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PILBARA JOBS BOOST

Iron ore may be volatile, but these big developments in the WA Pilbara could be just the thing that local contractors have been looking for.

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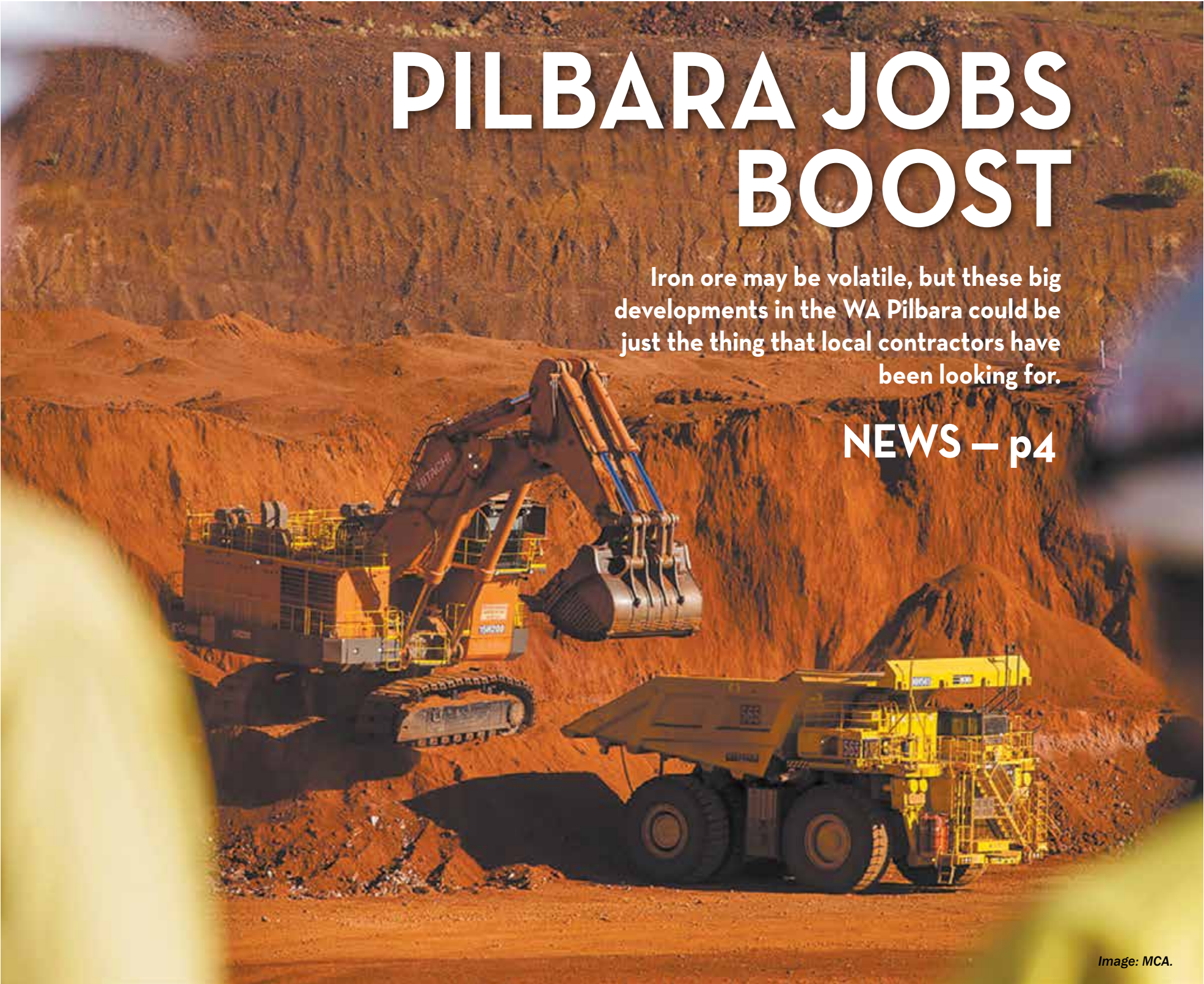


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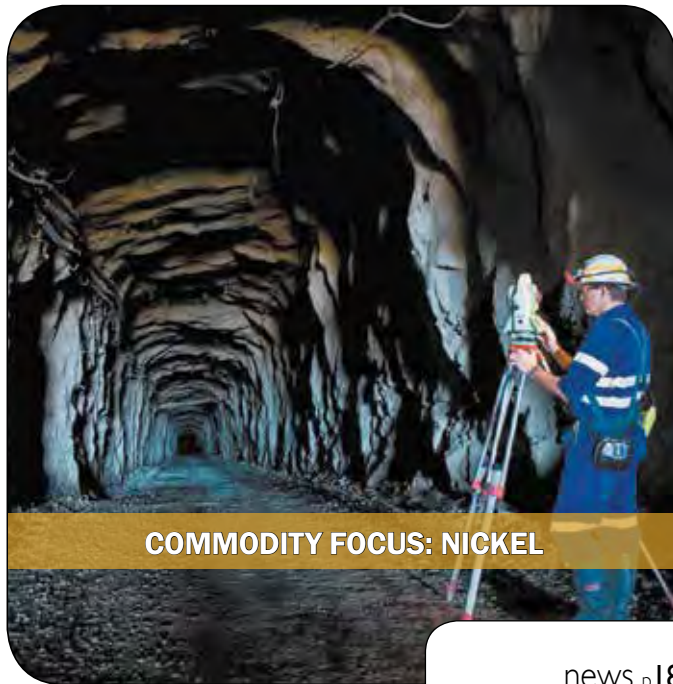
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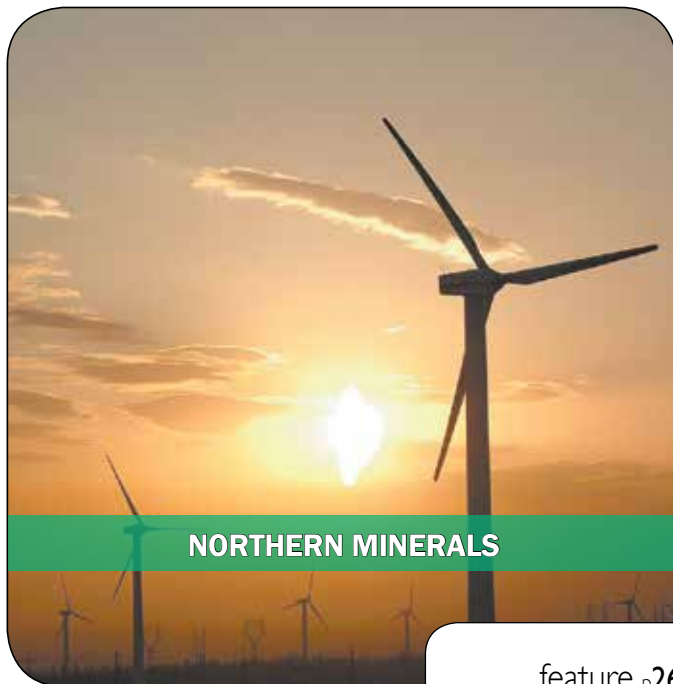
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Pilbara jobs windfall

IF APPROVED, DEVELOPMENT WOULD COMMENCE IN 2019, AND WOULD REQUIRE AN EXPECTED 1600 WORKERS DURING CONSTRUCTION AND 600 STAFF ONCE OPERATIONAL.



Image: Rio Tinto.

CAMERON DRUMMOND

FALLING iron ore prices have not deterred mining heavyweights BHP and Rio Tinto from progressing new developments to sustain production levels at their Pilbara operations.

Both are set to create thousands of job opportunities for Western Australians as the miners look to replace their dwindling mines with fresh production.

Rio Tinto

In August 2016 Rio announced it would complete the development of its 16th Pilbara iron ore asset, Silvergrass, adding an extra 10 million tonnes per annum (mtpa) of high quality ore to raise total production up to 340mtpa.

“The additional low-phosphorus tonnes that Silvergrass delivers will sustain the long-term viability of our Pilbara blend, ensuring continued premium pricing, whilst also lowering our operating costs through infrastructure improvements,” Rio Tinto chief executive Jean-Sebastien Jacques said.

Construction at the \$US338million project ramped up during the first half of 2017, creating about 500 jobs.

The miner had also created a further 500 construction jobs at its West Angeles and Yandicoogina operations as it concentrated efforts to sustain overall production levels.

In May, Rio approved a \$30.9m investment to complete a feasibility study for the development of its \$US2.2 billion Koodaideri iron ore project.

The study would examine the project as the company’s next potential major mining operation in the Pilbara, and would also be developed to sustain ore production levels.

If approved, development would commence in 2019, and would require an expected 1600 workers during construction and 600 staff once operational.

BHP

BHP is also looking to create hundreds of job opportunities after “The Big Aussie” approved \$244m of initial funding to develop its \$US3.2bn South Flank project last month.

Silvergrass
500 jobs, STATUS: ON SITE

West Angeles & Yandicoogina expansions
500 jobs, STATUS: ON SITE

Koodaideri Development
1600 jobs, STATUS: TO BE CONFIRMED

Balla Balla Infrastructure Project
3300 jobs, STATUS: TO BE CONFIRMED

South Flank
1000+ jobs, STATUS: TO BE CONFIRMED

The move would help the miner maintain its WA iron ore production when its Yandi mine reaches the end of its mine life in the early-to-mid 2020s.

BHP said the Mining Area C hub was its preferred option to replace production from the 80 million tonnes per annum (mtpa) Yandi operation.

The project was expected to be submitted for board approval in mid-2018, and first ore targeted for 2021, with ramp-up in production timed to coincide with the ramp-down of Yandi.

Initial funding was to be used primarily for the expansion of accommodation facilities to support current and future workforce requirements.

Full development of the project would generate thousands of jobs during construction.

BHP Minerals Australia operations president Mike Henry said the capital efficient South Flank project was a compelling option to replace Yandi production and offered attractive returns; its high-grade lump and fines ore and a strip ratio in line with the BHP WA Iron Ore (WAIOR) average would establish it as a highly-competitive operation.

“As well as supporting our current operational requirements, this work will

advance potential first ore from South Flank, while we further optimise the full development and progress external and internal approvals,” Mr Henry said.

“As we have said previously, a continuing stable investment environment in Western Australia is required to underpin ongoing investment in the business, including this project.”

BHP said the capital cost for South Flank was expected to be in the range of between \$US30 and \$US40 per tonne.

“The capital efficiency of South Flank is underpinned by the planned use of existing infrastructure at the Mining Area C operation, which would, if approved, become one of the largest standalone iron ore processing centres in the world, within reach of several billion tonnes of high-grade ore,” Mr Henry said.

BBI: in the wings

When iron ore prices were enjoying a renaissance in January, rising up to more than \$US90 per tonne (t), Todd Corporation’s BBI Group (BBIG) signed an agreement with the WA Government to develop the Balla Balla Infrastructure Project (BBI).

The project is a \$6 bn development linking

iron ore deposits in the Central Pilbara region with a new iron ore export facility at the Balla Balla port via a 162km purpose built railway.

BBIG said the project would create 3300 jobs during construction and 900 jobs once operational.

The initial capacity of the infrastructure would be about 50mtpa, however it would have the capability to be increased in the future.

The group estimated that a new and independent gateway to the iron ore rich Pilbara would reap \$11bn in royalties and taxes for the WA and Federal Governments from customer mines over the life of the project.

A number of small to mid-tier miners had expressed their interest in the supply of iron ore via BBIG’s Balla Balla rail and export infrastructure.

Mining juniors Atlas Iron, BC Iron, Flinders Mines and Mount Gibson Iron Ore all have projects that would benefit from the infrastructure.

Currently, smaller mining companies with projects in the Central Pilbara truck ore to Port Hedland for export – an expensive way of handling bulk commodities.

With a rail network in place these miners would be able to lower transportation costs and weather depressed iron ore prices.

In March, BBIG signed a memorandum of understanding (MoU) with China State Construction Engineering Corporation (CSCEC) for the construction of Balla Balla.

Further progress was made in May when it signed an option agreement to acquire Mineral Resources’ Weelumurra iron ore asset, 15km from BBIG’s proposed rail head and stock yards.

Based on previous exploration work BBIG said it could have about 200mt of iron mineralisation and potential exploration upside.

While iron ore majors (Rio, BHP, Fortescue) operating in the Pilbara have their own infrastructure to keep production costs down during depressed market periods, the BBI project could be a boon for budding iron ore companies needing more operational flexibility; and add a significant amount of employment prospects and future export ability to the region.

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**FEATURE
PAGE 40**

Gruyere ticks off another milestone to production.

Gold Road awards \$298m Gruyere contract

CAMERON DRUMMOND

GOLD Road Resources and its joint venture (JV) partner Gold Fields have awarded a \$298 million contract to the Amec Foster Wheeler Civmec JV (ACJV) for the engineering, procurement and construction (EPC) of a process plant at the Gruyere gold project.

Up to 50 jobs would be created in Perth for the fabrication of the plant and associated infrastructure at Civmec's 200,000 square metre facility, while ACJV expected to begin mobilising to Gruyere in August and have a total workforce of about 300 people on site during peak construction.

"ACJV combines Amec Foster Wheeler's world class gold processing experience and Civmec's excellent Australian fabrication and construction capabilities," Amec Foster Wheeler mining director Greg Hayes said.

Gold Road managing director Ian Murray welcomed the execution of the EPC contract with ACJV.

"This is another key milestone in the delivery of Gruyere into production and we look forward to work on the plant and associated infrastructure commencing in earnest on site," Mr Murray said.

"Importantly, this contract will focus on maximising the local content in the construction of Gruyere and generating significant employment opportunities in the Goldfields region and WA more broadly."

Monty construction begins

ELIZABETH FABRI

PERTH-based miner Sandfire Resources is a step closer to developing its Monty project in WA with the award of an \$8.2 million civil and earthworks contract to the Yagahong Alliance.

The \$90 m Sandfire (70 per cent) and Talisman Mining (30 per cent) Monty project joint venture contains one of the highest grade copper deposits in the world, and is just 10km from Sandfire's flagship DeGrussa mine.

The civil and earthworks contract involves development of a 14km haul road from Monty to DeGrussa; local access roads; a box-cut for underground access; stockpile and laydown area pads; infrastructure earthworks; and drainage. Initial site works will begin immediately and the development of the box-cut underground portal was expected to begin in the December quarter of this year.

The award of the underground mining and power supply contracts, and remaining statutory approvals were also expected in the coming months, with underground development expected to take 12 months before first ore is retrieved.

Sandfire managing director and chief executive Karl Simich said the first major contract for the Monty project was a great opportunity to extend the strong working relationship between Sandfire and the Yugunga-Nya People, who are the traditional owners of the project area.

"We are glad to be able to continue to support the alliance between Central Earthmoving and Yugunga-Nya and in the process continue our Aboriginal engagement across the mining operation while also generating employment and opportunities for communities in the Midwest region," Mr Simich said.

"We look forward to commencing the development of what will be the first new copper mine in the Bryah Basin since the development of DeGrussa six years ago."

"WE LOOK FORWARD TO COMMENCING THE DEVELOPMENT OF WHAT WILL BE THE FIRST NEW COPPER MINE IN THE BRYAH BASIN SINCE THE DEVELOPMENT OF DEGRUSSA SIX YEARS AGO."



Exploration drilling at Monty.

Image: Sandfire Resources.

Aggreko snares \$100m contract



Rio Tinto's Amrun project.

Image: Rio Tinto.

CAMERON DRUMMOND

RIO TINTO has awarded a \$100 million contract to power provider Aggreko Australia Pacific to build and operate a 20MW power station at its \$2.6 billion Amrun bauxite project, near Weipa in North QLD.

The station is to be a high efficiency modular diesel power system that includes engine efficiency upgrades and

a heat-recovery system, to be deployed over the 15 year term of the contract which comes with a five year extension option.

Rio Tinto Amrun general manager Marcia Hanrahan said the contract to build the power station signified another important milestone for delivery of the Amrun project.

"The power delivery expertise and operational capabilities that the Aggreko team will bring will be critical to the

success of our operations," Ms Hanrahan said.

A team of more than 20 Aggreko employees including engineers, project managers and technicians will come together to deliver the installation by December 2017, with the station flagged to go live by April 2018.

Production and shipping from Amrun was expected to commence in the first half of 2019, ramping up to full production by the end of the year.

IN BRIEF

Red River signs
offtake agreement
with Glencore

COPPER

NEAR-term zinc producer Red River Resources has secured an offtake agreement with mining giant Glencore for copper concentrate production at its Thalanga zinc project, 60km west of Charters Towers in Central QLD.

The project boasted a low pre-production start-up cost of \$17.2m, low operating costs, and a short 6-month timeline to production.

Red River managing director Mel Palancian said the company was excited about the copper offtake agreement and looked forward to finalising the zinc and lead concentrate offtakes also.

Sandfire to
explore Red Bore
project

GOLD

GOLD explorer Thundelarra has agreed terms with Sandfire Resources to explore the Red Bore copper-gold project on the mining license adjacent to Sandfire’s DeGrussa gold mine.

Thundelarra will be completely free-carried through to mining, while Sandfire can earn a 75 per cent interest by defining a JORC2012 resource of at least 30,000t of contained copper.

Sandfire will spend at least \$1.5m on exploration over the next 18 months.

“This transaction makes a great deal of sense for all parties [and] allows Thundelarra to focus all its efforts and cash on continuing exploration at the exciting wholly-owned Garden Gully gold discovery, while at the same time there will be significant exploration underway at Red Bore at no cost to Thundelarra,” Thundelarra chairman Phil Crabb said.

Hermes project
gains WA govt
approval

GOLD

CANADIAN miner Superior Gold – formerly Billabong Gold – has approval from the WA Department of Mines and Petroleum to commence development of its Hermes gold project in the Pilbara region of WA.

The project is 65km southwest of Superior’s Plutonic gold project which it bought from Northern Star Resources in August last year for \$66.2 million.

The Hermes deposit is expected to be mined as a conventional open pit, contractor operated mining operation.

The contribution of ore from Hermes is anticipated to allow Superior Gold to reach its targeted annual production of 100,000oz.

NT mine begins production



The project is located in the Tennant Creek region.

Image: Emmerson Resources.

ELIZABETH FABRI

PROJECT partners Emmerson Resources and mid-tier gold producer Evolution Mining will open the first Northern Territory gold mine in more than a decade, after final approval to begin production at the high grade Edna Beryl gold operation was received in June.

Emmerson’s strategy was aimed at monetising a pipeline of small high grade gold deposits within its Tennant Creek project as a low cost path to production; the company stated that it had identified 15 such mines within its tenements.

The first of these, Edna Beryl, will be operated under a tribute agreement with Edna Beryl Mining Company, an operator that specialises in small mines.

Emmerson Resources managing director Rob Bills said commencing production at Edna Beryl was a pivotal step for the company, which began exploration in the Tennant Creek Mineral Field in 2008.

The first 600 tonnes of development ore at the mine averaged 40 grams per tonne of gold.

“On behalf of the Emmerson board and our partner Evolution Mining Limited, we congratulate the Edna Beryl Mining Company for its expertise in developing this new generation of high value, small footprint style operations,” Mr Bills said.

“It not only provides a revenue stream but establishes a template for unlocking value in many of our other projects contained within our extensive 3000sqkm tenement package.

“We also congratulate the NT

Government for their ongoing support and vision under the banner of Transforming the Territory; in particular their initiatives to revitalise Tennant Creek, which will undoubtedly provide benefits to all stakeholders.”

Northern Territory Primary Industry and Resources minister Ken Vowles said the Government was focused on developing Tennant Creek as the mining services hub of the Territory.

“The cyclical nature of the industry means that investing in mineral exploration now is vital to ensuring the discoveries that will become the mines of tomorrow are made,” Mr Vowles said.

“We are working hard to facilitate and attract investment into the region to help grow our industries and create jobs for Territorians.”

Kwinana Lithium expansion on cards

ELIZABETH FABRI

CHINESE-owned Tianqi Lithium has agreed to invest \$317 million towards an expansion of its Kwinana Lithium Plant in WA, currently under construction.

The first stage of the project was due to be complete at the end of 2018, and set to produce up to 24,000 tonnes of battery grade lithium hydroxide per annum.

A second phase would double plant capacity to 48,000 tonnes per annum, and be built adjacent to the first plant, with a construction period of less than two years.

Tianqi Lithium Australia managing director Phil Thick said the company was pleased to be moving to an expansion quicker than expected, with a \$21 million feasibility study now underway, which he expected would be complete by October.

“[This is] a great opportunity to invest further in WA during a quiet period in the resources and manufacturing sector,” Mr Thick said.

“We’re excited to be looking at providing even more long term jobs in the Kwinana area.”

The news followed Talison’s (a joint venture between Albemarle and Tianqi Lithium) March announcement it would be expanding its LCE capacity from 80,000mtpa to more than 160,000mtpa at the Greenbushes mine, also in WA and



Image: Tianqi Lithium Australia.

The \$400 million first stage of the plant was now under construction.

Kwinana Lithium’s primary customer.

“Feedstock will continue to be 6 per cent lithium concentrate from Talison’s Greenbushes mine in the south west of Western Australia which is owned 51 per cent by Tianqi Lithium Corporation,” Tianqi stated.

“The acceleration of the second phase is being driven by stronger than expected growth in global lithium hydroxide

demand with the world’s leading lithium industry analyst Roskill predicting global demand for Lithium Hydroxide will rise from 31,000 tonnes pa in 2015 to 64,000 tonnes pa in 2020 and 129,000 tonnes pa in 2025, 15 per cent compound annual growth.”

A final investment decision on the expansion was expected later this year at the completion of the study.

IGO to divest Stockman for \$47.2m

ELIZABETH FABRI

INDEPENDENCE Group (IGO) has announced plans to sell its Stockman copper-zinc project in north-east Victoria to CopperChem for \$47.2 million to focus on production at its world-class Nova nickel project in WA.

Subject to regulatory approval, the transaction would involve a \$32.2 million cash payment and a 1.5 per cent net smelter return (NSR) royalty with a provisional value of up to \$15 million.

The project was acquired by IGO in 2011, but its future remained unclear following the acquisition of the low-cost and larger scale nickel-copper Nova deposit in September 2015, as part of the company's \$1.8 billion takeover of Sirius Resources.

IGO managing director Peter Bradford said the sale was consistent with the company's strategy of focusing on high-quality assets of scale, longevity and geographical focus.

"With the significant continued growth of IGO, including the ramping up of the Nova operation to reach nameplate capacity in the September 2017 quarter, the development of the Stockman Project is not consistent with this strategy," Mr Bradford said.

"Although IGO recognises the value of the Stockman Project, CopperChem is ideally positioned to continue its exploration and development, while we have retained upside exposure."

The deal was expected to be finalised in the September quarter, and result in an after-tax impairment of up to \$20 million in FY17.



Independence Group remains focused on the ramp up of its Nova project in WA.

Image: IGO.

The 4 key challenges for Australian mining

While the mining sector has experienced tough times it seems there are calmer waters ahead, according to trade credit insurer Atradius.



Atradius ANZ managing director Mark Hoppe.

"AUSTRALIA is one of the world's leading mineral resources nations, ranking in the top two to five countries in the world, depending on the commodity," Atradius ANZ managing director Mark Hoppe said.

"2014 saw the peak of the revival in the Australian mining industry. The main driver for this revival was the rapid urbanisation and industrialisation of emerging economies in Asia, especially China, which dramatically transformed global commodity markets during the 2000s."

In this period, a strong demand for resources propelled commodity prices to record levels, supporting rapid expansion of global energy and minerals supply.

The initial surge in resources investment was driven by coal and iron

ore projects, largely to meet demand for steel in China.

China became rapidly by far Australia's largest export partner and commodities dominate the rankings of main export sources.

China consumes about 47 per cent of the world's base metals (up from 13 per cent in 2000) and is the world's largest importer of iron ore, coal, copper, bauxite, and nickel.

The main consumers of Australia's major commodities are Chinese steel mills or power plants.

"Since its peak in 2014, mining has had its struggles but is now showing more positive signs. However, mining operations need to be aware of and prepared to face a number of key challenges in the coming months and years," Mr Hoppe said.

Atradius has identified four key challenges facing the mining sector:

1. Rebalancing of supply and demand.

The iron ore commodity rush dragged the major miners Rio Tinto and BHP (number two and three in the world) upwards and, in turn, created a more suitable market for players like Fortescue and Gina Rinehart's Roy Hill project to peg high debt against high returns and make their relatively new company viable.

The good times were expected to last forever but the downturn, as well the relative short period in which the price dropped, surprised everybody.

This made it more challenging to make a strong business case, especially organisations focusing on one commodity like Fortescue.

In the next five years analysts and the government expect the iron price to stabilise. This will make income and returns far more predictable. Businesses will be able to better plan for costs making lending to, and investing into, mining companies attractive again.

2. High profile casualties.

Pluton Resources, Convergent Minerals, and Kimberly Diamonds going into receivership, while Queensland Nickel was placed into administration in January 2016 and Peabody Energy filed for Chapter 11 bankruptcy protection in April 2016.

These high profile casualties occurred because of high inflexible company costs based on the expectation of commodity prices staying high.

When commodity prices dropped they were unable to adjust quickly enough.

Going forward we expect to see fewer well established mining companies going into administration.

3. Uncertainties about the Chinese Government's strategy.

The urbanisation of China has driven steel consumption in construction and infrastructure. The Chinese Government has committed to reducing their

steelmaking capacity domestically.

However, they have also announced plans to build a brand new city called Xionhan New Area which will be twice the size of New York City; almost 2000 square kilometres.

So uncertainty surrounds where China will source steel and raw materials (iron ore and coal) for their new city.

Will it be domestically or internationally? This decision will impact mining companies in Australia.

4. Focus on costs.

Flat price forecasts have meant we're starting to see listed miners publicly state their intent to drive down costs and debt, like Fortescue.

We also expect more junior mining and exploration companies to stop exploring if they're unable to produce a viable business case and find a reliable provider of cash or funding.

Suppliers like BHP and Rio, with world class assets, scale of production, efficiency and low costs can afford speculative exploration.

There's also potential for successful junior miners to be targeted in mergers and acquisitions.

"Mining operations and those looking to do business with miners should be aware of the coming challenges so they can develop a strategy to overcome them and continue to trade confidently," MR Hoppe said.

Pilgangoora poised for major construction

CAMERON DRUMMOND

LITHIUM developer Pilbara Minerals has successfully raised \$80m in a heavily oversubscribed placement for its Pilgangoora lithium-tantalum project in the Pilbara region of WA.

The move followed Pilbara Minerals' successful \$US100m bond issue the previous week, and completes the funding package required for the development of the project.

The company received commitments from institutional investors to raise \$53m at 35 cents per share, combined with a \$US20m equity commitment from offtake partner Jiangxi Ganfeng Lithium.

Pilbara Minerals' managing director Ken Brinsden said the response from investors had been exceptional.

"We are very grateful for the support received from both existing and new investors – as well as the strong support of our major shareholder, Mineral Resources, and our cornerstone offtake partner Jiangxi Ganfeng Lithium," Mr Brinsden said.

"The recent successful completion of the \$US100m bond issue and now this landmark \$80m equity raise signals the green light for full-scale construction to begin at Pilgangoora which is widely recognised as the world's leading lithium development project.

"The completion of the funding package clears the way for the Pilbara Minerals board to make a final investment decision – which is now expected to be imminent – and, with all major environmental and regulatory approvals in place, we can get on with the job of building an important new resources project in WA.



**"THE RECENT
SUCCESSFUL
COMPLETION OF
THE \$US100M BOND
ISSUE AND NOW THIS
LANDMARK \$80M
EQUITY RAISE SIGNALS
THE GREEN LIGHT
FOR FULL-SCALE
CONSTRUCTION
TO BEGIN AT
PILGANGOORA."**

The capital raise has paved the way for full construction activities to begin at Pilgangoora.

Image: Pilbara Minerals.

"Pilgangoora will be a major new source of lithium supply to the global battery supply chain – a critical component in the electrification thematic which is rapidly gaining momentum as more and more

investors understand the significance of the transformational changes that are occurring in China and elsewhere.

"This is an exciting time for the lithium industry globally, and we are very pleased that

Australia is going to play such an important role in the supply of a high-value metal which could help facilitate one of the biggest transformations the global economy has seen in recent times," Mr Brinsden said.

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IN BRIEF

EnviroSuite sells consulting practice

NATIONAL

MINING technology provider EnviroSuite has sold its Pacific Environment Consulting Practice to Environmental Resources Management (ERM) for \$15 million.

EnviroSuite is a global provider of monitoring and operational management services through its leading Software-as-a-Service (SaaS) platform, used by large mining companies, including Rio Tinto, BHP and Glencore.

EnviroSuite managing director Robin Ormerod said the transaction was a “transformational” move for the company as it focused on becoming a “well-funded, global SaaS technology business”.

“We look forward to working with ERM as one of our partners in the globalisation of the EnviroSuite platform,” Mr Ormerod said.

Future Workforce Program applications closing

EDUCATION

APPLICATIONS are closing for the Future Minerals Workforce Program (FMWP) to be held in Brisbane and Perth in mid-July.

The FMWP is a three-part workshop series for senior workforce leaders to benchmark and develop their organisation’s preparedness for the future.

METS Ignited, together with Minerals Council Australia and Mining Leaders Group, have developed the program to help METS and mining organisations looking to adapt and respond to new technologies.

The program recognises the impact of current trends including Industry 4.0, automation, and remote operation centres, and encourages participants to bring live scenarios to engage in peer-to-peer work-shopping, one-on-one mentoring, and guidance.

Women in STEM: METS Career Pathway Program

EDUCATION

AUSTMINE’S new Women in STEM: METS Career Pathway Program initiative aims at raising awareness of METS and the career opportunities provided by the sector to women studying STEM subjects at universities.

Kicking off in July 2017, this will be a two year program, each year welcoming a new group of students and METS companies to participate.

Each year, the program will include information evenings featuring women from the METS industry; a 10 week internship opportunity in participating METS companies; and a webinar series to provide coaching for the successful students.

Aussie tech goes global

ELIZABETH FABRI

GLOBAL mining equipment, technology and services (METS) company Corescan has signed an agreement with the CSIRO to bring its advanced mineral analysis and logging technology into commercial production.

The HyLogger technology would be integrated into Corescan’s existing suite of advanced hyperspectral imaging equipment and benefit miners across a broad range of commodities.

The tool was designed to aid in systematic mineral identification, using a spectra of reflected light from mineral surfaces to interpret the mineralogy of that material and provide near real time analysis.

CSIRO research director Dr Rob Hough said Hylogger reduced the costs and delays associated with laboratory analysis, and through partnering with Corescan, the technology could be accessible on a global scale.

“Through our partnership with the Australian state geological surveys, the National Virtual Core Library and AuScope, hyperspectral data is now routinely acquired at government core repositories and is generating new knowledge on mineral systems,” Dr Hough said.

“Transferring the technology and ongoing development to Corescan, an Australian SME, will enable CSIRO to focus on the application and integration of hyperspectral



Drill cores to be analysed with a HyLogger to determine what minerals are present from their unique spectral signatures.



HyLogger uses visible and infrared light to characterise selected minerals from drill cores, chips and pulps that are often difficult to interpret correctly.

information with other data sets to support mineral exploration through cover and for rapid resource characterisation in deposits.”

Corescan managing director Neil Goodey said the technology would help it better meet customer requirements at the various stages of the exploration and production cycle.

“Corescan will also be offering support

services to the existing HyLogger community and will leverage its global reach to bring the technology to new international markets,” Mr Goodey said.

“Corescan will be working closely with the Australian geological surveys and the National Virtual Core Library to continue on the great work that CSIRO has done in this area over the last decade.”

Rehabbed mine land outperforms in study

REUBEN ADAMS

A THREE and a half year study of beef grazing on rehabilitated mine pastures in the Hunter Valley of NSW has confirmed increased livestock productivity compared to original native pastures.

The Department of Primary Industries’ (DPI) Technical Specialist Pasture Production Neil Griffiths said the Hunter mine grazing trial was initiated by the Upper Hunter Mining Dialogue to answer the question: Can rehabilitated mine land sustainably support productive and profitable livestock grazing?

The study produced valuable insights into beef growth rates while grazing on both rehabilitated and analogue summer pastures at two mine sites, Mr Griffiths said.

“Ten Angus steers were located at each trial site, with the first group assigned in 2014 and the second group in 2016,” he said.

“Results showed that both groups of steers on rehabilitated mine land gained more weight than those on the analogue native pastures at both sites.

“The greater available pasture biomass on the rehabilitated pasture can largely explain the weight gain advantage of the steers on these pastures.”

Final results for the second group showed the steers on the rehabilitated site had an average weight of 529kg and 6.2mm fat per head of cattle, while on the analogue site the steers weighed 456kg and had 3.6mm fat.

This was consistent with the first group, where steers grazing rehabilitated mine land were on average 101kg/head heavier, and worth \$386/head more than those grazing the nearby native pasture which was similar to original pasture on the mine sites.

Mr Griffiths said the sites had not been mined for 15 and 30 years.



Pictured: (L to R): Rio Tinto’s Bill Baxter, rehabilitation area licensee and cattle owner Phil Baker and NSW Department of Primary Industries’ Neil Griffiths.

“Throughout the study regular soil, pasture and animal blood tests were conducted to check for the presence of heavy metal trace elements. Results have shown no major issues regarding heavy metals,” he said.

“Outcomes from this study will assist the mining industry to identify targets for rehabilitation and perhaps changes to rehabilitation practices for successful rehabilitation to grazing land in the region.”

Rio Tinto also confirmed that steers reared on land rehabilitated by Rio Tinto were found to be 100kgs heavier on average than cattle grazed on unmined farming land.

“The results of this study have been consistently promising and are a strong indicator that Rio Tinto’s rehabilitation

work has paid off,” Rio Tinto manager environment and community Andrew Speechly said.

“From the good quality data we are collecting it is clear that when done well rehabilitated mine land provides a commercially sustainable option for grazing livestock.

“We continue to draw on the expertise of the agriculture sector to improve our rehabilitation performance.”

The Hunter mine grazing study is undertaken by NSW DPI with funding support from the mining industry, The Australian Coal Industry’s Research Program (ACARP) and NSW Department of Planning & Environment Resources & Energy, Upper Hunter Mining Dialogue, Hunter Local Land Services, and local cattle producers.



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Siemens Mobility Services chief executive Johannes Emmelheinz and MRX Technologies managing director Jim Blair.

Siemens expands rail digitalisation capabilities

ELIZABETH FABRI

MINING services provider Siemens has strengthened its digitalisation capabilities in the rail infrastructure sector with an acquisition of MRX Technologies.

Headquartered in Perth and the UK, MRX Technologies provides services in Australia and the UK for manufacturers and operators of rail systems, including the mining sector.

Siemens Australia chief executive Jeff Connolly said the acquisition would complement its existing data services business, and take Australian innovation in rail digitalisation to global value chains in more than 200 countries.

“By bringing MRX Technologies into the Siemens family we not only strengthen our capability and offering to the rail industry but we also have the ability to take that business to a global level,” Mr Connolly said.

“This acquisition makes a lot of sense in a time when digitalization technologies are key to unlocking productivity gains – that is getting more out of existing rail infrastructure and adding intelligence to existing rail infrastructure.”

Siemens said MRX Technologies had a comprehensive portfolio for digitalised condition monitoring of rolling stock components and rail infrastructure, and delivered extensive measurement data to optimise the maintenance and cost efficiency of rail systems.

“From the use and application of 3D printing to reduce rail repair times to unique platforms that connect disparate systems together for the first time, Siemens has been pushing the boundaries of rail innovation in Australia,” Mr Connolly said.

“The MRX Technologies acquisition will enable us to bring in an added layer of digitalization and data analytics that help create intelligent infrastructure for our businesses and communities.”

MRX Technologies managing director Jim Blair said under the deal, the company would be able to offer customers “even higher system availability”.

“With this acquisition, we are combining the digitalisation of service-relevant data with the data analytics system and expertise of Siemens that is unique in the industry,” Mr Blair said.

“Together, we will lead the rail industry into the digital future.”

IoT uptake set to surge

RELIABLE NETWORK INFRASTRUCTURE PROVIDERS, THAT CAN OPERATE ANYWHERE IN THE WORLD, NEED TO WORK CLOSELY WITH END-USER BUSINESSES TO MAKE SURE THEY UNDERSTAND THEIR OPERATIONAL NEEDS.



REUBEN ADAMS

A GLOBAL research program finds that sluggish adoption of Internet of Things (IoT) technology within the mining industry is set to change radically, with 43 per cent of respondents expecting to implement IoT technology within two years, and 70 per cent believing that it would give them a significant competitive edge.

The Inmarsat Research Programme report, *The Future of IoT in Enterprise 2017*, surveyed 500 senior respondents in organisations with more than 1000 employees from the agritech, energy production, transportation, and mining sectors.

Key findings revealed that almost all – 97 per cent – of respondents across all sectors are experiencing, or expect to experience, significant benefits from the

deployment of IoT technologies.

Improved service delivery capabilities (47 per cent), better health and safety across the organisation (46 per cent), and greater workforce productivity (45 per cent) were identified as the top three benefits to be gained from the deployment of IoT-based solutions.

For example, Freeport-McMoRan is using drones to create steeper slopes in one of its mine, reducing the amount of rock it needs to move to access materials.

“These drones can not only scan the mines from perspectives that are dangerous and near-inaccessible to humans, they can also instantaneously communicate any information they pick up,” the report stated.

“This makes for a more rapid and detailed analysis of the mine slopes without having to deploy workers to the mine.”

However, this was not to imply that challenges were absent, Inmarsat Enterprise president Paul Gudonis said.

“The research points to clear concerns – namely, security, skills, and connectivity. The increasing interconnectivity of devices, teamed with a heightened cyber-security landscape and a short supply of relevant skills, brings an array of issues. To overcome these challenges, collaboration is key,” Mr Gudonis said.

“Developing new technology is complex and draws on many different type of skills. Reliable network infrastructure providers, that can operate anywhere in the world, need to work closely with end-user businesses to make sure they understand their operational needs.

“Inmarsat is working with our network of partners globally to drive innovation through our expertise in IoT solutions and satellite connectivity.”

FMG autonomous trucks in gear



FMG's Christmas Creek mine in the Pilbara.

Image: FMG.

ELIZABETH FABRI

FORTESCUE Metals Group (FMG) will add more autonomous trucks to its fleet in FY18 as part of the company's strategy to improve safety, productivity and efficiency across its Pilbara operations.

Announced on 27 June, the FY18 innovation projects included converting up to 12 793F trucks to autonomous haulage technology (AHS) at Solomon Hub, the rollout of AHS across the Chichester Hub project, a relocatable overland conveyor trial at Cloudbreak

mine, and IT network upgrades at Cloudbreak and Christmas Creek.

Fortescue said about 100 haul trucks would be converted to AHS at the Chichester Hub to deliver on the 20 per cent productivity improvements recorded at Solomon since the company's deployment of 56 AHS vehicles from 2012.

The investment in the new technologies would occur over a three year period, with partial benefits to be realised during FY18 and full benefits in the financial years that follow.

Fortescue chief executive Nev Power

said the company was continuing to introduce leading-edge technology, such as AHS, across its business to ensure it remained at the lowest end of the global cost curve.

“Our focus remains on improving safety and increasing productivity and efficiency to deliver ongoing cost reductions,” Mr Power said.

“These projects will encompass technological advancement, workforce skills development and collaboration with our suppliers to harness the best ideas and position Fortescue strongly for the future.”

THE AUSTRALIAN MINING REVIEW

AUGUST 2017 EDITION

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IN BRIEF

Thor enters US lithium market

US

THOR Mining has signed an agreement to acquire a 25 per cent stake in private Australian company US Lithium (USL), which has interests in lithium projects in New Mexico and Arizona.

Under the deal, Thor would provide a cash payment of \$US75,000 and a further \$50,000 to cover operational costs during the next three months.

It also had the option to purchase the remaining 75 per cent interest within 45 business days.

Thor chairman Mick Billing said the company was “delighted to have secured a stake” in the US lithium properties.

“The lithium projects are well positioned geographically and offer, we believe, significant upside value potential,” he said.

Indiana begins gold drilling program

TANZANIA

ASX-listed Indiana Resources has commenced a 2500 metre aircore drilling program at its Naujombo and Kishugu gold prospects in south-east Tanzania.

As part of the program, Indiana will complete about 1400m of drilling at Naujombo, and about 1100m at Kishugu to test gold anomalism.

Indiana said the program had potential to identify a significant gold camps at both deposits, located just 35km from each other.

“The main focus of the drilling will be to hone in on high priority targets identified from last year’s RAB drilling and from in-fill soil sampling and geophysics programmes,” Indiana managing director Campbell Baird said.

Outstanding drill results at Kildare

IRELAND

EUROPEAN explorer Zinc of Ireland has returned spectacular high grade zinc intercepts from the McGregor prospect at the Kildare Zinc Project in Ireland, including 23.25 metres at 12.7 per cent zinc and 0.8 per cent lead from 397 metres.

Kildare’s recently published maiden resource of 5.2 million tonnes at 8.6 per cent zinc would likely receive a boost from these latest results, which are about 45m from the nearest drill hole.

“It’s always exciting to be able to deliver a spectacular drilling result such as this, but the latest round of drilling has also delivered a host of other invaluable geological and technical information,” Zinc of Ireland managing director Peter van der Borgh said.

Rio strengthens China presence



Rio Tinto chief executive J-S Jacques.

“OUR JOINT EXECUTIVE TRAINING INITIATIVE WITH SASAC IS ANOTHER WAY OF DELIVERING OUR COMMITMENT TO DEVELOPING LONG-TERM RELATIONSHIPS WITH CHINESE PARTNERS.”

Image: Rio Tinto.

ELIZABETH FABRI

RIO Tinto has taken steps to further its presence in China through a heads of agreement (HoA) with Minmetals for a potential exploration collaboration, and a separate deal to develop an executive training program in China for industry leaders.

On 6 June, Rio inked an agreement with Chinese miner Minmetals to explore opportunities for mineral exploration inside and outside of China as an outcome of a Memorandum of Understanding (MOU) signed between both parties in March.

The two companies will now work together to formalise written agreements and establish joint teams to begin identifying projects of interest.

Rio Tinto chief executive J-S Jacques said

he looked forward to working with Minmetals, which was rapidly becoming an “important player in the global mining industry”.

“Our complementary strengths in exploration across the globe put us in the best possible position to find the metals and minerals that are essential to our modern lives,” Mr Jacques said.

Days later, Rio Tinto signed a MOU with China’s State-owned Assets Supervision and Administration Commission (SASAC) to develop executive training for Central State-owned Enterprise (Central SOE) leaders.

Under the deal, Rio and SASAC would develop a program together on a broad range of topics, including licence to operate, environmental and economic assessments, and stakeholder and community engagement.

“Our joint executive training initiative with SASAC is another way of delivering our commitment to developing long-term relationships with Chinese partners,” Mr Jacques said.

“We all must continually strive to improve our performance to meet the expectations of our stakeholders and explain how we add value to the communities in which we operate.

“This initiative underscores both Rio Tinto and SASAC’s commitment to do so.”

SASAC chairman Xiao Yaqing said the training program was a big milestone for the Group.

“From a long-term point of view, this training program will be beneficial to deepen the mutual understanding between Rio Tinto and the Central SOEs to explore long-term win-win strategic cooperative opportunities,” Mr Yaqing said.

Newcrest increases SolGold stake

ELIZABETH FABRI

NEWCREST Mining has invested an additional \$US40 million in London AIM-listed gold explorer SolGold to further exploration drilling at the company’s world-class Cascabel copper gold porphyry project in northern Ecuador.

The \$40m investment saw Newcrest increase its stake from 10 per cent to 14 per cent.

An additional \$1.5m was raised from institutional investors. The announcement followed Newcrest’s \$23 million investment in October last year, which saw SolGold turn down a competing offer from BHP.

The project, of which SolGold had an 85 per cent interest, was now in the exploration phase with recent drilling activity returning high-grade results.

“The Cascabel project, and surrounding region generally, appear to be prospective and we are pleased to have increased our interest in the region as SolGold continue to increase their drilling activity,” Newcrest managing director and chief executive Sandeep Biswas said.

SolGold chief executive Nick Mather said the arrangement with Newcrest, particularly in the area of technical liaison since its investment in 2016, had been “pleasingly smooth”.

“The SolGold Board and management are encouraged by this further endorsement of the technical merits



The Cascabel copper gold porphyry project is located in Northern Ecuador.

Image: SolGold.

and management’s commitment to the Cascabel project, SolGold’s exploration strategy across Ecuador and SolGold’s interests generally,” Mr Mather said.

Nickel: A fickle mistress

NICKEL prices are one of the most volatile of all base metal commodities. Indonesia and the Philippines account for about 30 per cent of global nickel production, and suggestions of supply disruptions from these two countries has wildly impacted prices in the last 18 months.

"CHINESE CONSTRUCTION AND GLOBAL INFRASTRUCTURE ARE PICKING UP WHICH SHOULD BE A TAILWIND FOR THE SECTOR."



Image: Independence Group.

Underground at Independence Group's Nova Nickel project.



Image: Supplied.

Manny Pacquiao has landed a knockout blow to mine closure plans in the Philippines, stepping down DENR secretary Gina Lopez.

CAMERON DRUMMOND

SINCE the beginning of the 2017 nickel prices have hovered around \$US10,200 per tonne (t), with swings of up to 18 per cent in the months leading to June.

In July 2016, the Filipino Government's Department of Environment and Natural Resources (DENR) announced a swathe of mine closures as a part of a campaign against environmental degradation by the mining sector.

By February this year the Filipino Government had ordered the closure of 41 mines – mostly nickel producers – accounting for about half of the countries' output; however, the mining companies lodged appeals against the decision allowing them to continue operating.

Upon the news, prices spiked to more than \$US11,500/t from mid-2016 lows of \$US8000/t as fears of a supply shortage grew.

Then Indonesia – which had banned ore exports in 2014 to cultivate the domestic processing industry – jumped at the opportunity perceived shortages would lend to renewing its own exports.

Its Government reversed the ban in January, causing nickel prices to spiral down to \$US8800/t by early May – the lowest since June 2016.

Filipino mine closures also remained in doubt as Department of Environment and Natural Resources (DENR) secretary Regina Lopez was pushed out of her role in May by the Philippines' powerful Commission on Appointments – chaired by boxing great-turned-politician Emmanuel 'Manny' Pacquiao – stating

she was unfit for the position.

Ongoing supply from the Philippines, an increase in supply to the world market from Indonesia, and low demand from China's steelmakers could be bad news for the highest cost nickel miners, forcing them to shutter mines while production remained uneconomic.

However, low-cost nickel producers such as ASX-listed Western Areas and Independence Group would likely be able to continue turning profits during depressed price periods.

Western Areas managing director Dan Lougher said larger multi-commodity miners such as BHP and Vale rationalised the high cost of closing nickel operations, preferring to continue to mine at a loss, and this additional supply would likely help keep prices depressed in the short to

mid-term.

"Fortunately, we run a high-grade, low cost operation with zero debt and a strong balance sheet to be able to continue operating until nickel again comes out of this depressed price cycle," Mr Lougher said.

On the demand side, HNW Financial Advising research analyst Matt Bohlson said the nickel sector had been savaged over the past five years with a severe bear market, however it was starting to show some early signs of recovery.

"Chinese construction and global infrastructure are picking up which should be a tailwind for the sector," Mr Bohlson said.

"Add to this a surge in demand from electric vehicles, (especially after 2018) and from energy storage the nickel sector can take off."

IGO ramps up at Nova mine

CAMERON DRUMMOND

OPERATIONAL ramp up of Independence Group's (IGO) Nova nickel mine was proceeding to plan, as the company completed its first offshore shipments of nickel and copper in late June.

IGO said it had made substantial progress on the development of the Nova deposit, allowing the first large stope of 60,000 tonnes (t) to be accessed in May and subsequently mined, and expected to hit nameplate capacity of 1.5 million tonnes per annum in the September quarter.

"Through the September 2017 quarter, the number of stopes accessed will be increased in order to ramp up the underground ore production from the 74,000t achieved in May, to the name plate monthly target of 125,000t by September," the company stated.

A shipment of 6700 wet metric tonnes

(wmt) of nickel concentrate and 5600wmt of copper concentrate were shipped out of Esperance Port on 27 June.

Since its commissioning in 2016, Nova's processing plant had been constrained by ore production from underground, and therefore had operated on a campaign basis.

As development progressed, IGO transitioned into a continuous operation earlier this year, in line with its mine plan.

Underground drilling would continue through to the September quarter as IGO worked on an interim mineral resource estimate for the project.

IGO has two nickel offtake agreements, one with Glencore where concentrate is shipped overseas, and one with BHP Nickel West, where concentrate is trucked to Kambalda on an ongoing basis.

Total FY17 production was expected to be about 3400t of nickel and 1500t of copper, in line with guidance.



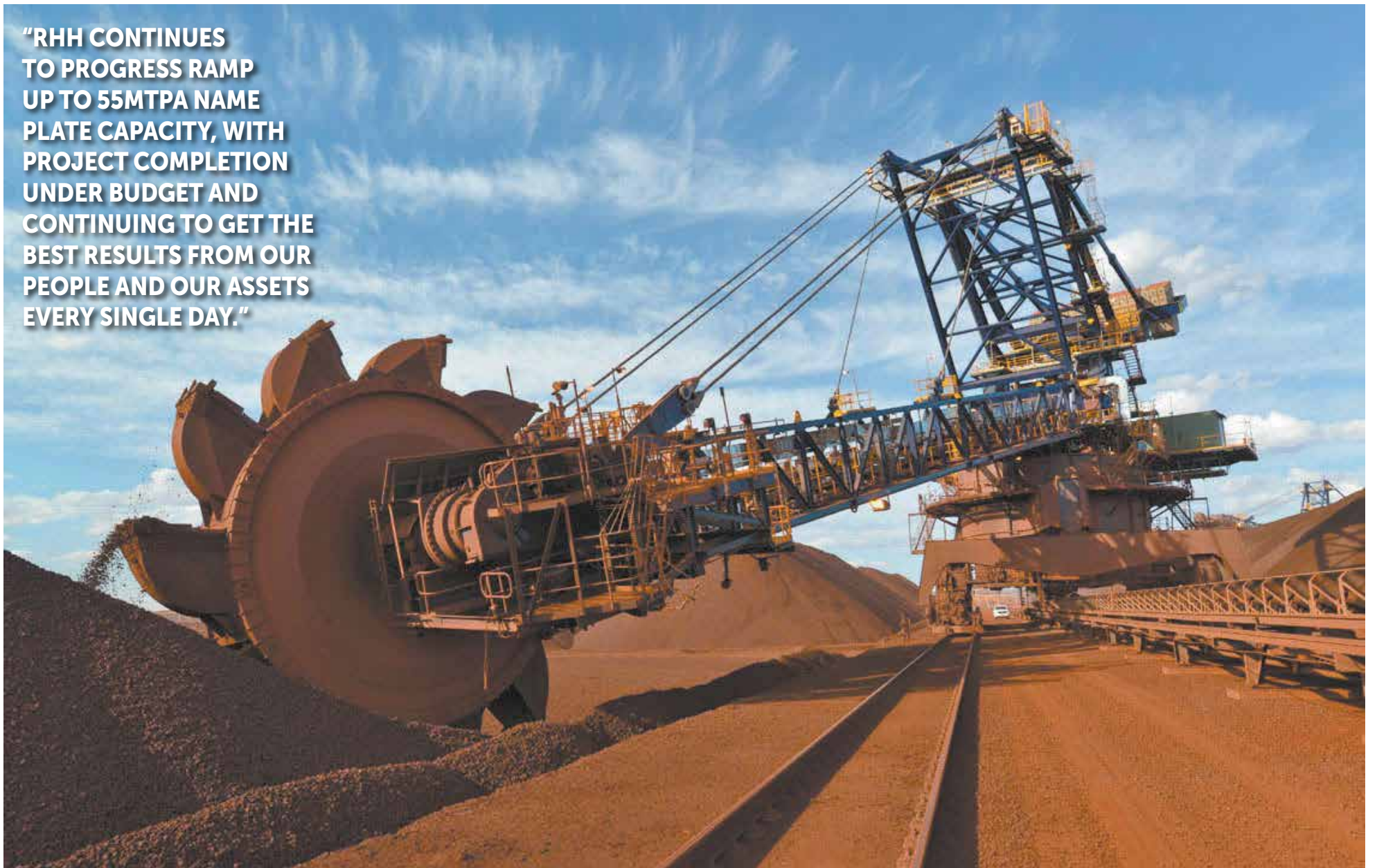
First nickel shipments from Nova left port in late June.

Image: Independence Group.

SPECIAL FEATURES

ROY HILL

"RHH CONTINUES TO PROGRESS RAMP UP TO 55MTPA NAME PLATE CAPACITY, WITH PROJECT COMPLETION UNDER BUDGET AND CONTINUING TO GET THE BEST RESULTS FROM OUR PEOPLE AND OUR ASSETS EVERY SINGLE DAY."



Construction on the mine was completed in May 2016.

All images: Roy Hill.

The home straight

The ramp up of the \$10 billion Roy Hill mine in the Pilbara continues. After a series of delays, company chief executive Barry Fitzgerald has confirmed the iron ore mine will reach its 55 million tonne per annum run rate by the end of the year.

ELIZABETH FABRI

ROY Hill mine's 23 year journey from discovery to first shipment exemplifies the struggle many Australian miners face in bringing a greenfield mine into production.

The mine's story began back in 1992 when Hancock Prospecting chairman Gina Rinehart and chief geologist Richard Paquay visited a site in the Pilbara region of WA; a site which would later become one of the region's largest mining operations.

It took Gina Rinehart's team years and 4000 submissions, but after much perseverance they eventually received the green light to begin construction, and haven't looked back since.

In March 2013, Roy Hill Holdings awarded a \$5.59 billion Engineering, Procurement and Construction (EPC) contract to Samsung C&T, and a year later announced the successful completion of a \$US7.2 billion loan facility in Singapore — the largest ever project financing for the development of a land-based mining project worldwide.

By July 2014 construction at the project was 50 per cent complete, and in December 2015, the mine completed its first inaugural shipment from Port Hedland bound for POSCO steel mills in South Korea.



The 344km standard gauge, single line, heavy haul railway transports iron ore from the mine to Port Hedland.

In May 2016, the company celebrated practical completion after taking over the reins from Samsung, and from then the race was on to hit that anticipated 55 million tonne per annum (mtpa) run rate.

The completed project comprises a

conventional open pit bulk mining operation; 344km single line heavy haul railway; 55mtpa wet processing plant; and purpose built dedicated two berth iron ore port facility at Port Hedland, with an initial mine life of 17 years.

The final stretch

Roy Hill said it expected to hit 55mtpa during the second half of 2017. Originally planned to be reached by the end of 2016, in September last year the target was pushed back to early 2017, and has since been extended another six months due to minor plant issues and weather disruptions.

The mine was nearly there; this year becoming the fastest Australian company to achieve total shipments of 35 million tonnes.

"We are learning every day, and seeing some great results across the business as we continue to bring on new employees," Mr Fitzgerald said.

Earlier this year, the company also partnered with IT consulting and services provider Ajilon to assist with productivity, along with Mineral Resources subsidiary Crushing Services International (CSI).

"CSI have been contracted to undertake crushing works at Roy Hill, and Ajilon is one of our IT partners supporting the delivery of analytics capability," Mr Fitzgerald said.

"As we ramp up at Roy Hill, we are bedding in the base technologies required for operations and starting to develop the capabilities to enable future opportunities such as AI.



Roy Hill Holdings was presented two awards in May at the Platts Global Metals Awards.

“So getting data right, and having core technological capabilities i.e. analytics, will enable us to quickly move into these technologies as and when suitable.”

Global accolades

After receiving a handful of national industry awards last year, Roy Hill and Gina Rinehart were recognised on an international level in May, snapping up the *Rising Star* and *Lifetime Achievement* awards, respectively, at the London Platts Global Metals Awards.

Presented to Ms Rinehart, the *Lifetime Achievement* award acknowledged the chairman for her leadership and commitment to the industry, which included founding and patronage of Australia’s annual National Mining and Related Industries Day, speeches on behalf of the industry and quarterly contributions to Australia’s Resources and Investment Magazine publication, her founding and chairing of Australians for Northern Development and Economic Vision (ANDEV), and two books including her most recent publication, *From Red Tape to Red Carpet*.

Ms Rinehart was also a proud advocate of breast cancer awareness, painting Roy Hill’s fleet of trucks pink last year to support the cause.

Mr Fitzgerald said it was “very exciting” for the Roy Hill team to be recognised for its achievements at such a prestigious event.

“Through the course of our project, Roy Hill has broken many records with the largest ever debt financing deal for a greenfield mineral resource project and the first Australian project with an RMB denominated loan,” he said.

“We had 38,000 construction workers directly engaged in the project, working



Roy Hill’s focus is on sustained, low cost production of iron ore consistent in quality and grade.

37.9m hours during the construction phase with a safety performance 50 per cent better than industry average.

“All to deliver a project that will be the largest single iron ore mine in Australia at full production.

“It is a credit to our owners Hancock Prospecting, Marubeni, POSCO and China Steel and all of the exceptional men and women who have worked on the project.”

Recruitment strategy

Roy Hill was also kicking goals on the jobs front; swiftly building a reputation for its inclusive workforce, largely made up of entry level workers.

The company’s decision to hire ‘green skins’ over more experienced personnel, was not only a cost saving exercise, it was part of Roy Hill’s bigger picture to boost productivity and safety levels.



Roy Hill chief executive Barry Fitzgerald.

“I fundamentally believe if people have the right values we can teach them the rest.

“Its early days, but already the greenies are challenging mental models in terms of safety performance and tackling core tasks differently.”

The company has also been applauded for its large percentage of female employees.

Its female employee base included women from a wide range of backgrounds, even former netball players who had been handpicked to drive trucks because of their advanced hand eye coordination skills.

The number of jobs were expected to increase over the next 12 months, as the company grew its workforce by 300 to reach a total of 2000 employees.

Outlook

Over the next 12 months, Mr Fitzgerald said the mine would focus on productivity and lowering costs in the face of depressed iron ore prices.

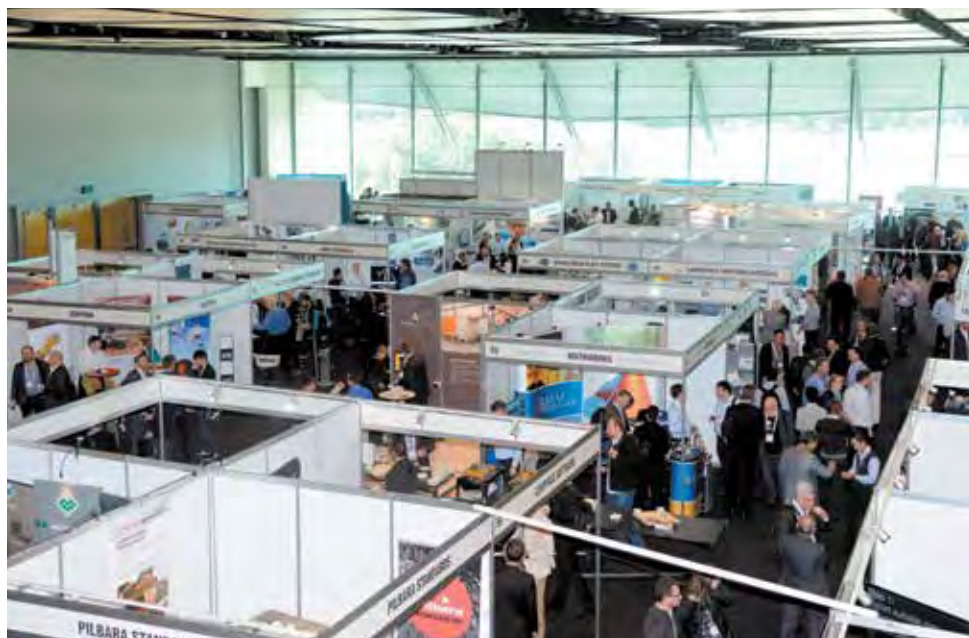
“As a margin driven business, we focus on innovation and business improvement methodology regardless of price,” he said.

“This discipline and a drive to recruit people for our values of lead, care, think and perform, position us well to weather an uncertain market.”

Roy Hill has recently settled an alleged \$1 billion construction dispute with EPC contractor Samsung.

“I can confirm that the parties have reached a commercial settlement,” Roy Hill Holdings (RHH) chief executive Barry Fitzgerald said.

“RHH continues to progress ramp up to 55mtpa name plate capacity, with project completion under budget and continuing to get the best results from our people and our assets every single day.”



Building Resilience

After iron ore prices experienced 12-month lows in June, the theme of this year's Iron Ore 2017 event 'Building Resilience' is set to provide valuable insight into how mining and METS companies can remain profitable during the downward swing.

ELIZABETH FABRI

JOINTLY organised by AusIMM and CSIRO, Iron Ore 2017 will be staged across three days at Perth Convention and Exhibition Centre from 24-26 July.

The boutique conference has been held since 2002, providing a unique opportunity for iron ore businesses to discuss the biggest issues facing the sector and, of course, the path forward.

This year's theme 'Building Resilience' aims to tackle issues experienced during the volatile price climate, and cover the latest developments in geology, exploration, mining and processing of iron ores, and market outlook.

While iron ore has seen some improvement since its December 2015 low of \$US40.88 per dry metric tonne, a wildly fluctuating price meant the industry was still erring towards caution, with the commodity's prices plummeting to a 12-month low in June, fetching just \$US53.36 a tonne.

Conference chair and CSIRO chief research scientist Dr Ralph Holmes said the reason for this year's theme was to equip companies with the tools they need to better cope with the low and fluctuating costs of iron ore.

Conference highlights

The conference will comprise key note speaker presentations, an exhibition hall and associated networking opportunities for delegates to come together in an informal setting.

Confirmed speakers for the event included CRU senior consultant Adrian Doyle who would be talking about the iron ore costs and future price trends; Nippon Steel and Sumitomo Metal Ironmaking Technology general manager Kyoichi Araki; POSCO Iron Ore Group vice president Yu Kyung Lee; and Process Tata Steel chief technology officer Ashok Kumar to offer an international perspective as to where the iron ore industry is heading.

There will also be presentations from Roy Hill Holding's chief executive Barry Fitzgerald; Geological Survey of WA assistant director Don Flint; Fortescue Metals Group general manager for iron ore Gerhard Veldsman; METS Ignited Australia chief executive Ric



The conference will be held in Perth this July.

Gros; and Perth-based consultancy Global Minerals Marketing principal Allon Brent.

"The keynote speeches will be supported by more than 80 technical papers over the three days, covering a wide range of topics including exploration, geostatistics and ore reserve estimation, ore characterisation, mining, processing, automation, project optimisation and development, health and safety, environment and community, technical marketing, logistics, utilities and new equipment," Dr Holmes said.

"We've had to work on the program pretty hard to fit them all in to be quite honest, which is encouraging."

Dr Holmes said the exhibition would contain about 50 booths, adjacent to where all refreshments would be served.

"That I think is a good catalyst for getting network happening," he said.

"In addition to that, we have the more formal functions; on the first day we have a welcome function with drinks, and on the second day we have a networking hour; again to get the linking going on.

"On the Tuesday we have a more formal conference dinner."

As the founding chair of the conference, Dr Holmes said he had received great feedback over the years of the conference's value.

"I think why delegates find it a must attend event is to remain totally abreast of the latest developments in the industry," he said.

"Companies are usually fairly protective of their practices but going to these conferences provides you with an opportunity to actually talk to some of your competitors and improve your understanding as to how you can improve

your operations.

"It provides the unique opportunities for networking which they can't normally get during normal business hours."

Workshops and tours

At the conclusion of the conference, delegates will have the opportunity to take part in optional workshops or a two day tour of mining operations in the Pilbara.

"The first workshop is on 'Advanced Characterisation and Geometallurgy of Iron Ores', which is being run by CSIRO, and that's pretty important these days in terms of trying to optimise your operations," Dr Holmes said.

"You really need to understand the characteristics of the ore and how that impacts on downstream processing so that's what that workshop is all about."

The workshop runs across two days on 27-28 July, and was aimed at researchers and industrial staff working with iron ore, sinter and coke characterisation.

"There's also another workshop being offered on 'Discrete Element Modelling' looking at materials handling," he said.

"As the industry moves deeper and below the water table and wet and sticky ores becomes more of an issue, that's a significant issue."

The workshop will also be held on the Thursday and was designed for engineers, equipment designers, technologists, and system suppliers.

"And finally, the third workshop we have on the Thursday is 'Tailings Disposal

and Water Recovery' and that's obviously a significant issue as well," he said.

"As we do more and more processing in this country, unfortunately we move very gradually to lower grade ores and that's a more topical issue, particularly given what happened in Samarco a couple of years ago when they had a tailings dam failure."

A post-conference tour of the Pilbara would also be run on 27-28 July, which would visit BHP's port operations in the Pilbara, Rio Tinto's Dampier operations, FMG's Christmas Creek operation and the Roy Hill mine.

"We also have a lab tour in Perth, if people don't want to go to the Pilbara, to visit some of the serviced laboratories in the area," Dr Holmes said.

Market outlook

The key goal for this year's event was for delegates to walk away with a better grasp of the iron ore market and strategies to improve productivity.

"I think hopefully some of the consumers of iron ore will give the industry some understanding as to where things are heading and what new technologies are being applied," Dr Holmes said.

"The reason why we chose 'Building Resilience' is the papers will all be focused on how you can actually reduce costs and be sustainable in a climate where a) the prices are a bit lower than you would like, and b) are fluctuating according to market pressures."

Dr Holmes said while the industry was unlikely to witness the highs experienced some years ago just yet when the iron ore price hit \$US180 a tonne, he thought between \$US60 and \$US80 was a more reasonable price to aspire to.

"I think if it was around \$US80 it would be great," he said.

"I'm a scientist, so I wouldn't profess to be good at making those assessments [but] even if you look at the so-called experts in the area, they're not universal in terms of their views either.

"I get a bit annoyed with the prophets of doom out there that say 'it's going to fall down to \$40/t', and if you're not careful it can become a bit of a self-fulfilling prophecy, so you ought to be positive about these things.

"It's an important commodity, it's important to this country, and we ought to be out there beating it up, not beating it down."



All images: AIMEX.

The future of mining

More than 6000 mining professionals are expected to touch down at Sydney Showgrounds next month for the biennial Asia-Pacific International Mining Exhibition (AIMEX) conference. Running from 29 to 31 August, the free-to-attend event will be the biggest to date, bringing together the industry's leading minds and technologies.

ELIZABETH FABRI

FIRST held in the 1970s, the AIMEX conference has become a must-attend event on the industry calendar; and it's easy to see why.

Spread across three days, the leading event presents a wealth of opportunities for the mining industry to up-skill, network and generate new business leads.

"This year we have the first free-to-attend conference program at AIMEX that we believe offers visitors key insights into the future of mining and is set to attract a large audience," event director Brandon Ward said.

The theme of this year's conference, 'The Future of Mining', will centre on three key streams; Mining Innovation, Surface Mining and Underground Mining.

Keynote presentations will be specially designed for executives, and practical white paper and case study sessions tailored for engineers and those at the coal face.

The first stream, Mining Innovation, will focus on where the industry is headed, highlighting the latest technologies and practices to help businesses remain competitive, sustainable and safe.

Surface Mining will touch on the themes of transport, systems, equipment, safety and step-change solutions, and the third stream, Underground Mining will be the perfect platform for delegates to discuss the critical issues facing the sector, including efficiency, competitiveness and productivity.

Mr Ward said the conference was on track for another busy year, with the team already receiving strong interest and support from the market.

"Along with networking opportunities, there are more than 300 exhibiting companies set to attend – including GM Holden, APC Technology, Beijing General Mining and Metallurgical Corporation, IFM Efector, Insitu Pacific, Austmine Ltd and Austdac," he said.

Keynote presenters

Undoubtedly the highlight of the conference, the key note presenter segment was progressing well, with a strong line-up



Keynote speakers for the August conference had now been confirmed.

speakers now confirmed.

Day one will kick off with a welcome speech from former Centennial Coal chief executive and AIMEX's newly appointed non-executive chairman David Moul, followed by presentations from NSW Mining chief executive Stephen Galilee and World Coal Association chairman Mark Buffier.

"General Electric strategic account development manager Ian Larsen will then speak on the Tuesday afternoon about digital transformation trends, and how these concepts can be implemented within the mining sector, and Mining3 chief executive Professor Paul Lever will present on the Wednesday as part of a panel on championing technology and innovation in 'new normal' environments," Mr Ward said.

"He'll be speaking alongside Telstra's Jeannette McGill, Centennial Coal's Steve Burgess and CSIRO's Dr Ewan Sellers."

Hatch's Brian Moore was also set to talk about innovations in bulk materials handling, and Ampcontrol's Tim Wylie would look at standards and industry practice around gas detection.

"We'll also hear from speakers like Simon Van Wegan of Modular Mining Systems, the Alcohol and Drug Foundation's Natasha Jager and Ian Campbell of Kal Tire," Mr Ward said.

In addition, delegates will get the opportunity to get up close and personal with the products and experts through live demonstrations at participating exhibitor stands.

"At this stage, we are still in the planning phase of the demonstration program but as in past years this will feature exhibitors who have new solutions and products on offer to share with the market," he said.

Breakthrough technology

Complementing the speaker and demonstration program was a new Breakthrough section celebrating the industry's latest technologies.

"The Breakthrough is a platform to showcase emerging technology that will provide significant benefit to the mining sector," Mr Ward said.

"All products are new to market, and have launched within the past 18 months."

Orb Engineering Services will demonstrate its new mobile clean energy platform that tackled cost per kilowatt-hour kWh with no carbon dioxide equivalent (CO2-e) emissions while producing electricity, and rental options for Renewable Energy Generators to local industry.

Also on show was the new Digital Drift

System; a high-speed, fit for purpose, access layer communications network designed to boost production and reduce costs.

The product was a world-first Cisco compatible system using a single coaxial cable to carry both power and data, and was suitable for underground mines, tunnels, and processing plants.

"The main focus here is on technology and innovation that will provide efficiencies to the mining sector such as renewable energy generators that have been designed with no harmful CO2-e emission emitted; mobile communication and asset management specialising in GPS based solutions," Mr Ward said.

Networking opportunities

Rubbing shoulders with industry peers was one of AIMEX's other drawcards.

This year AIMEX would be hosting a Business Matching Program to help maximise delegate time on and offsite with a tailored program created according to their interests.

On Wednesday 30 August, a networking event, sponsored by METS Ignited, will also be open from 4.30pm to exhibitors and visitors, with refreshments and entertainment.

"We hope this will allow colleagues — new and old — to meet up in an informal environment to share common challenges facing them," Mr Ward said.

"Smart Mining Networking Events — which is being hosted by Austmine Ltd. Organisers — will also delegates a great opportunity to learn and network with one another."

Mr Ward said in all, the event provided an "unparalleled opportunity" for companies and industry professionals from across the region to connect face-to-face, and discuss industry trends and generate new business leads.

"For suppliers, it's an opportunity to showcase their latest innovations," he said.

"For operators, it's a platform to see and discuss where mining equipment, technology and services is headed.

"For delegates, it's a change to meet with colleagues and discover new products and services on offer in addition to learn."

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For more information about the new Void Scanner go to www.renishaw.com/voidscanner or visit the team at its local Australian office in Melbourne.

You can also visit Renishaw at AIMEX in August at Stand 1414, to discuss more about how they can service your on-site needs.

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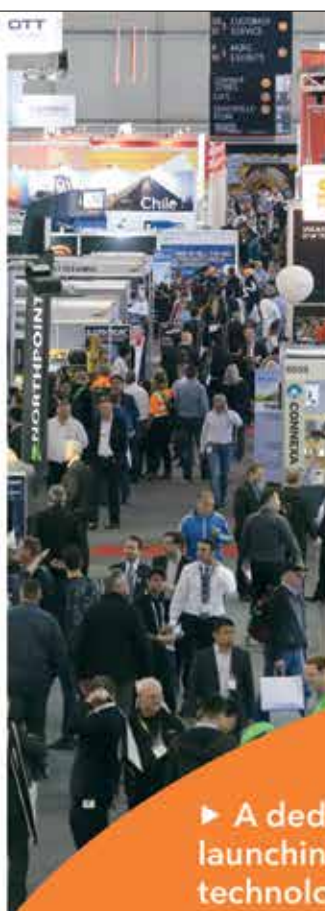


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TOMRA sensor tech on show

LEADING sensor-based sorting systems manufacturer TOMRA Sorting Mining will be among the many companies exhibiting at next month's AIMEX conference; this year launching its brand new multi-channel laser sorting technology set to revolutionise the business.

Designed and manufactured by TOMRA, the state-of-the-art technology will unlock new opportunities for quartz and gold processing, assisting miners in achieving higher recoveries, and better quality and more consistent sorting than other sensor devices on the market.

The technology is unique in its ability to identify and separate minerals that cannot be differentiated with existing technologies, such as X-ray transmission, near-infrared sensors or colour-sorting.

"The new ore sorting technology enables the user to define and apply a greater number of sorting criteria, and thus sort with much greater precision," TOMRA managing director Anthony Sacca said.

"The laser identification technology consists of a multi-channel laser scanning system with high-resolution imaging, and cutting-edge colour and textural selectivity.

"Multiple material characteristics such as brightness, colour, size, shape and surface texture are processed simultaneously."

Mr Sacca said the technology had potential to address some of the industry's biggest challenges; from declining ore grades, production costs, and water shortages, to increasing red tape.

The global company already contributes to increased productivity in mining



TOMRA laser technology.

operations, extending mine life and overall value of deposits.

"Our new laser sorting solution is unlocking untapped opportunities for

quartz and gold processes offering an innovative and cost-efficient solution, which increases the lifespan of their deposits," Mr Sacca said.

The TOMRA team of specialists can be visited at stand 1420 at AIMEX 2017. More information can be found at: www.tomra.com/mining.



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Enerpac talks the torque at AIMEX



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Electric and Pneumatic and Electric Torque Wrenches.

GLOBAL hydraulics leader Enerpac will feature displays of its powerful and precise bolting tools and hydraulic lifting technology at this year's Asia-Pacific International Mining Exhibition (AIMEX 2017) at stand 2144.

The high pressure hydraulics leader – which operates in more than 20 countries including Australasia and Asia-Pacific nations – will showcase its Pow'R-LOCK auto-locking jack and stand, XC-Series Cordless Hydraulic Pumps as well as its comprehensive ranges of safety-focussed non-impact bolting technologies and durable and efficient hydraulic cylinders and pumps.

Enerpac will also display its new Electric Torque Wrench (ETW), which improves bolting efficiency and performance for industries such as mining that require high repetition and high precision.

The ETW complements Enerpac's Pneumatic Torque Wrench, which is designed for optimum safety, simple operation and outstanding reliability.

Specialist staff will be on hand at AIMEX

to discuss the advanced technologies employed in recent major projects, including Enerpac Australia's Mining and Heavy Lifting Technology manager Warren Baltineshter, who will demonstrate the Pow'R-LOCK, and National Bolting product manager Andrew Marsh, who will demonstrate the ETW and bolting technologies.

Electric Torque Wrenches

Enerpac's new ETW – in maximum torque capacities from 1625-8135Nm (1200-6000 ft-lbs) – incorporates the latest advanced SMART safety and efficiency technology based on Enerpac's 50 years of experience as an industry leader in bolting solutions and is fully backed by Enerpac's extensive service and distribution network throughout Australasia and New Zealand to facilitate optimum reliability and safety compliance.

The ETW complements Enerpac's comprehensive range of hydraulic torque wrenches and bolting tools, which is highly

valuable to companies seeking time-saving choice, consistency of quality and traceability of outcomes.

Pow'R-LOCK

Enerpac's Pow'R-LOCK Portable Lifting system with full-time locking capability is designed and purpose-built to provide safe and secure lifting for heavy off-highway machinery including haul trucks and large industrial equipment.

Pow'R-LOCK accomplishes its load-holding protection by utilising a control system that maintains the position of a rotating locking collar near the cylinder base, providing a mechanical lock regardless of cylinder movement and control cycle.

The heavy-duty lifting system integrates into a rugged mobile cart with a high capacity and compact 700 bar (10,000 psi) hydraulic cylinder and an air-driven hydraulic pump unit with complete valving and control systems.

There are two versions which feature strokes of 356 and 622mm (14" and 24.5"), which are ideal for companies where time and safety are paramount, such as mining and heavy transport.

XC-Series Cordless Hydraulic Pumps

Enerpac's XC-Series cordless hydraulic pumps, which now come in single and double acting versions, offer the performance capabilities of an electric pump with the convenient portability of a hand pump.

Both types of Enerpac XC-Series cordless pumps actuate hydraulic tools as fast as a basic electric powered pump and create up to 700 bar (10,000 psi) of pressure.

The option of double-acting power – offering powered extension and retraction of an array of widely used cylinders and tools – extends further the versatility of XC-Series Gen II cordless pumps, which weigh less than most common hand pumps and are capable of being used in any position.

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Terrain overview of the Browns Range project.

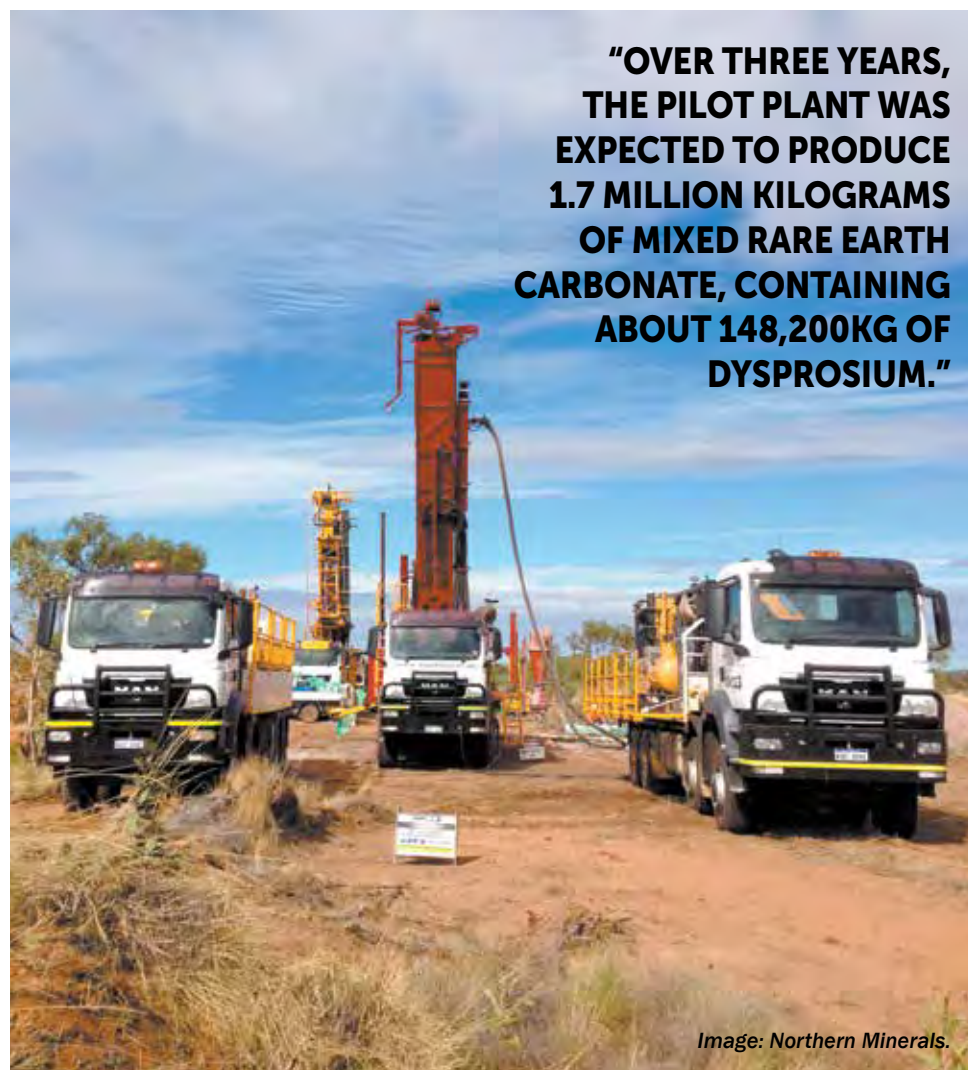


Image: Northern Minerals.

"OVER THREE YEARS, THE PILOT PLANT WAS EXPECTED TO PRODUCE 1.7 MILLION KILOGRAMS OF MIXED RARE EARTH CARBONATE, CONTAINING ABOUT 148,200KG OF DYSPROSIUM."

A crucial new source

Once fully developed, Northern Minerals' Browns Range project would produce the first major alternative source of dysprosium – used in electric vehicles – outside of China.

CAMERON DRUMMOND

HEAVY rare earths (HRE) developer Northern Minerals has stepped up from exploration and commenced preparations for the construction of its Browns Range dysprosium project, after moving its focus from uranium to HRE in 2010.

On 18 April the Northern Minerals board approved development of the \$56 million Browns Range HRE pilot plant, the first of three stages in the project's development timeline.

The pilot plant would run for an initial three years and be used to assess the economic feasibility of a full-scale project that could become Australia's first large-scale HRE project, and creating the first major alternative source of dysprosium outside of China.

The company also has other prospective HRE projects – John Galt in the eastern Kimberley region of WA, and Boulder Ridge in the Tanami region of the Northern Territory.

HRE market

Dysprosium is a key component in the manufacture of permanent magnets used extensively for high temperature applications such as electric vehicles, miniaturisation electronics, and wind turbines.

Currently, China is the dominant force in the rare earths industry, supplying about 90 per cent of global demand and consuming about 70 per cent of global supply.

It is also estimated about 30 per cent of global supply is illegally mined in China. Due to bad mining practices and the plundering of China's rare earth sources, the Chinese Government recently cracked



Dysprosium is a rare earth metal used in electric vehicles.

Image: Wikipedia.

down on these illegal mining activities.

Northern Minerals said global supply was likely to fall as a result.

"Supplies of HREs from China are likely to become scarcer, with market commentators forecasting China's HRE resources will be exhausted in 10-20 years at current rates of exploitation," the miner said in a statement.

"Furthermore, the Chinese Government continues to consolidate the industry into six rare earth producers to promote domestic downstream value-added production and assist in curbing illegal mining and processing.

"The drive to reduce the world's dependence upon fossil fuels and decrease carbon emissions, coupled with the growing demand for technology that is faster, smaller and more efficient, is

expected to foster significant growth in the rare earths market in the coming decade.

"With primary approvals, community support and the use of mining best practices Northern Minerals is positioned to become the first significant world producer of dysprosium outside of China."

Browns Range

Located 160km south of Halls Creek in northern WA, Browns Range includes several deposits and prospects containing high value dysprosium and other heavy rare earths, such as lutetium and terbium, hosted in xenotime mineralisation.

Xenotime is a rare mineralisation that is rich in a number of high-value rare earths, with comparatively minimal amounts of

lighter rare earths.

As rare earth processing is fairly complex, mining this type of formalisation makes it more economic to extract the higher-value elements such as dysprosium and terbium.

The advantage of xenotime mineralisation is the mix of rare earth elements (REE).

Its lanthanide content is typical of "yttrium earth" minerals, and runs about two-thirds yttrium, with the remainder being mostly the heavy and medium lanthanides of which dysprosium is usually the most abundant.

According to US-based analyst Hallgarten & Company, production from xenotime mineralisation was currently limited to small tonnages associated with tin mining in Malaysia and mining in the Guandong province of China.

The Browns Range pilot plant would make up part of the first stage of a three stage development program to extract the precious elements.

The pilot plant has a planned throughput of 60,000 tonnes per annum (tpa), and would be approximately one tenth of the proposed full-scale development.

The company said the mining operation for stage one would consist of a five month open pit mining campaign from relatively shallow pits at the Wolverine, Gambit West, Gambit Central and Gambit East deposits.

A total 172,080t of mineralised material at 1.19 per cent total rare earth oxide (TREO), containing 2,047,000kg TREO is to be mined and stockpiled ready to be fed into the pilot plant.

China-based Sinosteel MECC would provide the engineering, procurement and construction of the plant, with relevant modules to be fully constructed in China and sent to site in Australia for installation by late 2017.

(CONTINUED ON PAGE 26)

Leader in innovative mining technology



ANSTO Minerals uses its rare earth expertise at Northern Minerals' Browns Range project.

WITH more than 35 years' experience and access to world-class facilities, ANSTO Minerals is a leading international mining consultancy with a proven track record of providing practical solutions and applying innovative technology across the mining and minerals processing industries.

ANSTO Minerals has a wide range of specific experience with the development of

the rare earth projects, spanning everything from mineralogy to purification options, radioactivity management, process water treatment and individual separation of rare earths using solvent extraction.


Commissioned by Northern Minerals for this expertise in rare earth processing, ANSTO Minerals and Northern Minerals collaborated through its pre-feasibility and

definitive feasibility studies on the Browns Range rare earths project.


"We needed to solve some challenging metallurgical issues during piloting at ANSTO Minerals and the ANSTO team worked closely with us to ensure the success of this phase enabling us to move ahead into the DFS and the subsequent Browns Range Pilot Plant with confidence,"

Northern Minerals chief operating officer Robin Jones said.

ANSTO Minerals said it looked forward to continuing its collaboration with Northern Minerals by supporting the plant's construction, commissioning and operating phases, through the provision of expert advice and on-site processing support.



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(CONTINUED FROM PAGE 24)

"SUPPLIES OF HRES FROM CHINA ARE LIKELY TO BECOME SCARCER, WITH MARKET COMMENTATORS FORECASTING CHINA'S HRE RESOURCES WILL BE EXHAUSTED IN 10-20 YEARS AT CURRENT RATES OF EXPLOITATION."

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"QuedTech has provided similar expertise for other rare earth projects and is proud to have been involved in Northern Minerals' Browns Range project."

—Trevor Nicholson, Director

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Over three years, the pilot plant was expected to produce 1.7 million kilograms of mixed rare earth carbonate, containing about 148,200kg of dysprosium metal.

At its current price of \$US350/kg, that would equate to nearly \$US52m.

Northern Minerals managing director George Bauk said the decision to construct the pilot plant was a significant new chapter for the company.

"The pilot plant development will help us continue to assess the economic and technical feasibility of a larger full-scale development," Mr Bauk said.

"Incidentally, it also provides an opportunity to gain production experience and surety of supply for our offtake partner, and propels Northern Minerals towards being the first dysprosium producer outside China."

Stage two of the overall project involves developing the Project to BFS level, based on the definitive feasibility study (DFS) completed in March 2015 and the results of further studies announced in August that year, aimed at reducing mining costs, boosting production, producing a premium product and increasing the ore reserve.

Northern Minerals said it would review the mine design and schedule to improve productivity and reduce forecast mining costs at the proposed Wolverine underground site.

On completion, the company said it was confident a cost reduction of 40 per cent could be achieved through the elimination of paste fill by using sub level caving.

The final stage involves building the project to full scale production based on the successful outcomes of stage one and two.

Once at full scale the project will process 585,000tpa to produce 279,000kg of dysprosium, contained within 3,098,000kg TREO per annum (prior to yttrium rejection), in a mixed RE carbonate.

An offtake agreement has already been signed with Chinese manufacturer Lianyang New Materials Sales for 100 per



The EV market is set to boom.

Image: Wikipedia.

cent of production out of Browns Range.

Rationalised while Browns Range is under development, exploration will be concentrated at 170 conceptual targets within the Northern Minerals' tenement package in the Browns Range Dome region as part of preliminary expansion works.

Recent work

In early June, earthworks contractor MACA mobilised equipment and personnel to site for mining and earthworks infrastructure, and commenced the mining of 180,000t of ore associated waste from the Wolverine and Gambit West pits.

The material was to be used to construct the tailings storage facility and other surface infrastructure.

MACA was also preparing the pilot plant site, road access and airstrip for the project.

"The Browns Range site is now a hive of activity with the arrival of mining, admin and other site personnel," Mr Bauk said.

"With the mining for the pilot plant project to be completed as a single six month campaign, we expect that the site will be significantly transformed over the short term as we prepare for the arrival of the processing plant that Sinosteel MECC is currently constructing in China."

Sinosteel MECC then contacted local company Primero Group for the concrete, mechanical and electrical installation and commissioning of the process plant.

Northern Minerals said Primero Group had previously delivered lithium, vanadium and tantalum projects throughout regional WA.

"We are pleased that Sinosteel MECC has selected a quality local partner for the process plant installation component of the project," Mr Bauk said.

"Primero is well known in the WA mining sector as a trusted partner that delivers results."

Primero was expected to commence work on site in Q3 2017.

Tailored aerodrome servicing

BASED in Perth WA, Aerodrome Management Services (AMS) provides tailored, expert aerodrome services across Australia.

Over the years, the company has established a reputation for being the go-to specialist for all aerodrome related matters.

The organisation offers multi-faceted services; including aerodrome design and construction, consultancy and advice, inspections, survey and drafting, aerodrome equipment provision and line-marking.

AMS also offers training in a number of aviation disciplines; including refuelling and security.

It can also assist with providing relief coverage for reporting officers and aerodrome management staff.

The company manages several major airports throughout Australia for major resource companies in both the mining and oil and gas sectors.

Its clients appreciate that AMS is not simply a generic support services provider — rather an aerodrome specific provider with subject matter expertise in the field of aviation.

Together with an established safety management system, change management and quality management process, the company prides itself on a resilient



Aerodrome aerial inspection and lighting commissioning in South West WA.

service outcome that exceeds regulatory expectations.

AMS has recently undertaken two significant design projects for major resource companies within regional WA.

These projects incorporated the aerodrome design, passenger terminal and facilities, fuel installations and access roads.

For both projects, AMS provided

construction support and general oversight.

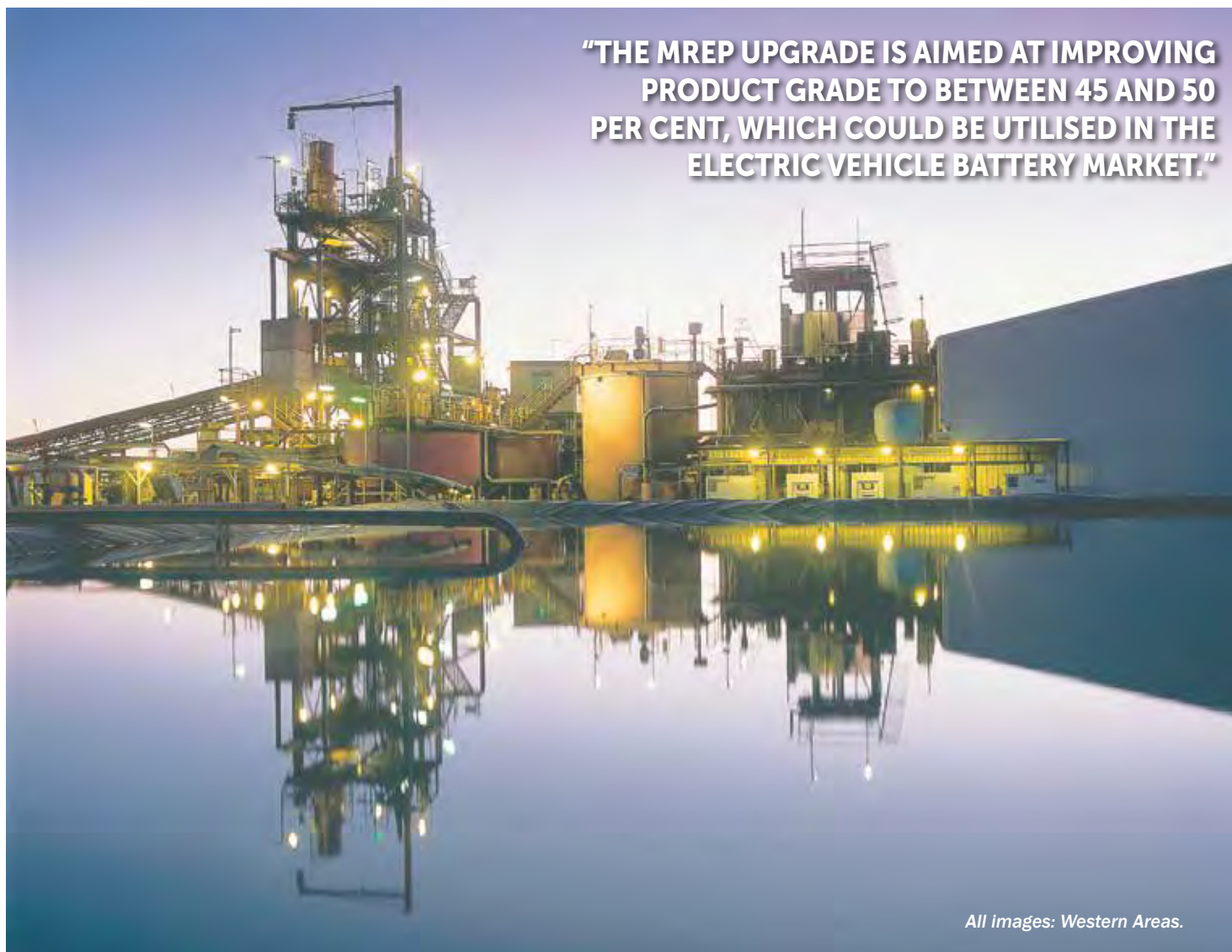
All AMS personnel are experts in their fields and can offer support and tailored advice to businesses regarding any of their aerodrome needs.



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Australia's only pure-play nickel producer Western Areas has been increasing its reputation as one of the world's best low cost, high grade operators with its own innovative BioHeap technology.

CAMERON DRUMMOND

VOLATILE nickel prices are being fair-weathered by Western Areas.

The company has utilised its position as a low cost, high grade nickel producer to increase cash in the bank and explore organic growth opportunities in WA.

Located 400km east of Perth, Western Areas' flagship project is Forrestania, which comprises two producing nickel mines, Spotted Quoll and Flying Fox, as well as the Cosmic Boy concentrator which treats the high grade ore to produce about 25,000 tonnes (t) of nickel concentrate per annum.

The concentrate is sold into offtake agreements with BHP Billiton for 12,000 tonnes per annum (tpa) and 13,000tpa with China-based Jinchuan for a total 25,000tpa.

Commencing production in 2006, Flying Fox is Western Areas first operation and one of the highest grade nickel mines in the world, containing a reserve ore grade of more than 4 per cent nickel. It is also a low cash cost operation, producing the commodity at under \$US3 per pound (lb).

In FY16 Flying Fox produced 12,426t of contained nickel.

Western Areas' second mine, Spotted Quoll, was discovered in 2007 and produces about 13,000tpa of nickel concentrate.

It rivals, and in cases, exceeds the nickel grades of Flying Fox, also making it one of the world's highest grade nickel



An aerial shot of the Spotted Quoll mine.

mines.

It's cash costs are even larger, with nickel produced under \$US2/lb.

Forrestania's concentrator, Cosmic Boy, treats raw nickel bearing ore to produce concentrate grading at about 14 per cent nickel.

At current capacity, Cosmic Boy can treat up to 600,000tpa of ore, and has the potential expand to up to 1 million tonnes per annum.

It consists of a three-stage crushing circuit, followed by a single closed circuit

ball mill and a system of flotation tanks and thickening / filtration system.

Recent Activities

The March 2017 quarter was extremely productive for Western Areas.

At \$2.23 per pound (lb) the nickel miner produced its lowest concentrate unit cost since June 2015.

Nickel production in ore and concentrate was in line with forecast for the quarter, leaving the company on track to deliver

physical production results toward the upper end of the FY17 guidance range.

Also during the quarter, exploration drilling had increased Spotted Quoll's mineral resource by 12,650 nickel tonnes, and a pre-feasibility study (PFS) was completed at the Odysseus project.

The board approved progress to a definitive feasibility study (DFS) at an estimated cost of between \$5m and \$7m.

Western Areas managing director Dan Lougher said it was another strong quarterly performance for the company.

"There were a number of highlights this quarter, including two successful shipments to our new customer Tsingshan which followed a detailed integration plan," Mr Lougher said.

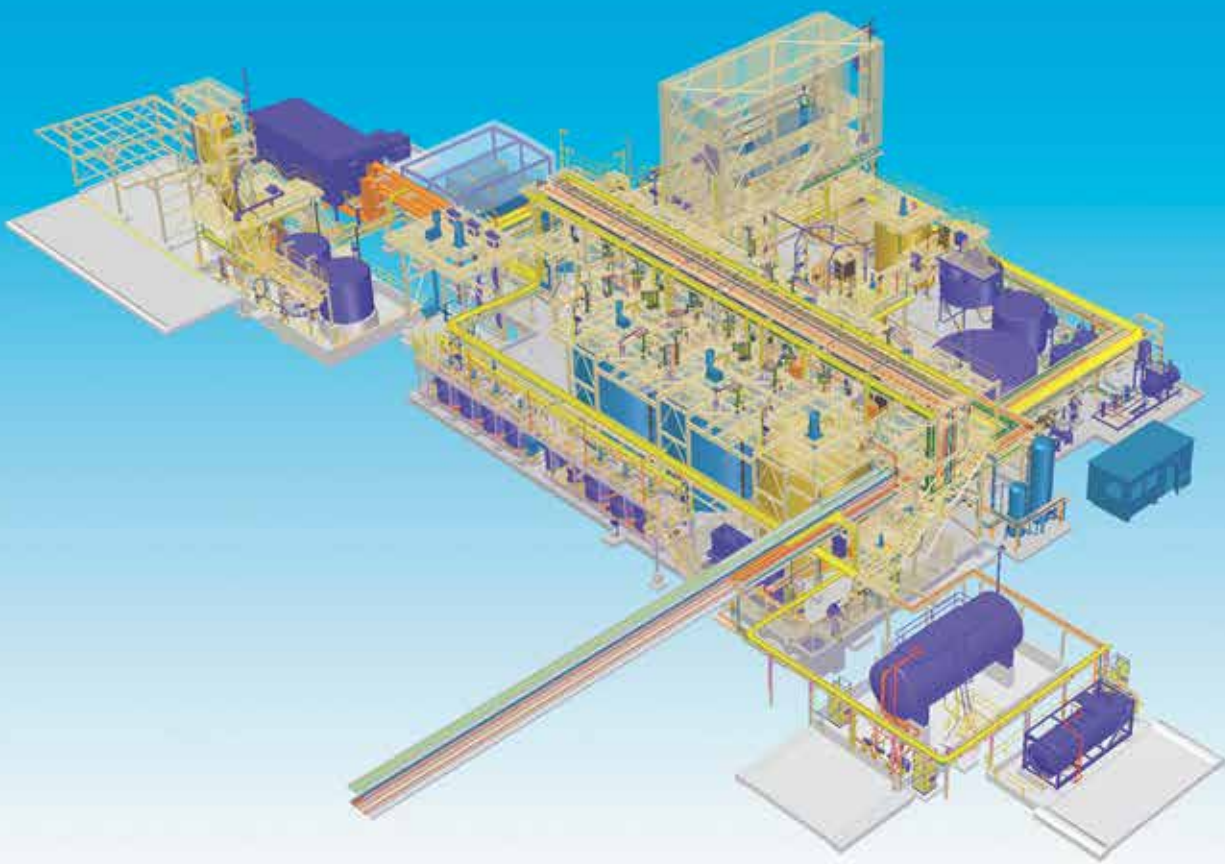
"Our ability to reduce unit costs to their lowest level since June 2015 mostly through innovative operational improvement, such as the ore sorter, is pleasing.

"At the same time we have increased the mineral resource at Spotted Quoll, delivered a positive pre-feasibility study (PFS) and had one of the highest grade nickel intersections ever recorded globally over significant width at Odysseus."

MREP

Another highlight for the quarter was gaining board approval for the construction of the Mill Recovery Enhancement Project (MREP) at Cosmic Boy.

(CONTINUED ON PAGE 30)



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(CONTINUED FROM PAGE 28)

The MREP upgrade is aimed at improving product grade to between 45 and 50 per cent, which could be utilised in the electric vehicle battery market.

Western Areas said it had been in discussions with major global companies active in the EV market and expected to improve the commercial terms for the new high grade product generated by the MREP.

“The MREP will utilise our internal bio-leaching technology that allow us to extract an extra 1400 nickel tonnes per year in addition to our current nickel output,” Mr Lougher said.

Western Areas said its BioHeap process utilises special bacterial cultures to leach or liberate valuable metals from sulphide ores.

The leaching can occur in either tanks or on large heaps and is applicable mainly to low grade ores.

Small batches of high grade nickel sulphate had been produced at laboratory scale with further optimisation work, focussing on reducing impurity levels, to continue further into 2017.

Site works for the MREP were expected to commence in the September quarter, with commissioning and production scheduled for March 2018.

Financials

On 9 June, Western Areas divested its 18.8 per cent share in Finland-based Bluejay Mining (previously FinnAust) for \$27m.

Mr Lougher said the transaction would return material value back to Western Areas, capitalising on a period of significant growth and value generation by Bluejay.

Western Areas has eight other nickel exploration projects across WA, ranging

“OUR LABOUR AND CONTRACT COST IMPROVEMENTS IN THE LAST 18 MONTHS HAVE BEEN MORE SUCCESSFUL THAN OTHERS, AND WE ARE ALSO IN THE LOWEST COST QUARTILE IN TERMS OF PRODUCTION.”

Underground at the Flying Fox mine.

from Ravensthorpe in the south up to its Sandstone nickel project west of Leinster in the Northern Goldfields.

“The funds return can be applied to fund our organic development and growth projects, such as the MREP at Forrestania and the Odysseus DFS study at Cosmos,”

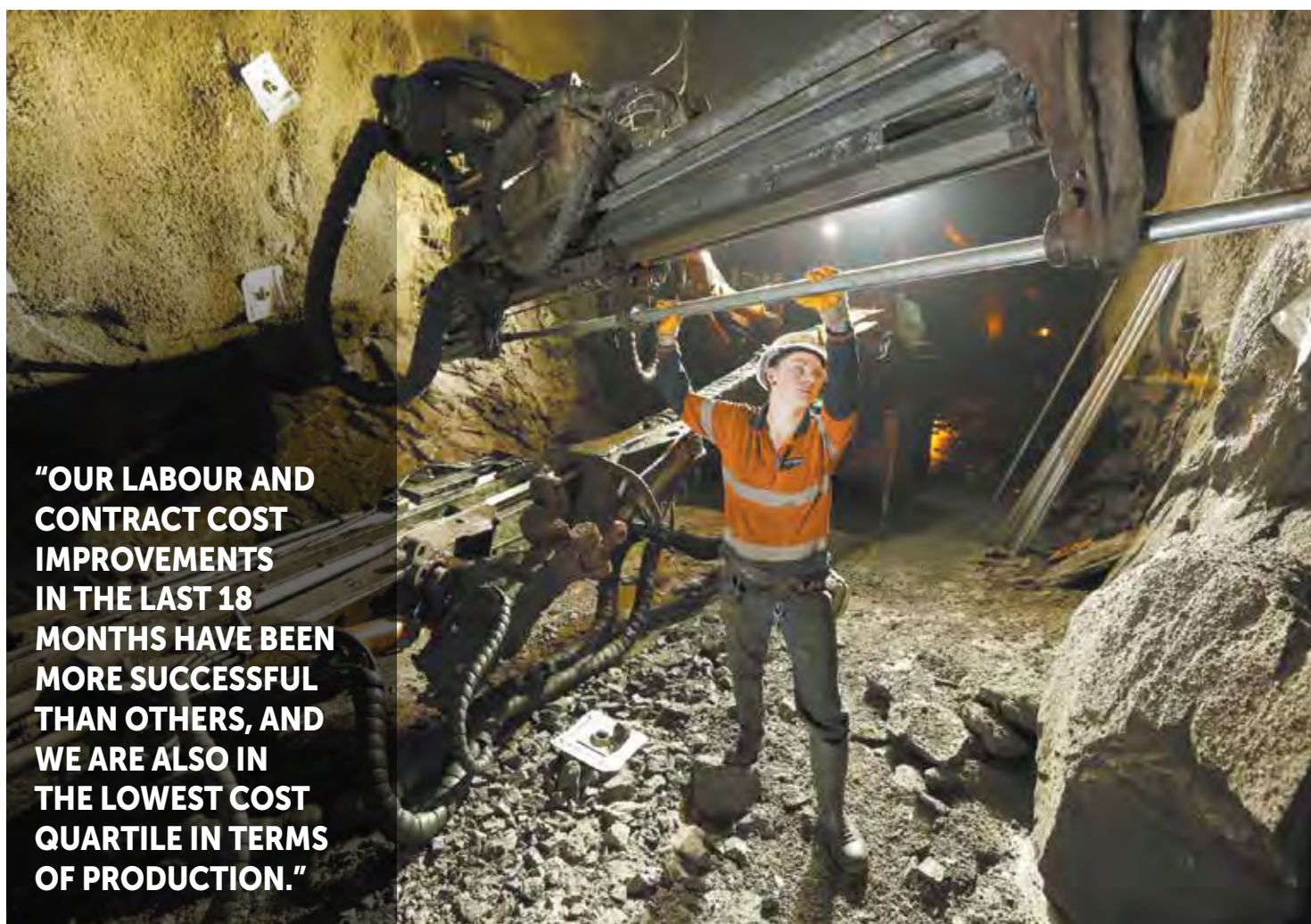
Mr Lougher said.

He also noted that the company had strong cash flow generation and zero debt to bolster its position.

“Our labour and contract cost improvements in the last 18 months have been more successful than others, and

we are also in the lowest cost quartile in terms of production.”

“This has meant we have been able to put money in the bank in the first half of the year and sustain operations through the depressed nickel price cycle as we look to further developments.”



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Rockwater congratulates Western Areas Limited on the success and growth of the Forrestania Project. We are pleased to have assisted WSA with groundwater and environmental aspects of nickel-mining operations at Flying Fox and Spotted Quoll.

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Dugald River will open in the first half of 2018.

All images: MMG.

A company to watch

Diversified base metals company MMG has made some significant advancements over the last six months. Under a new chief executive the company has streamlined its portfolio and was in the final stages of construction at its Dugald River project; set to become one of the world's largest zinc-lead-silver mines.

ELIZABETH FABRI

MMG's goal to become a top mid-tier mining company by 2020 was not far off.

In the first half of 2018 the Chinese-owned (China Minmetals 74 per cent) mining consortium will begin production at zinc powerhouse Dugald River in Queensland; adding a further 170,000 tonnes (at peak) of zinc to group production each year.

Its Las Bambas joint venture in Peru was also returning strong copper results, with March quarter production of 111,341t; up 6 per cent from the December quarter.

"The industry-leading ramp up of Las Bambas has been an outstanding success," MMG's newly appointed chief executive Jerry Jiao said.

"The operation has delivered its first three quarters above nameplate and our focus is now on optimising processes, increasing efficiencies and reducing costs."

Mr Jiao was appointed to the role of chief executive in February; stepping down from his role as chairman to replace retiring chief executive Andrew Michelmore.

Since his appointment, the company has continued to excel, recently snapping up the *Industry Leadership Award — Base & Specialty Metals* at the 2017 Platts Global Metals Awards in May.

The Platts award recognised MMG's strength during the downturn including its strong leadership, strategic thinking and global scale.

After some recent divestments, the company's portfolio now includes Dugald River and Roseberry in Australia; Las Bambas in Peru; the Sepon and Kinsevere copper mines in Southern Laos and the



MMG newly appointed chief executive Jerry Jiao.

Democratic Republic of the Congo (DRC), respectively, and zinc exploration licenses at the Izok Corridor project in northern Canada.

Divestments

As part of MMG's commitment to growing its business, the miner made the decision to divest its shuttered Century mine, and Golden Grove operation in an effort to streamline its operations.

After announcing its search for a buyer in August last year, on 30 December 2016

MMG entered into a conditional share sale agreement with EMR Capital subsidiary EMR Golden Grove for the sale of Golden Grove mine for \$US210 million.

The sale was completed on 28 February, and resulted in an estimated net profit after tax of between \$US10 million and \$US30 million.

On 28 February, MMG also entered into an agreement with Century Bull subsidiary Century Mine Rehabilitation Project for the transfer of assets associated with its Century zinc mine in North West QLD.

Century Bull had since partnered with

WA-based Attila Resources to reopen the mine to unlock its remaining resources.

Mr Jiao said this renewed future for the Century mine was a "great outcome" for the QLD community.

"It provides new life for the substantial Century assets, while supporting dedicated rehabilitation and ongoing employment, training and business opportunities," Mr Jiao said.

"Under this new plan, Century Bull will continue to generate employment and training opportunities and other ongoing benefits to the communities and businesses of the Lower Gulf."

MMG was also in the process of selling its mothballed Avebury nickel mine, with a potential offer from Dundas Mining in the air.

On 9 June, Dundas Mining had been given its third deadline extension to purchase the mine from MMG for \$25 million.

"Dundas Mining informed MMG earlier today that it was unable to provide the balance of the funds (A\$23.5 million) to complete the deal by the agreed date of 9 June 2017," it stated.

"MMG has the right to terminate the deal if final payment is not received by 7 July 2017."

However, MMG stated both parties remained committed to completing the deal.

2017 production

MMG made a strong start to the 2017 year, with March quarter production totalling 147,882t of copper, 19,146t zinc, and 6253t lead.

(CONTINUED OVER)



The Dugald River portal entrance.

While June quarter results were still yet to be released, the company appeared to be on track to achieving its 2017 calendar year guidance of between 560,000t and 615,000t of copper and between 65,000t and 72,000t of zinc.

“Operational excellence and cost improvement initiatives continue across all sites, group and support functions,” MMG stated.

“MMG’s operations recorded a Total Recordable Injury Frequency (TRIF) for the first quarter 2017 of 1.08.

“This was the lowest quarterly TRIF recorded in MMG’s history and we continue to benchmark in the lowest quartile of our peers according to the International Council on Mining and Metals safety statistics.”

Las Bambas

The largest contributor to group production, Las Bambas produced 111,341t of contained copper metal concentrate for the quarter.

Since its first commercial production in July last year, the mine was performing considerably well, and had now delivered four consecutive quarters of production.

“The ramp up has been one of the most successful of a greenfield copper plant in the past decade and our focus remains on further optimising production and reducing costs for the remainder of 2017,” MMG stated.

“MMG expects to produce 420,000–460,000 tonnes of copper in copper concentrate in 2017.”

Once in full production, Las Bambas will be one of the world’s largest copper mines, with



The \$US5.85bn Las Bambas mine was bought by MMG in 2014.

an annual nameplate throughput capacity of 51.1 million tonnes (mt) and an estimated mine life of more than 20 years.

Sepon

Located in the Savannakhet province of southern Laos, the Sepon open-pit copper mine produced 16,850t of copper cathode in the March quarter; a 25 per cent drop from December quarter results.

The mine had been in operation since 2005, and was jointly owned by MMG (90 per cent) and the Lao Government (10 per cent).

MMG said the decline in production was because the operation was transitioning to lower grade and more complex ores, but despite the challenges faced processing performance had been solid.

MMG said it now expected 2017 production to be at the lower end of its guidance of between 65,000t and 75,000t of copper cathode.

Kinsevere

Lower production was also experienced at Kinsevere, with a 7 per cent slide in tonnage compared to the previous quarter.

Production for the March quarter came to 19,349t; a slight drop attributed to weather related impacts and costs associated with changing a mining contractor.

MMG said it expected to produce between 75,000t and 80,000t of copper cathode for the year.

Roseberry

Closer to home, the Rosebery underground base metal mine in Tasmania was MMG’s only Australian asset currently in production.

Operational since 1936, the mine celebrated an incredible 80 years of business last year, and continues to perform well despite the lower grades expected as it neared the end of its life.

“Despite declining ore grades, production of zinc in zinc concentrate at Rosebery remained steady at 19,146 tonnes in the first quarter of 2017,” MMG stated.

“Zinc ore grades at Rosebery continue to decline over time as deeper ore bodies are accessed.

“Work to further debottleneck and optimise the mill continues to partially offset this ongoing grade decline.”

Dugald River progress

With less than a year left on the clock, MMG’s Dugald River project was nearing the end of its construction timeline.

The \$1.4 billion project in Queensland, 85km northeast of Mount Isa and 65km northwest of Cloncurry, began construction in August 2015.

As of the end of April this year, the mine

was 62 per cent complete, with commissioning expected later this year, and first concentrate shipping scheduled to begin in the first half of 2018.

MMG had now installed all process plant flotation, crushing and reclaim area equipment and steelwork, along with the commissioning of the 220kV transmission line and substation.

Ore stockpiles were also starting to be built up in the lead up to commissioning and ramp up.

In May, the miner began the recruitment process, advertising more than 40 positions for maintenance jobs, service crews, and plant and process operators.

QLD State Development and Natural Resources minister Anthony Lynham said the project was a “boon for local jobs in the North”.

“These jobs are just the beginning as it is anticipated that MMG Dugald River will employ up to 400 site based staff when the mine is fully operational,” Dr Lynham said.

“MMG has a focus on local employment from communities such as Cloncurry and Mt Isa.

“And it is not just the state’s North West which is set to benefit.

“MMG has identified Townsville as the FIFO commute base for their additional workforce requirements.”

The mine was expected to enter production amid a global zinc deficit, which was set to deliver significant benefits to MMG’s financials for the first few years of the mine’s 25 year life.

Outlook

MMG’s growth strategy over the next two years will be largely driven by its goal of becoming one of the world’s top mid-tier mining companies.

“With the support of our major shareholder, China Minmetals Corporation, we are well positioned to grow and continue to bridge between Eastern capital and Western assets,” Mr Jiao said.

To achieve this, MMG said it would continue to expand both its operations and production by identifying opportunities to maximise its existing assets through increasing efficiency and costs savings; organic growth opportunities through exploration; and external growth through quality value-adding acquisitions.

“We remain confident that our key commodities of copper and zinc have an attractive long-term outlook,” MMG stated.

“We believe that increasing supply-side constraints will intersect with ongoing demand.

“With the strategic insight and financial support of CMC, we are well placed to be positioned as a globally significant base metals producer.”

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“WE LOOK FORWARD TO WORKING WITH OUR STAKEHOLDERS TO DEVELOP FURTHER MEASURES THAT ADD TO THE ENVIRONMENTAL, ECONOMIC AND SOCIAL SUSTAINABILITY OF NCIG.”

Image: NCIG.

Critical to the coal chain

Since commissioning its terminal in 2010, Newcastle Coal Infrastructure Group (NCIG) has added 74 per cent to total coal exports out of Newcastle Harbour to help feed demand from Asian markets.

CAMERON DRUMMOND

NCIG is an integral part of NSW's Hunter Valley coal supply chain, contributing to \$11.5 billion worth of annual coal exports out of the State.

Located on Kooragang Island at the Port of Newcastle, NCIG operations throughput coal from the Newcastle, Hunter Valley, Gloucester, Gunnedah and Western coalfields to the world market.

NCIG was formed in 2004 by several Hunter Valley coal producers who anticipated production increases of about 30 million tonnes of coal by 2014, including BHP Billiton (through Hunter Valley Energy Coal), Centennial Coal, Donaldson Coal, and Excel Coal.

It took three years for NCIG to become the successful applicant for the terminal, and another three years to finance and construct Stage 1 of the \$2.5 billion project on a vacant site at Kooragang Island.

By May 2010 Stage 1 construction was completed and opened for business, carrying a throughput of up to 30 million tonnes per annum (mtpa) by the end of 2011.

Since then, NCIG has undertaken two further expansions.

The Stage 2 expansion was completed in mid-2012, boosting the terminal's throughput capacity to 53mtpa.

Stage 3 was completed on time and within budget in June 2013, bringing throughput up to 66mtpa.

It included the installation of a third berth, a fourth stacker reclaimers, additional stockyards and conveyors, as well as a rail flyover to the west of the island.



Operations

Trains enter the NCIG site from the Kooragang Island main rail line, travelling the rail arrival sidings to empty their coal wagons into one of the two train unloading stations.

Empty trains then continue around the Newcastle Coal rail loops in a clockwise direction and then re-join the Kooragang Island main rail line.

NCIG has two train unloading stations, housed within single multi-level structure that each receive 9000 tonnes per hour (tph).

Coal is then transported via conveyors to the stacker reclaimers at the stockyards.

After grade measurement, coal is reclaimed from the stockpiles through rotating bucket wheels on the stacker reclaimers and transported to two 2000t capacity buffer bins.

Two shiploaders receive the coal from the feeder bins and transport the product onto waiting ships at the berth at a rate of 10,500tph.

Milestones

As a major Australian coal export terminal, NCIG is an integral part of Australia's coal supply chain, and since commencing operation in 2010 it had contributed to a 74 per cent increase in coal exports out of Newcastle Harbour.

In 2016, NCIG recorded a record throughput of more than 52mt of coal, marking its seventh successive annual tonnage increase, adding to a total of 161mt exported through the port.

It also posted a record low operating cost per tonne of capacity, driven by record high workforce productivity.

“While the Newcastle Coal Infrastructure Group is a relatively young organisation, we have already established ourselves as a significant link for Hunter coal producers to the Asian energy market,” NCIG chief executive Aaron Johansen said.

“Our industry is operating in a time of rapid and fundamental change and we believe that we are well placed to deal with the expectations of our stakeholders.”

Asian consumption has fuelled the drive for coal exports out of Newcastle Harbour, with Japan the largest importer accounting for 31 per cent of total exports in 2016, followed by China and South Korea (22 per cent each) and Taiwan (15 per cent).

Other major destinations included Singapore, Thailand, Malaysia, Chile and India.

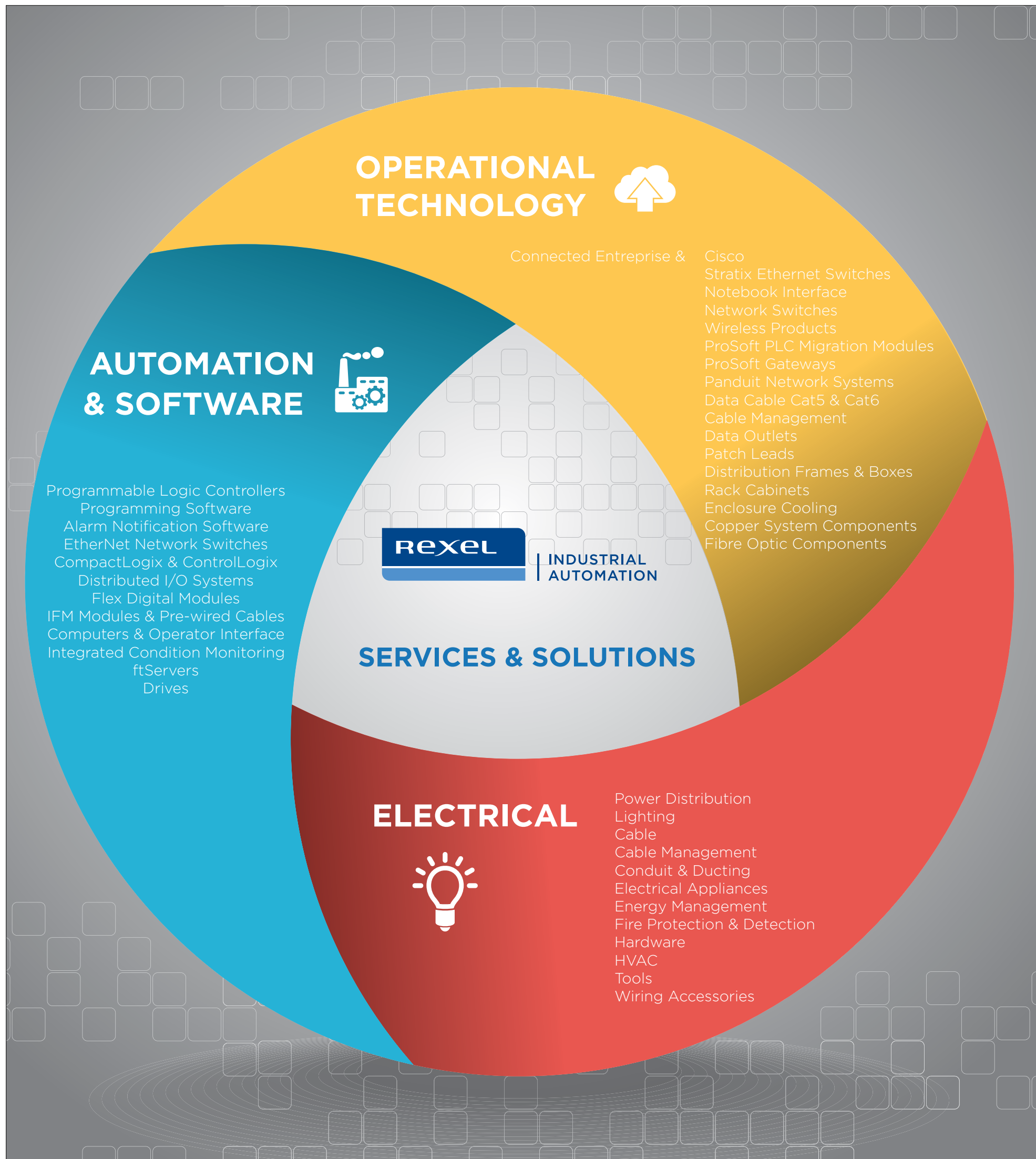
7525 coal trains unloaded product onto 540 ships at a rate of 5429tph during 2016, the largest of which was the *Hisui Horizon* cape sized vessel which took away 164,637t of coal bound for Japan.

Contribution

NCIG is a major contributor to the local and regional economy through employment, and its procurement of goods and services.

(CONTINUED ON PAGE 35)

Rexel named one of Fortune's best



Rexel's value proposition statement.

NAMED one of Fortune's *World's Most Admired Companies* for 2017, global company Rexel supplies a range of solutions for the resources sector, from simple components to complex designed-to-build systems, through its subsidiary, Rexel Industrial Automation (RIA).

As an authorised Rockwell Automation Allen-Bradley distributor in Australia, RIA offers a comprehensive range of value added services; from free hands-on workshops to a

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The company also specialises in asset management, assurance integrated support, safety services, remote monitoring and support, and remanufacturing and repair.

The company has won a number of prestigious projects, with recent accolades including the NorthConnex Tunnel network design, Cross City Tunnel Server upgrade,

Kraft Heinz (Golden Circle) – Industrial Data Centre, and more.

RIA is also a national distributor in Australia for global brands such as Grance Engineered Products, Panduit, Cisco, Rittal, Brady, ProSoft, Spectrum Controls; to name just a few.

It has also recently released, for the first time on the Australian market, the GraceSense Hot Spot Monitor; a non-conductive temperature monitoring

device that identifies potential hot spots and enables the user to predict the failures in an electrical equipment.

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Last year, the group spent more than \$45m in the region and an additional \$38.3m to the rest of NSW.

It is involved in a variety of community development programs, from major fundraising through its annual charity ball (which last year raised more than \$93,000) to purchasing new equipment for local sporting clubs.

“We see ourselves as a member of the community and we believe strongly in the positive impact local groups have on our community,” Mr Johansen said.

“For this reason, we aim to provide assistance to the groups that work hard to help their community.”

In 2016, NCIG’s Community Support Program contributed more than \$340,000 in fundraising and sponsorship to the local community, including support for educational, environment, social welfare and sporting groups.

As a major sponsor of 2016 Run Newcastle event, the company helped raise \$75,207 for the refurbishment of the adolescent ward at the John Hunter Children’s Hospital.

NCIG, in partnership with the University of Newcastle (UON), maintain a sustainable habitat for the green and golden bell frog and migratory shorebirds, which are impacted by the terminal’s

operations.

Construction of the new habitat was completed in late 2014 and required seven individual construction stages and planting of 60,000 native wetland species.

By 2016, two successful breeding events for the frogs had been recorded by the habitat development, and 24 hectares of migratory shorebird habitat had been restored.

NCIG is responsible for the management of the 78 hectare habitat and maintaining the sustainable native fauna in collaboration with scientists from UON.

Mr Johansen said that while the company

had demonstrated its commitment to being a responsible organisation, there was still more work to be done.

“We look forward to working with our stakeholders to develop further measures that add to the environmental, economic and social sustainability of NCIG,” he said.

“We place value on our ability to effectively manage and enhance the environment, engage with our community and improve the economy.

“Central to this is our people, through their actions, we continue to be a socially responsible organisation with a reputation as a world class shipping terminal.”



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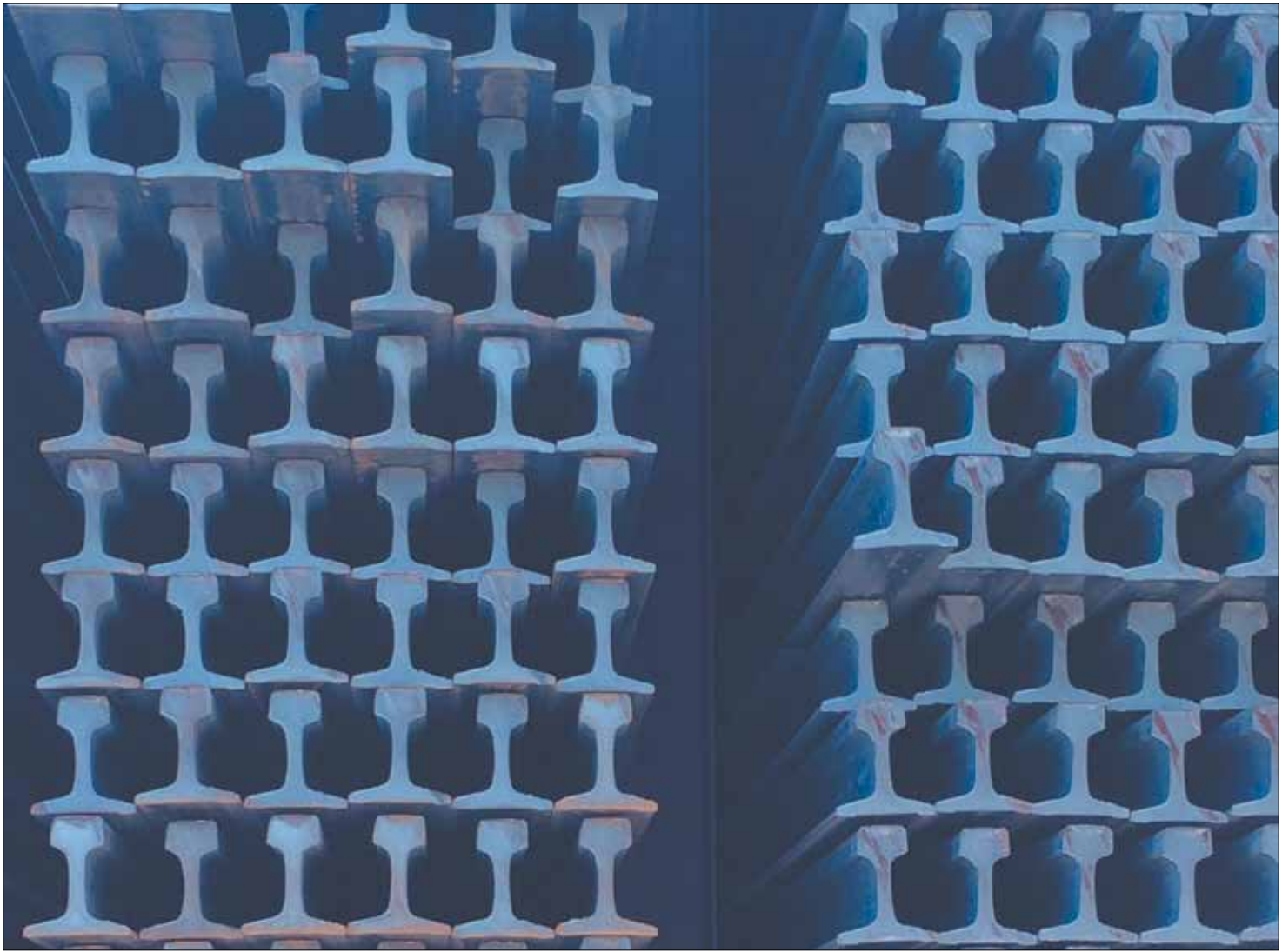
“We have worked with many companies in all markets supplying just the rail or complete rail package,” Mr Agius said.

“We were pleased to supply the rail for previous NCIG projects and more recently the upgrade to Port Kembla Coal Terminal.”

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"IF THIS DRILL HOLE NORTH OF THE DOLERITE DYKE HAS INTERSECTED A NORTHERN EXTENSION OF THE OREBODY, THEN IT WOULD BE A SIGNIFICANT DISCOVERY IN OUR SHORT HISTORY AT DEFLECTOR AND A POTENTIAL GAME CHANGER FOR THE OPERATION."

Looking down onto the Wilber Lode access point at the Andy Well project.

All images: Doray Minerals.

Going underground

Gold producer Doray Minerals is looking to its two producing assets – Andy Well and Deflector – for organic growth opportunities.

CAMERON DRUMMOND

WA gold producer Doray Minerals' Andy Well gold project commenced production in August 2013; with the Deflector gold-copper project commencing production in May 2016.

Both projects are currently undergoing aggressive exploration and development to increase the company's mineral resources and reserves.

Deflector

The Deflector project, 160km east of Geraldton in the southern Murchison region of WA, was acquired as part of Doray's successful takeover of Mutiny Gold in February 2015.

After fast-tracking development of the \$63m project, the mine commenced commercial production in November 2016 with an initial life of six years, producing about 60,000 ounces (oz) of gold per annum.

Deflector's three separate lodes hold reserves of 1.78 million tonnes (mt) of ore at 5.6 grams per tonne (g/t) for the production of 322,000oz of gold and 16,000t of copper concentrate.

"Since we completed the takeover of Mutiny Gold, we have funded, permitted and built a new 480,000 tonne per annum processing plant, a new 150-person



Doray Minerals is looking at boosting resources and reserves and both its producing gold projects.

accommodation village and all other associated mine infrastructure, and commenced open pit mining at Deflector," former Doray managing director Allan Kelly said at the commencement of production.

As the mine moved from an open pit operation to an underground mine in

early 2017, Doray recommissioned its Acacia processing plant to a two product design, producing gold in doré and a gold copper concentrate.

It also continued an aggressive drilling campaign to upgrade the mine's resources beyond its current five year life.

Initial results from an ongoing

resource infill and extension program released in May were positive, with Doray managing director Leigh Junk stating that the company now had an increased understanding of the orebody that confirmed strong mineralisation continuing at depth.

"The Deflector orebody is open at depth and these drilling results highlight the many opportunities we have to define further extensions, and strengthens our confidence that the mine life can be extended beyond the current five years," Mr Junk said.

As drilling continued into June, Doray announced it had identified a potential northern extension to the mine that could significantly expand mine life.

"This drilling to date has been important in confirming high grade extensions to the current ore body, and if this drill hole north of the dolerite dyke has intersected a northern extension of the orebody, then it would be a significant discovery in our short history at Deflector and a potential game changer for the operation," Mr Junk said.

Andy Well

Located 45km north of Meekatharra, production from Andy Well commenced in mid-2013.

(CONTINUED OVER)

(CONTINUED FROM PAGE 37)



"THE ADDITION OF THESE VALUABLE OPEN PIT OUNCES AT GNAWEEDA IS HAVING A SIGNIFICANT IMPACT ON HOW WE ARE ASSESSING THE ENTIRE STRATEGY FOR THE ANDY WELL GOLD PROJECT."

In addition to the main Wilber Lode, Doray discovered other parallel high-grade lodes, including Judy and Suzie, which added to Andy Well's mine life.

Activity during the half year to December focused on the processing of underground ore from the Wilber and Judy Lodes.

Development of the underground mine continued to prioritise both Judy and Wilber declines to access deeper levels and add to the project's mineral resource.

However, the Judy orebody reconciled poorly against reserves due to the width of this high grade lode being less than modelled, resulting in lower grades being available for processing from both development advance and stoping.

Confirmatory diamond drilling was expedited during the period and results incorporated into a revised geological model.

A revised mine plan was developed at the beginning of the March quarter to provide sufficient mine life to properly assess the potential of future production from Wilber Deeps and the satellite Gnaweeda open pit prospect.

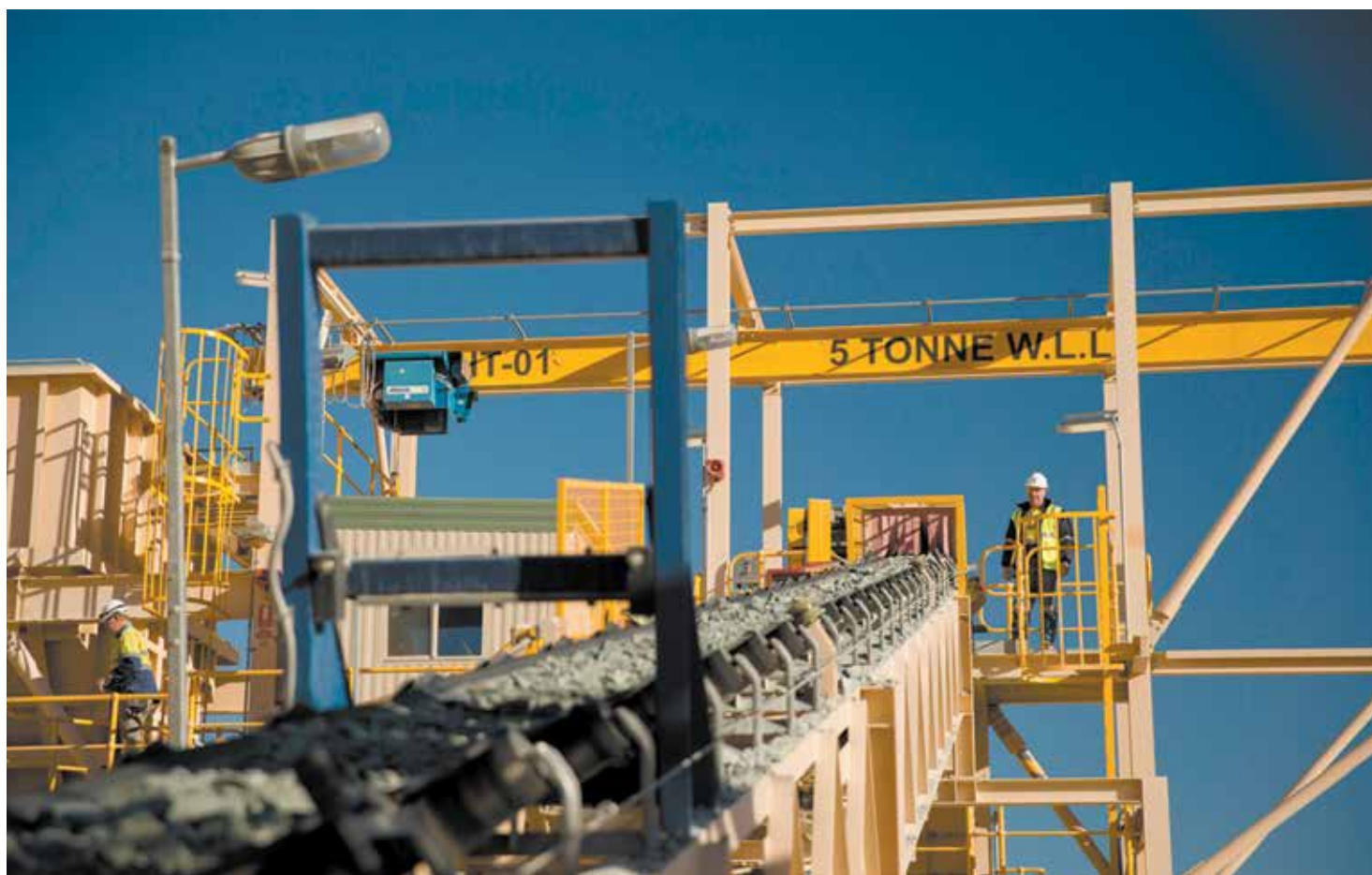
Doray said a clearer picture of longer term extensions to mine life would be available in the second half of 2017 after further diamond drilling was conducted.

Gnaweeda

Gnaweeda is a satellite project 15km from Andy Well, flagged as the next development in Doray's growth strategy.

In June, Doray announced an updated mineral resource estimate at the Turnberry open pit deposit, increasing its gold inventory by 21 per cent to 5.5mt grading at 1.8g/t for 322,000oz of gold.

The company said results from Turnberry South were highly encouraging, confirming both the revised geological interpretation of mineralisation at Turnberry, as well as the continuity of grade within the interpreted mineralised zones.



The Andy Well processing facility.

"The addition of these valuable open pit ounces at Gnaweeda is having a significant impact on how we are assessing the entire strategy for the Andy Well Gold project," Mr Junk said.

"Our optimisation strategy benefits from the flexibility of being able to prioritise this higher margin open pit material so close to our plant at Andy Well."

RC drilling had commenced, with initial results demonstrating consistent high gold grades and continuity within the Turnberry South area of the resource, the company stated.

Exploration efforts at Gnaweeda were ongoing and would continue throughout

the year, with a view to providing mill feed from Turnberry to the Andy Well processing facility.

Doray said it was in the final stages of its mining lease application and initial hydrogeological surveys had been completed, as well as initial assessments for open pit mining.

Financials

During FY17 the company continued to reduce its overall net debt, with a recent payment of \$8.5m reducing total debt to \$55m.

Doray said a further debt reduction was anticipated at the end of the financial

year, and was busy prioritising \$7.5m in exploration expenditure for FY18.

"Doray will be prioritising its total budgeted exploration expenditure for the year ending 30 June 2018 by rationalising its regional exploration portfolio.

"Priority will be given to orebody extensions and near-mine discoveries on the Andy Well and Deflector tenement packages, with grassroots regional exploration minimised.

"The company views these two tenement packages as the best opportunity to grow its resource and reserve inventory and increase its production profile due to the close proximity of its two operating processing facilities."



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Exploration drilling on the Yamarna Belt during May.



All Images: Gold Road Resources.

Golden road ahead

As Gold Road Resources' Gruyere project is fast-tracked into development, the now self-funded explorer has ramped up its exploration budget to explore organic growth options within its 5000sqkm Yamarna Belt tenements.

CAMERON DRUMMOND

WITH its joint venture (JV) partner Gold Fields, Gold Road has now awarded all major contracts for the construction of its Gruyere gold project in the highly mineralised Yamarna Belt, 200km east of Laverton.

A 2010 study by the Geological Survey of WA suggested the Yamarna Belt had geological similarities with the Kalgoorlie Terrane greenstone rocks, and studies by previous explorers such as Ausgold supported that claim.

Gold Road's 5000 square kilometres of tenements in the Yamarna Belt already contain a number of discoveries dating back to 2009 when the company made its first find, Central Bore.

The company undertook a range of exploration drilling campaigns, and in 2013 discovered the massive Gruyere deposit in the WA Goldfields region.

It took just 10 months to define Gruyere as a significant gold deposit, with a maiden mineral resource of 96.96 million tonnes (mt) grading at 1.23 grams per tonne (g/t) for 3.8 million ounces (moz) of gold.

By October 2016, Gold Road had completed a bankable feasibility study confirming the 6.16moz Gruyere as one of the longest life, lowest cost undeveloped gold projects in the world, supporting the production of 270,000 ounces per annum (ozpa) over a 13 year life.

For such a large project touted to cost \$514m to bring into production, Gold Road looked for partners to develop its find.

By December last year South African mining giant Gold Fields had paid Gold Road \$350m to earn a 50 per cent share of the Gruyere project, and formed the 50:50 Gruyere JV.

For Gold Road, the JV with Gold Fields meant the project was significantly de-risked, and expertise from one of the largest gold producers would fast-track development.

"The highly experienced team that we have established over the past 18 months will be the team to develop the Gruyere gold project under the guidance and leadership of Gold Fields," Gold Road managing director Ian Murray said.

In May, Gold Fields increased its holding in



Drilling at the Attila pit during 2016 added an extra 100,000 ounces of gold to the company's mineral resources.

Gold Road to 10 per cent for the sum of \$64.3m.

Gold Fields acquired 74,824,070 shares at 86 cents per share, a 27 per cent premium to Gold Road's share price at the time of 67.5 cents.

"We welcome Gold Fields as a shareholder and see this share purchase as a sign of faith that our partner believes in Gold Road and the Yamarna belt," Mr Murray said.

Haywood Securities head of mining research Geordie Mark said there was an appreciable likelihood that Gruyere would enter production in less than two years.

"Gold Road is not resting on its laurels with Gruyere, and are looking to use their strong balance sheet and expansive foothold within the Yamarna gold belt to deploy around \$22m on exploration projects," Mr Mark said.

First gold from Gruyere was expected in 2018, with the ramp up to full production to occur in 2019.

Recent Activities

In January, GR Engineering Services was awarded the contract to design, supply and install the Anne Beadell borefield pipelines and associated infrastructure to secure water

supply for construction works and provide potable water for the Gruyere village.

Then in April, civil works provider MACA was awarded a bulk earthworks contract for development of the main access road, borefiled access tracks, airstrip and process plant earthworks.

On 15 June, the Gruyere JV awarded a \$298m contract to the Amec Foster Wheeler Civmec JV (ACJV) for the engineering, procurement and construction (EPC) of a process plant at the Gruyere gold project.

Up to 50 jobs would be created in Perth for the fabrication of the plant and associated infrastructure at Civmec's 200,000 square metre facility, while ACJV expected it would begin mobilising to Gruyere in August and have a total workforce of about 300 people on site during peak construction.

"ACJV combines Amec Foster Wheeler's world class gold processing experience and Civmec's excellent Australian fabrication and construction capabilities," Amec Foster Wheeler mining director Greg Hayes said.

Mr Murray welcomed the execution of the EPC contract with ACJV.

"This is another key milestone in the delivery of Gruyere into production and we look

forward to work on the plant and associated infrastructure commencing in earnest on site," Mr Murray said.

"Importantly, this contract will focus on maximising the local content in the construction of Gruyere and generating significant employment opportunities in the Goldfields region and WA more broadly."

With the first 300 rooms relocated and erected in March this year, work to dismantle, relocate and install a second set of 300 rooms for the Gruyere accommodation village commenced in February and was scheduled for completion in the June quarter this year.

Exploration

Initially, Gold Road had flagged \$22m for exploration activities during 2017, however with its strong balance sheet it decided to increase expenditure to \$30m, allowing for accelerated exploration activity.

In February it announced the commencement of diamond drilling at its high priority Ibanez prospect on the Pacific Dunes-Corkwood camp scale target within its North Yamarna tenements.

"Given the increased funding resources available to us post the Gruyere JV, the opportunity to accelerate this program at Yamarna is an exciting one, and one that hopefully provides our shareholders with a more immediate exposure to the upside Yamarna has to offer much earlier than we had previously planned," Gold Road exploration and growth director Justin Osborne said.

Toward the end of May, Gold Road announced an updated mineral resource of the Attila open pit at Gruyere, increasing the deposit by 46 per cent to 6.6mt of ore grading 1.55g/t for 327,300oz of gold.

The updated resource included new information derived from diamond and reverse circulation drilling programs completed in 2016.

Mr Osborne said smart geology and efficient drilling helped extend the resource.

"We have more than 14km of known mineralisation along the Attila-Alaric trend of which we are developing a much more detailed understanding," Mr Osborne said.

ARMS Reliability commences Gruyere development

ARMS Reliability has begun work on a greenfield's maintenance strategy development project for the Gruyere Gold Project, a 50:50 Joint Venture between Gold Fields and Gold Road Resources, located within the Yamarna greenstone belt about 200km east of Laverton, WA.

In an effort to leverage the value of conducting maintenance studies on greenfields sites, the Gruyere JV brought ARMS Reliability in prior to the commissioning of the gold mine to set the scene for success in its asset management department.

ARMS Reliability will execute a Reliability, Availability, Maintainability (RAM) study on the design of the plant; and will also develop Reliability Centered Maintenance (RCM) based maintenance strategies and spare parts cataloguing.

"We selected ARMS Reliability because of their proven track record in RAM modelling, and their experience in working on greenfield sites like the Gruyere Gold Project," Gruyere JV processing manager Brett Foster said.

"Undergoing a RAMS study will ensure that this project delivers the most value to our stakeholders.

"By getting in early and conducting these maintenance studies now, we will save money and resources down the track by ensuring optimum performance of the plant from the outset.

"When we hit the 'go live' button, all maintenance costs and schedules will be well defined – we don't want any surprises," Mr Foster said.

The Gruyere Gold Project has commenced detail engineering, design and construction on site.



The Gruyere JV is one of the largest undeveloped gold deposits in the world.

ARMS Reliability's maintenance project will confirm the design of the plant from a capacity and availability perspective, to ensure it meets throughput targets.


As a plant moves closer to commissioning and operations, the ability to influence its RAM capability

diminishes greatly.

"ARMS Reliability is delighted to be working on a project with such significance as the Gruyere Gold Project, particularly from such an early stage," ARMS Reliability business development manager Craig Brydges said.

"We look forward to delivering a maintenance strategy that greatly reduces the probability of failure, increases uptime, and reduces maintenance costs for the life of the mine."

The ARMS Reliability project will be completed by September 2018.



"WHAT WE'D LIKE TO DO BY YEARS END IS TO HAVE A NEW DISCOVERY ANNOUNCED, WHICH COULD POTENTIALLY BECOME OUR NEXT DEVELOPMENT PROJECT ACROSS THE YAMARNA BELT."

Full production at Gruyere was expected in 2019.

"Given the success at Attila, and further north at Alaric, we have a high level of confidence that other recognised zones along this trend may offer similar upside exploration potential.

"Additionally, we have identified more than 150km along this same trend extending into our own 100 per cent owned North Yamarna project, and the South Yamarna [JV].

"Our 2017 exploration programs will be aggressively testing this well-endowed trend over the coming months."

As part of the ramp up of Gold Road's greenfields exploration budget for 2017, the company engaged WA operators DDH1 Drilling and Ranger Drilling Services to drill across its North Yamarna, Gruyere and South Yamarna projects.

DDH1 was contracted to complete 35,000 metres of diamond drilling services across all three projects, while Ranger was contracted for all reverse circulation (RC) and aircore drilling.

"These satellite deposits will either increase the life of the mine or would increase our annualised throughput using our SAG and ball mill that now has a greater throughput capacity of 8.5 million tonnes per annum," Mr Murray said.

"It's a big regional grassroots exploration that we're running this year with seven drill rigs in operation.

"We have now identified another five camp scale targets, and we are testing a portion of them this year, and a portion of them next year with our \$30m exploration budget, an amount we'd like to spend next year as well.

"This is a long term exploration strategy. The beauty of Gruyere is that now we are a self-funded explorer, generating cash flow from operations and being able to use it for organic growth options.

"What we'd like to do by years end is to have a new discovery announced, which could potentially become our next development project across the Yamarna Belt," Mr Murray said.



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"WHILE THE PROJECT GOT OFF TO A FAIRLY PRODUCTIVE START, THE FALLING IRON ORE PRICE ENCOUNTERED IN RECENT YEARS TOOK A TOLL ON THE JOINT VENTURE COMPANY."

Resilience

Over the last few years, Karara Mining's fragile finances and high operating costs have raised concerns over the longevity of the world-class magnetite operation. However, a funding extension confirmed in May has signalled some hope for the WA iron ore miner.

ELIZABETH FABRI

IT'S been 10 years since joint venture partners Chinese-owned Ansteel Group (52.16 per cent), and Perth-based Gindalbie Metals (47.84 per cent) joined forces to form Karara Mining (KML); the company responsible for developing WA's first major magnetite project.

The mega project, a short 60 minute flight from Perth and 200km east of Geraldton, comprises a large open pit mine and processing plant managed by Ansteel.

It is also complemented by more than \$1 billion in common-use infrastructure, including a 16 million tonne per annum (mtpa) export facility at Geraldton Port, an 85km rail line, 140km water pipeline, and a 160km 330kV power line connecting the Karara site into WA's South West power grid.

Project construction began in November 2009, and in January 2013 the mine completed its first shipment of magnetite concentrate for export to Asian markets.

By 2015, the mine had shipped more than 20 million tons of product, and achieved a milling record of 65,364 wet metric tonnes (wmt).

While the project got off to a fairly productive start, the falling iron ore price took a toll on the joint venture's earnings.

In March 2015, KML shed about 15 per cent of its workforce (70 positions) from the company's Perth office, Karara site and Geraldton Port operations, in an effort to reduce costs, and in January 2016 the company faced the risk of a mine collapse and loss of 1000 jobs due to uncertainties on future financial support from its chief backer.

In an email to staff, KML said its joint venture partner Ansteel's parent company



Karara mine infrastructure.

All images: Karara Mining.

might not be able to continue to provide funding support due to the prolonged iron ore slump.

In FY16, KML reported an after-tax loss of more than \$1.6 billion, including an impairment expense of \$1.2 billion and \$310.4 million operating deficit.

This was on top of a series of short term loans, including a \$US300 million China Merchants Bank loan.

Pushing forward

Despite financial hardships, Karara has proved its continued resilience in the tough economic climate.

At Gindalbie's 2016 Annual General Meeting, chairman Keith Jones said

"Ansteel continued to support Karara with management, technical and financial support, and without which, the project would not survive".

"The past two years have seen a substantial shift in the activities of Gindalbie," Mr Jones said.

"We retain our investment in Karara which continues to actively pursue cost reductions and efficiencies under the guidance of Ansteel."

In August last year, KML extended Downer's contract for a further four years from the original completion date of February 2018 to March 2022.

The contract extension was estimated to cost about \$350 million.

"This extension is an endorsement of

Downer's strong safety and productivity performance and we look forward to bringing further value to Karara's operations by reducing operating costs, increasing productivity and enhancing safety," Downer chief executive Grant Fenn said at the time.

On 24 May, Gindalbie announced KML had also extended its facility agreement with China Merchants Bank (CMB) for its \$US300 million Fixed Term Loan Facility.

"The loan facility was due for repayment in April 2017 and has been extended for another 12 months to April 2018," Gindalbie stated.

The extension bought KML some valuable time to pay off the loan, with the hope 2017 production and revenue would see some improvement.

Mine performance

Production for the March quarter came in at 1.994 million dry metric tonnes (DMT) of magnetite concentrate; an increase from September results, but a 4.46 per cent decrease from December quarter production of 2.087 million DMT.

The average realised cost and freight (CFR) price for the March quarter was about \$131.78 per DMT on a provisional basis, compared to \$112.54 per DMT in the December quarter.

"A total of 37 shipments were completed by KML from the Karara Export Terminal at Geraldton totalling approximately 2.066 million DMT of magnetite concentrate," Gindalbi stated in its March quarter report.

This brought KML's total shipments for the nine months up to 105, with June quarter results expected to be released in the coming weeks.

(CONTINUED ON PAGE 44)



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(CONTINUED FROM PAGE 42)

Community and environment focus

Since its establishment, the Karara mine has been held in high regard for its community and environmental programs; initiatives that helped it win a number of industry awards in 2016.

In August last year, the company took home the Chamber of Minerals and Energy WA *Innovation Award* in the Engineering category and *Industry Choice Award* for its micro-mist dust suppression system for primary crusher run-of-mine bin.

KML had initiated the design and installation of a bespoke micro-mist spray system, in consultation with Enviromist and Bulk Materials Engineering Australia, which had since delivered critical safety and environmental improvements.

In October, the company was also awarded the inaugural *Community Partnership Resources Sector Award* by the former Barnett Government for its commercial 2000-hectare Innovation Park farm that produced fresh produce sold locally, and donated to the local food bank.

The farm was developed back in 2011, and provided training and employment opportunities for the local community.

KML also launched a Karara Community Health Fund, a Mobile Dental Clinic in partnership with the Royal Flying Doctor Service, a community housing project in the Shire of Mingenew, and more.

In April this year, the mine was also



"WE RETAIN OUR INVESTMENT IN KARARA, WHICH CONTINUES TO ACTIVELY PURSUE COST REDUCTIONS AND EFFICIENCIES UNDER THE GUIDANCE OF ANSTEEL."

Karara mine is located 200km east of Geraldton, WA.

confirmed as one of The Australian Research Council (ARC) Centre for Mine Site Restoration's (CMSR) industry partners.

KML has said community programs such as these would continue throughout

the mine life, which, all going well, had at least 30 years still on the clock.

"The development and engagement of the Mid West communities in which we operate is a key commitment of Gindalbie and KML," Gindalbie stated.

"The objective of developing long-term, sustainable outcomes that deliver local benefits, such as employment, skills development, community partnership and local business development opportunities has continued."

WA's quarry specialist

B&J Catalano is a complete bulk haulage, civil construction, earthworks, crushing, materials supply, and equipment hire service operating in WA.

The company holds a comprehensive range of state-of-the-art earthmoving and materials processing equipment, complimented by an extensive fleet of trucks and tankers.

It also owns and operates a number of sand, gravel and limestone and hard rock quarries within the South-West, Mid-West and Metropolitan regions, supplying materials to key clients, including the mining industry and government departments.

The company strives to deliver exceptional service for a continually growing portfolio of clients across the State through corporate values of integrity, safety and 'best value'.

B&J Catalano delivers its services out of three strategic locations: Perth, Brunswick and Geraldton; as well as satellite materials supply locations throughout the State.

The company has a long and rich history of successful operation in the WA civil and mining industries.

Established in 1962 by brothers Bill and Joe Catalano, the business has experienced sustained growth over the 50 years since its inception, and is today a leader in the industry.

B&J Catalano was initially created to service the transport needs of the local rural community in the south-west region of WA.

The company was founded on values of hard work, quality service and a 'fair go' – values that have stood the test of time.

Bill Catalano remains a director of the company to this day and, along with his son Stephen and Joe's son Clem, works with an experienced management team to oversee the strategic direction and day-to-day operations of the company.

The company has a wide range of clients and takes pride in the long term relationships it has developed with these companies.

These relationships are founded on the principles of trust, integrity, service and



Catalano is involved in the rehabilitation of a number of sites within Karara's operational area.

value and are a testament to the culture the Catalano directors instil in its employees.

The company recently completed a large tailings dam for Karara Mining.

The work involved 1 million cubic metres of embankment consisting of rock fill, tailings and colluvium material; requiring 25 pieces of earthmoving machinery and 35 employees.

The construction period was tight, however the company rose to the challenge and the work was completed on time and on budget.

In addition to the tailings dam contract

Catalano was contracted to load 28,000 tonnes per day of magnetite ore onto trains for transport to the Port of Geraldton and provide a civil site maintenance team working in and around the plant maintaining roads, drainage and perform other small civil works.

Catalano are currently involved in the rehabilitation and landscaping of a number of sites within the Karara mine site.

It was also contracted to do bulk haulage of between 10,000 and 12,000 tonnes per day

of hematite ore from a mine site 25km from the plant.

The company has also provided plant hire equipment to various projects in the State's northwest, including FMG's Cloud Break, Solomon, and Christmas Creek iron ore projects; Mineral Resources' Phil's Creek, Sino Iron's Cape Preston and Rio Tinto's Pannawonica.

More information on B&J Catalano's offerings can be found at: www.catalano.com.au.



(CONTINUED OVER)

A new direction

South Australian mine Challenger has been operating for 15 years, but it still has a long and promising future ahead. Under the fresh ownership of WPG Resources, mine life continues to grow through an aggressive exploration campaign, and a two pronged expansion due for completion in early 2018.

ELIZABETH FABRI

DISCOVERED by Dominion Mining in 1995, the Challenger gold find was a huge win for the South Australian resources sector; generating thousands of construction jobs and ongoing jobs for the State.

Dominion Mining began construction in September 2001, open pit mining in 2002, and underground production in 2005.

The mine was later operated under a 50/50 joint venture between Kingsgate and Diversified Minerals, and last year was taken over by WPG Resources.

The project, 730km northwest of Adelaide in the Gawler Craton geological region, now has capacity to process more than 600,000 tonnes per annum.

WPG ownership

WPG and PYBAR subsidiary Diversified Minerals bought the mothballed Challenger mine from Kingsgate Consolidated in March 2016 for about \$1 million.



Challenger mine infrastructure.

All images: WPG Resources.

The operation was restarted in May the same year.

WPG became the 100 per cent owner when its acquired Diversified Mining's

remaining interest in August.

"The mine was bought, and the [Kingsgate] transaction was completed on 15 March 2016," WPG Resources newly

appointed chief executive Wayne Rossiter said.

"The acquisition price was \$1 million payable out of cash flow, which has all been paid now, and we restarted the mill on 23 May, re-entered the underground workings on 16 June, and started ramping the mine up from there; so it was a three month ramp up period.

"In that interim period, we entered into a transaction to acquire Diversified Mineral's interest in Challenger which was completed effective at the end of July and was consummated in August; so we now have a 100 per cent interest in the Challenger Gold mine and all the exploration properties that that relates to."

This included a 28 per cent interest in the Western Gawler Craton JV managed by Tyranna Resources.

Mr Rossiter said the company's basis for acquiring Challenger was to reopen the mine and mill and process 30,000 tonnes a month from the underground mine and 20,000t per month from an existing low-grade stockpile.



In the March quarter Challenger produced 12,406 ounces of gold.

Ore from WPG's nearby Tarcoola mine was to be sent to Challenger for processing; a decision that saved WPG about \$20 million and enabled a higher recovery and certainty for Challenger.

"We broke first rock at the Tarcoola mine in December and trucked our first ore to Challenger in January, poured the first combined bars in February, and have been actively stripping at Tarcoola and mining there since that point in time," Mr Rossiter said.

"The first couple of benches [were] pretty low grade [as] we were in a depleted zone, but in the month of May we hit the high grade area.

"It's been performing very well grade wise, once we got through that depleted zone."

In February, WPG announced the Challenger mine had reached its first major milestone, with one tonne of gold poured since the first pour under WPG ownership in May 2016.

Production results

While mining operations were now in full swing, production ramp up over the last nine months had been a challenge.

"Kingsgate weren't silly and mined their best stopes before they mined underground, so we did have a number of lower grade stopes to work through," Mr Rossiter said.

"From an overall cost perspective we were blending our higher grade material from underground with quite a low grade stockpile; that diluted our head grade up to the middle of the March quarter this year."

Mr Rossiter said its mining contractor PYBAR had struggled to "get development metres", which forced WPG to mine from outside its original mining plan — which subsequently diluted head grade.

A 12 December announcement advised that mining these lower grade stoping areas would lead to a significant reduction in forecast gold production for the month.

"While underground ore haulage in the year to date at Challenger has been a little in excess of budget, mine development is well behind schedule," WPG stated at the time.

As a result, PYBAR agreed to mobilise a brand new jumbo development rig at its own expense.

"We've seen some improvements starting to come through as a result of that at a number of production faces," Mr Rossiter said.

"We got squeezed to one stope in December, and now we're back to five or six."

"We're still behind in vertical development; that's about getting the mine set for this higher throughput and that's what we're working on now."

"It will take a couple of quarters for the mine to track back to where it should be."

In the March quarter, the mine produced 12,406 ounces (oz) of gold, following December quarter production of 12,429oz of gold, with year to date production for the first nine months sitting at 36,973oz.

WPG's FY17 guidance was between 52,000oz and 56,000oz, which would mean it would need to produce more than 15,000oz in the June quarter to reach the bottom end of the range.

Mr Rossiter said the company expected to still land within the FY17 target.



The project was located in the Gawler Craton region of South Australia.

Expansion plans

With teething issues now behind them, WPG was shifting its attention to a two-stage mine infrastructure expansion to boost productivity.

Mr Rossiter said the company's plan to process 30,000t per month from underground and 20,000t per month from Tarcoola was going better than expected, with almost 40,000t recovered from underground each month.

"It became very obvious to us that the mill was going to be the bottleneck in the process, so we have been undertaking a study of how we can expand the Challenger mill to accommodate all the ore that we have available," he said.

"This mill in a prior life has done more than 800,000tpa in duty, and we think we can get the mill up to 700,000t with a minimal capital spend and back to over 800,000t with a very modest capital spend."

"We've actually been running the mill at the equivalent of 700,000t already on an intermittent basis.

To be able to sustain that we need to be able to upgrade our water availability, which we are in the process of doing now, and there's some minor modifications in the plant that are required."

He said due to the age of the plant, the company needed to introduce some modern instrumentation.

Phase one of the upgrade was estimated to cost \$1.5 million and would involve an increase in the water supply, increase in the power of the motor on the second regrind mill, an absorption column and changing the tank screens on the absorption column to enable a higher flow rate.

On 13 June the company announced a \$7.2 million capital raising to fund phase one of the expansion.

"The purpose of this capital raise is to raise funds essentially to put us in a position that we can enact this program," Mr Rossiter said.

"Specifically the raising will be the \$1.5 million for the plant expansion.

"The bulk of the other proceeds raised will be directed back to underground working. It's a combination of exploration drilling to add to the resource base, and underground development drilling in our new areas, including Challenger Deeps which will be our primary production area, and the M3 structure that we are stoping on now for the first time."

Mr Rossiter said phase two of the expansion involved adding a tertiary crusher at an estimated cost of about \$2.7 million, which would be funded out of cash flow.

Extending mine life

WPG's plan to update resources and reserves would also be a key focus over the next 12 months.

The company has been progressing a number of exploration drilling programs across the project; specifically targeting Challenger Deeps.

"We knew that we would be able to keep mining the Challenger West structure that Kingsgate had mined until late this year," Mr Rossiter said.

"But the real reason for buying the mine was the unexploited potential of Challenger Deeps.

"About two months ago we reconfigured the ventilation circuit to get enough air to the bottom of the mine so we could run some machines down there and we've been drilling down as part of our first exploration program."

WPG's current drilling program was to test the M1 and M2 structures below the shears so it could begin planning to accurately exploit the mineralised lenses on each level.

"We've completed the first round of drilling and put out results for the first two fans," he said.

"We've got half of those results back

which we've announced and it's been very encouraging."

WPG had also been drilling the M3 structure, which ran in parallel to M1 and M2, and over the last few months returned positive results.

"This M3 structure has potential to add another one and a half to two years of mine life, and below the shear we're already seeing two to three years in that as well," he said.

"We're seeing a combined mine life now based on what is in resource and that exploration target of about four to five years."

On 1 June, WPG's updated mineral resource estimate of 343,299oz included a 27 per cent increase in contained gold but excluded recent progress made at the SEZ and M3 shoots, and exploration drilling in Challenger Deeps.

FY18 and beyond

WPG's principal focus for the next 12 months will be on production at Challenger, extensions to mine life and the two stage expansion project.

"We fully expect to keep adding to the mine life as we drill," Mr Rossiter said.

"We've got three underground drilling rigs that we own; one that hasn't been in service as it has been rebuilt, and the other two have been working 24/7.

"That third rig will come into service fairly soon and we may actually bring in another contract rig as we crank up our underground drilling once we come out of this raising and hit the go switch on the expansion plant."

Currently, WPG was spending several hundred thousand dollars each month on drilling alone, which was expected to increase further in the coming year.

"We will be increasing that budget once we put that to the board as part of this strategy as we will go from two rigs to three owned rigs plus a contract rig, so we will probably be doubling that budget," he said.

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It's highly aggressive screen can accept bofor bars, finger screens, woven mesh and punch plates along with other application-specific media types.

User benefits include a rapid set-up time and ease of operation aided by hydraulically folding conveyors, two-speed tracks, and a swift two-way split conversion.

The Warrior Screen Range has several features that are attractive and beneficial to the New Zealand and Australian customers, and Lincom Group is thrilled to bring the All-New Warrior 1200 to the market.

Abergeldie expands into Northern Ireland

AUSTRALIAN-based Abergeldie Complex Infrastructure has announced the establishment of its Northern Ireland office and the award of its first project in Europe in the same day.

The £8.5 million contract includes the renovation of the historic Killeavy Castle and construction of a 42 room, 4 star, boutique hotel, spa and adjacent wellness centre.

The Killeavy Castle, in County Armagh, sits majestically on the slopes of Slieve Gullion and is the centrepiece of an historic estate comprising 350 acres of farmland and woods.

The hotel and wellness centre will be built on the site of what once were the Killeavy Castle coach house, mill and farm buildings, and will incorporate many of their historic features. The project is expected to be completed in late 2018.

Abergeldie intends to, on the back of this project, expand its capability and deliver complex infrastructure and building projects throughout the UK and Europe.

500 BAR Raptor scores



Lachlan Berendrecht from JK Williams Contracting and the powerful Aussie Raptor, used for cleaning slipform pavers.

500 BAR is considered to be a point in pressure ratings where high pressure water blasters become "hydro-blasters".

500 BAR (7300 psi), constitutes serious cleaning power with consequent savings in time, energy, and one of the world's most vital commodities, water.

Australian Pump Industries (Aussie Pumps), preeminent in the design and manufacture of high pressure water blasting equipment in Australia, has developed a breakthrough hydro-blaster called the Aussie Raptor 12.

Powered by a 12.5kW industrial four pole motor, the new machine is built in production quantities.

It represents a huge breakthrough in design, effectiveness and value for money.

The Aussie Raptor electric drive pressure cleaner delivers more than 7000 psi and flows

to 12 litres per minute.

This combination of pressure and flow is used to prep concrete, strip rust, paint and antifoul, and blast off concrete from pre-cast moulds.

The heart of the system is a big Udor 7000 psi Penta style pump.

Its quintuplex design utilises a machined stainless steel head with big oil filled crank case for cool running.

Teamed with heavy duty stainless steel turbos, these machines deliver performances in excess of conventional higher rated and more expensive machines, in applications like stripping rubber linings from hug mills, washing down big plant like dump trucks or face shovels, and stripping rust and paint from infrastructure in preparation for corrosion resistant treatments.

The high pressure hose rated to 500 BAR

is also standard equipment with the machine coming with 10m of hose as standard.

An optional foot valve, enclosed in a stainless steel housing with rubber mounted feet enables the operator to have the double protection of both automatic shut-off gun and foot valve for additional safety.

As part of the Class B safety requirements, all Raptors are supplied with a 500 BAR hose shroud.

This protects the operator in unlikely event of a hose rupture or if fittings fail as a result of corrosion, wear or damage.

Further information is available from Dowdens Pumping and Water Treatment, Mackay on (07) 4969 4949 and Rockhampton (07) 4923 6969; dowdens.com.au; or from Australian Pump Industries, (02) 8865 3500.

Rollin' all over the world

SINCE making its debut in the mid-1980s, the unique Broons Square Impact Roller has made its mark on mine sites around the world.

Built locally at Broons' modern Adelaide facility, the Square Impact Roller has been railed, roaded, shipped, and flown to almost every corner of the globe.

For international freight movements, the Impact Roller can quickly be deconstructed to fit on a flat rack sea container or pushed inside a 747 aircraft.

Once arriving on site, a short recommissioning process can have the unit up and running *that same day*.

Hooked to a suitable 4WD tractor, the Impact Roller will immediately eliminate damaging sharp rocks on waste dumps or compacting haul roads and tailings dams, at speeds up to 10kph.

Nothing else can sweep through a mine site with such efficiency. With so much energy being put into digitising tyre management through TMS and TPMS, no algorithm will ever eliminate jagged sharp rocks and replace the energy from one single blow of the Broons Impact Roller.



The Broons Square Impact Roller.

Quality is a hallmark of the dedicated "MS" Mine Specification Impact Roller, with reinforced frame, heavy duty linkage, and wear plates on the module well suited to working in harsh mine site conditions.

Just like the Roller, all operators need to be fit-for-purpose too. Broons insists on OH&S and maintenance training on their Square Impact Roller to maximise the life of

the plant and ultimately guarantee a return on investment for the asset management.

Wherever the mine site, a Broons Square Impact Roller is never too far away.

Hire can be organised by calling (08) 8268 1988 or via email at info@broons.com.

A brochure can be downloaded from: www.broons.com/impact.

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**API 5L GRADE
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Perth's leading 4WD service

ESTABLISHED in 1995, Robson Brothers 4WD was one of the first specialised 4WD service and repair centres in Perth and has built a reputation as the trusted name with the resources sector, and off road enthusiasts across the State.

The expert team's highly personalised service and attention-to-detail is what keeps people coming back to see them, offering everything from minor servicing to log book maintenance, full vehicle overhauls and suspension upgrades.

"Robson Brothers 4WD will keep your motor running so you never have to worry," Joel Ford of Robson Brothers 4WD said.

"Unlike your usual mechanics we want to keep your vehicle off the road, ready for any adventure you throw at it.

"We pride ourselves on putting you in the driver's seat at every turn, discussing repairs and replacements before they happen, and giving you honest pricing."

The company's 600sqm workshop is equipped to handle all types of service and repairs including front axle overhauls, cooling system replacements and more.

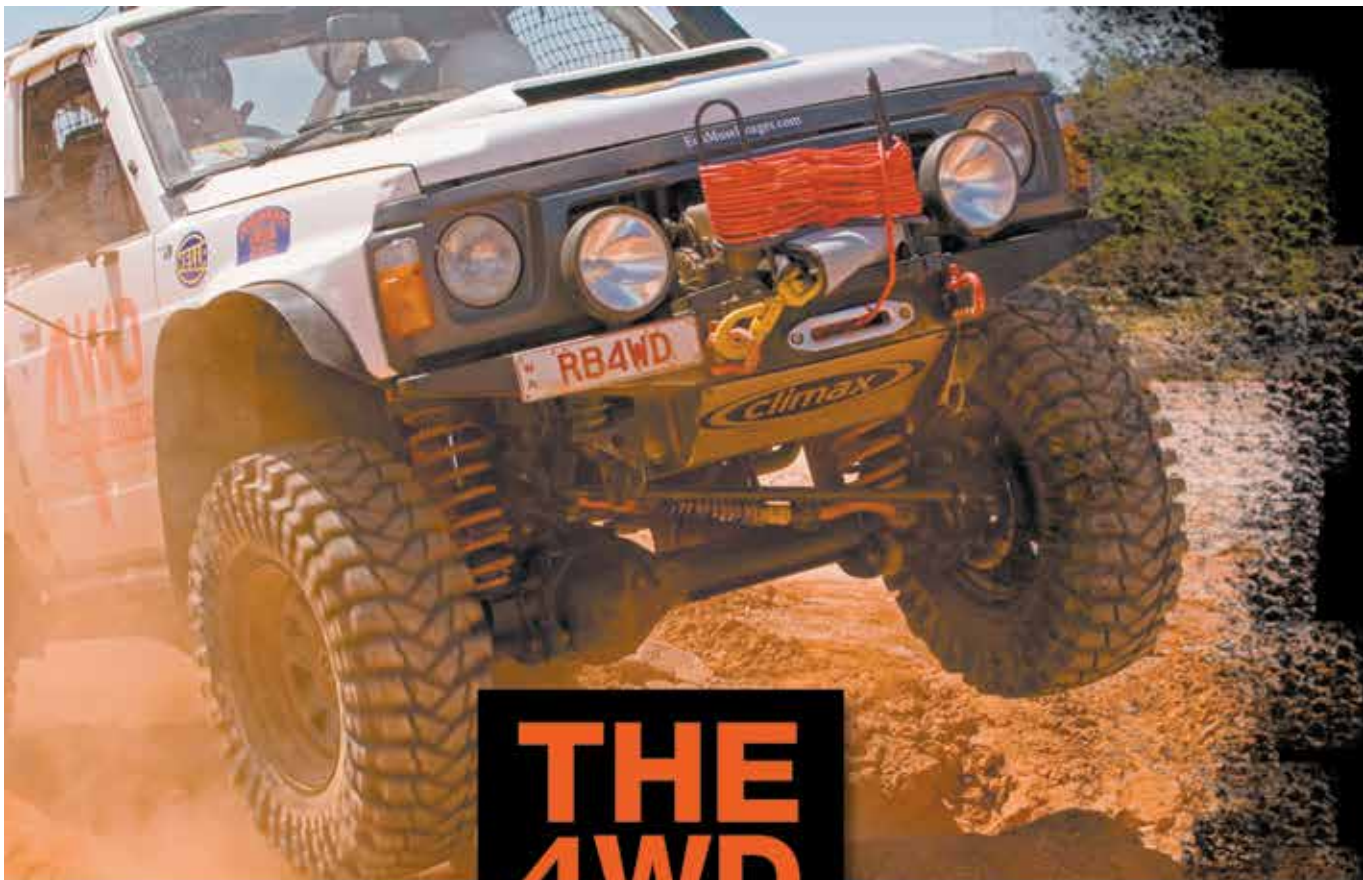
"We can even perform 4WD pre-purchase inspections to make sure you're buying the right machine for you and preventative maintenance reports to alert clients to potential future problems," Mr Ford said.

"For mining companies with a number of vehicles we also offer fleet service discounts."

More information on Robson Brothers 4WD services can be found at: www.robsonbros4wd.com.au.



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From design to manufacturing floor

WITH an extensive fleet of industrial and mining pumping equipment, Tru-Flo Pumping Systems' manufacturing capacity means it can not only develop strategic de-watering solutions to suit any application and circumstance, it also has the capability to bring those solutions to life.

Tru-Flo delivers an integrated platform of value driven and market leading capabilities for the engineering of world class pumping equipment.

The company brings together extensive capabilities with flexible assurance processes that are optimal for mining projects and related assets.

Its engineering and design capabilities are a unique combination of open-cut and underground mine pump equipment, partnered with technical expertise and extensive hands-on experience.

Tru-Flo's Vac-Assist pumping system has stood out for its exceptional reliability and performance for more than 20 years, setting the standard for premium quality and efficiency.

The Vac-Assist pumps are designed to deliver best in class efficiency.

The range of pumps offer unparalleled efficiencies; as every model is built tough for reliability, these pumps will out-perform every time.

The development consists of highly trained professionals and hand-picked technical engineers who are experts in their fields.

Tru-Flo works across the complete project and asset life-cycle, and tailors its approach to fit customers' specific needs to ensure every pump is delivered successfully.



Tru-Flo's Vac-Assist pumping system is built tough for premium quality and reliability.

Based in Bathurst, NSW, Tru-Flo Pumping System has an extensive 6000sqm workshop floor that holds a wide range of manufacturing equipment, including a sand blast room, bake oven, CNC machinery,

overhead cranes and milling machines.

Tru-Flo also has branches in QLD (Sunshine Coast and Moranbah), Perth and Indonesia.

This means Tru-Flo is completely

equipped for any sized job and can manage all works in house.

With an exemplary safety record thanks to its experienced team of operators, Tru-Flo jobs are executed safely, every time.



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Facilitator of dust and debris control

TENNANT Company is a world-leading manufacturer of award-winning indoor and outdoor industrial cleaning equipment chosen by blue chip mining organisations to maintain efficient, safe and healthy assets and workplaces.

Challenging environments like mine sites, wharfs and heavy vehicle workshops demand robust, heavy duty cleaning solutions.

With its extensive line-up of mining/heavy industry machinery, Tennant delivers on economic, productivity and Work Health and Safety efficiencies.

As ever-more stringent protocols are implemented that are designed to keep workforces safe and minimise environmental impact – all while maximising profit – demand has never been higher for equipment that ticks all these boxes and manages to exceed expectations.

Dust control and sweeping

“Tennant’s mining industry customers deploy Tennant’s Sentinel High-Performance Rider Sweeper for their wharf operations,” Tennant national sales manager Adam Esho said.

“The extreme levels of dust and other pollutants are simply no match for the Sentinel which is valued for its four-wheel power steering, tight turning circle and manoeuvrability to access between stock piles, without impeding traffic.”

The Tennant 800 Industrial Ride-On Sweeper is another popular unit used by customers in the mining industry.

It maximises cleaning productivity with its wide cleaning path, large capacity hopper and operator-friendly features.

Capable of capturing cement dust to heavy debris, its heavy-duty steel construction and high-performance dust containment make it



Tennant’s cleaning equipment keeps mine sites safe.

ideal for harsh environments.

For smaller-scale applications, Tennant offers a line of Compact Ride-On Sweepers including the 6100, 6200 and S20; variously used by mining enterprises of all sizes as well as partnered logistics firms.

Designed for optimal manoeuvrability combined with high-efficiency, single-pass sweeping and multiple-stage dust control systems, each model offers its own specific additional attributes.

Heavily supplied into mining workshops is the S10 Walk-Behind Sweeper, which capably does round-the-clock battle with copious work bay dust.

Scrubbing

Industrial scrubbers don’t come tougher or more versatile than Tennant’s range of Walk-Behind Scrubbers.

Considered an essential in any efficient

mine site or workshop, large or small, the 5700 Walk-Behind Scrubber delivers up to 136kg of down pressure.

It is robust, reliable and uses up to 70 per cent less water thanks to Tennant’s innovative ec-H2O technology.

Tennant T16 and T12 models are used in an array of applications including medium sized warehouses and large light vehicle and utility workshops where ride-on machines are a must to get the job done quickly and often.

Sweeping/Scrubbing

Where large quantities of wet debris, dirt and oils need to be cleaned up rapidly and completely, Tennant’s line-up of Sweeper-Scrubbers are infinitely up to the task.

The M20 cleans up to three times longer than conventional scrubbing by using less water and single-pass efficiency.

The 8300 Battery Powered Ride-On Sweeper-Scrubber for larger hub warehouses offers a super clean in one action and fume-free operation with a continuous battery power capacity of up to 1000 amp hours.

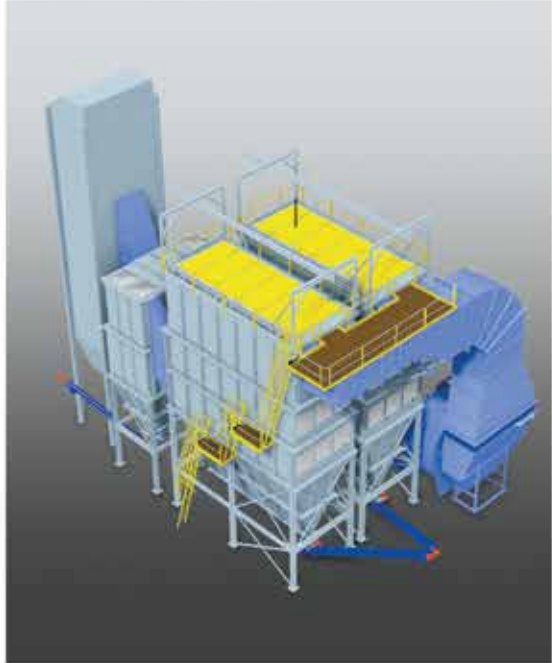
Service and maintenance

Tennant’s onsite service and maintenance program, TennantTrue, is the gold standard in the industry.

Company-trained field technicians carry all parts on board and are fully versed in the operation, repair and maintenance of all Tennant equipment, guaranteeing minimal downtime.

More information on Tennant’s products and services can be found at: www.tennantco.com.

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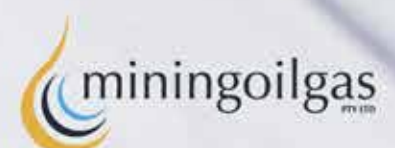
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Changing the way we play golf



CLIVE DAVIES
FORESIGHT SPORTS AUSTRALIA
DIRECTOR

GOLF technology has come a long way since the very first golf simulators hit the market in the early 90s.

Although the idea of being able to play a game of golf indoors by hitting a real golf ball into a screen with a projected image of a golf course hasn't changed that much, the way it happens these days is vastly different.

The original systems were developed from the first golf computer games, where you made the golf ball fly using a keyboard and a mouse.

These days, modern golf simulators utilise very sophisticated hardware and software to detect the way a golf ball is hit and to calculate where it is going to land.

Computer processing makes it possible for the ball to appear to roll with the contour of the fairways and greens, to splash into water hazards and bounce off the trees and rocks on the golf course – just like a real game of golf.

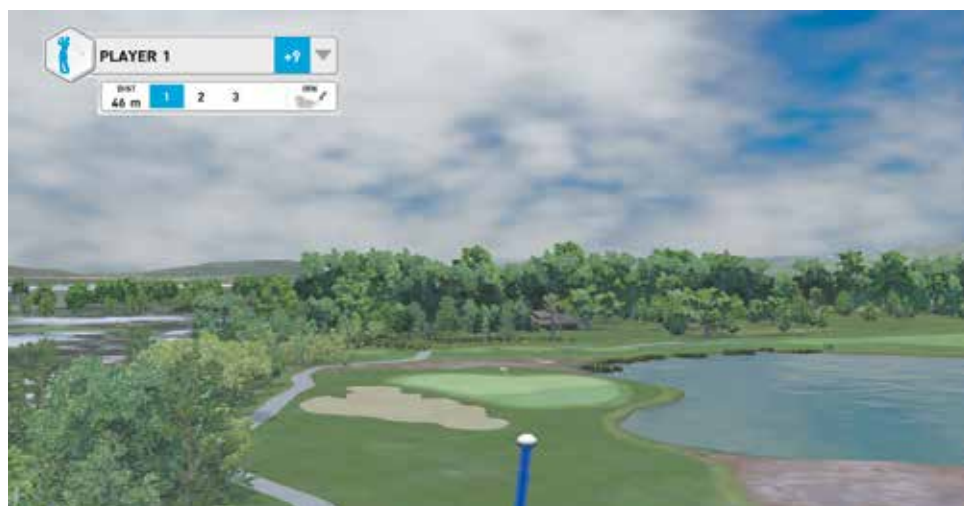
Many systems have evolved over the years, from the original light sensing mats that could detect a golf club moving over an array of sensors, to sonic systems that tried to measure where a golf ball hit the screen by monitoring the sound levels from at least two microphones, to the more accurate optical sensor systems where the position of a golf ball could be measured as it passed through two infrared tracking arrays, giving quite accurate ball speed, launch angle and direction.

Most of these systems required quite a large amount of floor space, and permanently mounted hardware that made them impractical for outdoor use.

But more recently, with the advent of radar based systems and photometric measurement, the modern golf "launch monitor" is quite compact and portable, and is equally capable of working indoors or outdoors.

But as the accuracy of the various tracking systems developed, so did the application of the technology.

Golf club manufacturers wanted to be able to measure and quantify the performance of their golf clubs, and use the information to continually improve their products.



Retail golf shops needed the information to help them demonstrate which club is best for their customers.

There is hardly a golf shop in Australia that does not rely of some form of golf technology to boost their sales.

These days, professional golf players all over the world rely on the accuracy of the launch monitor to record their statistics and improve their performance.

Tiger Woods, Jason Day, Jordan Speith and a host of top level players, as well as the best golf coaches in the world, all use golf technology to assist in the development of their game.

High speed video capture systems monitoring more than 200 frames per second can replay the golfers swing from every angle

imaginable, balance plate technology can show the weight transfer from one foot to another, and 3D motion analysis can measure and replay the entire body movement of a golfer through their swing.

Even putting can be analysed, and electronically adjustable putting surfaces can recreate the contour of any green.

Radar based systems that sit behind the golf ball, rely on a certain amount of actual ball flight to calculate spin rates, club face angle and other important data.

In fact they need about 30 metres of ball flight to be able to estimate side spin, whereas photometric measurement requires only a few feet of data to be able to calculate ball flight.

Because of this obvious advantage, camera based systems are emerging as the preferred

system of measurement, especially for indoor use.

High speed cameras running at up to 10,000 frames per second can measure what is happening at the instant of impact between the golf club and the golf ball, and capture hundreds of images of the golf ball in flight as it leaves the club, and of the club head before, at, and after impact.

And with the advent of the extremely high speed processing power that is available with the latest computer chip technology, photometric measurement has introduced new levels of accuracy to both launch monitors and golf simulators, as well as reducing the overall cost of the systems.

The only part of golf that hasn't improved very much is the actual golfer himself, or herself, since women's golf is now a big part of the game.

According to research by the USGA's Golf Handicap and Information Network, the average handicap today is only two strokes better than it was in the early 1990s, despite better technology, better equipment, and more available golf courses.

It seems that we play golf just because we enjoy the game, and as hard as we may strive to become better golfers it is still the quest and not the reality that keeps us coming back to the game.

I have been involved with golf simulation for nearly 20 years, and it has been amazing to see the development of golf simulation over that time.

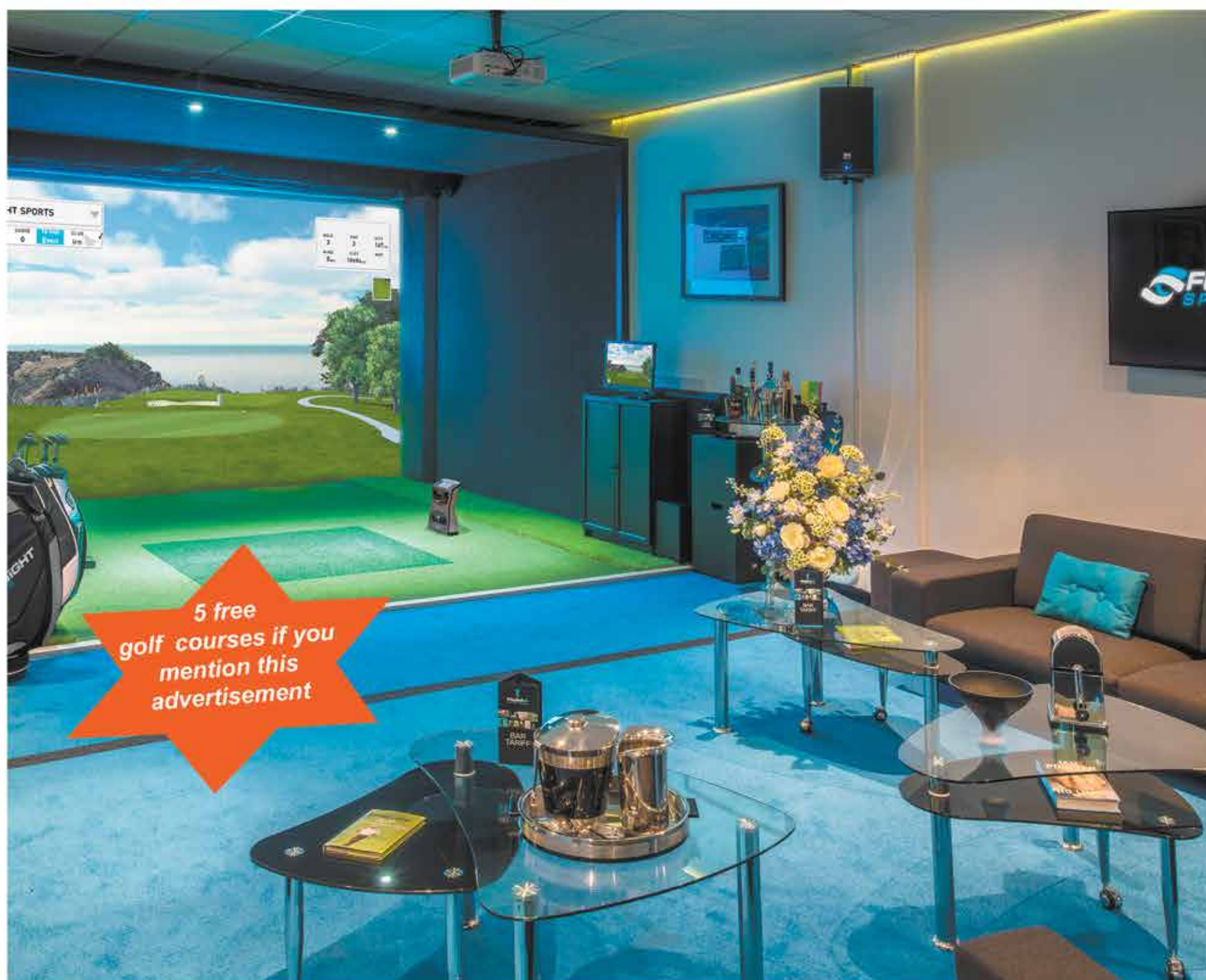
In fact, one of the fastest growing parts of the industry right now is the private business or home user.

Many golfers are looking to incorporate a golf simulator into the design of their new home, or are adding a specially designed room so that they can play golf indoors.

Businesses are installing golf simulators to entertain and impress their clients, residential complexes are adding a simulator to attract investors to their estate, and even mining companies can see the advantages of providing a golf simulator or two for their workers, who often have limited recreational activities available on-site.

And as golf technology becomes much more affordable, it is changing the way in which we are able to play golf, indoors, in the comfort of your own environment.

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Custom designs built to last

SUPERIOR Garages & Industrials (SGI) is a highly experienced building company specialising in the design and construction of custom structural steel buildings, sheds, garages, carports and residential housing in Queensland.

With more than 30 years' experience, the family owned business has built its reputation on using local products and providing streamlined design construct solutions that meet a client's individual requirements every time – saving both time and money.

"We like to think of ourselves as problem solvers – offering solutions that meet what people are really wanting, not so much as what product we want to sell," SGI director and structural engineer Jeremy Hunter said.

"Custom designs are not a problem, they are in fact welcomed by us, and identifying solutions to potential problems before they become actual problems is a priority for us."

Leading the team, Mr Hunter is a CP engineer who has been consulting to the shed industry for more than 20 years and owned-managed design construct businesses over the last 35 years.

"From the humble backyard shed to the most complicated large structure, we provide a complete package from conception, to engineering design and planning, through to processing, project management, assembly of structure and installation of cladding and completion of fit out where required, and work closely with industrial and commercial developers," he said.

SGI's Building Information Modelling (BIM), Detailing and Management



SGI offers streamlined design construct solutions for industrial and commercial building projects.

technology enables complete project delivery with a host of benefits including; greater accuracy in preliminary costing; 3D model design collaboration; integrated design and fabrication detailing; reduced Work Place Health & Safety risk; better planned and managed systems; and greater construction efficiency.

The BIM software allows on-site erectors to view the structural model on a tablet, to

enable them to quickly identify components and specific joint details for a smooth and accurate build process.

"Our experience and specialisation in custom design and construction of steel structures ensures quality and attention-to-detail you would expect while time schedules and budgets are adhered to using our five step custom design construct process," Mr Hunter said.

In its three decades of business, SGI has maintained strict standards, and is associated with industry bodies including The Institution of Engineers Australia and the Australian Steel Institute.

All of its contractors are fully qualified, insured and compliant with current Work Place Health and Safety regulations.

More information on SGI's services can be found at www.superiorgarages.com.



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Delivering outside the box

MODULAR building specialist ATCO Structures & Logistics (ATCO) has provided its services to the resources sector for more than 70 years.

The company has an exemplary track record for the delivery of modular solutions and associated site services in Australia, the Middle East and Asia.

Specialising in large scale workforce accommodation, ATCO has completed major infrastructure projects with accommodation requirements to service more than 6000

people at Curtis Island, QLD, for the three LNG projects.

ATCO also manufactured and installed blast resistant buildings and accommodation at Chevron's Wheatstone project in WA.

From temporary construction camps to permanent villages, a small staff to a large workforce, ATCO can develop customised housing solutions, on time and on budget.

In addition, ATCO has delivered modular education and healthcare buildings across Australia.

Headquartered in Brisbane, QLD, ATCO has nine sales offices across Australia and manufacturing facilities in Brisbane, Melbourne and Perth.

Over the years, ATCO has built up one of Australia's largest rental fleets of modular demountable units.

Working efficiently and quickly, the company provides one of the fastest deployment lead times in the business.

ATCO delivers "outside the box", with an ability to customise building design

and workforce villages to suit unique requirements.

Its operational excellence is mirrored by its ISO 9001:2008 certification, reflecting client expectations to be provided the most durable modular solutions, manufactured with materials of the highest quality, under the guidance of one of the most responsive and knowledgeable teams in the industry.

More information on ATCO's modular building solutions can be found at: www.atcosl.com.au.



ATCO specialises in complete turnkey solutions, from design, manufacturing, transport and installation.

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Steel structures built to last

ULTRASPAN proudly provides bespoke steel structures and premium quality fabrication services to businesses across Australia, and New Zealand via its sister company Ultraspans Otago at Cromwell.

The manufacturer provides cost efficient buildings and general fabrication services from its in-house engineering, design and fabrication facilities.

It works with clients to accurately design and manufacture products to ensure quick construction delivered on-time and built to the highest standard.

Ultraspans uses quality Australian BlueScope Steel and manufactures all sheds to engineer specifications.

The company assists customers from the design phase through to engineering, manufacturing and construction of bespoke fabricated buildings.

It also works closely with suppliers to acquire the best prices and latest products, to help bring designs to reality.

For each major project, managers oversee each element of manufacture, with subcontractors brought in for specialist roles when required.

Ultraspans's in-house drafting service uses Tekla 3D modelling to design buildings, allowing customers to view a true-to-life representation of the structure using Tekla Bimsight during the drafting process.

Ultraspans's other services include the fabrication of steel components and accessory products for housing one off parts and smaller buildings; sheet metal work and general steel fabrication; galvanising; construction and export shipping; onsite specialist equipment



Ultraspans provides cost efficient buildings and general fabrication services.

hire; demolition and removal of existing buildings; and documentation for planning approvals and permissions.

The company has provided buildings for Xtrata Mining in Mt Isa, at the Century Mine near Lawnhill for Zinafex,

as well as to mines in Emerald, QLD.

More information can be found at: www.ultraspans.com.au.



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Accura boat tried and tested

IN our modern world, companies have many requirements towards best practice.

Given these HR related considerations, there are now many situations where it is not practical to have a person in a potentially hazardous situation – hence the rise of the Remote-Control Hydrographic Survey Boat.

Australian company CR Kennedy brought the Accura to market after extensive consideration of the needs of those requiring hydrographic surveys.

The Accura is proudly an in-house development and has been successfully operating in Australian waterways for more than 18 months.

Early in the process, CR Kennedy partnered with Australian manufacturer CEE Hydro Systems.

In addition to the valuable advice throughout the build process, CEE now provide the sonar related hardware and software for the Accura as well as related training and support.

The Accura is a flexible platform and packages can be tailored for various requirements and budgets.

CR Kennedy would also like to thank its R&D partners, Seam Surveys.

“Seam Surveys has been involved with the Accura boat project for almost two years now,” Seam Surveys managing director Mick Harris said.

“The Accura Package has everything we need and is superior to the other products on offer.

“We are ecstatic with the Accura boat and CEE Sonar equipment and have now taken on a second Accura due to demand.”



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Daniel Rockhouse
Pike River mine disaster survivor

"THE NOISE WAS A LOUD BANG SIMILAR TO THAT OF A BOMB AND ECHOED THROUGH THE MINE FOR A FEW SECONDS. AFTER THE INITIAL BANG I RECALL THE SILENCE, NO NOISE FROM ANY OF MY COLLEAGUES UNDERGROUND."

THE INTERVIEW
p71



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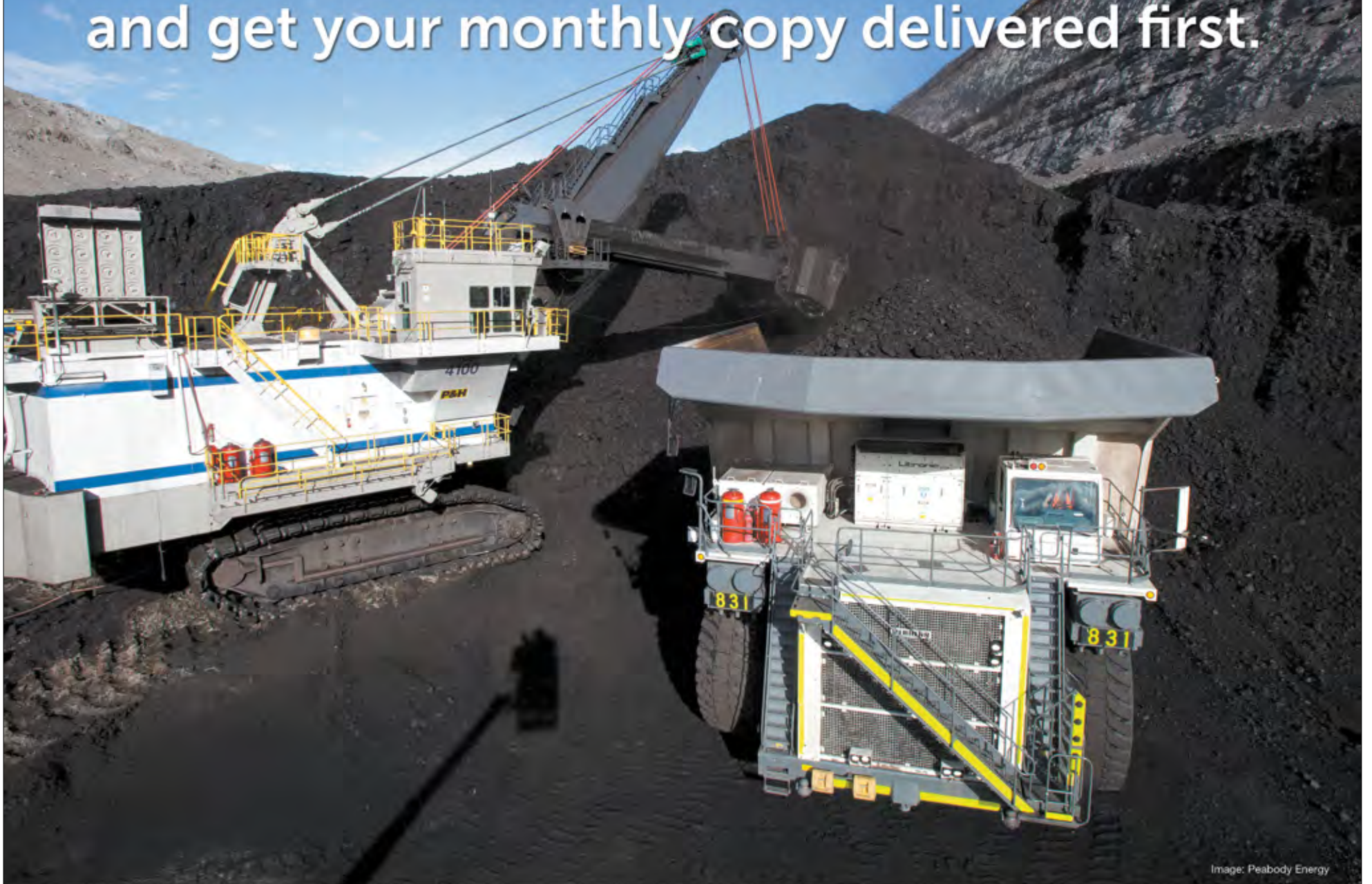


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THE AUSTRALIAN
MINING REVIEW

Remote sector spurs demand for video conferencing solutions

"CLOUD VIDEO CONFERENCING SERVICES WILL BECOME MAIN STREAM AS COMPANIES LOOK TO AVOID LARGE CAPITAL INVESTMENTS IN FAVOUR OF SUBSCRIPTION-BASED SERVICES."



PAUL DENTON
VIDEO DYNAMICS MANAGING DIRECTOR

THE Australian mining industry has entered a phase of cost containment and rigorous capital management in Australia; communication technologies have a fundamental role to play in delivering on these strategic initiatives.

According to management consultancy company McKinsey & Company, mining operations are 28 per cent less productive than a decade ago.

As a result, in a bid to manage these challenges, the vision of a connected mine is now becoming a reality as some of the world's largest mining companies look towards emerging technologies such as cloud based video conferencing solutions to revolutionise the performance of their mining operations.

The increasingly distributed sites and remote workforce in the mining sector requires companies to equip employees with highly featured and easy-to-use platforms, immensely widening the scope for solutions to bridge the gap between remote sites, improving management and decreasing the time it takes to make critical business decisions.

What was once in limited demand now holds serious weight in the minds of decision-makers across mining businesses.

As the next generation continue to make up a larger share of the workforce, video will become more pervasive and price points will continue to drop with newer technologies, further fuelling adoption.

Though the ongoing development and refinement of high definition (HD) video technologies, organisations are now able to implement video conferencing solutions over a wider range of network infrastructures with less bandwidth requirements.

Whether the network is a fibre based private network, home broadband, 3G/4G or low latency satellite link, current HD video standards offer greater flexibility,



Video Dynamics video conferencing solutions.

functionality and robustness over lower quality, lower bandwidth links.

While internet access is more prevalent in most areas, it's important to also consider how remote meeting attendees with no available internet can still access the meeting space.

Look for a cloud solution that also includes standard phone dial in access as a fall back.

Knowing you can still meet with people regardless of access method or device platform is a real-time saver and further extends the accessibility and reach of your collaboration platform.

Room base video conferencing will continue to be the linchpin of online collaboration.

Cloud based infrastructure has created a cost-effective plug and play conferencing solution, this has ironed out the AV quality issues that have plagued this space for the past 10 years.

collaboration process by using smartphone's tablets or laptops on the go.

Cloud based video conferencing will continue to erode the barriers that have prevented enterprise and SMB from using this type of communication

Communicating between employees and customers who can be literally anywhere in the world is now common place.

This dynamic is also now being felt in SMB (small to medium businesses) as the challenge to remain competitive, resources accordantly and more importantly drive growth becomes imperative in remaining relevant in the market in which it trades.

Communicating via a desk top client is evolving at a rapid rate particularly with cloud based technologies which empowers businesses to be more productive.

These types of technologies allow real time collaboration for organisations that have dispersed and mobile teams.

As demand has dictated accessing it from anywhere on any device, all venders of cloud-based solutions will have the added responsibility of ensuring businesses have the option to connect their cloud software into all of the other third party services in which they have already invested in or their clients are using.

The easier it is for employees to share documents and switch between services while collaborating will be the winning formula to ensure businesses can optimise productivity.

In 2017, venders will need to include more integration and sharing capabilities with everything from calendar applications and enterprise device management solutions to voice over IP (VoIP) services.

2017 will continue to bring a wave of innovation in cloud based technologies as the major venders continue to improve and build on the next-generation conferencing solutions that will allow for cross-platform integration.

I believe that the above-mentioned innovations will be the major trends to watch for throughout 2017/18.

The introduction of sophisticated web cams and huddle room solutions are the contributing factors of the cost-effective and easy to install "Room Based" solutions, that when combined with multi-way videoconferencing, presentation, and wireless content-sharing capabilities – all at 720p or 1080p video resolution – it becomes very compelling.

Although their outward appearance and functionality acts as simply as a flat-screen TV, these systems pack high-resolution cameras and computing platforms plus communication and collaboration software within one piece of hardware.

Cloud Based solutions is what connects a company not only at its core.

It allows for universal accessibility across a myriad of devices that employee and customers use to interact with.

Dispersed and mobile workforces are increasingly participating in the

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This year, Manitowoc won Foodservice Equipment and Supplies magazine's prestigious *Overall Best in Class Award* for Ice Makers for the 16th consecutive year.

The reliable and durable Manitowoc ice machines feature a strong aesthetic and cutting edge ice-making technology.

Stainless steel and galvanised panels make the machines easy to use and clean, with excellent corrosion resistance.

Manitowoc has a suitable model for every area of Australia's mining industry, with machines capable of producing up to 1300kg of ice per day.

AJ Baker & Sons is the exclusive Australian distributor of Manitowoc ice machines, and has sold them since 1976.

It is a family owned company based in Perth, with branches in Bunbury, Brisbane, Sydney, Melbourne and Adelaide.

As a market leader, it has been involved in the commercial refrigeration industry in Australia since 1931.

To cater for strict sanitary requirements, the company has matched the Manitowoc machines to a range of floor-standing ice dispensers from Kloppenberg.

The high volume dispensers feature pedal dispenser mechanisms that allow ice flow into drink containers or eskies without having to shovel or touch the ice.



Manitowoc ice machines are one of the most reliable and durable on the market.

This is ideal for the mining industry where hygiene is a must.

These units are fabricated from stainless steel, making them ideal for harsh environments. Numerous mine sites and construction camps across Australia have

benefited from the installation of this package.

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Ice is food, and cleanliness is paramount in

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Sovereign's proprietary Polymer Based Emulsion (PBE) grout NOH2O can seal any subterranean water leak and has successfully sealed leaks producing 12,000 litres per minute at pressures of 2900psi. The design properties of NOH2O are unique and unlike any other grout on the market. NOH2O is extremely permeable, its particle size less than 1 micron.

It also has a remarkable spread with an initial injection viscosity of only 2.5 cP, and controlled curing rates from two seconds through to several days. The grout won't wash out under high flow/high pressure conditions and works in all water types including hypersaline formation waters. With no heat generated and no exothermic reactions, NOH2O is non-hazardous and

safe to work with; and remains flexible after solidification with a 350 per cent elasticity. With offices in Perth, New York, Singapore and Canada, Sovereign Hydroseal are conveniently positioned to support its client's projects quickly and efficiently. More information can be found at: www.sovereignhydro.com and www.sovereigngrouting.com.

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- Exceptional performance under high pressure – successfully sealed static head of 20 000 KPA / 2900 P.S.I.
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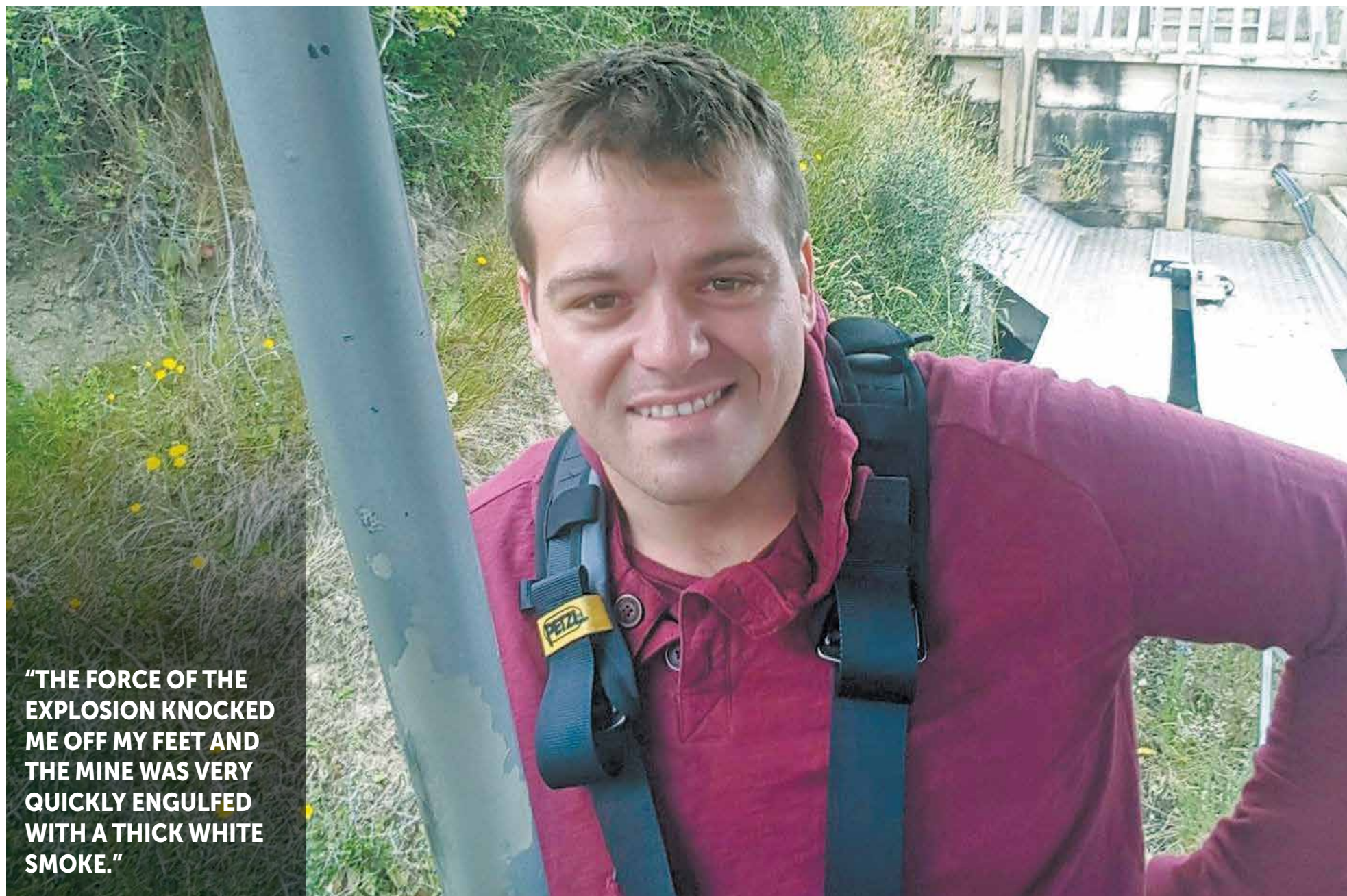
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 Mine Suppliers Online

Daniel Rockhouse

Pike River mine disaster survivor

Daniel was one of two survivors from the Pike River coal mine disaster in 2010 where 29 men lost their lives. While struggling to breathe himself, he carried his unconscious colleague Russell Smith several hundred metres to safety outside. **Cameron Drummond** spoke with him about his experiences and thoughts on safety in the mining industry.



"THE FORCE OF THE EXPLOSION KNOCKED ME OFF MY FEET AND THE MINE WAS VERY QUICKLY ENGULFED WITH A THICK WHITE SMOKE."

Q. Tell us about your professional history.

I started my career in mining in 2008 at Pike River coal operation in New Zealand. My father [had been] in the industry when I was a child and he was the safety manager at Pike River.

After the Pike River disaster, I moved to QLD where I worked for DMS Contracting at North Goonyella Mine for 12 months.

After leaving North Goonyella I moved to NSW and was employed by LDO Group at the Ravensworth mine for four months until they went to care and maintenance.

I was then transferred to the Chain Valley Colliery where I remained until December 2014. At this time I decided to take a break from mining and return to New Zealand to be with my family.

At the end of 2016 the mines were calling me again, so I have returned to QLD and am currently employed by Lunar Mining at the Ensham underground mine just out of Emerald.

Q. What can you tell us about the events of 19 November 2010?

Friday 19 November 2010 began as a normal day.

I was working my last shift before a

month holiday so I was in very good spirits. Nothing out of the ordinary happened and there was no indication of what was to come.

The tunnelling contractors to Pike River Coal were preparing to fire a controlled explosive shot and we were all withdrawn from our work areas to a safe area while this happened; this was the last time I saw my brother Ben (21 years old) alive.

At around 3:40pm I was on my loader heading out when the explosion occurred.

The noise was a loud bang similar to that of a bomb and echoed through the mine for a few seconds.

The force of the explosion knocked me off my feet and the mine was very quickly engulfed with a thick white smoke.

There was a strong smell of burning diesel which was making my eyes water and burn and my nose run.

I was panicking, choking, shaking and trying to put my self-rescuer on. My self-rescuer wasn't bringing oxygen through fast enough and I could feel my body shutting down. At this time I collapsed and passed out.

After a period of time I regained consciousness and began to slowly make my way out of the mine.

I came across Russell Smith who was

incoherent. I then dragged Russell several hundred metres until he was able to stand and we made our way out of the mine to safety.

Q. How has the Pike River incident changed you?

I suffer from PTSD and have severe depression. I have frequent nightmares and carry the heavy burden of survivors' guilt.

Even though I am dealing with all of this I have made the decision to not let the Pike River disaster define my life and I am taking my own steps to rebuild my life and move forward while making my brother and the rest of the men down there proud of me.

Q. What are you doing with yourself now?

I moved back to Australia in January this year and am working for Lunar Mining at the Ensham coal mine. I am living in Brisbane and my fiancé is moving from New Zealand to join me soon.

I have decided to study to achieve my Deputies Certificate and am hoping to join QLD Mines Rescue.

Q. How safe are our miners, and what can companies do to reassure their employees

about mine safety?

Mining is a dangerous industry, but the more knowledge and awareness we can arm our miners with will lower their risk and allow them to come home safely at night to their families.

Companies need to be transparent about mine conditions and any risk their employees may be taking to allow them to make informed decisions.

Q. What is your contribution to the Queensland Mining Industry Health & Safety Conference's theme of 'Sharing My Story'?

I want people to learn from the Pike River disaster and there to be changes in our industry to ensure incidents like this do not destroy more families.

I have a passion for mining, and returning to the mines has allowed me to move on with my life to a degree.

I hope that when I attain my Deputies Certificate and take my first crew underground that they can be assured that they are armed with all the knowledge I can provide them with to make informed decisions and feel safe and secure at work.

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