

Green Water and Wave Slam on Floating Structures

PAFA Consulting Engineers were initially engaged by the UK HSE to undertake a review of offshore industry methods applied to design for green water and wave slam on FPSOs and FSUs.

The work was initiated against a background of increasing numbers of damage incidents that appeared to be caused by such phenomena.

The design for green water and wave slam appeared to be haphazard with no recognised industry standard, rather each project adopting a different approach ranging from extensive evaluation to ignoring the issue.

Back-calculating incidents using simple linear calculations showed that serious green water damage could have been expected in likely occurring sea states. Wave slam was more difficult to quantify but knowledge from marine tanker operating experience in particular suggested that serious damage could also arise from some sea states.

PAFA Consulting Engineers in collaboration with leading European organisations launched a major project in this area - SAFEFLOW.¹

Four Work-packages were created:

1. Waves,
2. Hydrodynamic loading,
3. Structural response, and
4. Risk and design

PAFA Consulting Engineers managed the risk and design aspects and were responsible for collating all the SAFEFLOW reports into a single document.

Computational design tools have been developed by our staff to enable estimates to be made of the likelihood of green water and to determine the resulting forces on the vessel's hull, deck and appurtenances.

¹ Fyfe, A. J and Ballard, E. J "Prediction of Green Water Events on FPSO Vessels", OMAE, Cancun, Mexico, June, 2003.

Summary

- Design guidance for green water and wave slam
- Mathematical modelling
- Risk assessment

Selected Clients

- American Bureau of Shipping
- Amerada Hess
- Bluewater
- BP-Amoco
- Chevron-Texaco
- Conoco-Phillips
- IHC Gusto/SBM
- MMS
- Norsk Hydro
- Shell
- Statoil

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