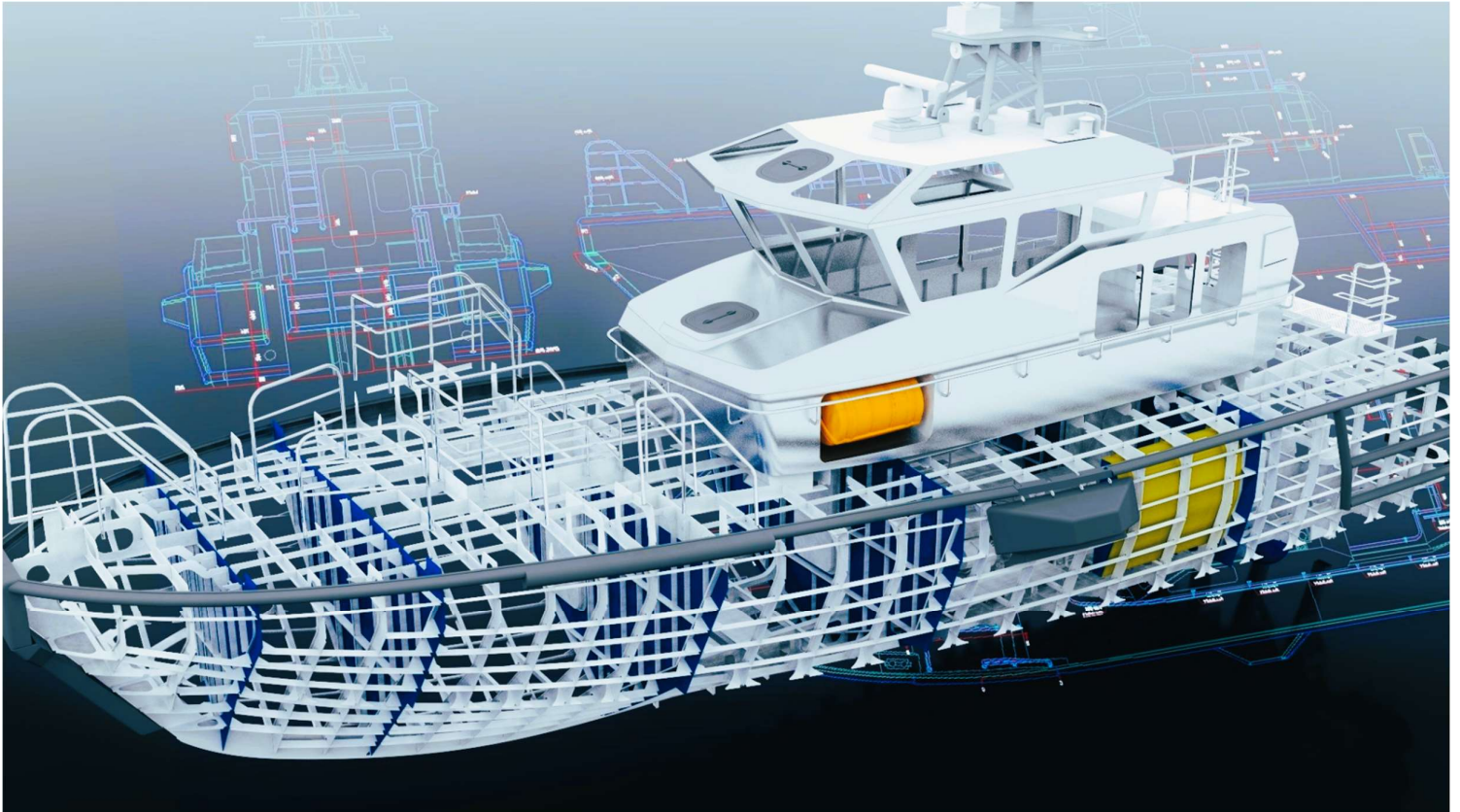


Ship Consulting Services

Naval Architecture & Marine Engineering



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Guayaquil, Ecuador: https://www.romv-sdci.ec/products/consulting_serv

Ship Design Philosophy

Constraints

Every ship design must satisfy a purpose and this is usually defined in the Shipowner's Requirements. While the shipowner's requirements are not really constraints they set the boundaries for the design. *"Physical constraints might be applied to the design itself for any one of three reasons: the need to build the ship in a specific shipyard and then get it to sea, the need to maintain the ship during its service life, and the need for the ship to visit specific ports"*.

Philosophy

A design philosophy is a weighted list of desired design/ship attributes that is used in the evaluation of design alternatives. Examples of such attributes include:

- First cost,
- Operating cost,
- Manning,
- Producibility,
- Operability,
- Maintainability,
- Reliability,
- Mission capability,
- Sustainability,
- Supportability, and
- Risk (cost, schedule and technical).

Degree of Uniqueness

Contemporary designs cover the gamut in terms of their uniqueness. Some new designs are very similar to existing ships with modest changes, for example, somewhat more or less propulsion power or payload. Other designs reflect significant changes from current practice in specific respects, the propulsion plant type might be an example, but in all other respects they are not unique. At the extreme, and quite rare, is the design that is very different from anything considered before. The rare unique design is not only an exciting challenge for the naval architect but it affects the approach to early stage design as well. This, in turn, might require a major effort to assess the anticipated hydrodynamic loads on the structure. The point designs, once they have been developed, can be used as parents to explore the effects of parametric variations in other, second order parameters. For the unique design, early stage design progress is slower, more difficult, and the design results are much less certain, that is, there is a higher degree of risk in the results of early stage studies of unique designs.

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Ship Design Scope of Work

Naval Architecture & Marine Engineering Assignments

To perform all work on a design project, we consider the following activities as included in our design services:

- Technical analyses including analyses of shipboard systems and structures to determine applicability and optimize use of equipment and space and vibration analyses.
- Calculations in support of submitted designs in the form of reports and sketches will be indexed and stamped by a professional engineer for record keeping and filing with the customer regulation.
- Design of shipboard electrical and mechanical systems and structure including but not limited to the following:
 - Electrical systems including ventilation, steering, air conditioning, vehicle, passenger and crew space lighting and electrical support systems, ships navigation electrical systems including navigation lights, radios, radars, and depth finding systems, electrical systems for habitability systems including galley equipment, and various electrical motors and systems including boat davits, winches and anchoring systems, boat handling equipment, and mooring and anchoring equipment, corrosion control cathodic protection, machinery automation and monitoring and alarm systems, steering controls, propulsion controls, propeller controls, and generator controls.
 - Vessel structure including shell plating, frames, strength members, hull lines, vessel stability, habitability features for passenger and crew spaces, and boats and lifesaving equipment.
 - Mechanical systems including vessel main engines, generators, steering systems, heating, ventilation, air conditioning, firefighting, compressed air, hydraulics, freshwater, sanitation systems, boat handling equipment, and mooring and anchoring equipment.
- Ship checks to ascertain existing conditions in preparation for design development.
- Feasibility studies to determine efficacy and and/or cost benefit of various engineering approaches to solutions of problems or dealing with situations requiring attention, correction, or improvement.
- Drawing and specification preparation in support of Ship Preservation, Improvement, Life Extension, New Construction, and Repair and Maintenance work.
- Cost estimate reports for design work and/or production work for implementation of designs.
- Design support during Ship Preservation, Improvement, Life Extension, New Construction, and Repair and Maintenance work.
- Public involvement: Coordinate, plan, prepare for, and attend coordination, progress, or presentation meetings with the customer and/or other representational officials, groups and/or individuals as may be requested.
- Co-location: Provide on-site technical and non-technical personnel to participate in project design teams led by our managers or other consultant project managers according to custom project methodologies.
- Perform other related assignments as requested by the customer.

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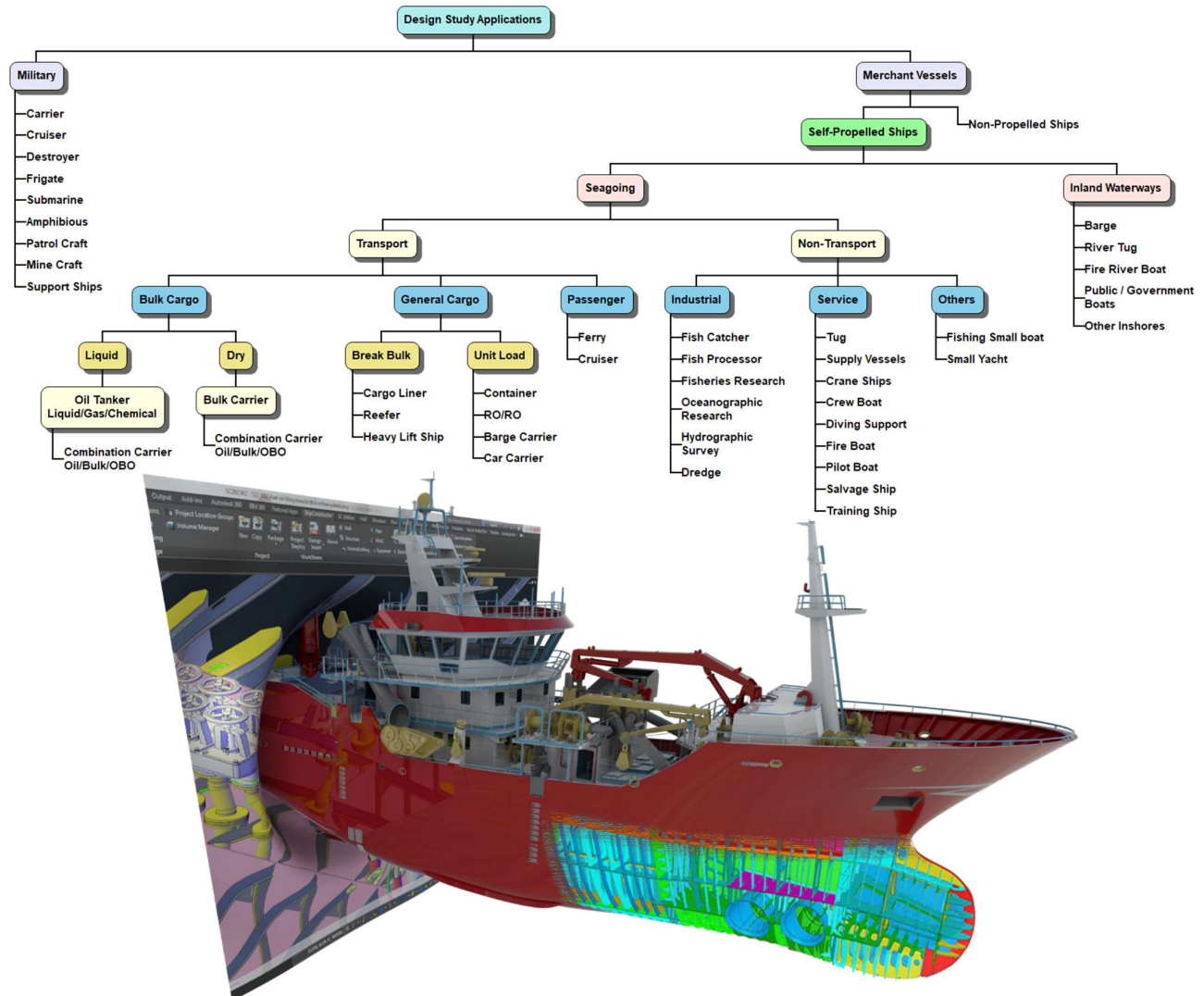
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Ship Consulting Study Applications

Categories

For the **scope of work**, we classify all ships based on floating structures Military and Merchant, later non propelled and self-propelled, seagoing and Inland Waterways, finally Transport and Non-Transport. transport and non-transport, with three and four sub-categories, respectively. Our process description applies to all of the sub-categories. We incorporate simplified and effective design exploration models with the ability to quickly generate ship characteristics corresponding to various combinations of payload and speed. Our models estimate the capital and operating costs for each alternative. Optimization techniques may be applied to the major variables to compare alternatives and search for the optimum or graphical output of performance metrics shown for the study option space so that a human decision-making selection can be made at the customer side.



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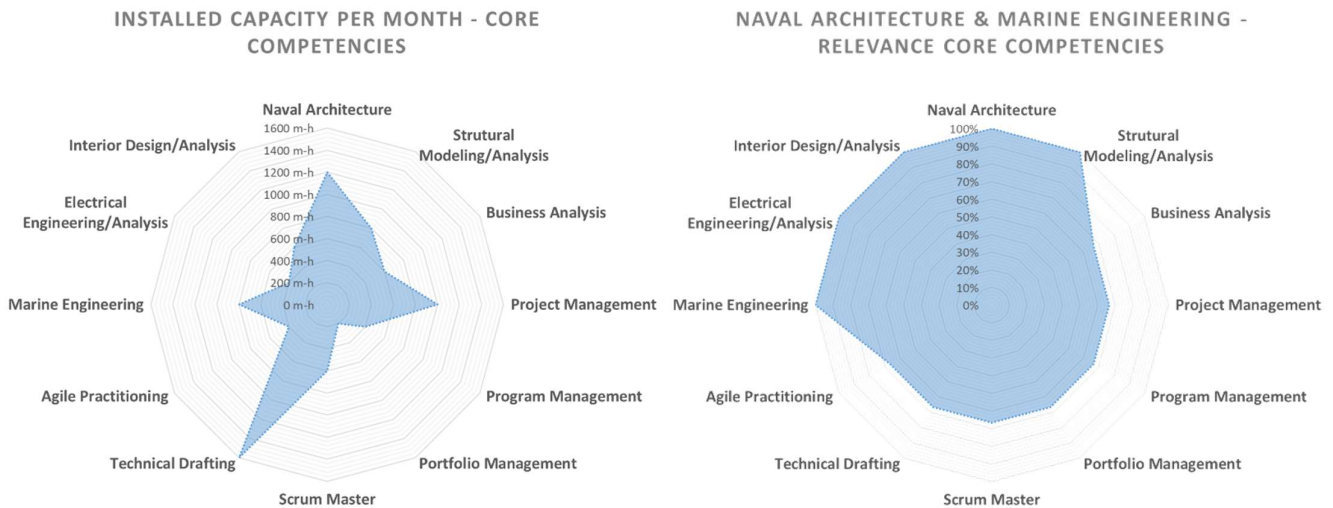
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Naval Architecture & Marine Engineering

Our Team

Competencies Radar

As a project must be well conceived and adequately financed, our resources are specialists, and experienced consultants, skillfully coordinated and managed to reach **project success** as customer it defines. We know the larger and more complex the project, the more critical this overall management function becomes, for that reason and based on our research, **we have identified twelve core competency** areas strictly considered in our services. These knowledges area have three pillars. **The first pillar** contains general management skills such as leadership, negotiation, communication, team building and other human resource management skills that are necessary in any management position. **The second pillar** contains knowledge of the accepted project management areas including the tools used in ten knowledge areas (such as project scope, time, cost, quality, resources, procurement, communication, risk, stakeholder, and integration management). **The last pillar** contains naval architecture and marine engineering specific management knowledge, such as lifecycle management and product development methodologies. We have an **Installed Capacity** of 8600-man hours each month distributed in two physical offices, Guayaquil and Duran, Ecuador, and we dedicate partial of the capacity for **Naval Architecture & Marine Engineering calculations and reports, accordance to Relevance Core Competencies:**



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Deliverables

A. Stability and Strength

1. 3D Hull form design for displacement / semi displacement / high speed planing hulls, and hydrofoils
2. 3D 5-axis mill-ready geometry, 2D hull jig & small part jig kits, lines & offsets
3. Hydrostatics, trim & stability, inclining, weight estimates.
4. Damage stability computations and probabilistic damage stability analysis
5. Stability booklets – Satisfies IMO / MARPOL / any other statutory stability criteria.
6. Tonnage and freeboard calculations
7. Load line calculations
8. Deadweight survey and inclining experiments
9. General arrangements, exterior styling, yacht design
10. Loading manual
11. Metal Structural design & Scantling computations, fabrication details
12. Composites design and Scantling computations, fabrication details
13. Finite element design, analysis and recommendations
14. Regulatory & Rule based compliance, ABYC, CE, ABS, DNV, MCA. DNV, BV, LR, RINA, ABS, etc.
15. Custom one-off projects, cranes, davits, hardtops, & masts

B. Resistance, Propulsion & Vibration

1. Powering & resistance, performance prediction, propellers,

2. Engines repower, mechanical refits, machinery foundations.

3. Ship standardization Trials Terms

4. Main Propulsion Machinery Frequency-Domain Vibration Analysis

5. Main Propulsion Machinery Resonance and Critical Vibration Analysis

6. Dynamic Unbalance, SAG & GAP, and Misalignment Calculations

7. Dynamic Shaft Stress Analysis

8. Longitudinal, Torsional and Lateral Vibration Analysis for propulsion shaft lines

9. Structural Resonance and Critical Vibration Analysis

C. Motion in Waves & Controllability

1. Ship motion analysis in Regular and irregular Seaway

2. Powering in a seaway and added resistance computations.

3. Analysis and simulations with forward motions, stationary or free-floating bodies

4. Model Test, Full Scale Trials, and Scale

5. Ship design with Seakeeping Constraints

6. Analysis of Course Keeping Controls-Fixed Stability

7. Hydrodynamics analysis & CFD of Control Surfaces.

8. Maneuvering Trials and Performance development

9. Design of Rudder and Other Control Devices.

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Naval Architecture & Marine Engineering Cost Estimation

About Calculation Requirement

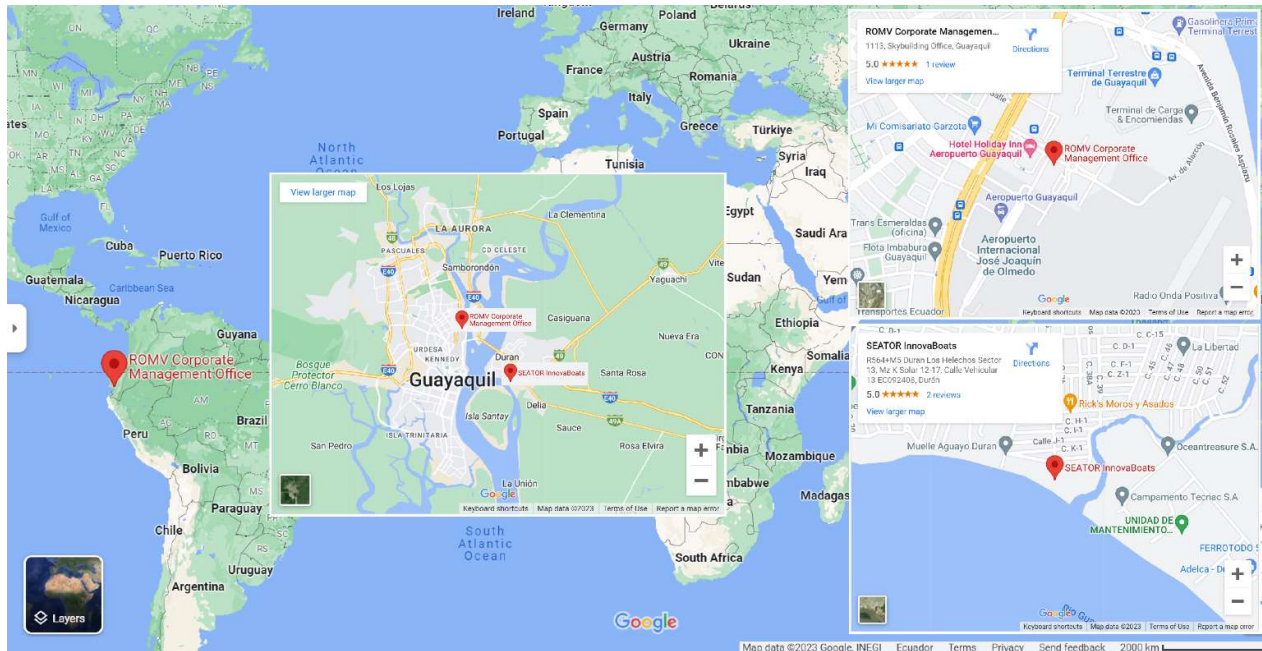
Our cost estimation during feasibility study activities is at a very high level and makes rather broad assumptions about the ship design, its general mission, and its physical and operational characteristics. We dedicate experienced consultants making broad assumptions about the general methods and organization of the design, engineering, and construction processes, and as a rough order of magnitude we prepared this cost estimation for floating structures applications, Merchant Vessels and Naval Vessels:

| Application | Calculation / Report | Estimated man-hours | Starting at |
|--|--|---------------------|----------------|
| A- Stability and Strength | 1. 3D Hull form design for displacement / semi displacement / high speed planing hulls, and hydrofoils | 100 | \$ 5.488 (USD) |
| | 2. 3D 5-axis mill-ready geometry, 2D hull jig & small part jig kits, lines & offsets | 60 | \$ 3.293 (USD) |
| | 3. Hydrostatics, trim & stability, inclining, weight estimates. | 30 | \$ 1.646 (USD) |
| | 4. Damage stability computations and probabilistic damage stability analysis | 100 | \$ 5.488 (USD) |
| | 5. Stability booklets – Satisfies IMO / MARPOL / any other statutory stability criteria. | 50 | \$ 2.744 (USD) |
| | 6. Tonnage and freeboard calculations | 40 | \$ 2.195 (USD) |
| | 7. Load line calculations | 25 | \$ 1.372 (USD) |
| | 8. Deadweight survey and inclining experiments | 40 | \$ 2.195 (USD) |
| | 9. General arrangements, exterior styling, yacht design | 255 | \$13.994 (USD) |
| | 10. Loading manual | 240 | \$13.171 (USD) |
| | 11. Metal Structural design & Scantling computations, fabrication details | 500 | \$27.440 (USD) |
| | 12. Composites design and & Scantling computations, fabrication details | 270 | \$14.817 (USD) |
| | 13. Finite element design, analysis and recommendations | 210 | \$11.525 (USD) |
| | 14. Regulatory & Rule based compliance, ABYC, CE, ABS, DNV, MCA, DNV, BV, LR, RINA, ABS, etc. | 250 | \$13.720 (USD) |
| | 15. Custom one-off projects, cranes, davits, hardtops, & masts | 120 | \$ 6.586 (USD) |
| B- Resistance, Propulsion & Vibration | 1. Powering & resistance, performance prediction, propellers, | 30 | \$ 1.646 (USD) |
| | 2. Engines repower, mechanical refits, machinery foundations. | 100 | \$ 5.488 (USD) |
| | 3. Ship standardization Trials Terms | 300 | \$16.464 (USD) |
| | 4. Main Propulsion Machinery Frequency-Domain Vibration Analysis | 150 | \$ 8.232 (USD) |
| | 5. Main Propulsion Machinery Resonance and Critical Vibration Analysis | 120 | \$ 6.586 (USD) |
| | 6. Dynamic Unbalance, SAG & GAP, and Misalignment Calculations | 130 | \$ 7.134 (USD) |
| | 7. Dynamic Shaft Stress Analysis | 70 | \$ 3.842 (USD) |
| | 8. Longitudinal, Torsional and Lateral Vibration Analysis for propulsion shaft lines | 210 | \$11.525 (USD) |
| | 9. Structural Resonance and Critical Vibration Analysis | 100 | \$ 5.488 (USD) |
| C- Motion in Waves & Controllability | 1. Ship motion analysis in Regular and irregular Seaway | 100 | \$ 5.488 (USD) |
| | 2. Powering in a seaway and added resistance computations. | 30 | \$ 1.646 (USD) |
| | 3. Analysis and simulations with forward motions, stationary or free-floating bodies | 40 | \$ 2.195 (USD) |
| | 4. Model Test, Full Scale Trials and Scale Reports | 60 | \$ 3.293 (USD) |
| | 5. Ship design Revision with Seakeeping Constraints | 65 | \$ 3.567 (USD) |
| | 6. Analysis of Course Keeping Controls-Fixed Stability | 100 | \$ 5.488 (USD) |
| | 7. Hydrodynamics analysis & CFD of Control Surfaces. | 190 | \$10.427 (USD) |
| | 8. Maneuvering Trials and Performance development | 90 | \$ 4.939 (USD) |
| | 9. Design of Rudder and Other Control Devices. | 70 | \$ 3.842 (USD) |

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