

Two leading truss Spar players choose MARIN model testing

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Horizontal tow test in breaking waves.

MARIN was very proud when the two main players in the truss Spar field, CSO -Aker and J. Ray McDermott, both decided to use MARIN's facilities and expertise for model tests.

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With the Nansen Spar leading the way, large truss Spars are becoming an increasingly common sight in the Gulf of Mexico. This new technology often proves a more cost-effective version of the classic Spar. The truss Spar design replaces the lower cylindrical hull of the original Spar with an open structure to improve stability, reduce hull weight and to increase performance in high current situations.

The main purpose of the model tests carried out for the two firms was to verify their computations, increase their knowledge database and capture unexpected phenomena.

World's largest truss Spar

Last year, CSO -Aker Maritime, a Technip-Coflexip Group affiliate, ordered on behalf of BP and their Holstein and Mad Dog partners the most extensive model test programme ever for a truss Spar. These tests concern the world's largest truss Spar, scheduled to come into action in the BP-operated Holstein field in mid-2004, in a 1,324 m water depth. The test programme involved an extensive VIV test programme, horizontal tow tests, upending tests and vertical tow tests, using four different model test basins.

During the VIV tests the strake design was optimised and also VIV tests with the bare Spar hull were performed. The horizontal tow tests focused on heave plate loads, bending moments and motions. Both tow by hard tank and soft tank were tested to determine the most favourable tow set-up. For the upending tests the actual ballasting sequence was tested, using nine individual ballast tanks. The vertical tow tests provided an answer to required tow loads in upended position and free drift speed in hurricane conditions. All of the model test results were used for comparison with its own simulation codes.

Medusa

The tests for J. Ray McDermott concern a Spar scheduled to come into action in the Murphy-operated Medusa field by late 2002, in a 677 m water depth.

For this in-place Spar, model tests were carried out in MARIN's Offshore Basin. The size of this basin enables accurate modelling of all individual mooring lines, top tensioned risers and steel catenary risers without truncation.

The tests made clear that it is important to generate the actual current flow with realistic turbulence levels, because the Spar motion behaviour is based on the mean current loads and the current velocities at the hard tank. To guarantee these sheared currents with constant velocity and low turbulence intensity the current generation system recirculates water with pumps outside the basin.

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In-place Medusa Spar.