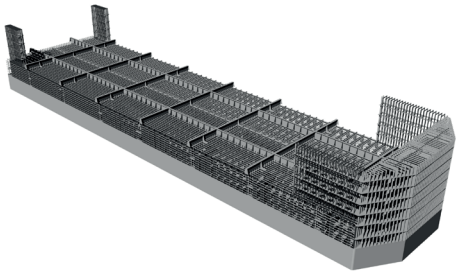
MULTI . engineering

EXMAR

Gravity Base Structure (GBS) design

Design of a sustainable solution executed in just 2 months

EXMAR investigated to use its C-FLNG in a mild offshore environment with limited water depth. The C-FLNG process plant allows for limited vessel motion and EXMAR invited MULTI.engineering to design a Gravity Base Structure (GBS) to dock the C-FLNG at the intended offshore location.



CLIENT

EXMAR is a multi-disciplinary maritime and offshore solutions provider, designing and delivering sustainable and efficient value chains for its customers worldwide for the production, storage, supply and transportation of oil and gas.

SCOPE

Gravity Base Structure (GBS) design

ADDED-VALUE MULTI.ENGINEERING

3D diffraction multi-body analyses were carried out by MULTI.engineering to determine the effect of the LNG tanker presence and to determine the optimum distance and location to the C-FLNG.

The GBS was minimized in main dimension to reduce loads and costs.

On the decks of the stability columns and bow, the foundation for temporary mooring provisions were designed, used to manoeuvre the CFLNG over the GBS for mating.

The scope was executed in just 2 months.

NO ENGINEERS, NO FUTURE !

SPECIFICATIONS AND CHALLENGES

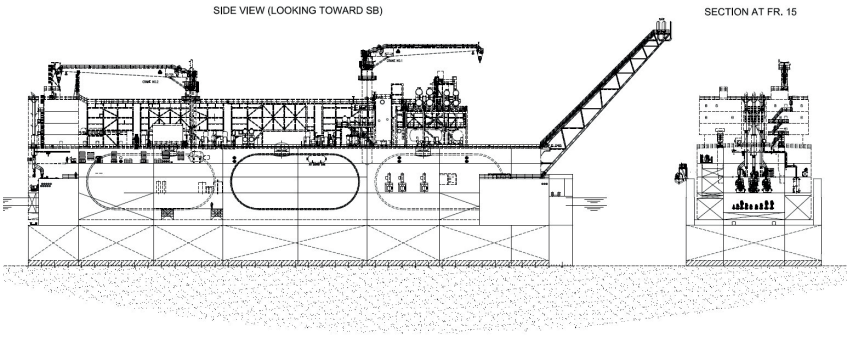
The GBS was also to be designed as a submersible heavy lift barge suitable for transit conditions. The GBS sits on a prepared seabed suitable to take the distributed loads involved with the offshore environment and combined loads of the GBS and C-FLNG.

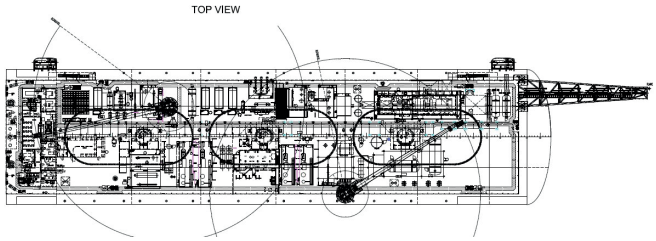
The challenges involved with designing a GBS for an object with a large waterplane area lie mainly in the large varying forces on the combined GBS and C-FLNG due to waves and tide.

Generally, a GBS will have a small waterline area minimizing wave loads. Also, the current and wind loads are to be considered, where especially the current loads for a large bottom supported object are to be carefully determined.

RESULT

MULTI.engineering designed the GBS as semi-submersible heavy lift barge, with intact and damage stability characteristics associated with the operations (transport and ballast down to the seabed). The decommissioning after the lifetime was also considered to ensure that the GBS could be re-floated.





SERVICES PROVIDED

- Design of the GBS
- Full 3D structural design of the GBS and interface with C-FLNG
- FEM analysis of the GBS with interface to C-FLNG and seabed forces
- Load calculations for the GBS and C-FLNG with and without presence of LNG tanker
- Determination of optimum position nearby storage tanker
- Determination of seabed forces and interaction with GBS
- Stability calculation for all stages from construction of the GBS to mating with C-FLNG, wet transport and installation on site.
- System diagrams for ballasting and tank vent systems, with routing of the lines to determine MTO's
- Optimization permanent ballast and selection of ballast mixture (seawater and sand)

FACTS & FIGURES

Dimensions
Length overall: 153.000 m
Breadth moulded: 37.920 m
Depth at side to main deck: 11.475 m
Maximum Operational draught: 19.100 m
Bow height: 22.950 m

Machinery
Ballast pumps
Self priming vertical centrifugal pumps:
2 x 500 m3/h at 2 bar

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MULTI.engineering is an engineering company. We support customers' success by offering flexible engineering solutions. We have Offices in Temse (BE), Vlissingen (NL), Zwijndrecht (NL), Delft (NL) and Komarno (SK).
Working with us is always a great experience!

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