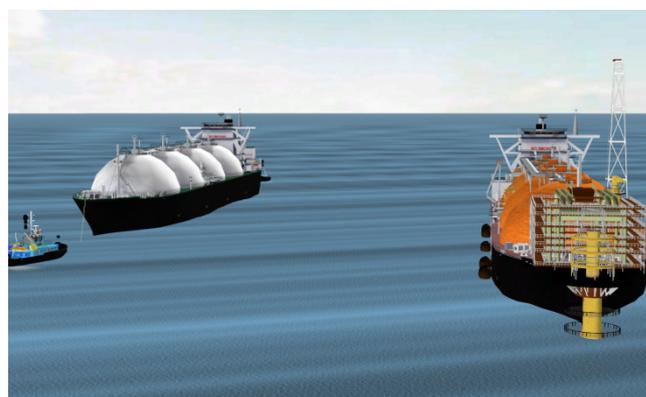


Valuable training for world's first FSRU using MARIN's simulator bridges**FSRU Toscana training simulations****Introduction**

Due to be installed in 2011, the FSRU Toscana of Offshore LNG Toscana (OLT) will be one of the first offshore LNG floating storage and regassification units in the world. The FSRU Toscana is a turret-moored converted LNG carrier with spherical tanks that will be anchored in the Mediterranean, 23 km off the coast of Livorno, Italy. LNG will be imported by mooring LNG carriers alongside the FSRU. After contracting ECOS (a joint venture of Exmar Offshore Services and Fratelli Cosulich) as the future operator and Fratelli Neri as the tug company for the facility, OLT commissioned MARIN's Nautical Centre MSCN to prepare a training programme for the mooring masters, terminal managers and tug masters that will be mooring the LNG carriers there later this year.

Database and workshop

For the training a database was set up of an open sea area with the FSRU with its mooring. Manoeuvring models were made of the FSRU, a Moss-type import LNG carrier (LNGC) and the two tugs assisting in the manoeuvre. Current, wind and wave conditions typical for the meteocean conditions at the site were prepared including the sheltering effect of the FSRU on the LNGC and vice versa with regard to wind and current. With these conditions and the vessels a number of representative scenarios for arrival and departure manoeuvres were composed. After a database for the simulations had been prepared, a two-day workshop was held. During the workshop a few preliminary simulator runs were carried out to get an idea of the manoeuvring strategy and to evaluate the database. The results were used to fine-tune the simulation scenarios and for further detailing of the training programme.



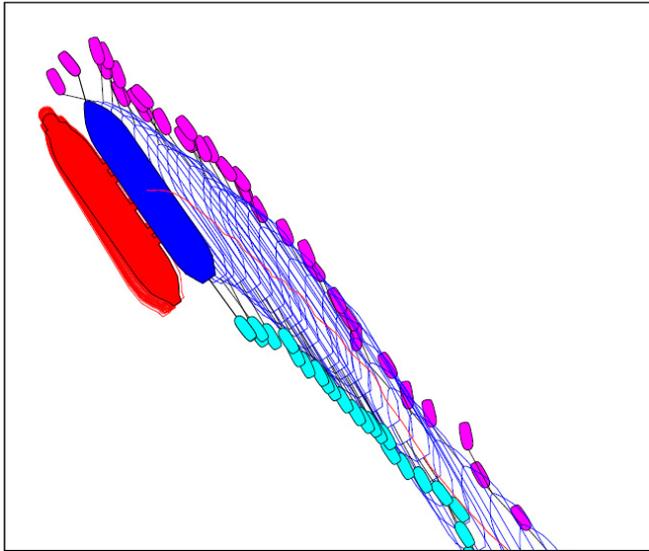
View from one of the runs for approach to the FSRU Toscana

Training simulations

The simulations were executed using three manoeuvring simulators and an FSRU control position. Communication between the vessels and the simulator supervisor connecting the mooring lines was done by VHF.

Thus each participant in the operation controlled his ship from his own simulator bridge:

- A mooring master who led the operation from the bridge of the LNGC on Full Mission Bridge 1, together with a colleague acting as the master of the LNGC and a helmsman following the course or rudder orders.
- A tug master operating the bow tug on Full Mission Bridge 2. This bridge was more suitable because the bow tug is manoeuvring more during the operation.
- A tug master operating the stern tug on the compact simulator.
- And the FSRU master terminal manager operating the heading control/stern thruster on a tertiary station and informing the approaching LNGC on the heading of the FSRU.



Example of the sailed track during an approach manoeuvre

All of the participating masters were very professional and showed a very high level of manoeuvring skills. Their skill level meant that the training sessions could focus on emergencies and more in-depth operational details which will in turn, serve to develop and optimise the strategies for various events. Only a few simulator runs were used for normal arrivals and departures under the limiting metocean conditions predetermined by OLT. In many runs, also in limiting conditions, various kinds of emergencies were introduced. Based on discussions in the workshop, a range of possible emergency scenarios was created. These ranged from failures of the main engine or rudder of the LNGC, to an emergency departure commanded by one of the tugs assuming the LNGC was out of operation due to a fire for example.

Results

Undoubtedly, the workshop and training sessions proved to be very useful for all participants. The workshop was the first time that the mooring masters, terminal managers and tug masters from different nationalities had met, so it facilitated a broad exchange of views on certain aspects of the operation. The simulations proved also to be very useful for the mooring masters and tug masters in understanding each other's position in the operation by observing the manoeuvre on another bridge. In the training simulations the arrival manoeuvres showed no particular difficulties and in fact, they showed that they may even be carried out at higher wind speeds than the adopted design limits. Departures in cross-conditions appeared to be more challenging because the FSRU tends to trail behind the departing LNGC. Just before operations start a short rehearsal training will take place. In that session the Portable Pilot Unit used by the mooring masters will be connected to the simulator so they can familiarise themselves with this equipment.



Picture of the FSRU Toscana under construction in Dubai

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