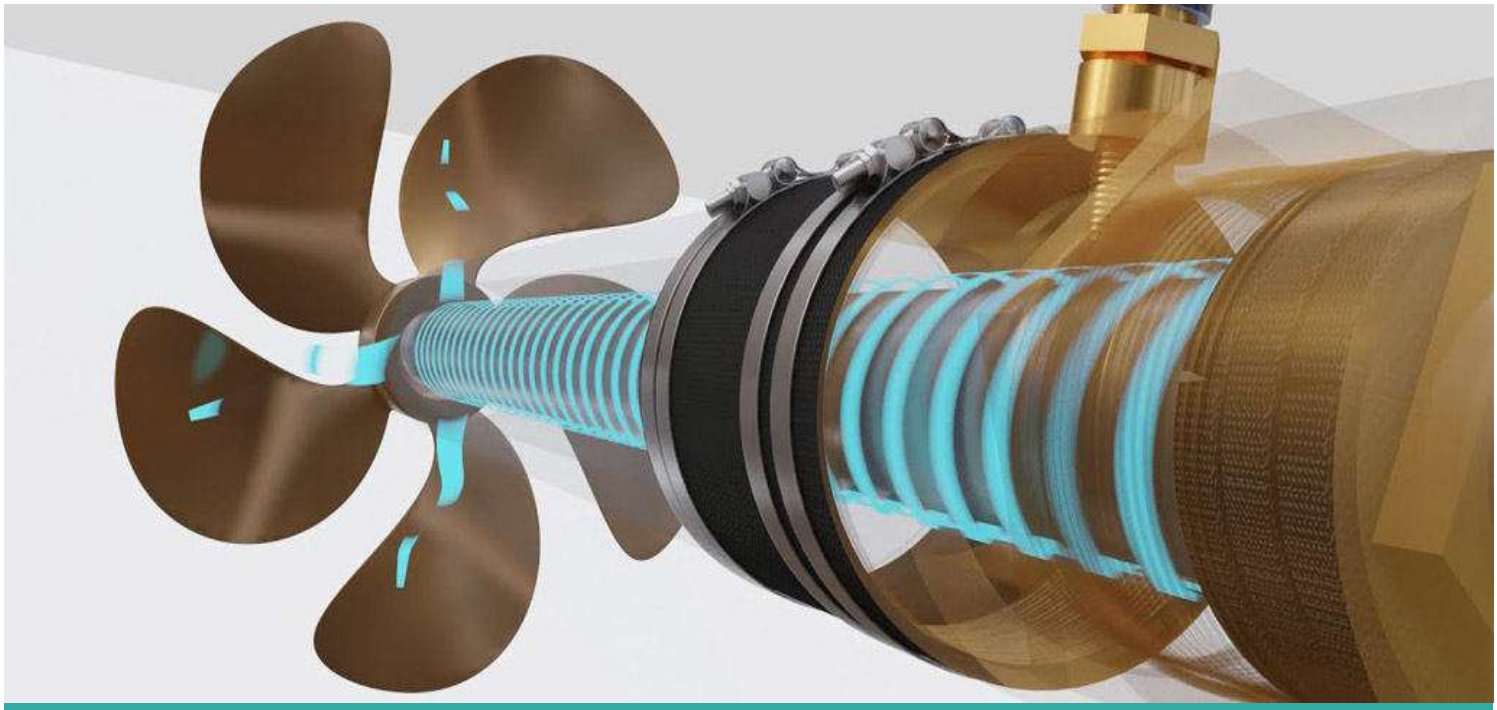
Ship Consulting Services

Equipment & Machinery



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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.

Ship Design Scope of Work

Naval Architecture & Marine Engineering Assignments

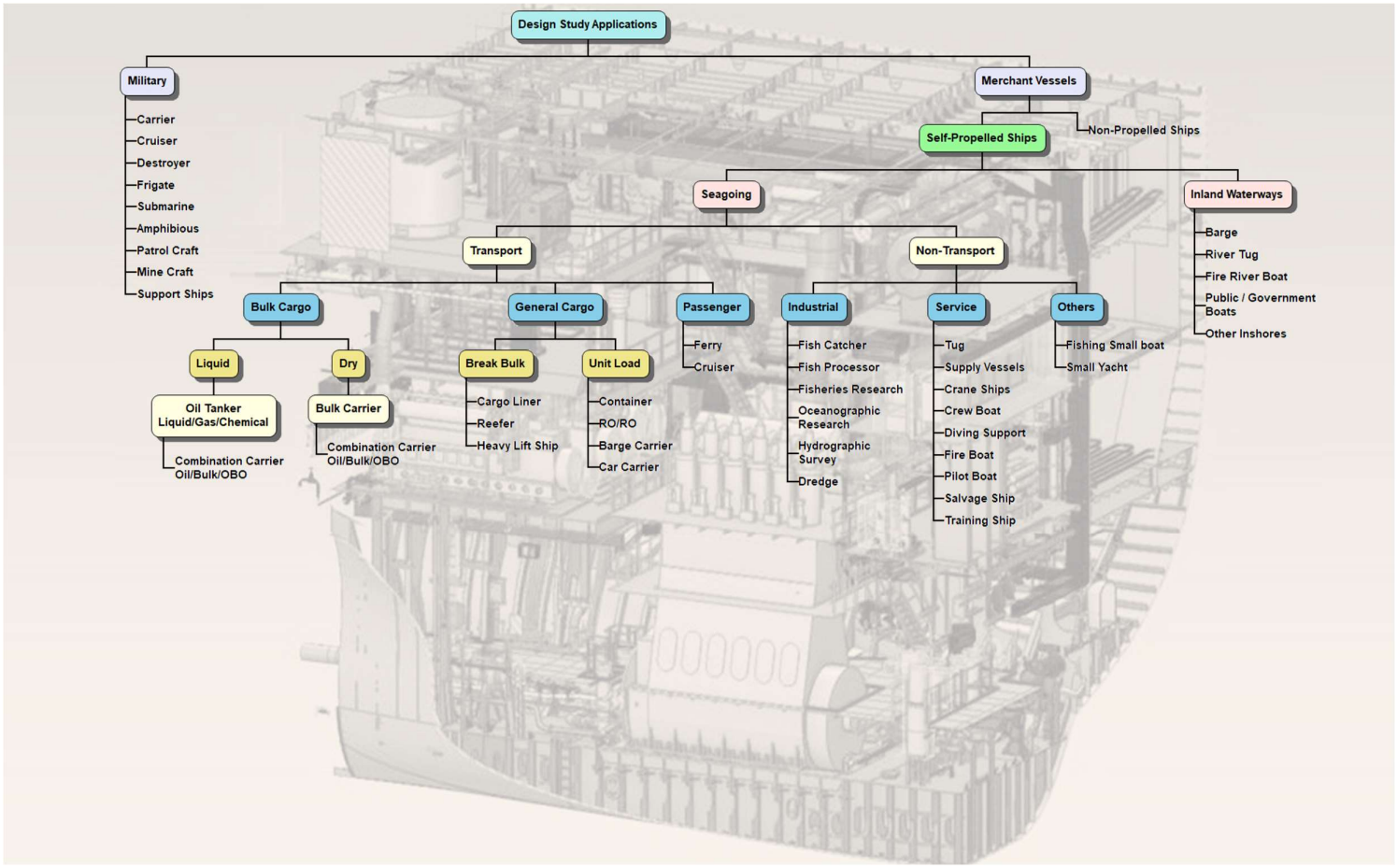
To perform all work on a design project, we consider the following activities as included in our design services:

- 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.

Ship Consulting Study Applications

Categories

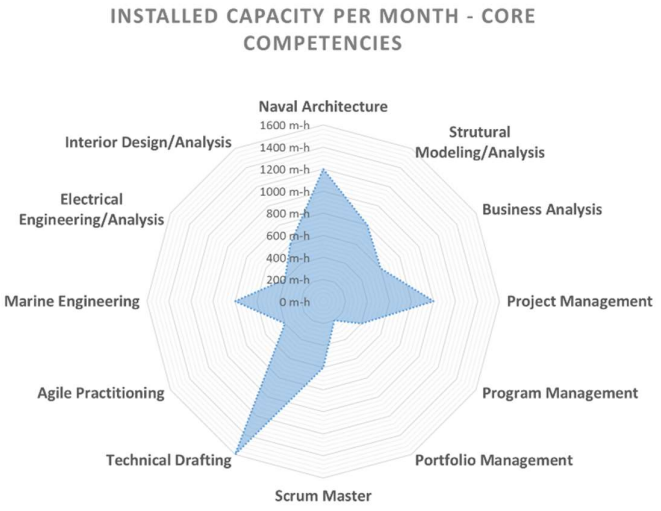
For the **scope of work**, we classify all ships based on floating structures Military and Merchant, later non propelled and self-propelled, seagoing and Inland Waterways, finally Transport and Non-Transport. transport and non-transport, with three and four sub-categories, respectively. Our process description 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.

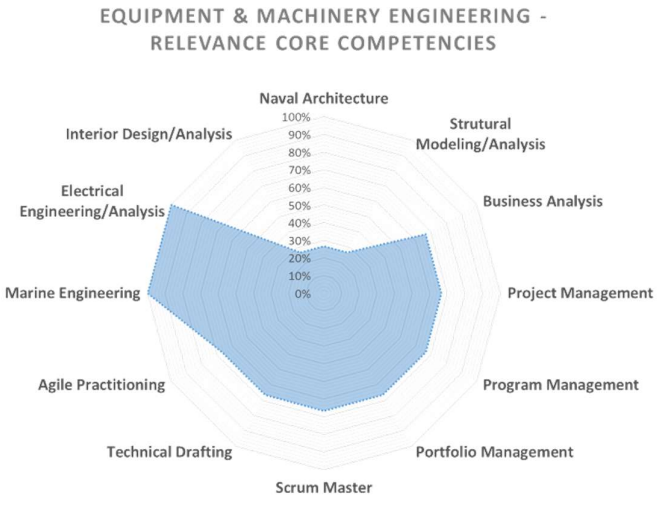


Our Team

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 **Equipment & Machinery calculations and reports, accordance to Relevance Core Competencies**:





Equipment & Machinery Engineering Services

Deliverables

A. Hull Equipment Calculation & Reports

1. Endurance & Range calculation
2. Mass properties engineering & Weight distribution curves calculation & report.
3. Equipment Numeral for Class requirements
4. Docking & Launching Calculation, Plan & Report
5. Bollard Pull Calculation, Plan & Report
6. Turning Circle Calculation, Plan & Report
7. Fire & Safety Plan
8. Sounding Tables
9. HVAC Calculation, Arrangement & Report
10. Mooring & Anchoring Calculation, Plan & Report
11. Shaft line Calculation, Arrangement & Report
12. Engine Room Arrangement
13. Propulsion set resin shock calculation.
14. Rudder stock calculation
15. Fresh water-cooling piping diagram calculation and preparation
16. Sea water piping diagram calculation and preparation
17. Exhaust gas piping diagram calculation and preparation
18. Lubricating oil piping diagram calculation and preparation
19. Fuel oil service piping diagram calculation and preparation
20. Sanitary Bilge piping diagram calculation and preparation
21. Bilge, Fire & General Service piping diagram calculation and preparation
22. Venting & sounding piping diagram calculation and preparation
23. Hydraulic systems piping diagram calculation and preparation.
24. Thermal Insulation Arrangement preparation
25. Others auxiliary systems diagram calculation & preparation
26. Corrosion protection design & calculation

B. Electrical Calculations & Reports

1. Load Balance & Analysis for DC / AC circuits
2. Short circuit calculation & analysis
3. Shore connection electric analysis
4. Lighting System diagrams
5. Navigation system diagrams
6. On-line key diagrams

Equipment & Machinery 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.Hull Equipment Calculation & Reports	1. Endurance & Range calculation	100	$ 5.705 (USD)
	2. Mass properties engineering & Weight distribution curves calculation & report	40	$ 2.282 (USD)
	3. Equipment Numeral for Class requirements	10	$ 571 (USD)
	4. Docking & Launching Calculation, Plan & Report	20	$ 1.141 (USD)
	5. Bollard Pull Calculation, Plan & Report	10	$ 571 (USD)
	6. Turning Circle Calculation, Plan & Report	10	$ 571 (USD)
	7. Fire & Safety Plan	40	$ 2.282 (USD)
	8. Sounding Tables	20	$ 1.141 (USD)
	9. HVAC Calculation, Arrangement & Report	120	$ 6.846 (USD)
	10. Mooring & Anchoring Calculation, Plan & Report	60	$ 3.423 (USD)
	11. Shaft line Calculation, Arrangement & Report	80	$ 4.564 (USD)
	12. Engine Room Arrangement	90	$ 5.135 (USD)
	13. Propulsion set resin shock calculation.	7,5	$ 428 (USD)
	14. Rudder stock calculation	10	$ 571 (USD)
	15. Fresh water-cooling piping diagram calculation and preparation	30	$ 1.712 (USD)
	16. Sea water piping diagram calculation and preparation	15	$ 856 (USD)
	17. Exhaust gas piping diagram calculation and preparation	30	$ 1.712 (USD)
	18. Lubricating oil piping diagram calculation and preparation	60	$ 3.423 (USD)
	19. Fuel oil service piping diagram calculation and preparation	30	$ 1.712 (USD)
	20. Sanitary Bilge piping diagram calculation and preparation	30	$ 1.712 (USD)
	21. Bilge, Fire & General Service piping diagram calculation and preparation	30	$ 1.712 (USD)
	22. Venting & sounding piping diagram calculation and preparation	30	$ 1.712 (USD)
	23. Hydraulic systems piping diagram calculation and preparation.	60	$ 3.423 (USD)
	24. Thermal Insulation Arrangement preparation	20	$ 1.141 (USD)
	25. Others auxiliary systems diagram calculation & preparation	10	$ 571 (USD)
	26. Corrosion protection design & calculation	15	$ 856 (USD)
B.Electrical Calculations & Reports	1. Load Balance & Analysis for DC / AC circuits	60	$ 3.423 (USD)
	2. Short circuit calculation & analysis	10	$ 571 (USD)
	3. Shore connection electric analysis	10	$ 571 (USD)
	4. Lighting System diagrams	30	$ 1.712 (USD)
	5. Navigation system diagrams	60	$ 3.423 (USD)
	6. On-line key diagrams	30	$ 1.712 (USD)

Ship Consulting Services

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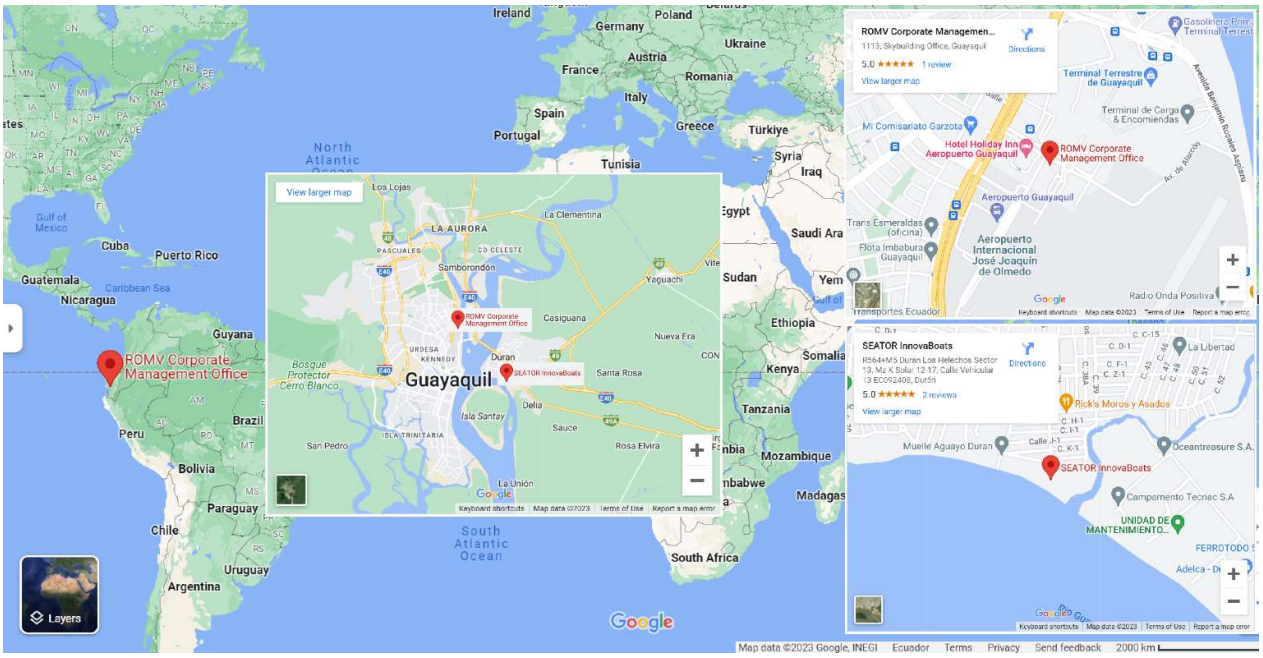
General Guidance & Administration
Hull Structure . Propulsion Plant . Electric Plant
Command & Surveillance . Auxiliary Systems
Outfit & Furnishings . Integration & Engineering
Ship Assembly & Supporting . Loads & Margins



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