

WHAT HAPPENED:

A semi-submersible Mobile Offshore Drilling Unit (MODU) was unlatched from the well in progress and located at a survival location during a storm. A dual wire mooring line failure occurred to simultaneously positioned lines. The failure of the wires allowed the free azimuth of the associated fairleads which punctured the hull, and over the ensuing period, the fairleads clashed, causing significant damage to both fairleads. The primary failure mechanism of the wires was identified as high load – low cycle bending fatigue.

CONTRIBUTING FACTORS:

There was a failure to slack off to the tensions specified in the mooring analysis during the event. Information in the Activity Specific Operating Guidelines (ASOG) did not accurately reflect the pre-tensions specified in the mooring analysis.

The severe swell because of the storm directly aligned with the wire rope mooring lines that failed, resulting in high dynamics in a tight mooring set-up.

The cyclic tensioning was not being monitored as the team were monitoring 'average' tensions and the rig appeared to be stable.

Failures were caused by extreme dynamic tension ranges in long swell 100-year Significant Wave Height/Peak Wave Period (Hs-Tp) conditions causing high tension low cycle bending fatigue.

The mooring analysis recommendations to slack off during survival conditions were not followed, increasing the dynamic tension ranges in severe seas.

LESSONS LEARNED:

1. Institute line management practices to inspect lines after severe storms and ensure the same section of the mooring lines does not receive repeated loading in subsequent storms. Ensure mooring lines are slipped and cut or retired when appropriate considering the loading history.
2. Mooring analyses should be appropriate for the expected conditions and use line dynamics methods where a large portion of the tensions are contributed from dynamic conditions
3. Ensure an ASOG exists with clear instructions regarding line tension management in severe weather conditions