

COMBINING MULTIBEAM SYSTEMS & LASER SCANNING DATA

RESON PDS2000 SOFTWARE

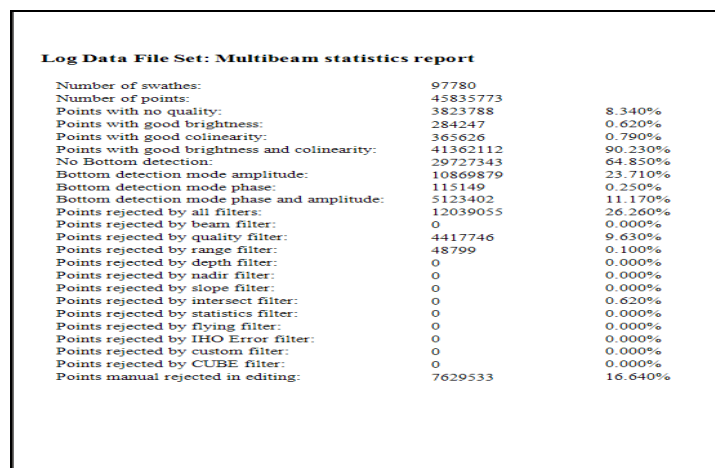
READY FOR WHATEVER THE FUTURE MAY HOLD

Karen Kingham – KNM MEDIA (UK)

An application that is becoming increasingly more recognised in the Hydrographic Community is that of Port Survey, combining both Multibeam Systems Data and Laser Scanning Data. The combination of these two data sets allows the user to merge information from above and below the waterline in one survey, resulting in a complete picture of a breakwater, dock or other objects within the port.

Danish company, RESON, a company synonymous with providing top quality branded underwater acoustic systems, transducers, hydrophones and software to the International Defence, Security, Maritime, Dredging and Offshore markets, is thriving in the current global economic downturn, by investing in, and exploiting the benefits of their PDS2000 software, which can take the data from their SeaBat range of Sonars, and when combined with laser scanning data can provide a wealth and depth of data previously only possible through the purchase of high cost equipment.

Laser scanners are an accepted tool within the survey segment of the market, especially now that current laser have ranges of more than 250 m and can generate large amounts of data. A dataset collected during a one hour survey can easily contain more than 25 Million data points; in fact in a recent survey using RESON PDS2000 Software in conjunction with SeaBat Multibeam Sonar System and the Applanix Landmark Laser Scanner, (which has a range of 1500m) over 40 million data points were recorded.



Log Data File Set: Multibeam statistics report

Number of swathes:	97780	
Number of points:	45835773	
Points with no quality:	3823788	8.340%
Points with good brightness:	284247	0.620%
Points with good colinearity:	365626	0.790%
Points with good brightness and colinearity:	41362112	90.230%
No Bottom detection:	29727343	64.850%
Bottom detection mode amplitude:	10869879	23.710%
Bottom detection mode phase:	115149	0.250%
Bottom detection mode phase and amplitude:	5123402	11.170%
Points rejected by all filters:	12039055	26.260%
Points rejected by beam filter:	0	0.000%
Points rejected by quality filter:	4417746	9.630%
Points rejected by range filter:	48799	0.100%
Points rejected by depth filter:	0	0.000%
Points rejected by nadir filter:	0	0.000%
Points rejected by slope filter:	0	0.000%
Points rejected by intersect filter:	0	0.620%
Points rejected by statistics filter:	0	0.000%
Points rejected by flying filter:	0	0.000%
Points rejected by IHO Error filter:	0	0.000%
Points rejected by custom filter:	0	0.000%
Points rejected by CUBE filter:	0	0.000%
Points manual rejected in editing:	7629533	16.640%

Figure 1 – Dataset taken from PDS2000 Multibeam with Laser Scanner

The RESON PDS2000 will interface with most laser scanner brands. Calibration of laser scanner data is different from the traditional multibeam data set. The RESON PDS2000 contains an enhanced calibration tool, which can also calibrate laser scanners and the PDS2000 data processing module is able to cope easily with the large data quantities that laser scanners produce.

One company who has utilised both the RESON SeaBat 7125 together with the PDS2000 Software with extraordinary results is Shark, srl, in Romania, who are a Diving, ROV and Survey Company. They themselves say that they were a small survey company in coastal engineering and port development, and realised that to take their Company to the next step to “Offshore Survey” would

entail investment in a RESON SEABAT 7125 and PDS2000.

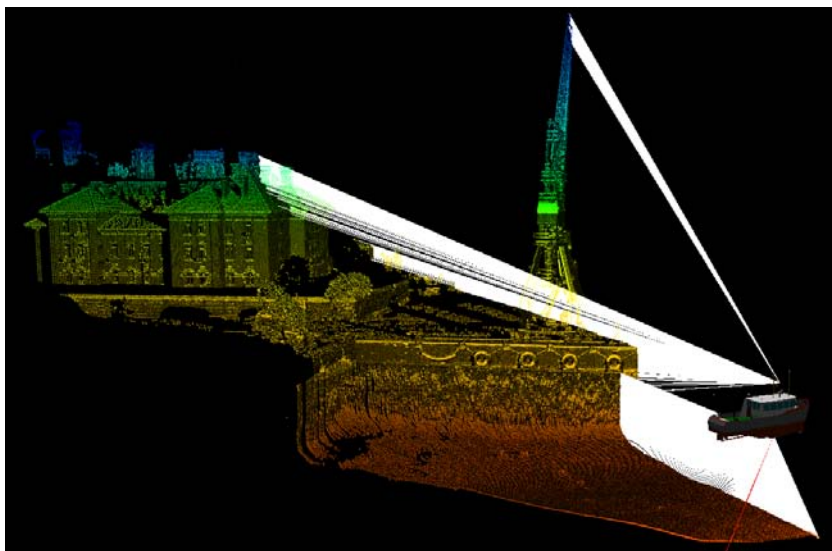
Alexandru Chiriac – Survey Manager at Shark, said, “The system itself is a high end technical piece of equipment, but there are many similar systems today. The key to the future development of our Company was the commercial, hardware and software support. We chose RESON because they know how to assist their clients both financially and with their technical requirements.”

He continued, “In only one year we transformed a multibeam system in a Mobile Mapping System - into an all in one software solution. The integration of a 7125-C onto a work class ROV was simple due to the high level of RESON engineering support. Today our products are not simple bathymetric models, but are complex point clouds, which means that no matter whether it is DSM, DTM, 3D mesh, reverse engineering, feature extraction, shallow, deep water or even land, that we can now offer our clients every possible solution.”



During an integrated Multibeam laser scanner project in the Port of Constanta, Romania, Shark SRL using their Riegl Laser scanner, a RESON SeaBat 7125 multibeam Sonar and an Applanix Wavemaster system providing attitude- and positioning information discovered that the PDS2000 was the perfect tool for Shark Survey to acquire and process the data from all these sensors.

Inertial Measurement Unit and 3d Laser Unit on top of the survey mast

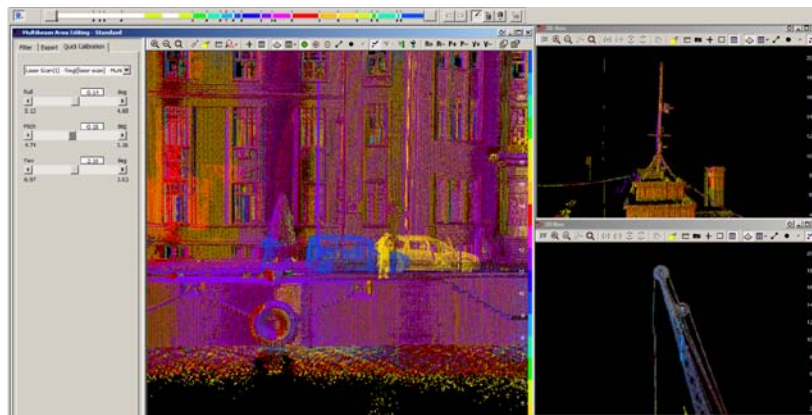
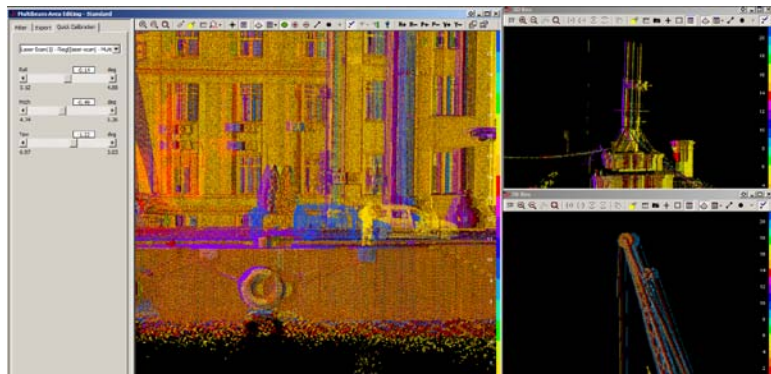


During data acquisition PDS2000 displays in real time the Laser data together with the Multibeam data in one 3D view. To control data quality for these large datasets the real-time 3Dvisualisation is a very strong QC tool. Other views are also available as per choice of the surveyor.

Constanta Port Berth 12 Port Administration building, platform, quay & seabed integrated survey

The PDS2000 handles the laser scanner-multibeam data well on a standard PC, but a more powerful PC with a powerful graphics card and fast hard disk makes data handling a lot faster.

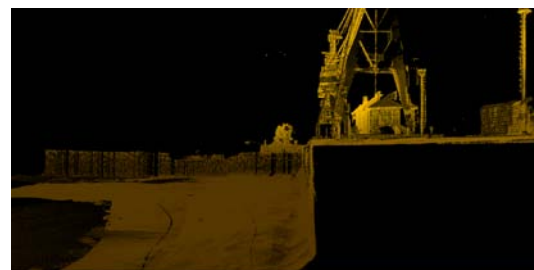
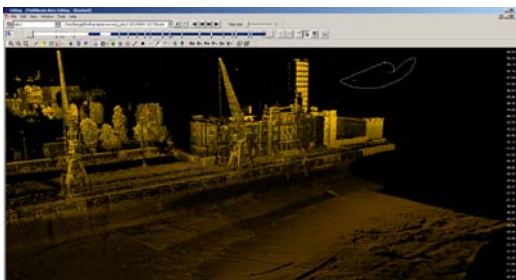
Just like with a multibeam a laser scanner requires calibration. The operator can choose to carry out the calibration prior to data collection and/or during data processing. Calibration prior to data collection results in a better real-data visualisation/quality. In PDS2000 the laser scanner data-calibration is part of the 3D processing module. Roll/Pitch and Yaw can be corrected to the right values on the fly. This is done by matching the point clouds of the different files (survey lines) with each other. The images below show an example of a non calibrated image. The masts on the building are a good point of focus same as the top of the cranes. On the main building the 3 bushes must be one as well. The correction is a combination of pitch and yaw.



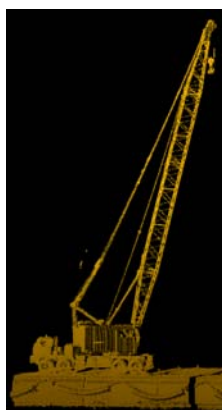
While moving the slider bars you instantly see the movements and that way you can find the best possible settings.

Data cleaning of the laser cloud is identical to multibeam data cleaning. The user can (un) delete laser data. The user has the choice to show laser data combined with the multibeam data or separated from each other.

The next images showing the multibeam and laser data combined.



Both images show that when an accurate attitude and positioning system is used the multibeam and laser data match nicely.



Data display is not limited to a number of points. Cloud laser data may also be displayed in combination with a DTM or raster model. PDS2000 3D box view provides the user with a very nice tool to grab data out of the data set for editing or just imaging and object measurement.

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More Information can be obtained from: www.reson.com

