ALGOR FEA HELPS NORTH AMERICAN SHIPBUILDING HOIST 1,000 TONS

Located along the intercoastal waterway in Larose, Louisiana, North American Shipbuilding (NAS) designs and constructs offshore vessels for its parent company, Edison Chouest Offshore (ECO), and affiliated companies. As part of its ship building and repairing operations, NAS uses finite element analysis (FEA) software from ALGOR, Inc. in Pittsburgh, Pennsylvania.

"ALGOR FEA allows us to check our first principal calculations as well as investigate more detailed problems," said Jacob Cheramie, Naval Architect of NAS. For example, when a new anchor-handling tug supply vessel was built, a 1,000-ton superstructure needed to be lifted by cranes for installation on the hull. Engineers at NAS performed ALGOR linear static stress analyses of key components to ensure that the ship could withstand the forces generated during the lifting operation. The FEA stress and displacement results verified NAS' calculations, which allowed NAS to proceed with confidence and execute the crane lift successfully.

North American Shipbuilding (NAS) of Larose, Louisiana, crane-lifted this 1,000-ton superstructure as part of the assembly process for a new anchor-handling tug supply ship. Engineers at NAS used ALGOR FEA software to analyze key components to verify that the ship could withstand the lifting operation.

Applying FEA to Shipbuilding

Founded in 1974, NAS has built more specialized offshore vessels than any other shipyard in the world. The company's notable achievements include: the first U.S. Antarctic icebreaking research vessel; the largest and most powerful anchor-handling vessel in the U.S. fleet; the first dynamically positioned vessel in the U.S. fleet; the world's first floating production system installation vessel; and the largest water throw capacity vessel in the U.S. fleet. Today, NAS employs more than 800 people in skilled positions.

ALGOR FEA is used at NAS by engineers including Francis Nguyen. "I was taught FEA in college," said Nguyen, "and started using ALGOR when working at NAS. I have performed linear static stress

analyses for applications such as loading conditions, equipment operation and effects of reaction forces and fatigue on equipment-supporting structures."

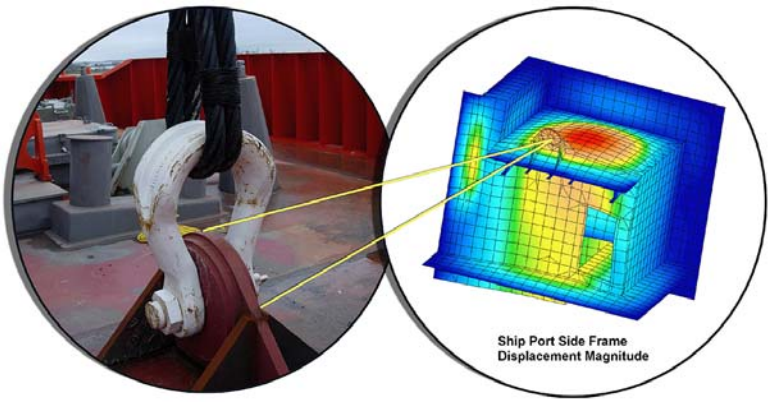
For the 1,000-ton crane lift, Gary Rook, Technical Manager of NAS, explained, "The ship was designed to support oil exploration in the oceans of the world. The hull was built in a fabrication building and then rolled onto a launching dock and floated into the water. A superstructure was built separately from the hull due to weight limitation on the dock. Then, the superstructure was lifted onto the hull for installation."

The ALGOR analyses to simulate the lift were performed, as Rook recalled, "early on during the design" of the ship. Two key components – the port side frame and a section of the hull – were analyzed because they contained the pad eyes and saddles where the cranes would pull upward on the superstructure. Hence, these components would experience the greatest stresses.

Analyzing the Port Side Frame

A section of the port side frame was modeled with a pad eye and saddle that bore a lifting force of 350,000 lbs (or 175 tons), representing 17.5% of the total 1,000-ton lift load. According to Nguyen, "The model geometry was created using ALGOR's built-in modeling tools." Plate elements were used to simulate the steel walls of the superstructure.

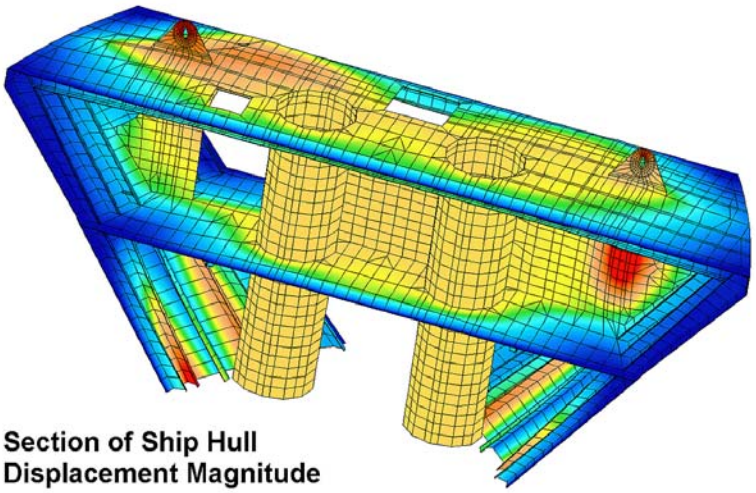
Cheramie said, "The first principal calculations gave us an idea of the structural requirements for this section. If all stresses in the model were below the American Bureau of Shipping allowable stresses, then the structure was adequate to do the job." The ALGOR analysis results verified that the maximum stress in the model was below the allowable limit.



NAS used ALGOR FEA software to analyze this pad eye and saddle unit of the superstructure (left). Displacement magnitude results are shown for an ALGOR linear static stress analysis of the ship port side frame (right).

Analyzing a Section of the Hull

Similarly, a section of the hull was modeled with two lifting forces of 350,000 lbs applied at each of two pad eyes for a total lifting load of 700,000 lbs (or 350 tons), representing 35% of the total lift load. According to Nguyen, "The results of the linear static stress analysis indicated the design was feasible. Using FEA provided the means to study the results in more detail." For example, ALGOR's results evaluation capabilities allowed NAS engineers to examine color-coded contour displays of displacement magnitude and von Mises stresses.



Results from an ALGOR linear static stress analysis are displayed as color-coded contours of displacement magnitude for a section of the ship hull.

Rook said, "Once the vessel was completed, it was delivered for service at Port Fourchon, Louisiana, on the Gulf of Mexico." The ship is currently in successful operation.

Future Plans for ALGOR FEA

NAS plans to continue using ALGOR FEA software as a vital tool for its future ship designs. According to Nguyen, "We have plans to use FatigueWizard in conjunction with ALGOR to determine structural hull integrity when exposed to prolonged and redundant forces."

For more information about NAS, visit www.chouest.com.