REPUBLIC OF THE PHILIPPINES
MARITIME INDUSTRY AUTHORITY

TERMS OF REFERENCE (TOR)
PROCUREMENT OF THE NAVAL ARCHITECTURE/ MARINE SOFTWARE

I.   BACKGROUND

The Shipyard Regulations Service (SRS) of the Maritime Industry Authority (MARINA) and the Maritime Regional Offices (MRO) are tasked to perform the review and approval of ship plans pursuant to Presidential Decree No. 1059 and issuance of corresponding certifications (i.e. Stability Certificate, Coastwise and International Loadline Certificate, Stability Booklet, etc.) pursuant to Executive Order No. 125/125-A. To date, this process has remained a manual and tedious procedure that could last several months due to the complexity and multitude of the amount of information that must be calculated. Furthermore, the results brought about by this complex manual process are prone to errors.

Considering the complexity of the manual process of the review and evaluation of ship plans, the SRS proposed the procurement of naval architecture/ marine software since 2005 and until this time the proposal was consistently pursued and repeatedly included in the Annual Procurement Plans of the SRS.

It is with ship safety and the lives of millions of sea-going passengers in mind that the SRS has come to realize the need for a naval architecture/ marine software that aims to respond to the objectives outlined in this TOR.

II.   OBJECTIVE

The objective of this project is to enhance the capabilities of the SRS and MROs through the use of naval architecture/ marine software in the conduct of vessel plans approval and other related functions, in consonance with the Authority's mandates and objectives:

(a). To enhance the domestic capability for shipbuilding, repair and maintenance of the country;

(b). To provide the necessary technological assistance;

(c). To provide for the effective supervision, regulation and rationalization of the organizational management, ownership and operations of all water transport utilities and other maritime enterprises;

(d). To ensure and enforce that all Philippine-registered ships comply with safety and environmental standards set by applicable conventions, codes and regulations;

(d). To create a modern and vibrant domestic merchant fleet;

(e). To provide wider and timely service to MARINA clients;

(g). To enhance competency, motivation and values of MARINA personnel; and,

(h). To develop an **IT-ENABLED AGENCY**.

The naval architecture/ marine software will greatly enhance the SRS/MRO's capability to review, analyze and approve/disapprove applications for ship plans approval, stability certificates, coastwise and international loadline certificates, and other pertinent design or construction/ statutory certificates which may be required based on internationally and locally established rules and regulations. Furthermore, the software will allow MARINA Central & Regional offices access to a database of ships' technical designs, 3-D CAD/CAM drawings, complete with hydrostatics calculations and corresponding hydrostatic graphs.

III. SCOPE OF WORKS

The Supplier shall supply, install, train and commission **naval architecture/ marine software** with pertinent computer hardware with 3-D CAD/CAM modeling capabilities, and the capability to perform analyses on ship hydrostatics, stability, seakeeping, powering, structural strength, and criteria checks with Technical Specifications detailed in section 0 herewith.

IV. TECHNICAL SPECIFICATIONS

1. Ship Database

(a). **User Login**. The system shall have a section that will allow for user administration wherein Administrators may manage system users and their corresponding privileges in accessing the system.

(b). **Shipowner Information**. The system shall have a section that will allow authorized users to encode and manage shipowner information. Shipowner Information shall include the following information:

- Company name
- Address
- Name(s), Designation(s) and Contact Detail(s) of officers
- Others, etc.

(c). Shipbuilder/Repairer/Ship Designer Information. The system shall have a section that will allow authorized users to encode and manage Shipbuilder/ Repairer/Ship Designer information. Shipbuilder/Repairer/Ship Designer Information shall include the following information:

- Shipyard name
- Address
- Name(s), Designation(s) and Contact Detail(s) of officers
- Others, etc.

(d). Ship Information. The system shall have a section that will allow authorized users to encode and manage basic Ship Information. Ship Information shall include the following key information:

- Owner
- Builder
- Designer
- Name
- Type
- Registration Number
- GT
- Overall Length
- Hull Length
- Breadth
- Draft
- Maximum Crew
- Maximum Capacity (in Persons)

(e). Ship Technical Information. The system shall have a section that will allow authorized users to upload and manage technical and design information about a ship, which shall include the following:

- 3D CAD/CAM drawings
- Hydrostatics information
- Hydrostatic graphs
- Stability Booklet
- Compliance with stability rules and regulations

(f). Audit Trail. The system shall have the capability to record user activities and report all actions made by user, to include any historical changes made to any information within the system to include but not limited to:

- User name
- Workstation identification
- IP Address
- MAC Address

- Date and Time
- Action Performed
- Old Data
- New Data

2. **Naval Architecture/ Marine Software Modeling Capabilities**

   (a). Multiple Surface Capabilities. The software must be capable of modeling any number of 3D surfaces in any given design. This feature will allow for the creation of any type of hull forms.

   (b). In order to allow the user to quickly model ships of standard designs, the software must have the feature to allow the user to quickly create any of the following pre-defined ship types:

   - Hard Chine Hulls
   - Offshore Supply ships
   - Yachts
   - RIBS Ships
   - Cago Ships
   - Catamarans

   (c). The software must be able to group ship parts into assemblies for easy grouping and navigation within a ship. The ability to group modelled parts into assemblies simplifies modeling as design components are grouped together systematically or as desired by the user.

   (d). In order to provide the user with easy access to the 3D model, design raw data, and analytical data, the program must be able to simultaneously display on screen any of the following information:

   - Perspective View
   - Plan View
   - Profile View
   - Body Plan
   - Calculations Table
   - Control Points
   - Curve Control Points
   - Curve of Areas
   - Table of Curves
   - Table of Markers
   - Table of Offsets
   - Table of Surfaces

(e). In order to quickly determine basic hydrostatics properties of the ship being modelled, the software should be able to provide instantly the following basic hydrostatics calculations at DWL over any user selected water densities, as a ship design is inputted or modelled:

- Displacement
- Volume (displaced)
- Draft Amidships
- Immersed depth
- WL Length
- Beam max extents on WL
- Wetted Area
- Maximum section area
- Waterplane Area
- Prismatic coefficient (Cp)
- Block coefficient (Cb)
- Maximum Section Area coefficient (Cm)
- Waterplane area coefficient (Cwp)
- LCB length
- LCF length
- LCB %
- LCF %
- KB
- KG fluid
- BMt
- BML
- GMt corrected
- GML
- KMt
- KML
- Immersion (TPc)
- MTc
- RM at 1deg = GMt. Disp.sin(1)
- Length: Beam ratio
- Beam: Draft ratio
- Length: Vol^0.333 ratio
- Precision

(f). In order to model/simulate a ship's structural design for later analysis, the software should have the following minimum structural design capabilities over Single Plate Parts or Plate Assemblies:

- Defining Structural parts
- Defining Shell stiffeners
- Defining Frames

- Defining Decks
- Defining Stringers
- Defining Plates
- Generating Plate Development
- Generating Plate Plan
- Generating Plate Profile
- Generating Plate Body Plan
- Generating Plate Templates
- Generating Pin Jigs
- Generating Shell Expansion
- Generating Inverse Bending Lines

(g). In order to provide the naval architect access to raw design data for easy verification or to perform custom computations on a spreadsheet if needed, the software should be able to provide data sheets or tables for the following items as ship structural components are inputted or modelled:

- Stringers
- Stringer Points
- Upstands
- Frames
- Decks
- Plates
- Plate Dimensions
- Pin Jigs
- Parts

3. **Naval Architecture/ Marine Software Input/ Output Capabilities**

(a). The software must allow "pasting" of data from any spreadsheet program, word processor, or text editor directly into appropriate data tables (i.e. control points, curve control points, markers, offsets, surfaces, etc). This capability will provide the naval architect access to raw design data for easy verification or to perform custom computations on a spreadsheet or another software if needed

(b). In order to ensure compatibility with generally accepted file format standards, the software must be able to read files from other software applications, including the following file formats:

- IGES Surfaces
- Rhino 3D
- IMSA NURBS
- USNA Fastship
- DXF Markers
- DXF Curves

- GHS Markers
- Seaway Markers
- PIAS ASCII Markers
- Wolfson LFH Markers
- nuShallo Trimesh
- WAMIT Trimesh
- StereoLithography Trimesh
- DXF Background
- Image Background

(c). The software must have the capability to load images and display them as background images to enable the operator to trace and compare 3D models with scanned images of existing paper plans.

(d). In order to ensure compatibility with generally accepted file format standards, the software, at a minimum, must be capable to provide highly accurate output in the form of hull lines, comprehensive offsets tables, and transfer files for the following file formats/programs:

- DXF and IGES
- Bitmap Image
- Rhino 3D
- Moses
- Wavefront Mesh
- StereoLithography Mesh
- Direct X mesh
- Fredyn

4. **Naval Architecture/ Marine Software Calculation/ Analytical Capabilities**

(a). In order to ensure accuracy of calculation results, the software must be able to allow for the calculation of windage groups, specifically for windage drag, shielding factor, or any number of user-defined windage factors.

(b). Units of Measure. The software must have the capability to interpret values in a variety of metric and imperial units. The software must be able to accept any measurement values encoded by the user, converting the encoded values into the default unit of measure defined by the user. This feature will make the software easier to use as the user will no longer need to do unit conversions because the system automatically converts values to default unit.

(c). Material Type. In order to ensure accurate calculations, the software, at a minimum, must be capable to accept ships designs made of the following material types:

- Steel (General, High Strength, ASTM, AS1163, AS1594, AS3678, AS3679, JIGS3106, JIGS3136, DIN17100, EN10025, TIS1227)
- Concrete
- Wood
- Aluminum
- Fiberglass

The user should also be able to create User defined materials to ensure greater accuracy. For example, different types of wood could be defined, in order to take into consideration the different densities or strengths of the type of wood used.

(d). The software must be able to perform the following minimum calculations:

- Upright Hydrostatics
- Large Angle Stability
- Equilibrium
- Specified Conditions
- KN Values
- Limiting KG
- Floodable Length
- Longitudinal Strength
- Probabilistic Damage Stability
- Tank Calibrations
- MARPOL Oil Outflow
- Motion Sickness Index
- Load line/ Freeboard Calculation
- Tonnage Measurement Calculation

(e). The software must be able to provide the following hydrostatic graphs:

- Hydrostatics
- Curves of Form
- Curve of Areas
- Bonjean Curves
- Righting Lever (GZ)
- Maximum Steady Heel Angle
- Large Angle Stability Hydrostatics
- Large Angle Stability Curves of Form
- Dynamic Stability (GZ Area)
- Cross Curves (KN)
- Limiting KG
- Floodable Length
- Longitudinal Strength
- Probabilistic Damage Stability

(f). The software should be able to perform seakeeping or sea motions analysis on the following **user-defined conditions**:

- Location (longitudinal position within the vessel, offset, height, offset from CG, height from CG, etc)
- Speeds
- Headings
- Wave conditions or Sea states

(g). The software should be capable of producing time series animation on any type of ship design based on any **user-defined conditions** in order to provide the user with graphical outputs that will allow the user to visualize deck wetness, slamming, hogging, sagging, propeller emergence, catamaran roll, etc.

(h). The software should be able to provide seakeeping analysis in the form of graphs for:

- Motion Sickness Index (MSI)
- Center of Gravity RAO
- Center of Gravity Spectra
- Remote Location RAOs
- Remote Spectra
- Global Hydrodynamics
- Section Hydrodynamics
- Added Resistance
- Surge Motion, Surge Velocity, Surge Acceleration
- Sway Motion, Sway Velocity, Sway Acceleration
- Roll Motion, Roll Velocity, Roll Acceleration
- Pitch Motion, Pitch Velocity, Pitch Acceleration
- Yaw Motion, Yaw Velocity, Yaw Acceleration

(i). Basic powering and resistance methods must be included in the software. Thus, the software should be able to provide resistance and powering calculations using the following methods:

- Savitsky (pre-planing and planning)
- Blount and Fox
- Lahtiharju
- Wyman
- Holtrop
- Compton
- Fung
- Van Oortmerssen
- Series 60

- KR Barge Resistance
- Slender Body
- Molland

(j). The software should be able to provide results of resistance and powering calculations in the form of graphs for:

- Resistance vs. Speed
- Power vs. Speed
- Total Bare-Hull Resistance Coefficient vs. Speed
- Residuary Resistance Coefficient vs. Speed
- Wave Resistance Coefficient vs. Speed
- Friction Resistance Coefficient vs. Speed
- Viscous Resistance Coefficient vs. Speed
- Correlation Coefficient vs. Speed
- Running trim vs. Speed

(k). The software should be able to produce time series animation for wake prediction by calculating the wave field generated by the modelled ship.

(l). The software must be capable of performing Finite Element Analysis (FEA) on structural components modelled for calculating and analyzing static or dynamic structural strength on:

- 2D or 3D Frame Elements
- 2D or 3D Beam Elements
- 3D Plate Elements
- Scantlings

5. **Naval Architecture/ Marine Software Stability Criteria Checking Capability (Mandatory)**

(a). The software should be able to check ship designs for compliance with various stability design requirements, to include but not limited to:

- Australian Design Standards
- British Design Standards
- Canadian Coast Guard Rules
- DNV Rules
- EU Rules
- IMO Rules
- IMO MSC Codes
- ISO Rules
- MARPOL Rules
- RAN Criteria
- US Coast Guard Rules

- US Navy Rules
- Japanese JG Code
- Royal Navy Rules

(b). The software should allow creation of custom criteria from existing rules or new rules as may be needed by the MARINA.

6. Naval Architecture/ Marine Software Reporting Capability

(a). The software must be able to generate stability booklets complying with intact and damage stability code and in accordance with MARINA rules and regulations.

(b). The software must be able to generate customized reports from analysis results generated.

7. Computer System – Branded

(a). Core i7 3GHz CPU or higher
(b). Windows 7 Professional Operating System or Higher
(c). 4GB RAM or higher
(d). 1TB Hard Disk or higher
(e). Two (2) High Definition LCD/LED Monitors at 21" diagonal or larger
(f). 3D Graphics Accelerator with 1GB Memory or Higher
(g). A3 Size Printer

8. Training Requirements

Training shall be provided by a bona fide and PRC registered Naval Architect of good standing. Training shall be for a minimum of ten (10) persons per unit and a minimum duration of eighty (80) hours. Handouts shall be provided to all participants.

V. BIDDERS' ELIGIBILITY REQUIREMENTS

1. Software Sales, After Sales and Support Availability Requirement

(a). The software and corresponding maintenance and support services thereof must be locally available, and if developed from another country, must be available through a local distributor that has the capability to provide local training and support services.

(b). Local distributors must submit a distributorship certificate from the country of origin, duly authenticated by the Philippine Consulate or Embassy thereat. The distributorship certificate must clearly identify that the bidder is a duly authorized distributor and provider of after sales, support and training services.

(c). Bidders must be a established software solutions provider with at least ten (10) years of experience as a provider of computer program sales and services.

2. Track Record

(a). The naval architecture/ marine program to be supplied must have a proven track record with an install base of at least five (5) users within the Philippines.

(b). As proof of compliance with **Error! Reference source not found.**, Bidders must submit a "Certificate of Performance Evaluation" issued by at least five (5) existing Philippine users with a satisfactory evaluation rating on timely delivery, compliance to specifications and performance, and warranty and after sales service.

VI. TERMS AND CONDITIONS

The winning bidder shall supply, install and commission the above enumerated software strictly in accordance with the specifications herein prescribed.

Payment, which shall be in Philippine Currency, shall be made only upon the issuance by the SRS of a Certificate of Acceptance.

No advance payment or mobilization fees shall be paid by MARINA to the winning bidder. However, progress payments on delivered and accepted items shall be allowed.

The suppliers shall be paid according to the following schedule of payments:

(a). Upon supply and installation of the Hardware and Software; and,	75% of the total cost
(b). Upon conduct of user's training	25% of the total cost

Any and all taxes, duties, fees, charges or other imposition of whatever kind and nature due or which may become due to local or national government or any of its instrumentalities in connection with or arising from this Project shall be borne and paid for by the winning bidder.

The naval architecture/ marine software should be fully operational and accepted by MARINA within ninety (90) days from the date of receipt of the Notice to Proceed (NTP) by the winning bidder, notwithstanding any delays which may not be under its direct or indirect control.

Failure of the winning bidder to completely install all requirements within ninety (90) days upon issuance of NTP would mean a penalty of one per cent (1%) of the ten per cent (10%) of the total contract price per day of delay until full commissioned to be automatically deducted from the 25% receivable balance from the MARINA.

Payment shall be made at the MARINA Central Office according to the following schedule of payments herein, subject to the government accounting and auditing rules and regulations.

The MARINA, however, shall refuse to make payments when the terms and conditions of the project are not satisfactorily performed by the winning bidders.

VII. SOURCE OF FUND AND PROJECT COST

1. The source of fund is the MARINA STCWO Budget for CY 2015 (General Appropriations Act).

2. The estimated project cost is Eight Million and 00/100 Pesos only (Php8,000,000.00), VAT inclusive, Philippine Currency.

3. The breakdown of the budget for the Procurement of the Naval Architecture/ Marine Software is as follows:

ITEM NO.	PARTICULARS	UNIT	COST
1	SRS, MARINA Central Office	Lot	2,000,000.00
2	MARINA MRO IV	Lot	2,000,000.00
3	MARINA MRO VII	Lot	2,000,000.00
4	MARINA MRO X	Lot	2,000,000.00
TOTAL			**8,000,000.00**

Prepared by:

BAC- Technical Working Group per Special Order No. 1633-15

(Sgd)
ADRIAN G. RAMOS
Member

(Sgd)
BUENA G. RAMOS
Member

(Sgd)

ALONA P. ARBOLIDA
Member

(Sgd)

JESUS REX FRANCIS E. ANTONIO
Member

(Sgd)

ATTY. SOTERANIA M. SIÑEL
Vice-Chair

FE M. CALAOAGAN
Chairperson

(Sgd)
RAMON C. HERNANDEZ
End-user

Recommending Approval:

(Sgd)
BASHIRUDDIN U. ADIL
Chairman, Primary Bids and Awards Committee,

APPROVED/~~DISAPPROVED~~:

(Sgd)
MAXIMO Q MEJIA JR, PHD
Administrator