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Forge

Digital data driving force

Mining companies are now focusing on digital effectiveness as their number one priority, recognising the potential for improvement through better use of data and technology to drive business performance.

Maptek encourages operations to be pragmatic when targeting digital enhancements by investing in integration and strengthening current applications as avenues to generate opportunity.
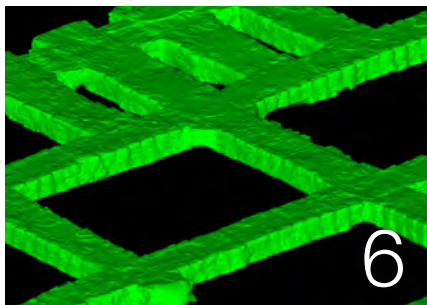
The opening article, a customised solution for underground geological face mapping is a good example of extending existing Maptek tools to reap the benefits of going digital.

Unifying the depth and breadth of Maptek development on the dynamic architecture of the Workbench leads to more effective, more productive users. It also opens the door for delivering enterprise level solutions in a cohesive technical environment.
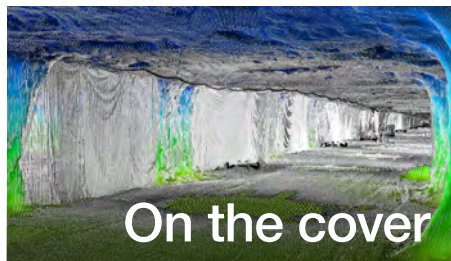
This issue of Forge highlights many examples of how Maptek is improving project value. We hope to connect with you at the industry events calendared in 2018, and we invite your insights into ways we can help make the future of mining even brighter.

We hope you enjoy this issue and welcome feedback at forge@maptek.com

Peter Johnson
Managing Director

Forge

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3D design model for a large underground mine in North America

On the cover

Geological face mapping underground

Barrick Gold Corporation uses Maptek™ Vulcan™ for various geological modelling tasks at the Cortez Hills underground operations in Nevada, USA.

Barrick Gold Corporation uses Maptek™ Vulcan™ at various stages of the Cortez Hills underground operations in north-central Nevada. Cortez District Operations comprises open pit mining of the Pipeline and South Pipeline deposits, and both open pit and underground mining of the Cortez Hills deposit.

Cortez is Barrick's and Nevada's largest gold producer. Mined continuously since 1862, Cortez is the longest operating gold mine in the state of Nevada.

Going digital

It became apparent that as the operation continues to grow, the old paper and pencil methods would not be able to keep up with the day-to-day demands of detailed face mapping.

It is difficult to maintain up to date face mapping using traditional paper based techniques.

'Going digital was the answer,' explained Dave Todaro, Senior Production Geologist at Cortez Hills underground division.

Putting the latest technology in the hands of the mine geologists allows them to work more efficiently. Timely access to all of the underground face data means that essential decisions are well-informed.

Tablet workflow

A customised workflow was generated using existing Vulcan functionality to suit the needs of the underground production environment. Customised Lava scripts speed up the workflow and reduce the amount of user interaction required.

Before heading out to the field the geologist prepares the tablet, ensuring the appropriate data files have been secured for review during the mapping process.

Once in the field the geologist can use the customised Lava scripts and existing Vulcan functionality to digitise the geological features in the correct spatial location.

The tablet system also allows the geologist to review geological observations spatially in real time.

'This is a game-changing advantage,' said Todaro.

Back at the office, geological observations can be shared with the team. The geologist now has more time to review the data and make critical interpretations about the ore system, which have the potential to impact decisions made in the production environment.

Benefits

As well as standardising the face mapping process, this customised workflow now provides a way for the team to 'efficiently go digital'.

'It also opens the doors for doing more with the data than previously imagined. Having access to data while underground means that our geologists are able to visit and clear more headings each day,' said Todaro.

This translates to quicker mining cycles as headings are returned to the mining operations teams faster. It also provides more time for geologists to work on other tasks like bulk sampling and developing sampling methods to meet automated advancements.

Thanks to
Dave Todaro, Senior Production Geologist
Underground Division
Cortez District Operations
Barrick Gold Corporation

Production geologists using tablet underground

Three dimensional view of the face mapping features in Vulcan, illustrating the geological units mapped in level and cross-section view
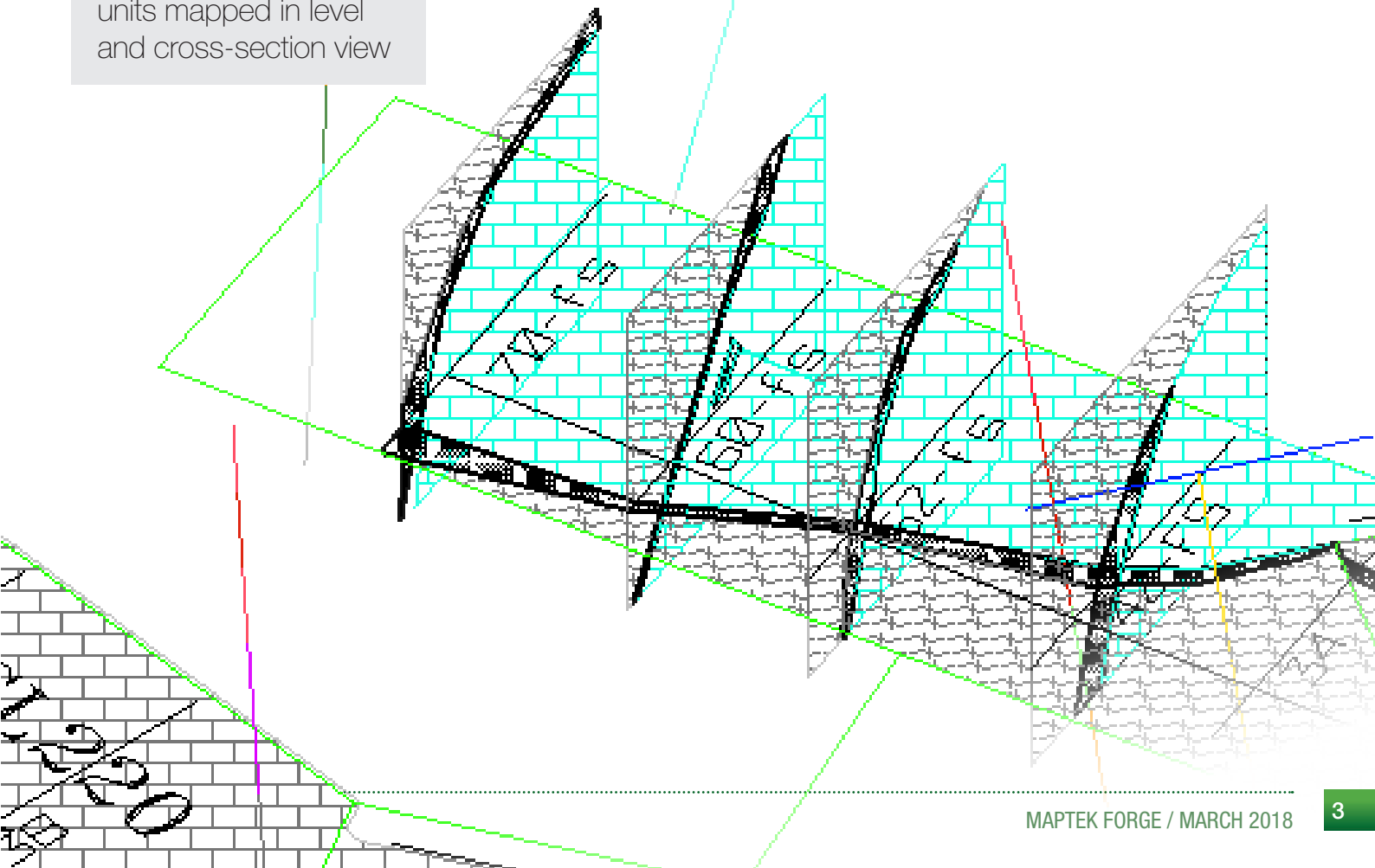
Gaining control over potential instability

The first Maptek™ Sentry monitoring system implemented in Peru will be used for managing geotechnical risk at a large iron ore mine.

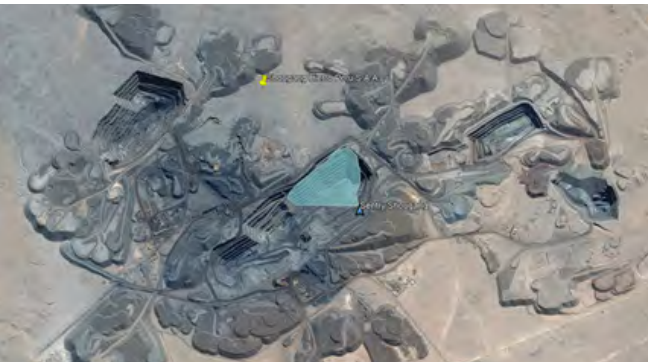Implementation of the first Maptek™ Sentry system in Peru was carried out over three days in November 2017. The Shougang Hierro Perú S.A.A. iron ore mine is in the Ica region of Peru about 520 km south of the capital, Lima. The deposit covers approximately 150 km².

Slope monitoring

The Geotechnical Department at Shougang needed to implement a slope monitoring system for its different active pits. This would give them greater control over the areas that show signs of instability, which could put operations at risk.

Geotechnical Engineer, John Garcia commented that the Maptek solution had been chosen as the pioneering monitoring system because of the flexibility demonstrated by Sentry and its capabilities compared with other slope control systems.

Benefits that influenced the decision to adopt Sentry included being able to generate queries from different areas, providing knowledge of the full history of potential instabilities in sectors where geotechnical information was not available.

In addition, the ease of installing the system at different locations, the expectation of being able to use the I-Site XR3 laser scanner for other survey applications and the support offered by Maptek made Sentry a definite winner for Shougang.

> Sentry has the potential to become the standard for slope monitoring at mines.

Maptek sees an opportunity to establish the Sentry monitoring system as an indispensable tool for use by mines to manage risk associated with geomechanical and geotechnical issues.

With that in mind, an agreement has been reached with Shougang to use this implementation as a pilot demonstration plan and case study for Peru, Chile and Brazil.

Implementation

Sentry implementation at Shougang consisted of several stages, from delivery of equipment and accessory requirements for optimal installation of the system, through to completion of the training.

Day 1 of the implementation required Shougang to provide accreditation passes, a safety induction, the equipment checklist and installation of the Sentry system at the monitoring point.

On the second day, Maptek gave a Sentry presentation to Shougang personnel, and assisted in setting up the areas of interest, the Wi-Fi network connection for remote monitoring, and a test run definition of alert parameters.

Day 3 included checking remote access, theoretical training for Shougang personnel, practice using the Sentry System, and wrap-up of the implementation.

Notwithstanding the initial training, Shougang has been encouraged to access Maptek technical support for the definition of alert parameters, under a two-month plan included in the contract.

Thanks to
John García, Geotechnical Engineer
Shougang Hierro Perú S.A.A.

Evolutionary scheduler milestone

Maptek™ is on track to deliver an holistic solution for open pit and underground scheduling combining period and activity-based schedule optimisation.

Production scheduling decisions are critical for mining and remain a key factor in determining the financial returns on significant investments. Obtaining the most profitable schedule is a complex task involving multiple constraints, large amounts of data and inevitable uncertainty.

When Maptek™ acquired Evolution it already had the backbone of an agile, dynamic scheduling solution for targeting complex, real world challenges. Evolution is now delivering on the promise of enterprise level strategic and tactical tools for scheduling and optimisation in open cut mining.

Evolution delivers systematic production schedules alongside practical development plans, and has the intelligence to concurrently consider multiple objectives. Users have flexibility to choose whether to aggregate data, and how to configure and optimise equipment fleets.

Evolution 5

The latest Maptek Roadmap milestone, Evolution 5, delivers an updated interface for scheduling with attributed solids. This upgrade enables scheduling with block models or solids, and seamless handling of stratigraphic reserves.

Version 5 builds on the 2017 release that introduced new global constraints and options to calculate the value for blended schedules meeting either product or process constraints. When mining is completed and an operation moves to a stockpile rehandle mode, fixed administrative costs are dynamically adjusted.
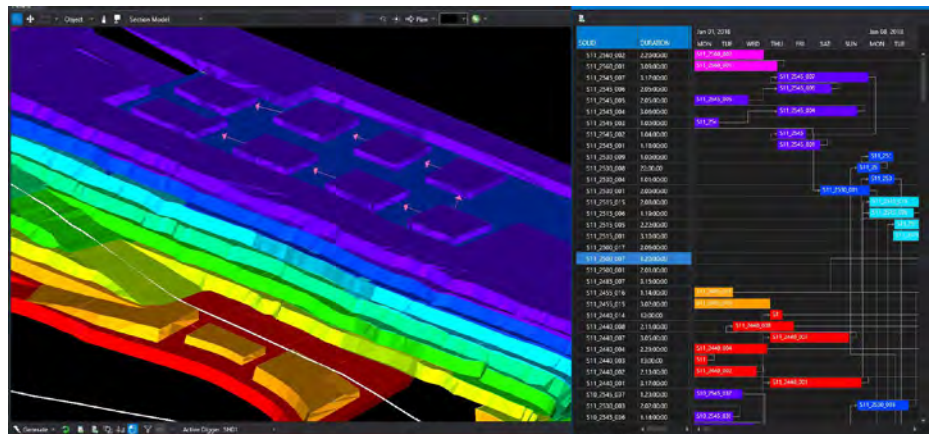
Evolution uses software-as-a-service. Users run Evolution locally on a notebook or desktop computer to import data, set up and analyse schedules and export models and scheduling files. Processing of schedules is completed via a secure hybrid cloud system.

Unique approach

Evolution is the only open pit scheduling solution which can optimise multiple objectives, millions of blocks, multiple models and multiple processing options simultaneously using a population of initial schedules.

A streamlined Vulcan–Evolution workflow reduces reliance on multiple platforms.

Hosting on the unified Maptek Workbench reduces import and export, simplifies software IT administration and lowers maintenance costs.

Evolution helps de-risk the effects of potential mistakes arising from data manipulation and aggregation. Time saved in formatting data for transfer between systems can be spent in analysing scheduling scenarios.

Holistic solution

With Evolution 5, operations gain the ability to optimise in an holistic way, using any source, for example block models or attributable solids, in combination with production plans, haulage routes and waste landforms.

'Evolution developers met the challenge of using solids rather than abstract blocks,' said Evolution Product Manager Eduardo Coloma. 'Designed for stratigraphic operations, attributable solids provide a more intuitive way to see the source information for scheduling purposes.'

The fully integrated haulage system in Evolution 5 is easy to use and configure for multiple trucks. Superior pivot report functionality allows users to report and graph any data related to the schedule.

Evolution 5, out in early April, is the precursor to a Maptek activity-based solution which will facilitate critical short term planning. This new solution will use the Evolution architecture and optimisation engines.

Upgrading from 2D to 3D underground

Wingfield Scale & Measure recognises the importance of fast accurate stockpile inventory results, and has expanded its capacity to meet the needs of the mining industry.

In 2015, Wingfield Scale & Measure purchased their first Maptek™ I-Site™ laser scanner to replace the total station setup for stockpile inventories. This system increased productivity, speed, capabilities, and most importantly, safety.

In September 2017, Wingfield was contracted to map and create a 3D mine design model for an underground mine. The objective was to begin transferring the 2D AutoCAD design into a 3D model for use in mine design software such as Maptek™ Vulcan™.

Data acquisition

More than 9,470,000 square feet of the mine was effectively mapped and surveyed, with 810 individual laser scans collecting 1,070,086,144 data points.

Around 11-12 linear miles of underground data was mapped in a week.

Wingfield personnel had previous experience with projects of this scope, complexity and size.

The site provided survey control coordinates, with a tripod set up over the known point at multiple intersections to create a rectangular pattern in the room and pillar areas.

This process continued until there was enough survey control data to establish a control coordinate system to register additional scans. Scans without survey control were conducted by mounting the scanner on a lightweight utility vehicle and scanning at each intersection.

Data acquisition was completed entirely using the Maptek I-Site 8200 laser scanner, which was chosen for its vehicle and tripod mount compatibility, high and accurate rate of data acquisition, ease of use, IP65 rating, and large field of view for underground scanning.

Software processing

Processing point cloud data is the most important part of finalising any project. Poor or inaccurate registration of point clouds will produce an inaccurate model, which can lead to additional issues with the deliverables.

Wingfield's software of choice for point cloud processing is I-Site Studio. I-Site Studio is ideal for mining and earthwork projects, and the modelling and filtering tools are perfect for working with underground data. The control for 3D display and editing the data is another benefit that makes the software extremely versatile.

Five separate data engines were created for four different sections of the mine, the largest section containing 380 individual scans. Registration of the survey control scans in I-Site Studio is easy and data is quickly placed into the mine coordinate system.

These survey control scans allow I-Site Studio software a valid referenced point cloud to which additional non-survey control scans may be globally registered. Global Registration uses features and repeatable data from each of the scans to register the point cloud into the proper grid system.

Once registered, scans were filtered to usable point clouds and unwanted data (vehicles, cables, mine equipment) was removed.

Point cloud data (white/grey) is cleaned and filtered into a rendered surface (green/blue); removing mine equipment and objects such as ventilation curtains is easy in I-Site Studio
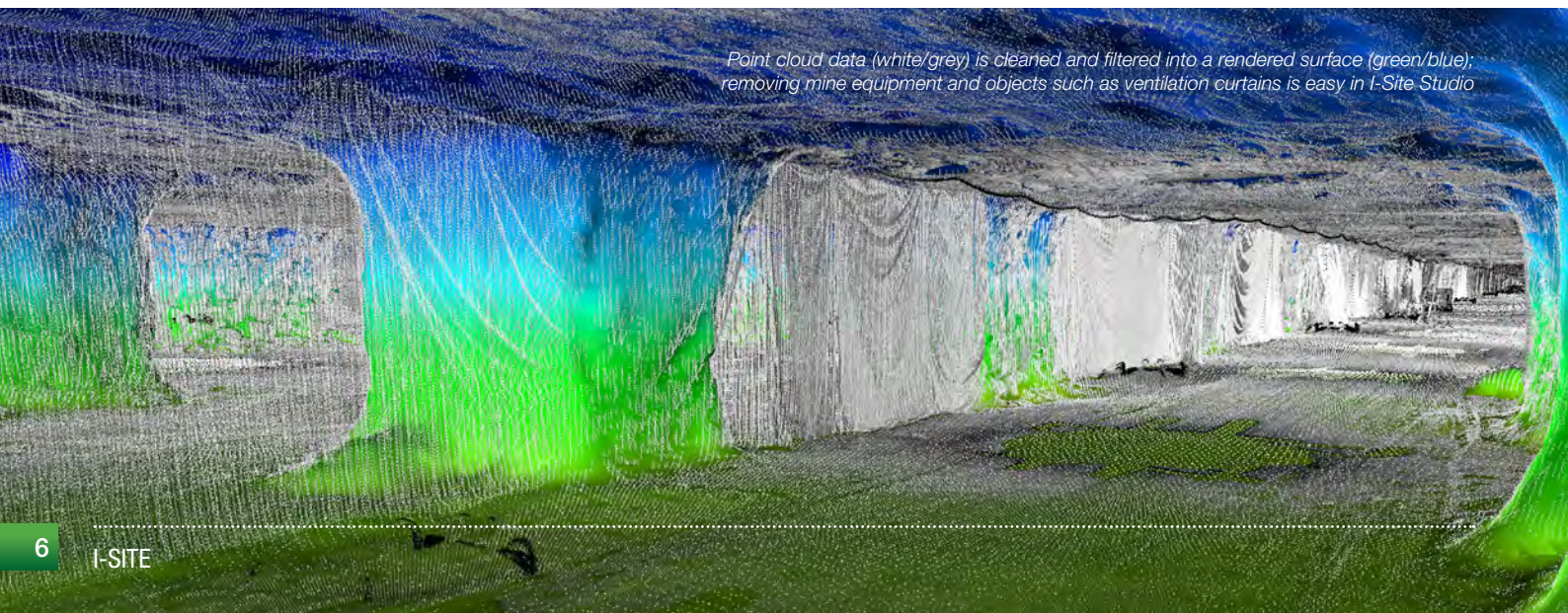
The point clouds were then modelled to create a valid triangulation for each area of the mine. Four variations of underground modelling options were used to create the overall mine site areas. A total of 43.4 GB of data was processed and delivered.

End results

The mine survey project was an overall success for both Wingfield Scale & Measure and the client. The site can now view the data in a 3D environment and make more use of the data with advanced mine design software. Wingfield is currently working with the client on three additional applications using the data captured – change detection, triangulation updating, and as-built against design.

Change detection can be used in areas of movement or rock fall. Comparing older LiDAR scans to updated scans can provide valuable insight; the data can be coloured to show areas that have changed over specified periods of time. Triangulation updates can help provide and improve the volume of material that is removed from a drift.

Capturing these volumes over time can track progress and help ensure accurate volumetric analysis. Managing as-built against design is a constant issue. Comparing triangulated scan data can show areas of divergence from design.

Wingfield is currently planning additional mapping at the site to continue developing a complete 3D model of the entire existing mine.

The site Senior Mine Engineer explained why Wingfield Scale & Measure was chosen for this project.

'Our survey and mine engineers are highly qualified and capable of doing the job, but it would be in addition to their everyday duties and could impact their primary responsibilities.'

Timeliness is a major factor. The site team could take 6-8 months to scan and process data between everyday tasks, while Wingfield can accomplish the task in a week of scanning and two weeks of processing. Site personnel can therefore complete their primary tasks and be assured deliverables are processed expeditiously to meet their needs.

Thanks to
James A. Kenney, Senior Engineer
Wingfield Scale & Measure

Wingfield Scale & Measure

Since 1937, Wingfield Scale & Measure has been a nationwide leader in the industrial scale and weighing systems industry. Located in Chattanooga, Tennessee, the business expanded into bulk inventory measurements in 2013 using terrestrial laser scanning.

Wingfield's multi-faceted expertise in inventory has enhanced this rapid expansion in both the mining and manufacturing industries. The Measure Department primarily uses Maptek hardware and software for surface and underground mining services. The Scale Department sells, rents, and custom designs micro-laboratory to haul truck scales.
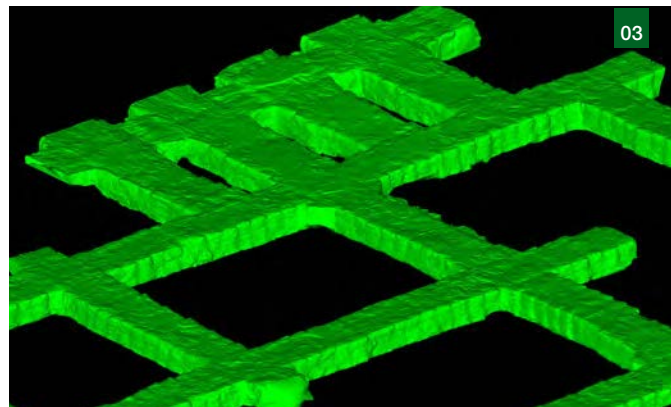
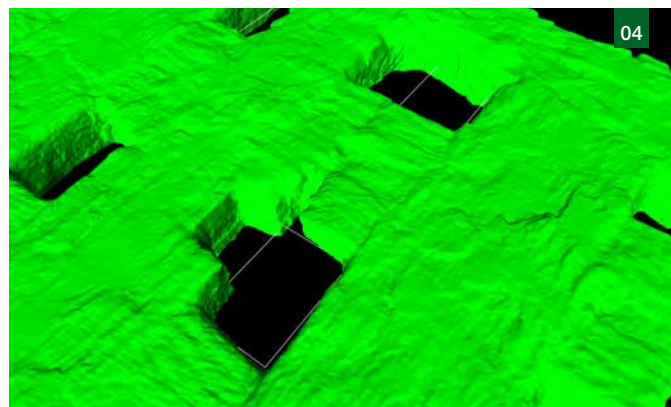To learn more please visit
www.wingfieldscale.com


01 I-Site 8200 laser scanner mounted on utility vehicle
02 2D design model in comparison to 3D model (green)
03 High level of detail captured and modelled
04 Pillar design (CAD lines) vs actual modelled surface (green)

New tools for resource geologists

Being able to analyse and interpret all available geological data within a single 3D visualisation environment streamlines resource modelling.

Samples Optimisation - CU
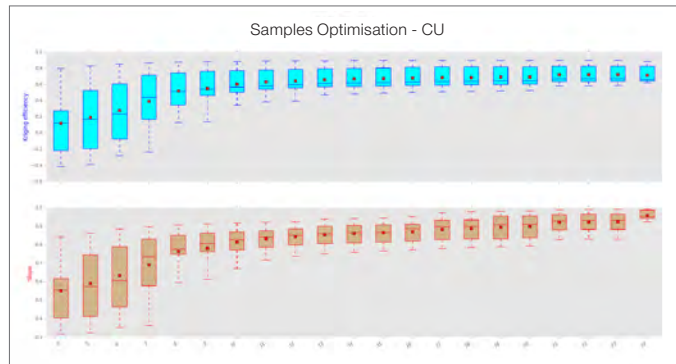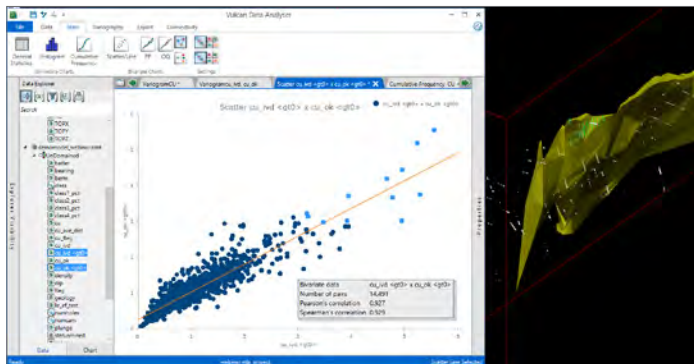
The upcoming Version 11 of Maptek™ Vulcan™ will allow resource geologists to take advantage of the single 3D visualisation environment on the Maptek Workbench for analysing and interpreting all available geological data.

The comprehensive range of statistical approaches supports intuitive interpretation, streamlined comparison of multiple theories and reliable results.

> Maptek will deliver new geostatistical functionality in Vulcan 11 on the Workbench during 2018.

The Workbench is a dynamic architectural backbone that allows enhanced workflows and data sharing. Ultimately, all Maptek applications will be accessed and run from the Workbench.

The planned release adds new functionality to both the Vulcan Data Analyser (VDA) and grade estimation workflow with the introduction of Kriging Neighbourhood Analysis (KNA) within Vulcan GeoStatModeller.

Kriging capability

Kriging Neighbourhood Analysis is a new feature. Fully integrated into the Vulcan grade estimation process, KNA is fast and intuitive to set up and run, and charts are readily saved for reporting.

KNA provides the ability to determine and optimise input parameters for the kriging process to minimise conditional biases during estimation. Block size, minimum and maximum numbers of samples, search distances and discretisation parameters can be charted showing their impact on kriging efficiency and slope of regression.

KNA can be effected on a single block (local) basis and on a multiple block (global) basis. The optimised KNA settings can be fed directly into a grade estimation run for efficient processing.

Other functionality of interest to resource geologists includes enhancements to stratigraphic modelling, new options in estimation and simulation tools, and application of command list and scripting to automate the geological workflow and save time.

Vulcan data analyser

VDA is easy to use and is fully integrated with geological resource data. Major improvements to the user experience are backed up with new options for analysis.

Variogram generation for block model variables will supplement the existing capability from database variables. New deferred scatter plot and madogram charts will be available for validation of Gaussian simulations.

Data highlighting is a streamlined way to check spatial locations of chart outliers and assess their potential impact during resource estimation. Users can simply select data on an existing histogram, cumulative frequency chart or scatter plot and highlight the selected data in 3D.

Minor changes include general improvements to workflow for fan variograms, the addition of slider bars to dynamically adjust lag on variograms, updates to variogram modelling and many visualisation enhancements.

Driving improvement in survey

Maptek™ I-Site™ has helped Codelco Chile El Salvador Division with efficient survey processes to improve the metallurgical balance for their operations.

El Salvador Division mine is located in the Atacama Region of Chile, nearly 2,600 metres above sea level. This operation is in charge of the Inca underground mine, and the open pit Campamento Antiguo and Damiana Norte mines.

El Salvador develops open pit mine processes and underground mining, and operates a hydro-metallurgy and concentrator plant, smelter, refinery and port.

Metallurgical balance

The term 'balance' in mineral processing encompasses all the technical and economic calculations made to evaluate the process of concentration by flotation.

Having all this information available at any time is essential for making accurate projections and effective decisions.

The balance is prepared and verified from the production data of the different mine divisions. This becomes the basis for the subsequent accounting processes of the El Salvador division.

Activities that should be controlled include process flows, sampling equipment, weighing equipment, statistical analysis of rules, and inventories.

Monitoring the metallurgical balance which is evaluated in the ore extraction cycle is made possible by controlling the volume of movements of materials processed and discarded.

> Properly managing mine tailings and minimising their impact on the environment has become one of the main challenges in mining today.

The objective is to collect better information and therefore gain better control of the metallurgical balance. Maptek™ I-Site™ technology provides a solution. The I-Site XR3 laser scanner captures detailed topographic survey information.

Efficient survey

I-Site systems improve the effective management of tailings dams, enhancing safety and productivity, ensuring operational control and environmental compliance.

A simple, efficient process streamlines the survey team workflow, increasing productivity and improving the mining business.

The implementation of I-Site Drive allows continuous acquisition of scan data with an I-Site laser scanner mounted on a site vehicle.

Mining operations can perform efficient surveys of stockpiles, slopes and haul roads, reducing surveying time by more than 50%.

The continuous monitoring system optimises survey time and controls slopes that may present a risk to the mining operation, increasing safety when accessing difficult areas.

Static surveys can be conducted without additional setup, and scanning while the vehicle is in motion captures data continuously. Large-scale surveys can be completed in a short time, with results delivered quickly to the operations.

Thanks to
Luis Cortés C., Mining Engineer
Codelco Chile – División El Salvador
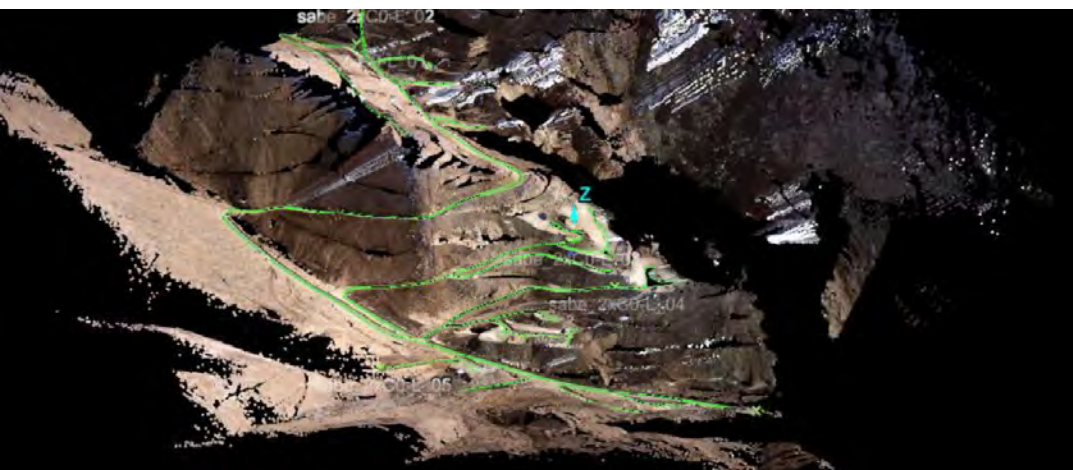
Stockpile management

A well-established underground manganese mine in the Northern Cape province of South Africa improved its stockpile management methodology using MineSuite.

The operation is able to provide a variety of products in a relatively short time. Mined material is conveyed to the surface, crushed and screened, then hauled and stockpiled into multiple stacks. Individual stacks are surveyed and analysed to generate an accurate profile.

Shortcomings include the time-consuming efforts when loading a consignment to be railed, and grade control compliance issues caused by loading individual stacks into individual wagons.

The MineSuite Management Information System was first implemented on site in 2005. The performance of processes is measured from the underground ROM bins where material is tipped, through the underground silos to surface silos. Plant performance is measured in two crushing and screening plants.

When the site needed to track material from the plant onto individual stacks to reconcile plant production, the new load-out operation provided an opportunity for MinLog to include this in their MineSuite offering.

Expansion project

The mine expansion and improvement project culminated in a blending bed and train load-out station upgrade.

Two stackers, a reclaimer and fully automated load-out station were built and assembled at the mine to facilitate the rapid load-out of railed consignments to increase production levels. The project scope started at trucks tipping material from the stacks into one of two bins each feeding a stacker.

Various product stockpiles are stacked according to pre-defined requirements, including product and volumes. The process aims to ensure each stockpile is stacked as soon as it is reclaimed, ensuring continuous availability of product.

Stockpiles are designed to cater for two consignments before being depleted. The reclaiming process commences as soon as a new consignment arrives and ends when the consignment departs. The objective is to load a complete consignment within 3 hours or less, an 80% reduction in turnaround time.

MineSuite solution

It became apparent that a gap existed between the stacks and the truck tips. MineSuite had not been used to measure load-out activities, so had no information regarding the stacks and their allocation to consignments. Manual handling with spreadsheets was no longer feasible.

MinLog was tasked with providing a solution, and the analysis phase identified that train activities were also not being managed appropriately.

A Train Load-out and Dispatch Module was implemented to manage train activities and to assign arrived consignments to stockpiles for the load-out station control system to engage the reclaimer appropriately.

A new Stockpile Management Module (SMM) now handles stockpile planning, allocation of stacks and stockpile monitoring.

> The Stockpile Management Module was developed and deployed within 3 months.

MinLog was able to identify and design the SMM around the given process flow as demanded by the stacking, reclaiming and load-out processes, with special consideration to various functional roles. These roles were clearly defined with respect to fitting into the process before any functionality was developed.

Another functional requirement was to manage and monitor the stockpile state changes. These are quite complex, as each stockpile caters for two consignments. In addition, the control environment had to be designed to handle automated state changes and be integrated with the SMM.

The mine expansion and improvement project is in its final stages, and feedback is extremely positive. MinLog has delivered on time, within budget and in scope, developing a new, fully functional module in record time.

Maptek™ recognises that uncertainty plays an increasingly important role in tactical and strategic mining studies and mine operational systems.

The world is more than complicated, it is complex! Maptek Core Technologies Product Manager, Chris Green provides some tips on how complexity can be embraced.

Fluctuations in the data within a typical mining supply chain are inevitable. Randomness, a standard geological feature of most orebodies, can be a source of confusion and frustration. Beyond those natural variations, we are confronted by the randomness of the human environment.

The problem is that almost all prediction work done within many sectors relies on the parameters of the Gaussian bell curve, which ignores large deviations and thus fails to take account of surprise results.

Humans are poor at factoring in the possibility of randomness and uncertainty. We forget about unpredictability when it is our turn to predict, and overestimate our own knowledge. We often desert the warning signs of our own intuition.

" Uncertainty is the single greatest design flaw within the current mine operational mindset and our predictive systems. "

We expect linearity in areas that are mostly non-linear. Systems tend to follow the same philosophy that has defined our scientific management systems which have dominated the corporate world since early last century. We are now clearly out of date in so many areas within this new era of big data and complexity.

This area of discussion is highly relevant today, and discussion forums are very active and at times emotional. However, there are avenues to explore in working with uncertainty and natural randomness.

Risk and Uncertainty are not the same.
Risk is where there is a set of possible outcomes within a system, and the probability of each outcome is known. Uncertainty is where there is an unknown set of possible outcomes, and the probability of each one is not known.

Probabilities and Uncertainty.
From a Bayesian viewpoint, probability is a measure that quantifies the uncertainty level of a statement. In the absence of information, all values are equally likely to occur and uncertainty is at a maximum.

The universe is an uncertain place and the best we can do is to make probabilistic statements about it. Whether the underlying reality is deterministic or stochastic, we are using probability as a tool to quantify uncertainty.

Use analytical techniques that work within non-linear environments.
Highly complex linear modelling techniques in non-linear systems should not be given greater credibility than they deserve. While useful for gaining a basic understanding, they are often no more valuable than a simple statistical study. To truly understand a dynamic non-linear system, you must adopt techniques that are built to handle such complexity and have a consciousness of history.

Prepare for multiple outcomes.
Rather than trying to make the one 'right guess' as to what will most likely happen, use a range of techniques to make multiple predictions, or scenarios. This is the way any truly innovative process works, and innovation is a good analogy for prediction. In addition, predictions generate history, and history should be an input into all further prediction and decision processes.

Focus your evaluation of initiatives on the inputs, not just the outputs.
Randomness will confound even the best efforts to produce trustworthy results. When assessing the success of an initiative, consider the quality of the decision to undertake it. Don't rely solely on the actual outcome of the project (good or bad), but take into account the quality of the process that went into its planning and execution.

Remain agile, and strive to respond quickly.
There's no substitute for intuition, awareness, listening, and detecting events as soon as they happen. Focus on 'sense and respond' as an organisation, and empower people to act quickly and decisively. A corporate policy that is strong on principle but general enough to be flexible will serve you well.

Talk to Maptek about risk and uncertainty and how we can solve your complex challenges.
Contact chris.green@maptek.com.au

Make uncertainty work for you

University partnerships

Maptek is involved in partnerships and initiatives that provide geologists, mining engineers and surveyors of the future with access to the latest mine technology solutions.

Train the trainers

Maptek hosted educators from across North America's top colleges and technical universities for the annual Train the Trainers Workshop in Denver during January.

The workshop provides a platform for educators to enhance skills and curricula while networking with others from the same field. This year eight professors and teaching assistants attended in person and five joined remotely.

The workshop began with an overview of the Maptek University Program, partnership opportunities and extra benefits, such as educational licences, training datasets and reference material. The five-day workshop covered Maptek™ Vulcan™ basics, block modelling, implicit modelling, open pit and underground design, pit optimisation, geostatistics and scheduling tools.

> The train the trainers workshop is just one example of activities which strengthen and grow unique mining partnerships with universities around the world.
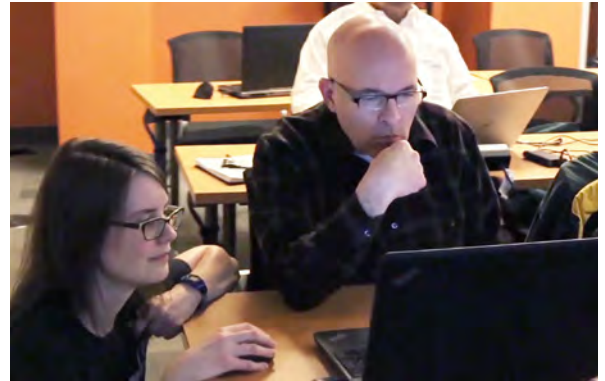
The sessions exposed participants to Maptek software applications and resources to easily integrate them into lecture and laboratory sessions. The Online Training platform was also showcased.

Throughout the workshop educators provided feedback on various tools and how they will be used. They also suggested ways to make the Maptek University Program more sustainable and help solve their challenges.

NExUS intensive

The second National Exploration Uncover School (NExUS) was attended by 33 future leaders of the minerals industry at the end of 2017. Funded by the Minerals Council of Australia and conducted by The University of Adelaide, the course included an introduction to geological modelling and resource-reserve estimation using Maptek™ Vulcan™.

The three-week intensive summer school exposes recent graduates, third year and honours students to the opportunities and challenges facing mineral exploration as search areas move increasingly under cover. Participants were selected from across Australia, with 12 universities represented.

The 3D orebody modelling component followed presentations, workshops and field practicals. Participants were exposed full circle from conceptual exploration through to modelling and evaluation.

> The practical session provided a valuable understanding of the modelling process, the stages involved and tools available.

Students used the latest Vulcan geological modelling tools. Dr Gavin Springbett, G&S Resources, covered geological databases, data appraisal and validation, database compositing, orebody boundary definition (implicit and explicit), surface and block modelling, grade estimation, model visualisation and validation, and resource-reserve estimation.

The alliance between Maptek and The University of Adelaide is set to continue, with a third NExUS program planned for late 2018.

Maptek in Mexico

More than 20 mining engineers from across the Americas took part in a strategic and tactical planning workshop hosted at Maptek Mexico's Hermosillo office.

Evolution workshop

The Maptek™ Evolution™ workshop in mid-January allowed Maptek Mine Planning Business Manager Australasia and Evolution Product Manager, Eduardo Coloma to present the dynamic scheduling solution to attendees.

Engineers from Fresnillo La Herradura, Agnico Eagle La India, Pinos Altos, La Mascota and El Barqueño, Alamos Gold El Chanate, Cobre del Mayo, Grupo México Cananea, Pan American Silver Dolores and Goldcorp Penasquito enjoyed the workshop and recognised the value of Evolution.

'It's a good way to see the tools available today to improve project performance,' noted Superintendent Technical Services Agnico Eagle, Sergio Bernal.

'Evolution fully integrates the most important variables for a medium and long term plan, and it's very practical to use,' commented Cobre del Mayo Planning Superintendent, Jhonnás Molina.

National Director, Maptek Mexico and the Caribbean Operations, Alberto Ramirez was delighted with the turnout of mining professionals enthusiastic to learn more about Evolution planning tools.

'The event exceeded our expectations,' he said. 'It has given us the opportunity to show the real value of this agile and dynamic program, which will allow engineers to maximise the value of their operations.'

New office locations

Mexico has become one of the world's main exploration destinations, leading to sustained growth in mining activities. Maptek has been the ideal technology partner to help companies succeed, providing software and hardware solutions across the mining cycle.

This year Maptek expanded its Mexican offices into new facilities with comfortable, modern spaces for training and meetings as well as more room for operational growth.

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