

ROV Coordinate Estimation With 0.07% Slant Range Accuracy

The Evologics S2C USBL (Ultra-Short Baseline) underwater positioning system demonstrated a consistent performance in a recent series of pool tests, estimating the position of an ROV for baffle bolt inspection in nuclear power plants. The system estimated the distance to the ROV resulting in a RMS deviation of 0.04° at 2.1m distance. This result corresponds to a 0.07% 1 drms slant range accuracy.

The Submarine System For Inspection (SUSI) ROV, developed by AREVA, is a device used for ultrasonic inspection of nuclear reactor vessel baffle bolts. The ROV's positioning system is required to document time and exact location of each measurement taken as the ROV examines numerous bolts that hold the baffle plates together. Such positioning must deliver an accurate performance without obstructing or slowing down the inspection procedure.

In December 2011, the Evologics USBL system was tested in a tracking scenario that emulates the testing procedure. These trials were conducted in a test pool, as such a positioning system must deliver accurate results in a confined space, where noise and multipath challenge the performance of underwater acoustic devices.

An S2C USBL device with a conical transducer beam pattern served as a transceiver and was mounted at the side of the test pool. An S2C underwater acoustic modem, mounted on the ROV with the transducer pointing vertically upwards, was used as a transponder. The ROV was located at the bottom of the pool within the transceiver's transducer beam.

To verify the results, the ROV was moved across a vertical 85x100mm testing grid with reference points that represented the actual baffle bolts. The system demonstrated consistent results and the 0.07% slant range accuracy was confirmed.