

SAFETY ON THE HIGH SEAS USING FINITE ELEMENT ANALYSIS

DMEC Limited specialise in providing a design service to the Shipbuilding industry. When asked by a customer to design a new A-frame structure for undersea operations, DMEC requested FEA Online to build and test a “virtual prototype” of the design using Finite Element Analysis (FEA) software. By adopting this approach, the intention was to get the design “right, first time”, prior to committing to manufacture.

The A-frame structure will be fabricated from steel plate, and is required to lift equipment over the stern of the vessel. The A-frame is mounted on the deck, and can be rotated inboard or outboard by two hydraulic rams (Figure 1).

To ensure the proposed design was fit for purpose, it was necessary to evaluate a series of load cases which represented normal operational and severe offshore conditions.



Figure 1

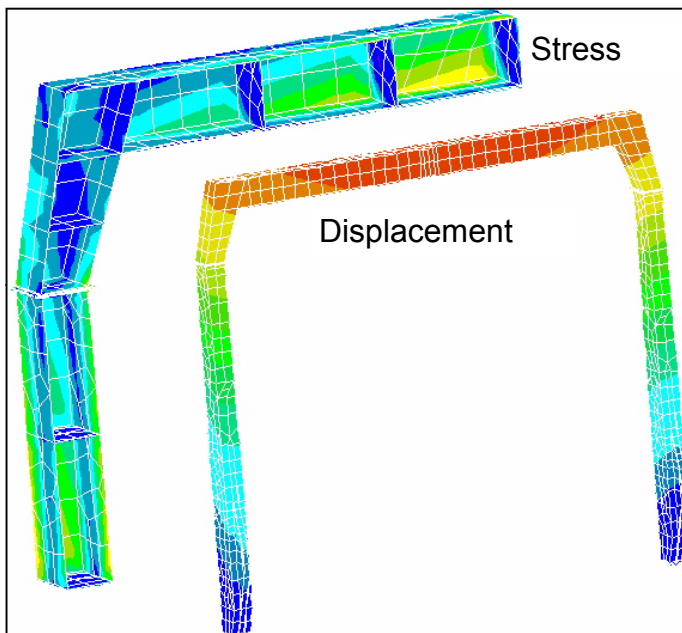


Figure 2

The loading conditions were then assigned to a shell mesh and subjected to a series of linear elastic analyses.

In close collaboration, a detailed investigation of the results was undertaken. Information can be presented as traditional colour contour plots (see Figure 2) or interactive 3D results files which can be rotated on the screen. This approach allows plates to be examined in any combination to carefully assess the complex stress distribution within the A-frame.

Using this approach, FEA Online and DMEC engineers were able to successfully validate the A-frame design to meet operational requirements.

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