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Cover

A shiploader from Sandvik Mining. The company has been awarded a contract to replace both shiploaders and stacker reclaimers at the Richards Bay Coal Terminal. See page 16 for further details.



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Mining ends 2015 in crisis

What a difference a decade makes. When *Modern Mining* was launched in 2005, the mining industry was in the early stages of one of the biggest mining booms in history. Fuelled by seemingly limitless Chinese demand for commodities, the mining sector simply took off – not just in Africa but worldwide – and at one stage during those heady days it seemed that hardly a week would go by without the construction of a new mine being announced.

Ten years on and I'm reading a piece in one of the British dailies with the headline 'Mining in meltdown: Mining stocks plunge to 11-year lows'. Is it an exaggeration? Not by any means. Mining truly is in a bad state – certainly the worst I've ever seen – and the lows of the current downturn are matching in their intensity the highs of the previous upturn. As Moody's said recently in one of its reports, "Commodity sectors are facing staggering adverse conditions driven by a potent mix of slower-than-expected global demand and excess supply." Or, as another commentator, Ambrose Evans-Pritchard of the 'Daily Telegraph', puts it, "What China giveth, China taketh away."

Indeed, as I'm writing this the news that Anglo American has embarked upon a radical restructuring of its portfolio is coming in and confirms that miners – as we've already seen from the travails of Glencore and many others mining companies – are in deep trouble. The group is going to cut back on its assets by a staggering 60 %, in the process cutting its workforce to about 50 000 – about a third of the size it was just a year ago.

Some sectors, of course, are worse hit than others, with iron ore and platinum in particular experiencing very challenging – to put it mildly – conditions. The iron ore price has recently dropped to a 10-year low, crashing down through the key US\$40/tonne level – which brings it perilously close to the break-even costs of even the biggest and most profitable iron ore miners such as Vale, Rio, BHP and Fortescue. As for the platinum price, it's currently below US\$900 an ounce, also a 10-year low (although there are suggestions that the fundamentals for this metal are more positive than for iron ore).

Certainly, it's going to be fascinating to see what the mood is at the upcoming Mining Indaba in Cape Town and whether the event is going to pull in anything like the number of delegates and investors it's had in the past.

There are, of course, isolated pockets of good

news in mining with some operations – admittedly, only a handful – doing well and with some companies pressing ahead with new mine development. One thinks, for example, of the Karowe diamond mine in Botswana (see also page 10 of this issue) which is continuing to perform spectacularly well – much to the chagrin, I'm sure, of some of the individuals previously associated with the property including that irrepressible Irishman, John Teeling! The mine's production in November included – incredibly – the second and sixth biggest diamonds ever mined anywhere in the world.

In respect of new mines, Ivanhoe seems intent on pressing ahead with its two primary projects, the Platreef PGM project in South Africa and the Kamoia copper project in the DRC (see page 26) while in Botswana US-headquartered Cupric Canyon Capital is continuing to make progress on its planned Khoemacau underground copper mine in the Kalahari, where it is ultimately planning to produce plus 80 000 t/a of copper.

The exact capex for the mine has not been finalised but Sam Rasmussen, who heads Cupric in Africa, has been quoted in the Botswana press as saying that the first phase of the project (to about 50 000 t/a of copper) will require an investment in the region of US\$200 million. I will be visiting Khoemacau shortly and hope to be reporting on it in full in our January issue.

It's also good to see that De Beers is on course with its R20 billion Venetia Underground Project (VUP), which is due to come on stream in 2021. I had the good fortune to visit Venetia very recently and was highly impressed by the progress being made by contractor Murray & Roberts Cementation on the twin shafts being sunk and the decline being developed. R20 billion sounds a massive investment and indeed it is – but it is spread over roughly eight years so the annualised capital spend is not as high as on most similarly sized mining projects.

As I say, the good news is patchy and overall I think we're heading for a very rough ride in mining which could certainly last into 2017 and very likely beyond, with Moody's for one believing that the current commodity downturn will be longer lasting and more severe than average. The upturn, of course, will eventually come – as it always does – but it's unlikely we'll ever again regain the levels of activity that we saw in 2006 and 2007. That was an exceptional boom – quite possibly a once in a century event – and unlikely to be repeated anytime soon.

Arthur Tassell



"Commodity sectors are facing staggering adverse conditions driven by a potent mix of slower-than-expected global demand and excess supply."

C-Cut Expansion at Cullinan running ahead of schedule



Access to 3 Shaft deepening and view of the installation of pump and water column which will assist with water management.

The underground portion of the C-Cut Phase 1 Expansion project at Petra Diamonds' Cullinan mine, initiated in 2011 and due for completion in 2019, has already been recognised as a major success. Shaft-sinking specialist Murray & Roberts Cementation believes that its dedication to its portion of the overall contract has helped position the project well ahead of schedule.

The expansion project is transforming Cullinan mine and will deliver a new operation which will perform strongly during its last years of operational life. "The new mine gives us access to greater volumes of fresh, high grade undiluted ore for at least another 16 years. It will also ensure the mine retains its status as one of Petra Diamonds' flagship diamond mines well

beyond 2016," says Petra's Mining Projects Manager, Andre Cloete.

The C-Cut Phase 1 Expansion project entails the development and construction of a new block cave on the western side of the orebody, 200 m below the current operational B block mining horizons, situated between 645 level and 885 level below surface.

Once in full production, the new C-Cut block will increase Cullinan's Run-Of-Mine (ROM) production from 2,5 Mt/a in FY 2015 to 4 Mt/a by FY 2019. By accessing the C-Cut block and mining high grade undiluted ore, ROM grades are set to increase from 24 cpht in FY 2015 to in excess of 50 cpht in FY 2019. As a result, ROM carat production is expected to increase from 0,6 Mct in FY 2015 to +2 Mct/a by FY 2019.

Aureus to acquire ground close to New Liberty

Aureus Mining Inc, the TSX- and AIM-listed miner which owns the newly opened New Liberty Gold Mine (NLGM) in Liberia, has agreed to acquire three exploration licences from Sarama Resources. These licences are contiguous to Aureus' Bea Mountain mining licence and are located close to the NLGM. Following the completion of the acquisition, Aureus will have 100 % ownership of the licences and the company's total land portfolio will increase to 1 683 km² from 1 402 km².

Exploration work undertaken by Sarama defined a 15 km long gold corridor highlighted by gold-in-soil anomalies and extensive artisanal mining, which on average are within a 15 km radius of the NLGM. Sarama has expended a total of US\$1,8 million on exploring the licences.

The acquired gold corridor will be the focus of follow up exploration programmes once Aureus achieves a cash flow positive position, with the objective of defining new gold deposits. ■

In addition to the upgrade and expansion of surface infrastructure, the expansion includes the deepening of both the men & material shaft (3 Shaft) from 805 level to 885 level and the rock hoisting shaft (1 Shaft) from 580 level to 934 level. It also includes new north and south declines and conveyors; heavy-duty, high volume north and south crushers; two big storage silos and the requisite access area development.

Murray & Roberts Cementation's contract, awarded in August 2012, includes the shaft-sinking extensions for both 1 Shaft and 3 Shaft. The company believes that its contribution towards the project's success continues to play a pivotal role in maintaining the development schedule but, more importantly, moving ahead of it.

The actual underground project scope was recently at 64 % complete and, to date, equates to about 2 km of development ahead of the original targets, Cloete notes.

The Murray & Roberts Cementation sinking team has been particularly effective with time utilisation. "We have focused intensively and simultaneously on all project aspects and variables as well as upfront scheduling which utilises our 307 employees' time effectively. This has minimised delays resulting from unforeseen sinking challenges for example," explains Robbie Duyts, Murray & Roberts Cementation's Senior Project Manager.

To date, sinking at 3 Shaft (7 m diameter/6 m diameter lined) has been completed and Murray & Roberts Cementation is working to complete equipping and lining shortly. Sinking at 1 Shaft (9,6 m x 2,3 m lined) is also well advanced and Duyts notes that sinking will reach the loading box by December (2015). The raiseboring technique has been used for both shafts – another project aspect which has ensured on-schedule development rates as equipping and sinking can occur simultaneously.

In addition to the shaft-sinking contract, Murray & Roberts Cementation has also started with the slipe and line for the two storage silos (13 m x 36 m). It has also facilitated engineering for the Koepe winders – the first was completed in December 2014 and the second is due for completion this month (December 2015). ■



Area 300 (recovery module) at Lerala – installing QC decking in civil section of high security area of recovery (photo: Kimberley Diamonds).

Lerala plant on course for re-opening

ASX-listed Kimberley Diamonds reports that it remains on schedule to re-open its Lerala mine in Botswana. It says that on-site civil construction is progressing well. Off-site fabrication of the major modules for the recovery, primary scrubber and secondary crusher is nearly complete and these components were scheduled for transport to Lerala in early December. Fabrication work on the conveyors, stacker conveyor and the 400-t bin is also progressing well and presents no scheduling issues at this stage.

Kimberley says that from early December

the focus will switch from civil construction activities to mechanical erection and installation of the various plant modules and components. Recommissioning of the plant is currently scheduled for April 2016.

The Lerala mine is situated in north-east Botswana, 34 km north of the Martin's Drift Border Post with South Africa, and comprises a cluster of five diamondiferous kimberlite pipes totalling 6,66 hectares in size, together with a modern processing and recovery facility. Lerala will target a production rate of approximately 400 000 carats per annum. ■

Development tunnelling resumes at Lace

DiamondCorp, which owns the Lace diamond mine near Kroonstad in the Free State, reports that – following completion of back-filling activities – development tunnelling has resumed on the 290 m doming level at the mine, almost two weeks ahead of schedule.

Tunnelling on the 290 m level is now progressing in competent high-grade K4 kimberlite following successful installation of steel arched sets for a 10 m section through the centre of the slot drive cross cut on this level. Tunnel advances are now being achieved at the originally planned rate as the kimberlite contains significantly less internal waste than the lower-grade K6 kimberlite on the southern side of the pipe, through which the development tunnels needed to pass before entering the high-grade Upper K4 (UK4) mining block.

The sets provide a safe canopy for workers and machinery which need to access this level for commencement of drilling and blasting of the slot between the 290 m level and the 310 m production level. The slot provides the initial ramp up in mining tonnages from the UK4 block.

Commenting on progress on 20 November, DiamondCorp's Chief Executive Officer, Paul Loudon, said: "Resumption of development work on the 290 m level combined with commissioning last week of the 400 tonnes per hour conveyor belt system from the first production level means that many of the operational challenges we have been facing in recent months have been overcome, albeit that the overall development and production timetable remains behind schedule, as previously announced." ■

DRA to undertake Feasibility Study for Darwendale

Global engineering and project delivery group DRA has announced that it has been awarded the Feasibility Study of the Darwendale PGM project in Zimbabwe by Great Dyke Investments (Pvt) Ltd (GDI), which is a Russian/Zimbabwean joint venture company.

The Darwendale project is located in northern Zimbabwe and is part of the Great Dyke ore reserve. The deposit is recognised as one of the largest PGM resources in the world, with the mineral resource potential estimated at 45 million ounces (1 400 tonnes) of platinum group metals (PGMs).

The Feasibility Study awarded to DRA will cover a wide range of components of the project, including mining, processing and associated infrastructure. It is planned that the long-life project will be implemented over three phases, with Phase 1 involving a 3,25 Mt/a open-pit mine and concentrator. In future phases, and as the project progresses, it is expected that mining will be by underground methods and more concentrator facilities will be added.

Paul Thomson, Chief Executive Officer of the DRA Group, comments: "We are extremely pleased and proud to have been awarded the study of this major project by GDI. Discussions and negotiations have been taking place over the last few months and during that time a strong relationship has been established between our respective project teams. It is especially pleasing that the Darwendale study will apply a full range of DRA's in-house expertise in mining, processing and infrastructure development.

"DRA has by far the largest track-record and highest level of expertise in the PGM industry in South Africa and Zimbabwe of any of our peer organisations. Earlier projects in Zimbabwe have included the Mimoso, Ngezi and Unki developments. Similarly, in South Africa the large majority of PGM production is via DRA's concentrators. In addition, we were recently pleased to announce the award of the Feasibility Study of the Platreef PGM project by Ivanhoe Mines. We now look forward to the opportunity of adding Darwendale and Platreef to our already long and successful list of PGM projects."

The study is expected to be completed by late 2016. ■



A recent view of the WBJV Project 1 processing facility showing the flotation circuit, concentrator and filter press (photo: PTM).

Production nears at WBJV Project 1

Reporting on its 2015 results, Platinum Group Metals (PTM), listed on the TSX and NYSE, says the year has been a pivotal one for the company as it completes construction at the WBJV Project 1 (Maseve) platinum mine near Sun City in South Africa and moves into production.

During 2015 the company also advanced and consolidated its large Waterberg platinum discovery while at

the same time progressing with a detailed pre-feasibility study funded by partner JOGMEC (the Japan Oil, Gas and Metals National Corporation).

Platinum Group says it has delivered the construction and development of Project 1 within its updated budget and schedule. At planned steady-state production in 2018, Project 1 is expected to be one of the lower cost conventional PGM mines in

South Africa with an expected cash cost of approximately US\$625 per 4E ounce.

First concentrate production at Project 1 is planned for late 2015 with first concentrate deliveries to Anglo Platinum scheduled for the end of January 2016.

The company says that its key business objectives for calendar 2016 will be to safely ramp-up the Project 1 platinum mine in line with – or exceeding – guidance and to advance the Waterberg project through pre-feasibility. ■

Update issued on Namibia's Kombat mine

Kombat Copper Inc, listed on the TSX-V, says in a recent statement that it is still actively working on its primary asset, the Kombat mine in northern Namibia.

The company states that it is in discussions with a local mining group which has shown significant interest in fast tracking scaled production at the Kombat mine. A due diligence period is in effect and the company will report on any material advancement in negotiations as they occur.

Water continues to be pumped from the #1 shaft at Kombat, ultimately allowing underground workings to be accessed. Drought conditions in Southern Africa have prioritised the mine as a significant source

of potable water that can be used to benefit Namibia. In an agreement with the local water supplier, dewatering of the mine is occurring at no cost to the company.

Kombat Copper says it continues to scan and compile historic documents in an effort to have all mine workings in an electronic format for subsequent digitising and modelling. Over 23 000 documents pertaining to the mine have been scanned and catalogued.

As over 45 years of historic Kombat mine documents are assessed, it has been interpreted by Kombat Copper that the Kombat East area of the mine may contain appreciable amounts of lead mineralisation.

This documentation also indicates that significant lengths of mineralisation may be present and a low-grade lead envelope with copper and silver credits may also be present.

Work is ongoing to determine the overall configuration and extent of the lead mineralisation and the company says it hopes to be able to display a model of this mineralised zone early in the near future. It cautions that these historical records have been examined but not verified by a qualified person. Further work is required to verify that these historical assays are accurate.

The mine site continues to be maintained on a standby basis and cost cutting measures continue to be implemented, says Kombat Copper. ■

Shaft-sinking activities start at Platreef



Shaft-sinking activities underway in the Platreef's Shaft 1 (photo: Ivanhoe Mines).

Ivanhoe Mines, listed on the TSX, has announced that initial shaft-sinking activities (drilling, blasting and mucking) at its Platreef project's Shaft 1 commenced on October 26, 2015, following successful construction of the shaft collar and ventilation plenum.

Shaft 1 will have an internal diameter of 7,25 m. It is projected to intersect the Flatreef deposit at a depth of 777 m below surface in late 2017 and reach its total depth of 975 m in 2018. Selected mining areas in the current Platreef mine plan occur at depths ranging from approximately 700 m to 1 200 m below the surface.

The Platreef project hosts an underground deposit of thick, platinum group metals, nickel, copper and gold mineralisation in the Northern Limb of the

Bushveld Complex, approximately 280 km north-east of Johannesburg.

Platreef's southern sector consists of

three contiguous properties: Turfspruit, Macalacaskop and Rietfontein. Turfspruit, the northernmost property, is contiguous with, and along strike from, Anglo Platinum's Mogalakwena group of mining operations and properties.

Since 2007, Ivanhoe has focused its exploration activities on defining and advancing the down-dip extension of its original Platreef discovery, now known as the Flatreef deposit, which is amenable to highly mechanised, underground mining methods. The Flatreef area lies entirely on the Turfspruit and Macalacaskop properties.

Ivanplats, Ivanhoe's subsidiary, completed a Pre-Feasibility Study (PFS) in January 2015 that covered the first phase of development that is expected to include construction of an underground mine, concentrator and other associated infrastructure to support initial concentrate production by 2019.

The planned initial average annual production rate is 433 000 ounces of platinum, palladium, rhodium and gold (3PE+Au), plus 19 million pounds of nickel and 12 million pounds of copper. ■

Caledonia announces upgrade of Blanket's resources

Canada's Caledonia Mining has announced an increase and upgrade to the resource base at its 49 %-owned subsidiary, the Blanket mine in Zimbabwe.

Based on the diamond core drilling that has been done at depth below the AR South Section over the past six months, it has been possible to add 222 000 tonnes of new inventory to the indicated resource category plus a further 283 000 tonnes to the inferred resource category.

Infill drilling has continued at Blanket Section to upgrade inferred resources to

indicated resources. A total of 254 750 tonnes of Blanket Quartz Reef, No 1 and No 2 orebodies, has been upgraded.

The combined total of new and upgraded indicated resources of 476 750 tonnes is in addition to the 3,47 Mt tonnes of reserves and indicated resources following the May 2015 upgrade. This upgrade and addition represents an increase of 14 % per cent in terms of tonnes and 19 % in terms of contained gold and equates to two years of production at 2014 production levels. ■



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Asanko on the brink of producing its first gold

In its latest release on its Asanko Gold Mine (AGM) project in Ghana, Asanko Gold Inc, listed on the TSX and NYSE, says that hot commissioning of the plant is expected to start this month (December) with first gold production due in January 2016.

Phase 1 is a low cost, long life mine that will produce an average of 190 000 ounces

of gold per annum at steady state over 12 years.

Mining of the Nkran pit, the main mineral resource for Phase 1, has continued at rates above long term steady-state mining rates. Mining operations are now entirely in fresh rock with the drill-blast-load-haul cycle fully operational.

As at November 8, 2015, the contractor had mined 16,6 Mt from the pit, and the pre-strip was nearly complete. To date, approximately 99 000 tonnes of ore at a grade of 1,69 g/t gold have been stockpiled ahead of the processing plant. The ore mined to date has been mostly from inferred resources that are located peripheral to the main orebody and have been exposed as the mining pushback has advanced.

Mineralised extensions to the main Nkran orebody were intercepted in late October, opening up two significant mining faces, which have been drilled for grade control.

In June 2015 Asanko signed a life of mine Power Purchase Agreement (PPA) with the independent power producer Genser Energy Ghana Limited (Genser). Under the PPA, Genser committed to deliver temporary power to the project by November 1, 2015 and build a permanent dedicated plant by May 1, 2016. Genser has been unable to meet

the deadline for providing temporary power to the project. Genser and Asanko are in discussions to resolve the issue and Asanko has reserved all its rights in connection with the matter.

The 30 km long, 161 kV power line connecting the project site to the national power grid at the Asawinso substation was completed in November, along with the 161/11 kV substation at site. The line is now energised and ready to deliver power to the project site for commissioning. The company plans to receive power from the state authority at rates materially in line with the Definitive Project Plan.

Asanko Gold has been focusing on business readiness for the past several months ahead of the hand-over of the process plant from the EPCM contractor, DRA Global, to Asanko. Recruitment is now nearing completion with training of operators and trades personnel well underway. Standard operating procedures and management operating systems have been fully developed and are being implemented on site.

The AGM continues to have a strong safety record with over 7,5 million man hours worked since the last Lost Time Injury, which occurred in July 2012. As part of this record, DRA Global and its sub-contractors have achieved an impressive 3,7 million man hours on the project without a Lost Time Injury.

With nearly all of the capital expenditure now committed, the project is expected to be completed within the US\$295 million capital expenditure budget. ■



The Asanko Gold Mine site showing the stockpile tunnel (photo: Asanko Gold).

Consortium to take over Kimberley Mines

Petra Diamonds has announced the acquisition of an interest in the Kimberley Mines in South Africa from De Beers Consolidated Mines (DBCM), in a consortium with Ekapa Mining, an established Kimberley-based diamond tailings producer.

Ekapa Minerals (Pty) Limited, the consortium's acquisition vehicle owned by Ekapa Mining (50,1 %) and Petra (49,9 %), has entered into a binding agreement with DBCM to acquire the Kimberley Mines as a going concern. The acquisition consideration is R102 million (ca US\$7,2 million) and will be funded by Ekapa Mining and Petra according to their

percentage interests in the consortium.

The acquisition comprises a number of tailings dumps in Kimberley (Tailings Mineral Resources or TMRs), associated plant (the 6 Mt/a Combined Treatment Plant or CTP), employees and all other assets and liabilities.

Ekapa Minerals expects to produce approximately 700 000 ct/a in the first three years of operation of the Kimberley Mines, with revenue of around R920 million per annum, based on an assumed diamond price of approximately US\$95 per carat.

Ekapa Mining will be the lead operator of the Kimberley Mines business and

will be managed by Jahn Hohne, a highly respected and successful operator of tailings in the Kimberley area.

"We are delighted to have formed this consortium with Ekapa Mining in the acquisition of an interest in the Kimberley Mines, and we look forward to working with them to build upon their proven capabilities in tailings retreatment operations in Kimberley, as well as their strong local relationships," says Johan Dippenaar, Petra's Chief Executive Officer.

"Together we are showing our commitment to shaping a new future for the diamond mining operations of Kimberley, to the benefit of our employees, shareholders and all stakeholders." ■



The R385 million cyclic-operated coal slimes ponds facility at Grootegeluk.

Pace-setting slimes facility at Grootegeluk completed

Exxaro's Grootegeluk mine in Lephalale has commissioned a R385 million, environmentally friendly, cyclic-operated coal slimes ponds facility. This innovative solution is reported to be the first of its kind globally. It provides unlimited capacity due to continuous reclamation of the dried coal slimes, which can be used as a fuel source.

The facility consists of four ponds, each with a capacity of 365 000 m³, two return water dams, each of 68 000 m³ capacity, a pump station, a substation and a slurry delivery line.

According to Exxaro, the large-scale installation of a sophisticated barrier and drainage system is a first in the South African mining industry while the reclamation of the coal fines as a continuous operation (ongoing re-mining) is – in its own right – another first for the industry. It also ranks the complex base construction of division walls in conjunction with the liner system draped over as a construction engineering feat.

According to Project Manager Happy Ntsala, the new facility will prevent harm to the environment by adhering to strict pollution prevention and control measures. "We considered the available methods in the market and preferred the cyclic ponds due to the technological advancements and our commitment to reducing our carbon footprint," he says. "The ponds are not a permanent storage facility but serve as a temporary 'drying' facility before reclamation.

"This solution has not been used elsewhere in the world as far as we know. The design of the evaporative drying of the coal fines is based on modern and ongoing research on the subject and the science of evaporative drying."

Grootegeluk's Coal Beneficiation Operations Manager, Adrie Conradie, com-

mended the team on the excellent and safe execution of the project. The Department of Water Affairs also gave the facility a thumbs up during one of its recent visits to the site and encouraged Exxaro to share its expertise and innovation with industry peers to uplift the standard of mining in South Africa and elsewhere. ■

Acacia Mining slims down its workforce

London-listed Acacia Mining, which operates three gold mines in Tanzania, says that over the past two years it has been undertaking a process to drive productivity and cash flow across the company.

Says the company in a statement: "We have implemented significant improvements to our mine plans, including the mechanisation of the Bulyanhulu mine and the move from open-pit to underground mining at the Gokona pit at North Mara. Alongside a formal cost saving programme, these changes have led to a reduction in our costs of approximately 30 % from their peak in 2012.

"As part of this process, there has been an ongoing programme to ensure that our workforce is of the appropriate size and mix for our operations. This process, initially scheduled to continue through to the end of 2016, has already led to a 60 % reduction in the number of higher-cost expatriates.

"Following a further review of the organisation in light of the current gold price and

recent performance, Acacia has accelerated the process of organisational change. As a result, approximately 1 050 of our people, representing approximately 27 % of our workforce, have either left or are expected to leave Acacia over the next few months through a combination of voluntary separation agreements and redundancies.

"The largest proportion of the role reductions is at Bulyanhulu, but all of our mines and offices will be affected. As part of this process, Acacia has fulfilled all local legislative requirements and is committed to minimising any employee hardship; as such, we have put in place support services to assist those affected."

According to Acacia, the restructuring, which is expected to lead to an annual saving of US\$25 million, prior to a restructuring charge of approximately US\$11 million predominantly incurred in 2015, is one of a number of initiatives underway to ensure costs within the business are optimised, in turn enhancing cash flow generation even in a low gold price environment. ■

Lucara provides operational guidance for 2016



The magnificent gem quality 1 111-carat, Type IIa diamond recovered recently at Karowe.

Canada's Lucara Diamond Corp says it is budgeting for revenue of US\$200 million to US\$220 in 2016. This excludes the sale of exceptionally high value diamonds recovered during 2016 and the company's current high value diamond inventory.

Lucara owns the Karowe diamond mine

in the Orapa Kimberlite Field in Botswana. The mine, known for producing large diamonds, enjoyed a spectacular November, with Lucara announcing the recovery of a 1 111-carat gem quality, Type IIa diamond on 18 November. A day later, Lucara reported the recovery of a further two outsized diamonds, one an 813-carat stone and the other a 374-carat stone.

The magnificent 1 111 carat stone, which originated from the south lobe of Karowe, is the world's second largest gem quality diamond ever recovered (after the 3 106-carat Cullinan diamond). It was recovered by the newly installed Large Diamond Recovery (LDR) XRT machines at Karowe.

In its guidance, Lucara says Karowe is forecast to treat between 2,2 to 2,4 Mt of ore, producing over 350 000 carats of diamond in 2016. The mine is expected to source up to 60 % of its material from the south lobe during the year. Waste mining – which will total between 13,0 and 14,0 Mt during 2016 – continues to open up the full extent of the south lobe. Operating cash costs (including waste mining) are

expected to be between US\$33,5 and US\$36,5 per tonne treated.

"Lucara had a successful operating year in 2015 which culminated in the historic recovery of the world's second and sixth largest gem quality diamonds," comments William Lamb, Lucara's President and CEO. "Our 2015 performance has positioned us well for 2016 as we focus on mining in the high value south lobe and advancing our organic growth projects at Karowe. We continue to deliver strong cash flows and returns for our shareholders and, as a result, we are introducing a progressive dividend policy."

The organic growth at Karowe which Lamb refers to includes an 'Exceptional large diamond recovery installation'. The current process circuit has been designed to recover diamonds up to a maximum size of 1 000 carats. Based on the recent recoveries of very large diamonds and the expected continuation of recoveries of exceptionally large diamonds in the south lobe, the company will be integrating an additional large diamond recovery process with an investment of between US\$15 million and US\$18 million. ■

Chilalo PFS indicates favourable economics

ASX-listed IMX Resources has announced the results of the Pre-Feasibility Study (PFS) for its Chilalo graphite project located in south-east Tanzania. The results of the PFS, it says, confirm the emergence of Chilalo as a market-leading graphite project that on all objective measures compares highly favourably with other graphite projects. It adds that the PFS results strongly support its strategy of focusing its efforts on advancing Chilalo as an outstanding near-term development opportunity.

According to the PFS, Chilalo has a pre-tax internal rate of return (IRR) of 62 % and a pre-tax NPV₁₀ of US\$200 million. The average annual EBITDA is estimated at US\$47 million over a 10-year mine life. The Life of Mine (LOM) average operating cost is put at US\$490 per tonne FOB – the lowest compared to similar scale projects and cost-competitive with Chinese graphite supply.

Metallurgical testing confirms high quality product in all respects – grade, flake size distribution and purity – delivering an attractive forecast basket price of US\$1 217 per tonne for the Base Case and

US\$1 456 per tonne for the Alternative Case

The pre-production capital expenditure is estimated at US\$74 million (including contingencies) with a pre-tax payback period of 19 months.

It is envisaged that mining will be by open-pit methods (on an owner operator basis) with the process route based on conventional flotation. The mine would have an average annual production of 69 000 tonnes of graphite concentrate.

"Completion of the PFS is an important milestone for IMX and the Chilalo graphite project, with the strong outcomes giving us a great deal of confidence that Chilalo will be a highly competitive, low-cost, high-margin open-pit operation incorporating conventional processing," comments Phil Hoskins, IMX's Managing Director.

The project is located on IMX's Nachingwea property, a 5 400 km² tenement package located in south-east Tanzania.

Perth-based processing engineering consultancy BatteryLimits completed the PFS based on the upgraded mineral resource estimate (MRE) for the Shimba

deposit at Chilalo completed by CSA Global in October 2015 and the outstanding results of metallurgical testwork. These revealed a significant portion of large and jumbo flake graphite and attractive concentrate purity.

The PFS considered two scenarios: producing 69 000 tonnes of graphite concentrate per year (the 'Base Case'); and producing 51 000 tonnes of premium graphite concentrate per year, which excludes material that is < 75 microns (the 'Alternative Case').

The Chilalo open-pit mine is planned as a conventional truck-and-shovel operation, using 40-tonne articulated trucks and matching excavators. Early stages of the open pit are expected to be free-dig, with the remainder to be mined using standard drill and blast techniques.

Initial optimisation testwork has demonstrated that a high graphite recovery is possible and a high grade coarse concentrate can be achieved using separate coarse and fine flotation streams. This can be further enhanced by separation and production of a secondary lower grade -75 µm graphite fines product. ■

BBE brings cooling to Malian gold mine

BBE Projects has been awarded a mine cooling project for the complete turnkey design and build of two refrigeration and air-cooling installations in Mali.

This is BBE Project's third refrigeration installation this year (2015) in Africa. The first was the second phase of the air-cooling programme at Acacia Mining's Bulyanhulu gold mine in Tanzania, comprising two 3,5 MWr York ammonia screw compressor refrigeration machines. These produce chilled water for a surface bulk air-cooling tower straddling a 1 000 m deep dedicated ventilation hole for the west section of the mine.

The second installation is an underground plant comprising three Trane 1,5 MWr three-stage centrifugal refrigeration machines providing chilled water through a closed-circuit network of cooling cars at a depth of almost 3 000 m at Sibanye's Driefontein gold mine.

The mine cooling project in Mali is for coolers that will be located on surface at the top of two new dedicated downcast ventilation holes at a gold mine. The coolers will each provide more than 14 MWr of air-conditioning for the deeper levels of the underground workings. Each installation will comprise two 7 MWr dual-compressor York YD R134a refrigeration machines producing chilled water for a horizontal spray chamber.

"A particular feature of these installations is that the air will be drawn through the ventilation holes by underground fans, so that the surface air coolers will be under a slight negative pressure from the induced ventilation," says Richard Gundersen, MD of BBE Projects. "This has allowed

the selection of lightweight building materials for the shell of the air coolers which offers savings in terms of cost and also speed of erection. Likewise, the condenser cooling towers for heat rejection will be constructed from lightweight FRP components with similar cost and time benefits."

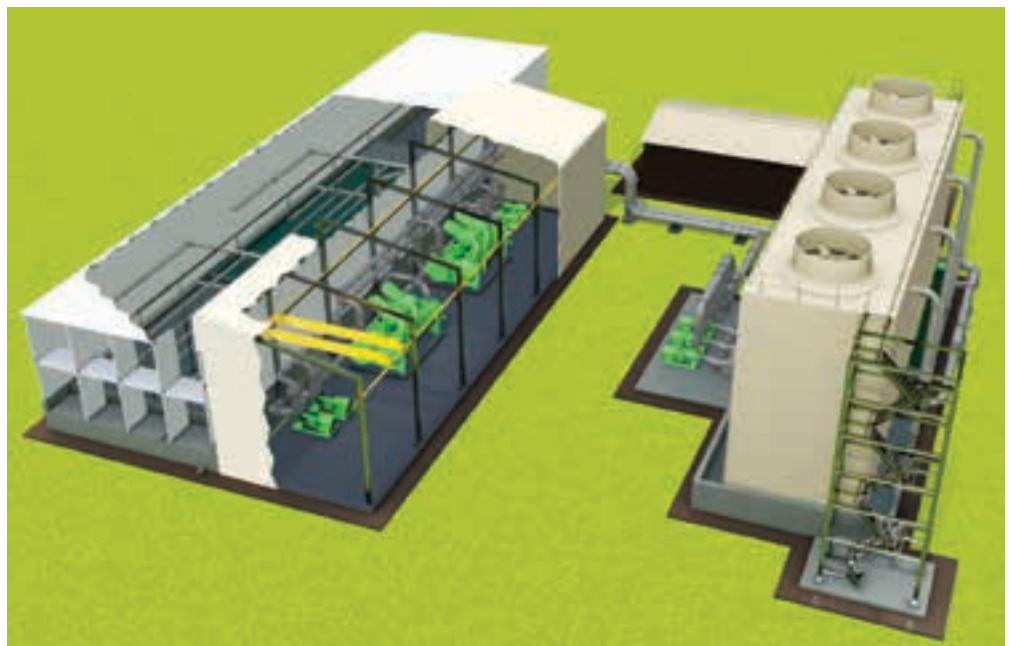
The shell of the bulk air cooler will be assembled from 1 200 mm wide steel-clad insulated panels fitting together in a tongue-and-groove manner, coupled with a light aluminium structure and attached directly alongside the main plant room. The use of this material and the resulting compact layout also contribute to a high thermal efficiency as the chilled water from the refrigeration machine is sprayed directly into the intake air stream, with no losses from interconnecting pipework. Each

plant occupies a footprint of just 50 m².

With all power for the mine coming from on-site generators, Gundersen says that special attention has been paid to overall system efficiency and low power consumption of the cooling system.

The remoteness of the location has necessitated that the cooling system be designed to be simple to operate with a minimum of control elements. Consequently, there is only one temperature-controlled valve on the water circuits in the entire plant and load control of the compressors is achieved with conventional inlet guide vanes.

Gundersen says that civil construction activities have already started at the first of the two sites and the first plant will be operational by mid-2016. The construction and commissioning of the second plant runs in parallel to the first plant with a stagger of about two months. ■



View of one of the refrigeration and air-cooling installations for Mali.



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Further positive results from Etango demonstration plant



Acid leaching of agglomerated ore in the demonstration plant occurs in four 2 m x 2 m x 6 m leach cribs, seen here. In addition to the cribs, eight 5 m high columns with an internal diameter of 0,18 m enable parallel leaching (photo: Bannerman Resources).

Australia's Bannerman Resources has reported further positive results from Phase 2 of the Etango heap leach demonstration plant programme. It says the results continue to strongly support the assumptions and projections incorporated in the Etango Definitive Feasibility Study (DFS) and DFS Optimisation Study.

The results indicate fast and high leach

extraction on a 60-tonne sample – within 20 days average total leach extraction of 93 % for the two cribs and 91 % for the columns (compared to the DFS projection for a scaled up heap of 87 %). They also demonstrate low sulphuric acid consumption – on average 15 kg/tonne (compared with the DFS projection of 18 kg/tonne).

Visual observations during the unload-

ing of the cribs again confirmed uniform percolation through the material and integrity of the agglomerate. Once again, no noticeable reduction in leach extraction performance was observed between the larger scale cribs and the smaller columns – which increasingly indicates that DFS scale-up factors could be conservative, says Bannerman.

The metallurgical database now reflects large scale testing of 180 tonnes of material since commencement of the heap leach demonstration plant programme in April 2015.

Owned 80 % by Bannerman, the Etango project is located on the Namib Desert sands approximately 38 km (by road) east of Swakopmund and has proved and probable reserves totalling 279,6 Mt at an average grade of 194 ppm for 119,3 Mlb of contained U_3O_8 .

The DFS on Etango envisages that the project – which will have a life of at least 16 years – will produce 7-9 Mlb U_3O_8 per year for the first five years and 6-8 Mlb U_3O_8 per year thereafter, based on an average processing throughput of 20 Mt/a and an average recovery rate of 86,9 %. It estimates cash operating costs of US\$41/lb U_3O_8 in the first five years and US\$46/lb U_3O_8 over the life of mine. The DFS estimates a pre-production capital cost of US\$870 million. ■

B2Gold breaks ground at Fekola in Mali

The official ground-breaking ceremony recently took place at B2Gold's Fekola project site in Mali. The event was officiated by Robert Diarra, Chief of Staff of the Ministry of Mines, and was reportedly well attended by national and regional government representatives, as well as community leaders.

Initial construction activities at Fekola began in February 2015 led by core team members of the Otjikoto construction team, B2Gold's new gold mine near Otjiwarongo in Namibia.

Early works construction activities that were completed included construction of a new site access road (40 km from the tar road to site) complete with a bridge across a major waterway to allow for year round access, as well as the construction of an on-site airstrip designed to allow personnel to fly directly in and out of the site (materially

complete but waiting for final regulatory approvals). Other works during this period were construction of the camp pad and commencement of clearing within the mill footprint; crushing of aggregate to produce sand and gravel to be used in the concrete batch plant; and construction of the concrete batch plant.

All of these activities allowed the project to move forward and prepare for work after the rainy season which runs from late June through September. The site has been receiving a steady stream of materials for mine construction which commenced in the fourth quarter of 2015.

Concurrently with the activities on site, the B2Gold engineering team continues to work with Lycopodium Engineering in Australia to complete detailed design and procure long-lead items. To date, many of

the major mill packages have been identified and purchase orders have been issued. These includes SAG and ball mills, thickeners, cyclones, crusher, and tanks.

On June 11, 2015, B2Gold, headquartered in Canada, announced robust results from the optimised Feasibility Study (FS) for Fekola. According to the FS, the current average annual production for the first seven years is approximately 350 000 ounces per year at an average operating cash cost of US\$418 per ounce and for the life of mine plan approximately 276 000 ounces per year at an average operating cash cost of US\$552 per ounce.

The total pre-production capital costs are estimated to be US\$395 million plus US\$67 million of anticipated mine fleet and power generator costs which are expected to be lease financed. Based on current assumptions, the Fekola mine is scheduled to begin production in late 2017. ■



Sishen's new heavy mining equipment (HME) filling station under construction (photo: VBKom).

HME facility enters commissioning phase

It is all systems go to fast track Sishen's new heavy mining equipment (HME) filling station. The project is entering the commissioning phase and VBKom reports it is ensuring perfect handover of the project to the owner mine through structured Operational Readiness principles.

Operational Readiness is part of VBKom's suite of industrial engineering services and aims to assist clients to reach nameplate performance with minimal disruptions in the shortest allowable timeframes.

As such, it is a combination discipline of technical, systems engineering, administration, project management, and structured facilitation and communication.

Within the next three months, diesel tank levels, decanting from suppliers, and dispensing to a 4-bay forecourt will all be put to the maximum test in a C1-C5 commissioning schedule. Several interfaces are included in the facility, such as diesel, lubricants, grease, anti-freeze, and nitrogen delivery, storage, and dispensing.

VBKom is ensuring that the owner mine will be completely enabled to operate the new facility when the project is complete, by engaging with critical stakeholders such as Dispatch, Recruitment & Training, material ven-

dors, maintenance contractors, mining (HME equipment requirements), product accounting, and civil and structural construction. The project is being fast tracked by three months and therefore it is critical

to manage schedule slippage, budget expenditure, and quality of works.

VBKom says it is driving the commissioning schedule hard and making sure that all necessary stakeholders are adequately involved and performing to the milestone dates. ■

Difficult start for new RHA tungsten mine

AIM-traded Premier African Minerals, which has developed and operates the RHA tungsten mine in north-western Zimbabwe, reports that development of the open pit on the basis of direct Run of Mine (ROM) ore feed, in light of the present wolframite pricing, is unlikely to bring RHA into profit in the short term.

RHA has therefore temporarily suspended open-pit operations to reduce cash outflow, and has accelerated the development of underground mining (something that had always been planned but on the basis that profitable operation of the open pit would fund underground development).

Premier reported first ore from underground on 27 October 2015 and ore from the 926 adit level continues to be mined and stockpiled. Simultaneously, Premier is accelerating access to fully developed historic reserves on the 870 level. This has previously been reported as 100 000 tons grading at approximately 7 kg per ton.

Premier expects hoisting and ventilation facilities for this level to be installed and operational by Q1 2016. At the same time,

Premier has conducted initial test work utilising XRT technology that has demonstrated excellent capability in recognition of mineralised ore that may result in significant grade improvement of the ROM ore. In turn, this is likely to substantially increase the available resource and reduce operating costs, it says.

Further test work has been commissioned which, subject to completion and conclusion of a toll process agreement, could significantly affect open-pit operating costs.

"The combination of a falling APT price, difficulties in achieving the planned Run of Mine feed grade from the open pit and some residual issues in attaining steady state in plant operations, have not made for the start to production Premier had anticipated," comments Premier's CEO, George Roach. "Despite this, we have opened a new mine in very trying times. Our experience to date has provided a solid platform from which we expect to see a move to profit during Q1 2016. Acceleration of the underground mining and the potential to upgrade through XRT sorting of the open-pit material has real promise for the future of RHA." ■

Kalana Main gold project DFS still on schedule

Avnel Gold Mining, listed on the TSX, is reporting that the Definitive Feasibility Study (DFS) for the Kalana Main project in Mali remains on schedule for completion by the end of the first quarter of 2016.

Geotechnical test work and modelling was completed during the third quarter of 2015 and was utilised in the Whittle optimisation for the updated mineral resource estimate (MRE) reported on October 5, 2015. Metallurgical test work and process plant design are scheduled to be completed in the fourth quarter of 2015. Mine design scheduling is due to be completed in the first quarter of 2016.

Based upon the initial findings from ongoing technical studies, the process plant is expected to be a conventional gravity plus CIL system. The processing rate of the process plant design is expected to be finalised shortly.

In parallel with the DFS, the company is preparing a new ESIA to satisfy the require-

ments of the Equator Principles with the intention of pursuing international financing for the construction of an open-pit mine at Kalana Main.

The formal Public Participation Process for the ESIA commenced in August 2015. The draft ESIA and other associated documentation, including a draft Community Resettlement Action Plan for a portion of the village of Kalana, is scheduled to be submitted to the Malian authorities in December 2015. Following the review of the draft ESIA, the company expects to submit the final ESIA for approval in early 2016. Accordingly, Avnel continues to anticipate receiving approval of the ESIA and a new Environmental and Mining Permit by the end of the first quarter of 2016.

As a result of these activities, Avnel says the Kalana Main project is expected to be sufficiently advanced for the company to consider a construction decision during 2016, subject to receipt of a positive

DFS, approval of the ESIA by the Malian authorities, and the availability of project financing.

Operations at the small, Soviet-era, underground mine at Kalana continue to benefit from the ongoing weakness in local currencies relative to the US dollar, which contributed to lower than budgeted operating costs. In the first nine months of 2015, operations also benefitted from higher than budgeted gold production that resulted in higher cash flow and lower unit costs than budgeted.

Despite these positive developments, Avnel does not expect the underground mine to be profitable under the prevailing gold price environment. The company continues to operate the underground mine to offset the cost of providing underground access to facilitate due diligence activities necessary to secure mine development financing and help maintain socio-economic stability in the local community. ■

Venmyn Deloitte cautions on resource/reserve calculations

Mineral commodity producers need to carefully assess the commodity prices at which their mineral resources and mineral reserves are being calculated.

This is the view of Venmyn Deloitte MD Andy Clay, who advocates that mineral

resources be calculated using a price that is 50 % higher than the spot price, while mineral reserves should be calculated using a price that is 10 to 20 % below the spot price.

"If those producing a particular com-

modity depart from this methodology, the reserves will be overstated," he says. "To correct this, impairments will have to be made."

According to Clay, mineral companies typically do not use the spot price to calculate mineral resources and mineral reserves, and prefer to use a broader range of prices that reflect the longer-term variability in the spot price. They believe that mine operating plans and strategic decision making are enhanced when a higher commodity price is used to calculate resources and a lower price than the spot price is used to calculate reserves.

However, what has become confusing of late is that the Platinum Group Metal (PGM) industry tends to use much higher values than suggested by generally-accepted practices used by gold producers – for instance, some PGM producers are calculating their resources at a price 70 % above the current price of the basket of metals that they produce.

"All research suggests that the PGM industry should be using a price much lower than the price they are currently using for reserves," says Clay. ■

New resource will strengthen Yaoure's economics

AIM-listed Amara Mining has announced an NI 43-101 compliant mineral resource update for its Yaoure gold project in Côte d'Ivoire.

The total mineral resource at Yaoure has increased by 491 000 ounces to 7,3 million ounces at 1,50 g/t – a 7 % increase in ounces at a 20 % increase in grade compared to the previous estimate.

John McGloin, Chairman and Chief Executive Officer of Amara, says the mineral resource update has delivered on all of the company's objectives for the recent drilling campaign. "We have increased the overall grade by 20 % to 1,50 g/t and substantially increased the amount of higher confidence M&I resources in the lower priced pit shells," he states. "This will strengthen Yaoure's economics, allowing us to focus on a lower

priced pit shell with an increased cut-off grade compared to the PFS announced in May 2015. By targeting higher grade tonnes, we can maintain gold production with a lower upfront capital cost due to the opportunity for a smaller processing plant and mining fleet. The grade improvements will also reduce the operating costs per ounce of production.

"The total contained mineral resource has grown to 7,3 million ounces, which ranks Yaoure as the largest undeveloped gold project in West Africa and brings the group's resources to over 10 million ounces. The new resource estimate has also seen the centre of the Yaoure Central portion of the resource migrate to the north of the deposit, concentrating resource ounces into a better defined area." ■

Galane Gold acquires Galaxy

Galane Gold, which is listed on the TSX-V and owns the Mupane gold mine in Botswana, reports it has closed its previously announced acquisition of a majority of the issued and outstanding ordinary shares of Galaxy Gold Mining Limited, a gold mining company with operations in Mpumalanga Province in South Africa.

"We are pleased to have completed the acquisition of Galaxy and added what we believe is a significant asset to our portfolio," comments Galane's CEO, Nick Brodie. "Our experienced management team looks forward to taking an under-performing asset and returning it to full and profitable production within the next 12 months. The team can draw from the experience gained in revitalising Mupane and an in-depth knowledge of mining and processing in the greenstone belt, including in Barberton itself.

"From our due diligence we have confidence that the potential of the Galaxy asset will assist Galane in being able to operate in any realistic gold price environment. To support that confidence we are currently in the process of completing a National Instrument 43-101 technical report and commencing a pre-feasibility study to support the expansion of Galaxy's operations up to 50 000 ounces per annum.

"Galaxy has been operating with a working capital deficiency which has led to disputes with critical suppliers and contractors," he continues. "As a result, Galaxy has also not met all of its statutory requirements. This has required an extended review of the business to satisfy ourselves that Galaxy can be resurrected to its historic production levels."

Galaxy's mining assets are located on the Barberton Greenstone Belt (BGB), approximately 10 km to the west of the town of Barberton. They include several historical mining operations on the BGB as well as tailings storage facilities comprised of previously mined and processed material. Galaxy's existing processing plant is in need of refurbishment and consists of crushing, milling, flotation, thickening, Biox, CIL, elution and tailings disposal facilities designed to treat 16 000 tonnes of ore per month. ■

BlueRock signs on Diacar as a sub-contractor at Kareevlei

AIM-listed BlueRock Diamonds has announced that it has concluded an agreement with Diacar Mining and Plant Hire to act as its sub-contractor. Under the terms of this agreement, Diacar has established a second processing plant at the Kareevlei site in the Northern Cape at its own cost in order to process kimberlite of over 70 mm in size (Oversize Material) – which BlueRock currently does not have the machinery to process – at a rate of over 40 tonnes an hour.

The agreement is for a period of five years although it is reviewable by BlueRock on an annual basis based on the performance of Diacar in the preceding 12 months. Under the terms of the agreement, Diacar is responsible for all costs other than the mining of the Oversize Material and diesel and is responsible for producing concentrate to be sorted by BlueRock.

BlueRock retains ownership of and is responsible for the marketing of all diamonds recovered from the concentrate. It is also entitled to 60 % of all revenues arising from the Diacar operations net of licence fee, taxes and selling costs. ■

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Makeover for Richards Bay

Sandvik Mining has been awarded a contract to replace the two existing Fives Lille-Gail Applevage shiploaders and two Dravo stacker/reclaimers at the Richards Bay Coal Terminal (RBCT). The purchase of a pair of Sandvik PL300 shiploaders, two rocker-type Sandvik PD200 stacker/reclaimers and a new substation from Sandvik Mining is a bold and timeous move by the terminal operator to ensure its sustainability for the future.

At present the 2,2 km long terminal with six berths is the single largest export coal terminal in the world with a throughput of approximately 91 million tons per annum. In order to achieve these staggering figures, however, the terminal operator relies on close cooperation with equipment suppliers to ensure ultimate reliability and availability of equipment on site on a 24/7 basis.

The Sandvik PL300 is a rail-borne, gantry-mounted, telescopic-boom shiploader with a steep luffing function.

Advanced equipment

According to Nico van Aarde, Manager Sales

and Market Development for Sandvik Mining, an important factor in awarding the contract to Sandvik Mining was the company's track record of supplying and supporting similar projects at the Port of Saldanha and elsewhere across the globe. In these instances the company has earned an enviable track record of providing advanced solutions for port materials handling projects and delivering unwavering support throughout the project life-cycle.

The equipment will be purpose-built, fabricated off-site and transported to the coal terminal, where it will be installed and commissioned in a carefully planned manner in order to minimise disruption to the busy coal handling facility while the upgrades take place. A new substation will also be constructed (and five others reconfigured) in order to provide power requirements to all parts of the terminal, minimising the effect on operations whenever circuits need to be switched off for installation and/or maintenance purposes.

Furthermore, Sandvik Mining will be required to meet strict standardisation requirements set out by RBCT as well as providing



Coal Terminal



a high level of customisation to ensure the machines meet operational specifications. Where possible they will also need to interface directly with current infrastructure in order to avoid costly and time consuming rebuilds. With the shiploaders' design capacities at a maximum 11 000 tons per hour and the stacker/reclaimers able to process a maximum 6 000 tons per hour for stacking and reclaiming, the behemoth-sized machines are an ideal fit for the project requirements.

All-around solution

The Sandvik PL300 shiploader is a rail-borne, gantry-mounted, telescopic-boom shiploader with a steep luffing function that is designed to cover all hatches on vessels ranging from 40 000 DWT Handymax up to 175 000 DWT Capesize. During berthing operations of the vessels, the shiploader boom can be simply raised out of the way to reduce any risk of collision.

The Sandvik PD200 stacker/reclaimer provides efficient use of available space as a result of its innovative design. It is a rocker-type, heavy-duty machine that minimises the migration of the centre of gravity in operation to allow very high capacities and an economical

rail gauge to be used while also maximising the usable width of the stockyard.

Richard Von Moltke, Lead Electrical and Instrumentation Engineer for Sandvik Mining, explains that the new substation is designed to optimise the network with built-in flexibility to isolate production areas. This makes reconfiguration possible as the old system could not

Above: A Sandvik PD200 stacker/reclaimer in action. Two units of this type have been ordered for the Richards Bay Coal Terminal.

Below: The PD200 stacker/reclaimer has a maximum capacity of 6 000 tons per hour.



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isolate individual production areas. The new substation also provides additional capacity to support the replacement project and any future expansions.

Long-term thinking

This allows the terminal's electrical system to operate efficiently over a 11 kV ring feed with 15 MVA additional capacity. The upgraded system will be completed before the delivery of the new machines in order to provide power requirement for the commissioning of the new equipment.

"With a project of this nature, the size and scope of work is enormous and will require close cooperation between the operator, ourselves and all other parties involved in shipping the components, construction and preparing the site for the installation of the machines," van Aarde says. "Everything needs to be carefully planned and executed to ensure the terminal upholds its sterling track record. Our focus at this point is to ensure milestones are met and thereafter to ensure the systems work flawlessly and are properly supported throughout their active service at the terminal. With the



selection of Sandvik Mining as a main supplier of machines for the RBCT project, we now have the opportunity to work with the operator and build a relationship that is mutually beneficial and instils confidence to meet any throughput targets in future." ■

The PL300 shiploader can handle up to 11 000 tons per hour. During berthing operations of vessels, the boom can be simply raised out of the way to reduce any risk of collision.

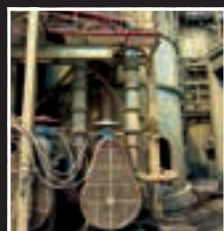
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Innovative solution to rockfall

*Geotechnical contractor Wepex recently completed a rockfall mitigation installation at Debswana's Orapa diamond mine in Botswana. The project recently received a 'Special Mention' in the prestigious Best Projects Awards organised annually by **Modern Mining's** sister magazine, **Construction World**. The following article is based on the submission for the project entered into the Awards by specialist supplier Maccaferri.*

How do you limit rocks from being dislodged from the upper areas of degrading slopes in open-pit mines? The answer is simple ... you cover the 'guilty' slopes of the opencast mine with a big 'fence'. This was the solution adopted at Orapa and it allows the continuation of mining in areas that

were previously considered too unsafe to mine.

In 2013, Wepex, a specialist geotechnical contractor based in Durban, South Africa, partnered with global steel manufacturer and supplier Maccaferri and consulting engineers Melis & Du Plessis to undertake the rockfall mitigation installation at Orapa. One of Debswana's flagship opencast diamond mines, Orapa was facing some challenges with rocks falling down some of its slopes, particularly during the rainy season. Situated 240 km west of Francistown, Orapa is currently mining at a depth of 250 m and is expected to reach 450 m by 2026.

The project – known as the 'Rockfall Support of Orapa Mine AK1 Pit 805 Ramp and North Eastern Ramp via Drapery Wire Mesh Support project' – addressed two areas of concern on Orapa's highwall pit slopes. Both highwalls were above active haul roads that allow

Rockfall protection at Debswana's Orapa diamond mine. Note the proximity of the haul road.



risk at Orapa

vehicular traffic into and out of the open pit. One of the slopes that required rockfall mitigation extends over an area of 57 040 m². The linear horizontal length of the area is 320 m, with the average height of the highwall slope being 178 m. The second slope extends over an area of 34 960 m², with a linear horizontal length of 330 m, with the average height in this case being 106 m.

Wepex had previous experience of providing viable solutions to rockfall problems at mines, having completed similar projects at Debswana's Jwaneng mine (a first project in 2010 of 54 000 m² and a second in 2013/2014 of 135 000 m²), as well as Anglo American Platinum's Mogalakwena mine in Limpopo (where the area involved was 40 000 m²). With all three of these projects, Maccaferri's products and Melis & Du Plessis' innovative design were used, achieving the desired results, with visible, quantifiable success.

Rockfall mitigation is not a recent requirement for open-pit mining activities. Various factors such as natural degradation of the rock mined, insufficient catchment areas, poor mining practices and rainfall cause rockfall hazards to develop. There are a number of mitigation options available and all have variable time, cost and quality implications.

One of the primary reasons a drapery system was chosen for Orapa was the height of the highwall slopes that required mitigation which extended to over 180 m above the haul road.

The drapery mesh solution that Wepex adopted prevents a significant number of rocks from falling in the first instance or, alternatively, in the case of rocks which have become loose, intercepts them, allowing a significant number to work their way to the bottom of the drape wire mesh without impacting the normal operation of the haul road. Many alternative solutions adopt the approach of trying to 'catch' the rocks on their way down to the pit floor or haul road. By the time these rocks have reached the catchment devices (or missed them and hit the pit floor or haul road) they have reached a significant velocity!

Benefits of the drapery mesh system include minimal to no environmental impact and the fact that the quality and construction of the Maccaferri drape wire mesh product used offers a longevity that exceeds the projected requirements for mitigation of the areas.

The wire mesh chosen for the project needed



Inspecting the integrity of the drapery mesh system.



Two Decoilers specially designed for the project were deployed on the contract.



Rope climbers in full safety gear working on the Orapa contract.

to be strong, long lasting, and of a correct weave to restrict the size of the smallest rocks that might pass through the apertures of the drapery mesh system.

Maccaferri's Steelgrid HR 50 was selected. The Steelgrid mesh is a new woven geocomposite comprising interwoven steel wire and ropes inserted in place of the conventional selvedge wire during hexagonal double twisted wire mesh production.

This product is especially useful for high strength simple revetment drapery applications and for many challenges in rockfall protection. The Steelgrid HR (high resistance) is provided with 8 mm diameter straight steel ropes, inserted at 0,50 m distances longitudinally in the woven mesh. The product has a nominal longitudinal tensile strength of 120 kN/m.

The steelgrid geocomposite is particularly suitable for rockfall protection as a drapery system for surface or soil veneer slope stability. It has the big advantage of connecting the longitudinal ropes to the top anchor rope: the weaving of the ropes inside the steel mesh increases the lining's vertical pull strength, resulting in a more effective anchoring ability.

The steel wire used in the manufacture of the double twisted wire mesh, as well as the steel rope, is heavily galvanised with Galmac, a zinc (95 %)/aluminium (5 %) alloy. The aperture on the opening of mesh (being the distance between the axis of two consecutive twists) is only 80 mm, therefore ensuring that only very small rocks are able to pass through the mesh. The double twist prevents unravelling of the mesh should any accidental wire rupture occur.

The design required an anchoring system at the crest of the highwall slopes. The drapery wire mesh had to cover the entire extent of the

project scope and be weighted at the toe to limit the runout distance of falling rock onto the haul road.

The anchoring of the drapery wire mesh had its own unique challenges, as there are two different types of bedrock at the crests of the two drapery wire mesh installation areas. The upper drapery mesh area required a 'deadman' anchor system due to the fact that the crest area consisted of previously blasted material. A buried gabion wall system was used for this area, with the gabion baskets supplied by Maccaferri. Grouted thread bars were used for the anchoring system at the crest of the lower drapery mesh area.

The anchoring system for the drapery wire mesh also has to be strong enough to (a) anchor the weight of the drapery wire mesh and (b) hold back any blocks of rock that worked themselves loose on the slope highwall and keep them trapped behind the drapery wire mesh curtain.

Wepex constructed all elements of the project. These elements included levelling and trimming of the crests of the two installations and construction and installation of the anchoring systems at the crests of the installations.

As regards installation of the drapery wire mesh curtain, rolls of Steelgrid HR 50 needed to be anchored to the anchoring system at the top of the crests. The mesh then needed to be installed down the length of the slope highwall. As previously noted, the average height of the upper drapery mesh area is 178 m and the lower mesh area 106 m.

Historically, two methods have been used to install drapery wire mesh down similar slopes. The drapery wire mesh is draped over the slope by helicopter or simply anchored to the crest and then pushed over the crest, allowing it to unroll to the toe of the slope.

Due to the massive area of drapery wire mesh to be installed, the helicopter option would not have been financially viable. The alternative method of 'pushing' the mesh rolls off the crest would have resulted in the mesh rolls twisting on themselves on the way down the slope due to the heights of the highwalls. In a mining environment, there are also catchment areas down the length of the highwall slopes ('benches') to serve as catchment platforms for rockfall. These benches would have stopped the drapery wire mesh rolls from reaching all the way to the bottom of the slope.

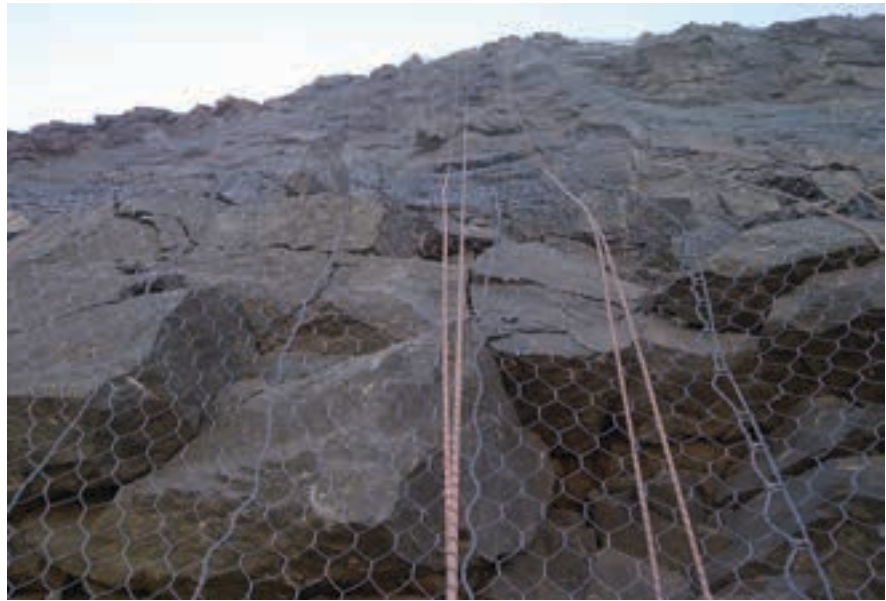
Bertoe Meyer, a mechanical engineer and one of the directors of Wepex, designed and

constructed a drape wire mesh decoiling machine which is able to anchor to the anchor system at the crest of the drape wire mesh installation areas, and then be remotely operated to ‘walk/drive’ down the slope highwall, at the same time decoiling the rolls of drape wire mesh. The ‘Decoiler’, as the machine has been named, is able to handle drape mesh rolls up to 200 m in length, and 8 m wide. The Decoiler has been internationally patented.

Two of these Decoilers were built by Wepex at its fabrication workshop in Durban and deployed at the project.

Working on unstable slope highwalls, suspended on ropes 180 m above the ground, is potentially a dangerous activity. Ensuring that a fully wire mesh laden 12 tonne Decoiling machine does not plummet uncontrolled down to the bottom of the highwall slope required innovative engineering design.

Wepex employed primarily local Botswana citizens in its workforce. The project depended heavily on rope access technicians operating



the Decoiler, as well as stitching close the drape wire mesh panels. Due to the rope access industry in Botswana being virtually non-existent, Wepex brought in a rope access instructor from South Africa to present two courses in Botswana. As a result, Botswana now has 10 new rope access technicians. ■

The wire mesh chosen for the project needed to be strong, long lasting, and of a correct weave to restrict the size of the smallest rocks that might pass through the apertures of the drapery mesh system.

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Twin decline development

According to TSX-listed Ivanhoe Mines, the Pre-Feasibility Study (PFS) on its Kamoa copper project in the DRC is expected to be finalised in early 2016. In the meantime, Ivanhoe has completed the construction of the boxcut for the declines required for the first phase of the project and has selected Byrncut Underground Congo SARL (BUCS) as the contractor to carry out the permanent support of the boxcut walls and the initial 1,2 km of development for each of the declines.

As most readers will know, the Kamoa discovery – announced in 2009 – was made in a previously unknown extension of the Central African Copperbelt in the DRC's Katanga province, approximately 25 km west of the town of Kolwezi and about 270 km west of Lubumbashi. In March this year (2015), members of the Ivanhoe Mines exploration team received the prestigious Thayer Lindsley Award from the Prospectors & Developers Association of Canada for the discovery.

Kamoa is a very large, stratiform copper deposit with adjacent prospective exploration areas and is reportedly the world's largest, undeveloped, high-grade copper resource. On January 17, 2013, an updated mineral resource estimate was issued that increased Kamoa's indicated mineral resources to a total of 739 Mt grading 2,67 % copper and containing 43,5 billion pounds of copper. This was an increase of 115 % over the previous estimate, prepared in September 2011, of 348 Mt grading 2,64 % copper and containing 20,2 billion pounds of copper. Both estimates used a 1,0 % copper cut-off grade and a minimum vertical mining thickness of 3 m.

In addition to the indicated resources, the updated estimate included inferred mineral resources of 227 Mt grading 1,96 % copper and containing 9,8 billion pounds of copper.

Ivanhoe has agreed to sell a 49,5 % share interest in Kamoa Holding Limited (the Ivanhoe subsidiary that presently owns 95 % of the project) to Zijin Mining Group Co, Ltd for US\$412 million. The purchase price will be satisfied by an initial payment of US\$206 million in cash upon the closing of the transaction (which, as this article is being written, is expected imminently). The agreements specify that the remaining US\$206 million will be paid in five equal instalments, payable every



three-and-a-half months from closing.

The 2013 Kamoa Preliminary Economic Assessment (PEA) reflects a two-phased approach to development of the project. The first phase of mining will target high-grade copper mineralisation from shallow, underground resources to produce approximately 100 000 tonnes of contained copper per year in a high-value concentrate. The PEA estimated that the pre-production capital required for Kamoa's first phase of development would be approximately US\$1,4 billion. The proposed second phase will entail a major expansion of the mine and mill and construction of a smelter to produce approximately 300 000 tonnes of blister copper each year.

Metallurgical test work has indicated that copper recoveries averaging 86 % and concentrate grades averaging 39 % copper are achievable at Kamoa.

In its review of operations for the third quarter of 2015, Ivanhoe notes that the twin declines are designed to intersect the high-grade copper mineralisation in the Kansoko Sud area, approximately 150 m below the surface. Ivanhoe's drilling programme in this area has defined a thick, near-surface zone of high-grade copper mineralisation where a recent hole intercepted 15,7 m (true width) of 7,04 % copper, at a 1,5 % total copper cut-off.

As already mentioned, BUCS will be

set to start at Kamoia project



responsible for the support of the boxcut and decline development. Contract negotiations are complete and a letter of award has been issued to BUCS for the permanent support of the boxcut. Work is expected to start early in 2016, to be followed by the initial development for each of the two declines. In the meantime, Ivanhoe is conducting repair and modification work on the boxcut berms. A geotechnical evaluation report for decline support design has been completed by SRK; the findings have been incorporated into the design.

A local DRC contractor, Tanga Logistics and Mining SA (TLM), recently completed the civil works in the boxcut, including the drains, sump and roadway. Ivanhoe is preparing the boxcut site for the mobilisation of the decline contractor, which includes upgrading of existing accommodation, the supply of power, diesel fuel, workshops and offices.

The site has thus far had an excellent safety record, says Ivanhoe, and – by the end of Q3 2015 – 4,39 million hours had been worked without a lost-time injury.

As regards electrical supply to the project, Ivanhoe reports that the installation of four new overhead cranes and the repair of turbine number one, under the terms of the pre-financing agreement with DRC electricity utility SNEL, is progressing well at the Mwadingusha hydroelectric power plant on the Lufira River, near

the town of Mwadingusha, approximately 250 km north-east of Kamoia. The repairs are required to secure 10 MW of power for the construction of Kamoia.

On the subject of exploration, Ivanhoe says that limited drilling occurred in Q3 2015, with 725 m completed in five shallow holes. This brought the total metres drilled to 1 719 for the nine months ended September 30, 2015. One hole was completed in Kamoia Nord to test for shallow mineralisation close to the Kamoia Dome, three holes were completed in Kansoko Nord to gain confidence in the high grade mineralisation up-dip, and one hole was drilled on one of the regional exploration licences to assist with relinquishment decisions.

The newly purchased deep-drilling Dando rig began drilling in Q3 2015. Ivanhoe is also considering mobilising the two company-owned Landcruiser-mounted rigs. The exploration programme will focus on completing the assessment of regional exploration targets to the west of Kamoia, then begin an exploration drilling programme at Kakula where previously high-grade copper mineralisation was intersected. Initial drilling at Kakula is planned at 800-m centres within the previously intersected high-grade zone, with additional, wider spaced drilling to increase the potential size of the mineralised area.

Photos courtesy of Ivanhoe Mines

Above: Mechanical installation of four overhead cranes has been completed at the Mwadingusha hydroelectric plant.

Centre: Boxcut civil works underway on the sump and roadway.

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Fire protection essential for conveyor belt systems

Belt conveyor systems are used extensively in the mining industry – they provide an ideal solution to transport manageable sized material from one processing point to another. Using such a system reduces the reliance on manpower and reliability is maximised. However, a key protection area that has to be considered is how to best handle the issue of conveyor belt system fires.



This is the view of Michael van Niekerk from ASP Fire, who goes on to add: “Conveyor belt systems and supporting structures are normally of non-combustible construction; however, any large fire may damage or cause the collapse of the structural elements. The principal fire load includes the material being conveyed, the mechanical components of the system, and the belt itself.”

He says there is a misconception that conveyors are not easily ignitable, which can often prevent mines from taking the necessary precautions to ensure that there is sufficient fire protection in place: “Once a conveyor fire starts, it will grow rapidly and become very difficult to control in a very short period of time.” He points out that belts contain polymeric materials, which present a serious risk in terms of rapid fire spread and the generation of toxic, corrosive smoke – making these fires lethal and incredibly difficult to control.

In June 2015, for example, a fire that burned a multi-story conveyor belt at a Lake Elsinore aggregate mining and crushing business in the USA caused an estimated US\$13 million in

damage and took firefighters more than two hours to contain. “When you consider the overall loss caused by a conveyor belt fire, you can’t just think about the possible loss of lives, injured staff and the loss of expensive equipment, but you also have to consider the excessive loss of revenue that will be incurred by the downtime required to fix or rebuild the conveyor belt,” says van Niekerk.

“As such, the essential ethos behind any quality conveyor belt fire protection needs to revolve around the preservation of the conveyor belt system itself. Hence, the need for early detection and the quick and successful extinguishing of any fire, while simultaneously cooling the affected structure, remains key.

“It is important to note that every conveyor belt system is unique and, as such, an individual assessment has to be made for each system in order to adequately and accurately determine where the fire risks lie for that particular system design.”

He notes that – in his experience – the most common causes of conveyor belt fires are static heat build-up from friction caused by belt movement, moving fire on the belt itself,

An underground conveyor tail pulley fire with water mist system in action. The water mist fire suppression systems available from ASP Fire force water through micro nozzles at a very high pressure to create a water vapour mist. Fire extinguishing occurs due to a combination of the cooling effect of the water mist and the displacement of oxygen caused by the expansion of the water mist as it is vaporised.

feature



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The Backpack water mist system being used on a fuel spill fire. The environmentally friendly system rapidly extinguishes 250 litres of burning fuel using 12 litres of water. According to ASP Fire, this has the same knock out power as a 500 litre trailer-mounted system.

electrical failure or overheating of the conveyor belt motors.

He offers the following outline of common causes of fire on conveyor belt systems:

- ❑ Friction due to a belt losing traction and slipping on the drive roller, or due to a misaligned belt slipping off the jam rollers and jamming. This can generate sufficient heat to ignite the belt itself or the product it is transporting.
- ❑ Cutting or welding activities generate hot molten metal particles that can ignite the belt.
- ❑ Accumulated waste below the belt due to lack of regular housekeeping.
- ❑ Overheated materials from ovens, kilns or dryers that have not been sufficiently cooled before being placed on the conveyor belt.
- ❑ Undetected electrical malfunctioning of conveyor belt motors.

To ensure early fire detection in conveyor belt environments, ASP Fire recommends the installation of a variety of Technoswitch fire detection technologies, which are especially suited to long-distance and moving environments. These include:

- ❑ The 246-1 Ember Detector, which recognises a smoldering ember on a moving conveyor belt before it bursts into flames.

- ❑ A linear heat detection cable, which is used for very long distances – common with conveyor belt systems – and responds to a rise in heat that is above the alarm threshold.
 - ❑ The 40-40 IR3, which uses three different infrared light wavelengths to detect an open flame.
 - ❑ The TEC247, a fire control panel that manages all of the detection devices, the alarms and the suppression equipment valves.
 - ❑ The TEC057-1, an interface unit that allows for multiple suppression systems or cylinders to be connected to a single fire control panel.
- Over and above this, van Niekerk recommends other industry-leading technologies for cost-effective conveyor belt fire-suppression: “The I-Cat Firetrace self-activating fire-detection and suppression system is a prime example. This technology can automatically detect fire and effectively suppress it in a matter of seconds before it becomes a problem.”

The Firetrace system boasts polymer tubing that will rupture when exposed to a flame. The specialised Firetrace detection tubing reportedly combines leak resistance, flexibility, durability and precise temperature sensitivity, allowing it to react quickly when the heat from a fire is present. It connects to a custom-engineered valve and a Firetrace cylinder that contains the best fire suppression agent for a particular hazard.

“These low-pressure systems cause no thermal shock, have long operational life, allow for on-site refilling of the systems, are electrically non-conductive and use sustainable, clean technology, and can even be used with other external fire detection systems,” explains van Niekerk.

The I-Cat T-Rotor Technology systems are another example of innovative technology – providing localised protection, hand-held extinguishers, fast response back-packs and vehicle protection systems. They comprise extinguishers that use a combination of water

feature




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and/or foam in a mist form, as opposed to traditional fire extinguishers that use either dry foam or chemical powders.

“The misting technology of the T-Rotor Technology uses a small rotor unit that atomises water and charges it with kinetic energy, creating a fine atomised mist at a water pressure of 3 bar in a mobile unit. Using water as the main agent, and nitrogen as a propellant, it can extinguish all types of fire, including rubber and plastic fires, kitchen cooking oil fires, diesel and petrol fires and electrical fires rated up to 245 kV,” explains van Niekerk.

The system can also be designed to create cooling zones on conveyor belts to detect and cool hot material – without adding to the moisture content of the product – to reduce any potential fire risks.

Van Niekerk ends by noting that the Water Mist extinguisher range is SABS-approved: “Using water and nitrogen is safe, effective and saves on maintenance and service costs. Each litre of water amounts to 120 m² of coverage capability, and the small quantity of water that is used has the added benefit of ensuring little to no redundancy, damage or environmental contamination.” ■

CMA holds ‘Industry Indaba’

At the International Materials Handling Conference – Beltcon 18, held in Johannesburg on August 5 and 6, 2015, members of the industry mandated the Conveyor Manufacturers Association of SA (CMA) to investigate two issues. These were preventing runback in conveyors and the nip guard gap.

The CMA hosted an important and successful ‘Industry Indaba’ in October 2015 to discuss not only these two items, but two more in addition – a report-back to inform industry that the recently repaired mid-scale gallery test apparatus at the SABS is once again available for testing of fire retardant belting; and pull key stations.

The format of the Indaba consisted of four presentations on the above matters of concern, followed by debate from the floor. The four topics on the agenda were:

- Part 1 – Legal requirements for preventing runback in conveyors. Simon Curry (Flexco, CMA Chairman).
- Part 2 – Legal requirements pertaining to nip guards. Alan Exton (Accrete Consulting).
- Part 3 – Legal requirements for testing of fire retardant belting (SANS 971). Paul Nel (ThyssenKrupp).
- Part 4 – Legal requirements pertaining to pull key stations. Alan Exton (Accrete Consulting).

Each topic informed delegates of the legal requirements relating to the specific area of concern, which was followed by debate from the floor.

The CMA was mandated to establish a working group to further investigate the nip guard gap and pull key stations. These are currently in the process of being formed, and it is envisaged that the working group will consist of all stakeholders, but mostly driven by the users and managed by CMA. ■

feature

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Chute systems installed as part of blast furnace upgrade

Weba Chute Systems has successfully completed the installation of 16 chute systems at ArcelorMittal's Newcastle works. The chutes form part of a conveying system attached to the upgrade of blast furnace Number 5 at the plant.

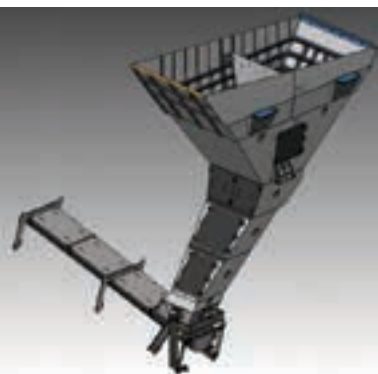


Illustration of Weba Chute System which handles fines at ArcelorMittal Newcastle.

Ted Cruickshank, Project Manager at Weba Chute Systems, notes that Weba Chute Systems was contracted by Howden for this particular project after being specified by ArcelorMittal itself, which he describes as “a significant reference” for the company.

“Teamwork formed an important part of our success, right from the design stage through to final commissioning in the last quarter of 2014,” Cruickshank adds. A couple of the transfer points had excessive transfer heights of around 16 m to 18 m. “It was essential that this be taken into account at the design stage, because when material is transferred at such heights, it becomes more difficult to control the velocity through the transfer point. When material is not properly controlled during the handling process, it can lead to excessive wear, poor loading and excessive dust emissions.”

It is far simpler to mitigate against such potential problems by means of upfront involvement. “Many of the issues associated with transfer points can be eliminated during the design stage,” Cruickshank explains. “Consulting with us during this vital phase means that we can bring the experience and expertise we have gained during thousands of installations to bear on an individual project. It also eliminates the situation where transfer points need to be redesigned after installation because certain critical factors are not taken into account. One of the most common problems associated with conventional chute design is where the product drops from any height directly onto the belt.

“Such a basic design fault causes the most catastrophic damage and cost, as the impact of product falling directly onto the belt results in excessive wear and, in the worst-case scenario, can even result in tearing of the belt. In addition to the impact, excessive spillage also results in increased maintenance requirements. This has a direct bearing on both productivity and costs, due to unnecessary downtime and component replacement.”

The common practice of installing skirting and a skirting box as a remedy to control spillage incurs an additional capital outlay and is not guaranteed to alleviate the problems associated with incorrect belt loading. Regardless of the direction or type of transfer, there are some design requirements that require specific attention, Cruickshank emphasises.

A major factor at the ArcelorMittal project was the reduction or suppression of dust, which posed a particular challenge as the material conveyed is prone to dust generation when being transferred. “We had to look at containing the dust wherever possible and also suppressing the dust, which is vital from an environmental point of view,” Cruickshank says.

In addition, the contract was on a tight timeframe, which meant that Weba Chute Systems had to put steps in place to accelerate the engineering and fabrication process to ensure that the required deadline would be met. In terms of the exact specifications of this project, material is transferred from the chutes onto conveyor belts that are either 600 mm or 900 mm wide. The belts move at speeds ranging from 1,27 m/s to 1,96 m/s and the material density ranges from 0,6 to 1,8 t/m³. The material throughput is an average of between 54 t/h and 256 t/h per hour.

This particular chute design was achieved using a sophisticated 3D Computer Aided Design (CAD) program. The process begins with a thorough site visit whereby Weba Chute Systems ascertains the exact requirements of the client by means of interviews with its operational and engineering teams. Thus the optimum design is derived and tested using a combination of sound engineering tools, substantial practical knowledge and Discrete Element Method (DEM) simulation as a verification tool.

“It is important to factor in the operation’s unique product specifications and data, belt width, belt speed, material sizes and shape and throughput, as well as the plant layout, including the position of belt scrapers and dust suppression/extraction systems. We take a holistic approach towards chute design, which encapsulates both the entry and exit points, as well as the control of the flow, volume and velocity of the material being transferred at all times,” Cruickshank concludes. ■

Lagging system reduces costs

Conveyor belt slippage, poor traction, inferior wear properties and inadequate water shedding are nightmares which plague plant operators on mines. All of these can cause unplanned downtime with associated cost implications. However, more critically, conveyor belt slippage is potentially dangerous and could even result in catastrophic failure in a plant. In instances where slippage continues, there is an increased danger of fire as well as damage to the carcass and splice, caused when the belt does not grip.



MultoLag™ pulley lagging functions as a maintenance-free, wear-resistant cover that is applied to pulley shells to improve traction in the case of drive pulleys and provide a polished low friction surface on non-drive pulleys.

This is according to Mark Jarrett, National Sales Manager of Multotec Wear Linings, who says that the company's MultoLag™ pulley lagging functions as a maintenance-free, wear-resistant cover that is applied to pulley shells to improve traction in the case of drive pulleys and provide a polished low friction surface on non-drive pulleys.

MultoLag™ has become a widely accepted solution for mining and industrial operations as a cost effective response to these recurring problems. "This lagging is particularly effective in aggressive conditions, even on bucket elevators or where material is inevitably trapped between the pulley shell and the conveyor belt. It is suitable for wet conditions and other applications where a low coefficient of friction or a high level of traction is required on drive pulleys or where general wear protection of the non-drive pulley is needed," Jarrett says.

He points out that traditional rubber or epoxy pulley lagging has a much shorter lifespan than ceramic lagging.

The MultoLag™ system uses standard smooth high alumina ceramic tiles for non-drive pulleys and studded tile lagging for drive pulleys. The smooth/polished surface provided by the very hard ceramics on the non-drive pulleys provides minimal friction, less resistance and therefore no wear. Conversely, the studded tiles on the drive pulleys have a high coefficient of friction of 0,78, which means no relative movement between the surface of the ceramic lined drive pulley and the surface of the conveyor belt. What is significant is that without relative movement between surfaces there can be no wear.

Ceramic lined drive pulleys are covered with high density 20 mm x 20 mm x 6 mm ceramic tiles, with 1 mm high round-edged studs on the tile face that create maximum traction, without the associated damage to belts. The 6 mm thick high density smooth ceramic tiles are bonded directly to the pulley's surface with specially formulated Multotec Hi-Bond epoxy.

"This epoxy allows us to achieve a bond strength at least 70 % higher than that of rubber to steel or rubber to ceramic. It also allows for surface flexing, corrosion protection and water dissipation. In the unlikely event that patching is required, local damage can be repaired quickly without removing the surrounding pulley lining," Jarrett says. ■

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Modular separation plant offers flexibility

One of the major advantages of the FLSmidth Modular REFLUX™ Classifier plant, which is suitable for fines gravity separation applications, is that it can be configured for specific requirements and is quick to install and commission on site within a relatively short period of time.

This integrated engineered modular solution has at its heart the well-proven REFLUX™ Classifier (RC™) from FLSmidth. Already well proven in the mineral beneficiation of fines in Asia, Australia, Africa and North America, use of this technology effec-

tively improves the performance of gravity separation circuits over existing technologies such as spirals and hydrosizers.

Ricus van Reenen, Senior Account Manager at FLSmidth, says the modular RC plant enables customers to take advantage of the benefits of RC technology as well as to leverage the flexibility that modularity gives to an operation.

Each section of the modular plant is contained within the dimensions of a 20-foot shipping container and the combination of these sections or containers allows the plant to be configured according to process requirements. The configuration is easily adjustable to accommodate the changing process or ore conditions within given parameters, and this offers even greater flexibility. The plant can also be easily relocated from one site to another.

Rapid on-site installation is possible as the frames of each modular section are easily assembled and locked together. All that is required is an 80-tonne mobile crane and a rigging team. Assembly is

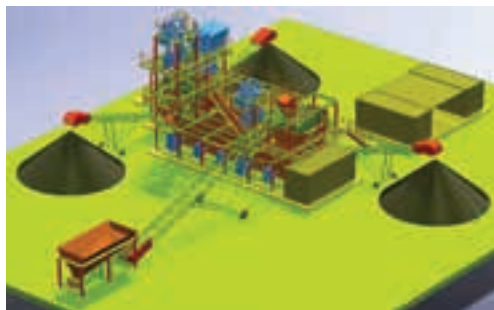
done under supervision of FLSmidth technical personnel who will hot commission the plant.

The equipment technologies selected for the modular plant are all from FLSmidth and interface optimally with the RC. This ensures the feed material is correctly prepared prior to reporting to the RC so that it operates correctly and to specification. In addition to the operational advantages that come with using technologies from one source, customers can leverage this single point of contact from an on-site support perspective as well.

Typically, the modular fines separation plant would include pumps, screens, dewatering equipment, cyclones and conveyors. The entire modular RC plant is automated using advanced instrumentation and control. All process parameters are monitored to ensure optimum performance. This allows for more consistent operation and therefore better recoveries.

The modular RC plant can also be integrated into a brownfields plant where the RC is retrofitted to replace less efficient technology.

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



Engineered as a plug and play solution, the integrated modular process plant has been designed for optimum recovery.

Distributorship agreement

Hydraulic and Automation Warehouse (HAW) has concluded an agreement appointing the company as an authorised distributor for SALAMI in sub-Saharan Africa. Effective from July 2015, SALAMI's hydraulic gear pumps, motors and manual-operated mobile control valves are available to the region's hydraulic industries, with full backup and after-sales support.

"SALAMI hydraulic components have an established reputation across the globe as a top-class brand with a wide range of products that introduce cost-effective, efficient and reliable performance in fluid power applications," explains Wynand Kellerman, General Manager, HAW. "We're excited to add SALAMI to our list of available products, which further cements our status as one of Africa's largest stockholders of hydraulic components from the world's leading brands."

HAW is a Hytec Group company. It has provided an expansive, high-quality product line of hydraulic hose and fittings components and accessories for the Southern African fluid power industry for more than 20 years.

Hydraulic and Automation Warehouse (HAW),
tel (+27 11) 281-3800

Babcock to distribute Terex haulers

Terex Trucks, which was fully acquired by Volvo Construction Equipment, Sweden in June 2014, has appointed Babcock International as the official distributor of its rigid and articulated haulers in Southern Africa, effective as from 1 October 2015. In addition to supplying new machines, Babcock will also provide parts and other essential aftermarket support services to customers in South Africa and neighbouring countries.

Headquartered in Motherwell, Scotland, UK, Terex Trucks is a manufacturer of off-highway rigid and articulated trucks that are used in mining, quarry and construction applications around the world. The Volvo acquisition, which includes ranges of rigid dump trucks with payloads from 32 to 91 tons and articulated dump trucks from

25 to 38 tons, will complement the other Volvo Construction Equipment products that Babcock represents.

Babcock is well geared to incorporate the Terex Trucks business into its current infrastructure, especially with the opening of its state-of-the-art branch in Middelburg which will serve as the head office for the Terex Trucks brand. This branch has been designed with large work bays that will accommodate trucks up to 100 tons.

David Vaughan, Babcock, tel (+27 10) 001-0730



A Terex TR60 rigid truck, part of the range of rigid and articulated haulers now available from Babcock.

Dust reduction solutions from I-CAT

According to Professor Jan du Plessis, Non-executive Director of I-CAT Environmental Solutions, both underground and open-cast mining operations are proactively seeking new methods of reducing the exposure of their workers to dust.

"Poor dust control negatively affects the health and safety of all employees and the quality of life for surrounding communities. It also negatively affects production and operating costs of all on-site vehicles and machinery, thereby impacting on the bottom line of the operation in the long run. Using water only as a control measure is not only a waste of this precious resource, but over-wetting of inclines and haulage roads also raises safety risks with regards to vehicle control," he comments.

I-CAT Operations Director Anton van der Merwe says that by using a dust palliative such as RDC 20, GreenGrip and GreenBit, the frequency of applications can be dramatically reduced. RDC 20 is a water soluble anionic polyelectrolyte polymer that has been exclusively developed by I-CAT for use on temporary roads.

It is an innovative formulation of blended emulsified co-polymers and ionic modifiers. When sprayed onto the road surface, RDC 20 forms a durable cross-linked matrix. The matrix binds fine soil particles into larger heavier particles, which are less

prone to become airborne. RDC 20 is used on temporary roads, as it is a cost efficient means to improve road and dust conditions exponentially.

Van der Merwe adds that GreenGrip is a natural polymer-based gravel road sealant. "It is an environmentally safe alternative to chemically-based products for semi-permanent gravel roads on mines and residential areas. The solution produces a durable, smooth and dust free surface with fewer maintenance intervals. For permanent dust roads, I-CAT offers a bitumen-based dust suppression solution called GreenBit," he elaborates.

I-CAT also offers its locally engineered and manufactured Dust Monster (DM 40, DM 70 and DM 110) mist cannons for dust suppression in open-pit areas where loading and off-loading of aggregate occurs. It is also suitable for use on stockpiles and any large dust generating areas. Van der Merwe explains that the Dust Monster range of machinery minimises the effects of dust by creating an ultra-fine mist that attracts dust and encapsulates the airborne particles, before driving them to the ground.

I-CAT also imports the internationally recognised SCRUBmist dry mist dust



The Dust Monster boasts a 'throw' of more than 100 m.

suppression system, which removes respirable and inhalable dust particles from the air with minimal water usage, and no collateral damage to property. It works by atomising water into minute droplets 5 micron (μm) to 15 μm in size, which are electrostatically attracted to dust particles and form agglomerations that subsequently fall out of the air.

For dust suppression and dust management on active or inactive tailings storage facilities, I-CAT offers the TDS 2005 tailings dam seal solution – a matrix blend of a patented anionic surfactant and other environmentally-friendly binding products.

The unique properties of this liquid gel allow it to penetrate the surface of the dump and open soil areas, creating a durable bond that binds loose aggregate by forming a porous crust that allows water to penetrate the surface, without being washed away under heavy precipitation.

Anton van der Merwe, I-CAT, tel (+27 12) 349-1441

Supplier of PPE wins Leadership Award

Select PPE was recently awarded the Frost & Sullivan 2015 Southern African Personal Protective Equipment Visionary Innovation Leadership Award at a prestigious ceremony that hosted 140 of Africa's top innovative companies at Table Bay Hotel in Cape Town.

The annual award recognises outstanding achievement and superior performance in areas such as leadership, technological innovation and strategic product development. Select PPE's Sales Director, Dries van Tonder, accepted the award on behalf of the 400-member South African-based company for its innovative PPE solutions for women and software that facilitates greater PPE control to previously unreachable markets.

To date, PPE has been specifically designed for men and does not properly fit a woman's form, reducing not only its protective functioning but also the popu-

larity among women in the industry. Select PPE, one of the few suppliers of female PPE through its field-researched programme, Women in Industry, has pioneered more accurate form-fitting equipment that significantly enhances overall industry safety standards.

Regarding the innovative software the company has developed, this challenges decades-old business models in a move away from paper-controlled business transactions towards online integration. Named PPE Solution, the software provides real-time information on all PPE users and daily usage, controlled by an application-specific Issuing Protocol (IP). This IP includes an assessment of the type and quantity of protective equipment needed, automatic replenishment of stock, and alerts the head of safety when an employee is at risk.

PPE Solution not only facilitates a safer

working environment and reduces operational costs for clients, but also helps mitigate possibilities of accidents and potential litigation costs. The solution addresses the industry-wide challenge of PPE abuse by logging staff-specific PPE onto their clock cards as a form of PPE identification, alerting managers to potential PPE abuse with individual product records.

Select PPE has also developed solutions for small-scale PPE. This unique online capability has reportedly enabled the company to capture markets that have traditionally been hard to access. Previously, smaller operations with 150 to 350 employees were difficult to supply with PPE, as it was not economically viable to have on-site facilities. Select PPE's software, online store and 'vending machine' for PPE afford these smaller customers access to the full benefits of a holistic PPE solution.

Select PPE, tel (+27 11) 296-3600

Wheel loaders offer performance and competitive pricing



Ernest Human of Dura Equipment Sales.

Sales of Foton Lovol wheel loaders are reported to be rapidly increasing as word-of-mouth referrals bring potential customers to investigate the merits of a manufacturer whose machines cost nearly half the price of new 'big brand' machines and whose new engines are claimed to use significantly less fuel than competitor machines.

Production machines are designed to operate 24 hours per day and seven days per week in almost any type of operating conditions. For this reason they are built to be far stronger and more durable than

the average construction-type loader with easy-to-reach service points that allow quicker access for field servicing.

It is precisely for this reason that high production machines traditionally command a significant cost premium over ordinary machines – which puts them largely out of the reach of smaller mining, quarrying and materials handling-type operations. The entry of Foton Lovol has reportedly changed this and turned the market on its head.

According to Ernest Human, Marketing Manager of Dura Equipment Sales, the Du Randt Group of Companies has – since taking over the agency in 2012 – turned the brand into a household name within its target market. Sales have increased steadily and are gaining momentum as the positive sentiments of the owners of the nearly 150 machines begin to provide proof of the machines' abilities.

"Foton Lovol is the first Chinese manufacturer to build its machines especially for South Africa to our exact standards and specifications using the best materials and components," says Human. "As a result of this commitment, we invested in over R14-million worth of spares to ensure we can support the machines going forward. We also put in place infrastructure in the form of full workshop facilities at our main branches, as well as investing in people and equipment required to sell, maintain and service our machines wherever they operate within South Africa or

even further afield across our borders.

"Our flagship machine, the Foton Lovol FL966-II loader accounts for most of our sales so far, especially in coal mining applications where its standard 3,8 m³ or oversized 5,5 m³ bucket is able to make short work of coal stockpiles. Likewise the FL958-II machine has found favour among quarry operators where its rugged ability and fuel-sipping consumption makes it ideal for this type of application where low resource prices require a low cost-of-ownership machine."

The two top-of-the-range machines come equipped with all the necessary gear to operate on mines. This includes falling object protection (FOPS) and roll over protection (ROPS) cabs, as well as 23,5 inch L5 tyres that are required for durability in productive environments. Powerful Weichai engines provide more than enough power and the proven technology of the motors allows fuel consumption of approximately 15 litres per hour during production.

The South African operation backs its products with a 3 000 hours or 24 months factory warranty and is prepared to guarantee customers that if, for any reason, a machine cannot be repaired within 48 hours, a replacement machine will be loaned to the operators until such time as the machine is up and running again. Yet another incentive to consider Foton Lovol is the fact that the first four services are free.

Ernest Human, Dura Equipment Sales, tel (+27 11) 918-4760

Dozer blade protection at the cutting edge

Developed specifically for Cat D10 and D11 track-type tractors, the new Cat High Abrasion Cast Cutting Edge System is built specifically for extreme, high abrasion pushing applications with low to moderate impact, moving more material with less machine downtime, shift after shift. The system is designed for fitment on Cat universal and semi-universal blades.

"The high abrasion end bits are now married up with complementary cast high abrasion cutting edges, a new development from Caterpillar," comments Barloworld Equipment Group Product Specialist Deon Delpont. Typical abrasive pushing applications include feeding a shovel, stockpiling, or maintaining a pit floor. In these appli-

cations, end bits are designed for half the life of the reversible cast cutting edges.

Designed for longer life, Caterpillar's new high abrasion cast cutting edges and end bits provide up to 40 % longer wear life when compared to the Cat Extended Wear Life (EWL) ground engaging tool system.

A new edge measures approximately 40 cm (16 inches) in width with a thickness of 50 and 80 mm for Cat D10 and D11 systems, respectively. The edge should be regularly monitored and flipped once it reaches approximately 34 cm (13,5 inches). Then at approximately 28 cm (11 inches) the edge is due for replacement.



The new Cat High Abrasion Cast Cutting Edge System.

"Excess wear on the base edge could lead to premature cutting edge breakage, which is why it's important not to exceed 7,5 cm (three inches) of wear per side," adds Delpont. "Adopting this practice will ensure maximum wear life performance and contribute towards lowest cost production."

Barloworld Equipment, tel (+27 11) 929-0000

Osborn modular plant processes iron ore in China

Osborn's locally-designed and manufactured modular plants are making their mark as far afield as China, where the Johannesburg-based equipment manufacturer has successfully completed the installation of a modular plant to process iron ore for Bayi Steel's Dundee plant, located near Ürümqi City in China's Xinjiang Province.

Marketing Director Martin Botha says this was Osborn's second export order to China, and that it reflects the modular plant's ability to withstand the most testing operating conditions. "The Dundee iron ore processing plant is situated 3 500 m above sea level, and the temperature goes down to minus 40. It only operates between May and October, due to severe weather conditions. Our machines' power packs have been installed with heat packs and uprated electric motors to cope in high altitude," he explains.

The Osborn modular plant – which Botha says has replaced a "locally-made kit" at the Chinese facility – comprises a primary Osborn jaw crusher, secondary cone crusher, screen and tertiary cone crusher. With a capacity of 300 t/h, the Osborn plant produces a nominal -12 mm product. Osborn won this R20-million export order to China amid stiff competition from leading global players, says Botha. The company partnered with a China-based operation that manufactured the plant's conveyors.

"This was a ground-breaking order. It is an exciting and significant development to see a South African machine shipped to China, and it reflects the exceptional quality of Osborn's equipment. Our modular plants are easy to build and are mounted on skids, so they are easier to set up. They are also easy to transport and re-erect on a new site. These plants are designed to fit into containers when they are dismantled, which makes transportation easier and cheaper. There's less civil work and they can be transported, assembled and dismantled easily and quickly. Customers also recognise that Osborn's machines are more robust and wear resistant, having dead box areas to improve liner wear and machine wear. It is proving a recipe for success," Botha concludes.

Three Osborn modular plants are available, in different sizes – a modular jaw crushing plant (sizes 2540, 3042, 3055, 3648 and 4248), a modular cone crushing plant (sizes 38, 44, 52 and 57) and a modular screening plant (sizes 6', 7' and 8' double and triple decks). With the addition of its KPI-JCI vertical shaft and horizontal shaft impactors to the modular set-up, Osborn can also offer a full quarry processing plant.

Charisse Fallows, Osborn Engineered Products, tel (+27 11) 820-7600



Osborn modular plant operating in testing conditions at the Dundee iron ore processing plant in China's Xinjiang Province.

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Customised solutions increase screening efficiencies



Multiple screen material options are available from Multotec and include rubber grades.

As the demand for enhanced efficiencies and throughput increases, the market is seeking out solutions that have a proven track record, yet can be customised to suit specific applications. This is the view of Multotec which sees its ability to stay abreast of technological changes and implement smarter, more cost effective ways of screening as a big differentiator.

The screen panel is the most critical aspect of the screening application as it defines what the end user will receive from the process. For this reason it is essential for the appropriate panel to be in place to ensure correct feed envelopes to

downstream processes. Much of the time, screening media is misunderstood and insufficient attention is often given to this critical component.

According to Rhodes Nelson, MD of Multotec Manufacturing, one of the driving forces in screening at the moment is the ability to determine wear of screen panels and to plan for maintenance and replacement thereof. "By being able to establish wear patterns before they cause a shutdown, process plants save substantial amounts of labour and money on downtime. As a result, we have seen an increasing demand for our online monitoring system, Hawkeye, as well as for enhancements in recording processes."

The use of visual wear indicators is another technology that is seeing an increased demand as it provides a major advantage in terms of monitoring screen panels. This is a system with a visual indicator that shows the incremental wear rates that occur on screening media. As the aperture wears, the visual dots become clearly visible and the changeout criteria cannot be misinterpreted. The end result is far more accurate determination

of screen panel changeouts.

Multotec is seeing a significant change in the end users' expectations of product quality and adherence to product specification. Nelson believes that this is predominantly because of the oversupply situation and applies specifically to coal and iron ore. "This has led to the reality that sampling of product is now far more critical than previously exhibited and there is a need for the feed envelopes to the various processes or for the final product to be more accurate."

Multotec invests strategically into R&D to respond to direct customer demands. This has resulted in the development of a number of products and solutions that are geared towards increased return on investment. "Another development we have seen is where three dimensional screening is optimising open area for screen panels. An example is the Multotec TeePee™ panel that is used in dewatering applications," says Nelson. In addition, Multotec's O-slot™ aperture is being successfully used in iron ore applications where panel life needs to be optimised, while still retaining non blinding characteristics.

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

Joest Kwatani screens find favour in coal sector

Joest Kwatani says it has been at the development forefront of custom-built vibrating screens, grizzlies and feeders in the South African and African mining industry for almost 40 years, especially in the coal sector where numerous Witbank and Middelburg mines operate its vibrating screens, grizzlies and feeders.

The company has 30 % black ownership and Level 3 BBBEE accreditation. "Joest

Kwatani was the first company in its class to exceed the mining charter requirement," says Kim Schoepflin, MD of Joest Kwatani.

New to the coal industry is its 4,3 m wide banana screen, which fulfils the industry's need for more efficient, high throughput equipment.

The new screen design, incorporating the latest technology and refinements, addresses the failure modes of existing 4,3 m wide screens while also offering reduced downtime and ease of maintenance, a critical consideration owing to the large scale components involved. The new screen also focuses on critical issues such as lifespan and structural integrity.

Joest Kwatani has become the preferred equipment supplier to one of South Africa's largest coal preparation plants close to Lephalale in Limpopo.

"Impressively, one of our 1 500 ton per hour single deck vibrating screens (3 m wide by 9,8 m long), installed in 2005, is still operational today and proof of our equipment longevity excellence," says Schoepflin.

The company also has two of the longest single deck banana screens used in coal sizing – measuring 3,66 m wide and 10 m long – installed at a colliery in Secunda. More recently, it replaced ageing competitor screens with two 650 t/h double deck, exciter-driven, ROM-sizing screens at a Delmas, Mpumalanga-based colliery. "The fast turnaround time of less than six weeks from the date of order contributed to maximised uptime and productivity," states Schoepflin.

The company has grown significantly over the past two decades. It believes that one of the major factors contributing to this growth is its 24/7 customer service and branch network located in all major mining areas with support from its Spartan headquarters. "We recently purchased another factory to increase our capacity which now extends over an area of almost 17 000 m² in Kempton Park," Schoepflin comments.

Joest Kwatani, tel (+27 11) 923-9000



A Joest Kwatani coal plant primary feed sizing screen.

XRT technology recovers record-breaking diamond

The recent recovery of a 1 111-ct diamond at Lucara's Karowe mine in Botswana (see also page 10 of this issue) was made possible by the use of TOMRA XRT (X-ray transmission) technology. The diamond, which is the second largest gem quality diamond in history and the largest ever to be recovered through a modern processing facility, was recovered by a TOMRA LDR (large diamond recovery) machine utilising X-ray transmission sensors which was commissioned at Karowe earlier this year (2015).

"We selected TOMRA XRT following an extensive suite of test work which demonstrated TOMRA XRT technology as a superior technological solution having the highest efficiency of diamond recovery and lowest concentrate yield compared to their competitors," comments Paul Day, Chief Operating Officer at Lucara Diamond Corp. "TOMRA's technology detects all types of diamonds with the same efficiency and has a remarkably small footprint in terms of power and water consumption."

Adds Dr Volker Rehrmann, Head of TOMRA Sorting Solutions: "It's an honour



TOMRA XRT sorters installed at Karowe.

for us to be part of setting new benchmarks in the diamond mining industry. We are very proud that Lucara showed confidence in our innovative sensor-based sorting technology which was rewarded with this outstanding recovery."

Six TOMRA XRT sorters have been in operation at Karowe since May 2015, replacing conventional Dense Media Separation (DMS) technology in the -60+8 mm size range. Each sorter can treat up to 150 tons per hour at over 8 000 hours per year. Advantages of the XRT technology include its compact footprint, low operating costs, high recovery rates and extremely low concentrate yields. There is no need to further process the sorter's concentrate before final hand sorting.

TOMRA, tel (+27 11) 010-0300

Maptek showcases its technology at gold exploration conference

The gold price is influenced by a raft of external factors so miners need agile technology to plan for different scenarios and quickly adapt to changes.

Maptek solutions offer advanced features, algorithms for running 'what if' scenarios and flexible platforms and applications, enabling users to cope with the fluctuations in today's commodities market.

The mine technology developer recently showcased its innovations at the biennial gold exploration conference, NewGenGold, held in Perth, Western Australia.

WA State Manager of Sales and Services Mike Husbands said Maptek modelling and mine planning software Vulcan 10 would include a new Data Analyser tool for variogram analysis when it was released in March 2016.

"Vulcan Data Analyser will give users

intuitive new tools to better understand geological data," he said. "It has the ability to dynamically update variograms based on changing parameters and output high quality charts for reporting.

"Users will be able to run scenarios quickly so they can focus on analysing them and can easily modify them if conditions change."

He added that Vulcan 10 would also allow users to display block models made up of hundreds of millions of blocks and offers extra support for multi-threaded processors for improved performance.

"A new open-pit option takes the pain out of creating scheduling blocks from your pit solids. Vulcan 10 will also include enhanced implicit modelling with new uncertainty and radial basis functions," he said.

Maptek, tel (+27 11) 750-9660, e-mail: info@maptek.co.za

Mining fleet management solution from Skygistics

Mining site fleet managers sometimes face different challenges to their road fleet manager counterparts. Some of the challenges faced daily include machine and equipment deployment at unpredictable times; monitoring engine and equipment mean time before failure (MTBF) timeline accuracy; ensuring mobile equipment remains within geo-fenced locations – across different mine sites; and monitoring vehicle speed and operators' safety practices remotely.

It should be noted that the majority of equipment and machinery is permanently on site and operated by a combination of employees, contractors and sub-contractors. This requires additional fleet management techniques, such as driver identification or equipment lockdown. To ensure that these kinds of fleets can be accurately managed with minimal disruption, and maintain a high standard of productivity, a comprehensive asset management solution is required.

"Mining fleet managers can benefit from multi-faceted tracking, surveillance and monitoring hardware and software that provides real-time feedback, cost-effectively," says Skygistics Sales and Marketing Executive Henry Smith. He adds that extensive research is done on the equipment and vehicle-monitoring needs of each mining customer so that the right asset management solution, using a high level fleet management telemetry application, can be supplied.

Called Sky Q, the software and the application's functionality greatly enhance fleet managers' monitoring capabilities. This enables managers to monitor productivity and identify vehicle/equipment availability, machine breakdowns and hours worked. In addition, data such as RPM, speed and braking is recorded. Operator accountability is escalated while managers' visibility of operations is improved, as all records of individual operator performance are readily available.

By making use of the complementary CANBus add-on, Sky Q uses GPS positioning to plot data on a map. This data can be used to determine the cause of an incident and the precise location it occurred. In addition, the CANBus and asset management application combination has the ability to warn operators of potential accidents through an in-cab buzzer.

The solution's hardware has been designed in such a way that it is easily installed on all mining vehicles and equipment.

Skygistics, tel (+27 12) 682-1607

New hydrocyclone offers high throughput



Weir Minerals offers a range of equipment solutions including hydrocyclones, rubber lining, hoses and slurry valves.

Maximised throughput and uptime, with minimised costs, are the goals of all processing plants. Extensive research and smart engineering have resulted in the development of a hydrocyclone that can reportedly achieve up to 50 % higher throughput capacity in comparison with competitor cyclones in the 26-inch diameter range.

The Cavex® 700CVX hydrocyclone, with a smaller, more space efficient body, has a higher throughput than the Cavex® 650CVX hydrocyclone making it attractive for new installations as well as retrofitting

into existing cyclone clusters. This allows mine sites to increase capacity with minimal capital expenditure while maintaining a competitive advantage.

Sheldon Gabriel, Product Manager Cyclones of Weir Minerals Africa and Middle East, explains that the inclusion of a unique laminar spiral inlet in the Cavex® 700CVX hydrocyclone is the secret behind the success of this new prod-

uct. "As with all products we introduce to the market, the design is based on feedback from the market and intensive field testing. The result is a hydrocyclone that produces the desired results due to its large inlet and vortex finder configuration.

"It is important to note that the development of the Cavex 700CVX hydrocyclone was not based merely on a cone modification, but rather on an entirely new feed geometry that substantially increases hydraulic throughput capacity while minimising localised wear on the feed chamber and vortex finder," says Gabriel.

Conventional hydrocyclone geometry causes migration of unclassified solids into the overflow, which can result in valuable mineral losses. The laminar spiral inlet geometry design of the Cavex® 700CVX hydrocyclone provides a natural flow path into the hydrocyclone. Due to the fact that the shape has no sharp edges or corners, it readily allows the feed stream to blend smoothly and efficiently with the rotating slurry within the chamber.

"When turbulence is reduced, sorting efficiency is naturally enhanced and fewer misplaced fines bypass to the underflow, with less coarse tramp material bypassing to the overflow. This is achieved by maximising the air core diameter created within the rotating mass of fluid in the hydrocyclone and results in reductions in overgrinding and circulating loads," says Gabriel.

Gabriel points out that in conventional hydrocyclones, slurry bursts into the cylinder with no flow control. The resultant turbulence is responsible for premature and localised wear of the liner walls causing inefficient classification and decreased wear life. By minimising flow resistance through the feed chamber, Cavex® hydrocyclones are able to process substantially higher slurry volumes.

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

Contract awarded for chrome recovery plant

JB Switchgear Solutions was recently awarded a multi-million rand contract for the design, manufacture and supply of motor control centres (MCCs) and VSD panels for Anglo American Platinum's Amandelbult chrome recovery plant (CRP).

The CRP will be installed prior to the secondary circuit, mainstream inert grinding (MIG) process and scavenger flotation. The new CRP will be of a modular design consisting of twin modules of spiral concentrators, employing a multi-stage configuration of

separators and spirals. Once the chromite has been extracted, the concentrate will be redirected to the platinum beneficiation plant for further processing.

The project is located within Rustenburg Platinum Mines' mining right area, 25 km south of Thabazimbi in Limpopo Province.

The chrome recovery plant will comprise two modules, with a combined capacity of 250 kilotons per month. Each will be approximately 30 m x 30 m in size and comprise feed systems,

thickeners, cyclones and spirals.

JB Switchgear is supplying six 'Eagle' series MCCs. Starter sizes vary between 1,1 kW and 45 kW. The operational voltage is 550 V with a prospective fault level of 50 kA. In addition to the MCCs, the company is also supplying 52 VSD panels ranging from 0,25 kW to 220 kW. The communication protocol for this project is 'Profibus'.

JB Switchgear is a level 4 BEE supplier, ISO 9001 certified with comprehensive IEC 61439-2 type test certification on its 'Eagle' series, including internal arc.

JB Switchgear, tel (+27 11) 027-5804

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