

Title: FMEA Proving Trials and Offloading Technology Simulations – Lessons Learned

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Abstract

Since March 2010, Bluewater's FPSO Munin has been operating in the South China Sea, at the Huizhou oil field. The FPSO is replacing another FPSO, which is off location for repairs, for a period of 1 to 1.5 years. As this is a relatively short operational period, it is not economically attractive to install a dedicated mooring system. The FPSO is equipped with a class 2 Dynamic Positioning (DP) system, which is used for station keeping, without the use of anchor legs.

In 2004 the Munin operated on DP with a similar configuration at the Xijiang field, [1]. However, this operation was for half a year only, it was done with a (partly) different crew and outside the soliton season in which strong currents occur. This time at the Huizhou field Munin will operate during the soliton season; therefore she will experience stronger currents compared to operations at Xijiang.

Operating an FPSO on DP is very uncommon, such that DP operators are unlikely to have experience with this specific type of operation. Conventional, non-DP, shuttle tankers are used to offload the FPSO, which gives an even more complex operation. This leads to an operational dilemma: complex operations are preferably performed by a crew which is experienced in doing such operations, but an experienced crew was not available due to the uniqueness of the operation.

To prepare both the FPSO and the crew for the DP operations at the Huizhou field, FMEA proving trials and an offloading simulation training have been performed. The proving trials have shown the FPSO's fitness to perform the operation, and the offloading training familiarized the crews of the FPSO, shuttle tanker and hold-back tugs with the operation.

Both the trials and the simulation training have made that the operation of the FPSO has been successful so far. Furthermore, they have both provided *lessons learned* which can be valuable in the design and operation of other DP vessels. This paper describes the FMEA trials and offloading simulation training, and the lessons learned that have been drawn from both. Also the relation with the *Ultimate Dynamic Positioning (UDP)* project is discussed. This UDP research project is currently in progress, and investigates the possibility of automated condition-monitoring and operator-support for DP systems.

The paper describes the FPSO and its DP system, and is followed by a section about soliton current events in the South-China Sea. Then the FMEA trials and the offloading simulations are discussed together with the lessons learned from both. The final section describes the relation of the trials and the training with the Ultimate Dynamic Positioning project.

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