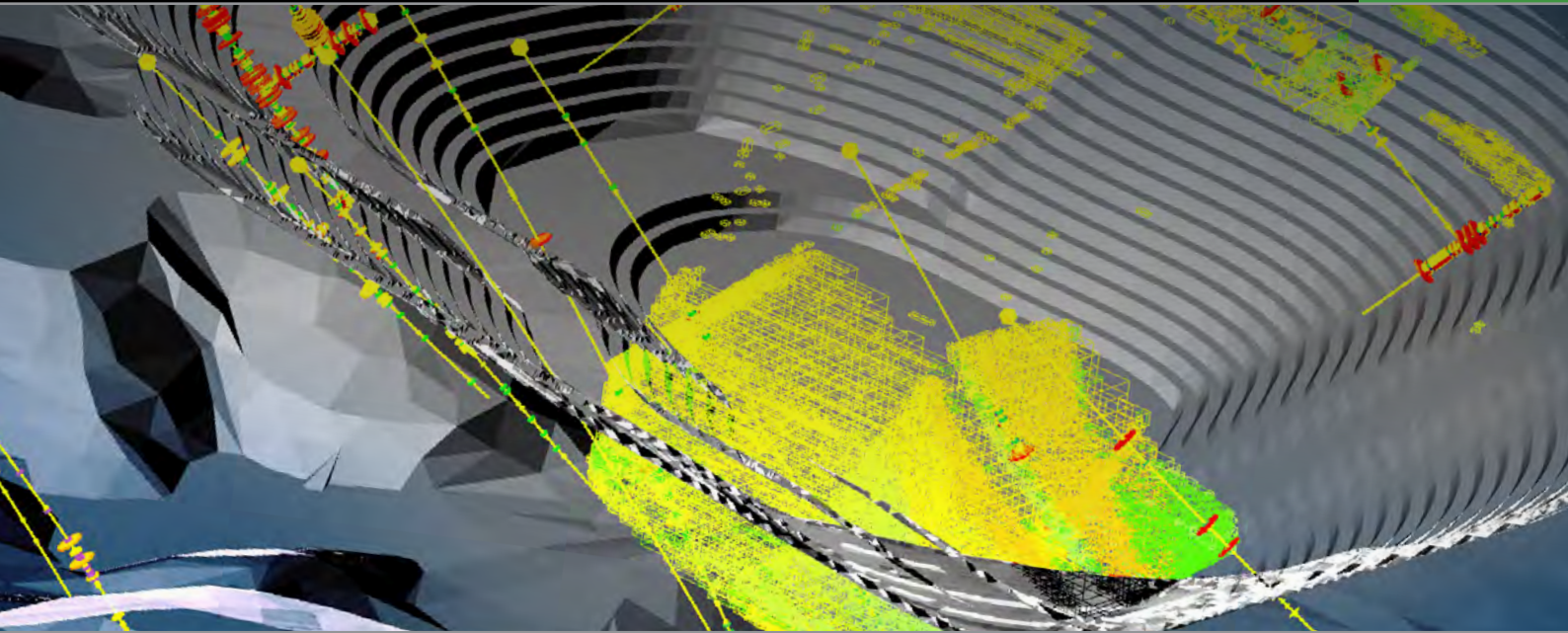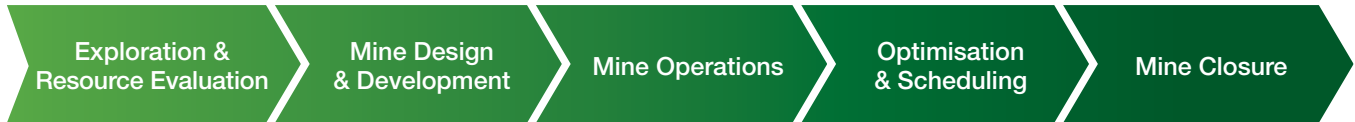# MAPTEK™ Vulcan™

3D Modelling & Mine Planning Software

Comprehensive tools provide a competitive advantage
from exploration to rehabilitation.

Maptek™ Vulcan™, the world's premier 3D mining software solution, allows users to validate and transform raw mining data into dynamic 3D models, accurate mine designs and operating plans.

| Exploration & Resource Evaluation | Mine Design & Development | Mine Operations | Optimisation & Scheduling | Mine Closure |

Maptek Vulcan plays a critical role from the very start of the mining process - commencing with exploration and geological modelling, ranging through mine design and scheduling to rehabilitation.

Powerful block modelling and integrated tools for survey, drill and blast, grade control, geotechnical analysis, geostatistics, scheduling and optimisation make Vulcan the complete mining software package.

Vulcan can manage and visualise very large and complex data sets, process the information and rapidly generate models. Sophisticated algorithms and fast processing allow virtually instant validation of data for building and maintaining up-to-date models of a deposit.

Vulcan provides an intuitive environment for visualising designs and models in 3D. Running animations and exploring alternative scenarios based on various resource and economic values is the most productive approach to developing practical mine plans that maximise resource recovery.

Vulcan provides a common platform for geological, geotechnical and engineering teams. Reliable, repeatable results are derived from running multiple scenarios for streamlined translation into safe and economical mine plans.

Whether developing day-to-day or long term mine plans, operations need to know where and when to mine. Vulcan provides the tools to model the resource and design the mine, dynamically updating plans as data changes. Interpretations and results can be shared with confidence that they reliably guide productive and profitable mining.

The Maptek Workbench supports all Vulcan functionality as well as ready access to database, text, scripting and spreadsheet applications. It provides a common platform for Maptek software products.
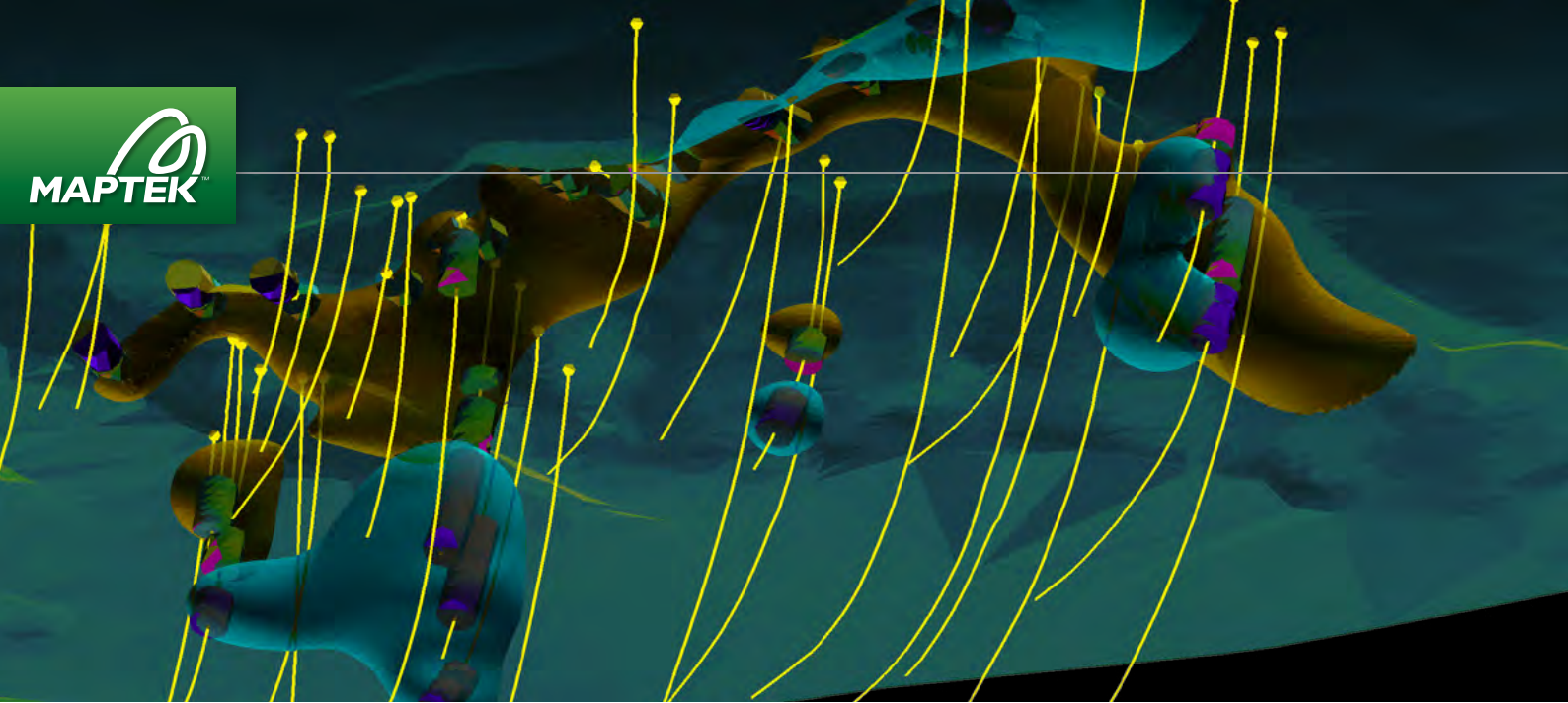
Exploration & Resource Evaluation

Vulcan offers an interactive 3D visualisation and modelling environment to create and test exploration models. Users can manage and validate drillhole, assay, geophysical, lithological and analytical data.

Implicit modelling tools provide RBF and uncertainty modelling regimes for working with complex geological domains. Users can maximise the use of all historical, drilling and assay data to run different scenarios for efficiently assessing the potential grade and tonnage of a resource.

Vulcan Data Analyser presents a streamlined interface that integrates variogram analysis with tools for handling structural and grade based anisotropy. Calculations are easily set up and fast to run, allowing users to gain a clear understanding of geological data. Multiple models can be displayed concurrently for real-time comparisons.

Dedicated stratigraphic tools facilitate modelling and interpretation of coal projects. A hybrid modelling approach allows all available data - survey pickups, seismic interpretations and crop lines - to be included with any or all horizons.

- Manage drillhole and sampling data
- ODBC link to external databases
- Easily visualise drillhole information in 3D
- Interactive 3D geological modelling
- Powerful stratigraphic modelling tools
- Intuitive options for structural modelling
- Implicit modelling for complex, multi-domain geology
- Create rotated block models
- Sub-blocking allows accurate modelling of geological contacts and boundaries
- Store unlimited variables in block models
- Generate sections and use dynamic slicing

- Dynamic new variogram analysis including directional variography
- Local anisotropies applied for implicit modelling, grade estimation and simulation
- Geostatistical analysis: Kriging, Inverse Distance, Indicator Simulation, Uniform Conditioning
- Multiple parameter analysis
- Store estimation results in block model
- Calculate reserves using triangulations
- Borehole graphics interface streamlines geophysical data interpretation
- Large block model display

Mine Design & Development

Vulcan mine design tools allow users to design optimal mine plans that ensure a profitable production phase. Users can forecast machinery allocation, engineer the best road design and analyse productivity scenarios before operations begin.

Open pit planning includes interactive surface road design, ramp design, drill and blast design, haulage profile and productivity analysis. A quick and easy Pit Optimiser allows users to create surfaces and animations and preview designs before running calculations.

Automated Pit Designer automates the creation of mineable pit shells after the optimisation process has been completed. Optimised block model results are quickly transformed into realistic mine design contours, serving as a base for further design work or to generate pit-by-pit graphs and long term schedules. Multiple scheduling options can be reviewed, and different design parameters evaluated for their impact on the plan.

Pit solids can be easily split into valid scheduling blocks using topography and horizon surfaces. Quality and geotechnical attributes can be assigned, and modelling fidelity is ensured. Solids can be clipped to a new topography when surfaces change.

Dragline design functionality simulates cast blasting, bulldozing, truck and shovel operations, and other kinds of material movement, to develop optimised range diagrams.

Ventilation tools, ring design and stope optimisation can be applied for underground mine planning. Underground level development with crosscuts can be created in minutes using the Level Designer function.

- Tailored pit and dump design tools, including ramp design
- Automated pit design
- Smooth transition between varying batters and berms (face angle and bench width)
- Pit optimisation (including Push and Relabel) combined with powerful analysis tools
- Run optimisations on sub-block models without regularisation
- Apply multiple batter angles, bench heights and berm widths
- Design declines with intermediate access points with automatic ramp tool

- Haulage profile uses information from block models, considering bench geometry for accurate route planning
- Refine stope access based on strings and cost information
- Automatically generate decline based on user-defined constraints
- Run multiple scenarios and generate mineable shapes with underground stope optimiser
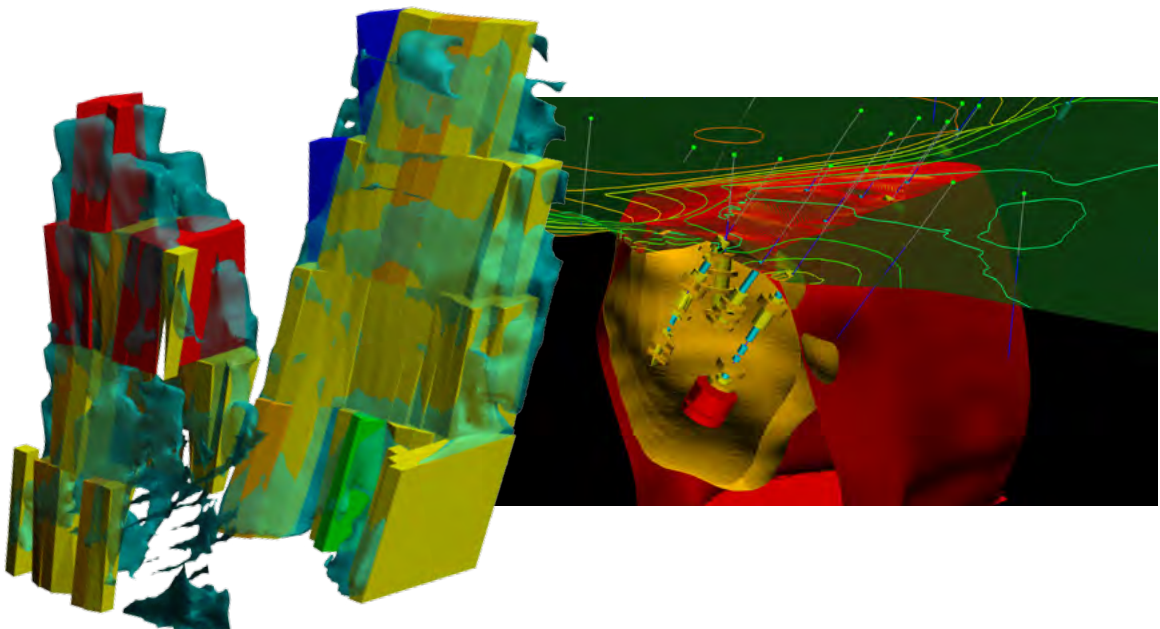- Easily determine dump (or angle) and number of ring sections
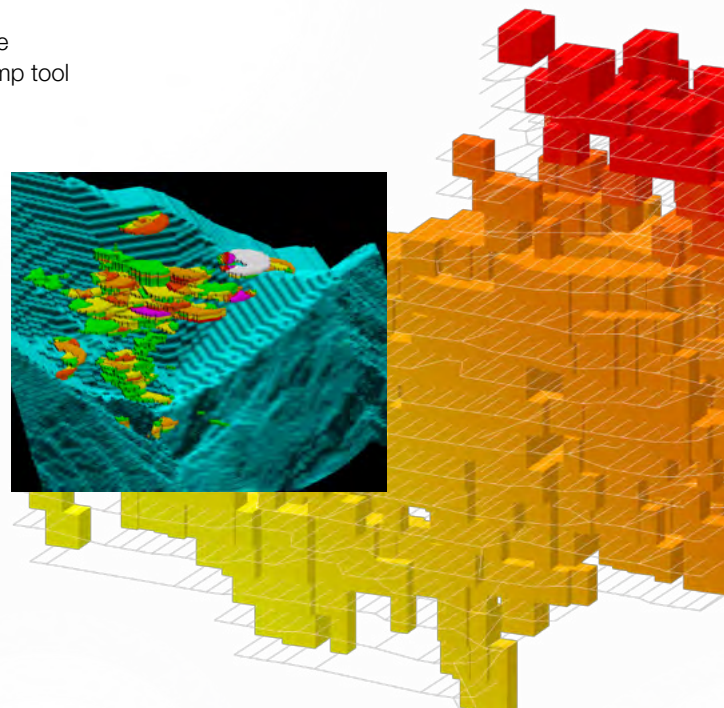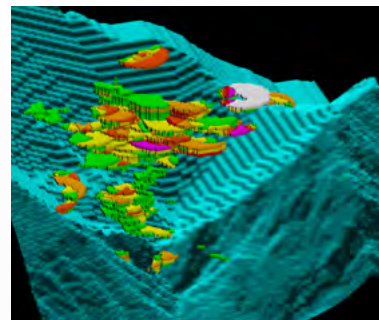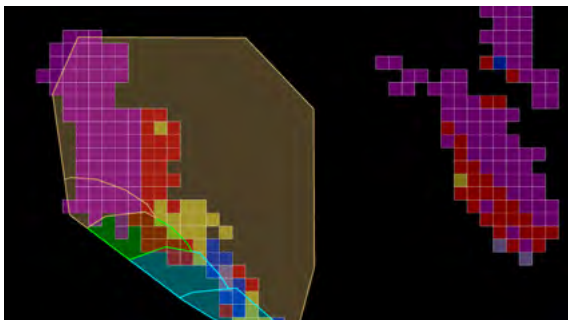
Mine Operations

Developing an operational mine is a costly and complex process. Vulcan assists in refining geology and resource models, calculating reserves, developing short and long term plans and scheduling operations.

Are you sure which material is ore and which is waste? Accurate grade control data helps ensure that the right areas are mined to maximise profit and minimise waste. Vulcan allows a better understanding of factors which contribute to dilution and improves confidence in resource classification. A robust, streamlined grade control process logs data rules and grade block calculations for auditing.

The 3D geological capabilities in Vulcan can be effectively applied to optimise a mine plan. Advanced grid, block modelling and grade estimation tools provide an integrated approach. to successful mine development.

- Create rotated block models
- Sub-blocking allows accurate modelling of geological contacts and boundaries
- Store unlimited variables in block models
- Generate sections and use dynamic slicing
- Visualise and plan the mine based on block model data
- Automatically exclude mined-out areas for enhanced grade reconciliation
- Automatic bench plan output extracts and labels grade blocks with required attributes
- Perform mineral classification and minimise dilution
- Powerful reserving tools; detailed breakdown of information (benches, stopes etc.)
- Calculate strip ratios from user-defined block model variables
- Import survey data into Vulcan
- Preview drill and blast patterns to refine layout before blasting
- Plan, design and construct road systems with balanced cut and fill
- Short term interactive scheduling and continuous reserve calculations
- Design and test different mining scenarios to ensure maximum output
- Create daily production reports to guide operations

MAPTEK

Your whole mine solution.

Waste Dump

Exploration

Environmental Management

Material Movement

Geological Modelling

Geotechnical

Mine QC
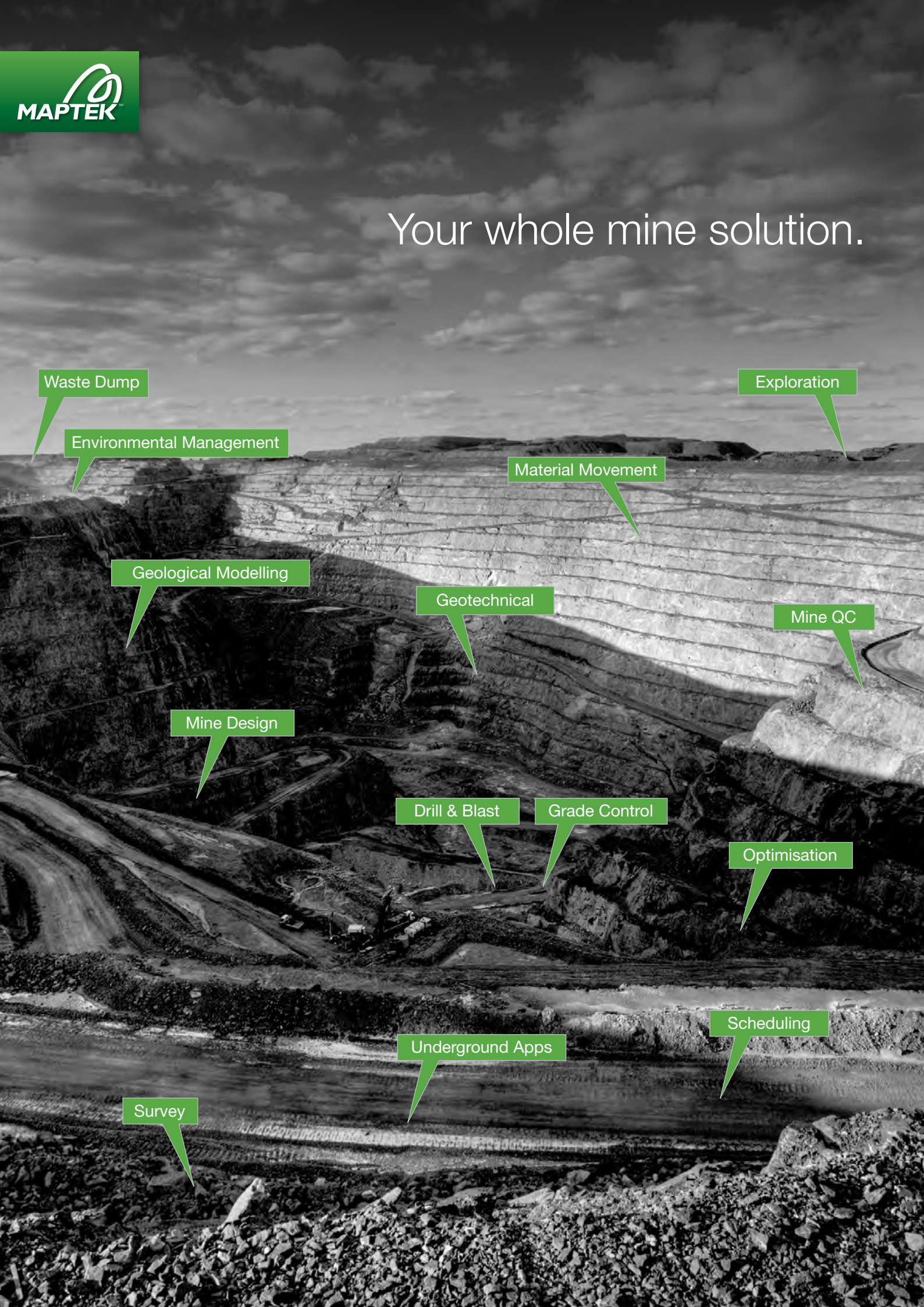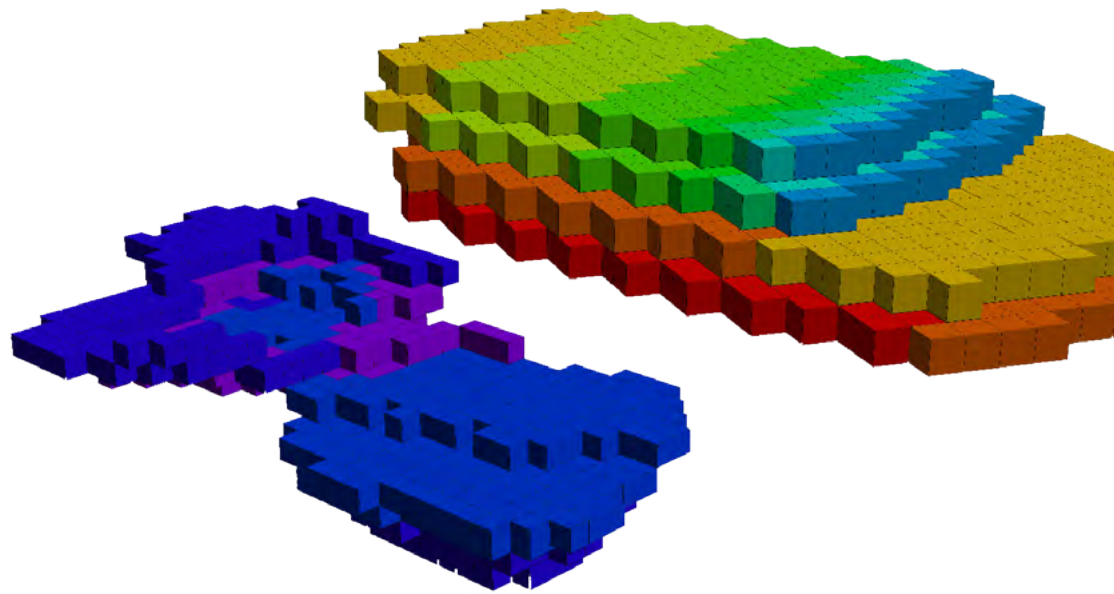
Mine Design

Drill & Blast

Grade Control

Optimisation

Scheduling

Underground Apps

Survey

Optimisation & Scheduling

Integrated mine design and scheduling is critical for ensuring that schedules are configured using the latest data. Maptek scheduling tools feature a user-friendly interface to streamline the setup and configuration of schedules. Preview, animation and reporting options allow plans to be clearly presented.

Vulcan pit optimisation tools make it easy to achieve the optimum mine plan. Operations can be optimised based on commodity prices. Designs can be validated and mining scenarios tested on the desktop before mining begins.

Automated Pit Designer automates the creation of mineable pit shells after the optimisation process has been completed. Optimised block model results are quickly transformed into realistic mine design contours. These contours serve as a base for further design work or to generate pit-by-pit graphs and long term schedules. Multiple scheduling options can be reviewed, and different design parameters evaluated for their impact on the plan.

Interactive block planner cuts bench polygons into period-based polygons, reserving target tonnage against a block model as cuts are made. Reserves are defined by a schedule of cut polygons, then accumulated and sub-totalled by bench, material type, grade and period for reporting.

Maptek Evolution produces medium, long term and strategic life of mine schedules. Operating costs are reduced and net present value optimised using grade cut-off techniques. Processing schedules within a single solution as well as in the cloud is 10 times faster than traditional methods.

Gantt Scheduler is a resource and activity based scheduling module. Users can create, sequence, allocate resources, animate scenarios and report activities efficiently and transparently directly from design data.

- Optimise pits at sub-block level without regularisation
- Schedule open pit and underground operations
- Short, medium and long term scheduling
- Apply resources and equipment efficiently
- Dynamic analysis and feedback between mine design, geological model and schedule

- Graphical interactive scheduling of reserves using triangulations and polygons
- Store metadata (block, waste tonnage) with scheduling objects for easy labelling of cut polygons by bench
- Animate schedules to analyse scenarios before mining
- Automatically update schedules when design data changes
- Use information directly from a Vulcan block model for target and extraction points

Mine Closure

Accurate, reliable and timely data is important for mining success. Feeding the knowledge gained from analysing that data back into the mine plan is critical for productive operations. Vulcan allows users to create an audit trail to analyse ways to improve.

Ensuring products meet customer specifications over the life of the resource can be a challenge. Stockpiles can be monitored for end of year resource and reserves reporting, mine scheduling, and closure and rehabilitation studies. Scheduling low grade stocks for mill feed as backfilling progresses adds value and certainty to the reclamation process.

Vulcan contains comprehensive tools for developing reliable rehabilitation plans. Designs can be created at any stage of the mining process for regulatory and environmental compliance. Users can model cut and fill volumes, and determine the most efficient plan to help keep costs under control and meet reclamation requirements.

Scheduling can incorporate waste landforms, bringing closure planning into the mine plan. The benefit of this lies in identifying areas where final landform development can commence early in the mine schedule for allocating costs and equipment.

- Model and visualise rehabilitated surfaces
- Monitor stockpiles and model ore grades for rehabilitation and closure studies
- Schedule low grade mill feed as backfilling progresses
- Interactive dump and ramp design
- Create detailed range diagrams for reclamation of dragline operations
- Section tools for balancing cut and fill materials
- Accurate calculations minimise haulage distances

Software Bundles

Vulcan Explorer provides an interactive 3D visualisation and modelling environment to view and validate exploration and geological models.

Vulcan GeoModeller is ideal for creating geological, structural and grade/quality models for stratigraphic and non-stratigraphic applications. It can also be used for face mapping, statistical analysis and preliminary resource calculations.

Vulcan GeostatModeller is a complete configuration for performing geostatistical analysis to accurately determine geological resources. Tools cover variogram analysis, grade estimation, grid and block modelling, geology and plotting.

Vulcan MineModeller Open Pit contains the essential tools for surface operations, covering pit design, dump design, surface manipulation and reserving. Surfaces and design lines can be easily updated with the latest data for generating daily production reports.

Vulcan MineModeller Underground is the essential tool kit for underground operations. The bundle includes tools for infrastructure design, stope design and analysis, triangulation manipulation and reserving.

Vulcan Modeller provides CAD, 3D visualisation and modelling tools to create, review and share models. Options for triangulation, grid mesh modelling and contouring enhance understanding of terrain, geology, mining and engineering scenarios.

Vulcan QuarryModeller is tailored for modelling and analysing deposit geology, and designing quarry operations. Different scenarios can be run to maximise output, and production reports can be generated to guide daily operations.

Vulcan Surveyor allows collected survey data to be imported into Vulcan for efficient review, manipulation and update. Direct communication with survey technology reduces errors which may occur during file transfers.

Maptek Evolution contains intuitive strategic mine planning tools which help maximise the value of projects. Featuring advanced strategic scheduling and optimisation functionality, these tools allow users to run production schedules, allocate routes, analyse haulage cycle times and optimise waste landforms.

Add on Modules

- Automated Pit Designer
- Base Geostatistics
- Block Modelling
- Channel Sampling
- Coal Washability
- Cutoff Grade Optimiser
- Data Analyser
- Dragline
- Drill & Blast Design
- ESRI ArcGis Interface

- Gantt Scheduler
- Gaussian Simulation
- Geology
- Geotechnical Toolbox
- Grade Control
- Haulage Profile
- Implicit Modeller
- Interactive Road Design
- Level Designer
- Monitoring

- Open Cut Drill and Blast
- Open Cut Mine Design
- Pit Optimiser
- Short Term Planner
- Stope Optimiser
- Survey
- Underground Drill and Blast
- Underground Mine Design

Industry Leading Global Solutions

Maptek is the leading global provider of innovative software, hardware and services for the mining industry. More than 2000 customers in 75 countries rely on Maptek.

Maptek mining technology can be applied throughout the entire mining life cycle. Our solutions help reduce operating costs and improve performance, productivity and profitability. Maptek provides expert consulting, training and support services to ensure you get the most from your investment in our products.
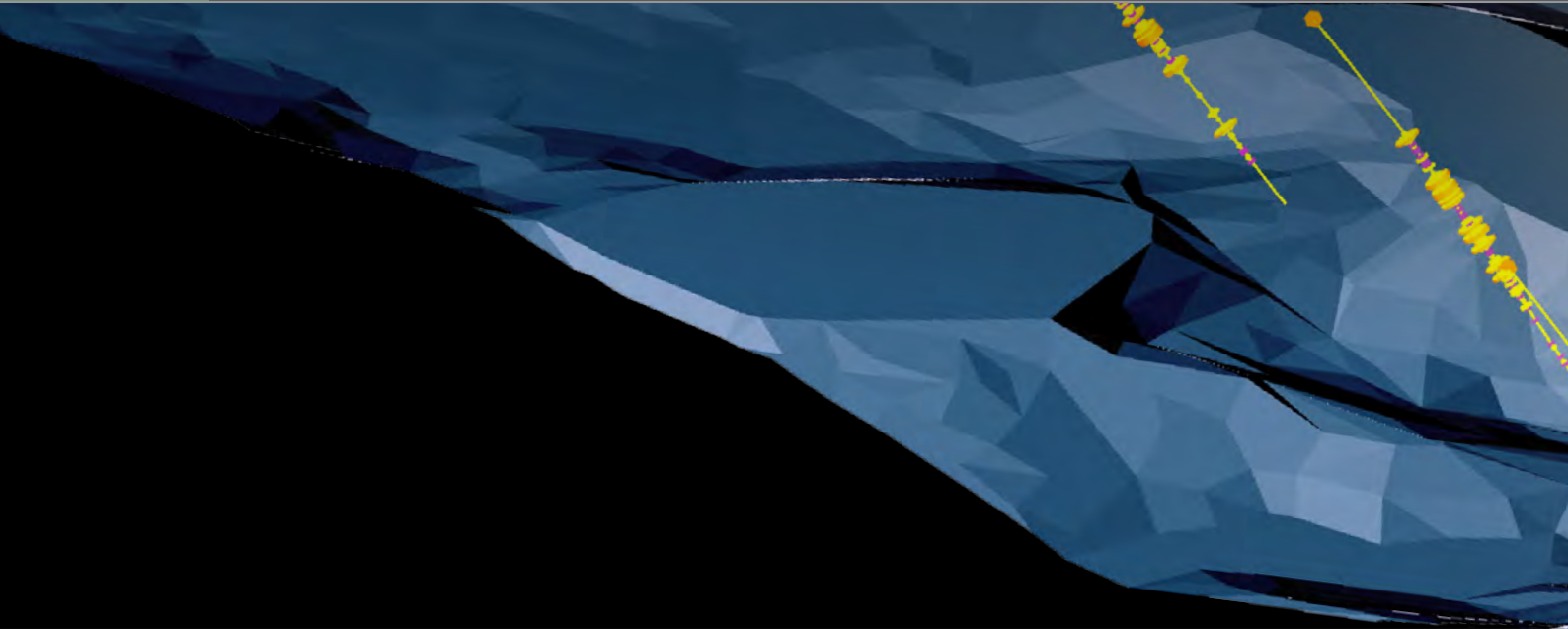
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