

CRANE-HIL

HIL TESTING OF CRANE CONTROL SYSTEMS

Reliable Cranes

Reliable crane control systems are important for safe and efficient handling during crane operations. Failures related to weaknesses and errors in Crane Control System hardware and software have led to a number of incidents, and may result in costly off-hire situations. Crane-HIL is a tool for independent testing and qualification of a Crane Control System.

Why Crane-HIL testing?

Crane-HIL testing using a customized crane simulator by Marine Cybernetics will reduce quality costs for heave compensated subsea cranes, heavy lift crane, and platform cranes and anchor handling winches to make the building, commissioning, sea trials and operations more predictable and efficient. The major advantage of HIL testing is that software errors, configuration errors, faulty parameter settings, and design weaknesses, that potentially may delay the delivery or operation, are detected and clarified at an early stage. The Crane Control System maker can then make corrections and improve the Crane Control System, in advance of commissioning, sea trials and delivery.

Independent Crane-HIL testing will also secure the required safety and availability of the crane, and reduce the risk for hidden errors/faults that otherwise may surface during critical operations.

How is independent Crane-HIL testing conducted?

During a Crane-HIL test, the CyberSea Crane Simulator is used to emulate the dynamic complexity and physics of the crane in realistic operational scenarios. Effects from vessel motions, forces from payload in the splash zone and at the sea bed, and wire forces are included in order to perform realistic and consistent functional testing of the Crane Control System without access to the real crane. Test scenarios that are potentially dangerous for personnel and equipment, or difficult to test for other reasons, can be completed safely and efficiently using the dynamic CyberSea Crane Simulator. This includes thorough testing of operator panel functionality and interlocks under abnormal and emergency conditions such as sensor failures, actuator and winch failures, blackout and auxiliary failures, controller and communication errors, and inadvertent operator actions.

The CyberSea Crane-HIL Simulator – a life-cycle investment

Marine Cybernetics independent Crane-HIL testing is valuable in the following phases:

- **Factory Acceptance Testing** of the crane control system using an independent Crane-HIL simulator and customized test program.
- **Commissioning Testing** in order to verify changes made after factory testing and during commissioning, and to test integrated functions.
- Testing of control system **software upgrades** before they are installed and brought into operation.

The crane and vessel HIL simulator can be used during vessel operation for planning, training and verification activities. The simulator tools and results from HIL simulator testing can not only be used to improve the functionality of the crane control system for your vessel, but provides critical information to be used in operational procedures, training programs for operators, and planning and preparations of crane operations together with your clients.

FACTS

Hardware-In-the-Loop (HIL)

HIL technology is used in testing of computer-based control systems. HIL testing is accomplished by connecting the target computer system to an external HIL simulator that emulates the controlled plant – ship system or offshore installation – and simulates this in realistic operating and environmental conditions, varying sea loads, and occurrence of equipment failures.

Crane-HIL will improve the performance for several types of vessels:

- Diving support vessels
- Construction vessels
- Heavy lift vessels
- Drilling vessels
- Pipelay vessels
- AHTS

ABOUT MARINE CYBERNETICS

Marine Cybernetics specializes in independent HIL testing of control systems for the maritime, oil and gas markets.

Marine Cybernetics is ISO 9001 certified, and delivers HIL testing in compliance with DNV's Standard for Certification of HIL testing. Marine Cybernetics is a member of IMCA.

PIONEERS IN SOFTWARE TESTING