MAZAGON DOCK SHIPBUILDERS LIMITED
(Formerly known as Mazagon Dock Ltd.)
CIN:U35100MH1934GOI002079
(A Government of India Undertaking)
Dockyard Road, Mazagon, Mumbai 400010. India.
Certified – ISO 9001:2008 for Shipbuilding Division
Website: www.mazagondock.in

EXPRESSION OF INTEREST (EOI)

Department	**: Design – East Yard**
E-mail ID	**: avkhanolkar@mazdock.com**
Phone no.	**: 022 – 23763581**
Fax	**: 022 - 23738333**
EOI no.	**: EY/D/IT/EOI/04**
EOI date	**: 12 May 2022**
EOI closing date & time	**: 26 May 2022, 15:00 Hrs**

EXPRESSION OF INTEREST (EOI) INVITED FROM FIRMS ESTABLISHING A DESIGN AND ENGINEERING CENTER FOR DESIGN, PLANNING & MANUFACTURING (I.E SUPPLY OF DESIGN SOFTWARE) IN SUBMARINE CONSTRUCTION.

LETTER OF INVITATION

Mazagon Dock Shipbuilders Limited (MDL) seeks response from Companies / Firms meeting the requirements of this EoI for Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) in Submarine Construction of MDL as per Scope of Work at Annexure -3

The Firms will be shortlisted based on this EoI & thereafter limited tender will be floated to the shortlisted firms.

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Sl. No.	DESCRIPTION
1	SECTION - 1: DISCLAIMER
2	SECTION – 2: SCHEDULE OF EoI PROCESS & CONTACT DETAILS
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4	SECTION – 4: PRE-QUALIFICATION CRITERIA
5	SECTION – 5: BID REJECTION CRITERIA
6	SECTION – 6: DOCUMENTS TO BE SUBMITTED ALONG WITH EoI

SECTION-1

DISCLAIMER

1. MDL, its employees and advisors make no representation or warranty and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of the EoI document.
2. MDL may, in its absolute discretion, but without being under any obligation to do so, modify, amend or supplement the information in this EoI document.
3. The issue of this EoI does not imply that MDL is bound to select and shortlist any or all the participating firm. Even after selection of suitable participating firm, MDL is not bound to proceed ahead with the participating firm and in no case be responsible or liable for any commercial and consequential liabilities in any manner whatsoever.
4. The participating firm shall bear all costs associated with the preparation, technical discussion/presentation and submission of EoI. MDL shall in no case be responsible or liable for these costs regardless of the conduct or outcome of the EoI process.
5. Canvassing in any form by the participating firm or by any other agency on their behalf shall lead to disqualification of their EoI.

SECTION-2

SCHEDULE OF EoI PROCESS & CONTACT DETAILS

6. SCHEDULE OF EoI PROCESS

The schedule of activities during the EoI Process shall be as follows -

Sl. No.	Description	Date
1	Issue of EoI document	12 May 2022
2	Last date of Submission of EoI response	26 May 2022 , 15:00 Hrs

7. CONTACT DETAILS:

Submission of proposal:

Proposal **(Original + one soft copy)** super-scribing the enquiry number, enquiry subject, last date for receipt of EOI and shall be addressed to

SUNIL KUMAR C
HOD (DESIGN-EAST YARD)
5th Floor, Reclamation Building
Mazagon Dock Shipbuilders Limited,
Dockyard Road, Mumbai 400010
Tel: 022-23763626
E-Mail: **kcsunil@mazdock.com** / **avkhanolkar@mazdock.com**

SECTION – 3

DETAILS OF EXPRESSION OF INTEREST (EoI)

8. ABOUT MDL

Mazagon Dock Shipbuilders Limited (MDL) is a leading Submarine and Shipbuilding company in the country with a Miniratna Category-1. The company was taken over by the Government of India and established as a Public Sector Undertaking under the Ministry of Defence in 1960. Over the last six decades, MDL has delivered over 250 warships/submarines/ platforms to various customers in India and abroad. Out of these 30 major warships/submarines have been delivered to the Indian Navy. The diversified platforms delivered to various customers range from Destroyers, Stealth Frigates, Submarines, Missile Boats, Corvettes, Offshore Patrol Vessels, Multipurpose Support Vessels, Offshore Supply Vessels, Dredgers, Tugs and Cargo-Cum-Passenger Vessels.

9. SCOPE OF WORK:

a) MDL is seeking response from Companies / Firms/ Authorised Partners/ Co-partners, involved in Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) in Submarine Construction.

b) The participating firm must possess basic necessary knowledge & experience for Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) to Defense Shipbuilding related organization.

c) The technology if any possessed by participating firm must be non-infringing while delivering the desired performance and it must be clear from third-party IP infringement claims.

d) Interested companies meeting the Pre-Qualification Requirements (PQR) as given in Section-4 and ready to associate with MDL as per broad scope given in Annexure-3 are invited to submit their offer in response to this EoI.

e) Upon receipt of responses against this EoI, MDL will review the responses to ascertain suitability of the offer and shortlist participating firm based on prequalification (technical, commercial and financial) documents submitted by firm. The shortlisted firm will be required to sign a Non-Disclosure Agreement (NDA) regarding the confidentially of Techno Commercial Aspects. If more than one valid responses are there, then subsequently, tender will be issued only to these shortlisted firms through Limited Tender Enquiry (LTE). Shortlisting of firms will be done as per qualification criteria & other aspects of this EoI.

10. INSTRUCTIONS

a) Language: All correspondences and documents related to the EoI response shall be in English language only.
b) The participating firm shall abide by the terms & conditions, as applicable, of the EoI.
c) All pages of the EoI shall be duly signed by the authorized signatory.
d) Multiple proposals from the same participating firm should not be submitted.
e) MDL at their discretion shall inspect the participating firm works/office/reference site premises for the purpose of evaluation, as deemed necessary before selection of partner. MDL decision in this regard shall be final.
f) Any participating firm which has been debarred/blacklisted or given tender holiday by Central/State Governments or by any entity controlled by Central/State Governments from participating in any of their project, as on date of submission of EoI, shall not be eligible to submit the EoI.

11. PROCESS TO BE CONFIDENTIAL:

Information relating to the examination, clarification, evaluation and comparison of EoI and recommendations shall not be disclosed to participating firm. Any effort by participating firm to influence MDL processing of EoI or selection decisions may result in the rejection of the EoI.

12. MISCELLANEOUS:

Right to accept or reject any or all Applications:

a) Notwithstanding anything contained in this EoI, MDL reserves the right to accept or reject any application and to annul the EoI process and reject all applications, at any time without any liability or any obligation for such acceptance, rejection or annulment and without assigning any reasons, thereof. In the event that MDL rejects or annuls all the applications, it may at its discretion, invite all eligible participating firms to submit fresh applications.
b) MDL reserves the right to disqualify any applicant during or after completion of EoI process, if it is found there was a material misrepresentation by any such applicant or the applicant fails to provide within the specified time, supplemental information sought by MDL.
c) MDL reserves the right to verify all statements, information and documents submitted by the applicant in response to the EoI. Any such verification or lack of such verification by MDL shall not relieve the applicant of his obligations or liabilities hereunder nor will it affect any rights of MDL.

13. GOVERNING LAWS & JURISDICTION:

The EoI process shall be governed by, and construed in accordance with, the laws of India and the Courts at Mumbai (India) shall have exclusive jurisdiction over all disputes arising under, pursuant to and / or in connection with the EoI process.

SECTION– 4

PRE-QUALIFICATION CRITERIA

The determination of eligibility will take into account the technical experience capabilities and past performance of the participating firm along with financial status; it will be based upon an examination of documentary evidence of the participating firm qualifications submitted by the participating firm as well as such other information, as the MDL deems necessary and appropriate. The participating firm willing to associate with MDL should meet the following Pre-Qualification Criteria:

14. Technical Qualification: -

The bidder shall submit the following as a part of technical qualification.

a) Bidders Company / Firm Profile.
b) Details of personnel (Project Management Team) with designation, qualification and experience to determine their capabilities.
c) Bidders / Firms/ Authorized Partners/ Co-partners either should have minimum 05 years' experience of Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) to Defense Shipbuilding related organization and submit relevant documents.
d) Bidder/ Firms/ Authorized Partners/ Co-partners shall not be under a declaration of ineligibility issued by Govt. of India / State govt. / Public Sector Undertakings etc.

15. **Commercial Qualification: -** The bidder shall submit the following as a part of commercial qualification.
    a) Certificate of Incorporation.
    b) Registration certificate from local bodies for conducting business.

16. Financial Qualification: -

a) The Bidder shall have minimum Annual average turnover of more than Rs. 100 crore during the last three years ending as on 31 Mar 2022.
b) The Bidder shall enclose Balance sheets and Profit and loss statement issued by Chartered Accountant with their seal and signature, stating the firms net worth & turnover during the past three years as per Annexure-2.
c) Documentary evidence of the Purchase Orders for Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) to Defense Shipbuilding related organization should not be less than 7 crore for last five years.

SECTION– 5

17. **Bid Rejection Criteria:** - MDL may at its sole discretion and at any time during the evaluation of proposal, disqualify any bidder, if they have:

    a) Bids received after due date.
    b) Bidder's failure to furnish sufficient or complete details for evaluation of the bids within the given period.
    c) Incomplete / misleading / false / ambiguous in the proof of eligibility requirements.
    d) Failed to produce timely clarifications related thereto, when sought.
    e) Bids not meeting qualification criteria mentioned above at Section-4.
    f) Submitted more than one proposal for single specialization area.
    g) Declared ineligible by the Government of India / State govt. / Public sector undertaking.
    h) Bids with technical requirements and or terms not acceptable to MDL.
    i) Information relating to the evaluation, clarification and recommendation for pre-qualification shall not be disclosed to bidders or any other persons not officially concerned with such process until the pre-qualification process is completed. Any effort by the bidder to influence MDL prequalification process may result in rejection of his EOI.
    j) Non signing of the Non-Disclosure Agreement (NDA) for the EoI.

SECTION– 6

Documents to be submitted along with EoI*

18. **Submission of EoI:** - List of documents to be submitted as part of EoI

Participating firm should submit following documents along with their Proposal.

Sl.	Document Description	Filled in Formats to be Submitted with Proposal	Remarks
1	Covering Letter		As per format attached
2	General information	Annexure-1	
3	Financial Information	Annexure-2	
4	Documents in support of Pre-Qualification Criteria at Section-4.		

EoI FORMS

Format for Covering Letter

[On the Letterhead of the Participating firm]

To,

SUNIL KUMAR C
HOD (DESIGN-EAST YARD)
5th Floor, Reclamation Building
Mazagon Dock Shipbuilders Limited,
Dockyard road, Mumbai 400010
Tel: 022-23763626
E-Mail: **kcsunil@mazdock.com / avkhanolkar@mazdock.com**

Ref: Submission of Expression of Interest (EoI)

Sir,

Being duly authorized to represent and act on behalf of…….
(Hereinafter Referred to as "the Applicant"), and having reviewed and fully understood the evaluation criteria and information provided, the undersigned hereby applies in response to the EoI document.

We would like to associate with MDL Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) in Submarine Construction. We understand that MDL is not bound to accept the EoI.

I am enclosing the Expression of Interest with the details as per the requirements of the EoI document, for your evaluation.

I hereby declare that the details furnished in this EoI proposal are true and correct to the best of my knowledge and belief. In case any of the information is found to be false or untrue or misleading or misrepresenting, I am aware that I will be held liable for it and MDL is free to take any legal / commercial action not limited to barring / blacklisting.

We hereby declare that we are not under a declaration of ineligibility / blacklisting /debarring/ tender holiday from doing business issued by Govt. of India / State govt. / Public Sector Undertakings etc.

Yours faithfully,

(Signature & Seal of Authorised Signatory)
Name:
Designation:
Date:
Address:

Annexure-1

General Information to be submitted by Applicant along with cover letter

1. Name of the Company/ Firms (if consortium):
2. Legal status of the Company (ies)/ Firms:
3. Brief description of the Company(ies) including details of its business groups / subsidiaries / affiliates:
4. Date of Incorporation / Registration:
5. Date of Commencement of Business:
6. Full address including Telephone nos. / Fax nos.:

   Registered Office:

   Head Office:

   Address for communication:

   Contact Details:

   Office Address in India, if any:
7. Documents to be enclosed:

As per pre-qualification criteria

Signature & Seal
Authorised Signatory of the Party

Annexure-2

Financial Information

Date: [insert day, month, year]

Legal Name: *[insert full name]*

1. Financial Data: -

Sl. No.	Last three Financial	Annual Turnover	Annual Net Profit	Net worth as at the end of the financial year
1				
2				
3				

2. Financial documents

The participating firm shall provide copies of the financial statements including balance sheets, P&L and related income statements for latest 3 *years.*

The financial statements shall:

- Reflect the financial situation of the participating firm submitting EoI.
- Be audited by a certified accountant.
- Be complete, including all notes to the financial statements.
- Correspond to accounting periods already completed and audited (no statements for partial periods shall be accepted).

(Signature & Seal)
Authorized Signatory of the Party

Name of the Authorized Signatory representing Auditing firm:

Designation:

Name of firm (Chartered Accountant):

Signature of the Authorized Signatory:

Seal of Audit firm.

Annexure -3

Scope of Work for Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) in Submarine Construction:

Annexure-3

EoI No. EY/D/IT/EOI/04

Scope of Work for Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) in Submarine Construction

Sr. no.	Criteria	Category	YES/NO	Software Name and Version	Module Name	Remarks
1	**Prerequisites**					
a	Experience in Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) to Defense Shipbuilding related organization	Prerequisites				
b	Whether Design software is parametric in nature	Prerequisites				
c	Whether Platform is part of a proven PLM system in Defence shipyard (If yes, kindly provide examples)	Prerequisites				
d	Whether Software is holistic and provides a common design platform for all users with controllable access rights	Prerequisites				
e	Whether Software is centralised in nature such that all users work on the same model with various degrees of authority to edit, update on one single platform with all capabilites built in/plugged in.	Prerequisites				
f	Whether Solution has provision to give rights for importing and exporting of data outside the environment	Prerequisites				
g	Whether Plaform / solution offered enables reuse of concept design data to build 3D based detailed deliverables and experiences (e.g. Virtual Reality/Augumented Reality) to allow the shipbuilding company to efficiently and effectively communicate concept to the ship owner without any conversion of the data. This should be possible via various media such as tablets, display screens, VR glasses, etc.	Prerequisites				
2	**Concept Design**					
a	1D Modeling and analysis of multi domain complex physical system which includes a combination of Hydraulic, Thermal, Pneumatic, Electrical, Electronic and Mechanical systems.	Concept Design				
b	The Software should contain predefined components for different complex physical models especially in marine application.	Concept Design				
c	Design and Analysis of 1D Systems, both mechanical and electrical and with the solution interlinked with graphics, 2D and 3D CAD as well as analysis softwares to evaluate feasibility of the system and to facilitate quick changes at the system level. Output must be graphical ie in the form of 2D,3D graphs, moving parts, in built animations, dashboard, etc. Must also include capability to link together multiple such systems to create a final physics based platform to evaluate feasibilty and to obtain preliminary specs.	Concept Design				
d	Solution must necessarily contain a library with objects and related data for Hydroplane shapes, Data for rudder creation and selection,Data for creation and Propeller Selection along with templates for the same.	Concept Design				
e	Library must contain objects and all necessary data for control systems, signal generation and processing, power electronics and other electrical devices required for marine applications	Concept Design				
f	Library must contain objects and all necessary data for all engineering devices used in marine applications along with all necessary documentation.	Concept Design				
g	Built in features to calculate common engineering problems applicable to marine environments, Hydraulic, pneumatic, or any other such. Selection of major engineering equipment such as engines, moving parts, pumps, etc must be possbile at this stage with preliminary specs.	Concept Design				
h	Initial Design features focusing on all marine requirements such as estimated resistance, propulsive forces, seakeeping, hydrodynamics, stablity, tank conditions, tank sloshing effects, weight calculations, etc	Concept Design				
i	Initial Design features focusing on preliminary electrical design including motor selection, thrust, torque values. Power consumption, load balancing, battery pack design (lead acid, Li Ion, fuel cells, etc), circuit design, earthing circuit design, control circuits, static and dynamic mechnical/electrical interfacing and analysis.	Concept Design				
j	Overall Platform performance such as underwater trajectory, navigation chart mapping, endurance, indiscretion rates, etc.	Concept Design				
k	Integration of Trim/List/Roll (6DOF motion) motion analysis with defined ranges and integration and impact of the same on the 1D systems during motion of the platform.	Concept Design				
l	Time based analysis of all of the above with capability to use variables within a range of values for optimisation of design.	Concept Design				
m	All the features above must be availiable on one platform for concept design where multiple users will be able to create various systems and finally integrate and run to evaluate feasibilty of the design. The features mentioned must be applicable to submarines and underwater platforms such as drones, ROVs,AUV's etc.	Concept Design				
3	**Evaluation of the following commonly encountered problems using 1D solution as mentioned above :**					
a	**Mechanical**					
i	Emptying of Ballast Tanks using HP air at varying pressures (Isothermal Process) in deep sea submerged condition.	Design problem				
ii	Evaluation of open circuit during pumping out of sea water into deep sea from a tank (infinite external volume).	Design problem				
iii	Evaluation of Pressure and flow in a closed water circuit.	Design problem				
iv	Thermal calculations for a cooling circuit and heat exchanger capacity design/evaluation.	Design problem				
v	Propulsion Motor Selection in 1 D System Design	Design problem				
vi	Optimisation of Hydroplane and rudder shapes based on parametric NACA profile	Design problem				
vii	Solution of atmospheric evaluation problems with variables such as Oxygen consumption and CO_2 release etc. to determine amount of breathable air and time	Design problem				
viii	Electro-Pneumatic assemblies	Design problem				
ix	Evaluation of Pneumatic operation of mechanical devices such as Retractable masts, Pneumatic valves (evaluation for number of operations, pressure required etc.)	Design problem				
x	Selection of Engine as per platform requirement					
b	**Electrical - System Analysis- Simulation of Electrical and Electronics Circuit from a schematic by inputting parameters.**					
i	Power supply analysis of different power sources like DG set, batteries, Fuel cells and solar etc.	Design problem				
ii	Endurance evaluations of different power sources as per user defined loads.	Design problem				
iii	Thermal analysis and performance analysis of different power sources.	Design problem				
iv	Design of cooling system for both electrical and mechanical equipment.	Design problem				
v	Evaluation of electrical harmonics, short circuit rating, fault analysis and voltage variations of equipment, cables, panels and systems.	Design problem				
vi	Evaluation of load analysis using parametric variables of time, individual device power consumption and losses to optimise power consumption and increase efficiency of a circuit.	Design problem				
vii	Evaluation of performance based on different battery charging levels.	Design problem				
viii	PLC coding and simulations of control systems.	Design problem				
ix	Power electronic design and analysis for development of controllers/drives.	Design problem				
x	Simulation of Battery monitoring system for batteries.	Design problem				
xi	Signal analysis of sonar : Ability to model DSP simulator to perform signal form a 3D sonar image of the target including filtration and directivity synthesis	Design problem				
xii	Evaluation of accoustic interference (like sonar and echo sounder frequency interface).	Design problem				
c	**Platform Performance- Creation of a physics based model of the platform to evaluate performance from the system schematics.**					
i	Evaluation of platform behaviour.	Design problem				
ii	Evaluation of Platform dive trajectory.	Design problem				
iii	Evaluation of objectives such as endurance, habitability etc.	Design problem				
4	Building the light weight representation of Ship structure plates & profiles using the 3D solid model of the Hull form as input.	Preliminary Design				
5	Any change to 3D model should automatically update the Basic design.	Preliminary Design				

Annexure-3

EoI No. EY/D/IT/EOI/04

Scope of Work for Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) in Submarine Construction

Sr. no.	Criteria	Category	YES/NO	Software Name and Version	Module Name	Remarks
6	Usage of dedicated tools to create the 1D & 2D sections for FEM Analysis. Build the mesh for structural analysis.	Preliminary Design				
7	Mid Surface Generation from 3D CAD model for importing to FEM solver	Preliminary Design				
8	Creation of the General Arrangement drawings for Class approval.	Preliminary Design				
9	Mechanical piping & electrical schematics would be built at this stage.	Preliminary Design				
10	Creating standard parts, primary & secondary structures, seatings,mounts and foundations. Selection from standard inbuilt catalogue for the same.	Detailed Design				
11	Software must necessarily have inbuilt templates for submarines and ships for quick creation of commonly used structures such as frames, flat and curved bulkheads, curved reinforcements/stiffeners, tanks, and all other such submarine specific structures as well as as commonly used marine structures.	Detailed Design				
12	Piping Routing, clamping and Modelling 3D mechanical piping (should include international design standards and customisation).	Detailed Design				
13	Automatic routing as well as auto clamping on the basis of proximity rules, etc.	Detailed Design				
14	Cable Routing, connecterization with electric cabinets and Modelling 3D cabling using input data (should include international design standards and customisation).	Detailed Design				
15	3D modelling and outfitting of electrical equipment using input data and imported CAD models	Detailed Design				
16	Detailed spatial outfitting of electrical and electronic parts inside a cabinet.	Detailed Design				
17	Outfitting of all equipment, mechanical and electrical with in built/definable proximity rules, etc as necessary	Detailed Design				
18	Inbuilt design rule checks: International and mil standards	Detailed Design				
19	Supports multiple design in a project and multiple sheets in a design	Detailed Design				
20	Rule based auto routing in 3D, based on equipment, cable ways and routing constrains. User should be able to override the auto result or create manual if required.	Detailed Design				
21	Inbuilt library for standard parts, equipment from international vendors for marine applications etc.	Detailed Design				
22	Automatic / Customized Nomenclature.	Detailed Design				
23	Automatic calculation of mechanical properties such as Weight, Permeability, Volumes, Material, Density, CG etc.	Detailed Design				
24	Definition of all properties of each model, mass, material etc.	Detailed Design				
25	Import of CAD models of various formats and integration into platform.	Detailed Design				
26	Creation of CAD library for future use and usage of existing CAD library.	Detailed Design				
27	Animation of system results as per 1D analysis and customization.	Detailed Design				
28	Acquisition and Comparison of real-time parameters of electrical and mechanical systems of Platform with 1D model for analysis and effective design of a Submarine Platform.	Detailed Design				
29	Multiple views of Design for viewing Functional, Zones	Drafting Tools				
30	Hull Drafting.	Drafting Tools				
31	Pipe Installation drafting	Drafting Tools				
32	Pipe fabrication drafting: Automatic spool and foundation drawings along with bend table based on bending machine available in Yard.	Drafting Tools				
33	Outfitting drafting	Drafting Tools				
34	Automatic annotations	Drafting Tools				
35	Automatic generation of manufacturing drawing from 3D model (frame wise and Baseline wise)	Drafting Tools				
36	Automated Pull Sheet Printing	Drafting Tools				
37	Generation of CNC codes (G-code), Piping Drawings, Nesting Plans etc	Drafting Tools				
38	2D Nesting layouts & CAM Program output for plate cutting. (MDL currently uses 'Act/cut' from ALMA cam for 2D nesting & CAM program output for plate cutting)	Drafting Tools				
39	GA designing of electrical and electronics cabinet	Drafting Tools				
40	Multiple views of Design for viewing System BoM	Drafting Tools				
41	Manufacturing information generation from Detail 3D Model	Drafting Tools				
a	Create hierarchical manufacturing assembly from 3D detail and it should adopt to manufacturing change on manufacturing user acceptance without manually implementing the change	Drafting Tools				
b	Method to automate welding creation along with Weld-edge preparation, weld-process parameter and properties	Drafting Tools				
c	Generate marking lines for manufacturing for all the welded object on given plate	Drafting Tools				
d	Create rolling line for curved plates for bending	Drafting Tools				
e	Capability to create plate development for curved plate for plate cutting profile	Drafting Tools				
f	Create plate template from detail 3D model for inspection purpose for curved plate	Drafting Tools				
g	Add green material on plate for manufacturing assistance	Drafting Tools				
h	Generate invers bending curve for bend stiffeners	Drafting Tools				
i	Ability to reintegrate updated data from manufacturing after construction, such as deviations, etc	Drafting Tools				
j	Deep integration of above data with planning, QA-QC and etc	Drafting Tools				
k	Automatic generation of all drawings for classification society approval.	Drafting Tools				
42	Parametric connection between 1D, 3D model and analysis softwares.	Interoperability				
a	A 3D model made at the basic/detailed design stage will be sent directly for FEM/CFD or any other analysis or imported directly into PARAMARINE with all native object properties & geometric properties intact, etc.	Interoperability				
b	The crux of the problem is to prevent remodelling in various softwares and to prevent data loss in any form whatsoever while carrying out analysis. Native solutions with deep integration to be provided for the same.	Interoperability				
43	Finite Element Method:	FEM Analysis				
a	Provision of Native meshing and inbuild capability to export the native mesh to any other FEM analysis software as orphan mesh without losing any properties.	FEM Analysis				
b	Should have a powerful pre-processor for converting 3D model to 2D Mid-surface shell Model and 2D meshing of the complicated shell model with best meshing elements. Software should be able to intelligently Interact with both stiffener (Beam properties) and shell (Plate theory) elements with minimum user interface.	FEM Analysis				
c	Exporting CAD models to FEM software and importing results.	FEM Analysis				
d	Converting 3 D model to 1 D Shell Model for initial prediction of structural behaviour.	FEM Analysis				
e	**Evaluation of models in native FEM: -**	FEM Analysis				
i	Static Analysis (Linear & Non-Linear), Buckling & Dynamic(wave/current/shock) analysis with geometrical imperfections of a stiffened cylinder with penetration undergoing external pressure and interaction with fluid(Fluid-structural interaction) and also calculating the fatigue strength for the number of diving cycles.	FEM Analysis				
ii	Structural Analysis:	FEM Analysis				
iii	Vibration and natural frequency Analysis.	FEM Analysis				
iv	EMI/EMC analysis.	FEM Analysis				
v	Thermal Analysis.	FEM Analysis				
vi	Linear and Non Linear Analysis, Plastic and Elastic mode analysis.	FEM Analysis				
vii	Shell and stiffeners analysis directly from 3D model.	FEM Analysis				
viii	Evaluation of manufacturing deviations / tolerances.	FEM Analysis				
ix	Shape Function should be able to interpolate with polynomial functions	FEM Analysis				
x	FEM Pre-Post should be built on CAD tool with instant dynamic modification and optimization	FEM Analysis				
xi	Provision for generative optimized design of structures	FEM Analysis				
44	Computational Fluid dynamics (CFD) :					
a	Evaluation of the following commonly encountered problems:: Computational Fluid dynamics analysis with marine modules for Surface and Submerged platforms analysis (VOF method, rotating propeller, manoeuvring, Hydrodynamics etc.)	CFD Analysis				

Annexure-3

EoI No. EY/D/IT/EOI/04

Scope of Work for Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) in Submarine Construction

Sr. no.	Criteria	Category	YES/NO	Software Name and Version	Module Name	Remarks
b	Tools specific to marine applications which includes all kinds of wave equations to aid in getting output like turning circle, hydrodynamic coefficients, zig zag manoeuvres, etc	CFD Analysis				
c	Animated 3D graphical visualisation of output results and platform	CFD Analysis				
d	Overset mesh for simulating dynamic operations like propeller rotation, hydroplane swinging, etc.	CFD Analysis				
e	Model should be able to capture added mass phenomenon, fluid structure interactions, etc.	CFD Analysis				
f	Solver should be based on Navier Stokes Equation and should include already well established solvers like K-Epsilon, K –Omega, RANS, etc.	CFD Analysis				
g	Model has adaptive mesh refinement targeting specific marine physics for overset motion and VOF method	CFD Analysis				
h	Simulation capabilities to capture Dynamic fluid body interaction motion; self-propulsion; ejection system	CFD Analysis				
45	Detailed Piping and Engineering Analysis	Piping and Engineering Analysis				
a	Software should be capable of device level and system level analysis of 3 D piping systems with features such as pipes, bends, valves, all others accessories and Engineering systems for finding out the pressure losses and the output can be used for preparing Technical specifications.	Piping and Engineering Analysis				
b	The pipe CAD should be importable into the 1D system for system analysis with automatic selection of pipe properties for analysis.	Piping and Engineering Analysis				
c	Output should be parameters such as device characteristics, pump capacities, Natural frequencies, vibrations and other system level and device level engineering parameters as necessary for each system.	Piping and Engineering Analysis				
d	Design of HVAC system	Piping and Engineering Analysis				
46	Stability: Paramarine					
a	Compatibility of Exporting platform model to Paramarine	Stability Analysis				
b	Integration of results in System Design for optimisation	Stability Analysis				
c	Seamless data exchange with hydrostatic software (PARAMARINE)	Stability Analysis				
47	Acoustic Analysis	Acoustic Analysis				
a	Engine & Compartment noise	Acoustic Analysis				
b	Hull noise radiation, cavitaion	Acoustic Analysis				
c	Hull Scattering & Sonar, echosounder, other acoustic device, Underwater communication and inter device interference	Acoustic Analysis				
d	Turbulent Boundary Layer Noise	Acoustic Analysis				
e	Propeller Noise	Acoustic Analysis				
f	Determination of platform acoustic signature - Near field and far field analysis	Acoustic Analysis				
g	Make simulations of acoustics, Measurement of actual acoustics of equipment and platform and their comparison	Acoustic Analysis				
h	Display of acoustics in graphical 3D spatial format	Acoustic Analysis				
i	Option to estimate noise absorbtion/reflection/resonance of various materials and shapes such as anechoic tiles	Acoustic Analysis				
48	Vibration Analysis	Vibration Analysis				
a	Forced Dynamics response for the Transient, Frequency, PSD, Response Spectrum/DDAM and quasi-static events	Vibration Analysis				
b	Responses for Displacement, velocity, acceleration, element force, reaction force, stress, strain and FRFs	Vibration Analysis				
49	Electrical Analysis					
a	PCB design	Electrical Analysis				
b	2D schema design of electric circuit	Electrical Analysis				
c	3D cabinet design	Electrical Analysis				
d	Cable layout and harness creation.	Electrical Analysis				
e	The final cable routing layout should be importable into the 1D system for system analysis with automatic selection of cable properties for analysis.	Electrical Analysis				
f	EMI/EMC analysis of Cables & electrical Devices	Electrical Analysis				
g	Wire harnesses should be directly imported from electrical schematic software including automatic generation of the 3D path and assignment of properties, making the EMC analysis highly efficient.	Electrical Analysis				
h	Multiconductor transmission line network (MTLN) solver to perform any EMC-related analysis on the wire harness, such as emission, susceptibility, and cross talk within the bundle and between bundles	Electrical Analysis				
i	Load balancing and power stability analysis	Electrical Analysis				
j	Thermal Analysis	Electrical Analysis				
k	Sonar Analysis & Design : Modelling and simulation of transducers and the sound field of operation to determine signals, System design for 3D Mapping, active/passive sonar positioning, blind spots, range, transducer selection.	Electrical Analysis				
l	Basics of Antennae Frequency analysis calculations and communication	Electrical Analysis				
m	Integration of PLC program with any available hardware modules and ability to evaluate real-time test results	Electrical Analysis				
n	Transducer analysis	Electrical Analysis				
o	Electrical/Electronic System analysis	Electrical Analysis				
50	Design Data Management System					
a	Inbuilt secure design data handling system	Design Data Management				
b	Design release and revision management for all documents and drawings	Design Data Management				
c	GUI based search tool for all design data from a central interface (like a search engine)	Design Data Management				
51	Quality Assurance and Data Management	Quality Assurance/ Quality Control				
a	Dedicated Module Availability for QA/QC	Quality Assurance/ Quality Control				
b	Inspection Data Handling System	Quality Assurance/ Quality Control				
c	Abilty to create standard Inspection templates and share across platform	Quality Assurance/ Quality Control				
d	Abilty to create Trial documents and share across platform	Quality Assurance/ Quality Control				
e	Ability to create stage wise approval of inspections/trials with designated approvers	Quality Assurance/ Quality Control				
f	Integration of QA/QC components with planning modules and dashboard to track progress	Quality Assurance/ Quality Control				
g	Integration of all QA/QC components with hand held tablets	Quality Assurance/ Quality Control				
52	PLM & PDM					
a	Two-way integration with SAP-HANA	PLM & PDM				
b	Must have capability to encompass full lifecycle of ship development including project governance, initial concept design, detail engineering\design, production planning, and manufacturing/quality execution.	PLM & PDM				

Annexure-3

EoI No. EY/D/IT/EOI/04

Scope of Work for Establishing a Design and Engineering center for Design, Planning & Manufacturing (i.e supply of Design Software) in Submarine Construction

Sr. no.	Criteria	Category	YES/NO	Software Name and Version	Module Name	Remarks
c	Integration with Industry 4.0 digitisation in the form of Tablets, Computers, Kiosk etc	PLM & PDM				
d	Customisable Dashboards for Review and Management reporting. Rights to customise the Dashboards	PLM & PDM				
e	Web Interface views for Production or Light Users	PLM & PDM				
f	Capability to handle Data / Feedback from Machine for Preventive/ Predective Maintenance	PLM & PDM				
g	Capability to integrate 3 party software for warehouse management, RFID technology etc	PLM & PDM				
h	Capability to integrate with AR/VR features	PLM & PDM				
i	Document management to be an integral part of the project management system and not a separate application.	PLM & PDM				
j	To have lifecycles for documents based on the classification of the document – ex: contract document, engineering drawing, internal memo, project issue report, etc.	PLM & PDM				
k	System should be a deliverables-based project management system	PLM & PDM				
l	Ship development data should be linked to project execution enabling tracking of project status. (Plan vs actual)	PLM & PDM				
m	System should cover project status on Phases, display Risks, Issues, changes & resource allocations via dashboards and should be configurable.	PLM & PDM				
n	Ability to consume / link the design data /Engineering BOM and create a 3D based Manufacturing BOM structure	PLM & PDM				
o	Ability to integrate and send MBOM structure to ERP System.	PLM & PDM				
p	Ability to create 3D Based Process Planning linking the Manufacturing BOM	PLM & PDM				
q	Ability to add multiple levels of operations / activities detailing the manufacturing steps for sub-assemblies and assemblies	PLM & PDM				
r	System should to be able to generate Gantt Chart and run a 3D build up for the process sequence.	PLM & PDM				
s	Ability to Publish the routings and send the same to ERP System whenever required.	PLM & PDM				
t	Ability to author 3D work instructions based /linked to manufacturing process plan	PLM & PDM				
u	System should be capable of publishing the work instructions in html, excel /pdf documents with minimal configuration.	PLM & PDM				
v	Ability to perform 3D virtual build of the process plan.	PLM & PDM				
w	Ability to create tracks on Manufacturing assemblies to study the design for assembly	PLM & PDM				
x	Ability to create tracks on process plan to study the assembly sequence	PLM & PDM				
53	Hardware recommendations					
a	Recommendation of Technical Specifications of requisite hardware configuration for workstation and servers to support the software solutions with capability to upgrade.	Hardware recommendations				
b	Recommendation for Near DR and Far DR Hardware and software with capability to upgrade and upscale	Hardware recommendations				
54	Other Requirement					
a	Design of mechanical devices along with motion animation, accurate calculations for displacements, velocities, acceleration, reaction forces, flexible body results etc.	Other Requirements				
b	Integrate systems and controls to simulate mechatronic systems to understand how controls will impact the overall mechanism performance	Other Requirements				
c	Design of mechanical devices along with motion animation.	Other Requirements				
d	True colour rendering of Platform	Other Requirements				
e	Walk through animation of platform.	Other Requirements				
f	Provision of 3D Scanner compatibility to import as is design for modelling and reverse engineering.	Other Requirements				
55	Analysis modules for the following :	Other Requirements				
a	Weapon Systems	Other Requirements				
b	Radar Cross Section analysis	Other Requirements				
c	Communication systems design (surface and underwater)	Other Requirements				
d	Analysis of explosions	Other Requirements				
56	Compatibilty with the following softwares :	Software Compatibility				
a	ABAQUS 2012, V6.12-3 and above	Software Compatibility				
b	Flowmaster V7 version 10.2	Software Compatibility				
c	PARAMARINE ver 2020 update 2	Software Compatibility				
d	STAR CCM+ 2017	Software Compatibility				
e	ACT/CUT for Nesting	Software Compatibility				
g	Importability of Aveva Marine Catalogue for library usage	Software Compatibility				
h	Importability of CADDS5 Models into environment for subsequent analysis	Software Compatibility				

NOTE : POC (Proof of Concept) for demonstrating of features of the software as given above to be provided by the vendor