Forge

MAPTEK™

March 2023 Newsletter

In this issue

Welcome to our Forge newsletter March 2023

Transformation can be challenging, and at Maptek we understand the importance of adapting to change to stay ahead of the curve.

Maptek is fortunate to have a strong foundation to build on as we shape our people, technology and processes into a more agile organisation for delivering customer success.

Our belief that miners should be enabled to make better decisions flows into solutions that continue to make our industry safer and more productive.

Identifying potential risk and managing visitor safety in limestone cave formations in eastern Australia was made easier with Maptek laser scanning and software technology.

Participation in the Geology Challenge created an opportunity to streamline the resource modelling workflow for an independent consulting company.

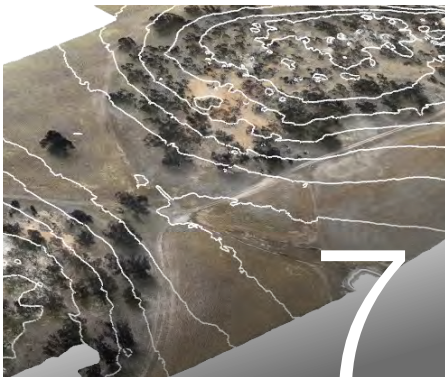
In this issue we also delve into future strategies for mine measurement technology.

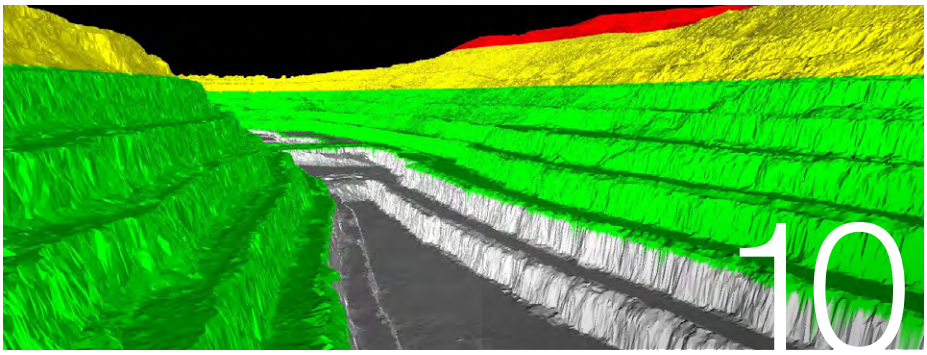
Collaboration persists as a theme, proving that Smarter Together is a key driver for changing the way mining is done. Whether through formal research programs or experimental in-house development, Maptek drives solutions that focus on value creation as we seek to Create Tomorrow.

One way to guarantee new approaches is to engage with future professionals. Our Australian summer intern program continues to flourish, as evidenced by the strong 2022-23 cohort. We wish them all the best for their future.

We look forward to sharing more success stories throughout 2023.

Eduardo Coloma
CEO





Maptek laser scanning solutions enable customers to make safer, more productive decisions

Contact us: forge@maptek.com

Contents

Managing safety in limestone caves

Laser scanner and UAV geotechnical data is instrumental in identifying potential risk and managing visitor safety in limestone cave formations in Victoria, eastern Australia.

Impressive limestone formations are a major tourist attraction in the Buchan Caves Reserve. The limestone was deposited about 380 million years ago, and dating of sediments and speleothems indicates cave formation occurred more than 750,000 years ago.

Most of the caverns and passages have no engineered rock support, relying on the arching effect of the host rock to maintain stability. No rockfalls or natural cavern instability have been recorded since the caves were opened to the public about 100 years ago.

Breakdown events pose potential risks to visitors, although lack of historic data means that quantitative assessments of size and frequency cannot be estimated using traditional methods. There have been no formal assessment criteria or operations plans for identifying and managing geotechnical risk.

Underground laser scanning and UAV photogrammetry were used to map the 3D spatial relationship between the cave system and the surface. The resultant model allows accurate identification of areas where breakdown events may be more likely, and provides baseline data for future monitoring.

Risk-based approach

AECOM used the digital model to develop a geotechnical risk framework to provide Parks Victoria with a formalised approach to understanding cave breakdown and managing visitor safety.

Site observations during cave inspections can identify hazards and inform subsequent risk assessment. Various factors must be considered when planning how to manage breakdown events in identified high-risk locations.

Such factors include the proximity to ground surface, the presence and condition of breakdown, natural variability in geological structure and material properties, and human modifications to the caves.

Cross-section dimensions and thickness of rock cover help identify areas with greater likelihood of breakdown due to a reduction in compressive stresses above the crown of the cave.

Shallow caves have been identified as having greater likelihood of reduced compressive stresses compared to deeper caves. The proximity of other caves can also influence stress distribution in structures.

Data acquisition

Accurate measurements of cavern width, shape and depth below surface were required to complement geological observations to better understand relationships between the physical dimensions of the caves, rock cover, and the potential for further breakdown.

> Preserving as much detail as possible for data analysis is especially important in areas that cannot be safely accessed.

Maptek™ SR3 laser scanners captured high resolution, accurate 3D point clouds with simultaneous photo realistic imagery. Overlapping scans produced a continuous model for identification and recording of key geological and geotechnical features.

A DJI Phantom 4 Pro V2 UAV captured photogrammetry of the topography over the caves, with imagery processed to produce a spatially correct surface.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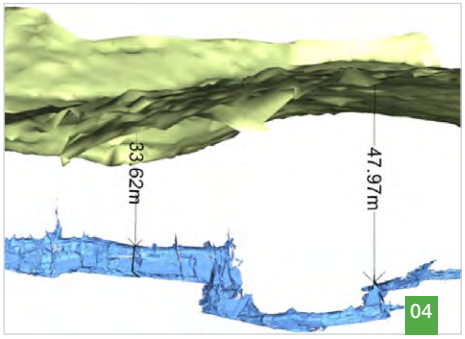


01 Maptek SR3 laser scanner near cave entrance
02 Jason Richards, Maptek, operating scanner in tunnel
03 Maptek SR3 laser scanner light illuminating limestone structures
04 Principal north-south oriented cave chambers are generally 10-65m below ground
05 Merged UAV and laser scanner datasets showing surface topography and cave details

Managing safety

The combination of in-cave laser scanning and above-ground UAV photogrammetry provides a rapid, repeatable way to develop an accurate 3D digital model of natural underground caves and how they relate to surface topography.

The consolidated 3D georeferenced dataset allowed easy measurement of cave width and depth of cover to identify unsafe or high-risk areas for further attention.

Areas with a rock cover thickness to width ratio of 0.7 or less were assigned a higher likelihood of breakdown. Caverns lying within three cave diameters of the surface were assigned an intermediate likelihood, while deeper caves nominally have a lower likelihood.

Observable features associated with cave breakdown include the presence of exposed bedding units in the roof and piles of debris in the caverns. Laser scanning provides data for rock mass measurements, which allows geotechnical analysis and design of ground support.

The point cloud has been used to estimate the size, volume and mass of boulders suspended over public access paths, to quantify hazards and plan remedial engineering design and stabilisation works.

Supplemented with visual geological assessments, the digital model provides an understanding of historical cave formation and the processes that continue to influence cave erosion. Authorities are now able to better manage geotechnical risks associated with limestone caves, improving visitor safety.

Thanks to
AECOM and Parks Victoria

Accurate outcomes

Combining underground laser scanning with surface photogrammetry improves understanding of the cavern system and surface topography.

- Rapid, more accurate and safer data acquisition
- Collection of orientation and persistence of discontinuities, including bedding planes
- Recording the size and geometry of cave breakdown and establishing baseline for future scans
- Elimination of human bias when mapping geology
- Sharing of georeferenced spatially correct 3D point cloud for other non-geotechnical applications
- Visualising spatial geometry of the cavern system in relation to the natural topography and known geological structures

From challenge comes opportunity

For a New Zealand consulting firm, the Maptek™ Geology Challenge was a chance to trial new software that could ultimately improve outcomes for clients.

A long-time Maptek™ Vulcan™ user, Engineering Geologist Kane Inwood runs Geosolutions Tasman Ltd, and has been working in the mining and quarry industry for over 25 years. In 2022 Inwood identified a resource model project that would suit the combination of Vulcan GeologyCore and Maptek™ DomainMCF.

‘Challenges for resource updates include timing and duration of the work,' said Inwood.

'Cost estimation for project work is always incredibly difficult and when you have to return to first principles then cost overruns can occur.’

Inwood typically spends significant time updating original models, and often goes back to the raw data to review and validate drillhole databases from scratch.

‘A model may have been updated multiple times, but once you start to unravel it some historical artefacts or assumptions don't stack up.’

Inwood immediately noticed one of the advantages of using Vulcan GeologyCore.

‘Linking back to the original database codes was much quicker and easier, allowing me to rapidly make significant changes to the modelling domains.’

However, the biggest overall benefit to the resource update process was the speed of DomainMCF. Being able to compare the machine learning output to the implicit model led to pivotal insights.

‘I built two provisional models using the same project database – one in DomainMCF and the other with implicit modelling in Vulcan GeologyCore. Superimposing these two models, combined with the exploration data, indicated historical modelling had significantly over-estimated resource in some areas.’

Geological confidence

Client representatives, who were new to the project, had recently observed complex structural geology on site. Discrepancies between the various geological models alerted them to the likelihood of gaps in the site data.

‘It was clear that earlier modelling had not properly grasped the structural complexity, and as a result, the geological model had a low confidence level.’

Inwood used the Maptek outputs to convey the modelling approach to his client – walking through the deposit guided by the current exploration drillhole database, and the implicit and DomainMCF models.

'Superimposing the data-driven DomainMCF model helped to communicate these issues and identify regions where more data is needed.’

Acknowledging that there is more work to be done, Inwood believes that doing the basics well can support better planning of additional drilling and optimise exploration time and cost.

‘Geological mapping, fieldwork and data interpretation can drive where exploration holes are placed and also help clearly identify areas where future quarry development is likely to head.’

Most projects Inwood is involved with require models to be built from scratch using first principles and are therefore not typically suited to a completely automated workflow. It's important for clients to have confidence in the consultant's expertise and the processes that have created the best model.

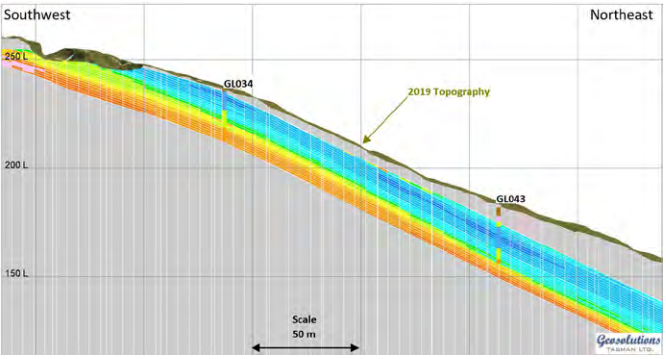
> ‘The geologist’s experience and expertise combine with the tools they're using to make for smart outcomes.’

By the end of the Maptek challenge, Inwood had helped his clients to a greater understanding of their deposit. What began as a quick update to the geological model, based on available data, led to a provisional data-driven model and a re-appraisal of the project plan.

Looking to the future, Inwood anticipates that Vulcan GeologyCore will help with resource model update projects for ongoing clients.

In summary, the Geology Challenge allowed Inwood to try new tools for validating drilling data, experiment with machine learning and gain insights into the confidence levels of resource model outputs.

Thanks to
Kane Inwood
Geosolutions Tasman Ltd



Example of a Vulcan geological model for an agricultural limestone quarry, where legacy exploration and new drilling program data were combined to build a site reserve model and 10-year quarry plan (courtesy Ravensdown)

PointModeller – the right tools for the job

Maptek™ PointModeller offers powerful 3D visualisation, smart registration and filtering, to derive value from airborne or mobile sensor data for quarry, civil or topographic projects.

Operations that rely on point cloud data captured by drone or other lightweight mobile sensors are well served by the latest Maptek™ point cloud processing solution.

Maptek™ PointModeller is ideal for quickly converting such data into deliverables for mining, civil engineering, topographic, earthworks, quarry and aggregate applications.

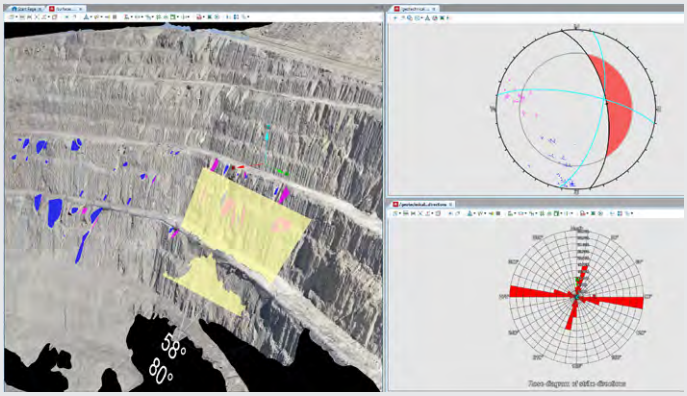
> Point clouds are translated into accurate surfaces, volumes and other deliverables in minutes.

Maptek realised that drone or mobile sensor users were often collecting large volumes of data, but lacked the tools to quickly turn that into information to support decisions affecting projects.

Smart tools optimise workflows to easily create topographic or 3D surfaces, calculate surface and solid volumes, manage stockpile inventory, create smart lines for toe and crest, and track digging conformance to design.

Data can now be combined from a variety of digital sensors and exported to CAD and mine design formats.

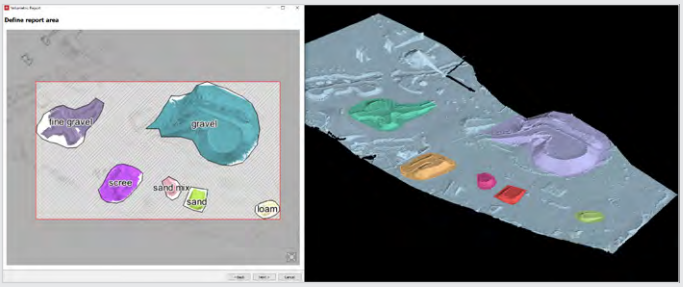
PointModeller is offered as a cost-effective subscription package that supports all .las, .laz, .e57, .obj or text files and exports deliverables in standard formats.

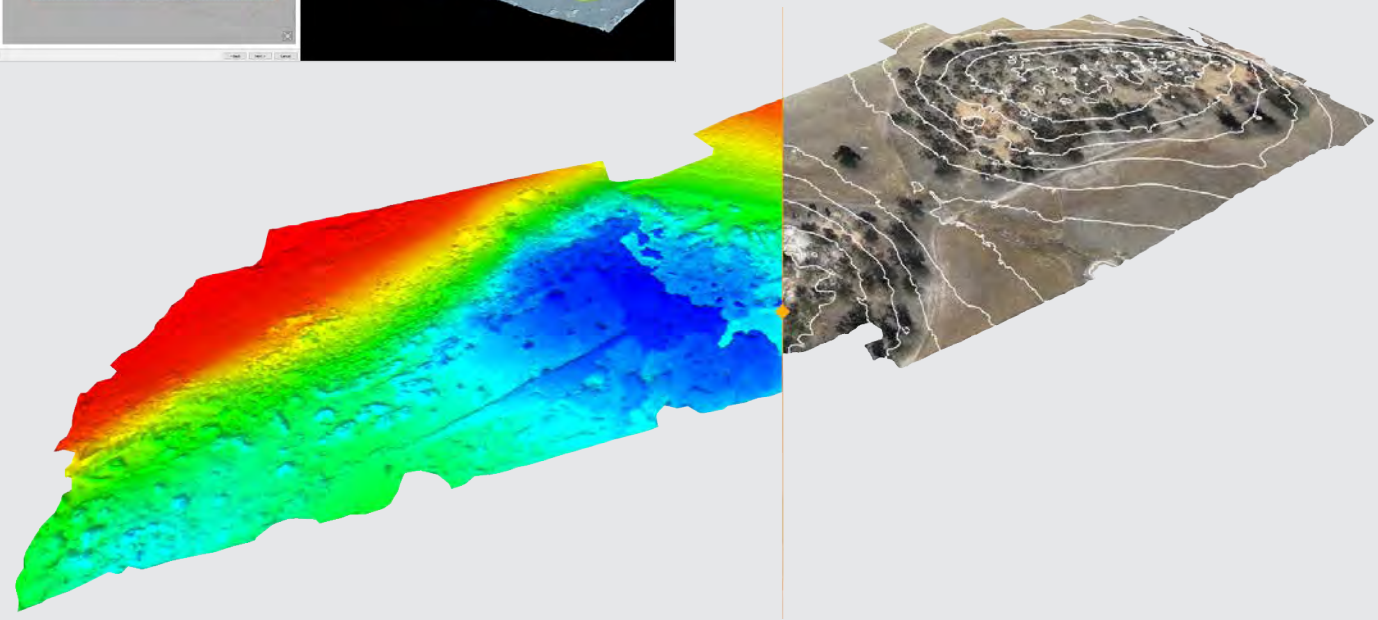


Advantages

- Smart registration tools for surface and underground data
- Easy to use coordinate system tools to translate data correctly
- Access to Maptek geospatial add-ons for geotechnical analysis, design conformance and reporting
- Photogrammetry feature converts drone imagery directly to a point cloud, textured surface or orthomosaic imagery

Contact Maptek to request a demonstration with your data.





Delivering value for miners

As the initial 5-year program for the South Australian PRIF Integrated Mining Consortium comes to an end, Maptek™ looks forward to what lies ahead to bring projects to market.

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01 PRIF Integrated Mining Consortium

02 Nigel Cook (R) and Bill Skinner (C) accepting the Highly Commended Innovation award from the SA Premier

The PRIF Consortium aims to create a safer, more secure workplace, a mining sector that has the social licence to operate, and a minerals industry that is committed to causing as little environmental disturbance as possible, using less water, energy and chemicals, and reducing waste.

Maptek™ joined the program in 2019 to help identify how ideas generated through research could be translated into industry value. Our contribution centred on optimisation of upstream processes for projects aligned with specific areas of interest to PRIF End-user Partner OZ Minerals.

Maptek provided software licences and staff who presented theoretical concepts and evaluated them using our software.

PRIF Consortium Director Nigel Cook said that balancing theory with practical and commercial realities can be difficult for academia, so collaboration during project design stages helps ensure the outcomes are tailored for industry.

'Critical for success is to find a champion – a company or individual – who shares the researcher's passion to carry out a successful project and to ensure that outputs are given every opportunity to mature into a potentially saleable product,' Cook said.

Head of Experimentation and Technology for Maptek, Simon Ratcliffe agreed that R&D is just the beginning of a pathway to commercial success.

'Miners want something that works and do not necessarily appreciate the precariousness of taking a concept to a solution. Companies like Maptek attempt to bridge that chasm,' said Ratcliffe.

Even with a clear view of the people, processes and technologies that need to be harnessed, Cook noted that the often conservative nature of mining and frequent role changes in partner organisations can make it challenging to cement long-term relationships. But that certainly does not mean it is not worth persevering.

> Effective communication is essential to develop a relationship based on shared goals: find common language, understand the problem, and address risks and uncertainties.

Cook noted that Maptek provided real-world context, problems to address and real data with all the complexities often ignored in more theoretical studies.

'We hope that participation in the PRIF Consortium has benefitted Maptek in terms of exposure to new ideas and approaches, potential links with other partners, and access to a mature, well-rounded future workforce,' Cook added.

While Maptek contributed to a small number of projects, we provided advice on a broad range of other innovations and inventions, and welcomed the feedback on our solutions approach.

Now that the initial research phase has finished, the Consortium begins an 18-month extension with a focus on 'commercial experimentation'. Maptek is excited about pathways for future development and implementation, including co-design of commercialisation roadmaps.

In terms of technology readiness, one of the projects being taken to the next stage focuses on Hybrid Geological Domain Modelling. The University of Adelaide is the research project sponsor, with Translation Partner Maptek and End-user Partner OZ Minerals.

The proposed geological modelling technique combines geostatistical simulations and classification algorithms with pre-processing data validation, promising significant advantages for industry.

Perceiving new possibilities

Improved depth perception in visualising software imagery has transitioned from a Maptek™ experiment into incorporation within current point cloud modelling applications.

The new shading technique better simulates real world lighting, making it much easier to interpret 3D data such as point clouds captured by Maptek™ laser scanners.

Since the depth information is retained for every pixel in the point cloud, those pixels can have extra shading applied in a post-processing step. This helps delineate objects and geometry.

Initially prototyped by graphics developers in Maptek 10% time, the 'eye-dome lighting' experimental work was reviewed and endorsed internally before being added to the development roadmap.

Software Engineers Ryan Marker and Dallas McNeill, who led the project, explained how it works.

'Think of the classic art exercise, where taking a flat circle and adding shading will turn it into a sphere,' said Marker. 'Incorporating this enhancement to the lighting in the image brings the scene to life.'

McNeill was able to quickly build a prototype for experimentation and to reference when implementing in Maptek solutions. This allowed the developer teams to determine early on what worked and what didn't, and rapidly evolve the prototype.

Maptek 10% time was instrumental in the project success, allowing the developers to quickly progress from idea to proof of concept, with the wider development team providing feedback along the way.

Timing was also key, as the underlying viewing infrastructure was now available, thanks to an earlier project that provided higher quality anti-aliasing for Maptek™ BlastLogic™.

Launching off this feature meant that eye-dome lighting could be incorporated into Maptek™ PointStudio™ reasonably quickly for testing. This in turn inspired the team who were devising ways they could improve the Maptek FieldHHC laser scanner user interface.

The project threw up several challenges. The most difficult was maintaining consistency of the effect, for example, keeping the shading similar for large as well as small data, or across orthographic/perspective projections. Feedback from the product team spurred many tweaks to the algorithm.

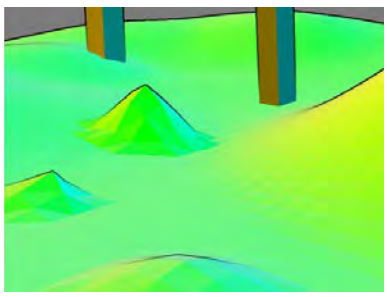
While users can customise the shading effect, Maptek was keen to avoid the need to adjust the settings for every new piece of data.

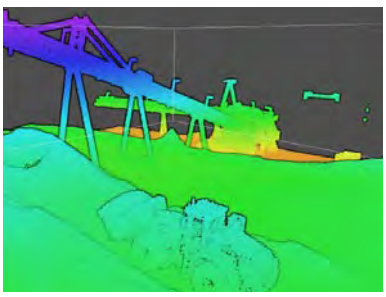
> Eye-dome lighting makes it dramatically easier to interpret 3D data on a screen, adding depth to what would otherwise be a flat image.

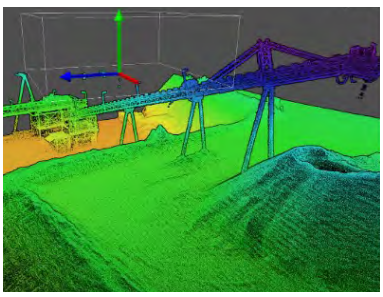
Marker said that they were surprised at how impactful eye-dome lighting can be for data visualisation, and highlighted the importance of experimentation.

'I encourage anyone to engage with experimentation. The key to success is not to force an idea but to wait for inspiration. Start with an area you're passionate about or a design concept of how to implement something – it's really satisfying when it works.'

Maptek introduced 10% time to champion staff to explore different approaches and experiment with new ideas. The initiative aligns with one of our principles, Create Tomorrow, by encouraging change and new thinking to solve industry problems.







Creating tomorrow for geospatial survey

Maptek™ looks to technologies in the geomatics space that will save time in managing files, create value from point cloud data, and help ease the global skills shortage.

Maptek Global Development Strategy Manager Andy Newman shares what the future holds.

How do integrated decision support solutions serve industry?

Everything comes down to simplicity. When something is 'integrated', it is inherently simpler because it is designed into the solution. It isn't an afterthought, which typically increases pain.

Part of my role is to ensure that we design with this ethos front of mind. Even when we cannot deliver immediately on full integration, it is important to prepare for additional features that will be integral to the master product and to ensure that they will be indistinguishable in the way they operate.

Maptek™ has many of the best performing software packages in the world, yet we are the first to admit they have not always worked well together. We have begun to work on this in earnest – it is one of our highest priorities.

What does this mean for customers? And industry?

Our customers are not interested in operating multiple complex software platforms. Or any complex system for that matter. Maptek recognises this and is striving to deliver the shortest, easiest path to value.

Partly this requires seamless integrations in the background. For industry, smart integration means less training, which in turn provides a faster, easier time to value realisation. It also means money is not wasted on fringe solutions that provide superfluous functionality.

Whether the customer is big or small, all of them will find the right tool in the box to provide the shortest path to the optimum outcome and thus, optimal value.

Many mining technology solution providers talk about the need to digitalise from 'cradle to grave'.

What is the Maptek strategy and how do we deliver on it?

Design for the future with an open mind. We are challenging ourselves to change from 'we have always done it that way' to looking at the entire picture and how everything fits together in real-time workflows.

A total solution has been the Holy Grail of providers for many years. The proliferation of powerful cloud services and mobile internet access makes it more achievable than ever before.

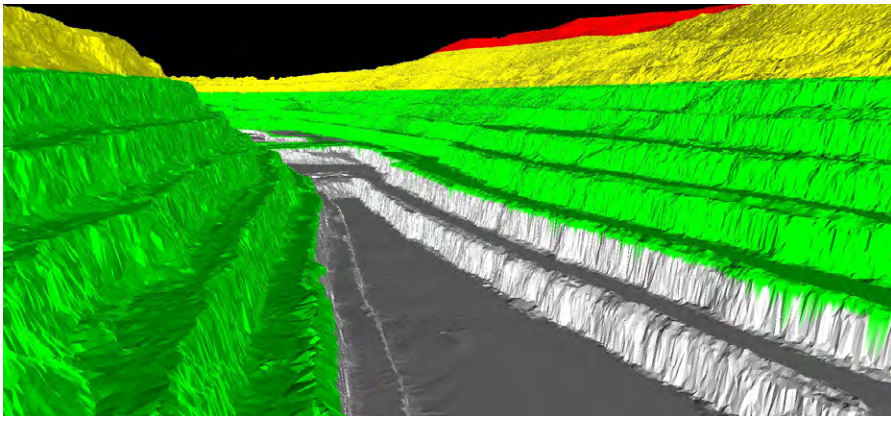
Maptek already has a fine suite of products covering exploration, extraction, operations and delivery to market. As we develop additional solutions to fill customer needs, integration and simplicity remain at the forefront of our development philosophy.

One strategic objective in the Maptek 5-year plan is to identify the right technology partners to work together.

Is it practical to work with potential competitors to develop complementary technologies?

Choosing the right technology partners is always challenging, especially if they are also competitors. We value trust and a strong foundation. These are traits to build on.

No single organisation is good at everything, so identifying your own and others' strengths and weaknesses is key to finding a good match. Only mutually beneficial partnerships stand a chance of succeeding.



GeoSpatial Manager is a new online service for visualising, analysing and dynamically updating surfaces

The geospatial survey space is always looking for better ways to handle big data.

What new functionality is coming soon?

Big data equals big problems with storage and utilisation. Lidar and photogrammetric-derived terrain models are employed more frequently and their continually increasing accuracy means ever bigger file sizes.

A new solution, Maptek™ GeoSpatial Manager is currently in the early adopter phase. It is the epitome of simplicity, delivering a single source of truth at any given time to solve the issue of point cloud data proliferation and visualisation both economically and elegantly.

How will GeoSpatial Manager help with data management and the global skills shortage?

GeoSpatial Manager makes it easy to store, visualise and access surfaces. It is an indisputable single source of truth through time that allows any surveyed surface to be downloaded or visualised via 3D view. Basic tools enable simple calculations, avoiding export to other solutions.

The simplicity of GeoSpatial Manager makes it a real time saver. Any company, mining or civil, that moves material will see benefits from having current information in the right hands, when needed. No longer will different departments need to hunt for the latest surface, or the surface three weeks ago, it's all right there. Staff can concentrate on what they do best, their core activity.

Looking to the future.

What's the next big piece of the puzzle in mine survey and allied technologies?

In one word, automation. Individuals no longer want to spend time and effort processing data with software. They want the software to do the processing, identify the 'answers' and make them available to consume with a simple click.

More and more data is collected across geospatial industries every day. Decision makers need automated systems to process, sort, file and present this data in a relevant, useful and simple way to prevent it becoming overwhelming and distracting.

After all, the core business of our industry is not data or software. Its purpose is to identify, extract, process and ship the required commodity in the safest, most efficient way possible. Having information you can trust at your fingertips really helps drive efficiencies. The aim is to lower costs and minimise environmental impact.

What technologies will be needed to support that and how will Maptek deliver what is needed?

Flexible platforms that allow various deployment options and web interfaces to access results from anywhere.

> Maptek is also investing in advanced machine learning processes to deal with automatic data ingestion, filtering and classification.

These initiatives have a common goal – to speed the path to value. Providing customers with what they need to know, when they need to know it, and with minimal effort on their part equals smart solutions.

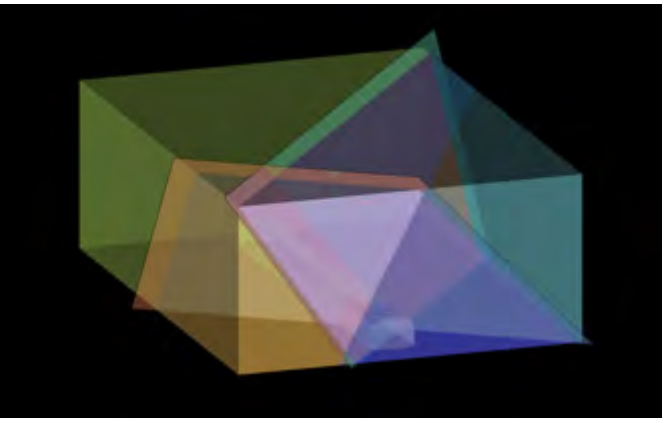
How would you sum up Maptek's approach?

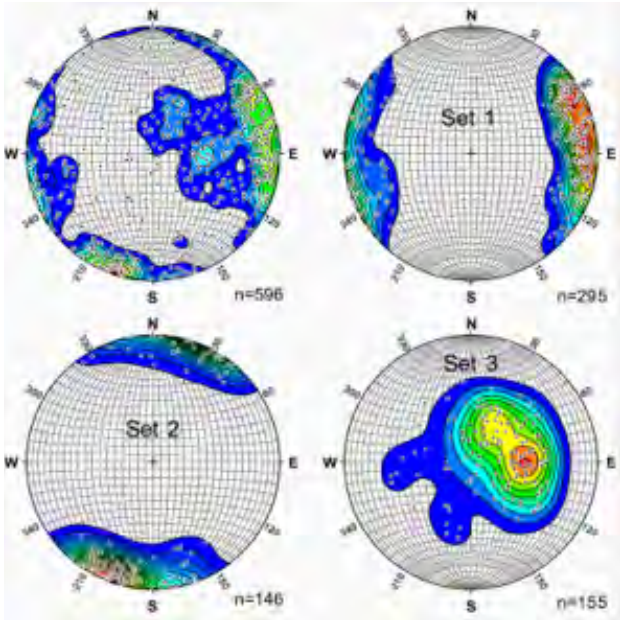
Listen to the customer. They know.

Site visits for Maptek software and production staff help provide context and insight for ongoing solutions development that meets customer needs

Learning on the job

Maptek™ has a long history of supporting university students through training, scholarships and internships to help kickstart their careers.





Each year Maptek™ selects a small group of Adelaide-based computer science undergraduates to participate in our software development internship program. Places are highly sought after, and for good reason, according to Global Development Strategy Manager Will Reid, who has run the program for several years.

'Maptek interns gain a unique opportunity to apply skills learned through their studies to developing software that helps the mining industry operate safely and efficiently,' said Reid.

Matt Stringer, Prajna Gupta, Irhas Gill, Henry Nguyen, Ben Wheeler, Viet An Nguyen and Aiden Mazik worked on various product and backend systems during their 3-month stint.

They agreed that writing code to solve real problems was a world away from university studies, and that the experience affirmed their chosen careers.

'Knowing I have now written code that will be useful to real Maptek customers, my career path finally feels right,' said Matt Stringer.

Stringer focused on transforming the Property Editor into a single resource for all things related to the properties of objects and highlighted the practical value of his experience.

'While time, complexity and memory usage are important, ease of maintenance and robustness should take precedence in programming', Stringer said.

Prajna Gupta, who grappled with changes in application logic as she developed a new web framework, described her experience as insightful, challenging and practical.

'I really enjoyed the brain-storming sessions with my mentor and senior engineers; I learned how systems are designed from scratch and the importance of UI design principles,' Gupta said.

'It was interesting to analyse the viability of various solutions and come up with an appropriate one.'

Making geotechnical analysis on laser scan data easier was the focus for Irhas Gill, who was pleased to find that his internship projects aligned well with his strong interest in mathematics.

'My first project involved clustering discontinuities in rock walls, the second created 2D bird's-eye view outlines of underground mines and the last was finding key blocks in underground tunnels,' Gill said.

‘I believed that algorithms and data structures learned in competitive programming and university work would be less useful in the industry setting, but I was pleasantly surprised to find that I could still apply that knowledge.’

> The interns rated learning new code, the value of peer review and being able to understand and read code within large existing code bases as key take-aways.

For Henry Nguyen the internship provided further understanding of his long-term areas of interest, alongside coding practices that will make his course work easier.

‘My key learning was the importance of understanding, analysing and considering all factors, including the business impact, before doing any coding!’

‘I also realised that software engineering is not always about coding; there are many other skills to master to be successful in any career,’ Nguyen said.

Ben Wheeler said his advice to future interns would be to take full advantage of mentoring offered by senior developers and not be afraid to ask questions.

‘The first few weeks I was full of questions as I constantly came across things I had never seen before. Everyone in the team was more than willing to explain concepts, and I found it a really good way to quickly learn a lot,’ Wheeler said.

Viet An Nguyen, who worked on a Google sheets app for core logging, affirmed the supportive environment alongside focusing on customer outcomes as the highlights of her internship.

‘Explaining your thinking process clearly to others, and putting yourself in the users' shoes when designing an app is critical – what's convenient and straightforward for a developer may not be convenient and straightforward for the users,’ said An Nyugen.

This year’s cohort strongly encouraged students to apply for future placements with Maptek.

Aiden Mazik, who first met Maptek representatives at ‘The Big Meet’ local careers fair, relished the opportunity to work for a global organisation.

‘I found the workplace culture demonstrated during the interview very attractive,’ commented Mazik. 'I really enjoyed being tested on the way I solved a problem rather than memorising specific programming principles, which other workplaces quiz you on.'

Maptek knows first hand the difficulties of attracting skilled staff in the current job market, with plans to expand the intern program across different disciplines. For now we wish the 2022-23 cohort all the best for the future!

Above (L-R) Matt Stringer, Prajna Gupta, Irhas Gill, Henry Nguyen, Ben Wheeler, Viet An Nguyen, Aiden Mazik

University collaboration

Maptek™ is effectively a strategic ally for the mining department of a university in Mexico, equipping students and graduates with the latest generation of software tools.

The University of Guanajuato holds a long tradition in the field of knowledge, originating from a school in 1732. It became a university in 1945 and in 1994 acquired autonomy. In 2008, it underwent an intensive academic transformation and now has a presence in various regions across Guanajuato state.

The Department of Mining Engineering, Metallurgy and Geology offers programs of the highest national and international academic standards that uphold values of belonging and quality.

Mining has undergone great transformation through the implementation of cutting-edge technology. The use of software for design, analysis and 3D modelling marks the switch from a classical mining industry to Industry 4.0.

The imperative is to train students in the latest generation of tools, preparing them to make confident short, medium and long-term decisions in their graduate field.

Maptek™ solutions extend from the exploration phase through to mineral recovery operations. Maptek™ Vulcan™ features an intuitive user interface, helping students acquire integrated solutions knowledge.

Specialised add-ons provide engineers and planners with tools for validation and transformation of data into dynamic 3D models, mine designs and operational plans.

Modern mining and Industry 4.0 implementation demand that mining professionals possess advanced skills in the use of mine modelling and design tools.

Incorporating Maptek software for Mining Engineering, Metallurgy and Geology has seen the development of various educational programs related to earth sciences.

> The collaboration equips students and graduates with the latest generation of tools focused on mining.

Teachers and students have gained the opportunity to use various hardware and software tools and Vulcan has been incorporated into the curriculum. In this sense, Maptek is a strategic ally for the university.

The main tangible benefits include the application of knowledge in geology, geotechnics, geostatistics, and mine planning and design.

A professional Mining Engineering career has historically required particular skills, knowledge, attitudes and values, which are essential for graduates to meet employer expectations.

'Our vision is to provide students with foundations to grow their skills in the use of new technologies, including artificial intelligence, data analysis, automation, the implementation of virtual reality and the use of information technology,' said Dr Ricardo Solís Rodríguez, professor in the Mining Engineering program.

Maptek collaboration with the University of Guanajuato now and in the future will provide teachers and students with the necessary base for integration into modern mining.

Thanks to
University of Guanajuato

Below: Dr Joel E. Valtierra Olivares, coordinator of the Mining Engineering degree, thanks Maptek Technical Services Engineer Denisse de La Rosa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