

CyScan: The Benefits of Multiple Hypothesis Tracking for Laser-Based DP Reference Sensors

Author: J Grothusen, Guidance Navigation Ltd (*Leicester, UK*)

Abstract

CyScan is a high performance local position reference sensor specifically engineered for marine vessel control applications at offshore installations, oil rigs or other offshore platforms. To achieve this high accuracy the system employs a number of data correction methods and tracking algorithms as detailed below.

It comprises a continuously rotating 360 °/s fanned laser measuring the range and bearing to retro-reflective targets. The range is determined by measuring the 'time-of-flight' of laser pulses while the bearing is referenced to an internal optical encoder. The retro-reflective targets are industry standard low-cost passive 3M reflective tube or flat targets or clusters of nitrogen filled glass prisms.

This data is automatically fused with attitude information from an internal vertical reference unit which provides automatic wave motion compensation to enable the unit to remain horizontal or at a given upwards or downwards viewing angle irrespective of the vessel roll and pitch. The vertical reference sensors module contains solid-state tri-axial accelerometers and gyros as well as a gravity referenced inclinometer. These sensor signals are processed to provide a rate stabilised vertical reference, a yaw rate, a lateral acceleration and a forward acceleration. Based on the calculated system inclination and the mechanical drive ball-screw displacement the system can calculate the actual inclination of the vessel. This paper will not provide details on the vertical reference measurements and attitude calculation.

This attitude-corrected basic range and bearing data can then be used for navigation purposes such as position-only basic single target tracking, i.e. range and bearing to a single reflector. However, when two or more reflections are combined in a multiple hypothesis tracking algorithm the system can provide local position and heading information. This paper is mainly concerned about the latter tracking mode.

Click below to:

[**Review the complete paper**](#)

[**Review the presentation**](#)

[**Return to the Session Directory**](#)