DP Conversion for a Successful Float-over Installation

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ABSTRACT

The Kebabangan (KBB) Central Processing Platform was installed offshore Malaysia in June 2014 and set the record as the heaviest platform installed by the Dynamic Positioning (DP) float-over method. The deck installation vessel was upgraded with DP capability by adding two portable azimuth thrusters to allow a safe and efficient installation of the platform. This novel upgrade was performed for the sole purpose of achieving overall cost and time efficiencies during the installation phase of this project, and was the first conversion of its type in the oil and gas and marine industries.

This paper describes the ad-hoc conversion of the heavy-lift vessel Xiang Rui Kou (XRK) to DP-2 class, with comprehensive focus on the impetus for conversion and the technical and practical challenges addressed by the solution developed, such as thruster selection, feasibility assessment, DP capacity study, state-of-art engineering analyses, relevant tests and the actual installation operation.

KEY WORDS: Conversion; DP-2; Dynamic positioning; Float-over; KBB.

NOMENCLATURE

COSCO = COSCO Shipping Co., Ltd,
DNV GL = Det Norske Veritas Germanischer Lloyd
DP = Dynamic Positioning
KBB = Kebabangan
MT = Metric Tons
MWS = Marine Warranty Surveyor
NTE = Not To Exceed (weight)
X-Class = COSCO’s X-series Heavy Lift Vessel
XRK = Xiang Rui Kou

INTRODUCTION

KBB Northern Hub Project is located offshore Sabah, Malaysia in the South China Sea, approximately 92km northwest of Kota Kinabalu.

The KBB topsides with a NTE weight of 20,500MT was originally planned to be installed by COSCO’s 50,000 MT deadweight X-class vessel using the moored float-over method. The installation location had a water depth of 142m and a seabed slope near the platform, meaning a traditional 8-point mooring system would be expensive to purchase and operationally challenging to install. These challenges necessitated an investigation into using alternative station-keeping methodology for the installation operation.

A DP-assisted float-over operation can reduce the weather windows required to perform the actual float-over (Beerendonk et al, 2008). Without the need to connect mooring lines and perform significant on-site preparations, the float-over operation itself can be performed within a much shorter timeframe, typically reducing the operational reference period (shown in Fig. 1) from several days down to several hours. There are clear benefits to cost due to involvement of less marine spread and higher operability, and also to operational safety due to a shorter exposure period. The DP-assisted float-over method thus offers clear advantages over the traditional, mooring-assisted approach.

Fig. 1. Definition of Weather Window (0001/ND, 2015)

Capitalizing on these advantages and avoiding the mooring difficulty in the complicated seabed topographic feature near KBB platform, a plan to convert the X-Class vessel to a DP-2 vessel was proposed for the float-over installation of the KBB topsides. The X-class vessels were