Forge

In this issue

Welcome to our Forge newsletter March 2024

Mapping and modelling are the backbone of the early stages of any mining project. Practical, easy to use solutions that translate technical data into knowledge for timely decision making lead to safe, sustainable, efficient mining.

Maptek customers excel at harnessing our software tools and hardware systems to collect and analyse their data.

Emperor Metals in Quebec has discovered a faster way to uncover the resource potential of a gold project through machine learning with DomainMCF.

Better modelling with GeologyCore and Vulcan has enabled Glencore to improve mining efficiency and maximise coal recovery at the Hail Creek mine in Queensland.

At Granite Creek mine in Nevada, geologists use the latest face mapping approach to acquire critical geological information to guide production modelling.

Maptek supports students and recent graduates through access to Online Training and software licences. Helping young professionals in Africa to achieve their career goals is incredibly rewarding. Positive intern experiences help university students in South Australia to prepare for the future.

We hope you enjoy these and other stories in this issue.

Eduardo Coloma
CEO
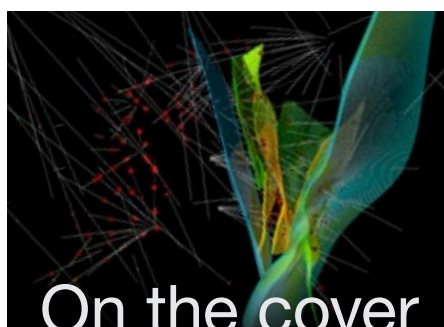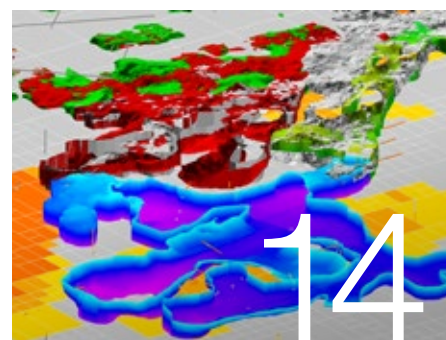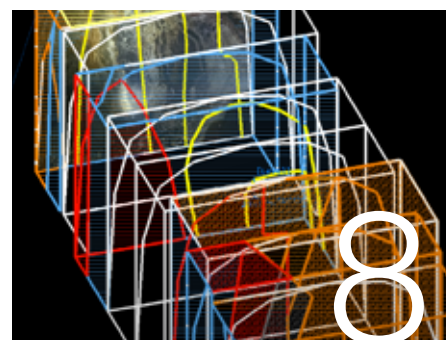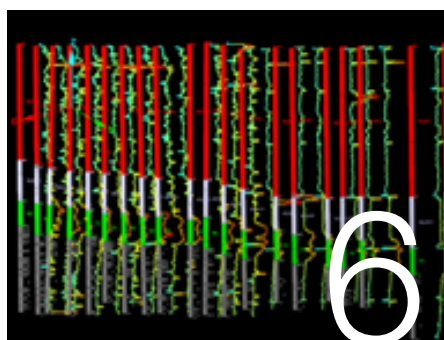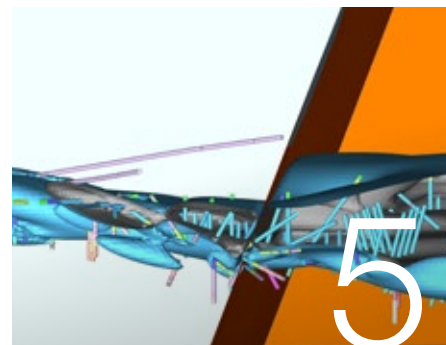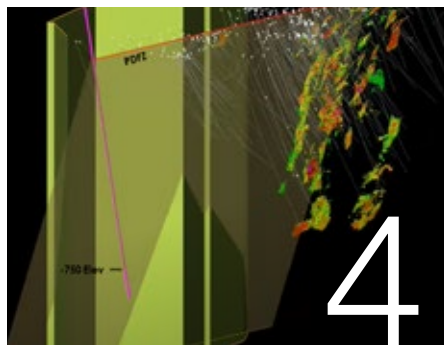
On the cover

Maptek integrated modelling and grade control tools streamline tasks for geologists

Contact us: forge@maptek.com

Contents Maptek Forge / March 2024

11

Advancing with DomainMCF

An exploration company in Canada found that Maptek™ domain modelling technology provided a faster way to uncover the resource potential of a gold project.

Emperor Metals is a gold exploration company focused on advancing the Duquesne West Gold project in Quebec, Canada. The project has a historical inferred mineral resource estimate of 727,000 oz of high-grade gold at an average grade of 5.42 g/t Au.

Historical data from more than 100,000 metres of drilling has been augmented by a recent 8,600-metre drill program. The high grade gold coupled with broad low grade bulk tonnage gold offers promise for developing an open pit above a high grade gold deposit.

Emperor Metals developed a 3D geological model using Maptek™ DomainMCF machine learning assisted domain modelling technology.

John Florek, CEO of Emperor Metals, acknowledged that without DomainMCF, the time to develop a 3D geological model would have been prohibitive.

'Within a month, we were able to build the first ever mineralised model of the deposit and within four months the first ever 3D geological model,' said Florek.

Florek was already familiar with the domain modelling technology and its many applications. In 2022, he was awarded third place in the Maptek Geology Challenge—a global competition geared towards rewarding the most innovative uses of DomainMCF—for application of the technology on a series of diamond drillholes for this high grade gold deposit.

Florek and his team continue to use DomainMCF and maintain a close partnership with Maptek.

'Working with Maptek allows us to capitalise on their expertise —we get access to developers, mathematicians and a specialised technical team,' he said.

The geological models of the Duquesne West Gold property have improved visualisation of the deposit and enhanced communication between project management and investors.

'Within a month, I could do a proper evaluation of the deposit and present the model to my board of directors,' Florek said.

Emperor Metals needed the power of machine learning to handle its large dataset in a timely manner.

Florek considers it vital for an exploration company to take advantage of new opportunities as quickly as possible, rather than waiting and potentially dropping a property due to lack of progress.

Not only did DomainMCF give nding the lithological, geological and structural control of the deposit gave them new areas to target for exploration.

> We see that the DomainMCF model is legitimate and accurate given the results from our drilling program. The model helped us to target specific areas that might have otherwise been overlooked.

Specifically, their interpretation led them to three distinct scenarios to add gold ounces to the project. In addition to the potential for high grade underground mining, the results of their drilling program have shown potential for open pit and low grade underground bulk tonnage mining.

Emperor Metals will continue using DomainMCF during the next phase of exploration and plans to add new geological information from the recent drilling campaign to the model.

Florek attributes much of the success from the first phase of exploration of the Duquesne West Gold property to DomainMCF and the benefits of this machine learning technology.

Thanks to
John Florek
President, CEO and Director
Emperor Metals

First quarter 2024 software releases

A tranche of Maptek™ software releases will drop in the first months of 2024, and will be available to download in Maptek Account.

Vulcan 2024

The latest release of Vulcan includes features to make workflows smoother and more efficient. The Quick Mode tool in Interactive Cut Planner seamlessly supports Advanced Reserves specification files, simplifying configuration for a more intuitive planning process. Users can now take full advantage of drillhole collar symbols when loading drillholes, providing a more comprehensive view of geological data.
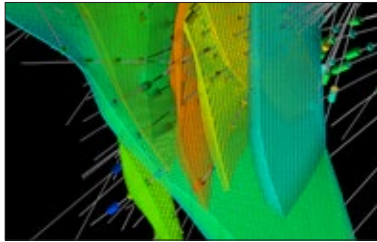
Grade Control attributes calculation is boosted with the introduction of new time variables for faster, more precise results.

Vulcan Data Analyser features enhanced visualisation of data and attributes. Gaussian transformations and simulations can be run from within workflows and the command editor, and linking to third party data and databases is improved.

Geotechnical structures can be scaled based on database fields, allowing for quick identification of important structures.

GeologyCore 2024

GeologyCore 2024, anticipated for release in April, increases the power and usability of the modelling workflow, as well as generating an automatic audit trail each time the model is run.
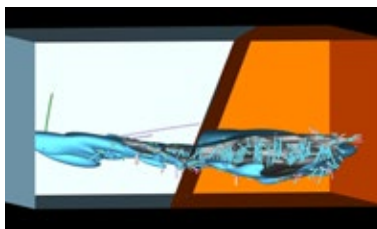
The enhanced Domain Manager allows better control over how small intervals are handled, and surfaces or solids can be used to split or flag existing intervals. Intrusives models can now be added within fault blocks in a faulted geology model.

Modelling Manager and Fault Manager feature improved network relationships panels, and a CSV report of all fault modelling settings is automatically created on completion of modelling and processing.

Evolution 2024

Evolution 2024 focuses on improvements to Evolution Epoch, supporting additional constraints and process modelling. Python report scripting has been expanded to work with Epoch and Live Dashboards, offering customisable, repeatable reports.
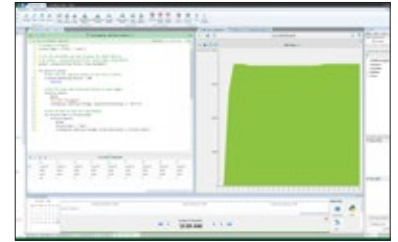
New Destination Priorities allows users to define priorities for mill, stockpile and waste by destination to maximise site equipment productivity. If stripping waste is the highest priority, waste utilities can be easily prioritised over mills and set within the waste utility group, improving the ability to model scenarios such as building out tailings dams.

A new interface for Epoch Destination Rate helps users constrain the flow of any accumulation item to any mill or stockpile. Calendars with variable periods, such as hourly, are now supported. Each destination can have multiple independent limits that are globally considered by the Epoch evaluator.

Epoch allows periodically changing productivities to be easily updated, and reporting to be aggregated in the most useful way. The Waste Area Accumulation constraint allows users to configure rolling maximum quantities of material that can be delivered to a waste area over a given period of time, helpful when modelling scenarios for handling waste.

Python report scripting now provides ultimate flexibility for Epoch users, allowing scripts generated to be used as pivot table data sources. This enables large transformations on the data to be performed directly in Evolution, consistently producing reliable results, while the pivots provide an interface to generate all the charts and graphics required to easily consume the information.

Evolution Strategy speed has been significantly improved, handling more complex scenarios with large block models or multiple reporting attributes.

A summary of all the changes in the releases can be viewed in Maptek Account. A new end user licence agreement must be accepted to download 2024 software releases.

Workbench 2024

The latest Maptek Workbench enables customers to more easily deploy and manage software seats and application tools within their organisations. Workbench 2024 features enhanced visibility of licence availability, including managing and returning borrowed licences, and session duration metrics. Base solution packages and add-ons are now grouped in a single hierarchical view. Python-enabled toolkits extend and streamline software functionality in Maptek applications. Open access SDKs and APIs allow users to bring data into the Maptek environment or push it downstream/upstream, leveraging external libraries to optimise processes across teams, sites and operations.

Accurate data interpretation

An open cut mine in Queensland maximised coal recovery through accurate data interpretation and structural modelling using measurement-while-drilling data.

Hail Creek Mine, owned and operated by Glencore Coal Assets Australia, is an open cut mining operation in central Queensland, Australia. Since 2003, the mine has been a key player in producing metallurgical and thermal coal for the export market.

Located within the Permian strata of the Bowen Basin, known for its substantial coal-producing intervals, Hail Creek Mine utilises dragline, truck and shovel methods in both strip and terrace mining sections across the deposit.

01

02
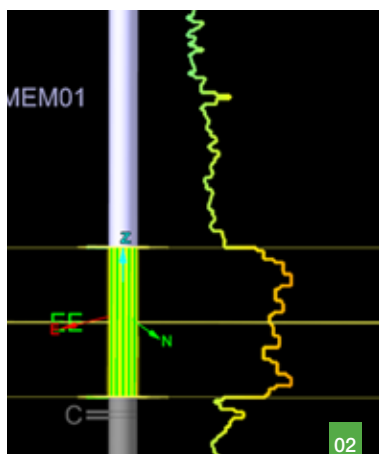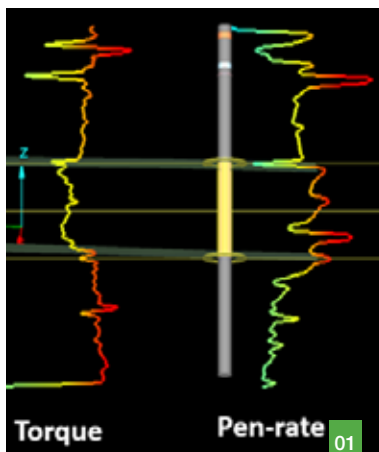
The operation produces premium low ash hard coking coal, higher ash hard coking coal, and high ash thermal coal for export. The site's strategic location contributes to its significance in the industry.

Improving mining efficiency and maximising coal recovery through the reduction of coal loss and dilution is a primary focus in Glencore coal mines.

Measurement-while-drilling (MWD) data, including penetration rate and torque, are crucial for identifying coal seam roofs and thick sandstone overburden units.

Hail Creek undertakes extensive short-term pre-production drillhole geophysical logging to unravel the complexity of the geological structures.

Maptek™ GeologyCore interpretation tools offer viable solutions to the challenges associated with interpreting the data. The geology team managed to reduce almost 60% of blast hole geophysical logging in certain areas of the pit, replacing it with MWD data interpretations.

With more accurate, faster interpretations from GeologyCore, it was possible to use MWD data in conjunction with Maptek Vulcan™ integrated stratigraphic modelling features. This allowed the combination of MWD with exploration data and its use in the site modelling process.

Identifying boundaries

MWD variables, such as penetration rate and torque, were used to identify coal seam roof, floor and thick sandstone overburden units (Figures 1 & 2).

A main goal was to clearly identify coal roof and thick sandstone unit boundaries, with a 15-20 cm maximum error per pick. Using the lithology targeting tool, coal seams and sandstone overburden units were efficiently bulk picked (Figure 3), saving considerable time in correcting drillholes.

> The visualisation tool played a pivotal role in accurately distinguishing between coal and sandstone units.

The ability to optimise a parameter range to achieve a better scale when two variables such as penetration rate and torque are plotted against depth significantly improved the accuracy of coal seam roof identification.

Corrected drillholes are combined with the site exploration database for more accurate results in Vulcan integrated stratigraphic modelling (Figure 4).

Implementing GeologyCore reduced costs by minimising geophysical logging and mitigating blast damage to coal through precise modelling.

The overall modelling process was faster and more efficient. Site geologists found the software user friendly, facilitating fast and easy training.

The positive impact of GeologyCore extends to multiple aspects of geological modelling at Hail Creek, contributing to enhanced efficiency and cost-effectiveness.

Thanks to
Kenneth Wijeratne
Mine Geologist
Glencore
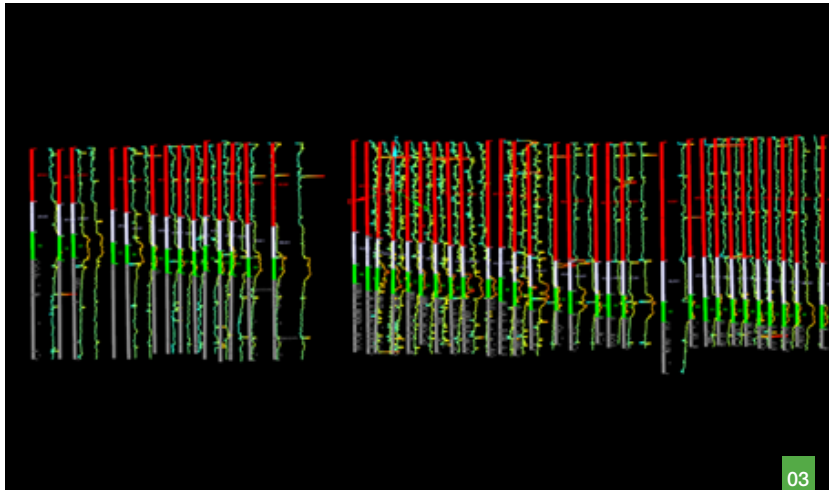
03
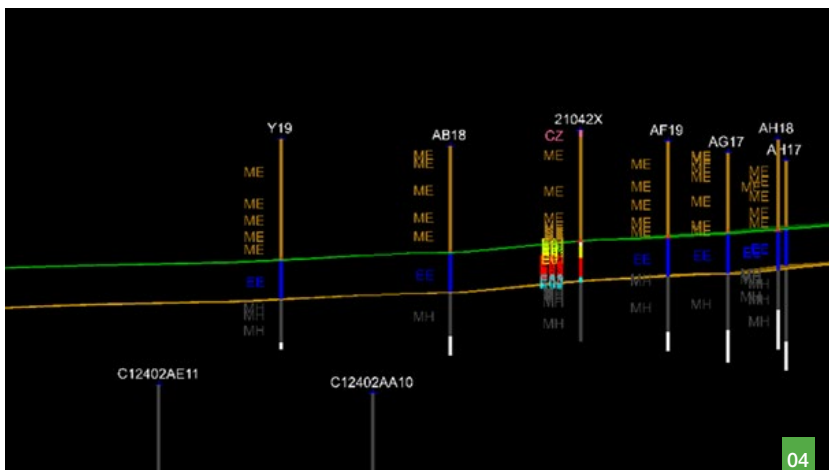
04

01 Torque and penetration rate values plotted as line traces against depth using visualisation tool
02 Penetration rate signature distinctively changes at coal seam
03 Bulk picked pre-split shot using lithology targeting tool
04 Final result when MWD combined with exploration data

Modelling tools

Maptek GeologyCore provides a dynamic workflow for validating drillhole databases, assigning domain codes and generating geological models directly from drillhole and other data.

Data is easily loaded from Vulcan and published back to Vulcan when modelling is complete. A dynamic interactive interface streamlines the generation of complex multi-domain models.

Users can access multiple techniques—Grid, Implicit, Vein or DomainMCF—in a single workflow. Other features include a visual interface for data preparation and validation, and an upload/download mechanism for DomainMCF.

The GeologyCore 2024 release delivers enhancements to how intrusives are handled, a new snapping mode for Implicit Modeller, Fault Manager and Intrusives in Modelling Manager. Improved network relationship panels, additional splitting options for fixed lengths from collar and by elevation, and output boosted by automated reporting are other benefits.

Vulcan Integrated Stratigraphic Modelling creates reverse and normal faulted stratigraphic models using defined dip and throw, without requiring solid triangulation fault domains. Strings or fault surfaces can be used as input. Users can directly incorporate data points from drillholes or CAD input via a hybrid modelling method.

Maptek GeologyCore

Vulcan GeologyCore was first delivered in 2021 as an inclusion for specific Vulcan licence types to support geologists in their daily work.

With the expansion of modelling features and an advanced workflow that connects geologists with multiple modelling methods, the solution is now rebranded and offered as Maptek GeologyCore, a standalone product.

GeologyCore is available as a subscription licence with dedicated add-ons for geotechnical, design conformance and working with seismic data.

Face mapping underground

A customised Maptek™ Vulcan™ underground face mapping solution helps acquire critical geological information for production modelling.

Owned by i-80 Gold Corp, the Granite Creek Project in Nevada, USA hosts high grade open pit and underground mineral resources that remain open for expansion.

As the production modeller in a small mine, Lead Project Geologist Kris Alvarez also helps with production geology, using data generated by the ore control geologists.

'Our company aims to be a mid-tier gold producer and the Granite Creek mine is a key part of producing that gold,' said Alvarez.

Her team provides knowledge of the location, grade and volume of gold ore so the miners can extract it safely and economically.

'At the end of the year, the key questions are how much gold was produced, how much did it cost and did everyone go home safely?'

Granite Creek began using the Maptek™ Vulcan™ underground face mapping solution early in the mine's production in May 2022. Maptek helped customise it to the mine workflow, and suggested how to most efficiently optimise the solution for their specific deposit.

Alvarez came on board in 2023 and used a senior geologist's how-to notes and tips from production geologists who used the solution daily to get up to speed.

The solution is used for ore control mapping and tracking the rounds. The location and volume of each round is fed into an acQuire database. Assays and other laboratory results are also uploaded into the database, enabling almost real-time tracking of the grade and volume of each face as it is mined.

'As soon as the lab loads the data, the production team can tie the grade to the location in space and view it in 3D,' said Alvarez.

The mine design is predicated on the resource model, which is based on a drill spacing of greater than 100 feet. Mining at 15-foot widths means that any information to pinpoint the location of the ore more precisely is valuable.

'We don't exist to mine waste!' commented Alvarez.

Economic mineralisation depends on both lithology and structure, so mapping geology at the face is vital. Geologists underground can see and interpret the underlying and overlying structures and test how the mineralisation is behaving in 3D.

Alvarez initially thought that digitising data at the actual face would be slower but realised the ore control geologists who do it daily can map as rapidly on the tablet as on paper. All it takes is practice and the right equipment.

Without this solution, geologists would use hybrid methods—map on paper, convert data, upload it to Vulcan and/or a database. Reducing duplication in data input saves time and potential errors.

Time spent converting field structural data to digital data in the office is better spent on higher value tasks—interpreting the data, talking with engineers and designing drill programs.

Alvarez commented that the face mapping solution gives the most immediate value through data integration—seamlessly linking the assays to volumes in space.

'My experience suggests it saves at least half an hour per face. That adds up in a production geologist's day.'

'Having the database integrated with lab results as soon as they are generated removes duplicated data entry. Being able to see the data in 3D and share it with the team enables collaboration to build better designs,' said Alvarez.

Maptek worked with the mine database team to overcome the challenge of integrating the maps with the assay databases.

'The lead person at Maptek stays on our support team. She helped build our custom system and her deep understanding of all the parts involved facilitates fast improvements or fixes.'

Benefits to the mine extend beyond face mapping. Because Maptek staff have wider experience in process enhancements, they have identified other ways to process or apply data.

'I also like that my junior geologists keep thinking of improvements, and the Maptek team can implement them rapidly,' Alvarez said.

A customised solution has served the Granite Creek mine well, improving the speed and quality of face mapping, and streamlining communication between teams.

Thanks to
Kris Alvarez
Lead Project Geologist
Granite Creek Mine

Granite Creek geologists mapping a fold in one of the mine accesses
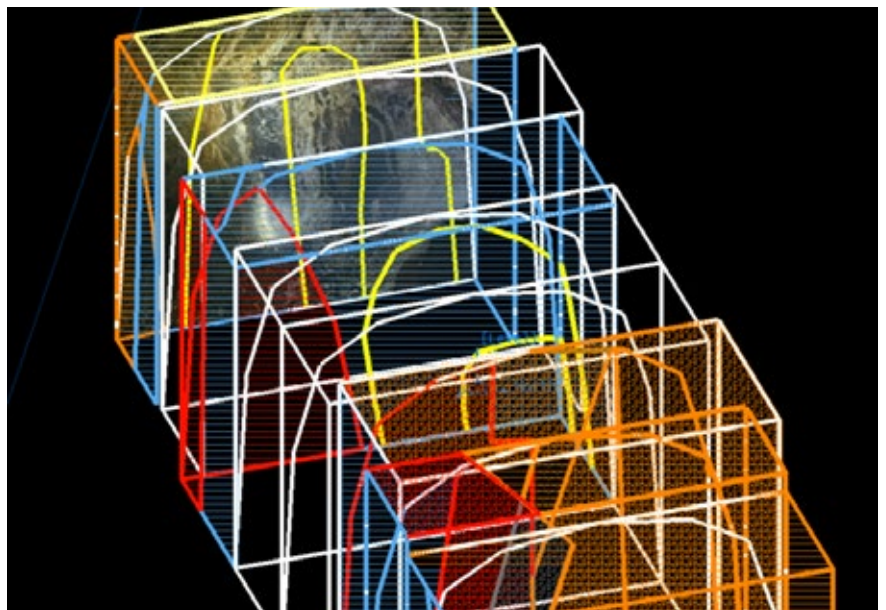
Support to achieve career goals

Access to Maptek™ online training, solution licences and support helps young mining professionals in Africa upskill to achieve their goals.

Alphée Mapendano recently completed a Masters Degree in Mine Planning from the University of Lubumbashi in the Democratic Republic of the Congo. His thesis involved time series and Monte Carlo simulation for underground long term mine planning with regard to commodity price uncertainty.

After forecasting and simulating all possible future copper prices, Mapendano used Maptek™ Vulcan™ Stope Optimiser to optimise stope shapes for the most likely annual copper price in a 10-year period. Vulcan Underground Design tools then helped develop the mine design for a cut and fill mining method. Finally, Vulcan and Vulcan Gantt Scheduler helped create and report a schedule.

'The Maptek Online Training platform made learning the software very easy because of the interactivity and clarity of the teaching,' said Mapendano.

He commented that using industry-leading software made his studies more interesting and helped him gain professional career skills.

> Skills in underground mine optimisation, design and planning increase chances to find a job as an underground mine planning engineer.

Mapendano was impressed with the speed of the underground tools for designing a mine, and the power of Vulcan Gantt Scheduler to link the solids and define precedences.

The biggest challenge encountered in his Master's project was using a set of stopes from different optimisations in a single schedule. The simplicity of the Maptek tools helped to develop a methodology to overcome this challenge.

From this experience he learned how to design and schedule using a cut and fill mining method.

Apart from access to software licences and training, Mapendano appreciated the support from Maptek Business Development Manager, Badisheng Morena, who provided wisdom and advice, with Mine Planning Engineer Stacy Epiga providing technical support for Vulcan underground functionality.

Mapendano continues to enhance his skills in optimisation, design and scheduling for other mining methods like sub-level and long hole stoping, block caving, and room and pillar. He is also learning applications using other software.

Mapendano's immediate aim is to complete his professional internship with Kamoa Copper Company, where he is currently working as a mine planning engineer.

Going forward Mapendano would like a similar role in an underground mine anywhere in the world, leading towards becoming a technical services manager at a large operation.

Thanks to Maptek training and support, Mapendano is on the way to achieve his dreams.

Thabo Malapane is a Senior Blasting Technician with BME (Bulk Mining Explosives) in the Northern Cape province of South Africa. His responsibilities include blast designs, QA/QC tracking, blast audit, blast timing design, fragmentation reporting, floor elevation control, auditability improvement and specialised controlled blast designs.

At an iron ore mine in the Northern Cape that uses Maptek™ software and services for blast design, Malapane developed his interest in upskilling. Maptek Online Training courses in BlastLogic™ and Vulcan™ covered drillholes, databases, block and orebody modelling, open pit design and open pit drill and blast.

Although these certifications were not an employment requirement, Malapane was motivated to enhance his technical proficiency and professional growth.

He completed the training in his free time to avoid negatively affecting work. In reality, it impacted positively. His new abilities helped to mitigate challenges faced by the drill and blast department, leading to better overall efficiency and outcomes.

'My employer recognised that the skills and knowledge gained brought value to our team and projects,' said Malapane.

Convenient online access, flexible pace of learning, keeping up to date with the latest technology, developing skills, improved QA/QC tracking accuracy, and real time data management were significant benefits.

'I integrated the learning material straight away—some topics were directly aligned with projects I was running, adding value to the client,' said Malapane.

He appreciated the resources provided, and also the flexibility to use his own to perform the same task. He was able to solve a particular problem using the video demonstrations to create triangulations and check closure before creating a solid, which minimised turnaround time when designing blocks.

'I now design blocks ahead of schedule and revise them when they are due for blast, which relieves the workload.'

Malapane sees the training as a step in the right direction to develop his skillset as a mining engineer. His immediate plan is to acquire statutory certification while gaining experience with different mining methods, resources and technology, followed by academic qualifications, and ultimately reaching technical management.

'The Maptek footprint covers most of the leading technology adaptive mines within South Africa, Africa and the world. Knowing the use and application of Maptek products is beneficial to anyone in the mining industry,' he concluded.

Malapane recommends Maptek Online Training for people looking to advance their technical skills while balancing work commitments.

Naphtali Dube completed a range of Online Training courses across Vulcan™, BlastLogic™ and PointStudio™ covering drillholes, databases and design data, open pit design, drill and blast, orebody modelling, block modelling and geostatistical data analyser.

Certification was essential for his role, particularly in relation to resource and block modelling, grade estimation, open pit design, drill and blast design, and manipulation of block models.

'My employer was appreciative of the significant value added to resource management and the insights that contributed to problem solving in the planning and design process,' said Dube.

Dube scheduled and completed sessions at his convenience, with the flexibility to save progress and continue during his own time.

A highlight for Dube was mastering the fundamental concepts of geostatistics, which are crucial for a mining engineer.

He was able to effectively apply the acquired knowledge in tasks such as resource modelling, grade estimation, resource classification, visualising block model sections and reporting resources to both geologists and mining engineers.

'A significant challenge was resolved around block model manipulation, impacting resource classification, grade estimation and open pit design, as well as import and export of external block models,' he said.

The straightforward nature of the training allowed Dube to swiftly incorporate the learning, significantly contributing to advancing his career. He intends to pursue additional training focused on mining software, emphasising mine design and scheduling.

'My overall proficiency with mining software improved and positioned me favourably towards my goal of becoming a skilled mine planning engineer,' he said.

Dube recommends Maptek Online Training for its user-friendly interface, concise and straightforward courses, and the flexibility it offers for learning.

Interns learn on the job

University of Adelaide students affirm that Maptek™ offers positive internship experiences, rounding out their coursework and helping them prepare for fulfilling careers.

Internships provide valuable real-world work experience for students. Working on a range of projects that ultimately benefit customers gives them a sense of achievement beyond simply putting their education into practice.

Developing software alongside others in a team and learning to work with an existing codebase are skills that elevate a graduate's performance when they embark on their first jobs.

Hosting interns helps Maptek™ to identify where new developers might struggle and provides mentoring opportunities. The extra resources can be applied to bring valuable projects forward.

Linh Nguyen decided to apply for an internship to put her Computer Science coursework knowledge into practice.

She worked on visually optimising the graphical language used in workflows, which included improving the links between nodes and visual representation of graph changes.

'Working with the visuals, it was fun to see how much difference it made every time I made a small adjustment.'

Nguyen initially found solving problems that involved multiple parts of a large system a challenge. She considers the skills and experience gained through exposure to a complex software system will give her a head start in adapting to new systems in future.

Having learned how to write maintainable code at university and following good coding practices, Nguyen was surprised to discover issues that she wasn't aware of until senior developers pointed them out in reviews.

'It's important to consider how users interact with the system and what they expect a specific functionality to do—it can be vastly different from what the developers think.'

Li-Ting Liao was drawn to the Maptek internship after hearing positive feedback from others on the valuable training it offers.

The interview process alerted her to the opportunity to tackle real-world problems.

Liao's main project involved creating a Python script designed to package essential files into an extension, which streamlines sharing among users. She also helped implement user-friendly features in the Workbench to ensure a smoother installation process.

'Working closely with senior engineers has allowed me to grasp the nuances of writing readable code. Creating user-friendly features and understanding the rationale behind coding structures was also particularly interesting.'

Liao, who is studying for a Masters in Computing and Innovation, faced the challenge of writing code that performs its function and is also easily understandable by others. She appreciated the thoroughness of peer reviews.

'The feedback was invaluable, helping me improve the readability of my code and introducing me to new syntaxes and libraries. I've learned that teamwork is crucial to building large scale, successful software solutions.'

Sam Yin found out about Maptek through a social computing club at the University of Adelaide and thought it would be a great opportunity to gain industry experience.

'We learned abstract concepts in Computer Science at uni and I was curious about their applications in real programming.'

Yin worked on a 'keyblock analysis' tool within PointStudio™ that helps miners identify potentially dangerous chunks of rock that are unstable due to discontinuities in their natural formation.

'I really enjoyed the team camaraderie. It's a great feeling when people come together to solve an unusual problem, especially the celebration that follows.'

The biggest challenge was the shift from an academic style where functionality is written from scratch to working with an existing complex codebase.

'I've learnt to never be afraid to ask for help. Concepts that might take hours to unravel only take minutes when someone with more experience explains them to you.'

'Maptek definitely lived up to its reputation of having the best internship experience in Adelaide!' Sam Yin

Aqmal Pulle had heard good things about Maptek through a friend who was employed after completing a summer internship.

'I heard how positive the work environment is and the ongoing support they provide to their employees, which I can now say is very accurate.'

University of Adelaide undergraduate students augmented their learning during a summer internship at Maptek: (L-R) Linh Nguyen, Li-Ting Liao, Sam Yin, Aqmal Pulle, Jared Lai, Peter Yeoh

Having just finished a Software Engineering degree, Pulle was part of a team developing a mobile app to assist in modelling material movements in mines. He appreciated getting real industry experience and particularly enjoyed the problem-solving aspect.

'There's a great sense of accomplishment when you finally solve something.'

Pulle advises others to always be ready to learn new things, and not be afraid to ask for help. The internship exposed him to completely new technologies, taught him about teamwork, and highlighted the importance of producing maintainable code.

'Maptek set incredibly high standards for me in terms of work environment, which will be a benchmark for any future jobs.'

Jared Lai had interviewed Steve Sullivan, a long-term Maptek employee, for a high school project and learned about LiDAR technology and its applications within mining, which led to an interest in laser mapping technology, and a degree in Mechanical Engineering.

During the internship, Lai helped to design a temperature-regulated enclosure for laser scanners. He learnt a lot about production—from laser cutting to sheet metal folding —and formed an appreciation of the engineering process involved. He also developed connections with people in industry.

'A highlight has been the connections I made along the way, with co-workers in Maptek, people from machining shops and engineering companies.'

The iterative process of design was frustrating at first, but Lai realised its importance to ensure a high quality product is being delivered.

'You must get experience of the engineering process in the workforce, as university cannot offer it adequately. This internship has allowed me to learn more about industry at my own pace.'

Peter Yeoh thought the Maptek internship would be a great opportunity to gain knowledge and experience in an area he wasn't initially considering as a career.

A Software Engineering student, Yeoh worked on Modular UI testing that can be applied to existing and future web-based applications via browser automation frameworks such as Playwright.

'I enjoyed learning all the new technologies and languages, then watching as everything begins to work together. Figuring out how to connect every new technology into clean and usable products is painful, but fun.'

Experience in browser automation opened up ways to automate tasks Yeoh hadn't considered before.

'I learnt about testing and distributed systems in real-world applications—more importantly I now know this is a career I can pursue while enjoying what I do.'

Yeoh learned a lot about working in an industry setting, and appreciated being able to ask questions and get advice on the best way to do something.

'The office environment cannot be understated. There were times I preferred it over WFH. It's a great place and a great community.'

The quest for speed

Maptek™ continually implements new approaches to processing to enhance the performance of software applications.

Multi-threaded grade estimation

Maptek™ Vulcan™ provides the capability to parallelise computational intense processes including grade estimation of numeric variables into 3D block models. The functionality has been available for many years and as processors get faster, Maptek has tapped into this power to benefit users.

Central processing unit (CPU) cores are accessed to run multiple processes simultaneously, with the results merged seamlessly into the final model. It is not uncommon to have 20+ cores in current CPUs, each potentially available for processing. Multi-threading capability can be accessed interactively through the Vulcan interface or automated through workflows and/or scripts.

A relatively new Run Estimation Multi option parallelises the already multi-threaded system. Computation times for a large number of block estimation IDs can be reduced by an order of magnitude.

> The faster you can convert data to a viable model, the faster you can deliver the updates for resource reporting and grade control.
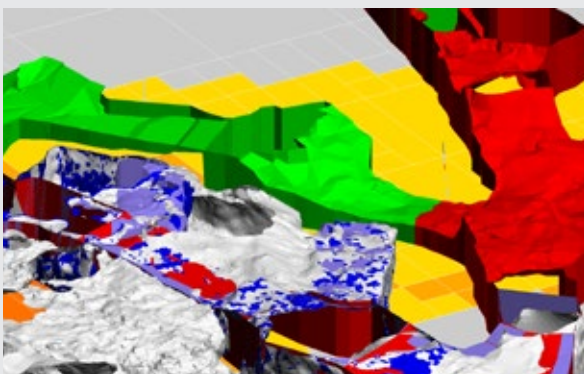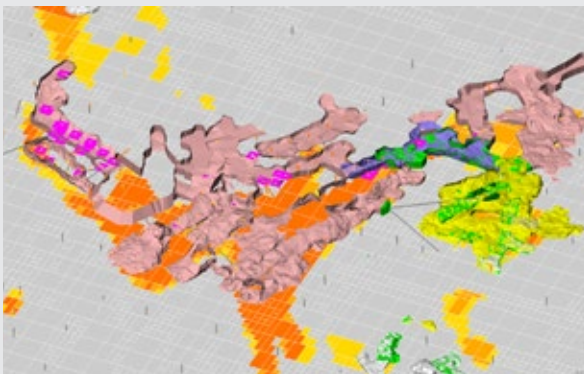
Just-in-time compilation

Once a resource or grade control geological model has been generated, additional work is often required to compute geometallurgical, geomechanical or mine planning values.

This could involve adding a new variable to the block model and calculating the in-situ dollar value of a block based on a simple set of pricing and recovery factors. Other scenarios may incorporate complex calculations based on parameters impacting the entire mine extraction to metallurgical recovery system.
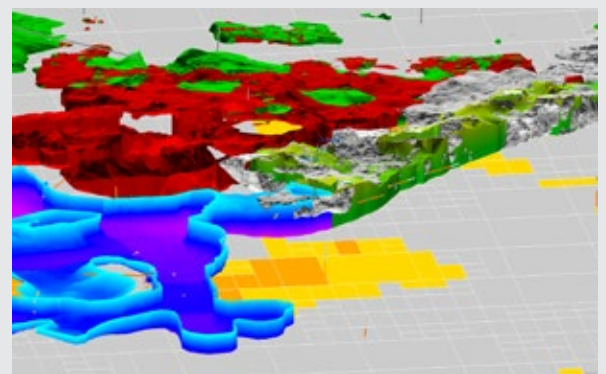
These block calculation scripts can be multi-threaded to the computer CPU cores as with the grade estimation multi-threading. For even better performance, just-in-time compilation provides a result two to three times faster. Multi-threading can be enabled in Vulcan preferences.
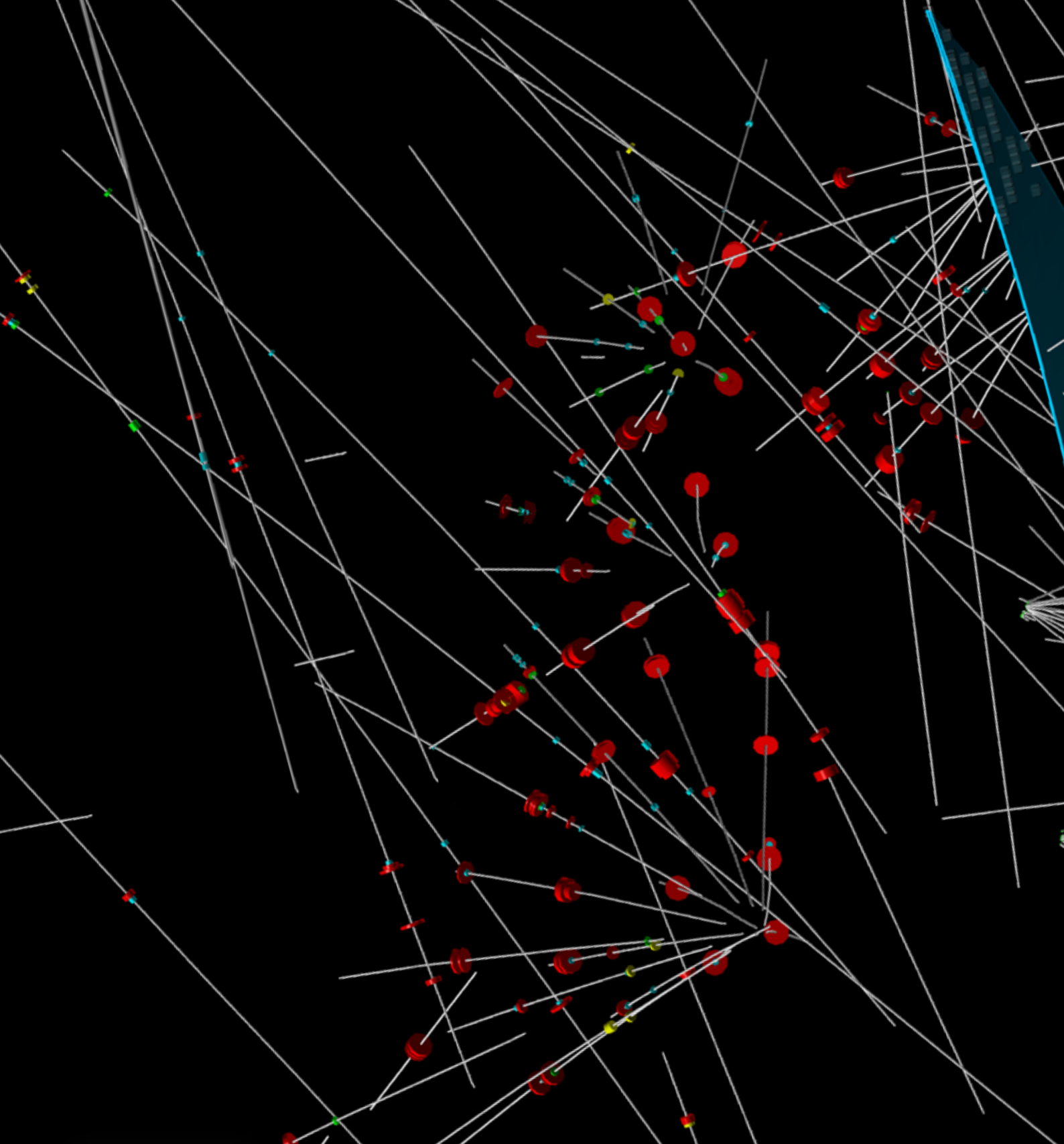
Cloud processing

As Maptek develops for the future, many of the compute intensive tasks will use cloud processing to deliver results much more quickly. Existing applications, DomainMCF and Evolution already work with cloud hosted GPUs and CPUs.

Data and process security is of utmost importance when sourcing compute resources outside your organisation and our existing experience delivering commercial applications in this manner will provide confidence to all users.

Contact Maptek technical support to see how you can speed up your work.

www.*maptek*.com