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The Maleo MOPU Project—Project Overview and Keynote Address

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Abstract

The Maleo Producer is a Mobile Offshore Production Unit (MOPU) that is owned and operated by Global Process Systems (GPS). The MOPU is currently leased to Santos and operates offshore Indonesia. First gas was produced in September 2006. This overview paper describes the conversion, operations and benefits that can be recovered through a MOPU deployment.

Safely designing a relatively old mat-supported jack-up drilling structure, to operate as a MOPU on a very soft soil, in a very seismically active location, was challenging. Technical efforts were placed on the dynamic analysis of the foundation coupled with the structure. The circumstances required unusually advanced analytical efforts in the fields of geotechnical and structural engineering. ABS, the selected classification society, needed special assistance in understanding the soils issues, especially in terms of the structure's response to seismic events.

Site investigations were performed both before and after the structure was placed on location. Extensive in-situ measurements of the soil characteristics in the mat-affected zone were made after the structure was installed. Advanced static and dynamic laboratory tests of the soil were undertaken. A new method of computing the overturning resistance of typical mat foundations on soft soils was developed. A very large 3-D non-linear dynamic finite element soil island foundation model was developed and linked with the structural finite element model. A site-specific seismic hazard study produced time series data for ground motions for design verification and dynamic response predictions.

This paper provides an overview of the last and most difficult phase of the Maleo project and explains how each of the following six papers in this session relates to the project and to each other. The culmination of this last phase was full class approval being given to the Maleo Producer as a fixed offshore structure.

Introduction

Shallow water marginal field development demands a cost effective solution with expedient delivery and commissioning of production assets in order that field development plans and concession development obligations are met. Field development is further complicated by uncertainty of reservoir life; a leased facility mitigates the reservoir risks by offering flexible lease terms and limits capital expenditure by the field operator while reservoir performance is evaluated. Conversion of a 250 ft class MODU such as a the Maleo Producer for MOPU applications readily meets these requirements with a fast conversion project timetable as opposed to conventional new build, simple installation procedure, easy relocation of the unit during the field operational life cycle and minimal abandonment costs.

The Maleo Producer (Figure 1) is an example of a Mobile Offshore Production Unit (MOPU) that provided cost effective exploitation of a marginal field. The platform is currently leased to Santos and operates offshore Indonesia in a water depth of 187 ft (Figure 2). First gas was produced in September 2006.

The Maleo site is underlain by very soft normally consolidated highly plastic lightweight marine clay. Site conditions were evaluated in a typical geotechnical investigation, which developed material parameters for the clay in terms of typical geotechnical variables (PT Kalindo Raya Semesta, 2003). Site soil conditions and their characterization contributed greatly to the challenges of this project.

While the MOPU is not a new concept, each individual project has its own unique project and technical challenges. This paper covers in detail some of the challenges faced during the Maleo project execution and the expertise and innovative technology that was employed to overcome them.