



HYSWEEP® Patch Test – How It Works

By Mike Kalmbach

It works very well! The patch test compares survey lines in pairs to find correct angular alignment of a multibeam sonar system – roll, pitch and yaw. (Or the latency of a positioning system.)

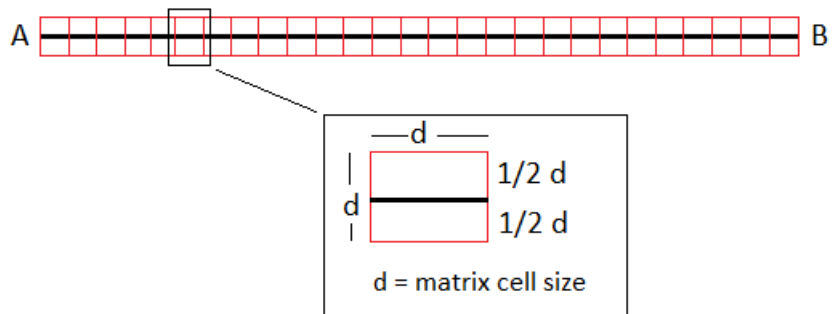
Comparison is done along a cross section from point A to point B. The program can cut the A-B section at an optimal location, or the user may select a mouse tool to cut the section at a location of his or her choosing. This is basic information well known to HYSWEEP® multibeam users. Continue reading to learn a few of the “nuts and bolts” of our patch test.

A-B CROSS SECTION

Figure 1 shows the gridding method used to correlate soundings with the patch test (A-B) cross section. Soundings falling inside the grid are included in the patch test, soundings outside are omitted.

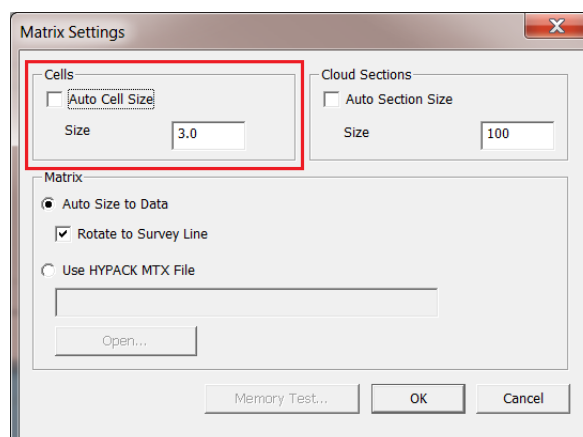
As a side note, the A-B cross section in MBMAX64 may be used to view profiles that don't align well with the survey matrix. The identical gridding method is used.

FIGURE 1. A-B cross section grid used to select soundings for patch testing.



If cell size is inappropriate for the data (too few soundings or too many), size may be changed in MBMAX64 Read Parameters. Use Survey tab, Edit Matrix Settings (figure 2). 25 soundings per cell is a good number. That's what Auto Cell Size in figure 2 shoots for.

FIGURE 2. Edit patch test cell size in Matrix Settings.



STATISTICAL METHOD

Stats 101 really. Correct angular alignment is found by minimizing the depth error between the survey line pair. *Depth error is a function of standard deviation along the cross section, equal to the summation of cell standard deviations divided by cell count.*

Figure 3 shows a result from the HYSWEEP patch test. Minimum depth error occurs at the center of the U shaped error curve, which is exactly where one would expect. And the cross sections match well.

FIGURE 3. Good roll test from MBMAX64.

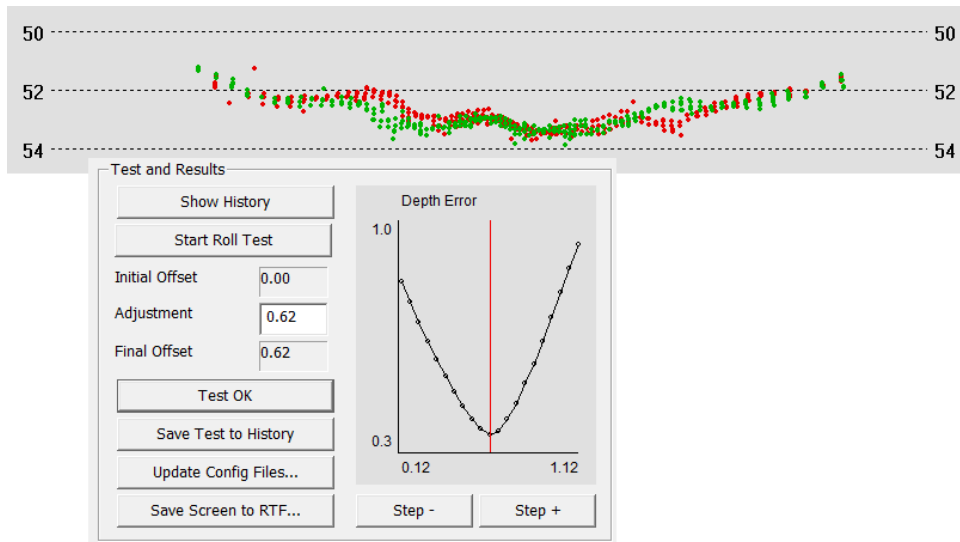
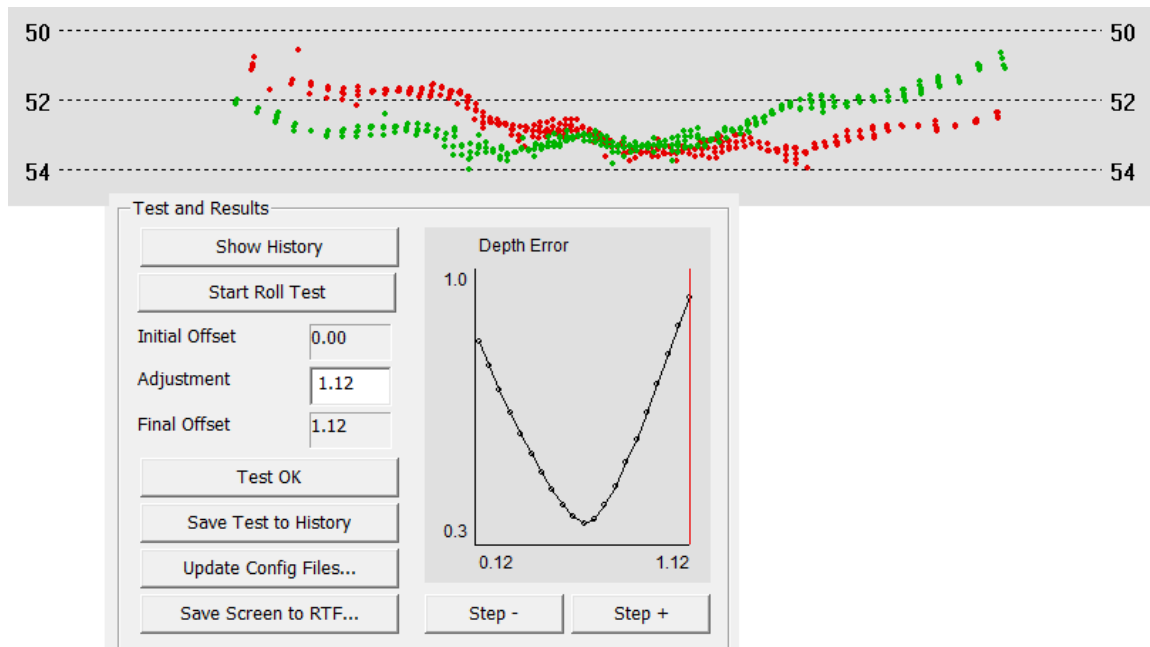


Figure 4 shows what happens at maximum depth error. It's easy to see how the mismatched profiles will lead to higher cell standard deviations and patch test depth error.

FIGURE 4. High depth error from mismatched profiles.



SUMMARY

Cross sectional gridding and basic statistics calculated along grid cells are the foundation of the HYSWEEP Patch Test.