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Forge

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Welcome

Welcome to the first edition of *Forge* for 2013.

Maptek is here to bring new technology to the table to help operations maximise their opportunities. Accurate data is the key - information that is up-to-date, comprehensive and in the right hands whenever and wherever it is needed.

Late last year we released two new Maptek products, which are already proving their worth. Eureka streamlines exploration projects, putting users in control of extremely large datasets. BlastLogic is an accuracy management system for improving drill & blast processes.

Development on Vulcan 9 continues apace, with beta testing scheduled for mid year. The new grade control, implicit modelling tools and underground design improvements are some of the upgrades that will make your job easier.

Maptek continues to develop fit-for-purpose I-Site laser scanning solutions. Our signature workflow helps operations to complete their survey tasks safely and on schedule.

We were pleased to meet with many customers at our Australian, North and South American users conferences last year.

The 2013 conference will be held in Brisbane, Queensland from October 21-23. Afternoon sessions will be devoted to hands-on workshops. Make sure you 'Invest in Yourself' by registering to attend!

We hope you enjoy the articles in this issue which outline the benefits of accurate data for improving productivity. In some cases, these have been summarised; you can download the full case studies from our website.



The 2013 running of the Dakar Rally was held in South America for the 5th time in its 35-year history.

The 8000 km route from Lima to Santiago traversed arduous terrain through Peru, Chile and Argentina.

See the back cover of this issue for a map showing Maptek customer locations along the route.



Online training

It is not always easy to leave site to get the training you need. Maptek can deliver one-on-one training that fits in with your daily work schedules.

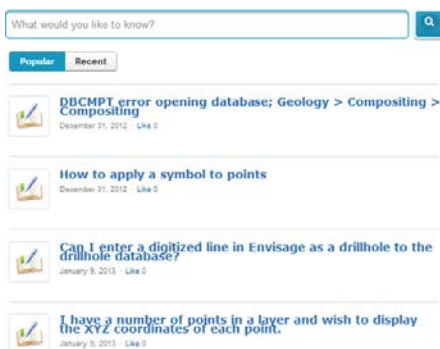
Personalised online training is offered to Maptek customers in North America via web platform GoToAssist.

The content can be customised to exact specifications, given 2 to 3 weeks notice, and scheduled for 2 to 6 hours per day at a time that suits.

'Customers receive the same high level of training as if attending a course at our office in Denver. And they don't need to worry about the travel aspect,' said Desiree Wentland, Technical Services Manager.

GoToAssist is already used widely by Maptek customers in North America to access support and services. Online training is becoming a popular alternative to classroom style courses.

To register for GoToAssist training in North America contact info@maptek.com



Knowledge base

All Vulcan customers with active maintenance will shortly receive an invitation to register for the online users area.

Accessing the site, which is currently in beta testing, will allow you to:

- > Submit, track and manage your support cases
- > Learn from solutions in the knowledge base
- > Search FAQs, tips and tricks
- > Watch how-to videos
- > Download Vulcan releases and feature packs
- > Post comments and share information with the Vulcan user community

Watch for information on how to register.



Users conference

The next Maptek Users Conference will be held in Brisbane, Queensland from October 21-23.

The 2013 'Invest in Yourself' users conference will give attendees the opportunity to learn new skills, network with industry colleagues and hear about the latest Maptek products.

For the first time, the schedule will be divided equally between technical presentations and dedicated workshops offering hands-on learning.

Attendees will be able to choose from 3-5 concurrent streams designed to teach new skills across a range of applications and resources.

More than ever, this conference is about providing you with an experience that will benefit your career. So tell us what topics you want covered!

Discounted early bird rates, free registration for speakers, presentation themes and more! Visit www.maptek.com/users2013

Maptek Calendar

April 15-18

SPAR International
Colorado Springs, Colorado - Booth 212

May 5-8

CIM Canadian Institute of Mining
Toronto, Ontario - Booth 711

May 14-16

Mining World Russia
Moscow - Australian Group, Booth 140

June 6-7

Elko Mining Expo
Elko, Nevada - Booth 110

June 10-17

Exponor
Antofagasta, Chile - Booth 579

June 25-26

Minerals Week 2013
Canberra, Australian Capital Territory

August 12-14

AusIMM Iron Ore 2013
Perth, Western Australia - Booth 78

September 16-20

Extermin 2013
Arequipa, Peru - Australian Pavilion

October 21-23

Maptek Users Conference 2013
Brisbane, Queensland



Indaba insight

Maptek staff from Africa and Europe have wrapped up a busy week showcasing Maptek products and services at Indaba, held this year in Cape Town, South Africa.

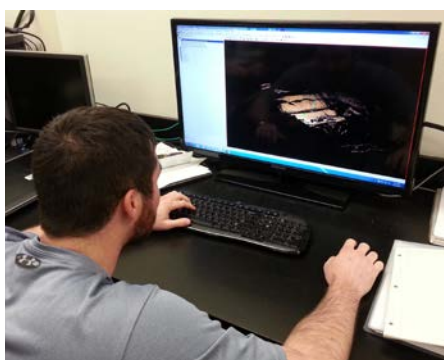
‘From an investment standpoint, uncertainty about the future of the industry remains, however the atmosphere at the show was very positive,’ commented General Manager for Europe and Africa, Duncan Lee.

Service providers such as Maptek can help companies succeed during times of low confidence. This is when it is even more crucial for professionals to have tools to increase productivity and maintain high-quality operations.

‘The large operator sector is going through its own mini ‘banking’ crisis, with some companies having to write down billions of dollars on projects that have not performed well,’ added Lee.

On the junior and exploration front, the general consensus was that most projects remain viable, with funding available for streamlined operations and quality projects.

Indaba presented the first opportunity to showcase Maptek Eureka to the South African exploration market. Eureka answers the need for target generation and regional trend analysis. Being able to easily communicate the value of a project increases the chances of companies getting investment money for growth.



Kentucky Uni

Students at the University of Kentucky at Lexington are gaining exclusive research experience with the I-Site 8800 laser scanner.

The university purchased the long range scanner in mid 2012, receiving educational licences for I-Site Studio and Vulcan mine planning software.

‘Graduate students have used the system for highwall mapping, impoundment movement and calculating the cast percentages of blasts,’ said Kyle Perry, Assistant Professor of Mining Engineering.

About 45 undergraduate students in the Mining Engineering department have been exposed to the I-Site system. Students are eligible for hands-on experience once they have completed the fundamentals of surveying.

‘The I-Site 8800 scanner and I-Site Studio software have greatly enhanced our research capability, as well as given students a new perspective on surveying and production monitoring,’ said Perry.

According to Perry, students have been excited by the I-Site hardware and software, and enjoy being able to collect data in a quick and easy way.

‘By training on the very latest survey technology, students will be able to transfer skills into their chosen careers,’ said Perry.

‘Exposure to innovative tools sets graduates up to better tackle problem solving in the mining industry.’



Ok Tedi, PNG

In November 2012, 20 technical staff at Ok Tedi Gold Mine in Papua New Guinea were introduced to the latest survey, geology and engineering tools in Vulcan 8.2.

Maptek Technical Services consultant Jonathan Haines conducted training over 5 days, with an extra day installing the latest version of Vulcan at the mine.

Ok Tedi Mine site, operated by Ok Tedi Mining Limited, is located in the Star Mountains, Western Province of PNG. The area is very remote and is only accessible via air, or a 5-day trip from Pt Moresby by barge along the Fly River.

The site is about 50 minutes drive from the village of Tabubil, one of the wettest places on earth. The tropical jungle receives rainfall of 8 metres per year, 10 times that of Jonathan’s home base in Perth, Western Australia.

The combination of training with onsite technical support provides obvious benefits to the operation. Using Ok Tedi mine data for training ensured faster up-take of the software.

Training included introduction to Vulcan, road and open pit design, and underground survey. Software installation revealed some issues with datasets which were soon resolved, allowing the new tools to be applied to clean data.

Personnel were also interested to hear about Maptek’s new blast accuracy management system, BlastLogic and the latest survey technology from I-Site.

Contact your local Maptek office to arrange customised training for your site.



Maptek services meet operational needs

Maptek is often contracted to provide staff to cover operational shortages. This may be for a few weeks to help a project stay on target, or on a regular basis to perform a particular task for which a site has limited resources.

Mine survey is one example. Maptek staff, operating the I-Site 8000 series hardware and processing results with I-Site Studio software, complete end-of-month survey and reconciliation efficiently and accurately. These regular contracts may extend for many years. The continuity of staff and equipment helps especially during transitional periods.

Poitrel Mine, southeast of Moranbah township in Queensland's Bowen Basin, is one such site. Leighton Contractors initially undertook all mine planning and surface mining operations at Poitrel. The first coal was mined in 2006, and BHP Billiton Mitsui Coal (BMC) took over operations in 2010.

The seams at Poitrel are faulted, and care is required to ensure the coal is mined cleanly to maximise its value. Overburden is moved through a combination of cast blasting, bulk dozer push and truck excavator activity. Coal is hauled to the run-of-mine stockpile or directly to the preparation plant bin for processing.

Laser survey is the best way to achieve the speed and accuracy required to keep the stockpile and pit models up to date. Between 2008 and 2012 Maptek Technical Services consultant Stephen Hoefler provided backup for the Poitrel mine planning team to help meet their project deadlines.

A registered surveyor, skilled in Vulcan and I-Site, Stephen routinely provides consulting, training and support, project and development work from Maptek Brisbane office.

Stephen started filling in as senior surveyor to guide Leighton surveyors for the day-to-day mine operation. He was also responsible for preparing and calculating reconciliation reports.

A survey management plan was developed, covering all aspects from pickup and set out procedures, GPS setup, naming and filing conventions, through work instructions to statutory plans.

Stephen also worked with the onsite geologists to develop a streamlined, repeatable process for updating accurate coal seam surfaces as new data became available.

When BMC took over management of Poitrel, Stephen continued to help the mine planning team during the transition from a contract operation to an owner-operated mine. A final handover to BMC appointed staff in October 2012 marked the end of Stephen's hands-on involvement at Poitrel.

Maptek staff are only a phone call away for support, consulting, or filling in for site roles as the need arises.

[Contact your local Maptek office to discuss your consulting needs.](#)



I-Site reseller

Maptek has signed an agreement with RDO Integrated Controls (RDOIC) to resell I-Site survey systems in North America.

RDOIC is the positioning technology division of RDO Equipment Co., supplying equipment for mobile mapping and terrestrial scanning into various industries, including mining.

Maptek and RDOIC started discussing the partnership shortly after MINExpo 2012, where Maptek was showcasing the I-Site 8400 and 8810 laser scanners.

'This partnership allows us to offer long range laser scanning systems to our customers,' said Adam Gilbertson, RDOIC General Manager-Northern Region.

'The I-Site laser scanning systems will fill a gap in our portfolio, making us a one-stop source for scanning, survey and machine control solutions for our customers.'

Spotlight on Vulcan

Maptek Vulcan™ 8.2.1 will include many improvements to functionality and performance.

The Maptek Vulcan™ 8.2.1 upgrade, available around April, will deliver more than 30 enhancements to existing functionality and improve the performance of Vulcan 8.2.

Upgrades include:

- > Drag-drop for 'Archive' files
- > Compositing with multiple weighting fields
- > Recolour of triangulations based on an external attribute file or based on the w tag of a secondary object
- > Start and end colours for automatic colour range to create consistent colour legends
- > Drill core photo interface through Coreviewer™
- > Automation executable for CSV Import and sample flagging
- > Section by line for multiple triangulations
- > Haulage profile equivalent distance calculation into a block model variable
- > Larger predefined Dynamic Memory Settings

Maptek Vulcan 8.2 offers a smarter, stronger Boolean function.

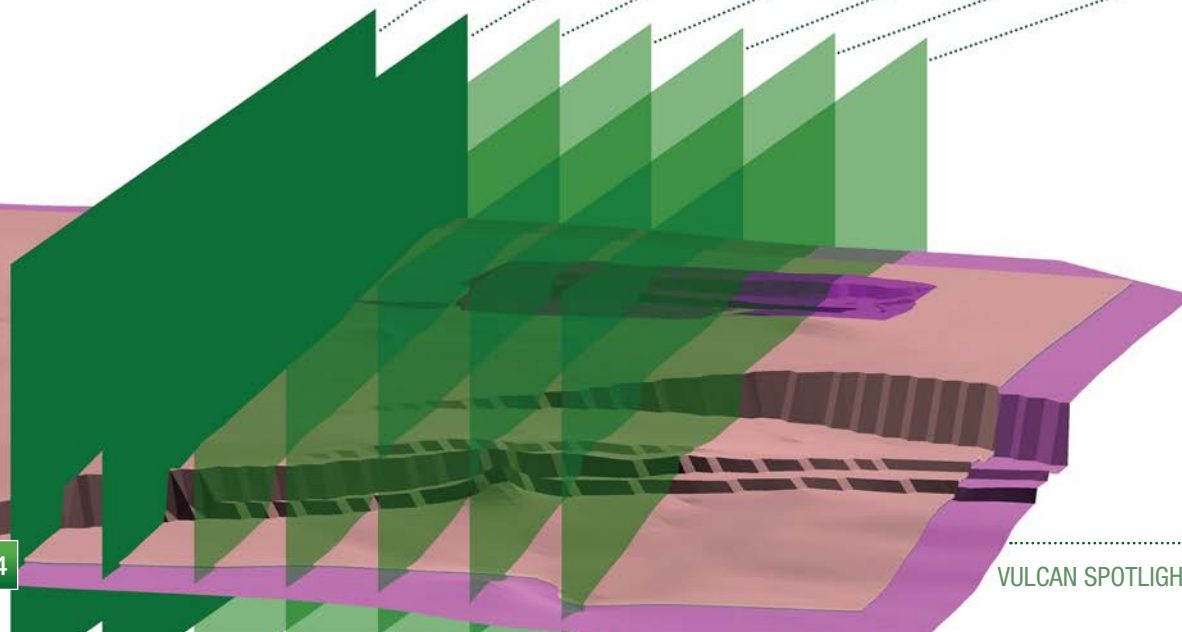
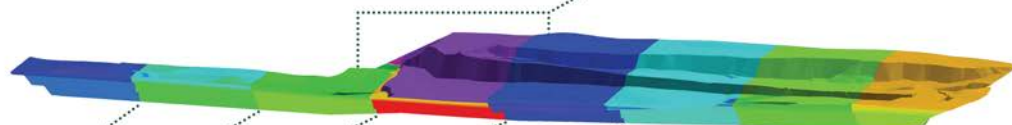
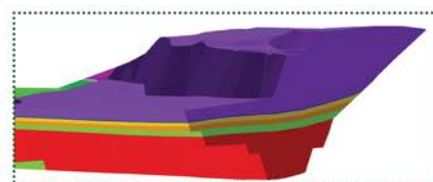
A new algorithm introduced in Vulcan version 8.2 streamlines Boolean operations to help surveyors, geologists, mine planners and schedulers.

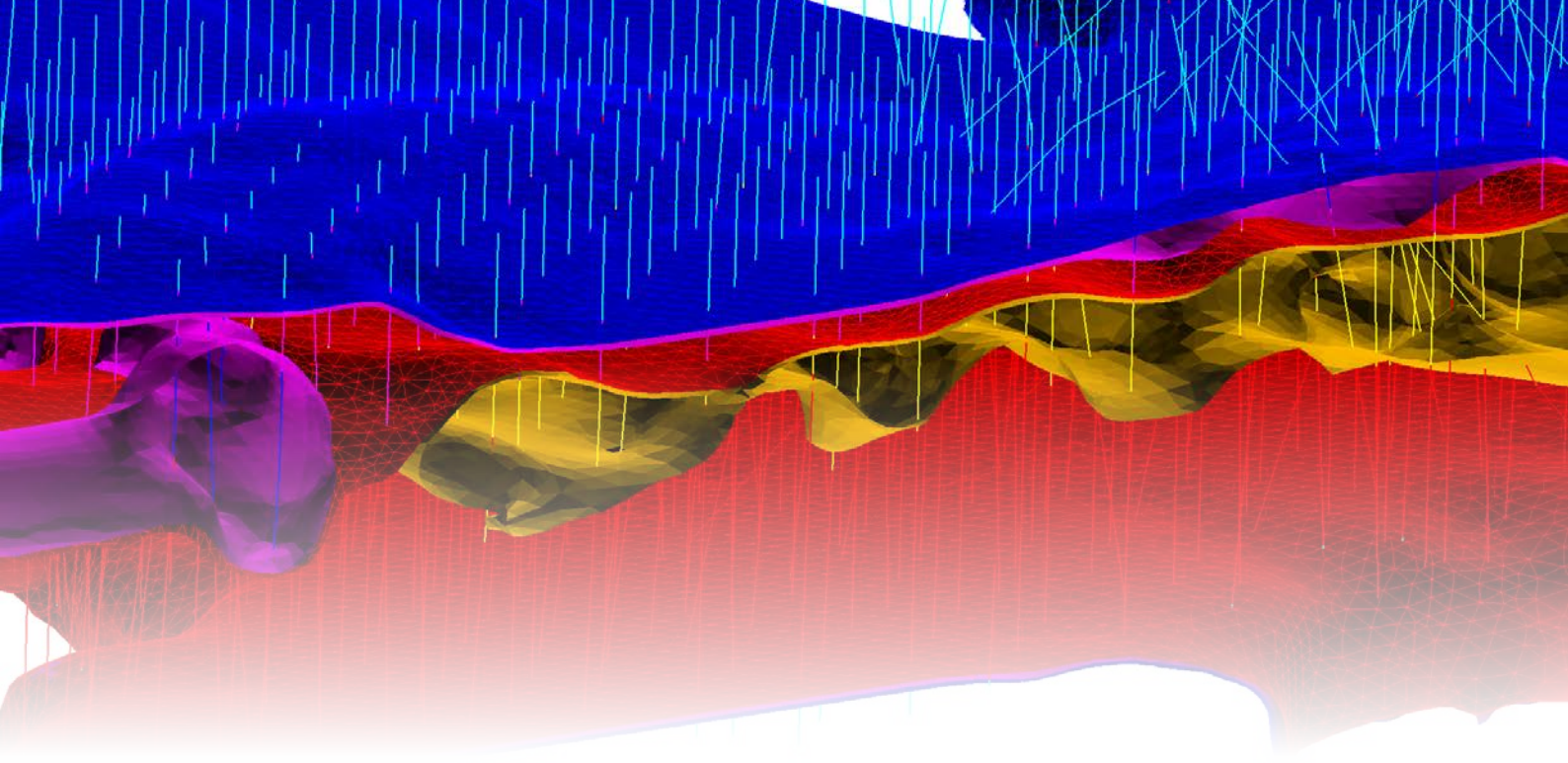
In the example shown here, mine planners took advantage of these improvements and were able to

work with complex intersecting triangulations, and build and manipulate solids.

Multiple iterations can be run with confidence knowing that the triangulations are valid.

Thanks to Premier Coal, Western Australia





Read about some of the upgrades planned for the Vulcan 9 release.

In Vulcan 9 Maptek will deliver two new tools that will expand users' ability to build geological and grade estimation models.

A new method to account for arbitrary search paths for grade estimation, known in the industry as Locally Varying Anisotropy (LVA), will help users model complex orebodies. LVA provides a flexible approach to create the models of anisotropies.

LVA is faster and easier to validate compared to current non-linear methods. The new option allows users to create their own anisotropy definitions or use the methods provided in Vulcan.

The implicit modelling toolset in Vulcan 9 will focus on the modelling of geological domains. It allows geological models to be created and updated directly from drillhole information.

Users will be able to include structural trend models and manual constraints, enabling faster results.

This new modelling method works alongside existing functionality in Vulcan, allowing users to customise their preferred method for modelling geology, or use a combination of implicit modelling and traditional techniques.

The introduction of implicit modelling in Vulcan 9 is the first step in a larger project. Users can expect to see further implicit modelling functionality in subsequent Vulcan releases.

Customers with the GeoModeller module installed under current maintenance will receive implicit modelling with Vulcan 9 at no additional cost.

Customer feedback is an important driver for upgrades to existing Vulcan tools. In Vulcan version 9 users can expect to see enhancements to existing tools in underground ring design and underground design.

Underground ring design has been streamlined to improve the workflow and increase functionality. Users will notice a decrease in setup time and quicker processing speeds.

Underground design tools will be enhanced to allow designs to carry additional user defined attributes. A number of attributes, such as tonnage and grade, will be self-populated, helping users make decisions based on up-to-date data in the design.

The Vulcan 9 release is scheduled for beta testing mid year. Look out for more information on what's coming in Vulcan 9 in the next edition of *Forge*.



Quarry management

The Maptek I-Site™ 8800 laser scanner allowed a large quarry in Leicester, UK, to devise practical, cost-effective safety strategies.

Oakes Surveys approached Maptek for help in conducting safety studies at the quarry, where weathering of the higher benches over decades of operation had resulted in loose rocks falling from the quarry faces to the floor.

Quarry management needed to identify the exact location of the sources of the rock falls. They also wanted detailed information on the number of falls in a given time, and the size of the rocks.

Surveying the quarry, which measured approximately 1000m by 600m by 150m, required a scanner capable of delivering high point density at long range.

The Maptek I-Site™ 8800 laser scanner collected data at the appropriate point density to detect small changes in a rock face at a distance of more than 0.5km.

High definition scan data was recorded from several scanner setups to collect point data for the entire quarry. The team set up the scanner at the same locations on subsequent visits.

Hundreds of millions of x,y,z data points were collected during each session, all accurately located within the site coordinate system.

Long range laser scanning is a safe, cost-effective and accurate solution which meets the challenges of monitoring and measuring rock falls from quarry faces.

Tight survey control, and the fact that the I-Site 8800 scan data had minimal noise, ensured an error free digital representation of the quarry faces.

The point cloud data was then processed in Maptek I-Site Studio™ software and accurate triangulated surfaces were created.

Surface data was divided into panels for comparing surfaces between quarterly site surveys.

Areas of change down to approximately 150mm were reported, along with the location and size of the fallen material.

Data from consecutive visits was easily compared to understand how the faces were developing and changing over time.

Detailed cross-sections of the quarry faces could be generated for rock fall analysis in simulation software.

Identifying the danger zones means that safety and 'stand off' berms can be appropriately placed to protect personnel from falling rock.

Reducing the need to install expensive netting unnecessarily on low-risk areas of the quarry makes for a more cost-effective solution.

*Thanks to Oakes Survey
Full article published in Quarry
Management*

Topographic survey

The benefits of laser scanning for mine survey are well-defined. The advantages of topography scanning before mining starts are less often realised.

Havilah Resources NL has discovered iron ore in the rugged northeast of South Australia. Drilling and exploration work has identified what is under the ground, geologists have modelled the deposits, and the engineers can now plan how to mine.

'An accurate pre-surface allows you to design your mine properly from the start,' said Havilah Resources Chairman Bob Johnson.

'Once we have those surveys we can start making decisions - here's the pit we'd design, this is where the stockpiles and infrastructure should be.'

The Maptek I-Site™ 8810 offers 5 different scan resolutions depending on the point density required. Terrain in the area is flat so standard resolution gives more than adequate survey coverage for the majority of scan locations.

The I-Site 8810 can be mounted on a vehicle and remain there for the entire day's scanning, withstanding temperatures in the 40s, dusty conditions and vibration. Battery life is not an issue as the scanner runs off the vehicle power supply.

The I-Site mobile scanning system means the surveyor rarely has to leave the vehicle.

The lack of elevated vantage points makes it necessary to stop and scan every 450 metres or so.

If foliage is too dense to get a backsight, the internal compass helps with scan registration.

Scanning beyond the orebody boundary ensures the surrounding topography is surveyed in enough detail for planning waste dumps, tailings dams and other mine infrastructure.

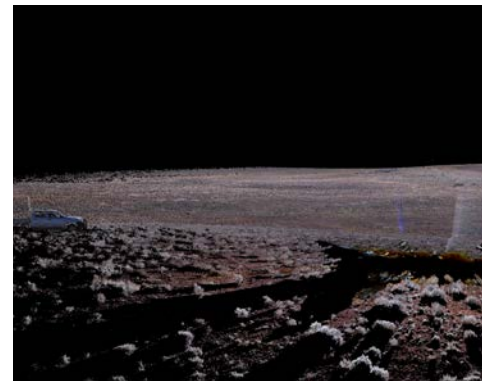
The I-Site 8810 incorporates internal GPS, wireless connection to the rugged scanner controller tablet, and vehicle compass calibration. It operates over a wide scanning temperature range.

The combination of vehicle mount and fast operating speed of the I-Site 8810 makes for very efficient field work, with time savings of about 3 hours per day over laser scanning from tripod setup.

At Havilah's Grants lease, scanning was completed in about 4 hours, with data captured over 6 million square metres. Surveying the Maldorky lease, with fences and creek washouts, took 16 hours over 16 million square metres.

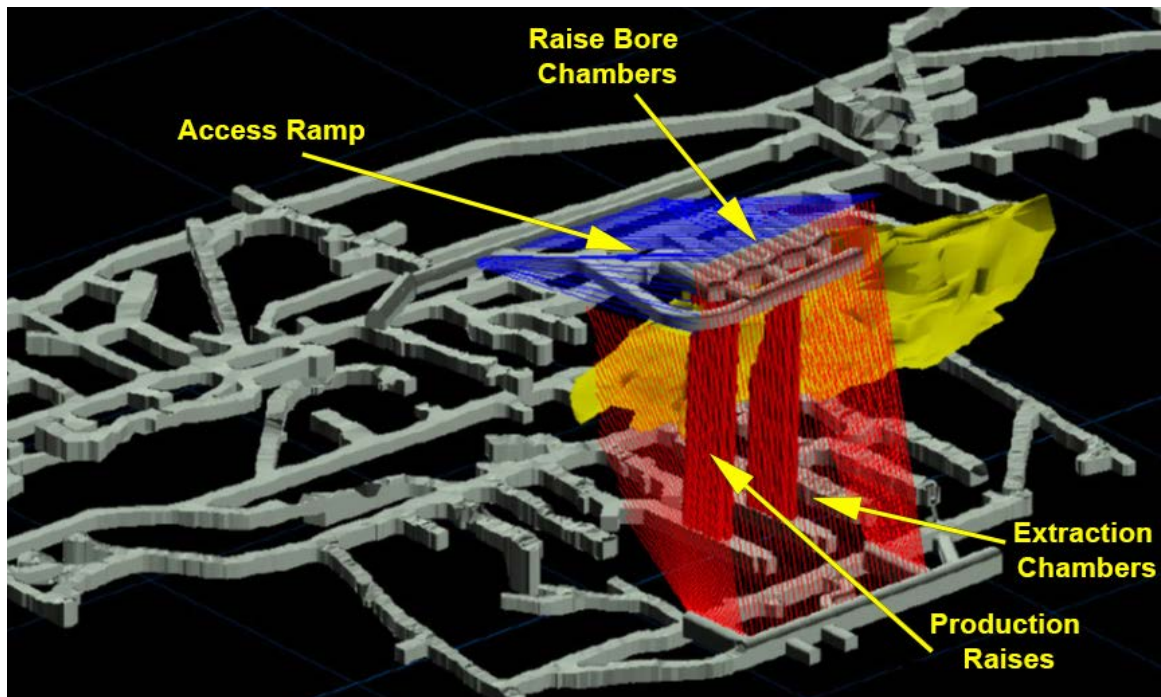
'Getting accurate survey data at the start of the design process can really save time later on. With an accurate surface, the volume of the orebody can be calculated. Knowing how much material has to be removed in overburden, and where to store it, is the key to good mine design,' concluded Johnson.

Thanks to Havilah Resources NL



Freeze walls for uranium

Brian Mattie from Cameco outlines successful methods for extracting uranium at McArthur River Mine in Saskatchewan, Canada.



Having pioneered a unique raise bore mining method for uranium production, Cameco uses Maptek Vulcan™ for planning and production as well as critical geotechnical modelling.

Saskatchewan Province, Canada hosts some of the world's most significant and unique uranium deposits. The McArthur River deposit was discovered in 1988, and with ore grades 100 times the world average, is now the world's largest high-grade uranium mine. The operation mines 150 to 200 tonnes of ore per day, producing more than 18 million pounds of uranium each year.

The orebody is formed at a plunging fault between basement rock and the Athabasca sandstone, which is saturated with water. The contact between the basement and the sandstone marks the unconformity.

Stringent mine design is the cornerstone of Cameco's development and production philosophy at McArthur River.

Freeze wall methods are used to control the groundwater and minimise the risk of shaft flooding. An underground milling facility turns the ore into a thick slurry which is pumped to the surface and transferred remotely to trucks.

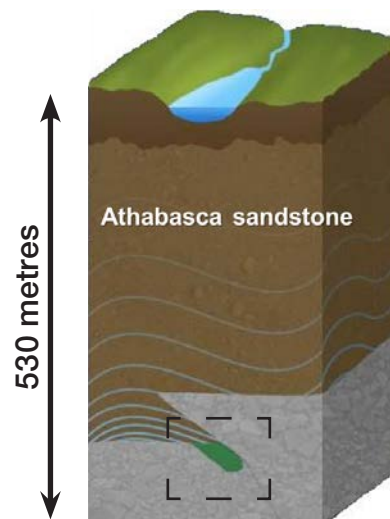
Ore zones are planned several years in advance to ensure a seamless transition between zones, with no dip in production. This accommodates the necessarily slow process of installing the pipes that distribute the freezing brine solution to isolate ore from the water bearing sandstone.

Development of freeze drifts at the 520 and 590 levels enables ore from Zone 4 North to be extracted. This involves developing a raise

bore and extraction chambers as well as access ramps under freeze protection.

Designing the freeze wall at the 520 level incorporates a 10m offset to the unconformity contact. Before development can begin, a diamond drill is used to drill a very tight pattern into the face where pipes will be installed. Any signs of water are plugged with high pressure grouting to avoid surprises as development progresses.

Drilling also confirms the location of the unconformity. All drill cuttings are captured and pumped to the milling circuit to avoid loss of any of the high grade ore. Negative ventilation is used extensively at McArthur River as part of the radiation controls. Rigid ducts suck the air into the heading so the workers always have fresh air at their backs.



Maptek Vulcan™ software has been central in overcoming the challenges presented by the geology of McArthur River and the radiological risks of producing uranium.

Heavy steel bars are installed to avoid rock failures during excavation. Mechanical excavation minimises ground disturbances and proceeds in short rounds, 2.5m at a time, before shotcreting, bolting and screening to increase stability. Adhering to strict design criteria and development methods provides confidence that the ore can be extracted safely.

Careful planning and accurate mine design is required to ensure freeze pipes are not damaged when developing close to the freeze walls. Special measures are also required at the 590 level close to the unconformity. Instead of drill and blast methods, a row header and excavator cuts through rock. A 15m offset is created to account for back of drift development.

Holes around 120m long are drilled upwards from the 590 level, with horizontal holes drilled along the

520 level. Holes are spaced about 2m apart to carry the 18-inch pipes, through which brine at -35° C will be pumped from the freeze plant on the surface. Freezing can take up to 6 months.

The as-built holes are surveyed to correct the orientation of planned adjacent holes. Once the ore zone is isolated, the raise hole is developed. A 12-inch hole is followed by the 3m diameter reamer which is pulled up through the pilot hole.

Loose ore is collected from the bottom of the hole with a remote-controlled scoop tram that delivers it to the underground processing facility. Each raise removes about 200 tonnes of ore. The raises are developed next to each other in a honeycomb pattern.

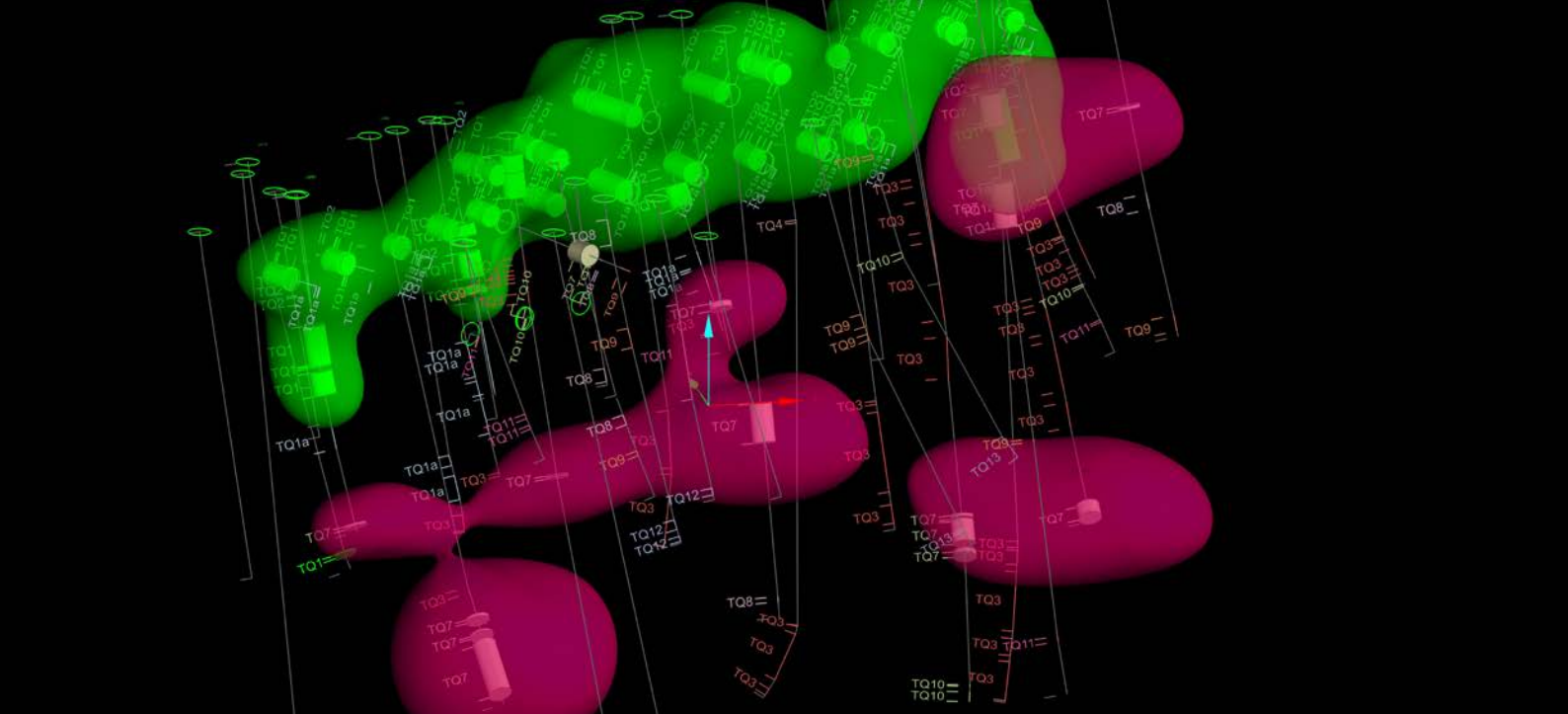
Maptek had developed a specific technique in Vulcan for calculating the recoverable ore tonnage

and grade from the honeycomb arrangement of raise bore stopes.

Sometimes the raise bore is required to mine through insitu ore and at the same time, intersect regions of cement fill present in the previously mined primary stopes. Calculating the diluted ore tonnages and grades, as well as sequencing the mining and backfilling of these stope arrangements, is performed by Vulcan's Cubic Reserving option.

Careful design and development practice, aided by the best technology, overcomes the challenges of mining in this high risk environment. McArthur River has been able to confidently control high-pressure groundwater, stabilise weak rock and eliminate the risk of radiation exposure.

*Thanks to Brian Mattie, Cameco
Presented at 2012 North America
Users Conference*



Equipped for exploration success

Maptek Eureka™ brings a practical focus to the dilemma of analysis of information when there is too much data rather than not enough.

Exploration has moved a long way from prospectors stumbling across outcrops. Most of the new discoveries have no surface expression. Fortunately, we have many other sources of information.

Google Earth lets us explore the whole earth without leaving our desks, via satellite imagery, maps and terrain data.

Vast areas have been surveyed by airborne and ground geophysical methods. Deep well logs from petroleum exploration are easily accessible. Old drillhole locations can be found with GPS. Historic plans can be scanned. A huge amount of exploration can be done before venturing into the field. Or can it?

In many cases, there is simply too much data to juggle. It can't fit on a desk, let alone a laptop. The task of fitting all the pieces of the puzzle together can be overwhelming. Until now!

Maptek Eureka™ provides a single 3D environment for accessing and managing all geospatial and geophysical information, with specialist tools for correlating drilling and seismic data.

Eureka supports all common CAD and geometry files, triangulated surfaces, .csv and ascii text files, image files (including .ecw and geotiff) and seismic SEGY formats, as well as terrestrial and airborne laser scan and photogrammetry data formats. Connection to Vulcan allows direct access to geology and drilling databases.

Typically, the problem of too much data is handled by filtering it down to a manageable size. The end-user does not get to see the original raw data. The task then is to analyse the results from different datasets and drill interesting anomalies.

Modelling software like Maptek Vulcan™ has made it easy to overlay and match these different data types, to draw lines and make correlations. The geologist's task became easier, but intuition said that there was information missing.

With Eureka, ALL the raw data can be used. All at once. All over the place. Once you've set up and stored the data for your project, there is no need to worry about dataset size outrunning your processing capability.

Eureka works like your brain. It uses all the information that you need for looking at a particular level of detail.

As you zoom closer, Eureka allows you to see greater detail. Points, drillholes and objects can be easily viewed, rotated and manipulated. Section views, transparency options, tied-windows and other techniques allow you to look at more data at once, and to make instant connections.

Being able to see corresponding trends, features and anomalies in the various datasets enhances understanding of the geology. This increases the confidence an individual or company can have in exploration findings.

The Eureka tablet equips the field geologist to interact with office colleagues. Interactive location maps, streamlined logging via handwriting recognition, virtual keyboard and dropdown lists for data entry enhance field work.

Instant communication means that no time is wasted when critical decisions must be made about an exploration program.

Taking control of drill & blast

Mine sites in Australia are discovering the benefits of Maptek BlastLogic™ intelligent database and reporting tools.

The new drill and blast accuracy management system has transformed their operations by simplifying routine tasks and increasing blast performance.

Since the release of Maptek BlastLogic™ version 1.0 in August 2012, Maptek has been developing new functionality to further meet industry and customer requirements. BlastLogic 1.1 will offer major new features:

- > Charge design has been extended to support deck loading off a surface for through-seam blasting
- > Cross-section profile of holes allows visualising of decks, water and surfaces for simple load plan QA
- > Simple hole-by-hole load plans can be edited by direct manipulation of individual or multiple decks within a hole, or across multiple holes

- > Capture and reporting of as-loaded hole charge data aids reconciliation to design
- > Post-blast performance data capture and reporting can be customised
- > Improved inter-operability of Maptek Vulcan™ and BlastLogic results in an iterative workflow for blast design

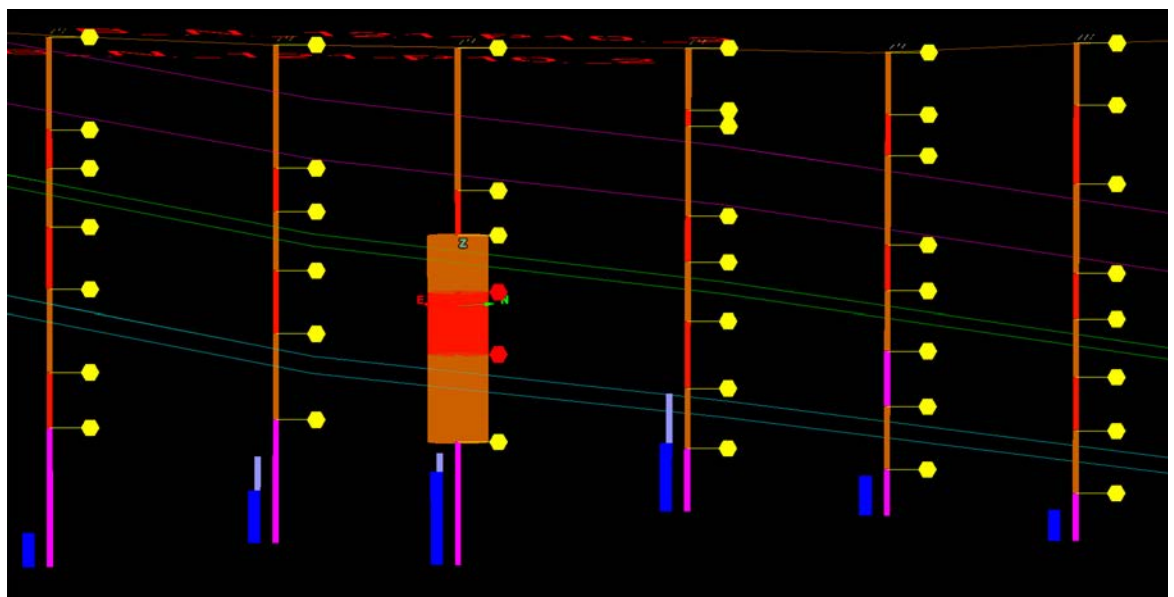
These enhancements will help mines to apply basic quality management principles needed to achieve superior blasting outcomes, leading to improved performance of comminution, load and haul, and mineral recovery.

The BlastLogic core function is to facilitate accurate drilling and charge placement, and enable reconciliation of these activities to design.

This is provided through immediate access to data, and checking against appropriate benchmarks at key points in the process. Users can easily measure and analyse the information to support faster and more informed decision making.

Importantly, BlastLogic makes the drill and blast process transparent to all stakeholders, which in turn fosters greater responsibility and accountability for blast performance.

Centralised storage of all critical information in the BlastLogic database ensures quick recall for analysis. Continuous improvement is supported through better understanding of the operational drivers intrinsic to drill and blast.



Modelling volcanic ash clouds

Maptek Vulcan™ modelling and visualisation tools proved effective in studying the behaviour of volcanic ash clouds for improving hazard management.

Explosive volcanic eruptions cause local, regional and global hazards. Where the tephra settles during and after an eruption impacts aviation, agriculture and habitation.

By modelling ash clouds we can better understand their general anatomy and behaviour. Since eruption columns are opaque, we can't see what is going on inside them. What are the global SO₂ and CO₂ loads, and how does this affect farming? Where is the greatest risk for aviation routes? These are all important questions.

Being able to predict where the ash goes during the first 8 hours after an eruption would allow information to be fed directly to the aviation industry for adjusting flight schedules. Emergency services could devise and implement evacuation plans. Advances in visualisation technology provide opportunities for better modelling, aiding communication and improving reaction time.

Standard integral models invoke a bullseye pattern - big ash inside, small ash outside. When affected by wind, the bullseye is stretched and becomes elongate.

Nomograms, graphical tables describing these ash deposition patterns using simple models, are widely used to interpret prehistoric eruptions. Unfortunately, the simple models used to build the nomograms are inadequate for bent, wind-affected plumes.

Visualising the model in 3D is key to understanding what the data actually means.

Recent advances in modelling employ multi-phase, physics-based simulations. ATHAM, the Active Tracer High-resolution Atmospheric Model originally from the labs of Graf and Herzog, uses computational fluid dynamics to model the eruption column in 3D as a multiphase fluid flow, accounting for changing dynamics in a very complex system.

Our large study area 100 km in three dimensions meant radical filtering of the vast amount of data. ATHAM data was imported into Maptek Vulcan™ to take advantage of the 3D modelling and visualisation capabilities, and generate block models and grade shells.

Using Vulcan we combined files, filtering out zero concentrations to visualise a short event, allowing direct comparison with real eruption plumes. Showing how a plume behaves in windy conditions allowed us to talk meaningfully with risk mitigation experts.

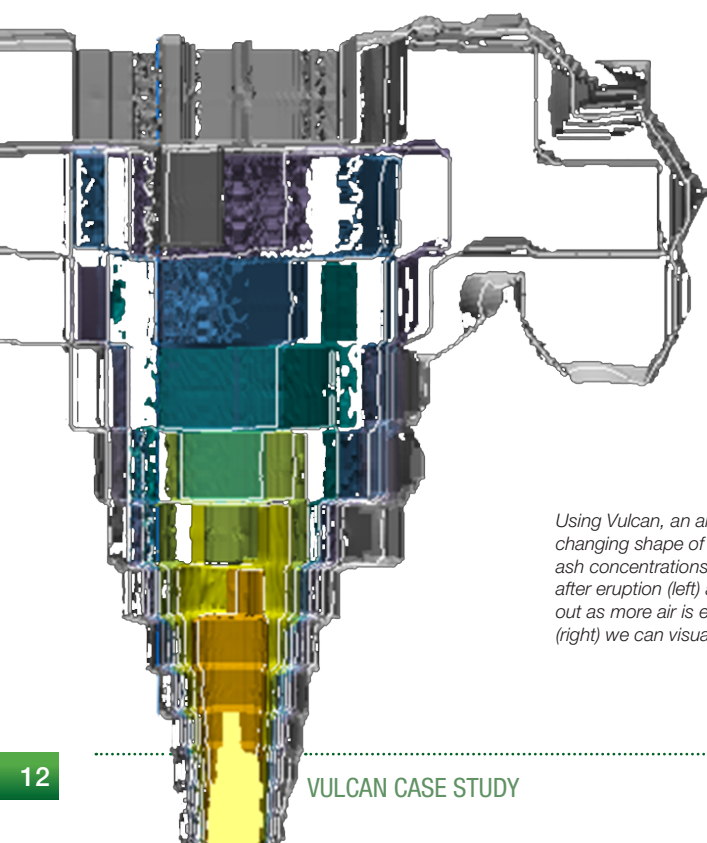
To simulate the eruption with variable wind conditions takes hours to capture minutes of simulation. With more time, mappable regimes of flow can be generated. Cross-sections can be produced to show gradations of ash concentration.

Seeing the morphology and concentrations change over time provides valuable information on the amount of ash, where it is in the atmosphere, and therefore where flights can operate safely.

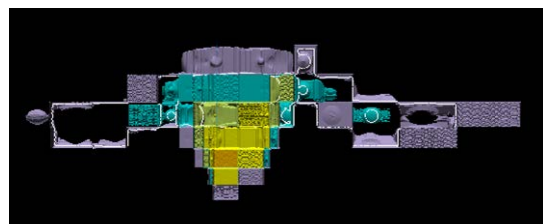
The modelled data can be merged with topography and hazard maps. We can easily show where accumulated tephra intersects with evacuation routes. Assessing risk factors and communicating this information clearly is vital for emergency crews and preparatory mitigation planning.

Thanks to Dr Shannon Nawotniak, University of Idaho

Presented at 2012 North America Users Conference



Using Vulcan, an animation shows the changing shape of the plume and the volcanic ash concentrations over time. At 600 seconds after eruption (left) a dense inner core spreads out as more air is entrained. At 1200 seconds (right) we can visualise the plume dying.



Delivering on innovation

Customers and staff came together at the South American Users Conference to share stories on innovation.

A warm welcome, a strong technical program and innovation in action are what Maptek customers have come to expect from the annual event in Chile. And the 15th South American Users Conference, held in Viña del Mar in December 2012, did not disappoint.

Staff from Maptek Chile office greeted the 200 customers on the first day. Proceedings opened with an address by Dr Clayton Deutsch of the University of Alberta, Canada. His theories on factors that promote or inhibit the adoption of new ideas in software development were backed up with instructive examples.

The following day, keynote speaker, Professor Juan Sebastián Montes of the Adolfo Ibáñez University in Chile, spoke passionately about how understanding our own abilities provides the key to becoming a successful leader.

Attendees were enthralled by Dr Montes' mountaineering experiences which included summiting Everest.

Presentations ranged across all products - Vulcan, I-Site, BlastLogic and Eureka - with applications including panel caving, underground stope optimisation, simulation, ring design, HARP block modelling, haulage profile, mine planning and survey.

Innovation was evident in previews of new products BlastLogic and Eureka. Rapid Pit Design, expanded colour palette and polygon morph were among the new Vulcan 8.2 features and enhancements covered.

The latest I-Site technology was also on show, with demonstrations of the long range I-Site 8810 laser scanner and I-Site Studio 4.0 software.

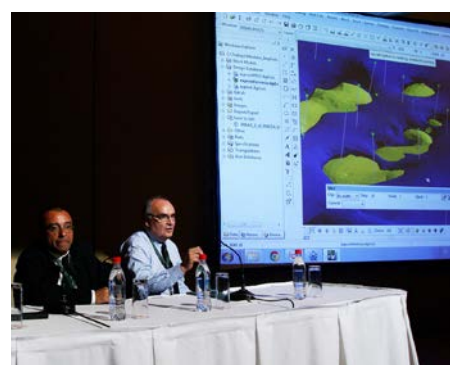
Social activities - from cocktails and casino night to the conference dinner with comedy act - allowed attendees to network in a relaxed atmosphere.

Among the guests were 3 of the miners rescued from the San José Mine in 2010, who enjoyed reconnecting with Maptek staff and industry colleagues.

Twenty attendees took up the option of the pre-conference workshop on the application of the Local Varying Anisotropy technique to geostatistical studies.

'Every year at our conference we have been able to show innovation in product development and the applications in mining,' said Marcelo Arancibia, Vice-President of Maptek South America.

'We were pleased to continue our tradition of hosting a forum that allows our customers to learn from the best in the industry.'



Maptek helps mining companies in South America to achieve their goals.

