

Title: Automated Hardware-In-the-Loop Testing – Experience from Onboard Remote Testing with CyberSea Signature

Authors: Luca Pivano, Nicolai Husteli, *Marine Cybernetics*
Jan Mikalsen, Paal Liset, *Marine Technologies*

Abstract

Modern ships and offshore rigs have advanced computer systems for dynamic positioning, power generation and distribution, drilling, lifting operations and other automation systems. It is well known that software errors may lead to delays and non-productive time, and compromise safety and lead to environmental disaster. While the testing and verification regime for structures and machinery systems is well established, most of the computer systems on today's vessels are put into operation without independent testing and verification. The risk of software failure can be mitigated by performing Hardware-In-the-Loop (HIL) testing. HIL testing is a well proven test methodology from several other industries. It facilitates systematic testing of control system design philosophy, functionality, performance, and failure handling capability, both in normal and off-design operating conditions, and is conducted in a virtual test-bed where there is no risk to man, vessel, or equipment. In order to perform testing in an efficient and effective way, automated HIL testing has been developed.

This paper briefly presents HIL testing for DP control systems and shares experiences and challenges from automated HIL testing performed on a series of Edison Chouest Offshore platform support vessels. This is the result of a joint effort of Marine Technologies and Marine Cybernetics. By developing an enhanced HIL interface towards the DP control system, Marine Technologies provides the possibility to replace the DP Operator with a *virtual one*, offering the opportunity for running automated software regression testing with Hardware-in-the-Loop technology developed by Marine Cybernetics.