Title: Redundancy in Dynamic Positioning Systems based on Satellite Navigation

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Abstract

Some DP applications have a specification for two redundant acoustic systems required up and running at all times, in some cases interpreted as four stand alone systems. Kongsberg Maritime has come to a solution with three acoustic systems being interfaced to each other in order to keep a minimum of two systems running at all times. They could be used in SSBL or LBL mode, depending on water depth. When multiple acoustic systems are used in LBL - to ensure a minimum of two separate position updates - there is also a need for separate seabed LBL networks. Hence, all working systems will need to have all LBL calibration files updated at all times.

In SSBL mode the most important sensor for the acoustic system is the Motion Reference Unit, and it has become common to use up to three separate MRU inputs, with automatic selection. The angle of the vessel motion is used to correct the angle at which the acoustic signal is received on the vessel transducer. Since a very small change/difference of angle output from the MRU's will result in a major position change at long ranges, a system of ruling and averaging is needed. When automatic changing from one MRU to another is implemented, this needs to be handled by a function where all are monitored and selected in a median solution. A jump in the acoustic position input to the DP, caused by selecting another MRU, will give the acoustic system lower weighting in the DP sensor voting, so the vessel position will not be directly affected by this.

New Technology like hydro acoustic inertial systems is also becoming more frequently used onboard DP vessels, as the acoustic position with inertial aid can have similar reference-weight as a corrected GPS signal. Inertial navigation is still part of the acoustic system, not a new third reference system, and needs to be handled as such, but it can give advantages as to transponder battery economy and less time used for transponder handling.

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