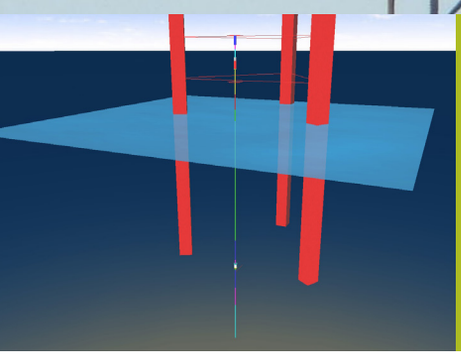
CASE STUDY

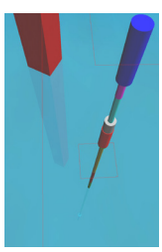
HP DRILLING RISER ANALYSIS IN SHALLOW WATER FROM A JACKUP ON HUNTINGTON, CNS

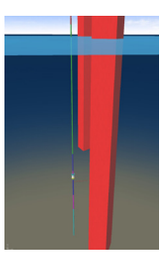


BACKGROUND

The Huntington field is located in the Central North Sea in 90m water depth. Production is to an FPSO through 18¾" horizontal subsea trees and subsea wellhead systems which were installed and completed from a jackup rig using a 5000psi, 24" high pressure riser system with 18¾" surface BOP.

CHALLENGE





Early in 2010, before the Huntington field development plan was approved, AS Mosley was contracted by E.ON Ruhrgas UK to perform global riser analysis to investigate the performance of a proposed design of high pressure (HP) riser, 24" outside diameter for 18¾" equipment, which utilised proprietary clamp-type connections on the riser joints. Of particular interest was how this jackup rig top tensioned HP riser system would perform through repeated drilling and completion operations on the six intended wells. Also investigated was how the HP riser system would affect the performance of passively preloaded subsea wellhead systems originally designed to be installed from a semi-submersible rig using subsea BOP, relatively light 21" marine drilling riser with flex joints and storm disconnection.

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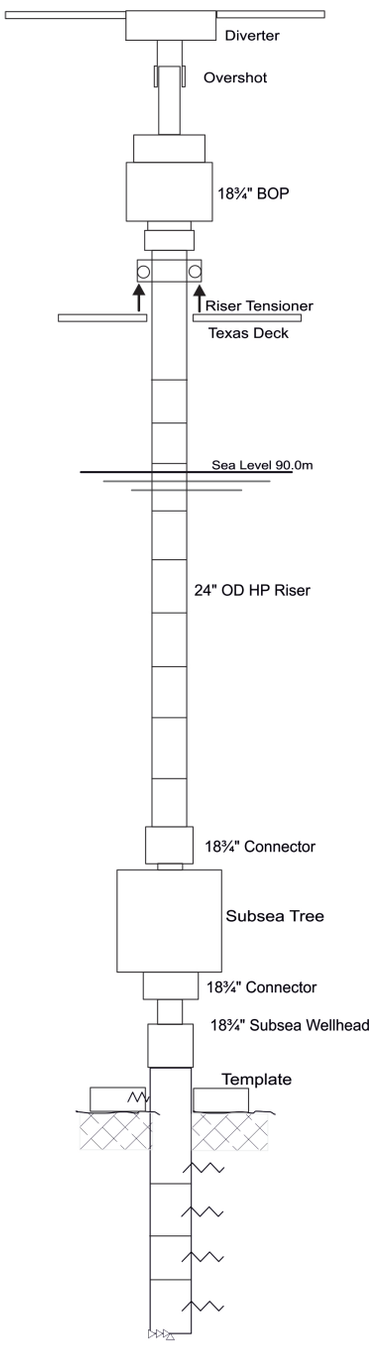

SOLUTION

The global riser analysis with jackup and HP riser system performed by AS Mosley soon identified that best riser performance was achieved at high riser top tensions. However, the proposed jackup had limited deck capacity for a push type tensioner system and high riser top tensions were found to relieve wellhead housing preload within the subsea wellhead reducing wellhead fatigue performance. Following parametric studies, an optimum riser tension solution was identified that was viable for jackup, riser system, and the proposed six wells on the Huntington development.

Following the initial analysis during the tendering process for hardware, AS Mosley was again contracted by E.ON Ruhrgas UK to quickly repeat the global riser analysis for a different design of HP riser system which utilised proprietary flange-type connections on the riser joints. Additionally at this time, more detailed data was made available from the selected subsea wellhead manufacturer on wellhead fatigue performance under different wellhead housing axial loads. Although a global riser model was used by AS Mosley for this computer simulation, sufficient detail needed to be incorporated into the global model so that the stiffness of the subsea wellhead system agreed with local computer simulation models used by the subsea wellhead manufacturer.

RESULTS

AS Mosley performed global riser analysis for both the original HP riser design, and revised the design with additional subsea wellhead data, considering different well casing programmes. For both riser designs an optimum tension solution was identified that satisfied:

- Acceptable strength utilisation throughout the system under extreme environmental loads with no riser disconnection.
- Acceptable fatigue life for repeated HP riser usage for both drilling on subsea wellhead, and completion operations through subsea tree.
- Acceptable individual subsea wellhead fatigue life.
- Acceptable jackup rig deck loads.
- Acceptable redundancy in tensioner system to account for an individual tension system failure.

Being involved early in the field development process, AS Mosley was able to confirm the viability of a development option. Also, being truly independent of hardware manufacturers, AS Mosley was able to perform analysis on different hardware from different manufactures, to an identical standard, which allowed direct performance comparisons to be made.

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