HVAC POWER TRANSMISSION TO THE GJØA PLATFORM

Erik **ERIKSSON**, Marc **JEROENSE**, Magnus **LARSSON-HOFFSTEIN**, Claes **SONESSON**, ABB AB, High Voltage Cables, Karlskrona, (Sweden), claes.sonesson@se.abb.com, erik.x.eriksson@se.abb.com, magnus.larsson-hoffstein@se.abb.com, marc.jeroense@se.abb.com

Knut-Aril **FARNES**, Rolf Ove **RÅD**, Karl Atle **STENEVIK**, Statoil AS, Stavanger, (Norway), KAFA@statoil.com, RORAA@statoil.com, KATST@statoil.com

ABSTRACT

Oil and gas is exploited more at submarine locations with larger depths. Consequently the platforms taking up the oil and gas are floating structures because platforms standing on the sea bottom become too expensive. Gjøa is an example of a floating device at a sea depth of 380 m. The platform gets its electric power from shore by means of a 123 kV AC cable. Most of the cable is of the static type with a maximum laying depth of 540 m, whereas the last 1.5 km is of the dynamic type. The dynamic cable has to withstand the substantial mechanical stresses due to weather conditions and depth.

KEYWORDS

Submarine, dynamic, platform

GJØA PROJECT OVERVIEW

The Gjøa platform located offshore west of the Sognefjord in Norway was developed and built by Statoil and is currently operated by Gaz de France Suez. Gjøa is located about 100 km North West of Mongstad. The water depth is 380 m and for that reason platform is of the floating type. The platform produces gas and oil which are transported via pipelines to Mongstad and St. Fergus in Scotland respectively. Gjøa was initially planned with a standard solution gas turbine driven power plant. In order to reduce the emission of greenhouse gases, import of electric power from shore was more attractive compared to a local power plant with a relatively low efficiency. The electric power consumption is estimated to be 40 MW at peak and between 25 -30 MW in average. The power will be imported from the national onshore grid at Mongstad. Onshore generation of power has the potential of a significant better environmental solution compared to offshore generation due to the availability of hydropower [1, 2].

One of the technical challenges that we faced in order to implement the "power from shore" solution on Gjøa is the following.

Gjøa is a floating production facility located at a water depth of 380 m. A dynamic HV cable rising 380 m from the sea-bed up to the floating platform was needed. The dynamic cable has to withstand the substantial mechanical stresses due to weather conditions and depth. Required fatigue properties are essential. Due to the high voltage of the power transmission a special radial water barrier was needed to reduce risk of water treeing. The significant development was successful and the cable system is in operation since mid 2010.

CHARACTERISTICS OF THE GJØA DYNAMIC CABLE SYSTEM

The cable system between shore and the Gjøa platform consists of several components that include a static and dynamic submarine cable, a transition joint linking these two cables, top side joints, a transition joint linking the static and dynamic cable and factory joints. Spare cable and repair joints were also included in the delivery. The static cable, dynamic cable, the transition joint and repair joint will further be addressed in this paper. A conceptual layout of the cable system is shown in Fig. 1.

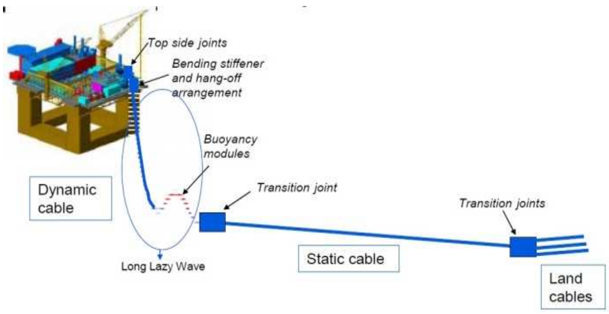

Fig. 1: Conceptual layout of the dynamic cable system.

Most of the submarine cable, that is 98.5 km, is of a static type and is not subjected to recurring movements that the dynamic cable will be. The dynamic cable, that is the 1.5 km cable that is hung off to the platform, will follow the movements of the semisubmersible, which is floating and may be translated with a radius of approximately 75 meters. In order to account for the translation of the semisubmersible, an extra length of the cable is introduced, by means of about 73 equidistant located buoyancy units, according to Fig. 1.

The extra length that is introduced with a so called configuration that in the case of Gjøa is of Lazy Wave type according to Fig. 1, and will account for any vertical and horizontal movements that the platform can be subjected to. In general, a number of standard configurations exist, and the choice of configuration is significantly dependent on the magnitude of translation of the platform and the subsea infrastructure in the vicinity of the platform, i.e. mooring lines, risers etc.