



DELIVERING ON CLEAN ENERGY

Opening the Maptek[™] 2012 Users Conference last month, keynote speaker Gus Nathan said that integrating existing technologies can quickly bring innovative solutions to sectors such as mining.

Before forming the Centre for Energy Technology, Nathan led a team of 23 researchers who spent 7000 hours devising the flame for the Sydney Olympic relay torch. Challenges included developing a combustion system which was stable in extreme weather, visible to millions of viewers, lightweight and safe.

The patented, award winning technology was also used for the relay torch and cauldron flame in Athens in 2004, with components still in use today.

The successful outcome was a direct result of an organic research culture based on shared interest, innovation and teamwork.

Nathan covered the transition to the CET which now identifies national and international priorities, sets goals and strategies and then collaborates with global partners to deliver cleaner energy.

Nathan, who describes himself as a technology agnostic, adopts a systems view, researching hybrid technologies to reduce the cost of renewable energy.

He outlined several CET research projects investigating solar thermal hybrids to deliver energy more efficiently while reducing carbon emissions.

'Hybrid simply means bringing together 2 or more energy sources. Often we hear that clean coal is at one end of the spectrum and solar, wind and renewable energy are at the other, but as engineers we think about engineering synergy,' said Nathan.

'A thermal cycle needs a heat source such as a boiler or receiver, and a heat sink, such as a condenser. If you share the heat source and share the condenser, energy savings are possible. It doesn't matter if the heat comes from solar, geothermal or combustion.'

'We're also working on new ways to integrate collection from different energy sources to further reduce costs. A mining company investing in a new mine with a life of 40-50 years must consider their energy requirements, since it is typically one of their biggest costs.'

'Who knows what the price of diesel will be next year, let alone that far down the track. We see big potential in locally generated energy, like using coal and adding a renewable component with solar heat.'

Solar energy can also be used directly in various mining processes, such as comminution. One of the hungriest energy consumers in the mining process - the crushing of rock - can be more efficiently handled than the sledgehammer approach of electricity and hammer mills.



Professor Gus Nathan, keynote speaker at AUSTRALIA 2012 Users Conference

'We will continue to apply the lessons learnt from the Olympic torch project - valuing team contributions, investing in our reputation and exceeding our commitment to our partners.'

'The mining sector is a field where we can apply our strengths and realise our potential,' concluded Nathan.

Miners' lanterns are the only combustion technology approved for transport by airplane. When the 'original flame' is captured from the sun in Athens every 4 years to fire the relay torch, it is also used to light 3 lanterns. This means the torches can be re-ignited at any time from the original source burning in the lanterns.

> In this issue

Meeting the survey challenge Modelling waste stockpiles A day with BlastLogic Focus on Users Conferences Global news and views

MEETING THE SURVEY CHALLENGE

OZ Minerals Prominent Hill operation has refined surveying techniques and improved accuracy of results with the I-Site[™] laser scanning system.

Introduced to site 4 years ago, the Maptek I-Site 4400LR laser scanner and vehicle mount are used with I-Site Studio at the large copper operation 650 km northwest of Adelaide, South Australia.

The I-Site system has proved to be very effective at delivering accurate endof-month data for pit surfaces, ROM, concentrate and coarse stockpile volumes.

Active work areas are scanned daily. Scanning is completed within a couple of hours each shift. The pit model is updated daily to ensure that the engineers have access to the latest data. By keeping the pit model updated daily, the end of month pit model is just another daily face update.

ROM volume reconciliations are critical at Prominent Hill. Since stockpiles are large, with up to 10-metre faces, surveying on foot would present a monumental undertaking each month.

It would be possible to complete the entire ROM stockpile surveys in around 60 scans in a single day using the laser scanner and vehicle mount. This would not be possible on foot.

However due to daily pit model updates, ROM surveys are captured over 2-3 days. The scanner also provides exceptional definition of paddock dumps.



GPS rovers are attached to the vehicle to orientate data when using the I-Site scanner on the vehicle mount. I-Site Studio software then effectively corrects the final adjustment, using large dataset physical features to swing data into accurate orientation.

Fit for purpose tools in I-Site Studio mean processing time is also reduced. Large datasets are easily loaded, registered and modelled.

Crushed ore and concentrate stockpiles are also surveyed at Prominent Hill. The scan data is filtered, modelled and despiked, with volumes easily calculated by comparing the new surface model against a standard reference base.

Using the I-Site laser scanner has vastly improved end of month survey at Prominent Hill. Geology and engineering departments are benefitting from the accurate data, heavy equipment down time has been reduced, as has the survey workload for end-of-month tasks.

Safety has been improved with access no longer needed to active working faces. Time in the field is reduced and processing in the office is quick and easy. /2

Thanks to Ben Roberts Mine Surveyor, OZ Minerals Ltd Presented at AUSTRALIA 2012









- 01 Daily pickups are used to update the pit model
- 02 Overlaying the surface model confirms data is accurately geo-located
- 03 I-Site Studio tools follow the survey workflow
- 04 Crushed ore stockpiles can be safely surveyed
- 05 Concentrate stockpiles are surveyed with I-Site



Prominent Hill open pit at May 2012, measuring 250 m deep and 1.4 km wide

MODELLING WASTE PILES

Energy Resources Australia (ERA) Ranger Mine in Kakadu National Park in the Northern Territory uses Vulcan[™] for stockpile modelling in preparation for reclamation and rehabilitation.

Ranger Mine is one of the most scrutinised mine sites in the world. Located in the middle of a protected national park, the open pit uranium mine must meet strict Australian government regulations.

Mining commenced in 1981, with the original orebody mined out by the end of 1995. A second orebody, Pit 3, commenced operations in 1997 and will be completed in the next 6 to 8 months.

Waste and low grade stockpiles have been kept on site for rehabilitation since the start of mining operations. Loss of corporate knowledge meant little data was kept on the contents of the stockpiles.

From 2006 to 2011 ERA undertook successive drilling campaigns to identify the composition of the stockpiles. Holes were gamma probed and chemically assayed on 1 metre intervals. Grade estimation into a stockpile resource block model was performed using Ordinary Kriging.

However as stockpiles change over time, the characteristics differ from an in-situ resource model. Assumptions had to be made regarding grade distribution.

Senior Resource Geologist, Stephen Pevely, decided that there had to be a better way to keep track of the grade stored in stockpiles and enlisted Maptek help to integrate data from a variety of sources in Vulcan.

Using a lava script, ERA was able to take data from an SQL database used for monitoring truck movements around the mine. From this a Vulcan samples database was created, providing the ability to sequentially flag block models and polygons to record each stage. This enabled estimation of the grade within the incremental block model.

Each load dumped by a truck has a discriminated grade value. Using the X, Y coordinates and resetting the value of the Z in the SQL database, the GPS truck data is of great value when tracking the movement of material to the stockpiles.



The stockpile model is current, robust, relevant and usable for end of year resource and reserves reporting, mine scheduling, and closure and rehabilitation studies.

Ex-pit multi element data sourced from insitu MIK model is regularised between same end of month surfaces. This is then used to populate multi-element variables in the stockpile block model.

The stockpile destination polygon names are flagged and put into the model. The grades are estimated into blocks using Ordinary Kriging parameters derived from the original drilling studies.

This new incremental stockpile is then added to the previous model providing an overview of the changes in the stockpile over time.

Since this method is highly dependent on the integrity and accuracy of modelled topography, advanced techniques such as laser scanning would be beneficial for optimising volume reconciliations and speeding up survey pickups.

This innovative approach to stockpile monitoring allows Energy Resource Australia to schedule low grade stocks as mill feed as backfilling progresses. It adds value and certainty to the backfill and reclamation process, which is imperative on a mine site where environmental and rehabilitation standards are paramount. A

Thanks to Stephen Pevely Resource Geology Leader, ERA Presented at ALISTRALIA 2012







- 01 Ranger Mine site
 02 New incremental model created between old and new quarterly EOM topographic surfaces
- 03 Multi element data sourced from insitu MIK model regularised between same EOM surfaces
- 04 Grades estimated into blocks using parameters from 2010 drilling studies, showing current and previous models merged

AUSTRALIA 2012



Visit facebook.com/maptek for more photos from AUSTRALIA 2012 Maptek Users Conference

MAPTEK FORGE

Darryn Tracy - 12737 steps

Honourable mentions Pete Manning - 132,4 Andrew Prentice - 1

> DENVER, COLORADO October 24-26 info@maptek.com



A DAY WITH BLASTLOGIC

Claire, second day on the job in a drill and blasthole dipping crew, quickly uses the Maptek BlastLogic™ Tablet to jot down hole depths as the other members of the dip crew yell the figures out to her.

The GPS tracks where she is on the pattern, showing the design holes in close proximity. Data entry is easy, even in the bright sunshine, and the team moves down the bench, completing the work in a single sweep. No paper pages are lost in the mud and no need to decipher illegible handwriting back in the office.

Meanwhile, surveyor Jeff sees Claire's dipping data appear on his BlastLogic application screen as the team progresses. Jeff also verifies the automated data feed from the drill navigation system, matching actual versus design collar locations via a graphical view.

He signs off on all the data after inspecting the reported depths interactively in 3D on a large dual screen display. At the touch of a button, a summary report highlighting depth accuracy to plan is produced.

He emails the PDF to his boss. Another copy is printed at A3 size and pinned to the mess board to show the drill crews how they performed in the last shift.

Now that the integrity and accuracy of the drilling is verified, water table measurements from the dip crew are overlaid in 3D onto the pattern visualisation. At a glance, it is obvious to blast superintendent Rick, that wet blast product is going to be required in differing amounts for several of the holes. Using BlastLogic software, he is able to calculate a custom charge plan for each hole based on the latest measurements of water depth, wet sides and predicted fallback.

He rotates the resulting charge plan in 3D to verify the decking and standoff distances around the mineable unit. Summary totals of products required are quickly compared to the last bench preparation.

They are spending less on product this blast than ever before and hope to continue to improve dig rates.

Rick's supervisor Brian looks at the summary report, signs off on the blast and the green light is given for loading the pattern. Rick generates charge sheets broken down by hole to match the familiar workflow of the explosive truck fleet and briefs the crew.

He shares the charge sheet with truck fleet and blast crews on the BlastLogic Tablet. The load plan is executed and the blast primed.

Rick, Claire and Jeff all want to see this one go off. Roy is confident in his measurements and knows they have been seen by the right people.

Jeff is confident that drilling accuracy is better than ever now that crews are seeing their own performance and are trying to outdo each other.

Rick is confident in his calculations and that his latest adjustments to the charging rules for this bench will see cost, safety and time targets for this blast met.

Mine manager John is seeing dig fleet numbers improve as his operation's drill and blast process is optimised with better capture of historical successes and failures and more timely availability of current data.

A dispute over metres drilled with the drilling contractor has him asking for a report of the blast just done. Brian has it prepared in a minute using BlastLogic historical searching and analysis. The PDF report arrives in his inbox by the time he returns to his desk with a fresh coffee.

Find out how this typical scenario can become a reality for your operation! Email blastlogic@maptek.com.au to arrange a demonstration.

WELCOMING INNOVATION

Registration is now open for the North American Maptek Users Conference to be held October 24-26 in Denver, Colorado.

- > Hear about new products & features
- > Learn innovative ways to apply Vulcan and I-Site tools
- > Network with industry peers
- > Provide feedback on Maptek products

Speakers attend for free!

Free registration for customer speakers includes a 3-night stay at The Ritz-Carlton Hotel. Please submit a short abstract to info@maptek.com by August 1. You will be notified of acceptance by August 31.

Noted astronaut Colonel Mike Mullane will deliver the keynote address on teamwork, leadership and safety.

After graduating from West Point, Colonel Mullane was commissioned in the US Air Force and saw service in Vietnam as a weapons specialist. He was selected as a Mission Specialist in 1978 in the first group of Space Shuttle Astronauts and completed 3 space missions.

Mullane has been inducted into the International Space Hall of Fame and has received many awards, including the Air Force Distinguished Flying Cross, Legion of Merit and NASA Space Flight Medal.

Visit www.maptek.com to find out more.



JUNE 2012

LOCAL VULCAN PRESENCE

In 2011 Maptek began partnering with Indonesian consulting company, PT Globecon, to improve recognition of Vulcan and boost technical mining services in Indonesia.

One year on, the venture has proved that local knowledge teamed with Maptek's background and expertise is the winning combination in delivering a total technical solution to customers.

PT Globecon delivers technical support and training to roll out new versions and keep users informed about upgrades. This ensures the return on investment in Vulcan software is realised.

'Pairing the proven capabilities and versatility of Vulcan with local support, bilingual training and consulting services, has allowed Vulcan to achieve a unique and popular position in the Indonesian market,' notes Roy Fordham Vogler, President and Director of PT Globecon.

'Access to Maptek's global knowledge base is invaluable for increasing our own expertise, and helps our customers.'

'The number of professionals taking Vulcan training to increase their qualifications and employability, indicates that Vulcan is already viewed as essential to the Indonesian mining industry.'

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NETWORKING IN PERU

Earlier this year, Maptek hosted sessions at the Australian Consulate in Lima, Peru to meet our customers and bring them up to date with the latest Maptek products and services.

At the first event in February, staff from Xstrata Tintaya learnt about a new technique for faster geological modelling using existing Vulcan tools. Applications for the I-Site 8800 long range laser scanner were also demonstrated, showcasing the efficiencies of Maptek's long range survey system.

We also outlined some geostatistical techniques and explained the philosophy behind our 24/7 technical support.



On the second occasion, we networked with customers including La Arena, Rio Tinto Proyecto La Granja, and potential customers such as Hoschild, Cia Minera Quechuas, Bear Creek Mining and MICSAC.

Attendees welcomed the opportunity to meet Maptek staff and were impressed with the latest technology we had to offer.





Maptek staff and customers in the Maptek booth at Expomin in Santiago in April



MINING WORLD RUSSIA

Maptek showcased our products and services at Mining World Russia in Moscow in April.

Benefits and features were promoted to representatives from some of Russia's most successful mining companies, with support from host organisation AustMine.

Russia continues to experience strong growth in the mining sector, with a focus on improving efficiencies. Maptek staff were impressed with the keen desire by mining professionals to understand key features of Vulcan and I-Site technology, which are unmatched in the local market.

VISIT MAPTEK AT THESE TRADESHOWS IN 2012

July 24-26 Queensland Mining Expo Mackay, Queensland, Australia

August 8-10 Australian Institute of Mine Surveyors Cairns, Queensland

August 16-19 Expo Bolivia Minera Oruro, Bolivia

August 29 - September 1 Congreso Tendencia de la Actividad Minera en México - Booth 207 Durango, México

September 8-10 Discover Mongolia - Booth 66 Ulaanbaatar, Mongolia

September 18-19 AusIMM Open Pit Operators' Conference Perth, Western Australia - Booth 5

September 24-26 MINExpo International - Booth 6062 Las Vegas, Nevada, USA

October 23-26 Seminario Internacional de Mineria Hermosillo, Sonora, México - Booth 59

November 19-23 ATEXPO Copiapó, Chile

VULCAN

ANGLO GOLD ASHANTI AUSTRALIA has purchased Vulcan for geological modelling and drill and blast at the new Tropicana open pit operations, around 330 km east northeast of Kalgoorlie in Western Australia.

AURUMAR, a JV between AngloGold Ashanti Limited and De Beers based in Cape Town, South Africa, will use Vulcan for geological modelling. Aurumar primarily mines gold, base metal and other minerals from continental marine shelf deposits.

BARR ENGINEERING, a consulting firm in Minneapolis, Minnesota has purchased Vulcan GeoStatModeller. Barr provides a wide variety of engineering and consulting services to government and industry.

BHP BILLITON IRON ORE will use Vulcan for survey, geology, drill & blast, geotechnical studies, mine planning and short term planning at the Jimblebar Mine in the Pilbara region of Western Australia.

BHP BILLITON MT ARTHUR COAL will implement Vulcan for long and short term mine planning at their open cut thermal coal mine near Muswellbrook in New South Wales. Mt Arthur is the largest individual coal production site in the Hunter Valley of New South Wales, with around 15 million tonnes of run-of-mine coal produced each year for local and international customers.

DIONYSIS MINING PTY LTD in Perth, Western Australia, will use Vulcan for consulting projects.

DULUTH METALS has purchased Vulcan for geological modelling and design of its open pit, iron ore mine in Duluth, Minnesota. Duluth is a Canadian advanced stage mineral exploration company.

EGRM CONSULTING, based in Perth, Western Australia, will use Vulcan for geostatistical modelling.

EXPLORACIONES MINERAS ANDINA SA is a private company held by Codelco and Sociedad de Inversiones Copperfield Ltda. It will use Vulcan for exploration projects.

LUMINANT, a subsidiary of Energy Future Holdings, has purchased Vulcan for geological modelling and mine planning at its open pit coal operation. Luminant is headquartered in Dallas, Texas.

MINERA LUMINA COPPER CHILE SA

has purchased Vulcan modelling, drill and blast, short term planner and haulage profile modules for short term planning at the Caserones project. This large tonnage copper/molybdenum deposit is in Tierra Amarilla in the Atacama Region of Chile. **PARSONS BRINCKERHOFF** will use Vulcan mine design, pit optimiser and scheduling tools for projects from its new office in Johannesburg, South Africa.

PREMIER MINING SERVICES will use Vulcan for mine design consulting projects. Premier is based in Arrowtown, an historic gold mining town in the Otago region of the South Island of New Zealand.

RED ROCK GEOTECHNICAL will use Vulcan for consulting projects from its base in Perth, Western Australia.

The Underground Technology Centre, part of **RIO TINTO TECHNOLOGY AND INNOVATION** group, based in Brisbane, Queensland, will apply Vulcan to projects as part of the technical advice and services it provides to Rio Tinto Group business units in mining and geotechnical engineering.

ROY HILL IRON ORE will roll out Vulcan for geological modelling and grade control at the mine, 105 km northeast of Newman in Western Australia's Pilbara region.

TAKITIMU COAL has acquired Vulcan for geological modelling at its Southland open cast coal mine in New Zealand.

THE MANHATTAN MINING COMPANY, located in Manhattan, Nevada, will apply Vulcan to modelling and mine design at its underground gold operation.

XSTRATA COAL has invested in Vulcan for modelling its exploration and development stage open pit coal project in Vancouver, British Columbia.

XSTRATA COAL SOUTH AFRICA, has purchased Vulcan for geological modelling at the Goedgevonden project, open cast coal mine near Ogies in Mpumalanga.

I-SITE

ASSMANG KHUMANI IRON ORE MINE

near Kathu in the Northern Cape Province, has purchased an I-Site 8800 laser scanner for accurate weekly stockpile measurements and pit model updates, as well as month end surveying of the open cut operation.

BARRICK PUEBLO VIEJO mine has purchased an I-Site 8400 laser scanner for survey of its complex tailing storage facility, where accurate and fast results are required. Applications include as-built models of the dam walls, structural fill and compaction test volumes, surface updates and cut/fill volumes for access roads. Building the dam wall and depositing waste and tailings material will be a 24-hour operation, requiring the scanner to operate at night. Pueblo Viejo mine is located about 100 km northwest of the capital city of Santo Domingo in the Dominican Republic. BHP BILLITON IRON ORE has purchased I-Site 8800 laser scanners for Jimblebar, Area C and Orebody 23 mines in the Pilbara region of Western Australia for surveying active work areas and geological faces.

BHP BILLITON OLYMPIC DAM uranium and copper deposit in South Australia is the world's largest uranium and 4th largest copper deposit. The I-Site 8400 laser scanner and vehicle mount will be used for stockpile surveys and overburden calculations.

CAPSTONE MINING CORPORATION has purchased an I-Site 8400 laser scanning system with I-Site Studio software for the Minto Mine in Yukon Territory, Canada, for end of month survey and stockpile analysis.

ENSHAM RESOURCES in the coalfields of Central Queensland, has added an I-Site 8800 laser scanner and vehicle mount for end-of-month survey.

FIRMATEK of New Braunfels, Texas has added I-Site Topo software to existing I-Site Studio licences for measuring stockpile volumes in the quarry industry.

LES MESURES LASERTECH INC has purchased a vehicle mounted I-Site 8400 laser scanning system with I-Site Topo to increase survey efficiency. Les Mesures, a consulting company in Quebec, Canada, primarily measures stockpile volumes.

RIO TINTO - IRON ORE COMPANY

OF CANADA of Labrador, Canada has upgraded to the latest I-Site 8800 system for month end reconciliation surveys and will use the system to collect geotechnical data.

RIO TINTO IRON ORE HOPE DOWNS, an open pit operation and processing facility 100 km northwest of Newman, Western Australia has acquired an I-Site 8800 laser scanning system.

VALE MOZAMBIQUE has purchased a second I-Site 8800 laser scanner for the Moatize Mine in the province of Tete. The initial system has proved its worth for efficient survey measurement.

XSTRATA COAL ULAN MINE has bought an I-Site 8800 laser scanning system for end of month surveys.



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