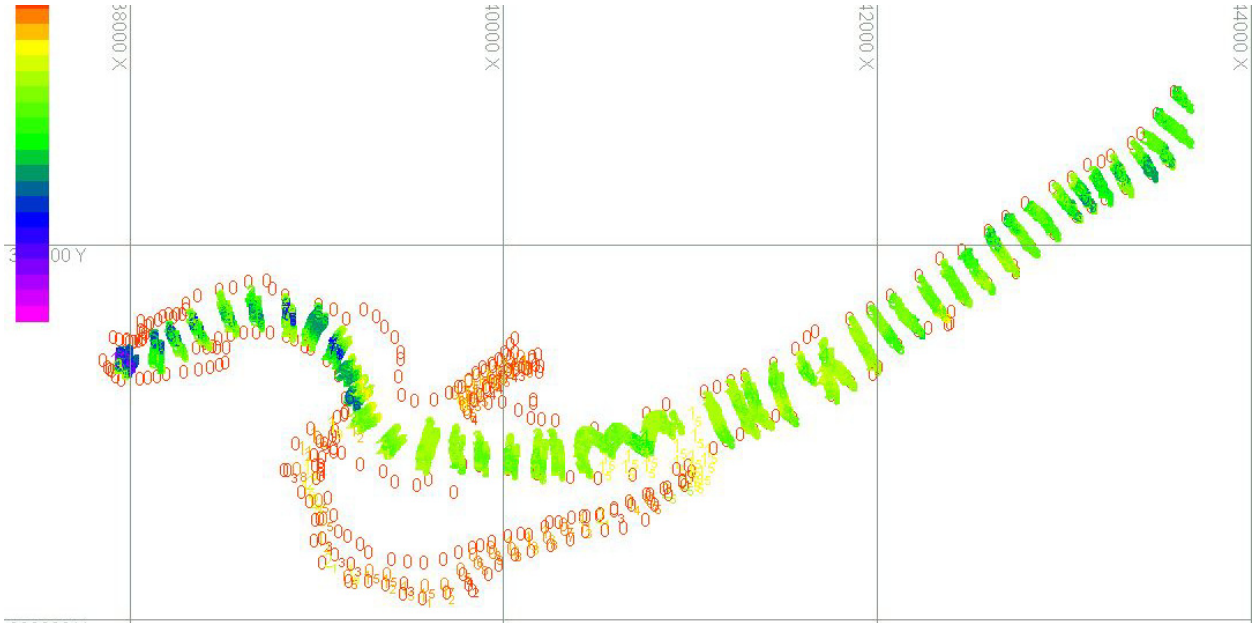
Working in TIN MODEL with a Difficult Data Set

By Bob Glover

For all of the wonderful abilities that TIN MODEL has to offer, sometimes it can become rather difficult to achieve the desired outcome. Data sets that have outlier points at different spacing can be problematic to work with and cause the TIN MODEL engine to produce a model that is less than desirable. In this article, we will look at a data set that would be extremely difficult to run through TIN MODEL without some editing necessary to produce a satisfactory result. I will also explain a few techniques used along the way that might come in handy should you be working with a similar set of data in the future.

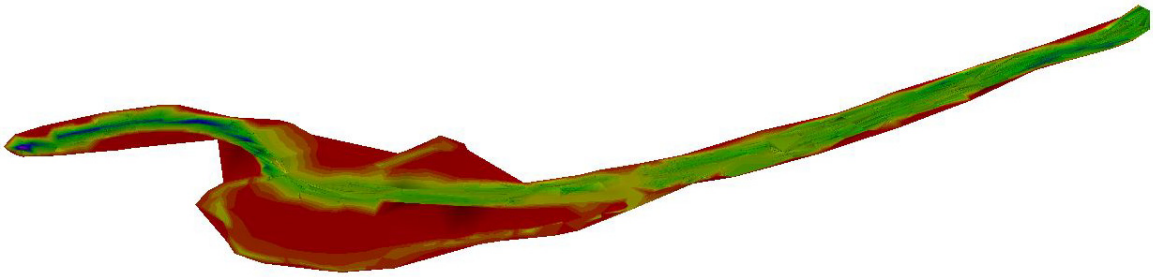
Figure 1 shows the initial XYZ data set (reduced from the original for this example). You can see where there are numerous points that lie at different spacing which would cause the TIN MODEL program to return results needing extreme editing before it would be useful.

FIGURE 1. *Data Set with Outlying Points*



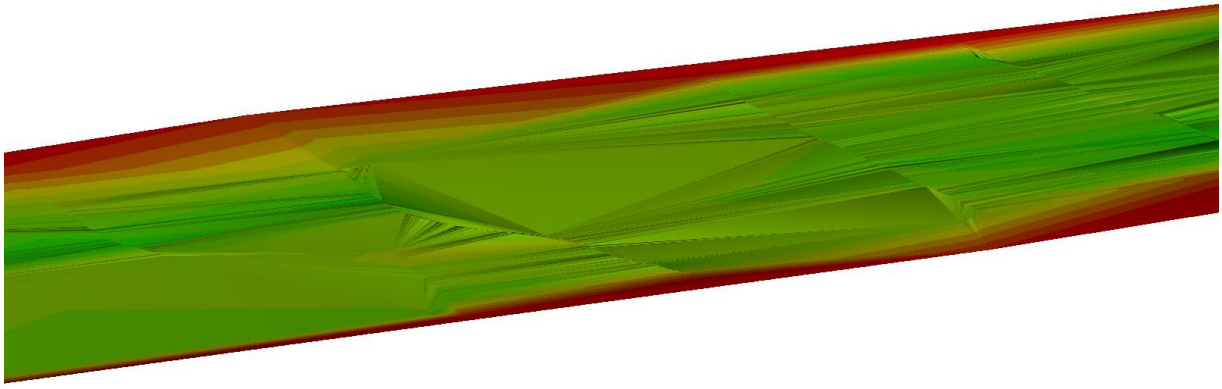
As you can see, points were added that will make rendering this surface most difficult. You need to balance the distance that the TIN MODEL program will look to connect data points (TIN Max Side) while also attempting to generate a representative model where points that should not be connected are not joined. Figure 2 shows what our model would look like had we kept the data set as we originally found it.

FIGURE 2. *TIN Model of the Original Data Set*



Using this data set, it was necessary to set the TIN Max Side to nearly 500 feet so that we could generate a model that did not have gaps (in the shoal areas) where TIN MODEL was unable to find suitable points to join. This distance has also caused TIN MODEL to connect points that should not have been joined. In this case, some points were created over others contributing to a surface that looks erratic in some locations. A closer look is shown in Figure 3.

FIGURE 3. *Original Model Close-up—Large TIN Max Side can Create Inaccurate Models*



We will need to edit the data to produce a model with a better surface representation. For this data, I choose to use the CLOUD program to open and edit the data set. CLOUD will allow us to remove points individually as we determine what we feel will produce a workable data set for the TIN MODEL program. In this example, I have removed most of the outlying points that were causing an issue. Careful editing would allow far more data points to be saved and still produce a more accurate surface; however, for this demonstration, I have just quickly removed most of the troublesome points.

FIGURE 4. *Original Data Set in CLOUD*

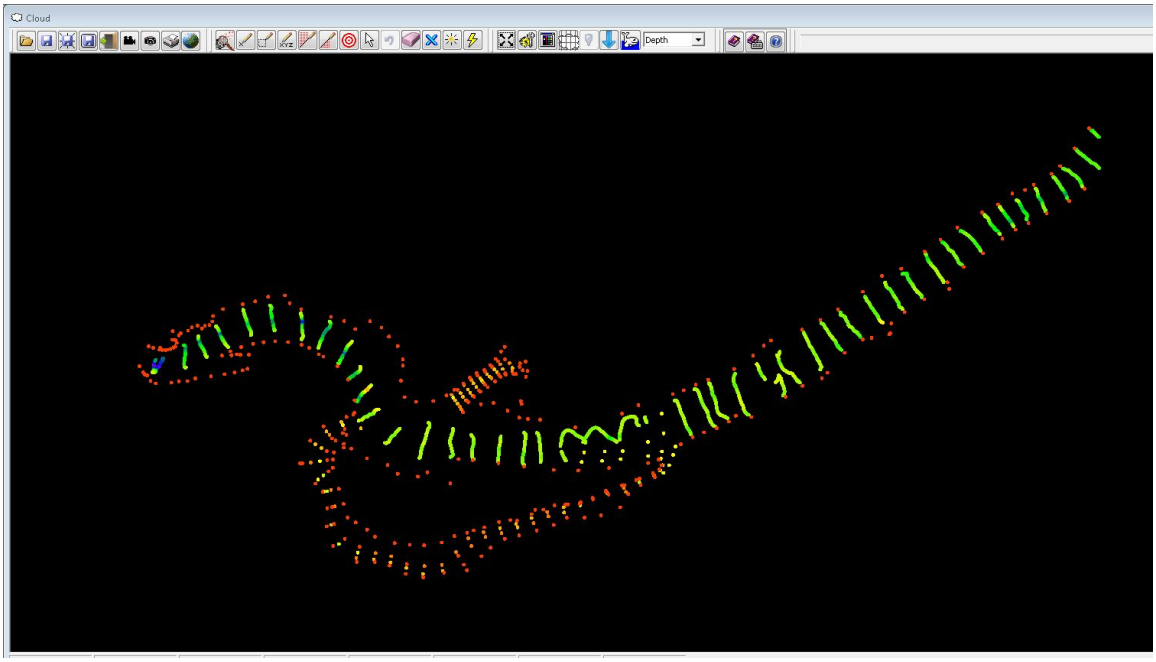
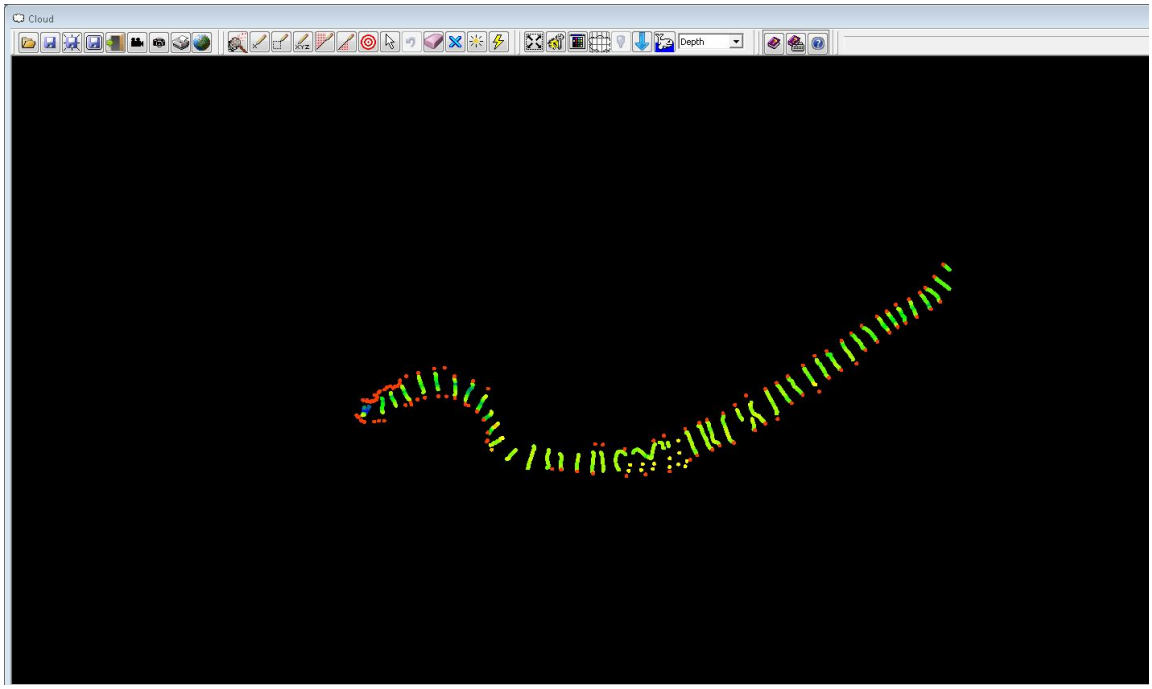
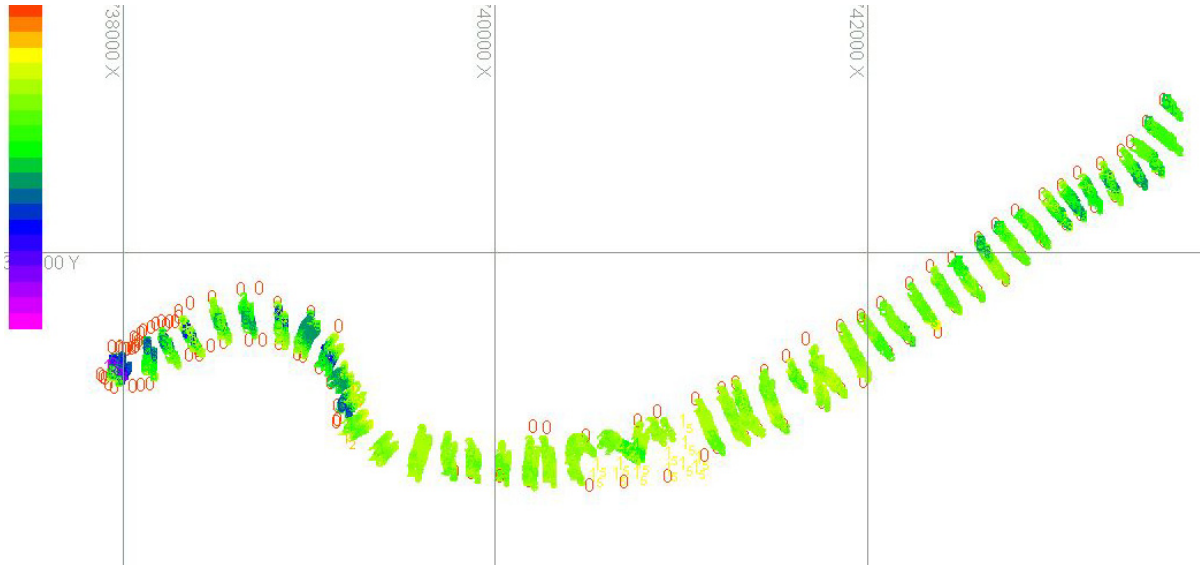


FIGURE 5. *Data Set After Editing*



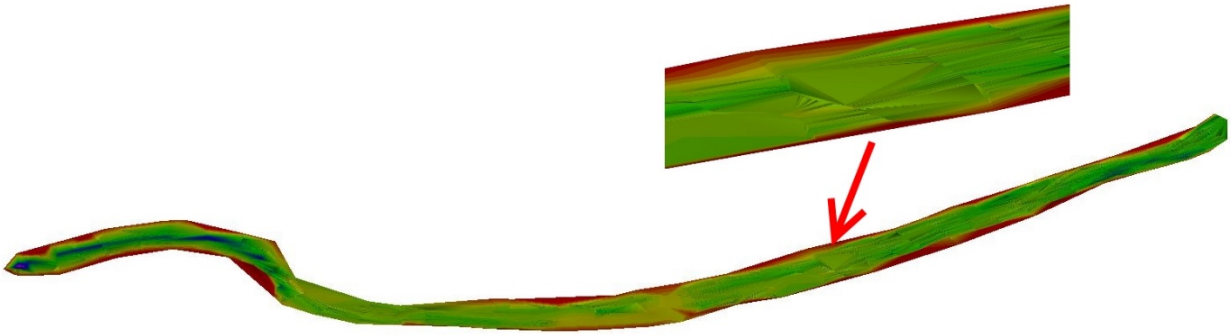
Our data set saved after editing in CLOUD now looks like this in the HYPACK Shell.

FIGURE 6. *Edited Data Set in the HYPACK® Shell*



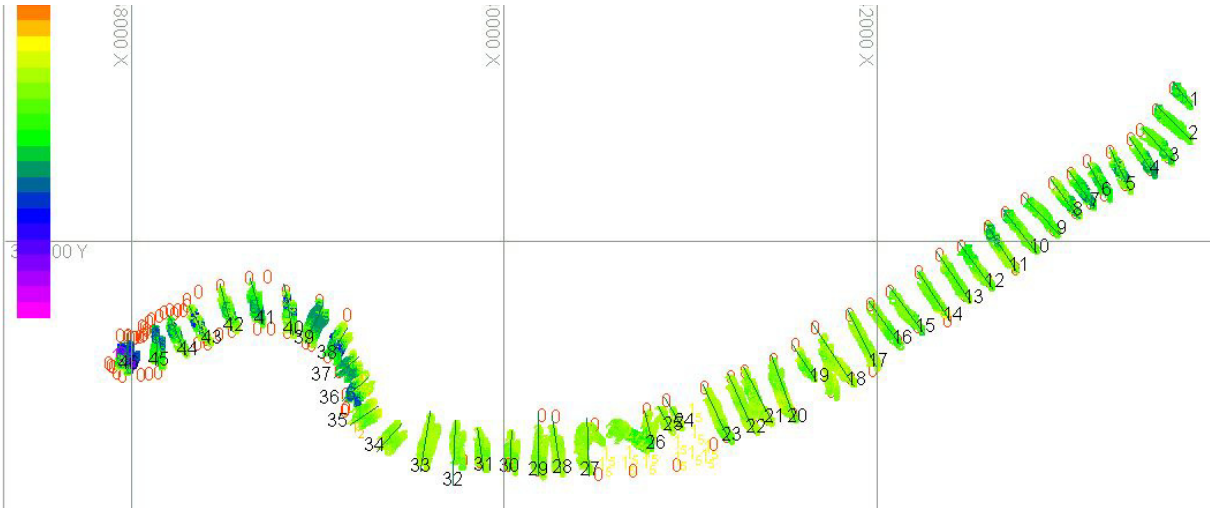
Using our edited data set in the TIN MODEL program, we can now expect a better result. There are no longer as many points that need to be connected beyond the TIN Max Side resulting in a model that better represents our surface; however, there are still points that are connected incorrectly.

FIGURE 7. *Misaligned Data Points Create Inaccurate Model*



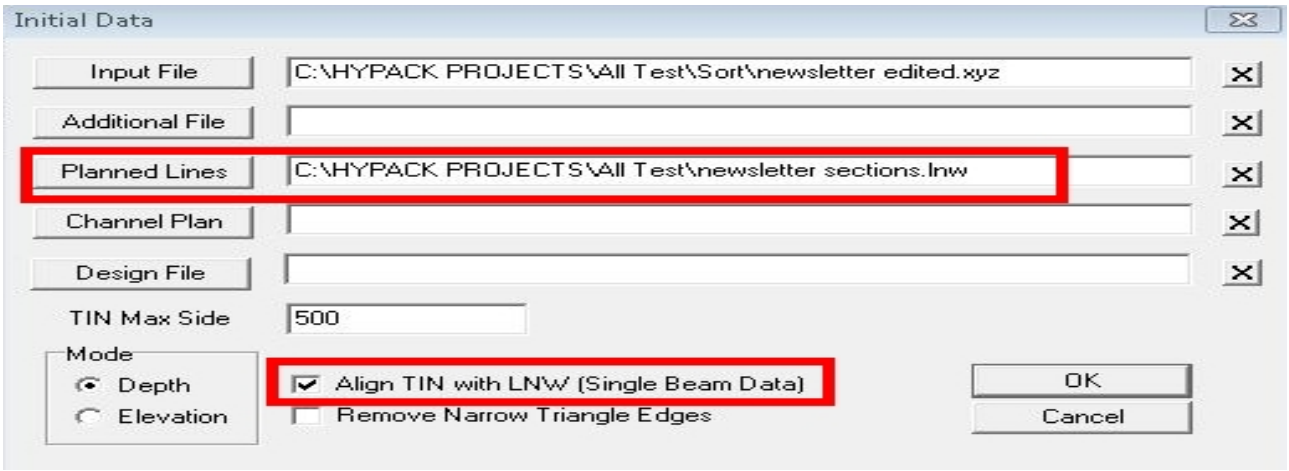
One of the little used features of the TIN MODEL program, is the ability to bring in a planned line file along with the data set. This line file will be used to help align the data in a way that generates a more accurate surface. Using the LINE EDITOR (from the HYPACK® Shell), I have created section lines that will be used with our data.

FIGURE 8. *Data Set and the Planned Line File in HYPACK®*



Now with our edited data and the new line file, we can bring both files into the TIN MODEL program and see if we have been able to create an even more representative surface. When loading the files, we select the Align TIN with LNW option and include a line file.

FIGURE 9. *Generating the TIN Model with the Planned Line and Align TIN with LNW Option*



It would also be possible to lower our TIN Max Side at this point, as long as careful inspection of the surface does not reveal any unwanted gaps in the data. Now, after running theTIN MODEL program, we can see that the data has been aligned with the line file leaving us with a surface without points falling on top of others.

A view of the same section now shows a much more uniform surface with our data aligned to the line file.

FIGURE 10. *TIN Model with Data Aligned with the Planned Line File*

This is just one of the many ways to edit data sets in order to generate surface models in the TIN MODEL program. The TIN MODEL program also has editing tools that allow you to manually break and reconfigure triangles individually, or trim and cut TIN surfaces using break lines and border files. In all, with careful editing, sound survey techniques and a solid knowledge of the TIN MODEL program, you can handle almost any situation and still produce fantastic results. As always, should you have any questions regarding the topic covered here, please feel free to email help@HYPACK.com for further information.