WATCH CIRCLE ASSESSMENT OF DRILLING RISERS DURING A DRIFT-OFF AND DRIVE-OFF EVENT OF A DYNAMICALLY POSITIONED VESSEL

Kenneth Bhalla - Stress Engineering Services, Inc.
Yusong Cao - Stress Engineering Services, Inc.

2005 MTS Dynamic Positioning Conference
September 27 – 28, 2005, Houston, Texas

ABSTRACT

The primary objective of a Drift-Off assessment is to address the behavior of a drilling riser when all thrusters lose power and are no longer capable of maintaining the drilling vessel on station. Whereas, the objective of the Drive-Off assessment is to assess the behavior of the drilling riser system when the thrusters malfunction and cause the drilling vessel to move away from station significantly. If any of these events occurs, an emergency disconnect must be initiated between the LMRP and BOP, otherwise a failure may occur in the riser or wellhead system.

The purpose of the Drift-Off and Drive-Off assessment is to determine green, yellow, and red watch circles of allowable vessel offset after which (Emergency Disconnect Sequence) EDS is initiated without damage to the riser. After the vessel exceeds the green watch circle, the vessel is in a degrading status. After the yellow watch circle is exceeded, preparations are made for EDS initiation. At the red alert, EDS is commenced.

The Drift-Off and Drive-Off response of a vessel is a function of the vessel characteristics and the environment. The vessel response and EDS allow operators to assess the risk associated with a given environment.

The Drive-Off and Drift-Off analysis starts with the effort to determine offset and heading as functions of time (trajectories) for the DP vessel in various Drive-Off and Drift-Off scenarios and environments.

Software and techniques have been developed to assist the DP vessel designer and operator to develop appropriate watch circles and assess the associated risk in a given environment. The inhouse software DP-SHIPMO is used to determine the vessel Drift-Off and Drive-Off response. Commercial software ABAQUS and in-house software DERP are used to develop the riser response to the vessel Drift-Off and Drive-Off.

Bhalla, K., Cao, Y., (September 2005), "Watch Circle Assessment of Drilling Risers during a Drift-Off and Drive-Off Event of a Dynamically Positioned Vessel," 2005 MTS Dynamic Positioning Conference, September 27 – 28, 2005, Houston, Texas.