Mining World

Volume 9 | Issue 2 | April 2012

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Mining World

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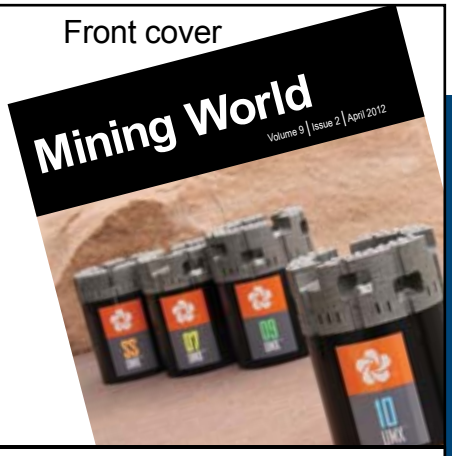

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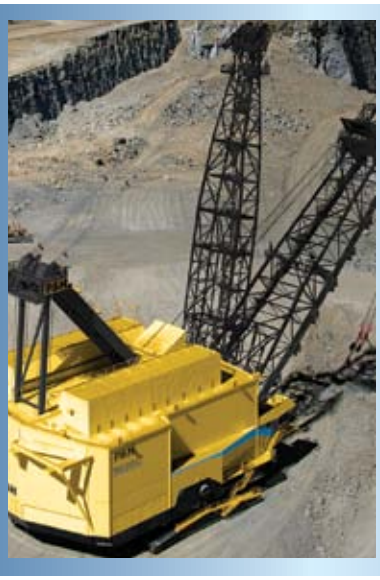

News Review

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Plant & Equipment

Unless otherwise stated, measurements are in metric units. Other abbreviations are listed below:

bcm	bank cubic metre	M	million
CANbus	controller area network bus	Mt	million tonnes
		Mst	million tons
cm	centimetre	Mtpa	million tonnes per annum
dwt	deadweight tonnes		
g	gram	ROM	run of mine
gpm	gallons per minute	RC	reverse circulation
GW	Gigawatt	SCADA	supervisory control and data aquisition
ha	hectare		
hp	horse power	SCR	selective catalytic reduction
I/O	Input/Output		
JV	Joint Venture	sec	second
kg	kilogram	st	tons
kV	kilovolt	t	tonne
kW	kilowatt	tph	tonnes per hour
l	litre	V	Volt
LOM	life of mine	lb	pound
m	metre	Mtce	metric tonnes carbon equivalent
mm	millimetre		
MW	Megawatt		

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Finning to acquire Bucyrus distribution business

Finning International Inc and Caterpillar Inc have reached an agreement for Finning to acquire from Caterpillar the distribution and support business formerly operated by Bucyrus in portions of South America and Western Canada and the UK. After closing, Finning expects to begin providing sales, service and support for former Bucyrus mining products in all of Finning's dealership territories. The transaction is valued at approximately $465M.

The acquired distribution and support business, which has current annual revenues of about $600M, includes facilities and inventory primarily in South America and Canada, as well as approximately 900 former Bucyrus employees who are expected to transition to Finning upon closing of the acquisition. Subject to customary closing conditions, it is anticipated that the transaction will close in two phases: in Finning South America and Finning UK and Ireland, followed by Canada.

In December, Caterpillar announced Sime Darby Industrial had acquired a portion of the former Bucyrus distribution business encompassing the Cat dealerships operated by Hastings Deering. Caterpillar continues to hold discussions with other Cat dealers that have mining activity in their territories and will continue to operate the former Bucyrus distribution business until the transitions have occurred in a given territory.

Cat 785D

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Joy enters distribution agreement with J H Fletcher & Co

Joy Mining Machinery and J H Fletcher & Co have agreed an exclusive distribution and authorised service provider agreement. This gives Joy the right to market, sell and service all Fletcher products to coal mines, as well as hard rock and industrial mineral mines that use Joy cutting products, with the exception of North America, Australia and Norway where Fletcher will continue to market, sell and service its products as it has in the past, and coal mines in Poland where Joy's rights will not be exclusive.

Fletcher offers a full range of high, medium and low seam mobile bolters and mobile roof supports with other underground coal mining equipment that includes pan line mounted bolters, degasification and exploratory long hole drills, diesel prime movers, face drill jumbos, and beam setters. Joy will continue to manufacture, market, sell and service its existing line of mobile bolting products such as the Ramtrak, Quadbolter and Multibolter to customers in Australia and to Joy's existing mobile roof bolting customers in other countries. This distribution agreement will allow Joy to provide a broader mining system solution for the mine of the future. In addition to cutting, haulage, crushing and conveying solutions, Joy can now offer a complete line of bolting solutions for all applications from low to high seams. Also Joy will now be able to offer full maintenance contracts for complete sets of equipment including both Joy underground mining machinery and Fletcher bolters in mechanised room and pillar sections.

Jez Leeming, Joy's global product director for bolter miners and bolters said, "Fletcher's mobile roof bolters are a welcome and complementary addition to Joy's existing product line allowing Joy to offer customers a broad line of bolting solutions including mobile roof bolters for low seam applications under 18 meters.

Greg Hinshaw, Fletcher president and COO said, "Fletcher is excited about the distribution agreement with Joy Mining Machinery. Joy's industry leading global network of company direct-to-customer sales and service locations will be beneficial to our existing customers and expand Fletcher's international presence."

Solo expands REE property

Montreal-based Solo International Inc has expanded its rare earth elements (REE) assets in Quebec with the addition of 60ha adjacent to its existing Philadelphia property.

The company's CEO, Michel Plante, commented that the acquisition completes another step in our acquisition and exploration plan to develop asset diversity.

The Philadelphia property, which is on the site of a previous apatite mine, is located 4 km northeast of Notre-Dame-De-La-Salette, and has no exploration restrictions.

Apatite and REE are associated with carbonatites and associated alkaline rocks, and apatite is occasionally found to contain significant amounts of REE (and can be used as an ore for those metals since apatite is non-radioactive). The primary use of apatite is in the manufacture of fertiliser, since it is a source of phosphorus.

China accounts for 97% of the global production of REEs (see separate article by Richard Mills, Ahead of the herd), and so the elements are considered strategically important.

BULM and EMX merge

Eurasian Minerals Inc and Bullion Monarch Mining Inc have agreed a merger of BULM with a wholly-owned subsidiary of EMX. The combined company will hold more than 145 properties on five continents, as well as a return (GSR) royalty currently paying 1% gross smelter on several of Newmont Mining Corp's operations and projects on the Carlin Trend in Nevada, including the Leeville mine and the Four Corners project. This royalty paid BULM more than $20M in the last six years and more than $6M in 2011. The transaction is worth approximately $45.8M.

Restart of Pinto Valley

BHP Billiton is to restart mining at its Pinto Valley operation in Arizona, US. The mine, which will produce copper and molybdenum concentrate, will have annual production capacity of approximately 60,000 tons of copper in concentrate. The $195M project will create approximately 650 new jobs with mining expected to resume at the end of the 2012.

Maximum tonnage under extreme conditions?

Absolutely.

The history of belt conveyor systems started in the early sixties. Ever since, ABB has been supplying engineering solutions for electrical control, automation and drive equipment for large scale conveyors such as a 13-kilometer overland conveyor system for a high-altitude copper mine in Collahuasi, Chile – with downhill conveyor and electric power regeneration. Our expertise shows in more than 700 kilometers of belt conveyor systems worldwide, meeting the challenges of long distances in extreme environments and transportation conditions as well as ever increasing belt loads. Our new gearless conveyor drive (GCD) combines all our experience in conveyor drive solutions meeting the highest demands such as minimum wear plus maximum efficiency and controllability. For more information, please visit us at www.abb.com/minerals

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Horizonte expands in Brazil

Brazil-focussed Horizonte Minerals plc has confirmed the purchase of 100% of the Vila Oito and Floresta nickel laterite projects from Lara Exploration Ltd. The properties are located adjacent to Horizonte's wholly-owned Araguaia nickel project.

The total consideration for the acquisition comprises 8.5M new ordinary shares, valued at C$2M. This represents less than 3% of the enlarged issued ordinary share capital of 288.1M shares.

Lara has undertaken to Horizonte not to dispose of the consideration shares for a minimum of 12 months following their date of admission to trading on AIM.

Acquisitions for Black Mountain

Black Mountain Resources Ltd has acquired a 70% interest in three silver and gold projects in north-western US. The projects, which incorporate former producing mines, have been purchased from ABM Mining Corp (the JV vehicle established to develop them).

The acquisition of the projects consolidates Black Mountain's strategy to focus on silver and gold opportunities. The JV will now focus on commencing development at its flagship project, New Departure.

Pursuant to the settlement, the company has issued 25M shares and 25M preference shares to nominees of the vendor.

To finance the acquisition, Black Mountain has issued 10M shares to raise $2M.

Micromine expands in Latin America

Provider of intuitive software solutions to the mining and exploration industry, Micromine has taken over its former agent in Brazil and formed the company; BNA-Micromine Consultoria e Sistemasl.

Production at the new Endako mill

Thompson Creek Metals Co Inc, a growing, diversified, North American mining company producing molybdenum has commissioned the company's new Endako mill, at its Endako mine, and commercial production commenced in February. For the first five days of February, the new mill ran at or above its design capacity of 55,000 tons per day, a 77% increase over the old mill's capacity of 31,000 tons per day. The company has also reaffirmed 2012 production guidance for its 75% share of the Endako mine of approximately 10 – 11M pounds of molybdenum and cash cost guidance of approximately $8.25 - $9.25 per pound.

The company believes that once at full production, the Endako mine is expected to increase molybdenum production from approximately 10M pounds per year to approximately 16M pounds per year.

The company is also in the process of constructing the Mt Milligan copper-gold mine in central British Columbia, which is expected to commence production in 2013. The company's development projects include the Berg copper-molybdenum-silver property and the Davidson molybdenum property, both located in central British Columbia. Thompson Creek has approximately 970 employees.

Mintec at SME

The Society for Mining Metallurgy and Exploration has more than 12,000 members and is an international society of professionals in the minerals industry. Its annual meeting is held in Seattle in February, where US company, Mintec Inc, a specialised software developer for the mining industry presented a talk about MineSight's role in mine planning.

MineSight, is the company's comprehensive, scalable, and fully integrated software solution, for exploration, modelling, design, scheduling, and production.

Senior MineSight specialist, Ernesto Vivas, discussed "schedule optimising for a typical hardrock open pit mine." The presentation focussed on La Caridad, a copper and molybdenum mine in Sonora, Mexico. This porphyry copper deposit is one of Mexico's largest mines, extracting 90,000 tons of ore per day. Vivas's workshop examined how MineSight schedule optimiser (MSSO) generates complex schedules honouring quantities and qualities requirements while accounting for detailed haul profiles. The case study analysed the steps required to create a practical monthly schedule with MSSO for La Caridad and the scheduling considerations, data preparation, program set-up and output examination.

MSSO is one of several MineSight products exploiting 64-bit technology. Recent upgrades have included a seamless integration with MineSight Haulage. Vivas is from Caracas, Venezuela, and graduated from the University of Arizona in 2000 with a Bachelor of Science degree in Mining Engineering. The 35-year-old scheduling expert works from Mintec's Tucson, Arizona headquarters and travels the world to help mine planners with long-range and short-range planning.

ABB to acquire Thomas & Betts

ABB, power and automation technology group, has agreed to acquire Thomas & Betts Corp, a North American supplier of low voltage products, for approximately $3.9 billion. The transaction is expected to close by the middle of 2012.

Thomas & Betts' network has more than 6,000 distributor locations and wholesalers in North America, and ABB has well established distribution channels in Europe and Asia. The combined product portfolio and enhanced distribution network will enable ABB to double its addressable market in North America to approximately $24 billion.

Thomas & Betts employs approximately 9,400 people and is estimated to report 2011 revenues of approximately $2.3 billion. ABB expects the transaction will deliver approximately $200M in annual synergies by 2016.

SRC to acquire gold and silver mine

Steele Resources Corp has executed a letterof intent to purchase the privately owned Billali gold and silver mine, a near term production gold and silver mine located in the Steeple Rock district in New Mexico, bringing the company's property portfolio to three projects in total. The district has several historic mines in the area, and from 1880 to 1991 an estimated 151,000 oz of gold, 1.2M pounds of copper, 5M pounds of lead, and 4M pounds of zinc was mined from the district.

Antofagasta plc's Q4 2011

The Antofagasta group's copper production was 187,000t in Q4, a 13.3% increase compared with the previous quarter, mainly due to increased production at its Chilean projects, Esperanza and Los Pelambres. Copper production in the full year 2011 was 640,500t, a 22.9% increase compared with 521,100t in 2010, as a result of the start-up of Esperanza and the increased throughput at Los Pelambres

Molybdenum production at Los Pelambres was 2,600t in Q4 and 9,900t in 2011, 12.5% above 2010 full year production, mainly due to the higher plant throughput as a result of the plant expansion which was completed during 2010.

Gold production was 71,800 oz in Q4, compared with 54,300 oz in the previous quarter, mainly due to the ramp-up of Esperanza. Gold production in 2011 was 196,800 oz, compared with 35,100 oz in 2010 reflecting the start-up of Esperanza in 2011.

Group production in 2012 is expected to be approximately 700,000t of copper, 280,000 oz of gold and 11,000t of molybdenum. Group cash costs in 2012 are expected to be approximately 105 cents per pound and 165 cents per pound before by-products credits.

VSUS expands Colombian coal assets

US-based coal producer VSUS Technologies Inc has reached an agreement to acquire the 390 ha La Herradura mine in Guaduas, Colombia. The company recently signed a definitive agreement to purchase the 57 ha La Tabaquera coal mine, and is in the final stages of an environmental impact assessment for that operation. VSUS said that this EIA can be extended to include the new acquisition.

According to a recent engineering report, there are17 Mt of coal reserves at La Tabaquera, and VSUS expects the new acquisition to have an estimated 70-100 Mt of coal reserves.

La Herradura is almost seven times the size of the adjacent La Tabaquera, whose coal veins extend into La Herradura. Coal reserves at La Tabaquera are estimated to be 70% metallurgical and 30% thermal coal. The company plans to begin deep geological surveys to produce a NI 43-101 technical report for both properties, and expects La Tabaquera to be in production in 2012.

Colombia is currently the world's fifth largest coal exporter and has the largest coal reserves in South America. The country's coal exports are expected to reach 150 Mtpa by 2015, from 85 Mt last year, stated John Campo, the president of VSUS.

Exploration boost at Lansing

New Dimension Resources Ltd has reported encouraging groundwork exploration at its Lansing project in central Yukon, and said it is looking forward to a "more aggressive exploration programme" this year.

Lansing, located within the prospective Tombstone gold belt, comprises 12 properties under option from Strategic Metals Ltd.

The highlights of the 2011 surface programme included the identification of several strongly elevated gold-in-soil values (including 8.32, 2.50 and 1.40 g/t gold) within a 2,000 by 1,000m target zone. The company also reported the discovery of precious-metal enriched, multi-element veins within a 1,200 by 800m bulk tonnage target at the Liam property.

New Dimension also holds a 35% interest in the Domain gold project located in northern Manitoba. Since 2006, three drill programmes have been completed on the property, returning encouraging results, including 18.05m of 4.61 g/t gold.

In northern Peru, the company's Cenepa's gold project lies within the prospective Cordillera del Condor mineral belt.

Major investment and reserve increase at Escondida

BHP Billiton has approved an investment of $2.6 billion in two projects that will underpin higher production at Escondida over the next decade. Escondida is located 3,100m above sea level, 170 km South-East of the city of Antofagasta in Chile. It is owned by BHP Billiton (57.5%), Rio Tinto (30.0%), JECO Corp (10.0%) and JECO 2 Ltd (2.5%). BHP Billiton operates the Escondida mine.

Organic growth project 1 (OGP1) will replace the Los Colorados concentrator with a new 152,000 tpd plant and allow access to higher grade ore located underneath the existing facilities. Construction has begun and commissioning is anticipated the first half of the 2015. The project will cost $3.8 billion ($2.2 billion BHP Billiton share) and is expected to create up to 7,000 jobs during the construction phase.

BHP Billiton also approved the oxide leach area project (OLAP) which creates a new dynamic leaching pad and mineral handling system that will include several overland conveyers. The new pad will maintain oxide leaching capacity at current levels following the exhaustion of the existing heap leach in the 2014. OLAP is expected to cost $721M ($414M BHP Billiton share) with commissioning anticipated in the middle of the 2014. Approximately 2,500 jobs will be created during the construction phase.

In addition, BHP Billiton announced a 17% increase in the mineral resources and a 25% increase in the ore reserves at Escondida following successful brownfield exploration and accelerated in-fill development drilling programmes. The reserve increase also reflects the approval of OGP1, as most lower grade sulphide ore is now expected to be treated through the flotation circuit with an associated increase in process recoveries. A new resource at Chimborazo, based on more than 115,000m of drilling averaging 530m in depth, was also declared. The resource is being evaluated as potential feed for Escondida's sulphide leach processing facilities.

BHP Billiton base metals president, Peter Beaven, said: "we expect the completion of the current Escondida ore access and Laguna Seca debottlenecking projects, and a strong recovery in ore grades, to support a substantial recovery in Escondida copper production to over 1.3 Mtpa in the 2015 financial year. Looking ahead, the success of our brownfield exploration programme suggests there are sufficient resources at Escondida to sustain production at current levels for more than a century. OGP1 is the first of a series of potential projects that could substantially expand processing capacity at Escondida."

Newmont implements Pitram Control

Micromine has supplied its mine control and management reporting solution, Pitram Control, to Newmont's Midas mine and Leeville mine. Both underground gold mines are located in the Carlin Trend near Elko, Nevada.

Pitram is a mine control and management reporting solution that records, manages and processes mine site data in real-time. It provides a thorough overview of a mine site's activities by converting data into meaningful information thereby increasing managerial control. Increased control allows key personnel to reduce costs, increase production, and improve safety and business intelligence capabilities.

The implementation commenced in December 2010 and was completed in September 2011. Located west of Elko, Leeville mine employs around 250 personnel on a typical shift and has 11 haul trucks in the mine fleet. The Midas mine has low and high grade ores, which are all trucked to the surface by the fleet.

Donaldson expands in Mexico

US company, Donaldson has opened a new manufacturing plant in Aguascalientes, Mexico to produce air filtration products including PowerCore, RadialSeal and Axial Seal air cleaners and ancillary products. The company will utilise its existing plant to increase liquid filtration manufacturing for products such as those designed with Donaldson's patented Synteq and Synteq XP media for fuel, lube and hydraulics applications.

"The demand for air filtration products to support our OEM and aftermarket customers in Latin America has increased to the stage where more direct access to products is required," said Guillermo Briseño, MD for Donaldson Latin America. "As we relocate our existing air filtration manufacturing capacity into the new plant, our existing facility is being reconfigured to double our liquid manufacturing capability in Mexico," continued Briseño. "Similar to the need for air filtration products, our Latin American OEM partners are also experiencing increased demand for liquid filtration products for diesel-powered engines and hydraulic equipment. Manufacturing crucial liquid filtration products within the region, such as those designed with our Synteq and Synteq XP media, will allow our customers the flexibility to source products to meet a wide range of filtration efficiency and capacity requirements."

The new Aguascalientes plant, which employs 260 people, is pursuing LEED (leadership in energy and environmental design) certification – an internationally recognised mark of excellence. In addition to the two manufacturing facilities, Donaldson also operates a distribution centre in Aguascalientes, and has other sales, manufacturing and distribution sites in Monterrey, Mexico; Sao Paulo, Brazil; and Santiago, Chile.

Eriks North American expansion continues

Eriks has acquired Quantum Supply Ltd, a manufacturer and distributor of engineering equipment to industry in Western Canada. The acquisition took place at the end of December 2011 through Etold wholly-owned operating company Newdell of Houston, Texas.

Quantum Supply Ltd markets valve and processing equipment to industry in Western Canada and also specialises in the engineering and fabrication of steam pipeline valve stations. Sales to Quantum Supply Ltd's customers, which span a range of engineering industries that include oil and gas production, mining, power generation and petrochemicals, generate an estimated annual turnover of C$10M (€7.7M). Quantum Supply Ltd will continue to operate as an independent unit within Newdell, a US manufacturer and distributor of valves that generates annual sales of $50M (€39.4M).

The purchase of Quantum Supply Ltd follows close on the heels of two previous additions to Eriks' list of North American acquisitions: Industrial Controls, distributor of controls, instrumentation, automation and automated valves, and Lewis-Goetz, a distributor of fabricated hose, conveyor belts and gaskets.

Eriks currently consists of more than 60 companies with branches in 25 countries, serving over 200,000 customers. In 2010, ERIKS generated net sales of €1.1 billion.

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Peabody Energy's 2011 year end results

Peabody Energy has reported full-year 2011 EBITDA of $2.13 billion. Income from continuing operations totalled $1.01 billion; this reflects $141.9M of transaction costs and related financial performance from the Macarthur Coal acquisition.

It also includes $85.2M in transaction-related costs, $29.1M of interest expense related to on going financing, and $16.2M of interest to secure bridge financing. Revenues reached $7.97 billion on sales of 250.6M tons.

Peabody Energy chairman and CEO, Gregory Boyce said, "looking forward, we are well positioned with fully contracted US sales, an expanding Australian thermal and metallurgical coal platform, a growing global trading presence and multiple emerging Asian joint ventures. With the addition of Macarthur Coal, we now have one of the strongest development portfolios of thermal and metallurgical coal assets in the industry."

Results from operations

2011 revenues increased 18% to a record $7.97 billion, driven by higher average pricing in all regions and increased volume in the US. 2011 sales volumes increased 3% to 250.6M tons.

Australia shipments totalled 25.3M tons, including 9.3M tons of metallurgical coal and 10.1M tons of seaborne thermal coal, on par with 25.3M tons sold in 2010. Increased volume from the expanded Wilpinjong and Millennium mines, as well as two months of volume from Macarthur was offset by the impact of first quarter flooding and geologic issues at the North Goonyella mine in the third and fourth quarter. Australia revenue rose 28% due to strong pricing for both metallurgical and seaborne thermal coal.

US shipments increased 5%, driven by the North Antelope Rochelle mine, which shipped a record 109M tons. US revenues increased due to higher average realised prices in both the Midwestern and Western regions.

EBITDA totalled $2.13 billion compared with $1.84 billion in the prior year, with increased contributions from all segments.

- US Mining EBITDA rose 3% to $1.17 billion, driven by higher margins in the Midwest and increased volume in the West.
- Australian Mining EBITDA rose 22% to $1.19 billion, reflecting a 26% increase in margins per ton despite the impacts of geologic issues at North Goonyella which totalled approximately $235M.
- Acquisition-related costs and two months of Macarthur results reduced EBITDA by $95.0M.
- Trading and brokerage and resource management both showed significant increases, delivering a combined $264.2M of EBITDA compared with $101.0M in 2010. Trading and brokerage benefited from increased high-margin export volumes, while resource management capitalised on several land and reserve transactions.

Operating profit rose 18% to $1.59 billion, leading to record operating cash flow of $1.63 billion. Income from continuing operations was $1.01 billion. During Q4, a decision was made to begin a sales process for the Wilkie Creek mine. As an asset held for sale, Wilkie Creek is excluded from continuing operations.

In Q4, the company finalised the permanent financing for the acquisition of Macarthur Coal, which included the use of $1.0 billion in cash on hand, $1.0 billion from a five-year term loan and $3.1 billion from the issuance of seven- and 10-year bonds. The term loan and bonds carry a current weighted average interest rate of 5.2%.

Safety and environmental results

Peabody delivered its safest year in company history with a global incidence rate of 1.93 per 200,000 hours worked, improving nearly 30% from the prior year's record performance. Two operations completed the year with zero incidents, and Peabody earned seven safety awards in the US and Australia. The company also earned six honours for environmental excellence in the US, Australia and Mongolia.

Peabody's position in global coal markets

"The International Energy Agency has projected that global coal use will rise 65% by 2035 under its 'current policies' scenario," said Boyce. "Coal would become the world's largest energy source, and the energy growth from coal would be 30% greater than the increase in global gas consumption and more than double the growth in oil."

Global coal consumption rose in 2011 to an estimated 7.5 billion tonnes, a new record, driven by increased coal use in China, India and other emerging Asian nations. Global seaborne demand rose an estimated 6% and exceeded 1 billion tonnes, led by an increase in thermal demand to supply approximately 81 gigawatts of new coal-fuelled generation brought on line in 2011.

Within the global coal markets:

- Global steel production grew an estimated 7% in 2011. Peabody estimates that global metallurgical coal imports increased 11% in the second half of 2011 following significant seaborne supply disruptions early in the year.
- China's coal-fuelled generation rose 14% in 2011, leading to record total coal imports of 182 Mt. Furthermore, Wood Mackenzie has estimated that more than 850 Mt of coal could be imported into China by 2015.
- India's coal-fuelled generation rose 9% from the prior year, driving thermal coal imports 35% higher to an estimated 85 Mt. Peabody expects higher metallurgical and thermal coal consumption to raise global seaborne demand 100 to 120 Mt in 2012, led by anticipated increases in China, India, Japan and Germany. Australia is expected to supply half of the growth in global coal exports.

An estimated 90 gigawatts of coal-fuelled generating plants are expected to come on line in 2012, representing more than 300 Mt per year of additional coal consumption. The World Steel Association predicts steel demand will increase 5% in 2012, which would require approximately 50 Mt of additional metallurgical coal

Looking at seaborne coal pricing, Newcastle thermal coal contracts settled at $116 per tonne for January settlements. Metallurgical coal prices for high quality hard coking coal and low-vol PCI settled at $235 and $171 per tonne, respectively, for January quarterly contracts.

In Australia, Peabody is settling first quarter metallurgical coal shipments in line with recent settlements with essentially all metallurgical coal production un-priced for the remainder of the year. The company is targeting total 2012

metallurgical coal sales of 14 to 15M tons. The company has 40 to 50% of seaborne thermal volumes un-priced for 2012 and is targeting full-year Australian thermal exports of 12 to 13M tons.

US markets have been marked by poor economic activity, low electricity generation and an oversupply of natural gas. US coal generation declined an estimated 5% in 2011 while US coal exports increased 29% to an estimated 108M tons. Utility customer coal inventories ended the year at approximately 65 days of supply, with the Powder River Basin the lowest of any major region at 58 days of supply.

In 2012, Peabody expects domestic US coal consumption to continue to be impacted by muted economic growth and additional coal-to-gas switching. Peabody expects its 2012 US volume to be at 2011 levels, with production fully committed. The company has 45 to 55% of planned production un-priced for 2013.

Macarthur integration

In the fourth quarter, Peabody completed the major acquisition of Macarthur Coal and finalised Macarthur's delisting from the Australian stock exchange.

"Peabody acquired Macarthur Coal to significantly expand our Australian metallurgical coal production base and add a large portfolio of development projects," said Boyce. "We are aggressively advancing these initiatives and at first look, the resource base is better, the team more highly motivated, and the project opportunities more robust than anticipated."

Peabody is targeting 2012 volumes of 4 to 5M tons from the Coppabella and Moorvale mines, based on attributable ownership at 73%. The Middlemount JV will be accounted for using the equity method, and therefore will not be included in reported volumes, revenues or costs.

The company is implementing a comprehensive near-term plan to improve the cost structure, productivity, and sustainability of the acquired operations, raising performance to Peabody standards and industry best practices. Key components of the 2012 plan include:
1) A major upgrade to the Coppabella mine to improve the mine plan and correct a significant overburden removal deficiency;
2) Increased dragline and equipment utilisation and productivity at the Coppabella and Moorvale mines;
3) Major repairs to production equipment that had been deferred under prior management; and
4) Improved coal marketing activities to strengthen the committed position and realise commercial synergies across all operations.

These items will impact financial results throughout 2012. The company believes that taking these early actions will provide a solid foundation for higher productivity, lower costs and improved financial performance in 2013 and beyond. The company's target to have the acquisition be accretive after the first year remains.

In addition to the improved operating and financial results expected beyond 2012 for the existing operations, on the project side, positive developments are also expected to improve 2013 and 2014 performance expectations.

- Peabody has approved the acceleration of development for the new Codrilla mine, which is now expected to produce first coal in late 2013 and grow volumes to approximately 3.5M tons (2.6M tons attributable) by 2014.
- Middlemount has completed a large new rail spur and is ramping up operations. Shipments are expected to reach 4.4M tons (2.2M tons attributable) and volumes will be sent through Abbot Point via the just-completed Northern Missing Link connecting the Goonyella and Newlands rail systems.

Project update

Peabody continues to advance multiple projects in Australia and the US. Capital expenditures for 2012, including Macarthur, are targeted in the $1.2 to $1.4 billion range, with approximately two-thirds targeted for new mines, expansion and extension projects.

Among the company's Australian projects:

- The Millennium mine expansion received necessary permitting in November to add 1 to 2M tons per year of PCI and semi-hard metallurgical production. The project is expected to add incremental volumes this year with full production expected in 2013.
- Progress at the Burton mine extension continues and is expected to add incremental volumes of hard coking coal this year with completion of a 1M ton-per-year expansion expected by late 2012.
- Construction of the new Metropolitan mine drift and upgrades to existing operations are under way to increase production of hard coking coal by 1M tons per year by late 2013.

In addition to the expansion, the mine is undertaking a modernisation programme to improve productivity and the cost structure.

Peabody also has begun converting the Wilpinjong and Millennium mines in Australia from contract mining to owner operations. Total expenditures of $400 to $425M are expected in equipment investments over the next two years to significantly improve the cost structure at these mines.

In the US, development will begin this year on the Gateway North mine, which will replace the current Gateway mine. The new mine is expected to produce approximately 4.5M tons per year after completion in 2014. In the west, the company has secured agreements to begin development of an extension to the current Twentymile mine.

Outlook

Peabody is expecting Q1 2012 EBITDA, including Macarthur, in the range of $500 to $600M. First quarter targets reflect a longwall move at the Twentymile mine. Results also could be impacted by the timing of shipments in Australia.

For 2012, the company is targeting total sales of 245 to 265M tons including 33 to 36M tons from Australia, 195 to 205M tons from the US and the remainder from trading and brokerage activities.

Peabody Energy is the world's largest private-sector coal company and a global leader in clean coal solutions. Its coal products fuel approximately 10% of US power and 2% of worldwide electricity.

FMC Technologies to acquire CSI

FMC Technologies Inc has agreed to acquire Control Systems International Inc (CSI). Founded in 1968, CSI is a supplier of control and automation system solutions. These include Fuel-Facs, the company's terminal automation and information management system, and UCOS (user configurable open system), a complete supervisory control and data acquisition system and software solution.

Outotec provides concentrator technology in Chile

Outotec has signed a contract with Chilean Codelco, the copper producer, for the delivery of concentration technology for a slag treatment plant to be located in connection with the Potrerillos copper smelter in Northern Chile. The contract is worth €10M.

Outotec will supply two grinding mills, flotation cells and a pressure filter. Potrerillos smelter uses Codelco Teniente converter technology for further refining copper after the smelting. The slag from this process contains 8-11% of copper. In the new concentrator the slag will then be processed to maximise copper recovery and metallurgical yield. The new plant will process 1,700t of slag per day. Deliveries are scheduled to be completed during 2012.

Anglo American 2011 results

The Anglo American group recorded operating profit of $11.1 billion with underlying earnings of $6.1 billion and underlying EPS of $5.06, a 23% increase from the previous year and its net debt reduced to $1.4 billion at 31 December 2011.

Highlights for the company included the Kumba iron ore record export sales volumes of 37.1 Mt and open cut metallurgical coal produced a record 7% increase despite Q1 2011 rainfall.

The $5.1 billion acquisition of up to 40% interest in De Beers gave Anglo a unique opportunity to consolidate control of the world's leading diamond company.

Anglo's $5.4 billion sale of a minority 24.5% interest in Anglo American Sur copper assets highlighted value and quality of asset base according to the company. The acquisition of 25.17% minorities in Peace River Coal gave the company 100% ownership of high quality 1 billion tonne metallurgical coal resource.

Ongoing projects include:

Barro Alto 36,000 tpa nickel project – first produced in March 2011

Los Bronces 200,000 tpa copper expansion – first produced in October 2011

Kolomela 9 Mtpa iron ore project – first shipment was in December 2011.

Collahuasi Phase I expansion (copper), Zibulo (thermal coal), Unki and Mogalakwena North (platinum) projects all completed in 2011.

Minas-Rio 26.5 Mtpa iron ore project is progressing well; implementing measures to mitigate various site challenges in a high inflationary Brazilian mining environment, to target H2 2013 first ore on ship.

Six growth projects approved in 2011, including Grosvenor 5 Mtpa metallurgical coal project in Australia were approved in December 2011.

Quellaveco 225,000 tpa copper project in Peru is progressing towards approval.

Financial results

Anglo American's underlying earnings were $6.1 billion, up from $5.0 billion in 2010, with a record operating profit of $11.1 billion, 14% higher than 2010. This increase in operating profit was mainly driven by the Kumba iron ore, metallurgical coal, thermal coal and diamonds business units, which benefited from strong market prices. There was an increase in realised prices across all major commodities with export metallurgical coal and South African export thermal coal prices increasing by 42% and 39% respectively from 2010.

Iron ore and manganese generated an operating profit of $4,520M, 23% higher than 2010. Within this commodity group, Kumba iron ore had a strong performance with a record operating profit of $4,397M, 29% higher than previously.

Metallurgical coal delivered a record operating profit of $1,189M, a 52% increase on 2010, primarily due to higher realised export selling prices, which offset the impact of rain on production and sales.

Thermal coal's record operating profit of $1,230M was 73% higher than 2010, as a result of higher export thermal coal prices for both South African and Colombian coal and a strong rail performance in South Africa in the second half of 2011.

Copper delivered an operating profit of $2,461M, 13% lower than 2010, as a result of lower sales volumes and higher operating costs, partly offset by high copper prices during the first half of the year.

Nickel reported an operating profit of $57M, $39M lower than 2010, largely due to higher project evaluation and exploration expenditure related to the development of the unapproved nickel project pipeline.

Platinum generated an operating profit of $890M, a $53M increase, due to higher metal prices, which were offset by higher costs driven by labour and electricity rate increases.

Diamonds reported a record operating profit of $659M, 33% higher than 2010, owing to significant price increases in 2011.

Other mining and industrial generated an operating profit of $195M, 71% lower than 2010, owing to the disposal of a number of businesses during the year and in 2010. Copebrás and Catalão delivered a combined increase in operating profit of 29% compared to the prior year. This was driven by an increase in sales volumes and prices at Copebrás owing to high demand for fertilizers.

Production

The group's operations were impacted by a number of challenges in 2011, most notably weather disruptions in Queensland, Chile and southern Africa. Iron ore production from Kumba iron ore's Sishen mine decreased by 6% to 38.9 Mt as production from the mine's dense media separation plant was hampered by mining feedstock constraints following wet weather. The Kolomela mine, which started production ahead of schedule, produced 1.5 Mt in 2011. Metallurgical coal export production decreased by 9% compared to the prior year primarily as a result of heavy rainfall and subsequent flooding in late 2010 and in the first quarter of 2011, which resulted in force majeure declarations being in effect until June. However, the business made a strong recovery as a result of successful mitigation actions taken early in the year to recover lost volumes in the second half of the year. Thermal coal RSA export production performance remained flat year-on-year and a record production performance at Cerrejón led to a 7% increase in production compared to 2010.

Copper production of 599,000t was 4% lower compared to 2010 due to lower grades, extreme wet weather, and operating issues at Collahuasi. Production was marginally higher at the Los Bronces operation as a result of the start-up of the Los Bronces expansion project in October. Nickel production in 2011 increased by 44% to 29,100t as a result of delivery of the Barro Alto project, which produced 6,200t, and higher output at both Loma de Níquel and Codemin.

Diamond production totalled 31.3M carats a 5% decrease compared to 2010, reflecting the impact of maintenance and excessive rainfall in southern Africa during the first half of the year, and a focus on waste stripping, as well as scheduled

maintenance at the Debswana and De Beers consolidated mines operations in the second half

During 2011, Anglo American approved a number of growth projects across the Group's portfolio of commodities, including the 5 Mtpa Grosvenor metallurgical coal project in Queensland, Australia and the Collahuasi Phase 2 expansion in Chile.

Beyond the near term, Anglo American has a world class pipeline of projects across its chosen commodities and is progressing towards approval decisions in relation to the development of further high quality growth projects, including the 225,000 tpa Quellaveco copper project in Peru. Submission to the board for approval is expected for the Quellaveco project once the necessary water permits have been obtained. Together with a number of other medium and longer term projects, Anglo American has the potential to double production through its $98 billion pipeline of more than 85 approved and unapproved projects.

The Barro Alto nickel project in Brazil, a greenfield nickel project approved for development in December 2006, delivered its first metal in March 2011. Barro Alto is ramping up towards full production capacity, which it is expected to reach at the beginning of 2013. This project makes use of proven technology and will produce an average of 36,000 tpa of nickel in full production (41,000 tpa over the first five years), more than doubling production from Anglo American's Nickel business, with a competitive cost position in the lower half of the cost curve.

The Los Bronces copper expansion project in Chile delivered its first production on schedule in October 2011. Production at Los Bronces is expected to more than double (increase by 278,000 tpa on average) over the first three years of full production following project completion and to average 200,000 tpa over the first 10 years. At peak production levels, Los Bronces is expected to be the fifth largest producing copper mine in the world, with highly attractive cash operating costs, reserves and resources that support a mine life of over 30 years and with further expansion potential.

Kumba's Kolomela project in South Africa shipped its first lump iron ore from the port of Saldanha to China in December 2011, five months ahead of schedule. Kolomela is situated 80 km to the south of Kumba's world class Sishen mine and, when full production is achieved in 2013, will produce 9 Mtpa of high quality seaborne iron ore, with further potential for expansion

The Minas-Rio iron ore project in Brazil is expected to produce 26.5 Mtpa of iron ore in its first phase and has made good progress during the year. Minas-Rio has secured a number of major licences and permits during the year; the offshore and onshore works at the port are on schedule; more than 90% of land access has been secured along the 525 km pipeline route and more than 200 km of pipe has been installed; and the civil works at the beneficiation plant are well under way. As with other complex greenfield mining projects, a number of unexpected issues, such as the discovery of caves at the beneficiation plant site which require specialised assessment, continue to cause delays to the work scheduling, in addition to outstanding land access and an evolving permitting environment. Minas-Rio is implementing various measures to manage these challenges in a high inflationary Brazilian mining environment, including acceleration activities within the previously announced 15% capital increase, to target first ore on ship in the second half of 2013. Pre-feasibility studies for the second phase of the Minas-Rio iron ore project commenced during 2011 and, although still under way, the studies, together with the current resource statement (total resource volume (measured, indicated and inferred)) of 5.8 billion tonnes, support the expansion of the project.

The greenfield Grosvenor project is situated immediately to the south of Anglo American's Moranbah North metallurgical coal mine in the Bowen Basin of Queensland, Australia. The mine is expected to produce 5 Mtpa of metallurgical coal from its underground longwall operation over a projected life of 26 years and to benefit from operating costs in the lower half of the cost curve. Grosvenor forms a major part of the group's strategy of tripling production of metallurgical coal from its Australian assets by 2020, equivalent to a 12% compound annual growth rate, using a standard longwall and coal handling and preparation plant (CHPP) design model. In its first phase of development, Grosvenor will consist of a single new underground longwall mine, targeting the same well understood Goonyella Middle coal seam as Moranbah North, and will process its coal through the existing Moranbah North CHPP and train loading facilities. A pre-feasibility study for expansion by adding a second longwall at Grosvenor is under way.

Caterpillar expands operations in US

Caterpillar has selected land near Athens, Georgia, Atlanta, as the location for a new facility that will build small tracktype tractors and mini hydraulic excavators. The one-million-square-foot facility is expected to directly employ 1,400 people once it is fully operational. The total investment for opening the new facility will be about $200M. Caterpillar estimates another 2,800 full-time jobs will be created in the US among suppliers and at other non-Caterpillar companies that will support the new facility.

The company also plans to have an on-site product distribution centre for small track-type tractors and mini hydraulic excavators produced at the new facility. These machines are currently made at Caterpillar's Sagami, Japan, facility.

Boart Longyear breaks records

Boart Longyear Ltd's full-year revenue and profit for 2011 were both records for the 120-year old company. Its revenue was up 37% to$2.02 billion, and EBITDA was $356M, up 60% from 2010.

For 2012, Boart forecasts revenue of $2.3 billion, up 14% over 2011 and EBITDA of $460M, up 27% over 2011.

According to the company, demand remains strong, particularly in the emerging markets of Africa and Latin America. Sales for drilling capital equipment doubled, indicating ongoing optimism for a robust drilling market. Rig utilisation for drilling services averaged approximately 75% throughout 2011.

Arch Coal CEO change

Arch Coal Inc's chairman and CEO, Steven Leer, will retire as CEO in April and will be succeeded by John Eaves as CEO, who currently serves as the company's president and COO, and as a member of its board of directors. Leer will remain with the company as chairman of the board of directors.

Terex' 2011 results

Terex Corp announced income from continuing operations of $38.8M, or on net sales of $6,504.6M for the full year 2011, as compared to a net loss from continuing operations of $215.5M on net sales of $4,418.2M for the full year 2010.

Cloud Peak Energy Inc announces results for Q4 and full year 2011

Cloud Peak Energy Inc, one of the largest US coal producers and the only pure-play Powder River Basin (PRB) coal company, reported full year EBITDA of $351.7M for 2011.

It recorded annual shipments of 95.6M tons from our three operated mines.

Notably, its Asian exports were up approximately 27% in the fourth quarter 2011 to 1.0M tons from 0.8M tons in the fourth quarter 2010. For the full year, Asian exports were 4.7M tons, up 42% from 3.3M tons in the full year 2010.

Proven and probable reserves increased to 1.37 billion tons at December 2011, up from 970M tons at year end 2010 due to the successful acquisition of coal leases at the Antelope mine in Wyoming.

The average price realised for a ton of coal in 2011 was up 4.9% to $12.92 from $12.32 in 2010. Net income for 2011 was $189.8M up from $117.2M in 2010. This increase was due to strong Asian export demand and an increase in realised domestic prices.

The addition of the West Antelope II coal leases increased the company's year end proven and probable reserves to 1.37 billion tons, up from 970M tons at the end of 2010. These leases increased overall reserves by 40%. The West Antelope II reserves contain some of the lowest sulphur and highest energy coal in the southern PRB, which is particularly well suited to help utilities meet proposed EPA emissions regulations.

The operations performed well during 2011 in spite of a wet spring, which made conditions at the mines difficult, and extensive Midwestern flooding, which impacted US rail capacity during the second and third quarters. During the period of reduced train shipments, the mines focused on reclamation and overburden removal, which allowed the increase in shipments in the fourth quarter when more trains were available. Full year costs of production was $9.12 per ton. For 2012, the operations are well placed as several major maintenance jobs were completed on draglines and shovels and two additional shovels were added to the company's fleet.

Coal shipments for 2012 are expected to be between 92.5M tons and 96.5M tons. For 2012, the company is contracted to sell 94.3M tons, of which 88.9M tons are under fixed-price contracts with a weighted-average price of $13.47 per ton. Assuming constant prices of $10.00 per ton for 8800 Btu quality coal and $9.00 per ton for 8400 Btu quality coal on indexed tons, the expected total realised price for 2012 would be approximately $13.27 per ton. For 2013, Cloud is contracted to sell 73.3M tons from the three company-operated mines. Of this committed 2013 production, 58.3M tons are under fixed-price contracts with a weighted-average price of $14.27 per ton.

The current exceptionally mild winter has dramatically decreased demand for electricity: since October 2011, heating degree days are down by 17% compared to normal, and electricity demand is estimated to be down by 3.3%. This lack of demand is a major factor behind the current low near-term gas and coal prices. Unless there is a dramatic cold snap, these conditions are expected to persist until the summer. However, due to the current low snow pack, 2012 hydro-electric generation is likely to be significantly below the high 2011 levels through the summer. Assuming a normal summer cooling season restores electricity demand, gas prices and coal prices are expected to increase later in the year, only then will it be possible to gauge the impact of increased natural gas production on coal prices and demand.

News from Washington, US

The 2012 SME annual meeting in Seattle, US had a total of 5,102 attendees, including 850 international attendees and 532 students. There were 690 exhibit booths, the largest number ever. The meeting included the launch of an annual meeting mobile app that was downloaded by 1,681 people.

In his proposed $3.8 trillion budget for 2013, President Obama renewed his call for the creation of a hardrock abandoned mined land (AML) fund, as well as a hardrock mining royalty of not less than 5% of gross proceeds. The Administration estimates the creation of a hardrock AML fund would generate $74.5M in revenue over the next decade. The BLM would distribute the funds through a competitive grant programme to reclaim the highest priority hardrock abandoned sites on federal, state, tribal and private lands. It would be instituted under a leasing programme under the Mineral Leasing Act of 1920 for certain hardrock minerals, such as silver, gold and copper. Existing mining claims would be exempt.

The Secretary of Interior also intends to reform coal abandoned mine land reclamation by terminating the unrestricted payments to states and tribes that have been certified for completing their coal reclamation work. Currently, the money has been dispersed to states based on how much coal they produce. However, a proposed new advisory council to be created under the Office of Surface Mining (OSM) would review and rank abandoned coal mine land sites, so OSM could distribute grants to reclaim the highest priority coal sites each year. It is estimated the reforms would save taxpayers $1.1 billion over the next 10 years.

SRK re-enters Peru

SRK Consulting has repositioned itself to grow with Peru's expanding mining industry through a merger with Lima-based firm, SVS Ingenieros. SRK, one of the world's largest diversified resources consulting groups, previously had an office in Peru but closed it in 2002 during the mining downturn. Group CEO Andy Barrett said SRK and SVS have enjoyed a strong working relationship for about 20 years.

Current projections indicate mining investment activity in Peru should continue growing by $4 billion a year over the next 4-5 years. The merger with SVS will enable SRK to gain "a foothold in Peru via an established base from which to add new services," says Barrett. "We aim to combine SVS's strong capabilities in tailings, environment and rock mechanics with our mining and geology skills to serve our clients in Peru and augment our international teams, particularly in Latin America," he said. SRK opened an office in Mexico and a second office in Argentina in 2011, in addition to their offices in Chile and Brazil.

About 90% of SVS's current work is in Peru, with the remainder in Mexico, Ecuador, Bolivia and Argentina. SVS will retain its name initially but will change to SRK Consulting within five years.

Andy Barrett, SRK Consulting

General Moly orders haul truck fleet from Caterpillar

General Moly Inc has placed orders for 18 Caterpillar 793 haul trucks with 250 tons of payload capacity each, through Caterpillar's Nevada-based dealer, Cashman Equipment Co. All 18 trucks will be delivered to and commissioned at the Mt Hope site beginning in late 2013 and early 2014 to complete mine pre-operation development. The total value of the Caterpillar order, including support equipment, is anticipated to be approximately $75M.

The Caterpillar haul truck order was originally placed in 2008 and contained price escalators. The total cost of the Caterpillar mobile fleet has been managed to a 5% increase from the 2008 budget, including escalation, offset by an optimised and partially used support equipment fleet

Following this order, the company has firm commitments not subject to escalation exposure for approximately $150M in capital equipment, representing approximately 40% of the equipment budget for Mt Hope.

General Moly is a US-based molybdenum mineral development, exploration and mining company with interest in the Mt Hope project and the Liberty project, both located in central Nevada.

IronPlanet's record proceeds

IronPlanet, online marketplace for used heavy equipment, sold more than $50M of gross merchandise volume (GMV) during its first onsite and online auction in February in Florida, US. The four-day sale was IronPlanet's largest auction in company history.

More than 42,000 attendees from 146 countries participated over the four days in the auction. Buyers outside the US bid on more than 65% of the equipment, with over 23% of units sold to international buyers

Equipment sold to buyers throughout the world, with more than 172 sellers located in 44 states, including equipment from Ring Power Corp, one of the largest Caterpillar dealers in the south eastern US.

Brazil Invest 2012

As Brazil becomes one of the top five destinations for foreign direct investment (FDI), Apex-Brasil and Beacon Events announce the new Brazil Invest 2012 conference which aims to give updates on the latest and best projects in oil, gas, agriculture, mining and infrastructure, analyse key potential new sectors for investment, explain the new government plans that impact FDI and the main mechanisms for investment protection.

Joy Global Inc Q1 results

Joy Global Inc has reported that first quarter bookings increased by 17% to $1.4 billion and net sales increased 31% to $1.1 billion compared to the same period last year. Operating income of $214M was 18.8% of sales, compared to operating income of $154M, or 17.7% of sales, in the first quarter of fiscal 2011. Income from continuing operations was $142M compared to $102M in the first quarter of 2011.

All systems go at Booysendal

Murray & Roberts Cementation has started to develop Northam's new Booysendal North platinum mine, a greenfields underground UG2 project located approximately 40 km due west of Mashishing (formally Lydenburg) in South Africa. The site is surrounded by established operations such as Mototolo and Two Rivers to the north and Everest to the south east.

Awarded in November 2010, this project is one of the largest Murray & Roberts Cementation has been involved in for some time and will call for more than 1000 people on site at its peak.

The contract value is approximately R1.3 billion over a 36 month period and includes the development and equipping of two sets of declines. Approximately 15 km of tunnel development and 310,000 square metres of stoping will be carried out during this period. The scope of work includes initial stoping to ramp up production to a steady state of approximately 180,000 reef tonnes per month. This will allow the plant to produce approximately 160,000 PGM (platinum, palladium, rhodium and gold) oz per annum.

The mine will be a fully mechanised bord and pillar operation utilising drill rigs, bolters, utility vehicles and low profile LHDs.

A unique aspect of the project is the concept of a reverse decline which connects the concentrator plant and other mine infrastructure situated on a plateau with the on-reef declines that access the underground mine and outcrop on the side of the valley. This design has enabled Northam to minimise the mine footprint in the picturesque valley in which the mine is being established.

A view of the three decline ends at the reverse

Features include:
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Divestment of interest in RBM

BHP Billiton has exercised an option to sell its 37% non-operated interest in Richards Bay Minerals (RBM) to Rio Tinto and will exit the titanium minerals industry.

RBM is a South African mineral sands mining and smelting operation and a producer of chloride titanium feedstock. BHP Billiton holds a 37% equity stake in RBM with equity partners Rio Tinto (37%), Black Economic Empowerment (BEE) parties (24%) and employees (2%). Rio Tinto manages the operation and is responsible for the marketing of RBM's products.

Sable Mining expands iron ore portfolio

Sable Mining Africa Ltd has expanded its West African iron ore portfolio following the acquisition of a123.5 km^2 exploration permit in the Mount Nimba area of south-east Guinea. The permit,which is highly prospective for iron ore, is adjacent to the BHP Billiton/ Newmont/Areva 600 Mt Nimba iron ore project, and close to the Ivory Coast and Liberian borders

Within the permitted area, on the lower flanks of Mount Nimba, significant quantities of Canga-type iron ore conglomerate have been observed forming three main plateaux covering an approximate area of 35 m^2. It is believed that the conglomerate is a product of erosion of Mount Nimba over time. Early reconnaissance and sampling have confirmed the presence of high-quality iron mineralisation with exposures showing thicknesses of greater than 15m, where the plateaux have been partially eroded by streams.

$3.89 billion raised for African projects

A total of $3.89 billion was raised for resource projects in Africa from equity funding across global stock exchanges during 2011.

An analysis of data from IntierraLive, the source of resource sector business intelligence, showed that most of this activity derived from the Australian and Canadian exchanges. Some $1.69 billion was raised on the Australian Stock Exchange and $1.39 billion on the combination of Canada's Toronto and Venture exchanges. Capital raisings for Africa from London during 2011 amounted to $720M.

IntierraRMG Executive Director, Glen Jones said, "these figures reflect the strong commitment to Africa from resource companies listed in Australia and Canada. There was an especially positive trend in African resource activity from companies listed on the ASX, where capital raisings rose 25% compared with 2010. This increase was helped by 19 initial public offerings on the ASX, with the newcomers being focused predominantly on exploration in Africa."

At Africa's largest mining exhibition, Indaba, RMG's CEO Professor Magnus Ericsson spoke and IntierraRMG conducted information-search demonstrations.

Uranium Resources plc commences drilling

Uranium Resources plc, the AIM-listed uranium exploration company, has commenced its 2012 drilling campaign at its 100%-owned Mtonya project in southern Tanzania, Africa. The programme is designed to comprise 20,000m of open-hole and diamond-core drilling and pursue the following objectives:

- further test the roll-fronts identified in tier 2 at depths of 240-260m,
- identify and establish geometries for roll-fronts in tier 1 at depths of 170-200m; and
- test for uranium mineralisation in tier 3 at depths of 300-320m.

Drilling is currently underway by a single rig, with further rigs to be deployed during the course of the campaign. The 2011 drilling and results of the recent mineralogical studies suggest similarities with the well-known sandstone-hosted roll-front uranium deposits of Kazakhstan and the USA.

Gold mine contract for FLSmidth

FLSmidth has been awarded a $82M contract from Allied Nevada Gold Corp to supply equipment and services to a gold mine 200 km northeast of Reno in Nevada.

The contract includes delivery of two SAG mills and three ball mills to a 100,000 tpd plant, making it the largest concentrator in North America that has ever been put into operation in a single phase.

Prior orders from Allied Nevada for FLSmidth equipment include a primary gyratory crusher as well as cone crushers for delivery in 2012.

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Weir consolidation

Weir Minerals Africa Ltd is relocating its Linatex facility in South Africa (although staying in Alrode, near Johannesburg) to accommodate "planned growth and the need to integrate the company's operations under one roof."

The company said that the market uptake for its Linatex products has been remarkable, with hose output doubling over the previous year and rubber lining output increased by 50%.

Weir Minerals Africa is accredited to ISO 1800 and 1400, so the Linatex operation will also benefit from falling under a single quality system. The company also expects to achieve faster throughput of these products.
Weir Group plc purchased the Linatex group of companies (a Malaysia-based provider of wear-resistant products) in 2010. At the time of the acquisition, Weir's CEO, Keith Cochrane, said the acquisition would create great opportunities for Weir's Minerals division by combining Weir's expertise in pumps, valves and cyclones with Linatex's renowned rubber products and branding.

The move to the new facility in Clarke Street will be completed by May.

An overview of the Weir Minerals Africa screens manufacturing facility.

Broad-based support for bauma Africa

In September 2013, Johannesburg will be the venue for the first bauma Africa. This new exhibition has already attracted support from the South African Construction and Mining Equipment Suppliers' Association (CONMESA).

Other supporters of the show include the German engineering federation, the VDMA (Verband Deutscher Maschinen- und Anlagenbau), and is making an application to the Ministry of Economic Affairs for it to back an official German pavilion at bauma Africa. According to the organiser, this is the first time all the main construction machinery associations worldwide are giving their full support to the premiere of a bauma brand event outside Germany.

MDM Engineering Group Ltd awarded BFS

MDM Engineering Group Ltd, the minerals process and project management company has been awarded the bankable feasibility study (BFS) for Amari Manganese pty Ltd's Kongoni project, located within the Kalahari manganese field. MDM will be responsible for the processing plant and surface engineering components of the study as well as the overall study.

In July 2010 MDM completed a pre-feasibility study for the Kongoni manganese project which has resulted in the successful award of the BFS to MDM. This study will establish the capital and operating costs for the mining crushing and screening as well as the associated infrastructure. MDM will confirm that the current plant design is suitable for the treatment of the defined ore body to be mined by Amari.

De Beers 2011 report

In the year 2011, De Beers reported total sales increase of 26% from $5.9 billion to $7.4 billion. Sales of rough diamonds by the Diamond Trading Co (DTC) increased 27% to $6.5 billion (including those through joint ventures), and DTC prices increased 29% from 1 January 2011 to 31 December 2011.

The company's diamond production totalled 31.3M carats compared with 33.0M carats in 2010. EBITDA increased 21% to $1.7 billion and a cash flow of $734M was generated in the year.

De Beer's Debswana's Jwaneng mine cut - 8 extension project is reported as progressing satisfactorily, largely on schedule and on budget. More than 40M tons of waste has been stripped to date, and infrastructure construction is over 90% complete, with the remaining work forecast to be completed during 2012.

The underground feasibility study to extend the life of Venetia mine in South Africa is underway, and scheduled for consideration by the De Beers Consolidated Mines (DBCM) board this year.

De Beers Canada completed an optimisation study at Snap Lake mine in mid-2011, securing a mining solution to economically access this promising long life but challenging ore-body, and thereby achieve its forecast 20-year life of mine. The environmental impact statement for Gahcho Kué has been submitted for review. Construction at Gahcho Kué is expected to commence in 2015, with production from 2017. The proposed mine is estimated to produce 4.5M carats annually over 11 years.

Prospecting right for Leinster manganese project

Ferrex plc, has been granted a prospecting right over the Tweed Farm, representing the final of 10 farms to be granted within the highly prospective 46,868 ha Leinster manganese project in South Africa. Ferrex currently has a 49% interest in the greater Leinster project through its interest in Umbono Minerals Holdings (Proprietary) Ltd, and this will increase to 74% once ministerial approval has been granted. Also the company's Malelane iron ore project in South Africa and Nayega manganese project in Togo recently reported impressive exploration results, and are both on track to deliver maiden resources in Q1 2012 and Q2 2012 respectively. South Africa hosts the largest metallogenic province of manganese mineralisation in the world.

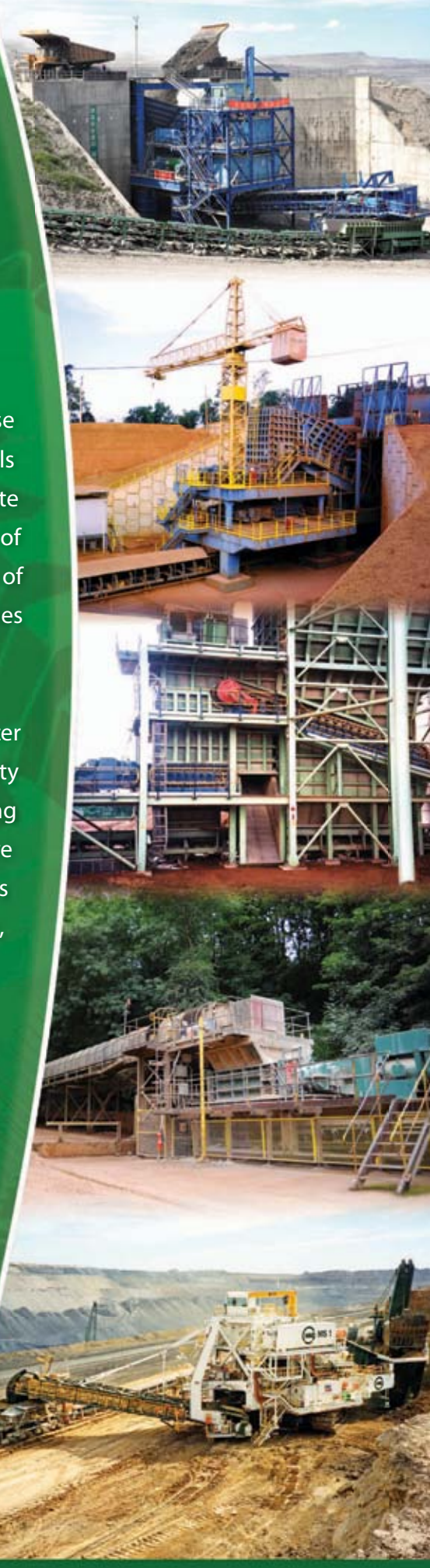
MineSuite consolidation

Mine technology provider Maptek has consolidated business development of its MineSuite businesses with MinLog. The latter has assumed all responsibility for the development, delivery and support of the MineSuite product. MinLog already provides delivery and support for MineSuite systems in Africa.

Maptek's general manager, Australia, Peter Johnson, said the company was confident the consolidated business will be beneficial to MineSuite customers. He added that MinLog will operate with a single strategic goal of delivering the best production-management information systems in the world.

For his part, MinLog's MD, Karel Gilliland, described MinLog as being at the forefront of mining executional value-chain solutions. MinLog will operate from the existing Maptek premises in Warabrook, New South Wales, as well as from its premises in South Africa.

The complete sizing solution



Established in 1978, MMD patented the Twin Shaft Mineral Sizer, whose breaking system makes them ideal for a wide range of materials ranging from wet and sticky to hard and abrasive, either separate or combined, thereby allowing MMD to establish a range of proven installations for the production and processing of over 70 different minerals in more than 50 countries around the world.

High capacity and compact, the MMD Sizer is complemented by the MMD Heavy Duty Feeder, which have the capability of being directly fed without requiring a protective bed of material, these unique features facilitating their incorporation in static, semi and fully mobile installations.

An independent company that remains focused on Sizer Solutions, MMD's policy is to work with its customers to develop systems adapted to meet their needs, basing their ongoing development on innovation through experience.

See us at MINExpo 2012
Booth 2603

THE MMD GROUP OF COMPANIES
WWW.MMDSIZERS.COM

Pilz's safety calculator

Almost 300 companies will be presenting at Drives and Controls 2012 in BirminghamUK. These exhibitors will include Pilz, which give advice on functional safety-related control standards and applications

This advice will focus on the transition from EN954-1 to EN ISO 13849-1 and EN 62061, and will feature the latest version of the company's PAScal safety calculator software. Pilz claims that this "uniquely caters for both performance level (EN ISO 13849-1) and safety integrity level (EN 62061), and produces technical reports as required by the standards."

Pilz's principal functional safety specialist, David Collier, will deliver a seminar entitled 'Clarifying the nature of safety reliability data'. Mr Collier will argue that EN954-1 is dead, and explain what users need to know about its replacement, ENISO 13849-1.

Pilz will also exhibit its IP67-rated Decentralised Periphery safe distributed I/O solution for 'cabinet-free connectivity'; the PSS4000 integrated standard and safety automation system, and the latest developments in the Pilz range of safety interlocks, RFID-based sensors, access control devices and light curtains.

New schedule optimiser

The Tucson-based software company Mintec Inc has announced what it claims is "an improved schedule optimiser". Mintec says the MineSight schedule optimiser (MSSO), version 4.5, uses a completely new user interface and increased processing power

Mintec's VP-technical, Glenn Wylde, claimed "our scheduling suite of tools continues to storm ahead", claiming that the MSSO, with its graphical integration, Gantt charting and the coupling of an equipment-cycle database has proven to be a huge leap forward.

Mintec claims MSSO determines the most productive cut mining sequence to achieve maximum profitability. It generates practical short- to medium-term project schedules and satisfies all project quality, quantity, market and geotechnical constraints.

The improvements include the solid scheduling function, which generate schedules for both 3DBM and GSM solids, and stockpile reclaim methods.

Improved constraints include stockpile reclaim methods, minimum-maximum bench lag/lead positions and destination availability.

There is also increased consistency between MSSO and MineSight's advanced reporting and charting tool.

Giving back to the planet for our future

Implementing best environmental practices to give back what has been taken from the planet

As the scale of mining activity has increased, as well as the infrastructure to support it, so has the level of impact upon the environment. The nature of mining processes creates a potential negative impact on the environment both during the mining operations and for years after the mine is closed. The crucial concept is that of sustainable development, which requires environment and development issues to be addressed in an integrated manner in order to meet the various needs of the present, and to take into account the needs of future generations.

This impact has led to most of the nations' adopting regulations to moderate the negative effects of mining operations. Protecting the environment is a priority for all members of society. Increasingly, governments, industry and community organisations are working as partners to protect the environment for present and future generations.

Over time, the industry has seen an introduction of tighter regulations both at a global and regional level. Mining practice has evolved to reflect these concerns and regulatory requirements, and some operators have introduced management policies and practices and have adopted technologies that allow mining to occur with minimum environmental harm.

Fleming Gulf Conferences initiative Global Sustainable Mining Summit, held in April 2012 in London, UK has been designed to discuss critical issues on how to implement technological advancements and best lawful environmental practices. The summit is designed to convene decision makers and policy makers from global mining powerhouses who have made a difference in sustainable development in mining and created advanced strategies to better the results of mining processes.

Substantial ore increase for Petropavlovsk

Russia-focussed Petropavlovsk plc has reported a substantial increase in its gold ore reserves and mineral resources (in accordance with Australia's Joint Ore Reserves Committee).

The highlights of the company's update are an 11% increase (after the mined depletion of 0.65M oz during 2011) in proven and probable ore reserves, and a 6% increase in total mineral resources.

Petropavlovsk's ore reserves have been upgraded from 9.1M oz, at an average grade of 1.17 g/t Au, to10.2M oz, at the slightly lower average grade of 1.13 g/t Au. Mineral resources have risen from 23.1M oz to c.24.6M oz, of which 14.4M oz are in the measured and indicated resource categories, and 10.2M oz are inferred resources.

The ore reserves for the group's main producing assets were estimated using a gold price of $1,000/oz (as per the estimate in January 2011). Reserves for the Albyn and Visokoe projects were estimated using a gold price of $1,200/oz.

The average gold grade remains in line with the previous year, despite the mining of high-grade material during 2011. This is attributed to the success of exploration programmes at Pioneer and Albyn (in the Amur region), Petropavlovskoye (in Yamal) and Visokoe (in the Krasnoyarsk region).

Additions to the group's JORC-compliant ore reserve estimates are attributable to successful exploration at Pioneer, Albyn, Malomir and Pokrovskiy (at the Pokrovka-2 and Zheltunak deposits). Exploration results from Pioneer, Malomir and Albyn have also identified new zones of both non-refractory and refractory mineralisation, the results of which have so far only partly been reflected in the group's resource estimate.

Features include:

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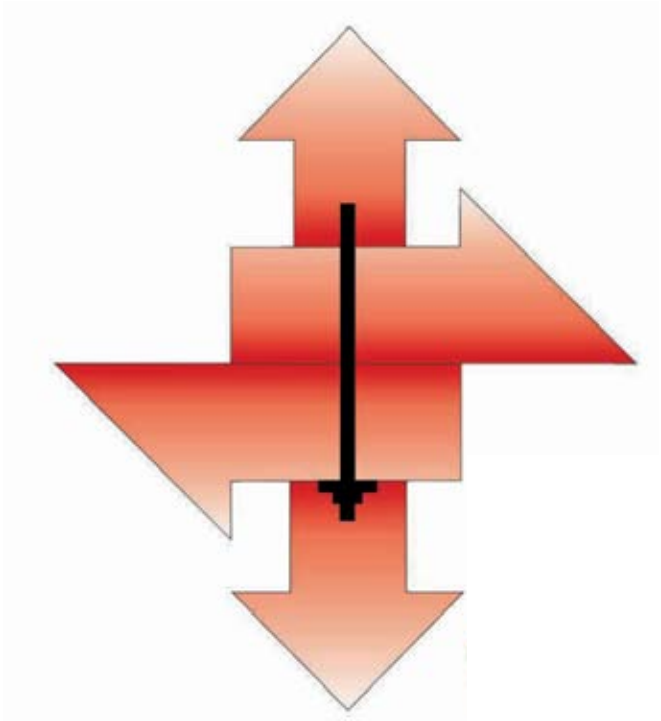
Rare Earths Global announces intention to float on AIM

Institute of Mining Engineering I

RWTH AACHEN UNIVERSITY

AACHEN INTERNATIONAL MINING SYMPOSIA

AIMS 2012



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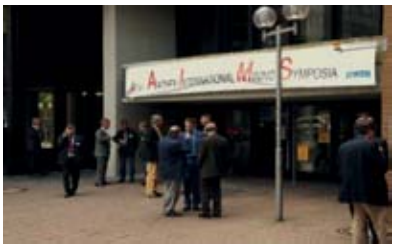

SYMPOSIUM SECRETARIAT

RWTH Aachen University
Institute of Mining Engineering I
Institut für Bergbaukunde I (BBK I)
Wuellnerstr. 2
52056 Aachen, Germany

Tel.: +49 241 8095673
Fax: +49 241 8092272
aims@bbk1.rwth-aachen.de
http://www.aims.rwth-aachen.de

3D Laser Mapping appoints new MD

UK based, 3D Laser Mapping has appointed Jon Chicken as MD, while the company's founder, Dr Graham Hunter, will take on the position of executive chairman. Dr Hunter will focus on the management of key suppliers, development of joint ventures as well as research and development.

3D Laser Mapping opened new offices in South Africa and Australia last year, and launched a number of new products as part of its expansion programme.

New appointment at Grantham Engineering

Grantham Engineering Ltd, manufacturers of the Invicta range of industrial vibrators, has appointed Huw Williams as technical director. He will be responsible for design, specification and industrial application of the company's rotary electric, rotary hydraulic and pneumatic piston vibrators. The appointment releases the former technical director, Phil Turley, to take up the newly created post of R&D director.

150 years of Sandvik

On 31 January 2012, it was 150 years to the day since Göran Fredrik Göransson's new company was formed in Sandviken, Sweden. At that time, Sandvik was first in the world to use the Bessemer process, which, the company claims, revolutionised steel manufacturing.

Sandvik 2011 results

For 2011, Sandvik reported order intake of 99,078 MSEK ($14,000M) with an operating profit of 10,148 MSEK ($1,517M).

Weir Group acquires Novatech LLC

UK based Weir Group plc has agreed to acquire Novatech LLC, a US manufacturer of well service pump valves and valve seats for upstream oil and gas applications, for $176M. Based in Dallas, Texas, Novatech, a family-owned business, produces a wide variety of proprietary valves and valve seats for high pressure applications such as frac, cement and mud pumps.

Weir's customer base includes the world's largest mining houses, major oil services businesses and nuclear and conventional power generation companies. Annual revenues were more than £1.65 billion in 2010, of which more than half came from the provision of services and aftermarket support. Emerging markets contributed 39% of overall group revenues.

New vein systems

Ariana Resources plc, the gold exploration and development company operates the Red Rabbit gold project in western Turkey, where drilling in the Arzu south/Arzu North gap zone resulted in 8.7m (drilled) at 2.03 g/t Au and 9.9 g/t Ag from 15m DTH drilling.

This also demonstrated potential for a multiple parallel vein and breccia zone. Further exploration drilling is planned for the wider Kiziltepe area, which demonstrates potential for additional economic vein systems to feed into the current Red Rabbit project resource of 448,000 oz of gold equivalent.

A deep drilling campaign at Kiziltepe is being planned to determine the long term underground potential of the project to extend the current projected mine life of eight years.

New shovel for Morris & Perry

UK company Morris & Perry Quarries Ltd has taken delivery of a Volvo L180G shovel for its Gurney Slade facility in the heart of the Mendips. The new shovel will replace an old L180E that had clocked up 24,000 hours on its original engine and transmission

Equipped with Michelin XLDD2A L5 tyres, a standard 4.4m³ rehandling bucket and RDS 8001 weigh-load, the new loading shovel was described by quarry manager Dave Roberts as "fully fit for purpose, handling in the region of 2,000t of material in a daily shift."

The new Volvo L180G features a 13l Tier IIIB-compliant 333 hp engine, with opti-shift transmission and axles all designed and manufactured by Volvo. The shovel features a full turn tipping load of 17.2t plus a 20% increase in lifting force and 10% increase in breakout force over its predecessor.

The high torque at low engine revs results in faster cycle times and increased productivity. Volvo notes that two, stronger, variable-displacement load-bearing axial piston pumps and hoses have been introduced to handle the increased pressures. These, according to Volvo, provide "superior control of the load and attachments, as well as high breakout force, faster lifting and tilt functions." A new hydraulic cooling system has been designed to reduce the working temperatures by up to 20°C over the F series model.

Morris & Perry is a family-owned quarrying company whose Gurney Slade quarry is recorded as having been in operation as far back as the middle of the 19th century.

L180G

Cargotec grows business

In its audited accounts for 2011, Cargotec Corp has revealed an 18% increase in orders to €3.23 billion, with sales up 22% to €3.14 billion

The company's research and product development expenditure was €60M, with an operating profit for the year of €207M.

Cargotec's president and CEO, Mikael Mäkinen, said in the autumn the company had received several large terminal project orders. It reinforced the company's automation expertise with the Navis acquisition, and decided to establish a joint venture with its long-term Chinese partner.

Hi-line boosts staff

Hi-line Industries Ltd, the manufacturer of compressed air treatment, conditioning and purification equipment, has strengthened its technical team. The company recently appointed Mark Baily as a service and production co-ordinator.

Mr Baily has both UK and overseas experience of co-ordination functions having spent nearly 25 years working for a major filtration company.

Mark Baily

Ronnie Leten comments on Atlas Copco's Q4 results

For the full year 2011, Atlas Copco reached new records for sales and operating profit.

"We have had a solid end to a year that was nothing less than fantastic for Atlas Copco," said Ronnie Leten, president and CEO of the Atlas Copco Group. "Demand for our products and services was better than expected during the quarter."

Revenues in the fourth quarter increased 16% organically to BSEK 22.3 ($3.3 billion) and the operating profit was BSEK 4.6 ($0.7 billion) corresponding to a margin of 20.6%. The full-year organic revenue increase was 22% to BSEK 81.2 ($12.1), with a margin of 21.6%. In the near term, the overall demand for Atlas Copco's products and services is expected to weaken somewhat from the current high level.

Notable events during the last quarter include the acquisitions of Houston Service Industries, a US manufacturer of energy-efficient blowers, and Swedish GIA, which broadens the offering of underground transportation and utility equipment.

Further expansion for Intierra

Following on from its recent acquisition of Stockholm-based Raw Materials Group, Perth-based InterierraRMG has announced the purchase of the base metals consulting and copper reports division of Bloomsbury Minerals Economics Ltd (BME).

As part of the asset transfer, London-based BME will increase its shareholding in IntierraRMG, in which it has been invested since 2009.

With immediate effect, BME's Paul Dewison and Robert Goldstein will join IntierraRMG, bringing supply-demand market analysis, mine project appraisal, a quarterly copper report and monthly copper briefing service.

The CE of IntierraRMG, Peter Rossdeutscher, said "Paul and Robert bring a wealth of experience in base metals, copper and copper-alloy fabricating, copper consumption and scrap, and I welcome them to the IntierraRMG team".

ArcelorMittal upbeat despite grim final quarter

Steel giant ArcelorMittal suffered a net loss of $1.0 billion in the final quarter of last year after a 2.5% fall in steel shipments to 20.6 Mt. This was blamed on destocking in Europe.

The company's chairman and CE, Lakshmi Mittal, admitted the situation in Europe was a live concern. However, despite what he described as continued uncertainty, he said "we are seeing an improvement in sentiment compared with the fourth quarter. Steel shipment volumes for the first six months are expected to be similar to the first half of 2011 and we are again targeting increased production from our mining business."

Last year as a whole was generally positive. Although net profit fell to $2.26 billion (from $2.92 billion in 2010), earnings before interest, tax and depreciation (EBITDA) were $10.11 billion, an increase of almost 12% on 2010.

ArcelorMittal continues to benefit from its diverse geographic presence and growing mining business, which delivered on its targets to increase iron-ore and coal production. The company achieved an 11% year-on-year increase in iron-ore production (to 54.1 Mt) and coal production was up 20% to 8.3 Mt.

Overall steel shipment volumes in the current half year are expected to be at a similar level as the equivalent period last year.

Mining production volumes are expected to be higher than in the first half of 2011, with plans to increase the company's own iron ore and coal production in 2012 by approximately 10%. Capital expenditure in 2012 is expected to be $4.0-4.5 billion.

Chilean rescue capsule on display

The capsule was specially built to rescue 33 miners who were trapped underground at the San José mine, Chile in October 2010. The 3.9m capsule is made of steel and measures 54 cm wide. All of the men were rescued from the mine 700m below after being trapped for 69 days– surviving longer underground than anyone on record.

The capsule has been on display at the Science Museum in London, UK. The capsule was fitted with enough oxygen-enriched air to last the 20 minute journey to the surface, as well as communication equipment and retractable wheels to help it run smoothly up and down the mine shaft. It weighs 460kg, is painted red, white and blue (Chilean flag colours) and is fitted with an emergency release mechanism so if the capsule got stuck, the miners could winch back down into the mine. It was designed by the Chilean Navy and built by Chilean Navy engineers.

BHP Billiton results

BHP reported strong financial results with underlying EBITDA up 8% to $18.7 billion for the half year ended December 2011. Attributable profit was down 6% and attributable profit excluding exceptional items down 7% to $9.9 billion. Gearing increased to 25% following the successful acquisition of Petrohawk Energy Corp.

Eriez Europe expansion

Eriez Magnetics Europe Ltd has purchased a 19,000 square foot building located next door to its current premises in Caerphilly, South Wales. Despite the current economic climate, Eriez Europe has continued to show growth. An increased order base has resulted in a heavier manufacturing demand and hence more space required to facilitate this. Eriez Magnetics designs and manufactures magnetic separation, metal detection and metal sorting equipment used in recycling, mineral processing and mining.

Management change at Groeneveld

Netherlands-based Groeneveld Groep BV has "reshaped its top management structure in order to optimally manage the company's global growth ambition." The company is a supplier of automatic lubrication and oil management systems, and active safety devises. In a statement, Groeneveld said that a management board has been established. This will comprise Henk Groeneveld (the company's president and CE), Ron den Engelsen (group director of strategy and business development) and Sjaak van Boxtel (group director of finance and administration).

Meanwhile, Mr den Engelsen has also been appointed MD of Groeneveld Transport Efficiency BV, which specialises in the development, manufacturing, marketing and sales of automatic lubrication systems.

Mr Groeneveld will head GreenCat, Groeneveld's IT division, which is specialised in transport management systems and telematics solutions.

Mr Groeneveld announced "we can look back on a successful 2011, the year in which the company celebrated its 40th anniversary and in which turnover and profit has shown a significant positive development."

Board of management

Ventyx completes integration of Mincom

Ventyx, an ABB company, has completed the organisational integration of Mincom, a global supplier of enterprise asset and work management software, following the company's acquisition last year. The newly merged organisation brings together three businesses: Ventyx, Mincom and ABB Network Control to form a software provider for the mining industry.

Acquisition of AmerCable Holdings Inc for $275M

Nexans, a worldwide supplier of cables, has agreed to acquire AmerCable Holdings Inc, producer of primarily mining, marine oil, gas and other industrial cables, including renewable energy, in North America for $275M (€211M).

Based in El Dorado, Arkansas, AmerCable employs approximately 400 associates and manufactures highly engineered and mission critical cables for harsh environments. AmerCable also provides a range of engineering field and support services into these industries; it makes 77% of its sales in North America, but also has growing operations in China, Latin America and Australia. For the year to 31 December 2011, AmerCable sales revenue totalled around $270M, which is an annual growth of more than 30%.

AmerCable's business complements Nexans' existing operations in resource cables, providing a new strategic and operational platform in North America. Commenting on this acquisition, Frédéric Vincent, Nexans CEO said that the acquisition of AmerCable fits well with Nexans' strategy to develop its industry division extending its presence in markets with high-growth prospects and above market profitability. The global mining market is expected to benefit from strong global growth, in particular in the coal market in the US and China. In particular the growing shift in North America towards unconventional oil and gas development is set to increase demand for AmerCable's products and services. AmerCable's presence in mining, oil and gas will double the size of Nexans' activities in those segments and will be highly complementary to Nexans' existing operations in offshore and subsea and for total revenues close to €350M.

Nexans has an industrial presence in 40 countries and commercial activities worldwide, it employs 24,500 people and had sales in 2011 of €7 billion.

First concentrate at Outokumpu

Altona Mining has produced its first copper concentrate at the Outokumpu project in Finland. Concentrate grades have quickly ramped up to the design grade of 24% copper. This is positive given the low grade feed that is being used for commissioning of the Luikonlahti processing plant. As expected the concentrate is clean with no penalty elements. Commissioning is continuing using higher grade feed (1.0 - 1.5% copper). This first production has been achieved seven months after starting plant refurbishment, and according to the company is a significant milestone for the project following closely after achieving first production from the Kylylahti mine.

The company has commenced deliveries to New Boliden's Harjavalta smelter in south-western Finland. Concentrates will be trucked 400 km to Harjavalta.

LiuGong sweeps Europe

Chinese equipment manufacturer, LiuGong Machinery Corp is planning an after sales service tour across Europe. Over 60 people, including management, engineers and staff from LiuGong Europe will be a part of the team. During the tour, the team will visit more than 70 key accounts and customers and perform routine maintenance on 200 LiuGong machines.

Established in 2010, LiuGong Europe is located in Amsterdam in the Netherlands. In 2011, its sales revenue increased more than 169% from the year previous. With LiuGong's acquisition of HSW (Huta Stalowa Wola) Dressta in January 2012, the company gained a manufacturing base in central Europe.

Honeywell acquires Fire Sentry Corp

Honeywell has acquired Fire Sentry Corp, a privately-held manufacturer of fire detection and control products. The terms of the transaction were not disclosed.

Based in Yorba Linda, California, Fire Sentry's product portfolio consists of fast-responding electro-optical flame detectors, portable test lamps and dedicated control panels that are used in industrial settings such as petrochemical, semiconductor, paint booth/finishing, automobile airbags and munitions plants. Fire Sentry's products are designed to detect both hydrocarbon and non-hydrocarbon fires within a single device.

The acquisition will help Honeywell expand its gas and flame detection, and monitoring solutions and builds on the company's acquisitions of System Sensor in 1984 and Zellweger Analytics in 2005.

A new microcontroller-based condition monitoring system

Monitran, developer and manufacturer of transducers for the measurement of vibration, proximity and displacement, has launched the MTN/5000-16; a microcontroller-based condition monitoring system.

The MTN/5000-16 contains up to 16 Monitran g-mac signal conditioning units and features a 2.8" TFT touch screen with a menu that enables users to set data sampling periods, ranges and accuracy levels plus vibration threshold (alarm) levels; on a channel-by-channel basis or across all channels. The system has 20 digital I/O channels, enabling the MTN/5000-16 to be integrated with other systems.

Each g-mac unit within the MTN/5000-16 can accept any standard two-wire accelerometer; but the data can be viewed and interpreted as acceleration or velocity. However, the g-macs can also be used with other transducer types and the MTN/5000-16's software can, upon request, be written to display virtually any parameter (eg temperature, light, voltage).

Systems are made-to-order and customers can specify how many channels they want the system to contain (1 to 16), the condition to be monitored by each channel and what levels of control they wish to have over each channel. Customers can also specify what power source the system should utilise and whether or not they want the system to do any direct switching for emergency shutdowns.

The MTN/5000-16 is initially available in a 350 x 250 x 200mm cabinet, though other cabinet sizes may become available later in the year.

Monitran together with specialist engineering consultancy Drive Management Services (DMS) has formed a diagnostic system integrator (DSI) partnership.

The partnership offers customers a complete single supplier service of products, installation, system configuration and full diagnostic support.

Rulmeca celebrates 50 years

Italian manufacturer of motorised pulleys and components for belt conveyors, Rulmeca is celebrating 50 years in business this year. Its founder Antonio Ghisalberti Rulmeca began the company in 1962 in Almè, Bergamo area of Italy, making rollers for the mining industry.

In the 1980s Rulmeca started to explore the international market with the first acquisition of competing foreign companies. Today the Rulmeca group has 22 manufacturing and/or sales companies with 1,100 employees and a turnover of €150M.

Metso Corp's 2011 results

Metso Corp reported that 2011 new orders and net sales were at a record high level, with orders received increasing to €7,961M, some 34% more than in the previous year. Orders received by the services business increased 18% and were €3,100M, some 40% of all orders received.

Net sales increased 20% from the previous year and were €6,646M, and free cash flow was €375M. The company said its order backlog for 2012 is strong at around €4 billion.

Firetrace for largest Bulgarian copper miner

Assarel-Medet JSC, Bulgaria's largest copper mining and processing company, producing more than half of the country's output, has chosen Firetrace International's Firetrace automatic fire detection and suppression system to protect the engine compartments of heavy earthmoving crawler equipment.
The equipment, built by Germany's Liebherr goup is vital to the company's operations as any damage resulting from an engine fire would seriously jeopardise production schedules, possibly for many months.

Mining is an extreme working environment and Firetrace was chosen because of its proven ability in similar applications to withstand intense vibration, extreme temperature variations and severe dust-laden atmospheres. With more than 150,000 installations around the world, Firetrace has also proven to be unerringly reliable; there has not been a single reported instance where a properly installed and maintained Firetrace system has either false alarmed or failed to detect and suppress a genuine fire.

Firetrace is intrinsically safe and ensures around-the-clock, unsupervised protection that requires neither electricity nor external power. It comprises a cylinder containing the extinguishing agent that is attached to specially developed leak-resistant polymer tubing. This proprietary Firetrace detection tubing is a linear pneumatic heat and flame detector. Immediately a fire is detected the tubing ruptures at the point where the heat is detected, automatically triggering the release of the suppression agent; in this case ABC dry powder, extinguishing the fire precisely where it starts and before it has had time to escalate or spread.

Bulgaria's largest copper mining company, Assarel-Medet JSC, has chosen Firetrace automatic fire detection and suppression.

According to Fire Technics Ltd, Firetrace International's Bulgarian trading partner, ABC, dry powder was chosen for this application from a number of Firetrace suppressant options because it is effective on every type of fire risk that is likely to be present. In addition to the fuel and the risk of fuel line ruptures, this includes any number of flammable liquids that are present throughout the engine compartment, including hydraulic, brake, transmission and power steering fluids, plus combustible accumulated grease on the engine block, for which frayed or damaged electrical wiring can easily provide the ignition source.

Firetrace is underpinned by its array of international standards. Genuine Firetrace is available only via ISO 9001:2008 certified Firetrace International's global network of authorised distributors.

First UK partner for Siemens large drives division

Siemens Industry Automation and Drive Technologies has partnered with South Wales-based Industrial Automation & Control Ltd (IAC) for its large drives. The two companies have been partners for over 20 years and IAC is Siemens' largest systems integrator.

IAC turns over £8M per annum and has expanded over the past few years with wholly owned subsidiaries in West Wales and South Africa

Peter Lewis, MD of IAC, Geoff Hirst and Andrew Peters from Siemens IA&DT

Keeping it in the family

On 27 February, John Jackson, 21, walked through the gates of Cleveland Potash Ltd (CPL) near Loftus in the UK to start work. What lifts this above the commonplace is that John is the third-generation Jackson to work for the mining company.

John, who after induction and training will be an underground miner, follows in the footsteps of his father, Gordon Jackson, who started work at CPL in March 1984 and is still working there (as a ventilation technical assistant).

Gordon's own father, Trevor, had joined the company in 1973 (the year the UK joined what became the European Union and the Vietnam war ended), and worked at CPL as an overseer when he retired in 1997.

This is not the first time CPL has boasted of an extended family connection at the mine. Personnel supervisor Joan Hogan joined CPL in 1973, and her daughter Julie followed (and now works as a human resources co-ordinator), with grand-daughter Hannah Lindsey signing up last year as an apprentice administrator.

CPL's external affairs manager Dave McLuckie believes there may be another two families with three generations of service with the company.

Hogan Girls

Jacksons

Indonesia to partner bauma 2013

Indonesia has been chosen as the partner country for Bauma 2013. The aim is to leverage Indonesia's significant business potential for the international construction and mining machinery industry.

A co-initiator of the partner country concept of Bauma, along with Messe München, is the German Engineering Federation, VDMA. Representatives from Indonesia will have the opportunity to present their country to the trade audience as an investment location and partner for upcoming projects. Indonesia's GDP increased in 2011 by 6.2%, and by 2025 the government wants to invest $465 billion in expanding the infrastructure, in oil, coal and gas extraction and in the "electrification" of the country.

IS Firetrace to safeguard Turkish mine

The Çayeli copper and zinc mine in Rize on the Black Sea coast of north-eastern Turkey is using Firetrace International's intrinsically safe Firetrace automatic fire detection and suppression system to protect existing underground mud pumps and electrical cabinets.

Eleven systems have been installed in the mine, which mills 3,000t of ore a day and is owned and operated by the Canada's Inmet Mining Corp. Each system is providing around-the-clock protection to vital equipment on which the mine's operations depend. According to Faik Tellioglu of MCS Fire Protection and Consulting Services Ltd, Firetrace International's Turkish authorised distributor, Firetrace was selected because the systems are completely self contained and are proven to withstand the harsh and dirty underground mining environment, plus the systems could be accommodated inside the narrow control panels. Firetrace requires neither electricity nor external power, so does not contain any components that produce sparks or which can hold enough energy to produce a spark of sufficient energy to cause an ignition.

Each of the Firetrace systems comprises an extinguishing agent cylinder that is attached to proprietary Firetrace detection tubing via a custom-engineered valve. This leak-resistant tubing is snaked throughout Çayeli mine's cabinets and enclosures to ensure fast detection and suppression of a fire at its source. Heat or flame will immediately cause this tube to rupture and the suppression agent is automatically released, extinguishing the fire precisely where it starts and before it can take hold. An important consideration for the mine's management was that, unlike many suppression systems, Firetrace can only ever be activated by a real fire, so there is no prospect of false alarms or agent discharge that might otherwise curtail mining operations.

Firetrace International's intrinsically safe system has been chosen to protect mud pumps and electrical cabinets at the Çayeli mine in north-eastern Turkey.

The Çayeli project uses both the Firetrace direct system and the Firetrace indirect system. In the direct system, the Firetrace detection tubing performs a dual function, operating as both the detection device and the suppressant delivery system, whereas the indirect system uses the Firetrace detection tubing as a detection and system activation device, but not for the agent discharge. The rupturing of the tube results in a drop of pressure causing the indirect valve to activate. This diverts flow from the detection tube and the agent is discharged from the cylinder through diffuser nozzles, flooding the entire cabinet.

Two risk-specific suppression agents were chosen for the project; 3M Novec1230 fire protection fluid is being used to protect the mine's electrical cabinets, while ABC dry chemical powder is safeguarding the Geho mud pumps.

Firetrace International is headquartered in Scottsdale, Arizona, with its EMEA offices in Gatwick in the UK. It has completed 150,000 installations globally to date.

According to Price Waterhouse Cooper . . .

Mining growth markets continue to gain traction as demand from emerging countries will continue to drive M&A. The company believes Africa will emerge as one of the most important mining geographies this year.

Despite a weak macro backdrop and falling commodity prices, 2011 marked the second busiest year in mining M&A activity in history. In 2011, growth market miners by value represented almost a quarter (24%) of global mining M&A. This is nearly 50% higher than the total deal value seen at the 2006 market peak and compares to the less than 1% penetration observed at the start of the millennium for the same group, according to PwC's Global Mining 2011 Deals Review & 2012 Outlook: On the road again report.

Regarding Western-led deals in 2011, many developed world buyers are playing it safe with 72% involving acquisitions of projects in another developed world region. The report indicates that this trend may be a barrier to long-term growth, given that roughly three-quarters of known reserves lie in countries outside the developed markets.

2011 by numbers

- In 2011, more than 2,600 M&A deals worth $149 billion were announced in the global mining sector. Volumes were close to historic highs and values were 33% higher than 2010.
- The US, Australia and Canada led the charge in mining sector deal making, accounting for 53% of annual acquisition values, up from 46% the previous year - while 30% of all 2011 global mining acquisitions involved a Canadian buyer, a greater proportion than any other one country.
- Although still only representative of a very small portion of the global mining M&A market, buyers based in India, Indonesia, South Korea and the Philippines made some notable moves in 2011.

SMT Scharf AG 2011 results

SMT Scharf AG, manufacturer of rail-bound railway systems for the mining sector, reports significant revenue and earnings growth in the 2011 fiscal year on the basis of final consolidated figures. SMT Scharf group's revenue was up by 23% to €82.1M, compared with €66.7M in the previous year. As in 2010, the most important market was China, followed by Russia and other CIS states. Markets outside Germany contributed 90% to total revenue (previous year: 91%).

Features include:

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Record-breaking shaft boring operation for Portuguese Somincor mine

Scania invests in India

Scania is planning to invest SEK 200M (approximately $30M) in an industrial facility in Bangalore; this will also serve as the centre of the company's commercial operations in the country. Scania's ambition is to sell about 2,000 trucks, 1,000 buses and1,500 engines per year in the Indian market within the next five years.

The facility is being constructed in an industrial area 40 km east of Bangalore, the capital of Karnataka state in southern India. Production is expected to start in early 2013, and it is estimated that almost 800 people will be employed.

Scania also has regional product centres in Russia, Dubai, South Africa, Malaysia, Thailand and Taiwan. The company has been represented in the Indian market since 2007, when a partnership was initiated with Larsen & Toubro (L&T). L&T has successfully established Scania's trucks and services and has developed a close partnership with customers in the mining industry. L&T currently operates about 10 Scania service workshops at various mining sites in the country.

Initial work approved for Port Hedland

BHP Billiton has apporved $917M (BHP Billiton share $779M) in pre-commitment funding for the construction of a 100 Mtpa outer harbour facility associated with its Western Australia iron ore operations. The project has an option to expand by a further 100 Mtpa. The approved funds will enable the company to progress feasibility studies and the procurement of long lead time items. In parallel with this work, engineering studies are underway to match mine and rail expansions to the expanded port capacity.

The first phase of the outer harbour development would include the proposed construction of a 4 km jetty, a four-berth wharf, 32 km of dredged departure channel and landside infrastructure, including stockyards and a rail spur. Start-up would be in the first half of 2016.

Metso dumper to Hamersley

Metso Corp is to supply a tandem rotary railcar dumper to Hamersley Iron Pty in Australia. The equipment will be delivered to Hamersley's Cape Lambert iron-ore operation in the north of Western Australia. The order, the value of which has not been disclosed, includes spare parts, technical assistance during installation, pre-commissioning, commissioning and performance testing.

Metso said that the design of the equipment allows for lower maintenance and higher, more efficient material output flow. The ease and safety of maintenance is, apparently, also improved through a reduction of overall components.

This is Metso's second delivery of equipment to this project, the previous order being delivered last year. The latest order is due to be delivered in the second quarter of 2013.

Hamersley Iron is a member of Rio Tinto Group.

$1billion contract for Thiess

Thiess Pty Ltd has been awarded a six year mining contract worth $1 billion to extend operations at Oz Minerals' Prominent Hill copper-gold mine in South Australia.

The MD of Thiess, Bruce Munro, described the contract as recognition of the company's strong partnership with Oz Minerals, a relationship built since 2006 when Thiess undertook the construction of infrastructure and then the mining for the greenfield operation at Prominent Hill.

The expansion requires Thiess to employ an additional 170 people over the coming months, with the total open-pit mining workforce expected to peak at 550 people.

The contract-signing ceremony was attended by Oz Minerals' CEO Terry Burgess, who spoke of the great prospects ahead for the two companies.

Putzmeister and Sany merge

Putzmeister Holding GmbH and Sany Heavy Industry Co Ltd have agreed to merge, making the transaction the largest Chinese-German one to date. Sany, together with the Chinese private equity company CITIC PE Advisors (Hong Kong) Ltd as a minority shareholder, thereby acquires 100% of Putzmeister. Both parties agreed not to disclose the financial terms of the transaction.

Putzmeister develops, produces and sells construction and mining machinery world-wide. In 2011 the company employed 3,000 people and generated about €570M in revenue. Sany, based in Changsha, China, is a large Chinese producer of construction machinery and market leader for concrete pumps in China,which is the largest and fastest-growing market for concrete pumps and other industrial equipment world-wide.

Both partners benefit substantially from the combination. Sany's financial strength secures Putzmeister's growth prospects and provides a significant competitive advantage. Sany adds to its portfolio technologically cutting-edge products and innovations "made in Germany" and acquires a strong distribution and service network outside of China.

Joy secures International Mining Machinery

Milwaukee-based Joy Global Inc has acquired International Mining Machinery Holdings Ltd (IMMH), a designer and manufacturer of underground mining equipment in China.

Joy Global made the takeover through its wholly-owned Hong Kong subsidiary, Joy Global Asia Ltd. Under the offer, announced on 7 January, Joy Global paid HK$8.50per share for the 400M IMMH shares it did not already own, and cancelled all outstanding options to purchase IMMH common stock (representing 17.9M shares), for the amount by which HK$8.50 exceeded the exercise price of each option.

Joy Global paid an approximately $420M for the shares and options.

Continental Coal funding confirmed

African focused coal mining investment and production company Continental Coal Ltd has executed a binding loan of approximately $65M of aggregate debt funding. The company also confirmed the draw down of the $35M, seven year project loan facility to fund the Penumbra coal mine development in Australia, was nearing completion.

Features Include:

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Using the continuous improvement process to optimise opencast mining operations

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Volvo CE fleet in Asia's largest mine

Sainik Mining and Allied Services, one of the largest contract mining and logistics companies in north eastern India, is a big Volvo CE customer, with over 30 of Volvo's heavyweight EC460 excavators and 11 wheel loaders of various models working in the region. Many of these machines are working 16 hours a day, seven days a week, in Gevra, Asia's largest open cast mine, located near Korba in the central Indian state of Chhattisgarh.

Open since 1981, the busy Gevra mine has, at one time, produced as many as 100,000 tons of coal in a single day. Sainik's machines load the coal into railway cars, where it is transferred for boiler firing at power plants around India. Included in Sainik's fleet are three Volvo wheel loaders that have each clocked more than 50,000 hours. The latest machine to cross 51,000 hours is an L120E that was purchased in 2004, while an L120D has put in 54,000 hours. These are big milestones, particularly for the wheel loaders at work in the brutal tropical conditions of Chhattisgarh, where temperatures can sometimes reach a sweltering 48°C.

For its wheel loaders, Sainik holds blue customer service agreements with the dealer SVP Mining and Technology, and thus far, the wheel loaders have only had to have routine maintenance and overhauls conducted.

"We are very happy with our Volvo wheel loaders," says operations manager Satish Kadian. "Because of their longevity and reliability, we want to purchase more of these machines as we gradually retire the older ones. We're working with Volvo CE to have them buy back some of our older wheel loaders so that we can make room for new equipment."

Buying back older equipment helps to reuse and recycle parts that are still in good condition, enforcing Volvo CE's dedication to environmental care. It also helps the customer to generate more cash-flow to invest in new machinery.

BAEconomics: significant benefits of remote operation

World-first technology in the mining industry is contributing to better health and safety for miners, production efficiencies and improved energy consumption and environmental benefits, according to research from BAEconomics.

The report, commissioned by Rio Tinto, concluded investment in mining technology and innovation should sustain long-term competitiveness while also providing the broader economic benefits likely to flow from a strong mining industry.

The report, entitled 'autonomous and remote operation technologies in the mining industry: benefits and costs' notes that "as automated systems allow workers to communicate with and control machinery remotely, this removes their exposure to hazardous mining environments, reduces or eliminates health and safety risks, and makes for a more attractive workplace."

BAEconomics also observes the appeal of these new roles, and the potential for them to be located in more desirable locations will broaden employment opportunities and attract more talent to the mining industry.

The head of innovation for Rio Tinto, John McGagh, said "the BAEconomics report highlights the increasingly complex challenges being faced by the mining industry. Our industry is facing maturing orebodies, fewer tier-one deposits, increasingly complex geographies and labour shortages and the report details how innovation in autonomous technologies can play an important role in addressing these challenges."

Rio Tinto is in a leading position in the field of mining innovation, with its Australian iron ore operations having already introduced automated trucks, and its blast-hole drill rigs, sorting machines and trains are all capable of being controlled by an operations centre in Perth. This facility already integrates Rio Tinto's port, rail and mine logistics.

The Rio Tinto Centre for Mine Automation, established at the University of Sydney, is one of five global research centres with links to universities. The company said that these research centres bring together the experience and know-how of our own technology and mining professionals with some of the best academic minds to achieve changes that are transforming the way mining, processing and energy are approached.

Rio Tinto's Mine of the Future programme has been running for the past four years, aimed at finding advanced ways to mine and extract minerals more efficiently while reducing environmental impacts and improving safety.

New Beml truck showcased

Indian earthmoving-equipment manufacturer Beml Ltd recently displayed its latest 100t rear dump truck, the BH100. The company showed the truck at the 4th International Mining, Exploration, Mineral Processing Technology & Machinery Exhibition in Kolkata in January.

The BH100, which incorporates an Allison H8610A transmission, is the largest rear dump truck produced by the company. This vehicle is designed to deliver what the company describes as outstanding productivity, reliability and durability, along with an increased level of manoeuvrability, comfort and safety.

Allison's fully automatic power-shifting transmissions combine, said Beml, "all the benefits of proven, hydraulic torque converter technology with advanced closed-loop adaptive controls. A special feature of H8610A is the dual torque path which provides high torque for greater tractive effort at launch."

Beml adds that the advanced CEC2 controls offered by Allison link the engine, transmission and vehicle systems for optimum performance and vocational value. Optimisation of the entire driveline system results in consistent shift quality, increased power train durability, and more efficient vehicle operation leading to greater fuel efficiency.

Rio Tinto invests $518M in autonomous trains for Pilbara iron ore rail network in Western Australia

Rio Tinto will run the world's first automated long-distance heavy-haul rail network, with a $518M investment (Rio Tinto share $478M) in driverless trains.

The first driverless train will be launched in 2014, with the AutoHaul automated train programme scheduled for completion a year later.

AutoHaul is being pioneered as part of the automation component of Rio Tinto's Mine of the Future initiative that also includes driverless trucks and autonomous drills. On its 1,500 km rail network, Rio Tinto currently runs 41 trains from mines to ports, comprising 148 locomotives and 9,400 iron ore cars.

Automating train operations allows Rio Tinto to expand Pilbara production capacity without needing to make a substantial investment in additional trains.

It will also drive productivity improvements, with greater flexibility in train scheduling and the removal of driver changeover times creating extra capacity in the rail network. Other benefits include more efficient fuel use, resulting in lower energy costs and a reduction of carbon dioxide emissions for each tonne of iron ore produced.

Launched in 2008, Rio Tinto's Mine of the Future programme introduces next-generation technologies for mining operations that aim to reduce costs, increase efficiency and improve health, safety and environmental performance.

Issuance of Mozambique ruby licences

Montepuez Ruby Mining Ltd, 75% owned by Gemfields plc has acquired a controlling interest in a ruby deposit based in the Montepuez district of the Cabo Delgado province in Mozambique, valid for a 25years.

The project is approximately 34,000 ha and is believed to be potentially one of the largest ruby concessions in private hands in the world. Mining had previously taken place on a relatively small and informal scale and activities will now be expanded considerably.

Ian Harebottle, CEO of Gemfields, said: "this is a particularly exciting development for Gemfields and we're thrilled to add rubies to our emerald and amethyst portfolio. A project team is already on site, assorted items of capital equipment have arrived and more are on the way. We will now initiate additional bulk sampling and diamond drilling of the area and expect our first production later this year."

Caterpillar restructures in Japan

Caterpillar Japan Ltd has acquired Caterpillar Tohoku Ltd, and restructuring its distribution network in Japan. For more than 40 years, Cat Tohoku was independently owned and operated, in the six prefectures of Aomori, Iwate, Miyagi, Akita, Yamagata and Fukushima.

Features include:
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At the heart of Turkey

Nexans goes live on grid with world's first second generation fault current limiter

Nexans, suppliers of cables and cabling systmes, has successfully commissioned the world's first resistive superconducting fault current limiter (SFCL) based on second-generation superconductor tapes. The SFCL, equipped with superconducting elements developed in cooperation with the Karlsruhe Institute of Technology, has been installed on behalf of Vattenfall Europe Generation AG to provide short-circuit protection for the internal medium voltage power supply that feeds coal mills and crushers in the Boxberg lignite power plant in Saxony, Germany.

A first generation SCFL, based on solid superconducting materials, was installed by Nexans at Boxberg in 2009 as part of a long-term test programme. Following the successful completion of this project, Nexans has returned to the plant for live testing of a new SCFL device featuring superconducting tapes. These tapes reduce the already low losses in the conductor material by around 90%, thereby lowering operating costs. They also provide an even faster response to a short circuit than the first generation materials.

"We now have a second superconductor material option for manufacturing power systems, and this will provide us with an even wider range of applications for our fault current limiters to help customers improve the safety of personnel and equipment while also reducing infrastructure costs. The upgrading and expansion of power networks to meet the fast-changing needs of our customers requires intelligent solutions and new functions," explains Jean-Maxime Saugrain, corporate VP at Nexans. "The power plant's house load is just one of many potential applications for SCFL technology. For example, in the renewable energy sector the capability to supply more power from renewable sources is frequently restricted by the level of the short circuit currents."

The current limiter works in a similar way to the low voltage safety cut-out in domestic homes, but operates on the medium/high voltage network. In addition, after operating, it does not interrupt the electricity flow completely. Under normal circumstances, its superconducting elements allow the electricity to flow unhindered and with practically no resistance. If a critical current level is exceeded, such as during a short circuit, the conductor drops out from its superconducting state within milliseconds to act as a strong electrical resistor. Only a precisely defined residual current will then flow. This enables the device to protect all the downstream components, such as switchgear, from the damaging overloading of a short circuit.

A key advantage of the SFCL is its inherent safety, as it responds to a short circuit without an external trigger signal. Unlike pyrotechnic devices that need to be replaced after triggering, it can resume normal operation as soon as the short circuit fault is cleared and the material is able to return to its superconducting state.

The new SCFL is designed for a nominal current of 560 A at 12,000 V, but can also allow currents of up to 2,700 A to pass briefly without triggering the device. This is an important pre-requisite for operation so that the coal mills can draw a high current on start-up without experiencing any problems.

The new current limiter is based on superconducting tapes made of YBCO (yttrium barium copper oxide) also known as coated conductors. At temperatures lower than -180°C the thin ceramic layer becomes superconducting and can conduct electricity approximately 10,000 times better than copper.

The current limiting components based on second-generation superconducting tapes were developed over the past two years as part of the Ensystrob project. The project partners are Nexans SuperConductors GmbH, the Karlsruhe Institute of Technology, the Cottbus and Dortmund Universities of Technology and the energy group Vattenfall. The German Federal Ministry of Economics and Technology provided the project with financial backing of about €1.3M.

At the annual press conference in London, Jean-Maxime Saugrain, corporate VP at Nexans highlighted the company's achievements of 2011. They included:

The award of an €87M contract by Energinet and Statnett to deliver the subsea power cable for Skagerrak 4, the fourth HVDC power interconnector between Denmark and Norway.

Creation of a JV with the Shandong Yanggu Cable Group in China to manufacture 110 kV and 220 kV power cables.

Plans to open a new HV cable plant in the US.

A €20M contract in Brazil to supply the conductors for the world's longest overhead power link.

Many major contracts for subsea umbilicals in the North Sea and Gulf of Mexico, a major development to support this business being the construction of a long-term storage Carousel in Mobile, Alabama.

Significant rail infrastructure contracts in France, Italy and Switzerland.

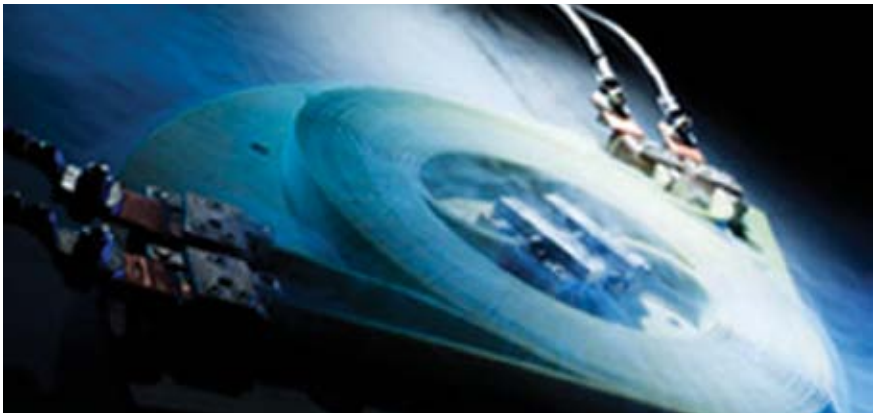
The establishment of a $6M JV with Alstom in Morocco for a plant to produce cables and electrical cabinets for high-speed trains and tramways.

Launch of the new Powermine range of cables for the mining industry.

Sponsorship of the Louvre Lens museum.

The signature of a sponsorship agreement with Electriciens sans Frontières.

Nexans employs 23,700 people and had sales in 2010 of more than €6 billion.



Superconducting fault current limiter (SFCL)

GBM Resources discovers large copper-gold prospect

Australian resources company GBM Resources Ltd reports surface sampling and mapping activity in the Mt Morgan project area has defined a large zone of anomalous copper and gold with coincident porphyry-style hydrothermal alteration. The Mount Morgan project is located 40 km south west of Rockhampton in Queensland, Australia in close proximity to the world class Mt Morgan copper-gold mine, which produced in excess of 8.0M oz of gold (Au) and 400,000t of copper (Cu) metal.

Rock-chip sampling across the prospect, referred as the Sandy Creek prospect, has returned 14 samples greater than 0.5% Cu with peak assays of 39% Cu, 8.5 g/t Au and 44ppm Ag. The central alteration zone is approximately 1,500m x 700m.

Following further detailed mapping and sampling the prospect will be ready for drill testing during the 2012 field season. It is envisaged the initial drill programme will comprise four to six inclined RC holes of maximum depth 200m. The drilling at Sandy Creek will form part of a regional prospect evaluation programme by GBM during 2012 in the Mt Morgan area.

Rio Tinto invests further $3.4 billion

Rio Tinto has committed a further $3.4 billion (Rio Tinto share $2.9 billion) to the major expansion of its Pilbara iron ore operations in Western Australia. The investment will extend the life of the Nammuldi iron ore mine, and with this funding, production capacity in the Pilbara is approved to reach 283 Mtpa.

The Nammuldi project will extend existing mining below the water table, increasing the mine's life by 14 years, at a production rate of approximately 16 Mtpa.

BHP intends increasing the iron ore operations in Western Australia by more than 50%, and production capacity of 283 Mtpa in the Pilbara will be reached in the second half of 2013. The Nammuldi expansion will deliver first ore in the third quarter of 2014, and there will be a transitional period until then in which ore will come from other mines to reach 283 Mtpa.

FLSmidth makes higher offer for Ludowici

FLSmidth has raised its takeover offer for Ludowici Ltd by 10% to A$11/share, which values the Australian company at A$388M. The new bid follows an announcement on 23 February by Weir Group plc that it was willing to match FLSmidth's original offer of A$10 for each Ludowici share.

FLSmidth's latest offer represents a price that is over three times the market valuation of Ludowici's equity on 18 January, and equates to an enterprise valuation that is almost 14 times the company's earnings before interest tax and depreciation.

The new offer price of A$11/share (less any dividend determined, declared or paid by Ludowici before the transaction is completed) will not proceed if Weir's application to the Australian takeovers panel results in a ruling against a revised offer.

Features include:
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An element of vanadium, named after the Germanic goddess of beauty and fertility

Exploration drilling: hunting cost efficiency

Mineral exploration is not for the risk averse. But limited frontier exploration for new mines over the last 20 years has stimulated a significant increase in exploration programmes focused on 'greenfields' projects, says drilling contractor Energold. In second quarter 2011 the company drilled a record 155,300m, up 80% from the equivalent period in 2010. Even so mining companies still need to secure the greatest possible amount of geometallurgical information from each exploration phase to justify its costs. Even at the drilling stage the risk factor remains high -- Rio Tinto states that just one in 350 of the projects it drills actually yields a mine, though some of the remainder may be developed by other companies using different economic criteria - so it remains essential fully to use the most appropriate and best drilling technology available. There's a wide choice of suppliers.

Three well-known companies now meet a large part of world demand for both diamond core and reverse circulation (RC) drilling equipment: Atlas Copco, Boart Longyear and Sandvik. Each has a spread of manufacturing facilities and worldwide distribution networks. The three firms offer generally similar ranges of core and RC drilling equipment and tools for surface and underground exploration. However, only Boart Longyear presently offers sonic drilling technology and none of the three manufactures directional core drilling systems.

More specialised suppliers operate in a number of major mining regions. Some focus on customisation of diamond core and/or RC drilling equipment for local clients and/or machines for use in remote, difficult terrain. Others produce bits, other tools, accessories and components for either international or local markets, in some circumstances working with the major manufacturers. A few firms work on specialised drilling techniques such as sonic and directional core drilling.

Drilling contractors form a third group of firms contributing to the supply of exploration drilling rigs by building equipment to meet their own needs - which they may also sell to third parties.

New tools for RC drilling

Each of the big three manufacturers has been working hard in recent years to capitalise on the widespread adoption of reverse circulation rather than diamond core drilling in order to reduce the cost of early phase deposit delineation drilling.

Bringing together specialist reverse circulation companies in Australia as well as the Hagby business in Sweden, Sandvik's Exploration team has developed a range of RC tools that includes hammers, rotary roller cone bits, dual wall drill pipes and face sample bits – the firm was the first to introduce a RC sampling system that featured the ability to capture the sample directly at the face of the bit, the sample no longer travelled on the outside of the hammer to enter through a cross-over sub.

At the time of writing the company is set to introduce the newest product for the world's RC drilling market - during March 2012 in Australia. This will be the first of a new RE range of hammers designed to deliver more power and higher efficiency than Sandvik's existing range. Manufactured in Perth, Western Australia, the new RE120 is purpose-designed for exploration drilling applications and replaces the previous RE040, RE545 and RE052 models. It will be followed by the RE110 and the RE130, which will respectively supersede the RE004, RE540 and RE542/3 hammers and the RE054, RE547 and RE140.

The RE120 hammers will be available with a number of different piston designs, including a grade control (GC) and an exploration (EX) option. Sandvik says the GC option is optimised for grade control or deep, dry exploration hole applications where both high efficiency and high power are required, whereas the EX version is intended to provide higher performance when drilling holes in ground where back pressures are high. Consequently, the EX hammer will continue to start when drilling underwater against a significantly higher water head than existing hammers.

The company says the new range will provide a greater than 20% increase in power at a given hammer size, a higher specific power (kW/kg), typically a 15% gain in efficiency with the GC variant, more efficient operation at higher pressures, and efficient operation across the 10 – 50 bar pressure range. In addition, the top-loading sample tubes are easier and quicker to change while the induction-hardened single piece tubes also offer up to three times more tube life than does the previous generation. Sandvik has also eliminated the need for "make-up" gap and associated components; introduced a more robust drive sub design that provides more effective lubrication; used 12 spline bits that are more resistant to bit shank failures; and reduced bit mass so stress is lower and manual handling easier.

Sandvik's product line manager for RC tools, Raymond Hill says the new RE hammers can deliver significantly increased productivity and so higher profitability per rig, faster contract completion and quicker progress to deposit characterisation. The increased efficiency reduces the air flow needed for a given power output which may mean that no auxiliary compressor is required; it lowers fuel consumption per metre drilled; and it may enable higher penetration rates with limited air packages, Hill says. He also argues that the higher specific power available means that, for a given power class, the RE hammer can be smaller and lighter by 10kg - so more streamlined drill string configurations can be used and manual handling is easier and safer. Hill said the better back pressure resistance of the EX option enables drillers to reach target depth more often in wet holes, with potentially less time spent flushing holes and/or lifting water after rod additions, and it also delivers higher penetration rates when drilling at depth.

Combining the diamond expertise of Boart and Longyear's

The RE120 hammer is Sandvik's latest product for the RC drilling market and is the first of three RE series models the company plans to offer.

core drilling pedigree Boart Longyear is more reliant on the exploration drilling market than its two global competitors, particularly if the Boart Longyear Drilling Services contracting business is taken into account.

During 2011, Boart Longyer added the LC6 drill (initially designated the RC6) as the smallest in the firm's line of reverse circulation rigs, to join the LC36 (previously KWL700) and LX 16 RC or diamond core drills. The new model is a lightweight and compact RC drill that also offers versatile small diameter coring, down-the-hole-hammer (DTH) and rotary drilling capabilities. Weighing only 8,000 kg (17,000 lb), the rig delivers an impressive 5.5 tons of pullback. It features a rotary head with up to 6,540 Nm of torque, and a Deutz air-cooled diesel engine providing 72kW (96 hp) delivering a 4m feed-stroke. The LC6 is engineered for fast set-up on site, superior mobility and powerful performance, delivering reliability and productivity on even the toughest terrain, says Boart Longyear.

With robust steel crawlers and an optional radio remote control for driving, the LC6 can be driven on slopes up to 30° while the operator maintains a safe distance from the rig when unloading or driving on uneven terrain. The rig also has an optional trailer-mounted cyclone and splitter for RC drilling that can be towed behind the drill rig for flexibility and ease of mobility on site.

According to Justin Warren, Boart Longyear global product manager for capital equipment: "The LC6 has a lot to offer to drillers that require a versatile rig, and contractors will be able to increase productivity and save a lot of time with this powerful drill".

Founded in Perth, Western Australia, in 1978, Metzke Engineering is an interesting independent DTH and RC drilling specialist company. The firm claims a pioneering role in reverse circulation technology, supplying mining and drilling

Boart Longyear says the LC6 drill is perfect for small start-up mining ventures, or for use on drilling sites where space is limited and it would not be practical to deploy a large reverse circulation drill.

companies all over the world with innovative solutions and setting the standard in the manufacture of drilling equipment. The product range includes Metpro drill rods, subs and swivels; sampling systems, mountings and trailers; cyclones, dust collectors and custom equipment. Recent introductions include a blow down valve for multi-purpose rigs and a break-out tool rated at 10,000 Nm.

Metzke also played a significant part in the design of Atlas Copco's Explorac 220RC, regarded as a 'next generation' RC rig when it was launched in March 2005. The first customer was contracting group SBD who subsequently deployed four Exploracs in Western Australia and three in West Africa.

Safety was a prominent objective in the design of Atlas Copco's Explorac 220RC which features a remote driller's console operable at a distance of up to 15m; 82 dba at 7m noise suppression; high-pressure plumbing mounted under deck; KL rod handler and SDS Ausminco fire suppression system.

Lighter, faster diamond core drilling

The "big three" may be the most widespread trees in the exploration equipment orchard but there are other more localised manufacturers, some supplying specialities others wide ranges.

The Santiago, Chile-based company Ingetrol has been manufacturing drilling rigs for the international mining industry for the past 22 years, maintaining a philosophy of modularity, versatility and simplicity. The firm's lightweight, highly portable drill models have been a particular success in the world market.

Responding to the increasing demand for deeper holes, Ingetrol is boosting the capacities of several of its models in 2012, including the Explorer Plus MD4, Explorer 1500 and Explorer 2500, as well as introducing the Explorer 1200. Furthermore it is expanding and improving its smaller, more portable rigs.

The internationally successful Explorer Plus MD4 portable rig will enjoy double its previous hydraulic capacity while maintaining its maximum module weights of 250 kg. Featuring a belt-driven H Chuck with synchronisation, the Explorer Plus MD4 will now be able to deliver depths of up to 900m in N diameter and 600m in H Ø wireline (W/L). The first of these improved rigs was delivered to Mexico in February.

The crawler or truck-mountable Explorer 1500 is also now more powerful with a 236 hp turbo diesel engine and a chain-driven P chuck, reaching depths of up to 1,100m in Ø N W/L, 750m in Ø H W/L and 500m in Ø P W/L. Similarly uprated, the Explorer 2500 will now feature a 275 hp turbo diesel motor and a gear-driven P Chuck, to drill up to 2,300 m in Ø N W/L, 1,500 m in Ø H W/L and 1,050 m in Ø P W/L. The Explorer 2500 is a multi-purpose rig suitable for reverse circulation as well as diamond core drilling.

For those who don't require man portability or such deep holes, Ingetrol is offering the new Explorer 1200D, featuring a chain-driven P Chuck and a 160 hp turbo diesel motor, and reaching depths of up to 700m in Ø N W/L, 500m in Ø H W/L and 300m in Ø P W/L.

To better serve portable drilling customers, Ingetrol launched a new ultra light version of the Sandy Jr. 25G rig at PDAC in March. With depth capability of up to 100m in Ø TT-46, this rig can be disassembled into modules with maximum weights of only 80 kg.

Finally, Ingetrol is introducing its new Mini Troner UL, a DTH drilling rig capable of reaching 60m with a 2½" diameter string. The Mini Troner UL weighs only 180 kg and can be disassembled into three modules for easy transport into any remote area. The simplicity of its design also allows for easy operation and maintenance, lowering costs to a minimum.

[Meanwhile, Sandvik's DE710 and DE740 heavy duty diamond coring drills, which can be truck mounted or fitted on a crawler unit, are also built in Chile.]

One of the most widely known "independents" is Fordia based at Dollard-des-Ormeaux near Montreal, Quebec, Canada. The company has built up an extensive product offering over more than 30 years including a range of diamond core bits, casing shoes, reaming shells, couplings, rod lifters, geotechnical and sampling products, and wireline drills. Having started supplying the Canadian market in 1993 Fordia initiated international operations with Fordia SA Chile and now has branches in Peru, Australia, China and Ghana as well.

In February 2011 Fordia launched the Eider series of diamond core drilling rigs capable of drilling to depths of 200m, 450m and 1,100m in standard N wireline and able to switch between surface and underground using a conversion kit. The drills can be supplied with either robust steel or lightweight

The latest version of the Ingetrol 1500D has a 236 hp engine and chain-driven P chuck.

At PDAC 2012 Ingetrol launched a new even lighter version of the Sandy Jr rig seen here working in Bolivia.

aluminium structures. The Eider products are engineered and fabricated by Versadrill Canada. Fordia also offers the Golden Bear rig for surface drilling to 1,400m in N wireline.

In addition to the LC6 exploration rig described above and the Lightning Rod range and RST thread for mining (Mining World, September 2011, pp 31-32), Boart Longyear last year introduced the Ultramatrix (UMX) diamond coring bit series (see Mining World, June 2011, pp 22-23) at PDAC 2011 in March. Characterised as innovative bits that make diamond coring more efficient than ever before, the UMX series has this year won an international award.

Boart Longyear says UMX bits are engineered to drill faster, last longer and outperform existing bit technology in a wide range of drilling conditions and ground formations. They combine four of the company's proprietary technologies: patent-pending Ultramatrix crown metallurgy using larger impregnated synthetic diamonds than before; the Razorcut face design with protrusions on the surface that contain diamonds for immediate rock cutting; and the patented Stage waterway technology with the patented Twin-Taper design that dramatically improves surface flushing, forcing debris through the windows while keeping the bit face clear and reinforcing the inner-diameter. The result is a choice of bits with three crown height options up to 25mm, four waterway options and five diameters. And these are now available in four grades to cover the rock hardness range – the original SSUMX, the 07UMX for highly variable ground, the 09UMX for extreme penetration and the new free cutting 10UMX for the very hardest rock.

Together with the XP line of surface-set bits introduced in 2010, the UMX series is paving the way for the future of diamond coring technology, the company says. Other new Boart Longyear core drilling tools included Roller Latch technology, rod lifter and split tube loader.

A year previously Atlas Copco had introduced its Excore diamond bit, which also utilised new matrix metallurgy and optimised crown design, to cover a wider application range than its predecessors and to deliver greater penetration rates plus extended service life. The bit is matched by complementary Excore tools. Atlas Copco has created a large pool of core drilling tool expertise through merging Craelius, JKS Boyles and Hobit.

Sonic drilling

Sonic drilling, as soil penetration by rotary-vibratory

The DE710 is one of the two DE700 series heavy duty diamond coring drills Sandvik manufactures in Santiago, Chile.

One of four models in Sandvik's DE100 series, the DE130 can be used underground or for surface exploration drilling. The firm says the highly modular DE100 rigs are the most mass-customisable compact core drills on the market.

Atlas Copco Geotechnical Drilling & Exploration offers Christensen rigs such as the CS14 seen here (left and centre) and also the Diamec range for surface and underground core drilling (right).

techniques is usually called, has been finding wider use in the mining industry since early this century. First proven by Hawker Siddeley with prototypes during construction of the Alaska oil pipeline, the technique gained widespread acceptance for environmental and geotechnical projects in the 1980s and 1990s on account of its high penetration rates and convenient sampling systems.

Later the mining industry realised that sonic drilling technology can take quality continuous core samples for mineral exploration in soft and unconsolidated soils and sediments and also in lateritic rock formations with delicate mineralised seams, providing geological information where conventional drills cannot. What's more sample recovery rates commonly approach the 100% mark. Sonic drills are also good for pre-collaring work in poorly consolidated overburden bedrock, casing the holes ready for diamond drilling in underlying hard rock formations. Simultaneously they can supply accurate and comprehensive hydrogeological information for mine permitting.

The technology has proved well-suited for sampling heap-leach formations, bauxite, mineralised sands, manganese, uranium and nickel laterites. It can also be used for sampling mine wastes, such as tailings, coal spoils, and disseminated gold. Other uses are site characterisation of contaminated mining areas using monitor well installation, continuous soil samples and discrete groundwater samples to define contamination and assist clean-up.

There are now a number of companies designing and manufacturing sonic drilling equipment and working with distributors internationally.

The Sonic Drill group, based in British Columbia, started with contract drilling. It was formed by Ray Roussy, generally regarded as a key figure in the introduction of this technology having worked for Hawker Siddeley in the early days. A first substantial contract came from the Canadian federal government. "After building my first sonic drill rig (in 1986), word spread quickly around the world about its unique capabilities and I was able to patent my ideas and develop my companies with no public funds or grants", Roussy recalls. Today, Sonic Drilling Ltd, the manufacturing unit Sonic Drill Systems and the US sales arm Sonic Drill Corp (based in Washington) are privately-held.

One of the key differentiating features of TSi 150 series drills is the exclusive TSi 150 sonic oscillator that efficiently utilises 150 hp (111.85 kW) to generate 50,000 lbs. (22,680 kg) of oscillating force and drill to a rated drilling depth of 700 feet (213.36m) with 6 inch (152.4 mm) casing.

Sonic Drill Systems says their rigs bore three to five times faster than conventional machines (depending on soil conditions) without using any drilling mud and provide continuous core samples to depths of more than 100m. Roussy expects to see more companies use sonic technology – either by contracting a drill rig or by purchasing a drill rig. The firm is exporting a high proportion of the machines it builds and expects external sales to increase. The greater part of applications is in the fields of geothermal drilling, environmental reclamation, civil construction and seismic exploration in Canada's Arctic for oil/gas but rigs have also been used for mineral exploration in Guyana, Peru, Chile and Russia.

Boart Longyear has been working on sonic drilling since early market acceptance of the method 15 years ago. The firm's contract drilling operation has built up an international fleet of over 120 sonic rigs backed by a dedicated R&D department, global manufacturing facilities and a Sonic University training programme. Today the Trusonic system combines sonic rigs, trained drillers and in-house tooling for sampling to depths of more than 182m. The LS600 rig is twice as fast as conventional overburden sampling methods, drills deeper, produces more accurate samples and serves more markets than any other sonic rig to date, the firm claims. It utilises a fingerboard for rod storage, a patented spring-loaded clam shell for safe rod management, a 90° head tilt for easy tripping and a full support vehicle equipped with a gantry crane for presenting rods to the head. With less than 1% hole deviation sampling is very accurate.

The Royal Eijkelkamp Earth Sampling Group, and later its daughter company SonicSampDrill, has produced sonic equipment since the early 1990s. The last 10 years were used for focusing on the reliability of the products and tooling which resulted in reliable equipment that provides high quality samples and good recovery in almost all conditions.

Every day equipment of SonicSampDrill is used for mineral exploration projects like grade control drilling and re-examining of tailings. The patented AquaLock system is a suitable sampler for alluvial soils, both saturated and unsaturated; it does not need a casing, which reduces drilling time.

For overburden formations SonicSampDrill offers the more robust single wall core barrel system with a casing to prevent the borehole from collapsing when the core barrel is emptied.

SonicSampDrill developed a dual wall core barrel system for harder formations. This makes it possible to use an additive during the sampling process which does not make contact with the sample, meaning harder and consolidated material can be sampled without washing away the fines. The dual wall core barrel is perfect for moraines, formations with boulders and weathered, softer rock.

Compared to RC, sonic provides samples that give more accurate information which results in a more detailed mining plan and mine value. Products of SonicSampDrill are also often used in rehabilitation programmes for installation of piezometers, water wells and environmental sampling.

Working under licence from SonicSampDrill in North America is another relatively new sonic drilling equipment company, Terra Sonic International (TSi) based in Marietta, Ohio. Staffed by a team of designers, manufacturing, and service personnel who have been in the contract drilling and sonic rig design and manufacturing business for over 20 years the company's mission is to be the preferred provider of equipment utilising resonant sonic energy for drilling, driving, excavating and other specialised applications. Current product offerings include: SonicSampDrill compact sonic, compact RotoSonic and mid-sonic equipment, and Terra Sonic International mid and large sonic rigs.

TSi rigs are matched with a complete set of robust proprietary

TSi drilling tools and include many standard safety and operational features to enhance driller performance. TSi 150 series sonic drills, introduced in 2011, are available skid mounted, in crawler configurations and mounted on a variety of truck carriers. TSi president Scott Alexander noted: "the Terra Sonic 150 is a large sonic workhorse that is ideally suited to many mining and geotechnical applications."

Smart drilling

The ability to steer a deviating core drill to reach its intended target can save significant amounts of wasted core, time and money. South African commentator Jimmy Swira has argued that directional core drilling also reduces adverse environmental impact and should therefore be used as widely as possible even though it is an expensive technique. Another time-saving system is the use of mobile online sample analysis in areas remote from laboratory facilities. Both technologies have been developed in Nordic countries.

In Norway Viktor Tokle formed Devico in 1988 to commercialise a core barrel steering system he had patented at the SINTEF research organisation in Trondheim. Commercialisation proved a lengthy process but in 2000 Devico launched the DeviDrill wireline system and a suite of borehole tools. The firm also started training qualified field engineers to support the technology, since then directional core drilling has gained increasing acceptance. Key customers were Areva Resources in Canada, who reported 45 – 85% time and cost savings, Agnico Eagle's Kittila project in Finland and Lundin Mining at Neves Corvo in Portugal.

In September 2011 the Canadian contractor Tech Directional Services Inc was able to deviate with a DeviDrill achieving full control over borehole direction to a depth of nearly 1,900m at a project in Guyana. Tech was formed in 2007 in Canada and reckons already to be the world's major directional core drilling contractor.

In Finland and Sweden geometallurgical studies by IMA Engineering and others have focused on reducing mine operating costs and waste material generation before blasting, including improving the cost efficiency of exploration drilling and reducing the adverse effects of exploration cycle times on mining projects. One practical outcome was an XRF elemental analysis and digital imaging system coupled with a Remolog on-line results reporting system for use by the Mine On-Line Service company (MOLS). A first van-mounted Scanmobile equipped with geochemical laboratory and on-line reporting system was put to work in 2009 and, working in northern Sweden and Finland, proved able to analyse core samples ranging from 500 to 10,000m and to service up to 20 core drills. Major applications were grade control and analysing core at national Geological Survey stores. MOLS now also offers analysis of till samples, core logging, 3-D blastfield modelling and heap leaching optimisation.

Drilling contractors ride the boom

For the most part of the present century, mineral exploration drilling contractors have enjoyed boom conditions in many parts of the world. This has favoured companies working on both regional and international scale, not least those which use their own proprietary equipment. Good examples of the former are Nitro Drilling in Australia and Oy Kati in Finland, while Foraco SA and Energold Drilling Corp are rapidly expanded international contractors. However, Boart Longyear remains the largest global drilling services firm and also sells some of its purpose-built equipment to third parties.

From one rig in 2002, Nitro Drilling has expanded to currently employ more than 200 people with 22 state-of-the-art multi-purpose exploration rigs. The head office is located on Queensland's Sunshine Coast and the company operates in the coal-rich Bowen Basin, with a six acre service and maintenance yard in Dysart supporting major clients like BHP Billiton Mitsubishi Alliance, Anglo American, Rio Tinto and Peabody Energy.

Exploration activity in the Nordic countries may not equal the levels in Australia and Canada but it has grown sufficiently for Oy Kati to expand its diamond drilling fleet from two rigs in 1995 to 14 including one helicopter portable unit. Since Kati's work is mainly within the Arctic Circle the company designs and builds its own rigs to cope with conditions there. These are mainly self-propelled on rubber tracks and equipped with Sandvik DE series drills. The company reports a high level of exploration in the Nordic region, especially in Finland itself where about half Kati's capacity is presently working at Anglo American's Sodankylä nickel project.

The French firm Foraco International SA, based in Marseille, has grown both organically and through acquisition and is celebrating its 50th anniversary in 2012. The company expanded drilling operations into North America in 2006 by establishing an office in North Bay, Ontario, then grew further through the acquisition of Connors Drilling in 2007 and Northwest Sequoia Drilling in 2008. Foraco listed on the

Tech Directional's deep hole Devico drill at work in Guyana. The contractor also uses the SPT north seeking gyro from Sweden. (Courtesy Tech Directional)

Sandvik DE810 (left) and DE880, working for Australian contractor Nitro Drilling. Sandvik says the DE800 line is the market leader for true multi-purpose RC, rotary air or mud and diamond coring drill rigs for surface exploration. (Courtesy Sandvik Mining and Construction)

Oy Kati's largest rig working at Agnico Eagle's Kittilä gold mine in Finland. (Courtesy Oy Kati)

TSX in 2007, and has since acquired drilling firms in Canada, Australia and Chile, and also bought control of a Russian company. The company operates in 22 countries and has over 180 rigs. Business is currently split about 70:30 between major companies and juniors.

Based in Vancouver, Canada, Energold Drilling Corp. has benefitted particularly from increased greenfield "frontier drilling" by major mining companies. The firm has grown by acquisitions such as Dando Drilling International and has achieved compounded annual revenue growth of more than 25% over the past six years. Energold is now operating 234 rigs in over 20 countries, with a significant number of them using the firm's proprietary highly portable EGD rig platforms. These have depth capabilities of over 850m with ¼" more in core diameter using the thin wall rod system.

The Boart Longyear Drilling Services (BLDS) division dates from 1928 and drills on six continents in over 40 countries. It undertakes surface and underground drilling with the world's largest mineral exploration fleet – including over 800 diamond core, RC and sonic drills distributed around the world. Expertise covers wedge drilling, pre-collar work and directional drilling, and BLDS can provide other surface drilling services on mine sites such as water wells, dewatering, geotechnical investigation and environmental sampling.

Much of the equipment is purpose-built by Boart Longyear, for instance a mobile drill rig (MDR) for underground coring based on proven underground running gear. In 2009, following success with several of these in Australia, the firm deployed MDR rigs in the North American market. Boart Longyear says advantages include: fast set-up and exceptional stability in the toughest conditions, either diesel or electric powered drilling, both wireline and conventional drilling with less manual handling and up to 7 tonnes pull-back capacity, and easy maintenance with the LM self-diagnosing CANbus control system.

Boart Longyear's new Adelaide test rig is installed in a pit.

Unique test rig for mobile drilling platforms

With a history dating back to 1881 Froude Hofmann designs, manufactures and supplies an extensive range of engine testing systems in the automotive, aerospace, marine and industrial markets. Now part of the privately owned HWH Investments Group, the company has manufacturing sites in the UK, Germany and North America, supported by sales and service centres in Australia, Brazil, China, France, India, South Korea, Spain and Czech Republic. Working with the wholly-owned US subsidiary Go Power Systems, the Australian team in Rowville, Victoria has developed a unique drilling test rig for Boart Longyear. Designed to test motors prior to final assembly as well as on refurbished self-propelled, stationary and truck mounted drilling rigs, the new test system is currently operational from Boart Longyear's Adelaide facility in Australia.

Froude Hofmann explains that two brakes form the basis of the torque measuring system. These are linked via a right angle drive 1:1 ratio gearbox and innovative alignment device to the drill rod of the drilling rig. The whole system is installed in a pit so the drilling platform truck can be positioned directly over the test rig, and the drilling rod connected vertically via a coupling and cardan drive shaft. The rig was conceptualised at the Australian office, designed and built at the Go Power facilities in Detroit, and was then shipped to Adelaide for installation and commissioning.

The system allows Boart Longyear to carefully load test customer rigs during the refurbishment process, greatly reducing the risk of unwanted downtime when the rigs return to service. With the new Froude Hofmann dynamometer system, sub-assemblies can be full load tested prior to final assembly which improves the build process. Load testing can be carried out on the complete rig and the system records information such as bearing temperature, oil pressures and load charts in an automated and repeatable manner.

In addition, Boart Longyear is using the system to thoroughly test prototype new rig designs before sending them to field test – allowing a more comprehensive evaluation in the controlled engineering environment. "This capability is part of our accelerated new product development process – accelerating time to market for our next generation drilling systems," said Joe Moody, Boart Longyear's Vice President, global engineering.

Dragline developments

Tradelink Publications' Managing Director Trevor Barratt looks at the latest developments in draglines focusing on the coal industry.

I do not wish to bore our respected readers with much documented history of the dragline only to say John W Page invented the dragline in 1904. A walking mechanism was developed a few years later, allowing draglines mobility free of rails and rollers, and was adopted by the Chicago-based Page Engineering Co in the 1920s. The company introduced its popular 600-series draglines in the mid-1930s, using an improved walking technology that was to be largely unchanged for the next 50 years, even after the 700-series machines debuted in 1954. Page also produced its own diesel engines specifically for dragline applications. John Page invented the arched dragline bucket, a design still commonly used today by draglines from many other manufacturers. In the 1960s, Page Engineering pioneered an archless bucket design. Walking draglines and dragline buckets were essentially the Page company's only products until its acquisition in 1988 by the Harnischfeger Co, makers of today's P&H line of shovels and draglines and part of Joy Global Inc.

As a matter of fact, draglines have remained relatively unchanged in design and control systems for almost 100 years. I will also relate the equipment mentioned to today's owners following the various changes of ownership that have occurred of dragline manufactures and OEM's over the past years. The main advances in dragline systems and methodologies have occurred mainly with the emphasis being on automation, simulation software and training. Rope design continues to develop as do tougher wear parts, cab design, filtration, ventilation and last but not least the bragging rights of we have the biggest machine and lowest operational costs. Overburden excavation is an integral component of the surface mine production chain. In large mines, the walking dragline is a dominant strip mining machine. Dragline performance depends on the operating speed, the bucket payload, and the machine availability, which could be negatively impacted by the actions taken to increase the machine productivity.

Universal-dig-dump UDD represented the first fundamental change to draglines for almost a century, since the invention of the miracle hitch. Instead of using two ropes (the hoist rope and the drag rope) to manipulate the bucket, a UDD machine uses three ropes, two hoists and one drag. This allows the dragline operator to have much greater selectivity in when to pick up the bucket, and in how the bucket may be dumped. UDD machines generally have higher productivity than a standard dragline, but often have greater mechanical issues. Within the mining industry, there is still much debate as to whether UDD improvements justify their costs.

Power consumption is a major factor for operations that have grid access, and more efficient AC drives have been introduced with Siemens and ABB teaming up with major players. During 2007, Siemens / Cat has introduced a patented, much higher efficient AC gearless technology to a dragline in China. For remote locations ie Drummond's Pribbenow and El Descanso mines without grid access, the large draglines can be operated from multiple diesel generators. However, this is not very efficient due to gigantic cycling load (motoring 26 MW, regeneration 15 MW) of a typical big dragline. Up to the late 1970s draglines where traditionally powered by DC motors. With the trend away from DC motors and generators in all areas of the mining industry and the high performance AC drives, based on increased safety, increased productivity, better efficiency and less maintenance costs are being offered. Cat and Siemens have experience supplying AC systems in the mining industry, including draglines, for more than 30 years.

Major players in the market.

Milwaukee based Cat and P&H still dominate a huge percentage of the market however successful development of a new product range by IZ-Karteks part of the OMZ group should strengthen its position in the market among the top three largest international manufacturers. All three companies are making concentrated efforts to win orders in India and the huge potential within the China market since the installation of the first AC powered walking dragline at Hei Dai Gou mine part of the giant Shenua group of a Cat 8750. The integration into one of country's largest surface coal mining operations represented a major step forward in surface mining in China. Hei Dai Gou open pit mine has applied a number of integrated mining technologies in the overburden removal process, for the upper layer averaging 49m (160 feet) thick; it uses four bucket wheel excavators with conveyors running around the pit to the dump areas. For the middle rock layer averaging 56m (184 feet), it uses electric mining shovels loading into mining trucks and the Cat 8750 walking dragline in a cast-blast/direct spoil application. For the bottom coal layer averaging 28.8m (95 feet), it again uses electric mining shovels loading into mining trucks which discharge into semi-mobile crushing stations and belt conveyors. Cat's 8750 dragline has a potential bucket volume of 129 m^3 and boom length of 132.5m. Siemens and Cat have jointly developed a patented gearless AC dragline drive system, which has been successfully operating in Hei Dai Gou mine, China, since October 2007 on a Cat 8750 dragline.

The Lake Lindsay dragline in Australia a 5,600t electric walking dragline was the first fully AC conventional drive dragline built in Australia and the

Cat 8750 dragline (courtesy of Caterpillar)

Specifications	
Bucket capabilities	76 - 129m³ / 100 - 169 yd³
Boom lengths	109.7 - 132.5m / 360 - 435 ft
Rated suspended load	226 800 - 383 286 kg / 500,000 - 845,000 lb
Approximate working weight	5.8 - 7.5M kg / 12.9 - 16.7M lb

second in the world. The dragline's bucket has the capacity to remove 168t of overburden from the mine and its combined drive systems for the hoist, drag, swing and walking motions have more than 37,500 applied horsepower. The dragline walks itself around the pit using two shoes each more than 21m long and 4m wide, and can dig to a depth of more than 50m as well as dumping spoil more than 50m high. The third Cat 8750 dragline with Siemens AC drives has been operating successfully at TransAlta mine in Canada since mid 2010. Two more Cat 8200 AC draglines are sold to Reliance, India and are scheduled to commence operation towards the end of 2013.

Cat dragline mechanical/structural information
Cat draglines brief history

From the largest dragline ever built to the world's first AC and direct-drive draglines, Bucyrus led the industry with ground-breaking dragline innovations. More than 1,100 of these draglines have been produced and delivered to every major continent over the past century–more than any other mining dragline manufacturer. Today, Caterpillar continues to lead the way in the evolution of these machines and maintains the expertise to keep them operating reliably.

The grid radial base design

The grid radial base design was adopted from the Marion Power Shovel Co after its acquisition by Bucyrus in 1997. The efficient grid design is used in the centre section. The radial design is used on the outer sections. This hybrid architecture offers the advantages of both base designs:

- More uniform compartment size improves weld accessibility.
- Uniform bottom plate support and the radial compartments outside of the rack pad provide better load distribution for higher walking and working loads.
- Combined with the through-thickness rack pad, the grid radial base offers the best support, lowest production costs and longest life.

Third rail system

The third rail system has a long history of superior reliability. The elimination of flanged rollers reduces spalling of the rails and rollers and eliminates chipping of the roller flange to rail interface.

The third rail system:

- Has more rollers to improve load distribution, effectively reducing stress on the rollers, rails, and t-sections in the base and revolving frame.
- Utilises upper and lower rails that are forged from a proprietary material for longer life.
- Provides an easy-to-replace sacrificial third rail to reduce replacement costs and downtime.

Tri-structure

The tri-structure is a rigid, triangular structure formed by combining the A-frame and the mast with mast and A-frame links. The tri-structure system offers the following benefits:

- The height is designed for optimised load flow through front end structures (boom, tri-structure and backlegs).
- Reduces boom compression and weight.
- Reduces peak roller circle loading.
- Permits greater payload.
- Designed utilising a simplified wide flange beam construction.

Cat dragline AC electric information

- AC conventional draglines are designed with line friendly AFE technology to provide very low THD (less than 2.5%) to naturally cancel harmonics without line filters. This design uses the same AC motors in all motions. The system design does not employ high maintenance fuses.
- AC gearless draglines include a patented technology that provides the benefits of greater efficiency and reduced maintenance costs, as the design eliminates all the gearboxes in hoist and drag motions. This is the biggest electrical innovation on draglines in several generations.
- AC helper drive retrofit solutions have been installed in an Australian mine and have been in operation from mid 2009. In this design, the AC motors operate together with originally installed DC motors to provide increased payload and reduced cycle times.
- Liquid cooled IGBT AFE / inverter NEMA 13 (IP54) cabinets are designed with higher safety ratings through the use of earth switch protections and bolted doors.
- The PLC system with profibus remote I/O nodes minimises wiring required for peripheral devices.
- Value added software solutions include a remote access tool called access direct, a process optimisation tool called MIDAS, and enhanced diagnostics.

P&H

P&H Mining's latest developments are its new 9000 C-series which the company claims has an industry-leading operating radius and a new four-chord boom design. The new ultra-class P&H 9020C features advanced solutions to the most demanding challenges facing mining operators today. From tub to boom point, the new systems add to dragline productivity. Some of the benefits are listed on the next page.

The P&H gradial tub

- A greater strength-to-weight ratio handles multi-directional loads, allowing increased reach and load capacity.
- A gradial design provides multiple load paths for ground induced forces, eliminating weak points and extending the life of the tub.
- An innovative, patented verti-shield welding process joins all intersecting plates with one continuous weld, resulting in minimal distortion and residual stresses.
- A triangular pattern provides large spaces for maintenance and inspection.

Large diameter roller circle and raised roller path

- Large diameter roller circle provides low loading in the rail pad support structure and increases reliability of tub and deck structures.
- Specially processed forged steel for longer roller and rail life.
- A raised roller path provides a larger space for inspection and maintenance of components.
- Internal gear design of swing rack provides better load sharing between teeth.
- Large diameter rack reduces gear and pinion loads.

Boom and A-Frame

- Wide flange chords allow for full penetration weld joints and ease of inspection from boom walkways.
- Four chord design provides more stability.
- A patented design with flatter bottom of boom improves visibility of boom point sheaves and balances axial working loads.
- Saddle mounted boom point sheaves allows 16.5° of swivel to follow the pendulum lag of the hoist rope, increasing allowable swing speed.
- The A-frame is optimised to reduce load forces and provide maximum rated suspended load.

Electrical system at a glance

- The Centurion control system utilises standard industry protocols and provides a platform that is scalable for future advancements.
- Intelligent sensors and I/O devices to monitor and control the dragline enable machine health reporting and performance enhancement systems.
- Advanced communication and monitoring links to mine management and maintenance crews reduce downtime.
- A Centurion-based graphical user interface (GUI) in the operator cab and machinery house provides continuous feedback on all operating systems, empowering walking dragline operators to get peak performance from their machines.
- The Centurion system utilises finger-safe 24VCD for maximised safety.
- Distributed I/O drops and fibre-optic cable linking drives, in addition to a supervisory controller, reduced wiring, resulting in reduced potential points of failure and simplified troubleshooting.

OOO IZ-Kartex

Part of the OMZ Group,OOO IZ-Kartex specialises in the engineering, production, sale and service of electric mining shovels from its Uralmash plant. OOO IZ-Kartex is the largest manufacturer and supplier of electric mining shovels in Russia and the CIS. Since 1957, OOO IZ-Kartex has manufactured and delivered over 2,700 electric mining shovels with a dipper capacity of more than 8m^3, 1200 of which are now in operation.

During 2010 the OMZ Group, agreed to supply a ESH 11.75 walking dragline for OAO Krasnoselskstroyjmaterialy (Belarus). The contract was signed as per tender results. Experts of Krasnoselskstroymaterialy studied the ESH 11.75 in operation at Stepnoy pit in Khakassia Republic and positively evaluated the machine's capabilities. The ESH 11.75 dragline (11m^3 bucket capacity and 75m boom length) will be used for overburden operations at two new pits of Krasnoselskstroymaterialy. New technical solutions developed by the mining equipment division included equipping the dragline with digital control and a centralised automatic lubrication system using Lincoln components. The operation experience of previous machines was taken into account for this machine, and mainly, its superstructure was reinforced, changes were introduced into the basic mechanisms, such as hoisting and drag winches, swing gear and walking mechanism, filter and ventilation plant shelter was developed. These improvements are expected to increase the service life of the equipment, reduce time and maintenance costs and increase efficiency. According to the customer's request, changes were introduced into cabin design, which should ease the work of the crew.

Simulation software and training

A dragline is a significant production asset and it makes poor economic sense to use it as a training tool, as is current practice by some producers. Simulators have been proved as the most efficient tool offering considerable advantages for training new and experienced operators in practical skills. The advantages include productivity gains, a safe learning environment, and consistency of standards. As we enter a virtual reality world, simulation software is becoming big business. According to Anglo Coal Australia (ACA), which partly funded development of the first dragline simulator

P&H 9000C series.

in 2005 the shortage of skilled dragline operators is acute in Queensland's Bowen basin, which has the largest operating dragline fleet of any single coal producing region in the world. ACA runs a fleet of seven draglines in central Queensland, including two units at the Callide mine south-west of Gladstone, where the first ever dragline simulator was used to train new operators, test prospective operators and in the coaching of more experienced drivers.

The primary overburden removal tool at many of central Queensland's 40 or so large open pit mines is draglines which shift more than a billion cubic metres of waste material in the region every year.

Simulator training is now in use worldwide. Since draglines are typically large, complicated and very expensive, training new operators can be a tricky process. In the same way that flight simulators have developed to train pilots, mining simulator software has been developed to assist new operators in learning how to control the machines. Skilled, competent operators are vital not only to the efficient and productive use of the machines that can cost in the region of $100M, but also in minimising equipment and component damage, unscheduled downtime, and safety risks. Draglines are probably one of the most complex machines to simulate as modelling the actual digging process can be very challenging. Crucial to effective dragline simulation is the accurate physical modelling of the complex interactions between cables, couplings and bucket structures, together with the bucket interaction with the terrain, to provide realistic behavioural response of the dragline to operator inputs. Simulated bucket swing behaviour under various loads and cable lengths has to be close to perfect. There are a lot of companies offering dragline courses working with scaled models as well as practical on site training.

If simulator training looked like a good idea four years ago, it has become a real fixture in the mining industry today. Australian based Immersive Technologies has recorded phenomenal growth worldwide with the latest simulator package the Pro3 that was showcased at AIMEX (Sydney) last year. Underscoring the growth in market uptake of the world's most advanced mining equipment training simulators; Immersive sold 55 base units in 2011, most of them new generation Pro3 simulators. The company claims it is the only mining simulator supplier with technical data exchange agreements with the major industry OEMS, including Caterpillar, Komatsu, Liebherr and P&H (Joy), and its trainer advantage program for simulator has now reached 1000 global certifications.

Another Australian company MineWare, a provider of dragline monitoring solutions, last year attracted two prominent industry leaders to its board of directors, including the widely recognised founding father of dragline monitoring, Geoff Baldwin.

"Through his company Tritronics, Geoff was the original architect of some of the first dragline monitoring systems in the industry, with his earlier work fundamental in building a solid base to improve productivity and enhance mine safety within the sector. The successfully developed and commercialised Tritronics series of dragline monitoring systems still form a key component of Leica Geosystems mine monitoring suite. Leica Geosystems joined forces with Titronics in 2003. The acquisition reinforced the commitment by Leica Geosystems to leverage its mining segment product offering and strengthen its overall portfolio with complementary solutions for production monitoring, machine automation and site management for mining.

Cat's Terrain for draglines (formerly Aquila dragline system) provides a comprehensive production monitoring module with real-time information on all dragline activities right down to individual bucket loads and dump locations. Machine performance, productivity and payload are monitored and organised in reports to optimise dragline output and minimise operating costs. Integrated office software combines functions for drilling, dragline, grading and loading operations, providing valuable productivity tools that allow users to create reports on utilisation, materials and volumes. An in-cab display shows the position of bucket and tub relative to the design plan. It also shows whether each dig point is above or below plan, helping operators move material more accurately and efficiently. Design plans can be easily updated, so operators always have the most current plan in front of them, which helps reduce rework, increase production and cut operational costs.

Machine health - Terrain monitors, displays, and logs a wide range of operating parameters. In addition, the system provides timely machine health information that can help operators identify potential problems (for example: tilt due to an unstable pad) and prevent catastrophic failures. Machine health data helps supervisors identify opportunities for additional operator training and actively manage asset life.

Production monitoring - along with monitoring machine health data, Terrain transmits and stores production information from each machine, as well. The data can be used to generate reports on machine performance, overall production, machine utilisation, and operator effectiveness. Using objective data to react to changes in the environment helps people understand the impact variations in operating practices and other factors have on total dragline production.

Wire rope

Draglines have one of the most demanding rope applications in the world. Wire rope is one of the highest equipment expenses for a mine and is at the heart of the intricate systems it supports. It is therefore in the mine's best interest to improve and maximise the service life of wire rope used on draglines. Advances in plastic technology have resulted in a stronger and more endurable rope. Choosing the right rope is crucial to any operation to reduce machine down time and increase productivity. There are three categories of dragline ropes namely, drag and hoist ropes, IBS and main suspension ropes, and dump ropes, which differ mainly by their functions. Previous experience on dragline rope maintenance suggest that some of the problems experienced are common to all three categories of ropes while others are more specific to one or more categories. The choice of lubricants is also a major factor for the life span of the rope. Many rope lubricants manufactured today are oil- or grease-based, designed to penetrate into the rope core. This type of rope lubricant works well in many applications, however, when talking about lubricating dragline hoist and drag ropes, this type of lubricant some would argue does not perform well. Six stranded ropes are more effective on some installations but as a general rule eight stranded ropes deliver the most cost effective performance.

Common issues

All three categories of ropes are subjected to fatigue loading, corrosion, and abrasive wear in the drums, sheaves and on the floor in case of dump ropes. The average life of all three categories of ropes has reduced over the last decade although, it is very difficult to pin point the factors that have made the most significant contributions to this life reduction. The quality of the wires, including material quality and drawing process, is a critical factor that determines the fatigue performance of ropes.

Rope manufacture developments

Surface and shaft mining operators are now able to place orders for the largest and most complex wire ropes in the world, which will be manufactured at a state of the art facility to be opened by wire rope manufacturer Bridon in early 2013. Bridon is investing £30M in its Neptune Quay facility, which will produce steel wire ropes in gross package weights of up to 650t. The factory will allow Bridon to manufacture dragline ropes of unprecedented scale and strength according to the company. The factory's next generation manufacturing equipment will also give Bridon the ability to make more complex ropes. Bridon is investing in people, technology, and infrastructure that will support the continued expansion of product development, most notably its multi-million pound technology centre currently under development at Bridon's base in Doncaster, UK – a facility which the company describes as central in its work towards global technology leadership. Bridon's Patricio Iligaray, sector marketing manager for global mining, commented: "Bridon is committed to meeting our customers' complex needs through sustained collaboration and technological innovation. We're looking forward to working with customers across the mining industry to make the most of the innovative new products we're rolling out over the next 12 months."

The company has developed a new dragline rope for the mining industry. Described as its latest innovation in drag and hoist ropes, the Tiger Big T Bristar will deliver an overall cost reduction for users by providing a longer service life and, as a result, fewer change outs. A special feature of the rope is that its independent wire rope core is covered with a fluted polypropylene material with helical grooves around its outer surface.

Mr Johannes Verwaayen, Bridon's technical director said that "this fluted shape core was formed by a special extrusion process." He added that "the internal contour of the fluted profile matches the internal contours of the outer Dyform compacted strands, and the pitch of the helical grooves is controlled to closely match the lay of the rope." Six or eight compacted outer strands surround the independent wire rope core, giving it several competitive advantages, he said. "This includes achieving a higher metallic area and high breaking load due to compaction." Mr Verwaayen added that "with more accurate and durable placement of the outer strands, there is also even load distribution, reduced internal friction and increased bend fatigue."

Wear parts

For decades companies have been finding new ways to increase the life of dragline wear parts. Dragline buckets, lips, drag and hoist chain, trunnion links, hitch plate links, anchor brackets, rope sockets, side pin teeth and numerous other components constitute the extensive array of parts available from engineering companies worldwide each staking a claim to be the toughest. Columbia Steel and Kennametal are two major US manufacturers of ground engaging tools.

Filtration and ventilation

To deal with the arduous task of dust control and ventilation requires a lot of thought and planning of what is suitable for a specific operation. Most draglines are fitted with Dynavanes, although some dragline have Floseps. While Dynavane elements have been regarded and marketed as self-cleaning, site experience has shown that some periodic cleaning was essential to maintain good performance. Dynavane is designed to handle large volumes of air at high velocities while operating at a constant airflow resistance. The Dynavane incorporates inertial separation, providing high dust-removal efficiency of airborne particulate matter. Several studies of filtration systems seem to favour Dynavane over its competitors; however in 2009 Australian firm BMT WBM Pty Ltd conducted a field test programme to measure airflow parameters, dust fallout rates and dust concentrations, inside and outside the machine house, on four draglines and one shovel. The study involved computational fluid dynamics (CFD) simulations. In an article featured in Coal Age the company described how the tests were made and the given results. The conclusion resulted that it was was not possible to say which of the two main filtration systems currently used on Australian draglines Dynavane or Floseps performs better.

Conclusion

Draglines handle some of the world's toughest materials and any developments that can improve efficiency and safety are welcomed. Some of these developments have been highlighted within this article and can only lead to a more productive and safer industry.

Rare Earths Global announces intention to float on AIM

Rare Earths Global Ltd, a Chinese mining services group focused on the extraction, separation, refinement and trading of rare earth elements (REE), oxides and other related products, intends to seek admission of its shares to trading on the AIM market of the London Stock Exchange.

REG is the holding company for a vertically integrated mining services group with its operations in the China. The business specialises in the extraction, separation, refinement and trading of REE, oxides (REO) and rare earth products (REP), with a focus on the more valuable heavy rare earth elements (HRE).

REG has three main subsidiaries in China; Pingyuan Sanxie Rare Earth Smelting Co Ltd, which owns a smelting and separation plant in the Guangdong Province of China and which has expertise in the separation and production of REPs; Billion Full (Huangshan) Mining Services Technology Co Ltd. a mining services business providing mining management services, technical support and equipment to rare earth mining companies and factories based in China; and Huangshan Quansheng Mineral Products Sales Co Ltd, a REP trading company which was incorporated in July 2011. The company expects to begin trading in the domestic market following admission.

REE have magnetic, electronic, catalytic, chemical and optical qualities. They are to be found in hybrid motor cars, computers, smart phones, medical equipment, lasers, magnets, light bulbs and fuel cells to name but a few and they are also a component of many other household products. REE contribute to these goods enabling them to be made smaller, more efficient and more powerful. The market for rare earths has grown rapidly over the last 20 years due to their wide array of applications and uses in contemporary technologies.

China is rich with rare earth natural deposits and, due to comparatively lower mining and separation costs, has become the leading global producer in the rare earth industry. Since 1992, China has been the dominant source of HRE and light rare earths (LRE) both domestically and internationally, accounting for 97% of global output in 2010.

From the total percentage of global rare earth production, LRE account for almost 93%, whilst HREs make up only 7%. Though LRE contribute to advanced technologies and dominate global rare earth production and demand, it is the HREs that are more expensive and highly sought after due to their unique properties and scarcity. Studies predict global HRE shortages occurring in 2015. The scarcity of HRE reserves typically leads to higher selling prices and thus greater profitability for enterprises engaged in HRE related business. Rare earth projects with a higher HRE production ratio are intrinsically more profitable and attractive to investors than projects with intensive LRE production.

Due to the group's expertise in producing HRE at high purity levels (99.9% purity compared to an industry average of 95%), REG believes it is well placed to achieve higher returns than its potential competitors elsewhere in the world and even within China itself.

REE prices are determined by a number of factors such as the availability of the REE in the market, its purity, the quality and the cost of extraction. As demand for each REE has grown over the years the price has also increased, for example, in 2002 1kg of dysprosium cost $20 and as at 23 January 2012, the cost was $1,420.

Global demand (including China) for REE is estimated to reach somewhere between 185,000 Mtpa and 210,000 Mtpa by 2015. China's output may reach 140,000 Mtpa with its domestic demand rising to 110,000 Mtpa (though some predict that China may not even be able to meet its own demand by 2015). In order to meet the shortfall, output from mines outside China will need to be between 45,000 Mtpa and 70,000 Mtpa. Although new mine production outside of China might be able to meet the demand for LRE there is likely to be a significant shortfall in production in certain HRE. As HRE are more abundant in southern China than anywhere else in the world the potential shortfall in HRE could create a real opportunity for the group in the future, if the group is able to increase both its production and export quota of HREs as planned.

According to the Congressional Research Service, as of 2010, China was the largest producer of REE followed by India, Brazil, and then Malaysia. World reserves of REE are dispersed in different countries with China holding 59%, Russia 14%, USA 10%, and other countries 20% However production outside of China was minimal. The REE market within China is dominated by these large state owned enterprises who produce thousands of tonnes of REE every year (eg China Minmetals Corp and China Nonferrous Import-Export Co). These groups will conduct most of their own mining operations, production and separation. However, because of the huge amount of resources within China the larger enterprises are outsourcing some of their operations. This has provided the group with opportunities to work with the larger state owned businesses as a sub-contractor.

For the year ended 31 December 2011, REG reported turnover and profit before tax of £26.1M and £2.8M respectively, and net cash of £1.3M.

The Sanxie plant, based in Guangdong province, was established in 1994 and is the rare earth separation and refining business of the group.

Through its wholly owned subsidiary Billion Full (Huangshan) Mining Services Technology Co Ltd (Billion Full), the company provides mining management services, technical support and equipment hire to local rare earth mining companies and factories in China. Blillion Full has signed a long term exclusive technical services contract with Zhejiang Ke Xin Electronics Co Ltd, whereby the company provides on-site operation

and management of the leach mining process. Also, Billion Full provides technical support in exploration know-how, design and construction of mines, water control and treatment of waste. By offering mining services the company is able to manage the complete value chain in the production of REP.

REP trading

In 2011, Huangshan Quansheng Mineral Products Sales Co Ltd, acquired a business licence to trade REP in the domestic Chinese market and in the overseas market using its export quota through Pingyuan Sanxie Rare Earth Smelting Co Ltd.

REE and the market

REEs are a group of 17 elements that are critical to the creation of many electronic, clean energy and clean technology applications. The group of elements is made up of 15 lanthanides in addition to the individual elements yttrium and scandium. Yttrium and scandium are sometimes also defined as rare earths because they are found with lanthanide deposits and possess similar characteristics. Rare earth elements are moderately abundant in the earth's crust, some even more abundant than copper, lead, gold and platinum. However, most rare earth elements are not concentrated enough to make them exploitable economically.

More about REE

REE can be separated into two groups known as light rare earths and heavy rare earths. In the lanthanides group, any elements between atomic numbers 57 (lanthanum) and 62 (samarium) in the periodic table are LRE. Elements with atomic numbers 63 (europium) to 71 (lutetium) in the periodic table are HRE. This delineation is due to differences in ionic radius, crystal structure and basicity of material. The ionic radius of the HRE makes them denser, more resistant to high temperatures, and less reactive in some circumstances. In addition, as well as having more unique properties, the HRE are more scarce than LRE. For example, regardless of the rare earth oxide grade, most rare earth deposits have a ratio of only around 95:5 (LRE:HRE).

Currently, the prices of REEs range dramatically between LREs (eg lanthanum $52/kg) and HREs (eg europium $3,800/kg). The table above shows internationally available prices for REEs. The group believes that the domestic prices available in China will typically be around 20% lower than those shown above.

Since 1992 China has controlled the world's primary rare earth export market. In 2003, China introduced an export quota restricting international supply to enable it to control global supply and pricing. Rare earth pricing has risen in any event due to the increasing demand from the automobile, consumer goods, technology and wind turbine industries. REE contribute to these goods enabling them to be made smaller, more efficient and more powerful.

Ten year historical view of selected REE prices

REO (99% purity)	Price ($ per kg)							
	La	Ce	Nd	Pr	Sm	Dy	Eu	Tb
2002	2.3	2.3	4.4	3.9	3.0	20.0	240.00	170.00
2003	1.5	1.7	4.4	4.2	2.7	14.6	235.4	170.0
2004	1.6	1.6	5.8	8.0	2.7	30.3	310.5	398.0
2005	1.5	1.4	6.1	7.6	2.6	36.4	286.2	300.00
2006	2.2	1.7	11.1	10.7	2.4	70.4	240.0	434.0
2007	3.4	3.0	30.2	29.1	3.6	89.1	323.9	590.4
2008	8.7	4.6	31.9	29.5	5.2	118.5	481.9	361.7
2009	4.9	3.9	19.1	18.0	3.4	115.7	492.9	261.7
2010	22.4	21.6	49.5	48.0	14.4	231.6	559.8	557.8
Q2 2011	135.0	138.3	256.2	220.1	125.6	921.2	1830.0	1659.2
Q3 2011	117.7	118.7	338.9	344.7	129.5	2262.3	4900.0	3761.5
Q4 2011	104.1	102.0	234.4	197.3	103.4	1449.8	2842.9	2334.2
23/01/2012	52.0	45.0	200.0	170.0	80.0	1420.0	3800.0	2820.0

Light Rare Earths (more abundant)	Major End Use	Heavy Rare Earths (less abundant)	Major End Use
Lanthanum	hybrid engines, metal alloys	Terbium	phosphors, permanent magnets
Cerium	auto catalyst, petroleum refining, metal alloys	Dysprosium	permanent magnets, hybrid engines
Praseodymium	magnets	Erbium	phosphors
Neodymium	auto catalyst, petroleum refining, hard drives in laptops, headphones, hybrid engines	Yttrium	red colour, fluorescent lamps, ceramics, metal alloy agent
Samarium	magnets	Holmium	glass colouring, lasers
Europium	red colour for television and computer screens	Thulium	medical x-ray units
		Lutetium	catalysts in petroleum refining
		Ytterbium	lasers, steel alloys
		Gadolinium	magnets

Using the continuous improvement process to optimise opencast mining operations

This paper was written by D Gärtner & A Oster, RWE Power AG, Germany and presented at Aachen 2011, Fifth International Conference, Sustainable Development in the Minerals Industry. Mining World thanks the authors for their contribution to this issue.

Operational excellence provides a sound foundation for RWE Power AG's three strategic pillars (innovation, expansion and organic growth). The maintenance and development of operational excellence in lignite mining operations at RWE Power is supported by the continuous improvement process (CIP) "immer:besser" (getting better). Obtaining cost reductions with the aid of the CIP as a kind of value-adding self-renewal process to ensure competitive lignite mining operations and lignite-based electricity generation forms the basis for further increases in profitability and growth.

Since the beginning of the 1990s, RWE Power has carried out a multitude of re-engineering projects focusing on the efficient shaping of processes with the assistance of external consultants to enable the company to cope with the considerable need for change by swiftly implementing major efficiency levers. These also include the required adaptation and development of the organisation.

Since 2004, the continuous opencast mine improvement process (KVT) has enabled the mines to tap significant cost reduction potential by virtue of their own strength. But there is another issue that has come into focus: the development of performance enhancement options. In 2006, the KVT process, piloted in the opencast mines, was included in the RWE Power-wide immer:besser (i:b) programme (Figure 1).

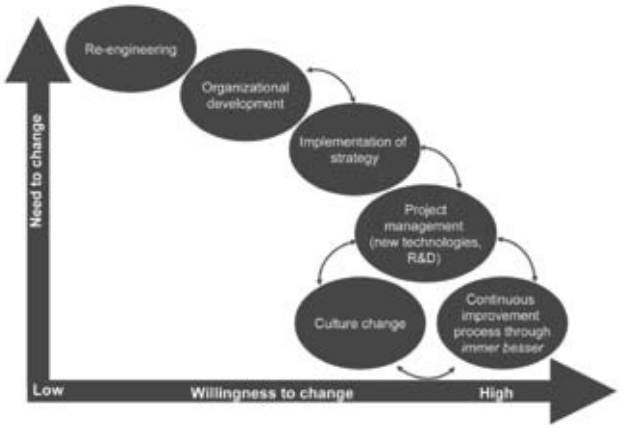


Fig 1: Optimisation approaches and need to change

The immer:besser programme is characterised by a continuous and, as a general rule, not project-based approach. The main aim of this programme is the implementation of operational improvements that can be promptly achieved.

As it always has been, the focus today is on technical, economic and organisational aspects of the processes. Leverage is provided by new requirements, problems, deficiencies, interfaces between departments and the spontaneous ideas of the staff, ie a mix of the creative development of employees and a directed focus on important fields of development.

Every continuous improvement process is based on the PDCA cycle developed by Edward Deming: plan, do, check, act.

Immer:besser also serves as a basis for this improvement cycle. Key operating indicators, weak points, problems, etc are utilised, eg by analysing disturbances, to identify new topics for improvement and improvement potential and giving pinpointed assignments to immer:besser teams which develop and implement efficient specific measures. The development of the monitored disturbance indicator permits success to be assessed and calculated, providing an inexhaustible supply of new topics.

Apart from this example, other immer:besser approaches, such as product portfolios, waste and value flow analyses, can be used to identify new topics for improvement (Figure 2).

Immer:besser requires a corporate culture that is characterised by both a willingness to change and the ability to adapt to change. This is why the culture change and the methods of the improvement process were closely linked in the immer:besser programme. Every single employee, including executives, should identify with the company and be ready to contribute to the its development. The immer:besser programme places staff at the centre when it comes to shaping change. Immer:besser offers the opportunity to change the company from within. The programme grants the employees much more creative leeway. Everyone is able to and called on to address problems openly, suggest improvement opportunities and contribute to solving unresolved issues.

However, the objective of immer:besser can only be achieved by a holistic approach involving employees and managers alike. Central points are staff motivation and competence, executive vision and process optimisation.

As a means of further enhancing motivation, new elements were added to the immer:besser programme in the opencast mines of the Rhenish mining area. These elements include immer:besser activities dealing with occupational safety topics,

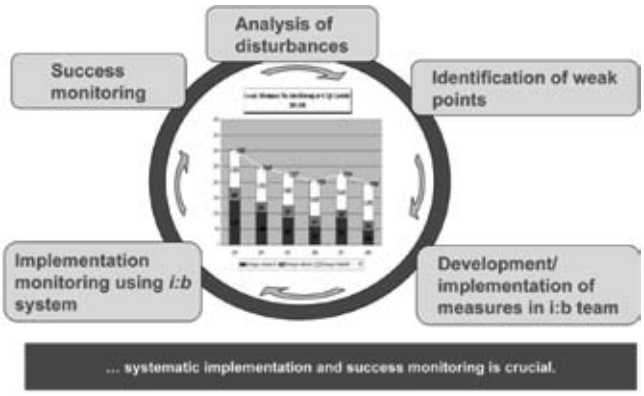


Fig 2: immer:besser approach; e g sustainable increase in performance efficiency

for instance hand and eye protection. In addition, there are so-called Immer:besser days during which individual operating locations are inspected by all employees working there, and improvement measures are decided on and implemented straightaway in accordance with the 5S methodology. 5S stands for sorting, straightening, systematic cleaning, standardising, and sustaining.

In order to motivate employees to become more involved in the immer:besser work, similar immer:besser on-site activities are carried out at the Inden opencast mine. These activities enable the employees to discuss improvement measures with their superiors directly at their workplace. The participation of the superiors and the associated direct implementation decision have a positive effect on the crucial cultural interface between the superior and the subordinate.

All things considered, this approach has long-term economic benefits and guarantees the continued and sustainable development both on a large and small scale.

The topics needed for the targeted development of improvement measures are supplied by day-to-day operations, on the one hand by the workforce in its daily work and on the other by key operating indicators such as disturbances, which are starting points for immer:besser topics and, hence, improvements. The following examples of RWE Power's continuous improvement process are an impressive collection of success stories achieved thanks to creative input.

A maintenance-related example of a process improvement brought about by i:b methods is the welding of treads onto crawler pads. This measure shows how an existing process can be optimised from within on the employees' own initiative in day-to-day operations. The welding of treads onto crawler pads permits annual savings in the order of €0.5M to be obtained.

From the water management division an immer:besser measure that drastically reduces the amount of work involved in shortening an inpit well will be presented. In this method, the submersible motor pump and the riser remain in the well when it is shortened by a bucket-wheel excavator. A new stopper, which is inserted into the well casing before it is shortened and from which the riser and the submersible water pump are suspended, was developed. Thanks to this method it is no longer necessary to remove the entire riser and submersible motor pump prior to shortening only to reinstall them later; instead, part of the riser and the submersible motor pump remain in the well casing. The limiting factor is the ultimate load of the stopper anchor. The ultimate load increases along with the depth of the well and the weight of the submersible water pump. This method can currently be employed for 230 of the 460 inpit wells located in the Rhenish mining area. The annual savings amount to some €110,000.

Another innovative improvement was developed for conveyor shifting (Figure 3). In a continuous improvement process starting in 2006 conveyor shifting was optimised such that time-consuming survey-staking work by our mine surveying department is no longer necessary owing to the introduction of a satellite-assisted machine system. Position detection using GPS combined with high-precision inclinometers allows belt conveyors to be accurately repositioned even in extremely uneven terrain. This results in annual savings in the magnitude of €40,000.

In the meantime, the above measures have enabled annual savings of some €34M to be identified and achieved in the opencast mines segment from 2004 to end-2010.

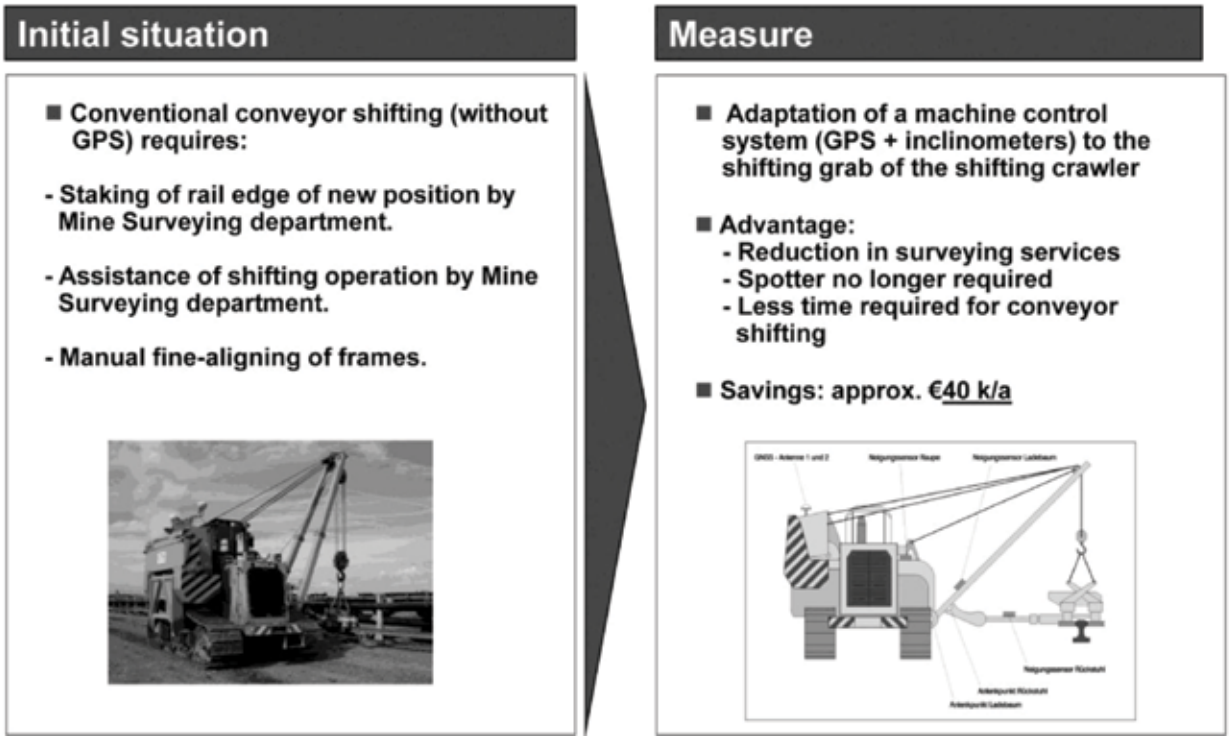
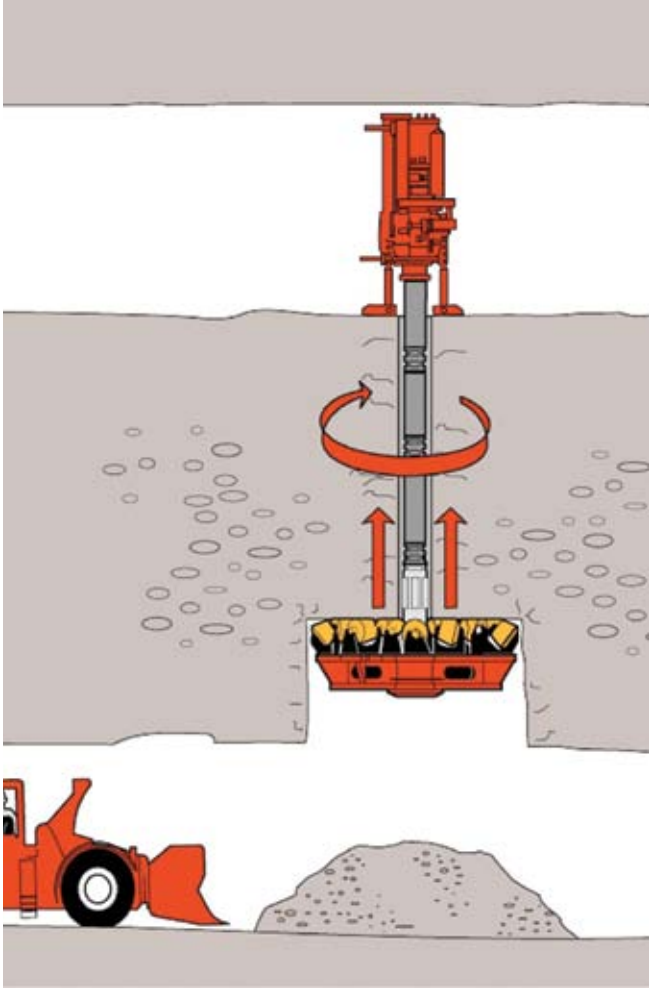
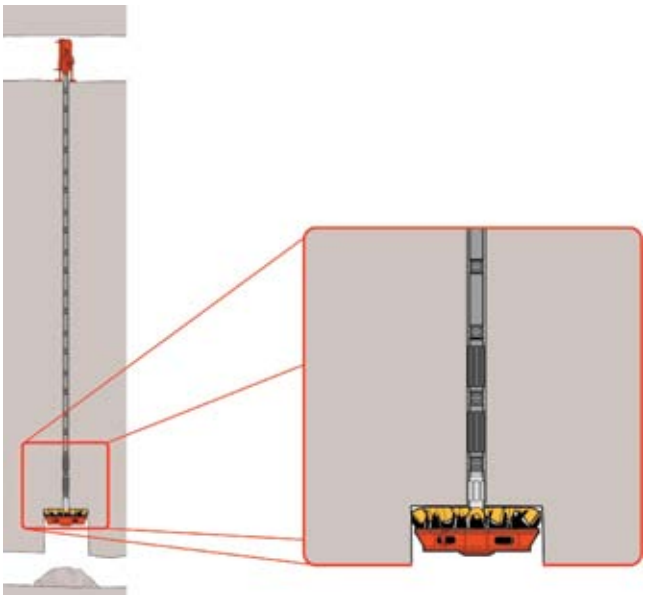


Fig 3: Example of immer:besser belt conveyor topic – GPS-based shifting of belt sconveyors



Raise pull



Vertikal

Record-breaking shaft boring operation for Portuguese Somincor mine

Shaft boring specialist Drillcon Iberia is currently boring its two deepest shafts to date at 615 and 630m respectively, each with a 4.0m diameter at Portugal's Somincor copper ore mine; using Sandvik reaming heads. Located close to Castro Verde, some 58 km north of Portugal's Algarve region, the mine opened 25 years ago and is today owned by Lundin Mining. The mine has been producing significant quantities of copper since then, peaking at 2.6M tons of ore and 0.8M tons of waste in 2010.

It employs both bench and fill and drift and fill stoping methods underground.

With the surface at 200m and designated +1200m by the mine, it has 800m of underground workings and 160 km of tunnels. The mine covers four established working areas, named after the villages of Graça, Corvo, Zambujal and Neves above. Development production also began last year on a fifth designated Lombador.

Shaft boring methods

Drillcon started working with Lundin mining 16 years ago with a contract to drill shafts, introducing raised boring techniques initially with a single unit – fitted with a Sandvik reaming head. Elected as the fastest shaft boring technique, the method was found to be considerably faster and safer than conventional drill and blast methods; with no people required in the shaft during boring.

A pilot hole is initially drilled from the surface down to the tunnel below. A Sandvik reaming head is then fixed to the end of the drill string at the bottom of the drop shaft. The drill rig then rotates and pulls the reaming head upwards towards the rig, excavating the ground.

The excavated material falls to the bottom of the drop shaft and is trucked out by the mine company.

Contracts

In 2011 the company was awarded a three year contract, and according to product director, Marco Macedo, the company expects to drill up to 6,000m in the first year, but he adds "I anticipate thereafter it will stabilise at between 3,500-4,000m."

He elaborated, "as the Lombador development increases throughout this year, we will be producing considerable numbers of shafts following the development workings. For example, CPV (principal ventilation shaft) 17 provided air ventilation for the initial development into the Lombador tunnels."

"Shafts CPV22 at 615m and CPV21 initially at 630m will provide the main inlet and exit ventilation shafts for further Lombador production development down to 590m level to a collector for passing the gases to the surface.

Pilot hole

The pilot hole for CPV21 started at the end of October last year passing through a number of geological layers. Marco Rafael Macedo elaborates "we can experience five or six different layers in drilling, yet just 100m away we may only encounter one or two rock types."

Rock can vary from black schales (xistos), which in turn can be very hard or very soft, almost like clay; hard volcanic rock ;black quartz, ultra hard chert and very hard quartzite, and it is often faulty.

The pilot hole using a 12 ¼ inch diameter Sandvik bit, took three months including a section of grouting, through a very 'broken' area with clays and also using the RVDS system (rotary vertical drilling system) in order to keep the hole straight. The Sandvik tungsten carbide type SCMH2 bit has been designed as a medium hard rock bit and Drillcon was able to achieve up to 250 drill metres per bit.

Reaming was started at the end of May 2011 and within six weeks Drillcon had completed almost 300m. "At this level experience has taught us that whilst the cutters will bore for up to 450m we opt to pause and fully refurbish the reaming head with new cutters on the surface," explains Marco. "This entails dismantling the reaming head at the bottom of the shaft and bringing it to the surface. In total we anticipate that it takes up to 15 days to refit the new head and reaming again."

In addition to replacing the cutters it also provides the opportunity for the contractor to eliminate any risk of damage to the reamed drill rods in the bottom 300m. Drillcon is relying on a Sandvik CRH 10ED reaming head dressed with 22 cutters for the CVP21 and CVP22 shafts.

Depending on the type of rock being experienced determines the reaming progress, varying from 4m to 13m per day.

Since starting at the Somincor mine, Drillcon has seen its fleet of Sandvik reaming heads increase from the original single unit to today's nine heads, comprising - 1 x 2.4 m dia; 3 x 2.1m dia; 1 x 1.8m dia; 1 x 1.5m dia; 1 x 1m dia; and 1 x 0.66m dia; in addition to the 4.0m dia head.

Latest order

To meet increasing demand for ever larger diameter, Drillcon will take delivery of a new Robbins 91R shaft boring rig, once again featuring a Sandvik reaming head designed for 5.5m diameter at depths of 500m.

Drillcon Iberia SA is headquartered in Braga, Portugal and is currently undertaking jobs in Sweden, Norway, Bulgaria, Finland and Portugal.

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At the heart of Turkey

Mining World distributed journals from its stand at the Minex Mining Fair in Izmir, Turkey in 2011. The small fair attracted visitors from around the world. Many of the agents acting for mining equipment manufacturers used the opportunity to promote their client's products and services. Mithat Dayioglu of MTM Makina represented many of his British customers, including RMI Armstrong, Allenwest now Ampcontrol and Fenner.

The natural resources of Turkey provide a flourishing mining market. Amongst its many resources is boron, of which Turkey is the world's largest producer, accounting for half of world output.

Barkom

Barkom, supplier of diamond drilling equipment was established in 1987 and is located in Ankara, Turkey. Its supply of equipment includes drilling accessories, core trays, rotary drilling equipment, soil investigation, rock drills, pick hammers and triplex mud pumps. The company's main activity is to manufacture customised diamond drilling equipment for mineral exploration, drilling accessories, and rotary equipment. It manufactures different types of equipment separately from each other, so equipment can be supplied autonomously or all together forming a complete drilling kit. It also provides spare parts for its own products.

Another service Barkom offers is importing equipment from worldwide manufacturers. The company has been through some difficult periods, but now, with a mixture of its own products plus representing well-established companies, it has become a significant supplier of diamond drilling equipment.

Barkom's aim is to show how easy it is to drill in any type of rock formation and how cost effective the process can be. It cooperates and collaborates with other known international drilling companies around the world, as well as manufacturing its own products with raw material imported from France SMP (Vallourec) and India.

Exhibitors at Minex

The Barkom Group represents the following companies and drilling products:

Atlas Copco (Sweden)	Tricone rock roller bits
Fordia (Canada)	Diamond tools
Australian Mud Co (AMC) (Australia)	Drilling fluid additives
Reflex Instruments (Australia)	Borehole surveying instruments
Hanjin D&B (Korea)	Drill rigs
Young Poong IR (Korea)	DTH and rock drilling tools
Jet-Lube (UK)	Thread components
Seko Drilling Co Ltd (Korea)	DTH hammers and bits
Sava (Slovakia)	Inflatable rubber and mechanical packers

Drilling fluids and on-site technical support

The Australian Mud Co (AMC) has over 20 years' experience in supplying drilling fluids to the mining, oil and gas, water well, horizontal directional drilling, civil and tunnelling industries worldwide. It has two distinct divisions, AMC Minerals and AMC Oil and Gas, enabling AMC to support these industries respectively in key regions of the world.

With a research and development laboratory and a dedicated team of in-house industrial chemists the company offers a complete facility for testing and developing customised drilling fluid programmes.

AMC Minerals specialises in drilling fluids and services, supplying a wide range of products, including site-specific products and environmentally-friendly alternatives. Satellite distribution centres are strategically located around the world to ensure operations are not compromised by inventory shortages.

AMC develops and markets equipment for fluid containment and transfer:

a) surface solids control unit – a unique product that allows surface drilling operations to be conducted without the need to dig conventional ground pits, and

b) underground solids control unit – for underground drilling operations.

The company offers an extensive range of fluids and chemicals in response to customers' growing needs. It also offers on-site support and training (mud schools) in fluid management, including the drilling fluids phase of the project. Technical support is backed up with the company's engineering and analytical services with fully-equipped laboratories.

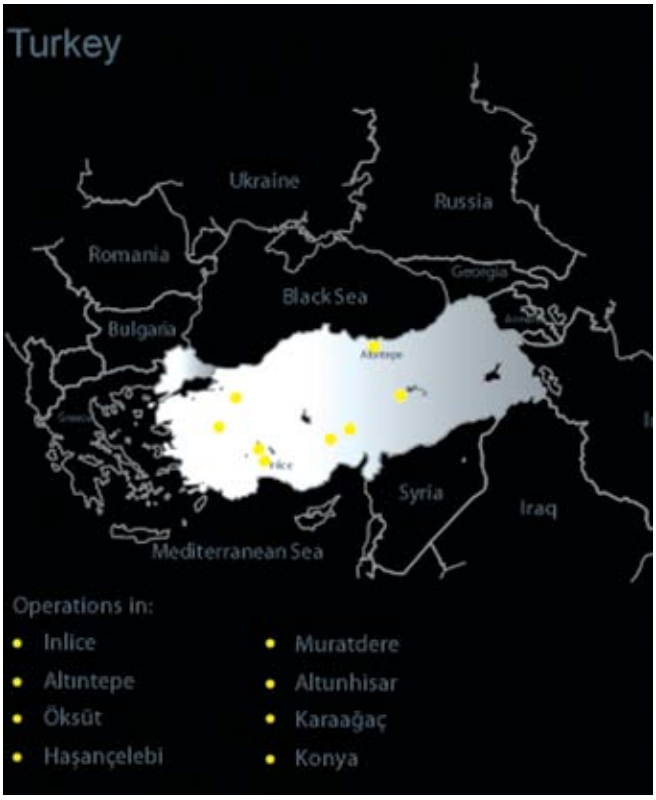
Reflex Instruments

The Reflex ACT is a fully electronic orientation instrument, designed to provide highly accurate and consistent core orientations for structural and geotechnical purposes in all types of formations. The company claims it is accurate, easy to use, water resistant, and available in all drilling sizes. It requires no battery charging and is not affected by geological anomalies.

Based on modern gravimetric sensors, Reflex ACT measures independent components of the earth's gravitational field, and correlates this information to accurately determine bottom of hole and the original position of the core sample in the substrate.

The instrument's one piece design incorporates advanced digital technology which eliminates reliance on mechanical movement and structurally sound ground to identify the accurate orientation of the core sample.

Internal shock absorbing systems allow the Reflex ACT to form part of the inner tube and orientate whilst drilling is taking place. The Reflex ACT is designed to be shock resistant and to reduce the drilling down time.



The Reflex ACT II RD retains the consistency of the ACT system which is used by many drillers and geologists worldwide. This upgraded version provides additional rapid descent, time stamping and infra-red technologies, making the tool faster, more robust and accurate.

The Reflex digital core orientation tool was designed with the realities of the harsh drilling environments in mind. Separating the infrared controller from the downhole tool has enabled a more rugged design and reduced risk of water ingress damage. When installed into the drill string, the Reflex ACT II RD is rated to 6,000 psi water resistance. Resilience up to 50,000g of force is achievable due to advanced components and clever internal shock absorption techniques.

According to Reflex, the Reflex ACT II RD is the quickest orientation method available with minimal impact on the drill productivity. The instrument is designed to work with all forms of rapid descent backend assemblies.

Netcad

A company that is growing rapidly in the country is Netcad. With offices in both Istanbul and Ankara, it serves the mining industry with its range of mining software.

Netcad was formed in 1989, and it produces and exports software and system solutions, compatible with world standards, to both the private and public sectors. The company ranks highly among software companies in Turkey with a market share of approximately 85% in the fields of construction, map planning and mining. It has over 6,000 registered users and holds more than 15,000 licenses. Netcad products are used in instruction at lectures in 76 departments in 53 universities around the world.

Following Netcad's work in the cartography sector, its development in underground and surface mining was a natural step. Netcad is able to calculate the proven reserves of an area and display this information in a digital format.

Following drilling, land models of formations and mineral deposits underground are made and their reserves are

calculated using a cubing or 3-D visuals. The 3D applications help accelerate the mine planning and determine the work flow.

Specifically for the mining industry, Netcad has designed Netpro/Mine. It is a module in which all the stages of ore body modelling and mine planning can be performed. It provides tools for data input, 3D visualisation and digitisation, digital terrain model (DTM) construction, geological solid modelling, resource and reserve estimation, mine design and planning.

Netpro/Mine combines basic map applications and reserve estimation of open pit and underground mining designs in order to generate manual wire-frame modelling with or without drill-hole data. By using borehole lithology, fully integrated automatic surface models can be created and used for the mine planning. This includes the gallery and bench design and construction based on the pit parameters and the connecting roads. It also assists with the ventilation design; calculating the airflow rates in each branch of the mine network based on road resistance values and fans.

The blasting programme, including the hole diameter and length, according to the drilling equipment being used can be calculated for both surface and underground mines. Following the extraction, the dump site roadway can be designed together with estimating the size and volume of the dumping area.

Netpro/Mine Netcad demonstrated its software packages at the Izmir Fair, and the stand was visited by the President of the Chamber of Mining Engineers, Mehmet Torun, Hamdi Lightning General Manager of Mining Affairs, Executive VP Muammar Bradley TKI, together with representatives from the public and private sectors and academics.

Mesut Ekinci, Netcad business development group manager said that Netpro/Mine was well received at the exhibition, and 20 sales have been made so far; while a great deal of interest was shown by universities and laboratories and potential customers from Iran.

Firetrace International

Near the town of Rize, on the Black Sea coast of north eastern Turkey is the Cayeli copper and zinc mine, owned and operated by Canada's Inmet Mining Corp. It has recently ordered Firetrace International's intrinsically safe Firetrace automatic fire detection and suppression system to protect existing underground mud pumps and electrical cabinets at the mine. Eleven systems have been installed in the mine, which mills 3,000t of ore a day. Each system provides dedicated, around-the-clock protection to vital equipment. Beneficially, Firetrace requires neither electricity nor external power, so does not contain any components that produce sparks or which can hold enough energy to produce a spark of sufficient energy to cause an ignition.

Each of the Firetrace systems comprises of an extinguishing agent cylinder that is attached to proprietary Firetrace detection tubing via a custom-engineered valve. This leak-resistant tubing is snaked throughout Cayeli mine's cabinets and enclosures to ensure fast detection and suppression of a fire and its source. Heat of flame will immediately cause this tube to rupture and the suppression agent is automatically released, extinguishing the fire precisely where it starts and before it can take hold. The Cayeli project uses both the Firetrace direct system and the Firetrace indirect system. In the direct system, the Firetrace detection tubing operates as both the detection device and the suppressant delivery system, whereas the indirect system uses the Firetrace detection tubing as a detection and system activation device, but not for the agent discharge.

Two risk-specific suppression agents were chosen for the project; 3M Novec1230 fire protection fluid is being used to protect the mines electrical cabinets, while ABC dry chemical powder is safeguarding the Geho mud pumps. Firetrace International has over 150,000 units in operation worldwide.

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An element of vanadium, named after the Germanic goddess of beauty and fertility

American Vanadium Corp is a company developing the only dedicated vanadium mine in the US. The company's Gibellini project in Nevada is currently in the permitting process and anticipated state of production is in the next several years. Leveraging the development of America's only domestic vanadium mine, the company's mission is to become a strategic supplier of vanadium for products such as grid scale batteries for the energy sector and lithium vanadium phosphate batteries for electron volts. Gibellini's world-class NI 43-101 compliant vanadium resource, together with the project's significantly low cost (open pit, heap leach), represents the opportunity for American Vanadium to become North America's only primary producer of vanadium. With mine production projected to reach an average 11.4M pounds of vanadium pentoxide per year, Gibellini could potentially supply approximately 5% of current global vanadium demand.

American Vanadium's 100% controlled, open pit, heap leach Gibellini project represents one of the lowest cost and most simple vanadium operations to be developed in the world. The project's resource represents 131.369M pounds of measured and indicated vanadium (ie, vanadium pentoxide or V205) grading at 0.285%, and an additional 48.96M pounds of inferred vanadium grading at 0.172%.

Vanadium was rediscovered in 1831 and named vanadium after the Germanic goddess of beauty and fertility. In its elemental form, vanadium is a soft, silvery grey mineral classified as a ductile transition metal. In its various market applications, vanadium represents a billion dollar industry. Global vanadium demand is projected to more than double by 2025, and Piper Jaffrey, a leading investment bank, predicts the market for energy storage will be worth $225 billion by 2020. Largely driving that growth will be renewable energy: grid scale energy storage in a dispatchable power format, which enables utilities to deliver specific amounts of electricity at specific times, making renewables such as wind and solar grid-friendly.

When a very small amount of vanadium is added to steel, high-strength low-alloy vanadium steel is created while greatly reducing energy, shipping and production costs. While steelmaking accounts for roughly 92% of all vanadium currently consumed, it is estimated that vanadium is only used in about 9% of all steels today. This percentage is expected to grow as emerging economies, particularly in the BRIC countries and Asia, increase their intensity of vanadium use in steels to build new infrastructure.

China's demand for vanadium has already demonstrated substantial growth, with consumption increasing at 13% per year between 2003 and 2009 in line with its surging steel output.

Gibellini project location.
Eureka county, Battle Mountain mining district, Nevada.

Visible (colourful) mineralisation on the pale grey host shale.

According to Bill Radvak, president and CEO of American Vanadium Corp, "Vanadium flow batteries are seen as key to bringing renewable energy into the mainstream. The vanadium flow battery shows enormous potential as an energy storage solution. In fact, it is the only battery technology today capable of powering everything from a residence, to the storage demands of a power grid. They can store electricity from alternative energy sources including wind and solar, and can modulate the intermittent production of electricity from these sources to produce dispatchable power to the grid. By leveraging our unique supply of vanadium electrolyte, American Vanadium aims to lead in the production of vanadium for the flow batteries in US."

"We in North America are 95% reliant on this critical metal," said an industry expert, "vanadium is critical to infrastructure, and critical to the quality of life that we have become accustomed to in North America. You don't want to be 95% reliant on something from China, or anybody for that matter."

Vanadium is produced as a by-product of steel smelter slag, and is also mined in two different types of mineral deposits: disseminated in carbon rich deposits and shales (as with American Vanadium's Gibellini project), and in magnetite (iron oxide) deposits alongside titanium.

The three largest vanadium producers are China, South Africa and Russia. In North America, vanadium production comes from spent catalyst, residues from burning coal and heavy oil, by-product of uranium mining, and imported pig iron slag.

With no currently operating primary vanadium mines in North America, and no primary vanadium mining in the US since the 1980s, American Vanadium's Gibellini project represents the opportunity to become North America's first and only primary producer of vanadium while meeting approximately 5% of current global vanadium demand.

Mining World speaks with Bill Radvak, president and CEO of American Vanadium Corp to find out more about this important element in our emerging markets.

Tradelink: It has been stated Gibellini could potentially supply approximately 5% of current global vanadium demand. How do you see this expanding in the future?

AVC: While we plan to be a major contributor to global supply of vanadium, our goal is to supply 100% of the American needs for vanadium electrolyte. Once our resource expansion programme is complete we expect to be able to maintain this strong position for a long time. It is also important to understand that currently there are only a handful of producers globally that can supply as much as our project will be able to.

Tradelink: Do you see the majority of the sales within the battery industry?

AVC: Our feasibility study demonstrates we will be very financially viable based on selling into the steel industry. However, to maximise the opportunity of being the only vanadium mine in the US, our desire is to divert as much of our production as possible to the battery industry. We expect that once we are in production the demand from the battery business will have grown dramatically, and continue to grow to the point where the majority of our sales are to the storage battery industry.

Tradelink: The Gibellini project is I believe a low capital cost truck and shovel operation. What are the production expectations and estimated mine life?

Feasibility drilling in 2010

Feasibility drilling in 2010

Gibellini core

ATV exploration programme 2010

Winter precipitation

AVC: Once in full production, we will produce over 11 million pounds of vanadium pentoxide per year. At that rate first two deposits at our mine will last around nine years.

Tradelink: How important is your future exploration programme to uncover more deposits within the area of Gibellini.

AVC: While our current deposits will make us a successful operation, our goal is to extend the life of the operation to 20 years. On our project site there are additional significant vanadium occurrences we have identified which we will thoroughly explore in the coming couple of years. Given the knowledge and experience we gained delineating the first two deposits, we are confident we will be able to reach that goal.

Tradelink: Are all the properties resources near to the surface?

AVC: Yes, we are extremely lucky that Mother Nature has done most of the work for us by exposing the resources to the surface. In fact, Gibellini Hill deposit itself has an extraordinarily low strip ratio of 0.2 to 1, meaning only one ton of waste rock has to be excavated to reach five tons of ore. This is almost unheard of in mining and is one of the reasons our mining costs are so low.

Tradelink: Do you expect to see other mining majors in the industry entering the marketplace?

AVC: We don't expect to see mining majors enter this marketplace other than those that are already involved in this business. Largely, the global deposits are contained in China, South Africa and Russia and under the control of a select few involved in the steel business as well as mining industry.


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CONFERENCE COORDINATOR
Fabiola Bustamante

+56 2 652 1555
minin@gecamin.com

www.minin2012.com

Intermat 2012 set to break records

In 2009, when other exhibitions were being cancelled or postponed, the organisers of Intermat, in Paris, France braved the storm and displayed an excellent variety of equipment, albeit with a reduced number of exhibitors and visitors. Whilst this is predominantly a construction show, in 2012 there will be a hall dedicated to mining equipment manufacturers and suppliers.

Positive growth forecasts and a high occupancy rate before the show are also promising signs for Intermat 2012. According to the Committee for European Construction Equipment, the industry is forecast to grow by 11% this year. Emerging regions such as China, India and Latin America record sustained growth. These markets posted more than 10% growth, which very few European markets were able to boast for 2010. It now remains to be seen whether Europe will benefit from this good performance.

In the wake of the major crisis of 2009, the European construction equipment industry grew by 18% in 2010. Nonetheless, the picture differs from one country to the next: Germany is in excellent shape with 19% growth, and the UK recorded +57% development for 2010! Conversely, Spain sustained losses of 19% in turnover and Italy saw its construction sales stagnate throughout the year.

Intermat 2012 will have an exhibition area of 375,000 square metres, including a 20,000 square metre outdoor demonstration area. Of the 1,500 exhibitors, 67% are international. There will be four national pavilions: China, Korea, UK (including Northern Ireland) and USA, and more than 200,000 visitors are expected.

Powerscreen's biggest equipment at Intermat

Powerscreen, part of Terex Corp and provider of mobile crushing, screening and washing equipment, will be exhibiting some of its most popular equipment at Intermat. It will display two of its largest machines, the Powerscreen XH500 impact crusher and the Warrior 2400 screen.

Powerscreen XH500

The XH500 horizontal shaft impact crusher is a track mobile crusher, designed for processing large volumes of soft to medium-hard primary and secondary materials such as natural rock and construction derived materials including asphalt, recycling and demolition waste. The XH500 has a maximum throughput of up to 500 tph (550 US tph), and ideal for contract crushing. Key features include vibrating pan feeder, double deck live pre-screen, feeder load management system, under pan feeder, efficient crusher direct-drive system, crusher hydraulic overload protection, hydraulic raise and lower product conveyor for rebar removal, new PLC control system and class leading stockpiling capacities.

Powerscreen Warrior 2400

The Warrior 2400 is the largest machine in Powerscreen's Warrior range. It is capable of handling larger feed sizes and has an output potential of up to 800 tph (881 US tph). It features a heavy duty incline screen with a high amplitude triple shaft drive mechanism, lending it to screening, scalping, 2 or 3 way splitting and stockpiling materials like aggregates, topsoil, coal, construction, demolition waste and iron ore. User benefits include a slide out tail conveyor facility to aid media access and a load sensing collection conveyor circuit to avoid blockages.

Powerscreen Warrior 2400

Powerscreen XH500

Hyundai at Intermat

Hyundai Heavy Industries Europe (HHIE) will present an extensive range of equipment for the construction, mining and quarrying industries at Intermat, including the first models of a new range of -9A series excavators and wheel loaders.

The company is also launching the giant new flagship model, the 120t R1200-9 excavator, and a preview of the first Hyundai hybrid model, a 22t tracked excavator.

New -9A series - excavators and wheel loaders

The most significant change in the 9A series of excavators is the introduction of EU Stage IIIb compliant diesel engines, with reduced exhaust emissions and improved fuel economy, and other operating and control system refinements.

New 120t flagship excavator - R1200-9

The all-new 120t R1200-9 has been conceived with an eye on the expanding worldwide mining and quarrying sector, where the demand for efficient, large-scale mass excavation in minerals extraction and overburden removal has fuelled an increase in sales of large mining trucks and the equipment to load them. The R1200-9 is powered by the high-performance 23 litre, 6-cylinder Cummins QSK23-C rated at 760 hp (567 kW).

This first version of the new 120t machine is equipped with a 7.55m back-acter boom, 3.4m dipper-arm, and 6.7m³ bucket - a combination which gives a maximum digging depth of nearly 8m, an outreach of 13.76m, and a load-over height of 7.8m. Maximum breakout force at the bucket is 64.9t.

Hybrid technology

Following three years of research and development at the company's R&D centre in Ulsanin Korea, the first Hyundai hybrid excavator, the R220LC hybrid was previewed at Intermat. The combination of power from the 133 hp (100 kW) diesel engine with on-board generated electric power, including the stored, regenerated power from the independent swing braking system - all monitored and controlled through a central hybrid control unit, enables optimum use of the power available. The result is a saving of as much as 25% in fuel consumption. This new technology is close to release for production, and anticipated introduction to the market is within the coming years.

New 120t flagship excavator - R1200-9

RDS debuts Loadmaster iX at Intermat

UK based RDS Technology will exhibit the new Loadmaster iX range of on-board weighing instruments for wheeled loaders at Intermat.

Loadmaster iX has standard features plus temperature compensation enhancing system performance particularly on machines with a wide variation in operating temperature and angle compensation providing an additional level of precision beneficial on most sites including those with obvious slopes.

In addition, the Loadmaster iX range offers effective management of weighing data. The Loadmaster 8000iX has an integral SD card port for the transfer of data between loader and weighbridge or PC and enables pre-registered customer reference data to be uploaded directly to the instrument.

Also available is the trade-approvable Loadmaster 9000i. When fitted to a wheeled loading shovel, this on-board weighing scale transforms the loader into a mobile weighbridge which conforms to MID Class Y(b) levels of accuracy.

The company has recently gained approval via the UK National Measurements Office to self-verify its instruments. Subject to formal training by RDS, this approval extends to all EU RDS distributors.

Also on show at Intermat will be the new Weighlog α10 on-board weighing system. Incorporating the latest colour touchscreen technology it provides an on-board weighing system that can be used for truck loading or check weighing.

Loadmaster iX

New Geith couplers and attachments

Geith designs and manufactures couplers and attachment products for excavators, and at Intermat it will launch new safety-focused, automatic quick couplers for a range of excavator sizes. Other displays of the Geith stand included the new ranges of heavy duty excavator buckets, tilt buckets and ripper attachments.

The new QC35/40 hydraulic coupler is designed for use on mini-excavators from 2t to 4t in weight and expands the range of Geith couplers to cover excavators from 2t to 90t. These fully automatic couplers ensure a safe changeover of attachments without the need for the operator to leave the excavator cab.

Excavator buckets

Designed for use on excavators ranging from 1t to 90t, the new heavy duty buckets are suitable for demanding excavating conditions. The range includes heavy duty digging and grading buckets in different widths and capacities with a choice of fittings to match the excavator to optimise digging and loading performance.

Tilt buckets

Geith tilt buckets increase the adaptability and productivity of excavators for land clearing, slope work and backfilling, and are available for machines ranging in size from 3t to 50t.

Features and benefits include an optimum pivotal design providing a 90° tilt (45° in either direction) with flow control valves for adjustment of tilting speed; two heavy duty hydraulic cylinders for holding power; and a spill guard and cylinder guards to protect the cylinder rod and hose fittings.

Ripper attachments

The Geith ripper is designed to give an excavator a powerful ripping ability in hard ground conditions, and is engineered to reduce excessive stress on the excavator. It is available for machines from 2t to over 80t in weight and offers a work depth of up to 1,550 mm (62 inch). Replaceable tooth systems are available for all models, and a pin-on replaceable shin is standard on all ripper models for excavators over 14t.

CEA Pavilion at Intermat

The CEA in conjuction with UKTI has organised a dedicated pavilion with more than 20 UK exhibitors.

Intermat attracts over 1,470 exhibitors from around the world, and at the last Intermat show in 2009 the event was visited by 84,000 visitors from 162 different countries.

In the next 12 months the CEA will run UK pavilions at Future Mongolia, M&T Expo Brazil, Bauma China, bCIndia and Bauma.

Listed below are some of the exhibitors in the UK pavilion.

Air-Seal Products is making its second appearance at Intermat having first exhibited in 2009. The company will be showing its range of pre-puncture tyre sealants which provide immediate protection to the tread area from punctures up to 30mm (1¼ inches) along with most other slow air leaks. Air-Seal's tyre sealants have been successfully used in many types of vehicles including HGVs, loading shovels, dump trucks and skid steers.

Amber Valley is using Intermat to announce the European launch of its full range of Ecolarm's environmentally friendly non bleeping alarms. They come in a range of db levels and with a range of features from night silent to reverse twice mute versions. There is also the Ecotalking alarm and brand new is the green LED seatbelt alarm for off highway use.Other alarm systems patent-pending include reversing safety and other hazard warning devices.

Ashtree Glass will be showing a range of mirrors and mirror arms designed to meet the latest visibility requirements for telehandlers. This will see a move away from the wide angle "fish eye" type mirrors to "E" approved mirrors.

Cab Glazing Services LLP is a supplier of glass to OEM brands, machinery dealers, spare part companies and end users.

Cesar will show its security scheme equipment used as a deterrent against theft of machinery.

The Gate7 group designs, manufactures and supplies vehicle livery, markings and decals.

GKD Technik will be showing PWS (proximity warning system) designed to protect site workers from being injured by mobile site machinery by using radio technology to detect the position of pedestrians and warn the machinery operator of the hazard.

KMP Products Europe Ltd, is an engine parts supplier for genuine replacements suitable for leading OEM's including Caterpillar, Komatsu, Cummins and Detroit Diesel.

Nylacast will be showcasing bespoke components and engineering polymers, including Nylacast Bigfoot, the crane outrigger pad.

Off-Highway Research is the world's largest consultancy specialising in the analysis of the international construction equipment industry, and will have researchers available for queries.

Selwood Pumps' range includes the S100, S150 and S200 Super Silent models. The 'S' range automatic self-priming pumps are designed for pumping solids, sludge and rags.

Southco is showing a complete range of off-highway access hardware solutions for interior, chassis and entry door applications.

Tata Steel, one of the world's top ten steel companies, is making its Intermat debut with its broad range of steel products and services. Last year Tata Steel invested £8M in its specialist steels Clydebridge plant in Glasgow, increasing the plant's capacity to produce the premium quality high-strength steel plate, essential for lifting and excavating industries, by up to 50%.

Webtec Products Ltd will be exhibiting its full range of hydraulic test equipment and hydraulic valves. Of particular note will be two new products, the HPM6000 hydraulic data logger with Intelligent Digital flow and pressure sensors as well as the RFIK series of portable hydraulic testers. The HPM6000 is the latest addition to the HPM series of hydraulic data-loggers. Also new are the RFIK30 and RFIK60 mechanical hydraulic testers.

Zigma Ground Solutions offers temporary access and ground protection solutions the company is making its inaugural appearance this year.

Other exhibitors in the CEA's UK pavilion include Con Forms Europe, who specialise in concrete pumping systems and accessories, hydraulic cylinder manufacturer Hendry Hydraulics, high performance polyurethane manufacturers Kay-Dee Engineering, Resale Weekly, which is a portal for new and used heavy equipment and Unitruck who manufacture and distribute rear view mirrors to the commercial vehicle industry.

A number of CEA's other members will also be exhibiting at Intermat but not in the UK pavilion: these include MOBA, who is launching a new control system for rollers, a 3D system for blades as well as the excavator system Easy Dig.

BSP Intermat

MOBA easy dig in cabin

Nylacast big foot


Zigma Euromat


Tata precision lazer cutting


Tata steel coil delivery

Terex's offerings at Intermat

Terex's Minerals Processing Systems (MPS) division will be exhibiting several units from its new modular product line at Intermat. The global product line director at MPS, Jason Talbot, described the new modular product line as representing a "move away from traditional machinery production methods. It is designed in response to demand from the materials processing market."

The products on display at Intermat will include the MC1000 cone crusher. Key features, according to MPS, are the 1,000 mm (40") cone chamber (which handles an all in-feed to enable attrition crushing), an all roller-bearing design (optimises crushing efficiency), hydraulically-adjustable closed side setting, and a weather protected, robust, user-friendly control panel.

Terex will also be displaying two inclined screens and an impact crusher at Intermat.

The company will display two Finlay screens; the heavy duty 863 and 684 inclined screens. The 863 is described as a "highly versatile and adaptable machine, engineered and built for working in quarrying, mining, construction and demolition debris, topsoil, recycling, sand, gravel, coal and aggregate applications where site space is at a premium."

This forward-facing inclined modular configuration has 2,755 mm x 1,200 mm (9' x 4') top and bottom decks. Depending on the working application of the machine, the screen box angle can be adjusted hydraulically by 14-18°.

The top deck can be fitted with a variety of screening media, including tines, bofor bars, punched plate and mesh. The bottom deck can be fitted with mesh or cascade fingers.

A 1,000 mm four-ply belt feeder, with hydraulic gearbox drive, is fitted to the machine as standard. The hopper has a 5m³ capacity as standard. The machine is also equipped with three hydraulically folding discharge conveyors.

A Deutz 2011 49 kW air-cooled engine is used to power the machine, and the heavy duty crawler tracks, and optional radio remote control unit, make for easier on-site mobility.

Finlay's new 684 inclined screen will also be displayed at Intermat.

Terex is also offering the Finlay I-110RS horizontal impact crusher, which is designed to offer operators and contractors "excellent reduction and high consistency of product shape for performance in recycling and quarrying applications."

Finlay said that, with its tracked mobility, the I-110RS is "capable of working in the most demanding of environments, and features a rapid set-up time and excellent throughput capacity."

The I-110RS features a 1,000 mm x 1,000 mm hydrostatic drive impact chamber with variable speed offering. The advanced electronic control system monitors and controls the speed of the rotor, and regulates the heavy duty vibrating feeder, to maintain a consistent feed of material into the impact chamber while maintaining optimal crushing conditions.

Doosan excavators and wheel loaders launched at Intermat 2012

Doosan Infracore Construction Equipment is launching several new products including the company's first Stage IIIB compliant excavators and wheel loaders. The first new generation crawler excavators include the DX300LC-3 and DX340LC-3 heavy models and the DX180LC-3 mid-range model. Intermat will also see the launch of the new generation DL300-3, DL350-3, DL420-3, DL450-3 and DL550-3 large wheel loaders and the new DL200-3 mid-size wheel loader. These will be shown alongside the company's new DA30 and DA40 articulated dump trucks which are being seen for the first time at the Intermat show.

Powered by Scania selective catalytic reduction (SCR) or Doosan exhaust gas recirculation (EGR) diesel engines meeting the Stage IIIB EU emissions regulations, the new excavators and wheel loaders combine high engine power output with new transmissions and several other features to minimise fuel consumption and provide better performance.

Excavators

In the new generation excavators, the ROPS and OPG certified cab offers 6% more space and direct control through the joysticks, which have new proportional thumb wheel switches and integrated buttons to provide precise, proportional control of attachments.

A new 7-inch colour visual control console has functions controlled both from the instrument panel as well as via a new jog/shuttle control next to the joystick. A new function allows the operator to select and set engine speed, hydraulic flow and pressure for attachments, with several preset positions, is a standard feature.

A new Eco gauge on the control panel helps the operator to lower fuel consumption by providing real time monitoring of fuel rate and actual engine-percent load.

New hydraulic pumps and valves increase hydraulic flow by up to 11% and pressure (350-370 bar) to boost front, travel and power functions as well as increase lifting capabilities and reduce cycle times. At 159 kW, the Doosan DL08K engine in the DX300LC-3 excavator delivers 2% more power at a lower speed of 1800 rpm than the existing DX300LC Stage IIIA model. Compared to the DX340LC, the engine in the new DX340LC-3 delivers 210 kW, a 7% increase in power at a low 1800 rpm.

Workload/hour outputs have increased by an average of 6% and 17% across the different power modes in the DX300LC-3 and DX340LC-3, respectively. In the DX300LC-3, a new travel device has increased the maximum travel speed to 5.3 km/h, while the drawbar pull is increased by 4% to 29,800 kg and lifting capacities have been increased by 6%. The same travel device has increased the maximum travel speed of the DX340LC-3 by 13% to 5.4 km/h and produced a 16% increase in the drawbar pull to 32,200 kg.

The DX180LC-3 excavator is powered by the Doosan DL06 6-cylinder turbocharged diesel engine meeting Stage IIIB engine emission regulations through the use of EGR and diesel particulate filter (DPF) after-treatment technologies. The DL06 engine runs at 1950 rpm and delivers 3% more power [91.2 kW (SAE J1349)] and 15% more torque (54 kgfm) than the engine in the existing Stage IIIA model.

Wheel loaders

The new generation DL300-3, DL350-3, DL420-3, DL450-3 and DL550-3 large wheel loaders have bucket capacities ranging from 3.0 to 5.5 m3. The DL300-3 and DL350-3 wheel loaders are driven by the 9-litre Scania DC09 SCR 5-cylinder diesel engine delivering a maximum power output of 202 kW at 1800 rpm, whilst the DL420-3, DL450-3 and DL550-3 models are powered by the larger 13-litre Scania DC13 SCR 6-cylinder diesel engine, with maximum power outputs of 264, 264 and 283 kW at 1800 rpm, respectively. Powered by the Doosan DL06 EGR diesel engine delivering 118 kW at 2100 RPM, the new mid-size DL200-3 wheel loader has a bucket capacity of 2 m^3.

DX340LC-3

The new wheel loaders have three engine working modes: Eco, Normal and Power, to adapt the machine to different applications, with different engine speeds and gear steps according to the working mode engaged. The Eco bar provides information about fuel consumption in relation to machine performance in real-time, allowing the operator to select the driving profile for the best fuel efficiency.

All new Doosan wheel loaders are equipped with load-sensing controlled, variable hydraulic piston pumps, improving performance and reducing fuel consumption. With load sensing, the hydraulic pumps receive a signal from the MCV informing how much oil is needed.

The new ZF limited slip Type II differential axles provide more durability and a longer lifetime. Rolling resistance for the axles is reduced, improving traction and decreasing fuel consumption.

Articulated dump trucks

Powered by the 6-cylinder Scania DC13 SCR Stage IIIB compliant diesel engine with a gross power output of 368 kW (500 hp) at 2100 rpm, the new DA40 articulated dump truck (ADT) offers a 10% increase in engine power compared to the previous MT41 model. The DA40 also has a 22% increase in gross torque to 2373 Nm (1750 lb/ft) at 1300 rpm.

The increased engine power is combined with SCR technology to lower fuel consumption. Also contributing to the overall 8% reduction in fuel consumption is the new ZF transmission offering eight forward and four reverse speeds.

The DA40 has a higher top speed of 58 km/h (36 mph) and an increased body capacity of 24.4 m³, and the payload has been boosted to 40t without tailgate, an increase of more than 15% over the payload of the MT41.

Building on the success of the popular MT31 model which it replaces, the new Doosan DA30 ADT, which has a payload of 28t, offers many new features in common with the new DA40 to meet customer demands.

Driven by the 5-cylinder Scania DC9 Stage IIIB compliant diesel engine with a gross power output of 276 kW (375 hp), the DA30 offers an 8% increase in engine power compared to the MT31. In combination with the greater engine power, the DA30 also has 30% more gross torque (1873 Nm at 1300 rpm), to produce the powerful rim pull required to work in extreme hauling conditions.

DL450

Rare Element Resources' 2011 drilling assay results

Rare Element Resources Ltd recently announced assay results from 34 rotary (reverse circulation) and two core holes drilled at the Sundance gold project, Wyoming. Rare Element Resources Ltd is a publicly traded mineral resource company focused on exploration and development of rare-earth elements and gold on the Bear Lodge property.

A total of 36 drill holes containing 22,930 feet (6,989m) were drilled during 2011, including 20 holes on near-surface targets within oxide zone mineralisation at the Taylor and Smith target areas and 15 holes representing 416m of condemnation drilling in a proposed tailings disposal site in Section 16 (Figure 1). Additionally, six core holes (593m), were drilled in the Taylor area to define a zone of coincident heavy rare earth element (HREE) and gold mineralisation. Gold exploration activity during 2011 was focused on:

1) step-off drilling from known mineralisation,
2) new target area testing, and
3) condemnation of an area proposed for tailings disposal.

This article covers the results of all the gold exploration drilling in 2011.

John Ray, exploration manager for the company stated, "SUN-116 located at the Smith target area has the highest gold grades and thickest interval of plus 1 g/t Au ever reported for the entire district and is open in two directions. We are excited about the discovery of this new prospect and anticipate determining the size and orientation of its high-grade nucleus.

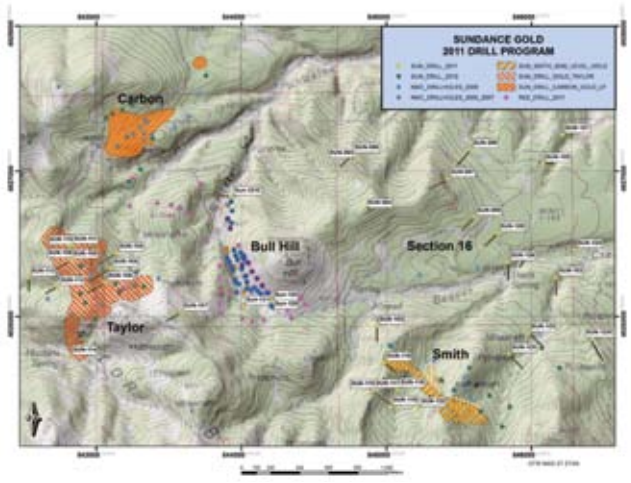

Figure 1: Plan map showing the location of the Smith, Carbon, Taylor, and Section 16 gold target areas within part of Rare Element Resources' Bear Lodge/Sundance property. The gold targets surround the Bull Hill REE deposit. The drill hole collars from the 2011 programme are shown in yellow. Drill-indicated gold-mineralised areas that contain greater than 300 ppb (>0.3 g/t) gold for each target area are shown as ruled polygons.

Most of the holes in the East Taylor area have significant near-surface intercepts of +1 g/t Au. Our goal of the 2011 drilling to find areas of higher grade gold mineralisation was achieved. Over the next few years, additional drilling will be needed to determine the extent of this mineralisation."

Smith gold target

In 2010, drill hole SUN-060 intersected 0.89 g/t Au over 85.5m, including 1.3 g/t over 44.2m along the strike of the main pseudoleucite body in veined phonolite wall rock. SUN-116 is a follow-up hole situated 100m west of SUN-060 and oriented to intersect a mineralised trend believed to be perpendicular to the main zone. Assays from SUN-116 returned 1.21 g/t Au over 176.8m, including 4.5 g/t Au over 24.4m, and penetrated similar host rock of K-feldspar veined phonolite. This represents, by far, the highest grade and thickest gold drill intercept in the 50 year exploration history of the entire Bear Lodge alkaline complex. Drill hole SUN-117, collared west of SUN-116, contains an intercept of 1.35 g/t Au and SUN-118 has 1.24 g/t Au each over

Smith: Significant Intercepts (>20ft and >0.40 g/t Au)							
Hole#	TD (ft)	From (ft)	To (ft)	Length (ft)	length (m)	Grade (ppm)	GT=Gram* Thickness (m)
SUN-115	520	300	320	20	6.1	0.43	2.6
SUN-116	815	165	225	60	18.3	0.49	9.0
		235	815	580	176.8	1.21	213.4
SUN-117	620	125	165	40	12.2	1.35	16.4
SUN-118	545	115	135	20	6.1	0.44	2.7
		245	275	30	9.1	0.41	3.8
		325	365	40	12.2	1.24	15.2
		490	520	30	9.1	0.41	3.7
SUN-119	660	205	225	20	6.1	0.52	3.2
		550	500	40	12.2	0.45	5.5
		615	645	30	9.1	0.61	5.6
SUN-120C	847	Assays Pending					
SUN-122	975	650	670	20	6.1	0.42	2.6
		745	770	25	7.6	0.43	3.3
		810	850	40	12.2	0.44	5.4
		940	960	20	6.1	0.64	3.9
SUN-123	600	460	480	20	6.1	0.51	3.1
		520	550	30	9.1	0.46	4.2
SUN-125	675	605	655	50	15.2	0.45	6.9

Table 1: Selected significant gold intercepts from the 2011 drilling programme at the Smith target area, Sundance project, Wyoming.

widths of 12.2 m. Further to the west, SUN-119 has significant intercepts exceeding 0.5 g/t Au. These data are beginning to define a new target area of noteworthy grade adjacent and perpendicular to the main Smith deposit. The occurrence of open-space K-feldspar veining and the higher grade intervals (up to 11.4 g/t Au) within this new zone are suggestive of a feeder structure.

A half-kilometre east of the main Smith deposit, drill holes SUN-123 and SUN-125 are follow-up tests of 2010 drill hole SUN-069, which contains an intercept of 0.49 g/t Au over 27.4m, coincident with a northeast-trending valley structure. Similar grades over narrower intervals in SUN-123 and SUN-125 suggest potential for a new area of low-grade gold mineralisation. Assays from core hole SUN-120C are pending. Eight rotary holes containing 1,649m were drilled to test areas adjacent to and outboard of the Smith gold resource area (SUN-115 through SUN-119, SUN-122, SUN-123 and SUN-125). Gold mineralisation at Smith is hosted by a steeply-dipping, brecciated pseudoleucite dike that strikes north westerly. The mineralisation extends from the surface to a depth of 300m and remains open at depth.

Taylor gold target

Representative grades within the mineralised plume at Taylor range from 0.42-0.67 g/t Au over thicknesses of 56 to 192m. In 2010, SUN-090 penetrated a higher grade portion of the plume that assayed 1.34 g/t Au over 62.5m with coincident HREE-enriched mineralisation. Eleven rotary holes (2,301m) were drilled at Taylor in 2011 to define a potential minable resource (SUN-104 through SUN-114). The gold mineralisation at Taylor is contained within a plume-like mass hosted by tertiary alkaline intrusions and cambro-ordovician sandstones of the deadwood formation. The mineralisation generally extends from the surface to a depth of about 400 feet (125m).

In 2011, core drilling was conducted in the vicinity of rotary hole SUN-090 to determine controls on the HREE-enrichment and coincident gold mineralization. Results included 1.93 g/t Au over 39.5m, 1.38 g/t Au over 24.7m, and 2.01 g/t Au over 49.2m, respectively (Table 2). In the same cluster and 30m to the east, RES11-31 assayed 0.77 g/t Au over 71.3m from surface to a depth of 234 feet, RES11-32 contains 0.55 g/t Au over 70.7m from surface to a depth of 232 feet, and RES11-33 has 0.49 g/t Au over 49.7m from the surface to a depth of 163 feet. These results indicate an approximate width of 120m for this easterly-trending zone of gold mineralisation and HREE enrichment. Gold assay results are pending for RES11-28

Rotary drill results from the Taylor area are also shown in Table 2. Drill holes SUN-109 and SUN-110 identify the continuation of anomalous gold mineralization to the northwest on the west side of Taylor Ridge, whereas drill holes SUN-104, SUN-105, SUN-108, and SUN-111 effectively cut off gold mineralization on the east side of Taylor Ridge. The gold intercepts in SUN-113, including 0.93 g/t Au over 7.6m, are associated with a cylindrical resistivity anomaly and show potential for the development of another satellite deposit on the west side of the ridge. Drill hole SUN-114 failed to reach its target depth to test historic gold intercepts, owing to poor ground conditions.

Taylor: Signifcant Intercepts (>20ft and >0.40 g/t Au)							
Hole #	TD (ft	From (ft)	To (ft)	Length (ft)	length (m)	Grade (ppm)	GT=Gram* Thickness (m)
RES11-26	139	9.5	139	130	39.5	1.93	76.3
RES11-26A	81	0	81	81	24.7	1.38	34.1
RES11-27	580	6	168	162	49.2	2.01	98.9
		238	268	30	9.1	0.58	5.3
RES11-31	260	549	580	31	9.4	0.69	6.5
RES11-32	385	0	234	234	71.3	0.77	55.2
RES11-33	500	0	232	232	70.7	0.55	38.8
SUN-104	785	0	163	163	49.7	0.49	24.5
SUN-106	680	155	175	20	6.1	0.53	3.2
		20	50	30	9.1	0.42	3.9
		210	250	40	12.2	0.44	5.4
SUN-107	530	590	610	20	6.1	0.42	2.6
SUN-109	750	0	20	20	6.1	0.44	3.2
		0	20	20	6.1	0.42	2.6
		40	125	85	25.9	0.57	14.8
		540	585	45	13.7	0.50	6.8
		700	720	20	6.1	0.75	4.6
SUN-110	750	420	450	30	9.1	0.50	4.5
		595	615	20	6.1	0.41	2.5
SUN-112	630	290	310	20	6.1	0.55	3.3
SUN-113	600	275	300	25	7.6	0.93	7.0
		430	455	25	7.6	0.48	3.6
SUN-114	660	135	160	25	7.6	0.56	4.3
		185	215	30	9.1	0.45	4.1

Table 2: Selected significant gold intercepts from the 2011 drilling programme at the Taylor target area, Sundance project, Wyoming.

Section 16 area

Section 16 is an area east of Bull Hill that is under consideration for a stockpile and waste facility for the proposed REE mine. During 2011, 15 rotary holes aggregating 2,296m were drilled to assess the REE and gold mineralisation potential. Limited drilling of four holes on the west side of Section 16 suggests minimal exploration potential manifested in drill hole SUN-093 by an isolated, narrow gold zone assaying 0.46 g/t Au over 7.6m and thin and sparse FMR (iron-manganese-rare earth) dikes. Most of the remaining holes were drilled in the central portion of the section (Figure 1). Although no significant REE mineralisation was encountered, anomalous gold mineralisation is identified in four holes.

Section 16: Significant Intercepts (>20ft and >0.40 g/t Au							
Hole#	TD (ft)	From (ft)	To (ft)	Length (ft)	length (m)	Grade (ppm)	GT=Gram* Thickness (m)
SUN-093	500	75	100	25	7.6	0.46	3.5
SUN-098	620	425	460	35	10.7	0.75	8.0
SUN-099	635	585	615	30	9.1	0.73	6.7
SUN-101	385	305	325	20	6.1	0.40	2.5
		360	385	25	7.6	0.50	3.8
SUN-103	505	465	505	40	12.2	0.41	5.0
SUN-126	600	265	410	145	44.2	0.58	25.7
		490	510	20	6.1	0.41	2.5
SUN-128	590	105	130	25	7.6	0.44	3.3
		240	265	25	7.6	0.45	3.5
		355	375	20	6.1	0.47	2.9
		480	535	55	16.8	0.43	7.2

Table 3: Selected significant gold intercepts from the 2011 drilling programme at the Section 16 area, Sundance project, Wyoming.

Ahead of the herd

by Richard Mills

Critical, or strategic, materials have been described in various ways, with perhaps the clearest being the following two definitions:

First, that a critical material is a commodity whose lack of availability during a national emergency would seriously affect the economic, industrial and defensive capability of a country. Second, that critical materials are natural resources that have a threatened supply availability and are a necessity for technology that is experiencing growing demand.

The French Bureau de Recherches Géologiques et Minières rates high tech metals as critical, or not, based on three criteria:

- Possibility (or not) of substitution
- Irreplaceable functionality, and
- Potential supply risks.

So, what are the critical materials?

In its first Critical Materials Strategy Report, the US Department of Energy (DOE) focused on materials used in four clean energy technologies:

- Wind turbines (permanent magnets)
- Electric vehicles (permanent magnets and advanced batteries)
- Solar cells (thin film semi conductors), and
- Energy efficient lighting (phosphors).

The DOE says they selected these particular components for two reasons:

First, because the deployment of the clean energy technologies that use them is projected to increase, perhaps significantly, in the short, medium and long term. Second, because each uses significant quantities of rare earth metals or other key materials.

The DOE defines 'criticality' as a measure that combines importance to the clean energy economy and risk of supply disruption.

The European Union last year listed 14 raw materials that it said are "an essential part of both high tech products and every-day consumer products, such as mobile phones, thin layer photovoltaics, lithium-ion batteries, fibre optic cable and synthetic fuels but their availability is increasingly under pressure."

Critical listing

Taking the metals from the various lists, gives us antimony, beryllium, cerium, cobalt, dysprosium, europium, fluorspar, gadolinium, gallium, germanium, graphite, helium, indium, lanthanum, lithium, magnesium, neodymium, niobium, palladium, platinum, praseodymium, rhenium, samarium, selenium, silver, tantalum, tellurium, terbium, tungsten and yttrium.

In its December 2011 report entitled Critical Materials Strategy, the US DOE examined the role that rare earth metals and other key materials play in clean energy technologies, such as wind turbines, electric vehicles, solar cells and energy-efficient lighting.

Five rare earth metals (ysprosium, neodymium, terbium, europium and yttrium) are considered to be the most critical of the elements considered in the report.

It is often said that each of these metals represent a market of less than a few billion dollars in a $50,000 billion economy, so they don't matter, they are inconsequential and are not really investable.

Let's look at why they matter.

The current size of the rare earth sector is estimated at $10-15 billion annually, and global production is about 120,000-130,000 tpa of rare-earth oxides. China provides 97% of the world's REE production but, according to the US Geological Survey, China only has 48% of the world's known reserves of rare earths. Demand inside China is growing at a faster rate than outside of the country, and, as a consequence, China has been imposing export quotas on rare earths which has created two separate rare earth markets – an internal Chinese market and a global one.

The Chinese export quota for the year sets the global supply and price of REEs. Demand forecasts indicate steady growth. In the next five years, Chinese demand for REEs is expected to grow between 7-12%. In the magnet industry, demand for neodymium is expected to grow by about 10% per year. The shift away from electromagnetic systems towards permanent magnetic-based direct drive systems is increasing demand for these high powered magnets.

The continuing miniaturisation of electronic devices (such as disk drives and micro motors) is possible because of the ability of rare earth magnets to combine high magnetic strength with a small size and weight. Rare earth oxides are the building blocks used to produce magnetic powders, these powders are the primary material used in the manufacture of rare earth permanent magnets (processing specific combinations of elements results in distinct magnetic and physical characteristics).

The main REE oxides consumed in the manufacture of neo and samarium-cobalt permanent magnets are; neodymium, samarium, some dysprosium and praseodymium.

Neodymium is the key to making the highest-coercivity rare earth permanent magnets (the superior high strength permanent magnets used for many energy related applications) and even the most efficient turbines require approximately 1,000 kg of neodymium for each megawatt of electricity to be produced.

The flow of electrical signals on every printed wiring board used in electronic devices is regulated and controlled by the use of dielectric chips known as multi layer ceramic capacitors (MLCCs). Many use rare earth formulas containing lanthanum and neodymium.

Magnetic technology rates as the most important use of REEs due to its many uses in green technologies and military applications. The two primary rare earth magnets are the samarium-cobalt (SmCo) magnet and the neodymium-iron-boron (NdFeB) magnet. The SmCo magnet is able to retain

its magnetic strength at elevated temperatures. Because of its thermo-stability, this type of magnet is ideal for special military technologies. These technologies include precision-guided munitions (smart bombs).

Each rare earth element has different end uses and applications, and is produced in different quantities (certain rare earths, including neodymium, are already in a supply deficit, both in China and in the west).

It is not the size of an individual REEs market, or even the whole critical materials market, one should consider. Rather, it is the manufacture of value added products enabled by these materials that counts. We are no longer talking a billion or two, we're talking hundreds of billions, perhaps trillions of dollars.

Critical materials, and their value added markets, should be on every investors radar screen. Are they on yours?

Richard Mills describes himself as "host" of www.Aheadoftheherd.com, and that he invests in the junior resource sector.

Penny & Giles' joy sticks

Penny & Giles, a business group of Curtiss-Wright Controls and designer and manufacturer of high precision sensing technology, is experienced in providing solutions for monitoring and control under extreme operating conditions. The Penny & Giles range includes rotary and linear position sensors, tilt sensors and joystick controllers, all of which are used extensively throughout the off-highway equipment industry.

Penny & Giles joystick controllers are used for numerous specialised transport applications. Its range of finger- and hand-operated joystick controllers are designed and developed for smooth, precise control of critical functions where a human-machine interface (HMI) is required. Available in single-, dual- or multiple-axis configurations and with ergonomic handle styles to enable superb proportional control, each model has a range of selectable options for the most comprehensive joystick-to-application matching.

An option that is proving popular with many OEMs, and one that Penny & Giles believes is the future of joystick controller technology, is the use of contactless, Hall effect sensors. These sensors provide reliable and accurate output signals and benefit from a second output to enable error checking of system integrity and also, for example, triple the operational life of the company's JC6000 from an already impressive 5M operations, to more than 15M.

A relative newcomer to the JC6000 range is a heavy-duty, single-axis version. The new higher-strength, return-to-centre joystick is ideal for use in arduous conditions or applications including heavy machinery where high across-axis loads can be an issue. The increased strength of the heavy-duty JC6000 is achieved by redesigning the body casting, which the company claims has increased across-axis fatigue life by a factor of five. The heavy-duty version also uses a new gaiter to accommodate the increased strength of the body casting.

The JC6000 is available with long-life potentiometer track sensors with auxiliary contacting directional switch tracks; single/dual non-contact Hall effect sensors (or a combination of both); Can (J1939) and Can-extended input interfaces; and is designed to share all standard JC6000 handles and grips.

Another recent introduction is the single-axis JC1500, which has evolved from the JC6000 and is designed for heavy-duty applications such as specialist off-highway vehicles and aerial work lifts and platforms, especially where reliability and strength are required.

Penny & Giles is also developing the JC1500 to produce a new heavy-duty joystick controller with all-round, high-strength features that will make it ideal for applications such as skid-steer, where operators typically use hydraulic joysticks.

Penny & Giles group

Penny & Giles joy sticks

Five Sandvik LH514 LHDs ordered

Following the deployment of three LH514 14,000 kg LHDs at its South Deep gold mine about 45 km south-west of Johannesburg, Gold Fields has placed a new order with Sandvik Mining for five more units for South Deep.

This order follows in the wake of the recent underground commissioning of a Sandvik DS210L-M underground bolting rig; the only fully mechanised rock bolter available in the South African mining industry. Sandvik's Sam Kader says, "South Deep originally utilised our Toro 1400 LHDs before introducing its successor, the more advanced LH514."

The first of the five new units, scheduled for delivery in March 2012, will be followed by a staggered delivery of the remaining LHDs over the course of the year.

The LH514 is a slightly more heavyweight machine than the old Toro 1400 product line and features excellent bucket fill capabilities, engine power to own weight ratio and turning radius. It has a trouble shooting and diagnostics facility via an on-board electronic control system, based on Canbus technology.

An LHD typically has more than 800 electrical connections. On the LH514, Sandvik has reduced the number of connections to about 150 by switching to Canbus technology. The LH514's advanced electrical system has wiring that harnesses Deutsch DT connectors for increased reliability and ease of service. The machine's load-sensing hydraulics feature reliable piston pumps that deliver power only where and when needed. A stronger bucket also contributes to the increased life of the unit. Safety features include ground level daily maintenance, three point mounting and dismounting, Posi-Stop brakes, fall protection systems, fire prevention, a lockable main switch as standard and efficient lighting.

The Sandvik LH514 features excellent bucket fill capabilities.

Sandvik launches two new trucks

Sandvik Mining has launched two new underground trucks: the TH550 and TH540 are the first in the underground mining world to offer energy efficient and low-emission EPA Tier 4i/Euro Stage IIIB engines. Compact and agile, they offer the biggest payload per envelope size and empty vehicle weight.

The TH550 and TH540 are based on “the old workhorses”, Sandvik T50 and T40. One of the main advantages of these trucks is the optional Tier 4i/IIIB engine that consumes less fuel, produces fewer emissions and has better torque characteristics for trucks than its predecessors. Currently, the TH550 and TH540 are the only trucks in the market available with these engines.

The TH550 and TH540 have new features, such as the possibility to conduct all daily maintenance from ground level and a new cabin.

The Tier 4i/IIIB engines cut operational costs through lower fuel consumption, and a reduction in ventilation requirements. Uptime hours are increased with practical, time-saving features such as a large tank capacity, centralised ground level maintenance and easily cleanable radiators. The new cooling system, even safer electrical wiring, new steering cylinders and durable tyres, combined with the other new features, are designed to increase operating hours per year and extend the overall service life of the trucks.

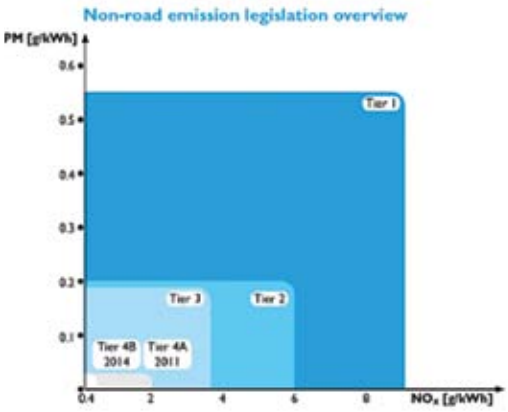

Figure 1. Non-road emission legislation overview

New underground mining truck

New refuge for MineARC

A new range of ultra-portable refuge chambers has been announced by MineARC Systems. The company says the chambers are designed for "tight underground confines, such as single entry headings and development areas."

The hard rock mine – extra low voltage portable (HRM-ELVP) chambers are available in both four- and six-person configurations. The units use what MineARC says is a revolutionary extra-low-voltage control system to power the chamber's internal life-support systems. This means the chambers require no permanent connection to mains electrical power (charging is required only once every three months).

Both the HRM4-ELVP and 6-ELVP can therefore be positioned and repositioned with ease, says MineARC, which, it says, is ideal for development areas where continuous drilling and blasting carries on in front of manned units.

MineARC claims the operational flexibility of the HRM-ELVP range, along with its small robust design, allow it to be positioned where standard refuge chambers can't, and so providing personnel working in confined areas with a safe place of refuge should an emergency arise.

The HRM-ELVP range supersedes the HRM-PLP (powerless portable) range.

New excavator solution for GE

GE Energy has introduced what it describes as a "new AC excavator solution" for challenging surface mine applications.

In the increasing pressure to improve energy efficiency, GE said it is offering its customers AC excavator systems as an alternative to the traditional DC excavator system.

GE's senior product manager for motors, Nimesh Sharan, said mining owners and operators are migrating to AC systems in general. AC excavator systems are, he claimed, more energy efficient, and, because they utilise less mechanical parts, they tend to require less personal care and maintenance.

GE's AC excavator solution is described as a complete electrical drive solution comprised of a family of AC motors, drives, controls, engineering and field services. GE said that heavy equipment original equipment manufacturers and earth-moving equipment owners can apply this solution in their draglines, shovels and blast-hole drills.

GE's senior marketing manager for motors, Justin Forbes, claimed that the company's solution is truly unique in the industry, adding that GE's end-to-end solution includes up-front application engineering, rugged, field-tested equipment and field engineering support for installations.

Uson Optima vT leak and flow tester unveiled

Uson Corp has designed leak detection equipmetn for mining equipment manufacturers and their suppliers that can be configured to their unique test application requirements. The Uson OptimavT leak and flow tester includes one or two test channels with four sensors each, totally customisable pneumatics, multiple built-in automated calculators, myriad data handling and storage options.

R&D for the multi-function single or dual channel configured Optima vT leak and flow tester began in 2009 and incorporates Uson's knowledge using the adaptable two-channel 8-sensor technology.

Uson first developed dry air leak testers for NASA almost 50 years ago and then introduced to commercial applications.

The company lists the following key features of the Optima vT leak and flow tester:

- Capabilities for vacuum decay tests, pressure decay leak testing, differential pressure decay leak tests, mass flow leak detection (including back pressure and differential), upstream and downstream cracking pressure, pressure rise tests,burst tests, laminar flow tests, force decay testing, and occlusion testing
- Micro controllers comparable to those used in the most sophisticated and demanding consumer electronics applications
- Two channels with up to 4 sensors/ channel, totalling up to 8 sensor inputs
- Simultaneous testing on all sensor inputs
- Built-in automated calculators to speed testing and data handling
- Large easy-to-read full color touch screen display with intuitive user interface.

Uson is headquartered in Houston, Texas, and has additional offices in Detroit, UK and China.

New hydraulic breaker HB 4100 from Atlas Copco

Atlas Copco presents the new hydraulic breaker HB 4100 at Intermat. With its reduced weight and better performance than its predecessor, it means that similar results can be achieved with a smaller hydraulic breaker. A lighter breaker also means that a smaller excavator can also be selected. That saves investment and operating costs according to Atlas

With a service weight of 4,100 kg, the HB 4100 is suitable for carrier machines from 40-70 t. All proven features of the heavy hydraulic breaker series from Atlas Copco are also found in the new HB 4100: the VibroSilenced system to protect operators against noise and vibrations, PowerAdapt, which switches off the breaker in the event of a hydraulic overload, AutoControl, for the adjustment of the blow frequency and blow energy to the hardness of the stone, as well as ContiLube II, the integrated, automatic lubrication apparatus. With StartSelect, the operator can influence the start-up and shutdown behaviour of the hydraulic breaker. The optional of DustProtector, means the breaker is protected against the penetration of dust and rock particles into the lower part of the breaker.

HB 4100 DP front

WS Tyler launches pro-deck vibrating screen system

WS Tyler, a wholly owned subsidiary of German Haver Screening has launched the pro-deck system to implement an analysis and modification strategy in processing operations, by selecting the appropriate type of screen media according to the three phases of screening.

Traditionally, processing operations tend to use the same screen media on each deck of the vibrating screen. Material travelling over a screen undergoes three different phases. WS Tyler calls these phases layered, basic and sharp screening phase. With each phase of the screening functioning differently, a customised screen media approach helps tailor the screen media to each phase accounting for the two most important factors in screen media – open area and wear life.

In addition to considering the phases of screening, the pro-deck approach also evaluates material characteristics, the current functioning of the plant and final output qualities to ensure the best blending of screen media. Adjustments to the screen media are made one section at a time. With analysis of material characteristics and adapting the screen media to accommodate wet, dry or even abrasive materials, the pro-deck approach becomes a scientific approach to screen media.


pro-deck vibrating screen system

Using self-developed vibration analysis tools, WS Tyler's screening experts ensure that the machine is working within operational parameters that cater to the application requirements of the material. The screening expert then determines the critical deck and section(s) within the screen. On the basis of screen performance as well as the wear experienced on the section(s) and deck, a recommendation for screen media modification is made. Upon installation of the new screen media, the results are measured and documented and the focus is laid on the next section(s). This process continues until all recommendations are implemented to the screen.

Micromine launches new managed services solution

At the Prospectors and Developers Association of Canada (PDAC) Annual Convention and Trade Show 2012, Micromine showcased its mining and exploration software, and launched its new managed services solution, which forms part of the Geobank data management solution.

The new managed services solution has been designed for organisations to outsource elements of their geological data management function. Included in the managed services solution is a hosting service, which is delivered by the provider DataGate. This data centre is designed to avoid the potential for any single point of failure in connectivity, power or climate control.

TMS keeps its finger on the pulse of tyre pressure

UK electronic product designer, AM Bromley has launched a new addition to its tyre monitor system (TMS). The TMS sensor reader is a handheld diagnostic tool that can be used to provide real-time tyre pressure information for any large off-road vehicle fitted with a TMS sensor.

Maintaining the right inflation pressure of off-road tyres is the single most important factor in maximising their use and longevity. The TMS system integrates internal and external tyre pressure sensors with a data management system that means drivers and managers have direct access to key tyre performance information via cab interfaces and PC programs while their vehicles are in service.

The addition of the TMS sensor reader means that vehicle managers have on-site access to performance-critical information. When pointed at a tyre fitted with a TMS sensor, the TMS sensor reader will identify the sensor's unique code and instantaneously relay tyre pressure, temperature and battery status information to the operator. It has a robust enclosure, backlit display and recharge time of 1-2 hours.

TMS sensor reader

Efficient security light uses 70% less energy

A new security and floodlight for mining and quarrying applications uses up to 70% less energy than the halogen equivalent and lasts 30 times longer is the claim from UK based Marl International.

The new light uses LED technology, and is designed to illuminate surface and underground mining operations. According to the company, it offers operators a typical payback period of two years, as well as a greatly reduced carbon footprint.

Designed and manufactured in the UK, the new Marl 748 series floodlight is 10cm deep, and delivers 3,000 lumens from an input power of 56W, equivalent to a 200W halogen floodlight. The floodlight has a rated life of 60,000 hours, equivalent to over 13 years at 12 hours per day. In this time, a halogen floodlight would need to be replaced 30 times, based on a standard life of 2,000 hours. Marl is offering a five-year guarantee on the light.

Marl 748 series floodlights are based on Osram Golden Dragon Plus LEDs, packaged in a robust die-cast, powder coated aluminium housing protected by tempered glass. The units are weather-proof, being sealed to IP66 standard, and are suitable for operation between -30°C and +45°C. Marl has designed the floodlight in accordance with world-wide electrical safety standards. An optional dusk-dawn sensor can be fitted to bring the light on when ambient light levels drop below a pre-set level, and it weighs 8.1kg.

NanoSteel wear pipe at uranium mine to save $1M

US based NanoSteel Co, a supplier of coating technologies has supplied an ID clad wear pipe application in a uranium mine that has been projected to last more than 17 years by mine engineers and save the customer more than $1M in replacement costs.

Canadian government regulations require spent sections in uranium mines to be completely encased in concrete. A uranium mine in northern Saskatchewan has been experiencing severe wear in a critical piping system which delivers concrete to underground mining operations. The previous system utilises API L80 steel pipe which requires replacement every 16 months due to continuous slurry abrasion.

Seeking an alternative which will significantly increase wear resistance and last the remaining life of the project, the mine installed a delivery system with NanoSteel's SHS 9800 alloy welded to the inside diameter (ID) of the steel pipe. Mine engineers have projected the NanoSteel ID clad wear pipe to last 17.5 years, an increase in wear life by a factor of greater than 13.

NanoSteel wear pipe ID cladding is applied by a process developed by Trimay Wear Plate Ltd using technology under licence from NanoSteel. The NanoSteel Co Inc is headquartered in Providence, Rhode Island, US. It designs and sells patented nanostructured alloys for thermal spray coating and weld overlay for hard facing and wear plate applications. NanoSteel's super hard steel alloys provide exceptional resistance to corrosion, erosion, impact and wear.

New iPhone application for conveyor users

Minnesota-based Superior Industries, a US manufacturer of conveying equipment, has announced a conveyor 'app' for the iPhone. Known as ConveyCalc, the free app includes calculator functions for operating costs (where variable costs can be input), stockpile volumes, belt capacities, horsepower and conveyor lift.

The app is compatible with iPhones running iOS 5 software.

Permanent refuge chambers

In the past few months seven permanent chambers have been installed by manufacturer MineARC Systems, across Australia,Turkey and the Philippines, in new and existing excavations. They often double as lunch rooms.

The MineARC permanent hard rock has been designed to clean the air of harmful gases and toxins from within confined spaces. It offers a practical alternative to the standard 'portable' refuge units, where constant maneuvering of chambers is not required or large numbers of miners require refuge. Unlike portable refuge chambers, permanent chambers can offer up a host of variable factors which require careful consideration before a suitable refuge solution can be implemented. The most critical aspect for designing a permanent refuge chamber is the volume of the chamber versus the number of occupants. This ratio is critical for determining a number of factors; the 'dead air' space available, compressed air flow regulation, the size of the scrubber, and the amount of metabolic heat generated for sizing a cooling and battery backup system. All of these factors are calculated by MineARC using proprietary models. To perform the technical engineering evaluation the following information is required:

- Volume of refuge station
- Number of persons
- Entrapment duration (36 hours is MineARC standard)
- Bulk head material
- Bulk head thickness
- Maximum external temperature
- Surrounding rock type

MineARC permanent refuge technology is capable of sustaining up to 150+ occupants in a single confined space. Most recently, Argyle Diamond Mines Australia installed two 80 person lunch room conversions at it's underground sites in northern Western Australia. In North Eastern Turkey, Inmet Mining implemented life support systems in two 30 person lunch rooms at Cayeli Bakir mine site.

Longer bearings life

Ohio-based Timken Co has announced what it claims is a 10% increase in calculated load ratings for its tapered roller bearings. The company said "with advanced technology engineered into the bearings, performance assessments warrant this increase in predicted life across 20 product types."

The company said "based on extensive lifecycle testing, Timken's higher performance ratings translate into greater value, with longer predicted useful bearing life and heavier load-carrying capacity than previously published."

Timken's senior VP of technology and quality, Douglas Smith, claimed "as the tapered roller bearing technology leader, Timken continually enhances this core product line."

Henry Timken patented the original Timken tapered roller bearing design in 1898. Soon afterward, he and his sons founded Timken to manufacture these breakthrough bearings. Since then, the company has applied its technical expertise to offer customers a growing portfolio of bearing and mechanical power transmission products and services.

Single roller bearing

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Contacts

Publisher: Trevor Barratt
info@tradelinkpub.co.uk

Advertisement Sales Manager: Kevin Barratt
sales@mqworld.com

Database Manager: Carol Chambler
info@tradelinkpub.co.uk

Graphic Designer: Karen Wardale
studio@mqworld.com

General enquiries:
Tel: +44 (0)1777 871007
Fax: +44 (0)1777 872271
E-mail: info@mqworld.com
Web: www.mqworld.com

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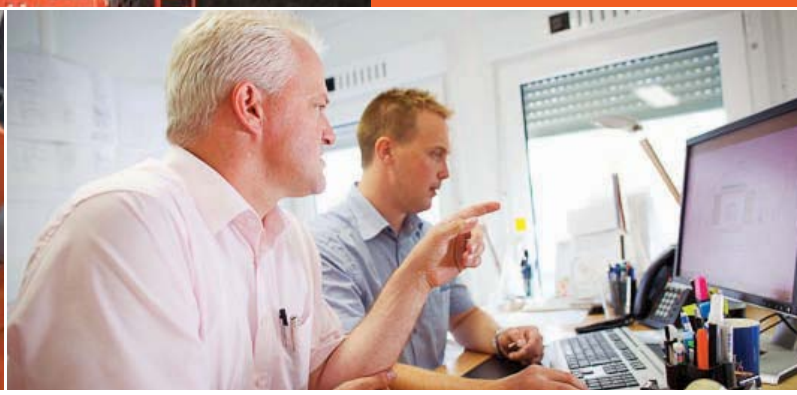

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