

DRILLING-HIL

HIL TESTING OF DRILLING CONTROL SYSTEMS

Benefits of HIL testing

Marine Cybernetics utilize CyberSea Simulator technology to perform an in depth verification of the drilling control system software and hardware functionality. The first main objective is to avoid unnecessary trouble and delays during commissioning and sea trials, by early and thorough testing at the factory. The second main objective is to find and eliminate hidden failures and software bugs and unexpected behavior in the drilling control system that could cause costly downtime or incidents during operations.

How is Drilling-HIL conducted?

A customized dynamic simulator containing all relevant drilling equipment is connected to the drilling control system at the system supplier's site, in a test laboratory, or onboard the drilling unit. Testing is then conducted by Marine Cybernetics in cooperation with the equipment makers and users according to a customized test program that considers the specific drilling equipment and their failure modes, functional design specifications, applicable rules and regulations, vessel motion, electric power plant, and operational philosophy. The simulator is interfaced directly to the bus, network or hardwired I/O of the PLCs for the different drilling machines, leading to an integrated test of both low level functionality of the individual PLCs, and the high level functionality of the driller chairs and control network. The setup may involve equipment of different manufacturers of drilling control system equipment, electric drives, riser management, subsea equipment control, auxiliaries control and other relevant control equipment depending on the design of the rig.

Test scope and simulation scenarios

Marine Cybernetics HIL test programs are developed independently of equipment makers' FAT and commissioning test procedures

- Functional testing of the individual drill floor machine controls, such as top drive, draw works, pipe handling, iron roughneck, active heave compensation, and others.
- Functional testing of high level integrated functions such as zone management, anti-collision systems, floor and crown saver, sequential control and automatic drilling, integrated power management and drive control. Simulations may include single and dual activity drilling, tripping, running BOP, well intervention operations etc.
- Failure mode testing of the above mentioned functions with realistic simulation of a wide range of failure modes occurring during critical operations. These could be in sensors, hydraulic actuators and valves, electric motors and drives, brakes, mechanical equipment, auxiliaries, power generation and distribution, electronic circuits and components, controller network and I/O systems, etc.

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.

Drilling-HIL testing

New builds, retrofits and major upgrades of drilling control systems on

- Drillships
- Semi submersibles
- Fixed offshore platforms
- Jackups

Software upgrades could be pre-tested using a HIL simulator prior to installation.

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