MINEsight for geologists: An integrated approach to geological modeling
MINESIGHT FOR GEOLOGISTS: An integrated approach to geological modeling

MineSight offers geologists, engineers and surveyors a complete software solution using the latest technology. Exceptional product development and first-class technical support distinguishes Mintec as the leading provider of mining software.

MineSight’s geology tools are at the forefront of this technology. They have the unparalleled ability to ‘talk’ to each other, from loading your drillholes, to building geological solids and creating your 3D Block Model.

“Our analysis of the market has shown that MineSight is the most complete and user-friendly package, accompanied by a high quality service and support.” – Olivier Gratessolle, IMC Consultants, Germany

Whether a block model is being created for resource evaluation, life of mine planning, or daily operations, a geological model is imperative to a successful project. A more traditional approach to building a block model might involve several import/export steps, which has the potential for user error or data loss. For example, transferring a block model from one software vendor to another can be problematic, especially if the model is rotated or sub-blocked. Data conversion errors, wasted time and lost revenue are the risks.

MineSight avoids those risks thanks to its fully integrated approach. Your data never leaves the software, minimizing risks and avoiding complications.

Figure 1: General workflow of a ‘typical’ MineSight geology project. All geology tools are integrated, meaning no import/export between packages.

www.minesight.com
Step 1 – Drillholes in MSTorque

Drillhole samples and geological logs are fundamental. It’s expensive to drill and collect this data, and it’s the foundation of nearly everything at the mine.

Drillhole or blasthole data is loaded into a secure SQL database using MineSight Torque. The data can be validated, manipulated and reported, and it is fully integrated with other MineSight products.

Figure 2: Viewing drillholes in both MSTorque and in the MS3D viewer: A powerful tool for visual analysis.

“Storing drillhole or blasthole data in a secure and validated way is imperative.”
– Mark Gabbitus, product manager-operations, MineSight Applications-Perth

Key Benefits:

- Quick and easy set-up.
- Integration with the rest of MineSight. Drillholes loaded into MSTorque can be viewed in MS3D (see Figure 2). No need for additional software.
- Data validation throughout MSTorque highlights possible inaccuracies with imported information, reducing the risk of error.
- Integrated compositing options available within MSTorque.
- Calculated Fields – equivalent copper can be calculated in MSTorque and then carried forward throughout MineSight’s other components.

www.minesight.com
Step 2 – Geological Interpretation with MS3D & Implicit Modeler

Building accurate geological surfaces and solids is essential to the modeling process. Depending on your data, you can perform geological interpretation using the manual method, or use the MineSight Implicit Modeler (Figure 3).

Figure 3: A geological solid created using the traditional method vs. solid built with the Implicit Modeler.

The manual routine (Figure 4) takes advantage of MineSight 3D’s intuitive suite of design and editing tools, and its industry-leading surface/solid editing options. This makes building geological surfaces and solids simple.

Figure 4: In cross-section using the Tri-viewer in MS3D to interpret coal seams from Torque drillholes. View the previous plane, current plane and next plane simultaneously.
MineSight Implicit Modeler makes creating solids and surfaces even easier. It avoids the need to manually create and link sectional interpretations, and it masters complex surfaces. Wire-framing is reliable, but it also can be time consuming. Wire-framing drillhole data amid details and deadlines takes time that could be spent analyzing information, testing theories and generally being a geologist.

"MineSight Implicit Modeler is quick, repeatable and builds multiple models with rapid updates. Evaluate your solid or surface, then add user-defined control points to guide it. In other words, you can spend more time being a geologist." - John Davies, Mintec president

Implicit modeling is a mathematical surface fitting method that interpolates points on the surface to give a smoother fit. MineSight Implicit Modeler uses the Radial Basis Function algorithm, which has been performance tuned, and can be relied upon to solve the following:

- Creates surfaces or solids from drillholes (Figure 6).
- Builds overturned and complex seam surfaces directly from drillholes, which is useful for complex coal.
- Links polygons that have been defined explicitly, and deals with splits, joins, bifurcations, etc.
- Creates surfaces from explicit polylines, as above, but surfaces instead of solids.
- Uses a combination of drillhole and polygon/polyline/point input for surfaces and solids.
- Solid or Surface created in the MineSight Implicit Modeler can be coded straight to a 3DBM without any import/export.
MineSight is the only general mine planning software package to feature a true implicit modeling tool.

Figure 6: Implicit Modeler builds realistic looking solids directly from Torque drillholes. These solids can then be coded directly to a block model.

“I can see some large benefits with MineSight Implicit Modeler. We model a large waste solid and using the linker tool, I can see the benefits of switching to that product and having mathematically computed solids.” – Kevin Schumacher, Canadian Natural Resources

Figure 7: MineSight Implicit Modeler used with complex coal to create more realistic seams.
Step 3 – Geostatistical Analysis with MSDA (MineSight Data Analyst)

MineSight Data Analyst (MSDA) handles geostatistical modeling. It can read drillhole information directly from MSTorque and other common formats, including spreadsheets, databases and text files to produce sophisticated and customizable reports, charts, and graphs.

It will also process model data (3D block, stratigraphic) (Figure 8) with complex statistical and geostatistical programs and tools.

Figure 8: A different solution depending on the character of the deposit.

Key Benefits:

- The ability to manipulate viewing of the model to provide quick analysis of different block model qualities.
- The automated method of updating a block model by use of the multi-run function will save time and reduce the risk of error.
- The Variogram 3D Manager (see figure 9) in MSDA will aid in the geostatistical analysis of the deposit. The results generated by this tool are then used to increase the accuracy of the model.
Figure 9: Auto-fitting variograms in the dedicated Variogram 3D Manager. Drillholes were read directly from a MineSight Torque database.
Step 4 – Sub-Blocking

Geologists can enjoy a new level of precision with the option to sub-block a 3D block model.

MineSight Sub-Blocking delivers two notable advantages over standard sub-blocking approaches. Firstly, a sub-blocked model can carry multiple divisions. For example, you may wish to sub-block a model by geologic codes and by a phase design. Once each set of solids is coded to the model, simply alternate between the two sub-block divisions within the one model.

“I went to a workshop on sub blocking and I was impressed.” - Kevin Schumacher, Canadian Natural Resources

Figure 10: The strategic use of the sub-block feature will allow geologists to interpret geology on a more detailed scale.

Secondly, sub-block divisions can be updated at any time. If you receive additional geologic data or a new pit design after the initial sub-blocking, you can easily update the model: no need to rebuild the model from scratch.

The ability to query parent and sub-blocks by showing zones and editing items offers great detail and flexibility.
Step 5 – Model build and Interpolation

Building and manipulating a block model in an auditable and repeatable way is essential to the operation of the mine. Creating a block model in MineSight is simple, thanks to the Model Manager. It offers an efficient workflow to create, manage and manipulate block models (Figure 11).

The ability to make edits and add compression to model files at any time during the modeling process saves time and effort, ultimately reducing project sizes and enhancing model performance.

Figure 11: The Model Manager makes it simple to create and edit block models.
MineSight offers a large variety of Interpolation methods to suit your preference. Using a combination of the model manager and our interpolation program, it’s easy to do multiple runs to achieve the desired result.

**Step 6 – Resource Reporting with MineSight Reserve**

Reserve reporting tasks, such as Mineral Resource Classification, are made even simpler thanks to MSReserve. It provides a convenient way to configure the interface for defining and generating reserves reports of all kinds from any kind of model. The easy-to-use reporting options allow the quick and simple creation of charts, graphs and reports in multiple formats.

**Key Benefits:**

- Quick and easy to set up.
- Integrated with other MineSight products.
- Works with all types of MineSight Geometry, including models and sub-blocked models.
- Direct export of reports to Excel, CSV, PDF, etc.
- The ability to calculate reserves of solids from the viewer (see Figure 12).
- The ability to provide customizable reports (Figure 13).

Figure 12: A solid created in the Implicit Modeler can be selected directly from the MS3D viewer to create a report.
“The product I’m most excited about is the MSReserve. I think it will be really useful for what we do. Mintec seems to really appreciate input from the users and they actually listen and they make those changes.” – Hayley Kenyon, Norwest Corp.

Figure 13: Create customized reserve reports in MSReserve.
Conclusion

MineSight is the only mining software package to offer a completely integrated geological modeling solution. Modeling in MineSight saves valuable time and resources, so you can focus on other areas of your daily job. Now, the model is ready to be handed to the engineers. Naturally, all our planning and scheduling tools talk directly to a MineSight block model.

*By David Collins, MineSight Specialist - London.*

About Mintec

Mintec, Inc. is a software developer and service provider for the mining industry. Founded in 1970, Mintec has grown into a global network of mining professionals providing technology, service, and support in the most complex mining operations in the world. MineSight, the company’s comprehensive modeling and mine planning software platform, offers integrated solutions for exploration, modeling, design, scheduling and operation. Headquartered in Tucson, AZ, we deliver efficiency and reliability that improves productivity at every stage of your mine’s life.

Contact: sales@mintec.com