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The low profile Sandvik DD210L drill rig allows easy access to the working area and rapid advancement of tunnels. See page 18 for further details.

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Australian miners in Africa under fire in new report

It's amazing to see that more than 10 years on the so-called Kilwa Incident in the DRC is still attracting attention. For those readers who don't know what the incident was and who need to be brought up to speed, Kilwa is a small town in 'Haut-Katanga' on the shore of Lake Mweru in the DRC. In 2004 an uprising in the area was "brutally suppressed" – as some reports put it – by the Congolese army, whose actions resulted in around 100 deaths.

What has this to do with the mining industry? Well, Australia's Anvil Mining operated the nearby Dikulushi copper/silver mine and was accused of supplying logistical support – in the form of vehicles and a plane – to the Congolese army and of thus being complicit in the massacre.

The Australian current affairs TV programme 'Four Corners' aired a story on the incident in 2005 that was highly critical of Anvil. The company responded by saying that while it was true that its vehicles and a plane were involved in the incident, they had more or less been commandeered by the army. The whole affair was, of course, extremely damaging to Anvil's reputation.

For what it's worth, I visited Dikulushi on three occasions after it was commissioned in 2002 and I got to know Bill Turner, the company's then CEO, well on these trips. Dikulushi was the first modern mine to have been built in the DRC in decades and its success undoubtedly encouraged other Western mining companies to take the plunge and invest in the war-torn country. I found Bill to be a man of the utmost integrity and I was impressed by the efficiency of the Dikulushi operation – and the evident commitment of its management to the welfare of communities near the mine.

Dikulushi, incidentally, is now in the hands of Mawson West (and on care and maintenance) while Anvil itself was sold to Minmetals in 2011. I still see Bill occasionally – he normally attends the Mining Indaba – and he is now the Chairman of the Australia-Africa Mining Industry Group.

The reason the Kilwa Incident is once again in the news is a just released multi-media report – easily accessed on the Web – prepared by the International Consortium of Investigative Journalists (ICIJ) entitled *Fatal Extraction – Australian Mining in Africa*. A summary of the report on the ICIJ website says that "more than 380 people have died in mining accidents or in off-site skirmishes connected to Australian publicly-traded mining companies in 13

countries in Africa" since 2004.

Although there are more than 150 Australian exploration and mining companies active in Africa, the report hones in on four in particular – Anvil, as already mentioned, Paladin Energy which owns the Langer Heinrich and Kayelekera uranium mines in Namibia and Malawi respectively, Resolute Mining, which operates the Syama gold mine in Mali, and Aquarius, active, of course, in South Africa.

While it is difficult to argue with the conclusions of journalists who have spent months carrying out their investigations, in my view the report does not make a particularly compelling case against any of these companies.

Aquarius, for example, seems to feature mainly on the basis of the 2010 incident at Marikana in which five contract workers were killed when a huge 500-ton slab of rock fell from a hanging wall. Obviously this was a tragic accident but hardly evidence – I would have thought – of any terrible wrongdoing by Aquarius. Similarly, Resolute is mentioned primarily because of an incident at Syama in 2012, when villagers who had blocked a road near the mine were dispersed by police, who opened fire on them. Resolute's role in this – as far as I can tell – was simply that it had asked the authorities to open the road to enable access to the mine.

As for Paladin, the report makes much of an accident at Kayelekera in 2009 when a tank that was being cleaned exploded and injured several workers (two later died) but there is very little evidence presented to show any negligence on Paladin's part.

Paladin has provided a detailed response to the accusations made against it on its website and remarks that its critics "appear philosophically opposed to the activities of mining companies in Africa." Paladin has probably hit the nail on the head here. There are indeed many activists around the world who seem to oppose on principle any and all mining activity, particularly if it takes place in the Third World.

Having said this, the massive improvements we've seen in mining over the past two or three decades in respect of safety, employment practices and care for the environment are arguably a result of the pressure applied by the industry's critics. This being the case it's important not to dismiss criticism out of hand and I hope CEOs and others in the mining industry will take the time to look at *Fatal Extraction* and learn from the unfortunate accidents and incidents it catalogues.

Arthur Tassell



Since the beginning of 2004, more than 380 people have died in mining accidents or in off-site skirmishes connected to Australian publicly-traded mining companies in 13 countries in Africa.

Conclusion of a report by the International Consortium of Investigative Journalists

Good progress continues on Asanko gold project



Mining operations around the old Nkran pit, which is currently being dewatered (photo: Asanko Gold).

Asanko Gold Inc, listed on the TSX and NYSE, reports that construction of Phase 1 of the Asanko Gold Mine (AGM) in Ghana remains on schedule with 60 % of the overall project complete and around 2 443 employees and contractors on site, as at the end of June 2015. Concrete civils are 66 % complete and steel, mechanical and platework 54 % complete. All critical path items are in hand and on time. Procurement is very well advanced with US\$286 million committed out of the total capital budget of US\$295 million. US\$138 million had been spent up to June 30, 2015.

Phase 1 will be a low cost, long life mine producing 190 000 ounces of gold per annum at steady state, with the first gold pour on track for Q1 2016.

Peter Breese, President and CEO, commented: "Construction of Phase 1 continues to advance according to plan and budget, which is very encouraging. Mining operations have hit their stride with the entire PW mining fleet fully mobilised and current mining levels exceeding the plan. The plant site construction is progressing very well and with the project now nearing two-thirds completion, we remain confident that we will be able to deliver this project on time and within the capital budget of US\$295 million."

The primary crusher foundations were completed in June and the structural, mechanical and platework installation has commenced. The jaw crusher is expected to be installed by the end of July. The concrete work for the run-of-mine tip wall at

the primary crusher, as well as the reinforced earth wall, is still under construction and due for completion by the end of Q3 2015.

Earthworks for the overland conveyor from the primary crusher to the stockpile tunnel were completed in June and the concrete precast sleeper foundations are being placed. The conveyor installation is expected to start this month (July).

Installation of the mills has begun. Both mills are on site, along with all the major ancillary pieces of equipment.

All seven CIL tanks and the cyanide detoxification tank have been fully erected, painted and welded. Interconnecting steel and platework is underway and due for completion by the end of Q3 2015. The mechanical installation of the agitators

and inter-stage carbon screens will follow.

The Tailings Storage Facility (TSF) continues to progress well, with over 67 % of earthworks complete and over 60 % of the HDPE liner installed. The northern portion is complete and work is now focusing on the southern portion of the facility.

Pre-stripping of the Nkran pit, the main mineral resource for Phase 1 continues to advance according to schedule. PW Ghana had now mobilised the entire mining fleet, consisting of four production shovels, eighteen Cat 777 and eight Cat 773 trucks, as well as seven drill rigs, in readiness for drill and blast operations, which are due to start during Q3 2015. Mining activities are underway 24 hours a day and production levels have reached 100 000 tonnes per day, which is approximately 10 % above the planned mining rates.

The contractor has mined 7,9 Mt from the pit (as at the end of June), representing 36 % of the planned pre-strip. Approximately 20 803 tonnes of ore at a grade of 1,87 g/t have been mined during the pre-strip and have been placed on the run-of-mine pad. Prior to milling operations commencing in Q1 2016, it is planned to have 423 000 tonnes of ore grading 2,09 g/t on the stockpiles.

Pit dewatering has continued to advance ahead of the mining operations with 3,36 million cubic metres of the expected 6 million cubic metres of water now pumped from the Nkran pit (approximately 56 %). Since the start of dewatering in December 2014, the water level has dropped by approximately 24,3 m. ■



Aerial view of the Asanko Phase 1 site, where construction has now passed the 60 % point (photo: Asanko Gold).



Earthworks in progress at the Yanfolila gold project site in Mali (photo: Hummingbird Resources).

Positive results from grade control orientation drilling at Yanfolila

UK-based Hummingbird Resources, the West African gold exploration and development company, has announced a positive update from grade control orientation drilling at the Komana East pit, the first area to be targeted for mining at the company's 1.8 million ounce Yanfolila gold project in Mali. Yanfolila is being developed as a high-grade, low cost gold mine with first production targeted for 2016.

Highlights of the drilling include a 68% higher grade of 5.24 g/t compared to the entire Komana East pit that averages 3.12 g/t; a 15% increase in the like for like grade over the grade control orientation panel to 5.24 g/t Au; and confirmation of a high-grade zone of 12 200 tonnes at 7.7 g/t Au. In addition, the drilling has confirmed consistent mineralised host rock unit and mineralisation control through-

out the southern mineable area of the Komana East pit.

Comments Dan Betts, CEO of Hummingbird Resources: "The analysis of the infill drilling taken from a section of the first year mining pit at Komana East has shown a consistent increase in grade. This is excellent news, and if continuous throughout the pit could provide significant economic upside to the already robust project credentials of Yanfolila. We intend to execute a close spaced grade control drill programme across the deposit to confirm these higher grades, prior to the commencement of mining.

"On a wider level, plant earthworks are ongoing at Yanfolila and we look forward to updating the market further as we develop Yanfolila as a leading high-grade, low cost gold mining project in West Africa." ■

Tango to acquire BK11 mine in Botswana from Firestone

Tango Mining, listed on the TSX Venture Exchange, has entered into a 'Sale of Shares and Claims Agreement' with Firestone Diamonds in terms of which it will acquire the BK11 diamond mine in Botswana.

The BK11 mine is a past producing diamond project located in the Orapa District of Botswana. Nearby operations include Debswana's Orapa, Letlhakane and Damtshaa mines and Lucara's Karowe mine.

Tango is currently preparing a comprehensive development strategy to reactivate the open-pit mining operation. Tango says that it recognises that by employing autogenous milling, as has been successfully implemented at Karowe, the mine could achieve improved liberation of diamonds and reduce the probability of diamond damage. It could also provide for lower operating costs relative to conventional techniques.

Prior to the BK11 mine being put on care and maintenance in February 2012, total expenditures in excess of US\$45 million had been invested in capitalised pit development and the processing plant and infrastructure. The BK11 kimberlite has a surface area of 9.8 hectares. There are excellent paved roads and water supply in the area and power is available from the national grid.

"Our acquisition of the BK11 mine is another major milestone for Tango following its acquisition of the African Star Minerals Group in October of last year," says Terry L. Tucker, Executive Chairman of Tango. "The acquisition will build on our existing portfolio of mining properties and mining service contracts in South Africa. Together with our Oena project, our producing alluvial diamond property located in South Africa, the BK11 mine acquisition will ensure Tango's presence as a diamond producer in a region renowned for its ability to maintain low cost and high yield diamond producing mines." ■



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True Gold's Karma site now a hive of activity



Construction underway at Karma late last year. The site has progressed considerably since then (photo: True Gold).

Canada's True Gold Mining Inc, listed on the TSX-V, which is developing the Karma gold project in Burkina Faso, reports it has drawn down an additional US\$14 million of the US\$100 million financing from Franco-Nevada (Barbados) Corporation and Sandstorm Gold Bank Ltd. This is the third draw down that True Gold has made under the facility, bringing the total

amount drawn to US\$71,6 million.

True Gold says that construction at Karma remains on schedule with the planned placing of ore on the heap leach pads in early 2016 and first gold pour anticipated for the end of Q1-2016.

Christian Milau, President and CEO of True Gold, stated, "There is an atmosphere of excitement on site with a workforce of

over 500 focusing on earthworks and the processing plant final assembly. We have progressed rapidly with site development and construction, highlighted by commissioning of the mine fleet, completion of the raw water pond excavation and initial construction of the raw water pipeline."

Excavation of the Pregnant Leach Solution (PLS) pond has commenced, stripping of Cell 1 of the heap leach pad has been completed and assembly of the hard rock crusher has begun. Assembly of the Absorption, Desorption and Refining (ADR) plant structural steel has also started. The mine fleet of six Komatsu 785 trucks, a PC 3000 excavator and a WA800 loader has been commissioned.

Located 185 km north of Ouagadougou, Burkina Faso's capital, Karma is a technically simple open-pit, heap leach mine which will produce an average of 97 000 ounces a year over an eight-and-half-year mine life (although further phases of development are anticipated). The project has a capex of US\$131,5 million with the estimated payback period being just 16 months. South Africa's SENET is the EPCM contractor. ■

Diesel Power awarded Elandspruit contract

Wescoal Mining has appointed Diesel Power Open Cast Mining as the mining contractor for its new Elandspruit mine near Middelburg in Mpumalanga. Mining activities have commenced and Elandspruit will produce its first Run of Mine during July 2015.

The mining division is on track to produce approximately 335 000 tons of Run of Mine (ROM) per month during the final quarter of the current financial year. This is equivalent to approximately 4 Mt ROM on an annualised basis.

The Water Use Licence for Elandspruit was secured early this year and the official opening of the mine will take place in August. The facility will eventually double Wescoal's mining output and is fundamental to the continued growth, sustainability and profitability of the Group with 80 per cent of its production supplied to Eskom through long-term contracts. ■



Employees receive training on one of the newly commissioned Komatsu 785 haul trucks. The mine has a fleet of six of the trucks (photo: True Gold).

Golden Star gets 'green light' for open-pit mining at Prestea

Gold miner Golden Star Resources, which has offices in Toronto and Accra, reports that it has secured the necessary permits to develop open-pit operations at its Prestea mine in Ghana.

The surface deposits to the south of the Prestea underground mine are host to 122 000 ounces of non-refractory mineral reserves at an average grade of 2,24 g/t Au. These surface operations are expected to be in production by the end of 2015, a year earlier than production from Prestea was initially anticipated. Combined with the redevelopment of underground operations, Prestea has the potential to deliver in excess of five years of low cost production.

The environmental permit was issued by the Ghanaian Environmental Protection Agency after Golden Star undertook extensive impact assessment studies and

local community consultations.

Prestea South has not been mined to date and an investment in the haul road will be required to bring the project into production. The existing contractor's fleet at Bogoso will be used to haul this oxide ore 16 km to the Bogoso non-refractory plant where processing will take place.

Commenting on this development, Sam Coetzer, President and CEO of Golden Star, said: "The awarding of this permit is welcome news and will enable us to start exploiting the considerable potential of our Prestea concession. Developing Prestea South is the first step towards our corporate strategy of transitioning into a higher margin non-refractory gold producer. We expect to update stakeholders with a new full year mine plan in the third quarter of 2015." ■



Headgear of the Prestea underground mine in Ghana, one of the oldest mines in the country. Golden Star is planning an open-pit operation on the Prestea property (photo: Golden Star).

RSV Group announces senior appointments

Consulting engineering and project management company Read Swatman & Voigt (RSV) has announced the appointment of **Rein Koelmans** as its new Chief Executive Officer (CEO). This is in addition to his existing appointment as CEO of RSV SA. He succeeds **Hennie Read**, who was one of the founders of RSV in 1991, who will now concentrate on his portfolio as Executive Chairman of the RSV Group companies.

Koelmans is a professional engineer registered with the Engineering Council of South Africa (ECSA) and has more than 30 years of experience within the mining industry. His career in mining started in 1979 and he progressed to senior management level during 1981, overseeing mining operations and becoming GM of a large chrome mining operation with Samancor, BHP Billiton, for a period of six years. He also

spent a year in the Samancor head office as Manager Strategic Projects.

He joined RSV as a Senior Mining Consultant and has progressed from Project Manager to Project Principal, Project Director and currently COO for the Platinum and Base Metals portfolio of projects.

During his time at RSV he has been involved in numerous mine design projects, project reviews, feasibility studies, study reviews and Competent Persons Reports and has managed the K4 project valued at R2 billion.

RSV has also announced that **Derek Naude** has been appointed as Technical Director and **Debbie von Ahlefeldt** as Finance Director.

Naude, a qualified mechanical engineer, currently holds the position of COO for RSV and head of Engineering & Technology. His

past positions have included being Design Manager for the owner's team on the South Deep Twin Shaft project. At the completion of this project in 2004, he joined RSV and worked as the Engineering Cluster Manager for the Impala No 16 Shaft project. In 2008 he joined a prominent shaft-sinking company heading up their design office as Manager of Engineering in North Bay, Canada.

He returned to RSV's Engineering and Technology department in 2009 where he has managed numerous key technical projects including the SBS project and Resolution Copper. Ultimately, he was the Project Principal for the three Oyu Tolgoi shaft projects completed by RSV.

Von Ahlefeldt is a professional accountant with some 30 years of financial experience. She has been with RSV for 16 years and is responsible for all the financial departments within the RSV Group. ■



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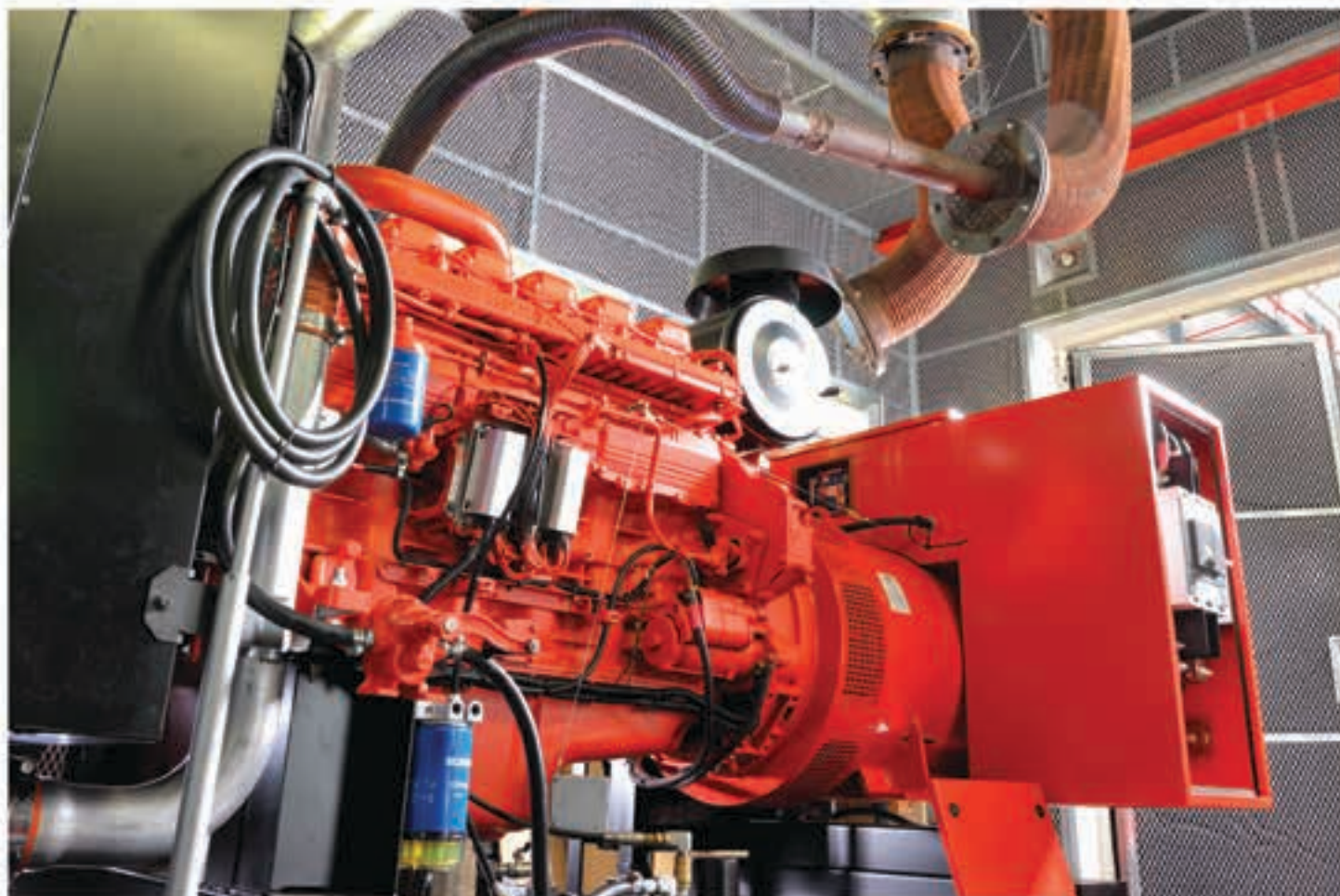

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Ramp-up of First Quantum's Zambian copper smelter ahead of expectations



The new smelter is situated at the Kansanshi copper mine in Zambia (photo: First Quantum).

First Quantum Minerals (FQM) says that the ramp-up of its new copper smelter in Zambia continues to progress well ahead of expectations.

Since the start of hot operations in mid-February 2015, daily throughput of copper concentrate has steadily increased, with the daily copper concentrate throughput currently averaging 3 000 tonnes with periods in excess of the 3 500 tonnes per day nameplate capacity.

Feed to the smelter currently comprises a mixture of stockpiled and fresh concentrate from FQM's Kansanshi mine and fresh concentrate from the group's new Sentinel mine.

The benefits to Kansanshi are increasing as the ramp-up progresses. Its concentrate inventory has been reduced to 29 600 tonnes of contained copper from 59 900 tonnes at the end of the first quarter of 2015. Over 180 000 tonnes of sulphuric acid have been produced by the smelter and used in Kansanshi's oxide and mixed circuits. The mine's C1 cost of production has been lowered to between US\$1,36 and US\$1,25 per pound from an average of US\$1,77 in the first quarter of 2015.

Given the progress to date, commercial production is expected to be declared in the third quarter of 2015 – ahead of the previous expectation of the first quarter 2016.

"We are very pleased with the performance of the smelter. The achievement of over 100 % of nameplate capacity in just three months from start-up is unprecedented. It is a credit to the design and project teams and illustrates the strong capabilities of the operations management and staff," noted Philip Pascall, First Quantum's Chairman and CEO.

"The smelter's value to our Kansanshi mine in particular is already very evident. For the first time in several years, the mine is able to operate without the constraints of limited availability and widely-fluctuating sulphuric acid prices and the lack of smelter capacity in Zambia.

"At our new Sentinel mine, commercial production on the entire facility is expected in the third quarter 2015 following delivery of the full power requirement which is on track for August. This, together with the smelter, will complete a significant phase in the expansion of our production capacity," Pascall concluded. ■

Acacia Mining appoints Chief Operating Officer

LSE-listed Acacia Mining, which operates the Bulyanhulu, North Mara and Buzwagi gold mines in Tanzania, has announced the appointment of Michelle Ash as Chief Operating Officer (COO).

Ash joined Acacia in October 2013 as Executive General Manager, Business Improvement and Planning and has driven

significant change across the company's operations in that time. She has more than 20 years of experience within the mining and manufacturing industries across a range of senior roles including Head of Alliance Planning and Co-ordination for the BHP Mitsubishi Alliance and General Manager Strategy for MMG. ■

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Cummins opens 'state-of-the-art' distribution facility

Service delivery and overall customer satisfaction across the Cummins supply chain in Southern Africa are set to dramatically improve, following the official opening in early July of the 20 000 m² state-of-the-art Cummins Regional Distribution Centre (RDC), Filtration and Coolant manufacturing plant in Johannesburg.

Cummins Supply Chain Director for Africa Ged Mackell says the new purpose-built facility is part of Cummins' global strategy to move its resources closer to its customers. This Southern Africa Regional Distribution Centre for parts and filters covers 10 000 m², while the engine and generator storage warehouse

covers a further 6 000 m² area.

"In addition, we are introducing a best-in-class coolant blending plant and air filter manufacturing plant that comprises 4 000 m² of the facility. The plant will also be home to the environmentally-friendly Fleetguard ES Compleat™ organic acid technology (OAT) coolant formulation," says Feroze Chowdary, Director of Africa Components.

Mackell states that the need for the RDC, located in Waterfall Commercial Park, was realised as a result of a strategy network study conducted by Cummins Africa. "The study revealed that, in order to support our forecasted growth on the African continent, Cummins would have to invest in supply chain capacity and capability that will be resilient, competitive and creates preference for Cummins by our current and future customers," he says.

Construction of the RDC took one year, and Mackell is confident that it will enhance the company's capabilities in Africa, allowing it to optimise customer service, inventory and logistics costs. "The Southern Africa RDC will vastly improve service offerings across the region through enhanced stock availability, shorter lead times, lower end-to-end logistics costs, and value-added logistics solutions. The RDC has also facilitated the consolidation of various distribution points under a single roof." ■



Inside the newly opened Cummins Regional Distribution Centre (photo: Cummins).

Kabwe testing confirms viability of leaching process

London-based, AIM-listed Berkeley Mineral Resources (BMR), which is planning to exploit the tailings deposits at the Kabwe mine site in Zambia, reports that the metallurgical test programme (announced in April 2015) on the Wash Plant Tailings (WPT) and Leach Plant Residue Tailings (LPR) using an acid/brine leaching process to recover lead and zinc has been successful.

The metallurgical testing was conducted by Kupfermelt at its laboratory in South Africa, under review by Dr Geoff Casson, General Manager of BMR's Zambian subsidiary, Enviro Processing Ltd.

The results demonstrated high metal recoveries from both the WPT and LPR of circa 80 % Pb, 70 % Zn, and 80 % Pb, 50 % Zn, respectively, into a pregnant liquor solution from which both lead and zinc could be extracted by precipitation and

also zinc alone by electro winning.

Liquid residue discharges from the process were non-toxic.

As a result, BMR says it is able to establish the mass, pulp and water parameters required for the construction of the planned pilot plant at Kabwe. It is therefore now focusing on the design and construction of the pilot plant and intends to source the majority of requisite equipment in-country.

The company has contracted JA Consultancy, based in Lusaka, Zambia, an environmental specialist organisation, to prepare, present and assist in securing approval for a further Environmental and Social Impact Assessment (ESIA) from ZEMA (Zambia Environmental Management Agency).

JA Consultancy is led by Dr Jewette Masinja, who obtained an MSc in Minerals Engineering at Birmingham University

and a PhD in Mineral Processing at the University of Queensland, Australia.

BMR believes that Dr Masinja and his team are particularly well qualified to secure ZEMA's approval for the planned pilot plant within the requisite time frame, having undertaken similar projects with a track record of successfully securing approvals from ZEMA.

BMR has also announced that it has engaged the services of Edward Musonda, an experienced metallurgist, to work under the direction of Dr Geoff Casson on the process design of the Kabwe pilot plant.

Musonda holds a Bachelor of Mineral Sciences degree in Metallurgy and Mineral Processing from the University of Zambia and has over 20 years' experience in mineral processing of gold and base metals with Anglo American, Gold Fields, Bateman Engineering Projects and ZCCM Investments Holdings (ZCCM). ■

Improved recoveries from test work on Fair Bride ore

AIM-quoted Xtract Resources announced on 29 June 2015 that it had agreed to acquire 100 % of the Fair Bride gold project from Auroch Minerals. The project is said to be 18 months from production and six months from the completion of a Bankable Feasibility Study (BFS).

At the time of the announcement in June, it was reported that recoveries of greater than 80 % in the sulphide ore had been achieved from test work to date but that further optimisation work was underway. The results from this optimisation work commissioned by the Auroch team have been received and the following is highlighted:

- ❑ 737 kg of diamond drill core from the Fair Bride sulphide zones were shipped to Nagrom laboratories in Perth, Western Australia in May 2015;
- ❑ the objective was to confirm and expand on the earlier flotation and gravity pre-concentrating testing done on Fair Bride ore in 2006;
- ❑ the sample was ground to P90 -0,075 mm and then four screening tests, using different reagent suites, were undertaken to determine the best conditions for a bulk flotation run to produce the required samples;
- ❑ recoveries of between 91 % and 94 % were achieved in comparison to previous work where recoveries of just over 80 % were achieved;
- ❑ the recoveries were achieved on a mass pull of between 9 % and 13 %.

Commenting on the test work results, Jan Nelson, CEO, said: "The flotation results commissioned by the Auroch team show a considerable improvement in recoveries of sulphide zone ore. This will impact significantly on the potential revenues that the project could generate. Lower mass pull results recovering more than 50 % of the gold at less than 10 % and gravity concentration at a coarser grind recovering up to 70 % of the gold at a much reduced energy consumption are expected to substantially reduce the cash costs of the project. This clearly highlights the quality of this project and the potential returns Xtract could generate from this project." ■

Financing raised for lithium/tantalum project in Zimbabwe

AIM-traded Premier African Minerals has raised £450 000 through the issue of new ordinary shares to finance commencement of early development at its Zulu lithium and tantalum project in Zimbabwe.

George Roach, Premier's CEO, commented: "Following an unsolicited approach, the company is pleased to have completed this direct placement intended primarily to develop the Zulu lithium and tantalum project (the Zulu project), which is a pegmatite with massive lithium mineralisation. Orebodies such as this lend themselves to rapid development through pilot plant production both as an exploration tool and as a revenue producer. The investor support is gratifying and an endorsement of the Board's strategy and will support rapid development of this project."

Zulu is located in south-central Zimbabwe. An historical exploration target estimation of the lithium mineralisation by Rhodesian Selection Trust suggested that 1,4 million tonnes of pegmatite at a possible grade of 1,4 per cent LiO₂ could be present. Two types of pegmatite have been identified in the area; both have estimated grades of 1,2 % lithium.

Premier is also currently developing the RHA tungsten project in north-west Zimbabwe. The plant at the RHA site has been commissioned and has been running on a 24-hour continuous production cycle since 26 June. First commercial shipments of product are expected to start this month (July). ■

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DSO discovery a potential 'game changer' for Tawana

Tawana Resources, based in Perth, Western Australia, which is developing the Mofe Creek iron ore project in Liberia, has announced the discovery of new high-grade Direct Shipping Ore (DSO) haematite mineralisation, averaging 62,8 % Fe and up to 66 % Fe, located a short trucking distance from the operating port of Freeport, Monrovia.

Additionally the company has discovered greater than 2,2 km strike of friable itabirite mineralisation in the Goehn prospect as part of its ongoing low-cost exploration strategy over its recently acquired, 100 %-owned Mofe Creek South licence.

The new zone of DSO haematite mineralisation occurs within the Goehn South East (SE) prospect, within a broader >550 m strike length of friable, coarse-grained itabirite, with potential for additional strike extensions.

Executive Chairman and Chief Executive Officer Wayne Richards said: "This target represents the highest grade, continuous

zone over multiple samples, of DSO haematite mineralisation discovered within the project area to date. It represents a fantastic result for the company and an exciting potential low-cost, early development opportunity within short trucking distance to the operational port of Monrovia.

"The combination of a new DSO hae-

matite discovery within the Mofe Creek project area and the recently announced port infrastructure MoU signed with WISCO-CAD significantly enhances the potential for a low-capital intensity, early start-up DSO trucking operation. This is a potential game-changer for both the project and the company." ■

Afarak starts bulk sampling at Vlakpoort chromite mine

Afarak Group reports it has commenced bulk sampling at its Vlakpoort open-pit mine in South Africa. The total open-pit measured, indicated, and inferred resources are estimated at 1,9 Mt of chromite, with a life of mine for the open pit of five years. The company expects to ramp up to full production in 2016, once the submitted mining right has been approved.

The mine is located on the farm Vlakpoort 388KQ, close to the mining town of Northam in Limpopo Province. Afarak acquired the Vlakpoort property and

prospecting surface right in 2013.

Afarak Group is a chrome mining and minerals producer focused – it says – on delivering sustainable growth with a speciality alloys business in southern Europe and a ferro alloys business in Southern Africa. Apart from Vlakpoort, its assets in Southern Africa include the Stellite chrome mine, the Mecklenburg mine and the Mogale Alloys processing plant in South Africa and the Waylox mine development project in Zimbabwe. The Group is listed on NASDAQ OMX Helsinki and on the LSE. ■

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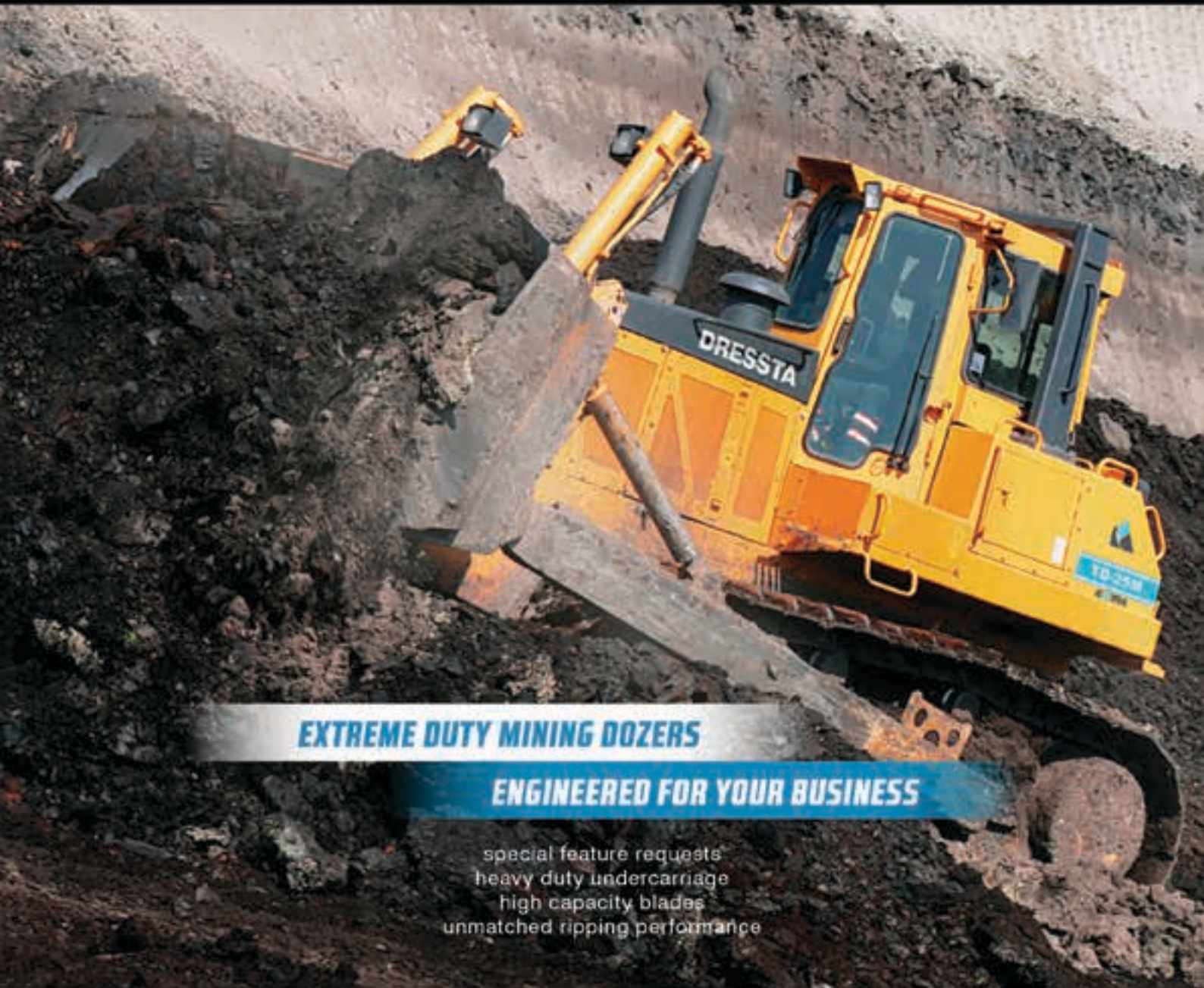


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Logistics expert joins Tanzanian Royalty



Mining activities in the South pit at Buckreef (Photo: Tanzanian Royalty).

Canada's Tanzanian Royalty Exploration Corporation (TRX) has appointed Jeffrey R. Duval as its new Vice President of Project Logistics. He brings to the company over a quarter-century of experience working with some of the largest construction firms in the US south-west.

Tanzanian Royalty is currently developing a pilot mine operation based on the Buckreef South prospect at its Buckreef gold project in Tanzania but is ultimately aiming to develop what it calls the 'Buckreef Mega-Pit'. Four heap leach pads and a 6-tonne capacity Carbon-in-Column (CIC) gold adsorption plant have been constructed at the site as part of the pilot mine development.

"I am delighted to be part of the growing TRX team," says Duval. "As it happens, I had been following the company and its CEO, Jim Sinclair, for many years. I look forward to the challenge. Tanzania is over double the size of California and the target sites that Jim presented to shareholders at the AGM are by no means contiguous. Planning and logistics are important. I was especially impressed by the 'attack plan' Jim designed to pull cash flow out of several smaller target sites first, so we can use the proceeds, sequentially, to assist in financing our build-outs as we move closer and closer to the Buckreef Mega-Pit.

"Of course, the company has just completed construction of what is called a basic heap leach plant; and, as we work our way

toward the Buckreef Mega-Pit, multiple CIL units will also be needed. An alternative is to design a modular unit that is portable, and I do fully intend to explore this option as well.

"CIL design has the ability to process not merely the oxide type of extracted material but also the sulphide type," he continues. "To have both facilities available – the CIC and the CIL – makes the company extremely flexible on a go-forward basis, and speaks to the scope of the long-term plan that Jim presented. Bottom line, we are looking to get the best efficiency, the best costing, and the most precise scheduling that is available.

"The future? All roads ultimately lead to the Buckreef Mega-Pit. I roughly estimate that the Mega-Pit would require a plant of approximately five times the size of the facility currently processing material for us at our launch site. That is a staggering number to imagine. I sincerely believe this is a company with a very exciting future indeed."

The Buckreef gold mine re-development project was acquired from the Tanzanian State Mining Company (Stamico) in December 2010. Under a Heads of Agreement concluded with the state-owned company, Tanzanian Royalty has the right to earn a 55% interest in Buckreef with Stamico holding the remainder.

The project is located in northern Tanzania immediately to the south of Lake Victoria and 110 km south-west of Mwanza. ■

Earthworks at Liqhobong impact on project schedule

In an update on its Liqhobong mine development project in Lesotho, Firestone Diamonds plc, the AIM-quoted diamond development company, says initial production from the new mine is now expected during Q4 2016 rather than the end of H1 2016 as previously anticipated.

Firestone says it was able to get ahead

on a number of work streams across the project before the start of the 2014/2015 summer rainy season. However, gains made against the schedule at this early stage were reversed by the impact of an increase in the quantity of overburden to be removed from the primary crusher and plant terraces. ■

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Roxgold mobilises mining contractor to Yaramoko

Roxgold Inc, listed on the TSX-V, has mobilised its underground mining contractor, a subsidiary of African Underground Mining Services (AUMS), to its Yaramoko gold project in Burkina Faso, West Africa. The previously announced mining services contract entered into with the underground mining contractor has an initial term of four years and includes the provision of a mining fleet and skilled labour force.

As previously announced, African Underground Mining Services Ltd (AUMSG) will make an initial investment in the company of US\$5 million by means of a non-brokered private placement. Upon closing of the private placement, AUMSG will hold approximately 3% of the issued and outstanding common shares of Roxgold on an undiluted basis.

“We are very pleased to welcome

AUMSG as a shareholder of Roxgold,” comments Paul Criddle, Roxgold’s Chief Operating Officer. “The alignment of interests between Roxgold and a key contractor bodes well for the smooth operation of the Yaramoko gold project, development of which has been progressing very well.”

AUMS is a joint venture between Ausdrill Limited, a leading international mining services business, and Barmenco Limited, a specialist underground mining contractor.

Yaramoko, which is costing US\$110,8 million to develop, will have an estimated average annual gold production of nearly 100 000 ounces over an initial mine life of 7,4 years at an all-in sustaining cost of US\$590/oz. The average mill feed grade is expected to be 11,59 g/t with the average gold recovery being 96,9%.

The EPC contractor tasked with delivering the 270 000 tonnes per year processing plant and related infrastructure is a DRA/Group Five joint venture. ■



Earthworks in progress for the boxcut at Yaramoko (photo: Roxgold).

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Pickstone-Peerless gold mine heads for production

Vast, the AIM-listed resource and development company, reports that strong progress is being made in advancing the Pickstone-Peerless gold mine in Zimbabwe into production in August 2015. The mine is being commissioned, with an estimated annualised gold production of around 10 000 ounces expected from the targeted initial mining rate of 10 000 tonnes of ore per month from the opencast oxide gold cap.

The first two blasts, one at the Pickstone opencast pit and the other at the Peerless opencast pit, have taken place. The crushing circuit, consisting of a primary crusher, two secondary crushers and a cone crusher, is complete and has been commissioned. This has released additional construction personnel who will now be allocated to the milling circuit and the carbon-in-leach/carbon-in-pulp tanks. The electrowinning and gold production facility is complete. ■



The primary crusher at Pickstone-Peerless, which has now been commissioned (photo: Vast).

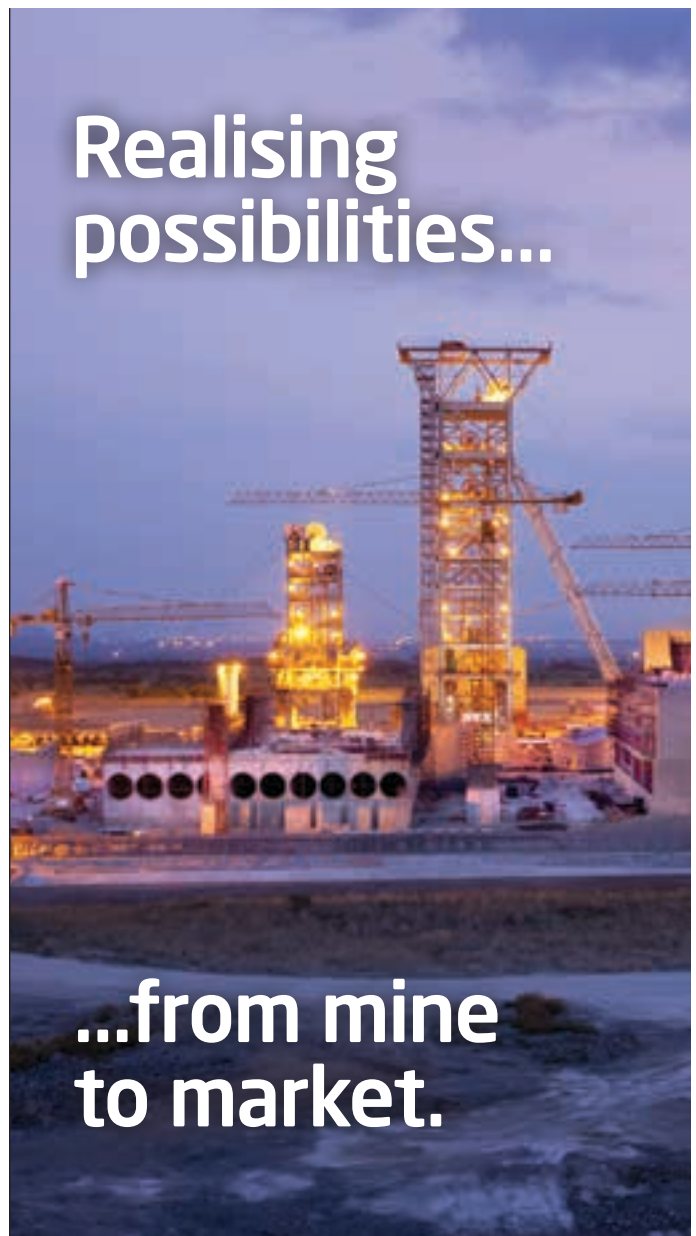
Rio Tinto completes sale of its Zimbabwean interests

Rio Tinto has completed the sale of its 78 % interest in Murowa Diamonds and its 50 % interest in Sengwa Colliery Ltd to RZ Murowa Holdings Limited. It says it believes that the future of these assets can be best managed by entities with existing interests in Zimbabwe.

RioZim Limited, an independent Zimbabwean mining company listed on the Zimbabwean Stock Exchange, already holds a 22 % interest in Murowa Diamonds and a 50 % interest in Sengwa and will assume the overall management of both entities.

Rio Tinto Diamonds and Minerals Chief Executive Alan Davies said: "Rio Tinto remains committed to the diamond industry and is focused on operating its two world-class underground mines whilst obtaining the approvals for its advanced diamond project in India."

The Murowa diamond mine is an open-pit mining operation located near Zvishavane in south-central Zimbabwe. Production from Murowa began in 2004 and the mine reportedly produced 344 000 carats in 2014. ■



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Sandvik forges ahead with dry

Sandvik Mining has successfully partnered with the Petra Diamonds Group to introduce state-of-the-art dust suppression technology on the Sandvik DD210L low-profile single-boom electro-hydraulic drill rigs it has supplied for dry drilling operations. Petra's Cullinan mine in Gauteng has five of the units operating.

The Sandvik DD210L is designed to work in excavations with headroom as low as 1,7 m. The robust universal boom has a large optimum shaped coverage, 360-degree rotation and full automatic parallelism for fast and easy face drilling. The boom can also be used for cross-cutting, with a hose layout specifically designed to maximise protection in low headings. The exceptional 'V'-shape layout is designed for good visibility and balance, while a powerful four-wheel-drive articulated carrier ensures fast and safe manoeuvring, even in low headroom conditions.

The high performance drilling system allows high drilling performance with good drill steel economy and high machine reliability. The operator environment and added automatic functions allow the operator to concentrate on safe, fast and accurate drilling. All the service points are well protected, but within easy access.

Dry drilling is the method of choice in many local underground rock drilling applications in kimberlitic ground, compared to the use of water in the drilling process. This is because water degrades the composition of kimberlite ore, causing it to swell and potentially destabilising working conditions. However, stringent health and safety legislation demands the proper control of the dust generated during dry drilling, creating an increasing demand for efficient dust collector systems for underground use.

"We originally introduced ILMEG dust suppression technology mounted on our DD210L mobile drill rigs as a trial at just one of Petra Diamond Group's mines and, based on its success, we later introduced more units," says Salties Pule, Sandvik Mining Business Line Manager for Underground Drills. "Our partnership with ILMEG has led to a complete solution for customers drilling kimberlite rock and positioned us as a market leader in terms of commercialising this combination of technologies.

"Petra Diamonds has been very supportive

"Petra Diamonds has been very supportive in trialling and implementing this technology and we made sure that we had a deep understanding of the customer's challenges."

**Salties Pule,
Sandvik Mining**



The Sandvik DD210L is designed to work in excavations with headroom as low as 1,7 m.

in trialling and implementing this technology and we made sure that we had a deep understanding of the customer's challenges. As a result, we've been able to meet their needs very well and have recorded excellent results, notably advancing between 80 m and 100 m in the first month of operation. This has led to repeat orders and, having proved the combined technology at these mines, we expect a knock-on effect from the rest of the diamond mining industry."

The ILMEG dust control system is based on the company's well known X-series dust collectors and features a newly developed cuttings collector which is mounted in front of the drill feed. This system was specifically developed for the rock drilling industry and can be mounted on any rock drilling rig being used for dry drilling.

Prior to the introduction of the Sandvik/

drilling technology at Cullinan



ILMEG dry drilling solution, Cullinan mine used a different system on normal drilling machines. However, Andre Cloete, Mining Manager Projects – Cullinan Diamond Mine, says Sandvik ‘blue’ development machines were the preferred choice since they are fit for purpose.

“We realised that we needed to upgrade our technology to achieve better safety, productivity and cost per metre savings in order to remain competitive in this market,” he says. “We partnered with Sandvik Mining, as we have an established relationship with them for the supply of other equipment and because of the service we have been receiving from the Sandvik team.

“The low profile Sandvik DD210L drill rig allows easy access to the working area and rapid advancement of the tunnels. It is uncomplicated to operate and has good



The drilling system allows high drilling performance with good drill steel economy and machine reliability.

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ergonomics. This technology has contributed to putting us ahead of our tunnel development schedule, despite unplanned delays.”

In addition to a new Sandvik DD210L drill, Cullinan has also ordered a Sandvik DS210 low-profile roof bolter designed for mechanised installation of standard rock bolts. Up until now, all supports have been carried out with conventional practices, but the introduction of the new roof bolter will effectively mechanise this requirement, making

operations safer whilst increasing the net bolt installed per hour.

Sandvik Mining says it is differentiated in the global marketplace by being customer focused and innovative. The current positive results of the dry drilling project are based on working together with customers such as Cullinan Diamond Mine, firstly to understand their challenges and, secondly, to achieve results based on the principles of environment, health and safety. ■

The DD210L is equipped with a universal boom offering large optimum shaped coverage, 360-degree rotation and full automatic parallelism for fast and easy face drilling.



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Namoya continues ramp-up to commercial production

Reporting on its activities in the second quarter, Canada's Banro Corporation says that its new Namoya gold mine in the DRC continued to ramp up toward commercial production levels, achieving stacking levels greater than 140 000 tonnes of agglomerated ore in June.

Designed as a hybrid gravity/CIL and heap leach operation, the Namoya mine poured its first gold in Q4 2014. The property lies at the southern end of the Twangiza-Namoya gold belt in Maniema Province, 225 km south-west of Bukavu, and consists of one PE (Exploitation Permit) covering an area of 174 km². Alluvial gold was first discovered in the area in 1930 and was mined between 1931 and 1947. Primary gold was also discovered during this period and underground mining on the Filon 'B' deposit began in 1947. Formal mining ceased in the 1960s, only recommencing with Banro's development of the present mine.

During wet commissioning of the process plant last year, it became apparent that the efficiency of the CIL circuit was being hampered by the quantity of fines content in the ore, as it exceeded the design capacity. The company determined that the best solution to the problem

was to acquire an agglomeration drum to run the mine as an agglomerated heap leach operation while pursuing options to best utilise the CIL plant to process the fines material. An agglomeration drum was procured in the fourth quarter of 2014 and installed in January this year.

In its quarterly report, Banro says that – as previously reported – a delay in financing resulted in a need to modify the mine plan to allow for the pre-stripping of the Kakula reserve pit. This modification impacted ore availability early in the second quarter as the mine fleet focused on waste removal in order to allow for increased access to mining faces when the first additions to the mobile fleet were commissioned in late May. This contributed to a decrease in the stacking level in April to 57 211 tonnes, which subsequently increased to 130 974 tonnes in May and 142 082 tonnes in June.

The significant decrease in stacking levels from March's 103 163 tonnes to the much lower April figure was also driven by the adverse impact of unseasonably high rains which interrupted supply routes and the ability to deliver procured materials and supplies.

The availability of ore from mining activities and the available medium grade stockpile material resulted in the stacking of ore with an average grade of 1,52 g/t Au.

According to Banro, Namoya management is

The processing plant at the Namoya site.



continuing to implement process modifications and upgrades, which are resulting in significant progress toward steady-state operating levels. Namoya poured 3 114 ounces in April, 3 315 ounces in May and 4 096 ounces in June, for a second quarter 2015 total of 10 525 ounces of gold.

During the second half of June and early July, Namoya achieved stacking rates in excess of 5 000 tonnes per day (tpd) and this is expected to increase to over 6 000 tpd by the end of July.

As Namoya progresses through the third quarter of 2015, the commissioning of the second stage of the additional mobile fleet, which is now on site, and delivery of the currently procured third stage, will allow the operation to advance more quickly with a number of mining activities, including waste stripping which was re-sequenced following the delay in financing. Banro says this will result in improved ore access in multiple pits, allowing the mining team to effectively drill, blast and mine ore and enable the delivery of ore at an average grade consistent with or above the average reserve grade in the latter half of the third quarter and into the fourth quarter. These activities will in turn support continuous increases in stacking rates following the commissioning of process upgrades early in the third quarter.

Banro points out that heap leach operations require several months of continuous percolation to fully recover the leachable gold. Thus, the process advancements from the second quarter, together with ongoing improvements to the heap leach circuit, are projected to result in monthly gold production of about 9 000 ounces once steady-state operating levels are achieved during H2 2015.

Taking into account production at Namoya



The Namoya mine camp with employee housing, canteen and some offices.

during the first six months of the year, together with the impact of delays in mobile equipment financing and the resulting delivery timelines on the ramp-up of Namoya, Banro has updated expected 2015 gold production from Namoya to a range of 60 000 to 70 000 ounces.

Banro's other mine in the DRC, Twangiza, located nearer to Bukavu at the other end of the Twangiza-Namoya gold belt, began commercial production in 2012. During the second quarter, it produced 34 325 ounces of gold, a 60 % increase over Q2 2014, for year-to-date production of 70 268 ounces of gold. For the second consecutive quarter, throughput at the Twangiza process plant achieved 101 % of the 1,7 Mt/a annualised design capacity. This throughput achievement includes processing an average of 43 % non-oxide material at an overall average process recovery of 82,2 %. Based on Twangiza's strong Q2 performance, Banro's guidance for full year production from the mine is between 115 000 and 125 000 ounces.

Commenting on the Q2 results, Banro President and CEO John Clarke said: "Twangiza continued to perform well through the quarter. Performance levels are stabilising as the mine continues to process increased levels of non-oxide material. Mine management is continuing to build on the achievements to date, with a particular focus on optimising operations at Twangiza. Namoya's operational performance progressively improved during the second quarter as capital equipment was commissioned. Namoya continues to achieve improved ore production and stacking rates and is now well-positioned for continued incremental improvements as it builds toward commercial production levels in Q3 2015."

Photos courtesy of Banro Corp

"Namoya's operational performance progressively improved during the second quarter as capital equipment was commissioned."

***John Clarke, CEO,
Banro Corporation***



Resilient Mupane alive

*Some mines, like old soldiers, never die. An example is Botswana's Mupane gold mine near Francistown which poured its first gold in late 2004. Currently Botswana's sole gold producer, the mine was developed on the basis of a six-year mine life but more than 10 years later it is still operating and has a new five-year plan in place (with reasonable prospects for this lifespan to be extended). **Modern Mining's** Arthur Tassell recently spoke to Charles Byron, a Director of Galane Gold, owner of the mine, to learn more about what lies ahead for Mupane – and also Galane's plans to extend its operations to South Africa via the acquisition of Galaxy Gold Mining.*

No one has a better knowledge of the Mupane operation than Byron, who is also the Chief Geologist of Galane Gold. He led the team that discovered the Mupane deposit in 1998 and has been associated with the asset ever since, notwithstanding three changes in ownership over the years. He

is an expert on the geology of the Tati Greenstone Belt and has been largely responsible for Mupane Gold Mining, Galane's subsidiary in Botswana, acquiring virtually all the prospective ground in the Tati area, including past producing mines such as Monarch and Shashe. As Byron says, "We control 90 % of the Tati Greenstone Belt and 100 % of the best parts."



of 1,69 g/t. The total cash cost was US\$960 per ounce (excluding royalties) and net earnings after tax amounted to US\$1,87 million. The level of gold production was somewhat lower than anticipated for the year (and roughly 8 000 ounces down on the 2013 figure), mainly as a result of a SAG mill motor failure, now resolved.

Originally the mine depended on several pits at the Mupane site itself, 30 km south-east of Francistown, but these have now been largely worked out, leaving the mine reliant on several satellite deposits such as Golden Eagle, 20 km from the Mupane mine site, stockpile material and an underground resource below the Tau pit, Tau being one of the original ore bodies discovered by Byron and his team.

Galane is already well advanced with the development of an underground mine at Tau. Explaining the project, Byron says it will exploit a measured and indicated resource of 128 600 ounces of gold. “The plan is to mine this ore – which has a grade of 3 g/t and better – at a rate of up to 30 000 tonnes/month over the next three-and-a-half years to produce approximately 100 000 ounces of gold. The mining method to be used is long-hole stoping. Access is provided by two portals at different levels off the side of the pit which link in to a zig-zag decline, which is still being developed down to the ore body. We expect to be in a position to start stoping in the third quarter of this year, although some ore is already coming through from the development work. We’ve contracted out all the underground mining to Minetech, which is a Botswana-based company. Their mining manager is Steve Venn who has a wealth of experience in mining the

Above: The screening plant was commissioned last year to handle stockpiled low grade material amounting to 700 kt at 0,97 g/t.

Left: The Tau pit showing the portals – at 880 m and 840 m – to the underground mine.

and well

Byron – whose home is in Francistown – forms part of a ‘hands on’ Mupane management team that includes GM Wayne Hatton-Jones, who has 26 years of experience in Africa, Asia and Europe in gold mining and Processing Manager Geoff McLoughlin, a metallurgist with 29 years of experience in operations and plant design. Galane itself is a TSX-V listed company and is headed by Chairman Ravi Sood, based in Canada, and CEO Nick Brodie, who is UK-based, both with financial backgrounds. Hatton-Jones, apart from managing Mupane, also acts as Galane’s COO.

In Galane’s 2014 financial year (to 31 December 2014), Mupane produced just short of 31 000 ounces of gold from total ore milled (including some low-grade stockpile material) of 745 000 tonnes at an average grade



The Mupane processing plant, commissioned in 2004 and still going strong. It can process up to 1,2 Mt/a.

Recent enhancements to the Mupane plant include this liquid cyanide facility, expected to lead to a 1% increase in recovery.

greenstone deposits in the Barberton area and in Zimbabwe.

“Once Tau Underground – as we call it – is in full production, it will provide nearly a third of the plant throughput. The plant, which is a modern CIL facility, can handle 100 000 tonnes a month, so the Tau ore will be supplemented by ore from Golden Eagle, where we’ve recently restarted mining, and soon from Tekwane, where the gold mineralisation occurs in a quartz rubble bed close to surface – which means very low mining costs. Tekwane has an indicated and inferred resource of around

24 000 ounces and we will be putting in a new gravity circuit at the Mupane plant site to handle the processing.

“Looking further out, we are going to mine at Jim’s Luck, around 20 km north-east of the plant on the border with Zimbabwe, with production probably starting in 2017. We’ve drawn up a mine plan based on a US\$1 400 gold price, which envisages the mining of 680 000 tonnes of ore at an average grade of 2,16 g/t at a strip ratio of 5,5.”

Byron adds that the stockpiles located at the ROM pad at the Mupane plant are considerable, amounting to just over 700 000 tonnes at 0,97 g/t. “As you probably know, we commissioned a screening plant at the mine last year to handle this material. By using a 40 mm screen, we can upgrade a large part of this resource by a significant margin and we’re expecting the process – which is already underway – to produce an additional 266 000 tonnes of ore at an average grade of 1,60 g/t. The material is easily milled with the recovery anticipated to be above 80%. The direct operating cost will be between US\$600 and US\$700 per ounce.”

Galane has another 1,4 Mt of low grade stockpiles scattered around its tenements and is currently reviewing whether these can also be treated through the screening plant.

Byron acknowledges that cash restraints





have inhibited Galane's ability to carry out all the exploration it needs to do on its properties and says the company is looking at bringing in a joint venture partner to assist with this task. "We're talking to several parties on a farm-in arrangement," he says. "We already have a large number of drill-ready targets, so we're keen to get an agreement in place sooner rather than later. This exploration is vital if Mupane is to have a future into the 2020s."

Discussing Galane's proposed acquisition of Galaxy Gold (a company founded by well-known mining entrepreneur Peter Skeat), Byron says the conclusion of the deal – which would result in Galane having an initial 78 % stake in the Galaxy – is subject to the satisfactory outcome of a very intensive due diligence process which is currently ongoing. "The attraction is the 1.6 million ounces of gold that Galaxy controls in the Barberton Greenstone Belt," he states. "The key asset is the historic Agnes mine, which started up in the late 1880s, and which has seen some production in recent years, although on a very small scale. All told, the Galaxy assets have produced over a million ounces of gold over more than a century of on and off operation."

"I personally know the Barberton area well but, even more importantly, our COO, Wayne Hatton-Jones, has an in-depth knowledge of Galaxy, having acted as its COO several years back. The mining methods required would be somewhat similar to what we're using at Mupane, so this is another plus. If the deal does go through, we could probably be producing

within six months. This timescale would be dictated by the fact Galaxy's existing processing plant – which incorporates CIL and BIOX facilities and which has the capacity to treat 16 000 tonnes per month – would need some refurbishment. The plant lends itself to expansion through the addition of larger mills and flotation equipment so we would probably look at undertaking a scoping study on increasing production in the medium term."

Summing up, Byron says he is very positive about the future of both Galane and the Mupane operation. "Mupane has now produced well over 650 000 ounces of gold since it was commissioned and it certainly has the potential to produce another several hundred thousand ounces over the next several years, provided we can get in all the exploration we need to do and build up fresh reserves. The plant is working well and we're managing to maintain a good throughput from a variety of sources. The Tau Underground will anchor the operation for the next three or four years and should have a positive impact on our cash costs."

"Certainly, the current gold price is as challenging to us as it is to most other gold miners but we believe that we can continue to mine profitably at Mupane even if the price dips below US\$1 000, as we do have enormous flexibility in sizing production to the prevailing gold price. So the outlook for Galane – which is debt free and unhedged – is very good, and will be even better if we can finalise the Galaxy transaction," he concludes.

Photos by Geoff McLoughlin of Mupane Mining

Stockpiled ore ready to be screened at the Tekwane surface ore deposit.

"This exploration is vital if Mupane is to have a future into the 2020s."

***Charles Byron,
Director, Galane Gold***

Innovative XRT circuit now in operation at Karowe

*Construction of the US\$55 million plant upgrade and optimisation project at Lucara's Karowe diamond mine in Botswana's Orapa Kimberlite Field (OKF) has been completed on time and on budget. Lucara's Gaborone-based COO, Paul Day, gave a presentation on the mine at the recent Botswana Resource Sector Conference in Gaborone and also discussed the upgrade project with **Modern Mining's** Arthur Tassell on the sidelines of the conference. He says that early results from the XRT technology installed as part of the upgrade are extremely encouraging, with the circuit thus far meeting all Lucara's expectations.*

Commissioned in 2012, Karowe – which exploits the AK6 kimberlite first discovered in the early 1970s – has been a spectacular success for Vancouver-based Lucara Diamond Corp, which acquired the project from De Beers and African Diamonds in two separate deals signed in 2009 and 2010 respectively. Designed to produce approximately 400 000

to 420 000 carats a year, the mine has met this objective easily and in fact produced just over 430 000 carats in 2014. While the overall carat production level has thus far been in line with estimates, what was not foreseen at the planning and design stage of the mine was that the orebody would have the ability to deliver large diamonds on a regular basis.

“Over the past 29 months, Karowe has produced 70 stones of over 100 carats, including 12 of over 200 carats, and one of over 300,” says Day. “The plus 300-carat stone, which was recovered earlier this year, is a 341,9 carat Type IIa diamond of exceptional quality. It could well rank as the biggest gem-quality diamond ever recovered in Botswana. There is some anecdotal evidence of a 372-carat stone having been produced in the past but this – if the rumours are true – was apparently of poor quality.”

Giving the background to the upgrade project, Day says the plant as originally configured and built was designed to treat the weathered and transitional ore near surface. “It was well understood from day one that as mining progressed the plant would have to be modified

The new XRT building at Karowe diamond mine.





to allow it to treat harder and higher yield material, particularly in the south lobe of the kimberlite, and its design allowed for this,” he explains. “As it became clear, however, that the mine was emerging as a prodigious producer of large diamonds, we decided that we would also need to incorporate a facility to avoid breakage of large stones and allow Lucara to realise their full value. So the entire project has had two elements to it – the upgrade, which was always planned, and a ‘Large Diamond Recovery’ circuit able to treat material up to 60 mm in size.”

To cater for both the anticipated increase in DMS yield and assist with the recovery of large stones, Lucara elected not to increase the DMS capacity, but to go for new technology that represents a ‘first’ in the diamond mining industry – the use of X-ray Transmission (XRT)

machines. The selection of XRT was based on extensive testwork on the Karowe ore which indicated that the XRT route was superior to other concentration methods examined.

The entire upgrade and optimisation project at Karowe was covered in our January issue this year but, to briefly recap, the work – carried out by DRA as EPCM contractor – has encompassed modifications to the autogenous mill (which, incidentally, was the first mill of its type to be installed at a diamond mine in Africa outside of Angola), the installation of new secondary and tertiary crushers, and the construction of an XRT building housing five high-capacity Tomra XRT machines.

The process route for all ore now is for the +1,5 x 8 mm ore fraction to go to DMS and XRF (X-ray Fluorescence) recovery with the

Left: The coarse (14 – 32 mm) XRT feed fraction. **Right:** These four stones of 270 ct, 196 ct, 142 ct and 342 ct were recently recovered at Karowe. The 342 ct diamond was recovered prior to the commissioning of the XRT machines but the others represent the first significant recoveries from the XRT circuit.

The XRT building houses five high-capacity Tomra XRT machines.



feature



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+8 x 60 mm fraction reporting to XRT bulk sorting for early recovery of larger stones. The XRT tails of various size fractions are recrushed for further downstream diamond liberation and recovery according to size fraction.

(As most readers will know, the difference between XRF and XRT technology is that XRF detects the fluorescence that diamonds exhibit when exposed to X-rays. By contrast, XRT – a younger technology, at least in terms of its application in ore processing – works on the principle of identifying atomic mass and picks up the carbon signature of diamonds in the ore stream.)

According to Day, the construction of the upgrade proceeded remarkably smoothly given that it was a ‘brownfield’ project with all that this implies in terms of restricted access and the need to minimise disruption of existing activities. The selection of DRA as EPCM contractor was a positive as the company built the original plant. Moreover, DRA’s sister company, Minopex, is the plant operator.

“The completion of the project positions us well for the rest of 2015,” says Day. “It will enable us to maintain plant throughput at 2.5 Mt/a despite the fact that we will be deriving a steadily increasing proportion of ore from the harder south lobe material. In addition, we have a great deal of ore stockpiled that we were unable to treat optimally in the original phase one plant. This can now be treated at nameplate capacity, as and when required.”

Discussing other developments in respect of Karowe, Day says that the new mining contractor – MCC recently replaced Kalcon, with the transition taking place during December 2014 – has settled in well and is maintaining the requisite level of production. “During the first quarter of this year, the ore mined in the pit was slightly below forecast but was at a higher grade

and in line with requirements. The volume of waste was comfortably ahead of forecast.”

Day also mentions that a new 15 t/h bulk sampling plant supplied by ADP Marine & Modular has been delivered to the Karowe site and should be commissioned in August. “The plant will be used to process samples from our two new prospecting licences which we acquired last year, one of which is located roughly 20 km from the mine and the other 30 km,” he says.

“One licence area, Block A, hosts the BK 02 kimberlite, which De Beers discovered in 1967. This kimberlite has a 2.4 ha outcrop and diamonds were identified in historic trenching results and microdiamond sampling. Our plan is to collect up to 5 000 tonnes of surface material for sampling. The other licence, Block E, borders on the Orapa mine lease and hosts four known kimberlites. Here again our plan is to collect a surface sample of up to 5 000 tonnes and put it through the new bulk sampling plant.”

Both blocks are within trucking distance of Karowe and Lucara’s hope is that they might provide satellite resources for the mine, which has a remaining life of roughly 10 years based on present reserves. Lucara is also evaluating the feasibility of eventually developing an underground operation at Karowe, which would primarily exploit the deeper reaches of the south lobe.

Lucara’s guidance for 2015 (the company’s financial year coincides with the calendar year) is for diamond sales of between 400 000 and 420 000 carats and revenues of between US\$230 million and US\$240 million, all from the Karowe operation, its only producing asset. Operating costs of between US\$33 and US\$36 per tonne processed are predicted. ■

Photos (unless otherwise acknowledged) courtesy of Lucara

This photo of the Karowe site was taken in September last year by ‘Modern Mining’ when the upgrade project was in full swing (photo: Arthur Tassell).

“The completion of the project positions us well for the rest of 2015.”

Paul Day, COO, Lucara



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Alrosa brings new technology to diamond exploration in Botswana



A regular – and popular speaker – at the Botswana Resource Sector Conference, held in Gaborone every year, is John Teeling, the ebullient head of Dublin-based explorer Botswana Diamonds. At this year’s event, he gave a typically upbeat address in which he explained the company’s strategy, including its 50/50 joint venture – signed in 2013 – with Russian diamond mining giant Alrosa. He said Alrosa was applying new technology and bringing ‘fresh eyes’ to previously explored ground in Botswana.

John Teeling listens to a question at the recent Botswana Resource Sector Conference in Gaborone (photo: Bennie Venter).

Opening his presentation, Teeling said there were four pre-requisites for a pure explorer such as Botswana Diamonds. “You need a market for the product you’re looking for, you need good ground, you need good technology and you need good people,” he said, adding that Botswana Diamonds, whose shares are traded on London’s AIM, was able to tick all these boxes.

On the subject of market demand, he said the fundamentals for diamonds were good and noted that the industry was now being driven by demand from Asia, particularly China, with historic consumer markets such as the US and Europe declining – in relative terms – in importance. He also argued that current diamond supply was flat and that there had been no significant diamond discoveries over the past 10 years. “Prices remain at historically strong levels though they’re volatile as the De Beers position weakens,” he said.

Addressing the topic of good ground, he said there was no better place in the world than Botswana for diamond exploration. “Some companies drill in places where they can’t possibly find the things they’re looking for,” he observed. He pointed out that this was clearly not the case when it came to looking for diamonds in Botswana as the country was the world’s biggest producer of diamonds

– at least by value – and hosted world-class mines such as Jwaneng, Orapa and Letlhakane, which had been joined more recently by Karowe and Ghaghoo.

Turning to the question of technology, he said Botswana Diamonds and Alrosa were now deploying the latter’s proprietary technology which was being used to explore, as he put it, “up to 100 m beneath the Kalahari sand, swamps and basalt.” He added that Alrosa has discovered 19 kimberlite mines in Russia, which together produced 36.2 million carats in 2014 – approximately 26 % of world production. Alrosa operates mainly in Russia but it does also have a one-third share in the Catoca diamond mine in Angola.

Botswana Diamonds has tenements in the Orapa area and in the Central Kalahari near the new Ghaghoo mine of Gem Diamonds,

Alrosa and Botswana Diamonds geologists in the field (photo: Botswana Diamonds).



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Botswana's first underground diamond mine. In respect of the Orapa tenements, Teeling said that Botswana Diamonds had provided its extensive Orapa database to Alrosa, which had analysed the data and produced a series of targets.

The Orapa licences include PL 206, where kimberlite indicator materials (KIMs) have been found in nearly all the samples thus far collected, PL 207, where two diamonds were found in the 2014 sampling, and PL 210, where exploration work has identified a clear anomaly and where drilling will be undertaken later this year. All told, the joint venture has a US\$1 million (for 2015) exploration programme underway on the Orapa blocks.

According to Teeling, one of the benefits imparted by Alrosa's technology is a fast turnaround on analysis of soil samples. "They use mobile mineral analysis labs on site and compare the results of sampling against known 'footprints' – there are no delays and the result is that exploration is speeded up dramatically," he said.

On a lighter note, Teeling mentioned the AK6 kimberlite, the resource being exploited

by the new Karowe mine in the Orapa area, and said he had almost got "sick" listening to the Lucara presentation which detailed the new mine's exceptional production of large stones. This was a reference to the fact that African Diamonds, a predecessor company to Botswana Diamonds, at one stage had an interest in the AK6 project in which it was partnered with De Beers. Teeling headed African Diamonds as Executive Chairman.

Teeling said that African Diamonds and De Beers had discovered the AK6 pipe in 2004. To the best of *Modern Mining's* knowledge, the kimberlite was in fact found circa 1970 by De Beers, which considered it at the time to be sub-economic. Teeling can, however, take much of the credit for the fact that AK6 now supports a diamond mine. De Beers favoured delaying mine development but Teeling would have none of it. He was instrumental in Lucara buying De Beer's share in the project and, as the saying goes, the rest is history, with Karowe now ranking as one of the most successful new diamond mining developments in recent years anywhere in the world (as our article on page 28 of this issue makes clear). ■

feature



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Sedgman to earn into the Mahumo

There are only two really significant players in Botswana's Kalahari Copperbelt. One, of course, is US-based Cupric Canyon Capital, which is developing the Khoemacau underground copper mine (and which has reportedly also acquired the adjacent Boseto copper mine from the liquidators of Discovery Metals), and the other is ASX-listed MOD Resources (MOD), based in Perth, Western Australia.

MOD owns the very promising Mahumo copper/silver project. In a significant step forward for Mahumo, MOD has announced that it has signed a binding Memorandum of Understanding (MoU) with Sedgman, which will see the latter company participating in the project.

In terms of the MoU, Sedgman, which is listed on the ASX, will inject up to US\$1,5 million into feasibility studies relating to Mahumo, including engineering and management services, and – in return – will earn up to a 10 % interest in the project via a joint venture arrangement (the Mahumo JV). Sedgman is a provider of services to the global mining industry and has experience of working in Botswana, having been the designer and contractor for the processing plant at the Boseto mine.

In its statement announcing the MoU, MOD says the agreement defines key terms for three additional documents which will require further negotiation and agreement by MOD and Sedgman. These documents are the Mahumo JV agreement, the Mineral Processing Plant (MPP) contract and the operations contract. Subject to agreement of operational and commercial terms and finalisation of these contracts, MOD will appoint Sedgman as the exclusive designer, constructor and operator of the MPP at the Mahumo project.

Independent Metallurgical Operations (IMO), reputedly Australia's largest metallurgical consulting group, will be appointed as an independent reviewer to confirm to MOD's satisfaction that the design and pricing of the MPP and the structure, pricing and KPIs for the operations contract are commercially competitive and appropriate for comparable operations in Southern Africa. Terms of the contract will be reviewed after an initial two-year period, then at three-year intervals.

The Mahumo JV will also include a mechanism for Sedgman to invest in MOD equity up



to a defined limit at a defined discount to the share price at the time.

Commenting on the agreement, MOD's Managing Director, Julian Hanna, said the board considered the MoU with Sedgman an excellent outcome for the Mahumo project. "Sedgman has the capacity to bring substantial resources, expertise and in-country experience to assist the potential development of the project from feasibility, through to possible plant construction and operation. The US\$1,5 million of services to be provided by Sedgman will also significantly reduce the amount of funding required by MOD to complete the proposed feasibility studies," he said.

"The structure of the proposed Mahumo Joint Venture will result in minimum dilution of MOD's equity in the project. It should also allow the company to focus on its core strengths of expanding high grade resources at Mahumo

copper/silver project



and exploring other priority targets in the surrounding area for possible new discoveries.

“Sedgman has significant experience operating in Botswana. This should assist MOD in building community and landowner relationships and undertaking environmental and permitting related studies that will be required if feasibility studies confirm a viable underground mining operation at Mahumo.”

Hanna is a geologist who was co-founder and former MD of Western Areas, Australia’s second largest underground miner. He leads a team which includes Steve McGhee, MOD’s Resources Director (he is also a co-founder and Director of IMO), and Jacques Janse van Rensburg, General Manager Exploration (Africa).

MOD has tenements in Botswana extending over nearly 7 000 km² in the area between Maun and Ghanzi. The Mahumo deposit, the

company’s main focus of interest, is located approximately 100 km south-west of Boseto, the only mine (although it is currently on care and maintenance) to have been built so far in the Kalahari Copperbelt.

A Stage One mineral resource estimate for Mahumo of 2,7 Mt at 2,0 % copper and 50 g/t silver was announced in March this year. It is based on drilling completed by MOD in 2011/2012 and 2014/2015 along a 2,4 km strike length at Mahumo to an average depth of approximately 300 m. The resource remains open below the current limit of drilling and resource extension drilling (Stage Two) is due to start shortly (subject to funding).

The Mahumo resource has a copper equivalent grade of approximately 2,5 %, which MOD believes is the highest grade for an announced copper/silver resource in Botswana. The silver grade of 50 g/t is particularly impressive and is

Above: Inspecting Mahumo drill core.

Top: Copper-rich Mahumo drill core.

Centre: Drilling at the Mahumo site in the Kalahari Copperbelt has outlined a resource of 2,7 Mt at 2,0 % copper and 50 g/t silver.



ACTOM and leading global fan producer TLT-Turbo form local joint venture company

ACTOM has joined international fans company TLT-Turbo GmbH of Germany in forming a joint venture (JV) company to cater to both the Sub-Saharan and local market for all types of large fans.

The market comprises mainly the industrial, mining, process, metallurgical, cement and power generation industries. The formation of the JV company, TLT ACTOM (Pty) Ltd, and the technology and licence agreements signed by the two partners took effect from May 1, 2015.

ACTOM and TLT-Turbo negotiated the new international partnership after ACTOM's technology agreement with international ventilation fan producer Solyvent Fläkt Woods AG was dissolved as a result of the acquisition of that company's international fan division by an opposition fan manufacturer.

TLT ACTOM retains the existing technology agreements with Fläkt Woods for categories of fans used in industry and for heating, ventilation and cooling (HVAC) systems used mainly in large commercial applications.

The large fan systems covered by TLT ACTOM's new technology partnership incorporate axial flow and centrifugal fan units with power ratings of up to 15 MW.

TLT-Turbo GmbH is wholly owned by Power Construction Corporation of China, a Chinese state-owned industrial conglomerate which is one of the world's 500 largest companies.

Craig Johnston, Managing Director of TLT ACTOM – which formerly traded as ACTOM Mechanical Equipment – said: “The new partnership arrangement places us in a much stronger position than before in two major respects. Firstly, in partnering TLT-Turbo in a 50-50 JV company we have a closer and firmer association with our international partner than applied previously.

“Secondly, we are entering the local power generation market with much

stronger credentials than before. There is an established installed base of TLT-Turbo large axial flow fans at Eskom's Majuba power station and their fan systems are being installed and commissioned at both of Eskom's new power stations, Medupi and Kusile.”

Rainer Redinger, Managing Director of TLT-Turbo, said: “The formation of the JV company is a big step forward for us in the Southern African region as it enables us to serve our local customers better. We now have a local company with the necessary expertise and a well-established presence to give full support to our local customer base and with the capacity, backed by our well-proven systems, technology and service knowhow, to expand our business in the region in all types of fan applications and to become a full after-sales service provider.”



A large centrifugal mine ventilation fan system from TLT ACTOM.

three times the silver grade of other announced resources for the Kalahari Copperbelt.

Mahumo is presently in the Scoping Study stage. MOD's South African consultants – led by Nikolas Rhodes of Ridgeback Mining Services – are awaiting indicative underground mining costs from mining contractors and are reviewing a range of options before finalising the study.

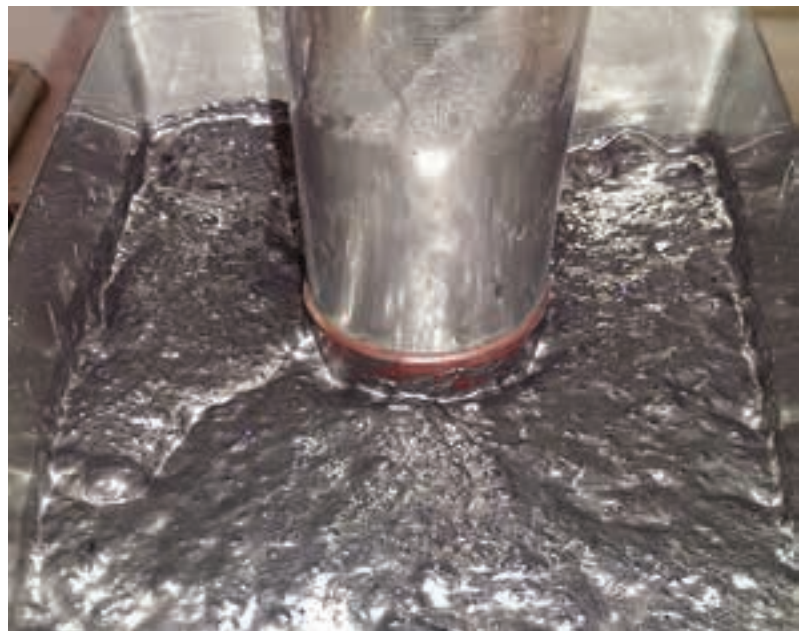
Initial underground models indicate that steady state production of up to 40 000 tonnes/month ore mined over a 4-5 year mine life from Stage One is achievable.

A combination of two underground mining methods is being evaluated to generate the best potential return from the Mahumo deposit. These include fully mechanised mining to establish two access declines, install development headings and to open up stopes to initiate production. Mechanised mining is proposed to convert to conventional mining operations (utilising airlegs for sub-level development and stope drilling) to achieve steady state ore production.

Conventional mining methods are widely used in steeply dipping vein style deposits (similar to Mahumo) in Southern Africa and at significantly lower cost if compared with similar style Australian operations. There are several benefits of using conventional mining which include the fact that a large part of mine development is in ore (rather than in footwall waste) and reduced ore dilution.

Due to the 2,4 km length of the Mahumo deposit, two declines are proposed to be accessed from two shallow open pits or box-cuts sited in near surface, high grade copper/silver sulphide ore at each end of the deposit (providing potential for early revenue from Mahumo). More detailed mine design work and scheduling scenarios are required to confirm this and will be further evaluated as part of the proposed PFS.

The scoping level metallurgical test work is



High-grade copper/silver concentrate produced during the test work programme.

now complete and has delivered exceptional copper recoveries of up to 96,6 % Cu on deeper sulphide ores. Commenting on the results recently, MOD's Steve McGhee said: "First pass test work on a relatively deep bornite rich composite (from 196,6 m to 524 m depth) has yielded an excellent response to flotation with copper and silver recoveries of 96,6% and 85,9% respectively into a low mass concentrate grading 38,5 % Cu and 758 g/t Ag. This complements the outstanding results already achieved with a shallower chalcocite rich composite. Future test work will aim to increase the silver recovery for bornite rich ores."

While Cupric Canyon is likely to be next mine developer in the Kalahari Copperbelt (it is planning to start construction of Khoemacau in 2016 and is expecting to be in production in late 2017 or early 2018), MOD Resources, based on the developments outlined above, looks well placed to follow in its footsteps, subject of course to the pre-feasibility and feasibility studies proving positive.

Photos courtesy of MOD Resources

feature



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New breed of ultra-size machines

To handle the huge volumes of material, both ore and waste, which have to be moved in the modern generation of super-pit mines (loosely defined as those where material movements exceed 100 Mt a year), the major mining equipment manufacturers have been steadily upscaling the size of their dump trucks and loading tools over recent years. At the forefront of this trend is Caterpillar, which now offers an extraordinarily broad range of heavy mining equipment for surface mining, as Ian Duthie, GM Legacy Cat Mining at Barloworld Equipment, the Cat dealer for Southern Africa, recently explained to **Modern Mining's** Arthur Tassell.

While Caterpillar has ranked for decades as one of the world's biggest suppliers of equipment for open-pit mining, there were some gaps in its product offering until several years ago, notably a lack of big hydraulic shovels, electric rope shovels and AC electric drive – as opposed to mechanical drive – off-highway rigid dump trucks. These omissions were rectified by the unveiling of the Cat 795F AC, Caterpillar's first-ever electric drive truck, and by the acquisition of American OEM, Bucyrus, in 2011 (in a deal worth around US\$8,8 billion), which added Bucyrus's hydraulic and electric rope shovels, as well as the Unit Rig range of AC drive off-highway trucks, to Caterpillar's line-up.

Comments Duthie: "The range that Caterpillar, and by extension Barloworld Equipment, now offers to the mining industry is the broadest from any OEM and certainly Caterpillar is the only supplier in the world to offer both rope and hydraulic shovels. A number of these new additions to the Caterpillar range have already been sold to customers in Southern Africa, including no less than nine Cat 7495 electric rope shovels, several hydraulic shovels, and six Cat 795F AC haul trucks.

"Three of the rope shovels have been deployed at Debswana's Jwaneng diamond mine in Botswana, where they are working on the massive Cut 8 project, a further three are now working at First Quantum's newly-commissioned Sentinel copper mine in north-west Zambia, while the final three have been delivered to Swakop Uranium's Husab uranium mine in Namibia."

The 7495 is the flagship of the Cat electric



rope shovel range. With a rated 109-tonne payload, it has a formidable production capacity – it can move over 5 000 tonnes an hour – and can easily service eight or more ultra-trucks. At all three sites in Southern Africa, the shovels are loading into non-Caterpillar trucks, reflecting the fact that when the contracts to supply equipment to these mines were being negotiated, Caterpillar did not yet have the AC drive haulers the respective clients required. "If these same contracts were being negotiated today, the situation could be very different," says Duthie.

Rope shovels are designed to work a single face of the correct height, loading well shot material and need a solid, level floor, with wide benches to facilitate truck manoeuvrability aiding hauler 'spotting' time. Where these conditions are not met but high production rates are nevertheless required, Caterpillar can now provide, as an alternative, the hydraulic face shovels acquired in the Bucyrus deal (although it should be stressed that the Bucyrus name has now vanished and that the shovels have all been 'Caterpillarised' to include the latest Caterpillar technology). These are designed to work at multiple face heights, in tough digging applications and tight loading areas, and can easily handle less than ideal underfoot

caters for mining's super-pits



conditions. The fact that they are available in both Face Shovel (excluding the 6090, which is FS only) and Back Hoe configuration, as well as electric or diesel drive, adds to their ability to work in a variety of mining applications.

The biggest model in the range is the 6090 FS, which is the world's largest hydraulic mining face shovel, with an operating weight of

980 tonnes, an engine output of 3 360 kW and a payload of 94 tonnes. The 6090 FS is said to be the only shovel capable of four-pass loading of 360-tonne haulers such as the Cat 797F. Only one has thus far been supplied in Southern Africa – to Vale for its Moatize coal mine in Mozambique. Several smaller 6060 FS models (with a 61-tonne capacity) have also been sold

A Cat 7495 electric rope shovel pictured at the new Sentinel copper mine in north-west Zambia (photo: First Quantum Minerals).



A Cat 6090 FS shovel loads a Cat 797F ultra-truck at the Moatize coal mine in Mozambique.

feature

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locally, including three to Swakop Uranium for the Husab mine and one to Jwaneng.

Moving on to the Cat 795F AC off-highway truck, the six machines operational in South Africa are all working at a super-pit mine. Duthie says the 795F has proved a big success for Caterpillar, with more than 150 now operational in mines around the world. “When it was introduced it represented a big departure for Caterpillar, which historically confined itself to the manufacture of mechanical drive trucks,” he notes. “There have always been customers, however, who prefer electric drive and Caterpillar is now equipped to supply them. Although the units delivered in South Africa are not equipped for trolley assist, Caterpillar does offer the option of a pantograph and in fact is putting in a trolley-assist system at its proving ground near Tucson, Arizona, so customers can see this capability in action.”

The Cat 795F is part of one of the broadest ranges of mining trucks currently available in the market with Caterpillar being the only OEM to offer both mechanical and electric drive machines from 40 tonne payload through to 360 tonne. On the mechanical drive side, the Large Mining Truck range comprises the 136-tonne capacity Cat 785D, the Cat 789D, which has a 190-tonne payload, the Cat 793D, which can carry 228 tonnes, and – topping the range – the Cat 797F, a 363-tonne (400-ton) capacity behemoth. Complementing these are three AC electric drive models, the MT4400D (221-tonne payload) and MT5300D (291-tonne), as well, of course, as the Cat795F (321-tonne).

Southern Africa does not have many pits



The well-appointed cab of a Cat rope shovel.

of a size to warrant the use of the top-of-the-range Cat 797F but the machine is not totally absent from the region, with a fleet of 10 being used at Vale’s Moatize coal mine near Tete in Mozambique. These work in conjunction with the mine’s 6090 FS.

What of the famous Cat 777, Caterpillar’s durable 91-tonne (100-ton) hauler, first introduced in 1977 and a huge seller ever since? According to Duthie, Caterpillar classifies it as being part of its quarry and construction truck range but he stresses that it is an excellent mining truck as well. “It is a very tough and durable machine which is perfect for small to mid-sized open-pit operations. Needless to say, we’re delighted with the popularity it has achieved in the mining space. In fact, mining is the main market for the 777 in Southern

“There have always been customers who prefer electric drive and Caterpillar is now equipped to supply them.”

**Ian Duthie,
Barloworld Equipment**



A close-up view of the Cat 797F, the biggest machine in Cat’s ultra-truck range.



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Africa in contrast to other regions such as North America where it is widely used on the type of big construction projects that are not too often seen any more in our own part of the world.”

On the question of what constitutes an ultra-truck, Duthie points out that definitions are necessarily arbitrary but says that Caterpillar and Barloworld Equipment view anything with a payload of 290 tonnes and above as falling within the ultra-class. “These are the trucks that can work effectively with the big loading tools, namely rope shovels and hydraulic shovels, and they are typically owned by mines and stay on a single mine for their entire lives due to the expense and logistical challenges of moving them from mine to mine,” he says. “I’ve yet to see any mining contractors in Southern Africa operating trucks of this size.”

Projects such as Husab and Sentinel were planned when the resources boom was still going strong but the current weakness in commodity prices has resulted in mining companies cutting back sharply on investment in new mines (and, for that matter, on expansions at existing operations). Duthie, however, is confident that the demand for ultra-sized equipment can only grow. “It’s only a question of time before the resources sector recovers,” he says. “Eventually new mines will have to be

developed and many of them will very likely be of considerable size, as the long-term trend is towards high volume operations able to exploit economies of scale. So I think it is safe to say that prospects for ultra-sized shovels and trucks over the medium- to long-term are extremely positive, both globally and in the Southern African region.”

Photos (unless otherwise acknowledged) courtesy of Barloworld Equipment

One of three Cat 7495 electric rope shovels supplied to the Husab uranium mine, with – in the background – one of two Cat C175 diesel engine motivators also supplied for the project.

Fleet Production and Cost Analysis

The huge investment in ultra-machines means that mines need to get maximum productivity, utilisation and efficiency out of them and Caterpillar and Barloworld have just the tool to assist in achieving this in the form of Caterpillar’s Fleet Production and Cost Analysis (FPC) software, which provides estimates of the productivity and costs associated with owning and operating equipment.

In continuous development over many years and now in Version 5, the FPC software was the subject of a presentation by Ian Duthie at the recent two-day conference on mechanised mining, held at the Birchwood Conference Centre in Boksburg, which was organised by the Wits School of Mining Engineering in conjunction with Barloworld Equipment.

Duthie looked in detail at the inputs needed by the FPC software and discussed some of the mistakes that users of the software tend to make. He concluded that – provided it was used correctly – it was a superb modelling tool able to assist with equipment selection and mine planning and deliver realistic and accurate simulations of mining operations. ■

Versatile ADTs now dominant in

Several decades ago, mine owners and mining contractors had little choice in the equipment used to haul material in open-pit operations. In essence, they were limited to using either rigid frame trucks (rigids) or – in the right conditions – scrapers. Nowadays there is a third option – the articulated dump truck or ADT, first introduced in the 1960s. Initially mainly deployed in civil earthworks applications, the ADT has been increasingly used in mining since roughly the 1980s. To learn more about this versatile tool, which is now the dominant hauler in small to medium-sized open-pit mines, **Modern Mining's** Arthur Tassell recently spoke to Terry Gillham (right), Director: Sales and Marketing of Bell Equipment, one of the world's leading manufacturers of ADTs and almost certainly the market leader for this class of machine in Southern Africa.



There is an obvious dividing line between ADTs and rigid trucks based purely on payload capacity. Currently the world's biggest ADT is the Bell B60, which – as its designation suggests – can take a 60-ton (54-tonne) load. While this capacity has taken the ADT concept into new territory, it nevertheless falls well short of what is required in large open-pit mines, where 100-ton, 150-ton and 200-ton machines are the norm. Capacities go up even higher than this and trucks of 240 tons and above are the machines of choice in the new generation of 'super-pits' around the world (several of which are in Southern Africa). Most

of the big rigid dump truck manufacturers have ranges which now top out at 400-ton payload capacity and one – Belaz in Eastern Europe – even produces a 450-ton machine.

Says Gillham: "Where the interesting overlap occurs is in the space which was once catered for by rigid trucks in the 35-ton to 60-ton class. This market has now been taken over by ADTs. You can still see rigids of this size at mines but they are increasingly rare and have suffered a significant loss of market share. The primary reason for this is that the ADT – with its all-wheel drive and articulated joint – is an incredibly versatile machine. It can handle both short and relatively long hauls, good and

The Bell B60 is the biggest ADT in the world. These three Bell B60Ds are working at an open-pit coal mine in South Africa but full commercial production of the B60 is only due to start with the E-series in 2017.



small to mid-size open-pit mining

bad underfoot conditions, flat and steep grades, and wet and dry weather, all with equal ease.

“Admittedly, rigids are probably cheaper to run over longer distances but balancing this is the fact that – being two-wheel drive – they require well-maintained, paved haul roads to operate. One often hears that rigids also offer a longer life and more reliability – but if they do, it is because they are not normally subjected to the same arduous conditions as ADTs. In terms of initial cost, ADTs are generally cheaper than similar-sized rigids.”

Gillham adds that a further advantage of ADTs is that they can easily be adapted to a variety of roles. “You can turn them into water bowzers, fuel tankers, service trucks and explosive trucks, to take the most common examples. They can also easily be transferred over to civils applications when mining is in a downturn. Obviously, this is not a huge factor for mine owners but it is for mining contractors, who in many cases are active in both mining and construction.”

It would be wrong, of course, to believe that ADTs have no place on larger mines. While they cannot handle the huge volumes and high impacts involved in very large scale material moving, they often have a role to play in supplementing the big rigid trucks. It is not uncommon, for example, to see rigids being dedicated to waste haulage with ADTs catering for the (generally) much smaller volumes of ore. ADTs are also well suited to the satellite-type operations that often present at large open-pit mines, which are too small to justify the creation of well-engineered haul road networks and which are best served by small trucks with all-terrain capability.

Gillham makes the point that current models from virtually all the big ADT players tend to be much more fuel efficient than was the case just a few years ago. “I think the big OEMs have all put a great deal of effort into reducing fuel consumption,” he says. “In the case of Bell, we use Mercedes-Benz engines and these are renowned for their efficiency – and, for that matter, their ‘green’ credentials, as they meet all emission standards.”

Bell, like most other manufacturers, has one global standard for its ADTs. “We don’t change the specification for specific parts of the world, with a high-tech machine for certain markets and a low-tech version for others,”



ADTs can easily be adapted to a variety of roles. This 35 000 litre water tanker is working at an emerald mine in Zambia (photo: Arthur Tassell).



says Gillham. “The machine we sell in Africa is the same as the machine we sell in every other market in the world. This partly reflects the fact that mining is a global industry and that big international mining groups expect the same standards to be met wherever they work and will not accept machines that compromise on safety and environmental standards on their sites.” He adds that one of the features of Bell’s

A prototype Bell B50E. This machine will succeed the ground-breaking B50D.

feature



Bell ADTs working at a large open-pit copper mine in Zambia.

range that promotes safety – and productivity – is the company’s satellite-based Fleetm@tic fleet management system – a ‘world first’ when it was launched a decade ago.

On the subject of innovation, Gillham says that most ADTs on the market these days have an array of high-tech features. “Bell itself has been responsible for many of these including HillAssist, Bin Tip Prevention, Turbo Spin Protection, On Board Weighing and our Auto Park Application, all of which are standard features on our trucks.”

Bell offers the biggest range of ADTs in the African market (with a matching set of excavators, all sourced from Liebherr but sold by Bell, to go with them). The ADT models specifically designed for mining are the B40, with a 37-tonne payload, which Bell sees as a flagship machine given its huge popularity, the B45, the B50, which can carry 45,5 tonnes, and, of course, the B60. “It is certainly not uncommon to see some of our smaller units at mines and quarries but the B40, B45, B50 and B60 have been designed from the ground up for tough mining applications,” says Gillham.

The B60D was introduced at the BAUMA Africa show held in Midrand in 2013 and since then has not received a great deal of publicity. Gillham says that this has been by intent. “Full commercial production of the B60 is only due to start with the E-series in 2017 so we’ve held

back on the marketing,” he explains. “Having said this, we do have machines working very successfully in the field and are selling limited number of D-series machines to customers both locally and abroad.”

The Bell B60 has an interesting design. While it classifies as an ADT, it would perhaps be more accurate to describe it as a ‘hybrid’ as it uses the two-axle concept that characterises rigid haulers. “Put simply, the B60 combines the best of both worlds,” states Gillham. “While it has just the two axles like any rigid truck, the difference is that the front axle is also driven so that it has a full 4x4 capability. As is the case with any ADT, the front and rear chassis are independent, giving it the manoeuvrability that rigid haulers lack. While it will be up to our customers to decide where the B60 best applies, we believe – and we said this when we launched the machine – that it will be well suited to the difficult ground conditions typical of many South African mines and quarries, particularly where there are tight turns and steep ramps. Often the flotation of an ADT is not really required but significant savings can be seen without having to do maintenance at the load and dump areas. It will give fleet owners a lot of options – among them the ability to keep operating in wet conditions which would bring a conventional rigid fleet to a standstill.”



A Bell B60D at work at a mine in the Rustenburg area.

Bell has retained the proven B50D ‘front end’ in the B60 although with a new engine and transmission. While the B50D and B60 share the same capacity V-8 turbocharged Mercedes Benz M502LA engine, the power output has been increased from 380 kW to 420 kW in the B60. Bell Equipment’s designers have also opted for a 7-speed Allison transmission rather than the 6-speed transmission of the B50D. At the ‘back end’, the back axle is a dedicated 70-ton truck-and-haulage axle from Kessler of Germany while the bin is much wider than a typical ADT bin to achieve the 60-ton capacity and increased loading target.

An interesting point is whether the B60 represents a ‘ceiling’ for the ADT. “I’m not an engineer so probably I’m not the right person

to ask,” responds Gillham. “Certainly Bell has no plans to go beyond the B60 at this point but I would guess that if we can go to 60 tons, then 65 tons or 70 tons would not be impossible. It’s all about the application and what the customer needs. Whatever the case, the ADT concept is firmly on the map and has proved to be a game-changer in mining. There’s no question that ADTs have transformed the face of the industry, bringing new economies and efficiencies to the mining of deposits of every type and also – and this is an important point – allowing the exploitation of smaller deposits which would probably have proved unviable to mine in the pre-ADT era.

“Finally – and I’m talking here with my Bell ‘hat’ on – I think South Africans can take pride in the fact that the ADT industry is one area where South Africa often leads the world. Not too many South African companies can claim to be leaders in their field globally but Bell Equipment is definitely one of them.”

Photos (unless otherwise acknowledged) courtesy of Bell Equipment

feature

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Hawkeye® system can drive down panel costs

Multotec is playing an important role in helping its customers to improve the throughput and efficiencies of beneficiation circuits with innovations such as Hawkeye®. Literally named after the expression of keeping 'a hawk's eye', this tailored monitoring system allows Multotec customers to carry out predictive maintenance on critical wear items such as screen panels, flotation wet ends, mill lifter bars or cyclone liners.

With regard to screening, panels are essential in maintaining a constant high quality throughput in a beneficiation circuit. "Screen panels are an integral part of the process," Ian Chapman, Engineering Manager at Multotec Manufacturing, says. "This is one of the reasons Multotec offers Hawkeye® as part of its field service and maintenance contract offering for customers."

Hawkeye®, based on monitoring the aperture growth of screen panels, allows management of screen-product size distributions. The system features graphic interfaces for easy interpretation and visualisation of results including MTBF (Mean Time Between Failures) and wear patterns. It is possible from the historical data to predict the life of replacement panels with reasonable accuracy.

An added benefit is that Multotec itself is able to conduct comparative analyses during field trials, which proves valuable

for product development and enhancement. "Hawkeye® plays an important part in our ongoing innovation and continuous improvement initiatives," Chapman says.

Hawkeye® is available in both Classic and Lite versions, with the latter allowing for off-line batch loading and posting to the dedicated Hawkeye® server, typically for use whenever bandwidth constraints are an issue. This means that Hawkeye® Lite is ideal for customers operating in remote locations in Africa, Chapman points out.

"We use technology such as Hawkeye® to give our customers advance warning on any potential problems or maintenance issues. This means our customers are able to plan in advance, reducing downtime and minimising any maintenance or repairs," Chapman says. "With commodity prices under pressure, such planning windows are important for our customers to manage their plant availability."

Customers are also assured that Multotec is updating the system constantly. "We are always adding enhancements to improve the overall functionality," Chapman says. The most recent additions include improved reporting to customers, additional fields added for more accurate measurement and a service module which assists with job card generation by specifying item quantities and the times required for specific tasks.



Hawkeye® allows management of screen-product size distributions and the system features graphic interfaces for easy interpretation and visualisation of results.

"We have also integrated it with Multotec's overall stockholding system," Chapman says. "This provides a better insight into consumption and inventory levels and allows us to reduce urgent requests to our production facilities."

"In most cases, our customers want to try and run their plants for as long as possible in order to increase the availability, and Multotec has to be cognisant of all the issues that our customers face. We also have to be sufficiently flexible to be able to offer our customers the benefit of our considerable experience in a range of commodity sectors and beneficiation circuit options. Now more than ever, Hawkeye® has allowed Multotec to enter into true partnerships with its customers," he says.

Bernadette Wilson, Multotec Group, tel (+27 11) 923-6193

Motivator at Jwaneng restored to prime condition

Cummins reports that maintenance and repair work has been successfully completed on a 2 MVA Cummins motivator which provides standby power solutions to a Bucyrus 495 electric rope shovel located at Debswana's Jwaneng open-pit diamond mine in Botswana.

The Cummins motivator is a containerised diesel generator powered by a Cummins C2250 D5, 6,6 kV generator set with a QSK60 engine, enclosed in a customised container, which houses medium-voltage switchgear, a medium-voltage transformer and a 10 000 litre diesel tank.

The switchgear is provided with FM200 gaseous fire protection, while powder-based fire protection is provided for the engine room. The generator set is controlled by a Cummins PowerCommand PCC 3200 controller. The whole container is mounted on a custom-built, 55-ton Martin

trailer, pulled by a Western Star 6900 XD truck, powered by a Cummins ISX engine.

The rope shovel extracts an impressive 100 tons per load, and the mine relies heavily on the Cummins motivator to power the unit, as it eliminates the need for long, vulnerable power supply cable runs that require multiple cables linked by substations.

Cummins Southern Africa's GM for Power Systems, Warrick Gibbens, states that the motivator allows for more freedom of movement over a greater range, which streamlines the diamond-mining process. "As a result, motivator downtime must be proactively avoided at all costs."

In order to get the motivator – which is no longer in warranty – into prime condition, Cummins worked closely with a number of partners and sub-contractors to recondition the entire unit. Gibbens points out that this involved repainting the trailer

and replacing all of its shocks.

"The fuel tank and 6,6 kV switchgear were also entirely replaced, in addition to the neutral earthing resistor, all fire systems, and the auxiliary generator. Cummins was responsible for designing and free-issuing the components, while our sub-contractors completed installation. A good working relationship between all parties resulted in no major challenges being encountered," he concludes.

Cummins South Africa, tel (+27 11) 321-8700



Cummins has reconditioned a 2 MVA Cummins motivator for Debswana's Jwaneng mine.

Sandvik CM designed for mid-size room-and-pillar applications

The Sandvik MC350 continuous miner (CM), for mid-size room-and-pillar applications, is the latest offering in the comprehensive range of continuous miners from Sandvik. The performance of the MC350 has reportedly been proven in extensive field tests in South Africa.

Sandvik continuous miners, including the MC250, MC430, MC470, and now the MC350, satisfy all seam conditions in room-and-pillar mines. Segmented for low, medium and high seam applications,

the continuous miners are all equipped with the functions expected to ensure maximum productivity, reliability and minimum cost for any seam.

“By using Sandvik continuous miners our customers benefit from more cost efficient operations,” says Bruno Reumueller, Product Line Management, Underground Coal and Minerals at Sandvik Mining. “Thanks to a higher weight class, shear-up capacity and loading and conveying modules, our continuous miners can improve productivity by 10-20 per cent compared to other continuous miners in their range.

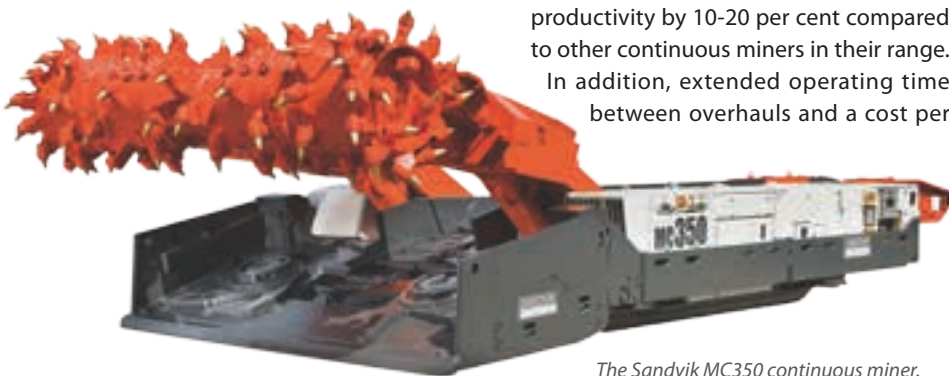
In addition, extended operating time between overhauls and a cost per

ton that is equal or better than other continuous miners makes this a very attractive offering.”

The MC-series continuous miners are built using top quality parts, sturdy, rugged structural components and boast a robust gearbox. Semi-automated and with a higher weight class, they offer a higher cutting rate and quicker loading time. They can be fitted with a proximity detection system to improve safety. A health monitoring function also ensures advance warning of any problems before they arise.

“It’s all about availability of the equipment and predictability in the operations, and part of that is also our complete parts and service offering”, Reumueller says. “Our service engineers ensure that our customers get the right parts, rock tools and service at the right time to ensure safe operation, low operating costs and long service life”.


John Scobbie, Sandvik Mining, tel (+27 11) 929-3000, email: john.scobbie@sandvik.com




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Customised screens from Joest Kwatani improve throughput

Large tonnage throughputs, long drop heights, very heavy ROM ore boulders and large cut sizes all mean that a screen and its component parts must be specifically designed for the loads and stresses normally not experienced in dry screening processes.

Kenny Mayhew-Ridgers, GM Engineering at specialist vibrating equipment manufacturer and supplier Joest Kwatani, says that the scalping screen design, amplitude of stroke, excitation force, drive angle, deck angle, operating frequency and screen deck selection must be optimised to limit pegging on screen deck apertures.

Joest Kwatani has an impressive footprint of screen installations throughout Africa, and this includes very large scalping screens. This local manufacturer has built its reputation through a strategic map that hinges on carefully considering exacting customer needs and engineering screens for tonnage throughput, reliability and durability. Bespoke screen types operate in applications from dry to wet screening, and include single to double or triple decks in a variety of sizes.

"We source the necessary information required for appropriate design, which includes the specified tonnage throughput with its related particle size distribution table showing the maximum and minimum size of ore to be screened. Our trained metallurgists and engineers then chart the various curves of material distribution from large/coarse ROM material down to medium and even predominantly fine material," says Mayhew-Ridgers.

The design and engineering process involves close cooperation between the in-house design engineer and the process engineer or metallurgist. Since a multitude of factors could compromise the fatigue life of a screen's components, the team needs to be able to extrapolate the most relevant data to produce a workable solution for the customer.

"After gathering all the necessary information, the process and design engineers will use in-house developed process and structural sizing programs. This will be followed by the development of a 3-D model by the engineering department in order to finally validate the design by using finite element analysis software. Once completed, a data pack comprising detail drawings, complete with specifications, and bill of materials is put together," says Mayhew-Ridgers.

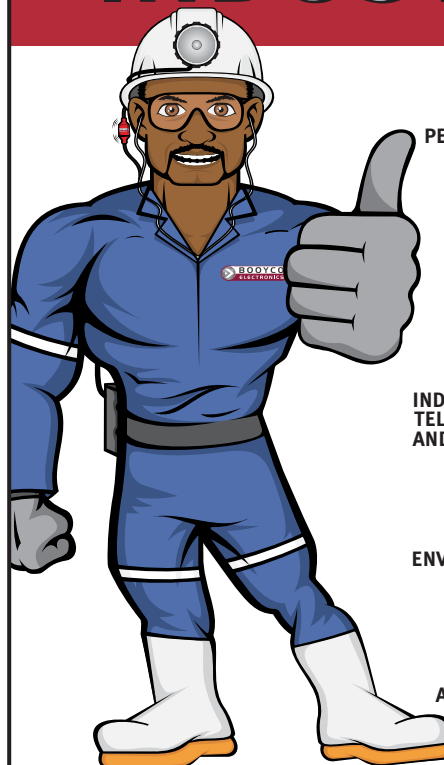
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Joest Kwatani recently completed one of the largest scalping screens ever produced to date.



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PRODUCT News

Hybrid panel supplied to silica mine

FLSmith has designed and produced a hybrid poly wire modular panel for use in Rietvlei silica mine's screening process.

Double deck woven wire units were originally used as secondary screens in the production of silica sand at the mine. However, localised wear patterns created holes in multiple areas of the screen surface. These screens were replaced with modular polyurethane panels, which effectively increased both safety and maintenance issues but negatively affected the production output.

"FLSmith's screen media specialists were asked by the mine to find a solution that would ensure employee safety, decrease maintenance required and increase productivity. After analysing the process and vibrating equipment, we provided a number of recommendations with respect to the setup of the feed to the equipment as well as the use of a new material for the bottom deck panels," says FLSmith's Screen Media Technical Support Manager, Jannie Engelbrecht.

FLSmith's hybrid poly wire modular panel is a standard 1'x1' panel comprising a flat top woven wire screen, using 20,0 mm x 7,1 mm aperture Vibro Optimax wire with polyurethane cast on to the steel edges to complete the 1'x1' modular panel. Standard pin and sleeve or bolted pin system fixing devices secure it to the sub-frame of the machine. Engelbrecht explains that once installed, the effective open area percentage of the poly wire modular panel is 48 %, which compares favourably with



FLSmith has designed a hybrid poly wire modular panel for use in Rietvlei silica mine's screening process.

the open area percentage of standard woven wire screens when installed.

A trial was undertaken at Rietvlei to determine the performance and suitability of the hybrid poly wire modular panel. "With the assistance of Jacques Labuschagne from Rietvlei silica mine, we were able to ascertain that the new panel provided increased tonnes per shift while the raw product feed to the plant had an increased percentage of fines. During a normal shift it is possible to obtain an increase of up to 33 % when compared to the output achieved by the modular polyurethane panels previously installed. This effectively means the output can increase per month," says Engelbrecht.

"We are extremely pleased with the outcome of the hybrid poly wire modular panel trials. We have managed to meet all of our stated goals without compromising on quality and we can additionally accommodate more fines," says Labuschagne.

FLSmith, tel (+27 10) 210-4820

BMG and Danfoss consolidate partnership

BMG and Danfoss Drives have consolidated a long-standing partnership with the official signing of a strategic alliance agreement which, they say, augurs well for both companies, stakeholders and customers.

"This new development formalises and strengthens the original distribution agreement for Danfoss variable speed drives and the soft starter range, which has been in place since 2007," says David Dyce, Division Manager, BMG Electronics – Bearing Man Group. "Through this firm alliance, BMG is set to increase awareness of the Danfoss brand, create a stabilised pricing structure and ensure efficient

enquiry turnaround times and a reliable support service of Danfoss systems."

BMG's R350-million expansion of the distribution and engineering facilities in Johannesburg includes new electronic workshops and a technical resources centre for the repair, maintenance and commissioning of the Danfoss product range. This 24-hour service is supported by mobile technicians.

BMG's purchasing system at Danfoss will become e-based, providing live updates on delivery times to ensure a highly efficient supply chain process.

Dave Dyce, BMG Electronics – Bearing Man Group, tel (+27 11) 620-1530

Super-Screw™ system offers fast conveyor belt repairs

BMG's belt fastener system, the Super-Screw™, which was originally used as a temporary alternative to conventional hot and cold splicing, has proved to be totally reliable as a permanent splice for conveyor belt repairs.

"This high strength splicing system is a flexible rubber splice using self-tapping screws that enable Super-Screw to be installed regardless of the configuration of the conveyor belt and irrespective of access and weather conditions," says Donovan Scott, Divisional Manager, Bulk Materials Handling, BMG. "The current trend in the mining industry is to avoid the use of hazardous substances wherever possible. Trichloroethylene, a hazardous solvent used in conventional hot and cold splicing procedures, can now be replaced by using the Super-Screw system as a safe splicing alternative.

"BMG, in conjunction with the SABS, has used various belt classes and widths to test the Super-Screw in different applications over the last three years. Further tension tests are currently being conducted through the CSIR on various splice types and on wider belts (500 mm). We expect to achieve even better results, which will be published in the next six months.

"Field tests indicate that the Super-Screw is the quickest method to repair a conveyor belt in any emergency situation, significantly reducing downtime. The mechanical joining technique is easy to complete, without the need for a skilled operator and heavy, costly equipment. This system, with a high tensile strength, has proved to be a suitable alternative to conventional splicing methods. In some cases, the Super-Screw exceeded the tensile rating of hot and cold splice samples of the same class rating.

"Trials, using the same belt width of 600 mm, also demonstrate that a conventional hot splice takes seven hours, a cold splice takes over eight hours (including curing) and the Super-Screw takes less than one hour."

This leak-proof system can be used for reliably joining a belt, repairing a longitudinal rip, or a puncture in a belt. The Super-Screw splice is compatible with small pulley diameters, suitable for pipe conveyors and is conveyor scraper and V-plough friendly. This flexible splicing system can also be used inserting new belting into old conveyor belt systems.

Super-Screw, which can withstand service tensions to 2 000 kN/m, is available in various grades of rubber to suit exact requirements.

The rubber material, containing tensile fabric used for the splices, is manufactured in rolls up to 25 m in length and in various strength ratings, from Class 315 to Class 2 000 conveyor belting. The system is also available in a ready-to-install option, with maximum pre-cut lengths of 3 metres and pre-installed assembly spacers.



BMG's Super-Screw belt fastener system screws onto a conveyor belt for efficient repair in all conditions.

Donovan Scott, BMG - Bearing Man Group, tel (+27 31) 576-6212

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New contender in the large top hammer market sector

Atlas Copco South Africa claims to have set the benchmark in the large top hammer market sector with the introduction of the PowerROC T50.

“Uncomplicated surface drilling technology meets Atlas Copco’s superior quality design and engineering

standards in this drill rig,” states Hedley Birnie, Business Line Manager – Surface Exploration Drilling (SED) for Atlas Copco Mining and Rock Excavation Technique. “And the result of this perfect combination is a high performance, rugged and reliable machine that drills bigger holes faster, requires very little maintenance and maintains high production levels for lowest overall cost of ownership.”

The straightforward modular design includes simplified hydraulic and electrical systems for easier operation and maintenance. “What makes the drill rig particularly attractive, especially in this tough economic climate, is its extremely fuel efficient capability,” continues Birnie. The machine’s effective management system allows for low fuel burn at full production, giving fuel burn as low as 27 litres per hour on large holes.

The machine’s Tier 3 diesel power pack delivers 261 kW at 1 800 rpm and provides more tons per litre of fuel which has a direct and positive result on productivity.

The drill rig’s high penetration capability comes from the powerful COP 3060 30 kW hydraulic rock drill, a proven high performance unit in the Atlas Copco range. While output is dependent on mineral type and location, the drill rig/rock drill combination’s output capabilities are extremely impressive, ranging from 200 m/h in medium rock (coal) to 70 m/h in hard rock.

The machine can drill holes that range from 102 to 152 mm in size and 35 m in depth. The motor driven aluminium feed delivers a maximum feed rate of 0,7 m/s and achieves straighter and more consistent holes compared to a steel feed. The double dampening system ensures constant hole bottom contact. Hole quality is further assured by the constant and sufficient supply of air delivered by the Atlas Copco screw type air compressor.

Weighing only 22,8 tons (without consumables), the compact drill rig’s high ground clearance and tracks ensure easy manoeuvrability and transportation.

Atlas Copco South Africa, tel (+27 11) 821-9000



The new PowerROC T50 from Atlas Copco.

GRP pipes well suited to mine dewatering

The proven resilience of glass-reinforced plastic (GRP) pipes in harsh terrains, extreme climates and unpredictable site environments makes them the superior choice over HDPE, steel and DICL (ductile iron concrete lined) pipes in the demanding environment of a mine dewatering system.

This is the view of Roger Rusch, CEO of IWC, who says: “Unchecked groundwater can affect the stability of the mine stopes and affect the depth of excavation. GRP’s resistance to abrasion from harsh chemicals – including hyper-saline and acidic

groundwater – eliminates the need for costly protective pipe coatings and sleeving. These highly flexible pipes also have exceptional creep resistance and resistance to environmental stress cracking, making them suitable for deep-level dewatering operations.”

According to Rusch, GRP mine dewatering pipes have proven advantages over HDPE pipes, another pipe material which is regularly used in open-pit mine dewatering applications. He says that GRP pipes can be manufactured at greater

diameters at a lower cost than HDPE.

In addition, GRP pipes can be optimally designed to meet the internal pressure and stiffness requirements of underground piping applications, unlike HDPE pipes.

When compared to steel and DICL pipes, GRP pipes are hydraulically smoother and require a lower pressure head, which reduces overall energy consumption for pumping. Their high strain allowance results in lower transient wave speeds during water hammer events and eliminates the need for expensive water hammer prevention infrastructure.

IWC, tel (+27 11) 466-0699

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Lifting equipment specialist expands product offering

Demand from its customer base has led to Elephant Lifting Equipment expanding its product offering to include larger overhead cranes from 30 tons upwards. "We took a decision to increase our existing 10-ton capacity and have successfully supplied a number of 30-ton capacity overhead cranes into the local mining industry," says Grant Walton, MD of Elephant Lifting Equipment.

Walton says that a significant feature of the Tusker overhead crane is that it has been designed without a rope guide. This results in reduced maintenance costs and decreased downtime. The hoist is extremely robust as it has fewer working components and its simple design readily lends itself to demanding local operating conditions. The overhead crane is designed to accommodate a wireless remote system with range limiting features that facilitate optimum safety and a digital readout capability which indicates the hoist's load.

An accredited company that has fulfilled all the requirements necessary to be issued with an LME (Lifting Machinery Entity) number, Elephant Lifting Equipment has a proven track record in the supply and load testing of overhead cranes, chain hoists and electric hoists. The company's qualified artisans are registered with the Engineering Council of South Africa (ECSA) as Lifting Machinery Inspectors (LMIs).

"The main focus with our lifting tackle is on traceability. This means that a recognisable brand logo is apparent on all equipment we supply. This not only underpins the fact that stringent quality control systems are in place during the production cycle, but it provides customers with the complete reassurance that these products are manufactured to the highest standards," says Walton.

He explains that each piece of lifting tackle supplied has a unique certificate which details the design standard that is strictly adhered to in the manufacturing process. "We do not permit any compromise on the product's structural integrity. All of our products are designed with safety in mind, in strict conformance to South African legislation that protects the user from accidental overloads or shock load."

In an industry first, the company offers existing customers an online certificate verification system, whereby at any stage the customer is able to access any certificate issued since the inception of the programme. Certificates include new supply, inspection and load testing.

Grant Walton, Torre, Elephant Lifting Equipment, tel (+27 12) 661-6105



A portal crane solution from Elephant Lifting Equipment.

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Plastic piping range designed for mining

Mining poses a particularly challenging environment for piping systems and products. DPI Plastics claims to lead the market in terms of innovation and technology, having met the demanding needs of this industry for over two decades.

Underground mining in particular has to contend with heat and corrosion issues, notes Renier Snyman, Technical and Product Manager at DPI Plastics. "Mining represents a very rugged and uncompromising environment, in which such issues can have a

detrimental impact on both productivity and the health and safety of workers."

DPI Plastics has developed a range of products with specific thermal and physical properties to be able to meet these requirements. The range consists of Mineflo, Drainflo and Airflo, all produced in high-impact PVC-M, and flexible PVC Duroflex mining hose.

The mining hose is SABS-certified and has the added benefit of being fully compatible with traditional hose fittings. This flexible PVC hose range is conveniently colour-coded orange for standard applications, blue for medium duty and green for heavy duty.

Duroflex is longitudinally reinforced with a fluted outer layer for added flexibility. These hoses are said to be ideal for both air and water applications and have a service temperature range of -10°C to 60°C.

Mineflo pipes are produced in accordance with the requirements of the SANS 1283 specification for PVC-M pipe for cold water services in underground min-

ing. Pipes are supplied in standard 6,1 m lengths and with pre-assembled steel Victaulic collars.

Snyman comments that it is sometimes necessary to cut pipes when performing repairs, or to make up short lengths of pipe, which necessitates the removal of the steel collars. DPI Plastics supplies two products for such applications, namely the Ultralok PVC-M restrained coupling and the Minelok steel repair coupling.

Drainflo pipe systems are used in the management of humidity and fine and aggressive slurries in underground mining haulage ways. The drain contributes to the control of heat loss, and overall safety in the work place.

Airflo pipes from DPI Plastics have been developed in conjunction with various mining engineers to meet the industry's requirement for a rough, ductile and lightweight pipe for the conveyance of pressurised air in underground mining applications. Airflo pipes are 7 bar (700 kPa) rated for maximum pressure, and are yellow for easy identification.

Renier Snyman, DPI Plastics, tel (+27 11) 345-5600



Duroflex mining hose is conveniently colour-coded orange for standard applications.

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Tega components improve conveyor system efficiency

Tega Industries SA reports it is marketing a number of carefully engineered conveyor components that are especially designed to address weak points on conveyors and maximise efficiency while simultaneously increasing the lifespan of belts and extending service periods.

According to Tega Industries SA's Business Development and Marketing Manager, Vishal Gautam, the solutions are designed to increase availability and avoid unnecessary downtime. Each one of the components was developed in response to common problems on African mines and in response to skills shortages which currently require products to be simpler and less maintenance intensive.

He says one of the biggest causes of damage to belting is at transfer points where impacts from large or heavy items can damage rollers (or impact rollers) to the extent that they may seize or begin to run unevenly. This can result in rapid wear of the belt and excessive drag on the rest of the system and will require the belt to be shut down for a lengthy period of time for repairs to be effected.

To combat this, Tega Industries SA has an impact pad system that replaces standard rollers with a solid impact bed. The specially formulated combination of materials incorporates a low friction surface that allows the belt to glide over the top with little or no friction, while a rubber middle layer absorbs shocks and reduces damage to the belt.

"We designed the Fri-Flo impact pad system with a top layer made of UHMWPE to glide the conveyer belt over the transfer point. The middle layer cushions impacts, while the lower layer is for fastening impact pads onto the support frame (usually made of aluminium). The pad provides a large contact area that supports the belt which means that there is no under cutting and damage as is the case with rollers," says Gautam.

"With no bearings or moving parts, the pads offer a long service life with no requirement for lubrication or further maintenance other than a quick visual check from time to time. Having continuous support under the belt at transfer points also acts to reduce spillage."

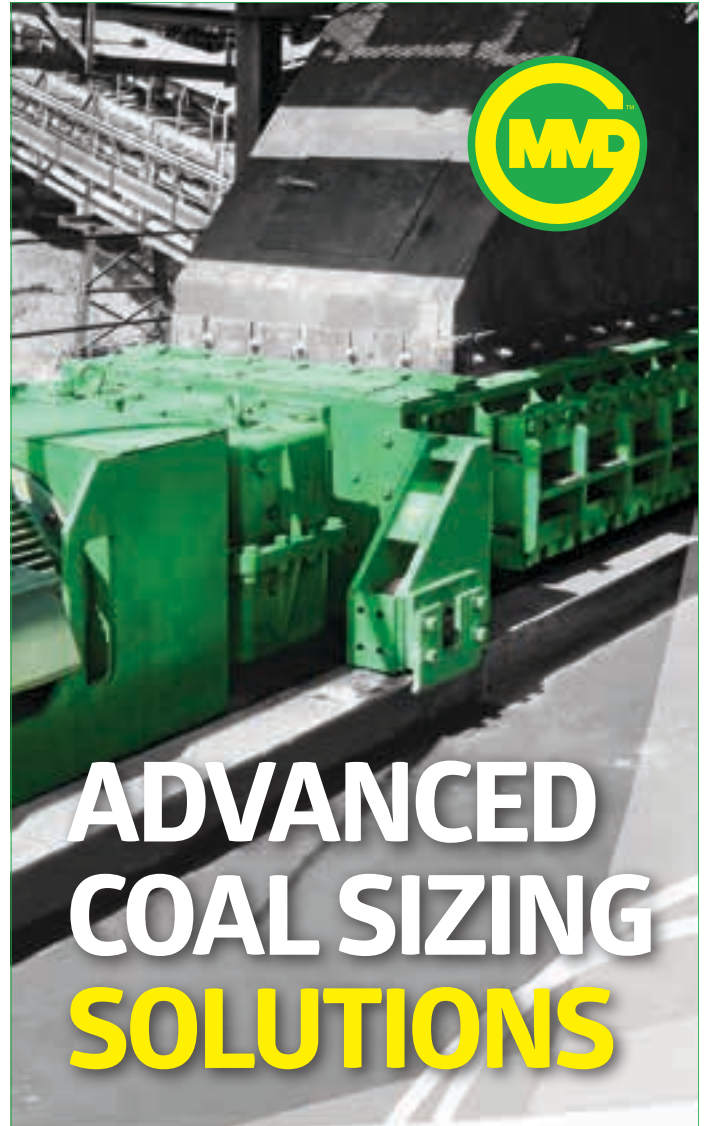
An additional system designed to eliminate spillage at transfer points is the Spill-EX skirt sealing system which, like the Fri-Flo impact pad, is designed to be simple. The Spill-EX system uses specially formulated soft rubber segments to act as a skirt to seal the sides or rear of conveyors and is adjustable to ensure that each segment makes contact with the belt to form a complete seal.

"Spill-EX replaces commonly used long rubber lengths which are comparatively difficult to install and provide little or no settings to adjust the skirt to match the shape of the belt," states Gautam. "Excessive wear or damage on any one section of the previous system invariably required the replacement of the full length of skirting which was costly and time consuming.

"Our system, by comparison, is supplied in short lengths that can be individually adjusted to make light contact with the belt. Our specially formulated rubber is softer than the belt which results in it wearing to the point where it takes the exact shape of the belt to create a full seal. Thereafter the blocks can simply be adjusted for wear and individual segments can be replaced if worn or damaged."

Another innovation is the company's ceramic pulley lagging system that fits existing or new pulleys to provide greatly increased traction on the belt and prevent slippage.

Vishal Gautam, Tega Industries, tel (+27 11) 421-9916



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Warman slurry pump range extended

Plant availability is paramount in all commodity sectors and there is an increasing



The Warman WBH slurry pump undergoing testing at Weir Mineral Africa's Alrode manufacturing centre.

emphasis on optimisation of pumping systems from end users as part of their cost savings drive. "One of the options in terms of reducing operating cost is to replace older technology with new," says Rui Gomes, Product Manager Slurry Pumps for Weir Minerals Africa and Middle East.

Gomes points out that Weir Minerals Africa has a depth of experience in terms of assessing pumping systems. This allows the company to provide solutions aimed at assisting customers in reducing total cost of ownership on pumping systems. "The recent expansion of the Warman® WBH® range of pumps now gives our customers access to the latest technology across a range of pumping applications."

The Warman® WBH® slurry pump is

typically used in heavy duty applications such as mill discharge, slurry transfer and process pumping applications and is said to be ideal for both greenfield and brown-field projects.

In 2010 the Warman® WBH® 75 and Warman® WBH® 100 were launched in the African market through a trial programme. The twofold objective was to obtain field and verification data and to gain market acceptance.

The Warman® WBH® pump has reportedly proven so popular with customers that the range has been expanded upwards and downwards, and covers from 50 mm discharge diameter up to 300 mm discharge diameter with flow rates of between 5 litres per second and 800 litres per second.

The range is available with both metal volute or rubber liners, depending on the application. Furthermore, the Warman® WBH® pump features a streamlined impeller and volute design, enabling flow paths within the pump that enhance the overall performance and combine high efficiency and long life.

The pump is designed with a throatbush or front liner adjustment mechanism, which continuously minimises the impeller gap as recirculation increases. "Recirculation of the slurry within the pump will significantly increase the wear, which in turn decreases the component life. To counter this and provide a significantly improved life on the impeller and throatbush, the gap between these two components can be mechanically adjusted from a single point on the pump exterior. This makes ongoing adjustment, as normal wear occurs, a simple task," Gomes explains.

Rene Calitz, Weir Minerals Africa, tel (+27 11) 929-2622

WEG contactors facilitate energy savings

The new generation of WEG contactors has been engineered to facilitate energy savings as well as the optimisation of space within electric panels. These environmentally friendly devices use only non-toxic and eco-friendly materials.

Designed using WEG technology and in-house software modelling programmes, the WEG CWB range of contactors has been engineered to accommodate surge suppressors directly in the device. This is not only a space-saving feature, but also allows easy access for maintenance or replacement. Another important feature is that coil replacement can be accomplished without the need for any tools making this a simple and time-saving task.

Energy savings are achieved through the low consumption of the coils used in the WEG CWB contactors and these also allow direct switching from PLCs without the

need for interface relays. This facilitates both space and cost savings for the end-user.

Developed by WEG's R&D department in Brazil, all devices in the WEG CWB contactor range meet the IEC 60947 and UL 508 international specifications. The range has been specifically designed to accommodate electric motors up to 18,5 kW at 380/415 V (AC-3).

According to Zest WEG, these contactors are ideal for applications where the majority of the motor starters in an electrical panel are direct online, forward reverse or star delta. The seamless integration between the WEG CWB range of contactors, overload relays and motor protection circuit breakers allows fast and easy assembly of compact starters and protection sets for low voltage motors. These modular devices offer a wide variety of combinations allowing greater flexibility.

Kirsten Larkan, Zest WEG Group, tel (+27 11) 723-6000

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