

Taking quantum to sea: From cold atoms to cold seas....

Covesion plays a central role in the recent successful sea trials of CPI TMD Technologies' HARLEQUIN quantum-hybrid inertial navigation system.

SOUTHAMPTON, HAMPSHIRE, UNITED KINGDOM, November 25, 2025 /EINPresswire.com/ -- Covesion is buoyed-up with excitement to have played a central role in the recent successful sea trials of CPI TMD Technologies' HARLEQUIN [quantum](#)-hybrid [inertial navigation](#) system. This marks a major step in proving that quantum sensors can operate not just on optical benches, but in the wild, windswept reality of maritime environments.

The work represents the first real-world deployment of our locked laser system in support of cold-atom technology at sea. And yes, we are very pleased to report that both the ship, the lasers and their shipboard shepherds stayed upright....mostly.

This sea trial follows months of preparation between CPI TMD Technologies, the University of Strathclyde, Covesion Ltd, Trinity House, NLA International and Innovate UK. Together, the team achieved something the industry has been waiting for: a quantum-enabled measurement system running successfully on a moving vessel, in conditions ranging from calm seas to three-metre swells and 50 mph wind gusts.

As a quick primer for those not yet fluent in quantum navigation, HARLEQUIN, stands for High Accuracy Robust deployable Quantum Inertial Navigation, and provides high-precision acceleration and rotation measurements by combining classical inertial systems with a quantum cold-atom accelerometer. This hybrid approach is designed to ensure reliable Positioning, Navigation and Timing even when GPS signals are unavailable, compromised or unreliable in contested regions.

A notable world first in the project is the use of a grating-based Magneto-Optical Trap for atom interferometry on a maritime platform. Compact, inherently stable and resistant to environmental variation, it enables the sensor to operate without laboratory-grade isolation.

The cold-atom sensor depends on highly stable laser systems for cooling, trapping and manipulating atoms. For the sea trials, Covesion supplied a ruggedised locked-laser system that was engineered to cope with vibration, temperature swings, magnetic field variation and constant shipboard motion. During the trials aboard the Trinity House vessel THV Galatea, the

systems demonstrated stable frequency performance, power stability and the tuneability required for the Rb cold-atom trap. Even with the ship running at full speed, the data showed minimal degradation in stability and impressive resilience in the face of mechanical and acoustic noise.

The laser systems continued to function despite being installed on the tween deck, surrounded by engines, tools and rolling seas. This was a setting far removed from the alignment-friendly calm of an optics laboratory, yet the systems operated consistently throughout the trip.

The trial team installed the HARLEQUIN accelerometer apparatus, two Harlequin laser systems, Covesion's LL2-Rb source, diagnostic equipment and a team of engineers onto the tween deck of the Galatea. Normally used for tools and machinery, this space was transformed into a floating quantum lab for several days.

The ship travelled from Cardiff to the Irish coast and then to Holyhead, with periods of sailing and anchoring in rapidly changing weather. Noise sources were mapped, magnetic field variations monitored and laser performance compared against temperature, pressure and vibration data. The result was a rich dataset showing exactly how the system behaved under genuine operational stresses.

The sea trials form part of the wider HARLEQUIN-ST project, funded by Innovate UK. This programme is building the path toward deployable quantum PNT systems for maritime users, with further testing and additional technologies, such as an optical clock and gravity gradiometer, planned for future demonstrations.

For Covesion, the trial confirms the suitability of its photonic technologies not only for research environments but for deployment in dynamic, real-world conditions. It highlights the importance of rugged photonics as the UK advances toward widely deployable quantum systems.

The sea trials show that the next generation of quantum navigation technologies can thrive outside controlled laboratory environments. The successful operation of the locked laser system aboard the Galatea demonstrates that quantum science is rapidly moving toward practical applications with real operational value.

Covesion looks forward to continuing this journey at sea, on land and wherever else quantum technology is ready to go next. Can we sail it? Yes we can....

Katherine Bourne
Accelerate Associates
+44 7904 594485

[email us here](#)

Visit us on social media:

[LinkedIn](#)

This press release can be viewed online at: <https://www.einpresswire.com/article/870110873>

EIN Presswire's priority is source transparency. We do not allow opaque clients, and our editors try to be careful about weeding out false and misleading content. As a user, if you see something we have missed, please do bring it to our attention. Your help is welcome. EIN Presswire, Everyone's Internet News Presswire™, tries to define some of the boundaries that are reasonable in today's world. Please see our Editorial Guidelines for more information.

© 1995-2025 Newsmatics Inc. All Right Reserved.