

Side-by-Side mooring study for the Sanha

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Difficult environmental conditions led ChevronTexaco to ask MARIN to study their effects on the LPG FPSO Sanha and to set up an operational window.

After being the first to operate an LPG FSO, ChevronTexaco was also the first to operate an LPG FPSO, named Sanha. Moored approximately 20 miles off the coast of Angola, the 264 m long and 49 m wide turret moored purpose-built LPG FPSO has a storage capacity of 135,000 m³ and is equipped with a 2,944 kW stern thruster.

Strong currents caused by the outflow of the Congo River, strong winds, and a high swell coming from the Southern Atlantic Ocean, define the conditions at the location. The enormous size and height of the Sanha meant wind and current-shielding was a serious issue.

In order to establish the operational window a MARIN fast-time simulation program was used which is steered by autopilot and is an efficient and effective tool for simulations with multiple free-floating models. An analysis of all the performed runs can provide a clear picture of the necessary tug power, provide a first estimate of the operational window and show the effectiveness of post-emergency measures.

New concept introduced

Next operational procedures had to be refined and it was necessary to test whether the operational window was feasible for the human navigator. The same database used during the fast-time simulations was used for the real-time simulations. These were performed on MARIN's FMB-I, which has a 360°

visual system and included a human operated tugboat. While the export tanker was sailed from FMB-I, the aft tug was sailed from FMB-II, a slightly smaller bridge specifically designed for tugboat operations. The test of the feasibility of the operational window was performed by experienced Mooring Masters.

During the trainings a new concept for the FPSO mooring was also introduced. Instead of two tugs on the side, MARIN introduced the "Aft tug" concept, whereby the tug on the stern was moved to the centre lead aft. After the first real side-by-side mooring, the first thing MARIN heard was: "It was just like on the simulator" – and that is how it should be.

Almost all the Mooring Masters have now followed the training programme and still ChevronTexaco continues to send its people to MARIN for regular refreshment courses, with special attention to emergency situations. Currently, ChevronTexaco and MARIN are working together in order to develop a new training initiative which will include Bridge Resource Management.

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