



*Third-party
testing of software*

Drill-HIL testing

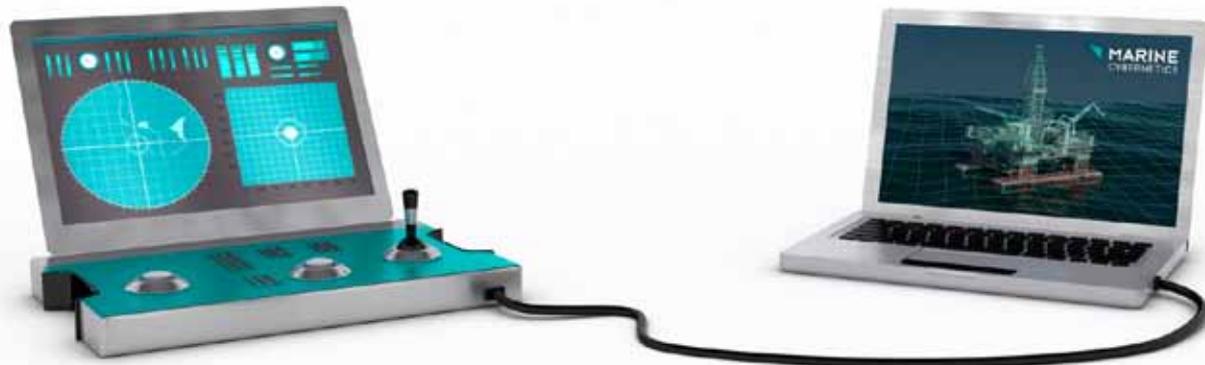
Third party testing for
Drilling Control Systems.

A modern drill-floor consists of sophisticated computer controlled drilling machines, often delivered by several suppliers. Failures in the control system software will affect safety and lead to non-productive time. The scope of Drill-HIL testing is to detect hidden software errors, erroneous configuration parameters, and design flaws in the Drilling Control System software before it is taken into use onboard the rig. Functionality and failure-handling capability in single machines, integrated functions, automatic modes and the anti-collision system is extensively tested using state-of-the-art HIL testing technology.

WHY DO WE TEST?

Failures in the Drilling Control System affect safety, result in less profitable operations, and give increased risk for non-productive time. Automatic drilling systems are advanced computer controlled systems that rely on software to function properly. This means that control system software from several suppliers must run and work together as an integrated system in order to maintain safety and achieve the desired operational performance. Drill-HIL testing from Marine Cybernetics will prevent such failures and give a more reliable system.

Drill-Hil testing



HOW DO WE TEST?

The Drilling Control System is tested in a virtual test bed in a HIL test lab, using sophisticated HIL simulators of the drilling equipment. For each drilling machine, the CyberSea Drill-HIL Simulator responds to the commands from the Drilling Control System in a realistic manner, and feedback from sensors and actuators to the control system is simulated according to the project specific equipment. The control system responds as it would in real operation onboard the rig. Functionality, performance, failure handling capability and safety-critical software barriers can then be tested systematically in a controlled environment.

The HIL simulator includes models of the hydraulic systems, the electrical systems, the mechanical systems, encoders and relevant sensors for all the drilling machines in the test scope. This enables efficient testing of system interfaces and integrated functionality between different vendors.

LIFE-CYCLE SERVICES

The lab setup established in the project may be used to provide life-cycle services for the Drilling Control System:

Software updates may be thoroughly tested in a controlled environment before it is installed on the vessel or rig, verifying that the update is according to specification and does not introduce unexpected problems in integration with other systems.

In case of software problems on the vessel or rig, the lab setup may be used for trouble-shooting to identify the cause of the problem.

Installation of **new equipment or machines** may be tested together with existing equipment to verify correct integration before installed onboard the vessel or rig.

TEST SCOPE AND SIMULATION SCENARIOS

Functional testing covers verification of control system functions and modes for single machines such as:

- Operator station and panel interlocks
- Normal operation of machines
- Mode change control
- Command abortion/cancellation
- Emergency stop functions

Failure testing covers testing of control system failure detection, handling for single machines, failure handling for integrated machine operations and anti-collision functionality. Failure testing includes single and multiple errors such as sensor drifting, protocol errors, feedback and command signal failures, signal freeze and electric and mechanical and hydraulic failures.

Integration testing covers integrated machine operations such as trip in and trip out, sequence control modes and interlocks between different machines. Anti-collision functionality such as preventing machines from entering other machine zones, stopping machines if other machines are entering the zone, and overriding functionality are tested. Integration testing also includes extensive testing of anti-collision functionality when failures are introduced in the system.