

# MODERN MINING

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- Construction of Boungou mine in full swing
- KZN coal producer looks for sustainability
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- Work starts on pilot plant at Mutamba



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#### Cover

The Generation 10TA400 articulated hauler from Terex Trucks. The dealer for Terex Trucks in Southern Africa, Babcock, has recorded some excellent sales since taking over as official distributor in 2015, as our cover story on page 18 relates.



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# Intelligent off-road trucking keeps Bell in the driver's seat



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# Katanga's missing millions

One of the most remarkable developments seen on the African mining scene in recent years has been the emergence of the DRC as the biggest copper producer in Africa and the biggest cobalt producer in the world.

Given the country's mineral riches (which, in the case of copper and cobalt, are almost exclusively located in Katanga Province), this might not seem a huge achievement but it has to be remembered that just 15 years ago the DRC's production of the two metals was insignificant. In 2003, for example, just 16 172 tons of copper and 1 200 tons of cobalt were produced.

Since those days, the country's copper/cobalt industry has been revitalised. Starting around 2005, the country's doors were opened to mainly western mining companies such as First Quantum, Anvil Mining, Freeport-McMoRan and Tiger Resources (most of whom have now departed the country). They proceeded to open a series of new mines and the results were startling. Production climbed year by year and by 2013 the country was producing more copper than neighbouring Zambia. In 2014, for the first time, over a million tons of copper were produced.

The problem with this success story is that it has a dark side, as international NGO Global Witness makes clear in its latest report on the DRC's mining industry. Entitled 'Regime Cash Machine – How the Democratic Republic of Congo's booming mining exports are failing to benefit its people', the report exposes huge malfeasance relating to the revenues generated from copper and cobalt mining.

Here is the nub of Global Witness's case: "More than \$750 million of mining revenues paid by companies to state bodies in the Democratic Republic of Congo was lost to the treasury between 2013 and 2015. Instead, the money disappeared into a dysfunctional state-owned mining company and opaque national tax agencies. There is no clarity on what this money was spent on or where it ended up, but testimony and documentation gathered by Global Witness indicates that at least some of the funds were distributed among corrupt networks linked to President Joseph Kabila's regime."

The "dysfunctional state-owned mining company" referred to is, of course, Gécamines, the descendant of the famous colonial-era mining company, Union Minière du Haut Katanga. Gécamines was once a major copper/cobalt miner in its own right – producing almost half-a-million tons of copper a year back in the 1980s – but years of plunder by President Mobutu Sese Seko and others saw it virtually collapse in the 1990s. Today, it has a share in most, if not all, the copper/cobalt mining ventures in the

country but does little direct mining itself.

Global Witness says its investigation shows that Gécamines, is "haemorrhaging money in suspect transactions" – some of them involving cash payments of millions of dollars – and has more than a billion dollars of debt.

"Gécamines has apparently prioritised paying off debts to a friend of the president over paying its staff, who have at times gone months without their salaries, and has handed out a crucial contract in opaque circumstances to a little-known sub-contractor," states the report. "Meanwhile, it fails to pay dividends to the government, its sole shareholder, and barely pays more than \$20 million in tax per year, according to an industry transparency body – much lower than the contributions of several private mining companies in Congo."

Global Witness lays the blame for much of what has gone wrong at Gécamines at the door of its Chairman, Albert Yuma, who apparently controls the company with little oversight and who reportedly only answers to President Kabila. It quotes an unnamed civil servant as saying: "You should forget Gécamines my friend. It's an empty shell. Plunder is done in the open. Decisions come from the top [officials] and there's nothing we can do about it."

Yuma is trying to re-launch Gécamines as a mining operator, with his hopes reportedly being pinned on the Kamfunda mine. Global Witness notes that "a little-known operator" with South African links has been selected as the sub-contractor for the relaunch work at the mine and says the contract appears to have caused concern even within Gécamines' own hierarchy. It adds: "The project consists of five separate contracts, none of which has been made public and whose terms are unknown, even to many within Gécamines."

Global Witness has a whole raft of recommendations to rectify the situation in the DRC's copper/cobalt mining sector and warns that failure to take action could be disastrous for the country. As it says, "The diversion of much-needed public funds into parallel networks close to the regime serves only to entrench the deadly divisions in Congolese politics today. It also heightens the risk of Congo backsliding towards the disastrous civil wars from which it has not yet fully recovered."

I realise that Global Witness is no great friend of the mining industry but its reports are extremely well researched and, in this particular case, give substance to what many of us familiar with mining in the DRC have already heard on an anecdotal basis. It's certainly well worth a read and can be downloaded from the Global Witness website.

**Arthur Tassell**



*"More than \$750 million of mining revenues paid by companies to state bodies in the Democratic Republic of Congo was lost to the treasury between 2013 and 2015."*

## Yanfolila draws closer to commissioning



A view of the Yanfolila site taken in July this year (photo: Hummingbird).

In a review of activities during Q2 2017, AIM-listed Hummingbird Resources says that its 1,2 Mt/a Yanfolila open-pit gold project in Mali remains on schedule and on budget with several aspects of development now completed and the first gold pour expected by year end.

Construction of the CIL tanks is now complete. The completion of the tanks has allowed other work fronts to progress rapidly; for example, the tank agitators and tank top steel are also now installed, again opening up more mechanical work fronts.

The ball mill arrived on site on time and preparation is in place for its installation. According to Hummingbird, this was the longest lead item on the project and its arrival has materially de-risked the construction timeline.

Construction of the crushing circuit is ongoing with the conveyor system starting to arrive on site. Pre-assembly of the arrived conveyor sections has started and their erection is expected to start imminently.

Mining contractor AMS has mobilised to site and is currently working on the TSF before commencing pre-production mining, which is due to start in Q3 2017.

A second round of grade control drilling was completed at the Komana East pit in advance of mining, with some 2 057 m of drilling being completed over 11 days. This drilling targeted zones where the mineralisation was not closed off either in the hanging wall or footwall of the main mineralisation.

Aggreko, the appointed power pro-

vider, will be mobilising to site in Q3 2017 to provide around 6 MW of power from the commencement of commissioning. Construction power is currently provided through a 1,6 MW generator.

Hiring of key personnel continues and Hummingbird says it has been pleased with the quality of applicants as it builds up its capacity to move from construction into operations when commissioning starts.

Dan Betts, CEO of Hummingbird, commented: "The construction of the Yanfolila gold project continues at pace. We currently have over 700 people on site and the construction team has recently completed 500 000 Lost Time Incident (LTI) free hours which is a significant achievement.

"The project remains on time and on budget and the team remains highly motivated as we enter the final phases of construction and mobilisation for mining begins.

"During Q2 we acquired a further 5 % interest in Yanfolila and bought out a 1 % royalty on the project for a settlement of US\$2 million of Hummingbird shares to be settled in March 2018. This will allow us to retain more of the cashflows from Yanfolila for the benefit of shareholders. Based on our reserves alone, this is estimated to add at least US\$10 million to the cashflows attributable to Hummingbird.

"Additionally, we entered into a loan agreement with Coris Bank International who are a supportive and knowledgeable lender. We have subsequently drawn the whole US\$60 million loan in order to bring any financing risk to an absolute minimum. At a US\$1 250 gold price, we anticipate, based on the final project study, free cashflows of around US\$70 million in our first full year of production." ■

### Imweru drill programme completed a month early

AIM-quoted Katoro Gold reports that the drilling for the Imweru resource development programme was completed on 19 July 2017. The expanded drill programme was completed almost a month ahead of the original schedule and well within budget and included 2 000 m of additional drilling, for a total of 31 drill holes (3 410 m). The original programme was for eight to 10 holes for 1 400 m.

Imweru, a gold project, is located approximately 120 km directly south-west

of the city of Mwanza in northern Tanzania (approximately 160 km west-south-west by road). The rapid progress and completion of the drill programme will enable the company to export all geological samples from the drill programme in one batch which will in turn have the added benefit of all the lab results being contained in one report. This will make work on the Pre-Feasibility Study (PFS) much easier and significantly quicker than planned.

Work on the Environmental and Social

Impact Assessment (ESIA) is also progressing well and the ESIA technical team completed their first on-site work session on 18 July 2017.

In May 2017 Katoro acquired the Imweru and Lubando gold projects in Tanzania from Kibo Mining for a total consideration of £3,66 million and was admitted to trading on AIM.

Imweru has a resource of 11,61 Mt at grade of 1,38 g/t for a mineral resource of 515 110 oz Au at a resource pay limit of 0,4 g/t for the open pit material and 1,3 g/t for the underground material. ■



The processing plant at Roxgold's Yaramoko gold mine in Burkina Faso (photo: Roxgold).

## Solid quarterly performance by Yaramoko

Canada's Roxgold Inc has announced second quarter (Q2) production of 27 970 ounces of gold from its Yaramoko underground gold mine located in the Houndé greenstone region of Burkina Faso. Yaramoko is a new mine which produced its first gold in May last year.

During the quarter, Yaramoko mined 66 044 tonnes of ore at 11,69 g/t Au with 2 085 m of development completed. The plant processed 65 159 tonnes at an average head grade of 12,78 g/t Au. Plant availability was 94 % and overall recovery was 99,0 % during the quarter. Similar grades are anticipated to be mined in Q3 with higher grade material scheduled for the latter part of the year.

By the end of the quarter, underground development had reached the 5083 RL, some 230 m below surface. Waste development continues to exceed plan and is providing a significant amount of flexibility to the operation going forward. With seven stoping faces operating at quarter end, the mine is well positioned to deliver in the second half of 2017, as well as in 2018 and beyond.

Roxgold is planning to expand operations at Yaramoko by developing the Bagassi South deposit, which is located less than 2 km from the current (55 Zone) mine.

During the quarter, the company progressed the Bagassi South feasibility study on a number of fronts. Highlights from the work plan of Q2 included: commencement of construction works associated with the camp expansion to accommodate construction and additional future opera-

tional personnel; and the completion of a programme to increase the capacity of the existing water storage facility to augment plant water supply.

During the quarter, Roxgold completed an infill and expansion drilling programme at Bagassi South. It has since published an updated Mineral Resource Estimate (MRE) which details an indicated mineral resource of approximately 352 000 tonnes at 16,6 g/t Au for 188 000 ounces and an inferred resource of approximately 130 000 tonnes at 16,6 g/t Au for 69 000 ounces.

The updated MRE will be incorporated into the feasibility study for the Bagassi

South expansion project which is due to be completed in Q4.

"Another solid quarter of production above expectations at Yaramoko has put us on track to meet the upper end of our annual production guidance," commented John Dorward, President and CEO of Roxgold. "With first half production of over 63 500 ounces, we are well placed to meet guidance of 105 000 to 115 000 ounces for the full year. In addition, the feasibility study for our Bagassi South expansion project is on track for delivery in Q4 and we are excited by its prospects to build upon the recently upgraded resource estimate." ■

## Namibian tantalite mine to increase production

Kennedy Ventures, an AIM-quoted investment company, which – through its stake in African Tantalum (Aftan) – has an interest in the Namibia Tantalite Investments (NTI) mine (historically referred to as the 'Tantalite Valley Mine') in Namibia, has raised £3,75 million through a share placing.

Larry Johnson, CEO of Kennedy Ventures, commented: "I am very pleased with the support we have received from our existing and new shareholders which will allow Aftan to accelerate plans to increase production as well as increase our tantalum resource and life of mine and complete a lithium JORC resource report. Having worked in the tantalum business for over 35 years, I am confident in my view that NTI represents one of the finest grade mines globally and this has played a part in helping us secure and execute a long-

term supply agreement with a global North American leading tantalum consumer and end user of tantalum ore.

"NTI is one of the highest-grade mines in the world and, following upgrades in H1 2017, we are now capable of meeting the customer's grade specifications. The fund raise will enable Aftan to implement further plant upgrades with the expectation of ramping up to 30 tonnes per quarter and beyond long term."

The upgrades will include the purchase of a variety of equipment to increase plant capability such as a new Tornado crusher, a fines recovery plant and conveyor belts. Aftan also intends enhancing the operational effectiveness of the mine by purchasing winches, water and air piping, explosives, a dump truck and a mining chute and platform. ■



## First production from Balama delayed till October



The Balama processing plant photographed in June this year (photo: Syrah Resources).

In its second quarter report (to 30 June 2017), ASX-listed Syrah Resources says that its Balama graphite project in northern Mozambique was 90 % complete at the end of the quarter with commissioning activities underway.

It notes, however, that subsequent delays in the construction completion of the processing plant have led to a delay in the commencement of production from late August into October and to an increase in the construction budget (including contingency) to US\$205 million from US\$200 million.

According to Syrah, the slower than planned completion of structural steel erection, piping installation and electrical work in the processing plant (particularly in the flotation and filtration areas) can

be attributed to a number of factors, including contractor productivity and commitment to scheduled completion dates. It also cites some specific material shortages of vendor-related equipment and piping materials, minor fabrication, design and installation issues, requiring re-work, and reduced power availability delaying commissioning.

Commissioning activities began in May 2017 utilising low voltage generator capacity on site and the planned usage of a 1 000 kVA portable generator from early July. On-site commissioning of the power station was dependent on the use of a load bank and sufficient load being available from the processing plant. Unfortunately, says Syrah, a truck transporting both the generator and the load bank was involved

in an accident en route from South Africa resulting in both items needing to be replaced. The replacement load bank and generator arrived on site at the end of July and have now been installed.

Syrah says that management and supervision continue to give the highest priority to recovering lost time and have been working around the clock with contractors to implement several initiatives to ensure delivery of the project. The company notes that, as the delay is relatively short and the initial planned production volumes are modest, it does not anticipate any material impact on total planned production for the 12-month period commencing August.

The operations team organisational structure is established and staffed, and the teams are completing training and preparation for operation of the processing plant. The mining contractor is established and – says Syrah – displaying excellent operational performance with initial mine development and the stockpiling of mineralised ore onto the ROM stockpile complete, ready for production. The mining technical support team continues to refine the mine planning model.

Balama will be a simple, low strip ratio, open-pit operation. Processing will utilise conventional processes including crushing, grinding, flotation, filtration, drying, screening and bagging. The processing rate is 2 Mt/a with the nameplate capacity being 380 000 tonnes of graphite concentrate per annum. ■

## Ity indicated resource climbs by a million ounces

Endeavour Mining, listed on the TSX, reports that its exploration programme at its Ity CIL project in Côte d'Ivoire has increased the indicated resource by 1,0 Moz to 3,8 Moz since the beginning of the year.

This marks a 1,5 million ounce increase in the indicated resource base since the publication of the November 2016 Feasibility Study (FS), representing a 65 % increase. An updated reserve estimate is due to be published in September as part of an Optimisation Study (OS) which is expected to be based on a circa 4,0 Mt/a gravity circuit/CIL plant, an increase from the previously contemplated 3,0 Mt/a plant, to better capture the value

created from recent exploration success.

"Our exploration team has done exceptional work over the past months which has led to a significant increase in the resource base at Ity ahead of the Optimisation Study," commented Patrick Bouisset, Executive Vice-President Exploration and Growth at Endeavour. "These results and the numerous other identified targets, on which initial drilling reconnaissance is currently being conducted, further demonstrate the prospective nature of the greater Ity area and our confidence in delivering against our five-year exploration strategy disclosed last November. We believe that the 80 km Ity corridor which we control is among the

most prospective areas in West Africa and we look forward to building on our exploration success."

Sébastien de Montessus, President and CEO, stated: "Under Patrick's leadership, Ity has been transformed from a 20-year operation nearing the end of its life into an asset that now has the potential to be one of our flagship operations. Our ability to quickly grow the indicated resource demonstrates the robustness of Ity, as well as the quality of our exploration team. We now look forward to announcing the results of the Optimisation Study and making a formal investment decision in September, following which we will transition the construction team from Houndé to Ity later this year." ■



## Firestone revises production guidance for Liqhobong

Firestone Diamonds, the AIM-quoted diamond company, says it has recently commenced a review of its current life of mine plan in order to optimise mining operations at its 75 %-owned Liqhobong diamond mine in Lesotho. As a result, the company is revising its production guidance for the year to 30 June 2018 (FY 2018).

As part of this review, Firestone will be extending the mining of the weathered kimberlite over the coming months, in order to access the lower areas of the pit that have historically yielded higher grade and higher value diamonds. The company also plans to mine additional waste rock in the coming year, in order to improve the long-term mining operations.

As a result, although the overall life of mine carats is not anticipated to change, the company now expects to produce between 800 000 and 850 000 carats in FY 2018 (previously 1,0 million carats), which is expected to impact revenues in the current financial year. Further details of the optimised mine plan will be announced in CY Q4 2017.

Liqhobong was commissioned in the



The Liqhobong diamond mine in the highlands of Lesotho (photo: Firestone).

second half of 2016. In the June quarter of this year, it treated 925 000 tonnes to recover 204 000 carats at a grade of 22 cpts (including 54 special stones larger than 10,8 carats). Two scheduled diamond sales held during the quarter in Antwerp saw 182 786 carats being sold, generating total sale proceeds of US\$14,1 million and achieving an

average price of US\$77 per carat.

At the end of the quarter and financial year, the project maintained its outstanding health and safety record, having reached over 4,4 million hours worked without a single Lost Time Injury since development commenced over three years ago. ■

### Senior appointment by DRA Group Holdings

DRA Group Holdings has announced the appointment of Pierre Julien as Executive Vice President – Origination for the DRA Group. In this role he will lead DRA's global origination team in identifying and accessing new business channels, seeking opportunities for growth into adjacent sectors and developing innovative ways to enhance DRA's service offering to clients.

"We are excited to welcome Pierre to our global team of professionals. In recent months DRA conducted an extensive tal-

ent search and during this process Pierre distinguished himself as a thought leader with the skills and experience needed to help us realise our global growth strategy," said Wray Carvelas, Chief Executive Officer of DRA Group Holdings.

Julien has over 22 years of senior level industry experience. Prior to joining DRA, he served as Vice President, Business Development and EPCM Partner Management at Outotec, a global leader in minerals and metals processing technology.

He graduated from Haileybury School of Mines and has an MBA from Queen's University in Kingston, Ontario. He is a very well-respected member of the North American mining community who holds executive and board level roles with the Canadian Mineral Processors Society and the Canadian Institute of Mines, Metallurgy & Petroleum (CIMM).

He will be based primarily in DRA's Toronto office. In the coming months, he will commence a global tour of the business to formally introduce himself to colleagues and clients in all regions. ■

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The processing plant at Kibali. The mine has been under development since 2010 and, later this year, will have all the facilities and infrastructure in place to allow it to deliver to nameplate capacity (photo: Randgold Resources).

## Full development of Kibali mine nearly complete

The two remaining components of the Kibali gold mine – its underground shaft system and third hydropower plant – are both on track, said Randgold Resources Chief Executive Mark Bristow at a recent media briefing in Kinshasa. These projects will effectively deliver the giant mine to nameplate design, scheduled for later this year.

Bristow said that while Kibali was working towards delivering the underground mine, it was also maintaining a steady operational performance and, as reported at the end of the first quarter, was well positioned to meet its production target of 610 000 ounces of gold this year on the back of better grades forecast from the underground ramp up, particularly in the fourth quarter.

He also pointed to ongoing brownfields exploration that was showing potential to add resources and reserves going forward.

Bristow noted that since the project was launched in 2010, Kibali had contributed US\$2.2 billion to the Congolese economy in the form of taxes, salaries and payments to local suppliers. The mine started production in 2013 and has repatriated more than 40 % of its gold sales revenue since first production in 2013, meeting and exceeding the requirements of the country's mining code.

The government is currently again considering changes to this code and Bristow said this represented an unmissable opportunity to lay the foundations for a sustainable mining industry in the DRC.

"I am concerned, however, that the government is not engaging in open and inclusive consultations with the industry and appears to be proceeding from a pre-determined position that may put existing and future mining investments at risk," he said.

"The mining industry is the main engine of the Congolese economy. Government and the private sector must work together to find the best way of growing this industry and to avoid potentially damaging short-term actions by realistically considering their consequences."

Bristow said despite Randgold's concerns about proposed revisions to the mining code and other challenges in the DRC, it was continuing to invest in the

## Site earthworks requirements at Colluli reduced

ASX-listed Danakali and its joint venture partner, the Eritrean National Mining Corporation (ENAMCO), have announced that – following a comprehensive optimisation programme – the overall site earthworks requirements for the Colluli potash project in Eritrea have been reduced relative to the Definitive Feasibility Study (DFS). Evaluation of the earthworks requirements follows a reduction in the overall size of the processing recovery ponds. This reduction occurred despite an increase in the processing plant throughput relative to the DFS.

A cut-and-fill process seeks to match the volume of required extraction material ('cut') to the required volume for construction ('fill') to minimise construction labour and cost. The processing plant cut require-

ments have been reduced by over 20 % from around 27 000 m<sup>3</sup> to approximately 20 000 m<sup>3</sup> while the plant fill volume has been reduced by over 80 % to around 27 000 m<sup>3</sup> from approximately 190 000 m<sup>3</sup>.

Further improvements include a reduction in overall site cut-and-fill volumes as a consequence of the reduction in the recovery pond footprint size. Total site fill volumes have decreased by approximately 22 % relative to the DFS.

The project is located in the Danakil Depression region of Eritrea, and is approximately 75 km from the Red Sea coast, making it one of the most accessible potash deposits globally. Mineralisation within the Colluli resource commences at just 16 m, reportedly making it the world's shallowest

potash deposit. The resource is amenable to open-pit mining.

Danakali and ENAMCO each have a 50 % ownership interest in the joint venture company, the Colluli Mining Share Company (CMSC).

The company has completed a definitive feasibility study for the production of potassium sulphate, otherwise known as SOP, a chloride-free, specialty fertiliser which carries a substantial price premium relative to potassium chloride, the more common potash type. Economic resources for production of SOP are geologically scarce. One of the key advantages of the resource is that the salts are present in solid form (in contrast with production of SOP from brines) which reduces infrastructure costs and substantially reduces the time required to achieve full production capacity. ■



country and, in addition to ongoing exploration along Kibali's KZ structure, was progressing work on the Moku project and the Ngayu belt. It was also investigating a number of other interesting opportunities and its commitment to the longer term was why it worried about ill-considered changes to the mining related legislation.

To complement Kibali's extensive social responsibility programmes and projects, Kibali was stepping up its regional engagement with stakeholders, civil society and local authorities on economic and infrastructural development in an effort to fill the void left by the current political impasse in the DRC.

Kibali's exemplary safety record was marred recently when a Congolese contractor on the site experienced a driving accident resulting in a double fatality. Bristow said that in response to this tragic accident the mine had reinforced its efforts to maintain the highest standards and best practices in its safety programmes. This included the comprehensive retraining of all employees and contractors. ■

## Strong results from initial Caula testwork

ASX-listed Mustang Resources reports it has received strong results from initial beneficiation testwork conducted on both oxide and fresh samples taken from its 80 %-owned Caula graphite project in northern Mozambique. Caula is located along strike from Syrah Resources' world-class Balama graphite project, currently under development and on the verge of production.

These results are based on non-optimised process testwork with scope for further optimisation through a coarser initial grind size and increased preservation of large and jumbo flakes in the intermediate processing stages.

Samples were compiled from quarter diamond drill core samples collected during the recent resource drilling campaign.

The testwork flowsheet utilised on the fresh sample comprised an initial coarse grind to 0,71 mm, followed by a series of flotation and regrind stages, and achieved an excellent TGC recovery of 96 %. The oxide sample achieved a TGC recovery of 87 %.

High recovery of jumbo and large flake (>180 µm or +80 mesh) was achieved for both the fresh (56 %) and oxide (38 %) material. Fresh and oxide overall concentrate grades were 95,7 % and 95,9 % respectively.

Mustang is currently completing its maiden JORC resource statement, which it expects to release by September 2017. This will underpin a scoping study for the development of the Caula project to be prepared by Wave International in collaboration with Independent Metallurgical Operations (IMO).

Wave is a highly-experienced resource development consultant working extensively in the battery storage sector across commodities such as lithium, graphite, cobalt and vanadium, and with specific expertise in the development and delivery of projects throughout Africa. IMO is a specialist metallurgical consultant with significant processing experience and expertise in graphite, having developed graphite flowsheets for numerous other African graphite projects. ■

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## Tongon on course to produce 285 000 ounces in 2017

Randgold Resources' Tongon gold mine in Côte d'Ivoire continues to ramp up production as it tracks its 2017 target of 285 000 ounces, Chief Executive Mark Bristow said at a media briefing in Abidjan on 22 July.

Bristow said with Tongon now operating to plan, its focus had shifted to finding additional reserves and resources to replace depleted ounces and extend the mine's life beyond its current four-year horizon. At the same time, the mine has continued its engagement with employees and other regional stakeholders.

Elsewhere in Côte d'Ivoire, Randgold's exploration programmes have defined a

large target at Boundiali in the Fonondara corridor, which Bristow described as potentially the most exciting gold prospect in West Africa. The company has just completed its annual review of its exploration targets, which Bristow said had also highlighted very positive results from its other holdings in the country, underlining again Côte d'Ivoire's exceptional prospectivity.

"The success of Côte d'Ivoire's growing gold mining industry is a tribute to the vision and commitment shared by the government and the industry, and to a mining code which is fair to both parties," Bristow stated.

"We cannot rest on past achievements, however, and the future of the industry depends on new discoveries and developments. There have been some project failures recently and these I believe have shown the need for greater resolve and engagement by the government, particularly in the north of the country, where the new opportunities are located."

Bristow said the single biggest challenge facing the industry was the increasing and unhindered encroachment of illegal mining, as was happening at Boundiali. While all stakeholders should address this growing problem, it was ultimately the government's responsibility to assert the rule of law. The delivery of new projects was also being impeded by delays and difficulties in the permitting process, but the new mining cadastre system recently put in place by the Ministry in charge of mines gave hope that these problems would be resolved very soon, he said.

He noted that Randgold's US\$28 million contribution to a public-private partnership investment in the power infrastructure had not yet been settled despite the Ivorian power utility having earned almost US\$100 million from supplying the mine and surrounding communities.

Tongon last quarter declared its second dividend, of which the government's share, including taxes, was US\$20 million. In total, the Tongon mine has contributed just under US\$1 billion to the Ivorian economy in the form of royalties, taxes, dividends, salaries, payments to local suppliers and community investments since it started production in 2010. ■



Open-pit mining operations at Tongon (photo: Randgold Resources).

### Capital development tonnage at Blanket gold mine prioritised

Caledonia Mining Corporation reports that approximately 12 522 ounces of gold were produced during the quarter ended 30 June (Q2 2017). This amount was approximately equivalent to the gold produced in Q2 2016 (12 510 ounces). Gold produced for the first half of 2017 was 25 316 ounces, an 8,5 % increase on the 23 322 ounces produced in the first half of 2016. Caledonia maintains its 2017 full year production guidance of between 52 000 ounces and

57 000 ounces and remains on track with progress towards its long-term target of 80 000 ounces by 2021.

Commenting on the production for Q2, Steve Curtis, Caledonia's CEO, said: "Notwithstanding the 8,5 % increase in production in the first six months of 2017 compared to the first six months of 2016, the second quarter of 2017 presented some operating challenges at Blanket. Although we have improved the infrastructure on

750 metre level in recent years, we are still constrained in our ability to move increased quantities of ore and development waste. Accordingly, in quarter 2, Caledonia took the decision to safeguard the long-term production target of 80 000 ounces in 2021 by prioritising capital development tonnage over ore production tonnage. This resulted in the 2017 production target being reduced from 60 000 ounces to a revised target of between 52 000 and 57 000 ounces.





## Arcadia's resource base increases

ASX-listed Prospect Resources has announced a further increase in the mineral resource estimate at its flagship Arcadia lithium deposit in Zimbabwe to 66,6 Mt at 1,13% Li<sub>2</sub>O (0,2 % Li<sub>2</sub>O cut off). Of importance, says the company, is the significant conversion of inferred resources based on infill drilling completed in the last quarter.

This increase in confidence in the mineral resource classification can now allow further optimisation of the pit inventory and ore reserves that were declared as part of the PFS study completed by the company in July.

According to Prospect, the resource upgrade at Arcadia confirms its status as the largest JORC Code reported resource of its type in Africa and the fifth largest globally. It comprises 755 000 tonnes of contained lithium oxide, equating to over

1 850 000 tonnes contained lithium carbonate equivalent (LCE).

The project is located approximately 38 km east of Harare. It occupies an area of more than 9 km<sup>2</sup> of granted mining rights and consists of several historical lithium and beryl workings within an existing agricultural area.

Arcadia's probable ore reserves form the basis of a standalone 1,2 Mt/a mining and processing operation over a 15-year Life of Mine (LOM). The PFS further examined a mine plan, which includes a pit inventory of probable ore reserves and inferred mineral resources within the pit outlines, giving a pit inventory of 23 Mt at 1,34 % Li<sub>2</sub>O and 124 ppm Ta<sub>2</sub>O<sub>5</sub>, a LOM of 20 years and an average strip ratio of 2,79 to 1.

According to the PFS, the project has a 39 % IRR and a pre-tax NPV<sub>10</sub> of US\$139 million. The estimated capex is US\$52,5 million. ■



An Atlas Copco CS14 core drilling rig at work at Arcadia (photo: Prospect Resources).

"The existing infrastructure constraints at Blanket are temporary and are expected to be fully alleviated when the new Central Shaft is commissioned in the second half of 2018. I am pleased to say that work on the Central Shaft remains on track.

"In the meantime, management has implemented further measures to address the short-term infrastructure constraints. We are optimistic that these measures will result in a higher quarterly production in the remaining quarters of

2017 and we are confident that we will achieve the revised production guidance for 2017 of between 52 000 and 57 000 ounces of gold."

Following the implementation of indigenisation in Zimbabwe, Caledonia's primary asset is a 49 % interest in the Blanket mine, located in the south-west of Zimbabwe approximately 15 km west of Gwanda, the provincial capital of Matabeleland South. The company's shares are listed in Canada on the Toronto Stock Exchange and on London's AIM. ■

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## First gold pour at Sissingué expected in early 2018



The process plant at Sissingué under construction (photo: Perseus Mining).

Perseus Mining, which operates the Edikan gold mine in Ghana and is listed on the ASX and TSX, reports that it “steadily advanced” the development of its second gold mine, Sissingué, during the June quarter. The open-pit mine, expected to produce 80 000 oz/a in its first 3,25 years and 70 000 oz/a over its five-year life, is located in Côte d’Ivoire.

According to the company, by the end

of the quarter development works were tracking on schedule with approximately 61 % of the works completed. The development is progressing in line with budget, with incurred expenditure to date (including US\$10,4 million of early works and holding costs) totalling US\$67,6 million, and the forecast expenditure to completion estimated at US\$47,8 million.

Off site, detailed engineering is com-

plete, as is the procurement of all significant long lead items of plant and equipment.

On site, the construction team continues to make sound progress, says Perseus, with the bulk concrete works associated with the plant and installation of underground services nearing completion. The majority of buildings including offices and the warehouse are either complete or well advanced, as is the erection of steelworks associated with the crusher and SAG mill.

The CIL tanks are being erected and the contractor responsible for the installation of the SAG mill has mobilised to site and will start work early in the September 2017 quarter. During the quarter, the airstrip, tailings dam, mine camp and work on the river intake structure were also completed.

Assembly of the generators and power station control panels is well advanced and this equipment is on schedule to be delivered to site during the December 2017 quarter.

Given the progress made to date on all fronts, Sissingué remains on track to produce its first gold in the March 2018 quarter.

Perseus’s Technical Services and Human Resources teams have prepared comprehensive Operations Readiness Plans for the Sissingué operation with the objective of ensuring that the ramp up to full scale gold production occurs as efficiently as possible following commissioning of the mine and plant.

### Sylvania Platinum to acquire Pan African’s Phoenix plant

Sylvania Platinum Limited, the low-cost PGM processor and developer, has entered into a conditional agreement with Pan African Resources (PAR) to acquire 100 % of the shares in and claims against Phoenix Platinum Mining Proprietary Limited for a purchase price of R89 million settled in cash.

The Phoenix operation consists of a 30 000 tonnes/month Chrome Tailings Retreatment Plant (CTRP) which was commissioned in November 2011 and reached full production in May 2012. It is located in North West Province near to Sylvania’s Millsell and Mooinooi complexes.

Phoenix currently recovers PGMs from chrome tailings dumps and dams through mineral rights agreements pertaining

to the Kroondal and Elandskraal tailings dumps, and Buffelsfontein tailings dams and potential future current arisings at the Lesedi mine, recently acquired by Samancor Chrome. As part of the acquisition, Sylvania will acquire an independent property for tailings disposal with associated regulatory approvals.

Phoenix currently has chrome dump reserves of approximately 2,4 Mt, containing approximately 2,5 g/t 4E PGE. It is estimated that these are sufficient to sustain current production levels for approximately eight to nine years.

During the previous published reporting period for the six months to 31 December 2016, Phoenix produced 762 oz of PGMs per

month, generating approximately US\$0,5 million revenue per month, at a cash operating cost of approximately US\$643/oz.

Commenting on the transaction, Sylvania’s CEO, Terry McConnachie, said: “The Phoenix project is a significant acquisition for Sylvania as we look for growth opportunities. Phoenix is a PGM dump operation with potential synergies with our existing operations which will assist us in increasing our production and earnings profile going forward. The geographical location of this asset will allow us to effectively utilise our existing infrastructure and management team to enhance this business. We look forward to bringing the Phoenix asset into the Sylvania portfolio.” ■



A number of key contracts were awarded during the quarter to suppliers of critical goods and services for the Sissingué operation, including the mining contract which was awarded to Société de Forage et de Travaux Public – Mining SA (SFTP). SFTP is an experienced Malian mining contractor that currently provides contract mining services to Newcrest’s Bonikro gold mine and Randgold’s Tongon gold mine, both located in Côte d’Ivoire.

SFTP was also contracted by Perseus to carry out the bulk earthworks associated with the construction of Sissingué’s tailings storage facility, finishing this task on time and on budget.

Grade control drilling, to be performed by SFTP as part of the mining contract, is expected to start in the September 2017 quarter. This drilling will ensure that approximately three months of grade control data is available for Perseus’s mine planning purposes before SFTP commences full scale mining activities on site in the December 2017 quarter. ■

## Significant milestone for Makabingui

Bassari Resources, an ASX-listed company, has announced that the Presidential Decree for the Makabingui Exploitation Permit has been signed by the President of Senegal and counter signed by the Prime Minister.

Following its recent funding deal, Bassari says it will now move to finalise with its project managers the processing facility plant upgrade (there is an existing small plant on site) within a short time-frame with mining of first gold targeted for the first half of 2018.

“This is a significant milestone for Bassari and the Makabingui gold project and we are delighted to have successfully concluded discussions and negotiations with the Government of Senegal,” says Alex Mackenzie, Executive Chairman of Bassari.

“Senegal as a stable democracy has demonstrated itself to be supportive of international investment in the mining industry. From the initial resource discovery at Makabingui to full project approval and funding we have received support

from our many stakeholders and we look forward to delivering this project over the coming months.”

The permit is for the development of the Makabingui project consisting of a resource of plus 1 million ounces of gold at 2,6 g/t inclusive of the 171 000 ounces of recovered high grade gold at 5,6 g/t in four pits to be mined in the initial stage of the Makabingui development. The permit also covers the 8-km strike at Makabingui South.

The first phase of open-pit mining will provide mill feed for a 300 000 t/a plant, which will average 95 % recovery over the initial stage of the project.

Bassari recently advised that its team in Senegal had successfully negotiated a Term Sheet with the Senegal division of Coris Bank International, a West African bank incorporated in Burkina Faso. The term sheet outlines the key terms and indicative conditions of a US\$12 million funding facility for the development of Makabingui through to production. ■



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## Fresh drill programme at Sudanese gold project

Orca Gold Inc, listed on the TSX-V, has announced that a 25 000-m drill programme is underway on the company's Block 14 gold project, located in the Republic of the Sudan. This drilling is aimed at expanding the current resource below the optimised pits set out in the recently updated Preliminary Economic

Assessment (PEA) and will update the model to be used in the Feasibility Study that is scheduled for completion by the end of Q1 2018.

The updated PEA is based on a mill throughput of 3,4 Mt/a, using a gold price of US\$1 100/oz for mine design and US\$1 200/oz for economic analysis. In-pit

mineral resources comprise 41,0 Mt grading 1,46 g/t for 1 928 koz in the indicated category and 3,4 Mt grading 1,56 g/t for 173 koz in the inferred category. The project shows strong economics with an after-tax NPV<sub>7%</sub> of US\$227,7 million and an IRR of 23,1 %.

The open-pit designs that form the basis of the updated PEA were restricted from going deeper due to a lack of geological information. Accordingly, the primary objective of the current drill programme is to expand the resource information in critical areas allowing the pit designs to develop to their full economic potential.

"Facilitated by our recent discovery of a significant water supply, we can now optimise the existing resources of Block 14 to target production in excess of 150 000 ounces per year," commented Hugh Stuart, President and Director of Orca Gold. "Beyond this production optimisation, we are excited to launch a new drill programme aimed at unlocking the full potential of our project. We are looking to expand the resource base below current pit designs, establish an initial resource at the Liseiwi satellite prospect, 15 km north of the Wadi Doum deposit, and test the high-grade structures recently identified below GSS and Wadi Doum." ■



A drill site in Block 14. The project is located close to Sudan's border with Egypt, 900 km north of the capital, Khartoum (photo: Orca Gold).

## Helicopter-borne survey identifies kimberlite targets

ASX-listed Lucapa Diamond Company and its partners, Endiama and Rosas & Petalas, have provided an update on the kimberlite exploration programme at the Lulo diamond project in Angola.

The programme aims to locate the primary hard rock sources of the large and premium value Lulo alluvial diamonds, which in 2016 allowed Lulo to achieve the highest per carat sale prices (US\$2 983) in the world.

The latest step in the programme involved a helicopter-borne Time Domain Electromagnetic (TDEM) survey flown over the Caculo River valley and its main tributaries, where Lucapa and its partners have identified extensive alluvial diamond deposits.

The SkyTEM 304M survey was flown between February and April 2017 in one block comprising 8 566 km of flight lines.

The TDEM survey completes the air-borne geophysical tools to be used by the Lulo partners to guide and update the ongoing kimberlite drilling programme by identifying new non (or low) magnetic targets. It also provides further definition of magnetic targets previously identified from aeromagnetic surveys flown over the entire 3 000 km<sup>2</sup> Lulo concession by Fugro Airborne Surveys in 2008 and 2013.

The TDEM results identified 11 new kimberlite targets within the Caculo River valley area demonstrating conductive EM signatures with little or no discernible magnetic signatures. These new mapped targets range in size up to 150 hectares.

Of the 11 new targets, five (G549, G550, G551, G552 and G553) are located along drainage systems feeding into the Mining Block 8 area, which has been a regular source of large and premium-value,

irregular-shaped and jagged-edged alluvial diamonds.

Another three of the new EM targets (G556, G558 and G559) are located further south-east along the Caculo River near the L165-L170 kimberlite area. This region was previously highlighted as an area of exploration interest due to favourable mineral chemistry results, including a micro-diamond and G10 garnets.

The TDEM results have enabled the Lulo geological team to update the ongoing kimberlite drilling programme. While three drilling rigs are currently available, the Lulo partners will consider allocating additional resources to this programme.

Kimberlite drilling will continue at Lulo for the remainder of 2017 with the aim of extracting core from the priority targets identified from the TDEM results. This systematic drilling programme will also include a planned deep hole at the L259 target, when ground conditions permit. ■



## Shanta Gold gets a new Chief Executive Officer

AIM-listed Shanta Gold, which owns and operates the New Luika Gold Mine near Mbeya in Tanzania, says that, following the recent changes to the regulatory, operating and fiscal environment in the country, it will be refocusing its strategy on cost control and shareholder returns.

As part of the revised strategy, Toby Bradbury and the company have agreed that he will retire as Chief Executive Officer but will remain on the board of directors until September 2017 to assist with the transition. He is replaced by Eric Zurrin who will take over as CEO with immediate effect.

Zurrin was re-appointed to the company as Chief Financial Officer (CFO) in March this year. He has previously worked across a range of roles within Shanta over the last four years including as interim CFO in 2015/2016 leading the financial restructuring and as Adviser to the Chief Executive Officer in 2013 leading an operational restructuring of the business as New Luika ramped up production.

He holds a Bachelor of Commerce (Accounting) degree and has 15 years' experience in investment banking and mining, previously with UBS Investment Bank in London, and serves as a director of Kincora Copper Limited. He will be based in the UK from September 2017.

Shanta produced 40 073 ounces of gold in the first half of 2017 at an all-in sustaining cost (AISC) of US\$755/oz. Production in July has been maintained at these levels and the company says it remains on track to meet full year guidance of 80 000 to 85 000 oz at an AISC of US\$800 to US\$850/oz.

Tony Durrant, Chairman, commented: "On behalf of the Board, I would like to thank Toby Bradbury for his contributions to Shanta as CEO over the last two-and-a-half years. Under his tenure the company has made significant steps forward, particularly in demonstrating New Luika to be a sustainable, robust and reliable, low-cost gold producer, as well as successfully com-

mencing its transition to a predominantly underground operation.

"Following the changing business environment in Tanzania, however, it is important that the company accordingly adapts and refocuses its strategy on cost and capital control. The Board and Toby have mutually agreed that the time is right for a new Chief Executive to lead these initiatives and therefore is very pleased that Eric Zurrin has accepted the role of CEO of Shanta."

The New Luika Gold Mine is the only operating gold mine in the Lupa goldfield of south-west Tanzania and achieved its first full year of commercial production in 2013. In May this year the first underground ore was produced from the first stope in the Bauhinia Creek deposit. Throughout 2017 New Luika will transition from being an exclusively surface mining operation to one that is mainly underground. Shanta also holds the Singida advanced stage gold project in Central Tanzania. ■

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## Exceptional rare earth grades confirmed at Gasagwe



View of the Gasagwe mine site, where work continues to expose the main vein ahead of full-scale mining operations. This photo was taken in July this year (photo: Rainbow).

Rainbow, the AIM-quoted rare-earth element mining company, reports that independent laboratory testing recently undertaken in respect of its 'main vein' at Gasagwe in Burundi has returned an average Total Rare Earth Oxide (TREO) grade of 62,17 %. Gasagwe is the area within the company's 39 km<sup>2</sup> mining licence which is expected to provide ore for the first two years of production, which is targeted to commence in Q4 2017.

The grade compares extremely favourably to the average grade of 57 % contained within mineralised veins across the project area as disclosed in the Competent Person's Report compiled by MSA and contained in Rainbow's IPO pro-

spectus published in January 2017.

Martin Eales, CEO of Rainbow, commented: "This really is fantastic news. We always knew that the Gakara project was capable of delivering grades far in excess of industry norms, but to get this level of average TREO content from our first mining area is a wonderful boost as higher grade means that we shall achieve higher prices for each tonne of concentrate sold.

"Taking into account the continued strengthening of rare earth prices over recent months, the Gakara project continues to add to its excellent potential. We are now gearing up towards our first production and sales of high-grade concentrate through our multinational distribution part-

ner thyssenkrupp Raw Materials in Q4 2017."

The laboratory testing was undertaken by ALS Chemex using its facilities in Canada and reviewed 20 individual ore samples taken from the main vein at Rainbow's Gasagwe area of operations.

In order to facilitate the production of rare earth concentrate from the run of mine material produced during mining, the company is constructing a processing plant at Kabezi which has been designed to operate on a batch basis with the capacity to produce over 5 000 t/a of rare earth concentrate without incremental capital expenditure.

The run of mine material will be processed simply by physically separating the mineralised vein material from the waste rock without requiring chemical processing.

According to Rainbow, the project is proceeding well. At the Kabezi site, civils are well underway and the first containers of plant components have been dispatched from South Africa ahead of assembly during September and October 2017. At the Gasagwe mine site, work continues to expose the main vein ahead of full-scale mining operations.

Rainbow recently hosted the President of the Republic of Burundi, Pierre Nkurunziza, and other notable guests at an inauguration ceremony for the Gakara project on 21 July. ■

### Mining at Karowe in Q2 lower than forecast

Canada's Lucara Diamond Corp, which owns the Karowe mine in Botswana, has announced second quarter revenues of US\$79,6 million or US\$1 336 per carat. During Q2 the company recovered 113 specials (+10,8 carats) which equated to 5,9 % weight percentage of recovered carats which was in line with expectations (Q2 2016: 4,6 %).

According to Lucara, Karowe's mining contractor experienced equipment availability issues during the beginning of the quarter that resulted in lower than planned ore mined. Mining activity therefore focused on waste material movement that is on schedule to ensure increased flexibility for mining south lobe ore in the future.

While ore mined was lower than fore-

cast, processed volumes were largely on forecast as ex-pit ore feed was replaced with south lobe stockpile material. Due to the south lobe being of lower grade when compared to the centre and north lobes, but of higher value, carats recovered to date are lower than forecast; however, Lucara continues to maintain its revenue forecast due to the processing of higher value south lobe ore.

Costs remain well controlled at US\$30 per tonne processed and are forecast to be between US\$36 to US\$40 per tonne processed for the year.

The two capital projects to enhance diamond recovery and maintain design throughput continued to advance on schedule and within approved budget, says Lucara. The Mega Diamond Recovery

(MDR) project is expected to be complete during Q3 2017, with commissioning and ramp up in the same period. Construction is essentially complete and first stage commissioning has commenced.

The -8+4 mm sub-middles XRT project's construction progressed on plan during the quarter and is also on schedule for completion in Q3 2017. This project will further enhance the processing facilities' ability to treat the high yielding, high value south lobe ore at depth and is anticipated to result in an efficient and cost-effective methodology for processing this ore.

An underground study at Karowe has commenced with the firm Royal HaskoningDHV being appointed to lead the work. A Preliminary Economic Assessment is expected in Q4 2017 and, following hydro geotechnical work, a Pre-Feasibility Study is expected to be completed in H1 2018. ■



## Cash injection a 'game changer' for gold explorer

ASX-listed Azumah Resources has entered into a binding Term Sheet enabling Perth-managed private equity group, Ibaera Capital GP Limited (Ibaera), to earn in two stages up to a 47,5 % interest for an expenditure of US\$13,5 million in the company's Wa gold project in Ghana.

The objective of the deal is to boost gold resources and reserves above the present 2,1 million ounces and 624 000 ounces respectively and deliver within a two-year time frame, or less, a revised Feasibility Study to support the funding and development of the presently proposed 90 000 oz/a gold operation.

"This transaction represents a game changer for the company and another important step in unlocking fundamental value and achieving a market rerating," says Azumah MD Stephen Stone.

"It's been a tough environment in which to build new projects and, having carefully considered several options, we are very pleased to be partnering with Ibaera. We are looking forward to working with its team of focused and highly regarded mining industry professionals who have a proven capability in discovery and for driving major projects to production whilst employed at WorleyParsons Ltd, Fortescue Metals Group Ltd and BHP Billiton Limited.

"Shareholders can expect an increased news flow reflecting a range of value-adding investment catalysts as the Ibaera funding injection drives an acceleration of activities," he said.

Azumah recently reported an exploration targeting review by CSA Global that highlights the opportunity to achieve Azumah's expectations of a lift in resources and reserves. The study identified over 140 target areas of which 18 were designated very high priority.

The Wa project is located in the Upper West Region of Ghana. Three main deposits have been discovered and extensively drilled at Kunche and Bepkong, adjacent to the Black Volta River and Ghana's border with Burkina Faso, and at Julie, approximately 80 km to the east. Several satellite deposits, including Aduane and Collette, have also been delineated.

To date, the company has defined a JORC 2012 mineral resource of 2,1 Moz of gold grading 1,5 g/t Au including 1,4 Moz measured and indicated grading 1,7 g/t Au with these evenly distributed between Kunche-Bepkong and Wa East (Julie deposit). ■



A drill rig working on the Wa project. Drilling to date by Azumah has totalled 9 762 holes representing 516 km (photo: Azumah Resources).



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# Babcock puts Terex Trucks back

*Terex Trucks, which has been part of the Volvo Construction Equipment (Volvo CE) group since 2014, is delighted with the progress that Babcock, its dealer in Southern Africa, has made in building market share and providing customers with top-notch support since it was appointed as the official distributor for Southern Africa less than two years ago. Says Erik Lundberg, Business Manager for Terex Trucks in Sub-Saharan Africa: "Babcock has really performed well. Not only has it recorded some excellent sales but it is providing the large Terex Trucks customer base in Southern Africa with a truly world-class aftermarket service."*



*Terex Trucks' Erik Lundberg.*

**T**erex Trucks has had a presence in the Southern African region for many years but has seen a revitalisation of the 'brand' since partnering with Babcock. "The appointment of Babcock has seen significant improvement in sales and aftermarket service for our customers in Southern Africa," says Lundberg. "Terex Trucks is on the move again in this part of the world. Sales of new machines have been impressive, the more so given the generally poor market conditions currently prevailing, while the feedback from customers regarding the levels of service provided by Babcock is overwhelmingly positive."

Lundberg points out that Babcock's

performance comes as no real surprise. "They're a thoroughly professional organisation. They were appointed as the Volvo CE dealer in Southern Africa in 2000 and subsequently grew Volvo CE's market share dramatically. When Terex Trucks was acquired by Volvo CE, it made sense for them to also take over the Terex Trucks distribution – which occurred in 2015."

Headquartered in Motherwell in Scotland, Terex Trucks is a manufacturer of both articulated and rigid trucks that are widely used in mining, quarrying and construction

*The TR100, the biggest unit in Terex Trucks' rigid truck line-up.*





# on the map in Southern Africa

applications around the world. There are three trucks in the articulated dump truck (ADT) range and a further four in the rigid dump truck (RDT) line-up.

Says Lundberg: “The Terex Trucks are proven machines with a long and proud history stretching back decades and over the years have built up a strong following worldwide as a result of their simple, robust design and reliable performance.”

The ADT range consists of the top-of-the-line TA400, offering a payload of 38 tonnes, the 28-t capacity TA300, and the 25-t capacity TA250, all powered by fuel-efficient Scania engines. The TA300 and TA400 are both now available as Generation 10 (Gen 10) machines. “The Generation 10 trucks – which were introduced at the Bauma show in 2016 – are the first new products to be launched by Terex Trucks since it was acquired by Volvo CE and they reflect a host of improvements which collectively add up to a major reinvigoration of the product line,” says Lundberg.

Among the enhancements are a new and improved operator environment with improved cab sealing, cab heating and ventilation; improvements to the hydraulic system with the addition of magnetic suction filters to protect against environmental contamination; a new generation transfer box allowing performance to be tailored to all working conditions; and the use of Allison transmissions with fifth generation adaptive shifting.

Lundberg also points out that access to all engine service points has been improved, making routine maintenance a one-man operation. “The Terex Trucks ADT has always been regarded as a machine that is easy to maintain. Generation 10 takes this low maintenance philosophy to the next level.”

Babcock has recorded significant sales of the Terex Trucks ADT since taking over the dealership, most of them to customers operating in the Highveld coalfields. “We see these orders as representing a massive vote of confidence in the brand and are very optimistic about the future of our brand in Southern Africa,” says Lundberg.

Turning to the rigid trucks, the



*The TA400 articulated hauler has a payload of 38 tonnes.*

models are the TR45 (a 41-tonne capacity machine), the TR60 (54-t), the TR70 (65-t) and the TR100 (91-t). Although the market for rigid trucks in mining is currently extremely depressed, Babcock has sold three TR60s to Atlantis Mining, a long-standing user of the brand, and is also busy with the delivery of

*The Generation 10 articulated haulers – the TA300 is seen here – were launched last year.*



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six TR100s to a mining contractor for use at a South African coal mine.

Terex Trucks and Babcock believe the rigid trucks will be a big seller once the mining industry recovers and mine owners and mining contractors start renewing their fleets. “Machines in the 100-ton class form the backbone of many hard-rock mining fleets and there is already an extensive population of Terex Trucks RDTs out in the field,” notes Lundberg. “The abilities of our rigid trucks are thus very well established and we expect to see brisk demand for these in the future.”

Like the Terex Trucks ADTs, the rigids are famous for their durability and uncomplicated design and are ideal for the conditions experienced in African mining. The entire drivetrain provides strong pulling performance and class-leading rimpull, resulting in high productivity on steep inclines and in poor ground conditions. Terex Trucks’ rigid planetary gearing and integral retarder provide smooth gearshifts for excellent momentum and acceleration in all hauler applications while fuel efficiency is outstanding, a result of using either industry-leading Cummins or (in the case of the TR70) MTU engines.

One of the advantages that Babcock brings to the marketing and support of the Terex Trucks range is its extensive branch network spanning the Southern African region, including its newly opened, state-of-the-art Middelburg branch – in the heart of South Africa’s premier coal mining region – which has been specifically designed with large work bays to accommodate all the Terex Trucks machines, including the TR100.

“An interesting point is that Babcock designed the Middelburg branch in advance of being appointed as the Terex Trucks dealer and

yet with the needs of the Terex Trucks range very much in mind,” says Lundberg. “This shows the level of commitment which has been on display at every stage of Babcock’s engagement with Terex Trucks.”

One of many customised features of the new branch is the 1 615 m<sup>2</sup> warehouse which can accommodate the inventory required for the Terex Trucks range alongside components for Babcock’s other product ranges. Babcock has made a considerable investment in stocking Terex Trucks parts to ensure the highest availability possible of components required to repair and maintain the trucks, ensuring that downtime is kept to a minimum for customers.

On the subject of parts, Lundberg also notes that Terex Trucks has launched a new extended two-year or 6 000-hour warranty – available to customers worldwide – on all factory-approved parts. “We believe this initiative is an industry-first and we’re very proud of it,” he says. “It reflects our confidence in the parts we supply, which have been purpose designed to be used in our trucks. Non-factory approved parts, by contrast, are designed in isolation from the rest of the truck and can result in compromised performance.”

Finally, Lundberg says that Southern Africa is a critical region for Terex Trucks, given that it is one of the world’s premier mining areas. “We’re determined to do well in this market and we’re delighted that we are now working with Babcock, which is fully committed to the Terex Trucks brand and which has the people, the corporate values and the infrastructure in place to provide the same high levels of service in Southern Africa that are the hallmark of Terex Trucks globally,” he concludes.

*Report by Arthur Tassell*

*The new state-of-the-art Middelburg branch represents a R100 million investment by Babcock.*

***“This shows the level of commitment which has been on display at every stage of Babcock’s engagement with Terex Trucks.”***



# DFS provides a clear path forward

*TSX-listed Ivanhoe Mines has released the positive results of an independent Definitive Feasibility Study (DFS) on its Platreef underground mine near Mokopane in Limpopo Province which confirm the excellent economics of the project which were first highlighted in the March 2014 Preliminary Economic Assessment (PEA) and the January 2015 Pre-Feasibility Study (PFS). Commenting on the results, Robert Friedland, Ivanhoe's Executive Chairman, said: "We now have a clear and defined path forward to initial production and subsequent phases of development."*

Ivanhoe is already well advanced with the development of the project, with sinking of the 7,25-m internal diameter Shaft 1 by Aveng Mining continuing to advance at a rate of 45 to 50 metres per month. Sinking has now reached a depth of over 450 m below surface and development of the first of four planned shaft stations – the 450-m level substation – is underway. Shaft 1, which will ultimately serve as a ventilation shaft, is expected to reach the Flatreef deposit, the orebody to be exploited, at a depth of 777 m below surface in the first half of 2018. Sinking will continue to a planned final depth of 980 m below surface.

The primary access to the mine will be by way of a 1 104-m deep, 10-m internal diameter production shaft (Shaft 2). It will be equipped with two 40-tonne rock-hoisting skips with a capacity to hoist a total of 6 Mt/a – which will

be the single largest hoisting capacity at any mine in Africa. The headgear for the permanent hoisting facility has been designed by Murray & Roberts Cementation.

Early works construction for Shaft 2 – which is located just 100 m north-east of Shaft 1 – began earlier this year. This approximately R70 million works programme will see the excavation of a boxcut to a depth of approximately 29 m below surface and construction of the concrete hitch (foundation) for the 103-m high concrete headgear that will house the shaft's permanent hoisting facilities and support the shaft collar.

Ivanhoe plans to develop the Platreef mine in three phases: an initial rate of 4 Mt/a to establish an operating platform to support future expansions; a doubling of production to 8 Mt/a; and expansion to a steady-state 12 Mt/a. The first phase development envisages producing 476 000 ounces of platinum, palladium, rhodium and gold, plus 33 million pounds of nickel and copper, annually.

The independent Platreef DFS – prepared for Ivanhoe by principal consultant DRA Global – covers the first phase of development that would include construction of a state-of-the-art underground mine, concentrator and other associated infrastructure to support initial concentrate production by early 2022. As Phase 1 is being developed and commissioned, there would be opportunities to refine the timing and scope of subsequent phases of expanded production.

"The completion of the Definitive Feasibility



# for Platreef project

*Platreef's Shaft 1 headgear. Shaft 1 has an internal diameter of 7,25 m and will be sunk to a final depth of 980 m.*

Study for the first phase of production is another key milestone in Ivanhoe's planned transformation of the Platreef Discovery into one of the pre-eminent South African producers of platinum group metals," commented Friedland.

"Platreef is a massive, high-grade, long-life and Tier One deposit that will produce a suite of vital metals, many of which are essential to sustain our urbanising planet. The nickel and copper by-products are essential in the electric car revolution and the platinum and palladium are equally vital for hydrogen fuel cell technology and catalytic converters to clean the air."

Friedland added that despite lower metal prices used in the DFS compared to the 2015 PFS, the excellent economics of the project have been maintained. He said this was due, in part, to the mine optimisation work completed with assistance from industry-leading experts, such as Whittle Consulting of Melbourne, Australia. "Even at today's spot metal prices, the Platreef project would generate an operating margin in excess of 40 %," he stated.

Highlights of the DFS include an enhanced mineral reserve containing 17,6 Moz of platinum, palladium, rhodium and gold (an increase of 13 %); an after-tax NPV of US\$916 million at an 8 % discount rate; and an after-tax IRR of 14,2 %. The estimated pre-production capital requirement is approximately US\$1,5 billion (at a rand/dollar exchange rate of 13 to 1).

Mining zones in the current Platreef mine plan occur at depths ranging from



*Inside Shaft 1. Sinking has now reached a depth of over 450 m below surface and is advancing at a rate of 45 to 50 metres per month.*



*The Platreef mine – illustration of first-phase surface infrastructure and host communities. The secured surface area is designed to accommodate an expansion to 8 Mt/a.*

approximately 700 m to 1 200 m below surface. As mentioned, primary access to the mine will be by way of Shaft 2 with secondary access to the mine via Shaft 1. During mine production, both shafts will also serve as ventilation intakes. Three additional ventilation exhaust raises (Ventilation Raise 1, 2, and 3) are planned to achieve steady-state production.

According to the DFS, mining will be performed using highly productive mechanised methods, including long-hole stoping and drift-and-fill. Each method will utilise cemented backfill for maximum ore extraction. The current mine plan has been improved over the 2015 PFS mine plan by optimising stope design, employing a declining Net Smelter Return (NSR) strategy and targeting higher-grade zones early in the mine life. This strategy has increased the grade profile by 23 % on a 3PE+Au basis in the first 10 years of operation and 10 % over the life of the mine.

The ore will be hauled from the stopes to a series of internal ore passes and fed to the bottom of Shaft 2, where it will be crushed and hoisted to surface.

Metallurgical test work has focused on maximising recovery of platinum group elements

(PGE) and base metals, mainly nickel, while producing an acceptably high-grade concentrate suitable for further processing and/or sale to a third party. The three main geo-metallurgical units and composites tested produced smelter-grade final concentrates of approximately 85 g/t PGE+Au at acceptable PGE recoveries.

Test work also has shown that the material is amenable to treatment by conventional flotation without the need for mainstream or concentrate ultrafine re-grinding. Extensive bench scale testwork comprising open circuit and locked cycle flotation testing, comminution testing, mineralogical characterisation, dewatering and rheological characterisation was performed at Mintek in South Africa.

Comminution and flotation test work has indicated that the optimum grind for beneficiation is 80 % passing 75 micrometres. Platreef ore is classified as being 'hard' to 'very hard' and thus not suitable for semi-autogenous grinding; a multi-stage crushing and ball-milling circuit has been selected as the preferred size reduction route.

Improved flotation performance has been achieved using high-chrome grinding media as opposed to carbon steel media. The inclusion



of a split-cleaner flotation circuit configuration, in which the fast-floating fraction is treated in a cleaner circuit separate from the medium- and slow-floating fractions, resulted in improved PGE, copper and nickel recoveries and concentrate grades.

As with the PFS, a two-phased development approach was used for the DFS flow-sheet design. The selected flow sheet comprises a common 4 Mt/a, three-stage crushing circuit, feeding crushed material to two parallel milling-flotation modules, each with a nominal capacity of 2 Mt/a. Flotation is followed by a common concentrate thickening, concentrate filtration, tailings disposal and tailings handling facility.

Given the size and potential of the Platreef resource, Shaft 2 has been engineered with a crushing and hoisting capacity of 6 Mt/a. This allows for a relatively quick and capital-efficient first expansion of the project to 6 Mt/a by increasing underground development and commissioning a third 2 Mt/a processing module and associated surface infrastructure as required.

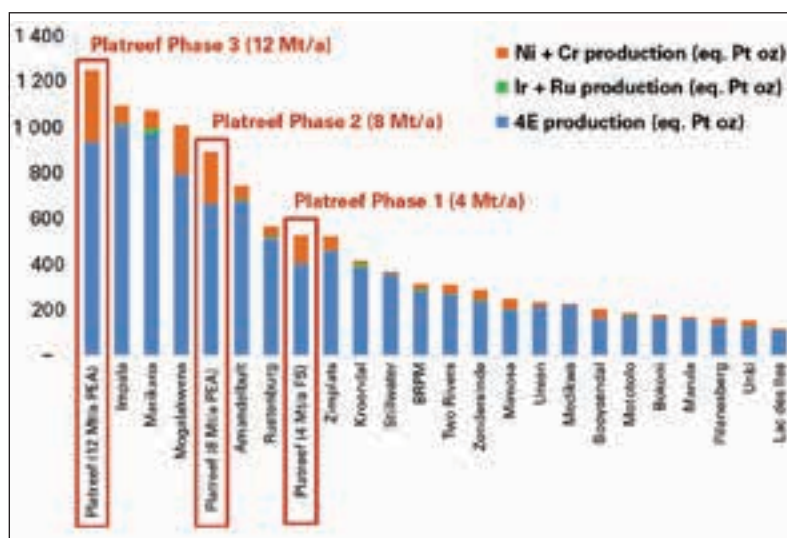
A further expansion to more than 8 Mt/a would entail converting Shaft 1 from a ventilation shaft into a hoisting shaft. This would require additional ventilation exhaust raises, as well as a further increase of underground development, commissioning of a fourth 2 Mt/a processing module and associated surface infrastructure.

The project's water requirement for the first phase of development is projected to peak at approximately 7.5 million litres per day. It is planned that water will be provided by the Olifants River Water Resource Development Project (ORWRDP), which is designed to deliver water to the Eastern and Northern limbs of South Africa's Bushveld Complex.

The project consists of the new De Hoop Dam, the raised wall of the Flag Boshielo Dam and related pipeline infrastructure that ultimately is expected to deliver water to Pruisen, south-east of the Northern Limb. The Pruisen pipeline project is expected to be developed to deliver water onward from Pruisen to the municipalities, communities and mining projects on the Northern Limb. Ivanhoe Mines is a member of the ORWRDP's Joint Water Forum.

Ivanhoe is also investigating various alternative sources of bulk water, including an allocation of bulk grey-water from a local source.

As regards electrical power, the 5 MVA power line connecting the Platreef site to Eskom was energised in February this year and is now



supplying electricity to Platreef for shaft sinking and construction activities. The new power line, a collaboration between Platreef, Eskom and the Mogalakwena Local Municipality, has also established a platform to provide energy to the neighbouring community of Mzombane, which previously was without electricity reticulation and supply.

Platreef's electrical power requirement for the phase one underground mine, concentrator and associated infrastructure has been estimated at approximately 100 MVA. An agreement has been reached with Eskom for the supply of phase one power. Ivanhoe chose a self-build option for permanent power that will enable the company to manage the construction of the distribution lines from Eskom's Burutho sub-station to the Platreef mine.

Ivanhoe has now appointed five leading mine-financing institutions as Initial Mandated Lead Arrangers to arrange debt financing for the development of the Platreef mine. They are: KfW IPEX-Bank, a German government owned institution; the Swedish Export Credit Corporation; Export Development Canada; Nedbank Limited (acting through its Corporate and Investment Banking division); and Societe Generale Corporate & Investment Banking. Expressions of interest have been received for approximately US\$900 million of the targeted US\$1 billion project financing.

Ivanhoe Mines indirectly owns 64 % of the Platreef project through its subsidiary Ivanplats and is directing all mine development work. The South African beneficiaries of the approved broad-based black economic empowerment structure have a 26 % stake in the project. The remaining 10 % is owned by a Japanese consortium of ITOCHU Corporation; Japan Oil, Gas and Metals National Corporation; and Japan Gas Corporation. ■

*As this graph (taken from an Ivanhoe presentation) indicates, at 12 Mt/a the Platreef mine would be the largest platinum group metals mine in the world.*

*Given the size and potential of the Platreef resource, Shaft 2 has been engineered with a crushing and hoisting capacity of 6 Mt/a.*

# Boungou mine development on course and within budget

*TSX-listed SEMAFO Inc is continuing to make good progress on the construction of its Boungou open-pit gold mine in Burkina Faso with the project on budget and within schedule and set for commissioning in the second half of 2018. The new mine, which involves a capex of US\$231 million, has a remarkably short estimated payback period of one-and-a-half years.*

**A**s at June 30, 2017, construction of the mine was 35 % complete with US\$69 million spent on development to date and the labour force on site standing at 1 540 personnel including contractors, 93 % of whom are Burkinabe. Over 1 million man-hours had been worked without a Lost Time Injury (LTI).

Concrete works are progressing on the SAG, Vertimill, crusher and surge bin foundations and erection of the leach and water tanks has commenced. The Vertimill, the first long-lead item, has been delivered to site and work has commenced on the power plant and fuel depot. The water storage facility has been excavated and is ready to collect 2017 rainwater. Pre-strip mining at the Boungou deposit has commenced.

The EPCM contractor for the project is

Lycopodium and the mining contractor African Mining Services (AMC), a subsidiary of Ausdrill Limited.

Located 320 km from the capital, Ouagadougou, in the south-east of the country on SEMAFO's Natougou property, Boungou will be a high-grade open-pit mine with the processing facility consisting of a 4 000 tonnes per day CIP plant. It is expected to produce approximately 1,2 Moz over a projected life of mine in excess of seven years with average annual production of more than 226 000 ounces in the first three years. During these three years, the average total cash cost is estimated at US\$283/oz and the AISC at US\$374/oz with the average head grade being 5,72 g/t.

There are good prospects of the mine life being extended and SEMAFO has committed to a substantial exploration budget in 2017 with the aim of increasing reserves and resources. It will also be examining the potential of an underground operation.

The Boungou permit lies within the Diapaga greenstone belt, a northeast-southwest orientated belt that extends over 250 km in length and over 50 km in width. The mineralisation of the deposit is predominantly hosted in a silicified shear zone and a significant quantity of the gold occurs as visible gold. Sulphide minerals

*The mining camp at Boungou (with the water storage facility in the background) pictured in July this year.*





comprise pyrrhotite, pyrite, and minor arsenopyrite and chalcopyrite.

According to the Feasibility Study (FS) completed by Lycopodium Minerals Canada, the deposit will be mined utilising conventional open-pit methods. Approximately 139 Mt of material will be mined from the open pit over the projected mine life. This will deliver 9,6 Mt of ore to the milling facility with an average head grade of 4,15 g/t Au. Most of the material from the deposit will be fresh rock, which will be drilled and blasted prior to loading.

The FS states that the process plant will be based on a conventional crushing and grinding circuit, with the crushing circuit composed of a primary crusher and a coarse ore storage bin. Crushed ore will be conveyed to the grinding circuit using a SAG mill in closed circuit with a pebble crusher and a tower mill. The target grind is planned at 63  $\mu\text{m}$  in order to achieve optimal gold recovery. A gravity circuit will be incorporated in the grinding circuit as about 30-50 % of the gold is recoverable by gravity. LOM head grades for the process plant are expected to average 4,15 g/t with a gold recovery of 92,9 %.

The tailings storage facility (TSF), located 1,5 km east of the process plant, will be fully lined with high-density polyethylene (HDPE). Recycled water will be optimised throughout the process to minimise the addition of fresh water to the process.

Bougou will be SEMAFO's second mine in Burkina Faso. Its first, Mana, is located 260 km south-west of Ougadougou and is reportedly the third largest mine in the country. It has

produced some 1,6 Moz since its first gold pour in 2008. The gold plant has been expanded four times since commissioning to a current capacity of over 7 200 tonnes per day.

In 2016 Mana's gold production totalled 240 200 ounces sourced from the Fofina and Siou satellite deposits. Guidance for 2017 is for Mana to produce between 190 000 and 205 000 ounces at a total cash cost of US\$685 to US\$715 per ounce and an AISC of US\$920 to US\$960 per ounce.

The commissioning of Bougou next year will confirm SEMAFO's status as a major player in Burkina Faso's burgeoning gold mining industry. Other companies with gold mines in the country include Canada's IAMGOLD, which operates the country's biggest gold mine, Essakane, Russia's Nordgold, which has three mines in the country, and TSX-listed Endeavour Mining, which has the Karma mine. Endeavour is also busy developing the US\$328 million Houndé gold mine which is expected to come on line in the fourth quarter of this year.

*Photos courtesy of SEMAFO*



*A recent view of leach tanks under construction at the Bougou site.*



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Rowan Karstel.

# Buffalo Coal looks to achieve sustainability

*Although it is currently trading profitably, Buffalo Coal, which operates the Aviemore and Magdalena mines near Dundee in KwaZulu-Natal, is faced with several challenges, some technical and some financial, which have largely been inherited by the current management and which need to be overcome if the company is to ensure its long-term future as a small- to mid-tier coal producer. Interim CEO Rowan Karstel, appointed in October last year, has been charged with the task of putting the company's mining operations on a sustainable footing and – as he recently related to **Modern Mining's** Arthur Tassell – believes that excellent progress is being made towards achieving this goal.*

*A continuous miner (CM) at Magdalena. The mine has four CM sections.*

**T**he mines were originally established by the Slater brothers but were acquired by Buffalo Coal (then known as Forbes & Manhattan (Coal) Inc) in 2010 when it bought out Slater Coal. The two properties are situated in the Kliprivier coalfield near

Dundee, with Aviemore, an anthracite mine, and Magdalena, a bituminous producer, being located respectively 10 km and 27 km north of the town. Both mines are underground bord-and-pillar operations (exploiting the Gus and Alfred seams) although Magdalena did operate an open-pit section until early 2015. Aviemore







has two conventional drill-and-blast sections while Magdalena operates four continuous miner (CM) sections.

Magdalena has its own beneficiation plant but the coal from Aviemore is processed in a wash plant at Buffalo's Coalfields site on the outskirts of Dundee. The Coalfields wash plant was commissioned by Slater Coal in 1992 (at that stage it was a toll treatment facility as Aviemore had not yet started up) while the Magdalena plant was built in 2007. Between them, the plants – which have identical capacities – can treat 3 Mt/a, which is in excess of Buffalo's present requirements. The Coalfields site is also home to a calcine plant which is owned by a third party but which is fully integrated into Buffalo's operations. Essentially a rotary kiln, the plant is used to drive off 'volatiles' in the anthracite to increase the fixed carbon content.

Since the 2010 deal, ROM production at the mines has roughly doubled from 822 000 tonnes to the 1,56 Mt (892 591 tonnes saleable) recorded in 2016, with Magdalena – which commissioned its first CM in 2011 – accounting for roughly two thirds of this figure. While this increase is impressive, much of this period was

characterised by declining prices for thermal coal and reduced demand for anthracite with the result that Buffalo Coal's operations had to be substantially restructured in 2014/15 to increase efficiencies and reduce costs.

Karstel, a mining and civil engineer who has enjoyed a long career in the coal industry (he was formerly with Beacon Hill Resources, Keaton Energy, BHP Billiton Energy Coal and Xstrata Coal), is building on this restructuring. "The measures taken were a big step in the right direction but we still need to do a great deal

*The Aviemore adit. Buffalo Coal has plans to put in a second adit at the Aviemore mine to allow production to be increased and mine life extended.*

*One of Aviemore's scoops. Buffalo Coal undertakes its own mining at Aviemore.*





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of work to ensure the continuing viability of Buffalo's operations," he says. "In particular, we need to get the correct infrastructure into place to ensure that we can continue to exploit our considerable reserves and we also need to reduce our debt, which includes a R200 million loan from Investec Bank. Community relations and safety are also top priorities and, in fact, a great deal has already been achieved in these two areas."

Buffalo Coal is listed on the TSX-V and the JSE's AltX with its top shareholder (86,2 %) being Resource Capital Funds (RCF), a US-based, mining-focused private equity fund. Buffalo operates in South Africa through Buffalo Coal Dundee (Pty) Ltd, which in turn holds a 70 % stake in Zinoju Coal (Pty) Ltd, holder of all the mineral rights in respect of the Aviemore and Magdalena properties. The remaining 30 % interest in Zinoju is in the hands of Nulane Investments, a BEE company.

Apart from Karstel, key management figures at Buffalo are Chief Financial Officer Graham du Preez, appointed on an interim basis at the same time as Karstel, Sales and Marketing Manager Bill Lamont, and General Manager Kevern Mattison, who is based in Dundee and is responsible for the mining operations. Mattison has been with Buffalo Coal since 2011, joining the company after holding senior positions with Anglo Thermal Coal. He has 24 years of coal mining experience and earlier this year

was elected as President of the South African Colliery Managers Association (SACMA).

Karstel reports to a strong international board, which is chaired by Craig Wiggill, who served as CEO of Coal Americas at Anglo American and as MD of Anglo Coal Marketing. Among the board members is Eddie Scholtz, who held GM positions on BHP's largest mines and was later MD of BHP's coal mining operations.

While Buffalo undertakes its own mining at Aviemore, the mining function has been outsourced at Magdalena. "STA Coal Mining was introduced as the mining contractor in 2015 and is now mining four sections on a fixed rand-per-tonne basis utilising continuous miners," says Karstel. "The company is very experienced and works for other coal producers such as Sudor Coal and Kangra Coal." When the contract was signed, it was agreed that a portion of STA's contract mining fees could be settled in shares up to a maximum of 9,9 % of Buffalo's equity and, as a result, STA now has a 5,9 % stake in the company, making it the second biggest shareholder after RCF.

Magdalena, which has a total mineable tonnes in-situ (MTIS) resource of 61,69 Mt, is accessed by a decline shaft (known as the Thubelisha shaft) from the opencast highwall. A key current project – the Panel 417 project – will see additional reserves in the south-western portion of the mine being brought into play.

*The anthracite from Aviemore is washed in this plant at the Coalfields site.*



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The calcine plant at the Coalfields site.

This has involved negotiating a 22-m thick dyke with a 13,5 m downthrow and the work is now completed. Another priority at Magdalena is to reduce contamination of coal mined in the four underground sections and Buffalo is working closely with STA to achieve this objective.

According to Karstel, about 80 % of production at Magdalena is derived from the Alfred seam. “The problem with the Alfred is that it has a very weak roof and the potential for fall-of-ground incidents is high,” he says. “To prevent fall of ground, the weak roof needs to be cut with the CMs and this causes contamination which reduces the saleable product yield at the end of the day.”

Magdalena is a typical KwaZulu-Natal underground reserve with lots of dykes and faults. Karstel also mentions that Buffalo is working on a new reserve statement for Magdalena, as well as a process to re-engineer the operation and evaluate it at a combination of CM and drill-and-blast operations

At Aviemore, as mentioned, mining is undertaken by conventional drill-and-blast methods with battery-operated scoops (rather than loaders and shuttle cars) being used to transport coal to the various conveyor locations. The Gus seam is mined (the average seam thickness is 1,6 m) and the roof conditions are much more competent than at Magdalena.

Potentially, Aviemore – which has a 42 MTIS

resource – has a remaining life of at least 12 years but to realise this a significant investment will have to be made in a new adit. Says Karstel: “This new adit – the North adit – will access new mining blocks that cannot be easily reached through the existing infrastructure. In any event, the distances involved would be too great. In our current mining areas, ventilation is already reaching the legal limits, power dips are becoming a problem and travel times to working areas are becoming an issue – although there are various interim measures we can take to alleviate these problems.

“We have completed a concept study on the North adit project and we now have an independent consultant, cPod, working on a pre-feasibility. If this is positive, we’ll proceed to a feasibility later this year. Assuming we get all the requisite regulatory approvals, construction could start in the second half of 2018. The project would take roughly 18 months to complete, so first production would be in early 2020. We will have to await the outcome of the various studies for accurate capex figures but initial estimates suggest that the project would cost in the region of R200 million.”

Karstel adds that Aviemore would become a four-section operation once the North adit is commissioned, allowing ROM production to be more than doubled (to almost 1,3 Mt/a) by 2022. This level of production would also

***“The problem with the Alfred is that it has a very weak roof and the potential for fall-of-ground incidents is high.”***



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see most of the Coalfields washing capacity being utilised.

On the subject of safety, Karstel says that this has been a particular focus for him since taking over as CEO, with results already starting to flow through. “There has been a significant improvement in safety performance in recent months, due to key safety drivers like Visible Felt Leadership (VFL) being introduced and focusing on high potential incidents. We have also appointed Altus Cloete as Health & Safety Manager to have a re-look at processes and systems and this has also made a huge difference. He has massive experience in this field, having previously worked in similar roles with mining groups such as Glencore and BHP Billiton,” he states.

“In 2016, our Lost Time Injury Frequency Rate (LTIFR) per 200 000 man hours worked rose to 0,97 from 0,35 in 2015. I’m happy to say that the statistics are now moving in the right direction. As regards fatalities, the last one was in 2014 at Avimore. As at the end of the first quarter of this year, we had achieved more than 6 000 fatality-free production shifts at Magdalena and the Coalfields site and just over 1 300 at Avimore.”

In all, Buffalo employs 1 134 people (including just over 500 contractors) at its operations in the Dundee area. Completion of the North adit project at Avimore will see Buffalo directly employing a further 120 people. Karstel takes pride in the fact that around 60 % of the Zinoju Coal board positions are occupied by Historically Disadvantaged South Africans.

Of the total thermal product produced by

Buffalo Coal, roughly half is sold into domestic markets with the other half being exported through Richards Bay. Anthracite exports are somewhat higher, with approximately 71 % of anthracite production being exported in the first quarter of this year. Buffalo keeps its logistics to a minimum by selling to traders on a Rand per ton basis, who then transport it from the Coalfields site – where all product is stockpiled – via either road or rail. In the case of thermal coal for export, it is mostly purchased by Glencore. Buffalo has its own small Quattro allocation (204 500 tons) but this is likely to be withdrawn within the next few months, although the company does not expect this to result in any reduction in exports.

Giving his views on the year ahead, Karstel says that the outlook for Buffalo is positive. “The price of thermal coal has rebounded quite nicely from the levels seen in the first half of 2016 while anthracite demand is very robust, so we envisage good sales and revenues,” he states. “Moreover, we’re one of the few suppliers of anthracite left in the country, given that two other anthracite mines in KZN – Springlake and Vaalkrantz – are no longer producing. I’ve been encouraged by our first quarter results this year, which indicated net revenues of R163,9 million compared with the R138,3 million of the first quarter of 2016. Most importantly, operating profit was R18,2 million compared to R10,6 million in Q1 2016. We’re definitely moving in the right direction and I’m very optimistic that we will have a good 2017 provided the contractor at Magdalena can overcome the geological challenges.”

*Photos courtesy of Buffalo Coal*

*Buffalo Coal staff (including Karstel at centre) and community members in a team-building exercise. Isandlwana, the hill where the famous Anglo-Zulu War battle took place in 1879, is visible in the background.*

**“There has been a significant improvement in safety performance in recent months ...”**





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## Acacia Coal achieves key milestones in June quarter

**A**SX-listed Acacia Coal says that among the highlights of its June quarter was the release of a Pre-Feasibility Study (PFS) for the Riversdale Anthracite Colliery (RAC) project. The reporting period also saw the completion of an updated resource statement (which demonstrated an increase in total resources to 10 Mt, of which 86 % lie in the measured and indicated categories), the commencement of discussions to secure offtake agreements for the project and an application to transfer the RAC project licences from Rio Tinto.

Acacia Coal has an exclusive option, in partnership with African Onca Limited, to acquire the Mining Right for the RAC from a subsidiary of Rio Tinto and its partner Khulani Resources.

The company says it will require further capital in order to fund its proposed activities through to March 2018 (including the next payment due to the underlying vendors of RAC and the completion of a Bankable Feasibility Study on the RAC project).

The RAC project covers an area of 2 716 ha in the southern portion of the Vryheid coalfield. It is centred around the Kwa-Ntabankulu mountain located 30 km south-east of Vryheid.

According to Acacia, the results of the comprehensive PFS prepared by VBKOM, a South African-based mining consultancy, surpassed expectations for the project at the time of securing the option to acquire RAC.

The study shows that the project is estimated to cost just A\$24 million to build on an outsourced operational model, with sustaining capital of A\$7,85 million, and is forecast to generate an average 438 000 tonnes of sales per annum for an initial eight-year mine life.

Based upon an average selling price of A\$125,1/tonne FCA mine gate and an effective 6 % royalty rate, the project study demonstrates a cash margin after tax of A\$34,40/t.

The PFS found that these financial parameters would result in an outstanding internal rate of return of 53 % and underpin a Net Present Value at a 10 % discount rate of A\$73 million.

Commenting at the time of the release of the PFS, Acacia MD Hugh Callaghan said the combination of the extremely high quality nature of the RAC coal and the declining inventory of metallurgical coal in South Africa was at the heart of the project's strong outlook.

Metallurgical test work conducted as part of the PFS found the RAC coal was ideal for use in South Africa's ferrochrome industry, which is struggling to source sufficient quantities of low phosphorus and low sulphur anthracite.

Callaghan said these factors were responsible for the strong price environment which, when coupled with RAC's low costs, would enable the project to enjoy robust margins.

The trade-off and detailed optimisation studies delivered an optimal development scenario of an average 60 000 tonnes per month underground mining operation using conventional mining in a bord-and-pillar configuration. It is envisaged that three adits will be developed and six sections established in a phased ramp-up. The mining operation would be undertaken by a contractor with 70 % of the equipment fleet being provided by Acacia. ■



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# MBE a leader in coal beneficiation

*Ease of operation and reduced maintenance costs are the critical parameters that all coal process plants demand. Add to this enhanced productivity and you have a winning formula, according to Johannes Kottmann, Managing Director of MBE Minerals, a company which has been involved in coal beneficiation technology for more than 100 years.*

**K**ottmann is quick to stress that ongoing product improvement has seen equipment upgrades over time to ensure that the latest developments are incorporated into plants. He also notes that each application, whether greenfields or brownfields, is carefully assessed in conjunction with the customer during a comprehensive site visit to determine the optimum solution.

“Our extensive local and international footprint allows the company to leverage the experience and expertise necessary to ensure a profitable and sustainable end result,” Kottmann says. MBE Minerals’ full scope of services includes feasibility studies, raw material testing, financing concepts, erection and commissioning, personnel training and pre- and after-sales service.

MBE Minerals has a reference base of vibrating screens in the African mining industry, from sizing to scalping, dewatering and media recovery. These vibrating screens have a proven track record under arduous and demanding conditions. They are available in a variety of sizes of up to 3,6 m in width and 6,75 m in

length, in single or double deck configuration and in either circular or linear motion.

Particular innovations introduced by MBE Minerals include an innovative side plate mounted drive, which means they are much more lightweight than those using vibrator motors. However, screens can be supplied with vibrator motors if necessary, while resonance screens offer the added benefit of lower power consumption.

All types of screening surfaces can be accommodated, with each screen incorporating mechanical design features such as vibration dampening, side plates, cross members and the appropriate feed and discharge chutes.

The PNEUFLOT® pneumatic flotation system was introduced into the market with the first coal flotation installation at Pittston, Pennsylvania in the US in 1987. Since then the technology has been used widely for fine coal slurries treatment. Currently PNEUFLOT®’s largest installation base is in China and India, with the technology expanding rapidly into Eastern Europe and other parts of Asia.

In 2012 MBE Minerals decided to introduce PNEUFLOT® into the Sub-Saharan market and, to address the key concern that the technology remained untested on South African coals, invested in a laboratory cell and pilot plant. These units have been used to test material from both the Soutpansberg and the Central Basin over the past year.

The laboratory cell has achieved product with less than 10 % ash (feed +50 % ash) for a Soutpansberg seam while the pilot plant produced a bulk product sample from the tails of a Central Basin plant fit for market acceptance presentation by a coal major.

“Test work has proved that PNEUFLOT® can produce a Waterberg flotation concentrate with less than 11 % ash at yields greater than 33 % and organic efficiencies greater than 68 %,” Kottmann says.

Prior to the design of an industrial scale flotation plant, laboratory scale test work and – where possible – semi-industrial pilot test work has to be carried out. The pilot plant can be installed anywhere in an existing circuit as a ‘plug and play’ device and the results generated can be scaled up directly to a full-scale application.

MBE Minerals offers a full testing programme in South Africa and Kottmann

*Dual feed and product discharge for a 6 m wide Batac® jig in a coal application.*



feature



# technology

says the pilot plant works with an agitated feed/conditioning tank with a volume of 1 m<sup>3</sup> for batch operations and can accommodate feed rates of up to 10 m<sup>3</sup>/h for continuous in-plant trials.

PNEUFLOT® technology works effectively at lower operating costs through much lower energy and maintenance and repair costs compared to column or mechanical agitator flotation. Advantages such as no moving parts, low wear and atmospheric aeration, negating the need for a blower or compressor, add value to a user-friendly system, together with low maintenance, low costs and low downtime.

MBE Minerals' BATAAC® jig technology has undergone extensive test work to prove its capability to deliver increased efficiencies, improved product quality and higher availability and throughput rates.

It represents the latest advances in stratification by means of jiggling, one of the oldest separation methods deployed in coal and mineral beneficiation. BATAAC® jig technology has developed a reputation for its excellent separation accuracy, combined with a fairly small footprint, which translates into a lower capital cost. This remarkable accuracy is due to electronic control of the air pulse generator and sensing of the thickness and densities of the material layers being separated.

The under-bed pulsated BATAAC® jig is said to be ideal for coarse applications from 150 mm down to fine coal in the 10 to 0,5 mm size

range, with throughput rates of between 100 and 1 200 t/h. "Such excellent performance has ensured that BATAAC® jigs are the preferred technology for numerous beneficiation plants the world over," says Kottmann.

MBE Minerals' ROMJIG® has proved particularly suitable as a reliable and economical solution in destoning raw coal. Extensive international testing has produced impressive results, with an operational efficiency (imperfection) of I=0,08 to 0,1.

"There was also an overall reduction in the stone handled and indications of a lower percentage of refuse in the washery feed," Kottmann says. This translates into cost-saving benefits such as reduced wear on machinery and transporting equipment, less grain degradation, less dust and slurry and reduced consumption of flocculation and flotation agents in downstream fines recovery circuits.

"MBE Minerals remains abreast of developments in coal beneficiation technology," Kottmann comments. "It does this by being part of an international network, which includes the MBE Coal and Minerals' R&D Centre in Cologne, Germany. This centre consults with customers globally in terms of optimum processing solutions, aided by an in-house laboratory and pilot test work facilities."

The centre can also provide specific customer training, from general mineral processing to maintenance of MBE Minerals' equipment. "MBE Minerals has the capability to design, engineer and supply equipment, as well as carry out projects on a turnkey or EPC basis, in addition to operating complete coal processing plants," Kottmann concludes. ■

*BATAAC® jig technology has developed a reputation for its excellent separation accuracy, combined with a fairly small footprint.*

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# Coal of Africa reviews its flagship Makhado project

*In its latest report for the quarter ended 30 June, Coal of Africa Limited (CoAL) states that it is reviewing the development plan for its Makhado project. It says this entails “re-assessing its strategy, which may or may not result in a reduced capital expenditure, a lower production rate and a shorter construction period through to earlier than planned production, with an extended mine life.”*

Originally Makhado’s development plan included a 26-month construction phase followed by a four-month ramp up to achieve a production rate of 5,5 Mt/a with a capital requirement of US\$281 million.

According to CoAL, the revised strategy – which will be reviewed by the company’s board in September – will look to incorporate a “manageable marketing and funding plan”. The company says that despite the proposed lower output, Makhado would still look to deliver positive returns for shareholders.

It adds: “CoAL remains committed to the sustainable development of the Makhado project, recognising its potential to drive significant socio-economic transformation. The company continues to engage with all stakeholders to ensure the on-going implementation of a co-existent model, seeking co-operation between mining, agriculture and heritage land uses.”

The Makhado project is located in Limpopo

Province. The nearest town, Makhado (Louis Trichardt) is situated 35 km south of the project area, with Musina located 50 km to the north. The project represents CoAL’s first project within the Soutpansberg coalfield. Within the project area, a number of coal seams occur within a 30 to 40 m thick carbonaceous zone of the Madzaringwe Formation. The seams dip northward at approximately 12 deg.

Between August 2010 and April 2011, CoAL excavated a boxcut in the project area. This resulted in 45 849 tonnes of ROM being processed, producing 21 800 tonnes of coal, some of which was transported to Exxaro’s Tshikondeni coking coal mine (now closed) for process testing. This bulk sample was excavated in order to confirm the hard coking coal qualities and coking product quantities



Core logging at the Makhado project (photo: CoAL).

feature


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and to test various processing options for the coal.

In June 2013, CoAL released an independently verified Definitive Feasibility Study (DFS), demonstrating the project's ability to mine the roughly 173 Mt Run of Mine (ROM) reserves in situ to produce 2,3 Mt of hard coking coal and 3,2 Mt of thermal coal annually at steady-state production over a 16-year life of mine. To achieve this, the required ROM production rate is 12,6 Mt/a.

As detailed in the DFS, mining would be by open-pit methods (although there is potential for underground expansion) with the project being divided into three separate mining areas – the East, Central and West

pits – for technical, logistical and practical reasons. The coal would be processed in a plant consisting of three sections – a double-stage DMS plant, a fines circuit (using Reflux Classifiers) and an ultra-fines circuit of Jameson column flotation cells.

In January 2016, CoAL and DRA jointly announced that DRA Projects SA had been awarded the Optimisation Study and Front End Engineering and Design (FEED) package for the project, a key requirement being the identification of appropriate cost reduction opportunities to help optimise the economics of the project.

The FEED and Optimisation Study resulted in a revision of the total project capital estimate from the US\$406 million quoted in the DFS to approximately US\$280 million, a 38 % reduction of US\$126 million.

Last year Makhado was granted a 20-year Integrated Water Use Licence (IWUL) but this was suspended following an appeal by the Vhembe Mineral Resources Forum and other parties opposed to the project. In its quarterly report, CoAL says that the suspension has now been lifted and that, as a result, the project “moves closer to being fully permitted.”

Apart from Makhado, CoAL also owns the Vele coking and thermal coal colliery in the Limpopo (Tuli) coalfield and the Mooiplats thermal coal colliery in the Ermelo coalfield, which are both currently on care and maintenance. CoAL intends selling Mooiplats and is currently in discussion with a number of interested parties.

During the June quarter, the company completed its acquisition of Pan African Resources Coal Holdings (PAR Coal), the 91 %-owner of the Uitkomst colliery, for a purchase price of R275 million. Uitkomst is a high grade thermal export quality coal deposit with metallurgical applications, which is situated in the Utrecht coalfield in KwaZulu-Natal. It consists of an existing underground coal mine (Uitkomst – South Mine) and a planned life of mine extension into the northern area (Klipspruit – North Mine).

According to the quarterly report, the Uitkomst acquisition represents “a highly compelling and attractive value proposition that CoAL believes will provide immediate cash flows to support the company as it continues to progress with the development of the Makhado project.” ■



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# Maccaferri promotes turnkey solutions for the mining industry

*A company with a 60-year history in South Africa is Maccaferri SA, probably best known for its gabion retaining structures although it has a host of other products and systems. Mining is one of the company's prime markets and to increase its engagement with this sector the company is increasingly emphasising turnkey solutions, an approach which has seen it developing partnering arrangements with mining clients, as well as consulting engineers and contractors.*

Explaining the strategy, Joseph Meadows, Maccaferri SA's Business Development Manager: Mining, says that many clients in the mining field want an 'all in one' solution for specific projects. "They're keen on a single interface and this is what we can provide. We've developed relationships with a number of leading consultants and contractors and working in conjunction with them we're able to tackle projects on a turnkey basis."

A classic example of this approach was provided a few years back when Botswana's leading diamond miner, Debswana, engaged with Maccaferri to design and install a rock-fall mitigation solution at its giant Jwaneng mine. Maccaferri was able to provide a

turnkey drapery solution in conjunction with its partners, engineering consultants Melis & du Plessis and contractors Wepex. In this case, Maccaferri acted as the project manager in association with the consultants to complete the design and also provided on-site supervision and technical advice.

A feature of the project was the use of an innovative drape wire decoiling machine – designed and built by Wepex – which could traverse the high wall decoiling the rolls of mesh, all under remote control.

Comments Meadows: "I should stress that Maccaferri is neither a consulting engineer nor a contractor. However, in conjunction with appropriate partners we can provide an all-encompassing solution that enables us to

**Below:** Rock slope stabilisation at Jwaneng in Botswana. Maccaferri was able to provide a turnkey drapery solution.

**Centre:** The innovative decoiling machine used to install Maccaferri's drapery system at Jwaneng.







contribute not just our products but also the in-depth expertise we have accumulated over many years.”

More recently, the same team that was responsible for the Jwaneng contract carried out a similar project at Debswana’s Orapa mine in Botswana. The mine required rockfall mitigation measures to be installed on two sections of highwall that were above active haul roads. A drapery rockfall solution was adopted based on Maccaferri’s Steelgrid HR50, a high strength,

steel wire geocomposite which is used in conjunction with anchor plates, U-bolts and mesh connectors.

The project – successfully completed in November 2015 – received a ‘special mention’ in the prestigious Best Project Awards organised annually by *Modern Mining’s* sister magazine, *Construction World*.

The Debswana contracts are just two examples of a wide array of installations by Maccaferri at mines all over Africa, including

**Above:** A 25 m high wall constructed at the Kwagga North coal mine in Mpumalanga. This Mechanically Stabilised Earth (MSE) wall is the highest ever built by Maccaferri in South Africa.

**Below:** The Orapa slope stabilisation installation by Maccaferri and its partners built on the success previously achieved at Jwaneng.







**Above:** MacRes and Terramesh tip wall at Optimum colliery.

**Centre:** A Maccaferri MSE wall at Randgold Resources' Tongon gold mine in Côte d'Ivoire.



the Klipspruit and Grootegeluk coal mines in South Africa, the Ngezi platinum mine in Zimbabwe, the Husab and Kayelekera uranium mines in Namibia and Malawi respectively, the Iduapriem gold mine in Ghana, the Tongon gold mine in Côte d'Ivoire, the Twangiza gold mine in the DRC and the Gangama mineral sands mine in Sierra Leone.

In some cases, Maccaferri's involvement with a project will last for many years after the initial installation. A case in point is provided by a contract completed at the Marikana platinum mine in 2002. The mine required a 22,5 m tip wall for its primary crusher – the challenge, however, was that the foundation had compressible soil characteristics and some settlement was predicted by the geotechnical consultants.

"To accommodate the settlement and working in conjunction with DRA, we provided our Terramesh mechanically stabilised earth wall system," says Meadows. "This is a modular system comprising a gabion-like front face with sandwiched layers of soil reinforcement. We've continued to survey the wall annually and the structure has performed as predicted, adequately accommodating the subsequent settlement. This demonstrates our long-term commitment to serviceability and asset protection."

Frequently Maccaferri will propose alternatives that are more cost-effective than conventional solutions. In 2011, for example, its Paramesh system was installed at the Grootegeluk coal mine in South Africa's Limpopo Province as part of the Grootegeluk Medupi expansion project. The mine required a 12,5 m high tip wall to accommodate fully-laden Cat 777 tipper trucks.

The initial design was for a traditional cantilever reinforced concrete wall. However, the

consultants, LSL Consulting, also approached Maccaferri for an alternative retaining wall solution. The company proposed a vertical, 12,5 m high, 120 m long Paramesh structure, consisting of Terramesh baskets in combination with Paralink 300 geosynthetic soil reinforcement grids and MacTex non-woven double needle punched geotextile. The proposal was accepted by the project team and the installation was successfully carried out between March and August 2011.

"The overall cost of the Paramesh system was lower than the conventional solution," notes Meadows. "Moreover, the flexibility of the system enables it to cope with any settlement and consolidation. No specialised lifting equipment was required during construction as all the elements of the system are compact and not excessive in weight. In addition, use could be made of locally recruited unskilled workers – which is a goal on many projects in Africa – who were employed to fill the single skin gabion face."

Elaborating on Maccaferri's partnership strategy, Meadows says the company is not referring to ironclad legal agreements. "Our approach is much more relaxed," he explains. "Essentially, when we refer to 'partnerships' we mean informal arrangements with other parties which are to our mutual benefit and which could take many forms – joint marketing or co-operation on training and education, to give just two examples. As I've mentioned, we already have many such arrangements in place but we're keen to develop more."

On the state of the current market, Meadows acknowledges that there has been a dearth of mining work over the past couple of years but says that Maccaferri has nevertheless maintained a healthy workload. "Fortunately, we





are diversified in the sense that we work right across both the mining and civil engineering industries with the bigger part of our workload coming from the civil engineering side," he notes.

Outlining Maccaferri's offering to the mining sector, Meadows says the company is a global leader in the manufacturing and supply of gabions and associated wire mesh products, as well as geosynthetics including geogrids and geocomposites, which singly or in combination can be used in a variety of applications – for example, rockfall protection, retaining wall construction, soil and slope stabilisation, drainage systems and erosion control. "Our manufacturing standards are very high and we have ISO 9001: 2008 and ISO 14001: 2004 certification, and run an Integrated Management System, which

includes BS OHSAS 18001:2007," he states.

Although Maccaferri has been active in South Africa for 60 years, the global Maccaferri operation dates back to the late 1870s, when the company was founded in Italy by Raffaele Maccaferri, credited as the inventor of the modern form of the gabion. Today, the company remains a family-oriented business but is also a true multi-national, with over 70 subsidiaries around the world, manufacturing facilities in a number of countries including South Africa, and a global workforce of nearly 3 000. The South African operation – whose MD is Adriano Gilli – is based in Durban, where a modern production unit covering more than 9 000 m<sup>2</sup> is located, but also has offices in Johannesburg and Cape Town. It works throughout Africa and has completed contracts as far north as Egypt and Eritrea. ■

*Above: Maccaferri provided the tip wall at Banro's Twangiza gold mine in the DRC.*

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# Savannah starts construction of pilot plant at Mutamba

*AIM-quoted Savannah Resources has commenced construction of the pilot plant for its bulk metallurgical test work programme at the Mutamba mineral sands project in Mozambique.*

**S**avannah expects to commission the 20 tonnes per hour pilot plant by the end of 2017. It will be used to produce bulk samples of concentrate for metallurgical and product test work. Mozambique-based AML, an experienced mineral sands engineering company, has been appointed to undertake the work.

Comments Savannah's CEO, David Archer: "We are pleased that the pilot plant construction work is now well underway at Mutamba and that good progress is being made. Once commissioned and operational, the plant will provide concentrate bulk samples for analysis and the preparation of final products for test marketing. The completion of the plant will be a key milestone for the Mutamba Consortium as we move the project towards a development decision."

AML is a fully independent company that has provided multi-disciplinary engineering and process services to the mining industry in Mozambique since 2011. Its clients have included Kenmare Resources, which operates the Moma Titanium Minerals Mine in northern Mozambique, MPDC (Maputo Port Development Company) and Mozal.

The pilot plant was constructed and tested under the direction of Rio Tinto in 2012 in



South Africa before being disassembled and packed into containers and shipped to the Mutamba site.

The Mutamba project is being developed by Savannah and Rio Tinto as part of a consortium agreement between the two parties. Savannah has the right to earn up to a 51 % interest in the project, subject to key milestones being met. The project is located in the Inhambane province of Mozambique about 35 km south-east of the city of Inhambane and 300 km north-east of Maputo.

The Scope of Works (SoW) for AML is for the turnkey re-assembly and commissioning of the plant. This includes: the bulk earthworks; preparation of the old railway line to be used as a construction access road; civil works; structural re-assembly; processing equipment (piping,

*Savannah personnel and members of the construction team inspect the pilot plant site earlier this year. Savannah's CEO, David Archer, is fifth from the left.*

*The 20 tonne per hour pilot plant on site at Mutamba.*



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#### BELT TRACKING SYSTEM 3 / 5 ROLL TROUGHING FRAME

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- Install the Belt Tracking System on the troughing side of the belt to centralise a misaligned belt, prevent spillage, decrease downtime, decrease maintenance and extend belt life.



#### BELT TRACKING SYSTEM RETURN FRAME

PATENTED

- Install the Belt Tracking System on the return side of the belt to centralise a misaligned belt, prevent belt edge damage, prevent structural damage, decrease downtime, decrease maintenance and extend belt life.



cyclones, distributors, spirals and distributors assembly); electrical and control; mechanical (pumps, conveyor, vibrating feeder); and plant commissioning.

Earlier this year Savannah Resources completed a Scoping Study on Mutamba that indicates excellent life of mine financial returns with relatively modest capital requirements. The company is targeting first production from Mutamba in 2020.

The mining inventory that forms the basis of the Scoping Study was derived from an optimised pit shell giving a 30-year mine life and comprises 451 Mt averaging 6 % Total Heavy Minerals (THM) in indicated and inferred resources.

Average annual production following ramp-up to a 15 Mt/a mining rate is estimated to be 456 000 tonnes of roasted ilmenite and 118 000 tonnes of non-magnetic concentrate (rutile and zircon) over an initial mine life of 30 years, which will position the Mutamba project as a globally significant ilmenite producer.

At the assumed base case pricing of US\$185/t for ilmenite and US\$250 for non-magnetic concentrate (rutile and zircon) over the project life, the project is anticipated to generate average pre-tax cash flows of US\$40 million per annum. The life of mine revenue is forecast to be US\$3,53 billion and cash operating costs over the life of mine are US\$2,16 billion.

Developing the project will involve a pre-production capital expenditure of US\$152 million plus US\$74 million of contingency, EPCM and spares, with identified opportunities that may reduce capital expenditure with a payback of five years.

Mutamba includes three separate mineral sand deposits: Jangamo, Dongane and Ravene. The Dongane and Ravene deposits are dominated by the high dune topography. However, at Jangamo, high dunes only occur to the



*A drill site at Mutamba. Over 80 000 m of drilling has been undertaken for the project.*

south where it approaches Dongane.

Several mining methods were reviewed for applicability to the project. These included the dredge wet mining method as well as the front-end loader (FEL)/truck and dozer trap dry mining methods. Of the dry mining options considered, dozer trap mining is preferred over the FEL/ truck mining method.

Mined ore will be slurried and pumped to the nearby primary concentrator plant (PCP). Processing in the PCP consists of desliming to remove fines and gravity separation using spiral circuits. The PCP has been sized for a nominal feed rate of 2 000 t/h in order to produce approximately 800 000 t/a of heavy mineral concentrate (HMC) with a heavy mineral grade in the order of >90 %.

The HMC produced will trucked to the mineral separation plant (MSP). The concentrate will be fed into the mineral separation circuit where it will be processed to produce a magnetic roasted ilmenite product and a zircon-rich non-magnetic concentrate. For the base case, the MSP has been sized to process HMC at a rate of 105 t/h to produce approximately 70 t/h of roasted ilmenite and 15 t/h of non-magnetic concentrate.

*Photos courtesy of Savannah Resources*

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## Tech Edge Group specialises in winding solutions

Bannister Erasmus, MD of the Tech Edge Group believes that great winding solutions require the three 'E's, namely experience, engineering, and excellence. "We believe that Tech Edge Group's historical track record is testimony to the fact that we possess all three of these qualities," he says. "This enables us not only to expand our ancillary products and services, but to compete successfully on the international stage."

Winches & Winders is South Africa's oldest winder design and manufacturing company and now trades as the Tech Edge

Group. Originally named J K Fulton (Pty) Ltd, it has – over nearly a century – manufactured and installed more than 5 000 Fulton winders at various Southern African and international mining operations.

Headgears, sheave wheels, winding ropes, as well as shaft and winder chamber equipment, have recently been added to the Tech Edge Group's range of ancillary products and services offered. These new additions offer players in the mining sector not only a reliable winding solution but all ancillary equipment required for the core winder.

"In addition to our products and solutions, we have proven project management and quality assurance strengths, as this is what our project partners and customers demand from us. Our response times are the best in the industry, and we can be relied upon to come to the rescue when a customer has an urgent need at the last minute," said Erasmus.

The Tech Edge Group has just completed a turnkey project which comprised all the above aspects. The project was in partnership with Australian consultants on an international gold project for a listed mining company. The scope of the project

included complete winders, winder house, headgear, sheave wheels, ropes, conveyances, attachments and all associated electrical control and communication equipment.

"We completed the project on time and within budget, with excellent design and quality standards," commented Erasmus. "How successful was the project? Well, a measure of success can be seen in the new orders received from the customer! I am very proud of our technical installation staff. They worked with a foreign crew under new and difficult circumstances, and still adhered to a rigid schedule and strict Australian quality standards. They were congratulated by the Australian consultants as well as by the mine management."

Other projects the Tech Edge Group have or are currently involved with include: a modern rope-handling solution for a ground-mounted Koepe winder at Wesizwe's Bakubung Platinum Mine; turnkey projects in Africa as well as offshore that include full headgear, hoisting system, winder house and control units; sophisticated containerised control rooms; and single drum stage winders.

Bannister Erasmus, Tech Edge, tel (+27 11) 976-3063



A single drum service winder provided to a mine by Tech Edge.

## BMG signs new agreement with Eaton

BMG has extended its range of Eaton hydraulic components to now include Eaton's advanced conveyor solutions, designed for safe and efficient electrical power management.

"Under the terms of the new distri-

bution agreement, which was signed in Johannesburg recently (18 July 2017), BMG will now distribute Eaton's complete conveyor protection and safety solutions across sub-Saharan Africa," says Gavin Pelser, MD of BMG, part of Invicta

Holdings Limited. "The addition of Eaton's electrical power management solutions – which include conveyor safety switches and accessories – completes conveyor systems supplied by BMG and enhances the company's comprehensive range of engineering solutions.

"This also fits with BMG's 'Bolt-On' strategy to offer customers the full basket of products and solutions, in line with our commitment of adding value and being part of every process."

Through this partnership, the market has greater accessibility to Eaton's Winner brand of hose and hose fittings and complete conveyor solutions, which are available from BMG's distribution network of over 130 branches.

Eaton's range of conveyor solutions encompasses safety switches which include double and single ended conveyor trip switches, conveyor rip/torn switches and double end slack rope switches, as well as belt alignment and belt trip switches.

BMG, tel (+27 11) 620-1500

## Metso HPGR passes a major production milestone

Metso and Freeport-McMoRan celebrated an impressive milestone in Q2 2017 as the new HRCTM3000, the world's largest operating high-pressure grinding roll (HPGR), at the Metcalf concentrator crushed its hundred millionth short ton of ore.

Due to its capacity, the HRCTM3000 reached this milestone in less than three years. The HRCTM3000 began operating in May 2014 at the concentrator, which is located at Freeport-McMoRan's Morenci mine in Arizona, USA. Morenci is an open-pit copper mining complex that has been in continuous operation since 1939.

The HRCTM3000 is the largest unit of its kind in the world, allowing for fewer lines of equipment which reduces the amount of ancillary equipment. It is also reportedly the first full-scale HPGR to incorporate revolutionary design features such as the flanged tyre design and the patented arch-frame.

Metso's solution has provided the Morenci mine with several benefits, including an estimated 13,5 % increase in energy efficiency over traditional HPGRs based on pilot-scale testing.

Metso South Africa, tel (+27 11) 961-4000



## MultoScan tracks mill liner wear in real time

Unreliable and time-consuming methods of monitoring the condition of mill liners are no longer necessary as mines can now ensure higher efficiencies by tracking liner wear in real time.

With the introduction of MultoScan by Multotec Rubber, milling plants can accurately measure a mill's liner profile and predict the point at which the mill will start becoming inefficient. The automatic measurement and display of the charge level confirms that the operation of the mill is correct.

According to Matthew Fitzsimons, Technical Manager at Multotec Rubber, wear rates of liners are not linear, as the increased slippage of the charge on worn liners tends to exponentially increase the wear rate.

Data generated by the MultoScan is analysed and interpreted by highly skilled technicians using Multotec's Hawkeye proprietary programme so there is no time lag, allowing plants much quicker responsiveness.

"When combined with critical mill operating parameters, this data can help predict the point where the liner becomes inefficient and hence when the mill itself will become inefficient," says Fitzsimons. "Customers can receive immediate feedback on the condition of the liners, so any urgent issues can also be timeously addressed."

The traditional way of monitoring liner wear was the time-consuming and often inaccurate pin-gauge method. The MultoScan now provides an effective alternative, while also being much more affordable than the highly sophisticated but expensive monitoring technology in the market.

Repeatability of the MultoScan results

means that there is hardly any room for human error in this system. It also saves mines significantly in terms of the time value of mill stoppages for taking manual wear readings.

Further savings can be harnessed by reducing the stockholding of liners that mines need to keep; this is due to better information on the liner profile, giving maintenance crews the ability to set the trigger point for the liner inventory as and when they need it.

Fitzsimons highlights the potential that MultoScan offers, as individual plants can map key performance indicators of their mills and link these to the liner profile condition, extending the capability of the



*MultoScan, from Multotec Rubber, can accurately measure a mill's liner profile and predict the point at which the mill will start becoming inefficient.*

monitoring system by allowing mines to select specific criteria.

Vivienne Murray, Multotec Group, tel (+27 11) 923-6000

## Dundee Precious Metals and MineRP join forces

TSX-listed Dundee Precious Metals Inc (DPM) has announced that it has entered into a definitive agreement with MineRP Holdings, a provider of integrated mining technical solutions. In terms of the agreement, DPM will combine its proprietary wireless underground communications technology, managed within DPM's Terrative Digital Solutions division, with MineRP, and acquire a majority interest in MineRP.

MineRP, a private company founded in 1997 and headquartered in South Africa, is an independent software vendor (ISV) for the mining industry. Its unique platform improves productivity in planning and operations by integrating various technical and financial applications in the industry. Since 2011, DPM has also established itself as a leader in digital innovation across its asset base, particularly at its Chelopech operation in Bulgaria where it developed wireless underground communications technology which is held within Terrative. DPM also

owns the Tsumeb smelter in Namibia.

With the August 2017 release of MineRP 4.0, MineRP is in a position to extend its data-integration capabilities to real-time operational monitoring and control. For this purpose, the cost effective, robust communication and data acquisition technologies developed by Terrative, combined with MineRP's solutions, will offer the mining industry a fully integrated communications platform and information management framework.

"MineRP has always been at the forefront of innovation focused on the Enterprise Big Data in mining. Combined with the advanced digital communication technologies offered by Terrative, MineRP's enterprise solutions provide a revolutionary platform for robust digital transformation for mining. The transaction provides MineRP with the means to aggressively implement our Spatial Enterprise Integration strategy across the globe," comments Pieter Nel, CEO of MineRP.

MineRP South Africa, tel (+27 87) 980-3100



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## Kwatani works closely with customers on screen maintenance

Cost pressures often force mines to make difficult decisions about how they approach the maintenance of their vibrating screens; OEMs can ease the trade-offs by offering solutions that match customers' specific needs and resources, according to Kwatani CEO Kim Schoepflin. The OEM was previously known as Joest.

"While most mines have been through a difficult period, each one has had to deal with it in its own way," says Schoepflin. "As an OEM, we need to understand their specific conditions and constraints before we can build a solid partnership that works for both parties."

She says it's about adopting a con-

sultative approach when dealing with customers, not just taking them a catalogue of products and services. Listening carefully to the customer is vital, to learn what their challenges and limitations are.

Mines have tended to cut capital expenditure as a result of depressed commodity prices, which means that the working life of equipment, such as screens, is being extended. At the same time, however, the necessary maintenance is often also cut back, creating serious risk of failure and unscheduled downtime.

"A vibrating screen is one of the smaller and less costly items in a plant, but it is a critical element that can bring a whole module, or even the entire plant, to a standstill if it fails unexpectedly," she says.

"At Kwatani, we typically start our intervention with an on-site audit to assess the situation in a plant, beginning with a look at the mechanical state of the vibrating equipment in its operational and non-operational state."

A visual inspection allows any damage to the steel section or wear to be identified. The next question is whether the equipment is performing to expectation in terms of

recoveries, tonnages and efficiencies.

"We also ask whether there have been any changes in the upstream process," says Schoepflin. "This is to check whether the feed that the vibrating machine is receiving is still in line with the original specification of the unit; ore bodies often change, and this can affect the material and the processing requirements. We need to establish whether the equipment is actually still fit for the purpose for which it was designed."

This leads to a list of issues that must be addressed, which in turn must be prioritised, starting with any vibrating machine that is close to destruction as costly downtime due to sudden failure must be decisively avoided. Refurbishment of the equipment by the OEM is usually significantly more cost effective, compared to a new replacement, when it is performed timeously.

"On the basis of this assessment and the resulting priority areas, we then agree on an action plan with the mine that takes into account their human and financial resources," she says. "Low commodity prices have also meant that mines have lost vital skills to operate and service their equipment."

Kwatani, tel (+27 11) 923-9000



Kwatani management on site inspecting a screen which is en route to the OEM for refurbishment.

## Material handling system ordered for Oyu Tolgoi

One of the richest underground copper deposits in the world will soon be accessed with the help of high-capacity gearless driven conveyors from thyssenkrupp. As one of the leading global providers of mining systems, the Industrial Solutions

business area has won a contract to supply a material handling system for the new Oyu Tolgoi underground mine in Mongolia.

The contract value is in the higher double-digit million-euro range. thyssenkrupp will supply a total of nine conveyors with a combined length of 9,5 km as well as seven transfer towers operating at a design tonnage of 7 100 tons per hour.

The Oyu Tolgoi mine complex is a joint venture between the Government of Mongolia and Turquoise Hill Resources, which is majority-owned by Rio Tinto. First production from underground is expected in 2020.

From a depth of nearly 1 400 m beneath the Gobi Desert in the south of Mongolia, the new underground material handling system is planned to transport 95 000 tons per day of copper ore up to the surface. The main components are four high lift conveyors each equipped with 1,6 m wide steel cord

belts and dual 5 500 kW gearless drives from Siemens. Further conveyors will feed the main incline conveyors and tie the new underground system into the existing process facility.

The order given to thyssenkrupp includes the engineering, design, and supply of the new material handling system as well as required site support services during the construction and commissioning phases. It will be designed with an emphasis on ease of maintenance. This includes, for example, the ability to quickly replace chute sections as well as idler rolls and belt cleaners.

The drive components are massive in terms of size and weight, so great attention will be paid to safely transporting them underground and to ensuring they can be safely exchanged in the future. Overhead bridge cranes are strategically located to not only service the equipment, but also to aid in the erection of the major structures.

thyssenkrupp Industrial Solutions South Africa, tel (+27 11) 236-1000



3D rendering of the Oyu Tolgoi underground drive chamber for one of the four slope conveyors with 2 x 5,5 MW gearless drives.



## New tools in BlastLogic optimise drill and blast

Major global operations are taking advantage of tailored BlastLogic solutions to reliably achieve greater accuracy in the critical drill and blast process.

Upgrades in the latest BlastLogic release help operations improve mineral recovery through streamlined drill and blast design, tracking and analysis. Connecting fleet systems, explosives loading and initiation, and production management and reporting systems allows continual improvement both upstream and downstream from the drill and blast process.

BlastLogic enables operations to make blast design and implementation decisions with reference to mine plans, geology and geotechnical data. Instant data connection and visualisation in the field or office helps ensure that every aspect of the site drill and blast process is fine tuned.

Tools in BlastLogic 2.1 create both pyrotechnic and electronic tie-ups, providing visual feedback on design effectiveness. Electronic initiation systems offer finer timing control and reduced misfire potential, increasing safety and reducing excessive vibration and noise.

Users can make small hole-to-hole and row-to-row changes which account for actual drilling, charging and stemming positions. This helps ensure optimum performance in safety and fragmentation for every blast.

Hole temperature logging in BlastLogic 2.1 allows the last known temperature, previous temperature and change in temperature to be entered via a tablet or desktop computer. Hole temperature can be viewed or edited, and dip, backfill and charge sheets show temperatures in hole tabular view.

BlastLogic allows informed analysis and modelling of drill and blast. Cost savings can be achieved through expanding the blast pattern and reducing explosives use without compromising blast performance.

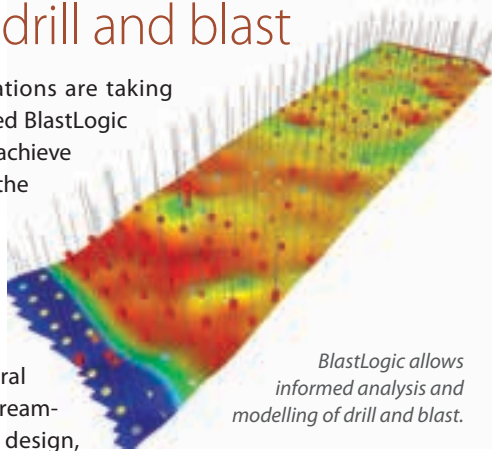
The intuitive BlastLogic interface allows users to quickly design blast tie-ups which allow explosives to be individually detonated and timed to the millisecond. Auto-fill enhancements duplicate a row design across multiple rows with a single mouse drag.

Drill and blast engineers can complete tie-up design faster. Tie-up sheets are easily exported and shared across operational departments. Blast crews can access printouts showing how to tie-up blasts.

"The technical mine landscape changes quickly," says Maptek Africa GM Nick Venter. "To get ahead, mines need more efficient and integrated systems to fine tune their processes. They also need practical ways to improve productivity and performance.

"BlastLogic has been proven to save up to 40 % in engineering time spent on data formatting and entry, reporting and meetings. It provides a dynamic platform for immediately increasing ore recovery and reducing costs."

Maptek, tel (+27 11) 750-9660, website: [www.maptek.com](http://www.maptek.com)



*BlastLogic allows informed analysis and modelling of drill and blast.*

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## Quality refurbishment for the mining industry

As difficult market conditions force companies in many sectors to relook at their cost structures, quality refurbishment is becoming more important as a strategy to contain costs.

According to Gary Colegate, General Manager of Parnis Manufacturing, such strategies demand that customers find experienced partners with both the technical capacity and responsiveness required for demanding projects, whether these are

for existing or greenfield projects.

"This economic situation looks unlikely to change in the near future, having been further aggravated by the recent surprise announcements regarding the Mining Charter and its requirements," says Colegate.

Engaged for decades in the mining sector, Parnis Manufacturing has extensive experience in equipment such as mine winders and their components, boiler components, fans and fan casings, mill heads and sheave wheels.

"Our large vertical boring machine puts us at an advantage to most of our competitors, and allows us to tackle a wide range of engineering projects, where we can assure customers of 'as new' results," he says.

Vertical boring capacity at Parnis Manufacturing extends to a table size of 4,5 m, a turning diameter of 5,3 m and a turning height of 3,2 m, with a maximum load of up to 50 tonnes.

"We have recently delivered a com-

pletely refurbished mine winder to a privately-owned gold mine in Zimbabwe," says Colegate. "The equipment – which dates back to the early 1950s – was used for decades on a South African gold mining operation; it was purchased for use in Zimbabwe and needed to be returned to a high operational standard."

In addition to its base-load work for the mining sector, Parnis Manufacturing has also made great strides into the energy sector.

"We have diversified into a number of fields, thanks to the entrepreneurial approach of our founder and CEO, Mario Guerini," says Colegate. "An important area of expansion has been into the design, fabrication and assembly of mobile, modular E-houses – fully equipped electrical substations."

He says the E-house concept saves costs, space and time when compared to traditional methods of building sub-stations.

Gary Colegate, Parnis Manufacturing, tel (+27 11) 613-3801



An E-house destined for Madagascar.

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## Metric Automotive invests in “one-of-a-kind machine”

Leading diesel engine component remanufacturer Metric Automotive Engineering has installed and commissioned the largest crankshaft polishing machine in Africa.

“This custom engineered, one-of-a-kind machine is capable of accommodating crankshafts with lengths of over 6 m,” says Andrew Yorke, Operations Director at Metric. “It represents our philosophy of investing in the latest bespoke and best practice technology, so that we can offer our customers around Africa a world-class standard of service.”

Yorke says that while crankshafts have traditionally been ground and then polished on grinding machines, this is certainly not the ideal solution.

“Polishing debris contaminates the crank grinding machine and this can lead to accelerated wear on critical areas of the machine,” he says. “Moreover, not all crankshafts need to be both ground and polished; some only need polishing, and doing this on a grinding machine is not the best use of this asset.”

Metric’s dedicated polishing machine will significantly raise the company’s productivity, enabling even more rapid turnarounds on those crankshafts that require only polishing and not grinding.

“We will also employ this machine to polish camshafts after the re-profiling of the component, or if the journals and lobes only require a polish and not a re-profile,” says Yorke. “Polishing of these components after grinding is vital, as it removes grinding burrs and ensures that the surface finish is ideally matched to the requirements of the bearing materials they run on.”

He emphasises that, in the case of crankshafts and camshafts, there are journals which run on the bearings and lobes which have roller followers carrying high loads. These require the best possible surface finish in order to prevent roller skidding or seizure.

“By polishing these journals and lobes to the correct surface finish, we can return them to OEM specification or better,” he says. “In turn, this leads to improved component performance and longer engine life.”

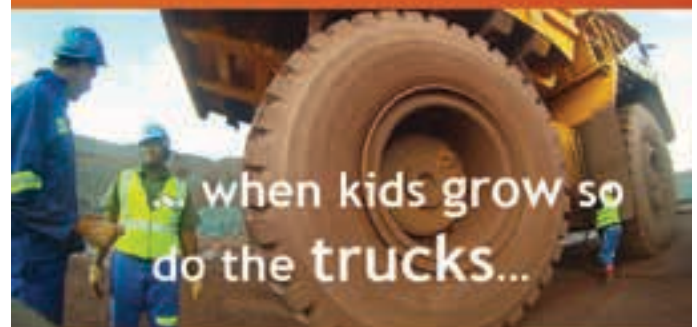
Andrew Yorke, Metric Automotive Engineering, tel (+27 11) 873-2350



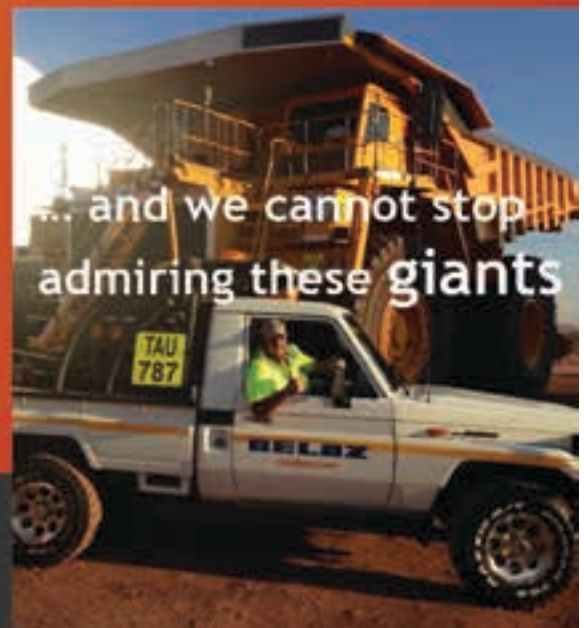
Metric Automotive Engineering has installed and commissioned the largest crankshaft polishing machine in Africa.



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## Booyco Ya Batho enables mines to communicate

Communication within a mining operation is critical to the safety of the people and underpins the mining operation; however, in underground mining this is seldom a case of one-system-fits-all.

Don du Plessis, General Manager of Booyco Ya Batho, says that for this type of communications network to be effective and reliable it has to be configured to the site-specific requirements.

Historically, complete imported communications systems have not met all the legislated requirements and, in many instances, while not performing as anticipated, these were also expensive.

Du Plessis says that an in-depth understanding of how communications systems can be configured in challenging operating environments is what sets Booyco Ya Batho apart in the mining industry.

“We believe that for the local mining industry it is a major advantage to be able to leverage off local expertise and have access to communications systems and products that are capable of meeting the challenges within the underground mining environment,” he says.

“It can be confusing when confronted with the technology and jargon used by communications network configura-

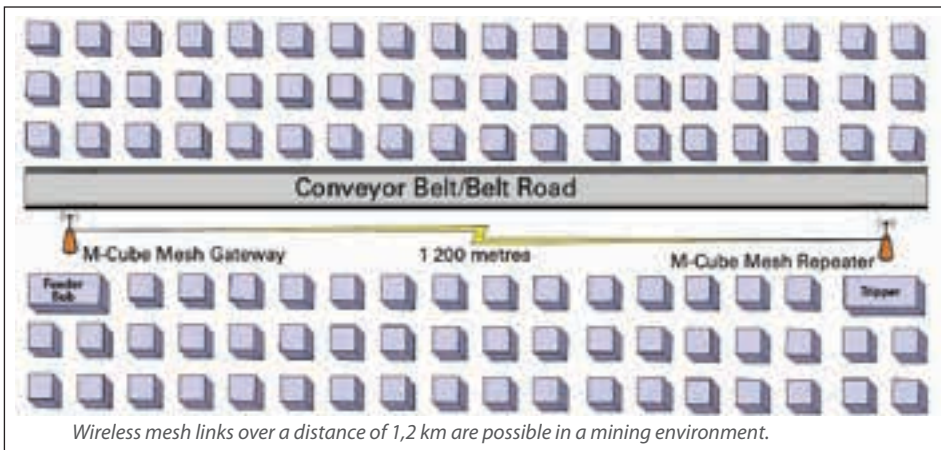
tion companies, and it is not always easy to make an informed decision. We work very closely with our customers to assist them in understanding what technology is available and what exactly it can do for an operation.”

The first step would be for Booyco Ya Batho to conduct an in-depth survey of the area in which the communications system would need to function. This, according to du Plessis, would allow for the network to be configured in such a manner so as to eliminate those areas where communication is not necessary, such as mined out areas.

“When a one-size-fits-all communications solution is applied, this type of in-depth assessment is not done and these types of communications solutions could weaken and create unnecessary interference,” du Plessis cautions.

“By doing an in-depth survey of the communications requirements, it is possible to optimise the RF propagation without sacrificing on the reliability or performance of the network. And this will eliminate the situation where the communications network has been over-engineered for the need at hand,” he says.

Understanding propagation patterns is



## Contract to run Jwaneng mine camp awarded

BelServest has partnered with Servest Camp Management Services, a highly experienced provider of camp management services for mining, construction and energy projects in Southern Africa. The company has been awarded a three-year contract by Debswana for its Jwaneng Diamond Mine Camp.

BelServest will employ around 180 personnel, and with a future planned camp

upgrade and expansion project, it is anticipated that this will grow to around 210 personnel within the next 18 months.

A comprehensive project to upgrade the accommodation, and dining, kitchen and recreation facilities of the Jwaneng mine residents' village started in November 2016 and will be completed by August 2019.

BelServest employs one expatriate

regional manager responsible for the area and the balance of personnel are all Motswana nationals. The camp has been operated for the past four-and-a-half years under the Servest Botswana banner.

BelServest Facilities Management Botswana is a full-service facilities management company which is majority-owned by a Motswana citizens group.

Servest, website: [www.servest.co.za](http://www.servest.co.za)

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critical to the success of the performance of the communications network and this is where Booyco Ya Batho brings its in-depth knowledge and skill to the industry.

Du Plessis says that recent test work has proved that effective communications are possible wirelessly over a distance of 1 km underground next to a conveyor belt. The tests were recently conducted by the company in an operating coal mine.

"It is all about understanding what the signal is doing. This is key," du Plessis says. "It is this thinking out of the box that enables us to tick the boxes when it comes to compliance with the requisite standards."

Founded in May 2010, Booyco Ya Batho's market offering includes locally manufactured and designed communication products aimed at underground coal and hard rock mines, including wireless access points and associated products. The company also does the cost-effective installation of fibre optics, networking and ancillary services.

Don du Plessis, Booyco Ya Batho, tel 0861 B00YCO (266926), e-mail: don@booyco-yabatho.co.za

## ContiTech technicians keep conveyors running

With a network of seven strategically located service branches and over 270 service technicians, ContiTech South Africa provides at-the-mine services that lower downtime for conveyor belting operations.

This team of service technicians, one of the largest in South Africa, is trained exclusively by ContiTech's international specialists. Training is conducted to the company's Global Standards of Conveyor Belting Excellence and Safety – ensuring world-leading conveyor belt services in the shortest timeframe possible.

"By positioning our branches at Southern Africa's major mining and industrial operations, we're able to support our range of premium conveyor belts with equally high-quality services," says Craig Rouhana, Sales and Marketing Director of the Conveyor Belt Group, ContiTech South Africa. "In addition, by having a 270-member-strong team, we are able to combine equipment resources and the required manpower to any of our clients facing critical breakdowns, with two or more service branch teams often work-

ing simultaneously to get client operations running as quickly as possible."

Conveyor belting services include belt repairs, splicing, pulling, winding and disposal, as well as services to belt operation structures such as pulleys, idlers and frames. ContiTech is one of only a few companies that are able to guarantee a splice that can last the service life of the belt, a huge benefit when compared to the industry standard one-year warranty.

Craig Rouhana, ContiTech South Africa, tel (+27 11) 248-9380



ContiTech is one of only a few companies that are able to guarantee a splice that can last the service life of the belt.

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## Hytec provides hydraulic systems on sampling vessel



A from-the-deck view of the Seabed Tool (SBT), a world-first advanced sub-sea sampling system aboard the mv SS Nujoma.

In its biggest sea vessel project ever undertaken, Hytec successfully designed, manufactured, installed and commissioned all hydraulics for three systems on board the most technologically advanced marine diamond sampling and exploration vessel in the world for its client, De Beers Marine.

Hytec, part of the Hytec Group, was responsible for all hydraulic related aspects of the heave compensation system, the launch and recovery system (LARS) and a world-first advanced sub-sea sampling system called Seabed Tool (SBT) for the brand new Debmarine Namibia-owned sampling vessel, the mv SS Nujoma.

Contracted by De Beers Marine South Africa in Cape Town, Hytec Cape Town was brought into the project as far back as 2012 for the pre-feasibility and feasibility studies. These were completed during the first half of 2015 and Hytec received the hydraulic orders for the SBT in July 2015 and for the LARS in September the same

year. Design, manufacture, assembly and successful testing of the SBT were completed in July 2016, while the manufacture and assembly of the LARS system modules, carried out in Johannesburg, was completed and delivered to De Beers Marine in Cape Town in August 2016.

Hytec's scope of work included the hydraulic installation and testing of the heave compensation system and the design, manufacture and installation of the LARS and the SBT hydraulic systems. The LARS and the SBT hydraulic systems were both designed and manufactured by Hytec and the passive heave compensation system was designed and manufactured by Bosch Rexroth in Boxtel, Netherlands. All systems were designed using high-quality Bosch Rexroth equipment.

The passive heave compensation system consists of cylinders connected to a hydraulic power unit and accumulator banks.

The hydraulic ring main for the LARS



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Contracting International is part of Afrimat Limited, a leading black empowered open pit mining company.



comprises a central hydraulic power pack. The power pack supplies oil through the ring main to the equipment used to launch and recover the SBT and consists of multiple winches and handling systems.

The SBT hydraulic system has power units with a combination of Bosch Rexroth open and closed loop pumps to power the subsea mining equipment. "The hydraulic system is designed for subsea use of up to 200 m," explains Herman van Rensburg, Regional Technical Manager, Hytec Cape Town.

The US\$157 million mining exploration vessel is 113 m long, 22 m wide with a displacement of 12 000 tonnes. It accommodates a crew of 80 and will carry out sampling for a three-year exploration operation before returning to port for maintenance.

Hytec is a subsidiary of the Hytec Group of Companies, a joint venture with Bosch Rexroth.

Herman van Rensburg, Hytec Cape Town, tel (+27 21) 551-4747

## Becker HS pumps delivered to platinum mine in Limpopo

Becker Mining SA has recently supplied five HS pumps to a new furnace slag granulation process plant at a platinum mine in the Limpopo region.

"This contract, for the manufacture of two 8x8-12 HS pumps with 'V' belt drives C/W 160 kW motors and three 6x6-18 HS pumps with 'V' belt drives C/W 90 kW motors, was delivered prior to the required delivery date," says Rick Jacobs of Becker Mining SA. "These robust pumps have been designed for optimum efficiency, low maintenance and extended service life in harsh operating conditions."

Becker's HS pump range includes four models – HS (horizontal type), VHS (vertical type), PVS (vertical type) and HTMS (submersible) pumps. These pumps are available in various sizes – from 50 mm to 203 mm units.

The heavy-duty, hardened chrome iron construction (650BHN) of the wet end in the HS series significantly increases service life. These pumps have a recessed impeller that allows large abrasive materials to pass through the pump without damaging the impeller, thereby extending the pump life and service intervals due to reducing wear.

The hydro solids pump range offers flexible drive arrangements – from direct drives to various V-belt drives. Units in the vertical spindle range of pumps are manufactured in different sizes with various shaft lengths to suit customer requirements.

Taryn Pretorius, Becker Mining South Africa, tel (+27 11) 617-6300



Becker Mining SA has recently supplied five HS pumps to a new furnace slag granulation process plant.



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## Crane hire company up to the challenges of Lesotho

Extreme weather, a remote location, and mountainous terrain over 3 100 m above sea level: these conditions – at a Lesotho mine site – have not prevented Johnson Crane Hire from delivering the safe and reliable service for which it has become known.

According to Johnson Crane Hire's Vanderbijlpark branch manager, Dean Wepener, the team has fine-tuned its operation in the 'Mountain Kingdom' to ensure that the customer can run operations efficiently and can rest easy in the knowledge that safe lifting services are taken care of.

Johnson Crane Hire has provided a 35-tonne mobile all-terrain crane on the mine site for an extended period of time, along with trained and experienced operators to ensure there are no hitches in the lifting duties required.

"This contract presents a number of unusual challenges, but none that we can't meet," says Wepener. "Our main task is to

keep the on-site crane operating in top condition and compliant in terms of our own operational policies, national regulations and customer requirements."

Working in weather that regularly delivers searing heat, freezing cold, torrential rain and howling winds, the crane operates 12-hour shifts for seven days a week. Its duties are focused on the range of maintenance activities that the mine demands, especially as the harsh climate increases the rate of replacement of many items of equipment on site.

"Our service offering to the mine includes a four-pronged application of specialist skills," he says. "An operator is permanently on site and rotates with a standby operator to ensure compliance with Lesotho's labour regulations and Johnson Crane Hire's best practice policies. Secondly, a maintenance mechanic visits the site regularly to service the machine, replacing oil and filters, and attending to

any other mechanical issues arising."

The third leg of responsibility and support is the certified lifting machine inspector (LMI), who visits the site quarterly to conduct the required compliance check on all aspects of the crane.

"We also have a Johnson Crane Hire foreman who makes on-site inspections, checking on both the machine and the operator," says Wepener. "In addition to those four interventions, I also am at the site regularly as the branch manager, and will do my own assessment of the crane's condition and general operations."

The aim of all this attention, he says, is to help ensure that there is no unnecessary downtime on the mine, which suffers substantial losses for every hour of lost production.

There are also other, larger cranes that Johnson Crane Hire makes available to this mining customer for specific short-term jobs. Here, cross-border administration and logistics add a host of other demands to the project, and the team must keep a number of bases covered if they are to meet the customer's deadlines.

A recent contract involved making a 275-tonne mobile crane available on site. This required transport arrangements for the crane and support vehicles in order to mobilise the crane's extensive components – including counterweights, hook-blocks and outrigger pads – to make the 400-km journey to site. Apart from stringent and onerous paperwork relating to the crane and trucks crossing the SA-Lesotho border, the convoy had to negotiate the narrow, twisting mountain road with the help of escorts and traffic authorities.

Elmari Snyman, Johnson Crane Hire, tel (+27 11) 455-9242



Johnson Crane Hire undertaking a lift on a mine site in Lesotho.

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