

Disruptive technology for autonomous shallow water operations: the development of new wide-swath bathymetric & imaging sonars

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The Challenge

Surveying in shallow water is a challenging endeavour for surveyors. The complexity and level of effort increases dramatically when autonomous survey platforms are added to the equation and none of the current MBES and PMBS systems are not specifically designed for autonomous operations. Beamforming multibeam echosounders (MBES) work extremely well in water depths deeper than 10m, providing good swath coverage of 3-4 times the water depth. Phase Measuring Bathymetric Sidescan sonars (PMBS) can increase swath widths in shallow water to 8 times water depth and meet IHO Special Order standards for total vertical uncertainty (TVU) but feature detection is not reliable.

New Bathymetry Sonars for Shallow Water Autonomous Operations

MIND Technology is developing the next generation of bathymetric sonars specifically designed for shallow water operations on small to medium sized autonomous platforms. These fully-integrated and pre-calibrated hydrographic systems (sonar, inertial navigation system and sound speed sensor) are centered around an advanced, multichannel sonar with a fully populated array, which offers much more robust performance compared to sonars that rely on interferometry. The bathymetry algorithm does not rely on phase differencing to resolve angles-of-arrival but instead directly computes multiple angles-of-arrival for each sample time using the full set of analytic signals to improve shallow water data quality and reduce uncertainty. This extends the achievable swath widths and feature detection capabilities to exceed IHO Special Order standards.

Some of the key system features include a low-drag hydrodynamic form-factor sonar head, low power consumption electronics, high ambient temperature tolerance, co-registered 3D high-resolution broadband sidescan backscatter imagery, advanced sounding binning methods and compliance with Hydrographic Office workflow procedures. The system will offer tight coupling to the integrated inertial navigation system and will be supplied pre-calibrated to reduce installation and setup time.