

NEi Nastran

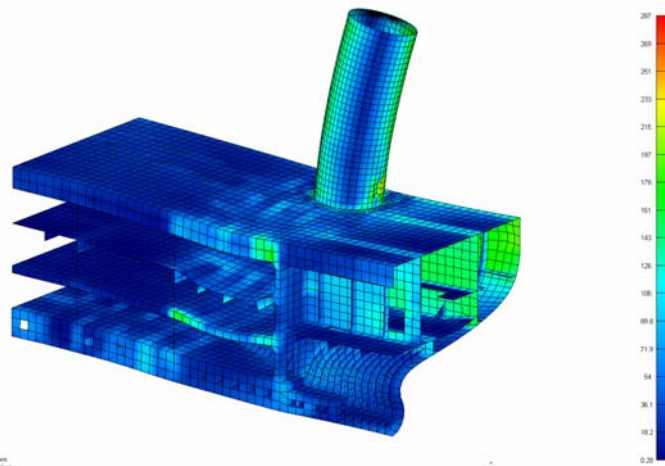
Marine Applications (STX Canada Marine, Inc., Canada – Subsea Crane Foundations)



STX Canada Marine, Inc. in Vancouver, Canada uses NEi Nastran to design foundations for heavy cranes on offshore supply vessels. These pedestal-mounted cranes are used to transfer oilfield supplies from the ship's deck to an offshore platform or the seabed. Able to lift up to 400 tonnes each, the cranes are also designed to withstand vessel motions and environmental loads for worldwide service. STX must provide an efficient foundation to support each crane which does not disrupt the vessel's arrangement of tanks and cargo holds below deck. The crane may be added to an existing ship design, or to a vessel already under construction, so minimizing rework to the existing hull structure is a further design objective. The foundation may also have to incorporate openings for ventilation, stairs, and machinery access.

A Finite Element Analysis (FEA) was considered to validate the crane design, minimize the size of the structure, and reduce the design time.

V 888 Main Crane V1



Output Set: Beam:stairboard.stem
ColorMap:05:0020: Total Translation
Control: Plot: Top: VonMises Stress

An FEA model of the crane pedestal, foundation, and surrounding hull was constructed in NEi Nastran and used to check stresses and buckling. Because the structure is welded steel plate, the model was built mainly from shell elements. Loads from the crane manufacturer were applied as forces at the top of the pedestal, while cargo and hydrostatic loads were applied simultaneously as pressures on the decks and hull. Direct and Von Mises stresses were compared to Classification Society requirements. Customization in FEMAP made it possible to use Visual Basic programs which calculate buckling based on Classification Society formulas. The buckling check results, calculated as usage factors, were graphically displayed using Femap. Other VB macros were used to generate sets of result plots from all load cases for inclusion in reports.

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