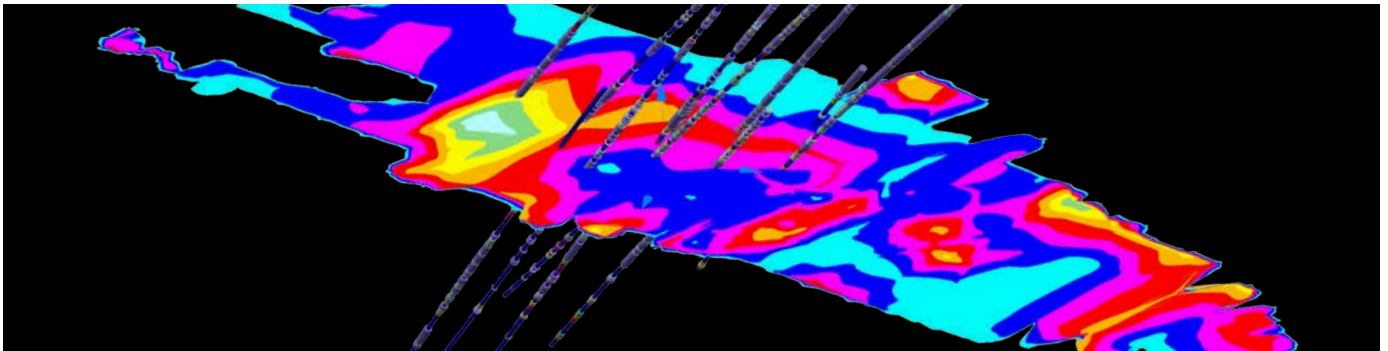


Vulcan Geology Modules

Advanced tools allow geologists to access and view drillhole data, define geological zones and accurately model orebodies and deposits.



Geology Tools

Management and validation of drillhole, lithological and analytical data using Vulcan database or through interface to third party databases.

- 3D display and analysis of drillhole data, and 3D geological interpretation; tools to query and filter information.
- Powerful compositing tools for both non-stratigraphic and stratigraphic environments.
- Display and manipulation of downhole geophysical data.
- Among stratigraphic modelling tools:
 - Single tree-style interface accesses virtually all of Vulcan's grid modelling tools
 - Save Complex Modelling runs as a single specification
 - Use multiple horizon lists, including an enhanced split definition panel which allows for 'Z' splitting
 - Dynamic model extent definition allows preview of grid size prior to modelling
 - Modelling direct from drillhole database or from Mapfiles
 - In-pit survey or mapping data incorporated directly into the interpolation or modelling process
 - Choose your modelling method - thickness stacked or direct structural surface creation
- Multi-domain Implicit Modelling with no void or overlap between domains.
- Model grade shell and geology domains.
- Boolean modelling ensures valid triangulations for mine planning.
- Calculate strip ratios from user-defined HARP block model variables, limiting a lowest mineable level.

Block Modelling

Accurate creation, visualisation and manipulation of complex block models.

- Based on user-defined block dimensions and sizes.
- Store and use information in any location of the space via regular cell or sub-cell variables.
- Inverse distance grade estimation.
- Creation of customised reports including grade tonnage curves.
- Dynamic visualisation of single or multiple planes through the block model.
- Advanced reserve reporting with ability to break down by other block variables.
- Support for a large number of blocks with options to add, delete or modify variables in real time.

Foundation for advanced modules such as Base Geostatistics, Gaussian Simulation, etc.

Base Geostatistics

General tools for the application of geostatistical techniques.

- Based on GSLIB, provides diverse functions to calculate and model variograms, including 3D variogram maps and interactive modelling.
- Variogram model autofit.
- Easily determine three orthogonal directions given a main direction.
- Indicate different geometric search parameters for each direction, facilitating the creation of directional variograms.
- Simple kriging, ordinary kriging, indicator kriging and indicator simulation can all be used in estimation.
- SMU support size analysis and validation.
- Unfolding module incorporated:
 - Unfolding can be applied to deposits where mineralisation is controlled by a modelled structural surface
 - Grade estimation search ellipse or variography search ellipse is distorted from the usual regular ellipse to follow folded upper and lower surfaces representing the orebody geometry
 - The difference between a normal estimation and an unfolded estimation is that the search ellipse is moulded to follow the surfaces used to bound the deposit
- Locally Varying Anisotropy (LVA) method for arbitrary search path for grade estimation.

An ideal upgrade to turn a GeoModeller into a powerful GeoStatModeller.

Gaussian Simulation and Co-Kriging

All the geostatistical tools widely used in risk analysis, uncertainty assessment and bivariate simultaneous grade estimation.

- Multi-variable co-kriging and many functions related to the handling of models.
- Multiple Indicator Simulation and specialised tools to prepare and process simulation data.
- Pre and post process tools for simulation include:
 - Normal scores (univariate) and stepwise (bivariate and trivariate) transformations
 - Drift analysis
 - Average variogram
 - Distribution and variogram validation options
- Among co-kriging tools:
 - Automatic calculation and fitting of a Linear Model of regionalisation
 - Simultaneous estimation with two variables
- Working in the Vulcan block model environment, very large models and hundreds of variables can be handled efficiently.

Channel Sampling

A special combination of options to streamline the creation and manipulation of underground channel samples.

- Allows user to create and edit simple locations and directions of channel samples.
- Samples can be rotated around the orientation and inclination, allowing the user to easily locate the channels without that do not have enough survey information.
- Visualisation of sample grades including weighted averages above user defined cut-offs.
- Can be achieved manually or by interactive graphics.
- Ideal in underground mines, which require a single administration of the samples for channels

Geotechnical Toolbox

Set up and use a structural database to display and calculate geotechnical information.

- Data can be manually entered, imported from ASCII files or linked to third party databases.
- Structures can be displayed in 3D; equiareal or equiangular stereonet, or orientation rose diagram, dipmeter or tadpole diagrams.
- Data can be selected directly from a region in the space to perform Stereonet analysis, where several stability tools are available, including friction cone, sliding and toppling faulting.
- Arbitrary user defined planes, such as proposed slopes with different directions and inclination, can also be entered directly at the stereonet.
- Support for oriented drillholes.

Easy to analyse different operational or design scenarios.

Grade Control

Perform material type/destination classification in open pit blasts and underground.

- Display blast hole samples and block model estimations along with related Vulcan data such as geological mapping and registered face photos.
- Material classification boundaries are digitised on the screen using standard Vulcan tools.
- Solid triangulation models of the blast are used for accurate volume calculations.
- Once material/grade boundaries have been digitised, the blockout process cuts the blast solid (using tri-boolean methods) into individual solid blocks for the purpose of material classification.
- Advanced features allow for reblocking and partial reblocking of a blast.
- Can perform blockouts on block models and/or drill samples if required.
- Database can be linked to external databases, such as Oracle, SQLServer or Access, using ODBC (Open Data Base Connectivity).
- Report summaries of each grade block and totals for each blast.
- Data used and created by the process is stored in a Vulcan Isis database that can be customised to the exact requirements of each mine.

Monitoring

View, calculate, manipulate and plot data obtained from monitors on a periodic basis.

- Time series data from the monitor is imported into the database established for the Monitoring module.
- The data can be observed over certain time intervals in 3D views or as time series charts. Various derived parameters, such as incremental and cumulative change and rates of change, can be queried and displayed.
- Colour legends and resizable symbols can be used to display selected data characteristics.
- Fully integrated with the other Vulcan modules, so geotechnical, geological and civil data can be overlaid and analysed along with the monitors.
- Models can be built to demonstrate how the monitors change with time. These changes are modelled as points, contours, triangulated surfaces or grids so that they can be used by the Animation module (under View) for powerful 4D visualisation.
- Levels of contaminants at different locations in a water table, or measurements from total station survey systems can be used to monitor wall movement in an open pit.

Coal Washability

Storage, manipulation and modelling of coal recovery curves for preparation plants.

- Convert and query washability data from relational database source.
- Produce washability Mapfiles for modelling and reporting.
- Create composite washability data source from selected holes, at a chosen size-fraction range, for individual graphical query.
- Produce Australian Standard wash curves (AS4156.1).
- Allow wash characteristics determination for required qualities.
- Combine other wash data with standard gravity separation techniques.

Complex washability models simplify the 'what if' questions asked of wash data.

Optimised Dig Limit

Maximises the profit for mining of each mining block.

- Apply optimisation techniques to available block information to measure the profit of blocks within the orebody delineation, in comparison to a penalty based on mining equipment constraints.
- Mining digability for a blast, mining block or bench can be determined using equipment specification curves with penalties applied for mining blast boundaries with acute angles.
- Simulated annealing to determine the best outcome, balancing mining recovery and grade constraints for each equipment type.
- Results can be displayed as layers within Vulcan for use in short term planning, as input for grade control, for upload to survey devices, and for field markup of mining benches.
- The optimisation process produces a mining boundary for use in short term planning, as input for grade control which maximises the economic benefit from blast material classification.

Improve efficiency with Vulcan

Vulcan software provides the user with the world's best 3D interactive modelling and planning package. It is the total solution of choice for the largest and best mining companies. From geology to mine planning and scheduling, Vulcan delivers functionality, efficiency and improved productivity to Maptek customers worldwide.

More questions? Contact us:

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