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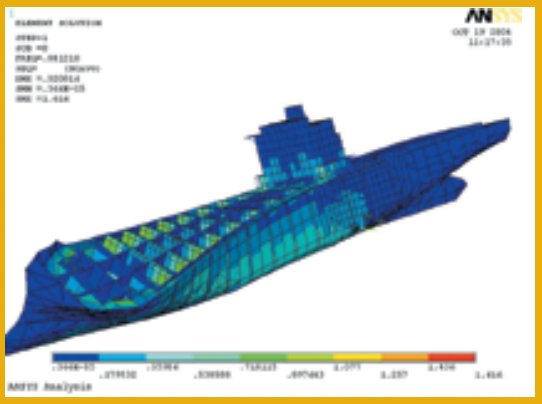
Hull structural loads at the heart of CRS research

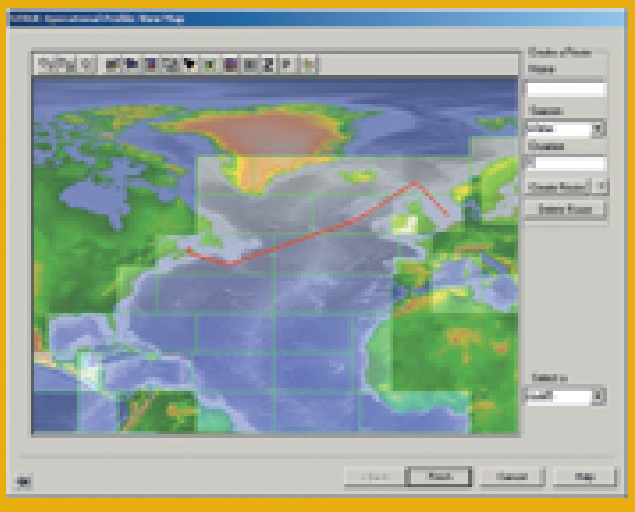
With ship owners, classification societies and shipyards among its members, it is no surprise that the research area of ship structures has received lots of attention in the CRS community.



Torsional deformation container vessel.

Structural loads have been a recurring theme since the beginning of CRS and undoubtedly it is a topic that will never be finished. Designers and shipbuilders are continuously striving to come up with better designs, reduced steel weights, increasing vessel dimensions and sometimes, entirely new design concepts.

Nowadays it is no longer possible to rely solely on "classic" ship design. The introduction of different hull segmentation, new design details and non-continuous deck plans, requires the use of special tools to evaluate the consequences of design decisions on both global, and local structural response. The tools that are used in this process are forged in a continuous research and development environment, where insight into the physics of floating structures, wave environments, diffraction analysis, finite element software and the fantasy and drive, of the engineers are key factors.
With the knowledge and experience gained over the years, a large number of subjects have been addressed by CRS. Gathering insight into the physics through model tests and desk studies, development of (numerical) design models, evaluation of design models through full scale investigations and the development of practical, usable and validated, software tools are just a few.



World map showing weather areas and operational route / scatter diagram.

STRUC

The current STRUC working group provides a good example. STRUC aims to provide a software package that can be used in design, along with PRECAL, to assess the structural characteristics of the new ship in its intended operational environment. Output includes ultimate hull girder loads and local hot spot stress histories for fatigue analysis. For this purpose a combination of ship hydro dynamics, FEM structural analyses, ocean weather data and software technology, is required. The involvement of all relevant parties from designers to regulatory institutions and operators, makes CRS a perfect platform for initiatives such as STRUC.
At the moment, not all relevant ship structural loads are incorporated in the STRUC software. But it is the intention to make STRUC the framework that will eventually bind together the various (hydro) mechanics prediction models for wave-induced bending moment effects, as well as non linearities, such as slamming phenomena, springing, green water loads and more.
Better insight, understanding and design considerations for ultimate loads, fatigue damage and local damage, will become possible using a comprehensive set of software tools. MARIN