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# INNOVATION IN MINE DETECTION

Ping DSP has introduced new technology designed to ensure the real-time detection of all mine threats in complex coastal waters.

Ping DSP's new real time 3DSS high definition imaging technology is set to revolutionize Mine Warfare in the shallow waters of the littoral zone. The littoral zone is one of the most complex environments both to fully understand and exploit. The potential complex nature of the both the seabed and ever changing currents and tidal streams provide challenges to even the most advanced maritime surveillance capabilities. Ping DSP has been working on solutions to these challenges and through its systems can provide significant tactical advantages to operating in this complex environment.

Over the last half century, the overall trend in naval warfare has been away from nation-state confrontations on the high seas. Coastal incidents have increased, reflected in a tactical shift in the world's navies. With naval mine attacks, approximately 200 times more prevalent than any other naval weapon, the threat to naval operations posed by a range of ground and moored mines remains ever present. Over fifty countries globally have the capability to field a mining capability.

Mine detection and identification in shallow waters can be time consuming and expensive. Mines can be irregular shapes and made of

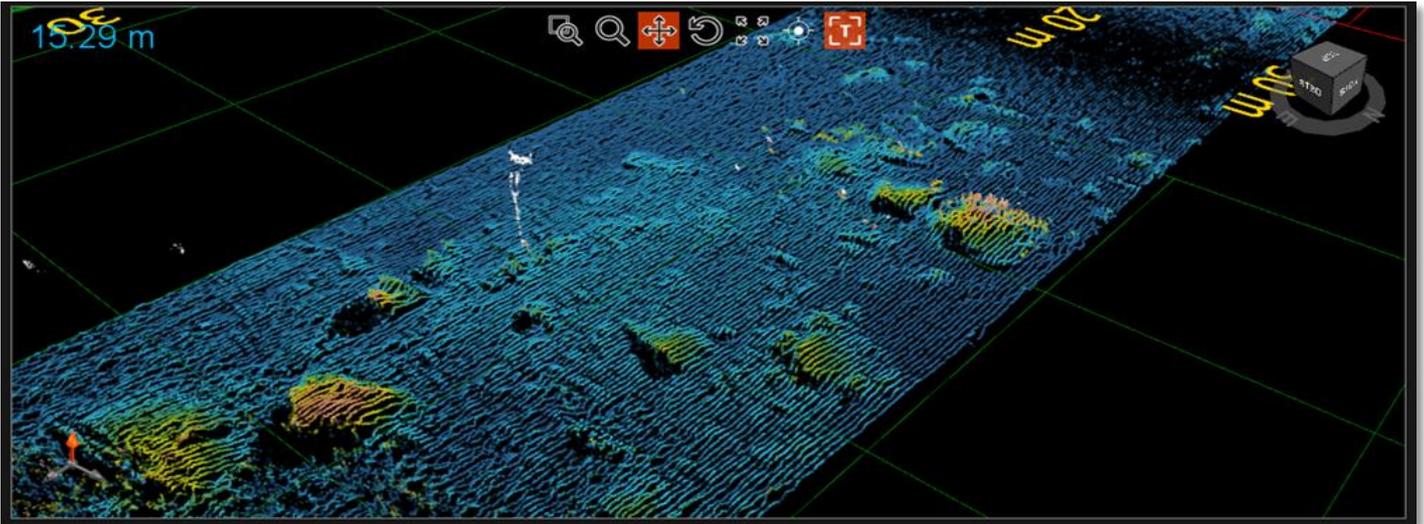
materials capable of escaping magnetic detection,

rendering traditional detection methods ineffective. Mine location as well factors into detection; mines placed in rocky terrain can blend into the background when imaged with sidescan sonar. Additionally, moored mines within the water column can be extremely difficult to detect with current 2D sonar systems. High resolution 3D imagery and fine scale bathymetry are needed for reliable positive identification and disposal.

New automated mine disposal systems are ensuring that the dangerous task of mine disposal can now be undertaken in relative safety. Ping DSP's new system is designed to work on a range of Automated Surface and Automated Underwater Vehicles. Compact in size with a low power requirement It is designed



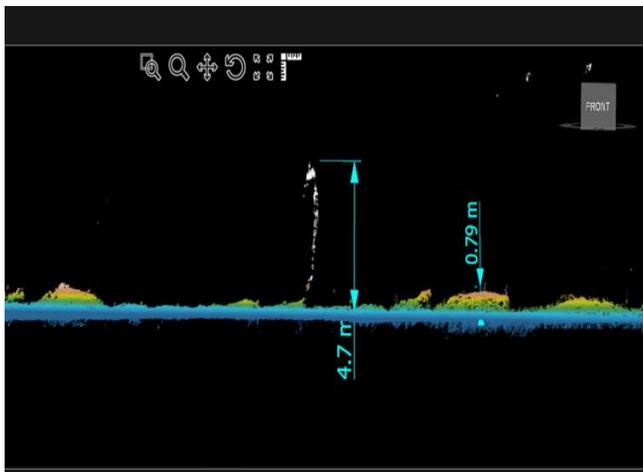
to complement current autonomous mine warfare systems and provide a level of visualisation and



detection of objects both on the seabed and within the water column with an unprecedented level of clarity.

Ping DSP has been working with Defense Research and Development Canada (DRDC) in proving the new technology for mine warfare operations. Trials of the Ping DSP system fitted on an ASV against a simulated 1m moored mine at a depth of 15m in Halifax Harbour, Nova Scotia show the high definition real-time 3D detection that can be achieved.

A simulated mine is imaged using geometrically correct 3D sidescan and is viewed from two perspectives. The first perspective view looking back towards the sonar showing the moored simulated mine and the rock debris and the second view is rotated to show a side view of the seabed and the simulated moored mine and its anchor chain are clear. Height measurements



made with the real-time software are also shown for the moored target. These images are

collected in real-time without the requirement for post processing. Heights of objects do not need to be determined based on sonar shadow zones and the images can be fully rotated to show every aspect of a target.

The 3DSS introduces true three dimensional sidescan imaging and extends swath bathymetry sidescan beyond the inherent limitations of interferometry. 3DSS explicitly resolves multiple instantaneous angles of arrival and separates seabed backscatter from sea surface, water-column and multipath backscatter. In comparison with interferometric systems currently in use for mine detection, 3DSS bathymetry is free of artefacts with wider, more accurate swath coverage, and real-time 3DSS imagery is geometrically correct in three dimensions.

The 3DSS is more accurate than current systems, has the ability to significantly decrease false targets rates, provides great coverage and faster mine hunting when conducting operations and provides greater clarity for detection of all mine types. Ping's 3DSS will allow for more effective mine detection and enable operators to concentrate their mine counter measure efforts from automated systems providing improved operational effectiveness.

In addition to the advantages that Ping 3DSS brings to mine detection it simultaneously collects bathymetric data allowing for the seabed to be mapped to IHO standards. The 3DSS allows mine detection and beach reconnaissance for amphibious operations to be conducted concurrently from surface and sub-surface autonomous vehicles.