ABSTRACT

As offshore topside continues to become larger and heavier, the float-over method was developed and employed these days as the popular and efficient means for topside installations. Within the float-over method for the topside installation at offshore, passive jacking (rapid load transfer) systems are commonly used in areas with swell wave such as West Africa, India and Myanmar due to high vessel motions.

There is an increasing trend in the use of active jacking system in place of passive system which employs sensor suites to compensate for the vessel motions to ensure minimum clearances during all stages of the float-over operation and improve operational confidence.

This paper outlines the feasibility of active jacking system for float-over operation at the swell wave area based on the model test result in order to compensate the vertical vessel motions during docking operation stages. The model test has been performed using VMG (Virtual Motion Generator) to simulate vessel motion behavior artificially with 4ea of 50M-ton Jacks for 6 M-ton Topside weight and the 3.5-degree angle with 10~13 second was considered. The results give some confidence that vessel motions could be compensated vertically by the active jacking system and it is a beneficial test that helps to establish additional test plans better results in the future.

KEY WORDS: Float-over, Mating, Swell wave, Hydraulic jacking system, Active Jacking system, Active control, offshore plants, Topsides Installation.

INTRODUCTION

Float-over installation method is normally used for heavy topside structure installations on top of substructure in offshore oil & gas field around the world instead of heavy lifting crane method due to the latter’s limited lifting capacities and availabilities.

In the historical trends of float-over installations, the integrated (single) topside weight of offshore structure has been increasing continuously with the heaviest topside at 47,830M-ton installed offshore Sakhalin in the Russian Federation in 2014.

According to the float-over methodology development, hydraulic jacking system for topside installation is considered at swell wave areas such as offshore West Africa, India, Myanmar in order to overcome the challenging operational environments, with prevailing long-period swells that may cause significant motion.

One of these methods is called Smart Leg; it was developed by ETPM and was first used in 1997 in West Africa for Ekpe Gas Compression Topside float-over installation (Alan M. Wang et al. 2010). The UNIDECK system was developed and used in West Africa for COB-P1 production platform in 1996. (J.H. Sigrist et al., 1996).

The concept of the hydraulic jacking system used for this project is similar to the UNIDECK mentioned and it enables a very short installation time compared to using a ballasting-only system, especially for initial contact and separation stages between the structures, thus reducing the impact between topsides and vessel (C. Tribout et al., 2007).