous year for the mining industry.

Australia’s chief economist reported in June that the nation’s resource and energy exports are set to hit a new record of \$285b in 2019–20, the increase in earnings driven by a spike in iron ore prices and a surging gold sector.

Meanwhile, the June quarterly report said thermal coal was facing a tough climate, with prices deteriorating, and predicted that gold would replace it as Australia’s fourth largest export in 2019-20.

It also warned about uncertainties caused by US-China trade tensions.

Against such a backdrop, there has never been a better time to hear from some of the world’s foremost mining experts as they discuss global and Australian opportunities and challenges.

The future of mining will be on display this month when Australia’s largest mining conference, the International Mining and Resources Conference and Expo (IMARC) 2019, scrutinises the key issues facing all miners.

The event will be held at the Melbourne Convention and Exhibition Centre, from October 29-31.

With replacement iron ore mines, a planned LNG expansion and a buoyant gold sector all driving the industry, companies such as Microsoft, BHP, Rio Tinto, Mitsui, Anglo American and South32 will discuss issues, trends and opportunities that are attracting investors across the globe; leadership and trust in the digital age; critical considerations for doing business in 2020; what is affecting the global mining industry; avoiding digital disappointment; and getting the mix right in the mines of the future.

FMG will discuss cyber threats and protecting data; the Minerals Council of Australia will deliver an outlook on battery metals; the skills shortage and skills of the future will be examined; and opportunities in Latin America and Africa will be explored.

This year’s event includes new focus areas on energy, the environment,

ABOUT IMARC

The International Mining and Resources Conference (IMARC) is where global mining leaders connect with technology, finance and the future.

Now in its sixth year, it is Australia’s largest mining event, bringing together more than 7000 decision-makers, mining leaders, policy makers, investors, commodity buyers, technical experts, innovators and educators from over 100 countries for four days of learning, deal-making and unparalleled networking.

IMARC is developed in collaboration with its founding partners: the Victorian State Government of Australia, Austmine, AusIMM and Mines and Money.

For more information, visit: <https://imarmelbourne.com>

workforce engagement as well as mine and plant optimisation.

Automation impact

The conference also examines the impact of technology on every aspect from exploration to production.

Resolute’s chief executive officer and managing director John Welborn is claiming substantial benefits from its underground operation at Syama, in Mali, where it runs autonomous drilling, loading, haulage and navigation.

“Ore will literally be drilled, blasted, bogged, loaded and hauled all the way to the surface without ever being manually handled,” Mr Welborn said.

While Mr Welborn, who will be speaking at IMARC 2019, expects automation will have productivity gains in the ballpark of 15 to 20pc at Syama, it will not be at the expense of local jobs and capacity building.

“We now have an all-Mali trained crew. Because these systems are automated, they’re easy to operate,” he said.

“Rather than taking jobs away from the local workforce, it’s allowing us to train,

employ, empower and upskill our local workers.”

Figures indicate the scale of the Syama success. The company invested \$15m on automation, which delivered a reduction in cost of production of \$135 an oz.

With 2.9moz in the ground, the savings amounted to more than \$390m.

The Syama experience is the extreme end of the technological revolution being experienced or contemplated in all sectors of mining in Australia and internationally.

Austrade identified in 2017 that Australia is a world leader in mine automation research and development.

It said automation has the potential to provide a mine with technology advances that impact the four big issues of productivity improvement, maximising plant and equipment utilisation, cost reduction and increased mine worker safety.

Accent on Ascent

With Australia leading the way, this year’s IMARC has launched the Ascent Village, a dedicated precinct on the expo floor showcasing companies which have cutting

edge technology and innovative products that will improve productivity across the mining value chain.

It will feature 20 start-up and scale-up companies, putting them in front of more than 7000 attendees, including key investors and some of most influential people in mining tech.

In addition, three university student groups will also be selected to showcase their STEM activities as part of IMARC’s Next Gen Program.

As part of the launch, IMARC is sponsoring two companies, providing them with a pod, delegate pass, and access to investor meetings as well as a seat on the pitch stand.

Telling technology

IMARC will also investigate the possibilities for technological advances, which are substantial.

A February 2019 Minerals Council of Australia report examining the economic implications of technology and digital mining quantified the potential benefits across all aspects of mining.

It said there could be a total overall improvement in productivity of between nine and 23pc.

In plant processing alone, it predicted an overall productivity improvement of up to 20pc from technology, including the introduction of renewable energy such as solar and wind, use of drones to scan materials entering the plant, autonomous decision making, machine learning and mineral sensing and sorting technology.

It said the benefits included:

- A 20 to 35pc decrease in asset downtime
- An increase in throughput of 10 to 15pc
- A reduction in processing costs of 10 to 15pc
- A 7 to 15pc improvement in asset productivity
- Improved sustainability.

IMARC will examine all these issues with five technology conferences over three days discussing mine optimisation, mineral processing, the digital plant, digital transformation, innovation and innovative exploration methods.

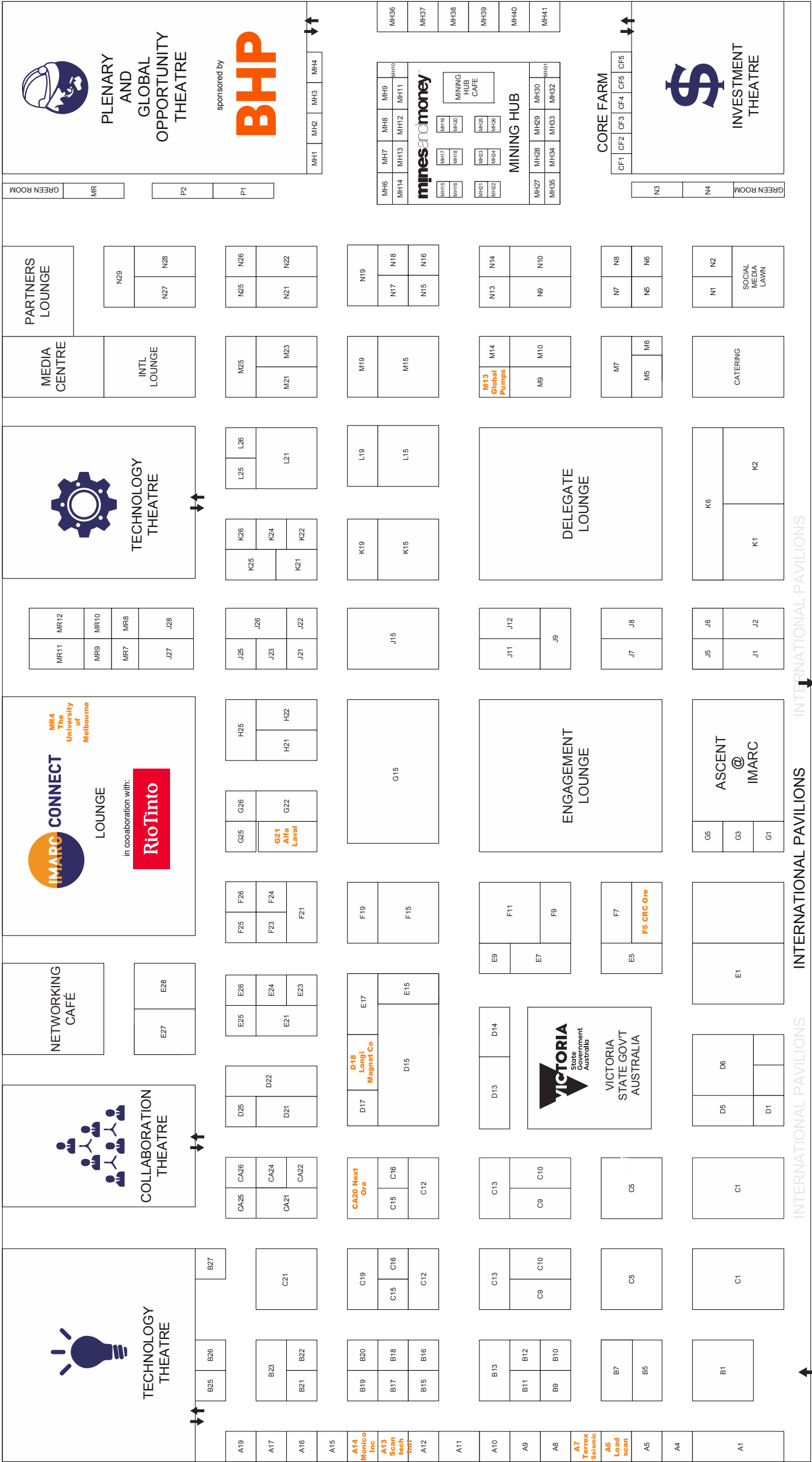
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Intelligent ore measurement

NATIONAL

CONVEYED flow quality measurement in real time provides the next level of plant control where there is higher variability in composition than sites expect, but a solution has been developed by analyser experts Scantech.

The Scantech GEOSCAN-M elemental analyser provides real and innovative approach using proven, real time measurement solutions for conveyed flow quality management.

Natural quality variability

Mined material is not homogeneous; in some cases the mining process accentuates the quality variability by adding dilution or waste as a result of the way the good and poor quality materials are interspersed, and so cannot be selectively removed.

Materials handling may mix the more and less valuable components to generate a blend.

Actual measurements show that this mixing still leaves considerable variability by the time the material reaches the next stage in the process.

Processes have been developed to take the as-received material and utilise separation techniques to recover valuable components and discard unwanted material as waste.

Such processes work well when the feed is relatively good and of consistent quality, but respond poorly to high variability in the feed quality, with recovery and efficiency sacrificed.

A major opportunity exists to improve existing process performance in most plants – resource companies recognise that in order to control feed quality, it needs to be measured.

Benefits from measurement

Scantech has designed its analysis equipment so that it can be easily installed on conveyor systems, allowing for continuous real time quality measurement.

It maximises benefits by integrating with existing infrastructure for bulk flows and providing opportunities for gains in process control by measuring and reacting to changes in material quality.

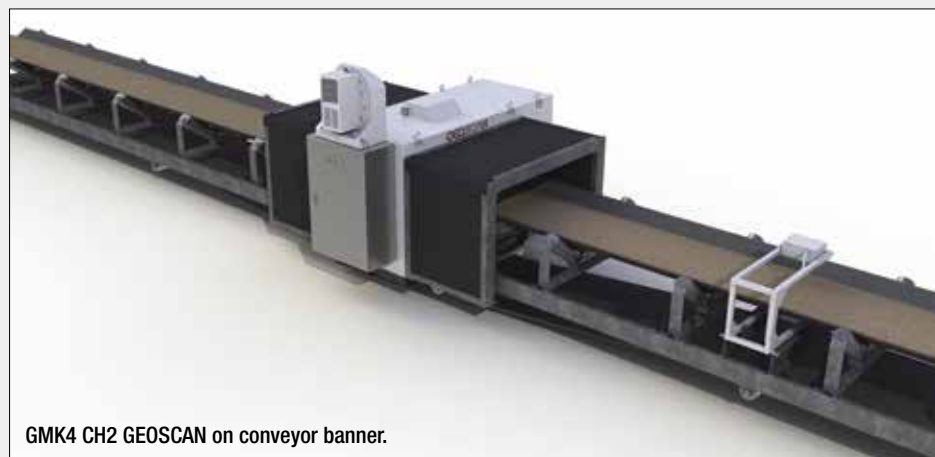
GEOSCAN-M

The GEOSCAN-M is a high-performance elemental analyser utilising Prompt Gamma Neutron Activation Analysis (PGNAA) to measure the elemental composition continuously in real time, through the full conveyed cross section, so that the entire flow can be representatively measured.

The GEOSCAN-M utilises a Californium-252 source to excite the elemental nuclei in the conveyed flow with neutrons, which in turn emit gamma rays that are detected by a high-specification detector array above the conveyor, allowing individual elements to be measured directly.

This configuration, combined with proprietary software, yields measurement performance that is unmatched in the minerals industry.

The GEOSCAN-M is combined with Scantech's TBM microwave moisture analyser, and takes an input signal from a belt weigher to provide tonnage-weighted average dry basis elemental and moisture



GMK4 CH2 GEOSCAN on conveyor banner.

results on a short analysis period to the plant control system.

The GEOSCAN can be configured to measure over shorter or longer time increments depending on the application.

Where bulk sorting is required, short analysis – say every 30 seconds – allows for a minimal sorting increment mass, whereas for blending purposes, a longer measurement time of, say five minutes, may be appropriate.

Typically results are reported every one or two minutes.

Mining applications

Ore quality in the ground is defined from drilling, sampling, laboratory analysis and geological modelling to assess geological continuity and grade distribution.

The resulting information is used to create a mining plan so that suitable material can be extracted in a sequence that satisfies operational and mining lease regulatory requirements.

Quality of most conveyed ores can be measured in real time with a GEOSCAN-M to determine the multi-elemental composition.

The analysis not only confirms the aforementioned mining plan, but offers results with a much finer resolution, allowing for real, positive control of the plant.

Moisture can be measured using a TBM moisture analyser, typically to accuracies better than 0.5pc.

Moisture content can also impact the process performance and measurement may also assist with dust management or dry tonnage basis calculations.

Bulk ore diversion

Detection of waste or different ore qualities can be used to divert increments of conveyed flow to different stockpiles.

Bulk diversion (bulk ore sorting) requires a flow diversion process to be activated by the plant control system using real time GEOSCAN-M measurements.

Delay time between GEOSCAN and diverter is taken into account so that each increment is diverted as accurately as possible.

Low quality material can be rejected entirely, so it is not processed or diverted to a stockpile.

Only high specification analysers have proven effective for bulk ore sorting as very short measurement times with good measurement accuracy are needed to optimise selectivity (<10t per increment for 1,000t/hr flow) and maximise confidence in diversion decisions.

GEOSCAN-M is also suitable for measuring pebble recycle quality to determine whether pebble flow increments should be diverted or processed.

Ore blending

GEOSCAN-M can measure the conveyed flows and adjust the proportion sourced from different quality stockpiles.

Adjusting the blend in real time allows a more consistent feed quality to the process plant, improving its performance, as high variation leads to inefficiencies, e.g. in metal recovery.

Measurement of such components as acid-consuming gangue, sulphide content,

clay content and moisture in the feed can be used for optimising flow rates, reagent dosing, metal recovery and concentrate/product allocation.

Even very small improvements in process plant performance and consumable savings will achieve very fast analyser payback.

Blending can also be used for products to ensure specification compliance and particularly to blend out high contaminant levels.

Plant performance

Most plants perform most efficiently when a consistent quality feed material is provided, so knowing when there is a major change in feed quality before it arrives in the plant is useful for ensuring appropriate control systems responses.

Geometallurgical domain changes may also be detected in plant feed through elemental measurement, which may assist process operators to continuously improve plant performance as recognition of certain ore types can be related to previous process performance.

Who is Scantech?

For more than 35 years, Scantech has been leading the development of innovative solutions using continuous, conveyed bulk analysis technologies that penetrate the full flow and produce representative, accurate, timely and reliable results, with 1100 units sold in 60 countries worldwide.

Focus on the minerals sector has resulted in a high-specification, minimal maintenance, robust design to exceed typical measurement expectations.

The highly qualified, experienced and motivated support team provides a wealth of knowledge in optimising applications and performance.

Authors:

Scantech technical manager Dr Luke Balzan, and minerals consultant Henry Kurth.

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Scantech International will exhibit at IMARC booth A13.

(CONTINUED FROM PAGE 29)

Microsoft Australia managing director Steven Worrall and Accenture natural resources industry lead Ann Burns are among the line-up of more than 300 speakers who will discuss automation, robotics, and data analytics, and how remote operating centres are transforming mine management through a series of panel discussions and keynote addresses across the three days.

Mining Hub

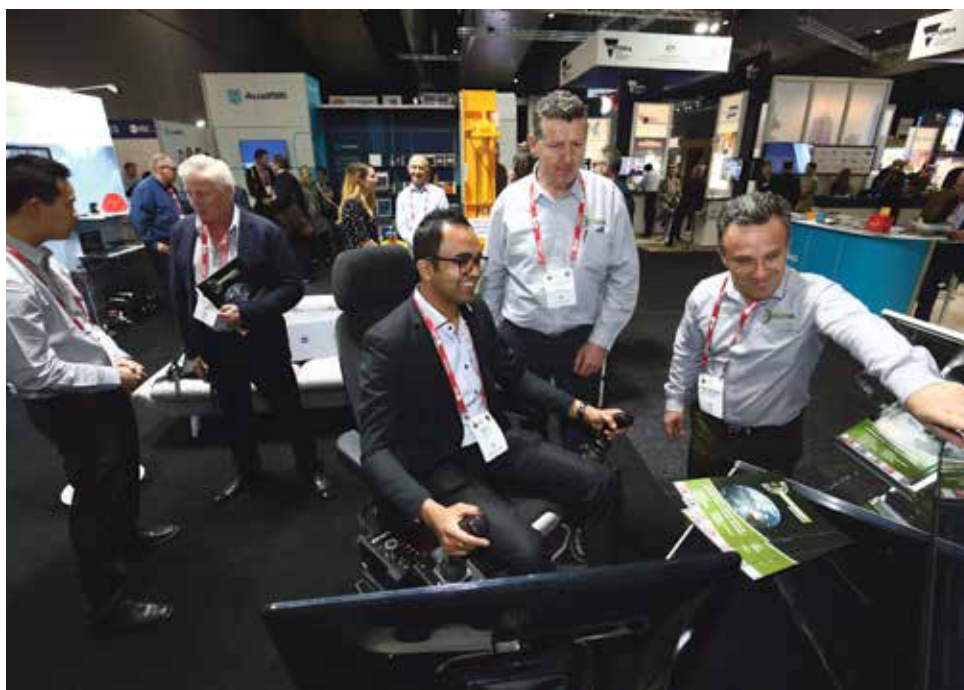
The conference once again features the popular Mining Hub, a dedicated precinct giving mining and energy companies the opportunity to professionally showcase their projects to prospective investors.

Commodity buyers, traders, and public and private investors will all be actively seeking new investment opportunities, looking to speak directly to senior executives to assess and compare an extensive range of investment opportunities in the mining and energy sectors.

The mining hub gives international and local fund managers, institutional investors, mid-tiers and majors along with global private equity companies the opportunity to compare projects and companies side-by-side to identify their next investment opportunity.

Core Farm

Here visitors can see the latest mineral drill cores close up and hear about



The latest mining technology will be on show.

emerging global discoveries.

They will have the opportunity to assess the core first hand and talk with the exploration geologists.

The farm will feature drill core samples from projects in diverse countries and settings, representing a broad array of deposit types and project stages.

Each confirmed Core Farm participant will be allocated a 2m x 1.5m deep booth to showcase core samples.

Guru Garden

This new feature will feature the world's leading experts who will be available for one-on-one consultations.

This is an opportunity for delegates to ask advice in a money-can't-buy experience.

It will be of immense benefit to mining companies, Next Gen leaders, governments and investors.

Sessions are only available to registered

delegates, speakers, sponsors and exhibitors.

International Pavilion

IMARC is a truly international event, with 92 countries attending last year.

At the International Pavilion, delegates can engage with visitors from Latin America, Middle East, China, India and more.

Countries and regions will showcase some of their leading technologies, innovations and latest projects.

Visitors can meet with international visitors and representatives to gain insights into global opportunities with countries who are actively sourcing and providing innovative equipment and services to enhance international relationships and collaboration with Australia.

Mining master classes

The exhibition is free to attend and is one of the most effective ways to meet more than 7000 mining professionals and resource professionals all under the one roof, who will participate in more than 130 hours of content, with five concurrent conferences and four workshops and master classes.

The latest mining discoveries, equipment, innovations and cutting-edge technologies will also be on display across the 1.2ha expo floor, which will host more than 260 exhibiting companies.

Subsurface imaging experts

NATIONAL

FOUNDED in 1981, Terrex Seismic (Terrex) provides subsurface seismic imaging and associated services to mining and resource companies operating throughout Australia.

Continued investment in the latest acquisition technologies available to market, coupled with the company's innovative approach to survey design and operational execution, has resulted in an increased ability to provide high resolution 3D data volumes capable of effective and efficient integration into mining and resource workflow models.

Specifically, the integration of high-resolution 3D seismic is proving capable of improvements in mine planning, risk mitigation, and the economic appraisal of new reserve blocks, mine extensions, and new prospects prior to the commitment of extensive capital expenditure.

At the centre of Terrex's ability to scale, economically, the density of seismic services that are now available to the mining industry was borne out of its investment in SmartSolo nodal technology.



Terrex Seismic is at the forefront of the industry, utilising revolutionary nodal technology for seismic acquisition.

Terrex is the only Australian owned and operated seismic contractor that owns 48,000 SmartSolo nodes — an advanced smart seismic sensor technology that improves the quality of seismic data and has significant benefits in terms of HSE exposure, data quality and operational

efficiencies.

Going nodal

Compared with traditional cable-based seismic data acquisition systems, nodal technology allows for the rapid deployment

and acquisition of higher density seismic data surveys.

Nodal technology requires less equipment and therefore reduces crew size, resulting in reduced manual handling risk, a decrease in vehicle transport and an overall lower environmental footprint.

Nodal systems also eliminate the problems of random noise and animal damage that cable systems are susceptible to.

In addition, there is no wasted time repairing line breaks or troubleshooting spread making nodal recording systems extremely reliable and efficient.

The SmartSolo nodes are compact, lightweight, and easily transportable, allowing for high-density point receiver geometries.

Nodal technology is revolutionising seismic acquisition by minimising cultural heritage exposure, reducing environmental impact and expanding exploration opportunities to places previously deemed inaccessible.

For more information visit: www.terrexseismic.com

Terrex Seismic will exhibit at IMARC booth A7.

THE LOW-DOWN ON NODAL TECHNOLOGY

- Reduced equipment volume
- Increased channel count
- Reduced crew sizes
- Improved health and safety outcomes
- Minimised environmental impact
- Improved ground accessibility
- Removed disruption to third parties

- Increased productivity no lost time on recording system
- Reduced costs
- No compromise to data quality
- High density, point receiver geometries

Since deploying SmartSolo nodal systems across our crews in mid-2017, Terrex has demonstrated improved HSE outcomes, operational efficiencies and increased spatial sampling capability while meeting clients' expectations for safe, high quality 2D and 3D seismic acquisition.



Mine Site Seismic

DOES YOUR MINE PLAN OPTIMISE YOUR MONTHLY PRODUCTION POTENTIAL?

Terrex Seismic are leaders in the design and acquisition of high-resolution 3D seismic that can improve mine planning, risk mitigation, and the economic appraisal of new reserve blocks, mine extensions, and prospects prior to the commitment of extensive capital expenditure.

Partner with us to better identify geological structures, intrusions, paleo-highs and paleo-lows today, so that they don't impact your profitability tomorrow.

TERREXSEISMIC.COM

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Superior magnetic equipment

NATIONAL

LONGi Magnet Co was founded in 1993 and quickly became the leading manufacturer of industrial magnetic equipment throughout Asia.

With a large product range including lifting magnets, WHIMS, LIMS, eddy current separators, metal detectors, drum separators, pulleys, vibratory feeders and much more, LONGi is well suited to provide for any industrial magnetic needs.

LONGi products widely used in mining industry, coal and power industry, metallurgy industry and recycling industry.

Always an innovator, LONGi holds more than 400 national patents for its productions and designs, as well as having a provincial-level research centre and laboratory operating in conjunction with



LONGi operates its own laboratory its manufacturing centre, a state-of the art magnetic separating engineering facility.

the Institute of Electrical Engineering at China's Academy of Science.

LONGi is well equipped to handle any project, find the best solution and

to provide the maximum value at a fair price both in terms of time and budget.

LONGi is committed to being the one stop shop for all magnetic needs for the

mining industry.

More information can be found at www.ljmagnet.com or by visiting LONGi Magnet Co at IMARC stand D18.

COMPANY PHILOSOPHY

Reliability: This is the first of three core values. At each step in the process, both before and after the sale, LONGi remains a loyal and committed partner to achieve success.

Value added: Secondly, the company pledges to find the best solution to customer needs and to provide the maximum value at a fair price both in terms of time and budget.

Convenience: The company takes the stress off of clients, be it testing, selecting the correct magnetics needed or even just looking at designs to make recommendations.



The optimal group for
purification of nonferrous materials
and beneficiation of weakly magnetic materials

They provide a worry free and jam free operation. Improve both concentrate grades and recovery. With an adjustable magnetic intensity it can be used to improve a very high range of both ferrous and nonferrous materials each with their own needs and properties.

- Very low consumption of electrical power and water.
- Compact size.
- Low maintenance.

LONGi®
The Experts in Magnetic Technology



Website: www.ljmagnet.com
Email: info@ljmagnet.com
Phone: +86-24-56700058 56700068
Fax: +86-24-56700017

Address: #6, Wenhua Road,
Fushun Economic
Development Area,
China 113122

Solving tough challenges

NATIONAL

GLOBAL Pumps has released the SlurryPro Elite; a mechanical seal that features a patented conical design and diamond-coated faces.

This new innovation achieves six times the service life of traditional cartridge seals – saving you time, money and water.

Established in 1977, Global Pumps delivers innovative solutions for difficult and challenging pumping applications with an uncompromising focus on reliability.

Global Pumps' strives to develop new technologies that assist customers to achieve lower maintenance and greater meantimes between failures, take for example the SlurryPro Elite mechanical seal.

Mechanical seals are a more efficient, cost-effective and environmentally friendly sealing solution, compared to braided-type packings.

They offer substantial savings, in terms of downtime and maintenance, due to their unique conical seal design.

The SlurryPro Elite mechanical seal features additional advantages over other types of mechanical seals, including, but not limited to; increasing the misalignment tolerance; does not require flush-water; enhances the fluid circulation in the stuffing box area, and is easily and quickly repaired.



The new innovative SlurryPro Elite mechanical seal offers durability, longevity and economic benefits.

The highly competitive price of both the SlurryPro Elite seal and repair kit, when compared to other cartridge-type mechanical seals, offers you real

long-term benefits.

Come and see the Global Pumps team at stand M13 for more information on this new and exciting SlurryPro Elite

mechanical seal.

For more information about Global Pumps, visit: www.globalpumps.com.au or call 1300 1 GLOBAL.

DON'T WASTE YOUR WATER

SLURRYPRO ELITE MECHANICAL SEAL by Global Pumps

- Flush-less
- Patented conical design
- Diamond-coated faces

Visit us at IMARC, **stand #M13** and find out how you can save time, money ... and water.



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globalpumps.com.au



Making mining sustainable

NATIONAL

MINING is a major contributor to both the Australian and global economies but the sector is facing strong headwinds.

It is increasingly difficult to find and access minerals, mine safety needs to improve and the environmental footprint of operations must be reduced.

Collectively, the industry also needs to do more to earn and maintain its social licence to operate.

The University of Melbourne has worked with the mining industry for more than 100 years and in 2018 created the Melbourne Mining Integrator (MMI).

MMI provides a clearer portal for industry contact and is draws upon the considerable resources across the University.

At the same time, MMI creates large multi-disciplinary teams to tackle grand challenges.

In addition to traditional mining disciplines, it has access to one of Australia's deepest knowledge and understanding of automation and artificial intelligence pools.

In order to progress and thrive, mining must become more precise, generate less waste and reduce its operating footprint.

The advent of Industry 4.0 (autonomous, smart and data-driven systems) presents significant opportunities across the mining industry.



Melbourne Mining Integrator director Professor Adrian Pearce.

So-called 'precision mining' offers the potential to improve safety, reduce waste, increase productivity and speed up the rehabilitation of mine sites.

This will also result in new opportunities for Australia's mining

equipment, technology and services (METS) sector.

The mining industry is already awash with data, but data by itself is useless if it is not used for better decision making.

Industries need to ensure they are

capturing the right data, connecting systems and optimising decisions across the whole system, not just sub-components.

Through MMI, the University of Melbourne is leading a national bid for the Mining Industry 4.0 Cooperative Research Centre (MI4 CRC). If successful, MI4 CRC would bring together METS and mining companies from across the value supply chain.

The focus is on improving the interoperability of sub-systems throughout the sector.

There are also significant opportunities for the METS sector in building and delivering these solutions.

With sustainability at the forefront, MMI is a foundation partner in the Future Battery Industries CRC (FBI CRC); funding for which CRC was announced early 2019 with an aim to develop a nascent battery sector in Australia.

There are numerous strong opportunities for MMI to contribute meaningfully to the mining and METS sectors and we are actively seeking partners and collaborators.

For further details, please contact:

Professor Adrian Pearce

Director, Melbourne Mining Integrator
Bid Leader, MI4 CRC

The University of Melbourne

E: adrianrp@unimelb.edu.au

The University of Melbourne will exhibit at IMARC booth MR4.

Accelerate your tailings dewatering with solid bowl centrifuge technology



Optimising your tailings dewatering processes is a straightforward way to cut operating and investment costs.

Alfa Laval's P3 solid bowl decanter centrifuge has been specifically developed for large scale, heavy duty solid-liquid separation tasks in the mining and mineral industry.

Find out why a growing number of mining companies choose dry centrifuged tailings as an alternative to storing a liquid slurry in a tailings dam.

The Alfa Laval P3 helps boost capacity, reduce tailings volumes, and increase the recovery of water, chemicals and minerals from tailings, including ultra fine solids and slimes. It offers a significantly smaller footprint, lower CAPEX and OPEX than other dewatering technologies.

Contact Alfa Laval Australia for more information on how the P3 decanter centrifuge can help boost your profitability.

www.alfalaval.com.au



www.alfalaval.com



MELBOURNE MINING INTEGRATOR

COLLABORATING WITH INDUSTRY ON INNOVATIVE TECHNOLOGIES TO INCREASE SAFETY, SUSTAINABILITY AND PRODUCTIVITY WITHIN THE MINING SECTOR

eng.unimelb.edu.au/industry/melbourne-mining-integrator





VISIT OUR
IMARC
STAND

**CRC ORE is the Cooperative Research Centre
focused on Optimising Resource Extraction for the
mining sector.**

We are working to minimise the impact of declining grades
and radically improve the productivity, energy and water
signatures of mining operations.

Talk to us at IMARC 2019 about:

- Grade Engineering ®
- Integrated Extraction Simulator
- Kalgoorlie-Boulder Mining Innovation Hub



crcore.org.au

Bringing profits for miners

INTERNATIONAL

THE Cooperative Research Centre for Optimising Resource Extraction (CRC ORE) is disrupting the industry one mine at a time, with impressive results flooding in from operations both here and abroad, including an estimated \$450m profit increase for a zinc, lead and silver operation in Bolivia.

Its success is driven by one of its state-of-the-art headline solutions, Grade Engineering, which deploys a range of waste rejection technologies that integrate with a suite of separation technologies relevant to ore specific characteristics.

A deeper understanding of the orebody enables miners to exploit inherent ore deposit heterogeneity and variability.

In 2017, the technology and innovation company teamed up with Sumitomo's South American mine Minera San Cristóbal (MSC) to assess the level of opportunity available at the mine to deploy its Grade Engineering solution.

Since late 2018, CRC ORE and Sumitomo have been working together on a full-scale production trial of the solution using a Metso Lokotrack ST2.8 mobile screening plant that can process up to 450t per hour.



CRC ORE principal mining engineer David La Rosa onsite at Minera San Cristóbal, Bolivia.

CRC ORE chief executive Ben Adair said initial results of the trial were exciting, with 66pc of value now contained in just 25pc of the grade engineered mass.

“So far, results show that by applying grade engineering to areas previously designated as ‘mineralised waste’, the value of grade engineered feed to the mill can be increased by over 2.5 times,” Dr Adair said.

“This has the potential to convert this waste material into high grade ore-feed with associated opportunity to increase metal production and reduce process power and water intensities.”

It’s an impressive result, which is underpinned by CRC ORE’s collaborative approach to solving mining’s biggest problems.

A similar project is now underway at Newcrest’s Telfer mine in Australia.

As a cooperative research centre, CRC ORE is linked to several leading universities and research organisations and brings together mining and METS companies to develop innovative solutions that improve productivity and sustainability for the mining industry.

At the commencement of its second funding term in July 2015, CRC ORE was originally targeting to achieve \$112m of contributions over its six year term.

Due to the significant interest in its technologies, that target has been well exceeded with the centre now anticipating receiving more than \$150m in cash funding and in-kind support by miners, METS companies, research institutions and the Australian Government to optimise resource extraction.

CRC ORE invites parties interested in its technology to get in touch.

For those attending this year’s IMARC conference, CRC ORE will have chief executive Dr Adair attending as a keynote speaker.

More information can be found at <https://crcore.org.au> or by visiting the team at their IMARC stand F5.

Bulk ore sorting

NATIONAL

AS global grades decline, and new high-grade discoveries operating mines and development projects are facing mounting pressure to materially improve the efficiency of mining systems.

Where applied properly, bulk ore sorting systems represent an opportunity for miners to simultaneously improve revenue and decrease costs - without introducing excessive complexity.

Bulk ore sorting systems with cutting-edge grade measurement devices make it possible to deliver analogous improvements at the scale of typical large mining operations that are processing tens of millions of tonnes of ore per annum.

NextOre’s flagship product, the on-belt magnetic resonance (MR) analyser, is used in high-throughput bulk ore sorting systems and allows for the grade of high throughput ore to be measured at industry-leading accuracies and speeds.

Radio waves are pulsed into a moving sample of ore and the response measured with a specific signal tuned to the signature resonant frequency unique to the target mineral, resulting in real-time grade measurements.

The MR measures, analyses, and physically diverts ore with minimal impact on other on-site systems – balancing high sorting performance with practicality and low cost.

Ore upgrade and waste rejection

Throughput capacity of the MR analyser is between 100t and 5000t per hour with zero



Surface bulk ore sorting plant using NextOre on-conveyor MR Analyser.

loss in measurement sensitivity at higher throughputs.

The system can measure grades quickly and accurately, measuring 100pc of the material on the conveyor belt for metal content, regardless of its size, shape, moisture content or rock type, in two second measurement intervals.

By reducing the measurement interval, a short conveyor belt can be used after the analyser and before the diverter gate, allowing the ore sorting system to more easily be integrated into existing conveying

systems.

This corresponds to pods of 30kg to 150kg for small operations (1Mtpa) and 1t to 5t for larger operations (10-40Mtpa), and between a 15-40pc reduction in tonnes equivalent or improved metal recoveries depending on the geological and operating conditions of the project.

Improved recovery

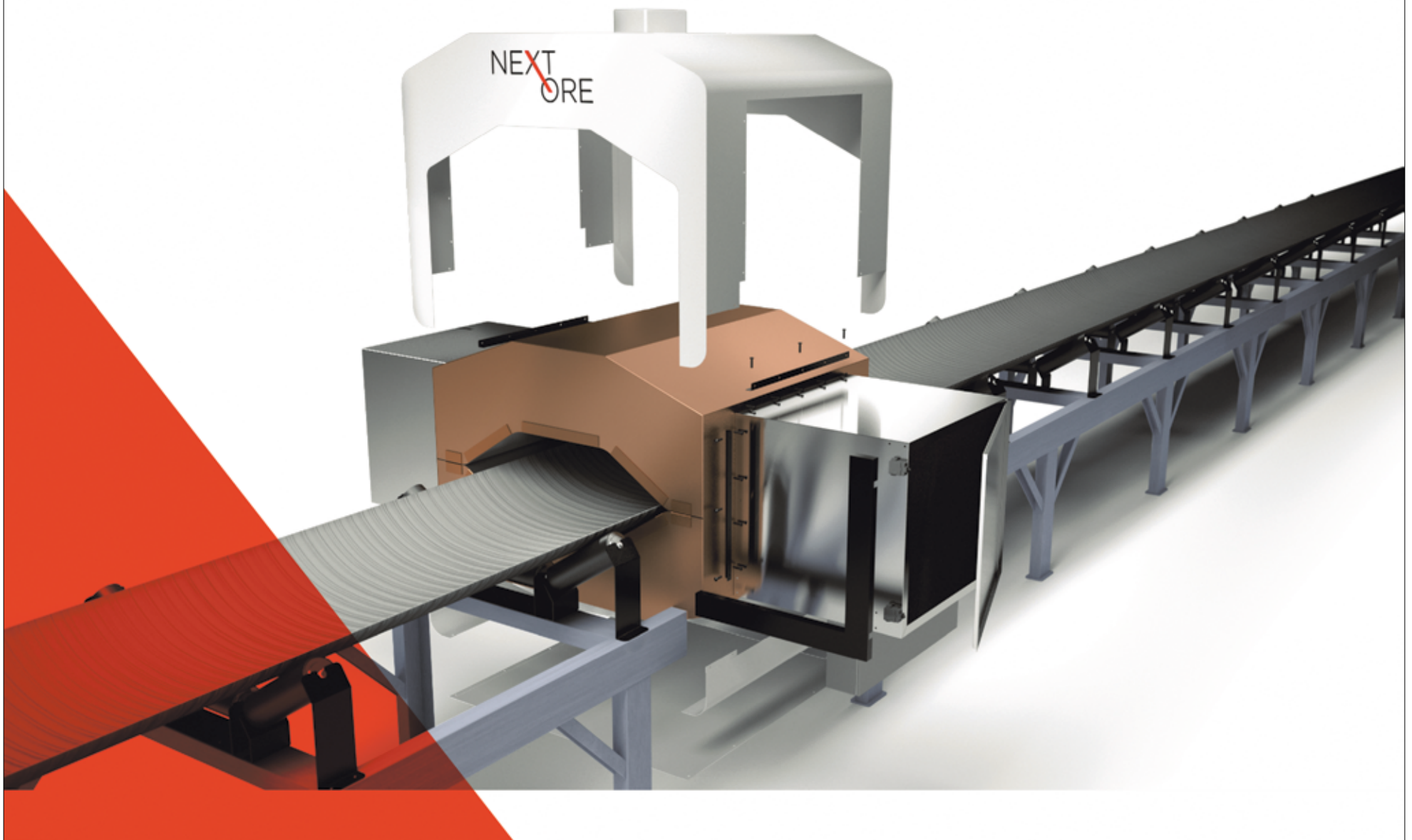
Bulk ore sorting can deliver an overall increase in metal recovery to mining

operations by capturing a portion of metal that would otherwise end up in waste dumps.

The result is an increase in metal directed to the processing plant without a commensurate increase, and often a decrease, in gross ore tonnage.

For more information about how NextOre can offer bulk ore sorting systems customised to your existing assets or development projects visit: www.nextore.com.au.

See them at IMARC stand CA 20.

NEXT
OREMAGNETIC RESONANCE
TECHNOLOGY
DEVELOPED BY CSIRO

Breakthrough Bulk Ore Sorting Technology

Powered by advanced MR technology, NextOre sensing systems provide sector leading accuracy and speed of grade measurement to enable bulk ore sorting systems at full mining rates.

Visit us at IMARC at booth CA20

to discuss how bulk ore sorting can improve the performance of your mine.

www.nextore.com.au

Advanced Sensing

MR is an advanced radio technology that directly measures mineral content. MR measures all ore, regardless of particle size or bed depth, and has demonstrated accuracy of $\pm 0.023\%$ (Cu) in full-scale mining applications.

Mine Scale

NextOre on-conveyor analysers are fitted over industry standard conveyor belts, installed in hours, and calibrated from the factory with demonstrated throughput capacities of between 100 - 5,000 tonnes per hour.

Real Time Data

Measurements are delivered in seconds, and provide precise operational control to deliver the highest value from your mine.

Increase the trucking factors

NATIONAL

MINES around the world are increasing trucking factors and production with innovative load scanning technology from Loadscan.

Aeris Resources' Tritton mine was one of the first local mines to invest in Loadscan technology.

The NSW copper mine credits the installation of its load volume scanner (LVS) for a 9.7pc increase in trucking factors, worth a massive US\$430K per month.

Tritton purchased a block-mounted fixed LVS and installed it on the road between the portal and the processing plant in 2015.

The LVS unit allowed non-contact, automated drive through scanning which was more attractive with minimal maintenance required than with the old inground scale.

Aeris Resources geotechnical engineer at Tritton mine Matthew Gouldstone said that the return on investment was extremely quick.

"Within the first full month after installation, the LVS paid for itself," Mr Gouldstone said.

The first LVS install was so successful that Tritton installed a second LVS unit into its Murrawombie site in 2017.

The mine previously used paper plods, generated by truck drivers, to



A Loadscan volume scanner in action on site.

track loads shifted.

This manual recording system added data entry time to the daily workload of the haulage supervisor.

Now, with the inclusion of Loadtrak in-cab consoles, this is all captured by the LVS system automatically, removing 20-30 minutes of data entry per shift; streamlining operations and reporting.

through increased productivity, lower cost per tonne hauled, and precise traceability.

Operational performance monitored

Mine management is enabled to manage haul-back and reveal the true shift tally. Managers can accurately calculate net volumes delivered for processing, minimise truck downtime, and eliminate quantity disputes between haulage and mill.

Safety in place

The LVS provides 3D load profiles for every load enabling early detection of overloading or off-centre loading. Good load placement also helps maintain good haul roads (decreasing the risk of road deterioration which leads to poor ride quality and whole body vibration).

Upskilling of workers

The LVS can cater as an ongoing training tool educating loaders using real-life visual feedback.

Time-saver

The LVS eliminates manual data entry/driver records as well as minimising paperwork — no more after-shift record sorting!

For more information visit: www.loadscan.com or IMARC stand A6.

Increased trucking factors

Mines worldwide are achieving up to 15pc increase in trucking factors, thanks to optimised loading, accurate monitoring and the removal of haul-back.

Fulfilled resource potential

The scanner can contribute to unlocking mine potential as quickly as possible

Real-time actionable intelligence so you can increase trucking factors



BOOTH A6

Equip your mine to optimise loading, eliminate haul-back, and improve productivity.

NSW branch now open!

Contact **Gavin Selth** to see what difference volume scanning can make to your mining operation's bottom line.



Freephone 1 800 335 305 | Email sales@loadscan.com

LOADSCAN
LOAD VOLUME SCANNERS

LOADSCAN.COM

Streamline data with Monico

NATIONAL

MONICO INC is an expert in industrial engine communications, and in particular, communicating with Caterpillar equipment in all mobile and stationary markets.

President and chief executive Doyle Taylor said that Monico's gateways are industrially hardened products that are pre-configured to be as 'plug and play' as possible, while providing scaled streaming data over a compressed and encrypted channel to meet today's cyber security needs.

"We have recently completed installations on Caterpillar mining equipment where we are providing streaming data directly into our customer's OSI Pi System data infrastructure," Mr Taylor said.

"This data is being used to provide operational intelligence to improve efficiency and pre-planned maintenance."

In the mining market in particular, only certain CAT equipment (such as haul trucks) have the option of a VIMS module to provide data to a customer.

"Unfortunately, it is aggregated data such as average, minimum, maximum, and median data and is provided in a text format once per hour — this does not meet the customers' needs for streaming data for



The mCoreSDR can stream CDL and J1939 data to OSIsoft Pi or MonicoLive for remote viewing, alerts and notifications, and analytics.

analytics," Mr Taylor said.

"Other equipment, such as dozers, do not offer this option at all.

"Monico gateways can fill this critical need in today's digital transformation environment."

The gateways read data from the machine network, create data containers and buffer them until a network connection is available for transmission.

In an industry where equipment is often heavily used in unforgiving environments, the buffering of data,

events and diagnostics enhance the ability to assess overall equipment health.

Mr Taylor points to a recent example in which Monico's gateways provided streaming brake temperature values for all wheels on a loaded decent road.

"The customer is comparing drivers of the large haul trucks to see who needs remedial training in the operation of the vehicles," he said.

"This achievement alone will save a tremendous amount of maintenance

money due to the large cost of brakes and tires on these vehicles."

Monico aims to work with customers' experts in future to create analytics for the engine and machines.

"This would then be pushed down to the gateway where everything can happen in real-time," Mr Taylor said.

For more information about equipment monitoring with Monico visit: www.monicoinc.com.

Monico Inc will exhibit at IMARC booth A14.

MONICO
SIMPLE SOLUTIONS. POWERFUL MONITORING.

Your Machine. Your Data. Your Way.™
www.monicoinc.com



mCore[®]SDR

- **Live Stream Data:** Cat® Data Link (CDL) and J1939
- **Rugged Device:** IP66 and IP67 / Class 1 Div 2
- **Edge Analytics:** Analytics processing capability
- **Cybersecurity:** Secured for OT environments
- **Preconfigured:** Solutions are delivered ready to go
- **IIOT Enabled:** Supports OSIsoft PI integration



MONICO[®]LIVE



- **Access from anywhere –** Remote Data Monitoring
- **Historical Data Storage**
- **Visualise Data**
- **Cloud Analytics**
- **Alerts and Notifications**
- **Trending of Data**
- **Track Readable Fault Codes**

* Monico Inc. is not associated with or sponsored by Caterpillar ® or Caterpillar ® subsidiary Perkins Cat ® and Caterpillar ® are registered trademarks of Caterpillar Inc.

Come Visit Us at IMARC booth #A14

ACCELERATED INNOVATION

The WA Mining Conference is a brand new mining conference that will look at the life of a mine from operational strategy through to execution and address both the strategic and technical approaches to improve productivity, lower costs and optimise the end to end process.

RAY CHAN

INNOVATION in the mining industry continues to accelerate at an unprecedented rate and WA is very much at the centre.

The complexities of this rapid rate of change and the key drivers pushing the WA mining industry will be examined in a brand new mining conference that takes place in Perth on October 15 and 16.

The program will examine innovation across the entire value chain from early stage exploration, to scoping and feasibility, onto design and construction through operation and ultimately rehabilitation.

These in-depth sessions will provide operational and execution strategies of a mine's life cycle and discuss approaches to improve productivity, lower costs and optimise the end to end process.

The two-day conference will have an impressive line-up of speakers that will feature mining decision makers, technology experts and industry leaders.

“No other event in WA offers this level of insight into the key drivers accelerating the WA mining sector to 2030.”

On day one, international mining expert and former external affairs manager for BHP Billiton, Dr Osvaldo Urzua, will discuss transiting to safe, smart, inclusive and sustainable mining.

“The world is rapidly heading to the automation era and mining can make automation work for all,” Dr Urzua said.

“The WA Mining Conference gives me a chance to discuss how collective action is required, and technology suppliers must consider social and community impacts.

“This is a new factor to be considered in the assessment of companies bidding processes.

“Australia is an example of how



Attendees will be given the chance to hear from leading experts who will share their insights about what is driving the mining sector forward.

mining has participated in technological revolutions. In the past Australian software has revolutionised mine planning processes. Today's METS sector is the new champion.”

Swedish academic, technologist and strategic advisor to the Defence SA advisory board, Professor Goran Ross, is also one of the key speakers at WA Mining.

Professor Ross will discuss collaboration strategies for the industry and what Australia can do to accelerate its innovations and capabilities.

WA Mining director Brandon Ward said the conference will provide delegates with a conversational style platform that will address the role technology and people will play in the future of mining in WA.

“The WA Mining conference agenda echoes the importance of collaboration, innovation and technology development in the WA mining sector,” Mr Ward said.

“Attendees will be given the chance to hear from leading experts who will share their insights about what is driving the sector forward while providing a unique opportunity to participate in this open and

transparent dialogue.”

“WA Mining will be technology-centric but it will examine the vital role people will play with augmented human intelligence, machine learning, predictive analytics and how the industry ensures the human capital is available to take the sector through its next phase.

“No other event in WA offers this level of insight into the key drivers accelerating the WA mining sector to 2030.”

A session will be held to discuss options for hiring or outsourcing equipment and workforce, looking at the drivers that the industry will face as the technological and social landscape changes.

The discussion will examine whether the accelerated rate of innovation could change the economics drivers and models in the Industry.

Interlate strategy director George McCullough will examine the future of remote monitoring in 2030 – remote operation technology and how this will impact the set-up for the future.

Factors include remote monitoring,

what we have learned, and where will remote monitoring be in 2030; best case examples on recent changes/challenges in remote monitoring and operations and how technology/engineering helped face them; what can be anticipated with the rise of drones, 3D printing and wearable technologies; and leveraging the mining Internet of Things.

Andrew Scott from the Global Mining Guidelines Group will investigate how blockchain can create new business models, its real benefits to the value chain, and how it can be used in innovative and useful ways.

This session will explore the role of blockchain in the future of mining, reporting and compliance measures considered and how the way data is generated and processed needs to be rethought.

There will also be a panel discussion on walking the climate change tightrope, and balancing long-term goals with future policy.

Panellists will re-evaluate the environmental and climate change process and how the industry can adapt to a low carbon future; look at recent actions such as the Gloucester decision and how this has fueled an innovation of response to the industry; and how climate change policy will continue to transform the industry in the future and what approaches should be looked at.

Alongside the conference will be a targeted supplier showcase where delegates can source the latest products and services as well as a networking event on the first night to catch up with colleagues from across the state.

WA Mining will take place on Tuesday, October 15 and Wednesday, October 16 at the Perth Convention and Exhibition Centre, with doors opening at 9am on both days.

Tickets are now available and they can be purchased by visiting waminingexpo.com.au.

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design and construction.

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More than 50 years later, Shaw Almex has nine corporate facilities and a network of exclusive distributors that are strategically located on five continents, providing a comprehensive sales and service support system to the company's

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To better serve its WA customer base, Shaw Almex has opened a new branch in Perth to supply clients with OEM services, spare parts, and in-house and onsite OEM training.

This opening coincides with the release of two innovative products.

The first is the new state-of-the-art T6GFXP Ground Fault box that offers data

logging of platen temperature, pressure and thermocouples, then combines the data in a QA report ready for the client.

It is capable of networking across eight sets of control boxes, maintaining temperature variation within 2.7 deg across all platens.

Splice parameters can be easily set via the touch screen or the Almex handheld device.

Also released is the new HP25MAX pump with increased capacity and quieter operation, ability to pressurise the vulcaniser in half the time, and many more features.

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- 4.3" full color touch screen display
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HONEYMOON'S PERIOD

With overall consensus expressed at the September 2019. World Nuclear Symposium in London, that the uranium market is on its way to recovery, and the recent US decision on Section 232 petition unlocking buying activity from US utilities, Boss Resources is readying its 100pc owned Honeymoon uranium project in South Australia to take advantage of a renewed positive outlook for nuclear energy.

The next five to 10 years look bright for Boss Resources and uranium in general.

EMMA DAVIES

LOW uranium prices led to the Honeymoon project being placed on care and maintenance in 2014, but Boss Resources is well underway to restart operations with the DFS expected to be complete by the end of 2019.

From there it's a case of confirming an offtake agreement to secure financing for the re-start of the project – which is essentially dependent on global uranium prices.

Boss believes the landmark decision of US President Donald Trump to decline issuing quotas for domestic US uranium production is very positive for Australian producers and the uranium market as a whole, as the declined restrictions may have created long term distortions in the market which could have further impacted the recovery of the uranium market.

Mr Trump's decision is expected to assist unlocking buying activity from US utilities and support uranium price increase – near perfect timing for the restart of the Honeymoon project.

"We welcome President Trump's resolve as Boss is in a very good position to respond as US utilities come back to the market," Boss Resources managing director Duncan Craib said.

"We have solid relationships with a variety of US utilities with whom we have been discussing off-take contracts."

Mr Craib said that Australia has been a long-term reliable and important supplier of uranium to the US and the decision will see this continue, underpinning project development in Australia as well as providing foreign investment.

"The outlook on improved uranium prices is positive," he said.

"Boss' 100pc-owned and fully permitted Honeymoon Uranium Project has the same cost structure and restart timeline as most of the tier one and tier two producers with existing and expansion capacity, making it

one of the few uranium projects worldwide positioned that can participate in the early stages of a new bull market.

"President Trump's announcement is timely as Boss advances its restart strategy and continues contractual discussions with US utilities, in concert with the underlying price of uranium.

"We look forward to business as usual in the US without tariffs or trade restrictions."

Re-start strategy

To ensure a pathway for continued success, a staged approach to restart the Project has been implemented by the Boss Resources board to address the challenges the previous owners had encountered.

Phase one of the Honeymoon re-start strategy was completed in April 2019, generating the final input data required to complete the Honeymoon DFS for production capacity of 2mlb/annum, to be ramped up to about 3.2mlb/annum uranium production.

This phase also includes the drilling program to deliver the measured and indicated resource, an optimisation program to deliver further cost savings and/or process improvements and a preliminary execution plan, updated cost estimate and schedule for the re-start of the existing Solvent Extraction (SX) plant.

Phase two is currently underway with the appointment of GR Engineering as Study Manager to complete the DFS engineering works, process engineering design and cost estimation, to deliver an independent feasibility study report.

And finally phase three of the re-start strategy involves detailed execution planning, operational readiness inclusive of SX plant recommissioning plan (currently on care and maintenance), in conjunction with the ion exchange plant detailed design.

These staged developmental steps will ensure Honeymoon will be in a position to proceed to mine as one of the first restart

competitive global producers.

Mr Craib said that the company is looking to secure an offtake agreement for the Honeymoon project.

"We're encouraged by our discussions with utilities as Honeymoon is seen as a real and near-term supply prospect, with a cost structure which would make it economic at similar levels to restart recently idled Tier 1 production," he said.

Once offtake and subsequent financing has been finalised, the company can begin construction of the processing plant and estimates start of production could be as soon as within one year.

Exploration potential

Boss has successfully proven up a significant increase in the global uranium resource to 43.5mt at an average grade of 660 ppm eU3O8 (for 63.3mlb eU3O8) above the 250ppm lower cut-off, and has plans to explore the 2595sqkm of prospective land tenure made up of the granted mining lease, five granted exploration licenses, three retention leases and two miscellaneous purposes licenses.

Honeymoon contains a combined exploration target of between 32mt to 78mt eU3O8 at a grade of between 450ppm and 1400ppm eU3O8 with a potential target endowment of between 42mlb and 100mlb of contained uranium.

To better understand the geology, mineralisation continuity and volume, Boss conducted advanced 3D geostatistical modelling over the three deposits on the Honeymoon Restart Area – which the company believes will be invaluable in assisting the technical and development teams to understand the orebody from both an exploration and mining perspective.

It will allow for more precise designs of production wellfields, boreholes and specific screen placement in these holes.

"We are really excited with our Exploration Target, and look forward to unlocking additional large-scale uranium

mineralisation within the broader Honeymoon Uranium Project," Mr Craib said.

"This is being made possible by the diligent efforts of the geology department re-analysing historical and recent drill and geophysical results."

Having multiple wellfields available and online (combined with a modularised plant) allows some flexibility as wellfields can easily be operated and turned off or brought back online depending on target production and more importantly target operating costs.

This significant flexibility in production capacity to seize upon upswings in market prices and readily adjust during the downswings means the Honeymoon project can respond very quickly to changing market conditions and catch the upside of the market cycle by operating from operating in the lowest cost quartile.

Nuclear on the rise

The next five to 10 years look bright for Boss Resources and uranium in general, with demand and acceptance of nuclear energy on the rise.

The World Nuclear Association's (WNA) projections for nuclear generating capacity growth have been revised upwards for the first time in eight years, following the introduction of more favourable policies in a number of countries.

Nuclear energy has also seen a swing towards a positive rhetoric for its importance for the transition towards a clean and affordable energy system.

With the restart of the Honeymoon project expected to coincide with demand, Mr Craib said "The overall consensus at the WNA Symposium appears to be that the market is on its way to recovery, demand is growing, inventory is falling and prices have to rise to incentivise supply – the longer prices stay low the stronger the upswing."



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Honeymoon DFS for GRES

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GRES has successfully completed feasibility studies, process and engineering designs, construction for

projects of various scale, and covers a diverse range of mineral commodities.

The company has delivered mineral processing or hydrometallurgical facilities and infrastructure for precious metals, base metals, mineral sands, industrial minerals, tin, tungsten and iron ore projects for a range of clients, both in Australia and internationally.

GRES has been appointed by Boss Resources as the lead study consultant on the Definitive Feasibility Study (DFS)

for the Honeymoon uranium project, and had been involved in some of the earlier studies for the project in 2016 and 2017.

GRES is pleased to have been selected by Boss to assist with the final stage of study and the potential restart of Honeymoon.

The innovative engineering solutions developed by GRES enable clients to confidently move into development with the knowledge that the outcomes from study work will be replicated in the

operation of their projects.

GRES also has a presence in the hydrocarbons industry via its wholly owned subsidiary, Upstream Production Solutions (Upstream).

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*GR Engineering proudly supports Boss Resources in the development of the Honeymoon Uranium project.



REGULATING THE GOLD RUSH

The Victorian mining industry is being bolstered by a recent spike in the gold price, and even with the introduction of a gold royalty, exploration licences in the state are in high demand.



All Images: VIC Department of Jobs, Precincts and Regions.

Victoria's Minerals Resource Strategy 2018-2023 includes initiatives to boost greater investment in minerals exploration.

EMMA DAVIES

WITH the gold price at an all-time high, and Victoria's largest mine at Fosterville forecast to produce 550,000-610,000 ounces of gold in 2019, there's been a significant resurgence in domestic and international interest in Victorian gold.

In response, the Victorian state government budget 2019-20 will introduce a 2.75pc gold royalty from January 1, 2020, which will bring Victoria in line with other states and is expected to generate \$56m.

Small miners will be exempt but Minerals Council of Australia Victoria branch executive director James Sorahan said the tax is reckless, poorly considered and will hurt regional communities and threaten jobs in a growing industry.

"Without changes, the royalty will have an unfair and significant impact on the operating costs of all gold mines in Victoria," Mr Sorahan said.

"There is a serious risk that mines will close early and regional development will be handicapped through less investment."

The MCA Victoria has proposed reforms to remove the unintended impacts by introducing an exploration offset to encourage exploration to create profitable royalty-paying mines; a progressive royalty rate structure with a gold price floor to account for inevitable lean years of low or no profitability; staged implementation to reduce retrospectivity and; a structure to ensure revenue raised from the royalty is spent in the regions.

"Without these changes, royalty receipts will come at a cost to investment in exploration," Mr Sorahan said.

"A new 2.75pc gold tax would add to uncertain project approval and regulatory regimes and regulatory duplication and inconsistencies."



The gold royalty takes effect on January 1, 2020.

The projected \$16 million in revenue per annum from the gold royalty compares to over \$300 million spent in Victoria by gold miners in 2018 on wages, goods and services, taxes and community grants.

Mr Sorahan said that the closure of just one mine would wipe out the entire benefit of the royalty revenue.

"The government appears oblivious to the fact that Victoria competes for investment in gold mining with every Australian jurisdiction in a globally competitive industry," he said.

"Victoria's gold industry has unique characteristics which require a more considered approach to the implementation of a gold royalty."

Specifically, Mr Sorahan pointed to Victorian gold orebodies being typically narrow vein and nuggety with irregularly distributed deposits which are more difficult for mine planning and typically incur higher production costs.

Victorian gold mines are also underground which involves higher costs than open cut mining given that gold has higher processing costs than other commodities.

"Despite this, the Victorian Government wants to impose a higher gold royalty than WA – which produces 68pc of Australia's gold," Mr Sorahan said.

"The shorter reserve life of Victorian gold

mines makes exploration the lifeblood of sustaining gold operations in our state.

"Gold mining requires ongoing exploration investment to keep replenishing ore reserves and resources to maintain mine life."

MCA Victoria has urged the State Government to start again by listening to industry on the gold royalty to create incentives to encourage exploration and maximise mine life.

"Every cent of the gold tax should be reinvested in regional Victorian communities," Mr Sorahan said.

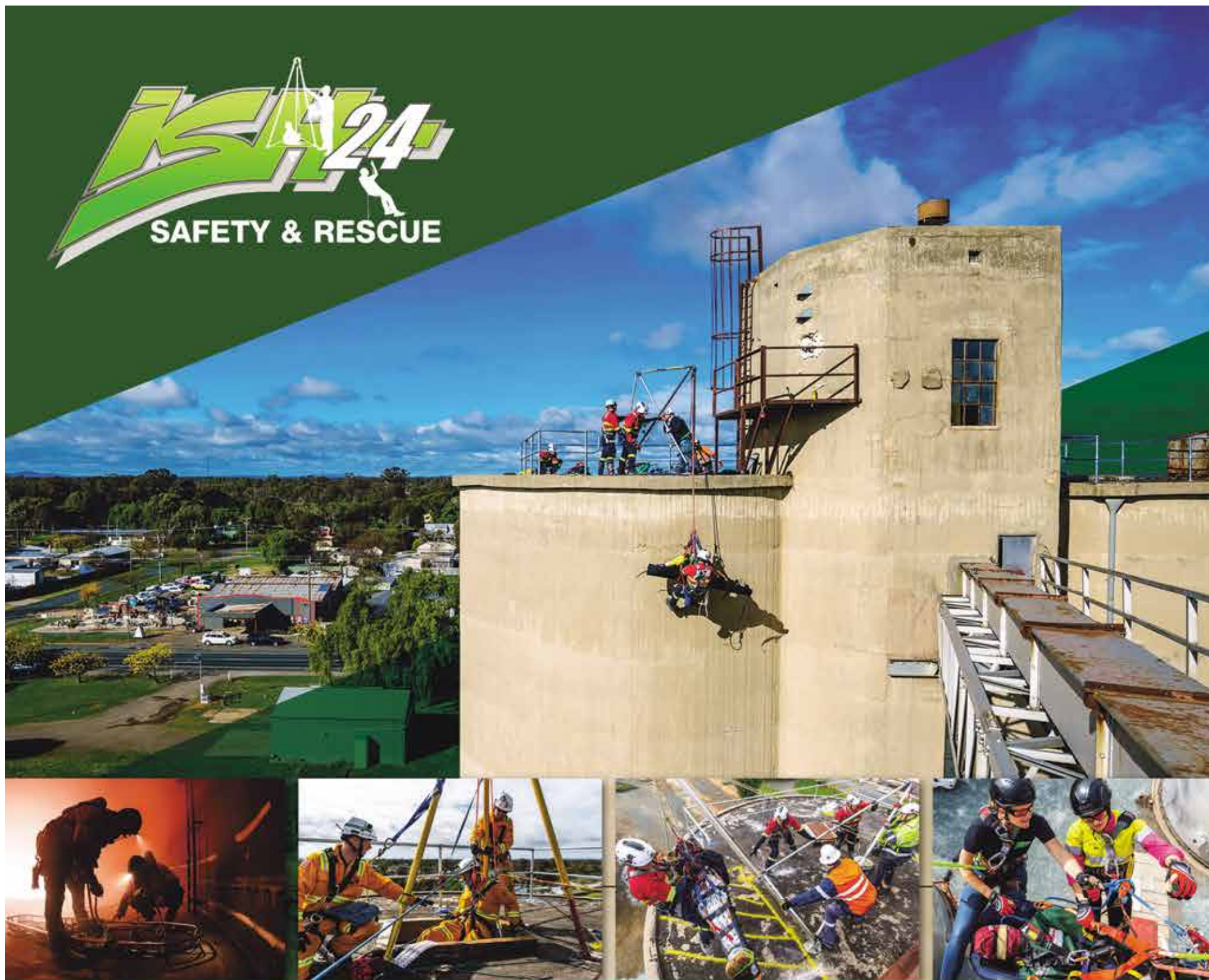
Mineral resources strategy

The royalty seems at odds with the State's Minerals Resources Strategy 2018-2023, which is focussed on helping grow investment and jobs in Victoria's minerals sector and its initiatives to boost investment in minerals exploration.

The Staveland Minerals Exploration Initiative is once such program which aims to encourage investment, with more ground in northern Victoria, with similar geology to the Fosterville gold deposit, expected to be released for minerals exploration in late 2019 via a competitive international tender.

While the Department aims to attract international companies to the State through these exploration initiatives, it's taken an integrated approach including conducting geoscience programs to identify areas that have the most potential for mineral discoveries, understanding the local land uses, environmental, water, land access and other factors that are most important to the region's local communities.

(CONTINUED ON PAGE 51)



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design and build of mud pumps and solid control systems.

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(CONTINUED FROM PAGE 48)

They include identifying and making available areas suitable for minerals exploration in a way that encourages the best exploration programs and explorers who are committed to working more closely with land holders and local communities before, and at all stages of their exploration programs.

The initiative also aims to engage with local communities, land holders, councils, water authorities and others in the region, to understand what's important to them, and involved an extensive geoscience program named the Stavely Project which found that the Stavely Arc has the geological potential for new copper, gold and possibly other metals discoveries.

Then there is the TARGET Minerals Exploration Initiative, a \$15 million strategy designed by the State Government to encourage investment in exploration for copper, other base metals and gold in Victoria (and create more jobs and new investments in regional Victoria).

The initiative includes government grants for companies to conduct co-funded minerals exploration programs for eligible minerals.

The grants cover up to half the cost of eligible exploration activities, which include geophysical surveys, drilling and sampling analysis and since 2016, 15 projects have been awarded more than \$3.4m in TARGET grants.

In October 2018, a further five projects in the Stavely Arc in western Victoria were selected to share in \$2.3m in TARGET grants (subject to being granted a minerals exploration licence), as part of the Stavely ground release tender.

However, securing a grant is a competitive process, with the State revamping assessment guidelines to raise

the bar on who can access state owned minerals.

The new guidelines will make sure a company's track record, and the records of its directors and executives, are examined when considering licensing decisions.

The goal is to provide greater assurance for farmers and communities that public safety, infrastructure and the environment will be protected when minerals explorers and miners work on both private and public land.





The changes will also benefit the sector by providing upfront and consistent information about how mining licence applications are assessed, making it easier for people with a good track record to apply.

These changes have been part of the process for assessing potential licensees for the Stavely Ground Release in western Victoria and will also be front and centre for the Lockington Ground Release in northern Victoria later this year.

Resources Minister Jaclyn Symes said the new guidelines centre around the main theme of the Mineral Resources Strategy – building a minerals sector that creates jobs, particularly in regional Victoria, and giving communities across the state confidence in the sector.

“We’re raising the bar to make sure our mining sector employs the most qualified and reputable people to access our state’s mineral resources with a strong focus on supporting the communities they work in,” Ms Symes said.

“We’re attracting people to our minerals and mining industry with a strong track record of integrity and collaborating with the community, to ensure we can keep supporting local economies and creating Victorian jobs.”



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COPPERING IT SWEET

Aeris Resources has had massive successes at its Tritton deposit and, as it gears up for a year of exploration, the company seems confident the next big discovery is just around the corner.

Underground at Tritton.

GERARD MCARTNEY

AERIS Resources' Tritton Copper Operations has gone from strength to strength, with FY19 exceeding production guidance and an aggressive exploration program that continues to yield exciting results.

The Tritton Copper Operation comprises the Tritton underground mine, the Murrawombie underground mine and the prospective Budgerygar project in NSW.

Aeris executive chair Andrew Labuschagne said that the success at Tritton

had continued to exceed expectations in terms of both grade and tonne.

"Despite the impact of the weakening currency over the past 12 months on our US dollar treatment and refining charges and sea-freight costs, we maintained C1 cash costs within the lower end of the guidance range provided in July 2018," he said.

Tritton underground

Production from the Tritton underground mine exceeded the 24,500t production guidance for FY18, producing 26,852t of copper at a cash cost of 2.78/lb.

The company said that its revised stope extraction sequence improved the ore quality, and that the stope design and orientation of the extraction sequence was changed to accommodate the "evolving ore body geometry and the increasing ground stress associated with the revised stoping design delivering stable stope production in 2019".

As Tritton went deeper, the company upgraded the loading and hauling efficiencies at the lower levels of the mine.

This included upgrading the tele-remote loader system and the establishment of a

truck loading loop for haul trucks

The company said that these initiatives demonstrated reductions in truck loading "between a half and two thirds, compares to the conventional loading methodology", despite the deeper operations.

Significant improvements to the communications and data backbone were made at Tritton, and the company installed the infrastructure necessary for camera set-ups that will allow for the remote loading of trucks in the loading loop from the surface control room.

The company said that this would also allow for the remote monitoring of selected paste fill infrastructure, meaning it could identify issues faster, and free up underground labour for other activities.

Murrawombie underground

At the secondary production source of the Tritton Copper Operation, commercial production rates at Murrawombie were achieved in 2018, and production increased in 2019.

A detailed stope design that was undertaken in FY19 greatly improved the geological understanding of the mineralisation and the resultant selective mining greatly improved copper grades.

The company said it had continued its grade control diamond drilling and geology mapping, and the ore drives continue to improve the detailed understanding of the deposit's geology.

"Revisions of the resource model using this additional information have occurred during the year, allowing selective mining on the higher grade mineralisation," it said.

"Toward the end of the financial year grade control drilling identified mineralisation to the north and below the current Mineral Resource envelope."

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Running from October 16-17 in Toowoomba, the South Queensland Energy and Resources Expo will cover renewable energy, gas and mining through to infrastructure, engineering, construction and transport – but communities and companies are concerned that, if coal is phased out, there will be other opportunities for employment in the region to fill the gap.

The South Queensland Energy and Resources Expo depends on the success of the mining industries.

EMMA DAVIES

QUEENSLAND is a state heavily reliant on resources for its economic prosperity, and the South Queensland Energy and Resources Expo is a key networking opportunity for businesses in the Toowoomba region.

According to Toowoomba regional council mayor Paul Antonio, mining generated just over \$940m in the 2017/18 financial year.

“The mining and resources industry makes up around 14pc of our \$10.81 billion Gross Regional Product, with most of this coming from the coal and gas industry,” Mr Antonio said.

“As mayor of this region, I advocate at every opportunity for an informed balance between the economic opportunities presented by the mining and resources boom and the future health of our environment, ongoing prosperity and long-term sustainability of our agricultural industry.”

Mr Antonio’s sentiments are echoed by the Toowoomba and Surat Basin Enterprise (TSBE), which is presenting an Enterprise Evening as the main business and industry networking opportunity for the Expo on October 16.

The enterprise evening will feature EnergyQuest head of consulting Richard Wilkinson, who will provide an update on domestic gas and export developments happening nationally and in the region, as well as his views on future demands and potential inhibitors; and the Clean Energy Council director energy generation Anna Freeman, who will provide an update on projects happening nationally and in the region for the renewable energy industry.

The final speaker for the evening is the Queensland Resources Council policy director, infrastructure and economics, Andrew Barger, who will comment on the current and future opportunities for the coal sector in Queensland.

TSBE is working with businesses with an interest in the developments and growth from renewable energy, gas and mining through

to infrastructure, engineering, construction and transport that are happening in the Darling Downs and Surat Basin region.

“Energy, metals, minerals are the building blocks of economic growth and new technologies are driving up demand, particularly in Queensland’s traditional markets in South East Asia,” a TSBE spokesperson said.

“But we must consider if we are doing everything required to grab these opportunities in Queensland. TSBE plays a major role in linking these opportunities to businesses in the region encouraging an investment in local content and capability.”

According to the TSBE, resources contribute \$1.8b to the Darling Downs GRP (which is 11pc of the GRP) and provides 9200 full time jobs.

“Investment in our region is continuing and we’re seeing increased drilling of gas wells in the Western Downs and Maranoa,” the spokesperson said.

“The Queensland Government’s release of CSQ tenements to be utilised for domestic gas production has seen new players such as Senex Energy, Central Petroleum and Armour Energy offered mining leases.”

TSBE believes the region has unrivalled road, rail and air connectivity, and is perfectly positioned for long-term prosperity, especially with large projects supporting logistics infrastructure, including the Toowoomba Second Range Crossing, Toowoomba Wellcamp Airport and the upcoming Inland Rail.

“Exporting our products is a huge focus for the Toowoomba region,” the spokesperson said,

“TSBE has received a federal government grant to assist food and agriculture businesses as well as businesses innovating in the oil and gas space to export their products and ideas overseas.

“This creates a strong flow-on effect in the supply chain, economy and local communities.

“The Enterprise Evening will showcase

the opportunities on offer as Queensland aims to resource the future.”

Beyond coal

According to the Clean Energy Australia Report, as at 2018, Queensland renewables make up 9.5pc of Renewable Energy Penetration across Australian states.

Renewable energy projects offer short and long-term work within the region, with a range of industries and businesses involved.

“Renewable projects are on the rise in our region. Yarranlea Solar Farm will be complete this month providing 100MW of power, the Coopers Gap Windfarm near Kingaroy will be up and running next year providing 450MW, and approval has just been given for a 250MW windfarm in Dulacca,” the TSBE spokesperson said.

“There are another 20 or so other renewable projects that are in various stages of approval.”

The future of Queensland’s mining industry beyond coal will no doubt be at the centre of industry leader’s speeches and networking discussions at the expo, with the recent controversy around the New Hope’s New Acland Stage 3 coal mine expansion being rejected by the State Government.

Mr Antonio said the mine was a major economic contributor to the Toowoomba and Southwest Queensland region, injecting \$300m into Queensland’s economy and \$100m into the Darling Downs economy annually.

“We have great concerns for the future of workers, local businesses and families whose livelihoods depend on the project proceeding,” he said.

“The impact of the mine stretches much further than the community of Oakey and the Toowoomba Region. The government can’t ignore the \$530m per annum economic impact of the mine expansion.

“The operation employs about 800 staff, including 275 local men and women and 507 contractors, as well as providing for around 2,300 indirect jobs.”

Mr Antonio also expressed concern that the loss of coal from Acland on the rail freight network would adversely affect transport costs for agricultural commodities across south west Queensland due to a loss of cross-subsidies, especially for grain, and would affect ongoing rail line maintenance costs at a time Queensland should be vigorously pursuing efficiencies to grow its world-class agricultural offering.

But the main point of contention around New Acland is the future of coal in Queensland.

“A rejection of the application for the Stage 3 expansion of the New Acland mine would deliver a devastating economic and social blow to the community of Oakey, which is still reeling from the highly publicised impact of ground-water contamination, as well as to the broader Queensland economy,” Mr Antonio said.

“When weighing up the prospects for a sustainable resource industry, my interest lies in what is the best outcome for our region.

“We need the best outcomes for employment, the environment, but also our communities.”

Mr Antonio said that Queenslanders had to decide, if the future is not in coal in the region, which opportunities would replace the industry.

“We must ensure that regional communities that rely on coal production so heavily for employment can get certainty about their economic future,” he said.

“Significant investment by all levels of government and the private sector will be needed to fill the void.”

The South Queensland Energy and Resources Expo takes place at the Toowoomba Showgrounds on October 16-17 and will showcase dozens of companies with new innovation and products that are suitable for all areas of mining, energy, renewables and infrastructure building across South Queensland and into the Surat Basin.



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NATIONAL

TREOTHAM Automation specialises in the design and implementation of moving power supply systems, in particular energy chain systems, which can transmit air, water, and oil without interruption.

Energy chains can be described as “the umbilical cord of modern machines”.

Universal applications include carrying sensitive bus, data cables, fibre optic cables and energy sources such as electricity, gas, air and liquids, often in harsh climate zones.

According to Treotham Bulk and Mining specialist John Sharp, there were many benefits of energy chain systems over motor-powered cable reeling drums and flat cable festoon systems.

“As an alternative to motorised cable drums, Treotham offers complete energy chain systems, which are particularly advantageous over long travels,” Mr Sharp said.

For one, the systems require no slip ring, which was one of the reasons they can transmit various media without interruption.

They also do not require their own drive; they are simply attached to the moving part of the system and carried along.

“Various cables and hoses for energy, data and media can be safely managed in one system and individually replaced or supplemented if necessary,” Mr Sharp said.

“Their assembly is relatively simple and they usually do not require a guide trough to hold the cable along the travel path.”

Other end-user benefits included space saving.

“Depending on the travel/cable length, a cable drum can have a diameter of up to eight metres,” he said.

“In addition, space is required for the motor and the slip ring body.

“In the case of an energy chain system, irrespective of the travel, only one moving arm

is required on the crane - which is integrated in the installation space of the crane, and the installation space for the trough of the chain on the ground.”

They are agile too, with travel speeds of up to 600m per minute without any restrictions on the loads or speeds at start up.

This compares to an average speed of 300m per minute for motor cable drums, which need to be braked and accelerated halfway for safety for centre feed.

Mr Sharp said less cable length was also required for energy chain systems as opposed to the motorised cable drums.

“In middle feed, half the travel length plus 20m reserve must be calculated as the cable length for motorised cable drums,” he said.

“In energy chain systems, one also calculates with half the travel length, but with only two metres in addition, which are needed for the radius of the chain.

“At higher travel speeds (over 60m/min), however, end feed is recommended for motor cable drums.

“This increases the cable length to the total travel length plus 20 metres reserve.”

Recent projects led by Treotham included the retrofit of an iron ore ship loader and the replacement of a conductor bar with an energy chain.

The project was a resounding success, whereby the company was also able to install high-voltage and fibre optic cables and Ethernet, as well as water onto the moving machine, for dust suppression, data acquisition and cameras.

Moving forward, Treotham looks forward to continued delivery of its energy chain systems to mining operations nation-wide, including power supply to conveyor trippers and major bulk expansions.

More information on Treotham and its services can be found at www.treotham.com.au or by emailing info@treotham.com.au.

Registration ensures competency

**NATIONAL
PROFESSIONAL ENGINEERS OF
QUEENSLAND BOARD CHAIRMAN
DAWSON WILKIE**

THE mining and resources sector is a key driver of the Queensland economy, contributing billions of dollars to the State Government through taxes and royalties.

The economic importance of the mining and resources sector to the Queensland public cannot be understated.

Risks to the health and safety of the personnel working on mine sites and the public from mining related activities can also not be understated.

At its core, the Professional Engineers Act 2002 (PE Act) is about protecting the public and setting a standard for engineers.

This is achieved through a registration.

Queensland has had a registration system for engineers since 1929 (currently the only comprehensive and mandatory registration system for engineers in Australia).

Once registered, engineers gain the title of registered professional engineer of Queensland (RPEQ).

Only RPEQs can legally carry out professional engineering services in or for Queensland.

The registration system prevents unqualified and inexperienced persons from carrying out professional engineering services.



The Board of Professional Engineers of Queensland chairperson Dawson Wilkie.

Therefore, the public can have confidence that a person holding the title RPEQ is a qualified, competent and experienced engineer.

Professional engineering services carried out by engineers on mine sites may still affect the public even though these services are not provided direct to the public.

For this reason, engineers in mining and resources are required by law to hold RPEQ status.

For more information on the PE Act or becoming a RPEQ, contact the Board of Professional Engineers of Queensland at admin@bpeq.qld.gov.au.

The Board of Professional Engineers of

Queensland is an independent statutory body, responsible for the administration of the PE Act and regulation of engineers.

*An unregistered person may carry out a professional engineering service under the direct supervision of a RPEQ, or if the professional engineering service is carried out only by following a prescriptive standard.



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Collaboration is the key

EMMA DAVIES

FOR disadvantaged groups like Indigenous Australians to better participate in the infrastructure and mining sectors, collaboration is needed at all levels.

Often people from disadvantaged groups struggle to participate as businesses in plant intensive industries due to the cost of equipment to deliver their services, struggles with compliance requirements and technology, and not having a good network of contacts to help find business in the short term and to develop a pipeline of work in the long term.

Horizontal directional drilling, civil construction and project management company Maxibor is working to stop this cycle of disadvantage, which has impacts on health, well-being, education and community, and is encouraging all stakeholders to support and help build up micro-businesses across the sector.

Maxibor chief financial officer Jeff Simpson said the company's Collaborative Indigenous Business Model embraced respect, relationship and response to help achieve three corporate objectives: sustainable profitability, growing the value of the business assets of shareholders, alliance partners and customers, and building a future everyone can look forward to.

"The first two objectives are economic, the third social, but thinking in the context of these three objectives allows a wider set of outcomes beyond the economic to be achieved," he said.

"Social and environmental outcomes are just as important."

Mr Simpson said the model requires all key stakeholders across the delivery chain to collaborate to achieve the objective of growing the micro business.

According to Christine Sindely, an Arabunna woman from South Australia, who in 2016 authored the Aboriginal Engagement Guidelines for the WA Civil Contractors Federation (CCF), the



Native Earthworks plant operator Chris Young is a beneficiary of the Collaborative Indigenous Business Model, which has helped his business secure contracts in the mining and construction industries.

collaborative Indigenous business model is a logical extension of the engagement efforts to help make a difference for Indigenous Australians in the mining and infrastructure sectors.

"Over the past decade numerous Indigenous Australians have had the opportunity to develop skills as an employee or small sub-contractor," Ms Sindely said.

"Many are now ready to take the next step and move to providing those services on a larger scale, direct to asset owners or principal contractors.

"The collaborative business model facilitates this opportunity through

providing the added capacity in the form of plant and equipment and business development and administrative knowledge and support to deliver at that level".

Benefits to the mining industry of implementing the model include increasing social responsibility and supplier loyalty, as well as creating value and profitably for Indigenous business owners to participate in projects.

Native Earthworks plant operator and Torres Strait Islander Chris Young can attest to the benefits of collaboration, having secured a wet hire plant contract on the West Gate Tunnel Project under construction in Melbourne.

"I would not have been able to participate at this level in a \$6.7b project such as this without collaborative support across the full delivery chain," Mr Young said.

"A leading social procurement policy specialist from the Victorian Government, diversity appreciation from the principal contractors CPB and John Holland, capacity in the form of plant from Orange Hire and knowledge sharing from Maxibor have all contributed to providing a pathway for my 100pc Indigenous-owned Native Earthworks business to be positioned to move to another level.

"Without the collaborative business model I would be still out in the paddocks."

MOU for indigenous women in mining

THE Australasian Institute for Mining and Metallurgy (AusIMM), the peak body for resources professionals in Australasia, has signed a Memorandum of Understanding (MOU) with Indigenous Women in Mining and Resources Australia (IWIMRA), an organisation representing Aboriginal and Torres Strait Islander women employed in the resources industry.

With an audience in Perth of 150 mining professionals as part of the AusIMM Thought Leadership Series, the MOU was officially signed as both organisations spoke publicly of their commitment to working together to support the needs and grow the voice of indigenous women in the sector.

At the official signing, AusIMM CEO Stephen Durkin and IWIMRA co-founder Florence Drummond spoke of the importance of the MOU and the impact their collaboration will have.

"AusIMM and IWIMRA recognise the strong participation and contribution of indigenous people to the resources workforce," Mr Durkin said.

"By working together, we can ensure that AusIMM is supporting all resources professionals, providing ongoing opportunities for professional development."

AusIMM last year established its Council for Diversity and Inclusion, comprised of many prominent industry representatives from a diverse range of backgrounds, who have promoted, supported and advised on AusIMM's commitment to the needs of the indigenous workforce.

AusIMM is currently developing, in consultation with the Council and indigenous representatives, an Aboriginal and Torres Strait Islander Engagement Plan for implementation.



AusIMM CEO Stephen Durkin and IWIMRA co-founder Florence Drummond.

Minecraft and mining combine

AUSTRALIAN students can now learn about the country’s world-leading minerals industry and electric car manufacturing with the launch by the Minerals Council of Australia and the University of Queensland of Mine Solar Car Lab – a new 3D digital game for Minecraft’s Education Edition.

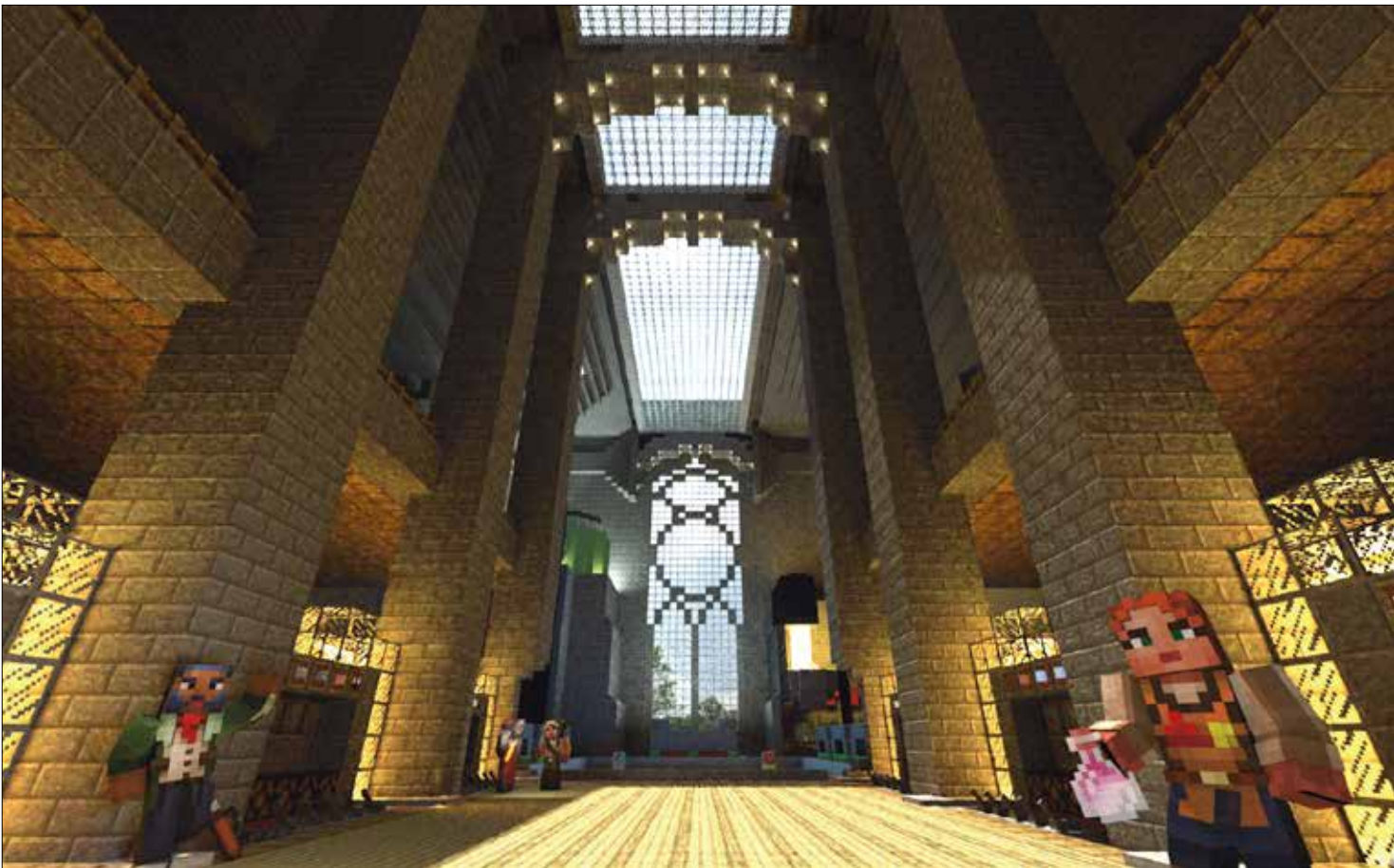
In an Australian first, primary school students will use the world-famous Minecraft education platform to work together to collect raw materials, then use the giant machines to build an electric car.

Accessible on Windows 10, iOS and Android devices, teachers and students will collaborate in the Mine Solar Car Lab virtual environment to learn about different minerals and metals sourced from Australian miners.

The MCA launched the game as part of the industry’s approach to educating young Australians on the innovative, technologically-driven Australian minerals sector.

Minecraft is the best-selling video game of all time. As of May 2019, more than 176 million copies had been sold across all platforms, and it has won numerous awards and accolades.

Since its release in 2011, it has amassed 91 million players worldwide.



The new Minecraft edition educates players about the Australian mining industry and electric car manufacture.

By introducing students to a modern electric car in a collaborative, interactive way, Mine Solar Car Lab aims to excite them about the way electric cars are built and spark interest in learning more about this rapidly-changing industry.

In the game, students visit the fictional Institute for Voltaic Propulsion, a research facility full of researchers and enormous machines.

They are tasked with mining and collecting raw materials used to build major parts of an electric car, then correctly inserting them into machines that will combine them into the finished components via an abstract version of a car factory.

Transformational educational tools like Mine Solar Car Lab will also provide Australian students with the

opportunity to expand their computing skills, an increasingly important part of the world-leading modern Australian minerals sector.

This valuable new educational resource has been built and designed by the University of Queensland and funded by Mining Education Australia and the MCA.

Science-backed social licence

AUSTRALIA’S national science agency, CSIRO, has developed and commercialised a new science-driven approach to tackle declining trust in corporations, enabling companies to better manage their social licence to operate, starting with mining and agriculture.

New business Voconiq was launched to scale up CSIRO’s community insights service, formerly called Reflexivity.

It captures real-time insights into community sentiment across time and locations, and aims to help industries and communities build greater trust and mutually-beneficial outcomes.

A social licence to operate continues to be a top business risk facing industry today, as highlighted in CSIRO’s recent Australian National Outlook 2019 report.

CSIRO mineral resources director, Jonathan Law, said the agency’s social insights capability has grown strong market demand from customers including BHP, Rio Tinto and the Chamber of Minerals and Energy of Western Australia.

“As a result we were able to spin out Voconiq, creating a new Australian company poised for international growth,” he said.

“This move means more businesses will be able to draw on CSIRO-developed science through Voconiq, who can grow their service to benefit more communities, the resources sector and any other industry where community trust is essential to their business.”

Voconiq already has operations underway across five countries and in key Australian mining regions, including the Pilbara, WA and the Hunter Valley, NSW.

A new agreement with Newmont Goldcorp in the city of Kalgoorlie-Boulder,

WA was implemented last month as the company continues to grow.

The Voconiq methodology involves community engagement, community surveys, data collection, analysis and reporting in a clear framework that companies can proactively respond to.

It is underpinned by more than a decade of CSIRO research that shows trust between companies and the communities they work alongside is a key factor influencing a social licence to operate.

When companies lose community trust, conflict can occur equating to potentially hundreds of millions of dollars in delays or the complete abandonment of a project.

Voconiq CEO Kieren Moffat, a former CSIRO senior research scientist, said that the service is about moving companies from a transactional approach to working with communities in a long term and constructive way.

“Our service enables companies to systematically understand the complex sets of issues and concerns held by communities, while providing communities with a constructive way to have a voice and influence company decision-making,” Dr Moffat said.

In its first year, Voconiq will focus on delivering for its current portfolio of clients, including recently-secured contracts with Newmont Goldcorp, AgriFutures Australia and LiveCorp.

It has longer term plans to expand further into the infrastructure, oil and gas industries and to provide its services to communities directly.

Voconiq will also build on previous national-scale research undertaken in CSIRO, including national attitudes to mining surveys for Australia, China and



Engagement science is about building understanding between organisations and communities.

Chile, and most recently for Australian Eggs.

CSIRO continues to maintain a strong social science focus across a range of industries, including mining, tourism, the marine environment, energy and onshore

gas, such as through the Gas Industry Social and Environmental Research Alliance.

The Voconiq team was supported by Australia’s national science and technology accelerator, ON, powered by CSIRO.

Future mining leaders recognised



Various applicants for the awards at the industry luncheon.

NINE of WA's brightest minds were awarded mining industry scholarships by the WA Mining Club and co-sponsors at an industry luncheon last month.

The disciplines included geology, mining engineering, metallurgy and environmental science.

Now in its 17th consecutive year, the WA Mining Club's scholarship program aims to encourage students to continue their tertiary studies in mining-related disciplines to ensure the sustainability of talent within the sector and to develop the next generation of leaders.

WA Mining Club president Kirsty Danby said the 2019 edition of the scholarship program had been the biggest to date, with nearly 500 applications received.

"When the program began in 2003, there was just one scholarship offered," she said.

"That number has grown to include scholarships in categories covering technical

disciplines and to recognise promising female and Indigenous students.

"Our Club has now awarded 74 scholarships since the program started.

"Mining companies continue to lend their support through the years. This year we'd like to thank Independence Group, Mount Gibson Iron, Newmont Goldcorp Australia, Pilbara Minerals, Western Areas and Sandfire Resources for supporting individual categories."

Each winner receives a \$10,000 grant.

Winners will also benefit from mentoring, career support and increased visibility within the industry.

They were selected by a panel from the scholarship co-sponsor and a representative of the WA Mining Club, which considered factors such as academic and work history, personal circumstances, financial need for a scholarship, and commitment to their chosen career.

The nine winners represent a cross-section of the WA academic landscape, including Curtin University's WA School of Mines, Edith Cowan University, the University of WA and Murdoch University, as well as TAFE and high schools throughout WA.

Encouragingly, 62pc of finalists were female candidates, and 66pc of the winners are female.

"In recent times the WA Mining Club has called for greater diversity in the industry," Ms Danby said.

"Judging by what we've seen today, we are beginning to see green shoots of change.

"Scholarships such as ours play a pivotal role in identifying talented individuals and giving them the funds, resources, connections and opportunities to lead the next generation of workers in the mining industry."

2019 WA Mining Club Scholarships Winners:

- **Geology** (co-sponsored by Independence Group) – Lorgen Siziba
- **Indigenous Student** (co-sponsored by Independence Group) – Isabella Beck
- **Female Student in a Technical Discipline** (co-sponsored by Mount Gibson Iron) – Ashlyn Bland
- **Resource Related Engineering** (co-sponsored by Mount Gibson Iron) – Joshua Slocombe
- **Female Student in a Technical Discipline** (co-sponsored by Newmont Goldcorp Australia) – Georgia Kerr
- **Mining Engineering** (co-sponsored by Western Areas) – Edward Fox
- **Metallurgy** (co-sponsored by Pilbara Minerals) – Abigail Amoah
- **Environmental Sciences** (co-sponsored by Sandfire Resources) – Dane Vincent
- **Indigenous Student** (co-sponsored by Sandfire Resources) – Jarni McGuire

MINERS AT THE MOVIES

SO you're back from your FIFO stint at the mines, and wondering what to watch at the movies? Here are some of the current and recently-released films you might want to catch at the cinemas or on a DVD.

IT: CHAPTER TWO

Jessica Chastain, James McAvoy

THE movie occurs 27 years after seven kids who call themselves the Losers Club banded together in the town of Derry in 1989, to defeat an evil supernatural force named Pennywise (Bill Skarsgård), which

primarily takes the form of a pernicious Punchinello and gobbles up small children.

Of the original club, only one of them, Mike Hanlon (Isaiah Mustafa), has remained in the town, precisely because he anticipated the creepy clown's return, and who – with Pennywise now having announced his return – calls on his former childhood friends to return home to battle this evil anew.

Mike, who has done some research involving Indian shamans, reveals to his peers that he knows how exactly Pennywise can be killed, but not before they must all confront their own past experiences with the horrific harlequin.

The movie is replete with digital effects that show off scores of monstrous beings of various shapes and sizes, but audiences these days are so indifferent to such overkill that the only truly frightening effects are realised through well-placed jump scares.

In fact, in the attempt to bedazzle the viewer, this sequel misses out on the finer details, in particular the symbolism and character development that made the first chapter ultimately a more well-rounded product.

The movie is not a full-on disappointment, but the talents of such a stellar cast seems wasted in a production that's more a case of the flesh being willing whilst the spirit is weak. Send in the frowns.

YESTERDAY

Himesh Patel, Lily James

A GLOBAL electrical power outage stealthily rewires the world, and for Jack Malik (Himesh Patel), it changes everything.

Knocked unconscious by a collision with a truck in the ensuing blackout, Jack wakes up to find he's somehow in a universe which lacks everyday items such

as cigarettes and Coca Cola, and has never been exposed to The Beatles.

But he remembers their tunes, ensconced as they are in the musical history of the world he used to know, and after recording them in the studio, worldwide fame ensues.

All the while, some viewers might be wondering about how the movie pans out across this universe, and whether Jack can get back to where he once belonged, now that his life has changed in oh so many ways.

One thing the film surely does is bring new life to Beatles classics which everyone from the last century is familiar with, and ultimately, that's where this movie excels, succeeding more as a commercial for the songs of the band, rather than as the uplifting, humorous rom-com with a difference it set out to be.

Reviews by RAY CHAN

Battery research charged up

NATIONAL

A NEW partnership between Australia’s national science agency, CSIRO, and Japanese specialist chemical manufacturer, Piotrek, will see Australian-developed battery technologies commercialised globally within the next five years.

The collaboration will enable the next generation of lithium battery technologies for portable electronic devices, drones and automotive vehicles, as well as address a critical safety need with lithium batteries by helping prevent battery fires.

The two organisations have partnered to develop the next generation of Solid Polymer Electrolytes (SPEs) for lithium batteries using CSIRO’s proprietary RAFT (Reversible Addition-Fragmentation chain Transfer) polymer technology and Piotrek’s Ion Conducting Polymers (ICP).

Piotrek general manager Ihei Sada said combining the CSIRO SPE with Piotrek ICP will give his company a big market advantage.

“This partnership will help Piotrek make our batteries safer and more efficient, and with our industry reach, we will get our advanced batteries to the market faster,” Mr Sada said.

“Together we will develop the world’s safest, longer life solid state high energy battery.”



CSIRO’s lithium battery experience spans 35 years, with expertise in characterisation, fabrication and testing of lithium-ion and lithium metal batteries

Solid state batteries are a class of lithium batteries that typically use a lithium metal anode, the highest

specific energy of all battery anodes, enabling next generation batteries with twice as much energy than today’s

lithium battery technologies. Additionally, there is no volatile or flammable liquids inside a solid state battery that can catch fire at low temperatures if the cell is damaged.

CSIRO battery research leader Adam Best said that with several companies already active in this field, there are proposals to have solid state battery enabled devices in the market by 2025, if not sooner.

“Our RAFT technology allows us to tune our SPEs’ properties to expand their versatility for different types of batteries and fuel cells, and will also significantly reduce the cost of device assembly and manufacture,” Dr Best said.

Director of CSIRO’s manufacturing arm, Keith McLean, said the technologies developed through the Piotrek partnership will support productivity gains, boost sustainability and help capture emerging opportunities in local and global battery markets.

“CSIRO is committed to solving the greatest challenges through innovative science and technology, and developing the world’s safest and most efficient next-gen lithium ion batteries is just one of the ways we’re doing this,” Dr McLean said.

CSIRO is also working with Piotrek to automate electrolyte processes using robots, and to license a new electrolyte recipe.

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Going to extremes

NATIONAL

OVER the past decade, Australian Pumps has been on a constant program of product development for high-pressure cleaning equipment to suit the mining industry.

Its launch of the Mine Boss series of diesel engine drive machines to 5000psi proved a winner, not just in Australia but in the Middle East, Africa and South East Asian countries all the way through to Mongolia.

The new Extreme series, taking pressures and flows higher to provide more cleaning “whack” to key mining projects, is another breakthrough for this dynamic and innovative Australian company.

Aussie Pumps’ operations manager, Hamish Lorenz, said the company’s basic philosophy of developing mining machines had been limited in terms of horsepower and size by the idea that the unit needed to be mobile or, for that matter, trolley mounted.

“Making the break to bigger machines required a rethink of exactly how we design and build those larger units,” he said.

The result is the revolution of the mine spec Extreme machines built up to 7300psi (500 bar).

The product range uses modular construction to enable machines to be built fast but designed with the Australian mining and quarry industry experience as the driver.

Aussie Pumps’ survey of mining companies indicated a number of European machines were being used with design criteria that wasn’t necessarily related to conditions in northern Australia.

“Monsoonal rains, dust storms and ambients as high as 45 degrees are somewhat unique to Australia,” Mr Lorenz said.

With the concept of using ‘Big Bert’ Bertolini heavy duty triplex pumps, the first machines put into the market had pressures of 5000 psi (350 bar) and flows of 25lpm.

A lower pressure version, 4300 psi (300 bar), was also launched with 31lpm flow.

“We found that a lot of the applications involving the cleaning of big plant needing a combination of pressure and flow to get the job done fast,” Mr Lorenz said.

“Time, or the reduction of cleaning time, was the big issue.”

The criteria for the machines was simple.

They needed to be protected from the weather, built into heavy duty hot dipped galvanised steel frames and provided with serious high pressure cleaning accessories that would get the job done.

Battery isolation and bunded frames were also considered to be essential.

The company consulted with iron ore, copper and coal mines and well as major quarry companies to get an idea of best requirements.

The heart of the system

With high pressure cleaning, everything depends on the pump selected.



The Aussie ‘Extreme’ pressure cleaner Hydroblasters are a unique Australian innovation designed with the co-operation of the mining industry.

The pump is the heart of the system and if it fails, everything else is out of action as well.

“Australian Pumps specified a new RA series ‘Big Bert’ Bertolini pumps because of their heavy duty configuration and features,” Mr Lorenz said.

“Bertolini offered heavy duty 316 stainless steel heads on the pumps in the 500 bar range, big one inch suction ports, top quality ceramic pistons and valves that are designed specially to provide the highest efficiency for the prescribed flow and pressure requirements.”

The company found that other manufacturers of pumps use the same valves for a wide range of products without particularly focusing on the individual combination of efficiency requirements.

Bertolini pumps also offered a very unique sealing system that protects seals for longer than competitors.

Big ribbed crankcases with extra-large oil capacity contribute to cool running with the ribs acting as cooling fins.

The whole pump system is driven through with a reduction belt drive for ease and convenience of adjustment where required the engine running at 2400rpm.

The pump runs at 1450rpm, providing long, trouble-free life.

Yanmar brings the power

Selecting an engine range to power the new series was also a big challenge.

The company considered Hatz, Deutz, Perkins and Caterpillar but eventually settled on Yanmar’s TNV series.

The TNV series comprises water-cooled engines that are found on mine sites all over the country, providing power through generation or driving hydraulic pumps for a huge range of mining applications.

Aussie Pumps specified an integrated control panel that provides the machines with full engine protection including an hour meter, low oil and high water temperature.

Frame design

Australian Pumps threw away the book when it came to the frame design.

The company decided to build it in a skid configuration so it could be towed by an excavator or dozer if necessary.

It built in fork truck tie slots so that the machine can be lifted on and off trucks and, lift eyes to enable it to be slung as well where appropriate.

Incorporated in the design was a 60l stainless steel break tank with low water shutdown, accommodated in a convenient spot in the unique cube design.

The first prototypes were acclaimed by both mining contractors and big mining company corporations as well.

A 50l fuel tank was also incorporated in the design to allow extended dry running for eight hours.

Finessing the product

Completely open-minded, the company has consistently added to the package to make the machines more effective and safer to operate.

All machines now have an integrated flashing safety beacon, double insulated wiring, dual pole battery isolator and are supplied with a self-contained fire extinguisher.

The pumps are fitted with ASP (Aussie Safety Protection Kit) that kit includes a safety valve, that will blow off in the event of an over pressure spike.

That protects the machine and the operator.

A thermal dump valve is fitted to enable the machine to dump water in the event of extended running on bypass, thus protecting the pump from overheating or cavitation.

A fully adjustable unloader that enables the operator to check the pressure is also included.

High-pressure accessories

High pressure accessories can make or break the efficiency of any mine cleaning job.

Even something as trivial as changing the nozzle in the gun every 40 hours can make a big difference on the cleaning efficiency.

“Every day we hear horror stories about operators cranking up the pressure or the rpm of the engine to compensate for a worn nozzle,” Mr Lorenz said.

“The problem is they don’t know the nozzle is worn, all they know is the pressure in the gun is dropping.”

Low pressure in the gun is by far the most common factor in reduction of pressure and changing out the nozzle is the lowest cost and most efficient way of rectifying that issue.

The company’s standard product comes with a stainless steel hose reel.

400 bar hose reels are supplied with the 350 bar machines, while a 500 bar stainless hose reel is available for the Raptor series product range.

An automatic Recoila hose reel is also available.

Time is money in cleaning mining equipment so accessories that get the job done fast are important.

Aussie Pumps has a great range of up to 500 bar turbos that can cut cleaning times by as much as half.

A total of 30m of high pressure hose is supplied on hose reels as standard equipment.

Australian Pumps understands that cleaning a big piece of plant with a 10m hose is a non-option.

Foot valves are standard for more control and a great range of high-vis personal protection gear includes overalls, jackets and trousers as well as aprons, gloves and boots are available.

The 500 bar breakthrough

When the company moved to 500 bar, it had to go up a size in Yanmar diesel (500 bar machines had to be matched with both 18l, 21l, and 24l combinations with substantial more horsepower required).

The same basic formulas were introduced with the differences in the Raptor stainless Big Berty pumps, 500 bar hose assemblies and the move to the 500 bar range of accessories.

Drain cleaning attachments

For the 350 bar machines, called the Predator series, a range of drain cleaning kits are available to help miners keep their process plants clean and pipelines free of buildup of material or sludge.

The drain cleaning kits were originally designed for unblocking sewer lines but they can be operated with the 350 bar 25l Predator version or with the Python 300 bar 31lpm machine.

Either way, the drain cleaner is a very handy option as well as flat surface cleaner that also will slash cleaning time by up to 80pc where appropriate.

New safety standards

All mines are aware of new safety standards that classify pressure cleaning machines into both Class A and B units.

Class A units don't require operator certification under the new standards, while Class B machines do.

The difference between a Class A and B machine is its "bar/litre" capacity.

To get that figure, multiply the bar pressure of the machine, say 275 bar (4000psi) by 20 lpm flow and wind up with a bar/litre factor of 5500 bar/litre.

That makes the machine a Class A pressure cleaner as the cutoff point is 5600 bar/litres.

Once you're in the territory of larger than 5600 bar/litres, the machine becomes a Class B, where the new safety standards require operators to be certified by an RTO registered and approved training authority with refresher courses being run and re-certification every two years.

That certification belongs to the operator who has been trained, not to the company who pays for the training.

"Some jobs absolutely require Class B machines. We work with companies who use up to 35,000 or 40,000 psi units which will always require that level of training and operator competence," Mr Lorenz said.

"Our Class B machines start at our Extreme rated Python, Predator and go all the way through to our Raptor series of 500 bar cold water cleaners."

On the other hand, the production of Predator Class A machines has recently gone through the roof as mining companies realise Aussie Pumps make a very robust smaller Mine Boss machine, trolley mounted, driven by a Kohler diesel and is more compact, more versatile and definitely comes under the rating of being Class A, i.e. no certification.

Further information on the Mine Boss and particularly Aussie's Extreme range, is freely available from Australian Pump Industries.

Pump up the gold

NATIONAL

FMR Investments was formed in 2007 when specialist hard rock underground mining services provider Barminco – founded in 1987 – divested its contracting business.

Today, the company operates three mining projects in Australia: the Eloise Copper Mine in northwest Queensland, as well as the Greenfields Mill and Gordon Sidar mine, both of which are located in WA.

The Greenfields mill is situated in the WA goldfields, three kilometres east of Coolgardie.

For more than 20 years, the site has provided first class toll milling to the local gold mining industry.

The plant has a unique set-up with three ball mills, allowing the circuit to be optimised for gold recovery depending on the needs of different clients.

In its current configuration, the plant can process up to one million tonnes per annum.

Stockpile ore delivered by FMR's customers initially passes through a three-stage crushing circuit consisting of a primary jaw crusher followed by secondary and tertiary cone crushers.

The feed from the secondary and tertiary crushers is graded by a double deck screen that removes undersize material from the circuit.

The crushing system produces a P80 product size between 6 and 8mm which is then transferred and stored in a 1000t mill feed bin.

The mill circuit consists of 1300, 875 and 500 kW ball mills.

Classification of leach feed product is handled by 15-inch cyclones.

Free gold particles in the cyclone underflow are separated in a concentrator and sent to the gold room for direct smelting, while the remaining underflow goes back to the grinding circuit to be further reduced.

The overflow product from the cyclones is sent to a CIL (Carbon-in-Leach) circuit.

In this process, gold is dissolved from the ore in a cyanide solution in the presence of oxygen, and the resultant gold cyanide complex molecule is then absorbed onto activated carbon.

The gold is stripped from the loaded carbon, in a process known as elution.

Gold is later recovered from the pregnant strip solution by electrowinning onto steel wool, and direct smelting before shipment to an external refinery.

Mill discharge pumps

Critical to the operation of the mill-to-classification process are the plant's mill discharge pumps.

They are responsible for transporting the milled slurry up a large vertical pipe to the classification cyclones.

The pumps process a high volume of material that is highly abrasive in nature.

This means that key wear components must be monitored regularly to ensure



Regular inspections and maintenance help FMR to ensure mill discharge pumps are ready for action.

the pumps operate efficiently and prevent unexpected downtime.

FMR maintenance supervisor Dave Scott describes how the pump setup has been designed to ensure there is always one pump available.

"If the mill circuit is stopped, it basically costs the business about \$40,000 per hour," he said.

"That's why we have a pair of pumps for this application. If the active 'duty' pump fails or is under maintenance, there is always a standby ready to take over."

Metso pumps cut costs

In 2014, FMR invested in two Metso HH200 pumps to replace existing units that were nearing the end of their effective life.

During routine maintenance of their original pumps, operators had to disconnect the suction and discharge spools, front casings and case liners to access critical internal components.

A mobile franna crane and a licensed operator were required to conduct the procedure.

The labour-intensive nature of the job meant that it could take up to eight hours to complete, which made it difficult to maintain the pumps on a regular basis.

The new mill discharge pumps are equipped with Metso's unique slide-base technology.

The slide-base allows operators to open the pump without removing the suction and discharge pipework, making it extremely easy to inspect wear components and conduct routine maintenance.

The slide bases have also reduced the time required to get a blocked pump online again.

Greenfields Mill alternative registered manager Morgan Dombroski said the site's mill discharge pumps are now checked on a weekly basis.

"Our team here have a lot of

experience at this site and are good at forecasting maintenance activities," he said.

"We monitor the pumps through weekly inspections including a 'shimming' process. This optimises both front and rear impeller clearances which makes the pumps operate more efficiently and extends wear life."

FMR maintenance fitter Travis Dingle explains how shimming extends a mill discharge pump's wear life.

"The pump operates more efficiently when the impeller is closer to the volute liner," he said.

"If you have a wider gap between these components, larger particles get in and wear the volute down at a faster rate. Shimming ensures the gap is reduced and the pump operates effectively."

The slide base technology helps the team to undertake this process quickly and with improved safety.

"What makes it easy with the Metso pumps, is the hydraulic slide. We simply remove the volute bolts and pull the housing back to access everything we need – without the use of a crane," he said.

By conducting weekly inspections and shimming both mill discharge pumps, the Greenfields Mill has been able to reduce the frequency of major overhauls.

Mr Scott said this has reduced operational costs for the site.

As well, the new pumps have also created a safer working environment on site.

"The slide base allows the team to conduct routine maintenance without using a crane," he said.

"This means there is no rigging gear for anyone to get struck by. The other factor is by not having to disassemble everything, most of the possible pinch points are removed from the process."

Trasan Pilbara locals

WA

TRASAN is a high-calibre, well established multi-disciplinary building service provider with a track record spanning 20 years of service to the Pilbara region.

The company has firmly embedded relationships across the supply chain in the Pilbara and has clients throughout WA.

Trasan managing director Travers Clarke said that the business he had built with his wife Sandi had been founded on quality service and strong client relationships.

“Our vision is to be recognised as the Pilbara’s preferred supplier and contractor for responsible projects in the heavy industrial, and commercial sectors, together with a range of associated services,” he said.

“Our business culture is evidenced through our local knowledge and our energy and commitment to delivering high-quality, sustainable project outcomes for our clients.

“Everything we do adheres to an established framework of safety, timescale and value.”

After a period of sustained growth, Trasan made the decision to develop a



Trasan’s specialised scaffolding division has allowed the company to significantly cut costs for its clients through operational synergies.

separate scaffolding division.

By offering the services and expertise of the resource in-house, the company was able to fulfil a broader range of project scope for its clients.

The specialised scaffolding division was able to create synergies which cut costs considerably and saved time in the coordination of multiple suppliers for certain projects, and would ensure that project deliveries were optimised.

Scaffolding supervisor Kirk Packham has brought many years of experience to the team, including in-house engineering and design for scaffolding.

Trasan employs and trains its own workforce, and its experience working in challenging environments sets it apart from competitors.

“As you would expect, our employees have a strong focus on Systems of Safe Work, which not only protects their health

and wellbeing, but ensures all regulatory demands are met,” Mr Packham said.

“This is beneficial to our clients and also helps meet our own legal obligations – safety is paramount at all times.”

The company prides itself on a responsive approach and its commitment to the highest standard of work.

For more information about Trasan, visit: admin@trasan.com.au

Leaders in energy motor bases

NATIONAL

LEVERLINK is one of Australia’s leading Original Equipment Manufacturers (OEM) of stored energy motor bases and impact beds for conveyors.

The company has been designing and manufacturing engineering solutions for almost 30 years, including base frames, guards and motor bases for all types of pumps.

Stored energy motor bases – also known as self-tensioning motor bases, tensioning motor bases or auto tensioning motor bases – are proven to shine even in the harshest of environments.

“A rubber torsional spring is the heart of stored energy motor bases,” Leverlink founder Richard Sharp said.

“This spring provides a constant force that compensates for the stretch and wear of the belt.

“The mechanical design allows for a quick belt fitting, and replacement with a single adjusting screw.

“As a result, safety is increased and the risk of personal injury is minimised.”

Leverlink offers overhead, horizontal and vertical motor bases, designed for either dynamic or static applications.



Leverlink can fully customise motorbases when required by customers, and all the pump drives and machine base frames are site-specific, made in Australia and include protective coatings.

The motor base models can range in size from 3kW to 1000kW, and be customised to suit a client’s requirements, when required.

This no one size fits all approach also applies to Leverlink’s pump frame range, which is designed in-house to suit the client’s specifications.

All the pump drives and machine base frames are site-specific, made in Australia, and include protective coatings.

Leverlink also manufactures guarding for machines, slurry pumps and conveyors that are lightweight and highly durable.

“The materials we use depend on the environment as well as the customers’ requirements,” Mr Sharp said.

“Our engineering team is focused on creating designs that are easy to fit, as well as easy to remove for maintenance purposes.”

While most of its products have a service life exceeding 20 years, Leverlink offers product refurbishments and repairs where needed.

“At some stage, your Leverlink product may require repair or refurbishment,” he said.

“We are able to do this in our state-of-the-art workshop for a fraction of the cost of a new unit, and in many cases, refurbishing can extend the product life to 30 years or more.

“All our refurbishments are backed by a 12-month replacement warranty.”

More information on Leverlink can be found at www.leverlink.com.au or emailing sales@leverlink.com.au.

Beyond buckets and bodies

NATIONAL

DT HiLoad specialises in the design and manufacture of dump truck bodies and mining buckets for the resources sector, with a skilled and committed workforce to deliver specific solutions for clients.

General manager Glenn Brearey said the company had positioned itself as a market leader in the sector by identifying new and innovative ways of solving common problems backed by exceptional customer service across the value cycle.

“Innovation is at our core and safety is a priority,” Mr Brearey said.

“We focus on quality customer support and innovation – taking products further to maximise our customer’s productivity and payloads.

“Recently we designed a super lightweight Hercules body for an autonomous truck for an iron ore miner in the Pilbara.

“The Hercules body design was specific and customised to ensure that weight reduction did not affect the overall wear requirements or durability of the body.

“The trial data we have received shows the Hercules body exceeded all our expectations and has given us a new direction of improvement based on our proven existing design.”

Safety is a key driver for innovation for the company.

“We have developed a patented pin insertion tool to improve safety when removing and installing the Hercules bodies,” Mr Brearey said.

The pin insertion tool addressed a long-known safety issue in mining maintenance - removing the need to work under a suspended load.

It reduced the need for manual handling and exposure to strains and other potential injuries when installing pivot pins.

“The wireless technology and some basic hydraulic principals remove the worker from a potentially dangerous position,” Mr Brearey said.

“Not only can we increase worker safety around that task, we can increase the value proposition for the product.”

The company is working on a range of high wearing, high strength steel as a natural evolution of its products.

“The material options we are working on will go in specific areas of our products where the wear characteristics of the materials matter most,” Mr Brearey said.

“We believe this will give our clients different options for material selection in key areas of the Barracuda buckets and Hercules bodies. “This will further improve our products’ reliability and abrasion resistance and will aid weight reduction.”

Engineering and more

DT HiLoad doesn’t just do buckets and bodies.

The company can cater for a range of engineering requirements.

Mr Brearey said the company knows the importance of safety in product design.

“One of our strengths is our ability to custom manufacture our product to suit the specific mine requirements,” Mr Brearey said.

“These needs are not a one size fits all



DT HiLoad designed a super lightweight Hercules body for an autonomous truck.



DT HiLoad also offers a range of integrated engineering solutions and always puts safety first in its product designs.

– we understand that.

“Innovation is at our core and safety is a priority.

“We use our engineering skills to make sure that our products are manufactured to the highest standards, are site-specific, and also adaptable to the varying safety regulations.”

The company’s engineering capabilities include using Finite Element Analysis (FEA) software to analyse how the products will react in real world forces.

DT HiLoad also use Discrete Element Method (DEM) to determine the behaviour of geomaterials such as iron ore and coal.

This method is used to analyse the flow behaviour and related wear characteristics.

Engineering manager Tom Smith said the engineering team frequently noticed areas where safety improvement could be made, including in kits for wear management.

“As bodies wear from the repeated dumping of product you need to install a wear solution to ensure that the tray thickness is maintained,” Mr Smith said.

“Often this would be plate liners which are heavy steel plates which often need rolling or bending, which leads to all sorts of issues with manual handling and stored energy risks.

“Our solution to this is our patented Hex Tile technology as wear protection which dramatically increases safety on site.

“They are up to 60pc lighter than

traditional steel plate liners when installed.”

There’s also no chance of stored energy issues.

Often wear plates have potential energy or residual energy when they are welded or forced down, so when those welds are cut, the plates can potentially spring back, which is a real risk to the maintenance teams working on the tray.

“The hex tiles are smaller, they basically sit in the palm of your hand,” Mr Smith said.

“That’s just one example of how we engineer safe and efficient product designs – it’s at the heart of what we do.”

For more information on DT HiLoad’s payload solution capabilities visit: www.dthiload.com.

The heat treatment specialists

NATIONAL

TOOLING and General Heat Treatment provide heat treatment services to businesses throughout Australia.

Customers range from manufacturers of high performance race/rally gearboxes to heat treatment for oil and gas equipment suppliers.

Using the latest equipment and processes, the company offers a range of heat treatments including case hardening (gas carburising), vacuum heat treatment and nitriding, customised to client specifications – and it operates 24 hours a day, seven days a week.

Specialties

Tooling and General offers expert technical advice to ensure materials and heat treatments combine to give maximum performance.

New processes are continually being developed to provide clients with improved component performance and service life.

Specialties include carburizing (case-hardening) of gears and shafts for all applications, from high performance automotive though to large earthmoving equipment.



For more information on Tooling and General Heat Treatment services, visit: www.toolgen.com.au

Tooling and General has the ability to carburise to depths of up to 3.5mm for drilling pistons and large earthmoving gears.

The company can also handle tiny hydraulic spools and fittings with case

depths of 0.25mm.

Process control

The control of heat treatment processes

is absolutely critical as parts are often finish machined.

Tooling and General's furnace equipment is regulated by temperature controllers linked to a master computer system.

This provides 24-hour monitoring, control and traceability of all work.

Data logging of furnace parameters is recorded and can be supplied with completed work.

Controller calibration is carried out by a NATA certified company.

Case studies:

Mining equipment transmission gear

A gear used in locally produced mining equipment was heat treated in the USA.

The results were unsatisfactory with high distortion after carburising or inadequate strength when nitrided.

Tooling and General Heat Treatment used its extensive experience and heat treatment knowledge to carburise the gear with minimal distortion and increase the service life.

Tool and dies

A customer was having high wear and galling when punching stainless steel.

Tooling and General Heat Treatment was able to assist by recommending a different material and heat treatment for the punch.

The results were improved punch life and component surface finish.

Custom-made for harsh conditions

NATIONAL

WHEN considering access to and around mine sites, there is no better solution than one that can be used again and again.

Road Mode is the market leader for reusable temporary road and outrigger solutions designed to withstand steel track vehicles up to a weight of 120t.

Road Mode sales and marketing manager Gareth Walsh said the ground mats are perfect for allowing access and gaining traction to construction sites for rubber and steel tracked type vehicles from cars, vans, JCB equipment, cranes, and various heavy goods vehicles.

"They are ideal for ground protection and pedestrian footpaths over soft or sensitive ground, sand, mud, turf, marshy areas at any event," Mr Walsh said.

"Our products are made of High Density Polyethylene (HDPE) using the Terra Firma master batch and will bend to suit the ground conditions.

"Our ground mats are durable, lightweight, and extremely strong because they are engineered to provide ground protection and access over soft surfaces and will provide a firm support base and traction for numerous activities --saving heavy vehicles from getting stuck in mud, wet and marshy conditions."

The Terra Firma master batch gives Road Mode products superior strength, flexibility and lifespan in harsh conditions.

"The products will not warp, rot, split or crack, they will not absorb



Road Mode can be used on hard or soft surfaces and in extremes of hot or cold weather.

contaminants, are non-conduction, easily cleaned and can be made to custom lengths," Mr Walsh said.

"We can save you time and labour getting vehicles and equipment traversed

over difficult terrain.

"Road Mode will also help sites avoid potential injuries to workers and equipment from excessive wear and damage due to operating on unstable

ground conditions."

To find out more about Road Mode products and how they can work for you, visit: www.road-mode.com.

KNOW THE DRILL

DRILLING SERVICES & SUPPLIES

Drilling down on skills

For more than 60 years, the Australian Drilling Industry Association (ADIA), Australia's peak drilling industry organisation with about 800 drilling contractors, suppliers, consultants and regulators in its registry, has been giving a voice to its members who are at the forefront of the growth and expansion of the sector. *The Australian Mining Review* spoke to ADIA chief **Peter Hall** about the current skills shortage, the issues industry faces to capitalise on the current mining boom and the cyclical nature of mining's effect on drilling.



ADIA chief executive
Peter Hall

Q. What is your professional background and how did you end up as the chief executive of ADIA?

I've been at ADIA for nearly four years now.

Previous to that I garnered 34 years' experience in the drilling industry, predominantly with Boart Longyear.

I started in an apprenticeship as a fitter and turner and made my way up through the products and drilling divisions over the years.

Fast track to 2016 and ADIA were looking for a new CEO.

I felt it was a great opportunity to utilise my experience to help grow a key sector of the Australian mining industry.

Q. Drill 2019 – can you fill us in on the details?

ADIA's drilling conference is a biannual event which this year ran from September 17-19.

We chose Darwin this year as the Territory has some great opportunities for our industry.

This time around we chose a theme called Drilling Down on Skills in response to the current skills shortage facing our industry.

As the drilling utilisation and demand on services has increased it has stretched the requirements of the skill base of our workers.

Drill 2019 was a chance to get industry players in the same room together to tackle the key issues facing the industry from as many angles as possible and find some sort of common agenda to sustain



Some of the exhibits at the 2017 ADIA conference.

and grow our sector into the future.

It also helped the suppliers, manufacturers, miners and service providers to network and create business opportunities.

Q. It has widely been reported that there is a skills shortage in the drilling sector. Can you tell me why that is, and what steps are necessary to fill the skills gap?

In terms of exploration drilling, the cyclical nature of the mining industry directly affects the work itself.

It's at the pointy end of the mining process which can be both good and bad.

When the sector is doing well, good

amounts of money tend to be spent by the miners to prove up further reserves.

However, when the market starts to quiet down, exploration drilling is one of the first parts of the mining process to be cut.

At the end of the last boom, around 2012, the whole drilling industry across Australia started to suffer.

We had just under 1000 drill rigs at that time – which equates to about 10,000 jobs if you estimate 10 workers per rig.

By 2016, before things started to turn around again, we were down to about 300 drill rigs in operation and about 7000 people were out of work, and that's a big loss.

One of the major issues we face is the difficulty of getting people into the industry when the work comes back up.

It can take up to three years to train people up to become drillers, and when an uptrend in exploration occurs, many of those that lost their jobs at the end of the last mining cycle have moved on to other work and become reluctant to come back.

Previously, under the 457 visas, drilling companies used to be able to fill the skills gaps that occurred by hiring drillers from overseas; however the federal government took drillers off that eligibility list a few years back.

Here at ADIA we've have been campaigning, and will continue to campaign for that to change.

Q. Tell us about the drilling book *Collared and Cased* by Barry Avery, that was released at Drill 2019.

About 18 months ago we started the process to get the stories behind a lot of the industry stalwarts that have been around for a number of years – such as John Emerson and Ron Sayers – who have been at the forefront of Australia's drilling sector and really shaped how the exploration industry grew over the years.

One of the big things that came out of the book was the fact there was a lot less red tape and regulation around the industry back then which sheds a light on how drilling businesses have changed and now operate.

(CONTINUED ON PAGE 66)

Exploration lifts drill sector growth

NATIONAL

A RISE in exploration expenditure has led to increased drilling across Australia this June quarter, with new deposit drilling leading the charge, according to the Australian Bureau of Statistics (ABS).

Holes drilled at new deposits rose 22.8 pc quarter-on-quarter (QoQ) for June, while drilling at existing deposits rose 19.5 pc across the same time period.

The ABS' Mineral and Petroleum June 2019 Quarterly Statistics, released on September 2, also showed total mineral exploration expenditure had increased \$31.3m (5.2pc) to a near-record high of \$629.6m for the quarter.

A total of about \$2.3b was estimated to have been spent on exploration in FY19 – up 19 per cent from FY18.

The current quarter expenditure estimate was a whopping 16.5pc higher than the 2018 June quarter estimate, and expenditure rose in every state, with WA being by far the largest contributor to the rise with \$22.9m.

Although metres drilled fell 1.2pc for the quarter, they were still 4.7pc higher than the June quarter estimate for the previous year.

Association of Mining and Exploration Companies (AMEC) chief executive Warren Pearce said the Australian Bureau of Statistics showed that mineral exploration expenditure rose in every single State and Territory of Australia.

"This is pleasing to see after a drop in the previous quarter," he said.

Greenfields mineral exploration expenditure continued another quarter of growth in all states except for Victoria, where it fell by \$1.6m, declining for the third consecutive quarter.

WA recorded an outstanding result with \$184.3m of exploration expenditure, the second highest on record.

In brownfields, mineral exploration expenditure grew in Victoria (\$4.3m), Queensland (\$19.9m), WA (\$35m) and Tasmania (\$1.6m), remained the same in NSW, and dropped for South Australia and Northern Territory.

"Australia needs greater greenfields mineral exploration, and the significant growth in greenfields mineral exploration expenditure right across the country reflects the returning strength of the exploration sector," Mr Pearce said.

"It has been a challenging environment for mineral exploration companies, however the statistics are now supporting better growth in the industry."

Image: Department of Mines and Petroleum.



Greenfields exploration is boosting the drilling sector across Australia.

Image: Perenti Global.



Perenti Global has poised itself for growth opportunities in the mining services sector.

Global growth for Perenti

NATIONAL

NEWLY renamed Ausdrill, now Perenti Global, has gone through a massive transformation in the past 12 months, kick-started by the 2018 retirement of its founder and managing director Ron Sayers, and increasing its global reach through strategic acquisitions and an

increased work book.

Perenti tripled its annual net profit to \$181.3m after absorbing underground mining services group Barminto late last year in a cash and scrip deal worth \$271m.

Its surface mining operations posted a 3pc rise in revenue to \$746m for FY19, however its underground mining revenue – via the Barminto acquisition – jumped 24pc to \$1.08b during the same period.

The company also declared a final dividend of 3.5c per share for FY19, making its full year dividend handout 7c per share.

On the back of the announcement, a subsequent surge in share price had triggered investment bank Gresham Partners to sell its \$91.2m stake in Perenti, which it acquired when Ausdrill purchased Barminto last year.

Perenti managing director Mark

Norwell said the results demonstrated the scale of the company transformation during the financial period.

"The conclusion of the escrow period and Gresham's move to sell the remaining shares, post the Barminto acquisition last year, completes what has clearly been a very positive acquisition for Perenti," Mr Norwell said.

"Barminto is a complementary business to Ausdrill, with a leading market position in underground hard rock mining that establishes the company as a more diverse group with a broader service offering sought by our customers."

The two companies were no strangers to each other's business services, having previously struck a number of contract deals with African-based miners such as AngloGold through joint ventures.

"We have evolved from an Australian drilling business into a global mining

services company, with a workforce of more than 8000 people working at more than 50 projects across four continents," Mr Norwell said.

"With a strong balance sheet and an order book that has grown to \$7b after securing \$3.4b in new and extended contracts since July 1, 2018, Perenti is well positioned for growth in FY20."

The group said it would also target a pipeline of \$8.5b of potential work across more than 40 projects that could be awarded over the next 24 months.

Mr Norwell said the ambition was in line with the company's name change to Perenti Global, which would better reflect the group's status as a diversified global mining services group.

"Our recent group rebrand to Perenti gives us a strong identifiable brand in the markets and a platform to grow our business in the future," Mr Norwell said.

Innovative drilling solutions

WA

PROFILE Drilling is a privately owned, Perth-based company offering reverse circulation mineral exploration services and grade control and water boring capabilities.

Its services include (but are not limited to) remote exploration projects via self-contained exploration camps, to on-mine resource drilling programs capable of exceeding depths of more than 600m.

With a fleet of modern and well-equipped high capacity rigs and support vehicles on 8X8 trucks, Profile Drilling is able to quickly and effectively meet the needs of its clients Australia-wide.

Operations manager Grant Ingram said the company prided itself on the ability to provide innovative solutions

to any problem that clients may have experienced.

Mr Ingram said that Profile Drillings' experienced crews ensured minimal downtime while operating to maximum efficiency without compromising the quality of clients' needs and requirements.

"We have a commitment to continuous improvement in safety and drilling solutions without compromising production standards with our objective to provide a comprehensive drilling service second to none," he said.

"With the combination Profile offers to only provide the most experienced drillers, support staff and crews along with providing modern, well-maintained equipment, we are able to provide our clients with a safe, cost-effective service."

More information can be found at: www.profiledrilling.com.au.



Profile Drilling's experienced crews ensure minimal down time and maximum efficiency on site.



ON TARGET ON TIME

profiledrilling.com.au

- MODERN FLEET
- EXPERIENCED OPERATORS
- ALL WHEEL DRIVE EQUIPMENT
- EQUIPPED FOR REMOTE EXPLORATION



Quality without compromise

NATIONAL

CASTLE Drilling Co (CDC) is a small owner-operated company offering grade control and exploration Reverse Circulation (RC) drilling services.

Managing director Matt Skeet said the company specializes in drilling holes in to hard-to-reach terrain with minimal earthworks and environmental impact.

CDC's grade control drilling services for open pit mining allow the completion of infill holes accurately and quickly, maximizing production and offering excellent sample quality.

"Further to our grade control services we have experimented with lighter drill rods and reloading techniques to offer exploration drilling to depths over 100 metres with the ROC L8 drills," Mr Skeet said.

"Our machines are maintained regularly so you get the best results for your project."

CDC has found a competitive advantage in utilising the Atlas Copco track-based drill platform to offer access to difficult terrain, with the most minimal environmental impact being capable of high levels of safe production through automated processes and machine design.

Machine design also enables the accurate drilling of holes on non-typical angles with a wide range of mast movement not seen on other drills.

Mr Skeet said that extensive CDC ancillary ensures the drill(s) are stocked,



Castle Drilling provided Calidus Resources with grade control drilling services. With more than 650,000m drilled in the East Pilbara, Castle Drilling is right at home in the hill country that characterises the area.

served and maintained to the highest standard offering excellent availability.

"Each drill has a mobile sea container that accompanies the drill for storage of spares and consumables while on site," he said.

"Transport of our drills as well as client equipment with our 30t dropdeck, offers

cost saving and convenience for our clients.

"Clearing with our backhoe loader onsite as needed ensures clearing of only what is required, resulting in both savings and assisting in the permitting process."

The team at CDC pride themselves on excellent production without compromising safety on site.

"Whether you are looking for reverse circulation drilling services, exploration drilling, grade control drilling services, clearing or transport, our professional, experienced team is sure to meet your needs," Mr Skeet said.

For more information visit: www.castledrill.com.

(CONTINUED FROM PAGE 63)

Q. What is the latest in drill tech that is improving the industry and what has led to the improvement of drill rig utilisation rates over the past few years?

The amount of data you get can out of a drill hole has been one of the biggest changes for us.

The ability to do some of the analysis on site instead of sending drill cores to a lab to be looked at has really upped efficiencies.

Results can be, in real-time, sent for analysis and companies can make decisions very rapidly on what might need to change or happen next in the drilling program.

Drill rig utilisation rates are at about 75pc — we would normally say 90pc is full utilisation as some rigs are always in a service cycle or moving into operation — so it's quite healthy.

One thing we are finding is that the bigger drilling companies tend to be busier than the smaller ones.

This is because the larger drillers are now funding a lot of the exploration themselves and make up the bulk of the active drilling in Australia.

Unfortunately, the junior sector is having a fair bit of difficulty in accessing exploration funding due to investment companies becoming more risk adverse.

Q. How have the demands from clients changed over the years?

What we hear from some of our members is that they find it quite difficult to

have a good relationship with their client, when once upon a time they used to deal closely with the exploration departments.

Now the contracts are handed across to procurement departments who don't necessarily know a lot about drilling, but are professionals are getting the best deal possible for their business.

Q. What are the issues surrounding contract rates and payment terms?

It's a normal supply and demand situation.

The drillers had it pretty good in the 2009-2012 period when there was a massive demand for drilling and this went in our favour and rates were good.

Then, when work dried up for four to five years during the downturn, we ended up with a big glut of inactive drill rigs.

The market thus became very competitive and drillers' rates went down as a result.

It's hard to push prices back up — it's a gradual process.

Payment terms have also increased from 14 days up to 90 days which become a burden to the smaller drillers who rely on a quick turnaround of payments so they can utilise that capital for the next job.

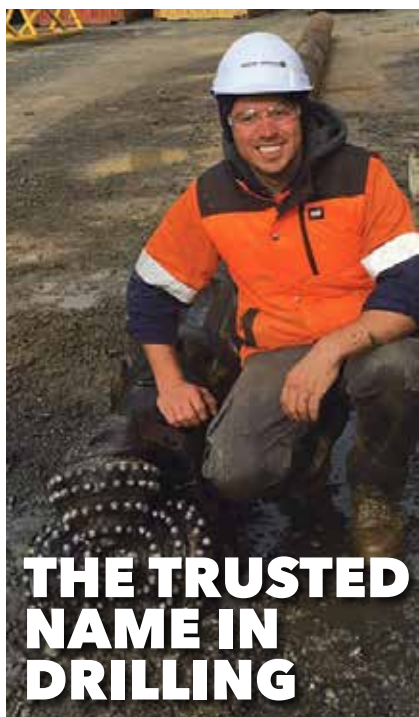
These factors put — especially the juniors — in a difficult situation.

We hope to see a change where drilling companies can navigate a fairer business climate into the future.

Information on how to stay up-to-date with the latest news and trends in drilling and what services ADIA provides to the sector can be found at www.adia.com.au.

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“delivering quality RC sample, safely”

CONTACT

- 0424 981 494
- Matt@castledrill.com
- www.castledrill.com

Quality, safety and value

NATIONAL

GRID Drilling was formed in January 2010 as a company committed to working with clients to understand their needs and requirements to achieve the best possible outcomes for all stakeholders.

“A company is only as good as its employees, and to that extent we actively undertake as much relevant training as possible and endeavour to upskill our workforce to benefit all stakeholders,” managing director Wayne Gridley said.

The company is very focused on safety and uses a third party cloud-based management tool which employees have full time access to via their mobile phones for up-to-date reporting.

Grid Drilling employs experienced drillers to pass on their knowledge and skills – gained over years of drilling in a variety of challenging environments – to the next generation of drillers.

The company has been involved with a number of exploration projects in the Northern Territory and northern Queensland working in some very remote locations.

“We have completed RC and coring contracts working safely whilst achieving



For more information on Grid Drilling's services visit: www.griddrilling.com.

excellent production,” Mr Gridley said.

“We pride ourselves on exceeding client expectations in safety, production and value for money.”

The company has also hired out equipment and worked with other contractors to complete larger diameter gas riser bores and vertical production

wells in the coal mines of the Bowen Basin.

Grid Drilling is a smaller well-equipped drilling company prepared to travel throughout Australia.




GRID DRILLING

We supply: Drilling Services | Equipment Hire | Sub-contracting Services

OUR RIGS

ALTON HD900

The track mounted Alton HD900 is an excellent rig for exploration leaving a smaller environmental foot print and excels where access is restricted. These easy to maintain and very capable rigs are rated to core NQ to 1200 metres, HQ to 800 metres. Their modular concept easily allows them to be configured from track base to truck mounted or skid for remote heli-portable work.

EVOLUTION FH3000

The truck mounted Evolution FH3000 multipurpose rig provides greater depth capacity at 2950 metres NQ, HQ to 2000 metres and flexibility in drilling applications. It is designed for mineral, shallow oil and gas exploration and water well construction. The rig is newly designed and manufactured in Australia, it comes complete with up to date safety features and improvements making the rig an excellent choice for experienced clients, drillers and contractors alike.



admin@griddrilling.com

(07) 4157 8080 // 0407 765 622

griddrilling.com

Specialised, adaptive drilling



Raisebore Australia is a privately owned company supplying raiseboring services to mining, coal and construction industries.

NATIONAL

FOR productive and safe raise excavation, raiseboring is the most successful method, and Raisebore Australia is one of the country's leading specialists.

Raisebore Australia is a one-stop shop – providing specialised, adaptive drilling solutions to meet the client's needs.

The new addition to the fleet is a diverse slot machine such as the Rhino 100.

Raisebore Australia Operations manager Alex Hughes said the Rhino 100 is an easy to use one-man machine, taking slot raise drilling to new heights, maximising the output and reducing the risks without compromising productivity.

"The set-up time for the machine is around 15 minutes, which is much quicker than conventional/box hole raiseborers," Mr Hughes said.

"You also don't need concrete

foundations for the derrick to be secured to and it's much easier to transport, making it convenient for clients drilling multiple pilot holes and slot raises."

The Rhino rig is an efficient option in underground operations, allowing mines to save money, manpower and time.

Mr Hughes said the company specialises in conventional, down hole, box-hole and any vertical development drilling.

"Our fleet features 14 machines, one of

the largest in Australia, with the flexibility to ream raises as small as 0.66m diameter up to 6m diameter and 1000m in depth, vent shafts, escape ways, slot raises, ore passes," he said.

"We cover everything—we're the one-stop shop when it comes to raiseboring."

For more information about the company, phone 0408 892 098, email alex.hughes@raisebore.com.au or visit www.raisebore.com.au.

RAISEBORE AUSTRALIA THE RAISEBORE SPECIALISTS

A privately owned company supplying raiseboring services to mining, coal and construction industries

CONVENTIONAL | DOWN REAMING | BOX HOLE



New Rhino 100 joining our Fleet soon

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- Welnav Directional Drilling Systems
- Micon RVDS Directional Drilling Systems

Our services:

- A specialist raiseboring company with a core business in conventional, down reaming and up-hole raiseboring
- Our fleet features 14 machines (one of the largest in Australia) with the flexibility to ream raises as small as 0.66 metre diameter up to 6.0 metre diameter and 1,000 metres in depth
- RBA has raisebored 146,000 metres since inception

Raisebore
Australia
raisebore.com.au

Contact: **Rod Bertram** Managing Director // m. 0419 856 118 // Office (08) 8358 4444 // email rod.bertram@raisebore.com.au
Contact: **Ben McCarthy** Chief Operating Officer // m. 0400 196 823 // Office (08) 8358 4444 // email ben.mccarthy@raisebore.com.au

The value of experience

NATIONAL

ESTABLISHED in 2006, DDH1 Drilling is a leading provider of technically innovative drilling services to the Australian mineral exploration and mining industry.

The company's reputation has been built on a track record of high performance and quality deep directional drilling with a strong emphasis on safety management and the employment of efficient, cost-effective operating systems and drilling practices.

With a fleet of 55 multi-purpose surface and underground diamond drill rigs utilising the most advanced technology systems available, DDH1 customers and 550 employees all know the importance of the value of experience.

Gwalia mine

DDH1 recently completed the Southern Hemisphere's deepest vertical cable drop hole at the historic Sons of Gwalia Mine in Leonora at 1440m, surpassing the previous record of 1375m by DDH1 at the same site.

This required a 96mm diameter pilot hole which was then reamed out to 305mm and steel casing installed.

The final phase involved installation of API approved 9-5/8 in oilfield casing and grouted back to surface.

The cable drop hole will allow the

underground operations to move from the current underground power supply to direct power feed underground infrastructure, as part of the ongoing mine expansion program.

Future focus

DDH1 has strong demand for similar works, where the ability to hit a very small target at great depths as cost effectively as possible is crucial to both production costs and ultimately, mine viability.

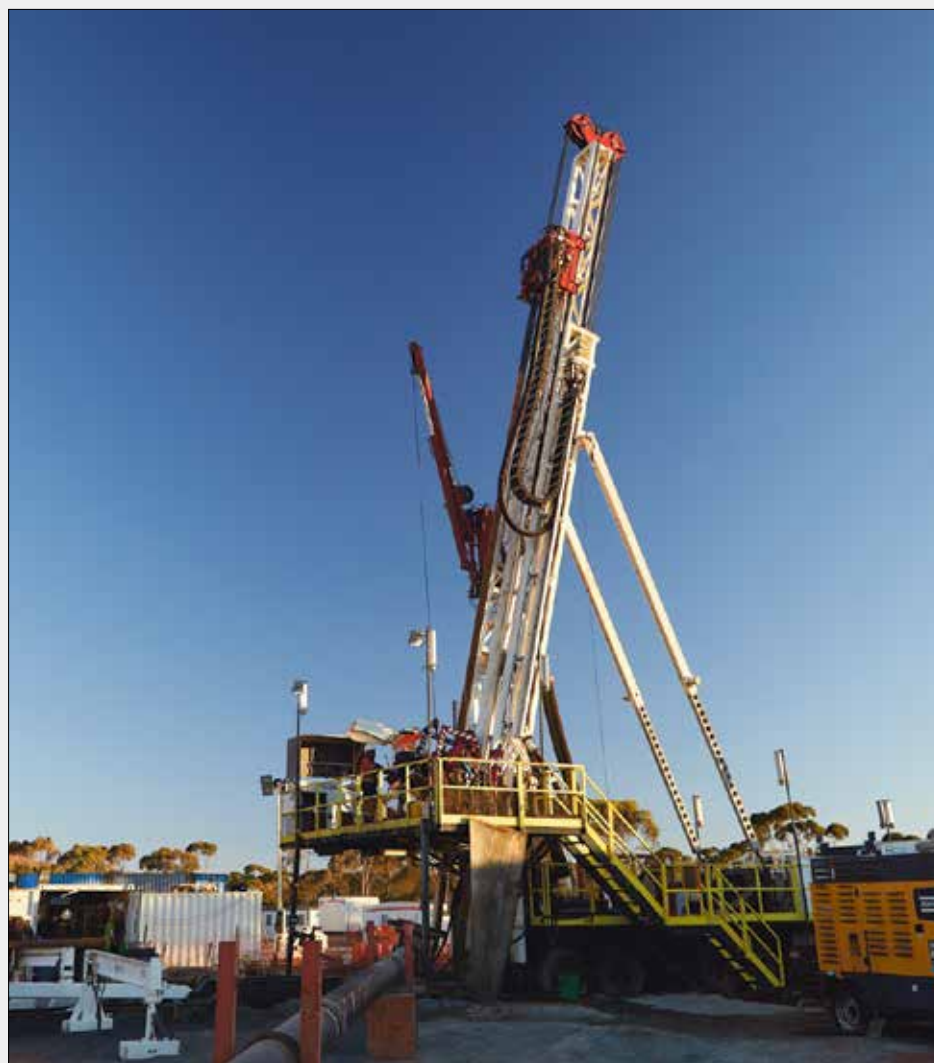
DDH1 Drilling also offers specialist engineering solutions to deliver innovative outcomes to the most technical drilling challenges in some of the most complex operating environments in Australia.

The company is known for its development of multiple-intersection drill hole design and the successful execution of these advanced designs.

Performance is achieved through following systems of work and drilling disciplines developed over more than 30 years.

Typically clients provide target location and the company calculates the most efficient, cost-effective directional drilling plan, which is predominantly 'cross-strata' drilling carried out in the 500m to 4000m depth range below surface.

For more information visit: www.ddh1drilling.com.au



DDH1 has a reputation for quality and safety.



DDH1 DRILLING - THE VALUE OF EXPERIENCE

From first pass exploration to resource drillouts and deep hole directional drilling, no one delivers results like DDH1.

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for more
information**

08 6102 2427

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oxengineering.com.au

With over 15 years' experience in drilling and mining, Ox Engineering provide design expertise, equipment, consulting and services to cover all areas of mineral drilling, earthmoving and general industry - large or small.

With an innovative approach, extensive product line and fully equipped workshop, Ox engineers have the ability to redesign or custom build equipment to individual requirements that can improve productivity and ultimately lower your bottom line costs.

Ox designs are simple, practical, reliable and effective resulting in less downtime, more efficient productivity and a safer work environment.

FOREMOST
AUSTRALIA



Ox Engineering has more than 15 years' experience in drilling and mining.

Innovative, effective engineering

NATIONAL

OX Engineering and Foremost Australia is committed to providing innovative and effective designs.

The engineers have broad field experience so have a clear understanding of the extreme and varied conditions required for a site's manpower, equipment and budget.

"We apply lateral and creative thinking, extensive experience and an uncompromising approach to quality and service with every project," general manager Nathan Horton said.

"Our equipment has been tested and proven in the field for more than 20 years.

"So for your engineering needs, take advantage of our wealth of knowledge and alternative thinking, and contact us to discuss a future of less downtime, more efficient productivity and a safer work environment."

Ox Engineering and Foremost Australia provides services that can deliver improved productivity, value, safety and versatility accommodating today's high demand,

increasing productivity while also helping reduce costs.

The engineers have the ability to redesign or custom build equipment to individual requirements – no matter the size of the project.

Superior services

• Drill rig modifications

With a range of services to suit individual requirements, Ox Engineering Foremost Australia can upgrade virtually any rig components or perform a complete rig overhaul.

Services include complete rig rebuilds, refurbishments of drilling equipment, modernisation, engine design change outs, prime mover exchange, rig moving systems, replacement masts and substructures and modifications to increase rig capacity.

• Trailer customisations

Whether manufactured to customer blueprints, individual designs or unusual applications, Ox Engineering and Foremost Australia can customise clients' needs to Australian standards.

The company's unique design solutions

are tailored to individual requirements from an original thought, superseding existing designs.

Consulting and labour

Ox Engineering and Foremost Australia can provide engineers and labour for site and project consulting.

The engineers' breadth of experience can provide welcome third party input, design applications and hands on assessment in the field.

Ox Engineering and Foremost Australia can also provide boiler makers, heavy duty mechanics, and hydraulic specialists for all a client's man power requirements.

Maintenance

Proactive maintenance and support for all equipment on site will result in less down time and ongoing productivity.

Ox Engineering and Foremost Australia can provide equipment maintenance, rig upgrades and overhauls for all drilling, mining and earthmoving equipment - not just the Ox and designs.

Custom design solutions

Ox Engineering and Foremost Australia can also design solutions for individual requirements.

The well-equipped workshop and professional engineers and tradesmen can custom design and build equipment specific to clients' needs.

All custom products are to the same high standard as all our products and comply with Australian standards.

Products

Ox Engineering's and Foremost Australia's product lines include dual rotary drill rigs, compressed air boosters, dual air swivels, sample systems, cyclones, hydraulic wheel carriers, truck bodies, trailers, support trucks, booster air trucks, automatic truck platforms and more.

The company can also custom design and build equipment specific to individual requirements.

For more information visit: oxengineering.com.au.

Innovative drilling fluids

NATIONAL

MUDEX is a privately owned and operated Australian drilling fluids company specialising in the manufacture and supply of high quality and environmentally friendly drilling fluid products for the mineral exploration, HDD, water well and civil construction industries.

A core part of Mudex involves the provision of on-site technical support and training of drilling personnel.

With a focus on reliable service, competitive pricing, and a complete range of performance proven and innovative mud products, Mudex can provides the right options to control down-hole problems, reduce drilling costs, and improve your productivity.

Mudex was formed by Dave Williams in 2014 after completing a strategic partnership with NorthStar



For more information about Mudex, visit: www.mudex.com.au.

and MayanStar drilling fluids. The partnership provides Mudex with a global reach and head offices in Australia, the US, Canada, and Mexico, as well as access to a wide-range of quality products.

With a clear strategy to be a leader in the drilling industry and to always strive to be at the forefront of technological advancements, Mudex believes its experience and ability to quickly adapt to customers' requirements gives its team the edge over the competition.

Partnerships and subsidiaries

As well as strategic international partnerships, Mudex and its partners have a well-established network of both international and domestic distributors.

This ensures Mudex can efficiently supply products and drilling fluid solutions to customers worldwide.

Through the subsidiary company Drillchem, Mudex is in a strong position to be able to provide fast, flexible, customised

and competitive product solutions to customers.

Drillchem is the manufacturing division and the primary Mudex formulator and toll blend manufacturer.

The staff have vast chemical knowledge and experience in their field. With a proven track record and relationship, over the past 10 years Mudex has been able to introduce some of the most innovative and successful products to the market.

The in-house chemist with lab and testing facilities ensures that the company has full control over product development and testing.

Innovation

The team is committed to knowledge sharing and continuous improvement, and the company is always looking for ways to do things better.

The main driver of innovation is utilising Mudex's many sources to keep up with the latest technologies, while maintaining a constant hands-on approach with field crews to better understand their needs and wants.

With its own in-house research and development team and partnerships, and links with technical specialists and companies in the industry, the company works to find new ways of adapting technology to suit the fields it works in.



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Drilling company makes impact

NATIONAL

IMPACT Drill and Blast's new bulk explosives manufacturing facility near Darwin will soon be ready for production.

The facility is capable of manufacturing a range of bulk emulsion products to suit a variety of applications such as reactive ground for surface and underground mining, and will provide mining companies in the region with a cost-effective option to use a high quality emulsion product that is made locally in the NT.

The location will also allow Impact Drill and Blast to deliver cost effectively into the northern areas of WA and the western areas of Queensland (Mt Isa and Cloncurry), and is strategically located to allow cost-effective deliveries to Adelaide and Melbourne via rail connection.

The facility can currently produce around 40,000t per annum of bulk emulsion, but has been designed and constructed to increase this capacity as required.

The Yahua Group

Impact's parent company, the Yahua Group, operates 57 wholly-owned subsidiaries, 23 manufacturing bases engaged in civil explosive business in China, and have the



Impact Drill and Blast has one of the largest fleets of blast hole drills in Australia.

annual capacity to produce 200,000t of explosives and 75m detonators.

Yahua also owns the Redbull Powder Company that has two bulk emulsion facilities in New Zealand.

Redbull and Impact will be working as one team to service the Australasian region, combining to build a strong force to deliver complete rock on-ground solutions to clients using the latest technologies, equipment and explosives products.

Impact Drill and Blast's ability to produce its own explosive products further enhance

the flexibility and capabilities to offer integrated rock on-ground services to fulfil the drilling and blasting needs of smaller quarrying businesses, right through to large multinational quarrying and mining companies.

By offering integrated drilling and blasting solutions, the company helps maximise the efficiency of mining, quarrying and construction projects around Australia and streamlines drill and blast operations to make the lives of project managers much easier.

The company also has one of the largest fleets of blast hole drills in Australia with an experienced team of shotfirers, drillers, maintenance personnel, project managers and blast engineers to handle the most complex of projects and to ensure that the job is always done safely, reliably and efficiently.

For more information about how Impact Drill and Blast can provide reliable, flexible and cost-effective solutions within the drilling and blasting industry, visit: www.impactdrillblast.com.

Leaders in the bits business

NATIONAL

CARBIDE Bit Co is a long established, Australian-owned and operated drilling consumable supplier based in Darra, just 20 minutes from Brisbane.

With original director Dan O'Keefe at the helm and the addition of manager Steve Mellish in 2008, alongside their well-qualified team, Carbide Bit Co is renowned for knowledge and understanding of the drilling industry, and quality, availability and competitive pricing.

This is evident in the showcase warehouse and through communications with Dan or Steve.

Over time, Carbide Bit Co has expanded stocks of new premium oilfield tricone and polycrystalline diamond compact (PDC) drill bits, as well as developing new products, including PDC core bits, carbide tiled integral body stabilisers, redesigned under reamer bodies and PDC blades.

The acceptance and the performance benefits obtained with PDC bits has driven the need for larger and non-standard size PDC bits, hole openers and other PDC tooling.

The use of different well designs/



There are more than 66 years of drilling industry wealth and knowledge accumulated between Dan O'Keefe and Steve Mellish, with Dan holding 41 years and Steve 25. This photo was taken in the company's very well stocked warehouse, dubbed 'drillers heaven'.

casing sizes, new casing materials and unforeseen issues such as out-of-round casings or over-welded joints, often create the need for other-than-standard oilfield size bits.

Carbide Bit Co specialises in

non-standard sizes and can offer the complete assembly, bits, stabilisers, collars and sub-assemblies for purchase or rent in certain cases.

"We have also continued the development of custom-made specialised

tungsten carbide insert (TCI) roller cones and PDC directional and vertical hole openers," Mr O'Keefe said.

"Bi-centre PDC motor bits for methane drainage are a recent success story for Carbide Bit Co."

Quality tooling of the right design is the secret to selling in any market, locally or worldwide.

Price is important but productivity is the key to a driller's success.

Carbide Bit Co offers the following equipment and services:

- PDC bits 2 15/16 to 24 inch ex-stock
- Tricone bits 2 15/16 to 28 inch ex-stock
- 4C/8C PDC coal coring bits
- Hole openers TCI up to 48 inch; and beyond/PDC, up to 36 inch
- PDC underreamers and casing cutters – three body sizes up to 20 inch cut
- Modern warehouse with quality packaging including steel cradles for convenience of dispatch and return for rental or refurbishing large tooling
- Specialist in milling tools and refurbishment of all PDC tooling
- The company is also an official Epiroc re-seller

For more information about Carbide Bit Co, visit: www.tricone.com.au.

CARBIDE BIT CO.

CONTACT

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steve.carbideco@bigpond.com



SPECIALTY DRILLING SERVICES

Carbide Bit Co has large stocks of new & used Tricones and PDC Bits – possibly the largest stockist in the southern hemisphere. Our equipment has proven performance & reliability as realized by major drilling companies. Let us help you get the BEST performance from you Down Hole equipment, including Hole Openers, Stabilizers and Drill Collars.



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Hole Openers
PDC & Roller Cone

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FURTHER. FASTER.

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NATIONAL

FOUNDED in 1985 and headquartered in Finland, Robit manufactures, sells and services a wide range of quality drilling consumables for the mining, construction, and water well industries around the world.

With manufacturing facilities in Finland, Australia, South Korea and the UK, Robit is an international company with active sales networks in 115 countries.

In serving the global mining industry, Robit offers a comprehensive range of top hammer and down-the-hole drilling consumables for both surface and underground applications.

Robit's focus is on driving value through productivity.

This is reflected in the design and quality of all Robit products, but



Robit's Evolution Bit series and Diamond Button series are game-changers in drilling performance.

probably best demonstrated in Robit's innovative, next-generation drill bit designs which help drilling consumable performance keep pace with increasingly productive, automated drill rigs.

Robit Evolution bit series

The Evolution bit series is the result of a systematic approach towards crafting the world's best button bits.

After extensive world-wide testing, the Evolution series has proved itself with improved rates of penetration and wear life – with bit life increasing by 20pc and button sharpening intervals increasing by as much as 60pc.

Robit Evolution bits come with features unique to Robit, and the heart of the bit design is in the unique head design with optimised flushing characteristics.

The Evolution technology is offered throughout the bit range, from 45mm upwards.

Robit Diamond Button series

Automation in mining is here and the trend towards remote drilling is increasing at pace.

The drivers for this are productivity and safety.

Autonomous drilling removes the risk of constant manpower in hazardous, harsh environments, and opens up opportunities for multi-rig, single-operator drilling.

The challenge for autonomous drilling however is the need to change drill bits frequently.

Standard bits might last 50-80 drill metres before they need sharpening, but each production cycle might require 250-400m of drilling.

Every bit change pauses the production cycle – moreover, it places personnel in harm's way.

Robit's new Diamond Button bits enable continuous remote drilling of the production cycle without loss of hole diameter.

Actual drilling time per shift is significantly increased while reducing personnel exposure to working areas, thus increasing total production and improving safety.

Costly and hazardous bit sharpening operations can be eliminated or reduced.

Fewer bit changes also means a reduction in the total number of bits needed in the drilling circuit and stores, with an associated reduction in manual handling and total supply chain burden.

For more information visit: www.robitgroup.com.

State-of-the-art sonic drilling

NATIONAL

DRILLING through cobbles, sands, boulders, fill and bedrock is no longer a problem with Groundwave Drilling Services' sonic drilling technology.

Groundwave managing director Duncan Black said the sonic drilling system employs simultaneous, high-frequency, vibratory energy.

This action produces a uniform borehole while providing continuous, representative, relatively undisturbed core samples of both overburden and most bedrock formations. If you are doing an site investigation (SI) on a tailings dam there is no better method.

The sonic system has many advantages, but the most unique is the inherent ability to obtain large diameter continuous core samples of almost any overburden (or rock) formation without the use of air, fluid or additive circulation, and often with or without rotation.

Mr Black said there was not a lot of in-hole testing the company can't do, with the ability to do SPT's, Diamond Tails and push CPT cones directly from the one drill. Experienced sonic drillers are the key to maximising the sonic technology and Groundwave Drilling has the most skilled sonic drillers in APAC.

The company has long been a pioneer in this drilling technique and boasts the largest and most diverse sonic fleet in the Asia Pacific region, with a portfolio of projects in Australia, Papua New Guinea, Antarctica, and the Pacific Islands.

Groundwave Drilling is also ISO-accredited and services the mining, construction and environmental sectors.

"Our speciality sonic drilling services set us apart from others," Mr Black said.

"We provide world-class drilling services using diverse and innovative techniques to achieve the very best results for our clients."



Groundwave Drilling is a pioneer in sonic drilling technology.

Backed by decades of drilling experience, Groundwave prides itself on being safe, reliable and environmentally sustainable.

"With nine sonic drilling rigs all capable of rotary drilling methods, we can provide a drill for jobs large and small," Mr Black said.

"Our drill platforms range in size from 3000kg to 18,000kg and can drill holes to depths of 240m.

"No other company can match us for versatility and experience and with offices in Perth and Melbourne we can cover all states."

Mr Black also made the point that

although the company specialises in sonic drilling, they also have small footprint tight access rotary drills rigs which can handle most site investigations.

Furthermore, Groundwave Drilling has established industry-leading incident and hazard reporting and investigation procedures that enable the team to analyse potential safety issues and fix problems that have the potential to cause harm, minimising the risk to its staff and clients.

"We are aware of the impact that all drilling operations have on the environment and are committed to

keeping our footprint to a minimum on each project," Mr Black said.

"On a case by case basis, we devise solutions to minimise the negative impact of our business operations on surrounding vegetation, wildlife and waterways."

Groundwave Drilling recognises that the protection of the environment is crucial to sustained economic growth in the future, and complies with all environmental statutes in the countries in which it operates.

More information on Groundwave can be found at www.groundwavedrilling.com.

groundwavedrilling.com


GROUNDWAVE
 DRILLING SERVICES

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- call us today to find out how we can help.

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Paul Griffiths **+61 425 769 219**
 paulg@groundwavedrilling.com


SAFE, DIVERSE, INNOVATIVE

Groundwave drilling services is a drilling company with a difference. We provide world class niched drilling services to our clients using diverse and innovative techniques to achieve the very best results.

We specialise in sonic drilling, a technique which makes use of a specially constructed sonic drilling rig. The technique involves sending high-frequency vibrations down the drill head which fluidises the soil around it, making it easy for the drill to progress with minimal torque. Groundwave Drilling has long been a pioneer in this technique. Our directors have been involved on every major sonic drill conducted in Australia over the last 7 years.

Sonic Drilling applications include:

- Sonic Drilling: Sonic / CPT combination
- Tailings Investigations
- Waste Rock Piles
- Leach Pads
- Mineral Exploration
- Water Wells installations
- Environmental Studies
- Piling and Micro Piling

With the largest and most diverse sonic fleet in the Asia Pacific Region, all of our drills can also drill rotary techniques like Diamond and DTH and we can push CPT cones from our drills. We also offer tight access rotary drills.

The one-stop drilling shop

NATIONAL

TOPDRIVE Drillers Australia provides contract diamond drilling, aircore, and reverse circulation (RC) services to the mining and minerals industry in Australia.

The company was reinvented in 2018 with new ownership, led by managing director Marchus Harris, and has an experienced team of drillers and technicians with all the skills required to operate efficient and cost-effective operation anywhere in the country.

“What makes Topdrive drillers different is that the guy who owns the business runs the business – so you can get decisions and advice directly without delay unlike much larger companies,” Mr Harris said.

“We have experience from remote desert drilling operations to mine site geotechnical, directional drilling and large scale drillouts, we can provide a tailored equipment suite to suit your requirements.”

Boasting a complete set of support equipment, Topdrive Drillers ensure that all remote drilling sites are completely self-sufficient with an extensive list of support equipment, including mobile workshops, support trucks, a fully-equipped site office and lighting tower.

“Core recovery, sample presentation

and quality is one of our major priorities right along to the safety, and we use only the very best equipment to achieve top quality samples in a safe productive manner,” Mr Harris said.

“We cover all disciplines of drilling and can undertake PQ, HQ, and NQ coring, we also offer services in mud rotary, aircore, large diameter coring and wedging or controlled directional drilling.

“And we are adding to our capabilities with the introduction of a new Austex X350 Reverse Circulation rig currently being built to meet Tier 1 client compliance requirements.”

Topdrive Drillers’ new rig build will be capable of drilling reverse circulation, grade control and aircore to depths of 300m and easily mobilised.

The rig, mounted on a 6x6 truck for the smallest foot print offered on a large capacity RC rig, will be available in February of next year.

“Our small footprint track mounted diamond rig allows us to get into those tight, small hard-to-access areas in pits and around the environmentally sensitive areas or on top of steep access ridges,” Mr Harris said.

“We are always looking for effective ways to improve our quality service.”

For a personalised tailored service from a team that are highly experienced and drill with passion and pride, visit: www.topdrivedrillers.com.au.



Topdrive Drillers Australia's Rig 4.



THE ONE STOP SHOP



Topdrive Drillers, provides efficient and cost-effective core sampling services to mining operations anywhere in Australia. Boasting a complete set of support equipment, Topdrive Drillers ensures that all remote drilling sites are completely self-sufficient and offer PQ, HQ, and NQ drilling, as well as services in mud rotary, large diameter coring and wedging or directional work.

Topdrive Drillers aim to be the ONE STOP SHOP for all our clients.

- Diamond Drilling
- Aircore Drilling
- Reverse Circulation Services
- Maintenance Services



08 9527 5101

admin@topdrivedrillers.com.au
topdrivedrillers.com.au

Keeping stock of innovations

NATIONAL

DRILLERS World Australia is a supplier to the drilling and environmental industries, servicing the mining, exploration, geotechnical, waste treatment, water well, tunneling, foundation piling and HDD communications sectors.

A member of the Australian Drilling Industry Association (ADIA), the National Ground Water Association (NGWA), and No-Dig Australasian Society for Trenchless Technology (ASTT), the company has been in operation since 1997 and is a family-owned and operated business.

Drillers World Australia owner and founder Bob Seaborn has been involved in mining and drilling particularly for more than 30 years.

“Our mission is to deliver a professional service to the drilling and environmental industries by providing a fast and efficient delivery service, from a fully stocked warehouse in Sydney, of products that our customers use on a regular basis,” Mr Seaborn said.

“The different drilling disciplines we sell to have enabled the company to have expansive suppliers that mines don’t always consider or aren’t on their current vendor lists. This gives us capabilities to



Drillers World managers Pete Seaborn and Tom Moc.

assist them in obtaining different product ranges”.

Popular products include Baroid drilling fluids and polymers, wireline and conventional core barrel assemblies, DTH hammers and bits, core trays, threaded steel and PVC tubing, Asahi diamond bits and more commonly PDC (Polycrystalline diamond compact) bits.

“PDC technology has led to improvements in penetration rates and a

big reduction in downtime due to less rod tripping and their ability to be used with air drilling or mud rotary,” Mr Seaborn said.

“We pride ourselves on the ability to support our existing customer base at short notice.”

Recently a client using PVC for a water well was unable to fit the PVC casing in the borehole.

This was due to borehole instability and

the end user not allowing drill mud to keep it stable, as they had to do permeability testing.

Drillers World was able to get the PVC threaded instead of bell-ended that night, to reduce the outside diameter of the PVC.

The client and hydrologist were extremely happy to see the product delivered on site the next morning, and allow completion of the well. www.drillersworld.com.au.

Drillers World Australia Pty Ltd has been in operation since 1997 and is a family owned & operated business.



Drillers World Australia Pty Ltd

MEMBERS OF
ADIA
NGWA
No-Dig ASTT

Drillers World Australia is a Supplier to the Drilling, Trenchless and Environmental Industries including Mining, Exploration, Geological, Geotechnical, Waste Treatment, Water Well, Consulting, Communications, Piling and Tunnelling.

Drillers World Australia Pty Ltd
Unit 9, 2 Marina Close,
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✉ sales@drillersworld.com.au

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All mining needs under one roof

NATIONAL

EQUIPMENT Hub was established as a one-stop-shop for customers looking to buy, sell or rent equipment and machinery for use in drilling, mining, civil, agricultural and other industries.

The company has experience in equipment brokerage, sales, rental for any and all equipment, mining, drilling, transport and agricultural equipment, including dry or wet hire, and the buying and selling of earthmoving and mining equipment, including drill rigs, mud pumps, tracked carriers, jack up skids, mud systems, compressors, boosters, light towers, generators and any other equipment requirements.

Equipment Hub managing director Terry Horsburgh said the company was always on the lookout for equipment to list for clients on its multiple web sites and social media platforms.

“In turn this will assist you in selling any equipment you have no further requirements for, and turn your unused and idle equipment into cash,” he said.

“Even if we don’t have the item you are looking for, we offer a service where we investigate, find, and source or locate and provide options for our clients.

“Equipment Hub are like an equipment concierge service – and we also manage the entire process of valuation, procurement, and relocation of your equipment.”



Equipment Hub has all buying, selling, and renting needs covered.

Whether you are looking to buy or sell surplus equipment, Mr Horsburgh said that Equipment Hub can assist.

“Whatever you need, whether you

need to hire, buy or sell, we can help you out,” he said.

“Equipment Hub is a one-stop shop for all of your drilling, mining,

earthmoving equipment sales and rental requirements.”

For more information visit: www.equipmenthub.net.

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Health monitoring medicals

NATIONAL

WITH an increasing number of chemicals and hazardous substances used in the workplace, health monitoring (previously known as health surveillance) has become a key component of an effective workplace health program.

Health monitoring is often a legal requirement in a workplace where an employee is exposed to substances hazardous to their health.

Pre-employment medical assessments provide a baseline understanding of the health status of prospective employees, providing assurance of the suitability of an individual worker to a particular job role.

Ongoing health assessments or health monitoring is designed to identify changes in a person's health status due to exposure to certain substances at work, allowing for early intervention to prevent further exposure and health effects.

Health monitoring medicals make it possible for employers to minimise the health risks to workers, by establishing baseline measurements of specific health indicators and monitoring these with periodic medical examinations.

Most state-based regulations prescribe health monitoring for particular hazardous chemicals.

Guidance is provided in the Safe Work Australia publication, Hazardous Chemicals Requiring Health Monitoring (2013).



Occuhealth director Dr Julia Norris (FRACGP, COH, FAIOH).

As well as regular medical assessments, biological monitoring can be used to

ensure effective workplace controls are implemented to prevent exposure to

chemicals.

Biological monitoring is used to test for the presence of a hazardous substance or its metabolites in the body, to determine

how much chemical has entered the body following exposure by all routes of entry (e.g. inhalation, ingestion, skin contact).

Early detection of elevated exposures or signs of adverse health effects allows companies to proactively implement timely remedial and preventative actions that minimise further harmful exposures.

Occuhealth is an occupational health and hygiene consultancy, offering a fully comprehensive service, including occupational hygiene, occupational health and occupational medicine.

Each work environment is different and Occuhealth understands the need for a risk-based approach to occupational health.

By carrying out the full suite of assessments from health risk assessments, workplace exposure monitoring through to occupational health monitoring, Occuhealth can customise services to each individual work environment.

The company maintains a number of fully equipped mobile units which travel to client workplaces, based in WA, operating throughout the nation and beyond, thus avoiding the needs for employees to lose time through travelling.

Not only does Occuhealth assist companies to meet their legislation obligations, but it also promotes proactive exposure control and disease prevention, creating healthier workplaces.

For more information visit: www.occuhealth.com.au.

Occupational Health, Hygiene and Medical Services



Occuhealth Pty Ltd

Creating Healthier Workplaces

Head Office: 57 Sutton Street, Mandurah WA 6210

Perth Office: Unit 27, 12 Cowcher Place, Belmont WA 6104

T: (08) 9537 5700 | E: info@occuhealth.com.au | W: www.occuhealth.com.au

Coal boosts local business

NATIONAL

FEW could argue that there have been numerous ups and down in the coal sector over the past 10 years, and while there has been a hotly debated range of conflicting reporting in local media outlets, one of the best alternative indicators of coal's overall growth is the flow-on economic impact to local service providers.

While it varies from industry to industry, businesses that support the employment needs of the coal sector are a good starting point as they provide an indicator across the entire industry, from mining companies through to contracting services and everything in between.

Over the past five years, Humanomics has seen continued growth in the business right across the mining sector.

Humanomics provide a 360-degree holistic health testing and monitoring service including pre-employment Order 43 medicals, specialised spirometry for



The Humanomics mobile van in action.

hazardous substances, respirator fit testing and health monitoring.

According to managing director Sanjiv Parmar, growth is a combination of industry growth and specialisation of their services to the sector.

“We’ve seen a steady, positive growth in the employment side of the sector over the last decade and wanted to make sure we could adapt our business to take advantage of that growth,” Mr Parmar said.

“We understand that the sector is going through ongoing change and that we needed to become more nimble to accommodate their needs and support their business.

“That’s why we introduced faster turnaround time for medical appointments and reporting, as well as a

mobile testing van for on-site delivery of services.

“We know that time is money for our clients and have developed a solution that ensures we deliver industry best practice medical services within the shortest delivery timeframe possible.”

Much like the best businesses within the coal sector, Humanomics has focussed on systems and processes to create business efficiencies that deliver improved outcomes for clients.

“This has involved a full rebuild of all of our systems,” Mr Parmar said.

“We have completely restructured our processes and services to make it faster and easier for our clients to do business with us.

“We increased the number of specialist

medical practitioners we have on staff to ensure timely appointments and improve the range of services, as well as increased peer reviews.

“We also doubled our front-line staff to make the experience as streamlined as possible for the employees who come to the clinic for testing as well as for employers to book and manage the process.”

The company focuses on the inter-relationships between workers, their workplaces and their work practices, occupational and environmental medicine encompasses prevention, treatment and rehabilitation, thereby further enhancing the holistic staff management opportunities for employers.

For more information about Humanomics, visit www.humanomics.com.au.

ORDER 43 MEDICALS AND MORE

5 Day appointment guarantee

We understand that time is money and you need to be able to get your people on the job quickly. That’s why we’ve developed a customised system for our registered clients to get their appointments sooner and their results faster.

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HUMANOMICS

Book now on: 02 4965 8199



Comprehensive medicals

NATIONAL

FOR nearly 25 years, Jobfit Health Group has been providing pre-employment medical assessments and occupational health services at its wholly-owned and operated centres across Australia and New Zealand, together with onsite medical services for mining and resources clients.

With expansion fuelled by demand from clients for efficient and professional occupational medicine services, Jobfit now conducts more than 120,000 pre-employment medical assessments each year.

Focused on creating lasting business partnerships, Jobfit can tailor pre-employment medicals and assessment services to meet specific industry and organisational requirements.

Jobfit delivers not only pre-employment medical services, but a broad range of occupational health services to thousands of businesses nationally.

Other services include work fitness assessments, injury management and prevention, drug and alcohol screening, onsite medical services, health surveillance, and health and wellness programs.

Managing director Steven Harvey said the company's efficiency, geographic spread of clinics, and ease of service were fundamental to its success in securing major contracts for mining and resources sites, including Olympic Dam, Weipa,



A Jobfit occupational health nurse conducts a hearing test on a candidate.

Adani, McArthur River Mine, Prominent Hill and Carrapateena.

"We offer our clients advanced and innovative systems to book and manage medical assessments online 24 hours a day, seven days a week, which is really important for our resource sector clients," Mr Harvey said.

"Our contact centre is open extended hours for a streamlined service for both candidates and employers, with a focus on

providing appointments at short notice, and quick turnaround of medical results."

Jobfit has delivered occupational medicine in challenging environments over many years, which has translated into project successes including minimum impact on workplace productivity and downtime for clients and their workers.

Jobfit can mobilise its medical team and upscale as necessary quickly to site, with technology supporting innovative services

such as telemedicine for remote locations.

Whether conducting a single pre-employment medical or a bulk recruitment drive, Jobfit is an expert across a comprehensive range of pre-employment medical assessments, from statutory medicals through to drug and alcohol screening and functional capacity evaluations.

For more information on expert medical services visit: www.jobfit.com.au.

JOBfit



Partnering with business for a healthy workforce

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- Drug and alcohol screening
- Injury management and prevention
- Health and wellness
- Vaccination programs
- Executive health assessments
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JOBFIT CENTRES LOCATED ACROSS AUSTRALIA AND NEW ZEALAND

Early silicosis diagnosis vital

NATIONAL

SILICOSIS is a lung disease caused by prolonged or excessive exposure to crystalline silica dust, a quartz-based substance found in sand, stone, concrete and mortar.

When inhaled, this dust slowly causes lung scarring (fibrosis), which can lead to a number of respiratory issues and reduces the lung's capacity to function properly.

Given the number of industries which use these materials, it is anticipated that silicosis will affect countless Australian employees and employers.

Activities involved in masonry, stone and brick cutting, sandblasting, quarry works, road works and brick or concrete manufacture are considered high risk.

There is no cure for silicosis, and no way to reverse the lung scarring caused by crystalline silica dust, but a GP can help to medicate and manage the symptoms.

Annual medicals can also assist with the early detection of silicosis, setting a benchmark for comparison, and help physicians identify any deterioration



There is no cure for silicosis, but screening measures can assist in the management and medication of the disease among mine workers.

resulting in poor lung health.

Symptoms can appear asthma-like, ranging from mild to severe, including shortness of breath, regular cough or wheeze, occasional chest pain/tightness, and minor fatigue.

Early diagnosis is important for

individuals at risk because the earlier a diagnosis is made, the more impact intervention can have on improving and preserving quality of life.

A late diagnosis, on the other hand, can lead to debilitating side effects.

Concerned individuals should speak to

their GP who may diagnose and assess by regularly using chest X-ray and spirometry testing methods.

While screening is more imperative than ever, preventing the inhalation of silica dust through the use of personal protective equipment, and limiting exposure to the crystalline silica dust, is the best course of action.

Mine Medicals, an Australian-owned and operated occupational health provider, understand that employee's health and wellbeing is a top priority and is dedicated to providing mining operations with thorough medicals and health services.

Director and owner David McDougall said that good workplace health doesn't happen by accident.

"Good workplace health takes action, and Mine Medicals makes that action easier," Dr McDougall said.

"We know employers rely on their workers to be at their best; to get the job done, on time, to standards and safely - that is why employee health and wellbeing is so important, not just when a new worker starts a new job, but throughout their time with an employer."

Mine Medicals offers services which have been devised to assist employers and employees, across a range of industries, to help maintain peak performance, minimise occupational hazards, diagnose occupation related illnesses and, assist with employee retention and return to work.

"When you rely on your employees to be at their best, you can rely on us to provide thorough medicals and convenient health services," Dr McDougall said.

To find out how Mine Medicals can help your business, email medicals@australiandoctors.com.au or visit www.minemedicals.net.

Minemedicals.net

When you rely on your workers to be at their best, rely on us to provide you with comprehensive and convenient medicals.

Silicosis is a lung disease caused by pro-longed or excessive exposure to crystalline silica dust and has the potential to affect hundreds of workers across the mining sector.

Preventing the inhalation of silica dust through the use of personal protective equipment and limiting exposure to the crystalline silica dust is the best course of action and, while there is no cure, Mine medicals has devised a medical for mine workers and high risk employees.

Annual medicals can assist with the early detection of Silicosis, setting a bench mark for comparison and helping physicians identify any deterioration resulting in poor lung health.

Contact us today for more information or to arrange regular medicals for your workforce.

(07) 3204 4222

medicals@australiandoctors.com.au
minemedicals.net



Technical services specialists

NATIONAL

BLACKROCK Mining Solutions (BMS) is a professional technical consultancy that provides contracting services to both the mining and civil sectors.

The company prides itself on its ability to deliver a full range of services across the geotechnical and mining disciplines, and to create quality solutions for clients.

BMS provides a range of geotechnical services to the mining industry, including rockmass characterisation, operational geology, and geotechnical consulting, while bringing extensive experience in mining method selection studies, mine planning and reserve optimisation to every job.

BMS also specialises in project management and prioritises the delivery of project outcomes to clients' expectations, particularly in conjunction with its specialist drilling division.

The drilling division has a wide range of expertise in ground pre-consolidation services, fault delineation and gas conformance testing, as well as certain geotechnical testing and core sampling.

BMS provides a range of geological services to the mining industry, which include exploration planning, exploration management, rig supervision, resource evaluation and mining reconciliation.

BMS' senior level staff have many years of experience in the engineering geology, geotechnical engineering,



Blackrock Mining Solutions has the experience and technical know-how to get jobs done safely, efficiently and on time.

project management and mining engineering within Australia, New Zealand, Philippines and Mozambique.

Furthermore, Blackrock Geotechnical,

a subsidiary of BMS, provides geotechnical and geological services to the civil engineering industry, including site investigation services, geotechnical

drilling/coring, geological logging of rock/soil core and the generating of geotechnical reports under a chartered professional engineer.

Competence and precision combined

NATIONAL

ESTABLISHED in 1992, Hagstrom Drilling is a national drilling company with a diverse capability and a proven reputation in the mining and construction sector.

Hagstrom Drilling has expanded to delivering successful outcomes for multi-disciplinary projects on land and over water environments throughout Australia and Asian-Pacific regions, becoming an experienced and truly diversified drilling service provider.

Hagstrom Drilling founder Paul Musca said that with a track record spanning nearly three decades, the company had a depth of experience completing not only local but international projects for mining companies, construction companies and government infrastructure programs.

"Our continual focus is on using the most technically advanced drilling equipment, combined with our extensive industry knowledge to maximise the efficiency and accuracy of every drilling scope," he said.

Hagstrom Drilling has been working with multiple clients in completing drilling programs across several mining projects, particularly in tailings storage facilities which has been a major focus in the wake of recent tailings dam wall collapses.

These programs require focus and accuracy with in sometimes very challenging conditions.

Other projects include completing drilling exploration programs in which Hagstrom was able to successfully drill in very remote parts of Australia.

Hagstrom Drilling has recently undergone a dramatic refocus in terms of highlighting its presence to the outside world.

Earlier this year the company took delivery of a Schramm T685 and supporting equipment to enhance its RC and exploration drilling services.

"This unit has the capacity of 450m and equipped with the latest technology and safety features to meet the growing client demand around rig safety," Mr Musca said.

"We want to position ourselves more accurately within the industry, where it's our mission to provide clients greater access to end to end service, by diversifying our capabilities and improve the overall experience.

"We can offer a reliable and productive partnership that is based on a flexible approach to each project.

"Our services include exploration, geotechnical, environmental and water drilling."

Hagstrom offers a comprehensive service both on land and in marine environments.

"Thanks to our specialised fleet of drill rigs, all-terrain vehicles, marine barges and supporting equipment, we'll ensure project requirements are completed safely, efficiently and cost effectively," Mr Musca said.

For more information visit: www.hagstromdrilling.com.au.



Hagstrom maintains the quality service safely mantra.



Competence and precision combined



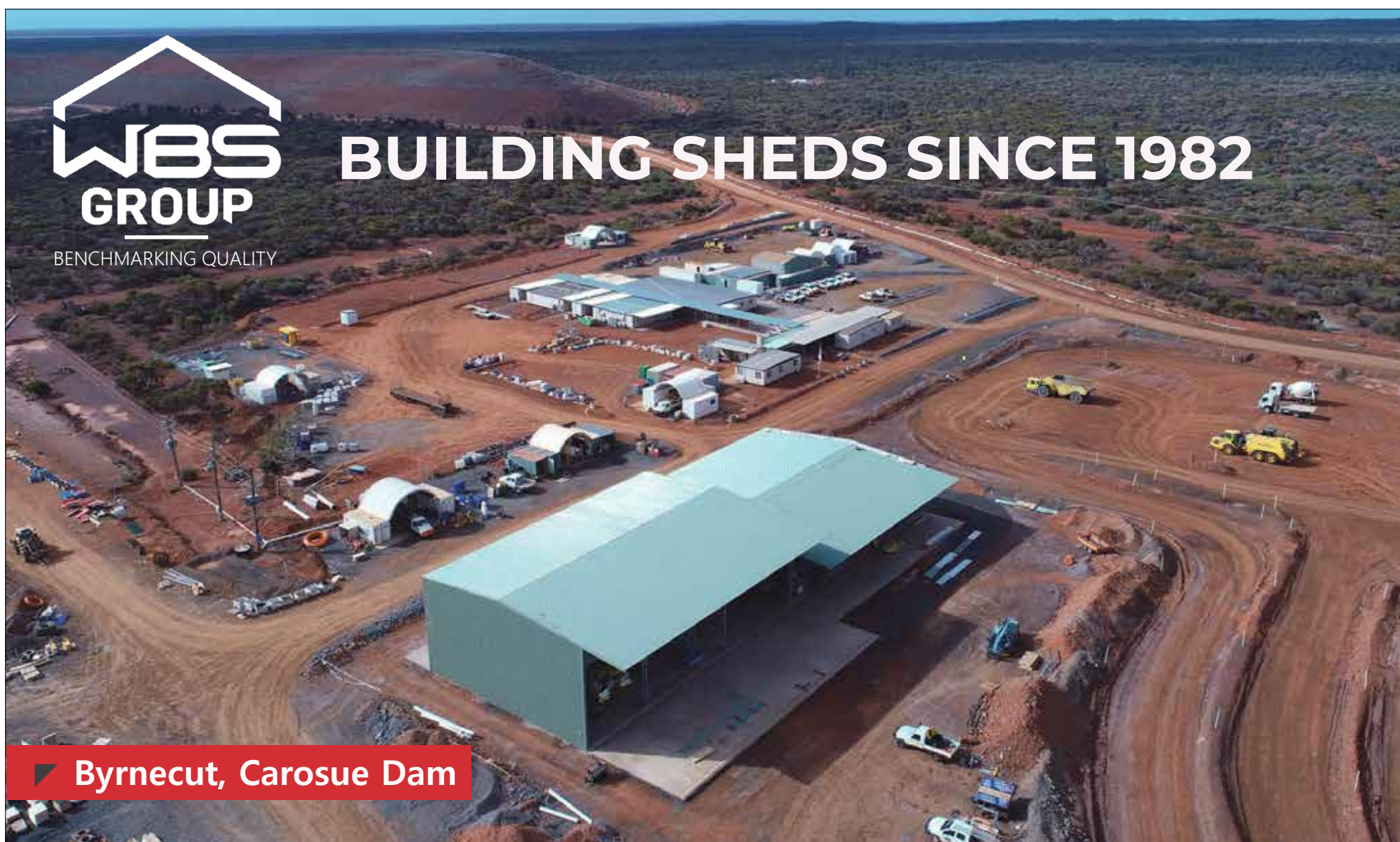
- National Drilling company with diverse capability
- Proven reputation in the mining and construction sector
- Successful outcomes for multi-disciplinary projects on land and over water environments throughout Australia and Asian-Pacific regions

Quality Service Safely

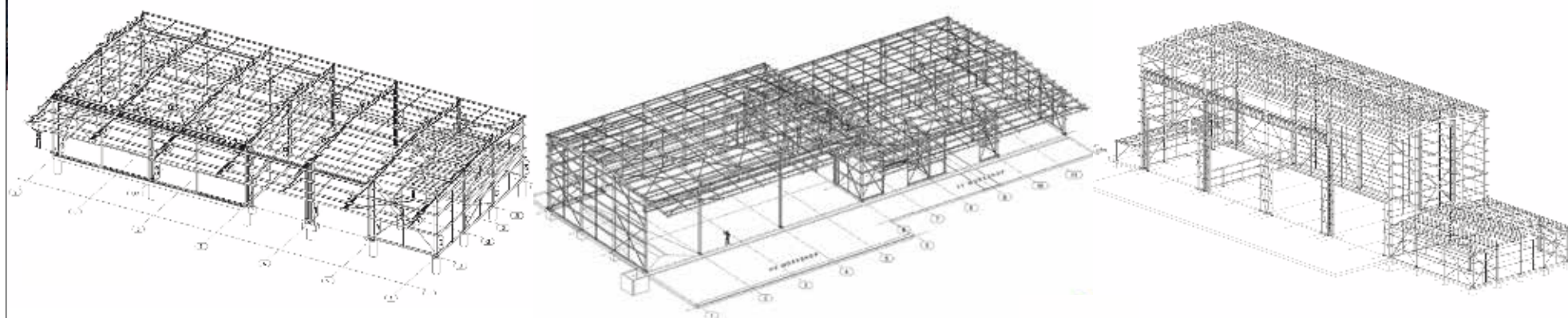
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Autonomous fleet at Westgold



Westgold Resources operations manager James Johnson, executive general manager David Noort and plant maintenance manager Barry Jastremski, with RCT business development mining manager Ryan Noden.

RAY CHAN
WA

LEADING autonomous solutions provider RCT is finalising a major automation project for Westgold Resources at five of its mine sites in WA's Murchison.

The package of works involved RCT installing and commissioning its ControlMaster Guidance Automation technology to 10 of Westgold's underground loader fleet across their mining operations, including CAT R2900Gs and Sandvik LH517 loaders.

RCT will also deliver its latest surface-based ControlMaster Automation Centres, equipped with multiple machine selection and multiple machine control options

aimed at driving further mining production efficiencies at each site.

Guidance automation encompasses a fully automated tramming cycle between production level locations, which includes proportional braking and automated steering and speed control.

The technology also includes features such as G-Dash, which empowers operators by presenting a graphical dashboard of the machine telemetry and diagnostic features to ensure optimal loader performance.

Implementing the ControlMaster Guidance Automation solution across Westgold's Big Bell, Paddy's Flat, Comet, South Emu and Starlight operations standardises the company's production technology and will deliver significant efficiencies and synergies.



RCT is commissioning 10 of Westgold's underground loader fleet, including CAT R2900Gs and Sandvik LH517 loaders.

RCT business development mining manager Ryan Noden said each delivery is being tailored to site-specific requirements.

"Over the past few months RCT has been working in a staged approach to upgrade Westgold's existing systems and consolidate the operating system across all operations to ControlMaster," he said.

"The introduction of RCT's technology will offer Westgold a proven and successful pathway to mine digitalisation, with the ability to adopt the latest technology offerings as and when required and applying shared learnings across its operations.

"RCT is excited to be working closely with Westgold as a technology provider to achieve operational excellence."

Westgold Resources executive

general manager David Noort said he was delighted to be working with RCT.

"We made the decision to implement the ControlMaster Guidance Automation solution due to RCT's proven productivity and technological reliability and proactive support services," he said.

"Being able to implement multiple machine selection/multiple machine control is an added advantage as it will support staged growth and specialised applications where geotechnical constraints require a period of standoff before re-entry after blasting."

RCT has been upskilling Westgold site personnel by implementing operator and maintenance training courses and will carry out after sales support and field servicing on an ongoing basis.

Flight fleet for FIFOs

RAY CHAN
NATIONAL

COBHAM Aviation Services (CAvS) has officially welcomed its first Q400 aircraft with the capability to transform Australia's fly-in-fly-out (FIFO) market.

With jet-like speed, highly efficient fuel consumption and low carbon emissions, the 76-seat Q400 Q Series is the world's most modern turboprop.

It will service Cobham's current and future FIFO passenger operations to regional and remote locations.

This step-change, the key part of a fleet renewal program, will be further enhanced this month with the delivery of a second Q400 which will also be deployed to support customers in the resources



The 76-seat Q400 Q Series is the world's most modern turboprop.

sector.

Ryan Both, chief executive Officer of CAvS – Australia's largest aviation group after Qantas and Virgin – said the new aircraft will be integral to operations as Cobham grows and broadens its flexible FIFO offer.

"The Q400 creates a strong platform for growth and greatly reduces complexity in our business. It enhances operational

reliability, reduces maintenance time and carries a bright and fresh cabin with 2x2 seating," Mr Both said.

The Q400 also burns significantly less fuel than other aircraft operating in the FIFO market.

More than 600 Q400s have already been sold worldwide.

"We expect the Q400 to advance Cobham's position as a leader in the FIFO

market and enable us to provide existing and future FIFO customers with unique and reliable solutions better tailored to their needs," Mr Both said.

"Cobham has a history of innovation in Australia, from our advanced electronic surveillance and search and rescue aircraft, to our work with General Atomics on autonomous aircraft operations, to being the first and only airline to operate high capacity jet FIFO flights to unpaved runways with the 146/RJ family.

"Cobham has now passed another milestone as the first and only operator of the Q400 to unpaved runways - another demonstration of Cobham's market-leading innovation."

The aircraft, based in Perth, currently services WA clients such as Alliance Minerals' Bald Hill Mine in Kalgoorlie, Round Oak Minerals' Jaguar Mine in Goldfields Esperance, Northern Star Resources' Jundee Mine and the Independence Group (IGO)'s Nova Mine in the Fraser Ranges.

"Cobham customers invest significantly and often in new technology at their mine sites," Mr Both said.

"It is fantastic that we can complement this investment with newer generation high-reliability aircraft for their operations.

"Less delays means more production, it's that simple."



As good as new – suspended electromagnetic repair.

Inspections minimise downtime

NATIONAL

WITH the ever-growing pressures on mining operations, companies are extending the life of their equipment by leveraging Eriez' service capabilities.

Its technicians can inspect equipment on-site, or customers can deliver their equipment in-factory for a strip and inspect.

Eriez provides a detailed report outlining the best courses of action.

This may mean preventative maintenance or replacing minor components, updating electronics, or carrying out a complete rebuild to original OEM specifications.

All repairs and refurbishments are

covered by an Eriez warranty.

Most importantly, Eriez understands the dangers associated with handling permanent magnets.

Its personnel are specially trained and follow specific job safety procedures to properly handle high-strength magnetic elements.

Eriez inspections and performance audits improve equipment availability by avoiding unscheduled downtime.

Its technicians have an unparalleled level of skill and knowledge understanding the application and limits of magnetic equipment.

Advancements in technologies and innovations are often implemented as upgrades during rebuild processes.

One of Eriez' early innovations was the

external oil expansion tank developed for its suspended electromagnets (SE). This ensures that the magnet coils always stay completely submerged, thus preventing moisture infiltration and coil burn-outs.

Subsequently, Eriez SE magnets run cooler, are stronger, and last longer than the competition.

The company has also retrofitted expansion tanks to competitor SE's to boost performance.

Eriez can improve the magnetic power of wet drum magnetic separators with enhanced circuit design and better-quality magnets.

The performance of vibratory feeders is improved with new energy saving components; metal detectors are improved with software updates; and smart phone

technology can feedback real time data to enhance maintenance and operating processes.

Process equipment represents a significant capital investment, and annual inspections are mandatory to maintain them in peak working order, to identify any looming issues and for the possibility of process improvements.

Regular equipment checks, process audits and in-plant certifications by Eriez will help maximise life.

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80GHz radar transmitters

NATIONAL

THE use of the radar level transmitter for the process industry started back in 1991.

These were extremely large units and operated with a 6GHz frequency.

The units were sold generally into liquid applications and were only ever considered when no other technology would work.

They were a large unit weighing in at several kilograms and operated only from an AC supply.

In 1997, VEGA released the world's first true loop-powered radar level transmitter, offering a more suitable transmitter for typical process applications, but once again they came with their limitations.

1999 saw the release of the 26GHz radar level transmitter that offered a smaller unit with a reduced antenna size and narrower beam angle (a downside to lower frequencies is the larger beam angle).

VEGA continued to develop and improve radar level transmitter performances through the first decade of the 2000s.

The main changes were in the software area, where thanks to customer feedback, the parameters for setup were improved and much more descriptive and user-friendly.

As with all developments, there comes a point where the components and physics of the technology have been maximized.

At this stage, VEGA started research on the 80GHz frequency range.

This frequency was not new to the market as it was and still is quite common in the automotive industry with reversing sensors.

During the research and development of this frequency, VEGA carried out a number of real life customer trials and the results opened up many more opportunities for the use of the radar that have never been practical before.

It also allowed antenna sizing for the first time and for adaption to many typical process fitting that exist in industry.

One of the things to note in regards to radar frequencies is that as the frequency is increased, the antenna size and the beam angle reduce.

Radar level transmitters work on the reflection of the signal from the product being measured and the strength of that returned signal is based in the dielectric constant (conductivity).

So applications that had a relatively low DK value radar were considered to be not suitable.

80GHz units now allowed these measurements to take place, but of course there are other considerations.

As well as the high frequency, quality components were needed to give very good sensitivity or dynamic range as it is commonly known.

Typically up to this point, radar level transmitters had a dynamic range of around 90db – that was until the VEGAPULS 64 (liquids) and the VEGAPULS 69 (solids) were developed.

VEGA now manufactures a radar



For VEGA, the use of 80GHz has proven to be a large step forward in solving difficult applications.

level transmitter with a dynamic range of 120db.

This means that, as well as with audio, for every increase of 3db, there is a doubling of the power.

An increase of 30db over previous and existing radar frequencies meant an increase of over 1000 times is achieved in the sensitivity of the VEGA 80GHz radar level transmitters.

For this increase, VEGA transmitters were now able to measure extremely low DK products such as plastics.

Radar level transmitters, like all instruments, do have their limitations, many of which are set by the physics of the technology.

It is very important to take into account not just the frequency but all the data when evaluating whether a transmitter is suitable for the application.

For VEGA, the use of 80GHz has proven to be a large step forward in solving difficult applications, but the company has also developed a model for liquids and solids, as different algorithms are needed for the types of process medium.

Radar level transmitters are now a very accepted form of non-contact level measurement and the use of these units have increased by many times over the past decade, but as with all developments it has not finished yet.

VEGA will continue to improve the transmitters to continue breaking barriers faced previously and open up the opportunities for radar to solve more and more applications.



VEGA Australia was the first company to release a true loop-powered radar level transmitter.

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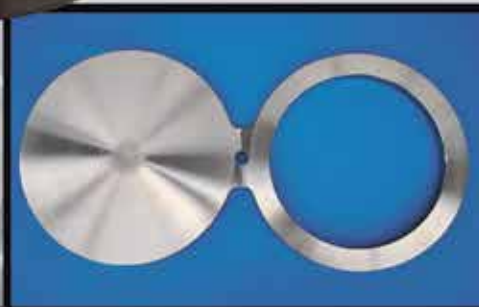
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Heavy metal

This is one of two Eumach 4-axis CNC milling machines used for a number of close-tolerance manufacturing and re-machining processes, including the complete re-machining of all holes and galleries in engine blocks after they have been repaired with metal spray.

WA

RECONDITIONING a heavy diesel engine places a weighty burden of responsibility on the machine shop carrying out the work.

Each component in these engines is expensive and must be stripped, cleaned and machined to exacting tolerances in order for the rebuilt

engine to give many thousands more hours of trouble-free operation.

In most instances, the downtime costs resulting from an engine failing in a large haul truck or excavator can approach the cost of the engine itself.

So the stakes are high and only the most experienced and trusted engineering workshops

earn the right to bring these iron behemoths back to life year after year.

The Australian Mining Review recently visited R Moore and Sons Diesel Engineers, in Kewdale, WA.

This proud family-owned company has been in operation since 1920 and eagerly anticipates its 100th anniversary next year.

That is a remarkable achievement for any company, enduring the great depression, a world war, the oil crisis and a host of other moments in history that sent lesser businesses to the wall.

Through it all, that sense of family remains and is apparent from the moment you walk through the door and are greeted with a warm welcome.



As blocks, cranks, cylinder heads and other components come through the door they are stripped and thoroughly cleaned prior to inspection. At this point a full report is done on each part, which is then sent to the client prior to work commencing.



The decks on this V16 block have been machined down to remove pitting and corrosion after thousands of hours of service. R Moore & Sons installs its own liner seat inserts to seal the tops of the wet liners and support each cylinder head. After this step the decks are reclaimed using metal arc thermal spray.



These Mazak CNC lathes manufacture liner sleeves and inserts from specially cast (in WA) pipe stock.



After metal spraying to reclaim the height of each deck and CNC milling to recut all the holes to perfect OEM specifications, the block is decked in a computer controlled Rottler mill.



Crankshaft grinding is as much an art as it is a science, and it takes an experienced operator and the highest quality equipment to produce perfectly round journals, with the correct surface RA finish and perfect fillets to resist cracking. Big end and main bearing journal tolerances are measured in microns by a constant grinding gauge while grinding.



The camshaft is the computer of any engine, timing valve events to deliver torque and horsepower at specific rpm points. Cam lobes are reground using separate master profiles for the intakes and exhausts.



Connecting rods must be resized to ensure that the big end is perfectly round once the cap is torqued to the required setting. The big end often becomes oval after constant use and that is not a good thing for oil pressure or prolonged bearing life. The little end bushes are also pressed out, replaced and then machined to OEM tolerances. Rocker arm bushes are also replaced and machined to spec.



These CAT cylinder heads have been cleaned, machined, fitted with new guides and have fresh valve seats cut. They await new springs, retainers, valves and collets before they find their way back onto the engine.



The cylinder head sits on a special assembly bench. Here two brand new valve guides have been fitted and a third is being seated. The guides are quenched in liquid nitrogen to shrink them prior to fitting (hence their icy exteriors) as they warm the form an interference fit with the cylinder head, locking them in place.



R Moore & Sons builds its own assembly jig to speed up the head building process and to ensure exact tolerances each time. Here a custom-made press is used to push the guide into the head. The steel collar ensures that each guide is installed to exactly the right depth.



A special fixture mounted to the press secures the retainer and allows the valve spring to be compressed while the collets are installed.



A look at the face of the new head showing a freshly milled surface and four brand new valves – ready for service.



The in-house dynamometer is rated to 1570kW (2100hp) and allows engines to be fully tuned and tested under load or varying duty cycles before they are shipped thousands of kilometres to site. Dyno testing is the most reliable way to run-in a new engine, check for problems and ensure it is completely fit for duty prior to installation. This dramatically reduces the risk of unexpected downtime due to the fitment of an untested engine. Engine oil samples can also be taken after initial run time and returned within 24 hours to provide critical information on the type and quantity of any metals or other contaminants present in the oil. Once again, it is cheaper and faster to check the health of a new engine before it heads off to site.



A view of the engine on dyno from inside the control room. An enormous number of critical temperatures, pressures and flow rates can be monitored and logged in real time as the engine is put through loaded test cycles.



This engine has just returned from the engine builder, after reconditioning, and awaits dyno testing before returning to work.



Part of the diesel rebuilding process involves the reconditioning, repair and balancing of turbochargers. These turbos are subjected to immense heat and their internals rotate at many thousands of rpm. Dust ingress and oil sludge build-up over time lead to wear, a loss of efficiency and even complete failure. Here a rebuilt turbo core is setup in the Schenck balancer. After balancing, this unit will be able to rotate to almost 100,000rpm without a hint of vibration.



Garret from R Moore & Sons mounts the exhaust housing to this newly rebuilt core. The intake housing is already in place.



This completed turbo is fully rebuilt and balanced. It is now ready for service once again.



Big diesels require large volumes of fuel under incredible pressure. This manual test bench uses a piston to force diesel through the mechanical injector to test its flow and spray pattern before and after rebuilding.



Without a correctly operating fuel injector pump the engine cannot run at optimum efficiency. This Bosch test unit allows the entire injection system to be tested and the volume of fuel flow through each individual injector to be measured.

The sentiment is emphasised by the respect and teamwork that is evident between all employees, from the shop floor to the boardroom.

The scale of the operation and the quality and quantity of the precision machinery on hand is remarkable.

It is clear that only the best will do when it comes to producing the highest quality end result

for each component from a 6t cylinder block to a 100g valve guide.

While the company does not actually build complete engines, it does strip, test, measure, analyse, report, repair, recondition, manufacture parts for them and dyno test them.

Each section of the workshop handles a different aspect of the process and the entire shop floor is arranged in a logical sequence from

initial delivery to final despatch.

The following photos give a glimpse inside this impressive facility and provide an insight into some of the processes and equipment housed within.

This is by no means a comprehensive pictorial of every service and operation provided but it does focus on the main areas of reconditioning a large diesel engine.

No replacement for displacement

NATIONAL

THE Australian mining industry is tough.

It's tough on the miners, tough on the equipment, and it's tough on the machines that keep it running.

These machines have to be heavy duty, reliable and precision-engineered to stand up to the testing conditions they are faced with every minute of operation time.

This means sub-standard equipment simply doesn't cut it.

The best equipment is expensive – and rightly so.

When the engine reaches the end of its service life, the cost of replacement can be daunting.

Remanufacturing engines has always been the best option.

Recycling the parts is good for the environment and, more importantly, it is very good for the hip pocket.

Remanufacturing a worn out engine is a highly qualified skill.

Engines, particularly those working in extreme environments, require components machined to exacting tolerances.

OE Manufacturers design engines to be remanufactured: core components like the cylinder block, crankshaft and cylinder heads are designed for a second and even third life.

When the right people are on the job, tired old diesel engines can be transformed into the heavy-duty powerhouses that have been driving the Australian economy and reshaping its mineral-rich landscape for more than a century.

For more than 50 years, HM Gem Engines has been providing the automotive, bus, earthmoving, marine, power generation and truck engine repair industry with industry-leading remanufacturing services.

From the get-go, the company has been raising the bar in cutting-edge new remanufacturing techniques, and setting new standards for remanufactured engine performance expectations.

Quality accreditation to ISO 9001: 2015 ensures the company's commitment to producing high quality remanufactured engines and machined components remains a top priority.

HM Gem has nine purpose-built workshops, from Adelaide to Cairns and every capital city in-between, all of which are equipped to machine heavy duty diesel components.

They have serviced BHP's Olympic Dam and the South Australian gas fields, coal mines in Wollongong and the Hunter Valley right through to operations in the Surat Basin, Bowen Basin, Cairns and Weipa.

All of the company's workshops have the necessary tools and equipment to remanufacture the smallest 2l engines from the worksite ute and van fleet, right up to the 91l Cummins V20 engine that is larger than most cars, and everything in-between.

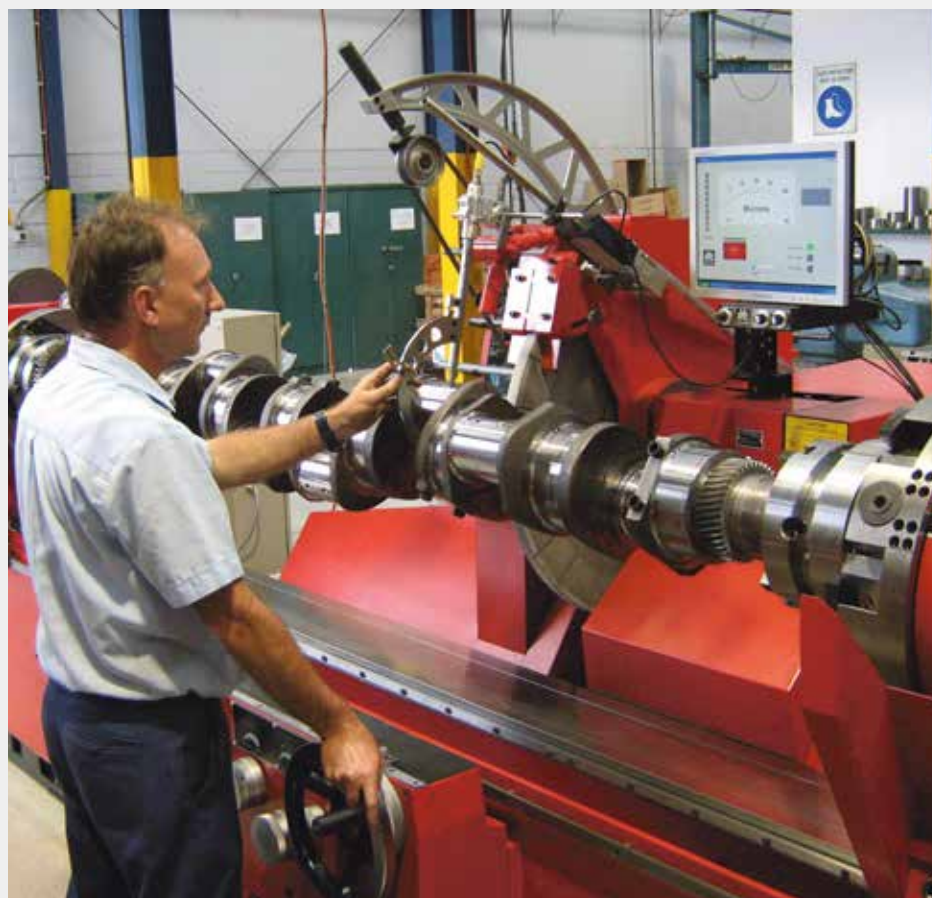
HM Gem's technical expertise has been built on knowledge gained from more than 50 years of service in the industry.

In this time it has forged a reputation for precision, reliability and timeliness that has led it to become the trusted authority, and an industry leader in engine remanufacturing.

This has resulted in a strong working



A Cummins V16 Cylinder block.



A Caterpillar V16 crankshaft.

rapport with many of the world's leading OE manufacturers, including, Caterpillar, Cummins, MTU Detroit, Komatsu, Mack, Mercedes, Scania and Volvo.

HM Gem's product range includes an extensive list of automotive exchange remanufactured long engines and cylinder heads,

as well as new engine parts.

The company stocks full engine rebuild kits and new cylinder heads to suit most automotive, light commercial, petrol and diesel applications, but its bread and butter is in heavy duty diesel engine component machining the area that has given it its reputation.

Cylinder block machining

Diesel and petrol cylinder blocks from the small to the very large in both physical dimension and machinable surfaces can be accommodated.

Thorough cleaning, crack testing and precision bore and surface finishes are achieved using the industry's latest available CNC machines.

Firstly, cylinder blocks have welsh and gallery plugs removed before the chemical cleaning process.

The block is then thoroughly inspected and all areas are crack tested and measured, including main tunnel bores and main tunnel centre line heights.

Cylinder block deck and counter bore recess areas are also checked to ensure they meet the OEM reusability guidelines.

The company can accommodate engines as large as the Caterpillar 35 series V20 and the Cummins QSK series.

Machining is carried out using the latest CNC technology by the industry's highest qualified machine operators to achieve the highest standard in engine remanufacturing.

HM Gem can carry out cylinder block milling, counter-bore recess machining, stainless-steel water passage inserting, liner seat inserting and cam follower bore (inserting) as required.

And if the cylinder block main tunnel does not meet the reusability guideline, the company can machine that, too.

Once the machining is complete, cylinder blocks are given a thorough final quality inspection, and all parts are rinsed to remove excess residue before being prepared for shipping back to the customer.

Crankshaft grinding and micro polishing

HM Gem provides a cost-effective crankshaft reclamation service.

When a crankshaft arrives at HM Gem, a full survey report is completed.

Magnetic particle crack testing, Rockwell hardness checking, and journal radii measurements are all recorded to establish the components' viability for re-use.

It is only after all these checks are completed that the machining process takes place.

Crankshafts up to 4m in length with a 300mm stroke can be accommodated.

The crankshaft is then ground to the next available undersize. All journal machining is carried out to manufacturer requirements.

The team will then micro-polish the crankshaft before completing the closing report to guarantee that the required specifications and finished sizes are completed to exact tolerances.

Just as with the crankshafts, camshafts are subject to a full survey inspection, including non-destructive magnetic particle crack-testing.

Once tested, camshafts are straightened, bearing journals polished, and cam follower lobes redressed.

Connecting rods

Connecting rod servicing is vital in the engine rebuild process.

Small-end bush replacement, proof and crack testing, broaching, pin boring, tunnel resizing, rod aligning and piston fitting ensure that the con rods can go the distance.

Cylinder head servicing

HM Gem has the largest cylinder head machining centres available in the industry.

Cylinder heads can be reconditioned at competitive prices using state-of-the-art computerised equipment.

The company will carry out a full survey report on every cylinder head to ensure OEM standards are met.

The team will also perform non-destructive magnetic particle crack-testing on components, as well as cylinder head crack and pressure testing.

If you need valve guides replaced, valve seat replaced and or cut, fire deck and or manifold face milled, flame rings re-cut and injector sleeve fitted and broached, the company offers these too.

Automotive exchange engines and cylinder heads

All workshops carry a large range of exchange automotive and light commercial petrol and diesel engines and cylinder heads.

All exchange products have a nation-wide 12-month factory-backed warranty and can be shipped to any part of Australia.

Whether your needs are for individual component machining, or engine assembly, HM Gem have the facilities, experience and capacity to professionally satisfy your needs.



A Caterpillar 3500 Series cylinder head.

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On the brake



A 600hp Deutz BF8M V8 on dyno. This engine is from a push-back tractor used to move A380 aircraft.

NATIONAL

WHEN it comes to measuring serious torque and horsepower, a chassis dyno doesn't cut the mustard.

It takes a water brake engine dyno to pull down 5000lb/ft and hold that torque for accurate measurement and testing.

What is a dynamometer?

Water brake dynamometers have been around for decades and they basically work on the principle that water cannot be compressed.

Therefore if the engine is forced to work harder and harder driving a water pump that applies more and more resistance, in theory the dyno should be capable of stalling the engine.

As the engine works to overcome the load placed on it by the water brake, Newton's law of equal and opposite reaction is put into practice and all that torque is also applied to a very accurate load cell.

If a given load is applied to a lever of a known length it is possible to calculate torque, and if rpm is then factored into that equation, horsepower can be calculated.

That, in the most simplistic of terms, is how an engine dyno functions.

Add modern electronic controls and the latest data logging modules and software to this platform, and the end result is a test bed capable of putting even the largest diesel engines to the test under partial or full loads, for extended periods of time if necessary.

Diesel Engines and Spares (DEAS) in Salisbury, Qld, have been rebuilding and testing diesel engines for many years – from the smallest utility motor to the largest earthmoving and mining powerplants.

The Australian Mining Review wanted a company to explain the benefits of dyno testing in the mining world.



A 69-litre CAT 35/16B engine from a 789 dump truck stretches the dyno's capabilities with its impressive 2000hp output.

With DEAS' years of experience and the fact that it strips, remanufactures or custom builds and then dyno-tests its own engines, it was the perfect company to work with.

Naturally, DEAS has a fully equipped workshop with all the necessary equipment and the qualified staff to build any engine for any customer – regardless of the size or complexity.

However, it was the cell out the back with "Dyno Room" painted on the door that we were interested in.

Lurking inside that sound-proofed room is a Taylor engine dynamometer capable of testing engines up to 1850hp and 5000lbs/ft.

Why dyno test?

The reasons engines require dyno testing are many and varied, but in the mining sector the high cost of the engines and the substantial costs incurred by machine downtime are the major contributing factors.

Prime examples of high cost installations are

the engines DEAS re-manufactures for remote oil drilling sites in the highlands of PNG.

These engines are flown into site at great expense, so any repair or unexpected reliability issue comes at a significant financial cost.

The same is true of engines used in power generation, marine applications and earthmoving equipment.

According to Brad from DEAS, even minor leaks or performance issues can cause expensive downtime and unplanned operational costs.

"Access to the engines, once they are installed, is normally very restricted and most of the time they are housed in contaminated environments that are not suited for engine repairs," Brad said.

So, dyno testing is insurance against potentially undiscovered issues that would only appear once an engine was delivered to site, installed and run for the first time.

However, for a low percentage of the overall re-manufacturing cost, the engine is

test run to its maximum specification for a period of time.

This process is to test for leaks, correct engine operation, performance (torque and horsepower), optimum operating temperatures and pressures and other custom parameters.

Depending on the requirements specified by the client, measurements of all aspects of the engine can be measured in a controlled environment.

All measurements are corrected to one of the internationally recognised standards (STP, SAE and others) for air temperature and pressure.

This allows an engine to be tested in the warmth and humidity of a Queensland summer and then be re-tested in the depths of winter; and despite the changes in air density and humidity, the correction factor means that the results of each test will be scaled and therefore comparable.

The base measurements taken while the engine is on dyno are oil pressure, oil

temperature, coolant temperature, exhaust temperature, boosted air intake temperature, boost pressure, fuel temperature, fuel pressure, fuel consumption, horsepower (kW), rpm, torque (lbs/ft or Nm) and many other readings depending upon the application.

In some instances, oil samples are taken from an engine after a predetermined number of hours on dyno, running through various load cycles.

With the engine still on dyno, the oil is sent to a laboratory for analysis – a bit like a blood test for an engine.

From the type and quantities of metals and contaminants in the oil, a skilled engine builder can determine whether the engine is behaving normally during its first few hours of life, or if there is an internal problem that warrants inspection.

Once again, any inspection or repair can be carried out at DEAS or the engine builder's workshop – a far cheaper option than sending the engine back to site, paying for labour to re-install it and then doing it all in reverse when a problem is discovered.

The cost of extra machine downtime also needs to be factored into this expensive equation.

Emissions testing

With additional sensors and data logging equipment, the dyno can also be used for very accurate emissions testing.

This is critical where an engine must meet internationally recognised emission levels before being permitted to operate in a given location.

DEAS has carried out tier certifications, underground exhaust filtration emission tests, fuel consumption tests, Lloyds marine certification tests and many more.

The resulting certification is proof that an engine meets those criteria and is fit for purpose

Additional benefits

DEAS has also worked in conjunction with smaller companies doing their own research and development on areas such as diesel performance, next generation fuels and extended life engine projects.

The benefits of engine dyno testing extend beyond those of a simple quality assurance tool for the engine re-manufacturing industry.

As mentioned, it also assists in the continuation of advancement of the performance of diesel engines through R&D, running valuable engines in a controlled environment and utilising accurate instruments to significantly reduce the background noise in data readings to those taken in the field.

This ensures that the resultant data is credible and undisputed (some scientific papers have been published with reference to DEAS test facilities).

So, for peace of mind – get on the brake.



DEAS' Taylor engine dynamometer is housed in a soundproof test cell. It can test engines up to 1850hp and 5000lbs/ft.



A view through the glass from the operator's console into the dyno test cell. The dyno has provision to monitor modern electronically-controlled engines using OEM software and older engines using manually operated gauges. Note the four pipes protruding from the roof – this is a water-to-air intercooler, with full temperature control, for single and multiple turbo applications.

MORE INFORMATION: Diesel Engines and Spares | 07 3277 9295 | www.deas.com.au



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Under cover

Pyrotek's thermal insulation blankets were custom-made to suit the exhaust manifolds, turbocharger and turbocharger air outlet plumbing to completely wrap any heat sources in this installation.



This engine, used in the gas exploration industry, has the turbocharger, exhaust pipe and muffler thermally covered to reduce the chance of fire and to protect maintenance personnel.

NATIONAL

EXPOSED hot exhaust manifolds, pipes, mufflers and turbocharger housings are a safety hazard.

A glowing turbo exhaust housing can reach well in excess of 800 deg C, which far exceeds the flash point of diesel and even heavy engine oil.

Any such fluid leaking or spraying onto such a surface can result in a significant fire that can jeopardise expensive machinery and worker safety.

The answer is to cover those dangerously hot components with a custom-fitted thermal blanket to insulate them from ignition sources and maintenance personnel.

Pyrotek designs and fabricates a wide range of thermal blankets and exhaust covers for use in the mining and oil and gas industries.

Mine-approved covers

Pyrotek's mine-approved covers are made to meet strict criteria and have proven themselves in the harshest environments across the industry.

One criterion for mine approval is that they must be totally non-absorbent.

That is, the covers will not absorb fuel or oil – on the contrary, with an outer layer made of PTFE (teflon) or silicone-coated fibreglass, any liquid simply beads and runs off the surface.

Pyrotek actually goes one step further in its thermal blanket construction, by adding another layer of PTFE under the outer layer, just in case the top surface is worn or cut at any stage.

This extra layer of protection provides both added protection and longer service life for the covers.

To add strength, structural integrity and even longer life, Pyrotek's covers feature an inner layer of knitted stainless steel mesh that sits directly against the hot face of the exhaust pipe.

For marine applications, IMO certified silicone-coated cloth can be used, which still repels fuel, oil and other chemicals, but has low smoke and low spread of flame characteristics that make it ideal for the confined engine room of a ship.

A fire at sea can be deadly, so thermally insulating any possible heat source is essential.

Laser cut patterns

All Pyrotek's thermal blankets are custom-made to suit the particular application, ensuring perfect coverage of high temperature components.

The covers are tailored to fit, which is important in cramped engine compartments.

Once a template is made, it is digitised and stored on file so that it can be re-created at any future point in time.

When it comes time to fabricate the cover, each layer of each panel of material is precision laser cut for a perfect fit each time.

The cover is then assembled and stitched together by qualified tradespeople at Pyrotek's ISO9001 compliant manufacturing plant in Queensland.

Faster fitment and removal

The beauty of thermal blankets and exhaust covers is that they are easy to install, easy to remove (with the use of lacing hooks and wire, or springs and rings, belts and buckles, hook and loop, zippers or snaps) during maintenance work and easy to refit.

This translates directly to less labour hours required to complete a given job and therefore lower operating expenses.

Removal and replacement time savings of up to 70pc are regularly achieved when compared to conventional steel heat shields.

Energy efficiency

Thermal insulation has a number of benefits for

both hot and cold applications.

Containing the heat in an exhaust system can lead to higher gas speed and greater engine performance – ask any race car engineer.

Keeping gases at a constant temperature is vitally important and that is why the pipework at gas plants is wrapped in foam glass and sheet metal insulation.

However, the valves and flanges cannot be covered in this way because access must be retained for bolts and valve controls during repairs and maintenance.

In order to insulate these areas, custom-made covers are used, which can be easily removed and replaced before and after servicing, and provide the required levels of thermal insulation to maintain the correct temperature for LNG in the pipe, for example.

Valve and flange covers are also used extensively in oil refineries, process plants and waste plant generators.

Pyrotek's thermal insulation blankets are fuel and oil repellent, highly effective at insulating hot exhaust plumbing and turbocharger housings.

They not only significantly reduce the chance of fire but also protect personnel from burns and help reduce engine compartment temperatures to keep engine inlet temperatures down and improve the life of proximally mounted electronics.

They are also widely used for cryogenic applications where pipes, tanks and valves need to be insulated from external ambient temperature.



In marine applications, fires can be deadly, so Pyrotek uses IMO certified silicone-coated fibreglass covers that not only repel fuel and oil but also have low smoke and low spread of flame characteristics.

MORE INFORMATION: Pyrotek | 1300 928 322 | www.pyroteknc.com.au

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- Expansion Joints, flexible connectors manufactured using FRAS rated material
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- Increase equipment service life

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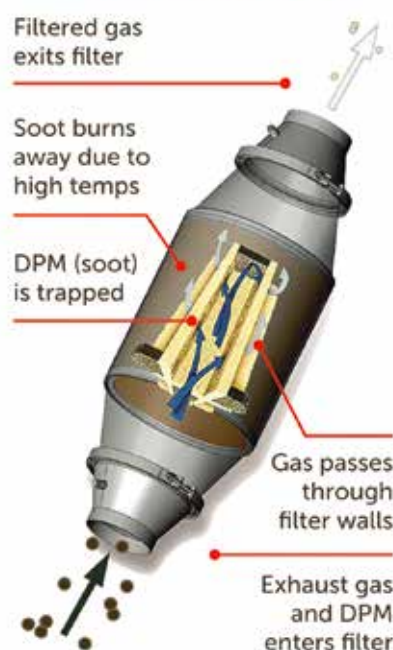
pyroteknc.com



Tackling DPM issues



How a DPF works



NATIONAL

FROM design and manufacture to installation of heavy-duty exhaust systems, Aletek specialises in tailor-made solutions for diesel engine applications for the underground mining sector.

The company is committed to tackling the issue of DPM (Diesel Particulate Matter) and exposure to harmful emissions for underground workers.

It offers a specialised range of DPF (Diesel Particulate Filters) and Emission Control Solutions to directly address this problem.

Continual exposure to diesel emissions is hazardous and may result in long-term health problems and the risk of developing cancer.

DPM has been labelled as 'the next asbestos', and in 2012 diesel emissions were classified as a Class I carcinogen by the World Health Organisation.

Small particles, big problem

In response to addressing the issue of reducing diesel emissions, Aletek has developed a

specialised range of emission control solutions.

As diesel engines have evolved to become the highly efficient machines that they are today, they have created a huge problem.

The issue is that engines now produce particulate matter well below one micron diameter, and these particles are now small enough to reach the alveoli of humans (the subtle respiratory membrane, a barrier that normally prevents particles from entering the bloodstream).

Nano particulates (50-1nm) are fine enough to translocate through the subtle respiratory membrane.

Trapping harmful DPM

Aletek Diesel Particulate Filters (DPFs) are designed to trap diesel particulate matter, opacity, carbon monoxide and hydrocarbons from exiting the engine.

A vehicle or engine fitted with an Aletek diesel particulate filter operates normally, using only the heat generated in the exhaust gas to continuously burn off particulates in a continuous matter.

This process is known as regeneration and

takes place whilst the engine is running.

For continuous regeneration to occur, the equipment must be operated so that its duty cycle produces exhaust temperatures greater than the balance point of the DPF for greater than 30pc of the time.

The required operating conditions of the DPF is for the temperature to remain over 350°C for 30pc of its time.

This will ensure that the filter passively regenerates without creating additional back-pressure.

How a DPF works

The catalytically-coated ceramic monolith contains long narrow channels open at one end and blocked at the other.

The exhaust gas is forced to escape by passing through the filter walls, trapping particulate matter (soot) in the filter.

At high exhaust gas temperatures, the soot particles burn away and transform into harmless carbon dioxide.

The filter also destroys carbon monoxide (CO) and diesel hydrocarbons (HC).

Aletek tailor-made DPFs

Aletek's Diesel Particulate Filter (DPF) product range has been specifically designed to combat the issue of DPM.

Its range of purpose-built DPFs includes wall flow DPFs, diesel oxidation catalysts and flow-through DPFs.

Aletek DPF product features include:

- DPF housings are designed, engineered and manufactured in-house
- Wall Flow (>99pc), Partial Flow (<66pc) and active regenerating configurations
- Manufactured from 304 grade stainless steel
- Heavy gauge 5mm and 8mm plate construction
- DCL premium cordierite substrates utilised

Aletek Wall Flow DPFs

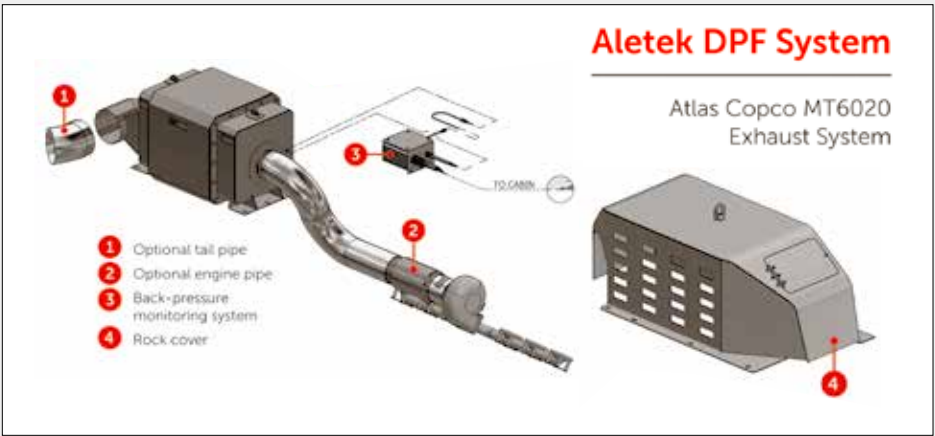
Aletek Wall Flow (>99pc) DPFs provide maximum effectiveness in trapping Diesel Particulate Matter (DPM) for a safer underground working environment.

An optional filter can be added to remove diesel nano particles which provide the highest human health risks.

These Wall Flow DPFs offer high diesel particulate reduction with minimal ongoing maintenance required.

Aletek Wall Flow DPF features include:

- Filters need no regeneration or fuel additives
- Retrofit in-line on the exhaust system or silencer muffler integration
- Back-pressure and temperature logger to



ensure peak performance

- Tailor-made to suit Caterpillar, Epiroc, Jacon, Normet, Sandvik and Volvo underground mining vehicles

DPF data logging

It is critical that DPFs are fitted with data loggers.

The purpose of a data logger is to record the back-pressure, exhaust gas temperature and engine RPM.

This data is used to predict the lifecycle to schedule cleaning and analyse filter performance.

Aletek Data Logger features include:

- Stainless Steel IP66 enclosure
- 'Plug n Play' wiring harness
- Mil-Spec cable terminations with cannon fittings
- Stainless braided Teflon hose
- Dash-mounted data download
- Harnesses protected with fire-rated sleeve

Aletek's data logger system has evolved to become a robust heavy-duty system that utilises the latest technology.

This system can be upgraded to assist maintenance planners in their work by offering real-time and semi real-time data transfer.

A data transfer upgrade utilises a Bluetooth, Wi-Fi and mobile network transfer system.

Onsite emission testing

Aletek's auditing and onsite services are further complemented by onsite emission testing.

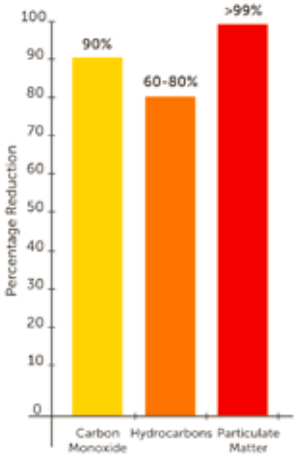
This allows maintenance personnel to monitor, track and control the emissions performance of each machine in your fleet.

Aletek's DPF condition monitoring service provides reporting data on machine back-pressure and thermal performance to assist with your maintenance scheduling.

This service includes:

- nDPM ambient testing

Aletek DPF Advantages



- Third-party gravimetric testing
- Gaseous emissions testing
- Light scattering tailpipe testing

Talk to the DPF experts

Learn more about the DPF emission control solutions on the Aletek website.

Contact the company's emissions control specialists for expert advice to suit your specific requirements.

East Coast:

Hayden Kirk: 0427 463 386

Email: hayden.kirk@aletek.com.au

West Coast:

Daniel Thomas: 0428 311 147

Email: daniel.thomas@aletek.com.au

MORE INFORMATION: Aletek. | 1300 886 628 | www.linkedin.com/company/aletek-pty-ltd | www.aletek.com.au

DPFS

Diesel Particulate Filters

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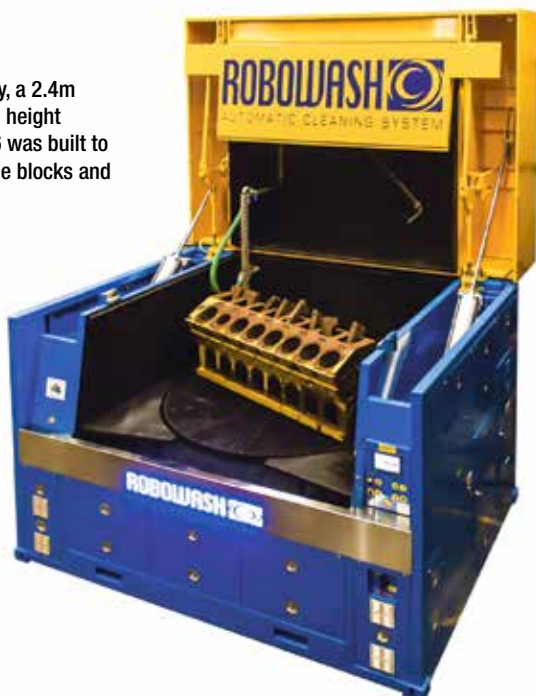
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With a 6t capacity, a 2.4m turntable and 2m height clearance, the R6 was built to clean 3500 engine blocks and 793 wheel hubs.



Robowash's massive new R6 machine is big enough for the largest engine blocks, wheel hubs and components.



Colossal cleaning

WA

ROBOWASH is an Australian manufacturing success story.

With more than 35 years of experience in the mining and earthmoving industry, Robowash has developed a unique and innovative way to automate industrial cleaning, and offers an environmental alternative to conventional hydrocarbon and caustic cleaning methods.

Since 1993 the company has been designing and building automatic parts washers from its manufacturing facility in Henderson, WA.

The company started with smaller units suitable for automotive workshops but the range has now grown to include the largest parts washers in the world designed to clean 6t, 20-cylinder train and earthmoving engine blocks and components.

Effective cleaning principle

The Robowash machine cleans parts using the same principle as a household dishwasher.

The parts to be cleaned are placed in the internal basket, the lid is closed and at the press of a button the machine does the rest.

While the basket containing the parts, or the mesh tray supporting the block are rotated, jets of hot water and cleaning agent spray from all sides to penetrate caked on carbon, oil and grease that can take hours to clean manually.

Hot water is filtered and recycled constantly within the machine and once the cleaned parts are removed from the Robowash, the absorbed heat permits them to 'flash dry' and eliminates the need to rinse or blow dry.

The mighty R6

The very latest machine from Robowash is the imposing R6, released in early September and designed specifically to thoroughly clean 3500 diesel engine blocks and components, as well as 793 wheel hubs to OEM specifications for contamination control.

This means that a re-machined used block,

cleaned in an R6, with the additional spray bar fitted for internal oil gallery cleaning, can have contaminant levels at less than 50ppm.

This is a remarkable cleaning achievement and one that is literally unobtainable by hand washing, where typical contaminant levels are 600ppm at best and not sufficient to meet OEM standards.

The R6 Robowash machine is perfectly designed for heavy industrial cleaning applications.

Apart from state-of-the-art engine block cleaning it is also capable of cleaning large, heavy components like wheel hubs, final drives and precision gears.

Wheel hubs can be washed without the need for complete stripping, such as the size of the cleaning cabinet.

The R6 also runs electric and optional gas for heating and has the ability to run caustic and rinse functions, through a separate wash circuit, if necessary.

It is the R6's design features that set it apart from anything else in the world and show the true depth of innovation and engineering know-how present in the Robowash team.

They have designed, developed and built every single component of this machine, which from the outside may look like a giant yellow and blue tool box but inside is a complex mesh of hardware, electronics and software.

The turntable, which is 2.4m in diameter with a 2m internal height, has a super-smooth electric gear drive, can support a 6t engine block and has spring suspension to prevent damage to the unit if the block is accidentally dropped.

Bringing a 6t mass to a stop also takes finesse if damage is to be avoided.

Allowing a smooth stop is a custom-designed clutch system that gradually ratchets until a given torque load is reached before being fully applied.

Sealing the machine during its wash cycles is a solid steel lid, lifted by the largest air-actuators on the market.

But just lifting the lid was not enough; in order to prevent it twisting as it opened, the Robowash engineers had to design and build a complex control system with an algorithm that assesses the position of each ram relative to the other.



The gear drive system incorporates a clutch to bring a 6t engine block to a gradual stop and is also spring loaded to withstand a component being accidentally dropped onto the turntable.



To ensure the huge lid on the R6 opens evenly and without twisting, Robowash's engineers designed and built a complex control system for the 200mm air rams. An algorithm monitors the position of each ram relative to the other to ensure the lid is lifted evenly.



One of the spray bars is mounted vertically in the unit while another is located in the lid. Others can also be employed to wash inside oil galleries.

This ensures that the lid lifts evenly throughout its range of movement and cannot damage the lid.

Part of the lid is the front flap, which gradually folds back as the top retracts to give clear access to lifting equipment.

The linkage mechanism to control the flap was the subject of an international patent (interestingly, this mechanism is similar to that used by Ferrari and Lamborghini to open their convertible tops).

The heart of the beast is the 2000l water supply and the muscle behind that is provided by dual pumps.

A smaller booster pump circulates the cleaning water through a series of debris traps and filters while a huge 15kW pump supplies 1000l per

minute and 9.5bar of pressure to deliver superior cleaning power through multiple spray bars and an array of strategically angled nozzles – designed to clean as the part approaches and moves away during its rotation.

For ease of maintenance, each pump can be isolated through valves and cam locks and then slid out of the machine on a roller slide.

The interest from industry in the R6 has been intense since its release in early September.

It is very clear to maintenance managers around the country that the R6 not only saves money because less time needs to be spent preparing parts for cleaning, but also the actual cleaning time is dramatically reduced, resulting in faster turnaround of equipment.



The main 15kW pump delivers 1000-litres per minute at 9.5bar to the spray bars and nozzles.

Add to that the degree of cleaning possible with the R6's filtration system and multiple spray bars delivering less than OEM-spec contamination levels, and the benefits of this behemoth are very evident.

The end result includes significant cost reductions and huge increases in throughput and capacity, resulting in significant productivity gains.

Clients also welcome the complete onboard logging and data sharing system that not only records every wash, filter clean and standby hour but also sends that information to Robowash, which can monitor its status, wherever it may be.

This also allows 24-hour monitoring of each unit and allows instant diagnostics and support to be given to site crews in the event of an issue.

This remote monitoring function allows for not only preventative maintenance but creates predictive maintenance that ensures downtime is virtually eliminated.

After 35 years in the industry, Robowash delivers reliability too, thanks to the world's best components, in-house innovation and Australian manufacturing.

A fully self-contained unit, the R6 only requires an external three-phase power supply and 2000l of water to be fully operational anywhere, anytime.

Available for sale or for hire, the R6 can be lowered onto the back of a truck and sent to even the most remote mine sites.

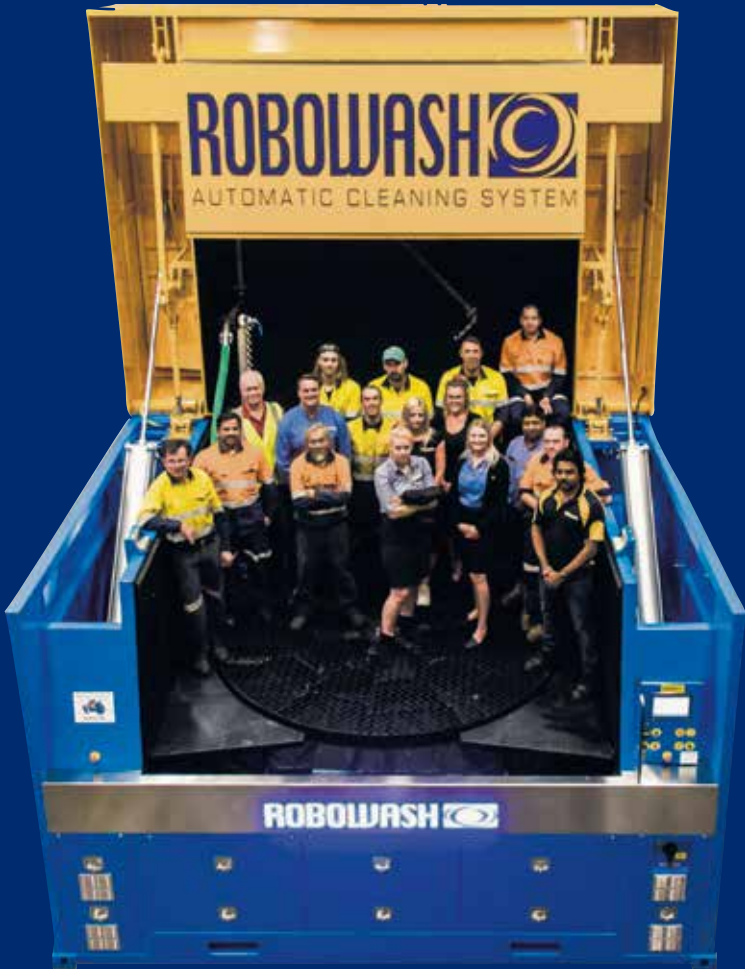
MORE INFORMATION: Robowash | 08 9410 6400 | www.robowash.com.au

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Turbocharging the industry

NATIONAL

WITH one of the largest fuel injection workshops in the whole of Oceania, United Fuel Injections prides itself on an outstanding level of customer service, professionalism and the highest calibre of experienced, expertly trained staff.

The business is focused around four key pillars – turbocharger sales and services, light automotive, heavy diesel and high-performance.

United Fuel Injection managing director Ken Ringrose said that it was all down to experience.

"Key to our ability to deliver the results that we do is our vast wealth of experience and knowledge, we've been doing it for 45 years," he said.

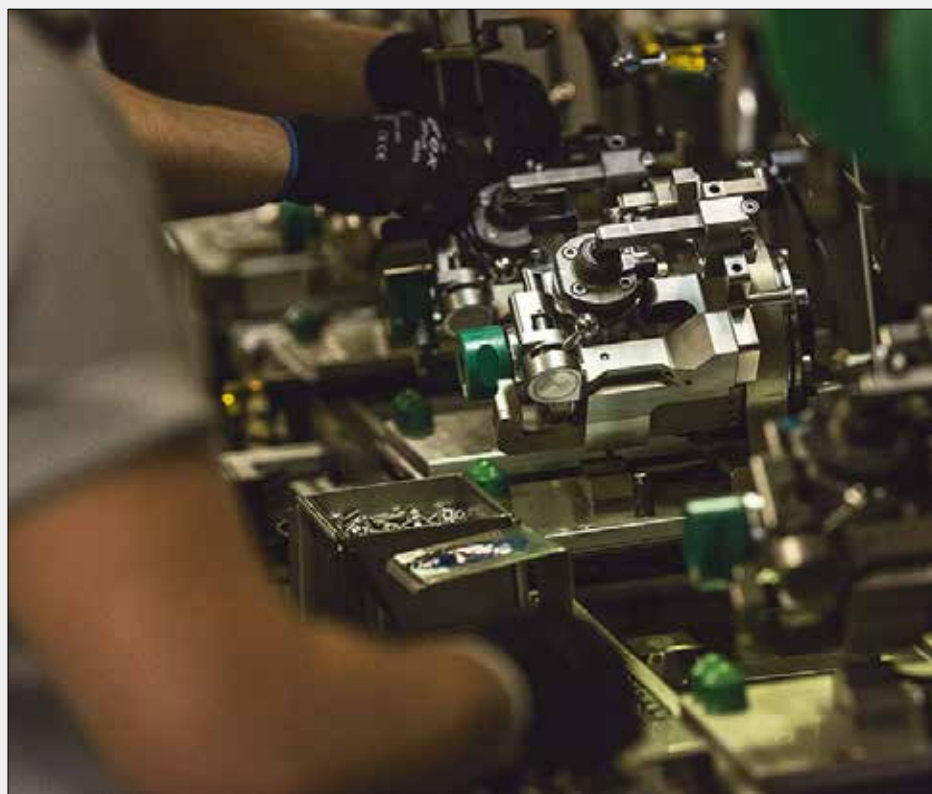
"You can't teach that.

"It can only be learnt through many years of experience."

Typically, a turbocharger remanufacture will involve the stripping down of a turbo to assess the damage to components, and those components that have reached their finite service life.

Once a quote of the overhaul is provided to clients, the turbocharger components are cleaned, the turbo shaft is re-balanced, and all parts at the end of their service life are replaced.

For a common rail fuel injector remanufacture, the process is very similar – United Fuel Injection will strip, clean and then



Over the past 45 years, United Fuel Injection has built its reputation for the highest quality work and the most experienced technicians.

replace any necessary components.

If applicable, the company will also apply the trim codes – the codes for an Electronic Control Module (ECM) that determine for how long a fuel injector injects fuel into a cylinder.

When a client frustrated with the service life of its dump trucks, United Fuel Injection was called in for specialist advice.

"They were trying to get 6000 hours of service life from its turbos before a scheduled service,

however they were constantly experiencing failure between 4000-6000 hours," Mr Ringrose said.

By utilising the wealth of knowledge and understanding of the turbo components, United Fuel Injection was able to instantly identify the parts that were the weak/failing point of the turbo, and were able to modify and strengthen the components that caused the most common point of failure, allowing the client to consistently meet the 6000hr operation life before overhaul.

"This meant that they could continue to utilise the equipment and avoid costly downtime from unexpected maintenance," Mr Ringrose said.

The company has established its name and reputation for quality work because of its continued investment in its team, and in the future of the business.

"Firstly, it's our employees; we pride ourselves on having some of the most experienced staff in their relevant fields of speciality in Australia and in some cases the world," Mr Ringrose said.

"Secondly, by constantly upgrading our equipment and refining our processes, and by sending our staff to training courses both in Australia and abroad, we make sure our staff are at the very forefront of industry knowledge."

MORE INFORMATION: United Fuel Injection | 1800 199 701 | info@unitedfuel.com.au | www.unitedfuel.com.au

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Preventative maintenance

NATIONAL

WHEN a single tyre has such a high dollar value, let alone considering safety factors and the cost of production downtime, it's simple logic to use a preventative maintenance approach to managing tyre damage in a mining fleet.

That's why TyreDoctor, which has specialised in OTR (off-the-road) tyre repairs since 1986, put so much emphasis on the importance of a preventative maintenance tyre repair program for mining fleets.

"Sure, we'll repair a tyre once it's failed – if it's repairable," TyreDoctor tyre repair division manager Harvey Hester said.

"But in nine out of 10 instances once a mining tyre actually fails it'll be damaged beyond repair.

"That's just a waste of an expensive tyre – whether it's a 33-inch underground slick, a 63-inch radial dump truck tyre or simply a large grader or scraper tyre."

Given the risks to operational safety, the value of the asset and the potential costs in lost production and downtime if a failure occurs under load, it's critical to be constantly monitoring tyre condition, assessing any damage and getting it repaired to minimise the risk of failure.

Safety first

Operational safety looms especially large in this area of the mining industry, quite apart from the cost factors.

"It's obvious that a tyre is a large pressure vessel" Mr Hester said.

"But it's one that's subjected to constantly changing stresses and with all kinds of environmental factors in play, so there's very significant safety reasons for ensuring the operational integrity of a mining tyre at all times."

After operational safety, there are cost factors to consider.

A failure generally means an expensive loss of productive tyre life which often could have been prevented if an injury was identified and addressed in its early stages.



Preventative maintenance tyre repair – fixing tyre damage before a failure – has a major role to play in maximising operational safety and tyre life for any mining fleet.

But the nature of the challenges in effective tyre management always differ from one mine site to another.

"Operating conditions are different on every site – even between large, well run sites that are located virtually side-by-side we see significant differences in tyre life and the type of injuries," Mr Hester said.

"The kind of soils and rock on site, ambient temperature, loading patterns, haul road condition and corner design – these are all things that have an impact in addition to factors that you can measure and manage more directly, like operating pressures."

"But with good on-site tyre management and an active program for preventative maintenance repairs, there's no reason that the vast majority of mining tyres shouldn't reach the expected service hours."

Where experience counts

TyreDoctor's company motto emphasises a singular focus on the OTR category.

Mr Hester's father started the business in

1986 to service the agricultural industry and earthmoving contractors in the local region.

Mr Hester and his brother Tom joined their father straight out of school in the early 2000's and the rest is history.

Mr Hester focussed on learning from his father's knowledge and experience in OTR repairs, becoming an expert in rubber compounding and tyre construction, while his brother did his time in repairs and trained as a certified OTR tyre fitter before focussing on running and growing the business.

Both brothers are still directly involved with day-to-day operations in the company's repair facilities in Leeton NSW and Mackay QLD, and firmly believe that hands-on involvement is the best way to pass on know-how to the team and is also the best source of innovation.

With 33 years on the clock so far, TyreDoctor has evolved into a full-service off-the-road (OTR) tyre and rim specialist with a customer base that includes Glencore, BHP, Evolution Mining, Yancoal and Peabody Energy.

But while TyreDoctor's scope of services also includes OTR wheel/rim testing and engineering

alongside supply of new OTR tyres and rims in a range of OEM brands, the team of 40-odd staff regard tyre repair as their 'core' speciality.

"Our experience in OTR underlies the value we're able to provide as a repair partner for mining operators and I think the benefits really show in terms of the hours they get out of tyres we've repaired," Mr Hester said.

"Over time we've developed our own techniques that build on standard methods for hot-vulcanised tyre repair.

"And we're able to back up our work with the best repair guarantees in the industry – that speaks for itself.

"We can't sit back and relax though – we're always learning and tweaking our processes to keep up with the pace of innovation from the tyre manufacturers."

Full-service approach

TyreDoctor sends technicians from its OTR repair team to major sites for pre-repair inspections every month.

"Regular site visits are a key part of our service, particularly for preventative maintenance repairs," Mr Hester said.

"It keeps us in touch with site conditions and helps to avoid wasting money by transporting tyres that actually aren't viable to repair."

TyreDoctor runs a dedicated fleet of trucks with specialised trailer combinations for transporting tyres, including the largest '63-inch' sizes.

"Operating our own fleet is certainly not the cheapest option but we've proved time and again that it's the only way to provide a complete gate-to-gate solution and keep full control of our service turnaround times," Mr Hester said.

"Providing reliable and timely service from pickup right through to delivery back to the site is just as critical to our business as our repair expertise is."

TyreDoctor has been operating for 33 years and counting. Based on this approach to doing business, the count is likely to continue for a while yet.

Making the most of nitrogen

NATIONAL

PULFORD Air & Gas is one of Australia's oldest air compressor companies, specialising in the design, manufacture and service of quality air compressors and nitrogen gas systems since 1925.

Since 2005, Pulford has concentrated on developing a nitrogen inflation system for the mining industry to increase the safety level of operators and site staff.

Its NitroPlus range of nitrogen tyre inflation systems are used across the transport and mining industries in Australia.

With systems currently in operation in the Hunter Valley and Surat Basin, as well as numerous South Australian and Western Australian mine sites, Pulford's experience in the field has given the company the capability to design custom systems to meet each client's specific needs in harsh Australian mining conditions.

Nitrogen is seen as the benchmark in safe inflation for mine trucks and with the tailored systems offered by Pulford, they can be matched to specific fleet sizes and truck types.

Each application is different, so Pulford takes the time to work through the application and clients' specific site requirements.

As there are different ways of producing the nitrogen gas, it is important for the client to choose the most efficient and economical on-site generator in order to maximise the return on the capital purchase.

The systems can be designed for any range or applications from 1m³/hr up to 3000m³/hr, and from 90pc purity all the way up to 99.9995pc.

Why use nitrogen in tyres?

There are several compelling reasons to use nitrogen in tyres. Nitrogen has the benefit of being corrosion-resistant, it assists in tyre pressure retention (since nitrogen is less likely to migrate through tyre rubber than oxygen) and, most importantly, it offers significant safety enhancements over air filling.

Most of the mining applications for nitrogen revolve around safety.

By filling tyres with nitrogen, there is less risk of a tyre exploding from a lightning strike, contact with power lines or a hot tyre event (where the liner has delaminated from the inside of the tyre, causing heat and creating the potential for a tyre fire).



Nitrogen is used in fire suppression because it reduces the amount of oxygen in the air.

By removing the oxygen, one side of the fire triangle (heat, fuel and oxygen) is also removed.

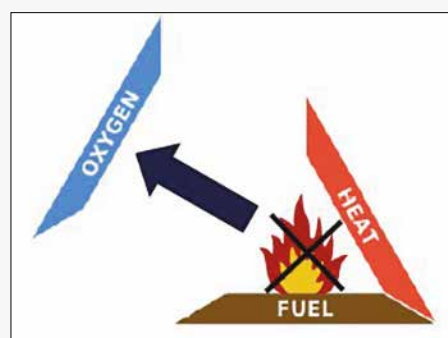
Without oxygen a fire cannot ignite and therefore a tyre cannot explode – this makes the equipment and the operator safer under a hot tyre event.

With a move to nitrogen there is the potential to eliminate hot tyre events and in doing this, the highest level of the hierarchy of control is enforced in a mobile fleet.

Machine operators can have more confidence in knowing that their machine will offer greater safety in the case of a hot tyre event.

How does it work?

With 20 years of nitrogen generation experience, Pulford Air & Gas has the equipment necessary to produce nitrogen on-site in any environment.



Nitrogen lowers the oxygen level in a tyre to a point that prohibits the likelihood of a fire.

Compressed air is fed through different types of filtration applications including drying, particle removal and finally oil vapor removal before flowing into the membrane.

Membrane gas production is efficient from 90pc to 98pc, giving constant flow using separation technology.

As air passes through the membrane under different pressures and flow characteristics, the purity of the nitrogen gas changes to effect the gas requirement desired at the outlet.

The flow and pressure of the nitrogen

gas are controlled to ensure that the desired purity for the system is achieved.

The industry standard for nitrogen in mine truck tyres is 98pc purity.

At this level, there is no risk of fire or explosion.

Nitrogen purity is measured at three positions: once at the system, next in the storage vessel and lastly in the tyre itself.

Aiming to further extend its expertise in the field of nitrogen tyre filling, Pulford is currently working on an in-tyre sensor capable of measuring the purity of the nitrogen inside the tyre in real time.

This will be trialled soon with a leading Australian mining company.

What are the benefits?

As anyone in the resource sector knows, minimal equipment downtime is imperative for improving productivity and reducing costs.

The biggest benefit of nitrogen-filled tyres is the elimination of the tyre fire risk with residual oxygen down to 5pc (95pc nitrogen in the tyre).



The containerised nitrogen membrane separation process.





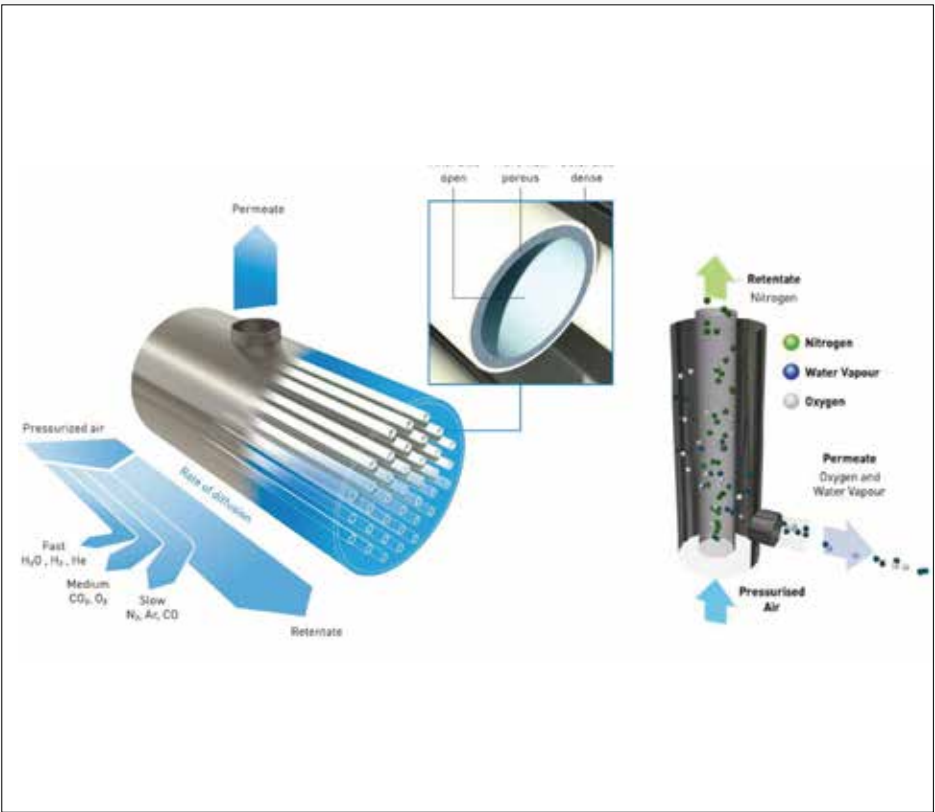
The NitroPlus tyre inflation system comes fully containerised for ease of installation and the potential to be moved should the need arise.

Nitrogen use also leads to a reduction in the corrosion of wheel components and tyre liner compounds, as there is very little moisture present in the tyre due to the lower oxygen levels.

There is also improved pressure retention from the partial pressure of nitrogen being more stable than normal air.

With the added benefit of less corrosion from nitrogen filling, clients see cost benefits from longer maintenance intervals for wheel and rim components and less refurbishment costs for those parts.

Pulford's NitroPlus systems are designed for varying fleet sizes and range in nitrogen delivery from 50m3/hr up to 150m3/hr, offering tyre inflation faster than most



The membrane gas separation principle.

conventional air compressors.

By incorporating a large storage vessel, the system offers instant inflation for up to two 57-inch tyres and fast recharge times for multiple inflations.

Mining contractors are always very conscious of controlling costs and boosting productivity.

By producing nitrogen on-site, using compressed air and membrane separation, the resulting mobile site systems can be packed up and relocated according to changes in site demands and locations.

Pulford prides itself on being market-focused and continually supports the development of innovative new products.

MORE INFORMATION: Pulford Air & Gas | 1300 138 124 | www.pulford.com.au

PREVENT TYRE FIRES AND EXPLOSIONS

CAN YOU AFFORD NOT TO RUN ON NITROGEN?

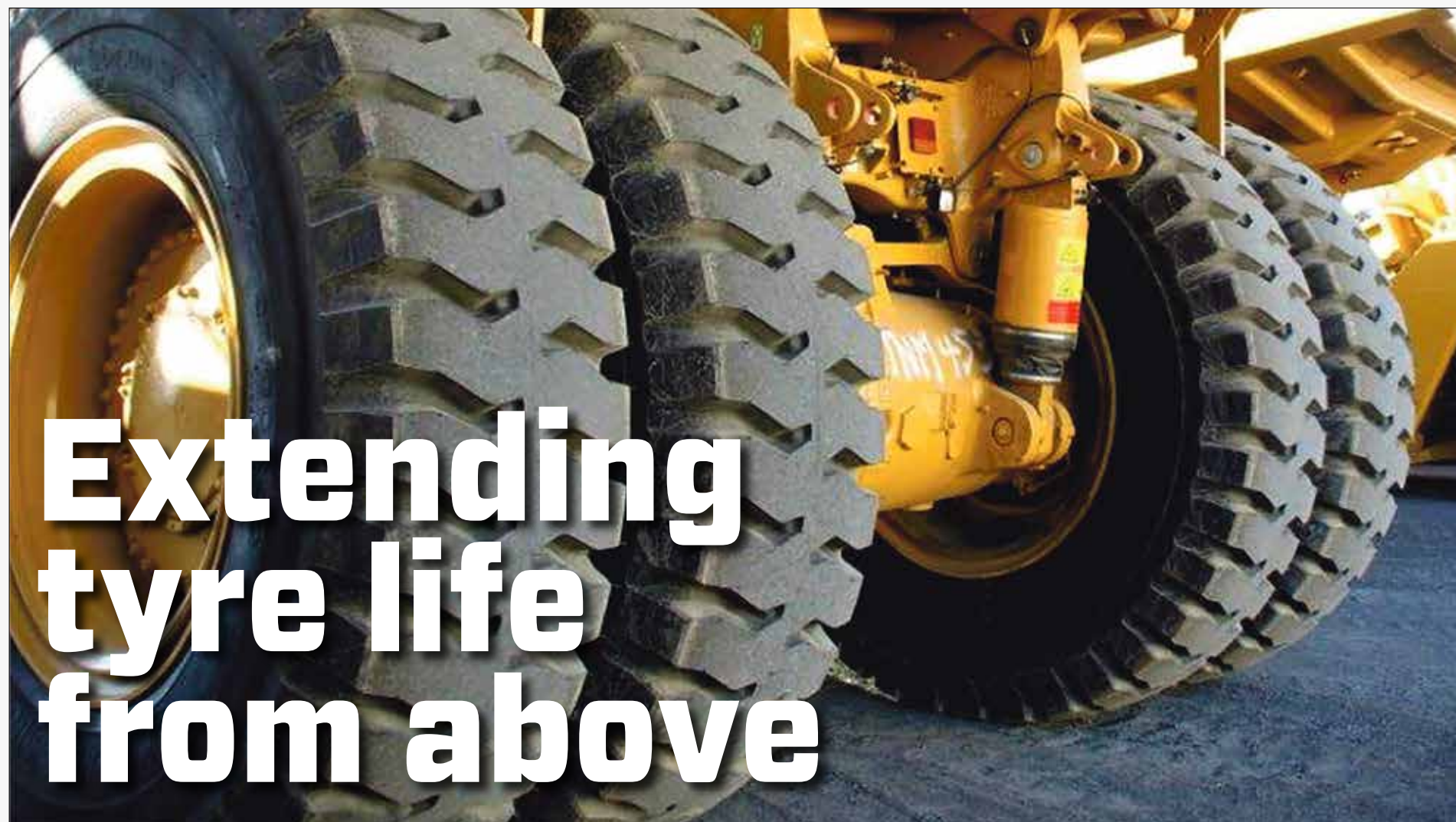


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Extending tyre life from above

NATIONAL

GLOBAL Tyre Information (GTI) has been supporting the WA tyre industry for more than 33 years, and has applied that wealth of knowledge and experience gained into developing the GTI tyre monitoring system.

Development started in 2004 to design a tyre pressure monitoring system (TPMS) that would be a standalone plug-and-play unit with no infrastructure needed on site.

A lot of trial and real time testing was carried out on one of GTI's client mine sites to fine tune and create a robust and real time output tyre monitoring system.

Whether it is a mine site or a construction site, operations rely heavily on equipment, and equipment relies heavily on its tyres.

Employing a robust system such as the one GTI has developed will minimise equipment downtime, increase productivity and return savings to the end user.

GTI has developed a relationship with a WA company supplying high-end radio and satellite technology to the mining and oil and gas industries, to allow them to produce a user-friendly system that has performed successfully in trials in 793C Cat trucks in a mine in the state's South West for three-years, with a zero transmission failure rate.

GTI designed and developed a system that is reliable in all weather conditions and that can be quickly installed for operational readiness on any mine site in the world.

The tyre monitoring system provides crucial information well beyond tyre pressure and temperature that can be utilised to optimise tyre

performance, saving downtime and money.

The GTI Tyre monitoring system uses advanced satellite technology that negates the need for expensive infrastructure like repeaters, poles or Bluetooth and does not rely on other devices.

This provides a signal that is more reliable and more accurate than non-satellite based systems.

The GTI system is fully self-contained saving time on system setup and costs. This makes the GTI system truly mobile.

With sensors fitted to the inside of the tyre onto the rim, on vehicle movement the accelerometer inside the tracking device is triggered and data from that particular wheel is transmitted.

Every wheel is fitted with an individual sensor, which tracks tyre pressure, temperature and more, providing crucial information that can be

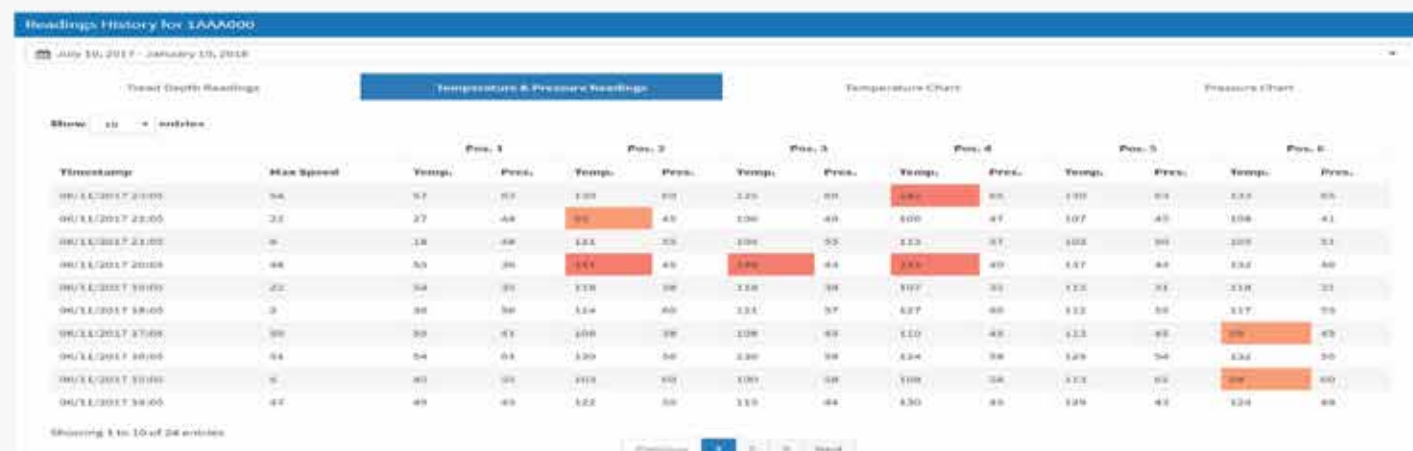
utilised to reduce fuel consumption and optimize tyre life and performance.

The sensors have also been designed to run in liquid (eg: up to 50l of tyre coolant in a 40.00R57 tyre).

The ability to retrieve data remotely makes the system superior for safe tyre maintenance and eliminates the need to send maintenance teams into the field to retrieve readings.

GTI's system reliably sends real time data from any remote location in the world, with no infrastructure needed, in all weather conditions.

Fully mobile, this system is not reliant on telecommunication systems like the 3G or 4G networks that may have minimal coverage in remote areas; it can operate anywhere in the world regardless of location and that means data can be accessed anywhere, anytime, anyplace via web and smart phone applications.



The GTI simulation tool allows customers to see the gains of incorporating a GTI system into their mining fleet.

An audible alarm can also be installed inside the cab of a truck, which can alert the driver to any movement outside of set parameters, allowing the driver to stop the truck in a safe area and prevent any further damage from occurring.

GTI prefers to use the automated alert systems remote from an operator (email and smart phone) as they have enough technology to be aware of managing large OTR assets.

Rather than waiting for a tyre failure, by adapting a GTI system into a fleet, a proactive approach to tyre maintenance can be taken.

With the maintenance department receiving real time data via satellite, specific parameters can be set to suit specific customer requirements.

Once set, system alerts are automated and sent by SMS and email to multiple users as required.

Fleet managers have access to detailed graphical reports or spread sheets with data which can be easily exported and includes tyre temperatures; tyre pressures and triggered alarms; travelled hours; mounted hours; highest speed alarm; average workday speed; and GPS location on Google maps.

Through satellite diagnostics, mine staff are alerted when pressures or temperatures shift from optimum levels and because it is truly real time data, quick action can be taken to avert possible tyre failure, reducing tyre-related downtime and this contributes to a safer working environment.

This data is also sent via satellite to GTI's secure servers and can be easily exported as



The tamper-proof unit is attached with rare earth magnets to the inside of the wheel.

graphical or spreadsheet reports to a client if required.

GTI's tyre monitoring system also provides a detailed tread depth recording feature to manage tyre changes and rotations as required. A field technician can either use a digital Bluetooth-enabled tread depth tool to measure individual tread depths for each tyre on each machine.

This data is then sent wirelessly from a tablet or smart phone to the database selected.

As soon as a satellite signal is present, the data is automatically recorded and entered into the client's database.



An aerial on the front of a truck.

Where tyre usage and wear used to be done by analysis of historical data, the GTI tyre monitoring system provides easy access to real time data that can be acted on immediately and effectively for more responsive tyre management.

Factors such as tyre life can be monitored for each tyre on each machine, helping maintenance staff to plan tyre orders and machine service rotations to streamline production.

Tyre data can be interfaced with most tyre management systems: just mention your requirement and GTI systems will ensure you

get the best outcome in this area.

Each unit can be purchased or hired which includes all software and hardware for installation and commissioning.

Reporting via satellite and secure information collection and storage is included, allowing for extensive onsite and remote reporting.

All information can be collected and reported on for historical information collection.

GTI is looking at the future of fibre optic technology as part of the next generation of sensor design.

This potentially would be more accurate than ever before, increase reliability tenfold, deliver cost savings to the end user and extend battery life to more than five years.

GTI has also designed a unique software tool which allows real mining data to be input into key fields to simulate specific mine conditions.

The tool takes into consideration many factors that can influence a tyre's life and this enables the customer to gain an immediate understanding of the gains that can be achieved by incorporating a GTI system into their mining fleet.

Perhaps the main point to consider is that with GTI's system and components, everything that can be made in Australia has been made in Australia – a refreshing change and an encouraging sign for Australian manufacturing.

MORE INFORMATION: Global Tyre Information (GTI) Tyre Monitoring System | 08 9353 3535 | vince@emtint.com

CUT DOWNTIME MAXIMISE PRODUCTIVITY



More than three decades servicing the mining industry

- Proactive tyre maintenance
- Fully customisable system
- Produces detailed graphs and spreadsheets
- Fully automated monitoring
- The first in Australia to use advanced satellite technology
- Real-time data from any location
- Fully mobile – no infrastructure needed
- Accessible anywhere, anytime, anyplace via web and smartphone applications
- Hire options available

Don't wait for your tyres to fail, take the proactive approach and adopt the GTI system into your fleet today.



MADE IN AUSTRALIA



08 9353 3535
vince@emtint.com



Filling the void

OTR Tyres supplies, fits, repairs and maintains everything from the largest earthmover tyres to the smallest light vehicles.

NATIONAL

MINING is a tough game.

It all comes down to how much material you can extract for the least amount of money and any interruptions to that extraction process cost companies many, many thousands of dollars.

Specialising in on-site earthmover and OTR machinery tyres, OTR Tyres' expert team of mobile tyre technicians manage a fleet of field service units and tyre fitting trucks for all on-site fitting and maintenance.

OTR staff are experts in the mobilisation and de-mobilisation of heavy equipment, working to minimise downtime for tyre removal and re-fitting once on site.

With global sourcing and supply capacity, OTR Tyres has the ability to source the right tyres and wheels for your requirements and is the chosen project partner for major state, national and international projects.

OTR Tyres has factory direct access to all product categories and the capacity to ensure continuity of supply of competitively priced tyres of all segments, from budget to premium brands.

It can also arrange tyre disposal and offer trade-in services.

OTR Tyres' extensive range of new and used (quality part-worn) OTR tyres offers a real commercial advantage, particularly if preparing machinery for sale, or if to match with existing tyres in service.

OTR Tyres combines world class facilities, tools and equipment with professional and experienced technicians to ensure tyres are serviced to the highest standards.

The team of tyre fitters and service technicians are highly trained and assessed regularly to ensure compliance to industry best practice.

The company offers a comprehensive range of tyre service and repair options including



A fleet of 16 service and grab trucks make on-site fitting and repair fast and easy anywhere in WA.

on-site coverage, call-outs and emergency repairs.

With a fast and reliable turnaround for all inspection and repairs, your equipment will be back on the road as soon as possible.

Get rid of flats for good

Have your operations ever been disrupted due to tyre failure?

One method that is proven to extend tyre life, eliminate punctures and virtually eradicate unexpected tyre repairs, is the use of solid filling.

The process involves filling the void in the tyre with a compound other than air to make it impervious to punctures or ruptures. Technology advances and one of the most highly adopted solid fill products in the world, Carpenter's world-leading Rely T-25 compound, has proven

itself time and again to reduce solid-shock and give drivers the same ride as pneumatic tyres.

Rely T-25 is available from TyreFill WA, part of OTR Tyres, based in Bellevue, WA.

It has been solid filling tyres for use in mining, agriculture, civil construction and aerial platforms for many years.

That experience has enabled the company to develop techniques to not only completely fill tyres and eliminate air pockets but also to set the 'tyre pressure' to OEM specs and, being a solid compound, that pressure does not vary for the life of the tyre.

A special storage and mixing facility is required to fill tyres with Rely T-25 as each of the two parts of the polymer compound must be stored at a specific temperature.

Dual pumps are used to draw Part A and Part

B from their individual containers and push them through a mixing screw before the combined liquid compound is forced through the valve of the tyre, which is mounted to the rim.

As the tyre fill compound enters the tyre, displaced air exits from a vent hole – just like bleeding a brake cylinder.

Once the tyre is filled with exactly the right volume of T-25 to give the required working pressure, it is allowed to set for 48 hours. From that point the tyre is flat-proofed and will be serviceable, without fail, until the tread is worn down to the witness marks.

Benefits of solid filling

The benefits of solid filling tyres are manifold as they become impervious to nails, spikes, slag and rocks.



The Rely T25 solid fill compound makes tyres impervious to nails, spikes, slag and rocks to get the absolute maximum life from each tyre.



OTR also has tyre handlers for rent.

OTR Tyres' solid fill is an investment that pays for itself.

Asset downtime is a costly exercise for any mining operation and unexpected tyre maintenance and replacement can often sideline equipment for days at a time.

By solid filling their tyres, mining operations save on expensive flat tyre repair and service charges, extend the service life of their tyres, eliminate interrupted work schedules, eliminate costly down time due to flats, and increase job productivity.

Improved safety is another significant advantage of solid filling tyres.

The process eliminates sudden loss of pressure,

helps to handle overload situations, lowers the machine's centre of gravity to reduce roll-over possibilities and improves traction.

Once the tyre is filled and fully, cured the chances of tyre failures and blowouts are eliminated, improving on-site safety.

Tyres that are improperly inflated pneumatically, wear out sooner due to over or under-inflation.

Tyres filled with OTR Tyres' solid fill are pressurised to manufacturer specifications and will stay that way throughout the tyre's life.

Rely T-25 filled tyres can be run continually at 56kph or for up to two hours in an eight-hour period at 88kph.

OTR tyres, wheels, servicing and repairs

OTR Tyres is a WA success story, having tyre supply and service contracts with the country's largest mining operations and an assembled fleet of 16 service trucks to handle tyre repairs and fitting for clients right across WA.

OTR's experienced and knowledgeable technicians are wheel experts, providing engineering consultancy with the design of wheel assemblies most suited to meet both machine and project requirements and working closely with all customers to ensure optimum

products are supplied.

They also consider the equipment type, operating environments, tyre size and load capacity expectations.

OTR Tyres also conducts in-house wheel examination, NDT testing, repair and certification for mandatory 10,000-hour inspections and is able to blast and repair rims or supply new components accordingly.

With branches in Bellevue, Port Hedland, Karratha and Kalgoorlie and a depot in Yatala, QLD, OTR Tyres has stock, equipment and personnel close at hand for its mining customers.

MORE INFORMATION: OTR Tyres/TyreFill WA | 08 9250 8949 | www.otrtyres.com



1300 OTRTYRES

When you need to keep your equipment rolling, dealing with flat or punctured tyres is costly, time consuming and frustrating.

Imagine if there was a simple solution which meant you'd never have to worry about a flat tyre again?

OTR Tyres' subsidiary company, Tyrefill WA are the largest solid fill suppliers in Western Australia. Based in Bellevue, Tyrefill WA supplies the mining, forestry, aviation, construction & marine industries with quality solid fill solutions for their equipment.

Solid filling tyres extends the life of the tyre, making them completely flat-proof and eliminating costly downtime. A polymer fill replaces air in the tyres with a liquid compound which, once cured, makes tyres impervious to nails, spikes, slag and rocks.

Tyrefill WA only use Carpenter's world leading Rely® T-25 compound which is proven to reduce solid-shock, giving your drivers the same ride as pneumatic tyres.

sales@otrtyres.com
otrtyres.com



Have your operations ever been disrupted due to tyre failure?





The Trelleborg Brawler Soft Ride is changing industry expectations around the use of solid tyres.

Trelleborg gains traction

NATIONAL

THE Brawler HPS Soft Ride tyre is Trelleborg's premium solid OTR tyre, specifically designed for the toughest climates and industries on earth.

The tyre has re-defined what operators can expect in terms of comfort and what owners can expect in terms of equipment longevity when using solid tyres.

The purpose-designed 'soft ride' compound, together with the unique elliptical apertures and deep tread layer, mean the Brawler is fast becoming a solution for mining applications around the world.

In comparison to its predecessor, the unique design of the Brawler HPS Soft Ride significantly reduces vibration to give ride comfort equivalent to a foam/solid filled pneumatic L5 tyre, while delivering the durability and toughness of a solid tyre.

This demonstrates Trelleborg's commitment to offering radically improved operator comfort as well as equipment life, while ensuring the Brawler range maintains its reputation for industry leading performance in the harshest environments.

By fitting a vibration-measuring device to the seats and to the machines, Trelleborg was able to quantify a 35pc reduction in vibration, measured against three ISO standards.

This directly translates to cost savings associated with machine wear caused vibration, operator efficiency, and a long tyre life that can offer zero need for maintenance and downtime.

Segment manager specialty-mining, waste and recycling at Trelleborg, Ditri Zweistra, said that the company set a lofty goal with the 'soft ride' compound – to expand the applications of solid tyres to new industries.

"We challenged ourselves to create a solid tyre that matches the benchmark for comfort achieved by foam-filled pneumatic tyres, but which still performed against all other requirements for tyres in this specialist segment," he said.

"I am pleased to say that we met – and exceeded – our own expectations."

The Brawler difference

It all translates into better efficiencies – for both the operator and the machine – and these efficiencies save money.

Sales Director (Australia) Paul Hansen said that the Brawler Soft Ride's point of difference is Trelleborg's specifically engineered 'soft ride' rubber compound, and its one-of-a-kind elliptical aperture sidewalls.

"While other manufacturers use a round hole that collapses into an elliptical, Trelleborg started with the elliptical hole to form a round hole under load," he said.



The Soft Ride rubber compound provides operators with an unmatched level of comfort for solid tyres, while the purpose-designed tread compound ensures maximum tyre life.

“The elliptical hole allows the aperture to perform at its best under load.”

The cushion rubber compound significantly increases deflection and shock absorption, while the elliptical apertures condense into circular apertures; and when combined with the purpose designed tread compound, the result is a solid tyre that is very tough – with flexibility.

Customers get all the advantages associated with durability for a solid tyre with no loss in load index, while also reaping the benefits of a comfortable ride that can enable an increase in operator efficiency.

The tyre was rigorously field-tested over a two-year period at various facilities around the globe including Australia, Asia, America and Europe.

Mr Zweistra said that despite the varying geographies and climates, the response from operators and site managers was always the same: “We don’t want to switch back.”

“Our investment in this process and time spent with customers to understand and solve their key issues is what we at Trelleborg call applications expertise, and is just one of the things that make us industry leaders,” he said.

Mr Hansen said that the ‘soft ride’ was fast becoming the tyre that could offer solutions for mining applications.

“Solid tyres mean no punctures or downtime and maximum uptime for equipment,” he said.

“The HPS series of Brawlers can be fitted to most standard wheels fitted as OE on the equipment.

“The HD series of Brawler can be made to fit a specific machine and then just bolted on – on site.

“It is exciting to know that there is a tyre out there that can provide a solution to many problems



THE TRELLEBORG ADVANTAGE

- Anti-vibration construction
- Deep tread
- Increased footprint
- Puncture proof
- Damage resistant compound
- Elliptical apertures
- Maximum value
- Maximum uptime
- Enhanced safety
- Reduced impact

The unique elliptical apertures collapse into circular holes under load, maximising the deflection and shock absorption.

found on a mine site.

“By having respondents talking direct to us we can tailor a tyre/solution to overcome their issues.”

Brawler has been an industry leader in the waste and recycling industries for many years, and Mr Hansen said that it is an exciting time for Trelleborg, as the tyre is beginning to gain traction in the mining industry.

“Now Australian mining companies have the opportunity to capitalise on the benefits of solid

tyres, without the vibration stress on their machines or operators,” he said.

“The ‘soft ride’ aspect of the tyre is the real game changer.”

The development of the soft ride compound means that the tyre has found a market for loaders, haul road graders, telehandlers and many other mine site vehicles that would benefit immensely from the added durability and strength of a solid tyre.

Trelleborg Wheel Systems is a leading global

supplier of tyres and complete wheels for agricultural and forestry machines, materials handling, construction vehicles and other specialty segments.

The company offers highly specialised solutions to create added value for customers and is partner of the leading Original Equipment Manufacturers.

Its manufacturing facilities are located in Italy, Latvia, Brazil, Czech Republic, Serbia, Slovenia, China, Sri Lanka and USA.

MORE INFORMATION: Trelleborg | +65 6662 8268 | www.trelleborg.com.au

Tough Jobs Soft Ride

BRAWLER SERIES

ANTI VIBRATION
CONSTRUCTION

CUT RESISTANT
COMPOUND

ELLIPTICAL
APERTURES

ULTRA
DEEP TREAD

SOFT
RIDE

Brawler HPS Soft Ride tyres are designed to perform in mining and tough recycling and waste management applications while providing the most comfortable ride within the Trelleborg Brawler range.

The Soft Ride compound combined with Brawler’s unique elliptical sidewall apertures delivers higher

shock absorption and reduced vibration ensuring the best possible protection for operators and machines.

Brawler HPS Soft Ride - Delivers the toughness of a traditional solid tyre and a ride comfort equivalent to a filled pneumatic tyre.

www.trelleborg.com/en-au/wheels
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T. +61 0438 120 728



Hit smarter with big data

After 40 years of experience with rockbreaking, Rammer is still at the cutting edge of breaker technology.

NATIONAL

BIG data is everywhere.

It has the ability to improve the operation and monitoring of just about every bit of equipment on the mine site or in the quarry.

It is a tried and tested way to cut downtime, proactively maintain equipment to avoid expensive repairs and to improve the overall productivity of assets.

Now, data-driven remote monitoring for rockbreakers has finally been developed by Rammer, the world-leaders in rockbreaking solutions.

Rammer continues to be the leading supplier of rockbreaker technology in Australia and has just added the first ever monitoring system for hydraulic rockbreakers – RD3, the first cloud-based monitoring device for hydraulic rockbreakers.

It attaches to the rockbreaker and then reports detailed information about the operation in real-time back to the customer.

By using advanced electronics to sense the impacts and stresses on the rockbreaker, it gives detailed information about operating hours, service intervals and the GPS locations of the product.

Simply by logging into the MyFleet platform, customers can see all the data recorded by the RD3 in order to maximise uptime through planned services and preventative maintenance – improving equipment uptime, reliability and availability.

The rockbreaker work hours show MyFleet users the total time the rockbreaker has been engaged in rockbreaking, and the real-time hour meter ensures a higher re-sale value as the actual work hours are known.

Rammer factory product specialist Marko Lahtinen said that, when renting the Rammer rockbreakers, invoicing can be based on



actual rockbreaker work hours, and the integrated GPS allows for the rockbreaker owners to precisely locate each unit at any time.

“For example, this enables invoicing based on actual worked time on specific location,” he said.

“In MyFleet you can see the last known location of the rockbreaker but there is also the possibility to track rockbreaker location history on the map for specific periods.”

The MyFleet portal solution for Rammer’s fleet management has been built as a tailored product for the Rammer Excellence line, in cooperation with Sandvik and third-party service providers.

Data is accessible 24/7 through the MyFleet

portal, which improves fleet management, helps plan preventative maintenance and makes processes more efficient.

Using cloud-based software, customers can remotely monitor rockbreaker usage and provide operator education when needed in order to avoid maintenance costs due to premature failure.

This can be especially important when considering one of the most common causes of rockbreaker failure, which happens when an operator continues to hit the trigger button, forcing it to keep the piston striking for extended periods of time.

By correcting the operator’s practices through remote monitoring, operational optimisation can reduce the chance of

rockbreaker failure and unscheduled downtime.

By providing real-time data on operating hours and service intervals, the RD3 with MyFleet platform actively manages service periods and minimises downtime.

Preventative maintenance and proactive monitoring improve the bottom line.

The service indicator in MyFleet works on rockbreaker work hours reported by RD3.

Customers can see actual time till next scheduled maintenance.

MyFleet shows indicators when maintenance time is approaching, and MyFleet can send email notifications to customers, as well as to the dealer to remind them of upcoming maintenance.

This also helps the dealer to prepare for the maintenance by ordering necessary parts to have on time for the customer.

The RD3 will stay connected to fleets 24/7.

It will monitor and optimise the utilisation of the rockbreaker fleet, give precise location for every unit, optimise fleet allocation, maximise uptime through planned service and preventative maintenance, review rockbreaker service history records and improve safety and best practice.

The Excellence line

The Rammer Excellence line is Rammer’s flagship product line of rockbreakers, a set of state-of-the-art hydraulic rockbreakers with integrated smart technology for easier management and more efficient processes.

The line has continued to build on Rammer’s 40-years of industry experience, delivering world-class rockbreakers designed to improve profitability, safety and performance.

Now fitted with the RD3 technology and monitored through MyFleet, Rammer rockbreakers have a number of maintenance and service features that set it apart from the rest, and will continue to assist developing businesses and enhancing the performance of their rockbreakers.

The Adjust Idle Blow Protection (IBP) feature ensures that the rockbreaker cannot be operated until pressure is placed on the tool.

This also protects the tool from failures and tie rod stress which ultimately reduces oil overheating and protects against premature failures.

The lower tool bushing is simple and easy to replace with Rammer's innovative design – it is as simple as removing the two lower pins, and can be done in the field.

This decreases maintenance costs while reducing the cost of ownership and operation.

Rammer has also added separate greasing channels from the valve body into the lower and upper tooling bushing.

This enables optimum greasing for both bushings which increases the lifetime of the tool and tool bushings.

Whether it is decreasing the cost of maintenance, ownership or increasing the service life of rockbreakers, all of Rammer's innovative maintenance and service features are designed to save customers money by improving the efficiency and quality of their products.

In Australia, customers are supported by an independent network of highly experienced Rammer dealers that provide expert advice and solutions that meet the specific needs of customers and ensure the maximum return on capital investments.



Rammer's excellence line is perfectly complemented by the RD3 monitor and MyFleet portal.



The Excellence line fitted with the RD3.

MORE INFORMATION: Total Rockbreaking Solutions | 1300 921 498 | sales@trswa.com.au | www.totalrockbreaking.com.au/



REMOTE MONITORING



Rammer is the first on the market introducing remote rockbreaker monitoring.

With the cloud-based system you will have real-time data 24/7 on

- operating hours,
- how the rockbreaker is being operated,
- the exact location of your equipment and
- service periods for proactive and preventative maintenance.

Remote monitoring system is available in all new Rammer Excellence models as standard.

rammer.com



Dealer Network

NSW

Groundtec Equipment
(02) 9642 2030
groundtec.com.au

VIC / TAS

Walkers Hammers
(03) 9315 3788
walkershammers.com.au

QLD / PNG

QLD Rock Breakers
(07) 3715 0800
rdw.com.au

SA / NT

Renex Equipment
(08) 8345 0555
renex.com.au

WA

Total Rockbreaking Solutions
1300 921 498
totalrockbreaking.com.au



Make it happen

NATIONAL

GOOD old customer service is a rarity these days but if the stellar rise of MHM Contracting is anything to go by, service is definitely not lost on their mining customers.

The company started operations in April 2018 and has grown rapidly in that time.

Its operation now has a head office in Applecross, WA, and workshops in both Port Hedland and Perth.

MHM is active on 21 mine sites across WA and that number is expanding as new customers begin to appreciate the company's work ethic, loyalty, transparency and honesty.

According to business owner, Michael Higgins, the company started out being customer-focused.

"We have continued that ethos since our inception," he said.

"All our staff are hand-picked to ensure they put the client's needs ahead of all else and focus on doing the best job possible, rather than just dollars and cents.

"Customer loyalty is very important because often contractors come and go and are not necessarily there to see the job through to completion.

"With us, we stay until the job is done – once we take on a job for a client – we stay until it is done and always strive to put a machine back into service as safely and as soon as possible to minimise downtime costs.

That is why our motto is always 'Make It Happen'."

Maintenance planning and component tracking

Apart from end-to-end maintenance services for all excavators and drilling equipment – surface and underground – MHM also handles back end operations.

Maintenance planning is a significant aspect to any mining operation, as time spent scheduling services



and shutdowns helps to streamline the process and allows the mine to stay fully operational by keeping critical equipment in operation while others are offline.

Basically, MHM plans the job in advance to ensure time on site is productive.

Breakdown response

MHM is also regularly involved with trialling new components and systems on behalf of clients.

The aim is to continually improve the life and reliability of these extremely costly machines by

constantly keeping up with new technology in the market.

This testing is not limited to clients because MHM Contracting also constantly tests and acquires new tooling for itself, to help keep its own efficiency levels high.

This directly translates to jobs that are completed more safely and efficiently.

MHM is self-sufficient on tooling and consumables, which is backed up by its critical parts stock.

It also has its own industry-leading technical support in-house, which really sets it apart from current industry standards.

Perhaps the most time critical part of the job is breakdown response.

When a machine goes down unexpectedly, production can be significantly impaired or can even grind to a halt.

Every minute that passes costs the mining company or contractor twice – once for lost earnings and secondly for idle labour and machine time.

Due to the close proximity to clients in the North West and Goldfields of WA, MHM prides itself on its rapid response time.

Literally, as soon as the phone rings, one of its 16 field service units is dispatched, and once the issue is shared with that crew, they will stay until it is resolved, which is backed up from Perth by technical support.

This is how the company has built such a solid reputation in such a short period of time and why existing customers have kept the company on site to help manage their maintenance and shutdown operations.

MHM is very different to labour hire; once it becomes aware of a customer's issue, it owns that issue until there is a resolution.

The right people

MHM operations manager Mick Dunsire has more than 30 years experience in mining, and he shares



MHM Contracting carrying out the scheduled change-out of a D10 track frame.

Michael's attitude towards business and clients.

Mick has helped to build a team of highly qualified, OEM trained and motivated staff at MHM, who are highly invested in the machines they maintain.

An added bonus from assembling the right team is higher levels of safety.

Staff who feel a sense of ownership and pride in their job, work smarter and safer, and this is reflected in MHM's superb safety record.

The workforce remains injury-free on hours worked to date – more than 60,000 hours spread amongst 11 customers.

Shutdown planning

MHM takes its level of planning a little further than most by ensuring that all parts are on site well beforehand.

The staff are briefed on the whole procedure

and supplied with complete parts listings and all MHM-supplied and operated tooling is on site a week in advance to eliminate the risk of delays caused by transport and logistics.

All the administrative work and checklists are completed with the client before MHM's staff arrive on site.

Furthermore, all MHM's customers can see their tooling schedule and availability; just another facet of the company's efforts to be totally loyal, transparent and honest with customers.

It is refreshing to find a company willing to take on maintenance, repairs and shutdowns with a sense of pride and responsibility for the job – a company that will stick by its clients and customers until the job is done.

It is the people that stand by you in the hard times that you remember and with a 'make it happen' philosophy, MHM Contracting will be there through fair weather or foul.



MAKE IT HAPPEN

Onsite Labour

- Tradespeople available short and long term

Tooling hire

- Specialist tooling equipment

Shut down support

- All minor and major shut downs, component change outs and machine rebuilds

Breakdown response

- Rapid response to all machine breakdowns across WA

Planning and coordination

- Specialist excavator relocation and end to end support to ensure minimal machine downtime

Technical support

- 24/7 offsite remote technical support

Contact Us

(08) 6113 5645
mhmcontracting.com.au



Getting back to business

NSW

TOBCO was founded by Sam Turnbull and Glen O'Brien in 2012.

After long careers in large-scale civil contracting, Mr Turnbull and Mr O'Brien became frustrated with corporate red tape and branched out to form their own company.

They wanted to get back to what it was all about – actually constructing things.

With a 'can-do' attitude and a passion for construction and machinery, TOBCO secured a place in 2016 as Australia's third fastest growing company with revenue growth of over 200pc.

Again in 2018 it was listed in the top 100 and it boasted a FY2019 revenue of more than \$27m.

The business is expanding while consolidating its position in the industry.

Which industry?

Initially, TOBCO brought civil engineering expertise in co-ordinating projects to the electrical industry.

As TOBCO grew, it managed to employ specialists in cable jointing and overhead line to work alongside heavy vehicle truck and crane drivers as well as digger operators.

While these operations would normally be carried out by subcontractors, TOBCO believes that it is better for the client to keep it in-house.

In NSW, TOBCO is accredited under the Accredited Service Provider (ASP) scheme with the NSW Department of Energy and Resources.

This allows the company to work on the distribution network both as a level 1 and 2 provider.

TOBCO can install substations and overhead lines, as well as underground connections, street lighting, traffic signals (TOBCO also has pre-qualification to install traffic signals in NSW with the RMS) and maintenance of power and lighting networks.

Currently TOBCO has maintenance contracts in Sydney for maintaining the LED networks at Sydney's Olympic Park and in North Sydney CBD.

The combination of skills and understanding in power gave TOBCO a natural avenue into the renewable energy sector.

Having the capability to self-perform all civil works in conjunction with power infrastructure connections meant TOBCO was suited to large scale utility work such as solar farms and wind farms.

Currently TOBCO is working in Western NSW near Balranald on the large 347MW Limondale solar farm, where it is installing more than 120km of trenching and over 900,000m of cabling, including the jointing and terminations of all AC/DC and LV cables.

The TOBCO team on-site are working tirelessly to install all of this before April 2020, utilising the large T755 Vermeer trencher, four CASEIH tractors (pulling cable trailers), large rotary Agri-world 300mm trencher and several graders and excavators – all owned and operated by TOBCO.

In addition to the standard civil and electrical works, TOBCO engineers have



The TOBCO solar farm ute fleet.

been able to utilise their skills and curiosities to get involved in other areas of the industry.

Battery energy storage systems are just one of these.

Having installed several small and medium scale solar and battery storage systems (60-100kW), TOBCO – through its subsidiary company OTG Energy – recently installed a larger 1.3MW rooftop solar system in Melbourne in the industrial area of Dandenong.

OTG Energy/ TOBCO now have experience in delivering a range of solar systems and battery storage, but more importantly is the knowledge of the system connections.

These can be quite complex to those not familiar with connecting to a monopoly distributors network.

Another unique project TOBCO are working on that combines the civil and electrical skills is a project in Sydney Harbour where the team have taken Fort Denison off the grid, and have installed a solar/ BESS along with backup generator as part of a large wharf development.

Currently the team is installing a sub-marine cable across the harbour to reconnect the island.

As a civil business

TOBCO has also been delivering bridges to regional NSW through the timber bridge replacement program.

So far more than 10 bridges have been delivered and several more are expected to be completed in coming months.

Some smaller but equally important civil projects include retaining wall rehabilitation in and around Sydney's foreshore as well as road widening, carparks and stormwater drainage have all been delivered recently by TOBCO, all handled in-house by TOBCO's own plant and equipment and people.

Complex electrical cable pulls are no problem with TOBCO's cable drum jinkers and winches working alongside the 40 tonne crane trucks, lifter-borers and EWPs.



TOBCO truck unloading large cable drums.





TOBCO servicing regional NSW.

TOBCO has just completed installation of more than 10km of HV feeder cable for Ausgrid and Lend Lease in the Homebush area of Sydney.

This included several months of trench

excavations and joint bays – working alongside live traffic and then the subsequent cable pulls of the insulated conductor into the 150mm conduits, all concrete encased in Thermally Stabilised Backfill (TSB) material.



Tobco is in the unique position to undertake civil and electrical works for solar farms.

With the ever-increasing challenges of supplying reliable power to a growing population and demand, TOBCO has assembled a team that does not just talk about how to build infrastructure – it physically does it.

For enquiries about pricing and partnering on the next power project, from substations to transmission and distribution as well as bridge building and road works please, do not hesitate to contact the team at TOBCO.

MORE INFORMATION: Tobco | 02 84159899 | info@tobco.com.au | www.tobco.com.au



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BRYAH RESOURCES MANAGING DIRECTOR NEIL MARSTON

Bryah Resources is a copper-gold-manganese focused explorer with two projects located in central WA – the 880sqkm Byrah Basin Project and the 200sqkm Gabanintha Project. Emma Davies spoke with managing director Neil Marston about recent drilling results and the joint venture agreement with OM Manganese Limited.

Q. You've recently had great drilling results at Black Hill – what's the next step at this prospect?

The results at Black Hill were especially encouraging because we intersected up to 42pc manganese at a prospect we discovered, and assays from drilling suggest the grades of ore are good enough for direct shipping to smelters in Malaysia, which is an outstanding outcome in a short time.

Our aim is to consolidate these discoveries with further explorations and assays to demonstrate the feasibility of a manganese mine.

The outlook is positive – manganese is invaluable – it helps turn iron into steel and it is the planet's fourth most consumed commodity, behind iron, aluminium and copper.

Bryah Resources has now drilled previously untested sites, including Black Caviar and Brumby Creek, and we believe we've identified several resources with potential to be part of a broader manganese mining operation.

High-grade results at Black Hill were achieved with just two drill holes to date.

We plan to undertake additional drilling this year to extend our understanding of mineralisation to the north of the prospect.

Overall, it's a pleasing outcome when you consider Bryah Resources was formed in 2017 as a copper-gold explorer.

With tenements situated just 60km from Sandfire's DeGrussa copper-gold mine, naturally, our initial focus was copper-gold.

That changed when I saw dark patches on satellite imagery of our ground.

I ordered geological sampling which returned rock-chip readings around 48.5pc manganese.

We secured options on the disused Horseshoe South manganese mine, which had produced more than 1mt of high-grade ore since the 1940s and as recently as 2011, and we formulated the strategy that manganese production could support copper-gold exploration.

Yet we still had to find suitable quantities of ore but we're well on the way towards realising that ambition, thanks mainly to an agreement we signed in April with OM (Manganese) Limited (OMM), which has funded the manganese drilling program.

As soon as we signed that agreement, we exercised our option to buy the Horseshoe South mine.

Q. What about at Brumby Creek? How does that prospect compare?

Again, Brumby Creek was a prospect we identified.



Bryah Resources managing director Neil Marston.

In drilling results under stage one of our agreement with OMM, we found multiple horizons of high-grade manganese over a wider area than Black Hill.

The nature of this mineralisation is shallow and, in some areas, flat lying.

That is conducive to development using shallow open-pit mining methods, generally a low-cost form of mining.

Q. Both drill programs were funded by OMM. Could you explain how the \$7.3m Manganese Farm-In and Joint Venture agreement with OMM came to be? Was this a key strategic step for Bryah?

OMM is a wholly owned subsidiary of Singapore-based and ASX-listed OM Holdings Limited (ASX: OMH), which mines, smelts and markets manganese.

OMM is a manganese miner in Bootu Creek in the Northern Territory, which aims to replenish their dwindling supplies of ore from within Australia.

They approached Bryah Resources and were interested only in manganese,

which meant Bryah Resources could form an agreement based solely on manganese exploration which excluded Bryah's copper-gold explorations (Bryah Resources retains 100pc interest in its copper-gold and other mineral assets).

That approach could de-risk Bryah's manganese strategy and offered OM Group another potential source of manganese ore.

Under the agreement, OMM funded \$500,000 of exploration expenditure, which Bryah completed in July.

OMM was then required to elect by the end of August whether to proceed to Stage Two, which gives 10pc joint venture interest in the manganese rights.

By proceeding, they agree to fund manganese exploration valued at \$2m, to be completed by June 2022.

Completion gives OMM a 51pc joint venture interest.

At that point, Bryah can elect to dilute its stake in manganese in return for payments of \$1.8m and \$2.5m from OMM, which would raise OMM's total investment to \$7.3m and a 70pc interest in the manganese rights, with Bryah retaining 30pc.

Yes, the agreement was a strategic step for Bryah because it de-risked project development cost and product marketing – these issues are addressed by the agreement.

OM Group has smelters in Sarawak in Malaysia and a network for marketing and distributing manganese.

Q. What is the proposed timeline for further drilling and feasibility studies at your manganese prospects? Is this reliant on securing Stage Two funding from OMM?

Assuming OMM commit to Stage Two, we expect additional drilling in several areas by the end of 2019 and into the first half of 2020.

The timetable for feasibility studies will depend on those results, so, the next 12 months are critical.

Our program of drilling and assaying will be intensive and the first round will include trial geophysical surveys to establish cost-effective exploration techniques that identify concealed manganese deposits.

Q. Can you tell me about exploration plans for high-grade copper-gold deposits in the Bryah Basin? Do any prospects stand out?

We will focus on areas identified during explorations completed by Bryah Resources in 2018.

A standout is Windalah Prospect, where high-grade gold results were defined in drilling - our best interval was 5m at 6.6g a tonne from 79m.

We are excited that this could be analogous to the nearby Horseshoe Lights copper-gold mine and indicative of a volcanogenic massive sulphide (VMS) system, often associated with copper and gold.

We expect to learn more through the next round of drilling.

We also intend to undertake first pass drilling at the Wongawar Prospect and several other areas – at Wongawar we identified a significant copper-gold anomaly which requires further testing.

Q. Where do you see Bryah in the next three to five years?

We see Bryah in a joint mining venture with OM Holdings and exporting manganese.

A manganese mine has low capital cost, and OMM brings relevant mining expertise.

As well, we expect to have identified the next copper-gold deposit in the Bryah Basin and be well on our way to developing it.

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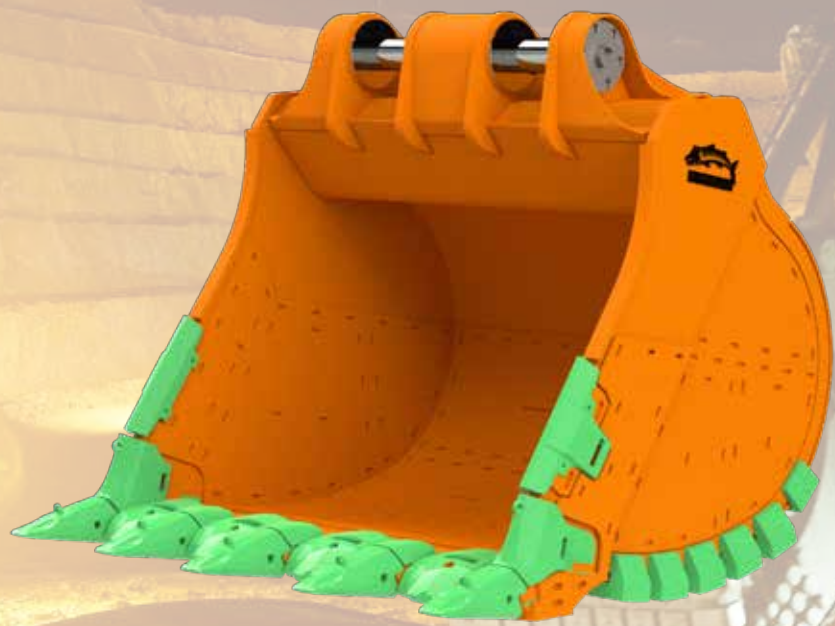


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