

Upgrade of offshore HVDC platform

CLIENT TENNET

YEAR 2025

PLATFORM TYPE

Offshore Platfom DoIWin gamma (HVDC offshore platform)

CLASS

Eurocode, DIN 18088

SOW

Structural Analysis for Modular Living Quarters (TLQ) Installation



13000kN

OF LOAD EVALUATED

46mm

DEFLECTION

96%

UTILIZATION

CLIENT CONTEXT

MLQ reconfiguration and compliance update

TenneT, the operator of the HVDC offshore platform DoIWin gamma of the offshore grid connection DoIWin5, planned to modify the configuration of their Modular Living Quarters (MLQ) by changing the number of future accommodation containers onboard. The MLQs, including associated water treatment systems, had to be reinstalled on an existing grillage structure. With regulatory requirements shifting from DNV standards to EUROCODE and DIN 18088, TenneT needed a new structural assessment to ensure compliance and safety under the updated design code regime.

THE WORK TO BE DONE

Project phases

The work to be done GLO Marine was tasked with performing a comprehensive structural analysis of the topside and grillage structure to validate the installation of the revised TLQ setup. The project included modeling the grillage, applying realistic boundary conditions and loads (static, live, wind, snow, and ice), and verifying the system against updated certification requirements. The evaluation would support certifiable documentation required by Lloyd's Register.

THE CHALLENGE

Requalification to Eurocode requirements

The existing grillage was originally designed under DNV standards and had been used to support a previous TLQ configuration. The challenge was to verify whether this existing structure, along with the underlying deck, could safely support the new arrangement of containers using the updated Eurocode-based design standards. This involved detailed Finite Element Modelling (FEM) and evaluation of stress, displacement, buckling, and environmental load conditions.

Involvement of GLOMARINE throughout the project stages

01. Initial review

We started by collecting and reviewing all existing structural documentation for DolWin gamma, including layout plans, topside drawings, and previous analysis results.

02. Model development

We created a detailed Finite Element Model (FEM) of the topside deck area from Frame 46 to Frame 114 and incorporated the full geometry of the existing grillage, containers, and staircases.

03. Load identification and application

We calculated and applied various loads:

- Permanent loads: Weight of grillage, MLQ containers, stair containers, and water treatment containers.
- Variable loads: Life loads inside the containers and staircases, deck live loads, and passageway loads.
- Environmental loads: Wind, snow (drifted and undrafted), and ice loads based on site-specific metocean data.

04. Structural evaluation

Stress (Von Mises): Maximum recorded vs. allowable (Utilization 96%). For the grillage we identified some high stressed areas caused by the increased loads as the factors of the Eurocode are more restrictive. We proposed solutions.

Displacement: Maximum vertical displacement. Buckling: All critical buckling zones were within acceptable safety margins.

05. Friction & load capacity check

Evaluated friction coefficient requirement for rubber mats under grillage to resist wind suction. Verified deck load bearing capacity for general areas, for designated laydown zones.

The outcomes

Final results

We delivered a comprehensive structural report confirming the adequacy of the deck and grillage under the new MLQ configuration. The FEM analysis demonstrated compliance with EUROCODE and DIN 18088 standards, with only minor local exceedances in the platform structure found to be non-critical and solutions to improve the grillage structure for the rule-updated loads. The study enabled TenneT to proceed confidently with MLQ reconfiguration and supported the documentation needed for class approval. The outcome: a verified, certifiable, and regulation-compliant solution for extending the service life and operational capability of the accommodation infrastructure.



Offshore Platform DoWin gamma (HVDC offshore platform)

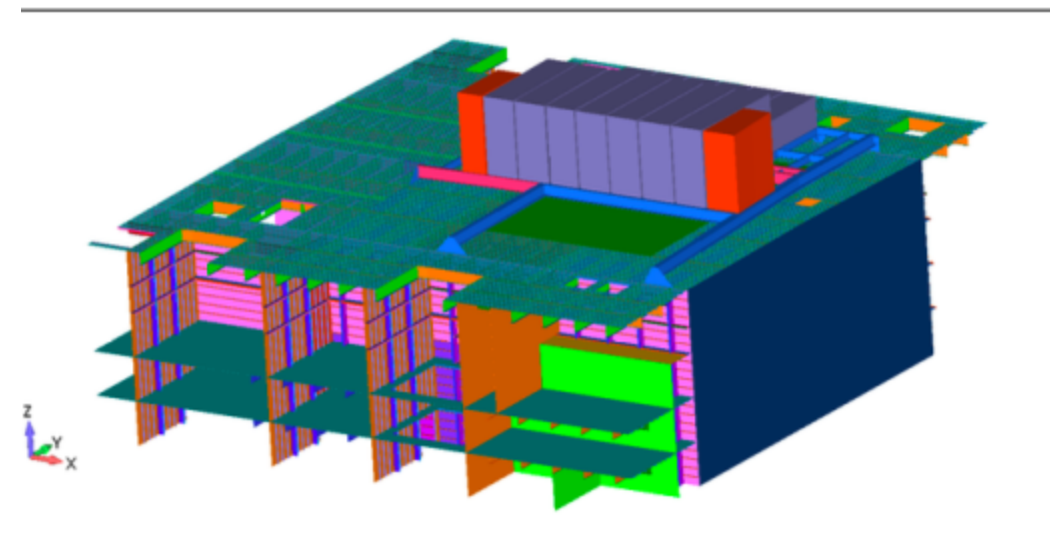


Figure 4.4 FE model- Isometric view

FE model - Isometric view

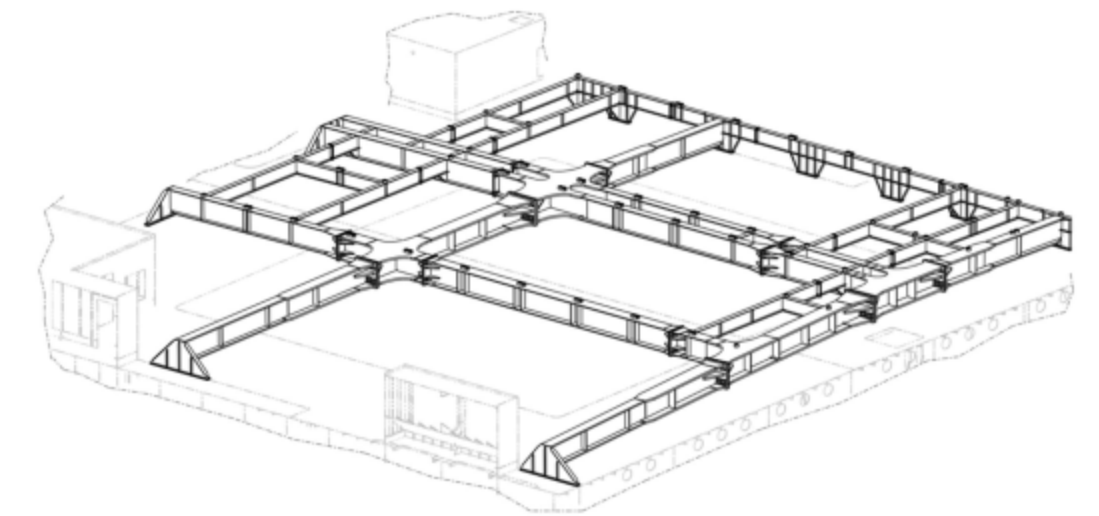


Figure 4.16 Grillage isometric view

Grillage isometric view

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