



# RINA

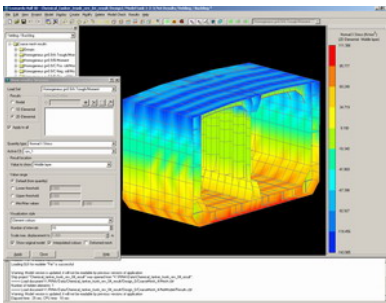
## entrusts the development of its new software for Ship Classification to Open CASCADE

S u c c e s s w i t h O p e n C A S C A D E

*"We rely on Open CASCADE services to facilitate the evolution of new software tools, allowing us to stay ahead of competition while reducing application development costs. The Open CASCADE team possesses excellent engineering and project management skills that allow them to understand our specific needs and observe tight timeframes during project implementation."*

Sauro Gazzoli,

New Products and Research  
Department Manager



### MISSION

Develop a software tool:

- providing the means for rapid development of meshed structural models of certain classes of ships;
- performing a finite element analysis of ship structures and providing visual feedback of their strength and deformations, including the fatigue check of structural details;
- including embedded RINA Rules for the structural analysis of ships by means of direct calculations;
- allowing smooth and efficient integration of RINA scantling verification Rules into the design and production process.

### SOLUTION

- Development of the Leonardo Hull 3D - Three Hold (LH3D-3H) application.
- LH3D-3H refers to structural analysis using a "three hold" approach, based on direct calculations carried out on three ship holds.
- Calculations follow RINA Rules for the Classification of Ships and assess the ship's structural compliance to these Rules.

### RESULTS

- Speed up the approval process of tankers, bulk carriers and other types of cargo ships.
- RINA's customers, i.e. shipyards now possess an easy-to-use tool for modeling and validating their ships during the production process.
- Rapid numerical simulation that meets quality requirements and represents a highly efficient replacement of older software.
- Facilities for monitoring the structural performance over the entire life cycle of a vessel and for timely maintenance support.
- Tools for reporting and communication between the shipyard and RINA.
- Reduction of the risk of delays during the drawing approval and construction phases due to early identification of critical areas.

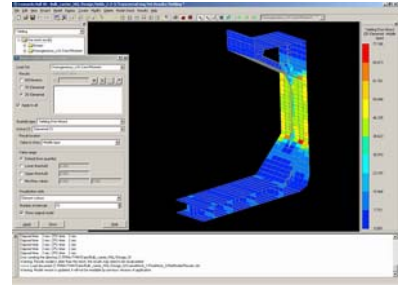
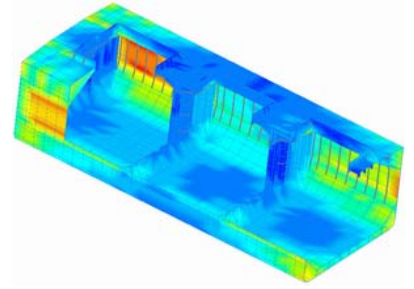




## FACT FILE

### Registro Italiano Navale (RINA)

- Established in Genova in 1861 by a group of shipowners and underwriters, Registro Italiano Navale is one of the oldest societies in the world for the classification of merchant ships. RINA is an active member of IACS (International Association of Classification Societies).
- In the marine sector, ship classification represents RINA's long-standing activity and consists in assigning a class to a ship on the basis of compliance of the design and materials used, in relation to the type of trade and ship's service, with international rules and standards.
- RINA is a member of CISO (Italian Certification of Quality Systems) and adheres to the international agreement IQNet. It is a body accredited by SINCERT (Italian Accreditation System) in a wide variety of market sectors for management system certification schemes (Quality, Environment, Safety, Automotive, Welding), products, personnel, and enables the Italian production system to make use of valid certification support.
- The certification services which RINA offers are relevant to Quality Management Systems (reference standards ISO 9000/AVSQ 94 and QS 9000/EN 729), Environmental Management Systems (reference standards ISO 14001 and EMAS), Occupational Health and Safety Management Systems (reference standard BS 8800). Moreover, RINA is accredited for Social Accountability certification (reference standard SA 8000), EC Product certification and product Life Cycle Assessment studies (LCA, reference standard ISO14040).



## MORE ABOUT THE PROJECT

### What is Leonardo Hull 3D – Three Hold?

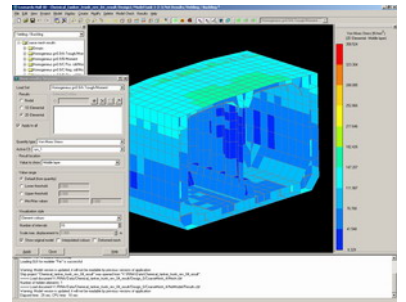
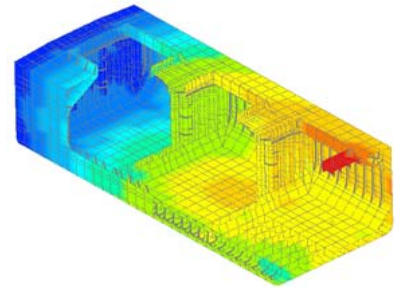
LH3D-3H software allows to create and maintain simplified finite element meshes for the structural analysis of tankers, bulk carriers and other types of cargo ships. It ensures rapid numerical simulation that meets quality requirements and represents a highly efficient replacement of the older software.

LH3D-3H allows RINA to speed the approval process and benefits shipyards by providing an easy-to-use tool for validating their 3D models well before the ship is built or repaired. In addition, ship owners will be able to monitor structural performance over the entire life cycle of a vessel and anticipate maintenance support, crucial, for example, in avoiding the disastrous consequences of large-scale oil spills.

The "3H" in LH3D-3H refers to analysis using a "three hold" approach, based on calculations carried out on three ship holds. Calculations follow RINA Rules for the Classification of Ships and assess the ship's structural compliance to these Rules.

The workflow starts from creation of a coarse mesh 3D model either by importing MSC-NASTRAN™ data files or from scratch, taking advantage of specialized features for modeling ship structures such as bulkheads and stools. The modeling is completed by the definition of structural properties, applying corrosion values and the automatic generation of loads according to RINA Rules. The most critical parts of the ship are further analyzed using finer mesh models that are easily created basing on coarse mesh data.

The strength analysis is based on the MSC NASTRAN™ solver and includes general post-processing of FEA results, and specific checks according to RINA Rules strength criteria (yielding, buckling, and fatigue). During the entire modeling and analysis process the user has full capabilities for controlling data consistency by means of visual checks and automated reports.



S U C C E S S W I T H O P E N C A S C A D E

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