



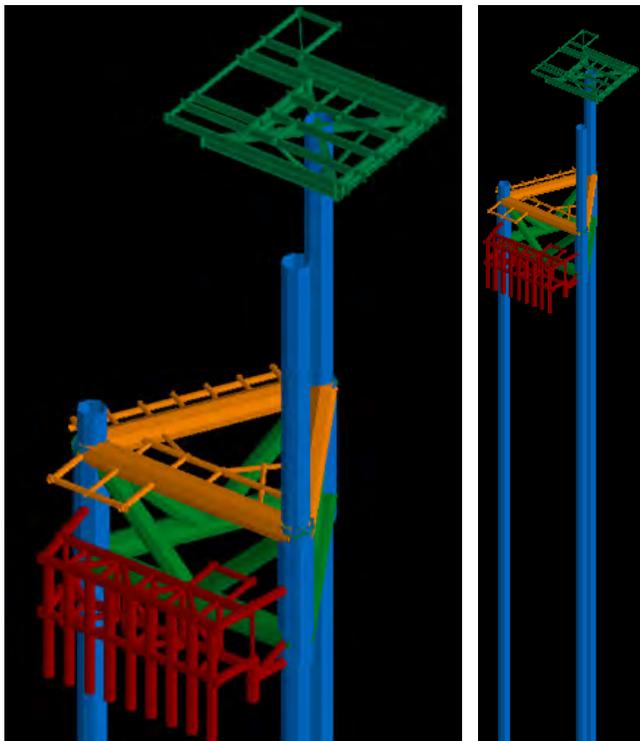
OFFSHORE PLATFORM

Texas, USA 2014

Failure Analysis for Ship Impact

Safety is of the utmost importance for clients like ARAMCO Services tasked ASI with the assesment of the vulnerabilities of a Single Well Observation Platform (SWOP) due to accedental impact from a ship while docking to the platform. The structure studied consisted of a single level service deck supported by three driven piles and a template bracing frame. A low service deck with a deep water case was selected for the initial proof of concept study (Well MNIF-83).

Case 1: In this case, the impact load is applied statically to the boat landing structure, where the effect of own weight is considered. At this stage the vessel is not activated.

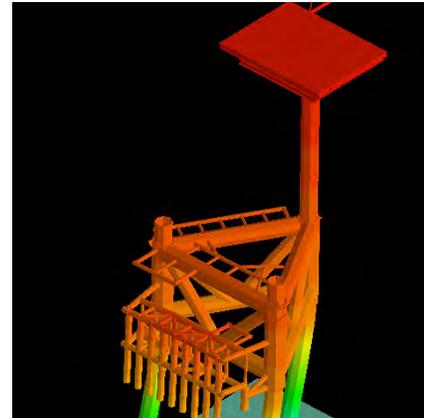


ELS Model Including All Structural Elements of the Platform

ASI was tasked with evaluating three scenarios:

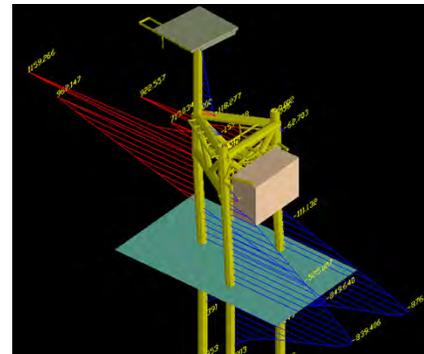
- 1) Equivalent static load for the impact of a 3,500 metric ton vessel
- 2) Dynamic load for the impact of a 3,500 metric ton vessel
- 3) Progressive collapse due to accidental failure of supporting piles

The project was carried out using ASI's Extreme Loading for Structures (ELS) software which allows ASI engineers to carry out nonlinear static and dynamic analysis of extreme loads through plastic hinge formation through complete failure and collapse.



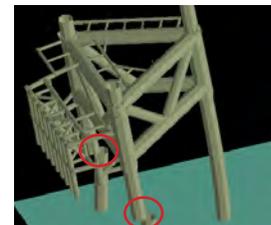
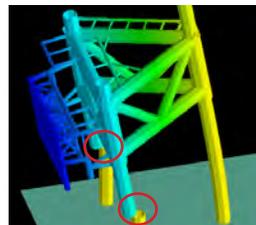
Y Displacement Conour after Static Load

Case 2: In this case, the impact load is dynamically applied by a 3,500 ton vessel modeled as a block moving at 1 knot hitting the boat landing.



Bending Moment after Ship Impact

Case 3: Accidental failure of only one of the supporting piles does not cause a progressive collapse of the SWOP. However, loss of two piles caused progressive collapse of the platform.



Loss of Two Piles Shows Progressive Collapse

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