HAL/HD/BD/RFI/DBMRH/MMR&MPR/RFI Date:16th Oct 2024

Sub: Request for Information (RFI) for Design development and supply of Surveillance Radar (MULTI-MODE RADAR SYSTEM FOR DBMRH-S variant).

1. Hindustan Aeronautics Limited (HAL), a Navratna Public Sector Company, is a pioneer in Aircraft Industry in South Asia (www.hal-india.co.in).
2. Avionics Division, Hyderabad an AS 9100D certified division of HAL is engaged in Production, Manufacture and Maintenance of Avionics fitted on various Rotary wing/ Fixed wing aircrafts, with the state-of-the-art technologies.
3. Deck based Multi Role Helicopter (DBMRH) are Medium Lift and Multi Role, 13-ton category Helicopters having pilot and co-pilot in a side-by-side seating configuration. Special Ops variant DBMRH (DBMRH-S) shall be fitted with Multimode Surveillance Radar system.
4. Flight worthy and certified Multimode Radar system needs to be available in a time span of two years from release of purchase order and subsequently production supplies in next few years.
5. Also, the vendor to support the proposed system for a minimum of 30 years (considering the life of a helicopter) in service i.e. after completion of production.
6. The goal shall be to maximize the Indigenous content in Units for fruitful long-term association of OEM and HAL to provide satisfactory services to end customer.
7. **Objective and scope of Request for Information (RFI):**
   a) Avionics Division of Hindustan Aeronautics Limited (HAL), Hyderabad– 500042, India is looking for the supply of Multimode Surveillance Radar Systems for DBMRH-S from D&D/ Production/ Supplying partners.

   b) The requirements of Multimode Surveillance Radar systems for DBMRH-S is enclosed at **Annexure- I**. It is requested to provide a comprehensive technical proposal along with point-to-point compliance to requirements provided by HAL. In addition, vendor may also provide technical details of any similar/superior/already airworthy product in a separate Annexure, if available.

   c) Interested companies from the defence / aerospace manufacturing sector, having experience in Design, development, manufacturing, Installation & Commission are requested to forward following detailed information:

      i. Company's profile (As per **Annexure II**)

      ii. Details of experience in Design, Development and manufacture of airworthy parts/systems.

iii. Details of delivered / similar / superior / already airworthy Multimode Surveillance Radar systems: Designed, Developed and supplied by the company for Helicopter applications.

d) Technical proposal addressing following:

i. Supplier to indicate mode of engagement with HAL-Hyderabad i.e

   a. Supplies through collaboration with HAL

   b. Direct Supplies (Indian Supplier / Foreign Supplier)

ii. Willingness to offer Transfer of Technology (ToT) for Manufacturing (ToT-Mfg) and Maintenance (Repair &Overhaul ToT-RoH) of Multimode Surveillance Radar System to HAL-Hyderabad.

iii. Key technologies with extent of Know-how and know-why, proposed under ToT to be mentioned with its extent of Range and Depth.

iv. Time frame / lead time & plan: For design and supply of D&D Units, Parts to be made available by Mar 27 for fitment on DBMRH-S Prototype. Completion of D&D activities and setting up of production facility within T0+60 Months.

v. Rough Order of Magnitude (ROM) Cost Information as per **Annexure- III**.

vi. Indigenous content (Definition of IC as per DAP2020) offered to HAL & Workshare offered to HAL (In % of Unit cost for IC and % of work share of total Program).

vii. Other details of the Multimode Surveillance Radar systems (which may be relevant to the proposal) which is not mentioned in the requirements.

viii. Details of testers/simulators for acceptance and/or maintenance testing at HAL and/or at Customer bases.

ix. Plan for Make in India, in case of foreign OEMs.

x. FRD (Facility Requirement Document) as per **Annexure-IV**.

xi. Information on off-the-shelf items which are closely meeting the requirements (if any).

8. Information and instruction for potential supplier:

a) Supplier with proven expertise in design, manufacturing and supply of similar types of parts for helicopter program shall participate in the RFI and details of similar product designed, manufactured and cleared to airworthiness to be provided.

b) In case of Foreign OEMs, RFI proposal should confirm whether any specific clearance and export permission, Licenses are required from Government of seller's country for supply of subject item to HAL and for Military applications. If so the estimated time period for obtaining of same to be indicated.

c) The prospective industry partners shall provide brief on Quality Management System (including process control) being followed.

d) The technical details enclosed are only tentative in nature and are subject to change and may be considered only as advance information for market exploration. HAL will freeze technical scope on responses to subject RFI as deemed necessary at the time of issuing RFP (Request for Proposal) at HAL's discretion.

e) The potential supplier can propose suitable and proven solution to meet HAL requirements.

f) This document is not intended to form the basis of any decision to purchase/finalize contract and it does not constitute an offer or invitation or solicitation of an offer to purchase.

g) HAL is looking for a potential supplier for the subject requirement with long term relationship.

h) Based on evaluation of RFI proposal received, HAL shall finalize technical requirement and float RFP (Request for Proposal) at HAL's discretion.

i) Supplier to provide Budgetary quote, per annum production capacity, warranty (24 Months), etc. Details of cost may also include product support package, training, additional details as deemed appropriate.

j) Certification details like Military certified. If no certification, vendor to provide details demonstrating capability / capacity in coordinating with regulatory agencies RCMA and DGAQA / DGCA for similar products.

9. Other Conditions:

a) Participation in RFI does not guarantee that RFP will be offered.

b) HAL has the right to use the information provided by the Industry Partners for future issuance of the tender.

c) HAL reserves the right to accept/reject any or all the RFI without assigning any reason and also will not be responsible for postal delays.

d) OEM/Vendor should provide confirmation (with documents in support of the same) on the Ownership of Intellectual Property Rights in the Product. Ownership of such IPR should also define both Product as well as Process Patents.

e) OEM/Vendor should indemnify HAL for breach of any 3rd Party IPRs by OEM/Vendors.

f) The Technical information shared by vendor/OEM will be shared with Platform Design & Development Division of HAL for DBMRH and if required with end customer also for the purpose of finalization of final Technical specifications for RFP.

g) Vendor/OEM to provide detailed technical specification of items offered against this RFI including environmental conditions.

10. The RFI project proposal (including the preliminary technical proposal and budgetary price proposal with lead time details etc) duly completed and signed shall be sent to

Name : Mr. S B R Jawaharlal,
Addl. General Manager (Business Development)
Address : Business Development Department,
Avionics Division, HAL PO, BALANAGAR, HYDERABAD 500042
Tele : 040-2382 2605, Fax : 040 2387 8187

E-Mail : jawaharlal.s@hal-india.co.in or marketing.hyd@hal-india.co.in.

PoC– Mr. SBR Jawaharlal,

Contact details 040-2377 0068, Mobile: 9666696033

11. Due date for submission of RFI proposal in complete is **15 calendar days from release of RFI**.

GENERAL INFORMATION

Sl. No.	Description
1.	**Company Profile:** Please submit your company profile in detail, indicating Type of the Company, Organization chart, Number of years in business, areas of expertise/technical competence, Man Power, Previous supply track record (for supply of same/similar materials/equipment/Tools/system etc.) with customer references (particularly for Aircraft Industry), International Accreditation if any, Inspection Procedure/Quality Assurance Standards/System, Production Facilities, Products Range.
2	Involvement of any Agents and Middlemen: No involvement of Agents or Middlemen in India or abroad in any capacity whatsoever is permitted at any stage in relation with this RFI, subsequent RFQ and the resultant contract/Order. Vendors should specifically indicate if any of their office or contact exist in India or abroad providing the details and extent of the activities handled and provide the details of the employees, address of the office/ location, phone and fax numbers. Offers and all correspondence/ communications should be addressed directly to HAL. No agency commission in any form is payable to any Agent/ Middlemen or any third party in India or abroad. If anything, contrary to the above is noticed by or is made known to HAL, HAL has the right to disqualify the offer or cancel the contract, forfeit all payments and take actions as deemed fit.
3	**Immunity to Government of India:** It is understood and agreed that the Government of India is not a party to contract if finalized in due course against specific RFQ to be floated by HAL at its sole discretion and has no liabilities, obligations or rights hereunder. It is expressly understood and agreed that HAL is an independent legal entity with power and authority to enter into contracts solely on its own behalf under the applicable Laws of India. Vendor shall agree, acknowledge and understand that HAL is not an agent, representative or delegate of the Government of India. It is further understood and agreed that the Government of India is not and shall not be liable for any acts, omissions, commissions, breaches or other wrongs arising out of the contract. Accordingly, Vendor expressly waives releases and foregoes any and all actions or claims against the Government of India arising out of contract, not to sue the Government of India as to any manner, claim, cause of action or anything whatsoever arising out of or under this agreement.
4	Vendors/OEMs shall not raise any dispute/s suits, claims and/or litigation of whatsoever nature maybe, against HAL pertaining to the terms and conditions of this RFI. HAL reserves right to sue or can initiate necessary legal action/s against Vendors/OEMs for making false representations/misrepresentations or not adhering to the terms and conditions of this RFI.
5	No Agent /Agents of Third party/parties are engaged by HAL in the process of procurement of any materials for HAL. HAL is also not responsible for any person/firm expressing or pretending to express himself /herself/themselves to be the agent or third-party representing HAL in the process of procurement of the materials. It is advised to deal directly with PoC mentioned in the document.
6	All communications, technical discussions will be held only with OEMs. Hence all potential suppliers (OEMs) are requested to adhere to the same and respond /communicate directly with HAL. No third party is permitted at any stage. The response to RFI shall be submitted by OEMs only.

Annexure 'I'

REQUIREMENT FOR MULTIMODE SURVEILLANCE RADAR SYSTEMS FOR DBMRH-S

Vendor should meet the following requirements:

I. Technical Requirements:

1. Radar system should be a pulsed Doppler radar. It should be based on 2D AESA (Active Electronics Scanning Array) technology by design. Vendor to indicate the technology used for T/R modules and number of T/R modules used in the MPR system.
2. Radar should be with a minimum horizontal scan width of ± 60° from the aircraft heading. Desirable is ± 110°. The elevation scan of the radar should be more than or equal to +10° and - 30° from the aircraft plane. Vendor to indicate the Escan coverage angular values for Elevation and Azimuth.
3. Radar system design should be as single fixed panel based AESA antenna. Vendor to indicate the type of the AESA antenna for the proposed system.
4. Vendor to ensure that there is no degradation in Radar performance with 10% random failure of TR module.
5. Radar System should operate in the following modes :-
   a. Sea/Surface Surveillance mode (SS).
   b. Terrain Following (TF)
   c. Low Power / Low Velocity (LP / LV) TF
   d. Terrain Avoidance (TA)
   e. Ground Mapping (GM)
   f. Air-to-ground ranging
   g. weather detection (WX)
   h. Beacon Interrogation (BCN)
   i. Navigation mode.
6. Vendor to provide the value of the bearing accuracy of the system.
7. Radar system should be designed to operate up to sea state 6.
8. Radar system should be capable of detection, auto classification and auto tracking of at least 50 targets in multiple modes simultaneously.
9. **Sea/Surface Surveillance:** Radar should have the capability to detect marine Targets as per Table -1 below at sea state 3: Vendor to specify Probability of

detection, False Alarm Rate, target height used to meet this performance requirements.

Target RCS v/s Detection Range				
Sl No	**Target type**	**Target – Radar Cross Section (in sq m)**	**Minimum Detection range (in nm)**	**H/c altitude (ft)**
1	Small Boat	10	15	at 3000
2	Small Ship/ Fast Patrol Boat	100	35	at 5000
3	Frigate	1000	65	at 10,000

10. The detection range values should be met based on complete scanning envelope of the antenna. There should not be any degradation of detection range performance at the extreme limiting angles (Az: ±60°) of the antenna.
11. Vendor to provide range profile for H/c altitudes of 3000, 5000, 10000 ft above mean sea level for all target RCS's in Table 1 for Radar.
12. **Weather mode**: In this mode, Radar system should be capable of indicating cloud concentration/ precipitation extant in terms of different color.
    a. Radar for weather mode should meet performance requirement as per RTCA/DO-220A standard.
    b. Vendor to indicate no. of colour levels used.
    c. Weather mode range should be at least 70 nm.
13. **Navigation mode:** Radar system should have navigation mode. Navigation mode should facilitate plotting of areas, circle, various symbols vectored waypoint and navigation with Vector map underlay. Vendor to specify the maximum range for this mode.
14. **Beacon/SART mode**: Radar should be capable of interrogating and receiving pulses from SART beacons. Vendor to specify range up to which radar can interrogate and receive pulses from SART beacons.
15. Vendor to provide effect of weather conditions such as precipitation on the detection range of the system. Vendor to provide details of attenuation on detection range due to rain and other atmospheric conditions (fog, temperature, Humidity etc).
16. Radar should have a fully integrated AIS input in standard NMEA protocol (NMEA 0183) capable of display of AIS targets integrated/correlated & fused on the Radar display.

17. Upon request, details of AIS contact should be displayed as a separate pop-up window on the Radar Video.
18. It should be possible to zoom in/Zoom out a particular area of interest on the Radar video for enhanced target discrimination.
19. It should be possible to freeze the image of Radar video.
20. It should be feasible to designate targets as friendly, enemy, neutral and unknown, as well as assign symbology and colors to the targets.
21. The display features should include options to display relative and true target vectors with trails of varying times, as well as fused data with other sensors.
22. It should have various color coding, symbols, and recording facility for ease of operator and training purpose of crew.
23. It should be possible to inhibit a particular sector during sector scanning in the system. Vendor to provide details of this feature.
24. Radar system should have a moving map display embedded in the Radar video.
25. Vendor to indicate if a dedicated INS/GPS is required to meet the system performance. Alternatively, Vendor to indicate the feasibility of interfacing Radar system with onboard INS/GPS using MIL 1553C Bus. In this configuration, Vendor to provide the details of accuracy requirements of onboard INS/GPS and it should also be possible to take the RF input from the onboard GPS antenna.
26. Vendor to provide the following details of the antenna:
    Beam width, Antenna Radiation pattern (in 2D and 3D format compatible with EMIEMC Simulation S/w), frequency, bandwidth, polarization, bearing accuracy, details on side-lobe suppression, antenna gain, antenna stabilization, max radiated power, average power, tilt angles etc.
27. Vendor to indicate feasibility of interfacing onboard IFF Mk XII/CIT (Combined Interrogator & Transponder) with Radar System through MIL STD 1553C interface. Vendor to indicate feasibility of Correlation of Target identification information with desired detected targets and report generation along with colour indication on Radar display.
28. Vendor to provide details of simultaneous multi-mode capabilities inside the system.
29. Vendor to provide list of all LRUs/SRUs of the Radar system along with their MTBF details.

II. **Additional Requirements**:

1. Weight of the system including all LRUs, mounting tray and shock mounts should preferably be less than 40 Kg.
2. Power consumption of the System is preferably be less than 1.5 KW.
3. Power consumption requirements should include the power required for any forced cooling system provided in the LRU.
4. Vendor to indicate if cooling of the units is self-contained or external cooling is required. Vendor to indicate if separate electrical power is required for cooling system. If yes, details of the same to be provided. Vendor to indicate cooling technology used in the system.
5. Vendor should specify heat dissipation along with surface limit temperature of each of the LRUs when the LRUs of the system are operational for a maximum duration of 10 Hrs.
6. Radar system from Power on to warm up to detection time from -30°C to +55°C should be less than 5 min.
7. The maximum antenna dimension of single fixed plate should be 600 mm (W) and 250 mm (H) including swept volume of the antenna. Vendor to provide the antenna details with dimensions including swept volume considering the H/c platform constraint and to meet required system performance.
8. System to be able to operate continuously for 10 hours of flight duration.
9. **Radome**:
    a. Vendor to design and develop Radome compatible with Radar System and Supply Radome as part of deliverable of the Radar System.
    b. Vendor should carry out EM testing to measure the electrical parameters (Transmission Efficiency, Beam deflection, Beam deflection rate, Cross-Polarization level, Main Lobe Beam width, Near Side lobe Levels, R.M.S Side lobe Level, Image Lobe Level, Difference Pattern) of the radome and provide test report to HAL.
    c. Testing of Radome should be as per MIL-R-7705B.
    d. Environmental test details and applicability of this standard for Radome will be finalized in consultation with RCMA (H/C).
    e. The bird strike testing of Radome should be as per FAR 29.631.
    f. Direct lightning test to be carried out as per Section 23 of RTCA DO

III. **Environmental And EMI / EMC Test Requirements**

1. Environmental tests: As per MIL-STD-810H
2. EMI/EMC tests: As per MIL-STD-461H
3. Lightning test: As per MIL-STD-461H(CS117, Table VII)
4. Compass safety requirements as per DO-160G (Section 15, Cat Z).
5. Power Supply test as per MIL-STD-704D, MIL-HDBK-704-8 & MIL-HDBK-704-3.
6. Helicopter is required to be complied with MIL-STD-464C for Naval environment. During the testing of helicopter as per MIL-STD 464C and testing with actual emitters in the Naval environment, if any modifications required in the Radar system due to malfunction, the same to be carried out by the OEM.

IV. **Reliability and Maintainability Requirements**

1. Vendor should specify the MTBF of each LRU and the complete system (3000 hours desirable at 35°C). MTBF achieved/established based on past experience may also to be provided. The system availability and reliability should be minimum 85%.
2. Vendor to provide details of the calculations and assumptions made in arriving at the MTBF estimate as per MIL-HDBK-217F, NOTICE 2.
3. Vendor should indicate MTBF (Aircraft Rotary Wing) for all LRUs at 20°C, 35°C and 55°C. As MTBF is a critical parameter, vendor shall adhere to the MTBF figure committed. MTBF of all LRUs would be monitored in the field after certification. The achieved MTBF values in the field shall not be less than the specified field values.
4. Repetition of same failure for more than 3 times (within a year) shall be treated as a trend and vendor shall investigate the reason for the same and implement corrective action to avoid the failure.
5. There shall be no shelf-life limitation for LRUs. If the system is shelf life limited, vendor to provide the details. Vendor to provide total storage life (in calendar period), total technical life (in operating hours) of the system. Vendor to provide total in-service life (in hours) after installation on helicopter.
6. Time Between Overhaul (in operating hours): There should not be any periodic maintenance of the system. It is preferred that the maintenance philosophy of the system is on condition.
7. Vendor shall define Mean Time To Repair (MTTR) at system level / LRU level and card level.

8. Vendor to provide the following documents related to Reliability & Maintainability Requirements:
   a. FMECA analysis covering failure modes affecting flight safety, mission accomplishment and other maintenance related issues.
   b. Reliability analysis based on FMECA as per MIL–HDBK-217F.
   c. FHA report.
   d. Fault tracing manual/flowchart.
   e. Repair and Overhaul manual.
   f. Storage, Preservation manual / schedules.
9. MTBF shall be estimated based on the data given below:
   a. Utilization Rate per helicopter will be 40 Hrs per month during normal operations in a year.
   b. Utilization Rate per helicopter will be 60 Hrs per month (at least 12 hrs per day) during intensive operations for a period of at least two months in a year.
   c. 75% serviceability in individual bases, including 85% of sensor serviceability (for all roles).

Annexure 'II'

OEM INFORMATION PROFORMA

1. Name of the OEMs/Company/Firm (Company profile in brief, to be attached)
2. Original Equipment Manufacturer (OEM): Yes/No
3. Contact Details.
4. Indian Branch (Contact details) (if any)
5. Category of Industry (Large/Medium/Small-scale):…….
6. Financial Details (Past three years balance sheet):…….
7. **Certification by Quality Assurance Organization**.

Name of Agency	Certification	Applicable from (Date & Year)	Valid till (Date & Year)

8. Details of Registration in India.

Agency	Registration No	Valid till (Date)
GeM		
DGQA/DGAQA/DGNAI		
OFB		
DRDO		
Any other Government Agency		

9. Equipment/Product Profile(to be submitted for each product separately)

(a) Name of Product:……
(Should be given category wise as per DAP 2020)

(b) Description (attach technical literature):…….

(c) Whether OEM or Integrator:……..

(d) Industrial License Number:…….

(e) Indigenous component of the product (in percentage):…….

(f) Status (in service/design & development stage):

(g) Production capacity per annum:

(h) Experience in Manufacturing of relevant systems.....

(i) Countries/agencies where Equipment supplied earlier (give details of quantity supplied):

……

(j) Estimated price of the Equipment……..

(k) Product List……..

(l) Details of orders supplied during Last five Years……..…

(m) Necessary certification as applicable……

10. Alternatives for meeting the objectives of the Equipment set forth in the RFI.

11. Any other relevant information:……..

12. **Declaration**: It is certified that the above information is true and any changes will be intimated at the earliest.

(Authorized Signatory)

Annexure 'III'

COST INFORMATION

Sl. No.	Item	Qty	Price
1	NRE for D&D		
1.1	Aircraft survey, PDR, CDR, Ground Trail, Rig Integration, Flight Trial etc.	**No of event**	**In % of ROM Cost**
1.2	Necessary documentation Eg: Tech Spec, System Design Document, Weight and CG analysis, De-rating analysis, Reliability analysis, Software Requirement Document, Software Test Plan, Software ICD, VDD, SVD,E-ICD, QTP, QTR, SOF test reports and any other relevant Document as required by certifying agencies etc.	**No. of Docs**	**In % of ROM Cost**
1.3	D&D Unit Cost		**In currency**
2	NRE for Production:		
2.1	Program management	**No of event**	**In % of ROM Cost**
2.2	Test Equipment (TTGE/STTEs, O Level & I Level)	**No. of TEs**	**In % of ROM Cost**
2.3	Production related Documentation: Eg: BOM, Gerber file, Set Delivery list, ATP, ATR, M-ICD, CMM, Operational & Maintenance, User Manual etc.	**No of Docs**	**In % of ROM Cost**
2.4	Training	**Man Days**	**In % of ROM Cost**
2.5	Technical Assistance	**Man Days**	**In % of ROM Cost**
2.6	Floats for Unit	**No. of unit**	**In currency**
2.7	Spares for Test Equipment	**No. of spares**	**In currency**
2.8	License Fee/Royalty (If applicable)		**In % of ROM Cost**
2.9	Std Test Equipment		**In % of ROM Cost**
3	Production Unit cost		**In currency**
4	Total ROM Cost (i.e. Project ROM Cost)		**In currency**

Any other associated cost

Annexure 'IV'

Facility requirement Document (FRD) for Production of unit

Sl. No.	Facility	Requirement
1	Power Supplies	+28V DC, 115V AC, three phase @ 400 Hz …..
2	Vibration facility	X, Y, Z Axis Sine: 1000kgf, Max (Including Fixture) Volume: Upto 250 mm(L)X 200mm (W) X 200 mm (H)…..
3	ESS	+/- temp range, rate of temp change…
..	EMI/EMC	..
..	..	etc