The Bearings and Integrated SHM System of the Johan Sverdrup Offshore Platform Facility

Masoud Malekzadeh

Mageba International, New York, USA

Gianni Moor

Mageba USA, New York, USA

Niculin Meng

Mageba SA, Bulach, Switzerland

Contact: mmalekzadeh@mageba.net

Abstract

The initial offshore platform facility of the Johan Sverdrup oil field, currently being constructed off Norway's coast, comprises four platforms which are connected by three bridges. Each bridge requires four bearings, two at each end. To ensure the ongoing proper functioning of these critical components, and the bridges they support, it was decided that a structural health monitoring (SHM) system should also be provided, with the bearings supplied with pre-integrated sensors to enable them to optimally supply the data required by the system. The design and supply of the specially designed bearings and the SHM system for this challenging application are described.

Keywords: Bearings; SHM; monitoring; offshore platforms; bridges.

1 Introduction

The Johan Sverdrup oil field is located about 160 km off Norway's coast. Peak production is expected to be over 660,000 barrels per day, making it the largest producing oil field in the North Sea. It is expected to start operating in late 2019. The first stage of development consists of a four-platform field hub (Fig.1). The platforms, designed for drilling, rising, processing and living quarters, are to be installed in 2018 and 2019. The platforms will be linked by three bridges, each supported by four bearings (two at each end).

To ensure the safety and proper structural performance of the vital bridge structures, both immediately following installation and on an ongoing basis, it was decided to equip the offshore facility with an SHM system based entirely on data from the bearings. The integration at fabrication stage of SHM sensors into critical structural components such as bearings can be very beneficial, as described by Islami et al [1]. The design and supply of the bearings and the integrated SHM system are described below.