BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
New Delhi – 110049

Notice for Inviting

Expression of Interest for Selection of Technology Partner for the Project Zorawar-
Armoured Fighting Vehicle- Indian Light Tanks (AFV-ILT)

EoI No: BHEL/AA/TL/0111

Date of Issue: May 24, 2023

Last date for submission of EoI response: June 15, 2023

Bharat Heavy Electricals Limited
New Delhi, India

Subject: Selection of Technology Partner for the Project Zorawar- Armoured Fighting Vehicle- Indian Light Tanks (AFV-ILT) for the Indian Army

1. Introduction

This Expression of Interest (EoI) seeks interest from prospective technology partners, who are willing to partner with BHEL on a long-term basis to address the requirements of **the Project Zorawar- Armoured Fighting Vehicle- Indian Light Tanks (AFV-ILT)** for the Indian Army.

Project Zorawar (AVF-ILT) is a system of systems requiring robust R&D, sound knowledge of system integration, and quality control. The technology partner should have a good understanding of large-scale project management similar to the requirement envisaged for AFV-ILT. The desired end product should be a comprehensive indigenous solution that can support the requirements of the Indian Army throughout the life cycle of the product.

2. About Bharat Heavy Electrical Ltd (BHEL)

BHEL is a leading state-owned company, wherein the Government of India is holding 63.17% of its equity. BHEL is an integrated power plant equipment manufacturer and India's largest engineering and manufacturing enterprise of its kind, catering to the core infrastructure sectors of Indian economy viz. energy, transportation, Oil & Gas, heavy engineering industry, renewable & non-conventional energy and defence. To position the company as global industrial giant, the Government of India categorized BHEL as **"Maharatna Company"** in 2013, empowering the company with enhanced autonomy in decision making. BHEL has 16 manufacturing units, 4 power sector regions, 8 service centers and 4 regional offices besides a host of project sites spread all over India and abroad. The annual turnover of BHEL for the year 2021-22 was around US $2.7 Billion (₹ 20,153 Cr). Highly skilled and committed manpower of approx. 30,000 employees, state-of-art manufacturing facilities and technologies have helped BHEL to deliver a consistent track record of performance. With the current order book exceeding US $ 14 Billion (₹1,02,000 Cr), BHEL is poised for excellent future growth.

Our ongoing major technology tie-ups include Siemens Energy Global GmbH & Co. KG., Germany (for Steam Turbines, Generators and Condensers); MHI, Japan (for Flue Gas Desulfurization Systems); Leonardo S.p.A, Italy (for Super Rapid Gun Mount); GE Tech. GmbH, Switzerland (for Steam Turbine for Nuclear Power Plant); Vogt Power International, USA (for Heat Recovery Steam Generators); Indian Space Research Organization (ISRO) (for Space Grade Lithium-Ion Cells); CSIR-IIP (PVSA based Medical Oxygen Plant); NANO Company Ltd., Korea (for SCR Catalysts); HLB Power Company Ltd., Korea (for Gates and Dampers); Kawasaki Heavy Industries, Japan (for Stainless Steel Coaches for Metros); Valmet Automation Oy, Finland (for DCS System), Sumitomo SHI FW, Finland (CFBC Boilers) and Babcock Power Environmental Inc., USA (for Selective Catalytic Reduction Systems).

For more details about the entire range of BHEL's products and operations please visit our website http://www.bhel.com.

3. BHEL presence in Defence Sector:

BHEL has been in defence business since more than three decades with a proven track record of being competitive, adherence to quality, reliable supplies and lifetime product support. BHEL has long-term association with Indian Defence Forces and key Indian organisations like Defence Research and Development Organisation (DRDO), Hindustan Aeronautical Limited (HAL), Defence Shipyards etc. for various projects including but not limited to the following:

1. BHEL has been manufacturing and supplying 76/62 Super Rapid Gun Mount since 1994 in collaboration with M/s Leonardo, Italy.
2. BHEL has also developed Integrated Platform Management System for Warships.
3. BHEL has also manufactured and supplied Armoured Recovery Vehicles to Indian Army.

4. BHEL was part of the development team for Main Battle Tank (MBT) Arjun and has supplied a gun control system for MBT Arjun.
5. BHEL has the capability for castings & forgings for defence and strategic applications.
6. BHEL has designed, engineered, manufactured and supplied launchers for Trishul Missile & Brahmos Missiles
7. BHEL also has designed, engineered, manufactured and supplied permanent magnet-based motors & frequency converters, bidirectional converters, alternators, mechanical auxiliaries, turbines, turbo-generators, condensers, etc. for warships and submarines.
8. BHEL is one of the selected few organizations with proven capability of design, engineering, manufacturing & testing of compact heat exchangers & pump modules for aerospace applications.
9. BHEL has long-term associations with various Indian Space Research Organisation (ISRO) centers and is a regular manufacturer and supplier of space-grade Li-ion cells and batteries, solar panels for satellites and launch vehicles, hot forming of titanium shells/ domes and cryogenic tanks.
10. BHEL has the core capability for machining and fabrication of exotic materials including Al-alloys, Titanium alloys etc.

4. Brief on Project Zorawar and the development program:

Indian Army released an invitation for Expression of Interest (EoI) under the Make-I program (Buy Indian-IDDM Category) for **Project Zorawar- AFV-ILT** for the Indian Army in April 2023. The project has been categorized under the Make-I category of DAP 2020. The current due date to respond against the India Army EoI is **3rd August 2023**.

Indian Army indicated requirements of the following no's for the AFV-ILT:

a. Prototypes: 02 (Two) No's
b. Production Stage: 295 (Two hundred ninety-five) No's.

The equipment profile of tanks in Indian Army must have the versatility & flexibility of medium & light platforms **to operate in varied terrain configurations available in the country** (High Altitude, Marginal Terrain - Riverine, Rann etc. besides Plains, Semi-Deserts and Deserts) in complete spectrum, of conflict including the Grey Zone war domains.

Methodology/ approach for achieving indigenous Design and Design ownership of the Indian Light Tank Platform and System Software including Fire Control System should be with Indian entity. Aspects related to IPR of the Govt in Make-I projects will be governed by Appendix J of Chapter III of DAP 2020. The Latest version of DAP 2020 can be accessed on GOI, MoD website: https://mod.gov.in/dod/defence-procurement-proc--dap

The following activities of prototype development shall be completed within **2.5 Years (130 Weeks)**.

Sl.	Phase	Activities
a.	**Phase** 1: Project Definition	Mobilization of initial startup resources, including development laboratories.
b.	**Phase II;** Preliminary Design	Establishment of design parameters for configuration, performance in compliance with essential qualitative requirements
c.	**Phase III:** Detailed Design	i. Detailed design of systems and sub-systems down to all components.

		ii. Finalisation of specifications of various equipment, systems, sub- systems. iii. Firming up of engineering design drawings /documents and process
d.	**Phase** IV: Fabrication/ Development	Manufacture of sub-assemblies in limited numbers as agreed to in DPR against total numbers required for subsequent stages.
e.	**Phase V:** Test and Analysis	Testing of several components, systems and sub-systems is to be undertaken concurrent with design
f.	**Phase VI:** Integration	i. Integration of systems/sub-systems ii. Finalisation of interface details and performance and assembly modules/sub-systems
g.	**Phase VII:** Performance evaluation	i. Technical and limited field trials of the prototype ii. Changes in design may be needed until final proving and meeting of essential qualitative requirements

5. Desired qualifications of the prospective partner

5.1 The Prospective Technology Partner should have either Designed or Designed, Engineered, Manufactured, tested, supplied and commissioned similar equipment matching with the broad technical specifications mentioned at **Anexure-1** or higher capacity during the last 10 years and such equipment should be in service as on date of closing of this EoI (to be substantiated by suitable documentary evidence).

(Note: In case of prospective Technology Partner finalised, based on only design qualification criteria, they should be capable and shall take the responsibility to arrange the transfer of Engineering, Manufacturing and testing know-how of AFV-ILT to BHEL within the specified timeframe.)

5.2 The prospective Technological partner can be:

(a) Individual EoI Respondent;

Or

(b) A respondent can also be a leader of a consortium consisting of not more than 4 companies or firms such that together they meet the qualifying requirement stipulated in clause 5. In case of a response from a consortium, the consortium partners shall necessarily identify a leader of the consortium who will furnish the consortium agreement, and the consortium partners shall execute a joint deed of undertaking in which the partners are jointly and severally liable to BHEL to provide desired results;

Or

c) The respondent can also be a Joint Venture (JV) company, provided the qualifying requirement stipulated in clause 6.3 is met by any one or more partners of the JV company. The partner of the JV company, on the basis of whom the JV company gets qualified, shall have minimum 26% equity in the JV company.

6. EoI process:

Interested prospective technology partners (as per clause 5.2) having proven technology and meeting the Pre-qualification requirements as specified in Clause 5.1 are requested to submit a response along with the following documents (in hard/soft copy) on or before **15th June 2023 (Thursday).**

a. Company Background and Presentation

b. Product catalogue

c. Technical features of the product offered for technology partnership

d. Latest three years' annual audited financial statements including auditor's report

e. Signed copy of the EoI along with complete Annexures

Based on the responses received, discussions will be held with shortlisted parties to finalise the scope of the technology partnership. In case any amendment/corrigendum issued to this EoI, it shall be notified only at www.bhel.com

7. Contact Details

The respondent shall submit a signed copy of the EoI along with Annexures, supporting documents specified above in this EoI to the following official:

Sr. Deputy General Manager

Corporate Technology Management

Bharat Heavy Electricals Limited

BHEL House, Siri Fort

New Delhi – 110049, India

Phone: +91 11 66337458 / 7213

Mobile: +91 9441176267 / +91 9818103430

Email: techeoi@bhel.in

8. Miscellaneous

8.1 Right to accept or reject any or all Applications

a. Notwithstanding anything contained in this EoI, BHEL 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 therefore. In the event that BHEL rejects or annuls all the applications, it may, at its discretion, invite all eligible OEMs/suppliers to submit fresh applications.

b. This EoI is being invited with no financial commitment on the part of the BHEL and BHEL reserves the right to reject any applicant during or after completion of the EoI process; if it is found there was a false statement or material misrepresentation by any such applicant or the applicant fails to provide, incorrect or misleading claims in their responses to this EoI, within the specified time, supplemental information sought by BHEL. The BHEL also reserves the right to disqualify any company should it be so necessary at any stage on grounds of national security.

c. BHEL 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 BHEL shall not relieve the applicant of his obligations or liabilities hereunder nor will it affect

any rights of BHEL.

d. Companies currently blacklisted by any Indian Govt Agency/ BHEL are ineligible for participation. Any such information not disclosed but revealed at a later stage would render the technology partner ineligible for further participation. In case, it is revealed at a stage when full or part of Govt of India/BHEL funds have been disbursed to the technology partner, Govt of India/ BHEL shall recover the funds as per the prevailing deposit rates of Reserve Bank of India (RBI).

8.2 Confidentiality Agreement

In case the technology partner is shortlisted after evaluation of EoI responses, a Non-Disclosure Agreement '(NDA)' will be signed. This will also include all technology partners (foreign as well as Indian) wherein the requirement of signing the NDA will be decided by BHEL on a case-to-case basis.

8.3 Governing Laws & Jurisdiction

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

Annexure-1

Indicative Specification of AFV-ILT

Operational Parameters		Desired Value	Respondent's Claim Value (RCV) information	
			Response	RCV
Crew Configuration		Three (3)	YES/NO	
Operating Temperature (Op Temp) Range		Temperature range of minus (-) 20° C to plus(+) 45° C	YES/NO	
Fire Power	**Main Armament**	Calibre should be minimum 105 mm and upto 125 mm	YES/NO	
	Missile Firing Capability	Incorporate anti-tank & anti-helicopter day and night missile firing capability through the barrel / externally launched with the minimum range of 100m and upto a range of 5000m.	YES/NO	
	Fire Control System	The AFV-ILT should have a complete solution Fire Control System (FCS) and gun control equipment to detect and engage targets at progressive ranges.	YES/NO	
	Secondary Armament	➢ **Coaxial Machine Gun:** 7.62mm ➢ **Anti-Aircraft Machine Gun (AAMG):** 12.7 mm capable of engaging aerial targets up to an effective range of 1500m and ground targets up to an effective range of 2000m.	YES/NO	
	Ammunition	The AFV-IL T should have the capability to fire :Kinetic Energy (KE) Projectiles (APFSDS), Chemical Energy (CE) (HE, HEAT or HESH and anti RCC), ATGM with tandem warhead, Loiter Munitions (LM) and Secondary armament ammunitions .	YES/NO	
Mobility		➢ The AFV-IL T must be capable of all-weather operations in plains, deserts, semi-deserts, marginal terrain, high altitude area mountainous terrain and island territory. ➢ **Speed:** ○ **Forward:** Minimum 45 kmph cross country and minimum 60 kmph on road.	YES/NO	

		○ **Reverse:** Minimum 20 kmph with multiple reverse gear ratios		
Communication	**Radio Communication**	➢ Buyer Nominated Equipment compatible with in-service radio sets and secrecy devices. ➢ Network Enabled for supporting additional feeds from UAV, Drones, other elements of Combat Group including Attack Helicopters and Aircraft.	YES/NO	
	External Communication and Inter-Communication	➢ **External Communication:** The facility to communicate with other outstations on the external radio network should be available to all crew members-based on Software Defined Radio (SOR). ➢ **Inter Communication:** Should have a digital Inter-Crew Communication System for all the crew members.	YES/NO	
Technical Parameters				
Combat Weight		Full Combat weight:25± 10% tons	YES/NO	
Dimensions		Should not impede its transportability by in-service rail, road, air and sea, should conform to existing Over Dimensioned Consignment (ODC) limits	YES/NO	
Service Life		The AFV-ILT should have a minimum service life of 35 years extendable to 45 years with upgrades	YES/NO	
Fire Power	**Main Armament**	Rate of fire minimum 06 rounds per minute	YES/NO	
	Angle of Firing (Main Armament)	➢ **Depression:** Minimum 10°. ➢ **Elevation:** Minimum 24°. ➢ **Traverse Angle:** Main Gun should be 360° traversable	YES/NO	
	Fire Control System	Full Solution Fire Control System should have: - ○ Accuracy to achieve the First Round Hit Probability (FRHP) of Minimum 90% ○ Hunter Killer mode with Multiple Target Tracker (Specifying number and types of targets)	YES/NO	

		○ Able to accurately hit stationary tank and broadside moving tank with speed of 25 kmph at maximum engagement ranges ○ Able to accurately hit in both moving (platform & target) condition at 2000m with both tank and target speeds of 25 kmph. ○ Day & Night capability for commander to search and queue up-to two targets up to the range of 5000m, while the gunner is engaging the first. Automatic laying of gunner's sight on next target once first engagement is successfully concluded ○ Minimum Identification Ranges (Standard Tank Target) 2000 meters both by day and night ○ Capability to fix own position and carry out Indirect Fire ○ Provision of Muzzle Reference System (MRS) ○ Provision to allow the main armament and the Remote Controlled Weapon System (RCWS) AAMG to able to engage different targets simultaneously.		
	Lethality	The AFV-IL T should have the capability to fire ammunition with following capability: - ➢ **KE:** Depth of Penetration (DoP) greater than 500mm at 2000m at 60° Angle of Attack on a Rolled Homogenous Armour (RHA) target. ➢ **CE:** ○ **HE**: As per calibre selected ○ **HEAT**: DoP greater than 450mm at 2000m at 60° Angle of Attack on a RHA target OR ○ **HESH**: Intensity of Tension wave adequate to create a detached Scab at 60° Angle of Attack at 2000m	YES/NO	

		on a target of 500mm thickness RHA ➢ **ATGM:** DoP should be greater than 650mm at 5000m and capable of engaging targets at progressive ranges from 500m upto 5000m ➢ **LM**: Capable of housing and launch of LM from tank with minimum DoP of 600mm in top attack mode		
	Secondary Armament	➢ **Coaxial Machine Gun**: 7.62mm with minimum range ≥ 1000m or improved machine gun in service ➢ **Anti-Aircraft Machine Gun (AAMG)**: 12.7mm in service or improved.	YES/NO	
	Ammunition Storage Capacity	➢ Main Gun - Minimum 20 rounds ➢ ATGM - Minimum 4 missiles ➢ 12.7mm AAMG - 500 rounds ➢ 7 .62mm MG - 1500 rounds	YES/NO	
Day and Night Vision Devices		➢ **For Commander and Gunner** ➢ **For Driver**		
Survivability	**Passive Protection**	➢ STANAG Level 6 in frontal 60° arc and STANAG Level 4 for Top. STANAG Level 2 all around in remaining surfaces ➢ Protection against top attack munitions should be provided by a suitable solution ➢ Crew compartments must be fitted with spall liners. ➢ Armour protection should be capable of incorporating modular armour including ERA which could be scalable. ➢ Provision to mount separate modular attachment for clearing path for moving across minefields.		
	Active Protection System	Active Protection Suite (APS) to contribute to the 360° all-round protection (including against top-attack) with soft kill.	YES/NO	
	Chemical Biological	The Crew and all Systems should be protected against	YES/NO	

	Radiological Nuclear (CBRN) Protection	the effects of Nuclear Explosions, EMP attacks, Toxic Chemical Agents and Biological Warfare Agents.		
	Instant Fire Detection and Suppression System	The Tank must incorporate environment-friendly, non-ozone depleting suppressant materials, and having an automatic activation response and fire detection of not more than 20 milliseconds. The fire should be suppressed within 130 millisecond in crew compartment and 10 seconds for the engine compartment along with serviceability indications	YES/NO	
	Stealth and Signature Management	➢ Incorporate Signature Management Technology to supress various signatures viz, Visual, Acoustic, Thermal & EM by at least 25% ➢ Multi Spectral Camouflage (MSC) to include paint/net or both	YES/NO	
	Smoke Grenade Dischargers	Create a smoke screen of 30m width and 10m height at 400m range with anti-thermal and anti-laser protection upto 1500m by firing a salvo of four grenades	YES/NO	
Mobility	**Engine**	Minimum 750 HP. The life of the Engine (without overhaul) should not be less than 750 engine hours.	YES/NO	
	Power to Weight Ratio	Not less than 27:1 horse power (HP/Ton)	YES/NO	
	Nominal Ground Pressure (NGP)	Not more than 0.70 kg/cm2	YES/NO	
	Obstacle Crossing	**Ditch Crossing:** Not less than 2 m **Vertical Step:** Min 1 m **Gradient Negotiation:** ≥ 35° **Side Slope:** ≥ 25°	YES/NO	
	Towing Arrangements	Two Hooks both in front and rear of hull	YES/NO	
	Tracks	Quick-Fit and Detachable Rubberised Pads / Composite Tracks, incorporating a Dynamic and Automatic Track Tension Measurement and Adjustment System	YES/NO	

Maintainability & Ergonomic Parameters			
Vetronics	Condition Based Monitoring System to display health of the platform relating to Automotive Armament and Electronics aspects for timely predictive and preventive maintenance.	YES/NO	
Auxiliary Power Unit	Power Output not less than 13KW at 27.5±1V DC. Based on common fuel as mainn engine/ fuel cell technology	YES/NO	
Cold Start Capability	Suitable Cold Start Capability for the main engine and the APU engine	YES/NO	
Ammunition Loading Provision	It should be Auto-Loaded with minimum 12 rounds ready for auto loading along with provision for Semi-Automatic and Manual Loading. Common for all ammunition types including ATGM in case of GLATGM.	YES/NO	
Gun Control System	All-Electric-Drive System in both horizontal and vertical planes, with backup manual operation for both traversing and elevating mechanisms	YES/NO	
Ammunition Stowage	➢ All ammunition should be stored in easily accessible containerized compartments (Bustle Loader), with suitable safety measures like Blow-Off Panels, to ensure Crew Protection from any accidental explosion involving blast, heat and fire ➢ Cater for Stowage of Missiles and LM	YES/NO	
Environment Control Unit	➢ 25°± 05°C (hatches closed) in an ambient temperature range from minus (-) 5°C to plus (+) 45°C ➢ For temperatures above plus (+) 45°C ambient, a minimum of 15° C drop in temperature within the tank must be effected	YES/NO	

Note : Respondent may also furnish any other additional information / specification showing enhanced features of their equipment and systems offered for qualification against this EOI.

Annexure- 2

Prospective Partner's Experience in Light Tanks

Sl. No.	Requirement	Remarks
(a)	Whether the Prospective Partner is an OEM/supplier of Light Tanks /Similar Equipment	
(b)	Whether the Prospective Partner has executed at least one single work contract of design / design, manufacture, supply, installation, testing & commissioning of Light Tanks / Similar Equipment during the last 10 years and at least 50% of designed/ designed, manufactured and supplied equipment are in service as on the closing date of EOI.	
(c)	Whether the Prospective Partner confirms its willingness to facilitate BHEL in establishing required manufacturing/assembly, integration and test facilities for Light Tanks	
(d)	Whether the Prospective Partner confirm that it will support BHEL during the comprehensive evaluation process under operational conditions as per Indian Army requirements i.e. Field Evaluation Trials (FET)	
(e)	Whether the Prospective Partner confirm that it will support BHEL for Prototype Development & Buy (Indian- Indigenously Designed Developed and Manufactured (IDDM)) for Procurement of 295 AFV-ILT as per Chapter III of DAP 2020 will have a minimum 50% IC at both prototype & production stage.	
(f)	Whether the prospective Partner confirms to provide necessary support to BHEL for fulfilling the Indian army's maintenance requirement. The service life of AFV-ILT envisaged is minimum of 35 years and extendable by 10 years.	
(g)	Whether the prospective Partner confirms to provide necessary support to BHEL for Life Cycle Management of AFV-ILT. The Planned life of Indian Light Tank is 35 years, extendable to 45 years with upgrades.	
(h)	Whether the Prospective Partner has been blacklisted/banned business dealings for the Ministry of Defence or any Government Department of India.	
(i)	Whether details of the company background, product catalogues have been enclosed.	
(j)	Whether the detailed reference list has been enclosed.	

Sl. No.	Requirement	Remarks
(k)	Whether copy of the Prospective Partner's annual audited financial reports for the last 5 years has been enclosed.	
(l)	Whether a summary of experience & references has been enclosed.	
(m)	Whether the Prospective Partner owns the IPRs for the technology being proposed) or have unencumbered right from the owner of the IPRs to sub-license the technology, if applicable. If yes, a list of such IPRs is to be enclosed.	
(n)	Whether the Prospective Partner confirmed the Transfer of essential technology to BHEL to enable BHEL to design, engineer, manufacture, assemble, quality control, test, supply, install, commission, repair, service, and retrofit of Light Tanks.	

(SIGNATURE)

Annexure-3

Reference List: The Prospective Collaborator shall furnish a summary of their product reference as detailed below for major supplies in last 10 years.

Sl.	Year of Supply	Name of Customer	Description of System/sub-system supplied	Remarks
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

(SIGNATURE)