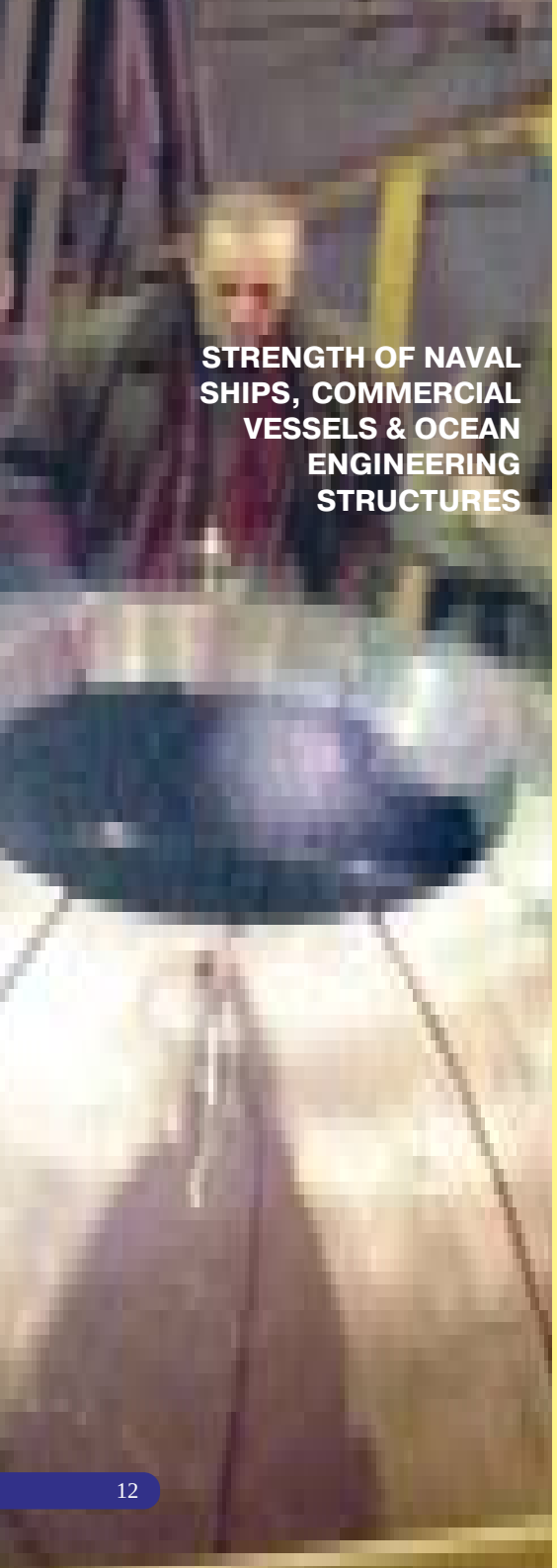


STRENGTH OF NAVAL SHIPS, COMMERCIAL VESSELS & OCEAN ENGINEERING STRUCTURES

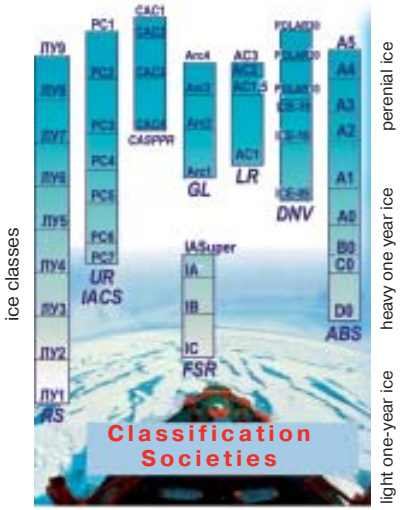
The more stringent requirements for efficiency and cost effectiveness of various marine engineering products are of more and more effect on the design of the ship hulls. Together with improvement of traditional ships the projects are evolving for new application areas requiring advanced engineering and architectural solutions. The non-traditional materials like composite materials find wider application. While increased yield strength is of primary goal when dealing with traditional materials, increased wall thickness and introduction of new welding methods are challenging the new projects.
Increased dimensions of structures call for new design models and ways to assess mechanical strength. Implementation of new materials, demands for extended service life and less consumption of materials pursue us to look for new structural solutions.
In the view of all these considerations experiments using full-scale and large-scale models are of great importance. They allow us to study the mechanisms of damage initiation and propagation, which is vital for serviceability assessment of new material structural application.
Mechanical strength investigations covered the following:

- Comprehensive analysis of hulls under various service conditions and development of procedures to assess their load and endurance to environmental effects;
- Investigation of fatigue damage initiation and propagation and ways to enhance durability of the hull structures;
- Investigation of material behaviour under real operating conditions, search for the most efficient design solutions providing for entire utilization of material strength;
- Improvement of quality control methods and structures monitoring;
- Development and practical implementation of new design methods and procedures.

STRENGTH OF NAVAL SHIPS, COMMERCIAL VESSELS & OCEAN ENGINEERING STRUCTURES

DEVELOPMENT AND JUSTIFICATION OF UNIVERSAL ICE CLASS EQUIVALENCE CRITERIA ACCEPTED BY RECOGNIZED CLASSIFICATION SOCIETIES

In recent years, the traffic intensity in the ice-covered waters and Arctic seas has considerably increased. The ships operating in these areas have been designed and built for ice classes of various classification societies as per the Client's request. To resolve problems encountered by ship owners, designers, and marine authorities the formalized procedures are required to assess equivalency of vessel capabilities, which had been designed according to various "Rules". Formulation of equivalency criterion procedure is of greater importance in view of new revisions of Ice Rules of Canada, Finland, Sweden as well as RMRS and other standards.
The new approaches introduced in the revised Rules with respect to specified ice and sailing conditions and strength regulations rule out the use the old simplified approaches that were based on direct comparison of parameters required by the Rules (dimensions of typical structures, minimum power, etc.). The obtained results of this study may be used by Marine Authorities and Classification Societies as a guide for resolving issues related to the ship entrance to the ice covered waters and harbours as well as for formulation of the RMRS position when putting together the IACS (International Association of Classification Societies) documents for ice class vessels.



R & D ASSISTANCE TO CALCULATIONS OF STRUCTURAL AND IMPACT STRENGTH OF SUBMARINE HULL AT COLLISIONS AND ACCIDENTS

Assurance of damage control and safety (primarily nuclear safety) of submarine at collisions or hitting the seabed due to the flooding requires reliable prediction of load cases, dynamic responses and the scale of potential structural damage as well as evaluation of loads (accelerations) transferred to equipment and affecting the crew.
Achieving this target has required to:

- Identify possible scenarios and design conditions for collisions;
- Develop a model of plastic deformation and failure (breach) for the submarine pressure hull at collision with the ship stem or fore end of ramming submarine;
- Make the qualitative analysis of plastic deformation for the submarine fore end when hitting the barrier (hull); the fore ends under study included:
  - Ship end with transverse and longitudinal & transverse framing;
  - Ship end with transverse framing and continuous along the end length longitudinal bulkheads and platforms;
  - Ship end with developed SONAR