Dynamic Positioning Committee
Marine Technology Society

Title: **DynCap – Full scale Validation of a Vessel's Station-keeping Capability Analysis**

Authors: **Øyvind Smogeli, Dong Trong Nguyen, Kristoffer Eide, Luca Pivano**,
Marine Cybernetics AS

Abstract

With the steady growth of the number of DP vessels, increasingly complex designs and operations, and a decreasing number of experienced DP operators, effective Operational risk management tools are key for safer and more efficient operations as addressed by the recent MTS guidelines.

The vessel station-keeping capability (or DP capability) is one of the key aspects to consider when addressing the operational risk as many operations rely on accurate positioning. Loss of position can lead to dramatic consequences and significant downtime. An example is given by diving vessels, where in case of loss of position the vessel can drag the diving bell away from the diving site leading to interruption of air supply to the divers. Another critical operation is oil and gas offshore loading where loss of position can lead to collision between the production platform and the shuttle tanker. Similarly a platform supply vessel could collide with an installation in case of loss of position. For drilling units loss of position may lead to disconnection of the drilling riser with related consequences.

One of the key aspects when looking at the operational risks is the estimation of the vessel position and heading after the worst case single failure and also in the transient period after the failure has occurred. This cannot be obtained from the traditional quasi-static capability analysis but it is possible by running comprehensive capability studies employing simulation tools based on accurate vessel modelling and time-domain simulations. Such a tool, DynCap, was presented in the 2013 MTS DP conferences. A case study of a diving vessel, for understanding the vessel's performance and limitations, was the topic in the 2014 MTS DP conference.

One open question still remains to be answered. *How accurate is DynCap compared to reality?*

The aim of this paper is to present results from full-scale trials performed with the platform supply vessel Island Condor. Island Condor is a 97 meter long platform supply vessel with azimuth thrusters as main prolusion, two tunnel thrusters and a bow retractable azimuth. It is equipped with a DP control system and data logging capability. Waves were measured by a buoy while wind speed and direction were measured by wind sensors onboard the vessel. Current speed and direction was estimated by the crew. The trials were conducted with both calm and harsh sea conditions outside Norway on different locations.

The results show that the DynCap simulations can be quite accurate compared to the full-scale measurements, provided that the models of the vessel and its equipment are sufficiently accurate.