



MAZAGON DOCK SHIPBUILDERS LIMITED

(Formerly known as Mazagon Dock Ltd.)

CIN: U35100M

H1934GOI002079

(A Government of India Undertaking)

Dockyard Road, Mazgaon, Mumbai 400010. India.

Certified – ISO 9001:2008 for Shipbuilding Division

Website: www.mazagondock.in

EXPRESSION OF INTEREST (EOI)

Department : Planning Additional Project – East Yard
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EOI no. : EY/PLG/AP/EOI-LIB/2006
EOI date : 10 Nov 2020
EOI closing date & time : 18 Nov 2020

Expression of Interest (Eoi)

Indigenization and Business Development through Collaboration for Lithium Ion Batteries of Submarine

LETTER OF INVITATION

Mazagon Dock Shipbuilders Limited (MDL) seeks response from companies meeting the requirements of this Eoi and are willing to be associated with MDL through a Collaboration on long term basis for Indigenization and Business Development through a Collaboration for Lithium Ion Batteries of Submarine.

The participating firm should be in a position to design, engineer, manufacture, test and supply. The detailed terms and conditions and other definitive documents of collaboration shall be mutually agreed upon.

There may be a MOU & Technology Transfer Agreement with the selected firm.

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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 Eol 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 Eol document.
3. The issue of this Eol 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 Eol. MDL shall in no case be responsible or liable for these costs regardless of the conduct or outcome of the Eol process.
5. Canvassing in any form by the participating firm or by any other agency on their behalf shall lead to disqualification of their Eol.

SECTION-2**SCHEDULE OF EOI PROCESS & CONTACT DETAILS**

A. 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	
3	Last date of Submission of Eoi response	

B. 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

Mr. Sanjay Singh,
 Additional General Manager
 (Planning-East Yard),
 Mazagon Dock Shipbuilders Limited, Dockyard road,
 Mumbai 400010
 E-Mail: sanjaysingh@mazdock.com

All the correspondences shall be addressed to Mr. Sanjay Singh, AGM (P-EY) and following shall also be marked in cc:

i) Mr. Atul Kumar Verma
 Chief Manager (Plg-EY)
 E-Mail: atulkverma@mazdock.com

ii) Mr. Ganesh L Fakatkar
 Deputy Manager (Plg-EY)
 E-Mail: glfakatkar@mazdock.com

SECTION – 3**DETAILS OF EXPRESSION OF INTEREST (Eoi)****3.1. 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.

3.2. Technical Requirement**3.2.1. AIM**

To develop High Capacity Lithium Ion Battery (LIB) System that is scalable for building a full stack LIB system for existing conventional submarines. The total capacity of LIB system is envisaged to be not less than 500 KWh which should be scalable upto 5 MWh.

3.2.2. Scope of Project

- 3.2.2.1. Design of a 500 kWh LIB System for Demonstration purpose.
- 3.2.2.2. Selection and characterisation of Lithium Ion Chemistry for making a cell that would provide maximum capacity and robust safety.
- 3.2.2.3. Study and design of system architecture (arrangement of Li Ion cells in parallel or series).
- 3.2.2.4. Design and development of the Battery Monitoring System. (BMS)
- 3.2.2.5. Development of acceptance test protocol for the Lithium Ion Battery Module.
- 3.2.2.6. Charge and discharge characterisation of the LIB along with the BMS.
- 3.2.2.7. Study report on overall demonstrator system for scalability and retro fitment on board conventional submarines.

Design of LIB**3.2.3. Capacity of LIB system**

The LIB is to be designed for retro fitment in lieu of type 1 batteries. The number of cells can vary depending on the total voltage requirement of LIB system which is considered to be from 240V – 280V. All the modules would be connected in parallel to achieve the same LIB system Voltage.

3.2.4. Sourcing of Li Ion Cells

The design is to be based on either imported / indigenous Li Ion cells. Firm should be willing to indigenize the cells in future. The choice of chemistry of the Li Ion cells along with report for testing and evaluation need to be finalized along with the design documents.

3.2.5. **Configuration of Cells inside Modules**

The configuration of the Li ion cells inside a LIB is to be chosen such that it meets the overall voltage level requirements of the batter group (240V-280V) and the existing PGD network of the EKM class of submarine.

3.2.6. **Battery Management System (BMS)**

BMS is to include sensors for current, Voltage and temperature along with switch gear arrangement for isolation of erratic cells/sub-module /module and short circuit protection device for the module. The BMS design has to cater for safe exploitation during charging and discharge cycles of the module. Based on the operational parameters for the constituent Li ion cells, the BMS has to cater for continuous monitoring of parameters, auto balancing of voltage and implement a protection sequence with graduated mode of evolution from warning to isolation of erratic cells/ cub module/ module. The BMS has to display exploitation parameters of the cells and facilitate active monitoring/ intervention in case if required. The BMS has to record parameters and generate advice *wrt* to state of charge of the module during charging/ discharging of the battery. The design therefore has to cater for an integrated BMS in the module and Interactive central and display unit. The design architecture of the BMS is required to be finalised to fulfilled requirement of end user.

3.2.7. **Safety and Protection Design.**

The following safety aspects are to be catered in the design:-

- (a) **Cell level.** The Li Ion cell to be selected with a safety vent, and overcharge safety device.
- (b) **Cell tray/ submodule level.** At the sub-module level, safety features of BMS are to be integrated for monitoring and isolation.
- (c) **Module level.** The LIB module has been integrated with a management device along with a power relay assembly device.
- (d) **System level.** The battery management system is to provide management for string of modules along with short circuit protection device.

3.2.8. **Testing Levels**

The following testing is envisaged for the various components of the LIB system :-

- (a) **Cell.** Test for cell runaway conditions.
- (b) **Battery Module.** Study propagation behaviours within the battery module and thermal energy release outside of the module.
- (c) **Battery Unit.** Test of the configuration of unit to unit fire spread with heat release rate and gas analysis to determine potential for explosion.
- (d) **System Integration.** Closed room test configuration of unit to unit fire spread with fire mitigation equipment.

3.2.9. **Test protocols**

The prototype LIB system has to tested for energy output at various discharge rates to validate capacity. The test protocols are to include the following details:-

- (a) Electrical performance
 - (i) Discharge rates at C₁, C₃, C₅, C₂₀, C₅₀ and C₁₀₀.
 - (ii) Insulation test

- (iii) Charge retention test
 - (iv) Internal resistance test
 - (v) Charging time
 - (vi) Warranted capacity test
 - (vii) Life cycle test
- (b) Safety Test
- (i) Over charge and Over discharge test
 - (ii) Short Circuit
 - (iii) Heat exposure
 - (iv) External fire exposure
 - (v) Salt water immersion
 - (vi) Safety function test of BMS
- (c) Reliability test
- (i) Weight and dimensions
 - (ii) Tilt Test
 - (iii) Immersion test
 - (iv) Shock test
 - (v) EMI/ EMC test

3.3. SCOPE OF ASSOCIATION:

- 3.3.1. MDL is seeking response from companies willing for Indigenization and Business Development through Collaboration for Lithium Ion Batteries of Submarine along with MDL.
- 3.3.2. Duly registered companies (in the country of their existing operations) or consortium of companies can participate in the Eol. In case of consortium, clarity on roles and responsibilities of the consortium members shall be provided.
- 3.3.3. The participating firm must possess necessary knowledge of the field of collaboration.
- 3.3.4. The participating firm must possess technology of the area of collaboration.
- 3.3.5. The technology possessed by participating firm must be non-infringing while delivering the desired performance and it must be clear from third-party IP infringement claims.
- 3.3.6. The participating firm if foreigner should be willing to source indigenous raw materials at a later stage after stabilization.
- 3.3.7. Interested companies meeting the Pre-Qualification Requirements (PQR) as given in Section-4 and ready to associate with MDL as per broad scope/ expectations given above are invited to submit their offer in response to this Eol.
- 3.3.8. Upon receipt of responses against this Eol, MDL will review the responses to ascertain suitability of the offer and shortlist participating firm for further discussions. Detailed discussions on commercial and other terms and conditions to finalize the Agreement shall be held with shortlisted participating firm. The detailed terms and conditions for agreement shall be mutually agreed upon.

3.4. INSTRUCTIONS

- 3.4.1. Language: All correspondences and documents related to the Eol response shall be in English language only.
- 3.4.2. The participating firm shall abide by the terms & conditions, as applicable, of the Eol.

- 3.4.3. All pages of the Eol shall be duly signed by the authorised signatory.
- 3.4.4. Multiple proposals from the same participating firm should not be submitted.
- 3.4.5. 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.
- 3.4.6. Any participating firm which has been debarred/blacklisted 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 Eol, shall not be eligible to submit the Eol.

3.5. PROCESS TO BE CONFIDENTIAL:

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

3.6. MISCELLANEOUS:

3.6.1. Right to accept or reject any or all Applications:

- i. Notwithstanding anything contained in this Eol, MDL reserves the right to accept or reject any application and to annul the Eol 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.
- ii. MDL reserves the right to disqualify any applicant during or after completion of Eol 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.
- iii. MDL reserves the right to verify all statements, information and documents submitted by the applicant in response to the Eol. 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.

3.6.2. Governing Laws & Jurisdiction:

The Eol 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 Eol process.

SECTION– 4

PRE-QUALIFICATION CRITERIA

The determination of eligibility will take into account the technical and experience capabilities and past performance of the participating firm; 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:

4.1. Technical Qualification: -

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

- i. Bidders Company Profile.
- ii. List of infrastructure/equipment's held by firm which shall include but not limited to R&D / product development facility, Manufacturing Facility, Quality Control and Testing Facility
- iii. Details and personnel (Project Management Team) with designation, qualification and experience to determine their capabilities.
- iv. Bidder to submit relevant documents for the similar product/project / work performed during last 03 years. (Should mention: Application, Types of Cell, Type of Battery and other Specification). Firm to submit PO copies in support of above.
- v. Valid ISO 9001:2015 Certificate
- vi. Firm should have expertise in BMS or similar testing/monitoring equipment design. Firm to submit earlier experience certificate related to BMS design and details related to Manpower and Infrastructure for BMS design.
- vii. Should be willing to undertake cell level testing of claimed parameters at any NABL accredited Lab and should be willing to submit a sample cell for verification trials by end user if requested

The Technical Qualification documents submitted shall demonstrate capability of firm to develop and produce Lithium Ion batteries to meet following Specs

- (a) Warranted life in cycles at 80 % Discharge on Demand (DoD): 1800
- (b) Cell Ah rating: 500 Ah and beyond
- (c) Op temp: 0 to 45 degrees C
- (d) Thermal Runaway: > 55 Degrees
- (e) Self-discharge per month at ambient temp up to 25 Degrees C : < 5 %
- (f) Cell is required to be explosion proof when uncharged and in charged condition using hot nail test

Firm to fill specification of battery developed by them at Annexure 3.

4.2. Commercial Qualification: - The bidder shall submit the following as a part of commercial qualification.

4.2.1. Bidder shall not be under a declaration of ineligibility issued by Govt. of India / State govt. / Public Sector Undertakings etc.

4.2.2. Indian Bidder:

- i. Shop & Establishment registration certificate.
- ii. Factory License.
- iii. Certificate of Incorporation / Partnership deed as applicable.
- iv. Registration certificate from local bodies for conducting business.
- v. MSME, Startup certificate
- vi. GST certificate

Foreign Bidder: Registration certificate for conducting business as relevant.

4.3. **Financial Qualification: -**

- i. Shall have Avg Annual turnover of Rs.1 Cr (min) or equivalent Foreign currency during the last three years ending as on 31 Mar 2020 to participate in this EOI.
- ii. The Bidder shall enclose with its Proposal as per **Annexure-1**, certificate issued by Chartered Accountant with their seal and signature, stating the firms net worth & turnover during the past three years. Firm to submit Balance Sheet and Profit and Loss statement for last 3 years.
- iii. Bidder shall demonstrate access to unutilised line of credit / overdraft facility / cash credit facility from its consortium of banks. Alternatively, or complimentarily should demonstrate liquid asset in form of cash / marketable securities in its balance sheet.
- iv. Companies / Start-ups may be relaxed for conditions of turnover, experience (PO copies), Infrastructure etc offering proven innovative product / technology having Business prospects. MDL reserves right to consider or reject based on merits of such proposal.

SECTION– 5

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.
- f) Submitted more than one proposal for single specialisation 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.

SECTION- 6

Documents to be submitted along with Eol*

5.1.1 Submission of Eol: - List of documents to be submitted as part of Eol:

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 attached format
2.	General information	Annexure-1	
3.	Financial Information	Annexure-2	
4.	Specification of Lithium Ion Battery developed by Firm (To be filled by firm)	Annexure-3	
5.	Questions	Annexure-4	
6.	Pre-Qualification Document		As per section-4
7.	Documents / Presentation in support of area of collaboration		

*In case of consortium, same to be provided for constituent companies of consortium.

EoI FORMS

Format for Covering Letter
[On the Letterhead of the Participating firm]

To,

Mr. S K Singh,
AGM (Plg-EY)
Mazagon Dock Shipbuilders Limited (MDL),
Mumbai-400010, India.
Contact No- 022-23763591,
E-Mail: sanjaysingh@mazdock.com

Ref: Submission of Expression of Interest (Eol)

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 Eol document.

We would like to associate with MDL for Lithium Ion Batteries of Submarines (area of collaboration).

We understand that you are not bound to accept the Eol.

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

I hereby declare that the details furnished in this Eol 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 /debaring 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:

General Information to be submitted by Applicant along with cover letter

1. Name of the Company/ Companies (if consortium):
2. Legal status of the Company(ies):
3. Brief description of the Company(ies) including details of its business groups/subsidiaries/ affiliates:
4. Date of Incorporation:
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:
 - a. As per pre-qualification criteria

Signature & Seal: Authorised
Signatory of the Party

Financial Information

Date: [insert day, month, year] Legal

Name: [insert full name]

Financial Data

Sl. No.	Last three Financial Year	Annual Turnover	Profit after Tax (PAT)	Net worth as at the end of the financial year
1				
2				
3				

* Exchange rate for conversion to INR shall be as published by Reserve Bank of India as on date of floating EoI.

2. Financial documents[#]

The participating firm shall provide copies of the financial statements including balance sheets all notes 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).

[#]In case of consortium, same to be provided for constituent companies of the consortium.

(Signature & Seal)

Authorised Signatory of the Party

Certificate from Chartered Accountant:

This is to certify that _____ (name of the Applicant) has received the payments shown above against the respective years and that the net worth is as computed.

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

Specification of Lithium Ion Battery developed by Firm
(To be filled by firm)

1.1 Module

Battery Module		
Electrical		
Cell		
Configuration		
Capacity (Nominal)		
Voltage (Nominal)		
Energy (Nominal)		
Standard Charge Condition		
Standard Discharge Condition		
Internal / external Communication Type	CAN	
Cooling	Natural air / Forced or liquid cooling	
Usable Pattern		
Charge end Voltage		
Discharge end Voltage		
Max Charge Current		
Max Discharge Power		
Environmental		
Operating Temperature	20 ~ 30°C	
Operating Humidity	5 ~ 85 % RH (Non Condensing)	
Recommend Operating Temperature	23±3°C	
Storage Temperature	~ 7days	-30 ~ 60°C
	~ 6months	-20 ~ 45°C

Noise Level	65dB(A)
Mechanical	
Dimension	
Weight	
Enclosure Material	

1.2 Battery Protection Unit (BPU)

ELECTRICAL SPECIFICATION

MODEL		
Main DC	Voltage	
	Current (Rated)	
Fan power / Aux power	Voltage Range	
	Power Consumption	

MECHANICAL SPECIFICATION

Housing Material		
Dimension (W x D x H)	SMPS BOX	
	BPU	
Unit Weight	SMPS BOX	
	BPU	
Indicator	Status	
Cooling System		
Main DC Terminal		
Control Power Housing	Upper	
	Lower	
E-STOP Input Terminal		
Main DC Wire		

PROTECTION

Over/Under Voltage	
Over Current	
Over Temperature	
Over/Under SOC	
Short Circuit	
Inrush Current	

OPERATING ENVIRONMENT

Storage temperature	
Operating Temperature Range	
Recommended Operating Temperature	
Operating Humidity	
Operating Altitude	
Pollution Degree	
Warranty	

Questions:

- 1) Whether firm have developed Marine Grade Lithium Ion Battery.
- 2) Whether firm have developed Lithium Ion or any other Battery for Submarine
- 3) Whether firm is willing to Indigenize the production of Lithium Ion Battery. (For foreign firm)
- 4) Whether firm is willing for Transfer of Technology (TOT) to MDL.