Stratigraphic Modeling Tools in MineSight Part 3

In Parts 1 and 2 of this series we looked at the stratigraphic tools in MineSight and how they can be used for modeling stratigraphic deposits like coal and bauxite. In this final instalment we look at how these tools could be used in a non-stratigraphic environment.

It is important to remember that stratigraphic models are a regular grid that stores numbers. This could be an elevation, thickness, slope, quality or some other recorded value. The fact that multiple, stacked, grids can exist in the same model all of a sudden allows you to do some pretty creative things with some very basic math.

The following example is from a client who raised the issue at a seminar. They had a very spiky surface, (Figure 1) and they needed to remove the spikes to a certain height so that they could mine the ore with surface miners. MineSight 3D v6.5 has a Surface De-spiking Utility, but this was not available at the time.

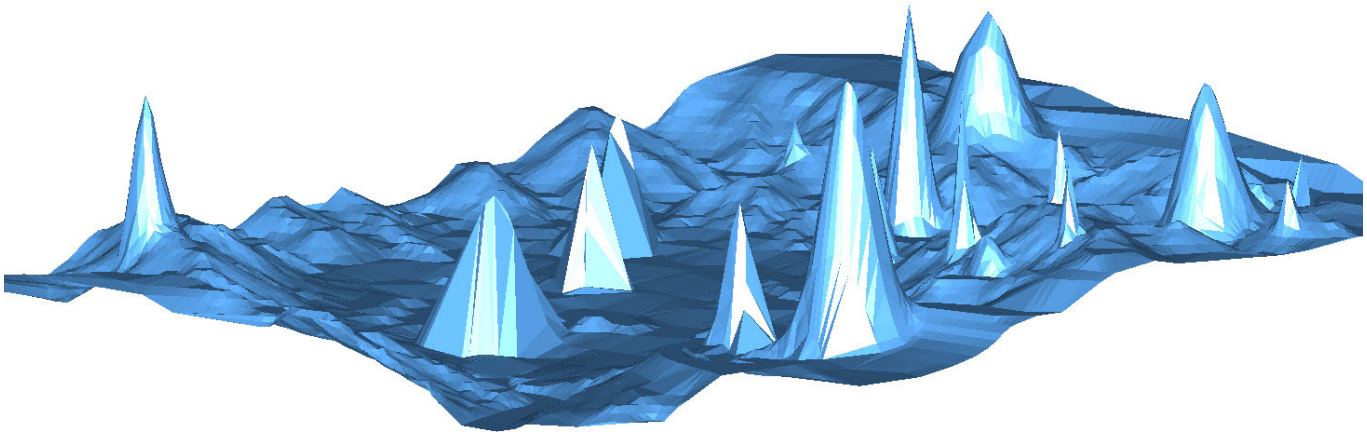

Figure 1. *Example of a spiky surface.*

Data provided was a triangulated surface and a series of mining rules:

1. A spike was defined as anything with a slope greater than 70°.
2. Spikes needed to be clipped to within 4m of a nominal default surface.

The client needed to know the volume of the spikes to be clipped. Surface Models (GSFs) were perfect for this job. Not only can you store multiple elevations in one model, but you can also calculate and store slope angles and perform math between elevations.

The current surface model file limitations (soon to be lifted) of a 1000x1000 grid and the required resolution meant that the project area had to be split into four project sections (PCFs).

In each PCF a surface model was created along with a model view (Figure 2). The original supplied surface was then gridded into each surface model (TOPOG).

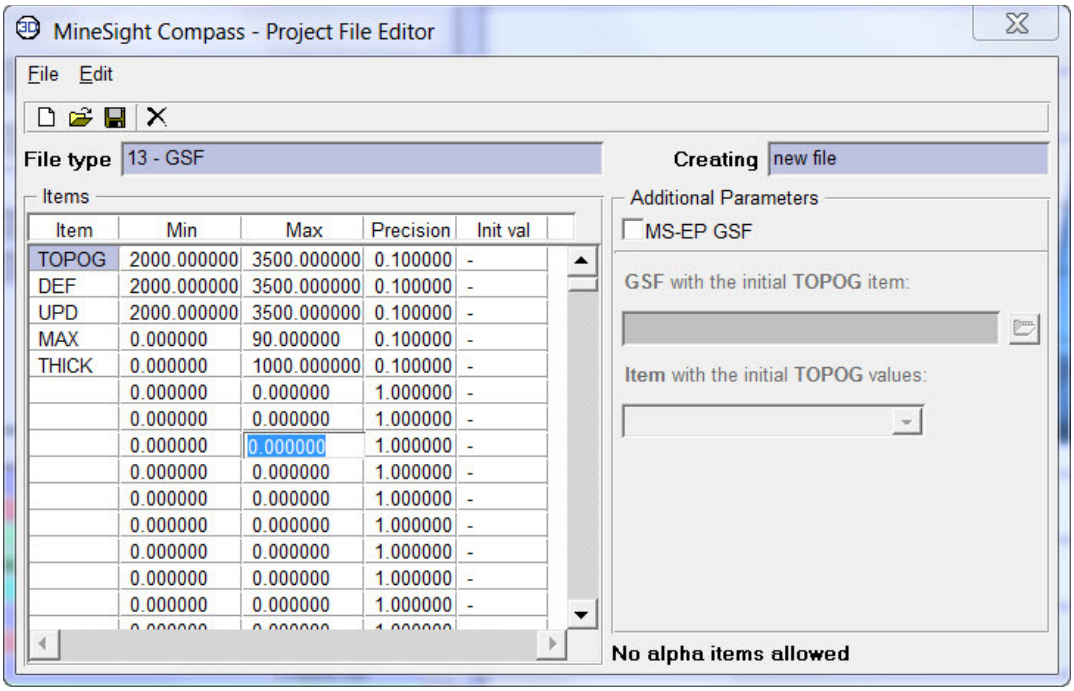

Figure 2. *Creation of a new surface model with the items required for this project.*

The next step was to create a nominal default surface (DEF). This is an imaginary surface based on the original surface, minus the spikes. Because we could not use the upcoming MineSight 3D De-spiking Utility we had to use a bit of ingenuity. Using the **General Gridder Tool** from the Point menu, we draped a 10x10m grid of points onto the original surface. We assumed that it was very unlikely that any of these points would land on a spike. As it happened, a few did but these were easily deleted manually in a side on view.

These points were then exported to an ASCII file and gridded to the surface model using the MineSight Compass procedure PDHGRD.DAT (**Grid DHs using DTM/Gradient**). The Gradient interpolation method produced the best results with this data. To ensure that the nominal surface did not go above the real topography, the surface was normalized using the procedure GRDRAT.DAT (**Rationalize Gridded Surfaces**). The results are shown in Figure 3.

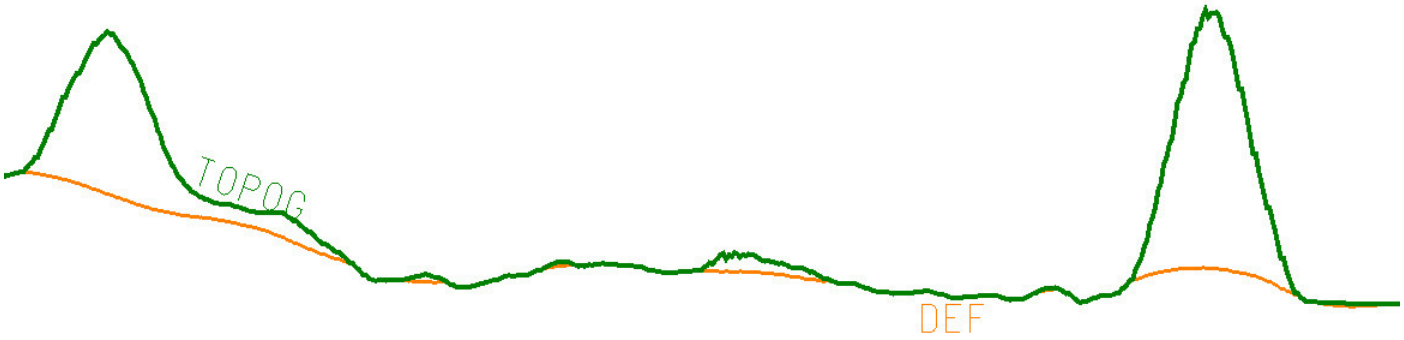

Figure 3. *Section view of the two surfaces after they have been normalized.*

The maximum slope of the original topography (MAX) was then calculated using procedure GRDSLP.DAT (**Calculate Gridded Slopes in GSM**). And procedure P61201.DAT (**User-Calcs Model**) was used to calculate the thickness between the original and default surfaces (THICK) (Figure 4). The original surface elevations were also copied into a new item, (UPD) again using P61201.DAT, so that they could be edited.

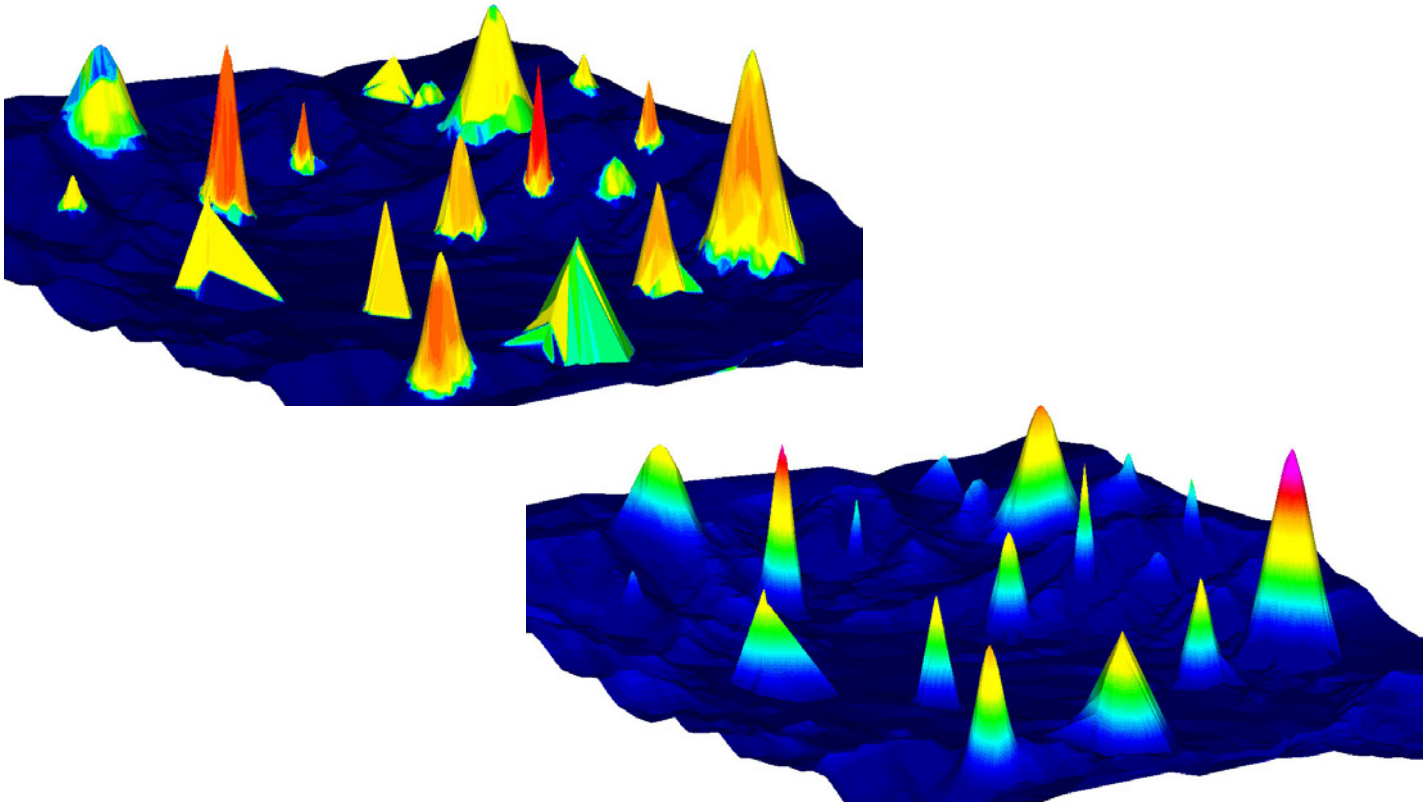

Figure 4. *TOPOG colored by the max slope (MAX) and thickness (THICK).*

The final calculation necessary was to set the new surface elevations to the nominal surface plus 4m, wherever the slope was greater than 70° and the thickness was greater than 4m, using procedure P61201.DAT again.

It is then a simple exercise to generate the solid shapes that were the difference between TOPOG and the final result (UPD) item using the **Intersect Surfaces Tool** in MineSight 3D (Figure 5). You don't even have to export the surfaces to an .MSR file because the Intersect Surfaces Tool can read directly from the surface model (also from LGOs).

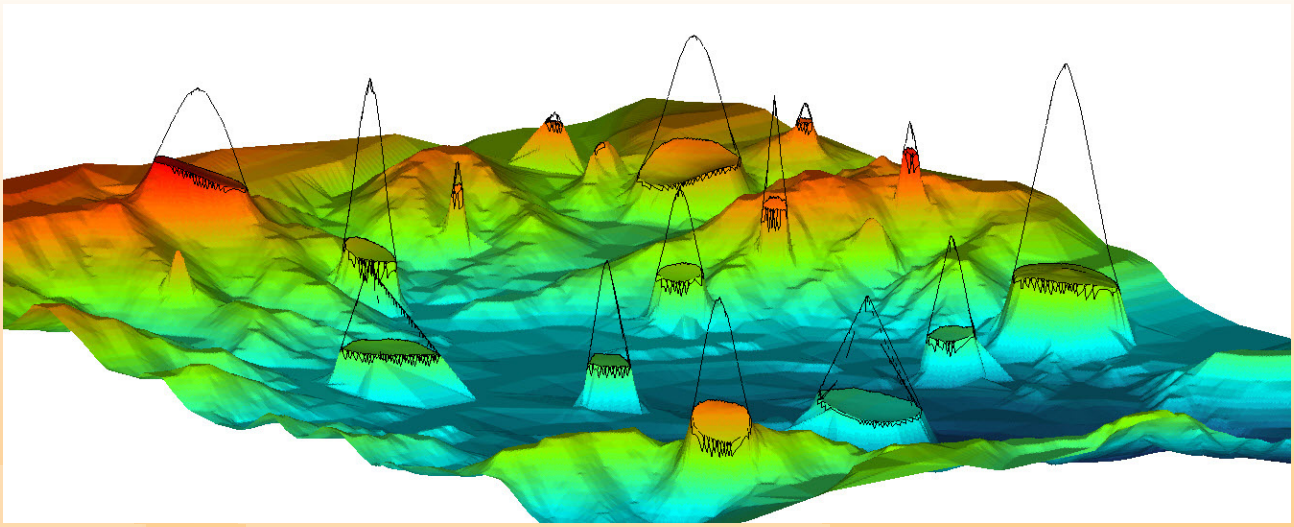

Figure 5. *UPD surface and the resultant solids displayed using Hard Edges.*

A little knowledge and some out-of-the-box thinking turn tools designed for stratigraphic modeling into a solution that would be very hard to obtain with triangulations. Next time you have surfaces that need manipulating, consider the stratigraphic modeling tools in MineSight. For help, call your local technical support team at Mintec, Inc.