

MODERN MINING

August
2016

Vol 12 No 8

www.crown.co.za

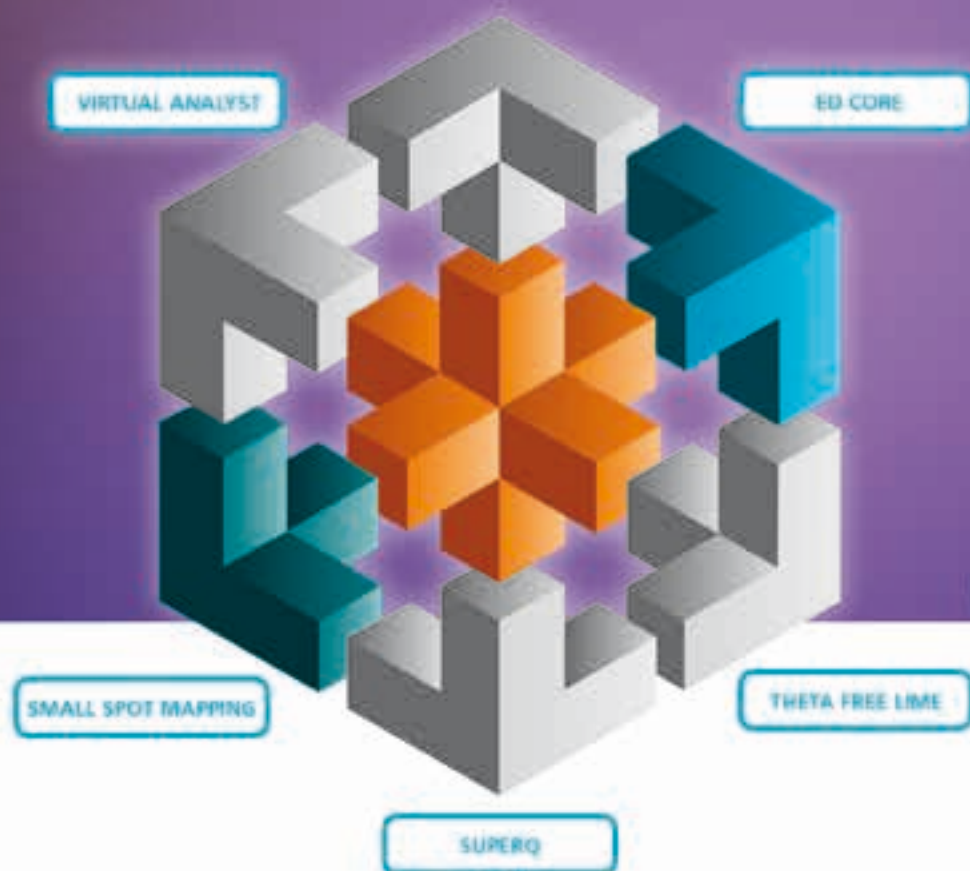
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Printed by:

Shumani Mills Communications

The views expressed in this publication are not necessarily those of the editor or the publisher.

Published monthly by:

Crown Publications cc

P O Box 140,
Bedfordview, 2008
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Cover

The new Cat 6015B hydraulic shovel, available from Barloworld Equipment, comfortably fits the gap between legacy Cat hydraulic excavators and the larger Cat mining shovels. See page 20 for further details.



Average circulation
(January–March 2016)
4381

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SAIMM paper outlines how privatisation has re-energised Zambian mining

Given the sporadic suggestions in this country that our mining industry should be nationalised, it's worth recalling what state ownership did to Zambia's copper mining industry over a roughly 25-year period starting in the early 1970s— and how the return of the mines to private hands in the late 1990s has re-energised and transformed mining in that country.

Some hard facts and figures on the damage done by nationalisation and the subsequent recovery of the Zambian mining industry as a result of privatisation are given in a recent paper – published in the *Journal of The Southern African Institute of Mining & Metallurgy* – by Jackson Sikamo, Alex Mwanza and Cade Mweemba entitled 'Copper mining in Zambia – history and future'.

All three authors are in the employ of Chibuluma Mines and Sikamo, in particular, is prominent in Zambian mining circles. He is Chairman of Chibuluma Mines (and Country Manager for its owner, Metorex, now part of the Jinchuan Group) and served in 2014/15 as President of the Zambia Chamber of Mines.

According to the paper, Zambia's formal commercial copper mining industry – launched in 1908 when a small mine was established at Kansanshi – was responsible for 12 % of global copper production in the 1960s, propelling Zambia into the middle-income country bracket with a GDP bigger than South Korea. The peak of production came in 1969 when the country's mines – all then owned by RST and Anglo American – produced 720 000 tons of copper.

The nationalisation process was implemented between 1969 and 1973 and the mines remained in the Zambian government's hands (from 1982 via ZCCM) until the 1990s. The effects were generally catastrophic. The government used revenue from the mines to fund its national development agenda, with the result that the mines themselves suffered severe under-capitalisation.

As the authors write, "There was little investment in technological upgrades, despite the increasing difficulties in mining and processing as mining proceeded deeper and the mineral grades leaner and more complex. Inevitably, production output declined while production costs were soaring. Employment levels reduced as the mines downsized their labour forces."

Under nationalisation, roughly 2 000 jobs in mining were shed on average each year and production declined to about a third of what

it was in 1969, reaching a low of a quarter of a million tons in 2000.

The authors point out that not all the ills of the Zambian copper mining industry in the 1980s and 90s can be directly attributed to nationalisation, as the copper price declined substantially from the highs of the 1960s over this period. They also note that one of the benefits of nationalisation was an emphasis on the training of Zambians.

"Gradually, the gap left by the white settlers in areas of skilled manpower was greatly reduced. The mining skill level of Zambia improved so much that later, when the mines were re-privatised, the new owners did not need to employ many expatriates," they write.

The decision to privatise the mines was taken in the early 1990s and was implemented between 1996 and 2000. Despite some stumbles, it has generally been highly successful. "The new mine owners invested massively in the mines and there was a sudden economic upturn, not only on the Copperbelt but in the country as a whole, with the mining industry as a pivotal contributor," say the authors. "Investments went into new machinery, new mining methods, and new mineral processing and metal extraction technologies. There were also massive greenfield projects at Kansanshi and Lumwana, both in the North West Province of Zambia, which brought newer technologies into the industry."

By 2013 production had reached a level of 763 000 tons per annum, surpassing the record set in 1969, and total direct mining employment had risen to 90 000 from a low of 22 000 in 2000. Critics of the privatisation programme, of course, would argue that all the benefits of the process have mainly gone to companies domiciled outside of Zambia but the figures presented by the authors don't support this view.

If one just takes tax revenues, for example, taxes paid by the mines constituted just 1 to 2 % of total tax revenues during the final years of public ownership of the mines. By 2011 the position was transformed with the mining contribution to the total tax base rising to 35 %.

Readers can probably get a copy of this very interesting paper from the SAIMM but a shorter route might be to go to the website www.miningforzambia.com which has a link to download it. This website, incidentally, has only recently been established and is an initiative of the Zambia Chamber of Mines. It is designed to promote mining in Zambia and is well worth a look.

Arthur Tassell



"The new mine owners invested massively in the mines and there was a sudden economic upturn, not only on the Copperbelt but in the country as a whole, with the mining industry as a pivotal contributor."



The new furnace at Northam Platinum's Zondereinde smelter operation under construction.

New PGM furnace for Northam reaches half-way point

High capacity furnace and smelting plant specialist Tenova Pyromet recently announced that it had completed 50% of Northam Platinum's new platinum group metals (PGM) furnace at its Zondereinde smelter operation in Thabazimbi, South Africa, having met all major project milestones to date. As a result, handover of a fully operational 20 MW furnace is on track for August 2017.

Project milestones achieved include the first steel being raised on site in mid-July 2015, as per the scheduled project date. This was the first of over 1 000 tonnes of structural steelwork that will be used on

the project. More than 20% of the civil structures are also complete, while the placing of the 12 m diameter furnace shell marks another significant milestone, with the site establishment of the mechanical installation contractor.

Access to the first two floors of the furnace building is scheduled to be achieved prior to the 2016 December recess in South Africa.

The contract, which was awarded to Tenova Pyromet by Northam Platinum in 2015, will support Northam Platinum's planned growth in PGM production, which requires the flexibility to process

high chromite, low base metal and high sulphur contained concentrates. Northam will be able to operate the furnace either as a submerged arc operation or brush arc operation and will therefore have a sufficiently broad operating range to accommodate feedstock with a widely varying mineralogy.

Tenova Pyromet's scope on the project covers the PGM smelting furnace, feed system and off gas handling plant, as well as the furnace building and all associated civil works, infrastructure and services. State-of-the-art technology that forms part of the technical solution includes Tenova Pyromet electrodes, copper cooling elements, and an off gas handling and furnace controller.

"We are acknowledged worldwide for the advanced technical solutions we provide our clients, but the progress that has been made to date, right on schedule, in the construction activities is also testimony to Tenova Pyromet's strength in managing the execution of such major and innovative projects," says Andre Esterhuizen, General Manager, Sales and Marketing, Tenova Pyromet. "Such large projects call for the interfacing of numerous contractors on site and, in the case of this project, within an operational plant." ■



Preparing for a concrete pour at the furnace site.

Botswana's Lerala diamond mine back in business

Reporting on Q4 2016 (to 30 June 2016), Australia's Kimberley Diamonds Ltd (KDL) says that this was the first period in which processing operations were undertaken at its newly recommissioned Lerala diamond mine in Botswana. During the quarter, 70 589 tonnes of ore were processed, with 10 564,11 carats recovered.

The first sale of diamonds from Lerala was undertaken on 28 June 2016. A small parcel of diamonds which was sourced predominantly from historic pre-2016 ROM stockpiles was sent to Antwerp for auction. The diamonds were sold at an average price of US\$98 per carat, with 1 110,18 carats sold for total revenue of US\$108 650.

The Lerala mine comprises a cluster of five diamond-bearing kimberlite volcanic pipes, designated K2 to K6, and a processing plant with a nominal capacity of 200 t/h. The mine was opened in 2008 but was subsequently placed on care and maintenance.

Following its acquisition of Lerala in 2014 from Mantle Diamonds, KDL's Botswana subsidiary, Lerala Diamond Mines Limited (Lerala), engaged Consulmet to redesign sections of the processing plant to facilitate improved diamond recovery and throughput reliability.

Open-pit mining by the mining contractor, Basil Read Botswana, began in early April 2016 in the K3 kimberlite pipe. During the quarter, Basil Read hauled 44 000 tonnes of stockpiled ore to the ROM pad, mined and hauled 191 000 tonnes of ore to the ROM pad and hauled 148 000 tonnes of low grade ore to the low grade stockpile area.

According to Kimberley Diamonds, mining operations have proved more than capable of sustaining a consistent feed



Kimberlite ore from the primary crusher at Lerala being fed into the new primary scrubber (photo: Kimberley Diamonds).

to the processing plant as it continues to ramp up production.

Commissioning of the processing plant commenced early in the quarter, and production began immediately thereafter. However, the ramp up of the plant has

been slower than anticipated as a number of constraints to the process flow and efficiency of the plant have been identified. These are being systematically rectified and this work will continue into the first quarter of 2017. ■

Garnet separation plant commissioned

ASX-listed Mineral Commodities Ltd (MRC) reports that its South African subsidiary, Minerals Sands Resources (SA) Pty Ltd (MSR), has completed the installation and commissioning of the Garnet Separation Plant (GSP) at its Tormin mineral sands mine, located on South Africa's west coast 400 km north of Cape Town.

The GSP has been installed at the front

of the existing Secondary Concentrate Plant (SCP). It is expected to increase the non-magnetic zircon/rutile feed grade to the SCP by removing the garnet fraction from the Heavy Minerals Concentrate prior to the SCP. This, in turn, will allow a higher grade non-magnetic concentrate to be fed to the existing magnetic circuit, thereby increasing overall final zircon/rutile concentrate production. ■



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Acacia's Tanzanian gold mines performing strongly

In its interim results for the six months (H1 2016) and three months (Q2 2016) ended 30 June 2016, LSE-listed Acacia Mining, Tanzania's largest gold producer, has reported gold production of 412 025 ounces, 12 % higher than in H1 2015. The AISC for the six-month period was US\$941 per ounce sold, which was 17 % lower than in the equivalent period last year. Q2 gold production was 221 815 ounces, 19 % higher than in Q2 2015.

"We are pleased that, through continuing optimisation, our assets are starting to deliver performance which reflects their potential and as a result increased our net cash position by US\$47 million in the second quarter," comments Brad Gordon, Acacia's CEO. "Strong production of 221 815 ounces aided a further reduction in All-in Sustaining Cost (AISC) to US\$926 per ounce, even after US\$72 per ounce of cost due to the impact of the strong share price on the valuation of future share-based payments to employees.

"The transition to underground mining at North Mara continues to deliver ahead of expectations with high grades at Gokona supporting production of 100 016 ounces in the quarter. Bulyanhulu again

produced above plan, delivering 78 643 ounces, although a planned two-week shaft closure for maintenance in August and a move back towards reserve grade will reduce output in Q3."

Looking ahead, Gordon says Acacia is now expecting to deliver at or above the upper end of full year production guidance of 750-780 000 ounces, and at the lower end of AISC guidance of US\$950-980 per ounce.

The North Mara mine produced 100 016 ounces in Q2 2016, 50 % higher than in Q2 2015 and 34 % higher than Q1 2016, driven by higher grade ore than plan from the Gokona Underground resulting from positive grade reconciliations and the processing of higher grade open-pit material. Total open-pit tonnes mined increased by 23 % from Q2 2015, driven by waste stripping in the Nyabirama pit. Cash cost per ounce sold of US\$382 was 37 % lower than in Q2 2015, mainly driven by the higher production base, higher capitalised development costs due to waste stripping at the Nyabirama pit and lower labour costs due to reductions in head count, partly offset by higher sales related costs as a result of higher sales volumes.

Bulyanhulu produced 78 643 ounces, 10 % higher than for the same period in Q2 2015 and in line with Q1 2016. Ounces produced from underground mining amounted to 70 307 ounces, a 17 % improvement on Q2 2015 due to an increase in throughput and grade, while production from the reprocessing of tailings amounted to 8 336 ounces. During the quarter, 236 000 tonnes of ore were hoisted while 251 000 tonnes of run-of-mine ore were processed, 10% higher than in Q2 2015 while grade increased by 5 % to 9,6 g/t.

At Buzwagi, gold production for the quarter of 43 156 ounces was 10 % lower than Q2 2015, but 16 % ahead of Q1 2016. Total tonnes mined decreased by 18 % from Q2 2015 while ore tonnes mined were in line with the prior year. Cash cost per ounce sold of US\$948 was 2 % higher than Q2 2015. This was mainly due to the lower production base, partly offset by a fall in energy and fuel costs driven by lower global fuel prices and reduced diesel usage, lower general and administrative expenses as a result of lower freight costs and lower labour costs driven by head-count reductions. ■



Acacia's Buzwagi mine is an open-pit operation commissioned in 2009. It produced 43 156 ounces in Q2 2016 (photo: Acacia Mining).

Lawyers launch model mining code

The World Initiative of Mining Lawyers (WIOML) has launched a mining code that it says could guide many countries in attracting investment while securing fair benefits from mineral exploitation within their borders.

"The code provides a good starting point for countries without a code in place yet," said Andrew van Zyl, Partner and Principal Consultant at consulting engineers and scientists, SRK Consulting. Van Zyl was a speaker at the recent WIOML conference where the code was launched. "It also provides a useful benchmark against which a country could compare its existing code."

Some of the principles underlying the model code include fair licence allocation, work-it-or-lose-it, the right-to-mine, and the social licence to operate.

"Clearly, the transparent awarding of exploration licences is a key starting point for any national effort to promote mineral development," said Van Zyl, "so this should be done on an objective basis with free and open access – although there may be circumstances under which tendering could be considered."

Mining companies should also be given enough exploration time so there is a reasonable chance of making an economic discovery – the average period for an economic discovery is eight years – followed by a right-to-mine that is granted on objective criteria that are free of discretion, he said.

"Equally, a good mining code would

ensure that explorationists make ongoing financial commitments if they want to maintain their exploration rights, or they must relinquish them so that others may gain access," he said. "The model code also encourages the use of mechanisms for local community engagement to entrench a company's social licence to operate, and recommends that the process for environmental approval should be facilitated through clear criteria and timeframes."

Applying a clear and reasonable mining code will go a long way to attracting investors, said Van Zyl, and should be augmented by a culture of constructive collaboration among mining stakeholders – which could gain traction while the global economy waits for commodity prices to improve.

"There is little appetite or ability right now to raise the billions of dollars needed to develop large mining projects," he said. "But there is the time to invest much smaller amounts in the vital but neglected process of forging agreement and trust between miners, governments, communities, NGOs and other interested parties."

Van Zyl emphasised the importance of in-depth negotiation well in advance of project implementation – especially when mining projects require complex and costly infrastructural arrangements.


"Too many projects are rushed into construction when commodity prices are buoyant, and are consequently hampered by




SRK Consulting's Andrew van Zyl.

a lack of local buy-in and insufficient clarity about each player's respective roles, responsibilities and benefits," he stated. "In many cases, the process becomes fraught with mistrust and brinkmanship, which delays or even threatens the project altogether."

Van Zyl argued for expert legal, financial and technical input in such discussions at an early stage, so that all parties can construct a common foundation of information, data and professional opinion – dealing with potential obstacles in a constructive but robust environment. ■




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The processing plant at Asanko, seen here, processed 702 318 tonnes of ore at an average grade of 1,69 g/t during the quarter (photo: Asanko).

Asanko Gold Mine delivers a strong quarter

Asanko Gold Inc, listed on the TSX and NYSE MKT, has announced production results for the second quarter 2016 from Phase 1 of the Asanko Gold Mine (AGM), located in Ghana.

Commercial production was declared on April 1, 2016 and ramp up to steady-state production of both the mining and processing operations was achieved by the end of Q2.

Mining operations continued exclusively in the Nkran pit where bulk mining of the periphery of the main ore zones was undertaken to open up access to the main orebody by the end of Q2. This objective was achieved in the quarter with 5,8 Mt of waste removed from the pit and 1,2 Mt of ore mined at a strip ratio of 4,7:1. As anticipated, the bulk mining resulted in higher

levels of dilution and gold losses than are expected at steady state, resulting in an average grade of mined ore of 1,48 g/t gold.

According to Asanko, mining efficiencies are showing signs of improvement as a result of receiving part of a new mining contractor fleet during the quarter to replace the second-hand fleet that started the pre-strip in 2015. A Cat 992 FEL, a

Groundwater inflow impedes Tschudi production

Weatherly International, listed on AIM, says that production from its Tschudi copper project in northern Namibia was 3 812 tonnes of copper cathode in the quarter ended 30 June 2016.

This was a decrease from the previous quarter, with Weatherly attributing this to increased groundwater inflow rates being experienced at levels which exceed those anticipated in the BFS. As a result, it has been necessary to design, procure and commission additional groundwater management systems and infrastructure whilst engaging additional Namibian and international specialist consulting expertise to assist with this process.

C1 costs for Tschudi for the quarter were US\$4 689 per tonne, increasing due to the reduced production and actions taken to manage the groundwater inflow. Weatherly says that C1 costs for the nine months from 1 October 2015 to 30 June 2016 – since Tschudi has been in commercial production – remained below guidance at US\$4 199 per tonne.

Production of 17 000 tonnes of copper cathode is expected to be achieved for the year ending 30 June 2017 with forecast C1 unit costs expected to be in the range of US\$4 100-4 200 per tonne.

Craig Thomas, CEO of Weatherly, commented: “The Tschudi operations have

been hampered during the quarter by groundwater inflows significantly higher than predicted during the feasibility study. Expertise and equipment have been procured to resolve the issue and full production rates are expected to resume before the end of the 2016 calendar year.”

The leaching behaviour of ore placed on the heap continues to be as expected in terms of both leaching rates and acid consumption. The solvent extraction and electro-winning plants continue to perform well, and have demonstrated the ability to produce at 1 500 tonnes per month when sufficient copper in solution is available from the heap. ■

Cat 6030 300T shovel and 10 Cat 777s, all new machines, were delivered during the quarter. In Q3 an additional 10 new 777s and three new drill rigs are expected, which – says Asanko – will go a long way towards improving net asset utilisation, increasing efficiencies and lowering costs.

The processing plant processed 702 318 tonnes of ore at an average grade of 1,69 g/t gold during the quarter. Recovery of gold was in line with expectations with higher recoveries achieved in the latter half of the quarter once the oxygen plant was fully operational. The average gold recovery for the quarter was 92 %.

During the quarter a number of operational improvements were implemented in the processing plant including mechanical changes to the materials handling and crushing circuits, ball mill and SAG mill gear changes and other de-bottlenecking work that resulted in higher than normal planned mechanical downtime in the processing plant. The goal of the work was to optimise the inherent additional mill capacity and operate at 275 000 tonnes per month, or about 10 % above design rates on a continuous basis. With the bulk of the changes completed by early June, the processing plant treated 265 000 t during the month and is now operating at the levels anticipated from these improvements.

Commenting on the quarter's results, Peter Breese, Asanko's President and CEO, said: "The Asanko Gold Mine delivered a strong quarter; commercial production was achieved a quarter ahead of schedule, gold production of 36 337 ounces was in-line with our guidance and ramp-up to steady-state production levels was reached within six months of starting the new production plant." ■

Perseus Mining expects late-2017 start-up for Sissingué gold project

Updating on the status of its Sissingué gold project in Côte d'Ivoire in its latest quarterly report (for the period ending 30 June), Australia's Perseus Mining says that post the end of the quarter and following the successful raising of equity finance, execution plans for the full-scale development of Sissingué were activated.

At a total development cost to completion of US\$100 million, Sissingué is currently forecast to produce 385 000 ounces of gold at an all-in site cost of US\$632/ounce over a 5,25-year period from first gold production to generate an ungeared after-tax IRR of 27 % at an average gold price of US\$1 200/ounce.

Perseus says negotiations with a highly regarded Australian contractor (Lycopodium) are well advanced on finalising the EPC contract, accounting

for approximately 50 % of the estimated construction scope. The execution of the EPC contract is currently scheduled for this month (August) and, given that all required licensing, permitting and landowner compensation has been completed, re-commencement of site works is expected to occur in the later stages of the September 2016 quarter.

The full scale development of Sissingué is intended to be financed through a mix of equity finance (US\$40 million) and project debt finance (US\$60 million).

Perseus says that given the quality of the project planning and the assembled project management team, construction and commissioning of Sissingué is expected to progress reasonably quickly with first production of gold now scheduled to occur in the December 2017 quarter. ■

Resource base at Blanket increased and upgraded

Caledonia Mining Corporation, listed on the TSX and AIM, has announced an increase and upgrade to the resource base at its 49 %-owned subsidiary, the Blanket gold mine in Zimbabwe.

Based on the diamond core drilling that has been done at depth below the Blanket section over the past half year, 343 000 tonnes have been upgraded from the inferred to the indicated resource category and an additional 1,28 Mt of new inventory has been added to inferred resources.

This upgraded indicated resource of 343 000 tonnes, combined with the resources upgraded during 2015, have increased the quantum of reserves and

indicated resources that may be used in the life of mine plan from the 2,93 Mt used for the Technical Report prepared by Minxcon in December 2014 to 4,89 Mt currently. This represents an increase of 67 % in terms of mineable tonnes and hence in the life of the mine.

Commenting on the resource upgrade, Steve Curtis, Caledonia's President and CEO, said: "This upgrade reflects the ongoing focus on resource development at Blanket mine. It should be noted that the upgrades are only in the Blanket section of the mine and that further resource upgrades in the AR South, AR Main and Eroica sections will be released in the second half of the year." ■



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Construction work on the main plant terrace at Lihobong (photo: Firestone Diamonds).

Lihobong diamond mine speeds towards completion

AIM-quoted Firestone Diamonds reports that construction of its Lihobong mine in Lesotho was 85 % complete as at the end of June 2016, ahead of the revised target of 81 %, with the plant 18 % commissioned, also ahead of target. The project's zero lost time injury record has been maintained, with approximately 2,6 million man hours now having been worked.

Initial production is now expected in early Q4 2016. The revised capital budget of R2,1 billion remains within the original project budget of US\$185,4 million.

The remaining 15 % of the project relates to the continued completion of the final equipment installation together

with the installation of the electrical and control cabling.

Lihobong has fully harvested its water requirements for its first year of production, with in excess of 400 000 m³ of water on site.

Currently Firestone's total workforce at Lihobong stands at 779, which includes both employees and contractors. The operational staffing of the mine is progressing well with all senior positions filled and the remaining required positions to be completed prior to the start of production ramp-up.

Once initial production has started, Firestone anticipates that the ramp up pro-

cess to full nameplate capacity – 3,6 Mt/a or 500 t/h to recover up to 1 million carats per annum – will take at least six months.

During commissioning, ore from mixed low grade stockpiles and diluted ore from the main pit will be processed through the plant. The variability of this ore will influence the recovery of run of mine carats.

Firestone expects to treat between 1,8 and 2,0 Mt of ore during the financial year ending June 2017. Within this period, it is estimated that between 380 000 and 450 000 carats will be produced at Lihobong. Costs are projected to be in the region of US\$12 to US\$14 per tonne processed.

Comments Stuart Brown, Firestone's CEO: "I am pleased to report that construction activities at the Lihobong diamond mine have continued to progress well over the last quarter. As at the end of June, construction was ahead of schedule and initial production is now expected in early Q4 2016. The company remains fully financed throughout its ramp-up period and expects to host its first diamond sale in January 2017.

"The excitement and momentum is building nicely and we are looking forward to the recovery of our first carats in Q4 2016." ■

Acacia accelerates buy-in to Kenyan project

LSE-listed Acacia Mining – which operates three gold mines in Tanzania – says it is continuing to enhance and expand its exploration portfolio through an agreement to accelerate the earn-in on the West Kenya Joint Venture licences in Kenya.

Acacia has agreed to increase its ownership from 51 % to 100 % in the two licences covering the majority of the West Kenya project area from a subsidiary of Lonmin plc for a consideration of US\$5 million.

Following the completion of the agreement, Acacia has full exposure to what it describes as "an exciting and highly prospective land package" in Kenya, including its most advanced project, the Liranda Corridor.

Acacia reports that it continues to intersect high grade gold zones at the Bushiangala and Acacia prospects along the Liranda Corridor where drilling is indicating the potential for a new gold camp. ■

Yaramoko on track for commercial production

Roxgold Inc, listed on the TSX-V, says it remains on track to declare commercial production at its new Yaramoko underground gold mine in Burkina Faso in the third quarter of 2016.

“We are very pleased to have poured over 14 000 ounces of gold in the six weeks since production commenced at Yaramoko,” commented John Dorward, Roxgold’s President and CEO. “Ramp up activities continue to progress well and we look forward to announcing commercial production in the third quarter.”

Stopping activities started in July 2016, as scheduled, with drilling of the first panel underway ahead of the delivery of production ore later in the month.

The eastern ventilation shaft was commissioned mid-quarter and is now operating. The western ventilation shaft was subsequently completed in June and is currently being commissioned.

Commissioning at the processing facility is complete with ramp up occurring without any unexpected interruptions. Operating time, throughput rate and gold recovery have hit or exceeded targets quickly and the near term focus is to optimise performance in these areas as the mine continues to ramp up its production levels.

The official opening of the Yaramoko mine took place on July 7, 2016. The Prime Minister of Burkina Faso, Paul Kaba Thiéba was in attendance, as well as the Minister of Mines, Professor Alfa Oumar Dissa.

Roxgold says it intends to complete an updated mine plan for Yaramoko prior to the end of the year. This will incorporate recent resource drilling. ■



The processing plant at Yaramoko (photo: Roxgold).



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A recent aerial view of the Balama project site (photo: Syrah Resources).

Balama well into the construction phase

Reporting on its activities during Q2 2016, ASX-listed Syrah Resources says that US\$22.9 million was spent on the Balama graphite project in Mozambique, increasing total project development expenditures to US\$47.1 million as at 30 June 2016. An additional US\$60 million in development expenditures has been committed, which brings total actual and committed capital expenditures to US\$107 million, against a revised capital cost estimate of US\$175 million for the project.

According to Syrah, development

activities at Balama continue to progress well with the detailed engineering and design on schedule for completion this month (August). Major procurement activities are now complete with mechanical equipment and structural steel deliveries to Balama having begun. Regular visits to key equipment and material suppliers are being conducted to ensure that delivery dates and quality standards are being maintained.

Notices of Award have been issued for the major construction contract

(Structural, Mechanical and Piping (SMP)) and various operational contracts (including mining, transport and logistics, fuel supply and laboratory services).

Sealing of the 7 km access road is complete and work is progressing on the construction of the internal plant site roads. Process plant and infrastructure concrete works are well advanced with approximately 3 400 m³ of concrete poured in all major areas (ore bin, primary crushing facility, primary mill and flotation circuit) during the quarter.

Clearing for the construction of the Tailings Storage Facility (TSF) is substantially complete and construction of the facility has begun.

There has been a substantial ramp up of key personnel with approximately 830 direct staff and contractors currently working on site. Ongoing recruitment of qualified Mozambican nationals continues to strengthen the team, says Syrah.

The site has now achieved over 1 million hours worked without a Lost-Time Injury.

The Balama project is situated in Cabo Delgado Province in northern Mozambique, some 200 km west of the port town of Pemba. According to the feasibility study on Balama, the project – which will employ simple open-pit mining – will have a production of over 350 kt/a. ■

Aftan plans upgrade of Tantalite Valley plant

AIM-listed Kennedy Ventures has announced a conditional placing to raise £2.0 million before expenses. The net proceeds of the placing will be used by African Tantalum (Aftan), Kennedy Ventures' investee company, to upgrade and expand Aftan's current plant at the Tantalite Valley Mine (TVM) in Namibia and open up the lepidolite orebody.

Kennedy Ventures says its operational cashflow has been constrained since Aftan reopened TVM and recommissioned the existing processing plant at the end of 2015. This is due to irregular mine grades and an unexpectedly high proportion of fine tanta-

lite as mining moved through the orebody. Additionally, TVM has encountered significant amounts of lithium-bearing ores that the existing plant is not currently configured to recover. The work programme is designed to address these issues as well as significantly enhance the productivity of TVM.

Once the work programme has been implemented, TVM will target a throughput of 15 000 tonnes per month (the previous target was 10 500 tonnes) and an output of 15 tonnes of tantalite concentrate. It is anticipated that all the increased product volume will be supplied to Aftan's offtake partner under the existing agreement. ■

High grade results from deep drilling at Syama

ASX-listed Resolute Mining reports new broad high grade results from deep drilling at the Syama gold mine in Mali. The Syama deep drilling programme was commenced in late 2015 with the ambition of substantially expanding the Syama underground resource.

Positive results have been previously reported for the first two drill holes of the programme. Results have since been received from a further seven holes with significant intercepts demonstrating that mineralisation at Syama remains open to the north and south at depth. The results highlight the potential for substantial future resource growth.

Resolute's Managing Director and CEO, John Welborn, says he is delighted by the positive exploration results: "Syama is a world class orebody and these results highlight the exceptional size and quality of the deposit. Resolute has commenced development of an underground mine at Syama which the recently released Definitive Feasibility Study demonstrated will deliver strong margins for Resolute over an operating life of more than 12 years. Site produc-

tion from Syama is expected to reach 250 koz/a based on our existing models.

"The DFS is based on the current underground reserve which has not yet been updated with results reported from the deep drilling programme. We expect to materially increase the Syama underground resource in due course. In addition to opportunities for a substantial increase in the already impressive mine life, we will consider the potential to expand future production." ■

KEFI restructures its board of directors

AIM-listed KEFI Minerals, the gold exploration and development company with projects in Saudi Arabia and Ethiopia, has announced that its board of directors is being restructured as from August 2016 as part of the company's transition towards gold production.

It is intended that Mark Wellesley-Wood, an experienced African mining operator, will join the board as Non-Executive Director. He will also serve as Chairman of the newly-created Technical Review Committee while Professor Ian Plimer will serve as Chairman of the newly-created Exploration Review Committee. The existing roles of Deputy Chairman and Senior Independent Director will pass from Professor Plimer to Wellesley-Wood as from January 2017.

The two new committees will independently review technical and exploration matters during the company's planned rapid expansion. This will allow Jeff Rayner to step down from the board and focus on a more free-ranging role to identify value adding opportunities for KEFI's next stage of development. Rayner will also continue to advise and mentor the exploration team, which remains under Group Exploration Manager, Dr Fabio Granitzio.

KEFI Minerals' Tulu Kapi gold project in Western Ethiopia is being rapidly progressed towards development, with the mining licence having been granted in April 2015. Latest estimates for annual gold production from the Tulu Kapi project are approximately 100 000 oz a year for a 10-year period at All-in Sustaining Costs (AISC) of approximately US\$741/oz to US\$762/oz at a gold price range of US\$1 200/oz to US\$1 500/oz. ■

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Otjikoto takes ramp failure in its stride

Canada's B2Gold Corp's Otjikoto mine in Namibia produced 36 172 ounces of gold in the second quarter of 2016, comparable to budget (of 37 426 ounces) and slightly down on the 36 963 ounces produced in the second quarter of 2015. Gold production was largely unaffected despite the previously reported pit slope failure on the Phase 1 pit access ramp on April 26, 2016.

Following the slope failure, a recovery plan to regain access to the Phase 1 pit was developed. The plan called for a temporary new access ramp to be established by mid-June to be utilised until the Phase 1 pit becomes depleted, expected in November 2016. The new ramp was successfully constructed and mining of the Phase 1 pit resumed in mid-June.

During the construction of the new ramp, mill feed was mainly sourced from the medium-grade ore stockpile, and supplemented with high-grade ore extracted from the Phase 2 pit (as part of the Phase 2 pre-stripping activities).

With the successful completion of the plant expansion project in the third quarter of 2015, the budgeted annual throughput rate for 2016 was increased from 2,5 Mt/a to 3,3 Mt/a. For the second quarter of 2016, the Otjikoto mill achieved record quarterly throughput of 890 704 tonnes, 8 % above budget (of 821 184 tonnes) and 25 % higher than Q2 2015 (711 462 tonnes).

The average mill recoveries for the second quarter of 2016 were 98,0 %, compared to a budget of 97,0 % and recoveries during the same period of the previous year of 98,7 %. The average gold grade processed was 1,29 g /t compared to a budget of 1,43 g /t and 1,63 g /t in the prior-year quarter. Gold grades were negatively impacted during the quarter by the ramp failure which had restricted access to the high-grade ore at the Phase 1 pit. However, gold production remained largely unaffected as higher mill throughput and recoveries offset the lower grades.

With access to the higher grade

Phase 1 pit being re-established for the second half of 2016 and the positive mill throughput/recoveries, B2Gold says there is no impact on the Otjikoto mine's 2016 annual guidance of 160 000 to 170 000 ounces of gold production at cash operating costs of US\$400 to US\$440 per ounce. Gold production at Otjikoto is weighted to the second half of the year, due to higher anticipated grades as the Phase 1 pit is completed.

The high-grade Wolfshag open pit, scheduled to enter production towards the end of the fourth quarter of 2016, is expected to increase production in 2017 and beyond. A new life of mine plan, based on the new grade model and geotechnical data including mining from the open-pit component of the Wolfshag deposit, is expected to be completed in the fourth quarter of 2016. Following the promising results of an internal scoping study, a detailed engineering study of Wolfshag underground mining will commence in the third quarter of 2016, with results to be delivered in 2017. ■

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Sese Joint Venture commits to major work programme

Australia's African Energy Resources reports that First Quantum Minerals (FQM) has committed itself to spending A\$3 million on work programmes to advance the Sese integrated power project in Botswana. Additionally, a 12-month extension – to 12 July 2017 – has been agreed for the investment of the remaining A\$7 million required to complete First Quantum's earn-in for a 75 % interest in the Sese Joint Venture.

African Energy says the A\$3 million commitment will be used to undertake a number of programmes which will commence immediately. These will include additional large diameter drilling to collect approximately 1 000 kg of coal for combustion testing and physical handling test work. This will lead to the development of the fuel specification for the proposed power station, and finalisation of the coal handling and processing flowsheet.

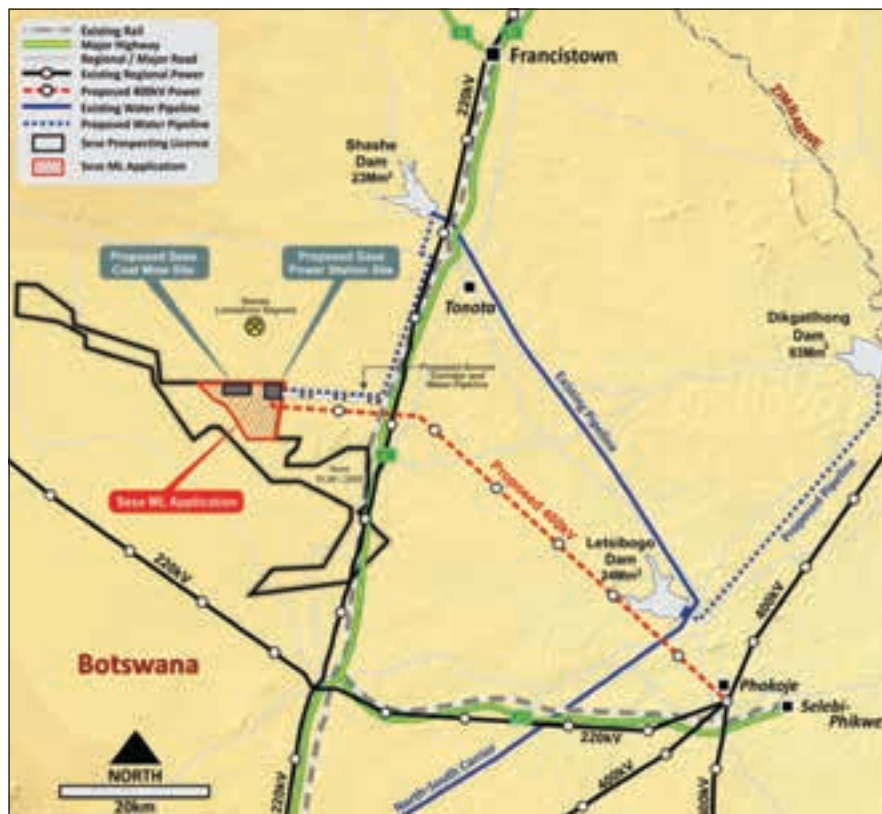
Preliminary geotechnical evaluations of the proposed power station site will be undertaken to assess sub-surface condi-

tions with respect to footings for the power station (boilers, turbines, generators) and ancillary infrastructure while hydrogeological studies at the mine site to characterise aquifers will be carried out to allow mine design and aquifer management plans to be advanced.

In addition, African Energy will update the environmental approvals to allow up to 450 MW of power generation (staged development of 2 x 225 MW units) and the associated coal mining and processing, update the mining study and start on preliminary power station design and layout.

The company also says it will commence early site works to include an upgraded access road and preliminary siting of camp facilities.

The Sese coal licence contains 5 billion tonnes of low strip ratio coal. African Energy announced in January last year that a joint venture with FQM – which owns the Kansashi and Sentinel copper mines in Zambia – to develop one or more power projects at Sese was proceeding. ■



Regional layout of key elements of the Sese integrated power project showing the outline of the prospecting licence, ML application area and key infrastructure elements (proposed mine site, power station site, water pipeline and transmission/grid connection).

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Maseve processing facility showing flotation circuit, concentrator and filter press (photo: Platinum Group Metals).

Maseve mine now in its ramp-up phase

In its financial results for the nine months ended 31 May 2016, Platinum Group Metals (PTM), listed on the TSX and NYSE MKT, says that its Maseve mine near Sun

City is fully constructed and is now in the ramp up phase of production.

At present development at Maseve has established 20 ends where the Merensky

Reef is exposed and, of these, 18 are currently working ends. Recent efforts have been focused on primary access development and raise lines. Active stoping areas are increasing as development and set up on Merensky Reef ends is completed.

Shanta Gold plans pilot-scale production at Singida

In an update on its Singida gold project in northern central Tanzania, AIM-listed Shanta Gold – which also owns and operates the New Luika Gold Mine (NLGM) in the Lupa goldfield near Mbeya – says that pilot-scale production will start in Q1 2017 on the Gold Tree 1 prospect, building up to a milling rate of 10 t/h for gold production of approximately 800 ounces per month. The development capital of approximately US\$4 million is to be funded from the company's cashflow.

Singida is an advanced stage project with a mining licence in place. The project has had in excess of 80 000 m of drilling and a feasibility study was completed in 2011. As previously announced in the 2011 feasibility study, Singida has nine orebodies named Gold Tree 1, 2, 3, Jem, Vivian, Corn Patch, Corn Patch West, Gustav and Kaiser Chief. The nine orebodies have a combined resource of 858 000 ounces (at a 1 g/t cut-off).

The pilot operation is expected to run for at least two years subject to further resources being identified and a larger scale operation being initiated.

Based on previous exploration drilling results, as well as numerous gold deportment and metallurgical tests conducted, Shanta is confident that a significant quantity of gravity recoverable gold can be realised from near-surface sources, down to a depth of approximately 10 m below surface.

In parallel, Shanta is commencing work on a feasibility study on the broader resource, as well as carrying out further exploration in the project area.

Toby Bradbury, Shanta's CEO, commented: "Shanta is very optimistic about the prospects for Singida. Following an extensive consultation programme, the company is now able to progress development at Singida with the full support

and enthusiasm from both the local communities and authorities. A new mine in this region of Tanzania has the potential to make a positive impact on the lives of many and Shanta intends to ensure that the economic benefit is extended beyond that of the mine itself. The company looks forward to working with our partners in Tanzania to bring this exciting project to life."

Recognising the potential at Singida, Shanta engaged Philbert Rweyemamu, a highly regarded Tanzanian mining industry professional, to lead the project as its General Manager earlier this year. He was formerly with Acacia Mining from 2007 to 2015 where he held roles as General Manager of the Buzwagi and Tulawaka gold mines as well as Government Relations Manager and leader of major community projects. Prior to this, he was with De Beers where he gained experience in South Africa, Botswana, as well as Tanzania. ■

Grade reconciliation from underground sampling to the deposit block model has been good.

Commissioning feed to the plant in February and March was primarily sourced from the low grade development stockpiles. During April and May a small volume of tonnes from underground mining were introduced along with the low grade development feed. To May 31 this year, 320 297 tonnes were milled at an average grade of 0,74 g/t. Approximately 5 326 ounces (4E) in concentrate were produced.

Looking forward, tonnes mined are scheduled to increase as key mining blocks are accessed, developed and stoped. Stopping in bord-and-pillar mining and long-hole mining has started. The grade of material feed to the mill is increasing as the proportion of the stoped tonnes increases relative to development tonnes.

First concentrate was produced in February 2016 with commercial production expected late in calendar 2016. Initial monthly revenue from concentrate sales before commercial production will be treated as a reduction in project capital cost. Cost recoveries to May 31, 2016 from concentrate sales totalled approximately US\$4,6 million.

"The construction of the Maseve mine has been completed with a good safety record and in accordance with designs," comments R. Michael Jones, CEO of Platinum Group Metals. "The deposit blocks that have been accessed for current mining show good grade thickness correlation to the block model. The concentrator plant performs at or in excess of design capacity and produced concentrate has been sold. Feed grades to the plant are increasing. Our challenge ahead is to open stopes and mine an increased volume of stoped material. Our most important and best grade thickness block in the mine plan is 90 m ahead of our declines and access and mining is expected in August 2016." ■

Record quarterly copper production by FQM

First Quantum Minerals, listed on the TSX, has announced comparative earnings of US\$38 million and cash flows from continuing operating activities of US\$304 million for the three months ended June 30, 2016.

During the quarter, FQM – whose assets include the Kansanshi and Sentinel copper mines in Zambia – set a new record for copper production and sales of 131 349 tonnes and 132 030 tonnes, respectively, surpassing previous records set in the first quarter of the year:

Sentinel recorded a 53 % increase in copper production over Q1 2016, reflecting steady operational and power supply improvements. For its part, Kansanshi achieved its highest quarterly production since Q3 2014 due to the increased smelter availability and sulphuric acid supply from the operation of the Kansanshi smelter.

Commenting on the results, Philip Pascall, Chairman and Chief Executive Officer, said that all the company's operations had shown improvements in costs and efficiency. "The greatest impact was attributable to Kansanshi, and the operation of its smelter. This provides the mine with more acid than previously available, and at virtually no cost. The extra acid helps recovery of mixed and high acid consuming oxide ores. The combination of higher recoveries, negligible acid cost, and the lower smelting treatment costs, make a significant difference. Other aspects of Kansanshi, particularly mining, have also improved markedly, as they have across the company." ■



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Universal Coal starts on NCC plant refurbishment

ASX-listed Universal Coal reported recently that it has begun refurbishment of the Coal Handling and Processing Plant (CHPP) at NCC (New Clydesdale Colliery) – located in the Kriel District south of Witbank – in anticipation of the commencement of thermal coal processing in September (2016). NCC – which has been on care and maintenance since late 2013 – was acquired by Universal from Exxaro in 2014. It is adjacent to Universal's Roodekop property and Universal's intention is to develop and operate the two assets as a single project.

NCC will become Universal's second coal operation, following its Kangala colliery, which recorded a run-of-mine coal production in excess of 3,2 Mt last financial year.

Ingwenya Mineral Processing is the nominated on-site CHPP contractor responsible for the recommissioning and future operation of the plant. Mining operations will begin in September 2016 at the Diepsruit shaft area in line with the timing of the CHPP recommissioning process.

Weighbridge infrastructure has already

been installed in anticipation of coal product flows before the end of the 2016 calendar year.

According to Universal, negotiations with potential off-take partners, including Eskom, are reaching an advanced stage with final assessment and selection of a nominated off-taker to occur shortly.

Universal says that funding of the return to operations of NCC will initially be covered on an equity basis from existing cash reserves. However, discussions continue with existing debt providers for the enlarged Universal Coal Group.

Universal was recently the subject of an A\$126,4 million takeover bid by Coal of Africa Limited (CoAL) but the offer lapsed in mid-July, with CoAL noting that Universal's long-term Coal Supply Agreement (CSA) with Eskom for NCC had "not yet been finalised or signed and that Universal has therefore not yet commenced mining activities at NCC, at which first coal was expected to be produced in the first half of 2016 as envisaged in the Offer Document."

Universal announced on 18 July that it had taken "an executive decision to commence underground mining operations at NCC with supply to the export thermal coal markets and the balance of product being sold in the domestic space." ■



The NCC infrastructure includes processing facilities with a capacity of 2,2 Mt/a. Part of the plant is seen here (photo: Universal Coal).



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Galane approves US\$2 million investment in Galaxy

Galane Gold, which is listed on the TSX-V, and owns and operates the Mupane gold mine near Francistown in Botswana, has approved a US\$2,0 million capital expenditure programme required for the first phase of the recommencement of production at its Galaxy gold mine in South Africa, up to a target of 60 000 ounces per annum.

Galane anticipates that the first phase will take six months to complete and will be funded from internal cash flows primarily from the company's core operation, Mupane, where an underground operation has now been established to mine the Tau orebody.

The first phase of the capital project is designed to refurbish existing infrastructure and upgrade the processing facility to take production to 18 000 ounces per annum. It covers the following steps:

- ❑ The refurbishment of the existing 15 000 tonnes per month processing plant which will include the installation of a new crusher, remedial work to the

float section, a new gravity separation section and re-establishment of the elution plant.

- ❑ The construction of a new 25 000 tonnes per month CIL tailings retreatment plant within the current footprint of the existing processing plant.
- ❑ The recommencement of underground mining at Woodbine, Agnes and Ivy on 17 level using conventional shrink stope mining.
- ❑ The commencement of tailings recovery by sluicing at the Woodbine and Hostel dumps.

"The second major goal for Galane this year is to recommence production at Galaxy," says Galane Gold CEO Nick Brodie. "Having achieved our first goal to commence mining in the main orebody at Tau, management of the company can now concentrate on the implementation of the first phase of this project at Galaxy. This first phase forms a core part of our long-term strategy to target production of

over 60 000 ounces per year at Galaxy.

"It is an exciting time for Galane as we start to see the fruition of all the hard work we have put in over the last five years to reshape the company into a long-life and low-cost operation that can produce positive returns for investors across commodity cycles."

The Galaxy gold mine is located approximately 8 km west of the town of Barberton and 45 km west of the provincial capital of Nelspruit (Mbombela) in South Africa's Mpumalanga Province and covers an area of 5 863 ha. The mine comprises 21 east-west trending gold bodies and four prospects at 600 – 2 000 m depth. Currently, over 75 historical adits exist within the mining area.

Galaxy's existing processing facilities consist of a south plant comprising crushing, milling, flotation, elution and smelting sections and a north plant equipped for biological oxidation and leaching of flotation concentrate. ■

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The new Cat 6015B hydraulic

Barloworld Equipment prides itself on its ability to sell and support the earthmoving requirements of customers across the spectrum with a comprehensive range of Cat® load and haul combinations. Caterpillar's new 6015B hydraulic shovel illustrates this strategy, coming into the Southern African market as a loader that comfortably fits the gap between legacy Cat hydraulic excavators and the larger Cat mining shovels.



Bongani Sibeko, Product Manager: Mining at Barloworld Equipment.

The Cat 6015B has the flexibility to work in heavy construction, quarry/aggregate, and small to medium size mining applications, says Bongani Sibeko, Product Manager: Mining at Barloworld Equipment. “This machine will also help contract miners to produce more material at less cost, meet production targets and maximise profitability.

“The Cat 6015B builds on the legacy of the popular Cat 5110B shovel, which has always been known as a robust and reliable digging machine.

“The 6015B has an operating weight of 140 tonnes with the most powerful engine in its class at 606 kW,” continues Sibeko. “The standard heavy duty bucket is also one of the largest in this machine class with a capacity of 8,1 m³. The combination of powerful engine and bigger bucket provides faster cycles and one pass-match advantage with Cat 773, 775 and 777 trucks over competing machines with standard buckets.”

He adds that the extensive use of Cat components such as the HEX cab, D11 track links and robust 5110B mining linkage assure the quality of the Cat 6015B.

Efficiency

The 6015B is powered by a Cat C27 ACERT™ engine rated at 813 horsepower that gives it the edge in digging power and cycle times. The 8,1 m³ bucket, using Cat C70 hammerless GET, is optimally suited to fill a Cat 773 truck in four passes, a 775 in five passes, and a 777 in seven passes. Manufactured at Caterpillar factories in Dortmund, Germany, and Batam, Indonesia, the Cat 6015B is currently available only in a backhoe configuration.

The Cat 6015B is both powerful and efficient.



In controlled tests, this machine has delivered a strong production advantage in pure tonnes produced over similar specification competitors, coupled with better fuel efficiency per tonne produced.

Fuel efficiency is boosted by several specific features, including Caterpillar's proprietary integrated engine control technologies, a boom float feature that regenerates boom oil for reduced engine demand, an oil cooling system independent of engine cooling, and regeneration of swing energy via a closed-loop swing system.

Cat automatic flow proportioning technology creates more efficient hydraulic pump utilisation, with less energy loss and more fuel savings. Exclusive Cat Proportional Priority Pressure Compensating technology ensures that hydraulic flow is proportional according to demands so that individual boom, stick and bucket functions are automatically prioritised during simultaneous operations. This aids smooth, efficient operation and controllability.

shovel – big and small enough



Pressure and flow compensation deliver only as much flow as needed, resulting in less heat build-up and component wear.

Reliability

The durable and reliable 5110B platform has been retained for the 6015B. A new feature of the 6015B swing system is a unique cross roller bearing with sealed internal gearing, connected to an automatic lubrication system to provide superior stability, extend component life and improve machine uptime.

Adding further to reliability, the undercarriage is a Caterpillar design that leverages proven Cat components.

A newly designed hydraulic filtration system has been incorporated in the 6015B. A separate

Above: The pressurised HEX operator cab keeps dust out and offers excellent all-around visibility of the work environment.

Left: The Cat 6015B can load a Cat 775G off-highway truck, which has a maximum payload of 77,5 tons (70,3 tonnes), in five passes.



The Cat 6015B in profile. It is powered by a Cat C27 ACERT™ engine rated at 813 horsepower that gives it the edge in digging power and cycle times.

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kidney loop provides continuous filtration, ensuring consistently clean oil and dependable hydraulic system performance.

Safety and support

The Cat 6015B is designed in accordance with the very stringent Australian MDG 15/41 Mining Machinery Design guideline.

The 6015B has a best in class standard lighting package as well as updated access and egress, walkways and handrails. Optional features include a 45-degree powered access stairway, cameras for right and rear, LED lighting and heated mirrors. Wire and hose guarding facilitate safe maintenance.

The pressurised HEX operator cab keeps dust out and offers excellent all-around visibility of the work environment. Features include automatic climate control and ergonomic electro-hydraulic controls with adjustable joystick console height, independent of the seat, to suit operator preference and provide precise manoeuvring.

Barloworld Equipment's specialist and simulator training facilities and planning and application skills, combined with high tech on-board Cat technology offerings, are designed to drive productivity for Cat machine owners.

Support packages for mining customers' machines and fleets aim to reduce cost per tonne and can range from basic service agreements to MARC (Maintenance and Repair Contract) agreements that enable mines to completely outsource all their surface and underground mobile equipment maintenance and repair requirements.

Barloworld is an industry leader in parts logistics and maintenance, training and specialised repair facilities, all critical elements of equipment management. People skills in both the operation and maintenance of sophisticated mining machines are hard to find and Barloworld Equipment can supply and train the necessary skills as part of its equipment management programmes.

Technology

On-board technology readily available on most Cat earthmoving machines today enables both Barloworld Equipment and its customers to monitor performance and identify functional problems on machines using satellite, cellular or broadband radio communication. Problems can be identified before even seeing the machine, unscheduled component failures are minimised and resources planned more effectively.

Barloworld Equipment has a dedicated technology group that works with the regional



operations to develop sustainable and scalable equipment management solutions incorporating relevant technologies to optimise cost per tonne for customers. Working with Caterpillar's Technology Group, the technology team supports all Barloworld Equipment's Southern African territories.

The 6015B incorporates advanced Cat technology solutions for improved productivity, maintenance and equipment management. All these technology solutions are available through Barloworld Equipment.

They include Cat MineStar System, the industry's broadest, most comprehensively-integrated mine operations and mobile equipment management system. It consists of a number of capability sets – including Fleet, Terrain, Detect, Health and Command – that can be used alone or as building blocks to next generation autonomous mining. ■

The Cat 6015B's standard heavy duty bucket is also one of the largest in this machine class with a capacity of 8,1 m³.

A complete range of hydraulic shovels

Many Barloworld Equipment mining customers will recall the Cat 5110 as a flagship in Caterpillar's 5000 series hydraulic excavators some 15 years ago and some may even remember this 123-tonne machine being the centrepiece of Barloworld Equipment's display at Electra Mining back in 2002.

Following an agreement between Caterpillar and Terex to market Terex hydraulic mining shovels through the Cat dealer network, Caterpillar discontinued its 5000 series product line. Barloworld Equipment and its fellow Cat dealers continued to support all owners of Cat 5000-series shovels.

Terex sold its mining business to Bucyrus International in 2010 and Caterpillar announced its acquisition of Bucyrus the following year. The rest is history and today Caterpillar has a complete range of Cat hydraulic shovels designed and built to pair with the Cat 700 series trucks and others of similar capacity.

Starting with the Cat 6015B, the 'Versatility Class' range of Cat hydraulic shovels also includes the new 6020B, with the 'Productivity Class' of mining shovels starting from the 6030 right up to the 980-tonne 6090 FS. ■



Jaco du Toit - 12 years



Christina Ramotsabi - 9 years



Ricardo Montoya - 25 years



Rejean Foisy - 25 years



Godwin Dzweiro - 26 years



Noel Mills - 33 years



Fregelina Mabotja - 9 years

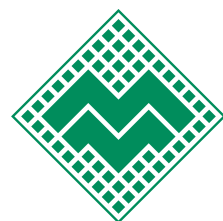


Roy Roche - 34 years

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WorleyParsons develops next dimension of project design

WorleyParsons RSA says it is propelling its integrated project design tools into the next dimension of project engineering and construction management, providing tangible and pre-emptive design solutions to project delivery.

The company began developing its integrated design project tools five years ago, taking 3D design to the next level by integrating 3D intelligent design data mapping with over 20 different engineering design processes and programmes to create a visual 5D design scope that incorporates schedule and cost.

“This unique 5D integrated project design approach has already been applied to some of our major current projects and is proving to bring added value to customers by providing design accuracy, the ability to look pre-emptively forward and create a scenario plan,” says Russell Du Plessis, Project Engineering Manager for WorleyParsons RSA.

“There is accuracy of design data control, a very high level of detailing, and the ability to have foresight by shifting the base line in the schedule so you can anticipate how it will affect a construction schedule,” adds Du Plessis, who has been leading the integrated project design development.

Du Plessis explains that the 5D model is created by taking the content of a 3D design model and segmenting it into components, and then associating those components with cost and schedule. An engine running behind this data enables a moveable timeline which builds a graphic display that accurately calculates cost on any given day of the project timeline.

“We integrate all the physical components of a 3D model with time and cost and produce a 5D model both ourselves and the customer can work from. The concept is to deliver an intelligent and integrated project scope that runs from the design phase right through to construction. By integrating everything, we have better control in terms of risk, we can avoid delays and exceed customer expectations,” says Mushir Khan, Manager of Engineering at WorleyParsons RSA.



“This also means that we can better define the inputs into a Quantitative Risk Analysis which can result in better understanding contingencies carried on the project. In addition, being able to play out various scenarios in the supply chain, we are better able to manage risk and possibly reduce contingencies on the project,” states Khan.

The system generates a plant breakdown structure which interfaces with the work breakdown structure (WBS) and provides numerical values for the project so that every single component is connected to an item on the schedule from a time and cost perspective.

Errors and related rework are minimised through the principles of centralised relational data management of multiple design environments. Scope changes during the project lifecycle are also managed automatically to generate seamless updates of all engineering deliverables associated with the updated data.

The integrated 5D model is capable of being applied not just in the design phase but can be utilised right through to project construction. “If a shipment arrives late, for example, customers can adjust the schedule and see any cost implications. This is something that we have never been able to do on a construction site before. Now you can sit in a boardroom with the 5D model in front of you and know exactly what should be happening on site on any given day,” says Du Plessis.

WorleyParsons RSA intends to incorporate this integrated approach into future projects as a standard value added service. ■

The 5D model is created by taking the content of a 3D design model and segmenting it into components, and then associating those components with cost and schedule.

“We integrate all the physical components of a 3D model with time and cost and produce a 5D model both ourselves and the customer can work from.”

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 **DRA**
Extraordinary Possibilities

Blue sky ahead for DRDGOLD

*With the R320 million flotation/fine grind (FFG) circuit at its Brakpan (Ergo) plant now working according to expectation, DRDGOLD – which has its primary listing on the JSE and a secondary listing on the NYSE – would seem to have plenty of blue sky ahead. Certainly this seems to be the view of investors who have pushed the company's share price up from just 160 cents a year ago to over R11 at present, reflecting satisfaction not only with solid results over the past few quarters but also DRDGOLD's excellent prospects. **Modern Mining's** Arthur Tassell recently visited the Brakpan plant (as part of a media contingent) to get an update on the company's operations.*



DRDGOLD's dump retreatment operation is a high volume, mechanised business which primarily makes use of high-pressure water jets.

Roughly a decade ago (when Niël Pretorius was appointed as CEO, a position he still holds), DRDGOLD was still primarily a deep-level gold miner, with its main assets in South Africa – it still had operations in Australasia at that stage – being the venerable Blyvoor and ERPM mines and the Crown tailings operation. Since then Pretorius and his management team have transformed DRDGOLD, which ranks as the oldest continuously-listed mining company on the JSE, almost beyond recognition. The group disposed of its last underground asset, Blyvoor, in 2013 and is now a 100 % 'surface miner', with its entire gold production being generated from one of the world's largest and most technologically advanced tailings retreatment operations.

DRDGOLD believes that its focus on tailings retreatment offers multiple benefits, not the least being the dramatic reduction in risk that comes with having all operations on surface. For the most part, the only 'mining' that the group now undertakes is the hydraulic mining of the tailings resource, which is an operation that presents relatively few safety risks (and which is, in any event, performed by specialist contractors).

Not only is safety enhanced but the labour requirements of tailings retreatment are also modest compared to underground mining. To put this in perspective, DRDGOLD – through its operating subsidiary, Ergo Mining Proprietary Limited (Ergo) – employs around 900 people (a figure which would more than double if contractors are included) to mine and process 1.8 Mt of material a month. By contrast, Blyvoor, when it was still owned by DRDGOLD, employed in the region of 4 500 permanent employees to produce 80 000 tonnes of ore a month. At this level of production, Blyvoor was producing roughly 14 000 ounces of gold a month which is not dissimilar to DRDGOLD's gold production, which in



FY2015 was just over 150 000 ounces.

A further benefit of the Ergo operation is that it is environmentally friendly in the sense that it consolidates material from poorly-designed historic tailings dumps into modern, well-designed facilities, at the same time freeing up previously sterilised land for development. DRDGOLD puts enormous effort into rehabilitating what remains of these old dumps and has revegetated 283,75 ha of top surfaces and side slopes over the past five years.

The Ergo assets stretch across the central and eastern Witwatersrand over a distance of 62 km and include not only the Brakpan plant – originally established in the late 1970s by Anglo American – but also the standalone Knights plant in Germiston, milling and pump stations at Crown Mines and City Deep (both former plants), as well as an extensive network of pipelines. The Brakpan plant is the flagship operation and is responsible for the majority of gold production (about 75 % with Knights accounting for the balance), with most of its feedstock (roughly two thirds) being sourced from the Elsburg tailings complex. The overall resource being exploited by Ergo amounts to 10,8 Moz of gold.

DRDGOLD has been involved with the Ergo assets since 2007 (initially in joint venture with Mintails, whose stake it purchased in two deals in 2008 and 2010) and has since modernised



and extended the operation, among other things constructing a 50 km long, 600 000 tonne/month capacity, HDPE-lined pipeline to link Crown and the Brakpan plant. The FFG circuit is the latest enhancement of the operation and is designed to recover an additional 0,03 g/t from the tailings material (which generally has a grade in the region of 0,28 g/t) passing through the plant.

Talking to *Modern Mining* during the media visit, Jaco Schoeman, DRDGOLD's Operations Director (he also carries the responsibilities of the COO position), said that the need for the FFG was identified several years ago when

Top: The flotation section of the FFG circuit at the Brakpan plant.

Above: The flotation plant separates the incoming feed into high-grade (the flotation concentrate) and low-grade (the flotation tails) streams.



Above: One of the vertical mills in the fine grind section of the FFG circuit (photo: Arthur Tassell).

Right: Another view of hydraulic mining by DRDGOLD. The hydraulic mining method is the main 'mining' method used by DRDGOLD although front-end loaders are used to reclaim a small proportion of the company's tailings resource – specifically, the sand dumps which resulted from the early 'stamp milling' process.



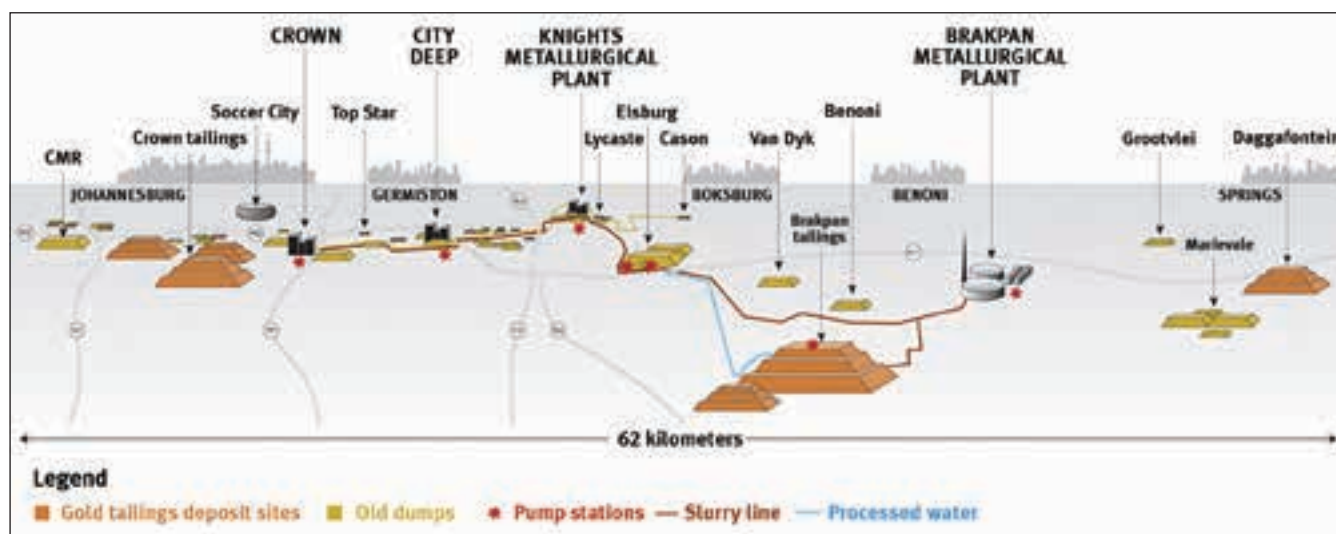
research by DRDGOLD revealed that pyrite particles, containing some 40 % of the gold entering the Brakpan facility, were not responding as well as expected to the CIL process used at the plant.

“We decided that the best way to improve the recovery would be to introduce fine grinding to liberate the gold within the pyrite particles. But you can't fine grind 1,8 Mt of material a month, as the energy costs would be prohibitive. So we've also reintroduced flotation – a process used by Anglo American when it originally commissioned the Brakpan plant but which was subsequently discontinued – to separate out the sulphides contained in the incoming feed. The new flotation and milling sections, together with a small dedicated leaching plant, constitute the FFG circuit.”

Schoeman added that while a 0,03 g/t increase in gold recovery might seem small, the huge volumes processed at Brakpan meant that this marginal improvement translated into significant additional gold production of around 50 kg or 1 700 ounces a month.

Although the FFG or high-grade circuit came on line in January 2014, it operated for less than three months before DRDGOLD decided to suspend operations as it was not delivering the outcomes expected and, in addition, was having a negative impact on the low-grade CIL circuit. At the time, Pretorius described the decision to take the FFG offline as the biggest and most difficult decision he had had to take during his tenure as CEO of DRDGOLD.

By September 2014, DRDGOLD had completed an analysis of the problems and optimised the circuits and was confident enough to reintroduce one stream of the three-stream FFG circuit, with generally positive results. It followed up in January 2015 by restarting the other two circuits. The result was



a record gold production in March last year.

“Getting the FFG circuit right was a difficult task, as we were dealing with so many variables that it was difficult to pinpoint exactly why we weren’t getting the recoveries we expected,” Schoeman told *Modern Mining*. “We were fairly certain that the basic design was sound but we identified over 50 enhancements that we thought could make a difference and systematically implemented them all. Then we started up the FFG circuit in stages, making sure that each float stream was stable and achieving the desired parameters before we moved onto the next one.”

The enhancements included changes to the carbon management circuit, increasing the water storage capacity and management within the plant, modifications to control systems and ensuring increased tailings thickener availability prior to the low grade CIL circuit.

Although the FFG circuit is now working well, Schoeman said that DRDGOLD is constantly looking at ways to improve its operation. “We believe we can get even better numbers out of the FFG. For example, we currently have a mill feed of about 80 % passing 35 microns and we mill that down to 80 % passing 24 microns. The optimum is to go down to 20 microns but there is a cost offset. We will get there – it’s a continuous optimisation exercise.”

Looking ahead, Schoeman said that Ergo’s total treatment capacity was now 2,4 Mt/month, with the Brakpan plant (after the recent refurbishment of five CIL tanks) now having the ability to process 2,1 Mt/month and the Knights facility a further 300 000 tonnes/month. “The current restraint on our production is not plant capacity but deposition capacity – specifically the rate at which we can safely deposit material at our Brakpan Tailings Deposition Facility (TDF) – and if we want to

go to the 2,4 Mt/month level, then we need to address this issue,” he explained.

“The way we intend to do this is to make use of the Withok site which is immediately adjacent to the Brakpan TDF. Earlier this year we received the necessary regulatory approval to incorporate the Withok footprint into the TDF and, once implemented, this will increase Ergo’s deposition capacity from 200 Mt to approximately 800 Mt – enough to receive most of the mine tailings in and around the Johannesburg area and to assure Ergo’s life of mine for at least another 25 years. When exactly we implement the project is dependent on a feasibility study which is currently well advanced and which is looking at all aspects of the Ergo operation,” he concluded.

Photos (unless otherwise acknowledged) courtesy of DRDGOLD

DRDGOLD’s infrastructure extends over a 62 km long portion of the central and east Witwatersrand.

The process flowsheet at Brakpan

With the FFG now fully operational for well over a year, all the slurry entering the Brakpan plant enters the flotation section after passing over linear screens to remove organic material and debris. After the material is conditioned with reagents, it enters the float cells where it is separated into two streams. One stream, the flotation concentrate, contains the sulphides while the second stream, the flotation tails, is made up of lower-grade material which is treated in the Brakpan plant’s main CIL circuit.

The concentrate stream is subjected to the new fine-grind process, which involves milling the slurry material with tiny beads using four vertical stirred mills (sourced from FLSmidth). At this stage the milled product has been liberated from the sulphides, making recovery of the previously encapsulated gold easier as it comes into contact with cyanide during the leaching process that follows.

The dissolved gold is adsorbed onto activated carbon and the ‘loaded carbon’ in each circuit enters the carbon treatment section where the gold is eluted from the carbon. The carbon then returns to the CIL circuit via a regeneration kiln. Once the gold has been eluted, it undergoes electro-winning where the gold is precipitated, calcined and smelted in the existing smelthouse. ■



Tough quarter challenges

Randgold Resources reports that its production and costs were hit in the quarter to June (Q2 2016) by a long mill downtime at the Tongon mine in Côte d'Ivoire and the continuing transition to a mixed-ore feed at the Kibali mine in the north-eastern DRC. The company says, however, that improvement expected in the second half of the year should boost its 2016 results to within its market guidance.

The flagship Loulo-Gounkoto complex in Mali ended the quarter ahead of target but with one of Tongon's two milling circuits losing 46 days after a breakdown and Kibali still dealing with throughput, recovery and dilution challenges presented by multiple ore feeds, group production was down 4 % quarter on quarter at 281 494 oz while total

cash cost per ounce rose 12 % to US\$727/oz. With the higher gold price only partly buffering the impact on the bottom line, profit was down 8 % at US\$58,7 million.

Compared to 2015's record interim results, however, profit for the six months to June was up 11 %, production was steady and total cash cost was 1 % lower. Also on the positive side, net cash generated increased by 6 % quarter on quarter and cash holdings rose by 7 % to US\$272,7 million.

Chief Executive Mark Bristow described the quarter as one of the toughest in years but said in June and July both Tongon and Kibali had made significant progress, with Tongon fixing the mill and completing the commissioning of its new quaternary circuit, and the new Kombokolo satellite pit at Kibali expected to improve its feed flexibility and grades. The



within guidance. In addition, we're intensifying our focus on critical operational issues to ensure that we deliver a substantial second-half improvement," he said.

Bristow said in addition to another strong performance by the Loulo-Goukoto complex, the quarter's highlight was the advances made by Randgold's exploration teams.

"The quality and scope of our exploration portfolio continue to grow and there is a solid pipeline of projects being developed through our resource triangle, from grassroots and generative work to resource definition. I believe we have at least three advanced targets, already scheduled for drill test campaigns, with real potential to become important assets," he said.

The advanced targets include Fonondara and Kassere on the Boundiali permit in northern Côte d'Ivoire and Sofia in Senegal, which looks likely to provide a high grade, free-leaching satellite resource for the feasibility study-stage Massawa project.

In Mali, the greenfield target Bakolobi is currently being drilled while drilling at Loulo's Gara underground mine has identified significant potential to extend its life and replace this year's depletion at Loulo. At neighbouring Goukoto, the feasibility study on the superpit option will be concluded by the end of this year. In the DRC, Randgold believes that the discovery and rapid development of the Kombokolo satellite illustrates the continued prospectivity of the Kibali permit area and augurs well for the Moku joint venture west of Kibali.

"While the more advanced work is ongoing, our greenfields team is also feeding the base of the resource triangle with new ground. The Bambadji joint venture with IAMGOLD has recently been renewed, we are applying for new permits in southern and western Mali as well as in southern Côte d'Ivoire, where we are also negotiating a new joint venture," Bristow said.

"The rest of the gold mining industry continues to shy away from exploration and there

Left: Ambarau, the second hydropower station at Kibali, will soon come on line. The first hydropower station, Nzoro, has supplied a steady 20 MW into the Kibali grid for over a year.

Below: Panoramic night view of the huge Kibali mining complex in the north-east of the DRC. Kibali produced 122 532 oz in Q2, a 6% decrease on the prior quarter. According to Randgold, the complexity of dealing with multiple ore types from different sources affected throughput, recovery and grade at Kibali during the quarter.

Randgold

development of Kibali as a complete project remains ahead of schedule.

"Looking ahead at the rest of the year, all our teams have been reworking and optimising their mine plans to ensure that we end 2016



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is now a consensus that new gold production will consequently continue to decline. This, in combination with growing global geopolitical and economic jitters, must be good for the gold price, at least in the long run. That's where Randgold's focus has always been fixed. We're building a sustainably profitable business on a very solid foundation, but considering the internal and external challenges ahead, our teams will have to test and, if necessary, re-invent the way they operate on a continuous basis."

Included in Randgold's Q2 report is an interesting commentary on the innovative management solutions which are driving down the cost of power and securing the stability of supply at the group's operations, while at the same time reducing its carbon footprint.

Randgold's Technical and Capital Projects Executive, John Steele, says access to power is one of the key considerations in developing a mine in Africa, particularly in those remote regions where the infrastructure is practically non-existent and there is no national power grid.

"In fact, it's so important that power management has grown into a big business within the Randgold group, and our engineers have become adept at building and managing major power stations – some of which are the largest of their kind in their host countries – and at dealing with the complex demands of maintaining mine-based micro-grids," he says.

The Loulo-Gouankoto complex has an installed capacity of 60 MW of which it draws 45 MW. Initially all power was supplied by high speed diesel-powered generators but over time it has migrated to HFO (heavy fuel oil) medium-speed generators, which now supply 80 % of its power, improving reliability and reducing unit costs significantly. A central power station supplies the whole complex through an overhead grid which extends over more than 30 km.

Kibali in the DRC represents a further advance in the evolution of Randgold's power management strategy. Here the company has had the opportunity to build its own hydro-power plants. Nzoro, the first of these to be commissioned, has supplied a steady 20 MW into the Kibali grid for over a year. The second, Ambarau, will soon come on line and the third, Azambi, will be operational in 2018 when Kibali is at full production.

Together, the three hydroplants will have a capacity of 44 MW which may reduce to 20 MW during the dry season. Kibali's peak demand is expected to be 40 MW and to ensure that this can always be met it has a high-speed diesel generating capacity of 36 MW. Its current



A trench at the Massawa exploration project in eastern Senegal. Massawa was discovered in 2008 and is one of the largest undeveloped orebodies in Africa. A feasibility study into the project is currently being progressed, with results showing good recoveries and a materially higher grade and larger resource in the central zone of the orebody.

supply is a 55/45 mix of hydro and thermal power but hydro's contribution is planned to grow to 75 % as the Ambarau and Azambi plants are commissioned.

Photos courtesy of Randgold Resources

Randgold leads the way in exploration

While the gold mining industry generally went back into survival mode in the post-supercycle slump, Randgold stepped up its exploration drive and both its greenfield and brownfield programmes have consequently delivered significant results, including the discovery of major new targets and a substantial increase in the company's groundholdings in its target areas.

Exploration remains the engine that drives Randgold's business and the resource triangle is still the most effective way of managing this critically important function, ensuring that the company's assets are developed in a balanced and methodical manner, says Group General Manager Exploration Joel Holliday in Randgold's Q2 report.

"It's a simple but essential tool which enables us to maintain a pipeline of projects with the potential to pass our strategic filters and ultimately to deliver our target of three new mines over the next five years," he says.

"We have a broad base of targets in our resource triangle and the discovery of Bakolobi, Fonondara, Kassere and Gbongogo in the past two years shows how quickly good ground can develop into significant advanced targets in a short time. All four feature significant mineralised systems with the potential to host large orebodies. Over the past quarter, we have completed the detailed surface geological work necessary for the development of models and drill programmes."

Holliday says Randgold's generative research is the only work of its kind being carried out in Africa at the moment and is providing new insights into the controls of large orebodies on a range of scales from continental targeting to detailed orebody definition.

"This research is highlighting areas of prospectivity where we will be acquiring new ground over the next few years. It also ensures that we do not waste time and money in areas which do not have the potential to host deposits that meet our criteria," he says. ■

Kakula could be “Africa’s most significant copper discovery”

Ivanhoe Mines has announced assay results from an additional eight holes of its ongoing drilling campaign at its Kakula discovery at its Kamoia copper project near the mining centre of Kolwezi in the DRC’s Katanga Province. Commenting on the results, Robert Friedland, Executive Chairman of TSX-listed Ivanhoe, says that Kakula could prove to be Africa’s most significant copper discovery.

Explaining the history of the Kamoia project, Friedland says that Ivanhoe’s geologists started the initial exploration programme at Kamoia in 2003, at which point it was nothing more than an unknown grass-roots prospect generated by Ivanhoe’s geological team and covered with a thin layer of Kalahari sand, sitting in a previously unrecognised district within the Central African Copperbelt.

“We made our initial significant discovery at Kamoia in 2008,” he says. “The quest, which by 2013 showed that Kamoia is the world’s largest, undeveloped, high-grade copper discovery, took more than 12 years of dogged exploration, dedicated geological and geotechnical

expertise and a total investment of several hundred million dollars.

“Our perseverance and eventual success in unlocking Kamoia’s world-scale potential was recognised by the Prospectors & Developers Association of Canada in March 2015 with the presentation of the prestigious Thayer Lindsley International Discovery Award to key members of the Ivanhoe Mines exploration team.

“However, given the remarkable exploration success we have had to date at the Kakula discovery, as it has been progressively revealed during the past year, we believe that this new copper discovery is substantially richer, thicker and more consistent than other mineralisation that we have found elsewhere on the Kamoia project. The results speak volumes: the Kakula discovery is a complete game changer in our planning for the development of the Kamoia project.”

Kamoia’s indicated mineral resources presently total 752 Mt grading 2.67 % copper and containing 44.3 billion pounds of copper at a 1 % copper cut-off grade and minimum thickness of 3 m. The project also has inferred

Continued on page 41

Boxcut and surface facilities at Kansoko Sud. The Kakula exploration area is approximately 10 km southwest of Kansoko Sud.



Continued from 36

mineral resources of 185 Mt grading 2,08 % copper and containing 8,5 billion pounds of copper, also at a 1,0 % copper cut-off grade and a minimum thickness of 3 m.

The primary objective of the current drilling programme at Kakula is to confirm and expand a thick, flat-lying, bottom-loaded zone of very high-grade, stratabound copper mineralisation at the southern part of the Kakula discovery area that has the potential to be amenable to bulk, mechanised mining and have a significant, positive impact on the Kamoia project's future development plans. Ivanhoe expects to have an initial mineral resource estimate prepared for Kakula around the end of Q3 2016.

Highlights of the latest drill results, which confirm the exceptional grades and shallow, flat-lying geometry of the Kakula mineralised zone, include hole DD1005 which intersected 7,36 m (true width) of 8,11 % copper at a 2,5 % copper cut-off, 10,3 m (true width) of 6,52 % copper at a 2 % copper cut-off and 20,71 m (true width) of 3,85 % copper at a 1 % copper cut-off.

As a result of the ongoing success of the Kakula programme and the extension along trend of the central, well-mineralised, chalcocite-rich core to the north-west and south-east at relatively shallow depths, the drilling programme has been expanded by an additional 9 000 m, to a total of 34 000 m. As the full extent of the discovery becomes apparent, further expansions to the programme will be accelerated. To help advance the ongoing exploration and delineation of the Kakula deposit, the Kamoia technical team is proceeding with the engineering and preparation of tender documents for the construction of a boxcut at Kakula to accommodate decline ramps that will provide underground access to the deposit.

"To date, the deposit has grown with virtually every step-out hole we have drilled," says Louis Watum, Kamoia Copper's General Manager. "In a country known for its high-grade copper deposits, Kakula is quickly establishing itself as the exceptional discovery."

The recent results support findings that mineralisation at Kakula is consistently bottom-loaded, with grades increasing downhole toward the contact between the host Grand Conglomerate and the underlying Mwashia sandstone. The highest copper grades are associated with a siltstone/sandstone unit occurring within the Grand Conglomerate, located approximately one metre above the top of the Mwashia sandstone unit.

"Kakula's combination of thick intersections of very high-grade copper mineralisation and



the bottom-loading of the grade profile allows for the testing of a number of potential mining scenarios at different cut-offs," says Lars-Eric Johannsen, Ivanhoe's CEO.

The 60-square-kilometre Kakula exploration area is approximately 10 km south-west of the Kamoia project's planned initial mining area at Kansoko Sud now being developed.

Updating on activity at Kansoko Sud, Johannsen says that that underground mine development is progressing ahead of plan and within budgeted costs. The twin declines, incorporating both a service and a conveyor tunnel, each have advanced more than 130 m since the first excavation blast occurred in May of this year. Development of the underground mine is designed to reach the high-grade copper mineralisation at the Kansoko Sud deposit during the first quarter of 2017.

The planned Kansoko Sud initial mining footprint contains high-grade intercepts of up to 7,04 % copper and a potential mining thickness of more than 15 m. The mineralised horizon is expected to be intersected by the declines at approximately 150 m vertically below surface, where initial mining operations will commence. Byrnescut Underground Congo SARL is the contractor for the development of the declines.

In parallel with the Kamoia 2016 pre-feasibility study, an alternative mining method – controlled-convergence room-and-pillar mining, developed by Poland-based KGHM – has been investigated for its suitability for use on the Kamoia Kansoko deposits. The method has been successfully implemented by KGHM at its copper mining operations in Poland for the past 20 years. Given the thick, mineralised widths encountered to date in the Kakula drilling programme, controlled-convergence room-and-pillar mining will also be investigated for its suitability for use at Kakula.

Photos courtesy of Ivanhoe Mines

Drilling underway at the Kakula discovery area.

The drilling programme has been expanded by an additional 9 000 m.

"To date, the deposit has grown with virtually every step-out hole we have drilled. In a country known for its high-grade copper deposits, Kakula is quickly establishing itself as the exceptional discovery."



Kareevlei modifies its processing plant

BlueRock Diamonds, whose shares are quoted on London's AIM, reports that operations at its Kareevlei mine in the Northern Cape, will be resuming shortly after operations were suspended in June to allow changes to the plant configuration. The company reported in July that the modifications to the processing facility were nearing completion and should result in a recovery in grade as well as increased capacity once operations restart.

The Kareevlei property is located approximately 100 km northwest of Kimberley and hosts the Kareevlei kimberlites – five kimberlite pipes ranging in size from less than a 0,5 ha to less than 5,6 ha. They were discovered in 1991 by De Beers following an extensive airborne magnetic survey of the Ghaap Plateau. The property subsequently passed into the hands of Tawana and was sold to BlueRock in 2013. Since then BlueRock has undertaken trial mining and is now transitioning into full mining.

BlueRock, which was registered in 2012 and admitted to AIM in 2013, has businessman Adam Waugh as its CEO (he was appointed in April this year) and Paul Beck – a member of the well-known South African mining family – as its Non-Executive Chairman. The CEO of its South African operating subsidiary, Kareevlei Mining, is Riaan Visser, a CA who has been involved with diamond mining and tailings

retreatment projects in the Kimberley area for over 20 years, while its Chief Technical Officer is John Kilham, a geologist who spent 27 years with De Beers.

In June this year BlueRock announced the appointment of Johan Milho, previously with Petra, as the new Mine Manager of the Kareevlei mine. He succeeds Willie van Wyk, the company's BEE partner, who is now Director of Mining Operations for Kareevlei Mining.

Outlining BlueRock's progress at Kareevlei, Beck says in his Chairman's Statement in BlueRock's recently released results for the year ended 31 December, 2015 that by the end of the year the company had produced in excess of 2 500 carats and installed facilities capable of operating at in excess of 20 000 tonnes per month. He also noted that the average value per carat achieved was US\$261, significantly in excess of the original estimate of US\$183 per carat and the updated estimate prepared by the company's Competent Person of US\$232 per carat.

Mining operations over 2015 were focused on developing and exploiting the KV2 pit, which covers an area of 1,1 ha and has an inferred grade of 4,6 cpht. By the end of 2015, Kareevlei Mining had removed the overburden from approximately 40 % of the pipe and had reached a maximum mining depth of around 28 m in a small area of the orebody.

BlueRock announced in March this year that it would be undertaking a strategic review of its operations (including a review of the plant



configuration) following a drop in recovered grades during the first quarter. More recently (12 July) it has provided an update on the strategic review. Says the company in a statement: “Our initial findings, with the help of Dr Kurt Peterson, showed a number of areas that were likely to have contributed to the lower recovered grade. These include sub-optimal setting size on our screens, some inefficiencies in our pan operations, unnecessary recycling of material through the tertiary crushing circuit and a non-representative supply of ROM (Run of Mine) kimberlite. Operations at Kareevlei were suspended in June to allow for the required changes to the plant. These modifications are close to completion and we expect to see a recovery in grade and also increased capacity of the plant when we restart operations.

“We continue to investigate ways to increase production through the plant and have identified some bottlenecks in our process. The most significant of these is our DMS (Dense Material Separator). We have identified a nearly new DMS which is twice the size of our installed machine and which is available in the Northern Cape and our operations team is currently assessing the benefits of its acquisition.”

BlueRock also reports that the Kareevlei mine had its first visit from the DMR on 6 July when an inspection of operations took place. “Our operations were found to be compliant save for two areas; processing plant procedures and guarding rails on the plant and Trackless Mobile Machinery (TMM). We expect to be able to make the necessary changes to our operational procedures and guarding rails within the next four to five weeks when the DMR will revisit our mine at which time we expect to have completed



the required changes to our plant.”

The company adds that the assessment given by the DMR regarding TMMs all relate to machinery owned by its contractor Diacar and that Diacar, having reviewed the DMR requirement to bring its fleet up to the required standard, has decided to withdraw from its agreement with BlueRock to provide earthmoving services.

“Our relationship with Diacar was already being assessed as part of the review process in order to ensure that we were operating on the best possible terms,” says the company. “The result of the DMR inspection and Diacar’s decision not to implement their requirements has expedited this process and we expect to be able to resolve this matter either through appointing another contractor or through leasing and operating the equipment ourselves during the final stages of effecting the final changes to our plant.”

Diacar, which was operating its own plant at Kareevlei, has stated that it would like to sell the plant and BlueRock notes that it is currently considering the economics of such a purchase.

“Our operations at Kareevlei have reached a very exciting stage,” comments Adam Waugh. “The pit development work we have done in the last three months will provide us with a sustainable supply of high grade kimberlite and I am confident the ongoing work on plant efficiency will result in higher grades and improved processing capacity. In addition, we now have the opportunity and the management team necessary to operate both our plant and the Diacar plant, in order to benefit from 100 % of diamond sales, and to manage more efficiently our earthmoving programme providing a platform for long term profitable mining.” ■

Above: Mining at Kareevlei has focused on the KV2 kimberlite.

Left: The processing plant at Kareevlei is capable of operating at in excess of 20 000 tonnes per month.

“We continue to investigate ways to increase production through the plant and have identified some bottlenecks in our process.”

A preview of Electra Mining

Taking place from 12-16 September at the Expo Centre in Johannesburg in an economic climate that is anything but favourable for the mining industry, Electra Mining Africa (EMA) 2016 is nevertheless expected to have over 850 local and international exhibitors who will collectively occupy 38 000 m² of indoor and outdoor exhibition space. **Modern Mining** looks at what visitors to the show can expect to see.

Electra Mining is reputedly the largest trade show in Africa and is certainly one of the largest mining shows in the world. Although in recent years some of the 'big name' suppliers of mining equipment to the mining industry have been absent, the total number of exhibitors has increased and Electra Mining remains one of the most important events in the mining calendar. Given the recession in mining, it will be interesting to see how many visitors it attracts this year but the organisers are hoping for around 40 000 – a figure that has been achieved in the past (although not in 2014, when the last Electra Mining was held).

The show has the support of leading industry associations including the Southern African



Right: Visitors crowd the aisles at the 2014 event. The organisers are expecting up to 40 000 visitors at this year's show.

Below: Outdoor stands at Electra Mining Africa 2014. EMA is regarded as the largest trade show in Africa.

Institute of Mining and Metallurgy (SAIMM), the South African Institute of Mechanical Engineers (SAIMEchE), the Engineering



Africa 2016



Council of South Africa (ECSA) and the Lifting Equipment Engineering Association of South Africa (LEEASA).

“Many professionals visiting the show will use Electra Mining Africa to network, exchange ideas, share information and develop partnerships,” says Gary Corin, MD of the organisers, Specialised Exhibitions Montgomery. He adds that – as is traditional – many exhibitors will be launching new products and that there will be daily live demonstrations of machinery and equipment, interactive product displays, simulation booths and technical presentations.

For the first time ever, Electra Mining Africa will offer free-to-attend seminars. These will be held in association with the SAIMEchE and will address various topics including the latest technologies and cutting-edge solutions helping delegates stay ahead of the pack and run sustainable, productive operations. One of the topics is entitled ‘Has 2016 been the year of reversing the downward trend?’ and will include discussion around what the leading strategy is for miners today, the effect of unusual market conditions, rallying prices and consolidation, and the outlook for 2017.

Turning to the equipment on display, leading training-technologies provider **ThoroughTec Simulation** – based in Durban but with offices



in Australia, the US, Canada, Chile and Russia – will be demonstrating a number of groundbreaking new developments.

“Star of the show will undoubtedly be the unveiling and demonstration of our brand new CYBERMINE Workforce Excellence (WX) training management platform,” says Adam Smallman, Regional Vice President of Europe, Middle East and Africa at ThoroughTec. “This ‘first-of-class’ system will serve as a foundation for the measurement and improvement of mine operator performance through full-spectrum, KPI-driven training.

“Naturally, we will also be demonstrating the latest version of our CYBERMINE high-fidelity Full Mission Simulator (FMS), in this case for the training of Komatsu 930E haul truck operators. These advanced, fourth generation simulators remain the cornerstone of our integrated training system, allowing for highly-realistic, ‘practical’ training in a safe, cost-effective and controlled environment.”

One of the regulars at Electra Mining, **Becker Mining South Africa**, will again be exhibiting a wide range of mechanical, electrical and electronic products. “Our display this year will showcase the company’s communication and automation solutions, energy distribution systems, mechanical, electrical and electronic mining products, as well as transportation and roof support systems,” says Tom Searle, the company’s Senior General Manager: Mechanical, Gold and Export.

Becker’s equipment is manufactured by three wholly owned South African manufacturing companies – EMIS for electrical energy distribution systems; Bellambie Mining & Industrial for hoist rope attachments, roof support systems and lifting equipment; and Becker

ThoroughTec will be demonstrating the latest version of its CYBERMINE high-fidelity Full Mission Simulator (FMS), in this case for the training of Komatsu 930E haul truck operators.



Sykes pumps – which will be on show at the Integrated Pump Rental stand – are engineered to offer market leading efficiency.

Electronics for electronic automation and communication systems.

Pumps and related equipment have always featured strongly at Electra Mining and they will do so again this year. An exhibitor in this field

will be **Integrated Pump Rental**, which believes there is a need on the African continent for a pump rental company able to offer a turnkey pumping solution for small, medium and large projects. According to Lee Vine, MD, the company has been filling this void for some time.

“Significantly, Integrated Pump Rental adopts a completely different approach in this industry sector,” Vine explains. “It is not a case of one pump fits all when it comes to the type of pumping environment in which we operate. While we do have off-the-shelf options available for rent, we believe it is essential to undertake a complete assessment of a customer’s pumping application and only then are we able to recommend a fit-for-purpose solution.”

Among the products that Integrated Pump Rental will have on display are two locally manufactured pump solutions– the SlurrySucker and the Slurry Blaster. The SlurrySucker dredge unit is claimed to be ideal for dredging and cleaning water capture areas where silt or slimes are an issue while the Slurry Blaster, launched late last year, is a hydro mining equipment solution that is said to offer optimum performance coupled with reliability.

The newest addition to the company’s range is the Sykes diesel driven mobile pumps which are suitable for all applications where electrical power is not readily available. These pumps feature cleverly designed automatic priming capabilities based on a Venturi system that can deliver suction lifts of up to 9 m.

Also exhibiting pumps will be **Franklin Electric South Africa**, which will be demonstrating how the new Mono EZstrip™ transfer pump can make a day-long maintenance operation a 30-minute job. The Mono EZstrip™ transfer pump – which the company regards as the biggest leap forward in cavity pump technology for 30 years – is reportedly the first unit of its type that can be stripped without the need for electrical disconnection or removal of pipe-work. The pump is easy to install and presents the opportunity to see downtime drastically reduced as maintenance, cleaning and repairs to the pump can be carried out in situ.

Franklin Electric will be demonstrating how to access the pump internals to either maintain the pump or clear out any buildup in less than a minute, with reassembly of the suction chamber taking the same period of time.

Moving to the environmental field, a first-time exhibitor at EMA this year will be environmental solutions provider **I-CAT** which will launch a range of water, fire and dust-suppression technologies.

The R-SDR (Retractable Stockpile Dust Ring)

SEW-EURODRIVE to unveil new products

Celebrating its 85th anniversary this year, Germany-based SEW-EURODRIVE will unveil a range of new products.

SEW-EURODRIVE MD Raymond Obermeyer says that the Original Equipment Manufacturer (OEM) has had a presence at this flagship exhibition since the 1980s. “Electra Mining is the largest exhibition of its kind in Africa. Therefore as a market leader, it is important for us to be there.”

New products to be unveiled include the new DRN series of asynchronous motors, which complies with all of the requirements for European energy-efficiency class IE3. The new motor range is fully downward-compatible with all of SEW-EURODRIVE’s existing products.

Another new product is the X-Series agitator, based on a modular concept that incorporates many parts from the standard product platform. Features include an integrated extended bearing distance (moderate or heavy-duty), integrated dry well sealing and pressure lubrication and a thermally-optimised housing.

SEW-EURODRIVE will also launch its Movitrac LTP-B Eco HVAC unit for mining, industrial and commercial applications. This comprises a total HVAC solution from fans to pumps and motors.

Commenting on the ‘The Future Starts Now’ campaign that will underpin its presence at Electra Mining Africa 2016, Obermeyer stresses that innovation, tradition and customer focus are the cornerstones of SEW-EURODRIVE.

“That was the case when our company was founded 85 years ago, and it still holds true today. Thanks to a range of customer-orientated service modules, we offer our customers added value and measurable benefits. This is made possible by powerful drives, high quality standards and customised solutions,” Obermeyer concludes. ■

SEW’s X-Series agitator is based on a modular concept that incorporates many parts from the standard product platform.



will be showcased as the latest innovation from I-CAT. Introduced to address dust issues at conveyor discharge points, the R-SDR system creates a virtual curtain around material flow for what I-Cat describes as “outstanding particle containment”.

Also on display will be the company’s I-VAP system (Waste Water Evaporation Cannon) capable of handling 500 m³ per 12-hour day, and its Roto-Fire-Pack (Backpack Fast Response System), which makes use of T-Rotor technology, currently the leading misting technology internationally. It extinguishes all classes of fires by using foam mist as the agent.

Exhibitors active in supplying equipment for minerals processing will include global mining solutions provider **Tega Industries**. The company – whose credo is ‘Partnership in Practice’ – will debut its mill scanning solutions that use hyper-accurate camera technology to view and measure the geometry of a mill to gauge the wear and to ascertain optimum replacement cycles for mill liners. Software will also be at hand to integrate and model efficient processes.

Tega MD Fernando Monteiro says some of the other products of interest will include a cross-section of available liner technologies, wear components and industrial products, as well as home-grown innovations such as drill rig shock assemblies, cable protectors and other locally developed innovations.

Screening and vibrating equipment solutions provider **Aury Africa** will be emphasising its capability to manufacture hand-poured polyurethane (PU) panels locally, a development which – it says – offers significant cost savings and enhanced quality for mining customers.

Aury Africa MD Mark Houchin notes that the company has just commissioned a hand-cast gravity-pour PU facility. It previously imported all of its PU panels from its sister company in Tianjin, China. “Aury China has supplied us with manufacturing equipment so that we can commence with local manufacture. This represents a major cost-saving, which will make our local products even more cost-competitive for our mining customers, and establish us as the leading local supplier,” he comments.

Aury Africa produces a complete range of high-quality vibrating screens for the coal and minerals processing industries. Included in the range are banana vibrating screens available in single- and double-deck configuration up to 4,8 m wide and 8,5 m long, and horizontal vibrating screens, also in single and double-deck configuration, up to 4,3 m wide and 8,5 m long. High-frequency vibrating screens, circular motion vibrating screens in single- and



The I-VAP System Water Evaporation Cannon from I-CAT.



Composite steel mill liners will be on display at the Tega stand.

double-deck configuration, and flip flop vibrating screens are also offered by the company, as are a range of excitors to fit most OEM screen types.

Another screen manufacturer booked for this year’s show is **Joest Kwatani**. “Electra Mining Africa allows us to meet a large number of

Conference to focus on African opportunities

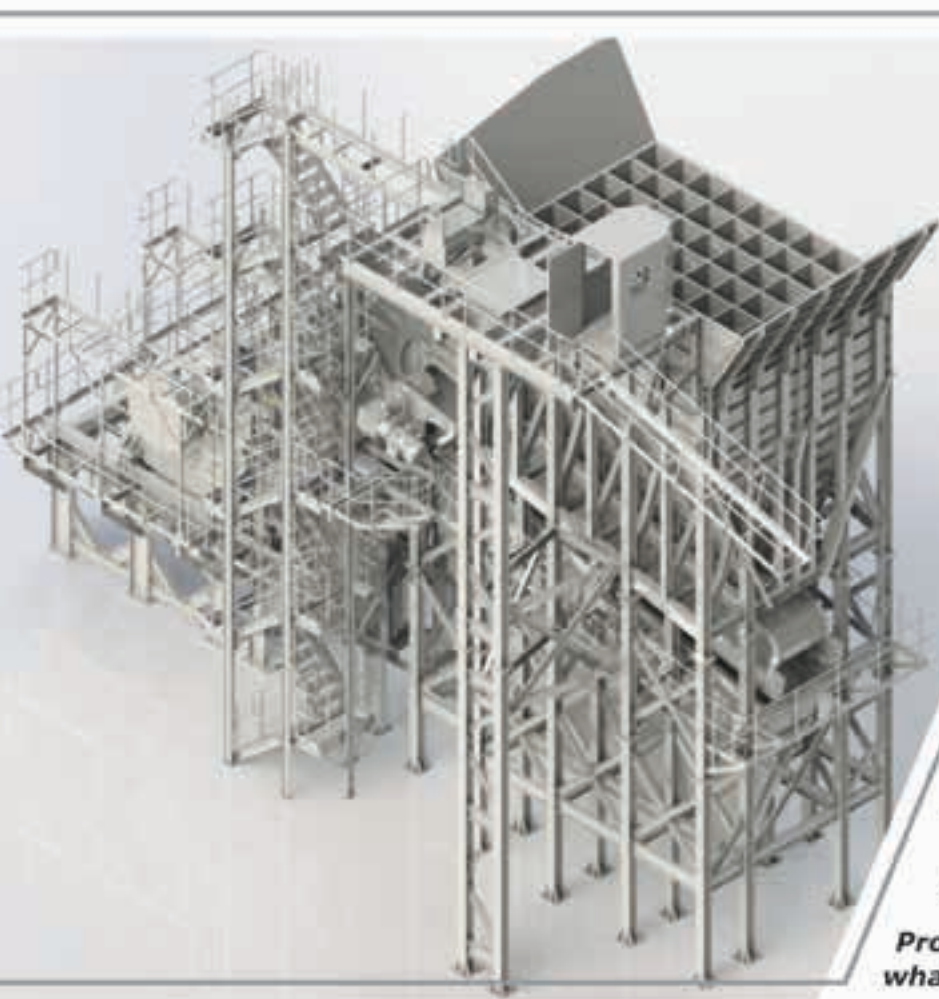
One of the inaugural events at this year’s Electra Mining will be a Southern African Development Community (SADC) conference focusing on opportunities in Africa which will take place on 15 September.

The opening keynote address will be presented by Charles Siwawa, CEO of the Chamber of Mines Botswana, and Isaac Kwesu, President of the Chamber of Mines Zimbabwe. They will be giving a SADC mining overview focusing on establishing a sustainable road ahead in a changing landscape.

Discussion points will include challenges and opportunities through to 2018, plans in place to attract foreign investment to the industry, strategies to ensure long-term sustainable growth and the importance of building relationships between the mining sector and local communities. ■

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existing and new customers, as well as forge more alliances with industry participants in just a few days,” says Kim Schoepflin, the company’s MD.

This year’s EMA will provide Joest Kwatani the opportunity to exhibit the Derrick range of engineered fine screening solutions. The company was recently appointed the exclusive representative for these technologies in select coal and iron ore mining regions in South Africa, and across the country’s borders. Schoepflin says the company’s sales and support functions will be undertaken in partnership with Derrick Solutions International Africa which, like Joest Kwatani, has dedicated as much as 40 % of its engineering skills to R&D.

The company’s stand will include a heavy media cyclone separation pilot plant featuring vibrating screens and feeders. The plant will simulate the recovery of sinks and floats on its single deck screen.

These will be complemented by the OEM’s comprehensive portfolio of drives, as well as discussions on Joest Kwatani’s new full load exciter gearbox test bay. The company says it is the only OEM to test run its exciter gearboxes in-house with full weights under plant operating conditions.

A prominent exhibitor in the field of safety solutions will be **MSA Africa**, which will focus on innovative technology at this year’s show, according to Product Marketing Manager Suraksha Mohun. “Our whole approach is based on being a holistic solutions provider, as opposed to being perceived as a traditional supplier of standalone products. We want to showcase how the company has grown and evolved in being able to meet all the requirements of our diverse customer base,” Mohun explains.

An example of the latest developments from MSA Africa is the integration of its new Thermal Imaging Camera (TIC) technology into the G1 Self-Contained Breathing Apparatus (SCBA) control module. What this effectively means is that every firefighter can now have TIC on hand, which represents a significant boost in terms of personnel safety.

Other new products include the MSA AirXpress 2 Fire, a highly economic SCBA with customisable configurations for a range of first-responder applications. A standout feature is the adjustable flow rate on the demand valve, which not only allows for comfortable breathing but efficient air consumption as well.

Still in the safety arena, **Booyco Electronics**, which claims to have already secured the foremost market position with its Pedestrian Detection System (PDS), has recently launched



Aury Africa’s Managing Director, Mark Houchin.



its fully integrated Asset Protection System (APS) for surface equipment.

Anton Lourens, MD of Booyco Electronics,

Joest Kwatani screens in the company’s manufacturing facility.

‘Green mining’ solutions from MMD

MMD will be showcasing innovative ways to improve mining efficiency and lower emissions, delivering on its promise of providing truly ‘green mining’ solutions. The focus will be on the MMD twin shaft mineral sizer which is a compact, high capacity and versatile machine capable of handling wet, sticky or hard material either separately or together.

To complement the mineral sizer, MMD has created a range of equipment such as a heavy duty apron plate feeder. The MMD feeder has rolled plates, a unique feature for a feeder, which ensures minimum spillage through the plates to efficiently deliver material for processing with mobile, semi-mobile and static In-Pit Sizing & Conveying (IPSC) units to offer the ultimate sizing solution.

The use of IPSC systems enables the use of conveyors for the long haul of material out of the mine, which in conjunction with fully mobile units eliminates the use of trucks for the long haulages. ■



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says APS represents latest generation technology and facilitates effective communication between surface vehicles. "Visitors to the Booyco Electronics stand at Electra Mining Africa 2016 will be able to experience first-hand how we have leveraged this electronic technology to enhance vehicle and operator safety in surface mining operations," he states.

He explains that as a leading supplier of reliable innovative mine safety related products, Booyco Electronics combines its in-depth understanding of conditions in both underground and surface mining operations with best practice engineering and manufacturing expertise to produce a line-up of technologically proficient solutions.

"The APS was developed in addition to our underground VLF system and it has been optimised for both the detection of pedestrian movement and more accurate detection of fast moving machinery in relation to each other," he says.

Safety will also be the theme of **Vital Engineering's** display at Electra Mining. "When it comes to safety in mining operations, there is no room for guesswork. That is why we ensure strict material controls for our products, which results in the benefits not only of minimising lost time injuries (LTIs), but of long life-cycle or LoM (life of mine) and low maintenance costs," says Dodds Pringle, MD at Vital Engineering and Angus McLeod.

The company, established in 1939, specialises in a range of fully serrated, multi-directional, non-slip floor gratings and stair treads, providing a durable, corrosion resistant and aesthetically pleasing solution for its customers. Under the brand name Vitagrid®, Vital Engineering's fully serrated gratings have been used extensively in large and small mining projects over many years.

Turning to tyres, **Continental** will – for the first time – be presenting a range of new



specialty tyres for heavy mining and earthmoving vehicles.

"As Southern Africa's largest mining, industry and electric trade show, Electra Mining Africa is a valuable opportunity to connect with customers across the conveyor belting, industrial hose and heavy automotive markets," notes Paul van Zyl, Marketing and Sales Administration Manager, ContiTech South Africa.

Tyres to be highlighted by ContiTech will include UnderGroundMaster, an L3-tread tyre designed for shuttle cars and face haulers in coal mines, and DrillMaster, which uses a V-ply construction for less movement of material, with strong sidewalls and high stability, and whose L4 deep tread is said to be ideal for drill rigs and service vehicles in below-ground environments. Also on show will be ScoopMaster, a V-ply tyre for load, haul, and dump vehicles, and EarthMoverMaster, which has an E4/L4 deep tread and is designed for articulated dump trucks, loaders and dozers, providing enhanced abuse protection for a longer service life.

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Booyco Electronics has leveraged its electronic technology to enhance vehicle and operator safety.

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INNOVATION IN MINING

Energy Solutions for Mining

Electrical power costs and uncertainty of supply, or even availability for new projects, is a major consideration for mines trying to ensure production and manage their future costs.

Initiatives underway by mining groups to create sustainable operations include; self-generation of power; investing in their own thermal power plants, using fuel cells, renewable power sources and using large diesel generators or sophisticated mechanised equipment. However, all such activities require substantial investments whose scale directly depends on how much power is really required.

Many mines have tightened up on power management since 2008. However, one of the largest and most energy inefficient technologies is still in widespread use – compressed air -- used to power pneumatic rockdrills. This accounts for a significant (and avoidable) chunk of a mine's energy usage.

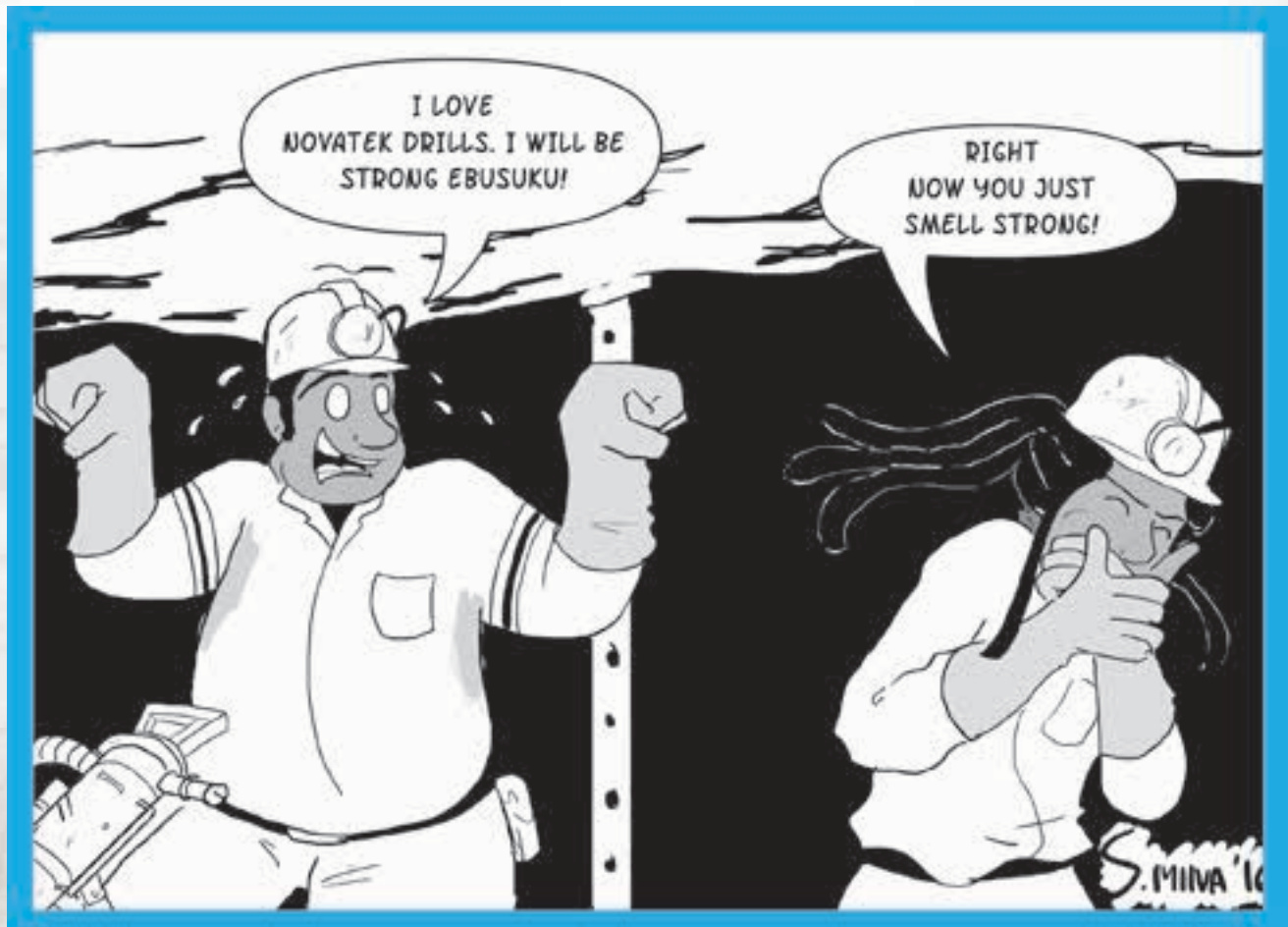
Novatek hydropowered rock drilling systems use 85% less energy to achieve the same result. Hydro drills are also much faster, drilling at more than 2x the rate of pneumatics, thus offering substantial productivity gains as well.

So why are mines still using compressed air? Largely because the systems pre-exist, infrastructure is in place and it is simply easier to maintain the status-quo. However, with rising power costs, this inefficiency carries an increasingly avoidable cost penalty.

The savings on energy costs and the productivity gains make implementing hydropower an economic proposition. Hydropowered systems can be implemented progressively, from a single stope system to complete raiselines to half-levels, etc. This avoids large single capital outlays and allows the technology to be rolled-out with little risk and at a manageable pace.

Given that 85% energy savings are possible with a proven, productive technology, hydropower should be seriously investigated as a demand-side part of mine energy planning.

Where mines want to move to more mechanised mining methods, Novatek are able to provide hydropowered solutions that are appropriate to SA mining conditions and skills. An example is the Modder E mine that uses the Novatek hydropowered stope drilling system, a low-tech mechanised solution that is also low cost, yet effective.





SureGO!'s floating bridge. The company envisages it being used in a variety of applications including mining where, for example, it could be used for crossing slurry ponds and settling dams.

special application belts the company will have on show are FortressXP, a heavy-duty conveyor belt that withstands the most arduous above-ground belting environments, CoalFlo, a solid woven belt for underground mining, available in both PVC and PVG, and Sicon, an extra-high flexibility belt that is enclosed from the feeding point to the discharge point.

Afrox, the leading industrial gases and welding equipment supplier, will demonstrate its move to solutions tailored for individual customers and will be joined on its stand by sister company, **Linde Engineering South Africa**.

“Our product service offers have shifted to focus on providing individual customers with bespoke solutions for their operations,” says Dhevan Moodley, head of Afrox’s Integrated Customer Solutions. “Our customers are under constant pressure to improve their efficiencies and Afrox recognises that to add value means understanding their operations and processes to offer services and products that are meaningful and beneficial to their needs.”

Among the products on display at the Afrox stand will be the AfroxPac 35i, a closed-circuit, self-contained, oxygen breathing apparatus designed for escape from oxygen-deficient atmospheres. AfroxPac 35i, which in the SA mining sector is used on average one million man-hours every day, uses an efficient bi-directional re-breathing system in

which exhaled gas makes two passes through the carbon dioxide removal/oxygen generation canister before the oxygen-rich gas returns to the user.

A further drawcard on the Afrox stand will be interactive live demonstrations by the ‘Kalahari Scientist’, aka Jonathan Hartley. The company says the not-to-be-missed, exciting and interactive science demonstrations by the ‘Kalahari Scientist’ will be a real education in the properties of hydrogen and oxygen, LPG and propane and nitrogen.

Finally, visitors to Electra Mining will be able to see what is billed as the world’s first safe and floating bridge prototype, which was designed and tested at the harbour mouth in Richards Bay in 2014. “The flexible and floating bridge was put to test for two months to see if it can endure strong storms and adjust to the ever-changing tides,” says Tex Neveling, owner of **SureGO!**

“What makes our bridges unique is that they provide the ideal solution to safely move from point A to point B, be it through walking or driving, over shifting surfaces. Our bridges prove to be a safe passage in areas with fluctuating currents, tides or water levels as well as in swamp and marsh areas with sludge and sand. SureGO! designed bridges change position and adapt according to the ever-changing environment, while ensuring continuous flooring and hand rail protection,” adds Neveling. ■

Aury Africa manufactures a range of high quality vibrating screens and screening consumables for the mining and coal industries.

Our range of products include:

- Vibrating Screens
- Coal Centrifuges
- Valves
- Wear Lined Pipes
- Centrifuge Baskets
- Screen Wear Parts
- Screening Consumables



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Suite of solutions from FLSmidth

FLSmidth has long been a leader on the African continent with its suite of minerals processing, materials handling and cement processing solutions, and its participation at Electra Mining Africa 2016 will underpin the importance that this region continues to have for the company.

With FLSmidth's ongoing focus on improving efficiencies, reducing costs and increasing throughput for its customers in the mining and minerals processing industries, the company's primary objective at the show is to interact with operational personnel from its customer base. To facilitate this, a team of technically competent individuals will be on hand at all times to discuss FLSmidth's solutions offering and how the various technologies can be leveraged to optimise efficiencies and increase throughput where relevant.

Terence Osborn, Sales and Marketing Manager – Precious and Base Metals at FLSmidth, says the nature of visitors that Electra Mining Africa draws makes it the ideal platform on which to engage at an operational level, and will allow the company to unpack its various support options that are geared at reducing total cost of ownership.

"Crucial to the successful operation of any minerals processing and materials handling equipment is the level of support that is rendered. FLSmidth has technically competent and skilled Customer Service teams that interact directly with customers on site," he says.

Another important aspect that will be covered is FLSmidth's extensive product and solution portfolio which has grown extensively over the last 15 years. "By discussing the full spectrum, we can assist customers in identifying other areas where we can assist in optimising a plant by introducing new technology," Osborn says.

An example would be the Reflux Classifier® (RC) which represents the latest in fine particle gravity-based separation technology. Already proven in gravity-based separation engineering in Asia, Australia, North America and Africa, Osborn says the RC is the next generation of fine coal and mineral processing equipment and is more efficient and compact than competing fine coal and mineral processing equipment such as spirals, up-current classifiers and teeter bed separators.

Another technology that has been successfully applied by FLSmidth is its VXPmill,

which has established a benchmark in the regrind of gold flotation concentrates resulting in significantly increased gold recovery. This technology will be particularly important now and into the future since ore grades are declining and minerals becoming more finely disseminated within the ore. Successful recovery hinges on liberation of the minerals and conventional grinding technologies are not able to efficiently achieve the fine product sizes required.

A further example of how FLSmidth's ongoing research and development has benefited the minerals processing sector is the nextSTEP™ rotor/stator. This combination represents the newest design in forced-air flotation technology and offers major advantages to the market. The design of the stator was reinvented in the development of the nextSTEP™. Slots were added to the stator, making energy dissipation more uniform and resulting in a higher probability of bubble particle contact during the flotation process.

Osborn says that reducing energy consumption is a prime focus on mines today and notes that it can be dramatically reduced through more effective dewatering.

FLSmidth has a broad product range suitable for sedimentation, filtration and drying technologies. Access to this wide range, together with its expert personnel, enables the company to structure a fit-for-purpose solution that will meet individual application needs and – with many different in-house technologies available – ensure selection of the best solution in each unique case.

"A solution that has been proven internationally by FLSmidth and that will allow mining companies to reduce their environmental impact is the dry stacking of tailings. This is used instead of the traditional wet tailings depositional facility and is particularly suitable for arid climates where water is scarce," he says. The FLSmidth Rahco® brand comes with over 60 years' experience in leveraging technology to provide solutions to the mining, aggregate and bulk solids industries. ■



Disc maintenance on the VXP1000 can be done safely from below the grinding chamber.

"Crucial to the successful operation of any minerals processing and materials handling equipment is the level of support that is rendered."



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Hytec Group and Bosch Rexroth to join forces at Electra Mining

Hytec, Hytec Fluid Technology, Hydraulic & Automation Warehouse, Hytec Services Africa and Hytec Engineering – all part of the Hytec Group of Companies – will be collaborating at Electra Mining Africa 2016. In addition, Hägglunds, part of Bosch Rexroth, will be joining the Hytec Group on its stand to display its 'Gearbox Eliminator' to strengthen the position of the Hytec Group as a leader in Africa in hydraulic sales, service and repairs.

H ydraulic & Automation Warehouse (HAW), the master and authorised distributor for hydraulic equipment manufacturers OMT and Salami respectively in sub-Saharan Africa, will showcase these product ranges at the exhibition.

The Salami ranges include gear pumps and motors, load sensing valves and manual control valves while OMT's range of hydraulic accessories includes bell housings, drive couplings and level gauges. These new hydraulic offerings complement HAW's already extensive range of products and accessories for mobile hydraulic machines, which will also be on display at the exhibition.

The group's hydraulic fluid specialist, Hytec Fluid Technology (HFT), will be displaying mobile filtration kits. These kits are used by major OEMs. The Hy-Pro Bulk Diesel Filtration Test Rig will also be featured at the stand. This test rig is Hy-Pro's coalescing/separator technology that removes water and dirt from diesel. A range of hydraulic filtration products and fluid cooling systems will also be exhibited.

In addition to the latest hydraulic systems and components and advanced pump and motor refurbishment capabilities, Hytec will display a Hydrostatic Drive Unit. The unit, equipped with hose connections, will demonstrate its various control functions for all mobile applications.

Hytec Engineering will have on show its cylinder repairs 'before and after' units as well as a range of newly manufactured cylinders

Above: Gear pumps and motors, load sensing valves and manual control valves from Salami will be featured on the Hytec stand.

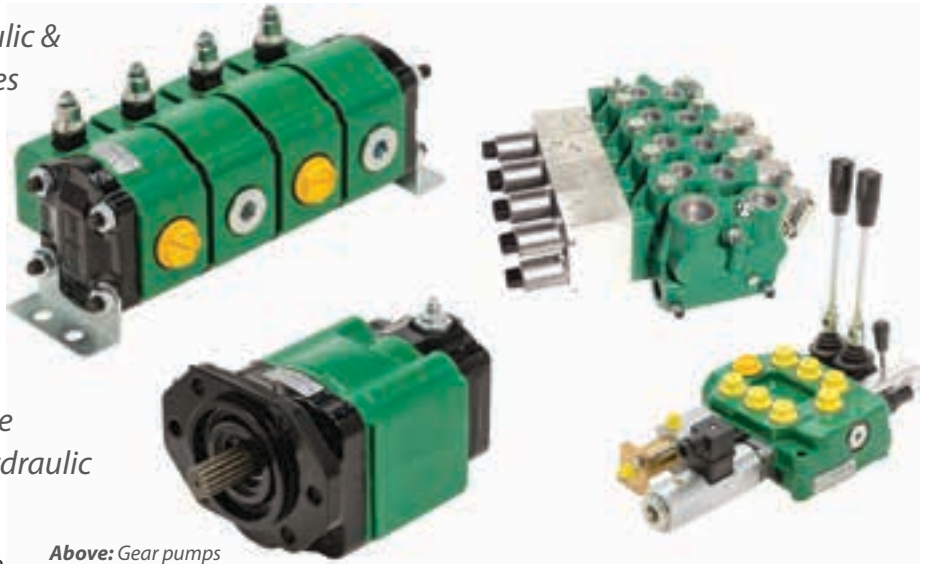
Right: A test rig of Hy-Pro's coalescing/separator capable of removing water and dirt from diesel will also be on display.

for mobile machines.

These two companies within the Hytec Group are the only companies in Africa accredited with the stringent Bosch Rexroth Service Centre of Competency certification, which they were re-awarded with again in 2014.

For visitors coming from the rest of Africa, Hytec Services Africa (HSA) will be available to discuss the Group's product and systems distribution, as well as service and support capabilities throughout sub-Saharan Africa. HSA will present its most recent expansions into African markets.

As mentioned, the 'Gearbox Eliminator' from Hägglunds will be on display. This gearless hydraulic drive system can provide maximum torque from zero speed with variable speed control. The power unit is of a closed loop hydraulic system design for continuous duty, suitable for high torque low speed applications. ■



Multotec expertise on show

Multotec Group says it will reinforce its industry-leading position within the minerals processing sector by demonstrating its in-depth knowledge and understanding of industry relevant topics and trends at this year's Electra Mining Africa (EMA) exhibition.

In response to the industry's need for cost effective equipment and service innovations aimed at delivering optimal processing efficiency, Multotec is offering an added value attraction to its EMA stand this year. The group will host a series of talks, presentations and panel discussions at regular intervals throughout the week to educate the sector and highlight its technological expertise across various minerals processing applications. The events will be presented by a number of local and international speakers from within the Multotec stable, as well as various industry and institutional partners.

Multotec will have a wide range of its proprietary technologies and solution driven equipment on display at EMA to demonstrate its high level minerals processing expertise.

Among them will be the Hawkeye predictive maintenance for system for screening. Unplanned shutdowns, which often result in the costly loss of production hours, can be avoided using Hawkeye predictive maintenance services. Precise measurements based on wear rate history facilitate consumption

projections with accurate timeline predictions for parts replacement, thereby ensuring maximum equipment performance and availability.

Multotec's composite screen deck designs will also be on show. The company has the in-house flexibility to optimise the performance of any screen by customising a solution specific to the needs of individual applications. There are no limits to its capabilities in this processing area with a range of products that extends from polyurethane to rubber and wedgewire.

In the field of milling, Multotec has developed a state-of-the-art technology which allows customers to monitor milling performance. Having recognised that this particular circuit can directly impact downstream recoveries, Multotec will highlight how its customised, integrated linear measurement reporting system delivers this functionality which will ultimately help improve the overall performance of any processing plant.

Conveyor belt technology on show will include the MATO mechanical belt fastening system, which is produced using 75 % local content. It can deliver a seamless joint in less than 30 minutes, which is considerably less than the traditional hot splice method which can take up to six hours. Again, this solution from Multotec is assisting its customers reduce operational downtime.

The system's Lacer Head is interchangeable throughout its range of fasteners and lacing beds which reduces the number of tools and parts needed on hand.

The MATO Wavemaster specifically guarantees straight and smooth belt joints flawlessly and consequently eliminates joint failure.

Another product in the belting field is the Mato belt cleaning range. The primary and diagonal conveyor belt cleaners are part of Multotec's comprehensive offering which ensures the highest belt operational availability. On the back of significant success with the product, the company introduced the MATO secondary belt cleaner which incorporates the unique, quick-change M-Track technology which features a slide-on-blade that

Multotec's wedgewire manufacturing facility situated in Spartan.



further reduces maintenance downtime.

Multotec will showcase its T-range series of 26 inch (T660) cyclones at EMA. These cyclones are claimed to be ideal for brownfield operations, an area which is rapidly gaining momentum in the mining industry in a low capital expenditure environment.

Multotec is known, of course, for its sampling technology and will be displaying the rotating cone sampler, a patented Multotec technology which overcomes the limitations of fixed cutter or pressure pipe probe designs. Sample integrity is enhanced due to its proportional design which provides on-line analysers with accurate sampler designs which take continuous full stream samples (and not portions of it) to deliver precise results on a continuous basis.

Multotec's pulping chute and the MultoCano chute system will also be featured. The pulping chute is a viable alternative to conventional rotary scrubbing units and is said to be particularly effective in the diamond industry while the MultoCano chute system offers real on-site benefits which are realised even before it reaches site.

Suitable for transport on a regular flatbed



truck (with less rigging equipment and personnel), the MultoCano system offers significant transport saving costs. It is also easy to offload with just a forklift. A team of three can comfortably assemble the chute system on site, even in confined spaces. It is easy to extend and the modular panel design ensures fast and easy replacement. ■

Spirals specifically benefit from test work because results cannot easily be predicted using mathematical modelling alone.



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Aftermarket focus for Manitou

According to Manitou Southern Africa (MSA), a particular focus of its stand at Electra Mining will be its aftermarket service and support offering but it will also be exhibiting recent machine and attachment innovations.

Products on show will include an enhanced 28-ton conveyor belt handler attachment proven to reduce mine conveyor belt handling time from days to hours and a 16-ton tyre handler attachment, representing a 5-ton improvement on its 11-ton predecessor.

Also featured will be an upgraded Manitou 35-ton tow tractor designed for underground use but also fully adept in aboveground mining applications.

MSA handles the Gehl range locally. New models include the Gehl AL 650 and Gehl AL 750 articulated loaders with rated operating capacities of 2 800 and 3 300 kg respectively. The latter will be showcased at this year's EMA.

"In addition to developing cost-effective machinery and equipment, after delivering the required equipment, standard or customised, we focus on providing customers with exceptional aftermarket support," says Lindsay Shankland, MD of MSA. "Our aim is to ensure they get the best value for money through effective equipment maintenance and support, long after the original purchase or rental agreement."

MSA's service and maintenance contracts form the bulk of its aftermarket offering, which is provided 24/7 in line with industry standards and offered by each of Manitou's 14 dealerships countrywide and over border. Elements of the

offering include rapid response for critical breakdowns with Manitou technicians positioned to respond within four hours, dependent on geographic limitations.

A 95 % stockholding of all movable parts ensures fast turnaround times.

The company's full maintenance contracts include all parts, all labour and all travelling with a guaranteed cost for five years or 12 000 hours.

A recent innovation from the company has been the establishment of a short-term rental fleet. This service was launched with 11 machines but the fleet has subsequently grown to 35 machines. It comprises telehandlers, access platforms, skid steers and track loaders, forklifts and rough terrain forklifts.

"Our customer-centric approach with an increased focus on aftersales service and aftermarket offerings has helped MSA achieve significant growth," says Shankland. "We have outgrown our current premises and the opening of our new premises coincides with Electra Mining Africa 2016. These premises, comprising 15 000 m² in Chloorkop, Gauteng, are also tailored to customer service with no less than 4 980 m² dedicated to workshop facilities and a 5 000 m² warehouse to be completed by 2018.

Some of Manitou's partners will be participating on its Electra Mining stand. They include Jewll Mining for flameproofing; 5DT, the simulator training and virtual reality experts; and Dynabolt, working in conjunction with Manitou to develop roof bolters and drilling machines. ■

"Our customer-centric approach with an increased focus on aftersales service and aftermarket offerings has helped MSA achieve significant growth."



The Manitou ManiTrax 35-ton tow tractor is designed for underground and confined spaces. It has received various modifications since it was unveiled at EMA 2014.

MBE Minerals has a 40-year track record in

A leading supplier of minerals beneficiation technology to the African mining sector, MBE Minerals will be participating at the show. "This is a significant year to be attending Electra Mining Africa as MBE Minerals will be celebrating 40 years of successful operation on the continent," Kottmann says.



Pneuflot® cells are simple in design, with a high yield of froth product.

Technically competent personnel will be on hand at the MBE stand to discuss the various technologies available from the company. These include Pneuflot® flotation technology which continues to attract global attention as a flotation technology of the future. Kottmann says that there are 82 installations in coal globally and in magnetite and haematite (itabirite) flotation in South Africa.

According to Kottmann, the Pneuflot® flotation cell improves product quality and recovery, delivering lower capital and operating costs, as well as significantly lower wear costs and higher efficiencies. It features a unique design with no rotating parts, achieving low energy consumption and less wear-and-tear than conventional agitator cells.

Also on show will be the company's BATAc® jig technology. This, says Kottmann, has been field-proven through extensive and diverse test work to deliver higher efficiency, huge economic benefits, better product quality, better machine availability and higher throughput rates. The main advantages are its excellent separation accuracy, its relatively small footprint and its comparatively low capital cost.

Discussing other product lines to be exhibited, Kottmann says the company's ROMJIG® has proved particularly suitable as a reliable and economical solution in destoning raw coal. "The lower percentage of refuse in the washery feed means reduced wear on machinery and transporting equipment, less grain degradation,

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less dust and slurry, and reduced consumption of flocculation and flotation agents in downstream fines recovery circuits," he explains.

The robust Jones® Wet High Intensity Magnetic Separator (WHIMS) offers a high throughput capability coupled with simple maintenance and lower energy consumption. The WHIMS is claimed to be ideally suited to treating feebly magnetic minerals with a particle range from 20 microns up to 1,5 mm with unit throughput capacities from 500 kg/h up to 250 t/h.

Significantly, MBE Minerals SA has installed the largest WHIMS plant in the world outside of Brazil in the Northern Cape.

The Permos® Medium Intensity Magnetic Separator (MIMS) drum type unit from MBE Minerals SA is suitable for materials which can be attracted by a field strength of between 2 000 and 5 000 Gauss. Kottmann says there are designs for both dry and wet feeding available.

The Palla Mill® offers the flexibility of being suitable for wet and dry applications in primary and secondary grinding and for pulverising materials of any hardness. This technology has a major advantage over other machines as it is capable of grinding more than 100 different materials, including a range of minerals and commodities previously considered unviable due to the costs involved.

MBE Minerals SA also manufactures a variety of vibrating screens, available 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. The company's screens have been operating in the African mining industry for the past 40 years, mainly in the coal, diamond and iron ore sectors.

With products for sizing, scalping, dewatering and media recovery, the company's screens feature an innovative side plate mounted drive, making them lighter than those using vibrator motors. MBE Minerals SA also supplies screens with vibrator motors where required, while its resonance screens offer the benefit of low power consumption. Each screen is designed with sound mechanical features including vibration damping, side plates, cross members and the appropriate feed and discharge chutes. All types of screening surfaces can be accommodated.

The South African company receives expertise and technical support from its worldwide network, including the MBE Coal and Minerals Technology's R&D centre in Cologne, Germany. The R&D centre consults with customers from all parts of the world with regard to optimum processing and this service is backed up by an in-house laboratory facility and pilot test work capabilities. The centre is also used as a training facility for customers, either on general mineral processing or on the operation and maintenance of specific MBE equipment. ■



The BATAK® jig has a relatively small footprint and offers excellent separation accuracy.

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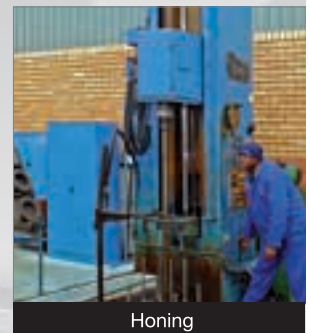
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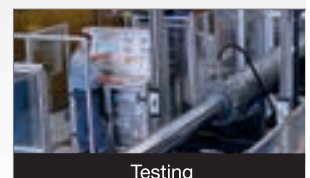
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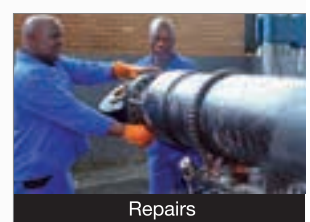
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Zest WEG enhances its production capability

It is never just about supplying products or technical support to the market. It is also about implementing best practice across all companies and in particular manufacturing operations.

Louis Meiring, CEO of the Zest WEG Group, says that it is this operating philosophy that has seen the Group's holding company, WEG Brazil, continue to invest in the local operation's manufacturing facilities. Significantly, Zest WEG Group will be exhibiting its locally manufactured custom equipment at Electra Mining Africa 2016.

Meiring says that the most recent investment has been in best practice production control programmes that will allow the Zest WEG Group manufacturing operations to improve processes, thereby accelerating production and meeting the shortened lead times which have become the norm in the market.

He explains that the decision to introduce WEG's manufacturing planning and execution system into the South African operations



forms part of the global sustainability strategy. "It was always the intention to implement best practices at these facilities with the ➤

Zest WEG Group generator set manufacturing facility in Cape Town.



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◀ long term objective of enabling these manufacturing plants to produce product for the international market,” he says. Eventually, WEG will be able to manufacture at any of its centres worldwide.

“Zest WEG Group as an organisation is very excited about this step and particularly the very clear benefits that our customers will see,” Meiring continues. “It will make a massive contribution to the success of our local manufacturing facilities and put us into the international space.”

Juliano Vargas, Zest WEG Group Logistics and Operations Director, explains that the manufacturing planning and execution system being used is well proven at other WEG manufacturing facilities.

“The system facilitates full control of all our manufacturing operations, and importantly provides accurate cost and time control. Access to this level of information allows a high degree of certainty and creates an environment where customers can have complete confidence and comfort,” Vargas says.

“Continuous improvement programmes have ensured that the system functions optimally and what is most important is that the system implemented at the South African manufacturing operations has been localised,” he explains. “This means that South Africa was able to draw on the experience of all WEG facilities with the result that the system considers the exact Zest WEG Group operational conditions while still achieving best practice criteria.”

Zest WEG Group currently operates four separate manufacturing facilities, these being Shaw Controls, WEG Transformers Africa Wadeville, WEG Transformers Africa Heidelberg and Zest WEG Group Generator Sets Division.

Vargas says the system will enable greater and transparent communication with customers in terms of the status of each order. “Access to information is in real time and is so specific that at any point in time a customer can find out the exact stage at which the product is during the manufacture process,” he observes.

Commenting on the actual implementation, Vargas says that the planning stages started mid-2015 when the alignment between the Zest WEG Group and the WEG teams was made.

In November 2015, a team of skilled practitioners from WEG Brazil visited the South African facilities to assess these operations and establish the status compared to WEG global best practices in manufacturing. This took place over a three-week period to ensure in-depth assessment of all four facilities.

Comparisons were done with WEG facilities in Colombia, Brazil and Mexico. These operations produce the same or similar products which meant that the manufacturing processes are the same and similar. These facilities already complied with WEG best practices, and Vargas says that some had done so for more than twenty years.

“The resultant gap analysis between the Zest WEG Group status and that of WEG’s best practices formed the foundation from which the implementation stage began,” Vargas notes.


The gap assessment was discussed in depth with WEG Brazil and the implementation plan was developed in conjunction with a local partner in South Africa. The implementation phase started in March this year and the system went live in mid-June with the support of the full team. ■

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
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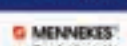
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FLSmidth provides package solution for Husab

The Counter Current Decantation (CCD) thickener circuit at Swakop Uranium's Husab project demonstrates the potential of an FLSmidth package solution. Designed and supplied by FLSmidth, this CCD circuit has the largest diameter thickeners of their kind to be installed on the African continent in this type of application.

Located near Swakopmund on the west coast of Namibia, Husab will reportedly be the largest open-pit uranium mine in the world, and will mine 150 million tonnes of rock per year and produce over 15 million pounds of uranium oxide.

The shareholders of Swakop Uranium are the Republic of Namibia, through state-owned mining company Epangelo, and the People's Republic of China, through state-owned CGNPC.

The scope of the FLSmidth order for the Husab CCD circuit comprises eight 40 m diameter thickeners. One is a high density pre-leach feed thickener and the other seven are high rate CCD thickeners. FLSmidth is also supplying a 25 m diameter ADU (ammonium diuranate) high rate thickener for installation further down the process. In addition to this, 38 Krebs® centrifugal pumps will also be installed in all slurry pumping applications on the project.

Describing a CCD thickener circuit, Terence Osborn, Sales & Market Manager, Base and Precious Metal for sub-Saharan Africa at FLSmidth, says the technology is used to recover soluble metal as pregnant liquor solution from ore leach residue.

The basis of CCD operation is to concentrate the leached solids, thereby minimising liquor content in the underflow slurry that flows in one direction. The underflow slurry is then diluted with wash liquor that flows in the opposite direction, while the leached solids are concentrated repeatedly. The amount of liquor in the thickener underflow contributes to determining the number of CCD stages required to recover the desired amount of soluble metal.

The nature of the process means that pumps are integral to the CCD circuit as these transfer the solution and the slurry from one stage to the next. Slurry being transferred has a very high density which maximises the wash efficiency making this type of application specifically



FLSmidth 40 m diameter CCD thickeners installed for Swakop Uranium.

suited to Krebs® pumping technology.

"The Krebs® pumps are well matched from a process performance perspective and the ideal pump for the transfer of material between the stages within the CCD circuit. Centrifugal pumps are capable of achieving the high flow rates required in this application and the Krebs® pump has the added benefit of its patented wear ring design which minimises wear enhancing pump performance and life," Osborn says.

It is significant that Krebs® pumps were

selected for the transfer of slurry from the underflow. The majority of pumps installed are Krebs® slurryMax™ units with a smaller number of Krebs® millMAX™ pumps being used.

The tailings pumps, also supplied by FLSmidth, have been installed in series. These Krebs® slurryMAX™ pumps will facilitate the transfer of material over the extended distance from the process plant to the tailings storage facility.

Terence Osborn, FLSmidth, tel (+27 10) 210-4820

Innovative prototype fan to be installed at Mponeng

Local fans and ventilation firm MechCaL has been appointed by AngloGold Ashanti to install a vapour compressor fan prototype at Mponeng mine.

The fan will be installed as part of a vapour compressor which is an integral part of a vapour compression refrigeration plant at Mponeng. The fan in question will form a flexible blade compressor that leverages the outstanding strength of high end composite materials. The prototype has been in development since 2012. Refrigeration plants are generally required in deep level mining where underground rock temperatures exceed the legal limits and the air needs to be cooled down to acceptable working environment levels.

According to Michael Minges, Director of Operations at MechCaL, the use of carbon composites allows the product to be used in extreme operating conditions of high loads. The fan is also suited to applications in refrigeration plants and desalination plants.

MechCaL's patented designs are coupled with the use of light weight composite

materials to create fans that boast increased efficiency, operational and energy savings, and lower mean time between failures.

"The use of composites in these systems is a niche application and use of such materials allows us to re-engineer the vapour compressor and blades that can withstand the highly loaded application where each blade experiences loads of up to 70 tonnes," says Minges. "These are mainly due to centrifugal loading, as the fan of 2,4 m outer diameter spins at levels of close to 3 500 rpm.

"Some tricky design issues needed to be addressed with innovative and well-engineered solutions that address issues such as the blade tip speed crossing the sound barrier at 400 m/s at 120 deg C and reaching speeds of 440 m/s. It is also critical to ensure that during the operational running of the fan the natural modes of the structure do not get excited – which makes the stiffness design of the fan blade material layout of vital importance."

MechCaL, website: www.mechcal.co.za

Increased efficiency with Cavex® hydrocyclones

Weir Minerals Africa reports an increased demand for its range of Cavex® hydrocyclones in DMS applications.

This statement is underpinned by the most recent installations for major blue chip mining houses, and Sheldon Gabriel, Product Manager Cyclones at Weir Minerals



A Cavex® DMS cyclone installed in a coal application.

Africa, attributes this to the increased separation efficiencies being achieved using Cavex® DMS hydrocyclones.

“During the Dense Media Separation (DMS) process, it is the ability to recover more economically valuable minerals that is considered vital and for this reason reduced turbulence in the cyclone plays a very real part in the process,” Gabriel says.

The inlet design of the Cavex® hydrocyclone has been engineered to reduce turbulence using a unique laminar geometry. The profile of the inlet section has been designed to incorporate an extended or 360 degree scroll and to eliminate any sharp or square edges or corners that are commonly found in conventional cyclones.

“This design allows the slurry to flow into the hydrocyclone with less resistance consequently reducing interparticle collisions, and this reduces turbulence and

friction inside the hydrocyclone,” Gabriel notes.

This greatly reduced turbulence results in a significant increase in separation efficiency, as the residence time in the separation zone is increased. Another advantage when compared with conventional cyclones is the reduction in misplaced particles in both the overflow and underflow streams.

“It should also be obvious that with such a marked reduction in turbulence and friction, there will be significantly reduced wear,” Gabriel adds.

In coal and similar applications where highly abrasive slurries are transported, ceramic tiles are engineered specifically for use in the inlet section of the Cavex® DMS hydrocyclone.

Tumelo Matsebedi, Senior Process Engineer Hydrocyclones at Weir Minerals Africa, says these specially designed radius tiles assist in maintaining the more rounded profile of the Cavex® in applications such as this.

“This further enhances the wear resistance capability of the hydrocyclone, and in extremely high wear applications where very abrasive slurry is being transported, the hydrocyclone could be lined with a variety of specialised ceramics and other exotic materials to ensure optimum wear life,” Matsebedi explains.

He adds that hard metal cyclones with a minimum of 27 % chrome content are considered ideal for diamond and chrome processing operations. This is because this metal alloy is able to withstand the impact forces while at the same time providing a smooth surface for the easy transfer of the material.

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

Rope access specialist assists Malian gold mine

When a gold mine in Mali required maintenance on a critical telecoms tower, it turned to leading rope access specialist Skyriders to not only provide the safest solution, but also to carry out and supervise all of the necessary work.

The South African company already undertakes yearly inspection and maintenance on the main smokestack at the gold mine, explains Skyriders’ Marketing Manager, Mike Zinn.

It was then approached by the electronics and instrumentation team from the mining company to provide an appropriate solution for the telecoms tower project.

Skyriders undertook the once-off project in a record six days, deploying a two-person team of Level 3 IWH technicians, which is

the highest level of rope-access training.

“Access to the top of the telecoms tower is not that restricted, but you are limited as to what you can do up there safely,” Zinn comments.

The scope of work for Skyriders consisted of replacing lightning rods, installing a new cable all the way up the telecoms tower, removing antennas, and welding on brackets where necessary.

Zinn stresses that Skyriders specialises in providing customised solutions for such unique projects. “We have the necessary training, expertise and equipment to come up with total solutions for all our clients’ requirements, in the safest and most cost-effective manner possible,” he concludes.

Mike Zinn, Skyriders, tel (+27 11) 312-1418

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Maptek and VUMA collaborate on mine ventilation solutions

Maptek and VUMA, a subsidiary of Bluhm Burton Engineering Pty Ltd (BBE), have executed a memorandum of understanding to facilitate collaboration and cooperation around mine ventilation solutions and mine design.

The primary focus will be on enabling detailed data transfer between Maptek Vulcan mine planning software and VUMA ventilation simulation software.

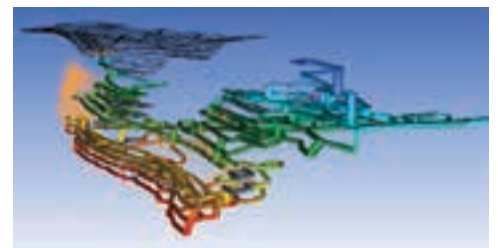
VUMA software has been developed for analysis of underground mine ventilation, contaminant tracking, refrigeration and cooling networks. The heat engineering balance can be examined in detail, taking into account all factors contributing to heat load, including equipment, advance rates, heat from broken rock and mine design.

Vulcan software provides advanced underground mine design, planning and scheduling tools. Enabling detailed design, survey and operational data to be transferred to VUMA software will deliver gains in accuracy, efficiency and speed for analysis and planning around ventilation and refrigeration in underground mines. This also allows ventilation factors to be considered earlier

in the mine planning process.

"VUMA is an impressive software suite. Integrating VUMA with Vulcan offers huge benefits to mine planning departments," commented Maptek Africa's General Manager, Nick Venter.

"It will allow mine survey and design data to be used in ventilation and cooling analysis, without replication of data, and ensures accurate, current representations of the mine surface can be applied to ventilation planning."



VUMA software has been developed for the design and analysis of underground mine ventilation.

Maptek, website: www.maptek.com or VUMA, website: www.vuma.co.za

Drives supplied to Lift II project at Palabora Copper


BMG has supplied external mechanical drives for the PC Lift II project at the Palabora Copper Mine through RSV SA.

"These mechanical drives, which will soon be installed on underground conveyors at the mine, comprise the largest motors supplied by BMG to date. These 630 kW, 4-pole, 11 kV BMG motors were designed and assembled by the BMG technical resources team," says Clive Dicks, BMG's Sales Manager, Projects. "The order encompasses a 75 kW complete drive for conveyor CV26 and six 630 kW complete drives for conveyors CV23 and CV25. These drives consist of BMG electric motors, Paramax gearboxes, couplings, guards and complete base plates.


"BMG has also supplied six Marland external holdbacks, with load sharing capabilities, and some of the belting required for these conveyors."


Clive Dicks, BMG, tel (+27 11) 620-1512


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Slurry Blaster deployed at DRC mine

Rapid sediment build-up in acid ponds can have dire results for mines as the reservoirs gradually lose their ability to store solution, impacting on both upstream and downstream processes.

This is exactly what happened at a copper mine in the DRC when two of its acid ponds silted up completely resulting in no solution capacity whatsoever.

Previous attempts at solving the issue were not successful due to the abrasive nature of the silt and solution that needed to be removed from the ponds. Integrated

Pump Rental was able to apply its latest technology and resolve the issue for the mine.

Lee Vine, MD of Integrated Pump Rental, says that the company's Slurry Blaster hydro mining equipment solution was deemed the most appropriate for this harsh application.

This locally developed and manufactured equipment offers optimum performance coupled with reliability, and this, according to Vine, was exactly what was required to hydro mine the slime out

of the ponds. "Not all applications are the same and for this reason, and after assessing the specific requirements on site, we custom built a Slurry Blaster unit for this particular task," Vine says.

All stainless steel components including pumps were used for the pontoon-mounted Slurry Blaster. The system comprises a 90 kW feed pump with float, two 30 kW slurry pumps for the removal of the slurry, a 200 m heavy duty hose and electric control panels for protection for the pumps.

The two acid ponds are identical; each is 100 m by 50 m and 6 m deep. The unit operated at a 7 bar pressure and discharged material at 80 litres per second with a concentration by volume of 70%. It took a month to clean each dam.

Integrated Pump Rental has an existing footprint of local partners in Africa and this ensures that the teams operating the equipment are familiar with local conditions.

Lee Vine, Integrated Pump Rental,
tel (+27 72) 627-6350



The Slurry Blaster hydro mining equipment solution in operation at a copper mine in the DRC.



Charting a course to excellence with specialised services across Africa

Afrimat Limited has established a strong foothold in contracting services through its Contracting International division operating from the Western Cape and Gauteng. Services include mobile crushing, screening, drilling and blasting, which offers mobility beyond fixed areas of operation.

Afrimat offers blast designs for bulk blasting in quarry and opencast mining and specialised restricted blasting in built-up areas. The division operates internationally through a mobile hard rock crushing and screening service.

Contracting International uses its expertise in fields such as drilling and blasting, load and haul, crushing and readymix concrete processing to prepare bids for major clients in the construction industry.



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

max

Affordable mill liner monitoring system

With the volatility of commodity prices today, it is critical that mines are able to optimise the operating costs of the entire plant, and this need has seen an increased focus on achieving the desired grind efficiency in mills.

While each mill liner profile is designed to provide the correct trajectory to achieve either impact grinding or attrition grinding depending on the specific application, wear on the mill liner profile will affect the grind efficiency.

Matthew Fitzsimons, Technical Manager of Multotec Rubber, explains that it is important to understand that the wear rate of liners is not linear and that, as the liners wear, the increased slippage of the charge increases the wear on the liners.

"This can, in turn, rapidly decrease the grind efficiency of the mill due to the trajectory in the mill being sub-optimal and the energy transfer for breakage is reduced," he says.

It is for this reason that condition monitoring of mill liners, whether steel or rubber, is necessary. Regular inspection of the liner profile will allow historical data to be collated which will facilitate liner life predictions.

Describing how liner inspection has been done traditionally, Fitzsimons says that until recently there have only been two options available, one of which is the pin gauge method which is known to be time consuming and often inaccurate. Furthermore it requires that the mill be stopped to allow access for personnel to actually perform the inspection. At the other of the scale is very expensive sophisticated technology.

Fitzsimons confirms that Multotec Rubber recently introduced what he says is set to become the most affordable best practice mill liner profile condition monitoring system because it offers high accuracy and immediate availability of information at a reasonable cost.

"With the introduction of MultoScan, it is now possible for plants to accurately measure the liner profile and, using this information, end users can easily and accurately predict the lifespan of the liner and the point at which the mill will become inefficient," he says. The automatic measurement and display of the charge level is valuable in confirming that the operation of the mill is correct and this value is essential in calculating the trajectory.

Highly skilled technicians take the data acquired by MultoScan and leverage Multotec's Hawkeye proprietary programme to interpret and analyse the data.

Significantly there is no time lag on the

information analysis and the level of responsiveness possible using MultoScan has not been available to plants until now.

"It will allow customers immediate feedback on the condition of the liners and any immediate issues can be addressed on the spot," Fitzsimons says.

Fitzsimons explains that MultoScan has been proven in field trials in some of the most arduous milling conditions on the African continent.

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



Multotec personnel discussing captured MultoScan wear profiling data on tablet.

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New technology generates power from conveyor belts

Martin Engineering has introduced an innovative technology that uses the kinetic energy from a moving conveyor belt to generate enough power to run a wide variety of electronic systems. The company has designed the Martin® Roll Gen™ system to create a self-contained mini power station that allows operators to run electrical monitoring systems and safety mechanisms.

Able to be retrofitted on existing idler support structures, operators are not required to maintain a special stock of conveyor rollers, as the generator can be employed on virtually any steel roller. The device is considered a first step toward eliminating power production obstacles,

as conveyors move into the next generation of 'smart systems' that are predicted to be more sustainable and autonomous.

Running auxiliary power can be both complicated and costly, says Martin Engineering, requiring expensive labour and oversized cables to accommodate the inevitable voltage drop over long runs, as well as transformers, conduit, junction boxes and other components. Using even a small conventional generator to provide power introduces a different set of issues, including flammable fuels.

In many operations, this lack of available power means that any monitoring of the conveyor must be done by technicians physically walking the length of the structure, which can be a difficult and time-consuming task when the systems are long and span difficult terrain.

A more efficient approach is to employ sensors to transmit important data from remote points to a central location where it can be monitored in real time and recorded for later analysis. But intelligent monitoring systems for any conveyor system require power for extended operation. Due to the distances involved, cabled communication systems are not ideal, and therefore wireless communication

systems are more advantageous.

Options such as solar power are not well suited to the general conditions of a conveyor system, as monitoring devices are often required in an enclosed structure without access to sunlight, or for continuous operation during both day and night.

"We found that we could draw energy from a moving belt by attaching an independent generator directly to one of the rollers," said Paul Harrison, Martin Engineering's Global Engineering Manager. "This way, the conveyor could produce power without altering the structure of the system or affecting its physical configuration."

Being able to add a generator to a roller delivers the benefit of utilising the proven reliability of existing roller designs, while drawing power from the belt for a wide variety of electronic devices. Product engineers developed a design to accomplish this through the use of a magnetic coupling that attaches to the end of an existing roller.

The outside diameter of the generator matches the diameter of the roll, but places the generator outside the material path to avoid the heavy loads and fugitive material that tends to damage existing design attempts. The roll generator is held in a fixed position by the roll support system, but is not normally required to bear any of the material load.

In the new, patent-pending design, a 'drive dog' is attached to the end face of the roll that is resting on the generator, using magnets. The drive dog engages the generator through the outer housing's machined drive tabs. The magnetic attachment ensures that electrical or mechanical overload does not force the roll to stop; instead the magnets will slip on the roll face.

The conveyor roll loads are carried by the large support shaft in the generator, which does not rotate and is rigidly mounted to the idler support structure. The generator forms a lightweight driven unit that does not affect the existing roll in any way, except to be rotationally engaged via the magnets, and so draw a small amount of mechanical power in order to generate the electrical energy.

Martin Engineering, tel (+27 13) 656-5135, website: www.martin-eng.co.za



The Martin® Roll Gen™ system is a self-contained mini power station.

Compact version of switchgear introduced

ACTOM MV Switchgear has recently developed and introduced a compact version of its new generation AMV12 air-insulated indoor switchgear.

The AMV12 range, rated for 12 kV with current ratings of 1 250 A and 2 500 A at 31,5 kA in accordance with IEC 62271-200, has reportedly proven to be highly successful since its launch into the market in January 2015. Over 300 panels have already been sold and supplied to numerous customers, which include Johannesburg's City Power, the City of Windhoek, Hessequa Municipality (Stilbaai), CONCO and DRA.

The supplementary compact version now on offer has been developed specifically for use in instances where space constraints apply. The width of a compact panel, which has a current rating of 800 A, is 650 mm, while individual standard AMV12 panels are available in widths of 800 mm and 1 000 mm.

"A single compact unit is 18 % smaller

in width than one of our standard 1 250 A rated AMV12 units. This translates into a space saving of between 14 and 18 % for a typical switchboard, depending on the busbar rating and mix of compact versus standard units making up the complete switchboard," commented Greg Whyte, ACTOM MV Switchgear's Design & Development Manager.

The new compact unit has been type-tested and certified in accordance with the IEC System for Conformity Testing and Certification of Electrical and Electronic Components, Equipment and Products Certification Bodies Scheme.

The type-tests on the compact AMV12 panel assembly, complete with circuit-breaker, earthing switch and cable-side voltage transformer, were carried out overseas through the well-known international certification body TUV Rheinland in January this year.

Greg Whyte, ACTOM MV Switchgear, tel (+27 11) 820-5140

Rapid turnaround on mill motor repair

Marthinusen & Coutts, a division of Actom, recently repaired two large mill motors for leading uranium producer Rössing Uranium in Namibia, a company celebrating 40 years of production this year.

Marthinusen & Coutts' field service team was requested by Rössing to inspect two brush mill motors on site. The team found that the starting cage winding on one of the motors had moved and rubbed against the stator winding, while an insulation test conducted on the second motor indicated that the stator winding was down to earth. This necessitated having both motors repaired at Marthinusen & Coutts' facility in Cleveland.

In view of the fact that no spare motor would be available to the mine in the event of a further breakdown while the two spare motors were being attended to by Marthinusen & Coutts in Johannesburg, the first of the two 1 586 kW, 3 300 V, 187,5 rpm brush motors to be repaired was treated with the greatest urgency to

ensure that it was returned to the mine as quickly as possible.

"We therefore designated it as being a 'breakdown' and the repairs on it were carried out as soon as it was received at our plant in October last year. The repairs were completed within three months and the motor was returned to the mine early in January this year," says Craig Megannon, Marthinusen & Coutts' General Manager.

The repairs carried out on the two motors consisted of rewinding the stators incorporating use of a resin-rich winding system, overhaul of the rotors and complete replacement of the rotors' electronic diode and synchronising hub.

"Application of the resin-rich winding system for the stator rewinds necessitated having to manufacture special customised press boxes for curing the cells. A critical part of this was ensuring that the dimensions of the cells were 100 % correct so that

they fitted into the core slots exactly. A coil reset jig also had to be made to enable us to manufacture the coils to the correct shapes," states Megannon.

Repair of the second motor was completed at the end of March. In addition to the stator rewind with resin-rich windings, the rotor was overhauled and the quadrants on a damaged damper winding of the rotor were replaced.

Marthinusen & Coutts, tel (+27 11) 607-1700



Alpheus Mtshali from Marthinusen & Coutts is pictured with the 1 586 kW stator.

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PROBLEM

- Severe conveyor belt misalignment and conveyor belt edge damage originating from side loading of material through the load chute.
- Damaged and misaligned idler frame sets.

SOLUTION

- 1x Belt Tracking Troughing System was installed between the head chute and load chute. This was installed ± 6 metres before the load chute.
- 1x Belt Tracking Return System ± 8 metres before the tail pulley to align the belt as it passes through the load point.
- Existing idler frame sets before and after the load chute were also aligned to improve the overall conveyor belt alignment.

RESULTS

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Fast-track solution for fast-track projects

The fast-track nature of many large industrial and mining projects on the continent has seen an increase in the demand for containerised housing for Motor Control Centres (MCCs).

These stations are quicker to establish on site than their brick-and-mortar coun-

terparts and they are assembled off-site in factory-controlled conditions.

There is no limit to the size of the MCC stations, with containers connected side by side or stacked on top of each other to provide the necessary space. Being a modular solution, individual containers are easily transported to the project site and then erected.

Shaw Controls' Chief Commercial Officer, Johan van Niekerk, notes that the company has supplied these solutions to many project sites including Eskom's Medupi Power Station project and the associated Exxaro Grootegeluk expansion programme.

A division of Zest WEG Manufacturing, Shaw Controls manufactures the containers at its 12 000 m² manufacturing hub in Robertsham, Gauteng, to customers' specifica-

tions. "All our containerised housings are built from scratch. We install all the necessary fittings and claddings, based on individual customer requirements," says van Niekerk.

This approach is in line with Shaw Controls' strategy of keeping manufacturing in-house to reduce costs and maintain close control over quality. The company says that the strategy is working considering that its order book for all its solutions, including its leading range of MCCs, is five times the size it was a year ago.

A sizeable share of this comprises orders from blue-chip mining houses and international engineering companies involved in brownfields and greenfields mining projects in Africa. Van Niekerk says the company's close affiliation to the mining industry means that it has to comply with the highest standards in the design and manufacture of MCCs and panels.

This includes all quality and safety standards adhered to by Australian engineering firms, who are dominant players in the African mining industry. These are more stringent than those followed in South Africa, and this compliance has given Shaw Controls a competitive edge when tendering for projects across the country's borders.

This is complemented by Shaw Controls' IEC 61439 certification which proves the integrity of its panels. As van Niekerk points out, these stringent tests require a high capital outlay and, for this reason, only a few South African companies have been certified. "We have subjected our products to all these tests, and re-verified the outcome of the tests in 2014. This is one of the reasons why we are so busy," he says.

Shaw Controls, tel (+27 11) 434-8100



View of the Shaw Controls MCC and panel manufacturing facility.

Industry-first for underground arc flash protection

Surgetek, a specialist in lightning and surge protection, electrical safety, and test and measurement equipment, has launched what it says is an industry-first, high visibility, 15 cal/cm² arc-rated low voltage overall, the highest cal-rated low voltage overall in the industry. Its high-visibility is attributable to its unique bright yellow colour which was developed for mines whose personnel become difficult to identify when wearing the conventional dark blue 12,4 cal/cm² rated low voltage overall in dimly lit underground environments.

The lightweight, brightly coloured arc-rated material was sourced from PPE

specialist manufacturer Protal. The design, stitching and make-up, however, are undertaken locally providing a local solution. The first samples were produced in January 2016, subsequent to thorough testing by the Aitex Laboratory in Spain.

This product is available as a one or two-piece overall. Surgetek stocks and distributes accompanying electrical protection clothing such as the 8 cal/cm² arc-rated double layer Nomex balaclavas; 18 cal/cm² arc-rated face shields and helmets; 32,8 cal/cm² arc-rated Dehn gauntlet gloves; and water and heat and electric shock-resistant safety boots.

Sikhumbuzo Ngwenya, Surgetek, tel (+27 11) 792-1303/4/5

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