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New Beam Angle Test in MBMAX64

By Mike Kalmbach

The Beam Angle Test (BAT) for multibeam sonar has been in HYSWEEP® for years. Its main purpose has been performance testing; an empirical and quantitative measure of system repeatability at various beam angles and for individual beams.

The test focuses on beam numbers (as in beam 1, 2, etc.) and beam angle relative to the sonar frame. When the sonar is mounted vertically, there is a reasonable correlation between beam number and angle relative to vertical. That is, the angles are the same. But for rotated head and dual sonar installations the correlation between beam number and vertical angle disappears. In these cases BAT results were confusing and not always useful.

Because of this, a new BAT has been introduced in MBMAX64. The new test accounts for mounting angles specifically, and provides improved graphing in general. The original test has been left alone.

BAT Concepts

The BAT requires two surveys. First is the reference survey which results in the best estimate of depth over a small, flat section; the reference surface. The best estimate comes from a saturation survey with surface points sounded multiple times by high quality beams. After editing, soundings are averaged for noise reduction and saved to the reference surface. The reference survey / surface is done once.

Second are the check lines; one or more survey lines run over the reference surface. Check lines are run whenever there is a need to check accuracy. Perhaps every day, perhaps once per survey. Certainly whenever a multibeam system has been removed and reinstalled.

BAT statistics are all calculated from the depth difference between the reference surface and the check lines. You will see “Reference – Check” frequently in the software as a reminder of what’s going on.

Dual Head Sonar – BAT vs. New BAT

As mentioned, results from dual head systems can be confusing. In the following example (Figure 1), head 1 is rotated +30 degrees and head 2 is rotated -30 degrees. After filtering +/- 70 degrees from vertical, the only beams remaining are +/- 40 degrees in the sonar frame. It’s not intuitive in the BAT what’s actually happening.

The New BAT (Figure 2) attempts to fix that problem.

Figure 3 shows the new BAT with the option of angles in the sonar frame. A sort of hybrid between new and old for those who find it useful.

FIGURE 1. *BAT for a dual head system with heads rotated +/- 30 degrees. It's hard to know what's going on because angles are in the sonar frame (before mounting rotation). Also, plus and minus angles are grouped together, an unpopular feature of our original BAT.*

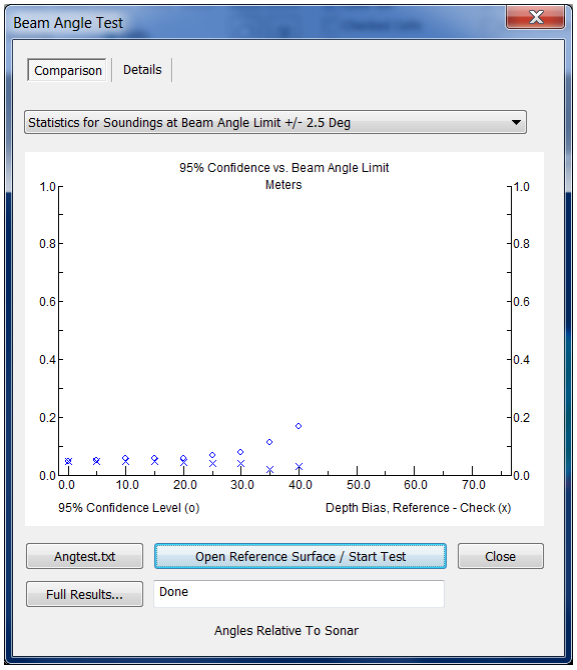

FIGURE 2. *New BAT for a dual head system with heads rotated +/- 30 degrees. Beam angles are relative to vertical and positive angles are separate from negative.*

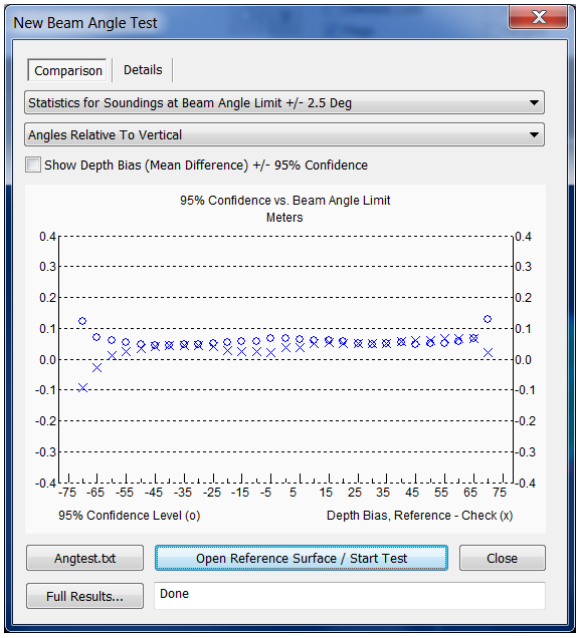

FIGURE 3. *New BAT using beam angles in the sonar frame. A hybrid between the original test and the new one.*