Additional Tricks for LiDAR Calibration

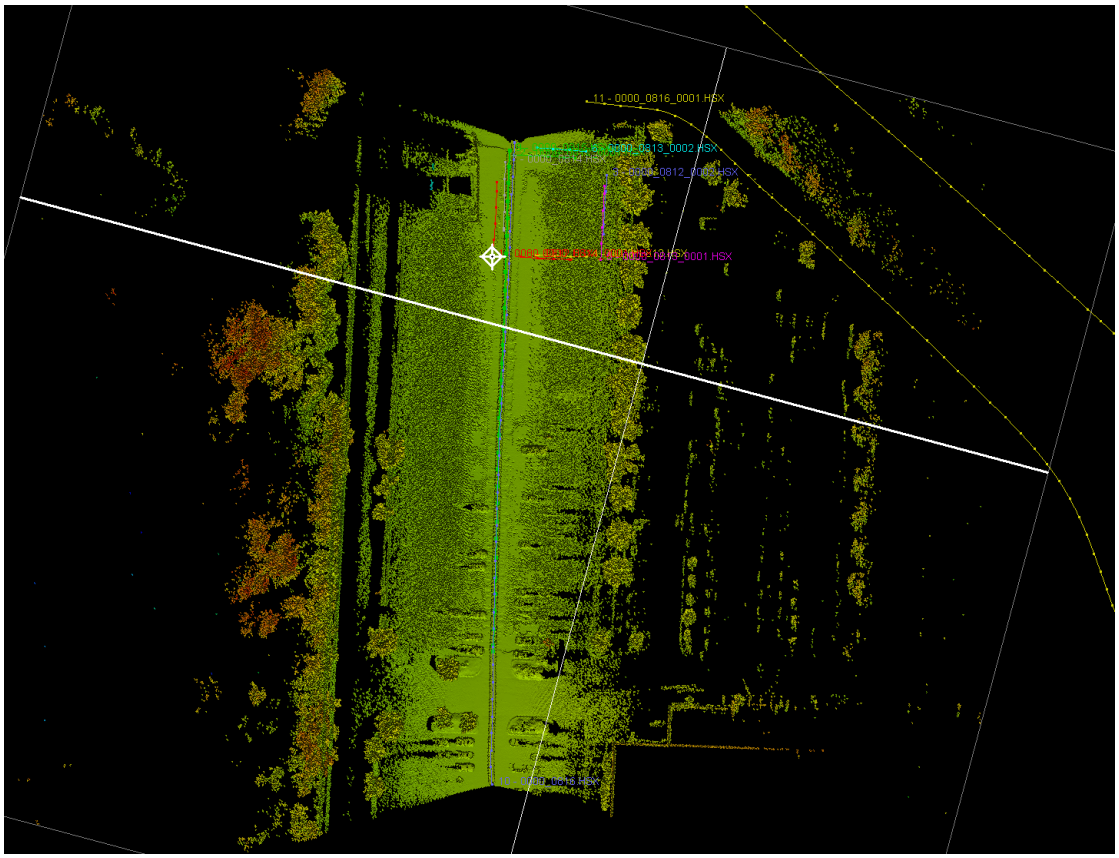
By Cristhian Bermudez

Before reading this article, I suggest checking the one Joe Burnet did for the LiDAR calibration (Performing a LiDAR/Laser Patch Test on Non-Aerial Vessels of Opportunity), and also the article written by Mike Kalmbach (LiDAR Cloud Calibration).

When we collect LiDAR data, we can work with the beams similar to a multibeam bathymetry system. If you have an aerial LiDAR, basically you can collect the patch test lines in the same way we do with an echosounder. You collect some lines for roll, pitch, yaw. With the drone, you can fly in sloped areas and look for some other flat areas in order to get the final alignment angles.

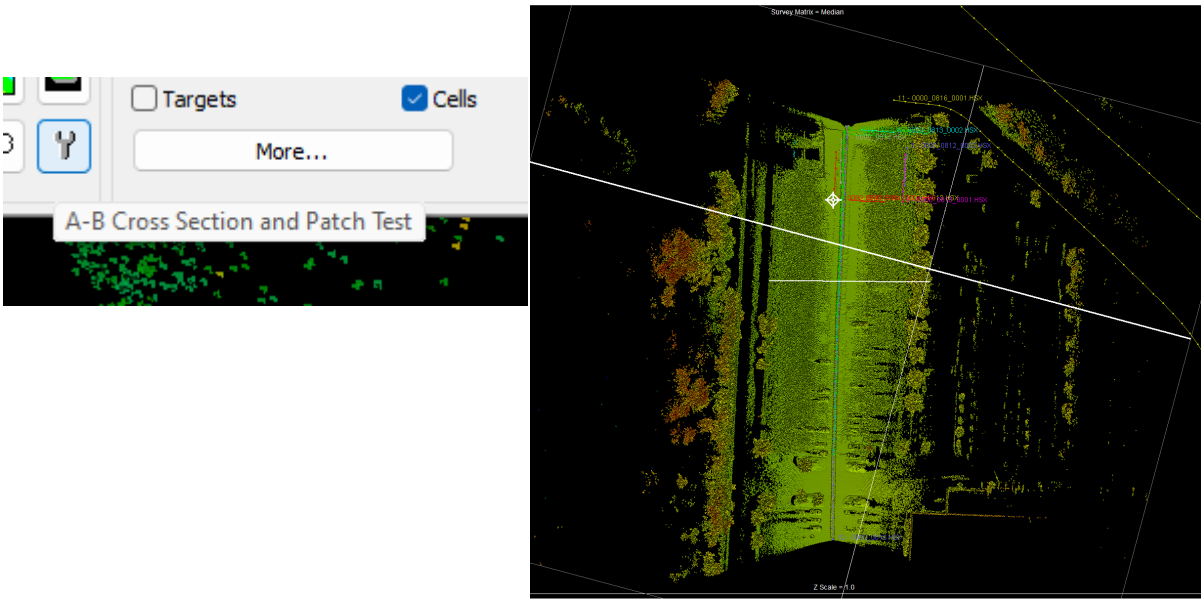
If you can collect data with you LiDAR on a flat surface, whether sailing or with the boat out of the water, you can collect reciprocal lines for getting the roll offset. In my example, you can see how the data looks before applying any offset:

FIGURE 1. Reciprocal Lines, No Roll Offset Applied



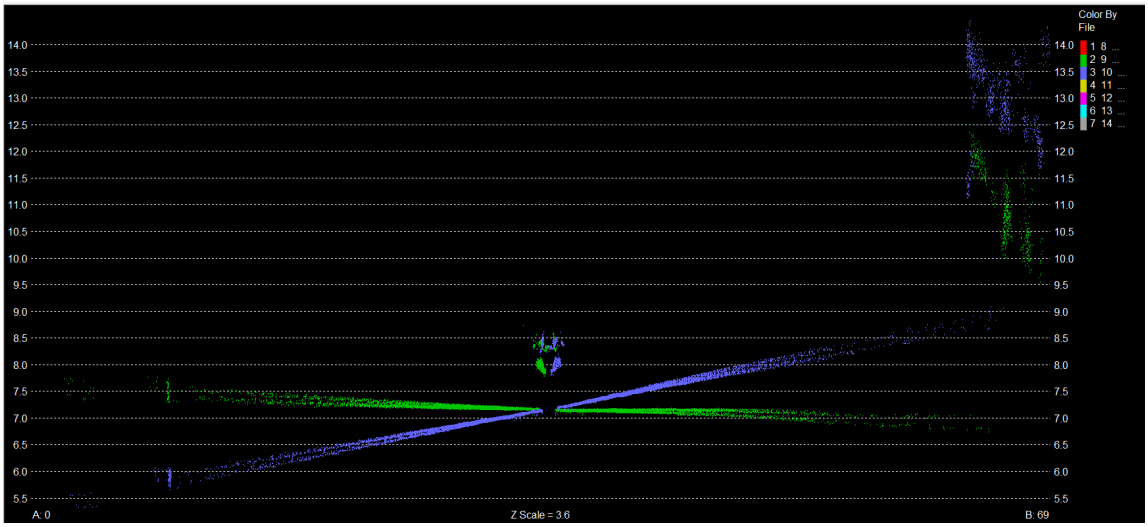
Because I collected the lines like that, and both swaths have enough data for the same area, I can use the statistical tools we have for obtaining the roll offset. I used the A-B Cross Section and Patch Test tool, then drag and drop perpendicularly to the tracking line.

FIGURE 2. A-B Cross Section and Patch Test



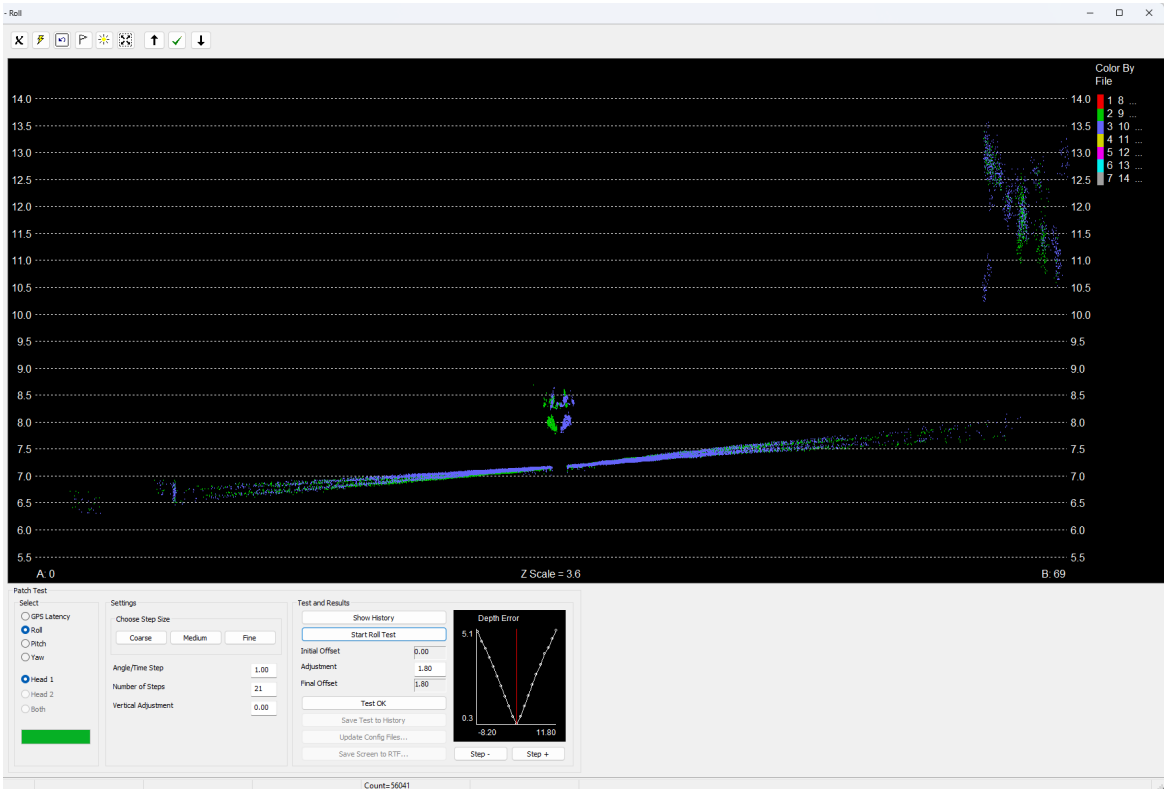
In the patch test tool, you can clearly see the difference in the two swaths.

FIGURE 3. Roll Patch Test



The tool tests different iterations until it finds the best roll angle. In this case, with a couple of clicks you can get the final angle. It also shows the depth error by comparing the data until the error shows the smallest value possible.

FIGURE 4. Roll Offset Applied



Now in the matrix we can see the difference, it clearly shows how the two files match.

FIGURE 5. Matrix with the Roll Offset Applied