

MINE SIGHT®

in the Foreground

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As part of Mintec, Inc.'s ongoing efforts to keep our clients informed about Mintec and MineSight® activities within our offices and client base around the world, we again publish a collection of articles submitted by our regional offices highlighting a variety of local solutions to mining challenges using MineSight®.

Mineralized Zones in MineSight®

This article was submitted by the Mintec Calgary, Alberta, Canada office, providing our clients in Alberta and eastern BC, Canada with service, support, and training.

2007 was a busy year for the Calgary office on the project sub-contracting front. The office was involved in more than 25 projects including GSM and 3dbm projects for various mineral types and mining methods. The main tasks focused on building models and running pit optimizations.

A variety of modeling methodologies were applied using many of the MineSight® Compass™ procedures and MS3D tools. These included:

- Mineralized zones using automatic gridding of top and bottom qualifying drillhole intervals
- Mineralized zones using polygon interpretation and solids linking
- True thickness for both GSMs and 3dbms
- Relative elevation interpolation
- Ore/parting ply modeling using mineable ore percentage
- Seam stacking of interburden and ore thicknesses
- Glacial ice using GSF surfaces (a material percent item named ICE%)

This article focuses on the mineralized zone methodology using solids. The main idea behind this methodology is to build a zone that includes

any drillhole intervals that have grade and use the zone for controlling the grade interpolation. The zone should usually be a grade/no grade boundary. Doing a zone with a cutoff grade greater than zero can sometimes lead to interpolation biasing as hard contacts are created that may not actually exist. If the contacts actually existed, the geologic control would normally define them.

It is important to note that Mintec prefers building geologic zones and using them for interpolation control (as compared to grade/mineralized zones). This isn't always possible especially on some of the older projects and on projects with sparse drilling.

A summary of the mineralized solids methodology follows:

1. Tag the individual mineralized intervals in the assay file (often using P20801 or PDHMIN).
2. Combine groups of tagged intervals into multiple zones or into a single "best" zone using PDHSEAM.
3. Set up a section grid set with planes that best fit the drillhole data. These can sometimes be non-orthogonal, non-parallel (see Feb. 2007 newsletter article for more details on grid sets).

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4. Interpret either 2D closed polygons for direct solids linking or 2D open polylines for footwall linking and true thickness interpolation. The **Viewer Properties | Clipping | Selected Planes** with a setting of 1 is very useful for seeing the interpretation from the previous section.
5. Adjust the interpretation using 3D volume clipping and point snapping to drillhole intervals.
6. Link the polygons/polylines into solids/surfaces.
7. If necessary, slice the solids/surfaces to a regular, tighter grid set, adjust, and re-link.
8. If using the true thickness methodology, do the required slicing, assigning seam dip/true thickness, building closed polygons, and re-linking (see 2007 Annual Seminar workshop paper *True Thickness Calculations in MineSight®* for details).
9. In certain cases, the solids and assay tagging are ready to go. Other cases may require the assay intervals be back-tagged with the drillhole view coding and/or some manual flag flipping using P20201 to adjust assay flags to match. When the tags do not match the solid, the two alternatives are to adjust the solid so they do (preferred), or flip some flags from inside to outside or outside to inside. The latter alternative is sometimes easier to do and it assumes the solid is "off" a little, but that all the proper assay intervals are used in the interpolation.
10. The solids are then coded to the 3D block model and the grade interpolation is done using the flag matching. If required, a relative elevation interpolation can be done (see 2007 Annual Seminar workshop paper *Block Modeling using Surfaces*).

The following example illustrates the methodology as applied to a veined deposit where only the main vein is being modeled. The deposit has multiple zones with multiple grade items. An Equivalent Grade (EQUIV) has been calculated for each assay interval and is used as the controlling grade item. The multi-run in Figure 1 shows the drillhole steps. The key step in the multi-run is the PDHSEAM in DH8 which is shown in Figure 2. MINFG is set to 1 for intervals with a EQUIV greater than zero using step DH7. PDHSEAM then combines groups of these that are less than 3m apart (maximum interburden/parting distance) to make combined zones. The zone

with the best accumulated grade x thickness is kept by tagging those intervals with a MINF1 of 1. This is then used as the geology item in the compositing and interpolation.

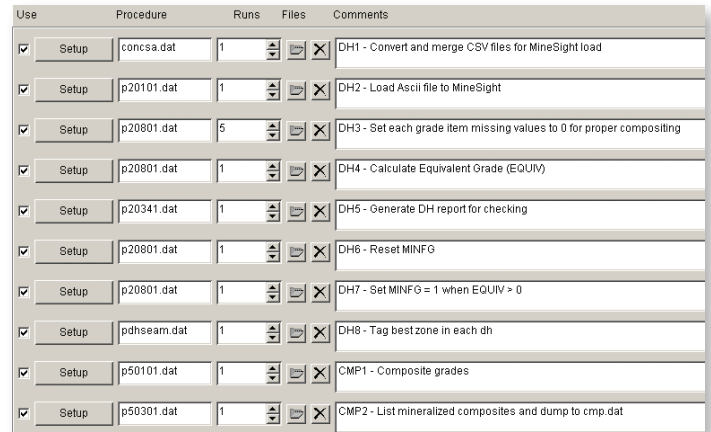


Figure 1. Multi-run for drillhole load and setup.

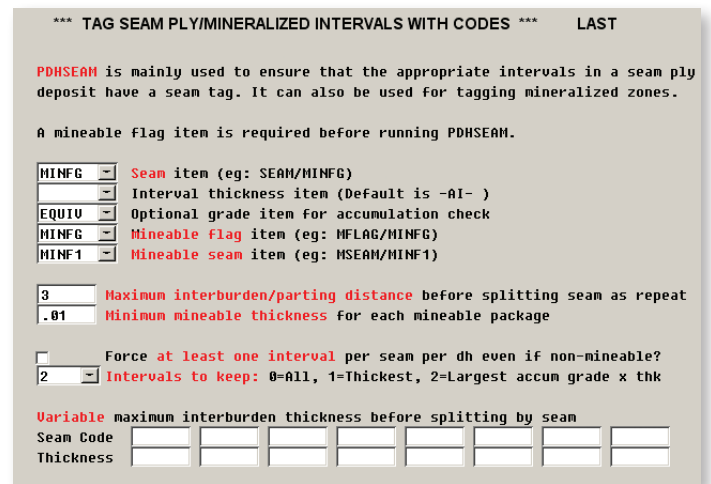


Figure 2. PDHSEAM for tagging the vein with the best accumulation (grade x thickness).

Figure 3 shows a sample section with the drillhole assay and flag data, along with the interpreted vein. The strip on the right side of the drillhole trace is the EQUIV, the one to the immediate left in light blue is MINFG, and the one to the left of that in light green is MINF1. The two left drillholes show an example of both a separable and non-separable interburden. All four drillholes also show the MINF1 tagging of a single zone with the highest grade x thickness value. The solid was coded to the 3D block model and the MINF1 was used as the geology item for compositing and interpolation matching.

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Figure 3. Sample section showing drillhole assay and flag data and interpreted vein.

Direct questions on the MineSight® mineralized modeling methodologies, to either support@mintec.com or Don.Guglielmin@mintec.com.

Variable Complex-Pit-Slopes in MineSight®

This article was submitted by MineSight Applications, Perth, Western Australia. MineSight Applications is a division of Mintec, Inc. providing our clients in Australasia with service, support, and training.

The challenge presented is to produce pit-designs based on a complex and dynamic geotechnical input. This requires the adjustment of berm widths and batter angles based on a number of criteria, namely the permutation of:

- 1.) the geotechnical rock type and
- 2.) the dynamic, projected facing azimuth of the pit wall.

The input data is often maintained in a series of Microsoft® Excel tables. A typical work practice is to iterate a solution based on initial first pass expansion with ensuing designs refining the geotechnical requirements. Each pit design can take up to a week or more to complete.

Currently within MineSight®, the **Pit Expansion Tool** can adjust the slope and berm of a pit design by using a sector table or by using coded model values (including code table lookup). However, it does not allow dynamic assignment of batter slope and berm width based on the actual current design azimuth of the pit wall.

The solution was to create a MineSight® Grail (MSGrail) script to calculate and code BERM and BATTER values into the block model by following the pit toe polygon at each level, i.e., determining the azimuth of the pit wall as it passes each model block. Selecting these coded model items in the **Pit Expansion Tool** thus causes the pit expansion to have the desired parameters of berm width and batter angle for the next expansion.

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