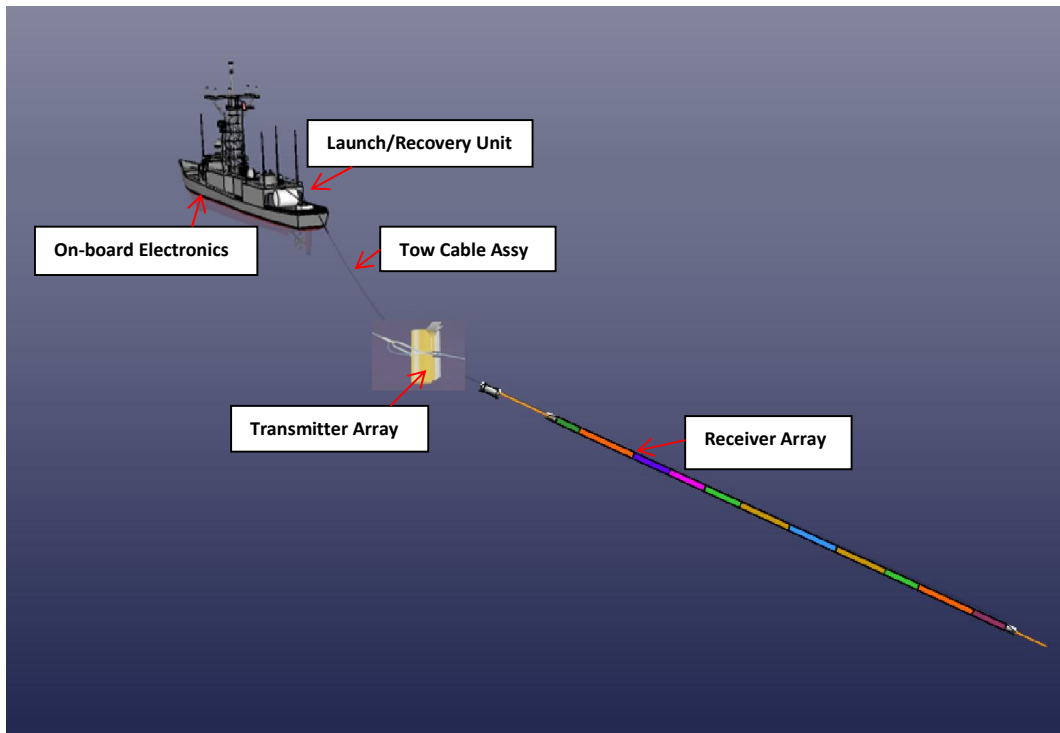


## Expression of Interest

### TOT OF AN ADVANCED LIGHT TOWED ARRAY SONAR (ALTAS)

#### 1. INTRODUCTION

NPOL, Kochi, a premier laboratory under Defence R&D Organisation invites Expression of Interest (EOI) from Indian manufacturers having sufficient experience, expertise and willingness to undertake System Integration of an Advanced Light Towed Array Sonar (ALTAS) on Naval Platforms. ALTAS system consists of mainly four subsystems i.e. Wet end system, Launch/Recovery unit (LRU), On-board Electronics and System Software.



#### **Schematic of ALTAS System**

1. The Wet End System consists of Transmitter and Receiver Arrays and Tow Cable assembly. The Transmitter Array is housed in a Vertically stabilised body and is hooked on to the seamless Tow Cable with linear receiver Array. The Launch/Recovery unit consists of a Heavy Duty Winch for Deployment, Retrieval and Stowage of tow cable assembly and Receiver Array and a hydraulically operated robotic handling gears for the launch/recovery of the Vertically stabilised body. The receiver array is linked to the on-board electronics through fibre optic telemetry. The

on-board electronics consists of transmit waveform generators including power amplifiers for generating the acoustic pulse and specific hardware modules for signal processing and display. The system software which resides on the on-board hardware modules implements advanced signal processing algorithms for target detection and localisation and presents the results in innovative display formats.

Technical Specifications are enclosed at Annexure 'A'

## **2. RESPONSIBILITIES OF SYSTEM INTEGRATOR**

ALTAS is a multidisciplinary sonar system consisting of technologies of transducers, mechanical engineering, ocean engineering, electrical and electronics engineering, power electronics and software. Realisation of the entire sonar system under one roof may not be practical because of the diversity of technologies, know-how and skill set required. And hence the hardware content of the sonar has been realised as subsystems through specialised Indian industries and integrated as ALTAS sonar system by incorporating dedicated software developed by NPOL. The responsibility of its installation onboard a naval ship and the role of lead system integrator was undertaken by NPOL. The performance validation of the system was done under the leadership of NPOL and with the association of Indian Navy through a series of structured sea trials with real targets deployed at strategic locations. Performance validation has since been completed, the Indian Navy will shortly evaluate the system as per mutually agreed trial plan and procedure. Indian Navy has plans to induct a few ALTAS sonar systems for its front line war ships soon after evaluation trials. The purpose of this EOI is to identify one / two potential Lead System Integrators (LSI) for ALTAS system. And the scope of TOT, after completing all official formalities, will be restricted to system level configuration and specifications, interface controls, supply chain and Bill of Materials, Acceptance Test procedure for subsystems and components, software integration procedure, binding data for installation, performance validation criteria and system maintenance tips. Responsibilities of Lead System Integrator are further elaborated in the succeeding sections.

### **2.1 Act as a single point contact between the Indian Navy/NPOL**

- a. The sub-systems of ALTAS system has been developed through specialised Industries.
- b. Detailed Specifications, Quality policy / program for component level to system level, ATP, FAT's, HAT's and SAT's documents and BOM will be provided in the TOT documents.

- c. The LSI will field ALTAS system against RFP from Indian Navy/other sources by submitting Technical, commercial and price bids appropriately.
- d. Once a Supply order is placed on the Lead System Integrator (LSI) , the LSI will execute the order within the stipulated time frame and budget by liaising with the sub-system manufacturers for realising the hardware, strictly adhering to the supply chain given in the TOT documents, and by integrating software as per procedure.

## **2.2 Organising QT/ET/ATP at the premises of sub-system manufacturer.**

- a. System Integrator has to organise QT/ET at the manufacturers end as per sub-system acceptance document provided in the TOT document.
- b. System Integrator has to conduct FAT's at the manufacturers end as per sub-system Factory acceptance document provided in the TOT document before despatch of sub-system for system Integration
- c. System integrator will ensure the presence of competent authority responsible for Quality assurance during all inspection stages.

## **2.3 System Integration at own factory before despatch to the destination**

- a. Before despatch to destination Onboard electronics and wet end subsystems of ALTAS have to be Integrated and evaluated as per FAT's document issued along with TOT Document at the own factory premises of System Integrator.
- b. All facilities essential for conduct of System Integration will be organised by the system Integrator.
- c. System integrator will ensure the presence of competent authority responsible for Quality assurance and inspection.

## **2.4 Installation On-board designated Platforms**

- a. System integrator will carry out the installation of ALTAS system on-board Naval Ship identified by Navy/NPOL. System integrator will be responsible for survey of the Ship and association with board of officers nominated for the Siting board for installation of ALTAS System.
- b. System integrator will prepare all necessary installation drawing specific to the designated Naval Ship.
- c. System integrator will transport all the sub-system to the harbour identified for the installation of ALTAS System.
- d. System integrator will ship-in all the necessary sub-systems and carry out the installation and Integration on-board the designated Naval Ship.

- e. System integrator is responsible for Laying of power cables, junction boxes and control panels required for system integration. System integrator has to procure all the necessary accessories for the same.
- f. System integrator is responsible for Air-conditioning, lighting and ventilation at the area where ALTAS systems are installed. Air conditioning includes cooling of cabinets for On-board electronics.
- g. System integrator is responsible for Providing False roof, Wall panelling and flooring at the area of installation as per Ship standard.
- h. System integrator is responsible for Plumbing works to make available fresh water and sea water necessary for system operation
- i. System integrator will carry out the installation as per procedure, safety norms and security norms of ship.
- j. System integrator will ensure the presence of competent authority responsible for Quality assurance throughout the installation procedure and will be responsible for completing installation inspection by the competent authority.

#### **2.5 Conduct HAT's and SAT's.**

- a. System integrator will organise the conduct of HAT's and SAT's post-installation as per Documents provided during TOT.
- b. System integrator will ensure the presence of competent authority responsible for HAT's and SAT's.

#### **2.6 Post Installation support like routine and preventive maintenance, AMC etc.**

- a. System integrator will carry out Post Installation support like routine and preventive maintenance, AMC etc. of the ALTAS system on the platform in which the ALTAS system is installed.
- b. The responsibility of the entire "Product Life Cycle Support" lies with the Lead System Integrator.

### **3. TOT TERMS**

3.1 As per DRDO Guidelines for Transfer of Technology (TOT), the first TOT will normally be given to the industry associated during development on priority so as to ensure high quality of manufacture within the limitations in hand-holding support of DRDO.

3.2 As more than one industry was involved in the realisation of the various sub-systems during the development of ALTAS System, the supply chain established by NPOL should not be disturbed by the industry that is nominated as the lead system Integrator.

- 3.3 TOT will be given on non-exclusive basis only. The number of license on non-exclusive basis will be restricted. However, additional licence if required will be given by DRDO on need basis. The intellectual property rights shall always remain with DRDO.
- 3.4 The amount and payment stages of TOT fee will be as prescribed by DRDO. As per current guidelines it is upto 20% of its developmental cost.
- 3.5 Royalty fee @ 2% of the annual sales will be applicable uniformly for all industries.
- 3.6 Technical assessment of the industries submitting EOI's will be carried out by a Technical assessment committee for verification of the technical and financial capability/capacity of the industry.
- 3.7 Eligible parties will have to sign Confidentiality & Non-Disclosure Agreement (CNDA) with DRDO for technical discussion including specifications, following which they shall be considered for giving Transfer of Technology (TOT) on non-exclusive basis.
- 3.8 TOT to industry will be given based on their manufacturing capability, assurance on quality and capacity of production apart from other terms and conditions.
- 3.9 The licencing agreement for transfer of technology (LATOT) which is to be signed will be as per the template approved by Department of Legal affairs. Ministry of Law and Justice.
- 3.10 DRDO shall have the march-in rights to use the IP for its own use in the interest of the Govt. of India without any restrictions, irrespective of the nature of licence granted.
- 3.11 The firm expressing interest should be technically sound to Procure/manufacture, supply, install, Integrate and maintain the system with requisite quality standards. Domain knowledge in installation, integration and maintenance of deployable underwater systems onboard naval ships is considered to be essential for satisfactory completion of system commissioning and sea trials.

#### 4. EOI TERMS

Interested Industries may write along with their company profile, financial & technical capabilities etc. as per the following format to Director, NPOL, Kochi and copy to Director DIITM on the following addresses within 45 days of this advertisement.

**Director, NPOL**

DRDO, Min. of Defence,  
Thrikkakara P.O.  
Kochi-682021  
Contact No - 0484 2424878  
FAX : 0484-2424858  
Email: [director@npol.drdo.in](mailto:director@npol.drdo.in)

**Director, DIITM**

Room No 446 DRDO Bhawan  
DRDO HQrs Ministry of Defence  
Rajaji Marg New Delhi – 110011  
Contact No - (011) 23016216 / 23007446  
FAX No. 011-23793008

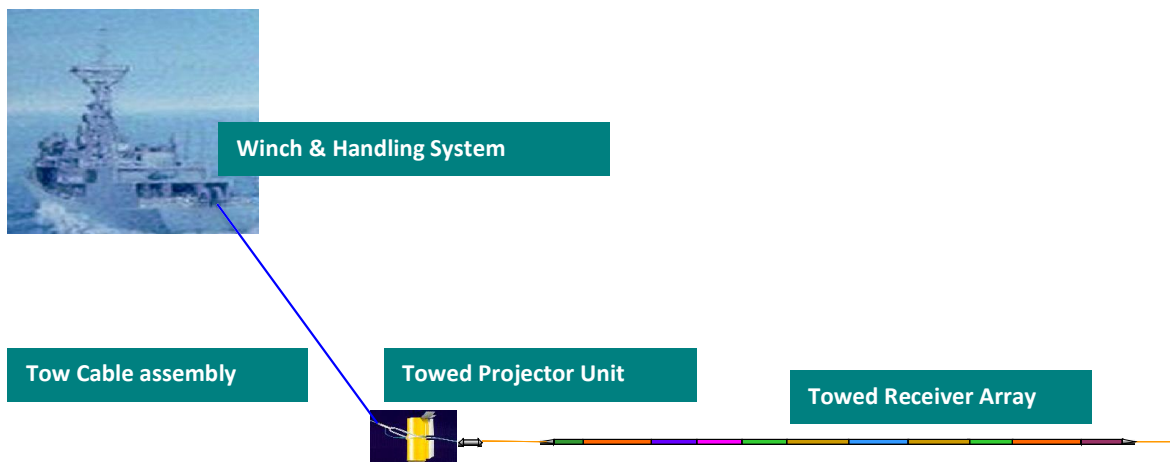
- a) Memorandum and Articles of Association (Should be incorporated as per Indian Companies Act, 1956)
- b) Certificates of registration as a manufacturing unit, if any.
- c) Balance Sheet for the preceding three years.
- d) Income Tax returns for the preceding three year period
- e) Details of shareholding/ownership pattern especially foreign partners/ shareholders, foreign employees, directors, etc. The company must adhere to the prevailing Govt. of India policies and regulations on Foreign Direct Investment (FDI).
- f) Annual budget for R&D during last three years.
- g) Numbers and details of IPR or patents etc. held by the company.
- h) Number of technically or professionally qualified personnel.
- i) Record of past performance (e.g. Supply orders executed against Ministry of Defence orders, public sectors and paramilitary forces, if any.
- j) Availability of adequate infrastructure (List of machines and their production capacities) and technical expertise.
- k) List of Testing and Support equipment.
- l) ISO/ ISI certification or any other certification
- m) Relevant clearances from the authorities/ ministries (if any)
- n) Capacity and capability to undertake developmental work and to accept attendant financial and commercial risks.
- o) Capacity/Capability to market the product through the marketing network, sales and service network, reliability to maintain confidentiality.

TECHNICAL SPECIFICATION

ADVANCED LIGHT TOWED ARRAY SONAR (ALTAS)

System Configuration

The ALTAS system will consist of a linear towed receiver array of 78 mm diameter with appropriate length for the detection of signals in active and passive modes, a vertical towed projector Unit for active transmissions, a hydraulically operated winch, handling systems for towed receiver array and towed projector Unit, tow cable assembly, on-board electronics and system Software for signal processing, display & recording of sonar information. Brief of each of these subsystems is given in the following section.



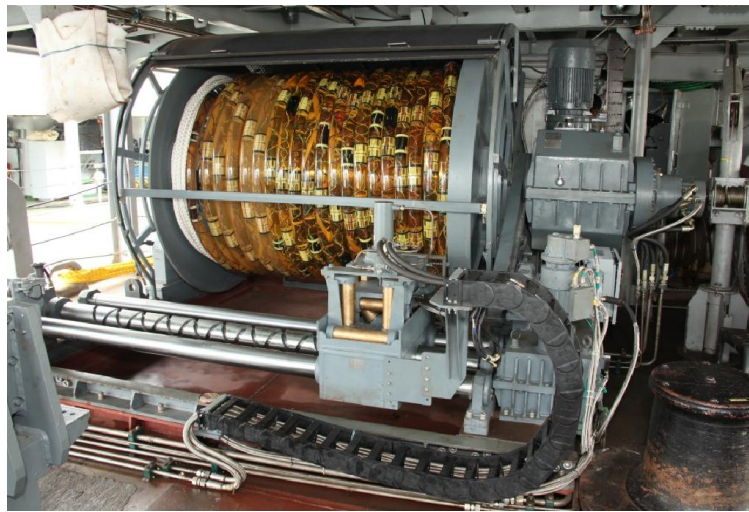
Schematics of ALTAS

**Towed Receiver Array (TRA)** : This is a linear array of hydrophones, typically 200 m long, housed in polyurethane hose of outer diameter 78 mm, along with signal conditioning electronics.

**Towed Projector Unit (TPU)**: This consists of a Vertical Projector Array (VPA) and a hydro dynamically streamlined Vertical towed body (VTB). VPA is an array of projector elements for active sonar operation

**Tow Cable Assembly (TCA):** Tow Cable assembly act as the life line of Towed Array Sonar, transferring the drag force to the winch, acting as the medium for transferring power supply to the arrays and providing a data telemetry link. Tow cable assembly is also used for depth keeping and level keeping of the arrays during sonar operations. Tow Cables are electro-optic-mechanical cables having electrical lines, Fiber optic lines and strength member. Tow cable assembly consists of a heavy tow cable, light tow cable and an interface unit.

**Winch & Handling System (WHS):** Sonar winch is used for winding, unwinding and stowage of the array and cables. A hydraulically operated winch is used for ALTAS. The Handling System is the mechanism through which towed transmitter body is deployed and retrieved. A hydraulically operated robotic handling system is used for the deployment / retrieval of a vertical Towed Transmitter Body. An overhead sheave positioning mechanism helps smooth deployment and retrieval.



**Cable and Array Wound on Winch**





**Launching/Retrieval Mechanism for Towed Projector Unit**

**Onboard Electronics (OBE):** This subsystem receives the data through a fibre optic data link from the array. It further does various signal processing techniques and displays the relevant parameters of the target in both active and passive modes of operation of the sonar.



**On-Board Electronics**

**ALTAS Subsystems**

The ALTAS sonar is divided into four subsystems as detailed below.

**1. Wet end subsystem**

This consists of :

- a) Towed Receiver Array consisting of acoustic and non acoustic modules and tail drogue.
- b) Tow Cable Assembly consisting of Heavy Tow Cable, Light Tow Cable, Electro - Opto - Mechanical interface connector and cable interface module.
- c) Towed Projector Unit consisting of vertical projector Array, Tuning Coil Box, Vertical Towed Body, Bridle Assembly and Cable Harness assembly.
- d) Array Data interface Box.

**2. Winch and Handling System:** This consists of a heavy duty winch with primary operation by hydraulic drives and auxiliary electrical drives, hydraulically operated robotic handling system, VTB trolley, fairlead assembly and an overhead sheave positioning mechanism.

**3. Onboard Electronics system:** This consists of two in number display cum processor cabinets, one in number power supply cabinet, two in number power amplifier cabinets and one in number data recorder cabinet.

**4. Software:** The System software which resides on the on-board hardware modules implements advanced signal processing algorithms for target detection and localisation and presents the results in innovative display formats. Exclusive rights for software will remain with NPOL.