

ENCLOSURE TO TENDER NO. RC/IMM/ENGINE/8422LRU/68/1

Transfer of Technology for Establishing Repair & overhaul Facility at HAL

1. Scope of Maintenance TOT:

- a. MToT Shall include:
 - Scheduled overhaul of the LRU including all its subsystems.
 - Unscheduled repairs and snag rectification activities.
 - Component level repair of all sub-assemblies
 - Repair scheme for reclamation of all Class “A” components.
 - Defect Investigation for premature withdrawal.
 - Compliance of modifications / upgradations up to latest standard.
- b. The maintenance technology should include those activities which are being carried out not only at the OEM premises but also carried out by his sub-vendors.
- c. The depth of maintenance ToT offered should be at least same as what is being carried out by the vendor at his premises / through his sub vendors and no portion of the maintenance technology which is available to the vendor is to be denied to HAL. In specific, all repair schemes for reclamation of components, boards, SRUs, sub-assemblies and assemblies should be available to HAL. The vendor should also provide engineering and reclamation documentation for specially qualified process.
- d. HAL reserves the right either to carry out maintenance in-house or subcontract to its established vendors or approach the OEM or his sub vendors directly. HAL shall be given rights for overhaul including certification either at its own premises or through its approved sub vendors.
- e. Vendor should submit undertaking that he would provide & support complete ToT for maintenance to HAL for the system and its sub-systems, modules, assemblies and detailed parts/ components for the entire life of the product.
- f. The OEM is required to provide the latest version of configuration control document which will provide detailed break down of the product structure in terms of lower level subsystems/ assemblies / sub-assemblies / modules / detail parts/ PCBs / wiring diagrams etc with their latest modification status covering the basic product. The OEM shall also provide the “P” factor (rejection rate) for each of the items including mandatory, rejectable [discarded], and “On condition” items. All updates should be provided as and when issued free of cost through the life cycle of the product. Consolidated list of updates during the year should be provided during the first quarter if the subsequent year.
- g. Vendor should indicate probability of failure of LRU/SRUs/Sub-assemblies, which are not repairable at HAL facilities. Vendor should provide the price of new module, repair price, Turn-Around-Time (TAT) for repair of LRU/SRUs/Sub-assemblies.
- h. The vendor should confirm in the proposal that all necessary government approval for ToT required for repair / overhaul, upgrade and all conditions indicated in paras above are in place for LRUS and all its systems and components and that there would be no denial delays in future for maintenance ToT.
- i. ToT shall include the details that are needed to give disposition during the maintenance on deviation / concession: modify / upgrade the licensed product and substitute parts and systems of the licensed product as required by the certifying agency and maintenance agency.
- j. Minimum bench check technology to qualify the item for reuse / ascertain the serviceability should be provided for the LRUS which are not in the list of mandatory replacement category.

2. Supply of Documentation:

- A.** The MToT documentation to be provided by the OEM shall be in English language, in electronic and hard copy formats and include documentation under the following heads: -
- i. Depot level Maintenance documentation in ATA 100 / ATA iSpec2200.
 - ii. Engineering documentation including special process
 - iii. Assembly and subassembly drawings and circuit diagrams.
 - iv. Test documentation.
 - v. Details of Special tools and Test Equipments, Jigs & fixtures.
 - vi. OEM's Standard Technical Manuals.
 - vii. Illustrated parts Catalogue with price list.
 - viii. Source identification for BOIs and subcontracted items; standard parts consumables etc.
 - ix. Mandatory spares replacement lists and price catalogue for O, I & D level maintenances.
 - x. Tools and test equipments manual.
 - xi. Master servicing recommendations with TBO & TTL, life limited components for LRU and its components.
 - xii. Design data- stress, fatigue, performance, qualification, environmental test, life (calendar/ total/ overhaul), life estimation, where applicable adequate to enable HAL to give disposition of deviation / concession.
 - xiii. Engineering and manufacturing documentation for items that need to be replaced during overhaul as stated in **para 10E**. If the repair for any component calls for cross-reference to the parent drawing, such parent drawing / data shall be mandatorily supplied.
 - xiv. Process schemes and process standard and specifications for carrying out various overhaul, reclamation and finishing activities.
 - xv. Fault diagnosis and trouble shooting charts for each system and subsystem.
- B.** The documentation to be supplied by the OEM shall be that which is used by the OEM or subcontractors for the purpose of maintenance of the licensed product. The OEM will ensure completeness and exhaustiveness of the documentation for the purpose and work to be performed by HAL for the maintenance / overhaul of the licensed product in his plant. Certification standards as far as possible will be relevant Military (MIL) Specifications or as mutually agreed with the user's Certification Agency. All the certification documents generated for obtaining certification in the country of origin are to be supplied. Further, vendor should supply such documentation as many are required by the Indian Certificate Authorities.

The list of documents to be provided as part of ToT is as under:

1. Maintenance Documentation.

- a. Operation sequence sheets.
- b. Process sheets of repairable / reconditioning of components including details of special process, heat treatment, non-destructive testing and finishes.
- c. List of standard tools with suppliers and cost.
- d. Complete set of drawings for tooling, Jigs, fixtures, gauges, press tools etc for undertaking maintenance activities.

- e. List of shop consumables with details of specifications; sources of procurement, data on shelf life etc.
- f. Any special maintenance facilities to be set up indicating plat and machinery, test equipment and their vendor details and cost. Plinth area and environmental conditions, if any
- g. Estimated man-hour requirements for reconditioning, repair, assembly and testing at sub-system level phase wise/module wise wherever applicable.
- h. Inspection stages, quality plan, details of Inspection equipment, gauges etc.
- i. Calibration procedures for inspection equipment, gauges, heat treatment & process equipment (furnace/baths).

2. **Test Documentation.**

- a. Factory test specification, procedure and acceptable test specification, procedure for PCBS, modules and equipment with detailed instructions on test set up, use of test and / or simulation equipment and software, execution of test with recording of results.
- b. Complete set of drawings for maintenance of test jigs including ATE fixtures, programmes as applicable.
- c. Unit wise/SRU wise quality assurance test procedures.
- d. Environmental conditions for maintenance, Assembly and test.
- e. Complete set of drawings for special to type test equipment, test bed rigs, etc. this will include maintenance details as well as software documents.
- f. Special category test details (re-certification, series testing, quality assurance testing).
- g. “Red Band” units, calibration procedures for test rigs / equipment.
- h. Clearly defined procedure for trouble shooting embedded systems for isolating hardware and software faults and suitable environmental necessary for loading the software.

3. **Technical Manuals.**

- a. User handbook detailing operational use of equipment.
- b. Installation and commissioning manual.
- c. Technical description of PCB, Modules, drawings, racks, etc., with details of block diagram, schematic general assembly drawing, timing details, PROM etc.
- d. Maintenance Manual covering periodic maintenance, Parts required, Tools required. The maintenance Manual shall cover the product for which the file of drawings / documents is given as well as all vendor items which are part of Licensed Product,
- e. Overhaul Manual for the product including the following:
 - Leading particulars, operation, function etc
 - Dismantling.
 - Cleaning.
 - Inspection / checks including spring check, NDT etc
 - Repair schemes with restorations of protective treatments/ painting.
 - Limits, fits and clearance/permissible worn out dimensions.
 - Assembly procedure.
 - Testing procedure and acceptable limits of overhauled units.

- Trouble shooting and Fault diagnosis.
 - List of mandatory replacement items, tools, test equipment, consumables etc.
 - Illustrated parts list.
- f. Structural part list for complete equipment.
- g. Drawings for standard repair scheme covering all items including components under full ToT phase.

4. **General Documentation (Including Standards and Specifications).**

- a. Standard Inspection method (inward goods in-process and final acceptance).
- b. Material / component and product standards including general fasteners and consumables.
- c. Process standards / procedures.
- d. Workmanship standards/ procedures.
- e. Quality standards/procedures including incoming inspection procedures, quality manuals, etc.
- f. General procedures.
- g. Qualified vendor Lists,
- h. Standards tools, jigs and fixtures.
- i. Design standards/ company standards.
- j. ISO 9001 certification of OEM, vendor & sub-contractors / AS9100 Certification.

5. **Additional Documentation.**

In addition to the documents listed in the above paragraphs, the OEM should include any additional documents that he feels would be required by HAL. Repair center documents including details of Test Instruments, Jigs, Fixtures etc for the End User.

Documentation shall be provided in the form of hard copy and electronic media, including that required for making copies of technical manuals as specified by the customer. Documentation shall be provided in English Language.

3 **Product Upgrades:**

Technical data including relevant documentation update in respect of any modification / improvements / upgrades undertaken by the OEM in the licensed product which need to be complied during maintenance shall be provided to HAL, along with all data for the same, at no additional cost during the entire life cycle of the product. The technical data provided shall contain detailed instructions for compliance of modifications / upgrade, costed list of spares required to accomplish the same, addresses of the OEM's for Bought out items with NATO code, rework instructions for upgrading and fitment, details of test, if any to enable HAL to independently carryout the activity etc.

4. **Special Technologies / Process:**

The OEM shall mention in the ToT proposal about special technologies and special coatings and treating process along with details of plant and machinery vis-à-vis specific components/ assemblies required as part of maintenance activity. For identifying the augmentation needs to plant and machinery available with HAL, if required vendor specialist shall visit HAL and assess the same before submission of technical and commercial bids.

5. **Capital Investments:**

OEM to provide their assessment of plant and machinery required including floor space required for establishing the ROH facilities for the subject LRU. OEM shall assist HAL to establish / augment facilities to enable it to provide life time maintenance support in terms of spares and depot level maintenance of the product.

6. Special tools and test equipments:

- a. Vendor to provide SRU wise list of special Test Equipments (STTEs) and tools indicating function.
- b. Vendor is required to provide list of ATE required for testing of electronics cards of various SRUs/Sub-assemblies. Vendor should provide bed of nails, jigs & fixtures, test s/w and associated standard equipments for testing on ATEs. In case of generic (Standard) ATE, brief specification, model no., source of supply etc shall be provided by the Vendor.
- c. OEM shall provide complete technical data/drawings of the special tools and test equipment used in the maintenance of product. This information shall include the data for manufacture and maintenance of the special tools and test equipments.
- d. OEM shall provide details of calibration and periodicity of calibration in respect of special tools and test equipments.
- e. Vendor should confirm that no other special test equipment, ATE & tools would be required other than listed in the submitted offer for repair of all TOT LRUs/SRUs/Sub-assembly.
- f. In due course of DLM operation, if certain modification is implied by the Vendor as part of system improvement by self or on request of customer, the respective modification in the STTE & tools (if required) to be incorporated by the Vendor in the STTEs and its associated documentation through proper change notes.
- g. *Wherever the OEM is already supporting maintenance of similar LRUs for other projects in HAL, the high value test equipments available with HAL shall be adapted for testing the subject LRUs. The vendor should provide information on such adaptation.*

7. Consumables:

List of consumables along with specifications and alternatives required for maintenance of product along with cost, source details and life data to be provided. ***Storage and disposal methodology for life and hazardous consumables to be provided.***

8. Training of Indian Engineers / Technicians:

- a. As part of MTOT, industrial training required for officers and technicians to provide component level maintenance support to be provided by the OEM. The industrial training shall be in English language, comprehensive and covering all aspects of maintenance of the product down to sub-assembly, modules and PCB level. Apart from classroom training covering the critical aspects, due emphasis will be given to on-the-job training. The training shall include among others, the mod upgradation procedure, repair scheme incorporation, testing and calibration and maintenance of test rigs.
- b. Industrial training shall be in OEM's Plants, and / or in the plants of its subcontractors, associates, principals and subsidiaries as the case may be. OEM shall ensure that such training is organized at the time when OEM has the product under production in its plant or in the plant of its vendors. It is the vendor's responsibility to ensure availability of golden LRU for training, training aids and resources.
- c. OEM shall provide complete details of Industrial Training programme, which will include scope, location, number of trainees and the duration for each phase of training and for each system individually in terms of instructor man weeks. Such Industrial training programme shall be mutually agreed upon between OEM and HAL.
- d. Detailed training on all aspects of major inspection involving pre survey, serviceability checks, routine inspections, NDT checks, bonding checks, defect investigations, accident / incident investigations and configuration control need to be provided. The documents and technology details should be available to HAL well in time to start the engineering activities. Vendor should

provide in depth training on all special process involved in maintenance / reclamation including those carried out at the sub vendor's premises covering, among others, aesthetics, finishing, painting etc.

- e. The detailed contents of the training program and its schedule shall be finalized in co-ordination with HAL.
- f. The OEM should provide the training certificate authorizing HAL/its sub vendors to carry out full ROH activities and certify the same.
- g. If OEM has already authorized any vendors in India for the product, the details to be provided.

9. Technical Assistance: Spare Parts List:

- a. Vendor is required to provide full technical assistance in the installation/commissioning of offered system & subsequent commencement of maintenance activities.
- b. During first repair of LRUs/SRUs/Sub-assemblies or electronic card vendor to validate the repair, inspection, testing process & certify the capability of the delivered repair means to perform satisfactory repair of the system. Process validation should be the joint responsibility of Seller & Buyer. Vendor should provide in advance, the methods & methodology for the process validation.
- c. As part of ToT, OEM shall provide requisite technical assistance to HAL during the maintenance programme of the product in India. The details of such technical assistance considered necessary by the OEM shall be provided as an Annex to the technical proposal. The total Technical Assistance package shall be in number of man weeks. OEM shall provide question / answer service, modification advices and all technical and logistic support during the life cycle of the product within a mutually agreeable time frame, at no additional cost.

If LRU or its sub-assembly/ component prematurely fails due to inherent design deficiency. OEM shall institute remedial measure to over come the subject deficiency and shall warrant free of cost repair / replacement over the life cycle of the component.

10. Spare Parts List

- a. The OEM, based on their experience, shall provide the followings
 - ❖ the Initial set of spare (ToT & Non ToT both) for 10 of repair
 - ❖ The repair material for each modules/SRUs repairable at HAL
 - ❖ The modules/SRUs which would be undertaken for repair at OEM plant and their p-factor
 - ❖ The modules/SRUs which would be replaced during repair at HAL and their p-factor
- b. Spares which are to be mandatorily replaced during the ROH activity should be identified and highlighted. For standard spares, "NATO" codes may be provided against the respective spares.
- c. The vendor should provide the complete details for sourcing of bought out items and subassemblies required as part of maintenance purpose including vendor addresses, alternate vendors/ alternate part numbers etc., the vendor should provide a spares price catalogue for spares to be procured from him along with escalation formula and cap for the life cycle of the product. The vendor shall consider entering into long term agreement with HAL for supply of spares required for maintenance of the product. HAL should get the spares at the same rate as what is available to the OEM with suitable annual escalation formula and cap. As part of fall clause, it shall be ensured that the cost charged to HAL for the spares / LRUs / repair service shall not be more than what is being charged to any other customer or what is being charged to the OEM by his sub-vendor.
- d. OEM shall ensure periodical review of obsolescence, study of Bought out items (BOIs) and provide retrieval scheme for minimum period of 30 years. In case where the suggested sources decline to supply the components / materials, OEM shall take

responsibility for supply of same or suggest and ensure alternate sources for the procurement of suitable equivalent components/ materials during the entire life cycle of the product.

- e. OEM has to ensure the availability of the proprietary items, or its equivalents during the life cycle of the LRUs for carrying out the required ROH activities. If the OEM, at any stage during the life cycle of the LRUS, intends to discontinue the production of proprietary items, the complete technical documentation in respect of these items available with OEM or his subordinators will be passed on to HAL at least 3 years in advance of implementation of such a decision to enable indigenous manufacture or establish alternative routes of meeting the requirement.
- f. The vendor shall provide the engineering and manufacturing and acceptance documentation for all “manufactured spares” required as part of the Maintenance activity. Manufactured spares for maintenance comprises of all mandatory replacement and rejection replacement items, except “On Condition” items, which are required to used as part of routine maintenance / overhaul of LRUs which are manufactured by the vendor or his subcontractor based on his engineering drawings. HAL reserves the right to either manufacture these parts In-house based on the OEM’s documentation, or subcontract the same to its sub-vendors or continue to source the same from OEM.
- g. *Spares procured based on recommendation of OEM which remain non-moving for more than 5 years or more from the date of their receipt shall be taken back by the OEM at the same cost of their procurement.*

11. Delivery Schedule:

OEM shall provide complete schedule for Transfer of documentation, providing of Training and Technical Assistance for M TOT, supply of spares, special tolls and test equipments in line with the requirement for maintenance post warranty of the product.

12. Long Term Product Support:

OEM shall ensure that the product support including supply of spares and management of obsolescence for the life of the product (minimum 30 years) should be available to HAL. *OEM shall provide a quote as part of long term repair agreement for repair / overhaul / defect investigation for a minimum period of 5 years to cover the period of facility establishment within the company, which can optionally be extended for further time period.*