Tank Testing

We provide tank testing services and also technical advice for the improvement of propulsive performance and energy efficiency.

1. Testing

We manufacture highly accurate ship models and perform high quality tank tests which can be immediately adapted to actual ship construction and new hull development. The results of these tank tests can be used for EEDI\textsuperscript{1} verification.

- Resistance and self propulsion tests
- Wake measurements
- Cavitation tests
- Maneuverability tests (PMM tests)
- Free running tests
- Free rolling tests
- Propeller open-water tests
- Tests in waves
- Wind resistance tests
- Flow visualization tests

\textbf{Note 1: EEDI}

In response to increasing awareness of global warming in recent years, the shipping and shipbuilding industries have started various initiatives aimed at reducing ship greenhouse gas emissions. In July 2011, the International Maritime Organization (IMO), a specialized UN agency, adopted amendments to international conventions requiring the Energy Efficiency Design Index (EEDI) values for carbon emissions per ton-mile of goods transported to be below certain reference values. Regulations will be incrementally increased from 2013, in the future only permitting the commissioning of ships showing 30\% improvements over current ship averages on this indicator. Construction agreements thus require obtaining advance certification, confirmed through model testing, that the ship will clear the reference values. SRC can assist in hull and technical development to meet EEDI regulations through various testing.

2. Technical Advice for Propulsion Performance and Energy Efficiency Improvements

We offer our customers advice on how to improve propulsion performance and deal with flaws, as well as assistance in new hull and concept ship development. In doing so, we make full use of various hull tests and computational fluid dynamics (CFD) for ships in order to complement our extensive skills and knowledge on ship performance which we have honed to date.

- Suggestions to improve mother ship hulls and performance
- Suggestions to improve course stability, maneuverability and noise abatement

\textbf{Performance improvement proposals}

- Hybrid counter-rotating propulsion system
- High-performance propeller matched to hulls
Ship Design and Supervision during Construction

We provide assistance in design, construction and maintenance of ships and marine facilities.

1. Assistance for Ship Design and Shipbuilding

- Initial Design of Ship
  We provide initial ship design services for various kinds of ships in accordance with the client's request.

- Supervision during Construction
  We assist in smooth construction by reviewing the various drawings, offering support for various checks of the hull and equipment during construction and supervising the construction schedule.

Since 1989, we have been involved in the initial design of 120 vessels and supervised the construction of 106 vessels, mostly for ships owned by local governments. (As of Mar. 31, 2013)

2. Examination Work for Ship Maintenance

- Ship Stability Assessment
  We provide consulting services for ship stability which is one of the most important factors for the safety of ships.

- Examination of floating oil storage barge for long-term maintenance

- Examination of fishing vessels for maintenance
**Overseas Cooperation**

**Consulting Services on Economic and Technical Cooperation Projects**

We assist with the facilitation of economic and technical cooperation projects through project feasibility studies, basic ship design, supervision during construction and other technical consulting services.

- Project finding and formation
- Feasibility studies for economic and technical cooperation projects
- Basic ship design for overseas cooperation projects
- Supervision during construction for overseas cooperation projects
- Follow-up on finished projects

![Field surveys for basic design](image1)

![Technical meeting during construction](image2)

![People celebrating the maiden voyage of a newly built ferry](image3)

**Technology Development**

**We have made contributions to ship innovations in terms of hull form design systems and new concept ship development.**

**New Concept Ship Development**

With our ship technology, we can develop new concept ships and propose improvements for hull forms and other ship components.

**Example concept ship designed by SRC**

- Realized double hull design of 749GT coastal black product tanker by introducing single pod electric propulsion system.
- Designed new coastal cargo ship with good habitability which applies the new ILO Convention without reducing cargo capacity
- Developed NOBS and MIBS to minimize required ballast water
- Developed the trimaran hull

![Cross-section comparison of conventional ship and NOBS/MIBS](image4)

**Note 2: NOBS / MIBS**

A vessel loads sea water as a ballast to maintain required draught, trim and stability. The ballast water contains many marine organisms from sea water taken from the area. These organisms can adversely impact the marine ecosystem around discharge areas. In response to this, IMO adopted the Ballast Water Management Convention in 2004 to prevent the spread of harmful marine organisms from one area to another, by establishing standards for the management and control of ballast water.

However, ballast water control systems not only increase cost but can also reduce cargo spaces. Under these circumstances, SRC proposed a non-ballast water ship (NOBS) and minimal ballast water ship (MIBS) and demonstrated the economic efficiency and environmental performance of these proposals.
**Training and Technical Services**

We offer training and technical services for the persons engaging in maritime fields.

1. **Training Related to International Maritime Treaties and Conventions**

   With our extensive technical knowledge and experience in maritime technology, we offer training services for maritime personnel in developing countries.

   - Training in international maritime conventions and ship safety inspections
   - Training in PSC implementation
   - Training in specific items to be implemented at the request of the governments of developing countries

   We have trained 832 trainees from 55 developing countries under JICA training projects and trained 584 trainees on PSC implementation from 52 countries under the Tokyo MOU Secretariat project. (As of Mar. 31, 2013)

2. **Technical Seminars and Committees for R&D of Hull Form etc.**

   We hold technical seminars and organize the following committees etc. for developing hull forms in order to support and help improve the engineering capabilities of the shipbuilding industry.

   - **Technical seminars**
     - Public technical seminars are annually held to introduce the latest engineering epochs etc. which help to the progress of the maritime industry.
   - **Hull Research Committee (HRC)**
     - A committee joined by the research members of specified shipbuilders and SRC to develop better hull form by studying and conducting tank tests.
   - **Ship Performance Calculation Group (SPCG)**
     - An engineering group joined by research members of specified ship builders and SRC to develop better hull form by using CFD.
   - **Technical bulletin (SRC News)**
     - Technical bulletins are regularly published to introduce the latest engineering news and the technical review of various matters developed by SRC etc.