

Isight-Abaqus Optimization of a Ring-Stiffened Cylinder

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Abstract

Electric Boat's design process involves evaluating the structural stability of ring-stiffened cylinder structures through finite element analyses to simulate a static pressure load. Each design revision of the cylinders must be evaluated to verify that the structure meets the required stress criteria for the static pressure load; any revision to geometry or material would require the design to be reevaluated. Additionally, it is critical that the weight of the structure is kept as light as possible while still satisfying all stress and deflection criteria. This presentation documents the use of Isight and Abaqus to perform a weight optimization for static pressure loading on a ring-stiffened cylinder, varying geometry and model thicknesses. The use of Isight to run the analysis allows Electric Boat to find an optimized design earlier in the design process.

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1. Modeling & Simulation

This paper will present an Isight optimization model of a ring-stiffened cylinder performed using Abaqus as the analysis tool. This optimization is designed to minimize the weight of the cylinder, varying model dimensions and thicknesses, for a hydrostatic load. The work presented was performed as part of the NSRP M&S project (Moore & Gordon, 2008) (Moore & Gordon, 2009). The project's objective is to investigate methods to reduce the time required to perform full-ship analyses. Reducing the time required to perform the analyses enables the simulation results to be